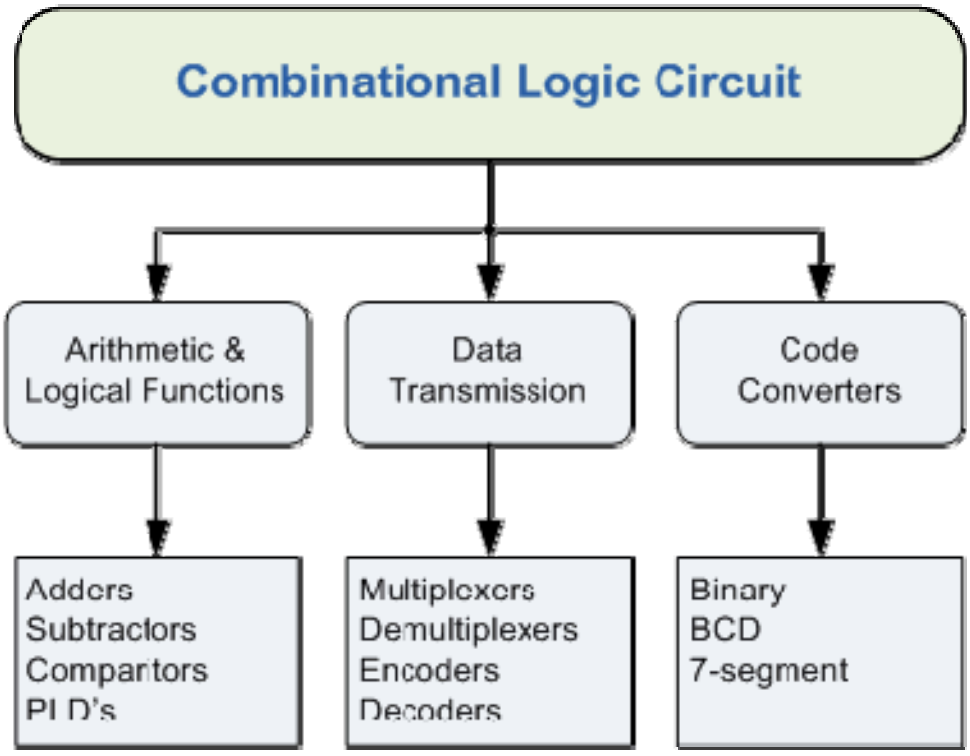
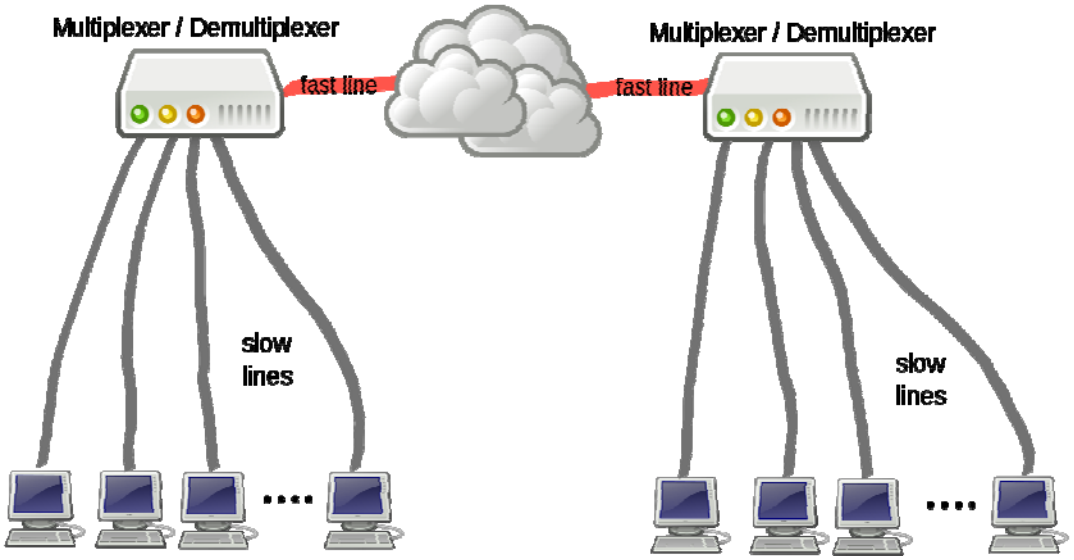
מערכות צירופיות שימושיות

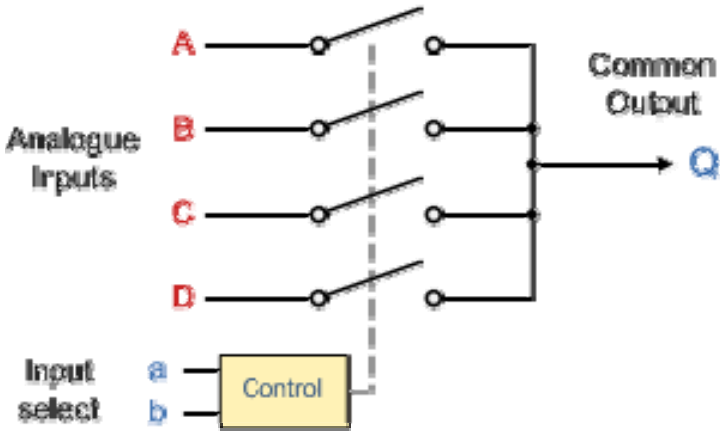


דוגמא לנחיצות השימוש במרבב ומפלג

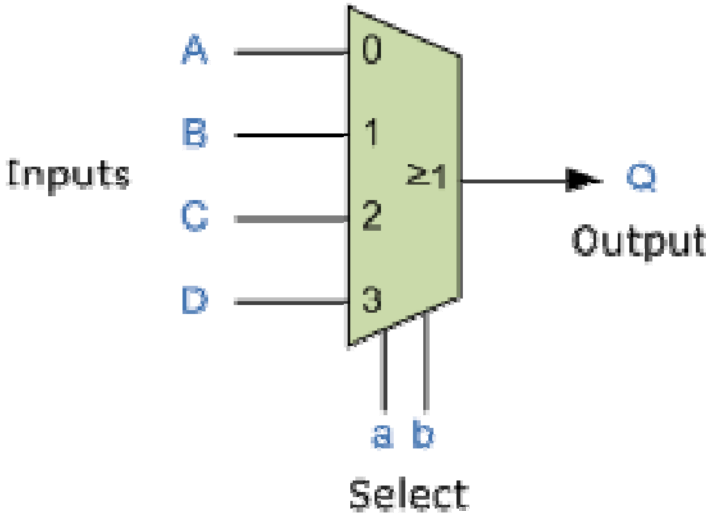


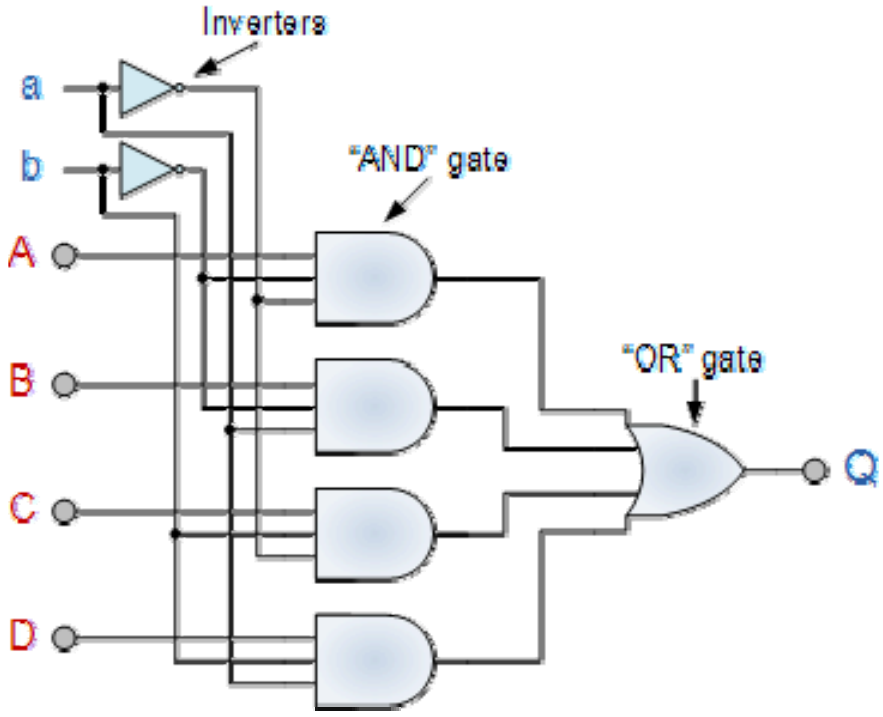
Multiplexer מרבב

http://en.wikipedia.org/wiki/Multiplexer



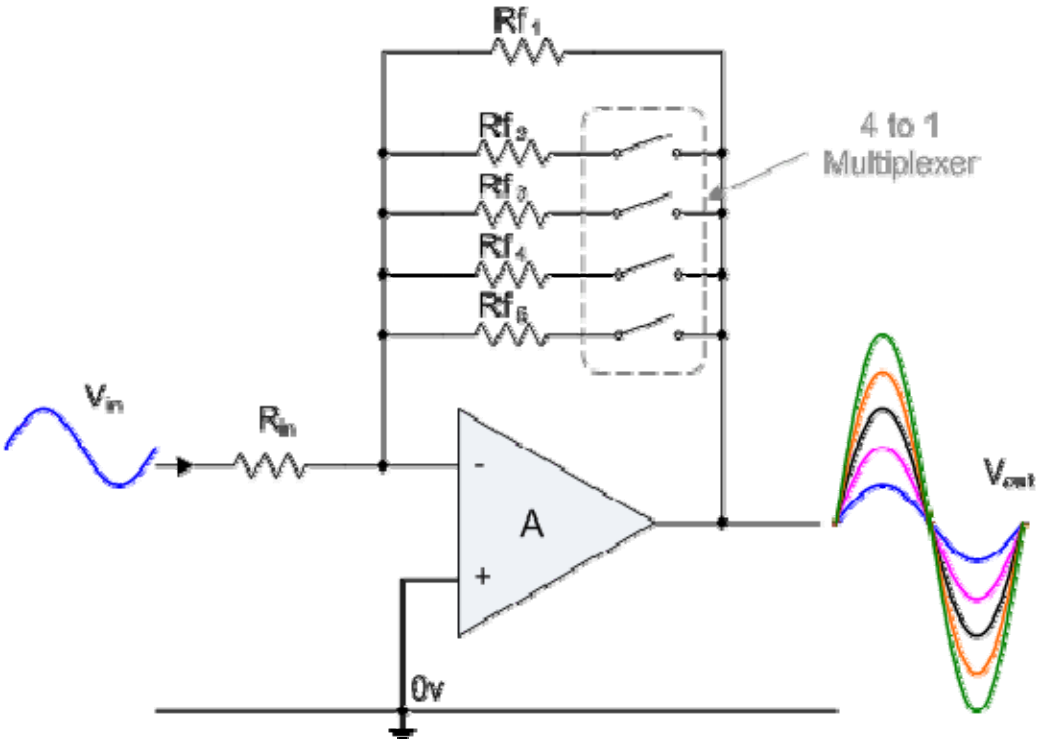
Addressing		Input Selected
b	a	
0	0	A
0	1	B
1	0	C
1	1	D





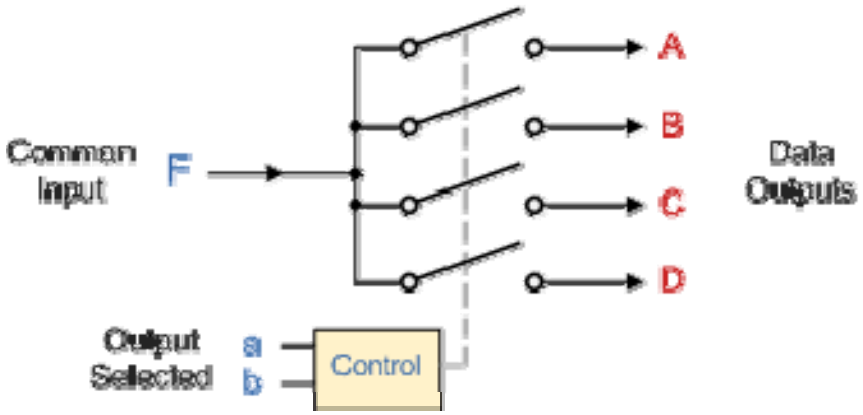
Digitally Adjustable Amplifier Gain

As well as sending parallel data in a serial format down a single transmission line or connection, another possible use of multi-channel multiplexers is in digital audio applications as mixers or where the gain of an analogue amplifier can be controlled digitally, for example:

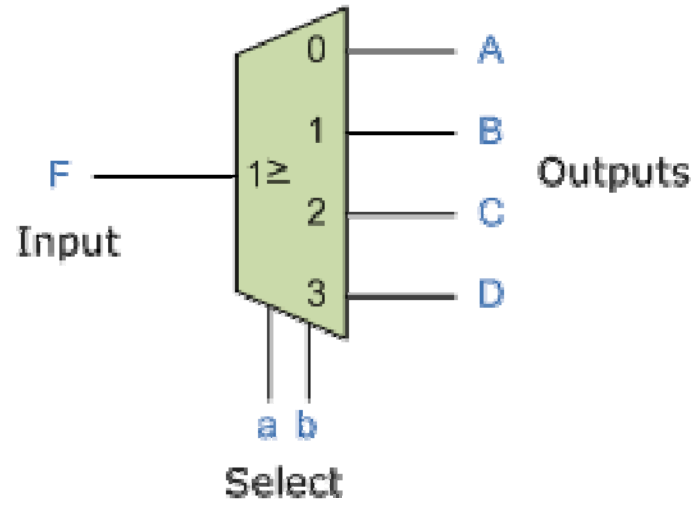


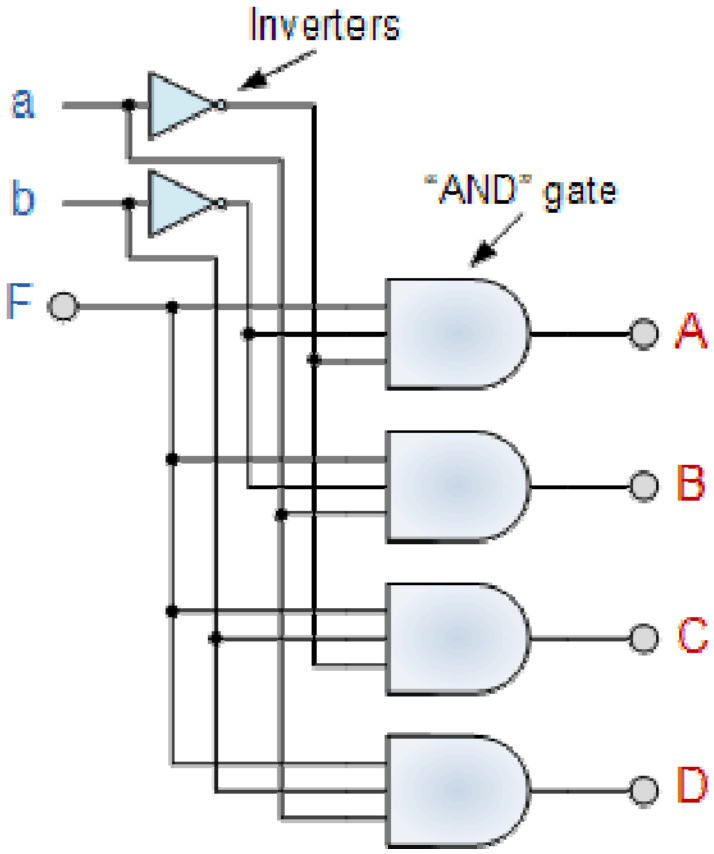
Here, the voltage gain of the inverting amplifier is dependent upon the ratio between the input resistor, Rin and its feedback resistor, Rf. A single 4-channel (Quad) SPST switch configured as a 4-to-1 channel multiplexer is connected in series with the resistors to select any feedback resistor to vary the value of Rf. The combination of these resistors will determine the overall gain of the amplifier, (Av). Then the gain of the amplifier can be adjusted digitally by simply selecting the appropriate resistor combination.

deMultiplexer מפלג



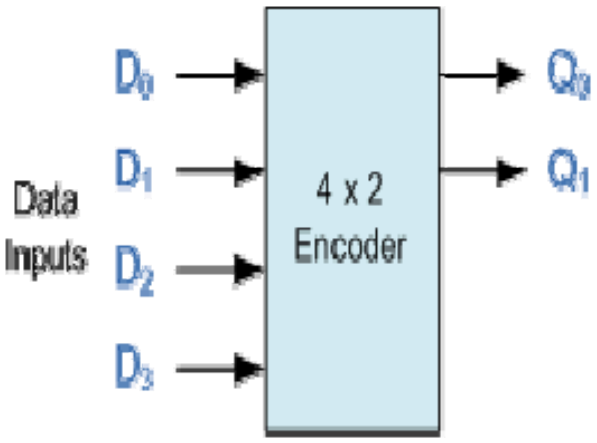
Addressing		Input Selected
b	a	
0	0	A
0	1	B
1	0	C
1	1	D


0
1
2
3
A
B
C
D
F
1≥
Input
Outputs
a b
Select


Inverters
a
b
F
"AND" gate
A
B
C
D

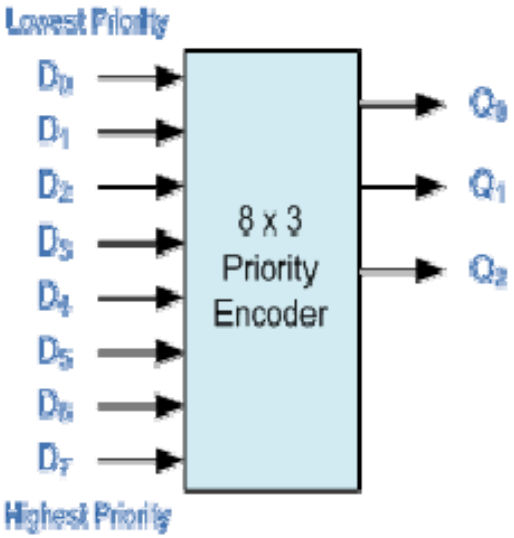
Encoder מקודד

http://he.wikipedia.org/wiki/%D7%9E%D7%A7%D7%95%D7%93%D7%93



Inputs				Outputs	
D_3	D_2	D_1	D_0	Q_1	Q_0
0	0	0	1	0	0
0	0	1	0	0	1
0	1	0	0	1	0
1	0	0	0	1	1
0	0	0	0	x	x

The **Priority Encoder** solves the problems mentioned above by allocating a priority level to each input. The *priority encoders* output corresponds to the currently active input which has the highest priority. So when an input with a higher priority is present, all other inputs with a lower priority will be ignored. The priority encoder comes in many different forms with an example of an 8-input priority encoder along with its truth table shown below.

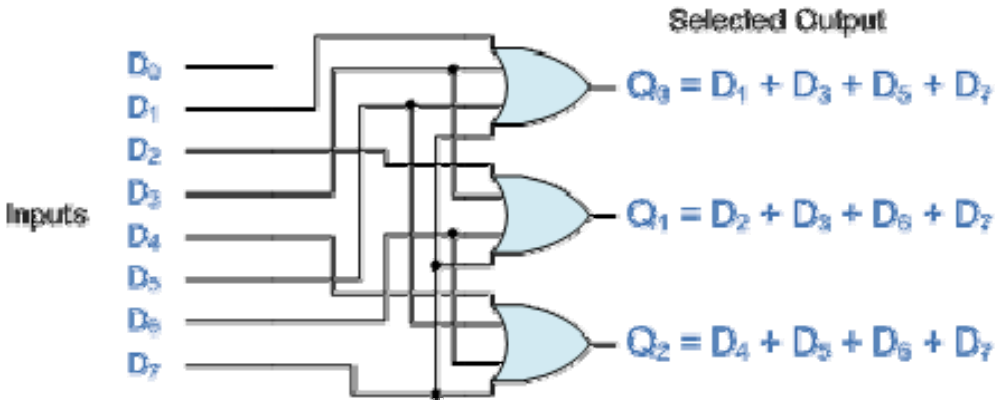


Inputs								Outputs		
D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	Q_2	Q_1	Q_0
0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	x	0	0	1
0	0	0	0	0	1	x	x	0	1	0
0	0	0	0	1	x	x	x	0	1	1
0	0	0	1	x	x	x	x	1	0	0
0	0	1	x	x	x	x	x	1	0	1
0	1	x	x	x	x	x	x	1	1	0
1	x	x	x	x	x	x	x	1	1	1

X = don't care

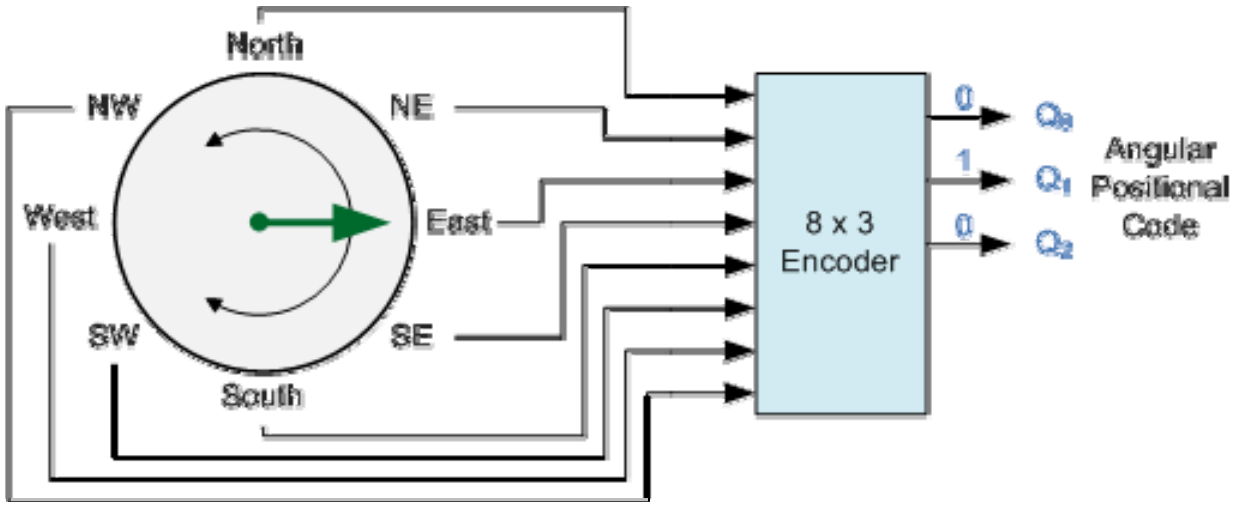
Digital Inputs								Binary Output		
D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	Q_2	Q_1	Q_0
0	0	0	0	0	0	0	**1**	0	0	0
0	0	0	0	0	0	**1**	X	0	0	1
0	0	0	0	0	**1**	X	X	0	1	0
0	0	0	0	**1**	X	X	X	0	1	1
0	0	0	**1**	X	X	X	X	1	0	0
0	0	**1**	X	X	X	X	X	1	0	1
0	**1**	X	X	X	X	X	X	1	1	0
1	X	X	X	X	X	X	X	1	1	1

ולהלן המימוש של המקודד הנ"ל:



דוגמאות למקודדים בחיי היום יום

Another more common application is in magnetic positional control as used on ships or robots etc. Here the angular or rotary position of a compass is converted into a digital code by an encoder and inputted to the systems computer to provide navigational data and an example of a simple 8 position to 3-bit output compass encoder is shown below. Magnets and reed switches could be used to indicate the compasses angular position.



Compass Direction	Binary Output		
	Q_0	Q_1	Q_2
North	0	0	0
North-East	0	0	1
East	0	1	0
South-East	0	1	1
South	1	0	0
South-West	1	0	1
West	1	1	0
North-West	1	1	1

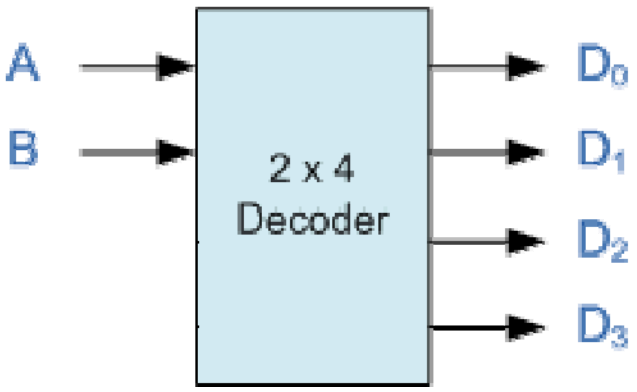
Other applications especially for **Priority Encoders** may include detecting interrupts in microprocessor applications. Here the microprocessor uses interrupts to allow peripheral devices such as the disk drive, scanner, mouse, or printer etc, to communicate with it, but the microprocessor can only "talk" to one peripheral device at a time. The processor uses "Interrupt Requests" or "IRQ" signals to assign priority to the devices to ensure that the most important peripheral device is serviced first. The order of importance of the devices will depend upon their connection to the priority encoder.

IRQ Number	Typical Use	Description
IRQ 0	System timer	Internal System Timer.
IRQ 1	Keyboard	Keyboard Controller.
IRQ 3	COM2 & COM4	Second and Fourth Serial Port.
IRQ 4	COM1 & COM3	First and Third Serial Port.
IRQ 5	Sound	Sound Card.
IRQ 6	Floppy disk	Floppy Disk Controller.
IRQ 7	Parallel port	Parallel Printer.
IRQ 12	Mouse	PS/2 Mouse.
IRQ 14	Primary IDE	Primary Hard Disk Controller.
IRQ 15	Secondary IDE	Secondary Hard Disk Controller.

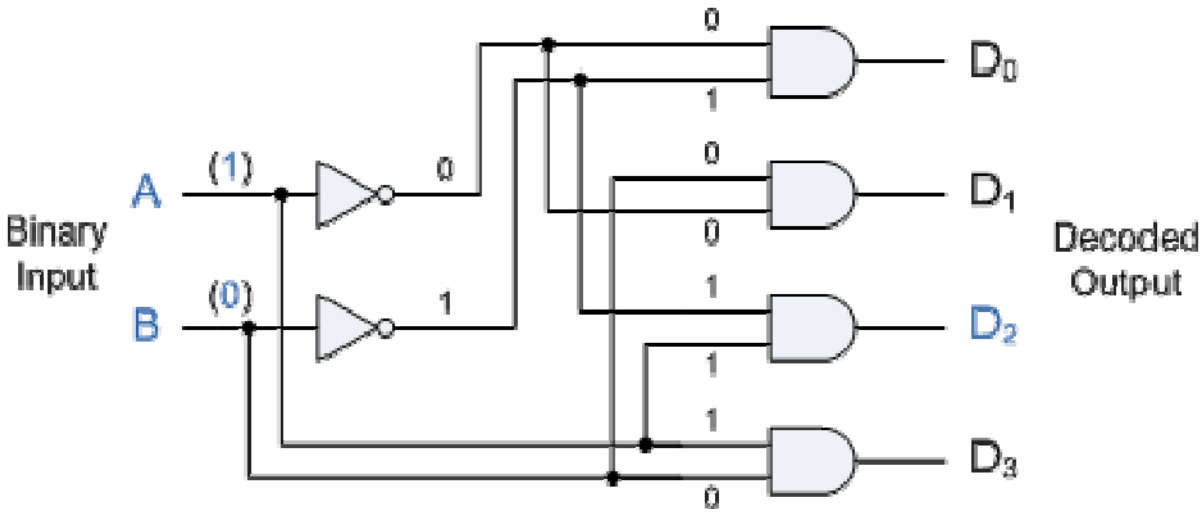
Because implementing such a system using priority encoders such as the standard 74LS148 priority encoder IC involves additional logic circuits, purpose built integrated circuits such as the 8259 Programmable Priority Interrupt Controller is available.

Decoder מפענח

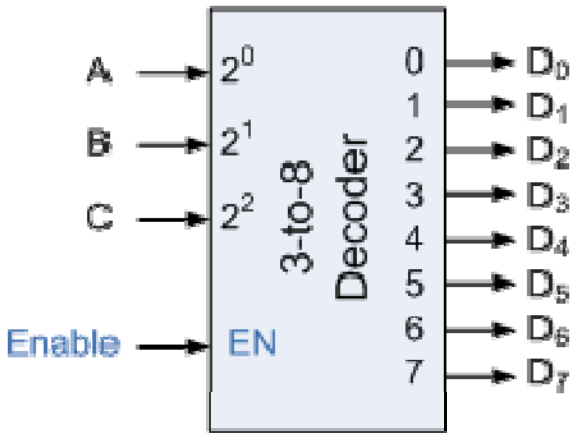
http://en.wikipedia.org/wiki/Decoder



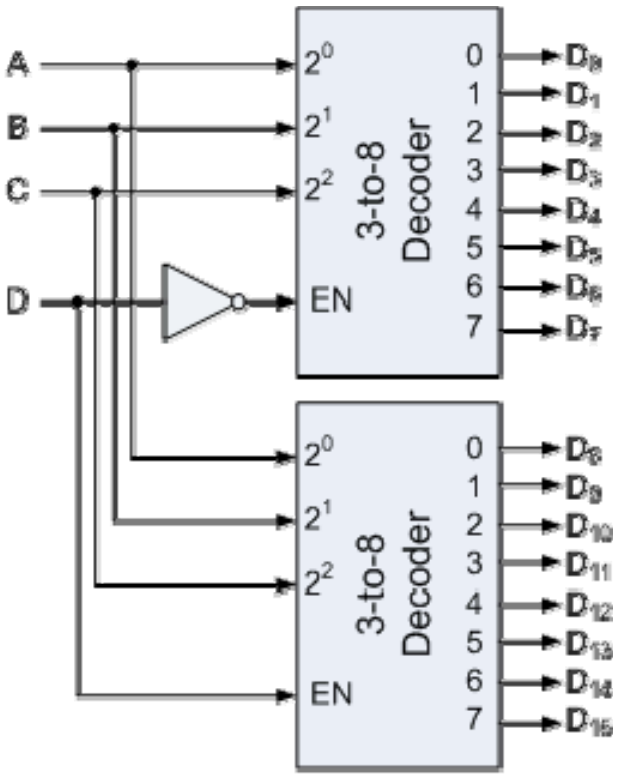
A	B	D_0	D_1	D_2	D_3
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1



Some binary decoders have an additional input labelled "Enable" that controls the outputs from the device. This allows the decoders outputs to be turned "ON" or "OFF" and we can see that the logic diagram of the basic decoder is identical to that of the basic demultiplexer. Therefore, we say that a demultiplexer is a decoder with an additional data line that is used to enable the decoder. An alternative way of looking at the decoder circuit is to regard inputs A, B and C as address signals. Each combination of A, B or C defines a unique address which can access a location having that address.



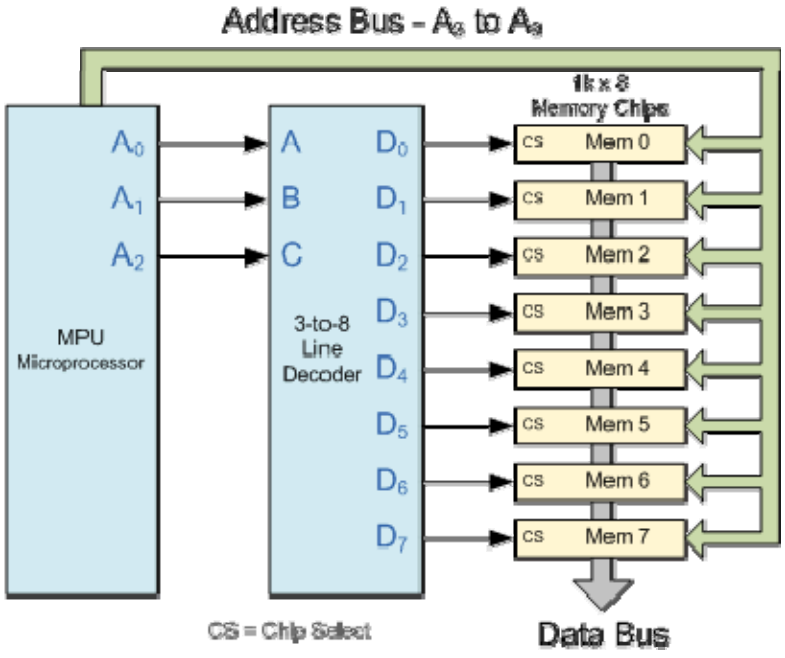
Sometimes it is required to have a **Binary Decoder** with a number of outputs greater than is available, or if we only have small devices available, we can combine multiple decoders together to form larger decoder networks as shown. Here a much larger 4-to-16 line binary decoder has been implemented using two smaller 3-to-8 decoders.



4-to-16 Line Decoder Implemented with two 3-to-8 Decoders

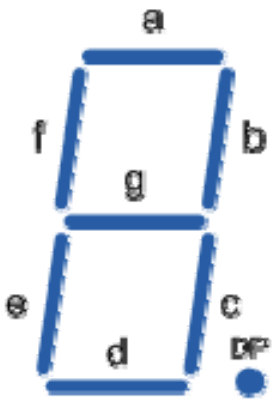
Inputs A, B, C are used to select which output on either decoder will be at logic "1" (HIGH) and input D is used with the enable input to select which encoder either the first or second will output the "1".

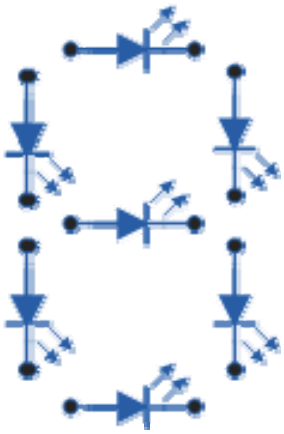
נסתכל בכמה דוגמאות למפענחים חשובים:



על נושא **מיפוי הזיכרון** נרחיב בשיעור אחר.

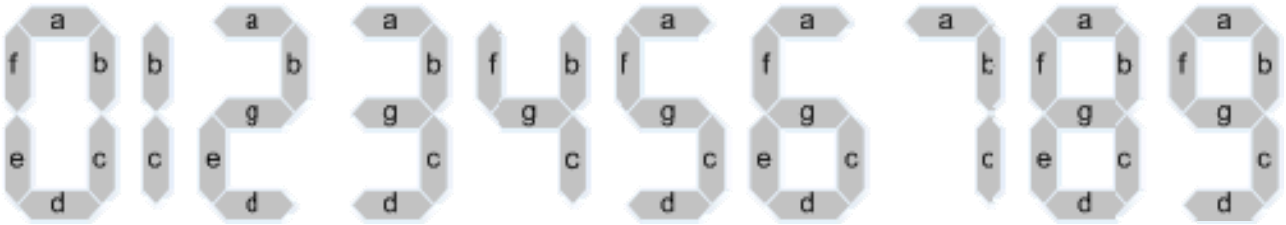
כעת נתבונן במפענח תצוגה בסיסה ונפוץ מאוד:

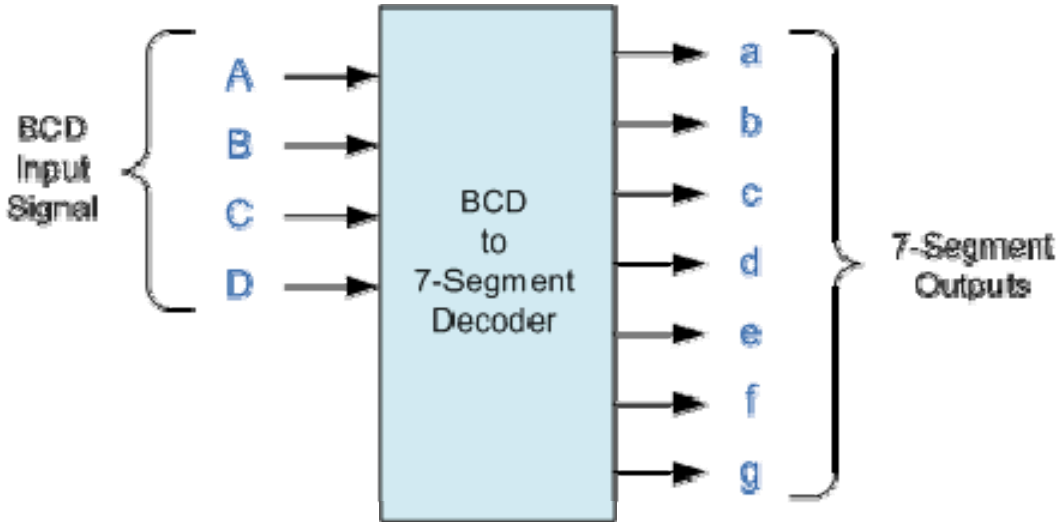




Individual Segments							Display
a	b	c	d	e	f	g	
×	×	×	×	×	×		0
	×	×					1
×	×		×	×		×	2
×	×	×	×			×	3
	×	×			×	×	4
×		×	×		×	×	5
×		×	×	×	×	×	6
×	×	×					7

Individual Segments							Display
a	b	c	d	e	f	g	
×	×	×	×	×	×	×	8
×	×	×			×	×	9
×	×	×		×	×	×	A
		×	×	×	×	×	b
×			×	×	×		C
	×	×	×	×		×	d
×			×	×	×	×	E
×				×	×	×	F





בפועל מחברים את המפענח כך: