ECGR6185/8185, Spring 2011: Lab 3
Serial I/O with Timers and Interrupts using Dissimilar Boards
Version 1.1

Learning Objectives

You are to write a program that runs on your QSK62P board and the RX62N board that uses timers and interrupts to transmit serial data.

Laboratory Assignments

In this lab you will be programming the timers and using interrupts to perform serial communications. This lab will use the on-board UART to communicate between two dissimilar boards (one QSK62P Plus and one RX62N). The LCD will be used to display the time of both boards. This lab must be demonstrated. The program must rely only on timers and interrupts. Note: Character transmission between boards must be done using interrupts. You **do not** need to create a circular queue like the example in class.

Requirements

Req. 1. The code generated is written in C for the QSK62P Plus and RX62N boards.

Req. 2. The code is well commented and easy to follow.

Req. 3. You may use the BNS functions.

Req. 4. A Renesas QSK62P Plus boards will be connected to a Renesas RX62N board via the RS-232C port transmit and ground pins.

Req. 5. You must use the Renesas board LCD.

Req. 6. The Renesas board will create an ASCII string representing a "stopwatch" of the format MM:SS<null> (MM means minutes, SS means seconds, followed by the null character).

Req. 7. Toggling the Renesas board switch S1 must pause and resume the time count for its own board.

Req. 8. Pressing Renesas board switch S2 must reset the stopwatch to 00:00 and cause it to pause on its own board.

Req. 9. Display on the board's line 1 of the character display the current stopwatch time of itself.

Req. 10. Display on the board's line 2 of the character display the current stopwatch time of the OTHER board attached via RS-232.

Req. 11. Generate an interrupt on the Renesas board every second. Increment the timer (if it is running), send this time as ASCII characters to the other board, and display the two stopwatch times.

Req. 12. Use another interrupt to send each character of the ASCII string to the other board using the RS 232 interface.

Req. 13. Use another interrupt to receive characters of the ASCII string from the other board using the RS 232 interface.

Req. 14. The serial communications should operate at 9600 baud, odd parity, 8 data bits and one stop bit.

Req. 15. The code should be as compact as possible.

Req. 16. Both boards should not start counting at boot up.

Req. 17. Both boards should display 00:00 on both lines at boot up.

Sample Test Procedure

Note: Hand the lab checkout sheet to the TA when you demonstrate your program. You will turn in your code and report electronically. See the website after 3/14/2011 for the score sheet.

Lab Report

Include in your lab report observations and procedure like the following:

The general learning objectives of this lab were . . .
The general steps needed to complete this lab were . . .
Some detailed steps to complete this lab were . . . .
1. Step one
2. Step two
3.   . . . .
Some important observations while completing/testing this lab were . . .
In this lab we learned . . . .

Upload to Moodle three files containing:

1. Your lab report (pdf). Name the file xxxxxxx_yyyyyyy_lab3.pdf, where xxxxxxx is the last name of one lab partner, and yyyyyyy is the last name of the other lab partner.

2. Your QSK62P Plus code (no need to include the sect30.inc, ncrt0.a30, LCD, or any .h files). Include all c code that you wrote (but if you are smart, this should be one small file so that the code size is small). Name the file xxxxxxx_yyyyyyy_lab3qsk.c, where xxxxxxx is the last name of one lab partner, and yyyyyyy is the last name of the other lab partner.

3. Your RX62N code (no need to include the sect30.inc, ncrt0.a30, LCD, or any .h files). Include all c code that you wrote (but if you are smart, this should be one small file so that the code size is small). Name the file xxxxxxx_yyyyyyy_lab3rx.c, where xxxxxxx is the last name of one lab partner, and yyyyyyy is the last name of the other lab partner.

FAILURE TO FOLLOW THESE SIMPLE INSTRUCTIONS COULD RESULT IN THE LOSS OF POINTS.

Document Revision 1.1, 2011-03-10: Adds requirements 16 and 17.