

PRELIMINARY HISTORY OF NASA

S U P P L E M E N T

October 7, 1968 - January 20, 1969

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PRELIMINARY HISTORY
OF THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DURING THE ADMINISTRATION OF
PRESIDENT LYNDON B. JOHNSON

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National Aeronautics and Space Administration
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P R E F A C E

This Supplement to the "Preliminary History of NASA during the Administration of Lyndon B. Johnson" covers the period of my tenure as Acting Administrator and Deputy Administrator from October 7, 1968, to January 20, 1969.

For NASA, this beginning of its eleventh year marked an exciting culmination of the Apollo lunar program, a new era in unmanned astronomical satellites, and preparation for the new administration of President-Elect Richard M. Nixon. A central concern was NASA's budgetary base and the projection of its 1970 program both in President Johnson's out-going budget message and in the new administration's space policies. These matters are treated in this manuscript, but necessarily with little detail.

The successful orbiting of the Orbiting Astronomical Observatory on December 7, 1968, was the culmination of a decade of concerted effort. OA0 II gave man his first clear view of the stars from above the obscuring effects of the earth's atmosphere, providing new data across the stellar spectra. It was hailed as a step forward as significant as Galileo's first pointing of an optical telescope at the Moon and Jupiter in 1609.

In placing three astronauts in a seventy-mile-high orbit around the moon, the Apollo 8 flight of December 21-27, 1968, brought to life the science-fiction of Jules Verne, Konstantin Tsiolkovsky and H. G. Wells. A dramatic first in man's exploration of the solar system beyond the earth, it was a major milestone in NASA's seven-year-old manned space flight program. Inevitably there was greater public interest in this spectacular pioneering flight than in OA0 II. The skill and courage of the Apollo astronauts displayed on global TV held great human interest for all, but they represented

only the visible tip of the total U.S. space program.

NASA's management during this period was planning to get the greatest possible space program returns within severe dollar constraints imposed by the FY 1969 austerity budget of President Johnson and the Congress. A great deal of effort was devoted to long and short-term planning, and the formulation of projected program alternatives to assist the new Administration and the forthcoming 91st Congress in deciding NASA's future direction and level of effort beyond the Apollo lunar landing.* A related activity was the preparation of an interlocking but concise body of source papers and briefings to expedite the smooth transition of NASA from the old to the new Administration. In the final hours of President Lyndon B. Johnson's Administration there was a White House ceremony and reflection upon the nation's achievements in space since 1958, and upon NASA's service to the peaceful purposes of mankind under three Presidents. This too must be noted for the preliminary record of the recent past.

This Supplement was rather hurriedly drafted by the NASA Historical Staff, with inputs and commentary from key NASA officials. The NASA ongoing historical efforts are mainly directed to the more distant past, and are recommended as the indispensable first point of contact for serious scholars desiring to make in-depth studies of NASA. The NASA Historical Staff normally provides Presidential Libraries with monographs, studies and documentary gleanings to help scholars accurately assess contemporary science, technology, and public policy.



T. O. Paine
Acting Administrator

*See my address to the Aerospace Industries Association, November 20, 1968, Phoenix, Arizona, in Appendix B-3.

S U P P L E M E N T

October 7, 1968 - January 20, 1969

to the

Preliminary History of NASA

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I

INTRODUCTION

I
I N T R O D U C T I O N *

For the National Aeronautics and Space Administration, the closing months of the Administration of Lyndon Baines Johnson were characterized by no less challenge than had pervaded space affairs since its post-Sputnik birth a decade ago.¹ When President Johnson announced in March 1968 that he was not standing for re-election, the prospect of a fourth "space age" President moving into the White House on January 20, 1969, held many implications for NASA. With declining public support and budgets for three straight years, NASA's future fate, after the priority Apollo program achieved the manned lunar landing goal in 1969, remained far from assured despite the still workable bipartisan support NASA enjoyed on Capitol Hill.

But the end of the prominent official association of Lyndon B. Johnson with American space matters since October 1957 -- this portended definite changes as the reins of the Federal structure passed to a new President. The close election of November 5 meant that the President-Elect was not Mr. Johnson's Vice President, Hubert H. Humphrey, who had chaired for four years the National Aeronautics and Space Council, but General Eisenhower's former Vice President, Richard M. Nixon. Further, the new 91st Congress would remain under the domination of Mr. Johnson's party, some members of which appeared less committed to space as a major national venture than many conservative critics of the President-Elect's party.

NASA quietly celebrated its exciting first ten years of existence with a black tie dinner at the Shoreham Hotel on October 1, 1968. There was

*Drafted by E. M. Emme, NASA Historian, and edited by key officials.

little feeling of celebration because of deep-seated concern for the next decade, and the social event passed with little notice in the National Capital. NASA's concern heightened with the resignation of Mr. James E. Webb, its second Administrator, on October 7. He had steadfastly and with great vigor battled for the nation's space program under two Presidents for over seven and one-half years during NASA's five-fold buildup.² He would be missed at the helm.

Upon Mr. Webb's stepping down, an interregnum began immediately under Acting Administrator T. O. Paine. This would last until President-Elect Nixon named the new NASA Administrator and Deputy Administrator, perhaps by January 20, 1969. During this "lame duck" interregnum, the processing of President Johnson's budget for fiscal year 1970, program planning for long-lead-time projects for the decade ahead, research and development activities, and on-going space flight operations (including the first manned Apollo mission and the first manned flight into lunar orbit) continued without pause.³ In addition, the transition process into the new administration was planned and discussions held with Mr. Nixon's Task Force on Space. These dynamic processes emerge as the focus of this preliminary historical account of the final weeks of NASA in the Johnson Administration. It may prove to be a period of considerable interest to future historians, who will possess greater perspective and have more complete evidence in hand.

Challenge also confronted the space agency in the pivotal area of national interest often referred to as "national prestige" or "national pride," depending upon whether one viewed overall aerospace affairs from an external or internal perspective.⁴ After the manned docking flight of Soyuz III in October and the circumlunar flight and recovery of Zond VI with

its turtles in November, much commentary was raised on the "space race" with the Soviet Union, on the need for increased military space activity, and on the high cost of the space effort.⁵ Yet space policy had not become a major political issue during the closing days of the heated presidential campaign. Both major candidates had endorsed a first-rate space effort by the United States in the context of serious fiscal problems posed by the Viet Nam involvement and the domestic urban crisis.⁶

An eighteen-month hiatus in the manned flights of the Apollo program ended notably with the Apollo 7 mission of October 11-22. This reintroduced vicarious participation by the general public in the space effort via live telecasts. Such participation rarely existed for unmanned missions. This successful first manned Apollo flight raised NASA morale from the depths caused by the tragic deaths of three esteemed astronauts on January 27, 1967 and restored public faith and interest in NASA. Apollo 7 demonstrated to all that NASA should be able to do what it set out to do with the epic flight two months later of Apollo 8 into lunar orbit over the Christmas holidays.⁷

To NASA, Apollo 8 was a logical next step following seven years of concerted effort. To the public, this continued the dramatic venture initiated with Mercury and escalated in difficulty and progress in Gemini. But Apollo 8 was by all criteria the most dramatic milestone in mankind's long history of exploring and conquering nature. Never before had men left the gravity of mother earth. The Astronauts dramatically reported to a waiting world via telecast their progress and observations as they proceeded on their pioneering voyage.

While the successful performance of NASA's Orbiting Astronomical Observatory (OAO II) launched on December 7 might eventually make as great

a contribution to basic science, the Apollo 8 mission attracted world-wide public attention as it flawlessly orbited three astronauts ten times around the moon on Christmas Eve 1968, and brought them safely back to "the good earth." It jogged the consciousness of almost all Americans. It was instantly in the historical and scientific tradition of Galileo and Kepler, Columbus and Magellan, Herschel and Newton, Verne and Tsiolkovsky, the Wright brothers and Lindbergh, Goddard and Gagarin. Apparently it blended smoothly with the spiritual Yuletide hopes for peace for all men on earth. Readings from the Book of Genesis by Astronauts Borman, Lovell, and Anders appeared both intellectually stimulating and spontaneous, no less so than man's first eyeball description of the nearby moon as the color of "dirty sand" and the appearance of the distant earth as "a grand oasis in the big vastness of space." A few people disagreed with the meaning of Apollo 8, voicing a "bah, hum-bug" attitude towards space achievement. Most Americans disagreed with these critics.

Apollo 8 ended, perhaps temporarily, discussions of the "race for the moon" theme in the American press. A manned lunar landing in 1969 could be anticlimatic; space achievement was now at its highest impact since the first Sputnik. The lunar achievement remained inseparable from other historical events in the context of December 1968.⁸ After a frustrating year of riots and assassinations, the bruised crew of the U.S.S. Pueblo was being released by North Korea, thousands were starving in Biafra, continued combat was occurring during the annual truce in South Viet Nam, the Arabs and Israelis were exchanging shots in the Middle East, and the fourth explosion of a thermonuclear device took place in Red China.

While Apollo 8 symbolized human achievement and the desire for universal peace on earth for all men at Christmas 1968 in the leading American newspaper

editorials and cartoons during and after the flight, there was sparse mention of the American space effort for the decade ahead. For their part, Soviet spokesmen applauded the U.S. astronauts and proclaimed their own intention to do more than merely fly cosmonauts to the moon. What the long-term impact of Apollo 8 will be in our revolutionary era, no one can today be the judge. Historically, man has not been able to turn back the technological clock, new scientific knowledge and technological capability seem to advance concurrently with social progress over the long term. As Acting Administrator Paine said: "the engine of change is technology."⁹

This preliminary account attempts to essay some of the dynamic features of the transition period in NASA's experience between October 7, 1968, and January 20, 1969. It examines highlights of the administrative and central budgetary process, flight operations, and on-going scientific and engineering developments during this period. It records the internal NASA preparations undertaken to smooth the continuity of government from the Johnson to the Nixon Administrations, and reviews some of the thoughtful reflections, as well as social recognition accorded to those whose contributions would influence the future.

Let us first examine a chronological overview of NASA-related events in the period under consideration.

NOTES TO CHAPTER I

1. Chapter II, "Chronological Overview of NASA," illustrates the vast welter of interrelated events concerning NASA. The passage of time will permit a more complete ordering.

2. Mr. Webb's challenging White House press conference on September 16, at which he announced his resignation effective October 7, is covered in the "Preliminary History of NASA During the Administration of Lyndon B. Johnson" previously submitted. Test is attached below in Appendix B-1. That afternoon, Webb dropped into a regular Management Council Meeting, reviewed his conversations with the President, and gave a full commentary upon the past, present, and future of NASA as he viewed it. Later, on September 25, the Administrator summoned all NASA top management and ten Center Directors to an informal dinner at the University Club to pull the NASA leadership together in carrying on in the future.

Commentaries on Webb's contribution to the U.S. space effort in news media are contained in Astronautics and Aeronautics chronology, Appendix C-4.

On October 7, 1968, Webb submitted to President Johnson for information, a copy of his letter to Astronaut Edwin Aldrin's father, which stressed confidence in the continuity of NASA management and in the Apollo program. See Appendix, A-1.

Mr. Webb was sworn in as a consultant to Acting Administrator Paine on October 9, 1969, and he made himself available at least half time to lend assistance on call. Mr. Webb also continued to be on call to the White House.

3. Dr. T. O. Paine was not formally named Acting Administrator. At his White House press conference on September 21, Mr. Webb said that the President had indicated that Paine should carry on as "acting Administrator," and Webb stated that Paine was fully qualified to fulfill the position. Paine had joined NASA as Deputy Administrator in March 1968, filling the vacancy created by the resignation of Robert C. Seamans.

4. See "Space Cartoons, October 7, 1968 - January 1969," in Appendix D-1 prepared by NASA archivist Lee Saegesser. This selection of cartoons is an extension of those included with the basic "Preliminary History..." They are attached for historical reference only as they are copyrighted.

5. See "Racing the Russians to the Moon," Newsweek, October 14, 1968, pp. 66-72.

6. No documentation other than passing references to space in the Presidential Campaign of 1968 is attempted in this manuscript.

7. See Chapter IV, "Manned Missions of Apollo Begin," which was drafted by Mr. Jay Holmes, Office of Manned Space Flight.

8. See "Men of the Year," "The Voyage," "The Groundling That Won," and "The Log of Apollo 8," Time, Vol. 93 (January 3, 1969), pp. 9-17.

9. See T. O. Paine, "Notes on the Year 2000," summary of talk delivered to the Young President's Organization, Bermuda, October 10, 1968. See Appendix B-1.

II
CHRONOLOGICAL OVERVIEW OF NASA

II

CHRONOLOGICAL OVERVIEW OF NASA

October 7, 1968 - January 20, 1969

A concise chronology provides a valid preliminary overview of recent events not narrated at this short a perspective. When NASA Administrator James E. Webb retired effective October 7th, T. O. Paine assumed the position of Acting Administrator. This provides the opening item of the chronology. Salient aspects of NASA's most recent "history" discussed in subsequent sections may appear more meaningful with this chronological backdrop.*

1968

October 7: Retirement of James E. Webb, NASA Administrator since February 14, 1961, effective. Deputy Administrator Thomas O. Paine became Acting Administrator of NASA.

- . Administrator Webb issued final order, one dissolving Apollo 204 Review Board established January 27, 1967.

October 8: U.S. Senate unanimously approved (66-0) the treaty providing for the rescue and return of astronauts downed on foreign soil approved by the United Nations Assembly in December 1967 and signed by 75 nations to date, including the Soviet Union.

- . Antennas on Explorer XXXVIII (launched July 4) extended to full 750-ft. length by ground command.
- . Associate Administrator for Manned Space Flight Mueller reviewed ten years of space accomplishment by NASA for conference of UPI Editors. In conclusion, he quoted the late Hugh L. Dryden, first Deputy Administrator, as eloquently stating: "None of us knows what the final destiny of man may be--or if there is any end to his capacity for growth and adaptation. Wherever this venture leads us, we in the United States are convinced

* "Astronautics and Aeronautics, 1968" and "1969," an on-going detailed monthly chronology of NASA-related events will not be available in time for submittal with this Supplement. The annual Astronautics and Aeronautics, 1967 (NASA SP-4008) will appear in early 1969.

October 8 (continued)

that the power to leave the Earth--to travel where we will in space--and to return at will--marks the opening of a brilliant new stage in man's evolution."

- . American press was studded with editorials and thoughtful praise concerning former NASA Administrator James E. Webb's contribution to the U.S. space program for almost eight years. Mr. Webb also received hundreds of personal letters of appreciation.

October 9: Former Administrator Webb sworn in as a consultant to the Acting Administrator Paine.

October 10: Aerobee 150 sounding rocket launched from White Sands with NRL payload.

- . NASA requested proposals by November 18th to build and test experimental turbofan jet engines in its quiet engine program.
- . Acting Administrator Paine gave speech on "The Year 2000" to Young President's Organization meeting in Bermuda.

October 11: Apollo 7 mission with Astronauts Schirra, Eisele, and Cunningham launched into orbit from Cape Kennedy by Saturn IB booster. First manned flight in the Apollo program, Apollo 7 tested many major systems and was considered a major milestone in U.S. manned space effort.

- . President Johnson sent message to Apollo 7 crew, saying: "Everything in the Presidential office came to a halt as Foreign Minister Debré of France and I watched with mounting excitement the magnificent launch of the Saturn..." Message was relayed from Air Force I as the President flew from Washington to visit former President Harry Truman.
- . President Johnson sent NASA Semiannual Reports (July 1, 1966-December 31, 1967) to the Congress, saying in covering message: "I commend these reports to your attention. They contain, I believe, concrete evidence that NASA is moving forward, and that America is contributing mightily in the worldwide effort to conquer space for the benefit of all mankind."
- . NASA task force issued A Study of NASA University Programs, pointing to contributions: Over 50 percent of experiments flown on NASA satellites generated; over 500 graduate degrees; etc.

October 11: GOP Presidential candidate Nixon stated in TV broadcast to viewers in Texas, New Mexico, Arkansas, and Oklahoma, that the U.S. must be "first in space... I don't want the Soviet Union or any other nation to be ahead of the U.S."

- . Cosmos CCXLVII launched by U.S.S.R.

October 14: First live telecast "high atop everything" from U.S. spacecraft by Apollo 7 crew.

- . The NASA FY 1970 budget request, totalling \$4,698 million was submitted to the BOB. Subsequently, Acting Administrator Paine met with BOB Director Zwick, and BOB staff members held budget hearings with NASA officials.

October 15: In bi-weekly report to the White House, Acting Administrator Paine reported on the Apollo 7 mission, a safe recovery of two radioisotope fuel capsules from the SNAP-19 generator (RTG's) lost at sea with failure of Nimbus B launch in May, and the successful launching of ESRO I on October 3 by a NASA Scout.

- . Acting Administrator Paine sent message to Program Associate Administrators and Centers promulgating the Interim Operating Budget as the firm FY 1969 Operating Budget. Critical procurement advance approval requirements were canceled.
- . Two NASA Nike-Cajun sounding rockets launched from Ft. Churchill, Canada, to compare atmospheric data with Oct. 14 launch from Point Barrow, Alaska. Nike-Tomahawk with Univ. of Michigan payload launched from Wallops Island.
- . Saturn IB Launch Complexes 34 and 37 at KSC placed on standby status until AAP begins in late 1970.

October 16: Hurricane Gladys photographed from above by Apollo 7 crew.

- . Aerobee 150 launched from White Sands with Lockheed experiment, indicating sun was in nonflaring state with increasing activity in west limb.
- . U.S.-Australia five-year agreement to expand exchange of scientific information signed.

October 17: Summary of combined findings of Accident Board and Review Board issued concerning May 6 crash of Lunar Landing Research Vehicle after pilot, Astronaut Neil Armstrong, safely ejected. Review Board appointed by Acting Administrator Paine discovered no effect of accident on Apollo program.

October 18: XB-70A flown by NASA pilot Fulton to 52,200-ft. and mach 2.18 in test over Edwards AFB, California.

- . NASA announced release of the tracking ship USNS Watertown from its priority role as one of the two instrumentation ships for reentry support of Apollo missions.

October 19-20: PSAC Space Panel briefed by Acting Administrator Paine on NASA prospects and problems, and Associate Administrator Mueller reviewed results of Apollo 7 so far and factors on the mission mode for Apollo 8.

October 21: Associate Deputy Administrator Shapley directed the heads of all program and staff offices to take necessary steps to prepare papers and briefings for the transition period following the Presidential election. He also established a working committee headed by Assistant Administrator Bernard Moritz to assemble papers and briefing data to serve the continuity of government process.

- . GSFC used ruby laser to track Explorer XXXVI (GEOS II) satellite during daylight, considered a significant milestone in the development of a laser satellite tracking system.

October 21-25: AIAA annual meeting in Philadelphia: Dr. William Pickering, Director of JPL, received Lewis W. Hill Space Transportation Award and Roy V. Harris of Langley Research Center received the Lawrence Sperry Award.

October 22: Apollo 7 splashed down after completing 163 complete revolutions. President Johnson telephoned a message of congratulations to the Apollo 7 crew from the White House, asserting that the 11-day mission had made Americans and the world proud: "On this universal gladness, there is the making of a human partnership where space technology and science serve as instruments of man's peace in the world..."

October 23: Acting Administrator met with top OMSF officials to review Apollo 8 mission.

- . First attempt at powered flight of HL-10 terminated because of engine malfunction.
- . Multi-purpose astronomical station dedicated at Mount Hopkins, Arizona (near Tuscon), by the Smithsonian Astrophysical Observatory, one supported by OTDA and OART of NASA. SAO and NASA will be performing a series of experiments related to laser communications.

October 23-24: Chief Counsel officers of all NASA Centers met in Washington, D.C.

October 25: Soyuz II launched by U.S.S.R.

- . Chairman Moritz of the NASA working committee on transition submitted a progress report to the Associate Deputy Administrator. By November 8, Volume I of the "Transition Papers" was submitted.
- . Ames Research Center announced that H. Julian Allen would retire as Director on November 15. He was to become Acting Director in November when Jack Parsons became ill.

October 26: Manned Soyuz III launched by U.S.S.R.

October 28: NASA released outline of six steps to lead to final decision on Apollo 8 mission. Because of Apollo 7 success, alternate missions were being considered: earth orbital deeper in space; circumlunar fly-by; and lunar orbit. Acting Administrator Paine said: "We will fly the most advanced mission for which we are fully prepared that does not endanger the safety of the crew."

- . Republican Vice-Presidential candidate Spiro T. Agnew said on visit to Manned Spacecraft Center during Houston campaign trip, "We will not tolerate America becoming second best" in space exploration.

October 28-29: OART Advisory Committee on Space Vehicles met at Marshall Space Flight Center.

October 29: DOD announced Army Map Service technicians were building hand-carved model of "target area" to assist NASA in simulation of Apollo lunar landings.

- . JFCST-University Symposium held at Smithsonian Institution on "Education and the Federal Laboratory-University Relationship," NASA personnel participating.

October 30: Soviet Cosmonaut-Colonel Georgy Beregovoy landed safely in Soyuz III in Kazakhstan after 64-revolution flight and rendezvous with Soyuz II. Speculation in American press rampant on whether Russian manned flight to the moon imminent.

October 31: Marker unveiled at JPL commemorating test-firing of rocket engine in 1936, by students of Guggenheim Aeronautical Laboratory at Cal Tech.

- . Cosmos CCL and CCLI launched by U.S.S.R.

During October: Exploring Space with a Camera (SP-168), edited by Dr. E. Cortright, Director of LRC, released and received high praise from outside NASA for its presentation of the "most significant pictures" of the first ten years of NASA.

November 1: XB-70 research flight accomplished in continuing NASA-DOD program.

- . U.S.S.R. launched Cosmos CCLII.

November 2: In ceremony at his ranch, President Johnson awarded NASA Exceptional Service Medals to Apollo 7 astronauts Schirra, Eisele, and Cunningham and NASA Distinguished Service Medal to former Administrator James E. Webb. Mr. Johnson said that Webb, more than any other individual, deserved credit for American successes in space and for "helping the United States to reach out to the stars."

November 4: President Johnson released Noise--Sound Without Value, a report of Federal Council for Science and Technology task force, and endorsed recommendations for national program attacking noise in environment from numerous causes. Recommendations included continued NASA study of community response to airport noise, continued NASA and DOT air transport noise in special situations, and DOT development of sonic-boom-control standards.

- . Chairman B. H. Flowers of the British Science Research Council and colleagues, accompanied by James E. Webb, visited Langley Research Center.

November 5: Presidential Election Day. Charles S. Murphy, Counselor to the President, advised all agencies including NASA to be prepared to assist individuals designated by the President-Elect in order to provide continuity of government.

- . Acting Administrator Paine sent basic policy memorandum to Associate Administrator for Organization and Management Finger on "Potential Contributions of Aerospace Technology to the Solution of National Problems."

November 7: Acting Administrator Paine addressing the AIAA National Capital Section luncheon, referred to the "critical period" of a change in Federal administrations and the importance of the general public's better understanding the importance of the space program to the United States.

- . Nike-Apache sounding rocket with ion concentration experiment launched from Wallops.

November 8: NASA Pioneer IX interplanetary probe launched from Cape Kennedy. Also launched piggyback from same Delta was TETR-2, satellite used for test and training purposes by the Manned Space Flight Network.

- . Bureau of the Budget issued a tentative allowance of \$3,623 million for NASA's FY 1970 budget request.

November 8: Results of decade of artificial satellite research into earth's environment in space were "revolutionary," said NAS-NRC Space Science Board in Physics of the Earth in Space--A Program of Research: 1968-1975, report of NASA-supported study made by 31 scientists at Woods Hole, Mass., in August. It said that "few of the concepts of the early 1950's have survived without major revision and totally unexpected discoveries have provided fundamentally new theoretical challenges." Report defined program of satellite, space probe, and sounding rocket missions for concerted attack on questions of sun-earth physical mechanisms in contrast to past decade's exploratory surveys.

- . American Nuclear Society held panel session in Washington, D.C., on "The U.S. Space Program: Achievements and Objectives."

Dr. Edward C. Welsh, NASC Executive Secretary, declared, "We must step up the rate at which we tap the vast potential of nuclear energy for the space activities of tomorrow.... Atomic energy will enable the space effort to reach for the infinite."

NASA Associate Administrator for Advanced Research and Technology James M. Beggs said "natural characteristic of technology is its multiapplicability" to space and nonspace uses and "a key to making this process productive...is a continuing research program, well planned and well supported" and well balanced.

Dr. Wernher von Braun, MSFC Director, told session, "The first practical application of space electric power systems...may well be found in our second generation orbital space station program."

- . Reported in Science that neither NASA's Mariner V (launched June 14, 1967, for flyby of Venus) nor U.S.S.R.'s Venus IV (launched June 12, 1967) had reported atmospheric conditions near level of the mean surface of planet.
- . Marshall Space Flight Center announced Boeing Co. had been issued \$239,000 contract for 10-mo. study defining two-stage derivative of Saturn V launch vehicle. MSFC also had signed \$22,826,736 contract modification with Rocketdyne Div. of North American Rockwell Corp. for continued production support of Saturn J-2 engines used in Saturn IB and Saturn V.
- . Manned Spacecraft Center awarded study contract to McDonnell for a nine-passenger Gemini "space bus."

November 9: Apollo 7 Commander Schirra received Assn. of Man in Space award from Italian Ambassador to U.S., Egidio Ortona; and Astronaut Cunningham was awarded his Space Wings from the U.S. Marine Corps.

November 10: U.S.S.R. launched Zond VI toward moon. No official statement was made of its purpose.

- . On nationwide "Meet the Press" TV interview, Astronaut Schirra commented on NASA budget cuts: "We've built up a fantastic technology [but] talented people are starting to leave.... We should let it be known that we are in this for the future, not just one flight."

November 10: NASA announced it soon would begin test flights at Langley Research Center of XC-142 tilt-wing VTOL aircraft on loan from USAF, to determine operational problems in airport terminal areas during poor visibility conditions.

November 12: At NASA press conference, Acting Administrator Paine announced lunar orbit for Apollo 8 mission for December 21: "After careful and thorough examination of all systems and the risks and benefits involved in each of the mission alternatives, we have concluded that we are ready to fly this advanced mission around the moon."

November 13: Dr. Abe Silverstein, Director of Lewis Research Center, was announced as winner of Rockefeller Public Service Award in the science category. Leonard C. Meeker of the State Department named for foreign affairs winner for his work on the 1967 Outer Space Treaty.

- . NASA's HL-10 lifting-body vehicle was successfully flown on first full-rocket-powered flight from Edwards AFB, Calif. Dropped from B-52 aircraft, vehicle climbed from 35,000 ft. to 43,259 ft., reaching top speed of 610 mph during 184-sec engine burn. NASA test pilot John A. Manke said craft climbed and maneuvered in "marvelous fashion."
- . Cosmos CCLIII launched by U.S.S.R.
- . John E. Naugle, Associate Administrator for Space Science and Applications, said NASA was "prepared to accomplish any goal in space exploration which the new administration may establish."

November 13-14: Joint NASA/DOD Life Support and Protective Systems Coordination meeting held at Langley Research Center.

November 14: Launch of OAO postponed for second time due to guidance system difficulty.

- . NASA announced it had authorized Jet Propulsion Laboratory to proceed with construction of two Mariner spacecraft for 1971 Mars orbit.
- . Acting Administrator Paine submitted draft "Preliminary History of NASA During the Administration of President Lyndon B. Johnson" to the White House.
- . Washington Evening Star editorial commented on scheduled December launch of Apollo 8: "...this promises to be one Christmas when the thoughts of all...will contain more than visions of sugarplums, of laden stockings, of gifts about to be received and bills about to come due. It is, in fact, just possible that NASA will succeed in putting that missing ingredient back into the yule season, and that more prayers will be offered this Christmas than at any time in the past 2,000 years."

November 14-15: NASA Procurement Officers met at Langley Research Center; first session was attended by Acting Administrator Paine.

November 15: NASA announced first U.S. astronauts to land on moon's surface in 1969 would place three scientific experiments on lunar surface. Two astronauts would leave spacecraft for up to three hours to make observations, photograph surface around spacecraft, collect soil and rock samples, and deploy experiments.

- . At annual NASA Honor Awards ceremony in Washington, D.C., Acting Administrator Paine presented Distinguished Service Medal--NASA's highest honor--to Alexander Flax, Assistant Secretary of the Air Force (Research and Development); Edmund C. Buckley, former NASA Associate Administrator for Tracking and Data Acquisition; Paul Dembling, NASA General Counsel; and Abe Silverstein, Director of Lewis Research Center.
- . Science editorial on NASA administration said: "In terms of numbers of dollars or of men, NASA has not been our largest national undertaking, but in terms of complexity, rate of growth, and technological sophistication it has been unique....Ever since the space program began to take shape there has been talk of technological spin-offs. It may turn out that the most valuable spin-off of all will be human rather than technological: better knowledge of how to plan, coordinate, and monitor the multitudinous and varied activities of the organizations required to accomplish great social undertakings."

November 16: U.S.S.R. announced launch of 17-ton Proton IV.

- . USAF ABRES experimental re-entry vehicle launched from Vandenberg AFB, Calif.
- . Apollo 8 prime crew--Astronauts Frank Borman, James A. Lovell, Jr., and William A. Anders--held press conference at MSC on Apollo 8 flight plan.

November 18: NASA submitted a reclama to the BOB FY 1970 tentative allowance totalling \$4,074 million. Subsequently, Acting Administrator Paine met with BOB Director Zwick.

- . U.S.S.R. announced recovery of unmanned Zond VI after a flight around the moon, and reported an atmospheric bounce re-entry with landing in U.S.S.R.
- . At NASA Conference on Pavement Grooving and Traction Studies at Langley Research Center, Air Transport Association of America reported that 15 to 19 months use at three major airports had confirmed conclusion of NASA research that grooving runway surfaces was "effective aid in overcoming hydroplaning" during wet landings.
- . Bullet fragment in brain of holdup victim was moved to safer area of brain by whirling patient in Ames Research Center centrifuge, subjecting him to six times force of gravity.

November 19: Vice President Hubert H. Humphrey performed simulated rendezvous inside mock spacecraft and ascended to spacecraft level of Apollo 8 during briefing at Kennedy Space Center. Humphrey told NASA officials: "I have felt it [NASA] has been underfunded at times and we

November 19 (continued)

will pay the price... Space is a wise investment on the part of the Congress and the public."

"I want to thank you for what you've done, which is to give the American people a lift. Without this program, this nation would feel very much behind in the international picture."

November 20: NASA Acting Administrator Paine told AIAA conference in Phoenix, Ariz., that "today the United States stands at the crossroads." In FY 1969 NASA was operating close to the "breakpoint" level. J. M. Beggs, Associate Administrator for Advanced Research and Technology, said increased aeronautical research, low-cost boosters, and use of nuclear energy in space were "major needs."

- . Sir Bernard Lovell, Director of Jodrell Bank Experimental Station, said on BBC TV that on scientific basis Apollo 8 plans were wasteful: "It's not necessary to risk human life to get information about the moon. Within a few years this information could be obtained by automatic, unmanned instruments."

NASA Associate Administrator for Manned Flight Mueller commented, "The purpose is not scientific but to take an important step in developing the capability of landing men on the moon." Apollo 8 Astronaut Anders told news conference at KSC that, though mission was primarily operational, crew felt they could add "significant bits and pieces to scientific knowledge."

- . Aerospace Industries Association survey predicted decline in aerospace industry employment from 1.431 million in March 1968 to 1.400 million in December and that employment would remain at December level through March 1969.

November 21: Aerobee 150A launched from Wallops carrying artificial gravity experiment using laboratory rats.

- . Cosmos CCLIV launched by U.S.S.R.
- . Military Aircraft Panel of PSAC received Langley Aeronautical technology briefing, the 32nd time this briefing has been given to various key audiences.
- . National Science Foundation reported in Research and Development in Industry, 1966 that NASA and DOD had financed work of 89% of R&D scientists and engineers employed by industry on Federal projects--with 54,000 working on NASA projects, an increase of 50% over 1953.

November 21-22: Key NASA Headquarters and Center management officials met at Arlie House.

November 22: Announced that NASA/OART fuel cell (Allis-Chalmers) had been selected for the USAF Manned Orbital Laboratory (MOL) program.

November 23: Mrs. Lyndon B. Johnson accompanied by Mrs. Lynda Johnson Robb, and escorted by former NASA Administrator Webb, Acting Administrator Paine, Astronauts Cunningham and Young, and other NASA officials, toured Kennedy Space Center. In brief ceremony, Acting Administrator Paine presented a model of the lunar module to Mrs. Johnson for exhibition at the Johnson Library in Austin, Texas, and reviewed the contributions of President Johnson to the U.S. space program since 1957.

November 25: Harold T. Luskin, Director of Apollo Applications, Office of Manned Space Flight, died after brief illness.

- . NASA Policy Directive on "Lines of Succession to Key Positions" (NPD 1160.1C) became effective, which provided for the naming of other than subordinates to provide for continuity during an emergency or absence of key officials.

November 26: Associate Administrator Newell gave address on "Science, Technology, and Society" to the National Council for the Social Studies, meeting at Goddard Space Flight Center. He said: "Science generates an increased understanding of man and nature and this understanding is reflected in the world's literature, in its social, political, and economic institutions, and in its application to human daily living... People now can conceive of man in a historical and cosmological perspective that did not exist in centuries past..."

. NASA-University of Texas 107-in. telescope dedicated at McDonald Observatory, Mount Locke, Texas.

- . Associate Administrator for Manned Space Flight Mueller reviewed NASA's accomplishments under three Presidents and six Congresses in address to National Space Club. Final decision on Apollo 8 mission was made, he said, "only after a thorough assessment of the total risks involved and the total gains to be realized in this next step toward a manned lunar landing."

- . 49th meeting of the NASA-DOD AACB.

November 27: In a meeting between President Johnson and Acting Administrator Paine, it was decided that the NASA FY 1970 budget request would be \$3,878 million, the same amount available to NASA FY 1969.

November 29: Marshall Space Flight Center requested proposals from 11 aerospace companies for six-month design and definition study of lunar roving vehicle (LRV).

- . Cosmos CCLV launched.

During November: NASA released special publication Objectives and Goals in Space Science and Applications 1968 (SP-162).

- . Electronics Research Center's Optics Lab developed a laser which emits

During November (continued)
white light.

- . Ten NASA employees at Langley and Ames were individually cited in a letter of appreciation from the Department of Defense for their contribution in the joint development of the C-5 aircraft.

December 2: H. Julian Allen, temporarily Acting Director of Ames Research Center, named Special Assistant to the Associate Administrator James M. Beggs, Office of Advanced Research and Technology.

- . Staffs of House and Senate space committees were briefed on EVA activity planned for accomplishment by the Apollo astronauts on the first lunar landing.

December 3: President Johnson announced that with the deposit of instruments of ratification by the U.K., the U.S., and the U.S.S.R., the Astronaut Assistance and Return Agreement had entered into force.

- . President-Elect Nixon announced that Dr. Lee A. DuBridge, President of the California Institute of Technology, would be his science advisor. He also announced creation of two task forces to make recommendations to him: one on general science headed by Dr. H. Guyford Stever, President of Carnegie-Mellon University; and one on space headed by Dr. Charles Townes, Nobel Prize-winning physics professor of the University of California (Berkeley).
- . President Johnson presented 1967 Harmon Aviation Trophy to Major W. J. (Pete) Knight, USAF, test pilot for his record-making flight of 4,250-mph in X15A2 on October 3, 1967.
- . General Jacob E. Smart, Assistant Administrator for DOD and Interagency Affairs, addressed the Armed Force Management Association on "NASA/Inter-agency Coordination."

December 3-4: AIAA Entry Vehicle Systems and Technology meeting held at Langley Research Center.

- . Interplanetary Trajectory Coordination Committee met at Langley Center.

December 5: NASA launched HEOS, the European Space Research Organization's Highly Eccentric Orbit Satellite A-1, from Cape Kennedy on Thor-Delta rocket. This was first NASA launching of a foreign scientific satellite on a cost-reimbursable basis.

- . Apollo 8 countdown demonstrations test began.
- . Deputy Administrator for Space Science and Applications Oran Nicks outlined application of Surveyor and Lunar Orbiter techniques to unmanned exploration of planet Mars at AIAA meeting in Washington.

December 6: Marshall Space Flight Center announced reorganization, creating Directors for Program Development, Center Operations, and Science.

December 6: NASA concern with possible delay to the Nuclear Rocket Test Program by next planned underground test in Nevada conveyed in memorandum of Acting Administrator to the President's Science Advisor.

December 6-9: NASA Science and Technology Advisory Committee for Manned Space Flight met in La Jolla, Calif., Chairman Charles Townes presiding.

December 7: NASA's OA0-II launched from Cape Kennedy by Atlas-Centaur. Known as "stargazer" Satellite, OA0-II would provide first telescopic view of 50,000 stars above the earth's atmosphere.

December 8: Lunar landing trainer crashed at Houston, test pilot Joe Algranti ejecting safely. Test was last scheduled before it was to have gone into astronaut training use.

December 9: Ceremony and formal dinner at the White House held by President Johnson for former NASA Administrator James E. Webb and 23 Apollo astronauts, their wives and distinguished guests including the Vice President, Cabinet and NASA officials, Charles A. Lindbergh and Alexander P. de Seversky. In awarding the Presidential Medal of Freedom to Mr. Webb, the President said it was "the highest civilian honor the President can bestow on any individual whose work advances a great cause." After dinner, excerpts from Offenbach's 1875 opera, "Voyage to the Moon," provided entertainment.

- . HL-10 lifting-body research vehicle successfully completed second powered flight.

December 9-13: SNAP-27 Safety Review Panel, including NASA representatives met in Washington, D.C.

December 10: NASA announced award of contract to Thiokol Chemical Corp. for development of new, more powerful rocket for unmanned missions, including possible use as a third stage for Centaur and Delta.

- . "Wet" portion of Apollo 8 countdown demonstrations test completed successfully.
- . Moscow broadcast in English quoted A. A. Blagonravov as saying that additional testing in the Zond program was necessary before a Soviet manned circumlunar mission could be made. Cosmos CCMVIII launched.
- . Goddard Space Flight Center announced a Planetary Explorer meeting for January 22, to review concepts and feasibility of placing scientific satellites around the planets Mars and Venus. Launch opportunities exist for Venus in 1972, 1973, and 1975, and for Mars in 1973 and 1975.

December 10: Joint U.S.-West Germany project for barium vapor photography of magnetic lines of force announced.

- . Announced that Manned Spacecraft Center awarded \$16.4 million extension of support services contract with Lockheed Electronics.

December 10-12: Space Science and Technology Panel of PSAC met in Tuscon, Arizona.

December 11: "Dry" portion of Apollo 8 countdown demonstrations test was successfully completed, with astronauts participating.

- . Seven University of Wisconsin ultraviolet light experiments were turned on in OA0-II, and the Smithsonian experiment was turned on December 13. OA0 II was considered to represent the greatest advance in astronomy since the invention of the optical telescope.

December 11-12: Turbulent Boundary Layer Symposium at Langley Research Center.

December 12: Structures Group of the NASA Inter-Center Hypersonic Aircraft Technology Committee met at Langley Research Center.

- . NASA requested proposals for fabrication and erection of two \$13-million, 210-ft.-dia. tracking antennas, to be installed in Spain and Australia as part of NASA's Deep Space Network.

December 14: At final pre-flight Apollo 8 press conference, Astronaut Borman said his Christmas flight around the moon was considered no more dangerous than a fighter pilot's tour in Vietnam.

- . Cosmos CCMIX launched by U.S.S.R., the 71st Soviet mission in 1968.

December 15: ESSA VIII was launched from Vandenberg AFB, a satellite expected to aid weather forecasters in more than 50 nations.

- . Apollo 8 began countdown on time at 7 p.m. EST, for launch scheduled at 7:51 a.m. December 21.
- . University of California (Berkeley) scientists headed by Nobel Prize physicist Charles Townes, reported the discovery in space by radar astronomy that molecules of ammonia gas were "quite abundant," and also detected in the atmosphere of Jupiter. Ammonia considered one of the chemical ingredients for the origin of life.

December 16: Apollo 8 astronauts pronounced fit and ready.

- . NASA canceled two 21-day Biosatellite missions for 1971. Two 30-day spacecraft efforts to be continued.

December 16: Test to deploy parachute at supersonic speed failed over White Sands when parachute prematurely ejected.

- . National Trendix poll reported public support for space program was 17% higher than last year, with survey showing 68% of public in favor of Apollo program to land man on moon by 1970, 49% favoring manned space exploration, and 60% favoring planetary exploration.
- . President Johnson issued proclamation calling for observation of Wright Brothers Day on December 17.

December 17: Extensive interview on December 13 of Dr. Lee A. DuBridge, President-Elect Nixon's announced nominee for Science Advisor, reported in the New York Times. DuBridge said he would try to enlist scientific leaders into the Presidential decision-making machinery and seek to increase Federal support for basic and applied science, he viewed space as expensive but productive in learning new knowledge and techniques, and national defense required active science and technological investigation and development.

- . Henry Loomis, executive director of task forces for President-Elect Nixon, informed Space Daily that report of Task Force on Space headed by Dr. Charles Townes would be submitted by January 20, 1969, and that it would be "privileged information."
- . Astronaut Schirra received the Navy's Distinguished Service Medal for his space leadership at ceremony at Pentagon.
- . Sixty-fifth anniversary of first successful heavier-than-air flights by the Wright Brothers at Kitty Hawk.

December 18: Intelsat III-B launched by NASA from Cape Kennedy, date of tenth anniversary of first comsat launching of Project Score.

- . Apollo 8 review at KSC declared all systems ready for launching on schedule.
- . Senior officials of NASA and the Department of State met in second of informal luncheons to combine understanding of the forces of advanced technology at play in international affairs.
- . NASA Director of Manned Space Flight Safety Jerome Lederer told Wings Club in NYC that Apollo 8 mission around the moon was as safe as Columbus voyage in 1492. Apollo 8 has 5,600,000 parts and 1,500,000 systems, subsystems and assemblies. With 99.9 percent functioning, "we could expect 5,600 defects. Hence, the striving for perfection and the use of redundancy."
- . William C. Schneider named director of Apollo Applications in the office of Manned Space Flight.

December 19: NASA Committee on Extra-Vehicular Activities (EVA) established to provide recommendations for planning and development.

December 20: NASA announced termination of the X-15 rocket research airplane program after 199 flights since June 9, 1959. X-15 reached peak altitude of 354,200 feet and a top speed of 4,520 mph. The NASA-USAF-USN X-15 program began in 1955.

. NASA Management Advisory Panel met in Headquarters.

December 21: Apollo 8 successfully launched with Astronauts Frank Borman, James A. Lovell, Jr., and William Anders, the first manned liftoff with Saturn V. Launching witnessed live by largest audience in history: an estimated 300,000 "birdwatchers" near Cape Kennedy. Three American TV networks, the B.B.C. and the 12-nation Eurovision TV networks--all telecast the event live to an estimated 130-million people in 54 countries. 10:41 a.m. third-stage of Apollo 8 fired for translunar trajectory, and at 10:44, Houston Control reported crew travelling faster than man had ever flown before.

. In message to Apollo 8 astronauts, President Johnson said: "Congratulations on the magnificent beginning of the Apollo 8 adventure. The visions of the past are coming closer and closer to becoming the amazing achievements of the present.

"I am confident that the world's finest equipment will strive to match the courage of our astronauts. If it does that, a successful mission is assured. Prudence is a hand-maiden of courage, however, so we must give top priority to astronaut safety as decisions are made each step of the way."

. Florida State Police radio network blacked out beginning with the Apollo 8 launch for almost an hour. It was theorized that an ionized layer in the upper atmosphere was created by Saturn V's exhaust gases.

. Sir Bernard Lovell of Jodrell Bank in pre-launch Apollo 8 interview said that the U.S. would land astronauts on the moon first but the "Russians may have much greater stakes in mind than simply a man on the moon." His previous comments, he said, had been taken out of context as he meant that a single lunar landing mission would make a limited long-term contribution to science. The Soviet news agency Tass carried prompt reports on the launching of Apollo 8, but it was not carried live on television.

. Dr. Charles P. Sonnett of Ames Research Center received AIAA Space Science Award.

December 23: Second live telecast from space by Apollo 8 crew--195,000 miles from earth at 3 p.m. EST. Second mid-course correction not needed to reach proper vicinity of the moon for orbit.

December 23: Acting Administrator Paine met with the entire Townes Task Force on space of the President-Elect in accordance with guidelines on the Administration Transition.

December 24: Apollo 8 crew successfully attained lunar orbit insertion at 4:59 a.m. EST, and made two live telecasts shortly thereafter featuring shots of the lunar surface and the earth from the vicinity of the moon.

Borman described color of surface as "dirty sand." Lovell described the earth's appearance as "a grand oasis in the big vastness of space," while Anders described the moon as "a vastness of black and white." They also broadcast Christmas greetings to the world, a prayer, and a reading from the book of Genesis of the Bible.

- . Intelsat III-B communications satellite, launched by NASA December 18, went into service in synchronous orbit over Atlantic. It was used for TV coverage of Apollo 8.

December 25: Apollo 8 crew successfully performed engine burn for return to the earth after 10 lunar revolutions, a critical phase of mission.

- . Associated Press members were repolled and the flight of Apollo 8 was selected as the top news story of 1968. Previous poll had selected the assassinations of Robert F. Kennedy and Martin Luther King, Jr., as the number one and two stories respectively, of the year.

December 26: No mid-course corrections required on Apollo 8 trajectory back to the earth.

- . Acting Administrator T. O. Paine recommended to Mr. James Jones, Special Assistant to the President, that plans be made for post-flight ceremonies for the Apollo 8 astronauts on January 8. Extensive de-briefings would keep astronauts busy until that date. Unprecedented wave of popular enthusiasm for the flight and its worldwide magnitude recommended special plans for an awards ceremony at the White House, a Washington press conference to be followed by Colonel Borman addressing a joint session of the Congress later in the day.

December 27: Successful reentry and splashdown of Apollo 8 after 147:41 hour flight to, in orbit around, and return from the moon. Pickup in mid-Pacific accomplished routinely by the CV Yorktown.

President Johnson telephoned a message to Astronauts Borman, Lovell, and Anders, saying that they had helped "open a new era." He also informed them that the "hot line" to Moscow had been used in the White House to keep the Soviets informed on the progress of the flight of Apollo 8.

Congratulations poured into Houston from leaders around the world, and editorials of American papers began their praiseful comments on the significance of the flight.

- . Ten Soviet cosmonauts sent congratulations to the Apollo 8 astronauts, which was made available by the Soviet News agency Novosti.

December 28: Reported from Moscow by New York Times that the Russian news media had given prompt, factual, and relatively detailed accounts of Apollo 8 mission throughout the week.

- . Astronaut William A. Anders promoted to Lt. Colonel by the Air Force in accord with policy adopted by President Johnson in 1965 of promoting each military astronaut after his first space flight.
- . Soviet news agency Tass reported that three Russian scientists had spent the past year in an airtight greenhouse to discover man's reactions to long space flights. The experiment began November 5, 1967, and ended a year later.
- . First experimental evidence that weightlessness can cause some chromosomal damage of genetic significance based on sperm cells flown 45-hours aboard Biosatellite orbited in 1967, reported by Irwin I. Oster and Loulin S. Browning at AAAS meeting in Dallas.
- . New York Times leading editorial concluded: "The real lesson of Apollo 8 is that this nation can do what it wants to do, if it is willing to pay the price."

December 29: Time magazine named the Apollo 8 astronauts as its "Men of the Year" for 1968, as follows: "For all its upheavals and frustrations, the year [1968] would be remembered to the end of time for the dazzling skills and Promethean daring that sent mortals around the moon. It would be celebrated as the year in which men saw at first hand their little earth entire, a remote blue-brown sphere hovering like a migrant bird in the hostile night of space."

- . Excerpts from the late President John F. Kennedy's address to a joint session of Congress on May 25, 1961, calling for a national decision for achievement "before this decade is out of landing a man on the moon and returning him safely to earth," were reprinted in the Washington Post.
- . Pope Paul VI said in Vatican City that Apollo 8 will be "useful to the progress of human conscience" because it will give man an idea of his "infinite smallness" in the universe. He had watched the splashdown on TV and later sent President Johnson a message of congratulations.
- . The International Flat Earth Society said in London that despite Apollo 8's pictures the world was circular but not globe-shaped.
- . Outgoing science advisor to the President, Dr. Donald Hornig, proposed in AAAS speech that a new look be given the concept of a cabinet level department of science, with the National Science Foundation at its core. He also proposed that the Office of Science and Technology submit an annual report to the President.

December 30: Spectacular color photos of the moon and the earth taken by Apollo 8 astronauts were released. After flying back to Houston, astronauts began extensive debriefings which would continue until January 6.

December 30: In Pravda, Soviet Professor Boris Petrov praised Apollo 8 and said unmanned Zond V and Zond VI "were adapted for piloted flight." "Study of the moon will be carried out by automatic means," he said, "although that does not exclude the possibility of manned flights."

December 31: U.S.S.R. announced that "supersonic transport" TU-144 had made first 38-min. subsonic flight in Moscow.

During December: Senate Committee on Aeronautical and Space Sciences issued a report entitled Tenth Anniversary, 1958-1968, reviewing its membership and its role in supporting the U.S. space program.

January 1: Praise and comment on Apollo 8 voyage made it appear to be the most spectacular worldwide space event since Sputnik I. President-Elect Nixon wired the astronauts: "You and your colleagues have just completed the greatest peaceful conquest in the history of man. Even more dramatic, you have demonstrated to all skeptics on the earth that through peaceful space exploration there are still new worlds to conquer."

January 2: NASA announced renewal for three years of its contract for the operation of the Jet Propulsion Laboratory by the California Institute of Technology.

. President Johnson announced the 12 winners of the 1968 National Medal of Science award, who included Dr. Detlov Bronk, former President of the National Academy of Sciences, and Dr. Herbert Friedman of the Naval Research Laboratory for "pioneering work in rocket and satellite astronomy."

. NASA announced completion of contract negotiation with the Boeing Company to extend technical integration and evaluation support of the Apollo program for another year.

January 5: U.S.S.R. announced launch of Venus V.

January 8: NASA's Orbiting Astronomical Observatory OA0 II was officially declared a success. Launched December 7, satellite had collected 20 times more ultraviolet data from stars in 30 days than had 15 years of sounding rocket observations.

. Apollo 9 was scheduled for February 28 launch to evaluate lunar module performance during manned earth orbital flight. Launch was scheduled for 11 a.m. EST from KSC's Complex 39A with astronaut crew of James M. McDivitt, David R. Scott, and Russell L. Schweickert.

. Acting Administrator Paine requested review board to restudy its findings on the May 6 crash of the lunar landing simulator, in view of a second crash on December 8. Pilots had escaped injury in both accidents. Manned Spacecraft Center was investigating the latest accident.

January 9: Apollo 8 day in the National Capital. In the East Room of the White House President Johnson presented each astronaut, Frank Borman, James A. Lovell, and William A. Anders, the NASA Distinguished Service Medal, NASA's highest award. At noon, the Apollo 8 astronauts motored up Pennsylvania Avenue to Capitol Hill where Frank Borman addressed a joint assembly of the Congress. The Apollo 8 Press Conference on the lunar orbit flight was held in the auditorium of the State Department in the afternoon. That evening an official reception was held in the National Air and Space Museum of the Smithsonian Institution.

January 9: Astronaut Borman was promoted to position of Deputy Director, Flight Crew Operations, Manned Spacecraft Center.

- . NASA announced Apollo 11 prime crew of Astronauts Neil A. Armstrong, Michael Collins, and Edwin E. Aldrin, Jr. Apollo 11 was scheduled in the summer.

January 10: Apollo 8 day in New York City as the astronauts were feted with a "ticker tape" parade and numerous receptions and honors.

- . Venus VI launched by U.S.S.R. and it was announced that Venus V launched January 6 and Venus VI would both attempt soft landings on the planet Venus.
- . Postmaster General Marvin Watson announced that an Apollo postage stamp would be issued on May 5, the anniversary of the first U.S. manned space flight of Mercury Astronaut Alan Shepard in 1961.

January 12: U.S.S.R. announced launch of Cosmos CCLXIII.

- . Apollo 8 astronauts with their families attended the Super-Bowl football game in Miami, participating in pre-game ceremonies.
- . Reported by the Communications Satellite Corporation that it would end up 1968 with an operating profit for the first time in its history, estimated near \$1 million.

January 13: Apollo 8 day in Houston which featured largest parade in city's history and honors for the first men who flew around the moon. At MSC ceremony, Acting Administrator Paine presented 12 Distinguished Service Medals, 62 Exceptional Service Medals, and recognized officially the contributions to the Apollo 8 space mission of individuals and groups in NASA, the Department of Defense, and industry. Receiving DSM's, NASA's highest award, were: Kurt H. Debus (KSC Director), Robert R. Gilruth (MSC Director), Christopher C. Kraft (MSC Flight Operations Director), George M. Low (Manager MSC Apollo Program), George E. Mueller (Associate Administrator for Manned Space Flight), Rocco A. Petrone (KSC Director Launch Operations), Lt. Gen. Samuel C. Phillips (Apollo Program Director), Eberhard F. M. Rees (MSFC Deputy Director), Arthur Rudolph (MSFC Saturn V Program Manager), William C. Schneider (Manager Apollo Applications Program), Gerald M. Truszynski (Associate Administrator for Tracking and Data Acquisition), and Wernher von Braun (MSFC Director). Group Achievement Awards went to the USS Yorktown and Embarked Air Group of the U.S. Navy, and NASA's Manned Space Flight Network and Office of Public Affairs. A Public Service Group Achievement Award was presented to the Apollo 8 Communications Network.

- . NASA announced termination of the joint NASA-DOD XB-70 flight research program.

January 14: State of the Union message delivered to a joint meeting of the Congress by President Lyndon B. Johnson.

. Apollo 8 astronauts feted in Chicago.

. Manned Soyuz IV launched by U.S.S.R.

January 14-15: NASA top management and Center Directors held "Blue Sky" meetings, a full spectrum review of aerospace trends and recommended NASA priorities for the future.

January 15: Astronauts would participate in underwater tests and training for the first American space station, NASA reported. Mockups of elements for the embryonic Apollo Applications workshop cluster were submerged in 1.4 million gallon tank to provide simulated weightlessness. Test results would be fed into workshops design development, with final design expected in May 1969.

January 20: Administration of President Lyndon B. Johnson comes to an end as President Richard M. Nixon is sworn in as President of the United States. Mr. Johnson had served the U.S. space program continuously since Sputnik I in October 1957, first on Capitol Hill as Chairman of the Select and then permanent Senate Committee on Aeronautical and Space Sciences. As Vice-President under the late President John F. Kennedy, he had served as Chairman of the National Aeronautics and Space Council, a post held by Vice-President Hubert H. Humphrey during the Johnson Administration.

III

ADMINISTRATIVE FOCUS ON THE FUNDING CRISIS

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The overall dollar limitations in fiscal year 1969 for the Johnson Administration proved a severe challenge to NASA. The mission of NASA in the 1970's, after the completion of a manned lunar landing probably in 1969, was clearly going to be dependent upon early program decisions by the White House and the Congress which must authorize the funding for space achievements in the decade to come.

In his White House press conference on September 16, James E. Webb had announced his retirement as Administrator effective on his 62nd birthday, October 7. He had strongly stated his reflective view, after 25 years of government service, of NASA's budgetary history since 1964 and its impact upon future American space achievement:¹

I leave NASA well prepared and with a conservative financial structure to carry out the missions that have been approved. They will go forward. What we have not been able to do under the pressures on the budget has been to fund new missions for the 1970's. So, there is going to be a period when there will be fewer flights than would, in my view, have been important to do....

I am not satisfied with the program. I am not satisfied that we as a nation have not been able to go forward to achieve a first position in space. What this really means is that we are going to be in a second position for some time to come....

While the dramatic flights of Apollo 7 and Apollo 8 were to come in October and December, Administrator Webb was referring to the post-Apollo period.

In an address to the Aerospace Industries Association, Acting Administrator T. O. Paine in November stated that NASA's greatest problem

*Drafted by E. M. Emme, NASA Historian.

was "to preserve the strong scientific and technological base of NASA and especially the management capability that we created over the past decade."² This was a candid expression of the seriousness of NASA's funding crisis.

THE INTERIM OPERATING PLAN FOR FY 1969

NASA had entered into the 1968 budgetary process conducted during 1968 for FY 1969 with scaled-down plans but with hope for launching some of its major new programs. When President Johnson signed NASA's appropriation on October 4, the FY 1969 budget provided adequate funding for Apollo and other existing programs but it postponed major new programs. This helped precipitate some uncertainty about the level and pace of the civilian space effort after the lunar landing phase of Apollo.

For FY 1969, President Johnson had requested in January \$4.37 billion for NASA, the lowest amount since President Kennedy's request for \$3.7 billion for FY 1963. It had become clear in June and July of 1968 that NASA would be fortunate if Congressional authorization and appropriation bills reached a total near \$4 billion. On September 25, the Congress had finally placed H. R. 17023 before the President for signature. It provided for a NASA appropriation of \$3.995 billion, \$375 million less than the President's request.³ But this was not all of the scaling down of the funding.

In a separate action in the Revenue and Expenditure Control Act of 1968, the Congress required President Johnson to reduce total federal expenditures for FY 1969 by \$6 billion below the budget estimates, as the price for passage of the surtax requested to help cover the escalated costs of the Viet Nam involvement. NASA could therefore expect to take its share of this

\$6 billion cut by the President - \$350 million - below what Congress actually would appropriate. While NASA awaited the final Congressional appropriation and the subsequent action by the Bureau of the Budget, NASA prepared an interim operating plan for FY 1969.⁴

On August 8, NASA had announced its interim operating plan which included drastic cutbacks in plans for all new programs and provided that work on Apollo, on aeronautics, and on space applications would proceed as authorized.⁵ Reduction of 1600 civil service personnel was specified. Most severe to a minimal projected program were the cutbacks of the earth-orbiting Saturn V Workshop to nonhardware studies, the postponement of the NERVA nuclear flight engine and the substitution of a much-reduced mission for the Mars 1973 project.

As pointed out by Deputy Administrator Paine to the Senate Space Committee on October 3, it was necessary to adopt an interim operating plan "to carry forward the NASA program during a period of uncertainty that could last four months or more into the fiscal year." The interim operating plan at least afforded a basis for moving on with efforts likely to be funded. It also recognized the necessity of making early reductions "to avoid the much deeper reductions than if we waited for final decisions later in the year."

NASA felt it essential to construct its interim operating plan within a "self-imposed \$3.85 billion limitation and to decide to operate on the basis of this plan pending final decisions." While budgetary guidance indicated that FY 1970 might be even more restrictive, Deputy Administrator Paine stated to the Congress that he was "personally convinced that the nation's space program requires an increase in funding in FY 1970."

"I am hopeful," he testified, "that as we proceed with the preparation of the FY 1970 budget we will succeed in establishing the need for a significant increase."⁶

BUDGET REQUEST FOR FY 1970

Basic guidance for the FY 1970 NASA budget had been given to the Administrator in a letter from the Director of the Bureau of the Budget, Charles J. Zwick, in August. In essence, this planning guidance required submittal by NASA by September 30, of a \$3.6 billion FY 1970 Program Plan with "proposed high-priority program additions to that plan."

The NASA Planning Steering Group outlined at a September 9 meeting a broad range of program alternatives and fiscal strategies. Deputy Administrator Paine requested that three alternative programs be prepared, saying: "We should make maximum utilization of this framework of alternative program considerations together with the runout implications of the FY 1969 Interim Operating Budget."⁷ On September 13, a call for Estimates was made. During the remainder of September, alternative budget plans, policy issues, and program plans were finalized.

On October 14, Dr. Paine, now Acting Administrator, dispatched the FY 1970 budgetary requirements of NASA to the Bureau of the Budget.⁸ In a covering six-page memorandum to the Director of the Bureau of the Budget, Dr. Paine summarized the impact of the guidelines used in preparing these requirements, and NASA's analysis of them. The basic thrust of this letter stated:⁹

A continuation of Executive and Congressional budget reductions and the even more restrictive recent expenditure limitations would cripple the nation's space effort immediately after Apolli, virtually bringing to a halt the great program

that was built at such great costs. I cannot believe that President Johnson or the new President would permit his 1970 Budget to place the nation in such untenable position....
[and] four principal considerations will be overriding in leading to a final decision to support a substantial increase in the NASA 1970 Budget.

The four principles underwriting the NASA budget request for FY 1970
10
were:

1. It is impossible to justify a rational national policy in which the Nation "turns its back in the second decade on what it can accomplish" in space.
2. In the 1970's, the space program may well be the best vehicle to project a peaceful image of the reality of American power and leadership on both sides of the Iron Curtain.
3. Realistic assessment of military and civil aviation shows "an alarming threat" to U. S. leadership in these fields.
4. FY 1970 Budget requests of the President will be publicly debated during a period when manned Apollo flights are in full view.

More specifically, NASA's seven major program goals for the next ten years, five major goals in space and two in aeronautics, provided the underlying pattern for the FY 1970 requests. In essence, these seven goals were
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stated in Dr. Paine's letter to Mr. Zwick as follows:

1. Understand and put to use what space means to people on earth:
 - a. Increase our scientific understanding of the vital earth-sun relationship, and study the earth itself from space.
 - b. Develop and experiment with new and improved practical applications of satellites.
 - c. Foster the prompt introduction into the economy of space-developed applications and advanced technology.
 - d. Keep alert to potential military applications of space and support the Department of Defense as required.
2. Follow up the first Apollo landing with a sound program of manned lunar exploration.

3. Proceed with the orderly development and experimental operation of manned orbital space stations.

4. Move steadily out in the exploration of deeper space -- to the planets with unmanned probes, and to the stars from orbital observatories outside the atmosphere.

5. Maintain the momentum of U. S. technological advance in aerospace disciplines.

6. Develop the full potential of U.S. military aeronautics.

7. Develop the full potential of U. S. civil aeronautics.

The FY 1970 budget estimates were, in NASA's view, those required to proceed to the stated goals at an optimum rate for a total of around \$4.7 billion, and rising to over \$5 billion in succeeding years. "These estimates," Paine's letter stated, "are the "A" budget which we recommend as the proper course to move this nation toward a position of world leadership in space and aeronautics." In accordance with the previous guidelines, however, NASA had prepared detailed supporting materials for a "B" budget level, which provided limited "new-starts" over the FY 1969 operating budget, and which came to \$4.2 billion for FY 1970. Detailed estimates for augmentation of this middle "B" figure to attain the "A" level of funding with a progressive leadership program" were available if desired by the BOB.

And finally, in submitting NASA's FY 1970 requests of the BOB, Dr. Paine referred to the guideline request for considering the implication of a total FY 1970 program limited to \$3.6 billion of new obligational authority. First, without any new starts, a FY 1969 operating budget total of \$3.8 billion was rock bottom. This was, he said, "strictly a going-out-of-business projection, certainly not a viable program." A \$3.6 level would require the abandonment

of manned explorations of the moon and space station development" "I do not see how the nation's space program could absorb such further reduction and survive in any meaningful sense.... I cannot see any realistic basis on which such a budget could be presented to the public or defended before the Congress."

In conclusion, Dr. Paine pointed to the high cost of the investment already made and the undesirable repercussions if the institutional base of NASA was further reduced. NASA remained hopeful that studies underway would point to substantial future savings in the costs of procuring large launch vehicles. He referred to joint studies with the Department of Defense on achieving maximum elimination of unnecessary costs and full coordination.

Dr. Paine concluded his letter to BOB as follows:

We are proceeding to review all our programs and estimates in detail with members of your staff. In addition, it seems to me that it would be desirable for you and me to discuss the major policy aspects and implications of our estimates.

After a series of hearings with Agency personnel and a meeting between Dr. Paine and Mr. Zwick on November 6, 1968, a Bureau of the Budget tentative allowance of \$3,623 million was received. NASA prepared a reclama outlining the impact of the proposal and recommending a program totalling \$4,074 million.¹² Dr. Paine and Mr. Zwick met on November 21, 1968, to discuss this recommendation, and on November 27, 1968, they met with the President. The Presidential allowance was established at \$3,878 million, the same level as the FY 1969 program.¹³ President Johnson submitted to the Congress his budget for FY 1970 on January 15, 1969.¹⁴

On January 20, 1969, President Richard M. Nixon inherited a NASA which had eminently succeeded in achieving the space goals set out for it by the

administration of the late John F. Kennedy in 1961, and carried forward thereafter by President Lyndon B. Johnson. For the 1970's, however, a national decision would yet be required to chart the course and level of effort the United States would undertake. In the meantime, President-Elect Nixon has appointed his Space Task Force chaired by Dr. Charles Townes to provide him recommendations as to what the space program should be.

NOTES FOR CHAPTER III

1. Transcript of New York Times, September 17, 1968, p. 1; Washington Post, September 17, 1968, p. 1. At the time of Webb's statement, the Congress had not completed action on NASA's appropriation for FY 1969.
2. Text, Phoenix, Arizona, November 20, 1968, p. 12. Copy in Appendix B-3.
3. See "Preliminary History of NASA During the Administration of President Lyndon B. Johnson," Volume One, Chapter II (previously submitted), pp. 21-25, for the opening of the FY 1969 budget story.
4. See testimony of Deputy Administrator Paine on the Interim Operating Plan for FY 1969, before the Senate Committee on Aeronautical and Space Sciences, October 3, 1968.
5. NASA, Interim Operating Plan for FY 1969, August 8, 1968.
6. Paine, Testimony, pp. 3-4.
7. Letter, Director of BOB to NASA Administrator, August 30, 1968.
8. Memo, Assistant Administrator for Administration to the NASA Historian, December 26, 1968.
9. Letter, Acting Administrator to the Director, Bureau of the Budget, October 14, 1968. Copy is in Appendix A-7. It must be pointed out that the presidential election was less than three weeks hence, and NASA's funding morale was at its lowest status and was an accumulation of the past caution to preserve the full context of determinant factors.
10. Ibid., pp. 2-3.
11. Ibid., pp. 1-2
12. NASA's reclama to the Bureau of the Budget response at a meeting on November 9, was contained in a letter from the Acting Administrator to the Director of BOB on November 18 (See Appendix A-8). This letter contained strong NASA arguments against the BOB dollar level for NASA, and further meetings were held, finally involving sessions with President Johnson. This resulted in the restoration of some monies to determine NASA's budget for FY 1970. "Summary by Program Category of FY 1970 Budget Estimates," December 1, 1968, is contained below in Appendix A-6. Specific impact of the FY 1970 budget upon the balance of NASA's overall programs, with the distribution of cutbacks in post-Apollo and orbital workshop programs, lunar and planetary exploration, aeronautics, etc., is premature for discussion here.
13. This NASA program level will be partially funded with the \$117 million withheld from FY 1969 appropriations, thus requiring only \$3,711 million in new obligational authority.
14. NASA FY 1970 Budget Briefing, January 15, 1969, with Background Material, is in Appendix A-4.

IV

MANNED MISSIONS OF APOLLO BEGIN

Chapter IV

MANNED APOLLO FLIGHTS BEGIN *

During the period from October, 1968, to January, 1969, the National Aeronautics and Space Administration resumed manned flights after a 23-month period involved with review, analysis, modification, test and careful preparation for flight.

The highly successful Apollo 7 and Apollo 8 flight missions in this period greatly augmented the momentum of the program, the confidence in our space endeavors was reaffirmed, and once again national and worldwide enthusiasm for space exploration was well in evidence.

The Apollo 7 mission, first manned flight of the Apollo program, showed that the government-industry-university team had recovered from the demoralizing effects of the Apollo 204 fire and that the technical and managerial problems that emerged from the investigation of that tragedy had been solved.

The Apollo 8 lunar orbital mission, two months later, was by far the most outstanding achievement to date in manned space flight. In addition, it demonstrated that the Apollo system was able to move rapidly toward its ultimate objectives. The successful results greatly increased confidence that the mission goal of a manned lunar landing and safe return would be achieved, as proposed by President Kennedy, before the decade is out. Shortly after the Apollo 8 mission, a flight

*Prepared by Jay Holmes of the NASA Office of Manned Space Flight

crew was selected for Apollo 11, the first mission with the capability of accomplishing the lunar landing and return.

The vast outpouring of public enthusiasm and acclaim for the Apollo 8 results were a challenge to press on to still greater achievement. On the other hand, the enthusiasm may have resulted only partly from the merit of the pioneering effort. Perhaps of equal significance was the desperate public desire for something to cheer about at the conclusion of a particularly difficult year for the nation and the world in general.

In this context the Johnson Administration firmed up plans for restrained continuance of the Apollo Applications program, leading to the flight of an orbital workshop in 1971 and the Solar Astronomy mission in 1972. At the same time, details were worked out for lunar exploration flights in the period following the Apollo lunar landings, and study continued on the concept of a semi-permanent space station in earth orbit.

PROGRAM MANAGEMENT AND SCHEDULE

In the period following the Apollo 204 fire, NASA took many steps to maximize assurance that such a tragedy would not recur.

The spacecraft design was changed to include the use of noncombustible and fire-resistant materials to the widest practical extent, the installation of water hoses for extinguishing fires, a shift from pure oxygen to an atmosphere containing nitrogen during ground operations, and the incorporation of a quick-opening hatch for rapid egress on the launch pad.

Manned spacecraft development programs were modified to include large full scale fire and vibration tests. Additional contractor activity in support of the total space vehicle integration was arranged. Procedures for management of testing, quality control audits and contractor relations were strengthened. Two safety review offices were established independent of the Apollo program organization. And NASA management procedures were modified to allow broader participation in major decisions by the upper-level management while at the same time more clearly establishing the relationships between the functional and program organizations.*

The combined result of these technical and management steps culminated in the beginning of Apollo manned flights in October, 1968. A revised Apollo flight schedule was adopted in November, 1967. It consisted of seven flight mission development phases, which were assigned the letters A through G, of which the first two had been completed. The phases were:

Mission A--Unmanned development flights of Saturn IB and Saturn V launch vehicles with spacecraft command and service modules (five flights accomplished between February, 1966, and April 1968).

Mission B--Unmanned development flights of Apollo lunar module with Saturn IB launch vehicle (one flight accomplished in January 1968).

Mission C--Manned validation flights of command and service modules in earth orbit.

Mission D--Manned validation flights of command, service and lunar modules in earth orbit.

Mission E--Lunar mission simulations in earth-orbital flight.

*See Chapter III and VI, "Preliminary History," for more complete discussion of events following the Apollo 204 fire in January, 1967.

Mission F--Lunar orbit missions with the command,
service and lunar modules. 1
Mission G--Missions with the option of lunar landings.

All of these missions were planned as "open ended." This term means that each mission has a series of decision points between key operational phases. Before and after each critical event a full review is made of all aspects of mission status. Then a decision is made whether to proceed to the next period of planned activity, to conduct an alternate mission, or to return to earth. By this means, a high degree of flexibility is retained with the potential to make the maximum progress on each flight.

During this period, flight crews were trained at the Manned Spacecraft Center for Missions C, D and E, but the preparations for subsequent missions had not proceeded to the stage of crew selection and training. 2 The preparations for Mission C (to be designated Apollo 7) proceeded satisfactorily through the spring and summer of 1968 and confidence increased that it would be carried out on schedule. For Mission D, the testing and checkout proceeded satisfactorily for the Saturn V launch vehicle and the spacecraft command and service modules, but in a fashion typical of flight hardware as it approaches its first manned flight, the lunar module lagged behind the other hardware elements to be utilized on the flight. Similar delays had been encountered in the preparations for the first manned flights of the Mercury and Gemini spacecraft as well as the Apollo command and service modules.

The magnitude of this problem was clearly evident during a review on July 17 of subsystems work, at the plant of the lunar

module prime contractor. The matter was discussed on August 6 at the monthly meeting of the Manned Space Flight Management Council, held at the Manned Spacecraft Center. These discussions were continued on August 7, during a lunar module design certification review meeting at the Manned Spacecraft Center, and on August 8, at a review of other aspects of the Apollo 8 mission, at Kennedy Space Center.³

These reviews led to a conclusion that the overall Apollo flight schedule should be modified to defer the first manned lunar module flight from Apollo 8 to a later mission, and to investigate the possibility of an alternate mission for Apollo 8. Such a deviation from the principle of "all up" flight testing seemed justified in order to assure maximum progress for the program at that time.

The prospect of removal of the lunar module from Apollo 8 actually eliminated a constraint against undertaking a more advanced mission--into deep space, around the moon, or possibly into lunar orbit. In the course of considering various options for proceeding toward the Apollo lunar mission, the Manned Spacecraft Center already had developed initial computer programs for the more advanced missions. George M. Low, Apollo Spacecraft Program Manager, discussed the problem on the morning of August 9 with Christopher C. Kraft, Director of Flight Operations, and other officials of the Manned Spacecraft Center. Later that morning, he telephoned Lt. Gen. Samuel C. Phillips, Apollo Program Director, and made a specific recommendation of a mission to lunar distance.

During the Phillips-Low telephone conversation, arrangements were made to follow the suggestion of Dr. Robert R. Gilruth, Director of the Manned Spacecraft Center, that a special meeting on this question be held later that day at the Marshall Space Flight Center, a central

location where participants could meet on short notice. Participants in the meeting were 12 key officials representing NASA headquarters and the three manned space flight field centers. They agreed not to discuss their consideration of the options outside of the group until they had studied them further and discussed the situation with NASA top management.⁴

The situation was complicated by the fact that Administrator James E. Webb, Associate Administrator Homer E. Newell and Dr. Mueller, Associate Administrator for Manned Space Flight, were en route or about to depart for Vienna, Austria, to attend the United Nations Conference on the Exploration and Peaceful Uses of Outer Space. Phillips reached Dr. Mueller by telephone in Vienna on August 14 to inform him of the special studies under way.

Deputy Administrator Thomas O. Paine sat in with the group in Washington on August 14 and 15 to review the results of the studies. On August 15, he telephoned Webb in Vienna. The limited conversation on an open line was supplemented by a lengthy, detailed cablegram on the same day. Paine informed Webb that a preliminary decision on Apollo 8 was recommended. The time had come, it appeared, for detailed flight and ground crew training, as well as mission rehearsals, if the best mission options were to be maintained for a December flight. Paine said the unanimous view of officials in Washington was that authorization should be given to remove the lunar module from the Apollo 8 vehicle (replacing it with a test article) and that necessary actions should be taken to hold open all of the options for a December mission.⁵

Webb replied in a cablegram on the following day that the proposed program changes were approved, but that no decision on the options for Apollo 8 beyond low earth orbit could be made prior to the completion of the Apollo 7 mission, the first manned Apollo flight. In accordance with standard practice, Webb asked Paine to inform the White House in advance of any public announcement.⁶

The Apollo mission changes were announced by Lt. Gen. Samuel C. Phillips, Apollo Program Director, in a NASA news conference at Washington on August 19. The E mission crew was assigned to the new Apollo 8 mission, designated C-prime. Phillips said the problems with the Saturn V launch vehicle highlighted by the Apollo 6 mission in April appeared to have been solved, but that further ground testing was necessary to verify the solutions, before the Saturn V could be man-rated for the Apollo 8 mission.* He said also that work would proceed in a manner that would afford options to fly Apollo 8 in earth orbit, out into deep space, around the moon or into lunar orbit. But he said that decision would be deferred until after the Apollo 7 mission.⁷

APOLLO 7 MISSION

The first manned flight of the Apollo spacecraft Apollo 7, was the fifth flight of the Apollo-Saturn IB series, the previous four having been unmanned tests of Apollo vehicles. The spacecraft consisted of command and service modules numbered 101, the first of the

*See account of Apollo 6 in Chapter III, "Preliminary History."

Block II configuration. The crew comprised Walter M. Schirra, Jr., command pilot, Donn F. Eisele and Walter Cunningham.

Primary objectives of the Apollo 7 mission included evaluation of the spacecraft and the performance of flight and ground crews through extensive exercise of environmental control, guidance and navigation, and propulsion systems. Another objective was demonstration of the rendezvous capability of the command and service module combination. This was done by simulating the transportation and docking maneuver, to be performed with the lunar module in the lunar landing mission.

The flight plan was laid out so that most of these objectives could be achieved within a few days. However, under the open-ended concept, Apollo 7 could last as long as 11 days if mission status continued satisfactory. The launch time was established in early August at 11 a.m., Eastern Standard Time, on October 11, 1968.

The actual launch was at 11:02:45 a.m. on that date. Both stages of the Saturn IB launch vehicle performed as designed and the spacecraft-second stage combination attained orbit 10 minutes and 26 seconds later. During the second revolution of the earth, the crew began a series of maneuvers to separate the spacecraft from the vehicle stage, transposing to face the spent stage, and simulating the docking maneuver to within five feet of the stage.

Seven television transmissions from Apollo 7 were sent to earth and broadcast live on the national networks. These, beginning

on October 15, were the first live transmissions from a manned U. S. spacecraft.

One problem that persisted through the mission resulted when all three crew members came down with head colds. Other than discomfort of the crew members, however, no serious consequences resulted. During re-entry, they chose to leave their helmets stowed, to permit equalizing the pressure on their ear drums to prevent a buildup to painful levels. By the time of recovery all three appeared to have recovered except for small degrees of nasal congestion.

The mission lasted the full 11 days. It was the first time that a new-model spacecraft had been committed to a long-duration mission on its first manned flight. Re-entry was normal with landing in the Atlantic Ocean at 7:11 a.m. on October 22, about eight miles from the carrier U. S. S. Essex. Although some difficulty was experienced in communicating with the recovery forces when the spacecraft overturned after landing in the water, submerging the antenna, it was promptly righted by inflation of bags installed for such a contingency.

All primary mission objectives were completed. The service module propulsion engine proved itself through eight firings without difficulty. Crew comfort was enhanced for the first time through the provision of hot meals. And a great deal of understanding was gained regarding the freedom of motion in zero gravity within a considerably larger volume than has been available in previous United States spacecraft.

It was concluded that this intra-vehicular activity posed less of a⁸ problem than had been anticipated.

DECISION ON APOLLO 8 MISSION

The success of the Apollo 7 mission was a prime factor in assuring that the more ambitious options for Apollo 8 were indeed possible. However, several steps remained to be accomplished prior to any decision. These included the final verification of the correction of the Saturn V problems, final spacecraft tests, review of network, operations and recovery support, certification of the computer programs for Apollo 8, and preparation and rehearsal of flight operations.

On November 7, 1968, the Apollo Design Certification Review Board completed its comprehensive review of the launch vehicle, spacecraft, space suits, operational support system and mission operations planning for the Apollo 8 mission. The board was chaired by Dr. George E. Mueller, Associate Administrator for Manned Space Flight. Members were Dr. Debus, Director, Kennedy Space Center; Dr. Gilruth, Director, Manned Spacecraft⁹ Center, and Dr. von Braun, Director, Marshall Space Flight Center. The board concluded that the overall state of readiness was such that the most ambitious mission option, a lunar orbit flight, should be recommended to the Acting Administrator, Dr. Paine.

As a further check, a comprehensive briefing was given on November 10 to the Apollo Executives, a group comprised of senior corporate officials of industrial companies directly involved in the Apollo program. On

November 11, there followed an all-day review with Dr. Paine and other members of the NASA senior staff.

On November 12, Dr. Paine announced:

After a careful and thorough examination of all of the systems and the risks involved, we have concluded that we are now ready to fly the most advanced mission for our Apollo 8 launch in December, the orbit around the moon.

Frank Borman and his crew and all our engineers are unanimously in favor of selecting this mission.

We have reached this conclusion after a long series of intensive investigations of the status of our program, the flight hardware, ground support equipment, status of our training.

The time of launch was established at 7:50 a.m. on December 21,
10
1968.

APOLLO 8 MISSION

Subsequent analysis indicated that the best moment for launch of the Apollo 8 mission would be at 7:51 a.m. on December 21. The vehicle was launched exactly on schedule, with its crew consisting of command pilot Frank Borman, James A. Lovell, Jr., and William A. Anders. According to plan, the first two stages of the Saturn V launch vehicle and a partial burn of the third stage placed the spacecraft and third stage in an earth parking orbit.

The go-ahead for trans-lunar injection was given at 10:17 a.m. and at 10:42 a.m., the third stage burned again to place the spacecraft in a trajectory that carried human beings beyond low earth orbit for

the first time. The main service module propulsion system was burned once in this period for the midcourse correction. Two and a quarter days later, at 3:29 p.m. on Monday, December 23, Apollo 8 left the region in which the earth's gravity is predominant and entered the influence of the lunar gravity. A final hairline adjustment of the trajectory was made by firing the four service module reaction control jets for 11 seconds.

Mission control gave the go-ahead for lunar orbit insertion at 3:44 a.m. on Tuesday, December 24. At 4:49 a.m., Apollo 8 passed behind the moon and communications were interrupted for 33 minutes. The crew of Apollo 8 became the first men to look at the far side of the moon. The service propulsion system burned during this period for 4 minutes and 2 seconds, reducing speed sufficiently to enter a lunar orbit with perilune of 60.5 nautical miles and apolune of 168.5 nautical miles. Two revolutions later, at 9:26 a.m., a main engine burn of 11 seconds reduced speed further to make the orbit circular at 61 miles.

During the period of lunar orbit, extensive photography of the moon was carried out and guidance and navigation procedures were exercised with the use of lunar landmarks and star sightings in preparation for later lunar landing missions.

After the mission, Lovell reported that lighting conditions on landmarks at one potential site in the Sea of Tranquility had been found satisfactory for landing. In fact, the range of light conditions

for good visibility was greater than expected. The astronaut could see features in deep lunar shadows. This capability had not been obtained from lunar photography. From these operating altitudes the astronauts found the moon to be gray in color with slight tinges of brown.

The go-ahead for firing the propulsion system for the return trip to earth was given at 11:55 p.m. At 12:42 a.m. on Wednesday, December 25, the spacecraft passed behind the moon at the conclusion of its tenth revolution and communications were interrupted for 38 minutes. During this period, the service propulsion system burned 3 minutes and 23 seconds to launch the spacecraft on its return flight to earth. Two days and nine hours later, Apollo 8 made contact with the earth's atmosphere. Only one 14-second course correction burn of the reaction control system had been required during the return flight. The service module was separated from the spacecraft 15 minutes prior to re-entry.

Apollo 8 landed in the Pacific Ocean 1,150 miles southwest of Hawaii at 10:51 a.m., on Friday, December 27, six days and three hours after liftoff. The re-entry guidance had brought it within three miles of the recovery ship. Again the spacecraft overturned in the water but was soon righted. The crew was on board the carrier U. S. S. Yorktown an hour and a half later.

Six television transmissions were sent to earth during the mission and were carried live by the national networks.

During transmissions from lunar orbit, Borman described the moon as "a vast, lonely, forbidding type existence--a great expanse of nothing, that looks rather like clouds and clouds of pumice stone...."

Anders said the moon's color was "like a very whitish gray, like dirty beach sand with lots of footprints on it."

Lovell said, "The vast loneliness up here of the moon is awe inspiring and it makes you realize just what you have back on earth. The earth from here is a grand oasis in the vastness of space."

Because of the difficulties experienced by the Apollo 7 crew, as well as a worldwide outbreak of a new strain of influenza, it was decided to limit contacts of the Apollo 8 crew for the 12 days prior to launch day, and they were given inoculations of a newly developed influenza vaccine. However, during the early hours of the first day of the flight, Frank Borman suffered illness and the other crew members experienced lesser degrees of nausea.

During the mission it was believed that Borman might have incurred influenza, but his symptoms cleared up rapidly and were not experienced by the others. Post-flight medical studies indicated that the difficulty was not caused by a viral infection. Medical analysis pointed to the possibility that the nausea resulted either from rapid movement during the acclimatization to zero gravity or from an after-effect of a sleeping pill. No further medical difficulties were encountered after the first day, but fatigue did pose a problem for all three crewmen during the remainder of the mission.

The Apollo 8 mission was rated as a complete success, and advanced the United States considerably toward the Apollo mission goal of a manned lunar landing and safe return of the astronauts, within this decade. In addition, the demonstration of space capability contributed substantially toward the achievement of the
11
broader national objectives of the space program.

Following the mission, Borman was promoted to the post of Deputy Director, Flight Crew Operations, at the Manned Spacecraft Center. He said that he had for some time wished to retire from space flight, but that as a member of the Apollo 204 Review Board, he had a strong desire to fly to demonstrate his confidence in the spacecraft.

NASA announced selection of the flight crew for Apollo 11, which was to be the first mission with the capability to carry out the lunar landing and return to earth. The Apollo 10 crew had been selected in November. In this revision of the Apollo flight schedule, Apollo 9 would combine Missions D and E, Apollo 10 would perform Mission F, descending to 50,000 feet above the moon, and Apollo 11
12
would carry out Mission G. The Apollo program also called for additional lunar landing missions on which astronauts would emplace the Apollo Lunar Surface Experiment Packages. Following the successful conduct of these missions, it was planned to begin the Lunar Exploration phase of the Apollo program.

The honors for the Apollo 8 flight crew following the mission included a White House ceremony, an appearance before a joint meeting of the Congress, a ticker-tape parade in New York and visits to Miami, Houston and Chicago.

President Johnson awarded the NASA Distinguished Service Medal to each of the crewmen on January 9, 1969. The citation said each was "one of history's boldest explorers," who had "blazed a new trail for mankind out into the vastness of extraterrestrial space."

The President declared:

...We recognize that mere national pride is insufficient--that these men represented in the vastness of space all mankind, all of its races, all of its nationalities, all of its religions, all of its ideologies.

For seven days, the earth and all who inhabit it knew a measure of unity through these brave men....

If there is an ultimate truth to be learned from this historic flight, it may be this: There are few social or scientific or political problems which cannot be solved by men, if they truly want to solve them together. That applies to the heavens or to hunger, to moon shots or to model cities. 13

At the joint meeting of the Congress, also on January 9, the Speaker of the House of Representatives, Mr. McCormack of Massachusetts, introduced the Apollo crewmen as "three brave men who have, through their notable contributions to our understanding and exploration of space, added glory to our Nation and knowledge to the world."

Following brief remarks by Lovell and Anders, Borman made the principal address, in which he noted that the space program had been supported continuously in the Congress for 10 years during the Administrations of three Presidents.

"I know I speak for everybody in NASA and everybody in the country when I say, 'Thank you from the bottom of our hearts'," he said.

The astronaut read an excerpt from the poet Archibald MacLeish in describing the feelings of the Apollo 8 crew in lunar orbit:

To see the earth as it truly is, small and blue and beautiful in that eternal silence where it floats, is to see ourselves as riders on the earth together, brothers on that bright loveliness in the external cold--brothers who know now they are truly brothers.

Borman continued:

So that the one overwhelming emotion that we carried with us is the fact that we really do all exist on one small globe, and when you get out 240,000 miles, it really is not a very large earth.

The Apollo 8 commander paid tribute to the many Americans in all walks of life who had contributed to the mission, and acknowledged receiving telegrams "from almost every country on the good earth, including a very significant and a very sincere one from the cosmonauts of the Soviet Union, and we were especially pleased to receive it."

He added:

Yet, when we say that this was an American achievement, we really have to go back to Newton and paraphrase him, I am sure in a poor way, by saying that we stood on the shoulders of giants, because how could anyone think of Apollo 8 without thinking of Galileo, or Copernicus, or Kepler, or Jules Verne, or Oberth, or Tsiolkovsky, or Goddard, or Kennedy, or Grisson, or White, or Chaffee, or Komarov. We truly stood on the shoulders of giants.

Borman predicted that in a few years there will be on the moon an international community of exploration and research, much as there is now in the Antarctic. The astronaut asserted:

Exploration really is the essence of the human spirit, and to pause, to falter, to turn our back on the quest for knowledge is to perish.... 14

During the visit to New York on January 10, Governor Nelson A. Rockefeller declared that the Apollo 8 crewmen were "wonderful men who gave the world a wonderful lift at a time when we really needed it."

Mayor John V. Lindsay said, "They have given a fresh and glowing¹⁵ luster to the adventurous pioneering spirit of this country."

On January 13, 1969, in a ceremony at the Manned Spacecraft Center in Houston, NASA awarded the Distinguished Service Medal, NASA's top award, to 12 key officials for their role in Apollo 8. Those honored were: Dr. Kurt H. Debus, Director, Kennedy Space Center; Dr. Robert R. Gilruth, Director, Manned Spacecraft Center; Christopher C. Kraft, Jr., Director, Flight Operations, MSC; George M. Low, Manager, Apollo Spacecraft Program Office, MSC; Dr. George E. Mueller, Associate Administrator for Manned Space Flight, NASA Headquarters; Rocco A. Petrone, Director, Launch Operations, KSC; Lt.Gen. Samuel C. Phillips, Apollo Program Director, Hq.; Dr. Eberhard F. M. Rees, Deputy Director (Technical), Marshall Space Flight Center; Arthur Rudolph, former Manager, Saturn V Program Office, MSFC; William C. Schneider, Apollo 8 Mission Director, Hq.; Gerald M. Truszynski, Associate Administrator for Tracking and Data Acquisition, NASA Headquarters; and Dr. Wernher von Braun, Director, MSFC.¹⁶

APOLLO APPLICATIONS PROGRAM

During the final months of the Administration of Lyndon B. Johnson, the Apollo Applications Program firmed up with the decisions on the allocation of Fiscal Year 1969 funding and the budget for Fiscal Year 1970.

The program schedule in January 1969 called for an Orbital Workshop mission in 1971, based on a dual Saturn IB launch, followed by a revisit mission later in 1971 and the Solar Astronomy mission in 1972.

The FY 1970 budget decision to proceed, coming after the Apollo 7 and Apollo 8 flights, supplied needed momentum to the Apollo Applications Program. In addition, the budget included funding for studies and advanced technology for an earth-orbiting space station and a low-cost shuttle system to provide an economical means of carrying men and equipment to and from stations in low earth orbit.

Harold T. Luskin, Director of the Apollo Applications program, died following a brief illness on November 25, 1968. On December 18, NASA announced the appointment of William C. Schneider to succeed him. Schneider began the assignment following completion of his duties as mission director for Apollo 8.

CONTINUED COMPETITION

The U.S.-Soviet competition in space achievement persisted through the final months of the Johnson Administration.

In October, 1968, Soviet manned space flights resumed after a hiatus of 18 months, which followed the tragic loss of a Soviet cosmonaut. A cosmonaut carried out a four-day mission in the Soyuz III spacecraft.

On January 14, 1969, another cosmonaut achieved orbit in Soyuz IV. He was followed a day later by Soyuz V, carrying three cosmonauts.

On January 16, 1969, the Soviet Union said, Soyuz IV and Soyuz V achieved rendezvous and docking. This was the first docking of two manned spacecraft and the first time that four men had been in orbit in a single vehicle. The Soviets said this was the first manned space station.

The Soviets said the two spacecraft were joined for more than four hours. During this time, two Soyuz V crewmen, Yevgeny V. Khrunov and Aleksei S. Yeliseyev, transferred to Soyuz IV, by extravehicular movement wearing space suits.

On January 17, 1969, Soyuz IV returned to a safe landing in the Soviet Union with commander Vladimir A. Shatalov and the two from Soyuz V. It was the first time that men launched in one spacecraft had returned to earth in another, thus demonstrating the feasibility of rescue from low earth orbit.

Soyuz V remained in orbit with its commander, Boris V. Volynov.

NOTES TO CHAPTER IV

1. George E. Mueller, address before Aviation/Space Writers Association, Washington, D. C., May 1, 1968. See also Apollo Program Office TWX (Confidential) to NASA field centers, April 29, 1968, and Harold B. Finger, memorandum to George E. Mueller (Classified: Confidential), May 1, 1968.
2. The prime crew for Mission C was Walter M. Schirra, Jr., Donn F. Eisele and Walter Cunningham. These three had comprised the backup crew for Apollo 204 in 1967. The Mission D prime crew consisted of James McDivitt, David Scott and Russel Schweickart. The Mission E prime crew consisted of Frank Borman, James Lovell, and William Anders.
3. Carl R. Liebermann, Memorandum for the Record, "Apollo 6 Anomalies and Apollo 8, C-Prime Lunar Orbit Mission Key Event Chronology and Documentation," December 16, 1968. A number of NASA officials, headed by Dr. George E. Mueller, attended the Bethpage, New York meeting, which was conducted by Grumman. The August 6 and 7 meetings were chaired by Dr. Mueller. The August 8 meeting was chaired by Lt. General Samuel C. Phillips, Apollo Program Director.
4. The individuals, in addition to Phillips, were: George Hage, Deputy Director, Apollo Program; from Kennedy Space Center, Director Kurt H. Debus and Rocco A. Petrone; from Manned Spacecraft Center, Gilruth, Low, Kraft and Donald K. Slayton; from Marshall Space Flight Center, Director Wernher von Braun, Eberhard Rees, Ludie Richard and Lee B. James.
5. This confidential cablegram was delivered through the U. S. Embassy in Vienna.
6. James E. Webb, cablegram (Classified: Confidential) to Thomas O. Paine, August 16, 1968.
7. "Apollo Program Changes," NASA News Release No. 68-148, August 19, 1968. Transcript of News Conference, Lt. Gen. Samuel C. Phillips and Julian Scheer, August 19, 1968.
8. Extensive documentation is provided by the NASA Office of Public Information for each Apollo mission, beginning with

announcements of flight plans and continuing with transcripts of the announcements made during the mission. After the crew has completed its post-flight debriefings, a news conference is held, and a transcript again is maintained. The post-flight news conference on Apollo 7 was held at the LBJ Ranch in Texas on November 2, 1968.

9. Under Design Certification Board procedures the program director, Lt. Gen. Samuel C. Phillips, presented facts for review and evaluation by the board.

George E. Mueller, Robert R. Gilruth, Wernher von Braun and Kurt H. Debus, "Apollo 8 Mission Design Certification Review," November 7, 1968.

George E. Mueller, memorandum for Dr. Thomas O. Paine, November 11, 1968, enclosing memorandum from Samuel C. Phillips, "Apollo 8 Mission Selection," November 11, 1968.

10. NASA News briefing, "Apollo 8 Moon Orbital Flight," November 12, 1968.
11. Apollo 8 mission documentation is comparable to that described in Note No. 8 for Apollo 7. See Appendix A-10 for a Summary Log of the Apollo 8 Mission.

12. Crews assigned were:

Apollo 10--Thomas P. Stafford, John W. Young and Eugene A. Cernan.

Apollo 11--Neil A. Armstrong, Michael Collins and Edwin E. Aldrin, Jr.

Lovell and Anders were assigned to the backup crew for Apollo 11, together with Fred W. Haise.

13. Presidential Documents, January 13, 1969, pp. 35-36.
14. Congressional Record, January 9, 1969, pp. H167-68.
15. New York Times, January 11, 1969.
16. NASA News Release, "NASA Apollo 8 Awards," January 13, 1969.

In addition, NASA awarded 62 Exceptional Service Medals and recognized officially the contributions to the Apollo 8 mission of groups and individuals in NASA, the Department of Defense, industry and the scientific community.

Those receiving Exceptional Service Medals were: Donald A. Arabian, MSC; Rear Adm. Fred E. Bakutis, Task Force 130, Department of Defense; Col. Oakley W. Baron, A/RIA Commander, DOD; William O. Brown, MSFC; Clifford E. Charlesworth, MSC; John F. Clark, Goddard Space Flight Center.

Also, Raymond L. Clark, KSC; Aaron Cohen, MSC; Ozro Covington, GSFC; Leroy E. Day, Hq.; Paul C. Donnelly, KSC; Friedrich Duerr, MSFC; Lynwood C. Dunseith, MSC; Maxime A. Faget, MSC; Robert A. Gardiner, MSC; Ernst D. Geissler, MSFC.

Also, Roy E. Godfrey, MSFC; Erich E. Goerner, MSFC; Robert E. Gorman, KSC; Wilbur H. Gray, MSC; Hans F. Gruene, KSC; Walter Haeussermann, MSFC; George H. Hage, Hq., Jerome B. Hammack, MSC; Karl L. Heimbarg, MSFC; Gen. Vincent G. Huston, DOD.

Also, Lee B. James, MSFC; Richard S. Johnston, MSC; Gen. David M. Jones, DOD; Kenneth S. Kleinknecht, MSC; Joseph N. Kotanchik, MSC; Chester M. Lee, Hq.; William R. Lucas, MSFC; Edward R. Mathews, KSC; John P. Mayer, MSC; Owen E. Maynard, MSC.

Also, James C. McCulloch, MSFC; Roderick O. Middleton, KSC; William A. Mrazek, MSFC; Warren J. North, MSC; Edmund F. O'Connor, MSFC; George F. Page, KSC; G. Merritt Preston, KSC; Ludie G. Richard, MSFC; Tecwyn Roberts, GSFC; Ralph S. Swayer, MSC.

Also, Julian Scheer, Hq.; Karl Sendler, KSC; Scott H. Simpkinson, MSC; Sigurd A. Sjoberg, MSC; Donald K. Slayton, MSC; Fridtjof A. Speer, MSFC; Laverne R. Stelter, GSFC; Joseph G. Thibodaux, Jr., MSC; Henry F. Thompson, GSFC; Howard W. Tindall, MSC.

Also, Mathew W. Urlaub, MSFC; William P. Varson, GSFC; Eugene W. Wasielewski, GSFC; Hermann K. Weidner, MSFC; John J. Williams, KSC; and H. William Wood, GSFC.

Public Service awards went to: Charles R. Able, McDonnell Douglas Corp.; William M. Allen, Boeing Co.; John L. Atwood, North American Rockwell Corp.; William B. Bergen, North American Rockwell Corp.; B. Paul Blasingame, A C Electronics Division, General Motors Corp.; Richard D. DeLauer, TRW Inc.; C. Stark Draper, Massachusetts Institute of Technology; Bob O. Evans, International Business Machines Corp.; L. F. Graffis, Bendix Field Engineering Corp.; William P. Gwinn, United Aircraft Corp.

Also, Samuel K. Hoffman, North American Rockwell Corp.; Robert E. Hunter, Philco-Ford Corp.; Howard W. Johnson, Massachusetts Institute of Technology; T. Vincent Learson, International Business Machine Corp.; James S. McDonnell, McDonnell Douglas Corp.; Kenneth G. McKay, American Telephone & Telegraph Co.; Reginald I. McKenzie, Aerojet-General Corp; Hilliard W. Paige, General Electric Co.; Ian M. Ross, Bellcomm, Inc.; Robert W. Schaeffer, Bendix Field Engineering Corp.

Also, George H. Stoner, Boeing Co.; and Robert B. Young, Aerojet-General Corp.

Group Achievement awards went to the USS Yorktown (CVS-10) and Embarked Air Group, Manned Space Flight Network and NASA's Office of Public Affairs.

A Public Service Group Achievement Award was presented to the Apollo 8 Communication Network.

A Certificate of Appreciation was awarded to members of the NASA Scientific and Technology Advisory Committee for Manned Space Flight: Chairman Charles H. Townes and Luis Alvarez, H. Stanley Bennett, Francis H. Clauser, Lee DuBridge, Leo Goldberg, Harry Hess, T. William Lambe, Gordon J. F. MacDonald, William G. Sheperd, William Shockley, William Sweet, John Whinnery and George D. Zuidema.

V

SPACE SCIENCE AND TECHNOLOGICAL PROGRESS

SPACE SCIENCE AND
TECHNOLOGICAL PROGRESS *

This chapter is a terse review of the closing sixteen weeks of the administration of President Lyndon B. Johnson with regard to space science, space applications, advanced research, and technological development in NASA. It can only cover the highlights of events and observations of activities largely associated with the Office of Space Science and Applications and the Office of Advanced Research and Technology. On the other hand, the end of a decade of NASA effort to achieve the space science goals established ten years ago, and the current endeavor to stake out the space program tasks and requirements for the next decade, offer a timely moment for some preliminary assessment.

Two events in this chapter are illustrative: First was the launching of the OA0 II (Orbiting Astronomical Observatory) on December 7, 1968. This represented the result of almost ten years of design, development and testing. Its experiments could mean as much for the science of astronomy as the invention of the optical telescope. The full impact of its observations will probably take months and years to measure and evaluate. Secondly, on December 20, 1968, NASA announced the end of the X-15 rocket research airplane program. Begun in 1955, its design and systems contributed importantly not only to new aerodynamic science and structures technology, but also its control and life-support systems contributed to manned space flight. These

*Drafted by E. M. Emme, NASA Historian, with review and assistance by key OSSA and OART personnel.

two examples, as we shall see, lend themselves to better understanding the long-term nature and fundamental aspects of the interrelationships between new technology applied to basic scientific progress and the insights provided by science for technological advances.

SPACE SCIENCE AND APPLICATIONS

The highlights of the past few months with regard to the Office of Space Science and Applications may be more meaningful when viewed from the perspective of the achievements of the past ten years. What has actually been learned? Of what significance is it? A brief review might be helpful.

Measurements of the composition and the surface characteristics of the Moon were made by the unmanned Rangers, Surveyors, and Lunar Orbiters. The properties of the Earth's atmosphere and the space environment in which the Earth orbits around the sun were measured by the Explorer satellites, sounding rockets, Pioneer space probes, and other space experiments. The Van Allen belts were but the first of numerous additions to man's knowledge of nature beyond the earth. The interplanetary environment between the orbits of Mars and Venus, as well as the atmospheres of these two closest planets was measured by the Mariners and the Pioneers. Stellar x-ray sources were discovered. The application of space technology for immediate usefulness on earth has been significant even since the first Tiros returned pictures of the cloud cover from above in 1960. Today, daily cloud cover maps are available to meteorologists around the world, and world-wide weather patterns are continuously now studied. In the field of communications, intercontinental radio and TV transmissions via satellite are not only a reality but routinely available commercially. Technology itself has been advanced by the requirements of scientific and application spacecraft. A three-year old

spacecraft has communicated and has been commanded over a distance of 42 million miles. One 575-lb. spacecraft was packaged with 39,220 individual electronic parts.

The fundamental impact of the past decade of progress was described by Dr. John Naugle, Associate Administrator for Space Science and Applications as follows:¹

While it is true that these are formidable scientific and technical achievements, perhaps the greatest achievement of the past decade has been the creation of a unique national capability to undertake and solve large, complex, and difficult scientific and engineering problems.... The space program has been extremely fortunate over the past decade to have difficult goals, which have attracted some of the very best scientists and engineers in the country.

The opportunity to explore the Moon, to study the planets, or observe stellar objects in unexplored regions of the electromagnetic spectrum has attracted some of the very best scientists and engineers of the country. In addition to being exciting, the program has been challenging. It has not been easy to design scientific experiments which will work unattended hundreds and sometimes millions of miles away, transmit the data through a telemetry system and a data processing system and still give accurate results. In short, we have developed what I believe to be a new, tougher, and perhaps more competent breed of scientist -- a space scientist -- whose impact will ultimately be felt in other areas of research....

Similarly, the engineering challenges have created a new breed of engineer -- a space engineer -- who must develop equipment which will operate for long periods of time in a remote and hostile environment and which requires a minimum of weight and power and which must work the first time it is launched.

Finally, the sheer size and complexity of operations such as Surveyor or Apollo has created a new breed of managers. Bringing together a spacecraft ready to launch at the Cape from systems and components which may have been developed in many of the 50 states, to see that it all is brought together at the proper time and that it can all be fitted together, will work, and be launched on schedule and within the costs, has been a formidable challenge.

Dr. Naugle was also stating the elementary historical fact that ten years ago such a space capability did not exist. From a "small handful" of scientists and engineers, a competent team of government, industry, and

university people now exist to undertake whatever space science and applications programs that may be determined significant.² NASA has been looking forward to emphasizing in the early 1970's a vigorous planetary program, an unmanned and manned lunar exploration program, a vigorous program in astronomy, and, perhaps most urgently, an increased space applications program.³

Let us now turn to several of the major highlights of OSSA during the period under review.

Pioneer IX:

On November 8, Pioneer IX was successfully launched on a Thor-Delta from the Eastern Test Range at Cape Kennedy. Placed into a heliocentric orbit close to that planned, all experiments were turned on and functioned normally to obtain data on solar plasma, magnetic field, and cosmic-ray measurements in the region of space which is inward toward the sun from the orbital path of the earth. The overall program objective was to acquire continuing measurements over the solar cycle at widely separated points in interplanetary space.

Also launched piggyback with Pioneer IX was a secondary payload Test and Training Satellite II (TETR-II). Placed accurately into orbit, TETR-II was designed to provide checkout of the Manned Space Flight Network.⁴

HEOS-A:

The European Space Research Organization (ESRO) Highly Eccentric Orbiting Satellite (HEOS-A) was launched successfully from the Eastern Test Range on December 5, 1968, using a Thor-Delta launch vehicle. Vehicle and launch services were furnished by NASA to ESRO on a reimbursable basis, the first such arrangement. It was also the first large satellite project of

ESRO. This successful development of a scientific satellite for investigating interplanetary magnetic fields and studying solar and cosmic ray particles demonstrated that the Europeans now have the capability to work together effectively in ESRO. Scientists from five different nations participated in the eight principal experiments, all of which have been turned on and checked out satisfactorily. The HEOS launching followed the successful flights of ESRO I and II launched on Scout vehicles earlier in 1968 as a part of the NASA contribution to cooperative projects with ESRO.

OA0 II:

The 4,400 lb. Orbiting Astronomical Observatory (OA0-II), the heaviest and most complex U. S. unmanned satellite, was successfully launched by an Atlas-Centaur vehicle from the Eastern Test Range on December 7, 1968. Ten years in development, this satellite may prove of great scientific importance. It should provide astronomers their first long-duration observations of stars and other astronomical objects across the frequency spectrum free of the earth's obscuring atmosphere. Significant new discoveries are expected as previously impossible-to-observe objects are studied for the first time. With eleven telescopes viewing and recording data on selected stars and interstellar gas clouds, it can be said that the OA0 satellite represents the greatest advance in astronomy since the invention of the optical telescope itself. Over a six-month period some 50,000 stars will be studied by the Smithsonian Astrophysical Observatory and the University of Wisconsin scientists, the prime experimenters on the OA0-II mission.

The Wisconsin experiment package was turned on December 11, and all seven instruments operated satisfactorily, observing stars in ultraviolet light and useful scientific data are being obtained. The Smithsonian experiment was turned on December 13. The first "pictures" showed three

sixth magnitude stars visible to the human eye only under ideal conditions.⁵

ESSA VIII:

On December 15, ESSA VIII was successfully launched by NASA from the Western Test Range at Vandenberg AFB, California. The Thor-Delta rocket placed this TOS weather satellite into orbit for the Environmental Science Services Administration. ESSA VIII was an advanced version of the cart-wheel configuration of the Tiros Operational Satellite (TOS-F). It provided excellent cloud cover pictures to 400 local Automatic Picture Transmission (APT) weather stations in 52 nations around the world. Operational control was transferred to ESSA on December 24.⁶

INTELSAT III:

INTELSAT-III was launched by NASA from the Eastern Test Range on December 18 and was placed in the planned transfer orbit. Under the operative control of Communications Satellite Corporation, the apogee kick motor was fired on December 20, placing the satellite in the desirable near-circular, synchronous, equatorial orbit. Further minor adjustments would refine and circularize this orbit in its operating location at 31°W longitude. This was the first of four satellites to be placed in orbit in this COMSAT Corporation series to provide communication satellite coverage on a worldwide basis. The first attempted mission on September 18 was aborted when the range safety officer destroyed the launch vehicle 108 seconds after lift-off when the rocket began to break up.⁷

Summary:

In the area of space science and applications of NASA's program, the challenge of complexity, fundamental contributions, and maintaining a vigorous U. S. effort for the decade ahead remained existent during the

closing months of 1968. New problem areas required constant definitions, interagency and nation-wide coordination, and demanding attention by the OSSA management in NASA. Two examples illustrate areas which future historians may want to explore in greater detail beyond the complex personal, institutional, fiscal, managerial, technical, and operational stories behind the history of every major project. Beyond the extension of the planetary, lunar, and astronomical goals of OSSA's program into the decade ahead was the high interest manifest throughout the space-related community in what were called Earth Resource Satellites. Using latest technology and spacecraft it would be possible to design and fly woon a multi-purpose vehicle that could provide data highly useful to agriculture, weather forecasting, resource survey, etc.

A second area of special concern to NASA was that it was becoming increasingly difficult to maintain adequate quality control and reliability in OSSA programs because of the declining rates of launchings in the years ahead. A cutback in the number of launchings in the years ahead was foreseeable because the observatory class contained large payloads with infinitely more experiments per payload. This meant that techniques or methods must be devised to maintain contemporary efficiency in payload checkout and launching operations.

ADVANCED RESEARCH AND TECHNOLOGY

NASA's Office of Advanced Research and Technology, headed by Associate Administrator James R. Beggs, was extensively covered in the "Preliminary History." This supplemental account of OART activities for the closing months of 1968 must, of necessity, be piecemeal in appearance. The acquisition of flight technology capability through research and technology is a constant process, often spanning many years of coordinated advances in diverse disciplines. The immediate goal is sound technology for the performance of new and useful space missions beyond the present state-of-the-art. The secondary function is to assist others in solving development and operational flight problems in existing systems.⁸ Thus OART plays a vital role in all NASA manned and unmanned space programs as well as advancing related engineering capabilities in the new technologies of primary interest to other Federal agencies, the aerospace industries, and the engineering community throughout the nation.⁹

For FY 1969, NASA's R&D program for research and technology in aeronautics and space was \$285 million, of which one-third was aeronautics and two-thirds space technology. About a third of the research is done in-house, a tenth by universities, and the balance by industry.

The closing days of the Johnson Administration witnessed no dramatic spectacles in advanced research and technology yet progress was marked in a thousand small ways in laboratory bench experiments, experimental equipment

operations, and flights of advanced vehicles.¹⁰

The X-15 airplane, one of the most successful advanced aircraft the world has seen, completed its 199th and final flight. This only manned aircraft capable of hypersonic speeds, the X-15 was first flown in 1959 and altogether over 80 minutes of flight time have been logged at speeds in excess of Mach 5. The late Dr. Hugh L. Dryden, NASA Deputy Administrator and Director of the NACA when the X-15 was originated, called the X-15 "the most successful research airplane ever built." The X-15 program was formally ended on December 20, 1968.¹¹

Another airplane the XB-70 supersonic experimental airplane made its final flight to Wright Field in mid-January 1968. During the 2,000 mile flight NASA obtained data on handling qualities of the airplane and its structural response to air turbulence. The large size and supersonic speed capability of the XB-70 has made it a valuable research aircraft for studying sonic boom, flight dynamics, and handling qualities associated with the development of advanced supersonic aircraft.

Another type of flight vehicle made the first of several successful unpowered and powered flights during the period. It is the HL-10 a prototype of an advanced spacecraft configuration designed to enter the earth's atmosphere and land like an ordinary airplane. It is a low lift vehicle and is called a "lifting body." The flight was one of a series to investigate the dynamic characteristics of the vehicle in the transonic and subsonic speed part of the flight.

Landing in the thin atmospheres of Mars and Venus will most likely use a parachute-type decelerator. Such a parachute was tested in October by

means of a sounding rocket. The parachute was deployed at a speed of Mach 3.5 and operated as predicted. A second test in November failed when deployment of the parachute occurred at higher than design speeds.

In aeronautics, flight tests began on the Nation's largest research aircraft capable of taking off and landing vertically. Aircraft with this flight capability offer promise for short haul transportation. The X-142 achieves vertical flight by tilting its wings and engines skyward while the fuselage remains horizontal. This concept was tested in NASA wind tunnels as early as 1956 and illustrates the long period required for research concepts to blossom into flight equipment.

Noise from aircraft has been an increasing problem to the jet age. During October 1968 NASA took a major step in its research program to reduce noise at its source. Requests for proposals were made and proposals received on a turbofan demonstrator engine which can operate at a noise level at least 15-20 decibels below present engines powering such commercial aircraft as the DC-8 and 707.

In November, a facility coupled with research capability at the Ames Research Center paid unexpected dividend. Doctors at Stanford University, treating a victim of a shooting with a bullet in his brain, asked Ames' help in centrifuging the bullet into a harmless area. The six-degree of freedom simulator, built to duplicate aircraft cockpit motions, was used successfully in this experiment.

In October, the Ames Research Center revealed results of research on a lightweight plastic foam that shows great promise for industrial fire protection and full fires in particular. This foam was developed by

researchers who have been studying materials for heat shields on spacecraft entering the atmosphere. The Ames material is a light polyurethane foam with additives to form a protective char layer when exposed to flame and, at the same time, releasing fire-extinguishing gases to help quench the flame.

The foregoing examples were but typical of the steady stream of research results that flow from a comprehensive research program in the many disciplines of aeronautics and space technology.

NOTES TO CHAPTER V

1. John E. Naugle, "Achievements and Objectives of the NASA Space Science and Applications Program," speech to International Meeting of the American Nuclear Society, November 13, 1968. See copy in Appendix B-10.
2. The ten-year accomplishments in space science and technology from the OSSA viewpoint were also developed by Dr. Homer E. Newell, Associate Administrator, "Space Plans and Possibilities," AIAA Honors Lecture, New York, January 23, 1968. Also see Oran W. Nicks, "Applying Surveyor and Lunar Orbiter Techniques to Mars," speech to AIAA, Washington, D.C., December 5, 1968.
3. NASA, Objectives and Goals in Space Science and Applications - 1968 (SP-162). Copy in Appendix C-1.
4. Pioneer IX, Post Launch Report 1, November 14, 1968.
5. OA0 II, Post Launch Report 2, December 18, 1968.
6. OSSA, TOS-F Mission Operation Report, December 11, 1968.
7. NASA Release 69-6.
8. See James M. Beggs, "Research and Technology for the Future," speech to the American Nuclear Society, Washington, D.C., November 13, 1968.
9. Numerous OART items for the reporting period have been cited in Chapter II, "Chronological Overview" of this Supplement.
10. Highlights were drawn from various OART reports, including "OART Progress, October 7, 1968 - January 1, 1969."
11. NASA Release, December 20, 1968.

VI
TRANSITIONS

VI
TRANSITIONS *

Just a decade old on October 1, 1968, the National Aeronautics and Space Administration had thus far only experienced one major change in Presidential administrations. The 1960-1961 interregnum between the Eisenhower and Kennedy administrations began as an almost traumatic challenge for NASA, one culminating in the national decision by mid-1961 to land an American on the moon. The coming of the Lyndon B. Johnson period, however, had mainly witnessed for space and aeronautics a continuation of that which had been laid down under the Kennedy space decisions for the decade of the 1960's. It had not been an easy task to maintain this venture in the context of other urgent national crises.

NASA had only had two Administrators before T. O. Paine became Acting Administrator on October 7, 1968. Beyond the previous budget and program chapters, this one examines the internal NASA preparations to assist the continuity from the Johnson to the Nixon Administration. It reviews also the policy planning and forethought activities in NASA headquarters and field centers during this interregnum period concerning the 1970's. And, it concludes with a review of some of the honorific events ending a period of NASA's history which was to be the beginning of another.

PREPARATIONS FOR THE NEW ADMINISTRATION

For the minority of those in NASA in 1968 who could recall the challenging days of 1960-1961 -- when the primary mission of the agency was

* Drafted by E. M. Emme

challenged by some scientists and the military services, when Project Mercury was in technical trouble, and NASA had been unable to gain White House approval for its long-range plan for the decade of the 1960's -- the change of Presidential administrations in late 1968 and early 1969 appeared to have some parallels other than relative ones concerning financial problems and the follow-on manned space flight programs for the decade ahead.¹

NASA Planning for Continuity of Government:

NASA Headquarters began the implementation of plans for an orderly transition of NASA under the new Presidential Administration during October 1968. Beyond the normal budgetary and long-range administrative planning, activity in this regard had been triggered by a memorandum to NASA Administrator Webb on September 9, 1968, from Charles S. Murphy, Counselor to the President and Central Coordinator for transition matters in the White House. In his memo entitled "Planning for an orderly transition of the Presidency," Mr. Murphy referred to the Presidential Transition Act of 1963, and stated that President Lyndon B. Johnson "wishes that necessary steps begin now" in order to assure continuity in the affairs of the Federal Government. "Each outgoing official of your agency" should "plan to do for his successor those things which assist in a smooth and orderly transition."²

Mr. Murphy pointed out that after the election on November 5, NASA should be prepared to assist individuals designated by the President-Elect and Vice-President-Elect between the election and inauguration. Oral and written briefings of essential data should be prepared to serve their immediate needs.³ While NASA's response to this appears procedural, it may be of interest to future historians.

On October 21, 1968, Associate Deputy Administrator Willis Shapley issued two memoranda. The first directed to the Heads of Program and Staff Offices indicated that Acting Administrator Thomas O. Paine had asked Associate Administrator for Organization and Management Harold B. Finger and Shapley to see that the necessary steps were taken to prepare plans, papers, and arrangements for the transition period following the Presidential election. He referred to the establishment of a working committee chaired by Assistant Administrator Bernard Moritz to "identify, produce or have produced, and assemble the briefing papers" to serve the transition process in NASA. Shapley's second memorandum charged the Working Committee⁴ on transition to examine the papers prepared for the 1960-61 transition from the Eisenhower to the Kennedy administrations. He spelled out identification of "the topics and pattern most suitable to present the NASA situation." Coordination with all necessary offices to provide papers and materials should be completed by November 15, 1968. Finger and Shapley would review papers on each topic as they became available before that date.⁵

By October 25, the Chairman of the Working Committee on transition submitted a progress report.⁶ It outlined the approach, content, and assignment of responsibility for preparation of the written briefings. It was indicated that collected data would be assembled in 3-ring notebooks, with supporting data such as the Administrative History, FY 68 Hearings, and Biographical Data Book maintained by the Secretariat as a "Transition Briefing Library." "Personnel arrangements," it was indicated, would be separately placed in folders and provided any appointee along with a briefing by General Counsel Paul Dembling and Director of Personnel Grove Webster. Oral briefings on the content and status of NASA programs would be available on short notice. Those briefings prepared by Associate Administrators on major NASA areas, it

was recommended, should not exceed 1 hour and those by Assistant Administrators should range from 15-30 minutes in length. Working committee Chairman Moritz indicated that conversations with program and staff office heads to exchange ideas and assure requested submissions would be completed on November 4, before the election. The due date for written transition papers would be November 4, with several exceptions, and review of written submittals would be completed by November 12. On November 4, instructions for submittal of five copies were transmitted to all concerned offices.⁷ On the morning of November 6, the day after a close Presidential election, NASA persons responsible for assisting the transition process now knew, as did all Americans, that the results of their labors would be available for President-Elect Richard M. Nixon and his designees.

On November 8, notebook "Volume I" of the "Transition Papers" was submitted by Chairman Moritz to Associate Administrators Shapley and Finger.⁸ In the meantime, other memoranda from outside NASA were received suggesting additional inclusions for the NASA notebooks.⁹ During the latter days of November and during early December, this process continued. Available for the incoming Nixon Administration was an informative collection of basic transition papers and available briefings to serve the continuity of government process.¹⁰

Initial Steps of President-Elect Nixon:

Despite rumors and speculation in late November, indications of nominations for NASA and other space-related executive positions in the Federal structure were not immediately forthcoming from President-Elect Nixon's informal headquarters in the Hotel Pierre in New York City. On December 3, Mr. Nixon announced that President Lee DuBridge of the California Institute

of Technology would be his Science Advisor. Dr. DuBridge was conversant with the national space program from the beginning because of Caltech's Jet Propulsion Laboratory's contribution to the first U. S. satellite, Explorer I, and its subsequently key role in NASA's lunar and planetary program. At a news conference, DuBridge and Nixon agreed that more money would have to be found from Federal and private resources to sustain key programs in science and technology.¹¹

At the same press conference, President-Elect Nixon also make known that two Task Forces had been created to make recommendations to him on national needs. President Guyford Stever of Carnegie-Mellon University was named chairman of a task force on general science. Dr. Charles Townes, Nobel Prize-winning physicist of the University of California (Berkeley), was named chairman of a task force on space. Both of these men, as well as Dr. DuBridge, had served on numerous advisory committees, some of which were very knowledgeable about NASA programs and activities. The NASA Manned Space Flight Science and Technology Advisory Committee, for example, met at La Jolla, California, December 6-9, 1968. Both DuBridge and Townes were members of this Committee, and attended the December meeting. Dr. Townes served as chairman until after this meeting.¹² It was made known in response to inquiries at the President-Elect's headquarters in New York that the reports of these task forces would be completed by January 20, 1969, and they would be "privileged information."¹³

On December 17, Dr. Townes visited Acting Administrator Paine. In accordance with transition guidance from the White House, Dr. Paine provided 25 program-review type documents as references. On December 23, Dr. Paine met with the entire Task Force.¹⁴

In the meantime, the names of three possible nominees by President-Elect Nixon for the post of NASA Administrator had been mentioned in various press commentaries over these interregnum weeks: General Bernard A. Schriever, USAF retired and former chief of the Air Force ballistic missile development program and former Commander of the Air Force Systems Command; Professor Robert C. Seamans, Jr., M.I.T., former NASA Deputy Administrator;¹⁵ and Acting Administrator T. O. Paine. Until the decisions of the President-Elect on executive selections and policies affecting NASA become known, such speculations require no elaboration here.

PLANNING FOR THE 1970's

An intimate part of the transition period was the NASA Headquarters' intensified concerns for the long-range goals and interim planning objectives for the U. S. space program. The coming of a new Presidential administration and a new Administrator of NASA, as well as the funding crisis for FY 1970 and after,^{*} were inherently a part of continuing challenge to formulate the rationale, objectives, program options, and agency balance for a viable future NASA. How could NASA best contribute to the national interests in the future within technical feasibilities, in-being capabilities, and expected resources? Such a process had helped underwrite NASA's budgetary estimates. The longer-range view of national purposes in space and aeronautics, however, came to a clearer focus in a series of continuing management, policy, and functional staff studies, with much "soul-searching" deliberation and dialogue as well as strategic projections of the future.

Revised Planning Process:

As a result of the revised planning process instituted early in 1968 under Associate Administrator Homer E. Newell, a set of underlying concepts

^{*}See Chapter III.

for the FY 1970 budget estimates had resulted. Development of thought-out NASA positions, consistent with the most logical program goals and long-range objectives in the light of projections of both technical feasibility and payoffs for the Nation, had been the focus of the labors of the Planning Steering Group and its Planning Panel structure.* It became clear by November 1968 that several major improvements could be made.¹⁶ Key points upon which the NASA headquarters planning process focused by late 1968 were:

1. Preservation of the conceptual base as a foundation for the introduction of evolutionary changes, thus maintaining the momentum already established of the planning process.
2. Streamline the planning process by earlier initiation of the cycle than was possible early in 1968, and by reorganization of the Planning Steering Group and the Planning Panel structure.
3. Development of a long-range planning structure based on viable agency goals and objectives to provide continuing direction to on-going programs, perspective for decision making, and visibility to program interrelationships.
4. Utilization to the fullest of NASA resources in the development of planning options, with emphasis upon participation by senior Field Center officials.

As a part of this, Associate Administrator Newell toured in December and January all major Field Centers to provide guidance and to enlist support for the improved planning process. A "blue sky" meeting was scheduled for January 14-15, 1969, to include NASA top management and Center Directors for a full spectrum review of aerospace trends and recommended NASA priorities for the future.

Studies and Analyses:

As a part of, yet operationally distinct from, the central planning process, were the many in-house study analyses made by key functional staff

*See "Preliminary History," Chapter VI on "Management and Organization."

offices. Some of these utilized NASA consultants as informal panels and selected supporting contractors as satellite seminars. Among the offices involved for this were the Office of Policy under A. J. Eggers, the Office of Program Plans and Analysis under DeM. D. Wyatt, Office of DOD and Inter-agency Affairs under Jacob E. Smart, and the Office of Management Development under C. E. Weakley. Most had supporting advisory groups with representatives from the major Program Offices plus those from Public Affairs, International Programs, General Counsel, and University Affairs Offices. In the area of dynamic research and development with large responsibilities involved, the effectiveness of advisory committees and study groups had long been recognized in the Federal government. NASA had also for some years regarded itself somewhat as a management laboratory in that its operations were under constant surveillance and analysis for maximum self-improvement, flexible coherence to realities, and mission accomplishment.

The legislative charter of NASA, the National Aeronautics and Space Act of 1958 as amended, assigned a clearcut primary mission to the agency for the exploration of space, and the conduct of advanced research and technological development and operations in its pursuit, as well as in aeronautical research. It clearly specified support of the Department of Defense, and the widest possible dissemination of the results of NASA's efforts in the peaceful use of space for the benefit of all mankind.¹⁷ Budget austerity, the complex interagency and mutual support of space technology applications animated by NASA (e.g., weather and communications satellites, etc.), and the intimate institutional relations on-going with the industrial, academic, and scientific communities -- these, in practice, raised a host of policy and functional problems requiring definition and projects. Additionally, technological advances via the NASA aerospace effort offered new opportunities, such as earth

resources satellites and the continuing revolution in aeronautics, where Federal and private "tradeoffs" were not entirely clear. And further, there was the application of NASA scientific knowledge, engineering techniques, and management approaches derived from its space and aeronautical advances; this could have important application to nonaerospace fields such as oceanography, transportation, and the general social welfare.

Related to the transition period but with long-range implications, NASA required serious forethought about and recommended policies for questions, such as the following: How can NASA best discharge its prime responsibility for peaceful exploration of space in a continued period of austere budgets? How can NASA best employ its aerospace R&D capabilities in support of and in concert with the Department of Defense and the Department of Transportation? How can NASA best employ its general R&D and management capabilities, and in concert with other governmental agencies (Federal, state, and local), and industries, in the solution of pressing nonaerospace national problems? How can NASA best organize itself (Headquarters/Centers) to perform its evolving national role for the future?

It is not possible here to catalog or to review the on-going in-house analyses of fundamental questions concerning NASA's mission, objectives, and tasks in serving the spectrum of national interests: from defense requirements to social welfare in concert with other governmental agencies, industry, and academic institutions via basic science and technological progress in space and aeronautics. Interagency studies were also active. The high cost of aerospace R&D prompted joint NASA-DOD studies through the AACB covering areas such as Manned Orbital Laboratory (MOL) and Apollo Applications (AAP) relationships, tracking networks, launch vehicles, and other areas. In the

field of aeronautics, the Department of Transportation (e.g., SST, sonic boom, systems analysis of urban transportation, etc.) and NASA had numerous on-going studies and coordinated efforts in areas of mutual interest and support. NASA's aeronautical research was also of interest to the DOD and the aerospace industry. The rising interest in oceanography as of national concern offered another area requiring limited NASA participation and study in support of the National Council for Marine Resources and Engineering Development. Many of the study efforts involved the White House Office of Science and Technology or the Federal Council of Science and Technology, which it will not be possible to review here. In short, however, NASA was clearly impacted by the technological explosions which it had itself helped to spark. No end to this chain-reaction process would seem in sight.

The application of NASA's progress to nonaerospace use helps illustrate the analysis process. On November 5, Acting Administrator Paine suggested that "a useful study effort" might be initiated on "the potential contribution of aerospace technologies, methodologies, and institutions to the solution of critical urban problems, such as environmental pollution, crime, poor education, and inadequate housing." These are "referred to frequently in a superficial way," and NASA should be working to define this potential more precisely with interested government agencies, aerospace companies, and universities. Paine said:

We should take a thoughtful and vigorous approach to this, being particularly careful to avoid over-simplified and exaggerated views of our capabilities to solve problems that we do not yet fully understand. The initial emphasis should clearly be on understanding selected areas; then the approaches to solutions.¹⁸

Finger asked the Office of Technological Utilization to respond.¹⁹ The Assistant Administrator for Technology Utilization, Richard L. Leshner,

replied with a thoughtful summary of NASA's "not inconclusive" efforts to date in such analyses, and pointed up problems in the transfer of new technology in a pluralistic society as well as the inherent difficulty of transferring NASA's systems analysis and managerial knowhow into areas where managers were trained in other disciplines than aerospace techniques. Leshner did point to the publication of an array of studies by the Office of Scientific and Technical Information which directly related to the social, economic, political, legal, historical, and administrative aspects of the space program.²⁰

While studies and analyses are a part of the staff work of the planning and policy formulation process in any large organization, at least some feeling may have been reviewed here to serve future historians.

A TIME FOR HONORS

While the transition period was a beginning of renewed challenges requiring NASA responses during its second decade, it was also the closing of the dynamic period of the space agency's history begun under the Kennedy Administration in January 1961. It was a historic fact that no U.S. President remained in office during the period when the major space programs he had initiated achieved their declared goal. The Mercury program founded by President Eisenhower in 1958 did not fly the first American astronauts until the Kennedy Administration. Both Gemini and Apollo approved by President Kennedy did not fly manned missions until the Johnson Administration.

The spectacular manned Apollo flights were just beginning during the period covered by this manuscript. The worldwide impact of Apollo 8 at Christmas 1968 would be a lasting item in the chronology of mankind. But

what would not be remembered without the labors of future historians would be the numerous decisions made and implemented, and the five-fold buildup of skilled people, facilities, and hardware to perform the most complex technological effort and the largest nonmilitary venture possibly ever attempted. For its part, NASA had been the nerve center of a vast national team encompassing and orchestrating individuals and institutional support from throughout government, the industries, and the academic community. With the support of the White House and the Congress and the American people, when Americans will land on the surface of the moon in 1969 it would truly have been a realization of what John F. Kennedy had offered in requesting this national goal: "we go into space because what mankind must undertake, free men must fully share."

It was not untimely that the completion of NASA's first decade, the resignation of Administrator Webb, the beginning of the spectacular manned missions of Apollo, and the closing weeks of the administration of Lyndon B. Johnson would feature a series of honorific reflections upon past accomplishments. A brief review offers suggestions for the future historian.

NASA's tenth anniversary on October 1 had been noted by a black tie dinner at the Shoreham Hotel sponsored by the National Space Club. Most NASA officials including Center Directors were present. Earlier in the day, the National Space Club had presented President Johnson a special award at the White House for his legislative and executive leadership in the national space program for eleven years. At the NASA dinner, the chairman of the Congressional Committees concerned with space, Senator Clinton P. Anderson and Representative George P. Miller, presented retiring Administrator James Webb with a Space Club award for his outstanding service to the American

space effort. In a telegram tribute to Webb, President Johnson said: "The Nation is in his debt. He will be deeply missed but gratefully remembered as his dreams continue to become reality in the years ahead."

A telegram from Vice President Hubert Humphrey read at the NASA banquet said: "The span of achievement which measures a decade of space progress is one which should be a source of pride to all of us. Now a new decade beckons, with new challenges, and new opportunities. And, such is the nature of the space age that we dare not become complacent about our rate of progress or the scope of our past accomplishments. It is unthinkable that we would allow ourselves to be surpassed in technology by any other nation. I have never questioned that space endeavors have contributed significantly to the strengthening and enrichment of our whole society, through a teamwork approach by private industry, our universities, and the Federal Government." A telegram from Republican Presidential candidate Richard M. Nixon was read, which said, "The space program must continue to be one of our national imperatives, and it must be supported at a level assuring efficient and steady progress."²¹

In his remarks at the anniversary banquet, Administrator Webb referred to previous Administrator Glennan, and Deputy Administrators Dryden and Seamans who helped carry the NASA program forward. Before this anniversary event, it should be noted that Mr. Webb had never allowed the limelight of attention to be directed on himself. He referred now to the entire NASA team, as was usual, but pointed to a few personal concepts of NASA management practices which should be remembered. He also spoke of the decline of resources for NASA and its failure to gain approval for major new programs once the Apollo had achieved initial exploration on the surface of the moon

by American astronauts. And, he expressed full confidence in the present NASA management to carry on the task which he was now laying down after eight years of challenging experiences. It was to be one of his last public appearances as NASA Administrator, except for his testimony on the FY 1969 NASA Operating Plan before the Senate Space Committee on October 3.*

On October 22, the 11-day Apollo 7 flight ended as a complete success, and the Presidential call of congratulations to Astronauts Walter Schirra, Donn Eisele, and Walter Cunningham was made. The first live TV by men from space and the flawless performance the Apollo 7 spacecraft made this first manned Apollo mission a major milestone. On November 2, in a what was reported to be a moving ceremony at his ranch, President Johnson awarded NASA Exceptional Service Medals to the Apollo 7 astronauts, their wives and children being present also. In a particularly moving spirit, Mr. Johnson presented NASA's Distinguished Service Medal to former Administrator James E. Webb, saying that he, more than any other individual, deserved credit for American successes in space and for "helping the United States reach out to the stars." "We are ready," the President said, "to take that first great step out into the solar system and onto the surface of the nearest of the many mysterious worlds that surround us in space."²³ It seemed fitting that NASA's highest medal be awarded Mr. James Webb by the President, and it was the first official recognition of his services to the American space cause. Ten days later, on November 12, Acting Administrator T. O. Paine announced that the Apollo 8 mission in December would be a lunar orbit mission.²⁴ Commented the Washington Evening Star the next day: "it is, in fact, just

*See Chapter III, pp. 2-3.

possible that NASA will succeed in putting that missing ingredient back into the yule season, and that more prayers will be offered this Christmas than any time in the past 2,000 years."²⁵

November 15 was the annual NASA Honor Awards ceremony in Headquarters. In addition to the longevity recognitions, Acting Administrator Paine presented NASA Distinguished Service Medals to Alexander Flax (Assistant Secretary of the Air Force for R&D), Edmund C. Buckley (former Associate Administrator for Tracking and Data Acquisition), Paul Dembling (General Counsel), and Abe Silverstein (Director of the Lewis Research Center).²⁶

As a part of Mrs. Lyndon B. Johnson's planned visitations throughout the United States over the past five years, she, accompanied by Mrs. Lynda Johnson Robb, and escorted by former Administrator Webb, Acting Administrator Paine, and Astronauts Cunningham and Young, and other NASA officials, toured the Kennedy Space Center on November 23. In a brief ceremony, Paine presented a model of the lunar module to Mrs. Johnson for exhibition at the Johnson Presidential Library in Austin, Texas. Paine reviewed the contributions of Lyndon B. Johnson to the U. S. space program since the first Sputnik in October 1957: his Senatorial service in helping the Congressional legislation of the National Aeronautics and Space Act of 1958 which created NASA; as Chairman of the Select, then of the Senate Committee on Aeronautical and Space Sciences; then as Vice President and Chairman of the National Aeronautics and Space Council under President Kennedy when the space program for the 1960's was laid out and implemented. Mrs. Johnson responded in her usually gracious manner, and with much feeling for her husband's special interest in NASA and its role in the national space program.²⁷

On December 3, President Johnson was pleased to proclaim that the Space Rescue Treaty was now in force, by which 75 nations agreed upon the principle of providing rescue and return of astronauts accidentally landing on foreign soil.²⁸ He also awarded the premiere 1967 Harmon Aviation Trophy to Major W. J. Knight, USAF, test pilot of the DOD-NASA X-15 on its record 4,250-mph flight on October 3, 1967.²⁹ On December 20, 1968, NASA announced the end of the highly valuable X-15 rocket research airplane program.³⁰

As the moment approached for the final countdown for man's first attempt to reach the moon with the scheduled launch of Apollo 8 on December 21, it was deemed timely that the highest recognition be given to former NASA Administrator James E. Webb by the President. On December 9 in a formal White House ceremony, Mr. Johnson awarded Webb the National Medal of Freedom, saying:³¹

I asked you to come here tonight in the twilight of this administration, so I could pay the respect and the honor and the affection that I felt for the man who had directed your efforts and directed them so well, and so that I could express my personal admiration and respect for you.

In January I will have been here [in Washington] some 37 years... But in all that period, in the hundreds of laws on which I have answered the roll call, the dozens and dozens and dozens of bills that I have sponsored or co-sponsored or amended or defeated, there is not a single one that gives me more pride than the Space Act that came out of our hearings following Sputnik I.

And out of that act came recognition of great Congressmen who are here tonight.... -- I see all of these pioneers, who through the years have kept our country in front.

But we came here tonight to pay honor to the astronauts and to the Administrator, who has carried the load for them and has paved the way for them. Jim Webb has served us all with courage and confidence, and with a North Carolina vision, and, most important, judgment.

He laid and he executed the plans for the pioneering and the exploration of outer space that this country has done. With the same devotion with which he once defended America in a Marine uniform, he led the effort to open its new horizons in space.

And in that effort, the beloved Vice President, who is Chairman of the Space Council, and its Secretary, Mr. Welsh, have been valued allies and co-patriots.

So here tonight in the dining room of the White House, Mrs. Johnson and I want to express to you this Nation's gratitude, and I propose to award the Presidential Medal of Freedom - the highest civilian honor a President can bestow on any individual whose work advances a great cause.

The President asked Mr. and Mrs. Webb to join him, and he read the citation, which is as follows: "A most distinguished public administrator, he has been a farsighted and forceful leader of this Nation in the pioneer exploration of outer space, opening new frontiers of discovery and progress for the American people." The President gave best wishes to the NASA officials and astronauts for the forthcoming Apollo 8 mission, led the guests in a toast to them, and said: "Texas will yield to North Carolina."

In his responding remarks, Mr. Webb said that he was not prepared for a medal and said that he was "completely unprepared to express" his appreciation. He wanted to thank President and Mrs. Johnson for their "understanding of what the men and women in the space program have tried to accomplish for this country.... and [to] see for yourselves the importance of what was being done and the fact that, indeed, man was entering a new era through this program." Mr. Webb continued:

I do want to thank you for this wonderful occasion which shows again your continuing deep interest in NASA and the manned space flight program....

We in NASA know, Mr. President, that you are the man of which our civilian space effort, conducted for the benefit of all mankind, is the lengthened shadow.

Mr. Webb briefly reviewed the American achievements in space under three space age Presidents during the past ten years, and proposed a toast: "So, it is my happy privilege to propose that we rise and drink this toast to our great space age patron and leader, the President of the United States."

The President very briefly responded with a toast "to the industrial genius that has made this possible, all America is in your debt." This was

followed by a companion taost to Apollo industrial contractors by Captain Walter Schirra. This was no usual White House ceremony. Twenty-three Apollo astronauts, their wives and distinguished guests including the Vice President, Cabinet, and most top NASA officials, and great aviation history makers of the past including Charles A. Lindbergh, Jacquelin Cochran, Alexander de Seversky, and others, totalling 140 guests, attended this historically-unique space affair in the White House. After the ceremonies and dinner, excerpts from Offenbach's 1875 opera, "Voyage to the Moon," provided entertainment.

When Apollo 8 was to complete its historic voyage of three Americans around the moon during Christmas 1968, NASA and the U. S. space program probably achieved their highest pinnacle of prestige in the eyes of people around the world. The full history of how this was done and came to pass will remain a complex challenge for the future historians of science, technology, public policy, and management processes.

It was Apollo 8 day in the Nation's Capital on January 9, 1969. Astronauts Borman, Lovell, and Anders were presented NASA's highest medal, the NASA Distinguished Service Medal, by President Johnson in a ceremony in the East Room of the White House. The citation to each was that they were among "history's boldest explorers" and they had "blazed a new trail for mankind into the vastness of extraterrestrial space." The President said: "We recognize that mere national pride is insufficient -- that these men represented us in the vastness of space, all of mankind -- all of its races, all of its nationalities, all of its religions, all of its ideologies." The "ultimate truth" demonstrated by Apollo 8, President Johnson said of this historic flight, was that "there are few social, or scientific or political

problems which cannot be solved by men if they truly want to solve them together -- and that applies to the heavens or to hunger, to moonshots or to model cities."³²

After the White House ceremony, the Apollo 8 astronauts participated in a motorcade to Capitol Hill. They spoke to a joint meeting of the houses of the Congress, Colonel Borman giving the principal address. He said: "We truly stood on the shoulders of giants," and, in paraphrasing Sir Issac Newton, he referred to Galileo, Copernicus, Kepler, Verne, Oberth, Tsiolkovsky, Goddard, Kennedy, Grissom, White, Chaffee, and Komarov as making the voyage of Apollo 8 possible. A NASA Press Conference was held that afternoon in the Department of State auditorium, and, that evening, a special reception was held in the halls of the National Air and Space Museum of the Smithsonian Institution. During subsequent days, the Apollo 8 astronauts were to be feted with warm acclaim in New York (January 10), Miami (January 12), Houston (January 13), and Chicago (January 14).³³

On January 13, at the NASA Manned Spacecraft Center in Houston, Acting Administrator Paine presided over an unusual NASA ceremony, one honoring the Apollo team from top management to supporting echelons.³⁴ Dr. Paine presented 12 NASA Distinguished Service Medals, 62 Exceptional Service Medals, and recognized officially the contributions to the Apollo 8 mission of many more individuals and groups in NASA, the Department of Defense, and industry. More high NASA awards were given to more persons and groups than ever before been occasioned, which seemed fitting to the dimensions and accomplishment of Apollo 8. Receiving DSM's, NASA's highest award, were: Kurt H. Debus (KSC Director), Robert R. Gilruth (MSC Director), Christopher C. Kraft (MSC Flight Operations Director), George M. Low (MSC Manager of the Apollo Program),

George E. Mueller (Associate Administrator for Manned Space Flight), Rocco A. Petrone (KSC Director of Launch Operations), Lt. General Samuel C. Phillips (Apollo Program Director in Headquarters), Eberhard F. M. Rees (MSFC Deputy Director, Technical), Arthur Rudolph (MSFC Saturn V Program Manager), William C. Schneider (Manager of Apollo Applications Program), Gerald M. Truszynski (Associate Administrator for Tracking and Data Acquisition), and Wernher von Braun (MSFC Director). Group Achievement Awards went to the U.S.S. Yorktown and Embarked Air Group of the U.S. Navy, and NASA's Manned Space Flight Network and Office of Public Affairs. A Public Service Group Achievement Award was presented to the Apollo 8 Communications Network.

FINAL REFLECTIONS

Fitting reflections for a finale of this "Preliminary History" of the space agency during the administration of Lyndon B. Johnson were to be provided by the President himself. The occasion was the dramatic White House news conference held immediately after the Apollo 8 reentry and splash-down in the mid-Pacific on December 27, 1968. It was the concluding moment of a successful and dramatic first voyage by men around the moon and their safe recovery from a textbook mission. It had not been without risk to the astronauts as well as to the Nation's pride of itself and its prestige in the eyes of the world. In this exhilarating moment President Johnson offered recollections concerning his eleven year association with the U. S. space program from the beginning, and provided candid commentary on numerous highlights of this eventful chapter in American history.

President Johnson opened the press conference with remarks concerning his just-concluded review of the Apollo 8 mission with Acting NASA Administrator

T. O. Paine, his personal telephone calls to the wives of the three astronauts, and his intent to call the astronauts as soon as they were aboard the aircraft carrier. He remarked that Dr. Paine had reminded him that "Mrs. Johnson and I saw the Sputnik [October 4, 1957] through the skies from the banks of the Perdernales" more than a decade ago, and that he as Senator had taken the initiative to open the first Congressional hearings on our satellite program, making 17 specific recommendations to accelerate the U. S. space program on January 23, 1958.³⁵

When asked if Apollo 8 put the United States "ahead in the space race," Mr. Johnson replied:

We are very pleased with the progress we have made. There are various firsts. Each side has different examples of its achievements. But in the 10 to 11 years since Sputnik I that I was talking to you about, when we didn't even have a space committee in the Congress, when we were talking about the basketball up there, when we have seen the editorial professors inform us that there was really no value in doing all of this anyway, it gives me great pleasure now to see the thrill that even they are getting out of it.

It must be a great satisfaction to men like Mr. Webb, Dr. Paine, and poor Dr. Dryden, who has passed on, to know that his men have not let him down.

The President was asked about his personal feelings as he watched television coverage of the reentry and splashdown of Apollo 8. He replied:

That is very difficult to describe, to portray accurately. I think all of you must know the anxiety that a President feels during a period like this. I think you must have thought a thousand times, "Are you sure we are ready? Is this the date? If something terrible happens, why does it happen the last week I am here or the last month I am here?" or "Has every possible precaution been taken? Has every man performed his every requirement?"

About all you can do under those circumstances is to pick men that you have confidence in, that you trust, give them the support they need, and then hold on. That is what I have done.

President Kennedy asked me at Palm Beach [Dec. 1960] to assume responsibility for the space program and try to give it some leadership and direction.

The first thing he asked me to do was to select the leader for it. I interviewed 28 different people before I interviewed Mr. Webb for the second time, when he turned it down the first time. I kept

going back to him. He had a combination of military experience in the Marines, State Department diplomatic experience, budget experience, scientific experience, that very few men in this country had.

The President talked to me a number of times about the desirability of setting a goal to go to the moon in this decade, and the dangers of it and the wisdom of it. He asked for my recommendation, which we made in writing. I recommended this goal for this decade. Mr. Sorenson and I discussed the goal at length before it was announced.

In view of the fact that our beloved President had set that goal, naturally we have religiously adhered to it and tried to make it. There have been many pitfalls every step of the way. I don't know how many folks have just wanted to abandon it, clip it, cut it, take the money for the cities or the war or just anything else. Space has been a whipping boy.

So when you see the day approaching when visions, and dreams, and what we said to the Congress when we created the Space Administration back in 1958 are becoming reality, you naturally are hopeful.

I don't guess your blood pressure can get down completely normal until you see the Astronauts back with their wives in Houston, until they come up out of that water, until they come on the carrier, until they are moved back home.

But we have come so far, so fast, so good. I have said many prayers the last few days expressing thanks for the good fortune we have had.

And finally, responding to a question whether he had any specific recommendations for his successor, Lyndon B. Johnson replied:

No. I think President Nixon feels very strongly about the program and its value. He will have to--looking at all the other priorities confronting him, and the problems that he faces--determine how this fits in.

I have every confidence that his decision will be a good one. I am not very strong on advising Presidents and speaking with cool authority on just how they ought to handle each specific subject. I have received a lot of advice in my time and a good deal of it has been worth-while, but I am not sure that the next President would profit a great deal by just having my personal views on some of these things. They will be available to him on anything that he wants them on, but I want to try to follow a policy somewhat like President Eisenhower has followed with me: To be there to help if you can, but don't be presumptuous enough to think that you are required.

After his news conference, President Johnson dictated a message over the phone to the crew of Apollo 8 not yet aboard the aircraft carrier Yorktown:

This is a message to Colonel Borman, Captain Lovell, and Major Anders:

We want to welcome you home. We thank God that you are back safe again.

You have made us very proud to be alive at this particular moment in history. You have made us feel akin to those Europeans nearly five centuries ago who heard stories of the New World for the first time. There is just no other comparison that we can make that is equal to what you have done or to what we feel.

I had a memorandum a short time ago from the men who handle the Washington-Moscow hot line. I thought you would be interested in a portion of that memorandum to the President.

It said that due to the interest of the Soviets in the Apollo program, we asked them, after we heard from them on Apollo 7, if they would be interested in being informed of development in Apollo 8. The hot line personnel in Moscow responded enthusiastically and asked us to keep them posted. So we informally here at the hot line in Washington relayed information in regard to the most important aspects of your flight, and the Soviets were very solicitous about the welfare of you astronauts and expressed great interest in the success of your flight.

We all know that you men were supported by an elaborate technical apparatus and by many brilliant and devoted men and women here on the ground. We salute all of them as we salute you.

The first thing I did this morning when things looked good was to call your boss, Dr. Paine, and Jim Webb, to congratulate them, and then I called your wives in Houston to express our gratitude to them for providing the strength and the inspiration to you men that would permit you to accomplish this great feat.

We know that all the engineering marvels in the world could not take away one whit of our commitment and admiration for the three of you who were out there in the vastness of space.

If I could have exchanged thoughts with you, I was going to ask you whether it felt better coming down or going up, and to have you tell me some of your experiences because you have seen what man has really never seen before. You have taken all of us all over the world into a new era.

My thoughts this morning went back to more than 10 years ago in the Pedernales Valley when we saw Sputnik racing through the skies, and we realized that America had a big job ahead of it.

It gave me so much pleasure to know that you men have done a large part of that job.

So we rejoice that you are well, and we send you congratulations from all of your fellow countrymen and from all peace-loving people in the world.

Well done.

These last words conveyed to the Apollo 8 astronauts, could well have been expressed by almost all Americans.

NOTES TO CHAPTER VI

1. Best accounts available of the 1960-61 transitions are: Robert L. Rosholt, An Administrative History of NASA, 1958-1963 (NASA SP-4101), pp. 183-96; L. S. Swenson, J. M. Grimwood, and C. C. Alexander, This New Ocean: A History of Project Mercury (NASA SP-4201), pp. 303-41; M. M. Link, Space Medicine in Project Mercury (NASA SP-4003), pp. 112-125; and E. M. Emme, "Historical Perspectives on Apollo," Journal of Spacecraft and Rockets, Vol. 5 (April 1968), pp. 369-82.
2. White House Memorandum, Charles S. Murphy, to NASA Administrator, "Planning for an Orderly Transition of the Presidency," September 9, 1968.
3. NASA was asked to name an official to carry out transition responsibilities, and submit brief monthly progress reports beginning September 30. On October 9, 1968, John W. Macy, Jr., Chairman of the Civil Service Commission, submitted to NASA a detailed memorandum detailing a briefing outlines on "Personnel Arrangements" and "Personnel Policies and Administration." It is worthy of note that the transition papers prepared by NASA in 1960 had not been used before January 20, 1961. President Kennedy did not nominate Administrator James E. Webb until January 30, 1961.
4. This memo was addressed to the following: J/Moritz, B/Myers, C/Mossinghoff and G/Holzman. Colonel Lawrence Vogel was designated as executive secretary to the working committee by Mr. Moritz.
5. See Appendix C-3.
6. Memorandum for ADA and D from Bernard Moritz (Assistant Administrator for Special Contracts Negotiation and Review), "Transition Papers," October 25, 1968, 9p.
7. Memo to /31/ Heads of Staff and Program Offices, "Administrative Instructions for Transition Papers," October 29, 1968.
8. Moritz (J) to Shapley (ADA) and Finger (D), "Transition Papers," Nov. 8, 1968. Memo indicated several sections being revised or in process of being modified, and that Volume II was yet being collected.
9. Memorandum from Office of Legislative Reference, Bureau of the Budget, November 4, 1968, including papers on "The Legislative Clearance Function," and a memorandum by Secretary of Labor Willard Wirtz, November 21, 1968, reviewing Federal Regulations concerning the duties of agencies, including equal opportunity compliance from contractors.
10. The detailed index to the three volumes of papers collected and collated is attached in Appendix C-2.
11. See New York Times, December 4, 1968, p. 1; Washington Post, December 4, 1968, p. A-1. An extensive interview on December 13 of Dr. DuBridge by staff of the New York Times, elaborated his views of the space program including manned space flight, as it contributed to science and national purpose, published on December 17, 1968, p. 1f.

12. Dr. Townes was informally provided at La Jolla material recounting the work of the space task force headed by Dr. Jerome Wiesner that had served the late President-Elect John F. Kennedy in December 1960 and January 1961. On December 17, 1968, the Acting Administrator received a request for NASA information from Dr. Townes, and fifteen program summary-type reports were dispatched.
13. See Space Business Daily, December 13, 1968.
14. NASA, "Biweekly Report to the White House," December 24, 1968.
15. Seamans was nominated by President-Elect Nixon as Secretary of the Air Force on January 6, 1969.
16. Memo, Office of Programs Plans and Analysis to NASA Historian, December 18, 1968.
17. Analysis of the national goals assigned NASA are discussed in R. Rosholt, An Administrative History of NASA, 1958-1963 (NASA SP-4101), pp 3-17.
18. Memorandum, Acting Administrator Paine to Associate Administrator for Organization and Management Harold Finger, "Potential Contributions of Aerospace Technology to the Solution of National Problems," November 5, 1968.
19. See Memo, Associate Administrator for Organization and Management, to Director of Technology Utilization R. Leshner, November 13, 1968.
20. Memorandum, Assistant Administrator for Technology Utilization, December 11, 1968. See copy in Appendix A-9.
21. National Space Club Newsletter, November 1968.
22. Though a text of Webb's remarks at the 10th Anniversary Dinner are not available, he spoke extemporaneously in the vein of his John Diebold Lecture at the Harvard Graduate Business School, September 30, 1968. See "Preliminary History," Appendix B-V-1.
23. White House, Compilation of Presidential Documents, Volume 4 (November 8, 1968), pp. 1568--.
24. NASA, Press Conference Transcript, November 12, 1968.
25. Evening Star (Washington, D.C.), November 13, 1968.
26. NASA Honor Awards Program, Historical Archives. Complete records of NASA medals and awards are maintained by the Office of Personnel.
27. KSC Release 500-68, November 23, 1968. Also see U. S. Senate, Committee on Aeronautical and Space Sciences, Tenth Anniversary, 1958-1968 (Washington: December 1968).
28. White House, Compilation of Presidential Documents, Volume 4 (December 9, 1968), pp. 1658-1659.

29. Ibid., p. 1660.
30. NASA Release 68-221.
31. White House, Compilation of Presidential Documents, Volume 4 (December 16, 1968), pp. 1689-1691.
32. Ibid., Volume 5 (January 13, 1969), pp. 35-36.
33. See New York Times, January 11, 1969, pp. 1f.
34. NASA Release (Special), January 13, 1969.
35. White House, Compilation of Presidential Documents, Vol. 4 (December 30, 1968), pp. 1738, 1742, 1744, 1746-8.