For GEO

intel PRODUCT INFORMATION

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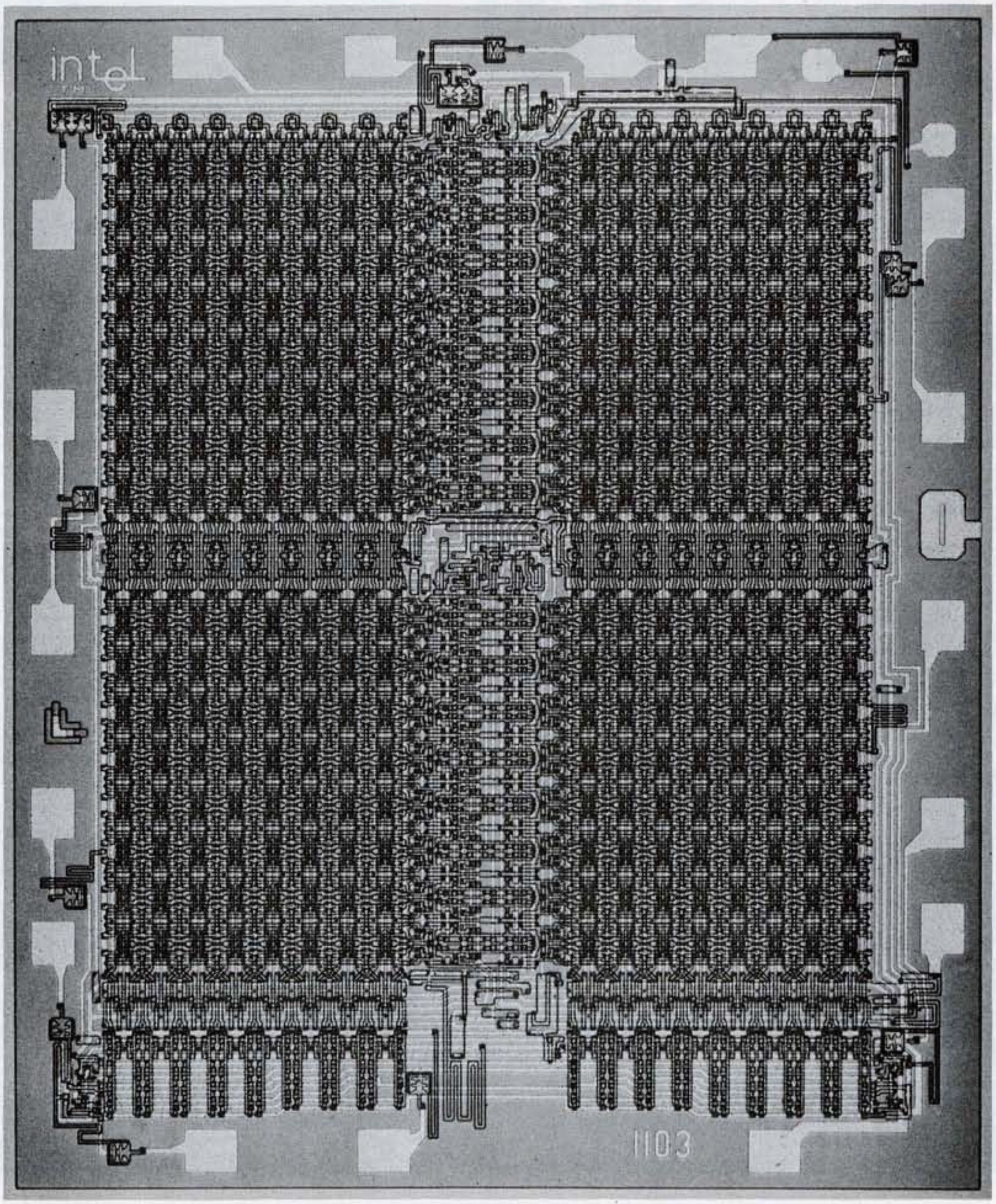
OCTOBER 1970

IT'S HERE!
THE PART IT TAKES TO MAKE THE CORES MOVE OVER!



THE 1103!

FEATURES

- 1024 Bit Fully Decoded Random Access Memory
- Write Cycle — 580 ns
- Read/Write Cycle — 580 ns
- Read Cycle — 540 ns
- Access Time — 300 ns
- Max. Time Between Refresh Cycle — 2 ms at 70°C
- Low Power Dissipation — 340 mW/Bit Average On Chips Being Accessed
- Low Cost Packaging — 18 Pin Plastic Dual In-line

PRODUCT DESCRIPTION

The 1103 is the first MOS memory capable of competing with core memory in main memory applications. We have combined cost-performance and packing density in a way which will demolish any remaining complacency the core user may have. When properly sold, the 1103 cannot be ignored.

The sales promotion on this unit is more extensive than on any product to date.

The circuitry used in the 1103 provides a dynamic storage cell using only 3 devices per bit. This dynamic cell stores information on a capacitor rather than in a flip-flop and gives us a real advantage in bit density.

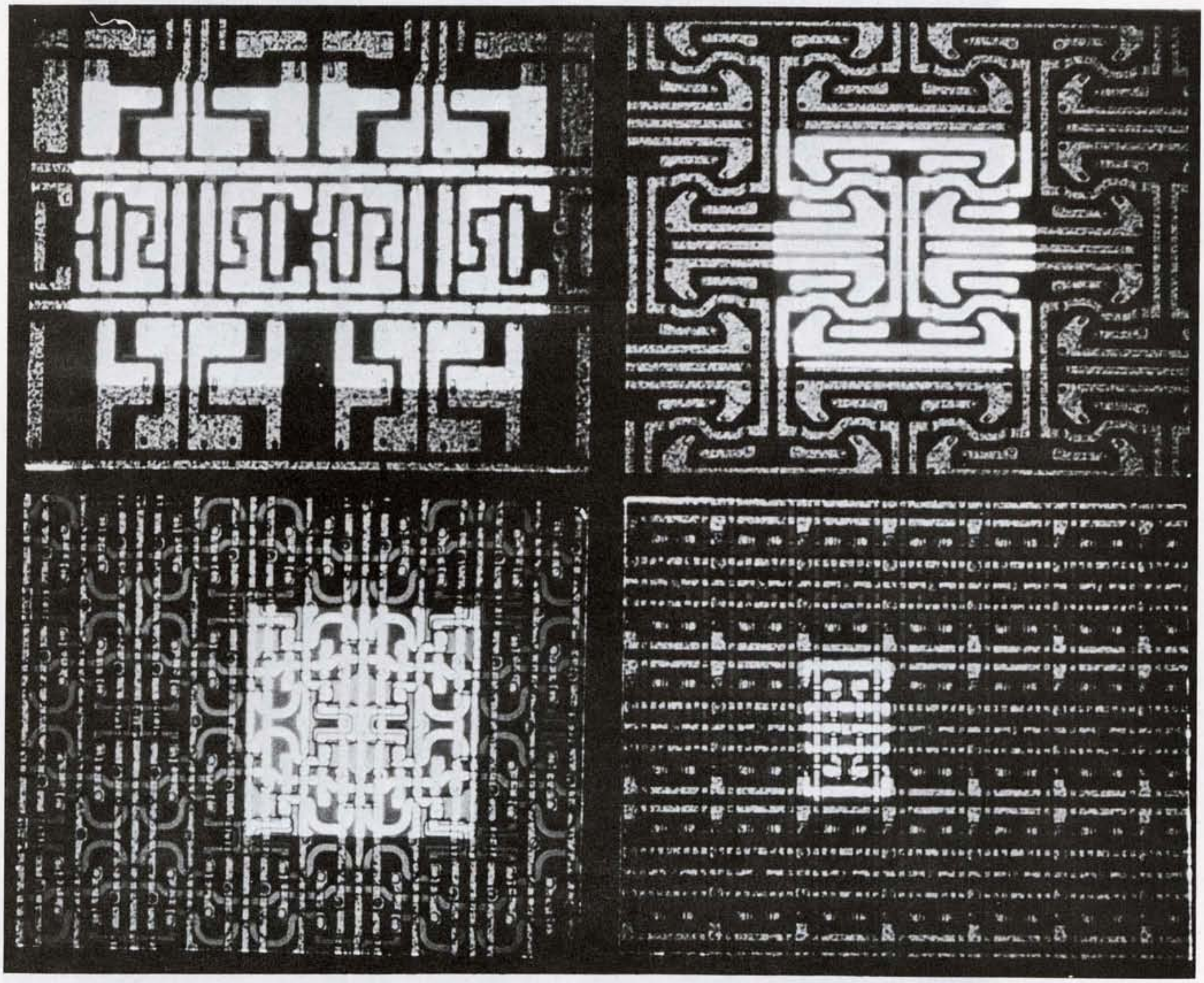
Figure I shows the relative size of static (flip-flop) and dynamic cells and in addition, compares Bipolar and MOS.

Because of the phenomenally low leakages inherent in the Intel silicon gate technology the stored information leaks away very slowly. In fact, our spec of 2 ms at 70°C for refresh time would be impossible to come close to without silicon gate. Cycle times of 580 ns for Read-Modify-Write make the 1103 a real match for core systems and the small physical size of the 18 pin package allows bit densities much greater than any of the competing devices.

The 1103 is not only fully decoded, but also has all of the refresh circuitry on the chip. To refresh the entire memory the user must only step thru 32 X addresses, in a read cycle mode, every 2 ms. (Less than 1% of memory time when the memory is operating at maximum speeds.)

COMPETITION

Our semiconductor competitors are Advanced Memory Systems, Computer Microtechnology, and Cogar. Information was not available at this time to include a comparison of Cogar's memory module in Table I.



Upper Left — HIGH SPEED BIPOLAR CELL (3101)

Upper Right — LOW SPEED BIPOLAR CELL (3102)

Lower Left — STATIC MOS CELL (1101)

Lower Right — DYNAMIC MOS CELL (1103)

COMPARISON OF **TYPICAL** RANDOM ACCESS MEMORY

TABLE I

	Intel 1103	**AMS 91600111**	**CMI 2400***
• Number of Bits	1024	1024	4096
• Write Cycle Time (ns)	500	800	450
• Read/Write Cycle Time (ns)	500	800	1200
• Read Cycle Time (ns)	450	800	450
• Access Time (ns)	250	400	300
• Max. Time Between Refresh Cycles (ms)	2 (T_A=70°C)	1 (T_A=25°C) (Not spec'd at 70°C)	0
• Power Dissipation Per Bit (μW)	240***	180	400
• Address Capacitance (pf)	5	15	5
• Precharge Capacitance (pf)	15	15	0
• Chip Enable Capacitance (pf)	15	7.5	20
• Read/Write Capacitance (pf)	11	5	5
• Output Current (mA)	0.9 (Sourcing)	5 (Sink)	16 (Sink)
• Type of Memory Cells	Dynamic	Dynamic	Static
• Number of Clocks	1	2	0
• Fully Decoded	Yes	Yes	Yes
• Operating Temperature (°C)	T_A=0 –70	T_A=0 –70	T_C=0 –75
• Package	18 Pin Plastic DIP**	24 Pin Ceramic DIP	26 Pin Ckt Module

*This is a hybrid memory.

**18 pin ceramic DIP available in first quarter 1971.

***This power is only dissipated on chips which are being precharged prior to a cycle memory or refresh cycle. Unselected chips dissipate virtually zero power.

Table I clearly shows that the 1103 does not have any semiconductor competition in a large memory. The AMS product has the disadvantages of slower speed, greater memory cycle interruption for refreshing (AMS does not specify worst case max. time between refresh cycles at 70°C), more clocks, and a larger package.

CMI offers 4 times the bit capacity but the higher dissipation per bit, 26 chip hybrid assembly and very large memory module (1.43 X 1.35 in²) offer sufficient cost disadvantages that the 1103 will easily push it aside.

The important technical features of the 1103 is **fast cycle time, fast access time, low power dissipation,** high packing density, and a very **long** time required before data in the memory needs to be **refreshed.**

PRICING

The strategy we are using in pricing is designed to **get the core.** We are going to outdistance our semiconductor competitors on the basis of technical advantage but to unseat the core we must be cost competitive.

Distributor quantity prices are:

	Intel 1103		**AMS 9160011**		**CMI CM-2400**	
Quantity	**Cents/Bit**	**$/Pkg**	**Cents/Bit**	**$/Pkg**	**Cents/Bit**	**$/Pkg**
1-9	6	60.00	10	102.00	29.5	1,200.00
10-24	6	60.00	10	102.00	24.5	1,000.00
25-99	4.9	48.75	8	82.00	19.6	800.00
100-499	3.8	38.40	5.2	53.00	?	?

Production quantity prices are also exciting. Even with core memory selling prices 2-6¢/bit and core memory costs in the 1-2¢/bit area we can show the customer a real advantage.

We are using a stepped price structure for large volumes as follows:

First 5,000	$20.00
Next 10,000	$15.00
Next 25,000	$10.00
Next 50,000	$8.00

Example:

Customer orders 20,000 units

He pays: $20.00 X 5,000 = 100,000
15.00 X 10,000 = 150,000
10.00 X 5,000 = 50,000
20,000 300,000

$$\text{Our price} = \frac{300{,}000}{20{,}000} = \$15.00$$

or 1.5¢/bit

Which of our RAM's to recommend?

3101 — Small high speed buffers (less than 10,000 bits).

3102 — Very high speed mainframe memory (access time less than 120 ns).

11011 — Small low speed memories for controllers, displays, buffers, etc. (less than 10,000 bits).

1103 — Wherever there is a core or plated wire memory.

WE ARE PRICED COMPETITIVELY

DELIVERY

A real challenge! This product has been a fantastic mover even before announcement so we will have to be careful on delivery commitments for 1 or 2 months.

Don't worry though. If we need parts we will get them.

COMPETITION

NONE

PROCESS

The combination of glass passivation and silicon gate makes our chips able to withstand even a plastic environment.

PACKAGE

Silicone is the only way to fly. We have the most rugged and reliable plastic package around. It even passes the proposed MIL STD 883 for plastic. Reliability data is available to prove it.

INTEL

Need you ask?

FACTORY INFORMATION

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