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FCC APPROVES BLUE BIRD FOR COMSAT APOLLO SYSTEM. The FCC has authorized ComSat to procure from Hughes the four **BLUE BIRD** satellites for the Corporation's **APOLLO**-support synchronous system (SPACE Daily, Oct. 29). The Commission's action covers both the procurement right and the actual contract with Hughes. ComSat will now tell Hughes to initiate full production.

BLUE BIRD (SPACE Daily, Nov. 1) is an advanced version of **EARLY BIRD**, ComSat's first communications satellite. Hughes, builder of **EARLY BIRD**, won the **BLUE BIRD** contract by default (SPACE Daily, Aug. 16) when no other company replied to ComSat's RFP issued two weeks earlier (SPACE Daily, Aug. 2). The four **BLUE BIRD**s will be orbited in pairs over the Atlantic and Pacific to plug key holes in the support network for **APOLLO** communications. Later, they will become the Corporation's first operational global/commercial system (SPACE Daily, Oct. 15).

NASA PLANS DIRECT BROADCAST SATELLITE RFPS. In the near future NASA-Washington will issue requests for proposals for a Direct FM Broadcast Satellite. The study program will be funded from the $800,000 remaining in FY '65 funds for this satellite, the **Standardized EXPLORER**, and the new **ATS-4** (SPACE Daily, Nov. 8). The program is expected to be managed by Dr. Homer Newell's Space Science and Applications office. Newell believes that direct radio broadcast with the aid of the satellite, another potential for synchronous orbit, to home receivers could become a reality in about four years.

Direct TV broadcasting by satellite is believed by Newell to be within three years, if the reception is restricted to local terminals or community antennae. Direct TV broadcasting to home receivers is not expected by NASA for 5 to 6 years and is dependent upon the development of space nuclear power technology or large deployable solar cell arrays. Also, the direct-to-home system would require home antennae with gain characteristics of present fringe area antennae and possibly even supplemented with antenna-mounted preamplifiers.

RCA's David Sarnoff believes that both radio and TV direct broadcast satellites are technically feasible for operational implementation by 1975 (SPACE Daily, May 28). Sarnoff envisions three equatorial, synchronous satellites powered by nuclear power built at a cost, exclusive of ground stations, of $30 million. He proposed, however, that a private, independent firm, not connected with Communications Satellite Corporation, be allowed the opportunity to provide competition.

ABC EXPECTED TO BE GRANTED SATELLITE OWNERSHIP. Space industrial officials are optimistic over the possibility that ABC will be granted FCC authorization for the ownership and control of a communications satellite (SPACE Daily, Oct. 29). The decision on ABC's application (SPACE Daily, Sept. 22) will embrace the major issue of whether the Communications Satellite Act of 1962 may be interpreted to allow an entity other than ComSat to own and operate such a payload. The optimism is based on the opinion the FCC will seek to encourage competition and innovation in the incipient era of communications and commercial services via satellites.

NASA TO CONTINUE R&D PACE FOR SATELLITE COMMUNICATIONS. The establishment and operation of the Communications Satellite Corporation will not diminish the pace or narrow the scope of the NASA's research and development of communications satellite systems. NASA's official policy is that it cannot, now that the groundwork has been laid, depend upon the industry alone for the continuing development of technology for future communications and navigation satellite systems. Requirement studies and technical assessment of the applicability of these satellites, NASA says, is a requirement of the agency in order that it can also extend the spacecraft technology in line with the future demands.

DOD COMMUNICATIONS SATELLITE EXPERIMENT SUPPORT SOUGHT. The Army Electronics Command of Fort Monmouth will issue next Tuesday, November 16, requests for quotations for the services and materials of a support contractor supplying 15 months of reduction, plotting, analysis, and correlation of data which will be obtained during special communications experiments which will be conducted during the DOD communications satellite (IDCSP) program. The Army is limiting the selection of contractors to those within a 75-mile radius of Fort Monmouth.

DOD WANTS SYNCHRONOUS WEATHER SATELLITE SYSTEM. DOD has requested the NASA and the Weather Bureau to participate with it in an experiment to determine the feasibility of establishing a synchronous weather satellite system capable of operational implementation by 1970. DOD, seeking real-time information, believes a combination of synchronous weather satellites and one or two polar-orbiting meteorological packages will provide world-wide coverage.

DOD was early placing on the record their objections to the TOSS (TIROS Operational Satellite System) as not being capable of supplying the needs of the military which might be seeking information for a specific theater of operations when the satellite (TOSS) is passing over other areas of interest. Several meetings between members of NASA, the Weather Bureau and the DOD R&E have taken place to establish the plans for the synchronous satellite experiment.

APOLLO CREW SURVIVAL RFPS OUT. Requests for proposals for the design, development, fabrication and flight qualification of the crew survival equipment which will be needed by APOLLO astronauts have been issued by NASA-Houston. The due date for the RFP (BG721-26-153P),which will be available until the end of this week, is November 26.

CLARK TO DEVELOP MOL FLIGHT SUIT. A contract will be negotiated with the David Clark Company for the research and development of the astronaut flight suit for the crew of the Air Force Manned Orbiting Laboratory. The contract for the pressure system will be awarded by Space Systems Division.

Clark is the developer and producer of the **GEMINI** pressure suit, the **GEMINI** extravehicular overgarment for micrometeoroid and radiation protection, and the **GEMINI** lightweight suit such as will be used during the mission of **GEMINI VII.** The **APOLLO** flight suit, including the outer garment for extravehicular activities,will be supplied by International Latex with Hamilton Standard providing the life support system (SPACE Daily, Nov. 8). In addition, Litton is under research and development contract for a hard suit assembly which may or may not be employed at some future date for lurain explorations or similar missions (SPACE Daily, April 10, '64 & Sept. 30).

DECISION STILL DUE ON LIVE TV OF GT-6/-7 RECOVERIES. NBC, CBS, and ABC are still undecided whether to provide live television coverage of the sixth and seventh recoveries of **GEMINI** astronauts (SPACE Daily, Nov. 1). The principal stumbling block is the cost--particularly the rates ComSat is expected to charge for relaying the TV signals from the recovery carrier to the Andover (Me.) ground station.

Because of the length and complexity of the **GTA-6/GT-7** mission, the opportunities for live pickups from the carrier will be considerable, and the three TV networks would like to offer as many as are feasible for the home audience, since the mission is to be of such interest. Financially and logistically, however, full coverage may not be practical, so they are now preparing cost estimates for consideration next week in hopes of then being able to make a decision.

SECOND SCOUT-LAUNCHED SOLAR RAD TO GO NOV. 18. **SOLAR RAD IX,** the Naval Research Lab satellite for solar-radiation study, will be launched November 18 from Wallops Island by a **SCOUT**--the second time a **SOLAR RAD** has ridden that vehicle. The first time--April 26, 1962--ended in a vehicle failure.

LTV/TELECOMPUTING COMPETE FOR MICHOUD SERVICES. NASA has selected Telecomputing Services Inc. and LTV's Range Systems Division for competitive negotiations of a contract to provide computer support services for the Michoud Assembly Facility. The one-year, cost-plus-award-fee contract is estimated to exceed $1.5 million. The contract will call for operation and maintenance of 20 digital and analog computers, a data transmission system, a data reduction system and related electronic equipment.

BELLCOMM AWARDED $10 MILLION EXTENSION. NASA-Washington has finalized a $10,087,000 cost-plus-fixed-fee contract extension with Bellcomm Inc. for systems engineering and support services for the manned space flight program. Finalization of the sole-source contract brings Bellcomm's present contract total to $35.3 million.

KAMHI TO DIRECT AEROSPACE CORP. SYSTEMS DEVELOPMENT

Martin Kamhi, previously director of the Mark 12 Program, has been named group director of Systems Development in Aerospace Corp.'s Re-entry Systems Division. Kamhi will be responsible for supervising the development, integration and testing of re-entry vehicle (MINUTEMAN II) programs in support of the AF Ballistic Systems Division.

WHITE HOUSE INTERNATIONAL COOPERATION CONFERENCE

The White House has scheduled a Conference on International Cooperation for Monday, November 29, through Wednesday, December 1. Included on the agenda is a panel on international cooperation in space which will meet Monday afternoon. The panel will be chaired by Dr. Joseph V. Charyk, president of the Communications Satellite Corporation.

FIRST APOLLO MICROCIRCUIT TELEMETER QUALIFIED

The first molecular PCM system to be fully space-qualified for the APOLLO mission is a 98-channel high level multiplexer and encoder produced by Radiation. The 50-cubic-inch package contains planar assemblies for integrated circuits and 3-D hybrid modules for mixtures of circuits and discrete components. The PCM system incorporates many design innovations to provide for minimum power and high performance.

DEFENSE WEAPON SYSTEMS MANAGEMENT CENTER ESTABLISHED

The Department of Defense has formalized the establishment of the Defense Weapon Systems Management Center (DWSMC) at Wright-Patterson Air Force Base as a centralized activity for training selected senior military and civilian personnel in the effective management of development, acquisition and integrated logistic support of weapon and support systems.

GENERAL WATERS TO ADDRESS WRIGHT BANQUET

The 1965 Wright Brothers Memorial Dinner, set for December 17 at the Beverly Hilton in Los Angeles, will be addressed by General John Waters, commander of the Army forces in the Pacific, as part of the annual commemoration of the 1903 Kitty Hawk achievement. Headquartered in Hawaii, Waters has held his present post since March of last year.

VEHICLE/ATMOSPHERE SYMPOSIUM: NOV. 26-27

The second Symposium on Interactions of Space Vehicles with an Ionized Atmosphere will be held November 26 and 27 at the Deauville Hotel in Miami under the sponsorship of the American Astronautical Society, the University of Miami, and the International Scientific Radio Union. Four technical sessions are planned, with the presentation of 18 papers.

NBS STUDYING SLUSH HYDROGEN AS POSSIBLE FUEL

The cryogenics lab of the National Bureau of Standards' Institute for Materials Research at Boulder, Colo., has developed a method of producing slush hydrogen in the lab and is now investigating the properties and behavior of the solid-liquid mixture to determine its potential as a rocket propellant. Sponsored by NASA, the study is focusing "on the shape and distribution of the solid hydrogen particles and the effects of aging upon them."

Slush hydrogen is considered a possible space fuel because it requires less storage space then liquid hydrogen, thanks to its greater density, and can be stored far longer. NASA is eyeing it for use with the SATURN and CENTAUR.

The lab's new slush process forms solid hydrogen on the surface of liquid hydrogen by vacuum pumping. Then the pressure is precisely modulated, and the solid mass sinks and breaks up into fine particles upon impact with the bottom of the container. The resulting combination of solid and liquid particles is the slush mixture. This process is basically a freeze-thaw operation.

High-speed photographic cameras and a computer are being used to observe the size and terminal velocity of the solid particles as they settle in the mixture. The study is secondarily concerned with the transportability of slush hydrogen, and such observations are expected to provide data for this inquiry as well. The freeze-thaw method is envisioned as applicable to slush-hydrogen production in batch-type generators or large storage dewars.

THE GEMINI IX MISSION

The **GEMINI IX** mission (SPACE Daily, Nov. 9) will attempt a number of significant firsts. During the two or three day mission, the first test of the Air Force **MMU** (Modular Maneuvering Unit) (SPACE Daily, June 3) life support and maneuvering system will be made, probably by an extravehicular astronaut maneuvering outside the capsule for as long as one orbit. Assuming the problems with the **AGENA** target vehicle have been cleared up by that time (yesterday's SPACE Daily), **GEMINI IX** will be a rendezvous and docking mission with the first attempts to use the target vehicle's primary propulsion system for orbit changing and maneuvering by the joint **GEMINI-AGENA** vehicle. After the maneuvers with the **AGENA** have been completed, one of the astronauts will place the **S-10 AGENA** micrometeorite collection experiment aboard the target vehicle. The target vehicle and **GEMINI** will then disengage and the **AGENA** will be placed, by ground command, into an approximate 200-mile orbit where it should be more stable. At some later time, NASA plans for a rendezvous with another **GEMINI** capsule to collect the results of the micrometeorite collection experiment.

Primary crew for the **GTA-9** mission will be Elliot M. See, Jr., command pilot, and Capt. Charles A. Bassett II, USAF, pilot (SPACE Daily, Nov. 9). Back-up crew will be Major Thomas P. Stafford, USAF, command pilot, and Lt. Cmdr. Eugene A. Cernan, USN, pilot.

Gene K. Beare, president of Sylvania, has been elected president of the National Electrical Manufacturers Association. Beare, who had been a NEMA vice president, succeeds A. C. Monteith, a senior vice president of Westinghouse.

Future Space Business

MECHANICAL SHOCK SPECTRA TECHNIQUES STUDY

NASA-Goddard has issued requests for proposals for a study of mechanical shock spectra techniques for spacecraft applications. A prerequisite for this work will be a familiarity with Goddard spacecraft launch environments and a knowledge of Goddard procedures as regards spacecraft qualification and acceptance testing.

An RFP will be sent to the following companies: Boeing, Lockheed Missiles and Space, National Engineering Science Co. (Pasadena, Calif.), General Dynamics/Convair, Bolt, Beranek and Newman, Measurement Analysis Corp. (Los Angeles), Mitron Research & Development Corp. (Waltham, Mass.), LTV Ling Electronics Division, United Aircraft Corporate Systems Center, Midwest Applied Science Corp. (Lafayette, Ind.), Southwest Research Institute, IIT Research Institute, Cornell Aeronautical Laboratory, TRW Systems Group, IBM Federal Systems, Douglas Missile & Space Systems, and Allied Research (Concord, Mass.).

Contact: NASA, Goddard Space Flight Center, Greenbelt, Md., Attn: Gary B. Burkholder, Code 247. Reference: RFP 321-62166/235. Due date: Nov. 19.

AEROSPACE TARGET ELECTRONIC SYSTEM MICROWAVE SCORING

The Air Proving Ground Center is planning to fund an exploratory development, analysis and study of microwave scoring techniques compatible with combined scorer/augmenter aerospace target electronic system and fabrication of feasibility test models.

Contact: Directorate of Procurement, Deputy for Materiel, Air Proving Ground Center (PGMKK), Eglin Air Force Base, Fla. 32542. Reference: PR WWM 66-210. Due date: Nov. 20.

DOD NEGOTIATIONS

Hercules Powder Co., Allegany Ballistics Laboratory--with Bureau of Naval Weapons to conduct broad scope supporting research in the field of solid propellant rocketry in order to upgrade the safety and performance requirements of the solid rocket motor missile system.

GCA Corp.--with Air Force Special Weapons Center for continuation of theoretical studies of heavy ion exchange in air.

Hughes Aircraft Co., Ground Systems Group--with Army Electronics Command to continue work in connection with satellite communications equipment.

Battelle Memorial Institute--with Office of Naval Research for research on determination of approximate structural parameters of a large steerable antenna and their relationship to the antenna performance.

Magnavox Research Laboratories--with Army Electronics Command to continue work in connection with satellite communications equipment.

MORE

DOD NEGOTIATIONS - Contd.

NTW Missile Engineering, Los Angeles, Calif.--with Air Force Special Weapons Center for continuation of engineering, design, and fabrication of prototype test vehicles.

Philco Corp.--with Army Electronics Command to continue research work in the field of satellite communications.

NASA NEGOTIATIONS

Booz-Allen Applied Research--with Marshall for ADP system study.

Data Corp., Dayton, Ohio--with Marshall to design and develop the data processing portion of an optical doppler velocity recording system.

Philco Corp., Western Development Laboratories--with Ames for an analysis of a lunar magnetometer experiment.

Scientific Data System, Santa Monica, Calif.--with Marshall for maintenance capability and space support effort for digital events evaluator systems.

NASA CONTRACTS

Ames

Textron Electronics, Spectrolab Division--$25,957 for solar radiation simulator.

Lewis

General Electric Co., Missile and Space Division--$65,846 to increase estimated cost and extension of completion data for NAS3-2534.

North American Aviation, Rocketdyne Division--$123,050 for design changes in MA 5 FLOX sustainer engine baffled injector.

Koppers Co., Cleveland, Ohio--$69,400 for engine exhaust and intake silencers.

Cambridge

Hughes Aircraft Co., Research and Development Division, Aerospace Group--$49,274 for analytical and theoretical deep space communication systems trade-off study.

Washington

Documentation Inc., Bethesda, Md.--$3.6 million for operation of NASA scientific and technical information facility.