VANIER COLLEGE - Computer Engineering Technology
247-409 Network Fundamentals

Lab 10: Introduction to RS232

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Purpose:

a) To familiarize with PIC UART configuration.

To be submitted:

Format:

1. No formal report required. Informal report to be submitted via Lea.
    a. Answers to all questions.
    b. Attached all the necessary **screen shots**, and clearly labelled each of them.
    c. Submit your source code.

2. You must demonstrate your final results for final approval.

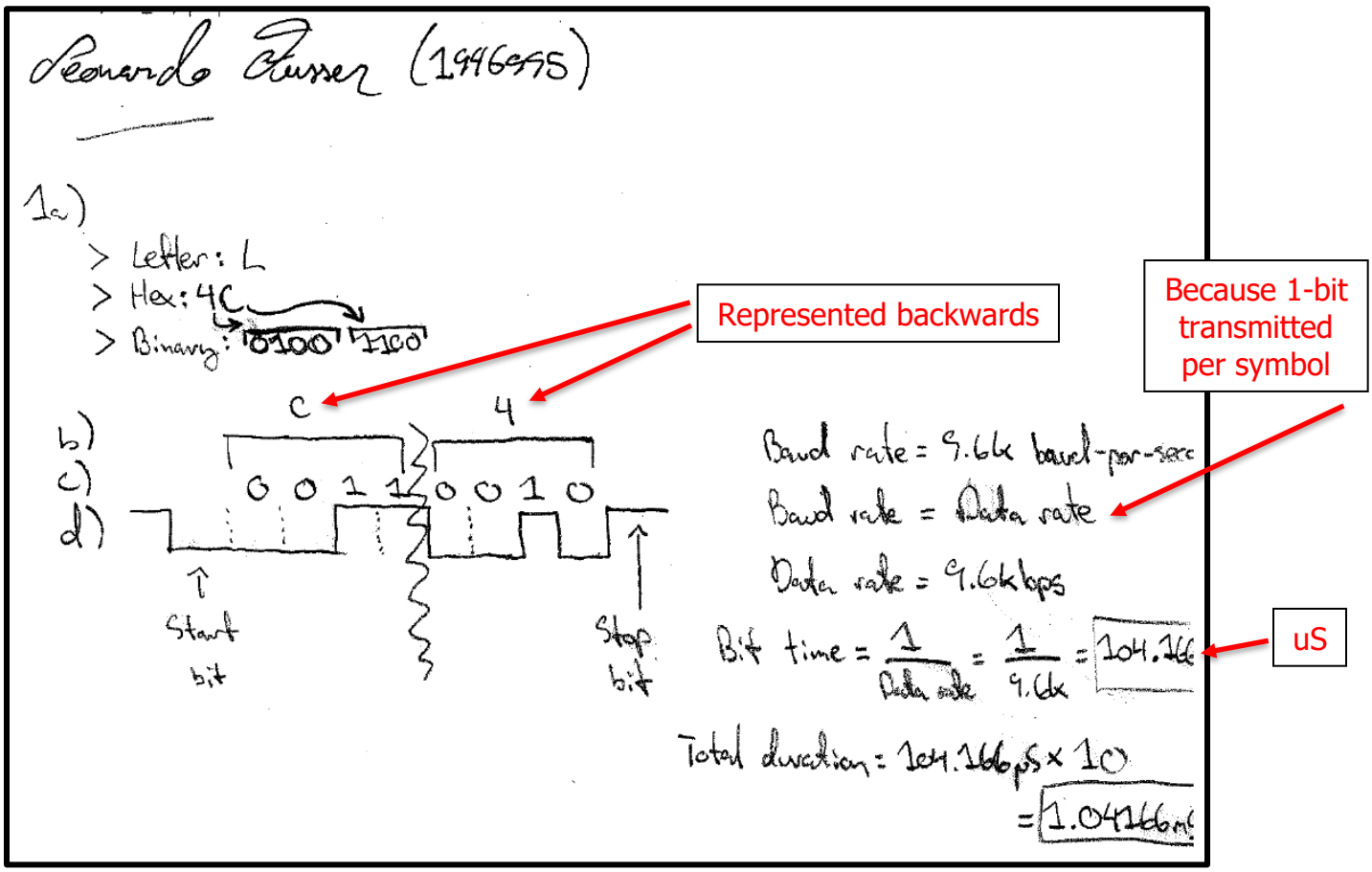
Lab Work:

1. Take the first letter of your first name (capitalized it).
    a) What is this character, and what is the corresponding ASCII code in hex format?
        - See scan on next page.

    b) Draw the asynchronous serial (8, N, 1) waveform used to transmit this ASCII character. Clearly label all data and control bits. (Show me for approval)
        - See scan on next page.

    c) Using the baud rate of 9600, compute one bit time, in microsecond.
        - See scan on next page.

    d) Compute the total duration of time to send this ASCII character, including start and stop bit.
        - See scan on next page.

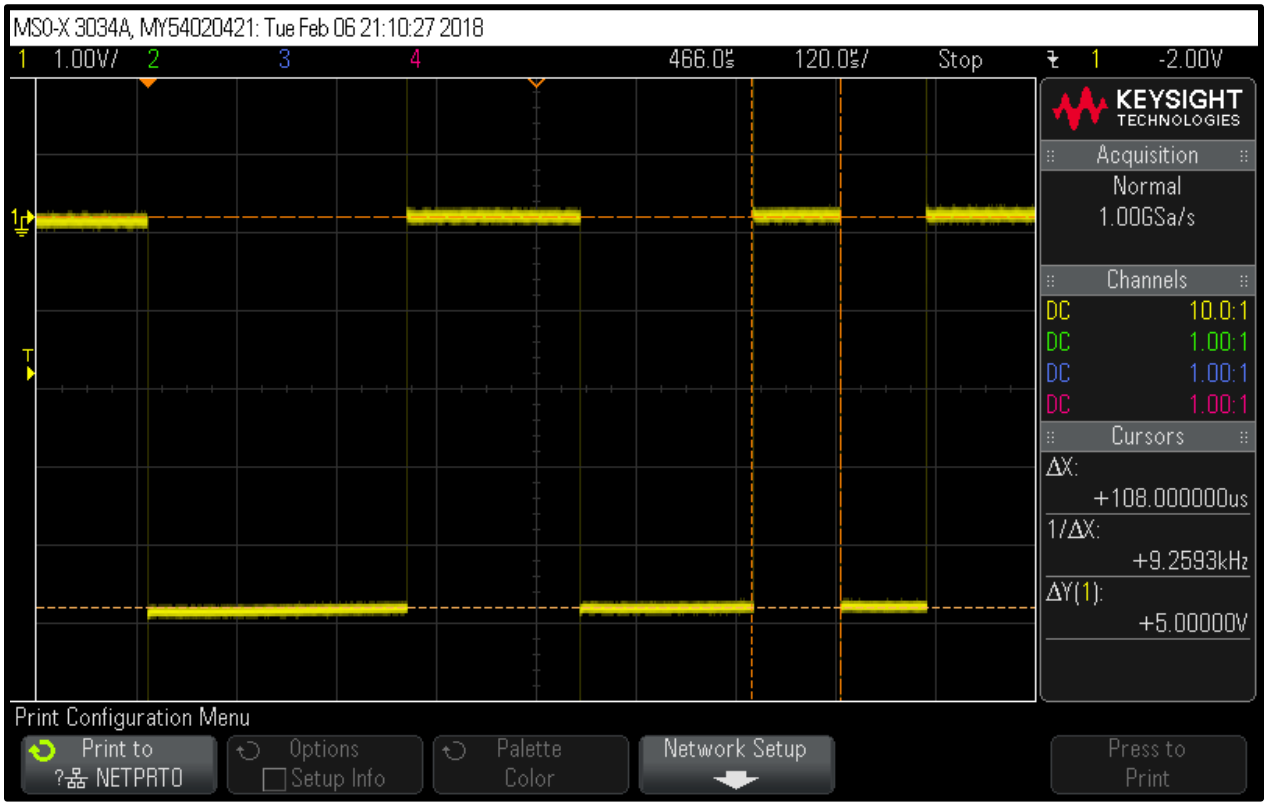


Scanned written work for question 1 shown above.

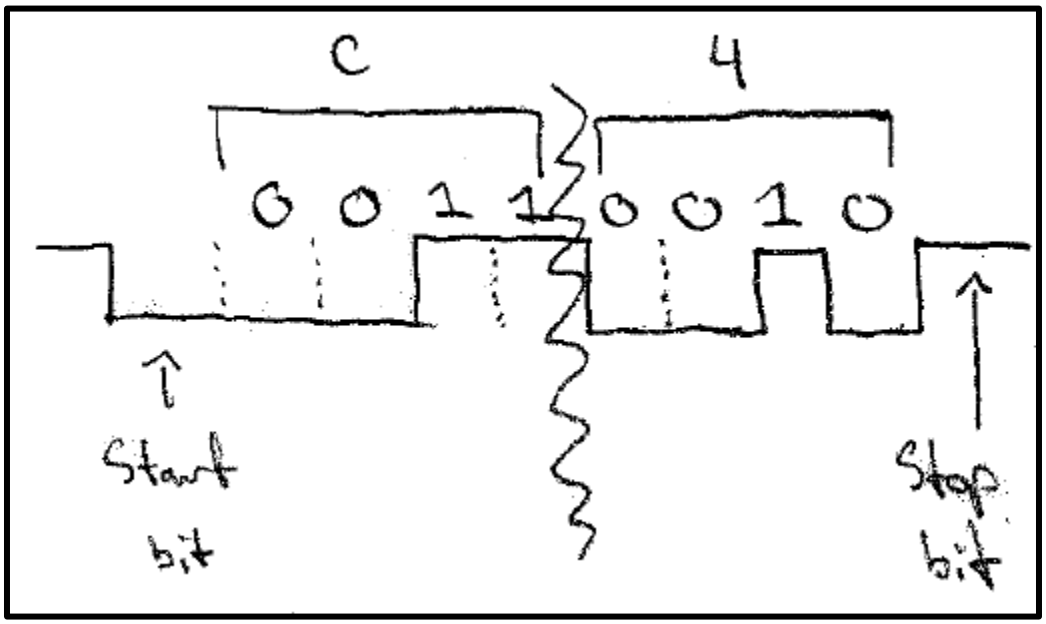
2. Verify what it should look like (DO NOT start this part before without approval!).
    a) Program the Arduino to send your letter to the serial interface add a delay after each print.

    b) Connect the oscilloscope on the TX (pin 1) take screenshot.
        - See screenshot on next page.

    c) Observe your letter and see if it matches your drawing.
        - See next page.



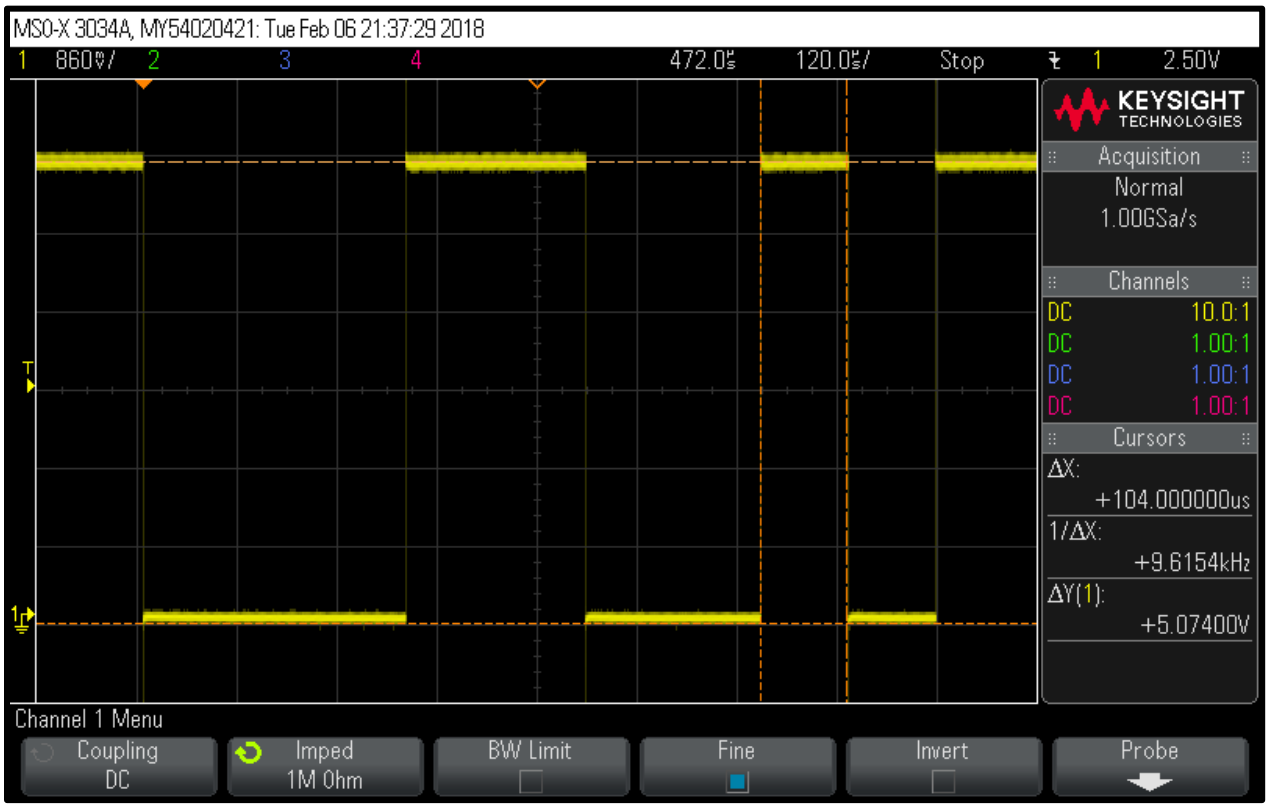
Screenshot from output of pin 1 (TX) on Arduino UNO shown above.



Recap of hand drawn signal of transmitting the letter "L" shown above. This drawing and the screenshot above are the same. The calculated bit time was 104.166uS and the bit time shown in the oscilloscope screenshot shows that the bit time is around 108uS. Therefore, the result from the oscilloscope screenshot is correct.

3. Write a code to send your letter on the digital pin 1.

    a) Connect the oscilloscope to this pin and observe the wave. Use delays to make your bit time match your calculation. Take a screenshot.



Screenshot from output of pin 1 on Arduino UNO second time around shown above.

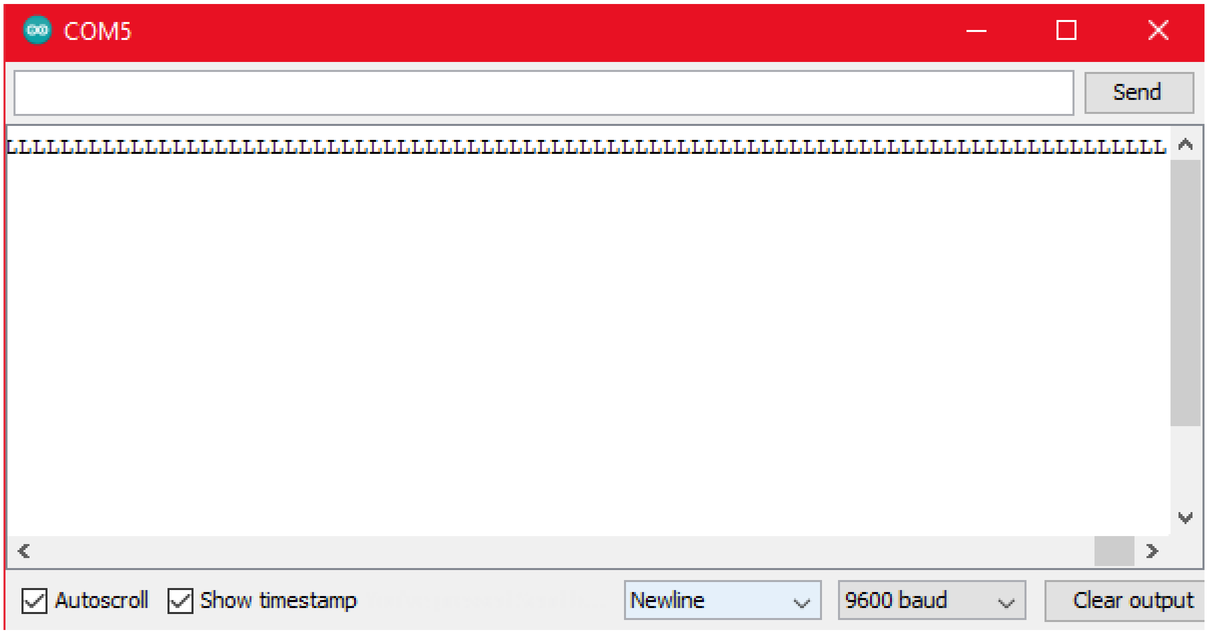
    b) Compare this waveform with the one you did in 1.b) and 2. b)

    - The two waveforms are near identical. The only difference is in the bit time; it is closer to the theoretical value than the bit time that was shown in the previous oscilloscope screenshot.

    c) Make adjustment to your delays to have the right baud rate.

    - No adjustment needed since the bit time shown in the above oscilloscope screenshot is close enough to the theoretical bit time shown before.

d) Now open the Serial Monitor and see if the letter is being displayed.



Output from serial monitor in Arduino IDE. Result shows the letter "L" printed repeatedly forever.