Digital Computer Laboratory
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TITLE: THE MIRROR: A PROPOSED SIMPLIFIED SYMBOL FOR MAGNETIC CIRCUITS.

To: 6889 Engineers

From: R. P. Mayer

Date: August 14, 1952

Abstract: A coil can be wound on a magnetic core in one of only two directions. There are several dot-conventions which can be used to indicate which direction is desired. A simpler symbol, which is quicker to draw and easier to follow, is proposed: The "mirror symbol", which "reflects" current to find resultant flux.

The Mirror Symbol

Figure 1 shows a conventional coil symbol and the corresponding proposed mirror symbol. Note that the core is a single line with blocked ends. The coil is indicated by the short diagonal "mirror", which "reflects" applied current to show the direction of the flux it tends to produce. There are only two directions in which a coil can be wound, and they are both shown in Figure 1.

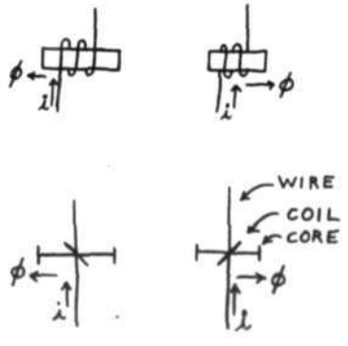
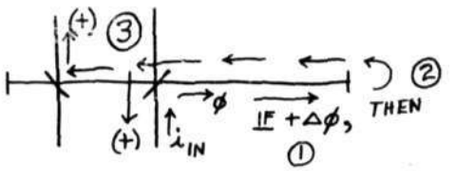


FIG. 1

Induced Voltages

Three simple steps (Figure 2) find the induced voltages: (1) Find the direction of positive flux change resulting from i_{IN} or other causes. (2) Go to the end of the core and bounce off. (3) Return back down core and reflect off all mirrors to find positive induced voltages.



"(+)" = INDUCED VOLTAGE, OR DIRECTION OF RESULTANT CURRENT.

FIG. 2

Applications

Figure 3 shows that a mirror in one place establishes coil direction, and that number of turns, etc., can be indicated (if desired) by any of several ways.

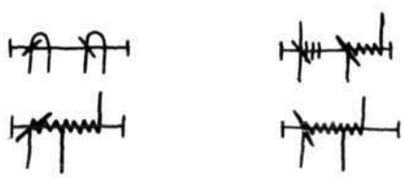


FIG. 3

Straight core symbols are strongly encouraged. But Figure 4 shows that a circular core symbol works almost as well. (Remember that you can find outputs only by reversing direction, even though the circle has no "end" to bounce off as in Figure 2).

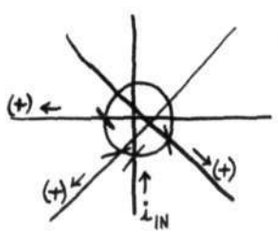


FIG. 4

Quadrature field windings can be shown as in Figure 5. The sensing pulse tends to decrease the main field, so the flux change is in the other direction.

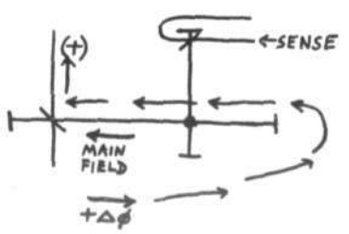


FIG. 5

Examples

The examples shown in Figures 6 and 7 show how a flip-flop and a stepping register work. These circuits were originally explained in M-1570 (Meeting of July 25, 1952). The "Method of Operation" shows the flow of information from input current, to ϕ, to reflected $\Delta\phi$, to output current, etc.

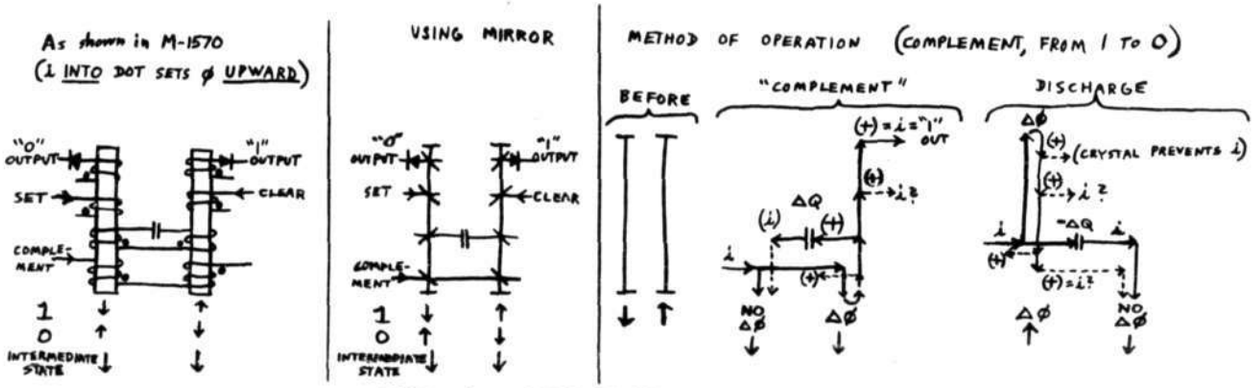


FIG. 6 - FLIP-FLOP

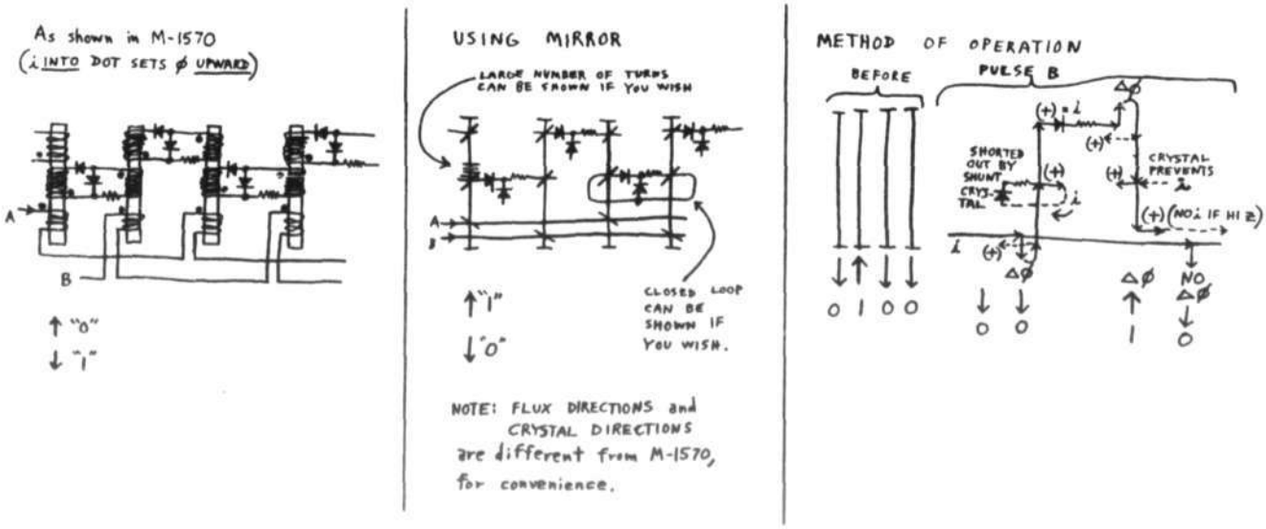


FIG. 7 - STEPPING REGISTER

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