LAB 16

REAL TIME CLOCK (RTC)

OBJECTIVE:

- To use the RTC chip.
- To schedule tasks.

REFERENCE:

- Mazidi & Naimi "The STM32F103 Arm Microcontroller and Embedded Systems," Chapter 16.

MATERIALS:

- Keil IDE or any other STM32 IDE
- Blue pill or any other STM32F10x trainer board
- ST-Link V2
- DS1307 (or a DS3231 module)
- A Terminal software

ACTIVITY 1

a) Connect a DS3231 module to your microcontroller.
b) Write a program that sets the time to 07:59:00. Then, reads the hour from the RTC chip. If the read hour is 7 set the PC13 pin; otherwise, clear it.
c) Run the program on your trainer board. By running the program, you make sure that you have installed your hardware properly.

ACTIVITY 2

d) Connect your trainer board to your computer through the USART port.
e) Write a program that sends the time to your PC through the serial port.

ACTIVITY 3

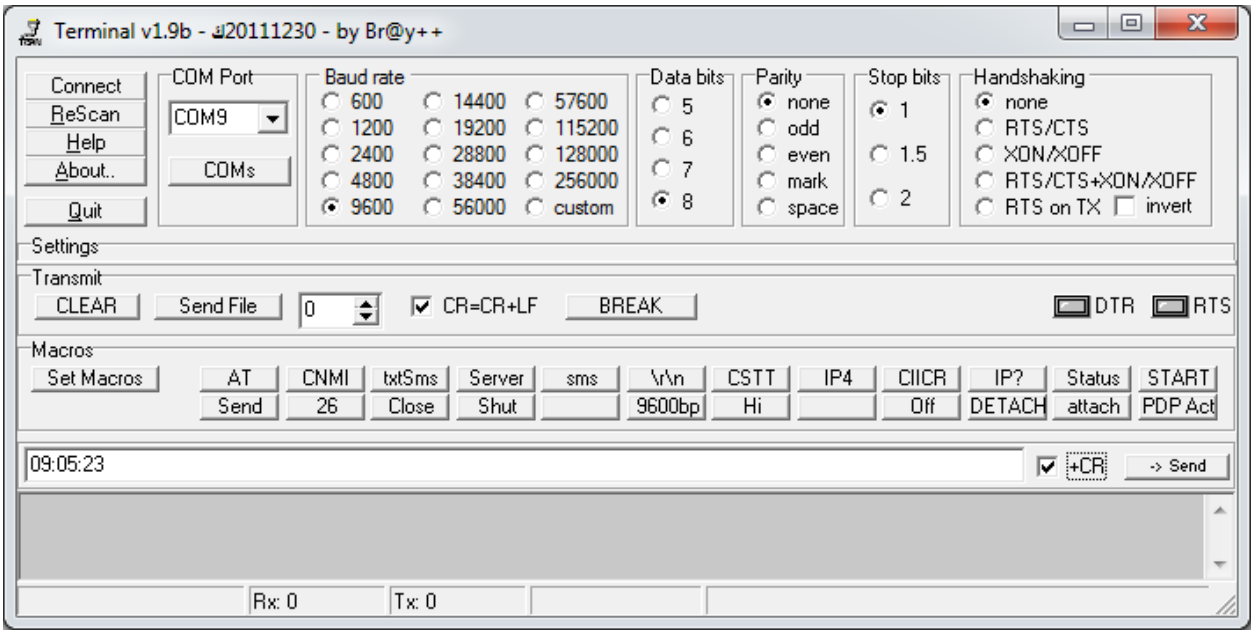
f) Modify Activity 2, to send time every minute.

ACTIVITY 4

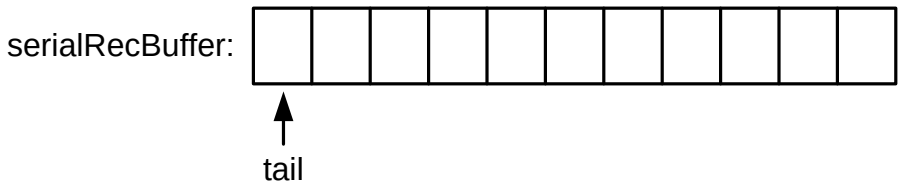
g) We want to turn on a lamp at 19:00 and turn it off, at 8:00 AM. Modify Activity 3, to set the PC13 at 19:00 and clear it at 8:00 AM.

ACTIVITY 5 (ADVANCE)

In this step, we want to modify Activity 4 so that the RTC time can be set by sending the time, in the Terminal.



a. Make a buffer (queue) with length of 11.



b. In the serial UART ISR add the received character to the queue.
c. Process the buffer and clear it if the last received character is carriage return or you have received 10 bytes of data.