

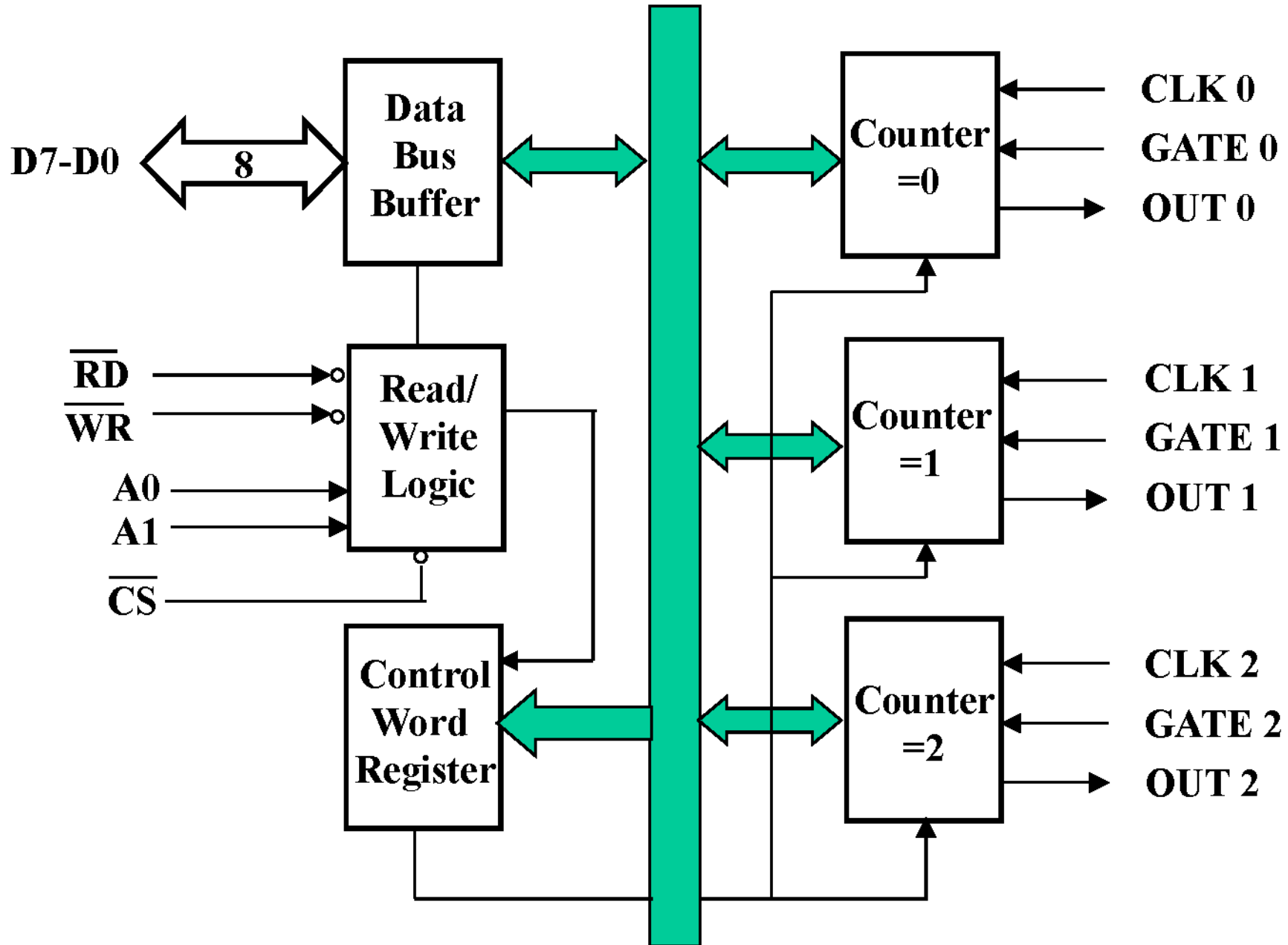
Unit 5

LECTURE 3

8254 Programmable Interval Timer

- It generates accurate time delays and can be used as real time clock, and event counter, a digital one shot , a square wave generator and complex waveform generator.
- 3 identical 16 bit counters that can operate independently in any 6 modes.
- 24 Pin DIP.
- 16 bit count is loaded in its register and on command begins to decrement the count until it reaches 0.
- At end of count, it generates a pulse that can be used to interrupt MPU. Counter can count either in BCD or binary.

8254 Internal Architecture

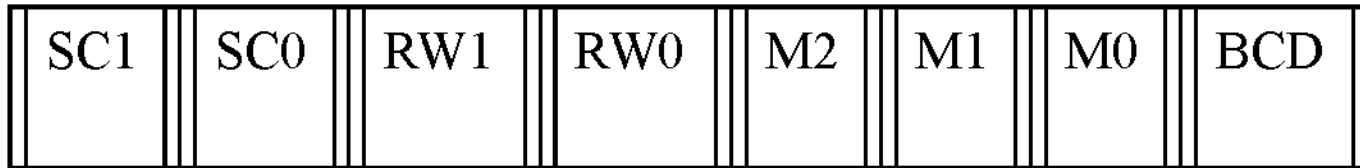


**THE CONTROL WORD REGISTER AND COUNTERS
ARE SELECTED
ACCORDING TO THE SIGNALS ON LINE
A0 and A1 AS SHOWN BELOW**

A1 A0 Selection

0	0	Counter 0
0	1	Counter 1
1	0	Counter 2
1	1	Control Register

8254 Control Word Format



SC1	SC0		RW1	RW0	
0	0	Select counter 0	0	0	Counter Latch Command
0	1	Select counter 1	0	1	Read/Write least significant byte only
1	0	Select Counter 2	1	0	Read/Write most significant byte only
1	1	Read-Back command	1	1	Read/Write least significant byte first, Then the most significant byte.

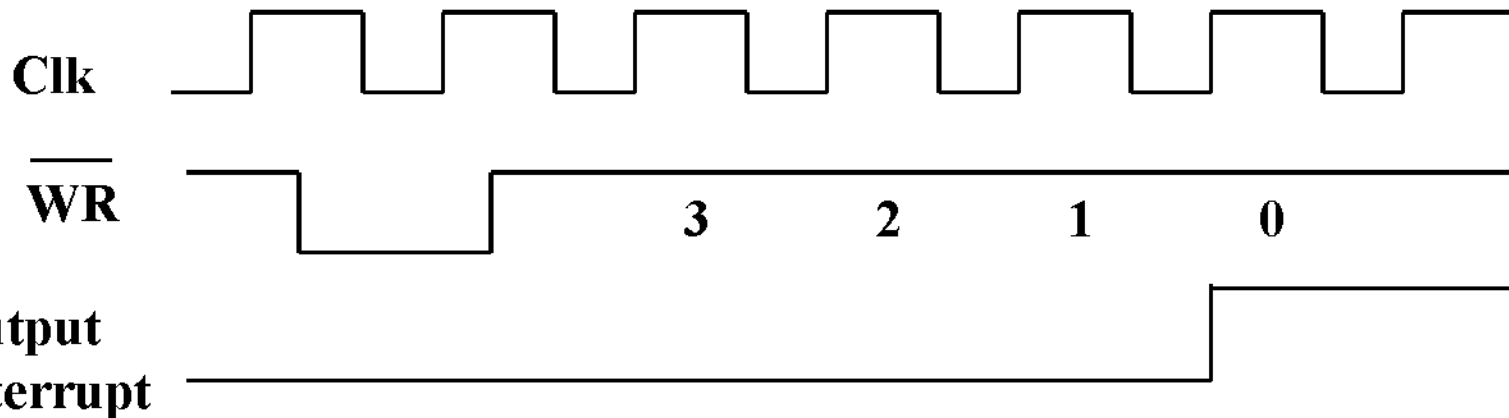
Read Back Command: (reading counts on the fly) :
In some applications, it is necessary to read the value of the count in progress. An appropriate control word is written into control register to latch a count in the output latch and two I/O read operations are performed by MPU.

BCD:

0	Binary Counter 16-bits
1	Binary Coded Decimal (BCD) Counter

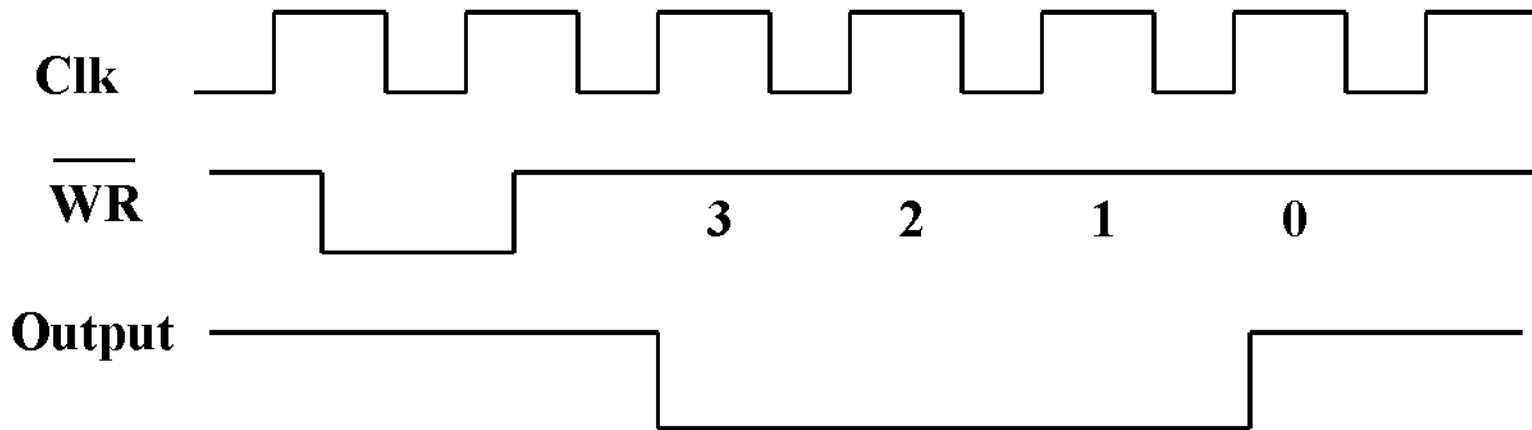
M2	M1	M0	
0	0	0	Mode 0
0	0	1	Mode 1
X	1	0	Mode 2
X	1	1	Mode 3
1	0	0	Mode 4
1	0	1	Mode 5

MODE 0 : Interrupt on terminal count



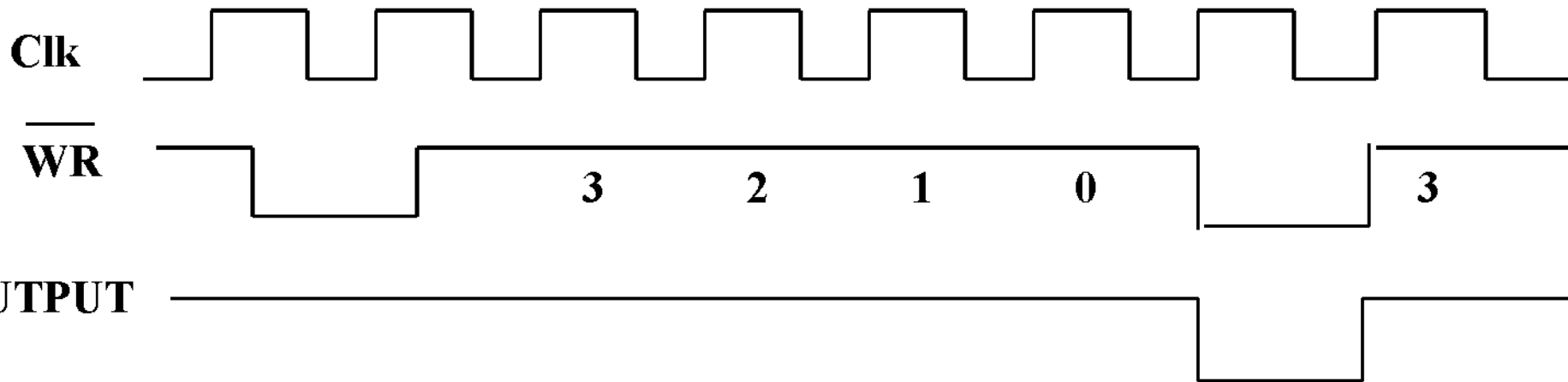
- Initially OUT is low.
- Once Count is loaded in the register, the counter is decremented every cycle.
- When count reaches zero, OUT goes high.
- This can be used as interrupt.

MODE 1 : HARDWARE-RETRIGGERABLE ONE-SHOT



- OUT remains initially high.
- When gate is triggered, OUT goes low.
- At the end of the count the OUT goes high again, thus generating a one shot pulse.

MODE 2 : RATE GENERATOR CLOCK



- This mode is used to generate a pulse equal to the clock period at a given interval.
- When count is loaded, the OUT stays high until count reaches 1.
- Then the OUT goes low for one clock period.
- The count is reloaded automatically, and the pulse is generated continuously.

MODE 3 : Square Wave Generator



- OUT is high when a count is loaded.
- Count is decremented by 2 at every clock cycle.
- When it reached 0,OUT goes low and the count is reloaded again.
- This is repeated continuously this generating a continuous square wave with period equal to period of the count is generated.

MODE 4 : SOFTWARE TRIGGERED STROBE

In this mode OUT is initially high; it goes low for one clock period at the end of the count. The count must be RELOADED -(*UNLIKE MODE 2*) for subsequent outputs.

MODE 5 : HARWARE TRIGGERED STROBE

- This mode is similar to MODE 4 except that it is triggered by the rising pulse at the gate. Initially, the OUT is low and when the GATE pulse is triggered from low to high , the count begins. At the end of the count the OUT goes low for one clock period.

READ BACK COMMAND FORMAT:

- *THIS FEATURE AVAILABLE ONLY IN 8254 and not in 8253.*

1	1	COU NT	STAT US	CNT2	CNT1	CNT0	0
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