

ECGR4101/5101, Spring 2010: Lab 4

Serial I/O

Learning Objectives

You are to write a program that runs on both of your QSK62P Plus boards that transmits serial data.

Laboratory Assignments

In this lab you will be performing serial communications. This lab will use the on-board UART and RS232C driver chip to communicate between a board and a PC. The LCD can be used to display debugging information. This lab must be demonstrated to the TA.

You will transmit/receive single characters to/from a PC. Use the mixed signal scope to monitor the communications lines as you debug your program. Include a screen shot in your report.

1. The QSK62P Plus board has two available serial I/O ports, but one of these is connected to the RS232C driver chip. Document in your lab report the one port/bits used. NOTE: Users of the QSK62P board will need to build their own driver board. See the ECE Technician for parts.
2. See the ECE technician for RS232-C 9-pin D-shell connectors for your board. Check out a serial cable and a scope probe for the lab.
3. Write and develop your program to meet the requirements, below.
4. Complete your lab report.
5. Bring the board to the lab TA and demonstrate the code (without the HEW application running). When the TA checks your board, he will also take your lab checkout sheet.
6. You **will** need to submit a soft copy of the lab report to Moodle. Include the printout of the .map file. Ensure it is a small font.
7. Also, submit a single code file (*.c) that hold all of your code.

Requirements

- Req. 1. The code generated is written in C for the QSK62P or QSK62P Plus.
- Req. 2. The code is well commented and easy to follow.
- Req. 3. You do not need to use the LCD, but it may be helpful while you debug your code.
- Req. 4. The serial communications should operate at 4800 baud, even parity, 8 data bits, one stop bit.
- Req. 5. Run a serial communications tool like Hyperterm on a PC.
- Req. 6. When a character is typed on the PC, it should be sent to the QSK board via the RS-232C port.
- Req. 7. When a character is received via the RS-232C port at the QSK board, make the following conversion: Capital letters are converted to lower case letters, lower case letters are converted to upper case letters, number characters are converted to "#", and all other characters are converted to "*". Send these converted characters back to the PC via the RS-232C port.
- Req. 8. Include in the report a scope trace of the voltage and signals AFTER the UART signal is level-shifted by the RS232 chip. (transmitted from QSK board to PC)

Lab Report

Include in the checkout part of your lab report the lines:

1. Upper case letters converted, sent back _____
2. Lower case letters converted, sent back _____
3. Number characters converted, sent back _____
4. Other characters converted, sent back _____

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. *. . . .*

Code generated or modified to complete this lab.. (do not include the LCD code)

Some important observations while completing/testing this lab were . . .

Here include the memory report given at the end of the compile process (map file).

*We are **especially** interested in seeing the map file.*

*Include a scope trace showing one byte of the transmission. Use **the scope probe, not the logic probes!***

In this lab we learned