

COMMENT DRAFT

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A P R I L 1 9 6 7

April 1: NASA's March 24 decision to delay issuance of AS-204 accident report until April 8 would not restrict scope of inquiry in public hearings, Rep. Olin E. Teague (D-Tex.), Chairman of House Committee on Science and Astronautics' Subcommittee on NASA Oversight, told Washington Evening Star reporter William Hines. Hearings would begin promptly "at 10 o'clock the same day the report is issued," Representative Teague said, and would be held at night if necessary. (Hines, W Star, 4/2/67)

- . Secretary of Transportation Alan S. Boyd outlined major goals of Dept. of Transportation (DOT) at ceremony in Washington, D. C., marking its first official operating day. DOT would (1) "insist that all forms of transportation become safer and more reliable for the user" and make increased effort to meet transportation needs of the physically handicapped; (2) strive for increased intermodal efficiency through promotion of integrated systems; (3) explore new possibilities to help transportation advance technologically and keep pace with progress of American industry; (4) encourage transportation industry in a selective expansion program for the domestic market; (5) seek ways for transportation to assist economic development of underdeveloped areas; and (6) make more positive contribution to urban development and quality of urban mass transit service. "At the very least, this Department must work to make transportation more efficient, more economical, more expeditious, and more socially responsible.... America, today, has the best transportation system of any nation in the world. But it does have its faults. It can be, it must be substantially improved." (Text)
- . ComSatCorp requested FCC permission to establish a pilot U.S. domestic comsat system with channels available without charge to educational broadcasters. Urging speedy approval of the plan, ComSatCorp stressed that "differences among private parties as to the best way to provide badly needed domestic satellite service should not be permitted to delay unduly inauguration of such a Program." ComSatCorp proposed two 85-ft send-and-receive antennas--one near New York City and one in California--and 30 smaller receive-only antennas in Pacific and Rocky Mountain time zones; it was prepared to finance and start construction of the system and act as trustee until FCC and Congress made final decision on ownership. System would become operational by late 1968. (ComSatCorp Release)
- . Dr. Mervin K. Strickler, Jr., FAA Congressional Fellow, received National Aeronautic Assn.'s (NAA) 1966 Frank G. Brewer Trophy at National Aerospace Education Council's annual banquet in Tucson, Ariz. Trophy was awarded annually for outstanding contributions to aerospace education of the Nation's youth. (NAA News)

April 1: New Jersey Governor Richard J. Hughes proclaimed April 1, 1967, Tيروس-Essa Day in New Jersey to mark seventh anniversary of first Tيروس launch and to pay tribute to NASA and U.S. space program. (Text)

April 2: One-inch-diameter hollow steel spheres for use in aerospace ball-bearing assemblies were being tested at Air Force Flight Dynamics Laboratory, Wright-Patterson AFB. Hollow spheres were half as heavy and equally as strong as solid ones currently used, had longer life expectancy, and could easily be mass produced. (AFSC Release 44.67)

April 2-5: National Assn. of Broadcasters (NAB) held 45th annual convention in Chicago. FCC Chairman Rosel H. Hyde strongly urged that U.S. commercial broadcasters support a system of public television and suggested that the broadcasters establish a national committee to aid noncommercial TV: "As diverse as our present commercial broadcasting system is, there is room for innovation, for more diversity, in short, for a viable, supplemental noncommercial service. Such a service could provide a further and differently based competitive spur to the commercial system. It would provide a place where new ideas and experimental techniques could more easily be tested...." (Dallos, NYT, 4/5/67, 78)

ComSatCorp Chairman James McCormack termed "nonsense" a charge by the Ford Foundation that ComSatCorp was threatening to become a monopoly: "Comsat far from being an evil octopus, is a youngster trying very hard to employ private funds and private initiative to...maintain the leadership granted to us, under extraordinarily complete regulation, to the benefit of the United States and the world more generally...." Restating the corporation's position that there should be one all-purpose domestic communications system, McCormack asserted that ComSatCorp, as a representative of U.S. communications policy, was in best position to establish such a system. "We calculate that a multipurpose system will, from the beginning, provide broadcast transmission services at less cost than will a single-purpose system [and] initial costs will continue to reduce over the years," affording a great deal of flexibility and security. (Text; Dallos, NYT, 4/6/67, 67; Reddig, W Star, 4/6/67)

April 3: Ford Foundation and AT&T submitted briefs to FCC on domestic comsat system.

Ford Foundation brief sharply criticized ComSatCorp's plan for a domestic comsat system and asked that ComSatCorp's April 1 request for permission to develop an experimental system be denied. "To add to Comsat's authority the exclusive franchise for a domestic communications satellite system...would give the corporation a world monopoly.

April 3 (continued)

One entity would provide all communications satellite services. One company would be responsible for developing all satellite technology. One customer would procure all satellite equipment. A monopoly of this sort would be unprecedented...." Ford suggested instead that the system be developed and initially operated by NASA so that technological knowledge could be gleaned without controversy over ultimate management or ownership. NASA could later be reimbursed by the entity finally chosen to operate the system.

AT&T supported ComSatCorp's proposal, suggesting the system be linked to and integrated with present ground systems. Rejecting Ford Foundation's proposal for a separate nonprofit satellite TV broadcast corporation whose income would support noncommercial TV, AT&T said that such proposals reflected "a parochial disregard for their effects on other satellite systems and terrestrial (land) microwave systems.... Installation of such limited systems would...jeopardize the existing public communications systems, both domestic and overseas, and would severely inhibit their necessary continued growth." (Text; Gould, NYT, 4/3/67, 1; W Star, 4/4/67)

- . Secretary of Transportation Alan S. Boyd addressed Sixth Annual Editorial Conference of Magazine Publishers Assn. and American Society of Magazine Editors in Washington, D.C.: "Today, April Third, is a memorable day in the history of communication. On this day, one hundred and seven years ago, the Pony Express began.... The Pony Express lasted only eighteen months. It was superseded by the transcontinental telegraph. And probably the managers of the Pony Express knew all along that that was going to happen. But they had customers who couldn't wait, who were willing to pay what it cost for a faster mail service.

"...this episode illustrates the driving impatience of the American people for progress.... We're doing the same thing today in the aerospace industry. We're building the SST. We already have a grasp of the technology that will supersede the SST, fifteen or twenty years from now. But Americans are not the kind of people who'll passively wait for new developments.... They're engaged now in pushing jet aviation technology to its practical limits." (Text)

April 4: U.S.S.R. launched COSMOS CLIII into orbit with 291-km (181-mi) apogee; 202-km (126-mi) perigee; 89.3-min period; and 64.6° inclination. Equipment was functioning normally. (Tech Wk, 4/10/67)

- . Astronaut Frank Borman told Cleveland Engineering Society that he and other astronauts hoped U.S. would immediately revitalize the Apollo program: "We'd like to see the crews regrouped and the program under way as soon as possible." (AP, W Post, 4/6/67, G2)

April 5: NASA's 815-lb ATS II (Ats-A) (Applications Technology Satellite) was launched from ETR by Atlas-Agena D booster on mission to evaluate gravity-gradient system for spacecraft stabilization in 6,900-mi-altitude orbit and to obtain useful data from experiments during first 30 days in orbit. Spacecraft successfully entered elliptical transfer orbit with 6,878-mi (11,069-km) apogee; 120-mi (192.7-km) perigee; 218.3-min period; and 28.4° inclination. Agena engines, which were to have reignited to inject spacecraft into 6,900-mi (11,103-km) -altitude circular orbit, failed to ignite for the second burn; spacecraft separated and, tumbling uncontrollably, remained in transfer orbit.

By April 7, all but one of the scientific experiments had been turned on and operated successfully, but usefulness of data could not be determined because spacecraft's sensors were not compatible with its orbit. Last experiment was turned on April 15. Although it was apparent that mission could not be successfully completed, scientists continued to operate experiments to obtain as much data as possible on spacecraft performance, and ground stations received occasional TV pictures and meteorological photos. Gravity-gradient configuration functions would not be exercised until spacecraft's attitude behavior could be better defined.

ATS II was second in series of five satellites designed to improve spacecraft technology; develop long-life control systems; advance spacecraft communications; and improve long-range weather predictions. Record size--252 ft long with 123-ft booms extended from opposite sides--ATS II was first U.S. gravity-gradient satellite to carry meteorological cameras and first with sufficient instrumentation to verify three-axis gravity control system in conjunction with detailed computer program. In addition to gravity-gradient experiment, satellite also carried communications equipment, two Advanced Vidicon Camera System (Avcs) cameras, and eight scientific experiments to measure orbital environment. ATS I was successfully launched Dec. 6, 1966, into a 22,300-mi-altitude near-synchronous orbit over the Pacific and was still operating flawlessly. Ats program was managed by GSFC under OSSA direction. (NASA Proj Off; NASA Release 67-71; AP, NYT, 3/31/67, 12)

- . NASA rejected industry bids ranging from \$13.6-14.9 million for construction of four buildings at NASA's Electronics Research Center in Cambridge, Mass. ERC Director James C. Elms said that difference between bids and \$10.4-million Government estimate was too great to be adjusted and that building plans would have to be revised. (McElheny, Boston Globe, 4/6/67)
- . President of the Republic of Turkey Cevet Sunay visited KSC for a tour and general orientation. (NASA Int Aff)

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April 5: FRC awarded General Electric Co. a \$2,782,272 contract for maintenance of XB-70 aircraft engines and support services. (NASA Release 67-81)

April 6: LUNAR ORBITER III press briefing was held at NASA Hq.

Dr. Leonard Reiffel, Apollo Program, OMSF, said NASA had selected eight "candidate" locations along the moon's equator as the smoothest and safest possible sites for first Apollo manned landings. Selection had been made after careful screening of photos taken by three Lunar Orbiters and SURVEYOR I. Detailed analysis of photos indicated that safest area might be a broad plain in the southeast part of the Sea of Tranquility--just east of Maskelyne D crater--where the surface was flat and there were few dangerous boulders and no deep craters. NASA officials emphasized, however, that no single site would be selected: each mission would have three possible sites along the equator--one in the east, one in the center, and one in the west--to allow for launch delays.

Harold Masursky, U.S. Geological Survey, described evidence of "seismic erosion" as "one of the major processes on the moon's surface that Lunar Orbiter has given us information about." Several photos showed dunes of soil-like material that appeared to be debris from moonquakes filling old craters. Some of the smoother plains on the moon might be caused in part by this process, Masursky suggested. (Wilford, NYT, 4/7/67, 1, 14)

- . Rep. Donald Rumsfeld (R-Ill.) introduced in the House H.R. 8145, a bill to establish Aerospace Safety Advisory Panel to "provide the [NASA] Administrator with independent advice and assistance in safety matters, regardless of operational 'commitments' or budgetary considerations. Regardless of the outcome of the current [Apollo accident] investigation...the National Aeronautics and Space Administration's...safety practices need strengthening. Based on NASA statements and...[FY 1968] testimony...the area of greatest weakness appears to be in the lack of a truly independent review of NASA's facilities, operations, and procedures solely from the viewpoint of safety." (CR, 4/6/67, H3657; NASA LAR VI/39)
- . Col. V. John Lyle (USAF, Ret.), former Assistant to the Comptroller of the Air Force, was appointed special assistant to NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller. (NASA Ann)
- . Reduced television and telephone rates between U.S. and Europe became effective when ATLANTIC II (INTELSAT II-C) comsat entered commercial service. New rates, which covered only the leasing of channels to authorized communications common carriers operating in the Atlantic, applied to both EARLY BIRD I and ATLANTIC II. Monthly charge for one

April 6 (continued)

leased voice channel was reduced from \$4,200 for 16-hr daily service to \$3,800 for 24-hr service. Rates for one-way black-and-white television in the Atlantic area were \$1,100 for first 10 min and \$30 for each additional minute per half channel. New rates for color TV reduced existing 150% of black-and-white charge to 125% of black-and-white rate. All rates were based on providing voice-grade or TV half-channel service from a U.S. earth station to an appropriate satellite and did not cover charges for communication links from satellite to an overseas earth station. (ComSatCorp Release)

- . Trans World Airlines retired the last of its propeller-driven Constellations and became first major U.S. airline to have an all-jet fleet on domestic as well as overseas routes. (NYT, 4/7/67, 62)
- . Editorial comment on domestic satellite system controversy [see April 1, 3].

New York Times: "The Ford Foundation and Communications Satellite Corporation are at odds about how best to set up a domestic satellite system that would carry educational television. Neither side, it appears, has all the answers. Ford is right to question Comsat's demand to run a domestic satellite system...[but] Ford's own plan for creating a new educational network is also unsatisfactory. It wants to give the job on a trial basis to the National Aeronautics and Space Administration, which has enough problems with its present over-ambitious objectives and should not have its energies diverted or its resources increased for anything new. Ford's suggestion that savings in communications charges made by the commercial networks should be used to finance educational TV has an inherent disadvantage in that the amount of savings would be inadequate to do a worthwhile job.... These differences in approach should not be allowed to hold up development of noncommercial network. The thing to do is to choose what is best from both plans." (NYT, 4/6/67, 36)

Washington Post: "The issue is more than just a squabble over Comsat's request. The Ford Foundation has proposed that the Nation establish more than one domestic satellite system, with one system reserved exclusively for television, both commercial and public. Comsat maintains that one system can do the entire job of communications adequately and will save large sums of money.... Given the complexities of the problem, and the need that it be solved hand-in-hand with the general question of how public television is to be financed, we think Ford's alternative is advisable.... NASA has the capabilities to do the job and would be involved, anyway, in putting Comsat's satellite into orbit. This solution would leave all avenues open, for NASA

April 6 (continued)

is highly unlikely to become the permanent operator and could recoup its expenditures by selling the equipment and stations to the eventual operator." (W Post, 4/6/67)

April 7: Seven communications companies filed joint application with FCC for construction of new earth station near Cayey, Puerto Rico, and the transfer of ownership of three existing comsat stations. Companies--ComSatCorp; AT&T; Hawaiian Telephone Co.; ITT World Communications, Inc. (WorldCom); ITT Cable and Radio, Inc.-Puerto Rico; RCA; and Western Union International (WUI)--submitted application pursuant to March 27 earth-station ownership agreement. (ComSatCorp Release)

- . Soviet scientist E. I. Taghiev told seventh World Petroleum Congress in Mexico City that U.S.S.R. planned to drill a 49,500-ft-deep test well to explore earth's crust and expressed regret that U.S. had abandoned its Mohole drilling project in the Pacific. Site of Soviet project was not revealed. (AP, W Star, 4/7/67, A14)

April 8: COSMOS CLIV was launched by U.S.S.R. into orbit with 232-km (144-mi) apogee; 186-km (116-mi) perigee; 88.5-min period; and 51.6° inclination. Equipment was functioning normally. (Tech Wk, 4/10/67)

- . Cosmonaut Yuri Gagarin, discussing Soviet space plans in Ogonyek, hinted that U.S.S.R. was preparing to launch a large manned space station in the near future. It had been speculated that U.S.S.R.--which had not launched a manned spacecraft since March 18, 1965--would conduct major manned launch in 1967 to commemorate 50th anniversary of the Bolshevik Revolution. Gagarin said there was little value in repeating feats already accomplished: "...it is not sensible in the future to put expensive spacecraft into orbit for several days.... It is apparent that they will have to stay in orbit a long time. It will be necessary to supply them and change crews with the use of simplified types of space vehicles.... The time is not far off when longer and more distant space flights will be made."

In later Novosti press agency report Soviet Academy of Sciences Chairman Anatoly A. Blagonravov supported Gagarin's predictions and said: "Mankind is entering the 7th year of the age of man's space flight, and we do not doubt that in the not very distant future we will witness new space victories which will exert a growing influence on the life of people". (Anderson, NYT, 4/9/67; UPI, W Star, 4/9/67, A13; C Trib, 4/10/67)

April 9: Most probable cause of Jan. 27 flash fire in which Astronauts Virgil I. Grissom, Edward H. White II, and Roger B. Chaffee died was a sparking short circuit in worn, defective, or poorly insulated wire, Apollo 204 Review Board concluded in its final report. Copies of report were distributed simultaneously to NASA Administrator James E. Webb, Congressional committees, and the press. Board was unable to pinpoint exact ignition source, but identified conditions which led to the disaster: (1) a sealed cabin, pressurized with an oxygen atmosphere; (2) an extensive distribution of combustible materials in the cabin; (3) vulnerable wiring carrying spacecraft power; (4) inadequate provisions for the crew to escape; and (5) inadequate provisions for rescue or medical assistance. Having identified these conditions, the Board addressed itself to the question of "how these conditions came to exist. Careful consideration of this question ...leads...to the conclusion that in its devotion to the many difficult problems of space travel, the Apollo team failed to give adequate attention to certain mundane but equally vital questions of crew safety.

"The board's investigation revealed many deficiencies in design and engineering, manufacture and quality control. When these deficiencies are corrected the over-all reliability of the Apollo program will be increased greatly."

Board offered a total of 21 recommendations, including: (1) an "in-depth" review of the entire Apollo life-support system; (2) an investigation of effective ways to control and extinguish spacecraft fires; (3) severe restriction and control of amount and location of combustible materials inside spacecraft; (4) reduction of time required for crew to egress and simplification of escape operation; (5) continuous monitoring of safety of all test operations to assure adequacy of emergency protections; (6) improved ground communications system; (7) continued studies of two-gas cabin atmosphere; and (8) full-scale mock-up tests to establish fire safety of reconfigured command module. Board emphasized that its report was not intended as a criticism of NASA's entire manned program: "The board is very concerned that its description of the defects in the Apollo program...will be interpreted as an indictment of the entire manned space flight program and a castigation of the many people associated with the program. Nothing is further from the board's mind." (Text; NYT, 4/10/67, 1, 28-9; W Star, 4/10/67, A1, A6-7; W Post, 4/10/67, A1, A8)

- . William H. Woodward was promoted from Deputy Director to Director of OART's Space Power and Electric Propulsion Div.--formerly Nuclear Systems and Space Power Div.--succeeding Harold B. Finger, who became NASA Associate Administrator for Organization and Management March 15. Woodward would be responsible for planning, managing, and coordinating advanced research and technology programs in the area of space power,

April 9 (continued)

including solar, chemical, nuclear, and electric propulsion. (NASA Release 67-78)

- . NASA Office--Downey at North American Aviation's Downey, Calif., plant was disestablished and its functions transferred to MSC and MSFC. (NN 1136)
- . Completed section of USN's \$80-million radio communications center at Northwest Cape, Australia, was occupied by Navy personnel under Capt. Robert Friedman. Center, which would maintain contact with U.S. nuclear submarines in Pacific and Indian Oceans via very-low-frequency waves, would become fully operational in July. (Durdin, NYT, 4/9/67, 3)

April 10: NASA Administrator James E. Webb, accompanied by Apollo 204 Review Board members, NASA Deputy Administrator Robert C. Seamans, Jr., and NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller, testified on Jan. 27 flash fire before House Committee on Science and Astronautics' Subcommittee on NASA Oversight. Webb said the Board had found error, "but it has also found the capability within NASA and the Apollo team of contractors to overcome error." NASA and industry would share their part of the blame "for what we have done or left undone," Webb said, but the Committee could have confidence that "NASA and its contractors have the capability to overcome every deficiency required to proceed to successfully fly the Apollo Saturn system and accomplish its objectives." He said Board Chairman Dr. Floyd Thompson had reassured him that the "concepts and the basic design on which the Apollo system is based can be made to work in a reliable manner," and Astronaut/Board member Frank Borman had reported he would be confident to fly the Apollo spacecraft if reported deficiencies were eliminated. Webb concluded: "If any man in this room asks for whom the Apollo bell tolls, it tolls for him and me, as well as for Grissom, White and Chaffee.

"It tolls for every astronaut test pilot who will lose his life in the space simulated vacuum of a test chamber or the real vacuum of space ...for every astronaut scientist who will lose his life on some lonely hill on the moon or Mars...for Government and industrial executives and legislators alike...for an open program continuously evaluated by the opinion makers with little time for second thought--operating in the brilliant color and brutal glare of real time, worldwide mass media with the speed of the television, from euphoria to exaggerated detail...."

Asked why six of the eight Board members were NASA employees, Webb replied that they were the best qualified people for the investigation

April 10 (continued)

and noted that they were all familiar with the spacecraft or with similar types of investigations. He said that in his opinion the Board had "to a large degree...overstated the case." Questioned about charges by the press that many qualified Project Apollo technicians were not called to testify before the Board, Webb responded: "It is easy to make allegations, hard to conduct an investigation, and even harder to make the Apollo Saturn fly at the earliest possible date. I do not believe these allegations are worth your consideration."

Dr. Thompson discussed methods and procedures followed by the Board, and key Board members traced the process of establishing the course of the fire, the "most probable" ignition source, and detailed findings and recommendations. (Testimony; Transcript 10, 15-8)

- . Rep. Donald Rumsfeld (R-Ill.) inserted in the Congressional Record his statement expressing concern over Apollo 204 Review Board's failure to determine whether Apollo accident was result of a single oversight or "indicative of a basic weakness in the organization of NASA and/or the contractors.... I am deeply disturbed by the report of the Apollo 204 Review Board. My concern is not that the Board was unable to discover the precise cause of the accident during the course of its rigorous technical investigation, but, rather, that the Board failed to examine, or at least report on, the fundamental conditions which permitted the accident to occur and which, moreover, resulted in the tragic deaths of three fine young men. The report's, and apparently the investigation's, shortcomings in this regard leave open the possibility of similar catastrophes in the future." (CR, 4/10/67, H3786-7)
- . Washington Evening Star suggested that House Committee on Science and Astronautics might have been "the victim of a high-level snow job last year when it did research for a 1,200-page report on Project Apollo" because report's conclusions conflicted so greatly with findings of Apollo 204 Review Board. Committee report issued March 29 praised ability of NASA and industry "to identify and solve technical and administrative problems" and stated that the Apollo accident did not "alter the basic conclusions" of the report. Board report, by contrast, criticized NASA and NAA for poor management and deficient quality control. (W Star, 4/10/67, A7)
- . Soviet space dogs Veterok and Ugolyek, in orbit Feb. 22-March 16, 1966, aboard COSMOS CX, had both fathered normal puppies, Tass reported. Effects of prolonged weightlessness [see May 16, 1966] had gradually disappeared, Tass said: "For some time, their movements were languid, and the animals preferred to lie down. But...2 $\frac{1}{2}$ months after their

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April 10 (continued)

space voyage, the dogs fully recovered and became cheerful again."
(UPI, NYT, 4/12/67, 77)

- . U.S.S.R.'s second MOLNIYA I comsat had decayed prematurely March 17 because of lunar and solar perturbations, according to USAF memorandum, Aviation Week reported. U.S. officials had declined to give reason for decay, first reported by GSFC March 31. (Av Wk, 4/10/67, 25)
- . U.S. defense warning system was "highly vulnerable" to missile attack because of increasing Russian missile strength, report by Institute for Strategic Studies warned. Institute, an unofficial body of military and international affairs' experts from 28 countries, recommended that U.S. establish a new back-up interceptor control against hostile missiles by mid-1970. (W Post, 4/11/67, A15)

April 10-13: Aerospace Medical Assn. met in Washington, D.C.

Computer technique which had been used to enhance 12 SURVEYOR I photos of the lunar surface in August 1966 might be applied to diagnostic x-rays, Dr. Robert Nathan, JPL scientist who developed the process, suggested in speech over closed-circuit TV broadcast. Process, which separated significant from insignificant detail, could remove distortions and obscurities that often make it difficult for physicians to interpret x-ray films. Dr. Nathan also predicted technique might enable scientists to see the inner details of human chromosomes for the first time and thereby gain a new understanding of birth defects.
(Randal, W Star, 4/11/67, A3)

FAA would appoint 10 radiation biology experts to study the radiation aspects of Sst operation, FAA Administrator William F. McKee revealed. "We want to assure ourselves, beyond any doubt, that high-level altitude flights can be made routinely." FAA was also studying new pressurization on equipment to assure passenger safety at 40,000-ft flight levels as well as new escape devices and evacuation methods, McKee said. (NYT, 4/13/67, 74)

NASC Executive Secretary Dr. Edward C. Welsh predicted that U.S. would have the best Sst in the world. "Despite its timing, I nominate it for the 'clean-up' position in sales, safety, and economy." Dr. Welsh said expenditures for the Sst could be justified because it was important to "our international balance of payments, to our technological progress, to our private enterprise system, to improved transportation, as well as to our international prestige." (Text)

April 10-13 (continued)

Philco-Ford Corp. and General Dynamics Corp. both displayed several monitoring devices which had grown out of technology acquired by NASA in the development of remote sensing equipment for astronauts. The corporations indicated they would attempt to market the devices for use in medical sciences. (Tech Wk, 4/17/67, 22)

Dr. Charles F. Gell, chief scientist of Submarine Medical Research Laboratory at U.S. Naval Submarine Medical Center, received Eric J. Liljencrantz Award and \$500 honorarium for his contributions to the advancement of aeronautics and space sciences through medical research. (Av Wk, 4/24/67, 121)

April 11: Apollo 204 Review Board, accompanied by NASA Administrator James E. Webb, testified before Senate Committee on Aeronautical and Space Sciences. Key Board members summarized the Board's findings and recommendations. Astronaut Frank Borman, asked if he believed U.S. decision to use 100% oxygen atmosphere in spacecraft had been influenced by a desire to achieve first manned lunar landing, replied: "...never since I have been associated with NASA have I ever experienced any decision where a known detriment to crew safety was sacrificed to any operational requirement. And although I am willing to accept risk... I am not willing personally to accept undue risk and I would not participate in any decision which I thought was expediting a program in an unsafe manner. And in the final analysis the crew is the Review Board because if we do not like the way the spacecraft is configured, we don't have to get in." Borman said if on Jan. 27 he had had the information accumulated by the Board, he would not have entered the Apollo spacecraft because: (1) the test had not been classified as hazardous; (2) the spacecraft contained too many combustibles; (3) the wire that provided the ignition source was vulnerable. Borman said he would be "willing and eager" to enter a 100% oxygen Apollo spacecraft which incorporated Board's recommended improvements. (Testimony; Transcript, 181, 209-10, 258)

- . In testimony before the House Committee on Science and Astronautics' Subcommittee on NASA Oversight, North American Aviation, Inc. (NAA), President J. Leland Atwood denied that pressures to meet 1970 lunar-landing goal had prompted NAA engineers to take shortcuts in Apollo program. Terming the Apollo 204 Review Board's study "a good and penetrating report," Atwood conceded that deficiencies existed in the Apollo capsule, but disputed Board's charge that "deficiencies existed in Command Module design, workmanship, and quality control...." NAA's Director of Research and Engineering Dr. John F. McCarthy said that

April 11 (continued)

although an electrical arc "probably" caused the fire, there were "various other possibilities"--such as Astronaut Gus Grissom's accidentally kicking loose a wire that could have later initiated the blaze. Under stern questioning by Subcommittee members, however, Dr. McCarthy admitted that this theory was pure speculation.

In response to charge by Rep. William F. Ryan (D-N.Y.) that prevailing attitude prior to fire was not "just a feeling of over-confidence" but "real negligence" by NAA and NASA, Atwood reasserted that the most serious error made by NAA and NASA was classification of the AS-204 test as "non-hazardous." Questioned about the reasoning behind designing to minimize fire hazard, Dr. McCarthy pointed out that NAA had concentrated on eliminating possible ignition sources while it turned out that the amount and placement of flammable materials was crucial. He characterized this as a "grave error in judgment." Atwood assured the Subcommittee that NAA and NASA had "placed great stress" on the importance of quality and workmanship: "The procedures followed and the depth of inspection which have been employed far surpass those...used on any other program. The fact of the accident itself makes it obvious that we must do more than we have done, that we must--guided by the finding of the board--redouble our efforts to approach perfection. Already we have gone over every other design feature of the spacecraft to identify any other area of possible failures...[and] we have found none." (NYT, 4/12/67, 34; W Star, 4/12/67, A6)

- . New York Times commented on Apollo 204 Review Board's final report on Jan. 27 flash fire: "Two months ago, on the basis of the incomplete evidence then available, we suggested that the Apollo catastrophe had taken place because 'many men miscalculated--grossly.' The official report...suggests that that conclusion was too kind...[since] the report convicts those in charge of Project Apollo of incompetence and negligence.

"The core of the problem is indicated in the board's fifth finding: 'Those organizations responsible for the planning, conduct and safety of this test failed to identify it as being hazardous. Contingency preparations to permit escape or rescue of the crew from an internal command module fire were not made.'

"How could those in charge of the test have 'failed to identify it as being hazardous?' The three astronauts had been put into what even a high school chemistry student would know was a potential oxygen incendiary bomb, one needing only a spark to initiate catastrophe.... But at Cape Kennedy, in the report's words, 'No procedures for this type of emergency had been established either for the crew or for the spacecraft pad work team.'

"The incredible complacency thus revealed overshadows even the

April 11 (continued)

other disgraceful and disheartening findings of the review board.... And as the record of incompetence and careless work--devastating in its impact--is recited in the report, one wonders how many of the previous manned space flights succeeded rather than how the Apollo tragedy occurred...." (NYT, 4/11/67, 44M)

- . FAA proposed that current noise abatement rules covering large aircraft be applied also to small turbine-powered aircraft. Many turbine-powered aircraft were not included under the large transport category, but created a higher noise level than piston-type aircraft of comparable size. (FAA Release 67-36)
- . Washington Daily News editorial warned that U.S. eagerness to sign space law treaty--under consideration in Senate since Feb. 7--might be costly: "Since the risks of Soviet deception are so great, it seems unwise to have accepted the Russian-proposed no-inspection honor system.... Since there is no provision for a check on space activity, the Soviet Union could push ahead with a variety of secret military programs in space while publicly attacking the right of the U.S. to an American military defense program in space.... Since the U.S. is an open society, any U.S. space defense program would be known. Since the Soviet society is closed, Moscow might well be able to keep its programs secret.
"The loose way in which this space treaty was written was due in part to the Administration's eagerness to get a treaty in hand. But that looseness could lead the U.S. into a trap." (Cromley, W News, 4/11/67, 12)

April 11-13: Witnesses testifying before Senate Commerce Committee expressed conflicting views on proposed Corporation for Public Television.

Ford Foundation consultant Fred W. Friendly said he would oppose any long-range design that relied on Treasury Dept. appropriations to produce news and public affairs programming because such funds would be subject to annual review by Congress. Instead, he suggested, news and public affairs should be underwritten from private funds--preferably out of savings from a non-profit comsat system that would employ income from commercial programs to help meet educational television's overhead.

Dr. James R. Killian, Jr., chairman of Carnegie Commission on Educational Television, urged revision of the proposed legislation so that the Corporation would have continuing responsibility for program selection to ensure freedom "from the centralization and rigidity of a network system" and to protect autonomy of local stations.

NET President John R. White argued that the Corporation's role should be limited to matters of "high policy" and that operational

April 11-13 (continued)

activities, including the choice of programs to be carried on a network, should be subcontracted to other entities. The Corporation, he said, would not be able to make informed decisions until the programs had been submitted for national distribution. (Gould, NYT, 4/12/67, 79; 4/13/67, 75; 4/14/67, 67)

April 12: U.S.S.R. marked Cosmonautics Day--anniversary of first manned space flight by Cosmonaut Yuri Gagarin, in 1961--by launching COSMOS CLV. Orbital parameters: apogee, 286-km (178-mi); perigee, 203-km (126-mi); period, 89.2 min; and inclination, 51.8°. (UPI, W Star, 4/12/67, 1)

- . NASA had been concerned about oxygen fire danger prior to Jan. 27 flash fire and had taken steps to curb the danger, NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller told the House Committee on Science and Astronautics' Subcommittee on NASA Oversight. NASA felt it "had control of the sources of ignition...[but] underestimated badly ...the course such a fire would take. If more thorough testing of flammable materials used in the cockpit had been conducted, the accident might not have happened." He denied emphatically April 11 suggestion by NAA Director of Research and Engineering Dr. John F. McCarthy that Astronaut Gus Grissom could have triggered the fire by kicking loose a wire, and said he generally agreed with the Apollo 204 Review Board's criticisms of deficiencies in project operations, conceding: "We were wrong in the standards we applied to the selection of materials for the spacecraft." Efforts were currently being directed toward eliminating flammable cockpit materials such as nylon and replacing them with glass fiber cloth and Teflon plastic. Although a study was also under way to assess the relative merits of pure oxygen and two-gas life-support systems, Dr. Mueller doubted that present system would be abandoned.

In answer to specific questions concerning escape and rescue, Dr. Charles A. Berry, Director of Medical Research and Operations at MSC, testified that the astronauts had died from asphyxia before the spacecraft hatch was opened and that their burns alone would not have caused death.

Apollo Program Director M/G Samuel C. Phillips told the Committee that his concern "about the load of work on NAA" had prompted an inspection by a NASA team of NAA's Downey, Calif., plant. He had reported to NAA President J. Leland Atwood Dec. 19, 1965 "some of things that if done differently would contribute to the progress of the program," and on April 22, 1966, noted that progress was satisfactory: NAA was "completely responsive to the programs we described...and a very aggressive effort...was applied to these problems." He declined to discuss specifics as requested by Rep. William F. Ryan (D-N.Y.) but indicated that NASA

April 12 (continued)

would consider releasing his report to the Subcommittee [see April 18]. (Wilford, NYT, 4/13/67, 52; Reistrup, W Post, 4/13/67, A2)

- . LaRC engineers successfully completed first of two planned orbit adjustments to place NASA's LUNAR ORBITER II and III spacecraft in favorable position for major lunar eclipse April 24. Adjustment, made by burning velocity-control engine of LUNAR ORBITER III for five seconds, decreased spacecraft's period by 57 sec to shorten length of time it would be in darkness during eclipse to 1 hr 20 min. Scientists speculated that power system of spacecraft--which experienced one hour of darkness per orbit--would not be able to survive four-hour dark period that would have occurred during eclipse without adjustment. Orbit of LUNAR ORBITER II would be adjusted April 14. (NASA Release 67-87)
- . Chairman of the Joint Chiefs of Staff Gen. Earle G. Wheeler (USA) and Deputy Secretary of Defense Cyrus Vance endorsed the space law treaty at hearings by the Senate Foreign Relations Committee. "The treaty," Vance said, "is one of the finest reflections of the people of our time meeting their duty--their duty to themselves and to future importance. It is a treaty of practical importance. We have studied this problem carefully...[and] looked at the implications for weapons development programs and at verification consideration, and we have concluded that this treaty will enhance our national security." General Wheeler added that he had "no military objection" to the treaty and believed it could "potentially keep the vast new frontier of space free of obstacles to international peace and order." (W Star, 4/12/67, A18; NYT, 4/13/67, 52)
- . At NASA request, NAS would conduct Space Applications Summer Study at Woods Hole, Mass., during summer 1967 and 1968 to determine how orbiting satellites could best be used for practical benefits on earth. Participants would review present U.S. programs and plans for peaceful applications of earth satellites; consider and evaluate probable future uses of satellites in a variety of areas; and provide advice on nature and scope of R&D programs necessary to achieve the possibilities. The 1967 session would "provide first judgments on...most immediately useful applications of satellites." The 1968 session would reach final recommendations on future satellite uses. Lehigh Univ. President W. Deming Lewis was named chairman of the Central Review Committee, which would oversee the study. Work would be conducted within NRC's Engineering Div. with Laser, Inc., vice-president Eugene T. Booth serving as study's executive director. (NAS-NRC Release)

April 12: Many building blocks of life, "and possibly life itself," may exist on Jupiter, ARC scientists Dr. Cyril S. Ponnampuruma and Fritz Woeller suggested at American Chemical Society meeting in Miami. Using electrical discharges as an energy source the scientists had simulated activity of Jupiter's upper atmosphere and produced numerous building blocks common to life on earth. They concluded that energy transfer and resulting chemical processes in Jupiter's turbulent atmosphere--similar to processes believed to have produced life on earth--"may produce organic chemicals such as the forerunner compounds of amino acids and of the living cell nucleus." (NASA Release 67-79; ARC Release 67-4)

- . MSFC Director Dr. Wernher von Braun presented Henry Ricketts a \$1,625 NASA suggestion award--largest sum ever awarded for an employee suggestion--for new method of removing coating from printed circuit boards. Method shortened removal time from 15 min to two minutes and reduced costs by \$571,750 the first year it was used. (MSFC Release 67-80)
- . USAF successfully launched Titan II ICBM from Vandenberg AFB toward target in the Pacific. (UPI, W Post, 4/13/67, A22)
- . Number of mid-air aircraft collisions could be reduced "if pilots accept the idea that the plane can be quicker than the eye," Lockheed Aircraft Co. aviation psychologist Dr. Earl J. Ends said in a Washington, D.C., interview. According to his calculations based on ideal conditions: "A pilot flying 600 miles an hour will travel 88 feet from the time his eye spots an oncoming plane until the message is relayed to the brain. By the time the brain interprets the message, the plane has flown 920 feet. When the pilot decides to climb, descend or turn, he has already covered 2,680 feet. And by the time he carries out his decision the plane has covered 4,792 feet. Put another way, one of the pilots would have to see the other plane 9,548 feet away before he could change course to avoid a collision." (UPI, NYT, 4/13/67, 74)

April 13: NASA Deputy Administrator Dr. Robert C. Seamans, Jr., and Associate Administrator for Manned Space Flight Dr. George E. Mueller, testifying before the Senate Committee on Aeronautical and Space Sciences, absolved North American Aviation, Inc. (NAA), of direct blame for the Jan. 27 Apollo fire but criticized contractor workmanship.

- . NAA "has not always been sufficiently dedicated to engineering design or workmanship" in the Apollo program and "did not address itself properly to the training and supervision of its personnel and the adequate inspection of the work that was done," Dr. Seamans charged. As a result of NASA's demand for numerous management reforms in late 1965, NAA had made "marked improvement...in the last year and a half,"

April 13 (continued)

Dr. Seamans noted, but he stressed that "it should not have been necessary for the Government to take this kind of strenuous action."

Dr. Seamans told the Committee that NASA would implement Apollo 204 Review Board's recommendations and build stronger discipline into technical requirements, schedules and management while placing the Apollo program "back on a firm operating schedule." He asserted that nothing in the Board's report suggested that the fundamental design or management structure was faulty. Basic revelation of the accident was fallibility, he stated. Dr. Mueller pointed out that the flammability and placement of cabin materials had been misjudged and compared this flaw in engineering judgment to those which resulted in catastrophic accidents in the course of aircraft development. (Testimony; Wilford, NYT, 4/14/67, 10; Abramson, W Post, 4/14/67, A2; AP, W Star, 4/14/67, A7)

- . President Johnson called for more Inter-American cooperation at conference of Latin American leaders in Punta del Este, Uruguay. U.S., he said, would aid Latin American development by (1) helping to develop a new common market; (2) contributing additional funds to Inter-American Bank for "special operations" such as construction of comsat earth stations; (3) exploring possibility of temporary preferential tariff; (4) offering agricultural and educational assistance; (5) increasing food program for pre-school and school-age children and operating a nutrition demonstration project; (6) establishing Alliance for Progress centers at U.S. colleges and universities; and (7) aiding development of science and technology, especially in areas of educational broadcasting, marine science, and atomic energy. (PD, 4/24/67, 636)
- . Japan's third attempt to orbit a satellite was unsuccessful when 3rd stage of Lambda 4S-3 failed to ignite at Uchinoura Range. In first attempt, Sept. 26, 1966, rocket went off course and missed orbital trajectory. Second attempt, Dec. 21, 1966, was unsuccessful because of 4th stage ignition failure. (W Post, 4/13/67, A17; SBD, 4/14/67, 264)
- . Second of three phases of tests to evaluate use of heavy-lift helicopters for Apollo crew and spacecraft recovery in KSC launch areas was being conducted by NASA and DOD at Eglin AFB. Tests would develop operational equipment, techniques, and procedures to be used at KSC where standard recovery equipment would be ineffective in case of a launch escape system abort during liftoff because of the surrounding marsh, beach, and surf. (MSC Release 67-16)
- . USAF and USN issued statements supporting development of F-111 fighter aircraft as an all-purpose military aircraft.

April 13 (continued)

Secretary of the Air Force Harold Brown: "The F-111A is designed to provide an all-weather strike potential superior to that of any tactical aircraft in the world today. It will fly faster, farther and carry a greater payload, nuclear or conventional, with an unexcelled capability to penetrate sophisticated enemy defenses.... We are confident from the level of performance already displayed in the very extensive flight tests performed on development aircraft that the operational F-111A will provide these vitally needed capabilities, and will meet the military requirements established for the aircraft at the inception of the program."

Secretary of the Navy Paul H. Nitze: "...development of a system as complex as the F-111B/Phoenix has produced sizeable engineering problems. I continue to be impressed with the manner in which they have been met and overcome. I have confidence that changes proposed by the Navy, approved by the Secretary of Defense and now being implemented, will make the F-111B suitable for operation from our first-line attack carriers and will give it the capabilities to perform its mission." (CR, 4/17/67, S5300)

- . U.S. bombers were being guided to targets in North Vietnam by daily meteorological photos received from Essa and Nimbus satellites, USAF announced. Detailed photos, monitored by USAF's weather stations in Saigon and Udon, Thailand, permitted USAF to divert aircraft to areas that were unexpectedly free from clouds. Since equipment for reception was relatively inexpensive, USAF officials speculated that North Vietnamese might also be receiving the photos and using them for defense planning. (AP, NYT, 4/14/67, 3)
- . A 2,000-mph USAF SR-71 reconnaissance aircraft on routine training flight from Beale AFB, Calif., crashed and burned near Las Vegas, N. Mex.--60 mi from site of Jan. 25, 1966, crash of another SR-71. Crew escaped major injury. Aircraft had been built for USAF by Lockheed as successor to the U-2 and had been undergoing tests since December 1964. (UPI, NYT, 4/15/67, 13; AP, W Post, 4/14/67, 9)

April 14: LaRC engineers successfully completed second of two planned orbit adjustments to place NASA's LUNAR ORBITER II and III spacecraft in favorable position for major solar eclipse April 24, by firing LUNAR ORBITER II's velocity-control engine for three seconds and shortening spacecraft's period by 65 sec. Similar maneuver had been accomplished with LUNAR ORBITER III April 12. (NASA Release 67-92)

- . Launch of ESRO's scientific satellite Esro II from WTR was postponed from April 27 until late May because of tape recorder malfunction.

April 14 (continued)

Satellite was first of two scheduled for launch by NASA under cooperative agreement with ESRO. (NASA Release 67-91)

- . MSFC had awarded one-year, cost-plus-incentive-award-fee contract extensions totaling more than \$57 million for engineering, fabrication, and institutional support services for Saturn launch vehicle program. Recipients: Sperry Rand Corp., \$12,695,727; Vitro Corp., \$5,344,159; Brown Engineering Co., \$12,350,140; Spaco, Inc., \$5,971,638; Northrop Corp., \$3,905,000; Hayes International Corp., \$4,969,277; Management Services, Inc., \$5,560,941; Rust Engineering Co., \$599,090; and RCA Service Co., \$5,749,907. (MSFC Release 67-81)
- . MSC awarded Owens-Corning Fiberglas Corp. a \$97,000, cost-plus-fixed-fee study contract to evaluate Beta fiber, a noncombustible fabric, for possible use in Apollo spacecraft and crew systems equipment. (NASA Release 67-90)
- . Informed sources speculated that U.S.S.R. had been conducting heat-shield reentry tests with Cosmos satellites since November 1966 in preparation for manned flights to moon, the New York Times reported. Spacecraft on missions from moon would reenter earth's atmosphere at about 25,000 mph and heat to 5,000-6,000⁰ F--too hot for heat shields currently used on earth-orbiting missions. (NYT, 4/15/67, 13)
- . Employment in the aerospace industry would reach 1,384,000 by September 1967--a 3.4% increase over September 1966--Aerospace Industries Assn. predicted. Forecast, based on survey of 60 companies representing 80% of entire aerospace industry, cited continuing demand for civilian aircraft; stable levels of missile and space sales; and increases in nonaerospace activities as reasons for steady growth in number of employees. (AIA Release 67-17)
- . Former Astronaut John H. Glenn, Jr., had signed contract to appear in at least eight Wolper Productions' TV documentaries on great explorations in history, the New York Times reported. Series, beginning in January 1968, would include Henry M. Stanley's African search for David Livingstone, Captain James Cook's exploration of the South Pacific, and Roald Amundsen's expedition to the South Pole. (Gent, NYT, 4/14/67, 67)

April 16: Astronaut Frank Borman objected to making anyone a scapegoat for Jan. 27 Apollo flash fire and said everyone connected with the program must be blamed. Interviewed on ABC television network with Chairman of House Science and Astronautics Committee's Subcommittee

April 16 (continued)

- on NASA Oversight Rep. Olin E. Teague (D-Tex.), Borman said he had "never...seen safety sacrificed for anything" in U.S. space program. Both men suggested that the greatest safety problem was tendency toward complacency about dangers inherent in tests. (W Star, 4/17/67, A2)
- . Delegates from U.S.S.R. and Communist-bloc countries, who met in Moscow April 3-15, had drafted a "joint satellite and rocket launching program" and had agreed to set up a satellite communications program "open to all countries willing to join," Tass announced. No further details were released. (UPI, NYT, 4/17/67, 10)
 - . U.S. technological lead might be lost because of increasing Vietnam war costs, L/G Ira C. Eaker (USAF, Ret.) wrote in the Newport News Press. He cited examples of this "dangerous possibility": (1) defrayment of war costs at the expense of other military programs such as maintenance of strategic forces and development of new weapons; (2) deferment and possible cancellation of Sst program which "now appears to be stalled on dead center"; and (3) cutting of space program budget and jeopardizing of its goals. "Needed now in this emergency is a people alert and aware of their hazard and determined to maintain the world's highest living standard the way they won it, with technological leadership." (Eaker, Newport News Press, 4/16/67, 21)

April 17: NASA's SURVEYOR III (Surveyor C) was successfully launched from ETR by Atlas-Centaur (AC-12) booster on 65-hr lunar intercept trajectory. Primary mission for the 2,283-lb spacecraft was to perform a soft-landing east of the SURVEYOR I landing site within the Apollo zone and to obtain post-landing TV pictures of the lunar surface. As secondary mission spacecraft would obtain data on lunar surface bearing strength, radar reflectivity, and thermal properties and photograph use of a surface sampler to manipulate the lunar surface [see April 19-30].

At 34:53 GET SURVEYOR III with two-burn Centaur--being used for the first time on a Surveyor mission--separated from Atlas and ignited to reach 100-mi-altitude circular parking orbit where it coasted for 22 min; Centaur then reignited to escape earth orbit and boost spacecraft toward the moon. SURVEYOR III separated from Centaur, deployed its solar panels, and locked on the sun and the star Canopus. Based on a 248-mi target miss estimate, a 4.2 m midcourse maneuver was conducted shortly after midnight April 18 to assure precise landing on target in the Ocean of Storms.

SURVEYOR III was third in series of seven spacecraft designed to prove out design, develop technology of lunar soft-landing, obtain

April 17 (continued)

- post-landing TV pictures of lunar surface, and provide basic scientific and engineering data in support of Project Apollo. Surveyor program was directed by OSSA Lunar and Planetary Programs Div.; project management was assigned to JPL; Atlas-Centaur launch vehicle was managed by LRC; and prime contractor for spacecraft development and design was Hughes Aircraft Co. (NASA Proj Off; NASA Release 67-85)
- . Astronaut M. Scott Carpenter would never be able to fly in space again because of an arm injury suffered in 1964 motorcycle accident, the Washington Evening Star reported. Surgery performed six months ago had failed to restore full mobility of the arm. (AP, W Star, 4/17/67, A6)
 - . Soviet scientists had succeeded in raising the temperature in lower atmosphere by as much as 14.4° F by dissipating clouds with carbon dioxide and other chemicals, Soviet Hydrometeorological Service director Dr. Yevgeny K. Federov told World Meteorological Congress in Geneva. Dispersal of "tens of thousands of square kilometers" of clouds could serve as "a mechanism for triggering off the modification of more massive meteorological processes," he said. (NYT, 4/18/67, 26)
 - . The press praised Apollo 204 Review Board's investigation of Jan. 27 flash fire.

Technology Week: "The harsh, scathing report of the Apollo 204 Review Board has effectively laid to rest charges that the board was assembled to conduct a whitewash of the January 27 fire, which took the lives of three astronauts. The board should be commended for the vigor with which it undertook to establish the cause of the fire, the energy with which it attacked what it regards as dangerous practices and procedures and the directness with which it distributes the blame.... Perhaps the question that will linger longest about the January tragedy is the part played by the pressure of the lunar landing deadlines. We personally believe that such target dates play a large and important factor in motivating the space program and keeping it moving at a healthy pace. But they should not be so sacred as to invoke carelessness.... Without waiting for another accident, it might be well to undertake the same sort of review of practices and procedures throughout the major elements of Apollo that has just taken place in regard to the spacecraft.... The Apollo 204 Review Board has set a good example of what can be accomplished." (Coughlin, Tech Wk, 4/17/67, 50)

Aviation Week: "Its report is technically incisive and sharply critical of NASA and the private contractors manufacturing Apollo

April 17 (continued)

hardware. It is as thorough and technically solid as any other investigation of aerospace disaster in the past three decades. It disproves earlier charges that NASA is incapable of investigating its own technical faults. In fact, it would have been impossible to assemble another group sufficiently knowledgeable about the Apollo system from any other source to complete a useful investigation within this time span.

"...there are none of the pat answers, so often demanded by legislators and harping critics, to the dangerous and complex problems of probing the unknown. Apollo is man's most daring foray in his history on this planet. If all the problems involved in a lunar voyage were so obvious and the solutions so simple as many critics seem to think, we could all buy tickets for a lunar excursion tomorrow." (Hotz, Av Wk, 4/17/67, 21)

- . A satellite capable of broadcasting directly to the home, bypassing local stations and national networks, might be technically feasible within five years, ComSatCorp President Dr. Joseph V. Charyk testified before FCC. Economic feasibility, however, might require more than five years, he said. Dr. Charyk appeared as a witness for the Justice Dept., which was challenging the proposed acquisition of ABC by ITT. (Mintz, W Post, 4/18/67, A2)
- . NASA Administrator James E. Webb told the Senate Committee on Aeronautical and Space Sciences that NASA would present, within two weeks, detailed estimates of how much the Jan. 27 Apollo accident had cost; what changes in spacecraft would be made to reduce fire hazards; and the earliest date for the first manned Apollo mission. He declined to disclose his thoughts concerning canceling NASA's contract with North American Aviation, Inc., because of failures to meet development schedules and stay within cost estimates: "They did not do all the things they should have done, but I can say the same thing about us at NASA." He stated his conviction that he was obligated to "act responsibly in respecting confidences between himself and contractors." Denying that undue risks were taken in order to speed the program, Webb emphasized that NASA had "never put schedule above safety." Apollo 20⁴ Review Board's study was "a good report," he said, but it should not be construed to be an evaluation of the entire space program: "The board has done an outstanding investigation of one accident but it is not a full and fair appraisal of the space program...[and] cannot be taken as a guide to the realities of this program...." In response to questioning Webb stated that, in his judgment, the pacing item in the manned lunar landing program remained the Saturn V booster, and when it was ready for manned flight there would be a spacecraft ready.

April 17 (continued)

Committee Chairman Clinton P. Anderson (D-N.Mex.) requested that NASA witnesses appear again not later than May 9 to detail changes to the program, as suggested by Webb. (Wilford, NYT, 4/18/67, C26; O'Toole, W Post, 4/18/67, A1; SBD, 4/18/67, 275)

- . Astronauts Donald K. Slayton, Alan B. Shepard, Walter M. Schirra, Jr., Frank Borman, and James A. McDivitt, testifying before the House Committee on Science and Astronautics' Subcommittee on NASA Oversight, expressed confidence in NASA's management of U.S. space program. They noted that there had been only one mishap in the program, compared with 16 successful manned flights under the same management. Since fire had been foreseen as a significant danger in orbit but not on the launch pad before fueling of the launch vehicle, everyone had been "lulled into a sense of false security...[and] grossly underestimated the fire potential of the spacecraft," they said. Schirra explained confidence astronauts felt prior to the fire Jan. 27: "The back-up crew [of which Schirra was commander] had left the Cape with the feeling that we had a good spacecraft behind us.... I was not at all prepared for the news I received when I arrived at Houston." (Hines, W Star, 4/18/67, 1)

April 17-20: Some of the more important preliminary results from NASA's interplanetary spacecraft PIONEER VI (launched Dec. 16, 1965) and VII (launched Aug. 17, 1966) were presented at American Geophysical Union's 48th annual meeting in Washington, D.C. Spacecraft, which had flown almost 200 million mi in their solar orbits, had provided: (1) better definition of solar atmosphere; (2) additional data on solar wind; and (3) improved measurement of earth's magnetosphere. Report by ARC scientists Dr. John H. Wolfe, R. W. Silva, and D. D. McKibbin indicated that magnetosphere ends about 3.5 million mi from earth going away from the sun; previous estimates had varied from 240,000 mi to 100 million mi. (NASA Release 67-94)

April 18: NASA Administrator James E. Webb submitted summary of M/G Samuel Phillips' (USAF) report on North American Aviation, Inc.'s workmanship (the "Phillips Report") to the Senate Committee on Aeronautical and Space Sciences: "Our main criticism was that the Space and Information Division was over manned and that the S-II and CSM programs could be done, and done better by fewer people, better organized with particular emphasis on achieving greater competence in key management and technical positions.... Work tasks were inadequately defined and scheduled...and, largely as a result of these conditions, budget and control were deficient.

April 18 (continued)

"...in each of...[the] problem areas we identified in December 1965, we found...improvement in the situation in April 1966. I do not intend, however, to leave the impression that we were completely satisfied with North American's performance. We did determine...that the corrective actions already taken and those in the process of being implemented in April 1966 were appropriate ones that reflected a responsive reaction by NAA to the criticism we had expressed during our review and provided some measure of confidence for improved future performance...."

Testifying in support of NASA's FY 1968 budget, Webb warned against permitting the Jan. 27 Apollo accident to deter U.S. space efforts. It should not, he said, "lead us to lose sight of the continued progress and vigorous efforts the Soviets are making.... With the world situation what it is, and with clear indications that the Soviets are going ahead with a large-scale, long-term program in space, it is especially important this year for the United States to let the world know that we cannot and will not surrender our hard-won position, even though we will not mount the larger effort required to catch up with them." Describing the proposed budget as "forward looking," Webb conceded that it would not "enable us [NASA] to move toward important goals with as much assurance as we would like." He outlined NASA's planned program and urged support for all future projects: "If we fail to make these decisions in our consideration of the 1968 budget, they will go by default.... Later when we find we do not have the capabilities we could have had and that others are accomplishing what we might have achieved, it will be too late." (Wood, W Post, 4/19/67, A9; Sehlstedt, B Sun, 4/19/67, 1)

- . Informed sources reported that U.S.S.R.'s Tu-144 supersonic transport would not be ready for the Paris International Air Show in May as UPI reported March 7 but would still fly before the Anglo-French Concorde and U.S. Sst, according to AP. First test flight of Tu-144 would be in late 1967. (AP, NYT, 4/19/67, 73)

April 19: First manned Apollo flight had been delayed at least one year by Jan. 27 fire at KSC, Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight, told Senate Committee on Aeronautical and Space Sciences. He said he believed men could still land on the moon by the original 1970 deadline "although the probability is lowered." Dr. Mueller told the Committee that the replacement spacecraft for the first manned Apollo mission, which incorporated "all changes resulting from the findings of the Apollo accident investigation," was on the assembly line at North American Aviation, Inc.'s plant in Downey, Calif. (AP, B Sun, 4/20/67)

April 19: USAF SV-5D lifting body vehicle was successfully launched from WTR by Atlas booster on reentry mission and telemetered excellent performance data. Vehicle--third of four in USAF's Precision Recovery Including Maneuvering Entry (Prime) program--was second to perform preprogrammed cross-range maneuvers and first to be successfully recovered. First SV-5D vehicle was launched Dec. 21, 1966, and lost when parachute malfunctioned during reentry; second, launched March 5, sank in Pacific after losing its flotation gear. (Tech Wk, 4/24/67, 13; Av Wk, 4/24/67, 35)

- . NASA Administrator James E. Webb addressed Edison Electric Institute's 35th Annual Convention in New Orleans: "Our flight projects, both manned and unmanned, depend upon electronic links back to earth where their data is recorded and analyzed, where their actions are controlled, and where the new knowledge is put to use. We must therefore continue to provide and operate the tracking and data acquisition networks and their associated communications. Our technology utilization program will continue to provide effective means for making available the fruits of our technological progress to the scientific and industrial community at large. And, in every area of our program effort, we are continuing the underlying supporting research and technology which makes possible the development of experiments, the implementation of ideas, and the advances in technology which culminate in meaningful aeronautical and space projects.... Research and development, scientific inquiry and technological advance, are the province of men working here on earth. New knowledge and new tools for its application are major elements of our total national power--political, military, and economic." (Transcript)
- . Edgar M. Cortright, NASA Deputy Associate Administrator for Space Science and Applications, testifying on NASA FY 1968 authorization bill (H.R. 6470) before House Committee on Science and Astronautics' Subcommittee on Space Science and Applications, said he had "high confidence that we can sterilize the VOYAGER system by 1973 to the satisfaction of the biologists." He disagreed with the opinion of Dr. N. H. Horowitz, Cal Tech, that U.S. was adhering to sterilization standards which were exceedingly severe and represented an obstacle to U.S. plans for planetary exploration [see March 24]. To support his view, Cortright presented a summary of the findings of Spacecraft Sterilization Advisory Board, chaired by Dr. Richard Bond, Univ. of Minnesota, which was "examining the statements" made by Dr. Horowitz. Cortright said it was felt that "probably Prof. Horowitz has overestimated the difficulty posed by the current sterilization requirements and underestimated the ability of aerospace companies and government laboratories to cope with it." Most of the components and parts NASA planned to use in Voyager and sterilize were already "demonstrably sterilizable," so there

April 19 (continued)

seemed to be no justification in abandoning a goal which the majority of the scientific community feels is legitimate." (Transcript)

- . The "Phillips Report"--report by NASA's Apollo Program Director M/G Samuel C. Phillips which "found insufficient competence in key management and technical positions" at North American Aviation, Inc., 16 mo before Apollo accident--was being suppressed by NASA, Rep. William F. Ryan (D-N.Y.) charged in an AP interview. Representative Ryan said he would ask Chairman of House Committee on Science and Astronautics' Subcommittee on NASA Oversight Rep. Olin E. Teague (D-Tex.) to demand NASA's submission of the full report for examination by the Subcommittee. (AP, W Star, 4/19/67, A6)
- . Letter to editor of Space Business Daily by unidentified leader in U.S. space program attacked NASA's use of pure oxygen in life-support systems: "...most engineering people in industry, most reputable bio-engineering people in USAF and NASA felt two gas was the way to go. In addition, there has never been an overwhelming engineering reason for a pure oxygen system.... The argument of reliability and complexity is ludicrous when you examine the complexity of other systems in the spacecraft and booster. Now it is even more ironic in that, if pure oxygen is kept, all sorts of complicating compensations must be made. The truth is that a few key people in NASA flew in the face of strong industry technical advice against pure oxygen. To add to the problem, GEMINI made them cocky and they forgot completely the sleeping monster they had created. Take anyone, regardless of skill and training, show him a fire in pure oxygen, and ask him if he'd agree to live in pure oxygen with that danger in the complex environment of a spacecraft. The answer is painfully obvious. Now we'll make a bad situation worse by jury rigging a system to avoid pure oxygen on the pad - but - we'll still have it in space.
"NASA and everyone must face it. It was a bad decision compounded by complacency, for example, the hatch design. If the atmosphere were two gas, chances are, survival would have occurred. Let's get guts, fix the basic deficiency and take the delay. That is the only answer and sooner or later it must be faced." (SBD, 4/19/67, 282)
- . Five communications companies filed joint application with FCC for construction of new comsat earth station near Rowlesburg, W. Va. Companies: ComSatCorp; AT&T; ITT WorldCom; RCA; and WUI. Proposed station, to be completed in 1968, would handle all types of high-quality communications. (ComSatCorp Release 67-31)

April 19: M/G Holger Nelson Toftoy (USA, Ret.), a leading Army ordnance expert who recommended that former German V-2 development team under the leadership of Dr. Wernher von Braun be brought to U.S. at end of World War II, died at Walter Reed Army Medical Center after a long illness. General Toftoy became commander of White Sands Proving Grounds immediately following World War II. In 1952 he became Director of the Ordnance Missiles Laboratory at Redstone Arsenal, Huntsville, Ala., and in 1958, when Redstone was reorganized as the Army Ordnance Missile Command, he was named Deputy Commander under M/G John B. Medaris. General Toftoy subsequently became commander of Aberdeen (Md.) Proving Ground until his retirement in 1960. (UPI, NYT, 4/20/67)

April 19-30: NASA's SURVEYOR III became second U.S. spacecraft to soft-land on the moon when it touched down in the Ocean of Storms after 64 hr 59 min flight and began transmitting the first of 5,487 detailed television pictures to JPL Deep Space Facilities, Goldstone, Calif.

Landing sequence began when SURVEYOR III shifted its normal cruising attitude to position main retrorocket. Triggered by radar (later ejected), main retromotor burned and slowed spacecraft to about 250 mph; retromotor was ejected. Vernier engines, which were to have slowed spacecraft to about 3 mph, failed to cut off at 14 ft above lunar surface as planned, and the 620-lb spacecraft made three separate landings--covering distance of 33 ft--before engines shut off 37 sec after initial touchdown.

First pictures transmitted were unclear because of sun's brightness, but later photos were excellent. They revealed that spacecraft was resting in a depression or small crater with 5° slope--which was expected to hinder photography of lunar horizon--and showed impressions made by footpads during multiple landing. Shortly after touchdown a telemetry malfunction falsely indicated major drain on power system, but photos confirmed that spacecraft's batteries were intact and undamaged.

In addition to photographic equipment, including two additional mirrors to expand camera's field of view, spacecraft also carried a shovel-like surface sampler which would scoop soil, move debris, and strike lunar rock with an expandable arm operated by radio signals from earth. On April 21-22 sampler began bearing strength tests and excavation of trenches up to six inches deep. On April 23-24, cooled by two-hour lunar eclipse, SURVEYOR III took 118 excellent color photos of Venus, a star cluster, and earth as it passed between the moon and the sun. On basis of preliminary digging operations and photos, project scientists concluded that lunar soil had consistency similar to wet sand and a bearing strength of about six pounds per square inch--firm enough to support Apollo spacecraft. Cal Tech professor and advisor to JPL on soil mechanics Dr. Ronald F. Scott explained: "The surface is like ordinary soil...a lot like fine grained sod or damp beach sand, and it

April 19-30 (continued)

behaves in perhaps a disappointingly ordinary way. The area presents no hazardous conditions and looks good for a landing site. An astronaut walking across the surface would not need snowshoes." On May 3 communications with spacecraft were halted temporarily to conserve battery strength throughout two-week lunar night.

Performance of SURVEYOR III, with equipment identical to SURVEYORS I and II except for soil sampler and two additional mirrors, was near flawless, and expected lifetime was indefinite. SURVEYOR I was launched May 30, 1966, successfully softlanded on moon June 2, 1966 in Ocean of Storms, and transmitted 10,338 pictures to earth. SURVEYOR II was successfully launched Sept. 20, 1966, but failed to softland because of an ignition failure. (NASA Proj Off; NASA Release 67-85; UPI, W Star, 4/23/67, A10; O'Toole, W Post, 4/22/67, A4; 4/23/67, A1)

April 20: NASA successfully launched ESSA V (Tos-C), fifth meteorological satellite in ESSA's Tiros Operational Satellite (Tos) system, from WTR using Thrust-Augmented Thor-Delta booster. Satellite achieved nearly -polar, sun-synchronous orbit with 883-mi (1,421-km) apogee; 840-mi (1,352-km) perigee; 113.5-min period; and 101.9° inclination. Wheel orientation maneuver would be completed during 18th orbit [see April 24], at which time first photos would be programmed and NASA would check out spacecraft before turning its operation over to ESSA.

An advanced version of the cartwheel configuration, 325-lb ESSA V carried two Advanced Vidicon Camera System (Avcs) cameras which would provide 24-hr global weather coverage. Photos would be stored on magnetic tape until readout by ESSA's Command and Data Acquisition (CDA) stations at Fairbanks, Alaska, and Wallops Island, Va., to supplement ESSA III--expected to become almost completely inoperable by early June.

ESSA financed, managed, and operated Tos system; GSFC was responsible for procurement, launch, and initial checkout of spacecraft in orbit. ESSA I was launched Feb. 3, 1966; ESSA II, Feb. 28, 1966; ESSA III, Oct. 2, 1966; and ESSA IV, Jan. 26, 1967. (NASA Proj Off; ESSA Release 67-39)

- . NASA Deputy Administrator Dr. Robert C. Seamans, Jr., testifying on NASA's FY 1968 authorization bill (H.R. 6470) before House Committee on Science and Astronautics' Subcommittee on Advanced Research and Technology, urged Congressional approval for funding to begin program to develop Nerva II nuclear rocket engine. Estimated cost over 10 yrs would be \$2 billion: \$500 million would be needed to develop nuclear stage and \$1 billion for ground testing. NASA's decision to develop Nerva II was based primarily on "our own national objectives in space; what do we do in the future; now looking ahead to the late '70s and

April 20 (continued)

'80s, as a requirement for booster capability in this country.... However, we also must consider our capability in the world arena and, of course, specifically today we have to be cognizant the best that we can of the Russian capability and the Russian plans." Dr. Seamans noted that Soviet Proton booster could launch 50,000 lbs into earth orbit, compared to 40,000-41,000-lb capability of Uprated Saturn I. "We have every reason to believe that in the [Soviet] program they recognized the same kind of needs that we recognized for our program and that they are moving on a broad front, including the development of very large boosters." (Transcript, 1131-4)

- . NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell, testifying on NASA's FY 1968 authorization bill (S. 781) before Senate Committee on Aeronautical and Space Sciences, urged Congressional approval to begin 10-yr, \$2.2-billion Voyager program. "Our concept in developing the Voyager spacecraft is to develop a technology that can be used for exploring the solar system. Although we talk in terms of going to Mars for the first missions, our plan is to modularize the system so that by rearranging and reorganizing pieces, one can go to Venus or one might develop a spacecraft to go out to Jupiter...we are planning on developing for planetary exploration the kind of technology that we developed in the Explorer series for exploration of the vicinity of the earth." Dr. Newell said NASA had no proposal for manned exploration of the planets at the present time. (Transcript, 320-2)

- . Testimony by NASA and NAA officials at Congressional hearings on Apollo accident was loaded with technical information to avoid discussion of mismanagement and responsibility, William Hines charged in the Washington Evening Star: "In execution, it was a masterful operation. Experts avalanched data on the committees until...[they had] far more technical information than they could possibly handle...." Hines cited statement by Sen. Walter Mondale (D-Minn.) which "got to the very core" of the problem: "'I am not interested in knowing enough about building spacecraft so that I can build one in my backyard, but I do think I have a responsibility to know enough about questions of management, contractor performance and quality control so I can pass judgment on the question of whether these are fundamental issues that we need to deal with.'"

"If members of the House committee had all kept their eyes on this central issue and refused to be confused by the irrelevant and the trivial, the hearings on that side of the Capitol would have been far more fruitful to date." (Hines, W Star, 4/20/67, A6)

April 20: Unconfirmed reports in Moscow indicated that "a spectacular and significant" space venture by U.S.S.R. would occur within one week, according to AP. (AP, W Star, 4/20/67, 1)

- . Third U.S. Redstone rocket in the "Project Sparta" antimissile-missile research program was fired from Woomera Rocket Range near Canberra, Australia, Supply Minister Denham Henty announced. (AP, C Sun-Times, 4/21/67)
- . Large antennas on satellites, missiles, aircraft, and household rooftops might soon be replaced by a tiny two- or three-ounce microcircuit device called Subminiature Integrated Antenna (Sia) being developed by USAF. Broad-banded Sia would have several octaves of bandwidth to cover entire VHF and UHF range; allow 50-100 times as much inflow of electrical current for sharper TV pictures; replace larger antennas that sometimes revealed presence of combat troops to the enemy; and reduce weight of future air and space vehicles by 10-500 lbs. (AFSC Release 40.67)
- . NATO was considering establishing a \$45-million comsat system which would permit simultaneous consultation of its leaders during crisis, William Beecher reported in New York Times. U.S. would supply and launch two satellites; costs would be shared by NATO members. Proposal was expected to be formally approved during May. (Beecher, NYT, 4/21/67, 11)

April 20-21: Thirteen high school students from Northwestern states presented scientific papers at regional Youth Science Congress at ARC. Congress was sponsored jointly by NASA and National Science Teachers Assn. to "encourage promising students to enter science as a career, and to develop their abilities in science through scientific investigation." (ARC Release 67-6)

April 21: Seven members of the House Committee on Science and Astronautics' Subcommittee on NASA Oversight continued hearings on Jan. 27 Apollo accident at KSC by touring AS-204 launch pad and questioning eye-witnesses.

Donald Nichols, assistant test manager at KSC, told the Subcommittee that the decision to keep the hatch closed during Jan. 27 Apollo rehearsal might have cost the lives of the crew. On Oct. 31, 1966, he said, decision was made to change plans that would have kept the hatch open until the crew had been better trained on emergency procedures. Officials decided that hatch could be locked and emergency escape practice conducted after the test, he said. If test procedures had not been changed, the

April 21 (continued)

hatch would have been open or the astronauts not present in the spacecraft.

Thomas R. Baron, former North American Aviation, Inc., quality control inspector, said that Apollo 1 astronauts smelled smoke in their spacecraft 12 min before they died and tried for five minutes to escape. This information, he said, had been supplied by NAA electrical technician Mervin Holmberg.

Holmberg later made a surprise appearance before the Subcommittee and denied Baron's allegation: "I listened to his [Baron's] speculation, but I didn't make any comment" on what caused the fire. "I wasn't even near the accident when it happened." Baron, who had submitted a report to NASA [see During March] prior to Jan. 27 accident charging laxity, poor morale, and bad management on the part of NAA, was sharply criticized by Subcommittee members, and his statement was disclaimed. (Abramson, W Post, 4/22/67, A4)

- . USN F-111B fighter aircraft crashed on takeoff in test flight at Grumman Aircraft Engineering Corp.'s Calverton, N.Y., flight test center. Both Grumman pilots were killed. Adapted for use by USN and USAF, the F-111 (formerly TFX) had been subject of continued controversy between Congress and DOD since Secretary of Defense Robert S. McNamara insisted that the F-111 be used by both services and overruled military leaders' objections to selection of General Dynamics Corp. for construction of the aircraft. Crash was first for USN test model, which had been stripped to remove excess weight; USAF test model (F-111A) crashed in January, killing one crew member. (Wilson, W Post, 4/22/67, A5)
- . Aquanauts diving to extremely low ocean depths should breathe almost pure hydrogen in their diving suits, Dr. R. W. Brauer of Wrightsville Marine Bio-Medical Laboratory suggested at Federation of American Societies for Experimental Biology in Chicago. Dr. Brauer planned to subject himself to such an atmosphere--98% hydrogen and 2% oxygen--at a pressure equivalent to 700- or 800-ft depth within the next six months. Divers long ago passed the depth limits that were feasible with compressed air and were now approaching the probable safe limits with an atmosphere in which helium was the major ingredient, Dr. Brauer said. Yet, oil drilling, prospecting operations, and other undersea activities were pushing divers to further depths which required new types of atmosphere and, possibly, drugs to modify the narcotic effects produced by the high pressure air. (Schmeck, NYT, 4/23/67, 60)
- . U.S. scientists' interest in military research had declined substantially, Bryce Nelson wrote in Science: "Since the beginning of the Second World War, many American scientists have regarded it as a duty to work on

April 21 (continued)

military research in times of national emergency and have often done so with enthusiasm. However...many scientists now seem to show little feeling of obligation to do military research." Suggested reasons for lack of interest: (1) disagreement with U.S. policy in Vietnam; (2) boredom with defense problems; (3) higher salaries in private industry than in DOD; and (4) increased interest in civilian problems such as urban development, poverty, and transportation. (Nelson, Science, 4/21/67, 24)

- . The efficiency of Soviet scientific research was deteriorating and the price of getting an idea into production was rising, biologist Alexander Neifakh wrote in Literaturnaya Gazeta. Although scientists had doubled every 7 to 10 yrs, published works had doubled only every 13-15 yrs. "This shows that the effectiveness of scientific activity per scientist or per ruble invested in science is consistently falling," Neifakh concluded. (Reuters, NYT, 4/22/67, 31)

April 21-23: Editorial comment on NASA SURVEYOR III's successful soft-landing on the moon April 19.

Miami News: "The National Aeronautics and Space Administration badly needed a victory to demonstrate that the moon program is not threatened by technical deficiencies, as the Apollo investigation seems to suggest. The landing of Surveyor III...and the transmission of TV pictures fills the bill.... There is no denying, however, that Apollo is in serious difficulty...[and] NASA is creating the impression that it is unwilling to see the investigation carried to a complete conclusion.... Surveyor and dozens of similar achievements demonstrate that the overall space program has been a remarkable success. NASA would make a mistake to see the luster of this record dimmed by its failure to cooperate fully in the Apollo investigation." (Miami News, 4/21/67)

New York Times: "Inevitably, Surveyor 3 calls attention to the fact that the first stages of lunar study and exploration do not require men, that the moon can be investigated to a considerable extent without incurring either the great risks or high costs of manned lunar flight. From the scientific and technical points of view, Surveyor-type flights are a rational and feasible alternative to Apollo.... Manned space exploration has unavoidable dangers, but these are multiplied many times by the pressure of the 1970 deadline that dominates the Apollo project. What Surveyor 3 has done is to remind us that--aside from propaganda and prestige considerations--there is no need to endanger brave men's lives." (NYT, 4/23/67, 10B)

April 21-23 (continued)

Washington Post: "With the success in landing Surveyor III...[NASA] once again exhibited its stunning scientific and technological skills.... Surely the time cannot be far off when men will be shuttling from earth to the moon--and far beyond.... Bold ventures of mankind are always undertaken in din of criticism, and the manned flight to the moon will be no exception to the rule. Space exploration will continue--not because it excites expectations of an El Dorado or a Fountain of Youth --but because it is an inescapable challenge to human curiosity and imagination." (W Post, 4/23/67, C6)

April 23-24: U.S.S.R. successfully launched SOYUZ I spacecraft with Vladimir M. Komarov, but mission ended 26 hrs after launch when spacecraft failed to reenter properly and crash-landed killing Cosmonaut Komarov.

Launched April 23 from Baikonur by a "powerful new carrier rocket," SOYUZ I entered initial orbit "close to the estimated one," Tass announced with unprecedented speed, only one hour 20 min after launch. Orbital parameters: apogee, 224 km (139 mi); perigee, 201 km (125 mi); period, 88.1 min; inclination, 51.4°. Onboard equipment was "functioning normally" and Komarov was "in good health and feeling well." During the flight Tass distributed only a few terse reports in contrast to extensive publicity usually accorded manned missions. Final announcement, which followed 11-hr silence, said accident occurred during 18th orbit after program of test flight had been completed and spacecraft had been successfully braked with retrorockets for reentry. "...when the main parachute was opened at an altitude of seven kilometers [4.3 mi], the lines of the parachute, according to preliminary information, got snarled and the spaceship descended at great speed, which resulted in Komarov's death." Tass did not report whether the cosmonaut had a personal parachute to attempt an escape. Western experts believed SOYUZ I was tumbling or spinning out of control during reentry: when parachutes were deployed, tumbling caused them to tangle among themselves or wrap around spacecraft resulting in crash-landing. Experts said difficulties apparently developed earlier in the flight because Komarov tried to reenter during 15th orbit but was unable to control his spacecraft.

Informed sources had speculated that mission involved the launch of a second spacecraft carrying several cosmonauts that would dock with SOYUZ I and permit at least one cosmonaut to transfer from second spacecraft to SOYUZ I. Tass's official announcement said mission would "test the new piloted spaceship, check the ship's system and elements in conditions of space flight, conduct expanded scientific and physical-technical experiments and studies in conditions of space flight, and continue medical and biological studies on the influence of various factors of

April 23-24 (continued)

space flight on the human organisms." Mstislav Keldysh, President of Soviet Academy of Sciences, said on April 26 that SOYUZ I spacecraft had been tested previously in two to four unmanned flights. Weight, size, and capacity of new spacecraft were not revealed.

Immediately following the accident, which was first known fatality during a space flight, the Kremlin announced it was appointing a Government commission to investigate "all the circumstances" of the cosmonaut's death. Komarov would be cremated and buried in the Kremlin Wall--a final resting place for Soviet heroes--and a monument would be erected on the site of his birthplace in Moscow. (NYT, 4/24/67, 1, 27; 4/25/67; 1, 20; 4/27/67, 2; W Post, 4/23/67, A1, A16; 4/24/67, A5; 4/25/67, A1, A16; W Star, 4/23/67, A1)

April 24: After successful wheel orientation maneuver ESSA V's No. 1 meteorological camera was turned on for the first time and transmitted "high quality" cloud cover pictures. Photography, originally scheduled to begin April 22, had been delayed until analysis of spacecraft's telemetry system confirmed that spacecraft and subsystems were working satisfactorily. Operation of ESSA V, launched by NASA April 20, would be turned over to ESSA in early May. (NASA Release 67-98)

. U.S. leaders expressed sorrow at the death of Cosmonaut Vladimir M. Komarov.

President Johnson: "The death of Vladimir Komarov is a tragedy in which all nations share. Like three American astronauts who lost their lives recently, this distinguished space pioneer died in the cause of science and in the eternal spirit of human adventure."

Vice President Humphrey: "It is with great sorrow that we learn of the tragedy involving Vladimir Komarov. The loss of a dedicated life is indeed a heavy price. Yet progress and space development is necessary."

NASA Administrator James E. Webb: "All of us who have faced the difficulties of understanding and putting to use the forces of nature at the outer edge of Man's knowledge of what is possible in this decade deeply regret the loss of life represented by the death of Cosmonaut Komarov, and extend our sincere sympathy to his family and associates. We feel certain that man will achieve great things in space. Some of these will determine what the men will be able to do on earth.

"We also feel that at this dawn of the space age, man has the duty to seek cooperation between nations, such as the USSR and the United States on a realistic basis.

"We at the National Aeronautics and Space Administration want to make every realistic effort. Could the lives already lost have been saved if we had known each other's hopes, aspirations and plans? Or could they have been saved if full cooperation had been the order of the day?"

April 24 (continued)

- U.S. Astronauts: "We are very saddened by the loss of Colonel Komarov. We feel comradeship for this test pilot because we have met several of his fellow cosmonauts and we are involved in a pioneering flight effort which is not without hazards." (Text; PD, 5/1/67, 660; AP, NYT, 4/25/67, 21)
- . NASA revised designations for Apollo and Aa missions: (1) all Apollo missions would be numbered sequentially in the order flown with the next Apollo mission to be designated Apollo 4, followed by Apollo 5, etc.; (2) Aa missions would be designated sequentially as Aap-1, Aap-2, etc. Number designations would not differentiate between manned or unmanned Up-rated Saturn I and Saturn V missions. (Text)
 - . Report on space rescue prepared by Rand Corp. for NASA recommended that all future spacecraft be compartmented with crew spread among separate detachable modules. Each module would carry additional survival equipment for use in space rescue missions in earth orbit, during lunar flights, and manned planetary missions, and would be equipped with a spare Earth Reentry Module (Erm). Study estimated, however, that even with an emergency system available, rescues would be successful in only 80% of space emergencies. (Taylor, Tech Wk, 4/24/67, 16)
 - . MSC awarded MIT a \$500,000 contract to study, develop, and test an advanced control guidance and navigation system for long-duration, post-Apollo manned spaceflight missions. (MSC Release 67-17)
 - . Water might have played an important role in shaping the lunar surface, Dr. Harold C. Urey, Univ. of California physicist, told National Academy of Sciences. As evidence to support his theory of the former existence of "lakes" on the lunar surface, Dr. Urey showed spacecraft photos of the moon's surface in which material had filled in depressions as though it were free-flowing. He also cited carbon-rich meteorites which seemed to be fragments of ancient lake beds. Dr. Urey believed many, if not all, the stony meteorites were fragments dislodged from the moon by impacting objects such as iron meteorites. As further evidence of water action, he noted the presence of meteorites within which numerous rounded fragments were embedded which appeared to have been shaped by frictional effects within flowing material. A body much smaller than the moon would not have had sufficient gravity for this flow effect, Dr. Urey argued. (Sullivan, NYT, 4/25/67, 23)
 - . ComSatCorp selected Holmes & Narver, Inc., to provide architectural and engineering services for three new earth stations under two contracts --\$361,600 for West Virginia and California facilities, and \$194,200 for Puerto Rico station. (ComSatCorp Release 67-32)

- April 25: Senate unanimously approved space law treaty, under consideration since Feb. 7, and transmitted it to President Johnson for signing and formal ratification. Treaty would become effective when ratified by U.S., U.K., U.S.S.R., and two other nations. (NASA IAR VI/51; Finney, NYT, 4/26/67, 1; W Star, 4/26/67, A3)
- . Col. Joseph F. Cotton (USAF) and NASA test pilot Fitzhugh Fulton made successful emergency landing of XB-70 No. 1 at Edwards AFB after crew entry door opened on takeoff and main landing gear malfunctioned. (XB-70 Proj Off)
 - . M/G Benjamin D. Foulois (USA, Ret.), oldest U.S. military pilot and first American to fly in combat, died at age 87 at Andrews AFB, Md. A member of USA since 1898, General Foulois had been first person to operate an Army dirigible; first military observer on a cross country flight (with Orville Wright); first military man to teach himself to fly; first military test pilot; first man to fly more than 100 mi nonstop; first man to use an aircraft in combat; and first Chief of Staff of the Army Air Corps to be a military aviator. He had received five campaign badges for field services, in addition to the Distinguished Service Medal, the French Legion of Honor, the Crown of Italy, and the Congressional Medal of Recognition. (UPI, NYT, 4/26/67, 43; Casey, W Post, 4/26/67, B8)
 - . NASA awarded Douglas Aircraft Co. a one-year, \$13.5-million fixed-price -incentive contract extension to provide continued support services for Delta launch vehicle. Contract covered nine launches--seven at KSC, and two at WTR--for 12 mo beginning Jan. 1. (NASA Release 67-99)
 - . Nearly 100,000 mourners filed past the bier of Cosmonaut Vladimir Komarov in Moscow. Premier Aleksey Kosygin and President Nikolay V. Podgorny briefly joined an honor guard of soldiers near the bier. (Anderson, NYT, 4/26/67, 3; UPI, W Post, 4/26/67, A16)

April 26: Italy's SAN MARCO II (San Marco B) scientific satellite was successfully launched from Mobile Launcher in the Indian Ocean off coast of Kenya, Africa. Four-stage NASA Scout launch vehicle boosted satellite into equatorial orbit with 748-km (465-mi) apogee; 219-km (136-mi) perigee; 94-min period; and 2.9° inclination. The 285-lb satellite--first of any nation to be launched from a platform at sea--would measure air density continuously by monitoring spacecraft's drag forces and investigate ionospheric characteristics which interfered with long-range radio transmissions.

April 26 (continued)

- SAN MARCO II was second Italian satellite to be launched under May 31, 1962, cooperative agreement between NASA and Italian Space Commission (ISC). First satellite, SAN MARCO I, was successfully launched from NASA Wallops Station Dec. 15, 1964. San Marco was a mutual program of NASA and ISC with no exchange of funds. NASA supplied launch vehicle and provided personnel training and tracking and data acquisition services. ISC was responsible for design, fabrication, and testing of payloads and for launching of satellite built by Centro Ricerche Aerospaziali (CRA) of the Univ. of Rome. (NASA Proj Off; NASA Release 67-93; WS Release 67-17)
- . NASA test pilot William H. Dana made successful emergency landing of X-15 No. 3 at Edwards AFB after low pressure developed in fuel pump. (AP, B Sun, 4/27/67)
 - . Ashes of Soviet Cosmonaut Col. Vladimir M. Komarov were buried in the Kremlin wall in a military funeral attended by Premier Aleksey N. Kosygin, President Nikolay V. Podgorny, and other high Government leaders and scientists. Cosmonaut Yuri A. Gagarin, in a brief speech, pledged that Soviet cosmonauts would "continue the cause" for which Komarov gave his life. A NASA spokesman said plans to send U.S. Astronauts L. Gordon Cooper and Frank Borman to funeral had been abandoned because U.S.S.R. denied permission, saying it was an internal Soviet affair. (AP, W Star, 4/26/67, A24; NYT, 4/27/67, 3; UPI, W Post, 4/27/67, A4)
 - . Rep. William F. Ryan (D-N.Y.), in statement on the House floor, charged that NASA refused to release the Phillips Report because "the truth concerning NASA's failure properly to supervise Apollo operations and incredible mismanagement on the part of NASA's major Apollo contractor is highly embarrassing." He said that if NASA failed to officially release the report by April 29, he would make the full text available to the press. "In a democracy no agency should be permitted to withhold critical information for its own protection. On the contrary, the public which, at a tremendous cost is financing NASA's efforts in space, has a right to know how its money is being spent." (CR, 4/26/67, H4733)
 - . New York Times praised Senate ratification of the space law treaty April 25 and called for increased international cooperation in space: "Ideally, the probing of space and the planets would be the province of a World Space Organization affiliated with the United Nations, financed by the contributions of all nations desiring to participate, and drawing upon the technical manpower and knowledge of all nations. This international organization could be the owner of the moon and other

April 26 (continued)

solar bodies, arranging for the exploitation of resources found there, and using any extraterrestrial profits for the benefit of all men.

"It will take much time before such an ideal can be reached.

But even now the more sober spirit evident in Moscow and Washington opens the door to greater bilateral cooperation. Both nations have technical knowledge in this field that they could exchange to their mutual advantage. Their space tracking and rescue facilities could be coordinated into a single world system; they could agree on a division of labor that would eliminate such duplication as is represented by Surveyor and Lunar Orbiter. The result could easily be major savings in money and increased safety for all astronauts, regardless of nationality." (NYT, 4/26/67)

- . James Smith McDonnell, founder of McDonnell Aircraft Corp., received National Academy of Engineering's second Founders Medal at NAE's third Annual Meeting in Washington, D.C. Medal honored "outstanding contributions by an engineer both to his profession and to society." (NAE Release)
- . Former NASA Associate Administrator for Advanced Research and Technology Dr. Raymond L. Bisplinghoff was among 45 new members and 10 foreign associates elected to NAS. (NYT, 4/27/67, 57)

April 27: NASA awarded General Electric Co. and Lockheed Missiles and Space Co. \$50,000, fixed-price contracts to conduct four-month parallel studies of a medical laboratory for Apollo Applications (Aa) flights. Designated Integrated Medical and Behavioral Laboratory Measurement System, laboratory would permit detailed measurements of human systems and crew functions during space flight. It could be flown as a complete laboratory or as selected group of measurement modules on specific missions. (NASA Release 67-102)

- . Nuclear physicist Dr. Edward Teller, speaking at a Washington, D.C., press conference, recommended that U.S. proceed with a ballistic missile defense system. Qualifying his opinion as "inexpert," Dr. Teller noted there were other factors to be considered in any decision for the deployment of a missile defense system--such as strategic considerations. Secretary of Defense Robert S. McNamara opposed the present establishment of an antimissile system on the grounds that it would not withstand a sophisticated assault. (B Sun, 4/28/67, 7)

April 28: USAF Titan III-C booster launched from ETR successfully orbited five unmanned satellites: two Vela nuclear detection satellites and three scientific satellites. The 731-lb Velas--improved versions of six Vela payloads previously launched--entered initial elliptical orbits with 69,000-mi (96,642-km) apogee and 5,400-mi (8,690-km) perigee. On April 29, orbit of one Vela was circularized at 69,000-mi (96,642-km) altitude; orbit of second would be circularized May 1. Designed to operate at least 18 mo in orbit, Vela satellites were part of DOD's Vela program to monitor space for violations of nuclear test ban treaty. The 20-lb scientific satellites contained scientific and engineering experiments to (1) investigate effects of vacuum on characteristics of 16 metals; (2) monitor radiation of Van Allen belts; and (3) measure solar radiation. (NYT, 4/29/67, 17; W Post, 4/29/67, A4)

- . Maj. Michael J. Adams (USAF) flew X-15 No. 1 to 167,000-ft altitude and 3,682 mph (mach 5.32) to provide pilot experience at high altitude and check out horizon scanner, horizontal stabilizer alpha, 3rd landing skid, and electrical loads. (X-15 Proj Off)
- . McDonnell Aircraft Corp. and Douglas Aircraft Co. merged to form McDonnell Douglas Corp., pending Justice Dept. approval. (Av Wk, 4/24/67, 35)
- . Joint application for authority to construct new comsat earth station near Jamesburg, Calif., was filed with FCC by ComSatCorp, AT&T, ITT WorldCom, RCA, and WUI. (ComSatCorp Release 67-34)

April 29: President Johnson authorized construction of two Sst prototypes by Boeing Co. and General Electric Co., who had been continuing development and refinement of aircraft and engine designs since their selection in design competition Dec. 31, 1966. He said he would ask Congress to appropriate \$198 million to finance Government's share of project during FY 1968. Construction of first flight model of the 1,800-mph, variable-sweep-wing aircraft was scheduled for completion by 1970. (Frankel, NYT, 4/30/67, 1; O'Toole, W Post, 4/30/67, A1)

- . NASA announced it was conducting series of conferences with Apollo prime contractors and "a number of other companies that may have resources which could be utilized to effect the most rapid feasible recovery from the setback to the Apollo program caused by the Apollo 204 accident." Contractors with whom discussions were being held included: Aerojet-General Corp., Boeing Co., General Electric Co., Lockheed Aircraft Corp., Martin Co., McDonnell Douglas Corp., and North American Aviation, Inc. (NASA Release 67-105)

April 29: Rep. William F. Ryan (D-N.Y.) made public the full text of the Phillips Report which had been withheld by NASA. Full report contained no significant information that had not been included in the summary presented by NASA Administrator James E. Webb to Senate Committee on Aeronautical and Space Sciences April 18. (UPI, NYT, 4/30/67, 38)

April 30: Launch of first manned Mol had been postponed by USAF from 1968 to 1970 because of "development problems," George Wilson reported in the Washington Post. According to USAF officials, the problem was not money but the "meshing of the various parts that go into the Manned Orbiting Laboratory." (Wilson, W Post, 4/30/67, C1)

- . Vladimir Komarov was twelfth Soviet cosmonaut to die in a spaceflight accident, Julius Epstein, a Stanford Univ. professor, told UPI. He claimed he had conclusive evidence including the names of Soviet cosmonauts who supposedly died on space missions. Epstein said U.S. policy of not disclosing Soviet space disasters that U.S.S.R. does not publicize was based on the State Department's desire "not to embarrass the Russians." (UPI, P Inq., 5/1/67, 1)

During April: The U.S. press commented on the April 24 death of Soviet Cosmonaut Vladimir Komarov.

New York Times: "Men have risked their lives in pioneering since history began--explorers, mountain climbers, the first aviators who conquered the globe's blanket of air, and now the cosmonauts who enter the 'infinite spaces.' That much has to be accepted--but how much? It seems clear that the three Americans who died in the oxygen fire at Cape Kennedy were victims of insufficient care, slipshod work and haste. There is no way of knowing whether similar factors led to the death of Komarov yesterday; but it is a fact that the Russians are aiming at time schedules, hoping to beat the United States to the moon, trying to meet special dates connected with the fiftieth anniversary of their Revolution. The United States still insists on trying to reach the moon by 1970.

"Both nations are duplicating costly and dangerous work. Thus good and brave men die unnecessarily, vast sums are wasted, and without doubt the progress that humanity could make through cooperation in the thrilling quest for knowledge of the universe is being hampered by pride, prestige and the nebulous possibility of strategic gain." (NYT, 4/25/67, 40)

During April (continued)

Philadelphia Evening Bulletin: "...hard on the heels of a test disaster that took the lives of three U.S. Apollo astronauts, tragedy has also struck the Russian space program with the crash of a new giant spacecraft and the death of its pilot, Cosmonaut Vladimir Komarov...."

"Had the Russians succeeded in mounting a new space spectacular at this time, it is possible that some of the sobering impact of the Apollo on this country would have been dissipated. Although there have been repeated disclaimers of a space 'race,' the sight of the Soviet Union again forging ahead would surely have fanned anew American competitive instincts. Surely the death of brave men on both sides will reemphasize for both the element of human fallibility and the need for offsetting it with infinite pains and caution in space exploration." (P EB, 4/25/67)

Technology Week: "The Soviet tragedy, by emphasizing the hazards of space flight, has perhaps eased some of the pressure on the National Aeronautics and Space Administration and North American Aviation. There is more awareness now that the exploration of space will not be a series of glittering successes, one after another. There are dangers; there will be further tragedies, other brave men to mourn. While bringing home the care which must always be taken, the Soviet accident also makes it clear that in programs of this magnitude humans are not always infallible...." (Coughlin, Tech Wk, 5/1/67, 50)

Aviation Week and Space Technology: "It is fortunate that the Apollo and Soyuz tragedies came this far downstream in the history of manned space flight. If they had occurred in the initial phases of Vostok or Mercury, the hue and cry of technical timidity in both countries might have killed the manned space flight programs before they had a chance to demonstrate their technical feasibility. Viewed against the perspective of Vostok, Mercury, Voskhod and Gemini and more than 2,000 hr. of successful space flight logged by crews of both nations, the recent tragedies spotlight development problems but do not raise any fundamental doubts about man's ability to reach the moon...." (Hotz, Av Wk, 5/1/67, 11)

- . Press commented on Congressional hearings on Apollo accident.

Philadelphia Inquirer: "With both the House and Senate conducting their own investigations of the Apollo tragedy, in the aftermath of the exhaustive inquiry by the National Aeronautics and Space Administration's own review board, there is a danger that what will result is a negative witch hunt instead of constructive criticism of benefit to the space program. Congress should strive to protect the Nation's investment in this critically important and expensive venture and that is not to be

During April (continued)

accomplished by laboring the deficiencies of Apollo I. Above all, the concern should be for the safety of future space voyagers. It should be to certify that no unnecessary risks will be taken that might invite another lethal disaster." (P Inq, 4/12/67)

New York Times: "It is a new, and rather shocking, NASA image that is being projected by the current Congressional investigations into the Apollo tragedy. One would have expected that NASA would make available every possible bit of relevant information.... The Space Administration cannot afford even to raise the suspicion that it may be covering up evidence relevant to the deaths of the three astronauts...[and] certainly does not want to reinforce the view of cynics who insist that NASA actually stands for 'Never A Straight Answer.'" (NYT, 4/19/67, 40)

Washington Post: NASA "has merited the reproach of the investigators of the Apollo disaster and the searching scrutiny of the congressional committees reviewing the program.... What must not be overlooked however, are the risks of the space program that cannot be eliminated altogether without abandoning it.... When these catastrophes take place, the Government and the people must and should react as they reacted to the Apollo fire, by demanding new and further precautions, even more careful and complete protection. But there will not be much bold venturing in a society that visits a sanguinary fury upon those unfortunate enough to preside over calamity. For in that kind of society, more and more men will discover that the way to avoid getting any reproach is to avoid taking any risks." (W Post, 4/19/67)

- . NASA awarded Univ. of Arizona a \$14,970 research grant for a case history of LaRC from 1917-47. (NASA Release 67-86)
- . Dept. of Commerce announced it would construct a multimillion dollar oceanographic laboratory on Florida's Virginia Key similar to West Coast Laboratory in Seattle. East Coast Laboratory would operate three ships and conduct research in geophysics, oceanography, and sea-air interaction. (UPI, NYT, 4/25/67, 26)

PROVISIONAL INDEX-APRIL

Aberdeen (Md.) Proving Ground, 141
Accident
 aircraft, 132
 Apollo AS-204
 cause, 121, 123, 128
 investigation, 114, 118, 121-123, 125-131, 133-134, 155-156
 SOYUZ I, 147-148, 154-155
Adams, Maj. Michael J. (USAF), 153
Advanced Vidicon Camera System (Avcs), 142
Aerojet-General Corp., 153
Aerospace Industries Assn., 133
Aerospace industry, 133
Aerospace Medical Assn., 124
Aerospace Safety Advisory Panel (proposed), 118
Aircraft, 118, 127, 131, 132, 145, 150, 153
Airlines, 119
Alliance for Progress, 131
American Broadcasting Company (ABC), 133, 136
American Chemical Society, 130
American Geophysical Union, 137
American Society of Magazine Editors, 116
American Telephone and Telegraph Co. (AT&T), 115, 116, 140
Ames Research Center (ARC), 137, 144
Amundsen, Roald, 133
Anderson, Sen. Clinton P., 137
Andrews AFB, Md., 150
Anniversary, 115
Antenna, 114, 144
Antimissile missile, 144, 152
Apollo (program), 116, 121, 123, 125, 126, 131, 136, 138, 149, 153
Apollo (spacecraft), 122, 125, 131, 136
Apollo applications (Aa), 149, 152
Apollo 204 Review Board, 121, 122, 123, 125, 126, 131, 135, 136
Aquanaut, 145
Arizona, Univ. of, 156
Army Air Corps, 150
Associated Press (AP), 138, 140
Astronaut, 116, 121, 122, 126, 128, 133, 135, 145, 148, 149
ATLANTIC II (INTELSAT II-C) (communications satellite), 118-119
Atlas-Agena D (booster), 117
Atlas-Centaur (AC-12) (booster), 134
ATS II (Ats-A) (Applications Technology Satellite), 117
Atwood, J. Leland, 125
Australia, 122
Aviation Week, 124, 135-136, 155

I N D E X

Award, 114, 125, 152
 Baikonur, U.S.S.R., 147
 Baron, Thomas R., 145
 Beale AFB, Calif., 132
 Beecher, William, 144
 Berry, Dr. Charles A., 128
 Bisplinghoff, Dr. Raymond L., 152
 Blagonravov, Dr. Anatoly A., 120
 Boeing Co., 153
 Bond, Dr. Richard, 139
 Booth, Eugene T., 129
 Borman, L/C Frank (USAF), 133-134, 137, 151
 Boyd, Alan S., 114, 116
 Brauer, Dr. R. W., 145
 Brewer, Frank G., Trophy, 114
 Brown Engineering Co., 133
 Brown, Dr. Harold, 132
 California, 149
 California Institute of Technology (Cal Tech), 141
 California, Univ. of, 149
 Calverton, N.Y., 145
 Canberra, Australia, 144
 Canopus (star), 134
 Carbon dioxide, 135
 Carnegie Commission on Educational Television, 127
 Carpenter, Cdr. M. Scott (USN), 135
 Centro Ricerche Aerospaziali (CRA), Rome, 151
 Chaffee, LCdr. Roger B. (USN), 121
 Charyk, Dr. Joseph V., 136
 Chicago, Ill., 145
 Cleveland Engineering Society, 116
 Commerce, Dept. of, 156
 Communications satellite, 114-116, 118-120
 Communications Satellite Corp. (ComSatCorp), 114, 136, 140, 149, 153
 Computer, 124
 Concorde (U.K.-France) supersonic transport, 138
 Congress, 155-156
 Congress, House, 151
 bills introduced, 118
 Committee on Science and Astronautics, 123
 Subcommittee on Advanced Research and Technology, 142-143
 Subcommittee on NASA Oversight, 114, 122-123, 125-126,
 128-129, 133-134, 137, 144-145
 Subcommittee on Space Science and Applications, 139-140

I N D E X

Congress, Senate, 150, 151
 Committee on Aeronautical and Space Sciences, 125, 130-131, 137-138,
 143, 154
 Committee on Commerce, 127
 Committee on Foreign Relations, 129
Congressional Record, 123
Cooper, Maj. Gordon L. (USAF), 151
Corporation for Public Television (proposed), 127
Cortright, Edgar M., 139
Cosmonaut, 120, 128, 147-151, 154-155
Cosmonautics Day, 128
COSMOS CLIII (U.S.S.R. satellite), 116
COSMOS CLIV, 120
COSMOS CLV, 128
Cotton, Col. Joseph F. (USAF), 150
Dana, William H., 151
Defense, Dept. of (DOD), 131, 146, 153
DOD. See Defense, Dept. of.
Douglas Aircraft Co., 150, 153
Downey, Calif., 122, 128, 138
Eaker, L/G Ira C. (USAF, Ret.), 134
EARLY BIRD I (communications satellite), 118
Earth Reentry Module (Erm), 149
East Coast Laboratory, Fla., 156
Eastern Test Range (ETR), 134, 153
Edison Electric Institute, 139
Edwards AFB, Calif., 151
Eglin AFB, Fla., 131
Electronics Research Center (ERC) (NASA), 117
Elms, James C., 117
Ends, Dr. Earl J., 130
Environmental Science Services Administration (ESSA), 142, 148
Epstein, Julius, 154
Esro II (ESRO satellite), 132-133
ESSA I (meteorological satellite), 142
ESSA II, 142
ESSA III, 142
ESSA IV, 142
ESSA V (Tos-C), 142, 148
European Space Research Organization (ESRO), 132-133
Extraterrestrial life, 130
F-111 (supersonic fighter), 131
F-111A, 132, 145
F-111B, 132, 145
Fairbanks, Alaska, 142

I N D E X

FCC. See Federal Communications Commission.
 Federal Aviation Administration (FAA), 114, 124, 127
 Federal Communication Commission (FCC), 114-115, 136, 153
 Federation of American Societies for Experimental Biology, 145
 Federov, Dr. Yevgeny K., 135
 Finger, Harold B., 121
 Flight Research Center (FRC) (NASA), 118
 Ford Foundation, 115, 127
 Foulois, M/G Benjamin D. (USA, Ret.), 150
 Friedman, Capt. Robert (USN), 122
 Friendly, Fred W., 127
 Fulton, Fitzhugh, 150
 Gagarin, Col. Yuri A. (U.S.S.R.), 120, 128, 151
 Gell, Dr. Charles F., 125
 General Dynamics Corp., 125
 General Electric Co., 118, 152, 153
 Geneva, Switzerland, 135
 Glenn, Col. John H., Jr. (USMC, Ret.), 133
 Goddard Space Flight Center (GSFC), 142
 Goldstone, Calif., 141
 Grissom, L/C Virgil I. (USAF), 121, 128
 Grumman Aircraft Engineering Corp., 145
 Hawaiian Telephone Co., 120
 Hayes International Corp., 133
 Helicopter, 131
 Hines, William, 114, 143
 Holmberg, Mervin, 145
 Holmes & Narver, Inc., 149
 Horowitz, Dr. N. H., 139
 Hughes Aircraft Co., 135
 Hughes, Gov. Richard J., 115
 Humphrey, Vice President Hubert H., 148
 Huntsville, Ala., 141
 Hyde, Rosel H., 115
 Indian Ocean, 150
 Institute for Strategic Studies, 124
 Inter-American Bank, 131
 International cooperation, 131
 International Telephone and Telegraph Co. (ITT), 136
 Italian Space Commission (ISC), 151
 Italy, 150-151
 ITT Cable and Radio, Inc.-Puerto Rico, 120
 ITT World Communications, Inc. (WorldCom), 120, 140, 153
 Jamesburg, Calif., 153
 Japan, 131

I N D E X

Jet Propulsion Laboratory (JPL), 135, 141
 Johnson, President Lyndon B., 131, 148, 150
 Jupiter (planet), 130, 143
 Justice Dept., 136, 153
 Keldysh, Prof. Mstislav V., 148
 Kennedy Space Center (KSC), 117, 131, 144, 150
 Kenya, Africa, 150
 Killian, Dr. James R., Jr., 127
 Komarov, Col. Vladimir M. (U.S.S.R.), 147-151, 154-155
 Kosygin, Premier Aleksey N. (U.S.S.R.), 150, 151
 Kremlin Wall, 148, 151
 KSC. See Kennedy Space Center.
 Lambda 4S-3 (Japanese booster), 131
 Langley Research Center (LaRC), 132, 156
 Las Vegas, N. Mex., 132
 Laser, Inc., 129
 Lehigh Univ., 129
 Lewis Research Center (LRC), 135
 Lewis, W. Deming, 129
 Lifting body vehicle, 139
 Liljencrantz, Eric J., Award, 125
Literaturnaya Gazeta, 146
 Lockheed Aircraft Corp., 130, 153
 LUNAR ORBITER II, 129, 132
 LUNAR ORBITER III, 129, 132
 Lyle, Col. V. John (USAF, Ret.), 118
 McCarthy, Dr. John F., 128
 McCormack, James, 115
 McDivitt, L/C James A. (USAF), 137
 McDonnell Aircraft Corp., 152, 153
 McDonnell Douglas Corp., 153
 McDonnell, James Smith, 152
 McKee, William F., 124
 McKibbin, D. D., 137
 McNamara, Secretary of Defense Robert S., 145, 152
 Magazine Publishers Assn., 116
 Magnetosphere, 137
 Management Services, Inc., 133
 Manned Orbiting Laboratory (Mol), 154
 Manned Spacecraft Center (MSC), 122, 128
 Mars (planet), 143
 Marshall Space Flight Center (MSFC), 122, 130, 133
 Martin Co., 153
 Massachusetts Institute of Technology (MIT), 149
 Medaris, M/G John B. (USA), 141

I N D E X

Meteorological satellite, 142
Mexico City, 120
Miami News, 146
Missile, 130, 152
Mohole Project, 120
Mondale, Sen. Walter, 143
Moon
 landing
 manned, 118
 soft, 134, 141-142
 surface, 118, 149
Moscow, U.S.S.R., 134, 144, 148
MSC. See Manned Spacecraft Center.
MSFC. See Marshall Space Flight Center.
Mueller, Dr. George E., 118, 128, 130, 138
NAS. See National Academy of Sciences.
NASA Office of Space Science and Applications (OSSA), 117, 135
Nathan, Dr. Robert, 124
National Academy of Engineering (NAE), 152
National Academy of Sciences (NAS), 129, 149, 152
National Aeronautics and Space Administration (NASA)
 Apollo AS-204 accident investigation, 114, 118, 121, 122-123, 125-127,
 128-131, 133-134, 155-156
 Apollo 204 Review Board, 121-123, 125, 126, 131, 135, 136
 awards and honors, 152
 budget, 138, 142-143
 contract, 150
 cooperation, 151
 criticism, 121, 123, 126-127, 135, 140, 143, 145, 146, 151
 facilities, 117
 grant, 156
 launch
 probe, 134-135
 satellite, 117, 142
 management, 137
 organization, 122
 personnel, 118, 121-122, 130, 152
 program
 Apollo, 116, 121, 123, 125, 126, 131, 136, 138, 149, 153
 Apollo Applications (Aa), 149, 152
 Voyager, 139, 143
 Spacecraft Sterilization Board, 139
 test, 131
National Aeronautics and Space Council (NASC), 124
National Aerospace Education Council, 114

I N D E X

National Assn. of Broadcasters (NAB), 115
 National Research Council (NRC), 129
 National Science Teachers Assn., 144
 Neifakh, Alexander, 146
 Nelson, Bryce, 145
 Nerva II (nuclear rocket engine), 142-143
 New Jersey, 115
 New Orleans, La., 139
New York Times, 119, 126, 146, 151, 156
Newell, Dr. Homer E., 143
Newport News Press, 134
Nichols, Donald, 144
 Nitze, Paul H., 132
 Noise, 127
 North American Aviation, Inc. (NAA), 125-126, 137, 138, 140, 143, 153
 North Atlantic Treaty Organization (NATO), 144
 Northrop Corp., 133
 Northwest Cape, Australia, 122
 Nuclear submarine, 122
 Nuclear test ban treaty, 153
 Ocean of Storms (moon), 134, 141
 Oceanography, 145
Ogonyek, 120
 OSSA. See NASA Office of Space Science and Applications.
 Oxygen, 125, 128, 140
 Owens-Corning Fiberglas Corp., 133
 Paris International Air Show, 138
Philadelphia Evening Bulletin, 155
Philadelphia Inquirer, 155
 Philco-Ford Corp., 125
 "Phillips Report," 137-138, 140, 151, 154
 Phillips, M/G Samuel (USAF), 137, 140
 PIONEER VI (interplanetary probe), 137
 Podgorny, President Nikolay V. (U.S.S.R.), 150, 151
 Ponnampertuma, Dr. Cyril S., 130
 Precision Recovery Including Maneuvering Entry (Prime) program, 139
 Press conference, 118
 Proton (U.S.S.R. booster), 143
 Puerto Rico, 149
 Punta del Este, Uruguay, 131
 Radiation, 124
 Radio Corporation of America (RCA), 120, 140, 153
 Rand Corp., 149
 RCA Service Co., 133
 Redstone Arsenal, Ala., 141

INDEX

Reiffel, Dr. Leonard, 118
 Research, military, 145-146
 Ricketts, Henry, 130
 Rome, Univ. of, 151
 Rowlesburg, W. Va., 140
 Rumsfeld, Rep. Donald, 118
 Rust Engineering Co., 133
 Ryan, Rep. William F., 126, 128, 151, 154
 Saigon, S. Vietnam, 132
 SAN MARCO II (San Marco B) (Italian satellite), 150-151
 Science, 145-146
 Saturn (program), 133
 Saturn I, Uprated (booster), 149
 Saturn V, 136, 149
 Scientists, 145-146
 Scott, Dr. Ronald F., 141-142
 Scout (booster), 150
 Sea of Tranquility (moon), 118
 Seamans, Dr. Robert C., Jr., 122, 130
 Silva, R. W., 137
 Solar eclipse, 132
 South Pole, 133
 Soviet Academy of Sciences, 120, 148
 SOYUZ I (U.S.S.R. spacecraft), 147-148
 Space Applications Summer Study, 129
 Space Business Daily, 140
 Space law treaty, 127, 129, 150-152
 Space program, national, 115, 134-138
 Space race, 138, 154, 155
 Space rescue, 149
 Space results, 129
 Spaco, Inc., 133
 Sparta, Project, 144
 Sperry Rand Corp., 133
 SR-71 (reconnaissance aircraft), 132
 Stanford Univ., 154
 Sterilization, spacecraft, 139-140
 Strickler, Dr. Mervin K., Jr., 114
 Subminiature Integrated Antenna (Sia), 144
 Sun, 137, 143
 eclipse, 132, 141
 Sunay, President Cevet (Turkey), 117
 Supersonic transport (Sst), 116, 134, 138, 153
 Surveyor (program), 135, 146
 SURVEYOR I (lunar probe), 142

INDEX

SURVEYOR II, 142
 SURVEYOR III (Surveyor C), 134-135, 146-147
 SV-5D (lifting body vehicle), 139
 Taghiev, E. I., 120
 Tass, 123, 147
 Teague, Rep. Olin E., 114
 Technology utilization, 125
 Technology Week, 135, 155
 Television, 115, 116, 119, 127-128, 133, 141
 Teller, Dr. Edward, 152
 Thailand, 132
 Thompson, Dr. Floyd, 122, 123
 Thor-Delta, Thurst-Augmented (booster), 142
 Tiros Operational Satellite (Tos) system, 142
 Titan II (ICBM), 130
 Toftoy, M/G Holger Nelson (USA, Ret.), 141
 Titan III-C (booster), 153
 Trans World Airlines, 119
 Transportation, 114
 Transportation, Dept. of (DOT), 114
 Treasury Dept., 127
 Tu-144 (U.S.S.R. supersonic transport), 138
 Tucson, Ariz., 114
 Turkey, 117
 Uchinoura Range, Japan, 131
 Ugolyek (dog), 123
 United Kingdom (U.K.), 150
 United Nations (U.N.), 151
 United Press International (UPI), 154
 Urey, Dr. Harold C., 149
 U.S. Air Force (USAF), 118, 131, 132, 140, 144, 150
 aircraft, 132, 145
 launch, 130
 lifting body vehicle, 139
 Mol, 154
 U.S. Army (USA), 129, 141
 U.S. Geological Survey, 118
 U.S. Naval Submarine Medical Center, 125
 U.S. Navy (USN), 122, 125, 131, 132, 145
 U.S.S.R. (Union of Soviet Socialist Republics), 127
 aircraft, 138
 Cosmonautics Day, 128
 international cooperation, 134
 launch
 Cosmos, 116, 120, 128

I N D E X

launch (continued)

- SOYUZ I, 147-148
- meteorology, 135
- missile and rocket program, 124
- MOLNIYA I, 124
- science, 146
- SOYUZ I accident, 147-148, 154-155
- space biology, 123-124
- space program, 120, 133, 138, 144
- Vance, Cyrus, 129
- Van Allen radiation belt, 153
- Vandenberg AFB, Calif., 130
- Vela (nuclear detection satellite), 153
- Venus (planet), 141, 143
- Veterok (dog), 123
- Vietnam, North, 132
- Vietnam war, 134
- Virginia Key, Fla., 156
- Vitro Corp., 133
- Von Braun, Dr. Wernher, 130
- Voyager (program), 139, 143
- Wallops Island, Va., 142
- Wallops Station (NASA), 151
- Washington, D.C., 114, 130, 137, 152
- Washington Daily News, 127
- Washington Evening Star, 114, 123, 135, 143
- Washington Post, 119-120, 147, 154, 156
- Water, 149
- Weather modification, 135
- Webb, James E., 122, 136, 139, 148, 154
- Welsh, Dr. Edward C., 124
- West Virginia, 149
- Western Test Range (WTR), 132, 142, 150
- Western Union International World Communications, Inc. (WUI), 120, 140, 153
- Wheeler, Gen. Earle G. (USA), 129
- White, L/C Edward H. II (USAF), 121
- White, John R., 127-128
- Wilson, George, 154
- Woeller, Fritz, 130
- Wolfe, Dr. John H., 137
- Wolper Productions (TV documentaries), 133
- Woods Hole, Mass., 129
- Woomera Rocket Range, Australia, 144
- Wright, Orville, 150
- Wright-Patterson AFB, 115

I N D E X

Woodward, William H., 121
World Petroleum Congress, 120
Wrightsville Marine Bio-Medical Laboratory, 145
X-15 (rocket research aircraft), 153
XB-70 (supersonic aircraft), 118, 150
X-rays, 124
Youth Science Congress, 144

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ASTRONAUTICS AND AERONAUTICS

MAY 1967

A CHRONOLOGY ON SCIENCE, TECHNOLOGY, AND POLICY

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M A Y 1 9 6 7

- May 1: Five NASA officials were among 45 young business and Government executives from U.S. and abroad selected to receive MIT's 1967-68 Alfred P. Sloan Fellowships for one year of study at MIT's Sloan School of Management "to accelerate their development into positions of major executive responsibilities...." NASA recipients: R. Bryan Erb, Assistant Chief, Structures and Mechanics Div., MSC; Robert H. Kirby, Jr., Flight Mechanics and Technology Div., LaRC; Calvin H. Perrine, Jr., Assistant Chief, Mission Operations Div., Apollo Spacecraft Program Office, MSC; Robert J. Schwinghamer, Technical Assistant to Director of Manufacturing and Engineering Laboratory, MSFC; and William E. Scott, Deputy Chief, Research Div., Office of University Affairs, NASA Hq. (NASA Release 67-104)
- . Orbit of second Vela nuclear detection satellite, launched April 28 by USAF Titan III-C booster, was circularized at 69,000-mi altitude. First Vela's orbit had been circularized April 29. Satellites were part of DOD's Vela program to monitor space for violations of nuclear test ban treaty. (AP, NYT, 5/2/67, 16)
 - . Field Enterprises Educational Corp. announced that it would not exercise its option to extend its rights for book and newspaper distribution of the personal stories of NASA astronauts and their families. Present four-year agreement, which paid the astronauts \$320,000 annually for exclusive publishing rights and provided each astronaut with \$50,000 life insurance policy, would expire Aug. 31. Field Enterprises president Bailey K. Howard said large number of astronauts now, compared with number four years ago, made continuation of the project impractical. (AP, NYT, 5/3/67, 13; US News, 5/15/67)
 - . Director of FAA SST Development B/G J. C. Maxwell signed the contracts for construction of two SST prototypes by Boeing Co. and General Electric Co. Industry representatives had signed earlier. President Johnson authorized FAA to proceed with Phase III (prototype construction) of SST program on April 29. (Sehlstedt, B Sun, 5/2/67, 1)
 - . U.S.S.R.'s May Day Parade was transmitted across U.S. for broadcast in Japan, but was not televised on American networks. The 1½-hr program, transmitted through the cooperation of ComSatCorp and U.S.S.R., originated live in Moscow and was picked up by Early Bird I over the Atlantic; relayed across U.S. by Andover, Me., and Brewster Flat, Wash., ground stations; and transmitted across Pacific via Intelsat II Pacific for viewing in Tokyo. Japan paid approximately \$30,000 for broadcast and transmission services. (Birger, M News, 5/5/67; ComSat-Corp)

May 1: Washington Evening Star editorial praised Senate's unanimous approval of the space law treaty April 25: "The action lends timely support to President Johnson's policy of seeking to promote a spirit of detente through various types of agreements designed to build bridges between our country and the Communist East.

"...the new space treaty is at best only a modest step in the direction of improved Soviet-American relations. Still, it is a step forward, and a good one. Anybody who objects to it on security grounds can rest assured: It will not interfere in the slightest with our country's ability to detect Russian cheating between us and the stars if such cheating actually takes place." (W Star, 5/1/67)

- . Haste might have contributed to the April 24 crash-landing of Soyuz I in which Cosmonaut Vladimir Komarov died, Edmund Stevens suggested in Washington Evening Star. He speculated that Soviet leaders, influenced by the goal of orbiting men around the moon by Nov. 7--50th anniversary of the Bolshevik Revolution--had launched Soyuz I before it was fully qualified for a manned mission. (Stevens, W Star, 5/1/67, A1, A6)

May 1-3: NASA's Surveyor III spacecraft continued photography and digging operations on lunar surface. On May 3, communications with spacecraft were halted to conserve battery power during two-week lunar night. Photos taken during mission since April 19 soft-landing on the moon totaled 6,315. (NASA Proj Off)

- . American Astronautical Society's (AAS) 13th Annual Convention, "Commercial Utilization of Space," was held in Dallas.

MSFC Director Dr. Wernher von Braun stressed the importance of space exploration to man's general welfare: "The space program is providing us with new and valuable scientific information about our environment in this universe. The space budget cannot be justified, however, solely on the basis of expanding scientific knowledge, even though the discoveries may be regarded priceless by one segment of society. Space technology must continue and expand its contributions to the satisfaction of the needs and desires of society in general if it is to become a permanent outlet for man's creativity and energies." Dr. von Braun later suggested to the press that the lunar module (LM) might not be ready for the Apollo lunar mission as soon as the other launch vehicle and spacecraft elements. In that event, he said, NASA might decide to "fly the lunar mission [as a manned circumlunar flight], but just not activate one phase of it." (Text; Av Wk, 5/8/67, 17)

Future potentials of navigation satellites were outlined by Eugene Ehrlich, Navigation and Traffic Control Program Chief, OSSA. Navigation

May 1-3 (continued)

satellites could provide: (1) high-accuracy position determination service to craft, people, and shore stations; (2) communications service to pilots, traffic controllers, and passengers; (3) air traffic control and maritime coordination; (4) SST radiation warning; (5) search and rescue aid during emergencies; (6) weather routing for aircraft and ships; (7) iceberg warning; and (8) data on migratory habits of marine, land, and sea life. (Text)

George S. Trimble, Director of Advanced Planning, OMSF, called for increased industry responsibility in space exploration. NASA builds "the roads into space. It is beholden on...industry to make certain that we build the proper ones for...future use.... As we look forward to missions of ever-increasing complexity, it is important that we continue to insure the most effective accomplishment of the most worthwhile experiments that this country can devise." (Text)

Rep. Joseph E. Karth (D-Minn.), describing industry's attempts to capitalize on non-Government space business opportunities as "substantially insufficient," urged industry to submit imaginative proposals for commercial development of space and to solicit Congress' support for the effort. (Av Wk, 5/15/67, 67)

A more realistic basis for determining space transportation costs should be devised to reflect actual use of the object in space, KSC Director Dr. Kurt H. Debus suggested. Although cost reductions were being studied, prospective commercial users of space should expect to spend about 10% of their overall program costs for launch operations, he said. He emphasized that more substantial savings could be realized in other areas such as reusable boosters and payload; increased life cycle of payload; reserviceable payload; and booster and spacecraft propulsion. (Text; Av Wk, 5/15/67, 69)

NASA Assistant Administrator for International Affairs Arnold W. Frutkin noted that space program had to defend itself continuously to enlist international support: "In ten years of space development, no nation has been harmed in any way. We must point to this record constantly in order to improve the atmosphere and wisdom of international consideration...[and] emphasize the expansion of benefits rather than restrictions upon progress. The record makes clear that we can address the more complicated questions of international organization on an evolutionary basis with the advantage of growing experience. The needs of the developing world and the magnificent record of space applications so far combine to show that the issues of international organization are secondary to the task of accelerating benefits for the world." (Text)

May 1-3 (continued)

Awards presented at convention included: (1) AAS Space Flight Award to MSC Director Dr. Robert R. Gilruth for "distinguished contributions to aeronautical and space research...direction of continuing investigation of man's capabilities in space, and...active participation in the scientific community for the public good"; (2) AAS Flight Achievement Award to Astronauts Charles Conrad and Richard F. Gordon for "their new space flight altitude record and the world's first one-orbit rendezvous on Gemini XI"; (3) Melbourne Boynton Award to Col. William K. Douglas (USAF), Assistant Deputy Chief of Staff, Bioastronautics and Medicine, AFSC, for exceptional accomplishments as the first flight surgeon in charge of astronaut medical operations; (4) W. Randolph Lovelace II Award to Dr. Robert M. Page, former Director of Research, Naval Research Laboratory, for pioneering work in rocket astronomy and contributions to radar development; and (5) AAS Fellowships to MSC Director of Medical Research and Operations Dr. Charles A. Berry "for providing exceptional medical support for the NASA manned spacecraft programs," and to MSC Director of Engineering and Development Maxime A. Faget for "contributions to the basic conceptual design of the Mercury spacecraft and...subsequent engineering efforts" on Mercury, Gemini, and Apollo Projects. (MSC Release 67-15)

- . North American Aviation, Inc. (NAA), NASA's prime Apollo spacecraft contractor, announced major management changes: (1) William B. Bergen, former President of Martin Marietta Co., who joined NAA April 7, replaced Harrison A. Storms, Jr., as President of Space Div.--formerly Space and Information Systems Div.; (2) Ralph H. Ruud, corporate vice president in charge of manufacturing, replaced William Snelling as executive vice president of Space Div. Snelling assumed new post of assistant vice president; (3) Bastian Hello, former Martin Marietta Co. executive, assumed new post of vice president in charge of Space Div.'s launch operations at KSC; and (4) Paul R. Vogt, former vice president of engineering at NAA's Rocketdyne Div., assumed new post of assistant to President of Space Div. in charge of quality control. (Clark, NYT, 5/2/67, 1, 53; UPI, W Star, 5/2/67, A13; O'Toole, W Post, 5/2/67, A4; Wilford, NYT, 5/4/67, 9)

May 2: NASA Assistant Administrator for Policy Analysis Gen. Jacob E. Smart (USAF, Ret.) received National Aerospace Services Assn.'s Quarter Century award for "outstanding contributions to aerospace advancement" and continuing leadership and service in NASA. (Natl Aero Serv Assn; Av Wk, 5/8/67, 13)

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May 2: Turbulence-measuring device developed at U.S. Weather Bureau's National Storms Laboratory in Norman, Okla., might be used by U.S. airports in 1968 to guide commercial airline pilots through severe and moderate turbulence areas, Martin Waldron reported in New York Times. Device measured severity of thunderstorms by analyzing and averaging radar pulses reflected from cells within the storm and then registered cloud structure on a radar scope. Data was relayed to pilots by flight controllers on the ground. Chief of U.S. Weather Bureau's radar systems section Stewart Bigler said a refined version of the device had been installed at Washington, D.C., National Airport in January and would be tested in June. If it performed satisfactorily, similar devices would be installed in other U.S. airports in 1968. (Waldron, NYT, 5/4/67, 51)

- . Washington Post editorial criticized suggestion by nuclear physicist Dr. Edward Teller that nuclear explosions be used to provide data about moon's interior: "Speaking for a multitude of laymen, we want our moon left intact. If not many farmers are left who do their planting by the times of the moon, at least all of us like to remember moonlit nights when we were not thinking of nuclear fission.... If Dr. Teller wants to dig another Isthmian Canal with 'a small nuclear explosive,' we might consider that within the range of our needs. But let our moon alone. We look forward once again to sitting in the moonlight on a summer's night and smelling honeysuckle without the thought that a chunk of moon might blast off suddenly into another orbit." (W Post, 5/2/67)

May 3: NASA's Lunar Orbiter Incentive Evaluation Board awarded Boeing Co. a \$1,918,725 bonus--maximum amount permitted under May 1964 contract provisions--for the Lunar Orbiter II mission. Spacecraft had obtained 98% of planned prime site photography after it entered lunar orbit Nov. 10, 1966; equipment failure resulted in loss of other 2%. Because Lunar Orbiter II also took excellent secondary photos--including two million square miles of the hidden side of the moon--Board ruled that usefulness of photographic data merited maximum award. (NASA Release 67-112)

- . Dr. Mac C. Adams, NASA Associate Administrator for Advanced Research and Technology, was featured speaker at MIT conference sponsored by Electronics Industries Assn. to acquaint aerospace industry with NASA's requirements for electronic systems on future space missions. He outlined objectives of NASA's electronics research program: (1) stabilization systems to maintain orientation in space environment and to

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May 3 (continued)

point telescopes and other experiments at celestial bodies with precise accuracy; (2) communications systems to translate data acquired in space activities over millions of miles and at rates comparable to exchange of information on earth; (3) communications and navigation satellites to meet increasing demands in commercial air transportation; (4) data -handling systems to quickly and efficiently store, catalog, analyze, and edit data produced by space exploration; (5) instrumentation systems to detect and measure environmental characteristics over broad ranges of temperature, pressure, and density; and (6) components and technology which could operate reliably for long periods of time despite extremes in radiation and temperature. (Text; NASA Release 67-103)

- . Charles W. Harper, Director of OART's Aeronautics Div., was appointed to new position of NASA Deputy Associate Administrator for Aeronautics. Aeronautics Div., renamed Aeronautical Vehicles Div., would be directed by A. J. Evans. (NASA Release 67-108)
- . Confidential report submitted to NASA by General Electric Co. cited numerous serious workmanship flaws in Apollo spacecraft No. 17, scheduled to be launched by Saturn V booster on an unmanned mission no earlier than August, New York Times reported. Flaws included damaged parts, corroded valves, leaky pipes, three small holes in heat shield that "could have catastrophic implications" during reentry, and more than 1,300 "discrepancies" in the 20 mi of electrical wiring. Report was prepared by GE's Apollo Support Dept. under terms of a 1962 contract with NASA to conduct computer-assisted checks of all systems in Apollo spacecraft prior to launch. George C. White, Jr., NASA Director of Reliability and Quality, OMSF, told New York Times reporter John Wilford in a telephone interview that report was "a working document that, in effect, summarizes known problems" for KSC supervisors and should not be taken as "an alert of really big problems." NASA officials said many of the flaws cited in the report had already been corrected; others had yet to be changed. (Wilford, NYT, 5/3/67, 1, 2)

May 4: NASA's Lunar Orbiter IV (Lunar Orbiter D) unmanned spacecraft was successfully launched by Atlas-Agena D booster from ETR on mission to photograph lunar surface [see May 8-June 1].

Agena 2nd stage fired to boost 850-lb spacecraft into 100-mi (161 -km) -altitude parking orbit, reignited after 30-min coast period, injecting spacecraft on 89-hr translunar trajectory, and separated. On schedule Lunar Orbiter IV deployed its four solar panels and two antennas, locked its five sensors on the sun, and fixed its star tracker on Canopus. At 18:00 GET midcourse maneuver with 53.8-sec engine burn was successfully

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May 4 (continued)

conducted to slow spacecraft's speed and alter its aim point slightly.

Primary objectives of NASA's Lunar Orbiter IV mission, fourth in series of five, were (1) to place three-axis stabilized spacecraft into high-inclination lunar orbit; (2) to obtain broad systematic photographic survey of lunar surface; (3) to improve knowledge of the moon; and (4) to provide basis for selecting sites for more detailed scientific study by subsequent orbital and landing missions. Full photographic flight plan would require more than 200 camera-pointing maneuvers, compared to 50 for Lunar Orbiter III. Photos would cover more than 80% of the moon's front face and more than 90% of the hidden side. Spacecraft would also monitor micrometeoroids and radiation intensity in the lunar environment, refine definition of moon's gravitational field, and serve as a target for tracking operations by Manned Space Flight Network stations. Lunar Orbiter program was managed by LaRC under OSSA direction. Tracking and communications were the responsibility of JPL-operated Deep Space Network. (NASA Proj Off; NASA Release 67-101)

- North American Aviation, Inc., President J. Leland Atwood assured the Senate Committee on Aeronautical and Space Sciences that NAA was making numerous technical, inspection, and management changes that would enable U.S. to "effectively accomplish the lunar mission in this decade." He accepted NAA's share of responsibility for Jan. 27 Apollo fire but urged the Committee to view the deficiencies cited by Apollo 20⁴ Review Board [see April 9] in the perspective of the standards involved. "...it must be recognized that in space work the standards are and must be extremely high. Literally perfection is the goal." Noting that many of the problems in NAA's management of the Apollo program had resulted from "a rapid build-up in manpower...encountered in almost all large, complex developmental programs," Atwood explained that the survey of NAA workmanship summarized in the Phillips Report [see April 18] had been conducted during time when these problems were reaching their peak. Thus the report did not truly represent overall NAA performance "but reflected the fact that the [Apollo] mission criteria had been evolving towards their final form." Atwood stressed, however, that General Phillips' recommendations had been accepted and corrected to NASA's "general satisfaction" by April 1966.

To further improve Apollo program progress, Atwood said, he and NASA Administrator James E. Webb had reviewed "the overall working relationship" between NAA and NASA. As a result of this review efforts would be made to (1) improve coordination of management effectiveness and program control; (2) establish clearer and more specific objectives and measurement techniques for program performance; (3) conduct more periodic surveys and audits of program progress and performance; and (4) include

May 4 (continued)

sharper incentives and penalties in contract relationships. Only major changes in Apollo spacecraft would be incorporation of a quick-opening hatch and installation of additional insulation for interior wiring and tubing. (Hines, W Star, 5/4/67, 2; Wilford, NYT, 5/5/67, 19; SBD, 5/5/67, 33-4)

- . Rep. William F. Ryan (D-N.Y.) recommended to the House that President Johnson appoint a high-level commission to fully investigate NASA and to determine whether NASA "has the competence to carry out the space program and to recommend changes in the agency to insure that our space program is efficiently and safely administered." Asserting that Americans "must have complete confidence in the administration of the space program" in order to give it unqualified support, he insisted that only a commission of non-NASA officials could thoroughly evaluate NASA. "From the [Apollo accident] testimony and subsequent developments it is clear that the entire management capability and supervisory competence of NASA is in question.

"...NASA is not competently administering one of the largest Federal programs...[and] has been extremely reluctant to be candid about its operations. There is every reason to believe that NASA will not examine itself sufficiently to form the basis for the changes that are needed to insure that there are no further catastrophes." (CR, 5/4/67, H5109-13)

- . Former Soviet Premier Nikita Khrushchev made at least two offers in the early 1960's to show to the U.S. photos of U.S. military bases taken by orbiting Soviet satellites "in return for certain favors," Dr. Charles S. Sheldon, formerly an NASC staff member and currently at the Library of Congress, told an AIAA meeting in Atlanta. He declined to specify what favors Khrushchev wanted. Dr. Sheldon said frequent launchings of satellites into low circular orbits indicated strongly that U.S.S.R. was observing U.S. from space: "I think there's little doubt they are in the observation business." It was difficult to ascertain the status of the Soviet manned space program, he said, but U.S.S.R. might feel ready to attempt a manned orbit of the moon within the next year. Concerning reports that several cosmonauts had died during space flights, Dr. Sheldon said U.S.S.R. had definitely not lost any men in orbit and probably had not lost any men in the space program before the April 24 death of Cosmonaut Vladimir Komarov. He acknowledged the death of a man in a parachute accident and the death of a Soviet test pilot, but said he was not certain these deaths were involved in the space program. (AP, B Sun, 5/5/67)

May 4: Total estimated cost for USAF's Manned Orbiting Laboratory (MOL) had risen to \$2.2 billion, according to March testimony by Secretary of Defense Robert S. McNamara released by House Armed Services' Appropriations Subcommittee. Estimate represented \$700-million increase over total cost of \$1.5 billion predicted by President Johnson in his Aug. 25, 1965, announcement approving DOD development of MOL. (Text; Getler, Tech Wk, 5/8/67, 14)

May 5: U.K.'s Ariel III (UK-E) scientific satellite was successfully launched from WTR by NASA four-stage Scout booster into orbit with 373-mi (600-km) apogee; 306-mi (492-km) perigee; 95.6-min period; and 80° inclination. The 198-lb satellite, which had a one-year design lifetime, carried five experiments for the investigation of earth's atmosphere; four were operating at liftoff and the fifth was turned on after third orbit. All five were functioning normally.

Third in a series of U.S.-U.K. cooperative space projects, Ariel III was designed to supplement and extend atmospheric and ionospheric investigations conducted by Ariel I (launched April 26, 1962) and Ariel II (launched March 27, 1964). Primary NASA mission objectives were to place satellite into planned orbit and provide tracking and telemetry support. NASA supplied Scout booster, conducted launch, and provided tracking and data acquisition services with STADAN facilities, under overall management of GSFC. Major portion of the technical effort on Ariel III, including design and fabrication of spacecraft and five experiments, was accomplished in U.K. under management of Science Research Council's Space Research Management Unit (SRMU). (NASA Proj Off; NASA Releases 67-96, 67-115)

- . U.S. should measure its return on space technology in terms of such things as the development of communications, meteorological, and simulation systems, rather than in dollars, NASA Administrator James E. Webb said in the Second Annual Cortez A. M. Ewing Lecture at the Oklahoma Center for Continuing Education in Norman. "The marginal return on the investment in the space program is greater than in any other area.... One must take into account the value of the services rendered."

Asserting that U.S. investment in the space program served as "a message to the world that we do not expect to be behind the world in the area of effective use of energy," Webb noted the success of U.S. space efforts. "We have accomplished in a decade what most informed sources in 1957 thought would take several decades."

Webb presented the Cortez A. M. Ewing Foundation with several photographs of the moon taken by Surveyor spacecraft, two atlases of the moon made from photos taken by Rangers VIII and IX, and color

May 5 (continued)

photos of India and Saudi Arabia taken by Gemini astronauts. (Norman Transcript, 5/7/67, 3; Howard, Oklahoma Daily, 5/9/67)

- . Dr. Heinz von Diringshofen, a German pioneer in flight and space medicine, died in Frankfurt, Germany, at age 67. Among the first to study the effects of weightlessness in vertical flight, Dr. Diringshofen recorded reactions of humans in weightless periods of up to eight seconds. He also developed systems currently used in the training of U.S. astronauts, including a centrifuge that produced 17 g's pressure. (NYT, 5/9/67, 43)
- . MSC awarded Rocket Research Corp. a \$405,000 contract to deliver by February 1968 two hand-held Eva maneuvering units and two extra propellant tanks for future manned spaceflight missions. (MSC Release 67-20)
- . Highest known temperature at which a material becomes superconducting --losing all resistance to electric current--was reported in Science by Bell Telephone Laboratories scientist Dr. Bernd T. Matthias. Conducting experiments under USAF contract, Dr. Matthias and six colleagues discovered a composition of niobium, germanium, and aluminum that became superconductive at -434°F. Discovery was expected to lead to construction of "super magnets" which could be used to shield manned spacecraft from high-energy particles in space and development of "super-efficient" electric motors and electronic computers requiring virtually no power. (Science, 5/5/67, 645-6; NYT, 5/6/67, 62; AP, W Star, 5/5/-67, A9)
- . Wilbur L. Pritchard, Group Director, Communications Satellite Systems, Aerospace Corp., was appointed director of ComSatCorp's new laboratories, scheduled for completion in Montgomery County, Md., by 1969. (ComSat-Corp Release 67-35)
- . NASA had funded 1st flight unit of new \$9-million Small Astronomy Satellite-A (SAS-A) project to map stellar x-ray sources. Spacecraft, scheduled to be launched in 1969 by four-stage Scout launch vehicle, would be placed into 330-mi-altitude circular orbit where it would measure position, strength, and time variation of all detectable x-ray sources. Project was under GSFC management. (NASA Release 67-111)
- . Alumni Assn. of Western High School, Washington, D.C., would honor alumnus Edward H. White II, one of three Apollo astronauts who died in Jan. 27 accident, with a memorial, which would include furnishings, decorations, and possibly a space exhibit for school's guidance library and counseling rooms. (W Star, 5/7/67, B1)

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May 7: Busts of Wilbur and Orville Wright were unveiled in the Hall of Fame for Great Americans at New York Univ.'s Bronx campus. They were among 93 people named to the Hall of Fame since its opening in 1900. (NYT, 4/2/67, 24)

During week of May 7: Stevens Institute of Technology, Hoboken, N.J., announced plans for what was believed to be the Nation's first academic center for the study of cryogenics--a branch of physics related to the production and effects of very low temperatures. Dr. John G. Daunt was named to direct the new center. Stevens President Dr. Jess H. Davis said center would have two major objectives: "to help meet the pressing need for scientists and engineers who have substantial training and experience in this developing science," and "to conduct basic research, which seeks to extend man's knowledge of cryogenics into areas as yet unexplored." (Bird, NYT, 5/14/67, 63)

May 8: Maj. William J. Knight (USAF) flew X-15 No. 2 to 96,000-ft altitude and 3,239 mph (mach 4.8) in flight at Edwards AFB to check stabilization and control with dummy ramjet and check-out thermalcouple system. Flight was successful except for break of dummy ramjet chute cable during landing sequence. (X-15 Proj Off)

- . NASA turned over Essa V meteorological satellite to ESSA for operation in accordance with NASA-Dept. of Commerce agreement. Essa V was launched from WTR by NASA April 20. (NASA Release 67-114)
- . ARC-sponsored study of Direct Lift Control (DLC)--system to help reduce aircraft noise and improve handling--began at Oakland International Airport with specially-equipped Boeing 707 aircraft. System consisted of applying various methods, such as retracting spoilers, modifying main flaps, and controlling boundary layer, to increase aircraft's lift directly. Tests would continue through July 1. (ARC Release 67-9)
- . Newsweek reported that Soviet diplomats in Washington, D.C., admitted to East European colleagues that Soyuz I mission had been launched one week early in an attempt to offset the impact of Svetlana Alliluyeva's press conference. Mrs. Alliluyeva, daughter of the late Joseph Stalin, defected to the U.S. in April. U.S.S.R. reportedly denied, however, that rescheduling had any effect on the April 24 crash-landing which resulted in Cosmonaut Komarov's death. (Newsweek, 5/8/67)

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May 8: U.S.S.R. was completing construction of several ground stations for use with second-generation Molniya comsats, Aviation Week reported. First Molniya II, expected to be launched in late 1967, would be capable of transmitting to several stations simultaneously; Molniya I's could reach only one at a time. (Av Wk, 5/8/67, 13)

- . "Despite the high cost and dangers in exploring space, tragically dramatized by the deaths of three U.S. astronauts and a Russian cosmonaut in recent months, Americans overwhelmingly approve of the U.S. effort to land men on the moon," the National Observer reported. Survey in 12 metropolitan areas showed that 77% of people questioned supported the lunar landing program; 17% opposed it; and 6% were undecided. There was less enthusiasm however, for manned planetary exploration programs: 57% favored manned planetary expeditions; 31% opposed them; and 12% were undecided. (Natl Ob, 5/8/67)
- . Earth had been cooling off rapidly since 1950 because of accumulation of atmospheric dust, Univ. of Wisconsin meteorologist Reid A. Bryson told UPI. Solid particles clogging paths of sun's warming rays had caused earth to experience an average loss in temperature from 2/3° to 1/2°, he said. (St. Louis Post-Dispatch, 5/9/67)

May 8-June 1: NASA's Lunar Orbiter IV became fourth U.S. spacecraft to circle moon when it entered lunar orbit following successful deboost maneuver which reduced its speed by 1,475 mph, permitting lunar capture. Orbital parameters: apolune, 3,797 mi (6,111 km); perilune, 1,681 mi (2,706 km); period, 72 hr 1 min; and inclination, 85.5°. Launched from ETR May 4, spacecraft performed 670 attitude changes, responded to 7,067 commands, and recorded two micrometeoroid hits. Spacecraft performed normally except for five-day period when camera thermal door operated improperly, causing overexposure and fogging. Problem was solved, however, and 163 medium- and high-resolution photos--including coverage of 99% of moon's front face--were taken with almost a hundredfold increase in discernible detail for most of the area covered. Final readout, underway since mission's photo-acquisition phase was terminated May 26 because of an encoder failure, was completed June 1.

By its telephoto coverage of eastern limb areas, Lunar Orbiter IV provided the basis for extending the cartographic grid system established for front-face mapping around to the hidden side, so that features there could be precisely located for future mission planning and operations. Initial photos, taken at 2,176-mi altitude, showed broad panorama of moon's South Pole region--which had never before been photographed--with typical rugged terrain of craters and ridges.

May 8-June 1 (continued)

Closer, wide-angle pictures of this area revealed a 200- by 10-mi crevice which scientists speculated had been formed by volcanic action. Other photos transmitted included excellent pictures of the Alpine Valley and Mare Orientale, a large and relatively young impact crater whose center lay beyond the western rim of the visible face of the moon. (NASA Proj Off; NASA Releases 67-127, 67-143; W Post, 5/12/67, A10; 5/13/67; AP, NYT, 5/28/67, 50)

During week of May 8: A sandbox full of hundreds of thousands of bullet holes accurately simulates the crater-pocked lunar surface, U.S. Geological Survey reported. Dr. Henry J. Moore, one of Survey's astrogeologists who fired projectiles of differing calibers into a sandtable at ARC, told UPI that results of experiment supported theory that moon's craters were, for the most part, created by the impact of meteorites. (UPI, NYT, 5/14/67, 29)

May 9: NASA Administrator James E. Webb, Deputy Administrator Dr. Robert C. Seamans, Jr., and Associate Administrator for Manned Space Flight Dr. George E. Mueller testified on Apollo project reprogramming before the Senate Committee on Aeronautical and Space Sciences. First "man-rated" Apollo Block II spacecraft would be delivered to KSC in late 1967 and launched three months later with Walter M. Schirra, Walter Cunningham, and Donn F. Eisele as prime crew, Webb said. Back-up crew would be Thomas P. Stafford, John W. Young, and Eugene A. Cernan. Spacecraft would still have 100%-oxygen atmosphere, but use of noncombustible and fire-resistant materials would minimize fire hazard, he asserted. "We are confident that the results of the first Block II Apollo flights will justify moving rapidly to follow-on flights, thus overcoming some of the effects of the present delay...[so that] we can carry out this plan within the funds now available for fiscal year 1967 and in NASA's budget for fiscal year 1968." In order to "assure maximum progress" and reduce pressures on North American Aviation, Inc. (NAA), prime Apollo spacecraft contractor, NASA was realigning its contracting arrangements, Webb said. Contracting changes included: negotiation of a new strong-incentive contract with NAA for manufacture, test, and delivery of standard Block II spacecraft; extension of Boeing Co.'s present contract responsibility to include integration of command and service module and lunar module with the Saturn booster system; selection of a third contractor to make necessary modifications to standard Apollo spacecraft produced by NAA; and consideration of offers by other aerospace companies to provide contractor assistance in Apollo systems management and check-out and test procedures.

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May 9 (continued)

Dr. Seamans described impact of Jan. 27 fire on Apollo schedule and budget. Lunar landing before 1970 "remains possible," he said. "The impact...has been to reduce that probability, not eliminate it.... After the first manned Block II flight on the uprated Saturn I in 1968, we plan three to four manned Saturn V missions...[and] in 1969...up to six Saturn V missions." Resulting \$75 million of additional costs through FY 1968--for materials and equipment changes, flammability testing, launch facility modifications, and spacecraft delivery rescheduling--would be absorbed within the total budget plan currently before Congress.

NASA's responses to recommendations by Apollo 204 Review Board were outlined by Dr. Mueller: (1) bulk combustibles and other flammable materials had been replaced with flame-resistant materials, and necessary flammables stored in fireproof containers; (2) emergency procedures would be reviewed and exercised prior to each hazardous operation, and a quick-opening hatch installed for simplified egress from capsule; (3) new NASA Office of Flight Safety would be established under OMSF to review and evaluate safety provisions and monitor test operations; (4) all emergency equipment had been reviewed and additions or substitutions--including installation of water fire extinguishers--made where necessary; (5) detailed design review of spacecraft communications system had been conducted and minor changes made to assure reliable operation; (6) full-scale mockup tests had been conducted to assess fire hazard and problems of gas detection and control; and (7) management and organizational changes had been instituted to clarify responsibilities and improve coordination between NASA centers and contractors.

In response to questions by Sen. Margaret C. Smith (R-Me.) regarding rating of companies in the 1961 Apollo spacecraft contract competition, Webb said that Martin Co. had been rated first, on the basis of its technical proposal, by the source evaluation board. However he, Dr. Dryden, and Dr. Seamans--considering other factors such as lower cost estimate, outstanding company performance record, overall capability offered, and experience with X-15 experimental aircraft--chose NAA as prime candidate for negotiation.

Senator Smith expressed concern that the Committee was not kept informed of serious problems revealed in the Phillips Report and asked whether NASA followed any guidelines to determine when situations should be brought to the attention of the Committee. Webb replied that no such guidelines existed and indicated that he thought it unnecessary to detail the problems to the Committee since he thought that NASA could control them. Several other committee members also expressed

May 9 (continued)

their desire to be informed of any problems approaching the magnitude of those surrounding the Phillips Report. When Sen. Walter F. Mondale (D-Minn.) continuously criticized NASA's reluctance to make the report public, Webb offered to discuss it, in complete context, in executive session, and repeated his objection to releasing such evaluations of contractor performance out of context. (Testimony; SBD, 5/10/67, 57-66; O'Toole, W Post, 5/10/67, A1)

- . Aerobee 150 sounding rocket launched by NASA from WSMR carried Naval Research Laboratory payload containing two coronagraphs to 113-mi (180.8-km) altitude. Primary purpose of flight was to launch externally occulted coronagraphs during period when moon was very close to the sun. Rocket also carried a photographic spectroheliograph, a photographic extreme ultraviolet heliograph, and an ion chamber to measure total solar flux at Lyman-alpha. Rocket and instrumentation performed satisfactorily. (NASA Rpt SRL)
- . NASA successfully conducted fifth test of a rocket-launched parachute as part of an advanced technology effort to investigate possible parachute landing systems for Voyager program. Two-stage Honest John-Nike rocket launched from WSMR ejected ringsail parachute at 130,000-ft altitude, where earth atmosphere resembles that of Mars. Parachute descended to earth with 200-lb payload carrying camera and instruments to record deployment of parachute and its characteristics in flight. Test was part of LaRC's planetary entry parachute program. (NASA Release 67-120)
- . Second Bell Aerosystems Co. X-22A V/Stol research aircraft successfully underwent 13-min demonstration flight at Niagara Falls International Airport. During test, which increased aircraft's total accumulated flight time to nine hours, X-22A achieved speeds of up to 130 mph, made several vertical short takeoffs and landings, and executed series of fast-climb-out turns. Designed and built by Bell under USN-administered program for Tri-Service V/Stol research project, aircraft would undergo 18-mo flight-test program at Bell and would then be delivered to Naval Air Test Center, Patuxent, Md., for further evaluation. First X-22A aircraft had been damaged beyond practical repair after crash-landing in summer 1966. (Tech Wk, 5/15/67, 18)
- . ComSatCorp President Joseph V. Charyk, speaking at ComSatCorp's fourth annual meeting in Washington, D.C., said a shortage of ground stations was delaying development of a complete international comsat network. "A fourth satellite of the Intelsat-II series exists and could be launched this fall.... Unfortunately, appropriate earth station

May 9 (continued)

facilities do not exist and even after approval of the necessary applications...[by FCC], operational availability will still be 14 to 18 months away." Because of this lag in number of earth stations and because a satellite failure could cause severe service interruption, ComSatCorp was seriously considering "the desirability of placing the fourth satellite of the Intelsat-II series as a spare in orbit this fall and...[seeking] a limited solution to the high-traffic demands by interim utilization of this satellite through a transportable earth station in Hawaii." (Text; Smith, NYT, 5/10/67, 63)

- . In February and March testimony released by Senate Foreign Relations Committee's Subcommittee on Disarmament, Director of Defense Research and Engineering Dr. John S. Foster, Jr., indicated that U.S. was developing a new type of nuclear warhead designed to destroy enemy missiles with high-intensity x rays. X-ray method, which would be used with three-stage Spartan missile, could destroy enemy missile by (1) disrupting avionic circuits used for guidance and detonation; (2) heating warhead to such high temperatures that it would ablate prematurely and burn up during reentry; or (3) triggering the warhead and causing premature detonation. (Committee Off; Av Wk, 5/15/67, 22; UPI, P Inq, 5/11/67, 3; Finney, NYT, 5/10/67, 1)
- . L/G Nikolay P. Kamanin, military commander of Soviet manned space-flight program, hinted in Zemlya o Vseleennaya that U.S.S.R. would use Soyuz-type spacecraft for manned lunar landing. He made no direct mention of Soyuz I spacecraft [see April 23-24]--believed to be heaviest Soviet space vehicle ever launched--but said "payloads of more than 15 tons have already been put into orbit." These payloads, he said, could soft-land on moon from lunar orbit. (AP, B Sun, 5/10/67)
- . End of the "space race" between U.S. and U.S.S.R. was nowhere in sight, Holmes Alexander speculated in the Philadelphia Evening Bulletin: "As matters stand today, the space contest is pretty much a race between the Communist and capitalistic systems.... Percentagewise the Soviet government is investing 2.5 times as much of its gross national product in the moon dash as we are. Moneywise, the investment is about equal. But the Russian economy, being much more 'managed' than ours, permits the ordering of what our economists call an 'internal brain drain.' Russian consumer industries are raided in order to feed the USSR space programs, whereas...NASA must compete...[with other agencies].
"It is wishful thinking to believe that the Russians will make any substantive concessions to ease the cost of the space race. As in

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May 9 (continued)

Vietnam, we are locked in an expensive contest against Communism. Nobody has yet found a way to the negotiation table." (Alexander, P EB, 5/9/67)

May 10: M2-F2 lifting body vehicle crashed on landing at Edwards AFB about three minutes after air-launch from B-52 aircraft, injuring NASA test pilot Bruce A. Peterson. Vehicle, on mission to evaluate effects of reduction in automatic damping for roll and yaw, turned over several times after touchdown and was heavily damaged. Although exact cause of crash was unknown, one unidentified NASA official speculated that pilot had been distracted by a helicopter flying nearby. NASA immediately set up a committee to investigate crash and said that powered M2-F2 flights scheduled for June would be delayed indefinitely until after repairs and conclusion of investigation. (Av Wk, 5/15/67, 34; Tech Wk, 5/15/67, 14; W Post, 5/11/67, C21; West, LA Times, 5/12/67)

- . NASA Administrator James E. Webb, Deputy Administrator Dr. Robert C. Seamans, Jr., and Associate Administrator for Manned Space Flight Dr. George E. Mueller appeared before the House Committee on Science and Astronautics' Subcommittee on NASA Oversight to submit Apollo project reprogramming plans presented to the Senate May 9. Dr. Seamans assured the Subcommittee that schedules could be met and urged that Congress continue to support NASA: "We have confidence in the ability of our technical and administrative teams, both in government and industry, to meet the challenge before us. But that is not sufficient; the Congress, representing the people of the Nation, must feel and show this same confidence if the work and the sacrifice of the past is to have meaning and the objectives of manned space exploration are to be achieved."

Several subcommittee members, however, condemned NASA for withholding facts about cost and management problems with North American Aviation, Inc. (NAA) and indicated that they would be more critical of NASA in the future. In response to charges by Rep. William F. Ryan (D-N.Y.) that Webb had "an obsession with secrecy," Webb asserted that NASA had been exceptionally cooperative: "No program of this magnitude has ever been operated with greater public scrutiny. No agency has ever given its committees more information on what it is trying to do." He offered to elaborate on the Phillips Report [see April 18] in closed session but declined to discuss it publicly, insisting that further public discussion would destroy close relationship between NASA and its prime Apollo spacecraft contractor. (Testimony; Wilford, NYT, 5/11/67, 26; O'Toole, W Post, 5/11/67, A9)

May 10: Prime and backup crews for NASA's first manned Apollo mission [see May 9] told a news conference at North American Aviation, Inc.'s Downey, Calif., plant that they were "very impressed" with the design changes being made in the Apollo spacecraft as a result of the Jan. 27 flash fire. Major changes included: (1) a new hinged hatch that could be opened outward in about two seconds by activating a springed level; (2) replacement of many highly-flammable materials such as nylon netting; (3) sheathing of open wiring with hard panels; and (4) flame-resistant spacesuits. In addition, spacecraft would be pressurized with nitrogen rather than oxygen on launching, and in orbit --where oxygen is indispensable--pressure would be reduced one third to 5 psi.

Questioned about his attitudes toward the program since the Jan. 27 Apollo accident, Command Pilot Walter M. Schirra replied: "...we went through a very agonizing self-appraisal; we suffered through three months of recrimination; we've culminated these three months with some very firm ideas." These ideas, Schirra said, were being phased into an orderly program that "will continue--with orderly haste...[and] we are not going to run rampant on schedules." The crews anticipated that Apollo 101 spacecraft would be delivered to KSC in December and that first manned mission would be flown in first quarter of 1968. Primary mission objective would be to "exercise the vehicle in earth orbit," Schirra said. Asked if the April 24 death of Soviet Cosmonaut Vladimir Komarov had had any adverse effects on plans for earth landings in the Apollo program, Astronaut Thomas P. Stafford replied: "The earth landing system that consists of the three main parachutes and the two drogue chutes had been qualified completely.... We still have some earth landing drops to be made. But right now as far as the crew is concerned, either the parachutes in this vehicle are qualified or we don't fly." (Transcript; Newsweek, 5/22/67, 94; Hill, NYT, 5/11/67, 27)

- . NASA awarded Douglas Aircraft Co. a \$4,665,000 modification to an existing contract for reliability and verification testing of Saturn S-IVB stage components. (NASA Release 67-118)
- . Small fire in KSC building housing an astronaut training simulator damaged \$1,200 worth of equipment, AP reported. Fire occurred in a rack of gear which provided electricity to the equipment, but which was not connected to the spacecraft simulator. NASA officials said no astronauts were inside simulator when fire broke out but even if they had been there would have been no damage. NASA issued no official announcement on the fire. (AP, NYT, 5/13/67, 15)

May 10: Fifteen outstanding young scientists received Air Force Office of Scientific Research (AFOSR) Postdoctoral Research Awards "for advanced study and fundamental research in the sciences." Selections, made by a board of NAS-appointed senior scientists, were based on "demonstrated competence and creativity in original research and on the scientific merit of the proposed postdoctoral investigation."
(NAS-NRC Release)

- . DOD awarded General Dynamics Corp. a \$1.8-billion fixed-price-incentive contract for production of 493 F-111 aircraft: 331 F-111As for USAF; 64 F-111 strategic bombers for SAC; 24 F-111Bs for USN; 24 F-111Cs for Royal Australian Air Force; and 50 F-111Ks for British Royal Air Force. Contract included only costs of basic airframes and minor electronic equipment; additional costs for engines, major electronic equipment, and modifications had not yet been fully determined and were not included. There was speculation that Congressional opposition to adaptation of F-111 (formerly TFX) as an all-purpose military aircraft --heightened by large increases in estimated costs and by January and April crashes of USAF and USN test models--might delay appropriation of production funds. (DOD Release 427-67; Wilson, W Post, 5/11/67, H11; Sheehan, NYT, 5/11/67, 1)

May 11: President Johnson submitted to Congress NASA's 15th Semiannual Report, covering January to June 1966, and praised the continued progress of U.S. space program: "The achievements reported here reflect not only our progress in space flight, but also new steps taken toward the real objective of all our efforts in space--the application of new knowledge to bettering the lives of all people. Already, we see dramatic examples of success in the satellites which have improved our weather forecasts and navigation, and which are extending radio and television communication to the farthestmost regions of the earth....

"The United States space program, as reflected in this report, continues to exemplify our Nation's conviction that the road to peace, progress, and abundance is through continued cooperation among all nations." (PD, 5/15/67, 729-30)

- . To clarify apparently conflicting statements presented during Congressional testimony, NASA Administrator James E. Webb issued statement regarding selection of North American Aviation, Inc., as prime Apollo spacecraft contractor. In separate appearances before Senate Committee on Aeronautical and Space Sciences, Webb had indicated (1) that NAA was the unanimous choice and (2) that Martin Co. had been recommended by the NASA Source Evaluation Board in 1961. Webb explained: "Dr. Robert Gilruth, Dr. Robert C. Seamans, and Dr. Hugh L. Dryden...were unanimous

May 11 (continued)

in their judgment that of the five companies submitting proposals ...[NAA] offered the greatest experience in developing high-performance manned flight systems and the lowest cost.

"In the selection...the work of the Source Evaluation Board was not rejected or discarded. It was used as the basis for a more extensive and detailed examination of all pertinent factors ...necessary to determine whether the facts then available formed an adequate basis for our selection of a contractor. We decided in the affirmative and then proceeded to select the contractor the facts indicated offered the most to the government." (NASA Release 67-122)

- . Subcommittee on Manned Space Flight, in its report to House Committee on Science and Astronautics, recommended that \$46.8 million be cut from \$3.4 billion requested by NASA for FY 1968 manned space flight program. Recommendation, which included \$25-million reduction in Apollo program, was approved by full committee May 16. (W Post, 5/12/67, A13)
- . NASA awarded 28 12-mo, \$2,400 predoctoral training grants to Univ. of Pittsburgh for public administration and to Georgia Institute of Technology, Univ. of Kansas, Cornell Univ., Purdue Univ., and Stanford Univ. for engineering design. (NASA Special Releases)
- . U.S. industry would spend \$16.6 billion for R&D in 1967--double the amount spent in 1957, McGraw-Hill, Inc., reported in its annual economic survey. Federal Government had financed 54% or \$8.4 billion of the \$15.5 billion spent for research in 1966. Survey estimated that 1970 expenditures would reach \$21 billion. It noted that more than half of the R&D was concentrated in two industries--aerospace, and electrical machinery and communications--both of which were heavily involved in defense and space exploration. (Koshetz, NYT, 5/12/67, 67)
- . Civic groups such as the Lions, Kiwanians, and Rotarians could make significant contribution to UFO investigations by equipping police squad cars with cameras, Dr. J. Allen Hynek, USAF consultant on UFOs and Chairman of Northwestern Univ.'s Astronomy Dept., told the MIT Club meeting in Washington, D.C. Policemen, whom Dr. Hynek characterized in general as good observers, often sighted UFOs but were not believed, he said: "For some reason we think that a policeman whose testimony could be sufficient to send a man to the electric chair is simply not to be believed when he makes a UFO report." Charging that Americans had "neglected looking at flying saucers scientifically too long," Dr. Hynek suggested that a "two-dimensional"

May 11 (continued)

assessment which considered both the "strangeness" of the reported event and the credibility of the witness be undertaken by physical and social scientists. (Hines, W Star, 5/12/67, A5)

- . France had informed shipping companies and airlines that a zone of 185 km (115 mi) around Mururoa Atoll in the South Pacific would be considered dangerous beginning June 1 because of imminent atomic tests. (AP, W Star, 5/11/67, A1)
- . U.K. was considering developing jointly with France a new generation of nuclear missiles to replace U.S.-made Polaris and Poseidon missiles, Karl E. Meyer reported in the Washington Post. British Prime Minister Harold Wilson had hinted in telephone interview that U.K. would soon announce its decision not to acquire additional U.S. missiles because of economic, political, and strategic considerations, Meyer said. Development of new missiles with France would be more beneficial to U.K. than purchasing U.S. missiles, Meyer suggested, because (1) it would prove that British were "European-minded" in defense policy and were weakening their ties with U.S.; and (2) it might persuade France to accept British application for admission to European common market. (Meyer, W Post, 5/11/67, A28)

May 12: U.S.S.R. launched COSMOS CLVII into orbit with 296-km (184-mi) apogee; 202-km (126-mi) perigee; 89.4-min period; and 51.3° inclination. All equipment was functioning normally. (UPI, NYT, 5/14/67)

- . Sensors aboard two Vela nuclear detection satellites, launched April 28 by USAF Titan III-C booster, were turned on, and large amounts of data were being received. Satellites were part of DOD's Vela program to monitor space for violations of nuclear test ban treaty. (AP, NYT, 5/14/67)

May 13: Manned expeditions to every part of the solar system would be achieved by the end of the 20th century, Vice President Humphrey predicted in his opening statement to a student panel at North Dakota State Univ. in Fargo. He envisioned "the development of a whole family of earth orbiting stations, manned and supplied by regular ferry services; the launching of unmanned probes to every part of our solar system, and probably manned expeditions as well." (UPI, NYT, 5/14/67)

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May 13: Australia would be able to maintain its prominence in radio-astronomy with a new 150-in optical telescope to be constructed at Siding Spring, New South Wales, the New York Times reported. Construction of the \$11,760,000 telescope, a joint British and Australian project, was expected to be completed in six years to provide Australian scientists--who currently had to send findings to Mt. Palomar (Calif.) Observatory for verification--with a suitable size optical telescope to check their observations. (NYT, 5/14/67, 37)

- . Gen. James H. Doolittle (USAF, Ret.) received the Sixth Annual Thomas D. White National Defense Award at Air Force Academy ceremonies in Denver. An aviation pioneer and Medal of Honor holder, General Doolittle was cited for making "outstanding contributions to the national defense and security...[and giving] a lifetime of leadership to military and civil aviation." (Denver Post, 5/14/67, 32)

May 14: U.S.S.R. was training more scientists, faster, than any other country in the world, Dr. G. M. Dobrov, Kiev Academy of Science professor, told a London meeting of scientists from 14 countries. During the last 50 yrs, the number of scientists in the world had doubled every 15 yrs: U.S. had doubled its personnel every 10 yrs; U.S.S.R., every seven years. Dr. Dobrov said U.S.S.R. had 10,000 professional scientists in 1917, compared to 700,000 in 1967. He suggested that women be encouraged to enter scientific professions to enlarge resources of potential manpower. (Reuters, NYT, 5/14/67, 85)

- . A 59-lb, \$350,000 computer used on Gemini V mission had been reconditioned and was being used by USN in tests of new airborne weapons system designed to locate and destroy enemy radar, AP reported. USN declined to name the aircraft or reveal where the tests were being conducted. (AP, Denver Post, 5/14/67)

May 14-18: Aviation-Space Writers' Assn. met in Las Vegas.

Dr. Mac C. Adams, NASA Associate Administrator for Advanced Research and Technology, discussed NASA's attempts to solve the increasing problem of aircraft noise. Efforts included: (1) active participation in the interagency task force established by President Johnson to study aircraft noise, (2) study of methods to reduce noise of conventional aircraft engines, (3) investigation of the use of steeper descent angles during approach to landing and steeper climb on takeoff to reduce noise by moving the source farther from the ground, and (4) research on a new turbine engine with low noise as a basic requirement. (Text; N News, 5/16/67)

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May 14-18 (continued)

Former AFSC Commander Gen. Bernard A. Schriever (USAF, Ret.) charged that the Johnson Administration was not "pushing technology" and suggested that \$400-700 million more should have been spent annually on exploratory and advanced development during the past four or five years. He was particularly critical of the "arbitrary separation of space activities into peaceful and military.... It simply serves to emphasize, by comparison, the straightforwardness of the Soviet program. Their single-purpose program seeks only to attain a versatile technological superiority which, once attained, will serve the political purpose they choose regardless of what kind of a space program we have or how we categorize it...." (Text)

Anglo-French Concorde supersonic aircraft, scheduled to enter commercial service in 1971, would pioneer three markets, monopolizing the first two until "pushed away" by U.S. SST, scheduled to enter passenger service in 1974-5, W. J. Jakimiuk, president of Sud-Aviation, predicted. Concorde would dominate the North Atlantic market where SSTs would first be used; however, "as soon as the U.S. SST penetration of the North Atlantic pushes away the Concorde, they will be introduced on the major other markets, where a position of monopoly again will be found," Jakimiuk said. When U.S. SST "pushes" Concorde away from these routes, it would then move to a new series of routes where traffic density would be so low that "there will be no SST competition." (NYT, 5/21/67, 88)

Director of FAA SST Development B/G J. C. Maxwell, referring to report by Institute for Defense Analyses (IDA) which suggested that SST program could seriously weaken the Nation's balance of payments [see May 16], said that "our balance of payments will continue to benefit if American and foreign airlines continue to buy and operate American aircraft in the upcoming supersonic area." General Maxwell said FAA estimated that 1990 market for SSTs, if operations were limited by sonic boom considerations, would be 500 aircraft, improving balance of payments position by \$17 billion. If sonic boom did not limit operations, 1,200 aircraft would be sold, improving balance of payments position by \$32 billion. (Text; Lardner, W Post, 5/17/67, C1)

Dr. John S. Foster, Jr., Director of Defense Research and Engineering, responded to criticism that U.S. was losing its strategic superiority. "For many years, the Soviet Union apparently had been following our lead in every important strategic system technical development.... This is still the case. We are following their activities with great

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May 14-18 (continued)

care. We see no evidence that our planned strategic capabilities will be endangered by recent Soviet technological actions...." Dr. Foster announced that first MOL would be launched by USAF in 1970, confirming rumors that program was two years behind schedule. (Av Wk, 5/22/67, 11)

Awards presented included: (1) Monsanto Aviation Safety Award for the "most significant and lasting contribution to air safety" in 1966 to FAA Deputy Administrator David D. Thomas, who was recognized as "the principle architect of the U.S. air traffic control system"; and (2) 1967 Robert S. Ball Memorial Award for distinguished and meritorious aerospace writing to Howard Benedict, AP senior aerospace writer, for series of articles from Aug. 8-Sept. 19, 1966, on Gemini XI mission. (Editor & Publisher, 5/13/67; FAA Release 67-7)

May 15: Cosmos CLVIII was launched by U.S.S.R. into circular orbit with 850-km (528-mi) altitude; 100.7-min period; and 74° inclination. Equipment was functioning normally. (AP, NYT, 5/16/67)

- . NASA announced that Oso III Orbiting Solar Observatory, launched from KSC March 8, had not only achieved but exceeded its primary and secondary objectives. Primary objective was to obtain high-resolution spectral data from pointed solar experiments during major portion of one solar rotation and adequate operational support of spacecraft subsystems to carry out acquisition of these scientific data. Secondary objective was to obtain useful data from the non-pointed experiments, and to obtain data from pointed experiments during more than one solar rotation. Oso III had operated satisfactorily for over two solar rotations and was continuing to acquire useful scientific data from both pointed and wheel experiments. (NASA Proj Off)
- . NASA's Nimbus II meteorological satellite successfully completed one year of operation and was still transmitting useful data. Spacecraft had taken more than one million weather photos since its launch from WTR May 15, 1966. (AP, B Sun, 5/15/67)
- . David S. Gabriel, former Program Manager for the Advanced Agena at Bell Aerosystems Co., was named Deputy Manager of AEC-NASA Space Nuclear Propulsion Office (SNPO). (NASA Ann; NASA Release 67-131)
- . Technique for predicting solar flares by the positions of the planets was described by Rex Pay in Technology Week. Predictions were made by calculating time rate of change of the gravitational field at

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May 15 (continued)

sun's surface, taking into account local areas of persistent solar activity and their alignment with respect to earth. "Principal influences on rate of change of the gravitational field at the solar surface are the planets. Although their gravitational effects are many orders of magnitude less than that of the Sun itself, the time rate of change of the resultant planetary field vector appears to have some triggering effect on the release of solar flares. It appears, therefore, that solar flares can be predicted from the positions of the planets." Dr. Richard Head, ERC, told Technology Week that technique had been used to predict intense proton storm in late August 1966 which occurred shortly after NASA's Lunar Orbiter I had completed its photographic mission. (Tech Wk, 5/15/67, 35)

- . Scientists at National Radio Astronomy Observatory, Green Bank, W. Va., and Naval Research Laboratory successfully demonstrated new technique to obtain high-resolution pictures of quasars. Radiotelescopes at both locations were focused simultaneously on a quasar 240 trillion mi away, and radio signals beamed to earth by the quasar were recorded on magnetic tape at both centers; processed by a computer; and matched to form a single, clearer tape. NRAO Director Dr. David Heesch speculated that facilities even farther away could be combined for sharper pictures: "Using this technique, there's no reason why we can't link up two telescopes 1,000 miles apart and improve our resolution 100 times over what we had." (O'Toole, W Post, 5/25/67, D18)
- . U.S.S.R. planned to display two new jet passenger aircraft at Paris International Air and Space Show in late May, Tass announced. First was 24-passenger Yak-40, scheduled to replace propeller aircraft on Soviet secondary air routes; second was 164-passenger Tu-154, scheduled to be main medium-range Soviet passenger aircraft. (AP, C Trib, 5/16/67, 3)
- . Washington Evening Star columnist Richard Wilson compared "cloud of suspicion over large undertakings" in both DOD and NASA programs: "An identical parallel is now disclosed between the award of the multi-billion dollar TFX fighter-bomber contract and the award of the very large contract for the Apollo capsule. In both instances the recommendation of the experts was rejected and a handful of public officials chose the contractor they favored.... In both instances many other facts and expert opinions were suppressed.
"Contrary to the findings of expert boards and committees and of the Joint Chiefs of Staff, the TFX contract was awarded to a company with good political connections which was temporarily in financial trouble. Contrary to the findings of a group of 200 space

May 15 (continued)

experts, the Apollo contract was awarded to North American Aviation, strongly represented in Washington's political life, instead of to the Martin Company.

"Congress and the public need to know how these huge undertakings have been handled because there will be many more of them in the future." (Wilson, W Star, 5/15/67)

May 16: House Committee on Science and Astronautics voted to report \$4.9 billion NASA authorization bill (H.R. 10340)--\$107.8 million less than \$5.1 billion NASA had requested for FY 1968. Committee reductions included \$46.8 million from manned space flight; \$35.3 million from space science and applications; and \$25.6 million from advanced research and technology. Report was filed with the House June 6. (O'Toole, W Post, 5/17/67, A1, A6; Hines, W Star, 5/17/67, A9; Av Wk, 5/22/67, 24)

- . Sen. Stephen M. Young (D-Ohio), speaking on the Senate floor, urged U.S. and U.S.S.R. to cooperate in the exploration of outer space. "Let us proceed to inquire together seeking to effect a treaty with officials of the Soviet Union for the joint exploration of outer space for peaceful purposes, including efforts for a joint lunar landing, sharing the cost on a 50-50 basis. The tremendous expense would be shared equally by our two great nations. Also, if we were no longer engaged in a race with the Soviet Union for space achievements, the likelihood of tragedies resulting from too much haste --such as both nations have recently witnessed--would be greatly diminished.

"This would save the taxpayers of our country at least \$1 billion next year and billions of dollars in future years. Even more important, it would be a great advance toward permanent peace in the world." (CR, 5/16/67, S6903)

- . SST program recommended by the Johnson Administration could seriously weaken the Nation's balance of payments, Institute for Defense Analyses (IDA) concluded in report prepared for and released by FAA. Report said gains from foreign sales of SST would be more than offset by a large increase in U.S. tourist spending abroad as well as by a reduction in sales of subsonic U.S. aircraft. IDA study was one of four reports commissioned by FAA for \$633,000 but withheld pending President Johnson's decision to proceed with Phase III (prototype construction) of SST program [see April 29].

New York Times later commented: "The very fact that there can be no certainty about the sales prospects for the SST or its impact

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May 16 (continued)

on the balance of payments argues for a deliberate and conservative approach in financing it. Statements based on hope and supersalesmanship are considerably less convincing than the hard facts of supersonic economics. The SST is supposed to be a commercial venture. It should meet commercial standards of investment." (Lardner, W Post, 5/17/67, C1; NYT, 5/21/67, E12)

May 17: NASA Argo D-4 (Javelin) sounding rocket launched from NASA Wallops Station carried Syracuse Univ. Research Corp. payload containing vacuum-ion chamber to 625-mi (1,006-km) altitude on flight to measure ion densities in the upper atmosphere. Telemetry signal was received for 18 min. (NASA Rpt SRL)

- . NASA test pilot William H. Dana flew X-15 No. 1 to 3,205 mph (mach 4.84) and 71,000-ft altitude in flight at Edwards AFB. Purposes of test: (1) Pcm system checkout; (2) coldwall heat transfer; (3) step panel heat transfer; (4) boost guidance checkout; (5) energy management checkout; (6) tip pod accelerometer; (7) sonic boom study; and (8) horizontal tail loads. (X-15 Proj Off)
- . U.S.S.R. successfully launched two Cosmos satellites: Cosmos CLIX entered orbit with 60,600-km (37,655-mi) apogee; 380-km (236-mi) perigee; 10-hr 33-min period; and 51° inclination; Cosmos CLX entered orbit with 205-km (127-mi) apogee; 142-km (88-mi) perigee; and 49.6° inclination. Equipment on both satellites was functioning normally. (UPI, W Star, 5/18/67, C18)
- . NASA's Surveyor III spacecraft, resting on the moon, would not be reactivated until about May 23 despite the end of the two-week lunar night, NASA announced. Officials said they wanted spacecraft to warm up gradually before resuming communications. (UPI, NYT, 5/18/67, 22)
- . Congress, the Administration, and the press had failed to put the U.S. space program--particularly the Apollo fire--into proper perspective, Rep. Joseph E. Karth (D-Minn.), Chairman of the House Committee on Science and Astronautics' Subcommittee on Space Science and Applications, told National Space Club meeting. "Despite reports and statements to the contrary, neither the Apollo nor the rest of the space program is falling apart. Despite reports to the contrary, NASA has revealed and discussed its errors and those of the contractor to an unprecedented degree. In fact, I have never heard more candid admissions of failures and responsibilities. Yet, these errors must be weighed in the overall balance with the tremendous accomplishments

May 17 (continued)

of NASA and its contractors during the past nine years. It is unfair and super-bad-judgment to measure this present 'low water' mark with any other yardstick...." (Text; Clark, NYT, 5/18/67, 30)

- . Soviet space program would be seriously delayed because of the April 24 accident which killed Cosmonaut Vladimir Komarov, Soviet Cosmonaut Yuri Gagarin disclosed in Komsomolskaya Pravda. "Flights of spaceships of the type of Soyuz I will be possible only after a complete determination of the causes of the accident, their elimination and then test flights. This, of course, will take time." Gagarin confirmed that Soyuz I mission had been first of a series of flights planned for summer 1967. Concerning rumors that Komarov had survived the crash-landing of Soyuz I, he said: "How we all wish that Volodya Komarov was alive.... But one must look facts in the face." (NYT, 5/18/67, 31; AP, W Post, 5/18/67, A26)
- . Michigan's Governor George Romney said U.S. exhibition at Expo '67 in Montreal was "a discredit to the Nation and the people of this Nation.... The only thing inside the exhibit that I could see that had any merit were the space capsules." (UPI, W Post, 5/18/67)

May 18: NASA personnel changes: (1) George H. Hage, former Engineering Manager for Boeing Co.'s Lunar Orbiter Program, had been appointed Deputy Associate Administrator for Space Science and Applications (Engineering), replacing Robert F. Garbarini, who resigned effective April 27. Hage would be responsible for maintaining the highest possible standards of engineering excellence and discipline, systems performance and project management on the spacecraft and launch vehicles in the OSSA program. (2) Bernard Moritz, former NASA Deputy Assistant Administrator for Industry Affairs, had been appointed Assistant Administrator for Special Contracts Negotiation and Review. Moritz would be responsible for negotiation and review of certain assigned contracts involving new policy or administrative arrangements requiring consideration or decision by the Administrator or Deputy Administrator. (3) M/G John G. Shinkle (USA, Ret.), Apollo Program Manager at KSC, resigned for "personal reasons." Dr. Kurt H. Debus, KSC Director, commented: "I deeply regret the decision of General Shinkle to leave the program. Throughout his association here, his experience has been of major assistance in our contribution to the Apollo program." (NASA Releases 67-128, 67-129; AP, NYT, 5/20/67, 2)

- . NASA announced it would negotiate three-month \$500,000 fixed-price contracts with Martin Marietta Corp. and McDonnell Aircraft Astronautics Co. for preliminary design studies (Phase B) of planetary entry capsules for the Voyager program. Phase B contractor efforts were the responsibility of JPL in conjunction with LaRC. Responsibility for

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May 18 (continued)

system design and hardware development subsequent to Phase B would be divided between JPL and LaRC with JPL responsible for surface laboratory and LaRC responsible for capsule bus system, which included entry and landing equipment. (NASA Release 67-126)

- . NASC Executive Secretary Dr. Edward C. Welsh, delivering the Steinmetz Memorial Lecture at Union College, Schenectady, N.Y., emphasized the contributions of the U.S. space program to national security. "Surely, we must all realize that the more certain potential aggressors are that we are informed and alert, the less is the likelihood of attack and the greater is the likelihood of peace. Space competence contributes significantly to our state of alertness and awareness.... We are not developing space weapons systems which might threaten the security of other countries, but rather we are developing insurance against the violation of international treaties as well as against surprise attacks. Those who want to live within the reasonable limitations of international law and who desire and are willing to work for world peace surely should welcome a program which lessens the risks of world conflict. Our space activity constitutes such a program." (Text)

May 19: U.N. space law treaty had been ratified by the Presidium of the Supreme Soviet, Tass announced. Presidium acted on behalf of the Supreme Soviet when the full body was not in session. Ratified by U.S. Senate April 25, treaty would become effective when U.S., U.S.S.R., U.K., and two other nations had filed ratification papers.

Washington Evening Star later commented: "...[the space law treaty] may not be one of the most significant agreements of our time, but it is surely the most far-reaching, encompassing nothing less than the infinities between us and the stars. It is an agreement, moreover, that puts America and Russia on the same side. It can be helpful as an example of what the two of us can do together--down here on the troubled earth--to promote a good and enduring peace." (NYT, 5/20/67, 1, 5; AP, W Star, 5/20/67, A5; W Post, 5/20/67, 1; W Star, 5/22/67, A16)

- . Press briefing on Esro II satellite and NASA International Cooperative Programs was held at NASA Hq.

Arnold W. Frutkin, NASA Assistant Administrator for International Affairs, discussed the areas of cooperation between NASA and ESRO, emphasizing the "unprecedented data exchange agreement.... I don't think there is anything quite as sophisticated or as extensive in the international field. Under this agreement...ESRO assumes responsibility to collect all of the European technical report literature relevant to space activities, indexes and abstracts it, reduces it to a standard

May 19 (continued)

microfiche or microcard format which is compatible with our own system, and provides that material to us. We incorporate it in a single combined publication every two weeks, listing all of the U.S. and European literature in the field so that it is available to both sides...."

Brian M. Walker, ESRO Project Coordinator for Esro II, announced that next ESRO satellite--Esro I--would be launched in late 1967 to study the ionosphere. Esro II was scheduled for launch from WTR May 29. (Transcript)

- . USAF awarded two fixed-price incentive-fee contracts to continue development of the MOL: (1) Douglas Aircraft Corp., contractor for the laboratory vehicle, received \$674,703,744; and (2) McDonnell Aircraft Corp., contractor for Gemini B spacecraft, received \$180,469,000. (DOD Release 464-67)
- . A street and school in Warsaw, Poland, had been named for Vladimir Komarov, Soviet cosmonaut who died April 24 when Soyuz I spacecraft crash-landed, AP reported. (AP, NYT, 5/19/67, 4)

May 20: Air Transport Assn. (ATA) issued statement urging FAA to expedite its program for automatic equipment to improve the control of air traffic. Statement noted that by 1970 airlines would have more than two thirds of their share of the equipment installed compared to FAA, which would have only one third of its ground stations suitably equipped. ATA urged that FAA temporarily abandon plans for a complex and costly system and proceed instead with less elaborate equipment. (AP, NYT, 5/22/67, 25)

May 21: Astronauts Walter M. Schirra, Jr., Thomas P. Stafford, and Frank Borman were interviewed on NBC-TV's "Meet the Press." Borman said he had "nothing but admiration for the way NASA had conducted its investigation of the Jan. 27 Apollo accident and that, far from losing confidence in the agency, he had gained confidence in it. Asked if he believed that some other group should also investigate the fire, he replied: "Absolutely not. I don't understand the desire for another investigation." Schirra, asked if he believed it were necessary to send men to the moon when unmanned spacecraft were obtaining valuable information, responded: "It is only natural that man must go out there and see for himself." The computer in unmanned flights is only a product of man's mind, and, "if something different occurs, man is best equipped to make the move." (AP, Newsday, 5/22/67)

May 21: One remaining "lightweight" prototype of USN's F-111B fighter aircraft had been grounded pending investigation board's determination of cause of April 21 accident in which an F-111B, which had been stripped of excess weight, crashed on takeoff. "You can't lose that high a proportion of your total assets and not have it hurt ...a lot," Capt. K. C. Childers, deputy director of F-111B-Phoenix program, told Washington Evening Star. He emphasized, however, that three other USN models of the aircraft were still flying, and two of them were being used in tests of the Phoenix missile that formed an integral part of the F-111B weapons system. (W Star, 5/21/67, A7)

May 22: Cosmos CLXI was launched by U.S.S.R. into orbit with 343-km (213-mi) apogee; 205-km (127-mi) perigee; 89.8-min period; and 65.7° inclination. Equipment was functioning normally. (AP, W Post, 5/23/67, A9)

- . USAF launched an unidentified satellite by Atlas-Agena booster from Vandenberg AFB. (UPI, W Post, 5/23/67, A9)
- . France and Quebec had agreed on joint use of a comsat for transmission of French radio and television programs to the French-speaking areas of Canada, Quebec's Premier Daniel Johnson disclosed at a Paris press conference. (NYT, 5/23/67, 77)
- . The time had come to end the "belabored post-mortems of the Apollo fire" and to restore confidence in the Apollo program, William Coughlin suggested in Technology Week. "NASA certainly has its faults, particularly in the quality control area. But we believe that the overall record of the Apollo 204 probe offers some inspiration for confidence in NASA management. It takes a great deal of integrity to give an accident review board full freedom and support when the outcome can only be critical of those setting up the board--and NASA provided that freedom and support. It then takes courage to stand up and disagree with some of the findings of the board--and NASA did that. The Phillips report, damaging as it was, also was testimony that NASA had been on top of the problems at North American and was making progress in solving them....
"Confidence in Apollo must be restored and the program allowed to move ahead, without undue restriction, on its new lunar schedule.
"Anything less will diminish the sacrifice made by three brave men." (Coughlin, Tech Wk, 5/22/67, 58)

May 22: Cosmos, Minn.--a community of 560--had given all its streets astronomical names such as Mars, Jupiter, Pegasus, and Comet. (AP, NYT, 5/22/67)

- . Dr. J. Herbert Hollomon, Acting Under Secretary of Commerce and Assistant Secretary of Commerce for Science and Technology, had been appointed President of Oklahoma Univ., effective Sept. 1. (AP, NYT, 5/23/67, 32)
- . USAF F-111A jet aircraft was flown from Loring AFB, Me., to Le Bourget Airfield, France, for display at the Paris International Air and Space Show. (UPI, NYT, 5/23/67, 77)

May 22-23: Vice President Hubert H. Humphrey, accompanied by NASC Executive Secretary Dr. Edward C. Welsh, toured MSFC and U.S. Army Missile Command (AMC) at Redstone Arsenal. During his visit, the Vice President watched a full-duration static-firing of an Uprated Saturn I 1st stage which lasted 145.6 sec. (Marshall Star, 5/24/67, 1)

May 23: Press briefing on Surveyor III was held at NASA Hq.

Dr. Ronald F. Scott, Cal Tech, showed film, which lasted only a few seconds, of Surveyor III's surface sampler digging a small lunar trench. Device picked up a small rock in left side of its scoop and tried unsuccessfully to crush it, exerting between 200-300 psi. "From this we concluded that the rock was at least harder than sandstone, which would have broken under an impact of about 200 pounds," Dr. Scott said. Surveyor III had also confirmed that moon's surface could support a manned lunar landing. Its consistency was that of wet or rainy sand and its bearing strength was between three and eight lbs psi--adequate to support the Apollo lunar module or an exploring astronaut. "He'll leave a definite footprint, that's all," Dr. Scott said.

Dr. Eugene Shoemaker, U.S. Geological Survey, said series of 50 photos taken by Surveyor III's black-and-white TV camera and converted into color photos by JPL with color filters indicated that lunar surface was gray. "The gray varies in shade from a pale to a very dark gray, but it appears to be still basically all gray." He said color probably resulted from lack of moisture and air, the presence of which on earth keeps minerals in a state of oxidation, causing them to be brightly colored. He noted, however, that many lunar rocks photographed by Surveyor III were almost black, suggesting that they had been coated with a darkening substance, nicknamed "lunar varnish."

May 23 (continued)

Among photos displayed were two pictures of the eclipse in which the earth was depicted as a dark circle sitting between the spacecraft and the sun. Earth appeared to have partial halo of deep sunset color in one photo and orange areas connected by a faint purple halo in the other. (O'Toole, W Post, 5/24/67, A12; Clark, NYT, 5/24/67, 50; Hines, W Star, 5/25/67, A13)

- . Some of the techniques used in managing the U.S. space program might be applicable to the problems of local, state--and possibly Federal --government, NASA Administrator James E. Webb suggested in speech at conference commemorating 30th anniversary of Univ. of Pennsylvania's Fels Institute of Local and State Government. Theme of the meeting was "Urban Government in the Decade Ahead: The Technological Revolution in Management." Webb said: "I believe that what the space frontier opened up in 1957 is the kind of frontier on which pioneers can experiment and learn to use many facets of modern technology here on earth. In urban America, as elsewhere, men need the constant development of new concepts of reality in the universe and the inspiration that comes from a chance to better know this universe in which we live...." (Text)
- . First SV-5D lifting body vehicle ever recovered from a suborbital space flight was displayed by USAF at Pentagon press briefing. Seven feet long and weighing 860 lbs, it was heat-blackened and slightly charred on its outer surface from 3,000 F reentry heat. Col. Curtis L. Scoville, AFSC, said vehicle, launched April 19 by an Atlas booster, had achieved an orbital speed of 17,000 mph and reentered in a maneuvering descent that took it "hundreds of miles" out of its straight-line trajectory. A USAF aircraft recovered it in mid-air during final parachute descent. Mission was third successful flight in USAF's Precision Recovery Including Maneuvering Entry (Prime) program; first two vehicles were not recovered, but program was considered so successful that planned fourth flight had been cancelled. (Schmeck, NYT, 5/24/67, 50)
- . Twelve Douglas Aircraft Co. officials had been elected to Board of Directors of the new McDonnell Douglas Corp, Chairman and Chief Executive James S. McDonnell announced. (AP, NYT, 5/24/67, 69)
- . Soviet Institute of Oceanology's Marine Electronics Laboratory was developing a television-equipped robot to probe the ocean floor at depths of four-six km ($2\frac{1}{2}$ -four mi), Science Service reported. Controlled electronically through a specially made cable, robot would carry a manipulator to pick up objects sighted by TV camera. Engineers hoped to eventually develop a robot that could be controlled entirely by ultrasonic signals transmitted through the water. (Sci-Serv, NYT, 5/23/67, 50)

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May 24: NASA successfully launched Explorer XXXIV Interplanetary Monitoring Platform (IMP-F) from WTR by three-stage Thrust Augmented Improved Delta booster into near-perfect polar orbit. Orbital parameters: apogee, 133,131 mi (214,348 km); perigee, 150 mi (241 km); period, 106 hrs; inclination, 67.2°. Preliminary data indicated that all spacecraft systems and the 10 of its 11 experiments which had been turned on were operating normally. Final experiment would be turned on by ground command June 1.

Explorer XXXIV would make measurements of solar and galactic cosmic rays within and at the boundary of earth's atmosphere and interplanetary space during period of maximum solar activity. Primary mission objectives were to: (1) place spacecraft into orbit with an apogee of approximately 92,000 mi, or greater, to investigate the region between the magnetosheath and the shock front; and (2) to obtain scientific data on the cislunar environment from a number of its experiments. Explorer XXXIV was ten times more complex than any of four previous satellites launched in NASA's Interplanetary Monitoring Platform (Imp) series, two of which--Explorer XXVIII (launched May 29, 1965) and Explorer XXXIII (launched July 1, 1966)--were still operating and providing scientific data. Imp series was managed by GSFC under OSSA direction. (NASA Proj Off; NASA Release 67-21; UPI, NYT, 5/26/67, 9; WSJ, 5/25/67, 1)

- . President Johnson, in a White House ceremony, presented M/G James W. Humphreys, Jr., of the Air Force Medical Corps, the Distinguished Service Medal for helping to develop "a national medical program for the Vietnamese people." General Humphreys would become Director of Space Medicine, OMSF, June 1. (PD, 5/29/67, 778; W Post, 5/25/67)
- . NASA announced that 2nd stage of the first Saturn V booster would be dismantled at KSC to check for any "hairline" cracks. Decision was made after similar cracks had been found in an identical stage of the vehicle at North American Aviation, Inc.'s Seal Beach, Calif., plant. Additional checks were not expected to delay first Saturn V flight --an unmanned mission scheduled for mid-August--by "more than a week or so." (NASA Release 67-132)
- . Ronnie J. Lagoe, 17-yr-old high school senior whose 1/7 scale model of NASA's Surveyor spacecraft had made five successful soft-landings on earth from varying heights, was introduced at a New York news conference by Dr. Allen E. Puckett, Executive Vice President of Hughes Aircraft Co., manufacturer of Surveyor spacecraft. Lagoe built his 2-lb model--designated Surveyor-R (for "revised")--with wood strips, foam rubber, bathtub calk, Elmer's glue, ping-pong balls, cork fishing floats, a battery, and four tiny rockets. Total cost: \$28.95. He

May 24 (continued)

described the 85-ft flight sequence following Surveyor-R's launch from the top of a water tower: "After retro-fire, a marked decrease in spacecraft velocity was noted until retro-burnout occurred at 20 feet and the verniers burned alone. Complete counteraction of gravity was achieved at two feet, after which vernier shut-off occurred and the craft dropped to the surface." Hughes presented Lagoe with a summer job at KSC, a free trip to its Culver City, Calif., plant, and a \$5,000 college scholarship. (Wilford, NYT, 5/25/67, 43)

- . 1967 Robert J. Collier Trophy was presented to James S. McDonnell, founder of McDonnell Aircraft Corp., by Vice President Humphrey in ceremony at Smithsonian Institution. Making the award on behalf of President Johnson, Mr. Humphrey said McDonnell had been selected because of his leadership in aeronautics and astronautics as demonstrated by the performance of the McDonnell Gemini spacecraft and the F-4 Phantom II jet fighter. Trophy was presented annually by Look and National Aeronautic Assn. "for the greatest achievement in aeronautics or astronautics in America, with respect to improving the performance, efficiency, or safety of air or space vehicles." (NAA News; AP, NYT, 5/25/67, 81)
- . The creation of a European Institute of Science and Technology to help narrow the technological gap between U.S. and Western Europe was proposed at a Deauville, France, conference of 70 U.S. and European businessmen, scientists, academicians, and public officials. Institute, which would be supported initially by private funds, would offer one-year postgraduate course. Faculty and student body would be international. Conference concluded that such an Institute would be "a considerable stimulant for the various European educational systems and a rich source of trained engineers." Meeting was sponsored by North Atlantic Assembly's Science and Technology Committee and Univ. of Pennsylvania's Foreign Policy Research Institute. (Mooney, NYT, 5/30/67, 25)

May 25: U.S.S.R. successfully launched Molniya IE comsat into orbit to relay television signals from the Soviet Far East to Moscow and on to Paris. Orbital parameters: apogee, 31,658 km (19,672 mi); perigee, 459 km (285 mi); period, 11 hr 55 min; and inclination, 64.8°. Tass said primary goal of the Molniya I series of comsats was "further checking and experimental exploration of a system of long-distance two-way television, telephone, and radio communications." Molniya IE comsat was believed to be replacement for Molniya IB comsat which had decayed prematurely March 17. (UPI, NYT, 5/26/67, 3)

May 25: Report by NRC Space Science Board on the concept of orbiting large reflecting mirrors concluded that there was no overwhelming evidence that scientific damage would result from the deployment of a single reflector system. It recommended, however, that such a satellite not be considered in the future unless the ability to destroy it by ground signals were an inherent part of the design and unless detailed studies of its effects on ecology, biology, and astronomy were previously conducted and made public. It said it could see no scientific merit for such a satellite system commensurate with its cost to the public and its nuisance to science. Report was prepared by Board's Committee on Potential Contamination and Interference from Satellites as a result of NASA's 1966 announcement that it had asked five aerospace companies to study feasibility of orbiting large reflecting mirrors that could illuminate land masses at night. Dr. Donald F. Hornig, Special Assistant to the President for Science and Technology, confirmed in a letter to NAS President Dr. Frederick Seitz that the Government no longer had plans for such a project. (NAS-NRC-NAE News Report, 5/67, 2)

- . Washington Evening Star columnist William Hines criticized Rep. Joseph E. Karth's (D-Minn.) May 17 speech before the National Space Club: "Karth's message--received appreciatively by an overwhelmingly space-oriented audience--was that the news media have been unduly critical of NASA in the wake of the Apollo tragedy. He felt, and made his feelings plainly known, that the press should spend more time accentuating the positive about the space program....

"If Karth had restricted his remarks to pointing out that neither NASA nor any other agency is all bad, and that the good should be told along with the evil, the newsmen in his audience would have no quarrel with his thesis. But Karth seemed to be seeking a contrived overbalancing in favor of good--even when there is not very much good to talk about." (Hines, W Star, 5/25/67, A18)

- . JPL announced that 24-hr efforts--begun May 23--to reactivate NASA's Surveyor III spacecraft on the moon after two-week lunar night were continuing. Officials said they were not concerned about spacecraft's temporary failure to respond, noting that it had taken seven days to reestablish contact with Surveyor I. (UPI, NYT, 5/27/67, 2)

May 26-31: 27th Paris International Air and Space Show at Le Bourget Airport was opened by French President Charles DeGaulle, who toured the French, British, U.S., and U.S.S.R. exhibits. More than 450 aerospace companies representing 16 countries participated in the show. Exhibits in U.S. pavilion traced the progress of aviation

May 26-31 (continued)

during the 40 yrs since May 20-21, 1927, when Charles A. Lindbergh flew from New York to Paris, becoming the first man to fly the Atlantic non-stop alone. Included were: (1) a replica of Lindbergh's aircraft, "The Spirit of St. Louis"; (2) Douglas Aircraft Co.'s DC-8 Super 63, world's largest commercial jet aircraft; (3) SV-5J, first manned jet lifting body vehicle; (4) USAF F-111A swing-wing jet fighter; and (5) models of NASA's Lunar Orbiter, Gemini, and Apollo spacecraft. Soviet exhibit featured first public display of Vostok booster, similar to the one used to launch Cosmonaut Yuri Gagarin on world's first manned space flight April 12, 1961.

On May 29, Cosmonaut Pavel Belyayev entered the Apollo spacecraft during a visit to the U.S. pavilion and discussed the instruments, levers, and buttons inside the spacecraft with Astronaut David Scott. Belyayev was first Soviet cosmonaut ever to have entered a U.S. spacecraft.

On May 31, it was announced that two USAF rescue and recovery helicopters had left New York enroute to Paris, attempting to achieve the first nonstop helicopter crossing of the Atlantic. Helicopters would refuel in flight about eight times during flight, which was expected to take 28-32 hrs. USAF said purpose of the crossing was to demonstrate "the long-range capability of the HH-3E [helicopter] for employment in long range recovery of personnel who may be forced down at sea a great distance from land." Helicopters landed safely at Le Bourget Airport June 1. (Long, NYT, 5/21/67, 88; UPI, NYT, 5/27/67, 50M; W Post, 5/27/67, D20; W Post, 5/30/67, A1)

May 27: Venus is devoid of water and, therefore, of life, Dr. Gerard P. Kuiper, Univ. of Arizona Lunar and Planetary Laboratory, told New York Times reporter Richard D. Lyons in a telephone interview. "We now know that Venus is a dead planet. The astronomical literature is full of references to water clouds and ice crystals. These two things are definitely wrong. The complete absence of water means that the chemistry of Venus is totally different from the chemistry here." Practical absence of water in the Venus atmosphere provided new information on the constitution of the planet, Dr. Kuiper said: "It is probable now that the Venus clouds are dust and that a substantial fraction of the high surface temperature must be attributed to internal heat reaching the planet's surface through a thin solid crust." Dr. Kuiper's conclusions were based on astronomical observations made May 13 from a specially-fitted NASA-owned Convair 990 jet aircraft which flew at 37,000-ft altitude over Canada. His theory conflicted with one set forth in 1966 by Johns Hopkins Univ. astrophysicists Drs. William Plummer and John Strong that surface temperatures of Venus were low enough to support life in certain areas. (Lyons, NYT, 5/28/67, 21)

May 27: The frontier of space is limited only by man's "ability to maintain individual freedom and yet join many minds in concerted action," NASA Administrator James E. Webb said at the Celebration of The Prelude to Independence in Williamsburg, Va. "It is the essential requirement for each of us to do what we can as individuals and as groups to make our system of representative government work, and then work better. More and more this means that each of us must find a way to reach through complexity and organized prejudice to trusted sources of information and organized facts. We must not do less than to make sure we understand the fundamentals in the many important disciplines of human activity. Without this understanding of at least the fundamentals...today's citizen cannot play the role only he can play in representative society, cannot bridge the gap from the old to the new, from one discipline to another. Without this capability, a citizen today cannot be a fully effective participant in a free society. Indeed, without this basic understanding on a large scale at all levels our nation is likely to forfeit the capability of collectively responsible action, and with it, the basis for an effective free society...." (Text)

- . NASA Administrator James E. Webb had been encountering a "storm of criticism" since the Jan. 27 Apollo accident, but "odds are he'll see his job through," Business Week concluded in an article summarizing Webb's career. It noted some of Webb's accomplishments as NASA Administrator: "...Webb has steered steadily growing budgets--from \$1-billion in 1961 to this year's \$5-billion--among the Congressional reefs. He runs a NASA organization of nearly 35,000 people in 16 facilities that stretch from Boston to Cape Kennedy, from Houston to the West Coast--and a worldwide network of tracking stations. At the same time, he has had to deal directly or indirectly with nearly 21,000 contracting companies, which employ about 400,000 people...." Article concluded that Webb had been "bruised, not beaten" by the controversy surrounding the Apollo accident. "...odds-makers in Washington are betting that when the smoke clears Webb will emerge still at the helm of NASA. Further, they think NASA still may meet its deadline of a moon landing before 1970." (B Wk, 5/27/67, 71-7)

May 28: Dept. of Agriculture scientists, in April testimony released by House Committee on Appropriations' Subcommittee on Dept. of Agriculture, predicted that the application of remote sensing techniques developed in conjunction with U.S. space program, could revolutionize agriculture. They requested \$340,000 for FY 1968 to adapt equipment to agricultural requirements. Equipment, currently flown in aircraft, was used to identify accurately within minutes, soil conditions and moisture, crop

May 28 (continued)

yield, and incidence and severity of diseases. Dr. G. W. Irving, Jr., Agriculture Administrator of Agricultural Research Service, predicted: "Once we are in operation from satellite-type spacecraft, the possibilities for securing vast amounts of useful information within extremely short time periods are almost limitless." (AP, B Sun, 5/29/67)

- . Some of the developments in the U.S. space program which had benefited the field of medicine were cited by John G. Rogers in Parade magazine. "A TV camera so tiny it can be dropped down your throat to study your ulcers...an ultra-sensitive device to detect the now undetectable first faint muscle quivers of dread Parkinson's disease...a heart examination table that escapes all foreign vibrations by suspending the patient on a sheet of air...a versatile electronic system that can keep close watch on 128 intensive-care patients at one time and 'shout' an alarm if one needs instant attention." Rogers also noted 'magic glasses' which enabled paralysis victims, by moving their eyeballs, to regulate electronically many activities necessary to daily life. (Rogers, Parade, 5/28/67, 14-5)

May 29: Esro II, first satellite designed, developed, and constructed by ESRO under July 8, 1964, NASA-ESRO agreement, was launched from WTR by four-stage Scout booster but did not achieve planned polar orbit. NASA officials were studying telemetry in an attempt to determine cause of Scout's failure.

Primary NASA mission objectives were to place Esro II in planned orbit and to provide tracking and telemetry support. 153-lb satellite carried seven experiments for solar astronomy and cosmic ray studies representing six different organizations from U.K., France, and the Netherlands. ESRO was responsible for delivery of satellite to launch site, for equipment and personnel necessary to mate spacecraft to launch vehicle, and for testing spacecraft. (NASA Proj Off; UPI, NYT, 5/31/67, 1)

- . GAO had begun "detailed examinations into certain specific areas of the Apollo program," Assistant Comptroller General Frank H. Weitzel wrote in a letter to Rep. William F. Ryan (D-N.Y.), who had inquired about GAO reviews of NASA-NAA contracts. Examinations were begun "on the basis of information developed during" a preliminary review, started in October 1966, which had covered NASA Hq., "several NASA centers," and plants of NAA and Grumman Aircraft Engineering Corp. (Hines, W Star, 6/1/67, C16)

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May 29: LaRC selected Northrop Ventura Co. to negotiate \$3-million contract to conduct research flight-test program using an all-flexible parawing. Experiments would be performed at various scales with remotely-controlled unmanned vehicles to establish a body of parawing technology which could be potentially adapted to manned spacecraft recovery systems. NASA's goal was to extend recovery capabilities for the AA Program command module (CM) to include land landings in the early 1970's. Northrop, relying on design criteria gained in earlier LaRC parawing research programs, would evaluate parawings in the 200-600-lb and 5,000-lb payload capacities, including flight tests, before designing 15,000-lb payload system required for the Apollo CM. (NASA Release 67-134)

- . Edward R. Mathews, chief of KSC Saturn systems office, was named acting Apollo Program Manager at KSC, replacing M/G John G. Shinkle (USA, Ret.), who resigned May 18. (AP, NYT, 5/30/67, 44)
- . AFSC awarded General Electric Co. \$110,020,000 cost-plus-incentive-fee contract for experiment integration work on the MOL. (DOD Release 497-67)
- . U.S.S.R. would launch test series of "carrier rockets of space objects" into the Pacific between May 30 and June 30 "to further explore outer space and accumulate experimental data," Tass announced. Aircraft and ships were warned not to enter 129-km (80-mi) -wide target area about 161 km (100 mi) from Jarvis Island, a U.S. possession, between noon and midnight local time each day. (UPI, NYT, 5/30/67, 2)
- . Dr. Peter Franken, Deputy Director of Advanced Research Projects Agency (ARPA), was appointed Acting Director of ARPA, succeeding Dr. Charles M. Herzfeld, who resigned to take an executive position with ITT. (DOD Release 493-67)
- . Paul C. Aebersold, a pioneer nuclear physicist who worked on the Manhattan Project which developed the first atomic bomb, jumped to his death from the top of an apartment building in Chevy Chase, Md. Aebersold had retired as Director of AEC's Office of Isotopes Development in 1964. (AP, NYT, 5/31/67, 18)

May 30: House Committee on Appropriations' Subcommittee on Dept. of Defense Appropriations released testimony on U.S. missile strategy by DOD officials at closed hearing March 20. Dr. Charles M. Herzfeld, who resigned as Director of Advanced Research Projects Agency (ARPA) May 26, testified that advanced missile systems based in space rather

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May 30 (continued)

than on land were being studied. He recalled that DOD had studied, until 1964, the "Bambi" system designed to use satellites to locate and destroy enemy missiles shortly after they had been launched. Work had been stopped because it was "much too costly," but "we think the time is getting ripe again to look at the whole question because the costs of putting things in orbit have gone down dramatically, the reliability of space engineering has gone up dramatically so that the overall cost of the system ought to come down significantly."

Dr. John S. Foster, Jr., Director of Defense Research and Engineering, revealed that repairs had had to be made on all Minuteman ICBMs because of missile's failure to fire in three tests during October 1966. He emphasized, however, that all missiles were operational at the time of his testimony and said overall readiness of the Minuteman and Polaris missile forces was "excellent." (Beecher, NYT, 5/31/67, 1, 28; W Star, 5/31/67, A6)

May 31: NASA completed membership of its Lunar and Planetary Missions Board and expanded its scope of activities to include: (1) assistance in the "planning and conduct of all manned and unmanned missions to explore the Moon and planets," and (2) development of "scientific objectives and general strategy for such missions including specific recommendations for mission design and scientific payloads." Board would report to NASA Administrator James E. Webb through Associate Administrator for Space Science and Applications Dr. Homer E. Newell. (NASA Release 67-133)

- . USAF launched unidentified satellite by Thor Agena booster from Vandenberg AFB. (UPI, W Post, 6/1/67, C4)
- . NASA had amended its contract with Bendix Corp. for the Apollo Lunar Surface Experiments Package (ALSEP) to add a heat flow experiment substation. \$2.4-million amendment increased total value of contract to \$23.6 million, plus incentive fees. Heat flow subsystem would measure net outward flux of heat from moon's interior, providing a comparison of radioactive content of the moon's interior and earth's mantle, a thermal history of moon, a lunar temperature-depth profile, and thermal parameters of the first three meters of moon's crust. (NASA Release 67-135)
- . Proposal that Canada immediately begin developing a Canadian-owned, multipurpose communications satellite system to be operational by 1970 was made to Transport Minister John W. Pickersgill by eight major companies of Trans-Canada Telephone System and Canadian

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May 31 (continued)

Pacific and Canadian National Telecommunications. \$80-million system would involve 54 earth stations, the purchase of three comsats, and the launching of two of them into synchronous orbit. Proposal recommended that system be fully integrated with existing networks to carry TV, telephone calls, data, and other services. (Can Press, NYT, 6/1/67)

- . Two-part report evaluating land use on and around airports and its relation to noise and hazards in the operation of aircraft was released by the FAA of Dept. of Transportation. Report, which included surveys of 70 different types of land use on and around 120 U.S. and Canadian airports, pointed out land uses which were compatible with airports and land uses which adversely affected the safety of flight operations. It also considered the problem of aircraft noise. (FAA Release 67-51)
- . A national information system for assuring the availability of every significant scientific or technical document, regardless of its origin, was "inevitable," Edward J. Brunenkant, director of AEC's Division of Technical Information, predicted at New York meeting of the Special Libraries Assn. Noting that over 1 million scientific articles were being printed annually in 35,000 journals, Brunenkant conceded that the establishment of a national system would be "extraordinarily complex," but said the need for it was "urgent." (NYT, 6/1/67, 33)
- . New York's Mayor Robert Lindsay announced plans to construct a \$10-million Hall of Science in Queens during the next 14 mos. Structure, which would be connected to science building used during 1964-65 World's Fair, would constitute the second stage of a center for science study and general education. "The Hall of Science when completed...will be not only one of the great science museums of the nation and the world, but also a major center for science research and training," the Mayor said. One feature of the new building would be a \$1.5-million nuclear reactor donated by AEC. (Knowles, NYT, 6/1/67, 33)
- . Soviet carrier Aeroflot would begin operating two flights a week from Moscow to Montreal in early June to accommodate "the big inflow of Soviet tourists to the Expo 67 exhibition," Tass announced. (NYT, 5/31/67, 66M)

During May: NASA conducted contract negotiations for KSC support services: Federal Electric Co. and RCA Service Co. were selected for competitive negotiations on a five-year, cost-plus-award-fee contract to provide

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During May (continued)

operational communications and instrument services at KSC; Catalytic Construction Co. and Dow Chemical Co. were selected to jointly provide KSC facilities support services under \$42-million, four-year, cost-plus-award-fee contract; Trans World Airlines received a \$17,006,394 contract extension for installation support services; and Bechtel Corp received a \$2,039,967 contract extension for specialized facility maintenance, repair, and minor construction services. (NASA Releases 67-106, 67-107, 67-109, 67-119)

. Editorial comment on Apollo accident hearings:

New York Times: NASA "went to great lengths...to assure the Senate Space Committee that all the expensive lessons taught by the fatal January fire will be taken into account before the next try. Yet doubts must persist because the pressurized oxygen system is retained. So is the prime contractor, North American Aviation, whose past errors and deficiencies contributed so much to the debacle. Moreover, NASA has preferred to ignore the pointed questions that have been raised about its own competence to supervise and manage this intricate endeavor." (NYT, 5/10/67, 40)

Washington Sunday Star: "Webb and his associates are not solely --perhaps not primarily--to blame for their attitude in time of crisis. In its formative years, the agency was pampered and spoiled by Congress like a favored child. The press willingly cooperated in the creation of NASA's shining image of a superagency staffed by supermen.... Inevitably, NASA became the spoiled brat of the federal establishment.

"But NASA, of course, is no different than any other federal agency. It is composed of wise and foolish men, of dedicated and self-serving public servants, of heroes and of knaves. It is doing an extraordinary--and, in our opinion, a worthwhile--task [and] deserves continued public support." (W Star, 5/14/67, C1)

New York Times: "Now that the public finally knows that North American was picked for the Apollo project by a few high officials--and not by a large group of technical experts as originally imagined--the question of why it was picked becomes even more intriguing than before. The cynics, of course, have always believed that the award went to North American as the result of a battle among influence peddlers, including Bobby Baker, former Secretary to the Senate Democrats. The cynics may be wrong, but the public cannot know without a full investigation. Congress has the obligation to force out all the facts." (NYT, 5/11/67, 44)

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During May: Editorial comment on authorization for SST prototype construction [see April 29].

Washington Post: "President Johnson made the right decision in requesting that Congress appropriate Federal funds for the development of the supersonic transport plane.... But in proposing what it calls 'a creative partnership between our Government and American industry,' the Administration should provide more adequate protection for the taxpayer who will bear a substantial share of the development costs.

"Why should not the taxpayers, who are to provide about 25 per cent of the capital required, be permitted to share proportionately in the enormous profits that would be earned by a successful SST? Although it is necessary to launch the SST project with the shortest possible delay, Congress should be concerned with a more adequate protection of the public interest." (W Post, 5/1/67)

World Journal Tribune: "Actually, the basis of the SST project is coldly commercial. At stake is not some vague blue ribbon of achievement but American leadership in the highly profitable business of supplying planes to the world's airlines.

"SST, by its size, speed and sonic boom will cause a number of problems which have not yet been solved. But it was inevitable that this country should enter the supersonic race--not for national pride or out of scientific curiosity, but as a matter of good business.

"The international plane market is too good for America to let it go by default." (WJT, 5/4/67, 22)

New York Times: "Mr. Johnson acknowledged that the building of an American SST 'carries high technical and financial risks.' Yet in his anxiety to get on with the job he has increased the potential hazards to the taxpayer....

"Congress has a responsibility to establish guidelines to keep the Administration's investment in the SST from getting out of hand. It should see to it that the Government does not write any blank checks and become overly involved in what is supposed to be a commercial venture. And industry, too, should recognize that if it asks Washington to shoulder the costs, then Washington may well end up running the entire operation. " (NYT, 5/2/67, 43)

- . American Helicopter Society, meeting in Washington, D.C., presented the Dr. Alexander Klemin Award to Avco Corp. executive Dr. Anselm Franz for "leading the development of a noteworthy series of gas turbine engines for helicopters and other VTOL aircraft...." (Av Wk, 5/29/67, 55)

PROVISIONAL INDEX-MAY

AA. See Apollo Applications.

Accident

 Apollo AS-204, 195

 investigation, 164-165, 171-172, 174-177, 184-185, 188, 200

Soyuz I, 159, 165, 168, 175, 185

Adams, Dr. Mac C., 162, 179

Advanced Research Projects Agency (ARPA), 197

Aebersold, Paul C., 197

AEC. See Atomic Energy Commission.

Aerobee 150 (sounding rocket), 172

Aeroflot, 199

Aerospace Corp., 167

AFSC. See Air Force Systems Command.

Agriculture, Dept. of, 195-196

AIAA. See American Institute of Aeronautics and Astronautics.

Air Force Academy, 179

Air Force Office of Scientific Research (AFOSR), 176

Air Force Systems Command (AFSC), 161, 190, 197

Air traffic control, 181, 187

Air Transport Assn. (ATA), 187

Aircraft, 168, 172, 176, 182, 184, 188, 189, 192, 194

Airlines, 187, 199

Airports, 162

Alexander, Holmes, 173

Alliluyeva, Mrs. Svetlana, 168

American Astronautical Society (AAS), 159

American Helicopter Society, 201

American Institute of Aeronautics and Astronautics (AIAA), 165

Ames Research Center (ARC), 168

Andover, Me., 158

AP. See Associated Press.

Apollo (program), 170-171, 177, 188, 196, 197

Apollo (spacecraft), 163, 175, 194

Apollo Applications (AA) program, 197

Apollo Lunar Surface Experiments Package (ALSEP), 198

Apollo 204 Review Board, 164, 171

Argo D-4 (Javelin) (sounding rocket), 184

Ariel III (UK-E) (scientific satellite), 166

Arizona, Univ. of, 194

ARPA. See Advanced Research Projects Agency.

Associated Press (AP), 175, 179

Astronaut, 158, 167, 169, 170, 175, 187, 194

Atlanta, Ga., 165

Atlas (booster), 190

Atlas-Agena D (booster), 163

MAY INDEX

Atomic Energy Commission (AEC), 181, 197, 199
Atwood, J. Leland, 164
Australia, 179
Avco Corp., 201
Aviation-Space Writers' Assn., 179
Aviation Week, 169
Award, 158, 161, 176, 179, 181, 191, 192, 201
Baker, Robert, 200
Ball, Robert S., Memorial Award, 181
"Bambi" (antimissile system), 198
Bechtel Corp., 200
Bell Aerosystems Co., 172
Bell Telephone Laboratories, 167
Belyayev, Col. Pavel (U.S.S.R.), 194
Bendix Corp., 198
Benedict, Howard, 181
Bergen, William B., 161
Berry, Dr. Charles A., 161
Bigler, Stewart, 162
Boeing Co., 158, 162, 170, 185
Boeing 707 (jet aircraft), 168
Borman, L/C Frank (USAF), 187
Boynton, Melbourne, Award, 161
Brewster Flat, Wash., 158
Brunenkant, Edward J., 199
Bryson, Reid A., 169
Business Week, 195
California Institute of Technology (Cal Tech), 189
Canada, 194, 198-199
Canadian National Telecommunications, 199
Canadian Pacific, 198-199
Canopus (star), 163
Catalytic Construction Co., 200
Celebration of the Prelude to Independence, 195
Cernan, LCdr. Eugene M. (USN), 170
Charyk, Joseph V., 172
Collier, Robert J., Trophy, 192
Commerce, Dept. of, 168, 189
Communications satellite, 158, 169, 172-173, 198-199
Communications Satellite Corp. (ComSatCorp), 158
Computer, 179
Concorde (U.K.-France) supersonic transport, 180
Congress, 176, 183, 201
Congress, House, 165
 Committee on Appropriations

MAY INDEX

Congress, House (continued)
 Subcommittee on Dept. of Agriculture, 195-196
 Subcommittee on Dept. of Defense, 197
Committee on Armed Services
 Subcommittee on Appropriations, 166
Committee on Science and Astronautics, 183
 Subcommittee on Manned Space Flight, 177
 Subcommittee on NASA Oversight, 174
 Subcommittee on Space Science and Applications, 184
Congress, Senate, 183, 186
 Committee on Aeronautical and Space Sciences, 164-165, 170-172,
 176-177
 Committee on Foreign Relations
 Subcommittee on Disarmament, 173
Conrad, LCdr. Charles E., Jr. (USN), 161
Convair 990 (jet aircraft), 194
Cornell Univ., 177
Cosmonaut, 159, 165, 168, 169, 175, 185, 187, 194
Cosmos, Minn., 189
Cosmos CLVII (U.S.S.R. satellite), 178
Cosmos CLVIII, 181
Cosmos CLIX, 184
Cosmos CLX, 184
Cosmos CLXI, 188
Coughlin, William, 188
Cryogenics, 168
Cunningham, R. Walter, 170
Dallas, Tex., 159
Dana, William H., 184
Daunt, Dr. John G., 168
Davis, Dr. Jesse H., 168
DC-8 Super 63 (jet airliner), 194
Deauville, France, 192
Debus, Dr. Kurt H., 160, 185
Defense, Dept. of (DOD), 158, 166, 176
DeGaulle, President Charles (France), 193
Denver, Colo., 179
Direct Lift Control (DLC), 168
Distinguished Service Medal, 191
Dobrov, Dr. G. M., 179
Doolittle, Gen. James H. (USAF, Ret.), 179
Douglas Aircraft Co., 175, 187, 194
Douglas, Col. William K. (USAF), 161
Dow Chemical Co., 200
Downey, Calif., 175

MAY INDEX

Dryden, Dr. Hugh L., 176
Early Bird I (communications satellite), 158
Earth, 169
Eastern Test Range (ETR), 163
Edwards AFB, Calif., 168, 184
Ehrlich, Eugene, 159-160
Eisele, Donn F., 170
Electronics Industries Assn., 162
Electronics Research Center (ERC), 182
Environmental Science Services Administration (ESSA), 168
Erb, R. Bryan, 158
ERC. See Electronics Research Center.
ESRO. See European Space Research Organization.
Esro I (ESRO satellite), 187
Esro II, 186-187
ESSA. See Environmental Science Services Administration.
Essa V (meteorological satellite), 168
ETR. See Eastern Test Range.
European Institute of Science and Technology (proposed), 192
European Space Research Organization (ESRO), 196
Evans, A. J., 163
Ewing, Cortez A. M., Foundation, 166
Ewing, Cortez A. M., Lecture, 166
Explorer XXVIII (satellite), 191
Explorer XXXIII (IMP-D), 191
Explorer XXXIV (IMP-F), 191
Explosion, nuclear, 162
Expo '67, 185, 199
Extraterrestrial life, 194
Extravehicular activity (Eva), 167
F-4 (Phantom II) (fighter aircraft), 192
F-111 (supersonic fighter), 176
F-111A, 176, 189, 194
F-111B, 176, 188
F-111C, 176
F-111K, 176
FAA. See Federal Aviation Administration.
Faget, Maxime A., 161
Fargo, N. D., 178
FCC. See Federal Communications Commission.
Federal Aviation Administration (FAA), 158, 183
Federal Communications Commission (FCC), 173
Federal Electric Co., 199
Field Enterprises Educational Corp., 158
Foster, Dr. John S., Jr., 173, 180, 198

MAY INDEX

France, 178, 180, 188, 193, 196
Franken, Dr. Peter, 197
Frutkin, Arnold W., 160, 186-187
Gabriel, David S., 181
Gagarin, Col. Yuri A. (U.S.S.R.), 185, 194
GAO. See Government Accounting Office.
Garbarini, Robert F., 185
Gemini (spacecraft), 192, 194
General Dynamics Corp., 176
General Electric Co., 158, 163, 197
Georgia Institute of Technology, 177
Gilruth, Dr. Robert R., 161, 176
Goddard Space Flight Center (GSFC), 167
Gordon, LCdr. Richard F., Jr. (USN), 161
Government Accounting Office (GAO), 196
Grant, 177
Green Bank, W. Va., 182
Grumman Aircraft Engineering Corp., 196
Hage, George H., 185
Hall of Fame for Great Americans (New York Univ.), 168
Hall of Science (proposed), 199
Harper, Charles W., 163
Head, Dr. Richard, 182
Heeschen, Dr. David, 182
Helicopter, 194
Hello, Bastian, 161
Herzfeld, Dr. Charles M., 197
HH-3E (helicopter), 194
Hines, William, 193
Hoboken, N. J., 168
Hollomon, Dr. J. Herbert, 189
Honest John-Nike (rocket), 172
Hornig, Dr. Donald F., 193
Howard, Bailey K., 158
Hughes Aircraft Co., 191
Humphrey, Vice President Hubert H., 178, 189
Humphreys, M/G James W. (USAF), 191
Hynek, Dr. J. Allen, 177-178
India, 167
Information retrieval, 199
Institute for Defense Analyses (IDA), 180, 183
Intelsat II Pacific (communications satellite), 158, 172-173
International cooperation, 178
International cooperation, space, 160, 166, 183, 186, 196
International Telephone and Telegraph Corp. (ITT), 197

MAY INDEX

Irving, Dr. G. W., Jr., 196
ITT. See International Telephone and Telegraph Corp.
Jakimiuk, W. J., 180
Japan, 158
Jarvis Island, 197
Jet Propulsion Laboratory (JPL), 164, 185-186, 189, 193
Johns Hopkins Univ., 194
Johnson, Premier Daniel (Quebec), 188
Johnson, President Lyndon B., 158, 159, 165, 176, 183, 191, 192
JPL. See Jet Propulsion Laboratory.
Kamanin, L/G Nikolay (U.S.S.R.), 173
Kansas, Univ. of, 177
Karth, Rep. Joseph E., 160, 184, 193
Kennedy Space Center (KSC) (NASA), 160, 163, 170, 175, 185, 197, 199-200
Khrushchev, Premier Nikita (U.S.S.R.), 165
Kiev Academy of Science, 179
Kirby, Robert H., Jr., 158
Klemin, Dr. Alexander, Award, 201
Knight, Maj. William J. (USAF), 168
Komarov, Col. Vladimir M. (U.S.S.R.), 159, 165, 168, 175, 185, 187
Komsomolskaya Pravda, 185
Kuiper, Dr. Gerard P., 194
Lagoe, Ronnie J., 191-192
Langley Research Center (LaRC) (NASA), 158, 164, 185-186, 197
Las Vegas, Nev., 179
Le Bourget Airfield, France, 189
Library of Congress, 165
Lifting body vehicle, 190
Lindbergh, Charles A., 194
Lindsay, Mayor Robert, 199
London, U.K., 179
Look, 192
Loring AFB, Me., 189
Lovelace, W. Randolph, II, Award, 161
Lunar Orbiter II (Lunar Orbiter B), 162
Lunar Orbiter IV (Lunar Orbiter D), 163, 169-170
Lyons, Richard D., 194
M2-F2 (lifting body vehicle), 174
McDonnell Aircraft Corp., 187
McDonnell Aircraft Astronautics Co., 185
McDonnell Douglas Corp., 190
McDonnell, James S., 192
McGraw-Hill, Inc., 177
McNamara, Secretary of Defense Robert S., 166
Management, 190

MAY INDEX

Manhattan Project, 197
Manned Orbiting Laboratory (MOL), 166, 168, 181, 187, 197
Manned space flight, 178
Manned Spacecraft Center (MSC) (NASA), 158, 161, 167
Marshall Space Flight Center (MSFC), 158
Martin Co., 171, 183
Martin Marietta Corp., 185
Massachusetts Institute of Technology (MIT), 158
Mathews, Edward R., 197
Matthias, Dr. Bernd T., 167
Maxwell, B/G Jewell C. (USAF, Ret.), 158, 180
May Day Parade (U.S.S.R.), 158
"Meet the Press" (TV program), 187
Meteorological satellite, 181
Meyer, Karl E., 178
Michigan, 185
Minuteman (ICBM), 198
Missile, 178, 198
MIT. See Massachusetts Institute of Technology.
MIT Club, 177
Molniya (communications satellite), 169
Molniya IB, 192
Molniya IE, 192
Molniya II, 169
Mondale, Sen. Walter F., 172
Montreal, 185, 199
Montsanto Aviation Safety Award, 181
Moon
 landing
 manned, 173, 187
 photographs, 159, 162, 166-167, 169-170
 probe, 163-164, 169-170, 184
 surface, 159
Moore, Dr. Henry J., 170
Moritz, Bernard, 185
Moscow, U.S.S.R., 158, 199
MSC. See Manned Spacecraft Center.
MSFC. See Marshall Space Flight Center.
Mt. Palomar (Calif.) Observatory, 179
Mueller, Dr. George E., 170, 174
Mururoa Atoll, 178
NASA Headquarters
 Office of Manned Space Flight (OMSF), 160, 171
 Office of Space Science and Applications (OSSA), 159
National Academy of Science (NAS), 176

MAY INDEX

National Aeronautic Assn., 192
National Aeronautics and Space Administration (NASA)
 accomplishments, 176
 . Apollo AS-204 accident investigation, 164-165, 171-172, 174-177,
 184-185, 188, 200
 Apollo 204 Review Board, 164, 171
 awards and honors, 158, 161, 167
 budget, 171, 177, 183
 contract, 175, 185-186, 198, 199-200
 cooperation, 166, 183, 186-187
 criticism, 165, 172, 182-183, 195
 grant, 177
 launch
 probe, 163-164
 satellite, 191, 196
 sounding rocket, 172, 184
 Lunar and Planetary Missions Board, 198
 Lunar Orbiter Incentive Evaluation Board, 162
 management, 190
 personnel, 163, 181, 185, 197
 program
 aeronautics, 179
 Apollo, 170-171, 175, 177, 184, 188, 196, 197
 Apollo Applications (AA), 197
 electronics, 162-163
 Voyager, 172, 185-186
 test, 172
National Aeronautics and Space Council (NASC), 186
National Aerospace Services Assn., 161
National Broadcasting Company (NBC), 187
National Observer, 169
National Research Council (NRC) Space Science Board, 193
National security, 186
National Space Club, 184, 193
National Storms Laboratory, 162
Naval Air Test Center, 172
Naval Research Laboratory, 172
Navigation satellite, 159-160
Netherlands, 196
New York, N.Y., 199
New York Times, 163, 183-184, 194, 200, 201
New York Univ., 168
Newsweek, 168
Niagara Falls International Airport, 172
Nimbus II (meteorological satellite), 181

MAY INDEX

Noise, 179, 199
Norman, Okla., 162
North American Aviation, Inc. (NAA), 161, 171, 174, 183, 200
 Rocketdyne Div., 161
North Atlantic Assembly, 192
North Dakota State Univ., 178
Northrop Ventura Co., 197
Northwestern Univ., 177
Nuclear test ban treaty, 158
Nuclear weapons, 173
Oakland International Airport, 168
Oceanography, 190
Oklahoma Center for Continuing Education, 166
Oklahoma, Univ. of, 189
Oso III (Orbiting Solar Observatory), 181
Pacific Ocean, 178, 197
Page, Dr. Robert M., 161
Parachute, 172
Parade, 196
Parawing, 197
Paris International Air and Space Show, 182, 189, 193-194
Patuxent, Md., 172
Pay, Rex, 181
Pennsylvania, Univ. of, 190
Perrine, Calvin H., Jr., 158
Peterson, Bruce A., 174
Philadelphia Evening Bulletin, 173
Phillips Report, 164, 171, 174
Phoenix (missile), 188
Pickersgill, John W., 198
Pittsburgh, Univ. of, 177
Plummer, Dr. William, 194
Poland, 187
Polaris (missile), 178, 198
Poseidon (missile), 178
Press conference, 175, 187-189
Pritchard, Wilbur L., 167
Puckett, Dr. Allen E., 191
Purdue Univ., 177
Quasar, 182
Quebec, 188
Radar, 179
Radioastronomy, 179
RCA Service Co., 199
Record, 161

MAY INDEX

Redstone Arsenal, Ala., 189
Research and development (R&D), 177
Rocket Research Corp., 167
Rogers, John G., 196
Romney, Gov. George, 185
Ruud, Ralph H., 161
Ryan, Rep. William F., 165, 174, 196
Satellite, unidentified, 188, 198
Saturn I, Uprated (Saturn IB) (booster), 171, 189
Saturn V (booster), 163, 171, 191
Saudi Arabia, 167
Schenectady, N.Y., 186
Schirra, Capt. Walter M., Jr. (USN), 170, 175, 187
Schriever, Gen. Bernard A. (USAF, Ret.), 180
Schwinghamer, Robert J., 158
Science, 167
Science Service, 190
Scientists, 179
Scott, L/C David R. (USAF), 194
Scott, Dr. Ronald F., 189
Scott, William E., 158
Scout (booster), 166, 167, 196
Scoville, Col. Curtis L. (USAF), 190
Seal Beach, Calif., 191
Seamans, Dr. Robert C., Jr., 170, 174, 176
Seitz, Dr. Frederick, 193
Sheldon, Dr. Charles S., 165
Shinkle, M/G John G. (USA, Ret.), 185, 197
Shoemaker, Dr. Eugene, 189
Small Astronomy Satellite-A (SAS-A), 167
Smart, Gen. Jacob E. (USAF, Ret.), 161
Smith, Sen. Margaret C., 171
Smithsonian Institution, 192
Snelling, William, 161
Sonic boom, 180, 201
Sounding rocket, 172, 184
Soviet Institute of Oceanology, 190
Soyuz I (U.S.S.R. spacecraft), 159, 173, 185, 187
Space law treaty, 159, 186
Space program, national, 160, 176, 180, 184, 186
Space race, 173-174
Space results, 159, 176, 195-196
Space transportation, 160
Spartan (missile), 173
Special Libraries Assn., 199

MAY INDEX

"Spirit of St. Louis," 194
Stafford, Maj. Thomas P. (USAF), 170, 175, 187
Stalin, Joseph, 168
Stanford Univ., 177
Stevens, Edmund, 159
Stevens Institute of Technology, 168
Storms, Harrison A., Jr., 161
Strong, Dr. John, 194
Sud Aviation, 180
Supersonic transport (SST), 158, 183-184, 201
Surveyor I (lunar probe), 193
Surveyor III (lunar probe), 159, 189-190, 193
Surveyor-R (spacecraft model), 191
SV-5D (lifting body vehicle), 190
SV-5J (lifting body vehicle), 194
Syracuse Univ. Research Corp., 184
Tass, 182, 197
Technology, 180
Technology gap, 192
Technology Week, 181, 182, 188
Telescope, 179, 182
Television, 158
Teller, Dr. Edward, 162
Thomas, David D., 181
Thor-Agena (booster), 198
Thrust-Augmented Improved Delta (booster), 191
Titan III-C (booster), 158
Tokyo, Japan, 158
Trans-Canada Telephone System, 198
Trans World Airlines, 200
Transportation, Dept. of, 199
Trimble, George S., 160
Tu-154 (U.S.S.R. airliner), 182
UK. See United Kingdom.
Unidentified flying objects (Ufo), 177-178
Union College, 186
United Kingdom (U.K.), 186, 193, 196
 aircraft, 180
 launch, 166
 missile program, 178
United Press International (UPI), 169, 170
U.S. Air Force (USAF)
 aircraft, 176, 189, 190
 award, 161, 179
 contract, 187, 197

MAY INDEX

U.S. Air Force (USAF) (continued)
 launch, 188, 198
 Mol, 166, 168, 181, 187, 197
U.S. Army Missile Command (AMC), 189
U.S. Geological Survey, 170, 189
U.S. Navy (USN), 172, 176, 179
U.S.S.R. (Union of Soviet Socialist Republics), 165, 190, 199
 aircraft, 182
 launch
 Cosmos, 178, 181, 184, 188
 Molniya IE, 192
 May Day Parade, 158
 rocket test, 197
 scientists, 179
 Soyuz I accident, 159, 165, 168, 175, 185
 space law treaty, 159, 186
 space program, 169, 173-174, 185
U.S. Weather Bureau, 162
Vandenberg AFB, Calif., 188, 198
Vela (nuclear detection satellite), 158, 178
Venus (planet), 194
Vogt, Paul R., 161
Von Braun, Dr. Wernher, 159
Von Diringshofen, Dr. Heinz, 167
Voyager (program), 172, 185-186
V/Stol aircraft, 172
Vtol aircraft, 201
Waldron, Martin, 162
Walker, Brian M., 187
Wallops Station (NASA), 184
Warsaw, Poland, 187
Washington, D.C., 172, 177
Washington, D.C., National Airport, 162
Washington Evening Star, 159, 182, 186, 188, 193
Washington Post, 162, 201
Washington Sunday Star, 200
Webb, James E., 164, 174, 190, 195, 200
Weightlessness, 167
Weitzel, Frank H., 196
Welsh, Dr. Edward C., 186, 189
Western High School Alumni Assn., Washington, D.C., 167
Western Test Range (WTR), 166, 168
White, L/C Edward H. II (USAF), 167
White, George C., Jr., 163
White House, 191

MAY INDEX

White Sands Missile Range (WSMR), 172
Wilford, John, 163
Williamsburg, Va., 195
Wilson, Prime Minister Harold (U.K.), 178
Wilson, Richard, 182
Wisconsin, Univ. of, 169
World Journal Tribune, 201
Wright, Orville, 168
Wright, Wilbur, 168
WSMR. See White Sands Missile Range.
WTR. See Western Test Range.
X-15 (rocket research aircraft), 168, 184
X-22A (V/Stol aircraft), 172
X ray, 173
Yak-40 (U.S.S.R. airliner), 182
Young, Cdr. John W. (USN), 170
Young, Sen. Stephen M., 183
Zemlya i Vselennaya, 173