

COMMENT DRAFT

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

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

FEBRUARY 1967

A CHRONOLOGY ON SCIENCE, TECHNOLOGY, AND POLICY

(HHR-23)

Text Drafted by Science and Technology Division
Library of Congress

NASA Historical Staff (EH)
Office of Policy Analysis
National Aeronautics and Space Administration
Washington, D.C. 20546

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F E B R U A R Y 1 9 6 7

February 1: NASA Administrator James E. Webb told Washington, D.C., women's club that Deputy Administrator Dr. Robert C. Seamans, Jr., would fly to KSC Feb. 2 to meet with Apollo 20⁴ Review Board investigating Jan. 27 accident which killed three Apollo astronauts. Dr. Seamans would report Board's preliminary findings to Sen. Clinton P. Anderson (D-N.Mex.), Chairman of Senate Aeronautical and Space Sciences Committee, and Rep. George P. Miller (D-Calif.), Chairman of House Committee on Science and Astronautics. Webb said NASA's decision to use 100% oxygen atmosphere in spacecraft had been made after "a long series of tests and evaluations. Any change would be made only after a most careful examination of all alternatives." (Sehlstedt, Jr., Balt. Sun, 2/2/67; Wash. Post, 2/2/67)

- . Announcement of major breakthrough in Soviet space program--probably an orbiting manned space platform--was imminent according to unidentified U.S. scientist recently returned from two weeks in U.S.S.R., Marquis Childs reported in Washington Post. "The likelihood of a dramatic new Soviet achievement takes on particular weight in view of the tragedy to the three American astronauts at Cape Kennedy. It will dramatize the degree to which the Soviets are ahead in heavy boosters essential to carry out a landing on the moon. Repeated denials from both sides that this is not a race to the moon are all very well. The fact remains that the first power to land men on that silver orb will gain enormous prestige." (Childs, Wash. Post, 2/1/67)
- . MSC Director Dr. Robert R. Gilruth, in welcoming address at MSC's two-day Gemini Summary Conference, urged space scientists to avoid "second-guessing" Apollo 20⁴ Review Board because undue speculation on the Jan. 27 accident was a disservice both to the Nation and the Board. (MSC Roundup, 2/3/67, 8; Wash. Post, 2/2/67, A2)
- . FAA announced that contracts for development of Sst would be extended on month-to-month basis with funds already available, "pending negotiations ...with the manufacturers and the airlines for airline financial participation in the Phase III (Prototype Construction) program." Evert Clark commented in the New York Times: "The move to have the airlines share the cost is intended to lessen budgetary pressures on the Administration, make the program more appealing to Congress and have the airlines, the ultimate beneficiaries of the project, show good faith by joining in the risk to a greater degree...." (Text; Clark, NYT, 2/2/67, 1)
- . Transportation men were still the great "risk-takers of our society," Secretary of Transportation Alan S. Boyd told Transportation Assn. of America meeting in Chicago. "Most of the entrepreneurs associated with America's great moments in transportation seem to have lost their shirt.
 "The builder of the greatest clipper ship went broke.
 "The builder of the greatest steamboat of the nineteenth century

February 1 (continued)

went broke.

"The builder of the first monorail went broke.

"Most of the early railroads went broke.

"Most of the early canals went broke.

"For that matter, the builder of the first Ford automobile went broke, at least on the first try.

"...our society must try to hold open financial rewards which are commensurate with such risks. Especially when you realize how brief...the life of many important transportation innovations has been...." (Text)

- . Entire universe might be immersed in a sea of tiny particles known as neutrinos whose presence had thus far eluded observation, Dr. William A. Fowler of Cal Tech told American Physical Society meeting in New York. His theory sought to explain absence of helium in the spectra of certain older stars within the framework of the "big bang" theory of the universe. If the exploding fireball from which the universe was formed had been packed with neutrinos, these particles would have interacted with neutrons to produce a cloud of protons and electrons, Dr. Fowler said. Latter would then have combined to form hydrogen atoms which would have stringently limited amount of helium formed. "Neutrino astronomy is just getting started," he said, "but it might ultimately verify or deny presence of the hypothetical neutrino sea." (Sullivan, NYT, 2/2/67, 25)
- . \$5.050-billion NASA authorization bill (H.R. 4450) was introduced to House by Rep. George P. Miller (D-Calif.) and referred to the Committee on Science and Astronautics. Bill was superseded March 2, by \$5.100-billion authorization bill (H.R. 6470). (NASA LAR VI/15; Committee Off.)
- . USAF's \$3.3-million solar vacuum telescope, designed to predict more accurately solar proton showers which endanger astronauts and spacecraft, was meeting its timetable for construction at Sacramento Peak Observatory near Sunspot, N. Mex., Office of Aerospace Research announced. Telescope --of which 193 ft. would be underground and 135 ft. above ground--would be largest solar vacuum telescope in the world when completed in 1968. In addition to predicting "safe periods" for space flight, it would study solar phenomena and solar-terrestrial relationships. (OAR Release)
- . Organizational changes became effective at AFSC Hq.: (1) creation of new Deputy Chief of Staff (DCS) for Operations; (2) reassignment of functions and responsibilities of the Office of the Deputy Commander for Space to other appropriate staff agencies; (3) redesignation of DCS for Foreign Technology to DCS for Intelligence and DCS/Plans to DCS Development Plans; (4) establishment of Office of the Headquarters Commandant as a special staff office; and (5) reassignment of GAO activities function to Deputy Chief of Staff, Procurement and Production. (AFSC Release 28.67)

February 2: USAF launched an unidentified satellite from Vandenberg AFB using an Atlas-Agena D booster. (Tech. Wk., 2/13/67, 10)

- . Aerospace industry had the knowledge to build quieter aircraft and "it is time to apply it," M. Carl Haddon, Lockheed Aircraft Corp. executive, said at AIAA meeting in Washington, D.C. "...we have reached a turning point beyond which we as designers and managers must see to it that no plane is designed and built that is not significantly quieter than existing aircraft." Haddon predicted that failure by aerospace industry to produce quieter aircraft could result in legislation that would curfew air traffic. (Wash. Eve. Star, 2/3/67, C6)

February 3: Astronauts Virgil I. Grissom, Edward H. White II, and Roger B. Chaffee had died of "asphyxiation due to smoke inhalation" but cause of Jan. 27 flash fire was still unknown, NASA Deputy Administrator Dr. Robert C. Seamans, Jr., reported in memorandum to NASA Administrator James E. Webb. Dr. Seamans had met Feb. 2 with Apollo 204 Review Board at KSC. "...clear identification of the source of ignition or of its possible source will depend upon detailed step-by-step examination of the entire spacecraft and its relative test support equipment." Dr. Seamans said duplicate Apollo spacecraft had been flown to KSC from North American Aviation, Inc.'s Downey, Calif., plant to permit a "parallel step-by-step disassembly process." In addition, Board was "defining a series of investigative tasks...and assigning these to teams for execution...." Report confirmed that spacecraft had been operating on external power when fire occurred, but there was no evidence "up to this time that the source of power whether simulated internal or external was related to the accident." Dr. Seamans emphasized that his statement was preliminary.

NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller announced that NASA would proceed with launching of three unmanned Apollo flights scheduled for 1967: AS-206, AS-501, and AS-502. Manned Apollo missions were postponed indefinitely pending the outcome of Apollo 204 Review Board's investigation. (NASA Releases 67-21, 67-22)

- . 60-day Sealab III experiment would be conducted 430 ft. below the Pacific off San Clemente Island in winter 1967 as part of USN's "Man-in-the-Sea" program. Underwater laboratory would be staffed by five eight-man diving teams rotating on 12-day shifts. Aquanauts would conduct experimental salvage techniques and oceanographic and marine biology research; and undergo series of physiological and human performance tests. Sealab III's long-range goal was to develop capability for rescue and salvage operations under ocean's surface and to determine how submerged continental shelf could be used militarily. In Sealab I experiment, conducted July 20-30, 1964, four divers were submerged 192 ft. beneath the Atlantic; in Sealab II, Aug. 28-Oct. 10, 1965, three teams of 10 divers alternated in spending two-week periods 205 ft. beneath the Pacific off La Jolla, Calif. (DOD Release 72-67)

February 3: MSFC awarded Boeing Co. a \$120-million contract modification for five Saturn V 1st stages. Modification increased total contract value to \$977 million for fabrication and assembly of 15 stages. (NASA Release 67-20)

- . ~~2%-6%~~ weight loss in astronauts returning from space flights might reflect natural readjustment of body water content, not simple dehydration, Paul Webb of Webb Associates reported in Science. He based his theory on similar losses which had occurred during experiments in simulated weightlessness; blood normally pooled in the extremities returned to circulation, increasing central blood volume and causing excretion of water not replaced during space flights. Webb said it was not yet clear whether reduced water content during weightlessness has harmful effects. (Webb, Science, 2/3/67, 558-9)
- . NASA's decision to launch ATS I satellite Dec. 6, 1966, with one of its important experiments purposely rendered inoperative, was praised by G. W. Swenson, Jr., National Radio Astronomy Observatory, and R. N. Bracewell, Stanford Univ. Radio Astronomy Institute, in Science. "The NASA people made a courageous and farsighted decision...[when] they disconnected the beacon transmitter" in ATS I which would have operated on the same frequency band as many of the world's most important telescopes. (Science, 2/3/67, 518-21)
- . Lunar Receiving Laboratory, under construction at MSC, would provide scientists with an unparalleled opportunity to examine extraterrestrial materials under controlled conditions, MSC staff members James C. McLane, Jr., Elbert A. King, Jr., Donald A. Flory, Keith A. Richardson, James P. Dawson, Walter W. Kemmerer, and Bennie C. Wooley declared in Science. The laboratory would have four major functions: "(i) distribution of lunar samples to the scientific community for detailed investigations after a period of biologic quarantine; (ii) performance of scientific investigations of samples that are time-critical and must be accomplished within the quarantine period; (iii) permanent storage under vacuum of a portion of each sample; and (iv) quarantining and testing of the lunar samples, spacecraft, and astronauts for unlikely, but potentially harmful, back-contamination (contamination of extraterrestrial origin)." (Science, 2/3/67, 525-9)
- . MSC Apollo Program Manager Dr. Joseph F. Shea briefed major Apollo contractors and subcontractors at MSC about Jan. 27 flash fire, John Wilford reported in New York Times. MSC made no announcement of the meeting. (Wilford, NYT, 2/4/67, 15)
- . LRC issued Rfp's on system employing 2,000- to 6,000-lb. comsats which could broadcast directly to home television sets from 22,300-mi.-altitude synchronous orbits. Successful proposal would receive study contract. (LRC Release 67-6)

February 3-4: Mars symposium sponsored by NASA Institute for Space Studies, Yeshiva Univ., and New York Univ. was held in New York. Discoveries reported at meeting were later summarized by Walter Sullivan in New York Times: (1) Martian surface, although free of water-carved valleys, is so heavily eroded that wind alone cannot account for it. It is possible that ground is soaked with liquid water even though air of Mars is too thin and dry to produce rain; (2) New observations seem to confirm that air of Mars contains methane or methane-based gases, presence of which is difficult to explain unless they are generated by living organisms; and (3) Evidence that carbon dioxide is predominant component of Martian atmosphere implies that oxygen is being continuously injected into air. Most likely source of oxygen is plant life performing photosynthesis. Sullivan concluded: "Despite the perceptible swing of the pendulum toward the possibility of life on Mars, a wide disparity of views on the nature of the Martian environment was presented at the meeting. It was evident that the information is still insufficient to assess the likelihood of life on Mars or even to design experiments for landings there that would most effectively test for the existence of life...." (Sullivan, NYT, 2/12/67, 12E)

February 4: NASA's LUNAR ORBITER III (Lunar Orbiter C) unmanned spacecraft was successfully launched by Atlas-Agena D booster from ETR in mission to photograph possible lunar landing sites for Apollo astronauts (see Feb. 8-28).

Agema 2nd stage fired to boost 850-lb. spacecraft into 100-mi. (161-km.) altitude parking orbit, reignited after 15-min. coast period, injecting spacecraft on 92-hr. translunar trajectory, and separated. On schedule LUNAR ORBITER III deployed its four solar panels and two antennas, locked its five solar sensors on the sun, and fixed its star-tracker on Canopus. Successful midcourse maneuver was accomplished at 37:43 GET to slow spacecraft's speed slightly, and JPL scientists predicted spacecraft would come within 10 mi. of original aiming point.

Primary objectives of NASA's LUNAR ORBITER III mission, third in series of five, were (1) to place three-axis stabilized spacecraft into lunar orbit; (2) to obtain high-resolution pictures of previously photographed lunar surface areas to confirm their suitability as landing sites for Apollo and Surveyor spacecraft; and (3) to improve knowledge of the moon. Photos would cover 12 primary target sites located within the Apollo zone of interest on the moon's front face. 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 67-12; AP, Wash. Post, 2/5/67, A6; AP, Wash. Sun. Star, 2/5/67, A8; AP, NYT, 2/6/67, 12)

February 4: Decision to use 100% oxygen atmosphere in U.S. spacecraft had not been made as a shortcut to compensate for U.S.S.R.'s superior booster capability, NASC Executive Secretary Dr. Edward C. Welsh told UPI. "There were other factors involved" including weight and efficient use of oxygen-consuming fuel cells. Dr. Welsh emphasized there was "no basis at all for a change in [Apollo program] policy" because of Jan. 27 tragedy at KSC and predicted U.S. still had 50-50 chance to land first man on the moon. (UPI, Wash. Sun. Star, 2/5/67, A8)

- . Dr. Donald E. Guss, project scientist for GSFC's Solar Particle Intensity and Composition Experiment, died in Cleveland after a heart attack. (Wash. Post, 2/8/67)

February 5: Sounding rocket launched by ESRO from northern Sweden to study aurora borealis reached 116-km. (72-mi.) altitude. (Reuters, NYT, 2/6/67, 3)

- . John R. Biggs, former director of NASA Office--Downey at North American Aviation's Downey, Calif., plant, became Deputy Executive Secretary in the Office of the Administrator, NASA Hq. (NASA Ann., 2/6/67)
- . 764 students would begin work toward doctorate degrees in space sciences during 1967-68 academic year at 152 institutions as part of NASA's Pre-doctoral Training Program to meet increasing need for highly-trained scientists and engineers. (NASA Release 67-19)

February 6: U.S.S.R. sought one-year postponement of meeting of U.N. Conference on Exploration and Peaceful Uses of Outer Space, scheduled for Sept. 11-23 in Vienna. Soviet Academy of Sciences member V. A. Kotelnikov told preparatory committee meeting in New York that U.S.S.R. needed more time for preparation of scientific data and papers. Request caused considerable surprise among U.N. delegates because U.S.S.R. had been chief supporter of resolution, passed by General Assembly Dec. 16, 1966, to hold meeting in September. (NYT, 2/7/67, 30; Estabrook, Wash. Post, 2/8/67)

- . Japan launched three-stage Lambda 3H rocket from Uchinoura Space Center, Kyushu Island, to 1,337-mi. (2,142-km.) altitude--record altitude for Japanese rocket. 9.5-ton vehicle carried instruments to obtain nine types of scientific data on the Van Allen belts and the ionosphere; all equipment functioned normally except electronic thermometer. 29-min. flight ended when rocket's 3rd stage impacted 1,400 mi. downrange in the Pacific. (AP, NYT, 2/7/67, 27)

February 6: President Johnson presented 1966 National Medal of Science to 11 scientists and engineers at White House ceremony and praised their efforts to make new discoveries: "Today, our enormous investment in science and research is our evidence of our faith that science can not only make man richer--but science can make man better." Awards were announced Dec. 24, 1966. (Pres. Doc., 2/13/67, 194-5)

- . FAA met with 11 U.S. airlines and one leasing company to discuss financing of Sst. Following conference, FAA Administrator William F. McKee announced that airline representatives had "indicated general agreement with the concept of assisting with financing of the prototype development phase." (FAA Release 67-11)
- . USAF would not use pure oxygen atmosphere on its manned space flights, partly because of the fire hazard, announced L/Col. John W. Ord, Director of Crew Test Evaluation at USAF School of Aerospace Medicine. Ord said Manned Orbiting Laboratory (Mol) program would use mixture of oxygen and helium because it was lightweight and conducted heat away from the spacecraft. (Lockett, Wash. Post, 2/7/67)
- . NASA appointed M/G John D. Stevenson (USAF, Ret.) Director of Mission Operations, OMSF, succeeding Everett E. Christensen who returned to Lockheed Missiles and Space Co. General Stevenson had been serving as special assistant to Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight. (NASA Release 67-23)

February 6-9: "Lectures in Aerospace Medicine" conference was held at USAF School of Aerospace Medicine (SAM), Brooks AFB, Tex.

Dr. Hubertus Strughold, chief scientist at SAM, recommended that astronauts preparing for long-duration interplanetary space flights undergo "prophylactic surgery" to prevent appendicitis or gall bladder attacks and prophylactic dental work to guard against abscessed teeth.

Dr. Alfred C. Koestler, head of Holloman AFB's Altered Atmosphere Pressure Laboratory, reported that 18 chimpanzees had survived rapid decompression to the near vacuum of 150,000 ft. for 3½ min. without any noticeable residual effects following four-hour recovery period. Tests offered hope that an astronaut outside his spacecraft could be rescued if his spacesuit were to spring a leak.

Bends, the painful decompression sickness that cripples deep-sea divers, would imperil astronauts leaving a spacecraft with "mixed-gas" atmosphere to work in space, L/Col. Robert C. McIver suggested. His conclusion was based on series of experiments in which 74 healthy men underwent a total of 388 exposures to decompression; one fourth developed symptoms of bends. (USAF Proj. Off.; AFSC Release 274.66; Wash. Eve. Star, 2/8/67, A8; Wash. Post, 2/10/67, A4; WSJ, 2/15/67, 1; UPI, NYT, 2/24/67, 53)

February 7: U.S.S.R. launched COSMOS CXXXX into orbit with 241-km. (150-mi.) apogee; 170-km. (106-mi.) perigee; 88.48-min. period; and 51.7° inclination. All equipment was functioning normally. (Tech. Wk., 2/13/-67, 10)

- . NASA's SURVEYOR I spacecraft, which softlanded on the moon June 2, 1966, was still functioning after transmitting over 11,000 photos to earth, Leonard Jaffe, Director of Space Applications Programs, OSSA, said in Cal Tech lecture. SURVEYOR I mission had been officially terminated July 21, 1966, after spacecraft's battery suffered a sudden dip in voltage. (L.A. Herald-Examiner, 2/7/67)
- . President Johnson submitted space law treaty (see Dec. 8, 1966) to Senate and urged that it be ratified promptly "in appropriate commemoration of the Senate's own role in charting the course that the world now seems willing to follow....
"The resources of this planet are already taxed to support human existence. Now and even more each day, as the family of man increases so rapidly, fertile soil, clear water, clean air and a safe atmosphere all become more precious to men and nations than the metals and jewels of ages past.... The future leaves no option. Responsible men must push forward in the exploration of space, near and far. Their voyages must be made in peace for purposes of peace on earth. This Treaty is a step--a first step, but a long step--toward assuring the peace essential for the longer journey." (Pres. Doc., 2/13/67, 196-9)
- . Charges that haste to meet 1970 deadline to land first man on the moon had contributed to Jan. 27 Apollo tragedy were completely "unfounded," Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight, told closed hearing of Senate Committee on Aeronautical and Space Sciences in testimony released Feb. 11. "...the Apollo program is...the longest R.&D. program that we have undertaken in this Nation.... It has been paced at a deliberate pace so that it would in fact reasonably economically, but certainly safely, arrive at a set of equipment capable of carrying out the mission...." Dr. Charles A. Berry, MSC Director of Medical Research and Operations, said that a total of 20,756 hrs. had been accumulated testing the use of 100% oxygen in NASA-sponsored spacecraft and spacesuit evaluation programs. Before Jan. 27 accident, three fires had occurred in pure-oxygen ground simulators: in all cases fires had been traced to electrical systems not used in spacecraft and crew members had recovered from burns. NASA witnesses recounted long history of precautions to avoid spacecraft fires, including insulation, circuit design and circuit protection for electrical wires, and fire-testing of over 400 materials. NASA Deputy Administrator, Dr. Robert C. Seamans, Jr., suggested that exact source of ignition might never be pinpointed: "It is therefore possible that we may fly the Apollo without having been able to establish the cause of the fire.

February 7 (continued)

Even in that case, I believe that the care and skill with which the board and program office are conducting their investigations and review will provide the necessary assurance that such an accident cannot be repeated...." (Testimony)

- . Board chaired by KSC Director Dr. Kurt H. Debus convened at MSFC to investigate Jan. 20 explosion of Saturn V 3rd stage at Douglas Aircraft Co.'s Sacramento plant. (Birmingham News, 2/7/67)
- . Edward H. White II, one of the three Apollo astronauts who died in Jan. 27 flash fire at KSC, was named to receive AIAA's 1967 Haley Astronautics Award. Selection had been made in early January. AIAA cited White for his historic walk in space and other contributions, undertaken "at great personal risk in the advancement of space flight" during June 3-7, 1965, GEMINI IV mission. Award would be presented to his widow. (AP, Wash. Post, 2/8/67, A6; UPI, NYT, 2/9/67, 9)
- . U.S. and U.S.S.R. had begun talks aimed at mutual agreement not to deploy antimissile missile systems, Deputy Secretary of Defense Cyrus Vance told Senate Foreign Relations Committee's Disarmament Subcommittee. (AP, Phil. Inq., 2/8/67, 3)
- . Pressure of meeting schedules often forced NASA employees to compromise and take shortcuts, MSFC engineers Jesse N. Bradley and David H. Driscoll, Jr., charged in separate reports prepared before Jan. 27 flash fire and presented at AIAA's Flight Test, Simulation and Support Conference at KSC. "In a program where millions of dollars worth of equipment is involved and where a mistake could cause injury or death, pressure to meet unrealistic schedule dates should not be a factor," Bradley said. "Pressure tempts people to compromise and to take shortcuts.... [Engineers should] concentrate on the work to be done and not on the schedule dates." Driscoll reported: "Because meeting schedules is of prime importance, there is a natural tendency for the test engineers and others who influence his task to choose the most superficial answer to a problem." Neither engineer cited specific examples of schedule pressures that had interfered with test programs. (Wilford, NYT, 2/8/67, 8)
- . First live global telecast linking North America, Europe, Asia, Australia, and Africa would be carried on National Educational Television (NET) June 25, NET Vice President William Kobin announced. Designed as a live documentary to enable man to see earth as a single entity in space and time, two-hour telecast would examine such major problems as hunger and overpopulation. It would be transmitted to more than 30 nations via four comsats: ComSatCorp's EARLY BIRD I and INTELSAT II-B and two of U.S.S.R.'s MOLNIYA I comsats. (Gent, NYT, 2/8/67, 63)

February 7: Eleven cosmonauts had been killed in accidents since first Soviet space flight in 1960 according to CIA report prepared for the White House several weeks before Jan. 27 Apollo tragedy, Northern Virginia Sun reported. CIA claimed five had been killed when their spacecraft failed to enter orbit and six had died in series of mishaps ranging from boosters exploding during countdowns to training incidents involving helicopter crashes. (Allen, Scott, Northern Virginia Sun, 2/7/67)

February 8: Third French satellite, DIADEME (D-IC), was launched from Hammaguir Range with three-stage Diamant booster. Orbital parameters: apogee, 1,341 km. (833 mi.)--418 km. (260 mi.) lower than nominal; perigee, 584 km. (363 mi.); period, 104 min.; and inclination, 40°. Reason for low apogee had not yet been determined. Designed to reflect laser beams fired simultaneously from ground stations in France, Greece, and Algeria, 50-lb. geodetic satellite would provide precise navigational data for France's strategic missile program.

First French satellite, A-1, was launched from Hammaguir Range Nov. 26, 1965; second, DIAPASON I (D-IA), was launched Feb. 17, 1966. Fourth and last satellite in Diamant series was scheduled for launch Feb. 19. (Hess, NYT, 2/9/67, 15; SBD, 2/9/67, 218)

- . COSMOS CXXXXI was launched by U.S.S.R. into orbit with 345-km. (214-mi.) apogee; 210-km. (130-mi.) perigee; 89.8-min. period; and 72.9° inclination. All equipment was functioning normally. (UPI, NYT, 2/9/67)
- . NASA turned ESSA IV meteorological satellite over to ESSA for operation in accordance with NASA-Dept. of Commerce agreement. ESSA IV was launched by NASA Jan. 26 from WTR. (NASA Release 67-10)
- . USAF launched unidentified satellite employing Thor-Burner II combination from Vandenberg AFB. (UPI, Wash. Daily News, 2/8/67)
- . The Washington Post praised space law treaty transmitted to Senate by President Johnson Feb. 7: "The new treaty is an eminently sensible limitation on the military exploitation of outer space. The great powers must continue their efforts until the problems of proliferation also have been met. And then they must go on to search for a means of thermo-nuclear disarmament that will rescue mankind from the threat of annihilation." (Wash. Post, 2/8/67)
- . White House had received a letter from a scientist suggesting that it conduct its own investigation into Jan. 27 accident at KSC which killed three Apollo astronauts, Karl Abraham reported in Philadelphia Evening Bulletin. Scientist, who was not identified, felt NASA had not sufficiently heeded warnings of fire hazards presented by use of pure oxygen atmosphere. (Abraham, Phil. Eve. Bull., 2/8/67)

February 8-28: NASA's LUNAR ORBITER III, launched from ETR Feb. 4, became third U.S. spacecraft to enter lunar orbit; four days later it was successfully transferred to final close-in orbit for photography. Orbital parameters: apolune, 1,145 mi. (1,847 km.); perilune, 34 mi. (55 km.); inclination, 20.93°; and period, 3 hrs. 29 min. Spacecraft performed 357 attitude changes, responded to 2,866 commands, and recorded no micrometeoroid hits. A total of 211 medium- and high-resolution photos were taken before mission's photo acquisition phase was terminated Feb. 24 because of a malfunction in the priority readout system. Readout would be completed March 6. Among photos transmitted, described by JPL officials as of "excellent quality," was a picture of Hygius Rille, a deep gorge similar to the Grand Canyon. The rille--not considered by NASA as a potential landing site--could not be seen distinctly through earth-based telescopes, but through LUNAR ORBITER III's cameras it appeared clearly as a deep steep-walled ditch with one large central crater and numerous smaller ones. Pictures taken of the Sea of Tranquility confirmed that the site was probably smooth enough for manned landings: they showed a thin scattering of craters, some as small as three feet in diameter, and only a few ridges steep enough to upset a landing spacecraft. (NASA Proj. Off.; AP, NYT, 2/16/67; Wash. Eve. Star, 2/21/67, A4; UPI, Wash. Post, 2/23/67, A3)

February 9: Feb. 15 launch of third satellite in ComSatCorp's Intelsat II series was postponed by NASA until mid-March to study recent failure in a Scout launch vehicle's FW-4S motor. Intelsat II comsats were launched by Thrust Augmented Improved Delta boosters which used motors similar to FW-4S. (NASA Release 67-24)

February 10: Three Apollo astronauts died in Jan. 27 flash fire at KSC because "some engineer, technician, or inspector had gotten careless," former Astronaut Donald K. Slayton, MSC Director of Flight Crew Operations, told employees at General Motors AC Electronics Div., Milwaukee, where Apollo guidance and navigation equipment was manufactured. Slayton urged workers: "Take a good sharp look at your job. Are you giving everything you've got? Now you know somebody's life depends on it." An MSC official later reported that Slayton's speech had not been intended for publication. Slayton emphasized that he was not trying to affix blame for the Apollo accident, but was just trying to make workers ultra-conscious of the importance of their jobs. (UPI, Wash. Eve. Star, 2/10/67; UPI, WJT, 2/11/67)

- . Time magazine considered the question "Why Should Man Go To The Moon?" and concluded: "The moon itself may not be a particularly valuable piece of real estate. But neither is a flight to the moon an end in itself; the moon is no more than a way station on a route that scientists have only

February 10 (continued)

begun to map. And there is no doubt that man is going to make the trip some day....

"The moon is a challenge that the U.S. has already taken, a milestone that U.S. astronauts are already looking beyond.... The real object is for the U.S. to develop the capability of voyaging confidently to the limits of man's imagination and ingenuity. The value of such voyages will always be unpredictable. But the history of the human race, said famed Norwegian Explorer Fridtjof Nansen, 'is a continual struggle from darkness toward light. It is therefore to no purpose to discuss the uses of knowledge; man wants to know, and when he ceases to do so, he is no longer man.'" (Time, 2/10/67)

- . Astronaut Donn F. Eisele, in Columbus, Ohio, to receive a "Governor's Award" for increasing the prestige of the state, told AP he was opposed to "an unrealistic, arbitrary" chronological date for reaching the moon. He favored a "technical" date, which he explained to mean "as soon as we're ready, when we have performed sufficient missions to be ready, when the spacecraft is ready." (AP, NYT, 2/12/67, 31)

February 11: President Johnson's Science Advisory Committee (PSAC), in report on The Space Program in the Post-Apollo Period, rejected the idea of selecting a single major goal as focal point for Nation's post-Apollo program and urged instead a "balanced program based on the expectation of eventual manned planetary exploration." PSAC recommended program "integrating manned and unmanned efforts" toward five major objectives: (1) a "limited but important" extension of Apollo manned spaceflight program; (2) a "strongly upgraded program" of unmanned planetary probes aimed at landing instruments on Mars and Venus by early 1970's; (3) a program of technology development and qualification of man for long-duration space flight in anticipation of manned planetary exploration; (4) "vigorous exploitation" of applied space technology for both military and socio-economic purposes; and (5) "exploitation of our capability to carry out complex technical operations in near-Earth orbit (and on the Moon) for the advance of science, particularly astronomy."

Report proposed one or two manned explorations of the moon annually after first manned lunar landing, together with unmanned flights to parts of moon inaccessible to Apollo spacecraft. NASA was cited for "absence of integrated...planning" of planetary exploration in the 1970's and urged to immediately study "the relative effectiveness of man in planetary flyby and orbiter missions to Mars and Venus." Committee endorsed NASA's proposal to use spent 2nd stage of Uprated Saturn I booster as orbital workshop for manned missions up to 56 days but recommended "careful study of the suitability, cost, and availability of Titan III/MOL system for biomedical studies of man for periods up to 60 days."

February 11 (continued)

Astronomy from earth satellite was "focus of...[committee's] recommendations for major pure science component of...[Nation's] program." It proposed a program leading to "establishment in earth orbit of a number of astronomical facilities, which by the end of...the 1970s will constitute an orbiting astronomical observatory" capable of: (1) exploring full-range of spectrum not accessible from ground; (2) direct scientific control by ground-based astronomers; and (3) extended useful lifetime by servicing in orbit using trained personnel.

Committee urged that "far more intensive effort" be conducted to examine applicability of satellite technology to missions of all Federal agencies. "Such studies should take into account not only technological possibilities but the benefits...which might be derived from satellite technology as compared with other methods." (Text)

- . MSC Apollo Program Manager Dr. Joseph F. Shea and MSC Director of Flight Crew Operations Donald K. Slayton had each made a last minute decision against joining Apollo I astronauts in tragic Jan. 27 launch rehearsal. MSC Deputy Director Dr. George M. Low acknowledged that Shea, who had frequently taken part in astronaut flight rehearsals either as a stand in for a crew member or as an observer, had decided not to participate when technicians were unable to find a communications headset for him to wear. In addition, both men had finally decided that entering the spacecraft would have been "contrary to good test procedural discipline... [and] highly irregular." (Hines, Wash. Eve. Star, 2/11/67, 1; UPI, NYT, 2/13/67; Wash. Post, 2/11/67)
- . Sen. William Proxmire (D-Wis.) urged that Congress cut \$9 billion from President Johnson's FY 1968 budget to avoid tax increase. Interviewed on "Youth Wants to Know" television program, Proxmire suggested that \$5-7 billion be cut from public works, \$1 billion from space, and \$1 billion from U.S. forces in Europe. (AP, Wash. Post, 2/12/67)

February 13: U.N. Committee on Peaceful Uses of Outer Space adopted Soviet suggestion for one-year postponement of U.N. Conference on Exploration and Peaceful Uses of Outer Space, scheduled for Sept. 11-23 in Vienna. General Assembly would vote on postponement in April. (NYT, 2/15/67)

- . Dr. Wilmot N. Hess, Chief of GSFC's Theoretical Div., had been appointed director of MSC's newly-organized Science and Applications Directorate. He would assume his new post in the near future. (MSC Release 67-8)
- . Soviet failure to launch probe toward Mars during January Mars "window" supported reports that U.S.S.R. space program had "run into budget troubles," Newsweek reported. (Newsweek, 2/13/67)

February 13: USAF successfully launched an experimental aerodynamically-shaped warhead from Vandenberg AFB aboard an Atlas Icbm to test reentry characteristics. (AP, St. Louis Post-Dispatch, 2/14/67, 17)

- . Peter V. Dementyev, U.S.S.R. minister of aviation industry, had been awarded the Order of Lenin "for his great services to the Soviet state in developing the aviation industry," Aviation Week reported. (Av. Wk., 2/13/67, 23)
- . U.S. civilian-manned satellite-tracking ship Sword Knot was still lying off port waiting for U.S. clearance to enter Durban, South Africa, harbor, AP reported. South African government had granted ship permission to enter port only if crew members agreed to obey country's race segregation laws. (AP, Chic. Trib., 2/14/67)

February 14: Successful simulation of a meteor was achieved when tiny manmade iron pellet fired by Trailblazer launch vehicle reentered earth's atmosphere at unprecedented speed of 38,180 mph and landed on target. Launched from NASA Wallops Station, six-stage Trailblazer reached 190-mi. (306-km.) altitude before firing one-gram pellet on downward leg of ballistic trajectory. Artificial meteor was visible for two seconds. Experiment was part of LaRC-Smithsonian Astrophysical Observatory program to study luminosity and ionization of simulated meteors thereby increasing scientists' knowledge of natural meteoroids. (LaRC Release)

- . U.S.S.R. launched COSMOS CXXXXII into orbit with 1,362-km. (846-mi.) apogee; 214-km. (113-mi.) perigee; 100.3-min. period; and 48.4° inclination. All equipment was functioning normally. (Tech. Wk., 2/20/67, 13)
- . NASA Deputy Administrator Dr. Robert C. Seamans, Jr., submitted second interim report to NASA Administrator James E. Webb on Apollo 204 Review Board investigation of Jan. 27 flash fire in which three Apollo I astronauts died. Board had established 21 panels to conduct inquiry, and Dr. Seamans said he was satisfied that the procedures they were following were "well worked out. When this work is completed, it will give us as clear a view as can be obtained from the evidence."

Source of ignition had not yet been determined, but physical evidence thus far examined indicated fire had had considerable variation and density and might have had more than one phase. "One hypothesis, supported by the cabin pressure history, assumes a small, low-grade fire whose heat was at first largely absorbed by the spacecraft structure and that was burning at the time of the first crew report; that fire may have continued for as long as ten seconds. A more intense fire may have then developed, causing the rapid increase in cabin pressure. This fire was probably then extinguished by the depletion of oxygen." Additional information on accident had been

1 9 6 7

February 14 (continued)

identified and was being analyzed. It was now clear that all three spacesuits had been burned through, Astronaut Grissom's receiving the most exposure and Astronaut Chaffee's, the least. Dr. Seamans said disassembly of spacecraft was proceeding with great care, and spacecraft was expected to be removed to industrial area at KSC by Feb. 17. He concluded: "It is important to note that no single spacecraft element is touched or removed for analysis without full Board approval and evaluation of its possible effect on any of the other on-going studies or analyses." (NASA Release 67-28)

- . NASA selected Boeing Co. and Douglas Aircraft Co. for negotiations on cost-plus-fixed-fee contracts for 32- to 36-mo. coordinated research programs to minimize jet aircraft noise. Boeing would receive about \$7.5 million and Douglas, \$3 million. (NASA Release 67-26)

February 15: France launched DIADEME (D-ID) geodetic satellite from Hammaguir Range with three-stage Diamant booster into 1,609-km. (1,000-mi.)-altitude orbit. Planned altitude was 2,092 km. (1,300 mi.). Companion to DIADEME (D-IC) launched Feb. 8, satellite was last to be orbited from Hammaguir Range, which would be shut down March 31. All future launches would be from new bases near Bordeaux and in French Guiana. (Wash. Daily News, 2/16/67; Av. Wk., 2/20/67, 25)

- . NASA's BIOSATELLITE I, carrying more than 10 million tiny living organisms, reentered earth's atmosphere and apparently landed "in the vicinity of Australia." On Feb. 22 NASA announced that search for capsule had been canceled.

Launched Dec. 14, 1966, from ETR, BIOSATELLITE I had been scheduled to reenter earth's atmosphere by parachute and be recovered Dec. 17, but it remained in orbit after retrorocket failed. It was first of three spacecraft in NASA's Biosatellite program to study physiological effects of weightlessness and radiation on organisms. (NASA Release 67-25; Reistrup, Wash. Post, 2/14/67, A4; 2/23/67, A3; AP, Phil. Inq., 2/16/67, 3)

- . GAO report found LRC innocent of alleged irregularities in construction of \$25-million tank chamber at Plum Brook Station but was critical of some of NASA's managerial practices. GAO said it had been advised by NASA "that closer construction management controls had been established...." Allegations, brought by Plum Brook employee and referred to GAO by Rep. Charles A. Mosher (R-Ohio), had been denied by LRC Director Dr. Abe Silverstein Jan. 19. (Text; Cleve. Plain Dealer, 2/15/67)

February 15: Boeing Co. would spend \$165 million and General Electric Co. \$65 million in Phase III (prototype construction) of Sst program, M/G J. C. Maxwell (USAF), FAA Director of Supersonic Transport Development, told American Marketing Assn., in Los Angeles. Total cost of Phase III work was estimated at \$1.1 billion; most of the difference would be supplied by Government and the small remainder by several U.S. airlines. Boeing and GE contracts would not be effective until President Johnson's authorization to begin Phase III. (Reddig, Jr., Wash. Eve. Star, 2/16/67, A17; WSJ, 2/16/67, 4)

February 16: Sen. Lee Metcalf (D-Mont.) urged on Senate floor ratification of space law treaty submitted to Senate by President Johnson Feb. 7: "So now, in the first flush of triumph over the obstacles of space, is the time to leave behind our terrestrial ambitions, disputes, and claims of sovereignty, and look to new ground rules for peace and cooperation in space.... The rivalries, the contentions, and the conflicts that have been our earthly heritage may be abandoned as we jointly and cooperatively launch ourselves into this great adventure in space. It may be that as a result we will achieve a greater cooperative spirit on earth and as a result international confidence and international understanding will grow out of extraterrestrial achievements." (CR, 2/16/67, S2072-3)

February 17: President Johnson, in letter transmitting Sixth Annual Report of the Arms Control and Disarmament Agency to Congress, said: "In 1966 a significant link was added to the still slender chain of arms control agreements--a treaty banning weapons of mass destruction in outer space and on celestial bodies. Its significance will grow as our mastery of space grows, and our children will remark the wisdom of this agreement to a greater degree than the present state of our own knowledge quite permits today...." (Pres. Doc., 2/20/67, 274)

. France reported that several French electronic companies had been awarded contracts for equipment to be used at Soviet cosmonaut training center. (UPI, Wash. Eve. Star, 2/17/67, 1)

February 18: Dr. J. Robert Oppenheimer, "father of the atomic bomb" and recipient of AEC's 1963 Enrico Fermi Award for his "outstanding contributions to theoretical physics and his scientific and administrative leadership," died at age 62. (NYT, 2/20/67, 36M)

February 20: NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller stressed importance of manned spaceflight program in speech before IEEE meeting in Washington, D.C.: "This is a particularly appropriate

February 20 (continued)

date for us to review our manned space flight programs. It was just five years ago today that John Glenn became the first American to orbit the earth in his Mercury spacecraft, Friendship 7. Since that time, we have made noteworthy strides in the manned exploration of space.... In the Mercury and the Gemini Programs, we learned much about man's capabilities in space flight....

"We will learn much more from the Apollo missions. By 1970, we will have provided the capability to explore space out to 250,000 miles from earth and to conduct manned operations and experiments on flights of up to two weeks duration. The Saturn I and Saturn V boosters will have injected up to 140 tons of payload per launch into near-earth orbit. The Saturn V will have sent 48 tons to the vicinity of the moon. The Apollo spacecraft will have sustained a three-man crew for two weeks in a two-compartment, maneuverable vehicle and will have landed two men on the moon and returned them with samples of lunar material, to earth. The U.S. manned space flight programs will have logged more than 500 man days in space, during which data and experience will have been acquired from approximately 100 in-flight experiments." (Text)

- . Former Astronaut John H. Glenn, speaking at National Space Club luncheon in Washington, D.C., criticized the press for uninformed discussion of the Jan. 27 Apollo tragedy: "I deplore comment in the press recently regarding the accident. The press has a responsibility not to comment in areas about which it is not informed." Speaking on the fifth anniversary of his space flight in FRIENDSHIP 7, Glenn noted that the deaths of three Apollo astronauts were part of the price man must pay in his quest for knowledge: "Man tries something and sometimes he succeeds and sometimes he fails. It is very regrettable. We hate to lose good friends, but we think they went in a good cause." (Sehlstedt, Jr., Balt. Sun, 2/21/67, 8; AP, Wash. Post, 2/21/67; NYT, 2/22/67, 50)

During week of Feb. 20: Princeton Univ. announced development of accelerator capable of raising electrically neutral atoms and molecules to energy levels never before obtained in controlled experiments. Utilizing supersonic jets of mixed gases in high-vacuum container, accelerator could generate molecular beams of neutral particles with kinetic energies of 10 or more electron volts. Particles at this energy level were necessary to many common gas-phase chemical reactions. Dr. John B. Fenn, professor who directed NSF-sponsored project, said accelerator would aid studies in meteorology and aerospace technology. (NYT, 2/26/67, 59)

February 21: Reps. Samuel S. Stratton (D-N.Y.) and Durward G. Hall (R-Mo.), members of House Armed Services Committee, released report charging that insufficient safeguards were at least partly responsible for deaths of

February 21 (continued)

- three Apollo astronauts in Jan. 27 fire at KSC and two airmen in Jan. 31 fire at Brooks AFB. "Our inquiry suggests that [fire prevention] procedures, not only at Brooks, but also at Cape Kennedy, were in fact inadequate," they told newsmen. Congressmen noted what they considered to be questionable procedures in safeguarding against fires in space capsules with 100% oxygen atmosphere: (1) absence of closed-circuit television monitoring of Apollo spacecraft or Brooks chamber; (2) absence of automatic or manually-activated fire extinguishing system onboard either capsule; (3) use of sponges by airmen although sponge burns up to 80 times faster in pure oxygen; and (4) use of foam couches by astronauts although foam burns 20-30 times faster in pure oxygen. The Congressmen said they had begun their probe because of "an interest in the two fires as they bear on the safety of armed services personnel." Future efforts would concentrate on Brooks AFB fire. (O'Toole, Wash. Post, 2/22/67, A4)
- . MSC awarded Allis-Chalmers Manufacturing Co. a \$3.4-million, cost-plus-fixed-fee contract for development and testing of an improved fuel cell power system for Apollo Applications (Aa) program. (NASA Release 67-33)

February 22: Soviet antimissile defense system could not prevent all enemy missiles from reaching their targets, Marshal Andrey A. Grechko, acting Soviet Defense Minister, and Marshal Vasily I. Chuikov, head of Soviet civil defense program, wrote in Izvestia article commemorating Soviet Armed Forces Day. Their assertion contradicted statement by Gen. Pavel A. Kurochkin, head of Frunze Military Academy, at Feb. 20 news conference: "If enemy missiles fly, they will not arrive in Moscow." (Anderson, NYT, 2/23/67, 1)

- . France would launch 330-lb. Saros comsat--138 lbs. heavier than ComSat-Corp's Intelsat II comsats--in 1970 from new French Guiana launch site using ELDO's Europa booster, Reuters reported. Saros would provide direct telephone, radio, and television communications between France and French-speaking countries. (Reuters, Wash. Post, 2/23/67, A3)

February 23: GSFC selected Radiation, Inc., for negotiations on a \$1-million, cost-plus-fixed-fee contract to develop Versatile Information Processor (Vip), an advanced telemetry system for the Nimbus D meteorological satellite. System would process, format, and store in the spacecraft scientific data obtained from experiments and monitor temperatures, pressures, power supply, and control system. (NASA Release 67-34)

February 24: Astrobee 1500 sounding rocket launched from NASA Wallops Station in third flight test carried 110-lb. instrument package to 1,495-mi. (3,007-km.) altitude before impacting 690 mi. downrange in the Atlantic. No recovery was attempted. The 11,600-lb. solid-fueled rocket--most powerful sounding rocket in U.S.--transmitted 30 min. of data on flight characteristics. From preliminary examination of data test appeared successful, but scientific data on cosmic noise effects were lost because rocket's spin rate was too high for proper deployment of experimental antennas. Astrobee 1500 was being developed by NASA "to provide a research rocket capable of carrying heavy scientific payloads to high altitudes, with a relative ease-of handling...." First launch attempt (April 8, 1963) failed 16 sec. after launch because of a nose-fairing failure; second attempt (Oct. 21, 1964) was successful. (Wallops Release 67-5)

- . NSF awarded over \$28 million in grants as part of expanded program "aimed at accelerating the output of students with advanced degrees in science, mathematics and engineering." Made under NSF's graduate traineeship program, grants would enable 206 institutions to appoint 5,077 students for full-time graduate study beginning in fall 1967 and 896 graduate teaching assistants for full-time study beginning in summer 1967. (AP, NYT, 2/25/67, 10)
- . "High priests of science"--notably space scientists--were making excessive demands on Federal budget with possible dangers to remainder of the scientific community, Ralph Lapp, nuclear science consultant, told Purdue Univ. audience. He urged "a unified science budget which reflects a 'fair share' for all scientific fields." (AP, Balt. Sun, 2/25/67)

February 25: NASA Administrator James E. Webb issued statement based on third interim report by Deputy Administrator Dr. Robert C. Seamans, Jr., on work of Apollo 204 Review Board. Webb observed: (1) "The risk of fire that could not be controlled or from which escape could not be made was considerably greater than was recognized when the procedures for the conduct of the test were established. Our experience with pure oxygen atmosphere included not only the successful Mercury and Gemini flights but a number of instances where a clearly positive source of ignition did not result in a fire...." (2) Apollo spacecraft had been equipped with such items as Velcro adhesive pads to hold frequently-used equipment and nylon netting to catch dropped objects. "While most of these [items] were constructed of low-combustion-potential material, they were not arranged as to provide barriers to the spread of a fire. Tests conducted...since the accident have shown that an oxygen fire in the capsule will spread along the surface of Velcro and along the edges of nylon netting much faster than through the material itself. (3) Soldered joints in piping carrying both oxygen and fluids were melted

February 25 (continued)

away, with resultant leakage contributing to the spread of the fire...."

(4) Capsule burst in such a way that flames traveled over and around astronauts' couches toward rupture. "Under these conditions, and with just a few seconds of time available, the astronauts could not reach the hatch and open it. (5) This fire indicates that a number of items related to the design and performance of the environmental control unit will require the most careful examination and may require redesign...." Webb announced that Senate Committee on Aeronautical and Space Sciences would hold open hearing on Review Board's preliminary findings Feb. 27 and that House Committee on Science and Astronautics' Subcommittee on NASA Oversight would conduct full investigation of accident after completion of Board's inquiry, expected by late March.

Dr. Seamans said in his report that an "electrical malfunction" was regarded as "most likely source of ignition" of the fire but the "possibility exists that no single source will ever be pinpointed." Board was still considering chemical reactions in onboard materials, spontaneous combustion of certain materials, and possible electrical phenomena. Evidence indicated fire had had three distinct phases: originating in left side of spacecraft, it had burned several seconds unnoticed, then spread becoming more intense and causing cabin pressure to rise rapidly as atmosphere became heated. Fifteen seconds after crew first reported fire, cabin ruptured. During second phase, gases and flames flowed past astronauts' couches and through hole moving from left to right. With cabin's oxygen quickly reduced by rush of flames and gas outside, fire continued as localized flame, smoking heavily, in third phase. Dr. Seamans said Board noted: "The experience in flight and in tests prior to the accident had suggested that the probability of a spacecraft fire was low. Continued alertness to the possibility of fire had become dulled by previous ground experience and six years of successful manned missions.... Potential ignition sources inside the spacecraft had been treated so as to be considered safe; neither the crews nor the test and development personnel felt the risk of spacecraft fire to be high...." Dr. Seamans emphasized that Board did not recommend changing pure oxygen system or planned cabin pressure for space flight, but did urge that "trade-offs between one- and two-gas atmospheres be re-evaluated ...[and] pressurized oxygen no longer be used in prelaunch operations." It also recommended: (1) combustible materials be replaced where possible with nonflammable materials; (2) nonmetallic materials be arranged to maintain fire breaks; (3) systems for oxygen and liquid combustibles be made fire resistant; (4) full flammability tests be conducted with mockup of new configuration; (5) more rapidly- and easily-operated hatch be installed; and (6) on-the-pad emergency procedures be revised to recognize possibility of cabin fire. (NASA Release 67-38)

February 25: NAS had received 923 applications for 20-30 positions in NASA's astronaut training program. Academy was expected to forward NASA a list of 60-75 recommended candidates in March for final selection. (Sehlstedt, Jr., Balt. Sun, 2/26/67)

- . Europe was weak educationally and should greatly expand institutions of higher learning to close a "technological gap" that was widening in favor of U.S., Secretary of Defense Robert S. McNamara told students at Millsaps College, Jackson, Miss. "Europe's weakness is seriously crippling its growth. It is weak in general education, it is weak in its technical education, and it is particularly weak in its managerial education." (Wash. Post, 2/25/67, 11)
- . Electrically-powered cars, trucks, and buses, with limited ranges and speeds, could be produced with existing technology, and their general usage would greatly reduce air pollution, Federal Power Commission (FPC) concluded in report to Senate Commerce Committee. Committee Chairman Sen. Warren G. Magnuson (D-Wash.) said he would hold hearings in March on the report which "hopefully will produce quick response from industry." (Ayres, Jr., NYT, 2/26/67, 69)
- . Quasars, which radiate as much light and energy as a galaxy, appear to have a diameter only 1% as large as galaxies, scientists from U.K.'s Royal Astronomical Observatory and Royal Radar Establishment reported in Nature. Theory was based on measurements of radio signals of 30 quasars, obtained by using two radiotelescopes 80 mi. apart in combination as if at extreme ends of single instrument. Data indicating quasars are smaller than previously believed compounded the problem of explaining their enormous quantities of energy. (Wash. Post, 2/26/67)

February 26: U.S. astronauts would one day encounter "other living things" in outer space, Dr. Kurt H. Debus, Director of KSC, told Rollins College audience. "This prospect cannot be dismissed as metaphysical speculation.... It is much more a mathematical certainty than were the early theories expounded by scientists and philosophers whose observations and discoveries made possible many of our activities today." (UPI, NYT, 2/27/67, 12)

- . Vice President Humphrey commissioned into service USN's \$130-million Atlantic undersea test center, which he predicted might become the Cape Kennedy of oceanography. Speaking at West Palm Beach, the Vice President said: "This center has been established primarily for purposes of national security. But the knowledge we gain here will help us in other ways." It would contribute to man's knowledge of tides and provide information on untapped mineral resources and unutilized food sources. "We may learn how to divert and even prevent hurricanes,"

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Mr. Humphrey said. "But perhaps the greatest promise of all lies in food from the sea." (AP, NYT, 2/27/67, 46)

- . Twin stamp honoring Project Mercury and NASA Apollo program would be one of four new commemoratives issued in 1967, Postmaster General Lawrence O'Brien announced. (Cabeen, Chic. Trib., 2/26/67)

February 27: COSMOS CXXXXIII was launched by U.S.S.R. into orbit with 302-km. (188-mi.) apogee; 204-km. (127-mi.) perigee; 89.5-min. period; and 65° inclination. All equipment was functioning normally. (Tech. Wk., 3/6/67, 15)

- . NASA's approach to preventing spacecraft fires "by preventing their ignition" was inadequate, Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight, testified at open hearing held by Senate Committee on Aeronautical and Space Sciences on Jan. 27 Apollo tragedy. Also present were NASA Administrator James E. Webb, NASA Deputy Administrator Dr. Robert C. Seamans, Jr., and Dr. Charles A. Berry, MSC Director of Medical Research and Operations. NASA's future approach would seek to: (1) minimize possibility of ignition, recognizing "that this possibility will always exist"; (2) limit chance of fire's propagating once it has started; and (3) minimize consequences of fire to crew. Dr. Mueller outlined an extensive program of testing, redesign, and procedural changes, which included escape hatch for Apollo spacecraft which could be opened in two seconds; search for new, less flammable materials for cabin interior and spacesuits; and revised emergency procedures. All improvements and changes would be incorporated into an advanced version--Block II--of Apollo spacecraft. No more Block I spacecraft like Apollo 204 would be used for manned space flights. Dr. Mueller said no estimate of fire's eventual cost in time or money would be made until completion of Apollo 204 Review Board's investigation, but he indicated it would be at least eight to 10 months before next manned Apollo flight. Dr. Mueller testified that launch rehearsal during which fire had occurred had not been classified as "hazardous" because seven years of experience with Mercury and Gemini programs had never indicated such tests were particularly dangerous. Even if the test had been categorized as hazardous, he said, it would still have taken 90 sec. for crew to open the double hatch. Crew died within 20 sec. after detection of fire. Webb added that the handle for equalizing pressure, necessary to open hatch, had not been actuated. Dr. Berry said carbon monoxide had asphyxiated astronauts. He confirmed that bodies had had "some thermal burns of second and third degree" but "not of sufficient magnitude to cause death." Dr. Berry warned that "we are never going to be able to completely eliminate the risk of fire as long as oxygen is available." Dr. Mueller said "an atmosphere which will support life will also support combustion. Therefore

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the first answer...must be fire prevention in terms of strict control of both potential ignition sources and combustible materials." (Testimony; Transcript, 3-4, 24, 41-2, 61, 70)

- . NASA Administrator James E. Webb presented the Distinguished Service Medal--NASA's highest award--to former NASA General Counsel Walter D. Sohler in special Washington, D.C., ceremony. Sohler was cited especially for his efforts on the space law treaty, patent policy, and NASA-university-industry relations. (NASA Release 67-39)

February 28: U.S.S.R. launched COSMOS CXXXXIV into orbit with 625-km. (388-mi.) altitude, 96.92-min. period; and 81.2° inclination. All equipment was functioning normally. (Tech. Wk., 3/6/67, 15)

- . President Johnson sent \$149.8-million FY 1968 Budget Amendment to Congress which included \$91 million for development of Rover nuclear-powered rocket engine. In his message, the President stated: "Government scientists and engineers have now concluded that a much more powerful nuclear engine would have distinct advantages over rockets now in use. I am recommending that...[U.S.] move ahead with the development of a nuclear engine having a potential of 200,000 to 250,000 pounds of thrust. "Such an engine could be used for a new and much more powerful third stage for our Saturn V launch vehicle. Because of its high efficiency, it could: [1] permit us almost to double the weight of the present payload of the Saturn V vehicle, [2] increase our ability to maneuver spacecraft, and [3] be used in future manned landings and explorations of far distant planets...." (Pres. Doc., 3/6/67, 334-5)
- . President Johnson's FY 1968 budget recommendations marked "a turning point in the Nation's space program," NASA Administrator James E. Webb testified before the House Committee on Science and Astronautics. Webb said President Johnson had "placed before the Congress a program which says that this Nation must go forward in space and not call it quits at the end of this decade." He summarized recommendations for (1) completion of Apollo program; (2) development of capabilities for long-duration manned space flight in Apollo Applications (Aa) program; (3) development of "practical applications of our space know-how" using capabilities of Aa program and "advanced unmanned systems like the ATS-4"; (4) planetary exploration through Voyager program; (5) development of Nerva II nuclear rocket engine; and (6) increase in aeronautical research efforts to deal with "emerging problems of civil as well as military aviation" (see Jan. 25). Webb announced that NASA had established Voyager program management responsibilities "designed to make the best possible utilization of the proved capabilities" of JPL "and of our field centers and laboratories." Voyager program, since 1964 under NASA Hq. Division of Lunar and Planetary

February 28 (continued)

Programs, would become a separate division in OSSA with Oran W. Nicks as Director and Donald P. Hearsh, Deputy Director. JPL would be responsible for surface laboratory, tracking, and mission operations systems; MSFC, for orbiting spacecraft and Saturn V launch vehicle systems; and LaRC, for landing capsule bus system.

Discussing the NASA program, Webb said: "I should be very clear on the subject of risks. In moving ahead to utilize the resources made available to us, we have had to take technical risks in the development of our equipment and in establishing our schedules. These have included risks that a particular design or line of development would not succeed in meeting the specifications; risks that schedules might not be met; and that we could not recover from a serious setback because we did not have parallel or back-up developments. But we have not knowingly accepted a higher level of risks in order to meet our manned flight schedules. In our specifications, trade-off studies, test criteria, or mission plans, we have taken no risks to the lives or safety of the astronauts that we could find a way to avoid."

Webb urged that decisions on Voyager and Aa programs and on Nerva II be made this year to avoid acceleration of the "dispersal of the know-how that we have built up in government, industry, and universities that has already begun...."

Questioned by Rep. James G. Fulton (R-Pa.) on whether U.S. or U.S.S.R. led in space technology, Webb replied that U.S.S.R. would be ahead in large spacecraft until "we get the NERVA as a third stage for the Saturn V which will roughly double the capability of the Saturn V for Earth-escape missions." While U.S.S.R. may lead in planetary exploration, he said, U.S. was superior in "the very sophisticated use of microminiaturization and many new techniques of handling data." (Testimony; Transcript, 14-15, 28-9, 34; NASA Release 67-40; NYT, 3/1/67, 29)

- . NASA awarded Carco Electronics Co. a \$692,000 contract to design, fabricate, install, and check out a dynamic test stand for prototype Apollo Telescope Mount (Atm) control moment gyro system. Installation at LaRC was scheduled for completion by spring 1968. (NASA Release 67-41)
- . NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell stressed importance of rocket-sonde in speech at AIAA Sounding Rocket Vehicle Technology Specialist Conference in Williamsburg, Va. "There is still a lot of important research to be done between the maximum heights of balloons and the minimum heights of satellites. The sounding rocket gives us the means for carrying out such investigations. [It] is valuable for checking out equipment, testing the design of an experiment, conducting an exploratory survey, probing for early discoveries, and in general providing an inexpensive means to lay the groundwork for more expensive satellite and space probe experiments to follow." Important uses for sounding rockets included: detection of x-ray sources; generation

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of artificial plasma clouds in space; solar observations; investigation of eclipses; study of atmospheric and ionospheric phenomena; and collection of micrometeoroids. Dr. Newell concluded: "We at NASA regard the sounding rocket program as a vital part of our total national space effort. It will continue to receive our strong support." (Text)

- . NASA had presented monetary awards totaling \$4,200 to six inventors, all employed by industrial contractors, for advancements in space technology: Charles R. Peek and Lewis E. Boodley, RCA--\$1,000 for new type of interconnector for satellite solar cells; G. Richard Blair, Hughes Aircraft Co.--\$1,000 for passive heat protective coating used on Surveyor spacecraft; Kenneth A. Ruddock and Robert G. Rempel, Spectra-Physics, Inc.--\$1,000 for magnetometer to measure earth's magnetic field more precisely; and Paul A. Jensen, Hughes--\$1,200 for low-noise antenna feed system used in all NASA Deep Space Network stations. (NASA Release 67-42)

During February: Space flights lasting one month or more should pose no new respiratory problems for astronauts, but additional research was necessary to ensure against respiratory problems that could arise from prolonged weightlessness and an artificial environment, NRC Space Science Board study concluded. Only serious effects of weightlessness on respiratory system anticipated were possibility that astronauts might inhale dust and other solid particles floating in the spacecraft and that muscles controlling the lungs might weaken because work was easier in weightless environment. Areas recommended for further study included: toleration limits for carbon dioxide in case spacecraft's absorption system malfunctioned; problems of infection during long missions; possibility of intentionally filling astronauts' lungs with a liquid to prevent collapse of blood vessels and tissues during acceleration greater than 15 G's; and basic medical training and use of drugs for self medication by crew during weightlessness. Committee also recommended efforts to improve methods to detect and extinguish spacecraft fires, and suggested that a two-gas system with nitrogen or helium be used until effective methods of fire control in 100% oxygen were developed.

Report, to be released shortly by NAS, was the product of a June 26-July 9, 1966, conference held at Woods Hole, Mass., at OART request. (NAS-NRC-NAE News Report, 2/67)

- . Initial reaction by the press to Jan. 27 flash fire in which three Apollo astronauts died:

Business Week: "After 16 space flights, in which 19 astronauts returned from their missions safely, many had forgotten the inescapable peril of exploration. No previous frontier has ever been crossed without the loss of life; it was not to be expected that space--the most

During February (continued)

perilous frontier of them all--could be conquered without sacrifice. None of this lessens the grief that every man in NASA feels for fallen comrades. But it is the nature of test pilots...to accept disaster not as defeat but as a call for intensified effort and dedication." (Bus. Wk., 2/4/67)

Washington Evening Star: "Now that the initial shock...is beginning to wear off, the second guessers are...wondering whether we should be going to the moon at all.... From any rational point of view, the only thing to do is to carry on. The Apollo program necessarily will mark time until the true cause of the spacecraft disaster is located and corrected. It is conceivable that the delay could cause the Dec. 31, 1969 deadline to be missed. It is entirely possible that the Russians may get to the moon ahead of us. But so what? The world will not end nor the United States vanish, if the Russians beat us to the moon.... It would be senseless to stop now. Fortunately, it probably would also be impossible." (Hines, Wash. Eve. Star, 2/2/67)

Editor & Publisher: "The recent disaster at Cape Kennedy indicates we are no less reluctant to face up to disaster than anyone else. Not only were our reporters not prepared for it--none of them were there for the simulated flight test--but neither were our space officials... [because] the full import of the tragedy was fed out piecemeal.... The lessons for NASA officials and for newsmen are obvious. Space travel is fraught with dangers in every test, every maneuver, every piece of equipment, but we became complacent about them because of our successes. NASA's record of dealing with the press up to now has been pretty good and if it hasn't already developed a 'disaster plan' for such accidents it soon will. News media have learned that nothing in the space program should be considered 'routine' and that front row seat should never be left unoccupied at any time." (Editor & Publisher, 2/11/67)

Press reaction to the accident later became increasingly critical of NASA:

Washington Evening Star: "The implication of the NASA story was that no fire extinguishing apparatus or quick escape mechanism--neither of which was present on the Apollo 1--could have saved the men. The implication of the truth is that if the spacecraft had been equipped with a means of blowing open the hatch, Grissom, White and Chaffee might have had a chance. NASA's motive in attempting to distort the truth may have been to protect the families of the astronauts from undue mental anguish. But it also served the function of protecting NASA by heading off criticism of the agency...by deliberately misleading the press, Congress and the public." (Wash. Eve. Star, 2/9/67)

During February (continued)

New York Times: "The most basic issue...is not, as NASA has tended to emphasize, the source of the spark that started the fire. It is rather the question of why so much was permitted to hinge on the assumption that there would be no fire....

"The answer is only secondarily, as a NASA official has suggested, that 'alertness...had become dulled' by previous successes.... More fundamental was the willingness to gamble for the sake of winning the race to the moon." (NYT, 2/28/67, 34)

Congressional actions in response to Jan. 27 flash fire at KSC in which three Apollo astronauts died:

Sen. Harrison A. Williams, Jr. (D-N.J.), urged Senate to ratify space law treaty (see Dec. 8, 1966) as a worthy tribute to the astronauts. (CR, 2/3/67, S1449-50; NASA IAR VI/16)

Sen. Spessard L. Holland (D-Fla.) and Rep. Edward J. Gurney (R-Fla.) introduced joint resolution (S.J. Res. 30) to establish a Commission "to formulate plans for a memorial to astronauts who lose their lives in the line of duty in the U.S. space program." Astronauts Memorial commission would be composed of five Presidential appointees--one NASA representative, one DOD representative, and three civilians. (CR, 2/7/67, S1657; NASA IAR VI/17)

Sen. Vance Hartke (D-Ind.) praised efforts of Mitchell, Ind., residents to erect a memorial to Apollo Astronaut Gus Grissom. "The memorial will preserve the memory of that record for future generations who might otherwise lose sight of the spectacular achievements of the few individuals who made the first forays into space." (CR, 2/16/67, S2071)

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COMMENT DRAFT

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ASTRONAUTICS AND AERONAUTICS

MARCH 1967

A CHRONOLOGY ON SCIENCE, TECHNOLOGY, AND POLICY

(HHR-23)

Text Drafted by Science and Technology Division
Library of Congress

NASA Historical Staff (EH)
Office of Policy Analysis
National Aeronautics and Space Administration
Washington, D.C. 20546

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ABBREVIATIONS OF REFERENCES

This is a revised list of abbreviations for sources cited or likely to be cited in subsequent monthly segments. It should be substituted for the list issued with the January segment.

<u>A&A</u>	AIAA's magazine, <u>Astronautics & Aeronautics</u>
<u>A&A 67</u>	<u>NASA Astronautics and Aeronautics 1967</u> [this publication]
ABC	American Broadcasting Company
AEC Release	Atomic Energy Commission News Release
<u>AF/SD</u>	<u>Air Force and Space Digest</u> magazine
<u>AFOSR</u> Release	<u>Air Force Office of Scientific Research</u> News Release
<u>AFRPL</u> Release	<u>Air Force Rocket Propulsion Laboratory</u> News Release
<u>AFSC</u> Release	<u>Air Force Systems Command</u> News Release
<u>AFSSD</u> Release	<u>Air Force Space Systems Division</u> News Release
<u>AIAA</u> Release	<u>American Institute of Aeronautics and</u> <u>Astronautics</u> News Release
<u>AIP</u> News	<u>American Institute of Physics</u> News
<u>AP</u>	<u>Associated Press</u>
<u>ARC Astrogram</u>	<u>NASA Ames Research Center's Astrogram</u>
<u>ARC</u> Release	<u>NASA Ames Research Center</u> News Release
<u>Atlanta J/C</u>	<u>Atlanta Journal and Constitution</u> news- paper
<u>Av Daily</u>	<u>Aviation Daily</u> newsletter
<u>Av Wk</u>	<u>Aviation Week and Space Technology</u> magazine
<u>B Sun</u>	<u>Baltimore Sun</u> newspaper
<u>CBS</u>	<u>Columbia Broadcasting System</u>
<u>ComSatCorp</u> Release	<u>Communications Satellite Corporation</u> News Release
<u>CR</u>	<u>Congressional Record</u>
<u>CSM</u>	<u>Christian Science Monitor</u> newspaper
<u>CTNS</u>	<u>Chicago Tribune</u> News Service
<u>C Trib</u>	<u>Chicago Tribune</u> newspaper
<u>DAC</u> Release	<u>Douglas Aircraft Co.</u> News Release
<u>DMSSD Apogee</u>	<u>Douglas Missile and Space Systems Division</u> <u>Apogee</u>
<u>DOD</u> Release	<u>Department of Defense</u> News Release
<u>EH</u>	<u>NASA Historical Staff (Code EH)</u>
<u>ERC</u> Release	<u>NASA Electronics Research Center</u> News Release
<u>ESSA</u> Release	<u>Environmental Science Services Administra-</u> <u>tion</u> News Release

FAA Release
FonF
FRC Release
FRC X-Press
GE Forum
Goddard News

GSFC Release
GSFC SSR

H Chron
J/Armed Forces
JPL Lab-Oratory
JPL Release
KSC Release

Langley Researcher

LaRC Release
LA Times
Lewis News
LRC Release
Marshall Star

M Her
MJ
MSC Release
MSC Roundup

M/S Daily
MSFC Release

M Trib
NAA Skywriter

NAA News
NAA Release
NANA
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NASA Hq PB
NASA Hq WB
NASA Int Aff
NASA LAR VI/8

NASA Proj Off
NASA Release
NASA Rpt SRL
NASA SP-4006
NASC Release

Federal Aviation Agency News Release
Facts on File
NASA Flight Research Center News Release
NASA Flight Research Center's FRC X-Press
General Electric Forum magazine
NASA Goddard Space Flight Center's Goddard
News
NASA Goddard Space Flight Center News Release
NASA Goddard Space Flight Center's Satellite
Situation Report
Houston Chronicle newspaper
Journal of the Armed Forces magazine
Jet Propulsion Laboratory's Lab-Oratory
Jet Propulsion Laboratory News Release
John F. Kennedy Space Center, NASA, News
Release
NASA Langley Research Center's Langley
Researcher
NASA Langley Research Center News Release
Los Angeles Times newspaper
NASA Lewis Research Center's Lewis News
NASA Lewis Research Center News Release
NASA George C. Marshall Space Flight Center's
Marshall Star
Miami Herald newspaper
Milwaukee Journal newspaper
NASA Manned Spacecraft Center News Release
NASA Manned Spacecraft Center's Space News
Roundup
Missile Space Daily newsletter
NASA George C. Marshall Space Flight Center
News Release
Minneapolis Tribune newspaper
North American Aviation, Inc., Los Angeles
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National Aeronautic Association News
North American Aviation, Inc., News Release
North American Newspaper Alliance
NASA Announcement
NASA Headquarters Personnel Bulletin
NASA Headquarters' Weekly Bulletin
NASA Office of International Affairs
NASA Legislative Activities Report, Vol. VI,
No. 8
NASA Project Office
NASA (Headquarters) News Release
NASA Report of Sounding Rocket Launching
NASA Special Publication #4006
National Aeronautics and Space Council
News Release

NAS-NRC Release	National Academy of Sciences-National Research Council News Release
NAS-NRC-NAE <u>News Report</u>	National Academy of Sciences-National Research Council-National Academy of Engineering <u>News Report</u>
NBC	National Broadcasting Company
NMI-	NASA Management Instruction-
NN	NASA Notice
NSC Release	National Space Club News Release
<u>NYT</u>	<u>New York Times</u> newspaper
<u>NYTNS</u>	<u>New York Times News Service</u>
<u>O Sen</u>	<u>Orlando Sentinel</u> newspaper
<u>PD</u>	National Archives and Records Service's <u>Weekly Compilation of Presidential Documents</u>
P <u>EB</u>	Philadelphia <u>Evening Bulletin</u> newspaper
P <u>Inq</u>	Philadelphia <u>Inquirer</u> newspaper
<u>SA</u>	<u>Scientific American</u> magazine
<u>SBD</u>	<u>Space Business Daily</u> newsletter
<u>SciServ</u>	Science Service
<u>SE Post</u>	<u>Saturday Evening Post</u> magazine
<u>SF Chron</u>	<u>San Francisco Chronicle</u> newspaper
<u>SR</u>	<u>Saturday Review</u> magazine
<u>Tech Wk</u>	<u>Technology Week</u> magazine
Testimony	Congressional testimony, prepared statement
Text	Prepared report or speech text
Transcript	Official transcript of news conference or Congressional hearing
UPI	United Press International
<u>US News</u>	<u>U. S. News and World Report</u> magazine
<u>USS-T Trans</u>	<u>Translation by NASA Scientific and Technical Information Division translators</u>
WBE SciServ	World Book Encyclopedia Science Service
<u>WJT</u>	<u>World Journal Tribune</u> newspaper
<u>W News</u>	<u>Washington Daily News</u> newspaper
<u>W Post</u>	<u>Washington Post</u> newspaper
<u>WSJ</u>	<u>Wall Street Journal</u> newspaper
<u>WS Release</u>	<u>NASA Wallops Station News Release</u>
<u>W Star</u>	<u>Washington Evening Star/Sunday Star</u> newspaper

MARCH 1967

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March 1: LRC awarded two one-year award-fee contracts totaling \$22,500,-000--\$17,665,000 to General Dynamics Corp. and \$5,171,000 to Honeywell, Inc.--for management and sustaining engineering services on Centaur launch vehicle. (NASA Release 67-43)

- . Dr. Louis B. Arnoldi, former Command Surgeon of Air Force Logistics Command, had been named NASA Director of Occupational Medicine, succeeding Dr. David H. Stoddard, who resigned. (NASA Release 67-45)
- . Special NATO council began study to define and analyze technology gap separating U.S. and Western Europe. Project, initiated by Italian Foreign Minister Amintore Fanfani, would reactivate cooperation within NATO and lead to cooperative programs to close the gap. (Mooney, NYT, 3/2/67, 12)

March 1-2: LUNAR ORBITER III continued transmitting photos of the lunar surface [see Feb. 8-28]. On March 2--during 149th orbit--final photographic readout was interrupted when film failed to advance in the camera system. Efforts to clear the jammed film and continue readout were unsuccessful. Photographic data had been received on all but 29 of 211 frames, including six of the 12 primary Apollo landing sites and 29 of 31 secondary areas. NASA Hq. program and project officials and LaRC engineers would make an on-site analysis of telemetry time histories and engineering tapes at JPL to determine exact cause of failure. (NASA Proj Off; NASA Release 67-46)

- . NASA Deputy Administrator Dr. Robert C. Seamans, Jr., testified in support of NASA's FY 1968 budget authorization before the House Committee on Science and Astronautics. He reviewed 1966 accomplishments and discussed future spaceflight activities: "We completed 22 missions during 1966 successfully out of 29 attempts, or a 76% success. This record is somewhat lower than the previous year, but it is marked by qualitative advances greater than any before.

"The FY 1968 request represents the first true post Apollo decisions.... The combination of the 1971 Mariner flights and the initiation of a continuing, major Voyager program" represented effective translations into action of President's Science Advisory Committee's recommendation that planetary exploration be given a high priority in the post-Apollo period. "During FY 1968 we will be decreasing somewhat our application of manpower effort on the manned space flight programs with a considerable shift in effort from the Apollo to the Apollo Applications part of that activity. We will be increasing our total effort in space science and applications programs, particularly in the build-up of the Voyager program activity...[and devoting] more effort to our advanced research and technology activities...."

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March 1-2 (continued)

Emphasizing that he was "not prepared nor willing to state that a manned lunar landing cannot be achieved before 1970," Dr. Seamans admitted there was a high probability that Apollo program would have to operate on a delayed schedule. "An important contributor to... success will be adequate resources and the flexibility to apply them when needed.... We cannot say today that the \$2.6 billion requested for Apollo is not enough [but] we can say it is not too much.... It cannot be reduced and still accomplish the objectives we have defined." (Testimony; Transcript, 118)

March 2: Two Aerobee 150 sounding rockets carrying instrumented payloads were successfully launched by NASA from WSMR. First rocket carried an ultraviolet stellar spectrometer and input telescope to 97.5-mi (156.8-km) altitude to measure spectral irradiance of five early stars in 1,100 to 4,000 Å wavelength. Second, carrying detectors to observe sky in the infrared, reached 98.5-mi (158-km) altitude. Rockets and instrumentation performed satisfactorily. (NASA Rpt SRL)

- \$5.1-billion NASA authorization bill (H.R. 6470) superseded \$5.05-billion bill (H.R. 4450) referred to House Committee on Science and Astronautics Feb. 1. (Committee Off)

- President Johnson told White House press conference that Soviet Premier Aleksey Kosygin had responded to his Jan. 27 letter: "This reply confirmed the willingness of the Soviet Government to discuss means of limiting the arms race in offensive and defensive nuclear missiles.

"This exchange of views is expected to lead to further discussions of this subject in Moscow and with our allies. It is my hope that a means can be found to achieve constructive results...." Asked if he viewed Senate passage of the consular treaty, the space treaty, the East-West trade treaty, and a nonproliferation treaty as "one movement," the President responded: "I think they are all very desirable moves in the national interest of the United States.

"...we are exploring, with every means at our command, every possible way of relieving tensions in the world and promoting peace in the world." (PD, 3/6/67, 353-4)

- Informed sources said U.S.S.R. had resumed sending meteorological data to U.S. from an orbiting satellite following a four-month pause, AP reported. Sent over a special teletype line established in 1964 between Moscow and Washington, D.C., for exchange of weather information, data were apparently transmitted from COSMOS CXXXXIV, launched Feb. 28. National Environmental Satellite Center later confirmed that it was receiving data from COSMOS CXXXXIV. (AP, NYT, 3/5/67, 31; AP, B Sun, 3/9/67)

March 2: GSFC selected GE Missile/Space Div. to negotiate a \$1.7-million contract to develop, integrate, and test attitude control system for Nimbus D meteorological spacecraft. (GSFC Release G-11-67)

- . MSFC would design and build inhouse a multiple docking adapter (Mda) for use in Apollo Applications (Aa) payload cluster scheduled for launch in 1968-69 [see Jan. 26]. Preliminary designs called for a 10-ft-dia, 15-ft-long cylinder surrounded by five 36-in-dia tunnels with docking collars and sealing hatches for orbital docking. (MSFC Release 67-42)
- . Purdue Univ. had approved memorials for alumni Virgil I. Grissom and Roger B. Chaffee, who died in Jan. 27 Apollo spacecraft fire. Memorials included naming two campus buildings for astronauts, providing full four-year scholarships for the two children of each man, and establishing astronauts' scholarship fund for worthy students. (AP, NYT, 3/3/67)
- . General Dynamics Corp. Convair Div. engineers said NASA had tentatively selected its double delta wing design for a hydrogen-fueled hypersonic aircraft of the future. Aircraft would weigh 500,000 lbs and cruise at six times the speed of sound. (AP, NYT, 3/2/67)
- . It was essential to have a system of international law to protect health of extraterrestrial life, Soviet scientist Gennadi Zhukov told Tass in an interview. The space law treaty signed Jan. 27 was only the beginning of space law as a science, Zhukov said; additional legal controls would be needed to ban potentially harmful experiments, prevent man's thoughtless use of planetary mineral resources, protect any existing forms of extraterrestrial life, and establish permanent orbital inspection stations around earth. (Reuters, NYT, 3/2/67, 20)
- . U.S. should develop a 5,000-mph commercial aircraft and a 8,000-mph bomber, Dr. Antonio Ferri, Director of New York Univ.'s Guggenheim Aerospace Laboratories, told AIAA luncheon meeting in Washington, D.C. "Civilization has grown with the speed of moving around. The history of civilization shows that gradually you want to get in contact with people further away." Dr. Ferri noted that jet aircraft had made Europe accessible, and the next generation of aircraft would bring other parts of the world within equally easy reach. He concluded that the technology and the "tremendous opportunities" of hypersonic aircraft were near at hand, but that necessary decisions and funds were still lacking. (Clark, NYT, 3/3/67, 16)

March 3: U.S.S.R. launched COSMOS CXXXXV into orbit with 2,135-km (1,327-mi) apogee; 220-km (137-mi) perigee; 108.6-min period; and 48.4° inclination. Equipment was functioning normally. (Tech Wk, 3/20/67, 13)

March 3: NASA would delay scheduled 1967 launch of second Orbiting Astronomical Observatory (Oao) until late 1968 to incorporate changes made necessary after failure of OAO I, NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell said in testimony before the House Committee on Science and Astronautics' Subcommittee on Space Science and Applications. Third Oao would be launched in 1969 and fourth in 1970 to continue studies in ultraviolet, x-ray, and gamma-ray spectral regions.

Dr. Newell explained that "the intensive investigations by NASA of OAO-I program development, test, and operations history have resulted in design and program modifications directed toward increasing the reliability and the operating efficiency of the OAO system in order to insure the success of the second OAO mission.... Although the remaining three approved missions have been delayed...the scientific goals of these missions will be accomplished...[and Oao] will continue to be the backbone of the NASA space astronomy program...." (Testimony)

- . Successful 15-sec captive firing of ground test version of Saturn V 1st stage (S-IC) was conducted at MTF by Boeing Co., prime contractor, to prove operational readiness of new S-IC test stand and support facilities and of the Boeing test team. Stage was powered by five Rocketdyne F-1 kerosene- and liquid-oxygen-fueled engines capable of developing 7.5 million lbs thrust. (Marshall Star, 3/8/67, 1)
- . Lockheed Aircraft Corp. was evaluating under a \$65,000 NASA contract the usefulness of slush hydrogen for three proposed long-distance vehicles: Up-rated Saturn I 2nd stage (S-IVB) as a lunar logistics vehicle to land payloads or manned modules on lunar surface; cryogenic service module for manned Apollo flights; and "space tanker" to be filled with hydrogen and used for inflight orbit refueling by other space vehicles. (Lockheed Release M3367-11)
- . Rep. Chet Holifield (D-Calif.) challenged President Johnson's budget priorities and attacked Administration plans to develop a nuclear rocket system for interplanetary space exploration. He told newsmen that it would be a much greater tragedy to limit school aid than to have a Russian cosmonaut welcome U.S. astronauts to Mars. "...We can't be like the Roman Empire. They gave their people circuses when they needed bread. And that empire disappeared." (UPI, W Post, 3/4/67, A2)
- . Washington Evening Star writer William Hines criticized Apollo 204 Review Board's failure to consult Walter C. Williams, operating head of Project Mercury from 1958-63, in investigation of Jan. 27 flash fire. "NASA has no ready answer...to questions about why Williams'

March 3 (continued)

name was omitted from the consultant panel. His standing in the space business is such that it could hardly have been due to chance oversight." Hines said Williams had left NASA in April 1964, reportedly after "disagreement with superiors over management policies. His relations with headquarters officials had been strained for six months prior to his departure, ever since a final report on Project Mercury was issued...[in which] Williams castigated industrial contractors, saying they had given poor attention to quality control on hardware for manned missions...." (Hines, W Star, 3/8/67, A5)

- . AFSC was conducting five-month study of ways to convert excess Minuteman I Icbm's to launch vehicles, thereby saving millions of dollars. Results of study, to be completed by May, would determine feasibility of flight-test program in which two converted Minuteman boosters would launch instrumented payloads into circular orbits from ETR. Preliminary studies had already shown that converted Minuteman booster could place large payloads into 575-mi circular orbit, or smaller payloads into an elliptical orbit 172 mi by 57,500 mi. (AFSC Release 20-67)

March 4: Press should find ways to better meet readers' needs for science news, James B. Lemert, Assistant Professor of Journalism at Southern Illinois Univ., suggested in Editor & Publisher: "There has been an overwhelming explosion of scientific knowledge, and the press has an increasingly important challenge...to report these developments so that the people who wouldn't know a cathode from a microbe--and who shouldn't be expected to know--can understand.

"Public understanding is important, because most of the money for science comes from public funds. Further, the long-term social and political effects of scientific achievements should be watched closely. Sometimes they are not evident until it is almost too late." (Editor & Publisher, 3/4/67)

March 5: USAF SV-5D lifting body was successfully launched from WTR by Atlas booster on reentry mission and telemetered "excellent" performance data to earth before losing its flotation gear and sinking in the Pacific. Released by Atlas booster at desired orbital altitude, the 900-lb vehicle became first spacecraft to perform preprogrammed cross-range maneuvers when it glided away from a straight line and then returned to original flight path. Purpose of flight--second of four in USAF's Precision Recovery Including Maneuvering Entry (Prime) program--was to further test theory that a vehicle could be designed to operate like an orbital spacecraft and be maneuvered like an aircraft when it reentered and traveled through the atmosphere. First SV-5D vehicle,

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March 5 (continued)

launched Dec. 21, 1966, performed successfully but was lost when parachute malfunctioned. (AFSSD Release 77.67; Av Wk, 3/13/67, 23; Miles, LA Times, 3/6/67)

- . Senate Committee on Aeronautical and Space Sciences staff report released by Committee Chairman Sen. Clinton P. Anderson (D-N.Mex.) disputed theory that any nation would have a military advantage with orbiting nuclear weapons. Report, prepared "to provide information for...legislative evaluation" on the space law treaty [see Dec. 8, 1966] submitted for Senate approval Feb. 7, noted: "Majority military opinion holds that orbital bombardment is not an effective strategic weapon as compared to land-based ballistic missiles. An effort to use space-based nuclear weapons would have the effect of a strategic warning, thus placing an aggressor in the position of being open to retaliation by strategic weapons." (Text)
- . Two- to 12-day delivery time for letters between U.S. and Vietnam could be appreciably shortened with Satellite Mail (S-Mail) system, National Environmental Satellite Center's J. Gordon Vaeth suggested in letter to New York Times editor. S-Mail letters would be electronically scanned and converted to radio signals that would be sent by mid-Pacific comsat relay to Vietnam where they would be reconverted and reproduced on a recorder. (NYT, 3/5/67, E9)

March 6: Distance between earth and moon had been calculated at 250,000 mi with 20,500-mi variation by JPL scientists Dr. J. Derral Mulholland and William L. Sjogren. New lunar values, which had an accuracy of less than 50 ft compared to previous discrepancy of one mile, were calculated from theoretical work by astronomer Dr. W. J. Eckert from spaceflight data; verified by ranging measurements of LUNAR ORBITER I and II spacecraft; and used to revise a 50-yr table of lunar motion required for plotting spacecraft trajectories, determining launch times, and scientific research. (JPL Release 436)

- . Florida radio report that Apollo spacecraft 017 had so many manufacturing defects that NASA was returning it to North American Aviation, Inc.'s (NAA) Downey, Calif., plant was denied by NASA. KSC spokesman acknowledged that about 1,000 "squawks" had been found in spacecraft --40 of which would be corrected--but said that at the present time there was no indication it would be returned to NAA. Spacecraft was scheduled for unmanned suborbital flight in May. (W Star, 3/17/67, A4)

March 6: NASC Executive Secretary Dr. Edward C. Welsh stressed at AIAA meeting in Baltimore the importance of space exploration as a contributor to peace: "...space activities can be a substitute for aggression, a bridge to understanding between the nations, and a major tool of arms control and disarmament. Once man accepts the challenge of exploring the great universe around us, he can more readily rise above the terrifying grip of parochial hatreds and fears. Space exploration helps satisfy man's unquenchable thirst for knowledge--a basic characteristic which sets him apart from other creatures. Compared to the business of coercing and killing his own kind, the challenge posed by the prospect of crossing the established frontiers of the normal physical world is not only infinitely to be preferred, but its potential is limitless." (Text)

- . Advanced solid rocket motor capable of being fired or pulsed on command had been developed at the Air Force Rocket Propulsion Laboratory (AFRPL) by Lockheed Propulsion Co. under two-year, \$2-million R&D program. Motor had been selected to power USAF's short range attack missile (Sram). (AFRPL Release)
- . DC-8 Super 63, world's largest commercial jet aircraft, was displayed by Douglas Aircraft Co. in Long Beach, Calif. Scheduled to fly within 30 days, aircraft had 187.4-ft-long fuselage, 148.4-ft wingspan, 251-passenger seating capacity, and 4,600-mi range. (DAC Release 67-36)
- . Milwaukee Journal editorial on space law treaty signed Jan. 27: "What's left unsaid in the new space treaty may be as important to world peace as what the treaty says. The treaty...prohibits stationing nuclear or other weapons of mass destruction in space...[but] makes no reference to use of spacecraft for military reconnaissance.
 "Spy satellites already in orbit can detect activity on earth in unbelieving detail. Even more sophisticated satellites are being developed.... Ground inspection, a barrier to nuclear control agreements, is therefore less important and airplane reconnaissance, which has strained Soviet-American relations, is unnecessary....
 "Reconnaissance satellites orbiting above may thus reduce the chance of war below." (MJ, 3/6/67, 10)

- . Washington Evening Star commented on Senate Committee on Aeronautical and Space Sciences' open hearing Feb. 27 on the Apollo fire: "The nation's space officials evidently have managed to keep their heads in the midst of the emotional chaos that followed the tragic accident at Cape Kennedy. They have resisted pressures from semi-informed sources condemning the pure oxygen environment that supported all Mercury and Gemini astronauts in space. And there is mounting evidence that the arbitrary 1970 goal for a manned lunar landing is no longer a

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March 6 (continued)

major consideration in the space program...[and] that the space planners are determined that they will no longer be prompted to act because of any arbitrary timetable or out of a competitive desire to beat the Soviets to the moon.

"This is as it should be. This nation should move outward into space with all deliberate speed. And right now, the emphasis should be heavy on that qualifying word." (W Star, 3/6/67, A11)

- . New York Univ. School of Engineering and Science announced establishment of a new chair in aerospace science endowed by \$500,000 grant from the Vincent Astor Foundation. Dr. Antonio Ferri, Director of New York Univ.'s Guggenheim Aerospace Laboratories, was named to the chair. (NYT, 3/7/67, 29)
- . Australia might agree to operate first joint tracking station with U.S.S.R. in Western Australia if U.S. approved, Newsweek speculated. U.S. currently operated three stations in Australia, and two more were under construction; U.S.S.R. had to maintain contact with its satellites via picket ships in the Pacific. (Newsweek, 3/6/67, 18)
- . 238,154 airmen certificates--a new annual record and a 32% increase over 1965 total--were issued by FAA in 1966. (FAA Release 67-18)

March 6-7: Merits of nuclear rocket propulsion were discussed by William Hines in series of two articles in Washington Evening Star: "If Congress approves the [Nerva] project...the nation's space horizons will be broadened considerably in the 1980's. Manned flights to Mars and Venus and unmanned missions to even more distant planets could be a reality 15 years hence." Although U.S. had not adopted a manned planetary landing program, Hines explained another advantage of a nuclear rocket--it could be used for continued exploration of the moon after first Apollo landings. "Using a non-nuclear Saturn 5, astronauts are restricted to landing areas in a narrow strip along the moon's equator. A nuclear upper stage would permit a manned spacecraft to land anywhere on the surface of the moon." Other possible uses included manned flyby missions to Mars and Venus; unmanned flights of large payloads to Jupiter, Saturn, and Mercury, or within a few million miles of sun; and manned orbital flights to Mars and Venus. (Hines, W Star, 3/6/67, 1; 3/7/67)

March 7: Secretary of State Dean Rusk, accompanied by U.S. Ambassador to the U.N. Arthur J. Goldberg, urged prompt Senate ratification of the space law treaty [see Dec. 8, 1966] at Senate Foreign Relations

March 7 (continued)

Committee hearings: "In my view, the interests and security of the United States would be advanced by its ratification.... The conclusion of this Treaty, we feel, augurs well for the possibility of finding areas of common interest and agreement with the Soviet Union on other significant issues--especially in those fields in which there are genuine common interests affecting all mankind."

In response to charges by Sen. Albert Gore (D-Tenn.) that some of the provisions were too "vague and even fuzzy," Ambassador Goldberg explained that Senate reservations were "unnecessary" because the treaty was "so crystal clear." Reservations entered by the Senate, he warned, might invite other countries to also enter reservations and thus "impair the value of the treaty." (Testimony; Finney, NYT, 3/8/67, 20)

- . Impact of Jan. 27 Apollo accident on Apollo program schedule was discussed by NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller, testifying before the House Committee on Science and Astronautics: "We will include in our schedules the time necessary to conduct a thorough program of reverification and requalification of changes...based on what we have learned from the AS-204 accident.... Our policy of full qualification prior to manned flight will remain unchanged.

"I do believe we still have a reasonable possibility of meeting the major milestones for the Apollo program which were established in 1963. In particular, although the probability is lowered, I believe we will be able to land men on the moon and return them safely to earth before 1970."

Asked about a manned lunar landing in 1968, NASA Administrator James E. Webb, who accompanied Dr. Mueller, replied that it was "not impossible, but almost impossible." (Testimony; Transcript, 286)

- . Vesta rocket launched by France from Hammaguir Range carried macaque monkey Martine to 233-km (145-mi) altitude in experiment to measure effects of extreme altitude and weightlessness on reactions of the monkey, who had been trained to push a button in response to a red light, for possible application to problems of manned space flight. Monkey was successfully recovered when she landed by parachute 98 mi from launch site after 21-min flight and was reported to be in good health. (NYT, 3/8/67, 24; W Star, 3/7/67)
- . Secretary of Agriculture Orville L. Freeman and six other Government officials visited MSFC at the invitation of NASA Administrator James E. Webb, who had invited cabinet members and representatives of other agencies to visit NASA centers to become more familiar with NASA activities. (MSFC Release 67-45)

March 7: U.S.S.R. would fly a prototype of her 1,550-mph Tu-144 super-sonic transport to the Paris International Air Show May 26, according to U.S. intelligence sources, UPI reported. If reports proved accurate, U.S.S.R. would become first country to fly a supersonic transport--about one year before scheduled flight of Anglo-French Concorde and several years before U.S. Sst. (UPI, NYT, 3/7/67, 69)

- . Canadian government should establish a national space agency and develop an extensive space program to avoid losing its control over domestic communications to U.S., report to new Science Council of Canada by a four-man panel of scientists and engineers concluded. Report asserted satellite communications were best means of binding Canada's five time zones and bringing advances to isolated northern communities. It advocated that Canada "make or buy" her own satellite launching facilities; centralize her fragmented space program for coordinated planning; renegotiate cooperative agreement for sounding rocket launches with U.S. so that Canada could gradually assume complete control of project; and set up a nationwide comsat system within five years. (Walz, NYT, 3/8/67, 21)
- . United Aircraft Corp. vice president and chief scientist Perry W. Pratt received the American Society of Mechanical Engineers' Gas Turbine Award for "his distinguished leadership and technical contributions in the development of aircraft turbojet and turbofan engines used widely throughout the world." (United Release)

March 8: NASA's OSO III (Oso E) Orbiting Solar Observatory was successfully launched from ETR with three-stage Thor-Delta booster to study the sun and its influence on earth's atmosphere. Orbital parameters: apogee, 354 mi (570 km); perigee, 336 mi (540 km); period 96 min; and inclination, 33°. Third of eight spacecraft in NASA's Oso program to provide direct observation of the sun, OSO III weighed 627 lbs, carried nine experiments, and had two main sections: the wheel (lower) section provided stability by gyroscopic spinning and housed the telemetry-command equipment, batteries, electronic controls, gas spin-control arms, and five experiment packages; the sail (upper) section was oriented toward the sun and contained solar cells and solar pointing experiments.

Primary purpose of OSO III 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. Spacecraft's experiments were designed to continue and extend work of OSO I (launched March 7, 1963) and OSO II (launched Feb. 3, 1965) spacecraft by collecting data on solar x rays, gamma rays, ultraviolet radiation, and other solar activity. Project management officials at GSFC tested or turned

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March 8 (continued)

on eight of nine experiments and reported that satellite spin rate, power level, charge rate, and temperatures were normal. Both tape recorders were operating. Last experiment, the high-voltage portion of GSFC's x-ray spectrometer, was successfully turned on March 14. (NASA Proj Off; NASA Releases 67-32, 67-52)

- . First contract for purchase from NASA of launch services for a foreign satellite was signed by NASA and ESRO in accordance with Dec. 30, 1966, Memorandum of Understanding on reimbursable launchings. Under contract, ESRO would purchase a Delta launch vehicle from NASA to launch its Heos-A interplanetary physics satellite from ETR in late 1968. The 230-lb satellite, carrying eight experiments prepared by 10 scientific groups in six European countries, would be launched into 120,000-mi-altitude orbit to investigate interplanetary magnetic field and study solar- and cosmic-ray particles outside the magnetosphere. NASA would be reimbursed about \$4 million. (NASA Release 67-48)
- . The House adopted H.R. 312 authorizing the Committee on Science and Astronautics, during the 90th Congress, to conduct studies, investigations, and inquiries on astronautical, aeronautical, and other scientific R&D. Rep. James G. Fulton (R-Pa.) urged House to authorize an Inspector General in NASA to evaluate complaints and control launch operations. (NASA LAR VI/30)
- . NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell, accompanied by his deputy Edgar M. Cortright and OSSA Director of Space Applications Programs Leonard Jaffe, stressed importance of space science in testimony before the House Committee on Science and Astronautics. "The space research effort has been abundantly fruitful in answering first and second generation questions about our space environment, and in turning up a whole new generation of fundamental and important questions, and potentially fruitful practical applications. To answer these new questions, and to continue advancing in this important field, it is time to select new missions to replace old ones."

Past OSSA successes and proposed 1968 program were outlined by Cortright: "During the past two years (1965 and 1966) 23 of the 28 OSSA missions were successful, including 7 out of 8 deep space missions to the Moon and into interplanetary space. In addition, we successfully launched 6 out of 6 payloads for other organizations. Further, the Atlas Centaur development program was successfully completed and Centaur was used to launch Surveyors I and II. The 1966 series of dramatic successes with second and third generation automated spacecraft demonstrated striking advances in the utility, durability, versatility, and effectiveness of this equipment."

The 1968 program--including Voyager, Mariner Mars '71, Sunblazer,

March 8 (continued)

Nimbus (E and F), Ats, and Voice Broadcast Satellite--had been carefully planned to meet U.S.'s most urgent minimum future needs, Cortright stressed. "...this is a critical year in the development of our Country's program to explore space and to apply space technology to the benefit of man.... Those new missions which we have selected to pursue...constitute the most important of a long list of exciting opportunities for space exploration and practical application." (Testimony; Transcript)

March 8-9: First of five two-day symposiums for Federal supervisors on equal opportunity problems was held at ARC. Part of drive in San Francisco area against minority discrimination within the Executive Branch of the Government, symposium was sponsored by ARC; Palo Alto VA Hospital; Menlo Park USGS; Moffett Field Naval Air Station; and Sunnyvale Naval Plant Representative's Office. (ARC Release 67-2)

March 9: President Johnson told White House news conference he was "very hopeful" of landing men on the moon by 1970, but did not think "there is any guarantee that we will at all." The President noted that a manned lunar landing was "a very difficult undertaking. I think it has been a very close question since the original target date was set." (PD, 3/13/67, 419)

- . Australian government announced it would begin new search for NASA's BIOSATELLITE I, carrying more than 10 million tiny living organisms, believed to have landed in western Australia Feb. 15. Initial search had been canceled by NASA Feb. 22. (Reuters, C Trib, 3/10/67)
- . Report on spaceflight emergencies and spaceflight safety, released by House Committee on Science and Astronautics' Subcommittee on NASA Oversight, made several specific recommendations: (1) NASA and USAF continue to devote intensive study effort to spaceflight safety and report periodically to the committee; (2) NASA and USAF establish joint working-level committee to eliminate duplication of effort, assure compatibility in equipment features, conduct joint accident reviews, and achieve a coordinated effort; (3) each agency establish a separate flight safety group to monitor system designs for specific missions to ensure close attention to the problem of flight safety; (4) development of possible space rescue or escape capabilities be considered in the design and development of all future manned spacecraft; and (5) NASA prepare a long-range "plan for meeting future spaceflight emergencies" --including program identification and long-range funding requirements --by the end of 1967. (Text)

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March 9: NASA Associate Administrator for Advanced Research and Technology Dr. Mac C. Adams outlined NASA's supporting role in Sst development at hearings before the House Committee on Science and Astronautics: "In 1965 NASA provided the FAA with the services of 50 technical people for six weeks for the evaluation of industry-proposed airframe and engine designs. During final evaluations last fall, 75 professionals were provided for two months and two major facilities at Langley and Ames were operated 10 hours a day and 6 days a week during September. We are assisting FAA contractors by making available to them facilities such as wind tunnels and simulators and have helped solve specific problems growing out of detail design. The contractors used about 4100 hours of NASA wind tunnel time for each of the past two years."

NASA was carrying a major research responsibility as a member of a Federal team on the Sst sonic boom program--including definition of sonic boom signatures and effects of sonic boom on structures, Dr. Adams said, and was also continuing its own study of materials suitable for Sst structures. "In addition to supporting the FAA on the present SST, we are continuing our general research program aimed at an improved second-generation supersonic transport. Because we expect to see a rapid growth in research efforts is also taking place." (Testimony)

- . Development of a military base in space or on the moon would be the least expensive way to protect U.S. cities, Rep. William Jennings Bryan Dorn (D-S.C.) suggested in speech on the House floor. He said that the refinement of U.S. capabilities to destroy, on a moment's notice, any potential enemy anywhere in the world would be far superior to development of an antimissile missile system for the protection of selected cities only. In addition, stations in space that could control the weather and current of the sea might well "deter a madman dictator" and a spacecraft capable of raining atomic warheads could ensure peace. (CR, 3/9/67, H2422-3)
- . Rep. Charles E. Goodell (R-N.Y.) introduced legislation to House authorizing the President to "designate a day in January of each year as a day of remembrance" for Apollo Astronauts Virgil I. Grissom, Edward H. White II, and Roger B. Chaffee, who died in Jan. 27 fire at KSC. (CR, 3/9/67, H2460)
- . Wall Street Journal editorial challenged theory presented in Rand Corp.-Brookings Institution publication, Technology, Economic Growth and Public Policy, that massive Federal effort was necessary to supplement U.S. technology development "in nondefense areas, on projects that will add to the nation's store of industrial technology and further spur economic growth...."

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March 9 (continued)

"Improved technology is vital to the nation, and Federal help sometimes is either desirable or unavoidable. But history indicates that the Government's efforts usually should come, not as a matter of bureaucratic routine, but rather as a last resort." (WSJ, 3/9/67)

March 10: COSMOS CXXXXVI was launched by U.S.S.R. into orbit with 310-km (193-mi) apogee; 190-km (118-mi) perigee; 89.2-min period; and 51.5° inclination. Equipment was functioning normally. (Tech Wk., 3/20/67, 13)

- . NASA had awarded Western Electric Co. a \$1,453,000 contract for operation of ground services at KSC connected with Delta launch vehicle guidance system. (NASA Release 67-53)
- . Director of Laboratories (DOL) agency was established within AFSC Hq. "to provide policy and technical direction" to all phases of its eight laboratories' programs and monitor their operations. (AFSC Release 50.67)

March 11: NASA officials dedicated at Corpus Christi, Tex., a 30-ft-dia dish antenna which would be used to receive signals from Apollo spacecraft. Operational responsibility for Corpus Christi tracking station, previously used for Gemini support, had been transferred from DOD to NASA in 1966. (UPI, NYT, 3/13/67, 60)

- . The Vatican had authorized the Roman Catholic apostolic delegate in U.K. to sign the International Treaty on Peaceful Uses of Outer Space, AP reported. Unanimously approved by the U.N. General Assembly Dec. 8, 1966, treaty was signed simultaneously by representatives of 62 nations Jan. 27 in Washington, D.C., London, and Moscow, and was kept open for additional signatures in those capitals. (AP, P Inq, 3/12/67)

March 12: Apollo program was six months behind schedule because of Jan. 27 accident, but time could be made up later, MSFC Director Dr. Wernher von Braun told Stuttgart, West Germany, audience. In Stuttgart to receive gold Boelsche medal for scientific achievement, Dr. von Braun said: "We have in no way lost our chance to fulfill the mission given to us: the landing of a man on the moon in this decade. I admit that the time has become tight. If further snags develop, this decade may run out... [but] we are firmly resolved not to take any undue risks." (AP, B Sun, 3/13/67; UPI, C Trib, 3/13/67)

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March 12: Technology gap was beginning to strain U.S.-European relations, Henry R. Lieberman wrote in the New York Times. Western Europeans, he said, expressed fear that "a widening gulf threatens to leave them further and further behind as the United States assumes command of the future by its grip on the 'high technologies'--computers, microelectronics, space, communications, nuclear energy, aircraft."

Secretary of Defense Robert S. McNamara had suggested that Europeans' complaint "is that we are so surpassing them in industrial development that we will eventually create a technological imperialism."

Noting that Europeans' frustration and resentment might cause increased nationalism, Lieberman cited recent warning by Vice President Humphrey: "Unless we are careful, our concept of the Atlantic partnership can be eroded by the fear and concern about the power of the American capital and technology." (Lieberman, NYT, 3/12/67, 1)

March 13: U.S.S.R. launched COSMOS CXXXXVII into orbit with 317-km (197-mi) apogee; 198-km (123-mi) perigee; 89.5-min period; and 65° inclination. Equipment was functioning normally. (UPI, NYT, 3/14/67, 3)

- . At the insistence of Sen. Albert Gore (D-Tenn.), the Senate Foreign Relations Committee agreed to qualify in its forthcoming report its interpretation of two clauses in the space law treaty [see March 7]. One clause questioned said benefits of space exploration "shall be the province of all mankind"; the other said that each nation would be liable for damages to another caused by its space vehicles. Committee specified that (1) nothing would "diminish or alter the right of the United States to determine how it shares the benefits and results of its space activities"; and (2) damage "pertains only to physical, non-electronic damage." Senator Gore had suggested that if there were two competing U.S. and Soviet space communications networks, one nation might sue the other for damage from electronic interference of one system on the other. (W Post, 3/14/67, A7; Finney, NYT, 3/14/67, 20)
- . NASA was negotiating nine-month, \$275,000 contract with Planning Research Corp. to identify, analyze, and evaluate potential economic returns from possible space station activities in mid-1970's. Earth-oriented application areas such as natural resources, meteorology, and communications would be considered as they might affect both the national and world economy. Univ. of Michigan would be major subcontractor to Planning Research in technical feasibility of remote sensing. Contract would be managed by OMSF Advanced Manned Missions Program. (NASA Release 67-54)

March 13: NASA had agreed to fly four DOD experiments on Apollo Applications (Aa) missions to support USAF's Manned Orbiting Laboratory (Mol), Aviation Week reported; more would be added. Experiments selected to date included: study of an inflatable elastic air lock; use of alternate restraints to determine standard workshop technique in weightlessness; evaluation of suit donning and sleep stations; and integration of multi-purpose equipment maintenance. (NASA Proj Off; Av Wk, 3/13/67, 18)

- . Advanced Defense Satellite Communications Project (Adscp) currently being revised by DOD was expected to reach capacity of 100-200 voice grade circuits, according to Secretary of Defense Robert S. McNamara, Aviation Week reported. In letter to Rep. Chet Holifield (D-Calif.) McNamara said that capacity expansion was being made in accordance with recommendations by House Government Operations Committee's Subcommittee on Military Operations. (Committee Off; Av Wk, 3/13/67, 12)

- . Technology Week editorial criticized Los Angeles Times editor Marvin Miles' accusation that Jan. 27 Apollo accident was caused in large part by NASA's shortsightedness and that NASA was trying to hide its negligence.

"Mr. Miles discusses the hatch hazard and NASA's failure to provide an explosive hatch and its failure to develop a fire suppression system. Then comes the ringing finale... 'The nation should be told the whole truth.'

"It is our impression that the agency is trying valiantly to come up with just such information and we don't understand the implication of a cover-up."

Editorial noted that in the past NASA had often been criticized for being too stringent and that despite all precautions, "something somewhere went wrong....

"We think the agency's standard of conduct has been high. Its statement before Congress was a frank and honest appraisal of the fact that, despite very strong efforts, somehow it had failed to take the steps to protect against the unlikely chain of circumstances that led to disaster." (Coughlin, Tech Wk, 3/13/67, 50)

- . Dr. Marshall L. Rosenbluth, Univ. of California at San Diego, was selected to receive Princeton Univ. Institute for Advanced Study's \$5,000 Albert Einstein Award for 1967 for his "outstanding contributions in the area of plasma physics." Selection of Dr. Rosenbluth, who helped develop the hydrogen bomb, was announced by Dr. Carl Kaysen, Director of the Institute. (AP, W Post, 3/14/67, A9)
- . Final report of New England Assembly on Nuclear Proliferation endorsed a nonproliferation treaty as "a modest but progressive stride toward nuclear control," and urged that U.S. cancel Project Plowshare program of peaceful nuclear explosions, the Washington Post reported. Assembly

March 13 (continued)

concluded: "No present or immediate economic gains are apparent that are worth the political costs. We recommend that implementation of this program be stopped and not resumed unless its economic value is proven and suitable international controls agreed to." (McElheny, W Post, 3/13/67, A8)

March 14: LUNAR ORBITER III photos of SURVEYOR I resting on the moon --first pictures ever taken of an identifiable outline of a man-made object that had been landed on the moon--were released by NASA. Photos were taken Feb. 22 at 30-mi altitude from slant range of 82 mi. (Marshall Star, 3/31/67, 2)

- . NASA Aerobee 150A sounding rocket launched from NASA Wallops Station carried 190-lb payload with AFCRL solar radiation experiment to 128-mi (206-km) altitude and impacted 60 mi downrange in the Atlantic. Protective nose cone was ejected during ascent, but payload did not separate from rocket. NASA later reported that desired results were not fully achieved because of partial failure in the spectrometer.
Prime mission objective was simultaneous measurement of solar extreme ultraviolet radiation (Euv) in upper atmosphere with Aerobee's photoelectric spectrometer and similar instrument on NASA's OSO III Orbiting Solar Observatory, launched from ETR March 8. Data from two would be correlated to verify satisfactory operation of OSO III's instrument. Secondary experiment on Aerobee 150A involved measurements of ion and electron concentrations and changes in radiation along rocket's trajectory. (NASA Release 67-56; WS Release 67-7)
- . President Johnson presented National Space Club's 1967 Goddard Memorial Trophy to Rep. George P. Miller (D-Calif.), Chairman of House Committee on Science and Astronautics, in special White House ceremony. The Trophy, founded in 1958 to recognize outstanding national space leadership, was presented to President Johnson in 1966. (Off of Rep. Miller; CR, 3/9/67, H2408-9)
- . NASA-Smithsonian Institution agreement providing for transfer of NASA's historical artifacts to the Smithsonian for display in National Air and Space Museum became effective. Agreement also specified that Smithsonian would establish a Committee on NASA Artifacts, which would include the NASA Administrator or his designee, to make curatorial decisions on aeronautical and space artifacts "with regard to their significance, preservation, and ultimate disposition." (NMI 1052.85)

March 14: NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller, testifying before House Committee on Science and Astronautics' Subcommittee on Manned Space Flight, was asked about recent press reports that the Apollo program and the Apollo spacecraft had serious deficiencies. "I don't recall the Apollo program in an overall sense as being in difficulty," Mueller replied. "I sincerely believe that the basic Apollo spacecraft design is sound and that the reason we can accommodate the changes that we are anticipating within our budget is that the design is basically sound and the changes that are required are going to be relatively nominal." Dr. Mueller denied reports that NASA was considering changing from North American Aviation, Inc., as prime Apollo spacecraft contractor. (Transcript, 32, 38)

- . Dr. Mac C. Adams, NASA Associate Administrator for Advanced Research and Technology, and his Deputy Dr. Alfred J. Eggers testified on NASA FY 1968 authorization bill before House Committee on Science and Astronautics' Subcommittee on Advanced Research and Technology. U.S. space program was entering a period when NASA would utilize existing capabilities, Dr. Adams said, and it was therefore particularly important for OART to "emphasize new technology so that new systems will be available for the next major thrust in aeronautics and space." He mentioned highlights of the program to develop new technology: (1) Nerva nuclear rocket engine; (2) experimental research related to hypersonic propulsion (3) advanced cryogenic engine; (4) improved life-support systems; and (5) increased effort in electronics problems because "electronics systems may well be the limiting factor in our future exploration."

Dr. Eggers noted that R&D budget request in aeronautics for FY 1968 nearly doubled that for 1967 and said the expansion reflected "recognition of the rapidly growing importance of air transportation and the need for increased R&D to provide required advances in the associated technology. Aeronautics is already the order of a \$24 billion a year industry and it is netting the nation better than \$1 billion per annum in favorable balance of payments. Accordingly, our proposed major strengthening of aeronautics R&D will be to the great commercial as well as military benefit of the nation in the future." (Transcript, 8, 13; Testimony)

- . Acting Under Secretary of Commerce J. Herbert Hollomon, in testimony before Senate Commerce Committee and Committee on Public Works' Subcommittee on Air and Water Pollution, recommended against direct Federal support of an electric car "at this time." He urged instead a program to reward the "best designs of low-pollutant vehicles by basing Government purchase on performance competition.... If electric vehicles can compete successfully...a market could be made available on which production facilities and schedules could be based...." (Testimony, 9, 11)

March 14-15: AAS-NSC Fifth Goddard Memorial Symposium, "The Voyage to the Planets," was held in Washington, D.C.

Arthur C. Clarke, author and Past President of British Interplanetary Society, chided critics of space program expenditures because "'there is so much to do on earth'.... There was plenty to do in Europe when Columbus left--there's still plenty to do there. But the opening up of the new world did more to revive the stagnant European culture and economy than an internal action could possibly have done.

"...I welcome the so-called space race, despite the multiplication of cost and human effort that it involves. If we weren't racing, we wouldn't be moving quickly enough...." (Text)

Mariner spacecraft would be increasingly useful in returning scientific data from the planets, JPL Director Dr. William H. Pickering predicted. He noted launch opportunities during 1970's in which Mariner-type spacecraft could be flown to more than one planet in series of gravity-assist missions and said 1970-6 period offered several favorable opportunities for closeup study of the comets by Mariner-type spacecraft carrying up to 150 lbs of scientific instruments. (Text)

GSFC Director Dr. John F. Clark, discussing possible first mission configuration for a Galactic Jupiter probe, said an initial flight could probably be launched during a 20-day launch window centered on first week of March 1972. Planetary encounter would occur between 17 and 20 mos after launch. (Text)

Sterilization of lander and surface laboratory constituted "the most difficult technological task" of NASA's Voyager program to explore Mars and Venus with automated spacecraft during 1970's, Edgar M. Cortright, NASA Deputy Associate Administrator for Space Science and Applications, told the meeting. The most difficult scientific task was developing an effective integrated set of biological experiments. (Text)

Exploration of the planets would contribute to, not detract from, man's ability to meet problems on earth, Dr. Charles Sheldon II, Library of Congress, suggested. "Also one has the right to hope that even if elements of past history repeat in new forms, mankind with a shrinking world and shrinking solar system, and with a greater awareness of his place within the scheme of things will divert his restless energies and struggles to overcoming the space frontiers rather than wasting his talents and his treasures in fratricidal war...." (Text)

U.S. had achieved world leadership in the technology of space exploration, but that leadership was relative and by no means conclusive, Rep. George P. Miller (D-Calif.) asserted. "The challenge is no less great now than it was in 1957 when Sputnik I jolted us out of the narcosis of complacency. To our peril, we cannot allow the transient pressures and strains of American life to vitiate our determination to maintain that leadership. At the same time we cannot ignore or overlook any opportunity to reach a rapport and an understanding with Russia that will

March 14-15 (continued)

be of material assistance in making the exploration of space for peaceful purposes truly a monumental achievement of all mankind." (Text)

March 15: NASA and West Germany's Federal Ministry for Scientific Research (BMwF) signed Memorandum of Understanding for study of electric fields in the upper atmosphere. NASA would furnish five Nike-Apache sounding rockets for launch from ESRO facilities at Kiruna, Sweden, beginning in April. Rockets would release barium clouds, particularly in the auroras, to be observed from the ground. BMwF would provide chemical payloads and ground observation equipment and would conduct launchings in cooperation with ESRO and Swedish Space Research Committee (SSRC). Both NASA and BMwF would bear cost of their respective responsibilities. Results would be made available to world scientific community. (NASA Release 67-57)

- . NASA and USAF announced agreement to transfer overall management of XB-70 supersonic aircraft research program to NASA Flight Research Center--effective March 25--and to utilize XB-70 "at a reduced rate." Under new arrangement, which updated May 1965 agreement, XB-70 research program would continue as joint NASA-USAF effort, with AFFTC mission support and DOD pilot participation, aircraft support, and research and test projects. Next flight of XB-70, which had been undergoing maintenance, modification, and installation of additional instrumentation since Jan. 31 in preparation for new program, was scheduled for late March or early April. (NASA Release 67-59; FRC Release 5-67)
- . Changes in NASA staff alignment: Harold B. Finger, Manager of NASA-AEC Space Nuclear Propulsion Office (SNPO) since its formation in 1960, was named to new NASA position of Associate Administrator for Organization and Management. He was succeeded in SNPO by his deputy, Milton Klein. Reporting to Associate Administrator Finger would be Assistant Administrator for Administration William E. Lilly; Assistant Administrator for Industry Affairs Dr. Bernhardt L. Dorman; Assistant Administrator for Technology Utilization Dr. Richard L. Leshner; and former LaRC Assistant Director Francis B. Smith in new post of Assistant Administrator for University Affairs. University Affairs Office would integrate, coordinate, and guide NASA's relationships with colleges and universities; manage the Sustaining University Program; and assume other duties previously assigned to OSSA's Office of Grants and Research Contracts. Dr. Thomas L. K. Smull, formerly Director of Grants and Research Contracts, was appointed Special Assistant to the Administrator on NASA-NAS and NASA-NAE relationships.

Other changes: DeMarquis D. Wyatt became Assistant Administrator for Program Plans and Analysis and David Williamson was appointed as

March 15 (continued)

his deputy. Budget and programming functions previously under Wyatt were transferred to the Office of Administration, where they would be integrated into a NASA-wide system for resources management, including programming, budgeting, personnel management, and financial reporting. (NASA Releases 67-49, 67-50)

- . NASA personnel changes: (1) Breene M. Kerr, Assistant Administrator for Policy Analysis, resigned to return to private industry but would continue to serve as part-time consultant to NASA; (2) Gen. Jacob M. Smart (USAF, Ret.) succeeded Kerr in addition to continuing to serve as Special Assistant to the Administrator; (3) William E. Lilly, Director of Program Control, OMSF, became Assistant Administrator for Administration, replacing General Smart; and (4) John Biggs, Deputy Executive Secretary, became Executive Secretary, replacing Col. L. W. Vogel (USA), who returned to his previous assignment as Executive Officer.. (NASA Release 67-47)
- . Sen. Clinton P. Anderson (D-N.Mex.), on behalf of himself and Sen. Margaret Chase Smith (R-Me.), introduced to Senate new \$5.1-billion FY 1968 NASA authorization bill (S. 1296) to reflect President Johnson's Feb. 28 request for funds to develop nuclear rocket technology. Original NASA authorization bill for \$5.05 billion (S. 781) had been introduced Jan. 31. (CR, 3/15/67, S3781)
- . Vice President Hubert H. Humphrey told the National Space Club's 1967 Goddard Memorial Dinner that U.S. space program would continue to move forward despite the Jan. 27 Apollo tragedy. "On behalf of President Johnson, I assure you...that we have not lost heart--that we will not falter--that we shall move forward with renewed determination in our exploration of space." The Vice President said the first obligation was to "come as close as humanly possible to determining the cause of the Apollo 20⁴ accident, so that we can make sure it will never happen again." He said he was impressed with the "tough-minded way the Review Board is going about its work."
National Space Club presented awards for the successful lunar photography program to Boeing Co., and Boeing Co. engineer Robert J. Helberg. (Text; AP, NYT, 3/3/67, 31)
- . NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell, testifying before House Committee on Science and Astronautics' Subcommittee on Space Science and Applications, said the scientific community saw a need to develop a spacecraft to make measurements at low altitude--about 80 mi--to investigate transition between the meteorology of the lower atmosphere and the aeronomy of the upper. In the lower atmosphere the constituents

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are thoroughly mixed; in the upper, they tend to separate by gravity with the heaviest below and the lightest above. "The importance of this transition region has been revealed by the [sounding] rocket program, but only satellites can provide the global measurements needed to establish the lower boundary conditions for the upper atmosphere as a whole," Newell said. "Such a mission would require the development of a spacecraft with a restartable engine in order to achieve an adequate lifetime." (Testimony)

- . Milton B. Ames, Jr., Director of Space Vehicles, and Dr. Walton L. Jones, Director of Biotechnology and Human Research Div., NASA Office of Advanced Research and Technology, testified before House Committee on Science and Astronautics' Subcommittee on Advanced Research and Technology. Ames said land recovery of manned spacecraft was one of OART's major objectives; NASA had enlarged research plans substantially to acquire "without delay" the detailed technology necessary to "permit the confident application of steerable flexible-winged parachutes to the recovery of manned spacecraft." Earliest major potential application would probably be to Apollo, to provide for land recovery in post-lunar-landing period of the early 1970's. "Such a capability would greatly extend the operational flexibility and utility of the Apollo system and...contribute to the feasibility of refurbishment and reuse."

Dr. Jones said increased possibility of aspiration of particulate matter had been identified by NRC Space Science Board as a potentially serious effect of prolonged weightlessness. "In zero gravity conditions, dust particles do not settle out. This could lead to deposits in the respiratory tract which could have important implications in the production of pulmonary disease." Jones said a new instrument to measure and record the number and size of dust particles in a spacecraft was scheduled for an Apollo flight. (Testimony)

- . Satellite reconnaissance alone justified spending 10 times what U.S. had already spent on its space program, President Johnson told a group of Southern educators and Government officials in Nashville. Because of this reconnaissance "I know how many missiles the enemy has." Before making his remarks on space, Mr. Johnson said he did not wish to be quoted on that section of his talk, but more than 100 persons not bound by press rules heard the statements. (Clark, NYT, 3/17/67, 13; Loory, W Post, 3/18/67)
- . NASA had successfully completed series of ground tests to qualify improved graphite nozzle insert in FW-4S solid rocket motor which had malfunctioned during launch of Scout booster in January. Malfunction had caused

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postponement of Feb. 15 launch of ComSatCorp's Intelsat II-C, because FW-4 was 3rd stage of its booster, Thrust Augmented Improved Delta. (NASA Release 67-60)

- . MSC had awarded Bell Aerosystems Co. a nine-month, \$5.9-million fixed-price contract to provide three Lunar Landing Training Vehicles (Lltv) for astronauts to practice simulated lunar landings. Capable of simulating 1/6 gravity environment of the moon, Lltv would be towed to about 4,000-ft altitude and released; pilot could damp out 5/6 of gravity force on vehicle using jet engines; remaining 1/6 gravity would be supported by rocket motors simulating lunar landing conditions. (NASA Release 67-58)
- . An electric rocket engine capable of operating off low solar cell voltage, which could be used for satellite station-keeping or attitude control, had been successfully tested for more than 400 hrs at LRC. (LRC Release 67-11)
- . U.S. should move its technology beyond the "building blocks" to break out of the "mental straitjacket which is confining the Nation to a stalemate of defeatism," recommended a policy statement adopted by Air Force Assn., at meeting in San Francisco. Asserting that U.S.S.R. was "far ahead" of U.S. in a critical area of nuclear knowledge, AFA called for a "sweeping re-examination of national strategy" to assess the impact of technology "on the world balance of power." In a specific resolution, AFA urged a full-scale U.S. Sst program, claiming that U.S.S.R. had been secretly flying a supersonic aircraft prototype for "more than one year." (Davies, NYT, 3/16/67, 10; W Post, 3/17/67, A4)

Dr. Harold Agnew, Weapons Div. leader at AEC's Los Alamos Laboratory, said U.S. reluctance to deploy an antiballistic missile system reflected a new balance-of-power concept which was characterized by weapons judged on their contributions to world stability rather than their superiority. This philosophy was dangerous because it stifled innovation and placed the Nation continually on the defensive. "Whether we use our full technological advantage should be determined solely on whether it is to our advantage politically, militarily and economically as far as our adversary is concerned. I believe it has been a mistake to allow the fleet-ing opinions of every nation that has a vote in the U.N. to influence materially our actions. The inhibition of the use of our full technological advantage has hurt our technological future as well as prolonging whatever confrontation is at hand. The basis of advanced technology is innovation, and nothing is more stifling to innovation than seeing one's product not used or ruled out of consideration on flimsy premises involving public or world opinion...." (Av Wk, 3/27/67, 11)

March 15: The possibility of using communications satellites to help expedite border-crossing formalities on international flights was considered by Air Transport Assn.'s Facilitation Committee meeting in Ponce, Puerto Rico. It was suggested that computers, working with numerical codes and aided by comsats, could file necessary papers on an aircraft's cargo and passengers from point of departure thereby facilitating clearances on arrival in the U.S. (NYT, 3/15/67, 78M)

March 16: COSMOS CXXXXVIII was successfully launched by U.S.S.R.

Orbital parameters: apogee, 436-km (271 mi); perigee, 275 km (171 mi); period, 91.3 min; and inclination, 71°. Equipment performed satisfactorily. (Sehlstedt, B Sun, 3/28/67)

- . COSMOS CXXXXIV satellite, which began transmitting meteorological data to Washington, D.C., March 2, was equipped with an infrared camera for night photography of clouds and ice fields and two television cameras for daylight photography of weather patterns, Izvestia reported. Launched Feb. 28, satellite was powered by two wing-like solar batteries that turned automatically to trap solar rays. (Reuters, NYT, 3/17/67, 13)
- . NASA Nike-Apache sounding rocket launched from NASA Wallops Station carried 96-lb payload with joint U.S.-Indian ionosphere experiment to 88-mi (142-km) altitude before impacting 100 mi downrange in the Atlantic. Purpose of flight was to prove out instrumentation and test new antenna design. Experiment, which measured electron and ion densities and lyman alpha flux in lower ionosphere with a riometer--cosmic radio noise absorption device--and a Langmuir probe, was being developed for series of cooperative NASA-INCOSPAR launches from Thumba range, India. (NASA Release 67-61; WS Release 67-8)
- . 110 scientists from U.S. and six other countries were selected by NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell--upon recommendation of Space Science Steering Committee--to conduct experiments with first lunar samples returned by U.S. Apollo astronauts. Principal U.S. investigators represented 21 universities, two industrial firms, three private institutions, and 10 Government laboratories. Nine scientific institutions were represented in U.K.; three in West Germany; and one each in Canada, Japan, Finland, and Switzerland. Most investigations would be conducted in scientists' own laboratories, but time-critical experiments would be carried out in MSC's Lunar Receiving Laboratory during quarantine period--anticipated to last 30 days. Plans called for a total of 122 experiments on approximately 50 lbs of lunar material to study composition of lunar surface and search for evidence of its origin. Four major investigative areas were: (1) mineralogy and petrology; (2) chemical and

March 16 (continued)

isotope analysis; (3) physical properties; and (4) biochemical and organic analysis. (NASA Release 67-55)

- . Francis J. Sullivan and Dr. Hermann H. Kurzweg of NASA Office of Advanced Research and Technology testified before House Committee on Science and Astronautics' Subcommittee on Advanced Research and Technology. Sullivan, Director of Electronics and Control Div., said that the development of technology for high-resolution, 60- to 120-in space telescopes for optical astronomy, communications, and other potential applications was a major OART effort. "Success in this research will provide the capability to study celestial objects which cannot be viewed from the ground because of atmospheric attenuation and will provide vastly improved resolution over that attainable through the earth's atmosphere." Sullivan said because environmental, structural, and control problems of large mirrors in space were almost insurmountable with conventional fabrication and alignment, unique approaches were being studied. One was 24-in-dia, three-segment mirror feasibility model in which distortion sensor, located in front of primary mirror, determined which segments were out of alignment and to what degree. Electronic circuitry then processed and used the alignment data to realign mirror surface segments with actuators located behind each segment.

Dr. Kurzweg, Director of Research, said that JPL had developed a new mathematical approach for calculating energy requirements for Mars vehicles which provided, for the first time, a complete day-by-day listing of the energies necessary for a round trip. Calculations had been completed for launching during the entire 1970-80 decade. "The calculated trajectories went from a circular parking orbit about the Earth to the vicinity of Mars, into a circular parking orbit about Mars for a stay time of 7 days, out of the circular parking orbit about Mars to the vicinity of the Earth, and into a circular parking orbit about the Earth. It was assumed that the one way flight times for both the departure and return trajectories are the same." Dr. Kurzweg said information was very important for "fast trade-off calculations for future advanced Mars missions...." (Testimony)

- . Vice President and Mrs. Humphrey, accompanied by NASC Executive Secretary Dr. Edward C. Welsh, would visit MSFC and U.S. Army Missile Command (AMC) at Redstone Arsenal March 22-23, MSFC and AMC announced. Trip was later postponed because Mr. Humphrey felt he should remain in Washington, D.C., to greet President Johnson on his return from a Pacific trip. (MSFC Release; Marshall Star, 3/22/67, 1)

March 16: Request for stricter controls to prevent "instrument abuse" at KSC was made by R. L. Wilkinson, chief of Measurement Systems Div. at KSC, in memorandum to NASA employees and contractor officials. An increasing number of instruments were requiring repairs because of tampering, "simple carelessness," and apparent thievery, Wilkinson noted. He said he had instructed technicians in his instrument calibration shop to report all "cases of obvious instrument abuse or missing rechargeable batteries"; reports would be "reviewed and forwarded through appropriate management channels for corrective action." (Hines, W Star, 3/27/67, A1, A8)

March 17: Honeysuckle Creek Tracking Station near Canberra, Australia --newest member of NASA's 16-station network to support manned Apollo missions--was dedicated in ceremonies attended by Australian Prime Minister Henry E. Holt, NASA Deputy Administrator Dr. Robert C. Seamans, Jr., and Edmond C. Buckley, NASA Associate Administrator for Tracking and Data Acquisition. Vice President Hubert H. Humphrey cabled congratulations to Prime Minister Holt: "The establishment of this tracking station is another link in the long chain of cooperative efforts in space between...Australia and the United States.

"In its support of the Apollo program, this new station will play a vital role in communications with our astronauts in preparation for their landing on the Moon and return to Earth...." (NASA Release 67-65)

- . President Johnson, in letter transmitting ComSatCorp's 1966 Annual Report to Congress, said: "Accomplishments of the past year under the Communications Satellite Act of 1962 have brought mankind to the threshold of a full-time global communications service to which all nations of the world may have equal access, from which all nations of the world may derive their share of the benefits.

"Our Space Technology is opening new doorways to World Peace. Within the grasp of the world's peoples is the potential for completely new, heretofore unimagined ways of peaceful cooperation for expanding world trade, for enhancing educational opportunities, for uplifting the spirit and enriching the lives of people everywhere...." (PD, 3/20/67, 494)

- . U.S. officials reported that COSMOS CXXXXVI, launched March 10, had split into three parts: two were spacecraft and one was final stage of launch vehicle, Evert Clark said in New York Times. Exact date of separation was not known. Some officials speculated that flight might have been in preparation for a manned flight on April 12--sixth anniversary of first manned space flight, by Cosmonaut Yuri Gagarin. (Clark, NYT, 3/18/67, 11)

March 17: Three Athena missiles were successfully launched within $4\frac{1}{2}$ hrs from Green River, Utah, to WSMR target area as part of continuing USAF study of missile atmospheric reentry. (AP, NYT, 3/19/67, 57; Tech Wk, 3/27/67, 28)

- . Paper model of "possible lifting re-entry vehicle design" had flown at 17 times the speed of sound and withstood $4,000^{\circ}$ F temperature and pressure equal to 177,000-ft altitude in test to check out recently-repaired wind tunnel at LTV Aerospace Corp. in Dallas. Designed by LTV scientist Charles J. Stalmach, model emerged after $\frac{1}{4}$ -sec test with only the nose and leading wing edges slightly blackened. (UPI, NYT, 3/17/67)
- . President Johnson's Science Advisory Committee's (PSAC) report, The Space Program in the Post-Apollo Period [see Feb. 11], was criticized by Dr. Philip H. Abelson in Science. Report did not fully discuss the comparative value of space and nonspace activities and "quickly ducked" the difficult problem of priorities, Dr. Abelson said. Nowhere was there an evaluation of the chances of finding extraterrestrial life. "Another deficiency is the lack of a full discussion of the role of man in deep space exploration. To date, manned missions have contributed little scientifically. The unmanned missions have had a cost effectiveness for scientific achievement perhaps 100 times that of the manned flights. Nevertheless, the report implicitly calls for a major role for man in the post-Apollo program...." (Abelson, Science, 3/17/67)

March 19: Dr. Rem Khokhlov, Univ. of Moscow, predicted at Symposium of Modern Optics in New York that within one year "or a little more" combined Soviet and U.S. techniques could make it possible to tune laser light to any wavelength from shortest wavelengths of ultraviolet across entire spectrum of visible and infrared light to the radio wavelengths used for radar. He described recent Soviet developments in the field and noted that U.S. and U.S.S.R. research was proceeding along parallel lines: both used certain crystals to alter wavelengths of light produced by a laser. Dr. Khokhlov believed tunable laser beam could be used in photochemistry to produce new materials and drugs and would have broad applications in basic physics. (Sullivan, NYT, 3/20/67, 33)

March 20: NASA would use AS-204 booster--an Up-rated Saturn I--to launch first Apollo Lunar Module (Lm) on unmanned flight in summer 1967 because it was last booster equipped with full research and development instrumentation. Original plans had been to use AS-206 booster. Undamaged during Jan. 27 fire, AS-204 launch vehicle would be moved

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from Launch Complex 34 to Launch Complex 37, which was equipped for unmanned launches of the Lm. AS-206 booster would be stored for use in a subsequent mission. Purpose of first Lm mission was to obtain data on ascent and descent propulsion systems, including a restart of the descent system; verify Lm structure; and evaluate staging. (NASA Release 67-67)

NASA Associate Administrator for Manned Space Flight Dr. George E. Mueller, in testimony before House Committee on Science and Astronautics' Subcommittee on Manned Space Flight, presented profile of a typical manned Mars mission. "We would launch as we approach the target planet, a series of [unmanned] probes, one would be an orbiter, another would be a Mars surface sample return probe.

"There would also be some Lander probes which would provide us with information about the atmosphere and the surface on a continuing basis. All of this would be done in a matter of a few days while one was in the vicinity of the planet.

"We would also be carrying out observations of the local environment and conducting an extensive solar observation program and a planetary observation program from various vantage points one attains from an orbit that is far removed from earth." Asked about the alternative of launching an instrumented spacecraft into a long elliptical orbit with two focal points--the earth and Mars--and manning it from earth, Dr. Mueller replied: "The major problem associated with that is that we are talking about a...telescope at least forty inches in diameter. It is a quite difficult task and we are reaching a level of complexity when man becomes an essential part of the system...." (Transcript, 180-1)

- . In the year 2000, space satellites would be identifying soil, assessing crop yield, and determining the extent of disease, drought, or insects, Secretary of Agriculture Orville L. Freeman predicted at National Assn. of Science Teachers' convention in Detroit. "While the farmers of tomorrow study reports in their air-conditioned offices, relieved at last of the physical drudgery and occupational anxiety so traditionally theirs...these shining space satellites, equipped with the most sophisticated remote sensing instruments will be supplying the information needed to make key decisions.

"Through information gathered by the satellites, the Government will be able to make accurate predictions to guide marketing and distribution of farm products to avoid waste and local shortages and surpluses." (Text; AP, NYT, 3/21/67, 34)

- . MSFC awarded Bendix Corp. \$7.4 million cost-plus-award-fee contract for development and production of Apollo Telescope Mount (Atm) pointing control system (Pcs). Bendix was scheduled to produce three units by

March 20 (continued)

August. Atm system would permit Apollo astronauts to point a telescope to selected regions of the sun during period of maximum solar flare activities beginning in late 1968. MSFC had awarded American Optical Co. \$740,460 contract to build a dynamic simulator for use in developing the Pcs. (MSFC Releases 67-54; 67-58; NASA Release 67-66)

- . Tokyo Univ.'s Institute of Space and Aeronautical Science would receive \$11 million of Japan's \$17.5-million space budget for FY 1967 (April 1967-March 1968), Technology Week reported. The Institute would launch 33 vehicles, including a 150-lb scientific satellite; a Mu 4S rocket; and three Lambda 4S vehicles. Remaining funds would go to the Transport Ministry, Meteorological Agency, and Ministry of Posts and Telecommunications. (Tech Wk, 3/20/67, 13)

March 21: U.S.S.R. launched COSMOS CXXXXIX into orbit with 297-km (185-mi) apogee; 248-km (154-mi) perigee; 89.8-min period; and 48.4° inclination. Equipment was functioning normally. (Tech Wk, 3/27/67, 28)

- . Dr. Homer E. Newell, NASA Associate Administrator for Space Science and Applications, defended the Mariner/Mars 1971 mission in testimony before House Committee on Science and Astronautics' Subcommittee on Space Science and Applications. Responding to criticism by Committee Chairman Rep. Joseph E. Karth (D-Minn.) that information from the mission would arrive too late to contribute to the design of the 1973 Voyager spacecraft, Dr. Newell said: "...it is very important to recognize...that there are three areas of design involved. One is the hardware design. Two is software design, and three is design of the scientific mission.... The Mars 71 probe will be fully in time for us to use in the software design, in other words, setting the profile of the mission to get the spacecraft into the atmosphere and onto the surface, and will be fully involved in continuing design of the scientific experiments and observations...." (Transcript, 433-5)
- . NASA-Cal Tech cost-plus-fixed-fee contract providing for operation of JPL had been extended for two years through Dec. 31, 1968, without major change. Since October 1958, Cal Tech had staffed and operated JPL; NASA owned the property, facilities, and equipment. (NASA Release 67-68)
- . Soviet Vostok spacecraft were equipped with quick-opening explosive hatches and jet-propelled ejection seats--the kind of equipment which might have saved U.S. Apollo astronauts Jan. 27, Cosmonaut Valentina Nikolayeva-Tereshkova said in Aviatsiya i Kosmonavtika. (UPI, NYT, 3/23/67)

March 21: ComSatCorp's annual report to its shareholders summarized accomplishments of 1966: "Satellite service brought a new era of communications to the Pacific area. Live transpacific television and other traffic was transmitted by the first of the INTELSAT II series of satellites even though the satellite did not achieve synchronous orbit as intended. A second INTELSAT II satellite was successfully emplaced in synchronous orbit and began regular, 24-hour commercial service over the Pacific, handling telephone, teletype, data, facsimile and television...." Report also revealed that Intelsat's Interim Committee had selected synchronous orbit configuration for basic global system, substantially reducing the number of satellites necessary for global coverage and the complexity of earth stations. Selection was made "after high-quality capability of synchronous satellites was established by the performance of Early Bird." (Text)

- . 50-lb radio backpack that could fix a soldier's position precisely by signals from a satellite had been developed by Johns Hopkins' Applied Physics Laboratory under sponsorship of USN Air Systems Command. Backpack would represent first dry land application of USN navigation satellites to military problems. In most cases, packs would be used in pairs: a forward fire controller would receive satellite signal and relay it to another soldier equipped with a backpack at an artillery base who also would have read satellite signal. Two readings would be transmitted to computer which would instantly tell each man his precise position. Navy sources predicted mass production models of backpack, working with existing satellites, could be in combat use in Vietnam soon. (Clark, NYT, 3/22/67, 16)

March 22: NASA launched ComSatCorp's INTELSAT II-C (nicknamed "ATLANTIC II" and "CANARY BIRD") comsat from ETR by three-stage Thrust Augmented Improved Delta booster into elliptical transfer orbit in preparation for geostationary orbit. Transfer orbit had 22,115-mi (37,200-km) apogee; 183-mi (294-km) perigee; 660.56-min period; and 27° inclination. On March 25, ComSatCorp fired apogee motor transferring satellite into geostationary orbit over the Atlantic.

Scheduled to enter commercial service April 6 INTELSAT II-C would join EARLY BIRD I, world's first commercial comsat, in providing service across the Atlantic and in fulfilling Project Apollo communications requirements. It was third satellite in ComSatCorp's Intelsat II program to place two comsats in synchronous orbit--one over the Pacific, one over the Atlantic. First satellite--INTELSAT II-A ("LANI BIRD")--was launched by NASA Oct. 27, 1966, but failed to achieve synchronous orbit because apogee motor malfunctioned; second--INTELSAT II-B ("LANI BIRD II")--was launched Jan. 11, achieved synchronous orbit over the

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March 22 (continued)

- Pacific, and entered commercial service Jan. 27. Intelsat II comsats, larger and improved versions of EARLY BIRD I (INTELSAT I) satellite, were capable of handling television and data transmissions of up to 240 voice channels. (ComSatCorp PIO; ComSatCorp Release)
- . COSMOS CL was successfully launched by U.S.S.R. into orbit with 373-km (232-mi) apogee; 206-km (128-mi) perigee; 90.1-min period; and 65.7° inclination. Equipment performed satisfactorily. (AP, NYT, 3/24/67)
 - . NASA Aerobee 150A sounding rocket launched from NASA Wallops Station carried AFCRL solar radiation experiment to 142-mi (229-km) altitude in test to complement March 14 mission which was not entirely successful. Primary objective was simultaneous measurement of solar extreme ultra-violet radiation (Euv) in upper atmosphere with Aerobee's photoelectric spectrometer and similar instrument on NASA's OSO III Orbiting Solar Observatory, launched March 8. (WS Release 67-11)
 - . Maj. Michael J. Adams (USAF) flew X-15 No. 1 to 3,818 mph (mach 5.68) and 135,000-ft altitude during nine-min flight at Edwards AFB to: (1) provide pilot experience at high altitudes; (2) record stabilizer flow angle of attack; (3) test electrical loads; (4) check out 3rd landing skid; (4) check out pressure attitude indicator; (5) record data from X-15 sonic boom; and (6) check out ablative coatings on stabilizer. (NASA X-15 Proj Off)
 - . An electrical arc caused by a break in insulation on a wire was "the most probable cause" of the Jan. 31 flash fire at Brooks AFB in which two airmen died, USAF investigative board concluded. Board said an electrical cord powering a work lamp outside oxygen-filled pressure chamber apparently developed a break in its plastic insulation, allowing wire to create an electrical arc against the aluminum floor. (AP, NYT, 3/23/67, 31)
 - . NASA Associate Administrator for Space Science and Applications Dr. Homer E. Newell told House Committee on Science and Astronautics' Subcommittee on Space Science and Applications that NASA did not know whether U.S.S.R. was adequately sterilizing its interplanetary spacecraft. "If we find...that...[Soviet] sterilization procedure is many orders of magnitude less good than ours, then we will be able to relax in our standards simply because there will be no value in our going through an expensive process only to find that they have already contaminated the planet.
"However, we do not know at the present time, and there is reason to believe that their procedures may well turn out to be adequate." (Transcript, 446)

March 22: North American Aviation, Inc., and Rockwell-Standard Corp. announced agreement on proposal to merge into new corporation called North American Rockwell Corp. Proposal was subject to approval by directors and stockholders of each company. (WSJ, 3/23/67)

- . A record 45-million takeoffs and landings were recorded in 1966 by FAA's 304 airport traffic control towers. Figure represented 12% increase over 1965. (FAA Release 67-24)
- . Dr. Eugene G. Fubini, an IBM vice president, told IEEE meeting in New York that too many scientists and engineers--as prime movers of change--were not sufficiently attentive to the results of their discoveries and inventions. "Historically, scientists and engineers have underestimated or ignored the social and moral consequences of their work. Don't continue to make that mistake," he warned.

Dr. Charles H. Townes, MIT provost, received IEEE's 1967 Medal of Honor for his "significant contributions in the fields of quantum electronics which have led to the maser and the laser." (Lieberman, NYT, 3/26/67, F1; Av Wk, 3/13/67, 97)

March 23: NASA had discarded crew assignments for three manned Apollo missions originally scheduled for 1967 but postponed shortly after Jan. 27 fire, MSC Director of Flight Crew Operations Donald K. Slayton told the press at MSC. "We don't have any crews assigned officially to any missions at the present time. There's not much point in worrying about crew assignments until we know what we're going to do." Backup crew for AS-204 mission had been Astronauts Walter M. Schirra, Jr., Donn F. Eisele, and Walter Cunningham; prime crew for AS-205/208 mission had been James A. McDivitt, David Scott, and Russell Schweickart; for AS-503, Frank Borman, Michael Collins, and William Anders. (UPI, W Star, 3/24/67, A2; AP, W Post, 3/24/67, A6; Wilford, NYT, 3/24/67, 1, 15)

- . U.S. officials were studying possibility of live television coverage via INTELSAT II-C comsat of Latin American summit conference in Punta del Este, Uruguay, April 12-14, which President Johnson was scheduled to attend, Benjamin Welles reported in New York Times. Live coverage would require air-lifting a portable ITT ground station to conference site because necessary ground stations for picking up satellite signals did not yet exist in Latin America. Use of ComSatCorp's INTELSAT II-C, launched by NASA March 22, would not only enhance interest in meeting, officials said, but would also dramatize U.S. technological and political support for Latin America. (Welles, NYT, 3/24/67)

March 23: LaRC Director Dr. Floyd L. Thompson had been selected as one of 10 public servants to receive National Civil Service League's 1967 Career Service Award for his pioneering efforts as an engineer, scientist, and administrator in advancing the science of aeronautics and space flight in the U.S. Award would be presented to Dr. Thompson April 21 at Annual Career Service Awards banquet in Washington, D.C. (NASA Release 67-69)

- . NASA Wallops Station employee James C. McConnell had been awarded \$1,000 for his invention "A Method of Plating Copper on Aluminum" by NASA Inventions and Contributions Board. Award was part of agency-wide program to encourage and reward NASA employees for meritorious inventions and contributions.

A second Wallops employee--Joseph W. McAllister--had been named one of the 1967 Economy Champions under President Johnson's national economy program for his "Device to Salvage Power Line Guy Anchors." An economy champion was a Government employee whose achievement or adopted suggestion during FY 1967 had shown first-year measurable benefits of \$10,000 or more. (WS Releases 67-9, 67-10)

- . Rep. Dante B. Fascell (D-Fla.) introduced in the House a bill (H.R. 7798) to strike commemorative medals in honor of Astronauts Virgil I. Grissom, Edward H. White II, and Roger B. Chaffee who died in the Jan. 27 Apollo flash fire. (CR, 3/23/67, H3301)
- . U.S. Ambassador to the U.S.S.R. Llewellyn E. Thompson and Soviet Foreign Minister Andrey A. Gromyko met briefly in Moscow for "preliminary discussions" aimed at mutual agreement not to deploy antimissile missile systems, U.S. Embassy announced. (AP, W Post, 3/23/67, A12)
- . Shortage of U.S.-manufactured high-reliability components because of the demands of the Vietnam war was one of the reasons Canada was postponing the launch of her Isis-A satellite from fall 1967 to 1968, Dr. John H. Chapman, Deputy Superintendent of the Defence Research Communications Establishment, told Toronto Globe & Mail. Isis-A would measure characteristics of the ionosphere. (Toronto Globe & Mail, 3/24/67, 29)
- . A correlation between earthquakes and the forces exerted on the earth by the sun and moon was reported by Dr. Alan Ryall, Director of Univ. of Nevada seismological station. Dr. Ryall said he could support with scientific data the theory that where the earth's crust is fractured and weakened, all that is necessary to cause earthquakes might be the pulling force or gravity of the sun and moon. (W Post, 3/24/67)
- . U.N. 17-nation disarmament conference in Geneva recessed until May 19 at U.S. request. (Cook, W Post, 3/24/67, A12)

March 23: ComSatCorp awarded two four-month study contracts--one to Lockheed Missiles and Space Co. for \$272,000 and one to Hughes Aircraft Co. for \$299,484--for research on advanced high-capacity synchronous satellites. Lockheed had proposed an inertia-wheel stabilization concept and Hughes a spin-stabilized approach for stabilizing a spacecraft in synchronous orbit. ComSatCorp had advised FCC Jan. 19 of plans to award contracts. (ComSatCorp Release)

- . U.K.'s Royal Aeronautical Society had invited foreigners to enter an eight-year old annual competition to stay aloft in a muscle-operated craft over a figure-eight course with two turning points half a mile apart, Reuters reported. Society had also increased prize from \$10,000 to \$28,000. (Reuters, NYT, 3/23/67, 5)
- . U.S. astronauts were honored with a special award at American Personnel and Guidance Assn. convention in Dallas. Accepted by Charles Duke on behalf of his fellow astronauts, the award cited the "exemplary model astronauts display to American youth in intellectual achievement, self-discipline, personal dedication and physical fitness." (UPI, W Star, 3/24/67, A6)

March 24: U.S.S.R. launched COSMOS CLI into 630-km (391-mi) -altitude circular orbit with 97.1-min period and 56° inclination. Equipment was functioning normally. (W Post, 3/25/67, A4)

- . Apollo 204 Review Board announced that completion of its final report on Jan. 27 fire would be delayed one week until April 8. Dr. Floyd L. Thompson, Director of LaRC and Chairman of the Board, issued another call for any information that might aid the probe. Board also announced that it had completed piece-by-piece disassembly of Apollo I spacecraft, although testing and analysis of spacecraft systems and parts were continuing. (UPI, W Star, 3/25/67, A5; W Post, 3/25/67, A5)
- . U.S. policies for sterilizing planetary spacecraft were needlessly stringent and should be revised to take into account new scientific data and past and continuing Soviet activities, two groups of U.S. scientists suggested in companion articles in Science. First, by Drs. N. H. Horowitz and R. P. Sharp of Cal Tech and R. W. Davies of JPL, reviewed sterilization standards set in 1964 by COSPAR and agreed to by both U.S. and U.S.S.R. "In effect the [COSPAR] resolution requires that less than one viable microorganism be contained in each 10,000 spacecraft intended for planetary entry. Attainment of such a goal demands heroic measures, and current U.S. directives call for dry-heat sterilization of the completely assembled lander stage." The

March 24 (continued)

authors asserted that COSPAR requirements were based on the outdated assumption that terrestrial microorganisms could thrive on other planets, particularly Mars; present knowledge, however, indicated that Mars is so dry, lacking in oxygen, and soaked with lethal forms of ultraviolet sunlight that proliferation of earth organisms would be unlikely. They suggested that COSPAR-recommended constraints "could be substantially relaxed without compromising to any significant degree the biological condition of Mars."

Second article, by Dr. Bruce C. Murray, Cal Tech, Merton E. Davies, Rand Corp., and Dr. Philip K. Eckman, JPL, said U.S. policy should concentrate on seeing that "U.S. contribution to planetary contamination will remain significantly less than the Soviet contributions" thereby reducing "significantly the cost and time required to carry out serious scientific investigations of the surfaces of Venus and Mars." The authors suggested that U.S.S.R. had already hit both Mars and Venus with spacecraft not sterilized in accordance with COSPAR standards. Any requirement for U.S. to apply more stringent restrictions "is illogical in that...the U.S. would be asked to increase greatly the cost and complexity of its planetary program without achieving any significant reduction in the probability of actual contamination." (Science, 3/24/67, 1501-10)

- . AFSC announced personnel changes. Effective March 27: (1) M/G Harry L. Evans, Vice Director of Manned Orbiting Laboratory (Mol), would become Assistant to the Commander, AFSC, pending his retirement from USAF May 31; (2) M/G James T. Stewart, Director of Space, Deputy Chief of Staff/Research and Development, USAF Hq., would succeed General Evans; (3) B/G Walter R. Hedrick, Jr., Assistant Deputy Chief of Staff/Systems, AFSC Hq., would succeed General Stewart. Effective summer 1967: (1) B/G Joseph S. Bleymaier, Commander of WTR, would become Deputy Director, Mol, with additional duty as Deputy Commander, Space Systems Div. for Mol; (2) B/G Clifford J. Kronauer, DOD Office of Director of Defense Research and Engineering, would succeed General Bleymaier; (3) M/G Vincent G. Huston, Commander of ETR, would be reassigned to AFSC Hq. as Deputy Chief of Staff for Operations; and (4) M/G David M. Jones, NASA Deputy Associate Administrator for Manned Space Flight, would replace General Huston. (AFSC Releases 63.67, 64.67)
- . Life magazine disputed critics who advocated cutting back NASA's Apollo program: "We do not share the attitude that it doesn't matter who gets to the moon first, we or the Russians. It does matter.... Remember the astonishment, the embarrassment, the apprehension, the loss of prestige we all felt so keenly when Sputnik I went up on Oct. 4, 1957? The prestige we then sought to regain was not mere prestige, an empty abstract symbol of superiority. The superiority

March 24 (continued)

at stake was real, not symbolic....

"NASA is now engaged in its customary annual defense of its budget requests. We recommend that its expenditures be kept at the \$5 to \$6 billion level for now. As we continue to compare NASA's budget with other pressing needs, we must be aware of the challenges and opportunities that arise in space...." (Life, 3/24/67)

March 25: U.S.S.R. launched COSMOS CLII, its eighth Cosmos satellite during March, to achieve record month of space launchings. Orbital parameters: apogee, 512 km (318 mi); perigee, 283 km (176 mi); period, 92.2 min; inclination, 71°. Equipment was functioning normally. (UPI, W Post, 3/26/67, A3)

Capt. Robert F. Freitag (USN, Ret.), Director of Field Center Development, OMSF, addressed the National Student Conference in Ann Arbor, Mich.: "...the more dramatic aspects of the space program sometimes tend to overshadow the fundamental purposes of the space effort. Just as the moon had influenced the course of young lovers for centuries, so has the excitement of lunar exploration blinded many to the deeper purposes and far reaching benefits of the nation's overall space program, and its deep impact on present and future generations.

"...a dynamic space program will...bring rewards in knowledge, wonders, and resources far surpassing the investment it requires in money, materials, and brainpower. We do not know all that we shall learn when we are able to place men, instruments, telescopes, and laboratories beyond the envelope of the earth's atmosphere. But we do know that we shall know a great deal more than we can possibly now know about the reality of which we are a part." (Text)

- . Soviet scientist Ruvin Garber revealed that U.S.S.R. had developed a thin thread-shaped tungsten crystal which was the "strongest substance" ever made on earth, UPI reported. Strand was reportedly .0002 cm in diameter and could withstand 230 tons of pressure per sq cm. (UPI, NYT, 3/27/67, 67)

March 26: White House Office of Science and Technology (OST) had failed to move effectively in the direction of long-range planning and had been seriously hampered by a "thinly spread" staff, concluded report prepared by Library of Congress Legislative Reference Service and released by House Committee on Government Operations' Subcommittee on Military Operations. Presented as a background document for future Congressional action or legislation, report reached no direct findings or conclusions but noted that during four years OST had been in

March 26 (continued)

existence its "most conspicuous operating characteristic has been the wide span of issues in which it has become involved.

"But with the office numbering only seventeen to twenty professionals its staff must be thinly spread." Although OST had not moved spontaneously in the direction of long-range planning, report said questions posed by various groups of Congress "at least imply a need for this policy planning, systems analysis capability, especially to deal with issues of transportation, waste management, water resources, and energy development." (Text)

March 27: Seven communications companies signed agreement for joint ownership of three existing ComSatCorp-owned earth stations and three new high-capacity stations for expanded international commercial satellite communications. The companies: ComSatCorp; AT&T; Hawaiian Telephone Co., ITT World Communications, Inc.; ITT Cable and Radio, Inc.-Puerto Rico; RCA Communications, Inc.; and Western Union International, Inc. Agreement established a policy-making committee composed of company representatives, provided for sharing of operating costs and capital, and described ComSatCorp's role as manager. It was filed with FCC in accordance with Dec. 7, 1966 order for joint ownership. (ComSatCorp Release)

- . William Tier, Deputy Manager of Operations in MFSC's Saturn I/IB Program Office, was named Manager to replace Lee B. James. Tier's former position would be filled by William F. LaHatte. (MSFC Release 67-62)
- . New York Times editorial on U.S.'s and U.S.S.R.'s competitive programs to land men on moon: "We fail to see that it makes any difference who reaches the moon first or whether the landing takes place in the 1960's or the mid-1970's. Moreover, we see large, unsatisfied needs here on earth--in this country and elsewhere--that could very usefully employ some of the vast resources now being devoted to the Apollo program and its Soviet analogue. A cutback in those resources and their diversion to more pressing needs would make more sense.
"The moon is not going away, and it can wait a little longer for visitors." (NYT, 3/27/67)

March 28: ComSatCorp's INTELSAT II-C comsat successfully relayed test signals over the Atlantic between ground stations at Andover, Me., and the Canary and Ascension Islands. Satellite was scheduled to enter commercial service April 6. (AP, NYT, 3/29/67, 30)

March 28: U.S. Government would receive in royalties more than the estimated \$1.3 billion it was contributing to SST development, ATA President Stuart G. Tipton told the Aero Club of Washington (D.C.): "The government investment is to be paid back with the 300th delivery. The manufacturer will thus pay royalties of 4.3 to 6.7 million dollars for each aircraft delivered.... Since these royalties are to continue for a 15-year period, they will go on well beyond the 300th delivery, and this phase of royalty payment will produce a return on the government investment comparable to levels normally received by industry." (Text)

- . Soviet astronomers from Ukrainian Academy of Sciences had produced a lunar astronomical almanac containing data on the locations of stars as seen from the moon, Science Service reported. Star charts of the sky from earth become outdated after several years, but a star chart for the lunar sky had to be revised after only several days. Precession of earth's axis causes each pole to complete a cone on the celestial sphere every 26,000 yrs; moon's axis has only an 18.6-yr precessional period which makes construction of a star chart of the lunar sky extremely difficult. (SciServ, NYT, 3/28/67)
- . FAA announced new safety regulation to protect aircraft from off-course or abandoned balloons. Effective April 28, all unmanned free balloons must be equipped with reflective devices to permit tracking by ground radar and at least two independently-operated self-destruction devices. (FAA Release 67-28)

March 29: Pan American World Airways cargo jet aircraft approaching Wake Island participated in first public demonstration of a new data-link system for transmitting navigation data from aircraft to ground stations via an orbiting satellite. VHF signals beamed to NASA's ATS I satellite by first data-link system ever installed on a commercial aircraft, and relayed to Mojave Desert antenna, reached Kennedy International Airport by telephone to fix aircraft's exact position. Experiment was part of a series using satellites to develop more reliable long-range communications and tracking contact with commercial aircraft on transoceanic flights. It was first test of aircraft antenna designed specially for transmitting satellite messages. Pan American officials predicted data link system could be fully operational by late 1969 and could lead to instant automatic and continuous plotting of flights across vast ocean areas. (Wilford, NYT, 3/30/67, 53)

- . A report expressing confidence in NASA's management of the Apollo program was released by House Committee on Science and Astronautics' Subcommittee on NASA Oversight. Report was prepared before Jan. 27 Apollo fire, but

March 29 (continued)

Subcommittee Chairman Rep. Olin E. Teague (D-Tex.) said the findings of the study were "essentially unchanged.... The public may look with confidence to the management, engineers, scientists and technicians of NASA and industry as the Apollo program progresses." Report praised the ability of the NASA-industry team to identify and solve the administrative, technical, and engineering problems "inherent in performing a program contributing major technological progress...." It identified the major Apollo pacing items as the Saturn V 2nd stage, the Lunar Module (Lm) for the Saturn I and V, and the Command and Service Module (Csm) for the Saturn I and V. "Any significant delays in attainment of flight capability of these items could affect both program schedule and cost adversely." Report said that an additional \$300 million in NASA's FY 1967 budget would have provided: "(1) increased confidence in meeting unforeseen development problems when encountered; (2) broader latitude in providing system alternatives when engineering difficulties are identified; and (3) an increased assurance of meeting the national goal of a lunar landing in this decade." (Text; Sehlstedt, B Sun, 3/20/67)

- . JPL had selected Avco Space Systems Div. for negotiations on a six-month, \$240,000 contract to study feasibility of launching a flyby spacecraft and atmospheric entry capsule to Venus in 1972. NASA had approved selection of the firm, which would head a team effort with Northrop Systems Laboratories. Study, expected to begin in May, would investigate all aspects of launching by an Atlas-Centaur booster a Mariner-class spacecraft weighing about 1,200 lbs. Near Venus, 100-lb capsule system would separate from flyby portion of spacecraft and enter Venusian atmosphere to take direct measurements during descent to surface. Capsule would not be designed to survive impact on Venus. (NASA Release 67-72)
- . United Air Lines 720 jet aircraft dropped 8,000 ft in clear air turbulence (Cat) near Cheyenne, Wyo., before pilot could bring aircraft under control for an unscheduled landing. One passenger died and several received minor injuries. (UPI, NYT, 3/30/67, 41)
- . French President Charles De Gaulle launched France's first nuclear-powered submarine, Le Redoubtable. The 7,900-ton submarine, which would become fully operational in 1970, would carry 16 missiles that could be fired from submerged positions toward targets up to 1,800 mi away. (WSJ, 3/30/67, 1; UPI, W Star, 3/29/67, 1)

March 30: NASA successfully launched three artificial cloud experiments from NASA Wallops Station. In first experiment Nike-Tomahawk sounding rocket ejected multicolored barium vapor clouds over eastern U.S. at altitudes of 142 and 200 mi (246 and 322 km) to measure electric fields and wind motions in the upper atmosphere by photographing and tracking ionized clouds. Experiment had been scheduled for March 28

March 30 (continued)

but was postponed because of overcast skies.

In second and third experiments Nike-Apache sounding rockets carried separate triethylborane (Teb) experiments to 100-mi (161-km) altitude to investigate distribution of, and radiation from, atomic oxygen. Teb, a new test material for measuring upper atmosphere wind profiles, was ejected at 90- to 50-mi (145- to 81-km) altitudes and photographed by special photometer as it dispersed. Launches were followed by reported sightings of bright Ufo's. (NASA Release 67-74; WS Release 67-12; AP, W Star, 3/31/67, All)

- . NASA Nike-Tomahawk sounding rocket launched from Wallops Station carried 180-lb Univ. of Maryland payload to 158-mi (254-km) altitude in mission that was coordinated with the overpass of Canadian satellite ALOUETTE II. Payload impacted 143 mi downrange in the Atlantic. Primary objective of flight was to evaluate techniques for studying the ionosphere. (WS Release 67-14)
- . USAF launched an unidentified satellite from Vandenberg AFB employing a Thor-Agena D booster. (UPI, W Post, 3/31/67, A3)
- . Rep. Olin E. Teague (D-Tex.), Chairman of House Committee on Science and Astronautics' Subcommittee on NASA Oversight, told AP he did not think "we will ever know what caused that fire" in which three Apollo astronauts died. Thousands of NASA and industry technicians responsible for Apollo I spacecraft would always wonder whether they contributed to the accident, Teague suggested. Asked if he believed NASA officials had taken unnecessary risks to land a man on the moon by 1970, Teague said: "Maybe we were a little bit careless." He said some of the safety checks probably should have been more thorough, but did not elaborate. (AP, W Star, 3/30/67)
- . FRC had awarded 15-mo, \$8.9-million contract to North American Aviation, Inc. (NAA), for maintenance and support of XB-70 supersonic research aircraft. As under previous support contracts, NAA would provide manpower, facilities, material, and equipment to support flight operations and would conduct data reduction. Overall management of XB-70 program was assigned to FRC under March 15 NASA-USAF agreement. (NASA Release 67-75)
- . Weather photos taken by NASA's ATS I satellite in near-synchronous orbit over the Pacific would be relayed to World Meteorological Organization (WMO) conference in Geneva April 3-28 to demonstrate new meteorological capabilities. Transmitted by satellite to Mojave, Calif., photos were traveling by land line to National Environmental Satellite Center in Suitland, Md., where they were being recorded for later transmission by ESSA surface facilities to Geneva. (NASA Release 67-77)

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March 30: Small opaque diamonds, formed when graphite-bearing meteorites impacted on earth, had been identified by three General Electric Co. scientists at Schenectady, N.Y., AP reported. Similar to man-made diamonds manufactured by using intense pressure and high temperatures, these diamonds had hexagonal crystal structure, thus differing from cubic structure of diamonds used in rings. Scientists predicted hexagonal diamonds would also be found in meteorites on the lunar surface. (AP, NYT, 3/30/67)

March 30-31: NASA's Space Science Steering Committee's Space Biology Subcommittee met at MSFC. Agenda included, in addition to discussion of subcommittee business, a review of Aa program by Leland F. Belew, manager of MSFC Saturn/Apollo Applications Program Office; a presentation on S-IVB space station module study; and a tour of Aa payload mockup and simulation facilities. (MSFC Release 67-65)

March 31: LaRC engineers at JPL, after repeated efforts to reactivate LUNAR ORBITER III's photo system which failed March 2, had concluded there was virtually no hope for transmission of further photos from the spacecraft. Analysis of events indicated failure had originated with momentary fluctuation in spacecraft's electrical power which disturbed photo system logic by turning the film advance motor memory to forward mode. Cause of fluctuation had not been identified. Motor, following incorrect logic, stalled as it attempted to move film which was being mechanically held in a fixed position while readout was in progress. During stalled condition, motor overheated to failure point. Despite termination of photo transmission, LUNAR ORBITER III continued to serve as a tracking target, providing practice for NASA Manned Space Flight Network stations, and to record information on radiation and meteoroids in moon's vicinity. (NASA Release 67-76)

- . First two of series of 20 Japanese and U.S. sounding rockets were launched from NASA Wallops Station as part of Japanese-U.S. meteorological rocket project to conduct comparative meteorological research between 12-mi (20-km) and 37-mi (60-km) altitudes. Japanese rocket was an MT-135; U.S. rocket was an Arcas. Payloads were ejected at programmed altitudes and descended on parachutes: wind measurements were obtained from radar tracking data; temperature measurements were radioed to ground receiving stations. Objectives of the mission were to compare and cross-calibrate data from various payloads; verify flight and operating characteristics; obtain new information on operation of each rocket system as a whole; and obtain additional data on diurnal cycles of wind and temperature in the stratosphere. Flights were conducted under a Dec. 26, 1966, agreement between NASA, Japanese Science and Technology Agency, and Japanese

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March 31 (continued)

Meteorological Agency. Results of experiments would be made available to world scientific community. (NASA Release 67-73)

- . France's Sahara Missile Proving Grounds at Hammaguir Range closed after 20 yrs, signalling end of operational use of Diamant 1 booster which had launched four French satellites from Hammaguir since Nov. 26, 1965. Next French satellite, 200-lb D-2, would be launched from French Guiana in 1969 with Super Diamant booster. (NYT, 2/11/67; Av Wk, 3/27/67, 50)
- . ComSatCorp requested FCC permission to substantially reduce television and telephone rates between U.S. and Europe effective April 6 when INTELSAT II-C comsat was scheduled to enter commercial service. New rates, which would cover only the leasing of channels to authorized communications common carriers operating in the Atlantic, would apply both to EARLY BIRD I and INTELSAT II-C. (ComSatCorp Release)
- . U.K.'s Royal Artillery Institution donated two 19th century rockets to the astronautical collection of Smithsonian Institution's National Air and Space Museum. One rocket was made by Sir William Congreve in 1815 and used on the Woolwich Ranges; the other, William Hale's 24-lb rotary rocket, was constructed in 1863. (Smithsonian Release)
- . Soviet Defense Minister Rodion Malinovsky, credited with having led Soviet military into the missile age, died in Moscow at age 68, apparently of cancer. (Rosenfeld, W Post, 4/1/67, B6)
- . U.K. had agreed to buy 40 more F-111 supersonic military aircraft from U.S. at total cost of \$785 million, Anthony Lewis reported in New York Times. Ten F-111's had been ordered March 31, 1966, with a one-year option to purchase 40 more. Deliveries were expected to begin in 1969. To offset impact on U.K.'s balance of payments, U.S. had agreed to buy \$785 million worth of British equipment during the next 10 yrs or help U.K. get orders elsewhere. (Lewis, NYT, 4/1/67, 1)

During March: Aerospace praised NASA's contributions to U.S. aeronautical research: "Since the United States started sending experimental vehicles beyond Earth's atmosphere nine years ago aeronautical research has been overshadowed by space exploration as far as the annual budgets of the National Aeronautics and Space Administration are concerned.... But dollar comparisons fail to tell the whole story. For its space work, NASA has had to build from scratch a variety of expensive ground facilities and equipment and to make heavy outlays for complex, non-reusable flight hardware. NASA's aeronautical teams spend little on flight equipment and what they do buy is reusable; furthermore, they

During March (continued)

operate from facilities for the most part built and paid for prior to the Space Age. There is no question but that space has played the dominant role in NASA's programs, but the aeronautical research effort has been far more substantial--and more rewarding--than an examination of budget figures would indicate. In the coming year, assuming Congressional approval of the pending budget, it will be increased."
(Aerospace, 3/67, 3)

- . NAS forwarded to NASA a list of 69 recommended candidates for 20-30 positions in NASA's astronaut training program. A total of 923 applications had been evaluated. NASA was expected to make final selections before Aug. 15. (NAS-NRC-NAE News Report, 3/67, 3)
- . Hugh L. Dryden Memorial Fund had received nearly \$1 million in donations for construction of 700-seat auditorium at NAS Hq. in Washington, D.C., in honor of the late NASA Deputy Administrator. Fund's ultimate goal was \$2 million. (NAS-NRC-NAE News Report, 3/67, 3)
- . James Smith McDonnell, founder of McDonnell Aircraft Corp., had been selected to receive National Academy of Engineering's second Founders' Medal which honored outstanding contributions by an engineer both to his profession and to society. McDonnell was cited for his "lifetime contributions of an outstanding nature in the design and development of military aircraft, and for pioneer work in space technology."
(NAS-NRC-NAE News Report, 3/67, 4)
- . Charges that NASA's Apollo program had serious deficiencies were reviewed by William Hines in series of articles in Washington Evening Star. A 55-page report submitted to NASA three days before Jan. 27 flash fire by Thomas R. Baron, former North American Aviation, Inc. (NAA), inspector at KSC Apollo warehouse, charged that improper parts had been installed in Apollo I spacecraft. Careless and unorthodox warehousing practices had caused many parts and materials intended for spacecraft use to lose their identity, Baron told Hines in an interview. "As a result there was probably a bundle of stuff [in Apollo] that they don't have any idea what...it is at all." Baron also charged that on at least one occasion, NAA had installed a substandard part with deliberate subterfuge, without the knowledge of NASA. Truth about the part could easily be concealed because NASA had no quality-control men of its own in receiving warehouse, Baron said. He was particularly critical of deviation from test procedures: "When you deviate on your small components, and you deviate on all of them, and you put these in one system and you run a systems test and you deviate again, you've ended up with a system that really isn't worthwhile."

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During March (continued)

James Parker, former NASA quality control inspector at KSC, told Hines that in summer 1966 he had predicted a catastrophe would occur in Project Apollo. He supported Baron's charge that NASA quality control supervision on Apollo contractors' work was "spotty" and said he had periodically cited instances of waste and improper expenditures in reports to his KSC superiors. (Hines, W Star, 3/15/67, A1, A6; 3/19/67, A7; 3/23/67, 1, A6; 3/26/67, A3)

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