Muliplexers and Demultiplexers

Part 8d of
"Electronics and Telecommunications"
A Fairfield University E-Course
Powered by LearnLinc

Module: Digital Electronics
(in two parts)

- Text: "Digital Logic Tutorial ," Ken Bigelow, http://www.play-hookey.com/digital/
- References:
  - "Electronics Tutorial", part 10 (Thanks to Alex Pounds) http://doctord.dyndns.org:8000/courses/Topics/Electronics/Alex_Pounds/Index.htm
- Contents:
  - 7 – Digital Electronics 1
    - 5 on-line sessions plus one lab and a quiz
  - 8 – Digital Electronics 2
    - 5 on-line sessions plus one lab and a quiz
- Mastery Test part 4 follows this Module

Section 7: Digital Electronics 1

- Logic gates and Boolean algebra
- Truth Tables
- Binary numbers
- Memory
- Flip-Flops

Section 8: Digital Electronics 2

- Clocks and Counters
- Shift Registers
- Decoders
- Multiplexers & Demultiplexers
- Sampling

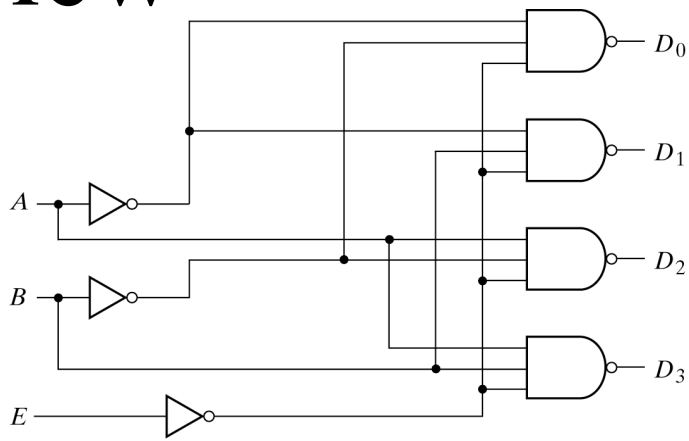
- **MT4**

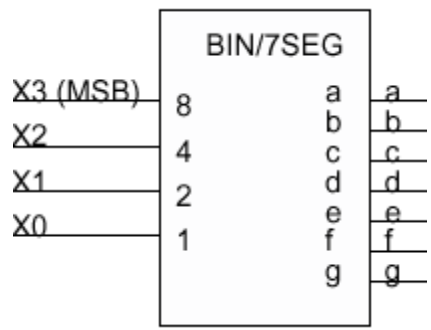
Section 8 Schedule

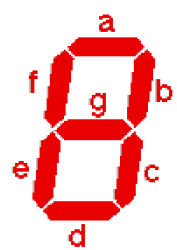
Session 8a	04/02	Clocks and Counters	"Hookey": "Counter" pages Alex Pounds: Part 27
Session 8b	04/09	Shift Registers	"Hookey": "Register" pages
Session 8c	04/14	Decoders	"Hookey": Decoders and Demultiplexers
Session 8d	**04/16**	**Multiplexers and Demultiplexers**	**"Hookey": Multiplexers, Decoders and Demultiplexers**
Session 8e	04/21	Sampling (A/D & D/A)	Notes
Session 8f (Quiz 8 due 04/27)	04/23	Review for Quiz 7	
Session 8g	04/28	Quiz Results	
Session 8h (Lab - 05/03, Sat.)	04/30	MT4 Q&A	
MT4 (Sat, Cheshire)	05/10		
MT4 Results	05/12		

Decoder Review

- A small number of input bits; treated as a binary number
- A larger set of output bits (up to 2^n)
- The output bit values are "decoded" from the combination of the input bits
- Examples:
  - 1 of N decoding
    - Line Decoder
    - Address Decoder
  - Seven segment display decoder
  - BCD to Decimal line decoder



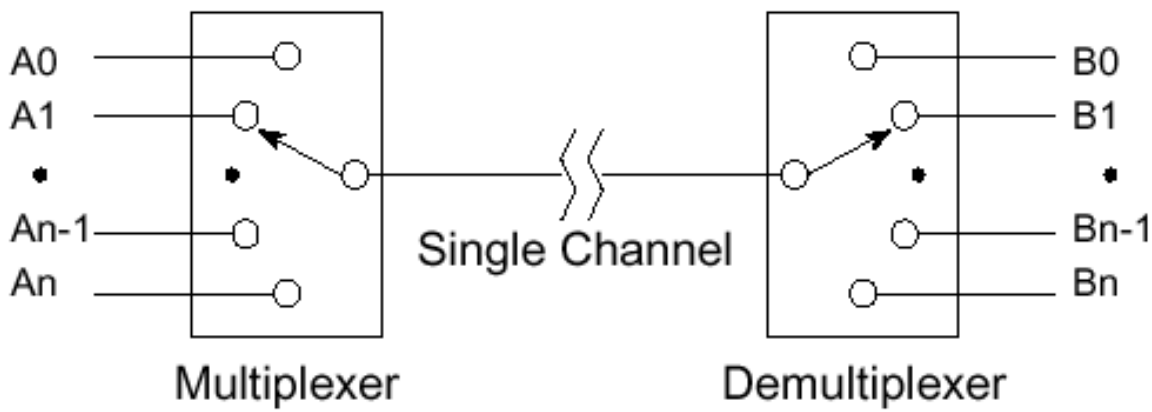




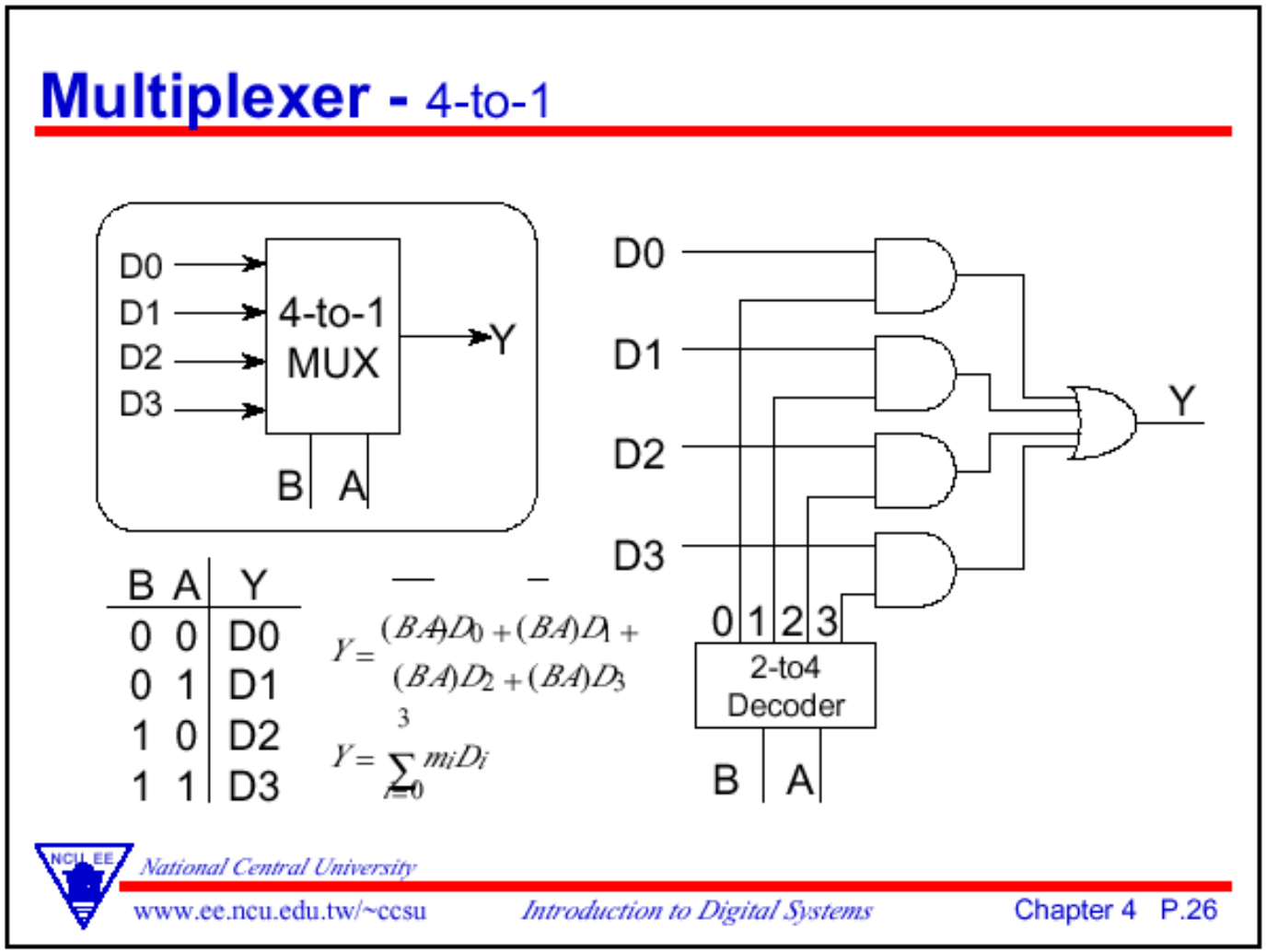
Multiplers and Demultiplexers

4.4 Multiplexer

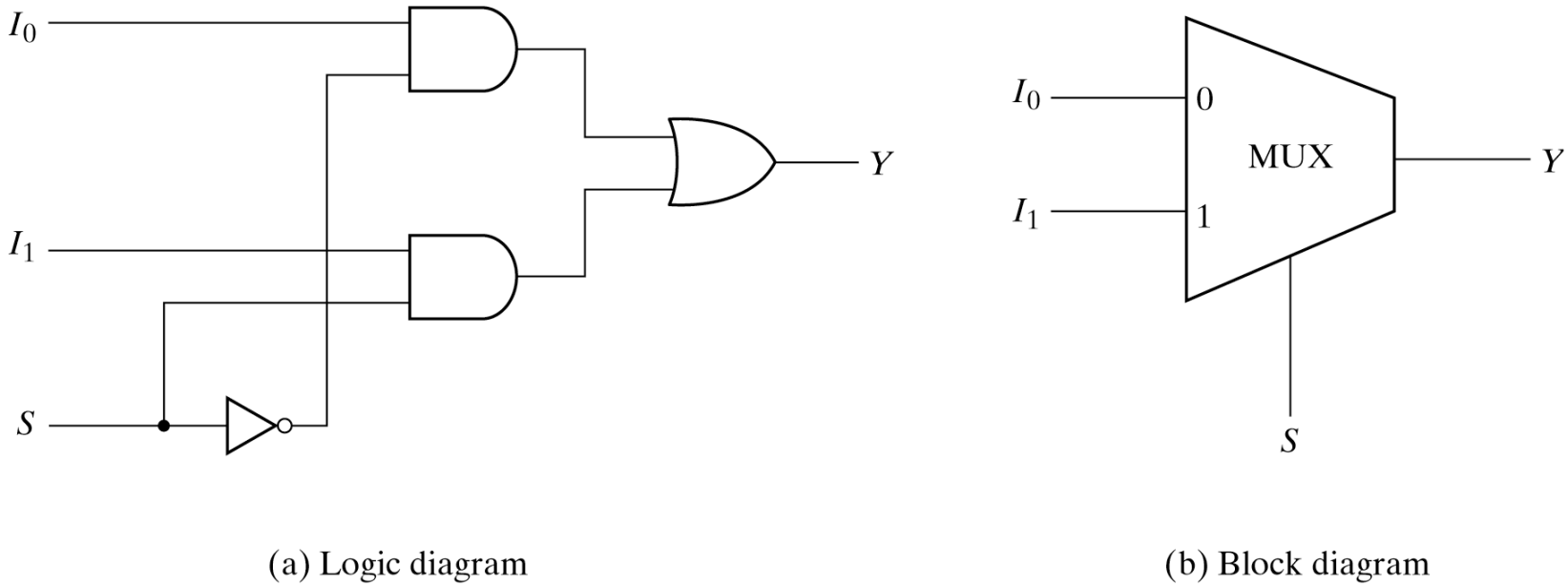
- Multilexer - A ***data selector*** that selects one of may inputs to appear on a single output line
- Demultiplexer - A ***data distributor*** that takes a single input line and routes it to one of several output lines



A 4 to 1 Multiplexer



2-to-1 Line Multiplexer

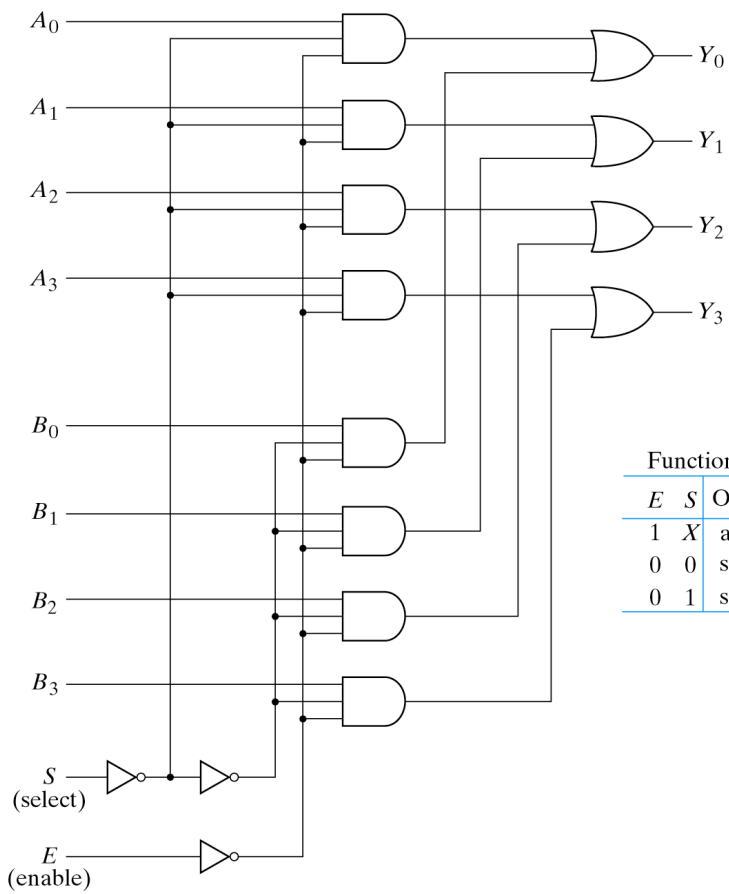


(a) Logic diagram

(b) Block diagram

Fig. 4-24 2-to-1-Line Multiplexer

2-to-1 Line Multiplexer * 4 Bits



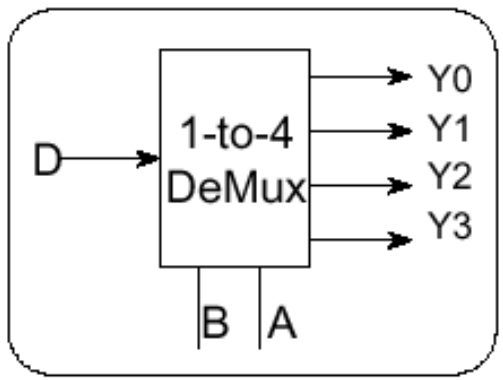
Function table

E	S	Output Y
1	X	all 0's
0	0	select A
0	1	select B

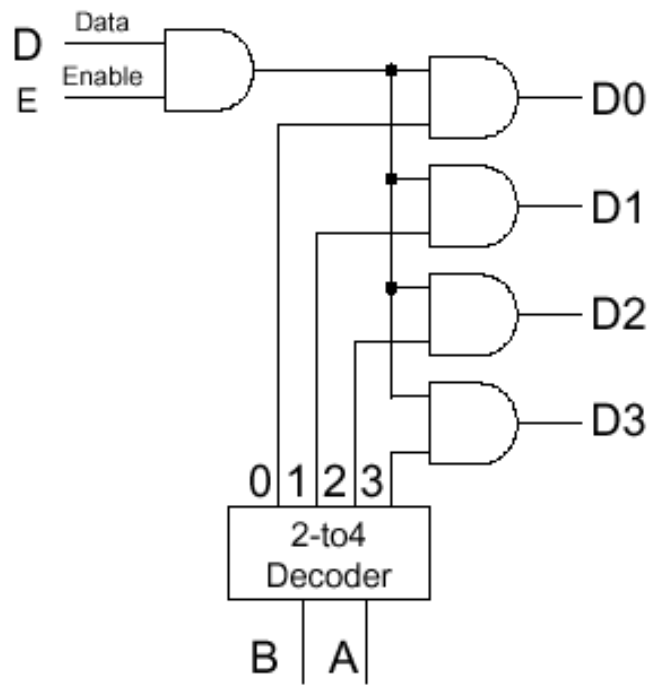
Fig. 4-26 Quadruple 2-to-1-Line Multiplexer

Demultiplexer

Demultiplexer



B	A	Y0	Y1	Y1	Y1
0	0	D	0	0	0
0	1	0	D	0	0
1	0	0	0	D	0
1	1	0	0	0	D



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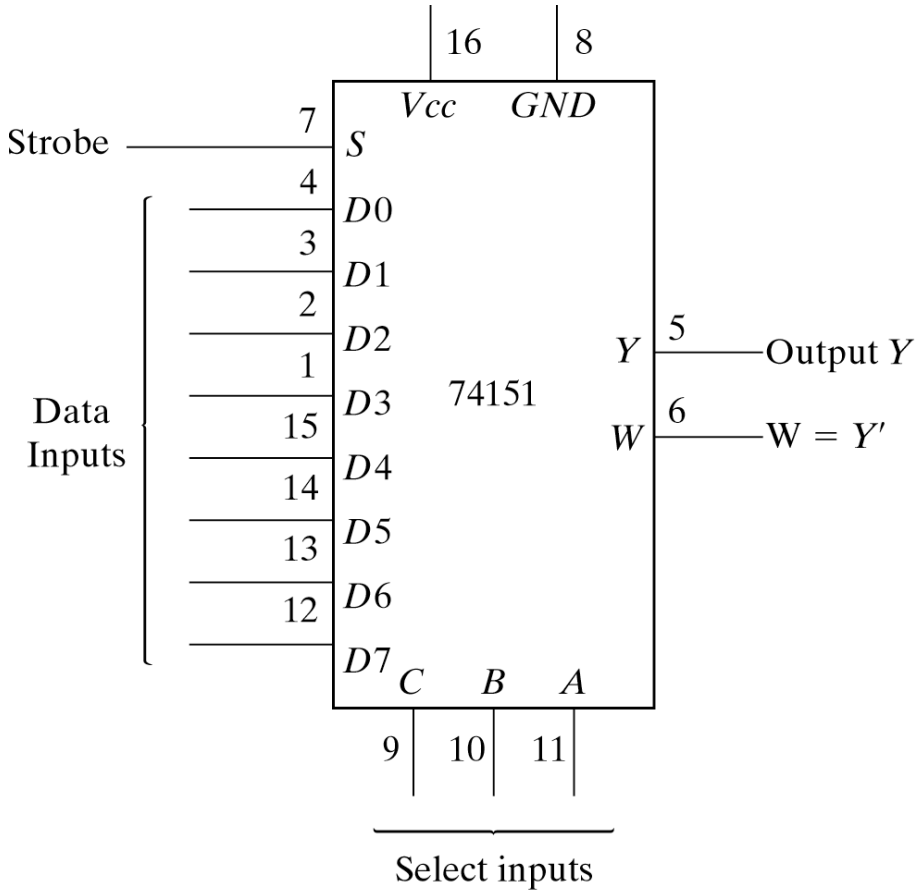
Chapter 4 P.34

74151 Multiplexer IC



Function table

Strobe S	Select C	Select B	Select A	Output Y
1	X	X	X	0
0	0	0	0	D0
0	0	0	1	D1
0	0	1	0	D2
0	0	1	1	D3
0	1	0	0	D4
0	1	0	1	D5
0	1	1	0	D6
0	1	1	1	D7

Fig. 11-9 IC Type 74151 8 × 1 Multiplexer

Simulation

- We'll again go to www.play-hookey.com/digital to see Multiplexers and Demultiplexers in action

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