MICROPROCESSOR

Tutorials

B

ASSIGNMENT EIGHT

2) Draw the bit configuration of the register TMOD. What's the function of all TMOD's bits?

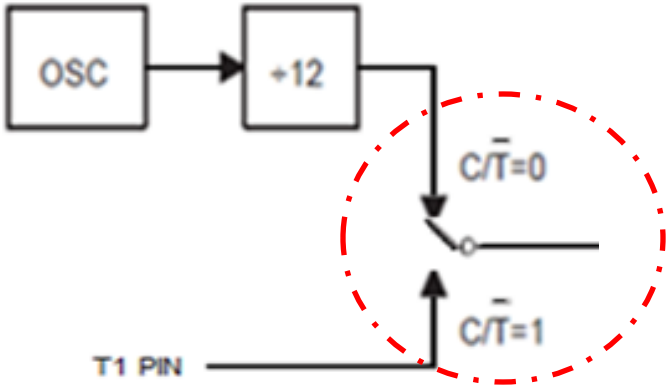
Timer Mode (TMOD)							
Timer 1				Timer 0			
Gate	**C/$\overline{T}$**	**M1**	**M0**	**Gate**	**C/$\overline{T}$**	**M1**	**M0**

Mode 0	0	0
Mode 1	0	1
Mode 2	1	0

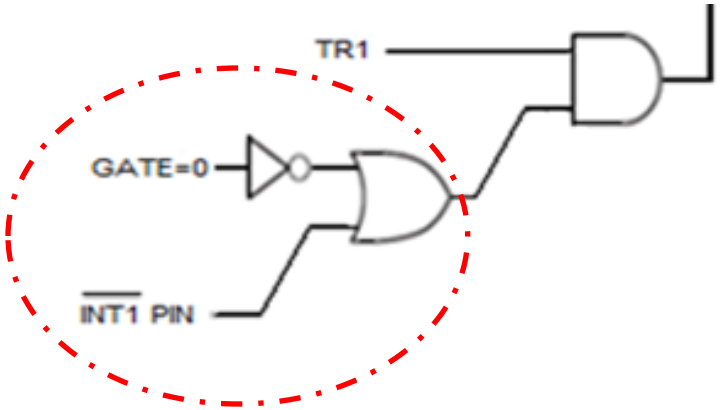
Mode 0	0	0
Mode 1	0	1
Mode 2	1	0
Mode 3	1	1

M1 and Mo …. For assign the timer modes

C/$\overline{T}$…. For selecting the source pulses to timer (either internal machine cycle or external clock pulse)

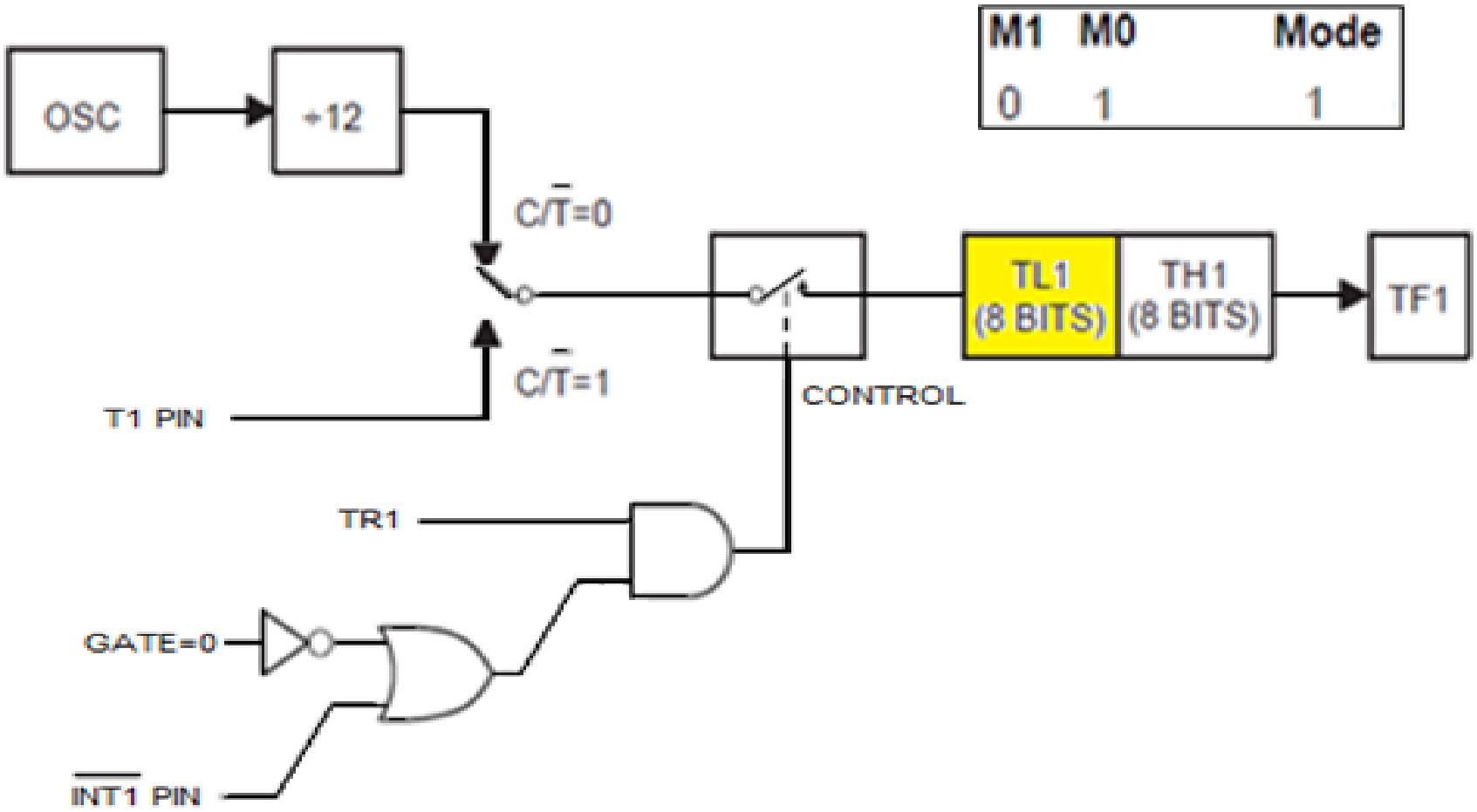


Gate …. For enable/disable the external interrupt to run/stop timer



4) Explain the Mode 1 of AT89C51's timers.

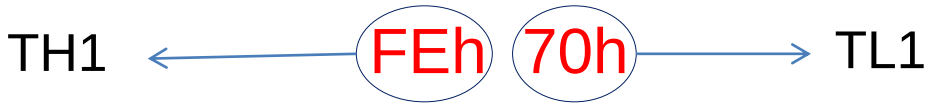
Mode 1: 16-Bit Timer



9) An embedded system is designed to count the instantaneous number of cars during enter a park. The system makes alarm and closes the door if it counts equal 400 cars. Write assembly code to perform the mentioned task (without using interrupt) based on Timer 1 of AT89C51.

We must calculate the Initial value of Timer 1 from the overflow value

65536 - **400** = 65136 => FE70 H

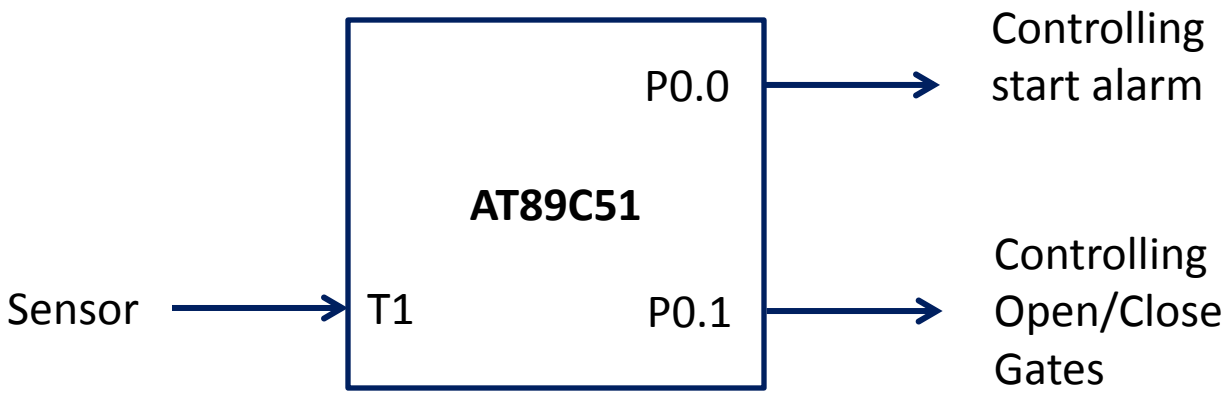


We must assign the timer mode and counter/timer operation.

- ✓ **C/$\overline{T}$** => logic one to count the external pulses
- ✓ **M1 M0** => "01" to assign Mode 1 (count 65136 pulses)
- ✓ Gate => disable external interrupt

TMOD = 50h

Timer Mode (TMOD)							
Timer 1				Timer 0			
Gate	C/$\overline{T}$	M1	M0	Gate	C/$\overline{T}$	M1	M0
0	**1**	**0**	**1**	0	0	0	0

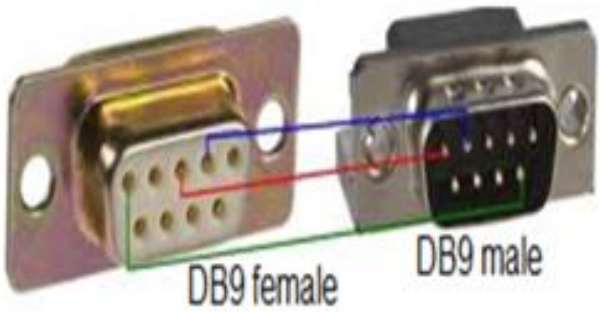

Controlling
start alarm
P0.0
AT89C51
Controlling
Open/Close
Gates
Sensor
T1
P0.1

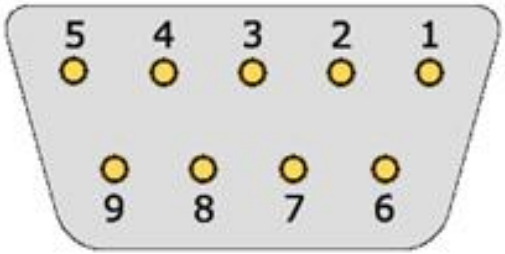
```
        ORG   0h
        ALARM EQU P0.0
        CLOSE_DOORS EQU P0.1
            MOV TMOD, #50H; Timer 1 as counter in MODE1
            MOV TH1, #FEH   ; Loads TH1 register
            MOV TL1, #70H   ; Loads TL1 register
            SETB TR1        ; Run the Timer 1
HERE:       JNB TF1, HERE   ; Counting via (T1) until TF1 is set
            SETB ALARM
            SETB CLOSE_DOORS
            CLR TR1         ; Stops Timer 1
            CLR TF1         ; Clears TF1 flag
```

ASSIGNMENT NINE

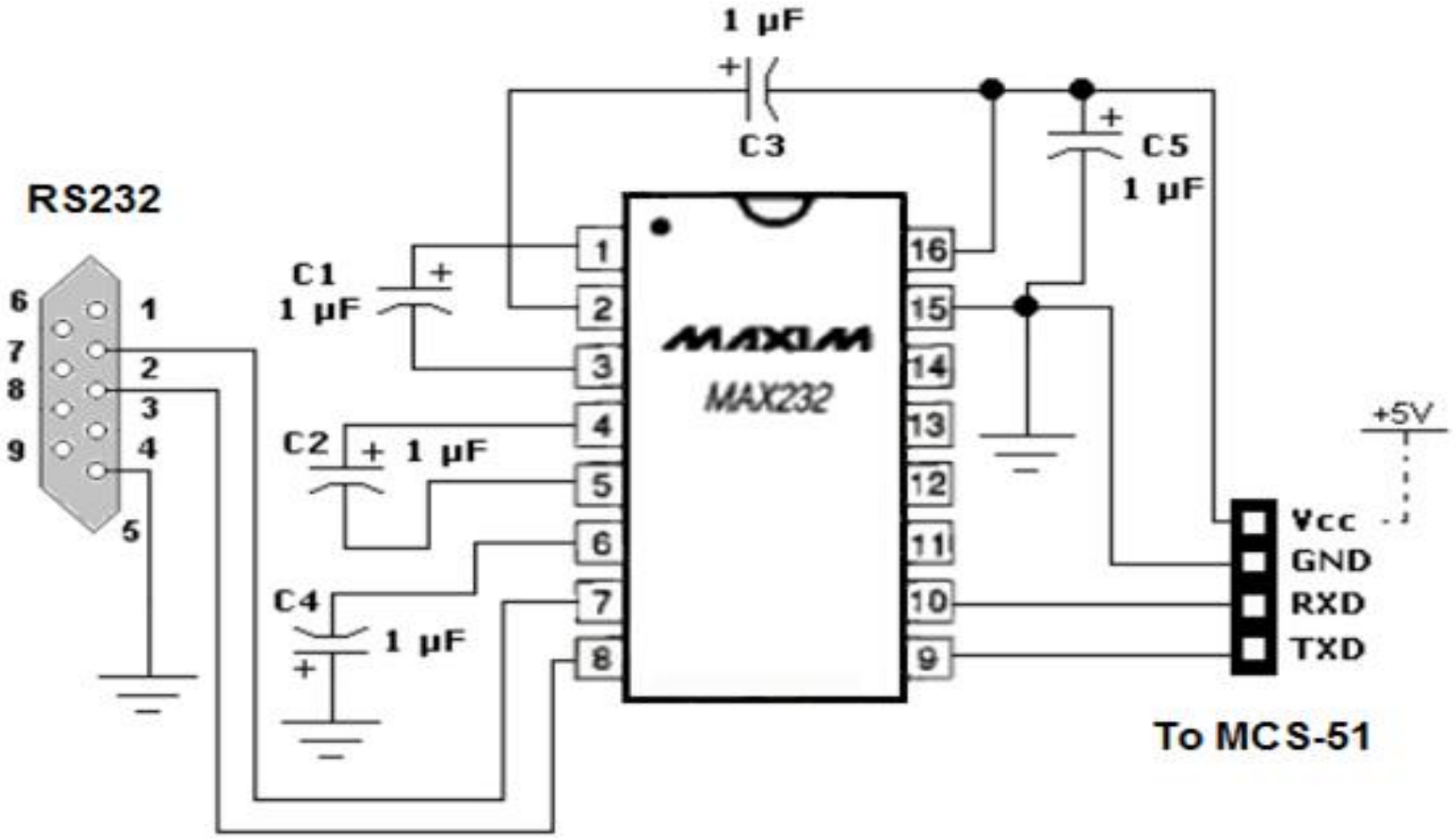
2) Describe the RS232 and its connector DB-9.

Pin number	Name
1	CD - Carrier Detect
2	RXD - Receive Data
3	TXD - Transmit Data
4	DTR - Data Terminal Ready
5	GND - Signal Ground
6	DSR - Data Set Ready
7	RTS - Request To Send
8	CTS - Clear To Send
9	RI - Ring Indicator

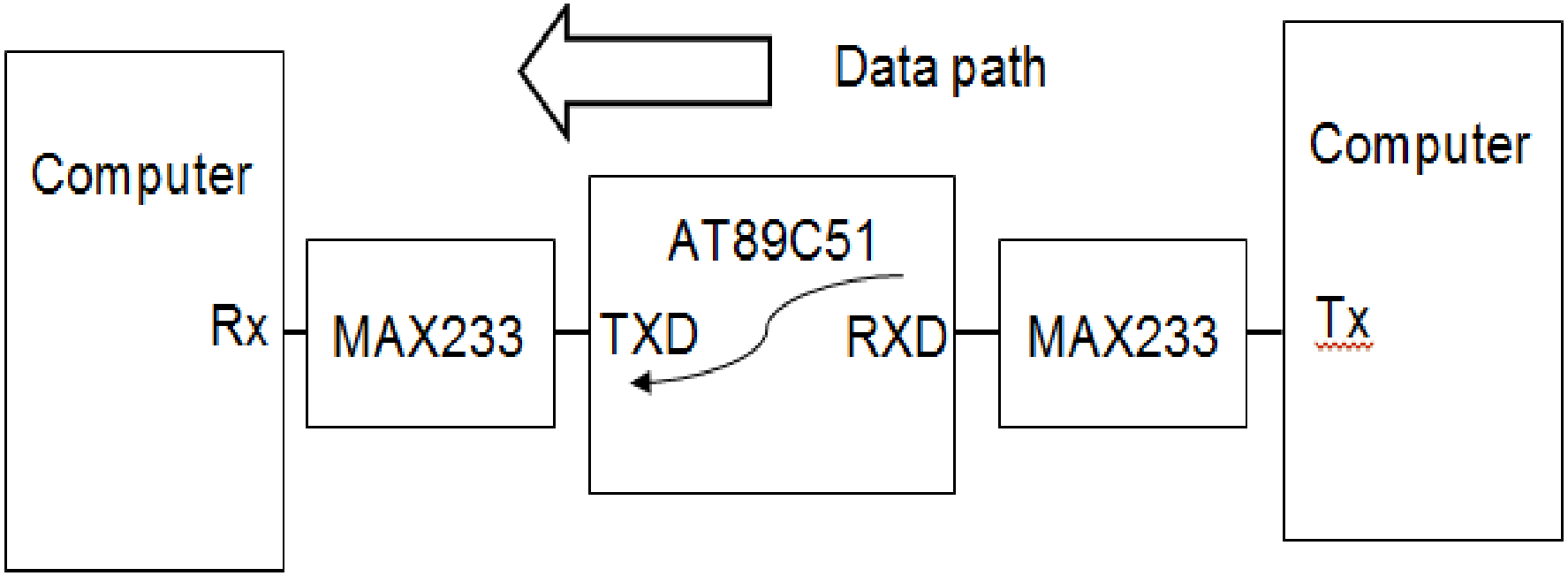




4) Draw block diagram to indicate how AT89C51 can interface with computer through RS232 using MAX233 or MAX232. And why?



13)Draw hardware block diagram and write software assembly program code (without ISR) to design digital circuit for communicating between 2 computers through RS232 based on AT89C51. The first computer for sending data-bytes whiles the second computer for receiving them with baud rate 9600 (TH1=FDh).



```
ORG 0H
   SJMP MAIN
ORG 30H
MAIN:
      MOV TMOD, #20H      ;timer 1 is auto reload (mode 2)
      MOV TH1, #FDH       ;adjust 9600 baud rate
      MOV SCON, #50H      ;Ser mode1 > 8-bit, 1 start, 1 stop
      SETB TR1            ;start timer 1

Recev_Chr:
WAIT_1:     JNB RI,WAIT_1 ;stay in waiting until complete Receiving
            MOV A,SBUF    ;Receiving data via serial port
            CLR RI       ;clear Receive interrupt flag
;---------------------------------
SEND:       MOV SBUF,A      ;sending data via serial port
WAIT_2:     JNB TI, WAIT_2 ;stay in waiting until complete sending
            CLR TI          ;clear transmit interrupt flag

SJMP Recev_Chr     ;  ANOTHER Chr.
```

Your Task

11) Draw block diagram and write assembly code (without ISR) for sending either words "Yes" or "No" from AT89C51 to computer via serial port with baud rate 9600 (TH1 = FDH) if P1.0 or P1.1 respectively equal logic zero.