

INSTRUCTION MANUAL FOR RANDOM ACCESS MEMORY (RAM) CIRCUIT

Random Access Memory circuit using IC 7489 has been designed to study the semiconductor memories .

THEORY

IC 7489 is a 16 x 4 RAM in which 16 words of 4 bits length can be read or written. Memory is a device used for the storage of digital data. Earlier, only magnetic memory devices were possible, but now a days it has become possible to make memory devices using semiconductors. Semiconductor memories have become very popular because of their smaller size (available in the IC form) Flip- Flops and other digital systems such as shift -registers can be used for the storage of digital data. In shift registers, the data can be stored for any desired length of time and then read out in a serial or parallel form. In this form of memory any location for storing (Writing) or reading the data can be accessed only sequentially. Hence, this form of memory is very slow and also has limited storage capacity. Therefore, this type of arrangement is not suitable for storing large data. Another form of memory in which any bit can be accessed in a random fashion, requiring the same time for each location, is known as the random access memory. **RAM** is a read and write memory, i.e. data can be written into it or read from it. In IC 7489 the outputs are open collector and active low. CE is the 'Chip Enable' terminal and when this is at logic '0', the memory is enabled. To write into any memory location apply the address of the chosen memory location at the address input terminals, apply the data to be stored at the data input terminals, apply logic '0' at the Read/ Write (R/W) line. To read from any memory location at the address input terminals, apply logic 1 at the R/W line.

PROCEDURE

1. Connect logic inputs '0' & '1' selectable through SPDT switches to ADDRESS inputs as well as to DATA inputs through patchchords. Also connect CE (Chip Enable) & R/W pin to logic inputs through patchchords.
2. Connect Four logic outputs (D₀1, D₀2, D₀3 & D₀4) to four logic output indicators (LED) through patchchords.
3. Switch ON the instrument using ON/ OFF toggle switch provided on the front panel.

4. To write into any memory location, apply logic input '1' at CE as well as at R/W pins as given in SR. No. 1 of Functional Table. Apply the ADDRESS of the chosen memory location at the ADDRESS input pins (0000 - 1111) and apply the DATA (0011) to be stored at the DATA input pins through SPDT switches.

Functional Table

| SR. No. | Chip Enable (CE) | Read/Write (R/W) | Mode |
|---------|------------------|------------------|-------|
| 1. | 1 | 1 | Write |
| 2. | 1 | 0 | Read |
| 3. | 0 | x | Hold |

5. To read the above stored DATA on output indicators proceed as SR. No. 2 of Functional Table i.e, change R/W input from logic '1' to '0'. We will observe that output indicators also shows output 0011.
6. Change the DATA from 0001 - 1110 and repeat the steps 4 & 5 of procedure.