

1958

"...I believe there is always a national answer to each national problem, and, believing this, I do not believe that there are necessarily two sides to every question.

"...I regard achievement of the full potential of our resources -- physical, human, and otherwise -- to be the highest purpose of governmental policies next to the protection of those rights we regard as inalienable."

"My Political Philosophy." by Lyndon B. Johnson, The Texas Quarterly of the University of Texas, 1958; reprinted in CR, 12/3/63, 21987-88.

1959

The New York Times quoted Lyndon B. Johnson as saying that he felt that the U.S. was "not going far enough fast enough" in its space program. -- "As weeks and months go by, we will realize it more and more."

NYT, Jan. 2, 1959

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1959

Lyndon B. Johnson, in a statement in the Baltimore Sun, said:
"We are falling short. We ought to spend the money, the time
and effort needed to surpass the Russian effort....We must
raise our sights, we must provide a better over-all program.
We must appeal to our people and warn them of the dangers
that they face. We must take all steps possible that we do
not remain second best. I don't think we have the proper
sense of urgency."

Baltimore Sun, Oct. 12, 1959

1959

Lyndon B. Johnson, in a statement in the New York Times, said that the space program seemed to lack "coordinated authority" and "a driver ... Further action appears to be necessary. There have been far too many instances in which we have pushed the button, but our missile remained on the launching pad. At the same time the Soviets are making a bullseye out of -- and placing a satellite around -- the moon. The American people are asking why, and they deserve an answer. This is one case where we have a team, but I'm afraid it lacks a driver."

NYT, Oct. 22, 1959

1959
Address Before Delphian Club Meeting
Port Arthur, Texas - October 22, 1959

RETURN TO AFEH

It is idle to talk about a budget cut of less than ten per cent as being responsible for the lag in space. Even though I myself was opposed to that cut, I do not see how it can possibly be blamed for our present set of circumstances.

There is duplication which must be ended.

There is wasteful effort which must be eliminated.

But the one thing we must do is to place into the space program the same sense of urgency with which our ancestors won their independence and conquered the wilderness.

We must step up our missile development.

We must make progress in our satellite program.

We must, above all, improve and increase the technological skill that will preserve our lives and our freedom.

This is a large order for Americans. It will not be filled overnight. But Americans are people who are accustomed to large-sized orders which are filled as soon as possible -- if not immediately.

It is with this thought that I leave you. If we work, if we will seek to understand the problem, the American soul and the American genius is big enough to conquer all obstacles, and this we shall and must do.

1959

The Baltimore Sun quoted Lyndon B. Johnson as saying: "If anything, we have fallen further behind...we have very nearly defaulted two years and if that course continues, we may default the century. The reason for this lies not with the American people. It lies with an attitude of some of their leadership. There are those who would have us maintain our national poise, whatever the peril, by pretending that the greatest advance of the century has not happened. To this I say: Space is the main street of freedom's survival. We must be able to walk that street, proud and unafraid, if we are to lead all free men to a community of peace. Our official policy has not been a policy of commitment. It has been a policy of conceding leadership to the totalitarians and hoping some day later to catch up. We have the resources of mind and materials and money to stand first in space. That we do not stand first rests solely on those in our leadership who lack the will to marshal those resources."

Baltimore Sun, Nov. 15, 1959

1959

Lyndon B. Johnson said in the Washington Daily News: "Out in space there lies the power to control the weather of the earth. Out in space is certainly the potential of tomorrow's navigation. These things are coming and with these things will come a changing world. If outer space goes by default to tyranny, the world will become only the tail to the tyrant's kite."

Washington Daily News, Dec. 9, 1959

The Washington Daily News quoted excerpts from a speech by Lyndon B. Johnson to the Aero Club of Washington, D.C., in which he said: "The beginning of the air age was ours... The beginning of the space age was not ours. Since Sputnik I the Russians have achieved success after success and these successes contrast all too painfully with our failures."

He said it was a "dismal story of drift, delay and dilution," an example of "procrastination and endless delay" and an indulgence "in the luxury of budget clerks gambling with our destiny. From a military standpoint our failure to take decisive action now to win the space race is in effect a form of unilateral disarmament. We certainly would not take unilateral action and demobilize our Army, sink our Navy, or scrap our Air Force in the hope that we might later reach a disarmament agreement with the Russians."

Washington Daily News, Dec. 18, 1959
(Speech was delivered on 12/17/59)

1959

A prime example of the need for democratic leadership if we are to survive is our nation's space program. This leadership must stem from a sureness of where we are going and why.

I think it is time that we all face one simple, basic fact.

We are in a continuing struggle with world communism. The space race is one aspect of that struggle. We are in a race and we must win it.

Let me put it another way.

Our national survival ~~could be held~~ upon our being first in the space race, and soon. An effort to catch up at some indefinite time in the future will not do.

Two years ago the Senate Preparedness Subcommittee took testimony from some 70 experts. In addition, about 200 other experts were interviewed. Questionnaires were sent to the leaders in science, education, industry and government. Over 7,000 pages of testimony were printed, all for the purpose of finding out what was wrong and what needed to be done.

We found many things. Among them were:

1. The Soviet Union leads the United States in development of ballistic missiles.
2. The Soviet Union has led the world into outer space.
3. The Soviets had rockets of much greater thrust than ours.

The Committee made certain urgent recommendations in 17 points. Included were recommendations to:

1. Modernize and strengthen the Strategic Air Force.
2. Modernize and strengthen ground and naval forces, step up production schedules of ballistic missiles.
3. Start work at once on the development of a rocket motor with a one million pound thrust.

Following these hearings, the Committee was assured that the Secretary of Defense had taken certain action, among which was removal of arbitrary overtime restrictions from the ballistic missile and other priority programs.

THE SATURN PROJECT

In February, 1953, Secretary of Defense McElroy told Congress that work had been started on a rocket engine with a thrust of one million pounds. In July, some seven months after the Committee's initial recommendation, work was finally begun on the one and one half million pound thrust rocket, popularly known as SATURN.

Where do we stand now, two years after the Preparedness Subcommittee recommendations?

1. We find that the Soviets still lead the United States in the development and operational deployment of ballistic missiles and threaten to increase their lead in the years ahead.

2. The Soviets are still ahead in the space race. They have been first to place a satellite around the moon and have been first to place a man-made object on the moon.

3. The Soviets still lead us in the power of their rockets.

This very month there was to have been a static firing of the SATURN engine. It will not take place. The latest information is that it will be delayed until at least spring of next year.

The dismal story of drift, delay and dilution in the SATURN program is not over yet. While next year's budget requests on this project have not been officially submitted, those directly responsible for the SATURN program have already made it clear that the program will need at least \$100 million more than the Administration proposes to request.

To me this is deeply disturbing. Clearly, the impression that we must win the race for space has not penetrated certain Washington levels.

I believe there are immediate decisions to be made:

First, we must decide at the highest national level that we are going to compete --- and win.

Second, we must set forth clearly our basic objectives in space.

Third, we must establish firm management leadership over the programs necessary to meet these objectives and we must back up our leaders with clear-cut authority and responsibility.

Fourth, we must provide the essential funds and priorities necessary to accomplish the objectives.

Fifth, we must eliminate arbitrary fund limitations and authorize whatever overtime may be necessary to get big boosters as soon as practicable.

Sixth, we must establish a comprehensive national space program as called for in the Space Act lest we continue down the road without a road map.

Seventh, we must provide for truly effective coordination of the military and civilian elements of the space program.

In short, we must get up and go. We can no longer afford procrastination and endless delay. We cannot indulge in the luxury of budget clerks gambling with our destiny.

I hope the Executive Branch will include in the forthcoming budget whatever funds are necessary to give us rocket motors that can compete with the Russians, including any supplemental appropriations required this year. I am confident that the Congress and the American people would support such action.

Our program for space is part of our overall national defense needs. Let us devote the necessary resources to our technical frontier so that we can continually build up strength.

The survival of our nation and the race of the free world could well be at stake. This is not a partisan matter. This is a national problem.

During the 1960's, the world will begin to use outer space for the delivery of mail, for the transmission of television and other communications, for the modifying of climate and weather, for the navigation of the ocean lanes and airways.

Will freedom long hold its present position if the Soviet Union becomes the postman of the world?

Where will freedom stand in a world that watches the programs of Moscow on its television screens? Where the Russians control the weather and determine how hot it is in Texas, how cold it is in Maine, and how much rain there is in Australia and Canada? Or turns toward a communist satellite as the new north star of the skies?

Our nation cannot commit itself to leadership for peace when it commits itself to a position of inferiority in strength. We cannot concede outer space to communism and hold leadership on earth. If we continue on this course, we shall be sowing the seeds of disillusion --- and we shall reap a wind of bitterness from all whose hopes we have raised.

The whole field of space needs one head --- one man to be accountable, one man with the powers to accomplish. We thought we had done this in the Space Act when we put the President in charge of it.

If the Executive Department cannot or will not meet this responsibility, then the Congress must act. America cannot sit out 1960 and wait to start up again, somewhere down the road.

We have a rendezvous to keep --- a rendezvous with greatness or a rendezvous with oblivion. We can still choose which it shall be.

1960

Lyndon B. Johnson in a statement in the New York Times said: Any rosy picture based upon second-guessing Khrushchev can quickly turn blood red ... The missile gap cannot be eliminated by the mere stroke of a pen. If our defense programs are being based -- as publicly stated by Secretary Gates -- on Soviet intentions rather than capabilities, there is real reason for concern. We certainly cannot afford to stake the lives and the future of 175 million Americans on the ability of some officials to read Khrushchev's mind.

"It is difficult to base our planning upon estimates of Soviet capabilities. Even then we must rely on bits and pieces of information, which can seldom give a completely accurate picture. But to go beyond this--from capabilities to intentions--and to rely upon hunches that slip Kremlin minds--is incredibly dangerous."

NYT, Jan. 24, 1960

1960

Lyndon B. Johnson stated in the Washington Post: there is now "a peculiar kind of bookkeeping which assumes that the money the Government invests in such projects [space] is money that is lost." Instead, he said, "it is the most productive of all the money that we spend..."

"The Russians boast that they are irrigating deserts by the wide use of atomic energy.

"The Republicans boast that their policy on irrigation and reclamation is 'no new starts'.

"The Russians boast that they are cutting through the jungles and the frozen plains -- to make land for their people.

"The Republicans boast that they have cut down on the construction of flood control works -- works that would save the lives and the property of our people.

"The Russians boast that their satellites have photographed the dark side of the moon, and that they can send missiles 7700 miles and hit a target.

"The Republicans boast that their 'orderly program' will 'catch up' with the Soviets in rocket power by 1965."

Washington Post, Feb. 6, 1960

***** Too many of us do not realize that the Space Age which began only a few years ago is probably the most historic event in world history since that in famous voyage of Christopher Columbus and the subsequent discovery of North America and the New World. Outer space is in fact the New World of perhaps the next 500 - 1000 years. What we do now will have profound effect upon the earth for many years thereafter ---maybe forever. *****

***** But what of this Space Age? Is it just another dimension of warfare or is it an age in which contributions will have been made toward perfecting peace for the world? We must be mindful of the first, of course, but if we compete against other nations in perfecting space weapons and we fail to realize the great peaceful potentials of outer space, the consequences could be devastating. *****

*** The Space Age revolution will change the rules and responsibilities of governments more than anything in a meridian. There are many reasons for saying this and here are just a few of the examples.

First, we have been assured that in the 1960 satellites will bring a new world-wide system of communication. Using earth circling satellites as relays for example, telephone communication between continents will become as casual and perhaps as inexpensive as some long distance calls in our own native land. Since the world system of national governments can be likened to isolation booths, walled off by physical and legal barriers, a simple means of international communication will allow peoples of all nations to communicate freely and easily with one another. This space technology development alone could be one of the most powerful forces for bringing men together and for crushing the barriers for world understanding the world has ever known.

Second, in much the same manner intercontinental radio and television broadcasting will be made possible through space satellites. Nations half a world away will begin to transmit broadcasts easily to our living rooms and into the living rooms of the world. Truly then the barriers of world government will be made transparent. The eyes of television upon the earth -- God willing -- will bring understanding instead of suspicion. Co-operation and not frightened isolation. Free exchange of knowledge. No nation then will be invulnerable to the eyes of the world. Science also assures that by 1970 satellites may well be able to deliver any continental mail in minutes and space satellites and even perhaps space stations will help provide navigation guidance for our air and sea lanes.

Third, weather control techniques employing outer space technology will someday modify the earth's atmosphere so as to change deserts to gardens and jungles to paradise. This power -- sufficient to rule the earth presents a dramatic challenge to America which we must be ready to accept and accept it today. *****

***** Until now we have had wars on earth largely because there was no such common denominator for joint effort among nations. Now we have something tangible upon which our joint efforts may be given. The result of this effort will bring peoples on earth closer together working together in joint enterprise and development of the still untouched potential that awaits mankind in space. *****

***** Today outer space is free. It is unscarred by conflict. No nation holds a concession there. It must remain that way. We of the United States do not acknowledge that there are landlords of outer space who can presume to bargain with the nations on earth on the price of access to this new domain. We must not, and we need not, corrupt this great opportunity by bringing to it the very antagonisms which we may by courage overcome and leave behind forever if we proceed with this joint venture in this new realm.

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1960

Basically to me there are only two fundamental conditions upon which mankind can achieve peace. Both are predicated upon respect.

The first is based on that respect akin to fear which is caused by a balance between weapons. The other is that higher and more enduring respect which stems from mutual understanding and cooperation -- founded upon that spiritual strength which recognizes the dignity and value of man.

Mankind, to date, has never achieved either condition except for brief and all too fleeting moments in history. Space alone, of course, cannot accomplish this --- but it does promise a means -- uncluttered by past traditions and prejudices -- which could well be the catalyst. And now is the time to act.

We were not the first in space, but we were the first to view space as a tangible means toward peace --- our DECLARATION OF PEACE.

I believe we have learned the lesson that the struggle for men's minds includes many things. Our belief in the democratic way of life and our economic system must be supported by tangible accomplishments, both material and spiritual, in order that those nations still uncommitted will have not only the evidence of belief in our system but the evidence of what this belief can produce.

America gave the Declaration of Independence to the world. It was a new challenge both in idea and concept. It was founded on sound beliefs and spiritual courage.

Now in our time we have a powerful new challenge in idea and concept -- the DECLARATION OF PEACE.

The Soviets say they want peace. Well, the proof of the pudding is in the eating. Let's challenge them to do something about it.

Will the Soviets join us:

- 1) In developing space for peaceful purposes?
- 2) In a mutual attack on cancer and other crippling diseases?
- 3) In providing adequate foodstuffs for the millions of starving peoples throughout the world?
- 4) In solving the mysteries of the ocean floor?
- 5) In opening the communications barriers of the world on a free and equitable basis?
- 6) In developing the arid regions of the earth and providing lifegiving water for the drought-stricken?

COPY

- 7) In harnessing the atom for peaceful purposes?
- 8) In establishing a nuclear test ban in which all can have faith and confidence?
- 9) In nurturing the dignity and honor of man so that he can exercise his God-given right to self-expression?

I invite the Russian people to accept these challenges as major steps forward in the interest of peace.

I invite the Communists to demonstrate their good faith by actions.

I invite them to join the scientists of the Western World in opening new vistas of understanding.

If the Soviets decline these invitations, the world can judge for itself the worth of "communist good faith."

If the Soviets accept the invitations, the results will speak for themselves.

When people work together to face challenges like these, they tend to lose their suspicion of each other. They become absorbed in worthwhile tasks and then warfare as an instrument of national policy would fade from the picture.

For those who really desire peace, these are the true challenges of the future.

1960

AUTHORIZATION OF APPROPRIATIONS FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. JOHNSON of Texas. Mr. President, I move that the Senate resume the consideration of Calendar 1333, House bill 10809, the authorization bill for the National Aeronautics and Space Administration.

The PRESIDING OFFICER. The bill will be stated by title for the information of the Senate.

The LEGISLATIVE CLERK. A bill (H.R. 10809) to authorize appropriations to the National Aeronautics and Space Administration for salaries and expenses, research and development, construction and equipment, and for other purposes.

The PRESIDING OFFICER. The question is on agreeing to the motion of the Senator from Texas.

The motion was agreed to; and the Senate resumed the consideration of the bill.

Mr. JOHNSON of Texas. Mr. President, as chairman of the Committee on Aeronautical and Space Sciences, I should like to make a brief statement concerning the bill now under consideration. This bill, H.R. 10809, as proposed to be amended, authorizes the appropriation of \$970 million for the National Aeronautics and Space Administration for fiscal year 1961.

Copies of the bill and of the comprehensive committee report are on the desks of the Senators.

The bill differs from the House-passed version in that \$50 million additional has been recommended, and I am happy to say unanimously recommended, by the NASA Authorization Subcommittee and unanimously approved by the full committee.

In taking this action the committee has once again shown its characteristic bipartisan sense of responsibility toward our Nation's space programs.

Before proceeding further I should like to commend the able and distinguished subcommittee chairman, the junior Senator from Mississippi (Mr. STENNIS) and the other dedicated subcommittee members, Senators YOUNG, DODD, CANNON, MARGARET CHASE SMITH, and MARTIN, for their tireless efforts in developing this bill.

The work of the committee again shows its diligent, thorough, and profound examination into the matter of America's space programs. Its work in this field is exemplary. There is no room for division when it comes to our space efforts.

The Senator from Mississippi will shortly discuss the bill in some detail. Therefore, I shall confine my remarks to the principal amendment made by the Senate—the additional authorization of \$50 million for NASA's research and development programs.

This additional authorization of \$50 million will provide our space program with needed elbow room. Our scientists and technicians have done wonders with the funds provided thus far, but we cannot expect them to perform miracles. Even in the space age, there is still no substitute for money.

In addition to assuring the ability to meet unexpected difficulties and to exploit scientific breakthroughs, the additional authorization will help assure the safety of the people involved in the space program. I am thinking chiefly of the seven gallant astronauts, at least one of whom is expected to circle the earth some time next year.

The committee feels, and I am sure the Senate will concur, that a reasonable cushion is needed for emergencies, so that America's space program will not be slowed down for lack of a full commitment of America's strength and resources.

We cannot gamble with our security or with the safety of our personnel.

Although our space program is still in its infancy, we can count many rewarding experiments during the last year, and especially during the last 2 months. And we will attempt another notable "first" this week, when we shall attempt to orbit a communications satellite, under Project Echo, on Thursday, May 5.

We have freely published and disclosed to the world data transmitted to earth from our television infrared weather observation satellite Tiros which was launched April 1.

We have disclosed to the world information concerning our solar satellite Pioneer V, launched March 11, which is now more than 7 million miles from earth. Our scientists hope that this satellite will maintain radio contact with earth for at least another year, and have recently revised the maximum distance of such radio contact from 50 million miles to an incredible 100 million miles.

The first experimental navigation satellite Transit is now circling the earth. It was launched April 13.

The Echo launching this week may, if successful, be the first step in a long-range program to develop the use of satellites to provide truly global communication.

These recent launchings show excellent progress. We can all be justly proud. But we cannot afford to coast or be complacent about our successes. There is still much to be done.

Though we have slipped somewhat in the past in our planned programs for

etc. →

space explorations, it is still our objective to be preeminent in this field.

Long-range objectives have been set by our national space agency. In what NASA calls its 10-year program, space exploration will call for somewhat more than \$1 billion in fiscal year 1962 and upward of \$1½ billion annually within the next 5 years.

This year we will be working toward the launching of an advanced lunar impact vehicle, and it is hoped that the first manned ballistic flight under Project Mercury will take place later this year.

Our continued work on superboosters such as the Saturn program will lead to soft landings on the moon and exploration of nearby planets. Just this past Friday, all eight engines of the Saturn were fired in a brief, but noteworthy, static test that produced 1,300,000 pounds of thrust.

These programs must move forward.

The committee has shown its awareness of this. It has reported a bill which provides realistic support of our civilian space programs. It is a bill we all can be justly proud of. It demonstrates our profound awareness and unanimous support of our nonmilitary space explorations—explorations which we intend to share with the world for the benefit of all mankind.

For the next century, men will be as deeply impelled toward space exploration as the men of the 15th, 16th, 17th, and 18th centuries were to explore the Western Hemisphere.

We must assure that there will be no financial roadblocks on our path to the stars.

Mr. President, the Committee on Aeronautical and Space Sciences recommend that the bill as reported be given favorable consideration.

I wish to conclude by saying that the tedious and detailed work performed by the subcommittee under the very able and brilliant leadership of one of the most beloved Members of this body, Mr. STENNIS, should be well received by all Members of the Senate, and I know will be properly appreciated.

Congressional Record

May 3, 1960

pp. 8532-33

1961.

Statement at Luncheon - Allan Shepard - May 9, 1961

Today as I contrast the reception Commander Shepard is receiving with the reception given a few years ago to calls for greater efforts in space, I find myself thinking of the old saying -- " ..The impossible takes a little longer." From the first earliest moments of the Space Age, those who have worked seriously in this field have known this could be done -- should be done --- and would be done. Unfortunately, along the way, there have been those who looked not for ways to accomplish it --- but for reasons why we might avoid doing it at all. We can never afford to turn back from man's frontiers -- and our challenge is to find the ways to success rather than excuses for hesitation. Needless to say, Commander, I am glad you went and am glad you are back ---but we can hope next time you can go farther and stay longer.

1961

Speech Before National Assembly of Viet Nam - Saigon - May 12, 1961

America is moving forward in the great adventure of outer space. Last week I sat with freedom's first man in space -- a young American, Alan Shephard. I was thrilled and proud of this great accomplishment by our strong and determined nation. But America's goal in space is not glory for ourselves. Our goal is gain for all mankind. We are committed to leadership in developing the peaceful uses of outer space for the benefit of all men on earth. Our program is an open program. We are not afraid for the world to see our efforts because we have confidence in our ability to succeed. We want the nations of the world on all continents to join with us in this work so that all mankind will share the gains.

1961

OPENING OF THE THERMAL POWER PLANT
THAILAND - MAY 17, 1961

" . . . I have worked actively on programs to develop the electric power which provides a foundation of strength for America's economy.

. . . the foundation on which American progress has been built is . . . the development of power resources."

1961

Statement - On Space Aspects of the President's Message to Congress
May 25, 1961

COPY

The President's message and budget request on Space reflect the type of decisive action and clear vision which Americans and free peoples throughout the world have eagerly awaited.

This is a "big booster" program in the broadest sense of the term. Not only does it bring closer the day when large payloads will be sent into space and returned safely to earth, but it lifts the morale of all those who identify leadership with the United States of America.

Peace through Space is the theme. Acceleration is the pace. Attainment of scientific knowledge, development of useful civilian and defense capabilities, and enhancement of international prestige are the goals.

The United States has the resources to do the job. Let us not for a moment think otherwise. What has been added by the President's action is the firm determination and the clarity of purpose hitherto lacking in our Space efforts.

1961.

Address - Commencement Exercises
Southwest Texas State College - San Marcos, Texas - May 28, 1961

I confidently believe that the developments of the Space Age will bring the beginning of the longest and greatest boom of abundance and prosperity in the history of man.

We have great capacities in space. The leadership of the United States today ---like the people of the United States --- is determined to win the position of leadership for America. We can do it and we will do it.

1961

West Point Commencement Address
June 1, 1961

COPY

***** While we are still in wisdom's infancy in dealing with nuclear energy, we are confronted with vast new problems in space, where the ultimate destiny of humanity itself may well be decided. Urgently, we must push on with all determination into space so as to win it for peace before some other nation conquers it for war and destruction.

1961

Address - Commencement - East Kentucky State College - Richmond, Kentucky
June 1, 1961

***we must remember that outer space, as President Kennedy told Congress the other day, may well hold the key to man's fate on earth.

Do we want Communist signposts to be set among the stars or do we want the signposts to be put there by free men? Do we want outer space to become a new arena for rivalry or is it to be a common glory won for all mankind?

We believe that outer space belongs to no one country and its conquest should be regarded as a victory for no particular economic or political system. We are ready to share all scientific knowledge of outer space with the entire community of world scientists.

We want an early international agreement to control the peaceful uses of outer space. If we cannot obtain such an agreement now, when we are at the very dawn of a new age of achievement, the problems of agreement will be much more difficult in future years. Here is one clear test of Russia's interest in genuine disarmament, apart from the manufacture of slogans about the virtues of peace.

1961

July 16: Vice President Johnson announced that the National Aeronautics and Space Council had reached unanimous agreement on the national communications satellite policy, and unspecified recommendation transmitted to President Kennedy.

1961

July 16: Vice President Johnson announced that the National Aeronautics and Space Council had reached unanimous agreement on the national communications satellite policy, and unspecified recommendation transmitted to President Kennedy.

1961

Questions and Answers Used for Filming TV Show
September 25, 1961

Answer - There can be no doubt that the Soviets lead in certain vital aspects of space exploration. Not only are these aspects vital but they are dramatic. I can cite a number of fields in which we are probably ahead but such a recital wouldn't satisfy you and certainly doesn't satisfy me. I believe that we should move ahead in every field and that is what we are doing. Moving ahead requires that we set greater goals and then dedicate our brains and our resources to achieve them

The President has set clear goals. We have stepped up our space program. The day is not very far away when we will be working right around the clock in a maximum effort to realize our full potential.

COPY
We have stepped up the booster program. We have set a policy on communication satellites. And I am convinced that if we continue with the same determination that is reflected in our programs set by the President, it is only a question of time until we reach the point where we should be as the leader of the free world.

Question: Mr. Vice President, how do we stand today in the space race with Russia, or don't you believe there is such a race?

Answer: Of course there is a race, and it is not an overstatement to say that our future as a free nation is at stake in that race. Hence, we have to win it, or at least we dare not lose it. As for "how we stand," a brief answer must include the following: (1) the U.S. leads in obtaining a wide range of scientific information about space, and also in the development of utility-type space programs such as weather, communications, and navigation; (2) the U.S. leads in the number of successful orbiting of spacecraft by 51 to 15, at the latest count; (3) the Soviets lead in the single most important aspect of the race: the ability to put large payloads into space. In summary, I would say that the United States is behind in the critical challenge to major space accomplishments because of a "booster lag."

Question: Why are we behind in the big booster development?

Answer: That is a long story and not possible to answer without discussing the inaction or lack of vision on the part of our Government in previous years. That is history, and it is not going to help us win the race if we keep looking backwards. I would prefer to discuss what we have been doing toward correcting the situation this year, but I will say that the Russians built large rockets to launch heavy fission weapons a long distance and found themselves with a big start in the space race when the much lighter fusion weapon came into being. We waited, and lost valuable time.

Question: You say you would rather talk about the present than the future. What has this Administration done to improve our position?

Answer: A lot of things have been done and in a relatively short time. Let me add that a lot more has to be done, as we can be sure the Soviets are not going to stand still and wait for us to build big boosters. Let me list a few things that have been done: (1) the Space Council has been activated; (2) a national policy has been established for making a manned round trip to the moon as quickly as possible; (3) the large rocket engine programs -- liquid, solid, and nuclear -- have been accelerated; (4) a 50 per cent increase in appropriations has been requested and approved by the Congress; (5) a communications satellite policy has been established for accelerating an operable global system. Those are just a few of the important things.

Question: You mentioned the Space Council. You are the chairman of that. What does the council do, or better still, what has it done so far?

Answer: We have co-ordinated an over-all study of the space programs in the various government agencies and made recommendations to the President for the new accelerated program, which he sent to the Congress on May 25. We prepared and recommended to the President the communications satellite policy, which he announced July 24. We have encouraged the acceleration of the large booster programs and have made a number of other specific recommendations to the President, and co-ordinated a number of problems between the various agencies. In mentioning those activities of the council, I do not take a thing away from the responsible officials of the operating agencies or anyone else in the government. All I say is that the council has given the President the mechanism for getting prompt and co-ordinated recommendations. Time is the factor which is very scarce in the space business.

Question: How much is the space program going to cost? I have heard large figures mentioned. Is it worth the expense?

Answer: You have doubled up on me there. Those are two big questions. However, I will try to answer them both briefly and, I suppose, inadequately, because the subject is much too complex to be put into a capsule. Let me take them one at a time. This year the new program calls for expenditures of about \$2.5 billion, or approximately one-half of 1 percent of our gross national product. In the coming years, it will be more than that. It might even go up to as much as 1 per cent of our gross national product within a few years. This will be a tax burden, but a relatively minor one when you look at what we will get out of it, and particularly where we would soon be if we did not make the effort. That leads me to your second question, namely "Is it worth the expense." Of course, I believe it is worth it or I would not have been urging an accelerated effort for so many years, and certainly I would not have recommended the new program to the President if I did not believe it was necessary. Some of the many advantages from the program will show up as improvement in our international position, increase in employment, higher standard of living, great scientific, medical, and metallurgical advances, improvement in the quality of our education, greatly expanded services in matters of weather, communications, and navigation and, of course, greater national security.

Question: Where do you think we will be in the space race at the end of 10 years?

Answer: No one can predict with accuracy that far ahead, particularly in any field so complex as space. However, by that time, I believe we can have a clear-cut world leadership in space performances. Not only will we have explored the moon and possibly other

planets, but we will have an operational communications satellite system, global weather reporting and possibly some competence in local weather control, a vastly increased knowledge of space, and a much greater understanding of life here on earth.

Reporter Gene Shumate's interview of Vice President Johnson
for the Washington Daily News, 10/2/61

1961

Statement - On Arrival at Moffett Field - California
October 3, 1961

This Administration has a very deep appreciation of the urgency of our space program. The road to future strength and future prosperity --- and we hope to future peace -- lies through outer space. As the leader of the free world, the United States must travel that road confidently and as rapidly as possible.

1961
ADDRESS BY VICE PRESIDENT LYNDON B. JOHNSON
PREPARED FOR DELIVERY BEFORE THE AMERICAN ROCKET
SOCIETY
NEW YORK CITY, N.Y., FRIDAY, OCTOBER 13, 1961

Noted
Mr. Dambing
Furn

FOR RELEASE IN AM'S OF SATURDAY, OCTOBER 14, 1961

CHALLENGE OF SPACE

It is a challenging opportunity to participate in this Space Flight Report to the Nation, so constructively presented by the American Rocket Society.

In preparing for this speech, I looked over the list of names of those who worked out technical papers for this event. My first thought was what an impetus the national space effort would receive if all those people were on the government's space rolls.

For example, 80% of the first 180 names mentioned on the program came from private industry or universities. Obviously, those organizations could ill afford to lose such talent. But one of the major problems confronting our space effort stems from the government's own rules which prevent it from competing for talent with private organizations.

We, in the government, must find a way to offer top competence more than a large sacrifice and a small paycheck.

Just last week, at the request of the President, I visited five of our major space installations. The difficulty of retaining high-quality personnel was clearly the greatest problem observed. All too often, the government space installations are training grounds for the highly paid technicians and Vice Presidents of private industry. We lose far too many of our best people.

HOPE OF FREEDOM AND PEACE

While visiting those space facilities, I saw much to encourage the friends of freedom -- and even more to discourage its enemies. For it is the paradox of the space age that the triumphs of science have given mankind new hopes of progress at the same time that they have threatened the world with new powers of destruction.

We want to make the space age an age of peace. We have no desire to convert outer space into a battleground of the cold war. We are thinking of peace, not conflict; of the hope that the gleam of a brighter future may yet fall from the reaches of outer space on our divided and quarrelsome earth.

(over)

We shall be discouraged by no disappointments in our search for valid and effective rules of international cooperation that will bring all effort in outer space under the restraints of peace. We ask for no more; but we can never be content with anything less.

In this spirit, even during the uncertainties of the Berlin crisis, I again call upon all members of the United Nations to join in a major effort to establish a far-ranging rule of law for outer space.

The essential points in such an international agreement have long been known. At the very least the Nations of the world should arrive at a mutual agreement that information regarding all satellites or space vehicles will be furnished to the international community.

Some day we must come to the further assurance that every object in space has a peaceful purpose and will remain continuously peaceful. By peaceful purpose, I mean to help keep the peace as well as to increase our knowledge for living better in peace.

We know, for example, that one satellite can bring all the varied traffic on the Atlantic or Pacific Oceans under constant observation.

As a servant of peace, such a satellite can give incomparable service in helping us to interpret and ultimately, perhaps, to control weather conditions. It can link even distant nations in a swift system of communication. It can provide new safety and security for the needs of peaceful commerce.

But as a weapon of intimidation or blackmail, space vehicles can bring dangers of a new and sinister kind to a world that has no desire to experiment with fresh horrors.

There should be no obstacle to the establishment of international rules, preferably under the United Nations, for outer space. We renew our proposals to all members of the United Nations to join with us in making at least a brave start in dedicating outer space to the blessings of peace.

We can expand the system of control and cooperation as confidence in our mutual purposes steadily grows on the basis of experience. But we cannot wait indefinitely with impunity.

Time presses, suspicions multiply, anxieties accumulate, and opportunities vanish. The necessity of an international agreement becomes more important, and more difficult, as our advances into outer space become bolder and more venturesome.

It is the solemn hope of the American Government that all nations will recognize this new opportunity for peace, and that there will be a mutual sharing of the adventures and rewards of making the space age an abundant blessing to mankind.

COOPERATION NOT COERCION

Our national effort in the space program depends upon the cooperation of the American Government and the American community. In the Soviet Union they have chosen a different method. They rely on coercion, not cooperation.

But even though we reject coercion, we must not underestimate some of the advantages which the Soviets have obtained from their dictatorial methods.

They can determine their scale of priorities by the arbitrary decision of the Kremlin. They can mobilize the resources of science and industry and labor by the unchallenged decree of a dictatorship.

The results of this method can already be seen in the Soviet achievements in outer space. We face a determined challenge. After a slow start, and several wasted years, we have now resolved to meet that challenge with all our resources and ability and the determination which we believe is the heritage of free men.

Once again it is a competition between freedom and tyranny; and we are confident that freedom will win.

The latest figures show that the United States leads the Soviet Union by 54 to 15 in the successful orbiting of spacecraft. Our country has an impressive margin of superiority in the information we have gathered about space, and in space programs for communications, weather, and navigation.

But the Soviet Union has the lead in placing large payloads into space. This lead forms the main challenge to our organized national effort and it would be childish on our part to downgrade its tremendous implications.

THE BASIC DECISIONS

Should be before American Society - 10/13/61
This year the President has made the basic decisions so vital to a vigorous space program -- so essential to freedom's extension into outer space. The members of Congress, acting on a request by the Administration, have increased the appropriations for the space program by fifty percent. This enlarged program will require an expenditure of about \$2-1/2 billion, and the figure will rise in coming years.

I have been assured by the scientific, engineering, and managerial community that a practical and advanced communications satellite can be achieved in the near future. The President has laid down a policy to encourage the development of such a system into a global network geared to promote the public interest at home and abroad.

The second stage in the development of a space communications satellite would involve the direct transmission of FM programs to home receivers. In this stage it would be possible to broadcast news and concerts from this country to all the world at a very low cost to the receiver.

In time this could lead to the development of a world-wide direct television network. The international advantages of bringing greater knowledge and understanding by this use of outer space, cannot be over-estimated.

As you have proceeded in your meetings to examine in thoughtful detail the multiplicity of complex components of our space program, I am confident you have explored methods for speeding progress in our man-in-space projects. Such efforts call for the highest priority of our thinking and our doing.

We must accelerate and improve:

- (1) The developments and production of larger and more reliable rocket engines -- liquid, solid, and nuclear;
- (2) The planning and activation of rendezvous techniques;
- (3) The exploitation of our space knowledge in communication, navigation and meteorology;
- (4) The progress in the life sciences;
- (5) The efforts to improve the quality of private industry's production and Government's planning and direction;
- (6) The attempts to coordinate intra-governmental activities and to marshal all skills in the national program; and
- (7) The programs to inform the peoples of our own country and the rest of the world of the accomplishments and the necessities of space exploration.

We do not have to wait for the future to unfold the marvels of

space. We already have made a small but encouraging start in turning the space age to peaceful uses for the benefit of mankind.

An outstanding example is in the field of weather. Our TIROS satellites are already telecasting information on global weather conditions to any nation asking for this service, including the Soviet Union and all members of the Communist bloc.

This development has more than technical utility. It forms a practical base for improved international relations.

In Washington, from November 13 - 22, an international weather workshop will take place. One hundred nations, once again including the Soviet Union, have been invited to this conference where their meteorologists will obtain the latest information and guidance on the most efficient way to use the TIROS data.

THE POLITICAL STORMS

But we must think not only of the storms of nature; there are also the political storms that sweep across our disordered world.

Our knowledge of outer space, and of activities in space, allow us to say with sad conviction that space systems can be of direct defense importance. Indeed, some defense functions can be conducted with unique advantage in space.

These include early warning of ballistic missile attack, various kinds of surveillance and reconnaissance, communications of a secure and invulnerable kind, and navigation. Space programs have benefits which can apply to both civilian and military space efforts.

It is not useful to pretend that arbitrary distinctions can or should be made between the two. The same engineering, the same scientific knowledge, the same values of man in space are applicable to defense and non-defense objectives. The liquid fueled rockets from our IRBM and ICBM programs, as well as the solid fuel technology developed in the POLARIS and MINUTEMAN programs, all have become a part of the national space effort.

If I could get but one message to you it would be simply this: The future of this country and the welfare of the free world depend upon our success in space. There is no room in this country for any but a fully cooperative, urgently motivated all-out effort toward space leadership.

No one person, no one company, no one Government agency has a monopoly on the competence, the missions, or the requirements for the space program. It is and it must continue to be a national

job.

I have come here to assure you that the Administration in Washington shares your hopes, supports your labors, appreciates your sacrifices, and rejoices in your triumphs. Let us dare to believe that the glory of science and technology will yet shine upon mankind's advancing march to greatness.

In that faith let us unite our efforts in making certain that America will always be an inspiration for freedom. Let us, together, walk with wisdom and find the paths of peace.

As President Kennedy said just this week in regard to the space program: "I will continue to be dissatisfied until the goal is reached. And, I hope everyone working on the program shares the same view."

I am confident I can bring back to him your full agreement with that determination.

###

1961

Remarks - Dinner Honoring Frank Ikard - Wichita Falls, Texas
December 5, 1961

9) We have made a steady record of achievement in space and in sharp contrast to the Soviet policy of semi-secrecy, we have made the knowledge we have gained from the voyages of our astronauts available to the scientific community of the whole world.

1962

January 3:

Vice President Johnson sent a congratulatory telegram to members of the OSCAR amateur radio satellite team: "For me this project is symbolic of the type of freedom for which this country stands—freedom of enterprise and freedom of participation on the part of individuals throughout the world." OSCAR I was launched with DISCOVERER XXXVI on December 12, 1961.

1962

January 5: President Kennedy released part of a report submitted earlier by Vice President Johnson, Chairman of the Space Council. The report stated that the U.S. had generated a greater rate of progress in space in 1961 than in any other year but that "it is too early to make definitive comparisons as between our newly developing competence and the capabilities of the U.S.S.R."

1962

LUNCHEON FOR LT. COL. JOHN GLENN
NEW YORK CITY - MARCH 1, 1962

"John Glenn -- like Commander Shepard and Captain Grissom --
has ridden a covered wagon across the frontier of outer space."

1962

PARTIAL REMARKS BY VICE PRESIDENT LYNDON B. JOHNSON
ELON COLLEGE, NORTH CAROLINA, MARCH 8, 1962

"The thing that has made Elon a great college is the same thing that has made America a great nation.

"That 'thing' -- that quality -- is our determination to do our best today -- and better tomorrow.

"We in America today -- as our forefathers -- are committed to the future.

"We did not stop at the shore's edge when the Pilgrims landed at Plymouth Rock.

"We did not stop when Fulton invented the steam engine.

"We did not stop when Edison invented the electric light bulb.

"We did not stop when the Wright Brothers flew their airplane at Kitty Hawk.

"And we are not going to stop with Colonel John Glenn's three orbits around the Earth.

"We are going ahead. We are going ahead because we want a better tomorrow -- for ourselves -- and for all mankind.

"...Our space program has moved into orbit now, and Colonel John Glenn and the other astronauts are hard at work evaluating every detail of his flight for guidance on future missions into space.

"The program moved slowly at first as we learned -- more than 1,200,000 tests were made to assure that our first astronaut, Commander Shepard, would come back safe -- then Colonel Glenn's flight was delayed, time and time again, until we were positive that everything possible was in favor for his return to earth.

"If all goes well in the space program, we would like to see:

"An 18-orbit trip around the world in 27 hours possibly before the end of the year:

"A two-man orbit of the Earth, for several days, in 1963 or 1964.

"A rendezvous of a two-man crew and an orbiting rocket a year later.

"By 1967, it could be that we will send a three-man crew around the moon and back to earth.

"And in this decade, we could have a three-man crew land on the moon before returning to earth.

"Space research already has brought us improved weather forecasting.

"Meteorological satellites are providing information regarding areas of the earth which are not covered by ground installations. They have told us of tropical storms, watched hurricanes develop and tracked them and will make general weather forecasting more accurate.

"Communication satellites promise to revolutionize world-wide communications. Newspapers -- television -- radio are looking into the development.

"Food we eat may change as the result of algal culture studies in the N.A.S.A. life science program. This research is producing a new understanding of algae as a protein source.

"Medical science is benefiting from space research in telemetry and other advanced instrumentation techniques. Telemetering devices are being used in hospitals to monitor blood pressure, respiration and heart action of patients.

"Other research promises to speed up development of power sources -- such as solar cells -- and fuel cells.

"Space requirements for lightweight, small size, highly heat resistant items have produced:

"Plastic containers which can go straight from the freezer into the oven;

"Small lightweight radios -- remote control devices for television -- micro-miniature ball bearings, and

"Even a plastic jacket which enables an average man to lift 600 pounds and to carry 100 pounds or more indefinitely without fatigue.

"These are examples of benefits we already are receiving from space research.

"We aren't waiting for them to be discovered accidentally. N.A.S.A. has an office charged with the specific responsibility of identifying -- and developing -- practical applications of its research and technology. All of this is being done under one of the greatest North Carolinians of all times -- Jim Webb.

"Such study is typical of America. We wanted to develop better plows -- better fishnets -- and we did."

1962
PARTIAL REMARKS OF VICE PRESIDENT
LYNDON B. JOHNSON GODDARD MEMORIAL
AWARD DINNER - WASHINGTON, D. C.
FRIDAY, MARCH 16, 1962

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FOR RELEASE IN AM EDITION OF MARCH 17, 1962

I think the man we honor tonight would be pleased indeed to know how much a part of the American scene his great dream has become.

And tonight, it is a great privilege for me to join with you in this dinner which pays tribute to Robert H. Goddard. All who know the story of his life and work, know how richly this honor is deserved.

He wasn't a Texan --- but I hasten to add that he came from the next best place --- Massachusetts.

It is fitting that we meet for this purpose at this time. This is a season of success for our nation's space effort.

We are reaping a bountiful harvest from the vision and the courage of those who urged that America move forward with vigor in the exploration of space.

To all those men of faith and zeal, our nation owes a very great debt for their leadership and their labors. Because of them, we shall live in a new and wondrous world.

OUR COMMITMENT TO SPACE

Today the exploration of space is firmly fixed as a part of our national policy and purpose.

Three years ago we began the space program with \$900 million. In the current fiscal year, outlays will reach \$3.1 billion.

For the next fiscal year, beginning in July, the request is for appropriations of \$5.5 billion.

Never before in history has any nation made so great a commitment of its resources and talents to a program of science research and exploration for purely peaceful purposes.

more

WHAT DO WE EXPECT?

With the space program at this level --- with space activities absorbing our national resources at this rate --- I believe we are obligated to ask ourselves, every step of the way:

Why are we doing this?

What do we expect to attain?

What will this mean --- in tangible terms --- for our people who bear the burdens of this great endeavor?

It is not enough to answer that, like the mountain climbers, we must climb into space simply because it is there. Nor is it enough to answer that we must explore space because others are engaged in such exploration.

OUR PURPOSE IS REALISTIC

Our purpose is not merely to peek into the windows of heaven --- or to preen our national pride. Our purpose in space is both realistic and responsible --- just as it is also peaceful.

It is important that the world understand this --- and it is equally important that we understand this about ourselves.

That is why tonight, as chairman of the National Space Council, I would like to address my remarks to these questions I have listed.

Why are we doing what we are doing in space? What do we expect to attain? What will our efforts mean --- in tangible terms --- for Americans?

"The real and legitimate goal of science is the endowment of human life with new inventions and riches."

That is the goal of our own space effort today --- to endow all of human life, in all lands, with new inventions and new riches.

It is peculiar to the nature of peaceful space achievements that their benefits flow not to a single nation or a single people --- but to all nations and all peoples.

Let me itemize and illustrate what I mean.

Thus far, space science and research is focused in five principal areas: communications, weather, navigation, mapping and medicine.

In each area, the gains of our progress will benefit not only ourselves but free nations in both hemispheres.

SATELLITES AT WORK

Our weather satellites already are doing this. Last year TIROS IV watched over five hurricanes and one tropical storm in the Atlantic.

The same satellite provided invaluable information on nine Pacific typhoons to Japan, the Philippines, Taiwan, Hong Kong and Mexico, as well as Hawaii, Guam and Okinawa.

Our navigation satellites are --- in every kind of weather --- guiding ships at sea, regardless of their national registry. Our research in space medicine is being shared in by our allies in the cause of freedom.

We anticipate in the not-distant future that mapping and measuring satellites will be in cooperative use with our neighbors in Latin America and elsewhere to permit for the first time accurate mapping of their nations.

COMMUNICATION SATELLITES

One of the most dramatic advances in human history will come from the communications satellite program proposed by President Kennedy.

That one program will eliminate the need --- and the cost --- of laying 50 additional cables across the oceans in the next 20 years.

Inter-continental communication between people will be made far easier, far less expensive.

More than that, this system will permit face-to-face television communication at any hour between heads of state.

Major conferences can be held without the principal participants ever leaving their own country.

Furthermore, advances in the realm of rapid data transmission will permit the transmission in two weeks time of every page in every book in the Library of Congress anywhere in the world.

That means that scholars in the new nations of Africa and Asia no longer need yearn for libraries or source materials. They will have access to the world's greatest stores of knowledge within a matter of seconds.

OUR EXPECTATION: PEACE

I cite these examples for one reason. From the beginning, our national policy toward space has been guided by the faith that the avenues of space offer man's best hope for bringing nearer the day of peace on earth.

All that we have learned --- all that we have achieved --- fortifies that faith.

In these realms, there is no cause for nations to war against one another. On the contrary, there is every cause for nations to cooperate together --- and out of such cooperation will grow the basis for understanding and peace.

It is our policy --- and will continue to be our policy --- to work for such joint exploration and use of space for peaceful purposes by all nations.

If any ask, why do we do what we are doing in space --- what do we expect to attain --- the first answer of America is a one-word answer: peace.

THE TANGIBLE GAINS

But, as this answer is given, we acknowledge the right of every American to ask and to be answered on what this space effort will mean to him in tangible terms.

Here, again, the answer is exciting.

Twice within the lifetime of many here --- and more often in the lifetime of our nation --- we have experienced our greatest bursts of economic growth and social advance on the impetus of new inventions and innovations.

At the turn of the century, such impetus came from inventions of the automobile, the airplane, the electric light, and many others.

Again, at the end of World War II, we experienced the phenomenon of the consumer markets with the application of many war-born inventions.

Out of today's space research another such wave of growth and business prosperity is developing now. Let me cite a few examples:

The transistor radio --- now one of the most popular consumer products in America --- is basically the outgrowth of space technology.

What we have learned in miniaturization techniques will make possible ahead wristwatch radios, pocket television receivers, new hearing aids for the deaf, whole new families of home appliances.

Out of space research the power plants of tomorrow's automobiles may be no bigger than a coffee can --- burning new fuels with much greater efficiency.

The automobiles themselves --- as well as our homes, our office-buildings, even the clothes we wear --- could be made of materials which are not known or named today.

Within the next ten years, at most, our economy will begin to feel the impact of major new revolutions --- a revolution in materials, in methods, in marketing, in medicine.

It is important to see our space program in this perspective.

We are substituting space research dedicated to peaceful purposes for war itself as the source and stimulus of new invention and technological progress.

We are strengthening our defense capabilities and we shall keep them strong --- but the funds going into space research are investments which will yield dividends to our lives, our businesses, our professions many times greater than the initial costs.

THE SPACE INVESTMENT

Let me underscore this. Our entire space program --- even at the peak planned for next year --- is costing annually less than the \$7.5 billion we spend on cigars and cigarettes, less than the \$5 billion we spend on face powder, lipstick and nail polish.

It could be tripled and it would still be less than the \$19.4 billion we spent in 1961 for what we call recreation.

And it is estimated conservatively that our space outlays will yield \$2 return for every \$1 invested. For every nickel we put into it, we get a dime back.

This is tangible, proved fact. Already the Weather Bureau estimates that the savings from our space advances in weather forecasting will soon run into billions annually.

Just last year, the weather satellite, TIROS IV, gave three days advance warning of Hurricane Carla.

The early knowledge permitted thousands of cars, bumper to bumper, to evacuate the people inland 300 miles, and this most powerful hurricane in a generation was one of the least costly in terms of human life or property damage.

From all our space programs, we may anticipate such measurable, tangible benefits enriching human life in our own land and on our own times and in all lands, for all time to come.

It may be 10 generations --- or it may be much sooner --- before space science will enable man to reach the Milky Way. But it will not be 10 years --- it may be very much sooner --- before space science reaches into every home, every business, the life of every family on Main Street, U.S.A.

A LOOK AT THE FUTURE

As we attempt to look 25 years into the future we catch visions of breath-taking journeys in large man-made planets around the sun to Mars and Venus --- of a new freedom of movement of man across millions of miles of space --- of a permanent colony on the moon and of large space stations or space ports at key locations for the conduct of space research, for aids to space navigation, and for rescue operations.

The cosmic space waves may well become as familiar to us as our present global airways.

THE NEW WORLD

As we strive to see or to explain the "practical" aspects of space, let us not forget the broad perspective.

From the beginning of time until about five centuries ago, men lived out their lives on earth without hope of rising above the station of their birth.

They had no expectation of freedom --- no expectation of justice --- no thought of individual rights --- no conception of a voice in governing themselves.

Then came the discovery of the New World --- the world of the Americas. Since that day, man has climbed steadily to his noblest heights.

His status --- economically and socially --- has risen through every century. Most importantly, since the opening of the New World, no crown has rested securely on the head of any tyrant.

Discovery, exploration and a floodtide of invention for five centuries have brought the liberation of the human spirit and the elevation of human dignity and worth.

Freedom as we know it would not have come into existence --- and certainly would not have survived --- without the opening of this great new frontier on earth.

Today the unlimited reaches of space constitute the New World of freedom.

This is no labored comparison. Of what meaning --- of what worth --- to their builders can walls long be in an age when men can leap from the earth and presume to reach toward the moon and the stars?

Of what value are the jail keys of the totalitarian societies when God has permitted man to unlock the doors to the Universe itself?

The scientific value is only a part of the impelling motives for our space exploration.

Improved weather forecasting --- the communication and navigational advances --- and the industrial improvements also represent gains in our defense structure.

A nation that could control the weather and communications could control the world.

Final results in space science and space explorations --- our intense support of the program --- could well be the determining factor between defeat and victory.

Vice President Johnson Discusses Space Benefits

**Estimates Nation Will Get a
\$2 Return for Every \$1 Invested**

Vice President Lyndon B. Johnson, also Chairman of the National Space Council, reviews our reasons for space exploration and cites great benefits to better living as new scientific breakthroughs are achieved. His views on U. S. space policy were voiced as part of a national tribute to Dr. Robert H. Goddard, pioneer space scientist, at the National Rocket Club's annual banquet in Washington, D. C., March 16th. NAA presents the Vice President's "working notes."



Vice President of the United States, Lyndon B. Johnson, heads the all-important National Space Council.

We are reaping a bountiful harvest from the vision and the courage of those who urged that America move forward with vigor in the exploration of space. To all those men of faith and zeal, our nation owes a very great debt for their leadership and their labors. Because of them, we shall live in a new and wondrous world.

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also peaceful. It is important that the world understand this, and it is equally important that we understand this about ourselves.

As chairman of the National Space Council, I would like to comment on these questions. Why are we doing what we are doing in space? What do we expect to attain? What will our efforts mean, in tangible terms, for Americans?

The real and legitimate goal of science is the endowment of human life with new inventions and riches. That is the goal of our own space effort today—to endow all of human life, in all lands, with new inventions and new riches. It is peculiar to the nature of peaceful space achievements that their benefits flow not to a single nation or a single people, but to all nations and all peoples. Let me itemize and illustrate what I mean.

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Artist's conception of Communications Satellite.

Communication Satellites

One of the most dramatic advances in human history will come from the communications satellite program proposed by President Kennedy. That one program will eliminate the need, and the cost, of laying 50 additional cables across the oceans in the next 20 years. Inter-continental communication between people will be made far easier, far less expensive. More than that, this system will permit face-to-face television communication at any hour between heads of state. Major conferences can be held without the principal participants ever leaving their own country.

Furthermore, advances in the realm of rapid transmission will permit the transmission in two weeks time of every page in every book in the Library of Congress anywhere in the world. This means that scholars in the new nations of Africa and Asia no longer need yearn for libraries or source materials. They will have access to the world's greatest stores of knowledge within a matter of seconds.

Our Expectation: Peace

I cite these examples for one reason. From the beginning, our national policy toward space has been guided by the faith that the avenues of space offer man's best hope for bringing nearer the day of peace on earth. All that we have learned—all that we have achieved—fortifies that faith. In these realms, there is no cause for nations to war against one another. On the contrary, there is every cause for nations to cooperate together and, out of such cooperation, will grow the basis for understanding and peace.

It is our policy, and will continue to be our policy, to work for such joint exploration and use of space for peaceful purposes by all nations. If any ask, why do we do what we are doing in space and what do we expect to attain? The first answer of America is a one-word answer: peace.

The Tangible Gains

But, as this answer is given, we acknowledge the right of every American to ask and to be answered on what this space effort will mean to him in tangible terms. Here, again, the answer is exciting.

Twice within the lifetime of many here—more often

in the lifetime of our nation—we have experienced our greatest bursts of economic growth and social advance on the impetus of new inventions and innovations. At the turn of the century, such impetus came from inventions of the automobile, the airplane, the electric light, and many others. Again, at the end of World War II, we experienced the phenomenon of the consumer markets with the application of many war-born inventions.

Out of today's space research another such wave of growth and business prosperity is developing now. Let me cite a few examples: The transistor radio—now one of the most popular consumer products in America—is basically the outgrowth of space technology. What we have learned in miniaturization techniques will make possible ahead wrist-watch radios, pocket television receivers, new hearing aids for the deaf, whole new families of home appliances.

Out of space research the power plants of tomorrow's automobiles may be no bigger than a coffee can, burning new fuels with much greater efficiency. The automobiles themselves—as well as our homes, our office-buildings, even the clothes we wear—could be made of materials which are not known or named today.

Within the next ten years, at most, our economy will begin to feel the impact of major new revolutions—a revolution in materials, in methods, in marketing, in medicine. It is important to see our space program in this perspective.

We are substituting space research dedicated to peaceful purposes for war itself as the source and stimulus of new invention and technological progress. We are strengthening our defense capabilities and we shall keep them strong. But, the funds going into space research are investments which will yield dividends to our lives, our businesses, our professions, many times greater than the initial costs.

L. B. J. - National Rocket Club - 3/12/62

The Space Investment

Let me underscore this. Our entire space program, even at the peak planned for next year, is costing annually less than the \$7.5 billion we spend on cigars and cigarettes—less than the \$5 billion we spend on face powder, lipstick and nail polish. It could be tripled and it would still be less than the \$19.4 billion we spent in 1961 for what we call recreation.

It is estimated conservatively that our space outlays

will yield \$2 return for every \$1 invested. For every nickel we put into it, we get a dime back. This is tangible, proved fact. Already the Weather Bureau estimates that the savings from our space advances in weather forecast will soon run into billions annually.

Just last year, the weather satellite, TIROS IV, gave three days advance warning of Hurricane Carla. The early knowledge permitted thousands of cars, bumper bumper, to evacuate the people inland 300 miles, and this most powerful hurricane in a generation was one of the least costly in terms of human life or property damage.

From all our space programs, we may anticipate such measurable, tangible benefits enriching human life in our own times and in all lands, for all time to come. It may be 10 generations, or it may be much sooner, before space science will enable man to reach the Milky Way. But it will not be 10 years, it may be much sooner, before space science reaches into every home, every business, the life of every family on Main Street, U.S.A.

A Look at the Future

As we attempt to look 25 years into the future we catch visions of breath-taking journeys in large man-made planets around the sun to Mars and Venus—of a new freedom of movement of man across millions of miles of space—of a permanent colony on the moon and of large space stations or space ports at key locations for the conduct of space research, for aids to space navigation, and for rescue operations. The cosmic space waves may well become as familiar to us as our present global airways.



The New World

As we strive to see or to explain the "practical" aspects of space, let us not forget the broad perspective. From the beginning of time until about five centuries ago, men lived out their lives on earth without hope of rising above the station of their birth. They had no expectation of freedom—no expectation of justice—no thought of individual rights—no conception of a voice in governing themselves.

Then came the discovery of the New World—the world of the Americas. Since that day, man has climbed steadily to his noblest heights. His status, economically and socially, has risen through every century. Most importantly, since the opening of the New World, no crown has rested securely on the head of any tyrant.

Discovery, exploration and a floodtide of invention for five centuries have brought the liberation of the human spirit and the elevation of human dignity and worth. Freedom as we know it would not have come into existence, and certainly would not have survived, without the opening of this great new frontier on earth.

Today the unlimited reaches of space constitute the New World of freedom. This is no labored comparison. Of what meaning, of what worth, to their builders can walls long be in an age when men can leap from the earth and presume to reach toward the moon and the stars? Of what value are the jail keys of the totalitarian societies when God has permitted man to unlock the doors to the Universe itself?

The scientific value is only a part of the impelling motives for our space exploration. Improved weather forecasting, the communication and navigational advances, and the industrial improvements also represent gains in our defense structure. A nation that could control the weather and communications could control the world.

Final results in space science and space explorations—our intense support of the program—could well be the determining factor between defeat and victory.



THE WEATHER WATCHING satellite
Tiros III provides this effective photo-
weather report on hurricane Esther.

WEATHER WATCHER TIROS III—
NASA's research into space vehicles
for peaceful uses covers many fron-
tiers where success will plow-back a
multitude of benefits to man.

Johnson, Lyndon B - B10 1962

REMARKS OF THE VICE PRESIDENT TO OPEN THE CONFERENCE ON
RESULTS OF THE FIRST U.S. MANNED ORBITAL SPACE FLIGHT

Friday, April 6, 1962

It is a great pleasure to welcome this distinguished group this morning and to share with you some of the excitement of the NASA report on the first U.S. manned orbital flight. It has been my privilege to follow the Mercury project through its entire development, culminating today in a definitive technical report to the nation and the world.

The significance of today's meeting must not be lost in the details of the report, because the significance transcends any of the individual details. It is important for us to realize that we are participating in a phenomenon that is peculiar to our kind of society.

The entire Mercury program--indeed the entire NASA program--has been conducted in the full public gaze. Our people and the world have been participants in every stage of development. Through the eyes and ears of the public press, radio, and television we have watched the development of the space capsule. We have witnessed the myriad scientific investigations and technical tests. We have observed the testing of the safety systems, the training of the astronauts, the ballistic and orbital flights of unmanned capsules, capsules containing primates, and the three shots that have involved human lives--those of Al Shepard, Gus Grissom, and John Glenn. Before many weeks have passed the world will again join us in watching the attempt to follow John Glenn's achievement with the orbital flight of Scott Carpenter.

We have come to take for granted this full openness of our program, but if we stand back a little and consider this policy in the light of history, and in light of the policy of some other nations, we appreciate that this openness is remarkable. For the first time in the history of technological development, the laboratories have been opened and the world allowed to watch a full program of experimentation. We lose sight of this fact: Cape Canaveral is a laboratory. It is not a transportation terminal from which flights are supposed to leave on time. It is a fantastic complex of instruments and systems that have the recording of experimental performance of new devices as their sole purpose. Admittedly, there are inherent risks in allowing so many witnesses to experimental developments. The principal risk is that many people do not understand that what they are observing is actually the kind of experiment that is usually hidden within a laboratory. As a consequence, people may expect too much. They may consider a failure to be far more serious than it actually is. There are failures in all experiments. If we knew all the answers, obviously we would not need to go through research and development phases.

(Over)

But in spite of the risks, we have demonstrated that openness is the only acceptable policy for an open society. Only an open society has the strength to demonstrate its failures as well as its successes.

After John Glenn's flight the comments received from around the world dealt as often with the openness of the event as with the event itself. It was considered a marvel, in these difficult times, that a nation had the courage to accept the risk of failure in order to allow its own people and those of other lands to participate vicariously in the experiment. Much has been discussed about prestige and the space program. There is no doubt that the high visibility of John Glenn's flight has raised American prestige to an extraordinary point --not only because the flight succeeded, but because the world watched it succeed.

Today you will hear the details of John's immortal flight. You will be convinced that he has demonstrated conclusively that the role of man in space is no longer open to question. You will be again reassured that the proper place for man is anywhere that man can go--anywhere his skill and courage can take him.

The world will listen with you, through its representatives here today. We are proud of the Mercury program and its astronauts --we should also be proud of the kind of society we are, one that can share with all mankind.

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1962

NATIONAL GEOGRAPHIC SOCIETY'S PRESENTATION OF THE
HUBBARD MEDAL TO LT. COL. JOHN GLENN
WASHINGTON, D. C. - APRIL 9, 1962

"It is obvious that space exploration can be of benefit to all peoples. It is equally obvious that space must be left free and spacious so that its use with man-made tools may enrich life in our own and other lands."

1962

NEW ORLEANS, LOUISIANA - APRIL 19, 1962

"We are going to the moon because it is a logical step in the exploration of the universe, and we know that the steps we have already taken have paid off a valuable return on our investment and paid off handsomely."

1962

May 10:

In address at dedication of the NASA Space Exhibit at the Seattle World's Fair, Vice President Lyndon B. Johnson said that "our entire space program now costs each American about 30 cents a week. During the next few years we plan to spend about 50 cents a week per person on space.

"However, our space program and its by-products will stimulate a sharp increase in the nation's productive output which in turn will increase our gross national product, our income, and the Federal Government's intake . . .

" . . . we are hopeful of achieving fruitful cooperation with the Soviet Union in such fields as communications, weather forecasting, mapping the earth's magnetic fields and space medicine.

"We feel that cooperation in outer space may establish a firm basis for greater mutual understanding—which in turn will help in our efforts to obtain disarmament . . .

"The responsibility to cooperate also lies heavily on the other great space power—the Soviet Union. I am able to tell you in a spirit of cautious optimism that the Soviet Union appears to realize that—in outer space, at least—there may be something to be gained by cooperating with the rest of humanity."

41

1962

In his address to the Second National Conference on the Peaceful Uses of Space, Vice President Johnson said:

"Since the time when earliest man looked cautiously beyond his immediate surroundings, he has had vastly different visions of the worlds around and above him. The world nearby was evil, dark, and dangerous. The world above was somehow purer, freer, closer to God than the earthbound existence that imprisoned our ancestors.

"The shackles of Earth are being broken and the resulting freedom will affect us all.

"As this fair [Seattle World's Fair] promises, Century 21 will be an outer space era. But so, ladies and gentlemen, is our own century.

"We in the United States find the dawn of the Space Age a particularly exciting time. Moreover, we are the first nation to realize the power of space to affect every aspect of our daily lives."

May 10, 1962

1962

In an article in the General Electric Forum, Lyndon B. Johnson said:

"There are specific manned and unmanned military missions in space, the most important being programs to provide maximum warning of hostile activities and knowledge and possible interception of unfriendly spacecraft. Our capabilities are being developed to accomplish both military and civilian objectives, the state of the world being what it is."

General Electric Forum, July-September, 1962

1962

July 18:

- In X-15 awards ceremony before distinguished guests and Headquarters personnel, at NASA Headquarters, tribute was paid to the team of governmental and industrial persons responsible for the contributions of the X-15 program to aeronautics and space flight. Associate Administrator Seamans reviewed the objectives and achievements of the X-15 program. NASA Outstanding Leadership Awards were presented to Paul F. Bikle (Director of the NASA Flight Research Center) and Hartley A. Soule (Langley Research Center X-15 project manager) by Administrator Webb. After a short address on the pride of the nation concerning NASA's achievements, Vice President Lyndon B. Johnson (Chairman of the National Aeronautics and Space Council and a key figure in the Congressional enactment of the National Aeronautics and Space Act of 1958) awarded NASA Distinguished Service Medals to the X-15 pilots Forrest Petersen (Cdr., USN), Robert M. White (Major, USAF), and Joseph A. Walker (NASA).

INTRODUCTION

It was my privilege to serve as Chairman of the Special Committee of the United States Senate, which in cooperation with its counterpart in the House of Representatives, was charged with the responsibilities which evolved into the National Aeronautics and Space Act of 1958. It is my duty again to serve in this field as Chairman of the National Aeronautics and Space Council which that Act set up.

Now, as then, I find it difficult to place any upper limit on the importance to our nation and to the world of the good or ill that lie in the conquest of outer space. The far horizons of communication, transportation, power, weather observation and control contain within them the possibilities of a "break through" coordinate in its magnitude with man's conquest of fire, the machine, electricity, and the atom. The abyss of fear, the terror of destruction and self-destruction, if outer space be given over to warfare—these shout the need for instruments of social and political and international control adequate to the stakes involved.

Our Committee in 1958 saw the problem in three dimensions—structure, policy, and the energy and will to act. The needs of structure dictated military and civilian instruments with the necessary power and freedom. The needs of structure called also for instruments of coordination and focus—to avoid duplication and to foster and develop a truly national policy.

This policy Congress laid down in broad and generous terms. The aeronautical and space activities of the United States shall be conducted so as to contribute materially to one or more of the following objectives:

1. The expansion of human knowledge of phenomena in the atmosphere and space;
2. The improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles;
3. The development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space;
4. The establishment of long-range studies of the potential benefits to be gained from, the opportunities for, and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes;
5. The preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere;

6. The making available to agencies directly concerned with national defense of discoveries that have military value or significance, and the furnishing by such agencies, to the civilian agency established to direct and control nonmilitary aeronautical and space activities, of information as to discoveries which have value or significance to that agency;

7. Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof; and

8. The most effective utilization of the scientific and engineering resources of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.

But structure and policy are impotent unless the energy and will to act are present in full measure in those charged with responsibility—in the Secretary of Defense, the Director of Defense Research and Engineering, and those associated with them; in the Administrator of the National Aeronautics and Space Administration and his colleagues; in the other agencies, public and private, to whom responsibilities are assigned or who have the initiative to seize them; in the Chairman and members of the Senate and House Committees charged with creative watchfulness; to me as Chairman of the Council; above all, in the President, himself, whose will to act is awesomely decisive in all that matters greatly in our government. This does matter greatly.

In closing I would like to add a word of personal appreciation to Alison Griffith for her sense of the importance of the legislative history of this, the first Space Act of our nation, and for her diligence in capturing and recording this history while it was yet ripe and recordable.

LYNDON B. JOHNSON

Washington, D. C.

"WHERE WE STAND AND WHERE WE'RE GOING IN SPACE"

By Erik Bergaust -- Head of the Republican Advisory Committee on Space and Aeronautics

Five years ago this week the first Sputnik jolted us into the humiliating realization that we did not have a monopoly on know-how -- that Russia had beaten the United States into space. The whole world hailed the superior technology of the Communists. The Space Age was here, and Russians, not Americans, had introduced it.

Why had we fallen behind? Not because our factories could not make a satellite-launching rocket, or because our scientists could not conceive one. We had been beaten because we failed to appreciate the true significance of the Space Age, and because we did not know what to do with what we had.

Today, five years later, the situation is, at least on the surface, unchanged. The Russians continue to beat us to the big firsts in space. Reports from all over the world indicate that in the space conquest the Russians are the heroes of the hour.

What are we doing to catch up? Will we ever be able to do it? And how important is it that we do catch up with the Russians?

To get the answers I went to America's three top space men: the Chairman of President Kennedy's Space Council, Vice President Lyndon B. Johnson; our Space Agency boss, Administrator James E. Webb; and our No. 1 rocket expert, Marshall Space Flight Center Director, Dr. Wernher von Braun.

Here is how they answered my questions.

First I talked to Vice President Lyndon Johnson.

"Mr. Vice President, after five years of 'space-age evaluation,' how do we stand in the race with Soviet Russia?"

"I don't think any precise comparison or measurement can be made. The Russians have used their larger rocket power to lead us in the size of the payloads put into space. Consequently, one of the essential features of this Administration's accelerated space program is to develop efficient rockets with millions of pounds of thrust to offset the Soviet advantage, and we are making real progress.

"We have the scientific ability, the engineering and production know-how and the resources to surpass the Soviets, but we started late. It is encouraging that we have already put about four times as many space vehicles into orbit as the Soviets and have obtained impressive amounts of information and also valuable experience since our program was stepped up last year."

"What -- in your opinion -- is the world-wide importance of an energetic space program?"

"I do not see our survival as a free and first-rate nation unless we have a position of leadership in space. Around a table the nation with the greatest competence in space science and engineering would have a large negotiating advantage.

"If the nation so endowed used its space strength to support freedom, the world would gain. If such a nation were given to blackmail, coercion and domination of others, freedom would be the loser. Hence, the United States dare not risk being in second place in the space race."

"Can we really afford to cope with the high cost of the space efforts."

"Certainly they will cost a lot. But not only can we afford it, we must afford it. Of course, we can't expect to undertake and maintain such a major space effort without large expenditures.

"As an example, during this year the space program will cost each American, on the average, about 40 cents a week. However, we are already beginning to enjoy the profits and returns on our space investments.

"It is estimated, and I believe conservatively, that our space outlays will yield at least \$2 return for every \$1 invested. This return on investment will take the form not only of profits and wages, but also of improved health, better consumer goods, more scientific knowledge, and greater national security."

This Week Magazine / September 30, 1962

Vice President Lyndon B. Johnson, in a speech at St. Mary's College, California, said:

"The U.S. is pledged to encourage other nations to go out into space with us, to use this new age to release long-slumbering energies. At a recent count, we were cooperating with 55 other nations to spread the benefits of space research to every corner of the globe. This is a practical and dramatic means for bringing underdeveloped nations into the Twentieth Century during a single generation. That is one of the things we are trying to work out together. Much has been said during the past five years of the probable physical characteristics of the world of the future. I would like to paint a hopeful picture of the Space Age's mental and moral effect on the people of the earth.

"Far too much recorded history, since its birth, has been made by wars and by the winners of wars. Man's real struggle against disease, ignorance, want, and famine have been frequently obscured by the political and military conflicts that have taken place through the ages.

"There were many people who convinced themselves that there were certain virtues in great nations that could only be displayed on the battlefield. In the optimistic days before the First World War, the American philosopher William James hoped that men would be able to keep these virtues, yet avoid future bloodshed, by finding what he called "the Moral Equivalent of War". His hopes were premature.

"The years since then saw the two bloodiest conflicts in the history of the world with the second one ending in the Atomic Age.

"The Age of the Atom made large scale war insane, but offered no substitute for the method that had been used to solve tribal and international disputes for many thousands of years.

"I hope that space exploration will become that substitute for war. It offers nations the chance to abandon schemes of earthly conquests -- conquests which have always proved costly and temporary -- in exchange for a joint venture into the vast universe that surrounds our small planet.

"I am a realist. I know that danger is near, that we must be prepared, that Russia's ambitions are incompatible with human freedom and national survival, and that the Space Age will not automatically solve anything.

"Yet we can work for a better, more peaceful world in an Age of Space. We can nurture the spirit of cooperation in outer space, and then attempt to spread it to all the other disputes that divide nations. This path may be slow, but it is worth taking."

"We are moving at a rapid rate into a new era of human adventure and exploration in the realms of outer space. It is my privilege to be associated with this national effort as Chairman of the National Aeronautics and Space Council which advises with the President of the United States on the space programs of our Nation.

"In less than 5 years, our country has assumed a solid and secure place of leadership in developing the peaceful and practical uses of outer space. Where once we were, in the judgment of some, lagging behind, today we are, on the basis of clear evidence, forging ahead. Our efforts in space are in no way dictated by a policy of duplicating the activities of the Soviet. We are not engaged in a race with Communist scientists -- we are engaged in a race to extend the horizons of man's knowledge and to increase the benefits which will better the lives of all men who live on this earth.

"In 1962 the United States enjoyed a year of great successes. Young Americans orbited the earth for the first time. We began to communicate through space to other continents. As the year ended American rockets were flying past far-away planets and transmitting to earth our first knowledge of these other planets in our universe.

"While our successes were both substantial and conspicuous, the most important works of space continue to be the steady progress we are making toward peaceful and practical uses of space technology in our own times. We are concentrating our efforts at present in three fields: weather, communications and navigation.

"On weather, in the not distant future we shall have achieved technical capability of great benefit to all the nations on earth. Satellites above us will have all portions of the earth under their steady gaze 24 hours a day. We will be able to know far more than we know now about the weather of the world -- and our uses of this knowledge will mean great savings of lives, property, and economic costs.

"Our weather satellites will be able to give us information about the snow cover on our own continent, to make the spring runoff predictable. The same satellites will give us knowledge we do not have now about the ice fields on the Great Lakes and our inland waterways. It is estimated that such information about the St. Lawrence Waterway alone will save shippers more than \$2 million each season. We will be able to prevent the loss of our timber resources through costly forest fires which now smoulder on the forest floor for many days before the presence of the fire is known. We will be able to work with the 60 nations of the

world which spend more than \$15 million annually trying to control the age-old plague of locusts.

"The weather information from our satellites will be one of the great advances forward for agriculture throughout the world -- as well as in our own country.

"The prospects for our communications satellites in space also defy the imagination. We will be able to have telephone communication between all parts of all continents. We will be able to have joint television conferences between the leaders of many nations simultaneously. We will be able to transmit the written word at phenomenal rates of speed -- a book the size of the Bible can be transmitted in a matter of seconds.

"The advances which will come in that field of communications are innumerable.

"In 1963, we expect to have operational the Transit system of navigational satellites. These satellites will permit navigators on the seas to determine their position within 0.1 mile, a degree of accuracy never before ever approached. Again, the savings will be great and far reaching.

"These are only a few selected examples of what the technology of the space age will mean when applied for peaceful and practical purposes of the future. More important to all of us, however, is the necessity of realizing how great will be the changes this age of space will bring to our lives, to our occupations, and to our whole society and economy in America.

"The age of space which we are now entering will dwarf man's memory of the impact of the industrial revolution. Every sector and every facet of our economy and our daily lives will be altered by the impact of these next years to come. The impact will be felt by us all in terms of the demands this new age will make upon us for greater productivity, for greater capability among our people, and for the greater rewards that will come to us all.

"If America is to continue to hold the leadership we have now achieved -- and follow in the tradition of leadership we have known since the beginning of our country -- the next 25 years will make it necessary for us to marshal our resources to the fullest. We as a nation shall not be able to tolerate the idleness of either our natural resources or our human resources. We shall need the full total of the national strength we can command to realize the promise and fulfill the opportunities of the age of space."

Remarks by Vice President Lyndon B. Johnson, Rural Cooperatives Association, Annual Meeting, Las Vegas, Nev., January 16, 1963.

1963

January 28:

President Kennedy transmitted to Congress the 1962 report on U.S. Aeronautics and Space Activities, stating in Preface: "The year 1962 was a period of acceleration, accomplishment, and relative progress for the United States in its space leadership drive. In both numbers and complexity of space projects, the past year was the most successful in our brief but active space history."

In accompanying message, Vice President Lyndon B. Johnson told Congress that, during 1962, U.S. "generated a greater rate of progress in space than did the U.S.S.R. [However]... the records of the two countries were closely similar in regard to the ratio of space successes to space failures." (Annual Report for 1962; L.A. Times, Wash. Post, 1/29/63, A2)

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NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
400 MARYLAND AVENUE, SW, WASHINGTON 25, D.C.
TELEPHONES: WORTH 2-4155 — WORTH 3-1110

FOR RELEASE: UPON DELIVERY, 2:30 p.m.
JANUARY 31, 1963

Remarks
by
Vice President Lyndon B. Johnson
Delivered by
Edward C. Welsh, Executive Secretary
National Aeronautics and Space Council

Fifth Anniversary of Tracking
Goddard Space Flight Center
January 31, 1963

The celebration of the Fifth Anniversary of Tracking takes me back in memory to the time when all this was just beginning.

On that January 31st, five years ago, we in the United States were jubilant because we had just orbited our 30-pound Explorer I earth satellite.

On that day we stopped being onlookers. We had entered the Space Age.

Still, elated as we were, we knew that we were not first in this daring new human venture.

I remember the urgent sense of mission we felt then. I remember it because we still feel it, although less painfully, today.

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Among many Members of both Houses of Congress and among those of you who had been laying the groundwork for this country's effort to conquer space for the benefit of all mankind, there was a spirit of determination and dedication so powerful that it was almost tangible.

Many of you here today have participated in the program from its inception. You have contributed substantially to the many historic space flights, manned and unmanned, launched in our effort to enable mankind to use the harsh environment of space for worthy purposes.

It was my honor to chair the Senate Special Committee on Space and Aeronautics, which--along with the House Select Committee on Astronautics and Space Exploration--wrote the Space Act.

That Act (Public Law 85-568) established the National Aeronautics and Space Administration, and set the stage for the progress in space exploration which we are celebrating today.

The international cooperation epitomized by our tracking agreements with 16 nations over the world--represented on this platform today--is heartening evidence that the intent of the Space Act is being carried out.

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I refer to the fundamental policy, clearly stated in the Act, that the aeronautical and space activities of the United States should be dedicated to peaceful purposes for the benefit of all mankind.

I would like to quote briefly from the report drafted by the Senate Committee before the passage of the Act:

" . . . Space neither invites nor necessitates any re-definition of American goals and aims. Throughout our history, it has been the goal of peace and liberty that has led Americans to explore the dimensions of challenging frontiers. Our goal now remains unchanged."

I have chosen this paragraph to quote because it is basic to our national philosophy. In space activities, the lines of demarcation that so often separate nations in their purposes would seem to be petty. Interchange and cooperation in the exploration of a realm as vast as the solar system--indeed, the universe-- should lead to better understanding among nations.

Everything that we have learned in the past five years is in harmony with this belief. We are constantly finding more evidence and hope that in the challenges inherent in the new frontiers of space we shall find the fresh perspectives

that will materially enhance the outlook for peace on earth. There are so many things to be learned, so many benefits to be gained, that international cooperation should be not simply logical but inevitable.

May I repeat - it is the policy of the United States to work in every possible way for joint exploration and use of space for peaceful purposes by all Nations.

This policy will continue. Almost every month that passes sees new cooperative international space activities, new projects, new potential benefits.

Harry Goett and Jim Webb and others who have preceded me today have given us specific examples of this cooperation, and I need not add to what they have said.

But in closing, I would like to quote some of what President Kennedy said in Houston last September after visiting major space facilities in the Southeast and Southwest. The President said, in part:

"Those who came before us made certain that this country rode the first waves of the industrial revolutions, the first waves of modern invention, and the first wave of nuclear power."

"Our leadership in science and in industry, our hope for peace and security, our obligations to ourselves as well as to 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 spacefaring 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 men, and only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace, or a new, terrifying theater of war."

That it will be a sea of peace, I strongly believe.

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1963

February 16: Vice President Lyndon B. Johnson, addressing Rural Electric Cooperatives Association's annual meeting in Las Vegas, said: "In less than 5 years, our country has assumed a solid and secure place of leadership in developing the peaceful and practical uses of outer space. Where once we were, in the judgement of some, lagging behind, today we are, on the basis of clear evidence, forging ahead. Our efforts in space are in no way dictated by a policy of duplicating the activities of the Soviet. We are not engaged in a race with the Communist scientists-- we are engaged in a race to extend the horizons of man's knowledge and to increase the benefits which will better the lives of all men who live on this earth...." (CR, 2/18/63, 2299)

Three Thousand Two Hundred Space-Related Products

EXTENSION OF REMARKS OF

HON. JOE R. POOL

OF TEXAS

IN THE HOUSE OF REPRESENTATIVES

Wednesday, March 6, 1963

Mr. POOL. Mr. Speaker, recently I had the honor of accompanying Vice President LYNDON JOHNSON and Gen. Bernard Schriever to Texas for a look at the aerospace industry in an area where we have always been aware, and proud, of space.

In Grand Prairie, we visited Ling-Temco-Vought, one of the leading aerospace firms producing the weapons carriers, rocket boosters, guidance and detection systems used in the U.S. defense and exploration efforts. We toured the facilities and spoke with men who are tops in the field of space science and its needs. General Schriever spoke for our delegation when he said he was impressed with the tremendous resources, technology, and management, which he saw there.

The place of a firm such as Ling-Temco-Vought in the present and future economy of a space-studious United States is, of course, obvious. But the needs of space age production offer an invitation also to smaller firms in less obvious areas of production.

The following day Vice President JOHNSON spoke at a board of city development dinner in the southwest Texas city of San Angelo. He spoke of the ways in which small business participates in the aerospace industry, in a speech which is cogent for many, many areas of this Nation. I am pleased to offer for insertion in the CONGRESSIONAL RECORD the remarks made by the Vice President in San Angelo on February 22.

The address follows:

REMARKS OF VICE PRESIDENT LYNDON B. JOHNSON, BOARD OF CITY DEVELOPMENT DINNER, SAN ANGELO, TEX., FEBRUARY 22, 1963

As long as I can remember, people have been saying they like San Angelo because the air is better here. I agree, the air is mighty good. But what I like about San Angelo—

and what has always made your city one of my favorites—is the people.

I like the spirit of progress, the sense of civic pride, the confidence in the future that has always been so much a part of the people of San Angelo and southwest Texas. It is good to be with you once again—and I am most grateful for all your generous courtesies today.

When I accepted this invitation, I asked one of your distinguished citizens what he thought I should talk about tonight.

He replied, "Why don't you talk about space, we have so much of it."

Space is a good subject—an increasingly important subject for Texans, as for all Americans. We are moving far faster than most of us realize into the age of space, and our lives are being reshaped every day by the new invention and discovery coming from space research.

That is what I would like to talk about tonight—about the practical, down-to-earth implications of our great national effort to explore the distant realms of outer space.

You of San Angelo understand the first and foremost implication. You are demonstrating this by the support you are giving to education—at the college level as well as at the public school level. The clear and immediate challenge of space requires that we make available to all of our young people far better education than any of their parents enjoyed.

Ninety percent of the scientists who ever lived are alive today. Ten years from now three-fourths of the people working in the plants and factories of the United States will be working on products not yet invented or discovered. If our sons and daughters are to have an even break in the competition of the 1970's and 1980's, education—at all levels—must have the kind of support throughout the Nation that it has here in San Angelo.

Some are quick to say that there is no place in our system of the small local area college. But as you well know, that is simply not so. Hundreds of thousands of young people are being denied essential college educations because there is no college in their own community. The likelihood of a high school graduate going on to college is 50 percent greater when the student lives within 20 to 25 miles of an institution of higher learning.

Whether close to home or far away we need better education at all levels. We need to be turning out two and one-half times more Ph. D.'s in engineering, mathematics, and the sciences. At the present rate, the United States will be short 90,000 doctoral degree holders by 1970. We need a wider dispersal of the graduate schools from which such degrees are obtained, because today three-fourths of all Ph. D.'s are being granted by a handful of universities located in only 12 States.

When I say these things to you I am not talking about education for education's sake alone. I know you love freedom. I know how you cherish independence. If we love freedom, if we cherish independence, we will recognize that the battlefield on which these great heritages will be won or lost in this century is the classroom.

The United States leads the world in the aggregate annual number of higher education graduates. But in the Soviet Union institutions of higher learning are today graduating three times as many engineers and four times as many physicians as the United States. I am unwilling—as I know you are unwilling—to be content with second place. In education—as in all things—we have the resources, we have the ability, we have the wealth to be first, and we must not settle for less than the best.

When we talk of space and space research there are those who raise the question that

our efforts cost too much. Certainly American leadership in space is not cheap. We are now spending 20 cents per week per capita on our national space program. But, at the same time, we are spending each year more than four times our space budget on golf and fishing and movies and other recreation.

Out of this effort that we are making, many Americans ask the question: Is the effort we are putting forth worthwhile? Is it practical? What will it mean to those of us on earth for one or two among us to land on the moon?

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I would like to answer that question in terms we can all understand. We are today only in the infancy of the age of space. Our efforts have only just begun. When we look back over the past, we remember that it took us 112 years to develop photography, 56 years to develop the telephone, 35 years to perfect the radio, 15 years to develop radar. Television took 12 years. The atomic bomb took 6 years. Even the transistor took 5 years.

While the space age is not yet 5 years old, we have made remarkable strides in producing usable down-to-earth products. More than 5,000 companies and research organizations have been or are now involved in our space effort. We have produced more than 3,200 different space-related products, many of which are already being put to use.

As one example, at Lawton, Okla., a small hatmaking company experienced difficulty and costly losses because the resin used to stiffen hats often stuck to the heating blocks. That company contacted the Office of Industrial Applications of the National Aeronautics and Space Administration. NASA gave them information about neoplastic coatings which had been developed in connection with space research on solid rocket fuels. Today, the little hat company in Oklahoma is coating their presses with this substance and its problem has been solved.

I could cite many more examples such as this. But the truth is we have only just begun to realize the benefits of our concentrated space research. These future applications will have meaning for all of us.

Let me give you some other examples. Medical scientists have determined that the kind of space suits worn by our astronauts—such as Colonel Glenn—can be and soon will be used to relieve the discomfort of victims of strokes. In our hospitals and medical centers, the little wire sensors used to signal the earth about the physical conditions of the astronauts will be put to use to keep constant check on the physical conditions of patients in their sickbeds. One product of our research on rocket propellants is already being used to treat tuberculosis.

A great many housewives today are using in the kitchen pots and pans made of ceramics which are the result of space research. Thermoelectric devices, first used to provide power for space satellites, are now being used in heating and refrigeration systems for our homes.

Out here in west Texas we know that the future is being shaped by the application of space technology to such projects as taking salt out of sea water and making the inexhaustible gallons of the gulf available for irrigation in this area. When space technology will permit us to modify the weather, we do not know. We do know that the weather satellites already projected will permit us to make great savings of lives and property in combating storm damage, providing early warning against floods, tornadoes, and hurricanes. Our space scientists even tell me that we will someday soon be using those satellites to guard against invasion of grasshoppers in west Texas and locusts in other parts of the world.

Within a generation it may be possible for us to predict the weather as far in advance

as a year, and think what that will mean to both ranchers and farmers in this area.

The day is not too distant when you will be able to pick up your telephone and call distant continents—Europe, Australia, or Asia—as quickly and as cheaply as you can call other Texas cities today. Live television shows will reach your living room from all points of the globe. The scientists in India or Africa or South America will be able to solve problems on computers located at Rice University or the University of Texas. Texas businessmen will be able to check their inventories in warehouses and retail establishments throughout the world in a matter of seconds.

When we recite prospects such as this, I know it is hard for the mind to grasp the full implications. But it is important that we make the effort to see beyond the present and to recognize the full import and impact of the future. Many of us present remember when people were saying that the automobile would never replace the horse and that airplanes would never fly safely and successfully. Twenty or forty years from now our children will be smiling indulgently at our own conservatism and caution today.

You and I—and our 180 million fellow Americans—stand now at the edge of one of the great adventures of mankind. In these years ahead the exploits and adventures of our young pioneers in space will make the headlines. But here on earth without fanfare, without much notice and without us even realizing it, our lives will be changed as never they have been changed in any comparable period of man's experience.

If, in this new age, America is to retain its position as a leader of the cause of freedom it will be necessary for us as a nation to mobilize the full resources of nature and of humankind. We cannot indulge the luxuries of leaving idle the mineral resources and other resources of nature which underlie these rocks and plains of southwest Texas. We cannot afford the expense of undertraining and undereducating our young people. We shall need—and we must have—the full natural and human resources of America mobilized for the great thrust forward which is coming within your lifetime and mine.

When this century began, only 1 out of 10 adult Americans had a high school or college education. Today, such an education is a first requirement for an ever-increasing number of jobs in our economy. Yet, only 43 percent of our adults have completed high school. Only 8 percent have completed college. And nearly 40 percent of our young people are dropping out of high school before they receive their diplomas.

The treasure of America today as always is its young people. We must not permit that treasure to be lost or wasted. Here in San Angelo your community dedication to education has won national attention. You have built one of the finest high schools in America—you are proud of it and you have the respect of your countrymen for the sense of local responsibility which you have shown. In the same sense, you are showing comparable support for higher education through your college.

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It is this sense of local responsibility that has made America strong. It is this sense of local responsibility that will help America realize the full rewards and potential of the future. I come here tonight to salute you, to congratulate you, and to commend your example of local responsibility to communities throughout the Nation.

Our strength as a nation—and as the center of the free world alliance—depends upon the sense of local responsibility which freemen in every county, every city, and every State manifest through these times of trial and peril. Governments at all lev-

els—Federal, State, and local—is the creation of the people and the servant of the people. There is no room for contests and conflicts in a struggle for power between the levels of government. There is only room for effort and assertion on the part of all Americans to make our system strong, to make our Nation strong, and to make our cause successful.

We are extending our reach today—we are reaching among the stars to touch the new frontier of man's experience. That longer reach will bring us rewards of which we have never dreamed. We shall live a life of greater freedom, a life of greater reward, a life of greater peace—and this is what we all want to have for our children.

(Congressional Record -- Appendix, March 6, 1963, pp. A1175-A1177)

REMARKS BY VICE PRESIDENT LYNDON B. JOHNSON
NATIONAL ROCKET CLUB DINNER
SHERATON PARK HOTEL
WASHINGTON, D. C.
FRIDAY, MARCH 22, 1963

FOR RELEASE IN AM'S OF SATURDAY, MARCH 23, 1963

In recent weeks, others of the Marine Corps and of the Administration have been engaging in the pastime of hiking together. Your honor guest and I have refrained from such hazardous practices. Instead, we have indulged in the pastime of eating together.

I assure you it is the Colonel -- and not the calories -- that brings me here tonight. Certainly, one of the most pleasant -- although unofficial -- duties of the office I hold has been the privilege over the past year of speaking at banquets honoring John Glenn. I am not sure whether he regards this as a pleasure, also. I understand the Colonel has suggested that an extra tube of food be put aboard the capsule to the moon as a precaution against the possibility that when the first meal is being eaten there, the Vice President might show up to make a presentation.

Tonight -- at this Goddard Memorial Dinner -- it is appropriate for us to concern ourselves with the fundamental issue of our national space effort: the matter of public support for our public policy in this field.

This is an audience of experts -- experts on the meaning and potential of the Space Age and on the needs of the Space Program of our country. Individually and collectively, you appreciate what a dynamic force the Space Program is for our economy. You know it means improved technology, greater security, a rising level of business activity, a higher standard of living for our people. Above all, you understand the essential fact that if the United States is to be a source of leadership for freedom tomorrow as it is today, we must succeed in our space efforts now during this decade.

In all realms of specialized knowledge, there is the ever-present danger of parochialism. Many of my scientist friends think that the most narrow and parochial men they know are engineers. Nearly all engineers I know think the same of scientists. But both scientists and engineers agree on one thing: nobody is more parochial and narrow and short-sighted than politicians.

I hardly need to say that some of my best friends are politicians. I can say of them that what you think of them, they in turn think of you. That is precisely the point to which my remarks tonight are addressed.

We are at a point in our national history in which the future capabilities of our country -- and the future of our country's role as a leader of freedom -- depend decisively upon both mutual understanding and mutual trust, as well as mutual comprehension, between the community of technology and the community of public affairs.

NASA HISTORICAL

To say this -- and to weigh the merits of each side -- does not automatically lead to the conclusion that one side or the other is the "right" side. The concern of the space scientists for maintaining the schedule of space projects is right and proper -- beyond dispute. The concerns of the political community for the implications of supporting those programs are no less right and proper -- beyond dispute.

Between these viewpoints -- each responsible, each prudent, each sincere and conscientious -- there exists what we must frankly acknowledge to be a "dollar gap." Those charged with responsibility for public policy know that the total space program has cost us about 20 cents a week per capita. They also know that in the near future the program may cost as much as 60 cents a week per capita. On the other hand, those in the technological community know that as a nation we are spending more on cigarettes, alcohol or recreation than we do on space. Last year alone, Americans bet more on horse races than on space.

Personally, I believe -- as I am sure you believe -- that we must be concerned with where America finishes in the space race -- and I am not content to bet on America merely to place or show -- and certainly not to finish out of the money altogether.

In either case -- from either viewpoint -- the present period of preoccupation with the dollar aspects of space is symptomatic of a failure to bridge the gap of understanding between the two communities which are jointly responsible for our national success or failure in mankind's Age of Space. In the long term, dollars alone will not be the decisive factor of either our success or our failure. We shall succeed only in proportion to our understanding of what is at stake and of how the stakes of space relate to those qualities of our society and our heritage to which no dollar value can be attached.

Of those qualities, none is more priceless than the fact that in our representative democracy public policy must be an expression of the public's will and support. The technological community which understands the stakes of space has a responsibility, therefore, for helping the public to understand those stakes. Unless and until this is done, the technological community cannot justifiably be impatient with those who are chosen to represent and express the public's own will.

Throughout our national history, America has moved forward on waves of new invention. The individual inventors of 50 and 60 years ago have been uniquely honored as virtual national heroes in this century. They have become a part of our folklore -- not to mention of our textbooks and motion pictures, as well. But we can only wonder what would have happened if Thomas Edison or Samuel Morse or Alexander Graham Bell had come to Congress and to the people and had asked for funds with which to invent an electric light bulb or a telegraph or a telephone.

We can imagine that the response would have been somewhat less than enthusiastic.

Today, the Age of Space is an infinitely more inventive age for America -- and the world -- than the era at the beginning of this century. Our national space program already has produced more than 3,000 new products and processes of private commercial potential. These achievements already are being put to work. Today's inventor is working on a much surer course -- with a much greater certainty of what will be accomplished -- than were the men who changed history by tinkering in their bicycle shops not so long ago.

Experimentation is still present in our efforts now but the factor of uncertainty has never been so small. We know what we are likely to do. We can be more certain of what our efforts are likely to produce. If there is a consistent pattern of error, it is error on the side of underestimation -- not overestimation.

This simply means that we are able to tell the people more of where we are going and more of why we should go there. If we fail to do this, if we fail to utilize this greater capacity, then the responsibility for lack of public support will fall upon those who had the knowledge but failed to impart it to the people.

Along with the knowledge of our own capabilities and directions, we are also possessed of knowledge about the capabilities and directions of our principal competitors in the space adventure. I believe it is a part of our responsibility to keep the public better informed about the relative progress and capabilities of the United States and the Soviet Union.

Let us look at a few basic comparisons:

1. Rocket Power: today the Soviets have in operation more powerful rockets than do we. We are trying to catch up. We have under development much more powerful rockets than the Soviets now have in operation. But we must assume that the Soviets are likewise working to improve the power of their own rockets.

2. Number of Successes: at the end of 1962, the United States had successfully orbited 120 payloads in space. This means that we have put about four times as many payloads into earth orbit as have the Soviets. But at the same time the smaller number of Soviet payloads have weighed substantially more than the total of our larger number of payloads.

3. Ratio of Failures: we can say with reasonable assurance that the Soviets have had a ratio of successes to failures comparable to our own. Our failures as well as our successes are known to the world. The Soviets have announced their successes and concealed their failures. But the basic fact is that in both nations the reliability of launching vehicles has shown a remarkable and comparable increase. For example, through 1960, the United States had about one failure for each success. In 1961, the ratio of successes was three to one. In 1962, the ratio reached five to one.

4. Space Applications: in utilizing space technology, to improve mankind's lot on earth, the United States is well ahead. Weather satellites, communication satellites, navigation satellites and many other activities are measures of this. In this realm, the Soviet Union -- despite the potential

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of its technology -- is not choosing to compete.

5. Scientific Information: comparisons between the nations as to which has obtained the most useful scientific data cannot be exact. Both nations have done remarkably well. The United States is sharing much of its information with the world scientific community. The Soviet is more selective and secretive.

6. Manned Flights: Soviet cosmonauts have put in more flying time than our astronauts. Certainly the U.S.S.R. is ahead in the total knowledge obtained from manned space flight.

7. Guidance and Control: both countries have made rapid progress in this technology. Last year's dual near-rendezvous launch by the Soviets is the outstanding single accomplishment by either nation, thus far. However, the United States has shown remarkable progress particularly in the Mariner shot and the Schirra flight.

We can say that competency is growing in the space programs of each nation. What space gap exists is not due to a lack of ability or resources on our part but exists because we started later and do not have a surplus of time.

The year of 1962 was a rewarding year for the United States in its space efforts. We demonstrated convincingly through both showcase successes and supporting scientific progress our ability to translate sound decisions into significant accomplishments. A gratifying number of historic successes were achieved by our efforts last year.

In this year of 1963, our program will be passing through a year of concentrated development. Concentrated development does not always produce "spectacular" events, and it is possible that our efforts may be overshadowed by Soviet space shots. I urge, therefore, that we not be discouraged by publicized events but rather be stimulated to even greater efforts for the coming years.

The United States is, at all times, cognizant of the fact of competition in the development of space technology. At the same time, neither the pattern nor the purposes of our program are controlled by other than our own national purposes to develop the peaceful uses of outer space. We do what we do in space because of our national faith, not our national fears. We proceed on the program scheduled because of our confidence, not because we are seeking to copy or duplicate what others have done or may do.

In the long prospect of the Space Age, our national efforts to this point are to the future as a minute is to a millennium. We cannot measure our continuing advance by the calendar. We are compressing generations of progress into months or even weeks of time.

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This very speed at which the United States effort is moving makes it imperative that we not form tomorrow's goals on yesterday's thinking. It is also imperative that we not set our purposes by the narrow horizons of a dollar debate.

There would be no reason for us to be concerned with space at all except for the clear and compelling implications of space to those values of our system and our society for which no price is too great. Freedom is a sturdy plant, but it cannot grow and flower on this earth if the universe which envelopes us is poisoned and contaminated by tyranny.

If we are to be successful in freedom's cause, we must, as I have said, concern ourselves with bridging the gap between space science and political science. Nowhere else has science served freedom as nobly and abundantly as under our system. Likewise, nowhere else has the political system supported scientific inquiry and achievement more effectively or more understandingly. Our achievements of the past five years dramatically demonstrate both of these points.

Americans now are able to be infinitely more confident about the future than in the first anxious days after Sputnik I in 1957. We can say now that on our present course there is no danger of a default by our nation in space. We can also say with equal confidence that there is a growing prospect of decisive success for our free society in the competition to preserve the realms of space for the peaceful benefits of mankind in this century.

In a day when machines can talk to each other and work with each other, it is neither too much to ask -- nor too much to hope -- that responsible men of the technological community and the political community can and will find their way to mutual understanding to assure our greater success in achieving the goals essential for our freedom.

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April 8:

Vice President Lyndon B. Johnson, in Associated Press interview, was asked: "Mr. Vice President, as chairman of the Space Advisory Council [i.e., National Aeronautics and Space Council], you were intimately concerned in drafting the 5.7-billion-dollar space budget. Former President Eisenhower says the budget is spongy, and there is no hurry about getting to the moon. In view of this recent Russian shot [LUNIK IV], what is your reaction?"

The Vice President replied: "The Administration has submitted to the Congress what we believe is a sane and responsible proposal to insure the maximum efficiency and effectiveness of our space program. I know of no reckless desire in any responsible quarter to get to the moon at all costs and without regard to the consequences to other vital aspects of our national policy.

"The objective of reaching the moon is one aspect of our national space program which will be of great benefit to our country, and I think to all mankind. It may be possible by appropriating more money to speed up slightly the attainment of that goal and, of course, we all know it would be mighty easy to slow that goal down. But I don't think that either alternative would be helping our country. Gaining a short period of time would almost certainly be at the expense of other crucial programs. Slowing down might bring us some one of these days face to face with the shocking knowledge that we had permanently assigned ourselves to second place.

"So, all in all, I think the Administration has submitted a program which we can all embrace and both parties can fully support." (AP, Wash. Post, 4/8/63)

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March 26: Vice President Lyndon B. Johnson reviewed his first 26 months in office on ABC television interview. Referring to his participation in major national decisions, he referred to pushing ahead with the large rocket booster program and the accelerated space program decisions in which he participated as Chairman of the National Aeronautics and Space Council. (Wash. Post, 3/27/63; Wash. Eve. Star, 3/27/63)

1963
REMARKS OF VICE PRESIDENT LYNDON B. JOHNSON
AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS
SECOND MANNED SPACE FLIGHT MEETING
DALLAS, TEXAS
TUESDAY, APRIL 23, 1963
7:30 P. M.

FOR RELEASE IN AM'S OF WEDNESDAY, APRIL 24, 1963

You may recall the circumstances of a football game in Dallas which went into Southwest Conference records as a one-to-nothing victory for SMU over TCU. On a rainy autumn Saturday, the bus carrying the Horned Frogs from Fort Worth, 32 miles away, couldn't make it up Chalk Hill, west of Dallas on the old Dallas Pike. The result was a forfeit -- with the official score of one-to-nothing.

I mention this to contrast our horizons -- and our capabilities. Many of you can remember when Chalk Hill was a major obstacle and the supreme test for every new automobile. Motorists could brag if they climbed Chalk Hill with no more than two or three rest stops to permit the engine to cool. Yet now, we are able to meet to talk seriously about explorations and journeys 26 million miles away to the planet Venus -- or 47 million miles away to the planet Mars.

We have come a long way. In the new Age of Space which brings us together, we are destined to go a long way further.

The Age of Space is less than six years old. It is no insignificant detail that this important scientific forum is convened in this city and this state far removed from the older established centers of economic, commercial and industrial enterprise of our nation. On the contrary, this emphasizes one fact about the Age of Space which many have neglected:

The fact that the Age of Space is -- for all regions of America -- a second industrial revolution -- a revolution which is bringing a new future, a new degree of participation, a new scope of contribution for every region of our country -- and for every segment of our society.

Some of our countrymen suspect that space is a gimmick or a gamble. Others regard it as forced upon us solely by considerations of national prestige and international competition -- the necessity of "keeping up with the Russians."

You and I believe such conceptions are false.

Space is not a gambit.

It is not a gimmick.

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Our national activities in space research and exploration are no longer in the category of a gamble.

"Keeping up with the Russians" is not our primary motivating force. In fact, we want to pass them, not just keep up with them. Moreover, what we are doing -- and what we hope to do -- would still be required of us in our own self-interest if we were the only nation on earth to possess space capabilities.

Yet, if misconceptions do exist among the public, the fault is less theirs than it is the fault of those who have understanding of space but have not taken the time to explain fully its meaning or the necessity for our national activities in this new realm.

The Age of Space reflects and is supported by a revolution in science and engineering.

Ninety per cent of all the scientists who have ever lived are living today. More mathematics has been created since the beginning of the twentieth century than in all the rest of history. Ninety per cent of the drugs being prescribed by our physicians now were not even known ten years ago. In many fields of science, the research literature published just since 1950 is several times greater than all that published in the centuries before.

This explosion of science and engineering is not just American. It is not just in the Free World. The sudden burst forward of man's scientific knowledge and capability is world-wide -- on both sides of the Iron Curtain.

In this context, when we speak of competition between the Free World and the Communist World, the competition in space is merely symbolic. The real competition between our systems is not a race for the moon -- it is a race to see which system will do the best job of developing and applying new scientific capabilities for the betterment of life on this earth for all mankind.

If this is the competition, I am sure some will ask why go to the moon? Why be concerned about Venus and Mars? Why send men up to orbit the earth? Why not keep both feet on the ground and spend our money here instead of in outer space?

These are sincere questions and valid questions. They cannot be dismissed impatiently. If the public is to be asked to support the cost of space research, the public is entitled to understand the justification for these large -- and still growing -- demands.

There are several parts to the answer.

First -- and foremost -- is the fact that the full value of science to the improvement of life on earth cannot be achieved, if we artificially limit our horizons to the outer edges of the earth's atmosphere. If we are to make science the servant of man, we must go into space to put science to work for us on earth.

Two examples help illustrate this.

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First, there is the field of weather. Scientists tell us that if we could accurately predict the weather five days in advance, it would mean cost savings of \$2.5 billion annually in agriculture, \$45 million in the lumber industry, \$100 million in transportation, \$75 million in retail marketing and more than \$3 billion in management of our water resources. This is for the United States alone. The total world-wide benefits are beyond calculation.

We will be able to do these things -- these and many more. We will be able to predict the weather, not just five days in advance, but perhaps for a whole season. In advance, we will be able to eliminate the high toll of lives and property from hurricanes and tornadoes and typhoons. We will some day perhaps be able to modify and exercise control over our weather -- eliminate droughts and floods, bring rains to the deserts and control the deluges of the jungles. But we can do none of this without developing space capabilities on which we are at work today.

Second, there is the field of communication. Our first trans-Atlantic telegraph cable opened in 1866. Sixty years elapsed before the first trans-Atlantic radio circuit in 1927. Thirty more years passed before we had the first reliable trans-Atlantic telephone cable in 1956. It took us ninety years to increase our capabilities a thousandfold. But today we have the prospect through communication satellites of achieving another one thousandfold increase in less than a decade.

Perhaps before the 1960's end, we will be transmitting hundreds of individual messages by satellites in one second. Books the length of the Bible will be transmitted in written form in less than one minute. Dallas business men will be able to check their inventories in London or Tokyo in a matter of seconds. Giant business machines and computers will be tied together across the oceans. Scientists in distant, underdeveloped nations will be able to solve their equations on computers in Texas or New England or California.

Again, if we are to achieve these things -- if we are to put our new technical competence to work for us to the fullest extent possible -- we must be capable of utilizing space as the avenue for these advances. Earthbound science cannot serve us. A ceiling on science would be a ceiling on our progress and our prosperity -- and eventually on our freedom itself.

That last point is one we must not forget.

The United States has chosen as a matter of firm national policy to commit its efforts to the development of the peaceful use of space. It was my privilege in 1958 to present the United States policy to the United Nations at the request of President Eisenhower while I was Majority Leader of the Senate.

We have invited and encouraged all nations on earth to join with us in this common peaceful endeavor. We can be proud that more than sixty nations -- from Argentina to Zanzibar, from Iceland to Thailand -- are working cooperatively with us in the greatest international program of scientific information exchange ever known.

Our first and continuing objective is to develop the peaceful uses of outer space. But we are not unmindful of the threats to peace on earth which would result from the exclusive mastery of space by any power seeking to perpetuate earthly aggressions.

When we send our probes on missions into space, near and far, we are not engaging in idle adventures. As some say, "What man can conceive, man can do." As just one example, it is conceivable that an unfriendly power might use space for arms storage, or for the stationing of an offensive weapon, or for other hostile purposes.

If we are to be responsible and prudent, we must anticipate today what the Soviets or others might have or might develop to threaten our freedom. We cannot wishfully and unrealistically assume that no nation will extend its objectives of world domination by means of space weapons.

If we are to realize the full capabilities of our technology for the betterment of American life -- if we are to meet fully our national requirements -- we cannot arbitrarily put a ceiling on the domains of science.

Responsibility to ourselves -- responsibility to the cause of freedom which we lead -- requires us to explore the realms of space as we are doing today.

There is another part to the answer about our purposes in space which is too little understood. This is the fact -- as I mentioned at the beginning -- that this Age of Space is the star performer in this industrial revolution.

Our space program is creating and helping to create new basic industries for our economy. The number of private companies and research organizations participating in our space programs has grown in less than six years to more than five thousand. A single orbital flight by one of our astronauts last year required the supporting services of more than four hundred thousand individual jobholders. Out of our space research programs have already come more than 3,000 new products and methods available for the use of private enterprise.

Technology of space research is just now beginning to be felt in our daily lives. By-products of the space program are appearing in the automobiles we drive, in our office equipment, in the air-conditioning and heating equipment in our homes, in the medicines we take and even in the pots and pans our wives use in their kitchens.

Many of the Buck Rogers symbols of this age have unexpected values. For example, the space suits worn by our astronaut heroes -- such as Colonel Glenn -- may soon be used widely in medical centers to relieve the discomfort of stroke victims. By-products of the research on the propellants which send our missiles aloft will provide effective means of treating tuberculosis.

It took us 112 years to develop photography, 56 years to develop the telephone, 35 years to perfect the radio, 15 years to make radio workable, 12 years to make television feasible and 6 years to develop the atomic bomb. But the outpouring of space research into our lives and businesses is coming after less than six years -- and this is only the beginning.

(5)
Equal in importance to these developments is the impact of our space effort on the economy of every region of our nation. As might be expected, Texans have said much about the significance of this State -- and of the Southwest -- in the Age of Space. But I would emphasize that this is by no means exclusive to the Southwest alone.

Space research has brought a major rejuvenation to New England.

It is generating new growth and prosperity in the Deep South and Southeast.

Space will be an increasingly important source of contracts and jobs in economic activity for the Great Lakes, the Northwest and the Rocky Mountain states.

Space-related activities have already become the number one industry for the nation's most populous State, the State of California.

For the first time in our nation's history, an historic new boom is beginning in which all regions will share -- in which the strength of every region will be marshalled and its promise realized and the people permitted to prosper.

This city, this state, this region have known boom-times in the past. But the promise of the future now unfolding dwarfs the dimensions of the past. Scientists and engineers -- as well as public officials -- have a duty to bring the reality of this future home to the American public now.

To reach for the moon is a risk. But it is a risk we must take. Keep in mind that failure to go into space is even riskier.

In less than a lifetime, Chalk Hill -- and many obstacles like it -- have been mastered and young generations have forgotten where it is. So it will be with outer space. Where the moon is a major goal today, it will be tomorrow a mere whistle stop for the space traveler.

We go into space as pioneers came into this West, for one purpose only: to find for ourselves and our families a better life on earth and to assure the ultimate success of the cause of freedom we uphold.

If we do not succeed in these efforts -- as one great American has put it -- we will not be first on the moon; we will not be first in space; and one day soon we will not be the first on earth.

#

"As satellites extend man's vision into new dimensions, weather forecasting will make major advances as a science, until we see reliable predictions a season ahead. This will have far-reaching economic benefits for all. Following are some estimates of cost-savings, assuming that we can predict weather accurately only five days in advance:

- * \$2½ billion a year in agriculture.
- * \$45 million in the lumber industry.
- * \$100 million in surface transportation.
- * \$75 million in retail marketing.
- * \$3 billion in water-resources management.

"These estimates of savings are for just the United States. Worldwide benefits would be many times as great.

"Continued scientific research aimed at understanding the underlying processes that produce weather and determine climate may lead us in the next decade to control weather and modify climate.

"This exciting prospect poses a profound challenge to our scientists to gain a thorough understanding of the consequences of any man-made interferences to insure that they are beneficial. For the fundamental importance to all mankind. To use it intelligently, to modify some of its excesses, as we fulfill our destiny in mastering the space environment.

Vice President Lyndon B. Johnson -- Editorial, Astronautics and Aerospace Engineering, April 1963.

1963

May 11: Vice President Lyndon B. Johnson, speaking before American Editorial Cartoonists' meeting in Washington, referred to complaints that excessive costs of Project Apollo and other U.S. efforts would "undermine the dollar.... But we are not told what would happen to the dollar--or to America--if space were defaulted to the Communists...."

"The question is which kind of philosophy, democratic or Communist, will dominate outer space?

"I, for one, don't want to go to bed by the light of a Communist moon." (AP, Wash. Sun. Star, 5/12/63; Wash. Post, 5/12/63)

1963 .

"In the field of space, the Soviets took an early lead in constructing the big booster rockets, and we have not caught up to them yet. And, they are also ahead of us in experience gained from manned space flights, although the recent magnificent achievement by one of your native sons, Maj. Gordon Cooper, helped narrow that gap significantly.

"....Space: This has gained the lion's share of publicity -- and justifiably so.

"When we talk of space and space research, there are those who raise the question that our efforts cost too much. Certainly American leadership in space is not cheap. We are now spending 20 cents per week per capita on our national space program.

"Other Americans ask if our space efforts are worthwhile.

"I can answer in terms we can all understand. While the space age is not yet 5 years old, more than 5,000 companies and research organizations have been or are now involved in our space effort. We have produced more than 3,200 space-related products, many of which are already being put to use.

"But, many prominent Republicans are questioning the value of the program. A former Republican President has referred to our moon project as a "stunt."

"I can answer that simply: I do not believe that this generation of Americans is willing to resign itself to going to bed each night by the light of a Communist moon."

Remarks of Vice President Lyndon B. Johnson, Jefferson-Jackson Day Dinner, Oklahoma City, Okla., May 20, 1963

1963

May 21:

At the State Department luncheon honoring Astronaut Gordon Cooper, Vice President Johnson remarked:

"In 1942, President Roosevelt called together our wartime leaders for the final decision on continuing or abandoning the Manhattan project which produced the atomic bomb. One of the most eminent leaders present heard presentation from all sides. Then, he solemnly gave President Roosevelt his verdict: 'The bomb will never go off--I speak, of course, Mr. President, as an expert on explosives.'

"In that first, uncertain spring of the space age 5 years ago, some conscientious experts took the same attitude toward Project Mercury. History has proved them grossly wrong....

"Hitler once predicted the Nazis would wring England's neck like a chicken. After the Battle of Britain, Winston Churchill said to Commons, 'Some chicken. Some neck.' We have heard some say recently that the civilian space program is only 'leaf raking.' Considering Major Cooper--considering the vast technological cooperation which made his mission a success--I would say today, 'Some leaf. Some rake.'" (Text, CR, 5/23/63, A3299)

1963.

"...In a short time -- a very short time -- weather satellites will be predicting and perhaps helping to modify the weather on Earth. Such satellites will be measuring snow cover, forecasting storms and floods, detecting forest fires, and even keeping watch on plagues of grasshoppers, locusts and other crop-destroying pests.

"Communications satellites will -- for very little more than the price of a phone call today to Austin or San Antonio -- be carrying your voice around the world as casually as the voices of the Project Mercury team circled the earth last week during Gordon Cooper's flight. Books as thick as the Bible will be transmitted across the Seven Seas in about the same length of time it requires me to speak this single sentence. Young men in India or Thailand -- or Africa or the Middle East -- will, without leaving their homeland, solve the problems of their mathematic equations on computers at the University of Texas or Rice or Texas A. & M...."

Vice President Lyndon B. Johnson -- Address at Johnson City, Texas
May 24, 1963

1963.

June 2: In commencement address at MacMurray College (Jacksonville, Ill.), Vice President Lyndon B. Johnson said: "...We are more masters of the future than of the past but we allow the hand of the past to rest heavily upon us...."

"At today's pace, the sum of human knowledge is being doubled every decade. On a relative basis, the class of 1963 may well be three centuries of learning ahead of the class of 1933. But we are asking a generation capable of going to the moon to live in a world ordered and fixed by generations which scarcely knew the model T--and that makes no real sense...." (Text, CR, 6/4/63, 9438-39)

date?

Lyndon B. Johnson

"If we are to be responsible and prudent, we must anticipate today what the Soviets or others might have or might develop to threaten our freedom. We cannot wishfully and unrealistically assume that no nation will extend its objectives of world domination by means of space weapons."

Quoted by Eugene M. Zuckert, Secretary of the Air Force, at Symposium on the Exploration of Mars of the American Astronautical Society, Denver, Colorado, June 6, 1963.

"The great breakthrough" -- President Johnson's support of the space program was well spelled out in a speech he made in June, 1963. He said that:

"If we as a nation had no competition, if we had no considerations of national security, if there were no Communist Russia or no Communist China, if we had nothing but our self-respect and our tradition of free scientific inquiry, our effort in space today should differ very little from its present magnitude or its present priorities.

"What we are and what we aspire to be as a nation rests upon the predicate of maintaining peace on Earth. If peace is to be maintained on Earth, free men must acquire the competence to preserve space as a field of peace before it can be made into a new battlefield by tyranny. Were there no other considerations, this alone would require us to do what we are doing in space -- and would permit us to do no less.

"We are not reaching for prestige in space -- we are reaching for peace. And this is considerably more urgent than many realize or others will yet admit.

"Space is clearly the great breakthrough of human knowledge -- for centuries to come. We do not know -- and the Soviets do not know -- what the stars will tell us. We do know that to default the exploration of the universe of space would surely be as catastrophic in its consequences as if we had defaulted exploration of the universe of the atom. Our superiority in any scientific field will be brief and fading if we do not win and hold competence in this new and decisive realm of discovery.

"Space is a boon -- not a boondoggle. We are talking superstition -- not sense -- when we talk of machines overpowering men. We are selling ourselves short when we show the white feather to nuclear fission.

"We have a long and undistinguished record of America failing to anticipate the promise and potential of each new age of science, invention and discovery. Early in our history, there was an effort to close down the Patent Office on the theory that everything worth inventing had already been invented. Even so farsighted an American as Woodrow Wilson spent time denouncing the automobile. The steamboat, the locomotive, the airplane all brought prophecies of doom and gloom. We have learned a lesson we surely do not need to be taught again."

1963

June 8: Vice President Lyndon B. Johnson said in commencement address at Univ. of Maryland: "We are not reaching for prestige in space--we are reaching for peace. And this is considerably more urgent than many realize or others will yet admit...."

"In exploring space, we are exploring the environment of the earth itself. We are finding paths through a new dimension--and historically civilizations have stood or fallen according to their ability to move through a dimension.

"We seek to make space an instrument for peace and the development of mankind. But if we abandon the field, space can be preempted by others as an instrument for aggression.

"And in a world of competing social systems, we would be naive indeed if we failed to recognize how bleak the future would be if this new dimension became the realm of tyranny. For your children, and your children's children, an iron curtain would be drawn across the pathway to the stars...." (Text, CR, 6/18/63, A3867)

1963

July 17:

- . National Aeronautics and Space Council met to consider NASA-DOD coordination in Project Gemini and space stations. Vice President Lyndon B. Johnson, NASC Chairman, said after the meeting: "Coordination is a natural and effective enemy of duplication.... I am encouraged by the coordination already being exhibited between these two agencies in these important fields, but continuing attention is required if this country is to fulfill its destiny as the leading space-faring nation." (NASC Release)

1963

July 23:

Vice President Lyndon B. Johnson, addressing Governors' Conference at Miami Beach, said:

"In the world of today, we must recognize that the winds and the waves are with us. This is the time for us to steer straight and true toward the horizons we have for so long hoped to reach.

"But we should also recognize that favoring winds are rising at home. Our record in space is a prime example. We started late. We moved too slowly at first.

"But the record shows now that where the Soviet Union has successfully launched 43 payloads into orbit, the United States has launched 144.

"Our ratio of successes to failures in launchings prior to 1961 was only 1 to 1--but it has now reached the ratio of 5 to 1.

"The Soviet continues its lead in the ability to launch heavier weight into space. But we are pulling far ahead in developing practical uses of space with weather, communication, and navigation satellites.

"We are not racing for prestige in space. We are engaged in a deadly serious race for peace--and for control of our own destiny. This is a race free men must win...." (Text, CR, A4759-60)

1963

Vice President Lyndon B. Johnson, writing in the Fall issue of Challenge magazine of the General Electric Co., said:

"Space is not a gambit. It is not a gimmick.

"Our national activities in space research and exploration are no longer in the category of a gamble. We are able to talk seriously about explorations and journeys, 26 million miles away to the planet Venus -- or 47 million miles away to the planet Mars.

"We have come a long way. In the new Age of Space which brings us together, we are destined to go a long way further. Where the moon is a major goal today, it will be tomorrow a mere whistle stop for the space traveler. I confidently believe that the developments of the Space Age will bring the beginning of the longest and greatest boom of abundance and prosperity in the history of man."

Sept 1963

FOREWORD

IN THIS FOREWORD I intend to indicate that the great new problems confronting civilization in the Age of Space require the close and devoted attention of the social scientists as well as of the natural scientists, and that principles of justice and order should be established in these early days of man's exploration of space. *Space Law and Government* is a penetrating examination and analysis of such principles and, as such, merits the careful attention of thoughtful people in all walks of life. By this, of course, I do not mean to indicate that I agree or disagree with the statements or conclusions of the author or of the authorities relied upon.

Our Earth is only one planet in our entire solar system. Our sun is only one of millions of stars in a single galaxy. Our galaxy is only one of many galaxies in the universe. Man and life as we know it on this earth exist only within a minute portion of the whole range of conditions within the Cosmos.

Man's vexing problems thus take their proper place when observed from afar. It is therefore fitting and proper that we urge every avenue be explored to set aside the manmade problems that plague this world and join others to explore jointly what lies outside this small world of ours. I note that a major portion of *Space Law and Government* is devoted to discussing international cooperation in space exploration on official and nongovernmental levels. This is indeed useful.

The United States already is pursuing an active program of cooperation with many other countries of the world. I would repeat here again what we have so often said before: our program is open to all nations. We hope that improved international relations as among all peoples will be furthered by man's move into outer space.

It is my earnest hope and the hope of all Americans that such international cooperation programs can be expanded to the fullest and that we, together with all the nations of the world acting jointly and cooperatively, can explore what lies beyond us. From such cooperation will be

derived practical experience in fairness and justice both in outer space and on the earth itself.

From the beginning of time until about five centuries ago, men lived out their lives on earth without hope of rising above the station of their birth. They had no expectation of freedom—no expectation of justice—no thought of individual rights—no conception of a voice in governing themselves. Then came the discovery of the New World—the world of the Americas. Since that day, man has climbed steadily to his noblest heights. His status—economically and socially—has risen through every century. Most importantly, the spirit of freedom and justice has proven its viability.

Discovery, exploration, and a floodtide of invention for five centuries have brought the liberation of the human spirit and the elevation of human dignity and worth. Freedom as we know it would not have come into existence—and certainly would not have survived—without the opening of this great new frontier on earth. Today the unlimited reaches of space constitute the New World of freedom.

The distinguished background of the author and the painstaking research which has gone into this book point up the value of *Space Law and Government*.

Lyndon B. Johnson
Vice President of the United States

1963

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Aerospace Magazine
September, 1963

By VICE PRESIDENT LYNDON B. JOHNSON



Seldom in its lifetime is a country fortunate enough to be confronted with such a challenge as that of the National Space Program. It enables our people to devote their skills, their courage, their initiative, and their resources to a continuing series of projects which expand their imagination while enriching their country.

SPACE AGE CHALLENGE

The space program — and particularly the manned flight portion of that program — has been likened to Columbus' voyage to the New World. And, there are grounds for such comparison. Both include exploration of the unknown and uncharted regions of the universe; both involve risks and skills and investment of resources; both contribute to broadening of man's knowledge and breaking down narrow barriers of thought. Yet, with all due regard to Columbus' venture, there are many features of the space program which raise it above the level of that historic feat of the fifteenth century.

One cannot measure the relative amounts of courage required by Columbus and his small crews, as compared with our astronauts. Suffice to say that both were great. No, the differences lie in other respects. The space venture stems from a decision by the elected representatives of the people, is financed by the people as a whole, is participated in by hundreds of thousands of individuals, pushes the state of the art technology to new horizons, contributes to new industries, new products, and new knowledge. More-

over, it furnishes a vehicle for improved international relations and increases the possibility of world peace.

AN INVESTMENT

The space program is a test, in a sense, of our way of life — a test of our confidence in our country. It is a situation where peoples of a country — generally well fed, well clothed, well housed, and even fairly well endowed with leisure and luxury — are willing to undertake, not ordered to undertake, a difficult challenge and are willing to meet that challenge with their material and intellectual resources.

There are those who decry the expenditures involved — those who by a curious line of reasoning conclude that it is not "fiscally sound" to go to the moon. In this free country, they are, of course, entitled to hold and to express such views, mistaken as they seem to me to be. It is worth pointing out that fiscal soundness does not mean that an individual or a nation should refrain from spending. Rather, it calls for spending for those objectives which promise the most assured and most constructive returns. The parable of the talents from the Bible comes to mind. The Lord's wrath was bestowed upon him who buried his money and the Lord's blessing was bestowed on those who spent or invested it wisely.

The space program is a wise investment. If the returns from the space program will be worth many times the cost — and I believe they will — then it would be fiscal irresponsibility to refrain from the investment.

On May 25, 1961, President Kennedy went before the Congress to talk about what our country should do to meet the "extraordinary challenge" before it. On that occasion, he said:

"Now it is time to take larger 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 may hold the key to our future on earth."

"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 the earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space —"

The country is stronger because the President made this decision and took it before the Congress. I am proud to have recommended this action to him.

The record should be clear, however. The President was also declaring a policy and a program for a well-rounded and balanced national space program, of which the moon project was an important part but only a part nevertheless. In that same message, and backed up by subsequent budget requests, he referred

to the need to develop large liquid and solid fuel rockets, as well as acceleration of the construction of nuclear rockets. He referred to unmanned as well as manned exploration of space. He urged action in the fields of space communication and meteorology.

Moreover, as the subsequent budgets reveal, the President has asked for significant funds for military development in space. For example, the defense space budget for FY 1964 is larger than the total spent for all space activities in FY 1961 — the last year of the previous Administration. (FY 1964-requested for Defense is \$1667.6 millions; FY 1961-spent for all programs was \$1468.3 millions.)

While it is my intention in this article to give major attention to the moon project, I want to emphasize that the National Space Program includes many space projects. Moreover, it will continue indefinitely to be a program of building broad space competence so that the new dimension of space will become as much a part of our way of life as the land, the sea, and the air.

5. NATIONAL PROGRAM

Why have we chosen the moon? Why undertake such a difficult and expensive project? What advantage does a round-trip to the moon have, which other less ambitious space projects would not also have?

Let's look at some of the reasons for the moon trip:

(1) **A CLEAR OBJECTIVE.** Impetus, order, and efficiency stem from having a clear-cut target in any enterprise. The moon is such a target. To get there requires organization and planning, specifically fitted and suited to accomplishing a definite goal. To bring forth the best effort the goal has to be difficult and challenge the very best brains — in management, engineering, and science. There are other space targets which meet these criteria, some more remote in time, but surely the moon trip meets these well.

(2) **LOCATION OF THE MOON.** Compared with other targets in space, the moon — only 240,000 miles away — is relatively near. Certainly it is the logical place in space where we can test the equipment and the men for future and more distant space travel. It is an area which we can photograph and examine by instrumentation prior to manned exploration. Little as we know about the moon, it is the area in space concerning which we now know and can most easily learn the most.

(3) **SPACE COMPETENCE.** Various space projects, such as weather satellites or communication satellites, require varied competence and sophisticated equipment. They are difficult to develop and they are important. But no project, currently within our capability, brings into focus as wide a range of developmental capabilities as the lunar task. Powerful rocket engines, complex spacecraft, precise guidance, trained astronauts, elaborate tracking facilities, and protective measures against the multiple hazards of space, are just some of the competences which must be wrapped together for a successful moon shot. These competences, once developed for this project, all have value as a solid foundation for a great variety of other

NUCLEAR-POWERED (RIFT) SPACE VEHICLE



WHY GO TO THE MOON?

a useful police force in space for maintaining the peace. Powerful rockets, reliability of space equipment, development of control and guidance systems, experience with manned spacecraft, etc. are all spin-offs from the lunar project, which help build our defense capability.

Each of the cited reasons for going to the moon could by itself be expanded into a persuasive argument. Taken all together, they form a sound, unemotional, pragmatic justification.

It is perhaps pertinent to comment briefly on a few of the counter arguments, not so much because they merit attention but because they receive attention anyway.

For example, the charge is made that the lunar program is a waste of trained manpower. It seems to me absurd to identify as waste the use of skills, even though scarce ones, on anything as challenging and constructive as the space program. Moreover, those who use this argument of waste are vague as to where these skills are being diverted from. Are they being taken from equally important projects and, if so, what are they? Or, are they being shifted from research and development on improved soap chips or more elaborate styling for automobiles? I doubt that those questions can be answered in any useful generalization, although I am confident that the net result is a more effective use of manpower. Those skilled scientists and engineers, who move into the expanding space arena, do so because of the challenge and the opportunity to put their skills to a real test. They will be better technologists for the effort, and the country will gain from the added knowledge and the demanding experience obtained.

It is interesting also to look at the statistics on this manpower shift. Currently, NASA is using for all of its space efforts, primarily through its private contractors, about 3% of the total supply of physical scientists and engineers. This percentage may rise to 6 or 7% within a few years but that is hardly a serious drain on the total number available, although it may strain the supply of some specialized individuals. Well over 90% of the country's total supply will still be devoted to other endeavors.

In addition to that statistical point, the fact is that the space program is stimulating more young people to go into the disciplines which space requires. It should also be noted that NASA, through fellowships and facilities grants to universities and other private organizations, is taking positive action to increase both the quality and the quantity of the supply for the future.

The argument is sometimes made that there are more worthwhile things on earth for which manpower and funds should be spent.

Granted that we need to do more in education, slum clearance, medical research, and crime prevention. But, when one looks at the billions spent annually for non-essentials in this country, it is clear that funds

do exist for handling both the space program and all other essentials, if we as a people just decide to spend our income that way. Moreover, curtailment of spending in space—abandonment of the moon project, for example—would not automatically mean expansion of spending for slum clearance or any of the other serious needs. In fact, it is more likely that the funds released thereby will go to the race tracks or for larger yachts, or for fancier country clubs. Do not be misled by the argument that space is taking from other essentials. Incidentally, most of those who make that argument would also oppose using the funds to meet the other essential requirements of our burgeoning society.

There are also those who say that the moon trip is dangerous—that the project could be crowned with disaster instead of success. If the first attempt fails, we would probably try again, with all the safety provisions we can devise and with the increased knowledge obtained from our first attempt. But, assuredly, the United States does not avoid risky ventures when the benefits from success promise so much. Even if the moon flight turned out to be a failure, which is possible but unlikely, there will have been tremendous gains from the competences developed in the process.

With all the sense of urgency which the moon venture engenders, it is still not a "crash" program. It is erroneously compared with the Manhattan Project, which was properly labeled as a "crash" effort. In that case we used all the resources we could obtain in order to develop the atomic bomb in the shortest period of time, regardless of cost. We maintained duplicating operations over a three-year period in the hope that one would work. Apollo is no such project. If it were, we would not have had the controversy over whether we should choose earth-orbital rendezvous or lunar-orbital rendezvous, or direct launch to the moon itself. A crash program would have gone into operational stages of all three alternatives. No, the lunar project is given a high priority, but it is being conducted in an orderly manner and with due regard for cost efficiency and unnecessary expenditures.

In conclusion, I like to think that our space program, with all of its challenges and all of its material costs, is a constructive step toward world peace. In this effort, there is opportunity to cooperate with other nations, without stepping on the nationalism of other territories or the embedded barriers of tradition. There is room in space activity for nations to grow closer together through exchange of information and through sharing of experience. There is also some possibility that an international peace born in space could deter the drive of aggression which might break loose from lesser restraints.

It is my hope and my expectation that the Space Age will be an age of maturity in man's relationship—an age of exploration, not exploitation.

REMARKS BY VICE PRESIDENT LYNDON B. JOHNSON
PREPARED FOR DELIVERY
FIFTH ANNIVERSARY OF NASA & PRESENTATION OF AWARDS
NATURAL HISTORY MUSEUM - WASHINGTON, D.C.
OCTOBER 1, 1963

FOR RELEASE AT 2:30 P.M. EDT, TUESDAY, OCTOBER 1, 1963

We are meeting today to commemorate five of the most exciting years in history -- the five years in which space exploration moved from the drawing board into the skies.

It is a bewildering sensation to realize how far and fast we have gone in just five short years.

When NASA was founded, we had launched only four successful earth satellites in twelve tries. Since then, we have put more than 150 payloads in earth orbit, and have sent six into permanent escape from the earth.

When NASA was founded, our space guidance was so limited that we were lucky when a payload ended up in any kind of orbit. Today our technicians are so good we can send astronauts whirling around the earth and bring them back within yards of their planned landing site.

When NASA was founded, we were stretching to the limit the thrust of a few rockets developed for military purposes. Today we are building rockets with millions of pounds of thrust, designed and powered to make us a space-faring nation.

When NASA was founded, a bigger orbiting satellite was our only firm goal. Today, we are going full steam to put a man on the moon within this decade.

And the policy of the United States is clear -- with or without cooperation from any other country, we are going to the moon, and we are going to make that trip as soon as we can.

We would like to do this through international cooperation. Leaders of both parties have sought cooperation under two administrations. The moon represents our major space goal for this decade and if cooperation is possible we are willing to share this goal as well as others.

But the goal itself is one to which we shall adhere.

It should be clear to every nation on earth that the United States seeks international cooperation in space.

We recognize that the road to the moon can also be the road to peace -- that by learning to live together in space, we may eventually learn to live together on this planet earth.

Already sixty nations have entered into cooperative relations with us in space, sharing the scientific findings for the good of mankind. This is the reason for our space effort -- the good of mankind.

The United States does not covet a single piece of real estate in the rest of the world, and we do not covet a single piece of real estate in the rest of the Universe.

We enter space to serve the cause of peace -- to make life better for every creature on earth. We call upon our fellow earthlings to join us in this quest. We feel that the exploration of space will bring us a new and exciting age which can be compared only to the periods when man learned to sail the seas and fly through the air.

But space programs and national goals are no better than the people that comprise them.

I am proud to join today -- on this Fifth Anniversary of NASA -- to honor some of the employees who have made outstanding contributions to this age of space.

This is recognition, without adequate compensation. But, it shows that your government is appreciative and grateful for your work. No one person -- no small group -- is responsible for the mounting success of our national space program. It is a team effort.

But even a team effort is only as strong as the individuals who make it up. When we honor individuals, however, we do so partly because of their contributions to the team effort.

Five years ago, the NASA team was made up of about 8,000 former NACA employees in the Washington headquarters and three field centers. Today, the team consists of close to 30,000 employees in great new facilities located strategically around the nation.

NASA has grown as the mission and importance of space has grown. It will continue to grow as the space program becomes an even more vital part of our national and international life.

If you who make this progress keep at it -- and I know you will -- the United States will lead the world to peace through space.

I again congratulate you all for your dedication to your country -- through your service to the Federal Government.

1963

IBJ Sees Prestige in Moon Trip

Boston, Oct. 24 (AP) -- Vice President Lyndon B. Johnson said tonight that to abandon now the costly and controversial project to put a man on the moon would represent "a conspicuous withdrawal and retreat."

Challenging critics of the multibillion-dollar moon project, Johnson declared that "leadership in space is decisive to leadership on earth."

In a speech prepared for a meeting of the Massachusetts Associated Industries, the Vice President took issue with what he called the demands of "a contradictory alliance of conservative economizers." He said they want to interrupt planned programs of research and development and "deliberately discard some of the most clearly enunciated and widely understood objectives of our national policy."

"It is a fact the moon landing will cost money," Johnson said. "But it is not a truth that abandonment of this objective would cost less."

"The dollars not spent would be worth no more than the confidence the world would have in our system after such a conspicuous withdrawal and retreat."

"Likewise, the discretion we would have to divert those dollars to schools, housing, medicine and food would be controlled by the reaction of our adversaries to the opportunity such a default on our part would present for them to exploit."

"If we want to maintain the credibility of our claim to the superiority of a free political system -- and a free private enterprise system -- we cannot seriously entertain the thought of precipitating now so massive a disillusionment as would follow a political default on our commitments in space exploration."

Remarks of Vice President Lyndon B. Johnson at Douglas Space Center Dedication in Huntington Beach, Calif.

EXTENSION OF REMARKS

OF

HON. RICHARD T. HANNA

OF CALIFORNIA

IN THE HOUSE OF REPRESENTATIVES

Tuesday, October 29, 1963

Mr. HANNA. Mr. Speaker, last Thursday in Huntington Beach, Calif., the Vice President of the United States, Lyndon B. Johnson, honored us by delivering the principal address at the dedication of America's newest and most modern center for space research and development. This space center was designed and built by Douglas Aircraft, Inc., a leader in this, the age of space.

Vice President Johnson's excellent speech outlined this Nation's commitment to, and stake in "mankind's last and greatest frontier—the frontier of space."

Mr. Speaker, I include the text of the Vice President's speech at this point in the Record.

REMARKS BY VICE PRESIDENT LYNDON B. JOHNSON AT THE SPACE CENTER DEDICATION, HUNTINGTON BEACH, CALIF., NOVEMBER 14, 1963

This is a day of great and justified pride for all associated with the building of this outstanding center of research and development for the age of space.

It is a credit and honor to our system that a private organization begun in the back of a barber shop could within a lifetime grow in size, talent, and vision to participate in the pioneering of our Nation's search for peace out in mankind's last and greatest frontier—the frontier of space.

This center is not dedicated today as a monument to past achievement. It is dedicated, rather, as a testament to our American faith in the future and in our own national resourcefulness for achieving and realizing the potential of that future.

If there has been a single characteristic responsible for our success over the past 200 years, it has been the characteristic American confidence in the future. It was that same confidence which brought other generations westward across the continent to build what has been built in such a short time here on the shores of the Pacific.

Today, in our land—and in the world—there are those who argue for the view that we should not push forward into new realms or new enterprises unless this is clear and compelling evidence of competition from other nations and other systems. I believe the American people reject the concept that their future—or the future of freemen everywhere shall be defaulted to the vision and ambition of the totalitarians.

We refuse to accept so negative a doctrine that we are not to interest ourselves in space unless the Communists are interested in space. We cannot live as freemen if for the sake of our own comfort, convenience and complacency, we permit ourselves to become slaves to the limitations, the deceptions or the gulle of the Communist system and its leadership.

Those who say—as some are inclined to do—that our purposes and the purposes of communism in space exploration are the same misread and misunderstand the history and meaning of our times. In 1957 when the Soviets placed the first sputnik in orbit, the Communist rulers of Russia refused to consider sharing the fruits of space research with other nations—refused to consider committing themselves to developing space for peaceful purposes alone. In that same year, we of the United States clearly stated our own national policy and purpose. We committed and dedicated ourselves to sharing the fruits of space research with all mankind—and in the sole objective of developing the uses of space for peaceful purposes.

It is significant that while the Communist efforts are conducted behind a curtain of secrecy, we of the United States enjoy the cooperation, support and alliance of more than 60 nations for our space program. It is significant that while we of the United States can and do propose joint endeavors for peaceful purposes, the Soviet both rejects our proposals and devotes itself to attempts to dissuade us from continuing on the programs we have established.

America's commitment to the exploration of space for peaceful purposes—and for the good of all mankind—is a firm commitment. We will not retreat from our national purpose. We will not be turned aside in our national effort by the transparent maneuvers of those who would attempt to divert us.

Our national purpose in space is peace—not prestige.

Our foremost objective is not to send a man to the moon but to bring a greater measure of sunlight into the lives of men on earth.

Our space technology and research have moved forward rapidly and dramatically since the early days of the age of space barely half a decade ago. But our achievements and accomplishments in this field remain in their infancy. It is imperative that at this critical point of development and progress we keep our space technology and science free of the control and misdirection of arbitrary policy changes.

The history of science is a history of unending service to the betterment of life for man. The same has not always been so true for the history of political science. We must not fasten down upon the scientific potential of this new age the limited vision of passing political causes and conveniences.

We have the country we have—our cause of freedom has the strength it has—because we have always maintained faith and confidence in the future and in our own ability to control it for the good of man.

Today the full complex of our society—business, labor, education, and government—are working together in resolute and determined commitment to realize the potential of the space frontier. Our objective must be to continue on this sure course, laying aside petty rivalries, idle jealousies and momentary discomforts to bring the full strength of our remarkable capabilities to bear on achieving the potential opening now before us—and before all the world.

A failure in space would be the costliest failure of our national history—a failure ultimately fatal to the cause we have championed at such great sacrifice and with such great devotion throughout this 20th century. On the other hand, success in space—the success we shall eventually win—may well be the greatest economy of our history if, by that success, we succeed in bringing closer to reality a world without war, a world of universal peace, freedom and justice.

Thus, today, with great pride and greater expectations, we dedicate this center to the service of the future and the cause of freedom which is our country's cause and the highest cause of man on earth.



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FOR THE PRESS:

November 26, 1963

The following is the text of a message sent yesterday by Secretary of Defense Robert S. McNamara to members of the Armed Forces:

"I am privileged to transmit this message from our Commander-in-Chief to the Members of the Armed Forces:

'We have suffered a great national loss and sorrow in the death of the Commander-in-Chief, President John Fitzgerald Kennedy. A man who knew war and hated it, he loved peace all the more and sought to make it secure in the world for your children and his. He will be remembered and honored forevermore for his valor and courage in serving that cause of peace which you serve in your faithful vigil for freedom.

'Our Constitution provides for the orderly continuity of the civil offices of our government. In the transition brought upon us by tragedy, there is no interruption in the continuity of that commitment to strength, steadfastness and selfless sacrifice which has kept us free and the world at peace. As you stand your guard of freedom and peace, you may know that the policies and purposes of your country are unchanged and unchangeable in seeking honorable peace, the friendship and alliance of free nations and the building of a responsible world free of the causes of hatred, division, oppression and human despair. Praying to be worthy of God's guidance, let us rededicate ourselves to the continuing tasks before us remembering always that the price of our liberty is eternal vigilance.

Lyndon B. Johnson'"

END

"The great breakthrough" -- President Johnson's support of the space program was well spelled out in a speech he made in June, 1963. He said that:

"If we as a nation had no competition, if we had no considerations of national security, if there were no Communist Russia or no Communist China, if we had nothing but our self-respect and our tradition of free scientific inquiry, our effort in space today should differ very little from its present magnitude or its present priorities.

"What we are and what we aspire to be as a nation rests upon the predicate of maintaining peace on Earth. If peace is to be maintained on Earth, free men must acquire the competence to preserve space as a field of peace before

tific field will be brief and fading if we do not win and hold competence in this new and decisive realm of discovery.

"Space is a boon--not a boondoggle. We are talking superstition--not sense--when we talk of machines overpowering men. We are selling ourselves short when we show the white feather to nuclear fission.

"We have a long and undistinguished record of America failing to anticipate the promise and potential of each new age of science, invention and discovery. Early in our history, there was an effort to close down the Patent Office on the theory that everything worth inventing had

it can be made into a new battlefield by tyranny. Were there no other considerations, this alone would require us to do what we are doing in space--and would permit us to do no less.

"We are not reaching for prestige in space--we are reaching for peace. And this is considerably more urgent than many realize or others will yet admit.

"Space is clearly the great breakthrough of human knowledge--for centuries to come. We do not know--and the Soviets do not know--what the stars will tell us. We do know that to default the exploration of the universe of space would surely be as catastrophic in its consequences as if we had defaulted exploration of the universe of the atom. Our superiority in any scien-

already been invented. Even so farsighted an American as Woodrow Wilson spent time denouncing the automobile. The steamboat, the locomotive, the airplane all brought prophecies of doom and gloom. We have learned a lesson we surely do not need to be taught again."



SPACE QUOTES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Reports and Special Communications Division

WASHINGTON 25, D. C.

Volume II Number 1

Bion

January 1964

ULTIMATE GOAL IS A WORLD WITHOUT WAR. President Lyndon B. Johnson's State of the Union message delivered to Congress, January 8, 1964.

"Our ultimate goal is a world without war, a world made safe for diversity, in which all men, goods and ideas can freely move across every border and boundary.

"We must advance toward this goal in 1964 in different ways, not as partisans but as patriots.

"We must assure our pre-eminence in the peaceful exploration of outer space, focusing on an expedition to the moon in this decade-- in cooperation with other powers if possible, alone if necessary."

Space Quotes
Vol. II No. 1
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NYT, 1/3/64, 21

LBJ

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Johnson Asks Educational 'Thrust'

WASHINGTON, Jan. 2 (AP)—President Johnson called today for an increased educational effort at all levels and for all Americans.

"The nation that has the schools has the future," he said in an article written for The Journal of the National Education Association.

"No less than our rocket thrusts into outer space, there is urgently needed a national education thrust of massive proportions that will help us master the problems of our age."

Mr. Johnson said that "figuratively and physically we are building not only a pathway to the stars but also—hopefully—bridges of understanding here on earth."

"It is here on earth that our task begins," he said. "And for that task, the education attainments of our fellow Americans are, in some categories, far less than they should be."

Automation Effect Noted

Mr. Johnson said the continuing tide of new knowledge had brought, in turn, a technological-scientific revolution. He went on:

"In industry, for example, automated machinery is being

numbers of American workers are being displaced.

"Many, with no skills or outdated skills, are thereby being confined in an airtight cage of poverty."

By 1970, the President said, "this country, because of increased productivity, will be able to match the output of the 1960's with 22 million fewer workers."

Mr. Johnson noted that about 23 million adult Americans lack an eighth grade education, that 75 per cent of white Americans graduate from high school but only 40 per cent of the nonwhites. Of Americans more than 25 years old, 6.2 per cent of the whites have had five years or less of school, compared with 22.1 per cent of the nonwhites.

Wide Increase Urged

"The quality and quantity of our education effort should be stepped up at all levels in an effort to help persons attain the background they need," the President said.

He said job opportunities for the unskilled were declining, while opportunities for technical and professional persons will rise by about 40 per cent in the next decade or so.

"Thus," Mr. Johnson said, "we have on one side of the national ledger a shortage of trained manpower in many areas and on the other side we have a large reservoir of untrained

large portion of the unemployed."

The President made clear his belief that further Federal legislation was necessary by citing his statement of last month when he signed the higher education facilities act.

At that time he urged Congress to take "early, positive action on the unfinished portion of the national education improvement act, particularly those programs which will assist elementary and secondary schools."

Federal Aid Backed

In his article for the N.E.A. Journal, the President said:

"The question is not whether there should be Federal assistance. We already have had it for more than a century and a half.

"The question today is what kinds of support there should be from the Federal level—and where and how that support should be applied."

Mr. Johnson said experience with Federal aid for areas affected by Government facilities, the National Science Foundation and the National Defense Education Act "illustrates that education can benefit from Federal support without becoming Federally controlled."

"The role of the Federal establishment," he said, "is to help identify education goals and then to help local, state and private interests build the necessary roads to reach them."

"...this budget...provides the funds necessary to advance our mastery of space toward the achievement of a manned lunar landing in this decade...

"Our plan to place a man on the moon in this decade remains unchanged. It is an ambitious and important goal. In addition to providing great scientific benefits, it will demonstrate that our capability in space is second to no other nation's. However, it is clear that no matter how brilliant our scientists and engineers, how farsighted our planners and managers, or how frugal our administrators and contracting personnel, we cannot reach this goal without sufficient funds. There is no second-class ticket to space.

"Appropriations enacted for 1964 for the National Aeronautics and Space Administration were \$600 million below the amount requested...

"As a result, major development programs leading to the manned lunar landing have fallen behind schedule. Careful replanning of the entire program, including a reduction in the number of test flights, will offset some of this delay. Even so, more funds are needed in 1964, and I am therefore recommending a supplemental appropriation of \$141 million for this year.

"For 1965, I am requesting appropriations of \$5.3 billion, \$63 million above the 1964 amount, including the proposed supplemental appropriation. The 1964 and 1965 recommendations represent the minimum amount needed to achieve our goals in space. The estimated increase of \$590 million in expenditures in 1965 is due principally to payments required by commitments made in 1964 and earlier years. With the leveling off of appropriations, annual outlays should remain relatively stable in subsequent years.

"In addition to the manned space flight program, though related to it, funds are included to support unmanned space flights for lunar exploration and supporting research and development. Funds are also included for scientific satellites, planetary probes, and experiments with meteorological and communications satellites."

(1/31/64)

John F. Kennedy
Rich



United States
of America

Congressional Record

PROCEEDINGS AND DEBATES OF THE 88th CONGRESS, SECOND SESSION

Vol. 110

WASHINGTON, MONDAY, JANUARY 27, 1964

No. 13

Senate

The Senate met at 12 o'clock meridian, and was called to order by the President pro tempore.

The Chaplain, Rev. Frederick Brown Harris, D.D., offered the following prayer:

God of all mercy, who art acquainted with our frailties, and forgivest even our craven denials of Thyself; Thou who knowest our hearts knowest that as we pause in contrite devotion at this daily altar of quiet, we hate our sins of omission and commission that draw us from the glory of our better selves. By our very failures and fallibilities and by tasks too difficult for us, we are driven unto Thee for strength to endure and wisdom to rightly interpret the signs of the trying times.

In the cause of our free land and of common humanity, may we be co-laborers with Thee in helping to build the city of God on the ruined wastes of this divided and disordered world.

May the benediction of Thy grace rest upon Thy servants, called to serve the Nation and the world in such an age. Here in the homeland, amid familiar scenes, or in far parts of the world, beset by danger, may Thy protecting care encompass them, giving them every new day, whatever may be the circumstances, the assurance that underneath are the everlasting arms.

Amid all life's changes, Thou who changest not, abide with us and guide us, now and forever. Amen

THE JOURNAL

On request of Mr. Mansfield, and by unanimous consent, the reading of the Journal of the proceedings of Thursday, January 23, 1964, was dispensed with.

MESSAGES FROM THE PRESIDENT— APPROVAL OF JOINT RESOLUTION

Messages in writing from the President of the United States were communicated to the Senate by Mr. Miller, one of his secretaries, and he announced that January 23, 1964, the President had approved and signed the joint resolution (S.J. Res. 136) providing for re-

naming the National Cultural Center as the John F. Kennedy Center for the Performing Arts, authorizing an appropriation therefor, and for other purposes.

REPORT ON U.S. AERONAUTICS AND SPACE ACTIVITIES—MES- SAGE FROM THE PRESIDENT (H. DOC NO. 207)

The PRESIDENT pro tempore laid before the Senate the following message from the President of the United States, which, with the accompanying report, was referred to the Committee on Aeronautical and Space Sciences:

To the Congress of the United States:

In accordance with section 206(b) of the National Aeronautics and Space Act of 1958, as amended, I transmit herewith a report for the calendar year 1963, on this Nation's aeronautics and space activities.

The year 1963 was a period of constructive development of our increasing space competence. It was also a period of searching evaluation of the national space program—an evaluation which resulted in broad acceptance of the policy of our attaining and maintaining space leadership, with due regard for our national security.

Our space program, in both its civilian and military aspects, is peaceful in purpose and practice. Moreover, it combines such objective with a policy of international cooperation based upon a mutuality of participation and benefits as well as the wide dissemination of knowledge.

Space progress is essential if this Nation is to lead in technology and in the furthering of world peace. Such progress requires the use of substantial resources, which must be employed efficiently and effectively in order that we obtain the maximum benefits with a minimum of waste.

In summary form, the accompanying report depicts the contributions of the various departments and agencies of the Government to the national space program during 1963.

LYNDON B. JOHNSON.

The White House, January 27, 1964.

HOUSING—MESSAGE FROM THE PRESIDENT (H. DOC. NO. 206)

The PRESIDENT pro tempore laid before the Senate the following message from the President of the United States, which, with the accompanying papers, was referred to the Committee on Banking and Currency:

To the Congress of the United States:

Our Nation stands today at the threshold of the greatest period of growth in its history.

By 1970, we shall have to build at least 2 million new homes a year to keep up with the growth of our population. We will need many new classrooms, uncounted miles of new streets and utility lines, and an unprecedented volume of water and sewerage facilities. We will need stores and churches and libraries, distribution systems for goods, transportation systems for people, and communication systems for ideas.

Above all, we will need more land, new housing, and orderly community development. For most of this population growth will be concentrated in the fringe areas around existing metropolitan communities.

I. HOUSING

Fortunately, the old pressures on our housing supply arising from depression and war-caused shortages have largely been overcome. But new pressures will develop as the number of new families rises rapidly in the late sixties. And great numbers of our families have yet to secure the true goal of every parent: not merely housing but adequate housing.

Now is the time to direct the productive capacity of our homebuilding industry to the great needs of the neglected segments of our population. This is necessary in its own right and vital to the continued strength of the industry.

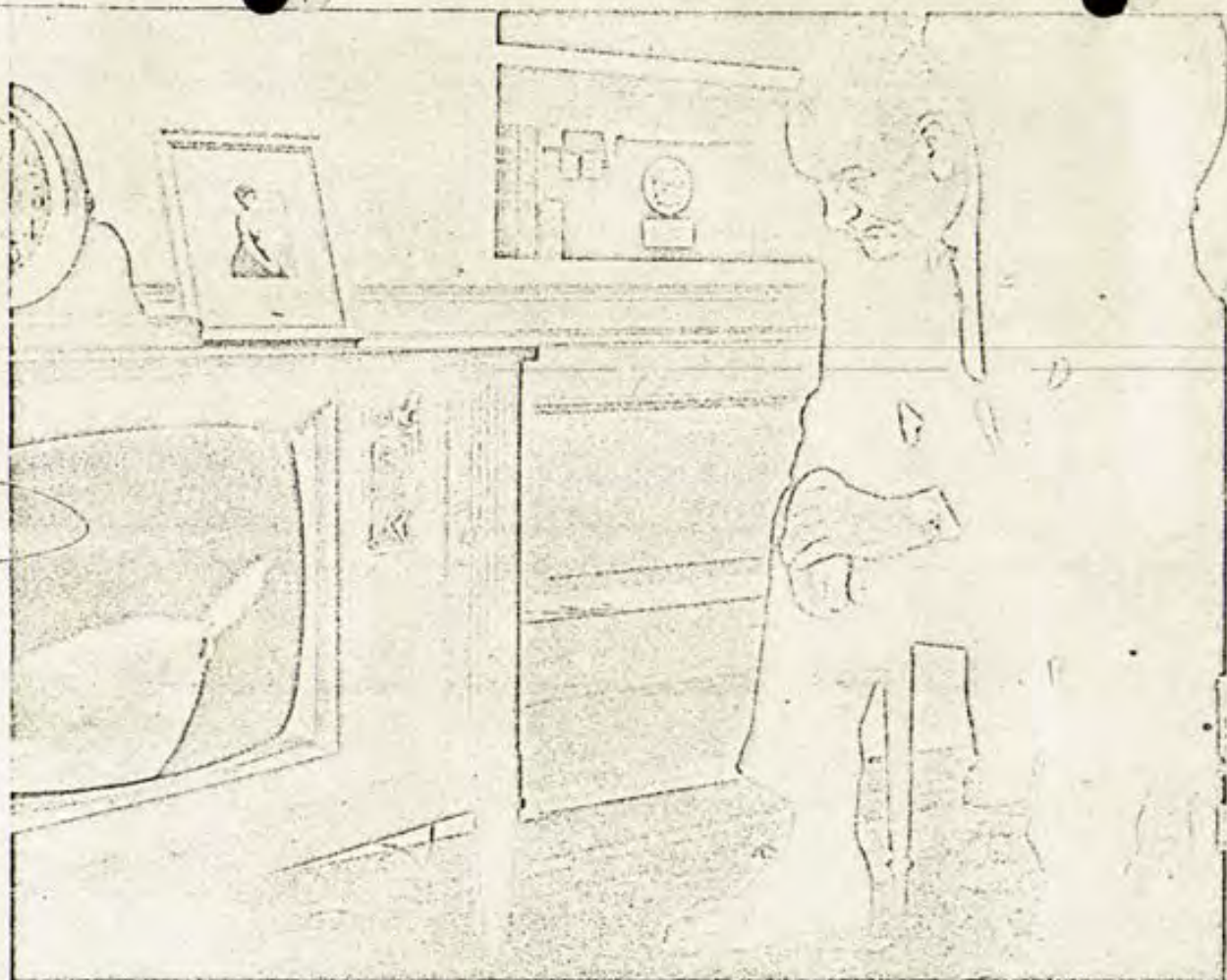
Satisfaction with the 1,600,000 new housing starts in 1963 cannot obscure the fact that too many minorities, too many families of low income, too many elderly, too many rural families, and too many military families have not shared

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This article is an abridgment of a chapter from the forthcoming book, *Space: Its Impact on Man and Society*, edited by Lillian Levy, to be published this fall by W. W. Norton & Co.

By Lyndon B. Johnson

THE
POLITICS
OF
THE SPACE
AGE



In his office at the White House, the President watches a telecast of the pioneer Saturn-rocket launching on January 29.

THE PRESIDENT OF THE UNITED STATES TELLS HOW THE CONQUEST OF SPACE CAN BRING AN END TO HOSTILITY AMONG NATIONS HERE ON EARTH.

The history of man is a history of triumphs, but a history of the governments he has devised to serve his needs is a history of failures.

Since the 18th century, man has substantially changed the nature and potential of his existence on earth with an outpouring of scientific inventions and discoveries. Over that same period the casualty rate among man's political forms, systems and values has been high. Of the 18th century's creations of political science, only the forms and values of the United States' system of representative, constitutional government survived unchanged through the impact of the 19th century's industrial revolution to flourish and flower in the 20th century.

This perspective is important. Any discussion of the "politics" of the space age is, necessarily, a discussion of politics in the classical sense, not the convention-and-campaign sense. If the space age has not eliminated the smoke-filled room, it has at least opened a window and given air to fundamental and sometimes obscured values.

The fate of the free society—and the human values it upholds—is inalterably tied to what happens in outer space, as humankind's ultimate dimension. While the response of our technology is important, no less important is the response and role of our political institutions—both to the challenges of the present and to the opportunities of the future.

The vital role of politics in the space age has been evident since October 4, 1957, when the Soviet's Sputnik I was launched. The orbiting of that first unmanned earth satellite was a feat of science. But the worldwide impact and importance were essentially political.

Sputnik I was proclaimed by the Soviets as validation of Communist prophecies about the superiority of their political system. Such conclusions have been proved premature and excessive by our own subsequent successes. But the fact remains that the Soviet "first" in space exploration resulted primarily, if not entirely, from misjudgments by our political leadership, not from deficiencies of our scientific community.

The price of underestimating space exploration has been much more tangible than a "loss of status" in world opinion. Whatever uncommitted nations and their leaders may have thought, the chief impact of Sputnik I was registered directly upon the Kremlin. Communism's leaders were convinced that the time of fulfillment for Marxian prophecy had come. They were emboldened to begin a period of belligerence and bluff toward the West which did not run its course until the abortive Cuban venture in 1962.

The review of these events is as important for what it does not mean as for what it does mean. Most emphatically, it is not to be inferred that the free society should accept as its goals those set by the ambitions and undertakings of the totalitarians. We would dishonor our trust to do so. The goal of free systems is human progress; the goal of the systems which compete against us is human enslavement. By definition, our work is never done. Human progress is a mountainside, not a mountaintop—political systems and politicians serving human progress may climb or fall, but never rest.

In our domestic American politics this is the lesson learned from Sputnik I. After the sustained climb of our postwar "consumer-goods" boom, some of our

political leadership elected to rest, as though a summit had been attained. In that moment of illusion we were passed by—in the technology of space.

Why did this occur? Self-examination is imperative. In retrospect, the answers seem to be these:

1. Despite two decades of intensive scientific advance, we had failed to establish adequate relationships between the scientific community and the political community—to the blame of each and the disservice of both.

2. Inherent in the political miscalculation toward space exploration was the influence of the unfortunate anti-intellectualism of the early 1950's. American political leadership repeated the classic error of the profession through the ages: assuming that the summit of power is also the summit of wisdom. The open contempt with which the Sputnik I success was greeted by some in positions of political trust betrayed a degeneration of the respect for intellect which is indispensable to the governing of a free and open society.

3. Perhaps the greatest failure of all was devaluation of the first—and hardest—responsibility of elected representatives of the people in our system: the responsibility to lead. Elective office entails more than merely serving the comfort of the electorate. In the 1950's higher values were attached politically to "pleasing" than to "pushing," and this uncharacteristic transposing of America's traditional values led to a lulling of national effort and momentum toward the "new" and "unknown."

No purpose is served, at this late date, by excessive recrimination. Sputnik I jolted us out of the lethargy and bad

habits into which we had drifted. Our political structure reacted responsibly. Science was accorded its rightful place as a resource and strength of integral concern to national policy making. The blight of anti-intellectualism was erased from responsible political leadership circles—and, no less important, the scientific community lost much of its anti-politician bias which inhibited accord, understanding and cooperation. Executive and legislative branches alike reassumed a responsibility for leading—for defining the higher goals and higher potentials of our society and system.

In the years since 1957 the American political system and its politicians have acquitted themselves well, as have our scientists. An orderly program of space exploration has been devised and financed without unbalancing the values of our free society. We have reached for the stars above us without forgetting the slums here among us. We have resisted the impulse toward totalitarian secrecy to conceal our failures, while also resisting the totalitarian monopolization of the knowledge acquired through our successes. These are significant achievements.

Our most important achievement politically in the space age has been this retention of basic national character, purpose and political values in our space program. It is reflected by a primary objective of our program, clearly stated at the outset, to gather knowledge for the benefit of all nations and to join with all nations in this endeavor. It is underscored by the fact that in the earliest days of the space age the United States formally insisted that the exploration of space should be a joint adventure of nations with the express objective of fostering

Sat & Post, 2/29/64, pp 22-23.

peaceful uses. This has been, and continues to be, our position both in word and deed.

It is a landmark achievement of our political system that the original National Aeronautics and Space Act authorized our Government to cooperate with other nations in pursuing the legislation's basic objectives. During the past four years we have cooperated with more than 50 other nations: sharing scientific information, training their scientists and, in several instances, launching their space payloads with our rockets. Our communications and weather satellites have convincingly illustrated both the potential for peaceful uses of outer space and our unhesitating willingness to share those benefits. While this is only a first primitive stage, these developments underscore the fact that space exploration is the first human experience with the potential of joint participation by all nations on earth.

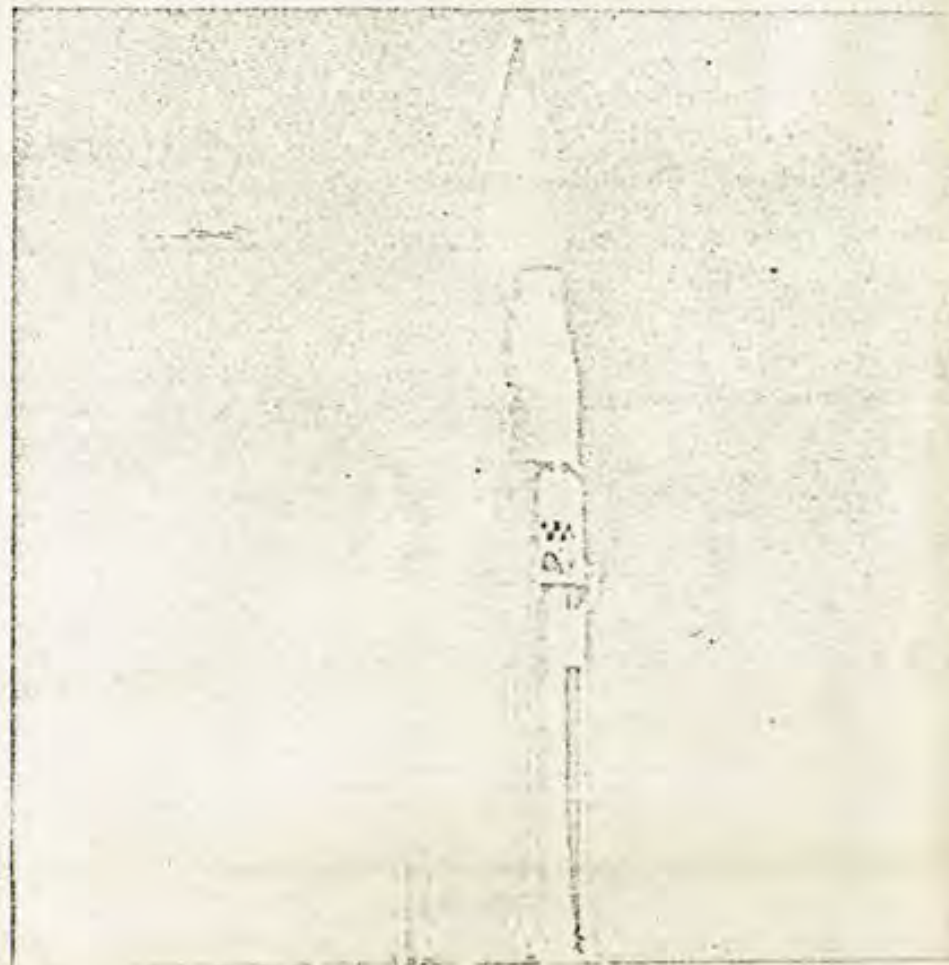
In my own judgment this potential—which lies clearly in the political realm—of bringing nations together in joint productive common labors to share common benefits is one of the greatest potentials space affords, at least for the remainder of the 20th century. Such common endeavors are basic to any real hope for peace. It is my conviction that space can be mankind's first real avenue to peace by giving all men and all nations a common self-interest and joint adventure.

age now beginning, our scientific and technological progress can mean great strength for our political institutions, at home and abroad, but we must not displace democracy with an overriding technocracy.

We must commit our national resources to the support of achievements in space—as we have done. But that commitment must not be blind to balance and proportion. We must not proceed on the dangerously oversimplified logic that money alone is the root of all national successes—in space or other endeavors. That is a false premise, as is the premise that niggardliness is the root of all failures of our political system.

This new age is a time of growth for our national capabilities. Such growth requires the free system's politician, and the free system's voter as well, to grow also. We must all have greater breadth and perception, appreciating that the value of our new capabilities is the support and strength they give to our oldest values of freedom.

Domestically the age of space, like the industrial revolution, will mean dramatic upgrading of the promise and potential of the lives of all our people. If our political institutions are to serve the people effectively during this period, those institutions must function to improve the quality and availability of education, permit and foster growth and expansion of our economic system, and stimulate, by



The human self-interest is the hope of making a better world tomorrow for today's children. The recent United States and Soviet cooperative space effort in communications marks what may be an auspicious beginning for better East-West understanding through the advancement of knowledge. We would like to see this understanding broadened by joint space endeavors in meteorology, astronomy, lunar and interplanetary exploration. For in the exploration of space, knowledge is both the key and the quest. When we reach for the moon and the stars, we reach for answers to the deepest secrets of the universe. How much more accessible these would be if we but strove upward together!

An era of great change

Since time began, change has been the mortal enemy of the political systems man has devised to give order to his own existence, to safeguard his person and property, and to preserve and perpetuate the ideals of his culture. The age of space is to be one of the great eras of changing human experience; it is, perhaps, a mistake to restrict the concept of this new era by characterizing it as the age of "space"; it is, more accurately, an age of exploration and extension for all the fields of human knowledge and progress. In this age of increasing emphasis on science and technology it is imperative that we not lose perspective of the challenge it presents to our political form, systems and values.

America's special contribution to the world has been in the political realm. Our greatest success has been at devising a pragmatic political system capable of transforming spiritual ideals into realities for the lives of all our people. In the

vigorous leadership and vision, aspiration toward higher national goals.

Internationally our capabilities in this new age will permit us to exercise a new leadership of hope. The technical accomplishments of the age of space will be enemies of war. Improving international communications, for example, will serve to lessen the likelihood of misunderstandings leading to nuclear disaster. More importantly, the accomplishments of technology, in the not-too-distant future, will permit attacks upon human poverty, agricultural deprivation, illness, illiteracy, etc., such as have never been possible in the past. We must exercise the inherent resiliency of our system to conceive meaningful applications of these new capabilities which will advance our goals of a world of peace, justice and freedom.

Thus far the space age has been characterized as a period of competition. It is important, however, that we keep in mind the fact that the competitiveness is between political systems, not between national scientific communities. In the world of science the logical instinct is toward cooperation without regard to political boundaries. This impulse we must preserve. The real challenge of the space age is for the politician to tear down the walls between men which have been erected by his predecessors and contemporaries in the political field, rather than to raise its barriers higher into the free and peaceful vastness of space. If the potentials of the age of space are fully realized, this period will someday be known—and blessed by all people on earth—as the Golden Age of Political Science.

THE END

Cape Kennedy: Saturna blasts off to hurl the heaviest of all satellites into earth orbit.

INTERPRETIVE REPORT

Space Aims Seen Unchanged

By WILLIAM BYRNE
Star Staff Writer

The Nation's space program is not likely to undergo much change under President Lyndon B. Johnson, either in scope or in the vigor with which it is pushed.

The reasons are twofold and simple.

First, Mr. Johnson is fully as enthusiastic about the space program as was Mr. Kennedy, if not more so. Second, the new President has been in on the space program from its start, and through the 34 months of President Kennedy's tenure was "Mr. Space."

President Johnson was head of a Preparedness subcommittee in the Senate at the time the Russians orbited Sputnik six years ago.

Using the tremendous prestige of his position as Senate Majority Leader, he launched an inquiry into the Nation's space posture, and subsequently brought about organization of a special Senate committee which grew into the present standing committee on aeronautical and space sciences.

As long as he was in the Senate, Mr. Johnson — along with his fellow Southwesterner, the late Senator Robert S. Kerr of Oklahoma — kept an eagle eye on the space effort. The No. 1 Democrat in the closing years of the Republican administration, he was continually pushing President Eisenhower for more ambitious undertakings in what he clearly regarded as a headlong race with the Russians.

More than any other man, President Johnson is personally responsible for the National Aeronautics and Space Act of 1958 and the sprawling agency which it created. A draft version of the space bill, prepared downtown, was ripped apart and rewritten by Mr. Johnson and the then House Majority Leader (now Speaker), John McCormack, behind closed doors on Capitol Hill in the summer of 1958.

Having written the bill, the two congressional powerhouses rammed it through their respective chambers virtually without debate and presented the measure to Mr. Eisenhower for signature. The then Presi-

dent, never much of a space enthusiast, insisted upon a clause stipulating "use of outer space for peaceful purposes for the benefit of all mankind."

That was about the only contribution Mr. Eisenhower made to the law; the rest was practically pure LBJ.

Under Mr. Eisenhower, the top-level National Aeronautics and Space Council set up in the Space Act was never actually formed. The President, its titular head, dealt with space matters through the National Security Council.

With the advent of the Kennedy administration, the space program immediately grew in importance, largely through Mr. Johnson's urging. The Space Act was amended to make the Vice President head of the council, whose members included the Secretaries of State and Defense, the Atomic Energy Commission Chairman and the administrator of NASA.

Under then Vice President Johnson, the council took on real meaning. A small and quite capable staff was organized under Dr. Edward C. Welch, former aide to Senator Symington, Democrat of Missouri. While thinking big about space, the council staff insisted in thinking small in bureaucratic terms. Only about 30 people work under Dr. Welch.

The Johnson-organized council staff prepared the studies which the Vice President used to persuade President Kennedy in the spring of 1961 that a manned lunar landing should be undertaken "before the decade is out."

In both public and private talks the new President repeatedly had evinced his enthusiasm for the space program and his grasp of the far-reaching ramifications involved.

In the fall of 1961, this reporter toured the West and South with the then Vice President in his role as Space Council chairman. For many hours between stops we sat in the cabin of the big presidential jet and talked space. On this topic — and there can be no doubt about it — Mr. Johnson does his homework and knows his subject.

On a few occasions, Mr. Johnson appeared to have been carried away by his space fervor, at times clearly overlooking the benefits accruing to the national economy from the large expenditures of the space effort. Lately, however — at the urging of his aides — he had moderated his claims, without in any way muting his enthusiasm.

In recent weeks Mr. Johnson and his Space Council staff had been busy working over the fiscal 1963 space budget. It is understood that he was planning to ask Mr. Kennedy for \$5.5 billion, a little less than was requested this year but somewhat more than was appropriated.

As the man with the say-so now, Mr. Johnson's approval of this figure is hardly open to doubt.

One subject which is open to speculation is how the new President will respond to the Air Force's unceasing demand for a larger manned role in space. As Spaceman No. 1 in the Senate, Mr. Johnson had no great fondness for the "peaceful uses clause" of the Space Act. He is understood to have agreed to it only under threat of a presidential veto.

In the last two and a half years, however, Mr. Johnson headed a space program which his two predecessors repeatedly had identified as nonmilitary.

EXECUTIVE

FG 263

DS

August 7, 1965

MEMORANDUM FOR JAMES WEBB

FROM: Bill Moyers

The President was very pleased with your report of August 6 and would like you to go over it in person with Bill Hines of the Evening Star.



EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON

August 6, 1965

EXECUTIVE SECRETARY

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Congress. The Independent Offices appropriation bill was approved by Congress August 5. NASA received \$5.175 billion, which is \$85 million less than the budget request. The Space Council received the full amount of \$525,000 requested.

2. Launches

a. The United States placed a military satellite in a low circular polar orbit August 3, using an Atlas Agena launch vehicle.

b. The Soviet Union launched Cosmos 77 into a low circular orbit August 3. The orbit inclines 52 degrees from the Equator and the satellite is of the type usually recovered after 8 days.

3. Pending Launches

a. The sixth Centaur launch vehicle is now scheduled for launch August 10. It will carry a model of the Surveyor lunar soft landing craft and place it into an orbit which will extend out to twice the distance to the moon.

b. Launch test of the improved thrust Scout launch vehicle is scheduled for August 12. It will orbit a SECOR geodetic satellite.

c. Launch of the two-man Gemini 5 for an eight-day mission is still scheduled for August 19.

4. Gemini TV. Live TV coverage of the Gemini 5 recovery operation will again not be available. The reason given for this failure is that the equipment involved is not suitable to place on the straight deck of the aircraft carrier Lake Champlain. TV coverage of subsequent Gemini flight recovery operations may be available for future flights.

5. Mariner IV. The U. S. Mars picture-taking spacecraft has completed the second full transmission of the high quality Mars photographs. The spacecraft continues to transmit information about conditions in space, and there is some hope that a fresh contact may be made two years from now when Mariner IV approaches Earth.

EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON



August 5, 1965

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Congress. The Independent Office appropriation bill was approved by Congress August 5. NASA received \$2,175 million, which is \$35 million less than the budget request. The Space Council received the full amount of \$225,000 requested.

2. Launches

- a. The United States placed a military satellite in a low circular polar orbit August 3, using an Atlas Agena launch vehicle.
- b. The Soviet Union launched Cosmos 17 into a low circular orbit August 3. The orbit inclines 33 degrees from the Equator and the satellite is of the type usually recovered after 6 days.

3. Pending Launches

a. The sixth Centaur launch vehicle is now scheduled for launch August 10. It will carry a model of the Surveyor lunar soft landing craft and place it into an orbit which will extend out to twice the distance to the moon.

b. Launch test of the improved Thrust Boost launch vehicle is scheduled for August 12. It will orbit a SNOOR geostatic satellite.

c. Launch of the two-man Gemini 5 for an eight-day mission is still scheduled for August 19.

d. Gemini TV. Live TV coverage of the Gemini 5 recovery operation will again not be available. The reason given for this failure is that the equipment involved is not suitable to place on the strait deck of the aircraft carrier Lake Champlain. TV coverage of subsequent Gemini light recovery operations may be available for future flights.

e. Mariner IV. The U. S. Mars picture-taking spacecraft has completed the second full transmission of the high quality Mars photographs. The spacecraft continues to transmit information about conditions in space and there is some hope that a first contact may be made with Mars now when Mariner IV approaches Earth.

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6. Apollo Communications. The Communications Satellite Corporation has been asked to consider establishment of a special world-wide system of synchronous satellites which would link tracking stations around the world to the Apollo mission control center in Houston, Texas. At least five satellites and four portable ground stations would be required.

7. Saturn V Test. The 7.5 M-pound-thrust, first stage of the Saturn V Apollo launch vehicle successfully endured a full-duration, 2-1/2 minute static test on August 5.

8. Weather Satellites

a. Tiros X photographed two typhoon storms, "Ivy" and "Jean", which threatened the Philippines and struck Okinawa with 100-mile per hour winds. Advance warnings were sent to the threatened areas.

b. A new data handling system at the National Meteorological Satellite Center has reduced the time needed to produce weather satellite pictures for analysis from 2-1/2 hours to 1-1/4 hours. As a result, photographs and cloud analysis from weather satellites are ready for distribution before a second satellite pass has occurred.

9. Communications Satellites. The live TV broadcasts via Early Bird satellite of the U. S. -Soviet track meet in Kiev marked the first live TV transmission from the USSR to the U. S.

10. Foreign Space Activities

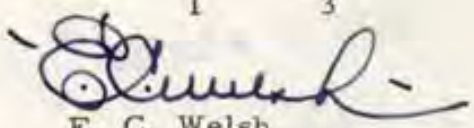
a. The 10-nation European Space Research Organization (ESRO) will meet this month to review its 8-year \$310 million program to orbit 17 satellites.

b. The U.S. and Brazil have signed a cooperative agreement to use sounding rockets for weather research. The U. S. will provide the rockets and train Brazilian scientists.

11. Space Payload Success Box Score (Aug. 6)

	USA		USSR	
	1964	1965	1964	1965
Earth Orbit	34	56	18	33
Escape	2	2	1	3

Friday, August 6
Time: 4:30 p. m.


E. C. Welsh

6. Apollo Communications. The Communications Satellite Corporation has been asked to consider establishment of a special world-wide system of synchronous satellites which would link tracking stations around the world to the Apollo mission control center in Houston, Texas. At least five satellites and four portable ground stations would be required.

7. Saturn V Test. The 7.5 M-pound-lifted, first stage of the Saturn V Apollo launch vehicle successfully endured a full-duration, 1-1/2 minute static test on August 5.

8. Weather Satellites

a. TIROS X photographed two typhoon storms, "Ivy" and "Jenny", which threatened the Philippines and struck Okinawa with 100-mile per hour winds. Advance warnings were sent to the threatened areas.

b. A new data handling system at the National Meteorological Satellite Center has reduced the time needed to produce weather satellite pictures for analysis from 5-1/2 hours to 1-1/2 hours. As a result, photographs and cloud analysis from weather satellites are ready for distribution before a second satellite pass has occurred.

9. Communications Satellites. The live TV broadcast via Early Bird satellite of the U.S.-Soviet track meet in Kiev marked the first live TV transmission from the USSR to the U. S.

10. Foreign Space Activities

a. The 18-nation European Space Research Organization (ESRO) will meet this month to review its 8-year \$310 million program to orbit 14 satellites.

b. The U.S. and Brazil have signed a cooperative agreement to use sounding rockets for weather research. The U. S. will provide the rockets and train Brazilian scientists.

11. Space Payload Successes For 1963 (Aug. 6)

	USA		USSR	
	1963	1962	1963	1962
Earth Orbit	14	55	13	13
Escape	1	2	1	3

1963 AUG 6 PM 5 23

Mr. E. C. Williams
Washington
The White House

Friday, August 6
Time: 4:30 p. m.



EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON

July 30, 1965

EXECUTIVE SECRETARY

EXECUTIVE

OS

FG 11-4

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Launches. The final 1.5 million pound thrust Saturn I launch vehicle was successfully launched July 30, orbiting the third and last Pegasus micrometeoroid satellite, and a model of the Apollo lunar spacecraft.

2. Pending Launches

a. Work is proceeding for the August 19 launch of Gemini 5 which is scheduled to orbit the earth with a two-man crew for eight days. The flight is expected to demonstrate that the prolonged condition of weightlessness will not be a threat to astronauts' health or skills.

b. The sixth test launch of the Atlas/Centaur launch vehicle is scheduled for August 4. The vehicle will place into orbit a full-scale model of the Surveyor spacecraft.

c. Launch test of an improved thrust Scout launch vehicle is scheduled for August 12.

3. Mariner IV

In an impressive ceremony July 29, the President awarded NASA medals to Pickering, Nicks, and James of the Mariner team. The 18 pictures of Mars, which had not previously been released, were made available to the press by NASA at a press conference which followed the presentation. The pictures were extraordinary in definition and gave a crater-pocked moon-like impression of the Martian surface.

4. Congress

a. The Senate-House conference of the Independent Offices Appropriations bill, including NASA and the Space Council, is scheduled for the coming week.

b. The Joint Atomic Energy Committee will hold executive hearings on space nuclear power systems (SNAP) August 6.



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5. Soviet Tests. The Soviet Union has reserved an impact area 80 miles in diameter about 1500 miles northwest of Hawaii for rocket tests. The test period is defined as being from July 28 to October 15.

6. RS-70. On July 27, the supersonic aircraft made its second flight in which speeds in excess of Mach 2.8 were attained. The peak altitude in this flight was 66,000 feet and the maximum temperature sustained on the plane's surface was 514 degrees F.

7. Commercial Applications

a. NASA has announced that space research is expected to increase greatly the lifetime of ball and roller bearings, resulting in savings to U. S. industry of millions of dollars a year in replacement bearings and many more millions in extended life of machines.

b. An environmental space type suit is expected to protect steel workers exposed to high temperatures and other industries can utilize the cold protective capabilities of the suit. Suppliers plan to get costs down to \$150 each.

8. Test of Saturn V. A full duration static test of the 7.5 million pound thrust first stage of the giant Saturn V, which is programmed to send the Apollo spacecraft to the moon, is scheduled for August 5.

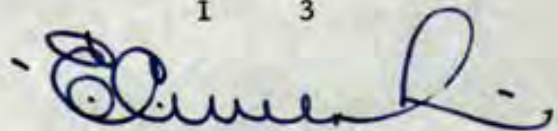
9. Nuclear Detection Satellites. The two nuclear detection satellites (Vela Hotel 6 and 7), launched last week, have been maneuvered into their individual orbits which extend out to about 69,000 miles.

10. Symposium. The keynote address at the Tenth Symposium on Space and Ballistic Missile Technology is being delivered by the Executive Secretary of the Space Council on August 4, in San Diego.

11.

Space Payload Success Box Score
(July 30)

	USA		USSR	
	1964	1965	1964	1965
Earth Orbit	33	55	17	32
Escape	2	2	1	3



E. C. Welsh

Friday, July 30
Time: 11:25 a. m.

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The White House
Washington

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The above information was obtained from a review of the files of the Department of Health, Education and Welfare, Office of the Assistant Secretary for Health, which contain records of the activities of the National Commission on the Causes and Prevention of Violence.

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EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON



EXECUTIVE SECRETARY

July 23, 1965

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Launches

a. The third set of U. S. nuclear detection satellites (Vela Hotels V and VI) were placed into orbits July 20. The 524 pound vehicles, capable of detecting nuclear explosions from the earth's surface out to distances of 200 million miles, were launched by an Atlas Agena. A 13-pound pygmy satellite designed to study radiation in the earth's radiation belts was placed into orbit by the same vehicle.

b. In two launches, one July 17 and the other July 19, the Department of Defense placed military payloads into circular polar orbits, using Thor Agena launch vehicles.

c. The Soviet Union on July 23 launched Cosmos 76 from Kapustin Yar into an orbit inclined 49 degrees to the Equator. This is probably a modest-sized non-recoverable scientific payload.

d. On July 18, the Soviet Union launched a heavy Sputnik platform, which in turn launched Zond 3 into orbit around the sun. The launch is thought to be an engineering test to evaluate systems to be used on future interplanetary probes rather than an exploration of any of the planets themselves.

e. USSR's Proton I, weighing 26,900 pounds, and described as an unmanned prototype of a space station, became the largest payload (without rocket stage) ever orbited. It was launched July 16. The most significant feature of that event was the announced use of a new booster -- more powerful than any other booster in operation.

2. Pending Launches

a. The final Saturn I is scheduled to carry the third Pegasus micro-meteoroid satellite and a test version of the Apollo lunar spacecraft into circular earth orbits about July 30 from Cape Kennedy.

b. An orbital engineering test of a new version of the Scout rocket is scheduled for launch from Wallops Island, Virginia, July 29.

c. The sixth flight test of the Atlas-Centaur vehicle is scheduled for launch from Cape Kennedy August 4.

d. The next manned Gemini flight (GT-5) is scheduled for launch from Cape Kennedy on an eight-day mission August 19.

3. Mariner IV

a. Pictures taken by Mariner IV of the planet Mars continue to be received on schedule, and indications are that 20 pictures will be obtained. The first three pictures were made public as they were received.

b. Soviet scientists have expressed interest in receiving Mariner photographs. The Soviet press gave attention to the Mariner flight, and Pravda and Izvestia carried the first Mariner photograph.

4. B-70. The second of the B-70 aircraft had a remarkable first flight on July 17. It flew 1 hour and 13 minutes; 21 minutes of which were at Mach 1 or above, with a maximum speed of Mach 1.4 at 40,000 feet.

5. German Satellite. The United States has agreed to launch a German satellite in 1968. The satellite, to study the radiation belts, will be launched by a Scout vehicle from the West Coast.

6. Supersonic Transport. NASA is now using an instrumented Boeing 707 jet aircraft at their Langley Research Center to study the landing approach characteristics of the proposed supersonic transport.

7. Rocket Test. The 7.5 million pound thrust first stage of the Saturn V, which will be used to propel the Apollo spacecraft towards the moon, will have its first full-duration static test in August.

8. Gemini TV. The Federal Communications Commission has received an industry proposal to provide live television of the Gemini 5 landing. The proposal suggests use of the Early Bird satellite and a portable ground station aboard an aircraft carrier in the landing area. If effective, the event will be televised in the United States and Europe.

9. Soviet Activities. The East European press is beginning to reflect Moscow rumors of a major manned Soviet launch perhaps within a couple

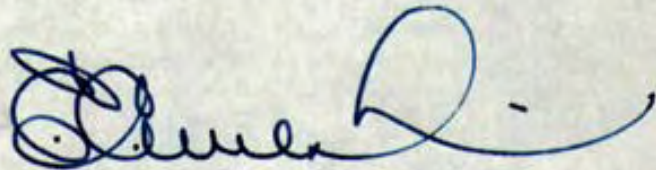
of weeks. This may include five or more cosmonauts, long stay time, and possible rendezvous, perhaps with Proton I or another heavy ship of the same class.

10. Congress. The Joint Atomic Energy Committee plans to hold an executive hearing on the space nuclear power program August 6. Witnesses from DOD, NASA, and AEC will be called.

11.

Space Payload Success Box Score
(July 23)

	USA		USSR	
	<u>1964</u>	<u>1965</u>	<u>1964</u>	<u>1965</u>
Earth orbit	33	53	17	32
Escape	1	2	1	3



E. C. Welsh

Friday, July 23
Time: 11:30



EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON

July 16, 1965

EXECUTIVE

DS

FG 11-4

EXECUTIVE SECRETARY

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Mariner IV. The 575 lb. Mariner IV passed Mars July 14 at a distance of 5,618 miles after a 228 day trip. Impressive results are being obtained as the pictures are being put together. The spacecraft's instruments obtained valuable scientific data from the eight experiments on board. Mars seems to lack a magnetic field, hence probably lacks an iron core, and it does not have a radiation belt.
2. Congress. The Senate passed the Independent Offices Appropriations bill (with \$5.190 billion for NASA and \$525,000 for the Space Council) July 13. An amendment to cut the NASA appropriations by 5 percent was defeated by a vote of 61-16. The bill is now in Conference to iron out the differences of about \$30 million between the action of the two Houses.
3. Launch delay. Launch of the third set of nuclear detection satellites (Vela Hotels VI and VII) has been delayed until the cause of the recent failure of the launch vehicle (Atlas Agena) to function properly has been determined. Vela Hotels VII through X will be redesigned to include improved nuclear detection devices. Vela Hotels XI through XIV are expected to be launched by Titan IHC's because of the heavier payloads involved.
4. Manned Space Flight
 - a. The problem in closing the hatch after Astronaut White's extra-vehicular walk has been traced to the dry lubricant on one of the surfaces.
 - b. A tool that will allow astronauts to conduct maintenance tasks outside the spacecraft has been developed by the Air Force, and will be used on subsequent Gemini flights. The tool has been tested in a KC-135 aircraft during short zero-g flights.
5. USSR Multi-Launch. The Soviet Union announced on July 16 that it has placed in orbit five satellites (Cosmos 71-75) in a single launch. The U.S. has on several previous occasions launched five or more payloads by a single launch vehicle.

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6. Weather Satellite. Typhoon Freda, which hit southern Luzon in the Philippines with 150 mile per hour winds July 13 had been tracked by Tiros IX since July 8, and advance warnings of the storm were sent to the threatened areas.

7. Space Cooperation

a. The U. S. has offered to extend and further implement an agreement exchanging scientific and technical information to the European Space Research Organization.

b. The Indian department of Atomic Energy and NASA have signed a memorandum of understanding providing for a continuation of cooperation between the two agencies and for the launching of 12 rockets from India for experiments in Aeronomy, Ionospheric physics and magnetic fields.

8. Awards. In formal ceremonies in the Pentagon July 15, Secretary Zuckert and Chief of Staff McConnell of the Air Force awarded astronaut wings to Lt. Col. McDivitt and Lt. Col. White of Gemini fame, and Captain Engle of X-15 fame.

9. Space Payload Success Box Score
(July 16)

	USA		USSR	
	<u>1964</u>	<u>1965</u>	<u>1964</u>	<u>1965</u>
Earth Orbit	30	48	17	29
Escape	1	2	1	2

E. C. Welsh

Friday, July 16
Time: 11:30 a. m.



EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON

EXECUTIVE

OS

FG 11-4

EXECUTIVE SECRETARY

Friday, July 9, 1965

4:05 P.M.

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities.

1. Space Council. The Vice President held a meeting of the National Aeronautics and Space Council Friday, July 9th, on the Manned Orbital Laboratory project. A brief general press notice was issued.
2. Mariner IV. The U.S. Mars-bound spacecraft is scheduled to perform its historic mission of photographing that planet Wednesday, July 14. Plans are being made so that the pictures will be available as soon as it can be done effectively and accurately.
3. Tiros X. The Weather Bureau's first operational satellite, launched last Friday, July 1, is operating satisfactorily, and cloud cover photographs are now being received on a regular schedule.
4. Gemini Flights. Gemini 5, scheduled for August, will feature a 8-day mission and rendezvous with a small space pod. Gemini 6, scheduled for the fall, will feature rendezvous and docking with an Agena spacecraft. Gemini 7, a 14-day flight in early 1966, will include extra-vehicular activity and the testing of a hand-aimed laser beam communications system.
5. Pegasus.
 - a. Pegasus II, in orbit for more than a month, has reported more than 50 penetrations by meteoroids, and is returning useful data for predicting the frequency and size of meteoroids found in space flight. These data may affect favorably the amount of shielding required for manned flight.
 - b. The third and final Pegasus is scheduled for launch late in July. It will use the last of the Saturn I launch vehicles.
6. Pending Launches. Two Vela Hotel nuclear detection satellites are scheduled to be launched in tandem by an Atlas launch vehicle July 15 from Cape Kennedy. The satellites have a greater detection capability than the four previously orbited.

7. ComSat Earth Stations. The Communications Satellite Corporation has requested proposals to be submitted by July 20 for architectural and engineering services for the construction of an earth station site at Brewster Flat, Washington. In addition to the Washington station, the Corporation plans to build an earth station in Hawaii.

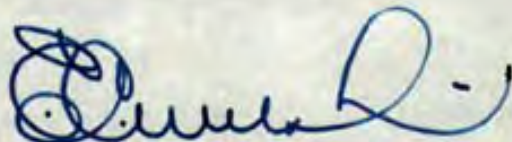
8. Soviet Space Station. The Soviet Union unveiled July 7 the model of a future manned space station of unstated but obviously large size designed to be assembled in orbit from numerous separately launched sealed canisters and equipment.

9. French Rocket. The French successfully launched July 5 at Hammaguir, Algeria, the first Saphir rocket combination. Now all three stages of their intended Diamant satellite launches have been successfully tested, and a satellite may be put up late this year or early next.

10. U.S. -USSR Agreements. In anticipation of renewed bilateral discussions at the UN in September, Dr. Dryden has asked Academician Blagonravov to review the unfinished business confronting them. Dr. Dryden expressed the hope that the Soviets would be able to indicate when meteorological satellite data might be available in sufficient detail to warrant continuation of the Washington-Moscow circuit which is presently being used only for conventional data. He also brought up the question of the exchange of visits to deep space tracking and data acquisition stations and the joint review of space biology and medicine.

11. SPACE PAYLOAD SUCCESS BOX SCORE
(July 9)

	USA		USSR	
	<u>1964</u>	<u>1965</u>	<u>1964</u>	<u>1965</u>
Earth Orbit	29	48	14	24
Escape	1	2	1	2



E. C. Welsh

1. Coastal Earth Stations. The Communications Satellite Corporation has received proposals to be conducted by July 1965 for satellite and earth station sites for the construction of an earth station site at Newbury Park, Washington. In addition to the Washington station, the Corporation plans to build an earth station in Hawaii.

2. Soviet Space Station. The Soviet Union announced July 7 the model of a future manned space station of modular and detachable parts designed to be assembled in orbit from launchers currently launched earth orbit and being sent.

3. French Rocket. The French announced July 5 at Lyons, France, Algeria, the first flight test of a rocket. The rocket was launched from the French space station and has been successfully tested. The rocket is to be put up into the year or early next.

4. U.S.-USSR Agreement. In anticipation of renewed bilateral discussions on the U.S. in September, the U.S. has asked Washington the answers to the questions raised by the Soviet Union. The U.S. has expressed the hope that the Soviet Union would be able to indicate when reciprocal satellite data will be available in order to permit continuation of the Washington-U.S. space station which is presently being used only for communication. The also brought up the question of the exchange of visits to keep space station and earth station stations and the joint review of space biology and medicine.

11. SPACE DATA CENTER BOX 2000
(July 2)

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USA
1965

Space Station
George

[Handwritten signature]
E. A. Wilson



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EXECUTIVE

OS

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July 8, 1965

Dear Mr. Teague:

I am pleased to know from your letter of June 30 that your subcommittee is initiating a series of staff studies in connection with space science and technology, and I will be pleased to offer any assistance to you that I can. In this connection I have asked Dr. Nicholas E. Golovin to be my contact with your staff. He will be looking forward to a call from Mr. Gerardi.

Sincerely,

Colin M. MacLeod
Acting Director

X
Honorable Olin E. Teague
Chairman,
Subcommittee on NASA Oversight
Committee on Science and Astronautics
House of Representatives
Suite 2317-2325 Rayburn House Office Building
Washington, D. C.

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June 30, 1965

CARDED

Dr. Donald F. Hornig
Director
Office of Science and Technology
Executive Office Building
Washington, D. C.

JUL 9 1965

Dear Dr. Hornig:

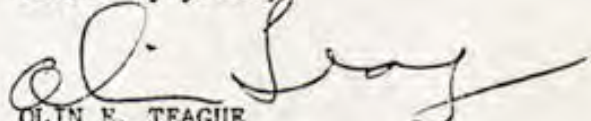
The Subcommittee on NASA Oversight is conducting a series of staff studies on selected areas of space technology and space sciences. Depending upon the results of such studies, public or executive hearings may be held during this or next year's Congressional session.

One of the studies to be undertaken will deal with a review and analysis of the space programs being undertaken or planned by other nations, both friendly and otherwise. It is hoped that such a study will assist in determining the impact of such programs on U. S. civilian and military space programs and objectives, the extent to which greater effectiveness can be obtained through increased cooperation between Free World nations in space, the degree to which duplication in space efforts among these nations can be reduced or eliminated, and related subject areas, including balance of payments considerations.

I have designated Mr. Peter A. Gerardi of the Committee staff to conduct the above-mentioned study.

I would appreciate your designating an appropriate official of your agency with whom Mr. Gerardi can consult and collaborate in the subject study.

Sincerely yours,



OLIN E. TEAGUE
Chairman
Subcommittee on
NASA Oversight

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EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON

EXECUTIVE

OS

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EXECUTIVE SECRETARY

Handwritten: L7

Friday, July 2, 1965
11:45 A.M.

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities.

1. Congress. The Senate Appropriations Committee June 30 approved a \$5.19 billion NASA appropriation for FY 1966, almost the same amount authorized by the Senate-House Space Committee Conference. Ninety-one thousand dollars for the President's Committee on Equal Employment Opportunity was deleted. Funds approved for the Space Council totalled \$525,000, which was the amount requested by the President.

2. Launches.

a. The Soviet Union placed Cosmos 70 into a 49 degree inclination orbit July 2 from Kapustin Yar, probably carrying a scientific payload.

b. Tiros X was launched from Cape Kennedy shortly after midnight July 2 in a near circular polar orbit of 452 nautical miles apogee and 406 nautical miles perigee. Cameras have been tested successfully and the regular picture-taking sequence is expected to begin tomorrow.

c. NASA launched a radio astronomy experiment June 30 from Wallops Island. An antenna with a wing-spread of 70 feet was propelled on this probe to an altitude of 1000 miles.

d. The escape rocket system of the Apollo lunar spacecraft was successfully tested June 29 when a dummy Apollo command capsule was fired one mile into the sky and returned safely by parachute.

e. The Department of Defense launched a military payload into a polar orbit June 25 with an Atlas Agena launch vehicle.

f. The Department of Defense launched a military payload into a polar orbit June 24 using a Thor Able Star launch vehicle.

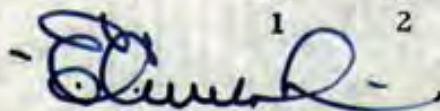
3. Scientist Astronauts. Six new astronauts with scientific backgrounds were officially inducted into the space program this week. Selected from among hundreds of applicants, the two college professors, two physicians, a geologist, and a rocket expert will begin three years of training for a lunar mission.
4. Nuclear Rocket. The Phoebus nuclear rocket reactor was ground-tested June 25 with a full power run lasting approximately 10 minutes. Supply of hydrogen coolant was not sufficient for its entire test and consequently the reactor was damaged.
5. Early Bird Inauguration. Trans-Atlantic commercial communications service was inaugurated via the Early Bird satellite on June 28. The inaugural ceremonies included statements exchanged between President Johnson and Government leaders in France, Germany, Italy, Switzerland, and the United Kingdom.
6. Lunar Research. NASA has developed equipment at Langley, Virginia to simulate lunar landing conditions. A powered module for two men resembling the Apollo lunar landing vehicle (LEM) is cable-suspended from a high steel structure.
7. Storm Detection. Tiros IX sighted Tropical Storm Emma over the northwest coast of Luzon in the Philippines on June 25, and Tropical Storm Ava off the west coast of Mexico June 28. Threatened populated areas were warned in advance.
8. Space Agreement. The United States and Canada have agreed to continue joint operation of the Churchill Research Range, Fort Churchill, Manitoba. The Canadian National Research Council will take over operation of the Range from the USAF, and NASA will become the U.S. operating agency. The agreement is expected to reduce the U.S. share of the costs involved.
9. MOL Briefing for Vice President. Vice President Humphrey was briefed on the MOL program by representatives of Secretary McNamara's office.

10.

SPACE PAYLOAD SUCCESS BOX SCORE

(July 2)

	USA		USSR	
	1964	1965	1964	1965
Earth Orbit	26	48	14	24
Escape	1	2	1	2


E. C. Welsh

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COMMITTEE ON SCIENCE AND ASTRONAUTICS
HOUSE OF REPRESENTATIVES

SUITE 2317-2325 RAYBURN HOUSE OFFICE BUILDING

WASHINGTON, D.C.

June 30, 1965

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EXECUTIVE

FGHII Science and
Astronautics
Committee on

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Dr. Donald F. Hornig
Director
Office of Science and Technology
Executive Office Building
Washington, D. C.

Dear Dr. Hornig:

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Sincerely yours,



OLIN E. TEAGUE
Chairman
Subcommittee on
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EXECUTIVE OFFICE OF THE PRESIDENT
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EXECUTIVE SECRETARY

25
Friday, June 25, 1965

11:30 A. M.

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities.

1. Space Council. The Vice President has called a meeting of the National Aeronautics and Space Council July 1. Subject will be the Manned Orbiting Laboratory.
2. Paris Air Show. The reaction to the delegation led by the Vice President was most favorable. A distinct plus for international cooperation and openness!
3. Launches. The Soviet Union launched Cosmos 69 June 25 into a low circular orbit inclining 65 degrees from the Equator.
4. British Space Interests. A British cabinet-level committee under the direction of Professor Bondi of Kings College, a noted cosmologist, is visiting Washington this week (June 21-25) to discuss potential British military space interest with U.S. space leaders.
5. Gemini 4. Most significant medical finding of the Gemini 4 flight is that no ill effects to the astronauts as a result of their four days of weightlessness have been observed.
6. ComSat Commercial Service. The Communications Satellite Corporation plans to inaugurate commercial trans-Atlantic communications satellite service with ceremonies in Washington June 28.
7. Propulsion. The propellant for the first 260-inch solid rocket motor was recently poured and cast. This, the world's largest rocket motor, will be static tested late this summer.
8. Aviation. The Soviet Union has stated that their prototype SST engine is being test flown, and that the prototype SST aircraft will be test flown in 1968. According to Soviet announcements, the aircraft will be constructed of aluminum and will cruise at speeds of about 1500 mph.

9. Pending Launches.

a. Tiros X, the first weather satellite to be funded by the Weather Bureau, will be launched by NASA June 30. Its near-polar, sun-synchronous orbit is designed to provide 60 to 80 percent coverage of the tropical storm breeding areas during the coming hurricane season.

b. The last of the Saturn I's (SA-10) is being readied to orbit the third Pegasus micrometeoroid satellite.

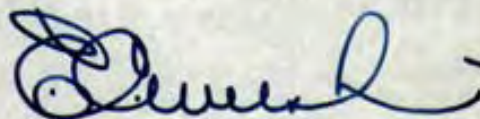
10. Moon Minerals. British physicist Samuel Tolansky predicts that the lunar surface may possess black (industrial) diamonds.

11. Nuclear Rocket Test. A ground test of the Phoebus IA nuclear rocket reactor is scheduled for the Nevada test site on June 25. The Phoebus series of reactors has a growth potential for eventual use in manned interplanetary travel.

12. Research Grants. During the past week NASA awarded 65 supplementary or new research grants totalling \$7,177,577 to 60 universities, colleges and private research institutions.

13. SPACE PAYLOAD SUCCESS BOX SCORE
(June 25)

	USA		USSR	
	1964	1965	1964	1965
Earth Orbit	26	44	13	23
Escape	1	2	1	2



E. C. Welsh

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NATIONAL AERONAUTICS and SPACE COUNCIL ①

EXECUTIVE

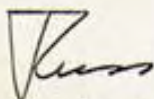
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June 23, 1965

MEMORANDUM FOR MR. BUSBY

Enclosed is an updated version of
New Zealand - Space Science Highlights,
No. 10 on our Visitors Series.



R. W. Hale

gah/pt



OFFICE OF THE VICE PRESIDENT
WASHINGTON

June 23, 1965

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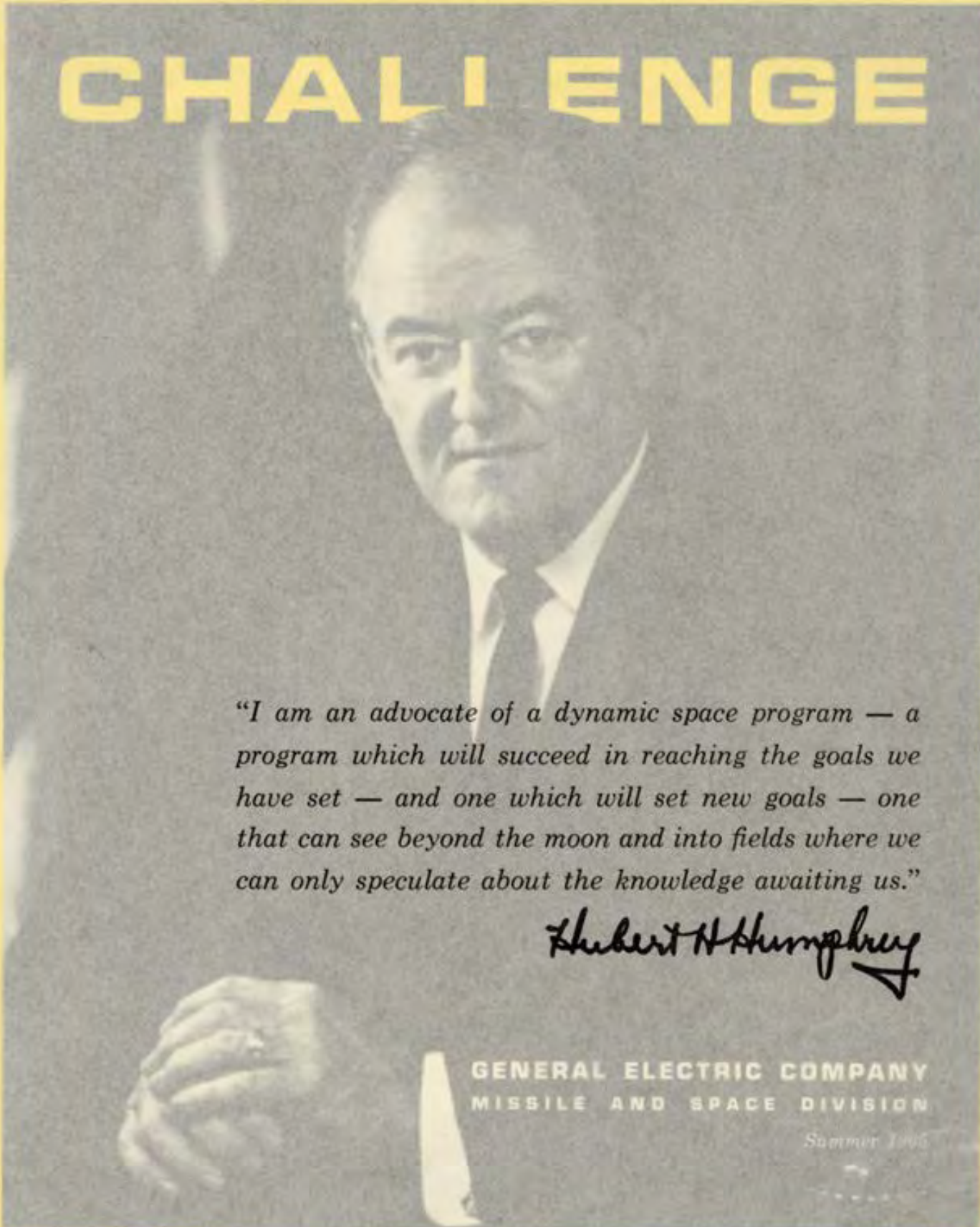
MEMORANDUM

TO: Bill Moyers
FROM: William Connell

We are beginning to get good Vice Presidential identification with the space effort, as you can see by the enclosed.

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CHALLENGE



"I am an advocate of a dynamic space program — a program which will succeed in reaching the goals we have set — and one which will set new goals — one that can see beyond the moon and into fields where we can only speculate about the knowledge awaiting us."

Hubert H. Humphrey

GENERAL ELECTRIC COMPANY
MISSILE AND SPACE DIVISION

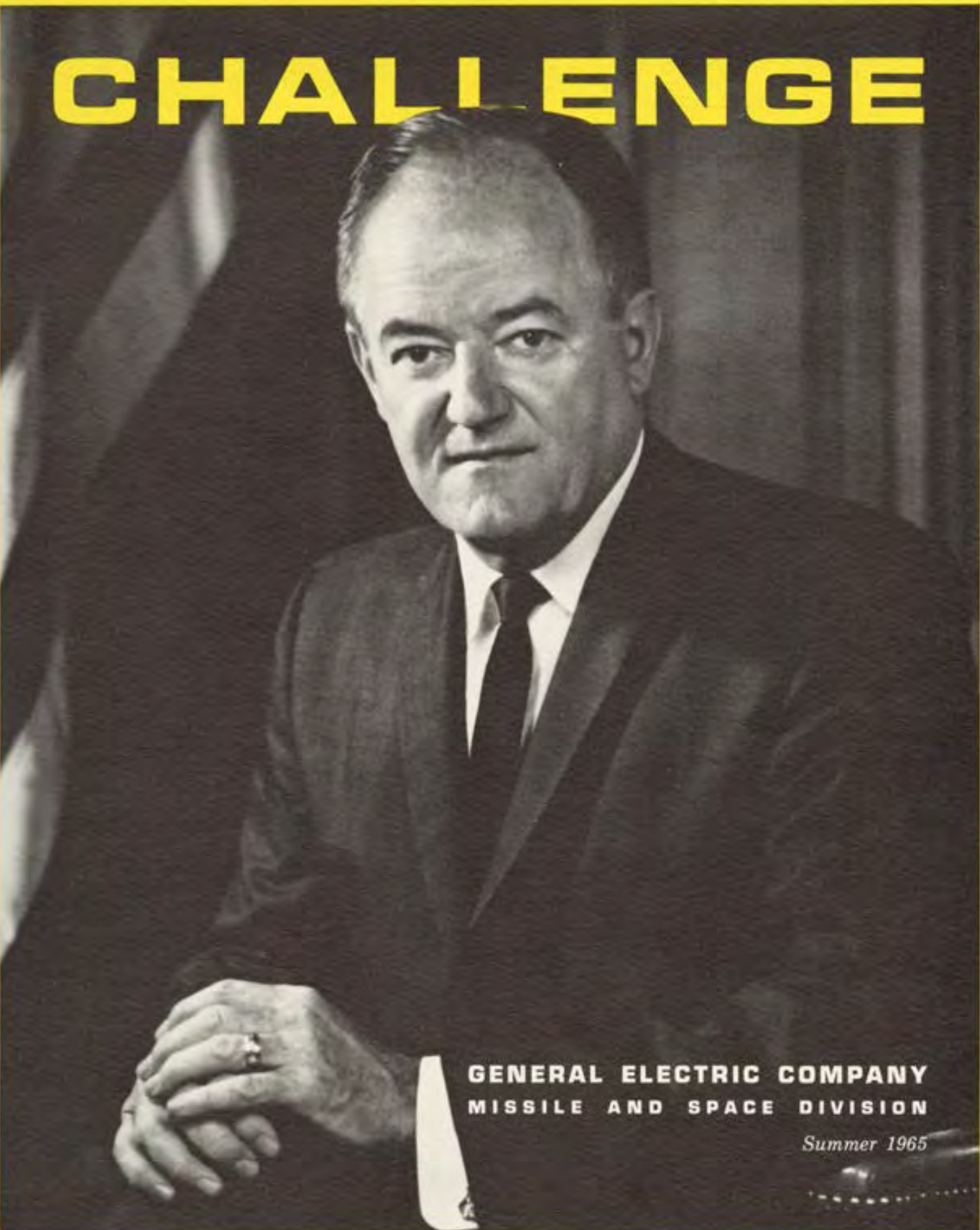
Summer 1966

NEPTUNE'S PROMISE —
The expanding arena
of Hydrospace

THE NAME OF THE GAME?
INTEGRITY —
General Sutherland and the
Army's TECOM

ASD AND RELIABILITY:
Vital to Apollo

CHALLENGE



GENERAL ELECTRIC COMPANY
MISSILE AND SPACE DIVISION

Summer 1965

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Summer 1965

GENERAL ELECTRIC COMPANY
MISSILE AND SPACE DIVISION

Volume 4, Number 2



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Photos used on pages 10-13 are official U. S. Army photographs.
Photo of General Sutherland, page 14, by Clarence S. Garrett of the Sun papers.

Challenge is issued quarterly by and for the employees of General Electric's Missile and Space Division, Philadelphia and Valley Forge, Pennsylvania; Burlington, Vermont; Daytona Beach, Florida; Bay St. Louis, Mississippi; Huntsville, Alabama; and key locations throughout the country. It highlights the people and events that make this the most exciting business in an out of this world.

Issued by
Employee Communications
Operation
3198 Chestnut St., Room 5306
Philadelphia 1, Pennsylvania
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OUR COMMITMENT TO SPACE

By HUBERT H. HUMPHREY

Vice President of the
United States and Chairman
of the National Aeronautics
and Space Council

The Great Society envisioned by President Lyndon Johnson is not one limited to the fight against poverty, ignorance, disease, and intolerance. The Great Society requires, in addition, an urgent quest for excellence, for intellectual attainment, for crossing new frontiers in science and technology.

An adequately funded, well-directed space program is an integral part of our nation's commitment to its future and to its greatness.

As one who has been an advocate of domestic programs which do cost money and which are not yet finished — who knows that much remains to be done and knows how expensive it will be — I have been asked why I strongly support the space program which, according to some, will take billions of dollars away from other useful programs during the next decade.

This strong and prosperous economy permits us to do many things and to do them well. We can put a man on the moon at the same time as we help to put man on his feet. We conquer outer space even as we conquer poverty.

I do not consider our domestic needs to be competitive with our space needs — any more than I consider them to be competitive with our national defense requirements. We can afford to do what is needed in space, in general welfare, and for our national defense.

Are we spending too much on Space — and not enough on problems associated with our own planet? Both, it should be obvious, are bound together.

It is not a question of space or social welfare.

It is not the moon or medicare.

It is not Apollo or education.

It isn't Pegasus or poverty programs.

It isn't launch pads or highways.

We can and must do all these things. Our rich and dynamic nation — growing richer every day — can afford all of these things. Our space dollars need not — and will not — deprive, starve or decimate any other useful programs.

One reason why I do support our space efforts strongly has to do with what might be called its social and economic spin-off. Consider only one domestic program — education.

The spin-off from the space program in education has been tremendous.

Since its beginning in 1958, the space program has served as a spring tonic to the American education system. It has done this from the grade school through the post-graduate university.

It has challenged — and it will challenge increasingly — our finest and most creative minds to the solution of new, vital, and complex tasks.

The exploration of space represents the "frontier of our times" which either this country or another will explore.

Aside from the physical frontier of space, it also

represents a frontier of technology and knowledge — an unending quest for new materials, improved techniques, more skilled scientists and engineers, better technicians and managers. Possibly the one most precious resource in this conquest is that of highly trained and dedicated people which it has attracted and developed.

And, our American schools have risen to the space challenge. In the grade schools and high schools, science courses have been modernized and new ones added. New textbooks have been written. Science teachers have been attending refresher courses to keep pace with rapid scientific advances.

The most gifted of our students are encouraged to expand their talents by means of scholarships and other assistance. Through the National Defense Education Act, which was passed in 1958, after Sputnik I, over 50,000 gifted science students have benefited from loans and fellowships.

NASA supports universities throughout the country in training space-oriented scientists and engineers; in building laboratories; in conducting space-aeronautics research.

Currently, almost 2000 Ph.D.'s are in NASA-

supported training at 131 colleges and universities. Soon these programs will exist in 142 institutions and cover every one of our fifty states. And consider the diffusion of knowledge resulting from such a program.

We are training advanced scholars in such diverse fields as astronomy, physics, metallurgy and chemistry — to name just a few.

If the space program had no other side effect beyond what it has done for education in the United States, it would be worth it. But, obviously, education is not the only field where benefits can be measured.

Resources devoted to space progress create more resources for many, many other purposes. In medical research, in the biological sciences, in our earth sciences as well as in the life sciences, our space program has brought vast gain to our nation and our people. It will continue to do so.

And our space programs have already demonstrated their usefulness in direct, practical, and peaceful ways.

The Weather Bureau predicts, for example, great savings, based on accurate weather prediction just five days in advance.

We will save two and one half billion dollars a

JOHN F. KENNEDY SPACE CENTER, NASA



Vice President Hubert H. Humphrey was at Cape Kennedy on March 23, 1965, for the launching of the National Aeronautics and Space Administration's GT-3 flight. With the Vice President is Dr. Robert C. Seamans, Associate Administrator, NASA.

year in agriculture, 45 million dollars in the lumber industry, 100 million in surface transportation; 75 million dollars in retail marketing; and 3 billion dollars in water resources management.

As the result of the competence of our weather satellites, we are already providing the nations of the world timely warnings on a global basis.

Certainly, too, we have much to gain from the accomplishments in communications.

Here again our system of private capital and government sponsored research has helped to tie the world community closer together through communications satellites.

And our space program has provided great stimulation to our economic and technological growth. After all, every dime of our space money is spent right here on earth. So far, there are no subcontractors on the moon.

The space program has meant profits, jobs, economic growth. In the last six months of 1964, the Department of Defense alone spent over 5 billion dollars on missile and space systems and aircraft. DOD spent in contract awards for experimental, developmental, test and research work in missile space work almost 3 billion dollars.

The space program has meant jobs too. There have been 300,000 men and women employed on the Apollo program alone.

It has infused our economy with new life. It has founded new research. It has developed hardware and constructed laboratories and other useful facilities.

And I want to underscore an undeniable fact of this infusion — the teamwork between our privately financed and privately run companies on the one hand and the Federal Government on the other is one of the major sources of strength of the whole national space program. In fact, it is basic to the strength of this great country.

By the year 2000 this country will be even greater — quantitatively as well as qualitatively. Our population will have doubled. The Census Bureau predicts there will be 361,947,000 people then — 90% in cities, 40% along our seaboards.

And to meet the needs of that population, our country cannot stand still. Our economy — a continued and strengthened partnership economy — must not stand still. And if the economy must grow rapidly, our technology cannot pause or stop. We are still a developing nation — our future is unlimited.

But, even if we could not point to a single immediate dollar return from the space program, we must continue — for that is man's history, as well as our destiny.

The pace of scientific discovery has increased. Only 39 years ago, knowledge and intelligence conspired within an American pioneer named Robert Goddard and we had a liquid fuel rocket.

Suddenly, in these few short years, man now moves at speeds 4000 times faster than his own legs can carry him.

Thus we have seen in our own lifetime the world move from horsepower in its literal sense to men

thrust into orbit about the earth. Yet much remains to be done.

If we were the only nation engaged in a space program, it would still be in our best self-interest to increase our efforts.

But, of course, we are not the only nation exploring outer space. The recent news from the Soviet Union should emphasize what we have already known well. The Soviets are investing great energy, vast resources, and know-how with great success in their space program.

Our military security rests on the same advanced research and technology as the space program. If we ever face a major confrontation with our enemies — whoever they may be — it will be in terms of Winston Churchill's "Wizard War."

If we are not strong in "wizard warfare," we are doomed.

Our national security alone would suggest reason enough for us to strive for absolute leadership in space exploration.

Wherever we stand, we cannot stand still.

Each time we pause, we have had a shock from the Soviet efforts in space from Sputnik in 1958 to the Russian in a space suit in 1965.

We can and do salute the Russian achievements! We can and do admire Russian science and technology. We can and do hope for totally peaceful uses of outer space. We can and do demonstrate our eagerness to cooperate with everyone in this quest.

But, we would be foolish if we did not understand the military implications of Soviet space science, as well as our own.

Each Russian shock has produced action here. But a mature nation should not need shock treatment. We are a peaceful nation; we are a peace-loving people; but we would ignore the real interests of the free world if we diminished our military efforts in space.

Even as we explore every responsible avenue for peacemaking and peacekeeping, we must ensure that our military space program receives its full measure of support.

The space program deserves whole-hearted support — for its intrinsic value as an intellectual search, for its domestic value as an economic goad for growth, as a pervasive stimulus for excellence, and, finally, for its importance to our military strength and the survival of free society.

I am an advocate of a dynamic space program — a program which will succeed in reaching the goals we have set — and one which will set new goals — one that can see beyond the moon and into fields where we can only speculate about the knowledge awaiting us.

Two years ago in a speech, I said, "This is a wonderful time in which to live. It challenges the best in us."

"It calls for doing the impossible — performing miracles. Mediocrity must give way to excellence; timidity to daring, fear to courage."

"We dream of sending a man to the moon in this decade. We know that dream will be fulfilled only with sacrifice, a commitment, a plan and a program."

NEPTUNE'S



With his space adventure launched, man now turns to a neighbor he must get to know for economic as well as military reasons — his sometime friend, frequent foe — the sea.

Now in the developmental stage is a combination aircraft-submarine. The craft could take off from land or water, perform a routine air mission, and then submerge for submarine-like exploration.

ogy, and meteorology, and requires the talents of industry, science and engineering."

Man Beneath The Ocean

University of Pennsylvania's Dr. C. J. Lambertsen has understood the sea's potential for years, and expends his efforts devising ways for man to learn to function comfortably hundreds of feet below the surface.

"There are many reasons," Dr. Lambertsen said, "why our combined attention should again be brought to bear upon underwater environment. Diving is an expanding field of practical endeavor, not only for military purposes, but also in scientific submarine explorations, oceanographic studies and marine biological research activities. While amateur interest in diving has not slackened and will probably be sustained forever, I

detect an increasing desire in civilian divers to put their interest in diving to useful purpose.

"Interest in the interrelated physiological effects of underwater existence is also increasing. The peculiar physiological stresses of diving are of evident interest to naval medical laboratories throughout the world. There has been a purposeful and welcome effort by the naval organizations of several countries to advance physiological studies in their own laboratories, and by support of research in universities."

Men like Dr. Lambertsen are seeking to speed the time when divers can operate in an ocean's depths with flexibility and security. The sooner this is possible the sooner mankind will benefit from an exploration that has unlimited promise. Some things are already known.

PROMISE



New submersibles will facilitate visual observations and exploration of the deep ocean. ALVIN, which can operate to depths of 6,000 feet, is an Office of Naval Research vehicle operated by the Woods Hole Oceanographic Institution. ALVIN will be used principally to investigate the continental shelves.

The longest mountain range in the world lies deep under the sea, where it extends for thousands of miles. How is this great mountain related to the basic structure of the earth? Studies of heat flow through the ocean bottom as well as of gravity and magnetic anomalies yield indirect evidence of the nature of the earth's mantle. This layer may comprise the largest single portion of the earth, yet man never has seen it.

Twenty-nine percent of the Earth's surface is land, but only 41% of that supports habitation. Our current population of three billion people, therefore, habitates only 12% of the Earth's surface and by the year 2000, our population will increase to six billion. Each year between now and 1970, one and one-half million workers will enter the labor market. By 1970, the world's food productivity

is expected to be insufficient to meet the needs of three continents, Africa, Asia, and South America. Despite the problems of hunger, poverty, population growth, depletion of natural resources, and the need for economic growth, man has so far restricted himself to 12% of the earth's surface.

Though only one percent of our food now comes from the sea, the oceans contain a super-abundance of food and industrial resources, especially in the first 600 feet of ocean depth. More than one-half of the ocean life exists in this envelope.

The quantity of economic resources in solution or suspended in the oceans is overwhelming as suggested by researchers at the University of California. Tabulating quantities on a per-person basis for a population of ten billion

people they calculate the sea offers:

- 6 million tons of salt
- 200 thousand tons of magnesium
- 50 thousand tons of potassium
- 10 thousand tons of bromine
- 1.4 tons of manganese
- 1 ton of iron ore
- 70 pounds of silver
- 2 pounds of gold
- Over 200 million tons of fresh water

Dr. Robert Morse, Assistant Secretary of the Navy and Chairman of the Governmental Inter-agency Committee on Oceanography, is a driving force behind development of our undersea knowledge. He observes: "Oceanography is not a separate science or a single study area. It is a group of disciplines applied by scientists of many different kinds, but with one unifying goal—to understand the sea. The National Academy of Sciences has defined oceanography as 'the scientific study of all aspects of the oceans, their boundaries and their contents.' An oceanographer is a scientist or technician with a background in any of a multitude of basic and technical fields. What makes him an oceanographer is his desire to understand, measure, or explore the sea."

Oceanography, though quite complex, usually is subdivided into ocean engineering and four major research areas: (1) physical; (2) chemical; (3) geological; and (4) biological. Ambitious study of all these fields of ocean science will uncover the knowledge needed and man must be able to explore firsthand. It's the kind of a contest where you have to be there to win.

With the dramatic appearance of military underwater swimmers during World War II, a newly-coined word appeared in the scientific vocabulary — SCUBA, or "self-contained underwater breathing apparatus." The connotation of man free-swimming under water for hours at a time was a startling one and focussed attention on the underwater world to a greater extent than ever before.

Bostonian Robert W. Morse is Chairman of the Interagency Committee on Oceanography of the Federal Council for Science and Technology and as Assistant Secretary of the Navy is the Defense Department representative to the Committee.

Navy veteran of World War II, publisher of over 40 scientific papers and a longtime consultant to the Navy as a civilian physicist, Dr. Morse has been a member of Undersea Warfare Committee of the National Academy of Sciences since 1957.

He earned his degrees at Bowdoin and Brown and has made significant contributions over the past two decades to scientific areas of great importance to the Navy and to all who probe the mysteries of underwater activity.



ROBERT W. MORSE

Physiological Problems

The dense, cold, wet, positive-pressure environment of diving presents the individual with a pattern of physiological stresses not encountered in any other situation. This requirement introduces problems which are not readily susceptible to the engineering approach, but require solution through greatly increased knowledge of the reactions to the peculiar diving environment.

The stresses upon the diver vary in type and degree with changes in depth and even with the rate at which change in depth is achieved. At any depth the nature and severity of these stresses varies with his diving duration. Many unique problems to be overcome are caused by high partial pressures of the gases he must breathe, or even by the normal gaseous product of his own metabolism.

Penn's Dr. Lambertsen comments: "Because now, as with the development of aircraft, it is easily possible to build mechanical equipment with a diving potential greater than that of its user, greatly increased attention must be given to the human aspects of diving. This is particularly true for self-contained diving and underwater swimming, where the diver carries his own supply of respiratory gases, serves as his own tender,

and often is without connection to the surface."

United States Navy Captain O. D. Yarbrough of the Bureau of Medicine and Surgery adds: "Man's desire to invade those areas of environment for which he is physiologically ill-adapted is well documented by the historical accounts of his constant attempts through the centuries to penetrate, survive, and perform useful functions beneath the surface of the seas. All individual underwater activity can be divided, with some reservations, into two categories, namely, deep-sea diving and shallow-water diving.

"Deep-sea diving is usually defined as that type of underwater operation that exceeds 100 feet in depth, performed in more or less open sea remote from land, and by means of the conventional deep-sea diving equipment. In contrast, shallow-water diving is a rather comprehensive category embracing many forms of individual underwater activity, such as skin diving, submarine escape, underwater demolition team activities, underwater swimming, mine detection and demolition, beach reconnaissance, individual aspects of miniature submersible craft operation, and many others. Shallow-water diving usually does not exceed 100 feet in depth and is performed in

water relatively adjacent to land, such as streams, rivers, bays, inlets, harbors, and so forth, and employs self-contained apparatus of some variety.

"The diver/swimmer quickly learns that in these operations he will be wet; he will be cold; he may contract the bends or an oxygen seizure; he must work in the dark; depending on his mission he must learn to get through nets or other barricades; his apparatus must not leak or fail; he must not lose his course in unfamiliar territory; and above all he must complete his mission successfully; and he must not dwell on the fact that he may not return. *In view of all these problems it is my opinion that this vocation requires a stout physique, a stout intellect, and a stout heart.*"

National Cooperation

Since the ocean is probably too large and too complex for any one nation ever to solve its many secrets, oceanography provides an important area for potential cooperation with other nations. This cooperation can result in furthering the three critical areas of scientific exploration, geographical exploration, and ocean development.

- Scientific exploration seeks answers to the "how" and "why" of ocean phenomena and is essentially basic or applied in nature.
- Geographical exploration is needed to describe accurately the sea by seeking answers to the "what," "where" and "when" of the ocean's features; this effort is motivated by social, economic, and political considerations.
- Ocean development is the application of scientific knowledge and engineering technology to the exploitation of sea. It is of great concern to the Federal Government and to some State and local governments.

Dean Spilhaus of the University of Minnesota's Institute of Technology says, "The freedom of the seas has been jealously preserved over the ages. But as more is taken

from the sea, not just along shore lines but from the open ocean, we shall need more international agreements, perhaps even the granting of rights for exploitation. When no single nation owns any parts of the ocean, then no nation worries about the conservation of its resources. Rights to exploit the oceans of the world should carry with them specific responsibilities for their conservation. An international seaboard control force will be necessary to enforce these agreements. Hopefully, this force would resemble an international commission of game wardens or officials of a world bank of ocean economic resources rather than the familiar pattern of the more politically involved international organizations."

In the United States, the federally-supported oceanographic program conducted through some 20 agencies, focuses on five major goals:

- ... Strengthening basic science.
- ... Improving national defense.
- ... Managing the ocean's resources.
- ... Managing resources in domestic waters with the objective of: safeguarding public health and conserving resources.
- ... Protecting life and property ashore; insuring safety of operations at sea.

These goals are interdependent for their own fulfillment; thus, furthering of one goal may actually benefit another. Pursuit of all five goals together, by all Federal agencies and by the scientific community, promises a considerable contribution toward outstanding achievements in oceanography.

"The national goal in oceanography," Dr. Morse says, "is to comprehend the world ocean, its boundaries, its properties, and its processes, and to exploit this comprehension in the public interest, in enhancement of our security, our culture, international posture, and our economic growth."

The funding profile of current and forecast Federal oceanic activities:

The Navy Oceanographic Office is conducting a ten-year program

with funding expenditures of 110 million dollars per year.

The Navy's Deep Submergence Systems Program is planned for five years with funding of approximately 200 million dollars.

The Navy's Anti-Submarine Warfare Program in 1965 constitutes funding plans for 2.2 billion dollars, of which 365 million dollars is intended for research and development, test and engineering efforts.

The Interagency Committee in Oceanography headed by Dr. Morse has a ten-year program to 1973 with the total funding at 2.2 billion dollars. The annual expenditures increase each year by ten percent and the funding level for this year is 138 million dollars, of which 69 million dollars is allo-

cated for research, 25 million for surveys, and 21 million for ships.

MSD's Jack Carpenter reports: "The National Research Council of the National Academy of Sciences has performed a study of the economic benefits to be derived from investments in oceanics research. The Council recommends that 280 million dollars a year be invested; 115 million for national defense related researching, and 165 million dollars for national considerations. The 165 million dollar annual investment would cover research investments in areas such as fisheries, long-range weather forecasting, near-shore sewage disposal, and near-shore recreation.

"The expected return on this 165 million dollar investment for 20 years is three times larger than



A seaman prepares to make Nansen cast in rough seas at night. The Nansen bottle is a traditional oceanographic instrument used to retrieve samples of sea water. It is equipped with a rotary valve at each end so that when it is rotated at depth the valves close and lock shut, entrapping a water sample and setting reversing thermometers. The bottle is named for its designer, Fridtjof Nansen.

the yield from investing this sum at a ten percent discount rate for the 20 year period."

Inside The Ocean Vault

Though much of hydrospace talk is futuristic, a quick glance at some current efforts illustrates the versatility and international complexion of oceanic exploitation.

- All of the magnesium and $\frac{3}{4}$ of our bromine is extracted from the sea.
 - 1000 carats a day — soon 5000 carats a day — of diamonds are dredged off South Africa.
 - The Japanese are extracting 600 tons of iron ore sand each month from Tokyo Bay.
 - The Japanese are also mining ten million tons of coal each year from ocean depths ranging from 600 to 3000 feet. This constitutes about 20% of Japan's total coal production.
 - According to the Shell Oil Company, the industry is spending one million dollars a day to explore off-shore leasings.
 - Kelp farming is a multi-million dollar business in California. The kelp is processed as a food additive for farm animals and results show an increase in animal size, weight, fertility, and immunity to certain diseases.
 - Seaplant Corporation in New Bedford, Mass., has a profitable business in extracting salable commodities from sea weed for ice cream gel, iodine, and animal food additives.
 - Tin is mined on the sea floor off Malaya.
- MSDers Priftis and Carpenter agree that the field has much to offer science and industry. They foresee:
- ... Ocean farming and fishing by cultivating and managing the ocean resources the way farmers and foresters do the land counterparts.
 - ... Undersea construction and habitation.

... Undersea transportation, especially from the standpoint of eliminating the restrictions of weather, the sea state, and heavy currents.

... Ocean surface shipping. In 1959, 277 million tons of cargo were shipped and it is estimated that in 1970 the tonnage will increase to 400 million. In terms of new ship construction, this can mean 500 million dollars per year.

... Oil, gas, ore, and chemical mining.

... Basic ocean research.

... Marine recreation. This is estimated as a 100 million dollar year business.

... Contamination control.

... Weather forecasting. Improving our long-range forecasting by 50% could mean annual savings of 2 billion dollars.

In the area of national defense, the Navy's Deep Submergence Systems Program is intended to procure the systems, equipment, components, and supporting research and development to extend man's capacity to do useful work to depths of 600 feet and then beyond; develop equipment and techniques for recovery of large objects such as intact subs and small objects such as ordnance items and aerospace hardware from depths extending to 20,000 feet; rescue of personnel from undersea systems; and develop deep submersible vehicles for research, exploration, rescue, and recovery.

Carpenter said: "These Navy programs plus the demanding anti-submarine warfare development requirements challenge science and industry to high levels of system inventiveness, equipment reliability, and place prodigious demands on technology. Industry must supply the new systems and equipment required for the increased depth, speed, and range of undersea operations."

Development of self-contained underwater breathing apparatus must attain a point where underwater man is released from his



Samples of the ocean floor are retrieved with coring devices like these. The corer brings up a vertical, cylindrical specimen of the bottom sediment, from which the nature and stratification of the bottom may be ascertained.

anchor to the surface and his dependency on it.

Since The Fourth Century

There are considerable gaps in our knowledge concerning the historical development of SCUBA, but it can be divided into three main periods.

- The period of the diving bell, dating from Aristotle in the fourth century B.C. to about 1800.

- The period of the self-contained underwater diver, dating from about 1770 to 1930.
- The period of the self-contained underwater swimmer, dating from about 1930 to the present.

In regard to the time element, the duration of each period differs noticeably. Period I lasted nearly 2200 years, Period II about 200 year, and Period III now is 20-plus years old. One arresting fact is the lengthy dominance of the diving bell. To be sure, there were other SCUBA developments during 22 centuries in Period I, but the diving bell remained pre-eminent, so far as we know.

The greatest development in SCUBA, qualitatively and quantitatively, has occurred since about 1900. During the first half of the 20th century man has overcome many of the physical, technical and psychological barriers of the underwater world. Even though SCUBA swimmers have penetrated only approximately 400 of the 36,000-foot depth of the oceans, future historians must list the first half of the 20th century — certainly the years between 1940 and 1950 — as the period of greatest advancement in underwater swimming since the time of Aristotle.

Dr. Morse says: "This Nation's destiny and the sea have been sig-



DR. DONALD F. HORNIG
Special Assistant to the President for
Science and Technology

nificantly linked together since the day this country was discovered by seafaring men. During this Nation's early growth, the sea provided both a natural barrier to aggression, and a highway for world-wide exchange of goods and of culture.

"To achieve our future objectives for security and for peaceful exploitation of the ocean greatly increased knowledge is required of the sea itself, its contents, its boundaries, and its interaction with the atmosphere."

The man in the moon, a quarter of a million miles away, is becoming more and more familiar every day. It's Father Neptune who remains the mystery. Less is known about the land which lies beneath the ocean — almost three fourths of the earth's surface — than about the far-away moon.

It's a decade since the world's first nuclear powered vessel, the submarine Nautilus, put to sea off Groton, Conn. Our newest model nuclear submarines, such as the Polaris-firing Casmir Pulaski and the blimp-shaped Skipjack, can go deeper, travel faster, and remain submerged much longer than the historic Nautilus could.

In the face of the latest submarines and other operational undersea craft, the ocean depths are, at last, beginning to yield up not only their mysteries, but also their chemical and mineral treasures.

Dr. Donald F. Hornig, Special Assistant to the President for Science and Technology comments: "There is still an unfilled need for capabilities to operate effectively beneath the surface of the sea. We have virtually no capability for engineering operations more than a few hundred feet below the surface; we have only a few stable platforms from which operations such as bottom drillings or deep ocean measurements can be carried on, and as yet we have none which are capable of operating in the deep ocean. In short, research and development in the seas is severely limited, not only by the manpower and by the science, but by the lack of suitable engineering

developments. I have no doubt that industry can make great contributions to the development of our exploration capability beneath the seas. After all, a nation which can build a supersonic transport and space vehicles must surely be capable of developing a means for exploring our own planet."

The aircraft-aerospace industry has already fixed its sights on the sea. It is working on a deep submersible for prospecting and recovering mineral and aquatic wealth.

Already beyond the drawing board stage is the concept of a Navy seaplane, which could fly in the air as an aircraft and submerge to cruise underwater as a submarine. This daring concept is considered by underwater experts as "feasible, practical and well within the state of the art," and, although the submersible seaplane is only in its developmental stages, it is of tremendous importance to future underwater research.

Yet in spite of these advances, many ocean phenomena — such as currents and waves — are still incompletely understood. But greater knowledge, greater insight, and greater wealth are the goals of all those interested in underwater research — submarine designer, engineer, scientist, and oceanographer alike. And those goals are now in sight.

Dean Spilhaus sums up: "Oceanography will progress from ships, to buoys, to much more sophisticated platforms, and ultimately to floating factories, dwellings, and all the components of future ocean cities. Then the occupation of the sea will have begun."

World-famous diver, Robert Ste-nuit, on emerging from a two-day stay underwater looked ahead: "What we have accomplished is to live in the depths in questionable comfort but relative security. Our successors will stay in the depths much longer than our two days. They will colonize the sea floor, cultivating its resources instead of pillaging them. Tomorrow the colonist will survey through the port-hole of his sea-ranch kitchen while a coffee pot simmers on the stove."

The Name of The Game? INTEGRITY!

"General Johnson, the Army's Chief of Staff, makes frequent reference to the 'four I's' when discussing the qualities needed to be successful in the Army or any other service or profession. The way I add things up, these attributes, intelligence, imagination, initiative, and integrity — especially integrity — are absolutely essential at TECOM if we are to breed confidence in what we do."



Major General James W. Sutherland, Jr., Commander, U. S. Army Test and Evaluation Command

The "mathematician" in this case is Major General James W. Sutherland, Jr. Commissioned a 2nd Lieutenant in 1940 after attending the University of Arkansas where he participated in the ROTC program, he is now the Commander of the Army's Test and Evaluation Command. A guy who made it the hard way — in competition under the old Thomason Act where only one out of every ten candidates was offered a regular Army commission — General Sutherland is, at 47, a young and energetic representative of the Army's new breed.

A combat veteran who saw action during WW II in Algeria, Tunisia, and Italy, Sutherland moved from 2nd Lieutenant to Lieutenant Colonel in only four years. When wounded at Anzio Beachhead in June 1944 he was commanding the 2nd Battalion, 6th Armored Infantry. Today, he is devoting his managerial skill and energy to essentially one task. In his words: "The ultimate assurance to the Army that its troops are being provided with materiel that will do what it is supposed to do whenever and wherever it is required to do it."

Overall development and test responsibility for Army materiel falls on the Army Materiel Command — a child of the Army reorganization of 1962, and one of only three major non-combat commands in the

Army. Within AMC there are seven major sub-commands: the Mobility Command; the Weapons Command; the Electronics Command; the Munitions Command; the Missile Command; the Supply and Maintenance Command, and the Test and Evaluation Command. With the exception of Supply and Maintenance, TECOM's siblings are charged with the development of Army materiel, while TECOM is responsible for writing the "insurance policy;" that is, it must certify as ready for safe, efficient and effective use every piece of equipment that gets into the hands of American soldiers.

According to General Sutherland, "The Army reorganization resulted in a substantial reduction of test facilities — from 44 to 17 — and putting these facilities under one command permitted a shortening of the time required to perform tests. It also enabled us to eliminate the element of redundant testing. By combining these facilities under a single command, we are able to turn out better test data and reports. This is vital because these reports form the basis for senior Army officials to make decisions regarding equipment.

"Another thing; having these facilities under one command 'roof,' I can shift resources to get a high priority test job done. Our current organization also

provides an environment in which more objective appraisals of equipment are possible. This was a natural result. At TECOM we are and must be completely independent of the developer; we must be objective. Our job is to report the facts — good or bad — after a test. And although we'll make recommendations on how we think a piece of equipment can be improved, we're not emotionally involved in whether the product is accepted or not. Like Joe Friday on the old radio and TV program, 'All we want are the facts.'"

To get the facts TECOM provides an independent evaluation, using appropriate tests, on all materiel for which AMC has developmental responsibility. To accomplish this, the Command must prepare a list of test objectives, prepare and approve a test plan, conduct the test and report on it, and evaluate and distribute the test report.

General Sutherland has eight organizations or "Testing Directorates" that fulfill this task for TECOM. They are the Testing Directorates for Air Defense Materiel; Armor Materiel; Aviation Materiel; Electronics Materiel; Field Artillery Materiel; General Equipment; Infantry Materiel; and Nuclear, Biological, and Chemical Materiel. If one were to regard General Sutherland as a General Electric Department General Manager, the commanders of these Testing Directorates would be the equivalent of Section level Program Managers.

Together But Apart

Although General Sutherland is an ardent fan of his own group ("I have fewer than normal problems. I like my command. They're a hard working and dedicated group from 'Bud' Schlanser — my Deputy — on down. They do a high-quality job and they're not afraid to put in the overtime that's sometimes required to do it."), he doesn't get involved in "my dog's better than your dog" comparisons.

"Everybody in AMC has the same goal," he observes. "We have to get the best possible 'tools' to the troops. The others develop and we test; it's that simple. Probably none of us is much good without the other. And when you look at the number of complaints that come in from the field you see that the record for all the Army is darn good. So we're back to integrity: a sincere and dedicated effort on the part of developer and tester to make ours the best equipped Army anywhere."

TECOM's evaluations must always be objective, but that doesn't mean the Command has gone into a self-imposed solitary confinement. In essence, there are two categories of tests performed by TECOM, not coincidentally called Category I and Category II. The latter requires the closest possible cooperation with the developing command.

Category I are those tests in which TECOM is responsible for establishing the test objectives; preparing and approving the test plan; and reporting and distributing the test results. Under this heading come such things as:

Engineering Tests, to determine to what degree an item meets the desired performance characteristics as specified by the Army.

Service Tests, intended to show the comparative value of an item under test with respect to that of the current standard item in a representative span of combat.

Environmental Tests, performed to determine if an item holds up effectively in the surroundings for which it is intended.

Confirmatory Tests, conducted on production models of items to ensure that no deficiencies or shortcomings have been created by previous modifications.

Check Tests, employed on Service Test models where major deficiencies had been discovered — deficiencies of such a nature as to have rendered the item unsuitable. This procedure is intended to guarantee that previous problems have been solved and no new ones created.

Category II are those tests in which TECOM performs a testing service for some requesting agency. In this case it is the requesting agency that sets up the test objectives and carries through with the final disposition of the test report. Here, TECOM lends its skill and facilities, but the developer is calling the test "shots." Therefore, though independent, developer and tester are indeed working together.

The range of these Category II tests runs from Research Tests — to confirm or further a research project or phases of it — to Comparison Tests — where random samples of production line items are tested as a quality assurance measure.

Around the Horn with TECOM

Test and Evaluation Command installations are scattered around the United States and one is in Panama. There are 17 sites in all, each equipped to perform a variety of tests in a specific environment. Eight of these are engineering test activities; six are service test centers; and three are environmental test centers.



A 76mm test rig firing on a high velocity range operated by Development and Proof Services, Aberdeen Proving Ground, Maryland. The range is just one of the innumerable instrumented facilities available at APG for testing Army materiel.

ABERDEEN PROVING GROUND, Maryland, is TECOM's headquarters. At APG they perform engineer design, engineering, production, and surveillance tests of weapons; weapons systems, generally excluding rockets; ammunition; combat vehicles, and other automotive vehicles. The latter category can include anything from a fire truck to a "six by," a six-wheel truck.

ELECTRONIC PROVING GROUND, Fort Huachuca, Arizona, plans, conducts, or participates in tests of all Army electronic equipment, including such things as an Artillery Locator and Target Acquisition Radar System or a Mobile Calibration Facility. The Army EPG also operates an Electromagnetic Environmental Test activity.

DUGWAY PROVING GROUND, Dugway, Utah, is the Army's Chemical, Biological, and Radiological proving ground. Here they plan and conduct both lab and field tests in CBR, meteorological, and safety capability for efficient field testing of CBR weapons systems, defense systems, and materiel.

JEFFERSON PROVING GROUND, Madison, Indiana, is the scene of ballistic acceptance, production, engineering and surveillance tests of ammunition. This installation also receives, stores, and issues industrial stocks of calibrated ammunition components.

ERIE PROVING GROUND, Port Clinton, Ohio, performs production acceptance tests on weapons,

mounts, and entire weapons systems.

WHITE SANDS MISSILE RANGE, New Mexico, a national missile range, is operated by TECOM. The Command is responsible for flight and range instrumentation, range operations, data measurements, data transmission, data reduction, and related reporting. In addition, TECOM is responsible for policies, programs, and procedures regarding flight safety for all missiles, rockets, munitions, and space vehicles belonging to all users of the range. This includes all such items launched from or into White Sands. Finally, all Army medium and long-range rocket and missile tests are performed by TECOM at White Sands.

GENERAL EQUIPMENT TEST ACTIVITY, Fort Lee, Virginia, produces test reports on non-combat and commercial vehicles, uniforms, field clothing equipment and related accessories, plus other items for personal protection and comfort. This activity also tests rail and marine equipment.

AVIATION TEST ACTIVITY, Edwards AFB, California, conducts engineering design and engineering flight tests — ranging from acceptance tests to renovation tests — on all items considered for the Army's air inventory. This is the only activity in the U. S. Army that has the capability to conduct engineering flight tests. An example of a recent Aviation Test Activity

program is the General Electric/Ryan Aeronautical XV-5A V/STOL Aircraft.

AIRBORNE, ELECTRONICS AND SPECIAL WARFARE BOARD, Fort Bragg, North Carolina, is a facility for the testing of airborne equipment, including aircraft, designed to facilitate air drop and air transport of Army troops, supplies, and equipment. The Board also checks out such items as field communications equipment, communications security equipment, shelters, power supplies, and navigational equipment for all-weather delivery of airborne and special forces personnel.

AIR DEFENSE BOARD, Fort Bliss, Texas, is the Army's center for service tests of air defense weapons systems, and engineer and service tests of fire distribution systems, air defense electronic countermeasure and counter-countermeasure equipment and devices, plus target devices and atomic demolition munitions. Currently on ADB's testing schedule is the Missile and Armament Department's Vulcan Air-Defense System. MSD's Burlington facility is under Army contract to develop the System, which includes the M61 20mm Vulcan Gun and a one-man-controlled, electrically-driven turret mounted on the M-113 Self Propelled Vehicle. The Air Defense Board is also testing the Redeye air defense missile and is conducting improvement tests on the Hawk air defense missile.

ARMOR BOARD, Fort Knox, Kentucky, provides test data on armor and engineer items of materiel and automotive systems, exclusive of specific Quartermaster and Transportation Corps items. Examples of the Armor Board's test activities include the underwater fording kit for the M-60 Tank and tests on a new 20-ton wrecker.

AVIATION TEST BOARD, Fort Rucker, Alabama, tests aircraft items, systems, and ancillary equipment. Two current projects are a high frequency aircraft radio set and armament systems for helicopters.

ARTILLERY BOARD, Fort Sill, Oklahoma, performs a variety of tests on equipment to be used by field artillery personnel. Currently on the Artillery Board's list of test items: searchlights, periscopes, a radar chronograph, 155mm projectiles, and a 105mm howitzer.

INFANTRY BOARD, Fort Benning, Georgia, tests equipment and ancillary items to be used by troop units for fire power, target acquisition, ground surveillance, fire control, and ground mobility. This includes field clothing, equipment, and rations for individuals and small units; anti-personnel mines and related equipment; chemical warfare and survival equipment for individuals and small units; airborne testing of clothing and equipment that will be worn by or carried by individual parachutists while jumping from aircraft.



(1) At Hand Hill Firing Point, Fort Sill, Oklahoma, members of the 2nd Battalion, 44th Artillery, use a T-2 Theodolite to "lay-in" the Pershing missile. (2) A Sherman vehicle scales a barrier on the Munson Test Course at APG. (3) Crew members watch as Pershing missile is raised on an erector launcher vehicle at Fort Sill, Oklahoma. (4) A Lance Missile System vehicle completes a swimming test at APG, Maryland. (5) Pershing moves horizontally, too. Here, crew members perform inspection before moving out of training area to firing area. In front is the XM-474 warhead vehicle and behind is the Pershing erector launcher vehicle. Fort Sill, Oklahoma. (6) At APG's Munson Test Course a 2,500-gallon tanker is put through a durability test. Munson is one of APG's automotive facilities for testing of Army combat vehicles and other wheeled and tracked equipment. (7) The XM410E1, a new 2½ ton cargo vehicle

with eight wheels and a sophisticated system of suspension and power transfer, attacks the snow covered slopes of the Arctic Test Center's incline test facility. (8) Soldier-technicians bake up a batch of bread rolls in an experimental Continuous Bakery System at the General Equipment Test Activity, Fort Lee, Virginia. This system was developed to satisfy military requirements in supplying fresh bread to combat troops in the field. The system is ultimately intended to replace the Army's Standard Mobile Field Bakery presently in use. (9) The Honest John Artillery Rocket on a test launch from White Sands Missile Range, New Mexico. (10) Besides its bout with the snow (photo 7), the new "eight by" must also take on the mud. This mud test was conducted by the Armor Board, Fort Knox, Kentucky.

YUMA PROVING GROUND. Yuma, Arizona, is the place where air delivery equipment and equipment used to support air delivery are put to the test. Products ranging from an armored Command and Reconnaissance Vehicle to rubber compounds for tank tracks come in for close scrutiny at Yuma, where materiel intended for use in a desert environment is tested. This installation also provides technical support for arctic environmental tests.

ARCTIC TEST CENTER. Fort Greely, Alaska, plans and conducts tests on all Army materiel intended for use in an arctic environment. ATC has the facility to test and evaluate such giants as the 175mm Self Propelled Gun and the two and one-half ton, eight wheel (8x8) cargo truck. Most Army vehicles and weapons are subjected to tests under arctic conditions.

TROPIC TEST CENTER. Fort Clayton, Canal Zone, plans and conducts tests on materiel intended for use in a tropic environment. The Tropic Test Center has tested the same "eight by" cargo truck previously mentioned. At the same time, the Center is conducting a series of tests on munitions items from tropic storage depots.

All of these organizations must provide the Army with test reports that are accurate as well as unbiased. One of the other "fringe benefits" of the reorganization helps make this possible. General Sutherland comments: "After the reorganization and with the establishment of TECOM we were able to develop a uniform testing language. We've been able to refine test terminology and standardize the definitions that apply to the various test programs. Since TECOM insists on a strict interpretation of all these definitions, the same testing language is now spoken throughout the Command. This has improved our ability to communicate within the Command and with the developers of Army equipment as well. You get some idea of the importance of this when you consider that we have a normal workload of between 2,500 and 3,000 test projects; we complete between 1,200 and 1,500 tests annually. These range from small to gigantic and in duration from one day to one year."

But Will It Work?

After an item has been tested and re-tested, after an item is as safe and efficient as the engineers and technicians know how to make it, the Army still wants to know: can the troops use it effectively? And they've got a way to find out. That method is to employ still one further test, the Troop Test.

By conducting a test of the item in the field, normally in conjunction with tactical field exercises, using troops similar to those who would need the item in actual combat, TECOM gets the Army its proof.

Most of us probably stereotype the Army in terms of tanks and trucks and guns. That's part of it. But right now, somewhere on a piece of TECOM's five

million acres of land one or more of the Command's 19,700 people is testing something as unconventional as:

- ... *combat boots* with steel intersoles for use in Viet Nam (seems as though the Viet Cong got cute and started planting bamboo spikes in the ground for our troops to walk on)
- ... *irradiated foods* for consumption in the field.
- ... *leech repellents* for use in jungle zones.
- ... *transistorized organs* for use in field chapels.
- ... *a quick mix and bake machine* that can turn out 20,000 bread rolls a day — in the field.

And this is only a sample. The best way to remember TECOM's products line is probably — **from shoes to missiles, TECOM tests it, evaluates it, and if need be, makes it work.**

General Sutherland has said, "The contributions made by the military man, and the civilian soldier in particular, to the betterment of mankind are almost without number, and I know of no other profession where the individual can enjoy the advantages and rewards that are inherent with service in the U. S. Army." Regarding the "contributions," he is supported by almost 200 years of American history; regarding the rewards and advantages, he is supported by current events.

Generally, individuals must earn their rewards. But as for the advantages, that's part of what TECOM, and indeed the entire Army Materiel Command, is trying to provide. In an era when trouble can break out quickly in any sector of the world, in a time when a strong defensive force is often needed to preserve the sometimes shaky peace, it's comforting to know that the skills and efforts of so many able people are going towards the safety and security of our troops. Especially if you're one of those civilian soldiers.



General Sutherland . . . Integrity a way of life



Former department store becomes site for new community college.

PHILADELPHIA STYLE

ITEM: In the next ten years, the United States must create new facilities for higher education equal in size to all those in existence now. In just ten years the nation must educate as many students as it has in the past three and a half centuries — in order to accommodate an exploding demand for knowledge and competence.

ITEM: The Pennsylvania State Board of Education, in April 1964, approves the proposal of the Philadelphia Commission on Higher Education to set up a Community College in Philadelphia.

ITEM: Dr. Allen Thomas Bonnell, vice president and provost of Drexel Institute of Technology, is appointed president of the new Community College on April 1,

Matching the needs of an old city with a new college is a man who specializes in educational innovation.

1965. In September, 1965, the first students will begin classes.

It's a long way from Colon, Panama—where Allen Bonnell was born in 1912 — to 20 South 12th Street in Philadelphia where he now occupies a fourth floor suite of offices as prexy of Philadelphia's newest venture in higher education.

But to Dr. Allen Bonnell, the geographical distance between Panama and Philadelphia is only

incidental, despite the stop-offs in Erie (Pennsylvania), Ohio, Illinois, Bonn (Germany), St. Louis, North Carolina, France, and Washington, D. C. The excursion that really counts for him is the one of the mind — and it's a varied voyage too.

It has brought him, finally, face-to-face with the staggering maze of difficulties that are sometimes politely called "Educational Problems in an Urban Society."

And right here, Allen Bonnell parts company with the phrases of those who write titles for symposium discussions. "I question," he says, "whether it's really useful for us to call these events 'problems'. I believe they're really indications of change in our lives — and when

you face up to these changes, you must also face up to different needs."

The Educational Crisis

The growing demand by Americans for educational services is one of these changes, he points out. In 1900, only four of every hundred students went on to higher education. In 1940, thirty of every hundred continued their education after high school — and today more than half of the students go on to educational programs above the high school level.

Add to this flood of students the special characteristics and needs of an urban center such as Philadelphia and you have a volatile blend. In the minds of many educators and other thinkers, it's a crisis.

In the mind of Dr. Allen Bonnell it's an invitation to action. "My own instinct," he muses, "is to move into educational vacuums and try to do something about them." So far, he's followed his instincts and they've kept him in the vanguard of educational innovation since he came to the city in 1948.

For example, he helped to organize the city's educational television station, WHYY (Channel 35), and is now a member of its Board of Directors and vice president. He also played a significant role in getting Channel 12 into service, and takes pride in its strong menu of public affairs programming. "Education should have a strong and close partnership with television," he says. "Here we have a unique opportunity to make a broad, frontal attack on the education lag in our community."

Another example. In 1957, he co-authored a report that led to the establishment of the Philadelphia Commission on Higher Education, a group that has spearheaded new educational programs for the city including the Community College itself.

He also shared in the setting up of the West Philadelphia Corporation as a member of its Board and Executive Committee. The Corporation is a moving force in the development of Philadelphia's Uni-



DR. ALLEN T. BONNELL
President, Community College of Philadelphia

versity City and Science Center. One major interest of Dr. Bonnell's here has been the "M" (for Motivation) program—a special project of the corporation designed to encourage incoming sophomores at West Philadelphia High School to keep their sights on continuing their education after graduation.

When you ask him — "Why a two-year community college for Philadelphia?" — Dr. Bonnell points to the evolution of higher education in the city for the answer. "Philadelphia is blessed with more than a score of higher learning institutions and each of them developed in response to a particular need. Drexel, for example, developed in response to a need for professional manpower, initially not on a collegiate level. As time went on and the needs of industry in the area became more sophisticated, Drexel began to offer baccalaureate programs. The other colleges and universities evolved in similar fashion, each in response to direct needs of the community. Drexel will soon offer doctorate degrees in various technical fields, and its standards for students will become even more rigorous," he states. "The development was upward — toward a higher order of educational competence, but it created a vacuum down below."

The Community College in

Philadelphia will help to fill this vacuum," he continues. "It's a product of at least three elements:

- "the new social demand by people throughout the society for the benefits of higher education.
- "a certain economic vacuum — the price of full-fledged college or university attendance is beyond the means of many families.
- "our affluent society — we can afford to provide more publicly-subsidized education."

The new College — which will open its doors to about 1500 full time and part time students in September — will address itself to a wide range of pupil needs.

One group of students, following a liberal arts curricula, will be prepared for transfer to four-year colleges or professional schools — using the Community College as a springboard to further educational achievements. Another group will attend the school to round off their educational experiences — taking an Associate in Arts degree or simply getting additional educational "seasoning" to be more employable. A third group will take technical training, leading to an Associate and Applied Science degree, (an electronics curriculum will be offered in 1965-66) to bring them to a semi-professional level which includes strong components of science and math. Others will take courses in less structured programs simply for their own satisfaction and interest in learning.

"In our first year, we will have two basic technical curricula — one in electronics and one in business technology with several options, including marketing and merchandising, accounting, and administrative-secretarial," Dr. Bonnell comments.

"We will add other curricula as we go along — and we will work with advisory committees to get full knowledge of the specific needs of the community. To this, we will add our own assessment of the long-range educational needs, so that we can give the best service to our young people.

"We must listen closely to what industry wants, but at the same

time we must look beyond the moment. It's tempting to do pure job training, but if you do, the rate of obsolescence will shortchange the talents of your students. A straight intensely specialized technological degree can be outdated in less than six years — the half life of a college education. What we will try to do is to teach the ability to work with concepts, the ability to adapt to new concepts and practices plus attitude, motivation and the skills of communication," he stressed.

One often forgotten group Dr. Bonnell is factoring into his plans for the future of the Community College is women. "The waste of womanpower in our country is unfortunate," he notes. "Millions of American women get college and even graduate training that is never put to use." His answer: special programs for women entering or returning to the job market after their children have grown up or gone off to school.

"Right now, there's a great shortage of teachers — particularly for pre-school children. Courses in child psychology and pedagogy for women interested in this field would help serve a special need of the community. This is simply one possibility for making better use of our woman-power," he adds. And he's also working to develop other programs to serve, for example, the full-time employed person who wants to increase his capabilities or learn techniques in a new field.

The Making of a College President

Born in Colon, Panama (his father worked on the Panama Canal project), Allen Bonnell grew up in Erie, Pennsylvania. He attended Erie Academy High School, then Oberlin College — having won a scholarship. After some consideration (he first decided to be a career musician, learned to play the violin, banjo, guitar, clarinet "and other reeds," and organized a band whose engagements paid for a good share of his college expenses) he picked Economics as a major and earned a B.A. and an M.A. in that subject from Oberlin. In 1935-36, he was

an exchange fellow in economics at the University of Bonn in Germany — and in 1937 received his Ph.D. in economics from the University of Illinois. His dissertation, later revised and published as a book, was titled *German Control Over International Economic Relations*. He then taught economics and related subjects at the University of Illinois, St. Louis University, and the University of North Carolina.

In the spring of 1940 after the war had started, he volunteered for American Friends' Service Committee duty overseas — spending his time in unoccupied France in organizing and administering relief services for children, displaced persons, and refugees from Germany and Central Europe. In 1942, he was called to Washington, where, for six years, first with the State Department and then with the United Nations Relief and Rehabilitation Administration, he played a continuous role in planning and executing the \$3 billion UNRRA program.

In 1948, he left Washington to come to Drexel as vice president under the then president, James

Creese. "That was the most difficult decision I've ever made," Dr. Bonnell noted. "It was a choice between entering college administrative work in an urban university, or going back to teaching on a 'green-grass' campus, as an associate professor." He made his choice — and since then, has scarcely had time to look back.

Quite obviously, the new responsibilities don't frighten Allen Bonnell. In fact, they stimulate him. There are few things he likes better than the opportunity to test new ideas and innovate. At the same time, you can tell that he possesses a quality perhaps all-too-rare among college administrators — an understanding and empathy with the student. It's evident in the way he defines education, for example — "education's principal duty is to help young people discover those powers that they have within themselves and to inspire them to make the best possible use of those powers in the service of others."

And, if you test his own life by the philosophy above, Dr. Allen Bonnell measures up . . . because he's still serving others.



Dr. Bonnell surveys part of the area being converted into classrooms and offices in the former Snellenburg's store in central Philadelphia.



A network of Acceptance Checkout Equipment/Space Craft fills a control room at one of ASD's Contractor locations, in Downey, Calif. The reliability built into this system — typical of the stringent quality requirements on the Apollo program — is illustrated by the concern and care in this ASD'er's eyes as she connects terminals to a cable for the equipment.

ASD and Reliability... Vital To Apollo

STOP in for a cup of coffee at an all-night eatery on Daytona Beach's Volusia Avenue and you find that the man behind the counter is the same as his counterparts in Burlington, Vt., Peoria, Ill., and Madison, Wisc. They're all willing to talk. The only difference is the subject.

In Daytona Beach, the Daytona International Speedway, dog races, jai alai and General Electric are a good starter for 2 a.m. conversation. If it's between seasons for the three sports, and if you're wearing a suit and an "I'm a stranger here" expression, talk will quickly turn to General Electric and the Apollo Support Department.

Except that this personification of "happiness is a cup of coffee" doesn't call ASD by its full name; rather he refers to it as "that GE group that has an important job on Apollo."

And that's a pretty good description of the role of the Missile and Space Division's Apollo Support Department.

"To provide services and supplies in integration, reliability assessment, and checkout for the Apollo program" is the way the initial letter contract signed by the National Aeronautics and Space Administration and General Electric defined the job in early 1962.

To meet this challenge, a diversified technical team was assembled, capable of supplying complex engineering services to NASA headquarters and the

NASA manned space flight field centers; in addition, a team capable of designing, fabricating, and testing complicated automatic checkout equipment was formed.

"We're a 'people-oriented' Department," ASD General Manager Roy Beaton remarked, adding that the "brain output" of these people is the Apollo Support's "most important product".

Dr. Beaton is a relative newcomer to ASD; he joined it last year after serving as General Manager of the Spacecraft Department since early 1963.

Confidence and Enthusiasm

Dr. Beaton talks confidently and enthusiastically about tomorrow... and the business.

"We want to be able to offer a wider range of assistance to the total Apollo program," he points out, "and become part of every 'thinking' activity that NASA must plan and carry out." He calls it the "right-hand man" approach. "I want the National Aeronautics and Space Administration to consider us the group they can turn to with a problem it wants solved; with a project it needs expedited, or with a mission to be accomplished."

"We are getting better every day," the 19-year GE veteran continued, "and are functioning more smoothly as a team. Let's say we're fast becoming a 'total organization'." Dr. Beaton has a solid grasp on the Department and where it's heading. He's also keenly aware of some of the hurdles it must overcome.

"We need some 200 additional employees each month, and we must be able to attract competent people, and absorb them into our successful team. We must constantly strive to reduce our overhead and keep all costs at a minimum. This is necessary," he added, "if we're to remain competitive."

The achievement of the reliability necessary to achieve mission success and flight safety is one of the most extreme challenges of the Apollo program.

In the key area of reliability assessment for mission success and crew safety, ASD is developing a graduated scale of varying success for the major goal of the Apollo program, based on reliability estimates of the equipment to be used. At one end of the scale, a totally successful mission includes crew safety; at the other end, a lost crew means that the mission was a complete failure. Between these extremes are varying proportions of mission success and crew safety. ASD is helping to develop methods for predicting these ratios for NASA's evaluation and/or action.

The Apollo Support Department is doing this by the construction of mission models. These models are block-diagram flow-charts, some running more than fifty feet in length. Apollo missions are broken up in

phases, such as launch, earth orbit, and translunar flight, and these phases are in turn divided into critical events, such as first-stage ignition, shutdown of the second stage, and firing of the charge to separate stages.

Value of this and other models lies in determining the success probability of subsequent missions, once actual flight experience has verified them; in providing a measure against which proposed hardware improvements may be judged; in optimizing trade-offs between mission success and crew safety; and in revealing deficiencies — either in hardware performance or in procedures.

Once reliability (the probability of success of the specified equipment in meeting the requirements of the mission) is determined, the question arises: How can we assure the production of the equipment to meet the quality requirements established by the specifications?

To assure needed quality, the Apollo Support Department has supported NASA in the development and implementation of data management, mass properties control, and operations planning; it has supported NASA in the development of their internal reliability and quality programs, and has operated training programs in these areas for NASA and contractor personnel; and has supported NASA by a variety of plans and studies designed to help its customer define his checkout equipment requirements,

to plan and review his testing programs, to identify and document equipment interfaces, to study the need and feasibility of special illumination and lightning protection at the launch pad, and hundreds of other special engineering support activities.

From a key group of 300 engineers and planners in Syracuse, N. Y., in early 1962 to 4,500 employees — engineers, scientists, and technical, clerical, manufacturing and support personnel in six locations three years later, the Apollo Support Department has grown in size and determination.

Familiar Faces

Among the familiar faces at Apollo Support Department (close to 300 MSD'ers from this area are now part of ASD) are: Lad Warzecha, Manager — MSC Support Operation (Houston); Chuck Crossen, Manager — Systems Evaluation Engineering (Huntsville); Leroy Foster, Manager — ACE-S/C Engineering (Daytona Beach); and Bernie Rachlin, Manager — Test and Checkout Engineering (Houston).

Approximately one-half of Apollo Support Department personnel is located in Daytona Beach. The



DR. ROY BEATON, General Manager of the Apollo Support Department, is a veteran of 19 years in electronic research and development, and atomic energy with General Electric. He took over the helm at ASD in October of last year after serving as General Manager of the Spacecraft Department since early 1963. Prior to that, Dr. Beaton was General Manager of the 908 Product Section for GE's X-Ray Department. The section, which he headed for five years, was engaged in research, development and manufacture of classified electronic devices for the Atomic Energy Commission. Dr. Beaton joined GE in 1946 to direct chemical development for the Hanford Atomic Products Operation. Born in Boston, Dr. Beaton earned his BS in engineering from Northeastern University in 1939 and his doctorate in engineering from Yale University in 1942.



WELCOME TO APOLLO PARK! And you couldn't say that — officially — before late last month when Dr. Wernher von Braun and members of the General Electric Company dedicated Apollo Support's home in Daytona Beach. Left to right, Lindy Saline, Engineering Manager; Gerald L. Philippe, Chairman of the Board, General Electric Company; J. S. Parker, Vice President and Group Executive — Aerospace and Defense Group; Dr. Roy Beaton; Dr. von Braun, Director, Marshall Space Flight Center; George Platt, Manufacturing Manager; Jim Keister, Checkout Systems Operation Manager; and Stan Schneider, Resident Manager — NASA Daytona Beach Operation.

close to 2,300 employees support NASA's manned space flight field centers with an Engineering Section, a Checkout Systems Section, a Manufacturing Section, and a Reliability and Documentation Programs Section.

Engineering is responsible for providing centralized engineering including equipment design, systems simulation and advanced engineering support; Checkout Systems handles the ACE-S/C Program; while the other two are concerned with equipment fabrication, reliability and quality assurance for hardware built in Daytona Beach by ASD, as well as the mission and systems reliability and integration engineering support of the overall Apollo Program.

The major hardware system designed, manufactured and tested at Daytona Beach is the Acceptance Checkout Equipment — Space Craft. This ACE-S/C system is a sophisticated, computerized complex of ground checkout equipment capable of receiving and evaluating large quantities of real time pre-flight checkout data from the spacecraft's electrical and mechanical systems. It presents the data to checkout personnel for the purpose of assessing the on-board spacecraft systems prior to flight. This will enable the test engineers to rely on computers for routine checks, freeing them to make thorough appraisals of total systems performance.

ACE-S/C Goes to Calif., N. Y.

The ACE-S/C Systems are being installed at selected contractor locations — North American Aviation at Downey, Calif., and Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y., at the Manned Spacecraft Center in Houston and at the launch site at Cape Kennedy. Five of the eleven stations under contract are already operational.

Another area of key hardware responsibility is the

Electrical Support Equipment (ESE), developed for the checkout of the Saturn launch vehicle.

The design and development of this Electrical Support Equipment is the major activity of ASD's NASA Support Operation, located at the Marshall Space Flight Center in Huntsville, Ala. This effort encompasses essentially all booster checkout equipment which will be required at the Merritt Island Launch Complexes. While the major share of this effort is being accomplished in Huntsville, Daytona Beach-based Systems and Equipment Engineering subsections are providing special engineering studies and investigations, and Manufacturing is fabricating part of the equipment.

The Kennedy Space Center Support Operation provides a broad spectrum of engineering capabilities for NASA's Kennedy Space Center organization. In engineering support, KSCSO people are working on the space center's operation plan for the Saturn IB and Saturn V vehicles. Others are conducting ordnance studies and documenting the ordnance systems for the Saturn I program. Lightning protection studies have been made for the Saturn Complexes.

KSCSO's major hardware contribution is in the area of launch control and checkout equipment. In the complete hardware system category are (1) the Telemetry Checkout System which will check 21 telemetry transmitters on board the Saturn V launch vehicle; (2) the Radio Frequency Checkout System which will check 10 on-board RF systems; (3) the Measurement and Calibration System which will provide data conversion and processing and other display monitoring and control functions, all required to verify the Saturn V vehicle launch flight measurement system; and (4) the Water Control System which provides control for the main pump station and two independent water distribution systems.

In the partial hardware system category are five

systems being designed for KSCSO by ASD's NASA Support Operation in Huntsville, under the direction of NASA's Launch Systems Electrical Division. The systems are commonly known as K-D hardware and only portions of them will be fabricated by ASD. All the design, however, is being performed by ASD in support of NASA.

Manned Spacecraft Center

Manned Spacecraft Center Support Operation in Houston is carrying out a number of vital tasks. Its Systems and Operations Engineering group provides engineering support to two divisions of the Apollo Spacecraft Program Office (ASPO); the Test and Checkout Engineering team provides engineering support to ASPO's Test Division which has the responsibility for the Apollo Spacecraft Development Test Program; Ground Systems Engineering provides support to the GSE Division of ASPO in the areas of checkout and ground support engineering requirements; Reliability and Quality Engineering subsection is responsible for the preparation of guideline documents for Reliability and Quality Assurance and the assessment of Apollo contractors' performance against these guidelines; and the Project and Operations Support provides support to the MSC/ASPO Program Control Division in three areas: documentation, PERT, and management control.

ASD has a group at North American Aviation's Downey, Calif., plant. Its purpose is to assist NASA by providing operating and maintenance support for the ACE-S/C stations there. North American Aviation is building the command and service modules for the Apollo spacecraft series. Prototypes, boiler-plates, and the actual mission module will be checked by the

ASD-produced ACE-S/C. There is also a small group at Grumman's Long Island facility where the Lunar Excursion Module (LEM) is being manufactured.

"The Apollo Support Department has made tremendous strides during the past 18 months," Dr. Beaton pointed out, "and can parlay these accomplishments into even greater successes by hard work, patience, and an 'open ear' to customer's suggestions. During the coming year, we will have a tremendous and ever increasing workload commitment to discharge. If we can get all our work done," he said, "in a way that makes our customer happy — and that means working within costs, on time, and with a quality product — we will be building our bank account for the future."

Dr. Beaton spoke about the interest on that bank account, gained by showing NASA that there are other areas, Apollo-related, that ASD can do well.

"We want to make ourselves indispensable to NASA in their manned space flight programs. Everything," he said candidly, "is aimed at proving that we can operate over a broader range than any other company in this area. I am pleased at our progress toward this goal. Our people have done an outstanding job in providing the customer with timely support and services. In three years of planning, growth and operation, ASD has built a large group of competent individuals into an excellent team that is capably performing over a wide range of activities."

If Roy Beaton and the Apollo Support Department meet that goal — and there are some 4500 people in six locations across these United States who are proof of why it will — it will make for some interesting possibilities in Daytona Beach. They might even talk about us during the Speedway season!



Members of the Missile and Space Division management team get a first-hand look at a piece of Acceptance Checkout Equipment/Space Craft equipment, a major hardware system of the Department. Leroy Foster (foreground), Manager — ACE-S/C Engineering, discusses the equipment with, l-r, Edward Hulse, Manager — Finance and Contract Management Operation; Arthur Robinson, Manager — Advanced Requirements Planning Operation; Richard Passman, Manager — Manned Space Operations; Logan Cowles, Manager — Spacecraft Department, and Dr. Roy Beaton, Manager — Apollo Support Department.

INNOVATION IN CONTRACT MANAGEMENT

On April 20, 1964 the Defense Contracts Administration Services Region, Philadelphia, Pa., became the first established organization under the concept initiated by Secretary of Defense Robert McNamara for the uniform administration of the defense contracts for all services under one agency.

This unified agency consolidated the offices of the Army, Navy, Air Force, Defense Supply Agency, and NASA.

Designed to eliminate duplication and overlapping of government contract administration practices by uniform regulations and procedures, the DCASR, Philadelphia, was the first of 10 more regions that will be established throughout the United States during the present year.

A Year Later

One year after presiding at the birth of the new organization, Colonel W. S. Collinson, Director of the Defense Contract Administration Services Region, Philadelphia, reports "the child has learned to walk and soon will be running."

As for Colonel Collinson, the pioneer Director of a DCAS Region, he is thinner, grayer and a great deal

wiser. He expressed satisfaction on the progress of his organization, and gratification that future regions will profit by the experience gained in Philadelphia during the formative days of the program for uniform administration of defense contracts.

"You don't take six widely divergent ingredients, mix them and expect a tasty dish the first time," Colonel Collinson said. "But we have by experience, trial and error, added here, subtracted there, and feel that we now have a highly palatable product."

"Our contractors, who number over 2,500, have been most cooperative and representatives of American industry such as General Electric, can take a significant measure of credit for our success. Their ideas, suggestions and cooperation have been most beneficial."

Philadelphia First

"Philadelphia can be justifiably proud that it was selected as the first Region of 10 more that will be established during the present year. We now consider ourselves fully operational with the capacity to do the job Secretary of Defense Robert McNamara first envisioned in 1962," the Colonel said.

"During our test period and the first year of our operational status we, in reality, served a dual mission. We not only serviced our contractors under uniform policies and procedures, but we also served as the guinea pig for other regions, not yet established."

"Our trials, our errors and our corrective actions already have brought dividends for the newest DCAS established on April 1, 1965 in Detroit. Reports from that organization reveal our tests have saved them many hours and were found readily adaptable."

"Prompt payment of contractor invoices was one of our most difficult areas, resulting mainly from the various systems and various paying offices the different services utilized under their systems. Where at one time we had a backlog of nearly 9,000 payments,

today we are paying on a current basis at the rate of approximately \$85,000,000 per month," the DCASR Director continued.

"At a recent conference I attended, my organization was paid a gratifying compliment by a General Electric executive who stated that their investment in account receivables with DCASR was lower than that experienced before DCASR was organized."

MSD Participation

Heading up the DCASR office at MSD is Major Patrick J. Lydon. An Air Force veteran with over 18 years of service, Major Lydon has his headquarters at the Valley Forge Space Technology Center.

The Defense Contract Administration Services Region, Philadelphia, is an organization composed of 2,150 civilian and military personnel administering contracts in Pennsylvania, southern New Jersey, Delaware, Maryland, Virginia, West Virginia and the District of Columbia.

Rhode Island born, New Jersey raised, Colonel Collinson's military service dates back to 1938 when, after earning a B.S. at Rutgers University and an M.B.A. at Northwestern University, he was commissioned a 2nd Lieutenant in the Army reserves. In 1940 he went on active duty as a flight cadet. Today he is rated both a command pilot and a combat observer.

During World War II Colonel Collinson served as a Flight Instructor, a Director of Flying, and a Squadron Commander in various commands and locations.

In 1950 he moved to Wright-Patterson AFB, Ohio where he was assigned to the Directorate of Procurement and Production. While there he was responsible for a purchasing operation.

Two years later he was assigned to the Military Assistance Advisory Group, Italy where he was the Military Production Officer. The following year he transferred to Headquarters USAF Europe as Chief of the Procurement Division.

July 1955 found Colonel Collinson at USAF Headquarters where he served in the Directorate of Procurement and Production and later in the Directorate of Materiel Programs. Between 1957 and 1959 he was Deputy Chief of the Aircraft and Missile Programs Division.

Tinker AFB, Oklahoma was Colonel Collinson's next stop. There he was Chief of the KC-135 Division under Headquarters, Oklahoma City Air Materiel Area. Later, in 1960, he was assigned as Commander, 2854th Air Base Wing and Tinker AFB.

Wright-Patterson AFB became "home" again in 1961 when Colonel Collinson returned as Chief of the Procurement Management Division in the Directorate of Procurement and Production, Headquarters Air Force Logistics Command.

Subsequent assignments included: Commander, Philadelphia Contract Management District, from

For the convenience of contractors, District offices are located in Camden, New Jersey; Pittsburgh and Reading, Pennsylvania; and Baltimore, Maryland, with Plant offices at GE (Philadelphia and Valley Forge) and American Machine & Foundry, York, Pa.

The original value of these contracts produced for the Army, Navy, Air Force, DSA, NASA and the AEC, total \$4,278,000,000, and reflects a backlog of approximately \$1,000,000,000, with the monthly value of shipments averaging over \$100,000,000.

"We have come a long way," Colonel Collinson recalled, "since that April day in 1964 when personnel from six different offices were brought together to do one job for all."

"I am proud of the job that these dedicated workers have accomplished and I thank them and the contractors who have ably assisted us with their valuable cooperation and suggestions," the Colonel concluded.



COLONEL WILLIAM S. COLLINSON

July to December 1963; Deputy Test Director, DCASR until June 1964, when he assumed his present post of Director, Defense Contract Administration Services Region.



Major Patrick J. Lydon, Chief—General Electric DCAS office has been assigned to the Missile and Space Division since July, 1962. A graduate of the University of Scranton, Major Lydon has been associated with contract management for more than ten years.



"Gus" Grissom

THE MOST EXCLUSIVE CLUB ON EARTH

Membership in the Aerospace Primus Club is actually pretty easy to come by. All you have to do to get an invitation is go up in a balloon with an open gondola to about 103,000 feet — and jump out.

Or, maybe take an X-15 up to 310,000 feet for a spin around space.

Then again, if you prefer events that are a little trickier, the next time you're out with your airplane and see a Discoverer XIV satellite capsule dropping past, try throwing out a grappling hook and catching the vehicle.

Of course, these events will be only practice for you; they've all been done before and one of the requirements of the Primus Club is that you perform an aerospace "first" of historical significance.

General Schriever established the Aerospace Primus Club in 1960 to both encourage aerospace achievements and to honor the people who perform them. It began with 13 charter members, and since that time only seven new members have been added. The Primus Club has been billed as "the most exclusive club on earth," and it's easy to see why.

The ranking member of the Primus Club is Major General Benjamin D. Foulois (ret.), who was recently awarded honorary membership. He has been described as the "living link" between the age of the Wright Brothers and that of the astronauts. The description is near perfect, because General Foulois was not only the first military man placed on regular flying duty, but at one time he seems to have been the entire air force.

I Told Orville . . . I Told Wilbur . . .

In 1909 Lieutenant Foulois was given 54 hours of impromptu flying instructions by Wilbur Wright, and shipped off to San Antonio, Texas. Accompanying him was the Army's only airplane and \$150.00 maintenance budget. Two months later, Lieutenant Foulois logged four "firsts" on his very first solo: *"It was my first solo flight, take-off, landing and crackup! I knocked the whole tail off. I wasn't injured but . . . I learned to stick the nose down and stick with the ship. I was flying again a week later."*

During his 38 years of active service General Foulois amassed a series of air "firsts," including: first flight as a dirigible pilot; first observer on a cross-country aircraft flight (with Orville Wright); first to test a radio in flight; first to use an aircraft in combat. He also invented the seat belt and de-



Benjamin D. Foulois

signed more than 20 mechanical improvements built into later Army planes.

In 1935, the General retired with military honors as the Chief of the Army's Air Service. Quite a tribute for a man who enlisted as an Army buck private during the Spanish American War. In total, General Foulois has been serving the nation for over 60 years.

Higher and Faster

On August 12, 1960, Major Robert M. White piloted the X-15 to the previously uncharted altitude of 136,500 feet — nearly 26 miles above the earth. Not only was this the highest altitude ever achieved by a manned aircraft, it was accomplished at speeds never before attained.

Then on July 17, 1962, Major White further distinguished himself by taking the X-15 to 310,000 feet and performing the first space flight of a manned aircraft.

Jump!

But the world of flight is not restricted to aircraft, missiles, and rockets. Captain Joseph W. Kittinger, Jr. proved this on August 16, 1960. Captain Kittinger stepped into an open gondola balloon at Holloman AFB, New Mexico and proceeded to soar to the record altitude of 102,800 feet. Then he jumped out. His four minute 38

second free-fall took him 85,300 feet. At the 17,500 foot level his parachute opened and he returned to the ground. No man has ever ascended higher in unpowered flight. In addition to that record, Captain Kittinger established new marks for open gondola ascents, longest free-fall, and highest parachute jump in history. It earned him a membership card to the Primus Club.

The Neatest Grab

Three days after Captain Kittinger came back to New Mexico's terra firma, Captain Harold E. Mitchell and his crew were positioning themselves some 400 miles southwest of Hawaii in an attempt to snag the Discoverer XIV satellite recovery vehicle as it plummeted toward earth after orbit. Their activity and subsequent success was the result of what was later described as the "superb planning and leadership" of Col. Alvan N. Moore, who guided the overall operation.

Lieutenant Robert G. Counts, the navigator, electronically detected the recovery vehicle and directed Capt. Mitchell onto the proper intercept course. When the vehicle was visually sighted, at an altitude of 16,000 feet, Capt. Mitchell and his co-pilot, Captain Richard A. Apaka began maneuvering the C-119 into position for the catch.

But not all the action was up front. Further aft, T/Sgt. Louis F. Bannick, winch operator and loadmaster; S/Sgt. Arthur P. Hurst, flight engineer and aircraft maintenance technician; S/Sgt. Wendell King, photographer, who photographed the successful recovery; and S/Sgt. Algaene Harmon, A/1C George W. Donahou, A/2C Daniel R. Hill; and A/2C Lester L. Beale — all loadmasters — were readying themselves for the first air-snatch of a returning earth-orbit satellite capsule.

On the third pass, at an altitude of 8,500 feet, the grappling hook used to grab the parachute and its passenger was secured, as was a permanent place in aerospace history for Captain Mitchell and his crew.

Never Volunteer?

June 6, 1961 was the day T/Sgt. James A. Howell earned his Primus Club card. Howell either hasn't heard of, or doesn't believe in the old military adage, "Never volunteer!" For not only did he volunteer, he took on an assignment that even euphemistically speaking can be described as hazardous — even death defying.

Sgt. Howell was aboard an F-106 as it streaked off the Holloman AFB, New Mexico runway. When the plane reached 22,060 feet and a speed of 338 Knots (389 MPH) Howell and his ejection seat shot out of the aircraft in what was the first premeditated live ejection test of the upward rotational supersonic "B" ejection seat. His skill and courage not only proved the reliability of the escape system, but brought the goal of absolute pilot safety a little closer to fruition.

Three's Not Always a Crowd

Three sergeants of the 76th Air Rescue Squadron share the honor of being members of the first para-rescue scuba team to recover a returning space capsule. The team bailed out of an Air Force Rescue-master flying over the Pacific northeast of Hawaii on June 18, 1961. *Although aware that they'd have to spend the night in the*

open sea with a minimum of survival equipment, the three disregarded the risks and took on the job. As a result, the U. S. got back Discoverer XXV and T/Sgt. Lenore M. Vigare; S/Sgt. Ray E. McClure; and S/Sgt. William V. Vargas received the applause of a grateful Air Force and scientific community, plus the honor of Primus Club membership.

Virgil as in "Gus"

Only a few yesterdays ago, the Air Force had a captain named Grissom. Virgil I. Today, the nation has a space age hero — he's named Grissom, too. But, in untold thousands of American homes, it's "Gus." Air Force Captain Grissom became all-American "Gus" Grissom on July 21, 1961 as he took a 303-mile ride down the Atlantic Missile Range, making him the first Air Force member of the Mercury astronaut team to accomplish a successful suborbital manned spacecraft flight. His 16-minute trip carried him into both the Atlantic Ocean and the Primus Club.

Grissom's journey at 5,000 MPH (apogee 118 miles) subjected him to five minutes of disorientating weightlessness. When the flight was over and his capsule hit the Atlantic's waters, it sank and Grissom literally had to swim for his



General Emmett O'Donnell, Jr., Commander-in-Chief, Pacific Air Forces, presents the Air Medal to Capt. Harold E. Mitchell — commander of the aircraft which caught the Discoverer XIV vehicle in mid-air on August 18, 1960.



Maj. Gen. Benjamin Foulois (center), USAF Retired, was welcomed to the Aerospace Primus Club by nine of its members including Col. Moore (left) and Maj. Kittinger (right). Grouped around the trio are (l to r): Maj. Mitchell, SSgt. Donahou, SSgt. Hurst, TSgt. Harmon, Capt. Counts, Daniel Hill, and MSgt. Bannick.

life. He was facing exhaustion when picked up by the rescue helicopter. Like General Foulois, however, Grissom wasn't deterred. Remember Gemini?

On February 28, 1962 Chief Warrant Officer Edward J. Murray earned his place in the Primus Club by performing the first manned ejection test of a B-58 escape capsule. Riding in the middle seat of a B-58 Hustler that roared out of Edwards AFB, California, Mr. Murray stayed with the craft until it was cranked up to 565 mph at an altitude of 20,000 feet. Then he and the steel cocoon escape capsule were shot 250 feet above the aircraft by two 5,000-pound thrust rockets, which subjected him to 13.5 g's for about one-quarter of a second. He then free fell to an altitude of 15,000 feet where a two-foot wide parachute slowed and stabilized the capsule. Moments later, a 32-foot parachute opened, returning Murray and capsule to earth. Although the entire test, from ejection to landing, took just eight minutes, Mr. Murray's performance resulted in the acquisition of vital data needed to perfect escape systems for supersonic aircraft. Just two years after his heroic accomplish-



Orville Wright and Lieutenant Foulois — pre-flight "Old Air Force No. 1" at Fort Myer, Va.

ment, on March 7, 1964, Mr. Murray died — the victim of an automobile accident.

By The Numbers

Air Force Major turned Mercury astronaut Leroy Gordon Cooper, Jr. joined the Primus Club by flying "Faith 7" for 22 orbits lasting 34 hours. During these hours on May 15 and 16, 1963, Cooper became the first Air Force astronaut to accomplish a successful manned orbital spacecraft flight.

Throughout his voyage, Cooper was subjected to weightlessness, except for short periods of powered flight and re-entry. Despite this, Cooper conducted a number of experiments including: making observations of his own condition, ejecting a flashing light into an

accompanying orbit and making observations of it, and making both television and still photos of various phenomena of interest to scientists.

During the 19th orbit his automatic control system failed and Cooper was forced to manually guide the spacecraft through re-entry. This he did, landing within close view of the primary recovery ship.

These are the members of the Aerospace Primus Club.

Spanning the decades from the Army's first airplane to a Mercury capsule and 22 orbits around the earth, from General Foulois to Gordon Cooper, these men are helping to fill the pages of a never-ending book titled **PROGRESS FOR AMERICA**.



THE MILLER MISSION... CONFIDENCE, COMPETENCE, AND COURAGE

John Paul Getty and Dr. Edward A. Miller don't know each other, but they have a lot in common.

They share an attitude toward life and success — and it has helped both of them excel in the competitive marketplace.

Mr. Getty puts it this way: "The only way in which any businessman can hope to achieve anything remotely approaching lasting success is by striving constantly to achieve success in everything he attempts, and by building new and greater success on the foundations provided by old ones."*

Presiding over a business empire with interests in a multitude of countries, Mr. Getty has been described as the richest man in the world.

Dr. Miller, a generation younger, has already joined that special elite of men who have demonstrated the ability to direct large and complex research and development programs through to success. He's now manager of the Manned Orbiting Laboratory Operation of the Missile and Space Division — guiding work that may well lead to the nation's first military man-in-space program.

Maybe it's easier to build a fortune than to build

a space vehicle . . . Ed Miller doesn't know; he's not a wealthy man by the standards used to gauge the fortune of Mr. Getty. But he does know that success generally comes to those who are prepared for it — not those who wait for it to single them out.

Prelude to Achievement

But what about this man Ed Miller? What is there about him that has brought him this far and this fast in perhaps the most rigorous of all business environments — the mercurial and harsh arena of aerospace.

From parents and family, a standard of accomplishment that has helped propel him to excellence? Certainly a possibility. His father, John M. Miller, was a prominent physicist who taught at Yale University. His scientific achievements include the discovery of the Miller effect and the Miller bridge, and his selection as an IRE Medal of Honor winner for electronics research.

His brothers and sisters, six of them, are wasting no time in carving out professional careers for themselves: two older brothers are engineers; one younger

*Quoted from *My Life and Fortunes*, John Paul Getty (Duell, Sloan & Pearce)

brother is a historian and the youngest brother a SAC pilot; an older sister is a chemist and a younger sister a physicist.

Steeped in science and imbued with a respect for education that he still retains, Ed Miller entered the University of Maryland in February 1940 and quickly resolved to accomplish two goals there. One — to get a firm grounding in the fundamental principles of engineering; two — to absorb a range of knowledge cutting across many other fields. The University's Americanization program provided the means to accomplish these twin goals. In it, each student was required to achieve competence in a variety of liberal arts disciplines.

It suited Ed Miller to a T-Square, and even foreshadowed the kind of career he would choose. As a result, he's become an articulate advocate of broad educational experiences. "Today's engineering students," he insists, "should look seriously at courses outside the engineering building. The dynamics of our society, and of the business world too, do not revolve exclusively around one particular scientific technique. The value to a technical student of a well-planned exposure to other fields can hardly be underestimated. My own studies of English, German, the social sciences, and law, have been tremendously useful in my career."

Like many others, his education was interrupted by the War and Miller spent the years between 1941 and 1946 in military service, first as a ship's officer in the Merchant Marines and later as an Army lieutenant when he persuaded medical officers to overlook his 4F classification and qualify him for regular duty. He spent 33 months in the Southwest Pacific and the Far East, and had a role in many of the major military engagements there.

Following the war, he returned to complete his undergraduate education at Maryland and graduated with a BS in engineering in 1950. Right after graduation, he was recalled to the Army as a Captain in the Corps of Engineers and served 39 months during the Korean conflict. He was separated as a Major in November 1953, but stayed with the Army three months more as a civilian to complete a special research and development project.

A Sense of Direction

Throughout his schooling and military service, the direction his later career would take began to crystallize in Miller's mind. Putting together his natural interests in the broad world of ideas, with his specialized training in engineering and his military experience in research and development, Miller decided to devote his energies to a career in the management and implementation of engineering ideas — rather than in the field of basic research and discovery of ideas.

"My interests were broader than simply engineering," he recalls. "I was strongly attracted to the idea of work along the lines of business management and finance as they related to engineering advances. It was evident to me that I'd be much more useful this way."

Add to this a special insight into what motivates people and makes them put forth their best efforts, and you have the ingredients for accomplishment.

Discussing his theory of managing people, Miller observes: "There's one exceptionally good way of getting people to respond, I believe. The people in our kind of business, 99½ percent of them anyway, want to do the best job they can to help the business succeed. Therefore, our job in management is to keep everyone as well informed as possible.

"Although management's decisions can never satisfy everyone, most people will support the decisions if they know the reasons behind them. You can't overestimate the importance of bringing all interested parties together to consider a problem and make recommendations," Miller continued. "The atmosphere of this face-to-face discussion should be as informal as possible to encourage a really free expression of ideas."

From Tennis To Technology

Even before Ed Miller embarked on his business career, he was demonstrating his excellence in another field — that of athletics.

Like most energetic young Americans, Ed Miller took part in a variety of sports activities. But unlike most other boys, he achieved a level of competence in one sport — tennis — that ranked him among the best young players in the nation.

As a senior at Philadelphia's Germantown High School in 1940, he won the title of Interscholastic Tennis Champion of the state of Pennsylvania. One of his boyhood tennis partners was another Philadelphian, Vic Seixas, who went on to become one of the world's top tennis amateurs.

Although he continued playing tennis in college and later, as relaxation from the demanding schedules of the missile and space business, Miller's energies and attention had turned to the broader world of technology management.

Today, whether he's holding a tennis racket or a staff meeting, Ed Miller is equally at ease. His youthful confidence in ranging across a tennis court is now paralleled by his mature handling of the spectrum of problems and opportunities he faces as manager of MSD's Manned Orbiting Laboratory Operation.

The tasks facing him — and the team assembled on the MOL program — are rigorous, but good men thrive on tough problems and Ed Miller is obviously flourishing in this atmosphere.

And he comes to it well prepared. When he finished his Army work in 1954, he joined General Electric as a technical engineer on the J-73 engine project in Evendale, Ohio.

The Learning Curve

In his four and a half years at Evendale, Miller acquired an across-the-board exposure to both the technical and management problems of the jet engine business. As a technical engineer in the engineering subsection of the J-73 project, he did work in vibration analysis and engine development tests.

From there, he went to the Flight Propulsion Laboratory Department as supervisor of advanced component tests where he conducted flame tunnel and wind tunnel tests for the experimental D2 turbo-fan engine program. He was then appointed manager of Programs and Administration for the D2 engine project — and did program planning, established technical objectives, and carried out the various other responsibilities of this position.

When the D2 program ended, Miller went to the Applied Research Operation in Evendale as Project Engineer for high energy fuel engine development.

While at Evendale, Miller did something that sheds more light on his character than a hundred citations for excellence would do. Because of an interest in contract law and personal property law, he began taking night courses at the Chase College Law School there. He soon became so interested in the broad field of law that he embarked on a full-time night program — three nights a week, 48 weeks a year. Some five years later he received a Bachelor of Laws and Doctor of Jurisprudence degree. The moral is obvious: once interested, he never let up until he acquired a mastery of the field.

Ed Miller didn't overlook his commitment to community either. During his stay at Evendale, he was elected to and served on his local school board. "Serving on the Greenhills City School Board was both interesting and rewarding," Miller comments, "and I still have a great personal interest in our educational system."

Evendale to Philadelphia

Meanwhile, in Philadelphia, the predecessor Department of today's Missile and Space Division was tackling some new challenges in re-entry technology and looking for competent men who weren't afraid to risk their careers on an intangible called "space."

Miller accepted the conditions with enthusiasm and in December 1958 joined the Missile and Space Vehicle Department as Project Engineer for experimental re-entry vehicles, i.e. the RVX-1 and 2. He stayed on this assignment for about six months, through the successful recovery of RVX-1, a record-breaking flight which marked the first recovery of a re-entry vehicle flown over intercontinental range. Its purpose: to determine various characteristics of ablation in order to select the best ablation material for a second generation re-entry vehicle, the Mark 3.

He was then designated Project Engineer for the Mark 3 program, a position he held through its first two successful flights late in 1959.

Then, in early 1960, Miller was tossed his toughest assignment: to manage the Department's Discoverer program. "It was in the middle of our early days on the program that I took over," he recalls. "The program was vital to national security and although we'd had a number of launches, we were still looking for our first recovery." The Discoverer satellite, of course, was supposed to be launched into an earth orbit and then, at the proper moment, to eject a satellite recovery vehicle (General Electric's part of the program)



Inspecting an instrumentation package similar to the Discoverer payload are Air Force Generals Bernard A. Schriever and Richard D. Curtin along with Dr. Miller.

which would be picked up in the sea by our ships or plucked from the air as it fell by a C-119 aircraft. Up to this time, no one in the world had ever recovered an object from an orbiting space vehicle.

It's history now that this was done, and many men — Ed Miller among them — underscore August 11, 1960, as an unforgettable day of achievement.

Miller was with Air Force Generals Schriever and Curtin in the Pentagon that day when word came through that the Discoverer 13 capsule had re-entered the earth's atmosphere. "We knew it was in the water and we kept getting fragmentary reports about the helicopters being sent out to find it, but because of the chain of communications involved we had no total knowledge of what was going on. It was about 6 p.m. then and the time really dragged as the evening went on and the capsule hadn't been picked up. About four hours later confirmation came and we knew the capsule was in safely. At 11 p.m. I participated in a press conference at the Pentagon which announced the success to the nation.

"The recovery of the Discoverer capsule was the culmination of an incredible amount of effort by hundreds of our people," Miller emphasizes. "They devoted themselves beyond any conceivable standard of dedication I've ever known. It was a Herculean team effort and it paid off."

Eight days later, the Discoverer XIV became the first man-made object to be recovered in mid-air from a satellite orbit — and Discoverer manager Miller and his co-workers could add yet another "first" to their records.

"The repetitive successes we achieved on the Discoverer and other programs," Ed Miller states, "were more than I believe any of us hoped for in the early days of our efforts. I don't think anything I do in the future can ever match the elation and satisfaction I felt when we recovered Discoverer. I'm grateful for the opportunity I had to be a part of it. Not many

people are given the opportunity to have this kind of role when the nation is trying to do something for the first time."

Getting the pay-off wasn't easy either. "The toughest decisions I've ever had to make as a manager came shortly after I took over our Discoverer program," Miller remembers. "I had to appraise the program carefully and I came to the conclusion that it was necessary to devote much greater resources to it in order to insure success. I had to go back to our management, the prime contractor, and the Air Force, to justify this increased support. There were some pretty agonizing days for a couple of months during this persuasion process but we got the support — and the program succeeded."

Following the Discoverer success, Dr. Miller was appointed manager of Space Systems Programs in 1961. In this position he was program manager for the Department's work for the Air Force Space Systems Division and he continued his record of achievement



Mock-up of Air Force Manned Orbiting Laboratory at the Space Technology Center is inspected by teachers at a local high school. The house-trailer size MOL with a modified Gemini capsule on top will be launched into a near-earth orbit by the USAF Titan III-C booster.

here, too — successfully managing a series of satellite projects.

Theory of Management

Throughout all of his experience in managing aerospace programs, Miller was refining and practicing his own theories of program management.

"The role of the program manager has evolved along with the growth of research and development as a major business," he says. "In one sense, it is a simple recognition of the fact that R&D is not just an engineering job. The right balance of a variety of elements — quality control, manufacturing, finance, facilities, etc. — has to be factored in on a day-to-day basis. The program manager does this. It's his responsibility to utilize all these capabilities and properly balance them in the best interests of both the program he is managing and of the government/customer."

"He must look at the job through the eyes of the customer and must understand the pressures on the customer and the reasons for particular customer requirements. He's got to be flexible and responsive to changes because changes always occur. He's got to be both thick skinned (to survive the inevitable criticism) and yet sensitive (to pick up the useful ideas of others)."

"When a program manager faces adversity, which occurs about three times a day," Miller calculates, "there's no substitute for honesty. I follow the same rules for dealing with the customer that I follow for dealing with our own people. Even if the situation is uncomfortable — maybe we've made a mistake on something — you've got to bring it out in the open. Prompt, complete and objective discussions with the customer should be held on every important problem that comes up. This is what the customer wants from us and expects us to give him, and this is the only mature way to manage this business."

And Ed Miller expects the same candidness from the people who work for him. "After all," he'll say, "you've got to expect people to make mistakes sometimes. As Henry Ford said, 'Show me a man who has never made a mistake and I'll show you a man who hasn't done anything.' The important thing is — to communicate the fact that a mistake has been made. You've got to know about it as early as possible so you can do something to correct it. Nobody makes a mistake on purpose. My philosophy is not to punish the person who errs, but to have him understand what went wrong to keep the same situation from happening again."

In August 1963, Dr. Miller took on a new assignment — heading up a team of designers and advanced engineers on a Division study team for a classified program. Five months later, he was selected by Vice President Hilliard Paige, General Manager of the Missile and Space Division, to attend the first three-month session of a new general management course at the Company's Crotonville Institute for Advanced Management in New York state.

Miller graduated on April 25 — and a week later was named by Paige to direct the Division's Manned

Orbiting Laboratory Operation. With this task, Miller took on a responsibility that made much of his previous career appear to be merely a prelude to the main event.

The Department of Defense Manned Orbiting Laboratory program will be — if the results of preliminary design studies are successful — the nation's first military manned space program. General Electric was one of four contractors selected to perform these studies earlier this year. The other three are Douglas, Lockheed, and Boeing.

According to Secretary of Defense McNamara, the MOL studies were oriented to the primary objectives of:

- Development of technology to improve capabilities for manned or unmanned operation of military significance. This may include intermediate steps toward operational systems.
- Development and demonstration of manned assembly and service of large structures in orbit, with potential military applications.
- Experiments directed to quantitative determination of man's military usefulness in space.

The Secretary stated that on the basis of these studies "a decision will be made to proceed with full-scale development by DOD of a manned orbiting laboratory system and what the specific development and vehicle configurations are to be. The Defense budget includes \$150 million in fiscal year 1966 for the program." Responsibility for the program within the Air Force was assigned to the Space Systems Division with Brigadier General Joseph S. Bleymaier as program director.

Underlying all the activity on this ambitious program is a simple fact: military control of the near-space and space regions surrounding the earth means military dominance on the world scene. "He who dominates space will certainly dominate the earth," Miller points out. "And we can't afford to be second best there, because second best is last."

"Perhaps there will never be military conflict in space," Miller adds. "But we must be prepared for it in any case. After all, it was only fifty years ago in World War I that men began taking pot-shots at one another from airplanes. Certainly in the next fifty years, military men will be able to take the equivalent of pot-shots at each other in space."

"Our policy here at General Electric is simple," Miller explains. "We are ready and willing to put together the kind of resources to carry out a full-scale MOL program that is tailored to the needs of the Air Force. Flexibility is the key word in our planning. We are building into our MOL team all the management advantages of a General Electric Department and all of the flexibility of a quick-responding project team."

And the competition is formidable. "We are competing directly with traditional airframe companies for prime contract work on MOL. We're in the aerospace big leagues now, and we have a lot going for us. The requirements of new aerospace systems are turning away from the traditional structures approach to more specialized experimental-type spacecraft pro-

grams. In other words, research and development is the key, not production capability. General Electric is ideally suited to this change in trend, because R&D has always been our strong suit," Miller explained.

Career and Family

Much of his success, Miller frankly admits, wouldn't have been possible without the understanding and support of his wife, Mary Jane. "Among other things, she really deserves about half of the law degree I earned for her willingness to manage the family and take care of the home while I studied and worked," he says. Born in New York and raised in Chevy Chase, Maryland, she attended the University of Maryland also, has a degree in sociology and psychology, served about two and a half years in the WAVES ("she generally outranked me," Miller comments), and is now busy raising the five Miller children — Edward, Jr. 17, Beth 15, Marion 14, Jane 12 and John 6. She's active in the League of Women Voters, too.

The Millers now live in the suburban Philadelphia community of Strafford — and Miller is pleased that his General Electric career has brought him back to the Philadelphia area where he grew up and went to school. He was born in Washington, D. C. in 1922, moved to the Germantown area of Philadelphia in 1925.

When he gets spare time, which isn't too often, Miller now likes to play golf (he shoots in the eighties) — or listen to classical or show music, and perhaps read magazines and articles about business management trends and theories. He's proud of his children, naturally, but isn't pushing them toward careers in engineering or management. "It's up to them to choose," he says. "My oldest boy, for example, is interested in international relations, law and politics, and I'll be satisfied if he finds the career he wants in one of those fields."

Thinking over his own life, Miller observes that he could be happy following two other careers if he should ever leave the aerospace business. One is education — "I'd love to take a crack at running a college some day," he says. "It would be a chance to use some of the management practices we've developed in this business in a completely different atmosphere." It would fit in with his life-long interest in American education. The second career he'd like to try is that of legislator in the national Congress. His school board election experience and his broad interest in the problems of American society would make him a good one. But right now he's fully committed to aerospace — and dedicated to success on the MOL work.

Losing is a word not in Ed Miller's vocabulary. He's confident that General Electric is as totally prepared as possible to move ahead with prime MOL work whenever the signal is given. He's reluctant to reflect on failure, but when he does he thinks of the two men that have inspired him most by their careers and actions — Winston Churchill and Douglas MacArthur. Both faced adversity and failure many times, and both refused to submit . . . and both finally prevailed. And you have the feeling that Dr. Ed Miller will too.

THEY CALL IT THE LASER

And the military and peaceful potential of this energetic infant fascinates the technical world—a world that includes General Electric's Missile and Space Division at the forefront of the investigation into this versatile phenomenon.

Even though the parents of the child aren't abundantly happy with its name, they can't help but admire the rapid growth of the youngster.

Its name is **LASER** (sounds like razor). It's been to the moon and back in less than three seconds.

It promises to revolutionize military defense systems.

It may hasten brilliant scientific achievements in medicine and communications.

Dr. Stanley Hurst, who heads the laser development effort for General Electric's Missile and Space Division at the Valley Forge Space Technology Center, starts the description: "The laser emits intense beams of coherent, or monochromatic, light when excited with more conventional energy such as from a radio transmitter, a flash lamp, or a dry cell, depending on the type of laser. It is already obvious that it has wide application in science, national defense, medicine and industry."

Dr. Hurst speaks not in speculation, but with authority based on successful MSD laser experiments that have accurately tracked the National Aeronautics and Space Administration's Explorer 22 Satellite. The General Electric-built laser bullseyed a long finger of light out to the orbiting Explorer 590 miles above the earth. Almost instantly Dr. Hurst and his associates caught the reflection through the Company's 60-inch optical telescope facility in Phoenix, Arizona.

"NASA scientists have been able to do the same

thing with their laser work," Dr. Hurst said. "They have assembled a notable team of accomplished engineers and scientists at the Goddard Space Flight Center in Maryland and this team and others like it in industry and the military are beginning to tap the potential of the laser.

"In the case of the Explorer 22, the satellite carried a retro reflector on its underside. This has 360 tiny quartz cubes that reflect light in the same direction from which it came. The light beam we sent into space was made from a ruby crystal rod about three-eighths of an inch thick and eight inches long. This laser element was excited with flash lamp optical energy at a rate equal to one million watts pumped into the crystal in a millionth of a second."

Tracking satellites and/or missiles has some immediately apparent peaceful and military attractions. But the laser's value doesn't pause there.

... In a Schenectady, New York, laboratory General Electric engineers used a laser to burn a hole through a diamond in the elapsed time of two hundred millionths of a second.

... In a New York City hospital doctors flashed a laser beam through the lens of an eye of a patient for one-thousandth of a second and instantly removed a tumor.

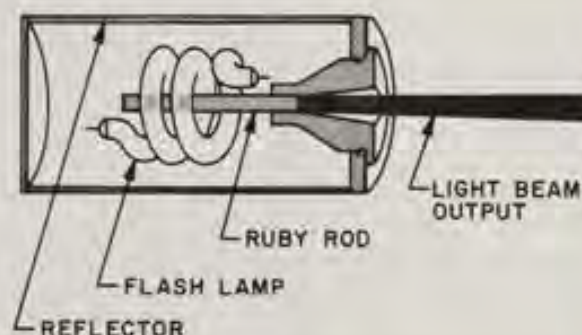
... In Lexington, Massachusetts, where less than two hundred years ago Minutemen

waited to see the white of their foes' eyes, Massachusetts Institute of Technology scientists joined colleagues from industry and pointed a laser at the darkened moon. A two-mile circle on the moon's surface was illuminated immediately as man's most powerful flashlight covered those 250,000 miles in 1.3 seconds.

Laser, not Loser

The word "laser" is an acronym, formed by the first letters of "Light Amplification by Stimulated Emission of Radiation." The reason scientists on the scene aren't content with the name is because it doesn't tell the whole story. In addition to amplifying light, it generates light. In electronics terminology a device that generates radiation is an oscillator, not an amplifier. Of course, use of the word "oscillation" in place of "amplification" would change the acronym from "Laser" to "Loser" and right away this creates an unnecessary psychological barrier to further research.

It's actually an adopted name growing out of its earlier cousin, the "maser" which stands for Microwave Amplification by Stimulated Emission of Radiation. The maser works on the same principle as the laser, except that it emits microwave energy rather than light.



Cutaway view of a ruby laser optically pumped by helical lamp. The ends of the 1/4" diameter, 2" long ruby rod are flat and parallel to each other. The left end is coated to form a mirror; the right end is partially transparent to emit the laser beam.

Scientist/Author John M. Carroll sheds some light of his own on the semantic struggle:

"Scientists who moved from maser research into laser research insist on calling the laser an optical maser. But it can be argued that it is ridiculous to talk of optical microwave amplification since optical means one thing and microwave quite another.

"Proponents of the term 'optical maser' counter by saying that 'maser' doesn't stand for microwave amplification by stimulated emission of radiation at all, but rather for molecular amplification, because masers depend for their action on the behavior of molecules. In fact, some masers and lasers do depend on molec-

ular effects, but more depend on submolecular particles like atoms, ions and electrons."

General Electric's Dr. Kiyo Tomiyasu describes one type of laser: "The laser uses a small cylindrical rod of pink synthetic ruby which is a corundum crystal containing a small amount of chromium. A typical ruby rod is 1/4 inch in diameter and two inches long. The ends are ground flat and parallel to each other. One end is coated as a totally reflecting mirror, and the other is a partially reflecting mirror to permit radiating a beam of light having very narrow divergence."

Organized Light

The key to the effectiveness of the laser is that the light it emits is coherent. The individual light rays are all on the same wave length. The difference between laser light and ordinary light is the difference between a smoothly organized, well-disciplined football team and a disjointed, loosely-played pick-up game. Coordinated like this, light rays from lasers can perform amazingly, because their energy is not dissipated—it can be concentrated at a sharply defined single point.

Applications for lasers are beginning to multiply.

"The laser has made available for the first time a light source so intense and so well collimated that many extraordinary and unusual effects of such laser beams interacting with matter have been discovered," Dr. Tomiyasu said. "The effects depend upon the amount of beam energy, beam power, pulse duration, as well as the material. If a laser pulse were to be directed onto metal, it could be vaporized, provided the pulse were short and contained sufficient energy. Assuming a fixed amount of laser beam energy, a longer pulse will melt the metal, and a still longer pulse will merely cause heating. The effect depends not only upon the beam energy but the rate of delivery and thermal conduction loss in the material."

Lasers can be used for machining. Holes can be drilled through steel 1/8 inch thick. Precision machining such as trimming the resonant frequency of a balance wheel of a watch or trimming resistors on printed circuit boards will become quite possible with lasers.

Lasers can be used for welding. Pulsed beams have sufficient optical energy to raise metal temperatures to the melting point and laser beams have already been used to weld both similar and dissimilar metals. The amount of difficulty is relative—copper is much more difficult to weld than stainless steel.

Lasers can be used in communications. Use of a laser for the transmitter will result in frequencies so high that enormous band-widths are possible, thus relieving some of the congestion in communications traffic. The laser beam is so intense and the width so narrow that communication is possible even over interplanetary distances between satellites.

Lasers can be used in medicine, (although not yet ready for general usage) as is being demonstrated in many current medical research programs. Thousands of people suffer from a detached retina. The laser beam can deliver the energy needed for the fusion involved so quickly that error due to motion of the eye cannot occur. Lasers have been considered for suturing wounds through heat. Dentists may find laser drills to be fast, sure and painless.

Lasers can be used in science, to help man improve his understanding of the measurements of length and time. In applied science the laser shows potential in spectroscopy. As the number of laser materials increases and the number of available coherent light frequencies increases, spectroscopists can look forward to more efficient tools that will assist them in their study of matter.

Of course, one of the prime uses of the laser that most people think of concerns its possible multiple military application. They envision a day when we will build a superpower laser to shoot down enemy missiles. *Scientists won't find it that simple.* Even with lasers only a few feet from steel the penetration is only $\frac{1}{8}$ inch. In addition, water vapor and atmospheric dust would considerably reduce the effective power of the light ray.

Consideration is being given to developing large lasers for use possibly atop mountain peaks, aboard orbiting satellites or on anti-missile missiles. There are other uses, such as a laser range finder for use by Army personnel in the field to locate targets. The "death ray" that has long fascinated science-fiction writers might be incorporated in a weapon that could be worn as a side-arm, a familiar Buck Rogers item.

All of these applications require large-scale government funding, which though predicted to be high, cannot be accurately determined until more basic studies can be completed. Enthusiasm, however, doesn't have to wait.



The four men in MSD primarily commissioned to explore the potential of the laser are (l. to r.) Gordon L. Snyder, Allen B. Grafinger, Dr. Hurst, and Howard W. Halsey.

"The energy directed by laser weapons," said Air Force General Curtis LeMay, "could travel across space with essentially the speed of light. This would be an invaluable characteristic for the interception of ICBM weapons and their decoys."

The laser story probably gets its beginning back when man made his first attempts to find a workable explanation for the two phenomena of light and electricity. But current credit for the laser and its predecessor, the maser, goes to Dr. Charles Townes, Columbia University scientist, who along with two associates, made the maser work for the first time in 1954.

Einstein On The Beam

At first the maser was of minor interest to scientists, until someone used it as a clock to check Einstein's Special Theory of Relativity (it showed Einstein to be right). Four years after making the maser work, Dr. Townes and his brother-in-law, Dr. A. L. Schawlow, outlined their idea for extending the maser principle into the invisible light spectrum.

(It was Dr. Schawlow who recently gave secretaries new hope by stating that a "laser eraser" could be developed where the pulsed light beam would eliminate individual letters from a typed sheet with such efficiency the adjustment could not be detected.)

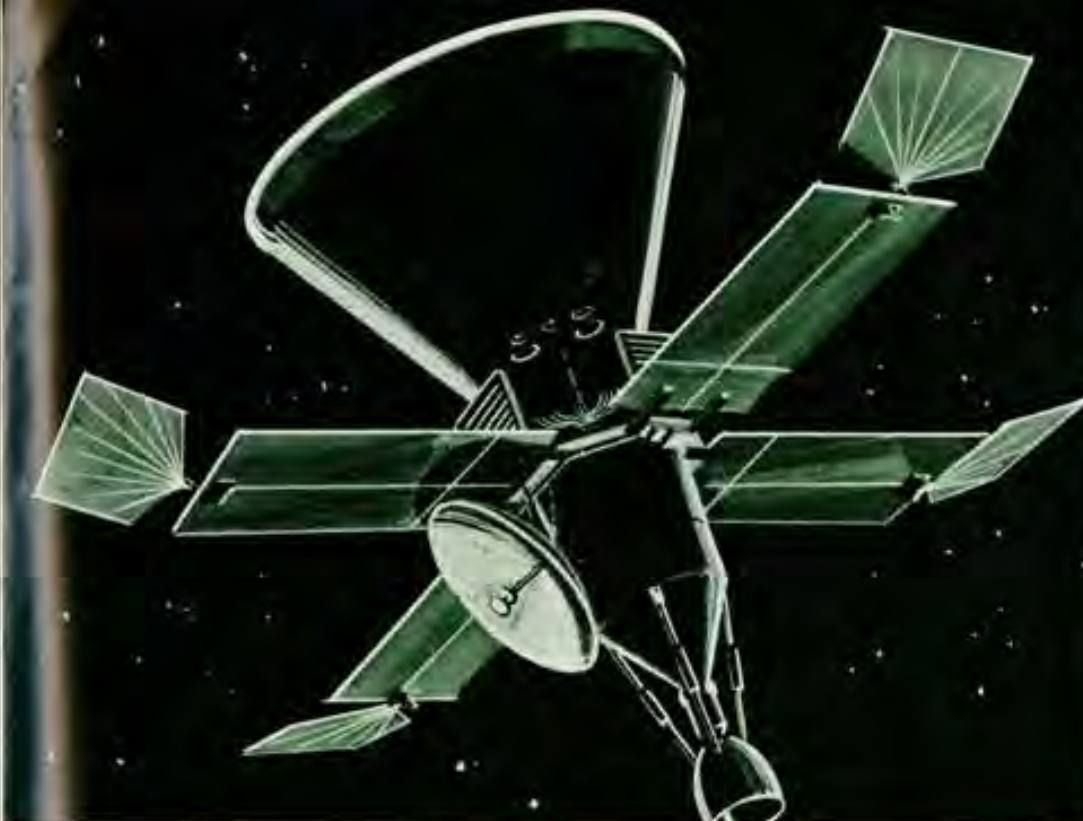
Dr. Townes, who, in addition to being a scientist is also a teacher, skindiver, mountain climber, traveler, breeder of orchids, and fluent in four languages, looks at the laser development: *"I think I might compare the laser with the vacuum tube. The laser will have uses comparable with, or even greater than the microwave technology."*

The vacuum tube was the key element of radio and whole modern electronics industry, so Dr. Townes' assessment is not a minor one.

With literally hundreds of companies getting involved in laser research, the promise of the laser is likely to undergo rapid development in the rest of the decade. Helping set the pace will be Dr. Stan Hurst and his crew at MSD. Dr. Hurst sums up:

"Naturally, we're optimistic, both about the future uses of the laser and about the Division's involvement in the total effort. We have been able to accomplish some significant work here, not only in the tracking and communication area, but in actual funding of the development of the first General Electric laser.

"We can look forward to continued development of the laser in communications and tracking experiments and in the study of the atmosphere and materials. Certainly as more and more private and public funding of laser programs comes along, we at MSD will be equipped both with the facilities and technical background to carry on further work. Our recent completion of a study contract with NASA on deep space communications has convinced us that much remains to be done with laser research, and we're anxious to get on with it."



BUS RIDE TO MARS

"The biological exploration of Mars is a scientific undertaking of the greatest validity and significance. Its realization will be a milestone in the history of human achievement. Its importance and the consequences for biology justify the highest priority among all objectives in space science — indeed in the space program as a whole."

The above quote is copyrighted 1965 by the New York Times. Reprinted by permission. Printed in the New York Times on April 27, 1965, as a part of the conclusions and recommendations of a report issued on April 26 by the National Academy of Science Study Group.

Politics probably had very little to do with a statement that was made at General Electric's Valley Forge Space Technology Center in April of 1965.

But the parallel was a good one, and Al Christensen was sounding very much like a political candidate, hard-running for the highest office in the land.

"What we've just done," Al commented, "was to 'run in the primaries and be nominated for office.' Now, we've cleared that hurdle. The next item of business is to win the election!"

Al was speaking as the incumbent in an already important office, and he was talking — as Manager of Business Management for General Electric's Voyager Project — about having just been awarded a Phase I-A study contract for the unmanned Mars program called VOYAGER.

This campaign took on notable impetus in October 1964, when the Space Science Board of the National Academy of Sciences stated: "Accordingly, the Space Science Board of the National Academy of Sciences designates the exploration of the nearer planets as the most rewarding goal on which to focus national attention for the 10 to 15 years following manned lunar landing."

And Homer E. Newell, Associate Administrator for Space Science and Applications, National Aeronautics and Space Administration, was in complete support of this designation when he appeared a few months later, in early 1965, before the Subcommittee on Space Sciences and Applications of the House of Representatives' Committee on Science and Astronautics.

"The expansion of man's knowledge of the Universe is an important objective of the space program," Dr. Newell testified. And "... exploration of the planets in our Solar System is a vital phase of such an endeavor."

The Firm Foundation

And more. Dr. Newell was suggesting that NASA start a solid program for the exploration of the planets. Based on the flight of Mariner II (providing us with our first close-up scientific data from the planet Venus) and of Mariner IV (scheduled to reach mission-completed status by mid-1965, providing this nation with a first close-up look at Mars) we were prepared, he said, to launch "an 'aggressive' planetary exploration program. Voyager will provide the means for such an endeavor."

What is this Voyager, this space-age explorer to "the nearer planets?" Frank Crump, Spacecraft Depart-

ment's Manager — Voyager Project, explains its immediate purpose this way: "This first Voyager series really has but one overriding scientific objective. That's the detection of life, or past life, on Mars."

But that's only a start. Again, NASA's Homer Newell: "While the initial Voyager application will be exploration of Mars, we are planning on using the basic spacecraft bus and propulsion unit for future exploration of Venus." And, indeed, NASA is already conducting studies of flight missions to Jupiter, Mercury, the Comets — even the Asteroids.

A Bus

Voyager has been under study for some four plus years. Various studies, combined with actual Mariner flights; successful developments of Saturn and Centaur launch vehicles; advances in ground-based data receiving systems; greater data storage devices on-board . . . these developments have led to a present-day Voyager concept that includes three modules: a bus, a retro propulsion system to put the bus in orbit, a large landing capsule. Total weight should amount to some 7,000 to 10,000 pounds, and capability will consist of a combination of orbiter and lander missions.

The basic Voyager bus, GE Spacecraft Department's primary interest, will probably measure nearly 20 feet across. According to Frank Crimp, " . . . our bus concept will weigh about 2,000 pounds, will serve as the package for some 300 pounds of scientific instruments, and will more than likely contain subsystems that will have direct and appropriate application for the much more refined and advanced missions of the future."

Crimp also sees three major technical problems which confront his team's effort:

First, the question of reliability . . . "We must consider a seven- to nine-month trip to Mars; then, a six-month orbit on top of that."

Second, the question of launch



Dr. Homer E. Newell



Frank W. Crimp, Jr.



Albert T. Christensen

times . . . "We're shooting for a 1971 launch for an important reason: it's something we call the 'window' to Mars. This refers to the best possible time for a Mars trip, a time when the lowest possible energy factor is necessary for the journey. This 'window' is only open to us for 45 to 60 days every two years. 1971 is one of those years and it's a particularly good one. We have to be on time." (It's during that year that Earth and Mars come within 35 million miles of each other. On the average, there are 50 million miles between Earth and Mars at their closest approaches in other years.)

And third, flexibility . . . "Our first Voyager flight is six years away. To look back six years is sobering, in light of the myriad of advances that have come about in that post-Sputnik era. We must build flexibility into Voyager from the very start — in order to provide acceptability for the advances of the next six years."

"And there's really a fourth consideration," Crimp continues. "It's just as important as the first three. It's the question of costs and of how we must stay within them. Innovation in cost management is a key to success on Voyager — and we're developing new techniques to accomplish this."

The second module of the Voyager concept is a package that will put the bus into a Martian orbit.

Built as a typical retro propulsion module, this package may use space-storable propellants at a thrust level of some 1,500 to 2,000 pounds, and the amounts of propellant used will depend directly on the amount of increase-in-velocity required at the planet . . . this, in turn, dependent upon the type of launch opportunity and the kind of Martian orbit desired.

The third Voyager module, the capsule system, may range in weight from about 1,000 to 6,000

pounds during the many parts of the program. This weight variance is intentional, and will enable the results from the operation of one capsule to be used for the development design and operation of the flights which follow.

From Washington To Pasadena

Total responsibility for the direction of the Voyager program has been assigned, by NASA, to the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California.

The third week in January 1965, saw a list of seven competing teams receive Requests for Proposal from JPL; and heard Spacecraft Department General Manager Logan Cowles say that the RFP obtained by his Department was a highly important opportunity.

The People . . . And The Plan

"Entering this field of interplanetary spacecraft is necessary if we are to continue to grow in this space business," Mr. Cowles said. "And we are prepared to commit a major resource to win this significant opportunity."

The resource he was referring to was the team that, in late April, received the following letter from William H. Pickering, Director of JPL:

*"General Electric Company
Missile & Space Division,
Spacecraft Department
Subject: Request for Proposal
. . . Voyager Spacecraft System
Phase I-A.
Your proposal submitted in response to subject RFP has been fully evaluated and it has been determined to enter into negotiations with your firm for a contract award . . ."*

In short, the note of award meant that the Spacecraft Department was now one of three firms still in the arena for a major hardware contract to be granted next year. "Now we are three," says Frank Crimp. "GE Spacecraft, the Space Technology Laboratories, and the Boeing Company. The matching of our facilities, our

background and our capabilities is perfect; but the competition is tough — and we've got a lot of hard work to do."

Al Christensen echoes the opinion: "Since 1961, we've devoted no less than 237,000 engineering man-hours to interplanetary study, have been involved in more system study contracts for Mars and Venus missions than anyone else. We're just not 'answering the mail.' We've done our homework . . . and now we're taking the test!"

In The Customer, Complete Faith

And both men concur on the complete capability and competency to be found at the Jet Propulsion Laboratory under the leadership of Dr. William Pickering, Director; General Luedeker, Deputy Director (former General Manager of the Atomic Energy Commission); and Don Burcham, JPL's Voyager Project Manager.

Christensen puts it this way: "No one else has built planetary vehicles, and JPL's performance on Mariner II (for Venus) and Mariner IV (for Mars) stirs up a very big desire for success in working with JPL." Spacecraft Department General Manager Cowles agrees, and in reply to JPL's notification of the Phase I-A award said, "You may be assured the full capability of the Spacecraft Department is available to support this effort."

Cowles speaks of this capability with a full knowledge of the background of the men of his Department's Voyager team. And Frank Crimp has words of praise for each of them:

On Bill Roths: "I honestly assess him as the best Spacecraft Systems Engineer in the country . . . fully qualified by virtue of his background, fully ready for this job by reason of his most recent experiences in similar work on the Medium Altitude Communications Satellite, on Advent and on the Spacecraft Department's Saturn V Voyager study, for JPL, last fall — when he was responsible for the total systems engineering effort."

On Al Christensen: ". . . who has directed the marketing and contract management on many of the Division's spacecraft programs (Advent, Nimbus, OAO, ATS) and has participated in the Department's interplanetary work since its inception in 1961. He is eminently qualified to carry out the business management for Voyager."

On Dick Tecca: "He comes to us fresh from having spent two and a half years as our representative in Los Angeles, working directly with JPL. As manager of Program Development, Dick is most adept in his knowledge of our customer, and of his needs."

And similar accolades from Crimp for Lew Seaman, who heads the Voyager design effort and who has just completed an assignment as Manager of OAO Engineering . . . for Mike Peterson, Carl Sells, Andy Bergner and K. C. O'Leary, who have all worked under contract to JPL. Each of the four remains on the Voyager team: Peterson responsible for overall schedules and budgets as Manager of Program Control, and O'Leary responsible for the efforts of our all-important sub-contract team members as Manager of Sub-Contract Telecommunications.

The Industrial Team

Each of these men deserves the special credit that goes with having reached the Phase I-A hurdle. Crossing that fence, though, really won't win the race until the Voyager bus is theirs to build.

Kenneth "K. C." O'Leary's job is worth highlighting; because with him rests the labor of sub-contract responsibility. "We have the cream of the Missile and Space Division working on the Voyager venture," says Frank Crimp. "But we've also got the best-in-the-business supportive capabilities represented on our sub-contract team."

Presently, two major sub-contractors are on board the Voyager bus effort:

- The Motorola Company, responsible for telecommunications;

- Texas Instruments, charged with the data handling and storage portion.

A third major sub-contract will be awarded by the Spacecraft Department at a later time — for the propulsion system that will serve two Voyager requirements: 1) a mid-course correction engine; and 2) a system that will propel the bus into orbit. Five companies are currently working with the Spacecraft Department on the propulsion package . . . Aerojet General, Space Technology Laboratories (propulsion division), Rocketdyne, Rocket Research and Thiokol.

But Why To Mars?

But whenever any discussion arises about Voyager — about its purpose, its plans, its people, its progress — someone always asks the question: "Why to Mars? Why not to someplace else? After all, the whole solar system is available . . ."

Bill Roths has an answer for that one, an answer he gave as one of *Challenge Magazine's* "People on the Move" in the winter issue

of 1964: "What we're shooting for is the 'reason why'," he said. "Why do we have indications of water vapor on Mars? What is that wave of darkening that moves across Mars with the seasons?"

So one question answered with another; and when you're talking about the discovery and definition of life on another planet, the answer to the query becomes obvious.

"The Others Will Have To Wait . . ."

Al Christensen talks about Voyager's pioneering aspect when he refers to the excitement of Voyager. "A few years ago, the moon was filling our imagination. We could see it with the naked eye — could even draw a visual 'map' with what we knew of the moon before we even flew the Ranger series to its surface. This is not so with Mars. The best 'map' we have of that planet is much less definitive."

Edgar M. Cortright, Deputy Associate Administrator for Space Science and Application, NASA, answers the "why-confine-ourselves-to-Mars-and-Venus" ques-

tions this way . . . in the view of the organization that has overall project responsibility for Voyager:

"We are, of course, fully aware of the accessibility of the solar system with relatively straight-forward launch vehicle and spacecraft developments. Naturally, we would like to conduct missions to the sun, Mercury, Jupiter, Saturn, and the outer planets, as well as to comets, asteroids, and out of the elliptic . . ."

"Such an effort would be a large drain on our resources, however. Rather than spread our manpower and funds too thin, we have elected first to do a workmanlike job on our nearest neighbors — the moon, Mars, and Venus. Project Voyager constitutes a major step toward the planets Mars and Venus. The others will have to wait their turn — which will surely one day come, and the sooner the better."

Voyager Is Now

The Spacecraft Department, its people and its supportive sub-contract teams are ready to face that challenge with Voyager.

"We've never tried harder. We've never been better prepared." That's Frank Crimp, the totally-committed manager.

"And we expect to win!" That's Crimp running for office.

From now until the time that Voyager has placed its bus into that "orbit far-away" — and later — the excellence of effort on the part of General Electric's Voyager people will be very evident in the aerospace arena.

And "winning the election" is only the start.

VOYAGER BUS

CHARACTERISTICS

• WEIGHT	2000 POUNDS
• LIFETIME IN ORBIT	6 - 12 MONTHS
• SCIENCE WEIGHT	200 - 300 POUNDS
• GUIDANCE	DSIF
• ATTITUDE CONTROL	COLD GAS (300 POUNDS)
• POWER	600 WATTS SOLAR CELLS & BATTERIES
• DATA STORAGE	10 ⁸ BITS
• COMMUNICATIONS	S BAND 10 FT. ANTENNA 2000 BITS/SECOND

THE ADVANCED TECHNOLOGY LABORATORIES . . .

'Building' General Electric's Most Important Product

It's been said that in any new technology the nicest place to be is in the forefront, because then you don't have to read anything!

It's an exaggeration, but it does contain a grain of truth.

If it were entirely true, the technical library at General Electric's Advanced Technology Laboratories would be as bare as Mother Hubbard's cupboard. For this Schenectady-based operation has been a leader in developing and demonstrating new technologies for the General Electric Company since 1895.

From its creation 70 years ago as our Company's first laboratory, whose job it was to calibrate and maintain instruments, the Advanced Technology Laboratories today has an imposing list of objectives:

- IDENTIFY and SELECT technological opportunities which show the greatest promise for exploitation by the Company.
- Provide and maintain a WINDOW TO WORLD-WIDE AND COMPANY-WIDE TECHNOLOGY.
- Develop and demonstrate new or improved technological principles or techniques of interest to the Company by conducting ADVANCED TECHNOLOGY PROGRAMS within the Laboratories and by supporting advanced technical work in operating components.
- Provide ENGINEERING SUPPORT on a contract basis to Company components when they need specialized assistance in advancing their own technologies.
- Identify and characterize potential NEW BUSINESS OPPORTUNITIES for the Company resulting from the laboratory activities and studies, and communicate this information to Company components.
- Provide SPECIAL DEVICES AND EQUIPMENT needed by Company customers but not available from operating components.

The broad objectives fit well into ATL's goal: to lead in all technical areas in which the Company has an existing potential interest, to disseminate technological advances, and to help Company components develop new products and systems.

Significant Developments

Among the Laboratories' significant developments have been the first General Electric radio receiver and transmitter, the cathode-ray oscillograph, the mercury arc rectifier, the oil-filled cable, the sound-level meter, the recording spectrophotometer, the network analyzer, the mass spectrometer, the amplifier, the x-ray microscope, and many others.

But at ATL, today will be yesterday tomorrow, and tomorrow is all they talk about today.

The man who is directly responsible for Advanced Technology Laboratories is Dr. George L. Haller. Dr. Haller, a General Electric Company Vice President, has been in his present position since 1962. In addition to ATL, Direct Energy Conversion, and New Businesses Development Operation — also members of Advanced Technology Services — report to him.



Advanced Technology Services is charged with keeping abreast of the tremendous technological explosion throughout the world, and with developing and disseminating information on new engineering advances. **PLAN AHEAD** might be an easy way to tag the group.

Dr. Haller calls advanced technology the "broad gray zone" between basic research for new knowledge and the line engineering function of designing products. "We have focused on the link between scientific knowledge, and human needs and wants," he explained. "We are trying to increase our effectiveness in applying new knowledge to the changing needs of customers. In effect," he continued, "to help our Company become a product link between the expanding capabilities of science and technology, and the needs of millions of customers."

The Information Revolution is a favorite topic of George Haller.

"The world today is in the throes of a new kind of revolution—a revolution in man's way of handling information," Dr. Haller said. "This Information Revolution in many ways parallels the Power Revolution, often called the Industrial Revolution. The Power Revolution vastly increased the energy available to man, changed his ways of using it, and increased his power to do physical work. The Information Revolution," he continued, "is vastly increasing the available information or knowledge, changing man's way of using that knowledge, and increasing his ability to do mental work."

Dr. Haller continued, pointing out that while the Power Revolution is still going on, particularly in the underdeveloped countries, from a world-wide viewpoint its rate of change is slowing up. We can see a plateau ahead, he noted.

Speed-Up of the Information Revolution

The Information Revolution, on the other hand, is just getting into second gear, he explained. The real speed-up is still to come, and it's rather frightening to contemplate. He described some of the measureable aspects of the Information Revolution, noting that the raw amount of information available, mostly technical information, is exploding; the variety, speed, and depth of communication is exploding, and the need for superhuman help in handling this flood of information is becoming acute.

"It is simply impossible to cope with the knowledge explosion and the communication explosion without super-human help. Notice I say 'super-human', not 'super-natural'," he pointed out.

Checkers, Chess . . . and Chinese

Already computers are doing the laborious, repetitive kinds of thinking. They make mathematical calculations that previously were too formidable or expensive to do by hand. It seems only a matter of time before machines will be able to do really sophisticated thinking. They can play a good game of checkers and



A tour of ATL's Cryogenics Laboratory will bring you face-to-face with one of the many fields of endeavor on which the Lab is concentrating. Dr. Haller discusses with Steve Minnich a superconducting coil. Steve is Project Engineer in the Cryogenics Laboratory.

a fair game of chess. At translating foreign languages, machines are not very good, but they are learning.

Then there is the problem of remembering, storing information. Permanent storage, as in a library, is one side of the problem. Temporary storage of data being processed, as in a payroll or accounting system, is another. We can see the direction the technology is taking, but we are far from our theoretical goals, Dr. Haller pointed out.

"At ATL we are working on storing information in extremely tiny wrinkles on a plastic film. The wrinkles are put there by the touch of an electron beam or a beam of light. We call this thermoplastic and photoplastic recording," he explained. "We are also working on better ways of finding particular items of stored information."

A Long Way To Go

"We have a long way to go before electronic systems can match the flexibility and complexity of the human brain. A man can be reminded of something—that is, he can 'read out' from his computer memory—in response to a great variety of stimulations: a picture, a word, a tune, even a smell. There is nothing in information technology to correspond to the brain's multiple cross-referencing and its apparent ability to filter out associations that are not pertinent. Current work with 'random access' storage systems is moving the machine capability closer to that of the brain," he explained.

"Technology does not operate in a vacuum," Dr. Haller pointed out. "It reacts with society and changes society, changing the needs for the technological development it sought to fill. The automobile was developed to replace the horse for motive power," he explained, "but it immediately transformed that

single need into something much greater. The face of the country and the pattern of our lives were drastically altered in processes that are still going on, two generations after," he noted.

"Since the need is altered by its fulfillment, we must expect continual change, continual adaptation. Neither a country nor an industry can hope to attain equilibrium. Success does not mean that you have found the best designs or the best policies for the present and the future," he emphasized, "it only means that they were valid yesterday."

But the Advanced Technology Laboratories are not in business for yesterday. They're working for Company leadership in technology today and tomorrow.

The Advanced Technology Laboratories are—
Chemical and Materials Engineering Laboratory
Electrical Engineering Laboratory
Information Engineering Laboratory
Mechanical Engineering Laboratory

The Laboratories occupy a 300,000-square-foot facility in Schenectady, and conduct development and investigation programs in a wide and diverse field of technologies. Because of the breadth of their experience in many engineering disciplines, the Advanced Technology Laboratories are particularly well qualified to handle development programs requiring a high degree of intertechnological coupling.

Today's Problems and Tomorrow's Technologies

While individual Company Departments maintain a high degree of competence in fields directly related to their own products, the Laboratories perform the essential Company function of providing assistance in

the solution of problems beyond the scope of the operating Departments. They also explore new technologies unrelated to individual projects.

One of every five members of the Laboratories' professional staff of 270 holds a doctor's degree or the equivalent, and more than half of the remainder hold other advanced degrees. A supporting staff of some 370 includes technicians, drafting, shop, finance, and other related and auxiliary personnel.

Some of the directions in which ATL is headed include:

HOLOGRAM-SPATIAL FILTERS . . .

provide a means for automatic word, character or image recognition without scanning or making comparisons with stored objects of like nature. The system makes use of the highly monochromatic laser light and ATL has demonstrated the capability of recognizing specific words from a printed page. The Laboratory has also used a multiple spatial filter to sense any one of the 10 digits, thus providing a means for automatically reading numbers without requiring relative motion between the sensor and the document. Since the recognition is instantaneous and requires no scanning or logic circuits, it constitutes a major technological step in automatic recognition systems.

RADIO-OPTICAL OBSERVATORY . . .

serves the Company's interests in the study of radio and optical propagation phenomena.



Features of a worldwide navigation and control system that would function full time and cover every corner of the earth are studied by Roy E. Anderson, Project Manager—Radio Optical Observatory at the Advanced Technology Laboratories. The system would pinpoint the position of a ship or aircraft and make this known in less than a minute to both the craft and a cooperating ground station.

ena, communications systems, and methods of acquiring, tracking, and discriminating space vehicles of all types. One outgrowth of the work at the Observatory is a concept for a world-wide full-time navigation and communication system using satellites. It would locate the position of every user ship or aircraft at frequent intervals and make known the craft's position in less than a minute, both at the craft and at a cooperating ground station. Equipment aboard the craft would be inexpensive and completely automatic with all computations done at the ground stations. A world-wide coverage system would use six ground stations and 24 satellites that would be placed in orbit by only four launches.

SOLID STATE ELECTRONICS . . . development of new devices and circuits for conversion and control of electricity in power quantities, in a manner similar to transistor and diode control of electricity in signal quantities.

BATTERIES . . . ATL is working on high-energy-content battery systems, and has already developed "third electrode" concept which permits rapid recharging of hermetically-sealed, nickel-cadmium cells.

CRYOGENICS . . . the technology of very low temperatures (-297°F to -459°F) is being maintained and advanced at ATL with concentration on specific applications. Cryogenics is a broad field including electrical phenomena (superconductivity high field magnetic coils, low noise electronics) establishment and control of low temperature environment (refrigeration, heat transfer, fluid flow, insulations), and materials behavior.

Missile and Space Division components have a more than passing interest in the Advanced Technology Laboratories. At present there are more than 30 MSD programs at ATL. They range from an Investigation of New Ion-Adsorption Electrodes for Saline Water (for the Missile and Armament Department), Sensor Designs—Mark 12 Program (Re-entry Systems Department), and Advance Zero Leakage Connector Technology (Space Sciences Lab) to Navigation Guidance and Control System for Manned Orbiting Laboratory (Spacecraft Department) and Mass Spectrometer for Missile Gas Monitoring (Apollo Support Department).

In fact, the Missile and Space Division is the second biggest customer of ATL. Defense Electronics Division is the Laboratories' number one customer.

Two-Way Street

But it is a two-way street. For instance, an MSD project for which the Advanced Technology Laboratories provide funds is the Electric Energy Storage

and Conversion Project of the Advanced Requirements Planning Operation. Last year the Spacecraft, and Missile and Armament Departments conducted projects for ATL.

And Dr. George Haller knows well both sides of that street. He's been directly responsible for the Company's Advanced Technology Services since 1962, and for six years before that was Vice President and General Manager of the Defense Electronics Division.

The Missile and Space Vehicle Department, now MSD, was then part of that Division, and the MSVD General Manager, Hilly Paige, was selected by Dr. Haller to report directly to him in that position.

Much of the history and growth of our Division, as we know it today, resulted from the guidance and leadership furnished by Dr. Haller from our earliest years up until his selection three years ago by Ralph Cordiner to his present position. Today, in addition to managing ATL, he is a member of General Electric's executive office, the Company's highest policy board.



DR. GEORGE HALLER

Now at ATL, Dr. Haller heads the Company's oldest Laboratory, whose 70 years span the illustrious names—and accomplishments—of Dr. L. T. Robinson, Dr. Charles P. Steinmetz, E. F. W. Alexanderson, David C. Prince and Cramer W. LaPierre. Dr. Haller's distinguished career in the fields of education, military technology and business management serve him well at Advanced Technology Laboratories.

George Haller beams when he speaks of the men and women who work in the Laboratories. "They take special pride in their ability to match new technologies to customer needs," he pointed out, "and they thrive on our emphasis on practical, rather than pure research; on engineering design and application rather than scientific discovery. Members of our professional staff are good salesmen too," he added. "They are able to get support for their ideas and gain acceptance past the formative stage. And they don't mind giving due credit to others," he added.

With less than 700 employees the Advanced Technology Laboratories cannot hope to completely cover the very wide horizon of advanced technology. "We must be selective," Dr. Haller stressed. "We must concentrate our efforts in areas with the best chances for achieving important—and profitable—advances. We must always be guided by a desire to expedite the transition of scientific and technological knowledge into products for our customers. By this progress," he continued, "we hope General Electric will keep its leadership in the businesses of the future."

And after all, Progress Is our Most Important Product.

A KIND WORD FOR COMMITTEES



"A camel looks like something put together by a committee."

"A committee is a group of people who singularly can do nothing, but together can decide that nothing can be done."

"The reason the Ten Commandments are short and clear is that they were handed down directly, not through several committees."

"A good committee should consist of three people, two of whom are absent."

That's a partial listing. For the balance of comments ridiculing committees at work in industry, you can consult with anyone who has ever served on one. Or maybe you can even talk to a rare species—that dying breed that somehow has never been assigned to a group of people charged with carrying out a specific task. Being critical of committees is a most fashionable indoor sport—it doesn't take much time; it requires less thinking than gin rummy; and you're guaranteed a receptive audience for your wise witticisms concerning the indecision, waste of time and boredom that are popularly supposed to surround committee sessions.

The "committee system" of doing business has long been based on the concept there are extraordinary possibilities in ordinary people working together. **Getting people together is a beginning; keeping them together is progress; and working together is success.** All through industry from design through production to distribution, groups of people work together on parts of a whole task.

You may label them councils, or work groups, or boards, or if you like class, you can call them task forces. In rare moments some of these groups have even been called "committees" though most companies display a semantic shyness about this term because in some circles it's looked upon as a dirty word. Whereas many self-respecting, God-fearing, tax-paying citizens may not want to serve on a "committee," they seldom can resist an urgent assignment to a "task force."

Despite the verbal abuse showered on committees, the sands in the hourglass of industrial history indicate that most activity and positive progress has resulted from the action of groups of people, not individuals. Certainly, many individual decisions are made, but these decisions are backed up by a fund of knowledge accumulated by committees, task forces, councils—call them what you like (and some people do).

Though people tend to deny it, much of what we accomplish outside of work is also "committee-inspired." You come into this world by committee—mother, father, doctor and medical claims agent. You leave the world with a committee of six men carrying you out to a cemetery run by a board of trustees who supervise graves decorated with flowers paid for through an office collection among a group of fellow employees. Somewhere in between that first team in obstetrics and that final one in dark blue business suits you will experience, day camps, student councils, fund-raising committees, election committees, credit boards, PTA's, and Girl Scout Cookie Sale

Councils. You will also read in your history book that somehow a group of people—a committee of conscience—got together in Philadelphia a couple of centuries ago and agreed on some words and a course of action that created a country. You will learn that Lindbergh's flight was readied by committee; that Custer died by committee; that Betsy Ross had several neighborhood women in her sewing circle.

If then committees are so valuable, why the stigma attached to them? Why do strong men shudder when assigned to one? Why does one man say, "The only satisfaction I ever got out of working on a committee was to discover that the real happiness in life is not in having a lot to do. The real happiness is having a lot to do, and then not doing it!"

There are several ills associated with committees, most of them historical.

People say committees are overpopulated.

They experience so much meaningless discussion—the only part of our society that keeps minutes and wastes hours. They study a question for weeks and come up with a definite maybe.

A third problem is the committee report summarizing and justifying the activity and recommendations of the group. This can be, pound-for-pound, weighed and found wanting.

The fourth concern—committees never seem to disband. No matter how temporary the assignment, job-security minded members can manage to make a career out of any particular task. One firm, startled because they found they had 37 active or inactive committees in their structure, assigned a special committee to study this problem and to produce some reductions. Six months later the special committee's report indicated that all 37 should be continued, and in addition, that the special committee should be held together to regularly continue studying the matter.

Despite these concerns, committees flourish. They flourish because they are (1) needed, and (2) successful. The Aerospace business is an example.

"This business is far too complicated for individuals working separately to solve," says an Air Force officer. "Its technical requirements overtax the capabilities of any one company. It takes a lot of people working together and right down through all organizations to accomplish a successful space mission."

Now an engineer: "There's a lot that's right with committees. We'd be in a helluva fix if we all worked individually. If some people think committee work is frustrating they ought to try this business without it. We need all kinds of groups just to keep our business going."

The type of groups he says we need all kinds of are fairly evident in General Electric's Missile and Space Division where literally hundreds of "committees" are at work. Here are a few:

Policies and Instructions Board—sets up the operating rules.

Facilities Council—assesses facility requirements and makes recommendations.

Design Review Board—provides high level agreement on product design.

Value Engineering Board—seeks to systematically get the most out of an engineering dollar.

Failure Analysis Board—helps insure highest quality.

Cost Improvement Board—evaluates improvements in operating methods.

Patent Review Panel—checks out new inventions.

There are equipment councils, configuration control boards, design change boards, suggestion boards, development authorization councils, signed articles councils, drafting practices panels, technical facility review boards and the etcetera can go on for some pages.

Add to these staff groups at all managerial levels, plus the spark-plugs of MSD's highly effective

management systems—PAR (Program Appraisal and Review), BAR (Business Appraisal and Review), and GAR (Growth Appraisal and Review), and you have a line-up that has a multiple continuing impact on the success of the Division. Groups of people working together make the business happen.

"Sure a lot of people are wary of hearing the term 'let's appoint a committee' but part of this reaction is due to a failure to understand that what we accomplish has to be done by groups not individuals," said one manager who by modest count is personally involved in over a dozen such committee assignments. "Everything we do from start to finish on a program is done by groups."

A program in Aerospace may well begin with someone's private idea, but a study team develops the idea to determine its feasibility.

A sales plan is needed, so a Marketing Strategy Task Force goes to work.

Progress continues. Time now to pull together a proposal team.

Then a program team. Then a design board. With no hardware yet visible the "committee system" has already been efficiently and effectively at work.

A dictionary commissions a committee "to investigate, study and carry out specific assignments recommending whatever action the members deem appropriate."

Branded all too often as crutches for those who don't make decisions, committees just don't deserve the rap. From the beginning of time man has banded together to accomplish things he couldn't do as an individual. He created "committees" as a bandage to protect a life made difficult by circumstance.

Where problems exist with committees whether they be in government, in industry, the PTA or Little League, the headache is usually a dual one: (1) the selection of the people on the committee, and (2) inability to communicate.

Most groups of people justify

the "committee curve." There are the dominant, participating ones; there are the quite withdrawn ones feeling more neglected than Whistler's father; there are the diplomatic ones waiting to gauge which way the tide is flowing; and there are those invaluable ones who operate like ducks in a pond—calm and unruffled on the surface, but paddling like hell underneath.

To have an effective committee the people assigned must be versatile, show ability to work together, have sufficient vision to see the total problem and understand it, demonstrate a talent for communication, and have the subject knowledge or be willing to acquire it. This knowledge is vital. It does no good to keep saving ourselves for the senior prom if we neglect to dance along the way.

The second area that makes the difference between effective committees and those that would like to be, is communication. An ability to anticipate barriers to communication is an immediate plus. The free flow of conversation—both critical and complimentary—is essential. (One man says, "I conscientiously avoid arguments. They are always noisy and frequently convincing.")

Want some communications barriers?

How about:

- Lack of time
- Too much pressure
- Fear of consequences
- Organizational structure
- Technical language
- Widely-varied audience
- Security regulations
- Resistance to change
- Failure to understand problem
- Personality differences.

That's only ten. Any person who has sat at a committee table, listened to arguments he can't buy, drank coffee he can't taste, heard discussions he can't get interested in, and doodled notes no one can interpret on a pad all too thick for the occasion—will tell you that

there are abundantly more barriers than solutions. But he'll be back at the committee table for the next meeting, seeking compromise, understanding, and a sound total committee contribution.

Someone has said that no man is lonely while he eats spaghetti. Too many things are happening at once.

No dedicated man who serves on a committee—whether its purpose is to award Boy Scout badges or to design a space satellite—need feel lonely if he is comfortable in the knowledge that this group needs his input, his knowledge, and the energy of his experience. Occasionally he will see some conversational blood flow at meetings, perhaps some of his own, but if he cannot stand the sight of his own blood perhaps he can find medication in the words of Theodore Roosevelt:

"It is not the critic who counts, not the man who points out how the strong man stumbled, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena; whose face is marred by dust and sweat and blood; who strives valiantly; who knows the great enthusiasms, the great devotions, and spends himself in a worthy cause; who, at the best, knows in the end the triumph of high achievements; and who, at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who know neither victory nor defeat."



DR. ALDO LA ROCCA . . . THE NEED TO DOUBT

Most people have goals. Some attain them; some don't. When a person aspires to the coveted doctorate degree he charts for himself a long and tedious course. When it's a double doctorate the journey towards achievement is even more arduous.

Dr. Aldo LaRocca, Manager of Advanced Propulsion Systems in the Spacecraft Department is one of the few who have managed to acquire a double Doctorate degree — Ph.D., Applied Mechanics, Polytechnic Institute of Brooklyn and Dr. M. E., University of Naples. Dr. LaRocca was also awarded a Fulbright Fellowship. And, without even a hint of braggadocio, he says it was easy. "I maintained straight A's with relatively little effort. But, what's important about that? Is it important to pass a test? or to get a degree? The important element of education is what an individual will get out of it."

"There is an academic tendency to resist innovation," Dr. LaRocca continued, "every individual seeking an education must not simply accept everything he reads in a textbook. He must be willing to ask WHY?"

Dr. LaRocca's General Electric career dates back to 1955, when he joined the Flight Propulsion Laboratory. In 1960, he came to MSD's Spacecraft Department as a Propulsion Consultant in connection with advanced propulsion systems. He has also been associated with prob-



people on the MOVE

lems concerning pulsed plasma devices. Dr. LaRocca developed the solid propellant electrical thruster accomplishing the reduction of pulse plasma accelerators to the previously unheard of level of $\frac{1}{2}$ watt of power.

Management is new to Dr. LaRocca and he enjoys the added responsibilities. "Leading talented people in the pursuit of scientific innovations can be very rewarding," he comments.

And there's no doubt that Dr. Aldo La Rocca will accomplish his share. Since "WHY" is his favorite question, and "impossible" is not in his vocabulary.

JOHN SHEA . . . A STUDY IN UNDERSTANDING

Computer: I am?

Caller: John Shea

Computer: I want?

Caller: The formula for a high speed, low cost information system.

Computer: Creativity + empathy + talent.

The formula describes not a system but a man. The man is FACMO's John Shea. Apparently even the computer knows once you have the men you can develop the methods. And everyone knows computers are never wrong.

Shea brings to his job of Manager, Information and Computer Systems Research, a balanced blend of creativity, empathy, and talent. And, the mixture has proved a potent tonic for some of the Company's instant information needs.

For creativity, take the Desk



Side Computer System that John Shea was largely responsible for implementing at MSD. This unique system provides, at low cost, a computer at any individual's finger tips. But, that wasn't enough for John Shea. He knew the greater the total computer load the lower the cost for everyone. So, he arranged to make computer time available to others. Today, any GE Department (through Dial Comm) can call into GE's first internal time-shared system. This same service is also available to local universities at a low cost. Result: improved utilization and lower cost.

For empathy . . . take a 10-year GE man, an MTP grad, who has worked in various phases of Manufacturing and Marketing and many different departments before joining Information Systems . . . that's John Shea. "Before entering a service organization, I feel it's extremely valuable to gain experience in other areas so you can really understand their problems," John comments.

For talent . . . talk to John Shea for a few minutes; there'll be no doubt . . . it's his middle name.

ART SWINGLE . . . A TOTAL COMMITMENT

Ask a group of engineers why they selected that field and the answers will usually sound like . . . the challenge — creative opportunity — interesting work.

Ask Art Swingle—Vermont's Engineer of The Year—why he became an engineer and he'll tell you, "I was all set to register for Forestry,



but when I got to the college the registration line for Forestry was too long; the line for Engineering was much shorter. I was good in math in high school (he graduated first in his class) so I am an engineer."

Immediately after graduation from college, Art joined the Company's Test Program and started work in the military fire control business. In 1960 he joined Burlington's Missile and Armament Department as Program Engineer — Advance Studies and Proposals. In July 1962, he became Manager — Helicopter Armament Engineering Unit, and June 1964 he was made Manager — Weapon Fire Control Engineering.

Art's participation is complete — from ideas to designs to Marketing efforts. And this is reflected in his personal life. A sample of his most recent leisure-time accomplishments includes the designing of a few houses. So what? Well, he designed the house he and his wife now live in. Oh yes, he also installed the plumbing, electrical systems, and built the cabinets.

Some day Art would like to take a trip to Alaska ("Who knows, I may even stay there.").

But, that's part of the future for Art Swingle. For the present he's content with his total commitment to involvement. And for Art Swingle, it's an involvement with success.

BUD WILSON . . . LEARNING NEVER ENDS

"I'm an engineer because I like to see things built. I guess that started when I was a youngster who liked to build model airplanes. Since then, I've worked as an individual contributor and as a manager. I like both."

The words belong to Bud Wilson, RSD's Manager of Navigation and Control. Fifteen years with General

Electric . . . twenty years in the aircraft/missile business . . . B.S. and M.S. in Aeronautical Engineering from M.I.T. have helped Bud develop some definite ideas on a variety of subjects.

MANAGEMENT: "A manager's task is not only to manage, but to hire and develop people who are so qualified that eventually they will not need you. If he is a good manager, there will always be a new job, a new challenge for him."

COSTS: "Let's face it, this business was on a financial 'gravy train' for some time. That's gone forever. It's been replaced with a low-cost 'express for perfection.' An engineer's natural tendency is to strive for perfection. This must be accompanied with a realism of the economics of the business."

TECHNOLOGY: "Of course it's changed a great deal. And, it's going to continue to change at an even more rapid pace. It's a big part of everyone's job to stay 'on top' technically — through education, reading, or maybe listening — but learning."

CHANGE: "I like change. It complicates things, but it keeps life interesting. I would hate to live in a society of 'status quo.' I set high goals for myself and whether or not I reach them is not as important as the fact that I've improved by trying."

As long as there are men like Bud Wilson — men with a disdain for mediocrity — there will never be a "status quo."



four men in motion

CHALLENGE ESSAY CONTEST WINNERS



1st Prize, Junior High
John Del Monaco
Thomas Edison Junior High School
Westfield, New Jersey



2nd Prize, Junior High
Marion Magnotta
Cardinal O'Hara High School
Springfield, Pa.



3rd Prize, Junior High
Kathleen Plankey
Vergennes Union High School
Vergennes, Vermont

America's younger generation enthusiastically supports the nation's space programs judging from the results of the Challenge Student Essay Contest.

The essays submitted covered a wide variety of space topics — "Mars or Venus", "Why the Moon", "Rockets", "Space Probes", etc. — but they were consistent in two respects: an impatience to get on with the conquest of space and no doubt about the reasons for doing it.

The six winners, four boys and two girls, received U. S. Savings Bonds from Challenge for their writing and research efforts.

Peter Wyman of the Mascoma Valley Regional High School in West Canaan, New Hampshire, won second prize in the Senior High School division of the Essay Contest. His photograph was not available at the time Challenge went to press.



1st Prize, Senior High
Robert Augustine
John F. Kennedy High School
Willingboro, New Jersey



3rd Prize, Senior High
Ronald Karolski
La Salle High School
Wyndmoor, Pa.

CHALLENGE facts and footnotes

CHALLENGE welcomes Vice President Hubert Humphrey to the list of notables who have shared their observations on space with us . . . Just two years ago Lyndon Johnson, while then Vice President, was also featured on our cover and in his article he said: "Nothing is more certain than the fact that space travel and space exploration have become a permanent part of our way of life."

The way of life for many in the Philadelphia area promises to be enhanced with the opportunities made possible by the opening of the Community College . . . When Bill Haynes interviewed the college's president, Allen Bonnell (a longtime General Electric neighbor at Drexel Institute of Technology), he did so amidst a group of carpenters putting up partitions for the school's administrative offices . . . The college will be located in a former department store complete with escalators that will high-speed students to classrooms and laboratories . . . Scholastic standards will be demanding — no bargain basement in this building.

All the high speed at the Daytona Beach, Florida, location of the Apollo Support Department isn't concentrated on the vertical . . . Within walking distance is the International Auto Speedway and also a dog racing track . . . Particularly evident in the gathering of information on hydrospace ("Neptune's Promise") was the universal enthusiasm of all who have studied the potential that the sea offers . . . Doubts about what was available beneath the ocean never came up — only an impatience to get on with the exploration.

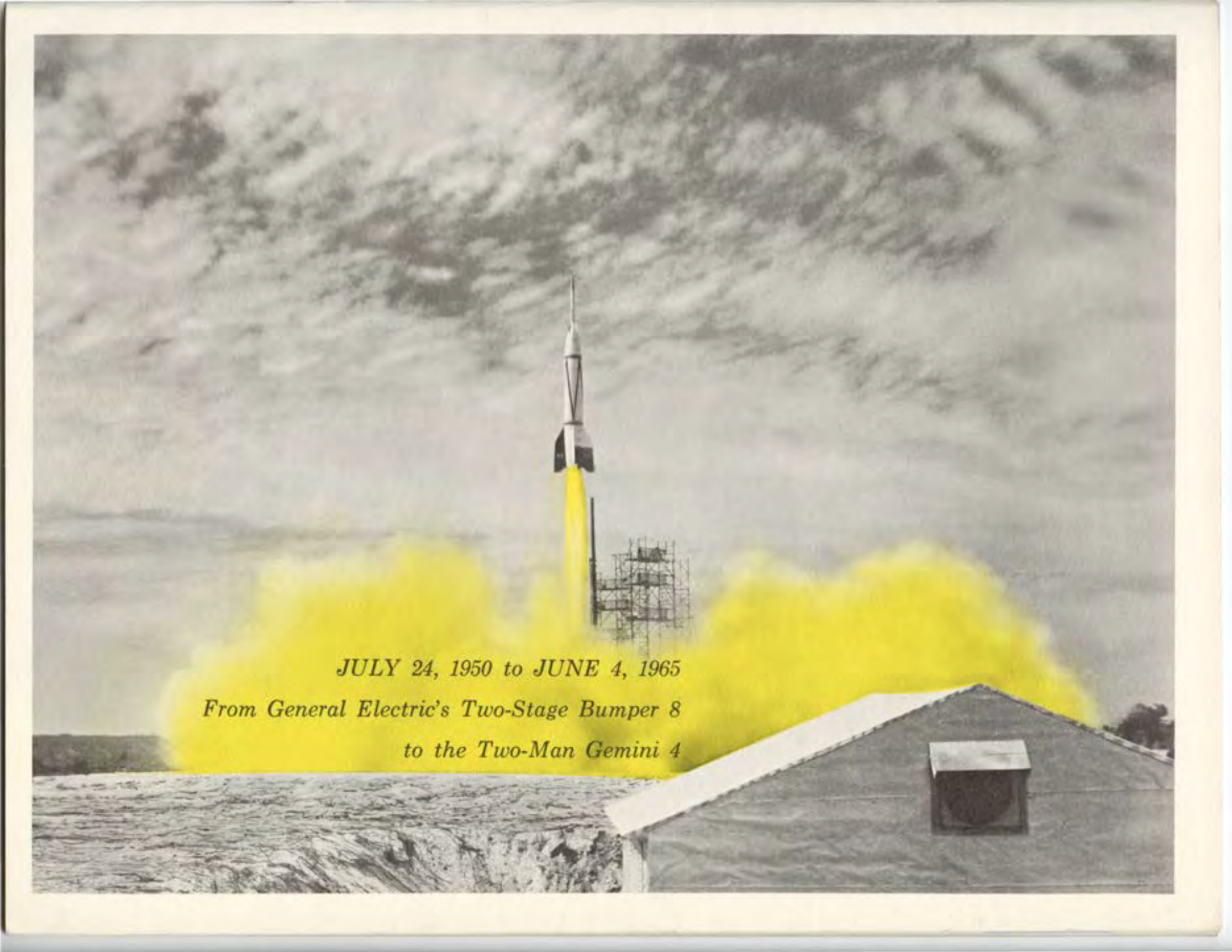
The profile on Ed Miller in this issue indicates how General Electric attracts talented technical people through its reputation for research and development . . . Leaving the service after the Korean conflict, he

was looking for work in gas turbine research . . . He appraised outfits so engaged, chose to apply at General Electric in Cincinnati . . . A graduate of the Company's General Management Course at Crotonville, New York, he called the course "quite useful and enlightening, both for the subject matter and the association with executives taking the course . . . helped us all immeasurably . . . studied everything from the Common Market to the electric automobile."

Demand for the issue of CHALLENGE saluting the Division's 10th Anniversary became so heavy from employees and non-employees, we had to start turning down requests for large numbers . . . An enthusiastic interest evidenced in those rapid 10 years . . . One of the persons keenly responsible for the Division's growth, Dr. George Haller, is featured in this current issue along with his Advanced Technology Laboratory which continues to be much involved in MSD activities. ("Of course, the best thing I did for MSD," Dr. Haller confides, "was to hire Hilly Paige.")

For several of the school youngsters winning the CHALLENGE essay awards, the excitement and nervousness at the presentations before school assemblies was almost too much . . . One, in an abbreviated acceptance, thanked Editor Sue Gingrich, and quickly confessed to being more relaxed writing than speaking . . . Dennis Solter continues to be the designing arm of CHALLENGE, providing valuable assistance and time in the layout of our publication . . . Next issue (in September) CHALLENGE studies the international space scene, profiles Air Force General Thomas Gerrity, talks to a distinguished panel about technical resources, and chases a woman who is chasing the stars . . . Volunteers for that last assignment keep pouring in.

— Richard Jackman



JULY 24, 1950 to JUNE 4, 1965

*From General Electric's Two-Stage Bumper 8
to the Two-Man Gemini 4*

**15 YEARS AS THE LAUNCH PAD
FOR THE NATION'S PROGRESS IN SPACE**

● CAPE KENNEDY

JULY 24, 1950 to JUNE 4, 1965

*From General Electric's Two-Stage Bumper 8
to the Two-Man Gemini 4*

June 19, 1965

EXHIBITIVE

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LG/Sacramento

Dear Mr. Brown

On my flight down to Houston last Friday, I went over your letter of May twenty-eighth with Administrator Webb, and I have asked him to consider carefully the position we should take following action by the Congress on the elimination of the M-1, SNAP-8 and 260-inch solid programs from the 1966 Budget and the subsequent action by the conferees of the House and Senate in recommending the restoration of funds for these projects. You understand, of course, that the appropriations committees have yet to act and, therefore, the inclusion of these programs in the authorization legislation must be weighed in relationship to the provision of appropriations.

My understanding is that the Appropriations Committee of the Senate has held its hearings this week and that within the next several weeks the Independent Offices appropriation bill will be enacted. At that time, we will be in a much better position to consider your appeal.

It is certainly a source of real regret to me that the termination of these three programs is of such serious import to California, to Sacramento, and to the Aerojet-General Corporation. The actions in the budget were in no way intended to have this effect but were rather to meet the requirements which faced us at that time.

I appreciate your letting me know your concern, and I will have it in mind when we come to the time of decision.

With warm personal regards,

Sincerely,

LYNDON B. JOHNSON

Honorable Edmund G. Brown
Governor of California
Sacramento, California

LBJ:HT:Drafted by NASA:lbm

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EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON



EXECUTIVE SECRETARY

Friday, June 18, 1965

12:15 P. M.

MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities.

1. Launchings.

a. The Air Force announced the successful launch of the Titan IIC, June 18. It is the most powerful rocket known to have been launched. The burned out third stage remained attached to the payload for a total orbiting weight of 32,427 pounds.

b. The Soviet Union June 15 placed Cosmos 68 in a low circular orbit inclining from the equator by 65 degrees. Similar satellites have customarily been recovered by the Soviets after eight days.

2. Mariner IV. The final in-flight adjustments have been made to the Mars-bound spacecraft. It is scheduled to photograph the planet on a fly-by July 14.

3. New Transports.

a. The Soviet Union has indicated that they will have developed a 120 passenger, 1550 mph, 4000 mile supersonic liner before the Anglo-French Concorde is ready. This presumably will leave the U.S. in third place as to timing.

b. The USSR made a big impression at the Paris Air Show by flying the world's largest aircraft. It is a turbo-prop craft scheduled to carry 720 passengers or 80 tons of freight and to fly about 470 miles per hour.

4. Improved Launch Vehicles.

a. NASA has announced development of a new Thor Delta launch vehicle designated as the Delta 3E. Used with the thrust augmented Thor, the vehicle will be able to place a third more weight into earth orbit (1200 pounds) and into orbit around the sun (225 pounds).

b. NASA will launch a new uprated version of the Scout launch vehicle this summer. The new vehicle will be able to put 320 pounds (compared to 230 pounds for the older vehicle) into earth orbit, and will have a maneuverable (dog-leg) capability.

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...and the ...

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1. The first of these is the fact that the Government has not yet decided whether or not it will accept the offer of the United States to purchase the surplus stocks of the Government. This is a very important question, and one which will have a great influence on the future of the Government. It is a question which will be decided in the near future, and it is a question which will be decided in the near future.

[illegible]

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ or 0.25 each over and over again if $\frac{1}{2} = \frac{1}{2}$ or 0.5. $\frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$ or 0.0625 if $\frac{1}{2} = \frac{1}{2}$ or 0.5 and $\frac{1}{4} = \frac{1}{4}$ or 0.25 over and over again.

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THE LIFE OF

1. The first step in the process of identifying a problem is to define the problem. This involves identifying the symptoms of the problem and determining the scope of the problem. Once the problem has been defined, the next step is to identify the causes of the problem. This involves identifying the factors that are contributing to the problem and determining the underlying causes. Once the causes have been identified, the next step is to develop a plan of action. This involves identifying the steps that need to be taken to solve the problem and determining the resources that will be needed to implement the plan. Finally, the last step in the process is to evaluate the results of the plan. This involves monitoring the progress of the plan and determining whether the problem has been solved.

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5. Navigation Satellite. The U.S. Coast and Geodetic Survey ship Pioneer has embarked on a four-week, 21,000 mile test of the Navy's navigation satellite system. The ship will visit Alaska, Midway, Johnston, and other Pacific Islands to check satellite fixes against other navigation points.

6. Congress.

a. The House Science and Astronautics Committee plans to hold hearings reviewing the activities of the National Science Foundation beginning June 23.

b. The Senate Appropriations Committee conducted a hearing on the NASA appropriation June 16. Discussion centered on the adequacy of NASA aeronautical research, nuclear power, and chemical propulsion.

7. Weather Satellite Activity.

a. The Early Bird communications satellite provided high-speed transmission of weather data and maps between the U.S. National Weather Center and the French National Weather Center on June 15. Tiros IX charts depicting cloud formations over the Northern Hemisphere for the previous 24 hours were transmitted at eight times the speed of conventional networks.

b. Gemini-4 astronauts took 100 pictures of excellent quality useful to weather research. Detailed comparisons of these color photos will be made with Tiros photographs of the same areas.

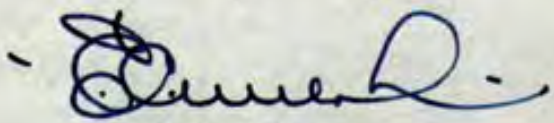
c. Typhoon Dinah was detected in the Pacific by Tiros IX June 11, and warnings were sent to Guam, San Francisco, and Los Angeles.

8.

SPACE PAYLOAD SUCCESS BOX SCORE

(June 18)

	USA		USSR	
	1964	1965	1964	1965
Earth Orbit	23	44	12	22
Escape	1	2	1	2


E. C. Welsh

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	1965		1964	
	1965	1964	1965	1964
North	12	12	12	12
South	12	12	12	12

1965 JUN 18 PM 1 29

White House
Washington

EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL AERONAUTICS AND SPACE COUNCIL
WASHINGTON

June 11, 1965

EXECUTIVE SECRETARY



MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Congress. Senate-House conferees agreed on a NASA Authorization, totalling \$5.19 billion, or about \$70 million less than the Administration's request. Among the items on which there were Senate-House differences, the Conferees approved \$6 million for the SNAP 8 nuclear power unit, \$7.5 million of the M-1 large liquid rocket, and \$5 million for the Electronic Research Center.

2. Launches.

a. The Soviet Union has announced that Luna 6 suffered a malfunction during a corrective maneuver and is expected to miss the moon by approximately 100,000 miles. The U. S. interpretation has been that this spacecraft was a second attempt to soft-land an instrument package on the lunar surface.

b. The Department of Defense placed a military payload in polar orbit on June 9 using a Thor Agena launch vehicle.

3. Gemini-4. The U. S. second two-man spacecraft was successfully recovered June 7 after having completed its programmed 62-orbit, 1.7 million mile mission. The astronauts show no significant physical ill effects (other than fatigue) from their four days in orbit, and the capsule appears to be in condition to be reused. This flight increased man orbits by U. S. astronauts from a total of 40 to a total of 164. This figure compares with 342 by Soviet cosmonauts -- an approximate 2 to 1 ratio.

4. Nuclear Power. A Snap 8 model, designed to provide electrical power for spacecraft, has completed 209 continuous days of ground-test operation at the design power of 600 thermal kilowatts.

5. Navigation Satellites. Twenty Polaris submarines are now equipped with navigation satellite system receivers, and the entire fleet of 41 is scheduled to have sets installed by mid-1967. This capability has allowed savings of days in the time taken for the submarines to replace each other on station.

6. New Launch Vehicle. The first launching of the next generation of military space launch vehicles, Titan III-C, is scheduled for June 17. The vehicle is expected to generate about 3 million pounds of thrust, and is scheduled to launch DOD's Manned Orbiting Laboratories, military communications satellites, and other important payloads.

7. Communications Satellites.

a. ATT, ITT, and RCA have approached the FCC for authorization to rent trans-Atlantic channels of the Early Bird communications satellite.

b. Tests are planned during June to demonstrate the versatility of the Early Bird satellite in carrying computer data. For the first time high speed computers will be tied together across the ocean and "talk" to each other.

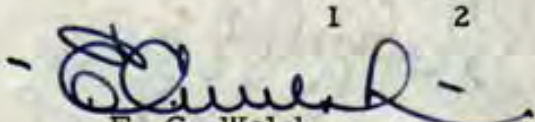
c. The ComSat Corp. has officially filed with the FCC an application for licenses to operate commercially the Early Bird satellite and the ground station at Andover, Maine.

8. Paris Show. The Paris International Air Show will open June 11 at LeBourget Airport. The show will have major aircraft, missile and space demonstrations by 15 participating nations, including the US and USSR. DOD and Commerce will participate, but NASA will not.

9. Soviet Cooperation. Interference with capsule communications discovered on the first orbit of Gemini-4 was traced to USSR ships and a land station in the northeast Pacific. At the request of our Moscow Embassy, the USSR ordered the station to stop transmissions for the four days of the GT-4 flight. Similarly, on request, Hungary cut off transmissions between Budapest and Hanoi when interference occurred during the last day.

10. Space Payload Success Box Score
(June 11)

	USA		USSR	
	<u>1964</u>	<u>1965</u>	<u>1964</u>	<u>1965</u>
Earth Orbit	22	43	12	21
Escape	1	2	1	2


E. C. Welsh

Friday, June 11
Time: 11:50

to determine whether or not the vehicle was involved in the accident. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

1. The vehicle was found to be a 1965 Ford Mustang.

2. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

3. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

4. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

5. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

6. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

7. The vehicle was found to be a 1965 Ford Mustang, and it was determined that it was involved in the accident.

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Washington



UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

EXECUTIVE
FG/RS/PR18
FG202
PQ2
OS

⑤

JUN 11 1965

Mr. George Reedy
Press Secretary
The White House

Dear George:

Attached is a public announcement of AEC negotiation of a contract with the Lockheed Missiles and Space Company, Sunnyvale, California, for the design, development, fabrication and ground testing of a prototype isotopic thermoelectric generator. The generator could be used to provide power for unmanned earth orbiting spacecraft. We plan to issue the announcement on Wednesday, June 16.

In addition, on June 7 I sent you a copy of a public announcement we plan to issue for use on June 16 concerning a study which has been submitted to the Atomic Energy Commission, the Bureau of Mines, and the El Paso Natural Gas Company. The study concluded that it is feasible to use underground nuclear explosions to fracture certain natural gas-bearing formations to improve recovery and production rates.

Sincerely yours,

Dune
Duncan Clark, Director
Division of Public Information

Attachment

cc: Charles Johnson
National Security Council

Nothing else sent to
Central Files as of 10/21/65

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