

REVIEW OF THE SPACE PROGRAM

WEDNESDAY, JANUARY 27, 1960

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

Hon. Overton Brooks, chairman, presiding.

The CHAIRMAN. Dr. Glennan, go ahead with your statement.

(Dr. T. Keith Glennan, Administrator, National Aeronautics and Space Administration, after being sworn in, took the witness stand.)

STATEMENT OF DR. T. KEITH GLENNAN, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Dr. GLENNAN. Mr. Chairman and members of the committee, I appreciate this opportunity to discuss NASA's program and its \$802 million budget appropriations request for fiscal year 1961.

The continuing interest in our program shown by the individual members of this committee has been stimulating and gratifying. I have had the personal privilege of accompanying several members on visits to our research centers and to test launchings at Cape Canaveral. And all who have made these visits have expressed sincere gratification at the quality and dedication of the men who are carrying forward the Nation's space exploration program.

Before entering upon a discussion of our budget request and program, I want also to express publicly my appreciation for the effective support given to our operations by the several military services and by the Office of the Secretary of Defense. Cordial and effective working relationships have been developed during the past year and I am confident that the means now exist, or are in the process of creation, that will further minimize duplication and encourage even more effective mutual support in this difficult but exciting business.

As you know, the President recently directed me to study the possible need for additional funds to accelerate the high-thrust launch vehicle program. As soon as this study has been completed, we will be requesting substantial additional funds.

The fiscal year 1960 budget appropriation was \$500,575,000. If the pending \$23 million supplemental request is granted by the Congress, the fiscal year 1960 total will be \$523,575,000.

Several members of our administrative and technical staffs will follow me with a detailed, program-by-program review of the \$802 million fiscal year 1961 budget request in the following three principal categories:

Salaries and expenses.....	\$167,560,000
Research and development.....	545,153,000
Construction and equipment.....	89,287,000

I would like to discuss with you some of the pertinent facts about the Nation's program in space exploration as I see them today. In doing this, I will start with an evaluation of our position with respect to that of our competitor in this business, the Soviet Union. Then I would like to point out the major events in NASA's operations over the past year and outline the course we must follow if we are to gain for the United States the advantages that accrue to a nation demonstrating leadership in the science and technology which must undergird a program in space exploration.

It is clear that the Soviet Union continues to hold a substantial space lead in the eyes of the world. It is equally clear that this lead is based principally upon the possession by the Soviets of one or more reliable launch vehicle systems having perhaps twice the thrust of our own first stage booster rockets.

This imbalance will continue until we have achieved a launch vehicle system that fully exploits the thrust of the Atlas through the construction and use of properly proportioned new upper stages, or until we have achieved a launch vehicle system which is based on a much more powerful first stage rocket—or both.

In no other aspect of the space business do we appear to lag the Soviet Union. In all other aspects, it is my opinion that we have an equal capability and that we have published more significant scientific results, more fully and more promptly than they.

This is a simple, straightforward statement. Like most such comparisons in the international scene, it is not subject to rigorous proof but my statement coincides, I believe, with the informed opinion of the scientific community at home and abroad. But this statement does not tell the whole story. The more powerful Soviet launching vehicles make possible their undertaking of some missions that are completely denied to us today. They are able, I should think, to move more quickly from the inception of an idea to the design and construction of payloads because weight restrictions are less stringent than ours.

Thus, they can avoid the time-consuming tasks of miniaturization, optimum packaging and other weight-saving practices.

It is probable, also, that the availability of high-thrust launch vehicles operates to increase the reliability of their flights, since they can undertake significant and spectacular missions with adequate weight-carrying capacity permitting substantial margins for their operations.

You may properly say: All right, that was the situation a year ago. What have you done about it? Gentlemen, we have done a great deal. As my associates describe in detail our activities in the vehicle development field, you will see the effort that has been expended, the progress made, and the plans and promises for the future.

I am sure you are concerned, as I am, about the very long periods of time required for most of these significant development programs. It would be easy to promise earlier dates. Many people do. But I call your attention to the history of the Atlas ICBM. Almost 5 years of intense, top priority effort—an urgent program in every sense of the word—had to be expended to bring that rocket to an operationally ready state. And the launch vehicle systems we are developing are more complex and versatile than the Atlas.

I think it is time that all of us recognize that on the basis of the present scoring system, one based almost wholly on weight-propelling capability, we cannot expect to outscore the Soviets for a considerable period of time. We should be able to match their present weight-lifting capabilities within the next 12 to 18 months, based on present expectations for the Atlas-Agena B and the Atlas-Centaur systems.

If by that time, as may well be possible, the Russians have made optimum use of what we believe to be their present thrust levels, or have developed an even higher thrust booster, our expectations of superiority will not be satisfied for about 4 to 5 years, when the Saturn should be ready.

But we have used, to maximum advantage, the cards we have held in this game. Without desiring to play down our very real deficiency in thrust, I would like to cite an example. I think it is clear that we have made excellent use of launch vehicles utilizing rocket engines which were originally designed and developed for the armed services' missile program, and not for space missions.

Out of 10 attempts to place spacecraft into orbit or on deep space trajectories in calendar year 1959, we achieved five successes. These, together with earlier Explorers, Pioneers, and Vanguard, have given us—and we in turn have given the world—a vast amount of data from which significant scientific information has thus far been derived.

As I have said earlier, in the extent and quality of our scientific findings we probably have an edge, in the judgment of the international scientific community.

But the fact remains that novel and spectacular space experiments involving heavy and complicated payloads on difficult missions are the big chips in this poker game at the present time. As one newspaperman has said:

It is not good enough to say that we have counted more free electrons in the ionosphere than the Russians have, that we know more about cosmic rays. We must achieve the obvious and spectacular, as well as the erudite and obscure.

There is only one way to regain the ground we have lost—ground lost several years ago. It will be accomplished by the establishment of hardheaded, long-term goals—this we have done—the identifying of the technical tasks necessary to be undertaken in order to press forward toward those goals—this we have done for the shorter term future—the development of the organization and management to accomplish these tasks—this we are doing—the utilization of the genius and capabilities of industry, education, and other branches of government—this we are doing—and the funding, at an adequate level, of the work to be undertaken—this we seek in the authorization request now before this committee for study and action. All of these elements must be pursued diligently, urgently, and relentlessly.

At the end of the present fiscal year, the National Aeronautics and Space Administration, with the support of the Congress, will have organized under one governmental agency what I believe to be the greatest collection of scientific and technical personnel ever assembled, to carry out vigorously this Nation's space exploration program.

With the help and genius of American industry, the proven talents of Dryden, Horner, Pickering, Silverstein, Abbott, Von Braun, Newell, Hagen, Stewart, and hundreds of others, will meet with con-

confidence any competitive challenge in space that this Nation faces today or that may arise to face us in the future.

As responsible officials, each of us can recognize that space is but one of the areas of intense rivalry between our way of life—freedom—and the Communist dictatorship. As individuals, we do have a responsibility to recognize that while space is the most glamorous, the most visible area of competition—and very fruitful also for propaganda purposes—we are engaged in an across-the-board contest. I remind you of this because these other areas of competition also make large demands on the Public Treasury.

Now what are our plans for the future? We seek \$802 million in new obligational authority. Before many days have passed this amount will be increased as we turn on more steam in our superbooster program involving Saturn, its component rocket developments, and the F-1, 1,500,000-pound single chamber engine. Our intent here is to advance, as fast and as surely as the technological problems will permit, the time period in which the two- and three-stage Saturn vehicles will be available for initial tests and the time period in which we will have a reasonably reliable launch vehicle system in the multi-ton payload range.

This program will be described for you by Dr. Wernher von Braun later in this series of presentations. The speedup we hope to effectuate promises to be as much as 1 year for the complete first phase of the Saturn vehicle. The test dates referred to for the two- and three-stage developmental Saturn units will be advanced by 3 to 9 months by the actions we expect to take.

Despite many expected problems, Project Mercury continues to move forward in an atmosphere of confidence apparent to all concerned. Morale is high, hours are long for the top staff, the Astronauts are busy and fit. In the third quarter of calendar year 1960 we expect to embark on the man-carrying, Redstone-boosted ballistic training flights. The first manned, Atlas-boosted orbital flight should take place in calendar year 1961.

The Atlas-Able flight to the vicinity of the moon, which was attempted on Thanksgiving Day last, will be repeated during the second quarter of calendar year 1960. A backup booster has been scheduled for this flight, but a word of caution is needed here. Pad availability and checkout time required make it highly unlikely that a repeat mission can be scheduled within 4 weeks of first launching should such a backup flight be necessary.

Our experiments in space science and applications are scheduled at the rate of almost one per month for calendar year 1960. The Tiros meteorological payload; Project Echo, the passive communications satellite; and the several flights intended for the study of radiation and other phenomena of outer space, will keep our launch teams and scientists very busy. It is of interest to note the participation of one of the Nation's largest communications companies in the Project Echo experiment, with an investment totaling several millions of dollars of its own funds.

Consistent with our determination to hold to a minimum the number of different types of launch vehicle systems, we recently canceled the Vega project in favor of the Atlas-boosted Agena B vehicle. We canceled Vega for a number of reasons.

First, the Defense Department's demonstration of significant reliability in the Thor-boosted Agena A system; second, the decision of the DOD to uprate the Agena A stage to a point where it approached the capability in most missions of the Vega; third, the high rate of firing of the Agena systems using both the Thor and the Atlas as first stage boosters, thus promising greater reliability; and fourth, the fact that the Atlas-Agena B availability approximates that of the Vega. All of these considerations entered into our decision.

The decision to cancel Vega was made with probable cost expenditures, including termination costs, running in the neighborhood of \$17 million. Some portion of the expenditure is recoverable in the Centaur program. Schedules will not be delayed by this change in vehicle systems.

Organizationally, we have made good progress. The President's decision to give NASA full responsibility for all superboosters made it desirable for NASA to acquire the Development Operations Division—the Von Braun team—from the Army Ballistic Missile Agency at Huntsville, Ala. The President's report and supporting papers dealing with this transfer now lie before the Congress. Negotiations to effect this transfer have been carried out in a highly cooperative atmosphere of good will, and I am confident that the needs of the Army for support of specific military tasks will be met.

The acquisition of the von Braun group has made possible the beginning of centralization at Huntsville of major responsibility for the bulk of our launch vehicle systems development and operations. A new division of the NASA headquarters organization, the Office of Launch Vehicle Programs, has been established evidencing the importance we attach to this activity in which our budget estimates show more than \$250 million to be obligated during fiscal year 1961. Subsequent speakers will discuss our organizational arrangements in more detail.

Construction of Goddard Space Flight Center, named for America's rocket pioneer, is proceeding on schedule at Greenbelt, Md. Initial occupancy is planned for mid-1960, thus beginning the consolidation of our Washington area staff engaged in space flight development and field operations.

In the field of international cooperation, we have made very great progress. Here our policy of frankness and our adherence to the traditional and well-understood policy of prompt disclosure of scientific results is building good will throughout the world.

Agreements with several nations have been negotiated covering the installation, manning, and use of tracking and data acquisition equipment. Others currently are under negotiation. Cooperative satellite launching programs are being undertaken with Canada and England and initial discussions have been held with several other nations. We have participated actively in the deliberations of the U.N. Ad Hoc Committee on the Peaceful Uses of Outer Space, and of COSPAR, the Committee on Space Research of the International Council of Scientific Unions. In all of these activities, we have worked closely with, and have had the counsel and support of, the State Department.

I have not attempted in this statement to go into detail on any of these program and operating matters. As I pointed out earlier, my associates will present those I have mentioned, and several others, in

sufficient detail to give you a good picture of the Nation's program and plans for space exploration.

In this regard, the Associate Administrator will present a plan for research and development activities extending several years into the future. He will point out, of course, that any research and development plan is subject to continuing review and can be considered valid only to the extent that it is funded. Nevertheless, we believe we have developed a plan that will guide our programming toward significant and ambitious milestones and end objectives.

Now, if I may, I want to turn again to budgetary matters. There is pending before the Congress our request for supplemental funds for fiscal year 1960 in the amount of \$23 million.

You will remember that your committee authorized expenditures of \$530 million last spring, but the Congress appropriated \$500,575,000. It is hoped that the Appropriations Committee will act promptly on this request, the majority of the funds being required for our top priority project—Mercury.

New obligational authority in the amount of \$802 million is requested for fiscal year 1961. I believe this sum, together with the additional amount we will request for acceleration of the superbooster program, will enable us to carry forward vigorously the program we will present to you.

I should note, however, that ours is almost wholly a research and development operation, with all of the uncertainties and unforeseen problems that accompany any such activity. We are dealing with an enormously complicated technology.

The most significant of our space experiments must operate in environments and under conditions not easily reproduced for component testing in ground-based facilities. A few conditions cannot be reproduced at all. Furthermore, almost all significant tests and experiments result in the destruction of the rocket and payload. Reuse is impossible, or nearly so.

All of this adds up to an expensive business. And this budget is a tight budget.

It provides for a determined and vigorous program to develop reliable launch vehicle systems with the thrust necessary to propel the spacecraft on the missions we want to undertake. It provides for the urgent prosecution of Project Mercury. It is intended to make possible difficult experiments in both the communications and meteorological fields.

It provides for a significant number of flights for the purpose of probing more deeply into the secrets of outer space as we build up our knowledge of the conditions to be met by future human voyagers to the moon and beyond. It provides support for the basic and applied research and advanced component development which is necessary to undergird any program of this kind.

In short, this budget is intended to provide for the urgent prosecution of the Nation's program in space exploration in all its phases, with particular emphasis on the superbooster developments. If approved, I am as certain as anyone can be in the research and development game, that we will accomplish our goals for the coming fiscal year and will have taken significant steps forward toward the attainment of the long-term objectives we have set for ourselves.

Respectfully, I urge you, Mr. Chairman, and I urge the members of your committee, to approve this budget request as soon as you have satisfied yourselves on the validity of our requirements. Delays in both authorization and appropriations actions will severely limit our abilities to plan for, and proceed with, our difficult tasks.

And now, I would call your attention to the schedule of presentations to be made by my colleagues and associates. Each of us will be happy to explain, as fully as we can, any aspect of our program and to answer your questions to the best of our ability. Thank you again for this opportunity to appear before the committee.

The CHAIRMAN. Thank you very much, Doctor.

Doctor, I want to assure you that this committee is going to give your bill its most prompt attention.

I have consulted with our counsel and with the members of the committee as to whether we should try to meet at 9:30 in the morning.

Of course, this thing should be followed with all possible speed, commensurate with thorough consideration of your bill, as I know it is urgent.

We were prepared to start January 2, but for a directive from the executive department. We found that we could not interrogate witnesses on any matters relating to funds until after the budget message of the President was made public on the 18th of this month. That is the reason for our present delay. But we are going to push it with all possible speed.

With that in mind, Doctor, please be back in the morning.

I think that the committee ought to go ahead with our GAO witnesses. We should finish with them. Then we will take up the NASA budget again with Dr. Glennan and question him the first thing tomorrow morning.

Mr. ANFUSO. Mr. Chairman, could I be permitted to ask him a few questions?

The CHAIRMAN. If we start doing that, then we will open—

Mr. ANFUSO. I understand it is agreeable to Mr. Fulton.

Mr. FULTON. I will be very glad to consent.

Mr. ANFUSO. If it is agreeable to the members, I would appreciate it.

The CHAIRMAN. All right, there is no objection to it.

Mr. ANFUSO. Dr. Glennan, first of all, I want to congratulate you on your very frank statement. I see that you and your agency are very much on the job.

In the last few days, Dr. Glennan, this committee has tried to alert the American people to the dangers we face from ICBM's attack. There is on record, for example, a statement by Gen. Thomas E. Power, commander of our Strategic Air Forces, that 300 ICBM's or less can be very devastating to our population and defense.

We are not going to be sleeping. I know that your agency won't permit this Government to be caught sleeping.

I ask you this for the purpose of inquiring. Doesn't the real hope of mankind depend to a great extent on the work which your agency is doing in developing outer space for peaceful uses, work which holds such great promise of creating a world of abundance, alleviating tensions, perhaps making war unnecessary, and promoting prosperity and a decent living for all peoples on earth?

Dr. GLENNAN. Mr. Anfuso, I think the work we are undertaking will make very, very substantial contributions to the well-being of all peoples; yes. This is really kind of an all-persuasive business we are in. Space is out there for everyone.

There are untold bits of knowledge which we expect confidently to acquire. It is a knowledge which ultimately will help us understand better what we are doing here on earth, and in the process of developing the devices which will carry us to our destination there, we are undoubtedly going to add materially to the sum total of the knowledge of techniques and processes, materials, systems, which are in use daily in this country.

I couldn't agree with you more that this is a quest for new knowledge, which is unique, and which I think will contribute very greatly ultimately to the peace and welfare of all nations.

The CHAIRMAN. Thank you, Doctor.

Mr. ANFUSO. Wait a minute.

The CHAIRMAN. We want to get on to the GAO witnesses.

Dr. GLENNAN. Mr. Chairman.

Mr. ANFUSO. Let me finish with just this question.

I am glad that you are negotiating agreements with other nations, because you realize that this country can't do this job alone. I hope that you will make agreements with other nations, such as, for example, to cooperate on space medicine and biology and other ventures such as better rocketry and guidance and instrumentation. May I close by saying that I, for one, and, I am sure, every Member of this Congress, feels that we want to give you more cards—I mentioned the word "cards"—we would like to give you more cards. In order to double this effort, in order that we can reassure the American people, do you think that at some time in the near future you can come back to us with a report stating how, if you had double the amount that you have requested, you could use that amount, and whether that would help us in catching up with the Russians. If you can come up with that statement, I am sure that we can get the Congress this year to appropriate it.

The CHAIRMAN. Thank you very much, Doctor.

Dr. GLENNAN. Mr. Chairman.

The CHAIRMAN. Let's go ahead with the GAO.

Mr. FULTON. Doctor Glennan wants to say something.

The CHAIRMAN. Do you want to answer that statement?

Dr. GLENNAN. No, sir; I wanted to ask a question of you. Our General Counsel is here, who is thoroughly familiar with all of these matters which have been under discussion by the GAO. He will stay here and attempt, if possible, to answer some of the questions that may be raised. I will be glad to come back, myself, tomorrow.

The CHAIRMAN. We will be glad to have your General Counsel remain with us.

(Whereupon, the committee proceeded to further business.)