Lab Manual 7
Multiplexers

Objectives:

To learn and understand the working of Multiplexers

2x1 MUX:

74LS157 is a high speed Quad 2-Input Multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four buffered outputs present the selected data in the true (non-inverted) form.

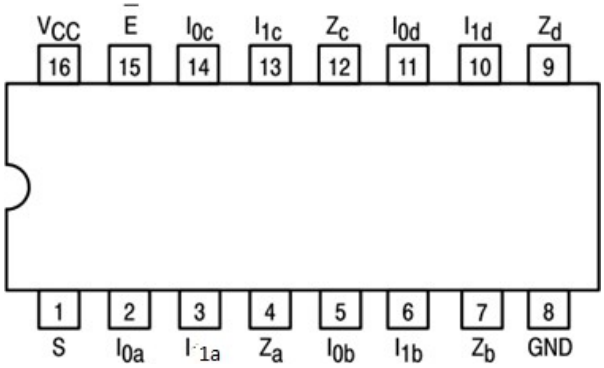
Function Table

TRUTH TABLE

ENABLE	SELECT INPUT	INPUTS		OUTPUT
$\overline{E}$	S	I_0	I_1	Z
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care

Connection Diagram



4x1 MUX

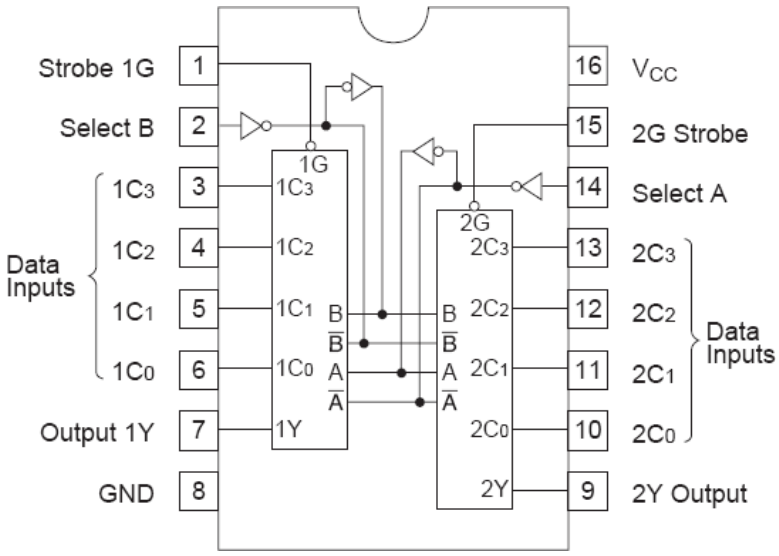
74LS153 IC is a dual 4x1 MUX with active low enables. Two 4x1 MUXs with common selection pins but independent inputs and independent outputs is known as dual 4x1 MUX. The function table and connection diagram for this IC are shown below:

Function Table

Strobe (Enable)	Selection Inputs		Data Inputs				Output
G	B	A	C0	C1	C2	C3	Y
H	X	X	X	X	X	X	L
L	L	L	L	X	X	X	L
L	L	L	H	X	X	X	H
L	L	H	X	L	X	X	L
L	L	H	X	H	X	X	H
L	H	L	X	X	L	X	L
L	H	L	X	X	H	X	H
L	H	H	X	X	X	L	L
L	H	H	X	X	X	H	H

H= Logic High, L= Logic Low, X= Don't Care

Connection Diagram

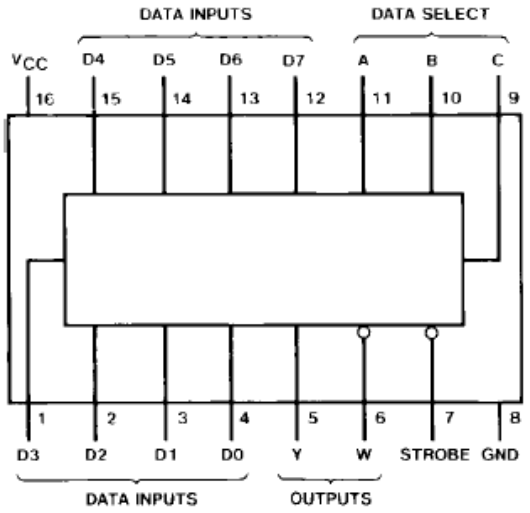


8x1 MUX

74LS151 IC is a 8x1 MUX with active low enables. The function table and connection diagram for this IC are shown below:

Function Table and Connection Diagram

Connection Diagram



Truth Table

Inputs				Outputs	
Select			Strobe	Y	W
C	B	A	S		
X	X	X	H	L	H
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

H = HIGH Level
L = LOW Level
X = Don't Care
D0, D1...D7 = the level of the respective D input

Problems / Assignments

Problem 1

Implement four variable function using multiplexer on Logic works. You must use **74_151** components in the Logic works.

A	B	C	B	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Write expressions of F also.

Problem 2

Implement 5x1 MUX using 2x1 MUX(s) on Logicworks. You must use 74_15 components inthe Logicworks and trainer.

Problem 3	

Implement the following function using 4*1 MUX on Trainer.

F (X,Y,Z) = m1 + m2 + m6 + m7