Digital Computer Laboratory
Massachusetts Institute of Technology
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SUBJECT: AUXILIARY DRUM TESTING - SUMMARY #2

To: W. W. Butler, Engineering Research Associates, Division of Remington Rand Inc., St. Paul, Minnesota

From: K. E. McVicar

Date: April 1, 1953

Abstract: The auxiliary drum system has been put on WWI power. This has permitted installation of blown-fuse indication and power interlocks similar to those used in Whirlwind, and the drum is now being operated on a 24-hour a day basis. This step has followed rather comprehensive programmed checking with specially written test programs, and after a moderate amount of marginal checking. The results of both the programmed and marginal checking have been good.

Contents:

1.0 POWER SUPPLIES

The auxiliary drum system has been put on Whirlwind I power and the regulators supplied by ERA removed. This will simplify the Whirlwind system by reducing the number of power supplies which must be maintained; and will also permit us to install indicating-type fuses and a system of blown-fuse indication and power-supply interlocks similar to those in the other parts of the system. The capacity of the WWI power supplies is adequate for both the auxiliary and the buffer system.

The regulators which came with the drum will be used as a source of test voltages for maintenance purposes.

A battery has been installed as a bias source for the write-gate amplifiers. This will reduce the possibility of writing between slots on the drum in case of power failure. The battery supply will probably be extended to other vulnerable drum circuits with the same goal in mind.

2.0 VOLTAGE SENSORS

The installation of WWI power for the drum eliminates the need for the voltage sensor panels as they are now used. A modified version of the present sensor panel may be used for transient detection.

3.0 CIRCUIT CHANGES

A few minor changes in the circuitry of the drum system have been made since those last reported. Some of the marginal checking lines have been changed, and one of the control chassis has been altered to conform with the corresponding chassis in the buffer drum system as requested by ERA. In addition, write-disable switches and indicator lights are being installed on the relay chassis so that semi-permanent information can be stored in arbitrary groups.

4.0 MARGINAL CHECKING

Marginal checking of all the variable voltage lines except those going to the write-pulse-forming flip-flop has been tried. Although the procedure used to date has been limited to a rather simple routine the margins have generally been good. We have set an arbitrary limit of 10% of the supply voltage, though the margins obtained have usually been considerably above this limit except for the 200-volt lines to the flip-flops.

The marginal checking procedure used has been to record the complement of the group and register number in every drum register and then vary the supply voltages while reading and checking these recordings. No marginal checking has yet been done on the few circuits outside the read operation.

One other check program was used for the SAR flip-flops and gates which program was especially written to check the advance SAR function. The margins obtained were the same as those measured with the more general program so the special program was abandoned.

A study is still being made of the marginal checking lines used with the purpose of increasing the coverage and efficiency of the marginal checking operations.

5.0 TESTS WITH THE COMPUTER

Several elaborate tests have been written to check the operation of the drum with the computer. We now have routines which are intended to check the operation of the read, record, control, SAR, and GSR circuits. Checks are made both using the single-word read and the block transfer orders. In addition, programs have been written to make extensive checks for relay sticking and relay operating time. All of these tests have run very well since ERA's representative was here and reset the heads.

In addition to the special tests which have been run on the drum, several programmers have written programs which are useful for other than test purposes. These programs have operated completely satisfactorily. In no case has a program failure been traced to the drum.

As of April 1, 1953, the drum system will be run on a 24-hour basis, available to programmers without special arrangement. Its performance will be closely watched and if extended operation without excessive trouble is obtained the drum will be permanently incorporated into the Whirlwind I system.

6.0 TEMPERATURE AND AGING EFFECTS

A thermostatic control has been installed in the drum bay to maintain the ambient temperature within a narrow range. As a result, the drum temperature has stayed between 42-46°C. These limits are not for the maximum variation which may be expected in room temperature, so that additional heating or cooling may be needed in the event of extreme weather conditions.

The drum is kept running almost continually as a further precaution against temperature effects in its operation.

ERA's representative has reported that G.E. expects the crystals in the read-gates to open up after they have aged. Periodic checks will be made of these crystals which so far have given us no trouble.

SIGNED K. E. McVicar

APPROVED E. S. Rich

KEM/cp
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