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Memorandum M-129

Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
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SUBJECT: WHIRLWIND I TROUBLE SHOOTING, COMMENTS ON MEMORANDUM M-123

To: Robert R. Everett

From: Jay W. Forrester

Date: October 28, 1947

The following comments occur to me after reading Memorandum M-123 on the Trouble-shooting Register.

The Stepping Register normally used for input and output sounds like the best bet for the trouble-shooting requirements.

To simplify equipment, I would suggest that we not use more than one set of coincidence circuits and therefore read out only one number per cycle of the check problem.

It should be possible, if desired, to channel the trigger, which is obtained from the coincidence circuits for operation of the trouble-shooting register, into the clock-stop system. It should then be possible to readily restart the check problem at its beginning. The stop order and the restart facility would make it possible to progress through the check problem one step at a time until trouble is detected. This is desirable since trouble might result in strange and unexpected computer operation which would prevent it from restarting on the test problem.

If no appreciable amount of extra equipment is required, it might be desirable to have the coincidence pulse from the counting circuits restart the check problem at its beginning in order that the test problem up to a given point can be solved cyclically. An error signal from the check register could then be used in the clock-stop circuit so that the computer would stop only if a mistake were made on the number being observed. This would be useful for transient troubles.

I feel we should consider both neon lights indicating the contents of the stepping register and a cathode-ray tube with double trace for indicating both the number and its complement in the stepping register. Normal permanent failures would be picked up on the neon lights but the cathode-ray tube and stepping register reading both numbers and complements could be used for detecting transient disturbances which would result in a wrong number only occasionally.

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Automatic comparison of the number read into the trouble-shooting register with the pre-set correct value would be of considerable help and facility is probably already available for this operation.

I would suggest considering the use of punched cards on which can be entered the proper quantities for a check test. Reading would be done in a simple, manually operated contacting device. The card could be punched with the order number, counter initial setting, the time pulse counter number, the high-speed time pulse counter number, and the selection of the quantity to be determined as well as the proper value of this quantity which would be fed into the check register. Checking could then be done by inserting cards, one at a time, into the reader until the trouble sequence is located.

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