Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: MATRIX DRIVING WITH UNIDIRECTIONAL PULSES

To: Jay W. Forrester

From: Dudley A. Buck

Abstract: Modification of the driving scheme during either the READ or the WRITE part of the READ-WRITE cycle would allow unidirectional current pulses in the rows and columns of a magnetic-matrix memory. This modification involves driving of all but the selected row and column during the modified part of the cycle. It requires additional low-level switching equipment and much larger total driving current, but with a tube-driven array, it eliminates half of the row and column wires and driver tubes.

The proposed modifications amount to adding a half-amplitude current to each row and to each column of a matrix memory array and then subtracting a full-amplitude current from every core via the z-plane winding. Each core is thus left with the same net mmf as in the unmodified driving scheme; the extra contribution of row and column is exactly cancelled out by the negative contribution of z-plane.

## PROPOSED MODIFICATION I

The first proposed modification (see Figure) leaves WRITE ONE and WRITE ZERO unchanged.

READ is modified by subtracting a half-amplitude current from each row and each column and adding a full-amplitude current to the z-plane winding. The READ current in the selected row and column is then zero, the current in the unused rows and columns is minus one-half, and the z-plane current is plus one. The READ currents are now of the same polarities as the WRITE currents. A given row or column is driven once each cycle--either during READ or during WRITE. The z-plane current is plus one during READ, zero during WRITE ONE, and plus one-half during WRITE ZERO. The plus one would probably be made up of two plus one-half pulses.

The noise considerations during READ should be approximately the same as in the unmodified scheme as far as contributions due to flux changes in the cores are concerned. Stray coupling between the driven wires and the sensing winding, however, might cause greater noise pickup during READ.

## PROPOSED MODIFICATION II

The second modification, suggested by R. R. Everett, leaves READ unchanged. WRITE is modified by adding plus one-half to each row and column and subtracting plus one from the z-plane winding. Once again, the row, column, and planar currents are of the same polarities during READ and WRITE.

The z-plane current is minus one during WRITE ONE and minus one-half during WRITE ZERO.

DISADVANTAGES OF NEW DRIVING SCHEME

1. Additional low-level switching equipment is required to drive all but one row and column.
2. With an n x n array, (n-1) times as much total pulse current is required during the modified part of the cycle.
3. Three values for z-plane current are required, namely, z = 0, 1/2, or 1.

ADVANTAGE OF NEW DRIVING SCHEME

1. With a tube-driven array, half of the row and column wires can be eliminated along with half of the heavy-current driver tubes.

Signed Dudley A. Buck
Dudley A. Buck

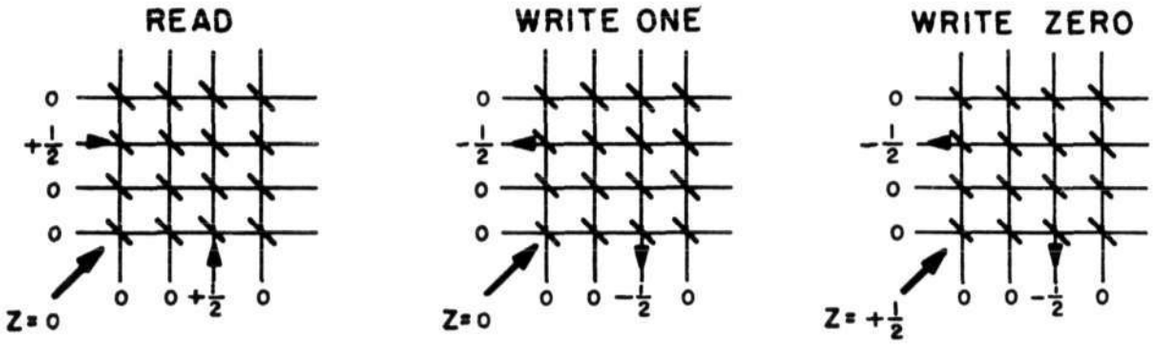
Approved William N. Papian
William N. Papian

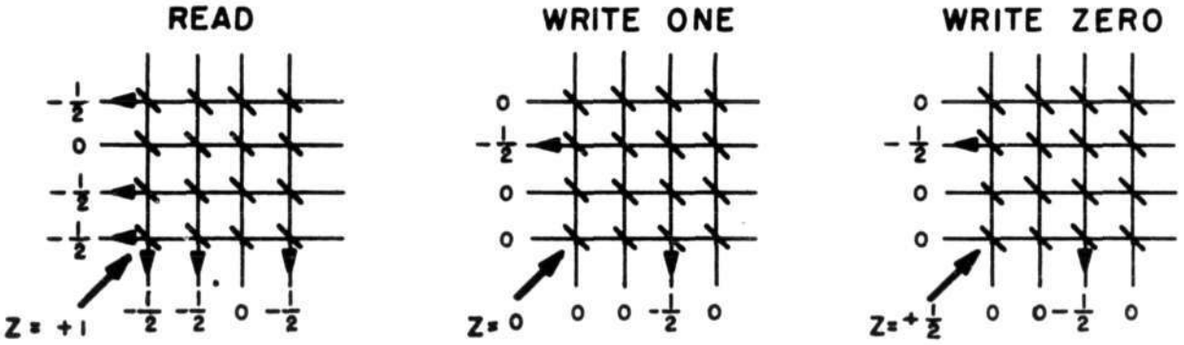
DAB/jk

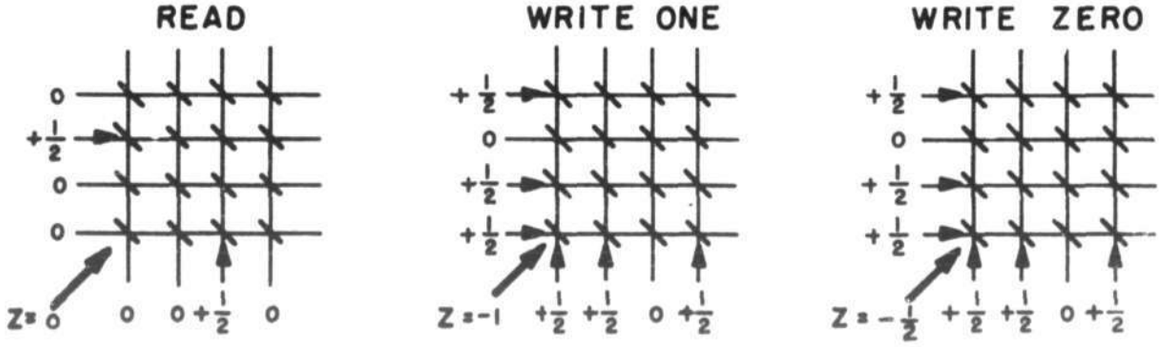
Drawings Attached:

Figure 1 A-53980

cc: Group 62
Group 63
R. R. Everett
IBM (6)




MODIFIED DRIVING SCHEMES TO ALLOW UNI-DIRECTIONAL CURRENT PULSES IN THE ROWS AND COLUMNS OF A MAGNETIC MEMORY ARRAY