8254 Read back command

Read-Back Command

- This command is used to read several counters at a time. It eliminates the need of writing separate counter-latch commands for different counters.
- It allows the user to check the count value, programmed Mode, and current states of the OUT pin and Null Count flag of the selected counter/ counters.
- The read back command is written to the Control Word Register.
- The command is written into the Control Word Register and has the format shown in Figure.
- The read-back command may be used to latch multiple counter output latches (OL) by setting the COUNT bit D5 =0 and selecting the desired counter(s).
- A single **read back command** is functionally equivalent to several **counter latch commands.**
- Each counter's latched count is held in the OL until it is read (or the counter is reprogrammed). The counter is automatically unlatched when read, but other counters remain latched until they are read.

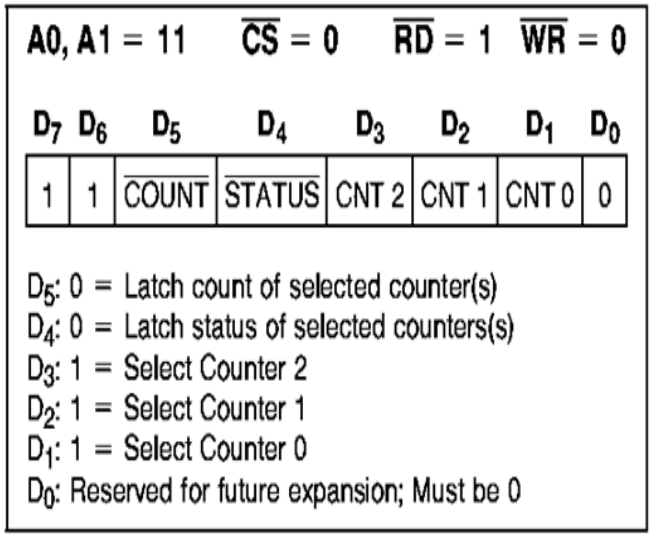

Figure Read-Back Command Format

Read-Back Command (Continued)

- The read-back command may also be used to latch status information of selected counter(s) by setting STATUS bit D4 = 0. Status must be latched to be read; status of a counter is accessed by a read from that counter.
- Bits D5 through D0 contain the counter's programmed Mode exactly as written in the last Mode Control Word.

- OUTPUT bit D7 contains the current state of the OUT pin. This allows the user to monitor the counter's output via software, possibly eliminating some hardware from a system.
- The counter status format is shown in Figure below.

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
Output	Null Count	RW1	RW0	M2	M1	M0	BCD

D_7 1 = OUT Pin is 1
0 = OUT Pin is 0

D_6 1 = Null Count
0 = Count available for reading

D_5–D_0 Counter programmed mode

- If both count and status of a counter are latched, the first read operation of that counter will return latched status, regardless of which was latched first.
- The next one or two reads (depending on whether the counter is programmed for one or two type counts) return latched count. Subsequent reads return unlatched count.

- NULL COUNT bit D6 indicates when the last count written to the counter register (CR) has been loaded into the counting element (CE).
- The exact time this happens depends on the Mode of the counter. Until the count is loaded into the counting element (CE), it can't be read from the counter. If the count is latched or read before this time, the count value will not reflect the new count just written.

Action	Causes
Write to the control word register;	Null Count=1
Write to the count register (CR);	Null Count=1
New Count is loaded into CE (CR-> CE)	Null Count =0

Read-Back Command (Continued)

```
; Count and Status latched for count 0

MOV DX, C_REG
MOV AL, 11000010B ; count latched for count 0
OUT DX, AL

; Reading the latched status for count 0

MOV DX, CTRM0
IN AL, DX  ; Reading Status
MOV AH, AL

; Reading the latched count for counter 0

IN AL, DX      ; Reading LSB of counter 0
MOV BL, AL
IN AL, DX      ; Reading MSB of counter 0
MOV BH, AL
```