RCA *Application Note*

AN-203

New Molded-Plastic Frames for Coincident-Current Magnetic Memory Stacks Utilizing 20- and 30-Mil Cores

by

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A specially designed plastic frame has been developed for coincident-current magnetic memory stacks utilizing standard cores 20 and 30 mils in diameter. This new frame, shown in Fig.1, can accommodate 4096- and 16384-word matrix arrays used in commercial computer and ground military applications. Although plastic frames have been used with "50-mil" cores, the new frames permit the fabrication of standard planes for stacks

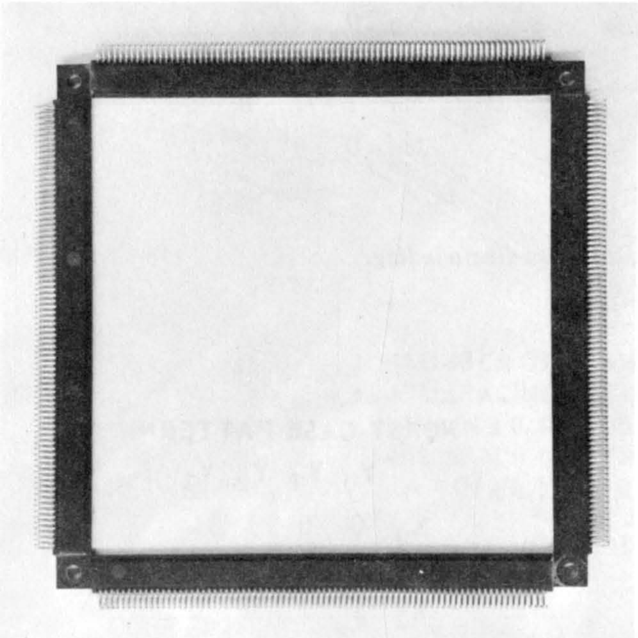

Fig.1 - Photograph of Molded-Plastic Frame for Coincident-Current Magnetic Memory Stacks.

of high-speed cores in smaller packages which have greater reliability, greater ease of manufacture, and a higher degree of standardization. A special feature of the new frame design is that the wire terminations and plane stacks are connected by a jig soldering process and the reliability hazards associated with hand soldering are eliminated.

Frame Construction

The plastic material used for the new frame is a diallyl phythalate, and the wire terminals are integrally molded within the plastic material. The terminals are copper-nickel rectangular wires spaced on centers either 0.025 or 0.0315 inch apart. A sufficient number of terminals are provided to accommodate all drive lines and sense lines

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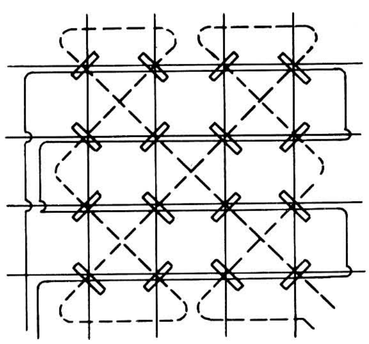
for 1024, 2048, or 4096 areas of the word array. The frames are standardized for three basic size configurations to house 20- and 30-mil core mats (matrices) of 4096 and 16384 words per mat.

Core arrays for coincident-current operation are available in the following arrangements:

Words	Bits per Plane	Core Spacing (inch)
4096	1	0.0315
4096	4	0.025, 0.0315
16384	1	0.025, 0.0315

Wiring

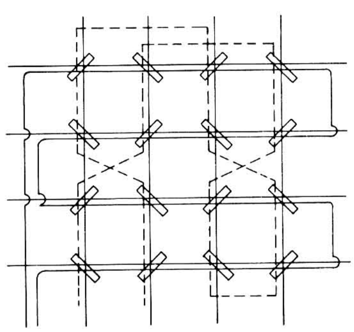
All the matrix wires used in the memory planes are nylon-coated polyurethane-insulated magnet wire. The sense line can be either a diagonal or a rectangular configuration, as shown in Figs.2 and 3, respectively. Also shown in these figures are the associated delta-noise worst-case patterns. The selection of a sense winding for a particular



WORST-CASE PATTERN:

	Y_0	Y_1	Y_2	Y_3
X_0	0	0	1	1
X_1	1	1	0	0
X_2	1	1	0	0
X_3	0	0	1	1

Fig.2 - Diagonal sense-line winding.



WORST-CASE PATTERN:

	Y_0	Y_1	Y_2	Y_3
X_0	0	0	1	1
X_1	0	0	1	1
X_2	1	1	0	0
X_3	1	1	0	0

Fig.3 - Rectangular sense-line winding.

application depends on several variables: speed, noise, core size, and wire length. There is no set rule for a given choice, but the diagonal sense line is the one more commonly used.

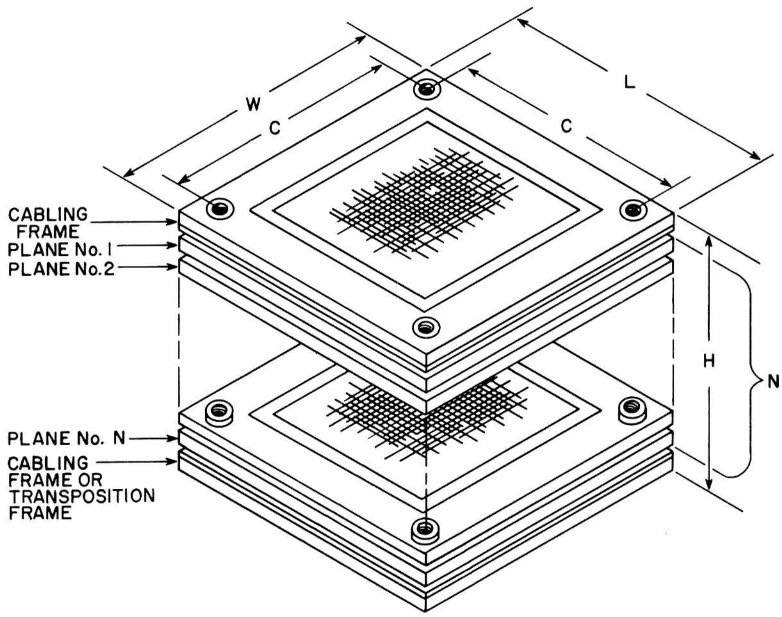
The inhibit windings are parallel to one set of the partial-write drive lines in the rectangular and diagonal configurations. The sense and inhibit lines are twisted pairs from the periphery of the matrix to their termination point.

The relationship of the core size to wire size is shown by the following table:

Core Size (Mils) OD/ID	Wire Size (AWG No.) X & Y	Sense	Inhibit
30/18	42	40	40
23/15	42	42	42

Stacking

All planes are stacked on rods and spaced either 10 or 60 mils apart. Fig.4 shows the dimensions and spacings of single and multimatted memory planes. Because temperature control is maintained by air cooling, the spacer used determines the stack operating-



N = NUMBER OF PLANES
60-MIL SPACING BETWEEN PLANES
H = (N x 0.185) + 0.342
10-MIL SPACING BETWEEN PLANES
H = (N x 0.135) + 0.292

	SINGLE MATTED			MULTIMATTED*	
WORDS	4096	16384	16384	4096	4096
CORE SPACING - in.	0.0315	0.315	0.025	5.610	5.024
L - in.	3.248	5.610	5.024	5.610	5.024
W - in.	3.248	5.610	5. 024	5.610	5.024
C - in.	2.548	4.910	4.324	4.910	4.324

* Denotes single matted construction with multiple mats per plane. Bit selection within a plane is obtained through the use of a transposition frame which replaces the bottom cabling frame shown in the illustration.

Fig.4 - Single and multimatted memory planes.

temperature range desired. Air may be directed through the planes from the side or over and along the stack from the top. The stacking rods may be used for the mounting of external hardware.

The following table lists cores recommended for use with the new plastic frames:

CORE		DRIVING CURRENT PULSE			
RCA Type No.	Size (OD/ID) (Mils)	Partial Write Current (mA)	Rise Time t_r (μs)	Duration t_d (μs)	Total Switching Time t_s(μs)
0146M5*	30/18	400	0.10	0.50	0.41
0167M5*	30/18	312.5	0.20	0.80	0.58
0172M5	30/18	350	0.10	0.40	0.36
0175M5	23/15	350	0.05	0.30	0.25
0183M5	30/18	275	0.10	0.50	0.41
1100M5	23/15	437.5	0.05	0.20	0.18
1101M5*	23/15	425	0.05	0.25	0.24

*RCA wide-temperature-range lithium ferrite cores.

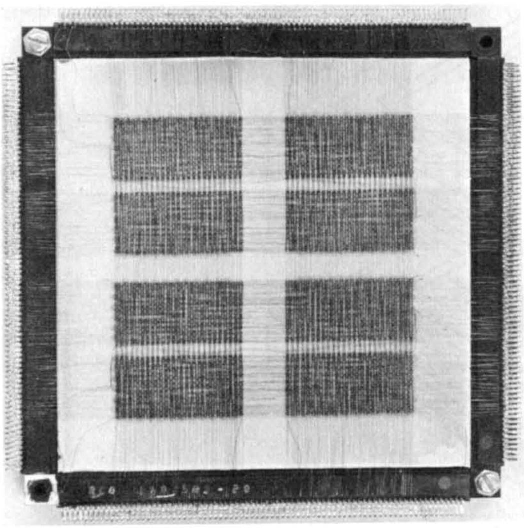


Fig.5 - Multimatted memory plane using new molded-plastic frame.

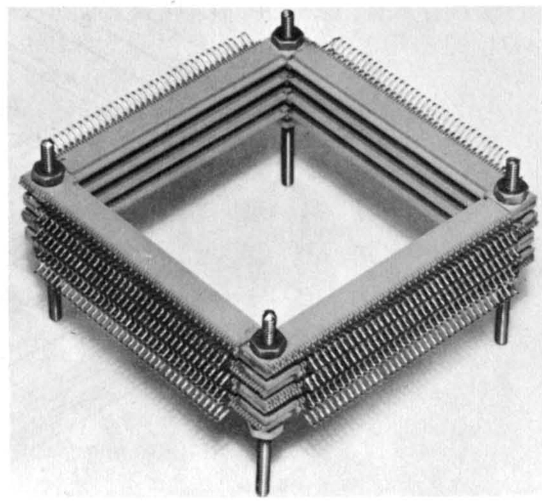


Fig.6 - Frame stack showing terminals of adjacent frames connected by jig-soldering.

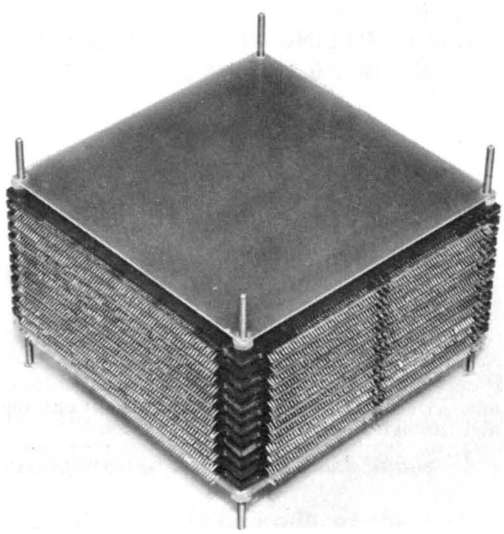


Fig.7 - Typical memory stack.