

“USART” - RS232 DATA (Universal Synchronous and Asynchronous Receiver Transmitter)

COMMUNICATION

SYSTEM

USING

HITECH - PIC - ‘C’

What is RS232?

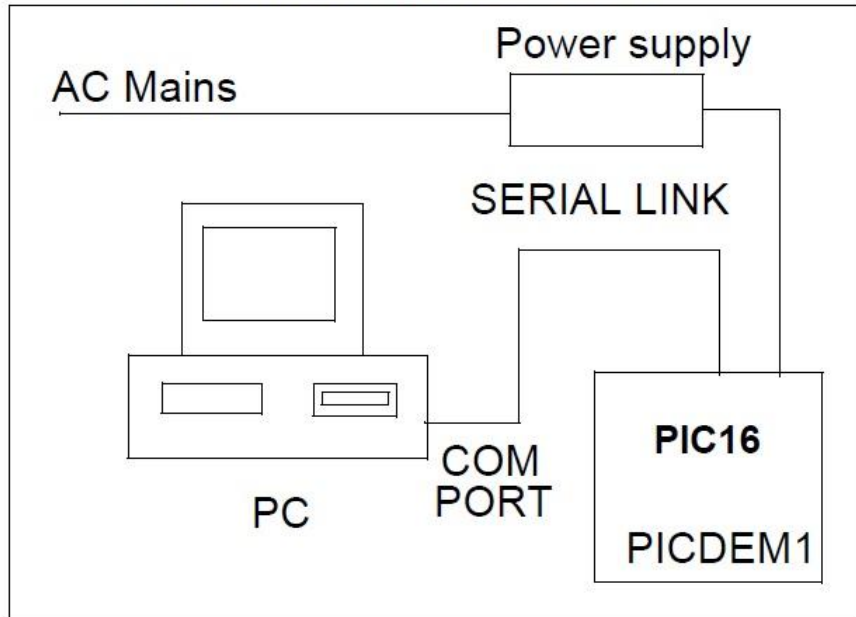


- Short Distance DATA Communication System
- Can connect to any Microcontroller, Microprocessor or a Computer
- Easy 3 wire - 7 wire Communication Method
- Data Transmitted in ASCII Format
- Global Standard Protocol.

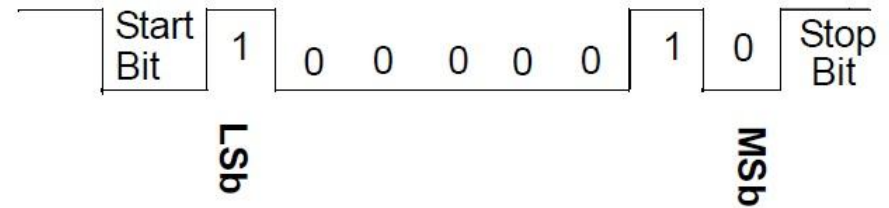
RS232 System:



RS232 HARDWARE SETUP



TRANSMISSION OF CHARACTER 'A'



Note: Character 'A' is equivalent to 41_H .
 $41_H = 01000001_b$

Voltage Levels

RS-232

-15V ... -3V

+3V ... +15V

TTL

+2V ... +5V

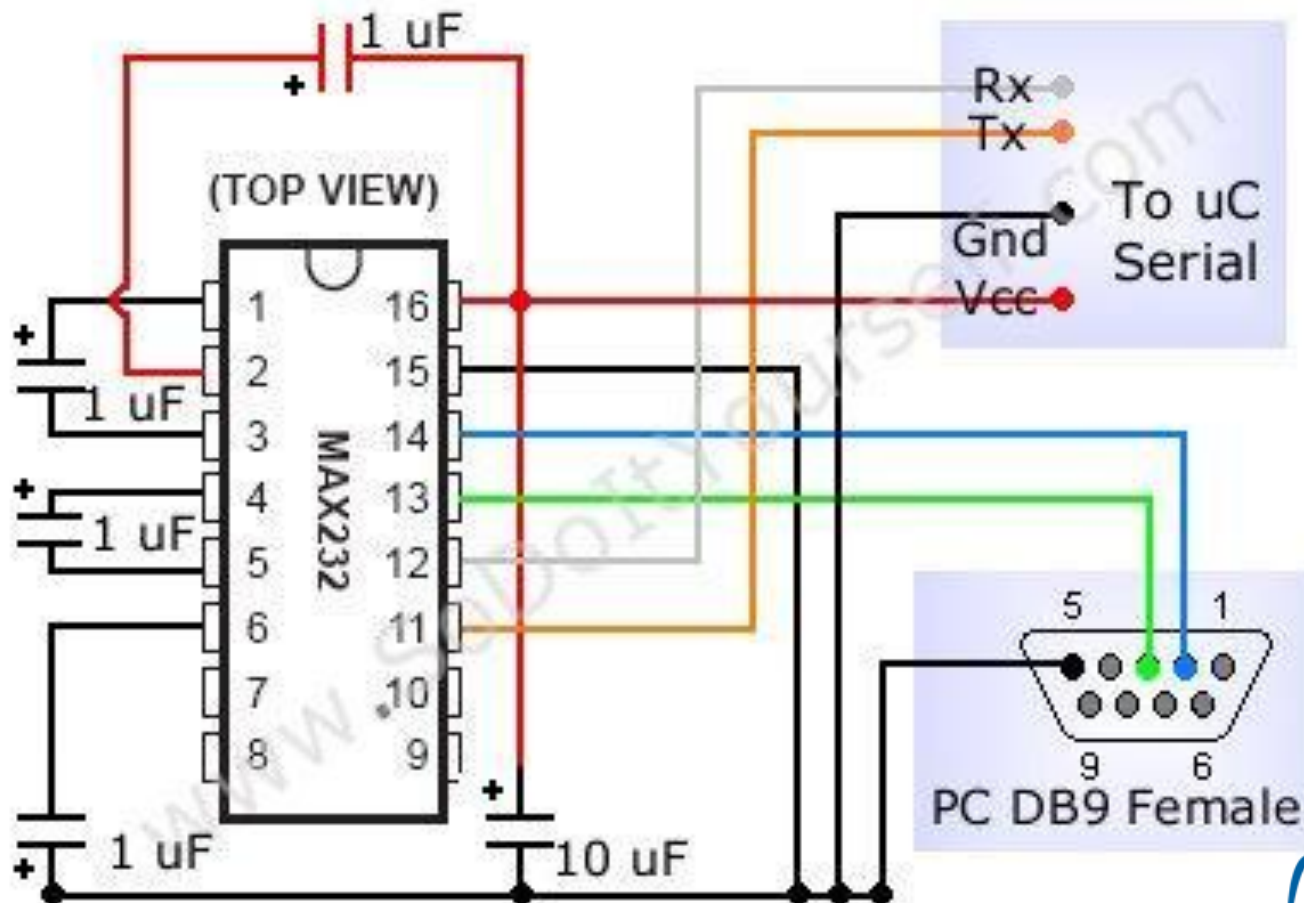
0V ... +0.8V

Logic

High

Low

RS232 – Serial Hardware



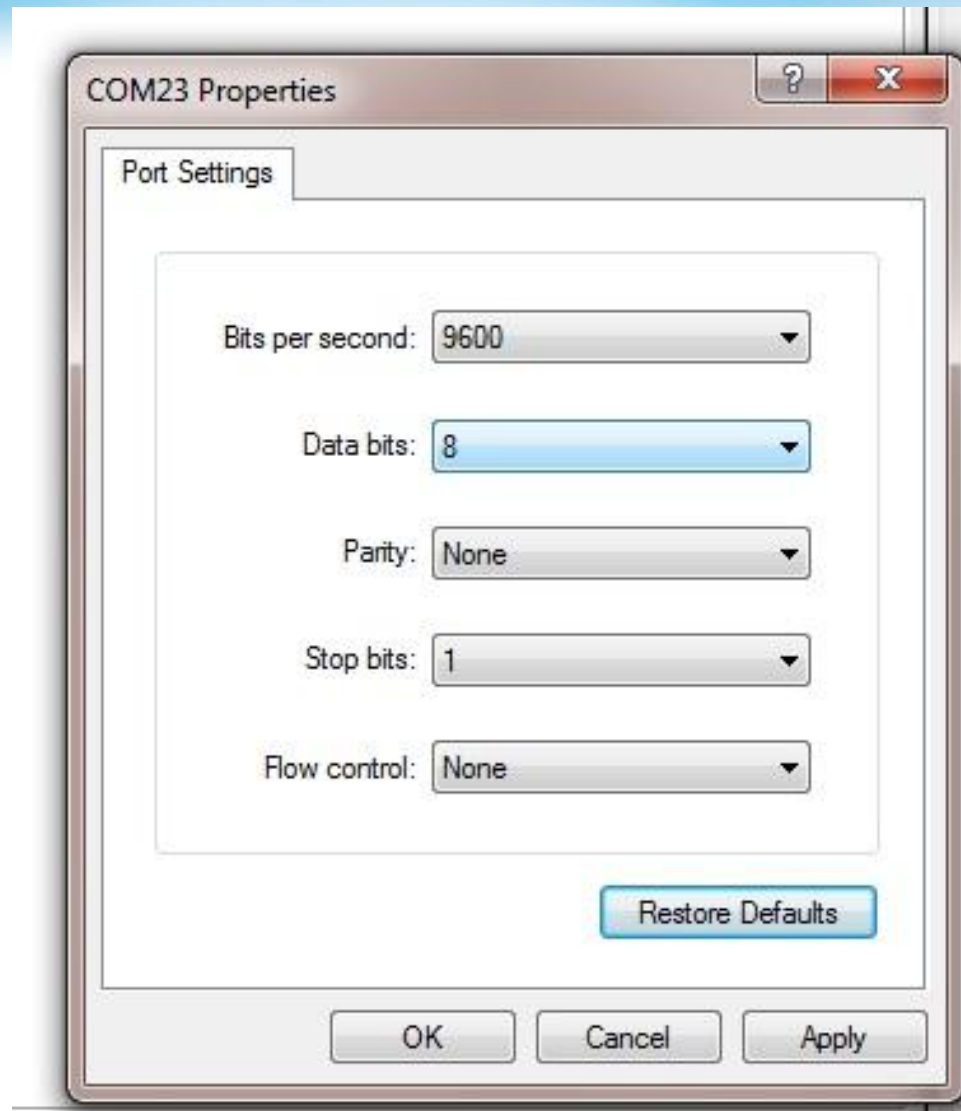
Converted Result:



PIC16F884/887

36	<input type="checkbox"/>	↔	RB3/AN9/PGM/C12IN2-
35	<input type="checkbox"/>	↔	RB2/AN8
34	<input type="checkbox"/>	↔	RB1/AN10/C12IN3-
33	<input type="checkbox"/>	↔	RB0/AN12/INT
32	<input type="checkbox"/>	←	VDD
31	<input type="checkbox"/>	↔	VSS
30	<input type="checkbox"/>	↔	RD7/P1D
29	<input type="checkbox"/>	↔	RD6/P1C
28	<input type="checkbox"/>	↔	RD5/P1B
27	<input type="checkbox"/>	↔	RD4
26	<input type="checkbox"/>	↔	RC7/RX/DT
25	<input type="checkbox"/>	↔	RC6/TX/CK
24	<input type="checkbox"/>	↔	RC5/SBO
23	<input type="checkbox"/>	↔	RC4/SDI/SDA
22	<input type="checkbox"/>	↔	RD3
21	<input type="checkbox"/>	↔	RD2

RS232 Port Settings



HYPER TERMINAL:



- Hyper Terminal is a Computer software
- Used for Dial up network connection.
- It can connect to computer ports like: Rs232, USB Ports etc.
- Text Data or Voice Data can be transmitted or received through Hyper Terminal.
- Can be used for testing RS232 data Transmission and Reception.

USART Registers & Bits



- Transmit Status and Control (TXSTA)
- Receive Status and Control (RCSTA)
- Baud Rate Control (BAUDCTL & SPBRG)
- Transmitter and Receiver Register (RCREG&TXREG)

Control bits

- CREN = 1
- SYNC = 0
- SPEN = 1
- TXEN=1

SPBRG Baud Rate Table:



BAUD RATE	SYNC = 0, BRGH = 1, BRG16 = 0											
	Fosc = 4.000 MHz			Fosc = 3.6864 MHz			Fosc = 2.000 MHz			Fosc = 1.000 MHz		
	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)
300	—	—	—	—	—	—	—	—	—	300	0.16	207
1200	1202	0.16	207	1200	0.00	191	1202	0.16	103	1202	0.16	51
2400	2404	0.16	103	2400	0.00	95	2404	0.16	51	2404	0.16	25
9600	9615	0.16	25	9600	0.00	23	9615	0.16	12	—	—	—
10417	10417	0.00	23	10473	0.53	21	10417	0.00	11	10417	0.00	5
19.2k	19.23k	0.16	12	19.2k	0.00	11	—	—	—	—	—	—
57.6k	—	—	—	57.60k	0.00	3	—	—	—	—	—	—
115.2k	—	—	—	115.2k	0.00	1	—	—	—	—	—	—

Sample code to start with:



```
void InitUART(void)
{
    TRISC6 = 0;           // TX Pin
    TRISC7 = 1;           // RX Pin

    SPBRG = ((_XTAL_FREQ/16)/BAUDRATE) - 1;
    BRGH   = 1;           // Fast baudrate
    SYNC   = 0;           // Asynchronous
    SPEN    = 1;          // Enable serial port pins
    CREN    = 1;          // Enable reception
    SREN    = 0;          // No effect
    TXIE    = 0;          // Disable tx interrupts
    RCIE    = 1;          // Enable rx interrupts
    TX9     = 0;          // 8-bit transmission
    RX9     = 0;          // 8-bit reception
    TXEN    = 0;          // Reset transmitter
    TXEN    = 1;          // Enable the transmitter
}
```

Sample code to start with:



```
void receive()  
{  
while(RCIF==1)  
x=RCREG;  
RCIF=0;  
}  
void trans(unsigned int *i)  
{  
while(TRMT==1);  
TXREG=*i;  
TXIF=0;  
*i++;  
}
```

QUERIES??



12/2 RVM Complex, Near PSG Arts,
Avinashi Road, SITRA, Coimbatore – 14

www.manfreetechnologies.com | info@manfreetechnologies.com

9944766990 / 9751509702

