SPACE BUSINESS Daily

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NASA TO SELECT 15 NEW ASTRONAUTS. NASA will select 15 additional astronauts for a training program to start next summer. Prior to December 351 persons had applied for astronaut status: of these 159 met the minimum qualifications and the next astronaut "class" will be selected from this group. Of the 159 qualified, 59 were civilian pilots. Although six women applied for astronaut training, none were considered to be qualified by NASA.

SATURN APPLICATIONS OFFICE CLOSED. When the **SATURN/APOLLO** Applications Directorate was established (SPACE Daily, Aug. 9 & 23), one of its two main branches was the **SATURN** Applications office, under Col. H. G. Russell, with the mission of directing the modification of the **SATURN IB** to the **CENTAUR** upper stage for the 1969 **VOYAGER**. As the **VOYAGER** has been postponed, first until 1971 and then until 1973, and the launch vehicle changed to the **SATURN V**, the **SATURN** Applications office has dwindled out of existence. The minor modifications now needed to adapt the **SATURN V** to **VOYAGER** are now being directed by L. K. Fero, special assistant for **SATURN** Applications to the Director of S/AAD.

GODDARD SEEKS DEPLOYABLE ANTENNA. In order to make electrical field measurement experiments from spacecraft NASA-Goddard plans to undertake a program for study of data gathering. Proposals for the system study identified as PC-612-82172-111, are due by January 25.

D-1A SET FOR FEB. 11 OR 12/D-1B FOR MARCH. As reported (SPACE Daily, Jan. 5), France's second attempt to orbit a satellite will be made early next month, and the probable date is now the 11th or 12th. Also, March is now the envisioned month for the launch of **D-1B**, and present indications are that **D-1C**, which was contracted for by the French space agency CNES this past October, will be orbited late this year or early next. The reason for the time gap between **D-1B** and **-1C** is partly the relative complexity of **-1C**, which will have laser-detection reflectors for its geodesy experiment and will be magnetically stabilized.

The 41-pound **D-1A** will be mounted atop the instrument unit of its three-stage **DIAMANT** vehicle and will be launched into a 372/1880-mile, 30-degree, two-hour orbit. It is more sophisticated than France's first satellite, the **A-1A**, which went aloft November 26 (SPACE Daily, Nov. 30 and Dec. 1 & 6).

$5 BILLION NASA BUDGET FOR FY '67 SEEN (An Analytical Review)--IV.
On Sept. 24 and 27 SPACE Daily reported that: "The first round of estimates places the NASA budget for FY '67 at, or even below, $5 billion, or more than $200 million less than for FY '66. The $5.25 billion annual level (SPACE Daily, Feb. 9) is still the general guideline for a 'balanced national needs' budget which draws more than $1 billion annually from a near-optimum space budget for the decade of the '60s in support of President Johnson's 'Great Society.' Now, however, Vietnam and the growing hungry, faster-than-anticipated demands of the 'Great Society' may make further slashes in the space requirements. . .

"Space legislators, while expressing a willingness to approve a budget for NASA on the same level as FY '66, appear just as willing to support an Administration demand for a lower budget. If the Bureau of the Budget and the Congress reach agreement on this plan the national space program will begin its first recession of ambitions since Kennedy's Space Mandate of 1961. The plan to hold the program at a defined, if unrealistic, level or peak of funding by moving other missions or projects destined to follow **APOLLO** into the break to hold the peak will have been abandoned.

"(The) New restrictions on the national space budget could be an appreciable delaying blow to NASA's plans for the **APOLLO** Applications (**AA**) program. . .

"The space legislators, unfortunately not attuned fully to the NASA plans, think NASA should not come before them with a request for more than $100 to $150 million for the **AA/AES** programs. To NASA this will be the same as postponing initiation of development for another year."

In support of this unusual form of analysis by review of an analysis, let it suffice for explanation that within days of the SPACE Daily report a space reporting medium denounced the $5 billion budget report as completely false, implying that the Administration had tacked the denial label on the report. Still more days later the "denial" reports were shifting to charges that the SPACE Daily report was not confirmed and besides, these reports "disclosed" that this time the Administration considered the $5 billion budget possibility not very plausible.

On Dec. 13 SPACE Daily again repeated the $5 billion report, emphasizing that the Bureau of the Budget and the Congress would be playing ball with a budget that ranged from the requested to the approved of $5.2 to $5 billion, which could materialize as high as $5.08 to $5.12 billion under favorable conditions. "If however," the report continued, "the pressures of the Vietnam War and the government welfare and assistance programs have their effect, then a $5 billion figure could cease to remain a sanctuary for the national space program." The "denial" reports have faded into obscurity as the development of the budget has become more publicly accessible.

There is little that we can add to this fourth report except to emphasize that in these last two weeks the budget is still in more danger as President Johnson looks from side to side for additional "loans" for the war and society programs, forgetting we believe that history will show that the national space program is a priority for his "Great Society" plan.

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The $5 billion budget will be an official stamp of approval by President Johnson that all plans for any major post-**APOLLO** programs be deferred at least for another year while he uses the money for programs he considers more urgent. All evidence points to a Congressional approval of his actions, whether loyal or in opposition.

It gives us little satisfaction that we can borrow from our Sept. 24 report that the plan being approved for the national space program "will begin its first recession of ambitions since Kennedy's Space Mandate of 1961." If we can also borrow and paraphrase from James Webb (SPACE Daily, Dec. 10), we can add that history has yet to teach us that our plans for our future in space should not be drawn by a timid hand.

SCIENTISTS DEFINE AA LUNAR EXPLORATION EQUIPMENT

The NASA 1965 Summer Conference on Lunar Exploration and Science at Falmouth, Mass. (SPACE Daily, Jan. 6), defined the equipment requirements for an adequate lunar exploration program. The recommendations of the scientific group conform to the general outline of the present **APOLLO** program and the **APOLLO** Applications program (SPACE Daily, Aug. 25, 30), and constitute a scientific justification for NASA's **AA** program which is being severely threatened by budget pressures. The scientists divide lunar exploration into three phases: early **APOLLO** surface missions and **LUNAR ORBITER** missions; the **AA**-Manned Lunar Orbiter missions (**AA-MLO**) and **AA**-Manned Lunar Surface missions (**AA-MLS**); and a post-**AA** program for the period after 1974.

The first **APOLLO** surface flights will require sterile sample containers, special sampling tools, an aseptic sample collection tool, a stereoscopic camera with several filters and polarizing lenses, and the experiments for the Lunar Surface Experiment Package (LSEP): a passive seismograph; a magnetometer/particle detector; a heat flow measurement device; an active seismograph experiment; an atmosphere measurement device and a micrometeoroid detector. Samples brought back from the Moon would be handled by a Lunar Sample Receiving Laboratory which would catalogue, check for outgassing, measure for low level radiation and examine for pathogenic agents. The **LUNAR ORBITER** missions in the same time frame would contain experiments emphasizing cartography, particles and fields and lunar atmospheres.

The AA Manned Lunar Orbiter (AA-MLO)

An extensive manned lunar orbiter program (**AA-MLO**) (SPACE Daily, Sept. 3) of five or six missions would require equipment to be developed for photography, remote sensing and experiments in atmospheres, particles and fields. The photography equipment needed will include: a metric mapping camera, a high resolution twin convergent panoramic camera, an ultrahigh resolution camera and a multiband synoptic camera system.

Remote sensing equipment to be used on the **AA-MLO**, would include UV imagers, IR imagers, and high-resultion radars, a passive microwave, radar scatterometer, IR, X-ray, gamma-ray, and alpha particle emission sensors. The **AA-MLO** would also carry ion and neutral mass spectrometers, ion traps, solar wind detectors, pressure gauges, cosmic-ray albedo, solar and lower energy galactic cosmic ray telescopes and neutron instruments to detect the hydrogen content of the lurain to indicate the presence of water. Sub-lurain analysis of the Moon would

MORE

POSSIBLE EXPERIMENTAL PROFILE FOR A MANNED LUNAR ORBITAL MISSION

EXPERIMENT	OPERATING SPECTRAL RANGE	ESTIMATED WEIGHT	ESTIMATED POWER	ESTIMATED DIMENSIONS	SPATIAL RESOLUTION (FROM 20 N. MILES)	POINTING ACCURACY REQUIRED
PHOTOGRAPHY	VISUAL RANGE	400 LBS. -1,000 LBS.	20 W -200 W	2 CU. FT. + TELESCOPE	A FEW FEET	±5°FROM VERTICAL
MULTI SPECTRAL PHOTOGRAPHY	0.35 TO 1.5 μ	20-40 LBS. + TELESCOPE	LESS THAN 20 W	1 CU. FT.	A FEW FEET	0.1°-0.5°WITH IMAGE MOTION COMPENSATION
RADAR MAPPING	MULTI SPECTRAL RADAR	500 LBS.	500-1500 W	TOTAL 20 CU. FT. ANTENNA 10' - 30'	20 SQ. FT. AT ALL ALTITUDES	LOW RATE
UV SPECTROMETRY	3000-4000 Å	PASSIVE 150 LBS.	150 W	4 1/2 CU. FT.	500 LINES OVER 20°FIELD	COUPLING WITH CAMERA SYSTEM
IR SURVEYING	7-30 μ	20-40 LBS.	5-10 W	1 - 2 FT.^{3}	0.7 SQ. DEG.	0.5-2 SECONDS
GAMMA RAY SPECTROSCOPY	0.001-.1Å	50-150 LBS	10-15 W	3-6 CU. FT.	30-100 KM	1-2 DEGREES
GRAVITY SURVEYING		10 LBS.	25 W	3 CU. FT.		ORDER OF AN ARC MINUTE OF ANGLE
X-RAY SPECTROSCOPY	1-50 Å	15 LBS.	5 W	1 CU. FT.	7M x 60M	NON-CRITICAL
REMOTE GEOCHEMICAL SENSING	UV AND SHORT VISIBLE	20-80 LBS.	20 W	2-8 CU. FT.	300 FT. FROM 20 N. MILES	ANGULAR RATE LESS THAN 10%/MINUTE
PASSIVE MICROWAVE EXPERIMENT		TOTAL 100 LBS.	200 W	+ ANTENNA	0.5 KM AT 20 N. MI ALTITUDE	±0.25 DEGREES TOTAL
METEORITIC DUST ANALYSIS		20 LBS.	2-4 W	2 CU. FT.		NON-CRITICAL
VHF REFLECTIVITY	NOT SPECIFIED	150-200 LBS.	200 W	1-4 CU. FT.	1/2-5 MILES FROM 20 N. MI	LOW-2 OR 3 DEGREES
MAGNETIC SURVEY	0.2-0.5 GAUSS	50 LBS	50W	4 CU. FT. in 1/4 out 10'-20' BOOM (OR SUBCRASH)	0.6 KM	PRE-ORIENTATION- Rb. Mg. FEEDBACK ORIENTATION FOR FLUXGATE

ESTIMATED TOTAL POWER 2 KW

ESTIMATED TOTAL WEIGHT 3,000 LBS.

ESTIMATED TOTAL VOLUME 80 CU. FT.

be investigated with a magnetometer, a gravity gradiometer and an electromagnetic pulse probe.

The AA Manned Lunar Surface Mission (AA-MLS)

Five or six **AA**-Manned Lunar Surface missions (SPACE Daily, Sept. 7) are recommended by the Conference through 1974 with stay times of up to 14 days. They should be equipped with a Local Scientific Survey Module (**LSSM**) (SPACE Daily, Feb. 24, '64 & Oct. 1) and a Lunar Flying Vehicle (**HOPPER**) (**LFV**) (SPACE Daily, May 14, '64 & July 23). Two important pieces of equipment for these missions would be an automatic position recording system to track, record and telemeter back movements of the astronaut, the **LSSM**, and the orientation of the camera, and the development of a one-inch drill capable of penetrating to a depth of three meters from an **LSSM**. Other equipment which would be needed would perform gravity surveys, active seismic surveys, magnetic measurements, radioactivity measurements, environmental measurements, and geological-geophysical surveys on the lurain.

Post-AA Lunar Missions

The Conference recommended that starting in 1975 a program should commence, with one mission per year until 1980, which would include a **MOLAB**-type vehicle (SPACE Daily, Mar. 17, '64 & April 19) and a fixed-site investigation capability of from two months to one year. Additional orbital flights would also be desirable during this period.

SPACE-OCEANOGRAPHY FEASIBILITY STUDY PLANNED--II

The Naval Oceanographic Office's (NOO) decision to undertake the responsibility of coordinating all investigations into possible applications of manned Earth-orbital operations in the field of oceanography for the Natural Resources program office and the **APOLLO** Applications (**AA**) Directorate (SPACE Daily, Jan. 4) appears to be the first positive movement by the scientific and technology community outside of NASA to bid for a ride on the opportunities of manned operational space stations as an arm of mankind.

NOO will examine the feasibility of remote sensing and data collection from space and the practicality of various experiments which can be performed on future **AA** and other space flights to determine the possible value of space operations to the field of oceanography. Some of the possible applications which appear most immediately feasible include: sea state; shore line changes; siltation in navigational channels; the interrelationship of sea state and ice state; the location and movement of icebergs; the location, velocity, and changes in ocean currents, the temperature of the sea and ocean currents; the location and movement of planketon groupings and other sea resources.

Oceanographic research may also be advanced not only by remote sensing from orbit but also by the collection of data from remote anchored buoys, drifting surface buoys and even submerged buoys at various levels which might telemeter data to surface buoys for retransmission to orbital data collection satellites. However, oceanography is only one of several natural resources fields which are being studied for remote sensing surveys from Earth orbiting vehicles (See accompanying chart). The five major areas under consideration for application possibly within the **AA** program are: oceanography and marine technology; agriculture and forestry; hydrology; geology and planetology; and geography and cartography (SPACE Daily, Jan. 6).

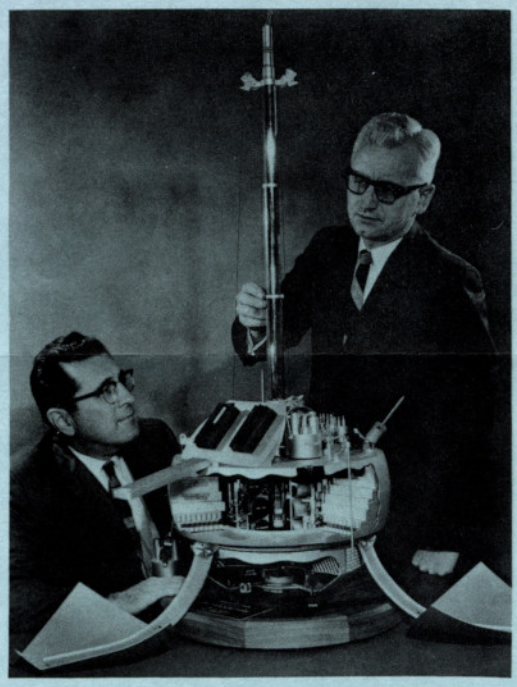
OBJECTIVES AND AREAS OF APPLICATION FOR SOME REMOTE SENSOR INSTRUMENTS

REMOTE SENSOR INSTRUMENTS

APPLICATION / EXPERIMENTAL TECHNIQUE	AGRICULTURE/ FORESTRY	GEOLOGY/ PLANETOLOGY	HYDROLOGY	OCEANOGRAPHY	GEOGRAPHY
VISUAL PHOTOGRAPHY	Crop and Soil Identification Identification of Plant Vigor and Disease	Identification of Surface Structure	Identification of Drainage Patterns	Identification of Sea State, Beach Erosion, Offshore depth & turbidity	Urban-rural land use, transportation routes &facilities. Terrain & vegetation characteristics
MULTI-SPECTRAL PHOTOGRAPHY	Crop and Soil Identification Identification of Plant Vigor and Disease.	Identification of Surface Features	Soil Moisture Content	Sea Color as Correlated with Productivity	
I.R. IMAGERY AND SPECTROSCOPY	Terrain Composition Plant Vigor and Disease Condition	Mapping Thermal Anomalies Mineral Identification	Detection of Areas Cooled by Evaporation	Mapping of Ocean Currents Sea- Ice Investigations	Surface energy budgets, Near shore currents and land use
RADAR IMAGERY & SCATTEROMETRY	Soil Characteristics	Surface Roughness Tectonic Mapping	Measurement of Soil Moisture Content Identification of Run-off Slopes	Sea State Ice flow and Ice Penetration Tsunami warning	Land/Ice Mapping Cartographic and Geodetic Mapping
R.F. REFLECTIVITY	Soil Characteristics	Sub-surface Layering Mineral Identification	Moisture Content of Soils	Sea Ice Thickness and Mapping Sea State	Land/Ice Mapping and Thickness Penetration of Vegetation Cover
PASSIVE MICROWAVE RADIOMETRY & IMAGERY	Brightness Temperature Map of Terrain	Dielectric Constant Measurement Indicative of Sub-surface Layering	Snow & ice Surveys		Snow & ice measurements
ABSORPTION SPECTROSCOPY (REMOTE GEOCHEMICAL SENSING)		Detection of Mineral Deposits Trace Metals, and Oil Fields		Detection of Concentrations of Surface Marine Flora	

NASA SM65-15136

PHILCO ABL STUDY TO BE EXTENDED



This is the preliminary design model of Philco's **ABL** (Automated Biological Laboratory), which NASA-Washington is planning to use to search for evidence of life on the surface of Mars (SPACE Daily, June 8, '64). Last month Philco submitted the final report of its year-long feasibility and preliminary design study, which was made under a $300,000 contract that was negotiated during the summer of '64 (SPACE Daily, July 23, '64), and NASA is now about to award Philco-Aeronutronic a follow-on contract to continue the study through this fiscal year. Philco was among nine bidders for the initial development package.

ABL is being considered for inclusion on a **VOYAGER** mission between 1973 and '75. It was once associated with a '71 **VOYAGER** launch but then deemed "incompatible" with such a mission (SPACE Daily, July 16). It is designed to soft-land on the marain and conduct life-detection experiments for at least one Martian year (687 Earth days).

The model shown is one-fourth actual size. On the left is Charles Gant, Aeronutronic director of space system programs, and on the right William Hostetler, space programs manager.

The curved, hinged arms with attached panels are two of the **ABL**'s three legs. When up in place, the panels form a shroud for the upper part of the lab, and when deployed, they serve as pads for the legs.

Extending from the spacecraft in front of Gant is one of two antennas. This one puts out a fan-shaped pattern that will be receptive to signals from Earth even if the lab assumes an abnormal position on the marain. The other antenna (largely concealed) is the small block at the top of the left black eraser-like object in front of and to the left of the central mast (the light colored strip near the antenna is a label identifying it).

Those two eraser-like objects are power supplies (Radioisotope Thermoelectric Generators), each rated at 75 watts and one intended as a backup.

The two small objects that resemble buckets with tubes in them--one resting next to the power supply structure and the other sitting next to Gant's right hand--are soil samplers. Both are attached to arms that can move them off the spacecraft and over the marain, and both are connected to a trolley system that can deploy them well away from the lab.

The trolley system uses the mast (which telescopes) and the tiny rocket that is poised at the right in front of Hostetler. The rocket, solid-fueled, will carry a wire up to several thousand feet from the lab and thus, with the help of the mast, create a "clothes line" for the sampler to travel so it can set down on the marain at any of many possible points along the line.

Visible just above the metal plaque on the model's wooden base is a tiny object similar to an ice cube. This will lower onto the marain to create an on-site experiment inside, just as the scientist does with a bell jar.

TRW SYSTEMS NEW BUSINESS UP NEARLY 50% (Special Report)

TRW Systems Group, which has experienced a minimum growth of 20 per cent each year since 1961 except in 1965 when the growth was almost 50 per cent, presently has more than 100 customers--the Air Force, NASA, industry, universities and foreign companies and governments--and more than 300 contracts that range in value from $500 to about $16 million on an annual basis. The former Space Technology Laboratories' development from a staff of four in 1953 to over 10,000 in 1965 has been a result of internal growth rather than growth through acquisition.

Much of this growth came from an expanding mix of capability and experience that permitted successful bidding on such projects as ASW, advanced interplanetary probes, global communications satellites, particle accelerators, scientific instruments for spacecraft, guidance systems for manned spacecraft, and a variety of low-thrust control-type space engines.

NASA Contracts Account for 50% of Business

Contracts with NASA currently represent about 50 per cent of TRW Systems' annual business volume. The company is the prime contractor for Goddard's Orbiting Geophysical Observatory (**OGO**) and Ames' **PIONEER** program.

TRW is also responsible for the mission trajectory control programs for **GEMINI** and **APOLLO** and for the **APOLLO** Systems Analyses Program under the direction of NASA-Houston. Under subcontracts to Grumman, the company is developing the descent engine for the Lunar Excursion Module (**LEM**) and for the **LEM** abort guidance systems. A subcontract with Collins Radio calls for TRW to build special demodulation equipment for installation in the **APOLLO** tracking network.

Other NASA efforts include the company's bid for JPL's **VOYAGER** program and a JPL study currently underway on the feasibility of an unmanned interplanetary probe capable of carrying a substantial scientific payload to Jupiter and beyond.

Air Force contracting efforts include **MINUTEMAN II** silo activation engineering for the Logistics Command, systems engineering for **MINUTEMAN II**, range instrumentation, re-entry phenomena, follow-on missiles to the **MINUTEMAN** and the use of a TRW-developed gyro compass to orient silo-based missiles. The company also continues in its role as prime contractor to the Space Systems Division for the Nuclear Detection (**VELA**) Satellite program, and is producing the prototype standard tracking, telemetry and control system for spacecraft and ground stations.

NASA-CAMBRIDGE ELECTROMAGNETIC INTERFERENCE STUDY

NASA-Cambridge has invited 12 companies to bid on a proposed contract to identify ambient detrimental sources of electromagnetic interference (EMI), generate criteria which will be useful in facility design and construction for the reduction of EMI, assist in electromagnetic compatibility requirements and present a program for control and assessment of continuing EMI identification and suppression.

The following firms are on the original source list for RFP AO 66-216: Barkley & Dexter Laboratories (Fitchburg, Mass.); Bendix Field Engineering Corp.; Cutler-Hammer, AIL Division; Franklin Institute; General Dynamics/Convair; Genistron Inc. (Los Angeles); Atlantic Research, Jansky & Bailey Division; Interference Consultants (Boston); Philco; Raytheon; Sanders Associates; and Stephen Galligan (Wellesley Hills, Mass.). Due date is January 24.

Future Space Business

SERVO AUTOMATIC CHECKOUT/ADJUSTMENT METHODS

NASA-Goddard is requesting proposals for a contract for a study of automatic checkout and adjustment methods for the servo and control system of large steerable antennas.

Contact: NASA, Goddard Space Flight Center, Glenn Dale Road, Greenbelt, Md. 20771. Reference: RFP 525-72592/236. Due Date: Jan. 10.

SOLAR DISK NOISE BACKGROUND MEASUREMENT STUDY

NASA's Electronics Research Center is planning to conduct a study to develop detailed plans and specifications for a system which will be used to measure background noise from the vicinity of the solar disk in the far-infrared wavelength regions.

Contact: NASA, Electronics Research Center, 575 Technology Square, Cambridge, Mass. 02139. Attn: Procurement Office. Reference: ERC/R&D 66-222. Due Date: Jan. 15.

DOD CONTRACTS

Navy

Alcan Aluminum Corp.--$6.7 million for rocket motors for 5" **ZUNI** rockets.

Norris Thermador Corp.--$6.5 million for rocket motors for 5" **ZUNI** rockets.

Air Force

RCA, Defense Electronic Products--$73,362 for microwave-microelectric communication satellite repeater.

National Bureau of Standards, Boulder, Colo.--$35,000 for a study contract investigation on meterological effects on air-to-air and air-to-ground communications.

NASA CONTRACTS

Houston

Lockheed Aircraft Corp., Lockheed-Calif.--$99,925 for the development of a spacecraft landing strut.

Ace Fabricators, Inc.--$53,680 to fabricate, test and deliver eight each, **APOLLO** boilerplate spacecraft.