



Semiconductor Memories

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Trichy.

- ❖ Memory Devices
- ❖ Computer
- ❖ Data storage device
- ❖ Electronics devices – Memories –Functioning: Store & Processing it.
- ❖ Computer
- ❖ 'Data & Programs
- ❖ Stored magnetic bulk storage devices

Semiconductor Memories

- ❖ An array of memory cells arranged in an rectangular pattern
- ❖ And are fabricated on Si-Wafer using Bipolar, MOS & CMOS technologies

Memory Cell

Can be stored one bit information/ data

- High speed operation
- Low power conception Small Size
- Low cost

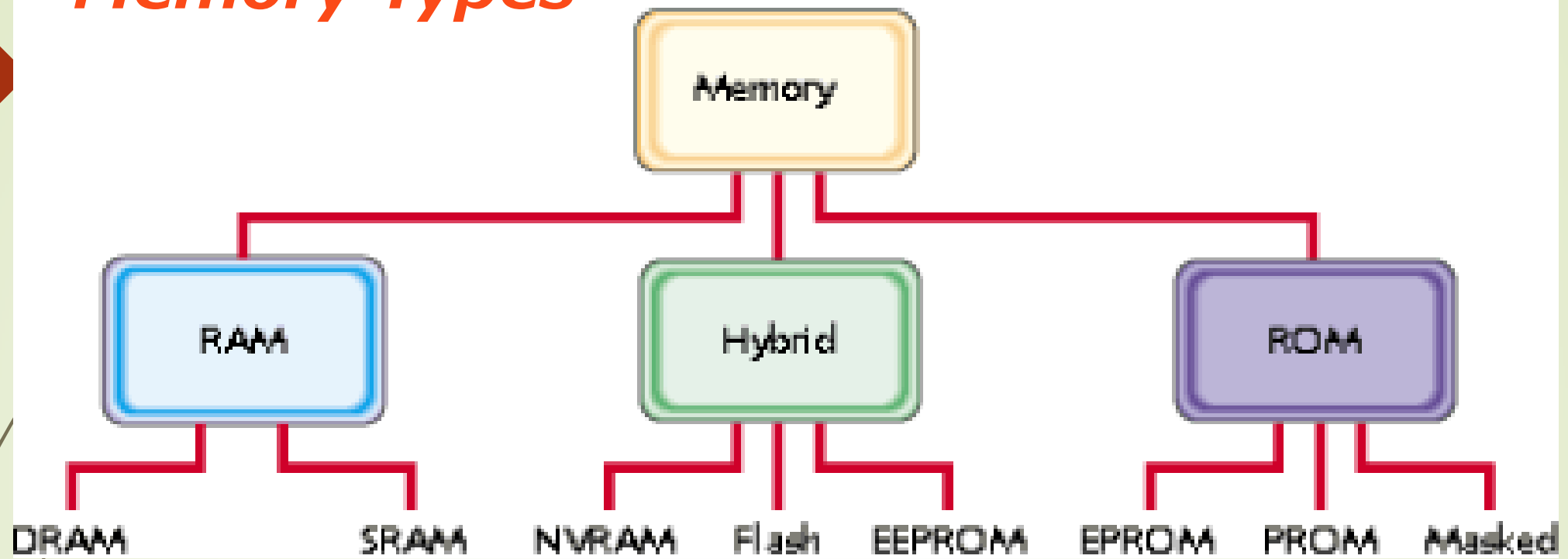
Memory from which data can only be read.

And are performed a particular task.

ROM / Read Only Memory -----Storage Capacity ----- number of memory cells

Eg: ROM 73S370 has 512 words of 4-bits (2048 X 512 X 4 memory cell)

Memory Types



Common memory types

- DRAM (Dynamic RAM)
- SRAM (Static RAM)
- NVRAM (Non-Volatile RAM)
- Flash memory
- EPROM(Erasable-and-Programmable Memory)
- EEPROM(Electrically-Erasable-and-Programmable Memory)

Read Only Memory (ROM)

Data is permanently stored in memory cell of an ROM

User requirements

Data can not be changed only read

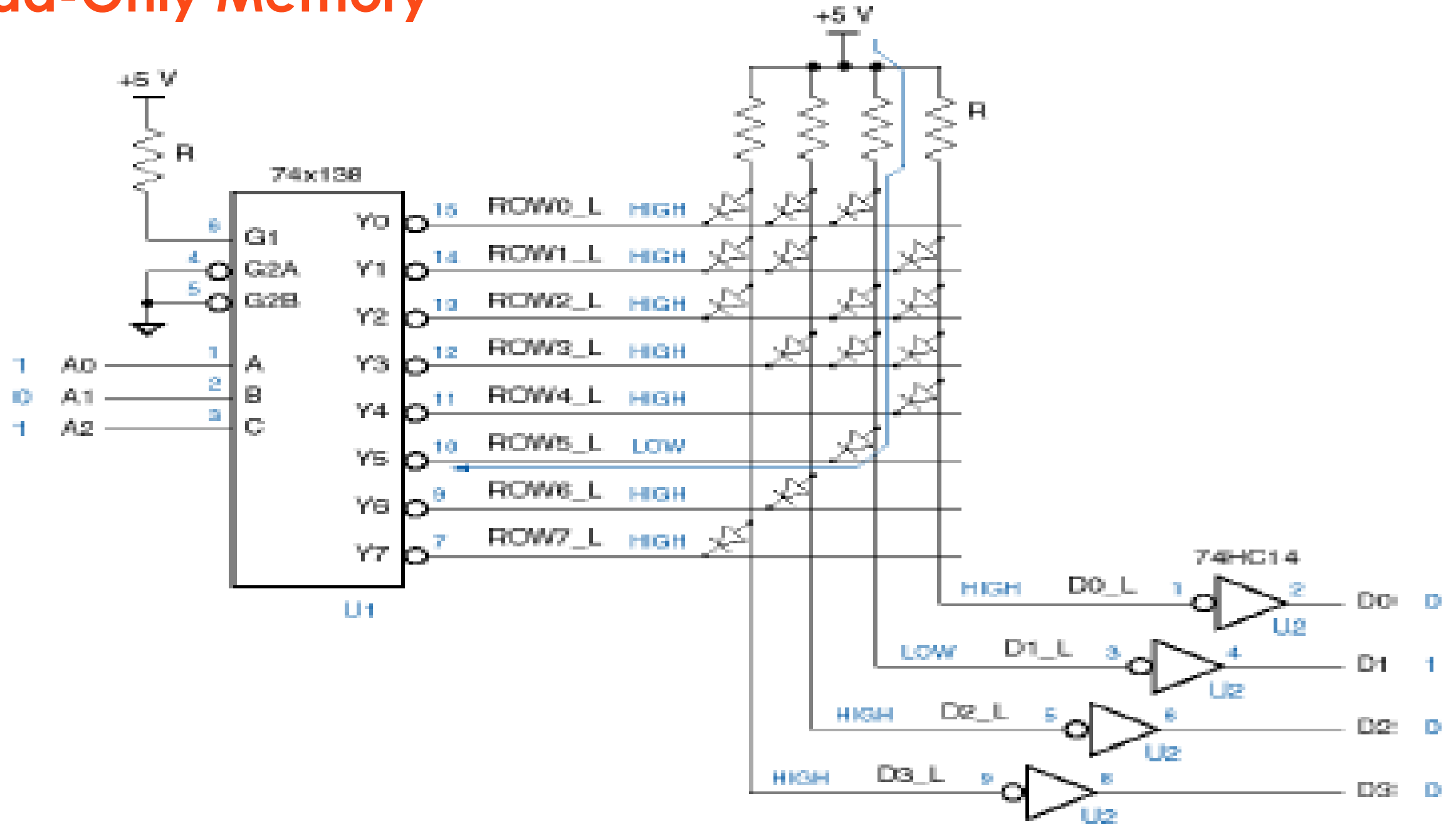
Masked memory ROM

PROM---- Programmable Read Only Memory

EPROM--- Erasable Programmable Read Only Memory (UV & Electrical)

Non Volatile--- Data stored in memory is not lost when power is shut off.

Read-Only Memory

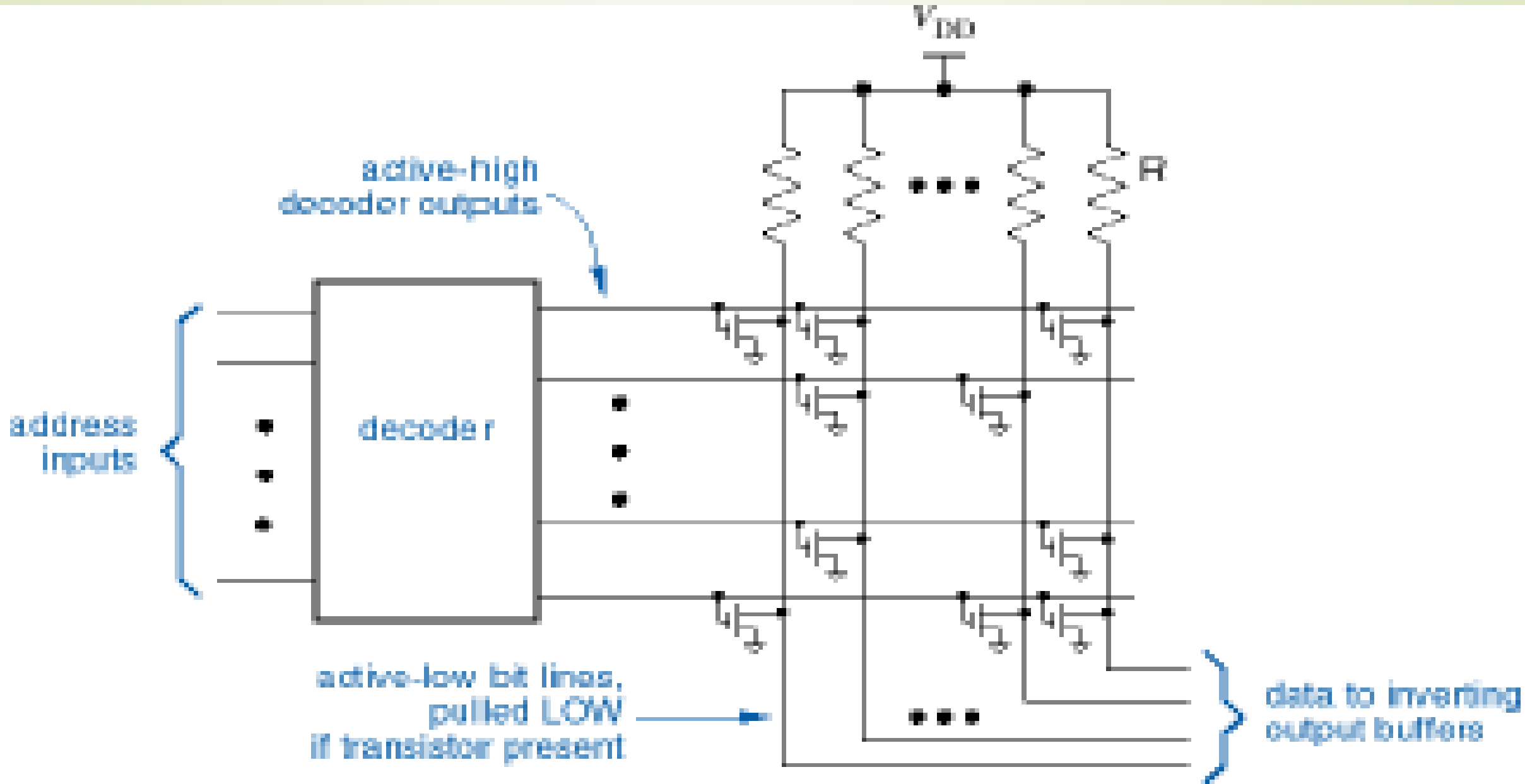


Read-Only Memory

Organization of Memory cells in rows & columns

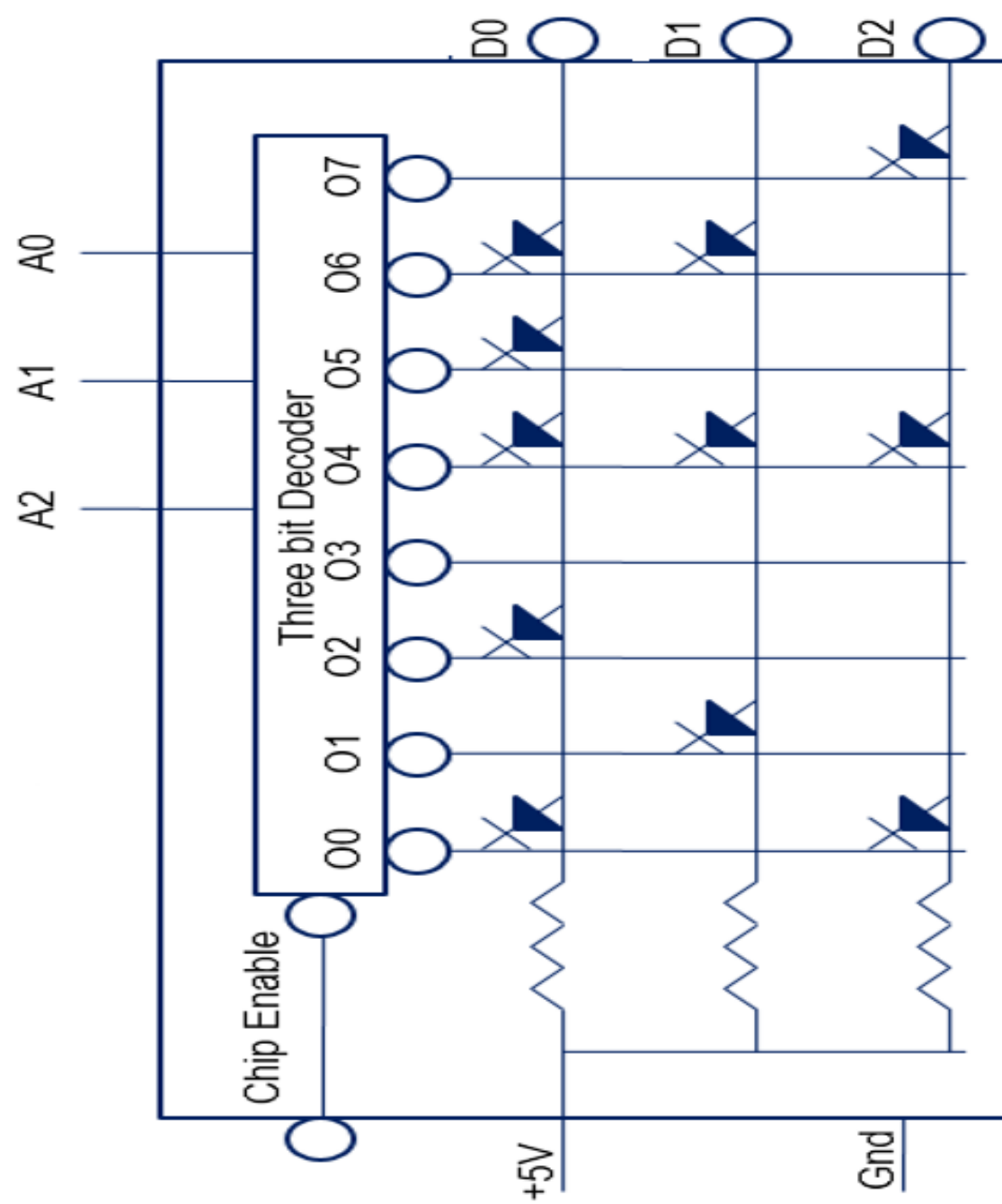
- Each row 4-bits constitutes a word
- 8X4 cell or 32 memory cells
- Each word can be addressed one at a time by an address decoder with 8 outputs
- Address input BCD indicates the selection of word.
- ROM--- Bipolar & MOS Technologies
- Photolithographic masks

Bi polar Transistors (Emitter) are used in ROM



Diode Matrix ROM

Decoder IC 7445
Not Gate IC 7404
Diode

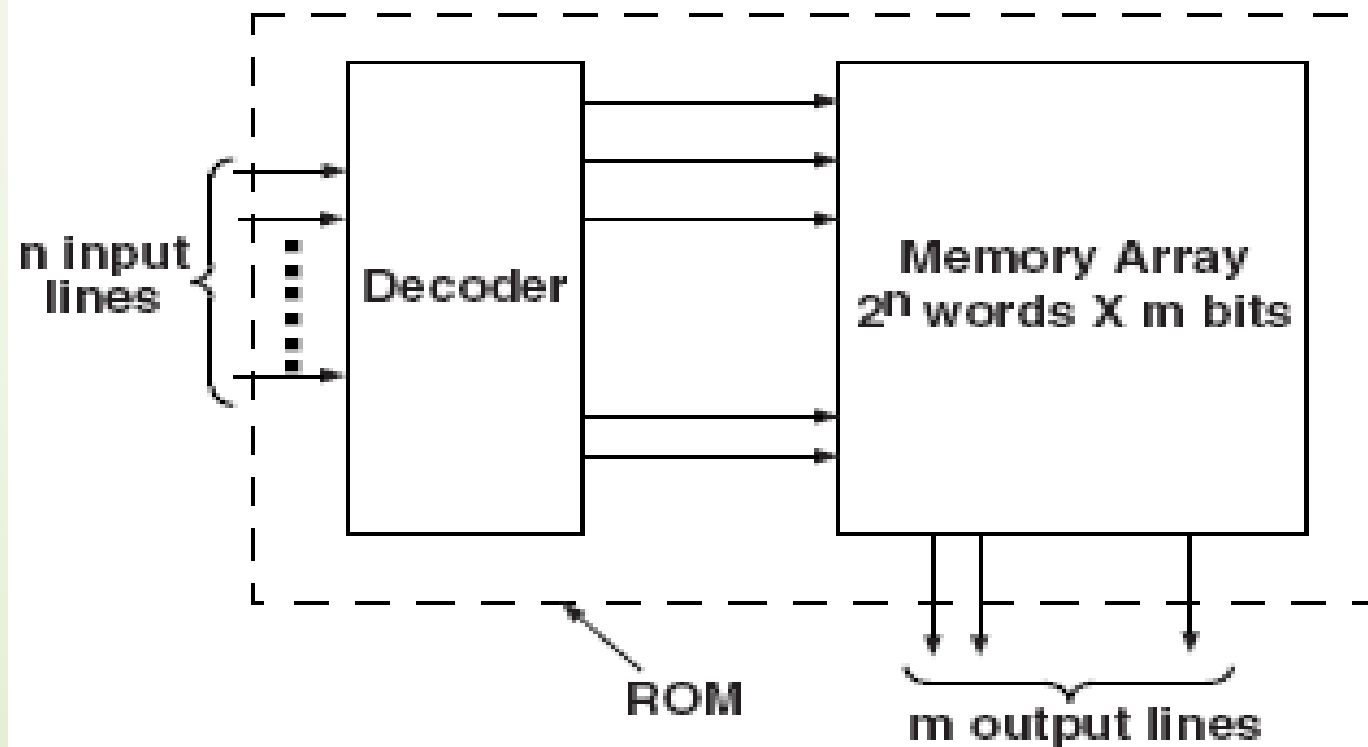


ROM IC 7488 A

TTL Device
256 bits ----32 words
8-bits

5 Address lines
8 o/p lines

Basic ROM Structure



Memory Expansion

Word Size / Word capacity

Expansion of word size:

Word size is available N & Required word size n

Number of memory chips required is n/N

Example.

We have **8-bit ROM** word

We **required** 16 bit word ,What we do?

We combine 2 no's of IC's used
(IC 7488 A)

Here $N = 8$ bit

$n = 16$ bit

Then required no. of IC are n/N is $8/16 = 2$

Connect Address lines

Connect enable i/p to the Chip

No. of o/p lines

= Original word size X no of IC
used

Expansion Of word Capacity

Word capacity

Memory requirement is m & Memory IC capacity of M words

Number of required IC m / M

Example.

ROM 64 x 8 memory

2^n address line

$2^6 = 64$ address lines

$n = 6$ –address inputs

Random Access memory / Read –Write memory

- Data storage is temporary
- Keep changing according to the operational requirements
- Volatile memory---Memory content are not lost when power is shut off.
- Static & Dynamic RAM's

Static RAM

- Computer data storage
- Directly addressed
- Read/Write
- Volatile

Dynamic RAM

- Single transistor memory cell
- Slower than static RAM
- Less space & low consumption
- To written a data every cell has to be Refreshed after 6-8 ms.



Thank you