# REVIEW OF THE SPACE PROGRAM

FRIDAY, JANUARY 29, 1960

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

The committee met at 10:10 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning we have Dr. Keith Glennan, Administrator. Dr. Glennan has been out in Detroit and has had trouble getting back. We are glad he is back with us.

The other day, before he left, Dr. Glennan gave the committee a lengthy general statement on the space posture of NASA at this time. This morning it occurs to me that it might be well to dispose of that matter and let's confine our questions at the start to his statement.

Following that, we will then go into the question of the correctness of the NASA in the position it has taken in withholding contracts and documents from the committee. I do that because some of our members are going to be late in arriving on account of a funeral and it seemed to me that that would be the best way to proceed.

We want to finish with Dr. Glennan, however, and we could do it that way.

Mr. QUIGLEY. Mr. Chairman, would it be possible for the members of the committee to have a copy of the statement that Dr. Glennan made Wednesday?

The CHAIRMAN. We will try to supply that. Yesterday, we had good testimony from your assistants who came here to pinch-hit for you. The committee felt we had obtained a lot of information from them.

This morning, I want to open up again the question of whether we are proceeding with this program with the sense of urgency that I think it is entitled to receive.

Now, I do that with the idea that up until yesterday we didn't know that you were actually authorized to use overtime in reference to any contract, regardless of how important that contract might be. What would you say with reference to that?

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

Dr. GLENNAN. Mr. Chairman, let me first express my appreciation for the indulgence of the committee with my travel problems yesterday. They were a little difficult to say the least.

As to your question, I think it is clear and should be clear that we are pursuing this program with a real sense of urgency. I think when the committee recognizes the magnitude of the task of putting together a hard hitting and very capable organization, while at the same time absorbing and undertaking to complete a substantial num-

ber of programs which had been started by ARPA, laying on the kind of a long-range plan which was described to you yesterday, and beginning the development of a family of launch vehicles which ultimately will give us the kind of thrust that we need, all of this in a short 16 months, I believe, since we have been in business, I think there is evidence of a real sense of urgency.

The fact that we have moved from a level in 1959 of $335 million to something more than $800 million in the 1961 period, again, seems to me to indicate that the kind of program we are undertaking is, while broadly based, one that has some very real and very definitive end points, objectives, and that these are being pursued with a real sense of urgency.

The CHAIRMAN. Well, may I say this, Doctor, that the increase in the amount that is being spent by the agency doesn't impress me as much as the results. I would far rather spend less money and get more results. What impresses me is the fact that we don't have the results which I know you and I both want. Up until the last day or two we have not found any need for using any overtime whatsoever.

Now, there is another way to approach that, too. We have the Project Mercury. It now has been given top priority, but why did we wait so long to request DX priority for the Mercury project?

Dr. GLENNAN. Mr. Chairman, if I may, I would like to comment on both of those statements. We have been using overtime consistently on Project Mercury, and Project Mercury has enjoyed the DX priority almost since its inception. I think it was first requested perhaps in January—what was the date of it?

Dr. DRYDEN. November 14, 1958.

Dr. GLENNAN. On April 27 last year, DX priority was assigned. Overtime has been used not only in Project Mercury but in other elements of the program.

I wouldn't want to mislead the committee. I don't think that you would find continuous, 60-hour weeks except on the part of our very top staff, myself, and the rest of the people in Washington.

The CHAIRMAN. We don't want to use overtime unless it will accomplish something because we don't want to throw away any money.

Dr. GLENNAN. In any research and development program there is a methodology of getting a program underway having many facets such as this does, and bringing all of those elements into an end product at a particular time. I believe that that kind of scheduling has been well done.

As a matter of fact, I am very proud of the way in which the Mercury team has conducted their business.

The CHAIRMAN. Now, that being the case, tell me this. How do you account for the fact that you delayed in presenting your request for a priority for the big engine project? That is the 1.5-million-pound-thrust project. When you finally presented it to the space council it was rejected and you withdrew it?

Dr. GLENNAN. For the big engine project, Mr. Chairman, we requested the DX priority in November 1958. This project as initially laid on called for a preliminary flight rating test, 42 months after the date of signing the contract. It is a project which requires relatively small amounts of critical materials as compared with a Mercury project, for instance.

The increase in the number of projects enjoying the Nation's top priority by an over-large number really means degrading all of the projects.

The DX priority ought really to be reserved only for those of the greatest urgency. We therefore backed off, if you will, from the large engine, believing that with the assistance of the Department of Defense in some of our procurement matters, we would not be held up for any of the materials that we would require. Had we been held up, we would have gone back to request a DX priority again.

The CHAIRMAN. I have been looking over this statement by General Medaris as set forth in the magazine, Missiles and Rockets, and generally in his statement, which I haven't studied very carefully, he says he would abolish the civilian agency and give the space missile job to a joint military command in order that we might get ahead.

In other words, he just comes out and says he would abolish the NASA.

What is the difficulty there?

Dr. GLENNAN. Mr. Brooks, I have not had an opportunity to read this statement. I would appreciate that opportunity and then I will comment on it.

The CHAIRMAN. It reads this way: "Huntsville, Ala.; Major General Medaris, retired, this week made a lashing attack on the administration's space policies and a call for the abolishment of NASA."

That is pretty strong language.

The general raked the military-civilian separation of the U.S. space program as fundamentally unrealistic and called for the creation of a single missile-space agency, a joint military command.

Dr. GLENNAN. Well, the essence of democracy is that people may speak their minds, and I respect the general for speaking his mind on it.

I would rather read his statement, if I may.

The CHAIRMAN. Yesterday your witnesses testified there was very fine cooperation between General Medaris and NASA, and I am just wondering about that in the light of this statement.

Dr. GLENNAN. I would have absolutely no question about the cooperation that has existed between General Medaris, the command at Huntsville, Dr. von Braun and his people, and our own people since the decision was made by the President to recommend the transfer. Since Dr. Dryden has asked for an opportunity to respond to this—I believe he spoke to the point yesterday—I would ask him to speak.

The CHAIRMAN. Dr. Dryden.

Dr. DRYDEN. I have not talked with General Medaris for about a month, but I know his personal statement has been that this transfer to NASA was a good solution under existing circumstances.

On the basis of those personal conversations more than a month ago, I made the statement that I did about the attitude of General Medaris on the transfer of the ABMA group from the Army to NASA. I told you that on the basis of that I thought that General Medaris would testify in approval of the transfer. It seems that I may be wrong. I have not read the statement to which you refer.

The CHAIRMAN. I just quote you one little item more because I don't want to take up too much time with this one thing.

**Here is the fundamental question—**

he said.

**We were dragged into this space business from the beginning and we still act that way. We ought to be in this argument, but instead we are still halfway in and halfway out.**

In other words, we are not putting our whole heart and effort into the program of the development of space. From a military viewpoint, I think it is most tragic that that is the case.

Dr. DRYDEN. As Dr. Glennan said, in a democracy we speak our minds. There are many people who write or publish letters saying that the whole space business is foolishness. There are other people who say we ought to be spending many times the effort. We, who are responsible for the program, have testified that we have worked out for you a program to be pursued urgently which we think will bring us to an outstanding position in the field of space.

Since such questions cannot be settled specifically by polls, I think we must say that everyone concerned has the right to speak his mind on the subject.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. We are glad to have you here. I encountered the same difficulty up in Pittsburgh so I know what you were up against in trying to travel.

There has been the comment by a committee of 17 scientists that the Mercury project, the man-in-space, should have its target point postponed 3 to 5 years, meaning downgrading that Mercury project from the highest national priority, the DX priority.

First, do you agree?

Dr. GLENNAN. I do not.

Mr. FULTON. Secondly, because I feel the man-in-space is a necessary and central step in our getting equal with Russia, and also our orderly progression in space, I believe that we must proceed with the Mercury project with all possible expedition. Do you?

Dr. GLENNAN. I certainly do.

Mr. FULTON. Would you please comment on how necessary Project Mercury is in your planning for the United States catching up to Russia?

Dr. GLENNAN. In the development of a hard-hitting space program, as in almost any difficult research and development task, it is very, very important to have particular aspects of the total program brought out as end objectives which in themselves require us to use all the ingenuity and all the genius and all the energy that we have. And in Project Mercury we have just this. It is a personalized project. People are involved. A man is going to ride in this and the workmen who are involved and the engineers and the scientists who are involved know that, and they work with these astronauts, day in and day out.

Mr. FULTON. It is necessary for man's progress in space, that man get into space, isn't it?

Dr. GLENNAN. I think there is no question about that and the earlier we determine the extent to which man can be useful in space, the more meaning the total program will have.

Mr. FULTON. And if it is said that the United States in its space program lags behind Russia, in some aspects, if the advice of these 17 scientists were taken, that we postpone from 3 to 5 years the target for the man-in-space Mercury project, that would mean that we would fall further behind and lag much further behind Russia in our total space program, and in our U.S. security, would it not?

Dr. GLENNAN. I would think that might well be the case. Again I have to say they have the right to speak their minds. I would oppose them solidly.

Mr. FULTON. Your suggestion is strongly to the contrary?

Dr. GLENNAN. Solidly.

Mr. FULTON. Did any of the 17 scientists, in order to make this judgment that occurred on a Sunday, January 24, with the publicity released on January 25, get in touch with you personally to consult with you on the space program and the projected programs for the coming year or so?

Dr. GLENNAN. No; no one got in touch with me personally on that at all, Mr. Fulton.

Mr. FULTON. Did anyone get in touch with Dr. Dryden from this group of 17 scientists?

Dr. DRYDEN. No, sir.

Mr. FULTON. Were they as a group taken through the installations or shown the details of the programs, either public or secret, that you might have in your files?

Dr. DRYDEN. Not to my knowledge, sir.

Mr. FULTON. Dr. Glennan?

Dr. GLENNAN. No.

Mr. FULTON. What they have is based on their own resources and not on those of your agency. Is that correct?

Dr. GLENNAN. As a group, that is correct.

Mr. BASS. Mr. Chairman, point of order. Are we operating under the 5-minute rule?

The CHAIRMAN. I confined myself to the 5-minute rule.

Mr. FULTON. I want to do that.

The CHAIRMAN. We are operating under the rule.

Mr. FULTON. I want to compliment you both in the handling of your agency. I also say to you, remarkably, in spite of the difference of opinion on various levels of certain individuals, this committee has unanimously backed you so far in your space program, as has the House, and we have not seen any reason to change anything in the authorization law.

I want to compliment you.

Dr. GLENNAN. Thank you.

The CHAIRMAN. Mr. Sisk.

Mr. SISK. Dr. Glennan, I have just been quickly trying to review the statement which you gave us the other day. I think all in all it is a very well-put statement. There are a few things that I would like to ask you about.

If you have a copy of your statement there, on the bottom of page 3 and at the top of page 4, you go into some discussion with reference to some of the problems that we have faced in this so-called race which we have discussed. You conclude that paragraph by a comment discussing the time-consuming task of miniaturization, optimum packaging and other weight-saving practices. It is probable, you say,

that the availability of high-thrust launch vehicles operates so as to increase the reliability of their flights; referring to our opposition's flights, of course.

Now, to what extent do you feel that more powerful vehicles would tend to give them greater reliability? Do you mean to indicate that miniaturization has decreased capability from the standpoint of guidance and things of that kind? I was a little startled with this statement and I would just like to have you elaborate. Maybe I have misinterpreted.

Dr. GLENNAN. I think I can see the problem here. No, I don't think that miniaturization has operated to decrease the reliability of our launch vehicles. My comment was directed at the time consumed by the necessity for miniaturization.

More powerful vehicles could undoubtedly improve reliability by giving the opportunity for redundancy, the ability to carry redundant circuits and controls in guidance mechanisms as well as in payloads.

During these early months of experiments flown by our Agency with the help of the military services, we have been pushing right up against the margin of the thrust capability of the vehicles available to us. We have not been able, in all instances, to practice redundancy to the extent that we would like.

I think that is in essence the basis of that comment.

Mr. SISK. Fine.

In order to hurry along here, I don't wish to question you specifically about the statements which the chairman has already referred to because I have just briefly reviewed these statements by General Medaris and, of course, he will be appearing before our committee before very long. At that time, I am sure we will be going into these things.

Now, in view of what I understood to be a rather cordial and cooperative relationship going on, with reference to ABMA, I would like your comments, Dr. Glennan, as to how much opposition actually was voiced at the time the President was considering this transfer back in October.

Now, maybe this falls into the category of things you cannot discuss—and here again, I don't wish to get into this argument of Executive privilege. But are you aware or can you comment on whether some real opposition may have occurred in that discussion of the possible transfer, prior to the President's announcement?

Dr. GLENNAN. I think under the rules of evidence, I can only tell you what I, myself, know. I can conjecture a great many things. But in my discussions with General Hinrichs, with General Schomburg, with General Medaris, with Secretary Brucker, with Colonel Guthrie, with people in the Office of the Secretary of Defense and the Director of Research and Engineering, Dr. York, I cannot recall any statements of opposition. I am as certain as I sit here, of course, that there are and would be—of right, ought to be, probably—feelings among people who have spent a great many years in development of an organization of this kind, that they hate to see it go out of the control of the military.

To my certain knowledge, those statements of opposition have not come to me, if they ever were made.

My own knowledge of this is that there was a cordial relationship from start to finish. Secretary Brucker and I, I believe, had three

luncheons together discussing the manner in which we could most expeditiously and most effectively make the transfer, sir.

Mr. SISK. One question in conclusion there—and I asked this question also of Dr. Dryden and Mr. Horner yesterday—as you know, I have introduced this resolution calling for the immediate turnover to NASA of the Huntsville facility in an effort to expedite the situation and to indicate Congress support for pushing ahead in space.

Now, I have been a great supporter of General Medaris and the Von Braun team, as you know, Dr. Glennan. I am curious to know what your position would be on this resolution at the present time insofar as you have knowledge of the resolution.

Are you in a position to say if you think you would favor it? It simply sets forward the date of the turnover.

Dr. GLENNAN. I would think so, sir. The sooner we get matters of this kind settled, the better able we will be to do a good job of management.

Mr. SISK. Thank you, Dr. Glennan.

Mr. Chairman, if I might, I have been submitted a list of questions by another member of the committee. In order to save time, if I might just submit this to Dr. Glennan and ask that the answers to these questions be placed in the record.

The CHAIRMAN. If there is no objection, it is so ordered.

Mr. SISK. These are questions that were left with me by Congressman Teague and, of course, in view of the limited time, I will submit them to you.

The CHAIRMAN. We are somewhat limited as to time this morning because we want to get into the question of executive privilege sometime around 11 o'clock. Some members are at a funeral and I don't think we ought to begin until then.

(The information requested is as follows:)

1. There is apparently some difference of opinion in the administration over whether or not our prestige has suffered internationally as a result of Russia's lead in space. What is your personal opinion on this subject?

Answer. To obtain an evaluation of the impact of Soviet space activities upon our international prestige, we have turned to USIA and the Department of State. We are informed by them that this Nation has suffered some loss of prestige, and may also have lost status with respect to the credibility of our statements in other fields. The Department of State and USIA believe they have been put at a disadvantage in the political and psychological fields because of these developments. I accept their statements as valid.

2. What sort of feat will the United States have to accomplish before it will be generally conceded throughout the world that we have taken the lead in space away from the Russians?

(*a*) How long will it take us to accomplish such a feat?

(*b*) How much will it cost to do it?

Answer. Currently the U.S. program consists of a number of milestone experiments to be conducted in outer space. Any one of them alone, if successful, is capable of helping to establish U.S. leadership in space activities. The U.S. program is a soundly conceived technical program for the exploration of space. The achievement of manned flight, useful communications or meteorological systems, or further outstanding scientific "firsts" like the discovery of the Van Allen radiation belts—any of these could follow from this program and would help to secure overall leadership for this country. Larger boosters will play a vital part in this program as a necessary technical tool.

(*a*) With respect to the length of time necessary for us to arrive at a position where we can compete for leadership I have already said that we hope to have boosters next year which have the capability of matching past Soviet accomplishments. The Saturn project may then enable us to match or excel the vehicle performance of the Soviets will by then have achieved.

(*b*) It is possible that some of the milestone projects mentioned above could be speeded up with additional money. It is certain that more assurance of successfully meeting established dates would result. However, it must be realized that money is not the only important factor. We must depend upon competent manpower and critical material, as well, and these are not available in unlimited quantities. Further, technology cannot be advanced at continually accelerating rate.

3. Information Agency Director George V. Allen said here last week that the next big contest in space would be to see which side got a man up there first. Now:

(*a*) How confident are you that we will do it before the Russians?

(*b*) What would be the world propaganda effect of a Project Mercury launching that failed; specifically, one in which an astronaut was killed?

(*c*) Would the untimely death of an astronaut set back, or otherwise adversely affect, our space program; if so, to what extent?

Answer. (*a*) We cannot be confident that we are going to launch a man into space before the Russians. We know that they are capable through the use of their big boosters, of putting heavy payloads into orbit now. Their extensive biological experimenting would support the idea that they will attempt manned flight at an early date. Also, because of their security measures and possible lesser regard for the individual involved, they can undertake high-risk projects at a much earlier date than we can. Over and above this, however, we do not have a clear indication of what their intentions are in this area. As you know, we are pursuing our program on an urgent basis. It will avail us little if we win in this contest at the expense of the life of the Astronaut.

(*b*) As you know, Project Mercury is being executed on the premise that the astronaut will have the same chance of survival as would a test pilot, say testing the X–15. It must be realized that there is a chance that the astronaut will be lost. On this basis, then we must assume that such a loss could result in propaganda being used adversely against this program. We are, of course, taking every precaution possible to protect the astronaut.

(*c*) It is difficult to say how a failure of a manned-satellite lanching would affect our space program. This would depend somewhat on the nature of the failure and upon the political climate at the time. Technically speaking, an accident might mean delay if the system had to be redesigned significantly. A failure might actually demonstrate the excellence of escape or alternative systems and emphasize the design values of the project.

Many of our aircraft development programs have cost lives without catastrophic program effects. We believe most people understand this.

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. Last night I was listening to a very popular TV program and some people lost $2,000 because they could not identify the Mercury program. How can we get the people to be more familiar with these programs?

Dr. GLENNAN. That would probably require a fourth branch of government.

Mr. CHENOWETH. Have we a proper balance between the military and civilian groups in this space picture? Are we devoting the time, money, and attention we should to our military and strategic program and also devoting what you think is sufficient attention to exploring outer space?

Dr. GLENNAN. I can't speak, of course, for the military. They will have to do that for themselves, but it is my personal opinion that the balance reached is a reasonable one.

Mr. CHENOWETH. You feel you have gone as far as you can go in the division of the responsibilities and the funds and the talents and energies we are putting in. Obviously, we can only do so much and you feel we are devoting enough to the military in this picture?

Dr. GLENNAN. Again, that is a question upon which I would have to defer to the military for a really proper answer.

I think the interlacing of these two programs is very considerable at all levels. I think the tasks which the military have set themselves to do to use outer space are significant tasks and they are military tasks. In our program, we continue to use military teams from time to time: the recovery team on Mercury, the launching teams at Canaveral and some of the tracking teams; that sort of thing.

So there is a continued interlacing all along the line. I think the tasks which they undertake for military purposes, they ought to undertake for military purposes. I don't believe we are invading their territory at all. We have come for the last 5 or 6 months into a fine level of agreement.

Mr. CHENOWETH. You don't feel that a project like Mercury is interfering in any way with an orderly normal military program, which is necessary for the defense of this country?

Dr. GLENNAN. No, sir.

Mr. CHENOWETH. You don't feel we are taking anything away from them that they should have, in the way of funds or manpower or engines?

Dr. GLENNAN. No, sir.

Mr. CHENOWETH. There would be a constant conflict between the two, I would imagine.

Dr. GLENNAN. I would suspect so.

Mr. CHENOWETH. But you see no better solution than that which is already worked out?

Dr. GLENNAN. So long as the law of this land calls for us to have a peaceful program for the exploration of outer space, I see no better solution to it and if the law didn't call for it, I think I would be advocating the solution we have presently.

Mr. CHENOWETH. If we have to have one or the other, we would quit the outer space exploration. Do you agree with that?

Dr. GLENNAN. I would do nothing to decrease the military effectiveness of this Nation.

Mr. CHENOWETH. But you see no reason why the two can't go on simultaneously?

Dr. GLENNAN. None whatsoever, sir.

Mr. CHENOWETH. Thank you very much. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Mitchell.

Mr. MITCHELL. Thank you, Mr. Chairman.

General Medaris said the transfer was a good solution to the problem, according to Dr. Dryden and Dr. Glennan.

I don't recall his ever saying that. I think he said it was the only solution because the Army was not getting the money to carry the project on.

Now, I want to ask you, Dr. Glennan, are you really happy with what we are doing in the space effort?

Dr. GLENNAN. Well, when you say "happy," if I might change that a little bit: I am never satisfied. I don't think any of us should be satisfied with any of the jobs that we undertake. I am of the belief that the program which I believe was presented to you yesterday, looking quite a way down the road with some significant objectives, the development of the program which we presently have before you for funding, to move toward those objectives, I think this is a very

excellent program. I am satisfied to the extent that, given just a wee bit of luck and the funds we have asked for, I think you will have no reason for regret.

Mr. MITCHELL. I appreciate your statement. I don't know whether it answers the question, Doctor.

Dr. GLENNAN. I meant it to.

Mr. MITCHELL. Now, let us refer to the transfer of the Saturn project. You know there is some concern as far as I personally am concerned, as to whether the transfer should have been made at the time it was. Don't you think that Saturn is going to cost us more money and actually the time element—the productive element—will be delayed as a result of the transfer from the Army?

Dr. GLENNAN. In no way—it is going to be speeded up.

Mr. MITCHELL. Tell me why.

Dr. GLENNAN. Because the Defense Department did not have a military requirement and not having a military requirement, they could not put a DX priority on it as we have done. They could not seek additional funds as we have done and expect to report to you, which will shorten the time by as much as a year. I think everything is working just the way you would want it to work.

Mr. MITCHELL. That is most comforting, if true. Now, the Army has been supporting Saturn without the necessity of contracting; isn't that right?

Dr. GLENNAN. They have been doing a great deal of inhouse operation on the first stage, the booster stage of Saturn. They had not started on the upper stages. They are now starting on the upper stages. Since we have had technical management of this project, we have decided on what those upper stages should be and they are carrying out that work.

May I make a point—this sounds as though they are carrying out that work inhouse and they are not. They couldn't. They don't have the capacity to do it. This is being done by contract with the Von Braun team monitoring—negotiating and monitoring those contracts.

Dr. DRYDEN. The contract for the engines, the contract for a lot of the hardware that goes into it. In fact, as I recall, something on the order of more than 50 percent of the money in the Defense estimate was for contracts outside of ABMA.

Mr. MITCHELL. Of course, this is a matter of opinion. There is certainly a divergence of opinion on this problem, that the Army has been supporting, without the necessity of negotiated contracts, certainly some minute components of the Saturn project.

Mr. GLENNAN. No, sir. What has been done is not a matter of opinion; it is a matter of record. You can have the entire story if you would like us to give it to you.

Mr. MITCHELL. Doctor, are we making the maximum effort insofar as space is concerned?

Dr. GLENNAN. I think we are making a maximum——

Mr. MITCHELL. Before you answer that, is there such a thing as a maximum effort, insofar as space is concerned?

Dr. GLENNAN. I think the only answer to that question is that in a technology as difficult as this, in a research and development program, certain things have to be done before other things can be done. The effort which is being made, while not "crash" in the sense of wasting

money, duplicating systems, going down several roads to one end objective, is a maximum effort in the context of all of the other efforts that have to be made by this Nation in its competition with the Soviet Union. So far as space is concerned, this is a determined, very urgent program.

The CHAIRMAN. Mr. Van Pelt——

Mr. VAN PELT. No questions.

The CHAIRMAN. Mr. Quigley.

Mr. QUIGLEY. Mr. Chairman, I will first start with an observation. In answer to the concern of my colleague from Colorado, I would say perhaps that television program of last night did not reflect adversely on the public relations of Dr. Glennan so much as it reflected credit on the committee and other committees of this body. It seems to me this demonstrated that these shows are no longer rigged.

Mr. CHENOWETH. A good observation.

Mr. QUIGLEY. Doctor, I would like to start out by congratulating you on what I think was an excellent statement you made Wednesday as to the overall NASA program.

I frankly regret that you had to make it under what I consider—which I am sure you consider—to be somewhat less than ideal circumstances. I also regret that in glancing over the testimony that you are going to give later this morning, that I am afraid those circumstances are not improving.

I am concerned about this. I think the old, eternal argument of Executive privilege versus congressional prerogatives as has been witnessed for 150 years, will probably be witnessed for another 150 years. I am not interested in having it resolved one way or the other at the moment. I am interested in seeing the vital space program move forward. You may be right in this instance, but I have a feeling that even if you are right, you are wrong.

Dr. GLENNAN. I understand.

Mr. QUIGLEY. I would like to see this whole program not deteriorate into a partisan political issue or into squabbling and quibbling between the two branches of Government. There is a job to be done and I think you and we want to do it.

Frankly, I see tendencies and indications at the start of this 2d session of the 86th Congress and the start of this Congress in a political year that, frankly, disturbs me, worries me, and frightens me.

If your Vice President and my Vice President and your political candidate for high office was anywhere near right last Wednesday night when he said the issue of this campaign is survival, this is not something that can be delayed until a new President takes over next January. We have to take care of it now. Perhaps we should have gotten to it 2 years ago, 5 years ago, or 10 years ago. I think our job, in any event, is to get to it now.

I have one question I want to direct to one paragraph of your statement on Wednesday. On the second page you said this:

> 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.

May I ask you this: When did the President direct you to make this study on the possible need for additional funds, on what I consider

to be the key to this whole thing, the additional high thrust launching vehicles?

Dr. GLENNAN. The actual date I can give you for the record, sir. I don't recall.

(The date referred to is January 14, 1960.)

Dr. GLENNAN. The discussions which led up to this decision on his part have taken place almost continuously, if I may put it that way, since the decision to give the NASA the responsibility for the superbooster program.

You see, prior to this time the Saturn vehicle was a responsibility of the Defense Department and we really did not have management responsibility for it. When that was turned over to us, sir, the technical responsibility was given us—I have forgotten, maybe 6 weeks ago. Since that time we have been attempting to move up the urgency of this program, and the discussions with the President have been many and the results of them are expressed in that letter and will be expressed in money very shortly.

Mr. QUIGLEY. Have you any idea when this study will be completed?

Dr. GLENNAN. I should say within a week, sir.

Mr. QUIGLEY. And will this committee shortly thereafter have your request for additional funds?

Dr. GLENNAN. Yes, sir.

Mr. QUIGLEY. Let me asks you this: One of the disturbing bits of testimony that has come to my attention in this committee was Dr. York's comment that there is a very definite limit on the amount of money we can spend.

One, the old budgetary bugaboo which seems to be an a priori factor. The second one is the fact that even if the Congress were to smother you with funds there is a limited amount of top-grade scientific personnel who could be acquired by Dr. York or by your department to do the job.

Do you share this opinion?

Dr. GLENNAN. I share that opinion in the large, yes. I think regardless of the field, it is possible to provide more money than the field sensibly can use. This is true in the medical profession, it is true in oceanography, it is true in astronomy, whatever the profession may be.

I don't think that we at the moment are at a saturation point in the field in which we are operating. But with his statement, I must agree.

Mr. QUIGLEY. Now, if this is true, and if, as Mr. Dulles, testifying before our committee last week, indicates that currently the Russians have twice as many engineering, scientific, and technical students in school as we do, isn't there a responsibility on the administration and on the Congress to start doing something about a long-range program so that we will have the supply of scientific, technical, and engineering people we need in this obviously long-range program?

Dr. GLENNAN. There is a responsibility on the people of the United States, Mr. Quigley, in this regard, and that responsibility certainly is shared by the administration and by the Congress.

There is a tradition in this country that I hold very dear, since I happen to be on leave from the presidency of Case Institute of Technology in Cleveland, an institution devoted to the education of scientists and engineers and managers in industrial enterprises, that in a

free economy we will get better results by the people undertaking this sort of a responsibility themselves, to the greatest extent possible. If they are failing in it, then I think the Central Government has a responsibility.

Mr. QUIGLEY. Wouldn't Dr. York's testimony in which you concur be pretty persuasive evidence that maybe they are failing? Maybe the responsibility has passed to the executive branch and to the legislative branch to start making some detailed, long-range plans to meet this problem.

Dr. GLENNAN. I am not really prepared to agree with that as yet. I think that the activities which have been undertaken in the last 2 or 3 years throughout the educational community are making very real progress. I think it is a situation which ought really to be watched very carefully.

Mr. QUIGLEY. That is all, Mr. Chairman.

The CHAIRMAN. Doctor, before I recognize Mr. Bass, may I ask, will the committee have access to that study in a week when it is finished?

Dr. GLENNAN. Which is this?

The CHAIRMAN. The study you referred to.

Dr. GLENNAN. Mr. von Braun will present this discussion to you.

The CHAIRMAN. He will present the results of the study?

Dr. GLENNAN. Yes. What is required to move Saturn up and develop a better schedule.

The CHAIRMAN. Mr. Bass.

Mr. BASS. No questions.

The CHAIRMAN. Mr. Karth.

Mr. KARTH. No questions.

The CHAIRMAN. Mr. Riehlman.

Mr. RIEHLMAN. Dr. Glennan, with respect to the questioning by Mr. Quigley and with respect to the discussion on the Saturn program, prior to the time that the President suggested to you a further study be made on the progress being made in this field, had you, yourself, after knowing that you had responsibility for the advancement of the Saturn program, done anything to increase the activity in that field in the way of additional time being spent by the people who are really in the construction end of it?

Did I make my question clear?

Dr. GLENNAN. I think not. Is this the matter of overtime?

Mr. RIEHLMAN. What I am interested in is this: Whether you, prior to the time the President recommended this study, had recognized the need to advance this program and had authorized additional work to be done—overtime?

Dr. GLENNAN. No, we had not authorized additional overtime.

Mr. RIEHLMAN. Well, since that time, have you?

Dr. GLENNAN. Yes, of course.

Mr. RIEHLMAN. To a great degree or just a minimum? How far have you gone?

Dr. GLENNAN. The Saturn project under Department of Defense management and Army prosecution had an overall limitation of, I think, 5 percent on the overtime which they spent. We have increased that to 20 percent, which is the amount requested by the managers of the project. We have been conscious of this program

right along but have not had financial responsibility to accelerate the program until recently.

Mr. RIEHLMAN. That is why I am asking the question. You were conscious of it and I want to know what your action has been, because I think it is important. People are feeling that we aren't taking this problem as seriously as we should and that your Administration may not be taking it as seriously as it should. I wanted to pinpoint the fact whether you had taken a constructive move in that direction.

Dr. GLENNAN. Mr. Riehlman, if I can just relate these matters. As the President announced his intention to transfer the superbooster program and the Von Braun group to us, we immediately entered into negotiations with Dr. York looking to the taking over, ahead of the transfer, of the technical responsibility for the project.

This, I think, was accomplished perhaps within 2 weeks after the announcement of the President's decision.

Immediately this was done, we set up a committee which included members of the DOD and Huntsville groups and our own staff, to determine on the upper stages for Saturn. After all, Saturn as conceived at the time it was turned over to us was a base booster rocket only. The upper stages had been in discussion and some tentative conclusions had been reached, but NASA went into action to attempt to determine the upper stages and this was done. And I guess the bidders' conferences are being held——

Dr. DRYDEN. They were held 2 days ago.

Dr. GLENNAN. They were held 2 days ago, so that requests for proposals are now in the hands of industry. I believe in perhaps a month we will have the proposals back on the upper stages for Saturn.

So I think that we have really exhibited an energetic approach to this problem.

Mr. RIEHLMAN. That is all I have.

Mr. FULTON. Will you yield?

Mr. RIEHLMAN. Yes; I will yield.

Mr. FULTON. Just as a matter of humor, I would like to say to the Administrator that Dr. Dryden suggested to us yesterday that we use better language than the scientists have used and call it the national launch vehicle program, so I would caution you on the use of the word "superbooster" which we use on this committee.

Dr. GLENNAN. Thank you.

Mr. FULTON. One other thing. I want to put on the record that I would like to join again with my good friend, Mr. Sisk, from California, in urging prompt action on the transfer of ABMA facilities to the NASA and under a very prompt program to move quickly. I also join with Mr. Quigley in saying that I am one of the eager beavers in the space department and if you can tell us how to get ahead faster, please do it.

The CHAIRMAN. I would like to ask the gentlemen this now. I am an eager beaver, too, as far as pushing this is concerned, but do you think we ought to act on the resolution of Mr. Sisk before we hear from the Army? The Army is slated to appear here in a few days.

Mr. RIEHLMAN. I think I still have my time that has not been used and I would like to ask Dr. Glennan this question. I think he gave the answer to Mr. Sisk or someone down the line. Do you feel that

if we pass this resolution that has been introduced by Mr. Sisk it will be effective and helpful in carrying out your program?

Dr. GLENNAN. Yes, sir.

The CHAIRMAN. I would like to see what the gentleman from Pennsylvania is going to say. Do you think we ought to judge before we hear from the Army?

Mr. FULTON. I feel that if the order has been given and it is simply a question of timing, then it is a question as to where the most effective result can be obtained. Of course, the receiving agency is NASA and to me they should determine when the administration should be begun.

If you recall at the time we set up NASA we said to you, more or less at the time—and we will conform to it—with statutory authorization. I would compliment the gentleman from California on his alertness and I think this would be helpful.

The CHAIRMAN. I think it would be excellent too, but the question is whether we should do it.

We will take that up later. I don't want to take time away from Mr. Hechler here.

Mr. Hechler, you are recognized.

Mr. HECHLER. Dr. Glennan, I think you have made an outstanding statement here and I think also you and your associates are doing an outstanding job. I was particularly impressed with the clarity with which the goals for the future were set forth. I am also impressed with what you say on page 2 of your statement: "Our competitor in this business is the Soviet Union."

You say that on page 2.

I assume then, of course, that our international prestige is at stake in the space race?

Mr. GLENNAN. Mr. Hechler, I think our international prestige is at stake in every activity of this Nation. There is nothing from murders to Nobel prizes that doesn't have something to do with the international prestige of this Nation today and that isn't being made use of by the Soviet Union in their propaganda activities.

Everything we do is of vital importance in our international relations, in my opinion.

Mr. HECHLER. I remarked after you left the other day that this little argument we got into, this power struggle between the legislative and executive branches—that I was sorry you had to waste your time in such a power struggle instead of devoting your time to the real power struggle which we have with the Soviet Union.

However, I was very deeply impressed by your statement and was somewhat disturbed when I went home and turned on the television set and heard you say that we are not pacing ourselves by the Russians. I believe that was the phrase that you used.

I just wanted to make sure that your considered judgment on this whole question of urgency was expressed in the statement rather than the offhand comment made in the program.

Dr. GLENNAN. Semantics being what they are, it is very difficult, really, without writing out a statement, to be sure that it will not be misunderstood or taken out of context.

Mr. HECHLER. I would like also—had you finished, Dr. Glennan?

Dr. GLENNAN. I hadn't, but I would be glad to chop off there, if you wish.

I don't recall the statement. It was probably something on the radio, but what I am sure I was saying is that, in a race, as one thinks of a race, there are two people on a track. They are running one against the other and they are going over the same obstacles. They must overcome the same difficulties one after the other. If one is behind the other—that is the kind of a trap I don't think we should fall into. I think we have an obligation to the American people to decide for ourselves as a Nation what we ought to be doing in this and then pursue it very, very diligently and very, very urgently and that, sir, is what I think we are doing.

I think in the long run this must win the competition. That is why I don't like the term "race," because this has a connotation that just doesn't seem to me to make sense in this business.

Mr. HECHLER. What you do, what your associates do, and what those in the Department of Defense do on the missile program and the space related activities is not the whole story. It is what the American people understand about the program and are willing to lend in the way of support to that program. It seems to me that they don't have the clear-cut understanding which you have so well expressed here.

Dr. GLENNAN. I am very disturbed about this same thing as a matter of fact.

Mr. HECHLER. I would like to ask one further question. You made reference to some of the activities in the private scientific and university community.

What is your assessment of the importance of and the adequacy of our educational system in relation to the progress we are making in the space program? How important is it that we have a good educational system in this country—both secondary and higher education?

Dr. GLENNAN. In a democracy I think the most important activity in which we can engage is that of education. Unless we have a really well educated electorate, we don't have a responsible government.

Mr. HECHLER. This is one thing to which witnesses before this committee always respond when I question them. Yet I would be happier if those officials responsible for missile and space matters would stress the vital importance of education in determining the future progress of this Nation. I personally feel that I don't want to vote any money for the space program until we have an adequate aid to education bill passed in this Congress.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Dr. Glennan, a year ago when there was discussion about the transfer of the missile team to NASA and it was decided it would not be transferred at that time, you said that you believed that the missile position of the country was more important than space. Do you still believe so?

Dr. GLENNAN. Yes, sir.

Mr. Daddario, may I say the defense of the Nation is more important than space. I think I would have wanted to put it that way if I didn't because I don't narrow our defense down to just the missile business.

Mr. DADDARIO. Then what has occurred in this whole effort which would now change that so that the decision which prompted the retaining of the missile team under the Department of Defense last

year would now bring us to the point where that same missile team would be transferred to you, taking into consideration that you then felt that the decision was a correct one because of the fact that missiles were more important than space?

Dr. GLENNAN. Mr. Daddario, a year has passed. A year ago the Secretary of Defense and the Secretary of the Army made the direct statement that the Von Braun team was necessary in the missile program of the United States.

This year a good portion apparently of the work upon which they were engaged has been brought to completion. The Jupiter is really phasing out apparently, in that it has been delivered in the quantities required. I believe the test program is completed for the Jupiter and certainly the same must be true of the Redstone which is already deployed.

The requirements for the work of that group at Huntsville in the missile program were going downhill very rapidly and when this became apparent in the Defense Department, they asked of our continued interest in this program, in that team, and, of course, we have a continued interest and we are just delighted to have them as part of our organization.

I think it is the difference in the workload on that team in Huntsville. The missile workload.

Mr. DADDARIO. Last year you said these boosters of varying capabilities are necessary for both civilian and military space programs. NASA undertook the depelopment of DOD in a military program aimed at correcting the program as soon as humanly possible and you were talking about the overall booster situation.

Frankly, I would prefer more of this being under a civilian agency. I wonder if you believe that now that this missile team is being transferred to you that you will continue and be able to have the proper type of coordination and cooperation so that the military needs can be also taken care of within the development of your own program insofar as the booster systems are concerned?

Dr. GLENNAN. I have no question of that, Mr. Daddario.

Mr. DADDARIO. And you believe it is a step in the right direction and you approve of what has been done to this time?

Dr. GLENNAN. I believe so.

Mr. DADDARIO. You feel we could have been further along the road had it been done a year ago when you requested it?

Dr. GLENNAN. Personally, I do.

Mr. DADDARIO. That is all, Mr. Chairman.

The CHAIRMAN. Mr. King?

Mr. KING. Dr. Glennan, I should like to pursue this matter of education just a step further because of your rich background in education. I think you are qualified to answer although you were not called here specifically on that subject. I realize that.

We have received testimony in this committee, and I believe the facts are undisputed and are pretty generally known throughout the country, that for the next 2 years the actual number of scientists and engineers graduated in our country will actually go down. Then in about 2 years the line reverses itself and starts on the upturn so that in about 5 years our rate of increase in scientists and engineers will be about the same as Russia, although we will be trailing Russia very substantially.

In other words, our line is climbing at the same rate as their line, but their line is many inches above ours on the graph, which means that even according to the most optimistic estimates, we will not catch up with the Russians within the foreseeable future. We will be trailing them.

Now, it's your testimony and everyone's testimony that education and space progress are so closely intermeshed that it is hard to separate one from the other.

If all that be true, doesn't that suggest that our country definitely needs an infusion of some sort into its educational system to enable us to close that gap?

As things are now, I can't see how we will ever close the gap and I am very concerned about it.

Dr. GLENNAN. Mr. King, I think there is no need for this Nation to get into a numbers race with Russia in this particular field. We do train our people very much more broadly, I believe. I made a trip there myself and talked with a good many of the people in higher education, 18 or 20 months ago. I believe we train our people very much more broadly than they do. They turn out larger numbers of very highly trained specialists than we do. We need to turn out more, but I don't think it is a matter of catching up in the sense of numbers alone.

The things that have been done in the last 5 years in this Nation to improve the quality of the educational offerings, I think, are beginning to bear fruit at the present time; just beginning to bear fruit.

I do believe that there must be a real effort made to increase the number of youngsters who will find satisfaction in careers in science and engineering. I think again this effort is being made although the fruits from that effort are much further down the line because one starts in the upper reaches of the secondary schools and in the high schools to encourage that kind of an interest.

Now, in the meantime, I think we do have a problem. We have a problem of the utilization of people who, being well trained, I think, can be better utilized than they presently are. If you want to talk about a gap in this Nation, I think there is a gap in numbers at present of well trained people of special talents.

Mr. KING. Dr. Glennan, don't you believe, however, that some of the lack of proper stimulation in the field of science is due to inadequate local school budgets? In other words, in the day school, junior high and high school level, many schools could do a better job in stimulating interest in basic science if they had larger budgets, better trained teachers and better equipment on that level?

Dr. GLENNAN. I don't think there is any question of it. It seems clear that we did let ourselves fall into a condition of lack of real concern for the quality of our teaching staffs. We fail to recognize the pace, the rate at which the developments in science and technology were accelerated. We fail to recognize this and translate it back far enough into our educational system. To catch up on that is a real task. It is being done very much with the aid of the Federal Government, as you may know, through the National Science Foundation's support of summer institutes for the—call it retreading or upgrading of the teachers of high school science.

My own institution has participated in these programs. I think our proudest alumni are the high school teachers who have spent summers on our campus in this way.

I think we are making progress, but not fast enough.

Mr. KING. Just one final question: Do you not feel, in the light of all that has been said, that if we could increase the number of competent graduates in these technical fields, that that in itself would enable us to accelerate our space program?

Dr. GLENNAN. I think there is no question about that.

Mr. KING. Thank you.

The CHAIRMAN. Mr. Roush.

Mr. ROUSH. Mr. Chairman and Dr. Glennan, first let me say that I especially appreciated the remarks of my colleague, Mr. Quigley. I don't entirely share his views because I think it is necessary for us to be quite critical at times. As I look at my own program as a Congressman, I find that I am strongest in those areas where I am criticized. I think the real reason this additional money is being requested for Project Saturn is because of public opinion and because of the criticism which has come to that program.

Now, in that light, I would like to ask just a couple of questions: First of all, Project Saturn should have had the emphasis, which you now give it, some time ago, should it not, Dr. Glennan?

Dr. GLENNAN. The easy answer to that, Mr. Roush, is "Yes." I do not feel it incumbent upon me to criticize someone else in this area. I think that it does take time to develop the best avenue along which to move with urgency to attain an end objective. I think that during the course of the last year there has been enough exploration and argument about this to have the program rather solidly set down. It might well have gone off in several directions had we not taken this time of gestation.

My own feeling is that the program really has not been set back particularly by the delay in coming to this decision.

Mr. ROUSH. Dr. Glennan, when was it that we first realized the reason the Russians were ahead of us was because they had achieved a greater thrust in rocket propulsion and were capable of putting larger payloads into orbit?

Dr. GLENNAN. I think almost from the beginning.

Mr. ROUSH. Do you mean when they first launched their sputnik?

Dr. GLENNAN. Yes; because as I recall, that weighed 184 pounds.

Mr. ROUSH. In just a few months they had one going over a thousand pounds.

Dr. GLENNAN. That is correct.

Mr. ROUSH. When was it we first made the decision to go ahead with Project Saturn?

Dr. GLENNAN. I would have to supply that date to you. I don't recall it.

Mr. ROUSH. Would 20 or 21 months ago be about right?

Dr. GLENNAN. I would think so. Something of that sort.

(The information requested is as follows:)

**Under order of the Advanced Research Projects Agency No. 14-59, the Army Ballistic Missile Agency was instructed to initiate a development program to provide a large space vehicle booster of approximately 1.5 million pounds thrust based on a cluster of available rocket engines. This program is now referred to as Project Saturn. The date of this order was August 15, 1958.**

Mr. ROUSH. In an interim period between October 4, 1957, and this period which would have fallen approximately April 1958, did we have any sort of a large-booster program going?

Dr. GLENNAN. A large booster of course, is the end objective of the F–1 engine program and as I recall it within a month after we declared ourselves in business, we moved directly to the F–1 engine. Prior to that, the Air Force had had study contracts looking to the development of a large engine.

In December 1958, we undertook to call together—NASA—all elements interested in this booster program to develop a national booster program out of which came the program we presently have.

Mr. ROUSH. You say that was in the first part of 1958?

Dr. GLENNAN. That was in December 1958.

Mr. ROUSH. This F–1 engine you are speaking of is one that has now been canceled?

Dr. GLENNAN. No; there is a whole family.

Mr. ROUSH. Now, back to the other side, Mr. Quigley's side of this for a moment. We have spoken of more money in order to enhance our program and speed up our program. There are other areas where we can also make improvements, I believe, Dr. Glennan. You spoke of getting more topnotch scientists and people into the program. What is keeping these people out?

Dr. GLENNAN. Well, for the most part the amount of money that we can pay them.

Mr. ROUSH. Then, if we pay these people more money, we could get them in our program and it would help speed it up. Is that correct, sir?

Dr. GLENNAN. I would think that this would be the result.

Mr. ROUSH. Are we also slowed down by administrative processes? The reason I say that, I heard Admiral Rickover, whom we like to quote once in a while. He said, "I believe the real contest we are in with Russia is one between two bureaucracies."

Dr. GLENNAN. He is perfectly right.

Mr. ROUSH. The administrative processes we have to go through then slow this program down. Is that correct, sir?

Dr. GLENNAN. They can't help but do this. But, after all, we have to be responsible for what we are doing. You don't chop off our heads in this Nation when we fail or make an error. I think we attempt to learn by our mistakes and the only way one can learn by mistake is to have administrative processes. They may be unduly complicated at times, but I personally would be quite happy to say to you that the actions of this committee and other committees of the Congress have been helpful to me.

Mr. ROUSH. Well, we hope they continue to be helpful. That is our whole intention, I am sure. Now, have you recommended more money to hire more scientists?

Dr. GLENNAN. Yes, sir.

Mr. ROUSH. Is that included in your budget this year?

Dr. GLENNAN. Yes, sir.

Mr. ROUSH. Is that one of the recommendations that was turned down?

Dr. GLENNAN. That is included in our budget this year.

Mr. ROUSH. Have you recommended the increasing of the pay scale?

Dr. GLENNAN. No; we have not.

The CHAIRMAN. May I say this to the gentlemen on the committee, that our program for 11 o'clock—it is a little after 11 now—is to take up the matter of Executive privilege so as to save Dr. Glennan the necessity of coming back.

At this time, I think we should proceed with the matter of Executive privilege. It is the first chance we have had to question Dr. Glennan in reference to that.

Do you have a general statement, Doctor?

Mr. FULTON. Mr. Chairman.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. In order to give them notice, either for Dr. Glennan later, or for future hearing, could I just have a second to give some notice here?

I would like to have more of your propellant and your propulsion programs.

Dr. DRYDEN. This is coming, Mr. Fulton.

Mr. FULTON. And especially the ionic plasma and boron programs.

Dr. GLENNAN. That is coming. May I attempt to put a statement in the record about this matter of continuing to use the inhouse competence, ABMA? This is being done fully. They will be doing as much or more than they were before. It is just a fact that they cannot take on this very much enlarged program with their inhouse people.

The CHAIRMAN. If there is no objection, you can file that.

Dr. GLENNAN. I will write to Mr. Mitchell.

(The information referred to is as follows:)

EXTENT OF IN-HOUSE PARTICIPATION OF THE DEVELOPMENT OPERATIONS DIVISION OF THE ARMY BALLISTIC MISSILE AGENCY ON THE SATURN PROJECT

**The in-house effort of the Development Operations Division of the Army Ballistic Missile Agency has not, in terms of research and development funding, exceeded 32 percent for the Saturn project. Below are approximate figures for fiscal year 1959 and 1960 which span the Saturn project funding period under the Department of Defense.**

*Department of Defense Saturn funding breakdown—Funds expended*

[Dollars in millions]

| | Amount | Percent |
|---|---|---|
| Fiscal year 1959: | | |
| In-house ABMA | $8.0 | 22 |
| External Government agencies | 1.5 | 4 |
| Industrial contracts | 18.5 | 50 |
| Corps of Engineers, U.S. Army | 9.0 | 24 |
| Total | 37.0 | 100 |
| Fiscal year 1960: | | |
| In-house ABMA | 22.0 | 32 |
| Industrial contracts | 39.0 | 57 |
| Corps of Engineers, U.S. Army | 8.0 | 11 |
| Total | 69.0 | 100 |

The budget for 1961 provides $81 million for basic in-house research and development effort at Huntsville. An additional $134 million is estimated to flow through Huntsville for major industrial contracts associated with developing the Saturn vehicle. The Huntsville establishment will, in the case of these contracts, have an industrial contractor supervision and technical monitoring function to perform.

The CHAIRMAN. We will now proceed with the matter of Executive privilege.

(Whereupon, at 11:25 a.m., the committee proceeded to further business.)