SPACE BUSINESS Daily

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FRANCE/USSR SPACE COMMUNICATIONS COOPERATION POSSIBLE. The Soviet-French communique issued at the departure of French Foreign Minister Maurice Couve de Murville from Moscow after six days of talks with Soviet leaders contained a message of a "desire" on the part of the two countries to reach an "appropriate agreement" in what SPACE Daily first reported (Oct. 26) as a program for a joint communications satellite system. Soviet Foreign Minister Andrei Gromyko and Murville paid particular attention to the recent space meeting led by Mstislav Keldych and Yvon Bourges (SPACE Daily, Oct. 21).

MONTH DELAY ADDED TO SURVEYOR SCHEDULE. NASA has added still another month to the interval before the first **SURVEYOR** lurain landing attempt. After confirming the SPACE Daily reports of Sept. 24, Oct. 5 and 11 that the first attempt has moved from October to late in the year, to "as far away as February," the NASA lunar and planetary programs director, Oran W. Nicks now says the flight is expected "by March." Nicks says "we're beginning to see things fall in place and we hope we're getting ready to go." After the first shot Nicks believes there is a fair possibility for three to four **SURVEYOR**s before 1966 is over. As for the competition with the Soviets, who have tried four times and are readying for the fifth, he said he was not convinced that "we're relegated to last place."

NEW COMSAT CONSTRUCTION RFP OUT. ComSat has issued as expected (SPACE Daily, Oct. 28) the second of its two new RFPs for land preparation and construction for its two ground stations in Washington and Hawaii. This latest request concerns the latter terminal near Paumalu and calls for identical work as the first RFP--i.e. grading, roading, utilities installation, and building. The quarters at each site will house control, utility, and service equipment.

Twelve firms received the Paumalu RFP, which is due November 22: Allied Engineering, South Gate (Calif.); P. J. Anderson, Seattle; E. E. Black, Honolulu; Capitol Builders, Honolulu; Dillingham Corp., Honolulu; J. P. Finan General Contractor, Honolulu; Vern Johnson & Son, Spokane; Reed & Martin, Honolulu; Sellen & Hanson, Seattle; H. C. Smith Construction, Compton (Calif.); Richard K. W. Tom, Honolulu; and Del Webb, Phoenix.

MARSHALL TO SEEK EARTH RENDEZVOUS STUDY. NASA-Marshall will

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open negotiations with Boeing's Aero-Space division at Huntsville for a study of guidance systems for Earth Orbit Rendezvous, a program which will be vital to the development of rendezvous and docking operations for the APOLLO Orbital Research Laboratory (AORL) phase of the AA (APOLLO Applications) program.

NEW ASSET CONTRACT TO MCDONNELL PENDING. The Research and Technology Division of Wright-Patterson is expected to open negotiations with McDonnell Aircraft for a contract to conduct engineering changes in the ASSET lifting-body space shuttle research and development vehicle program which represented the first phase of START, the program leading to the eventual development of manned space shuttle systems.

PROTON BOOSTER IS AT LEAST A SATURN II (An Analysis). Using the NASA criteria for identifying its SATURNs, where a 1.5 million pound thrust increment represents a number designation, the booster which lofted PROTON I and II into orbit is at least a SATURN II and not quite a SATURN III. On August 9 SPACE Daily, after consultation with industry propulsion and vehicle officials and engineers, reported that the PROTON booster could have a thrust up to 4 million pounds. This is a thrust approximately 1 million pounds more than the TITAN III-C and 2.2 million pounds more than the SATURN IB but 3.5 million pounds less than the SATURN V, which is still to fly.

The horsepower of the PROTON booster is calculated at 60 million while the TITAN III-C is calculated at 42 million. If we used the degree of efficiency of the TITAN III-C with its less than optimum efficient solid booster as a ratio for thrust determination, we would find that the PROTON booster should have a thrust of about 4.25 million pounds. If instead we use the Soviets' measure of efficiency and compare its VOSTOK/VOSKHOD boosters, which the Soviets said developed 20 million horsepower for the VOSTOK, with the 60 million horsepower for the PROTON we would find that based on the VOSTOK launcher's 1.323 million pounds of thrust the PROTON booster would have a thrust of 3.96 million pounds, while based on the VOSKHOD booster's thrust of 1.433 million pounds the PROTON launcher would have a thrust of 4.29 million pounds of thrust.

There remains the possibility that the Soviets, if we can believe their thrust and horsepower figures, have developed launcher systems with a higher degree of efficiency than our own, including not only our own operational, but out of the inventory, SATURN I, but the SATURN IB, yet to enter the inventory, as well. SATURN I is estimated to have a horsepower of 32 million for its 1.6 million pounds of total thrust while SATURN IB is estimated to have a horsepower of 35 million for its 1.8 million pounds of thrust. If we stack these two boosters up alongside the horsepower/thrust ratios of the Soviet VOSTOK/VOSKHOD vehicles then the SATURN I should have a thrust of about 2 million pounds and the SATURN IB a thrust of 2.275 million pounds.

The comparison of efficiency must cease, however, when we go beyond the first two vehicles of the SATURN family and the TITAN III-C. The SATURN V, which is a new vehicle from the drawing board up, will have a horsepower of 160 million for its 7.5 million pounds of thrust. Still, it is perhaps essential that we do bring the comparison

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to a halt because if the Soviets continue the Earth rendezvous, docking and assembly mode for their lunar missions there would not be the demand for a vehicle as efficient as the SATURN V. In fact, it is possible that the PROTONs are far from the total payload we can expect to be orbited by the new launcher in a single orbit. Even in its current displayed capability it could be workhorsed through the Soviets' entire initial space station development and lunar landing missions.

Therefore, several days after the August 9 SPACE Daily report it was interesting to note that Dr. Charles Sheldon of the National Space Council would only credit the Soviets with a possible 2-to-3-million thrust first stage for the PROTON launcher, which is the same as crediting the launcher with being less than 65 per cent as efficient as the TITAN III-C system and only about 75 per cent as efficient as the earlier VOSTOK launcher.

MIDAS SEEN WITHIN REACH

The Air Force is "now confident" that missile launch detection systems (the MIDAS program) "can be reliably and more effectively accomplished from satellites than by the use of earth-based systems alone." Maj. Gen. Jerry D. Page, deputy chief of staff for plans of the AF Systems Command, revealed the new status of the MIDAS project in an address to the International Space Electronics Symposium in Miami, Florida. The general also indicated that the Air Force considers that a synchronous altitude system would be the best for such an ICBM detection mission (SPACE Daily, Aug. 25). "Up to this time", said Page, " the main drawback (in a synchronous satellite) has been that available boosters were thrust limited; now the TITAN III-C enables us to lift over a ton of payload to this altitude."

Page outlined the military space program so far as being largely experimental, with two major objectives: to establish the technical feasibility of accomplishing military missions in space; and to evaluate the effectiveness of space as opposed to other means for accomplishing military missions. However, the situation is now such that the Air Force has a family of versatile, accurate and highly reliable space boosters. In addition many of the uncertainties of satellite technology have been resolved so that "it is not unreasonable to expect sophisticated spacecraft to operate in space in excess of three years." The Air Force now feels that military missions of communications (the Initial Defense Communications Satellite Program--IDCSP), nuclear detonation detection (Project VELA), missile launch detection (MIDAS), weather observation, and navigation (TRANSIT) can best be performed by space satellites.

One of the most promising areas for unmanned defense space programs envisioned by Page is the multi-purpose satellite. An Air Force RFP for a study of such a satellite was issued recently (SPACE Daily, Oct. 27).

SRAM DEFINITION CONTRACTORS SELECTED

Martin-Marietta and Boeing will perform the Contract Definition of the SRAM (Short-Range Attack Missile) program for the Air Force under $2.75 million contracts. If the next phase of the program is approved, one of those two companies will be given that award late next summer. The firms were among 12 that submitted proposals last August 30 (SPACE Daily, Aug. 4).

NEW REDHEAD-ROADRUNNER RAMJET BEING TESTED

Marquardt's 19-inch-diameter ramjet engine for the Army's **REDHEAD-ROADRUNNER** target missile is now being flight tested at White Sands, and preliminary data show it is performing satisfactorily. Marquardt has delivered five flight models to North American-Columbus as part of the effort to upgrade the missile so it can simulate a Mach-2, 60,000-foot-altitude target. The operational REDHEAD-ROADRUNNER, in service as part of the **HAWK** Air Defense System, uses a 16.5-inch Marquardt ramjet motor for a Mach-1.2/500-foot capability.

NASA ORDERS CONTROLLABLE APOLLO PARACHUTE

The $302,000 NASA-Houston/Northrop-Ventura contract (yesterday's SPACE Daily, p. 27) calls for a new parachute for guided landings of manned, **APOLLO**-type spacecraft. Northrop is presently making advanced tests of the 83-foot Ringsail chute it is providing for **APOLLO** craft. The new chute will be a 50-foot Cloverleaf configuration with three lobes and motorized suspension lines. It will be able to carry a half-scale (5000 pound) craft and will provide data for Houston to use in choosing the chute configuration for the full-scale version.

Ventura has already tested its Cloverleaf design over 70 times in sizes from 16 to 40 feet in diameter. The 40-foot model can land one ton. During flight tests, the design glided almost two feet horizontally for every foot of vertical descent. Its glide angle and turn rate are controllable from the spacecraft, by remote radio, or by homing on a ground-based beacon.

LEWIS ORDERS "TIME-SHARE" COMPUTER

NASA-Lewis has awarded a $2.7 million contract to IBM for the development of a new-type "time sharing" computer. The computer's processing unit is able to contain and utilize a number of independent programs by continuously switching back and forth between jobs while input and output processes are going on.

TWO MAJOR LASER ADVANCES ATTAINED

Perkins-Elmer laboratories has successfully accomplished two major advances in the field of laser technology: over 130 watts of coherent infrared radiations were produced; and a power conversion efficiency of 13.8 per cent was obtained.

The experiments utilized a glass plasma tube six meters long using carbon dioxide-nitrogen gas. This unit was able to produce over 130 watts of coherent infrared radiation. The related CO_2 laser experiment produced power conversion efficiency of 13.8 per cent, three times higher than previously reported for a gas laser.

THIRD TITAN III-C TO BE LAUNCHED DEC. 2

The third flight of the Air Force's **TITAN III-C** launch vehicle is scheduled for December 2 at 10 AM EST from Cape Kennedy with the **OV2-3** satellite aboard (and possibly other payloads).

WYDLER CRITICIZES AGENA FAILURE

Representative John W. Wydler (R-N.Y.), a member of the House Space Committee, has followed up his criticism of the last two **SATURN I** flights as unnecessary (SPACE Daily, Oct. 15) by charging that these two missions could have been used to test the modified **AGENA** target vehicle for the **GEMINI-6** mission. Pointing out that the **GEMINI-6** mission was the first flight test of the modified **AGENA**, he commented that "the cost of the failure in dollars and prestige was enormous." He charged that this **AGENA** could have been test fired by utilizing the last two **SATURN I** rockets which carried the additional **PEGASUS** satellites. "Such a test might have avoided the failure." Wydler called for a study by the NASA Oversight Subcommittee of the "question of priorities in the space program."

SEAMANS TO ADDRESS SPACE CLUB

Dr. Robert C. Seamans, associate administrator of the NASA, will discuss "the space capabilities of the nation" at the monthly meeting of the National Space Club to be held Wednesday, November 17, in Washington. Moderator for the question and answer session will be Evrett Clark, science reporter of the Washington Bureau of the New York Times.

DOLE ACCUSES DOD OF "LOOSE SECURITY" IN C-5A AWARD

Rep. Bob Dole (R-Kans.), in a letter to Secretary of Defense McNamara, has criticized "loose security" surrounding the award of the C-5A contract to Lockheed-Georgia. While Dole did not charge that advance word of the award was leaked from the Pentagon, he did say that "I am not oblivious" to "political mileage" that a member of Congress can get out of announcing a big contract for an industry in his state or district.

Dole, in asking McNamara for comment, said, "The stock market gyrations which preceded the announcement of the Lockheed award are evidence enough that the word was out to some people who obviously and rightly believed this action would have favorable impact on the price of Lockheed stock and an adverse effect on the prices of competitive aircraft stocks." Dole had earlier joined Sen. Strom Thurmond (R-S.C.) in requesting an inquiry by the Securities and Exchange Commission regarding the suspected leak (SPACE Daily, Oct. 6 & 19).

OPERATIONS RESEARCH RECEIVES AOSO CONTRACT

Operations Research of Silver Spring, Md., has received a $280,000 NASA-Goddard contract to independently monitor and recommend specific improvements in the reliability aspects of the Advanced Orbiting Solar Observatory (**AOSO**) project. The objective of the reliability program is to assure that the **AOSO** will withstand the environment associated with fabrication, tests, transportation, storage, launch and orbital operations.

Ralph A. Johnson has been appointed vice president of the Control Systems Division of Radiation Inc. Johnson was previously general manager of the division.

MATHEMATICAL MODEL DEVELOPED FOR LAUNCH PROBABILITIES

William H. Sellers of Raytheon has developed a mathematical model, using the Markov chain concept, for predicting countdown probabilities of space launch vehicles. Markov chain theory deals with permitting the outcome of any event in a sequence to depend only on the immediately preceding event. By dividing the countdown time into equal time intervals and establishing the transition probabilities from one state to the next, the probability of the countdown progressing to or being in a certain state can be computed from a probability matrix equation.

NSIA R&D SYMPOSIUM MEETING IN WASHINGTON

The National Security Industrial Association's two-day symposium on "Motivation and Support of Research and Development" (SPACE Daily, Oct. 18) is in its final day at the State Department's main auditorium in Washington, D.C.

Yesterday's speakers included Dr. Henri Busignies, ITT senior vice president, who made the keynote address, and Dr. Ivan Getting, president of Aerospace Corp., who addressed the symposium banquet. Getting spoke on "Achieving National Goals Through Science and Technology."

ZENITH HAS RECORD SALES/EARNINGS FOR FIRST NINE MONTHS

Zenith's sales for the first nine months of 1965 set a new record at $317,986,000, 22 per cent above last year's $261,391,000. Earnings rose 19 per cent from $14,-463,000 to a new high of $17,242,000.

PHILCO-WDL OPENS NEW COMPUTER CENTER

Philco's WDL Division has established a new Computer Center at its Palo Alto, Calif., headquarters to meet its expanding computing requirements and to provide a full range of computer service to industry. Housed in the 13,000-square-foot building is the new Philco 212 computer, its associated equipment, and programming, process control, keypunch and tabulating operations.

AEC MAKES SNAP POWER OFFICE APPOINTMENTS

New appointments at the Atomic Energy Commission's **SNAP** Electrical Power Office in the Division of Space Nuclear Systems include: Carl Johnson, formerly of AI, to be chief, Reactors Branch; Andrew Jackson, formerly of the AEC Personnel Division, now assistant to the director of SNS; Dr. Joseph LaFleur, formerly acting chief, Reactors Branch, Division of Reactor Development and Technology, new assistant to the assistant director of SEPO for applications and requirements; and Robert Carpenter, formerly chief, SNAP Isotopes Branch, DRDT, now chief of Isotopes Branch of SEPO.

J. W. Shaver has been appointed director-international marketing of the Douglas Missile & Space Systems Division.

Future Space Business

SHRIKE DUMMY CONTROL SECTIONS

The Naval Ordnance Plant has a requirement for **SHRIKE** dummy control sections to be used for handling and training purposes.

Contact: Contracting Officer, U.S. Naval Ordnance Plant, Louisville, Ky. 40214. Reference: IFB N0019766 B 0003. Due date: Dec. 1.

MULTI-MISSION FIGHTER/ATTACK AIRCRAFT

BuWeps is currently preparing a technical development plan for a high performance multi-mission fighter/attack aircraft in response to a specific operational requirement promulgated by the Office of Naval Operations.

Contact: Bureau of Naval Weapons, Washington, D. C. 20360, Attn: OPNAV Security Officer (OP-09B21-C). Reference: Synopsis No. 274-66. Due date: Nov. 12.

RE-ENTRY SYSTEMS ENVIRONMENTAL PROTECTION

The Ballistic Systems Division is funding a program of re-entry systems environmental protection. The program is to develop: 1) improved efficiency of reinforced plastic composites from the point of view of ablation performance, mechanical properties, fabricability and reliability in a high aerodynamic shear, high enthalpy and high heat flux environment; 2) high performance composites having improved resistance to nuclear effects; 3) superior heat protection components made from refractory materials; 4) transpiration cooled heat protection system which will show substantial improvement over current heat protection systems with respect to efficiency and control of observables; and 5) antenna windows superior in ablation performance, mechanical properties and ease of fabrication along with approaches to the hardening of antenna windows against nuclear effects.

The following firms have been invited to bid on the program: Aerojet-General; Aeronutronic; Allied Research Associates; Atlantic Research; Ara Inc.; AVCO; Battelle Memorial Institute; Bendix; Boeing; Chrysler; Conductron Corp.; Douglas; Dow Chemical; DuPont; Fabric Research Labs; General Dynamics, General Atomic Division; GE; B. F. Goodrich; Goodyear; Grumman; Hughes; IIT Research Institute; Ling-Temco-Vought; Arthur D. Little; Lockheed Missile & Space; McDonnell; Marquardt; Martin; Melpar; North American; Northrop Nortronics; Ownes Corning Fiberglass; RCA Defense Electronic Products; Republic Aviation; Rohr Corp.; Shell Development Corp.; Solar Division of International Harvester; Space-General; Speer Carbon Co.; Sperry Phoenix; Super-Temp Corp.; Texaco Experiment; H. I. Thompson Co.; TRW; Thiokol; TRW Systems Group; Union Carbide Corp.; United Aircraft; Westinghouse; Haveg Industries; Western Backing; Bell Aerosystems; University of Michigan; Ohio State University Research Foundation; Stanford Research Institute; Whittaker Corp.; and Georgia Tech-Research Institute.

Contact: Headquarters, Ballistic Systems Division, Air Force Space Systems Command, Norton Air Force Base, Calif. 92409, Attn: P. J. Hester. Reference: BSYKB-3/382-8616. Due date: Nov. 8.

DOD NEGOTIATIONS

U.S. Rubber, Research and Development Department--with Bureau of Naval Weapons for improved insulators for rocket motors.

Aerojet-General Corp.--with Bureau of Naval Weapons for 468 dual thrust rocket motors (DTRM) Mk 27, Mod 2 with rocket igniter Mk 190, Mod 3 including spare and repair parts.

NASA NEGOTIATIONS

American Machine and Foundry Co.--with Goddard for refurbishing and repairing an advanced model of the solar spectrometer experiment for the Orbiting Solar Observatory.

General Dynamics/Convair--with Marshall for a study of the response of liquid fueled space vehicle systems to low gravity conditions.

IIT Research Institute--with Western Operations for a study of protective coatings for refractory metals for liquid rocket engines.

United Aircraft Corp., United Technology Center--with Western Operations for ablative nozzle throat material evaluation.

DOD CONTRACTS

Army

Philco Corp.--$373,391 for initial endeavor for engineering services on MBT adaptation to **SHILLELAGH**.

Philco Corp.--$146,800 for **SHILLELAGH** missile design changes.

Bendix Corp.--$79,750 for ignition exciter.

Texas Western College of the University of Texas, Schellenger Research Laboratory--$33,630 for a study to perform investigations, exploratory studies and analysis to establish scientific and technical data to determine further research and development in meteorological area.

NASA CONTRACTS

Lewis

TRW Inc.--$1.4 million for continuation of **ATLAS/CENTAUR** studies for a one-year period.

Itek Corp.--$69,500 for rocket engine ablative material phenomena program.