PCB111000_CP2102 (the PCB): getting everything set up and running the first program

The idea for the PCB comes from the ATMEL AVR Butterfly module which came with an excellent text by Joe Pardue (JP) specifically written for the younger beginner.

Step 1 Why not start by downloading the text from
https://epdf.pub/c-programming-for-microcontrollers.html

The icon to download the book is is next to the print icon.
Skim through chapters 1 and 2. Rather than the WinAVR compiler we now use Arduino.
Programmers notepad (pn) and Bray++ are both still invaluable.

Step 2 Download Arduino from https://www.arduino.cc/en/software
In the download options box click on “Get” for the latest version which comes from the Microsoft store. Having downloaded it type Arduino IDE in the search box, right click on it and select “pin to task bar” and or “pin to Start”.
Versions 1.8.19 and above need an internet connection. Version 1.8.18 can be used off line.
Open Arduino click on Tools/Board and check the Arduino Uno is selected

Step 3 Download Bray++ version 20130820 from
https://www.sites.google.com/site/terminalbpp/
Bray++ enables us to use our PC to talk to the PCB. See JP page 24 for a good introduction to it.

Step 4 Download programmers notepad from
Programmer's Notepad - Download (pnotepad.org)
Get the Portable Version.
It is delivered as a .zip file. Right click on it and select extract all.
Move the pn directory to a convenient location (i.e. the root directory)
Open it, right click on the pn application
Select create short cut and move the short cut to the desk top.

Step 5 Download the Atmega328 data sheet from
https://ww1.microchip.com/downloads/en/DeviceDoc/ATmega48A-PA-88A-PA-168A-PA-328-P-DS-DS40002061A.pdf

Step 6 The Project directory
Click on
GitHub: Where the world builds software · GitHub
Search the site for PCB111000_CP2102_projects
Click on the repository found
Click on code and then Download zip.
Extract the files and move them to the documents folder as PCB111000_CP2102_projects

Step 7 Opening the first project
Click on the Arduino icon on the task bar (or from the start menu).
Select file, open and navigate to Projects\1_first_project. Open the directory and click on 1_first_project.ino.
Notice that there are two Arduino tabs.
The open tab contains the line #include "First_project_header.h" and a very short C program.
The other tab is labelled First_project_header.h. It contains necessary details that we do not want cluttering up our C program.
Open programmers notepad select file, open and navigate to Projects\1_first_project.

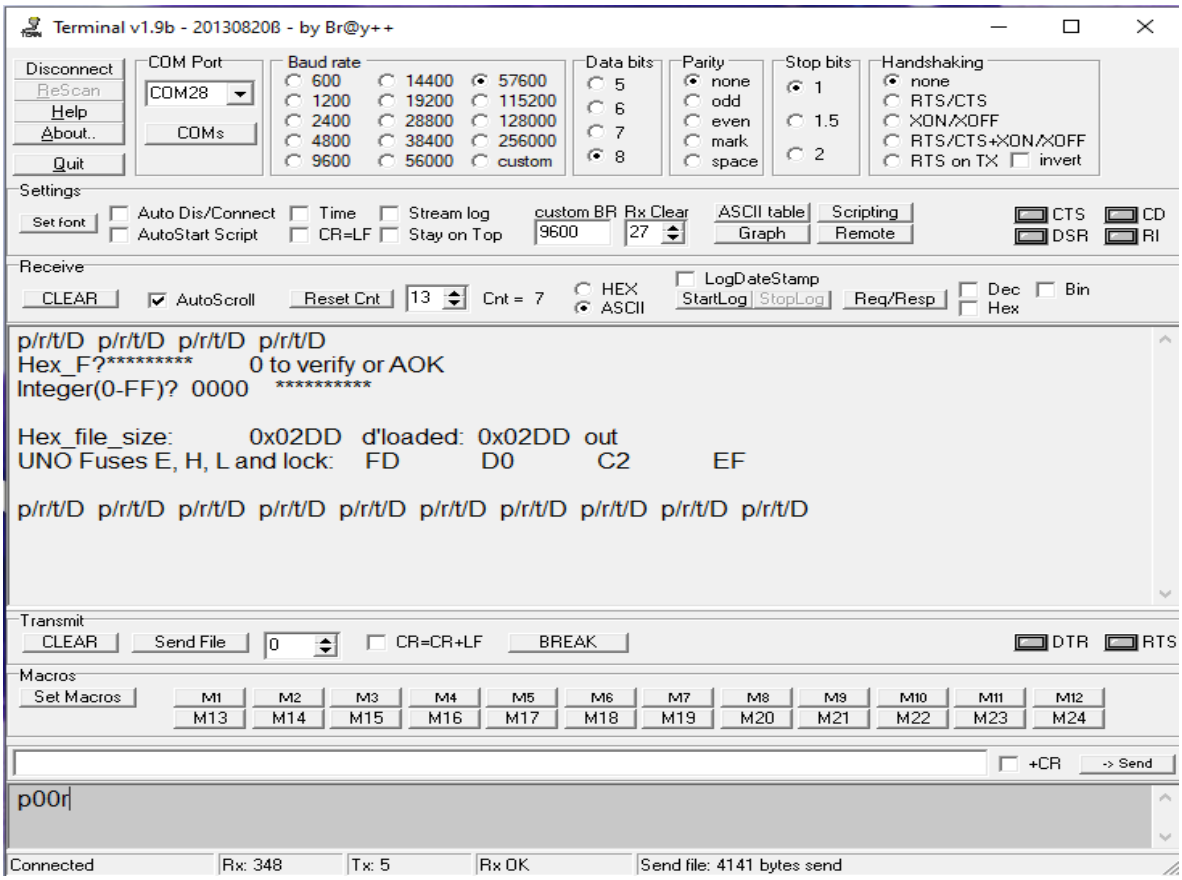
In addition to the Arduino files it also contains a Resources_first_project folder. This contains additional C files that we need. They can be opened any time, probably at some time in the future.

Step 8 Compiling the first project.
On the Arduino window click on Sketch/Verify/compile.
After several seconds a message appears in the black portion of the Arduino window. Hopefully it is in white text which means success. Errors appear in red text.

Assuming success click on Sketch/Export compiled binary. Notice that two new files are added to the projects directory 1_first_project.ino.standard.hex which we require and 1_first_project.ino.with_bootloader.standard that can be deleted.

Step 9 Connecting the PCB to the PC
A micro USB cable is required. Note that it connects upside down to the CP2102
A default program will run creating random patterns on the display. Press and hold the vertical switch (the reset control switch) to change the intensity.

Next open Bray++.
Check the following settings: Data bits: 8, Parity: none, Stop bits: 1 and Handshaking: none
Set the Baud rate to 57600 and check that the AutoScroll box is ticked.
Click on ReScan (just below the Disconnect/Connect button) and then click on Connect.
Briefly press the reset control switch and the user prompt p/r/t/D will appear on the screen.
Press “p” then the click on “Send file” and send project.ino.standard.hex
When done press 00
Finally press “r” and the new program will run.
See below for a screen shot of a typical terminal session.



D Deletes user programs so that the default program runs when power is applied
and t prints out pages from the commentary.