

UART on the 8051

Configuration

In order to configure the following registers must be initialized:

SCON (Serial port control register)

Configuration: 01010000

- SM0, SM1: 01
 - Mode 1 (8-bit UART)
- SM2: 0
 - Disable multiprocessor communication (modes 2/3 only)
- REN: 1
 - Enable serial reception
- TB8: 0 - 9th data bit to be sent - not used for 8-bit UART
- RB8: 0
 - 9th received data bit
 - Not used for 8-bit UART
- TI: 0
 - Transmit interrupt flag
 - Set by hardware when byte has been transmitted
 - Must be cleared by software
- RI: 0
 - Receive interrupt flag
 - Set by hardware when byte has been received
 - Must be cleared by software

TMOD (Timer/counter mode control register)

Since UART uses Timer 1, we only need to configure the upper nibble.

Configuration: 0010XXXX

- Timer 1 configuration
 - GATE: 0
 - Disable gating control
 - C/T#: 0
 - Select timer operation
 - M1, M0: 10
 - Select mode 2 (auto reload)

- Timer 0 configuration
 - Don't care

TCON

Configuration: 01XX0XXX

- TCON.7: 0
 - Timer 1 overflow flag
 - Set by hardware, should be cleared by software
- TCON.6: 1
 - Timer 1 run control bit
 - Set by software to start timer
- TCON.3: 0
 - Interrupt 1 edge flag
 - Set by hardware, should be cleared by software
- TCON.2: X
 - Interrupt 1 type control bit - we are not using interrupts on timer 1.

TH1

$TH1 = 256 - \frac{K(f_{OSC})}{384f_{BAUD}}$

- For $f_{BAUD}=9600$, $K=1$, and $f_{OSC}=11.0592MHz$, $TH1=253$.

Receiving

- To receive a byte through UART, move the contents of the SBUF register to another register.

```
mov A, SBUF ; Store the received byte in the accumulator.
```

Transmitting

- To transmit a byte through UART, move some data to the SBUF register.

```
mov SBUF, A ; Transmit the byte stored in the accumulator.
```

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