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COMPANY CONFIDENTIAL

PROJECT STRETCH

FILE MEMO #27

SUBJECT: Description of a Method of Checking  
BY: H. K. Wild  
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It is difficult to establish criteria for effective checking or error handling in a computer when the reliability, end of life, and failure rate of the components involved are not known. It is also probable that the checking circuitry itself is as likely to cause errors as the circuitry it checks. It is desirable to keep the amount of checking circuitry to a minimum, yet provide as complete a checking system as possible.

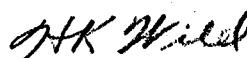
Consideration should be given to a method of checking which would employ a combination of judiciously located error detecting devices and a system of interleaved productive operations and diagnostic operations. The diagnostic operations would be controlled by the stored program or by built-in special instructions in conjunction with the stored program. It would be possible to automatically set up machine functions or processes, the results and other effects of which would be completely predictable. The checking circuitry would detect any deviations from expected operation and signal the error. In certain sections of the machine, this type of checking could be applied during normally unused time. In other sections, the time would necessarily be shared between productive operations and checking operations. The frequency of repetition of the application of checking procedures would be at the discretion and recommendation of the designers. As information is obtained concerning the reliability of the machine and as the dependability of areas of the machine become established, the amount of checking for those areas might be reduced or eliminated. We should eventually arrive at the point where we can establish with reasonable accuracy, mean error free running times for the machine. At that time if we decide that it is possible to reduce the amount of checking, we would not be burdened with excess checking equipment.

March 16, 1956

To detect malfunctioning in the performance of the checking circuits, we can apply a similar method to that described above. Periodically, during the operation of the machine certain conditions can be established which will cause the error detecting circuits to indicate an error and thereby test for proper operation. These error producing functions could either be injected directly into a set of checking circuitry or introduced into the operating circuits of the machine, whichever would be most advantageous.

I do not believe that this type of checking should be applied throughout the machine but it can cover large areas which at the present time are difficult to check adequately at reasonable expense.

Such a checking system would cost, in the initial phases of machine operation, time rather than money but as the reliability of the machine is ascertained and improved the checking effort could be decreased and the machine speed increased.



H. K. Wild

HKW/mms