

Multiplexer

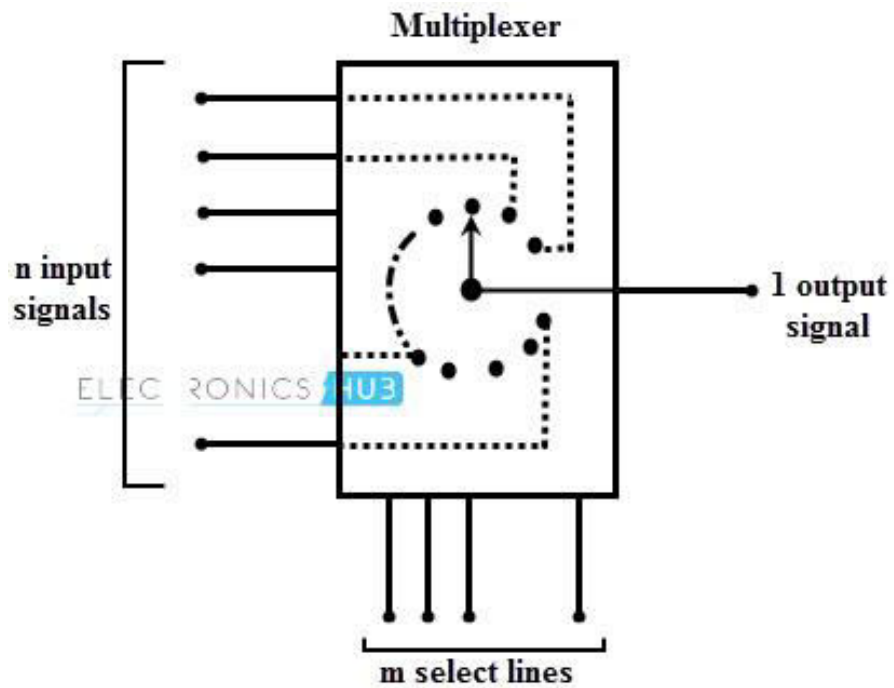
□ WHAT IS MULTIPLEXER?

- A **MULTIPLEXER** is a digital circuit that has multiple inputs and a single output.
- The selection of one of the n inputs is done by the select inputs
- It has one output selected at a time.
- It is also known as **DATA SELECTOR**.
- A multiplexer has
 - N data inputs(multiple)
 - 1 output (single)
 - M select inputs, with $2^M = N$

APPLICATION OF MULTIPLEXER:



Block Diagram



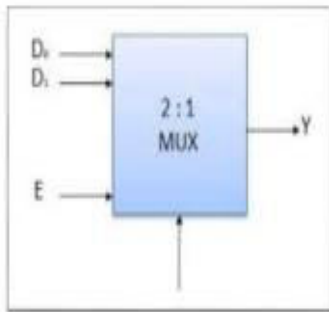
Types

- 2-to-1 (1 select line)
- 4-to-1 (2 select lines)
- 8-to-1 (3 select lines)
- 16-to-1 (4 select lines)

2-TO-1 (1 SELECT LINES) MULTIPLEXER

Here 2:1 means 2 inputs and 1 output

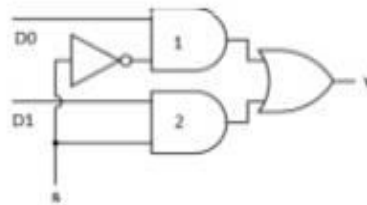
BLOCK DIAGRAM



TRUTH TABLE

S	OUTPUT Y
0	D0
1	D1

- The logical level applied to the S input determines which AND gate is enabled, so that its data input passes through the OR gate to the output.
- The output, $Y = D0S' + D1S$
- When
 - $S=0$, AND gate 1 is enabled and AND gate 2 is disabled. So, $Y=D0$
 - $S=1$, AND gate 1 is disabled and AND gate 2 is enabled. So, $Y=D1$



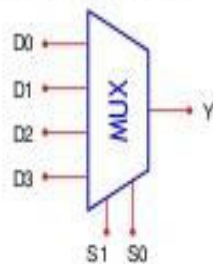
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❑ 4-to-1 (2 select lines) Multiplexer

- 4:1 MUX has 4 inputs(D0, D1, D2, D3) & 2 select lines(S0, S1)

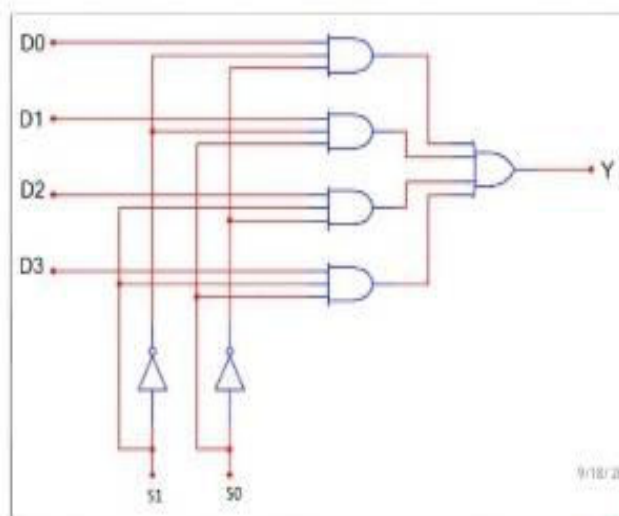
BLOCK DIAGRAM



TRUTH TABLE

S1	S0	Y
0	0	D0
0	1	D1
1	0	D2
1	1	D3

- The logical level applied to the S input determines which AND gate is enabled, so that its data input passes through the OR gate to the output.
- The output, $Y = S1'S0'D0 + S1'S0D1 + S1S0'D2 + S1S0D3$

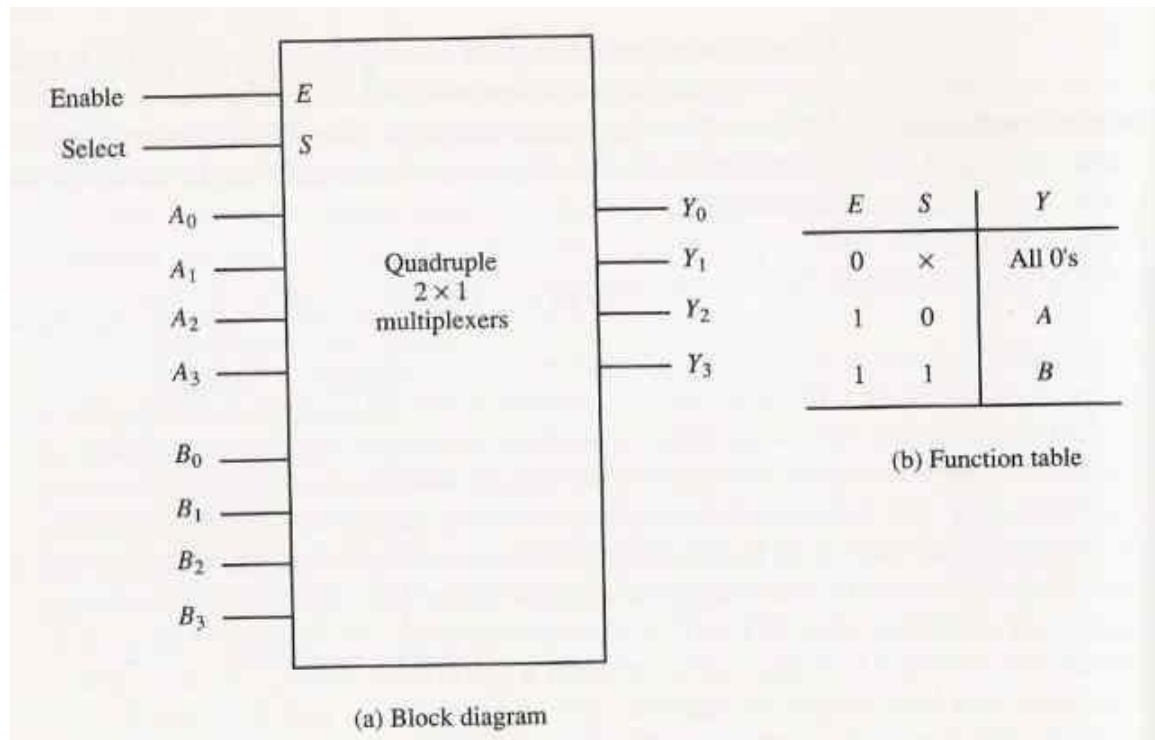


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Quadruple Multiplexer

- In some cases two or more multiplexers are enclosed within a single integrated circuit package.
- The selection and the enable inputs in multiple-unit construction are usually common to all multiplexer.
- Following is the block diagram and truth table of a quadruple 2-to-1-line multiplexer.



- The circuit has four multiplexer, each capable of selecting one of two input lines.
- Output Y₀ can be selected from either input A₀ or B₀. similarly output Y₁ may have value of A₁ or B₁.

- One input selection line S selects one of the line in each of four multiplexers. Enable E must be active for normal operation.
- In truth table, When $E=1$ then, if $S=0$, the four A inputs have a path to the four outputs. If $S=1$, the four B inputs are applied to the outputs. The output have all 0's when $E=0$.