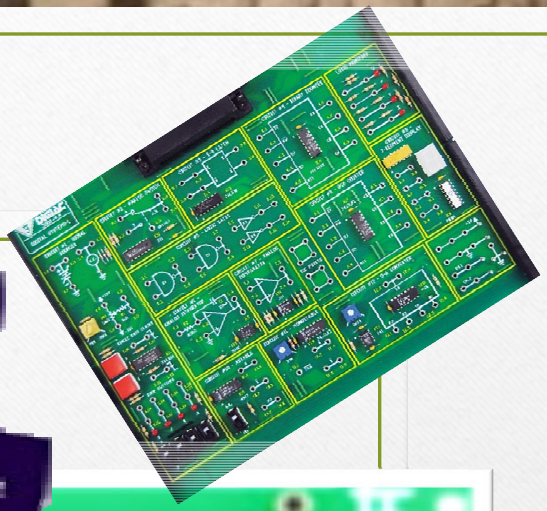

ELECTRONICS II

Lecture No.(13)- Semester 2

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Summary

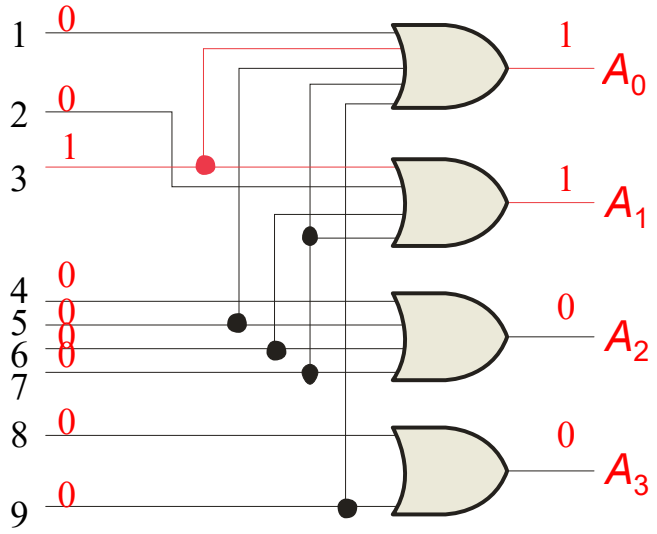
Encoders

Example

Show how the decimal-to-BCD encoder converts the decimal number 3 into a BCD 0011.

Solution

The top two OR gates have ones as indicated with the red lines. Thus the output is 0111.

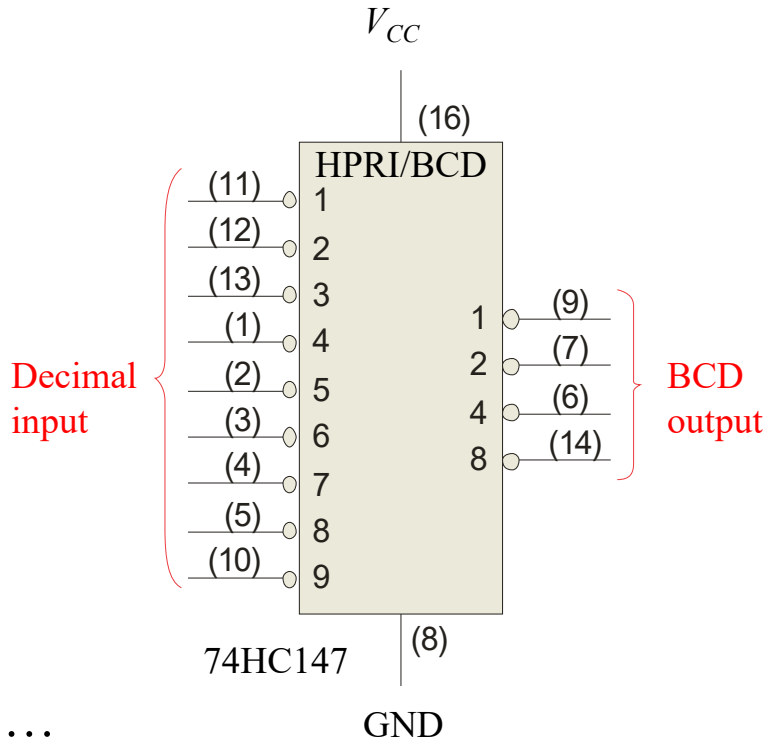


Summary

Encoders

The 74HC147 is an example of an IC encoder. It is has ten active-LOW inputs and converts the active input to an active-LOW BCD output.

This device is offers additional flexibility in that it is a **priority encoder**. This means that if more than one input is active, the one with the highest order decimal digit will be active.

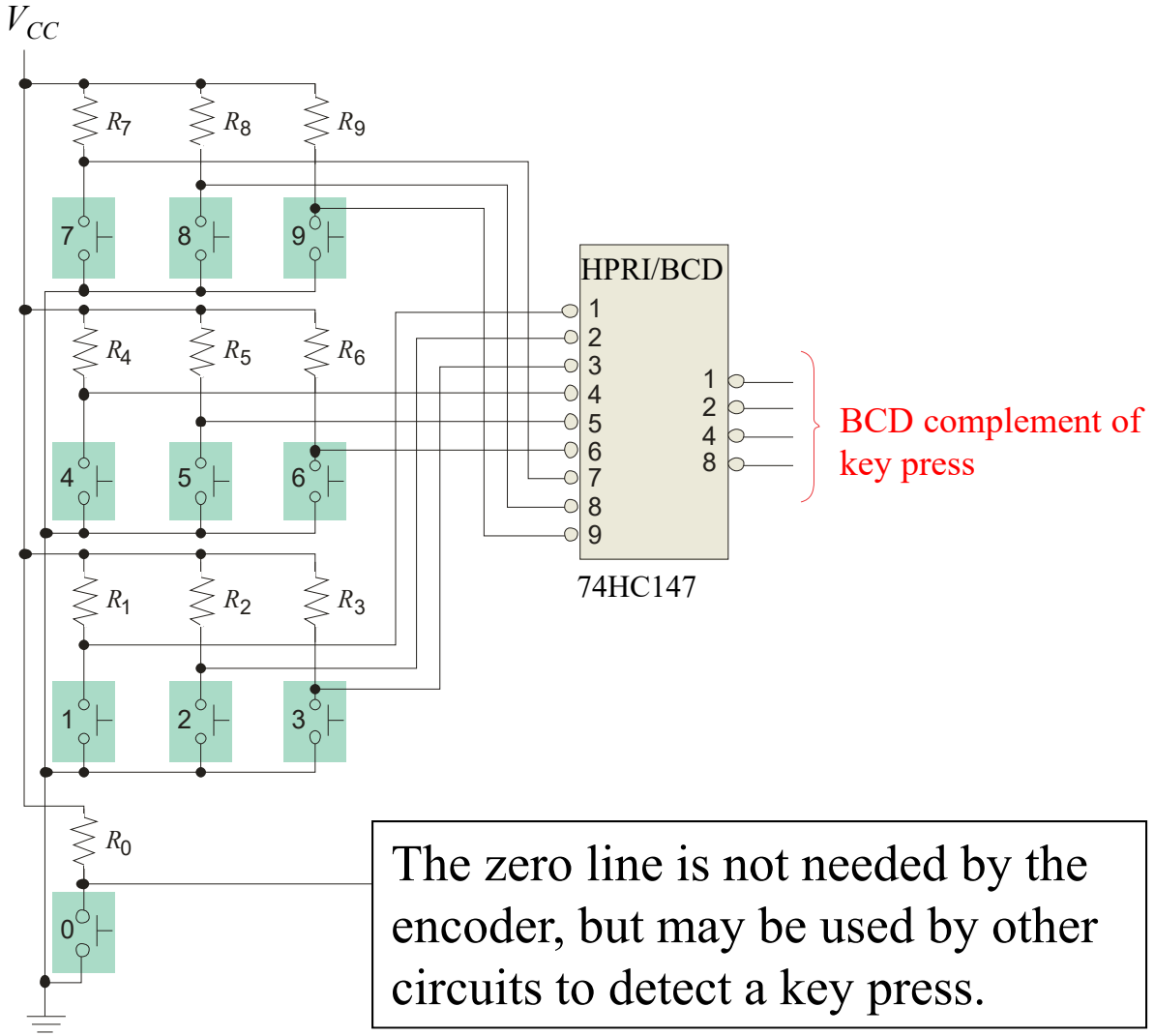


The next slide shows an application …

Summary

Encoders

Keyboard encoder



The zero line is not needed by the encoder, but may be used by other circuits to detect a key press.

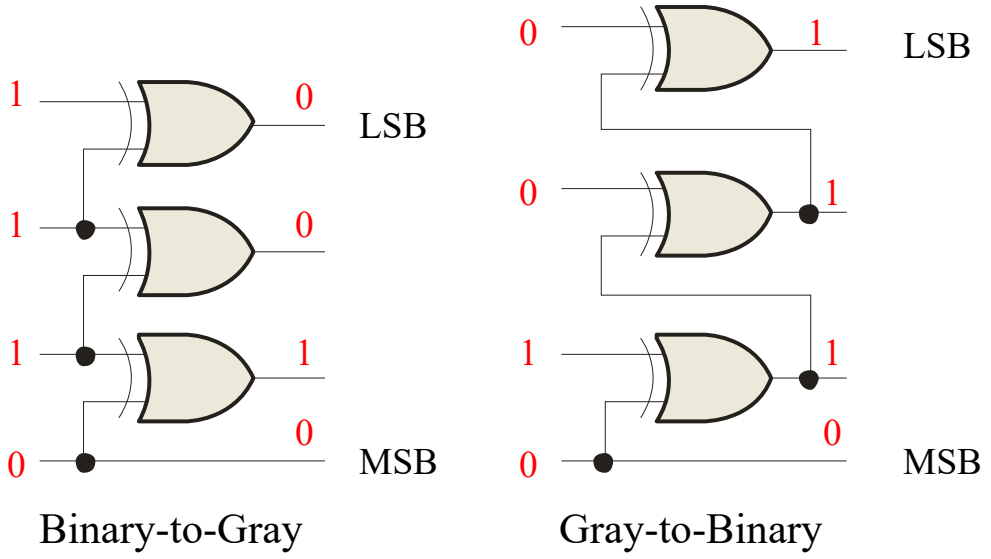
Summary

Code converters

There are various code converters that change one code to another. Two examples are the four bit binary-to-Gray converter and the Gray-to-binary converter.

Example Show the conversion of binary 0111 to Gray and back.

Solution



Summary

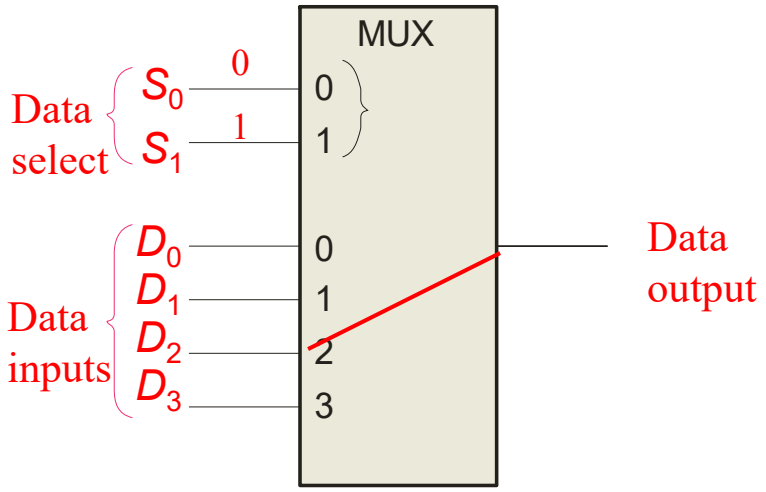
Multiplexers منتقي البيانات

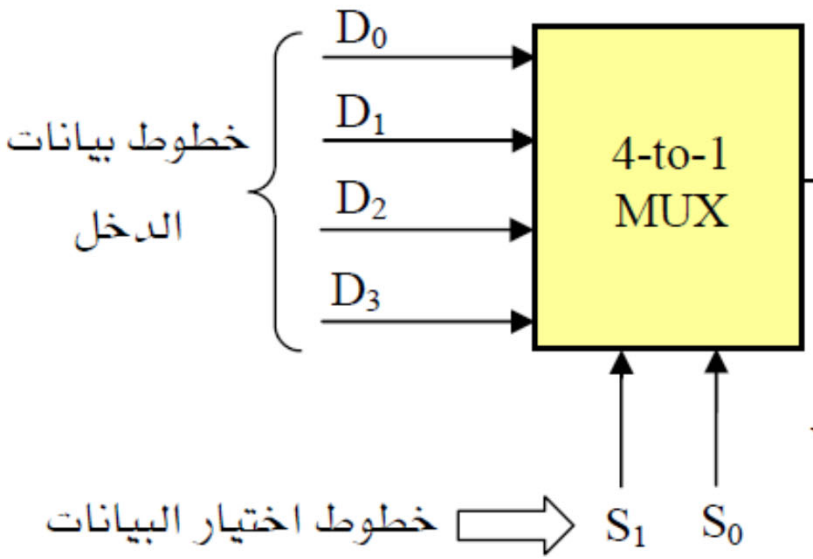
A multiplexer (MUX) selects one data line from two or more input lines and routes data from the selected line to the output. The particular data line that is selected is determined by the select inputs.

Two select lines are shown here to choose any of the four data inputs.

Question

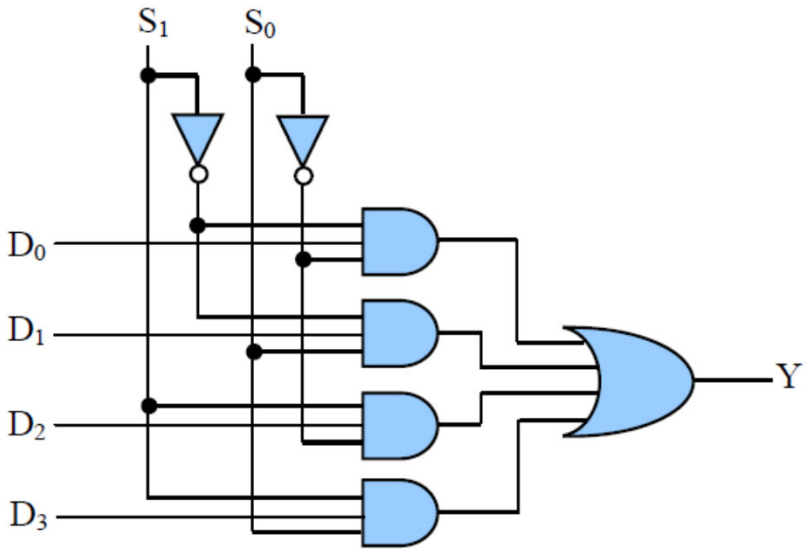
Which data line is selected if $S_1S_0 = 10$? D_2





$$Y = D_0\overline{S}_1\,\overline{S}_0 + D_1\overline{S}_1 S_0 + D_2 S_1\overline{S}_0 + D_3 S_1 S_0$$

خطوط الإختيار		خط الخرج
S_1	S_0	Y
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3

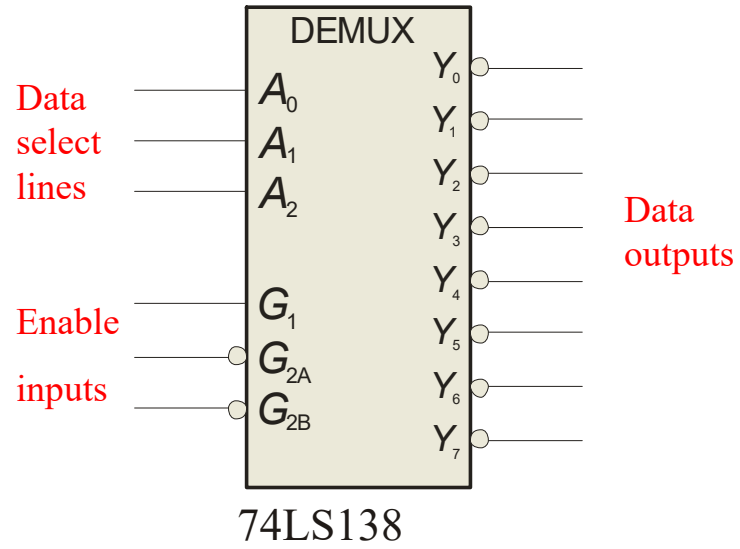


Summary

Demultiplexers موزع البيانات

A demultiplexer (DEMUX) performs the opposite function from a MUX. It switches data from one input line to two or more data lines depending on the select inputs.

The 74LS138 was introduced previously as a decoder but can also serve as a DEMUX. When connected as a DEMUX, data is applied to one of the enable inputs, and routed to the selected output line depending on the select variables. Note that the outputs are active-LOW as illustrated in the following example…



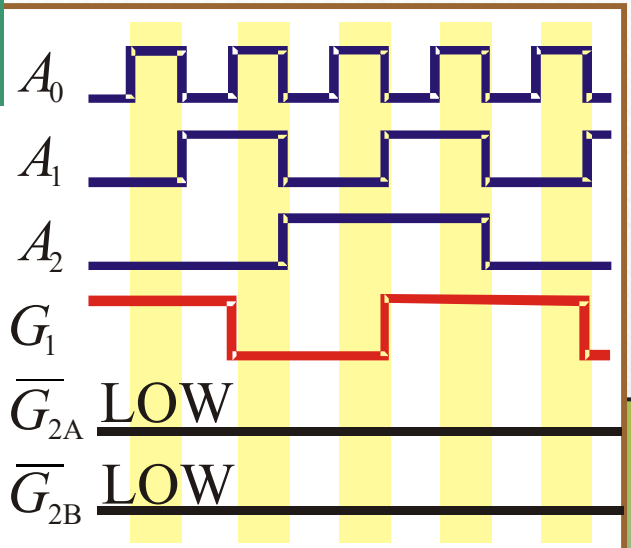
74LS138

Summary

Demultiplexers

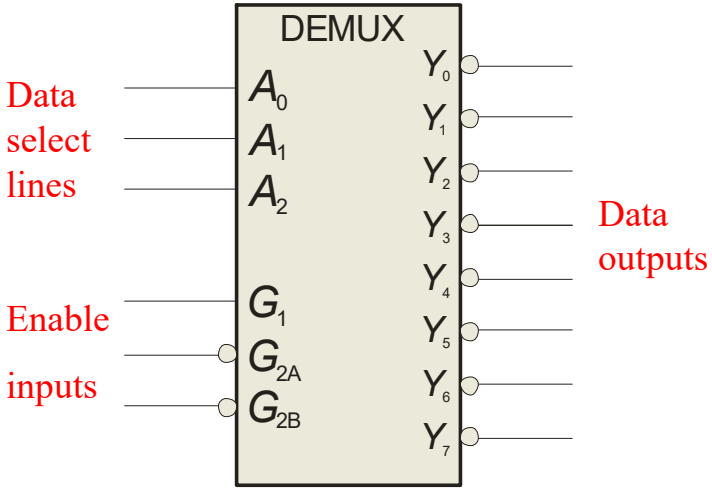
Example

Determine the outputs, given the inputs shown.



Solution

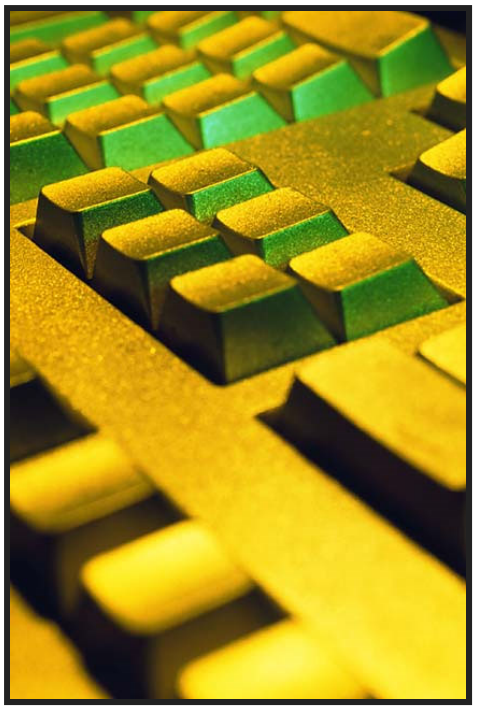
The output logic is opposite to the input because of the active-LOW convention. (Red shows the selected line).



Summary

Parity Generators/Checkers

Parity is an error detection method that uses an extra bit appended to a group of bits to force them to be either odd or even. In even parity, the total number of ones is even; in odd parity the total number of ones is odd.



Example The ASCII letter S is 1010011. Show the parity bit for the letter S with odd and even parity.

Solution

S with odd parity = 11010011

S with even parity = 01010011

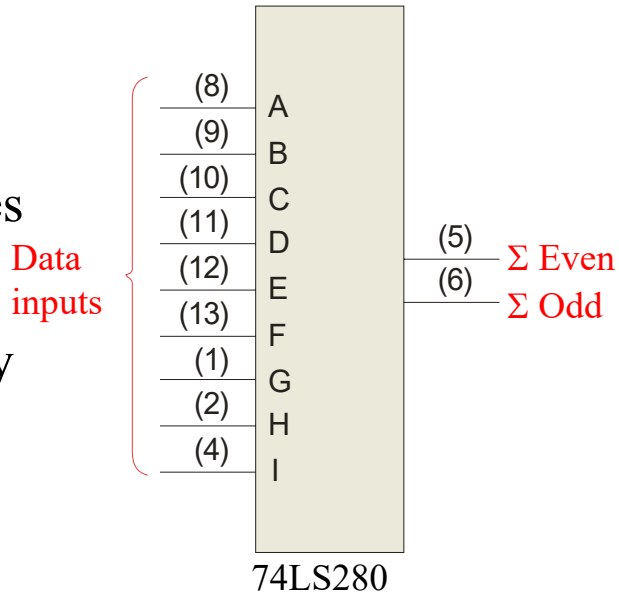
Summary

Parity Generators/Checkers

The 74LS280 can be used to generate a parity bit or to check an incoming data stream for even or odd parity.

Checker: The 74LS280 can test codes with up to 9 bits. The even output will normally be HIGH if the data lines have even parity; otherwise it will be LOW. Likewise, the odd output will normally be HIGH if the data lines have odd parity; otherwise it will be LOW.

Generator: To generate <u>even</u> parity, the parity bit is taken from the <u>odd</u> parity output. To generate <u>odd</u> parity, the output is taken from the <u>even</u> parity output.



Finish