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NATIONAL SECURITY AGENCY
CENTRAL SECURITY SERVICE
FORT GEORGE G. MEADE, MARYLAND 20755-6000

Serial: MDR-59059
1 December 2010

This responds to your request of 15 July 2009 to have "The National Security Agency Scientific Advisory Board, 1952-1963" reviewed for declassification. The material has been reviewed under the Mandatory Declassification Review (MDR) requirements of Executive Order (E.O.) 13526 and is enclosed. We have determined that some of the information in the material requires protection.

Some portions deleted from the document were found to be currently and properly classified in accordance with E.O. 13526. The information denied meets the criteria for classification as set forth in Section 1.4 subparagraphs (c) and (d) and remains classified TOP SECRET as provided in Section 1.2 of E.O. 13526.

Section 3.5 (f) of E.O. 13526, allows for the protection afforded to information under the provisions of law. Therefore, the names of NSA/CSS employees, personnel not directly employed by NSA but serving on boards and committees and information that would reveal NSA/CSS functions and activities have been protected in accordance with Section 6, Public Law 86-36 (50 U.S. Code 402 note).

Since your request for declassification has been denied you are hereby advised of this Agency's appeal procedures. Any person denied access to information may file an appeal to the NSA/CSS MDR Appeal Authority. The Initial Denial Authority for NSA is the Deputy Associate Director for Policy and Records, Diane M. Janosek. The appeal must be postmarked no later than 60 calendar days after the date of the denial letter. The appeal shall be in writing addressed to the NSA/CSS MDR Appeal Authority (DJP5), National Security Agency, 9800 Savage Road, STE 6881, Fort George G. Meade, MD 20755-6881. The appeal shall reference the initial denial of access and shall contain, in sufficient detail and particularity, the grounds upon which the requester believes the release of information is required. The NSA/CSS MDR Appeal Authority will endeavor to respond to the appeal within 60 working days after receipt of the appeal.

Sincerely,

Kristina M. Grein

KRISTINA M. GREIN
Chief
Declassification Services

Encl:
a/s

~~TOP SECRET~~

National Security Agency
Fort George G. Meade, Maryland

HISTORICAL STUDY

THE NATIONAL SECURITY AGENCY SCIENTIFIC ADVISORY BOARD

1952 - 1963

NSA HISTORIAN
(C-317)
SEPTEMBER 1965

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COPY NUMBER 2

~~TOP SECRET~~

THE NATIONAL SECURITY AGENCY

SCIENTIFIC ADVISORY BOARD

1952 - 1963

Historical Study by

Anne S. Brown

NSA Historian
Office of Central Reference
(C-317)

~~TOP SECRET~~

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1953 - 1963

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FOREWORD

This historical study of the Agency's Scientific Advisory Board and its supplementary panels of consultants deals with an effort to obtain counsel from persons who, besides spending relatively short periods in activity within the compound, held eminent positions outside NSA. These men were expected to help the Agency's own staff to break through the boundaries of "the state of the art" onto new ground. Their help took many forms and the arrangements by which they provided their advisory services to the Director were modified repeatedly. The historical study therefore has two themes of major interest: the specific subjects on which the NSASAB and its panels worked, and the methods by which their services were utilized.

The range of the subjects to which they gave their attention was extensive. Some were complex, difficult projects entailing high costs and long lead-times before the Agency could expect results, tasks in which the possibility of ultimate frustration had to be reduced to a minimum. Other matters on which the advisors furnished recommendations to the Director were less far-reaching or perhaps of immediate practical consequence.

To make the most effective use of these men of many interests and great prestige was a difficult problem of organization and management. They could not cope imaginatively with the tasks confronting NSA without knowing what had been done, what was being done, what was being considered for the future, and in general, what the Agency considered to be the "state of the art". That necessity involved successful efforts on the part of the Agency's staff to communicate to them what they needed to know. To fulfill expectations, the scientific advisors had to define and analyze cryptologic problems, arrive at hypothetical solutions, subject them to rigorous analyses and tests, and arrive at conclusions. Mutual stimulus and keen critical analysis might results from discussion in a group, but group activities could be overdone.

The ability of the members to comprehend and contribute was affected by their specializations. Because a considerable portion of each agenda had to be devoted to briefing by NSA officials before the Board could get to the consideration of Agency problems, it was of the utmost importance that the agenda contain the problems thought to be most pressing. Those problems had to be effectively presented. The NSASAB then had to have time to think about them, whether vocally as a group or silently and separated.

Concerning some matters it was probably best for individual scientific advisors to hold free and accurate intercommunication with working level members of the Agency staff away from conference rooms. Lacking accessible, secure areas, some of the advisors were handicapped by their inability to hold and consult cryptologic documents between meetings, and thus to live more or less with a problem. They could not benefit from the intuitive concepts that come with prolonged, even if intermittent, attention.

The Agency changed the organization of the Board and its panels, and tried various methods of arranging the Board's operations. The external conditions which would yield the best results remained elusive.

A justification of NSASAB's existence did not depend upon a demonstration that it was specifically responsible for any of the Agency's major technical advances. In an era when the prestige of science and technology in the United States had never been higher, the distinguished individuals who advised the Director, NSA, strengthened his position. Combined with his own scientists and mathematicians, the advisors were understood to bring to NSA the fruits of the technological revolution.

THE NATIONAL SECURITY AGENCY SCIENTIFIC ADVISORY BOARD

1952 - 1963

CHAPTER I

BEGINNINGS

The NSASAB, A Successor to the former Special Cryptologic Advisory Group (SCAG)

The National Security Agency Scientific Advisory Board (NSASAB) is the successor of the former Special Cryptologic Advisory Group (SCAG), which was established in March 1951 by the Research and Development Board (RDB), Department of Defense, at the suggestion of the Director of the Armed Forces Security Agency (AFSA). The fundamental purpose in establishing SCAG was to assemble a specific group of outstanding technical consultants in the scientific fields of interest to the Agency, and thus provide a valuable source of advice and assistance in solving special problems in the cryptologic field.* The SCAG existed for a little over a year, during which the group looked into the most important problems before the Agency.

* CONF AFSA Regulation No. 20-10, dtd 21 August 1952

The year's experience with SCAG convinced certain members of the group of the value of SCAG to the Agency, but that improvements in its organization were needed -- the statement of mission of SCAG needed to be amplified by more detailed statements of the procedure by which the members could carry out its mission. On 23 May 1952, by request, one of the members of SCAG wrote a statement of mission for consideration by the other members.* This document served as the basis for the final draft of the

* UNCLS Ltr, from V/DIR to C.B. Tompkins, dtd 17 Jun 1952. Copy in V/DIR Folder: Advisory Board

"Charter of Guidelines" for a new SCAG, which became the AFSA Scientific Advisory Board (AFSASAB), and later the NSA Scientific Advisory Board (NSASAB).

Outside pressure during the early fifties was perhaps another stimulus for establishing the Board.* Various proposals were made for setting up an

* Transcript of 1 Dec 1960 Session of the NSASAB. Copy held in the files of the Executive Secretary, NSASAB.

activity to insure that a portion of the nation's high-level scientific resources outside the Agency were being applied to important NSA problems. Such an activity would also provide a means by which the technical personnel of the Agency, who were compelled by security considerations to work in a cloistered atmosphere, could maintain contact with the outside community.*

* This activity (the NSASAB) also serves as an "interface between security and hiring"--one of the Agency's approaches to counter the many difficulties inherent in recruiting and retaining "top notch" people. See CONF report entitled "The Interface between Security and Hiring". Copy in M3 Files, subject: Director's Briefing, 1963.

The "Charter of Guidelines" of the NSA Scientific Advisory Board

Before the "Charter of Guidelines" for the direction and operation of the AFSA Scientific Advisory Board was finally issued as AFSA Regulation No. 20-10, dated 21 August 1952, three drafts had been drawn up and subjected to critical perusal and discussion. The resultant document instead of being "concise, general, and not more than one page in length", as originally hoped for, ran for almost four pages. Briefly, this "Charter", as adopted, defined the mission of the Board, as: "...to advise the Director on scientific matters related to the fulfillment of the mission of AFSA."

The Board was to report directly to the Director; it was his Board, specificially authorized to:

> Review all necessary data concerning the principal cryptologic problems being attacked....
>
> Bring to the attention of the Director scientific studies....
>
> Suggest changes in the effort applied....
>
> Keep the Director informed on the latest studies and developments....

Only when requested by the Director would the Board:

1. Survey laboratory testing, and processing equipment....
2. Evaluate the application of scientific effort on AFSA problems;
3. Survey current...technical educational programs....
4. Advise the Director concerning recruitment of scientific personnel; improvement in working conditions; equipment which should be acquired....

The Chairman of the Board was to be designated by the Director and to continue at his discretion. Meetings of the Board were to be held at times agreed upon by the Director and the Chairman of the Board.* Changes in the

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* See Appendix II, p.63 for the "Charter of AFSAB/NSASAB, as given in AFSA Regulation No. 20-10, dtd 21 Aug 1952, and later republished as NSA Regulation No. 11-3, dtd 22 Jan 1953.

"Charter" would be issued as Agency Regulations. NSA Regulation No. 11-3, dated 22 January 1953, marked the establishment of the NSASAB.

An Executive Group for Board Affairs (EXSAB) was established as a secretariat for the Advisory Board. This group was to be concerned with the routine details of the Board's functioning. Its members were appointed by the Director from top-level personnel within the Agency. It soon became apparent that the role of the EXSAB would have to be expanded in order to achieve the optimum use of the Board, both to the satisfaction of its members and to the benefit of the Agency.

The first NSASAB was composed of the following individuals, most of whom had been members of the SCAG:

Professor Stewart S. Cairns, Chairman
Head of the Department of Mathematics
University of Illinois

[redacted]

Professor Howard P. Robertson
California Institute of Technology

Mr. Howard T. Engstrom
Assistant Vice President
Engineering Research Associates
Division of Remington Rand, Inc.

Professor John von Neumann*
The Institute for Advanced Study
Princeton University

Mr. John C. McPherson
Vice President
International Business Machines Corp.

Professor S. S. Wilks
Department of Mathematics
Princeton University

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* Dr. John (Janos) von Neumann was one of the outstanding mathematicians of the twentieth century and a scientist of extraordinary breadth. Born in Budapest, Hungary, 28 December 1903, he was a general scientific prodigy and took a doctorate in mathematics in 1926 in Budapest. By 1933 (three years after coming to the U. S.), when he assumed the position which he held for the rest of his life as a professor of mathematics at the Institute for Advanced Study, Princeton University, he had already an international reputation, based on contributions to operator, quantum, set and game theories. He may well be remembered longest for his work in pure mathematics during 1933-43, and notably for founding the theory of operator rings, a high point of the axiomatic and integrative tendencies characteristic of 20th-century mathematics, the direction of which von Neumann probably as much as anyone helped to determine. During and after WWII, he engaged mainly in applied scientific research and administrative work. He led in the development of large high-speed digital computers and such application as the design of the hydrogen bomb and long-range weather forecasting, as well as doing important work on a variety of military problems, including the atom bomb. From 1955 to the time of his death, he was a member of the U.S. Atomic Energy Commission, which in recognition of his scientific contributions, gave him the Enrico Fermi award in 1956. See: Encyclopaedia Britannica, 1963 ed., Vol. XVI.

Dr. von Neumann served on the NSASAB until his death on 8 February 1957. That a scientist of his stature was willing to apply his talents to the Agency's scientific programs was indicative of their importance. He was especially interested in the Agency's program for very high-speed computing systems. See: Ltr from the Director, NSA, General Canine, to Dr. John von Neumann, dtd 19 Oct 1956. Copy in the NSA Records Repository, Drawer A-243, the Director's File: NSASAB.

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The First Conference of the NSA Scientific Advisory Board, 4-5 February 1953

Preparation for the first meeting of the NSA Scientific Advisory Board at the Naval Security Station, Nebraska Avenue, on 4-5 February 1953, began as early as 1 December 1952. The Chairman of the Board, Professor Stewart S. Cairns, suggested a number of items for the agenda with a view to briefing the new members. Since individuals who had been members of the former SCAG were already familiar with many of the Agency's operations, he suggested that they spend the first day in consultation with NSA technicians, while the following subjects were being presented to the new members:

The Place of NSA in the U.S. Governmental Structure and Its Relation to Other Intelligence Agencies.

The Use and Value of Communications Intelligence (COMINT) in the National Defense.

COMINT Operations of the NSA and a Forecast of Future Problems.

COMSEC Operations of the NSA.

Organization of the Office of Research and Development and Plans for Future Organization.

The Current [redacted] Problem.

Modified Radio-Printer Intercept Procedure and Signal Analysis.

Members of the group were also given tours of the Agency's special intercept equipment.

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Before adjournment of the two-day conference two problems were put before the Board: The Director, NSA, asked its assistance in finding a research man for Deputy Director, Research and Development. He also wanted the names of men in scientific fields who might be obtained by NSA for membership on NSASAB or its panels, and as consultants.*

* TOP SECRET Minutes of the NSASAB Conference held on 4-5 February 1953. Copy in D4 Folder: NSASAB 1953.

NSASAB Special Study Group is Formed to Evaluate COMINT as a Source of Early Warning

On 11-12 June 1953, members of the Board discussed the problem of evaluating the contribution which COMINT could make to the warning of an impending attack on the continental U.S. One member pointed out that the problem was not so much to compare the relative values of COMINT and radar warning, as it was to study the methods of integrating COMINT with other efforts.* The Board also recognized that some sort of evaluation

* TOP SECRET Minutes of NSASAB Meeting held on 11-12 June 1953. Copy held in D4 Files: NSASAB 1953.

might be needed to justify adequate support of COMINT, in the light of budgetary restrictions.

On 23 June 1953, the Director, NSA, requested the Board to initiate the study at once, and he placed at the NSASAB's disposal whatever facilities, records, and personnel it might need. At the suggestion of the DIRNSA, Dr. H. P. Robertson of the California Institutue of Technology was named Chairman of the Study Group. Other members were: Dr. Samuel S. Wilks, Dr. Howard T. Engstrom, [redacted] Mr. John C. McPherson, Mr. Dean Post, and [redacted] Some of these men had already

* TOP SECRET Report: "The Potentialities of COMINT for Strategic Warning." NSA Registered Publication No. 5-53.

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indicated in the meeting of 12 June 1953 that they could spend part of the summer on the subject if it touched on their individual fields. Since a number of relevant reports were already in existence, a considerable part of the problem would be to coordinate and summarize them.*

* See Appendix III, p. 65 for the Agenda of the Special Study Group.

By 16 October 1953, the Special Study Group presented to the Board its special report, entitled "The Potentialities of COMINT for Strategic Warning." The Study Group concluded that Signal Intelligence, above all COMINT, was the most promising source of strategic warning of an impending attack; the complexity of the process of preparing the forces for such an attack would make it practically impossible for an enemy to avoid the use of radio communications and other electronic signals at all stages of the process. The interception and timely evaluation would then constitute indicators for strategic warning.*

* TOP SECRET Report: "The Potentialities of COMINT for Strategic Warning." NSA Registered Publication No. 5-53.

The Special Study Group also studied the NSA COMINT effort thoroughly, and made a number of recommendations for effectively increasing this effort. Certain corrective actions by major components of the Agency were already in progress at the time the study was being prepared. The Group recommended, for example, that top priority be given to the solution of high-level Soviet cryptographic systems. That had already been done, but as part of the continuing effort, qualified specialists completed detailed appraisals of the work on these problems with a view to discovering new approaches and estimating the additional resources required to effect them.

In the personnel field, certain programs which were already in effect were accelerated, programs intended to improve selection, training, and retention of skilled personnel. COMINT career ladders for both military and civilian personnel, and uniform job descriptions applicable to the U. S. Cryptologic Agencies were developed.

Maximum effectiveness in traffic analysis was sought by continued specialized training, including cross-training between traffic analysis and cryptanalysis to produce technicians familiar with the tools.

After the acceptance of the report by the Board on 16 October 1953, the Agency began immediately to prepare to implement the recommendations, which affected all operating elements of the Agency. An Agency-wide study was made, and the Special Assistant to the Director, NSA, was made responsible for monitoring its progress. Steps taken to implement the recommendations were reported in the Monthly Operational Summaries and in monthly briefings of the Director, NSA, until February 1956.* The report,

* SECRET Minutes of NSASAB Meeting held on 17 Feb 1956. Copy in D4 Files: NSASAB 1956.

however, continued to influence Agency planning and policy. It also had an impact on future reports on COMINT matters compiled by other governmental boards and committees.

A sanitized version of the Report was later issued in order to comply with a request for a copy [redacted] EO 1.4.(d)

* TOP SECRET memorandum for the Executive Secretary, USCIB, Subject: Sanitized Version of NSASAB Report. Serial: 000175-S, dtd 13 April 1954. Copy in AG Files: NSASAB.

CHAPTER II

CREATING SPECIALIZED UNITS

The NSA Scientific Advisory Board Sets Up a System of Panels

During the June and October 1953 meetings, the Board discussed the desirability of a system of panels, operating in conjunction with the Advisory Board in specialized fields, including what panels should exist and who should be on them. It was the intention of the Board to staff these panels with eminent scientists who could be called upon for special service or consultation in matters of importance to the Agency. It was proposed that formal meetings of the panels be very infrequent and that, as a general rule, panel members be called upon to serve only as their convenience permitted. In many instances, these panel members would represent NSA's sole contact with many major industrial concerns and educational institutions. The panel members were to be made available to all NSA activities for consultation as their time afforded. It was decided that the conduct of such administrative procedures as would be involved therein, including correspondence, would rest with the Executive Secretary of the Board, Mr. William F. Friedman. It was further agreed that each member of the Board should be on a panel and that the chairmen of the panels be members of the Board. The Chairman of the NSASAB, in consultation with the Director, NSA, would appoint the chairmen of the panels.

During the discussion on 16 October 1953, the technical question of whether the Board had the authority to appoint panels and subcommittees was brought up. The Charter and associated documents were studied, yielding the conclusion that such authority was vested in Paragraph 6 of the Board's Charter.*

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* AFSA Regulation No. 20-10 of 21 Aug 1952, Paragraph 6 states that the Chairman of the Board may apportion the membership among technical panels....

The Chairman of the Board, Professor Cairns, then notified the Board that he had appointed the following Chairmen who had consented to serve:*

Electronics Panel	-	Mr. L. C. McPherson
Telecommunications Panel	-	[redacted]
Mathematics Panel	-	Dr. H. P. Robertson

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* TOP SECRET Minutes of NSASAB Meeting held on 15-16 October 1953. Copy in D4 Files: NSASAB 1953. See also Appendix VII, p.74 for list of Panel Members.

Several months were required to organize the panels for operation. Deciding on potential candidates for membership, sending letters of invitation, and obtaining the required clearances accounted for much of the delay. However, by 20-21 May 1954, the three Panels were ready for a joint meeting. The first day was devoted to familiarizing those Panel members not previously acquainted with NSA, with its organization and staff. All Panel members attended the next day's session, which was devoted to detailed presentations of NSA's plans and future panel activities.*

* TOP SECRET Minutes of the NSASAB Panel Meeting held on 21 May 1954. Copy in D4 Files: NSASAB 1954.

Although the main function of the Panels was consultative, there were instances when they were called upon to conduct surveys of Agency programs, such as the Mathematics Panel's review of the SCAMP Program and the Program of Mathematical Research within the Agency.*

* CONF Memorandum from the Executive Secretary of the NSASAB, Dr. S. Kullback, addressed to NSASAB Members and the Mathematics Panel Members, dtd 17 Oct 1956. Copy in D4 Folder: NSASAB 1956.

The NSASAB Establishes a Communications Panel, December 1958

The advisability of adding a Communications Panel was considered from time to time, but it was not formally endorsed until the 4-5 December 1958 meeting.*

* TOP SECRET Minutes of the NSASAB Meeting held on 4-5 December 1958. Copy in D4 Files: NSASAB 1958.

On 26 May 1961, the question of continuing that Panel arose during a discussion of the separate areas of the Panels. In the end, the Board and the Director, NSA, decided to retain it; the prospective needs of the new Defense Communications Agency (DCA) for a Communications Security input from NSA was the principal justification.*

* TOP SECRET Minutes of the NSASAB Meeting held on 26 May 1961. Copy in D4 Files: NSASAB 1961. The Communications Panel was deactivated 20 September 1962. See General Orders No. 25, dtd 27 October 1962.

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The NSASAB often discussed the possibility of adding an Operations Research Panel. Perhaps the most serious effort to organize one occurred after [redacted] joined the Board. In late 1959, he approached various candidates for membership on the proposed panel and found several*

[redacted]

who were willing to serve, but to date (July 1965) the panel has not been established.

CHAPTER III

NEW CHARTER IN 1958

Efforts to Make the Board More Useful to the Agency

There was no autumn meeting of the Board in 1954. The new Chairman, Mr. McPherson, who had been appointed in the 19-20 April meeting, expressed the opinion that unless some new problem developed which required the Director to call a meeting, he saw no need for one. The recommendations contained in the Report of the Special Study Group had covered all current problems calling for the Board's assistance. This gave time for pause and a look at the Board's accomplishments. On 13 September 1954, the Executive Secretary of the Board, Mr. W. F. Friedman, in a memorandum for Members of the Executive Group for NSASAB Affairs, reviewed the past year and a half's operation of the Scientific Advisory Board as follows:

1. The National Security Agency Scientific Advisory Board (NSASAB) has been in existence since January 1953. In the year and a half since that time, the Board has been of considerable assistance to the Director, National Security Agency. Significant in the aid rendered are:

a. The investigation and resulting report on the "Potentialities of COMINT for Strategic Warning".
b. Advice and assistance in the selection of a Deputy Director, Research and Development.
c. Advice and assistance in the establishment of the Mathematics, Telecommunications, and Electronics Panels.
d. Advice and assistance in the establishment of the Special Committee on General Purpose Flexible Analytical Equipment.

As to the Board meetings:

...thus far they have been very informal. While this informality has been conducive to a free exchange of ideas, it has been less conducive to clear-cut statements or actions from the Board. Although there have been many expressions of various ideas and opinions during meetings by individual Board members and NSA representatives, such expressions or recommendations recognizable as being those of the Board have been few indeed (the exception, of course, being the "Robertson Report").*

* The Special Study Group's Report was often referred to as the "Robertson Report" for Dr. H. P. Robertson, who directed the group.

In Board meetings it had been too easy to leave problems in the category of "unfinished business", and to furnish virtually no indication of the Board's decision. In order to realize the potential represented by the members of the Scientific Advisory Board, to clarify their position, and to make their endeavors as profitable as possible, without inhibiting or restricting their deliberations in any way, some additional guidance had to be provided by NSA. A part of this guidance should be a clearly defined modus operandi for Panels, the Board, and the NSA Executive Group for Board Affairs.*

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*SECRET Memorandum for Members of the Executive Group for NSASAB Affairs, dtd 13 Sep 1954, signed by William F. Friedman, Executive Secretary, NSASAB. Copy in D4 Files: NSASAB 1954.

Mr. Friedman's memorandum also mentioned the current criticism of the Armed Forces "...for their failure to make better use of the intellectual potential that could be brought to bear on the solution of complex problems...." A report of the Military Operations Subcommittee of the House Committee on Government Operations, which had investigated the use of scientists in government agencies, was recommended to the group.*

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* The 24th Intermediate Report of the Committee on Government Operations (House Report No. 2618). United States Government Printing Office, Washington: 1954.

Although the NSASAB Charter had just undergone a revision as of 20 July 1954, it was clear that more changes were needed if the Board and Panels were to be employed to the satisfaction of their members and the Agency. Accordingly, the Executive Secretary of the NSASAB, Mr. Friedman, called a meeting of the EXSAB for 22 September 1954. The Chairman of the NSASAB, Mr. McPherson, pointed out that the Board, Panels, and consultant

activities must receive their impetus from a flow of questions from NSA; that the Panels were reservoirs of cleared people who could be called individually or in groups, but before they could operate at all, a means of gathering and presenting problems would be essential. He suggested a top screening authority, probably best established under Mr. Friedman, with access to all channels and sources, and responsibility for gathering statements of the Agency's problems and for recommending appropriate disposition of each problem among the Board, Panels, Sub-Panels, and individual consultants. In general, he thought, long-range, overall, policy-level problems should be referred to the Board, and the purely technical ones, directly to the Panels or components thereof. Arrangements were needed to provide document storage, working space, and secretarial service for the consultants and to maintain within that space, reading files of pertinent minutes, reports, and other documents. Mr. Friedman volunteered his office for such purposes.*

* TOP SECRET Minutes of the Executive Group for NSASAB Affairs Meeting, 22 Sep 1954. Copy in D4 Files: EXSAB 1954.

As a result of the discussion on 22 September 1954, Mr. Friedman prepared a memorandum for the Director, NSA, dated 1 November 1954, Subject: "Measures to Increase the Effectiveness and Use of NSA's Scientific Advisory Board and Panels".* He proposed "...to gather information on the workings,

* CONF Memorandum from William F. Friedman to DIRNSA, dtd 1 Nov 1954. Copy in D4 Files: NSASAB 1954.

organization, responsibilities, and policies of some of the other high-level boards within the Department of Defense for study and possible benefit to the guidance of NSASAB." Mr. Friedman also undertook "...to establish procedures whereby NSA personnel will bring technical problems to the attention of the Board, Panels, or individual members thereof in a manner that will

permit NSA to realize and capitalize upon, the potential of the technological leaders at its disposal.

A limited study of other high-level Boards in the Department of Defense was then undertaken; and the Executive Group for Board Affairs was elevated to policy level, responsible for active overall guidance of the NSASAB.

Revision and Adoption of a New Charter for the NSASAB, 13 May 1958

The continuing dissatisfaction in NSA with the operation of the Board and the need for clarification and adjustment of NSASAB's goals led to the re-writing of the NSASAB Charter. During 1957, the Executive Group for Board Affairs (EXSAB) suggested several changes. At the meeting of the Board on 13 February 1958,* the Executive Secretary, Dr. S. Kullback, presented the

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* The meeting of the Board scheduled for 24-26 Oct 1957 was postposed until after 1 January 1958 due to budgetary restrictions. See UNCL Ltr, dtd 8 Oct 1957, from Lt. Gen. John A. Samford to members of the NSASAB. Copy in AG Files: OM-1, 1957.

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members with draft copies of a new Charter, which was eventually promulgated as a revision of NSASAB Regulation No. 11-3 , dated 13 May 1958.*

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* TOP SECRET Minutes of NSASAB Meeting held on 13 Feb 1958. Copy held in D4 Files: NSASAB 1958.

It called for a recasting of the Panels and changes in the Board:

1. An enlargement (as many as 16 members)
2. A definite term for each member (three years)
3. A rotation system whereby one third of the members of the Board was to be appointed each year.

The appointment dates of the various members were reviewed and an approximately equal distribution of membership over rotation cycles was

prepared:

Ended 30 June 1958	Ended 30 June 1960
Dr. S. S. Cairns	Dr. S. S. Wilks
[redacted]	[redacted]
Ended 30 June 1959	**Ended 30 June 1961**
Mr. W. F. Friedman	[redacted]
[redacted]	
Mr. J. C. McPherson	

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Board members were eligible to serve more than one term; the tenures of the members were reviewed periodically, and at the invitation of the Director, NSA, members might continue their services for several years. That is why the memberships of Drs. [redacted] and Wilks in 1960 were extended to 30 June 1963.*

* Ltr dated 15 June 1960, Serial: N2367, from the Director, NSA, Lt. Gen. John A. Samford, USAF, to [redacted] Palo Alto, California. Copy in O/M-1 Files: NSASAB. These NSA records are retired in Drawer A-182, Records Depository, Ft. Holabird.

The revised Charter called for continuing panels to facilitate the Board's activities. An ad hoc committee under the Chairmanship of Mr. McPherson canvassed all members of the Board concerning the realignment of the former Panels (Mathematics, Telecommunications, and Electronics). At the 22-23 May 1958 meeting* the members endorsed changes of two Panels and

* TOP SECRET Minutes of the NSASAB Meeting held on 22-23 May 1958. Copy in D4 Files: NSASAB 1958.

the retention of the third, as follows:

Mathematics
Electromagnetic Reception
Electronics and Data Processing

Ways in which an NSASAB Panel served as an instrumentality of the Board are illustrated by the activities of the Electronics and Data Processing (EDP) Panel. It assembled annually for three regular two-day meetings, for purposes described in formal agenda. The time was devoted to briefings, related discussions, tours of operating areas, and detailed work. The Panel preferred simplicity, directness, and give-and-take discussions between its members and NSA employees who were well informed about the subjects, uninhibited by non-participating observers.

The time left for detailed work was usually insufficient. Such activity therefore tended to take the form of consultations with NSA employees by sub-groups (or even individual members) of the Panel between the regular meetings. Any written opinion by a sub-group, after such a consultation, had to be accepted by the Panel in a subsequent meeting before it could be treated as the Panel's official position.

Conclusions reached at Panel meetings were recorded against significant odds: the Chairman often had too little time to complete the writing while the members were still available at NSA to review the draft and needed a long time to accomplish it after they had dispersed; in the ensuing coordination, NSA officials whose responsibilities were involved were not necessarily included. In such cases they had their first opportunity to express conflicting views only after the Panel had promulgated its paper. In some instances, Panel papers were not released to, or through, the Executive Secretary, NSASAB.

Panels have provided valuable suggestions. They might induce NSA to attempt something which would otherwise have been ignored. They might also cause Agency decisions to be reconsidered or even to be reversed. Their attention could energize NSA's attack on a problem. They could give an appraisal of the ideas and performance of elements of NSA dealing with that problem, an appraisal by "outside experts".

Thus a Panel's interests and activities were to a considerable degree self-generated rather than responsive to requests. Lower level officials were more likely to seek consultations with individual members than to deal with the whole Panel. The Panel, on the other hand, invited lower level officials to some of its sessions in order to keep itself fully informed or from the wish to be of help.*

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* This summary is based on a memorandum by [redacted], Secretary, EDP Panel, dated 15 July 1965. Copy in HIST Files. For the matters with which that panel dealt between September 1959 and May 1965, see the list in Appendix VIII, p. 85.

Each panel developed its own way of functioning. The Electromagnetic Reception Panel (EMR) adopted the following procedure: The panel met and held discussions, after which a paper was written, usually by its chairman; at the next meeting the paper was discussed, and recommendations, which often were the decision of the chairman, were forwarded to the Board or the Director, NSA, and occasionally to both, simultaneously.

Most members of the Mathematics Panel were associated with FOCUS and SCAMP, so that much of their work has been related to the tasks of these organizations. Meetings of this panel were infrequent.*

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* Information based on an interview of 6 Aug 1965 with [redacted] (D4), Special Assistant for NSASAB to Mr. Leo Rosen, who is the present Executive Secretary of the NSASAB.

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During the May 1958 meeting and at various meetings afterward, the Board was much concerned with the question of what scientific disciplines should be represented on the Board and what individuals, expert in those fields, might be invited to serve.

CHAPTER IV

FURTHER DEVELOPMENTS

The NSASAB Authorizes a Study of the Efficacy of the Board's Procedures, September 1960

At the 15-16 September 1960 meeting of the NSASAB, the Board authorized two of its members, RADM J. N. Wenger and Mr. W. F. Friedman, to conduct a study of the efficacy of the Board's procedures. In the course of their assignment they found it necessary to broaden the scope of their study to include matters of operation and organization, as well as procedures. A special report of their findings, which included a description and appraisal of scientific boards operating elsewhere in the government, all of which had been in operation from ten to twelve years, was presented to the Board on 1 December 1960. They summed up their conclusions concerning the latter organizations in one paragraph:

> We have concluded that after our study, despite the fact that scientific advisory groups in general are well regarded, questions concerning their value still exist, and studies are being made to prove it.*

* SECRET Memorandum, dtd 23 Nov 1960, for the Chairman of the NSASAB, Subject: "Report on a Study of Scientific Advisory Boards within the Department of Defense." Copy in D4 Files: NSASAB 1960.

With regard to the NSA Scientific Advisory Board they called attention to some of the difficulties which the Board faced:

> ...the fact that they (members of the Board) are away from here for a long period of time, are brought back occasionally for a brief time, and suddenly confronted with problems about which they haven't thought, and are expected to absorb information very quickly and perhaps come to a judgment.

This situation, Mr. Friedman felt, could be improved somewhat by making information available to members in advance of the meetings.*

* TOP SECRET CODEWORD Minutes of the NSASAB Meeting held on 1-2 December 1960. Copy in D4 Files: NSASAB 1960.

Another difficulty under which the Board labored:

> ...the fact that so often when the problem gets to some of us, they are so far along that we are not really in any position to offer anything significant or constructive. We can always criticize, but that is hindsight. Possibly if we could get a look at some of these things earlier, maybe it might be possible to do something.

RADM Wenger felt that NSASAB, because of unique security problems, operated under more stringent restrictions than the other Boards studied, but that it was feasible to improve the working conditions of the Board without adverse effect on security.

After the Director, NSA, had received the Wenger-Friedman report from the NSASAB, he requested the Agency's Executive Group for Board Affairs (EXSAB) to conduct a study to determine how the Board-Agency relationship could be improved. This group suggested revisions in membership, terms of office of members, responsibilities, functions, and operating procedures of the Board. The result was a revised NSA Regulation, issued on 27 September 1961.* Shortly afterward a slight revision of this Charter was

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* See NSA Regulation No. 11-3, dated 27 September 1961.

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required in order to reflect a DOD administrative change relating to ex-officio representation on the Board:

> The Board shall consist of not more than 15 members-at-large appointed by the Director. In addition to this membership, the Director of Defense Research and Engineering, and the Assistant to the Secretary of Defense, Special Operations, or their designated representatives, are invited to participate in the activities of the Board as ex-officio members.*

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* NSA Regulation No. 11-3, dated 11 December 1961

As a result of the President's memorandum of 9 February 1962, Subject: "Preventing Conflicts of Interest on the part of Advisers and Consultants to the Government," the Department of Defense issued two new directives

governing the appointment of consultants and their service on advisory committees:

a. DOD Directive Number 5030.13, dated 20 April 1962, Subject: Regulations for the Formation and Use of Advisory Committees.

The purpose of this directive was to prevent anti-trust and conflict of interest problems from arising during the operations of such committees. The immediate effect of the directive was to require the Agency to secure authorization from the Secretary of Defense to continue the NSASAB, prior to the first of July 1962, and every two years thereafter.*

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* The Director, NSA, on 21 May 1962, submitted a memorandum to the SECDEF requesting approval to continue the NSA Scientific Advisory Board for FY-1963 and FY-1964. It was received by memorandum from the SECDEF, dated 29 June 1962.

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b. DOD Directive Number 5500.8, dated 12 March 1962, Subject: Standards of Conduct (Advisers and Consultants)

A majority of the Board members were of the opinion that the official atmosphere behind this directive and the resulting methods employed by the Government might adversely affect the relationship between the Government and the Scientific community. A minority opinion held that a consultant's position was actually better than prior to the directive because it clarified such matters as disclosure of inside information and the question of group actions as opposed to individual actions within a group.*

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* SECRET Minutes of the NSASAB Meeting held on 10-11 May 1962. Copy in D4 Files: NSASAB 1962.

Some minor changes in the Charter of the NSASAB were required as a result of these directives. For instance, the statement pertaining to membership tenure had to be revised to reflect the fact that the appointment of

all consultants had to be approved by the Secretary of Defense, and that approval is for one year.* The Executive Secretary of the Board (EXSAB) was the individual designated to be present at all meetings to fulfill DOD requirements.

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* SECRET Minutes of the NSASAB Meeting held on 20 Nov 1962. Copy in D4 Files: NSASAB 1962.

On 1 July 1962, Lieutenant General Gordon A. Blake, USAF, became Director, NSA, and in November he met with the Board. He indicated his awareness of the work of the NSASAB and its Panels and encouraged the Chairman and the members to feel that the NSASAB was a working partner of the Agency, not a body to be steered narrowly on every hand.

During the June 1963 meeting, the Director discussed contemplated major changes in the charter and operation of the Board. The major change contemplated was to modify the Board so that its membership would include the panel chairmen and only such other panel members and consultants as would be desirable from the standpoint of the subject matter brought before it. The Board would meet when an area of interest was broader than could be grasped by a single panel, or by a joint meeting of two of the panels. The chair would then be filled by one of the panel chairmen, the Director or Deputy Director, NSA, or a consultant whose expertise was critical to the problem to be solved. The panels would continue to function as previously. General Blake did not wish to press the Board for a position statement on the proposed changes; he suggested they might wish to communicate their opinions individually or to meet again on the subject.

CHAPTER V

RESEARCH AND DEVELOPMENT

Project FREEHAND: NSASAB Recommendations for Projects LIGHTNING and PARALLEL

A meeting of the Advisory Board for 8-9 October 1956 was arranged by the Director, NSA,* to consider ways to implement the Agency's program called FREEHAND, a five point program:

EO 1.4.(d)

FREEHAND	-	the program as a whole
LIGHTNING	-	the project on kilomegacycle computers
PARALLEL	-	the independent effort (that some outside organization be obtained to run a parallel effort on a specific high-level problem)
[redacted]		
ERUDITE	-	the project to increase the effort at the Agency by hiring more people and increasing its component of machines, computers, and data patterns

* This meeting of the Board was called in response to an inquiry by the Secretary of Defense as to what the Agency might accomplish with the high-level problem if no limits were placed on the amount of money and people to do the work. See: SECRET Minutes of the NSASAB meeting on 8 Oct 1956. Copy in D4 Files: NSASAB 1956.

Concerning Project LIGHTNING, the Board was to advise whether a large amount of money should be spent immediately to develop electronic equipment in the kilomegacycle range. Completely new approaches to computing techniques were probably involved, and it might be better to start with a series of different research projects leading to sufficient knowledge to achieve success. What did the Board think was the maximum speed of the computer that could be built with the present know-how?

Dr. Engstrom, who had relinquished his membership on the Board to become Director of Research and Development, NSA, outlined a program to produce super computers and analytical equipment -- the aim envisioned was the complete automation of the Agency's processing tasks. It was proposed that a commercial firm be given the contract.

The Board held an executive session, drawing up the following proposal for LIGHTNING:

The Board recommends that the exploitation of technical developments as related to Project LIGHTNING be considered in two separate tasks:

a. The design of a complete system for taking intercepted material through the processing and analytical stages, and based on computer facilities operating in the 10 to 100 megacycle range. This task is a major undertaking in advanced systems-design development, and it should be placed with an organization equipped to handle considerable expansion of the initial project.

b. The search for completely new techniques to push data processing into an area that seems unreachable by refinements of present technology. A 1000 megacycle pulse rate or logical design improvements that lead to-order-of magnitude efficiency increase in equipment utilization is a typical goal. This task requires the development of a technical concept which is new and can best be approached by sponsorship of a number of studies into new physical phenomena in search of a firm proposal for future exploitation.*

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* CONF Memorandum addressed to the DIRNSA, from the Executive Secretary NSASAB, Subject: Resolution of the Board, dtd 16 Oct 1956. Copy in D4 Files: NSASAB 1956.

As a result of the Agency's following through on these recommendations, short-term contracts for the LIGHTNING Project were let to four competing commercial corporations (IBM, Sperry Rand, RCA, Philco) and MIT. By 1958 representatives of these firms were able to report that progress under these contracts was most encouraging and that the prospects of achieving the goal of kilomegacycle operation in the not too distant future were good.*

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* TOP SECRET CODEWORD Minutes of the NSASAB meeting on 14 Feb 1958. Copy in PERS Files: O/M 1-7 Scientific Advisory Board.

On 19 January 1960, the Board submitted further recommendations on the LIGHTNING Project:

Project LIGHTNING should be supplemented by the design and construction of some experimental cryptologic devices, for example, a key generator or a rotor analog. Such a device could profit by

extremely high speed and, at the same time, provide some valuable experience in the new techniques. Early examination of one or more candidates of this kind will provide information which will aid in narrowing the field of LIGHTNING techniques and components.

The urgent need is observed for a formal language for use in general context of SIGINT processing machines. An effort should be made to employ it early in the use of HARVEST for greater operating efficiency, and in preparation for transition to LIGHTNING.*

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* CONF memorandum for the Director, NSA, from the NSASAB, dtd 19 Jan 1960. Copy in D4 Files: NSASAB 1960.

With respect to Project PARALLEL the Board discussed the pros and cons of a RAND-type organization -- captive corporation -- versus the possibility of getting a university to run the project for NSA. At the end of the meeting on 9 October 1956, the Board unanimously adopted the following resolutions:

The Board considers the implementation of the PARALLEL project one which is of sufficient importance that scientific sponsorship of it should be solicited through the top level of the Executive Department.

Had time allowed the Board would have welcomed the opportunity to explore possible ways and means of most effectively implementing the project, and regrets that urgency now precludes its full consideration. The Board does recommend that NSA explore rapidly methods of initiating the project, in addition to the one under advisement.

The Board feels that the head of the project and a few of the leading personnel should be scientists of the highest repute, so that their prestige would serve as an effective consideration in attracting a small group consisting of some of the most promising research talent in the country on short-term basis. The conditions in question may be difficult to realize under industrial sponsorship.

While a new one-purpose group may be indicated for the project, the Board calls attention to organizations such as: Lincoln Laboratories, RAND, Institute of Defense Analyses, Associated Universities, Inc., and industrial companies in addition to General Electric.

The Board through its Members and Panels, expresses its eagerness to assist NSA in this matter in any way consistent with the temporal urgency of the proposal.*

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* CONF Memorandum addressed to the Director, NSA, from the Ex. Sec., NSASAB, Subject: Resolution of the Board, dtd 16 Oct 1956. Copy in D4

Files: NSASAB 1956. Note: The Agency took no positive action on setting up a "captive corporation" to run the PARALLEL Project until after the Eisenhower Administration acted on the Baker Panel's proposal (10 Feb 1958); the Agency then acted by entering into a contract with IDA. See: TOP SECRET CODEWORD Minutes of the NSASAB meeting held on 15 Feb 1958. Copy in D4 Files: NSASAB 1958. See also The Captive Corporation: The Establishment of the NSA Research Institute, p. 46 of this study.

Project HARVEST

The Board was introduced to the Agency's HARVEST Project in 1959 -- a high-speed computing system designed to increase overall performance, on large scale computing problems, of the order of 90 to 100 times the processing speed of the existing IBM-704 data processors. In September 1960, the Chairman of the NSASAB appointed an ad hoc committee to bring up to date information concerning the progress IBM was making on the Agency's contract for HARVEST. Primarily the Agency's concern was comparing the end product of this project with the original design goals. On 1 December 1960, this committee submitted its report, stating that many difficulties had been found that were past mending:

> What can be learned for the future? Your committee recommends that projects of this magnitude should be monitored continuously during their evolution, and the evolution should be fully documented. Such monitoring and documentation will provide a basis for clear comparison of the actual progress made against the progress originally expected. The documentation would include a statement of objectives, the phasing plan, management procedures, and project maintenance.*

* SECRET Minutes of the NSASAB Meeting on 1 December 1960. Copy in D4 Files: NSASAB 1960. The contract with IBM had been let in 1958, but the Board was not brought in on the project until May 1959, the explanation being that the previous time was mainly a period of study. See CONF Minutes of Board Meeting held on 22 May 1959. Copy in D4 Files: NSASAB 1959.

The Board resumed discussion of Project HARVEST on 30 November 1961. Partly as a result of the recommendations made by the Board's ad hoc committee, much progress resulted during the following year -- the hardware was operational at Poughkeepsie, N.Y., and it completed a problem

solution in two hours, a task which would have taken SLED II about 150 hours; acceptance tests were to begin in about two weeks; delivery to NSA was scheduled for January 1962; and the target date for operational use was set for April 1962.*

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* SECRET Minutes of NSASAB Meeting, 30 Nov 1961. Copy in D4 Files: NSASAB 1961.

Project BRISKER

Following a presentation on BRISKER -- a project aimed at coupling computers and data processors in NSA into one large system with common communication and control -- and discussion pertaining to it, the Board prepared a memorandum to the Director, NSA, Subject: NSA Scientific Advisory Board Recommendations on BRISKER, dated 1 December 1961:

> The Board endorses the objectives of BRISKER to improve the usefulness of mechanization to the Agency (by system reorganization in data processing) and feels that further pre-hardware work should be funded, staffed, and carried out. Such work may well include experimentation on a general purpose computer.
>
> The Board suggests that NSA personnel inform themselves more thoroughly with respect to the activities of other organizations in the area in computing machine organization and usage....
>
> Allowing for considerable divergence in views on the nature of BRISKER concept, its probable contributions, and magnitude of tasks implied, several points can be made:
>
> 1. The need for integrating the approach to the operation of complex data processing systems is clear.
>
> 2. In particular, concept development is urgently needed for the guidance of future hardware development and acquisition programs, as for example, in respect to possible early exploitation of LIGHTNING components.
>
> 3. The general concept presented is in a quite early stage, and has not yet been carried to the point of well-understood, detailed concepts. Nevertheless, the step taken is in the right direction and calls for vigorous expansion.
>
> 4. It is premature to consider special hardware development of centralized control logic. Specifically, there is a strong feeling that any such ultimate hardware, if needed at all, should be part of a system being controlled, rather than above it.

5. The requirements that the BRISKER concept take proper account of needs for intervention or quick-response action must be emphasized. A properly developed concept should permit flexible accommodation of the requirements both for efficiency and for service.

6. It is noted that the commercial telephone system and special military systems have many elements in common with the BRISKER concept. It is also noted that work at M.I.T., U.C.L.A., as well as some current design philosophies of commercial computers, may have considerable bearing.

7. It is noted that future successful applications of the BRISKER concept may require that studies be made of the patterns of useful activity and duty cycles encountered in existing hardware programs, down to the level of computer instructions.*

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*SECRET memorandum to the Director, NSA, from the NSASAB, dated 1 Dec 1961. Copy in D4 Files: NSASAB 1961.

General Purpose Analytic Equipment

The Sub-panel on General Purpose Analytic Equipment was appointed by the Scientific Advisory Board to review the development program of the Agency in this area and to formulate comments and recommendations which would extend the Agency's progress. In their memorandum of 7 March 1955, emphasis was placed on the present state of the art and on the potentiality of achieving a very high-speed arithmetic and logical unit in the milli-microsecond range. Dr. von Neumann and others strongly urged an intensive research program in speed of components of this sort aimed at determining ultimate limits of the physical phenomena helpful to very high-speed devices, such as the effective grain size and other physical limits. While other groups in the government were known to be interested in research of that type, the Agency appeared to be the logical organization to initiate work in this area. Support might be secured from other sections of the Defense Department and the AEC.*

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* CONF Memorandum prepared by the Sub-panel on General Purpose Analytic Equipment of the NSASAB, dated 7 Mar 1955. Copy in D4 Files: NSASAB 1955.

CHAPTER VI

SIGINT COLLECTION

SIGINT Concepts 1960

At the 19-20 May 1960 meeting, the Board dealt with the question of the changing role of SIGINT in the production of raw intelligence -- a very rapid change was going on, much of which was beyond the province of simply receiving the signals. The Agency needed to think about what to do with them, where they were being received, and what could be gotten from these signals. The Board advised that:

1. The Director, NSA, establish a directorate for system and program (management) to implement the responsibilities for review of Service plans, programs, and budgets in SIGINT and COMSEC areas.

2. The Director, NSA, establish a program to secure in calendar 1960:

[redacted]

3. ELINT and COMINT be merged to a larger extent in all phases of research and development and in operations.

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EO 1.4.(c)

4. The Director, NSA, establish requirements for space-vehicle-borne SIGINT collection systems and for related study and development programs.

5. The Director, NSA, establish a systematic program of evaluating ELINT receiving systems now in use with particular emphasis on determining the extent to which these systems have fulfilled operational needs under field conditions.

6. The Director, NSA, continue and expand research on the artificial control of the ionosphere and outer atmosphere for its influences

on electromagnetic propagation and that he re-emphasize the importance of such research to the Director of Defense Research and Engineering.

7. The Director, NSA, investigate the intelligence potential in certain communications systems not now being covered; for example, systems using infra-red.*

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*SECRET memorandum for the Director, NSA, from the NSASAB, Subject: Proposals of the NSASAB, dtd 1 June 1960. Copy in D4 Files: NSASAB 1960.

NSASAB's Recommendations Re: Mechanized Morse Intercept

At the 19-20 May 1960 meeting, the Board was briefed on the possibilities that the flow of mechanized Morse transmissions might be on the decline, so that mechanizing this intercept might not be so profitable. Against this prospect, the Board recommended that measures be taken by NSA:

1. To gain actual operational experience with a system that achieves some deliberate degree of planned mechanization. Such operational experience will aid in:

a. Evaluating other proposed mechanized systems.

b. Guiding future research and development.

2. To begin to profit from the increased efficiency and operational economy promised by electronic mechanization and systems integration.

3. To serve as a fitting cumulation to past Agency research and development in the field of mechanized Morse.

The Board also advised that the Agency proceed at once toward service tests of the equipments developed by RADE (R&D) for handling Morse intercepts. The Service Agencies should be urged to consider expediting a possibly contemporaneous procurement of production models.*

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* SECRET memorandum for the Director, NSA, from NSASAB. Copy in D4 Files: NSASAB 1960.

SPACOL [redacted] Requirements

As early as June 1959, the NSA Scientific Advisory Board recommended to the Director, NSA, that the Agency proceed immediately to establish requirements for collection systems, which made use of space platforms, for initial operation by 1965:

> The cases which may be handled with space-based equipment are highly varied, and numerous system designs and policy problems are involved, but a rapid move to guide the development of space vehicle systems is considered essential to continued production effort because of the following:
>
> a. The great and growing importance of intelligence in the national military posture.
>
> b. The impending move toward higher frequencies for important military traffic because of interference, over-crowding and vulnerability to weapon effects and countermeasures.*

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* CONF Memorandum from the Executive Secretary, NSASAB, to DIRNSA, dtd 11 June 1959. Copy in D4 Files: NSASAB 1959. OGA

By 1961 the National Security Agency had been allocated funds by the Defense Department for a SPACOL Program: SPACOL became the major item of Board business during the 1961-1962 meetings.* At the May 1961

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* SECRET Memorandum for DIRNSA, Subject: SPACOL, dtd 20 Dec 1961. Copy in the NSA Historian's Files (C317): SPACOL. The decision of the Secretary of Defense to support SPACOL program at the initial fiscal [redacted] made it necessary for NSA to prepare detailed development plans of the SPACOL program based on these funding assumptions.

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meeting, the Agency presented a Space Collection Plan which the Board was asked to study and evaluate in terms of SIGINT requirements pertinent to the Intelligence Community as well as those which had been stated relative [redacted] The Board was briefed on the overall mission, priority

questions, engineering design, and other technical features of the plan, in addition to matters concerning desirability, and feasibility of costs. The NSASAB submitted the following comments and recommendations:

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1. The Board welcomes your invitation for early participation in the decisions regarding SIGINT against hostile space vehicles.

2. The Board considers hostile space vehicles as prime targets for collection not only in satisfaction of [redacted] requirements, but also for satisfaction of many other intelligence requirements. By the 1965-70 period the potential volume of traffic from space vehicles will rival that now being processed from all other sources. A system or set of systems to collect, process, and communicate information from earth satellite vehicles and space vehicles bound for the moon and other parts of the solar system will be very large and complex. It is, therefore, worthwhile to approach engineering and construction of such a system with all the forethought and attention to detail which can be brought to bear on it.

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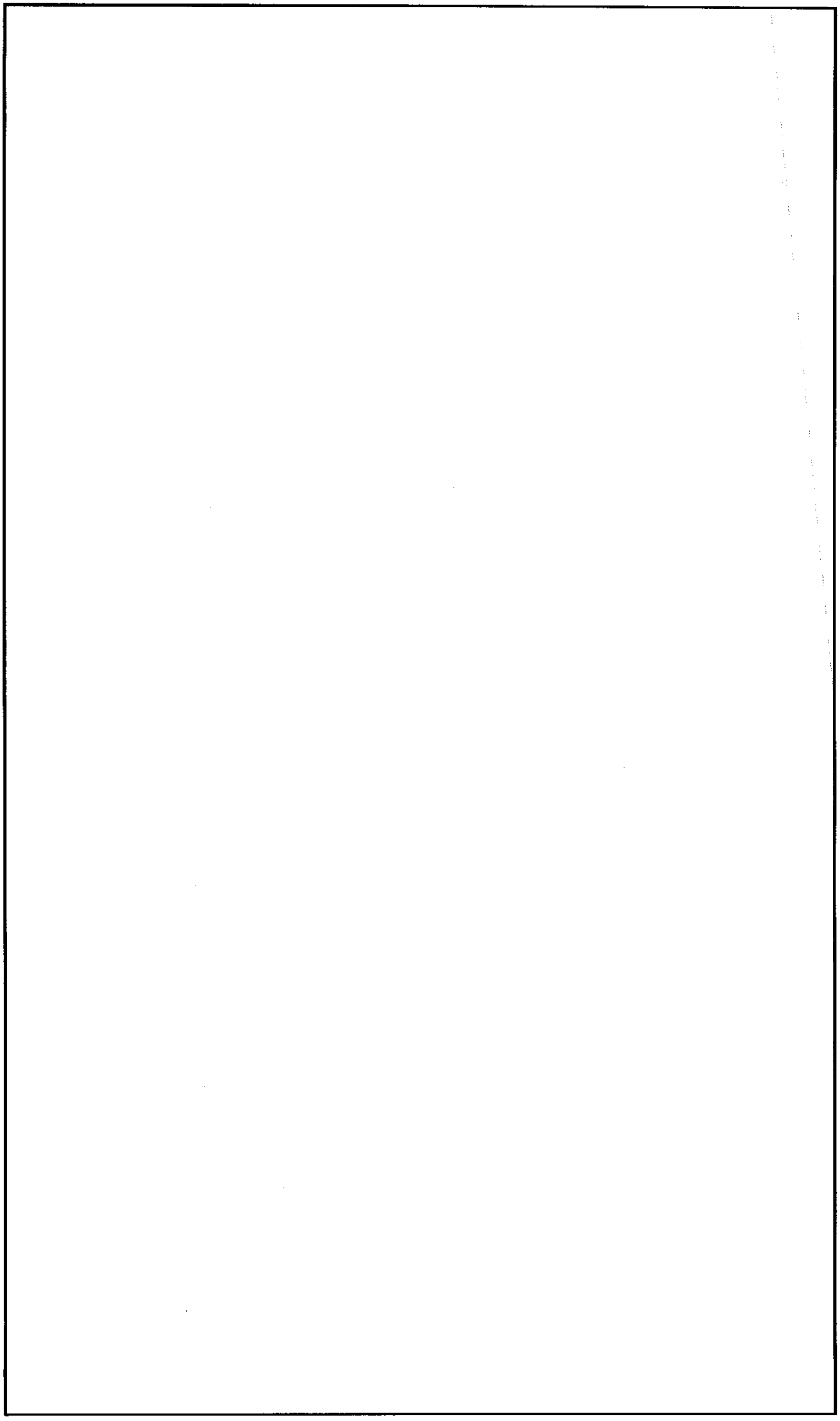
[redacted]

[redacted]

[redacted]



11. The Board would like to commend more attention to the growth of new systems from present sites and facilities. The Board recognizes that some attention has been given to the usefulness and deficiencies of currently available and planned facilities, but would like to be better informed on the possibilities and difficulties inherent in step-by-step growth as compared to complete system planning for implementation.

[redacted]

13. In answer to the specific questions directed to the Board, the Board finds that achievement of the full operational capability contemplated for the overall system by 1 January 1964, seems very unlikely. Problems must be solved in the system engineering, manpower and training, military construction, and site acquisition areas. A great deal can be done by 1964 to provide space collection capability based on improvements at the present field sites, but a great deal of work will be needed during 1964 and beyond to achieve a system of the size and complexity which seems to be called for by the space vehicle activity which may be expected.

14. The Board has mentioned above a number of alternate methods and development work to which attention should be given. [redacted]

15. With respect to processing, the Board feels that many of the [redacted] needs may be met with relatively simple processing and communication facilities and that a great deal of additional study is needed to specify the more complex facilities which will be needed to satisfy not only [redacted] requirements but to handle the large volume of traffic which is potentially available and applicable to many other requirements on the Agency.* OGA

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* TOP SECRET CODEWORD report to the Director, NSA, from the NSASAB, dtd 27 Jun 1961. Copy in D4 Files: NSASAB 1961.

With regard to [redacted] the Chairman of the Board, stated that Dr. Fubini, Deputy Director of Defense Research and Engineering, had asked the Director, NSA, to obtain the Board's comments on the requirements laid on NSA from the Department of Defense and, in particular from [redacted]. * The Chairman

* [redacted] OGA See: SECRET Minutes of the NSASAB meeting held on 27 June 1961. Copy in D4 Files: NSASAB 1961.

of the Board pointed out that normally this would be out of the purview of Board consideration and perhaps of the Agency; however, comments were invited. The Board prepared the following report:

1. The Board has responded to your invitation to review the SPACOL program and to comment on the [redacted] requirements against which it is designed.

2. The [redacted] requirements as stated are not complete enough for assessment. They must be improved considerably in terms of definition of the subjects about which intelligence is needed, the amounts and the delivery schedules for this information, the form in which the information is desired, and the locations to which it is to be delivered.

3. The Board considers that space vehicles will grow in importance and will become prime targets for collection of information applicable to many NSA missions including that of fulfilling [redacted] requirements. The Board assumes that NSA will present its space program to DOD and indicate what information could be made available to [redacted] as a part of this program.

4. By the 1965-70 period, the volume of traffic expected from space vehicles will exceed that which is now being processed by the Agency from all sources. Systems to collect, process, and disseminate this information will be large and complex. The Board therefore recommends an aggressive program of study, research, and development on the part of the Agency to determine the amount and kinds of information which can be produced by these systems. The Board also recommends consultations with using agencies to help in the establishment of rational achievable information requirements.

~~HANDLE VIA COMINT CHANNELS ONLY~~

5. In the using agencies, information is a basis of action. The quantities and delivery schedules of information needed by a using agency may be determined on a sound basis when the alternative actions available to that agency can be described and the information needed to permit a sound decision can be specified.

6. A matter of crucial importance is the delivery time for information relating to action decisions which must be taken quickly if they are to be meaningful. Real time in the classic sense is denied us by the laws of physics and the practical aspect of collection, processing, and communication. To specify real time in a requirement is therefore unrealistic. Any time delay which is tolerable can be used to reduce the cost of obtaining the information or to provide higher reliability in the information delivered. In formulating requirements, it is necessary to trade off the cost of rapid delivery against the cost of late delivery in an action decision.

7. The delivery time specification is only one example. There are also trade offs in quantity, form, and location which must be considered in formulating requirements against which system design can proceed.

8. A part of the difficulty in establishing good requirements lies in the fact that the user does not know what is feasible. A part lies in the fact that he does not know what he must pay in terms either of budget or of failure to satisfy other requirements, if his particular requirement is met in detail.

9. A part of the difficulty of advanced system design lies in the fact that the system designer does not have a good way of estimating real future requirements for information on the part of all users.

10. Only by a process of bargaining in which requirements and capabilities are continuously compared, modified, and traded off can we hope to improve our information system and our action posture fast enough to keep up with the growing complexity of the world situation.*

OGA

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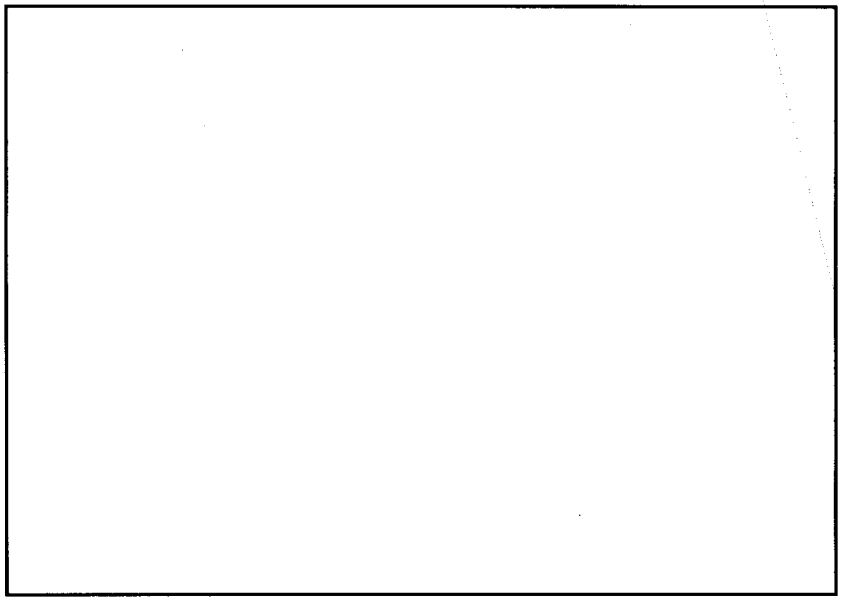
* SECRET report to the Director, NSA, from the NSASAB, dtd 27 Jun 1961, Subject: SPACOL Program and Comments on [redacted] Requirements. Copy in D4 Files: NSASAB 1961.

Could Overseas Expenditures be Reduced by New Technology?

In 1963, the Director, NSA, asked the EMR Panel to recommend possible means of accomplishing the national SIGINT mission with less expenditure outside the United States -- had technological developments advanced to

the stage where NSA could reduce its technical commitments overseas proportionally? The outflow of gold from the United States was a matter of concern. The Panel reported:



* SECRET Minutes, NSASAB Meeting, 28 June 1963. Copy in D4 Files: NSASAB 1963. A Board motion was made and carried to approve the Electromagnetic Reception Panel's report. See also the Panel's memorandum for the Director, NSA, dtd 29 May 1963. Copy in EMR Panel file: 27-28 May 1963.

CHAPTER VII

THE AGENCY'S MATHEMATICAL AND CRYPTOLOGIC PROGRAMS

The Agency's SCAMP Program

Members of the NSA Scientific Advisory Board showed an interest in the Agency's SCAMP Program from the time of its establishment.* On 15 October 1953, Dr. S. S. Cairns, Chairman of the NSASAB, presented a report on SCAMP

* SECRET report, "A Study of the Mathematical Effort in the National Security Agency," 31 May 1957, pp. 59, 64. Copy held in the NSA Historian's Files (C317): NSASAB. Proposals leading to Project SCAMP were made by [redacted] in his role as a member of SCAG. Dr. S. S. Cairns, who served as Chairman of the SCAMP Program during 1952-1953, did a remarkable job in assembling a competent group of mathematicians for the project as well as assisting in the physical and financial arrangements.

1953 before the Board, resulting in the following comments and recommendations:

1. As it now stands, SCAMP deals primarily with the computational aspects of discrete problems.

2. SCAMP might well provide a group of mathematicians located throughout the United States who are in a position to encourage students along lines of potential value to NSA.

3. Some SCAMP personnel might be considered for panel membership P.L. 86-36 . . . .

4. New York University has a major effort in applied mathematics that might be of some value to SCAMP.

5. UCLA has developed into a summer mathematical center. Its location is advantageous to such studies.

6. At present, and within security limitations, problems are presented to SCAMP. Those members fully indoctrinated are in a position to help out and make occasional suggestions.

7. The general nature of the problem is algebraic with some computing involved. A research contract with the Institute of Advanced Studies might be desirable. Such a program could deal with the computation of matrices in an effort to get specific work done on the shortening of matrix computations. This could introduce the computational aspects of some of NSA's problems.

8. Some similar effort with [redacted] involved, could introduce information theory into the problems that might be useful.

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9. A permanent organization to handle these matters might be desirable. It could be set up under a permanent executive secretary under SCAMP's chairman for the summer. The problem of funds would require consideration.*

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* SECRET Minutes of the NSASAB meeting on 15 Oct 1953. Copy in D4 Files: NSASAB 1953. It was also suggested that SCAMP should be lodged permanently at some university; the computer program lodged at the University of Manchester was cited as an example. The project is presently lodged at Princeton University.

At its February 1956 session, the Board accepted the proposal that the Mathematics Panel under the Chairmanship of Dr. S. S. Wilks review the SCAMP Program; the panel recommended that SCAMP should be continued and expanded:

> Expansion might include not only further increase in size within its present scope, but also coverage of special topics such as Bayesian statistics, the theory of search (including search guided by scoring techniques), partial permutations, and development of a theory of iterative decompositions (e.g., rectangle convergence).
>
> Every effort should be made within the Agency to relate the results of SCAMP and other outside researchers to Agency problems.*

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* SECRET report, "A Study of the Mathematical Effort in the National Security Agency," dated 27 May 1957. Copy in the NSA Historian's File: NSASAB. See also SECRET report, "NSA Mathematical Effort, 1960," which also recommended that SCAMP be continued and expanded. Copy in the NSA Historian's File: NSASAB.

A Study of the Mathematical Effort in the National Security Agency

In a report dated 31 May 1957, the NSASAB submitted to the Director, NSA, its comments pertaining to "A Study of the Mathematical Effort in the National Security Agency," as prepared by the Mathematics Panel and approved by the Board. The following findings deserve special mention:

The Agency has attacked its problem with competence and with full use of the available mathematical tools. However, its efforts have been handicapped by difficulty in recruiting high-calibre research mathematicians and by the absence of ideal research conditions.

The high-level problems require the utmost effort. We recommend that the present effort be supplemented by the establishment of a special group to do long-range basic mathematicial research in areas of cryptology. The group should not be located in the Agency either physically or organizationally. A method of partially implementing this recommendation would be to expand project SCAMP to a full-scale year-around operation.

An all-out effort should be made to enlist the services of the mathematical community to a greater extent than is done at present. More effort should be placed on the development of future capabilities of mathematics for problems of the Agency by the encouragement of research on special mathematical topics in universities. The Agency should also take more initiative in using its consultants.

The report recommends certain changes in Agency practices as an aid to recruitment and to improve the effectiveness and morale of the Mathematicians of the Agency. Efforts at instituting a substantial and growing training program in mathematics in the Agency should be redoubled. A strong attempt should be made to establish procedures whereby mathematicians and statisticians performing military service will be assigned to work at the Agency upon the Agency's request.

A final matter of increasing importance should be an intensified effort to integrate the mathematical disciplines and the electronics data processing tools which are used to carry out their analyses and solutions.*

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* CONF report from the Chairman of NSASAB to Lt. General J. A. Samford, USAF, Director, NSA, dated 31 May 1957. Copy in D4 Files: NSASAB 1957.

The Board returned to the subject of the Agency's Mathematical Effort in a memorandum for the Director, dated 19 January 1960:

> There is a continuing need for the Agency to compare its salary scales with those in the universities and industry. . . . There is little hope of substantial recruitment when NSA hiring salaries equal or fall below starting salaries in the best universities. This is now the case in Mathematics. It is recommended that starting salaries for PhD mathematicians be raised.
>
> Mathematicians who are not fully cleared can be of service to the Agency. Specific possibilities which deserve consideration as a mechanism to this include:
>
> 1. A continuation of a not-fully cleared version of SCAMP.
> 2. Subcontracting by FOCUS of sanitized problems.
> 3. Support for graduate students working with competent mathematicians.
>
> Work on advanced programming systems, especially those which make use of several logical levels, should be actively encouraged both in the Agency and at FOCUS. The work of the Agency on the development of cryptanalytic diagnostic programs has been encouraging. Activity in the area of automatic programming should be increased.*

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* CONF Memorandum for the Director, NSA, from the NSASAB, dated 19 Jan 1960. Copy in D4 Files: NSASAB 1960. See also SECRET report: NSA Mathematical Effort, 1960, prepared by the NSASAB's Mathematics Panel. Copy in D4 Files: NSASAB 1960.

By March 1960, the Mathematics Panel had prepared a second report entitled "NSA Mathematical Effort, 1960", for review by the Board and for drawing up recommendations for submitting to the Director. Significant were:

> The Agency's University Graduate Fellowship Program should be reinstituted in its original form, and information concerning this program should be appropriately disseminated.
>
> Working conditions for consultants to the Agency should be improved by at least the following actions: Setting aside adequate working space at Fort Meade and NSS, providing secretarial and other services to consultants, improving in transportation facilities for those consulting at Fort Meade, and those going to NSS to

confer with consultants, and giving the option of retaining their badges to consultants who visit the Agency frequently.

An operations analysis organization reporting to the Director should be established to study technical operations of the Agency.

A new Journal should be established to publish abstracts of all NSA, SCAMP, FOCUS, and other cryptologic papers. It is desirable that each abstract be written by some one other than the author or his immediate co-workers.

The policy of interchanging mathematicians and cyrptanalysts between R/D and PROD for temporary periods should be implemented through the medium of a committee charged with the duty of making such assignments, rather than through voluntary or informal arrangements.*

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* SECRET report, NSA Mathematical Effort, 1960. Copy in the NSA Historian's Files (C317): NSASAB.

The Establishment of the NSA Research Institute (FOCUS)

At the 13 February 1958 meeting, the Director, NSA, General Samford, introduced the question of setting up a "captive corporation" as the major topic for consideration by the Board, stating that the report of Dr. William O. Baker's Panel of the President's Foreign Intelligence Advisory Board had been more or less endorsed by the President and that NSA must act:

> ...we have the President's reaction to Dr. William O. Baker's Panel report which was finalized Monday and includes several quite interesting adventures perhaps in scientific matters that we will have an opportunity to discuss at a later date.

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> I think I might take just a moment to review what I think is the major item of interest to this group and the results of Dr. Baker's study. His recommendation is that we do a different thing in cryptanalytic research than we have previously, and this was endorsed essentially by the President. I believe, that it is understood by the President, the Secretary of State, and Defense, and by [redacted] as something of this sort: to resort to a different plan because it gets across the idea a little better.

I felt that Dr. Baker and his people thought we here in NSA were obsessed with what we might call the current cryptographic enemy and that by being too obsessed we would inevitably remain behind. The main thought in his recommendation, as it was approved, would be that in NSA we continue to concern ourselves with the current cryptographic problems, but that we build for ourselves a research institute which would concern itself with cryptanalysis with no particular enemy in mind. I think this is the impression I got from the general feelings which resulted from this main recommendation.

We, of course, will have, of necessity, to put a certain amount of our skills into this effort.*

---

* TOP SECRET CODEWORD transcription of the NSASAB Meeting, 13 Feb 1958. Copy held in D4 Files: NSASAB 1958. Dr. W. O. Baker became a member of the NSASAB, attending for the first time on 19 May 1960.

Some Board members had first-hand information pertaining to contractual commitments of Rand Corporation; MIT's commitments to the Defense Department; IDA and its contract with WSEG (Weapon Systems Evaluation Group); AUI (Associated Universities Incorporated), which runs Brookhaven Laboratory for the Atomic Energy Commission. * Such information would be of value to

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* TOP SECRET CODEWORD Minutes of the NSASAB Meeting, 15 Feb 1958. Copy in D4 Files: NSASAB 1958. See also: TOP SECRET CODEWORD Transcription of NSASAB Meeting 13-15 February 1958.

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the Director, NSA, in reaching a decision on the type of organization best fitted for running the Agency's research institute, recommended by the Baker report.

During the intra-Board discussion, the following ideas were advanced:

1. The Agency might be severely limited in a corporate operation.

2. As a source of prestige, the Agency would want good people and would want to avoid criticism. Picking the particular company is a big prestige factor. It is doubtful that just any "A, B, or C Corporation" off some place would have the importance and influence that would be necessary to do the Agency's research.

3. There is also the question whether the Agency could afford to have a company have an insight into handling the problem because of the limitations on that company's relationship with the Agency otherwise.

4. If the Agency sets up a corporation along the lines which the President suggests, the research "looking ahead" should be included; it should be looking ahead to what can be done with systems which are going to be coming around the bend.

5. Someone should look into programming techniques in advance of thinking what the Agency would get out of it.*

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* TOP SECRET CODEWORD Minutes of the NSASAB Meeting, 13-15 Feb 1958. Copy in D4 Files: NSASAB 1958; TSC Transcription of NSASAB Meeting, 13-15 Feb 1958.

Professor Wilks, Chairman of the Board, emphasized two points: "First of all, it (research institute) should be free from day-to-day, week-to-week, and month-to-month operations; secondly, it should have the mechanism for getting high-level people". He then called upon [redacted] (member of the Board) to comment concerning his experience with the Institute for Defense Analyses. [redacted] stated that IDA had been quite successful in getting people from universities to work on WSEG's contract. Some had used their sabbatical leave to do so.*

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* TOP SECRET CODEWORD Minutes of the NSASAB Meeting, 15 Feb 1958. Copy in D4 Files: NSASAB 1958. [redacted] gave a brief history of IDA, the Institute for Defense Analyses, explaining that the Institute had come into existence as follows: "About three years ago, [redacted] President of MIT, was approached by the Department of Defense, primarily by Mr. Quarles, ADM Radford, and, I think, [redacted] WSEG was finding it impossible to get the staff they needed to do the job they had... [redacted] pointed out that MIT's commitments to the Defense Department were much too great ... They suggested that a new corporation be formed in the nature of AUI (Associated Universities Incorporated), which runs Brookhaven. MIT then agreed to sponsor the

first interim contract for WSEG which it got a little over a year ago. The problem was transferred to a new corporation in about September 1956. The new corporation was sponsored by five universities, picked partially on a geographic basis."

On 23 May 1958, the Board returned to the question of the proposed research institute. Dr. Engstrom brought NSASAB members up to date on the various universities and organizations which had been contacted or considered to operate a research institute for the Agency; he then stated that the Institute for Defense Analyses had been requested by Mr. Quarles to operate a research institute for the Agency. The question of possible location and personnel were subjects of lively discussion. Later, at an executive session of the Board, after [redacted] had left the meeting, it was moved and unanimously carried that the NSASAB endorse the selection of the Institute for Defense Analyses to establish and operate a research institute for the National Security Agency.* P.L. 86-36

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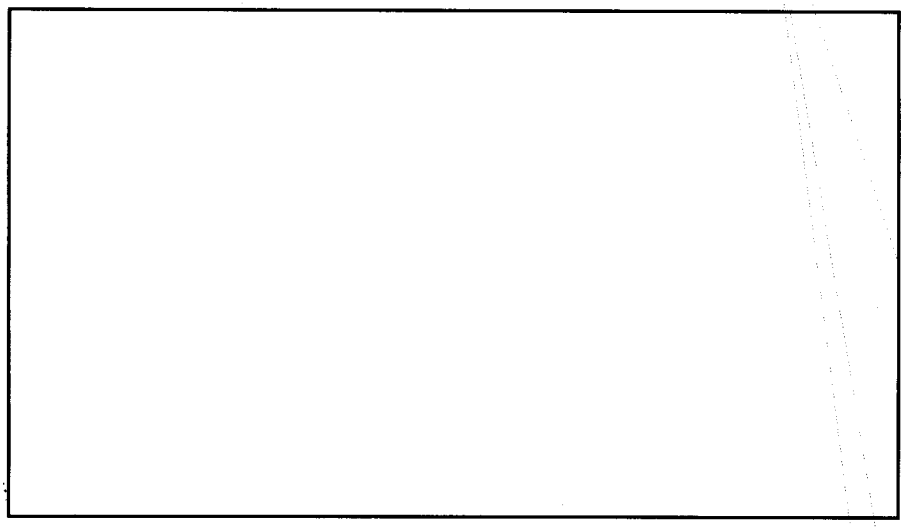
* TOP SECRET Minutes of NSASAB Meeting, 23 May 1958. Copy in D4 Files: NSASAB 1958 [redacted] pointed out that he was in a somewhat delicate position, and he raised the question whether the Board thought the Institute for Defense Analyses to be the proper agent. Ibid.

The outcome was the establishment of the Agency's Communications Research Institute (FOCUS) operated by IDA, which is a non-profit, non-governmental organization, under contract with ONR (Office of Naval Research) at Princeton.

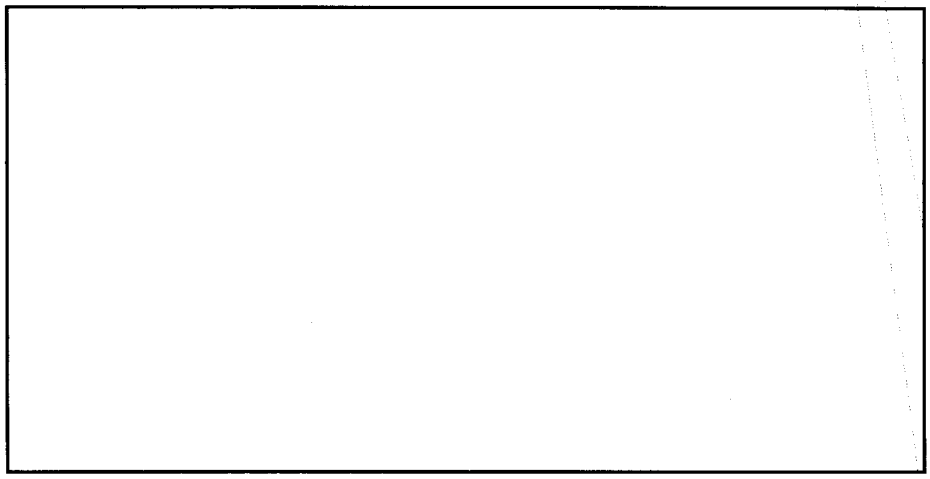
Recommendations Re: FOCUS 1961

On 1 December 1961, the Board's Mathematics Panel was asked to study the work conducted for NSA by the Institute for Defense Analyses at its Communications Research Institute (FOCUS). The Panel completed its report for Board acceptance and the following recommendations were forwarded to the Director in May 1962:

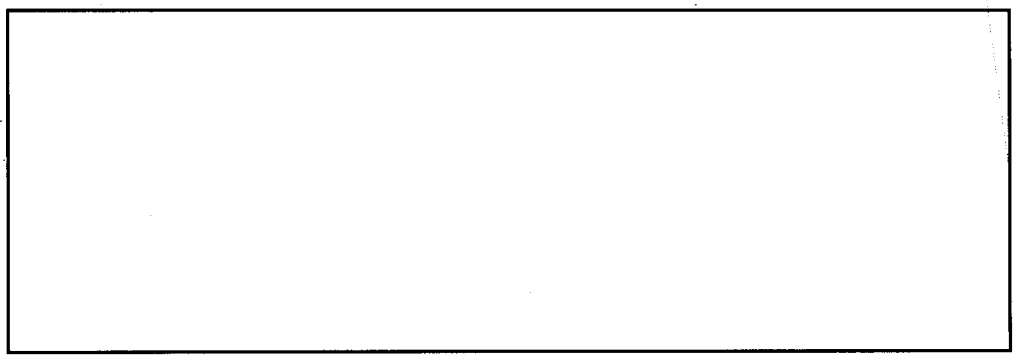
Technical Program



Cooperation and Communication with the Agency



* A Directive (27 March 1962) from the Director, NSA, establishing a new FOCUS Steering Committee within the Agency, was one of the major items included in the plans.



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* SECRET Minutes of NSASAB Meeting on 10-11 May 1962. Copy in D4 Files: NSASAB 1962.

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~~TOP SECRET~~

[redacted]

* SECRET Minutes of the NSASAB Meeting held on 28 June 1963. Copy in D4 Files: NSASAB, June 1963.

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CHAPTER VIII

NSASAB RECOMMENDATIONS RE: AGENCY RECRUITMENT

NSA's Recruitment Problem: 1961 - 1962

At the November 1961 meeting, the [redacted] ex-officio member of the Board, expressed the opinion that "recruiting is one of the most serious problems confronting NSA, particularly in the year ahead. The fiscal year 1963 Agency budget called for a net increase of some 800 personnel. Thus with its projected attrition rate, the Agency would require a total employment input of about 1500, many of whom would need to be highly specialized people. This, in turn, would mean processing five or ten times that many applicants in order to make proper selections."*

* SECRET Minutes of the NSASAB meeting on 30 November - 1 December 1961. Copy in D4 Files: NSASAB 1961.

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Thus, the Agency's hiring objectives represented a sharp departure, not a smooth step ahead. [redacted] also pointed out that "Secretary McNamara had approved everything that had been presented in the NSA budget, including SPACOL at a substantial level. Thus, in the case of the Agency's program next year, success or failure of this venture will largely hinge on whether the recruiting is successful."*

* Ibid. See also SECRET memorandum for the DIRNSA, subject: SPACOL, dtd 20 Dec 1960. Copy in NSA Historian's Files: SPACOL.

As a result of the Agency's recruiting position, the Board devoted time to this subject during the fall 1961 and spring 1962 meetings and advised the Director, NSA, as follows:

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The Board recommends that the Agency give consideration to the extension or the re-establishment of the following public relations activities in support of recruitment, as well as the reinstitution of those recruiting techniques which had proven effective in the past:

1. Reconstitute the "NSA Advisory Committee for Recruitment and Utilization of Mathematicians", and consider the advisability of establishing a similar working group for engineers and physicists.

2. Revitalize the "NSA Speakers Pool", a group of Agency scientists and engineers who make unclassified presentations to student chapters of professional societies.

3. Continue the Agency's sponsorship of two-day summer conferences at NSA for college placement officers and selected faculty members.

4. Increase the number of public relations visits to the campuses by Agency recruiters and alumni.

5. Conduct a study to determine the feasibility of involving Agency personnel in recruitment planning as well as active recruiting.

6. Seek recruitment assistance of members of the NSA Registry of Consultants, especially those in the academic communities.*

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* CONF Minutes of NSASAB Meeting held 30 Nov - 1 Dec 1961. Copy in PERS Files: NSASAB 1961

Exchange Research Fellowships

NSASAB discussed establishing Exchange Research Fellowships from which both the Agency and GCHQ might benefit, at its meeting in April 1955. The proposed fellowships were to be financed from U.S. Government funds. The intent of the program was to get persons formerly in the intelligence business, both within NSA and GCHQ, and now back at their respective universities or private companies, to devote one or two years of concentrated study to one or more of the unsolved high-level problems. Mr. Donald A. Quarles, at the time he was serving as Assistant Secretary of Defense, Research and Development, had indicated his approval of such a project and had asked that

he be given some estimate of the amount which should be set aside from MWDP funds for such a project. As usual, the real problem was to get qualified people interested in the problem. The Director, GCHQ, had also formally indicated his interest and willingness to cooperate to whatever extent was feasible. The Board expressed an interest in the project, but felt that candidates for the fellowships would be difficult to find.

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* SECRET Minutes of the EXSAB Meeting of 5 April 1955. Copy in D4 Files: EXSAB 1955.

The Move to Ft. Meade and its Operational Implications

In April 1954, the Scientific Advisory Board discussed the Agency's move to Ft. Meade. Mr. McPherson suggested that, judging by the experience of industries which had undertaken similar moves, NSA should hire numbers of the best people possible as a "buffer" against expected attrition. To select the best, NSA ought to give supplemental aptitude tests during the actual recruiting, and ought to start immediately using interim tests until a final battery had been developed.*

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* TOP SECRET CODEWORD Minutes of NSASAB meeting held on 20 April 1954. Copy in D4 Files: NSASAB 1954.

CHAPTER IX

NSASAB RECOMMENDATIONS: GENERAL

Recommendations of the NSASAB Special Study Group Re: Expanding and Improving the Agency's COMINT Effort

The Special Study Group of the Scientific Advisory Board, in addition to evaluating COMINT as a potential weapon of advance warning of an impending attack on the continental U.S., considered NSA's problems in carrying out its COMINT mission. The Group included in its report to the Director, "The Potentialities of COMINT for Strategic Warning", certain recommendations which the Agency should take into account in expanding and improving its COMINT effort. The following are representative:

1. Top priority should be accorded to the solution of high-level Soviet cryptographic systems and to their exploitation on a timely basis.

2. Traffic Analysis activities should be expanded and organized to give the maximum information obtainable from the material intercepted.

3. [redacted]

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EO 1.4.(c)

4. Personnel policies should be revised to improve the selection, training, and retention of skilled personnel, both military and civilian.

5. Additional research and development effort must be devoted to the field of intercept.

6. Research should be carried out in connection with the T/A fusion effort.

7. Improvements are needed in the training and instruction of communications personnel and in operations of the entire communications network to insure against personnel failures.

8. [redacted]

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9. Studies (intensive and comprehensive) should be made of activities of the Soviet Air Force [redacted]

10. Traffic analysis fusion effort in NSA should be decentralized to some extent by having traffic analysis units in operational areas and traffic analysis support at intercept stations.

11. A small research group should be established to carry out research on new methods of analysis.

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EO 1.4.(c)

12. NSA should reexamine its selection, training, proficiency evaluation, and promotional procedures. Possible application of modern psychometric methods should be explored in connection with personnel selection.

13. Consideration should be given to the establishment of COMINT career fields in the Army and Air Force.

14. A firm policy should be established to control and regulate the transfer of personnel familiar with the high-level problems. High-level effort requires augmentation by top-flight analysts.

15. NSA should increase its computing facilities and its staff of personnel skilled in programming. Use of outside programmers should be investigated.

16. The possibilities of carrying out electronic developments outside the Agency should be investigated.

17. There is a need for basic research on the theory of COMINT and for the development of methods and equipments which will permit the most efficient exploitation of the theoretical potential of the field.

18. [redacted]

19. Developments along the following lines should be considered: antenna systems (multiple unit) and integral receiving facilities to permit operators to determine the direction of arrival of a signal immediately without reliance on a separate D/F.

20. Development of repeaters, receivers, antenna systems, and techniques to improve reception above 30 mcs.

21. Development should be continued on equipments for better utilization of immediate action voice communications including better receivers, better recording machinery, automatic time registering devices, better techniques of receiving and copying this traffic, and eventually automatic semantic processing equipment for use in traffic analysis and recovery of brevity codes.

22. Equipments for reception of noise modulated signals (such as NOMAC system) should receive attention.

23. Development of equipment for detection and reception for [redacted] pulse and frequency dispersal communications systems should continue.

24. Installation and use of propagation measuring equipment to permit more efficient direction of intercept effort should be made.

25 [redacted]

EO 1.4.(c)
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26. Efforts should be continued on development of [redacted] and position-recording devices.

27. Effort should be continued on development of RFP devices for transmitters and operators, both voice and Morse.

[redacted]

29. More high-level positions and opportunities for advancement should be established.

30. Scientists and engineers could be borrowed from industry and universities for limited time periods.

31. In order to attract the interest of prospective analysts, the present recruitment policy of NSA should be restudied in the light of realistic security limitations.

32. Question of salary and promotion policy in NSA should be restudied to determine if it is conducive to sound development of the Traffic Analysis effort.

33. Consideration should be given to the establishment of a service career field for military intercept operators in order to avoid the problem of re-enlistment and rotation.

34. Analytic support should be provided at the intercept site, either by indoctrination of the intercept personnel with the rudiments of C/A and T/A or by assignment of an analyst to the site.

The NSASAB Special Study Group's report was well received by the Director, who immediately took steps to put into effect many of the Group's recommendations. General Canine, who had directed that the study of the Agency's COMINT effort be made, remarked: "If I ever had to justify the existence of the NSA Scientific Advisory Board, last year's report, 'The

Potentialities of COMINT for Strategic Warning', by the Special Study Group (with Dr. Robertson as Chairman) would in itself be more than sufficient justification." The report has not only been used extensively within NSA, but has improved NSA's position with the Department of Defense as well as other consumers. The report has been valuable in assisting the Agency in partially solving some personnel problems, specifically in regard to super grades.*

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* TOP SECRET CODEWORD Minutes of NSASAB meeting on 20 April 1954. Copy in D4 Files: NSASAB 1954.

APPENDIX I

THE CHRONOLOGY OF THE NSA SCIENTIFIC ADVISORY BOARD

March 1951 - May 1952

The NSA Scientific Advisory Board(NSASAB) is the successor of the former Special Cryptologic Advisory Group (SCAG) which was established in March 1951, by the Research and Development Board of the Department of Defense at the suggestion of the Director, AFSA. SCAG had been organized to assemble a group of outstanding technical consultants for advice and assistance in solving special problems in the cryptologic field. It existed for a little over a year, at the end of which DIRAFSA and certain members of SCAG felt that the group should be reorganized and established on a different basis.

May 1952 - 21 August 1952

In May 1952, a member of SCAG wrote a statement of mission for a "new SCAG", a document which was to serve as a basis for the final draft of a "Charter of Guidelines" for a body which became the AFSA Scientific Advisory Board (AFSASAB). This "Charter of Guidelines" was issued as AFSA Regulation Number 20-10 dated 21 August 1952.

22 January 1953

The NSASAB was established by NSA Regulation No. 11-3 dated 22 January 1953. It provided also for the establishment of an Executive Group for Board Affairs (EXSAB) within the Agency as a secretariat for the Board's operation.

4-5 February 1953

The first conference of the NSASAB was held on 4-5 February 1953, attended by:

Professor Stewart S. Cairns, Chairman
Mr. John C. McPherson
Professor Howard P. Robertson
Professor John von Neumann
[redacted] P.L. 86-36
Dr. Howard T. Engstrom
Professor Samuel S. Wilks

23 June 1953

The Director, NSA, named a Special Study Group under the Chairmanship of Professor H. P. Robertson to investigate the value of COMINT as a source of early warning against a surprise attack on the continental United States.

16 October 1953 EO 1.4.(d)	The Special Study Group submitted its report entitled "The Potentialities of COMINT for Strategic Warning" for acceptance by the NSASAB.
13 April 1954	A modified version of the Special Study Group's report was prepared as a result of a request by [redacted] authorities for a copy of their report. On 13 April 1954, a copy was submitted to USCIB for approval prior to transmittal to the [redacted]
20 July 1954	NSASAB's Charter (NSA Regulation 11-3) was revised, providing for the establishment of Electronics, Mathematics, and Telecommunications Panels, and such other panels and sub-panels as may be required to facilitate studying particular problems of the Board.
13 September 1954	The Executive Secretary of NSASAB prepared a memorandum, addressed to the members of the EXSAB, Subject: "Ways of making the Board more useful to the Agency".
22 September 1954	The members of the EXSAB and the Chairman of the Board met to discuss the memorandum of 13 September 1954.
1 November 1954	A memorandum was prepared by the Executive Secretary of the Board, addressed to the Director, NSA, Subject: "Measures to increase the effectiveness and use of NSA's Scientific Advisory Board and Panels". As a result of this the EXSAB was elevated to policy-level, and gave overall guidance to NSASAB.
8-9 October 1956	The Director, NSA, called a meeting of the Board to consider and advise him concerning the Agency's Program, cover name, FREEHAND. Consideration of a "captive corporation" was urgent.
13 May 1958	Revision of NSASAB's Charter providing for an enlargement of the Board (as many as 16 members) and recasting of Panels.
22-23 May 1958	At the 22-23 May 1958 meeting, the Board adopted Agency designations for three Panels: Mathematics, Electromagnetic Reception, and Electronics and Data Processing.
1 July 1958	A memorandum from the Secretary of Defense stating that all committees that could not be justified were to be abolished, effective 1 July 1958, was announced by Dr. Engstrom, Executive Secretary of the Board. No difficulty was encountered in justifying the Board's continuance.

4-5 December 1958	The Communications Panel, established in 1958, was endorsed by the Board at its 4-5 December 1958 meeting. On 26 May 1961, the question of continuing the Panel was discussed by the Director and the Board, resulting in its continuance.
1959 P.L. 86-36	On the initiative of [redacted] an effort was made to organize an Operations Research Panel of the Board. Candidates for membership on the proposed Panel were approached and some indicated a willingness to serve; however, as of this date the Panel had not materialized.
15-16 September 1960- 1 December 1960	At the 15-16 September 1960 meeting, the Board authorized two of its members, RADM J.N. Wenger and Mr. W. F. Friedman, to make a study of the Board's efficacy. The scope of their study was broadened to include an appraisal of scientific boards operating elsewhere within the Department of Defense. A special report of their findings was presented to the Board on 1 December 1960.
27 September 1961	The Director, NSA, requested the Agency's Executive Group for Board Affairs (EXSAB) to conduct a study to determine how the Board-Agency relationship could be improved. The EXSAB's study advised revisions in membership, terms of office of members, responsibilities, functions, and operating procedures of the Board. On 27 September 1961, a revised Agency NSASAB Regulation was issued.
11 December 1961	A slight revision in NSA Regulation No. 11-3, dated 27 September 1961, was made to include a DOD administrative change relating to ex-officio representation on the Board.
20 September 1962	The Communication Panel was deactivated. See General Orders No.25, dated 27 October 62.
January 1963	In January 1963, the NSASAB Charter was revised to further comply with DOD directives on the operation of advisory committees. The major change was that members were appointed on a fiscal year basis, rather than a three year term.
June 1963	During the June 1963 meeting, contemplated major changes in the Charter and operation of the Board were discussed. The central change contemplated was to modify the Board so that its membership would include the panel chairmen and only such other panel members and consultants as would be desirable from the standpoint of the subject matter brought before it. The Board would meet when an area of interest was broader than could be grasped by a single panel, or by a joint meeting of two of the panels.

APPENDIX II

The Charter of Guidelines for the AFSASAB/NSASAB

The AFSASAB "Charter of Guidelines" was published as AFSA Regulation No. 20-10 dated 21 August 1952. The excerpts of this document given below comprise the main rules and regulations under which the first AFSASAB operated. It was republished under NSA Regulation 11-3 dated 22 January 1953.

1. PURPOSE - The purpose of this Regulation is to set forth the organization and functions of the Armed Forces Security Agency Scientific Advisory Board (AFSASAB), hereinafter called the Board.

2. GENERAL - The Board is an extension of an organization established in March 1951 as the Special Cryptologic Advisory Group (SCAG) by the Research and Development Board (RDB) of the Department of Defense...

3. MISSION - The Board will advise the Director, AFSA, on scientific matters related to the fulfillment of the mission of this Agency and will report its recommendations directly to the Director. Individually, the members of the Board will serve as consultants, within their respective fields of science, to the various activities of AFSA.

4. FUNCTIONS - In order to advise the Director concerning possible methods of solving present and future problems... the Board will:

   Review all necessary data concerning the principal cryptologic problems being attacked...

   Bring to the attention of the Director scientific studies...

   Suggest changes of emphasis in the effort applied...

   Keep the Director informed on the latest studies and developments...

5. CHAIRMAN - The Chairman of the Board will be designated by the Director and will continue to serve at the discretion of the Director.

6. MEMBERSHIP - Permanent members of the Board will be appointed by the Director
   Term of appointment at the discretion of the Director
   The Chairman may apportion membership among appropriate technical panels, committees... The Director may appoint outside scientists to serve as ad hoc committees or panels of the Board.

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7. IMPLEMENTATION OF BOARD RECOMMENDATIONS - In all cases the Director will notify the Chairman of the Board of action taken on Board recommendations.

8. EXECUTIVE GROUP FOR BOARD AFFAIRS (EXSAB) - ...will be established within AFSA to conduct...liaison with members of the Board. The membership of EXSAB will be determined by the Director. The Chairman of EXSAB will be assisted as required by other members of the Group:

1. Preparing presentations to the Board...;
2. ...arrangements for Board meetings;
3. Making arrangements for visits of Board members to AFSA;
4. Providing pertinent technical reports, studies...requested by the Board;
5. Monitoring implementation of approved recommendations of the Board;
6. Advising the Director, as appropriate, on matters pertaining to the Board.

9. EXECUTIVE SECRETARY - The Chairman of EXSAB...will serve as Executive Secretary of the Board...the Executive Secretary will receive from AFSA activities requests for consultant services of individual Board members....

10. MEETINGS - ... held at such times as agreed upon by the Director and Chairman of the Board.

By General Orders, Number 20, dated 18 September 1952, the membership of EXSAB was announced, and on 26 September 1952, the following attended EXSAB's first meeting:

Mr. W. F. Friedman, Chairman
RADM J. N. Wenger (for part of meeting)
Dr. S. Kullback

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Dr. A. Sinkov
Dr. H. H. Campaigne

The first subject for consideration by this Group was the membership of the new AFSASAB. Six recommendations for the Chairmanship were listed in order of priority for the Director, who decided that

Dr. H. P. Robertson, California Institute of Technology, should be approached first.* Prospective members for the Board were to be considered from lists of names including: persons who were members of SCAG; persons whose names were suggested at one time or another or during the existence of SCAG; and persons whose names were suggested in the meeting of the EXSAB.**

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* SECRET Minutes of Meeting of EXSAB, dtd 26 Sep 1952. Copy in Wenger files, Folder: Advisory Groups.

** CONF ltr from Gen. Canine to S. S. Cairns, dtd 22 Oct 1952. Serial: 0685. Professor Stewart S. Cairns, Chairman, Department of Mathematics, University of Illinois, became the first Chairman, AFSASAB.

APPENDIX III

AGENDA OF ACTIVITIES OF THE SPECIAL STUDY GROUP*

On 27 July 1953 the Group assembled in Washington for discussion and planning proposed activities. The next day the members of the Group reviewed the Role of Intelligence in US Air Defense Systems; a briefing was prepared by the Directorate of Intelligence, Headquarters, USAF.

Other briefings and sources of information took them outside the Washington area:

29 July 1953 Brooks Air Force Base, San Antonio, Texas

Summary of COMINT capability to provide advance warning	Commander, USAFSS
USAFSS Organization and Operations	Deputy Chief of Staff/Operations, USAFSS
Traffic Analysis	Analysis Control Division, USAFSS
USAFSS ELINT Program	Chief, Implementation Division, USAFSS
Intelligence Requirements and Dissemination	Chief, Current Reporting and Requirements Branch, USAFSS
Communications	Command Communications Office, USAFSS

30 July 1953 Ent Air Force Base, Colorado Springs, Colorado

OGA

31 July 1953 Offutt Air Force Base, Omaha, Nebraska

Discussion of COMINT and Collateral Intelligence	Director of Intelligence, SAC (Strategic Air Command)
Location and Identification of Targets	Target Materials Division, Directorate of Intelligence, SAC

* NSA Registered Publication No. 2-54.

Philosophy of Intelligence Requirements for Strategic Operations	Air Estimates Division, Directorate of Intelligence, SAC
Communications	Director of Communications, SAC

1 August 1953 — Headquarters, Central Air Defense Force, Kansas City, Missouri

The Role of COMINT in the Korean War	Commander, Central Air Defense Force

On the return of the Group to Washington by 3 August a general discussion session to plan for future activities was held.

4 August 1953

Discussion of COMINT Capabilities and Potentialities	Meeting held at CIA

5 August 1953

Individual Studies by Members of the Group on specific problems

6 August 1953

Discussion of COMINT activities of the U.S. Navy	Operational Intelligence Section Department of the Navy

7 August 1953

General discussion and planning session

1-10 September 1953

General sessions of Group for further studies and preparation of report

The Group was assisted by Mr. William F. Friedman, Executive Secretary of the NSASAB; his assistant, [redacted]

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On several occasions the Group received special assistance from the following persons:

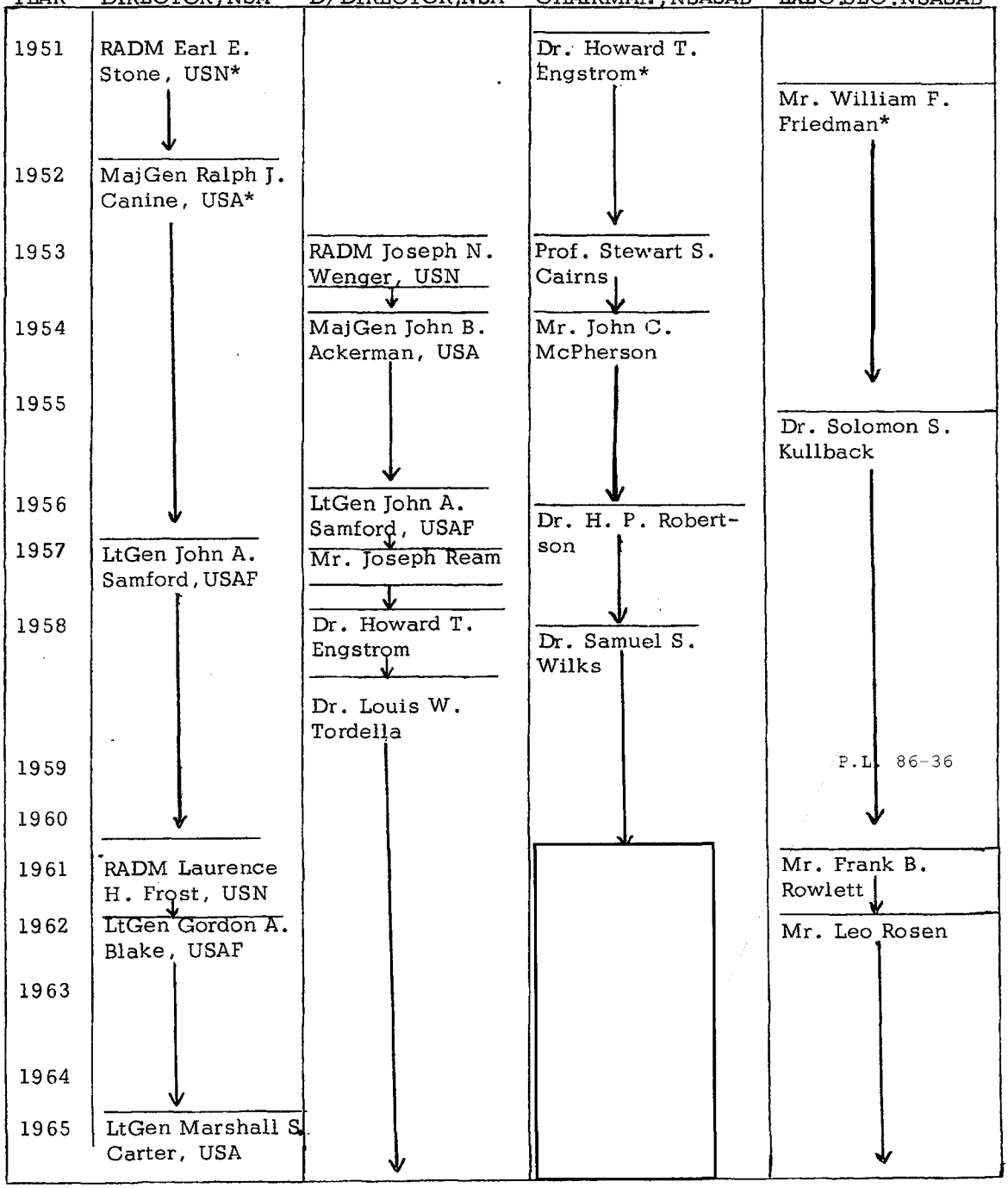
[redacted] OGA

RADM William Goggins, USN (Ret.), ERA
Capt Wilfred J. Holmes, USN (Ret.)
Col James L. Weeks, USAF, NSA
Col Gordon W. Wildes, USAF, USAFSS

Assistance in drafting the report which bore the title, The Potentialities of COMINT for Strategic Warning, but later to be known as the "Robertson Report," was rendered to the Group by Professor S.S. Cairns, Mr. J.Z. Millar, and [redacted]

APPENDIX IV

CHRONOLOGICAL CHART, NSA AND NSASAB OFFICERS, 1951-1965



* The Armed Forces Security Agency (AFSA) was the predecessor of NSA; officials who served before November 1952 were AFSA officials.

HANDLE VIA COMINT CHANNELS ONLY

APPENDIX V

MEMBERS OF THE NSASAB, JANUARY 1953 - JULY 1965

*Prof. Stewart S. Cairns, Chairman, 22 Jan 1953**	Head of the Department of Mathematics, University of Illinois
*Mr. John C. McPherson	Vice President, International Business Machines Corporation
*Prof. Howard P. Robertson	Norman Bridge Laboratory of Physics, California Institute of Technology
*Prof. John von Neumann	The Institute for Advanced Study, Princeton University
[redacted]	
*Dr. Howard T. Engstrom	Assistant Vice President, Engineering Research Associates, Division of Remington Rand Corporation
*Prof. Samuel S. Wilks	Department of Mathematics, Princeton University
[redacted]	
Dr. Jay W. Forrester	Lincoln Laboratory, School of Industrial Management, Massachusetts Institute of Technology
Mr. Donald A. Quarles	Assistant Secretary of Defense, Research and Development
[redacted]	
Mr. William F. Friedman	Consultant
[redacted]	

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[redacted]

*** Dr. William O. Baker — Vice President, Research, Bell Telephone Laboratories, Murray Hill, New Jersey

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*** RADM Joseph N. Wenger, USN (Ret.) — Consultant, Washington, D.C.

[redacted]

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* Original members of the NSASAB.

** In addition to Professor Cairns, the following have served as Chairman of the NSASAB:

Mr. John C. McPherson..... 24 May 1954
Dr. Howard P. Robertson..... 8 Oct 1956
Dr. Samuel S. Wilks..... 13 Feb 1958
[redacted]

*** Serving on the Board as of 1 July 1965.

DATES OF THE MEETINGS AND MEMBERS ATTENDING
4 February 1953 - June 1963

Dates of Meetings 1953 - 7 Mar 1957	Members of the NSASAB	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. 4 Feb 1953	Prof. Stewart S. Cairns	x	x	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x
2. 5 Feb 1953	[redacted]	x	x	*	*	*	x	x	x	x	x	x	-	-	-	-	-	x
3. 11 Jun 1953	Mr. John C. McPherson		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4. 12 Jun 1953	Prof. Howard P. Robertson		x	x	x	x	x	x	x	x	-	-	-	x	x	x	x	x
5. 11 Sep 1953	Prof. Samuel S. Wilks	x	x	x	x	x	x	x	x	x	-	-	-	-	-	x	x	x
6. 15 Oct 1953	Dr. Howard T. Engstrom		x	x	x	x	x	x	x	x	x	x	x	x	x	-	-	-
7. 16 Oct 1953	Prof. John von Neumann					x	-	-	x	x	x	x						
8. 20 Apr 1954	[redacted]			x	x	x												
9. 21 Apr 1954				x	x	x	-	-	-	-	x	-	x	x	x	-	-	x
10. 6 Apr 1955									x	x	x	x	x	x	-	x	x	x
11. 7 Apr 1955	Mr. Donald A. Quarles					x	-	-	*	*	x							
12. 15 Feb 1956	Mr. William F. Friedman												x	-	x	x	x	x
13. 16 Feb 1956	Prof. J. W. Forrester												x	x	x	x	x	x
14. 17 Feb 1956	[redacted]																x	x
15. 8 Oct 1956															x	-	*	-
16. 9 Oct 1956																		
17. 7 Mar 1957																		

* Mr. J. Z. Millar attended for [redacted] on 11-12 June 1953 and 11 Sep 1953.
Mr. Dean Post attended for Mr. D. A. Quarles on 20-21 Apr 1954.
Mr. Dean Post attended for [redacted] on 9 Oct 1956.

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Dates of Meetings 8 Mar 59 - 2 Dec 60	Members of the NSASAB	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
18. 8 Mar 1957	Dr. S. S. Wilks	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
19. 13 Feb 1958	Dr. H. P. Robertson	x																	
20. 14 Feb 1958	Dr. S. S. Cairns	x	x	x	x	x	x												
21. 15 Feb 1958	Mr. J. C. McPherson	x	x	x	x	x	x	x	x	x	x								
22. 22 May 1958	[redacted]	x	x	x															
23. 23 May 1958		x																	
24. 4 Dec 1958		-	-	x	x	x	x												
25. 5 Dec 1958	Dr. J. W. Forrester	x	x	x	x	x	x												
26. 21 May 1959	Mr. W. F. Friedman	x	-	-	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x
27. 22 May 1959	[redacted]	x	-	-	x	x	x	-	-	x	x								
28. 3 Dec 1959		x	x	x	x	x	x	x	x	x	x								
29. 4 Dec 1959		x	x	x	x	x	x	x	x	x	x	-	-	x	x	x	x	x	x
30. 19 May 1960						x	x	-	-	x	x	x	x	x	x	x	x	x	x
31. 20 May 1960						x	x	-	-	x									
32. 15 Sep 1960						x	x	x	x	x	x	x	x	x	x	x	x	x	x
33. 16 Sep 1960	Dr. Howard T. Engstrom								x	-	x	-	x	x	x	x	x		
34. 1 Dec 1960	[redacted]							x	x	x	x	-	-	x	x	-	x	x	
35. 2 Dec 1960								x	x										
	RADM J. N. Wenger							x	x	x	x	x	x	x	x	x	x	x	x
	Dr. George W. Brown											x	x	x	x	x	x	x	x
	[redacted]											x	x	x	-	x	x	x	x
	Dr. William O. Baker													x	-	-	-	x	x
	[redacted]															x	-	x	x

Dates of Meetings 25 May 61-28 Jun 63	Members of the NSASAB	36	37	38	39	40	41	42	43	44	45	46	
36. 25 May 1961		x	x	-	x	x	x	x	x	x	x	x	
37. 26 May 1961		x	x	-	-	x	x	x	x	-	-	-	
38. 26 June 1961	Dr. William O. Baker	x	-	-	x	x	x	x	-	x	x	-	
39. 27 June 1961		x	x	-	-	x	x	x	x	-	-	-	
40. 30 Nov 1961		x	x	-	x	x	x	x	x	x	x	x	
41. 1 Dec 1961		x	x	x	x	x	x	-	-	x	x	x	
42. 10 May 1962	Dr. Howard T. Engstrom	-	-	-	x	x	x	-	-	-	-	-	
43. 11 May 1962		x	x	x	x	x	x	x	x	x	x	x	
44. 29 Nov 1962		x	x	-	-	x	x	x	x	-	-	-	
45. 30 Nov 1962	RADM Joseph N. Wenger	x	x	-	x	-	-	x	x	x	-	x	
46. 28 June 1963	Dr. Samuel S. Wilks	x	x	-	x	x	x	x	x	x	-	x	
				x	x	-	-	-	-	x	x	x	
						x	x	-	-	-	-	-	

APPENDIX VII

PANELS OF THE NSASAB: 1954 - 1965

At the 20-21 April 1954 meeting of the NSA Scientific Advisory Board, the Board recommended to the Director, NSA, that the following three Panels be established: Electronics, Telecommunications, and Mathematics. The following is a list of members of these panels (of whom the names of NSASAB members are underlined):

ELECTRONICS PANEL

April 1954 - February 1958

MEMBERS	ADDRESS
*Engstrom, Howard T., (Chairman)	Assistant Vice President Engineering Research Associates Arlington, Virginia
Baker, W. R. G.	Vice President and General Manager, Electronics Division P.L. 86-36 General Electric Company Syracuse, New York
[redacted]	
* Forrester, Jay (Chairman)	Director, Digital Computer Laboratory MIT Cambridge, Massachusetts
[redacted]	
McPherson, John C. (Chairman)	International Business Machines Corp. New York, New York
[redacted]	
Rosen, Leo	Anderson-Nichols & Company Boston, Mass. P.L. 86-36

* Dr. Engstrom served on this panel until his resignation from the Board in July of 1956, when he became Deputy Director of Research and Development, NSA; Dr. Jay Forrester then took over the chairmanship. The first Chairman, Mr. McPherson, served briefly from Oct 1953 to Apr 1953.

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MEMBER	ADDRESS
Arthur, Samuel	Electronic Laboratories International Business Machines Corp. Poughkeepsie, New York

[redacted]

At the NSASAB meeting on 15 February 1958, it was proposed and approved that the Electronics and Telecommunications Panels be dissolved. Panels covering these areas were to be reconstituted within the framework of the NSASAB and reorganized by the new chairmen of the panels.

TELECOMMUNICATIONS PANEL P.L. 86-36

April 1954 - February 1958*

MEMBERS	ADDRESS

* [redacted] accepted an invitation to become a member of the Telecommunications Panel in 1957. The other members may be regarded as the original members. The Panel was dissolved in February 1958.

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MATHEMATICS PANEL

April 1954 -- July 1965

Member	Affiliation	Period of Service
Robertson, Howard P. (Chairman, 1953-54)	California Institute of Technology	Until 1961
[redacted]		*
		Until 1961
		*
Cairns, Stewart S.	Department of Mathematics University of Illinois	* P.L. 86-36
[redacted]		*
		*
		*
		May 1960 to 1963
		*
		Until 1963
		Appt. 4 Jan 65
		Until 1961
		From 1959 to 1961 (Left DOD July 1965)
		Until July 1962
		*
		Until October 1958
		*

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Member	Affiliation	Period of Service
[redacted]		Until March 1962
von Neumann, John	Institute for Advanced Study Princeton, N.J.	Until 8 Feb 1957
Wilks, S.S. (Chairman, 1954-58)	Department of Mathematics Princeton University	Until March 1964

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Executive Secretaries

[redacted]	May 1957 -- June 1961
	June 1961 -- April 1965
	April 1965 --

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* Unless otherwise noted all members have served from the beginning to July 1965 or longer.

ELECTRONICS AND DATA PROCESSING PANEL

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May 1958 - July 1965

Original Members	Affiliation	Period of Service
		Accepted Chairmanship in June 1959; served until July 1962
		***
		***
		Served until Oct 1961
		Served until Dec 1961
		***
		Became Chairman in July 1962 - ***
		Served until July 1962
		***
		***
		Became member in Nov 62; came from the EMR Panel - ***
		Became member in Nov 62; came from the EMR Panel; served until May 63.

Additional Members	Affiliation	Period of Service
		Became a member in Nov 62; came from the Communications Panel; served until Jul 64.
		Became member in Dec 1964 - ***

Executive Secretaries

Dr. Howard C. Campaigne**	NSA	5 Jun 61 - 27 Oct 62
Mr. Walter P. Sharp, Jr.**	NSA	27 Oct 62 - Sep 65
Mr. Glenn W. Shook	NSA	Sep 65 - ***

** General Orders No. 17, dtd 5 Jun 1961, and General Orders No. 25, dtd 27 Oct 1962.

*** Still serving as of July 1965.

ELECTROMAGNETIC RECEPTION PANEL*

May 1958 - July 1965

Members	Affiliation	Period of Service
[redacted]		***
		***
		***
		***
		Joined the Panel in May 1964 - ***
		Joined the Panel in 1960 - ***
		***
		***
Mr. Julian Z. Millar	Western Union Telegraph Co. New York, N.Y.	Came from the Communications Panel in Nov. 1962 - ***
[redacted]		Transferred to the EDP Panel In Nov. 1962 - ***
		Came from the Communications Panel in Nov. 1962 - ***
		***
		Served until Feb. 1963
		***

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Executive Secretary	Affiliation	Period of Service
Mr. Paul R. Reimers	NSA	** - June 1960
Mr. C. R. Summers	NSA	June 1960 - 5 June 1961
Mr. John G. Hengen	NSA	5 June 1961 - ***

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* The NSASAB established this Panel under the Chairmanship of [redacted] in May 1958; the original membership, composed of nine scientific personnel from academic and industrial organizations, was to advise the Agency on general problems of the signal environment of the future, and on the R/D program needed to support the mission and responsibilities of NSA in that environment. During 1960 - 1961, the Electromagnetic Reception Panel was active with Agency personnel who were concerned with the production of a study entitled "An Estimate of the Course of Development of [redacted] Electromagnetic Radiation Systems to 1972." The Panel also undertook a special effort relative to SPACOL. On 26 and 27 June 1961, at a joint Panel meeting with the Electronics and Data Processing Panel, the NSA Space Surveillance SIGINT Program was reviewed; special attention was devoted to the time interval for implementation, identification of all actual costs, and how economies might be realized in implementing the program. The sources and nature of requirements for collection, which NSA must satisfy also were taken into consideration. [redacted] has pointed out that the ERP Panel responds well to being brought into problems as early as possible, thus having an opportunity to work directly with the individuals assigned to the task. At its meeting on 27 - 28 May 1963, the Panel was briefed on LASER technology; [redacted] discussed the work he had done on Underground Transmission of Radio Signals; [redacted] of the Office of the Director of Defense Research and Engineering gave a presentation on the Concept of Space Defense; and Mr. Julian Millar discussed the field of Broadband Interception and Recording.

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** Mr. Reimers was the Executive Secretary of the EMR Panel as early as March 1960; after leaving the Agency in June 1960, he became a member of the Panel and served until November 1962, when he joined the EDP Panel.

Mr. Hengen was appointed as Executive Secretary of the Panel by General Orders No. 17, dtd 5 Jun 1961; he was reappointed by General Orders No. 25, dtd 27 Oct 1962.

*** Still serving as of July 1965.

COMMUNICATIONS PANEL

December 1958 - September 1962* P.L. 86-36

Member	Affiliation
[redacted]	
Mr. J. Z. Millar	Western Union Telegraph Co. New York, New York
[redacted]	

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* This Panel was endorsed by the NSASAB at its 4-5 December 1958 meeting; it was deactivated 20 September 1962. See General Orders No. 25, dated 27 October 1962.

Member	Affiliation
Capt. Arthur Enderlin** Executive Secretary	NSA

* The Communications Panel presented a unanimous report to the NSASAB, dated 19 May 1961, which reviewed the relationship between NSA and DCA (Defense Communications Agency) and made recommendations for actions to be taken to insure the most beneficial results from the relationships between the two Agencies. This was based largely on a report from an ad hoc group headed by [redacted] The Panel's report considered also an older report dated 19 April 1960 on the subject of forwarding SIGINT traffic, prepared by a sub-committee headed by [redacted] At the 11 May 1962 meeting of the NSASAB, the Panel Chairman read a sub-committee report on satellite communications as they relate to SPACOL. This was put before the Board as an information item not requiring action.

** Appointed 5 June 1961; served until Panel was deactivated. General Orders No. 17, dated 5 June 1961; General Orders No. 25, dated 27 October 1962.

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APPENDIX VIII

PROBLEMS WITH WHICH THE ELECTRONICS AND DATA PROCESSING PANEL DEALT

September 1959 - May 1965

Problems Related To	Occasions	Date
Electronic Components and Circuits		
LIGHTNING		
REDMAN		
Automatic Design		
Machines and Approaches		
HARVEST		
BRISKER		
SPACOL		
[redacted]		
RYE		
TIPS		
PACE Analog Computer		
System Efforts and Techniques		
Assembly line - SIGINT/SYSTEMS LOGIC - PILOT LINE		
Data Storage and Retrieval		
Association Factor		
Morse Processing		
466L		
Speech Processing		
Telemetry		
SPELLMAN		
Experimental Intercept Station		

Problems Related To:	Occasions	Date
General Investigations		
Man-machine Language		
Multiprogramming		
End Product		
Evaluation of Programmers		
Machine Processing		
Signal Analysis		
Mechanization of T/A		
P.L. 86-36 Interaction of Analysts and Machines		
Data Base		

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* Four Panel members were available at one time in February 1965 in addition to a regular meeting for consultation with personnel of R5 (Office of Data Processing Systems Development).

** Many visits have been made by Panel members as individual consultants; [redacted] spent two weeks in June 1964 on HARVEST, and have consulted a number of times on other projects, as have [redacted]

***At least seven periods of work or meetings were devoted to this problem in addition to regular meetings of the Panel. Three of these involved talking with NSA people, and writing a preliminary proposal. There were two periods of briefings at NSA prior to a two-week tour of European stations, and the tour itself; two other meetings were used for writing the final proposal to NSASAB and to the Director, NSA. Some members from the Electromagnetic Reception Panel also participated in the last four events.
