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# DEFENSE SPACE INTERESTS

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## HEARINGS

BEFORE THE

## COMMITTEE ON SCIENCE AND ASTRONAUTICS U.S. HOUSE OF REPRESENTATIVES

EIGHTY-SEVENTH CONGRESS

FIRST SESSION

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MARCH 17, 18, 20, 21, AND 23, 1961

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[No. 8]

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# DEFENSE SPACE INTERESTS

FRIDAY, MARCH 17, 1961

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

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

The CHAIRMAN. The committee will come to order.

This morning we are opening hearings on the subject of space organization in the Department of Defense, and its implications for relations to the national space program as a whole including NASA and the Space Council.

This is a matter which goes to the very heart of this committee's jurisdiction, as set forth in the Rules of the House, over "astronautical research and development, including resources, personnel, equipment, and facilities," and over "outer space, including exploration and control thereof." These same rules assign us responsibility to exercise continuous watchfulness over policies of concern to the Space Council and the National Aeronautics and Space Administration.

The internal organization of the Department of Defense for space activities is a vital factor in our total United States space effort which includes both military and civilian applications of space technology. This committee has demonstrated its concern for the military portion of astronautics research and development as recently as last month when it held its annual review of such programs in the Department of Defense. Approximately half the funds for our total space program are assigned within the Department of Defense.

The immediate occasion for these hearings is to evaluate the Department of Defense directive of March 6, 1961, on the development of military space activities. This directive deals with only one segment of the total cycle required for assuring "the role of the United States as a leader in aeronautical and space science and technology" in accordance with the National Aeronautics and Space Act. The directive is concerned with the "research, development, test, and engineering" of satellites and space probes. It does not of itself tell very much about its implementation; nor does it concern itself with operational responsibilities.

It is my view that such a directive cannot be considered apart from the broader context of the effects such a directive may have on the choice of projects to be pursued, our system of priorities, and ultimate applications in both the military and civilian spheres. When one views the entire cycle from the first research idea through to the final operational responsibility, a directive of this nature inevitably has ramifications not confined to the Department of Defense, but in-

volves policies which should be considered by the Space Council, of which the Secretary of Defense is a member. This is not a theoretical matter, and I expect the questions and answers of the next several days will make this amply clear.

It is certainly not our thought at this time to challenge the wisdom of the directive of the Secretary of Defense. But we would be derelict if we did not make such inquiries as will give this committee a full understanding of a directive whose consequences may be so far-reaching.

Without objection, I will place in the record at this point a copy of the directive, its accompanying press release, and memorandum from the Secretary of Defense.

(The documents referred to are as follows:)

THE SECRETARY OF DEFENSE,
*Washington, D.C., March 6, 1961*

MEMORANDUM FOR THE SECRETARIES OF THE MILITARY DEPARTMENTS
THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
THE CHAIRMAN, JOINT CHIEFS OF STAFF
THE ASSISTANT SECRETARIES OF DEFENSE
THE GENERAL COUNSEL
THE ASSISTANTS TO THE SECRETARY OF DEFENSE

SUBJECT: *Development of Space Systems*

Having carefully reviewed the military portion of the national space program, the Deputy Secretary and I have become convinced that it could be much improved by better organization and clearer assignment of responsibility. To this end, I directed the General Counsel of the Department of Defense to obtain your comments on a new draft DOD Directive, "Development of Space Systems."

After careful consideration of the comments and alternate plans that were submitted, the Deputy Secretary and I have decided to assign space development programs and projects to the Department of the Air Force, except under unusual circumstances.

This assignment of space development programs and projects does not predetermine the assignment of operational responsibilities for space systems which will be made on a project by project basis as a particular project approaches the operational stage, and which will take into account the competence and experience of each of the Services and the unified and specified commands.

We recognize that all the military departments, as well as other Defense agencies, may have requirements for the use of space equipment. The directive expressly provides that they will continue to conduct preliminary research to develop specific statements of these requirements, and provides a mechanism through which these requirements may be fulfilled.

Attached is a directive incorporating this decision. We expect all elements of the Department of Defense to support it fully and to help develop the military portion of the national space program in the most effective manner.

s/ ROBERT S. MCNAMARA.

Encl. DOD Dir. 5160.32

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*March 6, 1961*
NUMBER 5160.32

DEPARTMENT OF DEFENSE DIRECTIVE

SUBJECT: *Development of Space Systems*

References:

(a) Memorandum (Conf) from Secretary of Defense to Chairman, Joint Chiefs of Staff, subject: Satellite and Space Vehicles Operations, September 18, 1959.

(b) Memorandum from Director, Advanced Research Projects Agency to Secretary of the Army, Secretary of the Navy, and Secretary of the Air Force, subject: Study Contracts for Projects Assigned to the Advanced Research Projects Agency, September 14, 1959

(c) Memorandum (Conf) from Director of Defense Research and Engineering to the Secretary of the Army, the Secretary of the Navy, the Secretary of

the Air Force, and Director, Advanced Research Projects Agency, subject: ARPA Programs, June 11, 1959

I. *Purpose*

This directive establishes policies and assigns responsibilities for research, development, test, and engineering of satellites, anti-satellites, space probes and supporting systems therefor, for all components of the Department of Defense.

II. *Policy and assignment of responsibilities*

A. Each military department and Department of Defense agency is authorized to conduct preliminary research to develop new ways of using space technology to perform its assigned function. The scope of such research shall be defined by the Director of Defense Research and Engineering in terms of expenditure limitations and other appropriate conditions.

B. Proposals for research and development of space programs and projects beyond the defined preliminary research stage shall be submitted to the Director of Defense Research and Engineering for review and determination as to whether such proposals, when transmitted to the Secretary of Defense, will be recommended for approval. Any such proposal will become a Department of Defense space development program or project only upon specific approval by the Secretary of Defense or the Deputy Secretary of Defense.

C. Research, development, test, and engineering of Department of Defense space development programs or projects, which are approved hereafter, will be the responsibility of the Department of the Air Force.

D. Exceptions to paragraph C will be made by the Secretary of Defense or the Deputy Secretary of Defense only in unusual circumstances.

E. The Director of Defense Research and Engineering will maintain a current summary of approved Department of Defense space development programs and projects.

III. *Cancellation*

Reference (a), except as to the assignments of specific projects made therein, and references (b) and (c) are hereby cancelled.

IV. *Effective date*

This directive is effective upon publication. Instructions implementing this directive will be issued within thirty (30) days.

ROBERT S. MCNAMARA, *Secretary of Defense.*

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NEWS RELEASE

DEPARTMENT OF DEFENSE,
OFFICE OF PUBLIC AFFAIRS,
*Washington D.C.*

*Immediate release* *March 8, 1961*

No. 196-61
OXford 53201-
53176

DEPARTMENT OF DEFENSE ANNOUNCES NEW DIRECTIVE FOR DEVELOPING OF MILITARY SPACE SYSTEMS

Secretary of Defense Robert S. McNamara today announced policies and assignments of responsibilities for development of military space systems. The Secretary stated that the policies and assignments were being made after a careful review of the military portion of the national space program had shown that the program could be much improved by better organization and clearer assignment of responsibility.

The policies and assignments cover research, development, test and engineering of satellites, anti-satellites, space probes and supporting systems for all components of the Department of Defense and are set forth in a new Department of Defense Directive, Number 5160.32.

The Directive deals solely with research and development. The actual assignment of operational responsibilities for space systems will be made by the Secretary of Defense on a project-by-project basis as a particular project approaches the operational stage, and will take into account the requirements of each of the Services and the Unified and Specified Commands.

Under the new Directive, each of the military Services is authorized to conduct preliminary research to develop new ways of using space technology to perform its assigned function within limitations to be fixed by the Director of Defense Research and Engineering. When these studies result in proposals for research and development projects, the military Services will submit the proposals to the Director of Defense Research and Engineering who will recommend to the Secretary those proposals which he believes should be developed.

Upon approval of the project by the Secretary of Defense, the management of further research and development of the project will become the responsibility of the Department of the Air Force unless, in the opinion of the Secretary or the Deputy Secretary of Defense, unusual circumstances justify assignment of the particular project to another Service.

The Directive does not affect space research and development assignments previously made.

The CHAIRMAN. At the present time, only three days have been definitely programmed to go into these matters. In the interest of conserving time, without objection, certain staff studies under preparation of a factual background nature will be placed in the record for the benefit of the committee. There will also be some matters which cannot be developed with the witnesses to the extent necessary to complete the record during these three days. Some pertinent views of Department of Defense witnesses have already been made known to the committee, and without objection where the present testimony is incomplete, abstracts of such earlier testimony which will round out committee consideration of the issues will be added to this record. Members of the committee will have many questions for the witnesses. May I suggest that pertinent questions which may not have been answered in these hearings be given to the witnesses for inclusion with their replies as a part of the record.

The Chair cannot help but notice a certain coincidence of difficulty in obtaining the attendance at these hearings of the Secretary of Defense, the Director of Defense Research and Engineering, and the Secretary of the Air Force, even though each has offered an excuse.

I might say that I talked to the Secretary of the Air Force and he explained his position to me and I was satisfied with it, but I understand this morning that he has cancelled his plans to go to Europe and will be here next week.

We have also noted a certain foot-dragging in making available the military witnesses who will be most affected by this directive.

Let me state, by way of summary, what we hope to learn from the witnesses. We should like a statement of the circumstances which governed the making of this decision. We wish to be given as much insight as possible as to how the Department of Defense plans to implement this directive. We wish to sample the opinions of the three military departments and Services as to how they expect to be affected by this directive, and how they will have to adjust their plans to comply with its terms. We would also like to test by example in questions and answers how the directive may bear on relations between the Department of Defense or the Services, and the National Aeronautics and Space Administration.

This morning we have two witnesses from the Office of the Secretary of Defense. Specifically we have Hon. Roswell L. Gilpatric, Deputy Secretary of Defense, and Hon. Charles J. Hitch, Assistant Secretary of Defense (Comptroller). At this point in the record, we shall insert their biographies.

(Biographical sketches of Secretaries Gilpatric and Hitch are as follows:)

ROSWELL L. GILPATRIC, DEPUTY SECRETARY OF DEFENSE

Roswell L. Gilpatric was named by President Kennedy to be Deputy Secretary of Defense and was sworn into office on January 24, 1961. Prior to his appointment as Deputy Secretary, Mr. Gilpatric had served as Assistant Secretary of the Air Force from May 28, 1951 to October 28, 1951 and as Under Secretary of the Air Force from October 29, 1951 to February 5, 1953. Immediately before his appointment to his present office, he was Chairman of the Board of the Aerospace Corp.

Mr. Gilpatric was born in Brooklyn, New York, November 4, 1906. He attended public schools in New York and was graduated cum laude from Hotchkiss School in 1924. He received a Bachelor of Arts degree in 1928 from Yale University, where he was a member of Phi Beta Kappa, and was graduated from Yale Law School in 1931.

Mr. Gilpatric was admitted to the New York State Bar in 1932 and later was admitted to practice before the Federal Courts and the United States Supreme Court. His bar association memberships include the American Bar Association and the New York City and State Bar Associations. He was a Visiting Sterling Lecturer at the Yale Law School from 1940 to 1942.

In 1932, Mr. Gilpatric joined the legal staff of the New York City law firm of Cravath, de Gersdorff, Swaine & Wood, where his legal experience was primarily in the field of corporate and financial law. He was a partner of Cravath, Swaine & Moore from 1940 to 1951, and returned to this firm in 1953.

During World War II, Mr. Gilpatric's work was as legal counsel for various corporations engaged in war production. He was concerned chiefly with the legal aspects of matters dealing with the financing of emergency plant facilities, Regulation V loans and renegotiation and contract termination procedures. He worked mainly with Army Air Corps and Navy aviation officials and with the Defense Plant Corporation, which was created in August, 1940, under the Reconstruction Finance Corporation.

In 1958, Mr. Gilpatric married Madelin Thayer Kudner of New York City. He has three children by a previous marriage, Joan Bradshaw Sayres (Mrs. Wm. G.), John Fulton Gilpatric, and Elizabeth Levitt Gilpatric. The Gilpatrics reside at 2120 Kalorama Road, N.W., Washington, D.C.

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CHARLES J. HITCH, ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)

Charles J. Hitch was appointed Assistant Secretary of Defense (Comptroller) by President Kennedy and took his oath of office on February 17, 1961.

Prior to his appointment, and since 1948, Mr. Hitch had been with the Rand Corp., a firm of scientific consultants. Most recently as chairman of its research council he was responsible for planning and directing the research of the corporation. The Rand Corp. is a non-profit corporation engaged in research for the Air Force, the Office of the Secretary of Defense, the Atomic Energy Commission, and the National Aeronautics and Space Administration.

During World War II Mr. Hitch served on Mr. Averell Harriman's first lend-lease mission in London 1941–1942, and then in the War Production Board 1942–1943 where he assisted in the development of the controlled materials plan. He was inducted into the U.S. Army in May 1943 and later assigned to the Office of Strategic Services. In 1945–1946, after his discharge from the Army as a 1st Lieutenant, he was Chief of the Stabilization Controls Division of the Office of War Mobilization and Reconversion.

Born January 9, 1910, in Boonville, Missouri, Mr. Hitch received his early education in the public schools of Boonville and at Kemper Military School in Boonville where he was graduated from junior college in 1929. He received his bachelor of arts degree from the University of Arizona in 1931. After one year of graduate study at Harvard, he went to Oxford on a Rhodes scholarship and received his master's degree from Oxford. He was elected a Fellow of Queens College, Oxford, in 1935. He was general editor of the Oxford economic papers from 1941 to 1948 and was a visiting professor at the University of São Paulo, Brazil, in 1947.

Mr. Hitch has been active in a large number of professional organizations, serving as president of the Operations Research Society of America 1959–1960. He is a member of the research advisory board of the Committee for Economic Development, of the executive committee of the Universities National Bureau Committee for Economic Research, and of the national security policy committee of the Social Science Research Council. He is a member of the American Economic Association and of the Council on Economic Relations. He has written two books: America's Economic Strength, published by the Clarendon Press in 1941, and (with Roland N. McKean) The Economics of Defense in the Nuclear Age, Harvard University Press, 1960.

Mr. and Mrs. Hitch, the former Nancy Winslow Squire, have a daughter, Caroline Winslow, one year old, and reside at 1513 30th Street, N.W., Washington, D.C.

The CHAIRMAN. Have the witnesses been contacted and have we any difficulty in that regard? I realize that notice has not been too much in advance, but we did not know when this directive was coming out.

Dr. SHELDON. Mr. Chairman, all the departments have been contacted. They have been very cooperative. There has been some remaining question as to the availability on Tuesday of General White, Chief of Staff of the Air Force, and General Schriever, Commander of the ARDC. This has not been completely resolved at this point.

The CHAIRMAN. As I understand, General Schriever has not been on a vacation for several years and I know he has had a hard job there. Will he be away?

Dr. SHELDON. I understand he will be out of the city and that these would be plans quite difficult to shift.

The CHAIRMAN. We want to accommodate the witnesses and we recognize this, that the hearing was set up without very much notice. If you think it would be possible, we could hear General Schriever in the morning there so he could get away next week. If you think it would be possible, we could hear him in this room tomorrow morning.

Dr. SHELDON. Mr. Chairman, we will certainly make necessary inquiries.

The CHAIRMAN. Who is the other witness?

Dr. SHELDON. General White.

The CHAIRMAN. We could hear him at the same time.

Mr. FULTON. With regard to hearings tomorrow morning, some of us have made arrangements to speak out of town. I think that might be a little short notice. May I say about the Department of Defense, I hope for their future cooperation and I think we should leave it on the record that it is the incidence rather than the coincidence of these events. I know they are busy and they have a change-over and a tremendous job so possibly we can give them a little more notice.

The CHAIRMAN. How many witnesses do we have set up for these three days?

Dr. SHELDON. We have two planned for this morning, Mr. Chairman, as is evident by their presence.

On Monday, by your direction, the plan was to hear from the Secretary of the Army and General Trudeau, the Secretary of the Navy, Admiral Hayward, and Admiral Connolly, and I believe the Assistant Secretary for R. & D., Dr. Wakelin, is going to come on Monday.

On Tuesday we had scheduled the Under Secretary of the Air Force, Dr. Charyk, in the absence of the Secretary. We had hoped

to hear from General White and from General Wilson and General Schriever, also by your direction, sir.

The CHAIRMAN. We have a good many witnesses already available who will be here next week. I recognize what the gentleman has to say there, that this is short notice for a Saturday session of this committee, but—

Mr. FULTON. Mr. Chairman, could you ask the wishes of the others, the other members of the committee? Maybe I am the only one.

The CHAIRMAN. If it was left to the chairman, he would say not to have a Saturday morning session, but the problem is getting the hearing through and perhaps these two witnesses tomorrrow may not be vital witnesses.

Mr. TEAGUE. I could be here, but I think the committee as a whole should decide.

The CHAIRMAN. I will leave it to the committee as a whole.

Mr. MILLER. We already have other commitments.

The CHAIRMAN. It is a matter of whether we have these hearings or wait a number of weeks until the witnesses are available.

Mr. MILLER. I think it is a very important hearing and I don't think we can schedule its closing at any specific date.

Mr. TEAGUE. I suggest we inquire as to how many can be here tomorrow.

The CHAIRMAN. How many do we have here now who are members of the committee?

Dr. SHELDON. Fifteen, sir.

The CHAIRMAN. Why not do this: Let's wait until the others come in and then we will poll each one individually and see how many can be here.

Mr. FULTON. I am going to have to call Pittsburgh and cancel. The sooner I do it the better. I suggest we ask those here who can come.

The CHAIRMAN. Who can be here tomorrow morning to hear the testimony of these two witnesses who otherwise would not be presently available?

How many do we have?

Dr. SHELDON. Seven, sir.

The CHAIRMAN. How many can't be here?

Dr. SHELDON. It is about even, sir.

The CHAIRMAN. The Chair will rule this: We will wait until the other members come in and take another vote.

Mr. CORMAN. Mr. Chairman, is there a possibility of meeting this afternoon since there will be no meeting of the House today?

The CHAIRMAN. That might be a thought. It would be short notice for the witnesses.

Mr. RYAN. They might prefer to do that than come in on Saturday.

Mr. HECHLER. Mr. Chairman, I suggest the chairman decide and work it out to the best interests of everybody.

Mr. DAVIS. I second the motion.

Mr. HECHLER. I think we should get on with the hearing.

The CHAIRMAN. You have heard the motion. Is there any objection to that?

Mr. FULTON. As long as you decide in the next five minutes.

The CHAIRMAN. If not, it is so ordered.

The Chair will try to work it out satisfactorily to everybody.

Mr. TEAGUE. I have known of General Schriever's plans to be gone for a month.

The CHAIRMAN. I know the amount of work General Schriever has had to do and I think he is entitled to get away and get his rest and I am very much in favor of accommodating him so he can get away.

I recognize, too, if he does leave without giving his testimony, it will be some time before he can give his testimony.

Mr. Feldman, will you come up and have a seat with us?

Now, Mr. Secretary, we have a prepared statement here. Each member of the committee has a copy of it and we would be very happy, sir, for you to proceed with your statement. You may interpolate, add, subtract or whatever you wish.

## STATEMENT OF HON. ROSWELL L. GILPATRIC, DEPUTY SECRETARY OF DEFENSE

Secretary GILPATRIC. Mr. Chairman and members of the committee, you invited me to appear before you this morning to discuss with you the directive of Secretary McNamara of March 6, 1961 on the development of space systems within the Department of Defense.

The purpose of that directive is to establish policies and to assign responsibilities for research, development, test and engineering of satellites, antisatellites, space probes and their supporting systems for all components of the Department of Defense.

Under this directive every component of the Department of Defense, which includes not only the military departments but also other organizations of the Defense Department, is authorized to conduct preliminary research to develop ways of using space technology to perform its assigned function. The scope of such preliminary research by each defense component is to be defined by the Director of Defense Research & Engineering in terms of expenditure limitations and other appropriate conditions.

No military department or other Defense agency is authorized to go beyond the defined scope of preliminary research unless and until the program or project has received the express approval of either the Secretary or the Deputy Secretary.

To obtain that approval the several military Services and other Defense agencies are required to submit their proposals to the Director of Defense Research & Engineering for review and determination as to whether they shall be recommended for approval. Any such proposal will become a Department of Defense space development program or project when it has received the specific approval of the Secretary or myself. Once approval has been given, further research development, test, and engineering of Department of Defense space development programs or projects will become the responsibility of the Department of the Air Force unless a specific exception is granted by either the Secretary or by me. The directive provides that such exceptions will be made only in unusual circumstances.

Before discussing the events and circumstances under which this directive was formulated, I should like to review briefly with the committee the history of management of space projects and programs within the Department of Defense. Obviously some of this history took place before Mr. McNamara and I assumed office, but both of us

have been made familiar with it, partly with the knowledge we obtained before we came and what we have ascertained since.

Prior to the orbiting of Sputnik I in October 1957, the development of space projects was the responsibility of the individual Services. Interservice coordination was effected through interservice committees. The orbiting of Sputnik demonstrated the need for greater urgency in the development of both our ballistic missile and space programs and the need for stronger central direction and control. Accordingly, early in 1958 Secretary McElroy created within the Office of the Secretary of Defense the Advanced Research Projects Agency (ARPA) and assigned to it the responsibility for the research and development of advanced research programs. Subsequently, Congress gave statutory recognition to this agency. From the time of the establishment of ARPA, research and development of space programs and projects within the Department of Defense has been under the centralized management of the Department of Defense, and the military Services have played only such roles as have been assigned to them by the Secretary of Defense.

Upon the creation of the Office of the Director of Research and Engineering by the enactment of the 1958 amendments to the National Security Act of 1947 supervision and control of ARPA's activities were assigned to the Director of Defense Research & Engineering.

May I interpolate here that Dr. York, who now occupies that office, has been absent on leave. As you may have read, he is unfortunately leaving the Department of Defense to become chancellor of the new La Jolla division of the University of California and he made plans to go out in connection with that new assignment but he will be back here and I am sure he will be glad to appear before this committee if the committee desires to hear from him personally in connection with its inquiry.

In 1958, Congress established the National Aeronautics and Space Administration (NASA), and during that year the Department of Defense transferred to it those programs which were basically nonmilitary in character. The remaining military space programs continued to be developed by ARPA.

In September 1959, Secretary McElroy, determining that research and development of current space programs had reached a point where further development could be assigned to the Services, assigned to the Air Force responsibility for the development and production and launching of space boosters and the necessary systems integration incident thereto, if approved by the Secretary of Defense.

(The memorandum in question is as follows:)

THE SECRETARY OF DEFENSE,
*Washington, D.C., September 18, 1959.*

MEMORANDUM FOR: THE CHAIRMAN, JOINT CHIEFS OF STAFF
SUBJECT: *Coordination of Satellite and Space Vehicle Operations*

(First paragraph Classified and deleted.)

The Director of Defense Research and Engineering considers that the numbers of satellite vehicles to be launched and the numbers of satellites expected to be in orbit in any one period over the next several years will not be large. Nevertheless, the advent of military satellite and space vehicle systems has national security implications which emphasize the need for over-all control and coordination of the military activity pertaining thereto.

The establishment of a joint military organization with control over operational space systems does not appear desirable at this time. The utilization of the present organization of the Military Departments appears preferable in order to realize full advantage from existing support capabilities, to eliminate conflicting research and development interests and responsibility, and to simplify fiscal accounting.

Although the research and development leading to the demonstration of operational feasibility will continue to be the responsibility of the Advanced Research Projects Agency for the time being, it appears desirable at this time to begin the development of a plan for the orderly transfer of space projects to the appropriate military departments. This transfer will normally be made during the development phase at an appropriate time to be determined by the Secretary of Defense.

Satellite and space vehicle operations will be assigned to the appropriate military department after consideration of the primary interest or special competence of the respective service. Where no one military department has primary interest or special competence, consideration will be given to special competency in associated fields of development.

The responsibility for the development, production and launching of space boosters and the necessary systems integration incident thereto, as approved by the Secretary of Defense, will be assigned to the Department of the Air Force except for such research and development as may be conducted by ARPA.

The specific assignment of the payload for space and satellite systems will be assigned separately to the appropriate military department which, in addition to budgeting for the payload, will also budget and reimburse the Department of the Air Force for the necessary boosters, launching vehicles and other unique equipment required in launching and necessary systems integration.

The following specific assignments for payload development and payload research and development support and production improvement are approved:

(*a*) Interim satellite early warning system—Air Force.
(*b*) Phase I of satellite reconnaissance system—Air Force.
(*c*) Interim satellite navigation system—Navy.
(*d*) Interim satellite communications system—Army.

The date of transfer of the above-listed systems from the Advanced Research Projects Agency will be approved by the Secretary of Defense upon the recommendation of the Director of Defense Research and Engineering. Assignment of other systems that may be developed will be determined later.

Prior to assuming responsibility for a particular satellite and space vehicle program, the appropriate military department will submit to the Secretary of Defense for approval detailed plans for the system including user relationships with the Unified and Specified Commands and other appropriate agencies. The Secretary of Defense will refer such plans to the Joint Chiefs of Staff for comment and recommendation.

The Director of Defense Research and Engineering will review and approve the detailed research and development programs in the space and satellite field utilizing where appropriate the support of the Advanced Research Projects Agency in order to insure the most efficient and effective utilization of the Department of Defense resources in this field. Particular attention should be given to the desirability of incorporating where practicable, more than one payload or system in a particular satellite.

/s/ NEIL MCELROY.

Secretary GILPATRIC. I might remind the committee that in his directive of September 1959 Secretary McElroy made a finding that at that time a joint military organization to control space systems would not be desirable.

In other words, he did consider one of the alternatives we considered in connection with the directive now before the committee.

In addition, he made specific assignments for payload development and payload research, development, support and production improvements to the several Services. Samos and Midas were assigned for further development to the Air Force, Transit to the Navy and Advent to the Army. Further assignment of additional projects were to be determined at a later time.

The September 1959 directive of Secretary McElroy did not clearly delineate the assignment of responsibilities for future space research and development programs and projects and did not define the limitation within which preliminary research by the Services would be conducted.

(A further related memorandum is as follows:)

SECRETARY OF DEFENSE,
*Washington, D.C., June 16, 1960.*

MEMORANDUM FOR: THE SECRETARY OF THE ARMY
THE SECRETARY OF THE NAVY
THE SECRETARY OF THE AIR FORCE
CHAIRMAN, JOINT CHIEFS OF STAFF

SUBJECT: *Coordination of Satellite and Space Vehicle Operations*

Reference is made to the Secretary of Defense's memorandum of September 18, 1959, subject as above.

The decisions set down in the referenced memorandum are reaffirmed. Additionally, it is desired to emphasize that the establishment of a joint military organization for control over operational space systems does not appear necessary or desirable at this time.

With specific reference to the first full paragraph on page 3 of the September 18, 1959, memorandum, the appropriate Military Department will include in its detailed plans for a particular system not only the user relationships with unified and specified commands and other appropriate agencies, but also, where applicable, provision for the exercise of appropriate operational authority by the unified and specified commanders responsible for the functional area concerned.

THOMAS S. GATES, JR.

Secretary GILPATRIC. May I stress the importance of some control over preliminary research. Without some supervision in that area, preliminary research can go on, involve large amounts of money and can constitute a considerable diversion and dilution of resources within the departments, so it needs some sort of supervision, we feel.

By the time that Secretary McNamara and I assumed office in January of this year, it had become clearly apparent that there was need for immediate re-examination of the McElroy memorandum in light of recent developments. We felt we had several choices. We could reaffirm the McElroy directive or we could modify it, or we could make a completely new approach to the conduct of space responsibilities in the Air Force—in the Department of Defense.

There were a number of factors which led us to move on this problem as soon as we could.

In December of 1960, there had been an uncoordinated announcement by the Department of the Navy of its intention to initiate a series of new satellite programs in fields such as communications and reconnaissance, whereas the Army and the Air Force already had approved projects. In the case of communications, there was already a project well under way in NASA.

The Air Force had also announced a new communications project which would be in addition to Advent and Echo. On January 12, 1961, the Ad Hoc Committee on Space appointed by then President-elect Kennedy recommended that there be established "a single responsibility within the military establishment for managing the military portion of the space program."

Promptly upon assuming office, Secretary McNamara made the re-examination of space research and development management a matter of the highest priority and assigned the problem for study and report to the new Office of Organization and Management Planning Studies.

I think you have heard about this office. It has been written up in the press and it has been brought to the attention of Congress in several ways. It is a small office created by Secretary McNamara within the Office of the General Counsel primarily to conduct research to provide timely and effective solutions to Defense management and organizational planning problems.

I might say its staff consists of 3 officers, one from the Army, one from the Navy, and one from the Air Force. It wasn't the intention that it should be necessarily a balanced group with equal representation, but we found that the three most qualified officers in the whole defense office in this area, Colonel Cushman from the Army, Commander Cook from the Navy, and Major Greenleaf from the Air Force, did have the best reservoir of knowledge and competence in this area so they were asked to be assigned by their Services to our office. They had previously been used to some extent by Secretary Gates on an ad hoc basis.

The staff of this office reviewed the entire current military space program with the Director and staff of the Office of the Director of Defense Research and Engineering.

They also reviewed the management of each of the current military space programs with personnel from the appropriate military departments having knowledge of management practices and procedures for space projects. As a result of their study, the staff advised Secretary McNamara that under existing assignments the Air Force was responsible for over 90 percent of space research and development and that with respect to projects not assigned to the Air Force for research and development, the Air Force was playing a considerable part in the development of those projects through provision of the boosters, launch facilities and services. The staff also analyzed the advantages and disadvantages of a number of proposed solutions for defense space research and development. The solutions considered included reaffirmation of the McElroy memorandum, the establishment of a Department of Defense agency to carry out space research and development, a possibility which Secretary McElroy had considered but rejected, assignment of all space research and development to the Air Force—without exception—and assignment of such responsibility to the Air Force unless an exception is made by the Secretary of Defense.

After careful consideration of the matter by both Secretary McNamara and myself, the Office of Organization and Management Planning Studies was directed to draft and circulate for concurrence and comment a proposed directive assigning responsibility for all space research and development projects after approval by the Secretary of Defense to the Department of the Air Force subject to exceptions which might be made by the Secretary of Defense under proper circumstances. The draft directive was accordingly submitted to the three military departments and other interested components of the Department of Defense, including the Chairman of the Joint Chiefs of Staff, and a week's time limit was fixed within which all comments were to be submitted.

During the period while the draft proposal was under consideration, Secretary McNamara discussed the matter with the Secretary of the Navy and I discussed the matter with the Secretary of the Army. Upon receipt of all the comments from the departments

and other defense agencies—I might say we received comments from each of the offices to which this was submitted—in the light of that the Secretary and I analyzed with great care all of the comments. In light of that analysis, the Secretary and I concluded that the most economical and expeditious method of handling space research and development would be to assign future responsibility for the development of approved Defense space projects and programs to the Air Force. The Secretary then directed the redrafting of the directive in the form in which it has been issued and it is before you.

In our analysis of the comments of the several Services, we found that basically there were two criticisms of the Secretary's proposed directive. First was the criticism that such a move would result in overall loss of effectiveness through failure to utilize to its full potential the initiative, background experience and brain power available in the other Services and, further, that the move would impair the capabilities of the other Services.

Without in any way underestimating the seriousness or sincerity with which such contentions were advanced in the present situation, I must in all frankness point out that criticism of this sort directed to a Defense Department proposal is not new. It is also a criticism which is often impossible to prove and which has been made against many proposals for change within the Department of Defense since 1947, and will probably be made against many other proposals for change.

In any event, Secretary McNamara and I gave earnest and thorough consideration to the claim that this directive would bring about an overall loss of effectiveness in the other Services and would result in an impairment of their capabilities. Against these contingencies, we weighed the recommendation of the President's Ad Hoc Committee on Space, which was chaired by Dr. Jerome B. Wiesner, the President's Scientific Advisor, and the recommendation of Dr. Herbert York, Director of Defense Research and Engineering, the principal adviser to the Secretary of Defense on scientific and technical matters. Both of these men are eminent scientists in the field of space. We also took into account the limitation on the concept of a joint space agency and the problem that had been faced by ARPA when it was charged with responsibility for all space research and development projects in the Defense Department.

Furthermore, the Secretary wrote into the directive three safeguards designed to preserve the effectiveness and capabilities of all of the Services.

First, it was provided that each component of the Department of Defense would be permitted to conduct preliminary research to develop ways of using space technology to perform its assigned function.

Second, it was provided that no space project would be developed beyond the preliminary stage until it had been specifically approved as a Department of Defense space project or program by the Secretary and myself. Such approval would be given only after an affirmative scientific and technical recommendation had been made by the principal scientific advisor to the Secretary, the Director of Defense Research and Engineering. It should be noted that the Department of the Air Force does not select what projects are to be developed. In this respect, the Department of the Air Force is only another pro-

ponent of equal status with the other Services and there is no different situation than the Army or the Navy. It must come forward and justify projects which it wants with just as much support and validity as the other agencies do theirs.

Third, we provided that under unusual circumstances an exception could be made and development assigned to a Service other than the Air Force.

In addition, there is a fourth safeguard. Like all other research and development programs under single management in the Department of Defense, the space programs in their processes of development, research, testing and engineering are under the continuous direction and control of the Director of Defense Research and Engineering who will maintain close program review.

We believe that these four safeguards, the first retained by the Services and the remaining three vested in the Secretary of Defense, myself and the Director of Defense Research and Engineering, will be adequate to preserve the overall effectiveness and capability of all of the Services.

The second criticism advanced against the proposed directive was that the assignment of responsibility for space research and development to the Air Force would encroach upon the operational responsibilities of the other Services. The directive as issued, however, does not deal in any way with the operational assignment of space systems. In his memorandum of transmittal of the new directive, the Secretary made it abundantly clear that the question of operational assignment was being reserved for future determination. Whether we will ever have space systems for operational use as weapons systems is something we cannot predict today, but if we do we will then face up to the problem of which Service has the competence, the greatest interest and use in the operational control, and at that time we will determine to what Service the operational assignment should go.

The CHAIRMAN. Isn't the ballistic missile a space system?

Secretary GILPATRIC. Well, Mr. Chairman, the ballistic missile programs are not within this directive. They were assigned before the directive was issued and no pre-existing assignments are to be affected by this directive.

In other words, the Polaris program of the Navy, the Atlas, Titan and Minuteman programs of the Air Force, all stay where they are.

Now, if we have additional ballistic missile programs in the future, in addition to those we now have, they will be assigned according to what we would then find to be the optimum performance capabilities of the respective Services.

Moreover, the Air Force is making certain organizational changes to make sure that it can adequately and fairly service the requirements of the Army and the Navy, as well as NASA, to the extent that the Air Force has responsibility for the development of space projects of interest or concern to its sister agencies. The Secretary of the Air Force will, when he is with you next Tuesday, describe in more detail the steps which the Air Force is taking to discharge the added responsibilities which will be imposed upon it as a result of the new directive.

There is one other point I should like to address myself to briefly, and that is the manner in which Secretary McNamara's decision was made. It is true that the decision on assignment responsibility for

space developments was made in less time than has customarily been the practice in the Department of Defense. It is not true that the decision was made without full consideration and without giving all parties an opportunity to be heard.

Each Service and other component of the Department of Defense was given ample opportunity to concur and everyone took advantage of that opportunity and Secretary McNamara and I personally considered all the points of view presented by the different Services and the other agencies before we arrived at a final decision.

A major criticism of the Department of Defense, which has been made for many years both in the Congress and elsewhere, has been the slowness of the decision-making process within the Department. Secretary McNamara and I believe that it is imperative, if we are to have a defense adequate to meet the needs of this nuclear and space age, that decisions be made as promptly as possible. We do not feel that important decisions affecting the national security of the United States can be deferred pending attempts to work out a modus vivendi which will be satisfactory and pleasing to everyone.

Once you try to compromise the positions of competing interests, you water down the solution to a point where we believe it cannot be as effective as it should be.

Too often such efforts do not resolve our problems but rather intensify them in at least two ways.

First, during long periods of deliberation, independent actions may be taken by many of the participants which may, in turn, compromise the final policy when it is promulgated. Alternately, a moratorium on all actions during the period of prolonged deliberation may mean that some very necessary decisions are held too long in abeyance. Second, long and involved deliberations on the details of broad policy matters inevitably tend to exacerbate differences of opinion.

I am sure members of this committee have seen that process at work. I want to add, however, that any changes which are made within the Defense Department by the Secretary of Defense and myself will be made in accordance with existing legislation and law and wherever they involve matters within the purview of Congress we are certainly going to come to you first.

Before closing my introductory statement, I want to make a comment on the relations of the Department of Defense with the National Aeronautics and Space Administration.

On space this directive does not impinge upon that relationship but I have discussed this directive with Jim Webb. Jim Webb and I are old friends; we were in the Government before and we have worked together very closely.

One of the first things we did when we came into office respectively was to reach a written agreement on the National Launch Vehicle Program, on the 23d of February, and agreement that neither NASA nor the Department of Defense would go ahead with additional such programs without coordinating one with the other.

This is not new. Our predecessors had a series of agreements. There was a basic agreement that was reaffirmed as late as September of last year, setting up the Aeronautical and Astronautical Coordinating Board. This is a board which consists of equal representation by representatives of NASA and by the Defense Department. The

Deputy Director of NASA, Dr. Dryden, is co-chairman with Dr. York—or Dr. York's successor, Dr. Brown, when he takes office—and the Board consists of equal representation down the line and that Board is used to monitor programs of equal interest to the two departments and to make sure there is not contention, competition or overlapping between the activities of the two agencies.

Last summer my predecessor, Deputy Secretary Douglas, reached an agreement with Dr. Keith Glennan, then Administrator of NASA, regarding the handling of communications satellites.

As I have indicated in my statement, there are several communications satellite projects. Up to now we have worked out by agreement—and I feel sure we will continue to—problems where what NASA is doing and what the Defense Department is doing and each in its respective sphere—NASA, the non-military; the Defense Department, the military—can be worked out.

Surely we will have problems and we will have discussions, but I feel confident in assuring this committee that Mr. Webb and I—because the Secretary of Defense has asked me to continue what my predecessor did in monitoring this whole area—I feel sure we can avoid any conflicts, any major differences between the two departments and that will be our effort.

Thank you.

The CHAIRMAN. Thank you, Mr. Secretary, for your statement.

Your position is Deputy Secretary of Defense. You really are the head of the ARPA, as it is today, is that correct?

Secretary GILPATRIC. Actually the Director of Defense Research and Engineering has control over ARPA, but he, in turn, is subject to my direction and that of the Secretary and, as I indicated, Secretary McNamara has asked me to personally follow this whole area of effort within the Defense Department so in substance, what you say is true.

The CHAIRMAN. Within the realm of the Director of ARPA, you are following the organization of the entire space program in the Defense Department.

Secretary GILPATRIC. That is true.

The CHAIRMAN. The entire matter really goes back, doesn't it, to the Wiesner Report.

Secretary GILPATRIC. The Wiesner Report was one of the factors which led us, as I have indicated, to move in on this problem without delay. There are other factors, however. We found that the different Services had programs and projects of their own which unless brought into a centralized organization for supervision and control, could lead to overlapping and duplication and misuse of resources. We felt that there was a great deal of merit in the proposal of Dr. Wiesner, that the responsibility for all space activities within the military departments should be centralized.

We felt it would assist us in our relations with NASA, because NASA has some very heavy problems and serious problems in its programs, and it needs the support we can give it, and we, in turn, rely on it, so we felt there should be two strong positions, one in the Defense Department as well as in NASA, to deal with those.

The CHAIRMAN. Now does this directive carry out all of the recommendations of the Wiesner Report?

Secretary GILPATRIC. It only deals with the one recommendation I mentioned. The Wiesner Report goes into a number of other subjects, including specific portions of the military program and also into the heavy booster program which is the responsibility of NASA.

Now this directive to which I have referred, which is the subject of this hearing, does not go into that area, and we are only attempting to deal with the one problem of centralized management within the Defense Department.

The CHAIRMAN. Now, do you have a copy of that Wiesner Report? Would that be available for the record?

Secretary GILPATRIC. I am sure it can be, Mr. Chairman. It is a published document and we will see that it is furnished.

(The public version of the Wiesner Report is as follows, with the section most pertinent to these hearings printed in italic:)

REPORT TO THE PRESIDENT-ELECT OF THE AD HOC COMMITTEE ON SPACE

I. *Introduction*

Activities in space now comprise six major categories:

1. Ballistic missiles.
2. Scientific observations from satellites.
3. The exploration of the solar system with instruments carried in deep space probes.
4. Military space systems. (Separate Classified Report)
5. Man in orbit and in space.
6. Non-military applications of space technology.

We rely on the first member of the list, ballistic missiles, for a large part of the retaliatory response to the Russian missile threat.

It is generally assumed by the American citizen that our vast expenditures of money and technical talent in the national space program are primarily designed to meet the overriding needs of our military security. The fact is, however, that the sense of excitement and creativity has moved away from the missile field to the other components of the list, and that missiles, long before they are in condition for us to depend upon them, are slowly being delegated to the category of routine management. Before we proceed in this report to discuss and support the important activities in the other five categories we wish to emphasize the hazard of failing to complete and deploy on time our intercontinental deterrent missiles.

In addition to the need to develop ballistic missiles to provide for our military security, there are five principal motivations for desiring a vital, effective space program. It is important to distinguish among them when attempting to evaluate our national space effort.

First, there is the factor of national prestige. Space exploration and exploits have captured the imagination of the peoples of the world. During the next few years the prestige of the United States will in part be determined by the leadership we demonstrate in space activities. It is within this context that we must consider man in space. Given time, a desire, considerable innovation, and sufficient effort and money, man can eventually explore our solar system. Given his enormous curiosity about the universe in which he lives and his compelling urge to go where no one has ever been before, this will be done.

Second, we believe that some space developments, in addition to missiles, can contribute much to our national security—both in terms of military systems and of arms-limitation inspection and control systems.

Third, the development of space vehicles affords new opportunities for scientific observation and experiment—adding to our knowledge and understanding of the Earth, the solar system, and the universe. In the three years since serious space exploration was initiated the United States has been the outstanding contributor to space science. We should make every effort to continue and to improve this position.

Fourth, there are a number of important practical non-military applications of space technology—among them satellite communications and broadcasting; satellite navigation and geodesy; meteorological reconnaissance; and satellite mapping—which can make important contributions to our civilian efforts and to our economy.

Finally, space activities, particularly in the fields of communications and in the exploration of our solar system, offer exciting possibilities for international cooperation with all the nations of the world. The very ambitious and long-range space projects would prosper if they could be carried out in an atmosphere of cooperation as projects of all mankind instead of in the present atmosphere of national competition.

The ad hoc panel has made a hasty review of the national space program, keeping in mind the objective—to provide a survey of the program and to identify personnel, technical or administrative problems which require the prompt attention of the Kennedy administration. We have identified a number of major problems in each of these categories, and they will be discussed in this report. It is obvious that there has been inadequate time to examine all facets of the program or to permit full consideration of the possible answers to many of the questions raised.

Because of the overriding necessity to provide more efficient and effective leadership for the program, the group has devoted a major portion of its time to this aspect of the space program. We will, however, indicate important scientific and technical problems which should be thoroughly examined as soon as possible. We have concluded that it is important to reassess thoroughly national objectives in the space effort—particularly in regard to man in space; space, science and exploration; and the non-military applications of space, in order to assure a proper division of effort among these activities. Space activities are so unbelievably expensive and people working in this field are so imaginative that the space program could easily grow to cost many more billions of dollars per year.

While we are now compelled to criticize our space program and its management, we must first give adequate recognition to the dedication and talent which brought about very real progress in space during the last few years. Our scientific accomplishments to date are impressive, but unfortunately, against the background of Soviet accomplishments with large boosters, they have not been impressive enough.

Our review of the United States space program has disclosed a number of organizational and management deficiencies as well as problems of staffing and direction which should receive prompt attention from the new administration. These include serious problems within NASA, within the military establishment, and at the executive and other policy-making levels of Government. These matters are discussed in the sections which follow.

II. *The Ballistic Missile Program*

The Nation's ballistic missile program is lagging. The development of the missiles and of the associated control systems, the base construction, and missile procurement must all be accelerated if we are to have the secure missile deterrent force soon that the country has been led to expect.

While additional funds will undoubtedly be required to accomplish this, we believe that re-establishing an effective, efficient, technically competent management for the program is the overriding necessity.

Though the missile program is not ordinarily regarded as part of the space program, it is important to recognize that for the near future the achievement of an adequate deterrent force is much more important for the Nation's security than are most of the space objectives, and that at least part of the difficulty in the management and execution of the program stems from the distraction within the Defense Department and in industry caused by vast new space projects. However, we have no alternative but to press forward, with space developments.

III. *Organization and Management*

There is an urgent need to establish more effective management and coordination of the United States space effort. The new administration has promised to move our country into a position of preeminence in the broad range of military, cultural, scientific and civilian applications of satellite and other space vehicles. This cannot be done without major improvements in the planning and direction of the program. Neither NASA as presently operated nor the fractionated military space program nor the long-dormant Space Council have been adequate to meet the challenge that the Soviet thrust into space has posed to our military security and to our position of leadership in the world.

In addition to the difficulties and delays which the program has endured because of the lack of sufficient planning and direction, it has also been handicapped because too few of the country's outstanding scientists and engineers have

been deeply committed to the development and research programs in the space field. In changing the management structure and in selecting the administrators for the effort, the need to make space activities attractive to a larger group of competent scientists and engineers should be a guiding principle.

The new administration has announced that it plans to use the National Aeronautics and Space Council for coordinating Government space activities, or advising the President on policy on plans and on the implementation of programs. We believe that the Space Council can fulfill this role only if it is technically well-informed and, moreover, seriously accepts the responsibility for directing the conduct of a coherent national space effort. Particular care should be taken to insure the selection of a very competent and experienced staff to assist the Council.

Not only must we provide more vigor, competence and integration in the programs which support our national policy. We refer particularly to the missile needs, already mentioned, and to the continuing need for the development and research in the field of aeronautics.

*Each of the military services has begun to create its own independent space program. This presents the problem of overlapping programs and duplication of the work of NASA. If the responsibility of all military space developments were to be assigned to one agency or military service within the Department of Defense, the Secretary of Defense would then be able to maintain control of the scope and direction of the program and the Space Council would have the responsibility for settling conflicts of interest between NASA and the Department of Defense.*

We are also concerned by the NASA preoccupation with the development of an in-house research establishment. We feel that too large a fraction of the NASA program, particularly in the scientific fields, is being channeled into NASA-operated facilities.

One important responsibility of NASA given little attention now in the organization, is that of providing for basic research and advanced development in the field of aeronautics. There is a general belief in the aviation industry that the national preoccupation with space developments has all but halted any advance in the theory and technology of aerodynamic flight. There is ample evidence to support the contention that the Russians and possibly the British are surpassing us in this field and consequently in the development of supersonic commercial aircraft. We should make a substantial effort to correct this situation, possibly by getting some of NASA's aeronautical and aerodynamic experts back into the field of advanced aircraft research and development. Possibly, after careful investigation, the Space Council would prefer to stimulate this work by non-governmental arrangements, or by placing it entirely in another agency.

We believe that the work of NASA would be facilitated and the task of recruiting staff made possible if an outstanding expert was placed in charge of the direction and management of each of the following important areas of work:

a. Propulsion and vehicle design and development
b. The space sciences
c. Non-military exploitation of space technology
d. Aeronautical sciences and aircraft development

IV. *The Booster Program*

The inability of our rockets to lift large payloads into space is the key to the serious limitations of our space program. It is the reason for the current Russian advantage in undertaking manned space flight and a variety of ambitious unmanned missions. As a consequence, the rapid development of boosters with a greater weight-lifting capacity is a matter of national urgency.

Payload weight is currently limited by our dependence on modified military rockets as the primary boosters (Thor, Jupiter, Atlas). Current plans call for the first substantial increase in payload with the addition of the Centaur upper stage to the Atlas in 1962, followed by a second big step with the Saturn booster in 1965.

It is likely that a variety of new booster programs will be proposed in the near future, particularly for military projects. There are no fundamental differences in civilian and military requirements which are foreseeable now. If the national effort is to be focused and the very large expenditures are not to be distributed among an excessive number of booster programs, it is important that we maintain and strengthen the concept of a National Booster Program.

A number of problems may well arise in the National Booster Program. The present Mercury program, based on the Atlas, is marginal and if the Atlas proves inadequate for the job it may be necessary to push alternatives vigorously. The first possibility appears to be the Titan, although it has not yet demonstrated the reliability which is required. We should study the desirability of carrying out a Titan-boosted Mercury program in the event Atlas should prove to be inadequate.

The Centaur rocket involves an entirely new technology and is still untested. If difficulties develop in this program within the next three or four months we must act promptly to initiate an alternate.

Development of the Saturn-booster—a cluster of eight Atlas engines—should continue to be prosecuted vigorously. However, it would be dangerous to rely on Saturn alone for the solution to our problems, either in the long or short term, for two reasons:

(*a*) It is intrinsically so complex that there is a real question whether it can be made to function reliably.

(*b*) It represents a maximum elaboration of present technology and provides no route to further development.

Therefore, the development of a very large single engine should proceed as fast as possible so that it may be a back-up for the Saturn cluster and a base for future larger vehicle development. The present F–1 (1.5 million lb. thrust) engine development should be studied to be sure it is progressing fast enough and has enough promise of success to fill this role. If the technological step in going from the present 180,000 lb. thrust engines to 1.5 million lbs. is so big as to make success marginal, a parallel development of a somewhat smaller engine should be started.

The nuclear rocket program (Rover) presents an area in which some major decisions will have to be taken by the new administration. In principle the nuclear rocket can eventually carry heavier payloads much farther than any chemical rocket. Nevertheless, the technology is so new and the extrapolation from reactors developed now to sizes which would be useful in large rockets is so great that it is not clear how soon they will make an important contribution to the space program. The use of nuclear rockets will raise serious international political problems since the possibility that a reactor could reenter and fall on foreign territory cannot be ignored. A major technical and management review of the Rover program seems urgent.

Above all we must encourage entirely new ideas which might lead to real breakthroughs. One such idea is the Orion proposal to utilize a large number of small nuclear bombs for rocket propulsion. This proposal should receive careful study with a realization of the international problems associated with such a venture.

V. *Science in Space and Space Exploration*

In the three years since space exploration began, experiments with satellites and deep space probes have provided a wealth of new scientific results of great significance. In spite of the limitations in our capability of lifting heavy payloads, we now hold a position of leadership in space science. American scientists have discovered the great belt of radiation, trapped within the Earth's magnetic field. American scientists have revealed the existence of a system of electric currents that circle our planet. Our space vehicles have probed the interplanetary space to distances of tens of millions of miles from the Earth. They have shown that the Earth is not moving through an empty space but through an exceedingly thin magnetized plasma. They have intercepted streams of fast-moving plasma ejected from the Sun which, upon reaching our planet, produce magnetic storms, trigger off auroral displays and disrupt radio communications.

From these and other experiments, there is gradually emerging an entirely novel picture of the conditions of space around our planet and of the Sun-Earth relations. One of the important tasks of space science in the next few years will be a full exploration of the new field revealed by the early experiments. There is little doubt that such exploration will lead to further important discoveries.

Another scientific field, where space science promises an early and major breakthrough is that of astronomy. Until a few years ago, visible light from celestial objects, reaching our telescopes through the atmospheric blanket, had been the only source of astronomical information available to man. The only other portion of the spectrum capable of penetrating the atmosphere and the ionosphere is that corresponding to shortwave radio signals. In recent years, the development

of radio telescopes has made it possible to detect these signals. Radio astronomy has enormously advanced our knowledge of the universe. By means of radio telescopes we can now "see" not only the stars, but also the great masses of gas between the stars; we can detect the high-energy electrons produced by cosmic accelerators located thousands or millions of light years away from the Earth.

We are entitled to expect a similar and even perhaps a more spectacular advance the day that we shall have telescopes installed aboard satellites circling the Earth above the atmosphere and the ionosphere. These instruments will be capable of detecting the whole of the electromagnetic spectrum—from long-wave radio signals to gamma rays.

A third major task of space science in the years to come will be the exploration of the Moon and the planets. Scientists are planning to fly instruments to the vicinity of these celestial objects, and eventually to land them upon their surface. From the data supplied by these instruments they expect to obtain information of decisive importance concerning the origin and the evolution of the solar system. Moreover, there is the distinct possibility that planetary exploration may lead to the discovery of extraterrestrial forms of life. This clearly would be one of the greatest human achievements of all times.

Our present leadership in space science is due to a large extent to the early participation of some of our ablest scientists in our space program—primarily as part of the International Geophysical Year—and to the fact that these scientists were in a position to influence this program. Another important factor was our initial advantage in instrumentation, which helped to offset our disadvantage in propulsion.

We must not delude ourselves into thinking that it will be easy for the United States to maintain in the future a prominent position in space science. The U.S.S.R. has a number of competent scientists. It will be easier for them to catch up with us in instrument development than for our engineers to catch up with the Russians in the technique of propulsion. Thus we must push forward in space science as effectively and as forcefully as we can.

Our scientific program in space appears to be basically sound. However, to insure its success, the following requirements must be met.

1. In the planning of our space activities, scientific objectives must be assigned a prominent place.
2. Our space agency must insure a wide participation in its program by scientists from universities and industrial laboratories, where our greatest scientific strength lies.
3. It must provide adequate financial support for the development and construction of scientific payloads.
4. It must exert the greatest wisdom and foresight in the selection of the scientific missions and of the scientists assigned to carry them out.
5. It must initiate immediately a research program in advanced instrumentation, so that we may be ready to exploit fully the capability of flying heavier and more complex payloads that we shall possess several years from now. Problems of automation, processing, and transmission of information must be tackled by competent and imaginative research teams.

## VI. *Man in Space*

We are rapidly approaching the time when the state of technology will make it possible for man to go out into space. It is sure that, as soon as this possibility exists, man will be compelled to make use of it, by the same motives that have compelled him to travel to the poles and to climb the highest mountains of the Earth. There are also dimly perceived military and scientific missions in space which may prove to be very important.

Thus, manned exploration of space will certainly come to pass and we believe that the United States must play a vigorous role in this venture. However, in order to achieve an effective and sound program in this field, a number of facts must be clearly understood.

1. Because of our lag in the development of large boosters, it is very unlikely that we shall be first in placing a man into orbit around the Earth.
2. While the successful orbiting of a man about the Earth is not an end unto itself, it will provide a necessary stepping stone toward the establishment of a space station and for the eventual manned exploration of the Moon and the planets. The ultimate goal of this kind of endeavor would, of course, be an actual landing of man on the Moon or a planet, followed by his return

to the Earth. It is not possible to accomplish such a mission with any vehicles that are presently under development.

3. The acquisition of new knowledge and the enrichment of human life through technological advances are solid, durable, and worthwhile goals of space activities. There is general lack of appreciation of this simple truism, both at home and abroad. Indeed, by having placed highest national priority on the Mercury program we have strengthened the popular belief that man in space is the most important aim of our nonmilitary space effort. The manner in which this program has been publicized in our press has further crystallized such belief. It exaggerates the value of that aspect of space activity where we are less likely to achieve success, and discounts those aspects in which we have already achieved great success and will probably reap further success in the future.

VII. *Non-military Applications of Space Technology—An Industry-Government Space Program*

As the technical feasibiliy and reliability of man-made satellites was demonstrated, many possible civilian uses for satellites emerged. With no government support, various groups in private industry have examined the field for areas of study and development and a few substantial projects are already under way.

Industrial and governmental communications satellites appear practical and economically sound. Communication satellites will provide high quality and inexpensive telephone and general communication service between most parts of the Earth. A by-product of a communication satellite will almost surely be an international television relay system linking all the nations of the world. On a longer time scale it should be feasible to provide radio and television broadcasting service via satellite-mounted transmitters. Such systems would give the quality broadcast reception now only available in and near urban areas to most of the inhabitants of the Earth.

Satellites containing reliable beacons can be used to provide improved means of navigation for aircraft and ships at sea and can greatly advance the field of geodetics.

Proper use of the information gathered by meteorological satellites should greatly increase our understanding of meteorology. With more knowledge of meteorology and with a world-wide data frequently available from the satellites, longer-range and more reliable weather predictions should be possible. These projects, dreams a decade ago, bridge areas of technical speciality in which this nation is unexcelled. The United States has the most advanced communication system in the world, with a vast scientific and technological base supporting the communication industry. We are preeminent in the development of our electronic skills in radio, television, telephone and telegraphy. This entire industrial-scientific base is available to apply its art through satellite sysems to the civilian needs of the world.

The exploitation of a new area of industrial opportunity for civilian use is normally left by our Government to private enterprise. However, in the case of these important space systems, the development investment required is so large that it is beyond the financial resources of even our largest private industry. Furthermore, the use of commercial space satellites will require physical support of government installations as well as financial support.

All of the civilian satellite projects listed here will have direct or indirect military usefulness as well. Furthermore, communication and navigation systems of the type envisaged would be extremely useful in implementing an inspection system which might accompany a disarmament agreement. For these reasons projects of the type proposed might well be undertaken in cooperation with the military services.

We recommend that a vigorous program to exploit the potentialities of practical space systems. The Government, through NASA or the Department of Defense, should make available the required physical facilities as well as any extraordinary financial support required to make the undertakings successful.

Organizational machinery is needed within the executive branch of the Government to carry out this civilian space program.

SUMMARY OF RECOMMENDATIONS

1. Make the Space Council an effective agency for managing the national space program.
2. Establish a single responsibility within the military establishments for managing the military portion of the space program.
3. Provide a vigorous, imaginative, and technically competent top management for NASA, including:
   (a) Administrator and deputy administrator
   (b)
      i. A technical director for propulsion and vehicles
      ii. A technical director for the scientific program
      iii. A technical director for the non-military space applications
      iv. A technical director for aerodynamic and aircraft programs.
4. Review the national space program and redefine the objectives in view of the experience gained during the past two years. Particular attention should be given the booster program, manned space flight, the military uses of space, and the application of space technology to the civilian activities of the country.
5. Establish the organizational machinery within the Government to administer an industry-government civilian space program.

The CHAIRMAN. One Wiesner Report was a published document, but the other one wasn't.

Secretary GILPATRIC. You are correct. There was a portion of Dr. Wiesner's committee findings which related to classified areas and that was left out of the published report. As far as we are concerned—we didn't put the report out, it was put out by his committee—I think it is just a matter of how you handle classified materials and I would think that would be a subject for your staff to talk to Dr. Wiesner about.

The CHAIRMAN. We would like to have a copy of the available report for this record. That would show to what extent you relied upon the Wiesner Report in working out your present organizational set-up.

(The classified version of the Wiesner Report contains other material pertinent to these hearings but cannot be printed in this record.)

The CHAIRMAN. As I understand it from what you say, you have a working agreement with NASA through Mr. Webb, the Administrator, so that there will be coordination, and I want to commend you for that working agreement.

Do you have agreement that you will not enter into a new space program that NASA might be interested in, without getting NASA's approval?

Secretary GILPATRIC. We deal by specific project. We have an agreement that Jim Webb and I signed in February that covers just launch vehicles, the boosters.

(The document referred to above is as follows:)

THE SECRETARY OF DEFENSE,
*Washington, D.C., February 23, 1961.*

MR. JAMES E. WEBB, *Administrator,*
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
*Washington, D.C.*

DEAR MR. WEBB: It is the purpose of this letter to confirm and record our understanding concerning the maintenance of a National Launch Vehicle Program. This program comprises in its totality the development and procurement of launch vehicles for space purposes, some of which are the responsibility of the DOD and some of the NASA and all of which taken together comprise an integrated space booster program consistent with national space objectives and requirements. It is understood that boosters developed for weapons purposes are not automatically considered to be part of the National Launch Vehicle Program, although certain missile boosters, particularly the Thor and Atlas,

are widely used in combination with upper stages as part of the National Launch Vehicle Program. It is not unlikely that similar dual applications will evolve in the future.

The Aeronautics and Astronautics Coordinating Board has the responsibility for accomplishing the necessary interagency planning for the National Launch Vehicle Program. The Launch Vehicle Panel of the AACB will accomplish working level coordination and maintain a current publication summarizing the National Launch Vehicle Program. Planning, coordination, and the publication reflecting these will describe forward thinking and possibilities entertained by NASA and the DOD in addition to describing current status.

It is hereby agreed that neither the DOD nor the NASA will initiate the development of a launch vehicle or booster for space without the written acknowledgment of the other agency that such a new development would be deemed consistent with the proper objectives of the National Launch Vehicle Program. Such written agreements will be accomplished between our respective agencies upon the recommendation of the cochairman of the AACB.

Sincerely,

/s/ ROSWELL L. GILPATRIC,
*Deputy Secretary of Defense.*

Agreed to by

(s) JAMES E. WEBB.

Date: February 23, 1961.

Secretary GILPATRIC. We also have an agreement covering how we will handle new projects in the communications satellite area.

Now, as we get into other areas where there may be some common interest or some possible conflict to be avoided, we will have similar agreements. And then we have an over-all agreement which provides for a coordinating board which takes up the day-to-day problems when it meets between the two agencies.

The CHAIRMAN. Do you have copies of those agreements?

Secretary GILPATRIC. I will be glad to supply them for the record.

(The documents above-referred to are as follows:)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
*Washington, D.C., 18 August 1960.*

Hon. JAMES H. DOUGLAS
DEPUTY SECRETARY OF DEFENSE
DEPARTMENT OF DEFENSE
*Washington, D.C.*

DEAR MR. SECRETARY: It is the purpose of this letter to confirm the understanding reached in our conversation of August 9, 1960 concerning joint NASA and DOD policy with respect to satellite-based communication activities.

In November of 1958, discussions were held between Dr. Killian and representatives of ARPA, NASA, and the BOB. At that time and for the fiscal year 1960 budget year, it was agreed that ARPA would continue its work in the active communications satellite field while NASA would concentrate on the passive type. In effect, this represented a continuation of the main lines of effort then under way in the two agencies and was intended to avoid duplication.

It was also agreed that, at an appropriate time, NASA would undertake the research and development necessary to the development of components and prototypes of an active communications satellite system for nonmilitary purposes, making full use of the information derived from DOD experience with military systems. To provide close coordination, each agency was given representation on the technical committees of the other for purposes of keeping abreast of progress.

Subsequently, a particular type of passive satellite system was proposed by another organization, and NASA, limited in its ability to fund additional projects, agreed in writing that the DOD might support that particular project, even though it clearly fell within the purview of NASA under the informal agreement mentioned above.

In the nearly two years which have elapsed since the initial discussions concerning the division of effort in the communications satellite field, a number

of new factors have evolved which alter the circumstances governing decisions concerning the disposition of our current and near-term projects. Great strides have been made in the field of space technology generally. Many new techniques have evolved in the electronics field which facilitate the accomplishment of certain space missions. A great deal of interest has developed on the part of industrial concerns in the development and operational use of communications satellites for commercial purposes. International interest has developed, and it appears necessary not only to take technical initiative with respect to the extension of newly available techniques but to prepare to deal effectively with policy questions both domestic and foreign.

Accordingly, in view of the new technical developments and the demonstrated interest of private industrial organizations in participation in the development of both the passive and active systems for civil use, NASA proposes to move forward in the active satellite-based communication field. While the precise character of NASA's activity in this regard has not yet been determined, it is to be concerned primarily with the development of those techniques and prototypes that promise an early demonstration of feasibility. The chief intent of such activities will be to exploit to the maximum extent, *and on a timely basis*, the new potentialities made available by recent technological advances and rendered of particular importance because of their scientific, domestic, and international applications and implications. NASA further proposes that during the forthcoming months representatives of NASA and the DOD work out a more detailed assessment of the division of responsibilities for active satellite-based communication systems "in the large." It is suggested that both NASA and DOD set forth their proposed programs in detail sufficient for such an assessment including plans for associated ground support facilities. NASA recommends that the exchange of programs and initial policy recommendations be accomplished through the mechanism of the NASA/DOD Aeronautics and Astronautics Coordinating Board for subsequent consideration by the Secretary of Defense and the Administrator of NASA.

Your agreement to the actions proposed above is requested.

Sincerely,

s/ T. Keith Glennan,
t/ T. KEITH GLENNAN, *Administrator.*

Agreed to by
JAMES H. DOUGLAS
Date: *August 27, 1960*

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(Promulgated 13th day of September, 1960)

AGREEMENT BETWEEN THE DEPARTMENT OF DEFENSE AND THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION CONCERNING THE AERONAUTICS AND ASTRONAUTICS COORDINATING BOARD

I. *Policies and Purpose.*

(a) It is essential that the aeronautical and space activities of the National Aeronautics and Space Administration and the Department of Defense be coordinated at all management and technical levels. Where policy issues and management decisions are not involved, it is important that liaison be achieved in the most direct manner possible, and that it continue to be accomplished as in the past between project-level personnel on a day-to-day basis.

(b) It is essential that close working relationships between decision-making officials within the National Aeronautics and Space Administration and the Department of Defense be developed at all management levels. Where policy issues and management decisions are involved, it is important that the planning and coordination of activities, the identification of problems, and the exchange of information be facilitated between officials having the authority and responsibility for decisions within their respective offices.

(c) To implement the foregoing policies it is the purpose of this Agreement to establish the Aeronautics and Astronautics Coordinating Board.

II. *Establishment of the Board.*

There is hereby established the Aeronautics and Astronautics Coordinating Board, which shall be responsible for facilitating—

(1) the planning of activities by the National Aeronautics and Space Administration and the Department of Defense to avoid undesirable duplication and to achieve efficient utilization of available resources;

(2) the coordination of activities in areas of common interest to the National Aeronautics and Space Administration and the Department of Defense;

(3) the identification of problems requiring solution by either the National Aeronautics and Space Administration or the Department of Defense; and

(4) the exchange of information between the National Aeronautics and Space Administration and the Department of Defense.

III. *Composition of the Board.*

(a) The Board shall be headed by the Deputy Administrator of the National Aeronautics and Space Administration and the Director of Defense Research and Engineering as Co-Chairmen.

(b) The other Board members shall consist of Chairmen of panels as hereinafter established, and a minimum number of additional members as may be required to insure that each military department is represented and that the National Aeronautics and Space Administration and Department of Defense have an equal number of members.

(c) The members of the Board, other than the Co-Chairmen, shall be appointed by the Administrator and the Secretary of Defense, jointly.

IV. *Principles of Operation.*

(a) Panels of the Board shall be established by the Administrator and the Secretary of Defense and, initially, shall include the following:

(1) Manned Space Flight
*(2) Spacecraft
(3) Launch Vehicles
(4) Space Flight Ground Environment
(5) Supporting Space Research and Technology
(6) Aeronautics

(b) Terms and reference shall be prescribed for each panel by the Co-Chairmen of the Board. The members of each panel shall be designated by the Co-Chairmen of the Board.

(c) The Board shall meet at the call of the Co-Chairmen, at least bi-monthly, and the Co-Chairmen shall alternately preside over the meetings. Only Board members, and such others as the Co-Chairmen specifically approve, may attend meetings.

(d) The Co-Chairmen shall establish a small secretariat to maintain records of the meetings of the Board and of its panels and to perform such other duties as the Co-Chairmen may direct.

(e) The Board, its panels, and the secretariat shall make full use of available facilities within the National Aeronautics and Space Administration and the Department of Defense, and all elements of the Administration and the Department of Defense shall cooperate fully with the Board, its panels, and the secretariat.

(f) Actions based on consideration of matters by the Board may be taken by individual members utilizing the authority vested in them by their respective agencies.

FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION:

/s/ T. KEITH GLENNAN
*Administrator*

FOR THE DEPARTMENT OF DEFENSE:

/s/ JAMES H. DOUGLAS
*Deputy Secretary of Defense*

**Promulgated this 13th day of September 1960.**

The CHAIRMAN. You will consult with NASA before entering into specific projects there, but other than those specific projects——

Secretary GILPATRIC. We have this board to resolve any questions that come up.

There are three agreements, one for the board which covers the general scheme of coordination and one covering communications satellites and one covering launch vehicles.

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*For purposes of clarity, the name of this Panel was changed to *Unmanned Spacecraft* by the Aeronautics and Astronautics Coordinating Board at the 2nd meeting on July 26, 1960.

Those are two special agreements that deal with specific areas.

The CHAIRMAN. Other than that, you can go ahead with the program without reference to NASA?

Secretary GILPATRIC. In the military area only.

The CHAIRMAN. Who decides what is a military area now?

Secretary GILPATRIC. Well, if there is any difference, it comes up in these cordinating board sessions and also it is discussed by Mr. Webb and myself. We consult each other quite frequently.

The CHAIRMAN. And if it is in the military area and you agree it is a military area, of course, the Defense Department will proceed.

Secretary GILPATRIC. Yes, if we are authorized by Congress with funds. As you know we now have Section 412 procedures and we can't proceed without authorization by the Congress for missiles, aircraft and weapons.

The CHAIRMAN. If NASA determines it is not in the military area, does NASA have the same right to proceed that the military has, if the military determines it is in the military area?

Secretary GILPATRIC. Subject to what restrictions are laid upon it by the legislation which set it up. I am not familiar with the Act sufficiently to know what conditions it has to meet. I know it has to be funded, but within its own powers, it can proceed without any——

The CHAIRMAN. The military has no veto on the projects NASA proceeds with?

Secretary GILPATRIC. No.

The CHAIRMAN. And NASA has no veto power on the military, is that correct?

Secretary GILPATRIC. That is my understanding.

The CHAIRMAN. One is set up for peacetime space development and one set up for the defense of the Nation. I think it is proper that each one look out for its own specific needs.

You will place those three agreements in the record at this point?

Secretary GILPATRIC. Yes, Mr. Chairman.

(The documents referred to were carried above.)

The CHAIRMAN. Mr. Fulton, do you have any questions?

Mr. FULTON. Yes, sir.

I will take 5 minutes if that is not too long.

The CHAIRMAN. Very well.

Mr. FULTON. There have been consultations with the various Services and likewise with various components of the Department of Defense. Outside of the three departments, the Army, the Navy and Air Force heads, what other consultations were there?

Secretary GILPATRIC. The Chairman of the Joint Chiefs, Mr. Fulton, submitted some comments after he had received the draft directive I referred to.

Mr. FULTON. Did the Joint Chiefs unanimously agree to this proposal in the directive?

Secretary GILPATRIC. The Joint Chiefs did not act on the directive as a body. The individual Service Chiefs' views, I presume, were reflected by the Service Secretaries.

Each military department was given a chance to comment.

The Chairman submitted separate comments, some of which were taken into account in the final directive and some of which were not.

Mr. FULTON. So as a matter of fact, this directive in part overruled the recommendations of the Joint Chiefs because all the recommendations of the Joint Chiefs were not unanimously given nor accepted.

Secretary GILPATRIC. I think it would be more correct to state, if I may say, that the Joint Chiefs did not collectively consider this. We had the individaul Service positions through the Service Secretaries and we had the views of the Chairman of the Joint Chiefs, himself.

All of those four sets of comments were considered and as you say, some of the views were not conformed to in the directive.

Mr. FULTON. Could we have those views put in the record, Mr. Chairman, with your consent, and likewise, the statements of each of the Services on this proposed directive, both in its original and in its amended form?

The CHAIRMAN. Are they available, sir?

Secretary GILPATRIC. I think they are available. I want to take counsel as to whether there is any question of executive privilege here. For my own part, I don't see why the Committee shouldn't know these views. As a matter of fact, many of the views you have heard in previous hearings—because I have seen them referred to in the record. You have heard General Trudeau, you have heard Admiral Connolly, and Admiral Hayward, and you have heard General Shriever.

Mr. FULTON. With your consent, Mr. Chairman, may we put those in the record publicly which are not held by the Secretary to be classified? I will limit it to that. Otherwise make them available to the staff of the committee.

The CHAIRMAN. Is that satisfactory?

Secretary GILPATRIC. Very well.

(By later decision, the material in question was not made available to the committee.)

The CHAIRMAN. Without objection, it is so ordered.

Mr. FULTON. General Trudeau is Chief of Research and Development of the Department of the Army, Mr. Chairman. I would like to refer to his statement when he came before our committee on February 17, 1961, where in his statement he had said—and I will read the exact language he recommended.

> That joint military space agency today would have the capability of organizing programs and systems to solve this situation and then be able to expand progressively as required to an overall national agency both military and civilian for overall operation.

I understand from your statement today that statement of General Trudeau has been overridden, is that not right?

Secretary GILPATRIC. It is the judgment of the Secretary of Defense and myself as it was the judgment of Secretary McElroy, that a new joint defense agency for space would not be desirable so we do not agree with General Trudeau.

Mr. FULTON. Does this mean that the Navy loses the Polaris research and development and testing program?

Secretary GILPATRIC. It does not in any sense.

Mr. FULTON. Does the Navy lose the engineering program?

Secretary GILPATRIC. On the Polaris?

Mr. FULTON. Yes.

Secretary GILPATRIC. No, this directive, Mr. Fulton, does not affect any preexisting assignments including Polaris, Advent and Transit, or Nike-Zeus.

Mr. FULTON. In the Advent program, is the Army going to lose the Advent program?

Secretary GILPATRIC. This directive does not affect the Advent program. The Advent program was assigned to the Army before this directive—I don't say there are not problems with the Advent program and they are under review, but this does not affect it.

Mr. FULTON. The Notus program will be of interest to the Navy because it is navigational. Will that be under the Air Force?

Secretary GILPATRIC. The Transit, do you mean?

Mr. FULTON. Transit, I mean.

Secretary GILPATRIC. No, Transit stays with the Navy. That was a preexisting assignment not affected by the directive.

Mr. FULTON. How about the new Nimbus program that will be coming up?

Secretary GILPATRIC. I am not familiar with that, Mr. Fulton.

Mr. FULTON. I am running short on time, and I have one more minute. The Army has the Operations Research Office, Johns Hopkins University and likewise the Navy has the Applied Physics Laboratory, Johns Hopkins University, and the Institute for Defense Analyses in Washington.

Likewise, NASA has the Jet Propulsion Laboratory at the California Institute of Technology out in Pasadena and the Atomic Energy Commission has the Radiation Laboratory, University of California, at Livermore and Los Alamos, and likewise the Argonne National Laboratory of the University of Chicago, and Brookhaven, of Associated Universities at Long Island.

Department of Defense has the Institute for Defense Analyses and the FAA has the Mitre Corp. at Bedford, Massachusetts.

Will you please put in the record how these various agencies are to be affected by this directive? Does it mean that the Air Force contractual agencies or institutions that I have mentioned, will now be the ones upon which the research and development program will be centered and the Army, the Navy, and NASA, the Atomic Energy Commission and the Department of Defense agency as well as the FAA, are all going to be either downgraded or eliminated? If you would just give me a general comment, then I would like that individually in the record.

(The further information requested is as follows:)

The organizations listed by Mr. Fulton are involved in space activities to varying degrees ranging from a relatively minor portion of its total activity in the case of Argonne National Laboratory to a major portion in the case of the Jet Propulsion Laboratory. There are also varying degrees of these different levels of space activity which are conducted specifically for the Department of Defense.

It is not anticipated that the new space directive will have any significant impact on the percentage of their efforts devoted to space activity nor is any downgrading or elimination of space effort expected to result directly from the new space directive.

Secretary GILPATRIC. My general comment, Mr. Fulton, is that all of the Services are free to develop new ideas, to use their resources, their laboratories. I recognize that the ones you have mentioned are among our greatest assets in our whole national security organization.

Mr. FULTON. I want to preserve them.

Secretary GILPATRIC. We want to preserve them and make the best use of them. They will be permitted to develop in the preliminary stages any projects which are of importance to these Services.

Now how, after a development has been approved by the Secretary and myself, we will best harness these resources to the furtherance of that development is something which the Director of Defense Research and Engineering will see to being done.

I would like, however, to submit a statement in detail covering the point you have mentioned.

Mr. FULTON. I should say to you you ought to change the name of the Air Force because there is no air in space.

(The statement requested for the record is as follows:)

It is planned that each project or program to be submitted to the Secretary of Defense will be supported by a detailed development plan and supporting fiscal plan. Review of these documents and discussions with the cognizant Service(s) concerned will be the basis of DDR&E actions or recommendations to Secretary of Defense. Effective utilization of the available resources of the DOD will continue to be a major factor in the determinations. All preliminary research for developing new ways of using space technology will be handled in accordance with a DOD Instruction now under preparation.

The CHAIRMAN. Mr. Miller.

Mr. MILLER. Mr. Secretary, you stressed the fact that pre-existing programs will remain where they are. Now how about future programs? Will sufficient future programs be assigned outside the Air Force to keep intact the competence and know-how of the scientists and dedicated officers in these Services?

Secretary GILPATRIC. Mr. Miller, until we know what future programs are going to be funded for full development, I cannot answer in detail your question. We have reserved to ourselves the right in this directive, the Secretary and myself, to make assignments to other than the Air Force, but the purpose of this directive is to centralize our efforts and not to have the Army and the Navy and other agencies in the Defense Department spreading themselves more broadly than they need to.

The Navy has a very important field of research endeavor: The whole underwater and surface water of the globe. Oceanography.

The Army has many important missions. The amount of effort being spent today, for example, on the Nike-Zeus program. It may take away, distract some of the resources which the Army has for pursuing other types of research.

We think we can bring about a management of this totality of resources which will be to the best interests of the country by certain assignments. However, we will never lose sight of the consideration which you have mentioned, namely that when we do make new assignments, we won't lose the benefit of the personnel and resources we have.

Mr. MILLER. Of course, you just mentioned Nike-Zeus. The Air Force has been opposed to Nike-Zeus. Let's call a spade a spade. Is it going to throttle Nike-Zeus, now, or are we going to allow enough flexibility in this program to do something about Nike-Zeus?

Secretary GILPATRIC. You are asking about a position on which the President, himself, has not yet acted. I can assure you that the Secretary of Defense and myself aren't going to allow any one Service to throttle another Service. That is what we are there to prevent.

Mr. MILLER. Of course, Mr. Secretary, this committee, as I interpret it, its responsibility goes primarily to research and development. We have the peaceful uses, but NASA is interested in research and development. For years Mr. Brooks and I were both members of the Armed Services Committee. We heard about the necessity for scien-

tists, we saw this thing, we saw dedicated men driven out of the Service—or maybe that is too strong, but dedicated men like General Gavin and General Medaris who chose to leave the Service, who could have remained in them longer, who made great contributions in this field, because there was somebody gobbling them up.

It seems to me we used to talk about the healthfulness of inter-Service rivalry. Do you believe that inter-Service rivalry in these fields in conducive to the best thinking and the best development?

Secretary GILPATRIC. Up to a point. I think there is a point beyond which inter-Service rivalry is not to the best interests of the country.

Mr. MILLER. I am talking about inter-Service rivalry in research and development. In the initiation of programs.

Secretary GILPATRIC. We think we have drawn the line, Mr. Miller, at the right point. As I saw written up in some paper, there is no restriction here on the right to think in any Service. There are some very fine people in the Service who haven't left. The officers I have seen since I have come down here, General Trudeau, General Schriever, and the other research people mentioned, they are not going to be curtailed in what they can contribute to this very important area. It is a matter of management. There aren't limitless funds, here.

You speak of the Nike-Zeus. That is a program that could involve billions of dollars. These space programs are tremendously expensive and there is a limit on how much you can put——

Mr. MILLER. I think you can cite the silos we are building now that may be obsolete in the next 10 years before we get them built which are costing millions and millions of dollars.

Secretary GILPATRIC. And it gives me a great deal of concern to see us putting that much money into apparatus which may not be usable another decade from now.

But we have had it before and I am afraid our national security demands we do it again.

Mr. MILLER. Mr. Secretary, I have got to quit, but I just want to say that I want to make sure—I would like to be assured by the Defense Department that the step you are taking now is not going to dampen the spirit of younger officers coming into these departments, feeling that the door is going to be closed to them.

I think I can tell you that many of them are unhappy, and many of the very good ones, some of the people you have mentioned are very unhappy. They are too good a soldier to parade this, but this is the case. Are we going to dampen their spirits? Are we going to retard the very thing that we have been fighting for, the very thing that we need, the scientists, engineers, and the people who could go out and do this job?

What would have happened, where would we have been over the long, dry years, if the Army, with a group of dedicated men down at Huntsville, working with pennies, hadn't developed perhaps the only positive booster that we have?

And then have it taken away from them with the single stroke of a pen. These aren't rewards for good service, are they?

Secretary GILPATRIC. I might repeat two of the best scientists we have in the Government today, Dr. Wiesner and Dr. York, agree with the philosophy behind this directive.

Mr. MILLER. You see, you put me in a very humiliating position because Dr. York, until he changes his residence to La Jolla, is my constituent.

There is one other thing I would like to ask the Secretary, Mr. Chairman, and then I am going to quit:

The Air Force has a number of nonprofit organizations that it supports in some direct way.

I wonder if it would be possible for you to have supplied for us and put into the record, the officers of such organizations as the Rand Corp., Aerospace, and the rest of them, along with their salaries?

The CHAIRMAN. Will you yield at that point. The staff is studying that particular matter now and we will probably have some hearings later. I think it would be preferable, if it is all right with the gentleman from California, that that information be given to the staff so we can develop it later.

Mr. MILLER. I will do that because when that comes along, in trying to create this atmosphere for scientists I just happen to have an ad placed in a magazine by Aerospace, saying what we are going to do.

Secretary GILPATRIC. I was going to say, you will probably have me before you again, because I was chairman of the board of Aerospace at the request of the Government.

Mr. MILLER. I would like to know how these are set up, because maybe the other Services should set up comparable corporations to help them in their plight.

The CHAIRMAN. I will ask counsel to put the Secretary's name down for a future witness.

(The information requested, when received, will be found in the files of the committee.)

The CHAIRMAN. Before recognizing anybody else, I would like to ask the Secretary this:

How is your statement made this morning affected by the new directive of the Air Force that was released just a few minutes ago?

Secretary GILPATRIC. The new organizational setup in the Air Force was in response to a request—in fact, the directive of the Secretary and myself—that the Air Force make certain changes within its organization to put itself in a position to take on these added responsibilities.

These two things are keyed together, and I think when the Air Force witnesses are before you, you will see that the Air Force will be in a better position to service the needs of its sister agencies to the extent that it is called upon to do so, as a result of those changes.

But the two are related and the one that has just been announced is in response to the Secretary's and my feeling that the Air Force should be better organized to handle this assignment.

The CHAIRMAN. It is a reorganization of the Air Force to handle space, then?

Secretary GILPATRIC. Correct. In part. In part, it handles other weapons systems, too.

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. Mr. Secretary, do you feel this directive is going to accelerate and promote our research program or is it going to have the effect of perhaps retarding the same until some of these issues can be straightened out?

Secretary GILPATRIC. I don't feel that it will retard in any way our research efforts and our development efforts. If I believed so, I wouldn't be party to it. I feel, on the contrary, it will enable us to do more with the resources at our command because of better management.

Mr. CHENOWETH. You are aware of the criticism which has prevailed now for the past year or two that we are not moving fast enough in this space program; that the Russians are ahead of us.

The previous Administration was criticized repeatedly because we weren't doing enough.

Now, are we going to do more under this, or are we just going to take a further look at it?

Secretary GILPATRIC. There is great emphasis being laid on accelerating, within the limits imposed upon us by the President and the Congress, what we can do in this area. I feel very strongly what you say should be given full regard.

Mr. CHENOWETH. What you were trying to do here is to accelerate as fast as you can. I assume that is the motive behind the directive.

Secretary GILPATRIC. Yes, to put us in a better position to compete with those forces who are against us in the world.

Mr. CHENOWETH. Do you feel you will eliminate some competition or overlapping between the Army, Navy and Air Force in these research programs?

Secretary GILPATRIC. Yes.

Mr. CHENOWETH. You feel that there has been some?

Secretary GILPATRIC. There was some at least coming up—as I indicated in my statement, there was some indication there would be more overlapping if we didn't attempt to preclude it.

Mr. CHENOWETH. This will give the Secretary of Defense the opportunity to review these different programs and then they will all be assigned to the Air Force, except where exceptions are made; is that the situation?

Secretary GILPATRIC. Unusual circumstances, yes, sir.

Mr. CHENOWETH. You don't feel that process will delay actions to any great extent?

Secretary GILPATRIC. I do not.

Mr. CHENOWETH. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Teague.

Mr. TEAGUE. Mr. Chairman, it is obvious we aren't all going to be able to ask questions. Would it be permissible to submit written questions?

The CHAIRMAN. That was suggested in the initial statement that I made.

Also, I have some that I am going to submit myself.

Mr. TEAGUE. Mr. Secretary, I only have one question: In the discussions concerning this directive, was the theory of one Service, of doing away with Army-Navy-Air Force a point of discussion?

Secretary GILPATRIC. No.

I want to say right here I have been identified with various proposals for reorganization of the Defense Department, but never have I believed or advocated doing away with the Services. I feel very strongly that we must preserve all the assets that the individual Services represent.

There is no thought behind this directive in impairing the capabilities of any of the Services or infringing upon their proper roles and missions.

The CHAIRMAN. Mr. Bass.

Mr. BASS. Mr. Secretary, I have no question, but I want to make this comment, and of course what I have to say is just for myself as one member of this committee. But I want to congratulate you and Secretary McNamara for getting out this directive. I think it is a step in the right direction.

I think there is already much too much duplication and overlapping in our respective military Services, and I believe this reflects—this new directive reflects a healthy and refreshing philosophy which gives me a great deal more confidence as far as the future of our defense is concerned than in the past.

Secretary GILPATRIC. Thank you.

The CHAIRMAN. Any questions here?

Mr. Anfuso?

Mr. ANFUSO. Mr. Gilpatric, in answer to the chairman's question you said that you were not familiar with the Act. Were you referring to the Act creating NASA?

Secretary GILPATRIC. That is right. I am not intimately familiar with all the provisions in the Act which set up NASA. I wouldn't want to hold myself out as an expert on that subject.

Mr. ANFUSO. In other words, NASA wasn't at all taken into consideration in the issuance of this directive?

Secretary GILPATRIC. Oh, yes, it was. I think before you came in, Mr. Anfuso, I explained that I had a number of talks with Mr. Webb about this and was fully familiar with this, and I made sure there was no problem created in his mind for NASA by this directive.

Mr. ANFUSO. Under House Resolution 580 creating this committee, we are supposed to have jurisdiction as to astronautical research and development, including resources, personnel, equipment and facilities.

Don't you think that this committee should have been consulted as to the advisability of having such a directive?

Secretary GILPATRIC. I don't believe so, Mr. Anfuso, because we are not changing in any way the resources, the allocation of resources. This is a matter of management of the Defense Department, and as we understand it that is our job—Mr. McNamara and I—to see to it that the resources put in our hands by the President and the Congress are most efficiently and effectively used.

I feel very strongly there is nothing in this directive which in any sense cut across the conditions laid upon us by Congressional mandate.

Mr. ANFUSO. Perhaps we need clarification, then, because up to the time, or right after we created this Act, we thought that the Navy and the Army and the Air Force and NASA were doing certain specific researches and any change in that, I thought that we should be consulted to see whether or not that was advisable.

Secretary GILPATRIC. Well, this was done on the advice of our General Counsel. I am not practicing law any more so I am relying on him.

Mr. ANFUSO. Who determines the functions of NASA, now?

Secretary GILPATRIC. That is the Administrator, Mr. Webb.

Mr. ANFUSO. It is not possible, for example, for this directive to infringe on the functions of NASA by saying that certain projects in which they are now engaged are military projects?

Secretary GILPATRIC. No, Mr. Anfuso.

Mr. ANFUSO. There is no possiblity of that?

Secretary GILPATRIC. No, I don't see it, and neither does Mr. Webb.

Mr. ANFUSO. Well, couldn't Saturn, for example, which is now under the control of NASA, be classified? Couldn't somebody call it a military project?

Secretary GILPATRIC. The only person who could do that effectively is Mr. McNamara and myself, and we have no such intention. We are in no disagreement with NASA over the heavy booster program.

Mr. ANFUSO. However, you think you have the power of curtailing the functions of NASA?

Secretary GILPATRIC. No, we do not. If there was any question, Mr. Anfuso, as to whether a particular project were military or non-military, we would resolve it through the mechanism of this coordinating board, by agreement. It could only be a question of definition.

A question was asked earlier, I think by the Chairman to that effect, and I explained how we intend to resolve any incipient differences between the two of us. We don't control NASA.

Mr. ANFUSO. But you could take the teeth out of NASA by saying certain things they are working on are military.

Secretary GILPATRIC. Look, as long as there is a President and a Congress above us, I don't think we can curtail an independent agency.

The CHAIRMAN. Would the gentleman yield there?

Mr. ANFUSO. Yes, I yield.

The CHAIRMAN. You don't share in the belief I have seen expressed in the press and elsewhere by certain authorities, that the military should take over NASA, do you?

Secretary GILPATRIC. I certainly do not. We have plenty of problems today. We don't need any more.

The CHAIRMAN. I think you have, yes.

Mr. ANFUSO. Do you think that the military, the Defense Department, should have any control over NASA whatsoever?

Secretary GILPATRIC. I do not.

Mr. ANFUSO. Now, by this directive, are you not placing more emphasis on the military phases of space exploration than in peaceful——

Secretary GILPATRIC. We are changing no emphases. We are simply defining and redistributing the functions of the military organizations with respect to existing emphasis.

This directive doesn't change any activity now going on, nor does it add or subtract from any present research effort. This is just purely a management step.

Mr. ANFUSO. Now, if NASA felt some infringement, where would be their right of appeal, other than the Secretary of Defense?

Secretary GILPATRIC. As I explained, we have a coordinating board. If we can't agree, we are both responsible to the President. The President has the ultimate control, subject to Congress, over these two agencies arms of the Government: the Defense Department and agencies of the Government: the Defense Department and NASA. So there can't be any question of unresolved dispute any more than there could be between Defense and State, or Defense and CIA.

Mr. ANFUSO. And is NASA consulted by this coordinating board?

Secretary GILPATRIC. It has equal representation. Its deputy director is co-chairman of the board.

Mr. ANFUSO. And you say now you have no intention of infringing upon any of the rights of NASA?

Secretary GILPATRIC. That is correct.

Mr. ANFUSO. Now, one more question.

Did the Army and the Navy raise written objections to this new directive?

Secretary GILPATRIC. They did. In response to Mr. Fulton's question, I have said they would be furnished for the information of the committee.

(By later decision, the material in question was not made available to the committee.)

Mr. FULTON. Would the gentleman yield on that point?

Mr. ANFUSO. Yes, I yield.

Mr. FULTON. The question comes up because there is quite a grapevine that extends from the Pentagon up to Capital Hill.

Secretary GILPATRIC. So I have found.

Mr. FULTON. There are many roots and many vines..

On the very day the directive was issued, rumor has it there was a meeting at the Joint Chiefs of Staff at which seven people were present, and the vote then, with possibly some Secretaries present as well as the Joint Chiefs, the vote was then six to one against this directive.

Now, was that an official meeting, an unofficial meeting, if there was a meeting; and, secondly, is that right?

Secretary GILPATRIC. If there was a meeting, it is news to me. The Secretary and I meet with the Joint Chiefs once a week. We meet with the Secretaries frequently. I never heard of such a meeting, and I never heard of such a vote.

Mr. FULTON. The Joint Chiefs never had such a meeting?

Secretary GILPATRIC. They were consulted individually through their Service Secretaries. In other words, we did not bring this up in a big meeting. We handled it separately with each Service, each Secretary and with the Chairman of the Joint Chiefs.

Mr. FULTON. May I ask you to check, with the gentleman's permission [Mr. Anfuso], to see if there wasn't a meeting, because I think there was.

Secretary GILPATRIC. Well, you know more about it than I do, then.

The CHAIRMAN. We are going to have the Joint Chiefs up here, and you will have a chance to ask them about it.

Any further questions?

Mr. ANFUSO. No further questions.

The CHAIRMAN. Any questions here?

Mr. CORMAN. After the other gentlemen, I have one.

The CHAIRMAN. I am alternating side by side, so it will be fair.

Mr. Karth.

Mr. KARTH. I understand you and Secretary McNamara have been the two prime moving objects, if you will, in the issuance of this directive.

Secretary GILPATRIC. It was our responsibility to make it.

Mr. KARTH. Inasmuch as you were, I assume you had not one or two or three reasons, but possibly a great many reasons for doing this?

Secretary GILPATRIC. And a good deal of advice from others.

Mr. KARTH. I would like, if you will, to have you give us those reasons in the order of their importance, if you will.

Secretary GILPATRIC. Well, I feel that I can't add to what I have stated in my prepared statement.

Mr. KARTH. I am not sure they were listed in the order of their importance, as you saw them. I wonder if you could do that for the record, so the committee members would have a better idea as they reviewed this hearing?

Secretary GILPATRIC. I wouldn't want to try to establish any order of priority. I would have to sort out my own thoughts to a greater degree than I have.

I have felt that this was an important step to take and, after all, I am only the Deputy Secretary. Mr. McNamara has the final responsibility and he, in turn, reports to the President.

I wouldn't want to try to dissect all the motivations for this. It is simply that we felt, on the basis of experience—Secretary McElroy had issued a directive which went very much along the lines of this directive and other methods have been tried—this represents our best judgment, after taking into account all of the input received from even those who didn't agree. We took into account conflicting suggestions, other points of view, and we had, in our judgment, the best advice that we could call upon.

I think I would rather leave it on that broad basis than try to distinguish which consideration came first in our minds. We didn't approach it that way.

Mr. KARTH. Then I might ask you to do this, if you will. If you can't list them in the order of their importance, maybe you can put them all together once more so that they are all in one portion of the testimony, rather than scattered throughout.

Secretary GILPATRIC. I will submit a statement, then, to that effect.

Mr. KARTH. Fine. I will appreciate that.

(The statement requested is as follows:)

Following are the principal reasons underlying issuance of the new space directive:

1. Announcements by the military departments of overlapping and duplicative space projects clearly demonstrated the need for more effective control by the Secretary of Defense over all space development programs.

2. The Air Force was already responsible for over 90% of the total defense effort in space development activities, either by direct assignment or in support of other programs. To eliminate overlap and duplication in a highly expensive research and development area, it was logical to assign primary responsibility to the Air Force, while at the same time carefully preserving flexibility in the Secretary of Defense to make exceptions in unusual circumstances.

3. The approach adopted in the Department of Defense Directive permits maximum consolidation of effort while at the same time encouraging all components of the Department to conduct the preliminary space research necessary to their assigned functions.

4. The Ad Hoc Committee on Space, chaired by the President's scientific adviser, Dr. Jerome Wiesner, recommended that there be established a "single responsibility within the military establishments for managing the military portion of the space program."

Mr. KARTH. Mr. Secretary, this in your opinion would have no adverse effect upon basic research and development within the three branches of the Services. Is that correct?

Secretary GILPATRIC. That is my opinion. If we find out to the contrary, there will be opportunity for us to make changes.

We think there is enough flexibility, enough safeguards in this directive, to avoid the contingency that you mention. Certainly, it is furthest from our thoughts to have that happen.

Mr. MILLER. Will the gentleman yield?

Mr. KARTH. Yes.

Mr. MILLER. Mr. Secretary, by the time you find that out, will you not put a blight upon the people who are dealing with these programs? Are they not going to feel time has run out on them, and that they have been bypassed? Has this been given thorough consideration?

Secretary GILPATRIC. I think any time you make a change, any time you attempt to provide better management and better effectiveness under changed conditions, there is going to be some resistance to it and some disappointments.

I find you can't change anything in the Pentagon without stepping on somebody's toes, but if you didn't do it you would never make progress.

As Mr. Bass has said, we have to move ahead. We are in a different age and time, and I don't think we are going to lose anything by this.

Mr. MILLER. Of course, I agree with you on these things and I know these things, and I am not trying to defend people who are going to be knocked out of the ivory towers they have built for themselves in the Pentagon—and there are a lot of them over there.

I am concerned with the scientists, I am concerned with the people who made the breakthroughs for the Defense Department, who are now seeing themselves completely gobbled up and taken over by a Service not friendly to them.

As far as leaks are concerned, there are some of them right in this thing that haven't been published that have just come out.

Secretary GILPATRIC. I am not promising you we can control the leaks. I think that is beyond anybody.

Mr. MILLER. I am not concerned with the leaks, I am concerned with the scientists and dedicated young officers, the young men who are going into this thing now, the people who are going to be graduating from West Point and Annapolis, youngsters, also, who perhaps wanted to go there who won't go there. People we are going to lose in the future.

Secretary GILPATRIC. There is plenty of room for them. Space is only one aspect of this whole area we are dealing with.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. Mr. Secretary, I share completely what Mr. Bass has said about the value of this directive. The only thing I would like to ask you is, do you think as a result of the headaches that you may have experienced in getting this directive through, that this may inhibit you from taking other action in the future, further to sharpen the decision-making process and achieve real unification?

Secretary GILPATRIC. Speaking for myself, I will not be inhibited as long as I am here, and I think Mr. McNamara is of the same mind, sir.

Mr. HECHLER. I just want to congratulate you on the philosophy that you have expressed here. We have to consider not only the morale of the officers in the Pentagon, we have to consider the general public

and whether it understands who has the button in the Defense Department, and also whether we actually achieve something as a result of our program.

It seems to me that you have taken a step in the right direction. Although I will reserve judgment and hope I will have an opportunity to ask you more questions about this later.

Secretary GILPATRIC. Thank you.

The CHAIRMAN. Any questions on this side?

Mr. Daddario.

Mr. DADDARIO. Mr. Secretary, does this directive do anything else other than changing the management concepts of the responsibilities that the Defense Department now has to develop its program within the area of our national goals for space?

Secretary GILPATRIC. In the military field.

Mr. DADDARIO. In the military area.

Secretary GILPATRIC. You have stated it correctly.

Mr. DADDARIO. It in no way affects the management within NASA?

Secretary GILPATRIC. That is true.

Mr. DADDARIO. They have their problems and you have yours.

Secretary GILPATRIC. We are going to try to help each other but we are not going to try to run each other.

Mr. DADDARIO. You have said here, and I think it is probably the most pertinent sentence in your whole report, that—

> Important decisions affecting the national security of the United States should not be deferred pending a modus vivendi which will be satisfactory and pleasing to everyone.

Excepting for the effect on people who are not going to be satisfied, or not going to be pleased, your objective is not to make everyone happy but to bring order into the space program?

Secretary GILPATRIC. That is our objective. You have put it very well.

Mr. DADDARIO. Now, if somewhere along the line there comes a question as to the possibility of people now in the military space program, people who have great capacity, who are recognized as being people with the ability to help push our space program along, does this management change conceive that these people can be transferred from one branch of the Service to another, to participate in this program?

Secretary GILPATRIC. I think we have that flexibility. I wouldn't want to be too specific about it, but we have right in the Defense Research and Engineering staff, we have two or three hundred very able scientists.

I want to reiterate the type resources to which you refer and to which Mr. Miller refers are in too short supply for us not to make the best use of them wherever they are.

Mr. DADDARIO. If there is a problem which exists today it is the diffusion of this talent, spreading it too thin, and if I am correct in what I have heard here today, what you are doing is preventing this from being spread out and you are bringing it more closely together so that these people can work on programs better conceived and better managed so that they can then utilize their talents better to achieve these great goals in the military space area which we are striving for.

Secretary GILPATRIC. That is our endeavor.

Mr. DADDARIO. I cannot help but feel that Mr. Bass has put his finger on this. You have made a statement here which in my opinion is clear, and if the objectives are as they seem to me to be, I think they will answer the questions which have been posed on those problems which do concern members of the committee who certainly have no objective other than seeing these objectives achieved at the earliest possible date.

The CHAIRMAN. Mr. Randall.

Mr. RANDALL. I would like to associate myself with the comments of Messrs. Bass and Hechler.

I read a little in Nation's Business magazine by the United States Chamber of Commerce, which I don't always agree with, but it is entitled "You Can Get More Defense For Less Money."

It seems to me that many of the thoughts expressed in there are what we have been talking about this morning.

I have noted these four safeguards that you put in here very carefully. Again, it is your conclusion that none of the services in their process of preliminary research will be affected?

Secretary GILPATRIC. Up to the limits we will find on expenditures so as not to allow the preliminary research to get out of hand but they will not be inhibited from going ahead and developing the ideas that they have to improve their capabilities.

Mr. RANDALL. And then the final safeguard, the exception, the unusual circumstance, that will be reviewed and that will be a safety valve, in other words, for such situations of the Board that you describe review; is that correct?

Secretary GILPATRIC. If they affect NASA, they go to the Board. If it is just the military, they come to the Secretary and myself.

Mr. RANDALL. This is no invasion of NASA, this is purely a military matter you are talking about.

Secretary GILPATRIC. Surely.

Mr. RANDALL. Thank you.

The CHAIRMAN. Mr. Corman.

Mr. CORMAN. Mr. Secretary, I, too, am impressed by your presentation.

As one lawyer to another, I wonder if I might ask you a hypothetical question. If we can roll back the clock some four years, assume this directive is in effect and an admiral feels you can launch a ballistic missile from a submarine under the ocean and the Air Force doesn't think this is a bright idea. Could you tell us how far the Navy might be permitted to go in what we determine to be the preliminary research and development in furtherance of their assigned function and at what point the Secretary might have to make a decision as to whether to proceed with or abandon that particular project, and then if he made the decision to proceed, who would do it and who would have the responsibility for development?

Secretary GILPATRIC. I believe that if the question of a Polaris submarine came up today for the first time the decision would be no different than that which was reached 4 years ago.

I have been exposed to Admiral Rickover and I believe I have been just as convinced as my predecessors were, with the worth of his program, which has been a magnificient program.

As you will see from our recommendations to the President, when they are announced, we thoroughly believe in the Polaris program. I

don't think this would have changed and in the area where the Polaris functions, underwater launching of a ballistic missile—that is clearly an area where the Navy's competence deserves consideration.

Mr. CORMAN. The total program then probably would have been carried out by assignment from the Secretary of Defense to the Navy?

Secretary GILPATRIC. We see no reason to change that.

Mr. CORMAN. I realize you are not going to change the past program, but assuming you had a similar circumstance today, that is the kind of thing that would be assigned to a Service other than the——

Secretary GILPATRIC. Yes.

Mr. CORMAN. Thank you, sir.

The CHAIRMAN. Mr. Secretary, may I ask you something about this booster program? Originally we contemplated writing into the Act regarding NASA that NASA would have the authority to develop a booster, or a launcher.

Dr. Sheldon, is that in the authority?

Dr. SHELDON. Not that specifically, sir.

The CHAIRMAN. Originally we had language in there that would have done that. Perhaps we changed it later on, but under the concept of the Wiesner Report that the booster program would be a national program, how do you fit that into your statements there on page three in your reference to it? Will it be a NASA program, will it be a Defense program? How will it be handled?

Secretary GILPATRIC. Some of the boosters used now in our vehicle program are developed by the Air Force. Some are being developed by NASA. We have agreement between us—one of the agreements I will furnish for the record—in which we specifically approve a joint program—I have a copy of it right here. It is a classified document but it is the National Launch Vehicle Summary, and we have complete accord between NASA and ourselves on all launch vehicles and we also agree if we are going to start any more we will consult each other first.

The CHAIRMAN. Is it a national booster program? Do you follow the Wiesner concept on that?

Secretary GILPATRIC. Well, I don't know whether this meets all of Dr. Wiesner's points, but we have a national launch vehicle program now; agreed upon.

The CHAIRMAN. Your program now is to divide it between yourself and NASA on a basis of what you agree on?

Secretary GILPATRIC. And making the best use of the reserves we have. We don't want to spend money on programs that will parallel each other.

The CHAIRMAN. Our thought—and I get it from others too—is, to overtake Russia we must get busy and develop a booster that will be more or less a work horse, that we can depend upon it for heavy payloads to carry aloft. Is that your concept?

It might be used by the military or it might be used by the civilian?

Secretary GILPATRIC. Well, that is what is happening today.

Many of the shots being put up by NASA are on military boosters. The Titan, for example, will be one of our standard launch vehicles for years to come until Saturn and Nova and the others come along.

The CHAIRMAN. When you come to the concept of the national booster program as I understood it, we were going to get behind one

type of work horse booster which would be developed at a reasonably early date and might have a thrust of, say, a million and a half pounds.

Do we have anything of that sort in mind?

Secretary GILPATRIC. I am not sufficiently familiar with the NASA program to testify to it. I know that we have an agreement. We are not working on that. The military are not working on that one you mentioned.

The CHAIRMAN. Any further questions?

Mr. Fulton.

Mr. FULTON. The question comes on the budget. Who makes the justification for research and development now for space, first in the basic field and secondly in the practical field for weaponry systems? Who will do that?

Secretary GILPATRIC. As far as research is concerned, Mr. Fulton, I believe that each Service will be permitted to budget certain basic research within these limits——

Mr. FULTON. Basic. Now, applied research——

Secretary GILPATRIC. When we get to development, it will depend on which Service has the responsibility. The Army will budget for Nike-Zeus and for Advent. The Navy will budget for Polaris and for Transit and the Air Force will budget for Atlas, Titan and Minuteman, etc.—there are only a few approved programs now, you see. We don't know what will happen in the future, or to what extent Congress will appropriate future missile programs.

Mr. FULTON. Then the next question is on Polaris—and I must say I have been a Navy man so I may be a little bit prejudiced, but the question comes up between a land-based weaponry system and a sea-based maneuverable system.

When the proposal is made by the Navy to expand Polaris in competition with, for example, Atlas or Titan, or various ones, what is going to happen? Does the Navy have the right to go ahead and make Polaris an ICBM of 3,000, 4,000, or say 9,000 miles, to make it exactly competitive?

Secretary GILPATRIC. I haven't heard the Navy claim they can do that. When it does, we will be very interested.

Mr. FULTON. If the Navy wants to increase the range——

Secretary GILPATRIC. We have approved two successive improvements of the Polaris, the A–2 and the A–3.

Mr. FULTON. I am talking about the third one. Mr. Secretary, the third development is going to be making it into a competitor with the Atlas. What do you think of that?

Secretary GILPATRIC. I haven't heard of that. It hasn't come to my attention.

Mr. FULTON. Do they want to extend it beyond 3,000 miles range?

Secretary GILPATRIC. We have approved every extension.

Mr. FULTON. Will you approve it to make it competitive with land-based missiles?

Secretary GILPATRIC. I don't know how many ICBM's we want. I think very seriously before we have another—we have Atlas, we have Titan——

Mr. FULTON. That is the point I am making. What are you going to do—approve them all or cut the Navy——

Secretary GILPATRIC. We will have to see what the strategic requirements are when these come up.

Mr. FULTON. There is one point you have to come up against and that is that Congress, by statute, instituted the vast research project agency, ARPA, after the Secretary established it in 1958. We gave it statutory recognition.

Are you going to abolish ARPA? If it is going to be centered in the Air Force, what is the use of having ARPA?

Secretary GILPATRIC. ARPA is doing other projects and there is no disposition at the moment to change ARPA.

Mr. FULTON. You have said the directive provides such exceptions will be made only in unusual circumstances.

Will you please give us your method of deciding what unusual circumstances are? Is that on an emergency basis or is that on an area or geographical basis, and if it is on geographical bases, please tell me where space begins. Where does it begin to you?

Secretary GILPATRIC. I am not enough of a scientist.

Mr. FULTON. Where does space begin?

Secretary GILPATRIC. I couldn't define the unusual circumstances—the reason we put the exception in was to give ourselves a leeway to deal with conditions that cannot be predicted today.

Mr. FULTON. You gave yourself a leeway that has no reason to do it one way or another and you can decide that as you go, isn't that right?

Secretary GILPATRIC. We shouldn't be hidebound about this. Who could have predicted three or four years ago we would have the space programs we have now?

Mr. FULTON. Shouldn't Congress note your method of decision?

Secretary GILPATRIC. You will, certainly—as these things come up they will not be determined by secret processes. We can't think down there in the Pentagon without——

Mr. FULTON. It brings us back to point that you are going to say that space is the Air Force's exclusive prerogative.

Secretary GILPATRIC. Not for operational purposes, not for research.

Mr. FULTON. Except in unusual circumstances. That I must say to you, you must define to me where space begins before you can eliminate either the Army or the Navy. Where does it begin? Because you are up against the logical dilemma, you are setting something as a method of decision but you can't define space.

If the Navy goes up and fires a missile from a missile ship, for example, or a Terrier, a 15 to 25-mile range, is that Navy or is that space?

Secretary GILPATRIC. We have had no problem with this today and I am just not qualified. I am not a scientist and I can't deal with problems we haven't yet confronted.

Mr. RYAN. Will the gentleman yield?

It occurs to me that it is getting into an occult or mysterious thing here which to me is very simple. It is just a question of military or civilian, isn't that it?

Secretary GILPATRIC. That is one division. He is talking about another.

Mr. FULTON. I am talking about within the Department of Defense how they define space.

Apparently the Department of Defense can't say where space is.

The CHAIRMAN. Will the gentleman yield? I have been trying to get a suitable definition of space for three years. I haven't been able to get it from anybody, military or civilian.

Secretary GILPATRIC. You are not going to get it from me.

Mr. FULTON. Here is a directive written on space and nobody can tell where it is.

Mr. MILLER. Will the gentleman yield further?

Mr. FULTON. I am through. I think there is enough confusion now.

Mr. MILLER. May I make an observation?

The CHAIRMAN. Mr. Miller, do you want to ask a question?

Mr. MILLER. No. I will add to the confusion by saying, I see Mr. Feldman here. Last year we went over to the International Astronautical Congress in Sweden and we heard many speeches. We spent several days trying to find out where space was. We came away like Omar Khayam says, "by the same door wherein we went." We had some of the best legal brains connected with this field in the country.

Mr. FULTON. May I make one more point, Mr. Chairman?

The CHAIRMAN. Let me say this: We can't even define satisfactorily what the seaward limits are of the United States. We can't even get off the Earth.

Mr. MILLER. We can but other nations can't. They won't accept our judgment.

Mr. FULTON. May I just finish on one point?

The CHAIRMAN. If you will, at this point—then I will turn it back to you—we have Secretary Hitch here.

Mr. FULTON. I have just one point Mr. Daddario brought up.

The CHAIRMAN. What I want to ask the committee is this: What is the pleasure of the committee? Is it to continue on until 12:30?

Mr. FULTON. I so move.

Mr. MILLER. I think so.

The CHAIRMAN. If there is no objection and you can do it, sir, we will go right on through and finish with these witnesses.

Mr. FULTON. On page three of your statement you said—

> From the time of the establishment of ARPA, research and development of space programs and projects within the Department of Defense has been under the centralized management of the Department of Defense, and the military services have played only such roles as have been assigned to them by the Secretary of Defense.

Now, in response to Mr. Daddario's comments, you said it was not centralized and that you were going to centralize further because Mr. Daddario, as I understood him, had though it was divisive and diffuse. My question is this: How do you fit that in with your statement on page three that it was already centralized and that it would be the Secretary of Defense advising various missions and weaponry systems to the various departments within the Department of Defense and the components as seemed advisable at the time?

You see, when we come down to then question you exactly on your method in the directive, I would say to you it appears to me you are right back to what you have said at the top of page three in your statement that I have quoted, with the exception that now you are not only going to have 91 percent in the Air Force, you are going to come up with 97 or 98 percent.

Secretary GILPATRIC. I don't know because we are talking about future programs that haven't come up as yet.

Mr. FULTON. What is wrong with your statement that I have read to you then that it was centralized management under the Department of Defense under ARPA?

Secretary GILPATRIC. As I said later in the statement, Mr. Fulton, we found some things that weren't being attended to under this. We had to improve it.

Mr. FULTON. Then why don't you as a managerial administrative matter from day to day pull them in where you need, rather than put a directive out where I agree with Mr. Miller, it just cuts the ground out from under a lot of people who have put their lives into developments. Where would you have been without some of these programs that have been done by the Navy and the Army?

Secretary GILPATRIC. Mr. Fulton, when a person like myself takes on a responsibility such as I have, he can only use his best judgment and his best efforts.

Now, this is the belief of Secretary McNamara and myself, that this is the most effective way of achieving this objective.

If this directive doesn't work, we will probably change it.

Mr. FULTON. We are trying to get your methods of decision, the reason for the directive and the meaning of it.

I am trying sincerely to get it with an inquiring mind. When you first say you don't know where space is, and secondly you have said at page three that it was centralized already, and next that you have ample statutory authority, unless you want to really over-emphasize the Air Force and deemphasize the Army and the Navy on research and development, leaving out the operations from it, I can't see the reason for the directive.

Secretary GILPATRIC. Well, I apparently haven't made a sale with you, but I hope that my testimony and my statement made as a whole will satisfy most people. That is all you can do, I find. You can't make a 100 percent.

Mr. FULTON. I never said how you feel but I am certainly inquiring into the reasons. I would certainly like to know about that meeting of the Joint Chiefs of Staff, whether informal or formal, and wasn't the vote six to one against it?

Secretary GILPATRIC. I would to know it myself. They will be up here and you can ask them and I will be surprised if you find there was such a meeting.

The CHAIRMAN. At this time we would like to proceed with Hon. Charles Hitch, Assistant Secretary of Defense (Comptroller).

Do you have a prepared statement, sir?

Thank you, Mr. Secretary. We do appreciate your action in coming here.

Does this discuss your book, Mr. Secretary?

Secretary HITCH. It refers to my book, Mr. Chairman.

The CHAIRMAN. We would like to have you go into it.

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## STATEMENT OF HON. CHARLES J. HITCH, ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)

Secretary HITCH. Mr. Chairman and members of the committee, I appreciate the opportunity to appear before your committee today to clarify my position with respect to Secretary McNamara's March 6th memorandum assigning responsibility for the development of military space systems.

It has been suggested in a recent newspaper article that I opposed not only this particular action, but that, on the basis of the views expressed in a book of which I was joint author, "The Economics of Defense in the Nuclear Age," I oppose, in general, attempts to eliminate duplication and inter-Service competition in weapons development.

First, let me say that with respect to Secretary McNamara's memorandum and directive of March 6th, I had offered the Secretary no opinion, either pro or con. In fact, my office, while I was absent and sick with pneumonia, concurred in the directive. The implication, therefore, that I actively opposed issuance of the order is clearly in error.

The CHAIRMAN. Does that mean you did not approve it?

Secretary HITCH. My office concurred.

The CHAIRMAN. Did you approve it?

Secretary HITCH. The opinion of my office was asked. My personal opinion was not solicited and I did not volunteer it.

The CHAIRMAN. And you have not approved it?

Secretary HITCH. I have not approved it, no, sir.

The CHAIRMAN. All right, sir, proceed.

Secretary HITCH. The concurrence of my office was signed in my absence by my deputy, Mr. Hoover.

Second, as to the more general views expressed in our book, it is perhaps inevitable that the very brief reference quoted in the newspaper accounts should lead to some misinterpretations; a more complete quotation would perhaps have avoided this. I was quoted as having written in praise of the virtues of inter-Service rivalry. But, immediately following the passage mentioned in Sunday's Washington Post we went on in our book to say—

> But there is also no doubt regarding the undesirable consequences of some aspects of inter-Service rivalry. Perhaps the least desirable consequence for research and development is the use of exaggerated claims, on paper, for future weapon systems in the struggles for budget, roles, and missions.

I would take it that it was to avoid just such undesirable consequences that Department of Defense Directive No. 5160.32 was issued.

Obviously there cannot be a simple yes or no answer to the question of permitting competition in weapons development. There are no clearly divided black and white issues. We stated in our book that, granting the desirability of some diversification, no one knows enough to give precise, quantiative answers to the questions of how much diversification is useful, and where. This has to be a matter of judgment. Some theoretical studies indicate that in many circumstances there are great gains to be made from pursuing two or some small number of paths to a research objective, but that greater duplication provides rapidly diminishing returns.

The right number of research paths to support does depend, in my opinion, on how critical the project is and on how uncertain the outcome is, as well as on the cost of supporting alternate efforts. For example, as we pointed out in our book, it may have made sense to develop two intermediate range missiles—Thor by the Air Force and Jupiter by the Army—but not to buy quantities of both for operational use.

We also went on to say that there should be the greatest amount of duplication in exploratory development and research, where the cost of trying another path, or testing it, is usually a tiny fraction of prototype fabrication costs. It seems to me that Secretary McNamara's recent order specifically recognizes this point.

In the chapter on research and development in our book we were dealing mainly with the problems of a Service or agency in managing a research and development program, and only incidentally with how many Services or agencies should support research and development in a particular area. One of our key sentences reads—

*** * * there is nothing so stimulating to most people and organizations engaged in research and development as the fear that another company or laboratory will beat it to the objective.**

I think it is quite clear we were talking essentially about competition between laboratories and companies and only incidentally about competition between agencies and Services.

Secretary McNamara's order does not preclude, it seems to me, diversification and competition of this beneficial kind. While the Air Force now has primary responsibility for the latter and more costly stages of development of military space systems, the healthy aspects of competition and diversification can be retained since there will be competition among project organizations within the Air Force and among the Government laboratories and private corporations engaged in space research and development.

The order also authorizes each service to support research and development in its early, inexpensive stages, and, of course, there is also NASA supporting research and development at all stages.

Mr. Chairman, I hope this somewhat more complete statement of the views expressed in our book will make evident the fact that they are not, on the face of it, in disagreement with the Secretary's recent action. However, be that as it may, I should like to make it very clear that I do not consider the opinions Mr. McKean and I expressed as private individuals to be binding on me now as an official of the Department of Defense.

Not only has there been a significant alteration in my responsibilities since writing this book, but it would be most unusual if my assumptions and conclusions did not undergo some sort of a revision after being subjected to the test of experience. And while I expect, of course, to express my considered best judgment on appropriate matters, for me to be doctrinaire in matters that are of only secondary concern to the Comptroller's Office would be in my opinion both ill-advised and unhelpful.

Some two and a half weeks ago I had occasion to discuss my feelings on this issue when I spoke to the Armed Forces Management Association. I said at that time—

*** * * I do not consider my appointment as Assistant Secretary of Defense, Comptroller, in any way, a blanket endorsement of all the views contained in**

the book. I am sure, too, that some of my own ideas will undergo a change as I gain firsthand experience on the job. Meanwhile, I hope the book will contribute in some small measure to a better understanding of the Defense management problem and perhaps point to some solutions.

My feelings have not changed since I said those words.

Mr. Chairman, I have appreciated this opportunity to explain my position in some detail. I will be happy now to answer any questions you or the committee may have.

Thank you.

The CHAIRMAN. We are very happy to welcome you to this committee. This is the first time you have been here. You are in the position of money manager for the Department of Defense. Yours is a most important job. Your record is such as to show great promise in this high office.

On page 236, to page 265, beginning at the bottom of page 236 in your book are certain comments which would throw a lot of light upon your thinking, however, in reference to this organization. Of course, that book is copyrighted by the Rand Corp.

May we inquire, though, if you would put those excerpts in the record?

Secretary HITCH. Yes, I would be very happy to have those excerpts put in the record.

(The material referred to follows. Permission has been granted by The RAND Corporation to reproduce this material for this purpose, but it should be noted that copyright remains with RAND, and has not been waived for other purposes.)

## DECENTRALIZATION AND INCENTIVES IN DEFENSE DEPARTMENTS

Decentralization of the decision-making function is an extremely attractive administrative objective — in the military as elsewhere. The man on the spot can act quickly and flexibly. He has intimate first-hand knowledge of many factors relevant to his decisions. Large hierarchical organizations, by contrast, tend to be sluggish and hidebound by rules and regulations. Much of their time and energies are consumed in attempting to assemble, at the center, the information so readily available "on the firing line"; and since these efforts are never successful, their decisions have to be made on the basis of information that is both incomplete and stale. Decentralization of decision-making responsibility has the further advantage of providing training, experience, and a testing ground for junior officers. The best way to develop qualities of responsibility, ingenuity, judgment, and so on, and to identify them is to provide genuine opportunities for their exercise.

From an administrative point of view the price-and-market mechanism of the private economy can be regarded as a highly ingenious device for exploiting these advantages of decentralization, without sacrificing the major apparent advantage of centralization, which is operation in the interests of the whole rather than of the parts. Effective administrative decentralization in the military appears much more difficult to achieve. Nevertheless, the potential advantages of decentralization are so great that it would be worth a great expenditure of thought and administrative ingenuity to find partial solutions to these problems. The solutions do not have to be perfect or optimal, just better than the centralized solution, which is very imperfect indeed. We can live with *some* conflict between low level and high level criteria, as General Motors and United States Steel have deliberately decided to do.[27] If United States industrial corporations, with a market test available, consider themselves too large for centralized decisions, there is at least some presumption that the Department of Defense and the three Services are much too large to be making detailed operational decisions.

Decentralization in decision making is the counterpart, on the administrative side, of sub-optimizing in analysis, and raises issues that are strictly analogous.[28] Should Strategic Air Command (SAC) problems be delegated entirely to SAC, even though their solution affects air defense, atom bomb requirements, United States foreign policy, and so on, for which other parts of the Air Force and the government are responsible? And if so, should SAC be required to take these spillover effects into account? How can any such requirements be enforced, or even defined, and how can SAC obtain the information necessary to permit it to take the spillover effects into account, even if it wants to do so?

[27] See page 162.

[28] The issues are analogous even though the degree of sub-optimizing need not coincide with the responsibility of the decision-maker. See Chapter 9.

The fact that these are hard questions with no very satisfying answers should lead no one to jump to the conclusion that all decisions should be made hierarchically at a level high enough to include all the responsible organizations that might be affected — for instance, in the case of many SAC problems, by the National Security Council or the President. The burden on our highest officials is already too great for them to function efficiently as decision-makers. If any such "solution" were attempted, our governmental organization would become muscle-bound, rather than merely sluggish. Unfortunately the superficial illogicalities of decentralization are more strikingly obvious than the deadening consequences of extreme centralization.[29]

In fact the United States government and the military Services are much less highly centralized than many outsiders tend to think. Departments are largely autonomous, and so are the major Commands. The President possesses some rather shadowy authority over the Departments, and the Secretary of Defense rather more over the military Services. But problems that intimately concern more than one Department are usually discussed and agreed upon in the Cabinet, the National Security Council, Cabinet Committees, or (even more frequently) in less formal direct bargaining between the Departments. Similarly, within the military, a very high premium is placed on reaching agreement in the Joint Chiefs of Staff and its Committees, and within each Service, in bargaining among various Commands and staffs.

The intense dislike on the part of all officials for authoritarian decisions by higher officials is responsible for the pervasiveness of bargaining, which distinguishes other governments as well as our own, and indeed all large organizations. The dislike is based not only on egocentrism and envy (few people enjoy taking orders) but also on a shrewd recognition of the inevitable shortcomings of centralized decision making.

Intragovernmental bargaining of this kind is a poor substitute for the price-and-market mechanism of the private economy. It occasionally leads to agreements (of a log-rolling sort) which are conspiracies against the public interest rather than a broader, less parochial interpretation of it.[30] But bargaining does achieve some of the desirable effects in government that markets and prices achieve in the private economy. It goes some way towards reconciling the autonomy of lower-level organizations with higher-level (or at least more broadly based) criteria. SAC is unlikely to make a purely unilateral decision that adversely affects another Service for fear that the decision will be appealed to higher authority; it is unlikely to make a decision impinging on United States foreign policy with-

[29] Recall the storms kicked up by well-intentioned economy-minded people who discover from time to time that the Marines are paying more for toilet paper than the Air Force; or that the Navy is buying typewriters in San Diego while the Army is declaring others surplus in Detroit. The bureaucratic regulations and the paper work needed to prevent such occurrences would undoubtedly be far more costly and far more damaging to efficiency than any conceivable gains from coordination.

[30] So occasionally does the market mechanism.

out full discussion with the State Department, for the same reason. There is here at least an incipient mechanism for insuring that decision-makers take spillover effects into account in making their decisions, and for providing them with some of the information they need in order to take them into account.[31]

Always, however, governmental decisions involve *some* sort of bargaining. The significant problem, therefore, is the difficult one of choosing particular bargaining arrangements that are better than others. At present, there are surely opportunities for improvement. With existing institutions, for example, the bargainers are often given the perverse incentive of trying to maximize their budgets (their costs) instead of maximizing capability for whatever budget they receive. A subordinate official may well feel that effort devoted to getting his budget increased is more rewarding than analysis and effort devoted to getting greater capability from a given budget.

This tendency might be countered by some device for permitting units to keep a part of any cost savings. An extreme form of correction, which admittedly has certain disadvantages, would be to give each unit a budget fixed in amount for two (or even more) years in advance. Commanders would then have more time and stronger reason for trying to use their budgets efficiently. Another step might be to give commands greater freedom to reallocate funds among appropriation-categories (such as construction, maintenance and operation, and personnel). If this were done, the commands would not fight a running battle over each appropriation-category, pressing hardest for those items that have the most glamour and in the end finding themselves hamstrung by constraints on the amounts of specific items that they can use. Again, commanders would have more time and reason to seek efficient combinations of the inputs, as well as greater freedom to do so. These and other ways of improving the institutional framework — of trying to remove perverse incentives, cause the costs of decisions to impinge on the decision-makers, and make criteria at various levels consistent with national aims — deserve careful study and some experimentation. Some such changes may be essential if many of the improved choices suggested by analysis or better economic understanding, or both, are to be implemented.

[31] This view of bargaining was originally presented by Charles E. Lindblom in "Bargaining: The Hidden Hand in Government," The RAND Corporation, Research Memorandum RM-1434-RC, 1955.

# 13. MILITARY RESEARCH AND DEVELOPMENT[1]

In economics we distinguish between the problem of allocating resources efficiently with a given technology and the problem of advancing technology. In some circumstances and periods one of these problems seems more important; in different circumstances and periods, the other. Economic theory has a great deal more to say about the static allocation problem than about the promotion of technological progress, which is, for reasons we will explore, less tractable to analysis.

Technological progress in the field of national security now depends mainly upon the success of research and development activities sponsored by the military services and such closely related agencies of government as the Atomic Energy Commission and the National Aeronautics and Space Administration. There are other sources of useful ideas, of course. It is in the nature of research that the researcher does not know what he will discover; and many ideas developed in university or industrial laboratories or by civilian inventors have turned out to have military applications that were neither sought, anticipated, nor in some cases welcomed by their originators (for instance, Nobel's dynamite, the Wright brothers' airplane, and the concept of atomic fission). Also, the miltary Services include inventive persons who think of ingenious new devices or techniques for accomplishing military tasks outside the formal research and development establishment. But in the main the Services have to buy progress within that establishment; and their success depends upon (a) how much they spend, and (b) how efficiently they spend it.

There can be no question regarding the crucial importance of promoting military technology in the nuclear era. Any power that lags significantly in military technology, no matter how large its military budget or how efficiently it allocates resources, is likely to be at the mercy of a more progressive enemy. Both weapons and systems for delivering them have gone through several revolutions in the few years since the end of the Second World War. Individual bombs are now 1,000 times as powerful as those dropped on Hiroshima and Nagasaki, which were themselves 1,000 times as powerful as the largest dropped on Germany. Breakthroughs

[1] In this chapter we are especially indebted to Burton H. Klein and William H. Meckling (see their "Application of Operations Research to Development Decisions," *Operations Research*, May–June 1958, pp. 352–363, and see Klein's "A Radical Proposal for R. and D.," *Fortune*, May 1958, pp. 112 ff.).

in missile technology are continually threatening the whole offensive or defensive apparatus of one side or the other. Keeping ahead in the technological race is not in itself a guarantee of security in these circumstances; it remains essential to incorporate the technology in operational hardware ("forces in being") and to deploy them and use them with skill and intelligence. But no amount of production, skill, and intelligent use can compensate for significant technological inferiority. Our atomic monopoly in 1945 would have insured victory over Japan even if the ratio of our conventional forces to theirs had been reversed. Clever operations research can in exceptional cases improve some capability of a force by a factor of 3 to 10. Inventions can frequently change the same sort of capability by factors of 10 to 1,000.

Of course any particular nation will borrow much of its scientific knowledge and even its military technology from other countries. Science is international. Once a scientific discovery is made, it quickly becomes the property of scientists everywhere; frequently the same discovery is made nearly simultaneously in two or more widely separated research centers. Scientists in all leading countries (certainly including Russia) were familiar at the beginning of the Second World War with the basic scientific ideas that prompted us to initiate the Manhattan District Project. Few if any of these ideas were American in origin.

To a lesser extent the same is true of developments in military hardware. Despite military secrecy, the news of a new development leaks, and this leads to frantic copying on the part of potential enemies. The British "invented" the tank in World War I, but they disclosed it prematurely, and the most effective use of the tank in that war was made by the Germans. It is only a question of time before many additional countries perfect advanced nuclear weapons. Espionage is responsible for some of the transmission of new technological ideas from country to country, but espionage rarely does more than speed an inevitable process. New military hardware can usually be observed without too much difficulty when it becomes operational. In the United States and most Western countries full accounts are usually made available earlier than that to anyone who can read the public and technical press and the advertisements of contractors. Even if technical details are not revealed, the mere knowledge that a research objective has been achieved is an enormous help and stimulus. It means that the objective is achievable — that there is a treasure to be found and that a search (for that is what research is) is therefore definitely worthwhile. Other countries might not be developing atomic weapons today if we had not demonstrated their feasibility.

Therefore the net gains from a successful military development can only be counted on for a few years at most. If a nation's civilian economy is made more productive by research, the nation continues to gain from

the increased productivity even if other countries do copy (as of course they will). But military strength is in its very essence relative. Accretions to our absolute strength are offset if potentially unfriendly nations make equivalent additions to theirs. And we must, in general, expect them to do so when a new scientific idea is responsible for our gain.[2]

Nevertheless, those few years of superiority may be decisive. Consider how our security would be prejudiced if the Russians had the technological initiative and we were reduced to copying their successes with a lag of several years (a by no means inconceivable circumstance since their launching of the first satellite). Suppose the Russians had had a four-year lead with the A-bomb. Imagine them with a similar lead in operational intercontinental ballistic missiles. Or in effective anti-ICBM's. It is misleading to say that primacy in military research and development can give us *only* lead time. This may be enough to prevent or "win" a war, and, for a nation on the strategic defensive, is essential to avoid defeat.

## KINDS OF MILITARY RESEARCH AND DEVELOPMENT

Nomenclature in the field of research and development is thoroughly confused, partly because the processes by which new scientific and technical knowledge is wrested from nature are not well understood and are anything but neat and orderly. It is customary to use some such classification as the following in discussing problems of military research and development policy management:[3]

1. *Weapon system development,* directed toward the fabrication for testing of prototypes of operational weapons. In the case of missiles (and some other systems), this may mean the fabrication of rather large test inventories. The term "weapon system" in this context is used in a narrower sense than we have used it in discussing systems analysis. The system being developed typically includes the major equipment (say a bomber aircraft) and such auxiliary equipment as power plant, bombing-navigation system, other electronics gear, and armament, but would not necessarily include an operational concept, or base system, or personnel training program.

[2] This by no means implies that all scientific ideas are "neutral" as between nations. The question whether the development of A- and H-bombs is on balance favorable to the West (because it enables us to offset the alleged Russian superiority in manpower) or to the Russians (because it robs us of our previously decisive advantage in mobilization potential), or unfavorable to both (because it threatens mutual destruction) is still being ardently debated. There may be aspects of national geographies, economies, or psychologies which make any given invention more useful to one country than to another.

[3] This classification is not necessarily identical with that of the National Science Foundation or of other Agencies. Also, it might be noted that there are not sharp lines of demarcation between these categories. Nonetheless, the use of such a classification is essential to the understanding of R and D problems.

2. *Component development,* that is, the more or less independent development of items of military hardware which are not themselves "weapon systems" or "major equipment," but parts or sub-systems of such major equipment. The distinction between systems and sub-systems is, of course, arbitrary. The important thing is that the Services can and do spend money productively developing engines for aircraft, guidance systems for missiles, gyroscopes for guidance systems, communication systems for armored vehicles, gear for landing aircraft on carriers, and so on, without knowing precisely the type or model of the major equipment of which the component will be a part.

3. In *exploratory development, or applied research* the objective is advancing the state of the technological art rather than obtaining immediately operational hardware. Someone has had a promising idea for a new type of vacuum tube or a new fuel or a new design to reduce drag in an aircraft wing. The idea may have emerged from paper research or may simply have been someone's inspiration. Whatever its origin it requires some sort of testing or verifying before it can be accepted as valid and incorporated in the state of the art. This may involve a laboratory experiment, a wind tunnel test, or the construction of a working model, depending upon the nature of the idea. Test models are typically very much cheaper than operational models, although there are some exceptions.

4. *Basic research* is the deliberate search for knowledge. The military Services, AEC, NASA, and so on, support a good deal of basic research in areas of special interest to them, such as aerodynamics, atomic physics, and some branches of mathematics. Basic research is typically the cheapest type of research and development if we think of something like "cost per idea explored." It frequently requires no equipment except paper, and with some exceptions (betatrons, for example) even the scientific laboratories and computing equipment that are needed cost less than a single operational prototype of a new aircraft or missile.

We estimate that, using generally accepted definitions, military research and development in the late 1950's was costing about $6 billions per annum. This estimate is both arbitrary (the boundary between "development" and "production" is hard to draw)[4] and misleading, since by far the largest part of this total is at the weapon system end of the research and development spectrum and includes large costs of fabricating operational prototypes. Expenditure really devoted to advancing science and technology in areas of special military interest is much less — perhaps $1 to $2 billions. This would include basic research (on the order of

[4] For example, when the Air Force (or Navy) contracts for a new model of aircraft, making the first "prototype" batch is regarded as development. But when the Navy contracts for a new model of submarine, constructing the very first is regarded as production.

$150 to $200 million), what we have called exploratory development, and some genuine state-of-the-art advancement undertaken in connection with component and weapon system development.

Most weapon system and component development is undertaken by industrial firms on contract with one of the Services, although the Navy and Army still do some in their yards and arsenals. All three Services support extensive test facilities as well as administrative staffs to determine requirements, to let contracts, and to supervise performance under contracts. Research and exploratory development is divided between internal and external research centers and laboratories. A major share of the basic research is performed on contract by laboratories and individual scientists in universities.

## PROBLEMS OF RESEARCH AND DEVELOPMENT

It is apparent that many of the problems of managing a research and development program have important economic aspects.

For example, the most fundamental problem of all, how much to spend on the program, is an allocation problem. Economic theory tells us that we "should" spend on research and development until the marginal gain from the expenditures, properly discounted, is just equal to the gain from expenditures elsewhere. But in the case of research and development, whether it is performed for a military Service or a business firm, this formula is peculiarly difficult to interpret or apply. The gain is much more uncertain — much harder to predict with accuracy — than the gain from, say, an additional fighter defense squadron with aircraft of known performance. This is particularly true of basic research and exploratory development, where the product, if any, will be knowledge — and knowledge usually far removed from any practical end use. Calculating gains from research and development is further complicated by the need for discounting. Typically the payoffs from research and development are expected in a more distant future than payoffs from procurement, since there is no enhancement of military capability until the results have been incorporated in operational hardware, procured, and deployed in operational units. This means that the discounted values of the payoff are highly sensitive to rates of discount — and as we have seen, there is great uncertainty about which discount rates are most appropriate.

These uncertainties make it difficult or, in many cases, impossible to use an explicit economic calculus to determine how much of total resources should be allocated to research and development; how these resources should be divided among the various kinds of research and development; and which specific projects should be selected. At the end of this chapter we will return to the question of what role economic calculations can play in answering such questions. Short of such calcula-

tions, however, general economic reasoning and analysis of the institutional factors affecting the research and development process can throw some light on the way these problems should be approached, and on some common pitfalls and mistakes in research and development policies and management.

It is our opinion that the three main root causes of error in the management of miiitary research and development are: (1) a failure to appreciate the degree of uncertainty involved in research and development or, what has the same effect, a tendency to ignore uncertainties and act as if they were certainties; (2) a pervasive tendency, discussed in Chapter 11, to undervalue future outputs relative to current ones; and (3) certain characteristic tendencies of bureaucracy, particularly the strength of centripetal (centralizing) forces.

Of these the most serious and destructive is the first. *The* important thing to appreciate in making good decisions with respect to research and development is the dominant role played by uncertainty. Research and development are uncertain by definition. Research is a search, and one rarely knows in advance whether the search will be successful at all, let alone how long it will take or which route will lead to the treasure. The military Services have all too frequently tried to command the research and development community to invent new weapons to specification, just as they would command a platoon of infantry to march by the right flank. One of the Service manuals attempts to prescribe research and development planning procedures as follows:

> Planning for research and development is broadly similar to planning for a military operation. . . . The objective must be clearly identified, the operation or job must be divided into component parts, units or organizations must be assigned to accomplish each part, the time and resources required for each part must be estimated, and all efforts must be time-phased in proper relationship to each other.[5]

But the essence of research and development is that it is *not* like the military operations for which this kind of planning and scheduling is appropriate.[6] Among research and development activities, this type of planning is least inappropriate for weapon system development — al-

[5] *ARDC Program Management Procedures,* ARDC Manual No. 80–4, Headquarters, Air Research and Development Command, United States Air Force, Baltimore, Maryland, September 1, 1956, p. 11.

This is not to say that R and D planning is the same in 1960, or will be the same in the future, as in the past. In the U.S. Air Force, for example, some recent changes in procedures indicate a greater recognition of the crucial role of uncertainties in R and D planning.

[6] This kind of planning is equally inappropriate for a good many classes of military operations, where uncertainties demand flexibility, probing techniques to gain information, improvisation on the battlefield, etc., rather than neat, orderly scheduling in advance to achieve a clearly identified objective.

though even there, as we shall see, it has limited usefulness and great dangers. In exploratory development and research the precise identification of objectives and scheduling are less important than trying to cover all good bets, selecting first-rate scientists and productive laboratories, promoting competition, and preserving flexibility to follow up vigorously on break-throughs.

## SOME COMMON PITFALLS

### TOO LITTLE "DUPLICATION"

One of the most important and obvious corollaries of the uncertain character of research and development is the desirability of some duplication. (Here, as is common in discussions of research and development, "duplication" means diversification or pursuit along several routes.) If, as is typically the case, there are two, three, or a dozen possible paths to some research and development objective, each with supporters and detractors, it will frequently pay to try two or more, not just one, which may fail or take an inordinately long time. In any rationally conducted program there should be duplication in this sense, and there will inevitably occur what appears with the aid of hindsight to be waste — the effort devoted to the unsuccessful (or less successful) paths.[7]

But how much diversification and where? No one knows enough to give precise answers. Some original and suggestive theoretical analysis indicates that in many circumstances there are great gains from pursuing two, three, or four paths, but rapidly diminishing returns from further duplication. Not only does the use of several routes buy time; it also, up to a point, actually saves money! The optimal amount of duplication in any particular situation is sensitive to the following factors:[8]

1. There should be more duplication, the greater the expected payoff from the research. In the Manhattan District Project, six completely distinct and independent methods of separating fissile material were under development concurrently; if the expected payoff had been less, fewer of these expensive "duplicating" projects could have been justified. Incidentally, the method that succeeded in producing the material for the first bomb was regarded at first as among the least promising. There is a strong case for some duplication in the development of critical weapon systems, despite their great cost, because of the disastrous consequences if the one horse that we back runs last.

[7] For an excellent description of the uncertainties in R and D and the importance of "duplication," see Ely Devons, "The Aircraft Industry," in Duncan Burn (ed.), *The Structure of British Industry*, Vol. 2, Cambridge University Press, Cambridge, England, 1958, pp. 54–69.

[8] For an ingenious attempt to quantify the role of these factors, see Richard R. Nelson, "The Economics of Parallel R and D Efforts: A Sequential-Decision Analysis," The RAND Corporation, RM-2482, November 12, 1959.

2. There should be more duplication, the greater the uncertainties. If, in developing a missile, the airframe is straightforward engineering, while there appear to be great uncertainties in developing the guidance, the important thing is to try several approaches to the guidance problem — perhaps completely independent approaches using competing contractors.

3. There should be more duplication, the cheaper it is to duplicate. More weapon systems should be developed than are ultimately procured (it may have made sense to develop two intermediate-range ballistic missiles — Thor by the Air Force and Jupiter by the Army — yet not to buy quantities of both for operational use). There should be more duplication in the development of difficult or critical components than in the development of whole weapon systems. And there should be most duplication in exploratory development and research, where the cost of trying another path or testing it is usually a tiny fraction of prototype fabrication costs.

As a result of factors (2) and (3), we want a great deal of "temporary" duplication. Later, as we get more information and reach more expensive stages of development, we want to decrease the number of routes to be followed.

4. There is a stronger case for duplication if the alternatives are qualitatively different, and if the factors that will determine their success or failure are independent.

### TOO LITTLE COMPETITION

This is not quite the same thing as too little duplication, although the two are closely related in practice. Duplication is possible without competition — for example, if the multiple paths are explored by the same organization or individual. And competition is possible without duplication. (The Army and Navy would compete for budget even if they never developed similar kinds of hardware.) Competition provides a spur that is frequently lacking in the research and development world of cost-plus contracts and scheduled progress. Some dedicated individual researchers do not require it, but there is nothing so stimulating to most people and organizations engaged in research and development as the fear that another company or laboratory will beat it to the objective.[9] Even competition among the military Services has proved highly beneficial. Robert Schlaifer concluded as follows from his study of the development of aircraft engines:

> The American system of administering development did, however, have one feature greatly superior to both the British and the German systems. This was

[9] It helps significantly if some real monetary prize is awarded the winner — like a production contract.

the sponsorship of development by two separate agencies, the Army and the Navy. The first and most obvious result of a separate organization for naval aviation was, of course, that development specially directed at the needs of naval aviation was not slighted in the United States as it was abroad. In addition, however, the existence of two independent agencies meant that the mistakes or omissions of one were corrected in a surprisingly large number of instances by the actions of the other. Whatever may be the merits of the case for unification of the military services in other respects, there can be no doubt that the sponsorship and direction of development by two separate agencies brought results worth very much more than the cost.[10]

Unfortunately much of the competition between companies engaged in research and development is now concentrated at the stage of preliminary design. It has become a common practice for the military Services to invite industry to submit proposals (in the form of preliminary designs on paper) for the development of new weapon systems, and then to select one (or at most two) of these proposals for further support. As a result, there is intense competition among the companies involved in producing the most glamorous and promising drawings. But too often this kind of competition is a competition in optimism and exaggeration. The company that exaggerates more gets the contract. Competition is effective in promoting progress only if the consumers are well enough informed to make rational selections; and there is abundant evidence that no one — administrator or scientist — is good at picking winners at the preliminary design stage. On the other hand, judging the performance of actual hardware — even test models — is *relatively* easy and reliable. Exaggerated claims can be debunked on the test stand. Few things would have a more salutary effect on the efficiency of research and development than shifting some of the competition that now takes place at paper stages forward to early hardware stages. There are problems in doing this at reasonable cost, but longer-run savings justify a major effort to solve them.

### PREMATURE, OPTIMISTIC, AND TOO DETAILED REQUIREMENTS FOR ADVANCED SYSTEMS

Wishful thinking stimulated by the claims of contractors and enthusiasts, neglect of the uncertainties, and a natural desire on the part of responsible military officials to have the research and development establishment produce on order what they consider necessary for defense, have sometimes resulted in a tendency for the Services to specify their requirements for advanced weapon systems prematurely, optimistically, and in too great detail. Typically this kind of overspecification is

[10] Robert Schlaifer, *Development of Aircraft Engines*, in R. Schlaifer and S. D. Heron, *Development of Aircraft Engines and Fuels* (Boston, Division of Research, Harvard Business School, 1950), p. 11.

attempted following the submission of preliminary designs — or even earlier.

Studies have been made of the reliability of early estimates of (1) cost, (2) development time, and (3) physical and performance characteristics of new, advanced weapon systems. The results are striking. In the case of estimates made at the preliminary design stage, costs are typically underestimated by factors of 2, 5, 10, or in some cases substantially more. Development time is typically underestimated by 1 to 5 years. And the final system usually differs markedly from the predicted system both in physical and performance characteristics.[11] Usually, although not quite always, the estimates are optimistic — a bias one could expect from the premium on exaggeration by contractors in design competitions. But more serious than the bias (which could be discounted if it were systematic) is the wide range and scatter of the estimates. Choices at this stage must recognize these uncertainties. Precise technical and performance specifications at this stage involve self-delusion.

Premature specification makes it inevitable that many changes in specifications will have to be made as the system is developed. Detail also multiplies the number of changes in specifications that will be required, and obstructs the objective of getting a working model quickly into test. Excessive optimism in drawing up performance specifications can make the development so difficult that it must fail, or take much longer and cost much more than planned, or require a downgrading of the requirements.[12] It is not unusual for weapon system requirements to be so optimistic that several inventions or advances in the state of the art are needed on schedule if the development is to succeed. Prior to the successful test of the H-bomb, the development of the Air Force's first ICBM had been thwarted by requirements for payload and accuracy that proved infeasible. Only when these requirements were substantially relaxed after the successful H-bomb test could development proceed to the point where vehicles could be tested.

The need for changes in specifications would not matter so much if

[11] For example, more than half the aircraft developed since World War II ended up using different engines from those envisaged at the preliminary design stage. Aircraft expected to be supersonic turn out to be subsonic. Nuclear weapons expected to have a "yield" of x in fact have yields of 3x — or .1x, and so on. See A. W. Marshall and W. H. Meckling, "Predictability of the Costs, Time, and Success of Development," The RAND Corporation, P-1821, December 11, 1959.

[12] We will suggest later that instead of trying to specify all performance characteristics well in advance (x miles per hour, y C.E.P., z range, etc.), which places an intolerable strain on the art of prediction, the military Services would be well advised to indicate limiting values of such characteristics and acceptable trade-offs between them (in short, their "preference surfaces").

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they could be made quickly and easily as the need became apparent. But it is a fact of life in large bureaucracies that decisions are difficult to unmake and remake and that the process is time consuming. The military research and development establishments are not an exception to this general rule. As a result much time is lost in obtaining authorization for changes in specifications through all the echelons of authority. Even more time is lost in attempting to find a way around obsolete or excessively optimistic specifications to obviate the necessity of appealing through the echelons of the hierarchy for new decisions.

An important reason for early, fairly detailed specification of weapon systems is the need to match the various components under development — for example, in the case of a missile, the airframe, power plant, warhead, and guidance. This need is real, and must be achieved at the appropriate stage. Where a system is being put together from previously developed and tested components (as was the Air Force's Thor), matching and the detailed specifications required by matching may be imposed without too much risk at the preliminary design stage. But where a new system is really advanced, where the components have yet to be developed and tested for feasibility and performance, premature concern over physical matching can delay development by years. The urgent thing is usually to get the critical components developed to the point where they can be tested (having "duplicate" efforts on the most critical ones to gain quality, time, or both). When it is known that they work is early enough to worry about matching configurations *in detail*.

### PREMATURE COMMITMENT OF LARGE FUNDS

The illusion that the future can be foreseen with something approaching certainty, plus pressure from the contractor, plus a desire by the military Services to save time and to guarantee the availability of a budget to complete the development, produce a tendency to commit large funds prematurely to highly uncertain weapon system developments. Because of the great uncertainties that affect technological development, and the equally great uncertainties regarding the military usefulness of particular developments, it is desirable to retain the flexibility to terminate developments at short notice and low cost.

One type of premature commitment is the commitment to production tooling at an early stage of the development. There are exceptional cases where some commitment may be justified at an early stage, but most of the tooling ordered before the testing of prototypes has to be scrapped because of changes in specifications. This appears to be the sort of gamble where you gain little if you win (six months of lead time at most except in periods of heavy pressure on the capacity of tool producers); lose a

great deal if you lose (up to your total investment plus confusion and time); and, in view of the great uncertainties and typical drastic changes in specifications, have little chance of winning.

### EXCESSIVE CENTRALIZATION OF DECISION-MAKING

There seems to be an inevitable tendency in bureaucracies for decisions to be made at higher and higher levels. The forces in this direction are simple and easy to understand, but so powerful that they are almost irresistible even when understood. There are some good reasons for making decisions at high levels. The high level official can take a broader, less parochial view; he perhaps has a better conception of over-all Service or national requirements; the fact that he is at a high level suggests that he may be an abler person. On the other hand, there are excellent reasons for making most decisions at lower levels. Officials on the spot have far better technical information; they can act more quickly; giving them authority will utilize and develop the reservoir of ingenuity and initiative in the whole organization. Moreover, if large numbers of detailed decisions are attempted at a high level, or if decisions first made at lower levels may readily be appealed to be remade, the higher levels will become swamped in detail, decisions will be delayed, the organization will become muscle-bound, and the higher levels will have neither time nor energy for their essential function of policy-making.

Nevertheless, the high level official is acutely conscious of his advantages in making any particular decision; and while the lower level official is at least equally conscious of his advantages, the higher level official is in a position of authority, and decides who is to make the decision — too frequently, of course, himself. The result is a constant tendency for the center of gravity of decision making to shift to higher echelons. New higher echelons, in fact, get invented from time to time to facilitate this movement.

The implications are serious for the kind of flexible research and development management that will capitalize on the ingenuity and initiative of science and industry. The problem is not confined to the military Services or to the government. Industry and universities have their bureaucracies too. One very perceptive administrator of industrial research, C. E. K. Mees, described the problem in industry as follows:

> The best person to decide what research work shall be done is the man who is doing the research. The next best is the head of the department. After that you leave the field of best persons and meet increasingly worse groups. The first of these is the research director, who is probably wrong more than half the time. Then comes a committee, which is wrong most of the time. Finally, there is a committee of company vice-presidents which is wrong all the time.[13]

[13] As quoted by John Jewkes, David Sawers, and Richard Stillerman, *The Sources of Invention*, Macmillan & Company, Ltd., London, 1958, p. 138.

But in industry, and especially in universities, there are strong centrifugal forces to match the centripetal ones.

### TOO LITTLE EMPHASIS ON EARLY STAGES OF RESEARCH AND DEVELOPMENT

It is very difficult to say whether too little or too much is being spent on military research and development as compared with the procurement and operation of forces in being. Some general considerations — the undervaluation of future outputs in government and the tendency of all bureaucracies to avoid risky ventures — would lead us to expect that too little is being spent. But there are some countervailing factors — the fascination of high performance hardware, and the very general tendency (for reasons we have examined) for the Services to be excessively confident and optimistic about the prospects of uncertain weapon system developments. On this issue of the total research and development budget no confident conclusion is possible.

It does, however, appear extremely probable that precisely the same tendencies — to undervalue distant gains and to shun projects that are risky or have no direct or obvious military payoff — have led to an excessive concentration within the research and development budget on the final stage of research and development, weapon system development, at the expense of earlier stages. Here there seem to be no countervailing tendencies of any importance. Fascination with high performance hardware reinforces the emphasis on weapon systems. So does optimism about the prospects of advanced weapon systems. It is allegedly much easier to get money from Congress for the development of impressive weapon systems with undoubted military utility if they succeed, than to get it for components with no highly specific end use in mind, or for basic or applied research that is even further from practical military applications.

But it is in research and exploratory development that spectacular advances in the state of the art are discovered; and it is there that we can afford not to stint. In most instances, we could develop weapon systems more cheaply and in less time if we placed more emphasis on the more or less independent development of critical components, and on getting them quickly to test; and, as a general rule, did not try to "marry" them in a weapon system until a set had been tested.[14] If we shifted our emphasis in this direction (from our present development practices), making a stricter separation between "inventing" and "marrying," we could probably release substantial resources for inventing.

[14] There would certainly be exceptional cases where the utility of a new advanced system and its time urgency are so great that it would be worth early matching — at high cost — to have some chance of getting the system a little sooner *if* the required inventing did proceed on schedule.

## REORGANIZING RESEARCH AND DEVELOPMENT

Since the Russians so spectacularly demonstrated their progress in advanced technology by launching the Sputniks, there has been much critical evaluation of the United States research and development program and policies. In our opinion most of the criticisms have been wide of the mark. With amazing unanimity the critics have pointed to the uncoordinated character of research and development, the lack of adequate planning, the absence of strong central direction, and the alleged duplication, competition, and waste. They demand strong central direction and coordination, review of programs and projects, elimination of competition (especially inter-Service competition), and the weeding out of duplicating projects.[15] In response to these criticisms a new, echelon of research and development planners and managers is being added to the Pentagon at the Department of Defense (DOD) level to direct all lower echelons.

These criticisms, we think, are based on a fundamental misunderstanding of the nature of research and development. They treat as certain what is highly uncertain. They try to strengthen control at the top when what is needed is initiative and spontaneity at the bottom. They try to suppress competition and diversification because particular duplications are obviously wasteful from the vantage point of hindsight, apparently unaware that duplication is a rational necessity when we are confronted with uncertainty and that competition is our best protection against bureaucratic inertia.

The popularity of these criticisms is a little surprising when one reflects that military research and development is being pilloried for

[15] As an example, the following is an excerpt from an article entitled "How Ike Answers Critics of Shake-up in the Military," in the *U.S. News and World Report* dated April 25, 1958, p. 122:

"In another area — defense research and development programs — the need for central direction is especially acute.

"This area, more than any other, invites costly rivalries. The programs are critically important. They involve the weapons of tomorrow. In these programs we cannot afford the slightest waste motion. Nor can we afford to devote three sets of scientists and laboratories and costly facilities to overlapping weapons systems and research projects.

"Recently we have been spending something more than 5 billion dollars a year for research and development programs dispersed among the several services. This great sum is used to maintain our weapon potential but does not procure one single weapon or piece of equipment for the operating forces. Not a one. Eminent scientists report to me that centralization of direction over this program will surely cut costs markedly and improve efficiency.

"I have recommended that the supervision of this entire activity — and, to the extent deemed necessary, its direction — be centralized in the Defense Department under a top civilian who will be a national leader in science and technology — the actual work being done largely by the military departments, as is the case today. The Congress willing, we will substantially increase the efficiency of this multibillion-dollar research and development effort, reduce its cost, and strike at one of the roots of service rivalries."

precisely those characteristics that it has in common with research and development in the free enterprise economy. Research and development in the American economy is uncoordinated. There is no central planning or direction. There is a great deal of duplication, rivalry, and of course, viewed with the aid of hindsight, apparent waste. And yet the American economy is, in most industrial and technological areas, the most progressive and advanced in the world — certainly more progressive in those areas than the economies of countries that place much greater emphasis upon central planning and less upon competition.

We would not argue that all is perfect with research and development in the American competitive economy. There are persuasive reasons for believing that, from the point of view of national economic growth, the American economy spends too little in total on research and development and that, like the military it spends relatively too much at the quick-payoff, prototype end of the spectrum and too little at the basic and applied research end.[16]

Nor would we argue that the government could simply copy aspects of the competitive economy even if these were perfect in their own environment. There are at least two fundamental differences. In the economy the consumers are king; there are millions of them for firms to satisfy — with varied wants and in all sorts of circumstances. But military research and development has a much narrower purpose — the promotion of national security. And while national security is exceedingly complex, the government has a special capability as well as a special responsibility to define its objectives and means. This demands a kind and degree of planning and control that would serve no function in the private economy. And there is a second difference, which is of even greater practical importance. In the competitive economy, firms risk their own money; they therefore police themselves. In military research and development contractors risk public money, and some fairly effective controls against malfeasance, carelessness, and irresponsibility are needed and demanded — even at the cost of some efficiency.

Nevertheless, despite the imperfections of the competitive market solution and despite the differences in circumstances, the government could learn a great deal from observing how the private economy manages research and development. The private economy does, in effect, recognize the essential characteristic of research and development — uncertainty

[16] The most important reason for such underemphasis on basic research is the difficulty the private competitive firm has in latching onto property rights in the results of R and D. Patents provide partial and undependable protection in most areas. The obstacles to reaping the reward from one's own discoveries are greater the further removed the discoveries are from immediate practical application. (See Kenneth J. Arrow, "Economic Welfare and the Allocation of Resources for Invention," The RAND Corporation, P-1856, December 15, 1959.)

— and responds to it in a comparatively effective manner. The private economy is not afraid to follow multiple paths in research, and it duplicates more, the greater the payoff, and more, the less the cost. Instead of striving for an extreme form of monopolistic bureaucracy in the management of research and development, we would do well to consider emulating part of the practices of our more progressive industries.

## SOME REAL PROBLEMS OF RESEARCH AND DEVELOPMENT

The real problems of research and development policy and management in the government are not the elimination of competition and duplication. Neither, although some planning and control are essential, are those problems adequately described as the need for "strong central direction," "better planning and coordination," and similar clichés of our contemporary centralizers. But there are real and challenging problems:

1. *How can we effectively decentralize,* to promote initiative and spontaneity in industry, the laboratories, and throughout the military, while maintaining control of policy and preventing recklessness and malfeasance in the spending of public funds?

This is a general problem, by no means confined to the management of research and development, as we saw in the preceding chapter. One of the keys to its solution is an adroit use of competition. The Services can use competition among contractors to make their control of policy effective. If there are several competitors striving for future favors, they are highly sensitive to the requirements of the customer. But if there is only one source of supply, the customer is at his mercy.

Where contractors are sensitive to the customer's requirements, it is not necessary to spell out the required specifications in such damaging detail. A general indication of preferences and trade-offs — some indication of the relative worth of improvements in accuracy, reliability, and so on — will suffice. This leaves more scope for the exercise of ingenuity by the contractor, obviating some of the frustrations and delays resulting from the necessity for frequent changes in specifications.

2. At a higher level, *how can we make good use of inter-Service and inter-agency competition* while curbing its undesirable features? There is, in our view, no question that inter-Service competition serves a valuable role — particularly with respect to research and development. Like other competition, it provides a powerful stimulus to thought and action, and a safeguard against bureaucratic rigidities. It provides a number of alternative sources of support for scientists, inventors, and firms with new and unpopular ideas to be tested (and almost all great ideas were unpopular when new). If inter-Service rivalry did not exist, we would be forced to invent something very like it.

But there is also no doubt regarding the undesirable consequences of some aspects of inter-Service rivalry. Perhaps the least desirable consequence for research and development is the use of exaggerated claims, on paper, for future weapon systems in the struggles for budget, roles, and missions. This is the counterpart, at a higher level, of the use of inflated claims in the struggle for contracts at the preliminary design stage — and the two are of course closely related. If we could learn to avoid heavy commitments of money until performance has been demonstrated by prototypes or test models, we could put competition at both levels to a useful purpose.

3. *How can we judge and choose contractors and laboratories?* Successful research and development requires skill and genius. There is no substitute for talented people — and effective organizations. But how can performance be judged in a field where objective standards are lacking? And how, when competitive bidding is impossible, can the best contractors be selected?

We have no neat and simple solution, and doubt that one can be found. But we are persuaded that the Services should attempt to exercise control over contractors *mainly* by judging and rewarding performance rather than by detailed supervision. In the case of laboratories and research organizations the important thing is the successes of the whole organization over a number of years, rather than the prospects of any particular projects. If officials reoriented their thinking in this direction, instead of attempting project-by-project reviews, they would exercise more effective and meaningful control and save much valuable time of research scientists that now goes into the preparation of justifications. It is hard to judge an organization by its record, but usually easier than judging the prospects of a proposed or on-going project.

4. *How should research and development be planned?* We are convinced that the focus of research and development planning is wrong. There is too much and too early emphasis on the selection of "optimal" weapon systems — a tendency to treat the research and development problem as if it were a procurement problem. Choosing a weapon system or systems for the fabrication of prototypes is a vital function — but only one of several, and the last in time. It is at least as important to make sure that there are good prospective systems among which a choice can be made.

The appropriate function of research and development planning is to develop a strategy for broadly advancing the state of the technological art in areas of relevance to national security. This involves:

a. Determining what the areas are, and the relative emphasis to place on each. This is by no means easy: Few would have guessed in 1930 or even 1938 that atomic physics would soon become of the greatest im-

portance. It was not apparent to many as late as 1955 that protective construction had become a vital area for military research. The relevant areas change as we make progress, and one of the most important tasks of research and development management is to spot the new areas and to get good work in them started promptly.

b. Dividing the budget among what we have called weapon system development, component development, exploratory development, and basic research. The division between the last two and the first two depends to a large extent on our time preferences. If we attach importance to future decades, we had better allocate substantial sums to basic research and exploratory development and protect them as well as we can from raids by officials who have pressing and immediate operational responsibilities.

c. Selecting the critical components — the gyroscopes, the computing equipment, the nose cones, the infra-red sensors, the rocket engines, and so on — on which the success of future weapon systems is likely to depend, and making sure that there is an adequate program for the development of each — with plenty of duplication and competition — either within weapon system development projects or independent of them.

d. Finally, selecting good weapon systems for the fabrication of prototypes.

## ECONOMIC CALCULUS IN PLANNING RESEARCH AND DEVELOPMENT

We have already indicated that the kind of explicit economic calculus illustrated in Chapter 8, at least in its present state, is of only limited use in planning research and development. Uncertainties, incommensurables, and intangibles dominate many problems. Nevertheless, economic analysis can serve a useful function both in selecting development projects and in planning them.

1. *In estimating the utility of developments.* In military problems we can sometimes place an approximate valuation on the worth of research in relation to expenditures on procurement and operations. As an example from the past, how much was it worth to develop the B-52? As a first approximation, the amount we would have had to spend on additional B-47's, tankers, bases, and so on, to give us the same strategic offensive capability without B-52's in the force that we would have with them. A calculation of precisely this kind was made in Chapter 8, where it was estimated that the development of the hypothetical HC-500 and HC-600 aircraft had been worth about $600 millions. How much would it be worth to develop a lighter-weight structural material for aircraft and missiles? In only one use, strategic air, it would be worth the savings in tankers and overseas bases now needed to extend the range of our

bombers in other ways. Calculations of this kind frequently reveal spectacular potential gains from research or development, out of all proportion to the costs of the research. And the calculations can serve a useful purpose even though they are merely first approximations, and sometimes require radical modification.[17] Even where they fall far short of coming up with a specific value of a specific development, they may indicate areas of critical need where the value of any successful research is likely to be high. They can, in short, provide some guidance for the formulation of requirements for research and development — specific or general.

2. At a more detailed level, *in planning specific development projects.* Any complex development project must be undertaken in steps or stages, the later stages depending upon the results of the earlier ones. It is therefore a problem in sequential decision making. At each stage it is possible to make use of economic calculus in comparing the costs and gains from various alternative ways of proceeding. The costs in this case are the costs of the next stages of development, not the costs of procuring and operating the developed system. For example, should we try one or two or three suggested methods of making beryllium ductile? If one, which? If two, which two? An analysis of the expected costs, times, and chances of success of the three methods may help in making a rational decision. Also, this analytical process may result in designing new tests of components and new sequences of "breadboard" models to be considered.

### AN EXAMPLE FROM CHAPTER 8

Explicit quantitative analysis has been used most frequently for the first of these purposes — to provide some clue to the value or utility of a development project. *If* the development is successful, how much would it be worth to us? This usually involves comparing the cost of attaining some desired capability by procuring and operating the newly developed hardware with the cost of attaining it by some alternative program — for instance, by procuring and operating hardware already developed. If the difference in cost is large in relation to the estimated cost of development, a case exists for a detailed examination of possible development programs.

It is important to realize that this kind of quantitative analysis — the kind used to compare *procurement decisions* — while of some use in making development choices, is incomplete and inadequate as a guide to such choices. Assume that the HC-500 and HC-600 aircraft in the Chapter 8 example had not been developed, and that the question had been: Should we develop one or both; if one, which; and by what development procedures or techniques? This is a far more complicated

[17] They raise all the familiar difficulties associated with criteria, uncertainty, suboptimizing, time, and enemy reactions.

problem than the one actually posed there: Which transport aircraft already developed should we procure for our fleet? And while the quantitative analysis used for the latter problem gives information that is needed for good development decisions, it does not by itself point to the best choice.

All that the Chapter 8 analysis does is to estimate that the HC-500, if successfully developed, promises gains (that is, savings) of about $300 million (aside from the worth of advances in the state of the technological art that may accrue to other military or industrial activities); and that the HC-600, if successfully developed, promises savings of about $500 million. These estimates are themselves, of course, subject to great uncertainty. The uncertainties are inevitably greater at the time development decisions must be made than at the time the procurement decision is made, for the period covered by the analysis must lie further ahead of the development decision than of the procurement decision.

But quite apart from these uncertainties, with the general character of which we are by now familiar, there are other relevant uncertainties and gaps in the information provided by the analysis. What we need to know are the potential payoffs and the costs *of the development decisions under consideration*. Let us concentrate for the moment on the first of these questions: Which aircraft should we develop?

The analysis does not even give us the expected payoff from development, because it simply assumes that the development will be successful. In fact the probability that any particular development will be successful is never unity, and usually much less. It has been estimated that half the aircraft developed in the United States since the war — military and civilian — have been, in the vernacular of the industry, "dogs" — not merely somewhat inferior to some other aircraft, but wrongly conceived, technically unsatisfactory, failures. The *expected* value of a development will always be less than the potential value as calculated in Chapter 8, and sometimes much less.

Even if the aircraft is not a dog, its performance characteristics may well be less than predicted and its production costs greater, particularly if the predictions are based, as they usually have to be, on the claims of the company bidding for a development contract. Occasionally performance characteristics are better than predicted, but this is much less common;[18] costs are always greater. An optimistic bias is general. To the extent that performance is disappointing or estimated costs are exceeded, the payoff will be less than estimated in Chapter 8.

The corrected estimate of payoff must then be compared with the estimated costs of development, which were properly ignored as bygones

[18] Sometimes, however, there turn out to be unforeseen *applications* which make a development more valuable than anticipated.

in the procurement analysis of Chapter 8. The estimation of development costs is particularly subject to uncertainty and to optimistic bias against which the analyst must be on his guard. We will postpone the complication that the development may take any of several routes with different costs and different probabilities of success, assuming here that one route has been (or will be) selected.

If there is only one development under consideration (the question being, say, should we develop or not develop the HC-500), the criterion is, in principle, simple — as long as we are satisfied with expected values. If the expected value (discounted and adjusted somehow for uncertainties, biases, and chance of failure) exceeds the expected cost, the development should proceed.[19] In realistic cases, however, the criterion problem is more complex. Should we, for example, develop both the HC-500 and the HC-600? The analysis of Chapter 8 tells us that *if* both developments are successful, they will be worth only $100 million more than if HC-600 alone is successfully undertaken. But this does not necessarily mean that we should refrain from developing HC-500 if we expect its development to cost a little more than $100 million. For the development of the HC-500 is worth $300 million.

**Table 22. Cost and payoff of developing the HC-500 and HC-600 (millions of dollars)**

| | *Estimated payoff if successful*[a] | *Expected payoff if probability of success = 50%* | *Expected cost of development* | *Net worth of development* |
|---|---|---|---|---|
| HC-500 | 300 | 150 | 50 | 100 |
| HC-600 | 500 | 250 | 100 | 150 |
| HC-500 and -600 | 600 | 350[b] | 150 | 200 |

[a] It is assumed for simplicity that this payoff "if successful" has already been appropriately discounted.

[b] ¼ × 600 (both successful) + ¼ × 0 (neither successful) + ¼ × 500 (HC-600 succeeds, HC-500 fails) + ¼ × 300 (HC-500 succeeds, HC-600 fails). Note that we assume here, again for the sake of simplicity, that the probability of success in one development is independent of efforts on the other one.

Table 22 indicates how — in principle — we should set about determining whether to proceed with two (or more) developments rather than with one. Still assuming that we are satisfied with "expected" values, we calculate the expected net worth (expected payoff minus expected cost) of each alternative course of action. In this particular problem the three possibilities are to develop the HC-500 only, the HC-600 only, and both. The estimated payoffs if all developments are successful are 300, 500,

[19] If there is an arbitrary ceiling on the total amount that can be spent on R and D, projects that qualify by this rule may more than exhaust the budget. If transfers from other sources (the preferred alternative) are not permitted, R and D projects should be chosen to maximize the excess of payoff over cost.

and 600 respectively. The chance of success is estimated to be 50 per cent for both the HC-500 and HC-600 developments, so that the expected payoffs, if each is developed alone, are 150 and 250 respectively. The expected payoff for developing both, however, is more than half the estimated payoff if both developments are successful. With the assumed probabilities there is one chance in four that both will be successful (payoff 600), one in four that neither will succeed (payoff 0), one in four that only the HC-500 (payoff 300), and one in four that only the HC-600 (payoff 500) will be successful. The average expectancy is 350. In the example the preferred alternative is to develop both, which promises an expected net return worth 200 — 50 more than if only the HC-600 is developed.

Two points must be stressed in connection with this example. First, there is a spurious air of precision about the figures in the table. All are the roughest kind of estimates. The uncertainties clouding the estimated payoffs have been discussed in Chapters 8, 10, and 11. There are similar uncertainties regarding development costs, which frequently exceed estimates by factors of two, three, or more. And the 50 per cent estimate of chance of success is obviously a shot in the dark; clearly there are degrees of success, and also clearly the chance of success is a function of the cost of development — of how much we are willing to pay to insure success. Most developments can be made successful if we are willing to spend enough time and money on them. Moreover, entries in the table will usually be more uncertain, not less, when we are concerned with weapon systems rather than cargo transports. The HC-500 and HC-600 are apparently fairly straightforward advances on earlier transports. Their payoffs are essentially of the cost-saving variety. If the physical and performance characteristics of the transports are about as predicted, there is little doubt that these economies (payoffs) will in fact be realized. The weapon system, however, may well represent a considerably greater advance in the state of the art, which will make the outcome as well as time and cost highly unpredictable. Moreover, there is likely to be great uncertainty regarding the military worth of the performance characteristics even if these turn out as predicted — for reasons elaborated in Chapter 10. We cannot really know in 1960 how much it will be worth in a bombing campaign in 1970 to have bombers that will fly at Mach 4 rather than at Mach 2. The worth will depend upon the character of, say, Soviet air defenses in 1970, which will depend in part upon the success of Soviet developments not yet undertaken. Mach 4 might make the difference between being able to penetrate and not being able to penetrate; or it might have trivial or even negative[20] value.

[20] Infra-red devices are *more* effective in detecting the higher speed power plants and in directing defense missiles into them.

Nevertheless, development decisions regarding bombers to be operational in 1970 have to be made in 1960 — or earlier. Calculations of the kind reflected in Table 22 are worth making as an aid in the decision process provided the uncertainties and biases in the data are recognized. In many realistic complex cases the problem will be more closely analogous to choosing a strategy that leaves no soft spots than it will be to a simple optimizing calculation.[21] We want something in development to cover the contingency that the Russians will be strikingly successful in developing infra-red, and something else to take advantage of opportunities if they are not. What is a "good" way of providing both, and at the same time of taking care of other "important" contingencies?

The same kind of economic calculus can sometimes be helpful in estimating the utility of developing components, or improved materials, fuels, and so on. One assumes successful development, and then compares weapon systems using the new component or material with weapon systems not using it. What, for example, is the worth of a new higher energy fuel for jet aircraft? As a first approximation, it is the difference between the cost of achieving objectives without the high energy fuel, and the cost of achieving the same objectives with it. If the fuel can be used in existing engines, the calculations involved are, of course, simple — although greater savings may be achievable later in engines specially designed to take advantage of the new fuel. If the new fuel can be used only in specially designed engines, and the engines only in specially designed aircraft, the benefits can only be realized in the more distant future, which means that the calculations may be difficult and the uncertainties large, but no new principle is involved.

If several alternative developments are capable of achieving the same military objective — as lighter-weight structural materials, higher-energy fuels, and boundary layer control can extend the range of bomber aircraft — economic calculations of a similar type can indicate how great an improvement in each case is necessary to save the extra billion dollars that would have to be spent to extend the range by simply building larger, heavier, more expensive bombers. Expert technical opinion might consider some of these improvements much cheaper or easier or more certain of development than others. Despite the unreliability of this kind of expert opinion, hard choices among development alternatives sometimes have to be made, and a rational choice has a better chance of being right than a blind one. The important thing is to avoid the naive assumption that the problem is to choose the *one* best alternative. The simultaneous development of two or more of the possible choices is frequently preferable to developing only one — no matter how superior it appears to the experts.

[21] See Chapter 10, pp. 198–199.

The CHAIRMAN. While you were ill and away from your office, your office concurred in the directive of Secretary McNamara on March 6th.

Now, since then you have gotten well and have had a chance to look that over. Have you disagreed with your office in its action, concurring, or what is your present view on that?

Secretary HITCH. It would be an exaggeration to say that I have had an opportunity to look the matter over since I got back. I and my office have been engaged 12 hours a day and more on the revisions of the fiscal year 1962 budget which is our current major assignment and I really have not had any time nor opportunity to go into this order and into its background.

I have stated my general views about it in a statement that I have made. I don't think I have anything to add. I do not feel that I am in any way against this order. I think how it operates depends upon how we make it operate and I think it is perfectly possible with this order to make it operate right.

The CHAIRMAN. It would seem to me it might be a little difficult for you as Comptroller to handle the affairs of your office if you don't know the general directives of the Defense Department covering such vital matters as this.

I am just observing that. It is not necessary, if you don't want to, to answer it.

Secretary HITCH. Oh, no, sir. I certainly keep in touch with all of the directives of the Defense Department, but we do have a lot of very special responsibilities in the Comptroller's Office. They are enough to keep us very busy. The Comptroller of course, is interested in everything because everything involves money, but I don't think it is good management for us to be taking positions and throwing our weight around in matters that are the primary concern of the other parts of the Office of the Secretary of Defense.

The CHAIRMAN. Now, Mr. Miller has an article he wants to read into the record at this point.

Mr. MILLER. Mr. Secretary, I just wanted to quote from page 258 of your book, "The Economics of Defense in the Nuclear Age," because I think this is the one that precedes the statement that you made—

> w. At a higher level, how can we make good use of inter-Service and inter-agency competition while curbing its undesirable features? There is, in our view, no question that inter-Service competition serves a valuable role—particularly with respect to research and development. Like other competition, it provides a powerful stimulus to thought and action, and a safeguard against bureaucratic rigidities. It provides a number of alternative sources of support for scientists, inventors, and firms with new and unpopular ideas to be tested (and almost all great ideas were unpopular when new). If inter-Service rivalry did not exist, we would be forced to invent something very like it.

Is that a correct quotation?

Secretary HITCH. That is a correct quotation and I do not disagree with anything in it.

Mr. MILLER. Thank you. I did not think you did.

Some compliments were paid to Admiral Rickover a minute ago. I would like to pay the same compliment to you. I think you will have courage enough to stand up.

If Admiral Rickover hadn't been a stout-hearted guy and a dedicated man, he would have been pushed aside long ago and we would still be floundering for the Polaris.

The CHAIRMAN. And the nuclear submarine.

Mr. MILLER. The nuclear submarine and the things that go with it.

And in all this same period the Air Force hasn't given us one—is just emerging while this thing is on the books and is tried out. And I hope we never lose sight of the fact that inter-Service rivalry is good.

Now, you heard the question that I asked the previous gentleman on the stand, Mr. Gilpatric. We are concerned primarily with research and development in this committee. Do you believe that this order, as far as research and development is concerned, is not going to have a dampening effect upon the scientists and the young officers, the young men that we have to look to for the next generation in the Army and the Navy?

Secretary HITCH. I certainly hope it will not, and I think it can be operated in a way in which it will not.

Mr. MILLER. When you say you hope it will not, you imply it may do that.

Secretary HITCH. Yes, sir, there is a danger in almost any course that you take.

Mr. MILLER. When I spoke of some ivory towers in the Pentagon a few moments ago, I should have said most of these ivory towers are found in the Air Force.

The CHAIRMAN. Mr. Fulton, have you any questions?

Mr. FULTON. We are glad to have you here. With your having been absent, of course it brings up the question, what consideration did your office give to this proposed directive, because it has such far-reaching implications in the Department of Defense?

Was full discussion and agreement reached so that you are prepared to say that this from a budgetary point of view is good?

Secretary HITCH. No, I would say, sir, that we had no objections to it from a budgetary point of view. The budgetary implications are implications that are going to cause us no trouble. We can handle these within the framework of the budgetary and accounting system.

Mr. FULTON. You don't think ARPA as now set up is really a duplicating agency with the Air Force because they by statute have been given a broad responsibility for research and development overall in the Department of Defense? Had you considered that?

Secretary HITCH. They under present directives have responsibility for basic research in this area. But as soon as a project is ready for systems development—as I understand it—in the past, it has been assigned to one of the Services.

Under this directive it will, except in unusual circumstances, be assigned to the Air Force. That is the change this directive makes.

Mr. FULTON. From your point of view on this statement, the effect of the directive is simply to have everything channeled to the Air Force where previously the Secretary of Defense was assigning to various departments and Services as the particular situation came up, was he not?

Secretary HITCH. Yes, sir. As far as the assignment of systems responsibility is concerned, that, as I understand it, is the effect of this directive.

Mr. FULTON. What budgetary circumstance would cause these unusual circumstances where it would not be assigned—a project would not be assigned to the Air Force?

Secretary HITCH. Well, sir, my own understanding would be that these unusual circumstances——

Mr. FULTON. I would rather have the official understanding, not your own.

Secretary HITCH. Yes, sir.

My understanding would be that these unusual circumstances would be connected with roles and missions and not with any budgetary consideration.

Mr. FULTON. So actually on this particular directive, then, you felt it did not apply to the Comptroller's Office or the budget, and you just took no position really one way or another. Isn't that just about it?

Secretary HITCH. No, sir, that is not quite it. I didn't say that it did not apply.

Mr. FULTON. Then will you tell us how it does apply? I am trying to determine how your office is connected.

Secretary HITCH. I felt that the primary responsibility here lay with the General Counsel who has been assigned responsibility by the Secretary for organizational changes.

This is clearly an organizational change. Among the offices of the Secretary of Defense it is the primary responsibility of the Director of Defense Research and Engineering. The interests of the Comptroller in this particular order were quite secondary.

Mr. FULTON. In order to know what the background was which your office was working with at the time it made its approval of this directive, did your office or any member of it know that General Lemnitzer, as the Chairman of the Joint Chiefs of Staff on March 2nd, 1961, just prior to this directive, had submitted a statement, and it was in opposition to the draft directive on the assignment of space development?

Secretary HITCH. No, sir; we did not know that, and our own concurrence was sent in on that same day, on March 2nd.

Mr. FULTON. What time did your office have to make the concurrence from the time you were first submitted the form of draft director?

Secretary HITCH. I can't give you that answer offhand, sir. I would be happy to provide the answer.

(The information reported is as follows:)

A preliminary version of a proposed DOD Directive pertaining to "space" referred for review under date of February 23, 1961, was received by the Office of the Assistant Secretary of Defense (Comptroller) on February 24, 1961, and the ASD (Comptroller) comments and recommendations thereon were submitted to the General Counsel by memorandum dated March 2, 1961 and delivered to the Office of the General Counsel on the evening of March 2, 1961.

Mr. FULTON. Was it important enough to check with you in the hospital to give you the opportunity to say "Hold it until I get back"?

Secretary HITCH. No, sir. Many things were checked with me, but this particular one was not.

Mr. FULTON. Do you think this is of high importance in the Department of Defense because it does change the structure of operation

of all research and development in the Department of Defense outside of basic research and outside of operational systems?

Secretary HITCH. I think it is very important, yes, sir.

Mr. FULTON. Did you know there has been a protest by General Lemnitzer that the Joint Chiefs of Staff were being by-passed in the making of such a directive without adequate consultation? And if you knew of that, when did you first hear about it?

Secretary HITCH. No, sir, I did not know. I first learned of the opposition to this directive when I read a draft of Mr. Gilpatric's testimony to this committee.

Mr. FULTON. So when you hear that General Lemnitzer as the Chairman of the Joint Chiefs of Staff stated that the Joint Chiefs of Staff did not have a full opportunity to study the matter, which according to many had far-reaching military implications, you would then recommend to go slow on such a directive had you known that, would you?

Mr. BASS. Would you yield a moment?

Mr. FULTON. I would rather proceed with my questioning. You are on the other side of this.

Mr. BASS. I believe you are stating something that hasn't been brought out at all. I haven't heard evidence that General Lemnitzer complained that he was bypassed.

Mr. FULTON. At page 3857 of the Congressional Record, my colleague, Mr. Gerald Ford, Representative of Michigan, put in the Record: "The Truth is All-Important." And I would take his statements to be true, and I would put it, when he hears that that has been the case, what would he do. I am asking his judgment, "when he hears," not had he heard.

(The article referred to is as follows:)

[Congressional Record—House, p. 3857]

THE TRUTH IS ALL-IMPORTANT

(Mr. Ford asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. FORD. Mr. Speaker, on March 12, 1961 the office of Assistant Secretary of Defense, Public Affairs issued the following statement:

"The report that General Lemnitzer has protested to Secretary McNamara that the Chiefs are being bypassed or edged out of crucial military decisions by the Kennedy administration is simply without foundation."

This statement was carried on Monday, March 13, in many of the newspapers and other news media of the United States and probably in many of the newspapers throughout the world. This statement was issued by the Office of Assistant Secretary of Defense, Public Affairs, because the public charge had been made previously that Gen. L. L. Lemnitzer, Chairman of the Joint Chiefs of Staff, had protested the transfer of control of space development to the Air Force.

The aforementioned statement issued by the Office of Assistant Secretary of Defense, Public Affairs, is, to say the least, a half truth. The Assistant Secretary of Defense for Public Affairs knew or should have known the facts and he should not now try to cover them up. General Lemnitzer as Chairman of the Joint Chiefs did submit a statement dated March 2, 1961, in opposition to the draft directive on assignment of space systems development. In General Lemnitzer's reply to the Department of Defense draft directive he stated that the Joint Chiefs did not have a full opportunity to study this matter which according to him has far-reaching military implications.

General Lemnitzer's reply or memorandum also strongly protested the Department of Defense draft directive on the basis that such a move would result in an overall loss of effectiveness through the failure to utilize the full potential of our total defense resources.

The Office of Assistant Secretary of Defense, Public Affairs, by semantics is seeking to deny to the public the facts: facts the public is entitled to know. The release of Sunday, March 12, by the Office of Assistant Secretary of Defense Sylvester is a clearcut distortion.

This deliberate attempt to gloss over the true facts is difficult to understand when on Tuesday, March 14, Mr. Edward R. Murrow, the new director of the U.S. Information Agency, categorically stated the United States must tell the truth both to Americans and to the world. On this date Mr. Murrow lectured members of the Senate on complete frankness both at home and abroad. I suggest that this honorable approach be conveyed or transmitted to the Assistant Secretary of Defense, Public Affairs. He should follow the same guidelines in the future even though his office did not do so in this specific case.

Mr. BASS. My distinguished friend is a good lawyer, an able lawyer, and he knows this was not a statement of General Lemnitzer, it was what somebody else attributed to General Lemnitzer.

The CHAIRMAN. I don't see how we can serve a useful purpose in putting one Member against another.

General Lemnitzer will be available to testify and we ought to ask him what he said.

I have read the Record. I have a copy of it here. I know just what Mr. Ford put into the Record, but I would like to hear General Lemnitzer say what he had actually said.

Secretary HITCH. I don't know what General Lemnitzer said and I would like to see the whole of the statement before I answered the question.

Mr. FULTON. May I restate, sir, that we are clear that if you had heard that General Lemnitzer had stated that the Joint Chiefs of Staff did not have a full opportunity to study this matter, and that it has far-reaching military implications, then you would have wanted to wait and go slow on such a directive before it was put into effect, would you not?

Secretary HITCH. Well, sir; I would want to know more about the circumstances.

Mr. FULTON. And I admire you for your statement.

Secretary HITCH. And how long this would take, I don't know.

Mr. FULTON. The next question is this: If you had learned that the Joint Chiefs of Staff had felt that there would be an over-all loss of its effectiveness through the failure to utilize the full potential of our total defense resources, then you as the Comptroller would like to look into that, would you not?

Secretary HITCH. If there had been a corporate act by the Joint Chiefs to this effect?

Mr. FULTON. If they had individually felt, or jointly in a meeting, this, then if that had come to your attention you would like to look into that directive a little further, wouldn't you?

Secretary HITCH. Well, sir; if it were a corporate act of the Joint Chiefs, yes, I would certainly want to look into it further. But I have no evidence that there was any such act.

Mr. FULTON. Any individual acts you would like to look into, too?

Secretary HITCH. The individual acts of one of the Joint Chiefs? Not necessarily, no, sir.

Mr. FULTON. If each of the individuals or a majority of them felt such was the case and it had come to your attention, you would have asked for further time for consideration of the directive, would you not?

Secretary HITCH. Not necessarily, no, sir.

Mr. FULTON. That is all.

The CHAIRMAN. Questions?

Mr. TEAGUE. Mr. Chairman.

The CHAIRMAN. Mr. Teague.

Mr. TEAGUE. Mr. Secretary, did you enjoy your illness?

Secretary HITCH. It came at a most inopportune time.

Mr. TEAGUE. We have a number of votes over here where I would thoroughly enjoy a case of pneumonia.

Secretary HITCH. They took very good care of me in Walter Reed.

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. I have been curious, Mr. Secretary, just what is the function of the Comptroller in the Department of Defense?

I am not quite sure in my mind whether you are consulted on all these matters of policy and operations in the Department of Defense. Is it your role to pass on them, give them your opinion, or are you confined more to the fiscal and economic aspects of the Department of Defense?

Secretary HITCH. If any such order has any important financial or fiscal implications, I would be consulted on it. My office would be consulted on it.

Mr. CHENOWETH. You are consulted solely on the fiscal impact?

Secretary HITCH. Yes, sir.

Mr. CHENOWETH. Not on whether it was good or bad or wise or unwise, or whether it is to the best interests of the Department, but solely on the fiscal applications?

Secretary HITCH. That is true as far as my role as Comptroller is concerned, yes, sir.

However, the Secretary does encourage each of the principal advisors to express his opinions freely, and I would certainly not be out of order if I expressed an opinion on such an order that was not entirely based on the fiscal implications.

I have a special responsibility to look at the fiscal implications and comment on that.

Mr. CHENOWETH. As I get the situation, the directive then was in direct opposition or violation of certain statements you made in this book that you had written.

Secretary HITCH. No, sir. I think I have explained that I do not consider it necessarily in opposition to the statements that I had made in the book.

Mr. CHENOWETH. Of course if they were, you would be in a very embarrassing situation, wouldn't you? Now to be a part of the team down there where the captain makes a decision, and you would be going in an opposite direction, and it would be an impossible situation.

Secretary HITCH. Fortunately, this book was written by two authors, and I can always maintain that when something is quoted against me, that particular paragraph was written by McKean.

Mr. CHENOWETH. This is all, Mr. Chairman.

The CHAIRMAN. I assume you have different colored type in your book for each one?

Secretary HITCH. If I had known that I was going to have this job, Mr. Chairman, I probably would not have written this book.

The CHAIRMAN. I want to commend the witness for a very candid statement.

Mr. FULTON. You have heard the quote: "Would that mine enemy had written a book"?

Secretary HITCH. Yes, sir, I have used it.

Mr. KARTH. Mr. Hitch, I want you to know I have a perfectly open mind on this thing. I have felt for some time that something had to be done to bring better order out of something of a chaotic condition.

Now, whether this is right or not, I don't know, but this I am sure it is the desire of the committe to find out.

It is obvious to me that there are two reasons, at least, and I am sure many more, for this kind of a directive, (1) economy, and (2) efficiency.

Inasmuch as you are the Comptroller and also are interested in this, and inasmuch as you just said a moment ago that your office is primarily responsible for whatever important fiscal possibilities may be attached to this or that directive, then your office must have had some idea when they approved it of certain efficiencies or economies that this directive may effectuate.

Now, could you list those efficiencies or economies that were brought to light which caused your office to approve this directive?

Secretary HITCH. Well, the efficiencies and economies that one hopes to achieve by this order are the elimination or reduction of unnecessary and undesirable duplication of research and development activities.

Mr. KARTH. This is rather broad and general. Were there not any specific efficiencies and economies pointed out to your office that could come about as a result of this directive?

Secretary HITCH. Not to the best of my knowledge. Of course, this, as has been pointed out by Secretary Gilpatric, applies to the assignment of future research and development projects as they come up. It does not affect past assignments.

Mr. KARTH. No, but there are certain research and development works that are going on now in the various branches of the Service that this directive will, I suppose, affect.

I said research and development.

Were any of those specifically pointed out? Were any areas specifically pointed out to your office where the Defense Department was able to say to you that, "Here and here and here we will be able to eliminate duplications so that economies and efficiencies will come about as a result of the directive."?

Secretary HITCH. Well, sir, I have in my budget office people thoroughly familiar with the research and development programs, and I am sure that they were consulted, that they knew of such cases. I know their advice was taken into account.

Mr. KARTH. Will you then find out and submit for the record, those things that were pointed out to your staff that may very well result in efficiency and economies?

Secretary HITCH. I didn't say pointed out to my staff but by my staff.

To the best of my knowledge, nothing was pointed out to my staff.

Mr. KARTH. Let's have those things then pointed out by your staff.

Secretary HITCH. I will make inquiry about that.

(The information requested is as follows:)

In considering a preliminary version of a proposed Department of Defense Directive relating to "space" the staff of the Office of Assistant Secretary of Defense (Comptroller) took into consideration the fact that the proposed new Directive would provide a general statement of policy representing an additional step in the evolution of appropriate arrangements for managing the Department of Defense "space" programs. This evolutionary process was started immediately following the initial concern resulting from the first Russian satellite placed in orbit. At that time the primary U.S. satellite effort involved Project Vanguard conducted by the Department of the Navy as an element of the International Geophysical Year program and the Air Force was working on other projects such as the Weapon System 117L. (Reconnaissance Satellite.)

It was then recognized that management of the Department of Defense "space" programs should be consolidated to the extent possible pending the development of national policy with respect to the investigation, utilization and exploitation of the space environment. As a result of these considerations the Advanced Research Projects Agency (ARPA) was established and most of the then current Department of Defense programs directly relating to "space" were assigned to ARPA. During the same period the preliminary aspects of certain non-military "space" programs were initiated through ARPA, with the approval of the President, prior to the establishment of the National Aeronautics and Space Administration (NASA). When NASA was later established these non-military "space" programs were transferred to NASA. ARPA continued to be responsible for managing and directing the major portion of the Department of Defense "space" program, utilizing the facilities and capabilities of the military departments and contractors for the actual codnuct of the programs. The existence of ARPA provided the Secretary of Defense with a management mechanism to minimize duplication and over-lapping of "space" projects within the Department of Defense during the development of more finalized plans and objectives for "space" programs. As decisions could be reached and as developments approached the operational stage, various projects have been assigned by the Secretary of Defense to the Army, Navy or Air Force, as appropriate. Where applicable both program responsibility and funds have been transferred from ARPA. The Congress recognized the need for such adjustments and reassignments in the language included for the appropriation, Salaries and Expenses, Advanced Research Projects Agency, Department of Defense.

During the early part of this year the Office of the Assistant Secretary of Defense (Comptroller) was in the process of identifying and summarizing current data for the various "space" and "space related" programs of the Department of Defense. These programs and projects vary all the way from large development projects, such as Samos and Midas, down to the relatively small basic and applied research type projects which are many in number. A tentative preliminary summary, dated March 6, 1961, classified SECRET, is attached which will indicate to the committee the programs which were under consideration on March 2, 1961. The identification and review of "space" and "space related" projects is still in process in cooperation with the staff of the Director of Defense Research and Engineering, and the initial phase is expected to be completed in the near future.

The March 2, 1961, comments on a preliminary version of the proposed DOD Directive relating to "space" were developed within the context of the evolution discussed above. Specific line items were not, at the time, singled out for specific comment since the proposed Directive of itself did not transfer or reassign responsibility for any specific programs or projects. However, these projects have been under continuing review as a matter of normal practice. The staff did point out that the proposed Directive, as an additional step in the evolution of more effective management devices within the Department of Defense would bring the "space" projects under even closer scrutiny and more fine grained control of the Secretary of Defense, so that even more effective utilization of DOD resources, including funds, could be expected along the following lines:

(a) By further restricting the independent freedom of action of the three military departments to initiate research and development projects without prior approval of the Secretary, it is far less likely that new projects which could grow up to be inter-Service competitions with the same general objectives will be initiated.

(b) By limiting the latitude of the military departments to increase emphasis and funding for various projects it is less likely that competitive projects can get far enough along to be difficult to stop if such a determination is made by the Secretary of Defense.

(c) By assigning general responsibility for "space" projects to the Air Force, the department which will be primarily responsible for the development of "space" projects is then generally known in advance and there will be less incentive to initiate new or competitive projects in the expectancy of being able to induce assignment of continuing responsibility by virtue of a project in being.

(d) By achieving development of a Department of Defense "space" program (rather than independent "space" programs for each of the military departments) approved by the Secretary of Defense and under continual surveillance by the Office of the Secretary of Defense, which gives every promise of resulting in a better integrated program without unnecessary or undesirable competition.

(e) By encouraging vital scientific and technological competition which would be controlled to exclude unnecessary and costly development competitions. For example, it does not seem to be reasonable or economical to have two or three independent competing space surveillance systems, or two or three competing satellite communication systems, or two or three or four weather satellite systems, or many independent competing projects to develop major components for such systems.

The CHAIRMAN. Mr. Ryan.

Mr. RYAN. In your opinion, do you believe that the effect of this directive, that one of its defects will be to diminish the interests of the Army and Navy in research?

Secretary HITCH. Yes. I think that is going to be true to some extent in this particular area of research—not in research generally but this particular area of research.

There are a great many areas of research where we are very anxious to get more work done by the Army and the Navy, but I think it is inevitable that this will diminish the interests of the Army and the Navy in space research.

Mr. RYAN. And do you think that that effect will have an overall effect on our space program?

In other words, do you think your statement now is inconsistent with that expressed in the book quoted?

Secretary HITCH. Let me say in making a decision of this kind, we can't think only of the effect on the space program.

We also have responsibilities for research in other areas. We have to take into consideration the fact that we need to stimulate research in some of the other areas where the Army and the Navy have primary concern.

I hope that it won't have a deleterious effect on the space program, but we do want to get more research done, for example, on weaponry associated with limited warfare and research associated with antisubmarine warfare. There are things we have to think about as well as the effect on space.

Mr. RYAN. The result really will be to place space research in the hands of the Air Force?

Secretary HITCH. Not all of it, but I think the effect will be to reduce somewhat the amount of space research in the other Services and their interest in space research.

The CHAIRMAN. Would the gentleman yield?

Mr. RYAN. Yes.

The CHAIRMAN. By the same token, it would serve to intensify research and development in the Air Force.

Secretary HITCH. It certainly should and the Air Force as you know, just announced a reorganization that promotes space and will lead to an intensification.

The CHAIRMAN. What do you think will be the effect of the announced reorganization in the Air Force? Will it speed it up, do you think?

Secretary HITCH. This has only reached me this morning, sir. Upon reading it over, it looks very good to me.

The CHAIRMAN. Now generally speaking, do you feel that the organizational setup for space in the Department of Defense is going to redound to the accelerated program of space over there?

Secretary HITCH. Yes, sir, I think it will.

The CHAIRMAN. Economically—now you are Comptroller, there, and you have a terrific responsibility, spending $42 billion, which is a lot of money, do you feel that the present setup insofar as you have studied it—now I understand you haven't studied it very carefully—do you feel that it will be economical and will not lead to a waste of funds?

Secretary HITCH. Well, I will do my best to make it so, sir. I am new to this job.

The CHAIRMAN. Mr. Randall.

Mr. RANDALL. I wondered for a long while why you were considered such an important witness and I want to observe that I had not at that time read your biography.

I understand you were born in Booneville, Mo., and went to Kemper Military Institute. Now, I understand.

The CHAIRMAN. The Secretary has at least one supporter on the committee.

Mr. Fulton?

Mr. FULTON. I would estimate 91 percent of space expenditures are going through the Air Force currently.

The CHAIRMAN. You mean military space?

Secretary HITCH. Military space.

Mr. FULTON. Just the Department of Defense, yes.

The question then comes up under the new directive with the special emphasis on the Air Force and likewise decreased emphasis on research and development in the Army and the Navy in space, what budgetary percentage would then go through the Air Force except in these unusual circumstances?

Secretary HITCH. I don't know, sir.

Mr. FULTON. What is the percentage going up to?

Secretary HITCH. I do not know and I will not be responsible for the assignment of these development projects to one Service or another. That is the responsibility of the Secretary.

Mr. FULTON. Your job, of course, is on such a directive, and that of your office, to evaluate what the budgetary change is. That is why I have given you the figure of 91 percent and then asked in this change of emphasis, what will that figure go up to?

I said to the previous witness, will it be 96, 98 percent to the Air Force?

Secretary HITCH. I do not know, sir. This would involve predicting what future decisions the Secretary of Defense is going to make and I am not in a position to do that.

Mr. FULTON. Really the Comptroller's Office at no time then made a budgetary estimate of the effect of this directive.

Secretary HITCH. Of how much money would be transferred from one Service to another?

No, sir; we cannot do that.

Mr. FULTON. Don't you think that prudent corporate management or governmental agency management would have required some sort of a budgetary estimate as to the effect of a directive? On the division within the Department, of expenditure in the management of the funds? Don't you think it should have been held up until that was done, until you got back?

Secretary HITCH. No, sir. There is no immediate effect and I do not see that it is necessary to predict how much will be transferred eventually.

The CHAIRMAN. Mr. Comptroller, may I ask you one question which is a little bit beside the purpose of the inquiry: Would you say as Comptroller, that our military budgets are going up higher than they are now or are they going to be stationary or are you going to be able to drop them some?

Secretary HITCH. Sir, the size of the total military budget is not the primary responsibility of the Comptroller. This is the responsibility of the President.

The CHAIRMAN. Are the recommendations in line with your recommendations? That is what I am asking you.

Secretary HITCH. It is up to the President and the Congress. This, of course, is a matter under the most active consideration and discussion by the Secretary of Defense and the President right now and I will be happy to testify on this after they have made their own statements, which they will do soon, but I would rather not do so now.

The CHAIRMAN. Are there any further questions?

If not, the committee is going to stand in recess until tomorrow morning at 10 o'clock at which time we are going to meet to accommodate two witnesses here for this hearing.

We want to thank you, sir, for coming here and testifying. I haven't read all of your book, but I promise you this, I will read it.

We want to thank Secretary Gilpatric for coming. You have both been very helpful to the committee.

As I mentioned at the beginning of the morning, I have certain supplemental questions, the answers to which we desire to add to the record.

(The questions and answers referred to are as follows:)

QUESTIONS FOR DEPUTY SECRETARY GILPATRIC

*Question 1.* Suppose that the Army or Navy pursues a program of space research through the preliminary phases, aimed toward an operational need of that Service, but that development is assigned to the Air Force. Which Service's budget will carry the cost of this development?

*Answer:* Budgetary responsibility follows the assignment of program responsibility including the placing of cross-servicing order; that is, if a program is assigned to the Air Force, Air Force will provide budgetary support for that program.

*Question 2.* Please amplify on the charge that the Navy and Air Force made uncoordinated announcements of new space programs in December 1960. Could they have pursued these programs beyond the preliminary stage without the approval of D.D.R. & E.?

*Answer:* In the over-all R.D.T. & E. field, the military departments cannot pursue major hardware, research development, test and evaluation programs without specific approval of the Office of the Director of Defense Research and Engineering (O.D.D.R. & E.). However, study efforts and laboratory experiments can be conducted within broad technical areas without specific approval by O.D.D.R. & E. of each detail or element within that broad technical area up to $2.0 million annual budgetary level unless the Service specifically identifies the project under a budgetary line item. The new DOD Space Directive, and the Instruction thereto, is more cntrolling. Nevertheless, the Services will still have latitude for the exercise of individual initiative, the generation of new ideas and concepts, the evaluations and analyses of new ideas and concepts as well as laboratory feasibility tests. It should be noted that in support of the new Space Directive, a DOD Instruction is about to be issued which will define preliminary research and specify the level of effort which must be approved by the D.D.R. & E. All space programs beyond the preliminary research stage must be approved by the Secretary of Defense or Deputy Secretary of Defense.

Examples of preliminary research pertinent to the question involved active and passive communications satellites, mobile launch vehicles, and tactical satellite applications, based upon mobile launch techniques. Speeches and press releases relating to these efforts have resulted in eroneous impressions that certain of these preliminary research efforts were approved major development programs. In some cases this resulted in an inappropriate level of industry-sponsored activity, and also created some embarrassment in dealings with the National Aeronautics and Space Administration (NASA) on the basis that it appeared as though the Department of Defense (DOD) was not keeping faith with explicit written agreements between the two agencies.

*Question 3.* In the past the practice has been to carry on most research and development in the Service which plans to use devices operationally on the grounds that the user can better make known his operational requirements. If assignment of space development work to the Air Force does not commit operational use to the Air Force, what steps will be taken to insure adequate reflection of Army and Navy operational needs in detail?

*Answer:* In the past, it has, indeed, been the practice to carry on most research and development in the Service which plans to use the devices. It is still the practice in those cases in which only one Service has a unique requirement operationally. However, a review of the various Service requirements would indicate a tri-Service interest in all current major space programs as well as those under discussion.

It is the policy of the DOD to make use of unique technical capabilities within the DOD wherever they exist. In the interest of effective management and economy, however, future space system developments aimed at meeting common requirements will be integrated to avoid the emergence of multiple large management organizations. This does not preclude continued use of technical capabilities and competency existing throughout the DOD.

*Question 4.* Did Mr. Gilpatric receive comprehensive briefings by the Army and the Navy on their respective space capabilities and future requirements prior to the drafting of the directive of March 6?

*Answer:* If by "comprehensive briefings" is meant formal oral presentation of the Army and Navy positions with respect to the effect of the proposed space and research and development directive upon their respective capabilities and future requirements, then neither Mr. McNamara nor Mr. Gilpatric received "comprehensive briefings." Neither regarded such briefings as necessary in arriving at his decision. For almost two months both had spent a great deal of time studying and being briefed in almost every aspect of the Department of Defense, including space matters. Each Service had fully presented its position on the proposed directive in writing and the written comments and supporting data were carefully studied by both Mr. McNamara and Mr. Gilpatric. In addition, Secretary McNamara discussed the matter with the Secretary of the Navy; and Mr. Gilpatric discussed the matter fully with the Secretary of the Army and other Army representatives.

As a matter of general practice it is the intention of both Mr. McNamara and Mr. Gilpatric to dispense with formal oral presentations on matters submitted for decision. Secretary McNamara has directed that all proposals for decision shall be submitted in written form sufficiently detailed so as to permit action without oral briefings. In such cases, oral presentation will be used only to clarify and to explain technical details when requested.

*Question 5.* The committee understands that Advent, Nike-Zeus, Transit, and Polaris are not affected by the directive. However, the testimony suggests that the Services may not agree as to what constitutes an unusual circumstance. In a fast changing field, the decisions on new projects may count for more than holding the line on existing ones. Can you supply us with any guidelines which would help define "unusual circumstances"? Can you give us any clews as to the disposition of future communications satellites beyond Advent, an anti-satellite version of Nike-Zeus, mapping and geodesy satellites, Sea Scout, Renae, sea reconnaissance satellites, Caleb?

*Answer:* Exceptions to the basic policy stated in the space directive will be made by the Secretary of Defense. Such exceptions as may be granted will be on case by case basis, each dependent on its own special circumstances. It is therefore very difficult to generalize, or to specify what future space projects such as those named in your question might be excepted. In determining whether or not to make an exception, the Secretary will consider, among other factors, unique service capabilities and needs.

*Question 6.* Please explain how the existing laboratories and personnel of the Army and Navy will continue to be put to full use under a program of Air Force space development. Under what circumstances do you see the transfer of trained civilian or military personnel or facilities previously engaged in space research to the Air Force?

*Answer:* It is the policy of DOD to use effectively the trained personnel within its resources. No changes are contemplated in this procedure nor are there any planned transfers of Army or Navy trained civilians or military personnel or facilities to the Air Force specifically as the result of the space directive. In addition, it is believed that the presence of the Army and Navy representatives at several levels within the Air Force Systems Command will provide effective liaison channels through which the present and future capabilities of the Army and Navy laboratories and personnel can be considered and efficiently utilized.

*Question 7.* Which label will most typically describe the role of the Air Force in space research and development: "single manager," or "major contributor to a unified command"?

*Answer:* Neither label accurately describes the role of the Air Force in space research and development. Like the other military departments, the Air Force will conduct preliminary research to develop ways of using space technology to perform its assigned functions and submit these projects to the Secretary of Defense for consideration as approved DOD space projects. For approved DOD space projects regardless of where they were originated, the Air Force will act as the space R.D.T. & E. agent for the entire Department of Defense, unless an exception is made. The Director of Defense Research and Engineering will maintain close and continuing control over the Air Force's activities as agent for DOD space development.

*Question 8.* Suppose one Service is adamant in its advocacy of the Saint approach, and another Service feels equally strongly about Early Spring. What steps would be taken by D.D.R. & E. to insure that one or both of these approaches was developed with utmost vigor without regard to the attitudes of the Services toward each?

*Answer:* In the event of competing technical proposals to meet a single requirement or application, these will be evaluated on the basis of technical merit and assessed probability of meeting the particular requirement. There are other relevant considerations, of course, such as time scale for development, cost, facility requirements and the like. This situation is not unique to space development and will be handled in a manner similar to that employed in reviewing other missile or aircraft competing weapon systems.

*Question 9.* If a primary purpose of the directive of March 6 was to centralize management and control of the military space program, please explain more completely why it would not have been possible to accomplish this by tighter controls within the Office of the Secretary of Defense rather than in effect making two Services subservient to a third in a field which may come to dominate future military operations.

*Answer:* The space directive does not make two Services subservient to a third in the field of space operations. In the first place, the directive does not deal with the assignment of space systems when they become operational. It is concerned solely with research and development. Secondly, all three military departments are placed on equal footing in the conduct of preliminary space research. All three departments may conduct basic research under tightened management control of the Secretary of Defense.

Development of approved space projects beyond the preliminary research stage is centralized in the Air Force because that department already has the greatest responsibility and capabilities in the space development field. To allow the other two Services to continue to enlarge their own research capabilities in space development would cause needless duplication as well as dissipation of scientific resources that can be used for other vital research projects.

*Question 10.* In your opinion, do you feel the aviation industry would have benefitted if all aviation had been placed under the control of a single Service in 1947? What would such a consolidation have achieved?

*Answer:* It would certainly not have been beneficial to place all aviation under control of a single Service, and decisions made at the time reflect this. In the example of aviation, there were and are unique Service requirements which are to a great extent generated by the restricted range capability of certain aircraft. This requires, for example, that a naval task force be equipped with integral aviation capability. However, Earth orbiting systems, by their very nature, are not limited to a local geographic sphere of activity but are global in nature and perform functions on a global basis which can be used by all three military departments, independent of location, provided the orbits are selectively chosen.

In the interest of economy, therefore, joint requirements of all three Services are being formulated and will be the basis for each space development. It may be, in the future, as we become more knowledgeable in the use of space systems that deviations from this approach become evident or desirable. The exceptions clause in the new space directive will accommodate this situation should it arise.

*Question 11.* Please define "preliminary research."

*Answer: Preliminary research* means theoretical, exploratory and feasibility efforts including studies, experimentation and model fabrication. *Studies* include theoretical, planning, investigatory feasibility or preliminary design efforts related to the utilization of space for military purposes or in support of assigned military missions or responsibilities. *Experimentation and model fabrication* includes component, instrumentation, subsystem, propulsion, experimental payload and other efforts uniquely or chiefly applicable to or useful for space.

(Whereupon, at 12:35 p.m., the committee recessed to reconvene at 10 a.m., Saturday, March 18, 1961.)

# DEFENSE SPACE INTERESTS

SATURDAY, MARCH 18, 1961

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

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

The CHAIRMAN. The hearing will be in order.

We are sorry we had to have this Saturday morning committee meeting, but it appeared there was no alternative.

The purpose of the hearings that were opened yesterday was defined as that of establishing under the new orders from the Pentagon the lines of demarcation between military space effort and the civilian, or the NASA space effort.

There is no attempt on the part of the committee, I want to explain, to interfere with the internal operation of the Pentagon; and the orders put out by the Secretary with regard to the assignment of missions and roles in space and the space effort, I don't believe will be questioned by this committee. But we want to clear up certain points that have arisen in reference to the extent of the orders insofar as the NASA program is concerned.

Now, this morning, to accommodate these two gentlemen who I know are very busy men, and have a full schedule, we have agreed to hear General White and General Schriever in their testimony. We asked them to come down only yesterday afternoon, so we don't expect them to have any prepared statement—am I wrong in that respect?

General WHITE. I do not have one, Mr. Chairman.

The CHAIRMAN. Consequently, we will ask each of them to make a short general verbal statement as to their reaction on the orders in the Pentagon, and then to clear up any doubt as to the present or the future of the National Aeronautics and Space Administration.

I want to say this beforehand, that the Air Force has had a good many Chiefs of Staff, and I have known every one of them. I have been in Congress ever since the Air Force was organized, but we have had no greater Chief of Staff of the Air Force than we have at this time.

I told General White after he finishes he may leave. He tells me he works every Saturday. He is probably on Congressional hours and, therefore, as soon as we finish you may go back to your work.

Could you give the committee briefly your idea, or your reaction, as to the orders from the Secretary of Defense assigning most of space to the Air Force?

I will assume in advance that your reaction is favorable.

(The biography of General White is as follows:)

GEN. THOMAS D. WHITE, USAF

Thomas Dresser White was born in Walker, Minnesota, on August 6, 1901. Upon graduation from the U.S. Military Academy on July 2, 1920, he was commissioned a second lieutenant of Infantry and immediately promoted to first lieutenant.

Entering the Infantry School at Fort Benning, Georgia, General White was graduated in July 1921 and assigned duty with the 14th Infantry at Fort Davis, Panama Canal Zone.

In September 1924 he entered Primary Flying School at Brooks Field, Texas. He was graduated from Advanced Flying School at Kelly Field, Texas in September 1925 and assigned duty with the 99th Observation Squadron at Bolling Field, Washington, D.C.

In June of 1927, General White was assigned to duty as a student of the Chinese language in Peking, China. Four years later he returned to the United States for duty at Headquarters, Air Corps, Washington, D.C.

General White was named Assistant Military Attaché for Air to Russia in February 1934. A year later he was appointed Assistant Military Attaché for Air to Italy and Greece, with station at Rome, Italy.

General White was graduated from the Air Corps Tactical School at Maxwell Field, Alabama in May 1938. He then entered the Command and General Staff School at Fort Leavenworth. Upon completion of this training, he was assigned to the Office of the Chief of Air Corps, Washington, D.C.

In April 1940, General White became Military Attaché to Brazil and the following August was named Chief of the U.S. Military Air Mission to Brazil.

Returning to the United States in March 1942, General White was appointed Assistant Chief of Staff for Operations of the Third Air Force at Tampa, Florida and subsequently named Chief of Staff.

Reassigned to Air Force Headquarters in January 1944, he became Assistant Chief of Air Staff for Intelligence.

Proceeding to the Southwest Pacific in September 1944, General White assumed duty as the Deputy Commander of the 13th Air Force, taking part in the New Guinea, southern Philippines, and Borneo campaigns. The following June he assumed command of the Seventh Air Force in the Marianas and immediately moved with it to Okinawa. In January 1946 he returned with the Seventh Air Force to Hawaii. That October he was appointed Chief of Staff of the Pacific Air Command in Tokyo, Japan. One year later, in October 1947, General White took command of the Fifth Air Force in Japan.

Transferred to the Office of the Secretary of the Air Force in October 1948 General White became Director of Legislative Liaison. He was appointed, in May 1950, Air Force Member of the Joint Strategic Survey Committee in the Office of the Joint Chiefs of Staff. He was assigned as Director of Plans, Hq USAF, in February 1951 and in July 1951 assumed duties of Deputy Chief of Staff, Operations, for the Air Force.

General White was promoted to his present four-star rank of full general on June 30, 1953 and designated Vice Chief of Staff at that time, becoming Chief of Staff for the United States Air Force on July 1, 1957.

His decorations include the Distinguished Service Medal, Legion of Merit with one Oak Leaf Cluster, and Air Medal with one Oak Leaf Cluster. He is rated a command pilot, combat observer, aircraft observer and technical observer.

General White has one daughter, Rebecca Ann (Mrs. William Mitchell, Jr. of Boyce, Virginia). He is married to the former Miss Constance Millicent Rowe.

PROMOTIONS

Commissioned a second lieutenant (permanent) July 2, 1920, he was promoted to first lieutenant (temporary) July 2, 1920; reverted to his permanent rank December 15, 1922; was promoted to first lieutenant (permanent) August 24, 1925; to captain (permanent) August 1, 1935; to major (temporary) May 20, 1939; to major (permanent) July 1, 1940; to lieutenant colonel (temporary) July 15, 1941; to colonel (temporary) March 1, 1942; to brigadier general (temporary) November 2, 1942; to lieutenant colonel (permanent) July 2, 1943; to major general (temporary) July 6, 1946; to major general (permanent) February 19, 1948; to lieutenant general (temporary) July 28, 1951; to general (temporary) June 30, 1953.

Up to date as of January 1959.

## STATEMENT OF GEN. THOMAS D. WHITE, CHIEF OF STAFF OF THE AIR FORCE

General WHITE. I should say my reaction, of course, is favorable because I think the whole Air Force is mindful of the confidence that the Secretary of Defense has placed in the Air Force in defining this mission more clearly than in the past.

I think that our major reaction is that a very great responsibility, insofar as the military space program is concerned, has been placed upon the Air Force, and we intend to carry it out to the very limit of our ability.

The CHAIRMAN. Now, that gives military space largely to the Air Force. That is correct, is it not?

General WHITE. It gives the research, development, and testing of space matters to the Air Force, but there are many provisos that require us to consult with and utilize facilities and personnel of the Army and Navy on projects in which they may have an interest. It also provides that the other services may continue studying ways and means whereby space may be utilized for their particular missions in the military sphere.

The CHAIRMAN. Now, when a weapons system becomes operative it is then assigned to the proper military department, is it not?

General WHITE. It is assigned to the appropriate military command; the Unified Commands, or Specified Commands, which would have the need for the utilization of that particular system.

It is a fact that with minor exceptions all combat forces of all the services today, since the Reorganization Act of 1958, are assigned to unified and specified commanders and are no longer under service operational control. Prior to the 1958 Act, for example, the Chief of Staff of the Air Force commanded certain of the major units of the Air Force, such as the Strategic Air Command, the Air Defense Command, and one or two others.

The Chief of Naval Operations prior to the Reorganization Act commanded all naval forces. With the Reorganization Act, that authority was rescinded and the command reposes in the Unified, or Specified Commands.

The CHAIRMAN. Here is a point we want to get to: Some time back my attention was directed to a certain directive, order, or statement purporting to come from you in which you referred to the future of NASA—you referred in that statement to the fact that the military would ultimately take over NASA. That is a point that I wanted you to clear up.

General WHITE. I am delighted to have a chance to clear that up, Mr. Chairman.

The memorandum has been declassified, and I would like my staff to pass a copy to each member of the Committee, and then I would like to talk about it.

The CHAIRMAN. Is there any objection to putting that in the record?

General WHITE. Not at all, sir.

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

(The document referred to is as follows:)

Certified True Copy.
14 April 1960

AFPDC (Gen Landon)
AFDDC (Gen Wilson)

1. I am convinced that one of the major long range elements of the Air Force future lies in space. It is also obvious that NASA will play a large part in the national effort in this direction and, moreover, inevitably will be closely associated, if not eventually combined with the military. It is perfectly clear to me that particularly in these formative years the Air Force must, for its own good as well as for national interest, cooperate to the maximum extent with NASA, to include the furnishing of key personnel even at the expense of some Air Force dilution of technical talent.

2. It has come to my attention that key personnel in NASA feel that there has been a shift in Air Force policy in respect to the type of cooperation stated above. I want to make it crystal clear that the policy has not changed and that to the very limit of our ability, and even beyond it to the extent of some risk to our own programs, the Air Force will cooperate and will supply all reasonable key personnel requests made on it by NASA.

3. To meet the above requirement I have no doubt that some shifting of Air Force personnel within the Air Force will be necessary in order to feed new talent into ARDC. This should be done. In addition, while late, we must increase the number of slots in civil technical institutions for Air Force officers. I want this type of technical education to be given the highest priority in our civil educational program and the percentage of slots in this respect to be radically increased, effective as early as possible.

THOMAS D. WHITE
Chief of Staff

cc: Under Secretary of the Air Force
Dr. Perkins
General LeMay
General Schriever

Classification cancelled by
authority of COFS, USAF,
by: R. N. Ginsburgh
date: 14 Mar 1961

The CHAIRMAN. Now, you wish to explain the order?

General WHITE. Yes, sir.

I would first like to call attention to the date: 14 April 1960. I would ask the committee to recall the environment at that time in which there were many proposals for reorganization of the entire space environment, even one to create an organization paralleling the Atomic Energy Commission, for example.

This memorandum, I am quite frank to say, was a sermon from the Chief of Staff to his staff. At about that time I think it was Mr. Horner, who had been in NASA, reported to me that there was a feeling on the part of some people in NASA that the numbers of Air Force officers assigned for duty were inadequate, and that they had had some difficulty, on a lower level, getting the right people in the right slots over there.

The sole purpose of this memorandum—and I think I stated it very clearly—is that I want to make it crystal clear that the policy is we will cooperate with NASA—and to the very limit of our ability and even beyond, to the extent of some risk to our own programs. The Air Force will cooperate and will support all reasonable key personnel requests made on it by NASA.

I want to make it clear that it was my policy that the best people in the Air Force would go to NASA if they wanted them, and I am happy to say at the last count there are 77 Air Force officers in NASA and if they need more we will support them. There are a number

of NASA people working with the Air Force. It is on this basis that I want to continue.

The CHAIRMAN. May I ask you this question: When this memorandum was put out, and as of today, too, this reference to the fact that eventually NASA may be combined with the Air Force, does that indicate any planning on your part, on the part of the Air Force at the time the order was put out, or any planning on your part, or that of the Air Force, or anyone else that you know in authority in the Pentagon, to take over NASA?

General WHITE. Absolutely not, Mr. Chairman. None then, none now, and I know of no one else who has contrary views in the Air Force.

I would like to point out that this is not a statement of advocacy, but a statement of possible fact. That whether or not NASA remains independent, whether there be a change, NASA inevitably would be associated with the military in space matters, particularly in the early formative stages of both organizations, and that no matter what, the Air Force was going to cooperate. This was not advocacy but a statement of possibility.

The CHAIRMAN. And no planning on your part?

General WHITE. No planning whatsoever.

I would like to furnish at this time; if you haven't seen them already, information statements of policy which explain the whole thing. These were published in our monthly information bulletin for widespread use throughout the Air Force. Do you have copies?

I think they were furnished to the members of the committee at the time. But you might like to have them for the record, also.

The CHAIRMAN. If there is no objection, we will place copies in the record.

(The documents referred to are as follows:)

AIR FORCE INFORMATION POLICY LETTER FOR COMMANDERS

From Office of the Secretary of the Air Force

Vol. XIV No. 17 WASHINGTON, D.C., *1 December 1960.*

*AIR FORCE COMPETENCY IN SPACE OPERATIONS:* How important is the military role in space and how important is the Air Force role in that operational medium?

The first part of this question has been answered in much the same way by both the man who will be the President and Commander in Chief in January, and by the current Vice President. Their similar views on the question indicate a realization at the highest levels of our Government that military supremacy in space is as essential to our security as military supremacy at altitudes near Earth.

"Control of space will be decided in the next decade," according to President-elect John F. Kennedy. "If the Soviets control space they can control Earth." He has also said that "the United States must have preeminence in security as an umbrella under which we can explore and develop space for the benefit of mankind." And, according to Vice President Nixon, "As with our other ideals and principles, our military forces must have the mission, and the necessary strength, to defend 'freedom of space'."

Because of its assigned responsibilities, the Air Force has devoted its efforts, funds and dedication almost exclusively to aerospace operations from its earliest flights beyond man's natural environment—where he first had to learn to live with an oxygen mask. For the Air Force to make note of its competency in aerospace operations is not to take credit from the other military Services. Their assigned responsibilities to the American people lie elsewhere, primarily, and are equally indispensable.

The task of building ground forces better-equipped and trained than any in the world is a monumental responsibility that must be met if our Nation is not to be outperformed in that specialized field. "The Soviet Army," according to a Senate subcommittee report, "has been completely modernized and reequipped since World War II." Likewise, the task of defending our Nation against enemy missile-launching submarines is truly gargantuan when one considers the exposure of our continent to oceans, the much larger numbers of Communist submarines, and the degree of invulnerability attributed to undersea craft.

The Air Force believes that each Service's requirements for aerospace forces (using aircraft, missiles, and spacecraft) are justified to the extent they enhance that Service's ability to perform its assigned functions—and to the extent they cannot be provided for that purpose by the Service with the primary function in aerospace.

Our Nation cannot afford the alternative to this procedure; that is, it cannot permit each Service to be self-sufficient in all the forces for land, sea, and aerospace warfare. For the sake of operational effectiveness and to avoid wasteful duplication, each Service must (1) stick to its specialty, (2) become outstanding in that specialty in relation to the potential enemy threat, and (3) assist the other Services in an interdependent team effort.

During the past 20 years the broadest base for current U.S. programs in aerospace has been largely developed by the Air Force—plus the aerospace industry, research institutions and Government agencies, such as NACA and NASA, which have helped make the Air Force the world's leading aerospace arm. The know-how and facilities that have sprung from this military effort are a national resource of immeasurable value not only to free-world survival, but to scientific and technological advances for the welfare of mankind.

The deadly Soviet-free world competition for military aerospace supremacy has given urgency to the Air Force's efforts to advance in aerospace achievements. However, its funds for this purpose have had to compete for priority with other national requirements.

There is not space in this letter to give more than briefest mention of the people, facilities, and achievements that demonstrate the Air Force's unparalleled competency to assume an even more strongly supported role in gaining and maintaining general aerospace supremacy for our Nation.

*USAF ACHIEVEMENTS IN AEROSPACE:* Development of an aircraft and missile force able to deter war through capability to destroy enemy military forces that could otherwise destroy us. (This, primarily, has provided the umbrella of security under which the Nation could engage in many pioneering aerospace developments—and could move toward matching and surpassing the Soviets in the launching of heavy payloads so essential to other significant advancements.)

Development of the Atlas ICBM, which became operational in 1959 after five years of intensive efforts. The Titan ICBM, now near the end of its test phase, will become operational in 1961. Minuteman, to be a "mass produced" ICBM, will begin deployment on moving railway cars and in numerous underground sites in 1962. The Air Force-developed Atlas ICBM and Thor IRBM have boosted most of the Nation's successful military and nonmilitary space vehicles to date. The Air Force Thor has boosted more successful payloads than all other U.S. boosters combined.

The combination of Atlas with the Agena-B rocket gives the Air Force a launching vehicle for future satellite systems of substantial size, carrying either men or instruments.

During the past 10 years the Air Force became the Nation's primary high-thrust propulsion developer (see Policy Letter of 1 December 59). Rocket engines developed from initial Air Force contracts with North American Aviation are used in the Thor, Atlas, Jupiter and Redstone ballistic missiles. A version of the North American Aviation Rocketdyne engine is being clustered to boost NASA's Saturn vehicle. NASA now has been assigned responsibility for development of very large thrust boosters.

As of September 1959, the official responsibility for launch and development of military space boosters was assigned by DOD to the Air Force. Also, for all practical purposes, the launch capability for the civil space program, directed by NASA, rests with the Air Force.

The world was given a glimpse of the breadth of Air Force aerospace competency in a few days in August 1960 when:

Previous Air Force speed and altitude records near the outer fringe of the atmosphere were broken by the X–15, the Air Force-NASA experimental aerospacecraft, which was flown to an altitude of 136,500 feet and a speed of 2,196 mph in separate flights by Maj. Robert M. White and NASA test pilot Joe Walker.

Air Force Capt. Joseph W. Kittinger, Jr., ascended to a new altitude for balloons, some 102,800 feet, and parachuted from the gondola in making tests of value to aerospace pilots.

The first capsule was recovered from a satellite, Discoverer XIII, which had been sent into orbit from Vandenberg AFB, Calif. by a Thor-Agena booster.

About a week later a capsule from space (from Discoverer XIV) was first caught in a mid-air snatch by a C–119 team. (This feat repeated on 14 November.)

The communications satellite, Echo I, was launched for NASA.

Atlas was flown over 7,000 miles.

A follow-on to the X–15 is the Air Force program for a piloted Dyna-Soar, boost-glide aerospacecraft. (See The Airman, Oct. 1960.)

*USAF FACILITIES AND INSTALLATIONS FOR U.S. AEROSPACE SUPREMACY:* The major U.S. missile and spacecraft test range, often referred to as "Cape Canaveral, Fla." AF Missile Test Center operates Atlantic Missile Range.

Arnold Engineering Development Center, Tullahoma, Tenn. provides unparalleled wind tunnel, high altitude cells and other facilities for aerodynamic and propulsion testing. (See The Airman, May 1959.)

AF Flight Test Center serves other Services, NASA and industrial contractors.

ASTIA is the Nation's chief source of centralized technical information services. (See Policy Letter 1 Sep 1960.)

The National Space Surveillance Control Center, developed by ARDC, collects, analyzes and reports on orbits and positions of all known satellites and space probes. It will also identify and follow unknown objects in aerospace around our planet. Now under operational control of NORAD.

*PEOPLE FOR AEROSPACE SUPREMACY:* Aerospace Medical Center, Brooks AFB, Texas, trains flight surgeons for the Air Force and provides experts in aviation and space medicine, plus specially designed equipment for testing and performing basic research that will enable man to live in the realm far beyond the atmosphere, as well as under great new stresses within the atmosphere.

From its start, NASA's Project Mercury has been nourished by Air Force areospace medical skills and people. Both the Air Training Command's School of Aviation Medicine and ARDC's Aerospace Medical Division (Wright-Patterson AFB, Ohio) have performed bioastronautic projects of great importance to the national effort in manned space flight.

Nearly 10,000 doctors have been graduated from the School of Aviation Medicine. (Aviation medicine is a separate medical specialty.) 1,200 Air Force medical scientists are actively engaged n studying the problems of aerospace.

The Air Force is working with hundreds of scientists throughout the free world through its Office of Scientific Research. It farms out 90 percent of its basic research in pure sciences to 250 universities, colleges and non-profit research organizations. Ten percent of its research of this kind is done for it by industry. Basic research is being conducted in propulsion, materials, electronics, geophysics, biosciences, and aeromechanics. More than 1,000 contracts are being monitored in hiring the best available scientific brainpower in the United States, Canada, Latin America, Europe and the Near East.

*THESE ARE ONLY A FEW OF THE VOLUMES OF FACTS* about the achievements, facilities and people of the Nation's aerospace force. A large number of activities, programs and extremely important organizations in ARDC and in other organizations have been omitted. You will find a great many more details in back issues of this letter and its supplements Nos. 80, 81, 82; in The Airman magazine (especially Gen. Bernard A. Schriever's article in the Oct. 1959 issue); in Aerospace Talks (especially Nos. 3, 4, 5, 10, 11 and 13); in Air Force magazine and Space Digest (especially the Sep. 1960 issue. Note "Air to Aerospace Force" by William Leavitt); in Air University Quarterly (especially the Summer 1957 and Summer 1958 issues); two books based on Air University

Quarterly issues, USAF Report on the Ballistic Missile, Doubleday, Garden City, N.Y., and Man in Space, Duell, Sloan and Pearce, New York; and the 1961 Air Force Blue Book, Military Publishing Institute, Inc., New York.

*"I CONSIDER THE INFORMATION FUNCTION ONE OF THE MOST IMPORTANT IN THE AIR FORCE.* Without a professional, active and enlightened information program, many of the major advancements in military aviation would never have been realized. Further, I am convinced that aggressive information actions are essential to the USAF position as the primary deterrent to war in the world today."—General Thomas S. Power, Commander in Chief, SAC.

(Signed) E. B. LeBAILLY
E. B. LeBAILLY
Brigadier General, USAF
Deputy Director of Information

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AIR FORCE INFORMATION POLICY LETTER FOR COMMANDERS

From Office of the Secretary of the Air Force

Vol. XV No. 3 WASHINGTON, D.C., *1 February 1961.*

*NASA-USAF COOPERATION.* Under the National Aeronautics and Space Act of 1958, the management of the Nation's space activities is assigned to two agencies—NASA and the Department of Defense. Through a spirit of teamwork and coordination at policy and working levels these two agencies cooperate to produce a unified national effort.

Overall Department of Defense cooperation with NASA is monitored by a board established last September. Called the Aeronautics and Astronautics Coordinating Board, it reviews planning to avoid duplication; coordinates activities of common interest; identifies problems requiring solution by either NASA or DOD and insures a steady exchange of information.

DOD's Director of Research and Engineering and NASA's Deputy Administrator are co-chairmen. Top management level personnel from all space and aeronautics elements of DOD and NASA are represented in the board membership.

Within the Department of Defense the Air Force considers that it has the primary defense interest in space operations because of the unique capabilities developed to fulfill its function to "gain and maintain general air supremacy" which requires operations at any altitude.

From NASA's beginning, in 1958, Air Force-NASA cooperation has been close and mutually beneficial. As a matter of fact, NACA, NASA's predecessor had worked closely with the Air Force, the Navy and the aircraft industry for forty-three years, contributing to American supremacy in aviation.

The Air Force agrees with NASA that there should be a clearer realization, both in this country and throughout the world, that the United States has a single space exploration program administered by NASA; and that activities in the space environment related to national defense devolve from the responsibilities of the Defense Department for the defense of the Nation, and clearly must be managed by the Department of Defense. Air Force activity in space projects is devoted solely to the latter. These projects include responsibility for providing military booster systems integration and launching operations to meet the needs of the Army and Navy as well as the Air Force (See Policy Letter Nos. 17 and 18, 1960).

Although each agency has a different sphere of responsibility, both NASA and the Air Force contribute to each other's program.

NASA's contributions to Air Force advancement in aerospace, as well as to other agencies, are many-fold. The people of NASA (or its predecessor, NACA) have made their indelible mark on such vital projects as the X–15, Dyna-Soar, B–70, the "blunt nose principle" for reentry vehicles; and the "coke-bottle" effect in aerodynamics.

Similarly, the Air Force has contributed heavily to NASA's effort through its research and development on propulsion, guidance, control, techniques and hardware incident to the Air Force ballistic missile programs. For example, the Air Force has contributed to NASA's Project Mercury by means of the Air Force's Atlas boosters and its large-scale program in aerospace medicine. The Air Force and the other Services have provided astronauts for this program.

Booster development represents one of the most costly aspects of space work—military or civilian. That is why NASA and the Air Force are conducting cooperative programs on vehicles to be used in common, such as Scout, Agena B and Centaur.

The Scout vehicle is an excellent example of mutual benefits derived from knowledge and experience shared by NASA and the Air Force. To meet the requirements of military space research, the basic NASA vehicle was adopted by the Air Force, with modifications as necessary for Air Force missions. In turn, certain Air Force modifications to what it calls the Blue Scout have been conwhere possible, without compromising their mission * * * ."

More of this kind of exchange can be expected in the future. According to Lt. Gen. R. C. Wilson, USAF Deputy Chief of Staff, Development, "We expect to benefit greatly from the scientific and technical knowledge generated by the NASA; we also expect the NASA booster program to reflect military needs, where possible, without compromising their mission* * *."

The Air Force believes that exploration and experimentation in the boundless laboratory of aerospace—plus research, development, probes and flights in the vast operational medium—form a national cooperative effort that can open new vistas to peace while contributing to stronger military security.

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(Signed) Arno H. Luehman,
ARNO H. LUEHMAN,
*Major General, USAF, Director of Information.*

The CHAIRMAN. Your relations with NASA, now, how are they, are they satisfactory, or not?

General WHITE. In my opinion, Mr. Chairman, the relations have been optimum, both in the past, present, and I am certain for the future.

The CHAIRMAN. We have a big job to do, therein in reference to the utilization of space both militarily and in a civilian way, and we need big people to do that job, and I think you fit into that group.

General WHITE. My imagination tells me, and I think I am backed by pretty solid scientific advice, that the job is plenty big for all of us.

The CHAIRMAN. I am satisfied with your statement, General White.

Members of the committee, are there questions?

Mr. Miller.

Mr. MILLER. General, some of us are concerned, and may I say at the beginning that I realize that many authorities we exercise are involved with the scientific research end of this business, and another committee has charge of the Defense Department, and what it does.

In this field, with the new authority given the Air Force, is it going to be parochial, or is it going to listen to the other Services with regard to weaponry and types of defense, that people who are as skilled in defense as is the Air Force might come up with?

General WHITE. I am absolutely certain, Mr. Miller, that we will bend over backwards to insure that every bit of the letter and the spirit of the Secretary of Defense's directives will be carried out.

In line with that, I will tell you something not generally known—such things usually become known and there is no reason why this shouldn't—as soon as I could get them after the directive was issued, I had all the major commanders of the Air Force meet in the Pentagon Building.

I think it was within 36 hours of the time this directive was issued. Naturally we discussed it. I might say I pontificated, again, to my commanders. There was no possible interpretation that anyone disagreed with what I said, that this new mission meant enormous responsibilities to the Air Force and that the Air Force would bend

over backward to meet the requirements of the Army and the Navy as prescribed by the directive.

Mr. MILLER. Some of us remember that during the thin days when missilery was not popular and the Air Force was more interested in developing fast planes to carry out its mission, it neglected this field. And the Von Braun team, working on pennies, came through with the first breakthrough, but the breakthrough was hardly there, and the Air Force rather voraciously reached out and said, "This is ours. We are going to take it away from the Army."

I am not too certain that during the long period of the development of the Polaris, the Air Force was too happy.

Now is the Air Force under this directive going to find some way of saying, "Well now, Polaris is a strategic weapon. We will take it."

General WHITE. It is a very interesting theory, Mr. Miller. I don't happen to agree with you and it would take a long time to sort this one out, but I would like specifically to answer your last question: The Air Force has no designs whatsoever, on the Polaris weapon system. Polaris is carried by submarines. We don't have anything to do with combat ships at sea.

I have advocated that there be created a unified, single strategic command within the United States Armed Forces. I specifically stated that if such a command were formed, the Strategic Air Command would be a subordinate of it and I submit that no other chief of staff in history has ever offered to have its major command subordinated to any other command.

Moreover in the same paper I recommended, as would be normal in a situation such as that, that if a unified command were formed, the staff would be comprised of appropriate representatives from all the services that contributed forces and moreover that the commander of this force could be either a naval or an air force officer.

Mr. MILLER. General, knowing you and your record—I know your record, you hardly know me—when I was a junior member of the Armed Services Committee, I had the opportunity to follow yours and I have every confidence in you. I ask these questions because in this particular field, it is a field I feel belongs in another committee, but it was with respect to research and development of this weapon that I was concerned with extending its range, maybe new techniques of firing from under the sea—these are the things that we are concerned with and that in these, the Air Force was not going to be parochial is the thing that concerns me.

For instance, I have one more question. The only defensive system with which we have come up so far against air attack, or missile attack, is Nike-Zeus. Do you feel that the Army should be allowed to go ahead and continue Nike-Zeus?

General WHITE. I would answer that question in two ways: I in no way oppose the Army producing or manning a point defense system for the United States. When you get down to the Nike-Zeus, I have supported the Secretary of Defense's decisions in the matter.

The CHAIRMAN. After all, though that is a matter of the internal operation of the Pentagon rather than the——

Mr. MILLER. Now, Mr. Chairman, it involves——

General WHITE. It is that, but I am sure the Congress has an interest and has a right to have an interest.

The CHAIRMAN. We are interested, yes.

Mr. MILLER. The Congress has an interest and while this weapon is not in production yet, improvements can be made in it and there is research and development that can be done and I believe it is the interest of this committee and the committee has a right to inquire into it and find out if roadblocks have been placed in its way. There have been roadblocks placed in its way. I am not charging that to the Air Force. I do not think that the General realizes—that we all realize that the first one that has an adequate defense against missilery is one up on the other fellow.

General WHITE. I couldn't agree with you more. The Air Force feels that a useful, effective defense against the missile is one of our crying needs in the missile field and I will go further and say the Air Force hasn't the slightest design on Nike-Zeus.

Mr. MILLER. General, you confirm the high respect in which I hold you.

General WHITE. My answers are really nothing new, Mr. Miller. This just happens to be the first time these questions have ever been put in this way.

The CHAIRMAN. Mr. Bell.

Mr. BELL. I want first of all to say that I certainly welcome this change. I think it is a very good directive and I favor the idea of it.

I would like to ask you, though, a little bit more specifically—I appreciate, as you say, that Nike-Zeus is an Army program and the Polaris a Navy one.

I would like to get an idea from you, just approximately where you think the divisions in outer space would be.

For example, in antimissile warfare, another type of invention or another type of research in this direction, a protection against missile warfare, would you think this would be an Army project, or a project of the Air Force, or just where is the division, in your opinion, according to this directive?

General WHITE. That is a very good question, if I may say so, and I hope I can formulate a good answer to it. I can only give you my own reflections.

One has to look back over the history of things. This move into space is, in our thesis, an extension of the atmosphere. There is no dividing line.

Now, the Army has historically had the antiaircraft artillery role. The Air Force has had the fighter-intercepter role. Now, we come to the missile age. I would say that all of those weapon systems which are analogous to antiaircraft artillery are properly the Army's.

I would say all those weapons systems which are analogous to the fighter-intercepter are for the Air Force to develop and in this case, to operate because the Air Defense Command is the only one that uses that type fighter intercepter in the continental defense.

So, Nike-Zeus clearly falls in the role of a successor in the evolution of antiaircraft artillery—I am trying to reduce this to terms that I, myself, can see clearly and make it clear to others.

If there were an area defense against ballistic missiles, it could be Army or it could be Air Force, but an area defense corresponds much more closely to the fighter-intercepter role than it does to the artillery role.

I would add that by a point I mean a considerable area, a hundred miles in diameter, 200 miles in diameter—that is my idea at the moment of a point defense. But if you have a weapon that can cover, for instance, the entire continental United States, then that is an area defense and I think that is one that the Air Force might say is properly an Air Force responsibility.

I would say that intercepters in space would be Air Force, manned or unmanned, because they are analogous to the fighter-intercepter. If a weapon shoots from the ground at a missile, it is generally against a point target and I have no question about it, it belongs to the Army and I will never raise an eyebrow against that.

Mr. BELL. I have another question that I want to ask you: There are in other points of the Armed Services, people who are scientists and who are trained well in the aspects and work of outer space. There may be some who are better suited to do the type of work that would be done now, with the Air Force, than they would with some other service.

Is there any provision on the part of the Defense Department that you know of to arrange for these people who have these attributes to be used in the Air Force?

General WHITE. The directive prescribed, and the Air Force will certainly comply with the spirit as well as the letter, that the Air Force will use the facilities and expertise of the other services in furthering the military space mission.

The CHAIRMAN. Any further questions?

Mr. KARTH. Mr. Chairman, I would like to ask the General a question if I may.

The CHAIRMAN. Mr. Karth.

Mr. KARTH. I notice in your April 14 statement, General, your reference to the possibility of eventually combining the NASA with the military. I don't know if I heard you correctly, but I believe I understood you to say in your statement, with respect to cooperation that Air Force is giving to NASA, that you have assigned some 77 officers, or key personnel from the Air Force to NASA.

Have those people been assigned since April 14, 1960, in a major portion or what would you say the division would be?

General WHITE. Numberwise, I can't say. I think there has been some increase. We comply with NASA's requests. We had a great many people with NASA prior to the memorandum.

I would like to ask General Schriever to explain the effect of this memorandum on him because he controls most of our technically qualified people. While the memorandum was addressed to the Deputy Chief of Staff, Personnel, I sent a copy to General Schriever, because many of the people we would be talking about would be coming out of his hide, so to speak.

The CHAIRMAN. We are going to get to you later, but if you wish to answer that now, that will be fine.

General SCHRIEVER. I would like to comment on this particular directive since I consider myself more or less the culprit in the case because I was having discussions with Mr. Dick Horner, a very close friend of mine and who had been in the Air Force, who wanted some additional people to be assigned to NASA.

These people happen to be very key project people that I had within ARDC, on space work. I knew it would hurt ARDC consid-

erably to turn these people over to NASA, so I resisted their assignment, not because I didn't want NASA to have them, but because of the effect it would have on ARDC.

Mr. Horner subsequently visited General White and discussed this matter with him. As a result, this directive was issued which made it quite clear, that good people were to be assigned to NASA.

This happened to be a small group of project people who were involved in the Centaur program. Those people were on the West Coast at the Ballistic Missiles Division. They were assigned in toto to NASA and now work for NASA.

General WHITE. General Schriever wanted them back and I wouldn't let him have them back.

Mr. TEAGUE. General, you have a number of NASA people in your headquarters, also.

General SCHRIEVER. We have NASA liaison people at the present time and there is also right now under discussion, and it has been agreed to by both NASA and the Air Force—it is just a matter of sorting out the names—the actual assignment of NASA people to the Air Force, the Air Research and Development Command, to work and participate in programs, rather than just in a liaison capacity.

Mr. KARTH. General, who pays the 77 people who are assigned to NASA by the Air Force, the Air Force or NASA?

General SCHRIEVER. The Air Force, reimbursed by NASA. They are still Air Force personnel, but they work for NASA in every sense of the word. We don't write their effectiveness reports; they are written through NASA channels and they are assigned to NASA. They are a part of NASA in every sense of the word.

Mr. KARTH. There are some people who inadvertently may have been trying to help you keep these key personnel, General Schriever, because I understand there are some people today who feel that by virtue of the fact that so many key officers and Air Force personnel have been assigned to NASA, that partially at least, NASA has already been taken over. So there is that feeling, too, you see, that as a result of the assignment of a great many of the Air Force people to the NASA, that, in effect, they are being gobbled up by the Air Force.

I am not saying this is a fact; I am just saying there are some people who have made that statement and they think there is some validity to the thought.

General WHITE. That may account for some of the articles that have appeared in the press that have mystified me because I know what the top level in the Air Force thinks about it and all the way down the line.

I can only say that every Air Force officer in NASA is there at the request of the head of the organization.

The CHAIRMAN. Will the gentleman yield?

Mr. KARTH. Yes.

The CHAIRMAN. Under the law we provided for that arrangement, that NASA might assign to you and you might assign to NASA, and I personally want to commend the Air Force and NASA, both, for following through on that program. I think it is excellent cooperation.

General WHITE. I think this whole space business is in its infancy and we both need each other's help.

Mr. MILLER. You are not fearful that this might have reverse-English and that they might take you over?

General WHITE. No. The idea of a combination is so remote to my own thinking that I haven't seen that particular specter.

Mr. MILLER. I agree that it is very remote.

Mr. KARTH. You certainly place no validity in the theory that this, in effect, is a taking over of NASA by the Air Force.

General WHITE. We do not. They are all there by NASA request.

Mr. KARTH. Thank you.

The CHAIRMAN. Mr. King, you have a question?

Mr. KING. Yes.

General White, this directive of recent vintage came, I believe, as somewhat of a surprise to many members of this committee—at least, speaking for myself, it did. We had not heard anything quite that drastic was to be forthcoming and I believe we had been fortified in our impression that nothing quite that drastic was to be forthcoming by many statements, including one of your own before this very committee on February 4, 1960.

Maybe I could read a sentence or two to refresh your recollection, and I should like you to comment on it should you care to.

On February 4, the Chairman made the following statement or asked the following questions:

> Do you favor the Air Force having a monopoly on the military use of space, or do you favor a joint command, or a joint development program?

To which question you gave the following reply:

> I don't favor any of those things. I believe that there are military requirements for all of the Services in space. I believe, as I stated earlier, that any military mission that can be done either uniquely, more cheaply, or better in space should be done that way.
>
> All of the Services could have and some do now have requirements in space.
>
> Now, the joint development of the Services is very closely integrated in R. & D., now. To have a single R. & D. program for this, even in the military, I feel would be a mistake, for the same reason that we don't have them in the other weapons. In other words, I look on the space weapons system just exactly as I do on the terrestrial and aeronautical ones.

That ends your answer.

Now, it would seem to me that this expresses a sentiment that is somewhat at variance with the concepts behind the directive we are talking about this morning. Would you care to discuss that for a moment?

General WHITE. I still say there is a requirement for all Services to use space in their particular fields. For instance, the Army has the Advent system, a communications satellite. All Services use communications.

The Navy has the Transit system. Certainly both the Navy and the Air Force and to some degree, the Army, have navigation requirements. I think, however, such things as strategic reconnaissance, such roles as interception if it comes to that, all those things which have been traditionally done by the Air Force in the atmosphere are properly within the Air Force's particular requirements.

Mr. KING. May I be specific, General: Under this directive, I assume there have been vast areas of responsibility that have passed from the Army and the Navy to the Air Force. I assume that to be true or else the directive would have served no purpose.

Well now, if that be true, what are some of those areas that have passed from the Army or the Navy to the Air Force, and do you feel that they have properly passed to the Air Force because they fall within the area that you have described as being one that is traditionally reserved to the Air Force?

General WHITE. I think what has passed is more a matter of defining who will have primary responsibility for this. There are no approved space systems that I know of in either the Army and Navy, which have been cut off by this directive.

I think they have all had plans for certain developments and are making studies for certain developments, but I think all of the approved systems have been within the Air Force except for Advent, and Transit.

General SCHRIEVER. That is right.

General WHITE. And those remain with the Army and the Navy, respectively.

The thing that has passed is the primary responsibility for development, test, and research, with the proviso that the special facilities and personnel of the Army and Navy will be available to assist the Air Force in carrying out the primary responsibility in respect to those systems and a proviso that the Army and Navy may continue to study and to exploit, if there be some system peculiarly required by the Army and Navy.

They may present that to the Department of Defense and the Director of Defense Research and Engineering will have the final say whether that goes forward under their own aegis or whether it be turned over to the Air Force for final development. The very same restrictions apply to any Air Force projects in space.

Mr. KING. Are you saying that no projects will actually pass to the Air Force as such by virtue of this directive, but only the remote responsibility for them passes, as opposed to the actual operation, or carrying out of the project?

General WHITE. As far as I know, there are no projects to transfer. The only projects that I know of that have been approved are presently in the Air Force with the exception of the Advent, and the Transit, which are Army and Navy, respectively, and they remain in the Army and Navy, as I understand it.

The CHAIRMAN. Are there any further questions?

Mr. MORRIS. ARPA is considered an agency of the Defense Department and is not either Army, Navy, or Air Force?

General WHITE. Yes, sir.

Mr. MILLER. With regard to answering Mr. Bell, you spoke of the traditional role of the Army in antiaircraft artillery and in point defense.

Now, if we apply this, and Nike-Zeus becomes as successful as we hope it will, is the commander of a battery of Nike-Zeus around Seattle going to have to find out the missile coming over from Alaska and is over Seattle or Minneapolis before he shoots it down, or when the little black dots appear in the system, are we going to then say—and following out what you say, interception within the atmosphere—are we going to determine at that time who is going to shoot it down or is it going to be up to the Air Force to go out and intercept it in the air?

I am just wondering if we aren't using "point defense" and "interception within the atmosphere" in terms of weapons that travel at 2 or 3 or maybe 15 Mach, and isn't it a little bit obsolete? Of course, this isn't our field.

General WHITE. We are dealing here with two future systems, but the kind of a situation I think you are envisioning is this. Suppose there were—let's just make it easy—a winged space vehicle designed to intercept an incoming warhead and suppose there was a Nike-Zeus in position also able to fire at that warhead. Both of those things are so far in the future that I couldn't tell you exactly how it would work, but neither the commander of the manned or unmanned interceptor type or the Nike-Zeus commander would have the ultimate and free-wheeling decision. The entire defense of the continental——

Mr. MILLER. Would be put into one thing?

General WHITE. One thing, which is now in NORAD, and they have prescribed very clearly what the procedures are for the use of, for example, the Nike-Hercules, an F–106, or a Bomarc. It is a very complicated thing and cannot be resolved by the individual on the spot. It makes no difference whether it is Army, Navy, Air Force, or who it is, it will be handled from the top.

Mr. MILLER. I want to make sure the objective is going to be to knock down that missile that is coming in.

General WHITE. There is no question about that, Mr. Miller.

The CHAIRMAN. Mr. Corman has a question.

Mr. CORMAN. If I remember correctly, "Aerospace" is the organization out in Inglewood, Calif. Would you tell me the difference between the Air Force and Aerospace, and NASA and Aerospace?

General WHITE. I would like to turn that over to General Schriever, if you don't mind.

The CHAIRMAN. I think we have finished here and I again want to express my confidence in your ability and in your work in the Air Force. You asked to be released when you had completed your testimony, and I think if there is no objection, we will release General White and then we will proceed to talk with General Schriever.

General WHITE. Thank you, sir.

The CHAIRMAN. We appreciate very much your coming here voluntarily.

General WHITE. My visits here are always stimulating to me and I think highly beneficial to the Nation.

The CHAIRMAN. We have been happy to have you.

General Schriever, you have charge of space research and development and the interests of this committee, of course, go across the board on research and development. I have been interested in the possibilities of this new order and the relative position of the military and the NASA organizations.

Do you subscribe to the fundamental ideas that General White has just given the committee?

(The biography of General Schriever is as follows:)

BIOGRAPHY OF LT. GEN. B. A. SCHRIEVER

German born, Texas reared, Lt. Gen. B. A. Schriever immigrated to the United States in 1917. He was born in Bremen, Germany, on September 14, 1910.

Graduating from Texas A. & M. in 1931 with a B.S., he started his military career that same year when he accepted a Reserve appointment in the Field Artillery.

After assignments to March Field, Calif., and Albrook Field, Panama Canal Zone, the then-lieutenant reverted to Inactive Reserve status. Meanwhile, he accepted a position as pilot with Northwest Airlines.

Reentering the service as a second lieutenant in the Regular Army in October 1938, Schriever performed duty at Hamilton Field, Calif., and Wright Field, Ohio. In 1941 he entered Stanford University and in June 1942 was awarded a master's degree.

In July 1942, Major Schriever joined the 19th Bomb Group in the Southwest Pacific. While in that theater, he participated in the Bismarck Archipelago, Leyte, Luzon, Papua, North Solomon, south Philippine and Ryukyu campaigns.

From 1946 to 1949, General Schriever was assigned as Chief, Scientific Liaison Section, Deputy Chief of Staff, Materiel, Headquarters U.S. Air Force. Entering the National War College in 1949, he was graduated in June 1950. He then returned to USAF Headquarters where he served as assistant for development planning. In June 1954, he became assistant to the commander, ARDC and in July of that same year, although retained as assistant to the commander, ARDC he assumed command of the Air Force Ballistic Missile Division.

As commander of AFBMD, General Schriever directed the Nation's highest priority project—the development of the intercontinental ballistic missile. Not only was he responsible for telescoping time in the research and development on all technical phases of the Atlas, Titan, Thor, and Minuteman missiles and for Air Force space systems but he also directed the management program for concurrently providing the launching sites and equipment, tracking facilities, and ground support equipment necessary to these programs.

In April 1959, General Schriever assumed command of the Air Research and Development Command with headquarters at Andrews Air Force Base, Md.

Today he is responsible for managing the global military-science-industry brainpower required to provide the Air Force with the military tools to do its job: Weapons of superior quality, created and developed by engineering and scientific leadership.

General Schriever's management responsibility includes monitorship of more than 6,400 research and development contracts in which about 1,500 major contractors engage in work on Air Force weapon systems, materiel, equipment, and special projects.

General Schriever is married to the former Dora Brett. The couple has three children. They are: Brett Arnold, Dodie Elizabeth and Barbara Alice.

## STATEMENT OF LT. GEN. B. A. SCHRIEVER, COMMANDER, AIR RESEARCH AND DEVELOPMENT COMMAND

General SCHRIEVER. Yes, sir, in every way, particularly with respect to his comments pertaining to our relationships and working with and cooperating with the NASA.

The CHAIRMAN. There is no effort on the part of the Air Force to encroach on the normal fields of NASA activity, is there?

General SCHRIEVER. No, sir. I think that I have testified before your committee a number of times in the past and I can truthfully say I think that our relationships have been improving with time. We have had time to work out a lot of detailed working arrangements and I feel that our relationships with NASA, today, are better than they have ever been and I know of no controversy at any point in our relationships at the present time.

The CHAIRMAN. One thing I have failed to ask General White I will ask you: We had last year hearings on the trisonic transport, which involves, as you know, the B–70. How is that coming along?

General SCHRIEVER. The trisonic transport?

The CHAIRMAN. Yes, and, of course, we recognize it is tied hand and foot to the B–70 program.

General SCHRIEVER. The B–70 technology, of course, will make a very great contribution to any supersonic transport. Now, the re-

sponsibility for the supersonic transport as far as the Government is concerned, rests within the FAA.

I have already discussed this with Mr. Halaby, the new Administrator for the FAA. We will be working very closely with them on studies relating to a supersonic transport and that is about as far as we will probably go during the next year or so—to conduct additional technical studies. These will be under the supervision of the FAA, with the Air Force——

The CHAIRMAN. Just one moment if you will, General.

All right, General. Excuse me.

General SCHRIEVER. And we will, of course, be working directly with the FAA, as will the Navy, and——

The CHAIRMAN. May I interrupt there.

NASA is doing some of the work for you on the B–70 program, are they not?

General SCHRIEVER. Yes. They do a lot——

The CHAIRMAN. That is an area of coordination between you?

General SCHRIEVER. Absolutely. The relationship between the Services and the NASA, in the aeronautical field, has never really been in question, I believe. We continue to use their facilities and they work with us. The X–15 is a good example. We certainly use their wind tunnels and they do experimental work for us in the supersonic area.

There has been no change in that relationship at all.

The CHAIRMAN. Well now, you see no reason, do you, General, why in the future that the military can't take care of its problems and NASA take care of the peacetime developments of space?

General SCHRIEVER. I see no reason why we cannot work shoulder to shoulder in the most cooperative manner and there is plenty to do for both, I can assure you.

The CHAIRMAN. I have no further questions.

Any questions, Mr. Miller?

Mr. MILLER. I have no questions.

The CHAIRMAN. Mr. Morris, Mr. King, Mr. Randall?

Mr. RANDALL. I am not certain I understood about the X–15 statement, General. Did you say there was a relationship with some other agency in connection with that? I missed it. I just missed the point.

General SCHRIEVER. The X–15 is a joint NASA-Navy-Air Force program. All three agencies have put moneys into the program and all three agencies participate in the test of the X–15. It is a joint program in every sense of the word.

Mr. RANDALL. Thank you, sir.

The CHAIRMAN. Mr. Bell?

Mr. BELL. I have no questions.

The CHAIRMAN. Mr. Corman?

Mr. CORMAN. I would like to inquire into the relationship of the Air Force and NASA and the Navy, particularly, as to who has the decision-making powers as to what projects to go forward with in Aerospace.

General SCHRIEVER. The Aerospace is an independent organization. It is not a captive of the Air Force. However, it was created by the Air Force and the programs that it——

Mr. MILLER. Will the gentleman yield?

General, would you expand a little bit on what you mean by "created by the Air Force"? Give us some of the history. I assume what you say for Aerospace goes for Rand. I think you have four of these agencies, have you not?

General SCHRIEVER. Rand, of course, was established by the Air Force back in 1946. General Arnold was really the moving force behind the creation of Rand and it is quite a different type of operation than Aerospace. Rand really is in the study and analysis and evaluation sort of thing, and works not only for the Air Force, although it is primary working for the Air Force. It also has done studies for the Ford Foundation, it has done studies for the AEC, and it is still doing so.

So we are not the sole agency working with Rand.

Now, Aerospace, as I said, was created by the Air Force. We felt and still feel very strongly that we need an agency of this type to work with us in the overall management of our space and ballistic missile programs.

Aerospace, however, is not barred from doing work for other Government agencies. For example, if NASA wanted Aerospace to do certain things for them they would be available to NASA for that purpose.

The other organizations that you had in mind, the Mitre Corporation, up in Boston, was created primarily to create systems integration of the Sage Air Defense System. We have expanded their role to that of providing us with technical assistance in the overall command area. That is the communications and control systems, in addition to just Sage, Sage being an air defense system tied into the total NORAD Command.

I don't know whether I have described adequately the relationship between the Air Force and Aerospace, but Aerospace works directly with the Ballistic Missile Division on the West Coast, and they are geographically located together.

Mr. CORMAN. You could give Aerospace a particular problem, or a particular thing to develop. NASA might do the same thing; is that right?

General SCHRIEVER. That is right.

Mr. CORMAN. That is what I didn't quite understand.

General SCHRIEVER. They are not barred from working with NASA.

As a matter of fact, they are in essence working for NASA today in the Mercury program because the Air Force has the responsibility of supporting NASA in the booster and launch end of the Mercury program. We actually provide the Atlas booster and work under the supervision of NASA, but in turn the technical assistance to BMD is furnished by Aerospace in the Mercury program so they are, in effect, working for NASA right there.

Mr. CORMAN. Thank you.

The CHAIRMAN. General, you now have a new title. What is your new title for the record?

General SCHRIEVER. I don't have it yet. This will be effective on 1 April and the new title will be the Commander of the Air Force Systems Command.

The CHAIRMAN. Now, that gives you more responsibility, doesn't it?

General SCHRIEVER. It certainly does. It places in one command the total responsibility for the development, the test, and the procurement and delivery to the operational command of a system that will perform in accordance with the characteristics that have been laid down and with a reasonable degree of reliability. So one organization will have the responsibility and the authority for carrying out the program to that point.

The CHAIRMAN. Do you think that that will give the space program more impetus?

General SCHRIEVER. Mr. Brooks, I think from a management standpoint that this is a very good move. We have been studying for some time ways and means of improving management within the Air Force for weapons systems—what we call weapons system acquisition, or system acquisition. And this particular reorganization that is taking place now didn't just come out of thin air. It has been an evolutionary study. We have been at it for some time, and I personally think that it will do much to streamline and place responsibility in one place. This will, in my opinion, get the job done better, more efficiently and faster.

The CHAIRMAN. I would like to ask your comments on the national booster program, how your new responsibilities will work in reference to that, and whether or not it is the view of your office that you should support the NASA program in trying to get a national booster.

General SCHRIEVER. Actually, the new command will not change that because the booster program, that is the military booster program, has been the responsibility of the Air Research and Development Command. We have not had any systems, as such, tied to the boosters. That is, boosters in the sense that you are talking about. So there is no change. We have been working very closely with NASA on the national booster program—what you might call that.

The CHAIRMAN. I borrowed that phrase from the Wiesner report to the President, where they recommended a national booster program.

General SCHRIEVER. I think there is no doubt there should be a national booster program. There will undoubtedly be certain elements carried out by the military and certain elements by NASA. It should be a coordinated program and I think we have essentially that now but, of course, as we go down the line certainly new requirements for boosters will arise and we should continue to be very watchful that we do have a fully coordinated program between NASA and the military. I think we have that essentially today.

The CHAIRMAN. As you envision the future, do you envision the need for the peacetime agency in the development of space—for instance, peacetime communciations in space and peacetime navigation, for instance, to assist the merchant marine on the high seas and also of weather reporting there, and at the same time the need, of course, for a military development of space? Do you envision that?

General SCHRIEVER. Yes, sir. I envision it even more broadly than that, Mr. Chairman. We are just in the infancy of development of systems in space. As I see it, going down the line, timewise, we are at that point where we should look at it in the broadest possible context. There will be military requirements and the military will be developing in space. We will have a Government agency such as NASA carrying on developments in space. I think private enterprise will get into space developments.

The CHAIRMAN. I think they should.

General SCHRIEVER. I think they should, too. And, after all, if we had designated one agency years ago, if we had said, "Well, you are going to develop everything having to do with the atmosphere in the aeronautical sense," I don't think we would be where we are today, or, on land. I think you have to look at it in a very broad context.

The CHAIRMAN. Do you envision space developments in size as perhaps in time equaling that of the automobile industry in the United States? And I am talking about military plus civilian developments.

General SCHRIEVER. You are referring, I presume, to the resources both in terms of facilities, people, and dollars? If that is what you have reference to, I would——

The CHAIRMAN. Yes, and general need on the part of the peoples of the world for the use of space there in the future.

General SCHRIEVER. Well, I certainly think that it will probably demand of our resources more than the automobile industry demands.

I think the first really practical application of space to the civilian, or world economy, probably will come in the communications satellite area.

The CHAIRMAN. How about weather?

General SCHRIEVER. Weather is certainly another area that is right in there, too. We have already had two very successful weather satellite shots. I think communications, weather, navigation, to be followed at some later point in the actual movement of people and things in a commercial sense through space, is bound to come. These things are going to be evolutionary and the crystal ball is pretty cloudy as to the exact timing, but I personally think these things will come sooner rather than later if we aggressively pursue our programs in this country.

The CHAIRMAN. You think in resources and dollars and development activity it will not only equal but perhaps exceed the automobile industry?

General SCHRIEVER. Well, I don't know exactly what the resources are in the automobile industry today, but I think certainly from the standpoint of looking into the future it will involve perhaps a greater utilization of resources in this country than any other area that I can think of.

The CHAIRMAN. General, we certainly appreciate your interest in coming before the committee, clearing up a field of uncertainty that I think should have been cleared up. You have taken Saturday morning and the committee is not unmindful of that fact, although I know you in research and development work Saturdays and Sundays, too.

General SCHRIEVER. Well, we work every Saturday.

The CHAIRMAN. If there are no further questions, the committee will go into executive session for a few moments.

Mr. FULTON. May I just say I want to welcome the General, and I wanted to say that you are one of the chief redeeming features of the directive's position.

I have one question. My question is, if the directive that has been issued is the right thing for space, why isn't the same thing for aeronautics? Why don't we have the same policy for that, too, then?

General SCHRIEVER. I don't know that I can answer that.

Mr. FULTON. Well, let it go. If you get an answer, put it in the record later.

(See the first question and answer carried at the end of this day's testimony.)

Mr. FULTON. I want to compliment you—when you appeared at the Carnegie Music Hall in Pittsburgh lately, you were in good voice.

Mr. MILLER. Mr. Chairman, I think we should wish the General a well earned vacation.

The CHAIRMAN. He deserves a well earned vacation. Now, when he comes back he has another hat he has to put on, too, and he has to adapt himself to the new environment.

Mr. MILLER. Are you going to take a postman's holiday and do some flying?

General SCHRIEVER. Well, I plan to go out to the West Coast. My wife swears that I will—this probably shouldn't go on the record, but——

The CHAIRMAN. Off the record.

(Discussion off the record.)

The CHAIRMAN. Thank you very much, gentlemen. If there is no objection, the committee will go into executive session.

As was indicated on the first day of these hearings, there are certain additional questions to which I would like to have answers supplied for the record.

(The questions and answers referred to are as follows:)

QUESTIONS ADDRESSED TO THE AIR FORCE

*Question 1.* If the DOD directive on development of space systems, dated 6 March 1961, is the right thing for space, why isn't it the right thing for aeronautics?

*Answer.* In the infancy of military aircraft development, a decision to centralize responsibility for such development in either the War or Navy Department might well have been a valid and economic one. Such speculation should recognize that in an era of no executive control of these departments below the Presidency, such a decision might have been stifling to the fruitful employment of aviation in military undertakings. The facts are that no such decision was made and today the Army, Navy and Air Force are engaged in the development of military aircraft. Certainly no objection exists to the use by all Services of military aircraft, but the question of how many Services, or departments, should be engaged in developing military aircraft is a valid one.

It may be stated that the history of multi-department development of military aviation permitted full and free study of its uses for military tasks. The high production rates of aircraft during World War II would have legislated against consolidation under a single department at that time of all military aircraft development. A different situation now exists. The science of aeronautics is relatively mature. The role of pure aeronautics in military affairs is firmly established as are its concepts. The airframe and airbreathing engine industries are in the descendancy and the unit and dollar volumes of military aircraft development are waning. Yet a heavy investment still remains in the departmental development organizations. Development costs constitute an increasing portion of total aircraft programs, due in some measure to the limited numbers of modern aircraft procured in our current programs. The extremely high costs of aerospace systems development makes questionable the benefits from competitive Service duplication. Careful study might determine that many advantages would accrue from consolidation of DOD aircraft development when the unit or dollar volume of such reaches a level which would no longer justify the continuation of separate departmental organizations for such tasks. The question and its broad implications merit thorough study.

*Question 2.* The committee finds it hard to arrive at a clear statement of what constitutes "unusual circumstances" which would permit the Army or Navy to carry out development of a space project. How does the Air Force

categorize the following with regard to service assignment for development: communications satellites beyond Advent; an anti-satellite Nike-Zeus; mapping and geodetic satellites; Sea Scout; Project Hydra; Renae; Early Spring; Caleb; and sea reconnaissance satellites?

*Answer.* The current Advent satellite communication program has the principal objective of determining technical feasibility of using microwave frequencies for point-to-point communications. Management responsibility for the Advent program has been assigned by the Secretary of Defense to the Department of the Army. At such time as it becomes desirable to initiate new and follow-on programs having appreciably different objectives than that of the Advent program, the Air Force expects, in light of the 6 March 1961 directive, that the Secretary of Defense will review the matter and will determine the appropriate Service to proceed with the new program.

In the case of an anti-satellite Nike-Zeus, the Air Force considers that solution of the anti-satellite problem requires inspection of the satellite before attempting to destroy it. It is believed critically important that a foreign satellite be inspected at close range to determine the purpose and mission of the satellite. Only after inspection has been accomplished should we make a decision to destroy the satellite or allow it to continue on its mission. Further, it is felt that an anti-satellite system should have the capability to inspect multiple targets for the purpose of economy and operational flexibility.

Since the envisioned anti-satellite Nike-Zeus would not include these capabilities the Air Force would not seek this development program.

The assignment for development of the mapping and geodetic satellites is contained in the Department of Defense Directive Number 5160.34, subject: Reconnaissance, Mapping and Geodetic Programs, dated March 28, 1961 (see attachment No. 1).

The Scout vehicle is a solid propellant rocket booster initiated for development by the Air Force and later transferred to NASA. The Air Force Blue Scout is an adaptation of the NASA Scout and is being used in the Hyper-Environment Test Program. The Sea Scout is a Navy concept to adapt the NASA Scout for space activities. This Sea Scout has not been approved for development, nor has any space system been proposed which is based on the Sea Scout booster. It is presumed that if a proposal to develop the Sea Scout is forwarded to DDR&E the need for this booster will be outlined, and the capability of the Sea Scout to accomplish the proposed task will be judged in comparison with other available or proposed boosters.

The development of Early Spring by the Air Force would be dependent on its evaluation as a solution for the anti-satellite problem. This evaluation should include comparison of requirements and concepts for anti-satellite systems. If such were approved by DOD the Air Force should have the primary role for its development using the resources of the Navy, where applicable. It appears that sea launching of anti-satellite systems offers no unique advantages to an anti-satellite capability.

Hydra is a program for demonstrating feasibility of a water launching system. If this system were to be approved for development by the DOD, it would then seem to be a project falling within the purview of the national ranges. (See the answer to Question No. 3 which outlines the Air Force position.)

Renae is a satellite weather reconnaissance system. No reason is known why the development of such a system, if required, should be an exception to the 6 Mar 61 directive.

Caleb, which conceived the orbital launching of satellites from aircraft, appears to be particularly amenable to Air Force development, if such capability is required.

Sea reconnaissance satellites are presumed to mean satellites capable of reconnoitering ocean areas. The development of this capability is dependent upon achieving sensors aboard the orbital satellite. If this capability is required, the development of sea reconnaissance satellites should take advantage of the economies that can be realized from capabilities developed in other Air Force space sensor and satellite programs.

*Question 3.* Would the Air Force undertake to develop and operate a satellite launching ship, or is this an "unusual circumstance" that should be granted to the Navy? Would you support such a proposal?

*Answer:* The Air Force will continue to consider all possible solutions to the satellite launch support requirement generated by the Department of Defense or NASA space programs and will give every consideration to the use of Navy

capability wherever it is determined that higher efficiency or economy will result.

The Air Force has considered the feasibility of launching satellite and space vehicle boosters at sea and agrees that a sea launch is feasible although as booster size increases the feasibility becomes less credible. We note that at the present time no approved Air Force (or national requirement) for a sea launch satellite exists. For some applications, such as probes, sounding rockets, and small payload low altitude satellites, sea launchings offer some advantages. For larger space boosters (Thor class and larger) factors of cost, effectiveness, technical difficulty, and availability of existing land facilities reduce the advantages that might possibly be derived from sea launches. All test objectives of the present military space programs can be met through use of already established land based complexes.

Viewing future development test requirements for vehicles utilizing nuclear propulsion, toxic higher impulse chemical fuels, and extremely large boosters, more remote siting than of present test launching facilities may be required. In such case, these might be more economically supported from remote island locations rather than sea-based launches. Most advantages cited in favor of equatorial launches are expected to gradually diminish as we overcome the problem of limited booster thrust capability. Prediction of a capability to maneuver in space would also reduce requirements for a highly mobile launch point. Although safety is a strong advantage to a sea launch capability, it is expected that emphasis on this factor will also be diminished as reliability of conventional rocket booster vehicles increases. Our experience with over water ranges using seaborne tracking stations where island instrumentation is not available has shown that problems of stabilization and accurate positioning of these sensors have resulted in significantly higher initial and operating costs than land bases having the same capability.

*Question 4.* When the preliminary space research of other Services is assigned to the Air Force for development, whose budget should carry the burden of this research?

*Answer:* If a specific space program is assigned to the Air Force for *development*, regardless of where the responsibility for *operational* employment is assigned, the Air Force would budget for the full cost of development. If the other Services pursue a program of space research through the *preliminary phases* these Services would budget for such preliminary phases. However, these Services are not precluded from issuing cross-Service orders to the Air Force to support the preliminary phases utilizing funds budgeted and provided them for such purposes.

*Question 5.* When the Air Force is assigned development of space projects, to what extent does it plan to subcontract to Army and Navy facilities to insure that existing personnel and facilities are not left idle?

*Answer:* When the Air Force is assigned development of a space project, consideration will be given to the capabilities within the Air Force as well as those under the cognizance of other Government agencies. In the past, the Air Force has used the facilities of the Army and Navy as well as other Government facilities to insure effective and economical use of available Federal resources. The Air Force plans to continue this policy.

*Question 6.* The next question is hypothetical, but it has some current parallels. Suppose that the Von Braun team and facilities were still under control of the Army, and that in the absence of NASA, the Department of Defense set a requirement for a Saturn booster. Presumably the Air Force would be assigned this development project. Would it (a) subcontract to the Army, (b) take over the Von Braun team and facilities, or (c) turn the assignment over to some private contractor, or (d) build new facilities of its own?

*Answer:* Rather than alluding to a hypothetical situation, it is felt that the Air Force can be more responsive to the committee and the subject matter of ABMA and the Saturn project by briefly reviewing the series of events preceding the actual transfer. These events were as follows:

a. In a memorandum from the Secretary of Defense to the Chairman, Joint Chiefs of Staff, dated 18 September 1959, the Air Force was assigned responsibility for the development, production and launching of space boosters and the necessary systems integration incident thereto except for such research and development conducted by ARPA.

b. In view of the then current discussions concerning the future of the ABMA and having been assigned the primary responsibility for military space boosters, the Air Force recommended that responsibility for the ABMA be assumed by the Air Force.

c. Ensuing deliberations concerning the transfer of the ABMA and the Saturn project were consummated in a NASA–DOD agreement. This agreement was released with Executive approval under date of 2 November 1959 in which NASA was assigned responsibility for the development of large space boosters. Concurrently, the Saturn project and the ABMA were transferred to the NASA.

The Air Force adheres to its position that the assignment of the ABMA and associated projects, personnel complement and test facilities should logically accrue to the agency responsible for development of large space boosters. Thereafter, the management of that segment must be efficiently integrated within the responsible agency's overall R. & D. complex. The decision rendered in this case placed the responsibility with the NASA and provided concurrently that the resources were to be transferred to their jurisdiction.

Had the responsibility and associated resources been assigned to the Air Force, it can reasonably be surmised that the Saturn project personnel and associated facilities would have been most carefully integrated into the Air Force R. & D. management structure and physical plant. Air Force management of high priority R. & D. projects recognizes that the most efficient utilization of such critical resources as technical personnel and test facilities is a vital aspect in the successful prosecution of such efforts.

*Question* 7. Please define "preliminary research."

*Answer:* The following DDR&E definition of preliminary research is currently being coordinated within DOD. If approved, it will be issued as a directive to all military services. *Preliminary research* means theoretical, exploratory and feasibility efforts including studies, experimentation and model fabrication. *Studies* include theoretical, planning, investigatory feasibility or preliminary design efforts related to the utilization of space for military purposes or in support of assigned military missions or responsibilities. *Experimentation and model fabrication* includes component, instrumentation, subsystem, propulsion, experimental payload and other efforts uniquely or chiefly applicable to or useful for space.

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ADDENDUM

*March 28, 1961*
NUMBER 5160.34
GenCoun, DoD

DEPARTMENT OF DEFENSE DIRECTIVE

SUBJECT *Reconnaissance, Mapping and Geodetic Programs*

Reference: (a) DOD Directive 5160.32, "Development of Space Systems"

I. *Purpose*

This Directive assigns responsibilities for research, development, and operational activities in the fields of reconnaissance, mapping and geodetic programs.

II. *Reconnaissance Satellites*

The Department of the Air Force will be responsible for:

1. Research, development and operation, including payload design, launch, guidance, control and recovery of all DOD reconnaissance satellite systems.
2. Research and development of all instrumentation and equipment for processing reconnaissance data from satellite sources.

III. *Geodetic Controls and Mapping Production*

A. The Department of the Army will be responsible for the establishment and management of a single geodetic and mapping program to meet the total requirements of the Services and the Department of Defense in consonance with priorities established by the Joint Chiefs of Staff. This responsibility will include the establishment and maintenance of a world-wide master geodetic control system and geodetic library and the production and dissemination of geodetic data and topographic maps as required by Department of Defense agencies. In addition, it will include the establishment of a mapping and geodetic data collection program responsive to the needs of the three military departments and under the broad priorities established by the Joint Chiefs of Staff. The Department of the Army will be responsible for maintaining a research and development program in basic geodetic methods.

B. The Departments of the Navy and the Air Force will be responsible for exploitation of the basic information provided by the Department of the Army to meet their unique Service requirements.

IV. *Mapping and Geodetic Satellites*

A. The Department of the Army will be responsible for:

1. Establishment of detailed specifications for the development of mapping and geodetic satellite payloads and the operational coverage required of such payloads to satisfy its over-all data collection program.

2. Research, development and operation of all systems for processing and reduction of raw data accruing from geodetic and mapping satellites.

B. The Department of the Air Force will be responsible for:

1. Research and development of all geodetic satellite systems exclusive of data processing and data reduction, to meet the detailed requirements established by the Department of the Army.

2. Operation of geodetic satellite systems (excluding data processing and data reduction) as required to meet the schedule and coverage prescribed by the Department of the Army. The Air Force will provide operational boosters and payloads and the launch, control, guidance and recovery operations, and will deliver the collected raw data to the Department of the Army for processing.

3. Any exceptions to the foregoing will be determined in accordance with DOD Directive 5160.32 (reference (a)).

V. *Mapping and Geodetic Systems Other Than Satellite*

A. The Department of the Air Force will be responsible for research, development and operation of all cartographic photograph and geodetic systems (excluding data processing, other than field computations) requiring the service of manned high performance aircraft, in accordance with the requirements and schedule provided by the Department of the Army.

B. The Department of the Army will be responsible for research, development and operation of ground based mapping and geodetic systems (including components carried aboard instrumented probes and non-geodetic satellite systems), and the data processing and data reduction instrumentation and equipment associated therewith.

C. The Department of the Navy will be responsible for:

1. Research, development and operation of all oceanographic and geophysical equipment required for the survey of the ocean areas.

2. Performing geodetic operations ashore, as necessary, to position electronic aids for navigation at sea and for temporary electronic aids required for oceanographic survey operations.

3. Providing to the Department of the Army processed data in accordance with requirements established by the Department of the Army geodetic program.

VI. *Operational Priorities*

The operational acquisition of geodetic and reconnaissance data and mapping information will be carried out under the broad priorities established by the Joint Chiefs of Staff.

VII. *Effective Date*

This directive is effective upon publication.

ROSWELL GILPATRIC,
*Deputy Secretary of Defense.*

(Whereupon, at 11:10 a.m., the Committee proceeded in executive session, concerned with internal administrative matters for which no transcript was required. The committee recessed at 11:25 a.m. to meet again on Monday, March 20, 1961.)

# DEFENSE SPACE INTERESTS

MONDAY, MARCH 20, 1961

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

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

The CHAIRMAN. The committee will come to order.

I am informed on account of the smallness of the space here, and the number of people who want to get into the room, we are having some difficulty. We want to certainly take care of the reporters who come here to do a job. They come here in the regular, routine course of their work. Now, if there is any way we can accommodate the reporters better than what we have, we want to do it. You might suggest to Mr. Finch how we can improve the situation, which is going to be difficult, even at best.

We have a table coming in next week that will help some, but the prime problem is, we don't have the room here. I hope everybody will bear with us.

This morning, members of the committee, we have some very distinguished witnesses here. I know they are busy men, and so I would suggest as soon as we finish with these witnesses, that we release them, if there is no objection, that they may return to their office. I know what it is, now, with legislative committees calling them from all parts of the Hill, that they have a job to do and they have to get back to their offices.

Our first witness this morning is the Secretary of the Army, the Honorable E. J. Stahr.

Secretary Stahr, I think you were here the other day with our committee and we are very appreciative of your appearance.

We have your biography here. I think it would be very appropriate to have the entire document entitled "Biographical Material" inserted in the record at this point.

(The document referred to is as follows:)

BIOGRAPHICAL MATERIAL

SECRETARY OF THE ARMY ELVIS J. STAHR, JR.

Elvis J. Stahr, Jr., of West Virginia, Secretary of the Army, was sworn into office January 24, 1961; born in Hickman, Kentucky, March 9, 1916; son of Judge Elvis J. and Mary McDaniel Stahr; was graduated from Hickman High School 1932, and from the University of Kentucky (A.B.) 1936; won a Rhodes scholarship and attended Merton College, Oxford University, 1936–39 (B.A. in Jurisprudence, M.A., B.C.L.); honorary LL.D. West Virginia Wesleyan College, Concord (W. Va.) College and Waynesburg (Pa.) College; commissioned second lieutenant of Infantry, ORC, December 3, 1940; student and instructor at the

Infantry School, Fort Benning, Ga., 1941–43; earned diploma in Chinese language at Yale University, 1943; overseas service as combat liaison officer in North Africa three months and in Far Eastern Theater with Chinese Combat Command twenty-two months, participating in China offensive and Burma-India campaign; awarded Bronze Star (twice), Nationalist Chinese Special Breast Order of Yun Hui (twice) and Nationalist Chinese Army-Navy-Air Force Medal 1st Class; reverted to inactive status as a lieutenant colonel March 12, 1946; Special Assistant for Reserve Forces to the Secretary of the Army, 1951–52; consultant to Assistant Secretary of the Army (MP&RF) 1953; awarded the Department of the Army Certificate for Meritorious Civilian Service; practiced law as associate of the New York law firm of Mudge, Stern, Baldwin and Todd 1939–41 and 1946–47; Associate Professor of Law, University of Kentucky 1947–48; Professor of Law and Dean of the College of Law 1948–56; Provost of the University and Dean of the College of Law 1954–56; executive director, President's Committee on Education beyond High School 1956–57; Vice Chancellor, University of Pittsburgh, 1957–59; became President of West Virginia University, February 1, 1959, and is on leave of absence from that position to serve as Secretary of the Army; member of the bars of New York, Kentucky and the United States Supreme Court; member, Kentucky Constitution Review Commission 1949–56 (vice chairman 1952–56); chairman, Governor's Committee on Rehabilitation of the Handicapped 1955; chairman, Committee on National Defense of American Association of Land Grant Colleges and State Universities 1960; member, board of visitor of the Air University, Southern Regional Education Board, boards of directors of West Virginia Chamber of Commerce, First National Bank of Morgantown, W. Va., and Benedum Foundation of Pittsburgh, Association of American Rhodes Scholars, American Association of University Professors, Association for Higher Education, West Virginia Education Association, Sigma Chi, Phi Beta Kappa, Omicron Delta Kappa, Order of the Coif, Phi Delta Phi, Tau Kappa Alpha, Scabbard and Blade, Merton Society (Oxford), New York Southern Society, Newcomen Society, American Legion, Reserve Officers Association, Sons of the American Revolution, and Rotary Clubs, Cosmos (Washington, D.C.), Rolling Rock (Ligonier, Pa.), and Lakeview Country (Morgantown, W. Va.); elder, First Christian Church of Morgantown; married Dorothy Howland Berkfield June 28, 1946; three children, Stephanie Ann, Stuart Edward Winston and Bradford Lanier; Washington, D. C. address, 2618 30th Street, N. W.

Mr. HECHLER. I suggest the position of president of the West Virginia University be printed in italic.

The CHAIRMAN. The gentleman doesn't have a leaning toward West Virginia, does he?

Mr. Secretary, you have a short statement here and we would appreciate very much your proceeding with your statement.

## STATEMENT OF HON. ELVIS J. STAHR, JR., SECRETARY OF THE ARMY

Secretary STAHR. Thank you, Mr. Chairman and members of the committee.

It is a privilege and a pleasure to make my first formal appearance before this committee. With me this morning are two men whom you know quite well, Assistant Secretary Richard S. Morse, and Lt. Gen. Arthur G. Trudeau.

I will begin my brief remarks by stating that the Army will support completely the recent directive by the Secretary of Defense with respect to space programs and intends to work effectively under it.

In saying this, I certainly don't want to leave you with the impression that the Army has no interest in space. On the contrary, the Army has a definite and continuing interest in the use of space in furtherance of the Army's mission on the surface of the Earth. We believe that the directive as it is drafted, and as we think it will

work out in practice, gives us adequate scope to fulfill the Army's assigned and logical missions in the defense of this country.

It is my view that space is an environment—not a function. The Army does not view space programs as ends in themselves; rather, we view space as a new and challenging medium which we will have to consider and investigate and utilize in carrying out our mission.

Let me see if I can give you an example. The Army's mission, in its broadest sense, is preparedness for land warfare. We all know that one of the important functions in land warfare is communications, and it is hardly necessary to say that this function is becoming more important every day. It is also obvious that, for the future, space will be a critical environment for communications and that there is an enormous amount of work to be done in this field.

Now it happens that the Army has had assigned responsibilities in this area since 1959 which, under Paragraph III of the space directive, will be continued. This simply illustrates what I mean when I say that the Army doesn't take the view that it has any business working on space problems just for the sake of working on them. Our effort will always be to view space programs strictly in relation to our assigned mission.

It is this concept which has been at the center of the Army's thinking. It is my view that it is vitally essential to our national defense that the Army, Navy, and Air Force be encouraged and supported in their respective fields of primary research. Exploitation of this relatively new and untouched environment is best accomplished by maintaining a broad attack upon it, an attack characterized by the highly diversified and differing requirements of the three Services to conduct operations on the land, on the sea, and in the air. I'm sure I don't need to remind this particular committee of the Army's past accomplishments and contributions in space technology. Nor need I remind you of the proved and widely recognized capabilities and wealth of talent which exist in the Army's scientific team, both civilian and military.

I was here on last Friday during the appearance of Secretaries Gilpatric and Hitch, and I want to comment on one subject which seemed to concern some members of the committee. That is the problem of morale amongst the Army's scientific team, and more particularly the military members of that team, both present and future. I have given a great deal of thought to this subject and would like to give you my conclusions.

Stated in its simplest terms, the real question involved is whether Army scientists will be willing to bend their best efforts on primary research projects in space with the foreknowledge that the results of their work may later have to be turned over for development to another Service. My answer to that question is that I believe they will, given the assumption that the projects on which they are working are projects which really bear a logical and useful relationship to the Army's primary mission.

Any other answer, it seems to me, would suggest that the Army's scientific team is simply bent on self-aggrandizement, and this I do not believe to be the fact. I believe that in this day and age the Army is faced with more than enough scientific frontiers within the fields of its assigned missions to challenge fully the great intellectual and professional talents of our scientists and research teams.

In my opinion, the space directive provides the scope for a broad attack on space problems. In Paragraph IIA it provides for preliminary research by each of the Services. In Paragraph IID it provides for special projects and assignments in special circumstances. At the present time I have no information which would indicate to me that these provisions will be interpreted so as to interfere with the Army's requirements for the use of space which are peculiarly related to its primary mission. Quite to the contrary, since the space directive was issued, we are continuing to consider in conjunction with the Department of Defense the fields of mapping and geodesy, which are closely related sciences in which the Army has a vital interest.

Without going into details, I think I can say that responsibilities in this area are being worked out in a manner which is certainly satisfactory to the Army, and I can see no reason why future problems in other areas can't be worked out in the same way.

Once again, this is not to say that there are not going to be problems. Of course there will be, but this would almost certainly be true no matter how the directive assigned, reassigned, or failed to assign responsibility. There will be cases in which it is essential that the Air Force provide for active and full support of Army requirements based on its informed understanding of the importance of such programs to the Army's execution of its roles and missions.

I say again that I do not think there will be problems which are insurmountable. They will simply require some working on, and that is what my colleagues and I are hired to do. I assure you that if the Army's proper interests in space technology are at any time not being adequately recognized or served, Secretary McNamara will hear from us loud and clear.

From what I know of him, I am perfectly sure he will listen to us. But I also assure you that there is a dedicated determination on the part of all of us now in leadership positions in the Department of Defense to develop genuine teamwork, affirmative cooperation, and effective coordination in all our efforts in the best interests of the country and its security. National defense is the common mission of all the military Services. Speaking for the Army, and as its Secretary, our intention will be to support the team effort for the total defense wholeheartedly and to do our utmost to give the Nation the kind of Army—modern, hard-hitting, ready—which we must have in these very troubled times.

Gentlemen, I thank you for your courtesy.

The CHAIRMAN. We are very grateful to you for your statement. I will say, speaking for myself, that I think the Army has made a magnificent contribution to the cause of space development.

In the Redstone Arsenal there in Alabama in your early development under the Von Braun team and other work that you have done there, I think the cause of space would have been further back than we are at this time had it not been for the foresight of those leaders in the Army who saw the need and had the vision to develop space for the defense of this country.

I think your statement in which you refer to the desire of the Army to cooperate, making the orders work, is a fine statement.

Let me ask you a question or two. In your statement you refer to several projects. Of course, the Army needs communications. You

refer, however, specifically to mapping and geodesy—that is space mapping, mapping from space vehicles to be done by the Army? That is your particular mission?

Secretary STAHR. That is correct, sir, from space vehicles.

The CHAIRMAN. And the same thing with geodesy.

Now, what I wanted to ask you is this: In handling these projects for the Army, will you be able to work with peacetime space agencies? Because I can see the need, for instance, with maps, not only would the Army need the maps, but commercial ventures are going to need maps. They can be used in navigation, in aerial navigation and in many other respects, commercial institutions will need maps.

Would that permit you to work in cooperation with NASA, if NASA had a similar program for peacetime purposes?

Secretary STAHR. Yes, sir. As you know, the Army has worked very closely with Coast and Geodetic Survey, for example.

The assignment of responsibility for performing a function does not by any means suggest to me, and I don't think to anyone else, that the only function to be served is the function of the agency to which the responsibility is assigned.

Not only would we continue to give the benefits of our work in mapping to civilian agencies, but obviously, of course, to the other Services.

In other words, the Army would be the responsible agency for doing the work, but it would do the work in the national interests and in the interests of other agencies which will benefit from it.

It is simply a device for the management of actual operations.

The CHAIRMAN. Does that mean over the long pull, in order to get a map of that character you would have to go to the Army?

Suppose, for instance, one of these steamship companies would have a need for a map. Would your plan envision no peacetime agency handling it?

Secretary STAHR. Would what, Mr. Chairman? I didn't get the very last——

The CHAIRMAN. Would your plan envision that nothing but the Army would do this and that no peacetime agency might be interested in it?

Secretary STAHR. Certainly not. I am speaking only for the assignment of responsibilities within the Department of Defense when I say I think we are getting this thing straightened out in a centralized way.

Obviously the Army will continue to want to make available to agencies outside the Department of Defense, as it has for years, the fruits of these efforts.

We have no authority to preempt them. I think perhaps that is what you are driving at.

The CHAIRMAN. I believe that you are going to find after the Army, or perhaps, at the same time the Army develops its maps, you are going to find agencies outside of the Army who will feel the need of mapping perhaps as much as the Army or the military.

Now, would your plan envision the fact that in order to get this information that it must operate through military agencies?

Secretary STAHR. No, sir. We have no authority to require them to do that in the first place. We would merely offer our cooperation

so that the work could be done with their requirements in mind and with the objective of generating savings of funds for the Government and for the public. We obviously couldn't say that nobody else can do this just because we are doing it.

The CHAIRMAN. I want to ask you this question: There has been public reference to a March 1959 list of something like 19 Army interests in space. Can you give us that list?

Secretary STAHR. I am not familiar with it. I don't know whether anybody else here is or not.

Nineteen Army interests in space?

The CHAIRMAN. That is right.

General TRUDEAU. What was the date, sir?

The CHAIRMAN. March, 1959.

General TRUDEAU. We can certainly get it.

Secretary STAHR. We can probably find it somewhere.

The CHAIRMAN. Can you describe for us the process by which the Army requirements for the use of space will be satisfied in the future?

Secretary STAHR. In terms of the way the directive—do you mean under the new directive?

The CHAIRMAN. Yes, and I mean when the project Advent, for instance, is terminated. Does that complete your interest in space development?

Secretary STAHR. No, sir. As I endeavored to say in my statement, we have a continuing interest in space. Some of it we can't even now visualize, but any time that the use of space can help the Army to perform its mission better, we would have an interest in the development of that use.

Under the directive the Army would develop its ideas, present them for approval, as indeed I believe it has to do now, to the Office of the Secretary of Defense, primarily I guess to the Director of Defense Research and Engineering, and on his recommendation, to the Secretary of Defense, or the Deputy Secretary of Defense.

If it receives their approval, it would then go forward, normally through the Air Force as the actual developing agency. One of the interesting aspects of the directive is, ideas coming out of the Air Force itself would still have to go through that same process.

The CHAIRMAN. And those ideas might even in some instances be assigned to the Army?

Secretary STAHR. There is a provision in the directive "in unusual circumstances."

The CHAIRMAN. What about the Zeus now? What effect will this new order have on the development of the Zeus?

Secretary STAHR. None whatsoever to the best of my knowledge.

The CHAIRMAN. Is the Zeus going forward satisfactorily now?

Secretary STAHR. We think it is going forward extremely well, sir.

The CHAIRMAN. You are really pleased then with the speed you are making with the Zeus?

Secretary STAHR. We are highly encouraged.

General TRUDEAU. In R. and D.

The CHAIRMAN. Any questions?

Mr. FULTON. I yield my time to my colleagues.

The CHAIRMAN. Mr. Miller.

Mr. MILLER. I am sorry I wasn't here when you gave your statement, but I was particularly interested in reading on page three the

reference you make to the effect that this is going to have on the morale of scientists within the Army, and you seem to think they are dedicated men and they will just take this. I assume that they will, but it wasn't the experience of this committee when there was the rape of the Von Braun team's work, turning it over to the Air Force, that these people felt very happy about it.

Mr. FULTON. The what?

Mr. MILLER. I said "the rape."

The Von Braun team people didn't feel very happy about it. Now, maybe we didn't talk to some of the right ones on the Von Braun team who were not the dedicated ones, and I just want your assurance that you know that this is not going to have an adverse effect on a fine team of scientists in the Army.

Secretary STAHR. Sir, I could not possibly say that I know that.

Mr. MILLER. I don't think you can. That is what I wanted to ask you. You imply it here though, that they are good soldiers.

Secretary STAHR. Sir, I meant exactly what I said. I did not say I know that.

Mr. MILLER. I just wanted to bring that out, that you didn't know it, because I don't think anyone knows it.

Now, you have been developing a Pershing missile.

Secretary STAHR. Yes, sir.

Mr. MILLER. What is its present range or is that classified?

Secretary STAHR. Three to four hundred miles.

Mr. MILLER. Isn't this a little bit beyond the range that we signed over to you for artillery? Are you sure this isn't going to be declared a strategic weapon, particularly if you improve its range, and that it will be taken over, just as Jupiter was taken over? Can you give me any assurance as to that?

Secretary STAHR. It is my understanding, though this occurred before my arrival on the scene, that there was a specific exception made for Pershing.

That is a delicate problem, also. If you assign a specific limit, sometimes you find things just don't work out that way. That is not a space problem, however.

Mr. MILLER. This is not a space problem. Inasmuch as the research and development is a space problem and is within this committee, or parts of its jurisdiction at least, and we are concerned with it—of course, we had a lecture the other day about the functions of artillery and that artillery had always been the function of the Army and we had no desire to take it away.

Well, in World War I, I happened to have been an artillery man and I am sure that the artillery we used then wouldn't be accepted today. This new concept of artillery is missilery, isn't it? It is missiles and rockets? Isn't that the artillery we are developing for tomorrow?

Secretary STAHR. I think I can see the concept that you are trying to outline, sir.

Mr. MILLER. That is right, and I asked the Chief of Staff of the Air Force the other day if a rocket was coming over, perhaps headed for Chicago, and it started to pass over coming from the west, started to pass over Seattle and the captain of the battery who, when the thing came in, had tuned in on it with a Nike-Zeus, whether he could say "Fire," or would he have to call NORAD because he was only to do

point to point targeting; whether he would have to call NORAD to get permission to fire on this missile or would he have to send back—he only has seconds to go. Is this for the interceptor Air Force command or is this for the Army?

I would like to see the missile knocked out of the sky, no matter who does it.

Secretary STAHR. It is my understanding NORAD is a unified command.

Mr. MILLER. Sure. I know that. It is a unified command. I also know that Nike-Zeus, some of us who have followed it have great hopes for it and we hope the Nike-Zeus can do a very good job. I think it is the only thing and I am very happy to have had the Chief of Staff of the Air Force agree that this was the only defensive weapon that we are developing, the only defensive system. I asked him and I will ask you now, isn't the country which comes first with the defensive system the one which is going to be able to talk turkey with respect to disarmament?

Secretary STAHR. Well, I would think quite obviously it would have a great advantage, Mr. Miller.

Mr. MILLER. If you have the defensive system, we can sit back and do pretty well and I am certain the Russians realize this.

Secretary STAHR. The Army is doing its best to develop such a system.

Mr. MILLER. The Army is to be commended, Mr. Secretary, and you can feel very proud of the people in the Army who have developed this system and I, for one, want to see nothing done that is going to take the glory away from them, or that is going to destroy the morale of this fine people.

That is all I have to say.

Mr. CHENOWETH. Mr. Chairman.

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. Mr. Secretary, I certainly want to join in the welcome of your first formal appearance before this committee. We hope you will come frequently. Not that we want to impose on your time, but I know your appearance will always be most helpful to this committee.

Secretary STAHR. Thank you, sir.

Mr. CHENOWETH. I want to congratulate you on a splendid, clear-cut and concise statement. I get it that there is no disagreement at all as far as the Army is concerned on this new directive, as far as the space research program is concerned.

Was the Army consulted before the directive was issued?

Secretary STAHR. Yes, sir.

Mr. CHENOWETH. Was there any opposition or resistance on the part of the Army toward the directive?

Secretary STAHR. I think I could fairly say that there was, Mr. Chenoweth.

The CHAIRMAN. Would the gentleman yield?

You wouldn't imply that the Army voluntarily gave up all of this, would you?

Mr. MILLER. You wouldn't imply the Army took it lying down?

Secretary STAHR. I don't believe I implied either of those things.

Mr. CHENOWETH. But you feel now, do you, Mr. Secretary, that the directive was in the best interests of our space missile program?

Secretary STAHR. I think it will work. This is not a simple problem, as I said. It may even work better than what we have had.

The perfect solution in my judgment will evolve some time in the future.

Mr. CHENOWETH. I get the impression that had it been left to your judgment you would not have issued such a directive?

Secretary STAHR. I wouldn't have worded it precisely the way it was worded; no, sir.

Mr. CHENOWETH. One other question: You mentioned in your statement the Army's mission and you comment on it that in its broadest sense it is preparedness for land warfare.

Now, do I sense in that perhaps an innuendo that you feel that space-missile functions more properly belong to some other agency or are you in any way relinquishing the Army's interest in this program?

Secretary STAHR. No, sir; we are not relinquishing it. My point is that the Army does not have in my opinion primary interest in space as such, but the Army does have and will have increasingly genuine interest in the use of space as one more resource in carrying out what is our primary responsibility.

Mr. CHENOWETH. You don't intend in the least then to give up on any of the programs which you now have under way?

Secretary STAHR. No, sir.

Mr. CHENOWETH. And you may even take on additional programs as time goes on, additional research programs?

Secretary STAHR. This is not ruled out by the directive, and certainly, I would anticipate that we will continue to develop ideas. What they will be, I certainly don't know, and I doubt that anyone does at this time.

Mr. CHENOWETH. I think that is true.

I was reading something about plans for the Army—I know you don't want to take the time to go into them this morning—about an enlarged Army, or plans for greater preparedness for this land warfare.

Would you want to comment on that just briefly, Mr. Secretary? Are there plans now to increase the size of the Army?

Just give us a rough outline of what you have in mind.

Secretary STAHR. With your permission, sir, I would prefer not to discuss that at the moment in any detail for the simple reason that this matter is a part of the overall re-evaluation of our defense posture which is currently under consideration by the President, and I would prefer not to try to anticipate his decision.

Mr. CHENOWETH. That is perfectly all right and I am happy to have this reply, but I understand this is now under consideration. A review and perhaps reappraisal of our whole defense posture is now under consideration.

Secretary STAHR. Yes, sir, and I am quite sure it will continue for a long time.

Mr. CHENOWETH. When do you expect some decisions, perhaps, so far as the Army is concerned? Say as to the size of the Army, for instance. Is that a long way off, or is that something more imminent?

Secretary STAHR. Well, I suspect the question will come up every year for many years to come. As far as the immediate future is con-

cerned, it is the President's decision as to when he wants to make his decision. He has not made it yet so far as I know.

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

Mr. TEAGUE. Mr. Secretary, you are playing on a team, and you have to be a team player or you should get off the team. But we are all in a much larger team and I don't think "agreeable disagreement" hurts the team, but Mr. Gilpatric gave us one reason for this directive and that was, to use his words, "for stronger central direction and control."

Then later in his statement he said they gave consideration to the claim that "this directive would bring about an overall loss of effectiveness in the other Services and result in an impairment of their capabilities."

Now, I would like to know for the record of some of the advantages of this directive and some of the things that the Army considers to be a disadvantage of this directive.

Secretary STAHR. Well, I think the advantage has been stated by Secretary Gilpatric. I could not add anything to it. I could not think of any others.

Mr. TEAGUE. Stronger directional control is the whole thing we are getting from this.

Now, Mr. Gilpatric also stated that he——

Secretary STAHR. I thought he had one or two other points in there, Mr. Teague.

Mr. TEAGUE. If so, I haven't found them. I read it a number of times.

Also there was the question of an eventual one Service, doing away with an Army, Navy, and Air Force, whether that was a point of discussion and he said no. Was that a point of consideration as far as the Army was concerned?

Secretary STAHR. Not to my knowledge. Certainly not with me or during any of the discussions in which I participated.

Mr. TEAGUE. Was it the Army's position this would bring about an overall loss of the effectiveness of the Service?

Secretary STAHR. Potentially.

Mr. TEAGUE. In other words, it is a "roles and missions" type decision being made under the guise of research and development?

Secretary STAHR. I don't know whether I would characterize it that way or not. The point is that this directive provides that the Army's requirements for the performance of its own roles and missions must be met, even though the Army is not exclusively vested with the management of all of the programs which would contribute to meeting them.

Now, you can just splinter things to the point where you really do have critical overlapping and duplication and wasted funds and effort. The precise point at which you get the best balance is one that people have been arguing about for years, and, in my opinion, will continue to argue about a long time.

But, certainly, I don't think we should say that any time the Army or some other Service is not given everything, is not allowed to have everything under its management which is important to it, and to the other Services, we have made a mistake. I don't think we can say that.

Mr. TEAGUE. Well then specifically what were the agreeable disagreements of the Army to this directive?

Secretary STAHR. We haven't disagreed with the directive. In the course of discussing what might be in the directive before it was issued, in general, they are the points that I made in this statement.

One is that we don't think space is a function, or that it is a separable thing and we hoped they wouldn't overlook that. We conceive of space just like we conceive of the air and the ground, as one more medium for helping do a job for people on Earth, and specifically for the Army, in our case.

We also made the point that we have an interest and a very high competence in the field of communications and we wanted this protected and, as I read the directive, and indeed as Secretary Gilpatric testified, that interest is protected under the directive.

We also made the point that we feel, as I said here in my statement, that space research is an area where you need lots of ideas. This is a field that is just opening up, and it would be a great pity indeed if we said that only certain people are going to be allowed to think about it.

The directive meets that point by permitting each of the Services to develop ideas. This is where the real creativity goes on and I am sure that that is the reason why the directive specifically says that "preliminary research" is not going to be centralized. We also made the point about the possible effect on our scientific personnel.

Mr. TEAGUE. Did Army suggest a defense space agency instead of turning it over to Air Force?

Secretary STAHR. No.

Mr. TEAGUE. That is all, Mr. Chairman.

The CHAIRMAN. Questions?

Mrs. WEIS. Mr. Chairman.

The CHAIRMAN. Mrs. Weis.

Mrs. WEIS. Mr. Secretary, in the directive and in subsequent testimony the unusual circumstances seemed to come up as the reason why one of the Services should get the future development of an idea rather than the Air Force. Could you give me a precise, or "imprecise" definition of what "unusual circumstance" might be?

Secretary STAHR. I don't know whether I could or not. It is not within my prerogative to interpret this directive but I am going to take a crack at it anyway.

Zeus has already been mentioned. Zeus has at least the potential capability of being developed into an anti-satellite weapon. I would say that if it does so develop, that this would clearly be a circumstance in which the responsibility for that development should remain with the Army, which has developed Zeus to the extent it has already been developed. The mere fact that it was shooting down something out in space should not be considered a reason to change the developing agency. There isn't any place that I can identify where you can draw a line and say, "Here is not space and there is space."

This would be a logical "unusual circumstance" to justify assigning that responsibility to the Army in my judgment.

The CHAIRMAN. Will the lady yield there?

Is there any difference, Mr. Secretary, in having a weapon that will shoot down an airplane, shoot down an ICBM, or shoot down a satellite?

Secretary STAHR. I don't know. I am not a terribly theoretical fellow, Mr. Chairman.

The CHAIRMAN. This is terribly practical rather than theoretical.

Secretary STAHR. As a practical matter there are quite different problems involved in shooting down airplanes and in shooting down satellites.

On the other hand, there is enough in common that the Army has developed the potential capability to do both as a logical follow-on to the proven capability of Ajax and Hercules to shoot down airplanes.

As you know, Ajax, Hercules, and Zeus are generations of the same family—and, as I say, Zeus may go on to develop this additional capability——

The CHAIRMAN. Well, it is all defense against an incoming object which it is intended to destroy.

Secretary STAHR. That is true. It is defense from the ground.

Now, the Air Force defends from the air and the Navy from the sea against these same kinds of things, or it might do so.

The CHAIRMAN. Thank you very much.

Mr. KARTH. Mr. Secretary, I suppose you know many of us are pleased with the glorious history of the Army, including the many firsts in and out of space, and we are very proud of this branch of the Service.

As I looked over your biographical sketch, I was quite pleased to see that you have had a great deal of experience with the Service itself, and as a result of that you are perfectly aware of the fact that no one can do battle without the necessary tools of warfare, notwithstanding a committee of Congress.

I have been interested in some of the questions that have been asked, those of my colleague, Mr. Teague, and I am not sure that I am satisfied that I understand as well as I should understand those programs the Army now has in mind as it relates to the whole space effort of the defense of our Nation, whether or not I am satisfied in my own mind that you have given us, or the committee, for their consideration those programs that the Army may have in mind at this time that might be impeded as a result of this directive.

Could you for the record give us any of these programs that you feel might be curtailed or suffer curtailment as a result of the directive?

Secretary STAHR. I don't think there are any present programs that will necessarily be impeded by this directive.

Mr. KARTH. I refer to programs you have in mind that might not necessarily be present programs.

Secretary STAHR. I don't know of any. We have a couple of experts here. Would you care to have their response to this?

General TRUDEAU. I would be very happy at the proper time to incorporate in the record what capabilities and resources we have in connection with space programs. This will indicate whether or not they are——

Mr. KARTH. And also how you interpret the effect of this directive on those research and development programs that you have.

General TRUDEAU. If you desire, I will put it in at that time.

The CHAIRMAN. Will the gentleman retain his questions until we get to General Trudeau?

Are there any further questions?

Mr. Roudebush.

Mr. ROUDEBUSH. Mr. Secretary, I, too, have read your illustrious biography and I want to compliment you on many things, including being a Sigma Chi, so that I can refer to you as "brother."

I would like to ask you this question: Referring again to this much discussed directive, are there any programs under development at the present time that might possibly be abandoned—this has something to do with Mr. Karth's question too—abandoned or curtailed by this directive?

Secretary STAHR. None that I know at all.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. Mr. Secretary, I suppose it would be fair to summarize that you are really not jumping up and down and cheering about this directive.

Secretary STAHR. I suppose that is a reasonable interpretation of my——

Mr. HECHLER. I think you have been very realistic here in indicating that there are going to be problems, and I think you will agree that the best way to anticipate these problems is perhaps to look at the darkest side so that the problems don't become serious when they eventually come up.

Now, what safeguards do you feel should be utilized in practice in order to make sure that the Army's mission is not impaired by this directive? Looking toward the future now. I don't care about what happened in the framing of the directive or what objections the Army made, but now we have to face the future.

What do you think must be done in order to protect the Army's mission?

Secretary STAHR. Number one, I think the Army must continue to develop ideas for the use of space in furtherance of the Army's mission.

Number two, to be perfectly practical about it, I think the important thing will be—there will be two important things. One is to insist at all times that the Army's requirements are built into projects which are designed to support the Army. In other words, that the Army write its own requirements, and number two, that the Army make every effort to insure that the Office of the Secretary of Defense has a clear understanding of the Army's needs and is willing to exercise its authority to see that those needs are met.

Mr. HECHLER. I realize, of course, you can't go beyond your role as Secretary of the Army, but I think that President Kennedy, in his press conference, used a wonderful phrase, "speaking as a private citizen" when he was referring to the Rules Committee fight.

Just speaking as a private citizen now, and looking at the total picture, beyond your role as Secretary of the Army, what do you think must be done beyond what the Army does in order to make sure that the Army's mission is not impaired?

Secretary STAHR. I would give the same answer. I think the important thing is the development of a genuine sense of teamwork in the Department of Defense so that each of the principal members of that team feels a responsibility, not only to improve the play at his own position on the team, but to improve the total effectiveness of the team which means working with the other members.

Mr. HECHLER. Mr. Secretary, you spoke, and quite properly, of protecting the competence in the communications field that the Army possessed. I wonder if you could tell us a little more specifically what is being done to coordinate your project Advent with the NASA project Relay?

Secretary STAHR. I do not know enough about that to give you a reply that would be worth the time of the committee to hear, Mr. Hechler. There is a Coordinating Board of some kind, the details of which I am not thoroughly familiar with.

Mr. HECHLER. Thank you, Mr. Secretary.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Mr. Secretary, what part, if any, did the possibility of use of space for military purposes by an aggressor nation have to play in bringing about this directive?

Secretary STAHR. I couldn't say.

Mr. DADDARIO. Well, then, getting back to what Mr. Teague has asked you, are you satisfied, looking at this directive, now, from the point of view of it having been issued, and the arguments which you posed before it was brought about to defend the Army position, are you satisfied that there are more pluses than there are minuses from the standpoint of the Department of Defense having the capability now to meet its mission, insofar as the national security of this country is concerned?

Secretary STAHR. I can say that I certainly hope so. That as far as the Army is concerned, we intend to see that that is so.

I believe that the real answer to that question could not be given for, let's say, another two or three years, and will depend upon how this directive is carried out.

This directive can be made to work badly; it can be made to work well. I don't feel competent to speculate beyond saying that we intend to see it works well.

Mr. DADDARIO. Although I am in favor of the general idea of this directive, I think it would be better to bring together the skills and talents which this country has, but I am concerned about your testimony and the testimony of others, that something was given up, that there is as a result of this directive, a weakness in the Army, or in the Navy and I cannot understand at the moment, and there has not been any testimony given, that the strength that we gain more than compensates for the things that we have given up.

Secretary STAHR. Well, I thought Mr. Gilpatric's testimony, which was on that point of what are the justifications for this, covered it better than I could, anyway.

Mr. DADDARIO. Well, I think, Mr. Secretary, that Mr. Gilpatric's statement was in a general sense strongly in support of his position and I think it did a proper job, but I do think as the testimony unfolds itself from there, the specifics must be answered.

The specifics in this case have not been. I am concerned now about these weaknesses. I think we should learn what are the weaknesses, what have we given up, and what have we gained.

I think it ought to be spelled out if it can be. If it cannot be, then this concern will linger in my mind and I wonder if we can wait for the two or three years for it to be proven that this directive is a correct one.

Secretary STAHR. I can summarize my own views. Obviously, I can't give anybody else's.

Mr. DADDARIO. This is what I would like to have.

Secretary STAHR. On the plus side, there is the elimination of duplication, the efficient use of funds which despite the fact that the Defense Department seems to have a big budget, are still always strained, and I think we have an obligation to use them as efficiently as possible.

Up to this point, the Army has not had withdrawn from it any of its principal interests in space. What kind of interests might develop in the future which the Army would like to see all the way through, but which under this directive it would have to share development of with the Air Force, I am just unable to visualize.

But I am quite confident, just as a matter of experience with the way in which scientific breakthroughs are occurring, that there will be new things develop. I have no reason up to this point to believe that if there is a new development which logically should be carried all the way through by the Army, it won't be.

On the other hand, there is such a thing as trying to bring a little order out of what to some people seems to be a little chaos.

I think that is the basic purpose of the directive. If the Army and the Navy were cut off from the possibility of having anything whatever to do with even thinking about space, much less using it, then I think it would be a very bad directive, but the directive just does not do that.

Mr. DADDARIO. With these positive gains which you have spelled out, I can completely agree. The point that still bothers me is what is the negative side of it, what has the Army given up?

Secretary STAHR. Well, it has given up the possibility that something may develop—that it may come up with an idea which it would like to take all the way through to development, but which it may not be able to.

It has not given up any of the programs which it already has assigned to it.

Mr. DADDARIO. Then your statement, Mr. Secretary, is that there is nothing which has been given up, insofar as programs presently on the book are concerned, but that the weaknesses which might arise are those from this point on, that if the Army has a program which it wishes to sell from this point on down through the years ahead, that it may not be able to and a decision to have this developed by the Air Force may at some time then weaken the Army.

Secretary STAHR. I suppose that is a theoretical possibility. It just doesn't strike me as a very real one.

Mr. DADDARIO. I asked the question because of that. I can't conceive that the argument which the Army posed could have been based on future prospects and the thing that I still would like to know is, what are we giving up which presently exists? What programs are there now on the board which you feel will be curtailed as a result of this directive?

Secretary STAHR. Even if there were some, I think our desire to point out the Army's interests at the time this directive was under consideration were based upon a philosophy that the fellow who is the most interested probably ought to do the work.

The trouble is there are a lot of people interested in space and if everybody is doing it, it may not be done as well or efficiently as it should be when you look at the broader needs of something as complicated as the Defense Department.

I think it would be unfortunate if we were in a position where we could not state our legitimate concerns, because we were afraid that somebody was going to question them later and make us appear not to be cooperating in the greater concern.

Mr. DADDARIO. Then the conclusion we can come to, Mr. Secretary, is that in the long run, we will have, as a result of this directive, a more efficient operation, and you are convinced of that?

Secretary STAHR. Well, that is its purpose and as I say, I believe it will work.

Mr. KARTH. Would the gentleman yield for a moment?

Mr. DADDARIO. Yes.

Mr. KARTH. Mr. Secretary, if I may just roll back the clock for a few years, I wonder if you could tell me in your own opinion whether or not this directive, had it existed at the time Nike-Zeus was first conceived in the minds of the Army, whether or not under this directive, the Army would have been allowed and would have proceeded with Nike-Zeus to the point that they have now proceeded?

Secretary STAHR. I don't believe this directive would necessarily have changed that. Under this directive—suppose this directive had been in effect as you say at the time Zeus began. I would have interpreted this as a further development of the Nike family, Nike-Ajax, Nike-Hercules, and this directive would not prevent that as I interpret the directive.

The CHAIRMAN. Will the gentleman yield?

Mr. DADDARIO. Yes.

The CHAIRMAN. This directive more or less boxes in the projects which the Army presently has, doesn't it, for the future?

Secretary STAHR. It gives them the opportunity to continue to develop ideas. It relieves them of the responsibility of carrying those all the way out except they will continue to be deeply involved in the—as I interpret it, they will continue to be deeply involved in the drawing up of requirements.

The CHAIRMAN. Now, you are an Army man and I am an old Army man, too. Do you think it is the best thing for the development of military space to be put in that position—to have the Army scientists put in that position?

Secretary STAHR. There are many considerations involved in military space inquiry, not just the Army's.

I think all of the Services have legitimate interests in space and I see no reason why those interests cannot be combined and coordinated and worked out so that everybody will get what he needs from space.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. I yield to Mr. Riehlman.

The CHAIRMAN. I thought you were through, Mr. Daddario.

The Chair recognizes Mr. Daddario.

Mr. DADDARIO. I am happy to yield to Mr. Riehlman.

The CHAIRMAN. Let me say this: The Chair is trying to recognize everyone in proper manner. If the gentlemen want to be recognized

and then yield to somebody else, the Chair is going to consider that full recognition.

Mr. TEAGUE. Mr. Chairman, Mr. Daddario yielded to you.

The CHAIRMAN. I recognized Mr. Fulton here a couple of times. It is that which I refer to. Mr. Daddario.

Mr. DADDARIO. Mr. Chairman, I yield to Mr. Riehlman.

Mr. RIEHLMAN. Thank you, Mr. Daddario.

I followed your statement, Mr. Secretary, I think, very carefully and I think you have made statements clearly based on your own knowledge of the directive and how you feel it is going to work.

Our committee, I am sure, has an interest to know whether or not anywhere in this directive it is going to affect the relationship between NASA and the Army, because certainly you have some working programs and will have a continuing working arrangement between NASA and its programs.

Now is there anything in this directive which you realize will affect your relationships so that you will have to go through the Secretary of Defense to get permission to carry on programs with NASA, or vice versa, that NASA would have to go through the Department of Defense to work with the Army on projects?

Secretary STAHR. I don't believe there is any problem there, at all. Could I ask Secretary Morse who is on that coordinating board, to——

Mr. RIEHLMAN. I can't conceive anything being in the directive that would affect it.

Secretary STAHR. Neither can I.

Mr. RIEHLMAN. But our committee certainly has some interest in this directive, but our prime interest, I expect, would be whether or not NASA is going to be affected anywhere along the line in respect to its activities in space and whether or not there is any apprehension that we are eventually going to lose our jurisdiction in this field, or NASA is going to lose it.

Secretary STAHR. I see nothing in this directive which will bear upon that point, Mr. Riehlman.

General TRUDEAU. NASA uses us very little since they were able to secure ABMA, and 2,000 of our people, you know.

Mr. RIEHLMAN. I suspect that is true. You might apprehend that it is possible that NASA might lose some of its program, too.

The CHAIRMAN. Any further questions?

Mr. Daddario——

Mr. DADDARIO. I yield, Mr. Chairman.

The CHAIRMAN. Does anyone wish the Chair to recognize them?

Mr. FULTON. I have a question.

The CHAIRMAN. I recognize Mr. Fulton.

Mr. FULTON. I yield to Mr. Hechler without withholding any time whatever.

Mr. HECHLER. I want to be sure everybody has an opportunity, but I have another question.

The CHAIRMAN. The Chair recognizes Mr. Fulton. If you want to ask any questions, proceed to do it.

Mr. FULTON. I said I would wait for everybody else.

Mr. HECHLER. Mr. Secretary—

Mr. FULTON. Don't force me to ask questions.

Mr. HECHLER. Mr. Chairman.

The CHAIRMAN. The Chair recognizes Mr. Hechler.

Mr. HECHLER. Mr. Secretary, following up my question about protecting the competence in communications of the Army, I just wanted to make absolutely sure as a result of this directive that sufficient safeguards are written in, in practice, and are utilized in practice, so that the Air Force does not impinge on the role of the Army in communications.

I wonder if you would care to comment on how that can be insured.

Secretary STAHR. It can best be assured by clear-cut separate directive, I would think. However, it is important to remember that, as Mr. Gilpatric testified, I believe, existing programs are really not involved in this directive, so that the problem you are bringing up is one which we would either have or not have, whether or not this directive had been written.

Mr. HECHLER. I just wanted to raise a little red flag.

Secretary STAHR. I appreciate that and I have one flying, myself.

The CHAIRMAN. Mr. Teague—

Mr. TEAGUE. Mr. Secretary, the thing that scares me about this whole situation is that there is an implication of haste, an implication of not telling the whole story.

It seems to me this question is important enough—and as I say, I can't say whether I am for it or against it for three years and we can't wait that long.

It seems to me this is important enough that the Chiefs of Staff would have considered it from A to Z, and it would have gone to the President, himself.

Do you know whether or not the President considered this question or not?

Secretary STAHR. I do not know.

The CHAIRMAN. Mr. Miller—Mr. Morris.

Mr. MORRIS. Mr. Secretary, I don't know either whether this is a good directive or will not be good for the country. Apparently the word of the official statements before this committee will be that it is going to be good for the country.

The thing that disturbs me about the directive is that the previous position of the Army, that they should have a role in space, and the fact that they surrendered without firing a shot somewhere concerns me about the directive.

Secretary STAHR. Shots were fired. They are not reflected in the directive, sir.

Mr. MORRIS. You mean before the directive.

Secretary STAHR. I beg your pardon?

Mr. MORRIS. You mean before the directive.

Secretary STAHR. No; I mean that the directive, itself, does not indicate what shots were fired during its consideration.

Mr. MORRIS. I see, but as far as you and the Army are concerned now, the thing is finished and this is going to be good for the country and we are going to make it good for the country.

Secretary STAHR. Well, I will certainly take the last part of that. We intend to make it good for the country; we intend to do our very best to make it work effectively.

The CHAIRMAN. Any further questions?

Mr. MORRIS. Just a minute, Mr. Chairman, I would like to ask another question: As I also understand it now, you have taken a firm

position with regard to the Nike-Zeus. That this is an Army project. If it is made into an operational antimissile system, that the Army should have the operation and control of this project.

Secretary STAHR. I hadn't heard that anybody had even questioned it, but if they did, there would be some shots fired, yes, sir.

Mr. MORRIS. The reason why I wanted to get you to answer that question, Mr. Secretary, is that we had Dr. Charyk before this committee just a few days ago, and in answer to a question, to show you how hard it is, and how fluid positions are in this business, the chairman asked Dr. Charyk this question—

Has the Air Force changed its position since last year with respect to the assignment of a mission in space?

Your position is substantially the same.

The question to Dr. Charyk. The answer—

"I don't think our position has changed."

Now, it seems to me that this directive was in the mill at that time and surely Dr. Charyk had been informed of this directive.

Secretary STAHR. I just don't quite get all the implications of this question, Mr. Morris. What was the Air Force position a year earlier that is refrred to?

Mr. MORRIS. That they should have the same mission in space that they had at the present time. That was just prior to the issuance of their directive.

Secretary STAHR. I thought you were saying something about Zeus.

Mr. MORRIS. The answer to the question of the chairman prompted me to ask you the question about Zeus because I wanted to make sure we understood that your position and the Army's official position is the same as last year and will be the same in the future with regard to the Zeus.

Secretary STAHR. Well, it will be the same for the future as long as I am involved in that future, yes, sir.

Mr. MORRIS. That is fine.

The CHAIRMAN. Any further questions from anybody on the committee?

Mr. FULTON. I do.

The CHAIRMAN. Mr. Fulton has a question. Now don't yield to anybody.

Mr. FULTON. It is a very pleasant change for me.

With regard to applying the directive, you would say it would not apply, then, to the Advent program, either at the present time you have it on R. & D., or the test, or the engineering. The directive will not apply to your Advent program?

Secretary STAHR. I believe the directive specifically excludes it.

Mr. FULTON. So I am taking it a little further, into testing and engineering as well. You would say your program is safe that far?

Secretary STAHR. The distinction you made is one with which I wasn't too familiar because we don't separate research, development, testing, and engineering.

Mr. FULTON. Where is your forward limit under the directive?

Secretary STAHR. The directive only has to do with research and development.

Mr. FULTON. Then I am asking, can the Army still go ahead and do the testing on the Advent program and do the engineering work,

such as for components and things of that type that you have to have to make it workable?

Secretary STAHR. I don't think there is anything in the directive which would affect that either way.

Mr. FULTON. Now, for the next point is this: Let's try to apply the directive to a current situation coming up. And you are in a good spot to apply it because the Army has been eliminated from this particular part. There is Lt. Col. John Glenn, a Marine, who is an astronaut, and Commander Alan Shepard, is one of the astronauts, (the son of a retired Army officer), and then there is Virgil Grissom, Captain Grissom of the Air Force.

If we apply this directive to a program to come in the future, which is certainly as "research and development" as you can get it—nobody has done it at all—we would have to say, applying that to the present directive, it wil be Air Force, except for unusual circumstances. So if you apply the directive to the present man-in-space Mercury program, the first man-in-space will be Captain Virgil I. Grissom of the U.S. Air Force "except for unusual circumstances" and then it will be either Lt. Col. John H. Glenn, Jr., or Cmdr. Alan B. Shepard, Jr.

Secretary STAHR. I understood that was a NASA program.

Mr. FULTON. Yes, but you see we have the Services mixed into it. So we are then trying to say in the Services, as an example, what will happen. The question will come among the Services, which will be first, in the vehicle that NASA puts up.

Secretary STAHR. I think maybe there is a little confusion here somewhere, and it is probably with me.

These astronauts, because of the nature of their future mission and activity, had to have jet training and the Army just doesn't have any jet aircraft. We just don't have people who have that jet training and I believe these people were selected from among people who do, or who have had.

Mr. FULTON. I said that the Army was already eliminated from it and the requirements of jet training—which I did not agree with at the time—it was worked out so the Navy got three, the Air Force got three, and the Marine Corps one. The mathematical probability of the millions of men, the hundreds of thousands of men in each of the Services coming out exactly right 3–3–1, is beyond my comprehension, as a former mathematics student. But they were very able to come up with the qualifications to work it out so it came exactly, Air Force, even, Navy, even, and the Marine Corps represented.

But the question now comes where you get a tremendous competition among the Services and I ask this of you, because you are in a position of having no personal interest in it, in the Army. You are in a beautiful position. Here is the competition with the Marines, the Navy, and the Air Force to be first in space. And I said to you then from your position of no personal interest, if we apply this directive to a research and development situation like that, with rivalry between the Services, when I apply the directive, it is this way: It will be Captain Virgil I. Grissom, of the U.S. Air Force, the first man in space, "except for unusual circumstances," and then if there are unusual circumstances, it will be a rivalry between Lt. Col. John H. Glenn, Jr., the U.S. Marine Corps, and Comdr. Alan B. Shepard, Jr., of the U.S. Navy.

Now, I am just applying the directive, you see, and you have no personal interest in it. It just shows what you come to, so my question is really over your head, or as a Navy man, I should say "across your beam."

In the Air Force, where would it be—"in the wild blue yonder?"

Who is going to be the first man in space in view of this directive?

Obviously, there is rivalry among the Services to be the first in space. Who is it?

I would like the Air Force to answer that later, Mr. Chairman.

Another point I would like to make: The Army is trained for certain purposes. The Moon is in space, obviously. You might have the Navy take you out to a launch platform at sea, you might have the Air Force get you up so high, or launch you. But when you get to the Moon, the people who might walk around on the Moon and who might be in tanks on the Moon when some adverse enemy power might have gotten there first, are going to be who?

Are they going to be Air Force people who then don the Army uniform and become tank experts and artillery experts? Is it going to be a Marine landing under Navy auspices?

Is Rickover going to circle the Moon with a submarine? You see, it isn't quite as logically simple as saying that the so-called Air Force will then be in a place where there is no air. Because maybe the functions of the Army are much beyond a limit in place or time.

So that I am trying to point out on this directive through this questioning that it needs a little bit more thought, and maybe upon its applications it should be given further consideration.

Now may I finish on this: Research and development should be in every one of the three forces, should it not, under the Department of Defense?

Secretary STAHR. I think it should.

Mr. FULTON. I think that means both basic research and research of a practical nature so you can come up later with weaponry systems. That you need practical research as well in each of the three forces, don't you?

Secretary STAHR. That is correct.

Mr. FULTON. And then that there should be very wide leeway given because the research and development may apply to the Army, the Navy and the Air Force as well, or the Marine Corps, the Coast Guard, or the Merchant Marine.

Shouldn't you give wide leeway, then, in the various Services—and I hope you say yes.

Secretary STAHR. Well, the word "wide" is wide enough so that I think I can say yes.

Mr. FULTON. Now, I have been hearing General Trudeau here, and I respect his judgment very highly. Likewise, Mr. Morse, I have seen sitting in other hearings than just this one, listening.

Could I, with the Chairman's permission, ask General Trudeau and Mr. Morse to say——

The CHAIRMAN. If the gentleman will, just as soon as the Secretary finishes, I think we can call the other witnesses who have not said anything yet.

Mr. FULTON. Are they going to testify?

The CHAIRMAN. Yes, today. That is what we are waiting for.

Mr. FULTON. I thought there was just the main event here.

The CHAIRMAN. We have Mr. Richard S. Morse, Assistant Secretary, and General Trudeau, if you are finished.

One more question I would like to ask you, Mr. Secretary, and then we will let you go. Did you have any recommendations submitted to you by your Chief of Staff?

Secretary STAHR. Very definitely, yes, sir.

The CHAIRMAN. Were they favorable to this order, or unfavorable?

Secretary STAHR. I have heard nothing from him since the order was issued.

The CHAIRMAN. Do you know whether there was a meeting of the Chiefs of Staff with reference to this directive?

Secretary STAHR. That I do not know.

The CHAIRMAN. We certainly thank you, Mr. Secretary. We have kept you a long time.

Mr. MILLER. I think in extension of what Mr. Fulton was talking about, these astronauts, and 3, 3 and 1, he is really concerned that they didn't include Members of Congress who wanted to go up.

Mr. FULTON. I have long since volunteered three years ago, and meant it.

Mr. DADDARIO. I was just going to say since the gentleman from Pennsylvania has volunteered, I think we ought to find out where he stands on the list.

The CHAIRMAN. I don't know whether he would fall under this directive or not, but at any rate, Mr. Secretary, we are most grateful to you for being present here this morning. You have helped us a great deal.

We will release you now.

Secretary STAHR. Thank you, Mr. Chairman.

The CHAIRMAN. Next, we will call Secretary Morse. Could we hear Secretary Morse and General Trudeau, together, in the interests of finishing there? I think these are valuable witnesses and some of them have strong ideas, and I personally would like to ask questions and I know everybody else would.

Do you have a statement?

Secretary MORSE. No, sir, I don't think I was officially asked to appear until Friday.

The CHAIRMAN. Do you, General Trudeau, have a prepared statement?

General TRUDEAU. I have a brief statement in which I would like to answer the question on the capabilities and resources the Army has as of now in space programs.

The CHAIRMAN. You may make your statement.

(The biographical sketch of General Trudeau is as follows:)

Arthur Gilbert Trudeau is a native of Middlebury, Vt. He was graduated from U.S. Military Academy in 1924 and commissioned a second lieutenant, Corps of Engineers. Prior to World War II he served with various Engineer units of the Regular Army, National Guard, and Organized Reserves, and on river and harbor duty.

In 1942 General Trudeau became the Chief of Staff of the Engineer Amphibian Command. After brief service in the Southwest Pacific in 1942, planning amphibious operations, he returned to the United States to organize and command the 4th Engineer Amphibian Brigade, then served as Deputy and later Director of Military Training, Army Service Forces. He was promoted to the grade of brigadier general in 1944.

After V–E Day General Trudeau returned to the Pacific, as G–3, AFWESPAC, and later commanded Base X, Manila, for the support of planned assaults on Japan.

In 1946 he returned to Washington as Chief, Manpower Control Group, General Staff. In 1950, after commanding the 1st Constabulary Brigade in Germany for 2 years, he served as the first Deputy Commandant of the reactivated Army War College.

During the Korean war, General Trudeau served in Japan as commanding general, 1st Cavalry Division, and in Korea as commanding general, 7th Infantry Division. After the armistice he was returned to Washington as Assistant Chief of Staff for Intelligence. In 1955 he returned to the Far East as Deputy Chief of Staff, Far East, and United Nations Command. One year later he was promoted to lieutenant general and assigned command of the I Corps (Group) in Korea. On April 1, 1958, he assumed his present post of Chief of Research and Development, Department of the Army.

In addition to a B.S. degree from the U.S. Military Academy, General Trudeau holds an M.S. degree in civil engineering from the University of California and honorary degrees of LL.D. from Seattle University, Middlebury College, and the University of Michigan and Eng. D. from Manhattan College.

Among his U.S. decorations are the Distinguished Service Medal (with Oak Leaf Cluster), the Silver Star (with Oak Leaf Cluster), the Legion of Merit, the Bronze Star, and the Air Medal. Additionally, he has been awarded foreign decorations by Belgium, Ethiopia, Colombia, Korea, Japan, and the United Nations.

## STATEMENT OF LT. GEN. ARTHUR G. TRUDEAU, USA, CHIEF OF RESEARCH AND DEVELOPMENT, DEPARTMENT OF THE ARMY

General TRUDEAU. I would like to open by stating that it is always unfortunate when the press reports the comments we make down here as "opposing directives."

I have been in uniform for 41 years and I don't oppose directives or orders, even though I might have done them differently, so I would like to say first, that the Army intends to support as loyalty and fully as we can, the decision of the Secretary of Defense.

The CHAIRMAN. May I interrupt you to say this: This committee has confidence in you and your integrity. We think you are a very able soldier and a very great American, too.

General TRUDEAU. Thank you, sir.

The Army considers space environment, as the Secretary has said, to enable it to do better the thing the Army must do on the ground. Therefore, it is vitally essential the Army be encouraged in primary research because of the differing requirements to conduct operations by the three Services.

In the case of geodesy and mapping and communications, the Army will continue with its present program. These are satisfactory to the Army, and it is our understanding that the Advent communication system has been assured to the Army, and we feel the same assurance should be forthcoming with respect to geodesy and mapping.

The Army Corps of Engineers, since the days of Lewis and Clark has done the mapping for this country. To respond a little more broadly to some of the questions that have been previously asked, the geodetic, cartographic and hydrographic data that is made available through the Army Corps of Engineers, through the Navy, through the Coast and Geodetic Survey, is all made available for commercial use in this country, and most of the maps you see produced by Hammond and other people who produce maps, are all based on data that is provided by the Government. None of them would have the resources to go out and do their own.

Mr. MILLER. This is something that isn't generally known.

The CHAIRMAN. It is something that has been concerning me as to how the civilians are going to profit by this work.

General TRUDEAU. This work is all given to them.

For the future the Army should be given the authority for the development programs and projects related to its mission including air defense. And here I include the follow-on Zeus that would produce an anti-satellite weapon, unless something better comes up.

It is no more logical to give the Air Force the development of the entire space program than to give the Army the single responsibility for all programs on the land.

In my opinion, the Army should be given the operational satellite communications system—I should change that to say "should keep it," and also the Army should retain its responsibilities in the field of air defense and geodesy and mapping, as they are related to space, and as always within those terms, we loyally support the present directive.

Now, what are the capabilities and resources of the Army in connection with space programs? I would like to spell them out for the record, for once. This memorandum I have before me is the memorandum you referred to of 1959, upgraded as of 14 November 1960. It has not been changed since the recent directive has been issued. If I may, I will read it. It is fairly brief.

Q. What particular capabilities and resources in connection with space programs does the Army have?

A. 1. Signal Research and Development Laboratory:

a. Extensive electronic research facilities.

b. Have accomplished Tiros, Courier, and Score.

2. Ordnance Corps:

a. Ballistic Research Laboratories—DOPLOC surveillance system designed and constructed.

b. Diamond Ordnance Fuze Laboratories—micro-miniaturization of electronic components.

c. Army Ordnance Missile Command—White Sands Missile Range, Army Rocket and Guided Missiles Agency and Army Ballistic Missiles Agency.

3. Corps of Engineers:

a. Specialists in construction.

b. Army Map Service for space mapping program.

4. The Army Chemical Corps:

a. Biological warfare has application to space.

5. Quartermaster Corps:

a. Laboratories for clothing and feeding of human beings in hostile environments.

6. Transportation Corps—Vehicle Development for Booster Transport.

7. Army Medical Service—Biological Research on effects of ionization radiation.

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"1. The Army has resources and capabilities for space activities in all of its seven technical services. Within the Signal Corps and in particular, at the U.S. Army Signal Research and Development Laboratory are extensive electronic research facilities and proven technical talent. Here the research and development phase of Project Tiros, the meteorological satellite, was accomplished and in addition, the main ground readout station exists.

"Project Courier, the delayed repeater satellite, was developed under the supervision of this agency.

"Project Advent, the 24-hour real-time repeater satellite, is being managed by the Advent Management Agency at Fort Monmouth.

"2. The Ordnance Corps has extensive capabilities at the Ballistic Research Laboratories, particularly in fields such as space surveillance. The Doploc system was conceived and built here and was employed in the "dark fence" to

detect the passage and determine the trajectories of known radiating satellites. The Diamond Fuze Ordnance Laboratories has made an outstanding record in the development of microminiaturized electronic components which have had such a vital role in many space programs. The facilities of the Army Ordnance Missile Command also constitute valuable resources. This includes the White Sands Missile Range in New Mexico, the Army Rocket and Guided Missile Agency which is developing the technical missiles for the Army. The Army Ballistic Missile Agency, since the transfer of its Development Operation Division to NASA, is restoring its capability of developing ballistic missiles for the Army.

"3. The Corps of Engineers through its extensive experience in construction programs throughout the world, probably constitutes the Nation's number one source of talent for unusual construction in difficult environments. It has the capability of making valuable contributions in extraterrestrial operations when the time comes. Through its Army Map Service, great progress has already been made in mapping the Moon and studying the lunar topography.

"4. The Army Chemical Corps and its facilities at the Army Chemical Center and the biological warfare labs can do many tasks of collateral value in space programs. Among these is the work now going on in the sterilization of space probes.

"5. The Quartermaster Corps with its research and development labs has an extensive capability for clothing and feeding human beings in hostile environments.

"6. The Transportation Corps with its Research and Engineering Command has experience and background in developing vehicles to perform under diverse and difficult environments ranging from providing barges to haul massive boosters on the ocean to studying vehicles capable of operating on the lunar surface.

"7. The Army Medical Service has the capability of performing biological research slanted toward or with indirect benefits to space programs. Included here is the Army's experience in putting animals into space on missile nose cones and related research. The program of protecting animals against the effects of ionization radiation by use of drugs has obvious applications to space. The facility of the Walter Reed Army Institute of Research and the Fort Knox R. & D. Lab are prominent among the resources in this field."

Approved by: Brig. Gen. D. C. Lewis.
Action officer: Maj. Mittenthal/71714.
Date: 14 November 1960.

We would like to keep these capabilities and have them recognized in connection with the authorization of research, at least. "Preliminary research" is a new term. We are generally familiar with basic research and the terms applied in supporting research. What the intent is, if anything, with respect to the word "preliminary," I am not sure, but at least it would infer in the field of basic research and possibily some supporting research, the Army's capabilities would be utilized.

Thank you.

The CHAIRMAN. General, you have given us a very fine statement. Very short and very fine.

How many of these missions or programs that you refer to are lost as a result of the directive?

General TRUDEAU. There are no programs as such that are lost. This is on the assumption that we will be firmly given the responsibility to continue the Advent program and to do the necessary work that is in the planning and research stage on mapping and geodesy.

The CHAIRMAN. Well now, in the foreseeable future, would you say that this directive is going to hurt the research and development program of the Army?

General TRUDEAU. I will be glad to answer that, Mr. Chairman, but before that, I would like to add also among the other two programs that I mentioned what I consider the absolute desirability of retaining

in the Army the work on the advanced Nike system, if it is authorized, in connection with the anti-satellite missile. The tremendous fallout in knowledge which we have gained through the three steps we have taken that now give us the Zeus capability, must not be ignored and should not be shifted in connection with the anti-satellite missile.

In connection with these other programs, and as I say, they are not really programs. It is research that is done by our scientists, primarily in basic research or perhaps in supporting research, since the development of stable platforms and guidance systems and the work on propellants, naturally give us an opportunity to acquire added knowledge and the added incentive of thinking in bigger terms than the things you are faced with immediately.

It is possible that if we are—and I hope we will not be—restricted in this field, that the scientific talent that exists in the Army will atrophy on the vine. This is a matter of concern to me, but I am hoping that the full meaning, that we will continue to do research, will meet with support.

The CHAIRMAN. It could do research in other fields than space.

General TRUDEAU. We have much to do in other fields and the Secretary was absolutely right when he said we were busy in other things, but to restrict those scientists who have knowledge in this field and who must be knowledgeable as to many of the space problems in order to do even Nike-Zeus today—if we lose those for one reason or another, through being denied opportunities to add knowledge to the general subject of space, then this would be a set-back.

The CHAIRMAN. One thing this committee is going to be very much interested in is the utilization of the talents of your able scientists who would otherwise be interested perhaps in space activity.

General TRUDEAU. This is true in both the Army and the Navy, I am sure.

(Secretary Morse also spoke and his biography is as follows:)

HON. RICHARD S. MORSE, ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH AND DEVELOPMENT

Mr. Richard S. Morse, following his resignation as president, National Research Corp., Cambridge, Mass., became Director of Research and Development for the Department of the Army on June 1, 1959. As Director of Research and Development, Mr. Morse has been responsible for supervision of all Army research and development activities with the authority and responsibility of an Assistant Secretary. His title was raised to that of Assistant Secretary of the Army for Research and Development on March 1, 1961.

Mr. Morse was born on August 19, 1911, in Abington, Mass., and received a bachelor of science degree from Massachusetts Institute of Technology in 1933. Following graduate work in physics at the Technische Hochschule, Munich, Germany, he spent 5 years in research work at Eastman Kodak Co. in Rochester, N.Y. In 1940, Mr. Morse organized National Research Corp. and served as its president until his resignation in 1959.

Mr. Morse is generally recognized as one of the early pioneers in the field of high vacuum technology and, as a technical executive, experienced in the organization and management of business ventures resulting from research and development. He has, at one time, served as president of Columbia National Corp., NRC Equipment Corp., Minute Maid Corp., Vaculite Corp., and Vacuum Metals Corp., as well as a director of New Enterprises, Inc., and Escambia Chemical Corp.

Mr. Morse also has for many years been associated with the national defense effort. In addition to having acted as civilian adviser to the Atomic Energy Commission and the Office, Secretary of Defense, he has served on the following committees: the Army Ordnance Research and Development Advisory Com-

mittee, the Technical Advisory Panel of the Department of Defense on Chemical and Biological Warfare, and the Defense Science Board. Mr. Morse was Chairman of the Army Scientific Advisory Panel from October 1957 until May 1959. He holds honorary degrees of doctor of engineering and doctor of science, and in 1961 received the Distinguished Civilian Service Award.

Organization memberships include the American Chemical Society and the Institute of Astronautical Sciences. Club memberships are St. Botolph (Boston), Army-Navy Club, and the Quissett Yacht Club.

Mrs. Morse is the former Marion E. Baitz, of Rochester, N.Y. They have two sons: Richard S. Morse, Jr., who attends Princeton University, and Kenneth P. Morse, who is a student at St. Albans, Washington, D.C.

Office address: Room 3E390, The Pentagon, Washington, D.C.

Home address: 4989 Glenbrook Road NW., Washington, D.C.

## STATEMENT OF HON. RICHARD S. MORSE, ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH AND DEVELOPMENT

Secretary MORSE. We are not doing so badly in that area, I think, Mr. Chairman.

You asked if I had a general statement. I don't because I didn't realize I was going to be called on, but if I may I would perhaps like to put some of these things in what I think may be a little different perspective.

I won't say a different perspective, but let's say a perspective in the way I see it. Their directive really is a management tool and technique. The reason it has its importance in the press and elsewhere is that space is very glamorous and the number of dollars involved are very large.

In our large efforts today, our large system programs, we have had quite a revolutionary change in the past 10 years. In the range of 30 and in some cases 50 or 60 per cent of our total funding for these large programs are now in the field of R. & D. You people in Congress recognize the staff was set up in Dr. York's office. That is why this directive takes on added significance, because in a sense we are issuing a directive via the R. & D. channel which really tends to then control an ultimate role and mission. I think this is probably where some of us become involved from the point of view of being concerned.

In a sense Dr. York's office has and still has essentially all of the authority he needs to perform the functions suggested in this directive anyway and I must say in the two years that I have been in office the tendency has certainly been going rapidly in this direction towards the Air Force for most of our large R. & D. efforts.

Now, the reason that we get more concerned perhaps with space than other areas is the cost. These are large, very expensive programs in terms of facilities, people and ultimately, of course, the cost of operating them.

Again I want to say this directive does not get into operating itself. On the other hand, it obviously means that the operating assignment will follow. I think this is an area which is of concern to the Army.

I would like also to say, however, that the Army has in my opinion, in the case of geodesy, mapping and communications and Zeus, three of the very real, important and sensible space programs.

They are of importance to the country. In the case of geodesy, mapping and communications, they are going to be important to the civilian components of our economy and I think we have to move in

that direction, bringing industry into that particular effort more rapidly than we have in the past.

I am speaking broadly. I am not speaking just of the Army program, but from a national viewpoint.

I would like to make this observation also, that to date there isn't anything operating in space. We are talking about all these great and wonderful things, but it is still R. & D. essentially in almost all of our efforts, and it is still very expensive.

Now, when you get to operating—let's say in a communications satellite effort which is one that I am personally very much interested in, the cost of operation is essentially zero. The cost per ton mile of a satellite after it is up there is nothing, and I think this is important.

We are never going to have any operations in space that are worth a damn until we get reliability. It makes no sense to go on researching forever. We have got to get something which works, and when a communications satellite, for example—and the same applies to other satellite systems—becomes operational and is useful whether it be for military purposes or civilian or any other application we may think of in the future, its cost then is nothing per ton mile. It just sits there, and all of the costs associated with the operating aspects of the program are going to be on the ground and that is where the Army is, on the surface of the Earth.

As in the case of the Navy, in navigation, for example, in Transit, I think in many cases we should look a little further ahead than just to be temporarily glamorized by R. & D. at the moment. We have to look further down the road and perhaps realize when these things become operational—and we are doing things in space, whether it be to make money for stockholders or do it to defend the country or against a satellite, or to communicate world-wide—the problems are going to be quite different and it is necessary on a national level and we will think more along these lines of a nationally-planned effort.

We get excited about these things and the directive comes out but it is still research. However, it does affect the future and I think that is why each of the Services is very much interested.

I think those are the main points I wanted to make, if they are of any use.

General TRUDEAU. This is why the position was taken as stated by myself before this committee last year, and this year in the previous recommendations we have made because we could see that whatever you do now with respect to research and development is going to have a major impact on operations. All you have to do is to look at this wonderful model [of satellite orbits around a globe], Mr. Chairman, that you are putting out here, and look at all those bands going around in all these directions at different speeds and for different purposes and realize that somebody at some focal point has got to do a lot of work one of these days.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. The problem comes up on the new terminology. I spoke of that previously. There is basic research and development; there is applied research and development; there is then testing as a stage and then engineering as a stage.

We may have revisions and variations and so on in models and the changes for practical uses.

What struck me was—and I have been in the Service and worked somewhat in this field in World War II—that it is the start of a terminology where we in Congress can't make the content of the works that we have, have square edges. I can't find where it begins and where it ends yet.

Again on the point of unusual circumstances as the exceptional case, I see nothing in there as a means of decision but somebody's idea at the time he comes to make a decision on the things he thinks are important.

General TRUDEAU. That is correct, sir. Actually that fourth terminology, that "E" on the end of "R.D.T. & E.," is for evaluation. It does what you say.

In other words, it studies the engineering, it recommends revisions and as of yesterday or whatever day the new Air Force directive was published. For instance, it ties on to this Air Research and Development Command the initial production of the items as they come into production and, of course this permits or might permit—we hope, the first run production—some telescoping of the operations in the interests of saving time and providing better unity of control all the way through the cycle.

Mr. FULTON. But you would think going through, say a pilot line or pilot plant stage, would still be in research and development.

General TRUDEAU. That is in the development and the intent of the directive is certainly not to let anybody go that far, except the Air Force.

Mr. FULTON. I wonder about it, so the problems we are raising here might make some people revise some language.

General TRUDEAU. And "except in unusual circumstances"—and as the lady said, these are very key words, "unusual circumstances."

Mr. FULTON. With the Department of Defense through Dr. York's office, having the ability, the power and the statutory power to assign projects as they come up as a preliminary decision, this looks to me as though they are in advance making a preliminary decision that will be one place; in the Air Force, but if they don't want it there, they can put it some place else.

Secretary MORSE. Under this directive, the decision now for assignment of projects has been raised above York's office.

Mr. FULTON. I couldn't hear you, sir.

Secretary MORSE. Under this directive as now written, the assignment of projects between the Services has now been taken out of Dr. York's office and raised to the level of the Secretary of Defense.

I would not only present this to Dr. York, but the final assignment of a new mission, or one in an unusual circumstance, would not be made by Dr. York but by the Secretary of Defense or his deputy, as I read this.

Mr. FULTON. Now, if the Joint Chiefs of Staff have been left out of the directive on how to assign—because nobody else seems to know whether or not there was even a meeting of the Joint Chiefs—will the Joint Chiefs in the future be left out of the decision on each assignment under this procedure?

Secretary MORSE. I don't believe we can speak for the Secretary of Defense. This is his decision, not ours.

Mr. FULTON. I am asking you, looking at the directive, what does it mean to you?

Secretary MORSE. I would assume that the Secretary of Defense, and I can't speak for him, would normally——

Mr. FULTON. No, just speak about the directives.

General TRUDEAU. No, I think the Joint Chiefs of Staff say what they want but they don't say who is going to develop it. I think Dr. York and the Secretary of Defense—that civilian channel will be used on that.

Secretary MORSE. This directive refers to the civilian channel through York, but the actual decision is made by the Secretary of Defense. With respect to an assignment of a mission in R.D.T. & E., that is.

Mr. FULTON. If this is a matter of simply emphasis in the directive, if the Air Force is to be emphasized over the Army or the Navy, then obviously as a corollary to me, that means the Army and the Navy are to be de-emphasized.

Secretary MORSE. I don't think that follows.

Mr. FULTON. Secondly, if the Air Force has 91 per cent of total budget funds for research and development in space now, if there are going to be economies made, it would seem obvious to me that the economies will be made, that they speak of in the Air Force, from the research and development, from the Army and the Navy, which is the nine per cent. Would the General comment on that?

General TRUDEAU. This has been building up because in the initial stages not over three years ago the Army had 90 per cent of the capability, but now you have the Air Force spending 90 per cent of the funds and that evidently is the way the administration and the Congress want it to be. So again we abide by your decision.

Secretary MORSE. I think we make a great mistake in this country, if I may say so—we all do—of talking about space projects. I think it is about time this country started talking about the use of space to do something sensible on the surface of the Earth. There is a lot of difference in your thinking. Everybody is talking about the aerospace industry, and the space industry.

Mr. FULTON. Not me.

Secretary MORSE. I am not speaking of you, sir. I am saying in general, one does, and I think the sooner we get off of this wicket and talk about the sensible use of space by the United States or the United Nations or the world, we will get some of these questions in better perspective.

If you look at the Army's effort from this viewpoint, we have got the best programs in space, I think, or certainly many of them, in communications, and Zeus certainly is a space effort. The kinds of things we encounter, the kinds of research problems that we have are in outer space, in Zeus. We are going after ICBM's, we are working on the decoy discrimination problem in outer space by definition, and as a use of space to perform a mission on the Earth. And we will do the same thing with mapping. We will end up with a map someone can use here on the ground, whether it be for civilian use or military use.

We are not exploiting space as such. We are using it to do our job, the same way the Navy is interested in oceanography, for the same reason they must do this, in order to get on with the antisubmarine warfare program but also perhaps to help the fishing industry.

Mr. FULTON. Well, the remarkable thing about it is that the Air Force is losing the air as a strategic area obviously.

Secondly, the Air Force is losing men in either air or space. So in the future there will be men in the Air Force neither in air nor space.

Secretary MORSE. They will be on the ground.

Mr. FULTON. That is my next point. They will either be on the ground——

Secretary MORSE. Or underground.

Mr. FULTON. Or on a ship.

Now, with the Air Force losing everybody out there, there will be nobody in uniform in the wild blue yonder.

General TRUDEAU. Perhaps then this is why they need this as an added function, because the Army thinks kindly of them and we wouldn't want to see them only as the silent silo sitters of the seventies here.

Mr. FULTON. I move we adjourn.

The CHAIRMAN. We will have to adjourn promptly at 12 o'clock—and that clock is a little bit fast up there. I am watching it. On account of the memorial services on the floor today, we will have to do it. Just bear that in mind.

Mr. Teague.

Mr. TEAGUE. Mr. Secretary, you said, I believe I understood you correctly, that the operational responsibility would obviously follow.

Secretary MORSE. What I meant to say, Mr. Teague, was that we are all concerned with things in the R. & D. phase today more than we used to be because there is such a large part of the total effort in the sense you build up experience and people and so forth. There is no sharp line between development, test, and operation. We are still doing research on the Redstone missile, the first one the world ever had. So in that sense research is more important because it does act, let's say, as a precursor of things to come in operation.

I didn't mean to imply this directive established that rule because the directive necessarily refers to R. & D.

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. Just one question: I am sure you don't want to leave the impression with this committee that the Army wants to see all of the Air Force underground.

Secretary MORSE. No, sir, we certainly don't.

The CHAIRMAN. I don't know if there is any rule but there should be a rule about one Service there poking at the other Service.

Secretary MORSE. In the R. & D. field we have a very close working relationship and have had in the last couple of years with Secretaries Wakelin and York and Charyk in the R. & D. area.

Mr. CHENOWETH. It is your position that the Army would like very much—in fact, you are going to insist and probably make a fight to retain the mapping, geodesy and Zeus programs to the full extent?

General TRUDEAU. And the communications satellite.

Mr. CHENOWETH. The Advent?

General TRUDEAU. We have been assured of that, but these things can change, you know.

Secretary MORSE. The directive specifically excludes reassignment of currently assigned projects. Those are projects which we now have and to which we are devoting a substantial amount of effort.

Mr. CHENOWETH. You want to go all the way with these?

Secretary MORSE. That is right.

Mr. CHENOWETH. You want to be relieved of no responsibility with respect to development of these?

Secretary MORSE. That is right. On the other hand, we don't want to duplicate efforts which the Air Force can do better. With regard to boosters, we don't want to develop them and make another facility.

Mr. ANFUSO. Mr. Secretary, first, I want to congratulate you on your statement that we ought to do more serious thinking about what space is for.

Secretary MORSE. Yes, sir.

Mr. ANFUSO. I gather by that that you meant the greater benefit to mankind to use space for peaceful purposes?

Secretary MORSE. I think that is a very important application of space. We have to look at it on a longer term basis rather than these quickies. When somebody gets excited about the shots the Russians put up or one we do or don't put up——

Mr. ANFUSO. And that is one of the functions of NASA and I gather you are willing to assist NASA in that project?

Secretary MORSE. We have a board that has been meeting and we are trying to make certain we don't duplicate efforts between us.

Mr. ANFUSO. May I ask this question of either you, Mr. Secretary, or General Trudeau, for whom I have the highest respect and admiration?

General TRUDEAU. Thank you, sir.

Mr. ANFUSO. If you had had it in your power to propose the directive that we are talking about, would you have made such a proposal?

General TRUDEAU. No, I didn't make such a proposal. My proposal was on the record here.

Mr. ANFUSO. Would you have made such a proposal?

General TRUDEAU. No, sir, but I accept it.

We read every day about how fortunate we are to have the civilian competency which is being brought into the Government and as a simple military man I accept these profound decisions as being made in great wisdom.

(General Trudeau requested that the following letter be included in the record in clarification of his statement above:)

*March 21, 1961*

HON. ELVIS J. STAHR, JR.
THE SECRETARY OF THE ARMY,
Room 3E–718, *The Pentagon*

DEAR MR. SECRETARY: I am deeply disturbed that a sentence in my testimony before the House Science and Astronautics Committee yesterday gave the impression that I intended to criticize my civilian superiors.

I want to assure you and Secretary McNamara that there was no intention to criticize high Government officials despite the impression the remark gives taken out of context with the balance of my testimony and the atmosphere that then pervaded the committee room.

I don't believe anyone who reads the testimony can challenge the fact that we have clearly expressed our intent to loyally execute the directive on military space responsibilities, despite our earlier expressed desire for a different approach.

I hope no further accent will be placed on the sentence in question and trust you and the Secretary of Defense will accept my explanation at face value.

Faithfully yours,

ARTHUR G. TRUDEAU,
*Lieutenant General, GS,*
*Chief of Research and Development.*

cc: GENERAL GEORGE H. DECKER

The CHAIRMAN. Will the gentleman yield?

Mr. ANFUSO. Yes.

The CHAIRMAN. The gentleman's proposal was given to this committtee, is that right, and is a part of our record?

General TRUDEAU. It is a part of your record last year and this year, yes, sir.

Mr. ANFUSO. I have one final question: I have also admired the great work which the Army has done on the Nike-Zeus. Do you feel there is going to be some interference with that?

Secretary MORSE. Do you mean as far as this directive is concerned?

Mr. ANFUSO. Yes.

Secretary MORSE. I don't anticipate any.

General TRUDEAU. No.

Secretary MORSE. The directive does refer to anti-satellites. I think that would be the only area. As far as the current Zeus program is concerned, it is in the current program; it is well funded and is essentially on schedule and we are awaiting decision as to whether or not we are to go ahead with a limited deployment program which we prepared some months ago.

Mr. DADDARIO. In view of what has just been said, in part of your testimony you said that one of the things you thought was extremely important the Army continue doing was "work on advanced Nike system, if it is authorized, to go on to anti-satellite missiles."

Secretary MORSE. Yes, sir.

Mr. DADDARIO. How about this work on advanced Nike systems "if it is authorized?" It has not as yet been authorized?

General TRUDEAU. No, it has not.

Mr. DADDARIO. What would this do to the Army's position if in this whole field of space and all of the scientists and people you have working on this program, if the Nike system itself is not authorized?

General TRUDEAU. You mean the anti-missile, or the anti-satellite aspect?

Mr. DADDARIO. The anti-missile. You have said work on the advanced Nike system, if it is authorized, to then go on to the anti-satellite missile. If the first is not authorized, you will not be authorized to go on to the second.

General TRUDEAU. That is right.

Mr. DADDARIO. Logically the argument still goes back to the question of the authorization of the Nike-Zeus system itself?

General TRUDEAU. That is correct.

Secretary MORSE. I think there is a misunderstanding here. General Trudeau spoke of the anti-satellite capability of Zeus. Zeus' primary mission is against ICBM's and IRBM's. That program is not affected by this directive.

Mr. DADDARIO. Is that program at the moment authorized?

Secretary MORSE. Yes, the research and development is. This directive is only concerned with research and development.

Mr. DADDARIO. You had no question, General Trudeau, about the authorization then of the Nike system—the advanced Nike system to then go on to the anti-satellite missile system.

General TRUDEAU. We are prepared to go on, but I don't know that there has been any formal request made for it as yet.

Secretary MORSE. No, there hasn't.

General TRUDEAU. I don't think there has.

Mr. DADDARIO. You are satisfied the Nike-Zeus system will be authorized?

Secretary MORSE. It is authorized for research and development.

Mr. DADDARIO. I refer to going on into the production end of it.

Secretary MORSE. We have no idea.

General TRUDEAU. As the Secretary said, that depends on the overall look.

The CHAIRMAN. I think all you need now is the money to go ahead in production.

Mr. ANFUSO. Any changes in that program would be up to the Secretary of Defense and nobody else.

General TRUDEAU. Yes, sir.

Secretary MORSE. That is right, sir.

The CHAIRMAN. Further questions?

Mr. FULTON. I move we make the General an honorary member of the committee.

General TRUDEAU. Thank you.

The CHAIRMAN. The committee will stand in recess until tomorrow morning at ten o'clock at which time the Secretary of the Navy and other officials will be here.

As announced on the first day of the hearings, there are certain additional questions which we wish to have answers supplied for the record.

(The questions and answers referred to are as follows:)

QUESTIONS ADDRESSED TO THE ARMY

*Question 1.* Can you trace for us how you visualize the operation of the directive of March 6: Suppose the Army does preliminary research on a space project in which it is interested, and then development is turned over to the Air Force. What Service will fund the development? How will the Army insure that its operational requirements are adequately reflected in detail in the development phase?

*Answer:* The Army has not received instructions on the implementation of the directive. Therefore, at this time it can only be surmised how the operation will be accomplished. It does seem reasonable that the funds necessary for completing the development after it is turned over to the Air Force would be included in the Air Force overall budget. Normally, it is expected that the Army would insure that its operational requirements are being met in the development phase by closely monitoring the project, by following the written technical reports, and by placing liaison officers at appropriate levels and geographic locations. If the Army's interests in space technology are not being adequately recognized or served, the Secretary of the Army has pledged to the committee that he will promptly and vigorously notify the Secretary of Defense of these deficiencies.

*Question 2.* To what extent will the Army press for the use of its facilities and personnel as subcontractors for Air Force space development projects? If such work is not forthcoming, would the Army prefer to reorient research efforts, replacing equipment and personnel, or would it recommend their wholesale transfer to Air Force control in the manner that the Von Braun team and JPL were transferred to NASA?

*Answer:* It is not likely that the Army will press for the use of its facilities and personnel as subcontractors for the Air Force. The Army's facilities and personnel are not oriented to production or even to extensive development type fabrication. Rather, they are tailored to the job of accomplishing preliminary design and directing and supervising commercial contractors in the fabrication of the final product. Therefore, there is little value to be gained from employing these in a subcontractor role. Needless to say, the potential of the Army facilities and personnel is primarily oriented toward a solution to Army-wide requirements. For example, our communication laboratories do work in all types of communications, not only space communications. Therefore, it would

be necessary and proper to accomplish a minor reorientation and employ these facilities on other work within the Army rather than to consider transferring these to another Service with attendant degradation in progress in other essential Army efforts.

*Question 3.* Explain how you would expect Army interests to be protected in the fields of mapping and geodesy under the terms of the directive. Would the Army develop suitable satellites for Air Force launching, or would the Army merely plot the results brought to it from Air Force developed and operated satellites?

*Answer:* The Army is in receipt of Department of Defense Directive 5160.34, subject: "Reconnaissance, Mapping and Geodetic Programs," dated 28 March 1961, which defines the Army responsibilities in these fields, including the exploitation of space systems. The Army is in complete accord with this directive, a copy of which is attached for your information.

(The directive has previously been printed following the testimony of March 18, 1961 in these hearings.)

*Question 4.* General White described point defense as an Army responsibility, and area or interceptor defense as an Air Force responsibility. Suppose that the Nike-Zeus shows further growth potential. At what point does it cross the definition of General White to become an Air Force responsibility for development?

*Answer:* The Army's responsibility for point defense was assigned by the Office of the Secretary of Defense. In that assignment of responsibility a point defense was, in general, characterized as one in which the radars of the system were located in the vicinity of the defended area and did not require a distant interlocking network of radars. An area defense was characterized as involving the concept of locating defense units to intercept enemy attacks remote from and without reference to individual vital installations, industrial complexes or population centers.

Nike-Zeus as designed, being developed and recommended for deployment by CINCNORAD is, under the above definition, a point defense system to provide protection against the ICBM. It is believed the growth potential inherent in the system is such that, with modifications to some of the equipment, Nike-Zeus from its ICBM defense positions could provide a secondary capability to intercept satellites.

It would therefore appear that Nike-Zeus would always be primarily a point defense system and hence an Army responsibility.

*Question 5.* Please define "preliminary research."

*Answer:* Preliminary research is a term not previously used in Army research and development. It would seem reasonable that the intent of this DoD Directive is to consider preliminary research as all basic research plus some early part of applied research. It is expected that a more precise definition of this term will be issued later in the implementation of the directive.

(Whereupon, at 12 noon, the committee recessed, to reconvene at 10 a.m., Tuesday, March 21, 1961.)

# DEFENSE SPACE INTERESTS

TUESDAY, MARCH 21, 1961

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

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

The CHAIRMAN. The committee will come to order. I have a small matter to take up this morning and while we are waiting on a Republican to come, I wish to say this: That under the authority that the rules give me I have created a subcommittee from this committee, headed by Mr. Miller, for the purpose of working out satisfactory jurisdictional arrangements with the Committee on Merchant Marine and Fisheries. We have some jurisdiction in oceanography and they have some jurisdiction and we always work together in harmony.

So I have set up this subcommittee, Mr. Miller being the chairman because he is a member of both committees, Merchant Marine and Fisheries and this committee.

Mr. Anfuso is a member of it and Mr. Daddario is a member. On the other hand, Mr. Jim Fulton and Mr. Riehlman are members. They constitute the subcommittee. I hope the subcommittee will get to work right away and contact the authorities from the other committee and let us work it out so we can go ahead with the work that we have in oceanography.

I am just told the Republicans are having a conference on the House Floor. I do not know what it is about but probably these newspaper reporters do. The best thing for us to do is to go ahead, because we have these distinguished witnesses here this morning.

This is Navy Day and we have Hon. John B. Connally, the Secretary of the Navy; we have Hon. James H. Wakelin, Jr., Assistant Secretary of the Navy, and we have Vice Admiral John T. Hayward, Deputy Chief of Naval Operations (Development). We have Rear Admiral Thomas F. Connolly, Assistant Chief, Bureau of Naval Weapons this morning, a distinguished array of Navy witnesses and we are delighted to have them here.

As you know, gentlemen, we have been probing into the extent and ramifications of the new order which designates the assignment of space missions and space R. & D. programs, among the several Services and we have heard from the Defense Department, the Air Force, and the Army and this morning we want to hear from each of you.

My thought is that we would hear from the Secretary of the Navy first. I understand the Secretary has a prepared statement.

Mr. Secretary, if you would proceed with your prepared statement, we would be glad to have it. We have his background here also. At

this point I would like to place in the record the background statement which we have on the Secretary's past training, experience, education, and qualifications, and he has many of them, too.

Secretary CONNALLY. Thank you, sir.

(The biography of Secretary Connally is as follows:)

BIOGRAPHY OF JOHN BOWDEN CONNALLY, SECRETARY OF THE NAVY

John Bowden Connally was appointed Secretary of the Navy on December 27, 1960, by then President-elect John F. Kennedy and took the oath of office on January 25, 1961.

In addition to a distinguished Navy war record, Mr. Connally brought to his new office a diverse, well-rounded background in law, business and corporate management. After World War II, he and several other veterans organized Radio Station KVET in Austin, Texas, of which he was president and manager for three years. He has had extensive management experience in a wide variety of interests including oil, oil field services, radio-TV, carbon black, ranches, etc., and as a director of several corporations, including the New York Central Railroad and Insurance Securities Incorporated (of San Francisco).

In the non-commercial field, he is a director of the Southwestern Exposition and Fat Stock Show, and Boys, Incorporated.

Born February 27, 1917, the son of John Bowden Connally and Lela Wright Connally of Floresville, Texas, he attended public schools in Floresville and Harlandale (San Antonio) and the University of Texas at Austin, from which he was graduated with the degree of Bachelor of Laws. At college he was president of Athenaeum Literary Society, won the Inter-Society Oratorical Contest, was vice-president of the Freshman Law Class and speaker of the class, was elected to Students Assembly and served as its chairman in 1939, was president of the Students Association in 1938 and that year appeared in Who's Who in American Colleges. He was also president of Alpha Psi Omega (national honorary dramatic organization) and a member and dean of Delta Theta Phi (legal fraternity).

He was commissioned as an ensign in the U.S. Naval Reserve on June 11, 1941, was promoted to lieutenant (junior grade) the following year, to lieutenant on October 1, 1943, and to lieutenant commander on October 3, 1945, holding that rank until the termination of his service in 1954.

For a period he served in the Office of the Chief of Naval Operations and in January 1942 was transferred to the Office of the Under Secretary of the Navy where he dealt with problems of training and manpower. Remaining there until February 1943, he served in the Procurement Division (Legal) and in the immediate office of Under Secretary of the Navy James Forrestal.

He was then sent to Algiers where for nearly a year he assisted in planning for the Italian invasions. Following specialized training in radar, he was assigned to the aircraft carrier USS *Essex* (CV-9) which won the Presidential Unit Citation for heroic service in the Pacific during the period August 31, 1943, to August 15, 1945.

As Radar and Radio Officer and later as Fighter Direction Officer of *Essex*, and for a time serving also as CIC Officer for Task Group 38.1, he participated in action in the Gilberts, Marshalls, Marianas, Philippines, Formosa, China Sea, Bonins, Ryukyus and Japan during the latter period of the war. He was observed to be an "extremely outstanding officer" by Admiral T. L. Sprague, USN, in command of Task Group 38.1, who said his "work was, in great part, responsible for the success of the Task Group."

He was awarded the Bronze Star Medal with Combat "V", and citation, in part, as follows: "For heroic achievement while serving as Fighter Director Officer on board the USS *Essex* during a concentrated attack by enemy Japanese aircraft against that vessel in the forward Pacific area on April 6, 1945. Alert and aggressive in the performance of duty as an overwhelming force of hostile planes flew in over the Task Group, Lieutenant Connally rendered gallant and effectual service in coordinating a determined and prompt aerial offensive and, by his professional skill, brilliant tactics and cool courage in the face of grave peril, contributed essentially to the success of embarked planes in shooting down sixty-nine Japanese aircraft and to the security of the *Essex* from all damage * * *"

A Gold Star in lieu of the Second Bronze Star Medal was awarded, but rescinded in favor of the Legion of Merit, with Combat "V", citation to which follows, in part: "For exceptionally meritorious conduct . . . as Force Fighter Director Officer on board the USS *Essex*, Flagship of Task Force 38, from July 7, 1944, to June 26, 1945; and later as Task Group Fighter Director on the staff of Commander Fast Carrier Task Group 38.1, with flag in the USS *Bennington* during operations against enemy Japanese forces at sea and against the Japanese mainland from June 26 to August 28, 1945. An officer of resourcefulness, mature judgment and clarity of mind, Lieutenant Connally effected notable improvements in Fighter Director and CIC policy and doctrine. His practical application of these doctrines together with his thorough knowledge of aerial tactics made possible the utilization of the air power available to cause maximum destruction of Japanese planes threatening our forces and to afford the greatest protection for elements of the Carrier Task Group . . . By this distinctive service in this vital phase of operations, (he) made a substantial contribution to the success of our offensives in the major campaigns conducted during this period, thereby upholding the highest traditions of the U.S. Naval Service."

Detached from the *Essex* in November 1945, he was relieved of all active duty at the Officer Personnel Separation Center, Washington, D.C., on January 3, 1946. He remained a member of the Naval Reserve (inactive) until 1954.

In addition to the Legion of Merit and Bronze Star Medal, each with Combat "V", former Lieutenant Commander Connally has the American Defense Service Medal, the American Campaign Medal, European-African-Middle Eastern Campaign Medal with one operation star, Asiatic-Pacific Campaign Medal with one silver and two bronze stars (seven operations), the World War II Victory Medal, and the Philippine Liberation Ribbon with two stars.

Mr. Connally is married to Idanell Brill of Austin who in 1938 was the "University of Texas Sweetheart." They have three children: John B. III, 14; Sharon, 11; and Mark, 8.

1 FEBRUARY 1961.

The CHAIRMAN. We would be happy to hear from you, sir.

## STATEMENT OF THE HONORABLE JOHN B. CONNALLY, SECRETARY OF THE NAVY

Secretary CONNALLY. Mr. Chairman and Gentlemen: I am honored to be here today. I am honored to be here today to appear before this committee and to give you the Navy's position on its role in space and on the recent directive concerning space, issued by the Secretary of Defense.

As I am sure you know, the Navy has always had a major contribution to make to this country's efforts in space and I am sure will always in the future be able to contribute. We have an inhouse research capability that is, in my opinion, the best in the world. We have had experience in the launching of space vehicles and in the construction and operation of the payloads which these vehicles bear. We will be ready to contribute all of these talents to our Nation's space program.

During the past few weeks, I have had an opportunity to make known to the Secretary of Defense some of our abilities in the field of space and our position on the type of organization which we feel could best use our talents as well as those of the other military departments and civilian organizations. I have had an opportunity to study the present directive and to make known my views on it.

My views, insofar as the Navy is concerned, were not in complete accord with the directive as it was finally issued. Prior to issuance of the directive, I voiced my own opinions and my recommendations as to the type of program the country should have.

I assume the other Service Secretaries did the same and that others within the Defense Department whose duty it was to comment and to advise the Secretary of Defense also voiced their opinion.

The decision has been made and the Navy, as it always has done and always will do, will cooperate with that decision to the utmost of its ability.

When I had an opportunity to address myself to studying the document, I felt some concern about it for several reasons.

First, I thought in the scientific world the Navy inhouse research capabilities were and are generally recognized to be the finest in the world. I did not think we would get any substantial argument from anyone about the capabilities of the Navy's scientists to do an outstanding job for our Government. I thought that this ability and think this ability was and is unequaled in the Government or in industry.

Based on that feeling, which was a very strong conviction, I was concerned that if this directive were approved it might tend to cause the Navy to lose its scientists to other pursuits. I thought that it was imperative that we maintain these inhouse scientists and experts and that we maintain the abilities and capabilities within Navy research programs that we have had for so long in order to do a job not only for the Navy but for all the Defense Department and for this Nation as a whole. Many of the programs concerning space which are now in existence are largely derivatives from research that the Navy has performed in the past years. I was extremely interested in seeing that these scientists, who have spent their lives in dedicated effort, were constantly encouraged to continue that work and that they not receive any impression that their efforts, their imagination, or abilities would be stifled or hamstrung.

I did not believe and I do not believe today that there is any such intention on the part of the Secretary of Defense to do so.

With these thoughts in mind, I had the opportunity on the morning after this directive was issued to talk to Secretary McNamara at some length about my feelings. We went over this matter thoroughly. I expressed my feelings in detail and he then assured me that he agreed with me that the Navy research capabilities in our laboratories were the finest in the Government. He assured me that it was his intention to continue to use these services and that the last thing anyone would want to do was to stifle their activities. He further assured me that the Navy would be given an opportunity to continue working on space programs in which we are interested, and that if this directive did not result in the requirements of the Navy being met, then, under the directive, exceptions would be made in order that the Navy might itself pursue these activities.

Or even if necessary, the directive might be altered to assure that the Navy keeps the abilities and capabilities to perform its naval missions. As you all know, there are many elements of space with which we are vitally concerned.

In years past, we have found that we could vastly increase our naval capabilities by exploiting the three dimensional regions lying beneath and above the surface of the seas.

Today the scene of naval operations reaches down to the ocean floor and up to the limits of the upper atmosphere.

From the naval point of view, space is but the extension of where we operate right now. And although research in its use is still in a formative state, we know very well indeed that space will offer many things that will help us to carry out our naval missions more effectively.

Historically, the Navy has had great problems in keeping track of weather. Space will help us solve those problems. Communication difficulties have always plagued us. We believe that space will enhance our communications capabilities tremendously.

Navigation at sea has always been a great challenge. Space will help us to navigate precisely and reliably. Reconnaissance of the seas has always tested every navy's capabilities. Space offers great promise here, too.

We expect to find other functions which can be used as part of our naval mission or which will aid the carrying out of our naval missions.

With the feeling that I believe I know the Secretary of Defense has, I am sure this directive will be administered in such a way that the requirements of the Navy, and the Army as well, will be met. This is the spirit in which the Navy will pursue its activities and in which it will carry out the directive.

Let me repeat, I have had an opportunity to express the Navy's views as forcefully, as eloquently, and as intelligently as I could.

The decision has been made by the Secretary of Defense and, as we always have, we shall now abide by it to the fullest extent. I am confident that our contributions in the field of space will continue to be made and that our needs will be met.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, Mr. Secretary, for a very strong, virile and Navy-like statement. I think that I can say this, as I listen to your statement: That the Navy obviously was not pleased with the order, is that correct?

Secretary CONNALLY. Mr. Chairman, I would not put it in those precise words. I would say the Navy, in the opinions I expressed prior to the issuance of the directive, thought that they could obviously accomplish the desired result perhaps in a different manner.

The CHAIRMAN. So you were not happy with the order. I did not ask for an answer to that.

Secretary CONNALLY. All right.

The CHAIRMAN. I think you have answered it. I want to say this.

You were afraid, too, the order would result in stultifying the Navy efforts in science, research and development especially, right?

Secretary CONNALLY. That was the great fear which of course we had at the time of the initial consideration of the directive, and it is a problem which we will constantly watch. I feel very strongly as I have already said in my statement, sir, as I have already expressed to the Secretary of Defense, that at all costs, work which has been performed in the Navy research programs and the people who made those accomplishments have to be encouraged, have to be maintained, within the realm of Navy activities in order that their contributions will continue.

The CHAIRMAN. I would be glad to join with you there, if with the scientists—you have some brilliant scientists in the Navy—if their services are wasted now, I think it would be a tragic loss to the Government.

Secretary CONNALLY. Mr. Chairman, I do not think they will be wasted. I am sincere in that. I cannot conceive any person in a responsible position of authority in this Government who would not find some means and make a conscious effort to do so in view of the imagination, the brains and initiative that the Navy research scientists have.

The CHAIRMAN. But it was the uneasiness in your feeling that caused you to go to the Secretary of Defense to present that problem, was it not?

Secretary CONNALLY. Well, of course, the consideration of any such a directive as this raises fears that may or may not be well founded, Mr. Chairman.

The CHAIRMAN. That is right.

Secretary CONNALLY. Therefore, in fairness to the people who have dedicated their lives to scientific endeavors I think I would be less than intelligent and less than responsible if I did not consider the effect that such an action might have on their state of mind which, as you well know, is important, sir.

The CHAIRMAN. I am just trying to put myself in the Navy attitude there in reference to the mater. Now, you presented the matter to the Secretary and you were reassured that the Navy abilities in science and research and development would be used in the future. Isn't that correct?

Secretary CONNALLY. Yes, I am convinced that is true, sir.

The CHAIRMAN. And before this order came out, did the Navy have an opportunity to present its case to the Defense Department?

Secretary CONNALLY. Yes, it did.

The CHAIRMAN. And it did present it.

Secretary CONNALLY. Yes, it did.

The CHAIRMAN. Now, the case of the Navy which was presented was not entirely in line with the order that subsequently was issued, was it?

Secretary CONNALLY. That is correct, sir.

The CHAIRMAN. Wherein did it differ?

Secretary CONNALLY. Well, basically, our approach, as I said in my prepared statement—our position differed from the directive as it was finally issued. Our position basically was that the various programs of the Defense Department should be, as they have in the past, assigned only on a program basis more or less.

Our objectives and observations that I gave to the Defense Department raised the question that space in itself is not a program, it is a medium, it is not an end in itself, it is not an objective in itself.

The CHAIRMAN. It is like the ocean.

Secretary CONNALLY. That is correct, sir.

And that again our principal observations and recommendations centered around the continued use of the abilities which we had to be sure that there was not created an environment or an organizational setup which would preclude the use being made of the brains that we had available to us.

The CHAIRMAN. Now, you are satisfied, are you, Mr. Secretary, that nothing in this order will disturb the development of the Polaris program, are you?

Secretary CONNALLY. I am as sure of that as that I am sitting here, sir.

The CHAIRMAN. Now, any offshoot or branches of that that are usable by the Navy would likewise be included in the Navy jurisdiction.

Secretary CONNALLY. I would certainly assume so.

The CHAIRMAN. How do you interpret the unusual situation which would permit the Navy to engage in any new or additional space programs.

Secretary CONNALLY. Mr. Chairman, I am not sure that I can give you a categorical answer with respect to any detailed program. I can only say this, that we range all the oceans of the world. The surface of this Earth is largely composed of oceans as you well know. It is inconceivable to me in the development of many of the space projects that the waters of the world will not play an important part in that; and, to that extent it is in the realm of the Navy and has traditionally been there and I certainly think we will have ample opportunity to engage in new programs that have a bearing along those lines.

The CHAIRMAN. I did not ask it first, Mr. Secretary, but I assume each one of you wish to testify separately.

Secretary CONNALLY. Not necessarily, Mr. Chairman. They are here at the wish of the committee. They will be available.

They are not here necessarily to make statements. Dr. Wakelin has a prepared statement which he can enter into the record, but they are merely here at your call, sir. They are not necessarily desirous of making statements.

The CHAIRMAN. Mr. Miller, do you have any questions?

Mr. MILLER. No, Mr. Secretary, other than to say I am sorry I was delayed coming down here. But California has constituents—I had a hard time breaking away from them. What is going to happen to the Sea Scout program?

Secretary CONNALLY. That program has been under study for a considerable length of time. Its future in my opinion was not deterred nor determined by this directive. It is something we will continue to pursue. The extent to which we will do so will have to remain for the future, but no action has been taken with respect to that particular program as a result of this directive.

Mr. MILLER. You do not think that this program although it is for the future, it may be dormant at this time, that it is completely abandoned?

Secretary CONNOLLY. No, it certainly is not abandoned.

Mr. MILLER. I certainly think it has a great potential.

Secretary CONNALLY. Well, those of us in our Navy who are familiar with it, and there are many more familiar with it than I, think it has a very great future. It is still in the budget. There are no plans I know of for the Navy to abandon the concept or not pursue the matter.

Mr. MILLER. I just hope under this directive nothing will happen that will deter the people in the Navy who have made such a great contribution in this field from being able to exercise their talents. Do you think, Mr. Secretary, that this, though, is going to have an adverse effect upon the younger people, the young scientists, the younger officers coming along in the Navy, that they feel they have been abandoned or their efforts not appreciated? Do you think this will have an adverse effect on their morale? Will you be able to get scientists? Will young men want to make a career of the Navy?

Secretary CONNALLY. I think so, Congressman. I suppose the initial impact—I could not read people's minds but I am sure the initial impact had an effect on some people in the Navy but I think on sober reflection it must be apparent to anyone that the Navy has been in existence for a long time and the Navy is going to continue. There is not any question in my mind about that and I think the longer we go, the greater role the Navy is going to have in performing missions in defense of the United States and the free world.

Certainly no one would gainsay there is not ample opportunity within the Navy today for all the talents, brains, imagination we can possibly muster and we certainly are in a position to say to any man young or old that there are great potentialities and possibilities here, because we still maintain under this directive the prerogative of engaging in preliminary and basic research, which we certainly will do.

Mr. MILLER. I am glad to hear you say that, Mr. Secretary. I sincerely hope that you are right because I have the same admiration for the Navy and its accomplishments that you have and when I think that within its house the Navy, without any fanfare and trumpets, developed such things as the Sidewinder——

Secretary CONNALLY. Yes, sir.

Mr. MILLER (continuing). That has never been given in my mind the credit that it should be given. It stopped at least the brush fire for a while, in Formosa and stopped it cold in its tracks with about 6 missiles——

The CHAIRMAN. It prevented a war.

Secretary CONNALLY. Yes, sir.

Mr. MILLER. I happen to have been out there about the time these were being fired——

Secretary CONNALLY. Let me say this, Congressman. I think the Navy has without fanfare, made great contributions to nearly all of the programs in existence today. We started using the old V–2 back in the latter days of the war. We went from that to the Aerobee, back in 1946–1947; for many years the Navy has made great contributions. They have a great background of contributions and know-how in this field. There is nothing inherently in this directive that would preclude those abilities from continuing to contribute. This directive like anything else, sir, can be good or bad, largely depending upon how it is administered and therein, I think, lies the secret of it. I can not conceive—I have great admiration—and I say this publicly—for the Secretary of Defense for his fairness and his decisiveness and his objectivity.

We all are trying to do what we feel is best in the interest of the overall defense effort of this Nation.

Now, I would not be in the least reluctant, sir, to come before this committee and sound the cry of alarm if I felt that this directive or any other directive was being administered in such a fashion that the full capabilities of the Navy were not being used. I hope I never am in that position. At present I do not feel that I ever will be. But as I say, the question about the Navy's future actions will largely be determined, there is within this directive a framework and a pattern under which we can accomplish any desired objective.

Mr. MILLER. Mr. Secretary, we are glad to have you there and you just keep that Irish up. We look to you and your namesake over here for protection.

The CHAIRMAN. Mr. Van Pelt.

Mr. VAN PELT. No questions.

The CHAIRMAN. Mr. Riehlman?

Mr. RIEHLMAN. I have one. In response to a question by the chairman, apparently you were not too happy with the decision. I wondered if, during the discussion with the Secretary of Defense, you had an alternative plan you offered to them.

Secretary CONNALLY. I certainly discussed with him the possibilities that rather than making an overall designation of responsibility, perhaps an alternative suggestion would be to allocate responsibility on a program by program basis.

Now, let me say this, when you talk about being happy or unhappy. I feel that I have a responsibility first to make whatever contributions I can to the overall defense efforts of this country. Secondarily, I feel in the position of the Secretary of the Navy I must at all times pursue the course that I think will permit the Navy to make its greatest contributions in the performance of its missions. Now, there are times of course when I do not have all of the information that the Secretary of Defense has, so very frankly, I view my position as one at times of being a judge, as a part of the overall civilian defense team, and at other times as being an advocate for the Navy.

Now, I recognize the fact that I will not always be in possession of all the facts surrounding any particular program and I will express my opinion so long as I am there, sir. But beyond that I do not assume that I have all of the intelligence or all of the information and so when a decision is made by my superiors, I will do my utmost to carry it out.

Mr. RIEHLMAN. I was not here to hear you read your statement but I was just wondering if you could tell us briefly what you feel the mission of the Navy at the present time under the directive is.

Secretary CONNALLY. I do not think it materially altered any missions we have. In the first place, all of our existing programs, the existing assignment of responsibility with respect to programs was unchanged, was unaltered. We will continue to have those. We will continue to have the right to do preliminary basic research and when we develop something that we feel is of paramount importance to the Navy that would materially increase our capabilities then we certainly have the right to go to the Secretary of Defense and ask that we pursue that particular program, which all of the Services have to do anyway, and then once a program becomes operational, if its primary concern is toward the Navy missions, then I would anticipate and expect that the Navy be assigned the operational role of that particular program.

Mr. RIEHLMAN. One other question, Mr. Secretary. In view of this committee's interest, particularly in the development of the NASA program, is there anything you see in this directive that would alter your working agreements between NASA and the Navy?

Secretary CONNALLY. Not at all, sir. We are continuing to work with them daily and shall continue to do so.

Mr. RIEHLMAN. Suppose a specific program comes up that lies possibly outside of your jurisdiction as you see it today, you would then

have to get authority from the Secretary to enter into any agreement with NASA?

Secretary CONNALLY. I do not think we would necessarily have to do that in order to cooperate with NASA. We do it constantly in programs in which we are not primarily concerned. Certainly there is a great exchange of information and free flow of ideas between us daily and I certainly would expect that to continue.

Mr. RIEHLMAN. Well, we want that to continue. We want to know whether there was any possibility that this directive would interfere with any exchange between NASA and the Navy and their activities.

Secretary CONNALLY. I certainly do not see any reason why it should and certainly do not expect it would.

Mr. RIEHLMAN. That is all.

The CHAIRMAN. Are there any questions on this side?

Mr. Anfuso.

Mr. ANFUSO. Mr. Secretary, I should like to take this opportunity of congratulating you. I have read your background. It is one of the best I have ever read. You certainly come to this Service with great qualifications. I believe it is one of the best appointments President Kennedy has made.

Secretary CONNALLY. Thank you.

Mr. ANFUSO. I note, knowing a little of your background, as Churchill said when becoming Prime Minister of England, he did not intend to surrender the British Empire. You do not intend to surrender the Navy.

Secretary CONNALLY. I do not think anyone has asked us to surrender yet.

Mr. ANFUSO. It has been interesting to watch you, the great lawyer you are, take the position that you have. I have also been watching Admiral Hayward whom I have know for a great length of time and if only science could develop a method of recording facial expressions, we might know exactly where Admiral Hayward stands at the present moment. [The editor glanced at Admiral Hayward at that moment; the admiral's face seemed inscrutable.]

I note in your statement that you voiced recommendations to the Secretary of Defense. I suppose that they were in writing, Mr. Secretary.

Secretary CONNALLY. Both. Both in writing and verbally.

Mr. ANFUSO. Did the Secretary have the opportunity of reviewing your recommendations?

Secretary CONNALLY. I have substantially given to you this morning the basic elements of my recommendations that were proposed both verbally and in writing to the Secretary.

Mr. ANFUSO. Of course you understand this is a legislative committee and we have the power to correct by legislation anything we see wrong.

Secretary CONNALLY. Yes, sir.

Mr. ANFUSO. You say in your statement that the Polaris is going to go ahead. Now, you may have many other projects which the Navy is working on. Are they going to go ahead, too?

Secretary CONNALLY. Yes, sir, so far as I am concerned, no existing program will be disturbed whatever.

Mr. ANFUSO. Will this directive prevent you from initiating any new projects?

Secretary CONNALLY. Not in my concept of it, no, sir. As I tried to say a moment ago, we have under this directive the authority, and we certainly intend to exercise the responsibility, of continuing our preliminary basic research all across the broad spectrum.

Now, when it gets beyond that point, when it gets in the development stage under this directive as we do now, we will have to go to the Office of the Secretary of Defense for approval to continue any particular program, but that is unchanged from what exists today. So that we certainly anticipate, within the broad realm of preliminary basic research, that we are going right ahead with it, sir.

Mr. ANFUSO. Have you found any reasons to object? If you saw that you could not do the things that you wanted to do, you would be the first to object?

Secretary CONNALLY. Yes.

Mr. ANFUSO. I have the greatest admiration for the Air Force. There is not any question we have the best Air Force in the world—we have the best Navy. Now, the directive here is going to be under the control of the Secretary of the Air Force to a great extent. Suppose some people in that department do not agree with your statement that you have the best inhouse facilities for research and all that, what is going to happen then? Suppose they say they have the best inhouse facilities for research and they restrict you to certain fields—what then?

Secretary CONNALLY. I do not think they have the authority now or under the directive to restrict us to certain fields, Congressman.

I think there is not any question under the directive but that in the preliminary basic research we have the freedom to delve into any problems that we think we are required to do in performing the naval missions. There are perhaps those in the Air Force who feel today that they have better inhouse capability than we do. My attitude is we can certainly disagree without being disagreeable and I do not want to debate the matter with them. If they feel that way, I am proud of them.

I think one of the great things that make the Services what they are is the spirit inherent in those Services. If a man did not have that, I do not know how he could make any great contribution to a military Service in this country. If he did not believe he was serving in the best outfit, whether it is a platoon, a company, a battalion, a regiment or a division or ship, then we would deteriorate.

Mr. ANFUSO. I like that statement very much.

Secretary CONNALLY. And that is the thing I was getting at a moment ago. One of the basic, inherent things in maintaining a fighting force is that you have to instill these people with a concept of what they are fighting for and you have to make them believe that they are a part of the greatest outfit in the world, and parenthetically I might say here, I think that is very simply the answer to why the Marine Corps is the magnificent organization that it is, because they do have an esprit de corps second to none. Possibly, if I may inject a note of levity at this point, possibly with the exception of Texas A. & M. College of which your colleague is an alumnus——

Mr. ANFUSO. No comments.

Mr. TEAGUE. I will forgive you since you are in the Navy.

Secretary CONNALLY. But to complete my statement, when you deal with any military establishment, and that is what we are deal-

ing with, in the final analysis whether you have ships or planes and whether the ships are submarines or aircraft carriers, the effectiveness of that weapon is dependent entirely on the manpower. You get back to the human element and unless you have the feeling among the men that this is the best that there is and unless you have in a sense, and a large sense, a competitive feeling that this is the best, then your entire structure seems to me to be on the verge of a serious decay.

Mr. ANFUSO. Mr. Secretary, how did this directive come about? Secretary of Defense McNamara is a comparatively new person in Government. He was making cars before this and there is no doubt that his intentions are the best, and that he is going to try his utmost to become an excellent Secretary of Defense, but I am anxious to know where did this thing start? Who went to the Secretary of Defense, who initiated this directive? It did not come from the Navy, I am sure.

Secretary CONNALLY. Congressman, I cannot answer that, sir. I just do not know.

Mr. TEAGUE. Doesn't it go back to a study ordered by President Kennedy before he took office?

Secretary CONNALLY. No, sir, I do not think so, Congressman. I think it went back perhaps even further than that. I think the question of a so-called single manager for space has been kicked around for quite some time. I think there was consideration given, at least among the Services, last year. I am not sure of this. There are others who could certainly better inform you on it. But to answer your question specifically, I do not know where it originated.

Mr. ANFUSO. We are interested to find out and I think we will. One final question: I hope this directive is not to place too much emphasis on the military. We are engaged in a world struggle with Communists. And we cannot emphasize the military. The Russians certainly do not do it. They seem to emphasize their scientific achievements toward peaceful purposes. Do you believe there should be more emphasis in space exploration on the peaceful uses of outer space?

Secretary CONNALLY. Well, Congressman, you are certainly getting me out of my field in commenting on a matter of that kind. I will only say this, that certainly the work of NASA should be encouraged. Certainly there is a tremendous amount that we can learn from space for peaceful purposes and it should be pursued.

The extent of it is certainly not for me to decide.

Mr. ANFUSO. And you believe all Services should cooperate with NASA in that respect?

Secretary CONNALLY. Yes, sir.

Mr. ANFUSO. That is all.

The CHAIRMAN. Are there any further questions on this side?

Mr. Bell?

Mr. BELL. Mr. Secretary, my question would be directed to Admiral Hayward.

As I noticed, the Secretary said he felt the problems of the Navy will satisfactorily be met under the new directive. But on February 20, Admiral Hayward, you said:

> We do not know what the decision will be or how our plea to use space to better accomplish our purpose will be settled. I only know if the United States is to go ahead in this field, that we should be allowed to pursue our objectives.

Now, my question is: Is there any change as a result of this directive that would change your views in regard to this objective?

Admiral HAYWARD. Mr. Congressman, I was with the Secretary when we spoke personally to Mr. McNamara on one of our programs. He personally told both of us to continue with our programs, to keep on doing them, and if anybody interfered, to come to Mr. McNamara.

So he in no way has indicated that it would be changed, and that was since issuance of the directive, actually. That was the first time I have talked to him about it.

The CHAIRMAN. Any questions?

Mr. Hechler.

Mr. HECHLER. Mr. Secretary, I think you have expressed very eloquently here the necessity of protecting the scientific knowhow that the Navy now possesses and particularly its scientific personnel.

Let us look not to the present but toward the future. Is not one phase at least of the strength of the Nation going to be the extent to which we can utilize most effectively those people now in high schools and colleges and universities who are training for a scientific career in the future?

Secretary CONNALLY. Yes, sir.

Mr. HECHLER. Now, what concerns me is—and I would like to get your very frank comments as to how we can write in certain safeguards that might prevent this. What concerns me is: A young person coming out of a university or graduate school, with scientific training, is trained to decide where he can best utilize his best capabilities, and say he wants to go into the Nation's service and he looks around and thinks about such things as you mention, weather, navigation, communications, reconnaissance of the seas, and he suddenly says, "After all, the Air Force has control of all this." Won't the tendency be for the younger person to gravitate toward the Air Force because of feeling they now have control of this whole pie and therefore the Navy will lose a good deal of an infusion of new blood which it must have in order to maintain its capacities?

Secretary CONNALLY. I would hope it would not. I would hope the college graduates, coming out, trained in the sciences—I am not a scientist, but if I know anything about them, they look about in an attempt to find those areas, whether in industry, those colleges, themselves, or in the military services, where they can associate with others whom they feel can comprehend their own activities and give them inspiration and an objective appraisal; I think that they would have to say that the Navy certainly would offer as attractive a place to go for a young scientist as there is in this country.

Mr. HECHLER. Well, of course, this is theoretical.

I was wondering if there is any way we can tie this down.

At the bottom of page 3 of your statement, and the top of page 4, you mention if the directive did not result in the requirements of the Navy being made, exceptions would be made or the directive may be altered.

Can you conceive of any way right now that we can prevent some of these things in the future, so you don't have to keep running up to the Secretary of Defense and saying, "I am sorry, but this is not going to work." Isn't there something we can do to prevent these crises before they arise?

Secretary CONNALLY. Perhaps so, Congressman. But I am not in a position to give you today, nor do I think I could in the foreseeable future, give an answer as to how you could look in the future and see those areas in which scientific advances would be made and the precise application of those achievements to the point where I could make any specific recommendations to you, sir.

Mr. HECHLER. Is it all right if I ask the same question of Admiral Hayward, Mr. Chairman?

The CHAIRMAN. Of course, we are not going to let Admiral Hayward down this late; that we are just going to ask him casual questions.

Mr. HECHLER. In order to preserve continuity.

The CHAIRMAN. Go ahead.

Admiral HAYWARD. I would answer it from the technical point of view.

Most scientific people have scientific disciplines. If you are interested in radio waves or some specific thing, you would go where these areas are being studied, rather than space, which, as the Secretary said, is a place, not a program. But this is where your people go. In other words, if you are going to study wave propagation, you would probably go to Stanford or the best teacher or the best atmosphere. If you were going to study atomics, you would go to California. You would not necessarily pick a military Service because they had all control of space.

Mr. ANFUSO. Admiral Hayward, when it comes time for you to ask for money on research, for example, do you contemplate in any projects that this directive will restrict you as to the amount of money you can ask to carry out your objectives?

Admiral HAYWARD. No. Nobody has brought this out. There is nothing in this directive that changes anything as to how we present our research and development program. We have all of our basic sciences and our disciplines. We go through the same process, whether this directive existed or not, for the overall Navy budget, and we have to fit it in, as this committee knows, to the overall Navy program. There is nothing in the directive which would change that, and nothing the Secretary of Defense said would change it. And it is a pretty hard problem to distinguish, as you know.

Mr. HECHLER. Just one more question, Admiral.

Could you delineate some specific examples of what you consider "unusual circumstances," under which the Navy requires space technology for its roles and missions?

Admiral HAYWARD. I certainly can.

There was an experiment in space that was launched not long ago, a case where NASA is doing associated work for us, the VLF experiment. The Navy is primarily interested in that type of communication. This is the only type of electro-magnetic vibration that can penetrate sea water because it has very long wavelength. No one else would be greatly interested in this, and we would continue work in this experiment. This is an "unusual circumstance."

There are others that would fall into that category I am sure. They would be associated with the controling factor of all of our work, the environment, which is the sea. So I think that it is a good example of "unusual circumstance."

The CHAIRMAN. Mrs. Weis.

Mrs. WEIS. Mr. Chairman and Mr. Secretary, I think, to follow up the "unusual circumstance" aspect of the whole directive, we got a very impressive answer from you.

You say you feel that anything—and the Admiral backs it up—that anything that pertains to your medium you would get. If the Army feels the same way, that anything pertaining to development in their medium they would get, and as I understand from Mr. Fulton, there is no air in space, which leaves the Air Force out entirely, would not this become an exercise in futility, this whole directive, if everything that comes up turns out to be an "unusual circumstance"?

Secretary CONNALLY. If everything that comes up is deemed to be an "unusual circumstance", I suppose that would normally follow.

I certainly don't think it will be the case.

Mrs. WEIS. Don't you think in the laboratories and the Services, themselves, they might so construe it, if they got a breakthrough on something intimately connected with the Service; they would think it was an "unusual circumstance", and did everything they could to get that interpretation of it?

Secretary CONNALLY. I suppose there would be that interpretation made.

As you well know, there is a very long and tenuous road from an idea in a research lab to funding by the Congress. Any program has to be sifted and sifted; and as I see it, it proceeds along a rather tortuous route, so that even though a scientist in a laboratory might say, "This certainly is an unusual circumstance," others might disagree.

Mrs. WEIS. So there is still no definite definition put on it that you can go by?

Secretary CONNALLY. No, ma'am, there has not been.

The CHAIRMAN. Mr. Karth.

Mr. KARTH. I had the opportunity of serving with the military, and you know, on certain days the top sergeant to the first lieutenant, just to keep our bodies busy, would issue an order, to just keep us occupied and forget about those things we might be interested in back home.

I have a feeling, however, the Secretary of Defense does not issue orders for this purpose.

For 3 days I have been unable to find out what the purposes may have been or what the consequences of the order might be.

After I heard your testimony today, I am in about the same position as I have been in the last 2 days of these hearings.

I would like to ask you if there is any effect, then, other than the effect of the order having been issued, that you see this order having on research as conducted by the Navy, except that you now must go to the Secretary of Defense to whom you probably had to go before, to get approval of certain aspects of your research and development program.

I have a feeling that there is a purpose for the order. This is my point. I have a feeling, too, that I have not yet found out what the purpose may be.

Could you, as precisely as you can, give me the benefit of your thinking as to what effect, adversely or otherwise, this directive or

this order will have on the Navy's future in the research and development field?

Secretary CONNALLY. Within the limits of my knowledge and information, let me try to answer it this way, Mr. Congressman:

Prior to the issuance of this directive, previous Secretaries of Defense had assigned to the Air Force the responsibilities with respect to booster development and research and operations of boosters. Now, this—and I am going to ask Dr. Wakelin to interrupt me here if at any point I get off in the background of this—is that correct?

Secretary WAKELIN. That is right, sir.

Secretary CONNALLY. This directive certainly goes beyond that point. This directive says, in effect, the Air Force has not only the responsibilities for the boosters, as such, but for the payloads.

Mr. KARTH. Yes, sir, I understand the directive.

I would like to find out what your interpretation is of its effect, other than to say that you have the assurance of the Secretary of Defense that if you have a problem you would like to pursue, about all you have to do is to go to the Secretary of Defense and you are quite assured of approval.

Now, if that is the effect of the order, I don't see that it has changed anything from what we have had. But I have a feeling the order was issued for a purpose other than that.

Secretary CONNALLY. No.

Mr. KARTH. What effect do you think this directive will have on your research and development program, if any, and if it won't have any, in your opinion, I would like to have that answer.

Secretary CONNALLY. I think it certainly will have some effect.

Mr. KARTH. Yes, sir. And what will that be?

Secretary CONNALLY. In the first place, the mere assignment of the payload responsibility, in itself, is a tremendous effect. The development of the payload responsibility is of considerable consequence.

Mr. KARTH. Let me ask you this question, sir:

Will this, then, adversely affect your pursuance of objectives?

Secretary CONNALLY. I don't say it will adversely affect it. That I don't know. The directive has just been issued. We don't know what the application is going to be.

It does mean this: If in our research and development programs we conceive an idea and do the preliminary basic research on those ideas, if we then get to the point of development of procurement under those ideas, as the directive now stands, at that point in time the Air Force will take over the program. With respect to the development and procurement——

Mr. ANFUSO. Will the gentleman yield?

Secretary CONNALLY. —and only in unusual circumstances would we be permitted to engage in those activities, specifically the boosters, the payloads, the development, and the procurement, which are covered under this directive, and any research beyond the preliminary basic phase, that would go to the Air Force, so that the Navy as well as the Army are now in a position more clearly than ever—it is not alone a budgetary matter at this point—but we are more clearly in a position, if we want to pursue a particular concept, beyond the point of basic preliminary research, then we will have the burden of proof, so to speak, to show that this particular program, its develop-

ment, its operational characteristics, are peculiarly within the knowledge of our particular Service, or that the contributions to be gained from this particular program are primarily of benefit to our particular Service, in order to justify an exception being made to this directive.

Mr. KARTH. I will yield in a minute.

Just by virtue of the fact that you transfer your project from your Service to another branch of the Service, after you have done the preliminary research work on it, would this in your opinion adversely affect the project or slow it down or have any other adverse effect upon it; because those people to whom it is transferred obviously would not have all of the background information of its development to that point that the Navy, for example, would in this case, if you developed something? So in this area would you say that this probably would not be a savings but would be a more costly feature of the order, if it were carried out in that manner?

Secretary CONNALLY. Congressman, I think you would have to assume—and I get back to my statement of a moment ago—that the net effect of this directive is going to be in the administration of it. I think you have to assume first that there is a great exchange of information between all of the Services with respect to their basic research and knowledge of each other's programs;

Secondly, I think you have to assume we can not proceed in the defense efforts of this Nation on any other assumption than that we are dealing with men of good will and good faith, and if we develop a program which we feel is essential to carrying out the naval missions, and even though, after we have reached the point in time where we have pursued the basic research, even though that program at that time is turned over to the Air Force, we would certainly assume they would pursue it in the development, in the procurement, in the additional research required with the same ardor and vigor that we would do so.

Mr. KARTH. Thank you very much.

I yield to the Gentleman.

Mr. ANFUSO. Mr. Secretary, you are the first one of all the witnesses here who has shed any light on the reason for this directive.

Mr. KARTH. I might say that.

Mr. ANFUSO. Now, that leads me to this question:

Why was development and procurement placed in the hands of the Air Force? What is the reason behind it?

Secretary CONNALLY. Well, you get me once again into an area where I am not sure I can supply the answer.

Let me put it this way:

Certainly, the basic concept, as I understand it, is that all of us are interested in preventing—and we in the military are as interested as those of you are here—in preventing duplication, waste, friction, and it was conceived to be in the interest of efficiency, of economy, of less duplication, of overall greater advancements, to, in effect, set up a single manager and to assign the responsibility, as it has been done under this directive.

Now, as far as I know, that is the basic underlying reason for it. And to that extent it makes a great deal of sense.

Now, as you well know, nothing is black or white. There are many gray areas. And I consistently get back to the point that whether or

not the directive is good or bad, with respect to the defense effort of this country—and I am not talking about the Navy or the Army—but whether it is good or bad in its basic concept will depend largely upon the administration of it.

Let me make one other point:

In consideration, if you combine many of the activities that have been carried on by the three Services, where then and how then do you combine it? Well, at the time this directive was issued approximately 90 percent of all of the money being spent in this direction was being spent by the Air Force. So the weight of the evidence of that one factor alone largely contributed, I am sure, to the determination that the consolidation of responsibility within this area should be placed in the Air Force.

Mr. ANFUSO. Thank you, Mr. Secretary.

Mr. Chairman, may I direct this to you, as Chairman?

In view of this very clear statement made by the Secretary, I think we ought to have a further clarification of the Secretary of Defense as to the reasons for this directive.

The CHAIRMAN. Well, let's get through with the witnesses we have this morning.

Mr. Chenoweth.

Mr. CHENOWITH. Am I correct in assuming from the statement here today and the general replies you have given to the questions propounded, that in your opinion this directive is not really going to have any great impact upon the space programs of the Navy?

Your group is enthusiastic about what you are doing; you feel you are doing a good job; you have got a real mission, and you don't anticipate any difficulty whatever in selling it to the Secretary if it comes to that point. In other words, you don't feel it is going to have any impact on your present space programs?

Secretary CONNALLY. On the basic preliminary research I do not anticipate it will have any effect.

Let me say this:

We always have difficulty in selling ideas to the Secretary, as I think we necessarily must, because every idea we generate costs money, and it has to be considered in the light of other requirements; so we have trouble all along the line. Very frankly, the research people have trouble with me, and I have trouble with the Secretary of Defense, and he has trouble, and we all have trouble up here.

So I can not——

Mr. CHENOWETH. We don't want you to have any trouble here, Mr. Secretary.

Am I correct in assuming the Navy resisted this directive?

Secretary CONNALLY. We resisted it only to this extent—I would not use the word "resist," but we resisted it, to use your word, by attempting to make constructive suggestions that were not completely in accord with the directive as it was finally issued.

Mr. CHENOWETH. You were reluctant to acquiesce in the directive; you were not just quite sure it was in the best interest of our space program, from the Navy's standpoint, particularly?

Secretary CONNALLY. You certainly could be correct in that.

Let me say at that point, though, I certainly don't think I know as much about the space programs of the various Services as a lot of other people do, and so I talked to our people, to our research and

development people. We went over the matter very thoroughly. I went down and personally went into it with Secretary McNamara. I wrote my suggestions to him about how I thought it could be done. They decided to do it some other way. I am not going to come here before this committee with a weeping towel out, frankly, sir, and say we have been treated unfairly, because I don't think we have. We are all working toward the same end, and they may be right. And I assume they are. And we are going to do our utmost to make it work.

Mr. CHENOWETH. But they had some difficulty in convincing you they were right; you were not fully satisfied at the beginning?

Secretary CONNALLY. I think we would have difficulty absolutely convincing anyone until future events determine the course that is pursued with respect to these various programs and again you get into an area that, in my mind, is most difficult to understand and to conceive, because you are dealing basically with ideas and imagination, and we spend a great many dollars on many that never bear fruit, and so it is one of those areas that is a question of judgment, and reasonable people can take the same set of facts and reach different conclusions.

Mr. CHENOWETH. As I get it, Mr. Secretary, you want to leave the impression with this committee, which is very much concerned over the program—the Navy has done a tremendous job and we want it to go ahead—you want to leave the impression now you are not concerned, as Secretary of the Navy, over the impact of the directive, and you are going to continue the programs that are started, and beyond that, you don't believe you will have any difficulty convincing the Secretary that the Navy should so function?

Secretary CONNALLY. I would like to believe our writings would be so clear and lucid and our voice so crystal clear we would be able to convince him.

The CHAIRMAN. As I understand it, while the Secretary acquiesced, he did not agree to the directive, is that right?

Secretary CONNALLY. No, I did not mean to leave that impression. We have certainly agreed to it. At what point in time are we speaking? If you ask did I agree with the original draft of the directive as I received it, the answer is no. Do I now agree with it? The answer is yes.

Again I get back to the point that we were given ample opportunity to explain our position and to voice our reasons. That we tried to do. We did do it. The decision was made on a basis that differed from our recommendations.

The CHAIRMAN. At the time of the decision you did not agree with it. Now you agree with it?

Secretary CONNALLY. Well, in the light in which you put it, I do not think it accurately reflects my position, Mr. Chairman.

I will say simply that at the time of the initial directive I thought I had some contributions in the way of ideas and in the way of approaches to the problem that would be constructive and very helpful. Others disagreed, and the decision was made the other way.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. When this directive was set before this committee in the first instance, it was presented as a step ahead in the management concept, with lines unequivocally drawn, with the idea of not

pleasing anyone in particular but achieving national goals and, as such, I was forcefully drawn towards it.

But as I read your statement this morning—and if I put something that you have at the end before what you say at the beginning, it comes out this way—this is the spirit in which the Navy will pursue its activities and in which it will carry out the directive, but that if the directive did not result in the requirements of the Navy being met, then exceptions would be made and the directive altered.

If this is so, it is not a clear and concise document. It does not set forth the areas of responsibilities of each of the Services. It is loose and elastic, and as a management concept, it would, in my opinion, have great weaknesses as a result.

Are you saying here, this morning, that there will not be quick and clean and clear conclusions reached but that there will be a great deal of discussion and hassling before these decisions are reached and, in fact, that would not be good management but would lead to worse management than we now have?

Secretary CONNALLY. No, sir, I am not saying that at all. I am not saying that at all.

I think the directive is fairly precise in its applications. Now, it is not precise and can not be precise in the field of dealing with future scientific developments as ideas or concepts. And I don't know how anyone could be precise with respect to things which are not yet known. But insofar as the practical management of the program, I think it is specific, I think it is precise. And I think it does place responsibility in the hands of the Air Force. I think it does lend itself to a savings. I think it does lend itself—let me digress one moment here—in attempting to administer any of these programs the difficulty is the placing of responsibility as well as authority for something that was done.

There are many times when there are alternate sources of supply, there are areas of duplication, which this directive attempts to get at, and I think it will get at. Because they need to look to us, they need to look to the Army if there is some foul-up in a program. They know precisely where to go.

Mr. DADDARIO. What you are saying, Mr. Secretary, is the spirit in which you pursue it is not that the directive will be altered or changed but in order to achieve these ends which you have just set forth, that if a decision is made, that the Navy will not have a research program in one particular area; that it will take the scientists which are perhaps working on that and direct them to other achievements following what the order of this directive might be?

Secretary CONNALLY. No, what I am saying, Congressman, is simply that suppose we had a major breakthrough in the field of oceanography, I would assume that in the development, when we reached the point beyond preliminary basic research on it, I would assume that the development and the procurement and the operation of that program would be assigned to the Navy, because that is where the preliminary interest in this particular program is.

Now, I would assume if we reached that point, and the point where the preliminary and basic research has been done, if the matter was then turned over to the Air Force for additional research, for development, for procurement and for operation, and they did not do

it, then at that time—I think I have received assurances if at that time that kind of situation arose, that certainly exceptions would be made, or if necessary the directives would be changed. But I anticipate no such thing.

The CHAIRMAN. Let me interrupt right here to say it is 11:20 now. We have three other witnesses to be heard. All of them are well worth hearing. They are distinguished witnesses. We can not meet this afternoon, because of the schedule on the floor of the House, and we have witnesses summoned for the hearings tomorrow morning. So we are in this situation: If we can finish with the witnesses present this morning, we had better do so.

Now, that is all I have to say, not with any desire on my part to cut anybody off.

Mr. DADDARIO. I yield, Mr. Chairman.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. I yield.

The CHAIRMAN. Mr. Randall.

Mr. RANDALL. As I see it, coming in late, and I think I understand it, after this preliminary research stage there is something the Navy comes up with, perhaps something else connected with the Polaris or atomic sub, that if you feel the safety of this whole thing, even beyond the preliminary research, lies in the safety valve of the unusual exceptions, you can go to the Secretary of Defense and say, "Here is something we should retain," and you feel you will be able to sell that, and the directive implies that, and the spirit of the Department will permit it?

Secretary CONNALLY. Yes, I have every confidence.

The CHAIRMAN. I recognize Mr. Fulton.

Mr. FULTON. The question is, what does this directive do, Mr. Secretary? And that hinges on a management question. At the present time and prior to that, the time this directive was issued, the method of distribution of programs in the Department of Defense was without any favoritism or emphasis on any service or de-emphasis on any service.

Now, at the level of management, it would seem to me that the decisions were made at Dr. York's level, and then with the approval of the Secretary of Defense and in consultation with the various departmental Secretaries.

This directive, after some study, to me, raises the level of decision above Dr. York's level and puts it in the Secretary of Defense's person.

First, he says if it is the ordinary routine, or the ordinary project, it will be Air Force. Then he puts a "but if" there are unusual circumstances, it will then go to the Navy or to the Army.

So it seems to me he is just setting a premise, that is, 91 percent of the money already goes to the Air Force, and that that means in the majority of cases the projects go there, but if there are sufficient reasons shown, and that is where I disagree with him on his "unusual circumstances," if there are sufficient reasons shown that a particular Service should itself continue or start into a new project relating to the strategic necessities of that Service, that particular Service will get the project.

Do you agree with that? Do you agree, first, it increases the level of decision of the Secretary of Defense, which is, to me, bad, and,

secondly, that it is actually only a presumption at this point by this directive?

Secretary CONNALLY. Well, I think it does elevate the exceptions to be made to the order of the level of the Secretary of Defense. Unquestionably, it does that. As a practical matter, as you well know, they have had basically this type of control, both in Dr. York's office and the Secretary, through the funding concepts, anyway.

Mr. FULTON. So really it is almost just a rule of thumb that has been set by this directive and a very tenuous rule of thumb, because I understand that the Secretary of Defense has further assured you that the Navy would be given an opportunity to continue working on space programs on which they are interested, and if this directive did not result in the requirements of the Navy being met, that under the directive exceptions would be made in order that the Navy, itself, might pursue these activities.

That is the first change in position the Secretary of Defense has made since this directive has been issued.

I might add that this is the first hole shot in the pie, by the man who made it—

> Or even if necessary, the directive might be altered to assure that the Navy keeps the abilities and capabilities to perform its naval missions. As you all know, there are many elements of space with which we are vitally concerned.

That has two things. That has, first, that there will be amendments which the Secretary of Defense has already promised to his directive, issued with exceptions, and likewise, he says that the Navy keep the abilities and capabilities to perform its naval missions, and of course it is inferred, in space.

Now, that is not only research and development but basic research and development, applied research and development, test the engineering and commissioned performance, so if that is an accurate quote of the Secretary, he certainly has left a very fine lacework of a directive in his own hands.

Secretary CONNALLY. Let me say this, Congressman:

The words you are reading are my words. They are not his words. They are not intended to be a quote of his words, whatsoever.

I think what he said to me was entirely consistent with his directive.

Mr. FULTON. But didn't he give you the feeling if necessary, the directive might be amended?

Secretary CONNALLY. If necessary.

Mr. FULTON. That is right.

Secretary CONNALLY. If necessary.

Mr. FULTON. When a man sets a very stern rule and then says first, "I will make exceptions, and if the exceptions don't go far enough, I will then amend the whole directive," he has not left much of a directive for himself.

Secretary CONNALLY. I think, sir, that we are perhaps taking my words out of context with the directive.

The directive anticipates that there might be changes in the future, depending upon what the future brings, because he leaves several outs in dealing with unusual circumstances, and my language which I used in my direct statement this morning should be construed in the light of the directive and in the light of the words "unusual circumstances." I don't think and I do not intend to convey the idea——

Mr. FULTON. No, you personally did not, but it is my judgment, after hearing these witnesses and what the Secretary of Defense has said he would do, it leaves very little left of the directive, once you give a number of exceptions and then say you are ready to amend when necessary.

I am talking about what the Secretary of Defense does, not what you think. I am giving what my judgment of it is, and I do not want to give you that responsibility.

Now, looking a little further, on page 3, the Secretary of Defense assured me, you state, that it was his intention to continue these services, and I would take that to mean in the sense above; the Navy research capabilities and our laboratories, which he had said to you were the finest in the Government.

Then you go further to say the last thing anyone would want to do is to stifle our activities. The most remarkable thing in your statement is that the Secretary did not assure you that it was his intention to continue to use these Navy services. He told you he would use the services, but he didn't tell you they were going to be used in the Navy.

Could they be, then, used in the Air Force? Did he mean he might transfer some of your laboratories over to the Air Force and take out of uniform one of our best, I would say—well, how do you call it—a physicist first class, the Admiral here?

Secretary CONNALLY. Well again, sir, I do not want——

Mr. FULTON. Might you lose some of your laboratories? May you, under this directive here, lose some of your laboratories and research facilities?

Secretary CONNALLY. I do not think any such thing is contemplated.

However, our research laboratories, you know, work for the Air Force and Army constantly.

Mr. FULTON. But you are not in danger here of losing your research laboratories?

Secretary CONNALLY. Certainly not. The idea never occurred to me.

Mr. FULTON. I would like to ask the admiral.

The CHAIRMAN. The admiral comes after the Secretary.

We have been saving these three witnesses. As soon as we are finished with the Secretary, we are going to ask the Assistant Secretary and the admiral.

Mr. FULTON. I will ask the Secretary this:

General Trudeau had been here yesterday. I enjoyed him thoroughly. I started on a line of questions that the Air Force is losing its jurisdiction, and it has to get another line of jurisdiction because already you are getting robot planes and the missiles are superseding the manned planes. So you can see with the Army on the ground and up to ground effect instruments and low-flying planes, and then the Navy having the sea, and the Air Force losing its jurisdiction of land planes, the Air Force, if it goes into the missile business or space, is going to be either ground-based or sea-based, because it has to launch its vehicles from someplace. So really the Air Force finds itself in the position that it is going to have to join the Army or the Navy.

Now, I said you would then have these land-based missile sites, with these fly-boys on the ground, with no wings, putting off their

boosters into space, and likewise for the Navy part, they would be on ships, in Air Force uniforms, putting off their missiles the same, into space, and General Trudeau came along and said no, that I wasn't right. He said with these new Atlas missiles and these hardened bases they are going to put them down in, he said, the Air Force is going to be down in the silos, and he called them the "Silent Silo Sitters of the 70's". The Navy would have the sea, the Army the land, and the Air Force would be underground.

What do you think of the jurisdiction? Is there a jurisdictional change there by this directive?

Secretary CONNALLY. Congressman, you have got me in a realm I am not sure I am competent to testify in.

But let me say first I think you would get a great deal of dissension from the Air Force on the idea that the manned aircraft is going out and that they were completely without any jurisdiction with respect to any missions to perform.

Mr. FULTON. Certainly it will be de-emphasized.

Secretary CONNALLY. Certainly in the work on space and missiles, they will be, much of their activity will be land-based, unquestionably, and we think in terms of fully developed space activities that much of that work has to be sea-based, obviously.

Now, I am not a Nostradamus, looking into the future, to say who is going to man what ships or perform what tasks——

Mr. FULTON. That brings up the point: Don't you think when these flyboys are on ships and never do get in the air, that they should be in Navy uniforms?

The CHAIRMAN. I don't think the Secretary has to answer that question.

Mr. FULTON. It is very pertinent. Here is one other thing, and Mr. Miller very adequately suggests this:

He said, on the ground, then, they will be in the Air Logistics Department, these Air Force men, because they will then be doing the trucking from the factories into the bases, setting the things up, ready to get them going.

Maybe we are having a basic change here of these Services by that directive, and we should be very careful about it because of the duty of this committee to see that research and development, our scientific community, has the opportunity and the disciplines to give us a broad scientific advance in this country.

The CHAIRMAN. I want to say this:

Generally speaking, this committee does not have and is not going into the question of missions for the several Services. We are interested in research and development and space.

Mr. FULTON. That is all, Mr. Chairman.

The CHAIRMAN. If there are no further questions, I am going to recognize the gentleman from Texas.

Mr. Secretary, you have a lot of admirers on this Committee, but you have one special admirer, and that is Mr. Teague of Texas.

Tell us where Texas is. [In a jocular spirit.]

Mr. TEAGUE. Mr. Chairman, I just want to say we from Texas are very proud of Mr. Connally, and I am sure every member of the committee joins me in congratulating him on his appearance here this morning.

The CHAIRMAN. He is really a most creditable representative of a great State.

Mr. TEAGUE. There is another person we are just as proud of and that is his charming wife, Mrs. Connally, at the back of the room, underneath the picture of the submarine. [Applause.]

The CHAIRMAN. Would you rise, Mrs. Connally? [Applause.]

Mr. TEAGUE. I don't think the Secretary knew she was here. I hope he didn't.

Secretary CONNALLY. I want to thank you for your very kind remarks.

I must say I felt somewhat nervous in anticipation of what I might encounter in dealing with a fairly difficult subject. If I had known she was back there, I think I would have been much more so.

The CHAIRMAN. Mr. Secretary, we want to thank you very much.

If you wish to stay, we would be glad to have you.

We are now going to turn our attention to these three distinguished witnesses who accompanied you here.

Secretary CONNALLY. If I may say, Mr. Chairman, I would like to stay.

And may I express my deepest appreciation for the manner in which this committee has received me.

The CHAIRMAN. I hope you will come back and come back often.

Secretary CONNALLY. Thank you, sir.

The CHAIRMAN. At this time we have Hon. James H. Wakelin, Jr., Assistant Secretary of the Navy for Research and Development.

Dr. Wakelin has a prepared statement here, which I understand is an excellent one. I think you wish to put that in the record, do you, sir, and then to brief ad lib?

Secretary WAKELIN. Just as you wish.

The CHAIRMAN. By your judgment. I think, because of the lateness of the hour, it might be well to summarize, if you wish.

I am going to take my copy to the office and look it over again.

If you will proceed, sir.

(The biography of Dr. Wakelin is as follows:)

JAMES H. WAKELIN, JR.

James H. Wakelin, Jr., was born in Holyoke, Mass., on May 6, 1911. He attended the public schools in Holyoke, graduating from high school in 1928. He received an A.B. degree in physics from Dartmouth College in 1932. During 1932–34 he attended Cambridge University, Cambridge, England, where he was granted a B.A. degree in the natural sciences in 1934 and an M.A. degree in 1939. Dr. Wakelin received his Ph.D. degree in physics from Yale University in 1940, where he specialized in the field of ferromagnetism.

During 1939–43 Dr. Wakelin was a senior physicist in the Physical Research Department of the B. F. Goodrich Co., Akron, Ohio. His work there was concerned with the structure and physical properties of natural and synthetic rubber, and with X-ray diffraction and electron microscope studies of high polymers.

From 1943 to 1945 he was ordnance staff officer to the Coordinator of Research and Development, Navy Department, Washington, D.C. During 1945–46, as a lieutenant commander, USNR, he was head of the Chemistry, Mathematics, Mechanics, and Materials Sections of the Planning Division, Office of Research and Inventions, and was active in the planning and organization of the Navy's program to sponsor basic scientific research, now under the direction of the Office of Naval Research. Following World War II, Dr. Wakelin joined a group of of former Navy research scientists in the establishment of Engineering Research Associates, Inc., of Washington, D.C., and St. Paul, Minn., and held the position of director of research. While with this company he was also

director of the field survey group of ONR Project Squid under contract to Princeton University.

In 1948 he became associate director of research of the Textile Research Institute in Princeton, and in June 1951 was appointed director of research of the institute, serving in this capacity for 3 years.

In 1954 Dr. Wakelin established his own consulting business in Princeton and has been a consultant on research planning and organization to the Lamp Division, General Electric Co., Cleveland, Ohio; Stanford Research Institute, Palo Alto, Calif.; American Radiator & Standard Sanitary Corp., New York City; J. P. Stevens & Co., Inc., New York City; Frenchtown Porcelain Co. and Starr Porcelain Co., of Trenton, N.J.

He was one of the founders in 1954 of Chesapeake Instrument Corp., Shadyside, Md., established to conduct research and development for the Navy in the fields of underwater sound and acoustic devices. He has been a vice president and consultant of that company. During this period he was also a research associate on the staff of Textile Research Institute working on the structure and physical properties of high polymers under a program sponsored by the Office of Naval Research.

Dr. and Mrs. Wakelin, the former Margaret Cushing Smith of Concord, Mass., lived in Lawrenceville, N.J., for 10 years prior to Dr. Wakelin's accepting the position of Assistant Secretary of the Navy for Research and Development in July 1959. They have three boys: James H., III, who attends Wilbraham Academy; Alan B., who attends the Lawrenceville School; and David, who attends St. Albans School here in Washington.

The Wakelins were active with the Cub Scouts and the Parent Teachers Association in Lawrenceville and with the American Red Cross in Princeton. Dr. Wakelin served as president of the Nassau Club of Princeton in 1955 and as a member of the board of trustees, 1956–59; he is also vice president of the Fathers' Association of the Lawrenceville School. Mrs. Wakelin was active as a volunteer with the Princeton Hospital where she was chairman of the hospital aid committee. The family's recreational hobbies include golf and sailing and they spend their summer vacations on Pickering Island in Penobscot Bay, Maine.

Dr. Wakelin is a member of Sigma Xi, the American Physical Society, American Association for the Advancement of Science, the American Crystallographic Society, Textile Research Institute, the Textile Institute of Great Britain, and he has been a contributor of scientific papers to the Journal of Applied Physics, the Industrial and Engineering Chemistry, and Textile Research Journal in the field of high polymer physics. He is a coauthor with C. B. Tompkins and W. W. Stifler, Jr., of "High-Speed Computing Devices," published by McGraw-Hill Book Co. in 1950.

(The prepared statement follows:)

STATEMENT OF HON. JAMES H. WAKELIN, JR., ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH AND DEVELOPMENT

Mr. Chairman and members of the committee, I am honored to join Secretary Connally before this committee to present the Navy's position on the development of space systems.

First, as Secretary Connally mentioned, the Navy has a vital concern in the exploitation of space technology and the employment of space systems. We believe that space technology can be used to enhance present Navy weapons and to bring forth new weapons and new support systems. These are the tools of command which will make this Nation's seapower stronger than ever before. However, the Navy does not seek a space program for the Navy alone, but as an equal partner in an overall national space effort.

Secretary Connally mentioned our interest in space systems for weather, communications, and navigation. We are also deeply interested in geodesy, sea surveillance, space surveillance and space defense systems.

Our interest has been deep and long-standing. We are particularly proud of our past achievements in space and space technology. Immediately after World War II the Navy began an aggressive program of space research and has continued this effort to the present time. In the late 1940's, the Navy participated in the space launchings of captured V–2 rockets, concentrating on the development of scientific payloads for these tests. This program yielded the first photographs from space, temperature and pressure measurements in space, and radiation surveys of solar transmissions. This information pioneered probe

and satellite weather systems, reconnaissance systems, communication systems, and scientific space programs. Included in these launchings was a demonstration of the feasibility, practicability, and utility of launching large rockets from ships at sea.

This initial space research was followed by the Navy development of the Aerobee sounding rocket for the conduct of experiments in space. Over 100 launchings of this rocket have been accomplished since 1947. Valuable data have been obtained on cosmic radiation, the Earth's magnetic field, communications phenomena and high altitude photography of the Earth. Early space environment and bioastronautic experiments were conducted. These investigations are an essential prelude to manned space flight. The Aerobee rocket is used universally as a scientific launch vehicle for experiments up to altitudes of 75 miles.

As space technology expanded, the Navy developed the Viking rocket to fill the need for a research probe vehicle which would lift larger instrumented payloads up to 500 pounds to altitudes above 100 miles for upper atmosphere investigations. This liquid rocket vehicle used the first gimballed rocket motor for flight control. This technique is now universally used on all liquid rocket systems in this country. In May 1950 a Viking was successfully launched from the USS *Norton Sound*.

The instrumented payloads of Viking rockets obtained data on cosmic radiation and on the temperature and pressure of the atmosphere above 100 miles. The results of this research led directly to the successful development and operation of the Vanguard Earth satellite. Viking research pioneered space photography and demonstrated the feasibility of satellite weather observation and reconnaissance and contributed greatly to present programs such as Tiros and Samos.

In parallel, another phase of space research was undertaken by the Navy using stratosphere balloons to carry out research at very high altitudes with large instrumented payloads and to recover the data obtained safely. In this program the Office of Naval Research developed the Skyhook balloons. This program led further to manned gondolas which provided the first data on the space environment and the means of surviving in space. The knowledge gained from these experiments has enabled the Navy to provide much of the space survival information required by NASA for Project Mercury. Also, as part of the program, the first telescopic observations were made above the atmosphere of the planet Venus which led to the finding of the presence of water vapor on that planet. Such research as this is being contained by NASA in their orbital astronomical satellite.

Beyond space probes and in the field of Earth satellites, the Navy is similarly proud of its record. As early as 1946, the Navy recognized the potential of satellites and initiated, jointly with the Army Air Corps, the first United States Earth satellite effort. During the 1946–48 period, over one million dollars in research and development funds were expended to develop flight techniques, equipment and payload design, controls and the booster vehicle. This rocket was a very advanced design and included a liquid hydrogen-liquid oxygen rocket motor.

Although this program was terminated in 1948 by the OSD Research and Development Board, this early start made a substantial contribution. The USAF space studies by the Rand Corp. evolved from this effort, and early hydrogen rocket research was stimulated.

In 1954, Project Orbiter was sponsored initially by the Office of Naval Research. This was a satellite vehicle concept that eventually evolved into the Army Explorer satellite project.

Later, in 1955, a special OSD committee chaired by Dr. Homer J. Stewart was convened to review several proposals for an Earth satellite. The committee voted to accept the Navy's proposal for Vanguard as the International Geophysical Year program for an Earth satellite.

The Vanguard satellite and space vehicle was developed by the Navy at the Naval Research Laboratory. This project resulted in the successful orbiting of an artificial Earth satellite to obtain scientific data. From the Vanguard satellites data were obtained on the Earth's magnetic field, intensity of solar radiation, meteorite penetration, dust erosion, space temperatures and related phenomena which has brought about a new and basic understanding of space environment. This fundamental knowledge has contributed directly to all follow-on satellite programs.

As part of the Vanguard program, a global tracking and telemetering system known as Minitrack was developed. A total of twelve stations were constructed and deployed by the Naval Research Laboratory. This network was used successfully in the Vanguard program and, after the network was transferred to NASA, it has been used on various NASA programs.

A major outgrowth of the Minitrack space tracking technique was the application of these results to the development of the space surveillance system (Spasur) which is now operational. This system is used for the detection, tracking and prediction of orbits of non-radiating and uncooperative satellites.

Another major achievement was the development of the theory of the pear-shaped Earth from the orbital data of the stable Vanguard I. This Vanguard orbit data was also used to located accurately the position of various islands in the Pacific Ocean.

This geophysical achievement was basic and led to the revolutionary use of satellites for global geodesy. This work is now being prosecuted by the Navy jointly with the Air Force, the Army and NASA under Project Anna, the geodetic satellite.

Again, in 1958, the Argus Project was initiated to insert high energy electrons into space using high altitude nuclear explosions in order to verify the theory that space radiation particles are captured by the Earth's magnetic field. A major portion of this project was accomplished by the Navy under the direction of the Office of Naval Research. Three large solid propellant rockets were launched from the USS *Norton Sound* in the South Atlantic—a good example of the advantages of mobility in space operations. Three nuclear explosions were achieved at nominal altitudes of 300 miles. The high energy electrons traveled along the magnetic lines of force and spread to create an "electron-shell" around the Earth. In effect, the artificial equivalent of the two natural Van Allen radiation belts was created. The electrons created an artificial aurora which interfered locally with certain radio transmissions. This experiment demonstrated the capability to disturb the ionosphere actively and leads to new understanding of the ionosphere and the possibility of control of communications with similar space phenomena.

These achievements, together with many experiments and developments in guidance, propulsion, instrumentation, range operations and other facets of space research, have now begun to bear fruit.

While it is difficult to look clearly into the future, certain things make judging easier. One of these is the past record.

We are in the throes of worldwide changes, technological and otherwise. There have been and there will continue to be dramatic changes to our national courses, our military postures and our very lives. There is no sign of a slowdown in this technological advance. More money, people, and resources are being applied to science and technology than ever before and no slowing influences are apparent.

How far we will go in space for military applications, no one knows. I do know we need to continue to work hard—to continue research in order to be ready for this opportunity.

I am convinced that space technology and space systems are essential to keeping the Navy's strength and readiness at a top level. Just as airpower gave new life and strength to our fleet in the past half century and as nuclear power is opening new horizons of today's fleet, space systems may add immeasurably to the capabilities of the Navy of the future. We are already seeing some of the impact of space technology on the new Navy. The Polaris missile, operating in outer space, has been combined with the most modern technology to bring forth one of this Nation's most effective deterrent forces.

To me it is vital to our security that unnecessary restrictions are not imposed on the ability of the Navy to analyze space technology, to conduct space research, and to create space systems to improve seapower and to further the national space effort.

It is vital that the Navy and its sister Services employ all of the sciences and technologies which are available today in order to improve our readiness for national defense and the preservation of peace.

## STATEMENT OF HON. JAMES H. WAKELIN, JR., ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH AND DEVELOPMENT

Secretary WAKELIN. Mr. Chairman and members of the committee, I should just like to brief what I submitted to you as a statement and to say that we have a long history of success in the area of space and space vehicles, and in the field of navigation, communications, study of the upper atmosphere, probes and high altitude balloon studies.

These have not only contributed to our mission as a navy but formed a background for the scientific achievements of other people who we hope are interested in space.

We believe our role in the national effort is to make our laboratories and our scientists available for work in both research and development in the whole field of space technology, where they are qualified. We have excellent laboratories, one of which, the Naval Research Laboratory, has done outstanding work in upper atmosphere physics, in communications, and the Moon relay problem, and has recently been able to study the upper atmosphere by a pickaback to Transit.

We have the Applied Physics Laboratory, whose work in the development of the Transit pay load has been an historic development, having been done so inexpensively in such a short time.

We have the Naval Ordnance Test Station at China Lake, Calif., which has contributed a great deal of work.

We have supported Project Mercury for NASA through our work in the Naval Air Development Center at Johnsville, Pa., where we have human centrifuge equipment to which the astronauts have been subjected in physiological studies. We have also a school of Aviation Medicine at Pensacola, which we believe is a most important activity to further studies of humans in the space flight problem.

This is all I wish to say in furtherance of my statement, except to emphasize again what Secretary Connally has said, and that is our scientific effort in the Navy has not been changed one bit. We have informed the people in the laboratories and bureaus that there will be no substantial change at all in our scientific effort in this field and that we don't believe that the things we are doing now, at the Pacific Missile Range and the Space Surveillance System, are going to be substantially changed at all by this directive.

(The committee was provided with this checklist of Navy inhouse facilities useful for space research:)

NAVY INHOUSE FACILITIES

Naval Research Laboratory—Vanguard, Greb, Lofti, Mini-track, Spasur, Orbiter (Explorer), Upper atmospheric research
Special project group—Polaris missile
Nuclear propulsion group—Nuclear reactors for propulsion
Pacific Missile Range—Important segment of astronautic ground environment
Naval Ordnance Test Station—Caleb, Sidewinder
Naval Missile & Astronautic Center—Hydra
Various launch ships—Argus, Polaris tests, sea recovery
Naval Aero-medical Facilities—
- Aviation Medical Acceleration Lab—centrifuge
- Air Crew Equipment Lab—closed ecological systems—pressure suits
- Naval School of Aviation Medicine—disorientation study
- Naval Medical Research Institute—heat, vibration, $CO_2$, tolerance
- Naval Parachute Unit—escape systems
- Naval Medical Research Lab—atmospheric control

Shipyards—launching and handling capability for large metallic shapes

The CHAIRMAN. Thank you very much, Mr. Secretary.

We have, sitting quietly over here, a very able service man. We have had him before our Committee. He has given us a great deal of help. I refer to Vice Admiral John T. Hayward, Deputy Chief of Naval Operations for Development.

Admiral Hayward, if you have a statement you would like to make, we would be glad to have it at this time.

(The biographical sketch of Admiral Hayward is as follows:)

VICE ADM. JOHN T. HAYWARD, U.S. NAVY

Born in New York City on November 15, 1908, Adm. John Tucker Hayward had 15 months' enlisted service before his appointment to the Naval Academy in August 1926. As a Midshipman he excelled in water polo, being a member of intercollegiate championship teams for 3 years and All-American in 1930. Graduated and commissioned ensign in 1930, he subsequently advanced to the rank of vice admiral, in 1959.

His early service included sea duty in the U.S.S. *Richmond*, and for saving the lives of members of a swimming party at Tela, Honduras, in June 1931 while attached to that cruiser, he was awarded the Silver Life Saving Medal by the U.S. Treasury Department. He was designated naval aviator on September 13, 1932, and subsequently served in carrier based Scouting Squadron 1; Patrol Squadron 2, based on Coco Solo, C.Z.; the aviation unit of the cruiser *Philadelphia;* and as senior aviator of the cruiser *Phoenix.*

Prior to and following the outbreak of World War II he served as Assistant Chief Engineer (for Instruments) at the Naval Aircraft Factory, Philadelphia, and while so assigned had duty in 1940–41 as U.S. Naval Observer with the Royal Air Force. From December 1942 until March 1943 he had command of Headquarters Squadron, Fleet Air Wing 2, on the west coast. He commissioned, then commanded Bombing Squadron 106 in 1943–44, and for outstanding service in action in the Central, South, and Southwest Pacific, was awarded the Silver Star Medal, Legion of Merit, Distinguished Flying Cross (four times, once by the Army), the Air Medal (five times). He was also awarded the Purple Heart Medal for wounds received during the bombing of Canton Island by enemy aircraft in March 1943, and is entitled to the Army Distinguished Unit Ribbon for service with the 5th Air Force.

In June 1944 he became experimental officer at the Naval Ordnance Test Station, Inyokern, Calif., where he worked on all phases of rocket development and the development of, and study of destruction caused by the atom bomb. He received a letter of commendation from the Secretary of the Navy for extraordinary achievement in that field. From July to December 1948 he was Director of Plans and Operations for the Armed Forces, Sandia Base, Albuquerque, N. Mex., concerned with the use of atomic weapons and integration of military requirements with the Los Alamos Scientific Laboratory.

He has a total of over 12,000 hours of flight as a pilot and has participated over many years in the development of new aircraft. He was the first naval aviator to land heavy attack aircraft on board our carriers and had the job of putting the atom into the fleet. The present heavy attack squadrons all began when he assumed command of Composite Squadron 5 in December 1948. He held this command until June 1951. This was followed by a tour of duty with the Atomic Energy Commission (Military Application Division), a year at sea in command of the carrier escort vessel *Point Cruz,* and command of the Naval Ordnance Laboratory from June 1954 to January 1956.

He commanded the giant aircraft carrier U.S.S. *Franklin D. Roosevelt* from February 1956 until January 1957, when he became Special Assistant to the Director, Strategic Plans Division, Office of the Chief of Naval Operations. In October 1957 he assumed the duties of Assistant Chief of Naval Operations (Research and Development) and in April 1959 reported as Deputy Chief of Naval Operations (Development).

Navy: Office of Information, Biographies Branch, January 6, 1961.

Personal data:

Born: November 15, 1908, New York, N.Y.

Parents: Charles B. Hayward (deceased) and Rosa Valdetarro Hayward (father was associated with Wright brothers and prominent in aviation. Author of outstanding texts on aeronautics).

Wife: Lelia Marion Hyer, of Pensacola, Fla.

Children: Mary Shelley, Lelia Marion, Victoria, Jennifer, and John T. Hayward, Jr.

Address (official): Box 110, Pensacola, Fla.

Education: Loyola School, New York City; Oakdale Military Academy, Long Island, N.Y.; U.S. Naval Academy, Annapolis, Md. (BS, 1930); completed Naval War College correspondence courses in strategy and tactics and international law.

Promotions: Enlisted, June 29, 1925; honorably discharged, July 12, 1926; midshipman, July 13, 1926; commissioned ensign, June 5, 1930; lieutenant (jg), June 5, 1933; lieutenant, June 30, 1937; lieutenant commander (T), January 2, 1942; lieutenant commander, May 29, 1943, to rank from June 30, 1942; commander (T), August 20, 1943; captain (T), December 10, 1945; commander, August 7, 1947, to rank from December 30, 1941; temporary appointment as captain terminated, January 1, 1948; captain (T), August 1, 1948; captain, July 1, 1951, to rank from August 1, 1948; rear admiral, to rank from August 1, 1957; vice admiral, to rank from April 25, 1959.

Decorations and medals: Silver Star Medal, Legion of Merit with Combat "V", Distinguished Flying Cross with two gold stars and Oak Leaf Cluster (Army), Air Medal with four gold stars, letter of commendation with ribbon and one bronze star, Army Distinguished Unit Citation (Fifth Air Force), Purple Heart Medal, Silver Life Saving Medal, Second Nicaraguan Campaign Medal, American Defense Service Medal, Fleet Clasp, American Campaign Medal, Asiatic-Pacific Campaign Medal with one silver star and three bronze stars, World War II Victory Medal, Naval Occupation Service Medal, Asia Clasp, National Defense Service Medal, Philippine Liberation Ribbon, Order of British Empire (Honorary Officer) and Ribbon Bar.

Citations: Silver Star Medal and Army Oak Leaf Cluster to the DFC (not available), Legion fo Merit with Combat "V": "For distinguishing himself * * * during the period March 25, 1944, to June 1, 1944, as commanding officer of Bombing Squadron 106. He successfully carried out 305 long-range search operations, armed reconnaissance, and offensive strikes against the enemy. As a result of the offensive actions of the aircraft under his command, 12 enemy cargo vessels and 14 barges were sunk and 10 enemy vessels and 13 barges were damaged. In aerial combat the squadron shot down 12 and damaged 3 enemy aircraft * * *."

Distinguished Flying Cross: "For heroism and extraordinary achievement in aerial flight as commander of a heavy bombing squadron in action against enemy Japanese forces on Wake Island, October 5, 1943 * * * (He) skillfully directed and coordinated the operations of his squadron in bombing and strafing important enemy installations, pressing home his own powerful attacks accurately and with aggressive determination and obtaining many valuable photographs of the target area. His inspiring leadership and indomitable fighting spirit, maintained at great personal risk, were responsible in large measure for the oustanding success of this vital mission * * *."

Gold Star in lieu of Second Distinguished Flying Cross: "For heroism and extraordinary achievement * * * in the South Pacific War Area from November 8, 1943, to February 24, 1944 * * * (He) completed many combat and search missions over hostile territory and, by his courage and determination, succeeded in launching a smashing bombing attack on Kapingamarangi Island to score four direct hits on an enemy bivouac area, in sinking several Japanese supply barges on three other occasions and in spotting three hostile cargo vessels in Kavieng Harbor to enable our forces to destroy them * * *."

Gold Star in lieu of Third Distinguished Flying Cross: "For heroism and extraordinary achievement in aerial flight during operations against enemy Japanese forces in the Pacific Area from April 1 to 23, 1944 * * *."

The Air Medal and Gold Star in lieu of four additional Air Medals were awarded "For meritorious achievement in aerial flight during operations against enemy Japanese forces in the Pacific area * * *" from October 13, 1943, to May 19, 1944.

Letter of Commendation with Ribbon (SecNav): "While serving as Experimental Operations Officer of the U.S. Naval Ordnance Test Station, Inyokern, Calif., from August 4, 1944 to August 9, 1945, he distinguished himself by extraordinary achievement in connection with the development, organization, and operation of the station * * *. His active participation in hazardous aerial flights in connection with experimental projects being carried on, and his untiring devotion to duty were a source of inspiration to those who worked with

him. His skill, technical knowledge and initiative were in a large measure responsible for the development of new weapons being tested at this station * * *."

Chronological transcript of service:

August 1930 to September 1931: U.S.S. *Richmond.*

October 1931 to October 1932: Naval Air Station, Pensacola, Fla. (instruction).

November 1932 to April 1935: Scouting Squadron One–B (U.S.S. *Langley*).

April 1935 to June 1935: Scouting Squadron One–B (U.S.S. *Ranger*).

July 1935 to May 1937: Patrol Squadron Two–F, Aircraft Squadrons.

June 1937 to July 1938: U.S.S. *Philadelphia* (Aviation unit).

August 1938 to May 1940: U.S.S. *Phoenix* (Senior Aviator).

June 1940 to September 1942: Naval Aircraft Factory, Navy Yard, Philadelphia, Pa., (Assistant Chief).

October 1942 to April 1943: Headquarters Squadron, Fleet Air Wing two (Commanding Officer).

May 1943 to June 1944: Bombing Squadron 106 (Commanding Officer).

July 1944 to July 1947: Naval Ordnance Test Station, Inyokern, Calif. (Experimental Officer) (Fleet Air West Coast, 1 month).

August 1947 to December 1948: Sandia Base, Albuquerque, N. Mex. (Director, Plans and Operations for Armed Forces).

December 1948 to June 1951: Composite Squadron Five (Commanding Officer).

June 1951 to May 1953: U.S. Atomic Energy Commission, Washington, D.C. (Military Application Division).

May 1953 to May 1954: U.S.S. *Point Cruz* (CO).

June 1954 to January 1956: U.S. Naval Ordnance Laboratory, White Oak, Md. (CO).

February 1956 to December 1956: U.S.S. *Franklin D. Roosevelt* (PCO and CO).

January 1957: Office of Chief of Naval Operations, Naval Department (Director, Strategic Plans Division).

October 1957 to April 1959: Assistant Chief of Naval Operations (Research and Development), Navy Department.

April 1959: Deputy Chief of Naval Operations (Development), Navy Department.

Navy—Office of Information (Biographies branch) 25 May 1959.

Graduate work and technical background Vice Adm. John T. Hayward, U.S. Navy: Years 1937, 1938, 1939, 1940 University of Pennsylvania, Moore School and Temple University.

(*a*) Theoretical physics.
(*b*) Electronics.
(*c*) VH frequency currents.
(*d*) Mathematical analysis.
(*e*) Elementary foundry work.
(*f*) Experimental atomic physics.
(*g*) Applied gyrodynamics.
(*h*) Procedures in experimental physics.
(*i*) Magnetism.

Years 1944–46 California Institute of Technology OSRD ran NOTS Inyokern technical work at this time.

(*a*) Exterior ballistics of rockets.
(*b*) Chemistry of explosives.
(*c*) Chemistry of propellants (solid).
(*d*) Aerodynamics.
(*e*) Optics.
(*f*) Microtime physics.
(*g*) Interior ballistics of rockets.
(*h*) Strength of materials.
(*i*) Explosive casting techniques.

Years 1947–48 University of New Mexico and Los Alamos.

(*a*) Contemporary physics.
(*b*) Physics of the atmosphere.
(*c*) Wave mechanics.
(*d*) Critical assemblies.
(*e*) Uranium processes.
(*f*) Plutonium processes.
(*g*) Nuclear processes.

Year 1949—Stanford.

(*a*) Compressible and supersonic flows.

(*b*) Theoretical chemistry.

During the period at Philadelphia he was in charge of all instrument development for the aeronautical organization of the Navy. This included navigational instruments and techniques for aircraft.

While at Inyokern he worked for the California Institute of Technology as experimental officer. This included all work on the rockets developed by the OSRD and the building of the technical facilities at Inyokern. The Manhattan District work called for him to work on checking all radar fuzing and its operational functioning on the weapon. The explosive casting and assembly work was also done. This work was done with Los Alamos under the direct supervision of Dr. Oppenheimer and the late Rear Adm. W. S. Parsons, USN. He went to Japan at the close of hostilities for the Nagasaki and Hiroshima study. In 1946 he had charge of the first attempt to photograph a nuclear explosion (Bikini) at 800,000 frames a second to see if one could relate yield to actual expansion rate of fireball. This year found him in charge of the first Bumblebee tests at Johns Hopkins.

The passage of the Atomic Energy Act brought his transfer to New Mexico in 1947, where the construction of the Sandia Base began and personnel were actively trained for use of the atomic weapons. Here facilities were designed in conjunction with the Bureau of Ships. The *Coral Sea*, *Midway*, and *Roosevelt* were the first to be so configured. He participated as a technical assistant in Sandstone where he worked on the measurement of alpha rays and an attempt to measure neutrons of various energies. His work was in close collaboration with Los Alamos and specifically with Dr. Bradbury, the new Director.

In 1949 he was designated to organize and train the first heavy attack squadron which was to be a wing. This tour lasted 2 years and out of the successful operation of the AJ grew the first atomic capability. The A3D concept had been chosen earlier with the decision that the AJ would be the interim solution.

In 1951 he was ordered to the Atomic Energy Commission as the Head of Weapon Research in the Division of Military Application, where he participated in program planning for all atomic weapons laboratory work at Los Alamos and Sandia. Operation Greenhouse, Buster and Ivy were in these programs and were of considerable technical impact on our whole atomic program. The formation of the Livermore Laboratory program in 1952 was one of the responsibilities of this Division. His work on this program was done in close collaboration with Dr. Ernest Lawrence and Dr. Edward Teller. His tour with the Commission lasted over 2 years.

In 1954 he became the Commander of the Naval Ordnance Laboratory at White Oak. During his tour, Dr. Bennett, the Technical Director, transferred to General Electric, and until another director was appointed Admiral Hayward was responsible for both jobs. This was a period of 4 months. While there he participated in graduate programs at the University of Maryland.

His work has brought him in contact with practically all the outstanding scientific people of our country. His graduate work was done originally to further his education in physics, his favorite hobby. He is an Associate Fellow in the Institute of Aeronautical Sciences; a member of the American Physical Society and the Society for the Advancement of Science.

## STATEMENT OF VICE ADM. JOHN T. HAYWARD, U.S. NAVY, DEPUTY CHIEF OF NAVAL OPERATIONS (DEVELOPMENT)

Admiral HAYWARD. I have no prepared statement, Mr. Chairman.

My feeling is that the Secretary covered it by saying the implementation of this directive is the most important thing. The Secretary of Defense has told me, along with the Secretary, personally, to continue the programs that we were doing, and if we had any difficulty continuing them, to let him know.

The CHAIRMAN. Now, Admiral Connolly, do you have a statement, sir? You have been quiet there and have not said a word.

(The biography of Admiral Connolly is as follows:)

REAR ADM. THOMAS F. CONNOLLY, U.S. NAVY

Thomas Francis Connolly was born in St. Paul, Minn., on October 24, 1909, son of Thomas Ignatius and Leona (Gillespie) Connolly. He attended the University of California at Los Angeles, prior to his appointment to the U.S. Naval Academy, Annapolis, Md., from the 11th Congressional District of California in 1929. As a midshipman he was a member of the American Olympic team in 1932; athletic editor of the Lucky Bag; and was awarded the Society of the Cincinnati Sword for excellence in modern languages. Graduated and commissioned ensign on June 1, 1933, he subsequently advanced in rank attaining that of captain, to date from July 1, 1951. His selection for rear admiral approved by the President on July 22, 1959, his date of rank is April 1, 1960.

After graduation from the Naval Academy in 1933, he served for 2 years aboard the U.S.S. *Cincinnati*, before receiving orders in June 1935 to the Naval Air Station, Pensacola, Fla., for flight training. Designated naval aviator on July 22, 1936, he remained at Pensacola for a month, and in September was assigned to Observation Squadron 2–B (redesignated Observation Squadron 1 in July 1937), attached to the U.S.S. *Nevada*. In June 1938 he transferred to Patrol Squadron 12 based on the U.S.S. *Langley*, which in 1939 won the Schiff trophy (awarded annually to the naval aviation squadron or unit with the best safety record in flying during the year).

During July and August 1939 he had duty with Training Squadron 8 attached to the U.S. Naval Academy. Between July 1939 and May 1941 he attended a course in aeronautical engineering at the Postgraduate School, Annapolis, continuing instruction at the Massachusetts Institute of Technology at Cambridge, where he received the degree of master of science in May 1942. He had duty under instruction at various places for a month, and in June 1942 he joined Patrol Squadron 13, assuming command of that squadron on March 11, 1943. While in command of Patrol Squadron 13, he was awarded the Distinguished Flying Cross with Gold Stars in lieu of a second and third Distinguished Flying Cross and an Air Medal with Gold Stars in lieu of a second and third Air Medal. The citations follow in part:

Distinguished Flying Cross: "For heroic and extraordinary achievement in aerial flight as commander of the First Echelon of PB–2Y–3 planes, during action against enemy Japanese forces on Wake Island, January 30, 1944, and succeeding dates * * * Commander Connolly led his unit through intense antiaircraft fire in pressing home a bold strafing and bombing strike at masthead height against the strongly fortified Japanese base and, in addition, personally directed two other night raids on this strategic island, contributing materially to the neutralization of Wake as a factor in our operations connected with the seizure of the Marshall Islands * * *."

Gold Star in lieu of a second Distinguished Flying Cross: "For heroism and extraordinary achievement * * * in action against enemy Japanese forces in the Pacific area, April 17, 1944 * * *. [He] boldly penetrated enemy territory to lead his squadron on a long-distance mine-laying sortie in the harbor of a strongly fortified enemy base and, despite the additional hazards of maneuvering the heavily loaded planes under adverse night weather conditions, successfully executed his mission and brought his squadron back without loss or damage * * *."

Gold Star in lieu of a third Distinguished Flying Cross: "For heroism and extraordinary achievement * * * operating from advanced bases in the Central Pacific area against enemy Japanese forces on Truk, Saipan, and Wotje from May 25 to June 23, 1944 * * *. By his skill and courage, he aided in providing essential intelligence to his own forces and in inflicting damage on the enemy, thereby depriving the Japanese of access to vital bases * * *."

Air Medal: "For meritorious achievement * * * against enemy Japanese forces on Mille and Truk from October 24, 1943, to March 30, 1944 * * *. By his skill and courage, he aided in providing essential intelligence to his own forces and in inflicting damage on the enemy * * *."

Gold Star in lieu of a second Air Medal: "For meritorious achievement * * * operating from advanced bases in the Central Pacific area against enemy Japanese forces on Truk, Ponape, and Wake from April 5 to April 12, 1944 * * *."

Gold Star in lieu of a third Air Medal: "For meritorious achievements in aerial flight as patrol plane commander of a patrol bomber plane in patrol

squadron 13, operating from advanced bases in the Central Pacific area against enemy Japanese forces on Truk, Wotje, and Kusaie from May 1 to May 21, 1944 * * *."

Relieved of command of Patrol Squadron 13 in September 1944, he had a month's duty with Fleet Air, west coast, and between November 1944 and March 1947 served as Assistant Director of Flight Test at the Naval Air Station, Patuxent River, Md. He was executive officer of the U.S.S. *Rendova* until September 1948 when he returned to the Naval Air Station, Patuxent River, for duty as Director of Test Pilot Training. While there he qualified on September 15, 1948, as a helicopter pilot. He attended a course at the Armed Forces Special Weapons Project, Sandia Air Force Base, Albuquerque, N. Mex., from April to June 1951, after which he commanded Composite Squadron 6, operating in the Atlantic. Relieved of command of that squadron in August 1952, he then reported as experimental officer at the Naval Ordnance Test Station, Inyokern, Calif.

Early in 1954 he was assigned to the Office of the Chief of Naval Operations, Navy Department, after which he commanded the U.S.S. *Corregidor*. In the summer of 1957 he transferred to command of the U.S.S. *Hornet* and in September 1958 became Assistant Chief of the Bureau of Aeronautics, Navy Department. In December 1959 he assumed duty as Assistant Chief of the Bureau of Naval Weapons for Pacific Missile Range and Astronautics.

In addition to the Distinguished Flying Cross with two Gold Stars and the Air Medal with two Gold Stars, Rear Admiral Connolly has the American Defense Service Medal; the American Campaign Medal; the Asiatic-Pacific Campaign Medal; the World War II Victory Medal and the National Defense Service Medal.

His usual address and that of his wife, the former Margaret Irene Hagy of Beverly Hills, Calif., is 1717 South Shore Drive, Holland, Mich., but he and the family currently reside at 2353 South Meade Street, Arlington, Va. They have one son, Thomas F. Connolly, Jr., and a daughter, Susan L. Connolly.

## STATEMENT OF REAR ADM. THOMAS F. CONNOLLY, ASSISTANT CHIEF, BUREAU OF NAVAL WEAPONS FOR PACIFIC MISSILE RANGE AND ASTRONAUTICS, DEPARTMENT OF THE NAVY

Admiral CONNOLLY. Mr. Chairman, I do not have a statement. I am here to answer questions.

I see the situation exactly as it has been explained to you, and I am prepared to answer questions that may come up in my particular area.

The CHAIRMAN. Fine.

Well, let me ask you all this question, then:

This directive is not going to put the Navy out of business in space?

Secretary CONNALLY. We certainly would hope not, sir.

Secretary WAKELIN. It is not.

The CHAIRMAN. You will continue with your Polaris program and your other programs that have been defined, and you hope that an interpretation of the exception will put you in a position where you can carry on additional programs in the future?

Secretary WAKELIN. We have every belief that this will be so, Mr. Chairman.

The CHAIRMAN. And that applies to the two Admirals, Admiral Hayward and Admiral Connolly. You agree. [They nod.]

Are there any questions, Mr. Miller?

Mr. MILLER. No.

Only I would like to pay my respects to the three gentlemen who accompanied the Secretary.

I have had the privilege of knowing them. I think that they typify the best in science and the best in dedication to the Navy.

Mr. Secretary, you are very fortunate to have them as your good right arm.

Secretary CONNALLY. Thank you, Congressman.

I could not agree with you more, sir.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. May I say I wish I had been at the meeting with the Secretary of Defense where you say, let me repeat—"I had an opportunity to express the Navy's views on the recent directive and I did it as strongly, as forcefully and eloquently as I could." I notice that you went beyond intelligence and used some force. I think that must have been quite some meeting. The other point I think is this: It is going to be pretty hard to put the Navy out of the space business, because you are on your third anniversary on Vanguard I.

Admiral HAYWARD. Yes.

Mr. FULTON. And five miles a second, 473,040,000 miles already it has gone.

Admiral HAYWARD. Yes, that is correct.

Mr. FULTON. And before it is done, it will be gone for 200 years and will go 31,536,000,000 miles, so we still have 197 years to go with the Navy in space yet and nobody knows how to knock them down.

Secretary WAKELIN. I might say the Vanguard is still broadcasting at 108.25 megacycles.

Admiral HAYWARD. If you would like to listen to it, you may.

Mr. FULTON. I believe the radio has an estimated life of 150 years in space so you have 147 years on that yet, Admiral.

Admiral HAYWARD. Yes.

Mr. FULTON. Well, one other thing before we quit. On the Polaris, suppose you want to go further on the Polaris, either on accuracy and guidance, or on distance, will you have enough—will you have any trouble on that under this directive?

Admiral HAYWARD. No, sir, this is nothing in this directive that has anything to do with the Polaris program.

Mr. FULTON. Can you go as far as you want?

Admiral HAYWARD. Yes, sir.

Mr. FULTON. Even though it competes with Air Force missiles?

Admiral HAYWARD. Well, this does not compete, as I have said before.

Mr. FULTON. I said even though it does.

Admiral HAYWARD. Yes, this is a missile system in being.

Mr. FULTON. May I say, too, Mr. Secretary, I am one of your reserve officers in the Navy and I hope you will continue the reserve program.

I might say I think the Navy has been a very good launching pad because I was elected to Congress from the Admiral's bridge on a jeep carrier in the Pacific in World War II and it was the same carrier Lt. Tom Gates was on.

I was a lieutenant with him.

Secretary CONNALLY. The ancillary benefits this country has received by virtue of the Navy are incalculable. [Laughter.]

Mr. FULTON. When I told the captain I had been elected, I think it was sometime in January though it had happened some 3 months before, I went to the captain and said, I have a matter of enough personal concern for me to speak to him.

He wanted to know if my grandmother had died and I told him I had been elected to Congress. His comment was, "Why does this have to happen to my ship?"

The CHAIRMAN. Well, let us get away from these career men now. Mr. Bell, you have a question?

Mr. BELL. Yes. Mr. Secretary, or anyone who wants to answer it. Perhaps you might not like to comment on it. But in view of the fact many of the decisions are going to be made who is to do which particular job as the years progress, by the Secretary of Defense, according to this new directive, I would like to ask you if you see any feature in this that is developing toward the Secretary of Defense being a stronger body which may eventually result in a unified command?

Do you see anything in this that is developing in that direction?

Secretary CONNALLY. It certainly could under the Reorganization Acts that have occurred, particularly the 1958 act. The Secretary of Defense has very broad powers. There is no question about his powers.

Mr. BELL. But does this increase——

Secretary CONNALLY. What the exercise of those powers would result in we have no way of knowing.

Admiral HAYWARD. Mr. Bell, we have many unified commands today and have for some time but the Secretary of Defense has this authority and this has happened over many programs.

Secretary CONNALLY. We have many single management programs. A single program for petroleum—for all of the drugs and many others.

Mr. BELL. But you do agree this strengthens the Defense Department's position somewhat—this directive.

Secretary CONNALLY. I think it does, yes.

The CHAIRMAN. Mr. Corman?

Mr. CORMAN. You managed these other single management programs such as petroleum and so forth. I want to know if this is analogous to that, this directive in another field and if any of these other programs resulted in hardships to any branches of the Services or have they generally worked out efficiently? I am talking about these unified management directives in other fields.

Secretary CONNALLY. To my knowledge and I am not sure the two precisely are analogous, I would say they were not, because in the other cases of the single managers you are dealing with things, procurement as such, whereas here you are dealing with a great deal more than that.

But in those areas where you have single managers to my knowledge there has been no great hardship on any of the Services. Would you disagree or agree with that?

Secretary WAKELIN. I would not disagree with it.

The CHAIRMAN. Mr. Anfuso.

Mr. ANFUSO. I just want to put in the record what has already been said regarding Rear Admiral Connolly, Dr. Wakelin, the Assistant Secretary of the Navy and Vice Admiral Hayward. They are the finest of men. I hope they will continue under you, Mr. Secretary, and they will not lose any of their great vim and vitality that they have demonstrated in the past.

The CHAIRMAN. Does anybody else have any remarks to put in the record on that point?

Mr. HECHLER. One final question: If you want to go beyond the preliminary research stage, and the Director of Defense Research and Engineering turns you down, do you feel you have a good channel there?

Suppose you feel very deeply about the necessity for a particular project to pursue it. Do you have a channel to the Secretary of Defense through which you feel free to go?

Secretary CONNALLY. Yes, sir, and let me say this, sir, and this may sound like a self-serving declaration on behalf of the Navy but we definitely feel we have an avenue directly to the Secretary of the Defense.

At some point someone has to make decisions and we are willing to abide by them when they are made but if I exude any spirit of confidence in the Navy pursuing its research and its programs it is because I am supremely confident that the Navy has within its scientists and within its laboratories the finest inhouse capabilities in this country. I think we have as fine a group of dedicated intelligent outstanding men in uniform as any country in the world and I believe given the type of personnel we have, given the brains and dedication that we have in the Navy, that we can sell anything that we really believe in.

Now, perhaps my confidence may not be borne out. But I think the accomplishments that the Navy already has in its record should be pretty tremendous proof that they are not only men of great knowledge and initiative, who can conceive projects of great value to this country, but that they have the dedication and the tenacity to pursue them to accomplishment.

Mr. HECHLER. You do not think this directive is going to hurt the kind of thing Admiral Rickover is doing or the people working with him?

Secretary CONNALLY. No, I do not. It should not have any effect whatsoever on it.

Mr. HECHLER. Thank you.

The CHAIRMAN. Mr. Ryan.

Mr. RYAN. Mr. Secretary, how do you feel this directive will affect the Navy's budget for space research?

Secretary CONNALLY. Well, I do not quite know how to answer that. I would hope it would not affect it at all. It perhaps will in isolated areas. But it simply means that perhaps our activities will be restricted in certain areas within our own—with our own choosing, that we might place more emphasis on one than another. It may well mean that beyond the point of preliminary basic research, that we will be able to channel more money into projects that we strongly believe in and advance that equally provided we get the same number of dollars. Whether or not we will I cannot say.

Admiral HAYWARD. Can I answer Mr. Ryan to let me give you a good example. The Navy started and did all of the shock tube work in the United States.

This was started years ago and without it we would not have had a successful re-entry body for the Air Force or anyone else.

It could not have been said at the time one started all this what its use would be. So when we defend a budget we realize that what we get for our research will depend upon our tenacity, our salesmanship, and how we sell research programs. In the large booster field,

we have no intention of competing or duplicating some of the really large boosters, or any of the really large systems. Any such attempts would certainly suffer. But the Department of Defense would make the decision which programs are going forward just as they do now anyway, in everything, not just space.

Mr. FULTON. Is it not a fact on Service cooperation, that while the Air Force has the Discoverer program, yet it was the Navy on the recovered capsule and the navigation and the Air Force could not have done it without the accuracy of the navigational system?

Admiral HAYWARD. That is right. We put the Transit oscillator on the Discoverer and everybody knows we were delighted because we are interested in a successful Discoverer program.

Mr. FULTON. I think it was so successful I would like the team arrangement continued with adequate room for research and development across the board.

The CHAIRMAN. Are there any further questions from anyone on the committee? If not, I would like to say this: We have plans to invite General Lemnitzer down here. He is Chairman of the Joint Chiefs of Staff. I have asked Dr. Sheldon if he will contact the General and make arrangements. We have beginning tomorrow plans to resume the hearing on the NASA authorization budget, and we will do so at that time. When General Lemnitzer is available, we can set aside those hearings for the purpose of hearing him. That will more or less conclude our hearings.

I want to thank everybody who participated in the hearings. I think they have been excellent, and I believe, Mr. Secretary, and gentlemen, that I can voice the sentiment of the entire committee when I say this, that what the committee is interested in is to get along with the program of space, with the utmost efficiency, with speed, and with results that we can use to sell to our people out in the country. If we do that, and the directive bears it out, I believe it will go a long way toward satisfying the committee and the Congress. And I want to thank all of you gentlemen for coming here and helping this committee. We will recess now until tomorrow morning.

As I stated on the first day of these hearings, there are certain additional questions which together with their answers I wish added to the record.

(The questions and answers referred to are as follows:)

QUESTIONS ADDRESSED TO THE NAVY

*Question 1.* Can you trace for us how you visualize the operation of the directive of March 6: Suppose the Navy does preliminary research on a space project in which it is interested, and then development is turned over to the Air Force. Which service will fund the development? How will the Navy insure that its operational requirements are adequately reflected in detail in the development phase?

*Answer:* The Secretary of Defense has offered considerable assurance that the Air Force will indeed be responsive to the space requirements of the other military Services. It is anticipated that the manner of satisfying these needs will be similar to that which is employed in the operation of such facilities as the Natonal Missile Ranges. In such case, the requirements of all of the users are made known sufficiently in advance to the Service having responsibility for the provision of the service, who then provides the necessary funding to satisfy those needs. In the space requirements then, it would appear that the Air Force would fund for the developments which result from preliminary research performed by the Navy. Since implementing instructions for the recent directive

have not been issued, it is not known how the Navy will insure that its operational requirements are observed. The Navy will make its requirements clearly known to the Department of Defense and the Air Force to assist the Secretary of Defense in carrying out his expressed intent of insuring that its needs are met.

*Question 2.* To what extent will the Navy press for use of its facilities and personnel as subcontractors for Air Force space development projects? If such work is not forthcoming, would the Navy prefer to re-orient research efforts, replacing equipment and personnel, or would it recommend their wholesale transfer to Air Force control in the manner of the Vanguard team which transferred to NASA?

*Answer:* Navy laboratories are not primarily involved in space development projects nor do they pursue strictly space projects. Their capabilities and real value to the Navy lie in the functionally oriented generation of ideas and in the evolution of concepts for future systems based on their expert knowledge of Navy requirements and abilities. Therefore, it is not anticipated that any transfer of facilities or personnel would be involved since these laboratories would continue preliminary research under the terms of the new directive. Since most developments are carried out by industry whether sponsored by the Navy or the Air Force, there is now a primary contracting authority for space system development in the DOD.

*Question 3.* Explain how you would expect Navy interests to be protected in the fields of ocean reconnaissance and tactical weather systems under the terms of the directive. Would the Navy develop suitable satellites for launching by its own Sea Scout, or turn them over for Air Force launching, or would the Air Force develop and operate these devices for later Navy use, or would the Air Force develop and operate these devices, and merely supply the resulting data to the Navy?

*Answer:* The Navy would be the first to state that it has no desire to compete with or duplicate the efforts being undertaken by another agency which could be used to satisfy Navy needs. The approach of simply using the data provided by another Service is certainly acceptable as was demonstrated by Tiros, although the system certainly was not adequate to satisfy Navy requirements. There is an immediate need for a tactical meteorological satellite in advance of the National meteorological system which may meet Navy needs by 1965. Similarly, in ocean reconnaissance, it is conceivable that other reconnaissance satellites could perform this function although present developments in sensors, coverage, and data collection are not oriented toward Naval applications. This solution of having one Service provide essential services to another has been used in a number of instances previously with varying degrees of success. The efficiency of such arrangement appears to lie not in the wording of the directive which instituted the policy, but rather in the similarity of the users needs to those of the primary supplier. Since the techniques of sea reconnaissance differ so greatly from those of target surveillance, development of a Naval system under the "exceptions" provision may be warranted. As for the question of who performs launches, the Navy considers that the advantages to be gained from mobile space operations, using the sea environment, are so great that the U.S. space program should not be penalized by restricting it to existing facilities.

*Question 4.* Please define "preliminary research".

*Answer:* "Preliminary research" is the first of the three phases of space systems as treated by the DOD Space Directive; it preceeds space systems development and operational status. "Preliminary research" then, is understood to include exploratory research, studies and anlyses of special problems, component research, experimental tests, and systems analyses. A liberal interpretation of the term preliminary research is essential to assure a broad attack on the space frontier by all potential users.

(Whereupon, at 11:55 a.m. the committee recessed until 10 a.m., Wednesday, March 22, 1961, to open hearings on another subject; the remaining meeting on the Department of Defense directive was arranged for 10 a.m., Thursday, March 23, 1961.)

# DEFENSE SPACE INTERESTS

THURSDAY, MARCH 23, 1961

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

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

The CHAIRMAN. The meeting will come to order. We are going to be a little crowded here. Members will be dropping in. I am sure most all of them will be here this morning. They will be here in a few moments. I think we will go ahead in the interim.

At this time I want to say that we have one last witness on the hearing which we began sometime ago on the question of developing the scope and the effect of the order recently issued by the Secretary of Defense covering the assignment of research and development in space.

This morning we have General Lemnitzer, Chairman of the Joint Chiefs of Staff, a very able soldier, certainly a fine Chairman of the Joint Chiefs of Staff, a friend of this committee, a man who presented us with this battle flag here with 142 streamers, and the committee, General, still appreciates that fine sentiment that actuated you in bringing us that flag, so that we could have it here in our committee room during the sessions.

I understand you have just returned to Washington, that you have not had time to draw up a prepared statement; as a result of it, I am going to ask you this:

The committee has asked you to come here. You voluntarily came but it is at the request of the committee. I would like to ask you if you want to make a short statement before we ask a few questions.

(The biography of General Lemnitzer is as follows:)

GENERAL LYMAN LOUIS LEMNITZER

Lyman L. Lemnitzer was born in Honesdale, Pennsylvania, on August 29, 1899. He graduated from Honesdale High School in June 1917, and the following year entered the U.S. Military Academy, graduating in 1920. His assignments from that time until the outbreak of World War II alternated between duty with troops and service as student and instructor at Army schools. As a member of the Coast Artillery Rifle Team, he became known as one of the Army's outstanding rifle marksmen, winning the National Team Gold Medal, the First Place Gold Medal in the Philippine Department, and the Distinguished Marksman's Badge. He completed two tours at Fort Mills, Corregidor, Philippine Islands; he was twice assigned to the U.S. Military Academy as an instructor in the Department of Natural and Experimental Philosophy; and, following his graduation from the Command and General Staff School in 1936, he served three years as an instructor of tactices at the Coast Artillery School, Fort Monroe, Virginia.

As a member of the last pre-war class at the Army War College (1940), he began establishing a firm reputation as a thorough and imaginative planner. In consequence, with the beginning of the expansion of the U.S. Army, early in 1941 he was recalled from duty with an antiaircraft artillery brigade at Camp Stewart, Georgia, to an assignment with the War Plans Division of the War Department General Staff. In this position, and during succeeding months with General Headquarters, U.S. Army and Headquarters, Army Ground Forces, he took part in the planning for mobilization and training of the huge wartime Army and for the projected landings in North Africa, known as Operation Torch.

August, 1942 found him in England as the Commanding General of the 34th Antiaircraft Artillery Brigade. His intimate familiarity with the plans for the forthcoming North African operation, however, promptly led to his assignment to General Eisenhower's Allied Force Headquarters. Here, although retaining command of his brigade, he was designated Assistant Chief of Staff for Plans and Operations, charged with directing the final, detailed preparations for the landings and the operations in North Africa. In this capacity he accompanied General Mark W. Clark as second-in-command of the dramatic secret submarine mission to contact friendly French officials three weeks prior to the landings and smooth the way for Allied invasion forces. For his participation in this mission, he won the Legion of Merit (Degree of Officer).

After a brief return to England, General Lemnitzer moved to North Africa as a member of General Eisenhower's staff. In January 1943 he was assigned as Deputy Chief of Staff to General Mark Clark in Morocco during the early phases of the organization of Fifth Army. Resuming active command of his brigade in late February 1943 he led it through the Tunisian Campaign and the early landing phases of the Sicilian Campaign.

General Lemnitzer's service during the remainder of the war was as U.S. Deputy Chief of Staff and Chief of Staff to General (later Field Marshal) Sir Harold Alexander, who was first the Commander-in-Chief of the 15th Army Group and later the Supreme Allied Commander, Mediterranean. In addition, General Lemnitzer served as Chef of Staff to the Commanding General of the (U.S.) Mediterranean Theater of Operations. Under Sir Harold Alexander, General Lemnitzer took part in the negotiations with Marshal Badoglio which led to the capitulation of Italy, in the discussions with Marshal Tito and with Soviet Marshal Tolbukhin for the coordination of the final military operations by the Yugoslav and Russian armed forces against the German armies in Southern Europe. In March 1945 General Lemnitzer entered Switzerland in civilian clothes, charged with management of the discussions with German representatives which resulted in the unconditional surrender of the German armed forces in Italy and Southern Austria. In discharging these responsible and important functions he earned a reputation as an able negotiator and military diplomat.

General Lemnitzer's skill as a planner was put to immediate use following the war when he was designated as the Senior Army Member of the Joint Strategic Survey Committee of the Joint Chiefs of Staff, in Washington, D.C. He next became Deputy Commandant of the National War College, playing a key part in the establishment of that agency for the highest level of joint military education. At this time, he also served as head of the U.S. Delegation to the Military Committee of the Five (Brussels Pact) Powers in London, helping to pave the way for the establishment of the North Atlantic Treaty Organization. He assisted in the presentation of the NATO Treaty to the Senate for ratification.

On the strength of his experience as a military diplomat, he next was named the first Director of the Office of Military Assistance, under Secretary of Defense James Forrestal. In this capacity he played a key role in establishing the Military Assistance Program which has provided a major element in the Free World's mutual security activities.

Returning to duty with troops, in 1950 General Lemnitzer qualified as a parachutist, at the age of fifty-one, and assumed command of the 11th Airborne Division, at Fort Campbell, Kentucky. A year later he went to Korea, commanding the 7th Infantry Division in the Battles of Heartbreak Ridge, The Punch Bowl, and Mundung-ni Valley, and in the fighting in the Chorwon Valley, winning the Silver Star for conspicuous gallantry.

Back in the United States in 1952, he was named the Army's Deputy Chief of Staff for Plans and Research. During this same period he was the Army's Associate Member of the Kelly Committee to Study the Defense of North America against Atomic Attack, and a member of the Secretary of the Army's Advisory Committee on Army Organization.

General Lemnitzer returned to the Far East in March 1955, assuming command of the U.S. Army Forces, Far East and the Eighth U.S. Army. Shortly thereafter, on the departure of General Maxwell D. Taylor to become Chief of Staff, U.S. Army, General Lemnitzer was named Commander-in-Chief of the United Nations and Far East Commands and Governor of the Ryukyu Islands. In this position he maintained the defensive strength of UN forces against any resumption of hostilities in Korea, directed the build-up of the military effectiveness of the Republic of Korea armed forces and the Japanese Self-Defense Forces, and encouraged the improvement of economic and military stability throughout that area of the world.

In July 1957 he took up new duties as Vice Chief of Staff, U.S. Army. Among his activities of special note during this period were his influential role in the final decision made regarding the relationship between the National Aeronautics and Space Agency and the space research facilities of the Army, and his participation as U.S. Military Representative at the meetings, in London and Karachi, of the Military Committee of the Baghdad Pact Organization.

In March 1959 General Lemnitzer was named to succeed General Maxwell D. Taylor as Chief of Staff, U.S. Army, and assumed his new duties on July 1, 1959.

President Eisenhower on August 15, 1960, nominated General Lemnitzer as Chairman of the Joint Chiefs of Staff. He was confirmed by the Senate August 27 and was sworn in as Chairman on September 30, 1960.

*Personal data*

Date and Place of Birth: August 29, 1899, Honesdale, Pennsylvania

Parents: William L. Lemnitzer (father), Hannah (Blockberger) Lemnitzer (mother), both parents deceased.

Marriage: Mrs. Katherine Mead Tryon, Honesdale, Pennsylvania (wife)

Children: Lois Katherine, wife of Captain Henry E. Simpson, USA, Captain William L., USA.

Date: November 6, 1923

*Education*

U.S. Military Academy, 1920.

The Coast Artillery School, Officers' Basic Course, 1921. Battery Officers' Course, 1931.

Command and General Staff School, 1936.

Army War College, 1940.

| Promotion | Temporary (AUS) | Permanent (RA) |
|---|---|---|
| 2d lieutenant | | July 2, 1920 |
| 1st lieutenant | | June 9, 1925 |
| Captain | | Aug. 1, 1935 |
| Major | | July 1, 1940 |
| Lieutenant colonel | Dec. 11, 1941 | July 2, 1943 |
| Colonel | June 11, 1942 | |
| Brigadier general | June 25, 1942 | Jan. 24, 1948 |
| Major general | May 27, 1944 | Apr. 29, 1952 |
| Lieutenant general | Aug. 1, 1952 | |
| General | Mar. 25, 1955 | |

*Citations and decorations*

Distinguished Service Medal (with Oak Leaf Cluster).
Silver Star.
Legion of Merit (Degree of Officer).
Legion of Merit.
Medalha de Guerra (Brazil).
Grand Star of Military Merit (Chile).
Grand Officer of the Order of Boyaca (Colombia).
Medal for Military Merit 1st Class (Czechoslovakia).
Order of Melnik (Ethiopia).
Legion of Honor Degree of Officer (France).
Croix de Guerre with Palm (France).
Honorary Companion of the Most Honorable Order of the Bath (Great Britain).
Honorary Commander of the Most Excellent Order of the British Empire (Great Britain).

Military Order of Merit (Italy).
Cavalier of the Great Cross, Royal Crown of Italy (Italy).
Grand Cordon of the Order of the Rising Sun (Japan).
Order of Military Merit Taeguk (Korea).
Order of Military Merit Taeguk with Gold Star (Korea).
Presidential Unit Citation (Korea).
Gold Cross of Merit with Swords (Poland).
Most Exalted Order of the White Elephant (Thailand).
Royal Order of the White Eagle, Class II (Yugoslavia).
Grande Official, Order of Military Merit (Brazil).

## STATEMENT OF GEN. LYMAN L. LEMNITZER, CHAIRMAN, JOINT CHIEFS OF STAFF

General LEMNITZER. Yes, I would, Mr. Chairman. I am happy to have this opportunity to appear before the House Committee on Science and Astronautics this morning. It is apparent that certain reports that have been carried by national news media have resulted in some misunderstandings, and I always welcome an opportunity to set the record straight. I hope my appearance before the committee this morning will accomplish this purpose. The facts are as follows:

On the 24th of February, 1961, I received a request dated 23 February from the General Counsel of the Department of Defense requesting my comments on a draft which revised a previous directive issued by Secretary McElroy, then Secretary of Defense, in September, 1959, and which established policies pertaining to and assigned responsibilities for military space activities. By that same memorandum from the General Counsel, the Service Secretaries and other Department of Defense officials were requested to submit their comments on the same draft directive.

In accordance with the General Counsel's request, I submitted my comments on the 2d of March, 1961. I would like to emphasize that this was several days *prior to* the date that the Secretary made his decision and issued the directive in final form.

This you will note is completely contrary to the impression given by whoever leaked my memorandum. The impression given by that individual was that my memorandum was sent directly to the Secretary *after*—and I repeat *after*—the Secretary made his decision on the subject directive and that I was protesting his decision. This is completely incorrect and raises the question in my mind as to the motive of the individual involved.

The particularly unfortunate aspect of this matter has been that it implies that there is a lack of close working relationship between the Secretary and the Deputy Secretary of Defense and the Joint Chiefs of Staff. I would like to assure this committee and the American public that these working relationships are extremely close and harmonious.

That completes my very brief opening statement, Mr. Chairman.

The CHAIRMAN. We thank you very much, General, for your statement. We would like to ask you a few questions. During the course of the hearings that we have had, the matter was brought out that perhaps there was a meeting of the Joint Chiefs of Staff of which you are chairman, prior to the issuance of that order and that certain recommendations may have been made. I would like to ask you about that. Is that correct?

General LEMNITZER. I am not sure what meeting you are referring to. We have frequent meetings of the Joint Chiefs of Staff. Are you referring to a meeting on this specific memorandum?

The CHAIRMAN. Yes, sir.

General LEMNITZER. There was no meeting on that subject during that period that I know of.

The CHAIRMAN. Was there a meeting on the question of the handling of the space program in the Defense Department and recommendations from the Joint Chiefs of Staff to that effect to the Secretary?

General LEMNITZER. No, there was not. But there were several when the original directive was under consideration by Secretary McElroy. We considered the original directive on several occasions and submitted our comments.

The CHAIRMAN. That was the directive of March 2?

General LEMNITZER. I am referring to the directive which was issued by Secretary McElroy in September, 1959. This is an old problem, Mr. Chairman.

The CHAIRMAN. The recent directive that we are referring to is where the disposition of space efforts, the Air Force was given about 91 percent, I think, of the spending of money for space.

General LEMNITZER. There was no meeting of the Joint Chiefs of Staff on this particular memorandum during the period you refer to, Mr. Chairman.

The CHAIRMAN. Did you have occasion either formally or informally to discuss the matter?

General LEMNITZER. I discussed it with my own staff. It was being handled by the Secretary of Defense so that the views of the other members of the Joint Chiefs of Staff would be incorporated in the replies which the Service Secretaries were asked to give on the same draft memorandum that I was asked to comment on.

The CHAIRMAN. You made certain recommendations as of March 2?

General LEMNITZER. That is correct.

The CHAIRMAN. How did those recommendations fit into the final directive? Were they in consonance with them?

General LEMNITZER. They were considered by the Secretary, together with the other suggestions which were made by the Service Secretaries and other officials of the Department of Defense. All of the suggestions I made were not adopted. However, the final directive along with the announcements on how it was to be handled, and considering the areas in which I had a particular interest, the final directive was satisfactory from my point of view.

The CHAIRMAN. In other words, they were accepted by the Secretary and placed in his order——

General LEMNITZER. Some of them were.

The CHAIRMAN. What parts were not placed in the order?

General LEMNITZER. The directive was a little more general than I suggested that it be. I was concerned primarily with two areas, and they dealt with the previous assignments of responsibilities to the Services primarily in the field of communications and in navigation. I understand that it has been clearly indicated that previously made assignments of responsibility would remain as they were. This went a very long way in meeting my suggestions.

The CHAIRMAN. The committee would be interested in your views on the contributions to research and development policy and decisions

which could normally be expected to come from the civilian officials of the Department of Defense.

General LEMNITZER. I am not clear as to what you mean by that question, sir.

The CHAIRMAN. I mean this: How do you think now the setup is going to work out in reference to space? Is it going to be satisfactory, because these directives really came from civilian officials of the Department?

General LEMNITZER. That is the responsibility of the Secretary. He is responsible for the operation of the Department of Defense. We make our recommendations, and he makes the decisions. That is the way the Department of Defense is set up. That is the way it has been operated. That is the way it is operating now. As I pointed out in my statement, the working relationships between myself and Secretaries McNamara and Gilpatric are very close and harmonious. I could not ask for better working relationships. I am constantly consulted. I see them on a daily basis and many times a day on some occasions.

The CHAIRMAN. Then I understand from what you say you are supporting that directive?

General LEMNITZER. I am.

The CHAIRMAN. You think it is going to result in pushing forward the military space effort at even greater speed than it is going at this time?

General LEMNITZER. As I indicated in my own memorandum, we are only in the initial stages of military operations in space. I am not sure that we can arrive at the optimum solution in organization and procedures now. I presume that as a greater experience is gained, there may possibly be further revisions.

The CHAIRMAN. Mr. Martin.

Mr. MARTIN. I have no questions.

The CHAIRMAN. Mr. Miller?

Mr. MILLER. General, we are concerned, of course, here with the research and development phases and all of its operations and not with the operation of the military departments or the Department of Defense. But we do have a great concern in the field of research and development. As I look back at it, the Army through the thin years when no one else seemed to have any great interest in this field used the Von Braun team to break through and give us the only real thrust engine that we had for a long time, and it is still a good team.

General LEMNITZER. That is right, sir.

Mr. MILLER. You are to be congratulated. The Navy developed Polaris pretty much on its own without a great fanfare of trumpets, Aerobee and some of these others that came out of the other Services. Now, are the Services going to feel the same confidence when the Army conceives a particular weapon useful for its needs, it is going to be used in space, ground to ground, or the Navy comes up with some other, are they going to feel the same confidence that they have had when they developed these things, themselves, when they have to turn it over to another sister Service who, in turn, traditionally according to the way it has done business, is going to turn it over to some contractor?