# X.   ANALOG COMPUTER RESEARCH

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## A.   THE OPERATION OF PRESENT COMPUTERS

### 1.   The Macnee Differential Analyzer

A nonlinear analysis of the blocking oscillator has been completed.  Successful qualitative results have been obtained and further work will be done to reduce them to a quantitative basis.

A. MacMullen, Jr.

The manual of operating and calibrating procedures is in preparation.

R. E. Woods

### 2.   The Scott Impedance Function Analyzer

Graphical flux plotting methods have been extended to the problem of obtaining the pole and zero locations of network system functions.  The flux plots are essentially a graphical solution of Poisson's equation in terms of a potential function and the gradient of a potential function along a contour.  By the principle of analytical continuation the approximate location of the zeros and poles is found by sketching a grid of orthogonal curvilinear squares starting from the flux plot along the $j\omega$ axis.  The location of a singularity is indicated by the convergence of the current flow lines.

R. L. Mathews

Experimental investigations of the problem of optimum transient response have been conducted.  The transfer impedances of various interstage networks have been correlated with the transient response for a range of parameter values.  The networks investigated include shunt compensation, series compensation, the doba circuit and series shunt compensation.

P. J. Caruso

## B.   THE DESIGN OF NEW COMPUTING ELEMENTS

### 1.   Integral Equation Computer

The mechanical design and construction of the data input unit for the machine is almost complete.  System tests of the data input and electronic computing system will be initiated shortly.  Final machine tests will be delayed until the output keyboard punch is constructed.

J. M. Ham, S. Fine

### 2.  Function Generator

Completion of the evaluation of the closed loop response of the function generator employing the RCA-5527 image orthicon tube has been delayed by military service requirements.

<div align="right">O. N. Becker</div>

### 3.  Analog Digital Conversion Device

The unit is being incorporated into the integral equation computer and final performance data based on its performance in the machine will be reported.  Preliminary measurements indicate that the desired accuracy of 1/500 on a voltage range of $\pm$ 100 volts has been achieved.

<div align="right">J. M. Ham</div>

### 4.  High Speed Commutator

A four-line model of the high speed commutator has been completed.  It operates over a large dynamic range with negligible cross talk.  It will pass low level alternating and direct signals, and it has very little attenuation.

The sampling rate of the experimental model is 2200 cps.  Cross talk is less than 0. 1 percent and direct signals as low as 2 mv can be passed.  The upper level is for all practical purposes unlimited.

The "tree" circuit is such that extension to a large number of channels introduces no new problems of consequence.

<div align="right">P. W. Cooper</div>