

PCB 111000: Getting the project PC ready

Disclaimers

PCB 111000 has been developed for educational purposes only. All associated software is supplied “as is” with no implied warranty or assumption of fitness for any purpose.

Instructions presented below involve making changes to a PC. They should only be carried out by a competent person who judges that to do so will in no way impair the computer performance or put at risk in any way the data already stored on it. Permission of the owner of the PC should also be sought.

Please also see disclaimers published with WinAVR.

Summary of the steps involved

Getting the PC ready involves carrying out the following steps.

- Downloading and installing the WinAVR compiler and Programmers Notepad (pn)
- Fixing an error in the WinAVR installation
- Doing a test compilation
- Downloading drivers for the FX230 USB chip
- Downloading a terminal program
- Running the test project
- Downloading a bit of help from the web
- Accessing the WinAVR programs

Downloading WinAVR and programmers notepad (pn)

Go to

<https://sourceforge.net/projects/winavr/files/WinAVR/20100110/>

Download and run WinAVR-20100110-install.exe.

Select all the defaults i.e.

Install in the root directory, Install files, Add directories to path, Install programmers notepad.

After completing the installation navigate to C:\WinAVR-20100110\pn.

Right click on the “pn” application and select “Create shortcut”.

Drag and drop the short cut onto the desktop.

Fixing the Installation error

Before proceeding there may be an installation error to deal with. Check the reviews tab on the download page to determine whether or not it has been fixed. The problem may be because WinAVR is installed in the root directory rather than under “Program Files(x86)”. There are various ways of getting around it. The option selected here is to go to the following web page which discusses the problem in some detail

<http://www.avrfreaks.net/forum/windows-81-compilation-error>

Then click on the link: <http://www.madwizard.org/download/electronics/msys-1.0-vista64.zip>

This downloads the file “msys-1.0-vista64.zip”. Extract file “msys-1.0.dll”.

Use it to replace the file of the same name in the following directory:

WinAVR-20100110\utils\bin.

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Doing a test compilation (shows screen shot of programmers notepad (pn))

Open pn from the desktop.

The first time this is done the dialogue boxes “Text Clips”, “tags”, “projects” and “scripts” are all present. They are not used by the PCB 111000 projects can all be closed.

Open the first User project “Proj_1A.c”.

Then click on Tools:

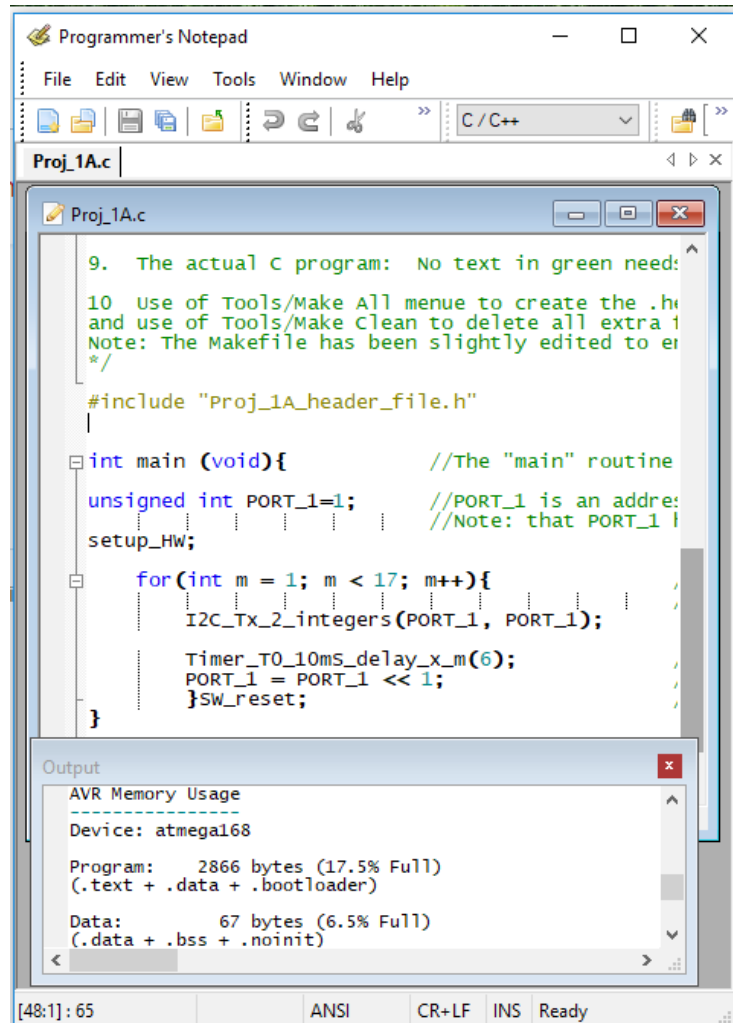
[WinAVR]Make All.

An Output dialogue box tracks progress. The important thing apart from the absence of errors is the amount of program and data space used: 17.5% and 6.5% in this case.

Click on Tools:

[WinAVR]Make Clean

to delete files generated by the compiler that are not used by PCB 111000 projects. (Note the “makefile” has been changed slightly to ensure that the .hex file is not also deleted.)



Downloading drivers for the FX230 USB chip

Having connected PCB 111000 to the PC for the first time this usually happens completely automatically in several minutes. Opening “device manager” enables this process to be tracked and also reveals the “comm port number” assigned to the pcb which should be remembered.

Downloading a terminal program

The terminal program enables PCB 111000 to communicate with a PC.

Two programs have been used during development of the PCB 111000 projects. The first is [Br@y++](http://www.avrfreaks.net/forum/where-download-brays-terminal) for which there are several versions. The simplest and most suitable can be obtained by going to

<https://www.avrfreaks.net/forum/where-download-brays-terminal> and then clicking on http://www.smileymicros.com/download/term20040714.zip?&MMN_position=42:42

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Alternatively go to <https://sites.google.com/site/terminalbpp/> Version Terminal20130116 is known to be suitable (but click the auto scroll box). This version must be used if the "comm port number exceeds 7.

Once the program has been downloaded it can be copied to the desktop or a short cut can be used if wished.

TeraTerm: This is a good alternative. A google search will quickly locate it. (For example try <https://tera-term.en.lo4d.com/>). When installing Tera Term accept all the default settings.

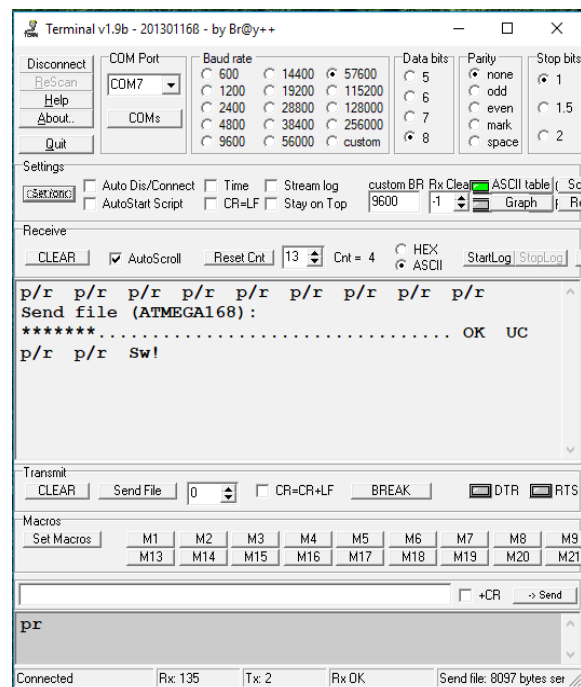
Setting up the Br@y++ terminal program (includes a screen shot of Br@y++)

Connect PCB 111000 to the PC before opening the terminal program.

The program automatically scans the USB ports and assuming that PCB 111000 is detected it is then necessary to select the correct "comm port number" and click on the "connect" button.

Then set the program as follows: Baud rate: 57600, 8 data bits, 1 stop bit, no parity and no flow control. Click the auto scroll box (if present) and adjust the font.

Note the two text boxes, one for receive and one for transmit. Ensure that the cursor has been placed in the lower box before typing the characters "p" and "r" which will then be transmitted.



Running a test program

Switch the DPDT switch to the RHS.

Press the vertical push button switch.

The Terminal program should display the user prompt p/r p/r

Press -p- on the keyboard.

The message "Send file (ATMEGA168):" will be displayed

Send the file Proj_1A .hex.

At the p/r prompt press -r- and operate the DPDT switch when instructed.

The PCB 111000 leds should now flash.

If they do so then setup and installation have been completed successfully

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Setting up the Terra Term program (includes a screen shot of Tera Term)

Connect PCB 111000 to the PC before opening the terminal program.

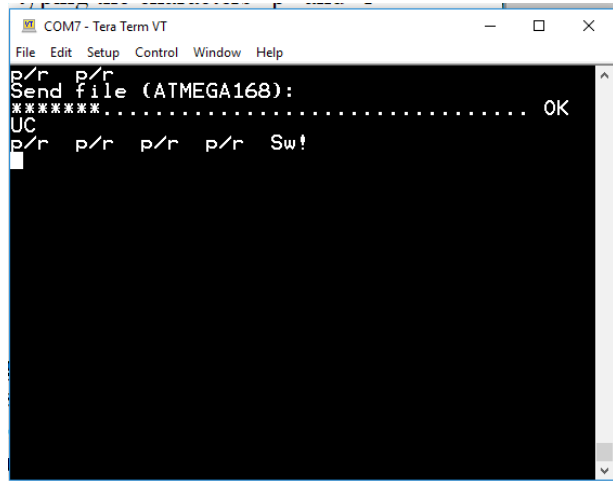
As soon as the dialogue box appears click on the serial button and then click on OK (assuming that the PCB 111000 has been detected).

Using the “setup menu” select serial port”, Set the baud rate to 57600 and operate the pcb switches so that the p/r.... prompt appears.

Then select a suitable font.

Finally use “Setup/Save setup” selecting the name “TERATERM”.

The next time Tera Term is used it will start up as wanted immediately.



Note: There are no separate Receive and Transmit boxes and key presses are not echoed

Downloading a bit of help from the web

The following resource gives an excellent introduction to C and the Atmega devices and also gives help in driving the [Br@y++](#) terminal and programmers notepad.

Do a google search on “C Programming for Microcontrollers”. This leads to the book by Joe Pardue of SmileyMicros.com

(Or try “<https://epdf.tips/c-programming-for-microcontrollers.html>”.)

Accessing the WinAVR programs

Left click in the “Windows” icon or press the “Windows” key.

Then scroll down the list of programs until the WinAVR-20100110 directory is reached.

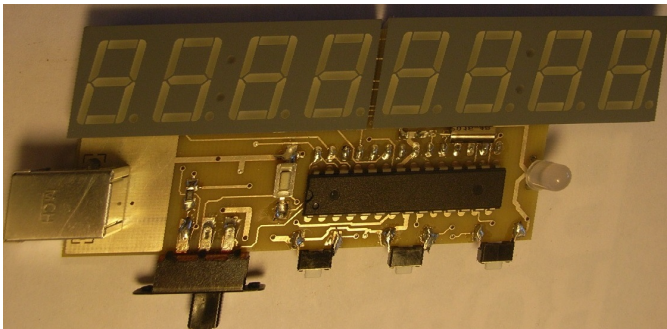
Open it to reveal various applications and manuals any of which can be pinned to the start bar if required.

Mfile[WinAVR] is used to create “makefiles” which together with “pn” control the operation of the WinAVR compiler on behalf of the user.

Note: There is no need at this stage to access any of these programs. “Programmers notepads”(pn) acts as a development environment and automatically calls WinAVR when required. Additionally copies of “makefile” are already included with each project.

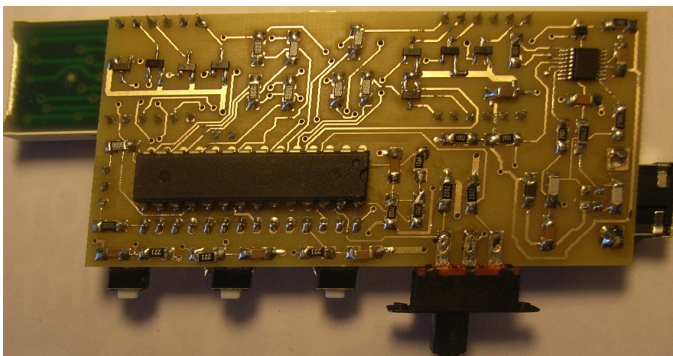
Summary of the pcb operation

1. Operation is controlled via two switches.
2. A double pole double throw (DPDT) which switches the USB bridge between the Atmega 328 and 168 and controls the external reset pin of the Atmega 168 (see photograph).
3. A push button (PB) which provides an external reset to the Atmega 328, which in turn initiates the bootloader causing it to generate the following user prompt “p/r p/r p/r.....”.
4. **Operation of the pcb when power is applied:**
5. The Atmega 328 automatically runs the mini-OS and provided that the Atmega 168 is connected to the USB bridge the user code will run (even from a 5V supply).
6. **Programming the Atmega 168 and then allowing it to run:**
7. Connect the pcb to a PC run the terminal program and select a Baud rate of 57600.
8. Use the DPDT to connect the Atmega 328 to the PC.
9. Operate the PB, press “p” at the user prompt and send the hex file when requested.
10. Press “r” when the user prompt is repeated, then operate the DPDT when requested.



Photographs of the PCB

View of the Atmega 168
Pin 1 closest to the DPDT



Note The DPDT switch
the vertical push button switch and the
three horizontal switches

View of the Atmega 328
Pin 1 closest to the DPDT