

Memorandum M-1705

Page 1 of 2

Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: VISIT OF OCTOBER 28, 1952, TO BELL TELEPHONE LABORATORIES,
MURRAY HILL, NEW JERSEY

To: Jay W. Forrester

From: Dudley A. Buck

Date: October 31, 1952

Abstract: On October 28, 1952, D. R. Brown, P. K. Baltzer and D. A. Buck of this laboratory visited the Bell Telephone Laboratories at Murray Hill, New Jersey, to discuss magnetic materials research with the following Bell men:

R. M. Bozorth	F. J. Schnettler
H. J. Williams	V. E. Legg
M. Goertz	J. R. Anderson
J. K. Galt	S. O. Morgan
J. H. Scaff	

The effect of mechanical stress on the hysteresis loop of nickel-zinc ferrite was discussed. Similar results were reported by Baltzer and Williams. The group at Bell has been working with a Ni - Zn ferrite of their own manufacture which has an exceptionally low coercive force (.02 Oersted). It has a saturation induction of approximately 1,500 Gauss. Stressing (compression) caused the hysteresis loop to become quite rectangular, with a negligible increase in the coercive force.

Compressional stress was applied by means of a hydraulic system which exerted uniform pressures inward along the outside periphery of the core up to a pressure of 1,200 p.s.i. The core under test was a ring of about 3/4-inch outside diameter. Hysteresis loops were made with the Cioffi flux-meter.

A second method for applying a compressional stress has been tried with success. The core to be stressed was placed in a dish, windings and all. A thermo-setting plastic (Selectron--a polyester) was then poured in the dish so as to just barely cover the core. During curing the plastic shrunk and in shrinking applied the desired stress.

Their ferrite contains 67.09% Fe and the Nickel-to-Zinc ratio is 3 to 7. It has a negative magnetostrictive coefficient (presumably a requisite for the squaring-up by compression) of -1.5 parts per million.

Similar effects due to compression have been noticed on Ferramic G and H.

Memorandum M-1705

Page 2 of 2

Switching time of ferrites was discussed. Galt described his experiments. He observed domain-wall velocity to be a linear function of the applied field minus the coercive field. He feels that the double-hump switching phenomenon is tied in some way with the pattern of domain walls and the changes in this pattern (particularly the number of walls) during switching. He also expressed the opinion that the first spike might be due in part to rotation effects in small closure domains. His magnetite experiments showed eddy-current effects due to the low volume resistivity of magnetite. His current work is with nickel ferrite crystals grown by Linde.

We were shown photographs of a 16 x 16 ferroelectric memory array which was evaporated onto the faces of a single crystal of barium titanate grown at that laboratory. Row and column lines were .006" wide, spaced .023". Driving circuits and sensing amplifiers have been designed and are under construction. The particular crystal described was accidentally broken. These crystals were grown from a fluoride flux in the form of thin (.010") plates, some as large as a 1" x 1" x 1.5" triangle. They are translucent, amber in color. Removing from the flux and cooling seems to be a critical part of their manufacture. Morgan mentioned that some of the crystals are removed from the flux before cooling. The large crystals we saw, however, were cooled to room temperature in the flux.

We were shown the photomicrograph equipment which was used in the Kerr magneto-optic effect work on cobalt domains, and were shown domains under a microscope using colloidal magnetite.

Arrangements were made with H. J. Williams to show motion pictures and recent slides of stationary and moving domain patterns at MIT's Hayden Library Lounge (14E-310), November 13, 1952, at 9:00 a.m.

Signed



Dudley A. Buck

Approved



David R. Brown

DAB/jk

cc: Group 63