[1964?]

Speech file

How the NASA Space Program Benefits the Nation

It may be appropriate at this time, when so many new and urgent needs of the nation must be met, to stress once more the many and varied ways in which the NASA space program serves the national interest.

Two basic reasons led to the creation of the space program we are working on today:

One. This nation must have the new technology that flows from an energetic, balanced, on-going space effort with ambitious goals; we cannot afford to lag behind the Soviet Union in any major area of advanced technology.

Two. This nation must have the worldwide prestige that comes at this stage in history from a leading role in space exploration and exploitation; why should the leader of the Free World surrender this emblem of success to the hard-pressed salesmen of Communism?

We believed these reasons to be valid when we were behind. I see no reason to question them now -- when, by strenuous effort and a substantial investment of our national resources, we have improved our position.

(Some people don't care for the word Prestige. You could call it enhancement of the U.S. potential for advancing the cause of freedom and democracy on the world scene; that is what it means to me as I have used it here. Our representatives in foreign capitals around the world are very much aware of what the prestige of clear space leadership means to them in the day-to-day conduct of American foreign policy.)

The basic reasons I have outlined give the space program its urgency. Their logic helps set the level of effort that must be maintained, and the schedules that must be met. These are the reasons which bear on the national security, and on the ability of the United States to keep the torch of freedom burning in the world.

But these are not the only considerations that justify a strong, on-going space program with ambitious goals. There are many ways in which our space strength and varied space

activities benefit the American people, quite apart from the necessity of competing successfully with the Soviet Union. I believe it would be useful to go over some of them with you today.

I can begin with the obvious practical benefits which come from weather satellites, communications satellites, and other spacecraft of this sort that pay their own way in the service of mankind. As Dr. Newell and Dr. Mueller will testify, we have many good ideas for additional things that working satellites can do whether manned or unmanned. The era of service satellites is undoubtedly just beginning.

This lead immediately to some thoughts on the very special benefit that can come from communications satellites in the field of human relations. In addition to carrying the messages of commerce, these satellites offer us an added opportunity to knit closer ties among the family of man. I venture to say that if a satellite system can be devised that will one day enable all men everywhere to share regularly common experiences, this will be as strong an influence for peace and the survival of the race as anything the mind of man could devise.

Modern technology brings us dangers and hopes. Perhaps the global communications satellite will be the other side of the coin to atomic weaponry. This is true provided that the nations which are able to sponsor such a system have peace as their aim.

I believe it a tremendous and enduring benefit to the American people that they are preparing themselves to play a leading role in what may prove to be the most significant undertaking yet in the field of human communications -- the establishment in the skies of direct broadcast satellites.

Every advance we make in satellite technology supports the theory and practice of "open skies". Inspection from satellites could be a major factor in breaking some of the political log jams that have blocked progress toward safe disarmament and a reduction in the nuclear threat to civilization.

The space program has given science important new tools with which to produce new knowledge, and has turned all of space into a new and productive laboratory.

In our great drive for advanced technology to meet the basic considerations of competition from the Soviet Union in

space, we have been able to offer the scientific community many opportunities for experimentation in space which they may not have had in this generation if there had been no such competition.

To be in a position to meet the nation's future needs in space and aeronautics, the space program is providing the stimulus for much of the most important basic research in the world today. Only the space program can provide the answer to what is generally regarded as the most interesting scientific and philosophical question of our time -- whether life exists elsewhere than on our planet earth.

There are other great questions which cannot be answered without the support of a strong space program. For example, the National Academy of Sciences (in the Space Science Board Report of October 28, 1964) has stressed the importance of "looking out into the universe for insight into the fundamental nature of matter and energy" and to seek to "observe gravitational radiation".

Much fundamental research of this sort can be carried out only beyond the blanket of the earth's atmosphere, which

screens out so many important emissions from space.

The space program stimulates progress in aeronautics. For example, many of the advantages which the United States has over other countries in developing a supersonic transport stem from space research and development. This will be much more noticeable as we work toward commercial V/STOL planes and hypersonic transports.

The NASA space program, which is conducted in close collaboration with the Department of Defense, provides off-the-shelf technology, hardware, and operating experience for military applications.

The Space Act of 1958 provided that the Department of Defense would be responsible for, and direct, those space activities "peculiar to or primarily associated with the development of weapon systems, military operations, or the defense of the United States, including the research and development necessary to make effective provision for the defense of the United States."

But the Space Act makes NASA responsible for the broad advances in space science and technology that will meet

anticipated civilian needs and at the same time provide a valuable fund of knowledge, technology, and experience upon which the Defense Department can draw to meet its needs. The use of the Gemini spacecraft as a key element in the Air Force Manned Orbiting Laboratory system is a good example.

The NASA space program at its present level requires the skills and services of some 400,000 Americans. If this figure is not allowed to fluctuate wildly, this provides a good balance wheel for the American economy. It also assures the country of a hard core of engineers and scientists, technicians and managers, laboratories and industrial facilities, working on challenging problems in aeronautics and astronautics, and available for quick mobilization to meet any urgent national need in this general area.

The space program provides clear directions and guidelines (as well as funds) for the creation of new technology. You cannot call a group of scientists or engineers together, give them a sum of money, and say, "Create some valuable new technology for mankind." You have to give them clear-cut

demanding goals that cannot be reached with existing technology and experience, but which are nevertheless realistic and attractive. The space program serves admirably for this purpose. The Apollo program with the lunar landing goal in this decade is an excellent example; the main purpose of this great effort is not to set foot on the moon but to do everything that is necessary to get there -- and get back.

The balance of power in the world today depends more and more on the balance of technology. And the technology that counts most in this balance is not the technology you already have, but the new technology you are wringing out of on-going programs.

If the United States did not have the space program to produce technological progress, it would have to have some other program like it -- or run the risk of falling behind the rest of the world. And I do not know of any other program in any other area the United States could sponsor that would produce so much new technology so rapidly in so many vital fields and at such reasonable costs as the space program is now doing.

The new technology created for the advance into space does enter rather quickly into the general economy. One good example is computer technology. The pressure generated by the space program for more versatile and more compact computers will continue to benefit the economy at large for many years. The micro-miniaturization of electronic equipment in general is another good example. NASA makes a special effort to speed up this spin-off process. It is a very successful effort. Anyone who doubts whether space technology has present and potential value to the nation's economy should read the French and German newspapers. They don't doubt it.

Space technology is becoming a saleable item in international trade. It will help our balance of payments problem. We are glad to share the technology of peaceful space exploration with other nations; but we expect them to pay a fair share of the R&D bill.

There is one aspect of space "spin-off" that deserves separate mention. The space program has put a premium on sound design and reliability that may have been missing from a large sector of our mass production economy in the past. The beneficial efforts of this emphasis in space

will be felt for many years -- and every citizen in the land will be a beneficiary.

The so-called "systems approach" to large research and development programs was not invented in the space program; it originated in high priority and highly classified military programs. But the space program "civilianized" the systems approach and makes it more available for meeting many other problems of the modern world besides space exploration. I think the famous American ability to get the job done has been upgraded and modernized in a most valuable way in the space program.

The space program has spurred interest in education from kindergarten to the PhD level. It has helped to popularize the difficult subjects -- such as mathematics and physics -- which large numbers of our population must master if America is to survive in the modern world.

NASA's sustaining university program has helped universities in all 50 states participate in valuable space research programs while carrying out their most important function of training the leaders of the next generation.

I have said before, and I say again now, if the space program had no other side effect beyond what it has done for education in the United States, it would be worth the investment.

Now nobody can "prove" a statement like that. But it is something on which you can have a strong feeling and make your own judgement.

The space program has added greater meaning to our lives. Man does not live by bread alone. Great nations, too, live for more than material benefits. Individuals seek fulfillment and satisfaction in many kinds of activity that have no practical value. Nations may do the same.

I know some people will not agree, but I have talked face to face to ~~as~~ (a great) many Americans recently about the benefits of the space program ~~as almost anyone,~~ and I have found that ~~many~~ most of my fellow citizens get a thrill and a sense of accomplishment and satisfaction out of this great undertaking of our nation, and for this reason alone they regard it worthwhile.

On a per capita basis, the space program is now costing each person in the country about $25 a year, which is not a unreasonable price for sharing in one of the greatest undertakings in all human history.

The space program has provided new heroes for our youth -- not legendary figures of the past, but young men out of the high schools and the neighborhoods of America today. This

has a great value for our society that simply cannot be measured in dollars and cents.

One of the most important contributions that the space program is making to human welfare is new knowledge about man himself. To prepare our astronauts for the voyage to the moon and back, we must obtain, and are obtaining, the most searching scientific data on man's bodily and mental functions under conditions of stress. We are discovering facts about human physiology and mentality that cannot be learned by the laboratory methods and facilities ordinarily available to medical research.

NASA's international programs to share the technology and adventure of space exploration with other nations provide the United States with an important new instrument of foreign policy. They stimulate exchanges between American scientists and the world scientific community. They provide a useful bridge of understanding between this country and the newly emerging nations. They may provide the channel for increased cooperation with the Soviet Union and help lead to a lessening of world tension.

The space program led to a solution to one of the great dilemmas of modern democratic society. The Communists, at least, thought the United States could never mobilize its resources for a great undertaking like the exploration of space without abandoning the essential characteristics of a free society. Our society faced up to this problem in 1958; we wrestled with it; and we produced a new law and new institutions and the new concept of the government-industry-university team, under government direction and responsible to the will of Congress, with a mandate to explore space, obtain new knowledge, and benefit mankind. Our ability to solve this problem in political science has gone a long way to deflate the argument that Communism, and only Communism, can be the wave of the future. In our space program, as in our Great Society programs, we are meeting this wave-of-the future challenge head on.

To close this discussion on a somewhat different note, I would like to say that NASA has done its part to help spread the "If we..., why can't we" syndrome over the country. I am referring to the ideas advanced in a recent newspaper column. It was humorous, but also uncovered an important

phenomenon of our times. According to this theory, Americans say more and more, "If we can go to the moon, why can't we get down town faster?" And so forth.

That is the spirit of the age. It is a healthy spirit. I am glad the space program is contributing to it.

These are some of the broad and varied benefits which the American people are obtaining from their investment in the national space effort. They include the material, the intellectual, the spiritual reasons that have helped to launch a great nation into a new age of exploration and discovery unmatched since the 15th century. Some are obviously more significant than others. Taken together, they certainly help to justify its cost. They add zest and excitement and dignity to what might otherwise be a dreary chore. But as I have said before, the full cost of the space program as we know it today is already justified by our national need to be preeminent in this vital area of international competition. It is the price we pay for security in the modern world and for success in the long-drawn out struggle between ideologies that has dominated international affairs since the end of World War II and which qualified observers think may well last throughout this century.

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SPACE: PROGRESS AND POSTERITY

By
Dr. Edward C. Welsh, Executive Secretary
National Aeronautics and Space Council

Robert H. Goddard Memorial Dinner
Washington, D. C.
March 20, 1964

This Annual Dinner is a tribute to Robert Goddard's brilliance and pioneering efforts. He dedicated his life to increasing man's knowledge and to transmitting that knowledge into action. As such, he symbolizes our National Space Program. How he would have enjoyed seeing the fruition of his path-finding experiments as exemplified by this country's belated but eminently successful exploration of space!

By sponsoring this Goddard Memorial Dinner, as well as by its other constructive activities, the National Space Club is doing a vital job in keeping us all aware of the space program's origins while keeping our eyes focused on the future.

President Johnson continues to be the prime mover in our country's drive for space leadership. In January of this year, he told the Congress, "Space progress is essential if this country is to lead in technology and in the furthering of world peace." He did not say it would be desirable for us to lead in space. He said "essential" -- and that is the policy position of this Nation.

We really have no choice except to move rapidly in the development of a broad space competence second to no other nation. While some try to avoid any reference to a space race, the fact is that -- like it or not -- we are in a serious competition which we dare not lose. What is more, even if there were no competitor at all in this business, I am certain that we would still have enough pioneering spirit to push vigorously in the field of space.

We talk about our having a national space program, and rightly so -- but what is it? The ingredients are clear: a sound legislative base; able executive leadership; operating agencies of the government with managerial, scientific and technical competence; specialized facilities; supporting academic structure; capable private contractors; and, of course, those all-essential budgets. With

these ingredients melded together, we engage in research, launch spacecraft, and explore space. We do these things, not as separate and competing agencies of the Government, but rather as a unit made up of energetic and complementary parts. The net result: rapid development of space technology and the ability to use that technology to strengthen our national security and build up our economy.

In a philosophical sense, the most significant aspect of this national space program is that it disturbs the status quo. It makes obsolete those who think and act only in terms of the past. It inspires those who believe in the future of their country. It even puts stars in the eyes of those accustomed to judge progress solely by last year's profit and loss statements. The national space program is in a real sense a renaissance of the spirit of '76, the Declaration of Independence, and the Westward Movement.

Missions

As we evaluate various projects and proposals in the space program, we are frequently confronted with the question: "What is its mission?" or, "Is there a requirement for it?" If the answer is that there is no known mission at the present time, except to advance the technology, the right decision may be to go ahead anyway. If we had required a clear-cut prior mission, we would probably have developed no airplanes, no spacecraft, or, in fact, no wheel. The absence of a firm requirement may be the result of our being too slow in determining missions rather than our being too fast in developing our ability to perform missions. In a fast-moving age like the present, it is just as reasonable to ask, "Why don't we have a mission for an evolving technology?" as it is to ask, "Why evolve a technology since we don't have a mission?"

Let me hasten to add that the mission test has its value. It should help reveal whether a new development promises only marginal improvement over existing capability or would divert limited funds from more essential and clearly established missions. While the mission test does not give all the answers, it is a helpful management tool -- particularly in respect to budgeting scarce resources. It is not, however, a device which should be used to close the door to technological progress in the absence of a clear-cut and firm requirement. Our rate of space progress cannot be sustained unless we keep expanding promising technology and developing selected long-lead time items prior to knowing precisely just what contribution they will make.

Lunar Program

Currently, the largest space project for which we have a firm decision is that of going to the moon. I say "currently", not to raise doubt about the lunar project but just to make the point that we will have in the future other space projects of even greater complexity and magnitude.

In 1961, President Kennedy -- on the recommendation of then Vice President Johnson -- announced "the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth." This goal was overwhelmingly approved by the Congress.

The goal still stands. The schedule, as stated, still stands. Nothing has happened since 1961 that would cause us to change either. Since the date of President Kennedy's announcement we have had the great Mercury program success, the Venus shot, communications-navigation-and weather satellites, over 100 payloads put into earth orbit, and impressive progress in booster development. Concurrently, we have experienced a sharp increase in national prosperity and our gross national product. Also, the Soviets have had a series of space successes. Surely, this combination of factors should spur us on rather than suggest delay. One thing is clear: if the lunar schedule should slip into the next decade, such slippage should be due to unavoidable technical factors, not to deliberate failure of our pioneering spirit.

Let me make a few additional observations in order to give perspective to the lunar program:

1. To attain preeminence in space, we would be doing practically all the things involved in the Apollo program anyway, even if we didn't have the lunar goal. We might not do them as well or as efficiently, but we would still be developing the boosters, the spacecraft, the launching and tracking facilities, and the other related competences.

2. As important as it is, the lunar project is not the whole space program. Last year, for example, all aspects of manned space flight, plus supporting unmanned launches, accounted for 47% of the U. S. expenditures on space. This year, the estimate is 50%.

3. There are real hazards in the lunar project. As we know from experience, delay or failure can occur at any stage in such a complex venture. However, every reasonable effort is being taken to increase the likelihood of success.

4. Anyone who understands management, research and development, and production problems knows that slowing down the program would increase the total cost. Such deliberate delaying action might properly be called "fiscal irresponsibility." But, what is even more important, is that failure to carry our technological impetus to fruition would amount to "political irresponsibility."

Relative Progress

I would turn your attention briefly to how we stand in comparison with the Soviet Union in space accomplishments. But first, I want to emphasize that the Soviets have a strong, orderly program, with every indication that it is continuing vigorously, apparently unaffected by adverse economic factors in their country. Wishful thinking to the contrary, we dare not slow down unless we are willing to pay the terrific price of second place.

Here is how we compare:

1. As regards that key feature of booster power, the Soviets are ahead on an operational basis, although we are moving up rapidly, having attained the current weight-lifting record on a test shot by the Saturn I.

2. We have placed almost four times as many payloads into earth orbit, while they continue each year to increase their absolute lead in total weight of net payloads orbited.

3. Our numerical progress in orbiting payloads is impressive. Last year alone, the U. S. put more payloads into earth orbit than the USSR has since Sputnik I in 1957.

4. The increasing reliability of our launchings is also impressive. During the past three years, we placed successfully into earth orbit 82% of all the payloads which we attempted to put there. The Soviet record, while not identical, is comparable.

5. The Soviet heavy Vostok class of vehicle has accumulated some 1600 orbits, as compared with 37 for our smaller Mercury. In flying time even their female cosmonaut has gained more orbital experience than all of our astronauts combined. Gemini, Apollo, and MOL may well correct that imbalance, but at the present we are well behind.

6. The Soviets have devoted more of their attention to far-out space than we have. As a percentage of total space launching attempts, they have devoted five times as much effort to escape-missions to the moon and planets as we have. The opposite is true as to near-earth orbits, in which the U. S. emphasis has been much greater than theirs.

7. Both countries have made impressive strides in accumulating scientific data about space. We may even be ahead in this regard, but it is not safe to assume so.

8. The U. S. is clearly ahead in world-wide sharing of space research in cooperative programs, and in direct application of space technology to practical use in communications, weather reporting, geodesy, and navigation.

In summary, we have made enormous gains in the past few years in the race with our able and aggressive competitor.

National Security

Having referred to the strong Soviet space program, I believe it is appropriate to make a few observations regarding the national security dimensions of our own space activities. The Space Act makes clear that space activities concerned with our national security are a significant part of our peaceful space missions. We are not neglecting this important responsibility, and I am confident that the future holds an increasing number of operational space roles through which peace may be encouraged and aggression deterred.

In 1963, about 80% of all the U. S. payloads put into earth orbit were launched by the Department of Defense. This statistic is cited, not to make a comparison with NASA, but simply to give an indication of the volume of military space activity.

While we need not be satisfied with the rate of progress in either the civilian or defense aspects of space, it should be recognized that major national security objectives are being supported by both NASA and the Department of Defense. The former is developing a broad range of competences and related skills and facilities, while the latter is also developing technical competences and applying them to such fields as navigation, communications, observation, detection, interception, command and control techniques, and manned and unmanned space flight.

The Defense Department has a mandate to relate its space activities to the enhancement of our national security, and it applies certain criteria to that end. However, we do not intend to limit such activities only to those projects where military advantage is certain in advance. It is necessary to go into space to see what can be done and how well. These decisions can not all be made by paper or even laboratory analysis. Nor, can we be certain as to what possible aggressors might do, and hence we need to develop the ability to offset potential as well as existing military dangers.

I am much encouraged by the decision to develop and operate the Manned Orbiting Laboratory -- the MOL. This is a positive step to ascertain what man can do in space for defense purposes. Moreover, it is another important illustration of coordination between DOD and NASA, with the rockets developed by one agency and spacecraft developed by the other. This is also a step toward the creation of a space station. The future promises rapid progress toward multi-manned, long-duration resupplied space stations in polar as well as conventional low inclination orbits.

The fact that we do not plan space projects for aggression does not mean that we have a national security space gap or that we will allow one to develop.

International Relations

One cannot put our national space program into proper perspective without reference to its international aspects and the responsibilities which accompany them.

As impressive as it is, it is not enough to cite the fact that we are cooperating with some 60 other nations in our space program. Such a statistic does not reveal the full international impact of what we are doing in space and what we plan to do in space. Our space program has become a vital and continually growing factor in international relations. We seek cooperation from abroad in the location of tracking stations and the making of ground-based space observations; we work out international agreements and regulations required for an orderly and sensible expansion of our space activity, in matters of frequency allocation and freedom of access to space; and we use our space program to support foreign policy objectives, such as banning weapons of mass destruction in space.

Our space activities have become the concern of the policy planner and the diplomat as well as of the scientist, the engineer, and the educator. To an increasing degree, our world posture will be affected by the manner in which we conduct our space program. Our growing space successes have enhanced the image of America as a progressive Nation and as a Nation seeking to increase the chance of world peace. To improve this image, we must continue to conduct our space program on as open a basis as possible.

We have taken some preparatory steps for cooperation with the Soviet Union in space activities. Certainly the Soviets have a highly developed technology -- we have no monopoly on space competence -- and hence cooperation with them might not only improve the prospects for peace, but we might well benefit from a mutual exchange of knowledge and experience. As for international cooperation on the lunar project, no details have been worked out, and perhaps none will be agreed to. That remains to be seen, but we must keep alert to its potential. It should be made clear, however, that we do not plan to enter into any one-sided agreements, any agreements which will impair our national security, or any agreements which will inhibit the development of our own capabilities.

Space Benefits

In addition to the international aspects of our space program, there are impressive space benefits which flow throughout our domestic economy. There are a few individuals who claim to see little impact of the program on our present and future. Maybe they are blinded because the light emanating

from the program is too bright to permit them to see. On the other hand, perhaps this reaction is due to the fact that space research, as a term, is misleading. It is not a narrow and specialized endeavor. Rather, it is a composite of many scientific disciplines, most of the technological competences, and all of the managerial techniques.

The space program is a catalyst, a stimulant, and a dynamic force. Its effects permeate the entire society. What other composite activity can one name which, with the application of only about one percent of our gross national product, helps maintain our national security, stimulates education, encourages the development of new industrial processes and new products, expands scientific knowledge, adds to our national wealth in new facilities, employs increasing amounts of manpower and other resources, and furthers world peace!

Some of the benefits are intangible, but all are real. We can be certain that the long-run returns from our national space program will more than justify the investment.

The Future

In conclusion, I would say a few words about the future of the national space program. First of all, it has become a permanent part of our institutional structure and, as such, will and should be subject to continuing evaluation, criticism, and debate. It will, however, survive such examination and grow. Next, it is reasonable to predict that its rate of growth will, over the years, be consonant with the rate of increase in our gross national product.

So far -- and necessarily so -- the approach to space has followed what might be called the ammunition philosophy. This applies particularly to rockets, which we launch off the pads, send on their missions, but fail to bring back. I suggest that we will gradually outgrow this approach and switch to the more economical transportation philosophy in which the vehicle leaves the ground, accomplishes its mission, and returns to fly again. The re-usable single-stage space ship will become a feature of future space flight.

The round trip to the moon will be just the first of a series of steps in moon exploration. I certainly doubt that the landing of two men for two days on a surface almost as large as that of North and South America together will satisfy our lunar requirements.

Mars, and the other planets, will become objects of space exploration -- both manned and unmanned. In fact, the most obvious assertion one can make about the space program is that its potential is unlimited and its future an unending series of new challenges.

Space stations will go through the evolutionary process from small to large, from short duration to permanent, and from special purpose to multi-purpose. Nuclear power and energy will gradually become a major factor in where we go and what we do in space.

While the immediate future is devoted to enhancing our national security, going to the moon, putting into operational status our communications and navigation and weather satellites, and standardizing our equipment, we must also devote a significant portion of our effort to the long-lead time requirements of the more distant future. To neglect this far-sighted effort would be like burying our talents and vetoing progress.

We have the drive, the resources, and the imagination. Let us use all of them.

NATIONAL AERONAUTICS and SPACE COUNCIL

February 21, 1966

To: The Vice President

Tiger Teague put my Twin Cities speech in the record, with some very generous introductory comments. See the attached.

E. C. Welsh

While we feed one out of every three Indians, we sit back and permit the leaders of the Government of India to carry on an anti-American, neutral-to-the-left foreign policy.

For years and years, we Americans permitted ourselves to become patsies for aid without strings attached to nearly a hundred nations. What this propaganda really means is the demand that we put up and shut up. While we put up for Tito of Yugoslavia, he uses both our dollars and food in pursuit of his own devious Communist policies. While we put up money and food in Egypt, Nasser conducts intrigues with our worst enemies.

Benefits of National Space Program

EXTENSION OF REMARKS
OF

HON. OLIN E. TEAGUE

OF TEXAS

IN THE HOUSE OF REPRESENTATIVES

Wednesday, February 9, 1966

Mr. TEAGUE of Texas. Mr. Speaker, Dr. Edward C. Welsh, Executive Secretary of our National Aeronautics and Space Council is without doubt the best salesman this country has ever had insofar as our space program is concerned. He has an uncanny ability to reduce the technical aspects of this intricate program into language understandable by the layman and place it in a perspective so that even an outspoken critic has difficulty in arguing against it.

Under leave to extend my remarks in the RECORD, I wish to include the text of Dr. Welsh's remarks before the Twin Cities section of the AIAA at St. Paul, Minn.

BENEFITS OF THE NATIONAL SPACE PROGRAM

(Address by Dr. Edward C. Welsh, Executive Secretary, National Aeronautics and Space Council, before the American Institute of Aeronautics and Astronautics, Twin Cities section, St. Paul, Minn., February 14, 1966)

At the request of your distinguished Congressman and my good friend JOE KARTH, I agreed to brave the anticipated cool weather of this time of year in your great metropolis and talk with you about the benefits of the national space program. I am confident that a group such as this is well informed about space projects and the many scientific, engineering, and managerial complexities which combine to make them successful. However, you have a great responsibility in addition to that of understanding or even performing space technology. You should join in the job of explaining to the general public—to the general taxpayer—why we should be investing so much in the space program. Consequently, I chose to review with you today some of the more important reasons for our national drive to attain space competence.

While I would make the statement anywhere, it seems particularly appropriate for me to point out here that one of the major forces which makes our space activities so successful in this Nation is that it has a JOE [illegible] very considerable talents to the program. I am sure you all know, he is one of the very best in the business and is recognized as such by those fortunate enough to associate with him in Washington.

In fact, Minnesota has made some tremendous contributions to the space success of this Nation. On the Senate side of the Congress, the space committee there has been immeasurably strengthened by the addition of WALTER MONDALE. And, I know I need not remind you that our Vice President is the Chairman of the Council which advises and assists the President across the board on space and aeronautics matters. HUBERT HUMPHREY is so able, so knowledgeable, so energetic, and so personable that I would be almost certain to understate the case if I started to talk about him.

I have already referred to the national space program and perhaps it would be well if I explained what I mean when I call it that. All the industrial, academic, and governmental resources devoted to space activities combine to make up the national effort. This includes the research, the development, and the operations of NASA, the Department of Defense, the AEC, the Weather Bureau, as well as other agencies. It is the efficient employment of all our space assets which has enabled us to overcome so much of the great headstart the Soviets were permitted to obtain over us. No one agency of the Government, no one company, and no one group of experts has a monopoly on our space capability. It is a national resource, which can be used for the peace and progress of mankind.

I would now like to refer briefly to some of the major benefits which are flowing and will in the future flow in even greater numbers from the national space program.

ECONOMIC

I mention the broad economic contributions first in order to help clear up misunderstandings which sometimes exist. At the outset then, we should make it clear that space activity is productive and creative. Some of our most valuable resources, such as skilled manpower and modern facilities, are at work producing, creating, doing. Most of these resources represent investments by taxpayers. These investments are in turn paid out in the form of wages, salaries, and profits to people throughout the whole country.

It should not be necessary for me to point out, but I will do so anyway, that all of the U.S. space money is spent here on earth rather than out on the moon or some other heavenly body—despite careless assertions to the contrary—and almost all of it is spent right here in the United States. Some people would have you believe that space budgets are funds which just disappear or are wasted. The opposite is true.

Space money stimulates the economy with a multiplier effect, at the retail store as well as at the steel mill and the aerospace plant. Some of the money goes through the process of salaries and dividends into savings accounts and stocks and bonds; some goes through the process to purchase clothes or finance college educations; some goes to build new laboratories, new facilities of all types—to increase our country's productivity. Practically all of it goes to broaden the base and increase the size of our gross national product and, in so doing, to lessen not the size but the burden of taxation. A major economic aspect of the space program is that it develops methods, techniques, and procedures which can increase the efficiency of much of our Nation's business.

What I have just said is probably rather obvious and elementary. In a sense, it adds up to the fact that the space program is similar to other productive activity in our society, but perhaps more so.

INNOVATIONS

Having pinned the "productivity" label on space business, we might pause to identify a few things that it produces. I could summarize by saying that it produces progress through the development of new materials, new products, improved services, new productive processes, and more effective managerial techniques. But let's be just a little more specific.

In the field of medicine alone, the benefits are impressive. Medical instrumentation, improved as a result of electronic applications from the space program, are beginning to revolutionize the equipment of clinics, hospitals, and doctors' offices. For the first time, healthy—impressively healthy—individuals, the astronauts, have been studied thoroughly under a variety of adverse or hostile conditions. The resultant addition to medical knowledge is considerable.

Other direct benefits come in the form of such important services as wideband transoceanic communications, global weather reporting and forecasting, improved forest fire fire detection, and high accuracy navigation. Or, we might note many improvements and developments in metals, alloys, ceramics and other materials, with great potential for improving our standard of living. And I can go on with such useful things as accelerated use of liquid oxygen in steelmaking, new coatings for temperature control of buildings, detergent filters, and fantastic strides in more effective, more reliable, and more compact electronic equipment.

Separate and increasing attention is being given to the application of space developed methods, managerial techniques, systems engineering, and other innovations to solving or at least to help solve near-space problems in this complex society. The range of problems to which aerospace experience looks promising is indeed wide, stretching from air pollution, traffic congestion, garbage disposal, to the elimination of many other ills of city living.

There are those, of course, who say such benefits as I have here mentioned are greatly exaggerated or would have come along anyway. The skeptics do, however, find it increasingly difficult to play the ostrich act and pretend these benefits from space technology just aren't there.

Remember this is a young—a very young—program and it is already producing or promising manifold benefits, some of which are material and measurable and some are not. I might say somewhat parenthetically that I find myself at odds with those self-appointed critics who discount the importance of our space program because they cannot measure precisely in quantitative terms many of the benefits flowing therefrom. Actually, there are few more blind than those who believe only those things exist which can be measured and weighed and packaged. Such a state of mind points to the inadequacy of the measurer and not to the nonexistence of the benefits. But, let us move along, as there are more categories of benefits to mention.

NATIONAL SECURITY

The maintenance of our democracy and of our private enterprise system requires that we be strong in our ability to defend ourselves. More than that; it requires that everyone should know that we will use that strength in response to aggression and that we will not use it for aggression against others. The national space program makes important contributions to this state of national security.

Keep in mind that by law and by policy all of our space activities are to be directed to peaceful objectives. And surely no activity is more peaceful in effect than that which discourages war.

Alertness on our part and awareness by others of the certainty of a prompt response to aggression discourage war. Our peaceful application of space competence to national security takes such forms as support for our terrestrial Armed Forces in better communications, more accurate knowledge of weather, more effective mapping, earlier warning of impending dangers, knowledge of nuclear explosions in space or in the atmosphere, etc. In addition to the direct national security

advantages from space competence, the Nation is also strengthened through our large investment in modern facilities, in experience, and in trained personnel which can be devoted to a wide variety of purposes as we seek peace.

EDUCATION

In at least three different ways the space program has shown major benefits for education. First of all, the obvious: it has added immeasurably to the total available knowledge of man, of the earth, and of the solar system. Second, funds have flowed from NASA, for example, to our educational institutions in the form of scholarships and fellowships, in the form of new laboratories, and research opportunities.

It is estimated that from this one source about 1,000 new Ph. D.'s are added annually to this resource of the Nation. And third, the space program has been a catalyst and a stimulus to education throughout the whole country. It has encouraged young people, particularly in science and engineering, but also in other fields as well.

In a short period of time, the space program has given more impetus to improved education than has almost any other major activity. In fact, the space program can properly be called the "antidropout" program.

INTERNATIONAL RELATIONS

Some people tend to minimize the international prestige benefit resulting from our national space program. Maybe it is just the term "prestige" which offends. In any event, we should be concerned with the impression people of other countries have of the United States. We gain from a "prestige [illegible]." The ideal picture is that of a Nation of [illegible] tality and strength in ideas, in technology, in freedom, in standards of living, in education, in opportunity, and in objectives for peace.

The space program, effectively and imaginatively conducted, contributes positively to such an international picture. Currently, we are cooperating in some aspect of space performance with some 70 countries around the world. Our astronauts carry exciting information about their country and its space program to distant lands.

All too few in this country are aware of what a successful job the USIA is doing in distributing the truth about our space achievements throughout the globe. Our handling of exciting portions of our space program out in the open for all to see has done much to give an excellent impression of our democratic system. In fact, few activities of the United States have reflected as favorably on our great Nation as has the space program.

CONCLUSION

The national space program is a seedbed of invention, a spur to our economy, a source of insurance for our safety, a stimulus to education, and a worldwide ambassador for peace. Let us support this dynamic effort and give it full credit for the healthy impact it is having on our great Nation.

Lithuanian Independence Day

SPEECH
OF
HON. DANIEL J. RONAN
OF ILLINOIS
IN THE HOUSE OF REPRESENTATIVES
Wednesday, February 16, 1966

Mr. RONAN. Mr. Speaker, today we join with freedom-loving people everywhere in commemorating the 48th anniversary of the independence of Lithuania. On February 16, 1918, Lithuania was able to proclaim its independence following more than a century of subjugation by czarist Russia. Unfortunately, their freedom was short lived, and after an all-too-brief 22 years of independence, the country of Lithuania again fell under the yoke of Soviet oppression.

The Lithuanian people, however, fervently remember the glorious period when they were masters of their own fate and able to breathe deep of the fresh air of freedom. Although they remain oppressed by the totalitarianism of Soviet communism the Lithuanian people are silently resolute and determined to regain their independence no matter how difficult or long the struggle may be.

Having engaged in a similar struggle to gain our independence, we have a common bond with the Lithuanians and on this symbolic occasion we voice our hope that this small but valiant country will once more be victorious in the battle for self-determination and independence. It, of course, will not be easy, but there have been victories against longer odds in the pages of history.

Cooperative Foreign Aid

EXTENSION OF REMARKS
OF
HON. RICHARD T. HANNA
OF CALIFORNIA
IN THE HOUSE OF REPRESENTATIVES
Thursday, January 20, 1966

Mr. HANNA. Mr. Speaker, we will hear increasingly in the days ahead from skeptics who will speak scoffingly of programs that attempt to alleviate the problems of other countries. It will be said, and in some respects demonstrated, that our demands at home and the urgencies of Vietnam, preclude a continuing effort in foreign assistance.

May I point out a source of strength and a potential for multiplying our performance which has so far not been widely acknowledged? The people we have helped are now in a position to themselves assume some of the burdens of improving world conditions. We have for some time been urging greater participation in this great calling from our European allies. Let us not disregard the emerging capabilities of our friends in the Pacific community.

The free Chinese of Taiwan are now extending technical assistance to 20 nations in Asia, Africa, and Latin America. The effectiveness of these technicians freshly recruited from the ranks of a country just beginning to realize the benefits of adapting to newer methods and improvements, cannot be underestimated. The underdeveloped nations which must be encouraged to stretch into the mainstream of modern industrialization can relate [illegible] more readily to those who have just gone through the experience of the major shift than they can relate to the arrived giant, America.

We can magnify at least fivefold the effectiveness of our dollars in the foreign assistance field by cooperating with technical assistance programs from Taiwan, Korea, Japan, and the Philippines whenever, and to the degree, it is possible and feasible. In my view, Mr. Speaker, it is the next logical step in the evolution of our international aid programs. At the same time it can answer positively the carping critics who maintain we cannot solve all the world's ills alone. The answer is clear. We are not alone, and we need not be alone. Let us commence a dynamic program of cooperative effort. Not only, mind you, from the most advanced countries to the least advanced, but from the more developed areas to the less developed areas. Free China has given us a classic showcase that should be duplicated and expanded.

Ribicoff Safety Bill Has Vast Potential

EXTENSION OF REMARKS
OF
HON. BERNARD F. GRABOWSKI
OF CONNECTICUT
IN THE HOUSE OF REPRESENTATIVES
Monday, February 7, 1966

Mr. GRABOWSKI. Mr. Speaker, in the Washington Evening Star of Thursday, February 17, the columnist, James J. Kilpatrick, focused attention upon the excellent highway safety proposals made by the able Senator from my State, the Honorable ABRAHAM RIBICOFF. I call the attention of the House to this perceptive article.

RIBICOFF ROAD SAFETY BILL HAILED
(By James J. Kilpatrick)

Well, sir, it sounds an awful lot like heresy in the ranks of the States rights religion, but the avowal has to be made. Senator ABRAHAM RIBICOFF's bill to create a National Highway Traffic Safety Center ranks among the finest pieces of domestic legislation now pending in the Congress. The bill offered by the Connecticut Democrat should be passed.

It may seem incredible for a card-carrying conservative to speak in this unseemly fashion of the Ribicoff bill. After all, the measure numbers among its sponsors such certified liberals as CLARK, DOUGLAS, GRUENING, MCGEE, MORSE, Mrs. NEUBERGER, and KENNEDY of New York. The bill would create one more program of Federal grants-in-aid, to be added to the 120 such programs already channeling $13 billion a year back to the subvervient States. One section of the proposed act would involve an educational "frill." On the face of it, the bill bears all the aspects of legislation we could get along without.

Yet in point of fact, the wonder is that Congress has waited so long to tackle the prodigious problems of highway safety; and the puzzling thing is that the people themselves have applied no pressure for congressional action.

Surely, if there had been and disposition in the Congress to act, a solid constitutional basis could have been laid long ago for Federal action in the field. The power to regulate commerce among the States plainly could be invoked to justify sweeping Federal regulation of our highways. Yet the Congress seldom has concerned itself with highway safety as such. A House committee conducted certain hearings in 1959, issued a largely unread report in 1961, and came up 2 years ago with Public Law 88-515, prescribing certain safety standards for motor vehicles purchased by the Government. Apart

Speechfile

REMARKS BY VICE PRESIDENT HUBERT HUMPHREY

"STEPPING STONES TO MARS" CONFERENCE
BALTIMORE, MARYLAND - MARCH 28, 1966
TO BE DELIVERED BY EDWARD C. WELSH, EXECUTIVE SECRETARY,
NATIONAL AERONAUTICS AND SPACE COUNCIL

It is a privilege to live in a time such as this, when man is preparing, for the first time since life appeared on this planet, to voyage to other worlds.

It must have been rather like this in the Age of Discovery centuries ago, when our ancestors first ventured forth from Europe to discover a whole wide world they had never dreamt of.

And, incidentally, if you've looked into the tiny ships on which they made such long voyages, a spacecraft doesn't seem all that cramped and confining.

President Johnson said in his Inaugural Address that America is "the uncrossed desert and the unclimbed ridge." And then he brought us right up to the space age when he added that America is also "the star that is not reached."

I know that Mars isn't a star -- even though people once thought it was -- but it is a goal which stretches the human imagination to its utmost.

It is appropriate that you should meet in this historic and beautiful city of Baltimore -- which has vaulted right into the forefront of the space effort with its magnificent contribution to the Gemini program with its mighty and reliable Titan boosters.

I know that all of you join with me in joy and thankfulness that David Scott and Neil Armstrong made such a safe, happy -- and phenomenally accurate -- landing a few days ago.

We have gained a new appreciation through our space effort, of the vastness of the universe. But we have also come to realize, even more vividly the high achievements of which individual men -- tiny and insignificant as they may seem by comparison -- are capable.

I don't mean only the vision of our scientists and the ingenuity of our technologists, which have made it possible for us to set forth into space.

I also mean human skill, human courage, and human ability to cope calmly and effectively with grave emergencies -- such as the Gemini astronauts demonstrated to the highest degree.

Believe me, my heart was with them -- and the hearts of all Americans and of people throughout the world -- not least, I am sure, the Soviet astronauts, who share with them first-hand knowledge of the grandeurs and perils of space.

They showed courage and skill of the highest order in getting out of an extremely tight corner -- and believe me, we now know how tight a corner there can be, even in the vastness of space.

Their superb performance is a tribute to the excellence of their training. It is a tribute also to the worldwide ground support team, which converted an emergency into a routine landing.

These are Americans all of us can be profoundly proud of.

I think, however, too few people realize what these two brave and skillful men really accomplished before they ran into trouble.

When the history of man's adventure into space comes to be written -- a kind of 20th Century equivalent of Richard Hakluyt and his "Voyages and Discoveries of the English" -- I think we shall be more impressed by what went precisely according to plan on this flight than distressed by what went wrong.

The main purpose of the Gemini 8 flight was the physical joining -- the docking -- of two space craft in orbit, a maneuver of great delicacy. This was, in fact, accomplished.

What was left undone, in the way of space-walking and other maneuvers, was not fundamental to the objective of this flight.

Let me note one other point -- the prompt decision to cut short the mission rather than risk the safety of the astronauts. It is a heartening reminder that, even in this age of the computer, human life comes first and technology is the servant rather than the master of man.

This experience has been a stern warning to all of us that things <u>can</u> go wrong up there in space.

When I addressed the Goddard Space Dinner less than a fortnight ago, I stressed the vital importance of maintaining the most meticulous standards of forethought and performance at every level of our space effort.

I noted that, although this tremendous effort involves hundreds of thousands of people, each and every person involved in it must fully recognize and fulfil his own individual responsibility for its success.

I am therefore pleased and impressed, in examining your agenda, to see that you will be dealing in detail with a very wide range of the complex problems involved in a voyage to Mars. Painstaking preparation like this has made the remarkable overall success of our space program possible.

As for myself, my confidence in our advancing science and technology is such that I believe that man can land on Mars -- although I do not venture to set any timetable for it.

Of course, I believe that we can and will achieve the original goal set by Presidents Kennedy and Johnson: a manned landing on the moon before 1970.

I can foresee still other dramatic achievements -- although again I set no precise dates for them.

1. The exploration of the lunar surface, and possibly the establishment of one or more permanent bases there.
2. The development of a whole family of earth-orbiting stations, manned and supplied by regular ferry services.
3. The building of spaceports in a number of places in this country for the departure and arrival of spacecraft.

4. The development of recoverable and re-usable launching vehicles, and manueverable space vehicles, with a consequent drastic reduction in the cost of space travel.
5. The improvement of propulsion methods, with the use of nuclear as well as chemical energy, so that faster and more powerful rockets can make planetary trips in a week or less which today would require many months.
6. The launching of unmanned probes to every part of the solar system -- and perhaps manned planetary expeditions as well.

Prospects like these are thrilling and enthralling. But we must not, however, let them tempt us to neglect the application of space technology to achieving a better life -- a Great Society, if you will -- right here on this planet earth.

Technological advancements -- some of them real breakthroughs -- are occurring with ever-increasing speed. We must see to it that they are disseminated and applied as widely as possible at something like a comparable rate.

Already, we are beginning to achieve substantial terrestrial benefits from our space effort.

In the field of medicine, we are fast approaching the day when it will be possible to monitor continuously and in detail the condition of hundreds of patients from a single central location. Already, the use of our communications

satellite system has enabled a doctor on one continent to diagnose a patient with a heart affliction on another.

We are rapidly improving our ability, through the use of meteorological satellites, to predict with accuracy the weather everywhere on earth. Ultimately, we may be able to control, and bring life-giving rain to hitherto arid parts of the earth.

Through satellites and sensors, we will improve our techniques for detecting forest fires and surveying natural resources.

We will increase the accuracy of air and sea nabigation under all weather conditions and in every part of the globe.

I could also mention, as dividends already from our realized space effort, such things as new alloys, ceramics, and plastics; new industrial processes; and more efficient, reliable and compact electronic equipment.

Already our space program has contributed materially to our national security -- communications, weather, and navigation satellites are backing up our effort in Vietnam.

I should like now to turn to a matter of special interest to me -- space in international relations.

Astronauts Schirra and Borman have just returned from a trip to six free Asian capitals and to Australia and New Zealand. And it was a most successful trip.

Everywhere they found scientists, students, and even the general public keenly interested in space and surprisingly well-informed about it. Everywhere, they found deep appreciation of the open way in which much of our program has been conducted -- a practical and convincing demonstration of the meaning of an open society.

Thus far, we have engaged in space cooperation with about 70 countries, advanced and developing nations alike. All cooperative projects are conducted openly, and the scientific and technological data resulting from them must be made freely available to the scientific community.

All such projects must be scientifically valid. There are no "token" programs or public relations gimmicks.

Ground-based cooperative projects are very appealing to less affluent nations because they permit some degree of participation in space programs without requiring costly space vehicles or hardware. While NASA's international program absorbs only about 180 million dollars, a small fraction of its total budget, a cooperative effort with another nation may represent that country's total space program.

The United States has arrangements with educational and professional centers in 34 countries around the globe providing for post-doctoral awards to senior scientists for participation in space research in this country, technical training at NASA centers in the U.S. in support of agreed cooperative projects, fellowships to graduate students on a shared-cost basis for training

in space sciences at U.S. universities, and technical training at NASA installations abroad in connection with tracking-station agreements.

The United States has received about 13,000 visitors from more than 100 countries who came here to observe various aspects of the U.S. civilian space effort or to discuss opportunities for foreign participation in NASA programs.

A further instance of international cooperation in space is the fact that about 50 nations have already joined the international COMSAT consortium for the financing, ownership and operation of a system that is intended to extend its space satellite communications activities into a global network by the latter part of next year.

So far, the United States is the only country to devote a considerable portion of its energies and resources to space activities of immediate practical benefit to all the world by advancing science generally, and by giving other nations the opportunity to participate in this advance.

If imagination and enlightened self-interest continue to prevail in our space program, and I have every confidence that they will, we will press vigorously forward with ever wider international cooperation in this field -- thus supplementing our own resources in minds and money, furthering our shared adventure into space, and hopefully reducing, in some measure, political and economic tensions here on earth.

Coming back, in conclusion, to the theme of this gathering, it is indeed worth considering the possibility of having man's firstvoyage to Mars become a truly international undertaking. We in this country are eager to share the thrills and the benefits of space exploration with other nations. This enterprise is of such tremendous, such breath-taking scope that there is ample opportunity for many nations to contribute to it, each in its own way. There are many imaginative and ingenious scientists and engineers in other countries, and we welcome their ideas on how Mars may best be reached and explored.

I know that the great dream of many of you is to make contact with life -- and hopefully with intelligent life -- perhaps on Mars, perhaps elsewhere in the universe.

I think that this prospect should give us renewed determination to order our affairs better hereon earth. I hope that we shall move with increased urgency and dedication from our present perilously obsolescent international system into a new world of freedom and justice under law.

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RELEASE P. M.'s MAY 21, 1964

PROGRESS THROUGH SPACE

By
Dr. Edward C. Welsh, Executive Secretary
National Aeronautics and Space Council

American Ordnance Association
Washington, D. C.
May 21, 1964

It is a pleasure to talk to this distinguished group today. What I have to say will not take long. I just want to mention briefly a few ideas which I -- and undoubtedly many of you -- have been reflecting upon during recent months.

I start with the firm assumption that most Americans would like to see permanent world peace. Surely our government wants that. I am also confident that some degree of mutual disarmament should characterize a world peace offensive. Surely our government wants that.

In other words, world peace and mutual disarmament are desirable objectives. To attain such objectives would, of course, call for some major economic and political adjustments -- adjustments which I believe could be made with resultant net gains to the vast majority of people everywhere.

I have heard people talk as if world peace, and particularly disarmament, would bring about economic depression and resultant hardships. It is conceivable that such would be the result, but with thoughtful attention to the problem it is not necessary that it be so. In fact, it would be a sad commentary on our type of society if we were not able to transfer some of our energies from the production of military equipment to other types and forms of economic activity. There is no reason why such a transfer cannot be made, and there is every reason why we should be prepared to make such a transfer. The economic problem created by disarmament is one of adjustment to new or expanded demands, offsetting declines in old demands. It need not be an adjustment to a smaller total of production.

Please note that I have referred to a possible decrease in the production of weapons systems, but I have not and I do not suggest any decrease in research and development of advanced weapons technology. We must stay on the technological alert so as to be able to turn to production promptly if such should become necessary. Moreover, we must maintain a deterrent strength sufficient to do what it is intended to do: deter.

We can afford almost anything in this great country -- except complacency!

I have also heard people talk as if world peace would be accompanied by a decline in the production of space systems as well as weapons systems. It has not, however, been made clear to my satisfaction as to why those systems should be linked together. Perhaps it is just because the same companies are often contractors in both fields. But, surely, that is not a sufficient reason. In fact, I do not think we can find a logical basis for such linking. To my way of thinking, space activity is an area which should be greatly stimulated by a disarmament trend.

Can one name any activity more clearly identifiable with economic progress than exploration of outer space? From where do new materials, improved electronics, new processes, and improved management techniques flow more readily? In what activity do we discover greater stimulus to education and to increasing our gross national product? In fact, it appears reasonable to expect that increased space activity would actually accentuate the trend toward world peace by diverting the same skills and facilities from weapons systems to space systems. Also, a sincere interest in maintaining world peace would call for greatly expanded peace-keeping competence in space. For example, in the areas of inspection and detection systems, space competence has particular value.

It is my thesis that mutual disarmament -- and prudence dictates that there should be no other kind -- would greatly increase the flow of funds and effort into space exploration and into the building of greater space capability. This does not necessarily mean a full transfer of all available resources to space applications. But, just for illustration, suppose that there were a 10% decrease in weapons systems spending. With good planning at least half of it could be diverted smoothly and efficiently into an increased space effort. With greater difficulty, the remainder might be directed toward mending other inadequacies in our society.

The ingredients of weapons system development are many, but the most valued are engineering, scientific, and management skills as well as the laboratories and production facilities in which those skills can be used. The country would probably gain the most or lose the least in efficiency if the skills and facilities released from weapons system development went into space systems development. Such transfer would do two things: cause very little economic disruption, as many of the same companies would be involved, and result in the most efficient application of those specialized resources.

Under the conditions of a defense cutback, my belief is that U. S. resources and aspirations are sufficient to encompass both the increased exploration of space and enhanced human welfare activities. Both contribute to the development of a greater America. The painfully acquired skills of the space engineer, for

example, are not readily or efficiently convertible into widely contrasting activities. As the leading country of the Free World we must be first in building roads, schools, and hospitals; first in eliminating slums and redeveloping urban areas; and first in exploring space. They are all complementary -- and indeed essential -- in the make-up of a world power in our times.

A pace-setting field like space exploration is a must for stretching the technological state of the art to maintain the keen edge of U. S. technological leadership. To maintain this leadership it is essential to strive toward the difficult technological goals of space which continually exceed the current know-how of the country. Space technology will remain for the foreseeable future the standard for technological progess. It will serve as the goal to inspire our youth toward new intellectual creativity in the scientific disciplines.

There are those who lament the fact that such a large portion -- perhaps as much as 70% -- of the total research and development being carried on in this country is funded by the government. First of all, it is important to note that there is a lot of research, both basic and applied, being done. We would have a really serious basis for worry if that were not the case. It seems to me that the source of the financing is much less important than is the fact that the research is being performed. The space program is a major stimulus to this increase in research -- and research is a basic component of progress.

While it is true that the government is the major financer of this country's research and development, it is also true that the performance is being carried out largely in private companies and institutions. There are a number of reasons why the government gets so heavily involved in such financing. In some cases private companies have such short-run views that they have not even done the research they could afford. Also, some companies prefer to have the government take the risk and the companies take possibly smaller but more assured profits. In many cases, the government is involved in research and development financing because so much of it has direct application to missions primarily governmental in character. Basically, it is not a case of government's taking the research and development responsibility away from private companies, but rather it is a situation in which the government has moved to fill a gap.

I propose that the space planners within the Government with the help of those in industry strive to look forward with improved vision into the future. With space exploration still in its infancy, consider the many legitimate space fields that we have for extensive research activities. If the planning is basically sound and is kept under constant review and if industry is kept closely tied in, we can utilize effectively every added resource that might be made available to the space program.

I am an avid supporter of the private competitive enterprise system. I am also an avid supporter of a responsible government which creates a climate in which

the private system can work efficiently. My proposal to accelerate space activity to offset decreases in weapons system activity does not conflict with my support of private enterprise. In fact, it supports it, even though the funds would pass through government hands in the process. The basic objective is to strengthen our country.

If we turned our attention for the moment to the USSR -- where there is very little private enterprise, but much interest and competence in space, I am confident that mutual disarmament would cause them to accelerate their space efforts. They are that practical and they tend to control the flow of their available resources where they think they will do their country the most good -- both economically and politically.

In conclusion, let me emphasize:

-- First. Disarmament, in the form of decreased production of weapons systems, does not need to cause an economic depression.

-- Second. Resources made available as a result of decreased production of weapons systems could most effectively be applied to accelerated development of space systems.

-- Third. While it is important to keep private industry healthy, government financing of research and development is not in conflict with such objective. In fact, it may well stimulate increased production and increased employment by private companies.

And finally, I do not suggest that there should be a sharp increase in spending for space. But I do believe space spending should increase at a rate at least consonant with the increase in our gross national product, not only because increase in the GNP makes resources available for more space activities, but also because space exploration itself stimulates the gross national product.

RELEASE P. M.'S MAY 26, 1964

REMARKS BY DR. EDWARD C. WELSH, EXECUTIVE SECRETARY
NATIONAL AERONAUTICS AND SPACE COUNCIL

on occasion of

DEDICATION OF AEROJET GENERAL'S
DADE COUNTY (Florida) PLANT

May 26, 1964

It is a privilege to participate in the dedication of this modern resource for space power. I congratulate all who have had a part in making this facility possible.

My congratulations extend, of course, to those with the technical competence to design and to construct such a facility.

I want to go further, however, and commend the leadership of this great company for the confidence, the courage, and the farsightedness to undertake this venture. It gives me added faith in the private enterprise system.

Except to congratulate you and to express my confidence in the future utility of solid propellant rocket engines, I have no special message for you regarding the use of this new facility. It would, in fact, be presumptuous of me to talk technology in detail with experts such as grace this audience. We do know, of course, that solids have a long and very useful role to play, as also do nuclear and liquid rockets. Not only will each technique contribute to the total in propulsion technology, but through cross-fertilization I believe we will gain a great deal more than would result from each technique taken by itself. In any event, solids -- both large and small -- are basic to the space age.

Quite recently, a member of Congress was quoted as having referred to the space program as a "madman's race to the moon." He is also reported to have labeled it as a "crash" program and to have lamented that the funds being spent on space were not transferred to alleviate the pockets of poverty throughout the nation.

Now, I hesitate to give additional attention to such misinformation. In fact, the purported remarks were so distant from fact as to suggest misquotation. However, they were published and consequently have created some confusion about our national space program. Silence in the face of such attack might lead some to believe that there was substance to such statements, and I would not want anyone to believe that. For example, anyone who knows anything about "crash" programs or the space program would never so identify either. Crash programs have unlimited funds, unlimited overtime, and parallel approaches to the end objective. None of these aspects applies to the space program or even lunar project. Funds are not unlimited; overtime does not characterize the activity; and a single approach to the lunar trip is being followed. Moreover, the pace might be called brisk, but it is far from a crash speed.

Dwelling a bit more upon this purported statement, one wonders who the "madman" is who is doing all this racing to the moon. He was certainly not identified. Perhaps it is just as well since we know that no responsible official is going to confuse the United States with a madman. That is about the last label one would give to the serious-minded and expertly trained scientists, engineers, astronauts, and executives who are involved in our space program. Madman indeed! Surely the reference is not to any President of the United States or to the vast majority of members of the Congress who supported President Kennedy's decision to go to the moon. Perhaps the reference was only a case of non-poetic license!

As for the suggestion that resources should be transferred from the space program to alleviate "pockets of poverty," the approach is wrong. Surely action should be taken and funds put to work to eliminate poverty wherever it exists. The President is vigorously pushing a program to do this very thing. But we should not consider the elimination of "pockets of prosperity" such as this new facility represents as a solution to the "pockets of poverty" in other areas.

Anyone knows -- or should know -- that using our skills and our resources in the most productive way gives the biggest boost to the economy as a whole and thereby provides the best medicine for the sick areas of our nation. I believe that putting scientific and engineering and management skills to work on the space program gives a boost to our entire economy. In addition, such activity maintains this nation's technological leadership in the world.

Propulsion is the heart of the space program. Because we lagged in this technology the space gap with the Russians really developed. It is due to our recent accelerated activity in this field that the space gap is beginning to disappear.

The Soviet advantage came through their exploitation of liquid engine technology. The relative situation is such that we can, if we will, maintain a lead in the solid and nuclear aspects of propulsion. It should be noted that solid fuel rockets have done so much to eliminate the missile gap; they should be a major factor in dissolving the space gap as well.

Leadership in propulsion is, as I said previously, synonymous with leadership in space -- for both military and non-military purposes. We cannot afford to relax in this area. There is no room for complacency, only room for urgency.

The warning against complacency does not need to be made to leaders of a company which bases its policy on the theme of expansion and backs that policy with investment. However, the warning does need to be made to many others -- even to some of the thoughtful people in the country. In supporting the thesis that there is real danger from complacency, I list the following points:

1. The USSR is having some economic difficulties, particularly in agriculture. Yet, their space program is expanding.

2. The USSR is far ahead of the United States in manned flight experience. Even their female cosmonaut has flown more orbits than all of our astronauts combined.

3. The USSR has flown their heavier Vostok spacecraft in manned and unmanned flights some 45 times as many earth orbits as we have flown our much smaller Mercury.

4. Practically all of the competences developed for space could be used for aggression as well as for peaceful purposes.

Please do not misunderstand what I am saying. We have made great strides, particularly in the past three years. We are actually ahead of the Soviets in some applications of space, such as communications and meteorology. We are, however, not yet ahead overall. But, our rate of progress is very impressive.

Probably what I am warning about more than anything else is the danger that we might slow down our rate of progress -- that we might heed the voices of defeatism and impracticality. This is the one thing we cannot afford. We cannot afford to lose the momentum which stems from a growing program. To slow down is to be content with second place. This we should not do. In fact, we dare not do it.

Again, I want to congratulate the Aerojet General Corporation for its vision, its technical competence and its managerial excellence. This new facility is a monument to the vigor, the courage, and the confidence of this company.

RELEASE 10:30 A. M. JUNE 16, 1964

REMARKS BY DR. EDWARD C. WELSH, EXECUTIVE SECRETARY
NATIONAL AERONAUTICS AND SPACE COUNCIL

on occasion of

DEDICATION OF J-4 PROPULSION ENGINE TEST CELL
ARNOLD ENGINEERING DEVELOPMENT CENTER
TULLAHOMA, TENNESSEE

June 16, 1964

THE FOUNDATION FOR SPACE PROGRESS

I am honored to participate in the dedication of the new J-4 Propulsion Engine Test Cell here at the Arnold Engineering Development Center. It was just about three years ago that Air Force Secretary Zuckert and United States Senator Gore took part in ceremonies initiating the construction of this high altitude rocket test cell. Today, we mark the addition of this facility to the Nation's growing resources for space progress.

The facilities here at this Center are truly a great national asset. In recent years they have provided invaluable support to nearly every major missile and space program, including the Air Force's Atlas, Titan, and Minuteman; the Navy's Polaris; the Army's Pershing and NIKE; and NASA's Mercury manned space flight program. Among the NASA programs supported by this Center just during the past year are the Gemini and Apollo manned space flight programs, Syncom, Scout, and Surveyor. The J-4 Test Cell, which can test full-scale rocket motors of a half-million pounds thrust at simulated altitudes of over 100,000 feet, greatly increases the value of this test complex in furthering our national security and other national objectives.

This occasion affords a welcome opportunity to recognize the importance to the national space program of adequate technical facilities. Too often, public attention is focused on the dramatic launch of a space vehicle while the long months spent in preparation, in careful testing under simulated conditions, and in painstaking collection of data are overlooked or minimized. Yet such advance work is the essential pre-condition of success.

Technical facilities -- together with the qualified people who operate them -- have been vividly described as the "life blood" of aerospace operations. General Schriever, whose Air Force Systems Command controls these facilities at the Arnold Center, recently identified some of the unique contributions made by such resources:

> "They have been indispensable to instrumented tests, designed to investigate the causes of malfunctions, and have repeatedly revealed problems not predicted by theoretical studies or by sea-level testing. ... In many cases, this testing obtained data which could not have been obtained in any other way. ... Dramatic savings in time and money have resulted from the use of flight simulation facilities."

There are three points with regard to technical facilities which I would like to mention briefly:

First, they are indispensable to the advance of technology, since they provide the means of proving that a feasibility exists. Thus, they must be maintained at the most modern state of the art and stand at the forefront of every development effort. This applies not just to the Air Force but to every aspect of the national space program.

Second, technical facilities support developments which could not be predicted at the time the facilities themselves were conceived. In 1945 no one could have foreseen that Arnold Center facilities would be used in support of missile and space programs. Three of the cells here at Arnold which were designed twenty years ago to test air-breathing systems are today being used exclusively to test rocket motors.

Third, technical facilities are frequently as complex as the systems they support, and take as long to develop. It usually takes between six and seven years from the original determination of the need for a highly complex test facility to the time when the first usable data are obtained from it. A substantial portion of this time is spent in obtaining approval for construction and in acquiring the necessary funds. The remainder of the time is spent in negotiating the contracts, in actual engineering and construction, and in shakedown and calibration. I understand that the facility we are dedicating today has had a history which generally fits that pattern.

Facilities which are essential to progress in space are subject to long leadtimes. To insure the construction of facilities needed for development and testing in 1970 and beyond, planning must begin today. Such planning requires unusual foresight. What is more, it calls for strength of character to back up that foresight with action. The easy road is to plan only from one fiscal year to the next. Sound facilities planning should not be limited by the needs of already

approved systems. Rather, it should be based on the trends in system development and the advances in technology which can be forecast for the next ten to fifteen years. This kind of planning is most economical over the long run. Even more important, it is also the type which enables the country to cope quickly with national emergencies.

The J-4 Test Cell is an outstanding example of a facility authorized and funded, not on the basis of a specifically defined weapon or space system, but on the basis of a recognized national need. Discussions between the Air Force and NASA helped establish its general requirements, and today, even before it has begun actual test operations, it is fully scheduled for a year in the future. Moreover, it has been designed for growth. A major modification, which could be achieved in about a year and a half, would allow the testing of upper stage rockets having up to one and a half million pounds of thrust. The capability for this expansion was requested by NASA more than five years ago when the cell was in its conceptual stages, and it was planned for at that time.

Now let me say a word about the future role of technical planning in the national space effort. In recent years, there has been much talk about a "space race." There is such a race and we should not forget it for a minute. However, we must not let the pace of our national space program be determined just by the actions of others. We must maintain a vigorous and well planned effort regardless of what other nations may do. We cannot afford to relax, for example, just because the Soviets slow down -- or say they are slowing down. Incidentally, there is no evidence that the Soviets are slowing down on their space program. In fact, the contrary is true.

Actually, the real opponent in the space race is time. In today's world, rapid technological progress is inevitable. If our Nation does not set the pace, then others will take the lead. While it is true that Soviet progress in space has a very direct bearing on our national security, we would be unwise to make our space program wholly dependent on either their announcements or their actions. Our space program must be shaped by our own needs -- the needs of scientific knowledge, technolgical leadership, economic development, and national security.

These needs require that we continue to push technology vigorously. There is a theory in some circles that we have reached some sort of technological plateau, and that we can now afford to relax. I think this is a dangerous fallacy. Technology has played a decisive role in the attainment of our present leading position in the world. It remains crucial to both military and economic strength, which are often the opposite sides of the same coin. This is no time to be standing still. On the contrary, it is a time to keep moving boldly forward. Recent studies, such as the Air Force Project Forecast, have identified many

technological opportunities in the years ahead. We should take prompt advantage of such opportunities.

Thus, time will always be one of our most precious resources. If we insist that an approved system requirement must always prec ede the approval of new technical facilities, then we may find ourselves with a potentially dangerous built-in delay of several years. On the other hand, if we use foresight in building advanced test facilities, our progress in space technology can be much more rapid and much less costly than it would be without them.

Regardless of how imaginative we are in trying to forecast the pace of technological progress, we are never adequately prepared to translate new ideas into specific applications. Consequently, facilities which are created to meet anticipated needs must be adapted for other uses than those for which they are conceived and designed. This has been consistently true here at the Arnold Center. If we limit ourselves to those needs which can be clearly foreseen and plan only on that basis, we will always fall short of the potential which we could exploit. This we dare not risk.

Ground-based facilities, such as we dedicate here today, play a key role in building a sound foundation for the exploitation of space. Our philosophy in designing such facilities must be to construct laboratories which are flexible and adaptable. Their design and justification should not be limited by specific foreseen near-term requirements. Rather, they must be tailored to long-term needs which can be envisioned only in broad outline.

Because these facilities are expensive, unnecessary duplication must be avoided. But, as expensive as it may be to have too many facilities -- too much capacity -- it is nowhere near as expensive as to be caught short with too few facilities -- too little capacity. Duplication of omission is more serious than duplication of commission. In the latter case, you waste money while in the former you may risk freedom.

Now it is a great pleasure to mark the formal dedication of this new space facility. I congratulate the Air Force, the ARO Corporation personnel, and the industrial contractors responsible for the design, instrumentation, and construction. I know that the J-4 Test Cell, like the other national assets here at the Arnold Center, will have a vital and indispensable function in our Nation's continuing space effort.

RELEASE A. M.'s JUNE 19, 1964

ADDRESS BY DR. EDWARD C. WELSH, EXECUTIVE SECRETARY
NATIONAL AERONAUTICS AND SPACE COUNCIL

on occasion of
MARTIN COMPANY HONORS NIGHT BANQUET

Washington, D. C.
June 18, 1964

It is a privilege to join in this tribute to our greatest resource -- the creative effort of individuals. Though the complexity of our society requires us to stress the importance of teamwork, we must never overlook the worth of the individual nor the incentives derived from the recognition of individual accomplishment. That your efforts are recognized here tonight is not just a tribute to you and a credit to your company; it also honors advances in science and technology and thereby renders an important service to your country. I urge you to continue your dedication to the increase in man's knowledge and the transmission of that knowledge into useful action.

Shortages

Even in a nation of plenty, and ours can properly be called that, there are shortages. There will always be shortages. Man's wants are unlimited and his ability to distribute his products equitably is always faulty.

Also, there are shortages in abilities. We do not have a serious shortage of engineers, scientists, and managers, but we do have an insufficient supply of the very competent. The best will always be too few. I want to compliment this company for the portion of the best it has acquired.

Today, this country is confronted with many challenges, which will take the dedicated efforts of the best, if we are to meet those challenges successfully. Among the challenges are those of maintaining adequate defense, eliminating poverty, destroying bigotry, improving our educational system, and overcoming the obstacles to full exploration of outer space. I would talk with you briefly about the last-mentioned -- the space challenge.

Technological Challenge

There are numerous dimensions to this space challenge. The most obvious is technological. It is in this regard that your company and other great corporations have made and are making major contributions. In fact, while the technological problems of space are certainly most complex, they are also ones in which we are making major progress. Just pause for a moment and consider the really impressive progress made in the technological attack on space during the past six or seven years. It is almost overwhelming. Seven years ago, no one had put a single spacecraft into orbit. To date, the United States alone has put about 200 payloads of varying sizes and missions into earth orbit. The USSR has orbited more than fifty -- and, as you well know, they have made up for the smaller number by a vastly greater total weight. We have impacted the moon and flown a spacecraft near Venus. We have made many measurements and observations of value to our national security as well as to our accumulation of scientific knowledge. The list of accomplishments is so impressive as to give one an unwarranted feeling of optimism. "Unwarranted", I say, because, while encouraging, it is dangerous to acquire a sense of complacency as regards our relative position in technological accomplishment compared with the Soviets.

Educational Challenge

Another dimension of the space challenge in which we have done less well is what I refer to as the educational. By educational I mean the extent to which we have educated the public to the value, the significance of space progress, space leadership, and space benefits. I suggest that private industry is not carrying its share of this part of the space job. No one questions the successful maneuvers of private companies in selling new colors of soap chips, wall-to-wall carpeting for automobiles, new odors for deodorants, or sharper razor blades. But a less impressive job is done in selling something, like the space program, on which the country's future may well depend.

Millions of dollars are spent annually by companies in the aerospace industry for attendance at luncheons, lectures, banquets, and conferences. These are important, of course. Many more millions are spent annually by companies in the aerospace industry advertising their products in trade journals which are read by people of the same industry. This also is important. But, suppose that some of the time, the energy, and the funds devoted to luncheons, banquets, and technical advertising went to educating the general public -- including the Congress -- as to the importance of space competence to our national security, our national welfare, and our standard of living! I daresay we -- both the nation as a whole and the companies in particular -- would all benefit as a result.

I am not suggesting that the indoctrination burden should fall fully upon private industry. Far from it! But I am asserting that the job is not being adequately handled and that part of the responsibility lies with the private corporations. Some excellent work is being accomplished, but far from enough.

Sanity

It should not be possible for anyone to take seriously the public diatribes against the national space program. The cries of "moondoggle," "crash program," "moon madness" have a right to be uttered and have a right to be heard. But the public is also entitled to know the truth.

Anyone who knows anything about "crash programs" or the space program would never talk that way. Crash programs have unlimited funds, unlimited overtime, and parallel approaches to the end objective. None of these aspects applies to the space program or even to the lunar project. Funds are not unlimited; overtime does not characterize the activity; and a single approach to the lunar trip is being followed. Moreover, the speed is geared to getting the most progress per dollar spent rather than the most progress in the shortest period of time. As for those who question the sanity of the program, I would simply say that they are engaged in an exercise of self-exposure. Either they are revealing their ignorance of the manifold benefits flowing from the development of space competence or they are trying to undermine the space program in favor of some pet project of their own or some illusory budgetary goal.

Second Place

It should not be possible for anyone to take seriously assertions that there is no danger to this country if it finds itself in second place in the space race. Those who espouse such doctrine have a right to be heard, but, again, the general public is entitled to know the truth. Being second in space technology, in space competence, in space equipment, amounts to nothing less than endangering our freedom. Control of space for purposes of aggression could undermine the safety of peace-loving nations.

Expand, Not Curtail

Every responsible citizen sees a real need for improved educational staffs and facilities, for eradication of slums and the construction of decent housing, for elimination of pockets of poverty and their substitution by pockets of prosperity. There are many deficiencies in our economy for which solutions are possible and desirable. We should move vigorously to mend these weaknesses in our society. However, the way to improve is not to cut from one constructive activity to bolster up another. It is impracticable, unreasonable, and misleading to argue that we should curtail space research and development,

limit space exploration and performance, in order that we may have better schools, better housing, and less poverty. The fact is that our expanding economy can afford to carry on all of these activities. New programs are essential to its expansion. What is more, decreased spending on education, for example, does not automatically increase the funds available for space exploration or vice versa. Funds, people, facilities, and know-how are not readily transferable from one such activity to the other. I would be particularly suspicious of an individual who favored cutting space funds because he thought more money was needed for education, and then opposed action to increase education funds because he thought the budget ought to be balanced. He is the sort of "fiscally responsible" individual with whom this country has suffered before. He is the type who would let us get behind the Soviets in space while at the same time enjoying recessions and unbalanced budgets. We already know that path well enough and do not plan to travel it again.

National Space Program

As we attempt to carry out our responsibilities in educating the general public about the national space program, there are a few concepts which need particular emphasis:

1. Education

The space program has been a catalyst, a stimulus to education at all levels, with particular attention to science and engineering. How much is it worth to have raised the educational sights of our young people and at the same time to have increased the wealth of knowledge with which to condition them? I cannot put a price on it, but I believe the value will exceed the total cost of the space program.

2. National Security

The contribution of our space program to our national security is also considerable. How much more secure are we, due to improved communications, more accurate navigation, and more complete weather information? How much is it worth to be better informed about potential sources of danger? How can we assess the advantage of developing competence to detect and offset possible aggression from space? I cannot put a price on it, but I am confident that its value exceeds the total cost of the space program.

3. Innovations

The space program stimulates the development of new materials, new products, new productive processes, and new managerial techniques. I cannot place a

precise value upon such innovations, but I would estimate that the investment will repay itself many times over.

4. International Status

A substantial difference in influence in world affairs evolves from whether a country is in a first position or a second position in power. In many respects, a nation's relative position depends on how it stands in advanced technology. Power and influence in world affairs depend to a great degree upon the technological capability of a nation. International prestige is not a mantle to be weighed lightly or to be worn carelessly. We should be concerned with the image that people of other nations have of the United States. The ideal picture is that of a nation strong in ideas, in technology, in freedom, in standards of living, and in military power to protect the viability of the other prestige ingredients. The space program effectively and imaginatively conducted contributes positively to all of those ingredients. Of even greater importance is the potential impact the space program can have on world peace through substituting competence in space exploration for competence in building implements of aggression. If sanity prevails, the path to the stars can be the path to peace. How much is such a contribution worth? I do not know, but I am confident that if we fail to strive for it, we would be making it clear that we no longer value our freedom highly.

5. Economics

Combining, as the space program does, the best talents in management, in engineering, and in science, with the most modern facilities available, the net result is the production of progress. A program which stimulates education, expands research and development, augments total productivity, increases employment, and improves our international relations is a program of the greatest economic significance. By increasing our total national income and gross national product, the national space program expands to a significant degree the size of the base on which our taxes are levied. It increases the profitability -- yes, the constructive profitability of the private sector of our economy.

Conclusion

It is my hope that those we honor tonight and their counterparts throughout the country will be persuaded to take advantage of the position of high esteem in which they are held and assume some of the responsibility of educating the general public to the significance of the national space program.

The national space program is a creative force in our society. Each of you here is, either directly or indirectly, giving it some of its basic vitality. As we marshal our progressive strengths, let us use them to stamp out the evils of ignorance and misunderstanding.

RELEASE ON DELIVERY

OPENING REMARKS BY DR. EDWARD C. WELSH
EXECUTIVE SECRETARY OF THE
NATIONAL AERONAUTICS AND SPACE COUNCIL

NATIONAL COLLOQUIUM ON SPACE EXPLORATION
WASHINGTON, D. C.

JULY 2, 1964

ORDER AND UNDERSTANDING RE SPACE

I am honored to participate in the opening of this National Space Colloquium. I am particularly privileged to convey to you this morning the best wishes for a successful session from the President of the United States. He regrets that his schedule prevents him from accepting the invitation to be here on this important occasion.

There are many dimensions to the space challenge. The most obvious are the scientific, the engineering, and the managerial competences so necessary to exploration in space. The scientific and engineering contributions are generally recognized and they should be -- but I want to give comparable emphasis to the importance of management.

Another dimension of the space challenge, in which we have done less well, is what I refer to as the educational. By that I mean the extent to which we have educated the public to the value -- the significance -- of space progress, space leadership, and space benefits. Much more needs to be done in this regard, if the potential of space is to be effectively exploited. Each of us has a measure of responsibility in this educational dimension.

In fact, a widespread understanding of space is essential to creating the basic atmosphere for peace and international order.

As we do our duty in educating others about space, there are a few areas which need particular attention:

First - The area of education. The space program has been a catalyst, a stimulus to education at all levels, with particular attention to science and

engineering. How much is it worth to have raised the educational sights of our young people and at the same time to have increased the wealth of knowledge with which to condition them? I cannot put a price on it, but I believe the value will exceed the total cost of the space program.

Second. The area of national security. The contribution of our space program to our national security is also considerable. How much more secure are we, due to improved communications, more accurate navigation, and more complete weather information? How much is it worth to be better informed about potential sources of danger? How can we assess the advantage of developing competence to detect and offset possible aggression from space? I cannot put a price on it, but I am confident that its value exceeds the total cost of the space program.

Third. The area of innovations. The space program stimulates the development of new materials, new products, new productive processes, and new managerial techniques. I cannot place a precise value upon such innovations, but I would estimate that the investment will repay itself many times over.

Fourth. The area of international relations. A substantial difference in influence in world affairs evolves from whether a country is in a first position or a second position in power. In many respects, a nation's relative position depends on how it stands in advanced technology. Power and influence in world affairs depend to a great degree upon the technological capability of a nation. International prestige is not a mantle to be weighed lightly or to be worn carelessly. We should be concerned with the image that people of other nations have of the United States. The ideal picture is that of a nation strong in ideas, in technology, in freedom, in standards of living, and in military power to protect the viability of the other prestige ingredients. The space program effectively and imaginatively conducted contributes positively to all of those ingredients. Of even greater importance is the potential impact the space program can have on world peace through substituting competence in space exploration for competence in building implements of aggression. If sanity prevails, the path to the stars can be the path to peace. How much is such a contribution worth? I do not know, but I am confident that if we fail to strive for it, we would be making it clear that we no longer value our freedom highly.

Fifth. The area of economic progress. Combining, as the space program does, the best talents in management, in engineering, and in science, with the most modern facilities available, the net result is the production of

progress. A program which stimulates education, expands research and development, augments total productivity, increases employment, and improves our international relations is a program of the greatest economic significance. By increasing our total national income and gross national product, the national space program expands to a significant degree the size of the base on which our taxes are levied. It increases the profitability -- yes, the constructive profitability -- of the private sector of our economy.

Sixth. The area of law and order. In every aspect of the space challenge, there is the need for legal order. To preserve freedom in space, to assess international liabilities and responsibilities, to develop just rules and procedures and then to see that they are complied with -- all these are as essential to the space challenge as the rockets, the spacecraft, and the astronauts. The legal challenge becomes more complex as the nations participating in space activities multiply in number. Yet, the basic issue of justice and order remainsthe same. Let us not forget as we move to meet this legal challenge that we are dealing with a society of men motivated by terrestrial standards of value.

It is through groups such as are assembled here today that the hope for legal order regarding space rests. Strive not to seek order for the sake of order, but for the sake of world peace. The space challenge, if met in reasonable terms by reasonable men can be a major factor in forming a world of peace. On the other hand, if it is approached in an arena of chaos and an atmosphere of aggression and individual exploitation, it can lead down the path through which freedom is lost.

It is meetings such as this one in which you are about to participate that excite the imagination and generate those fresh ideas which are essential to our continued growth and success in the preservation of outer space for the free use and enjoyment of all mankind. The concepts you are gathered here to consider are essential to space progress and more importantly to world peace. May you all be inspired to brilliance in your endeavors.

RELEASE P. M.'s AUGUST 8, 1964

REMARKS BY DR. EDWARD C. WELSH, EXECUTIVE SECRETARY
NATIONAL AERONAUTICS AND SPACE COUNCIL

to
AEROSPACE INDUSTRIES ASSOCIATION COUNCIL
Seattle, Washington
August 8, 1964

This is indeed a distinguished audience. Without the organizations and resources you command, this great nation might otherwise be in a second place position in strength, in technology, and in prosperity. I compliment you on the job you are doing.

Profit Motive

I very much appreciate the frequent briefings which we receive from your representatives in regard to new developments, new studies, and new proposals. They are mostly excellent. The quality of the individuals making such presentations is very high. I am also impressed with what they have to say and how they say it. I do, however, have one complaint regarding this service. Frequently -- not always -- but frequently -- the briefers will somewhat apologetically admit that, in addition to the main motives of patriotism and the desire to beat the Russians, their companies also have interest in making some money out of a development or production contract. Whenever I hear something like that, I feel like giving a little lecture to the effect that in a capitalistic society one should not apologize for seeking to make a reasonable profit. It is a myth that your government is opposed to private profits. The defensive attitude of some of your representatives in this respect does tend to perpetuate that myth. Obviously, profits should not be the only motivation of your companies, but it should be a major one, and you should be proud of it.

Aerospace Trends

This leads me, without too much strain, to a subject of interest to all of you, namely, what does the future hold so far as aerospace activity is concerned? Obviously, I can only suggest some trends and express some personal opinions. These could be summarized as follows:

1. I do not see any substantial decrease in the dollar amount of defense spending in the immediate future. However, to the extent that conditions warrant such a decrease, it would be a sad commentary on our type of society if we were not able to transfer some of our energies from the production of military equipment to other useful types and forms of economic activity.

2. The most efficient and logical direction of such transfer would be toward an expanding space program. It would be difficult for anyone to name an activity more clearly identifiable with economic progress than is the exploration of outer space. From such activity flow new materials, new processes, and improved management techniques. In what activity do we discover greater stimuli to education and to increasing our gross national product? Moreover, it is reasonable to conclude that increased space activity would actually accentuate the trend toward world peace by diverting the same skills and facilities from weapons systems to space systems. It is my thesis that mutual disarmament -- and prudence dictates that there should be no other kind -- would greatly increase the flow of funds and effort in space exploration and into the building of greater space capability.

3. Part of any decrease in the production of weapons systems should be offset by an increase in the research and development of advanced weapons technology. We must stay on the technological alert. All too often, the emotional impact of disarmament falls upon the fields of research and development rather than upon operational and obsolescing weapons systems where it belongs. Economies can properly be found in the discontinuance of systems and facilities no longer needed, but savings should not be sought from investments necessary for the development of new methods and new systems.

4. Space systems have peculiar advantages in the keeping of the peace. Hence, a trend away from weapons of aggression should be replaced with a trend toward systems of surveillance, detection, and interception from space. I hasten to add that such measures cannot and should not be expected to meet all of the defense needs of a nation seeking to maintain a permanent peace. However, space systems can be and will be an increasingly important factor in helping to maintain the peace. This is a type of insurance we should stimulate.

5. Shifts in emphasis, from weapons systems to advanced research and development and to space systems, will have a significant effect upon the aerospace industry. Even if the dollar volume of your contracts increases -- and I expect over the coming years this will be the case -- the major demand will be for your most able engineers, scientists and managers. Less attention will go to quantity of output; more attention to quality of personnel and equipment. This is going to present a considerable challenge to the management of each of your companies.

6. Contrary to alarming reports, there is no depression in the space business. Look at the record. The total spent on space by all agencies of the government in 1964 is more than six times what it was in 1960. This is a business which has moved in the last four years from a gross of less than $1 billion to more than $6 billion. That is a remarkable rate of expansion. True, such a rate of increase is not going to continue, but assuming a favorable election this year, I would expect that the trend of space expenditures would be upward. Such trend should be consonant with an increasing gross national product.

7. It is probable that the large number of new starts which has characterized the space business during the few short years of its history will decline. Of necessity, more emphasis will be placed toward completing or expanding projectsalready started. While there will probably be fewer starts, the new projects which do commence will probably be more sizable. The lunar project seems like a huge enterprise -- and in a sense it is -- but if one strips it of the new facilities and other assets of general utility to the whole space program, he finds that what is left is not particularly large dollar-wise compared with what might be expected for the more complex projects of the future.

8. We are just at the beginning of a technological revolution, sometimes referred to as the Age of Space. It is indeed a very short-sighted person who thinks that we have arrived at a technological pleateau. As I see it, by 1980, the new developments will be so manifold that people will look back at these days and wonder how we could have been impressed with the few developments which characterize them. It is wise to invest your faith and your resources in the expansion of technology.

9. In addition to a wide range of space projects, both classified and unclassified, it is reasonable to expect that this country will develop larger and longer-lived manned space stations, follow the initial lunar landing with extended exploration of the lunar surface, and engage in an expanding program of interplanetary exploration. For these projects and the spacecraft and propulsion systems necessary to make them successful, it is important that we begin as soon as possible to invest adequately our talents and funds in the essential long lead-time items.

Public Education

On a previous occasion, I have suggested that members of the aerospace industries share with their government a responsibility for educating the general public to the importance of the national space program. On that occasion, there were some who misinterpreted my remarks as a suggestion for decreasing advertising in the trade journals, since I had noted that

significant amounts of money were being spent in that fashion. My point is, however, that the aerospace companies should not do less advertising, but rather that they should do more advertising, some of which should be for specific products and some for a better public understanding of the space program.

I believe that a somewhat less than impressive job is being done in selling the space program on which the country's future may well depend. Consequently, I suggested and now reemphasize that some of the time, energy, and funds available to members of the aerospace industries would be well invested if they were used to stress the importance of space competence to our national security, our national welfare, and our standard of living. In fact, I would even go so far as to suggest that some such expenditures might be worthwhile profit-wise even if they were not allowable as costs in government contracts.

As we attempt to carry out our responsibilities in educating the general public about the national space program, there are a few concepts which need particular emphasis.

Space Program Values

The space program has been a catalyst, a stimulus to education at all levels, with particular attention to science and engineering. How much is it worth to have raised the educational sights of our young people and at the same time to have increased significantly the wealth of knowledge with which to condition them? I cannot put a price on it, but I believe its value will exceed the total cost of the space program.

The contribution of our space program to our national security is also considerable. How much more secure are we, due to improved communications, more accurate navigation, more complete weather information, and better world-wide mapping. How much is it worth to be better informed about potential sources of danger? How can we assess the advantage of developing competence to detect and offset possible aggression from space? I cannot put a price on these contributions to national security, but I am confident that their value also exceeds the total cost of the space program.

The spaceprogram stimulates the development of new products, new productive processes, and new managerial techniques. I cannot place a precise value upon such innovations, but I would estimate that such investment will repay itself many times over.

A substantial difference in influence in world affairs evolves from whether a country is in a first position or a second position in power. To a significant degree, a nation's relative position depends on how it stands in advanced technology. International prestige is not a mantle to be weighed lightly or to

be worn carelessly. We should be concerned with the image that people of other nations have of the United States. The ideal picture is that of a nation strong in ideas, in technology, in freedom, in standards of living, and in military power to protect the viability of the other prestige ingredients. The space program, effectively and imaginatively conducted, contributes positively to all of those ingredients. I do not know how much such a contribution is worth, but I am confident that if we fail to strive for it, we will be making it clear that we no longer value our freedom highly.

Combining, as the space program does, the best talents in management, in engineering, and in science, with the most modern facilities available, the net result is the production of progress. A program which stimulates education, expands research and development, augments total productivity, increases employment, and improves our international relations, is a program of the greatest economic significance. By increasing our total national income and gross national product, the national space program expands to a significant degree the size of the base on which our taxes are levied. It increases the profitability -- yes, the constructive profitability -- of the private sector of our economy.

Gentlemen, you can gather from the preceding remarks that I am an optimist as regards the basic strength and growth of the space program. However, I believe that each of us has a responsibility to spread throughout the nation solid understanding of the program and its benefits, if such optimism is to be warranted.

Thank you.

RELEASE 2:00 P. M. (EDT)
AUGUST 27, 1964

ADDRESS BY DR. EDWARD C. WELSH, EXECUTIVE SECRETARY
NATIONAL AERONAUTICS AND SPACE COUNCIL

At the Dedication of the

NORTH AMERICAN AVIATION, INC., SCIENCE CENTER
JAMES HOWARD KINDELBERGER MEMORIAL LABORATORIES

Thousand Oaks, California
August 27, 1964

It is a privilege to be with you in such pleasant surroundings and to participate in the dedication of these outstanding facilities for the advance of science. I appreciate North American's invitation to speak on this occasion -- first because of my close connection with aerospace developments, and second because I cherish the memory of an acquaintance with Dutch Kindelberger. In this connection, I would like to commend Lee Atwood and his associates for their fine judgment in dedicating the laboratories to Dutch's memory. This Science Center typifies the spirit that was found in full measure within him -- the willingness and even the eagerness to adapt the organization to meet new challenges.

Character of the Center

I would like to take a few minutes to mention some of the outstanding features of this new research organization, which have come to my attention.

It is very significant that the Center does not work on any products, except as it may give specialized advisory help to other divisions of the company. Rather, it is concerned with the advance of knowledge in the broad fields of interest to the company. The application of this knowledge to specific products is the province of others.

Also, the Science Center management recognizes a fundamental necessity in basic research -- that only the scientist with specialized knowledge in his field knows how to explore the various theoretical and experimental approaches that may lead to new knowledge. Therefore, the Center has been staffed with

highly qualified scientists in pertinent areas of interest, and gives them the most advanced facilities appropriate to their work. But, they are not told how to conduct their research.

In short, this organization is engaged in what is called "pure science" -- the advance of knowledge for its own sake -- in contrast to "applied science."

Partly because of this concept, the Center has been able to attract creative scientists of the highest quality. The roster of its staff includes some of the most respected authorities in the disciplines represented here.

These scientists are engaged in pursuing new knowledge that will benefit both the company and the Nation. The knowledge which each of them gains in his specialized field is at the disposal of the company in helping to solve its most complex technical problems. I stress that this same knowledge is added to the Nation's scientific stockpile through the close liaison maintained with the rest of the scientific community.

Missions

It is often desirable -- sometimes even essential -- that individuals and organizations have rather specific goals or missions. There is value in knowing what the requirements are -- in having advance knowledge of what is expected of your efforts. But, I want to emphasize the importance of having some of our energies and some of our facilities and some of our funds devoted to activities from which we cannot predict the end results. This is investment in the production of new knowledge, new technology, new experiences -- as such, it is an investment essential to progress.

It would indeed be a sad state of affairs if we arrived at a condition of contentment and satisfaction with the level of our understanding or the status of our technology. The man who looks backward instead of forward may have his uses, but leadership is not one of them.

In contrast, North American has, with its investment in this impressive Center, shown the type of individual leadership which will help a great nation grow greater in the future.

The Space Program

President Johnson has said:

> "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 dwarf their imagination while enriching their country."

No area of endeavor provides a broader opportunity for basic research. If one wished to be generous in his judgments, he would call "blind" the individual who says we should abandon the Apollo program. One can be grateful, however, that the majority of our citizens have more confidence in the Nation and more faith in the advantages of increased knowledge. Those of little faith would have us bury our talents rather than invest them in progress.

The whole complex activity of exploring space is important not only because the many private and governmental organizations contributing to space flight are continually uncovering new facts, new products, and new processes which bring immediate benefits to mankind. These benefits are only the beginning. Looking beyond them, we see vast unknown frontiers opening up, with unguessable discoveries yet to be made. Step by step we are conquering the hostile environment of space. We are accumulating new knowledge about the heavenly bodies, and disproving old beliefs about them.

I would emphasize several points about the space program:

First, it is here to stay;

Second, it promises a profitable return on investments in basic research;

Third, it will be an expanding activity, with no finite limits to its potential;

Fourth, it will enhance our national security, stimulate our accumulation of knowledge, improve our standard of living, and further the chances of world peace.

From time to time, one hears the suggestion that the exploration of space should be slowed down. This would, of course, lessen the benefits which flow so freely from the program. But, the slowdown proponents are willing to deprive the Nation of such benefits in the interest of hoarding money. After all, they say or seem to say that knowledge and accomplishment and international prestige and national security are less important than money. Obviously, I believe in investing money wisely rather than in refraining from using it. I believe these great facilities we are dedicating today are evidence that North American shares this belief.

What is equally disturbing about those who adhere to this slowdown philosophy is that they don't understand that they are actually recommending waste and higher costs. To slow down a carefully planned project such as Apollo would be to increase its cost and reduce its likelihood of timely success. Key to the waste involved is the break-up of highly competent teams of scientists, engineers, and managers. Key also to the waste is the resultant partial

idleness of facilities rather than their full use and at the same time failure to make productive use of manpower and facilities on other new projects. Those who propose a stretch-out or slowdown in the space program are in effect arguing for inefficiency and higher costs, as well as delayed accomplishments.

New Emphasis on Technology

Beyond particular applications in national defense, or in space programs the rise of science as a powerful national tool has brought about a significant change in the complexion of American industry. It has done so because industry itself -- certainly the aerospace industry -- has responded vigorously to the challenge.

To measure this response, let us examine its history and see where such institutions as this Science Center fit into the pattern. Until the 1930's, a company's technical effort -- as distinguished from manufacturing -- was largely confined to engineering. There were spectacular innovations that transformed the Wright Brothers' invention into a potent military weapon and a practical commercial transport. But these were primarily imaginative applications of knowledge, rather than new additions to knowledge.

During the 1930's, and particularly toward the end of the decade with the approach of World War II, we entered a new phase. Industry and government launched conscious efforts in research -- especially applied research. Among the revolutionary results were radar, jet propulsion, and nuclear fission.

By the middle of World War II the military services were calling for new types of weapon systems that could take maximum advantage of these scientific advances. This meant growing emphasis on research and development in contrast to straight production; much longer lead time in developing new products; the rise of concurrent development and production; and vastly increased development costs.

The response was effective investment in expensive new facilities, hiring a larger proportion of engineers, diversifying into a much greater variety of activities, and generally upgrading the training and skills of both employees and management.

Still another result was that industry began working ahead of actual requirements for specific products. Larger and more advanced facilities were established to promote the state-of-the-art -- irrespective of particular development or production contracts. In fact, technical progress made by both government and industry had the effect of generating new requirements. Such progress made available new possibilities that the Nation, for its own safety, could not afford to ignore. In general, during this period, industry was concentrating on applied research -- the pursuit and use of knowledge for particular purposes.

Basic Research

Now we are observing a third and most remarkable step in the aerospace industry's technical progress. That industry's conscious and organized activities now begin, not with engineering, nor even with invention, but at the very sources of knowledge.

From the industry's standpoint, a science Center, such as this, accomplishes at least two main purposes. First, it accelerates a company's own capacity to identify and apply new knowledge, and thus strengthens its competitive position in the industry. At the same time, the Center provides the company with a window on the world's scientific processes -- a means of receiving, digesting, and disseminating the latest data appropriate for the company's activities. These functions should be appreciated by all who have an interest in our country, as well as those who have a direct interest in this company as stockholders or as employees.

For the Nation, the rise of basic science in the aerospace industry has deep significance. It means that more people of the highest technical training, experience, and motivation will be devoted to the quest for fundamental knowledge. These people and these facilities are really not competing with university research centers or other institutions already engaged in scientific investigation. On the contrary, they constitute new reinforcements in the assault on the unknown.

In all of these areas of continued investigation, the full-blown advent of basic science in industry represents a new era. The knowledge gained here becomes part of the entire body of knowledge vital to the Nation's overall progress. The advances made by these laboratories are swiftly shared with others throughout the country through scientific publications and the reading of papers at technical symposia. I understand that for two years in a row, this young organization -- still modest in size -- has been the Nation's second greatest contributor of papers before the American Physical Society. This is an asset not only of North American, but of the United States itself.

For all of these reasons, I attach profound significance to today's dedication. Industry's recognition of basic research, added to its long established work in production, development, and applied research, gives fresh and powerful impetus to the Nation's scientific progress. It sharpens still further an absolutely essential tool in pursuing our national purpose.

I am proud to have had the opportunity to participate in this important event.

Thank you.

R. V. MROZINSKI

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~~EXECUTIVE 3-3300~~

~~EXT. 2816~~

STAFF MEMBER
NATIONAL AERONAUTICS AND SPACE COUNCIL
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D. C.

File SD - Space

RELEASE A. M.'s SEPTEMBER 19, 1964

ADDRESS BY DR. EDWARD C. WELSH, EXECUTIVE SECRETARY
NATIONAL AERONAUTICS AND SPACE COUNCIL

CITY OF PHILADELPHIA AND THE GREATER PHILADELPHIA
CHAMBER OF COMMERCE

Commercial Museum
Philadelphia, Pennsylvania
September 18, 1964

It is a pleasure and a privilege to be here this evening. I was honored to be invited by both your distinguished Mayor and the President of the Chamber of Commerce of this great metropolitan area. To my way of thinking, that adds up to a very special sort of invitation. In addition, I am pleased to help honor NASA on its sixth anniversary and also to preview the Man-in-Space exhibition at the Commercial Museum.

Space Exhibition

I understand that the exhibition is impressive. I am confident that it marks a forward-looking step. It is evident that far-sighted civic leaders have realized that this great new space era is here to stay and hence they have thoughtfully planned to enlighten the community on the progress being attained. It is such a current field, however, that we must wait for part of the history to be made before the evidence can be displayed. The developments in space are so amazing that even the most active imagination has difficulty keeping ahead of the accomplishments. I want to congratulate the city of Philadelphia for its Museum and particularly for this new space exhibit. I also congratulate NASA for its role in making this exhibit possible.

Misconceptions

The space program has many mysterious aspects, not the least of which are the misconceptions created about it. It takes a certain type of ability to manufacture plausible-sounding myths, and unfortunately such ability has been working overtime regarding the space program. I would take a few minutes of your time to examine several of these confusing rumors about our space effort.

1. National Security. First of all, we are told that our space activity is all directed toward going to the moon while neglecting our military competence. The facts do not support that accusation. For example, during the last twenty-one months, we have put more than 100 payloads into earth orbit, of which about 80 percent were put there by the Department of Defense. I hasten to add that this in no way plays down the significance of the NASA launches. It is cited merely to give a factual account of the amount of defense activity in our space program.

Moreover, less than half of our total space expenditures go to what is loosely referred to as the "lunar venture." I say "loosely" because most of what is being devoted to the lunar project would be spent to develop space competence even if there were no goal of a manned trip to the moon. Do not be misled by those who would have you believe that we are spending $20 billion just to put a man on the moon. The fact is that the $20 billion figure includes the cost of developing large rockets and sophisticated spacecraft which will have many uses, only one of which is the lunar trip. The $20 billion figure also includes the Gemini project, which is devoted to extending our experience and increasing our competence in manned space flight in earth orbit, including the rendezvous and docking of two spacecraft. These developments in rockets, spacecraft, rendezvous and docking, tracking, etc. -- all contribute to a strong national security base for keeping the peace, not for aggression.

The fact is that the Department of Defense is annually spending about a billion and a half dollars in space research and development. This includes projects in navigation, communications, observation, detection, booster development, scientific instrumentation, command and control techniques, interception, and manned and unmanned space flight. In addition, various space projects of NASA, the AEC, and the Weather Bureau contribute directly or indirectly to improving our national security.

One of the outstanding features of our national space program is the close and efficient working relationship between NASA and the Department of Defense. This interface includes the exchange of personnel, the sharing of scientific and technical knowledge, and the use by one agency of the boosters and spacecraft developed by the other. The critic who belittles what is being done in space to

strengthen the nation's defense is either ignorant, irresponsible, or both. This does not mean that I am satisfied with the rate of progress, but I do accept facts as facts. Progress of a substantial nature is being made in strengthening our national security through space competence.

2. Crash Program. A second misconception which cannot stand exposure to factual analysis is the assertion that we have a "crash" program in space. Of course, anyone who knows anything about crash programs would never talk that way. Crash programs have unlimited funds, unlimited overtime, and parallel approaches to the end objective. None of these aspects applies to the space program or even to the lunar project. Funds are not unlimited; overtime does not characterize the activity; and a single approach to the lunar trip is being followed. Moreover, the speed of the program is geared to getting the most progress per dollar spent rather than the most progress in the shortest period of time. Whether we should or should not have a crash program is a different question, but to assert that we do have one is to deny the facts and distort the truth.

3. Either/Or Philosophy. A third misconception about our space program flows from those whose reasoning is handicapped by what might be called the "either/or"philosophy. In the simplest terms, this concept is that we can have either a space program or better educational advantages, but not both; that we can have either a space program or a slum elimination program, but not both; that we can have either a space program or a program to care for the elderly and the ill, but not both. It is my belief that most people who hold such narrow views are opposed to progress in general rather than specifically opposed to space exploration. They probably would not vote more money for education or public housing even if they could curtail the space program. They might be known as the "fiscally responsible" type of individuals at whose hands this country's health has suffered before. They are the type who let us get behind the Soviets in space while at the same time we were experiencing recessions and very slow economic growth. We already know that path well enough and do not plan to travel it again.

No realist believes that this country cannot afford to invest in our national security and in technological progress just because we are not investing enough in some other phases of our economy. Actually, investments stimulate other investments; they do not deter them. This is not an either/or proposition, i.e. schools or space. Rather, the one helps the other. Both are needed and both can be afforded. What is more, decreased spending in education, for example, does not automatically increase the funds available for space exploration, or vice versa. We cannot afford to neglect any of the basic essentials, including space exploration, if we are to continue to be the world's leading peace-loving and freedom-loving nation.

4. Slowdown. A fourth misconception is that we should slow down the program and thereby save money. At first blush, this "what's the hurry?" philosophy may sound reasonable. In fact, the proposition has only two things wrong with it. First, such an approach would be of great benefit to the Soviets as it would make it easier for them to increase their lead in some aspects of space and attain the lead in others. Do not think for a moment that they are not trying hard to do just that. So far this year, the USSR has put more than twice as many spacecraft into orbit as they had put into orbit by this time last year. In a sense, they are doubling their space effort. The second thing wrong with the slowdown approach is that it doesn't save money; it wastes it. To slow down a carefully planned project, such as Apollo, would be to increase its cost and reduce its likelihood of timely success. Key to the waste involved is the break-up of highly competent teams of scientists, engineers, and managers. Key also to the waste is the resultant idleness of facilities rather than their full use. Those who propose the stretchout or slowdown in the space program are in fact arguing for inefficiency and higher costs as well as delayed accomplishments.

Space Race

Now that we have sharpened our awareness that the space program

... is making a major contribution to our national security,
... is not a crash program,
... is not being pursued at the expense of other primary objectives, and
... cannot be slowed down without raising costs and benefiting the Soviets,

I would turn your attention briefly to how we stand in the space race.

1. As regards that key feature: booster power, the Soviets are still ahead on an operational basis, although we are moving up rapidly, having attained the current weight-lifting record on a test shot by the Saturn I.

2. We have placed almost three times as many payloads into earth orbit, while they continue each year to increase their absolute lead in total weight of net payloads orbited.

3. Our numerical progress in orbiting payloads is impressive. Since January 1963, the U. S. has put more payloads into earth orbit than the USSR has since Sputnik I in 1957.

4. The increased reliability of our launchings is also impressive. During the past three years, we placed successfully into earth orbit about 85 percent of all the payloads which we attempted to put there. The Soviet record, while not identical, is comparable.

5. The Soviet heavy Vostok class of vehicle has accumulated more than 2500 orbits, as compared with 37 for our smaller Mercury. In flying time, even their female cosmonaut has gained more orbital experience than all our astronauts combined. Gemini, Apollo, and MOL may well correct that imbalance, but at the present we are well behind.

6. The Soviets have devoted more of their attention to deep space than we have. As a percentage of total space launching attempts, they have devoted four times as much effort to escape-missions to the moon and planets as we have. The opposite is true as to near-earth orbits, in which our emphasis has been much greater than theirs.

7. Both countries have made impressive strides in accumulating scientific data about space. We may even be ahead in this regard, but, if so, the margin is not large.

8. The U. S. is clearly ahead in world-wide sharing of space research in cooperative programs, and in direct application of space technology to practical use in communications, weather reporting, geodesy, and navigation. I want to emphasize that the Soviets have a strong, orderly program, with every indication that it is continuing vigorously, apparently unaffected by adverse economic factors in their country. Wishful thinking to the contrary, we dare not slow down unless we are willing to pay the exorbitant price of second place. We have made very impressive progress in the past several years. Our gains have been encouraging.

The Future

And now I would glance with you at what the space program may look like in the future. Keep firmly in mind that the program is here to stay and that its trend will be one of expansion rather than contraction.

Application of space-oriented knowledge will increase at an increasing rate. Weather prediction and possibly even weather control will save vast amounts of property and thousands of lives annually. Communication by satellites will link the nations of the world closer together and aid in the sharing of knowledge, the conducting of business, and the avoidance of international misunderstandings and disputes. New materials, new products, new processes will flow from the space program to raise our standard of living. Our national security will be enhanced as satellites contribute to our alertness to what other nations are doing, contribute to the observance of treaties, and divert competitive energies from earth-bound aggression to peaceful competition in limitless space. Our knowledge of the earth's origin will be greatly increased and our education stimulated.

As for space projects, we will explore the moon, not just visit it; we will explore the planets, not just fly by them; space laboratories will be generally accepted as extensions of laboratories here on earth; and spacecraft and space rockets will be recoverable and reusable.

It is my thesis that we are entering such a period of prosperity, technical opportunity, and social progress that our previous accomplishments will pale by comparison. The vitality of the space program will contribute immensely to this building of a greater society.

As President Johnson has said:

> "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 dwarf their imagination while enriching their country."

United States Senate

MEMORANDUM

Speech for Howard Hughes space Center in Los Angeles on Oct. 2. This center produces the Syncom satellite which is suitably lauded in the speech.

[Oct. 21 1964]

Jill - ED Space

Space Challenge

I heartily agree with President Johnson's statement : "Seldom in its lifetime is a country fortunate enough to be confronted with such a challenge as that of the national space program."

After an inexcusably late start during the Republican Administration, we are now meeting the challenge of space with mounting success. Your work here has been of great significance in helping to meet that challenge.

At this great space center, I want to make a special point of our success in the field of communication, particularly in the form of that magnificent satellite known as Syncom.

Syncom is a world's first -- a tribute to government and private enterprise working together. Syncom is playing a major role in international affairs -- both in giving us

better communications with troubled areas in the Far East and also in increasing our reputation for useful service by the forthcoming transmission of the Olympic games from Japan. The satellite is indeed a major success, and I want to commend everyone who has worked to produce this achievement.

Our space competence in personnel, in facilities, and in knowledge is a national asset of prime importance. It enhances our national security, creates new industrial capacity, managerial techniques, and productive processes, stimulates our educational system and provides better jobs, promotes both national and regional economic development, affords opportunities for international cooperation in the interest of world peace, and acts as a working symbol of national prestige.

The space program has grown rapidly to make up for the inadequacies of the years before 1961, and can now hold to a

steady pace consistent with the growth of our gross national product. Our orderly space program will permit us both to reap equitably the benefits of space research throughout the nation and also to meet other goals of our great society.

In his customary irresponsible way, the temporary Republican spokesman wants to slow down our space effort. He is particularly opposed to the manned lunar program, which he says should be abandoned. It is apparent that the Senator is completely out of step with the Congress of the United States and with both the Republican and Democratic Administrations since 1958.

It is almost inconceivable, yet apparently true, that the ~~Senator~~ leader of the Goldwaterites disapproves of the Mercury program, and all the competence contributed to our nation by Astronauts Shepard, Grissom, Glenn, Carpenter, Schirra, and Cooper.

It is almost inconceivable, yet apparently true, that the

leader of the Goldwaterites ~~Senator~~ does not know that the Gemini program is also a part of what he would have abandoned. This is the program which will help develop our ability to rendezvous and dock in space -- competence necessary to our national security as well as to the development of space stations.

It is inconceivable, yet apparently true, that the ~~Senator~~ leader of the Goldwaterites fails to realize how the lunar program contributes to our national defense. This program includes the development of large rockets to surpass the Soviets, the development of great facilities which can be used for military as well as non-military purposes, the training of skilled pilots for spacecraft, the improvement of electronics and command and control capabilities, and the construction of national engineering and scientific resources superior to any other in the world. Why do you suppose the ~~Senator~~ leader of the Goldwaterites wants to stop these activities? Why do you suppose the Senator wants a program which

will make it easier for the Soviets to attain first place in the world of space?

The short generous answer to those questions is simply that he doesn't understand the national space program.

The Goldwater Platform states that the Democratic Administration "has retarded our own military development for near and outer space." As usual, the facts refute the Goldwater Platform statement 100%. The official published data -- that is, the actual budget figures -- show the following:

1. In the last four years of a Republican Administration (1957-1960), space expenditures by the Department of Defense equalled only $1 billion.

2. In the last four years of Democratic Administration (1961-1964), space expenditures by the Department of Defense equalled $4.6 billion.

3. In other words, the Democrats have pushed military space activity by a ratio more than four times as great as that of the previous administration.

This is hardly retardation, although it does give some evidence of some mental retardation on the part of those who prepared the Republican Platform.

Those of you who are devoting your time to the space program know that it helps lay the foundations of world peace and cooperation, that it advances progress in science and technology, and that it improves our standard of living, standard of health, and standard of education.

You in the space programs know that great national ventures, undertaken with careful consideration and massive effort, should not be abandoned because of the whim of/an insufficiently informed Presidential candidate.

To preserve our space program, our constructive domestic achievements, our responsible Presidential control over nuclear weapons, and a prudent and enlightened foreign policy, we need a President who has demonstrated his understanding of the problems of today's world. Just as the achievements of the space program, once abandoned, could not be immediately regained,

so the achievements of our great nation, once Presidential restraint over our nuclear arsenal is abandoned, could never be restored. Beware the prophets who call for quick solutions in an age in which instant victory is equivalent to instant annihilation. Elect a man who knows that responsibility and prudence must be the hallmark of any President in the nuclear age. Elect Lyndon Johnson, a man who cares enough about our great American achievements to avoid risking them in one impetuous moment. We have worked too hard for America; we have achieved too much; we have too much to offer the world to risk all by joining a desperate lemming-like march into the sea. If we meet our challenges with perseverence and without wild panic, our nation will survive and flourish in freedom.

5c WF-Space

COPY

November 14, 1964

Mr. Harold Berger
Berger and Stein
1220 Philadelphia Saving
Fund Building
12 South Twelfth Street
Philadelphia, Penna. 19107

Dear Harold:

I appreciate so much your kind offer of assistance in relation to my duties as Chairman of the President's Space Council. I am sure we will be calling upon you and your Committee frequently. This is a challenging and new assignment for me and I look forward to it with great anticipation.

Best wishes.

Sincerely,

Hubert H. Humphrey

LAW OFFICES

BERGER AND STEIN

1220 PHILADELPHIA SAVING FUND BUILDING

TWELVE SOUTH TWELFTH STREET

PHILADELPHIA, PA. 19107

HAROLD BERGER
WALTER STEIN
CECIL MAIDMAN
R. ADRIENNE BONNELLY
WILLIAM J. DUIKER *

*MEMBER OF D. OF C. BAR ALSO

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November 6, 1964

The Honorable Hubert H. Humphrey
Vice President-Elect of the United States
c/o Senate Office Building
Washington, D. C.

My dear Mr. Vice President:

As National Chairman of The Federal Bar Association Committee on Space Law, it is my great pleasure to offer to you the full cooperation of our Committee in your new duties as Chairman of the President's Space Council. Rest assured that the National Committee stands ready to be of service to you at any time.

With warmest personal wishes, I am

Sincerely yours,

HAROLD BERGER

HB:rdt

Warmest personal wishes

The United Nations and Sovereignty in Outer Space

By HAROLD BERGER

National Chairman, The Federal Bar Association Committee on Space Law

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THE UNITED NATIONS AND SOVEREIGNTY IN OUTER SPACE

By Harold Berger

National Chairman, The Federal Bar Association
Committee on Space Law

Unmanned space craft will soon land on the moon to collect lunar material and radio scientific reports to earth. Additional satellites will orbit around the moon and Mars, transmitting photographs of hidden surfaces. And manned space expeditions are currently in final planning stages.

In view of rapid achievement in the space sciences and the technological success of the Ranger VII moonshot in August 1964—one of the most productive experiments in scientific history—it is indeed fitting to discuss current United Nations aspects of activity and sovereignty in outer space containing celestial bodies and space stations now being designed for orbital placement.

Existing international flight agreements and customary rules of international law affirm that every state has the absolute right to control all movement in an area called air space above its land and waters, and that air space over the high seas is as free for international use as are the high seas themselves. See Article I of the Paris Convention of 1919 on the "Regulation of Aerial Navigation," which sets forth that "the High Contracting Parties recognize that every power has complete and exclusive sovereignty over the air space above its territory."

The Chicago Convention of 1944 similarly adopted a restatement of existing international law by providing in Article I "that the Contracting State has complete and exclusive sovereignty over the air space above its territory." Prior to the Chicago Convention, the United States, in both the Air Commerce Act of 1926[1] and the Civil Aeronautics

1. 44 Stat. 568 (1926); 49 U.S.C. Section 176 (1958).

Act of 1938,[2] asserted sovereignty over the air space above its land and waters. Although the term "air space" is nowhere defined, it seems evident that the draftsmen of this legislation and of the pertinent sections of the Paris and Chicago Conventions had no thought at the time of space vehicles, space travel, appropriation of celestial bodies or orbital placement of space stations.

It can thus be concluded that existing agreements did not, by their terms as previously understood, apply to cosmic space and, therefore, such agreements left the regime of outer space an open question.

In connection with the legal-political status of celestial bodies, President Eisenhower, in an address before the United Nations on September 22, 1960, proposed that celestial bodies should not be subject to national appropriation by any claims of sovereignty and that the nations of the world should not engage in warlike activities on these bodies.

Subsequently, on December 20, 1961, the General Assembly of the United Nations adopted the following celebrated Resolution[3]:

"The General Assembly,

"Recognizing the common interest of mankind in furthering the peaceful uses of outer space and the urgent need to strengthen international cooperation in this important field,

"Believing that the exploration and use of outer space should be only for the betterment of mankind and to the benefit of States, irrespective of the stage of their economic or scientific development,

1. *Commends* to States for their guidance in the exploration and use of outer space the following principles:

(a) International law, including the United Nations Charter, applies to outer space and celestial bodies;

(b) Outer space and celestial bodies are free for exploration and use by all States in conformity with international law, and are not subject to national appropriation;

2. 52 Stat. 973, 980 (1938); 49 U.S.C. Section 401 (33) (1958).
3. U.N. Gen. Ass. Res. 1721 (XVI).

2. *Invites* the Committee on the Peaceful Uses of Outer Space to study and report on the legal problems which may arise from the exploration and use of outer space."

Thereafter, in an address before the United Nations in October 1962, President Kennedy stated that proposals should be urged extending the United Nations Charter to the limits of man's exploration of the Universe and reserving outer space for peaceful use by all nations.

On December 19, 1962, the United Nations General Assembly adopted Resolution 1802 (XVII) calling upon Member States to cooperate in the further development of law for outer space; requesting the Committee on the Peaceful Uses of Outer Space to continue urgently its work on the further elaboration of basic legal principles governing the activity of States in the exploration or use of outer space; and referring to the Committee certain draft proposals submitted by the U.S.S.R.,[4] the United Arab Republic,[5] the United Kingdom[6] and the United States.[7]

Following several meetings of the Committee on the Peaceful Uses of Outer Space, a draft Declaration of Principles was submitted to the General Assembly of the United Nations for consideration and was unanimously approved on December 13, 1963, as Resolution 1962 (XVIII). This landmark Resolution declares inter alia that the exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind; that outer space and celestial bodies are free for exploration and use by all States on a basis of equality and in accordance with international law; and that outer space and celestial bodies are not subject to national appropriation by claim of sov-

4. Union of Soviety Socialist Republics: Draft Declaration of the Basic Principles Governing the Activities of States Pertaining to the Exploration and Use of Outer Space.
5. United Arab Republic: Draft Code for International Co-operation in the Peaceful Uses of Outer Space.
6. United Kingdom of Great Britain and Northern Ireland: Draft Declaration of Basic Principles Governing the Activities of States Pertaining to the Exploration and Use of Outer Space.
7. United States of America: Draft Declaration of Principles Relating to the Exploration and Use of Outer Space.

ereignty, by means of use or occupation, or by any other means.

This resolution further sets forth that the activities of states in the exploration and use of outer space are to be carried on in accordance with international law, including the Charter of the United Nations; that states bear international responsibility for national activities in outer space whether carried on by governmental agencies or by non-governmental entities; and that in the exploration and use of outer space states shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space with due regard for the corresponding interest of other states.

Resolution 1962 (XVIII) further provides that the state on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object and any personnel thereon while in outer space; that each state which launches or procures the launching of an object into outer space and each state from whose territory or facility an object is launched is internationally liable for damage to a foreign state or to its natural or juridical persons by such object or its component parts on the earth, in air space or in outer space.

Finally, Resolution 1962 (XVIII) sets forth that states shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress or emergency landing on the territory of a foreign state or on the high seas. Astronauts who make such a landing are to be safely and promptly returned to the state of registry of their space vehicles.

Conclusion

Although Resolution 1962 (XVIII) is not a legislative enactment, it would clearly appear in view of draft declarations submitted, United Nations General Assembly Resolution 1721[8] (XVI), and the unanimous approval of Resolution

8. Supra note 3.

1962 (XVIII) by the United Nations General Assembly, that the international community, or at least all members of the United Nations, have indeed accepted the fundamental doctrines that outer space and celestial bodies are free for exploration and use by all states in conformity with international law; that this freedom includes establishment of space stations[9] and free navigation by means of space vehicles; and that outer space and celestial bodies are not capable of appropriation[10] or exclusive use by any state.

9. See Meyer, Prof. Dr. Alex, Legal Problems of Outer Space. Address delivered before the Annual Meeting of the Deutsche Gesellschraft fur Rakententechnik und Raumfahrt in Munich on May 8, 1959; translation from "Rechtsprobleme des Weltraumgebiets," "Raketentechnik und Raumfahrtforschung," 1960, p. 1 et seq. The author is Director of the Institute of Air and Space Law, University of Cologne, Germany.

For legal problems relating to communications satellites see Berger, Harold, "Legal Problem-Subjects of Communications Satellites In and Out of Orbit," 34 Pa. Bar Association Quarterly, pp. 510-522 (1963).

10. See The New York Times, Aug. 17, 1964, p. 1, for statement issued by President Johnson urging that all nations join through the U.N. to place the "peaceful realms of space off limits to the designs of aggressors on earth."

Warmest personal Wishes

Legal Problem-Subjects of Communications Satellites In and Out of Orbit

By HAROLD BERGER

B.S. in E.E., Moore School of Electrical Engineering of the University of Pennsylvania; LL.B., University of Pennsylvania; Chairman, Committee on Space Law of the Philadelphia Bar Association; Fellow, British Interplanetary Society; Member, International Institute of Space Law, American Institute of Aeronautics and Astronautics

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LEGAL PROBLEM-SUBJECTS OF COMMUNICATIONS SATELLITES IN AND OUT OF ORBIT

By Harold Berger

Chairman, Committee on Space Law of the Philadelphia Bar Association

I. Introduction

Less than a century ago, in 1866, the first transatlantic telegraph cable was installed thus beginning direct continent to continent communication. Slightly over 35 years ago, transatlantic telephone communication first began via long-wave radio. Today, although approximately 300 high quality telephone channels are in use across the Atlantic, it is abundantly clear that many more long-distance communications channels will become urgently needed in the near future not only for possible telephone requirements, but also for important television and data transmissions.[1]

At the present time, the world's communication traffic is, of course, heaviest in sections of high industrial productivity. Approximately 57% of the world's telephones are in North America, 30% in Europe, 6% in Asia, 2% in South America and only 1.4% in Africa. Although traffic to and from North America currently represents about 80% of the world's total, this figure will gradually be reduced as communication traffic increases in other areas.[2]

The heavy volume of transatlantic telephone calls (including voice, data and other services) is estimated to be increasing currently at the rate of 20% per year, while total overseas telephone calls are predicted to increase from 4.3 million in 1961 to nearly 100 million by 1980.[3] It is thus becoming more obvious to electronics engineers and technical planners that existing intercontinental facilities

1. See Jaffe, Communication by Satellite, International Science & Technology, August, 1962, p. 44.

2. See text of address by Brophy delivered at the Space Law and Sociology Conference held on April 24, 1962, at the Carnegie Endowment Building, New York City, sponsored by the American Rocket Society.

3. *Ibid.*

will become totally inadequate not only for essential telephone communications, but also for important broadband communications such as telecast relays presently contemplated.

In view of the increased burden presently placed on all channels of communications, the use of microwave technique for point to point communications (first introduced in 1947) has become more important daily while masers and lasers[4] are yet in the theoretical development stage. Today, a large part of all inter-city telephone and television communications make use of microwave facilities. Since microwave beams travel in straight lines and since the earth is curved, a microwave signal once it passes the horizon goes off into space. This factor limits microwave communication links to line of sight distance. Signals must, therefore, be transmitted from horizon to horizon by relay stations located as high as possible on mountains or towers. The necessity of raising the height of relay stations by placing them in earth orbit to provide ocean spanning microwave communications thus becomes apparent.[5] It is, therefore, appropriate to discuss with concise background some significant provisions of the unique Communications Satellite Act of 1962.

II. Communications Satellite Act of 1962[6]

Since the United States cannot alone operate an international communications system, the Federal Communications Commission in March 1961 (approximately fifteen months prior to the launching of Telstar), began an inquiry as to what entity should represent the interests of the United States in a proposed commercial communications satellite system.[7] Thereafter, during the summer of 1961,

4. See *The Wall Street Journal*, Dec. 11, 1962, p. 6; see also *Electrical Engineering*, Dec. 1962, p. 978.

5. See text of address by Moulton to Sections on Public Utility Law and Corporation, Banking and Business Law, 85th Annual Meeting, American Bar Association, San Francisco, Cal., August 7, 1962; see also Crocker, Communications and Instrumentation, p. 92, *Astronautics*, a publication of the American Rocket Society, Nov. 1962.

6. 47 USCA §701-§744.

7. Notice of Inquiry, F.C.C. Docket No. 14024, March 29, 1961.

five Congressional Committees held 21 days of hearings on communications satellites.[8] In addition, the F.C.C. appointed an Ad Hoc Committee comprised of interested American international carriers with instructions to formulate a plan of organization. On October 13, 1961, the Ad Hoc Committee recommended the creation of a non-profit corporation to be established by United States carriers, so incorporated that it would not be controlled by any single carrier.[9] Thereafter, on August 31, 1962, the Communications Satellite Act of 1962 was enacted.

The declaration of policy and purpose of the Act is set forth as follows:[10]

"(a) The Congress hereby declares that it is the policy of the United States to establish, in conjunction and in cooperation with other countries, as expeditiously as practicable a commercial communications satellite system, as part of an improved global communications network, which will be responsive to public needs and national objectives, which will serve the communication needs of the United States and other countries, and which will contribute to world peace and understanding.

"(b) The new and expanded telecommunication services are to be made available as promptly as possible and are to be extended to provide global coverage at the earliest practicable date. In effectuating this program, care and attention will be directed toward providing such services to economically less developed countries and areas as well as those more highly developed, toward efficient and economical use of the electromagnetic frequency spectrum, and toward the reflection of the benefits of this new technology in both quality of services and charges for such services.

"(c) In order to facilitate this development and to provide for the widest possible participation by private enterprise, United States participation in the global system shall be in the form of a private

8. Senate: Committee on Commerce; Subcommittee on Monopoly of the Select Committee on Small Business.
House: Committee on Interstate and Foreign Commerce; Committee on Science and Astronautics; Committee on Judiciary, Anti-trust Subcommittee.

9. For the text of the Ad Hoc Committee Report, see Hearings on Space Communications and Allocation of Radio Spectrum, Communications Subcommittee, Senate Committee on Commerce, 87th Cong., 1st Sess. 203-69.

10. 47 USCA §701.

corporation, subject to appropriate governmental regulation. It is the intent of Congress that all authorized users shall have nondiscriminatory access to the system; that maximum competition be maintained in the provision of equipment and services utilized by the system; that the corporation created under this Act be so organized and operated as to maintain and strengthen competition in the provision of communications services to the public; and that the activities of the corporation created under this Act and of the persons or companies participating in the ownership of the corporation shall be consistent with the Federal antitrust laws.

"(d) It is not the intent of Congress by this Act to preclude the use of the communications satellite system for domestic communication services where consistent with the provisions of this Act nor to preclude the creation of additional communications satellite systems, if required to meet unique governmental needs or if otherwise required in the national interest."

The Act, although authorizing the creation of a communications satellite corporation for profit which was not to be an agency or establishment of the United States Government[11] nevertheless permits the Government to control the actual formation of the corporation and to retain a strong and permanent voice in its operations. Indeed, the Act specifically sets forth that the President shall appoint the incorporators who shall serve as the initial board of directors.[12] In addition, the Articles of Incorporation are required to be approved by the President[13] who will have the permanent right to name three individuals to the corporation's permanent fifteen member board of directors. Six other directors will be elected by communications companies that purchase stock in the corporation while the remaining six directors will be elected by the other stockholders of the corporation.[14] The President, moreover, is to keep the corporation under continuous review and will "exercise such supervision over relationships of the corporation with foreign governments or entities or with international bodies as

11. 47 USCA §731.
12. 47 USCA §732.
13. 47 USCA §732.
14. 47 USCA §733(a).

may be appropriate to assure that such relationships shall be consistent with the national interest and foreign policy of the United States."[15]

The National Aeronautics and Space Administration under the Act is to advise the F.C.C. on technical characteristics of the communications satellite system and is to cooperate with the corporation in research and development to the extent deemed appropriate by the Administration in the public interest.[16] The Act further provides that N.A.S.A. shall "furnish to the corporation, on request and on a reimbursable basis, satellite launching and associated services required for the establishment, operation, and maintenance of the communications satellite system approved by the Commission."[17]

The Federal Communications Commission will have much broader powers to regulate the day-to-day operations of the satellite corporation than it currently exercises over communications concerns. The Act, for example, confers on the F.C.C. authority to "insure effective competition" among companies that will supply the corporation with satellites and other equipment.[18] The Commission also will be able to require the corporation to set up satellite terminal stations at any foreign point in the national interest and will control vital access to the satellites since neither the corporation nor any existing communications concern will be able to build a satellite terminal station without a Commission construction permit.[19]

As to financing, the satellite corporation is to have voting stock eligible for dividends and priced initially at a price not in excess of $100 for each share. At no time after the initial issue is completed shall the aggregate of the shares of voting stock of the corporation owned by authorized carriers directly or indirectly, through subsidiaries or affiliated com-

15. 47 USCA §721(a)(2) and §721(a)(4).
16. 47 USCA 721(b)(2).
17. 47 USCA 721(b)(5).
18. 47 USCA 721(c)(1).
19. 47 USCA §721(c)(3) and §721(c)(7).

panies, nominees or any persons subject to their direction or control, exceed 50 percentum of such shares issued and outstanding. Further, at no time shall any stockholder who is not an authorized carrier, or any syndicate or affiliated group of such stockholders, own more than 10 percentum of the voting stock of the corporation issued and outstanding.[20]

Vast expectations exist for the satellite corporation which will, of course, transmit telephone, telegraph, television, radio and data communications on a commercial basis. American Telephone and Telegraph Company's Telstar satellite has been a significant and highly helpful experiment and many additional communications experimental satellites are presently being designed for future launching.

"The ultimate result," President Kennedy declared at the Bill signing ceremony, "will be to encourage and facilitate world trade, education, entertainment and many kinds of professional, political and personal discourse which are essential to healthy human relationships and international understanding."[21]

III. Communications Satellites and the United Nations

President Eisenhower, in an address before the United Nations on September 22, 1960, stated:

"... We press forward with a program of international cooperation for constructive peaceful uses of outer space under the United Nations. Better weather forecasting, improved world-wide communications, and more effective exploration not only of outer space but of our own earth—these are but a few of the benefits of such cooperation."

And in October 1962, President Kennedy stated:[22]

"... We shall propose, finally, a global system of communications satellites linking the whole world in telegraph and telephone and radio and television. The day need not be far away when such a system will televise the proceedings of this body to every corner of the world for the benefit of peace."

20. 47 USCA §734.
21. *The Wall Street Journal*, Sept 4, 1962, p. 24.
22. Address before the United Nations.

It thus became clear that complex issues involving the law of communication satellites would in the future be the subject of intensified thought and attention as new satellites were placed into orbit and new peaks of scientific achievement were reached. It is, therefore, appropriate to enumerate with background some novel legal problem-subjects involving space communications and communications satellites which have already arisen, have been recognized or may indeed arise in the future.

By Resolution 1348 (XIII)[23] of December 13, 1958, the General Assembly of the United Nations established an Ad Hoc Committee on the Peaceful Uses of Outer Space, consisting of the representatives of eighteen nations including the United States, Great Britain and Russia.[24]

The work of the Ad Hoc Committee began on May 6, 1959, and was conducted at United Nations Headquarters in New York. Two committees of the whole were established, one constituted as a technical committee, and the other constituted as a legal committee with valuable assistance being received from the United Nations Secretariat.[25]

After conclusion of the initial period of activity on June 25, 1959, the Ad Hoc Committee presented to the United Nations General Assembly at its 14th Session a significant report on the Peaceful Use of Outer Space, which report was docketed as United Nations Document A/4141, and dated July 14, 1959.[26]

Thereafter, at its 856th Plenary Meeting on December 12, 1959, the General Assembly adopted Resolutions 1472 A

23. See Report to the U.N. Gen. Ass. Off. Rec. 14th Sess. (A/4141) (July 14, 1959).
24. Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Iran, Italy, Japan, Mexico, Poland, Sweden, Union of Socialist Soviet Republics, the United Arab Republic, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.
25. See Note by the Rapporteur, U.N. Doc. (A/4141), July 14, 1959.
26. For the full text of this report, see Symposium—Legal Problems of Space Exploration, prepared for the use of the Committee on Aeronautical and Space Sciences, United States Senate, Document No. 26, 87th Congress, 1st Session, Appendix B(1) pp. 1246-1272 (March 22, 1961).

(XIV) and 1472 B (XIV) dealing with international cooperation in the peaceful use of outer space.

By Resolution 1472 A (XIV),[27] the established Committee on the Peaceful Uses of Outer Space was requested to study practical and feasible means for giving effect to programs in the peaceful uses of outer space which could appropriately be undertaken under United Nations auspices. Means suggested by the Resolution included organization of the mutual exchange and dissemination of information on space research; the study of legal problems which may arise from the exploration of outer space; and the encouragement of national space research programs.

The General Assembly further provided that there should be convened, under the auspices of the United Nations, an international scientific conference of interested members of the United Nations and members of the specialized agencies for the exchange of experience in the peaceful uses of outer space and requested the Secretary-General to make the necessary organizational arrangements for holding such a conference.[28]

Subsequently, on December 20, 1961, the following United Nations General Assembly Resolution dealing with satellite communications was unanimously passed:[29]

"The General Assembly,

Believing that communication by means of satellites should be available to the nations of the world as soon as practicable on a global and non-discriminatory basis,

Convinced of the need to prepare the way for the establishment of effective operational satellite communication,

1. *Notes* with satisfaction that the International Telecommunication Union plans to call a special conference in 1963 to make allocations of radio frequency bands for outer space activities;

2. *Recommends* that the International Telecommunication Union consider at this conference those aspects of space communication in which international cooperation will be required;

27. See also U.N. Doc. (A/4351).
28. See U.N. Gen. Ass. Res. 1472 B(XIV).
29. See U.N. Gen. Ass. Res. 1721(XVI)D.

3. *Notes* the potential importance of communication satellites for use by the United Nations and its principal organs and specialized agencies for both operational and informational requirements;

4. *Invites* the Expanded Programme of Technical Assistance and the United Nations Special Fund in consultation with the International Telecommunication Union to give sympathetic consideration to requests from Member States for technical and other assistance for the survey of their domestic communication facilities so that they may make effective use of space communication;

5. *Requests* the International Telecommunication Union, consulting as appropriate with Member States, the United Nations Educational, Scientific and Cultural Organization, and other specialized agencies and governmental and non-governmental organizations, such as the Committee on Space Research of the International Council of Scientific Unions, to submit a report on the implementation of these proposals to the Economic and Social Council at its thirty-fourth session and to the General Assembly at its seventeenth session;

6. *Requests* the Committee on the Peaceful Uses of Outer Space, as it deems appropriate, to review this report and submit its comments and recommendations to the Economic and Social Council and the General Assembly."

In view of the consistent recommendations made by the General Assembly to date, there can be no serious doubt that the United Nations will continue to exert substantial efforts to prepare the way for the establishment of an internationally effective operational satellite communications system in the "interests of the development of science and the improvement of the well-being of peoples."[30]

IV. Legal Problem-Subjects of Communications Satellites and the International Institute of Space Law

The establishment of the International Institute of Space Law in 1959 represented the culmination of many years of work within the International Astronautical Federation. One of the basic purposes of the International Astronautical Federation is to promote space flight as a peaceful

30. See U.N. Gen. Ass. Res. 1472 B(XIV), second paragraph.

international project. In addition, the I.A.F. facilitates high level cooperation among astronautical scientists and development of legal and political programs designed to promote such international cooperation.[31]

In fulfillment of these objectives, the I.A.F. has had as one of its principal functions the development of international space law. Accordingly, on August 31, 1959, the following Resolution was approved by the Plenary Session of the 10th I.A.F. Congress held in London:

"Resolved that the presently constituted Permanent Legal Committee of the International Astronautical Federation be replaced by an International Institute of Space Law and that an ad hoc organizing committee consisting of five persons and a secretary, be authorized to draft by-laws for the organizations and government of the proposed institute, which will be in accordance with the constitution of the I.A.F., and subject to the approval of the Council of the I.A.F. at a future meeting.

"That the General Counsel of the I.A.F. is authorized to establish immediately such Working Groups as are necessary to consider the legal problems of space, which are today considered perhaps capable of resolution, for example, space radio allocation frequencies, now being considered by the International Telecommunications Union in Geneva, Switzerland."[32]

In April 1960, eleven Working Groups were constituted and chairmen appointed. The services of these Working Groups were officially offered to the United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space which had been formed in December 1958. The legal subjects involving space communications presently under study of these Working Groups cover such complex problems as those set forth in the following precise language:[33]

31. See Report of the U.N. Gen. Ass. Ad Hoc Committee on the Peaceful Uses of Outer Space, Part 1(E), Para. 1(a) of U.N. Gen. Ass. Res. 1348(XIII).

32. See British Interplanetary Society, IV Spaceflight 94 (1962).

33. See letter from Andrew G. Haley, General Counsel, International Astronautical Federation of Academician Leonid D. Sedov, Chairman, Commission on Astronautics, U.S.S.R. Academy of Sciences, Moscow, U.S.S.R., Dec. 27, 1960. See also British Interplanetary Society, IV Spaceflight 94 (1962).

1. What provisions should be made for the determination by national and international organizations of the nature and extent of the requirements for the use of radio in spaceflight activities? What is the status of current knowledge as to the extent of such requirements at present and in the foreseeable future?

2. What provisions should be made for the determination by national and international organizations of the radio frequencies available for use in spaceflight activities? What is the extent of current provisions in national and international law for allocations for such uses of radio frequencies?

3. What provisions should be made for international agreement on interference involving radio frequencies used in spaceflight, including the following subjects:

(a) interference to radio transmissions in spaceflight activities;

(b) interference from radio transmissions in spaceflight activities to other uses of radio;

(c) termination of transmissions from radio transmitters in space, especially those operating unattended;

(d) establishment of priorities for transmission and reception involving spaceflight activities where interference would result from simultaneous transmissions from several sources;

(e) identification of transmissions to aid in the determination of the sources of transmissions and interference?

4. Is the International Telecommunication Union (I.T.U.) presently constituted so as to be capable of regulating the use of radio in spaceflight activities? To this end, what are the present legal capabilities of the I.T.U. with regard to the matters listed below, and in what respects should the International Telecommunication Convention and the Radio Regulations of the I.T.U. be enlarged, or modified, so as to permit the resolution of these issues:

(a) In what manner should radio frequencies be allocated for use in spaceflight activity, *i.e.*, on an exclusive basis, on a shared basis involving other uses, to individual nations, to world organizations, and the like?

(b) What is the extent of the I.T.U.'s jurisdiction? Can frequency allocations be enforced by the I.T.U. as to uses outside the earth's atmosphere?

(c) Are the existing agencies of the I.T.U. capable of making continuing studies of the uses of radio in spaceflight activ-

ities? In what respects should the agencies of the I.T.U. coordinate such studies with other bodies such as the I.A.F.?

The International Telecommunication Union (I.T.U.) is the body responsible for the international coordination and rational use of all forms of telecommunications by land-line, submarine cable or radio means. It is advised by two technical committees, the International Telegraph and Telephone Consultative Committee and the International Radio Consultative Committee (C.C.I.R.), which deal with line and radio problems respectively. In the field of radio communication, I.T.U. drafts regulations which, among other things, define the conditions, procedure and standards for all applications of radio to the communication of intelligence in any form, including telegraphy, telephone, picture transmission, broadcasting television, radar, navigational aids and scientific uses such as radio astronomy.[34]

As an indication of the future dangers that could be expected for the telecommunication services, it is easily possible for a satellite equipped with an effective radio transmitter to be supplied with batteries charged by solar radiation to continue in orbit for many decades. This could seriously interfere with communications that operate on the same frequency or adjacent frequencies that are used by the satellite for its transmission during its travel around the earth.

According to the 1947 Convention drawn up at Atlantic City, I.T.U. acts as the general agent for the allocation of radio frequencies, promotes the development of technical facilities by establishing standards and operating rules in order to improve telecommunication services and harmonizes the activities of nations for the attainment of these ends.

Although allocations for space and earth-space radio services were included in the radio regulations annexed to the International Telecommunication Convention signed in Geneva in 1959, the inadequacy of the allocations for future expanded uses was frankly admitted by the representatives

34. See Report to the U.N. Gen. Ass. Off. Rec. 14th Sess. (A/4141) (July 14, 1959).

of many of the signatory nations. Accordingly, all nations tentatively agreed at the Geneva Conference to convene an extraordinary administrative radio conference in 1963 to provide adequate radio spectrum segments for all categories of cosmic space communications and services.[35]

V. Conclusion

In view of the foregoing, it seems essential that the complex field of communications satellites and space communications should be immediately and effectively regulated on an international basis under United Nations supervision in order to insure future peaceful and cooperative exploration of cosmic space.

35. See Haley, A Basic Program for the 1963 Extraordinary Administrative Radio Conference on Space Communication; Symposium—Legal Problems of Space Exploration, prepared for the use of the Committee on Aeronautic and Space Science, United States Senate, Document No. 26, 87th Congress, 1st Session, p. 694 (March 22, 1961).

OFFICE OF THE VICE PRESIDENT
WASHINGTON, D.C.

May 20, 1966

FOR: The Vice President

FROM: Don Paffel

Forgot to mention that the basic speech for Williamsburg combined the talents of Dr. Welsh, David Williams and me -- with smoothing by Ted Van Dyk.

DEPARTMENT OF STATE

FOR THE PRESS

MAY 16, 1966 NO. 112

for Lee Carter VP

CAUTION - FUTURE RELEASE

FOR RELEASE ON DELIVERY SCHEDULED FOR MONDAY, MAY 16, at 2:30 P.M. E.D.T.
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ADDRESS BY THE HONORABLE U. ALEXIS JOHNSON,
DEPUTY UNDER SECRETARY OF STATE FOR POLITICAL AFFAIRS,
BEFORE THE OPENING SESSION OF THE UNITED STATES
SEMINAR ON EARTH STATION TECHNOLOGY,
DEPARTMENT OF STATE, WASHINGTON, D.C.
MAY 16, 1966

Communications experts from 40 nations

Mr. Solomon, Seminar participants, friends and colleagues in government and the United States communications industry, honored guests, ladies and gentlemen. It is a great pleasure to welcome you to the Department of State on the occasion of our Seminar on Communication Satellite Earth Station Technology.

While we have had considerable experience in this country with technical cooperation programs, we undertake today for the first time the presentation of an extended seminar under the auspices of the International Telecommunication Union. We have wanted to do this for a long time. The seminar approach affords an opportunity to explore a single subject in depth and to provide, in an orderly way, all available information on that subject. At the same time it provides a first hand opportunity for a free exchange of ideas, the generation of pertinent questions and perhaps, in some degree, progress toward answers to those questions. In any event this is a cooperative effort and we hope to benefit from your presence in the same way that we hope you will benefit from your experience here.

At the outset we considered the possibility of holding a seminar on any one of a number of currently important topics. Very quickly, however, our choice narrowed down to the general subject of satellite communications. In a world where those of us who are not technicians find it increasingly difficult to grasp fully the startling advances of scientific technology, few developments have appealed more dramatically to the imagination of all people than man's first steps into space. Communication by earth satellite relays

relays is an application of space technology which has already passed from the experimental to the practical. At the same time it offers the promise of rewards still dimly understood by most of us.

In recognition of this potential we have been engaged for several years in the promotion and establishment of a single global communication satellite system, owned by many nations, accessible to all members of the International Telecommunication Union. The initial germ of this concept has become a reality. Today 49 countries, many of which are represented here, share in the ownership and operation of the space segment of a satellite system through membership in an international consortium. These 49, shortly to be joined by others, represent at least 90 percent of the potential international telecommunications traffic which a global satellite system might serve in the next few years. The Department of State takes pride in the role it has played in the negotiation of the international agreements which have made this consortium a reality. The countries represented here should take pride in the role they have taken in making the consortium an effective instrument.

Under the international agreements the Communications Satellite Corporation is the entity designated by law to participate for the United States. In addition, it acts as manager of the system for the consortium. I need hardly add that the corporation, or COMSAT as it is more familiarly known, has played a major role in the proceedings which commence this afternoon. The advent of commercial satellite communication was assured in April 1965 when "Early Bird" successfully entered its orbit. Less than three months later inaugural ceremonies celebrated the beginning of actual commercial operations. I am told that "Early Bird" has a capability of transmitting 240 simultaneous telephone conversations or 6200 teletype messages, or; as many of us have seen dramatically demonstrated on one or another of several historic occasions, live television. I am further told that "Early Bird" is only the

forerunner

forerunner of more advanced satellites to come. Commercial service will be expanded, using more versatile spacecraft over the Atlantic and Pacific by the fall of this year. Plans are already underway for far larger satellites having a capacity of approximately twelve hundred two-way voice channels, five times the capacity of "Early Bird".

Difficult though it may be for some of us to grasp the complexities of earth satellites and their delicately-tuned packages, I understand that the earth stations which transmit and receive communications to and from communication satellites represent perhaps an even more crucial element of the total system. On the one hand they must be able to detect the faint satellite signals and boost their power tens of billions of times. On the other they must transmit strong signals for the satellite to repeat. The more we considered the possibilities of the field, the more it appeared to us that earth stations and their technology should be our choice for the topic of our Seminar. This was especially true since many of you may expect to acquire earth station facilities in the not too distant future.

As all of you know, one of the first and largest stations in the United States was constructed by the American Telephone and Telegraph Company in 1962 at Andover, Maine. This facility has served under the direction of COMSAT as the North American Early Bird Link. In addition COMSAT is building earth stations in Hawaii and the State of Washington for the establishment of service with Japan, Australia and other nations of the Pacific. Stations abroad are already located in England, France, West Germany and Italy. Canada has a new station at Mill Village, Nova Scotia, which those of you who are from other countries will be able to visit after the close of our program here. Programs are under way or under active consideration which by 1968 will assure the completion of earth station facilities in a number of additional countries in Asia,

Latin America

Latin America and Africa. By that time global coverage will essentially be achieved.

Very probably the technology of earth stations will play an important part in the plans of the communications interests which you represent. Our purpose here is to provide you with as much information as possible from our own experience to assist you in meeting problems of earth stations in your own countries. At the same time we hope to learn from you the kinds of problems which such projects might be expected to encounter. So for the next two weeks we will all be students and teachers together in a school established uniquely for this purpose.

The Department of State is honored to have you here. Obviously, however, we in the Department do not count among our numbers those best qualified to assist you with the technical sessions. Accordingly we have called upon other government agencies and, more especially, upon the United States communications industry for their cooperation, their support and their technical resources. Their response and their generosity have been most gratifying.

COMSAT itself has acted as program coordinator. However, our contributions to the program have orginated not only with COMSAT but with a considerable number of industry sources. More than 45 faculty members, if I may use that term, will present lectures. This same faculty will be available to deal with your questions and to discuss any matters of particular interest which you may wish to raise with them.

Under the coordination of the Department of Commerce a number of exhibits related to topics of the seminar are displayed in adjoining rooms. They will remain on view throughout the Seminar and we trust that they, too, will contribute to your experience here.

The National Aeronautics and Space Administration, in coordination with the industry, has arranged a program of field trips which will follow the two-week period of the Seminar. We hope that as many of you

as

as possible will take advantage of this program which will include visits to earth station installations and pertinent equipment manufacturing plants.

At the request of the Vice President of the United States I should like to read the following message which he has addressed on this occasion to you, our distinguished visitors from other countries.

"I greatly regret that I am unable to be with you today. You represent countries sharing our interest in an exciting new application of space technology: global communication through earth satellites. I am confident that the great expansion of global communication promised by this capability will go far to foster the growth of cultural and trade exchanges so important to the development of peace and understanding among peoples throughout the world. I wish you every success in your endeavors and hope that you will find this Seminar helpful and rewarding."

There is little I can add to the words of the Vice President. Ladies and gentlemen I bid you welcome to Washington and to the Department of State. May your stay be satisfying and may you return to your homes with new insights on the future of satellite communication and the ways it may affect the lives of all of us.

* * *

Vice President's Msg — Don & Darlah

Speech file

RELEASE P. M.'s JUNE 9, 1966

ARMED FORCES COMMUNICATIONS AND ELECTRONICS ASSOCIATION
Industrial Luncheon

Address by Dr. Edward C. Welsh, Executive Secretary
National Aeronautics and Space Council

Washington, D. C.
June 9, 1966

It is a pleasure to be asked to participate in the 20th Annual Convention of this distinguished Association.

I plan to talk with you briefly about aspects of the national space program, some of which are not those of communications or electronics in the specific and technical sense. However, I find it impossible to talk sensibly about space without first acknowledging the basic role of communications and electronics every step of the way.

Basic Elements

Communication forms the lifeline, so to speak, between terrestrial managers and equipment on the one hand and our satellites in space on the other. We cannot even build a sophisticated satellite, let alone operate it, without electronics. There is no point in sending a satellite to places or to distances with which we cannot communicate, just as there is little point to having a satellite out in space if it cannot communicate back to earth. Without communications, based on advanced electronics, there would be no extension of man's capacity to sense and control, and satellites would have neither practical nor scientific merit.

Without electronics, our weather satellites would be blind, our communications satellites mute, and our navigation satellites disoriented. In fact, it is inconceivable that we could have even begun the engineering of rockets without electronic sensors to report what was happening inside the test models so that the state of the art could be advanced and necessary design changes made.

Communications and electronics are indeed major controlling factors as to what we can do in space. They are the tools of growth, the instruments of progress, and the competence essential to our whole space program.

As you can see, I do not even need to exaggerate when I emphasize the importance of communications and electronics to this Nation's standing in the field of space.

Perspective Re Space Competition

Reference as to how we stand in space suggests that we might spend some time building perspective as to what our space accomplishment position is relative to that of the USSR. It is always useful to know how and what your competition is doing. In the field of space, however, it is not easy to answer that question because it is so difficult to measure precisely the accomplishments of either country, although we know rather well what progress has been made both here and abroad.

Before getting more specific in any comparison of the two countries' space achievements, I want to make several observations which should help put such comparison in an understandable light. First of all, I suggest that more attention should be given to how we can become further advanced and what we are going to do next in space than to who is ahead of whom at any given point in time.

In order to weigh properly any comparison of space accomplishments, it is important that we understand and emphasize the principle that this country should be doing most, if not all, of what we are now doing in space even if the USSR or any other countries had no space programs or space competence. We should be doing these things for the practical reason that the space program is a seedbed of invention, a spur to our productivity, a source of insurance for our national security, a stimulus to education, and a world-wide ambassador for peace. In other words, its benefits are manifold and we would indeed be careless of our country's welfare if we did not seek emphatically to obtain those benefits.

I further suggest that it is a matter of judgment, rather than one of mathematical measurement, as to who is ahead in what. Certainly, the fact that one country has accomplished something first is not necessarily a basis for concluding who is ahead now, and particularly it is no basis for predicting who will be ahead in the future.

Comparative Progress

Now, to be a bit more specific on areas of relative accomplishment, I list the following:

1. Number of spacecraft. The United States has placed almost 400 spacecraft into earth orbit and on escape missions, while the USSR has put slightly less than 200 on such missions. In other words, the mathematical ratio is approximately 2 to 1 in favor of the United States. However, some of this differential is offset by the fact that the Soviets have placed each year a greater total weight of payloads into space than has the United States.

2. Lunar and Interplanetary. The United States has been far less active but considerably more successful in its interplanetary activities than has the USSR. We have photographed Mars and had a productive fly-by of Venus while the USSR's active interplanetary program has been primarily plagued by failure. In addition, we have taken some 17,000 photographs of the moon and are taking hundreds more by the magnificent Surveyor spacecraft so recently and so successfully soft-landed on the lunar surface. On the other hand, the USSR has also photographed the moon and was first with a soft lander on the moon's surface and a spacecraft placed into lunar orbit.

3. Manned Flight. So far as manned space flight is concerned, the U.S. at this time has a distinct lead over the USSR, with about 1500 man flight hours in orbit compared with about 500 such hours for the USSR (3 to 1), with the longest individual flight as well as the longest extra-vehicular activity. Also, the U.S. has had two controlled rendezvous maneuvers, one docking experiment, and considerable manned spacecraft maneuvering experience. So far, the USSR has achieved none of these latter goals.

4. Space Applications. The United States has navigation, weather, and communications satellite systems in regular operation, while the USSR is still in the developmental stage in such activities.

5. Scientific Data. Both countries have obtained substantial amounts of scientific data from space, with no way of measuring accurately the qualitative lead that one country may have over the other. It is not unreasonable to conclude, however, that the larger number and greater variety of U.S. scientific payloads, as well as the wider and freer dissemination of the information obtained, may well have added more to the world's store of knowledge.

6. Propulsion. During most of the space program's history, the USSR has surpassed the United States in the field of propulsion so far as the amount of thrust is concerned although not in the quality of technology. This thrust advantage is much less true today as both countries have in operation and under development larger and more advanced propulsion systems.

From the brief factual presentation just made, it is reasonable for us to conclude that the space competition is close, with the United States having a current edge in over-all space capability. This status has been recently acquired and is not sufficient to form even the slightest basis for complacency since the Soviets have a strong, orderly program and are devoting a bigger percentage of their gross national product to it than we are investing of our GNP to our program.

In concluding this analysis, let me re-emphasize the point which I stressed as I began this comparison, and that is that we should have a forward-looking and vigorous space program even if no one else were engaged in such activity.

Electronics: A Challenge

Now, I return to a few more thoughts about the fields of primary interest to you, as they relate to space.

It is difficult to imagine the proper design of space systems, including their original selection, without a great amount of computer assistance. Sensors on spacecraft and rockets, communications links, command circuits, guidance systems, all represent the difference between an unguided, slow explosion not going anywhere significant and the mechanical equivalent of intelligence functioning in a purposeful way through the application of electronic devices of many different types.

The fundamental question is: Why do we send payloads into space? The factual answer is: to collect information. And information in the mechanistic sense means bits of information which can be handled electronically by the millions and billions, collated, processed, assessed, and presented in meaningful form through the use of or by computers.

Men go into space partly to guide the spacecraft and its equipment so that these vast numbers of bits of information may be gathered. True, they also go to experience personally things that abstract information may not convey the same way. And, more importantly, men go into space to ask the right questions -- many of the answers to which can then be obtained by electronics and by other techniques. In any practical sense, it is hard to imagine men apart from an intimate relationship with electronic equipment. As our space effort becomes more complex, the relationship between man and his machines will become even more important.

One of the major constraints on our space operations is the limited capability of on-board electrical power supplies. The present family of spacecraft have

been designed around the use of solar cells, batteries, and fuel cells. These are not suited, however, for the high power long life requirements for planetary exploration spacecraft. Also, broadcast type communication satellites, in order to provide economical service, will need reliable long lifetime power supplies of the order of 100 kilowatts or more. The development of nuclear power supplies appears to be our only option in meeting this type of requirement.

Because propulsion is also a limiting factor to space travel, the ingredient of electronics represents a way to overcome limitations of propulsion. The electronics industry can design smaller components, integrated circuits, lighter weight sensors, and clever new control devices. On board computers can supply information permitting more refined uses of propulsion so as to conserve fuel in conducting a rendezvous, or in selecting a re-entry corridor. More sensitive electronic devices permit sending higher amounts of data bits for a given expenditure of power, and novel ways of sorting out meaningful information from the "noise" surrounding the desired signal. The electronic industry can also design longer life, reliable systems which will reduce the number of times we have to pay for expensive launch vehicles either to replace operating payloads or to try long range flights which might not work because of low mean-time-to-failure performance on long flights to other parts of the solar system.

These are some of the challenges for your industry, and they are ones which your inventive people have shown a willingness to accept. Yours is an area of fantastic progress. It is indeed a rare month when significant new developments are not being announced. The Nation owes you a great debt, and your unfailing continued efforts will be needed indefinitely. It is fortunate that we build upon the foundations of what we have learned before. For your industry faces ever greater challenges, demanding more imagination and inventiveness all the time. And this added effort builds upon your accomplishments which can only astound even the best informed.

Moreover, yours is an area of endeavor which will undoubtedly lead the way in the imaginative conversion of space stimulated developments to the solution of non-space problems, to the production of new products and new or improved services -- in other words, to the general benefit of our whole people and to those of other countries as well.

Progress in Communications

Before I end this brief commentary, I would suggest that it is time we revised the recently held view that communications satellites would likely develop into a useful supplementary system for international communications. Now, we can revise that to read: a useful primary system for both domestic and international communications.

We can also visualize for the relatively near future direct broadcasting via satellites as well as point-to-point broadcasting. We can certainly see satellite communications becoming a major factor in increased understanding between peoples, increased education of peoples, increased commerce among peoples, and above all, increased security due to decreased misunderstanding and surprise. The communication of weather, navigation, and other information essential to our defense and national security will aid our terrestrial forces and be a source of alertness to our policy makers. Such communications are essential and must be improved, advanced, and made more effective.

Again, I urge that you accept these challenges as you have in the past. Nothing is impossible when it is approached with the enthusiasm and the optimism, so characteristic of this organization and its members.

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