MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING

Report No. 1

Prepared by W. N. Papian

PROGRESS REPORT TO THE DEPARTMENT COMMITTEE ON GRADUATE STUDY AND RESEARCH

SUBJECT OF RESEARCH: M.S. Thesis: A Co-Incident-Current Magnetic Memory Unit

Period Covered by this Report: February 8, 1950 to March 2, 1950

Student Working on Research:

William N. Papian

Building: Barta

Expected Date of Completion:

July 21, 1950

Supervisor: J. W. Forrester

Note by:
Res. Lab. Office . . . . .
Grad. Com. . . . .
Supervisor . . . . .
. . . . .

Detail of Work Currently Active: There is an observed lapse of time between the application of a current step to a coil on a test core and the appearance of the pulse indicating reversal of magnetization in the core. Current activity centers around finding the reason for this delay by analytical and/or experimental means.

Expected Date of Completion of this Detail: March 16, 1950

Statement of Progress Since Last Report:

Progress in the last three weeks was made in two general directions.

Equipment was collected and set up. This includes, up to the present, a temporary setup for displaying the 60-cycle hysteresis loops of some of the cores, and the loop derivatives (dB/dH) for others. The 60-cycle frequency may be too high for accuracy even for cores wound of 1 or 2 mil tape, and a lower frequency may be tried. Also set up and in partial use is an arrangement for testing the cores by means of low-frequency adjustable-amplitude square waves. Initial operation of this apparatus gave some rough results which agreed approximately with the work done last summer on this subject by Mr. Forrester. A few more test cores of various types are being wound and mounted.

Some time has been spent attempting to find a solution to the eddy-current shielding problem for non-constant permeabilities. One equation, for example is:

$$\frac{\partial^2 H}{\partial x^2} - \sigma\mu\frac{\partial H}{\partial t} - \sigma H\frac{\partial \mu}{\partial t} = 0,$$

where $\mu = f(H)$ as determined by the pertinent portion of the hysteresis loop. The solution to this should indicate whether or not the delay in the appearance of the reversal-indicating pulse is due to eddy-current shielding. Indications so far are that the solution is not in the literature on the subject.

Signed: William N. Papian
William N. Papian

WNP:sst