

Memorandum M-1650

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Digital Computer Laboratory  
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Cambridge, Massachusetts

SUBJECT: THE EFFECT OF SIZE OF METAL CORES ON PULSE AND HYSTERESIS MEASUREMENTS

To: D. R. Brown

From: R. F. Jenney

Date: September 25, 1952

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DD. 100-1000  
FROM THE ROOM

Abstract: Metallic cores with small dimensions switch faster, have greater outputs, and can be driven with lower currents than large cores.

In a recent trip to Magnetics, Inc. 75 Mo Perm  $1/8" \times 1/8" \times 1/8$  mil  $\times$  10 wrap cores (from two new batches of about 350 each) were spot checked. Five fast-switching and five slow-switching cores were chosen for special measurements which included determination of the O.D. of the metal wrap and the O.D. of the bobbin on an optical comparator.

Four of the fast-switching cores had bobbins between 117 and 120 mils O.D., wraps between 132 and 136 mils O.D. and wraps between 14 and 16 mils thick. All five of the slow-switching cores had bobbins between 125 and 128 mils O.D., wraps between 146 and 150 mils O.D. and wraps between 18 and 23 mils thick. The remaining fast core had physical measurements placing it in the same region as the slow cores. (Note that the small bobbins have thin wraps.)

$I_c$ , the current corresponding to the coercive force in a saturated hysteresis loop, was measured and was found to have some correlation with the size of the core. All four small cores had  $I_c$ 's less than 150 ma. peak, and four of the six large cores had  $I_c$ 's greater than 150 ma.

The fast cores had greater outputs than the slow ones. The slow cores could be made to switch as fast as the fast cores by raising the driving current.

Generally speaking, the small cores switch faster, have greater outputs and can be driven with lower currents than the large cores. Magnetics, Inc. has been informed of these results and has been checking the diameter of the bobbins used in an effort to turn out more uniform cores.

Signed Richard F. Jenney  
Richard F. Jenney

RFJ/jk  
cc: Group 63 Staff  
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Approved DRB  
David R. Brown