COMPANY CONFIDENTIAL

PROJECT STRETCH
LINK COMPUTER MEMO NO. 13

October 29, 1956

Subject: Power-Off, Machine Stop, and Idle Conditions in the Link and Stretch

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Although it is necessary to cause any computing machine to cease functioning at times, the STRETCH system is designed under the assumption that such times will be infrequent. There are three types of cessation of function that can be distinguished. Special provision must be made for each if unattended operation is to be feasible.

The first is the power-off condition, initiated by a power-off operation that can only be undone by extra-machine intervention. In general, the power-off operation will be caused by certain safety devices such as overheating alarms and power interruption alarms. A power-off button must be provided for maintenance, and insurance and fire regulations will probably demand other power-off controls.

In addition to such conventional controls, it appears desirable to provide programmed power-off control, so that an unattended machine may turn itself off when it finds itself unable to perform further useful work. Such a programmed control would need to be adequately safeguarded against accidental use. This safeguard can probably be sufficiently provided by requiring that the power-off instruction will be executed as a no-operation unless it is immediately preceded by a Prepare for Power-Off Instruction and an enable switch on the maintenance console has been set. This combination-lock principle can obviously be extended to the requirement of any length special sequences. The Prepare for Power-Off instruction would check to make sure that the exchange and the other computers were idling.

The machine stop condition in present machines implies that the machine is in a ready condition and capable of operating, but that the control system has been halted. In conventional machines, machine stop can only be undone by extra-machine intervention. Probably this type of operation is completely unnecessary in the STRETCH system. Program-caused errors will need to be repaired automatically for any operating efficiency, and machine errors in general, will not be helped by a calculation stop.

Therefore, a new type of operation, called Idle, is proposed. Idle differs from Stop in that the instruction mechanism continues to operate in a cyclic fashion, and at the end of each instruction cycle, break-in is possible.

Thus, while a computing machine that has been stopped cannot be restarted by program action, a machine in the idle status could be restarted by a program. Assuming the break-in system of Link Computer Memo No. 12, such operation might be as follows: Upon determining that there was no work ready for computation, the Link or Senior machine program would set up a mask and starting address for break-in in case other work is added, and with two instructions would prepare for idle status and begin idling. Any signals would cause break-in to the other instruction counter, which would begin the new task. Such a mode of operation would be of value when an unattended machine is expected to be alert to inquiry signals even after finishing its ordinary tasks.

This type of operation might be performed with no new instructions by using a tight Transfer loop. However, the use of special idling instructions would permit visual indicators to be provided on the maintenance console indicating when each of the Exchange, Link, and Senior machines were in idling status.