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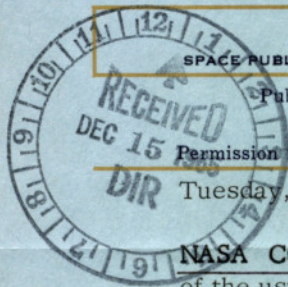
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NASA CONTRACTS EXTRAVEHICULAR MANEUVERING GUN.

In a reverse of the usual practice, NASA-Houston will enter into negotiations with Rocket Research Corporation for a program to develop a system which the agency has already demonstrated.

Using a different gas system, Rocket Research will be asked to develop a jet gun thrust assembly which can be used by astronauts for extravehicular activities. The Hand-Held Maneuvering Unit operated by astronaut White, developed in-house by NASA-Houston in the interval between cosmonaut Leonov's extravehicular experiment and White's extravehicular experiment, was powered by a simple oxygen gas release system operating through two jets.

SEAMANS TO SUCCEED DRYDEN.

The White House has confirmed that President Johnson intends to appoint Associate NASA Administrator Robert C. Seamans Jr. as the new Deputy Administrator of NASA to replace the late Dr. Hugh L. Dryden. The appointment will require confirmation by the Senate.

"BLUE BIRD" LIKELY TO BECOME OFFICIAL.

As reported when dissatisfaction arose over ComSat's choice of **BLUE BIRD** as the name for its **APOLLO** satellite family (SPACE Daily, Nov. 19), the name will probably stick and be officially adopted. ComSat reports a "good chance" that will happen. **BLUE BIRD** was unofficially chosen by ComSat earlier this fall (SPACE Daily, Nov. 1), and the contract for the four **BB** satellites was officially awarded almost a month later (SPACE Daily, Nov. 29). No alternative names have been proposed.

AIR FORCE SEEKS IMPACT OF SPACE FORCE.

The Air Force Systems Command anticipates the initiation of negotiations with Abt Associates of Cambridge, Mass., for a program of research and development to establish a model for assisting Air Force planners to assess the impact of military space operations on the force characteristics. The contract to be awarded will be identified as a supplemental agreement.

ELEVEN INVITED FOR BOOST RE-ENTRY GUIDANCE.

The Ballistic Systems Division is planning an advance development program for the production and testing of a self-aligning boost re-entry guidance system and inertial measurement units. GM's AC Electronics, NAA's Autonetics, American Bosch Arma, Bendix, General Electric, General Precision Instruments, Honeywell, Litton, Nortronics, Sperry Gyroscope, and Bell Telephone Laboratories are on the original invitation list.

The Leader in Missile/Space Reporting

NASA AWARDS ORAO STUDY CONTRACTS

NASA has awarded a \$100,000 grant to the University of Michigan for development of a web-like, six-mile-wide Orbiting Radio Astronomy Observatory (ORAO) antenna that would be placed in orbit by a SATURN. The antenna would provide new parameters of measurement of very low frequency natural radio emissions from celestial objects--data to be used in determining fundamental questions about the universe. A second \$100,000 contract has been awarded by NASA to TRW Systems Group to evaluate (engineering) problems of erecting large structures in space. Both contracts are first-phase feasibility studies.

Although its final size and structure will be determined by the study, the observatory probably will consist of a central satellite, and four subsatellites connected by nylon filaments. The connecting lines may resemble a spider web with the distance across the web being about six miles.

The central satellite will contain electronics for the receiver and telemetry, a control system, and an astronomical data processing system. All systems will be linked by a computer. The four subsatellites and the interconnecting lines will comprise the antenna system--a large rhombic antenna and two dipole arrays, consisting of a package each on opposite sides of the web. Microrockets on the four subsatellites will provide deployment stabilization control and change of axis as well as spin. The computer will control the rotation so that over a year or so the entire sky will be scanned.

The University of Michigan was awarded a \$485,000 grant from NASA in 1963 for studies on radio antennas. The latest grant is for the first nine months of a two-year feasibility study.

MICHIGAN SEEKS SPACE RAO ASSISTANCE

The University of Michigan Radio Astronomy Observatory (RAO) has called on the space industry for aid in pioneering and developing a very large, six-mile-wide, web-like Orbiting Radio Astronomy Observatory (ORAO) antenna (see above).

RAO Director Fred T. Haddock said the Observatory has a concept ("based on the scientific objectives we've written down") to begin initial work on such an antenna satellite. "While such a large antenna is within the state-of-the-art," he said, "we're interested in getting information from a wide range of disciplines. . . . We want to take advantage of the latest technology. . . . As astronomers we can use such structures. But we want to get others interested in funding them and building them."

Two of the key problems in planning such a satellite, said Wilbur J. Lindsay, engineering manager of RAO, are: 1) How to get the web spread out; and, 2) How to keep it in its most effective shape once it is spread out.

G. P. Sutton, previously manager of Rocketdyne's Advanced Design Engineering, has been appointed executive director of engineering.

New appointments at Mitre include: William E. Carroll, previously director of administration, has been named assistant vice president-administration, and Robert C. Mahoney, controller, has been promoted to treasurer.

AEROSPACE EMPLOYMENT EXPECTED TO RISE 7.3 PER CENT

According to Aerospace Industries Association forecasts 1965 increases in aerospace employment will more than offset the 1964 decline. The forecasts, based on information gathered in a survey of 53 aerospace firms, estimated that employment of scientists and engineers will rise about 7.3 per cent--from 177,000 to 190,000--with the geographical distribution expected to remain relatively stable. The number of engineers and scientists working in spacecraft and missile establishments is anticipated to have risen from 96,000 in March to 100,000--a 4.2 per cent increase.

PACIFIC AUTOMATION SHOWS PROFIT FOR '65

Pacific Automation Products of Glendale, Calif., a producer of cable for space and defense applications, had sales of \$1,514,160 for FY '65, compared to 1964's \$1,239,592. After recording a loss of \$298,376 last year, the company showed a 1965 profit of \$41,502.

President Arthur P. Jacob says that "The company is stepping up its sales effort and, although the copper shortage has created some problems, backlog has steadily increased and shipments are made on schedule. The company has continued to maintain a modest research and development program to keep ahead of the state-of-the-art."

KEY PERSONNEL NAMED FOR TI SEMICONDUCTOR PLANT

A.N. Provost, assistant vice president, has been named manager of Texas Instruments' new facility in Sherman, Tex., which will contain the manufacturing activities of its Semiconductor-Components division. Other key managers will be Jack M. Nolinberg, personnel; Al Stein, process engineering; Bill Fuqua, production planning; Mike Peshock, product engineering; Charles Wofford, manufacturing; Gene Boggs, quality control; Roger Osterhout, industrial engineering; and Marty Briehl, mechanization, test, and repair and maintenance.

Current plans call for TI to begin to occupy the plant about the middle of February. By 1967 approximately 750 employees should be supporting a two-shift operation.

ISI PURCHASES COMPUTER SERVICES

Information Sciences Inc., an Atlanta, Ga., subsidiary of Brown Engineering, has purchased the assets and liabilities of Computer Services Inc. of Montgomery, Ala.

Ralph Dillard, president of Computer Services, will serve as manager of ISI's new Montgomery facility, which will provide management services to business, industry and government. D. Douglas Brown, president of Information Sciences, says that the acquisition is "another step in the expansion of Information Sciences' operations in the Southeast." By 1967 the firm expects to have operations in nine southeast states. Present facilities include offices in Atlanta, Birmingham, Huntsville, and Merritt Island, Fla.

THIOKOL TESTS SRAM MOTORS

Thiokol has tested two prototype configurations of the restartable solid-fueled rocket motor it is developing for prospective use on the Air Force's **SRAM** (Short-Range Attack Missile), which is presently under contract definition (CDP) by Martin and Boeing (SPACE Daily, Nov. 4). The prototypes were temperature cycled at between -75 and 175 degrees F, then static fired at -75. The first, containing two end-burning fuel grains, operated for about two minutes; the second, containing two different propellants, for about one minute. Thiokol has proposed its motor to both Martin and Boeing, but the latter earlier had expressed interest in an Aerojet-General design.

AF HELIUM-OXYGEN TEST ENDS

The third Air Force test of a helium-oxygen atmosphere for astronauts (SPACE Daily, Oct. 5) ended yesterday at 11:30 AM CST when the four test subjects, all SAC officers, emerged from the simulated space chamber they had been living in since the afternoon of October 4. Located at the AF School of Aerospace Medicine at Brooks AFB in Texas, the chamber was set to duplicate the atmosphere at 27,000 feet after the test had run eight days (Oct. 4-12), and that environment (5 psi) was maintained until last Wednesday, after which a normal atmosphere was returned to allow extra time to evaluate the subjects at that level (SPACE Daily, Dec. 3).

Yesterday was the 70th test day (Oct. 5 being the first full day) (in the Dec. 3 SPACE Daily article, "50th" should have been 60th). This was the longest of the three such AF tests and the longest such performed in the United States to date. The first was run last year, ending at about this time then, and the second ran from March 1 to April 5 (SPACE Daily, Mar. 26 and Apr. 9).

The atmosphere used for this latest test was 30 per cent helium and 70 per cent oxygen, and the subjects reported no significant problem in breathing it. The temperature was maintained at between 70 and 74 degrees F with a humidity of 35 per cent. The subjects wore hospital greens, sweat socks, and slippers and performed a diversified daily routine of exercise and recreation.

INTEGRATED CIRCUITS REFRACTORY DIELECTRICS STUDY

Proposals are due at NASA-Cambridge on January 5 for an investigation of refractory dielectrics for integrated circuits (ERC/R&D 66-120). The Center invited the following firms to submit bids on the program: Autonetics; Battelle Memorial Institute; Bendix; Douglas Missile & Space Systems; Douglas, Aircraft Group; Emerson & Cum-
ing, Dielectric Materials Division; Fairchild Semiconductor; General Dynamics/-
Electronics; General Precision; GT&E Labs; Hughes, Microelectronics Division; IBM Federal Systems; IIT Research Institute; Litton Industries, Applied Science Division; Litton Systems, Guidance & Control Systems Division; Marquardt; McDon-
nell; Melpar; Microwave Associates (South Burlington, Mass.); Motorola, Semicon-
ductor Products Division; United Aircraft, Norden Division; Philco, Lansdale Divi-
sion; RCA; Raytheon; Sperry Rand Research Center; Stanford Research Institute; Texas Instruments; and Watkins-Johnson (Palo Alto, Calif.).

TRW SYSTEMS WINS INCENTIVE FEE FOR PIONEER

TRW Systems has to date earned a bonus of \$215,000 on its contract with NASA-Ames for the **PIONEER** spacecraft. Additional bonuses or penalties will be assessed to the company, depending on the achievement of proper orientation of the satellite in space and for exceeding target lifetime in orbit.

A weight-incentive clause in the contract applies only to the first flight spacecraft, less the weight of the experiments. It provides for a \$50,000-a-pound increase in target profit for savings between two and five pounds under the target weight of 111.2 pounds. A penalty of \$100,000 a pound was to be imposed for spacecraft weight in excess of between two and five pounds over target. A maximum bonus of \$150,000 was paid the company based on an achieved weight of only 103 pounds. For one group of spacecraft, which includes the **PIONEER** just launched, the incentive bonus is \$30,000 if the magnetic strength is between one-half and one gamma; and \$40,000 if it is between zero and one-half gamma. Another group of **PIONEERS** has an incentive bonus of \$20,000 if the magnetic strength is between one-half and one gamma; and \$25,000 if it is between zero and one-half gamma. To date, the company has earned the maximum attainable bonus of \$65,000 for meeting this requirement on both the prototype and first flight vehicle.

The incentive provisions of the contract state that if the orientation maneuver is a failure, the lifetime in orbit incentive starts after the 45-day target lifetime of the spacecraft at the following rates: \$2000 a day for the first 45 days, and \$1000 a day for the next 90 days, for a maximum payment of \$180,000. If the effective orbital lifetime of the spacecraft is less than target lifetime, profit is reduced by \$2000 a day for the maximum penalty of \$90,000 at zero lifetime.

The schedule incentive, which applies only to the first flight spacecraft, states that TRW will be penalized \$1000 a day for the first 20 days delay, \$2000 a day for the next 20 days delay, and \$3000 a day for the following 20 days delay. The total penalty is \$120,000.

HONEYWELL ESTABLISHES ENGINEERS/SCIENTISTS AWARDS

Honeywell has established an awards program to give recognition and encouragement for outstanding engineering and scientific achievement of its employees. The H. W. Sweatt Awards Program, named for Honeywell's past president and chairman of the board Harold W. Sweatt, provides for up to 25 engineers and scientists to be honored each year.

TRADE SECRETS THEFT LEGISLATION

The theft of trade secrets is now a felony in Pennsylvania, New York, Georgia, and New Jersey. Legislation has also been introduced in the House of Representatives by Harris B. McDowell (D-Del.) to make it a federal crime to steal certain trade secrets or to transport stolen trade secrets in interstate or foreign commerce.

The Pennsylvania law defines trade secret as "the whole or any portion or phase of any scientific or technical information, design, process, procedure, formula or improvement which is of value and has been specifically identified by the owner as of a confidential character, and which has not been published or otherwise become a matter of general public knowledge.

SPACE SHUTTLES--NEXT STEP

Use of lifting space shuttle vehicles is the next logical step for man in space, says E. Robert Schuberth, chief of new design for spacecraft and hypersonic vehicles for Lockheed-California. He said the first phase in this development would be the launch into controlled flight in pre-programmed orbits to then paradrop back to Earth.

Space shuttle systems have been investigated for NASA (Edwards) by McDonnell and Northrop. A decision for continuation of this program is expected next month (SPACE Daily, December 6). Another NASA (Langley) space shuttle study program is in the RFP stage. The program is aimed at determining the relationship of size and cost to the eventual development of lifting body space shuttle systems.

ISIS EXPERIMENTS SUCCESSFUL

The **ISIS** project, which launched the Canadian **ALOUETTE II** and NASA's Direct Measurements Satellite (**DMS**) (**EXPLORER 31**) aboard a single **THOR AGENA** vehicle on November 28, is working well and receiving excellent data. The launch placed both satellites within about one mile of each other in an approximate 310/1850-mile orbit.

All 13 experiments on the satellites have been checked out and are functioning normally. The magnetic field spin and attitude control system on the **EXPLORER** has successfully oriented the satellite to a 30-degree angle to the orbital path. Both satellites are designed as part of a coordinated international program of ionospheric studies.

NASA GETTING LASER SPACECOM RECEIVER

Sylvania Electric will deliver to NASA-Marshall this month an operational receiver of communications-carrying laser beams. Described as an optical, superheterodyne unit, the receiver has been tested by Sylvania's Applied Research Lab over a one-mile atmospheric path under various weather conditions and has demonstrated that it "can extract incoming laser signals with the accuracy required for coherent communications between space vehicles" and the ground. The receiver will be installed in a mobile van with power supplies and related equipment before being delivered. It is being provided under a \$160,768 contract.

J-2 ENGINE UNDER TEST

The 200,000-pound-thrust J-2 engine, designed to power the **SATURN V S-IVB** third stage, has been undergoing battleship static firing tests at NASA-Marshall since the new J-2 test facility was completed there in August. Ten tests have been completed so far, with the most recent test lasting 418 seconds. The longest test to be conducted will be 460 seconds duration.

MOCK AGENA BEING READIED FOR GEMINI VIII

NASA is fabricating a passive, mock **AGENA** target vehicle for rendezvous and docking during the **GEMINI VIII** mission in case the active **AGENA** vehicle cannot be readied in time for a possible February launch of the mission.

Identified as an Augmented Target Docking Adapter (ATDA), the mock vehicle is officially a back-up to the active **AGENA** target vehicle, now at Bell Aerosystems being readied for delivery to Arnold Engineering late this month, which, presently, is not expected to be ready for flight until early March. The ATDA would be launched directly into a 185-mile circular orbit by an **ATLAS** without a cooperative propulsion capability.

COMSAT PICKS ITT TO SUPPLY GROUND ELECTRONICS

ITT Federal Labs will supply the electronics for the two new ComSat ground stations under a \$1,780,000 contract. The announcement of the Corporation's choice was expected last week (SPACE Daily, Dec. 6) but had to be held up to allow a copy of the contract to be filed with the FCC. RCA was the only other contender for the award.

THE LOG OF GEMINI VII/VI

December 11, 1965--Early Morning: "When we woke up we were tumbling much faster than we ever were before...going round and round" at 10 degrees a second, **GEMINI VII** astronauts report. Tumbling is stopped immediately with rocket control. Tumbling was believed caused by condensing water from the suit circuit.

8:10 AM EST--Spacecraft enters its 102nd orbit. Apogee: 186.5 miles; perigee: 186 miles.

10:33 AM--During its 103rd orbit **GEMINI VII** passes the half-way mark of its planned 14-day flight.

During 104th Orbit--Astronauts fail to make voice contact with the ground via a laser light beam. (See SPACE Daily, July 19.) Attempt is made over White Sands Missile Range.

Afternoon--Astronauts spot laser beam sent upward from Hawaii (SPACE Daily, December 8).

December 12, 1965--9:54 AM EST--The launch of **GEMINI VI** is aborted three seconds after zero count when an electrical plug in the base of the **TITAN II** drops out two seconds too soon, causing an automatic control system to shut off the engines. (The launch, later rescheduled, now stands at 8:37 AM, December 15. Malfunction is attributed by NASA to a plastic dust cover--found in a **TITAN II** gas generator.)

1:26 PM--Astronauts pass the world endurance mark in space of 190 hours, 56 minutes set by **GEMINI V** astronauts Gordon Cooper and Charles Conrad August 21-29 of this year.

December 13, 1965--Morning: A tape recorder aboard **GEMINI VII** is on the blink. The recorder collects medical data for feeding to various tracking stations. Its tape is not rewinding.

Morning--A problem is found in the **TITAN II**'s engine system, but after a long series of meetings, the trouble is pronounced eliminated. NASA says **GEMINI VI** is "still on schedule."

DOD NEGOTIATIONS

General Electric Co.--with Army Research and Development Laboratories for studies on 500 watt 12 volt D. C. acid electrolyte hydrogen-to-air fuel cell system.

Leach Corp., Azusa, Calif.--with Army Research and Development Laboratories for a Leach Model MTR 3200 tape recorder-reproducer.

North American Aviation, Columbus, Ohio--with Air Force Special Weapons Center for dual mode demonstration program.

Aeronautical Research Associates, Princeton, N.J.--with Office of Naval Research for further research on hypervelocity kill mechanisms.

Space Instruments Research, Atlanta, Ga.--with Aberdeen Proving Ground to intensify and extend field support of Project **HARP**.

Cubic Corp.--with Army Research and Development Laboratories for preparation of direct and general support maintenance manuals for the long-range survey system.

Philco Corp.--with Air Force Western Test Range for range system engineering study.

Thiokol Chemical Corp., Huntsville Division--with Bureau of Naval Weapons to conduct an exploratory development program directed to a more advanced understanding of the back-bleed tube thrust modulation process and to the technology of its application to 200-pound solid-propellant motors.

Lockheed Electronics Co.--with Bureau of Naval Weapons for basic ordering agreement in support of United Kingdom missile test equipment.

Lowell Observatory, Flagstaff, Ariz.--with Aeronautical Chart and Information Center for lunar illustration of an additional 291,662 square miles of lunar surface.

Texas Instruments--with Bureau of Naval Weapons for material and services necessary to conduct a production compression capability program for the **SHRIKE** missile guidance and control section plus wings and fins.

Sperry-Farragut Co.--with Bureau of Naval Weapons for material and services necessary to conduct a production compression capability program for the **SHRIKE** missile guidance and control section plus wings and fins.

NASA NEGOTIATIONS

Electro-Optical Systems--with Lewis for integration testing of a cesium bombardment thruster system with a power conditioning system.

Allis Chalmers Manufacturing Co.--with Marshall for expanded effort in fuel cell technology.

Martin-Orlando--with Marshall for the establishment of standards for compatibility of printed circuits and components lead materials.