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NATIONAL SECURITY AGENCY  
Washington 25, D.C.~~SECRET~~

TO  Mr. William F. Friedman 310 Second Street, S. E. Washington, D. C.	SERIAL OR CONTROL NUMBER  R/D 11-57  DATE  12 February 1957
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SIGNATURE

S. B. Cronise

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WASHINGTON 25, D. C.Serial: EXSAB 5-57  
11 February 1957

Mr. William F. Friedman  
310 Second Avenue, S. E.  
Washington, D. C.

Dear Mr. Friedman:

Inclosed herewith is the agenda for the meeting to be held  
7-8 March 1957. Also inclosed is a copy of the minutes of the  
last meeting.

I hope that your schedule will permit you to join us for  
the meeting on these two days.

Sincerely,

S. KULLBACK  
Executive Secretary  
NSA Scientific Advisory Board

- 2 Incls:  
1. Agenda  
2. Minutes

Declassify when inclosures are removed

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## NATIONAL SECURITY AGENCY SCIENTIFIC ADVISORY BOARD

## AGENDA

7-8 MARCH 1957

The meetings will be held in Room 17-117 at the Naval Security Station beginning at 0900.

1. Review and approval of Minutes of 8-9 October 1956 meeting and other Board business.
2. The Current FREEHAND Status Presentation. Mr. Howard Barlow  
Dr. H. T. Engstrom  
Dr. R. A. Leibler  
Brig. Gen. W.M. Burgess, USAF
3. Report by the Mathematics Panel. Dr. S. S. Wilks
4. Current Status of SCRAMBLER. Mr. A. Levenson
5. Panel Activities.

Consideration for possible participation by the Electronics Panel and Telecommunications Panel in aspects of LIGHTNING, collection requirements and SCRAMBLER.

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MINUTES OF THE NSA SCIENTIFIC ADVISORY BOARD MEETING  
HELD ON 8 OCTOBER 1956

1. The following were present at the meeting.

a. Board Members:

Mr. J. C. McPherson, Chairman  
Dr. S. S. Cairns  
Professor J. W. Forrester  
Mr. W. F. Friedman  
Mr. A. W. Horton  
Dr. H. P. Robertson  
Dr. S. S. Wilks

b. NSA Executive Group for Board Affairs:

Dr. H. T. Engstrom, Chairman  
Dr. S. Kullback, Executive Secretary  
Dr. A. Sinkov  
Captain J. S. Holtwick, USN

c. Department of Defense Observer:

Mr. M. Dean Post

d. NSA Observers:

Lt. General R. J. Canine, USA  
Major General J. A. Semford, USAF  
Mr. J. H. Ream  
Dr. R. A. Leibler  
Mr. H. C. Barlow  
Mr. H. J. Stucky

e. Recorder:

Miss Catherine Johnson

f. Mr. H. P. Corwith sent the following telegram to the Chairman, NSASAB: "Last minute development has made it necessary for me to remain in New York on October 8 and 9. Sorry I cannot be with you but my absence is unavoidable."

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2. The first session convened at 0900, 8 October 1956 in Dr. Engstrom's office at WSS. General Canine opened the session with a remark that the meeting was arranged on rather short notice for the specific purpose of asking the Board to consider a program called FREEHAND and was occasioned by queries as to what the General could do about the so-called high-level problem if he were not limited by money, people, etc. General Canine reviewed the COMINT activities during World War II and compared them with the current situation. FREEHAND consists of the following five point program.

- a. That we support the British with a large electronic digital computer.
- b. That since the problems of cryptanalysis are not mathematics but are of a mathematical nature, we should see whether or not there has been maximum application of mathematics and mathematical talent on Agency problems.
- c. That some outside organization be obtained to run a parallel effort on a specific high-level difficult problem.
- d. That we undertake the research and development aimed at kilomegacycle analytical machines.
- e. That we increase the effort at the Agency by hiring more people and increasing our complement of machines, computers and data patterns.

The first four proposals were agreed to in principle by the Secretary of Defense. The last is still under consideration. General Canine pointed out that the Agency needed the advice of the Scientific Advisory Board on all of the problems and their implementation with the exception of the question of a machine for the British. This was already laid on and under progress.

The Chairman, Mr. McPherson, thanked General Canine for his comments and commented that the Board had been given a big assignment for the two-day session.

3. As an item of business, the minutes of the last meeting held 15-17 February 1956 were accepted and approved.

4. The Chairman reviewed the changes in the Board membership since the last meeting. All members were present except Dr. Baker, Mr. Corwith and Dr. von Neumann, who is extremely ill. Dr. Engstrom relinquished his membership on the Board in view of his new position as Director of Research and Development at National Security Agency and Dr. A. G. Hill has accepted an invitation to become a member.

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Mr. McPherson pointed out that he had been Chairman of the Board for several years and recommended the appointment of a successor as Chairman of the Board. General Canine thanked Mr. McPherson for his faithful service as Chairman and nominated Dr. Robertson who accepted the assignment as Chairman of the Board, the office to be assumed at the end of the present session.

5. Further details on the program outlined by General Canine were then presented by Dr. Leibler and Captain Holtwick. Actions already underway were reviewed and a copy of the memorandum which was presented to the Secretary of Defense was read.

6. As a further briefing in the COMINT area, Dr. Sinkov reported on the results, conclusions and recommendations of a conference held in September between NSA and GCHQ.

Dr. Sinkov then commented briefly on the independent PARALLEL effort. General Electric seemed to be an appropriate organization to undertake this project, resulting in part from Dr. Baker's own interest in the problem. Two meetings were held with representatives of General Electric. General Electric estimated that they could ultimately employ about 200 people on the project, consisting of approximately 80 professional and the rest support personnel. 30 of the professional personnel would be scientists of high professional ability.

After lunch the members of the Board pursued the subject of what Agency personnel thought would be required for a group to make a substantial contribution in the independent PARALLEL effort. Questions as to type of individual best suited, salary ranges, scientific maturity, and relative distribution as between professional and support personnel were discussed. As a basis for comparison the scale of effort presently being devoted within the Agency on some of these problems was reviewed. The Board also questioned the nature of the recommendations that the Agency could make with respect to the projects, such as allocation of personnel as between analysts and engineers.

Captain Holtwick commented that Mr. Barlow would probably be the NSA project officer for the PARALLEL project.

7. The PARALLEL project having been rather thoroughly discussed and to be brought up in Executive Session later that afternoon, the Board proceeded to hear Dr. Engstrom's presentation on the question of a super class of computers and analytic equipment. He pointed out that the program will also include within it a goal of complete automation of our processing. It was proposed that the entire task be assigned to a prime contractor who will use sub-contractors as necessary.

Dr. Forrester pointed out the need for finding new approaches for super high-speed application. Further discussion revolved around

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the question as to what part the exploitation of current techniques to their limit should play in this program.

The meeting was recessed at 1515 and the Board went into Executive Session.

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MINUTES OF THE NSA SCIENTIFIC ADVISORY BOARD MEETING  
HELD ON 9 OCTOBER 1956

1. The following were present at the meeting.

a. Board Members:

Mr. J. C. McPherson, Chairman  
Dr. S. S. Cairns  
Professor J. W. Forrester  
Mr. W. F. Friedman  
Dr. A. G. Hill  
Mr. A. W. Horton  
Dr. H. P. Robertson  
Dr. S. S. Wilks

b. NSA Executive Group for Board Affairs:

Dr. H. T. Engstrom, Chairman  
Dr. S. Kullback, Executive Secretary  
Brig. General W. M. Burgess, USAF  
Dr. A. Sinkov  
Captain J. S. Holtwick, USN

c. Department of Defense Observer:

Mr. M. Dean Post  
Mr. R. V. Zander

d. NSA Observers:

Lt. General R. J. Canine, USA  
Dr. R. A. Leibler  
Mr. G. H. Vergine  
Mr. A. H. Levenson  
Mr. T. R. J. Hollcroft  
Mr. Dale Marston

e. Recorder:

Miss Catherine Johnson

2. The second session convened at 0900, 9 October 1956. Captain Holtwick presented the assigned cover names:

**FREEHAND** - the program as a whole.

**LIGHTNING** - the project on kilomegacycle computers.

**PARALLEL** - the independent effort.

**AMIGO** - Support to GCHQ

**EFFIGY** - Identifies the specific computer provided GCHQ.

**ERUDITE** - the mathematical survey.

3. Dr. Engstrom indicated that he had briefed Dr. Hill about some of the previous day's discussions. Mr. McPherson commented that he felt further discussions should be held on the two principal tasks, **PARALLEL** and **LIGHTNING**. He raised the question as to whether a large amount of money should be spent right now with the objective in mind of trying to develop electronic equipment in the kilomegacycle range. He raised the point in view of the comments that completely new approaches to computing techniques were probably involved and thought that possibly the start should be with a series of different research projects leading to sufficient knowledge to implement such a plan. The second question that Mr. McPherson felt important for further discussion was the nature of the organization for both the **PARALLEL** and **LIGHTNING** projects. There was some discussion as to the maximum speed computer that could be built with the current know-how without any large scale development. It was pointed out that the kilomegacycle proposal was based on scientific evidence aiming at a goal just somewhat beyond what could be clearly reached. It was pointed out that the program was broad enough to include automation and a plateau at a hundred megacycle computer should that be desirable.

Dr. Engstrom pointed out that the technical capability of the Agency was currently at the saturation point and that in order to solve the computer problem with an enlarged capability it seemed indicated that outside agencies be brought into the problem.

Possible contractors as between universities and other organizations were discussed particularly as to whether there were any organizations with ideas in this direction which would lead to an interest in the program. Dr. Hill mentioned IBM as a concern with a strong team in this field that might be freer than the Lincoln Laboratories, which had been mentioned as a possibility.

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Dr. Forrester commented that in the first phase of LIGHTNING, that is the search for new ideas, it may be just as well to go to a number of different universities rather than to one large organization. Mr. Friedman commented that in view of the nature of the problems under consideration, the Board might designate a special sub-committee to study these questions and come up with a solid body of facts and recommendations for the Board. Dr. Robertson pointed out, however, that unfortunately at the present juncture, things had gone rather far and there was an urgent pinch to get matters settled. He made the point that the Board express its desires that they be consulted earlier, and proceed with giving what advice they can at the present.

Further discussion about the PARALLEL and LIGHTNING projects indicated that they are estimated as \$5 million a year for PARALLEL and \$6 million a year for LIGHTNING. Dr. Hill reported on the aspects of the problems which might make them attractive to MIT.

Dr. Hill also gave the background of the formation of Lincoln Laboratories to assist in the administrative problems that might have to be solved.

The question was raised as to whether a university particularly would relish getting involved in something very highly classified and Dr. Cairns pointed out that space is very critical at most universities. Mr. McPherson commented that possibly the sponsorship by a group of universities was called for.

In view of the discussions in the Executive Session as to the nature of an organization best suited for the PARALLEL project, the question was raised as to whether there was any way in which the responsible people at General Electric could be brought up-to-date on the considerations by the Advisory Board.

Dr. Cairns suggested that the Board offer a resolution to the Director of the Agency and Dr. Robertson read a draft of a proposed resolution. The final revised resolution, unanimously adopted by the Board is the following:

"The Board agrees with NSA on the importance of the PARALLEL project, and with the proposal for its immediate implementation.

"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

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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 now 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 of the country on a 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."

4. While copies of the resolution were being typed, a discussion was held on the question of the next regular meeting of the Scientific Advisory Board. It was moved and carried that the date for the next meeting of the Scientific Advisory Board would be 7-8 March 1957.

5. The Board then took up the matter of its action with respect to LIGHTNING. Considerable discussion ensued about the place of automation in this program, the desirability of pushing present techniques to their limit and the need for new ideas. As a result of the discussion, the statement of a recommendation by the Board was drafted and the following resolution unanimously adopted.

"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 a considerable expansion of the initial project.

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"(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 be best approached by sponsorship of a number of studies into new physical phenomena in search of a firm proposal for future exploitation."

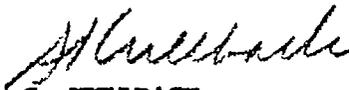
6. Mr. Friedman made a motion which was seconded and unanimously adopted for a resolution expressing regret at the inability of Dr. von Neumann to participate in this meeting of the Board. General Canine conveyed this resolution in a letter to Dr. von Neumann.

7. In view of the fact that General Canine had announced to the Board the pending termination of his assignment as Director of the National Security Agency and since the Board is an Advisory Board to the Director, the question was raised as to whether the members of the Board should tender their resignations to permit the new Director to express his choice of members for the Board. After some discussion the Executive Secretary was instructed to inquire as to the pleasure of General Canine's successor in this regard. This was done and the members of the Board informed that it was the desire of General Sanford that the present Board continue in this capacity.

8. During the time that copies of the resolution were being prepared, Mr. Hollcroft presented current developments on one of the Agency problems.

9. General Canine was present during the latter portions of the session and participated in a general discussion as to the needs for successful COMINT operations. He indicated that the comments of the Board members were most helpful to him and particularly for a further session with the Secretary on this subject. As seems inevitable, the discussion ended with the general needs of the Agency personnel wise and a review of the various programs to recruit and attract the right college graduates. Dr. Wilks expressed an interest in the Agency recruitment and psychometric program and agreed to come back the following week to meet with the placement and psychometric people. (This was done.)

General Canine closed the session with the comment "you have done a good day's work, I will sign your vouchers."



S. KULLBACK

Executive Secretary

NSA Scientific Advisory Board

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