MPE xARM/Cortex

First steps – Olimex LPC1766STK

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Book name

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Software

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1 Setting up

We assume that you are using a supported board. For the LPC17xx family, this is the Olimex LPC1766STK.

If you have not already got it, get Flashmagic from

http://www.flashmagictool.com/

This software uses a serial port on the PC and the bootloader software in the LPC1766 to perform a reflash of the target. The bootloader is in protected Flash/ROM that you cannot (normally) corrupt.

Find the directory containing the MPE control file

Olimex1766stk.ctl

and note it down. It should be in

<xArmCortex>/Cortex/Hardware/LPC17xx

AIDE tools

AIDE is a program that provides manages external tools and provides a terminal emulator. Make sure that everything is set up correctly.

- 1) Run AIDE
- In AIDE, use
  IDE -> Cofigure Edit/Locate
  to set up your favourite editor.
- If the 1766 is not on AIDE's toolbar, add a new tool using:
  IDE -> External Tools

To use the MPE control file

Olimex1766stk.ctl

set the start directory to the containing Olimex1766stk.ctl. You will need quotation marks if there are spaces in the path. Some people prefer to uninstall and reinstall to a directory with no spaces in the pathname. The set up in my development system is:

BMP file: c:\buildkit.dev\software\Aide\CM3.bmp

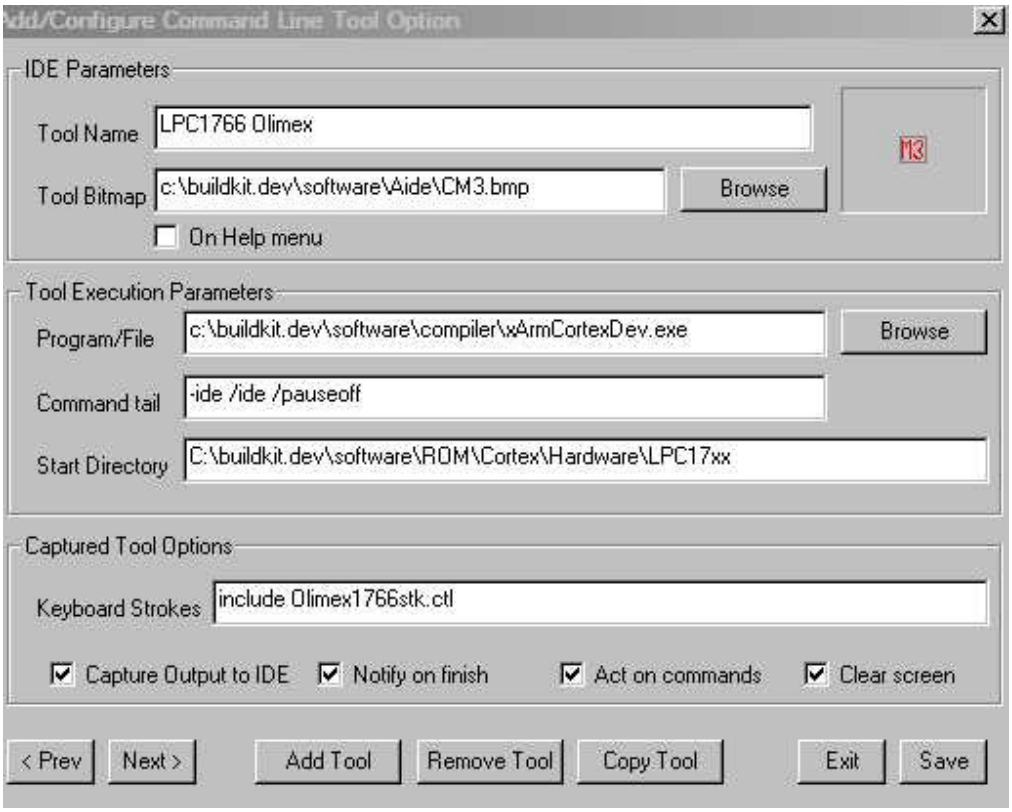
Compiler: c:\buildkit.dev\software\compiler\xArmCortexDev.exe

Command tail: -ide /ide /pauseoff

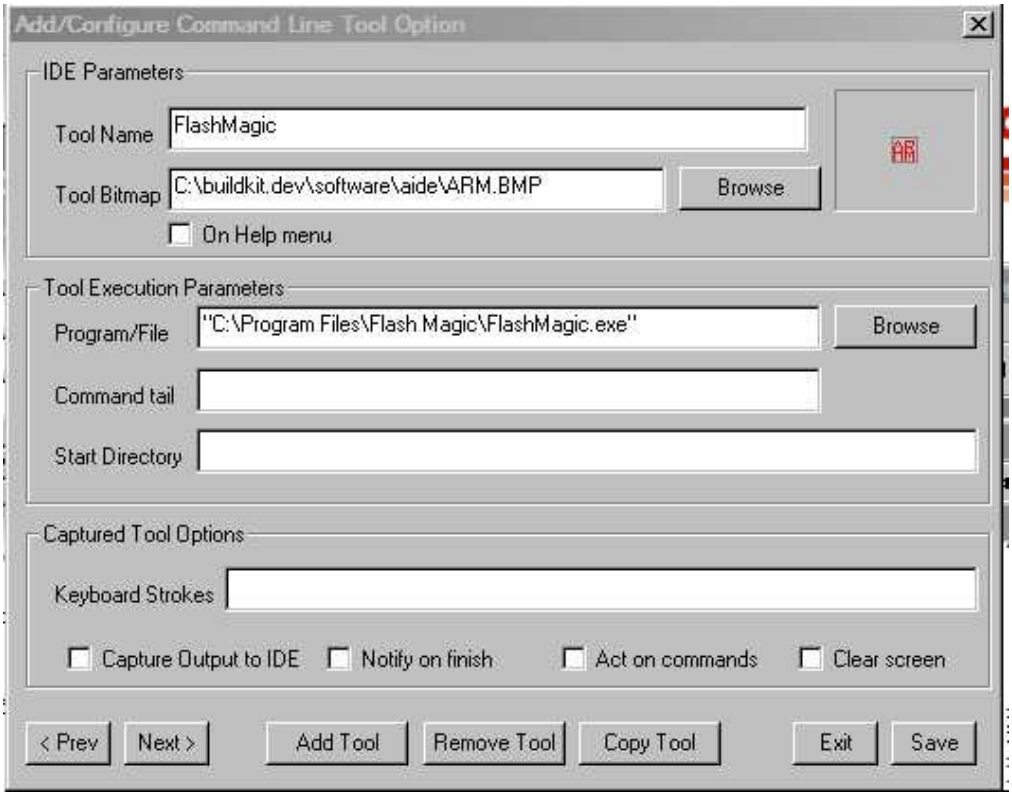
Start dir: C:\buildkit.dev\software\ROM\Cortex\Hardware\LPC17xx

Keybd Strokes: include Olimex1766stk.ctl

All four checkboxes in the "Captured Tool Options" box are checked. See the following picture for my complete settings.

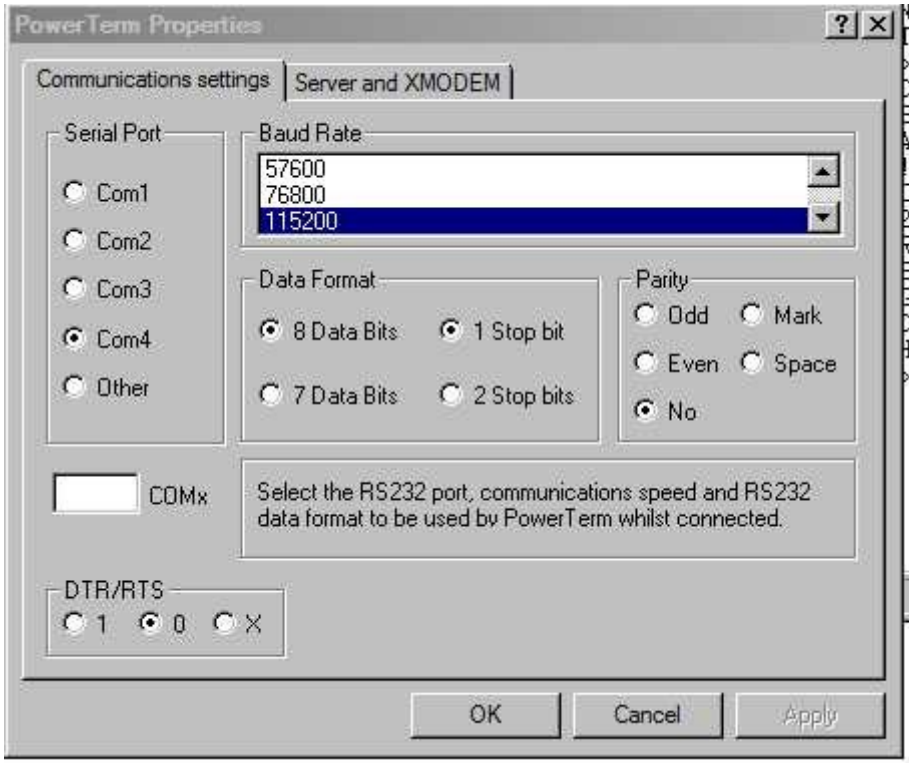


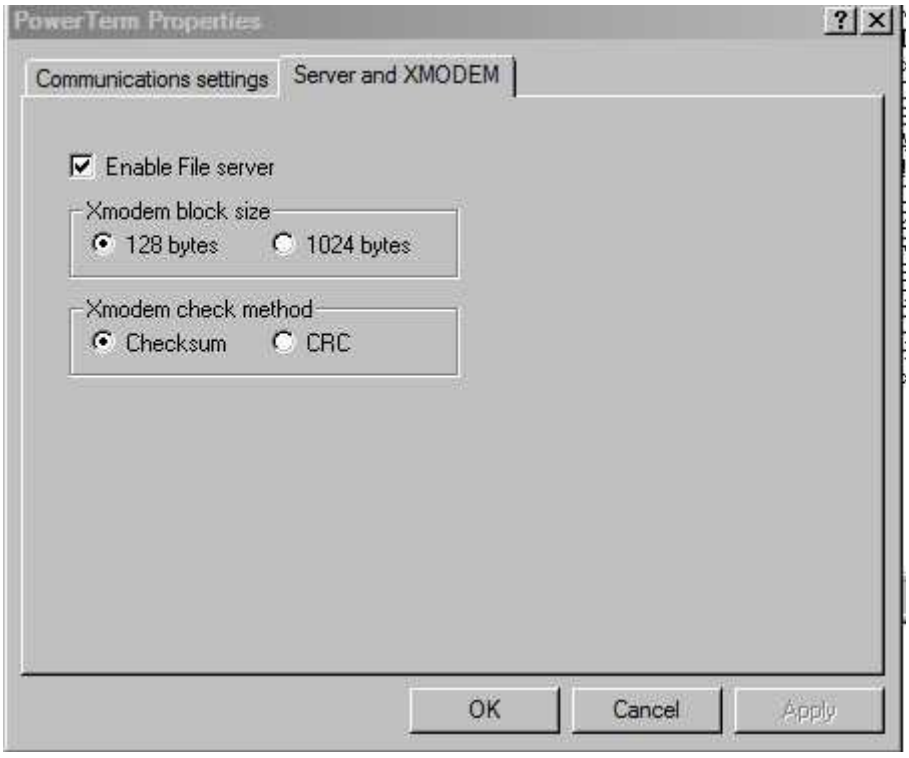
Add Flashmagic as an external tool



AIDE PowerTerm

Configure PowerTerm for 115200 baud, N81, COMx using the Properties button that is second from the right on the PowerTerm toolbar. Switch to the "Server and XMODEM" page, and check "Enable File Server" with 128 byte and Checksum Xmodem selected.





What you did

You now have two tools set up, the Forth cross compiler and FlashMagic. There will be a corresponding buttons on the toolbar.

When you click the compiler button the file

Olimex1766stk.ctl

is included by the cross-compiler. This file is a control file. It tells the cross compiler how to compile the target and what to compile.Because the tool capture checkboxes were checked when the tool was set up, the compiler runs in the “Tool Capture” window.

When you click the FlashMagic button, FlashMagic runs. Because the tool capture checkboxes are unchecked, FlashMagic runs in an independent window.

2 Compiling and testing

Compile and download

You now have a tool set up. There will be a corresponding button on the toolbar. When you click it, the file

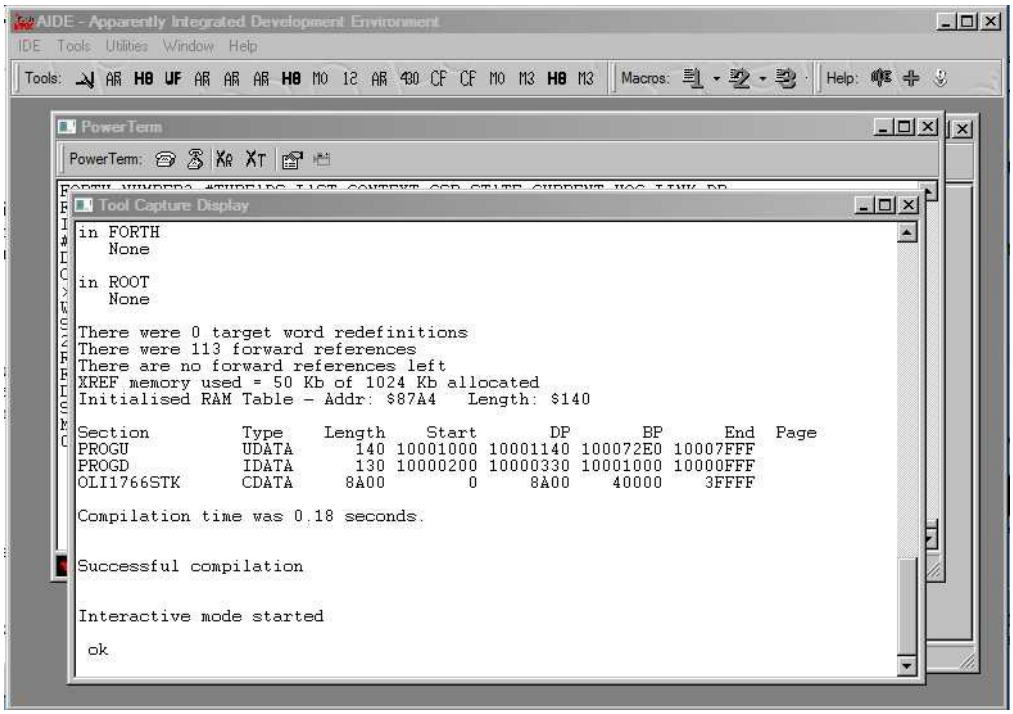
Olimex1766stk.ctl

is included by the cross-compiler. This file is a control file. It tells the cross compiler how to compile the target and what to compile. When the compiler has finished, there will be two output files in your LPC17xx folder

OLI1766STK.img

OLI1766STK.hex

The cross compiler always produces binary image files with a ".img" extension. The control file tells the compiler also to produce an Intel Hex file with a ".hex" extension. The binary files are used by MPE tools, the hex files by external tools such as Flashmagic.



AIDE's Tool Capture window should be visible - the compiler is still alive so that you can disassemble words and use the cross reference tools such as XREF and LOCATE. Make sure that PowerTerm is also visible, but is disconnected.

We will now program the Flash on the Olimex board.

- Connect a serial cable to RS232_0.
- Near the RS232 connector is a block of three jumpers labelled DBG_E

RST_E
ISP_E
The first one enables debugging, the other two are controlled by Flashmagic with the DTR and RTS lines.

- Power the board using the big USB connector.
- Run FlashMagic by clicking the button on AIDE's toolbar.
  Configure it for LPC1766, 12MHz, 38400 baud, COMx
  Configure Options -> Advanced Options -> Hardware Config to enable DTR/RTS control.
- Program the Flash using the Start button.
- Close FlashMagic
- Remove the two jumpers
  RST_E
  ISP_E

Press the PowerTerm connect button (the telephone) and then reset the board. You should now get the MPE PowerForth sign on message. This is the target Forth on the board. You can use this as a normal Forth, and you can even compile code on it. However, since the cross compiler takes a fraction of a second, and the Forth has facilities to reflash itself, it is quicker just to recompile and reflash. To use the Forth facilities, just type

```
REFLASH
```

AIDE will put up a box asking for an image file. Navigate to the LPC17xx folder and select OLI1766STK.img. AIDE will download this to the target and reflash the target. If the process has no errors, at the end you will be offered R to reboot. The new target image will then run.

You just repeat the recompile and reflash cycle as required.

If the REFLASH operation fails, you will have to use FlashMagic to put the hex file into the target again.

Adding application code

Control files and text macros are important in MPE Forth systems. They are documented in the main cross compiler manual. Please read these sections of the manual.

Although you can just add new lines to the MPE control files, we do not recommend this. You run the risk of losing your changes when you update the compiler. Make your own project. You do this by making a copy of Olimex1766stk.ctl and using it as the basis of your project. MPE suggests that you leave our code alone and make a new project that is **not** in the cross compiler folder.

To do this, make a new folder and put the renamed control file in it, (say) My1766.ctl. Also copy over o1766stk.no and rename it as (say) my1766.no. Use AIDE's "External Tools" "Copy Tool" button to make a new project button and edit the start directory and include file name.

Edit the control file's text macros that start at line 41 so that they point to the right folders. Edit the build file name on line 320. Now use your new button to recompile and then reflash the new image.