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SUBJECT: PRELIMINARY MTC SYSTEM TEST

To: Norman H. Taylor

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Abstract: A preliminary test of MTC, using about half of the computer, was performed. The arithmetic element and output scope displays were tested by a fixed program which generated sines and cosines and displayed them.

### Introduction

The overall plan for testing MTC is to test and troubleshoot it by steps. The first step of this plan was the MTC type control which was built in December 1952 from standard test equipment. The second step was the accumulator test which is described in M-1887. The third, fourth, and fifth steps were testing the A-Register, the B-Register, and the Flip-Flop Register of Panel Storage. The latest step of this plan involves testing all of the above equipment plus the decoders and output scopes simultaneously.

### Description of Test

The sines and cosines of the angles between  $0^\circ$  and  $90^\circ$  can be generated in many ways. One of them is the following pair of equations:

$$\sin n = \sin (n-1) + b \cos (n-1)$$

$$\cos n = \cos (n-1) - b \sin (n-1)$$

where  $n$  is the index of the angle, and  $b$  is a small constant which represents the number of radians between angle  $n-1$ , and angle  $n$ . This pair of equations can be derived from the trigonometric identity for the sine or cosine of the sum of two angles, or from the limit concept of the derivative of the sine or cosine.

$b$  was selected to be a binary number convenient for shifting namely,  $2^{-5}$ , which corresponds to 5 right shifts. The necessary transfers, additions, shifts, complements and clears were performed by a special circulating pulse control made of standard test equipment. Complete manual push-button control was provided for the test. This included being able to push one button and have the next sine and cosine calculated automatically.

The permissible information transfers within MTC are shown in Figure 1.

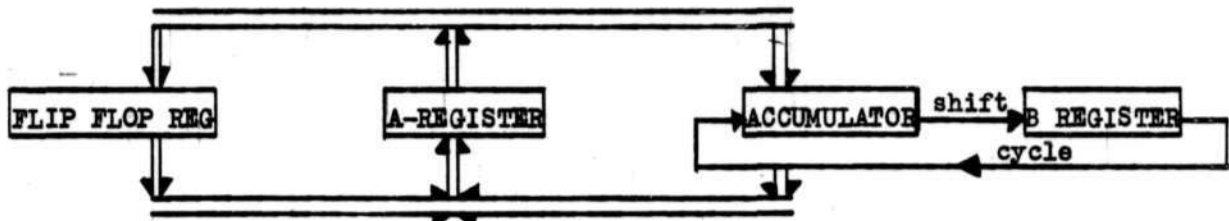


FIGURE 1

Results

The results are of two types, qualitative and quantitative.

A plot of sine versus cosine yields a circle. This circle was observed and had about 200 distinct dots. The number of dots was determined by the increment between angles. This display indicated that the part of the computer being tested was working satisfactorily.

The values of the sines and cosines were recorded from the indicator lights for the first twenty pairs of sines and cosines while operating the program in the automatic step manner. These values were found to agree in all cases with manually computed values.

MTC first successfully performed this test on March 4, 1953.

Signed

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HEA:jrt