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Memorandum M-1322

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By: R B Everett
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Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: FIFTH MEETING ON AIR DEFENSE COMPUTER

To: Jay W. Forrester

From: B. E. Morriss

Date: November 9, 1951

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Those present at the meeting were:

Forrester, Jay W.
Adams, C. W.
Brown, D. R.
Everett, R. R.
Israel, D. R.
Linvill, W.
Morriss, B. E.
Papian, W. N.
Taylor, N. H.
Walquist, R. L.

Mr. Brown presented a summary of the first four meetings. It was pointed out that the statement concerning the desirability of a general purpose computer might be misleading. What had usually been meant when the group referred to a general purpose computer was flexibility. The summary, which is found in memorandum M-1327, was otherwise accepted.

Mr. Taylor and Mr. Walquist introduced the idea of special purpose equipment, especially at the ends of the phone lines receiving information from radar sets. It was agreed that some equipment to perform functions such as clutter rejection would be necessary, but widely varying views were held as to how much of this type of equipment was necessary or desirable. Mr. Taylor and Mr. Walquist are preparing a memorandum on the subject of special purpose equipment. This question is rather intimately tied up with the question of input-output equipment and its control. Therefore the question was asked, "When should terminal equipment be considered?" One view was that a general purpose computer

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could be built and that if flexible enough the terminal equipment would not cause any difficulty. The other view was that the consideration of the terminal equipment should have a strong influence on the form of the computer.

The following section, prepared by D. R. Brown, is a summary of the present status of the transistor and its affect on the work of the Laboratory.

Transistors

1. Reliability

Our best experience with vacuum tubes in Whirlwind I is a rate of failure of 0.5 percent per 1000 hours. Our best experience with germanium crystal rectifiers is a rate of failure of approximately 0.25 percent per 1000 hours. The rate of failure for transistors is expected to be in this same area. Bell Labs has extrapolated from 20,000-hour life tests that the number of transistors in service after 70,000 hours will be 1/e of the original number, a rate of failure of 1.4 percent per 1000 hours. However, this 20,000-hour life test has employed early-model transistors; the reliability of transistors may be expected to improve as production techniques improve.

2. Circuit Techniques

The feasibility of a high-speed computer employing transistors in the arithmetic element has been demonstrated at Bell Labs, where a 16-digit serial multiplier has been operated at a one-megacycle prf. The speed of the basic circuit of this computer has since been increased from one to three megacycles. Because of the success of the Bell Labs Computer, no major technical problems are expected in the development of a transistor arithmetic element for the air defense computer. The use of transistors in the control presents some problems which have not been investigated at the present time.

3. Procurement

For some time to come, certainly for the next six months, very few transistors will be available. In fact, the supply may be so limited that circuit development will be handicapped. We are evidently quite low on the priority list. Of the 100 Type 1734 transistors produced each month at the present time, the number allotted to us is zero.

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4. Production

The rate of production of transistors in the future is uncertain, and the demand will probably be large. Quality control will be exercised by the manufacturers and will be beyond our direct influence.

Signed B. E. Morriss
B. E. Morriss

Approved
Jay W. Forrester

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