Lab Manual#12`

FAIRCHILD SEMICONDUCTOR™

August 1986
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DM74LS74A
Dual Positive-Edge-Triggered D Flip-Flops with Preset, Clear and Complementary Outputs

General Description

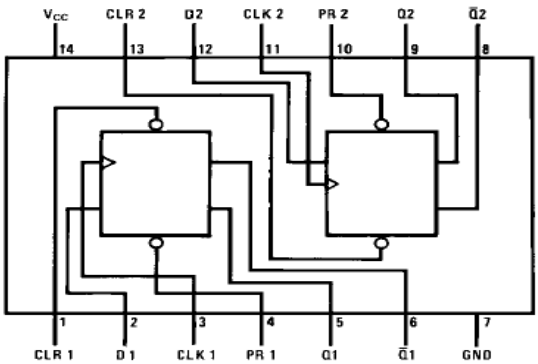
This device contains two independent positive-edge-triggered D flip-flops with complementary outputs. The information on the D input is accepted by the flip-flops on the positive going edge of the clock pulse. The triggering occurs at a voltage level and is not directly related to the transition time of the rising edge of the clock. The data on the D input may be changed while the clock is LOW or HIGH without affecting the outputs as long as the data setup and hold times are not violated. A low logic level on the preset or clear inputs will set or reset the outputs regardless of the logic levels of the other inputs.

Ordering Code:

Order Number	Package Number	Package Description
DM74LS74AM	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
DM74LS85ASJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
DM74LS74AN	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagram



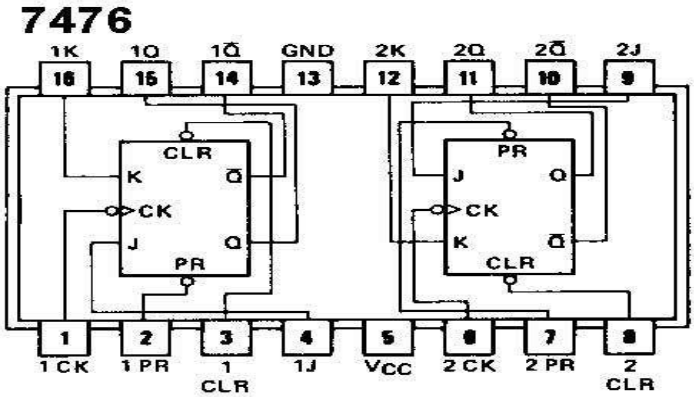
Function Table

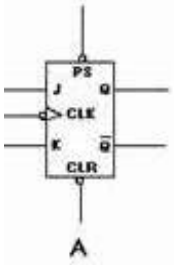
Inputs				Outputs	
PR	CLR	CLK	D	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H (Note 1)	H (Note 1)
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q_0	$\overline{Q}_0$

H = HIGH Logic Level
X = Either LOW or HIGH Logic Level
L = LOW Logic Level
↑ = Positive-going Transition
Q_0 = The output logic level of Q before the indicated input conditions were established.

Note 1: This configuration is nonstable; that is, it will not persist when either the preset and/or clear inputs return to their inactive (HIGH) level.

Figure 1: D FF IC





A

	INPUTS					OUTPUTS	
	PRESET	CLEAR	CLOCK	J	K	Q	$\overline{Q}$
1	0	0	X	X	X	1	1
2	0	1	X	X	X	1	0
3	1	0	X	X	X	0	1
4	1	1	↓	0	0	0	$\overline{Q}$
5	1	1	↓	1	0	1	0
6	1	1	↓	0	1	0	1
7	1	1	↓	1	1	TOGGLE	
8	1	1	0	X	X	Q	$\overline{Q}$

X = IRRELEVANT

B

Figure 2: JK FF IC

LAB Task 1: Design and implement a master slave flip flop. Use D flip flop as master and SR as a slave in LogicWorks.
Make it operate as:

a) Negative Edge Triggered
b) Positive Edge Triggered

Compare and explain the timing diagram of both

LAB Task 2: Design and Implement a SR Master Slave Flip Flop using SR flip flops on LogicWorks with

a) Negative Edge Triggered
b) Positive Edge Triggered