

Solutions to Assignment 4

Question 1

- (a) The voltage levels for an RS-232 interface must be greater than +3V or less than -3 V, so the voltages shown are valid.
- (b) If only one character was transmitted, the period must be the smallest interval shown or 0.4 ms for a bit rate of about 2500 bps (probably 2400 bps).
- (c) The first positive bit is a start bit. This is followed by 7 or 8 data bits. Since the 8th bit in the character is positive, it cannot be a stop bit. Since a parity bit was also not sent then 8 data bits must have been sent.
- (d) The bit values are received from LS to MS bit. In this order they are: 0010 1000. In MS to LS bit order they are 0001 0100 which is hex 0x14 which is a control character (control-N or "SO" in the ASCII code).

```
/* Write c to parallel printer port. */  
void cprint(char c)  
{  
    /* wait until printer not busy */  
    while ( speak(STATUS) & BUSY ) ;  
  
    /* put character on data lines */  
    spoke ( DATA, c ) ;  
  
    /* short pulse on the strobe line */  
    spoke ( CONTROL, 0 ) ;  
    spoke ( CONTROL, STROBE ) ;  
}  
  
/* Print string s on printer. */  
void sprint(char s[])  
{  
    int i ;  
    for ( i=0 ; s[i] ; i++ ) {  
        cprint ( s[i] ) ;  
    }  
}
```

Question 2

If the CTS pin on the computer measures 12 volts it must be an output. Since CTS is an output for a DCE, the computer must be wired up as a DCE. On a 25-pin connector, pin 3 is RxD. RxD is an output on a DCE. Since the machine tool is driving RxD, then it must also be wired up as a DCE. The cause of the problem is that both devices are wired up as DCEs. The solution would be to use a "null modem" to exchange the pins assigned to the handshaking and data signals.

Question 3

```
#define DATA    0x17D  
#define STATUS  0x174  
#define CONTROL 0x180  
#define BUSY    0x01  
#define STROBE  0x10
```