Evaluation board for NXP LPC2103

User Guide
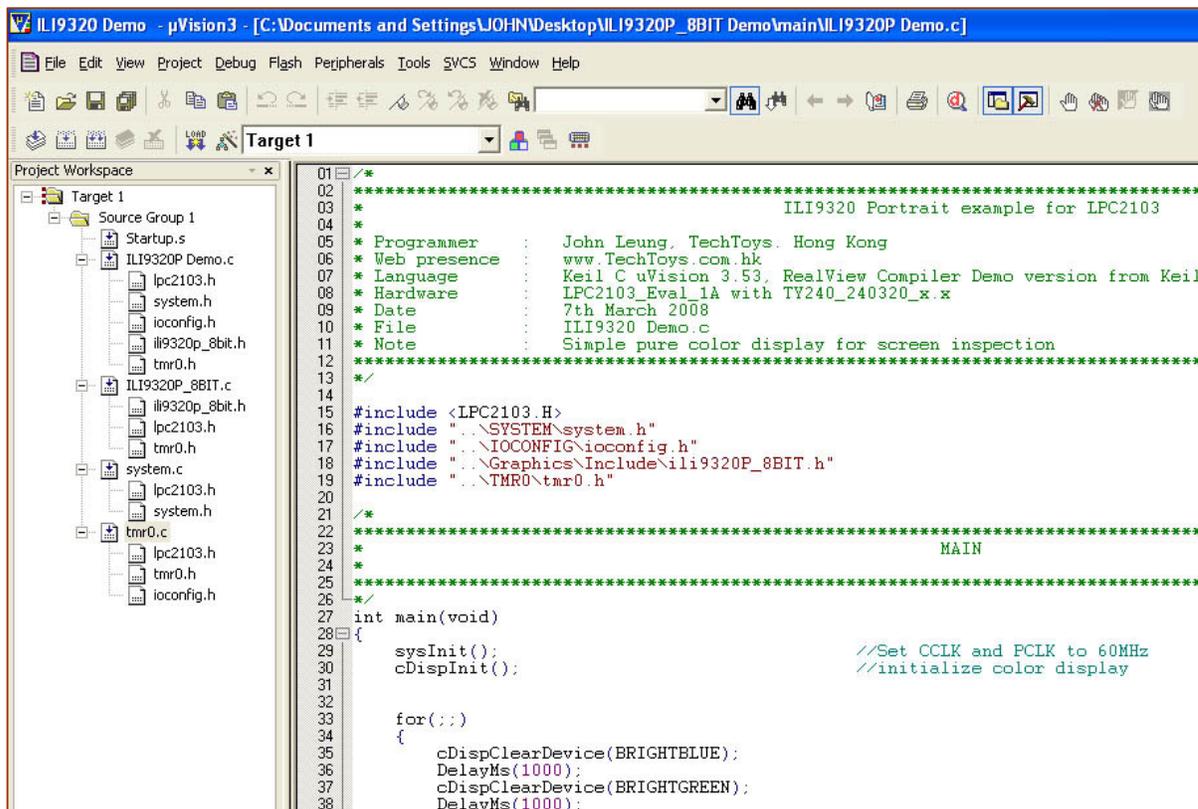
SOFTWARE

Download from KEIL web site at http://www.keil.com/demo/ for ARM evaluation software. Limitations to this evaluation copy have been summarized on the web page http://www.keil.com/demo/limits.asp. At time of writing, the version was 3.22a. Double click on the icon mdk322a.exe and follow the default installation path.

After installation, launch µVision 3 from its icon on the desktop and browse to your project directory containing a valid µVision project. You may download from our web site at http://www.techtoys.com.hk/ARM_boards/LPC2103_Eval_1A/LPC2103_Eval_1A.htm for some ready-to-run projects including HelloWorld project, LED blinky project, as well as simple color changing demonstration for 2.4" TFT color LCD, and 2.8" TFT color LCD.

Let's take the 2.4" TFT example as a demo for now. Unzip the file to any place in your hard-drive, under *Project→Open Project*, browse to the *.uv2 file ILI9320 Demo.uv2 and click open. Right away you will see the project setting with source file as shown in the screen shot below.
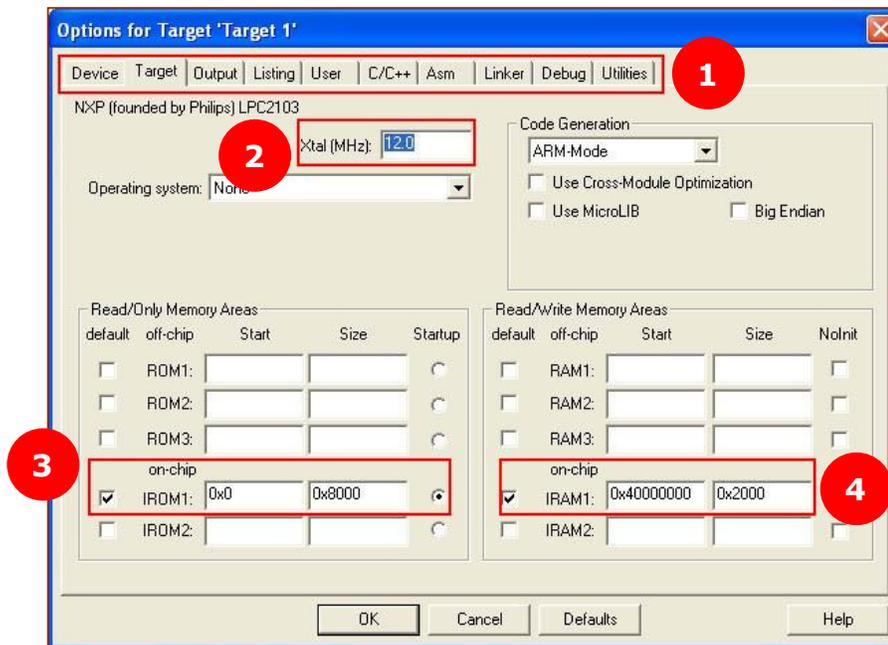
Before getting the project compiled, please take a look at the project setup to understand what is going on with various options. Some of them are keys to successful program compilation and linkage. Highlight and right click on the parent folder under *Project Workspace* at the left panel.
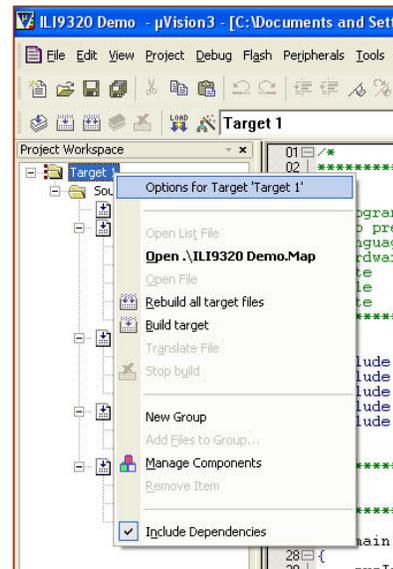
Open Options for Target 'Target 1' you will see project options as follows.

Important configuration:
1. *Device, Target, Output, Linker, and Utilities*. Under the *Device* tab, it states that NXP LPC2103 microcontroller has been chosen.
2. *Target* tab shows the Xtal frequency value, Read/Only Memory Areas, and Read/Write Memory Areas. These parameters vary from individual hardware and choice of microcontroller. Because we are using an external crystal of 12MHz, we need to input 12.0 under Xtal text box.
3. *Read/Only Memory Areas* contains the Flash start address and size. LPC2103 has 32KB on-chip Flash ROM therefore its size reads 0x8000. Its starting address is 0x0 from ARM architecture.

4. *Read/Write Memory Areas* defines the starting address and size of static RAM of LPC2103. It is always possible to define different values for on-chip Flash ROM and RAM for a certain microcontroller (e.g. LPC2103) and get the project successfully compiled. However, its resultant hex file may not be able to run correctly.
5. Under the *Output* tab, check the check-box Create HEX File; otherwise, no hex file will be created upon successful compilation.
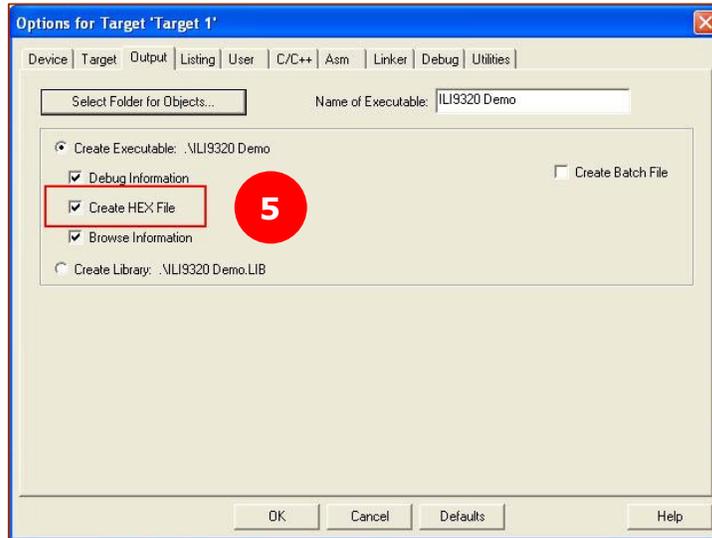
6. Under the *Linker* tab there are important parameters for non-volatile memory (R/O Base) and static RAM (R/W Base) base addresses. One should enter the correct values for these boxes otherwise, the program will not compile or not running properly.

7. There are other important options for Debug and Flash programming Utilities which I will leave them until the introduction on JTAG debugger.
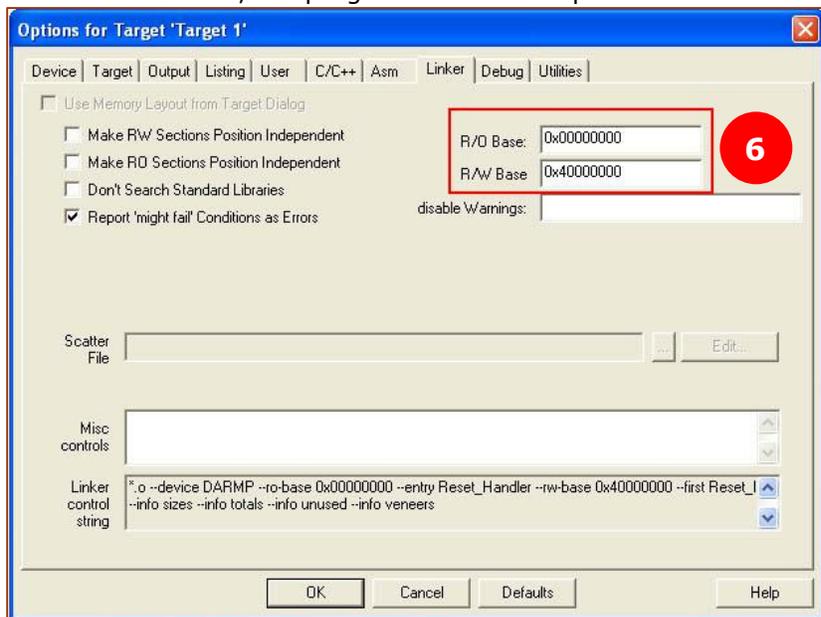
Click *OK* to quit the setup.

Going back to *Project Workspace* and right click on parent folder *Target 1* again and select *Manage Components*. You will see under *Folders/Extensions* the *Tool Base Folder* which is C:\Keil\ARM\ and the compiler folder is actually under BIN31\. These are important paths that should not be confused; otherwise, the IDE will not be able to point to the correct compiler and linker.
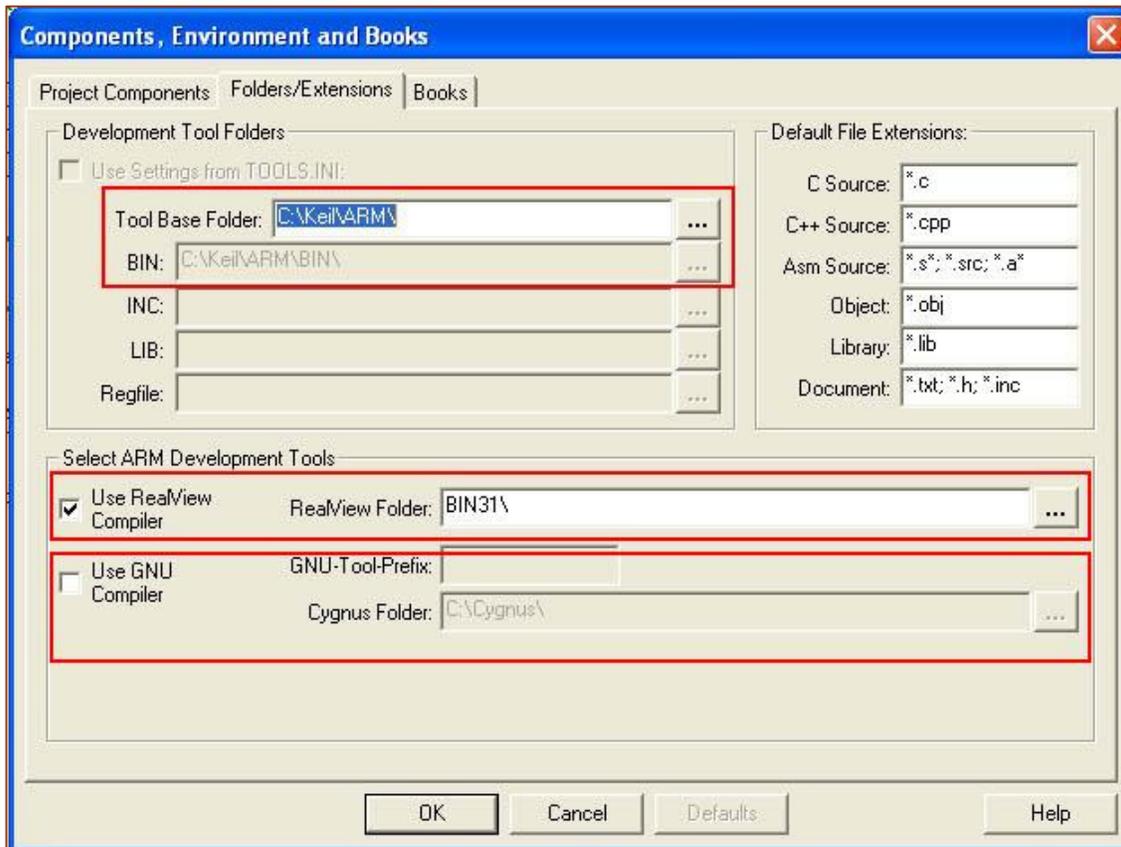
It is interesting to note that under the option Use *RealView Compiler* there is another option as **Use GNU Compiler**. Evaluation version of RealView limits to 16KB of code size. However, the GNU ARM tools (compiler, assembler, and so on) that are provided are not limited or restricted in any way except that one must not use it for commercial product. Before you may use the GNU compiler, download and install from the same web page that you have downloaded the RealView compiler. The default installation path is C:\Cygnus. It contains all arm-tools and manuals. Just keep this folder for now and we will leave this feature for future.

Finally, from *Project→Rebuild all target files* we will be able to generate a hex code under the project folder. The next section describes the procedure to use LPC2000 FLASH UTILIY to download this execute file via Boot Loader, which is built-in LPC2103.

To install the GNU development tools...

NOTE: If you want to use only the RealView compilation tools for ARM, you do not need to download the GNU GCC Compiler listed below.

- Right-click on **GCCARM331.EXE** and save it to your computer.
- PDF files may be opened with Acrobat Reader.
- ZIP files may be opened with PKZIP or WINZIP.

GCCARM331.EXE (20,905K)
Monday, October 11, 2004

Estimated File Download Time:
< 1.5 Hours: 56Kb Modem
< 40 Minutes: 128Kb ISDN
< 4 Minutes: T1/Broadband

LPC2000 FLASH UTILITY

To use the Boot Loader, one may connect a straight cable from J2 (standard DB-9 female header) onboard to one of the COM PORT of your PC. Make sure jumpers at JP1 & JP5 are present. Fail to do so will disable communication between LPC2000 Flash Utility Program and the evaluation board. Download the LPC2000 Flash Utility program from the following web site.

http://www.nxp.com/products/microcontrollers/support/software_download/lpc2000/

By installation and launching the program you will see the program interface below. *The actual parameters shown on the first program startup will be different. Just don't worry too much at the moment.*
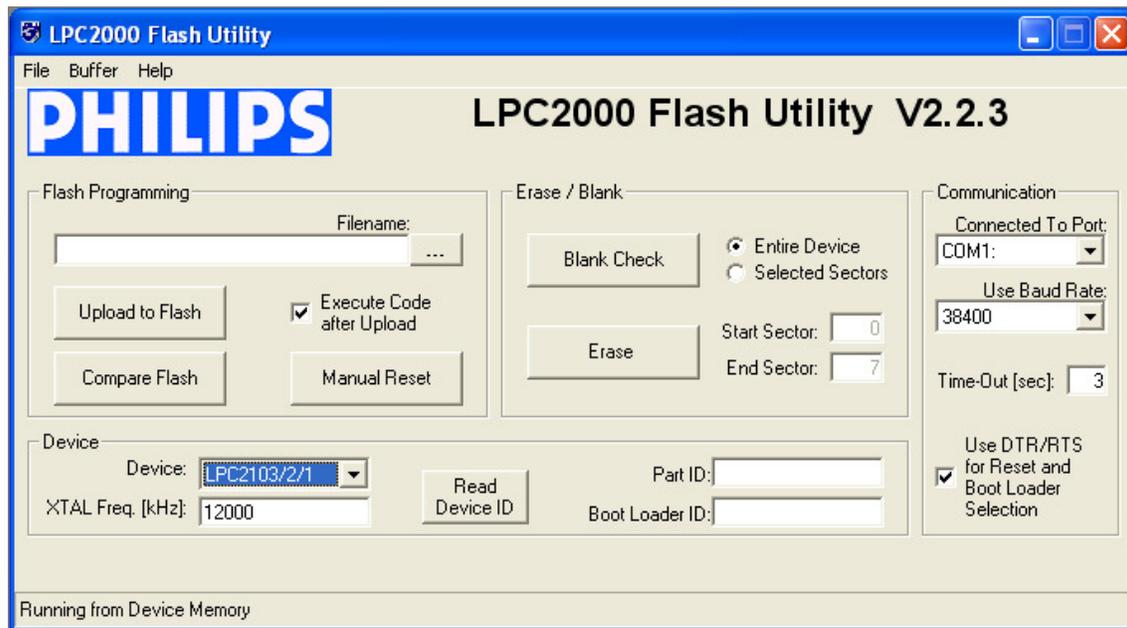
Check the check-box *Use DTR/RTS for Reset and Boot Loader Selection* at the lower right corner.

Enter the XTAL frequency as 12000. Our crystal frequency is 12MHz.
Select the COM Port and baud rate. We are using COM1 as an example.
The choice of baud rate depends on XTAL Freq. From experience, a baud rate of 38400 is a good choice for 12MHz XTAL frequency; fast and stable.

Press the file browser button [...] and browse to your target hex code. If you don't follow from last section, it is also possible to use our ready-made programs available at the following hyperlink. A proven project for 2.4" TFT LCD demo has been uploaded to the link Doc 06. The operation is the same for all kind of hex code.

http://www.techtoys.com.hk/ARM_boards/LPC2103_Eval_1A/LPC2103_Eval_1A.htm.

Supply 5V DC with pin positive to the power jack, and press the button *Read Device ID*. You will see the Part ID and Boot Loader ID as shown below. These parameters show that the Flash Utility program has successfully hooked up with the microcontroller.
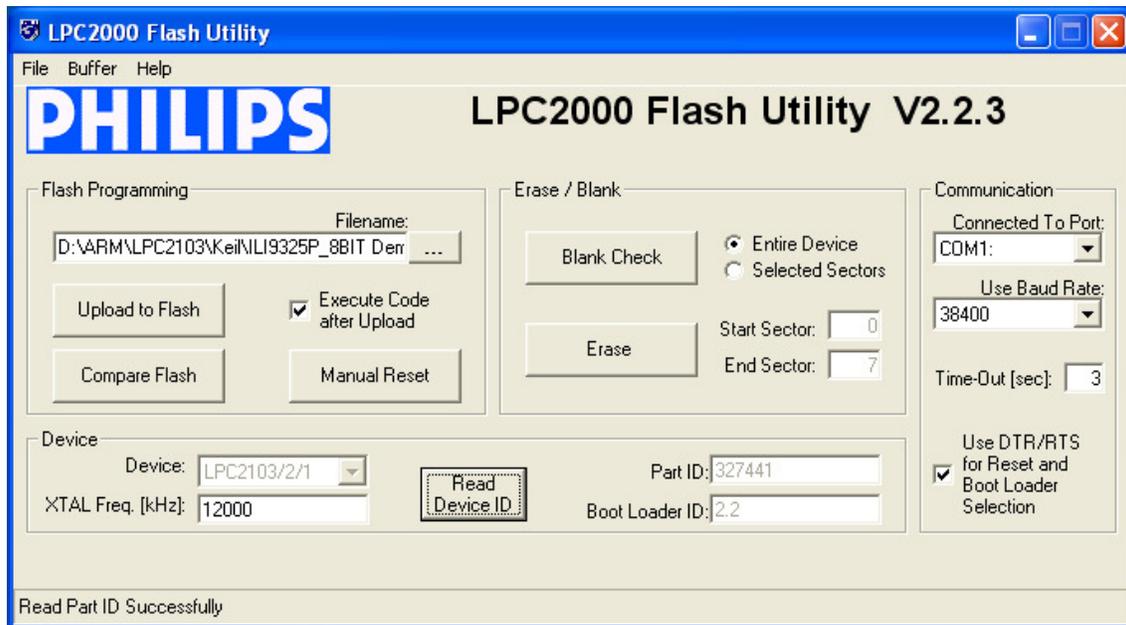
Follow the screen shot above for other parameters and finally press the *Upload to Flash* button for code download. You will see program running after just 1-2 seconds.

FLASH MAGIC

If you don't want the LPC2000 Flash Utility, you may consider Flash Magic which can be obtained from the web site http://www.flashmagictool.com/. This is a freeware sponsored by NXP Semiconductors.
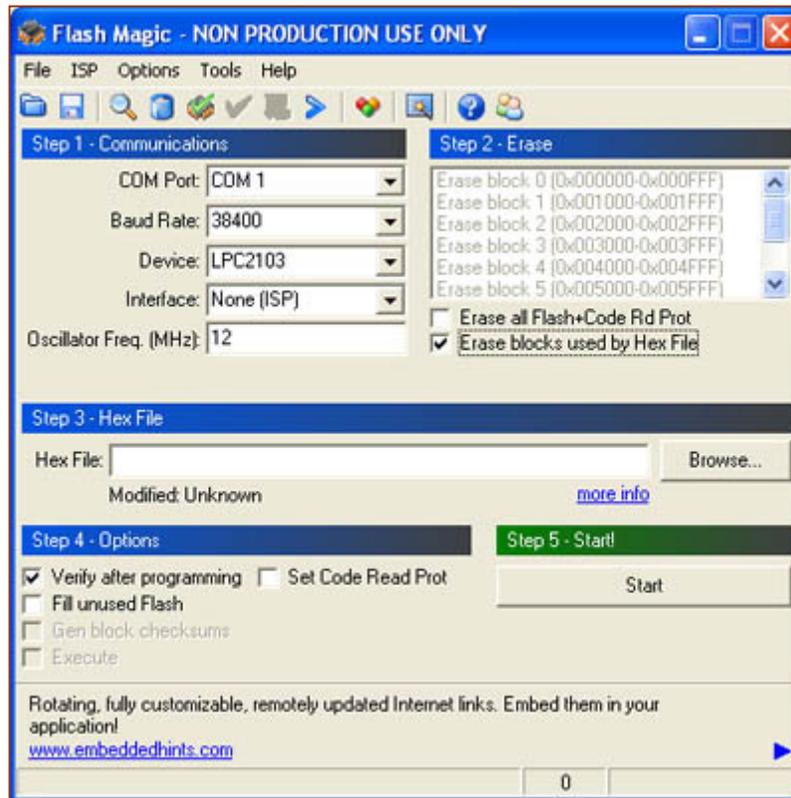
Download, install, and launch the application you will see the user interface as below.

To configure LPC2103 Evaluation board for Flash programming, follow the steps.

Step 1 - Communications: specify the COM Port to use and Baud Rate. From my experience, a Baud Rate of 38400 usually gives a good result. Try different Baud Rate to suit your particular environment.

Step 2 – Erase: Enable **Erase blocks used by Hex File**

Step 3 – Hex File: Browse to your hex code, for example
D:\ARM\LPC2103\Keil\ILI9320P_8BIT Demo.hex

Step 4 – Options: Enable **Verify after programming option**. In the main menu **Options – Advanced Options** dialog, select the **Hardware Config** tab, then check the **Use DTR and RTS to control RST and P0.14** check box. This option is dictated by the hardware design.

Step 5 – Start! : Finally press start to program