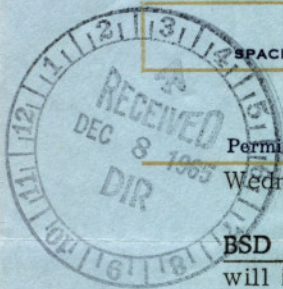


# SPACE BUSINESS



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## BSD INITIATES EXO-PAC PENNAID PROGRAM.

The Ballistic Systems Division will issue on December 27 requests for proposals for the EXO-PAC (Exo-atmospheric Penetration Aids Deployment Concept Program), a program that seeks to develop more advanced methods of utilizing and deploying penetration aids for better penetration of enemy defenses as envisioned for the immediate and more distant future. It is not planned as a part of this program to develop hardware or formulate a flight test program for re-entry vehicles or their penetration aids. The 28 companies receiving the RFPs include Aeronutronic, Atlantic Research, Avco, Bell Aerosystems, Bendix, Boeing, Chrysler, Douglas, General Dynamics, General Electric, Goodyear, Grumman, Honeywell, Hughes, Lear Siegler, Ling-Temco-Vought, Lockheed M&S, Martin, McDonnell, North American, Northrop-Nortronics, Philco, RCA Defense, Raytheon, Republic (Fairchild), TRW Systems, Pratt & Whitney, and Westinghouse.

On December 23 BSD will issue RFPs to more than forty companies for the initiation of the ENDO-PAC Program (SPACE Daily, Dec. 1) which will include the design, development and test of atmospheric decoys as endo-atmosphere warhead re-entry penetration aids. The ENDO-PAC Program includes the development of flight test data. In addition, BSD has invited almost fifty companies to participate in a run-off for a program to complement the ENDO-PAC Program by providing re-entry penetration decoys for wind tunnel and radar cross section measurement tests (SPACE Daily, Nov. 17).

## LUNIK VIII MAY HAVE MADE A SEMI-SOFT LANDING.

The LUNIK VIII spacecraft may have almost completed a successful soft-landing impact on the lunar surface. In fact it may have survived intact but landed with so much force as to cause its radio equipment to cease working one minute and 30 seconds after impact. The Soviets say LUNIK VIII landed at 4:51:30 PM EST, two seconds earlier than the time reported by Jodrell Banks (SPACE Daily, Dec. 7). However, the Soviets had reported before the landing that touch-down was expected at 4:50:00 PM EST. The Soviets explained that: "the functioning of the landing system was checked and it shows that the systems were functioning normally."

There is the possibility, one that will require further data from the Soviets for resolution, that a deep lunar dust was encountered into which the LUNIK VIII sank after landing. Air Force Lt. Col. John D. Peters recently told a national conference that the United States was gambling with the possibility that the APOLLO Command Module would sink into deep dust on the lunar surface which would be found either in a loose state or under a light surface crust which would collapse with the spacecraft. Peters was voicing concern with a possibility voiced earlier by others such as Dr. Thomas Gold (SPACE Daily, April 22). *Leader in Missile/Space Reporting*



## NORTH AMERICAN AGAIN HEADS NASA'S TOP 100

NASA's FY '65 top 100 contractors, according to the net value of direct awards, are headed by North American-Downey (\$1,099,448,000), Boeing-New Orleans (\$305,988,000), Grumman (\$267,226,000), Douglas-Santa Monica (\$251,668,000), GE-Huntsville (\$181,472,000), McDonnell (\$166,670,000), IBM-Huntsville (\$128,312,000), Aerojet-Sacramento (\$123,186,000), General Dynamics/Convair (\$111,148,000), and RCA-Princeton (\$106,552,000). Total NASA procurements for the year totaled \$5,187,000,000 with the top 100 firms accounting for \$4,141,434,000 of that amount.

Top Twenty Contracts Total \$2.487 Billion

The 20 largest contracts in terms of aggregate value, which totaled approximately \$2.487 billion, are: 1) NAA-Downey--Design, develop and test **APOLLO** spacecraft; awarded \$582 million; cumulative awards \$1.452 billion; 2) Boeing-New Orleans--Design, develop and fabricate **SATURN S-IC** stage and construct supporting facilities; awarded \$247 million; cumulative awards \$483 million; 3) Grumman--Lunar Excursion Module development; awarded \$243 million; cumulative awards \$393 million; 4) NAA-Downey--Design, develop, fabricate and test the **SATURN V S-II** stage; awarded \$216 million; cumulative awards \$433 million; 5) Douglas-Santa Monica--Design, develop and fabricate the **SATURN V S-IVB** stage; awarded \$200 million; cumulative awards \$377 million; 6) McDonnell--Design and development of the **GEMINI** spacecraft; awarded \$167 million; cumulative awards \$658 million; 7) GE-Daytona Beach--Overall integration, checkout and reliability of **APOLLO** system; awarded \$121 million; cumulative awards \$243 million; 8) General Dynamics/Convair--Develop, fabricate and deliver **CENTAUR** vehicles and support equipment; awarded \$88 million; cumulative awards \$256 million; 9) Chrysler-New Orleans--Fabricate, assemble, checkout and static test **SATURN S-I** stage; provide product improvement program and spare parts support; and modify areas of Michoud Plant assigned to contractor; awarded \$83 million; cumulative awards \$237 million; 10) Aerojet-Azusa--Design, develop and produce **NERVA**; awarded \$70 million; cumulative awards \$263 million.

11) NAA-Rocketdyne--1.5-million-pound-thrust F-1 rocket engines with supporting services and hardware; awarded \$66 million; cumulative awards \$123 million; 12) NAA-Rocketdyne--200,000-pound-thrust J-2 engines with supporting services and hardware; awarded \$65 million; cumulative awards \$117 million; 13) General Motors--Guidance computer subsystem for **APOLLO C/S** Modules; awarded \$65 million; cumulative awards \$291 million; 14) NAA-Rocketdyne--1.5-million-pound-thrust F-1 engine; awarded \$62 million; cumulative awards \$186 million; 15) NAA-Rocketdyne--200,000-pound-thrust J-2 engine; awarded \$52 million; cumulative awards \$186 million; 16) Boeing--Develop and fabricate **LUNAR ORBITER**; awarded \$48 million; cumulative awards \$68 million; 17) IBM--Fabrication, assembly and checkout of instrument units for **SATURN IB** and **V**; awarded \$36 million (new contract); 18) Collins Radio--Design and fabricate S-Band tracking data equipment and components; awarded \$26 million (new contract); 19) Catalytic Construction (Philadelphia)--Management services, fabrication, installation and checkout of propellant servicing systems for **SATURN** Launch Complex 39A; awarded \$25 million; cumulative awards \$31 million; and 20) RCA-Van Nuys--Fabrication of **SATURN IB** and **V** ground computer systems; awarded \$25 million (new contract).

**Merritt G. Purpus**, general manager of Benson Manufacturing, has been elected a corporate vice president of Electronic Communications. Purpus will continue as general manager of the new ECI division.



### LIBRASCOPE EXPANDS OPTICAL FACILITY

Librascope Group of General Precision is expanding its efforts in the area of electro-optical and mechano-optical systems for space and industrial application. A two-fold expansion of the firm's Optics Technology Center (formerly Washington Engineering Branch) in Rockville, Md., is underway. Among other products, the center produces the telescope and sextant simulator for the **APOLLO** mission simulator. Harold A. Timken will remain in charge of the optical facility.

### TIME STANDARDS FOR INTERPLANETARY NAVIGATION SOUGHT

Fifteen companies have been invited to submit proposals for NASA-Cambridge's study on time standards for interplanetary flight navigation. The objective of the proposed contract is to perform research on the ingenious use of spacecraft time standards for interplanetary flight which will significantly improve overall accuracy, reliability and capability of future guidance systems.

The following have been invited to submit bids on ERC/R&D 66-113: General Motors, AC Electronics Division; Ewen-Knight; General Dynamics/Pomona; GE; General Radio Co. (West Concord, Mass.); Hewlett-Packard, Hydro-Space Systems Corp. (Cedar Rapids, Iowa); IBM; Marquardt; National Co. (Melrose, Mass.); Pickard & Burns Electronics (Waltham, Mass.); Raytheon; TRW Systems; Texas Instruments; and Varian Associates, Quantum Electronic Devices. Due date is January 3.

### ERC MAKES MICROWAVE ADVANCE

NASA-Cambridge has accomplished a promising advance in microwave research by generating higher frequency microwaves by interaction of hot electrons in solid state component material. The technique applies a low voltage across a bulk gallium arsenide semi-conductor crystal which is less than one-thousandth of an inch thick.

### NASA TO SPONSOR FELLOWSHIPS FOR INSTRUCTORS

NASA, in cooperation with the American Society for Engineering Education, will sponsor six special 10-week summer programs of study and research for college and university instructors and assistant professors with two or more years of staff experience. The programs are designed to: update and add to the professional knowledge of participants; to stimulate and enrich educational and research activities at the various institutions; and to stimulate an exchange of ideas between the participants and NASA. Six colleges or universities and six NASA centers are in the program.

Mario Dell'Aglio has been appointed plant manager for Weston Instruments' Archbald Division. Dell'Aglio will be responsible for the engineering, marketing and production of all operations at the division which is engaged in the production of precision electro-mechanical components and systems.



### APOLLO SHIP REPORT DUE TODAY

Ling-Temco-Vought says its cost/scheduling report on the two **APOLLO** tracking ships damaged by Hurricane Betsy (SPACE Daily, December 6) will be submitted to the Navy today. The ships--USNS Huntsville and USNS Watertown--will be used for the re-entry phase of the **APOLLO** mission, and were to be delivered for final testing on July 15, 1966, and Sept. 16, 1966.

A new round of contract negotiations are now dictated, starting with today's contractor report. The Navy will extend maximum effort to meet the **APOLLO** ship schedule.

### SHIPBOARD MISSILE RADAR ORDERED

Production of eight radar systems (AN/SPS-48) for use on a variety of Navy guided-missile ships equipped with **TERRIER**, **TARTAR** and **TALOS** missiles, will be carried out by ITT Gilfillan under a \$6.9 million letter contract from BuShips. The 3-dimensional systems, known as Shipboard Long Range Air Search and Designation radars, are to be delivered starting in January 1967. ITT Gilfillan has been awarded approximately \$67 million for the AN/SPS-48 since 1959.

### FR-1A ACHIEVES GOOD ORBIT

France's American-launched **FR-1A** satellite, put in orbit Monday afternoon (yesterday's SPACE Daily), is in a very good path whose period and inclination are exactly those desired. Intended for a 490-mile circular orbit with a 100-minute period and a 76-degree inclination, the satellite is 462 miles out at perigee and 480 miles out at apogee and is performing normally.

The 135-pound octahedral payload, 27 inches in diameter and 52 inches long (including an extended boom), is being used to study VLF propagation in certain regions of the ionosphere and to measure electron densities. NASA-Goddard's STADAN (Space Tracking and Data Acquisition Network) and CNES's DIANE network (SPACE Daily, Nov. 22) are tracking the craft while STADAN and CNES's IRIS net (SPACE Daily, Nov. 22) are handling telemetry. (CNES is the French space agency.) Also supporting the satellite are the ground stations at Saint Assisi, France, and Balboa, Panama.

### GUNDERSON TO HEAD DOUGLAS INTERNATIONAL OPERATIONS

Lawrence B. Gunderson, assistant manager of international marketing for Douglas, has been appointed manager, International Operations, replacing John P. Robinson. Robinson has been named director of International Operations for South America with offices in Buenos Aires.

Jay G. Levinthal has joined Raytheon Computer Operation as the first manager of computer systems development. Levinthal, previously manager of industry sales with GE's computer department, will be responsible for all computer systems hardware and software development.



### GEMINI VII LASER EXPERIMENT PENDING

One of the more important experiments to be conducted during the flight of **GEMINI VII** will be the first attempt at laser communications between an orbiting spacecraft and Earth. The experiment has been held up so far by unfavorable cloud conditions. The test is designed to ready the laser for use in a fully operational spacecraft communications system.

The ground-based laser equipment employed in the **GEMINI VII** experiment was built for NASA-Ames by Electro-Optical Systems. The same equipment, which utilizes an ionized argon gas laser, will be used next year by NASA in experiments designed to determine the effects of atmospheric disturbance on the laser beam as it is transmitted from a ground station to the **EXPLORER XXII** and then reflected back to Earth. (See *SPACE Daily*, June 15 & 16.)

During the flight of **GEMINI VII** as the spacecraft is orbiting over the Pacific, command pilot Borman will point the nose of **GEMINI** downward to visually observe the laser beam being sent from Kauai, Hawaii. Once the Earth beacon is observed in orbit, co-pilot Lovell will aim a second, smaller laser (built by RCA--*SPACE Daily*, July 8, 14 and 19) through a port in the capsule and fire back at the Earth beam. (The capsule device is a semi-conductor laser which sends out its beam in rapid bursts instead of continuously.) In addition, Lovell's voice will be picked up by a built-in microphone and beamed on the laser waves. Dual telescope receivers will separate the returning laser light waves from the sound waves, amplifying the sound portion to reconstruct the astronaut's message.

Two additional NASA ground stations will also participate in the experiment from locations at White Sands Missile Range and Ascension Island in the South Atlantic.

### GEMINI VII TO MEASURE ROCKET RADIATION

An experiment to measure ultra-violet and infra-red radiation is scheduled for **GEMINI VII** December 14. Astronauts Borman and Lovell will attempt to take the radiation measurements as a high-speed sled blasts down the 35,000 foot track at Holloman AFB. The test is scheduled for 9:27 AM EST, when the **GEMINI** is expected to be at an altitude of 158.14 nautical miles and an elevation of 33 degrees above the southern horizon--a slant range distance of 276 miles from the sled track. The test is sponsored by the AF Cambridge Research Laboratories.

Walter E. Sutter has been elected vice president and senior director of marketing at Page Communications Engineers. Sutter was previously manager of defense sales in GE's Computer Department.

Warren R. Ross has been appointed editor of Sylvania Electronic Systems' quarterly publication, *The SCANNER*. Ross was formerly editor of employee magazines and newsletters at New England Telephone and Telegraph Co.



### 18 INVITED TO BID ON COMPUTER USE STUDY

NASA-Cambridge has invited 18 firms to submit proposals on its study (ERC/R&D 66-117) of the use of large computers in (symbolically) solving problems of calculus and algebra. The objectives of the study are to develop improved methods for Automatic Symbol Processing (ASP) in general, and to develop special computer programs that can handle the extensive repetitive operations of algebra and calculus that occur in certain analytical methods of solution for problems in celestial mechanics, guidance theory, and trajectory analysis.

The following organizations were on the Center's original invitation list: Allen-Babcock Computing Inc. (Los Angeles); Booz-Allen Applied Research; C-E-I-R; Computer Corporation of America (Cambridge, Mass.); Computer Research Corp. (Belmont, Mass.); Computer Sciences Corp. (El Segundo, Calif.); Computer Usage Development Corp. (Newton Upper Falls, Mass.); GE; H R B-Singer; IBM Federal Systems; IIT Research Institute; Lester B. Knight & Associates (Chicago); Litton Systems, Data Systems Division; Lockheed Missiles & Space; Stanford Research Institute; United Aircraft Corporate Systems Center; Technology Inc. (Dayton, Ohio); and Wolf Research & Development Corp. Proposals are due January 4.

### OFFSHORE EXPLORATION CONFERENCE: FEB. 21-23

The Offshore Exploration Conference will be held February 21-23 at the Lafayette Hotel in Long Beach, Calif., under the sponsorship of the THUMS oil combine (Texaco, Humble, Union, Mobile, and Shell). Technical papers, symposia, and displays are scheduled, and the invited speakers are John Moore, North American-Autonetics president; A.W. Rose, Borg Warner-Byron Jackson president; and A. C. Rubel, former Union board chairman. The papers will focus on oceanography, electronics, subsea systems, fixed and floating platforms, and management.

### SEC FILES INJUNCTION AGAINST TENNEY

The Securities and Exchange Commission has entered a Federal court order permanently enjoining Tenney Corp. from failing to file timely periodic reports with the Commission as required by the Securities Exchange Act. The SEC has alleged that between September 1960 and July 17, 1964, Tenney had filed 14 out of 20 periodic reports late and that an additional report was overdue as of the latter date. The company, which consented to the injunction, filed the overdue report before the SEC began the action.

Raymond C. Watson Jr. has been named a vice president of Brown Engineering. Watson, previously director of research will be responsible for Brown's Research Laboratories, Future Programs Office and other company organizations concerned with advanced systems and technologies.

Ormond E. Hearn has joined Bendix's Washington office as a sales representative with Bendix Systems Division. Hearn was formerly Washington representative for Collins Radio.



### HAMILTON PUTS APOLLO LIFE SUPPORT TO TEST

Hamilton Standard Division of United Aircraft has successfully tested a life support back pack designed to meet the requirements of the lunar surface suit for the **APOLLO** lunar landing mission. The life support system functioned as planned for over three hours inside a vacuum chamber while the test subject walked on a treadmill to simulate the metabolic load on an astronaut on the lunar surface.

The 65-pound portable life support system contains oxygen, water and other expendable supplies designed to last three to four hours and can handle a metabolic load of 4800 BTUs. It supplies oxygen, pressurized to a minimum 3.7 pounds per square inch, controls its temperature and relative humidity and circulates it through the suit and helmet. The pack pumps cooled water through the tubing of the undergarment for cooling inside the pressure suit. A canister of lithium hydroxide traps carbon dioxide and other air contaminants to purify the oxygen for reuse.

### AEC POTASSIUM SPACE TURBINE TEST COMPLETED

AEC's Oak Ridge National Laboratory has successfully completed over 2000 hours of test operation on a turbine designed for use in a boiling potassium reactor. Such reactors are being developed by the AEC as possible future space power generators. The boiling potassium concept would use a reactor to heat potassium so that the vapor, when entering the turbine, would be heated to about 1200 to 1500 degrees F. The turbine would produce seven horsepower.

### VIETNAM BOOSTS USSR DEFENSE BUDGET TO \$14.7 BILLION

The Soviet Union's budget for 1966 has hit a record peacetime level of \$115.8 billion--an increase of approximately \$15 billion over last year's figure. The defense budget increased five per cent--from \$14 billion to \$14.7 billion.

Finance Minister Vasily Garbuzov told delegates to the Supreme Soviet that the increase in military spending was forced by "aggressiveness by imperialist forces." Garbuzov did not mention **Vietnam** by name but made it clear that the conflict there had caused the boost in defense spending to 12.8 per cent of the total budget, breaking a two-year trend of cutting that part of the budget.

The remainder of the budget was allocated to: \$47 billion for development of industry; \$14.5 billion for farming; \$5.7 billion for housing; and \$19.5 billion for social, cultural, educational and scientific services.

### THE LOG OF GEMINI VII

December 7, 1965--8:04 AM (EST): The second stage of the **TITAN II** booster which launched **GEMINI VII** plummets into the Indian Ocean west of Australia.

12:13 PM--Astronauts fire rockets to push **GEMINI VII** into a new and higher orbit so that rendezvous attempt with **GEMINI VI** may be made. New apogee: 197 miles; new perigee, 145 miles.

During 46th Orbit--Plans for Sunday, December 12, launch of **GEMINI VI** are being held up due to malfunction in the spacecraft's computer.



### Future Space Business

#### AIRBORNE HIGH FREQUENCY TELEMETRY DATA ANALYZER

NASA-Houston is funding a program to develop an airborne high frequency telemetry data analyzer.

Contact: NASA, Manned Spacecraft Center, General Research Procurement Branch, Houston, Tex. 77058, BG721, Telephone: (713) HUnter 3-5441. Reference: RFP MSC BG721-28-6-230P. Due date: Dec. 23.

#### DOD NEGOTIATIONS

General Electric Co., Heavy Military Electronics Department--with Air Force to add improved specifications to electro-counter-countermeasures.

#### NASA NEGOTIATIONS

Radio Corporation of America, Astro-Electronics Division--with Goddard for pre-launch publications and launch support for **TOSS** spacecraft and post-launch operational analysis and evaluation of **TOSS** satellites.

Grumman Aircraft Engineering Corp.--with Goddard for air bearing table testing of the **OAO** spacecraft stabilization and control subsystem together with star trackers and Princeton experiment package.

#### DOD CONTRACTS

##### Navy

PRD Electronics, Westbury, Long Island, N.Y.--\$1.5 million modification to an existing contract for FY 1966 research and development on VAST (Versatile Avionics Shop Tests) equipment.

North American Aviation, Rocketdyne Division--\$5.4 million for rocket motors for **SPARROW III** and **SHRIKE** missiles.

Western Electric--\$1.3 million modification to an existing contract for engineering services on the **TERRIER**, **TARTAR**, and **TALOS** missile systems.

General Instruments, Hicksville, N.Y.--\$1.2 million for classified electronic equipment.

##### Air Force

Coast Engineering Laboratory, Redondo Beach, Calif.--\$43,695 for cartridge dehydrator applicable to the A/A44A-1A rocket motor.