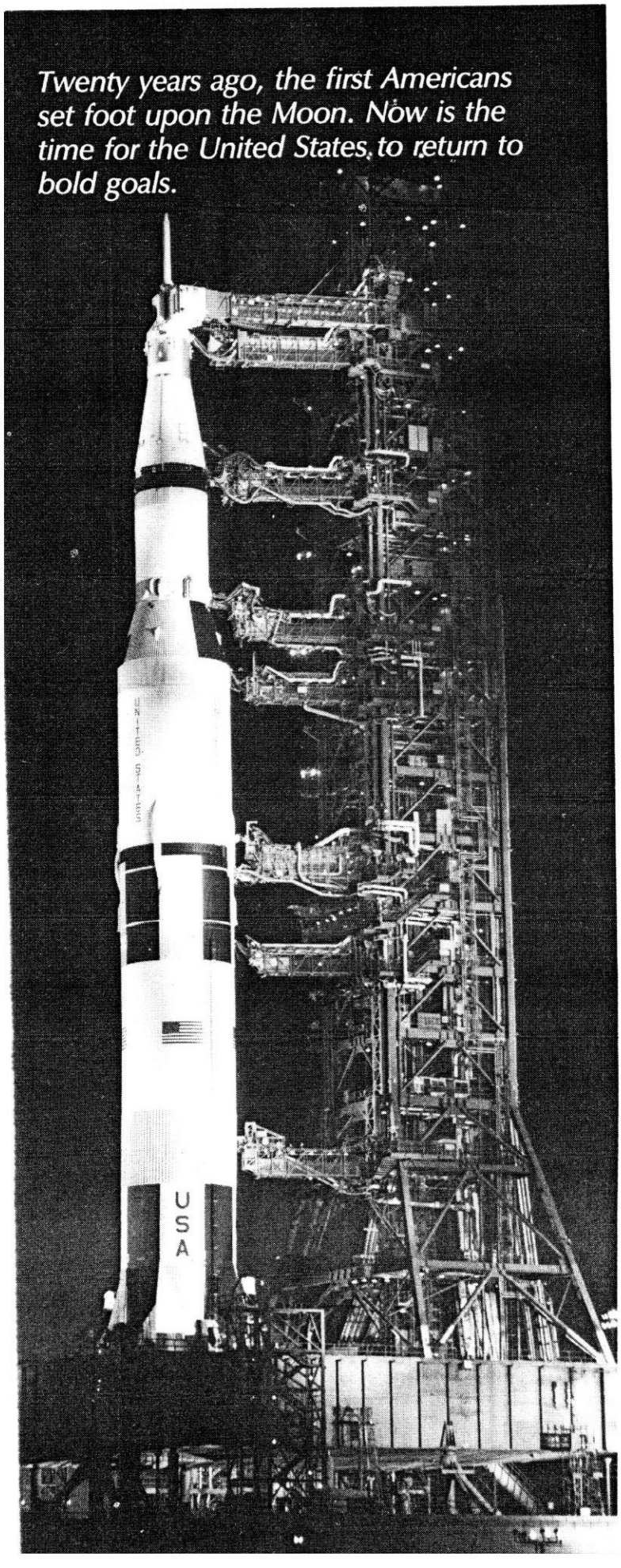
Twenty years ago, the first Americans set foot upon the Moon. Now is the time for the United States to return to bold goals.



The Apollo

Return America to Leadership i

by Marsha Freeman

With the launch of Apollo 11 on July 16, 1969, a million scientists, engineers, and skilled workers witnessed the culmination of a decade of hard work and full-time commitment. For a smaller group, it was the fulfillment of a dream that had started 40 years earlier in Germany and survived world war and relocation—a dream that represented a stepping-stone for man's journey to the rest of the solar system.

It has been estimated that nearly half of the people on Earth knew about America's Moon landing as it was happening. For the 600 million people (about one fifth the world's population at that time) who watched Neil Armstrong's first small step via television, it was the finest hour for America—a nation that was itself explored by those who first left only their footprints, to be followed by others who moved here with a commitment to tame and develop this new world.

The crowd at Cape Canaveral on the morning of the Apollo 11 launch, July 16, has been estimated at 1 million. In the grandstand was a crowd of 20,000, including 3,500 reporters and photographers from 56 nations. Also present at the launch were Rev. Ralph Abernathy and members of the Southern Christian Leadership Conference, who had originally come in protest.

Looking back 20 years, it seems impossible that such a long-term program—which would not have been completed in John F. Kennedy's presidency *even if he had served two full terms*—could be carried out and meet its major goal. Today, such long-term programs are hardly proposed. Although only the lunar landing part of the plan was carried through to completion, President Kennedy's lunar initiative, contrary to popular misconception, was not an isolated program but part of a broad upgrading and acceleration of the infant U.S. space effort.

The Apollo mission was certainly implemented in response to serious political setbacks early in Kennedy's administration, such as the Bay of Pigs, but it became an integral part of his plan to move into the decade of the 1960s with a vision of the future based on a domestic economic policy of growth. Many of President Kennedy's initiatives were not implemented. While he publicly stated his policies in numerous speeches before the American people, many government departments in practice did the *opposite* of what the president proposed, and some policies were not enacted into law by Congress. In fact, Kennedy's cabinet, including science adviser Jerome Wiesner, opposed

All photos are courtesy of NASA, unless otherwise noted.

Apollo 11, which took man to his first Moon landing.

Legacy

in Space

the Apollo program, and Apollo went forward only because of Kennedy's personal commitment and that of Vice President Lyndon Johnson. Even the most enthusiastic supporters of the space program gave the Apollo effort only a 50 percent chance of beating the Soviets to the Moon.

All told, however one might evaluate the final outcome of Kennedy's less-than-three years in office in terms of foreign and defense policy, U.S.-Soviet relations, and overall domestic policies, this nation lived and prospered for 20 years as a direct result of the technological-economic driver established by Kennedy's Apollo program investment.

Today, the basic policies that a Democratic Party president espoused in 1960 are considered heretical. Now, members of the party who campaign for economic growth, nuclear power, a strong defense against Communism, and a strengthening of the Atlantic Alliance are booted out of the party. This has happened, for example, to members of the National Democratic Policy Committee, elected to public office. At the same time, the Republican Party does not even concern itself with issues like medical care for the aged, job training for youth, education, or investment in infrastructure—much less understand that the supposedly "recovered" economy of the United States today is actually tottering on the brink of physical extinction.

In the past two decades, no president has understood that budget deficits are remedied only through economic expansion and growth, not by cutbacks in federal spending, tax increases, austerity, or selling off government assets to the private sector. Most presidents since the early 1960s have posed a "guns versus butter" choice for the American people and their legislators, insisting that this country could not have a strong defense while at the same time making the necessary investments for economic growth. Indeed, during President Kennedy's second year in office, Rand Corporation policymaker James Rodney Schlesinger wrote that national security and economic growth had become "decoupled" and that it did not matter if the U.S. economy actually *produced* anything.

The Apollo missions to the Moon ended in 1972, before all of the lunar exploration objectives had been met. The last few flights were canceled, and the huge Saturn V rockets that should have gone to the Moon became exhibits at various National Aeronautics and Space Administration (NASA) research centers. Between that last lunar flight and the first Space Shuttle mission in 1981, the United States really had no manned space program.

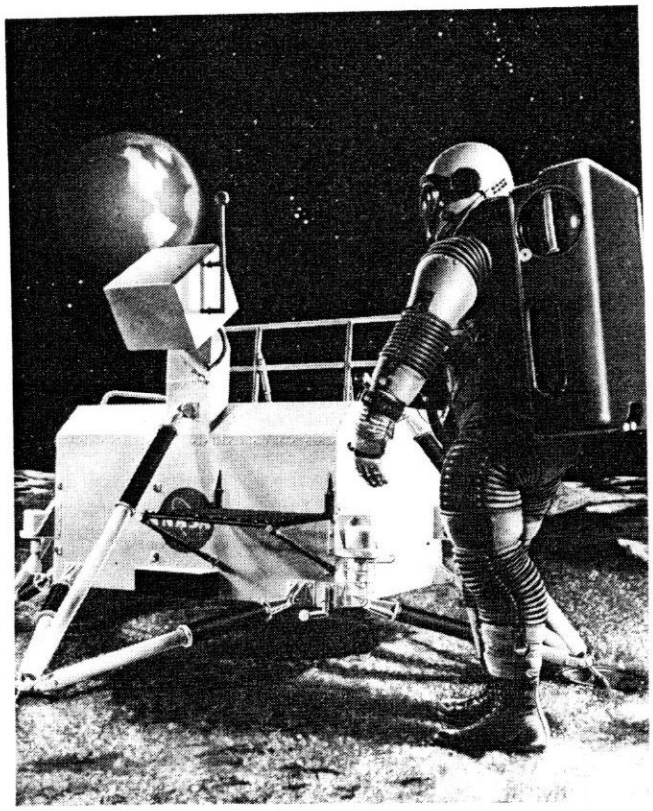
Since the first successful Shuttle flight in 1981 and the 1984 space station initiative, space policy planners have once again set their sights on getting the nation back to where it was in 1969. Now there is a chance that a new president, faced with as many (or more) crises as John F. Kennedy was, might turn to the space program as a way to bring America back to its finest hour.

We have gone to the Moon. We have proven that it is feasible to land and work there and return safely to Earth. The next step in space—as it was in settling America—is not to make more short, exploratory visits, but to move people, technology, and scientific instruments there. After man learns how to live on this heavenly body so close to Earth, he will be ready to again stretch his scientific knowledge and technological know-how and go on to settle worlds even farther away.

From 1969 to 1989

The new NASA Office of Exploration presented its first annual report to the administrator at the end of 1988. In it, John Aaron, Assistant Administrator for Exploration, reminds us: "[N]early two decades have passed since the United States established preeminence in space by sending human explorers to walk on the surface of another world. . . . Today, once again, the United States and other spacefaring nations are placing a priority on human expeditions for beyond the confines of Earth."

A presidential directive signed Jan. 5, 1988, by President Reagan promulgated the long-range goal to "expand human presence and activity beyond Earth orbit into the solar



Three years before man first landed on the Moon, engineers at NASA had already designed a Manned Flying System for exploring terrain inaccessible to the lunar rover.

system." NASA is now considering two major scenarios to meet this mandate. The only one that would "build a capability that would lead to a nearly self-sufficient, sustained human presence beyond low-Earth orbit" starts with a lunar base that evolves toward a manned Mars program. This "evolutionary" scenario in NASA's plans would first establish a "permanently staffed facility on the lunar surface." It would give the space program experience in providing "a living environment in which to conduct partial-gravity research, gain experience in long-duration human planetary missions, and initiate the use of local resources."

More than 20 years ago, space scientist Krafft A. Ehricke began to publish extensive, detailed plans for the industrialization of the Moon, which he described as Earth's "seventh continent." He proposed the use of nuclear fission energy to power regularly scheduled transporters from Earth orbit to lunar orbit and to power the mining of lunar resources. He saw a time when fusion energy would be used on the Moon, a development that could open up the permanent colonization of Mars.

These ideas are once again discussed in the 1988 NASA report: "Lunar oxygen, for example, could support the lunar base life-support system, and could be used for rocket fuel for further expansion of exploration. Another interesting possibility is that helium-3, which is available in commercially useful quantities on the Moon, may be a potential fuel for nuclear fusion reactors on Earth." This scenario from the NASA report would require the buildup of infrastructure in Earth orbit, lunar orbit, and on the Moon. Transport systems specific to each leg of the interplanetary journeys would have to be developed. And in this scheme, the time would be available to develop wholly new propulsion and other systems, such as fusion power, to accomplish the Mars colonization in the safest, most efficient way.

NASA has all the plans ready, just as it did in 1960. But unlike 1961, today the budget deficit and other economic crises are used as an excuse as to why aggressive goals *cannot* be set for space. In constrast, what became clear in the early 1960s, was the fact that the space program was in large part the solution to most of the economic and social problems facing the nation.

The Question of Leadership

When President Kennedy took office in January 1961, this nation faced domestic, foreign policy, economic, and military crises—not that different from those George Bush faces today. In his State of the Union Message, delivered Jan. 29, 1961, Kennedy summarized the situation:

> The present state of our economy is disturbing. We take office in the wake of seven months of recession, three and one-half years of slack, seven years of diminished economic growth, and nine years of falling farm income.
>
> Business bankruptcies have reached their highest level since the Great Depression. Since 1951, farm income has been squeezed down by 25 percent. Save for a brief period in 1958, insured unemployment is at the highest peak in our history. Of some 5½ million Americans who are without jobs, more than 1 million have been searching for work for more than four months. And during each month, some 150,000 workers are exhausting their already meager jobless benefit rights. . . .
>
> Our cities are being engulfed in squalor. . . . [W]e still have 25 million Americans living in substandard homes. . . .
>
> Our classrooms contain 2 million more children than they can properly have room for, taught by 90,000 teachers not properly qualified to teach. One third of our most promising high school graduates are financially unable to continue the development of their talents. . . . We lack the scientists, the engineers and the teachers our world obligations require. We have neglected oceanography, saline water conversion, and the basic research that lies at the root of all progress. . . .
>
> Medical research has achieved new wonders, but these wonders are too often beyond the reach of too many people, owing to a lack of income (particularly among the aged), a lack of hospital beds, a lack of nursing homes and a lack of doctors and dentists. . . .
>
> The denial of constitutional rights to some of our fellow Americans on account of race, at the ballot box and elsewhere, disturbs the national conscience, and subjects us to the charge of world opinion that our democracy is not equal to the high promise of our heritage.
>
> But all these problems pale when placed beside those which confront us around the world. . . . Our greatest challenge is still the world that lies beyond the Cold War, but the first great obstacle is still our relations with the Soviet Union and Communist China. We must never be lulled into believing that either power has yielded its ambitions for world domination.

"But this is not merely a race. . . . We go into space because whatever mankind must undertake, free men must fully share."

Kennedy continued, "To meet this array of challenges, to fulfill the role we cannot avoid on the world scene, we must reexamine and revise our whole arsenal of tools: military, economic, and political."

This arsenal included an array of specific proposals and legislative initiatives, the most important and long-lasting of which was the space program. But without the investment tax credit program, the tax cuts to encourage investment and savings, the upgrading of education, the investment in basic water and energy infrastructure and in medical care, and programs to integrate minorities into the mainstream of economic opportunity, this space program would not have had any more of an impact on the overall science, technology, or economy than President Reagan's quickly disappearing Strategic Defense Initiative.

'Landing a Man on the Moon'

One month after Yuri Gagarin became the first man to orbit the Earth, and days after the failed Bay of Pigs invasion of Cuba, President Kennedy delivered a "Special Message to the Congress on Urgent National Needs," May 25, 1961:

If we are to win the battle that is now going on around the world between freedom and tyranny, the dramatic achievements in space which occurred in recent weeks should have made clear to us all, as did the Sputnik in 1957, the impact of this adventure on the minds of men everywhere, who are attempting to make a determination of which road they should take.

Since early in my term, our efforts in space have been under review. With the advice of the vice president, who is chairman of the National Space Council, we have examined where we are strong and where we are not, where we may succeed and where we may not. Now it is time to take longer strides, time for a great new American enterprise, time for this nation to take a clearly leading role in space achievement, which in many ways hold the key to our future on Earth.

I believe we possess all the resources and talents necessary. But the facts of the matter are that we have never made the national decisions or marshaled the national resources required for such leadership. We have never specified long-range goals on an urgent time schedule, or marshaled our resources and our time so as to insure their fulfillment.

Recognizing the head start obtained by the Soviets with their large rocket engines, which gives them many months of lead-time, and recognizing the likelihood that they will exploit this lead for some time to come in still more impressive successes, we nevertheless are required to make new efforts on our own. For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last. We take an additional risk by making it in full view of the world, but as shown by the feat of Astronaut Shepard, this very risk enhances our stature when we are successful.

But this is not merely a race. Space is open to us now; and our eagerness to share its meaning is not governed by the efforts of others. We go into space because whatever mankind must undertake, free men must fully share.

Therefore I ask the Congress, above and beyond the increases I have earlier requested for space activities, to provide the funds which are needed to meet the following national goals:

First, I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish. We propose to accelerate development of the appropriate lunar spacecraft. We propose to develop alternate liquid and solid fuel boosters, much larger than any now being developed, until we are certain which is superior.

President Kennedy congratulates astronaut Alan Shepard, the first American in space, at a ceremony on the White House lawn.

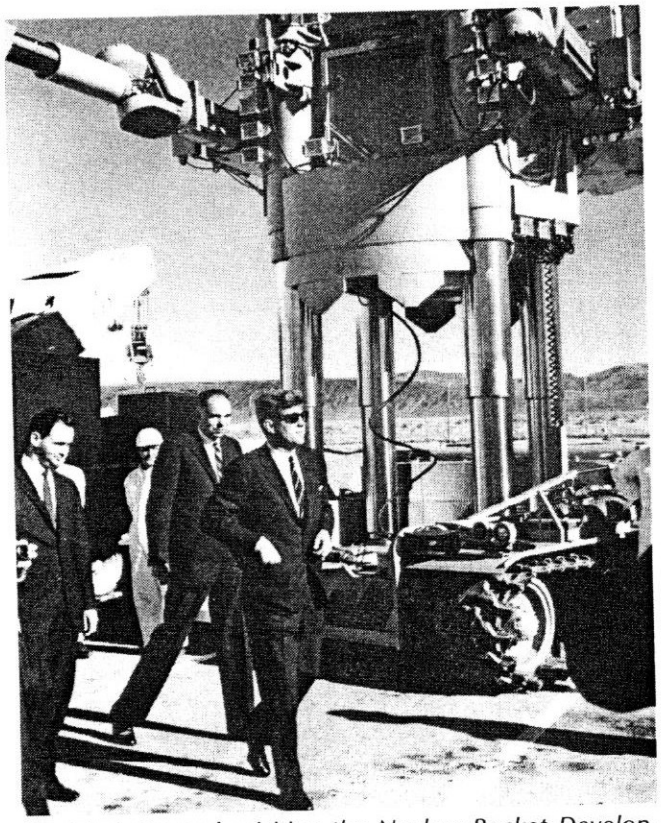
We propose additional funds for other engine developments and for unmanned explorations, explorations which are particularly important for one purpose which this nation will never overlook: the survival of the man who first makes this daring flight. But in a very real sense, it will not be one man going to the Moon; if we make this judgment affirmatively, it will be an entire nation. For all of us must work to put him there.

Second, an additional $23 million, together with $7 million already available, to accelerate development of the Rover nuclear rocket. This gives promise of someday providing a means for even more exciting and ambitious exploration of space, perhaps beyond the Moon, perhaps to the very end of the solar system itself.

Third, an additional $50 million will make the most of our present leadership, by accelerating the use of space satellites for worldwide communications.

Fourth, an additional $75 million, of which $53 million is for the Weather Bureau, will help give us at the earliest possible time a satellite system for worldwide weather observation.

Let it be clear—and this is a judgment which the Members of Congress must finally make—let it be clear that I am asking the Congress and the country to accept a firm commitment to a new course of action, a course which will last for many years and carry very heavy costs of $531 million in fiscal 1962, an estimated $7 billion to



President Kennedy visiting the Nuclear Rocket Development Station in Nevada in December 1962. Behind him is the "Bettle," a massive, self-propelled remote manipulating machine.

Astronaut Gordon Cooper (left) briefing President Kennedy on the Mercury spacecraft and its complex instrument panel.

$9 billion additional over the next five years. If we are to go only halfway, or reduce our sights in the face of difficulty, in my judgment it would be better not to go at all. . .

It is a most important decision that we make as a nation. But all of you have lived through the last four years and have seen the significance of space and the adventures in space, and no one can predict with certainty what the ultimate meaning will be of mastery of space.

I believe we should go to the Moon. But I think every citizen of this country as well as the Members of Congress should consider the matter carefully in making their judgment, to which we have given attention over many weeks and months, because it is a heavy burden, and there is no sense in agreeing or desiring that the United States take an affirmative position in outer space, unless we are prepared to do the work and bear the burdens to make it successful. If we are not, we should decide today. . . .

This decision demands a major national commitment of scientific and technical manpower, material and facilities, and the possibility of their diversion from other important activities where they are already thinly spread. It means a degree of dedication, organization, and discipline which have not always characterized our research and development efforts.

The president with Robert Gilruth, director of the Houston Manned Space Center. Kennedy is holding a model of the Apollo command module.

At the time this speech was made, NASA Administrator James Webb reportedly believed the United States had only a 50-50 chance of beating the Russians to the Moon. More than half the American public was opposed to a lunar landing effort, according to polls. Dr. Jerome Wiesner, the president's science adviser, also opposed the manned space program; and in the White House, only Vice President

Johnson was an enthusiastic supporter. But Kennedy believed that under his leadership, the nation could be mobilized not only to support, but also to *accomplish* the goals he outlined.

A Cultural Paradigm Shift

Very quickly, the national outlook and culture of this country shifted, in response to the space initiative, In his remarkable book, *Project Apollo,* published in 1964, Tom Alexander reported: "[A] curious breed of individual seems to be making a place for himself in this ordeal of emerging from the pupal state into the space age. This is the man who, technically speaking, appears to be willing or able to think more than 10 years ahead. A few years ago, people of his type were called crackpots. . . . Terraforming planets is a topic of discussion among the less inhibited Washington space policy men nowadays."

In this book, written five years before the first flight to the Moon, Alexander said that the next steps should be an Earth-orbiting space station, then a lunar base using nuclear rockets, and then manned expeditions to the planets. He proposed that lasers could be used for space communications, carrying "millions of times as much volume of information as radiowaves. If nuclear fusion ever proves feasible," he continued, "it might be an even more efficient way of providing the necessary large amounts of energy to process lunar rock. Already Atomic Energy Commission officials envision implanting a permanent 1,000-man colony on Mars. . . ."

Kennedy knew that his direct attention to the progress of the Apollo program would be required to keep the effort on schedule, and not crippled financially by Congress. He mentioned the space program in most of his important speeches, and in his second State of the Union Address in January 1962, he assessed the progress made during his first year in office:

> With the approval of this Congress we have undertaken in the past year a great new effort in outer space. Our aim is not simply to be first on the Moon. . . . [O]ur objective in making this effort, which we hope will place one of our citizens on the Moon, is to develop in a new frontier of science, commerce, and cooperation the position of the United States and the free world.
>
> This nation belongs among the first to explore it, and among the first, if not the first, we shall be. We are offering our know-how and our cooperation to the United Nations. Our satellites will soon be providing other nations with improved weather observations. And I shall soon send to the Congress a measure to govern financing and operation of an International Communications Satellite system, in a manner consistent with the public interest and our foreign policy. . . .

Kennedy's second *major* space policy address was at Rice University, Sept. 12, 1962:

> . . . This country was conquered by those who moved forward, and so will space. . . . The exploration of space will go ahead, whether we join in it or not. And it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in this race for space.
>
> Those who came before us made certain that this country rode the first waves of the industrial revolution, the first waves of modern invention, and the first wave of nuclear power, and this generation does not intend to founder in the backwash of the coming age of space. We mean to be part of it. We mean to lead it, for the eyes of the world now look into space, to the Moon and to the planets and beyond; and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace.
>
> Yet the vows of this nation can only be fulfilled if we in this nation are first, and therefore we intend to be first. In short, our leadership in science and industry, our hopes for peace and security, our obligations to ourselves as well as others, all require us to make this effort, to solve these mysteries, to solve them for the good of all men, and to become the world's leading space-faring nation.
>
> We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of preeminence can we help decide whether this new ocean will be a sea of peace or a new, terrifying theater of war.
>
> I do not say that we should or will go unprotected against the hostile misuse of space any more than we go unprotected against the hostile use of land or sea, but I do say that space can be explored and mastered without feeding the fires of war. . .
>
> But why, some say, the Moon? Why choose this as our goal? And they may well ask, why climb the highest mountain? Why, 35 years ago, fly the Atlantic?
>
> We choose to go to the Moon. We choose to go to the Moon in this decade, and do the other things, not because they are easy but because they are hard; because that goal will serve to organize and measure the best of our energies and skills; because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win. . . .

"Those who came before us made certain that this country rode the first waves of the industrial revolution, the first waves of modern invention and the first wave of nuclear power, and this generation does not intend to founder in the backwash of the coming age of space."

Apollo 11 astronaut Neil Armstrong introducing himself to the grandson of Japanese Prime Minister H.E. Eisaku in November 1969. The astronauts were awarded The Order of Culture by the Japanese government.

It is for these reasons that I regard the decision last year to shift our efforts in space from low to high gear as among the most important decisions that will be made during my incumbency in the office of the Presidency. . . .

The Mariner spacecraft now on its way to Venus is the most intricate instrument in the history of space science. The accuracy of that shot is comparable to firing a missile from Cape Canaveral and dropping it in this stadium between the 40-yard lines.

Transit satellites are helping our ships at sea to steer a safer course. Tiros satellites have given us unprecendented warnings of hurricanes and storms, and will do the same for forest fires and icebergs.

To be sure, we are behind, and will be behind for some time in manned flight. But we do not intend to stay behind, and in this decade we shall make up and move ahead.

The growth of our science and education will be enriched by new knowledge of our universe and environment, by new techniques of learning and mapping and observation, by new tools and computers for industry, medicine, the home as well as the school. . . .

And finally, the space effort itself, while still in its infancy, has already created a great number of new companies and tens of thousands of new jobs. Space and related industries are generating new demands in investment and skilled personnel. . . .

To be sure, all this costs us all a good deal of money. This year's space budget is three times what it was in January 1961, and it is greater than the space budget of the previous eight years combined. That budget now stands at $5.4 billion a year—a staggering sum, though somewhat less than we pay for cigarettes and cigars every year. Space expenditures will soon rise some more, from 40 cents per person per week to more than 50 cents a week for every man, woman, and child in the United States, for we have given this program a high national priority—even though I realize that this is in some measure an act of faith and vision, for we do not now know what benefits await us.

But if I were to say, my fellow citizens, that we shall send to the Moon, 240,000 miles away from the control station in Houston, a giant rocket more than 300 feet tall, the length of this football field, made of new metal alloys, some of which have not yet been invented, capable of standing heat and stresses several time more than have ever been experienced, fitted together with a precision better than the finest watch, carrying all the equipment needed for propulsion, guidance, control, communications, food and survival, on an untried mission, to an unknown celestial body, and then return it safely to Earth, reentering the atmosphere at speeds of over 25,000 miles per hour, causing heat about half that of the temperature of the Sun, almost as hot as it is here today, and do all this, and do it right, and do it first before this decade is out, then we must be bold. . . .

One of the most damaging results of the past 20 years' obsession with the idea that there could and *should* be a "no risk" society, has been the pressure on the space agency and other research and development programs to be "success oriented." Not only is there no scheduling or budgetary margin for failure, but programs are constantly under the threat of being *canceled* if their success rate is less than perfect. How many things has the United States done since 1969 that could be described as bold? Who was the last American president to use the term preeminence?

The economic impact of the Apollo program's first five years is well documented. More than 400,000 highly skilled jobs were directly created in industry; most of the engineers and doctors of science graduated in the 1960s were directly or indirectly supported by NASA; and science curricula starting with elementary school were revolutionized. The technologies transferred from space to the national economy were largely responsible for whatever increases in productivity there were in industry, commerce, and the home, for more than 20 years. Developing nations saw that their lives could be dramatically improved through the use of satellites for communications, Earth remote-sensing, and education.

American System Economics

Kennedy knew, however, that the result of years of economic decay and stagnation, the "no-investment" policies of his Republican predecessor and the Congress, and the

rightful expectations of economic advancement by disenfranchised minorities, also had to be addressed with direct programs in parallel with the space program.

Kennedy had an "American-system" approach to domestic economic policy. Rather than basing his policies solely on financial problems (of which there were many), he proposed the expansion of the *real economy*—manufacturing, agriculture, and infrastructure—and he made a commitment to both increasing defense and advancing standards of living, as well as upgrading all of the government services needed to help accomplish these goals, particularly education, nutrition, and medical care.

This is the American System approach that led to the establishment of the United States as an industrial republic during the nation's infancy, through the credit and industrial growth policies of Treasury Secretary Alexander Hamilton. During the Civil War, President Lincoln's economic advisers—Henry Carey, for example—advanced the building of railroads, bridges, tunnels, and canals as necessary infrastructure for the nascent iron and other manufacturing industries.

During World War II, President Roosevelt's mobilization of the entire U.S. economy made the difference between defeat and victory, and Kennedy's programs followed that model, posing a lunar landing that would require the mobilization of evey capability the country could muster. Less than three weeks after his inauguration, Kennedy said in his "Message to the Congress on Economic Recovery and Growth":

> The potential of the American economy is constantly expanding. The labor force is rising by 1.5 percent per year. Output per man rises annually by 2 percent as a result of new and better plant and equipment, modern technology, and improved human skills. These increases in manpower and productivity provide the base for a potential annual growth of 3.5 percent in the nation's total output. This is not high enough. Our potential growth rate can and should be increased. To do so, we propose to expand the nation's investments in physical and human resources, and in science and technology. . . .
>
> An unbalanced economy does not produce a balanced budget. The Treasury's pocketbook suffers when the economy performs poorly. Lower incomes earned by households and corporations are reflected in lower federal tax receipts. Assistance to unemployed workers and the costs of other measures for alleviation of economic distress are certain to rise as business declines. . . .

One key to the Kennedy plan to get the idle factories open and encourage investment in new basic industry was a series of tax measures that he outlined for Congress on numerous occasions. On April 20, 1961, Kennedy presented his basic program on "Tax Incentives in the Federal Tax System":

> The history of our economy has been one of rising productivity, based on improvements in skills, advances in technology, and a growing supply of more efficient tools and equipment. This rise has been reflected in rising wages and standards of living for our workers, as well as a healthy rate of growth for the economy as a whole. It has also been the foundation of our leadership in world markets, even as we enjoyed the highest wage rates in the world.
>
> Today, as we face serious pressure on our balance of payments position, we must give special attention to the modernization of our plant and equipment. . . . If our own goods are to compete with foreign goods in price and quality, both at home and abroad, we shall need the most efficient plant and equipment. . . .
>
> Additional expenditures on plant and equipment will immediately create more jobs in the construction, lumber, steel, cement, machinery, and other related capital-goods industries. The staffing of these new plants, and filling the orders for new export markets, will require additional employees. The additional wages of these workers will help create still more jobs in consumer goods and service industries. The increase in jobs resulting from a full year's operation of such an incentive is estimated at about half a million. . . .

"America has the human and material resources to meet the demands of national security and the obligations of world leadership while at the same time advancing well-being at home."

In this speech, President Kennedy recommended a tax credit to businesses undertaking new capital investment expenditures, along with nine other tax measures, which were *not* passed by the Congress. One year later, in his second State of the Union address, Kennedy once again urged that Congress pass his "8 percent tax credit for investment in machinery and equipment, which, combined with planned revisions of depreciation allowances, will spur our modernization, our growth, and our ability to compete abroad."

In early 1961, the president presented a "Special Message on Natural Resources" to Congress, outlining his programs in water and electric power development and stressing the research, development, and application of emerging technologies:

> No water resources program is of greater long-range importance, for relief not only of our shortages, but for arid nations the world over, than our efforts to find an effective and economical way to convert water from the world's greatest, cheapest natural resources, our oceans, into water fit for consumption in the home and by industry. Such a breakthrough would end bitter struggles between neighbors, states, and nations, and bring new hope for millions who live out their lives in dire shortages of usable water and all its physical and

economic blessings, though living on the edge of a great body of water throughout a parched lifetime.

This administration is currently engaged in redoubled efforts to select the most promising approaches to economical desalination of ocean and brackish waters, and to focus our energies more intensively on those approaches. . .

I now pledge that, when this know-how is achieved, it will immediately be made available to every nation in the world who wishes it, along with appropriate technical and other assistance for its use. Indeed, the United States welcomes now the cooperation of all other nations who wish to join in the effort at present.

To keep pace with the growth of our economy and national defense requirements, expansion of this nation's power facilities will require intensive effort by all segments of our power industry. Through 1980, according to present estimates of the Federal Power Commission, total installed capacity should triple if we are to meet our nation's need for essential economic growth. . . .

Our efforts to achieve economically competitive nuclear power before the end of this decade in areas where fossil fuel costs are high will be encouraged through basic research, engineering developments, and construction of various prototype and full-scale reactors by the Atomic Energy Commission in cooperation with industry. . . .

Indeed, because of the economic gear-up that resulted from the Apollo program and overall industrial expansion during the 1960s, electricity growth averaged more than 7 percent per year. If that rate of growth had continued, the 1960's estimate of the need to triple capacity by 1980 would have been entirely accurate.

In his speech on natural resources, Kennedy announced that he was rejecting a "no new starts" policy on water resources and flood-control projects, and was requesting appropriate department and agency heads to schedule an orderly progression of such projects.

The Human Requirements

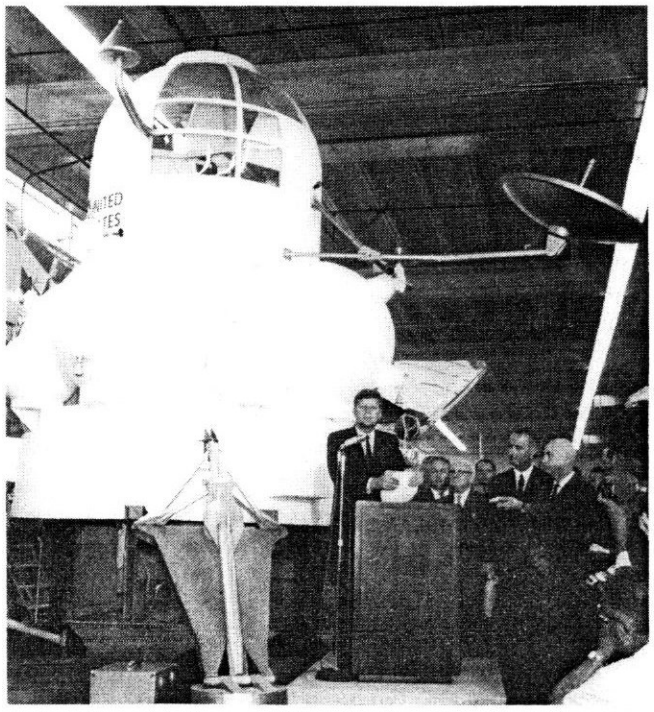
It was clear that none of these programs could go forward unless U.S. education were upgraded; the driver for the required improvements would be, in particular, the goals the president had set for the nation in space.

In a "Special Message to the Congress on Education," Feb. 20, 1961, Kennedy stated:

> Our progress as a nation can be no swifter than our progress in education. Our requirements for world leadership, our hopes for economic growth, and the demands of citizenship itself in an era such as this all require the maximum development of every young American's capacity.
>
> The human mind is our fundamental resource. A balanced federal program must go well beyond incentives for investment in plant and equipment. It must include equally determined measures to invest in human beings, both in their basic education and training and in their more advanced preparation for professional work. . . .
>
> Too many classrooms are overcrowded. Too many teachers are underpaid. Too many talented individuals cannot afford the benefits of higher education. Too many academic institutions cannot afford the cost of, or find room for, the growing numbers of students seeking admission in the 60s. . . .

Along with investment in human education came investment in health. To Kennedy, it was important that long-term, affordable health care be available to the infirm and elderly of the nation, as well as a vigorous immunization effort to protect the young from childhood diseases. In a "Special Message to the Congress on Health and Hospital Care," Feb. 9, 1961, the President stated:

> Twenty-six years ago, this nation adopted the principle that every member of the labor force and his family should be insured against the haunting fear of loss of income caused by retirement, death, or unemployment. To that we have added insurance against the economic loss caused by disability.
>
> But there remains a significant gap that denies to all but those with the highest incomes a full measure of security: the high cost of ill health in old age. One out of five aged couples drawing Social Security benefits must go to the hospital each year. Half of those going to hospitals incur bills in excess of $7,000 a year. This



President Kennedy holds an Apollo command module model during a 1962 visit to the Manned Spacecraft Center in Houston. Behind him is a lunar module display—quite different from the lander that went to the Moon seven years later.

is over one-third of the total annual income of a typical couple, more than a modest food budget for an entire year. Many simply do not obtain and cannot afford the care they need.

In addition to outlining guaranteed health care for hospitalization, skilled nursing home services, hospital outpatient clinic diagnostic services, community visiting-nurse services, and other home health care, Kennedy also recommended federal scholarships for medical and dental students and cost-of-education grants to the schools they attended; matching grants for construction, expansion, or restoration of medical and dental schools to increase their capacities; funds for construction of nursing homes and the improvement of nursing home and home-nursing services; increased funds for medical research and construction grants for medical research facilities and experimental or demonstration hospitals; establishment of a National Institute of Child Health and Human Development; and, increased appropriations for the maternal and child health, crippled children, and child welfare programs of the Children's Bureau.

In his second State of the Union Message, Jan. 11, 1962, Kennedy stated: "To take advantage of modern vaccination achievements, I am proposing a mass immunization program, aimed at the virtual elimination of such ancient enemies of our children as polio, diphtheria, whooping cough, and tetanus. . . ."

Although Kennedy had a commitment to the programs that would uplift the large part of the workforce that was economically disenfranchised, he also recognized—unlike those who followed him—that unless those who would have better education, better health care, and better access to lunch counters also had decently paying jobs, these advancements would be meaningless.

In a presentation before a convention in New York City of the AFL-CIO Convention, Nov. 15, 1963, Kennedy said:

> . . . There are those who support our effort for jobs but say it isn't the number one issue. Some may say that civil rights is the number one issue. . . . But no one gains from a fair employment practice bill if there is no employment to be had. No one gains by being admitted to a lunch counter if he has no money to spend. No one gains from attending a better school if he doesn't have a job after graduation. Civil rights legislation is important. But to make that legislation effective, we need jobs in the United States.
>
> And some may say that the number one domestic issue is education. . . . What concerns me almost more than anything is the statistic that there will be 8 million young boys and girls coming into the labor market in the 60s who have not been graduated from high school.
>
> Where are they going to find jobs?. . . [T]he best schools, the best teachers and the best books—all these are of no avail if there are no jobs. . . .

Technology for the Third World

Much can be said, pro and con, about the foreign policy initiatives of the Kennedy administration. One thing Kennedy did stress was that the technical expertise that had made America a great power must be made available to less-developed nations, if they were to join the community of industrialized countries. A great focus of his attention was on Latin America, and in a Jan. 1962 address to a reception for Latin American diplomats, Kennedy said:

Neil Armstrong (left) and Edwin Aldrin (far right) explain launch procedures to the Empress of the Shah of Iran, and their children. The "Giantstep-Apollo 11" tour took the Apollo 11 astronauts to 24 countries in 45 days.

> . . . All the people of the hemisphere must be allowed to share in the expanding wonders of science, wonders which have captured man's imagination, challenged the powers of his mind, and given him the tools for rapid progress. I invite Latin-American scientists to work with us in new projects in fields such as medicine and agriculture, physics and astronomy, and desalinization; and to help plan for regional research laboratories in these and other fields; and to strengthen cooperation between American universities and laboratories.
>
> We also intend to expand our science-teacher-training programs to include Latin-American instructors, to assist in establishing such programs in other American countries, and translate and make available revolutionary new teaching materials in physics, chemistry, biology, and mathematics, so that the young of all nations may contribute their skills to the advance of science.

According to some who were there at the time, the greatest inspiration to the industrializing nations of Latin America was not foreign "aid" programs, but the space program. Seen as a race between the Soviets and Americans around the world, children kept "scorecards" to follow developments in each program and argue about which country was ahead.

In the early 1960s, fledgling space programs began in

Right: Donning sombreros and ponchos, the Apollo astronauts are mobbed by crowds in Mexico City.

Opposite page: Joining the Apollo 11 astronauts in a motorcade through Berlin is Mayor Klaus Schuetz. Behind the motorcade are the ruins of the Kaiser Wilhelm Church.

Argentina, Brazil, Mexico, and Peru, including the launching of small rockets and satellites.

With or Without the Soviets?

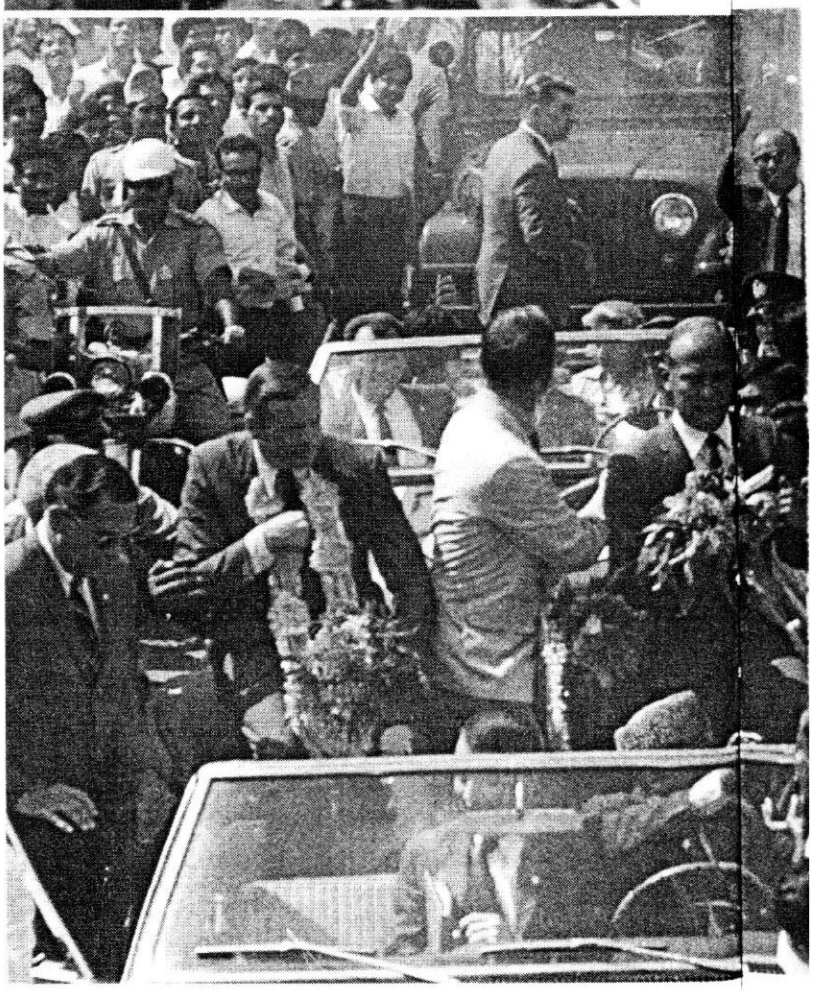
During his less-than-three years in office, Kennedy had more than one face-off with the Soviet Union. Although he often stated his abhorrence of the Soviet system, he backed down under pressure, pulling medium-range missiles out of Turkey, for example, as a concession to the Soviets during the Cuban missile crisis, thus weakening NATO. Despite his moving speech in Berlin, the wall was still built, and it remains.

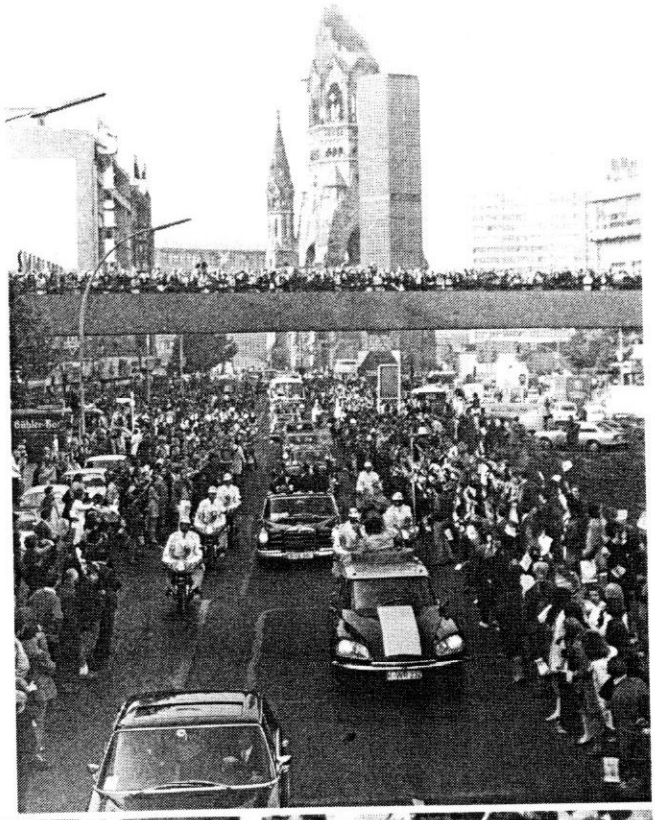
In terms of the space program, Kennedy knew painfully well that the Soviets were years ahead. But he also knew what was at stake in terms of world prestige, should America reach the Moon second. Although he offered the Soviets a program of cooperation, he also spared no effort in pushing NASA as fast as he could to beat the Soviets to the Moon. In his first State of the Union address, Kennedy said:

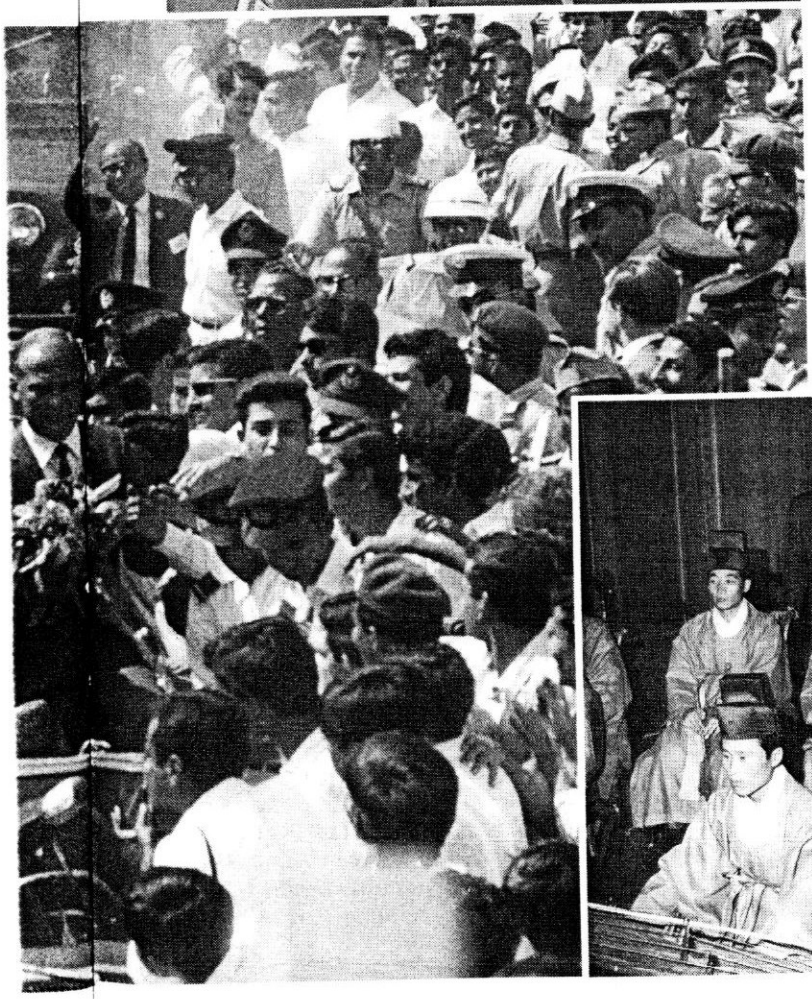
> . . . I now invite all nations, including the Soviet Union, to join with us in developing a weather prediction program, in a new communication satellite program, and in preparation for probing the distant planets of Mars and Venus, probes which may someday unlock the deepest secrets of the universe.
>
> Today this country is ahead in the science and technology of space, while the Soviet Union is ahead in the capacity to lift large vehicles into orbit. . . . The United States would be willing to join with the Soviet Union and the scientists of all nations in a greater effort to make the fruits of this knowledge available to all, and, beyond that, in an effort to extend farm technology to hungry nations, to wipe out disease, to increase the exchanges of scientists and their knowledge, and to make our own laboratories available to technicians of other lands who lack the facilities to pursue their own work.

Two years later, Kennedy restated the same theme in an even more specific form before the United Nations in New York City, Sept. 20, 1963:

> [There are] basic differences between the Soviet Union and the United States, and they cannot be concealed. So long as they exist, they set limits to agreements, and they forbid the relaxation of our vigilance. . . .
>
> In a field where the United States and the Soviet Union have a special capacity—in the field of space—there is room for new cooperation. . . . I include among these possibilities a joint expedition to the







Moon. . . . Surely we should explore whether the scientists and astronauts of our two countries—indeed, of all the world—cannot work together in the conquest of space, sending someday in this decade to the Moon not the representatives of a single nation but the representatives of all our countries. . . .

At first glance this sounds no different from the proposals from the Carter and Reagan administrations. Yet today, so-called science advisers insist that such international cooperation should *replace* aggressive efforts in science and technology research in the United States as a budget-saving measure. And then there is a constant barrage from space quack Carl Sagan—and the Soviets themselves—that the only way to go to Mars is if we all go together. The initiative for international cooperation was never seen by Kennedy as a *trade-off* with an aggressive domestic U.S. effort. His primary concern was that the United States be *preeminent* in space exploration.

While Kennedy held out this offer to the Soviets to participate in the new frontier of space, he was fighting with NASA to spend *more* money to speed up the Apollo program. Former NASA deputy administrator Robert Seamans recently related in *Space World* magazine (November 1988) that when Kennedy "learned [in November 1962] that the lunar landing might occur six months earlier than planned if $400 million could be added to the Apollo budget," the President strongly insisted that this be done. Kennedy tried to have more funds programmed into the Apollo effort from other parts of the space budget, but was eventually convinced by the NASA leadership that although the increase might gain some time in getting to the Moon, it would hurt other aspects of the space program.

Left: Throngs of enthusiastic Pakistanis try to get a close-up view of the astronauts on a motorcade through Dacca.

Below: At a reception in Korea hosted by Prime Minister H.E. Il Kwon Chung, the astronauts pose with the orchestra.

The day that John F. Kennedy was killed, he was scheduled to deliver a speech to the Dallas Citizens Council. His theme was the strategic security of the United States, and its allies. After summarizing the upgrade under way in areas of U.S. defense, the speech continued:

> . . . I have spoken of strength largely in terms of the deterrence and resistance of aggression and attack. But, in today's world, freedom can be lost without a shot being fired, by ballots as well as bullets. . . .
>
> That is also why we have regained the initiative in the exploration of outer space . . . making it clear to all that the United States of America has no intention of finishing second in space.
>
> This effort is expensive, but it pays for its own way, for freedom and for America. For there is no longer any fear in the free world that a Communist lead in space will become a permanent assertion of supremacy and the basis of military superiority. There is no longer any doubt about the strength and skill of American science, American industry, American education, and the American free enterprise system. In short, our national space effort represents a great gain in, and great resource of, our national strength. . . .

A Different America

Before three years of his presidency were completed, Kennedy had seen the fledgling space program make significant strides forward. It would have been hard for him to imagine how different the world would look when the time to launch the first manned mission to the Moon finally arrived.

By July 1969, the United States had gone through four years of declining budgets for the space program—1965 was the peak funding year for NASA. The future programs, which in 1961 were assumed to be part of America's venture out into "this new ocean," were disappearing from the nation's long-term plans by 1969.

Even before Kennedy was elected, but with increasing frequency and voracity after he was dead, the "Aquarian conspiracy" was bearing down on the space program. Groups like the Brookings Institution, the London Tavistock Institute, and later the Club of Rome were publishing material lobbying for the "Great Society." The idea was that it is not people's standard of living, hopes, dreams, or plans for their children's future that are important, but the "quality" of their lives in terms of psychological "fulfillment." "Inner space" replaced outer space, as the location of an individual's identity.

Reports from these groups stated that the increase in the number of scientists and engineers NASA was creating would have dangerous consequences—such as optimism, patriotism, and growth. Didn't people realize, the New Agers said, that man has "limited resources," that there are already too many people, and that these hoards of human beings were destroying the environment with all their industry and agriculture?

In 1968, James Webb, who had headed NASA from the beginning of the Kennedy administration, resigned in dis-

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Above: Rev. Ralph Abernathy leading the March on Hunger at the Apollo launch site. Left: Dr. Thomas Paine, NASA administrator when America landed on the Moon, at a 1970 news conference.

'We Are Also Americans'

by Dr. Thomas O. Paine

On July 15, 1969, the day before the Apollo 11 launch to the Moon, I was in the office of Kurt Debus, director of the Kennedy Space Center, discussing rather arcane questions of lunar flight. At about noontime, the chief of the security forces came in. He was very flustered, and the chief of public affairs, Julian Scheer, came in with him.

Julian, Kurt, and I listened to his story about these people who had announced their intention of marching on the gates of the Space Center, holding a demonstration. All the deputy sheriffs that could be located in nearby Florida counties were being marshaled to counter this demonstration and keep people away from the launch site. Because this was the culmination of years of preparation, the last thing anyone wanted was civil disorder.

On the other hand, we had the entire world press corps there—possibly the largest number of press people ever assembled from all around the globe. We were not anxious to have our wonderful NASA liberation of mankind 's spirit to soar to the stars sullied by any broken heads if demonstrators and tough cops battled each other. It was a difficult situation.

The demonstration was a march against hunger. The marchers were making the basic point that while there were people in America who were hungry, it was obscene to be spending money on science and technology,

going to the Moon, and spaceflight. They thought we should take all that money and distribute it to the poor.

Of course you can make a case for the poor, just as you can make a case for science and technology. They are not really necessarily in conflict. In fact you could say that it has been science and technology that has given the poor their only real relief. It hasn't been the distributing of alms to the poor that has made any dent.

Knowing that, we were quite comfortable with what we were doing, but at the same time we didn't want to have any great confrontation, which seemed inappropriate. And so in order to try to contain the situation and convert it over to a more thoughtful interchange, I offered, as the head of the space program, to go out and meet the marchers. We instructed the sheriff's deputies and security people to not have a confrontation.

We negotiated with Rev. Ralph Abernathy and the marchers to give them what they wanted, which was actually a television opportunity. They were very unsophisticated in their mode of transport—they were using mules pulling carts—but they were extremely sophisticated in their utilization of the television medium. And so we arranged for them to have their caravan cross a big open field outside the gates of the Kennedy Space Center and advance, while I would come forward from the other side of the field. We would meet in the center of the field. They would present their case, and we would have a discussion of the Moon project and hunger in America, and any connections and interactions between them, permitting television people to be present. That was arranged for about 4 o'clock that afternoon, with the Moon rocket to be launched the next morning.

This was a very critical and busy time in preparation for the launch, but at the same time, I wasn't out there with a match under the bottom of the Saturn V to light it. I was only there to provide overall direction, and this was very much a problem—as I saw it—where I could contribute by taking it on myself.

So Julian Scheer and I went out to the field, and of course, it being 4 o'clock in the afternoon in Florida, the expected happened. On the horizon, enormous thunderheads appeared, and you could hear the rumbling of the thunder. It was a very dramatic setting—the scrub pine trees in the background, and the open field—sort of stubble—that they were coming across with their mule train. There were women, children, and elderly.

'Opening New Lands'

Reverend Abernathy spoke, and spoke very dramatically, about the plight of the poor in America and hunger. When he had finished, I welcomed him to the Kennedy Center and said that we had a large number of reporters there, and that I was sure that his story would get wide distribution—and so would ours.

I said that he represented one of the major movements in America, and one of America's concerns. I pointed out that science, technology, and exploration—opening new lands—also was a very important part of the American heritage, and that the pioneers and the explorers had probably done more for the homeless and the hungry of the world than any amount of people who stayed home. I said that we were very proud of what we were doing, just as he was very proud of what he was doing.

Since everything was being discussed on a very reasonable basis, Reverend Abernathy said that they were not there to protest the Moon rocket at all, that, on the contrary, they were very proud, as Americans, to be a part of the great day that was going to dawn tomorrow, when we launched Apollo 11 to the Moon. He said that they were Americans too, and it was part of them that would also be going to the Moon. And that, of course, was a great breakthrough. I was just delighted, and I assured him that we looked at it that way too.

I said that what I would like to do would be to send buses to his camping area the next day, take his people inside Cape Kennedy, and give them a place in our viewing area where they could watch the Moon launch and participate in it. He thought that was magnificent, and said he would accept that.

In the meantime, the storm clouds had been getting closer and closer. At about that time the first few little patters of rain fell, and you could see the trees in the background beginning to bend with the wind as the thunderstorm approached. So, on that note we shook hands all around and parted.

We each then turned and marched back in our respective directions, Julian Scheer at my side saying, "Wheeeeeeew!" As soon as he got back, he arranged for the buses, and he also arranged with local caterers to have every seat of the bus with a rather generous breakfast laid out, so that on their way to the viewing stands, at least, the demonstrators wouldn't be hungry.

They did come on the Cape, they did view the launch. Like everybody else they completely lost their heads when Apollo 11 started to lift off on Man's first journey to another world. They shouted and cheered and enjoyed it thoroughly, and I think they returned to their camp with a very strong feeling that it also carried their hopes for the future.

When he arrived leading the march, Reverend Abernathy may not have been a supporter of the space program, but as he and I talked that day he shifted his position to one of, "Look, the demonstration is not us against *you*. You are launching a great enterprise for the future of mankind, and you are doing it from America, and *we are Americans.*" That was his fundamental point. "We are Americans too, and what you are doing, we are a part of also."

Dr. Thomas Paine, president of Thomas Paine Associates in California, was the administrator of NASA at the time of the Apollo II launch. More recently, he chaired the National Commission on Space, which produced a report for President Reagan in 1986 urging a 40-year mission to go back to the Moon and on to Mars.

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gust, giving up the satisfaction and congratulations he would have deservedly received when Apollo 11 landed on the Moon. He had tried to fight the space agency's contraction into the single mission of finishing Kennedy's mandate to go to the Moon; but by 1968, the programs to carry the fire after Apollo were nearly gone.

By the time of the July 14, 1969 launch, President Kennedy's brother, Edward, had already begun to call for increased cuts in the NASA budget, so that more funds could be spent on federal "antipoverty" programs. Martin Luther King had been killed by an assassin. King's dream that black Americans would get aboard a train of civil rights *and* equal economic opportunity had been replaced by a government-sponsored antipoverty apparatus that payed off some, largely to retain the staus quo for the many.

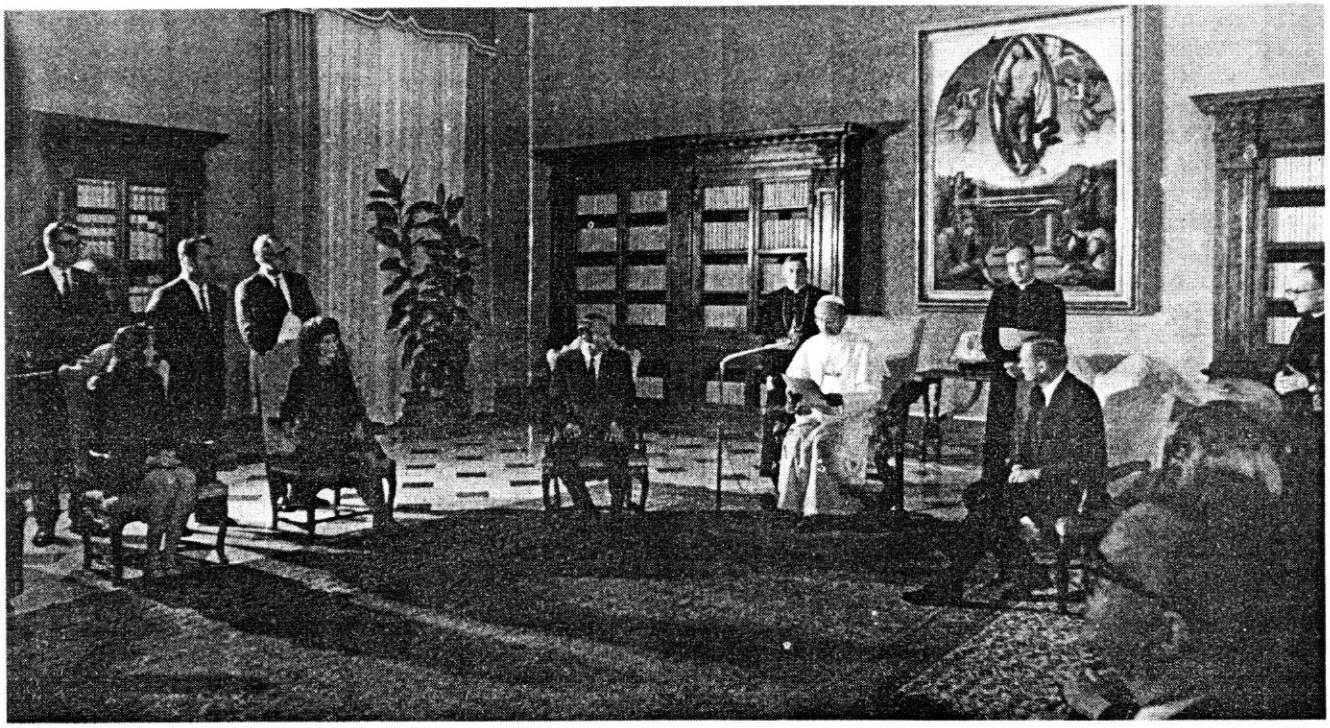
The riots in cities in the summers of the late 1960s focused the nation's attention on frustration rather than solutions, as "black power" became the slogan, and the goals of economic growth and opportunity receded. The demonstrations to end the war in Southeast Asia created a generation of young people who had no faith in their country or their future, nor any positive ideas about what should be done.

The counterculture of drugs, rock music, and immorality quickly replaced the vision of the Wernher von Brauns. As Harry Hurt wrote recently in his book, *For All Mankind*, the "cynical attitude of America's youthful 'New Left' was graphically illustrated by a T-shirt on sale in New York. Emblazened beneath a silk-screened photo of an anonymous astronaut standing on the lunar surface was a rhetorical caption expressing the frustrations and disillusionment of an entire generation: 'So what?' "

It is sometimes difficult today to imagine that this nation could once again embark on a long-range program in the footsteps of Apollo, a program that would not only mobilize, but strain to the limit, the present resources of the country; forcing us to get back to basic moral values and end the past 20 years' descent into a new dark age. But now is the time to turn people's minds away from what is expedient (and will not work) toward the heavens, and the challenges of moving human civilization beyond the bounds of where we were born.

The Apollo astronauts stand at attention during the playing of the national anthem in Kinshasa, the Congo. With them is Lt. General Joseph Desire Mobuto, who awarded them the National Order of the Leopard.

Marsha Freeman, whose father worked on the Apollo program, is an associate editor of 21st Century.



Pope Paul VI met with the Apollo 11 astronauts and their wives in the Papal Library at St. Peter's Cathedral.