COMMENT DRAFT

N O T F O R R E L E A S E

A S T R O N A U T I C S A N D A E R O N A U T I C S

SEPTEMBER 1969

A CHRONOLOGY ON SCIENCE, TECHNOLOGY, AND POLICY

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S E P T E M B E R 1 9 3 9

September 1: L/G Samuel C. Phillips, Apollo Program Director, became Commander of Air Force Space and Missile Systems Div. (SAMSO). Gen. Phillips had been Director of Minuteman program before assignment to NASA in January 1964 as Deputy Director of Apollo Program. (NASA Ann, 7/31/69)

. S. Paul Johnston retired as head of Smithsonian Institution's National Air and Space Museum. He would represent AIAA on NRC. (A&A, 9/69, 15)

September 2: U.S.S.R. launched Cosmos CCXCVII from Plesetsk into orbit with 309-km (192.0-mi) apogee, 204-km (126.8-mi) perigee, 89.6-min period, and 72.8° inclination. Satellite reentered Sept. 10. (GSFC SSR, 9/15/69; SBD, 9/3/69, 8)

. Qatron Corp. announced it had received $275,000 contract from GSFC to build several recorder-receiver switching and preprogrammable patch systems for Apollo program. (W Star, 9/2/69, A16)

September 3: NASA's HL-10 lifting body vehicle, piloted by NASA test pilot William H. Dana, reached 81,000-ft altitude and mach 1.42 after air-launch from B-52 aircraft west of Rosamond, Calif. Primary objective of flight, 24th in series and first with new engine, was to obtain stability, control, and engine data. (NASA Proj Off)

. Tokyo Univ. scientists successfully launched four-stage Lambda rocket in preparation for launch of Japan's first satellite in late September. (UPI, W News, 8/4/69; Harrison, W Post, 9/24/69, A9)

. MSFC announced contract awards: McDonnell Douglas Astronautics Co. was awarded $97,340,000 cost-plus-fixed-fee/award-fee contract to provide for two Saturn V Workshops--one for launch in 1972 and second for backup. McDonnell Douglas also received $87,450,000 cost-plus-fixed-fee/award-fee contract modification for continued work on two airlock modules for Apollo Applications (AA) program cluster, including tests, checkout, documentation, and logistics support.

Boeing Co. received $25,130,376 contract modification extending period for completion of Saturn V 1st stage (S-IC-15) from June 30, 1970, to June 30, 1971. (MSFC Releases 69-199, 69-200, 69-201)

September 3: Swedish aircraft constructor Has Fancher had said that in 1944 Adolf Hitler took delivery of first Junkers 390 aircraft with 14,400-hp engine constructed specially to bomb New York, Washington Daily News reported. Fancher, pilot on aircraft's nonstop test flight between Germany and South America, said plane weighed 93 tons with bombs and had planned range for nonstop flights from Bordeaux in occupied France to New York and return. Aircraft, delivered too late for use in war, had been burned by Germans. Comparable aircraft was not built until 1956, Fancher said. (W News, 9/3/69)

September 4: Some NASA scientists were helping their communities and hiding their aid projects "as tho they were sinful," Roy Cromley said in Washington Daily News. Scientists were using space-acquired skills "to help their fellow men in ways they were uniquely qualified." Projects included applying systems analysis to air pollution problem, planning school expansion to meet population expansion, applying systems concept to town management and to city police force problems, developing new concepts for airport planning and new technique for vandalism prevention, developing improved communications systems for city emergency departments, and helping an agency develop ways of evaluating proposals for study and development contracts with private industry. (W News, 9/4/69, 23)

September 5: First measurement of Mars UV dayglow, made during Mariner VI Mars flyby July 31, was reported in Science by Univ. of Colorado astro-geophysicists C. A. Barth, C. W. Hord, J. B. Pearce, K. K. Kelly, A. I. Stewart, G. E. Thomas, and G. P. Anderson; Johns Hopkins physicist W. G. Fastie; and JPL's O. F. Raper. Emission features from ionized carbon dioxide and carbon monoxide were measured in 1,900 Å to 4,300 Å spectral region. Lyman alpha 1,216 Å line of atomic hydrogen and 1,304 Å, 1,356 Å, and 2,972 Å lines of atomic oxygen were observed. Prime objective of experiment was to search for nitrogen in Martian atmosphere. First analysis had shown no evidence of nitrogen emissions in UV spectrum of upper atmosphere. (Science, 9/5/69, 1004-5)

September 6: Astronauts Frank Borman, James A. Lovell, Jr., and William A. Anders were named winners of 1969 Harmon International Astronaut's Trophy for December 1968 Apollo 8 mission. Maj. Jerauld R. Gentry (USAF) was awarded Aviator's Trophy for testing HL-10 lifting-body vehicle. (UPI, W Star, 9/7/69, A7)

September 6: Apollo 11 astronauts attended celebrations in their hometowns. In Wapakoneta, Ohio, Neil A. Armstrong was cheered by crowd estimated at 10 times normal 7,000 population, addressed teen-age rally, and led parade including Gov. James A. Rhodes, Dr. Albert Sabin (developer of oral polio vaccine) and comedian Bob Hope--all Ohioans. Edwin E. Aldrin, Jr., on second visit to hometown as astronaut, presented Montclair, N.J., Library with autographed photo of plaque left on moon; Library named its science collection in his honor. Astronaut Michael Collins, who was born in Rome, Italy, visited New Orleans, La., as his adopted hometown. He attended luncheon in his honor and visited NASA's Michoud Assembly Facility. (W Post, 9/7/69, A3)

September 7: Self-testing-and-repairing (STAR) computer to direct unmanned spacecraft on multiyear missions to outer planets and intergalactic space had passed preliminary tests and would begin full-scale ground operation at JPL during week, JPL announced. Believed first computer capable of detecting its own failures and repairing itself, STAR had been developed by Dr. Algirdas A. Avizienis, JPL computer expert, who was trying for 90% probability that it would last 15 yrs, to control operations to Neptune or Pluto in solar system Grand Tours scheduled for late 1970s. During 9-to-11-yr minimum lifetime, STAR would automatically switch on up to three backup units to replace defective parts. By 1974, more modest model might replace defective parts twice for use on shorter missions like one to Jupiter. STAR could also aid in hospital and supersonic-aircraft automation. (JPL Release 532)

September 8: NASA's 363-ft-tall Saturn V launch vehicle, tipped with Apollo 12 spacecraft scheduled to carry astronauts toward moon Nov. 14, was placed on launch pad at KSC. (AP, W Post, 9/9/69, A2)

. MSFC announced selection of McDonnell Douglas Corp. to receive 11-mo, $2,899,986 contract for preliminary design and planning for 12-man earth-orbital space station for possible mid-1970 launch. Station--initial element of large space base and means of investigating effects of long-duration space flight on man--would have 10-yr lifetime, subject to expendables resupply and crew rotation. Parallel effort was being conducted by MSC and North American Rockwell Corp. (MSFC Release 69-204)

. Mexican President Gustavo Diaz Ordaz announced in Coahuila, Mexico, that President Nixon had accepted invitation for Apollo 11 astronauts to start round-the-world tour in Mexico. He repeated congratulations to

September 8 (continued)
Government and U.S. people on Apollo 11 success. "The United States gave proof of its greatness when it achieved this triumph, but it became even greater when they understood it and accepted it as a triumph of all humanity." President Nixon was in Mexico to attend dedication of Amistad Dam on Rio Grande. (PD, 9/15/69, 1241)

September 9: NASA's X-24A lifting-body vehicle, piloted by Maj. Jerauld R. Gentry (USAF), reached mach 0.6 after air-launch from B-52 aircraft at 40,000-ft altitude over South Rogers Lake Bed, Calif. Purposes of flight, fourth in series, were to evaluate stability and control derivatives at upper flap positions, determine handling qualities, and obtain flow visualization motion pictures of tufts on vehicle's aft portion. (NASA Proj Off)

. Aerobee 150 MI sounding rocket, launched by NASA from WSMR with VAM-20 booster, carried Cornell Univ. payload to 97.8-mi (157.4-km) altitude to examine sky in far infrared (5μ-1,600μ), using copper-doped-germanium, two gallium-doped-germanium, and indium-antimonide detectors. Loss of residual helium at 162 secs disabled attitude-control system. Timing failed in experimental payload and no useful scientific data were obtained. Some useful engineering data were collected. (NASA Rpt SRL)

. FRC announced award of $1.8-million NASA contract to North American Rockwell Corp. for construction of new supercritical aircraft wing. Wing, which utilized airfoil shape with flat top and rear edge curved downward, had been developed by Dr. Richard T. Whitcomb and tested at LaRC. Wind tunnel tests indicated new shape could allow highly efficient cruise flight at nearly 600 mph at 45,000-ft altitude. By increasing cruise speeds without increasing power, wing might significantly reduce operational cost of subsonic jet transport flights and allow faster travel, lower fuel consumption and costs, increased operational range, or increased payload. Wing would be mounted on modified Navy F-J fighter aircraft at FRC for flight-testing. (FRC Releases 4-69, 15-69)

. Former NASA Apollo Program Director, M/G Samuel C. Phillips (USAF), received Distinguished Service Medal from Secretary of the Air Force, Dr. Robert C. Seamans, Jr., in Pentagon ceremonies. Award was for achievements with NASA from December 1964 to August 1969. Gen. Phillips had left NASA to become commander of USAF Space and Missile Systems Organization (SAMSO) in Los Angeles. (AFJ, 9/27/69, 8)

September 9: At Apollo 11 splashdown party at Shoreham Hotel in Washington, D.C.--attended by Apollo 11 astronauts and wives--NASA Administrator, Dr. Thomas O. Paine, announced new Apollo Achievement Award of lapel button and certificate. He presented awards to NASA Associate Administrator for Manned Space Flight, Dr. George E. Mueller; former Apollo Program Director, L/G Samuel C. Phillips (USAF); and Deputy Director of Apollo Program George H. Hage. (Beale, W Star, 9/10/69, F1)

. At first day ceremonies for commemorative moon landing stamp in Washington, D.C., Postmaster General Winton M. Blount presented Apollo 11 Astronauts Neil A. Armstrong, Edwin E. Aldrin, Jr., and Michael Collins and NASA Administrator, Dr. Thomas O. Paine, with albums containing 32 stamps each. He said: "In the largest sense we pay tribute today to the spirit of man. We cannot separate the accomplishments of Apollo 11 from those of Vostok 1; we cannot separate the contributions of Michael Collins, or Edwin Aldrin or Neil Armstrong from those of Goddard and Einstein, Kepler and Newton, Copernicus and Galileo. We know this. And in the knowing again we find hope. For if men of all nations, together, can achieve dominion over the heavens, men of all nations, together, can achieve peace on earth for all men for all time."

Armstrong said astronauts had deferred cancellation of stamps until they were reunited in CM, July 22. They had then grasped canceler simultaneously and pressed it upon die-proof version of commemorative stamp affixed to unaddressed envelope. Cancellation date remained July 20, day of lunar landing. (PO Dept Release 135; Shandler, W Star, 9/10/69, A3)

September 10: Nike-Apache sounding rocket launched by NASA from NASA Wallops Station carried Univ. of Illinois-GCA Corp. payload to 127.4-mi (205-km) altitude to measure electron density, collision frequency, and temperature in lower ionosphere on quarterly world day. Payload included dual-frequency propagation experiment. Rocket altitude was nominal but range was only one-fourth that predicted. Instrument performance was excellent and good data were expected from all experiments. (NASA Rpt SRL)

. Paul G. Dembling, NASA General Counsel since January 1967, became NASA Deputy Associate Administrator. Dembling, who had joined NACA in 1945, had been principal drafter of bill which became National Aeronautics and Space Act of 1958 and had received NASA Distinguished Service Medal in 1968 for contributions to development of legal framework of U.S. aeronautical and space activities. (NASA Release 69-131)

September 10: Study of lunar samples was "bringing to light as many mysteries as it unravels," New York Times editorial said. Theorists were cautious, with evidence from one small area, Tranquility Base. "It is likely that the picture will become still more complex when a representative collection of samples becomes available from ten, twenty or thirty areas spread over the entire lunar surface. But even the limitations of the present data suggest strongly that the moon is very different from earth, and therefore has much to teach human science about the origin and evolution of the solar system. The case for intensive scientific study of the moon--conducted in part by geologists and other scientists sent there for on-the-spot investigation--is strong." (NYT, 9/10/69, 40)

September 11: Press conference on results of Mariner VI (launched Feb. 24) and Mariner VII (launched March 27) was held at NASA Hq. Some 200 TV pictures of Mars were taken by two Mariners, including 57 high- and medium-resolution views of selected Martian surface areas from altitude of only few hundred miles. Spacecraft sampled Martian atmosphere for temperature, pressure, and chemical constituency and measured surface temperatures in effort to correlate thermal characteristics with features observed in TV pictures. Data indicated Mars was heavily cratered, bleak, cold, dry, nearly airless, and generally hostile to any earth-style life forms.

Dr. Robert B. Leighton of Cal Tech said success of TV experiment on spacecraft could be easily shown by comparing actual picture return with projected picture return. "We got nine times the number of far encounter pictures that were originally proposed [few years ago], 20 per cent more near encounter pictures than were proposed, and 1,100 digital pictures which were entirely impossible according to schemes at the time of the proposal.... After Mariner 4 Mars seemed to be like the moon. At last Mariners 6 and 7 have shown Mars to be like Mars and have brought out Mars' own characteristic features, some of them unknown and unrecognized elsewhere in the solar system."

Dr. Robert P. Sharp of Cal Tech said Martian terrain could be divided into three types--crater, featureless, and chaotic. Cratered terrain was widespread and common on Mars and resembled moon. Featureless terrain was represented by Hellas area, which appeared to be upland area, 150-mi-wide zone that gently sloped into flat featureless floor. Chaotic terrain had series of "short ridges, little valleys, and irregular, jumbled topography." Chaotic and featureless terrain appeared to be distinctly Martian, suggesting "that on Mars we have either a difference in processes that are operating on the surface or within the crust or we have a difference of material from one place to

September 11 (continued)

another on Mars and different than on the moon, or, more likely, a combination of both.... We also have good reason for believing that the evolutionary history has been somewhat different. Again, there are scars on the face of Mars that we do not see on the face of the moon. And there have perhaps been episodic events in Martian history that are unique to the planet Mars. We end up with the conclusion that Mars is its own planet."

Dr. George C. Pimentel of Univ. of California at Berkeley said reevaluation of initial data from infrared spectrometer had shown infrared spectral features earlier ascribed to methane and ammonia were actually due to previously undiscovered absorptions of solid carbon dioxide. Reflection peak recorded three times in atmosphere off Mars' bright limb showed presence of solid carbon dioxide at high altitudes and at latitudes north of polar cap. Broad absorption near 9μ recorded on bright limb was ascribed to solid silica or silicate material and broad absorptions near 12μ recorded near dark limb were tentatively ascribed in part to solid carbon dioxide above ground. Further experimental work was in progress to refine thermal map.

Initial results of UV spectrometer experiment were detection of ionized carbon dioxide, carbon monoxide, atomic hydrogen, and oxygen. Nitrogen and nitric oxide were not detected and no evidence was found of clouds, blue haze, or any appreciable atmospheric absorption of UV radiation. Dr. Charles A. Barth of Univ. of Colorado said important point "is that the atmosphere of Mars is different than the atmosphere of the earth. If I showed you a spectrum taken the same way from the upper atmosphere of the earth, we would see a plentiful number of nitrogen bands. We could see emissions from nitric oxide. We could see emissions from atomic nitrogen. None of those features is present in the atmosphere of Mars...."

Dr. Norman H. Horowitz of JPL presented biological implications of Mariner 1969 results. "There is nothing in the new data that encourages the belief that Mars is a body of life. But the results don't exclude this possibility.... The Mariner 6 and 7 data strengthen the previous conclusion that the scarcity of water on Mars is the most serious limiting factor for life as we know it on this planet.... Mars is a cold desert by terrestrial standards. If there is life on Mars, it must be a form of life that can utilize water in the form of water vapor or ice. And it is possible to make even extensions of our own terrestrial life, evolutionary adaptations, being able to live under these conditions...." (Transcript; NASA News Release)

September 11: President Nixon announced intention to nominate Secor D. Browne to be member of Civil Aeronautics Board for remainder of term expiring Dec. 31, 1974. He would replace John H. Crooker, who had resigned effective Sept. 30. Browne would also be designated CAB Chairman. (PD, 9/15/69, 1249)

September 12: NASA began distribution, at MSC, of about 18 lbs (8.2 kgs) of lunar material to 106 U.S. scientific investigators and 36 in eight other countries for university, industrial, and government laboratory analyses. Lot comprised one-third of lunar samples returned by Apollo 11. Another 15% would be kept as examples of Tranquility Base material. Remainder would be held for later scientific experiments, with small amount possibly available on loan for public display. Material had been quarantined in LRL since its July 25 return; tests on animal and plant life had shown no ill effects. Interagency Committee on Back Contamination had approved release of samples to principal investigators or their representatives whose plans for safeguarding material had been approved by MSC officials.

Preliminary LRL examinations had disclosed two basic rock types, compacted lunar soil and igneous rocks; rocks had been on lunar surface from 10 to 150 million yrs; and igneous rocks had crystallized from 3 to 4 billion yrs ago. Approximately 3 kgs of samples would be destroyed during experiments; residues and remaining 5.1 kgs would be returned to NASA. Results of analyses were to be reported early in 1970.

Among measurements to be made were those of: physical properties of rocks or soil to help in understanding optical observations of moon from earth and future seismic experiments; mineralogy and petrology to show mineral content, amount of water present when rocks crystallized, and how surfaces were eroded by particles; chemical composition of rocks and fines to determine concentration of 92 elements occurring on earth and in meteorites, times of crystallization of igneous rocks, and periods rocks had lain on lunar surface. Studies of rare gases in soil would furnish first data on isotopic compositions of solar materials. Biologists and organic chemists would determine structures and abundances of carbon compounds in and on lunar surface and their origin; catalog microstructures in terms of organized elements and microfossils; and define presence or absence of viable lunar organisms. (NASA Release 69-130)

. Spencer M. Beresford, former special counsel of House Committee on Science and Astronautics, was appointed NASA General Counsel succeeding Paul G. Dembling, new NASA Deputy Associate Administrator [see Sept. 10]. (NASA Release 69-173)

September 12: White House announced President's Science Adviser, Dr. Lee A. DuBridge, would visit four Western and two Eastern European countries in September and October to discuss arrangements for international scientific and technological cooperation and explore specific possibilities for strengthening existing arrangements. (PD, 8/15/69, 1251)

. Reuters said NASA had accepted offer of French sculptor Marcel Recher to build 140-ft "Platform for the Conquest of the Cosmos" at KSC as memorial to first lunar landing. Recher was looking for sponsor to contribute $145,000 for project. (W Post, 9/11/69, A3)

. Dec. 15 debut of Boeing 747 would be delayed by six to eight weeks, Boeing Co. said. Pratt & Whitney Div. of United Aircraft Corp. had encountered problems in meeting performance goals in 362-passenger aircraft's engines. (NYT, 9/13/69, 46)

September 13: Aerospace Corp. announced election of Dr. T. Keith Glennan, President Emeritus of Case Institute of Technology and first NASA Administrator (1958-1961), as Chairman of Board of Trustees. Sherrod E. Skinner retired as Chairman and L/G James H. Doolittle (USAF, Ret.), Vice Chairman, also retired during annual meeting of Board of Trustees. Skinner and Gen. Doolittle were awarded USAF Exceptional Service Award by Under Secretary of the Air Force John L. McLucas in El Segundo, Calif., ceremony Sept. 12. (Aerospace Release; CR, 9/25/69, E7813)

. Smithsonian Institution Curator of Meteorities, Dr. Kurt Fredriksson, arrived in Washington, D.C., carrying 10 gr of lunar material from LRL in nitrogen-filled plastic bag inside steel briefcase. One of six men in U.S. who had studied lunar samples, he later said Smithsonian scientist Dr. Bryan H. Mason, currently in Australia, would receive another 10-gr set. (Conroy, W News, 9/16/69, 5)

September 14: NASA announced availability of Earth Photographs from Gemini VI Through XII (NASA SP-171), collection of best 250 pictures taken between 1965 and 1967 from altitudes between 99 and 850 mi as Gemini spacecraft orbited earth. First and last views were of Cape Kennedy, with views of principal areas within 30° latitude of equator between. (NASA Release 69-129)

September 15: Space Task Group presented report The Post-Apollo Space Program: Directions for the Future to President Nixon at White House. It recommended basic goal of balanced manned and unmanned space program conducted for all mankind, with emphasis on increased utilization of space capabilities for services to man through expanded space applications program; enhancement of U.S. defense posture for world peace and security through exploitation of space techniques for military missions; continuing strong program of lunar and planetary exploration, astronomy, physics, and earth and life sciences; development of new systems and technology for space operations, emphasizing commonality, reusability, and economy through development of new space transportation capability and space station modules; and promotion of world community through program of broad international participation and cooperation.

As focus for development of new capability, Task Group recommended U.S. accept long-range goal of manned planetary exploration with manned Mars mission before end of century. Activities leading to goal should include initial concentration on dual theme of exploiting existing capability and developing new one while maintaining program balance within available resources; operational phase using new systems and capabilities in earth-moon space, with men living and working in that environment for extended periods; and manned exploration missions out of earth-moon space, using experience of earlier two phases. Schedule and budgetary implications of phases were subject to Presidential choice, with detailed program to be determined in normal annual budget and program review.

Report outlined three possible NASA programs for manned Mars landing before century's end. Option I would launch manned mission in mid-1980s and would establish orbiting lunar station, 50-man earth-orbiting space base, and lunar surface base. Funding would rise from current $4-billion level to $8- to $10-billion level in 1980. Decision to proceed with development of space station, earth-to-orbit shuttle, and space tug would be required in FY 1971. Option II would include Mars mission launch in 1986, allowing for evaluation of unmanned Mars mission results before final designation of landing date and require about $8-billion maximum annual expenditure in early 1980s. Option III would include initial development of space station and reusable shuttles, as in Options I and II, but would defer decision on manned Mars landing date while maintaining goal of after 1980 but before close of century. Concurrent development of space transportation system and modular space stations would require rise in 1976 annual expenditures to $5.7 billion, while their development in series would entail $4- to 5-billion funding level.

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Recommended DOD options were: (A) program of full military space capability in case of overt threat to national security, (B) development of efforts to counter known and accepted projections of security threat and increase in development activities if threat increased, and (C) program of lower level system deployment with technology and support effort necessary for contingency planning on assumption that lessening of world tensions would reduce emphasis on national defense.

At White House briefing following presentation, press secretary Ronald L. Ziegler said President Nixon had concurred in Task Group's rejection of two other, extreme space programs, one to land men on Mars as soon as possible, regardless of cost, and one to eliminate manned flight program after completion of Apollo. He did not know when President would make decision on course to follow, but budgetary considerations would be major factor. (Text; PD, 9/22/69, 1291; NYT, 9/16/69, 1)

. U.S.S.R. launched Cosmos CCXCVIII from Baikonur into orbit with 162-km (100.7-mi) apogee, 127-km (78.9-mi) perigee, 87.3-min period, and 49.6° inclination. Satellite reentered same day. (GSFC SSR, 9/15/69; SBD, 9/19/69, 81)

. Lunar Rock Conference was held at Smithsonian Institution, with participation of Dr. Thomas O. Paine, NASA Administrator; Dr. Henry J. Smith, NASA Deputy Associate Administrator (Science); and Lunar Receiving Laboratory scientists. During conference NASA released PET Summary of Apollo 11 Lunar Samples, report of 60-day preliminary examination of 48 lbs of Apollo 11 lunar samples in LRL by university and Government scientists on NASA Preliminary Examination Team (PET).

Report confirmed existence of unexplained erosion process on lunar surface indicated in Ranger, Lunar Orbiter, and Surveyor photos, "unlike any process so far observed on earth"; said unique chemical composition (that of silicate liquid) of Tranquility Base fines and igneous rocks "implies either the composition of the rock from which the liquid was derived differs significantly from that of the mantle of the earth, or that the mechanism by which the liquid was formed differs from analogous terrestrial processes"; and concluded there was "very good chance that the time of crystallization of some of the Apollo 11 rocks may date back to times earlier than the oldest rocks on earth."

Samples could be divided into fine- and medium-grained crystalline of igneous origin, breccias of complex origin, and fines. Crystalline rocks differed from any terrestrial rock and from meteorites in modal mineralogy and bulk chemistry. Erosion had

September 15 (continued)

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September 15 (continued)
occurred on lunar surface but there was no evidence it was caused by surface water. Probable presence of assemblage iron-troilite-ilmenite and absence of any hydrated phase indicated crystalline rocks were formed under extremely low partial pressures of oxygen, water, and sulfur. Absence of hydrated minerals suggested absence of any surface water at Tranquility Base since rocks were exposed. Rocks and fines showed evidence of shock or impact metamorphism; all rocks displayed glass-lined surface pits possibly caused by impact of small particles; and fine material and breccia contained gases that indicated they were derived from solar wind. Measurements on igneous rock indicated crystallization 3 billion to 5 billion yrs ago. Rocks had been within one meter of surface for 20 million to 160 millions yrs. Level of indigenous volatilizable and/or pyrolyzable organic material was extremely low. All rocks and fines were generally similar chemically. Major and minor constituents were same as in terrestrial igneous rocks and meteorites, but differences in composition were significant. Elements that were enriched in iron meteorites were not observed or were very low in occurrence. No evidence of biological material had been found. Tranquility Base soil was fine grained, granular, cohesive, and imcompressible, with hardness increasing at six-inch depth. It was similar in appearance and behavior to soil at Surveyor landing sites. (Program; Text; Science, 9/19/69)

. NASA announced withdrawal of three Apollo range instrumentation ships--USNS Redstone, Mercury, and Huntsville--from tracking network supporting Apollo flights. Remaining tracking ship, USNS Vanguard, would be continued on station in Atlantic about 1,000 mi southeast of Bermuda. NASA said reduction of Apollo ship support was based on high success of Apollo missions, particularly their excellent "launch on time" record. (NASA Release 69-133)

. House passed H.J.R. 775, to authorize President "to award appropriate medals honoring those astronauts whose particular efforts and contributions to the welfare of the Nation and of mankind have been exceptionally meritorious." (CR, H7870-2)

September 16: Astronauts Neil A. Armstrong, Edwin E. Aldrin, Jr., and Michael Collins reported on Apollo 11 mission to joint session of Congress called in their honor. Astronaut Armstrong said: "Several weeks ago I enjoyed the warmth of reflection on the true meanings of the spirit of Apollo. I stood in the highlands of this Nation, near

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the Continental Divide, introducing to my sons the wonders of nature and pleasures of looking for deer and for elk. In their enthusiasm for the view they frequently stumbled on the rocky trails, but when they looked only to their footing, they did not see the elk. To those of you who have advocated looking high we owe our sincere gratitude, for you have granted us the opportunity to see some of the grandest views of the Creator. To those of you who have been our honest critics, we also thank, for you have reminded us that we dare not forget to watch the trail."

Astronaut Aldrin said: "Our steps in space have been a symbol of this country's way of life as we open our doors and windows to the world to view our successes and failures and as we share with all nations our discovery. The Saturn, Columbia, and Eagle, and the extravehicular mobility unit have proved...that this Nation can produce equipment of the highest quality and dependability. This should give all of us hope and inspiration to overcome some of the more difficult problems here on earth. The Apollo lesson is that national goals can be met where there is a strong enough will to do so."

Astronaut Collins said: "We have taken to the moon the wealth of this Nation, the vision of its political leaders, the intelligence of its scientists, the dedication of its engineers, the careful craftsmanship of its workers, and the enthusiastic support of its people. We have brought back rocks. And I think it is a fair trade. For just as the Rosetta stone revealed the language of ancient Egypt, so may these rocks unlock the mystery of the origin of the moon, of our earth, and even of our solar system."

Astronauts presented Congress with two U.S. flags which previously had flown over Senate and House of Capitol and had been carried to moon aboard Apollo 11 spacecraft. (CR, 9/16/69, H7937-9)

. At Smithsonian Institution ceremony attended by Apollo 11 Astronauts, NASA Administrator, Dr. Thomas O. Paine, presented two-pound, grey, lunar rock of igneous, breccia type to Smithsonian Secretary, Dr. S. Dillon Ripley, for Smithsonian collection. It would be sealed in nitrogen-filled container covered by three-foot glass bubble and displayed to public beginning Sept. 17 for indefinite period in Arts and Industries Building. At presentation, Astronaut Edwin E. Aldrin, Jr., said: "Every human being, every animal who has looked up into the heavens has seen that rock. It is a fortunate time for mankind to look up and be able to say, 'here is the moon.'" (Smithsonian Release SI-150-69; Shelton, W Post, 9/17/69, B1)

September 16: Senate passed H.J.R. 775, "to authorize the President to award, in the name of Congress, Congressional Space Medals of Honor to those astronauts whose particular efforts and contributions to the welfare of the Nation and of mankind have been exceptionally meritorious." (CR, 9/16/69, S10630)

. New York Times editorial commented on Apollo 11 and Mariner VI and VII: "The unprecedented advances in the study both of the moon and of Mars during the past few weeks have produced a stunning crop of surprises about both celestial bodies. On the closest examination yet, these neighbors in space have proved far more complex and strange than previous theories have led men to believe. And the magnificent, lifeless desolation of the lunar and Martian surfaces emphasizes more than ever how wonderful it is and how little science understands why it is that this third planet from the sun is so uniquely green, vibrant and overrunning with life." (NYT, 9/16/69, 40)

September 17: Space Task Group report to President on post-Apollo space program [see Sept. 15] was released at White House press conference by Vice President Spiro T. Agnew and Space Task Force Group members Dr. Thomas O. Paine, NASA Administrator; Dr. Robert C. Seamans, Jr., Secretary of the Air Force; Dr. Lee A. DuBridge, Presidential Science Adviser; and William A. Anders, NASC Executive Secretary. Vice President Agnew said Group had rejected "crash program of the magnitude that would turn loose every bit of our technological ability" to achieve quickest possible manned Mars landing because "there are competing priorities in a difficult time of inflation." Group had also rejected "foregoing the substantial benefits that have come out of the Apollo program, the benefits of National prestige."

Dr. Paine said all three options recommended to President in report would enable NASA to "hold together the team" and provide "major challenge."

Dr. DuBridge said all three options held "heavy emphasis on earth applications, satellites, for studying the geology, the geography, the atmosphere of the oceans of the earth and bringing space technology directly and immediately to the benefit of the people on earth. All three programs also...include heavy emphasis on scientific programs, to extend our scientific knowledge of the earth itself, of the moon, through additional lunar expeditions, interplanetary space and additional scientific information about the moon and the planets." He also cited emphasis on international collaboration. (Transcript)

September 17 (continued)

NASA released America's Next Decade in Space: A Report for the Space Task Group. Major points had been incorporated in Task Group report [see Sept. 15]. (Text)

. First day of public display of lunar rock at Smithsonian Institution attracted 8,200 visitors, including former NASA Administrator James E. Webb. Webb said: "The rock represents all the work and all the submergence of personal ambitions that thousands put into the space effort. It proves we have the scientific, technical and managerial capability of expanding our space values for use under the sea, on the land and in the air." (Schaden, W Star, 9/18/69, B4)

. Senate adopted by 85-0 vote amendment offered by Sen. William Proxmire (D-Wis.) to S. 2546, FY 1970 military procurement authorization, which would require study and review by Comptroller General of profits made by Government agencies, including NASA, on contracts for which there had been no formally advertised competitive bidding. (CR, S10743-52)

. Rep. George A. Goodling (R-Pa.) introduced H.R. 13838 "to provide for the distribution to the several States, for display to the public... samples of the lunar rocks and other lunar materials brought back by the Apollo 11 mission." (CR, 9/17/69, H8098)

. New York Times editorial: "The space age is here to stay, but the precise contours of how far and how fast this nation will go in the decades ahead will have to be determined on a pragmatic basis, almost year by year and Administration by Administration. (NYT, 9/17/69, 40)

September 18: U.S.S.R. launched Cosmos CCXCIX from Baikonur into orbit with 219-km (136.1-mi) apogee, 207-km (128.6-mi) perigee, 89.2-min period, and 64.9° inclination. Satellite reentered Sept. 22. (GSFC SSR, 9/30/69; SBD, 9/19/69, 81)

. NASA's HL-10 lifting-body vehicle, piloted by NASA test pilot John A. Manke, reached 79,000-ft altitude and mach 1.39 after air-launch from B-52 aircraft west of Rosamond, Calif. Purpose of flight, 25th in series and 12th using engine, was to obtain stability and control data at various angles of attack in speed range around mach 1.2. (NASA Proj Off)

September 18: NASA and AEC announced successful completion of NERVA nuclear experimental rocket engine (XE) testing in Jackass Flats, Nev. Tests, conducted from March through August, had included 28 successful engine startups and 3 hrs 48 min cumulative operating time, with 3.5 min at full power (55,000-lb thrust). XE program had explored wide variety of operating modes and pressure and temperature conditions, demonstrated automatic startups using bootstrap techniques, demonstrated stability of nuclear rocket engine performance, and validated design and operation of engine test stand No. 1. XE engine runs concluded series of successful technology tests over several years. Design and development of flight-rated 75,000-lb-thrust NERVA rocket was being initiated on basis of information produced. Nuclear rocket program was managed by AEC-NASA Space Nuclear Propulsion Office. (NASA Release 69-134; AEC-NASA Release M-216)

. NASA Administrator, Dr. Thomas O. Paine, and Chairman of Indian Space Research Organization, Dr. Vikram A. Sarabhai, on behalf of India and U.S. signed agreement at NASA Hq. to provide direct TV broadcasts from satellite to some 5,000 small Indian villages. Broadcasts would be first from satellite to small receivers without ground relay. Experiment would utilize ATS-F, sixth in NASA series of Applications Technology Satellites, scheduled for mid-1972 launch. India would use experimental ground station at Ahmedabad and others to transmit TV programs to satellite, which would relay them to village receivers. Increased onboard power and deployable satellite antenna with high pointing accuracy made direct broadcast possible. (NASA Release 69-135)

. Senate began consideration of H.R. 11271, FY 1970 NASA authorization bill passed by House June 10 and reported with amendment in form of substitute bill by Senate Committee on Aeronautical and Space Sciences June 24. Sen. William Proxmire (D-Wis.) introduced new Section 7: "Of the funds authorized...$300,000,000...earmarked for operation of the Apollo missions shall not be obligated or expended until the Administrator, in consultation with the State Department, has fully explored the possibilities of international cooperation and cost-sharing in space exploration, and has reported to Congress on the results of these efforts." Efforts should include possibility of establishing international consortium with NASA as manager of operations or possibility of bringing space exclusively within U.N. jurisdiction and control, establishing "United Nations Space Council modeled after the World Health Organization." (CR, 9/18/69, S10895-907)

September 18: President Nixon addressed 24th session of U.N. General Assembly: "Of all man's great enterprises, none lends itself more logically or more compellingly to international cooperation than the venture into space. Here, truly, mankind is one: as fellow creatures from the planet Earth, exploring the heavens that all of us enjoy. The journey of Apollo 11 to the moon and back was not an end, but the beginning.

"There will be new journeys of discovery. Beyond this, we are just beginning to comprehend the benefits that space technology can yield here on earth. And the potential is enormous. For example, we are now developing earth resource survey satellites, with the first experimental satellite to be launched sometime early in the decade of the seventies. Present indications are that these satellites should be capable of yielding data which could assist in as widely varied tasks as these: the location of schools of fish in the oceans, the location of mineral deposits on land, the health of agricultural crops.

"I feel it is only right that we should share both the adventures and the benefits of space. As an example of our plans, we have determined to take actions with regard to earth resources satellites.... The purpose...is that this program will be dedicated to produce information not only for the United States, but also for the world community. We shall be putting several proposals in this respect before the United Nations. These are among the positive, concrete steps we intend to take toward internationalizing man's epic venture into space--and adventure that belongs not to one nation but to all mankind." (PD, 9/22/69, 1275-81)

. Post Office Dept. announced delay in delivery of moon landing stamp first day covers because of "unprecedented number of requests." Processing crew of 100--more than twice number normally employed--were working longer shifts with more special canceling equipment than ever before to handle "response from people all over the world." (PO Dept Philatelic Release 50)

. List of U.S. attempts during 1969 to effect cooperative space agreement with U.S.S.R. was entered in Congressional Record:

April 30, NASA Administrator, Dr. Thomas O. Paine, forwarded copy of Opportunities for Participation in Space Flight Investigations to Academician Dr. Anatoly A. Blagonravov and assured him that proposals by Soviet scientists of experiments to fly on NASA spacecraft would be welcomed. Supplements to NASA document were to be sent routinely to Soviet Academy.

September 18 (continued)

May 29, Dr. Paine invited Academician Blagonravov to attend Apollo 11 launch and to discuss, informally, mutual interests in cooperative space projects. Dr. Blagonravov had declined.

August 21, Dr. Paine invited Academician Prof. Mstislav V. Keldysh to send Soviet scientists to Sept. 11-21 briefing at NASA Hq. for investigators who might wish to propose experiments for 1973 Viking missions to Mars. Dr. Paine suggested meeting serve as opportunity for discussion of planetary exploration plans contributing to coordinated efforts beneficial to both countries. Prof. Keldysh had declined, but asked for copies of meeting materials so Soviet scientists might develop proposals. He had suggested possibility of later discussions. (CR, 9/18/69, S1095-6)

. Senate swore in Sen. Ralph T. Smith (R-Ill.) to serve unexpired term of late Sen. Everett T. Dirksen (R-Ill.) and adopted resolution assigning him to Senate Committee on Aeronautical and Space Sciences to replace Sen. Charles McC. Mathias (R-Md.), reassigned to Government Operations Committee. (CR, 9/18/69, S10763)

. Senate passed by voice vote S. 1857, FY 1970 NSF authorization of $487,150,000. (CR, 9/18/69, S10764-70)

. Senate passed by record vote of 81 to 5, S. 2546, FY 1970 military procurement authorization which included amendment requiring study and review by Comptroller General of profits on Government contracts for which there had been no advertised competitive bidding [see Sept. 17]. (CR, 9/18/69, S10888-91)

September 19: Canadian Black Brant IV sounding rocket was launched by NASA from Barreira do Inferno, Natal, Brazil, carrying MSC-Univ. of California payload to provide detailed scientific measurements of charged particles environment in South Atlantic Anomaly region. Secondary objectives were to measure magnetic field strength and flight-evaluate payload telemetry-system performance. Rocket reached 532-mi (856-km) altitude, with performance higher than expected. All experiments performed satisfactorily and data were obtained on all channels. (NASA Rpt SRL)

. Senate passed by voice vote H.R. 11271, FY 1970 NASA authorization of $3.716 billion, allocating $3.020 billion for R&D, $58.2 million for construction of facilities, and $637.4 million for research and program

September 19 (continued)
management. Total was $250.85 million less than had been passed by House June 10 [see also June 24]. Senate insisted on its amendments and requested conference with House. (CR, S10977-99, 11002; Text)

. White House announced Apollo 11 astronauts would make 22-nation tour starting Sept. 29, to stress U.S. willingness to share space knowledge. Itinerary would include Mexico City; Bogota, Colombia; Buenos Aires, Argentina; Rio de Janeiro, Brazil; Las Palmas, Canary Islands; Madrid; Paris; Amsterdam and Brussels; Oslo; Cologne, Germany; Berlin; London; Rome; Belgrade, Yugoslavia; Ankara, Turkey; Kinshasa, Congo; Teheran, Iran; Bombay, India; Dacca, Pakistan; Bangkok, Thailand; Darwin and Sydney, Australia; Guam; Seoul; Tokyo; Honolulu; and return to Houston, Tex., Nov. 5. Additional trip to Ottawa and Montreal, Canada, was planned for December. (UPI, NYT, 9/20/69, 5)

. U.K.'s first lunar samples--3 oz of moon dust in 16 contamination-proof boxes--arrived in London and were shown to scientists and press at Science Research Council. Dr. S. O. Agrell of Cambridge Univ. and Dr. P. E. Clegg of London Univ. had flown to MSC to collect them. They would be scrutinized by 14 British research teams. (AP, Kansas City Times, 9/20/69)

. French scientists, using "world's most powerful laser" at Limeill Weapons Research Center of French Atomic Energy Commission near Paris, had generated succession of tiny thermonuclear explosions, Walter Sullivan said in New York Times. It was important step toward taming hydrogen bomb energy and underlined concern of scientists that lasers might simplify design of devastating nuclear weapons. (NYT, 9/19/69, 1)

. Report of President Nixon's Task Group on Space and Apollo 11 astronauts' speeches to Congress [see Sept. 16] had "brought some rationality back to the discussion of whither the space program," Washington Post editorial said. Acceptance by President of recommendation "would eliminate talk of abandoning manned space flight, which would be a foolish course of action, or of proceeding toward Mars in a crash effort to get there as quickly as possible." It was important "for the nation to push ahead on the immediate recommendations of the Task Group--exploring the moon, developing the tools that are needed for systematic exploitation of our space travel capability, and extracting from the space program more benefits for those of us who are earthbound." (W Post, 9/19/69)

September 21: Washington Sunday Star commented on display of moon rocks at Smithsonian Institution: "The lunar chunk does indeed look like something that, if it turned up in a Bethesda [Md.] backyard, would not draw a second glance. And yet it is something that, until two months ago, no man had seen before.... It is a promise of unimagined things to come." Judging by crowds queued up, "Smithsonian has booked its best act since the Mona Lisa came to town six years ago." (W Star, 9/21/69, C1)

. Parade magazine called for establishment of July 4, 1976--200th anniversary of U.S.--as national deadline for conquering some of earth's social problems. "Having harnessed our special strengths--money, men, materials and the organizational genius to control them--we conquered space before 1970. Why can we not conquer some of our social problems on earth by 1976?" (Parade, 9/21/69, 1)

. "The notion has occurred to more than one person that NASA, having reached the moon and now fearing its way to the planets possibly blocked by budgetary obstacles, might find the requisite new worlds to conquer right here, at home," William Hines said in Washington Sunday Star. It was "fundamental precept of modern technology that anything which can be imagined can be accomplished. A cure for cancer, an end to poverty, a cleanup of the environment, termination of the Vietnam war, even effective nuclear disarmament? If it is conceivable it is achievable." While NASA could be depended on to give good account of itself in scientific and engineering situations, "its ability to handle problems with a big 'people' component is largely untested." Since "people-problems" were predominant these days, maybe NASA wouldn't work out so well after all. "But on the second thought, no other government agency is showing much flair for coping with the human element, either." (W Star, 9/21/69, C4)

September 22: USAF launched unidentified satellite from Vandenberg AFB by Thorad-Agena booster into orbit with 157.2-mi (253-km) apogee, 110.0-mi (177-km) perigee, 88.7-min period, and 85^{0} inclination. (GSFC SSR, 9/30/69; UPI, W Post, 9/23/69, A20)

. President Nixon announced appointment of NAS President, Dr. Philip Handler, to President's Science Advisory Committee. He would replace Dr. Frederick S. Seitz, President of Rockefeller Univ. in New York. (PD, 9/29/69, 1335; W News, 9/23/69, 44)

September 22: President Nixon announced establishment of series of Presidential task forces, including Task Force on Oceanography, to review public and private efforts in oceanography and suggest actions to accelerate development of "increasingly important area of exploration"; and Task Force on Science Policy, to review present policy and make recommendations for future scope and direction. (PD, 9/29/69, 1304)

September 23: U.S.S.R. launched Cosmos CCC into orbit with 189-km (117.4-mi) apogee, 183-km (113.7-mi) perigee, 88.0-min period, and 51.5° inclination. Satellite reentered Sept. 27. (GSFC SSR, 9/30/69; SBD, 9/25/69, 106)

. Aerobee 150 MI sounding rocket, launched by NASA from WSMR with VAM-20 booster, carried Univ. of Hawaii payload to 108.4-mi (174.4-km) altitude. Objectives were to obtain high-resolution spectra of solar disc from 1,800 Å to 2,000 Å, using high-resolution echelle grating spectrograph pointed by Univ. of Colorado biaxial pointing control. Rocket and instruments functioned satisfactorily and photographic spectra were obtained on both camera cycles. (NASA Rpt SRL)

. President Nixon announced decision to continue development of SST. "The supersonic transport is going to be built. The question is whether in the years ahead the people of the world will be flying in American supersonic transports or in the transports of other nations...whether the United States, after starting and stopping this program...finally decides to go ahead.... I have made the decision that we should go ahead...because I want the United States to continue to lead the world in air transport. And it is essential to build this plane if we are to maintain that leadership.... I have made the decision, also, because...through this plane we are going to be able to bring the world closer together in a true physical and time sense.... This is a massive stride forward in the field of transport." President said prototype would be flown in 1972. (PD, 9/29/69, 1309)

. President Nixon would ask Congress to appropriate $662 million over five years to assist in SST development, Secretary of Transportation John A. Volpe announced. Federal Government would spend estimated $761 million through FY 1974, including $99 million in funds already appropriated, to construct and flight-test two prototype Boeing SST models. Total development cost was estimated $1.5 billion, with $1.3-billion Government participation to be repaid from sale of approximately 300 aircraft capable of carrying 300 passengers each at maximum 1,800-mph speeds. (DOT Release 21069)

September 23: USA Atmospheric Sciences Laboratory helium-filled balloon was successfully launched from WSMR, carrying 70-lb scientific payload to measure ozone concentration, cosmic radiation, and atmospheric pressure, temperature, and density at 160,000-ft altitude. The 600-ft-tall, 1,700-lb balloon drifted to New Mexico where it released payload for recovery on ground. Data would be used for number of WSMR projects. (USAF PIO; UPI, W News, 9/24/69, 9)

. Associated Press quoted Col. Edwin E. Aldrin (USAF, Ret.) as saying NASA had rejected his proposal to postpone Apollo 12 and run it in tandem with Apollo 13 so crews could protect or rescue each other in emergency. Aldrin was father of Apollo 11 Astronaut Edwin E. Aldrin, Jr., and a NASA safety consultant. NASA Manned Space Flight Safety Director Jerome F. Lederer had called proposal impractical, "tremendously expensive, and I don't know if it could be done." Lederer had said there was no question that astronaut rescue capability from lunar surface or orbital emergency must be provided, but it was "out of the picture for Apollo." (Haughland, AP, W Star, 9/22/69, A4)

. Fédération Aéronautique Internationale posthumously awarded its highest honor--Gold Medal--to NASA test pilot Joseph A. Walker for "his many enduring contributions to the advancement of aviation made during a 21-year flight research career marked by extraordinary perfection and valor." Award was received by his widow at Edwards AFB ceremony. As FRC chief research pilot, Walker had flown X-15 to its highest altitude, 354,200 ft (67 mi); was first man to fly LLRV astronaut training craft; was author of 20 technical papers and articles; and had taught Apollo 11 commander Neil A. Armstrong at FRC. (FRC Release 17-69)

. MSFC announced award of $19,073,032 modification to IBM contract for fabrication, checkout, and delivery of 27 instrument units for Saturn IB and Saturn V boosters. Modification revised delivery schedule, extended performance period 15 mos, and provided for assessment of certain MSFC engineering change requests. (MSFC Release 69-214)

. FAA, Air Transport Assn., and manufacturers McDonnell Douglas Corp., Bendix Corp., and Wilcox-Sierra successfully flight-tested three separate but compatible devices composing aircraft collision avoidance system (CAS) capable of issuing microsecond warning. Tests were held at Martin-Marietta Airport, Baltimore. CAS included cesium atomic clock so precise that watch of similar construction would lose only one second in 67 yrs. System operated like balloon around aircraft which, when penetrated by similarly equipped plane, provided pilots with command to make evasive

September 23 (continued)
maneuver. All aircraft would need system for it to be effective. System, product of $12-million, 13-yr R&D, could be operational by 1971. (Yarbrough, W Star, 9/24/69, A7)

. In Paris press conference Presidential Science Adviser, Dr. Lee A. DuBridge, and French Minister for Industrial and Scientific Development Francois X. Ortoli announced plans to increase flow of scientists and specialists between France and U.S. to broaden scientific and technical cooperation in wide areas, including nuclear research for peaceful purposes. (W Post, 9/24/69, A22)

September 24: Two photometers on board NASA's OGO V orbiting geophysical observatory (launched March 4, 1968) had successfully scanned Lyman-alpha radiation, NASA announced. Data were expected to provide new information on Lyman-alpha emission from Milky Way and to help determine what portion of observed radiation was from geocorona and what portion was from outer space. On Sept. 12 OGO V had pointed at sun and spun slowly while scanning mirror in Univ. of Paris experiment rotated, covering 30° of celestial sphere. On Sept. 14 spacecraft returned to normal three-axis-stabilized operation, where it would remain until December when second series of maneuvers would be conducted to cover remaining portion of sky and provide first complete mapping of extra-terrestrial Lyman-alpha radiation. Univ. of Colorado photometer, which provided broader coverage of Lyman-alpha radiation at 180° to Univ. of Paris experiment, would be used to confirm measurements and verify calibration levels.

OGO V had 18 of 24 onboard experiments still operating. It had provided first measurements of electric fields in earth's bow shock and comprehensive data on particles and fields in earth's magnetosphere. (NASA Proj Off; NASA Release 69-137)

. U.S.S.R. launched Cosmos CCCI from Baikonur into orbit with 279-km (173.4-mi) apogee, 192-km (119.3-mi) perigee, 89.2-min period, and 65.4° inclination. Satellite reentered Oct. 2. (GSFC SSR, 9/30/69; 10/15/69; SBD, 9/25/69, 106)

. NASA's X-24A lifting-body vehicle, piloted by Maj. Jerauld R. Gentry (USAF), reached mach 0.62 after air-launch from B-52 aircraft at 40,000-ft altitude over South Rogers Lake Bed, Calif. Purpose of flight, fifth in series, was to obtain data on upper-flap control effectiveness, handling qualities during change from lower-flap to upper-flap control, and effect of rudder postion on air flow around tail. (NASA Proj Off)

September 24: Aerobee 150 MI sounding rocket, launched by NASA from WSMR with VAM-20 booster, carried Univ. of Colorado Laboratory for Atmospheric and Space Physics payload to 124-mi (199.5-km) altitude. Objective was to obtain high-resolution spectra of Carbon IV resonance doublet at 1,548 Å and 1,550 Å using high-resolution, narrow-band spectrograph with echelle as principle dispersing element and SPARCS solar pointing control. Rocket and instruments functioned satisfactorily. (NASA Rpt SRL)

. Bert Greenglass, former head of Apollo program Control Office at KSC, and later Deputy Director of Management Systems Div. in NASA Office of Technology Utilization, had joined HUD as Director of Management Information and Program Control Systems. (W Star, 9/24/69)

. Board of Investigation which probed Feb. 17 death of Sealab III Aquanaut Berry L. Cannon had concluded probable cause was carbon dioxide poisoning due to faulty diving gear, USN announced. Gear had lacked substance for filtering carbon dioxide from exhaled breath. Associated Press said Sealab III project had been "shelved" because of insufficient funds for FY 1970 and quoted USN spokesman as saying it would be continued later. Sealab habitat was undergoing repairs near San Francisco. Project had been suspended since Cannon death. (DOD Release 794-69; W Star, 9/24/69, A9)

. Shawbury, England, innkeeper Jack Warner had asked U.S. Government for license to open first pub on moon, Associated Press said. He would call it The Space Inn or The Lunatic Tavern. (W Star, 9/24/69, A16)

September 25: Apollo 9 commander James A. McDivitt was appointed Manager of Apollo Spacecraft Program at MSC, replacing George M. Low who was temporarily on special assignment to MSC Director to plan future MSC programs and work on organizational matters. (MSC Release 69-66)

. East Germany's People's Chamber unanimously ratified nuclear nonproliferation treaty. West Germany had not yet signed. (P Inq, 9/25/69)

. House Committee on Science and Astronautics reported favorably S. 1287, which authorized appropriations for FYs 1970, 1971, and 1972 for metric system study. (CR, 9/25/69, H8488)

September 26: Glazing discovered on lunar surface by Apollo 11 astronauts was analyzed in Science by Thomas Gold of Cornell Univ., senior investigator for close-up photography. Glossy surfaces similar to glass found clumped in centers of small lunar craters appeared to have been swept in after craters had been formed. Glazed areas were also concentrated toward tops of protuberances and, in some cases, droplets appeared to have run down inclined surface and congealed on sides. Glazing phenomena might have originated from effect of exhaust of LM descent stage, splashing of liquid drops from larger impact elsewhere, shock heating or volcanism on moon, same impact that created craters in which glazing was found, or intense radiation heating. Intense radiation was most probable cause, Gold said. Source could have been impact fireball on moon, impact fireball on earth, or most likely, solar outburst in geologically recent times. (Science, 9/26/69, 1345-9)

. In address at Clarkson College of Technology in Potsdam, N.Y., Dr. Thomas O. Paine, NASA Administrator, said: "We know that hydrogen bombs work (unfortunately)--the Lord made the Universe that way. And, of course, we know that (fortunately) fusion energy keeps the sun shining every day. Our great visionary dream is to find out how to unlock this energy for spaceship propulsion. This is a great challenge but consider the new tools that we have available: giant magnetic fields with superconducting magnets, tremendous power densities from lasers, the great energy of nuclear power, and new high temperature materials. These, with new plasma dynamic developments, may usher in fusion power in the eighties, the nineties, or in the next century. Harnessing fusion power for propulsion is an even farther-out challenge, but it could prove to be one of the more direct applications. We won't have to convert the fusion energy to electricity; just fuse a couple of deuterium atoms and then let them blast out the back of the vehicle!

"So fusion remains a tantalizing promise for the future.... If we ever do achieve such propulsion, we'll be able to move with some ease out from our little 8,000-mile-diameter Solar System. All of the 9 planets, 32 moons and 1600 known asteroids will come within reach of our vehicles. And, indeed, if we could achieve high efficiencies in a fusion propulsion process, we could talk of eventual relativistic velocities, of time compression, and of travel to the nearest stars." (Text)

. Venus, "least understood of the inner planets," should be U.S. space program priority target, Kitt Peak National Observatory physicist Dr. Donald M. Hunten and Harvard Univ. physicist Dr. Richard M. Goody said in Science. Some fundamental data were available; quantitative theories had been stated; questions about atmosphere could be answered

September 26 (continued)
by feasible missions; and geophysists' interest had been aroused and offered specialized knowledge needed to understand complex processes. But NASA had no present plans for investigation of Venus' lower atmosphere. Uncertainty as to Soviet intentions had been cited as reason for giving Venus low priority. But until collaboration with U:S.S.R. and other European countries could begin, "we have no choice but to base our judgment upon our own scientific and technical abilities and desires. Our program should be flexible enough to accommodate new information from any source; if it stretches our capability and imagination to the limit, we need not fear its ultimate value." (Science, 9/26/69, 1317-23)

. Wall Street Journal editorial: "While there will be debate on the Administration's approval of a go-ahead on the supersonic transport, the President plainly picked the proper method for financing further development of the controversial plane. Earlier there had been talk of setting up a special SST authority that would raise money by selling Government-guaranteed bonds to the public. The idea never had much to recommend it. At the moment the SST faces an uncertain economic future.... If the plane is a flop, the Government would be stuck one way or the other. ...the bond plan would ease the current pressure on the Federal budget. But it also would fool at least part of the public about the financial risk that the Government actually is assuming.... Whether one especially relishes the notion or not, supersonic travel is sure to come sooner or later. In heading toward that development, the Administration is wise to avoid financial subterfuge." (WSJ, 9/26/69)

September 27: Evidence for detection of high-energy cosmic gamma radiation (above 50 mev) from point source in constellation Sagittarius was reported in Nature. Case Western Reserve Univ. physicists G. M. Frye, Jr., J. A. Staib, and A. D. Zych and Univ. of Melbourne (Australia) physicists V. D. Hopper, W. R. Rawlinson, and J. A. Thomas presented preliminary results from collaborative program in which two high-altitude balloon flights were made from Parkes, Australia, Feb. 5-6 and Feb. 26-27. Object was first such point source of gamma rays detected in heavens. Research was supported by NASA, NSF, and Australian Research Grants Committee. (Nature, 9/27/69, 1320-1; Sullivan, NYT, 10/2/69, 33)

. Satellite system which combined navigational and air traffic control and collision prevention had been proposed to FAA and DOD by TRW Inc. Systems Group, Washington Evening Star reported. Proposal called for four satellites, one in permanent orbit with others revolving around it at lower altitudes. Aircraft would radio distinct signal to satellites and its

September 27 (continued)
position relative to two or more satellites would be determined by ground computers that could figure precise latitude and longitude of aircraft within 50 ft. System, based on delicate measurement of time for aircraft signals to reach satellite, would cost estimated $100 million, could be in operation by mid-1970s, and was also being proposed to aviation industry. (Lannan, W Star, 9/27/69, A11)

September 28: In telephone call to Apollo 11 commander Neil A. Armstrong on eve of Apollo 11 astronauts' round-the-world tour, President Nixon asked astronauts to invite foreign countries to become "partners in space" with U.S. He also invited astronauts and wives to White House dinner Nov. 5. (UPI, W Star, 9/29/69, A3)

. Washington Post columnist Franklin R. Bruns, Jr., said 10 days after issuance of moon landing airmail stamp in Washington, D.C., "an already tired city post office crew had just passed the two-million first day cover mark." Post Office had gone "all out" to cooperate with those of other countries in returning covers and with Voice of America, NASA, and regular servicers. There was little doubt that "new first day cover record is in the making." (W Post, 9/28/69, F9)

September 29: Apollo 11 astronauts and wives arrived in Mexico City for start of 39-day tour of 22 countries [see Sept. 19]. (AP, B Sun, 9/30/69, A1)

. President Nixon approved H.J.R. 775, to authorize President to award Congressional Space Medals of Honor to astronauts [see Sept. 15]. (CR, 10/6/69, 1362)

September 30: USAF launched unidentified satellite from Vandenberg AFB by Thorad-Agena D booster into orbit with 303.2-mi (488-km) apogee, 299.5-mi (482-km) perigee, 93.8-min period, and 69.6° inclination. (GSFC SSR, 9/30/69; SBD, 10/7/69, 162)

. NASA's HL-10 lifting-body vehicle, piloted by Maj. Peter Hoag (USAF), reached mach 0.9 after air-launch from B-52 aircraft at 45,000-ft altitude over FRC. Purposes of flight, 26th in series and first powered flight for Maj. Hoag, were to provide pilot training and obtain stability and control data. Winds rose from 5 knots at launch to 20 knots at touchdown, but did not interfere with flight. (NASA Proj Off)

September 30: In speech before Chicago Executive Club in Chicago, Ill., Vice President Spiro T. Agnew said operation of military systems in space "to enhance the national defense" must be one objective of U.S. future space program to ensure "there will be no blind reliance on good faith." Vice President Agnew also was chairman of NASC and of President's Space Task Group.

Two questions dominated speculation over national space policy, he said: Why space? And Why Mars?. "Mars holds the greatest promise of a capability to sustain human life. It is a potential resource and reserve. More important for the present is the fact that the mind of America functions better when it focuses upon a clear target. Manned exploration of the Solar System is too nebulous to capture the public's attention. A manned landing on Mars is as understandable a challenge to the citzen as it is to the scientist. It is a test that can be put in a time frame and its anticipation can be appreciated by all." (Text)

. MSFC announced selection of Bendix Corp. and Boeing Co. for further competitive negotiations on cost-plus-incentive-fee contract for design, development, test, and delivery of four manned lunar roving vehicles for flight to lunar surface aboard descent stage of Apollo LM [see July 11]. First operational vehicle would be delivered in early 1971 for launch late that year.

MSFC also had awarded $238,400 contract to Bryson Construction and $224,888 contract to Miller and Berry for construction of two clean rooms for Apollo telescope Mount (ATM) assembly and test and had called for bids for checkout station construction. Bids were due Oct. 21. (MSFC Releases 69-220; 69-221)

. Federal Electric Corp, IT&T Corp. subsidiary, announced it had received $21,321,680 NASA contract for continued work as KSC prime contractor. (UPI, W Star, 9/30/69, B7)

. Washington Airlines had terminated first and only STOL service between Washington and Baltimore after one year and would liquidate its three Dornier aircraft, Washington Post said. Company had lost nearly $5,000 weekly and carried 25,000 passengers instead of targeted 108,000 since inauguration of service Sept. 23-25, 1968. (Samuelson, W Post, 9/30/69)

During September: Dr. Robert C. Seamans, Jr., Secretary of the Air Force, defended value of Safeguard ABM defense and also discussed use of space for strategic deterrence, writing in Air Force/Space Digest: "In terms of security, the space age presents dangers--but it also affords oppor-

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tunities for increasing strategic stability." Dangers stemmed from weapons placed in orbit: "It might be possible to trigger such weapons with very little warning, thus increasing the risk of surprise attack." Outer Space Treaty of 1967 might help avoid this danger, "while providing us opportunities for other sorts of military systems that could strengthen deterrence rather than weaken it." Each generation of space vehicles would provide additional improvements in monitoring enemy activities. "We are now working on a satellite early-warning system that would detect missiles as they are launched from land or sea." Dispersed bomber force "would be able to take off from its bases before the impact of enemy weapons, even if the time of flight of the latter were greatly reduced." (AF/SD, 9/69, 61-4)

. USAF magazine Airman published interview with Secretary of the Air Force, Dr. Robert C. Seamans, Jr., former NASA Deputy Administrator. NASA-USAF X-15 program had been highly successful in providing data for many disciplines and "very good test bed" for atmospheric probe instrumentation. XB-70 program, initiated as manned supersonic bombing system, was "very bold step" in speeds over mach 3. When technological difficulties and rising costs resulted in decision against XB-70 production, NASA with USAF had initiated experimental program. Dr. Seamans felt USAF was not using NASA expertise to fullest extent and that it needed new manned bomber, new fighter, and modernization of air defense. He was not convinced USAF had yet established "best relationships with industry to get these things done." (Airman, 9/69, 7-9)

. "There appears to be much more to be squeezed from Apollo than just the incalculable value of national prestige or scientific discovery," Michael Getler wrote in Space/Aeronautics. "The ability to mine these supporting talents, to judge their value outside manned space flight and disseminate and apply them may well prove the most telling and measurable argument in the debate which is bound to continue over Apollo's real value." Apollo had combined "much of what we have with what we do best. Though complex, it was manageable. It had clear goals, was well funded, enjoyed fairly widespread public support, and dangled the element of competition in front of our involuntary reflex. Most impcrtantly, it tapped an industrial base and an enthusiasm for gadgetry that are unmatched anywhere.... Because many of today's challenges confront human nature and not technology, Apollo can be made to seem irrelevant. In fact, however, we are not left alone with our behavioral troubles. There is still an economy to keep sound, industry and commerce to be kept competitive, and a

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government to be made more efficient. Failure to take this extraordinary project apart, piece by piece, and examine its usefulness in these areas would indeed be wasteful." (S/A, 9/69, 42-53)

. Atlas published translation of article in L'Espresso, Rome, by Italian novelist Alberto Moravia on implications of Apollo 11. "In Columbus's days, men were offered finite goals, like the discovery of America; or they were offered spiritual aims, like the search for goodness, truth and beauty. At that time, no one could have guessed that Columbus's discovery was only a beginning. That other discoveries would follow, a second America, a third, a fourth, and so on through millions of years and billions of kilometers. But today that is happening. Compared to our new set of goals, the aims of Marx and communism are pure imagination. For the first time the real and the rational are about to become one. We are now at the end of history--and post-history is just beginning." (Atlas, 9/69, 40-3)

. Atlas said its "Talk of the World" section had "got a little hoarse" on subject of Apollo 11. It quoted "a few of the more unusual moon-thoughts" from international press. El Tiempo in Bogota had reported Colombian wool fabrics were used in Apollo 11 spacecraft upholstery. Canada's Kitchener Waterloo Record had said LM had touched down on moon with legs made in Canada by Montreal firm. Oiga, in Lima Peru, had said when Sputnik went into orbit "it was noted that Pedro Paulet Mostajo had invented a jet-propelled rocket back in 1895." Atlas commented that "this could go on forever." (Atlas, 9/69, 10)

. In Astrophysical Journal, Princeton Univ. astronomers J. P. Ostriker and J. E. Gunn reported results of quantitative exploration of pulsar model. Assuming seat of pulsar phenomenon was rotating neutron star with dipolar magnetic field not parallel to rotation axis, they showed such stars would emit large amounts of magnetic-dipole and gravitational-quadrupole radiation, that these energy losses were associated with losses of angular momentum and increases in rotation periods, and that emitted, low-frequency magnetic-dipole radiation was efficient at accelerating charged particles to relativistic energies. Explicit expression for period as function of time allowed calculation of age of Crab Nebula and prediction of unobserved second derivative of period. Luminosity of nebula and highest-energy electrons being injected into it were determined and found to be in good agreement with independent observations. In extreme cases, acceleration mechanism could produce protons with energies in excess of most energetic

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cosmic rays yet observed. After determining magnetic decay time to be about 4 million yrs, report predicted few pulsars should be found with periods over 1.5 secs. (Astrophysical Journal, 9/69, 1395-1417)