

## PICAXE Command Line Compilers – Beta Tester Information.

*Pre-release beta tester information v0.1*

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### Introduction.

Revolution Education develop and publish three specialised Windows applications to support programming and simulation of the PICAXE microcontrollers.

- **PICAXE Programming Editor**

Programming Editor is the default free development system for PICAXE microcontrollers. It supports programming and simulation of PICAXE chips via BASIC program listings and/or graphical flowcharts.

- **PICAXE VSM**

PICAXE VSM is a powerful Berkeley SPICE based circuit simulator that simulates complete PICAXE electronic circuits.

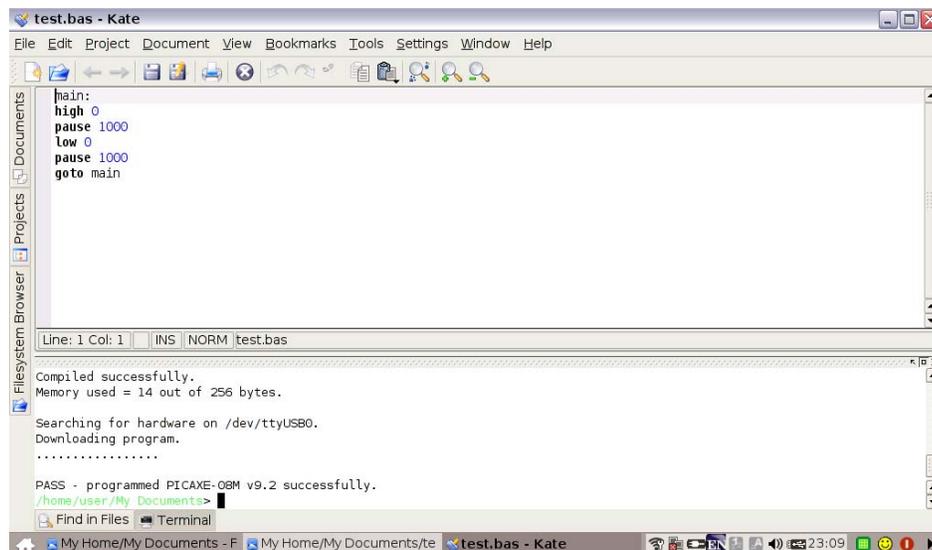
- **Logicator for PIC and PICAXE microcontrollers**

Logicator is a flowcharting application that is widely used within schools for developing and simulating PICAXE programs.

All three applications make use of the PICAXE compiler files (Windows version) to compile the ‘BASIC program text’ into the actual the ‘PICAXE code’.

However Revolution Education acknowledges that not all users choose to use the Windows operating system. Therefore, although our main software products are Windows based, we also produce free compilers/downloaders to support the other major operating systems (Linux, Mac etc.).

As PICAXE BASIC programs are saved as simple text documents, the BASIC programs can actually be generated in any existing text editor (or third party application) on the appropriate platform (e.g. ‘Kate’ under Linux KDE). When the BASIC program has been saved it can then be downloaded via the free compiler/downloader program.



```
test.bas - Kate
File Edit Project Document View Bookmarks Tools Settings Window Help
main:
high 0
pause 1000
Low 0
pause 1000
goto main
Line: 1 Col: 1 | INS | NORM | test.bas
Compiled successfully.
Memory used = 14 out of 256 bytes.
Searching for hardware on /dev/ttyUSB0.
Downloading program.
.....
PASS - programmed PICAXE-08M v9.2 successfully.
/home/user/My Documents>
```

*Kate (Linux with KDE)*

## Command Line Compiler.

The command line compiler/downloader (“compiler”) allows PICAXE programs to be compiled and downloaded on a variety of different computer platforms. The compilers are compatible with both the AXE026 (serial) and AXE027 (USB) download cables.

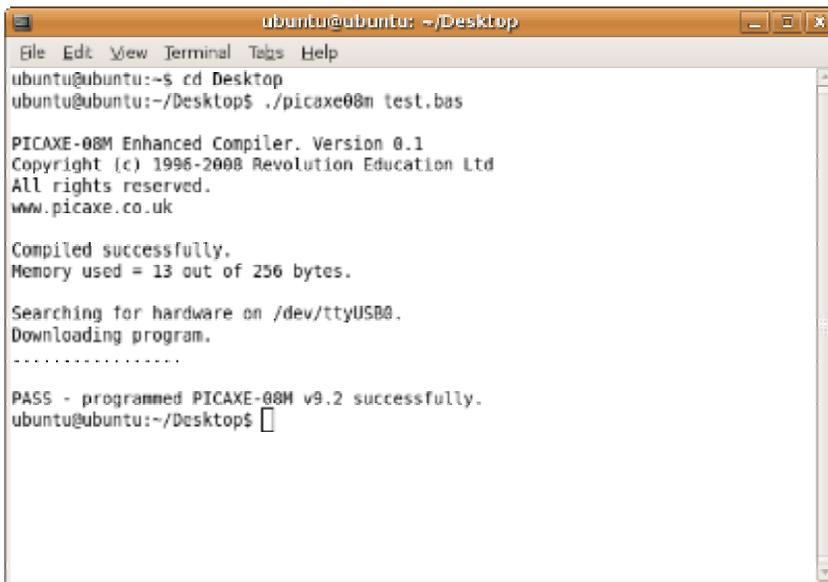
### *Currently supported platforms include:*

Windows	(NT, 2000, 2003, XP, Vista and later)	Serial & USB
Linux	(kernel 2.4.20 and later)	Serial & USB
Mac OS	(X and later)	USB

### *Platforms under development include:*

Windows CE	(4.2 and later)	USB
iPhone, iPod Touch		Serial

The compiler is designed to be as small footprint as possible, typically only 300KB, and so it is also suitable for installing on very low memory devices such as PDAs/Smartphones and budget laptops (e.g. ASUS eeePC or Elonex One).



```
ubuntu@ubuntu: ~/Desktop
File Edit View Terminal Tabs Help
ubuntu@ubuntu:~$ cd Desktop
ubuntu@ubuntu:~/Desktop$ ./picaxe08m test.bas

PICAXE-08M Enhanced Compiler. Version 0.1
Copyright (c) 1996-2008 Revolution Education Ltd
All rights reserved.
www.picaxe.co.uk

Compiled successfully.
Memory used = 13 out of 256 bytes.

Searching for hardware on /dev/ttyUSB0.
Downloading program.
.....

PASS - programmed PICAXE-08M v9.2 successfully.
ubuntu@ubuntu:~/Desktop$
```

*Linux (Ubuntu live CD)*

## Using the Compiler

To use the compiler there are two options:

- 1) Run the compiler in a Console Terminal
- 2) Use a third party application that provides a 'graphical front-end' to the compiler

## How do I open a Console Terminal?

### Windows

Click Start>Run and type in  
cmd

### Linux

This depends on your Linux distribution! It will be there somewhere, see the distribution documentation! Some common options on different distributions may include

- Press <Ctrl>+<Alt>+t
- Open File Manager then <Ctrl> + t
- Right click mouse and select 'Open Terminal'
- Menu > System Tools > Terminal
- Applications > Accessories > Terminal

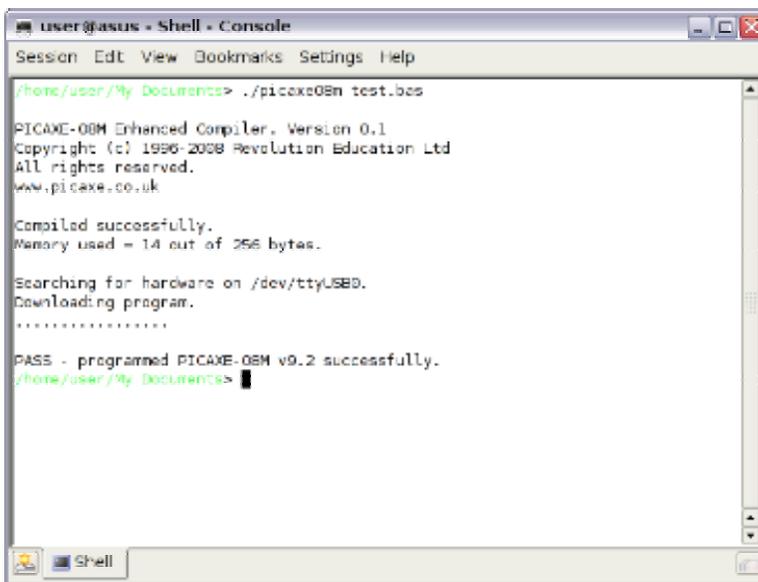
### Mac

Click Go > Applications > Utilities > Terminal

### Windows CE

Double click on the application name (e.g. picaxe08m).

As Windows CE does not directly support Console Terminals the terminal messages are reported within a text box within the PDA/Smartphone application.



```
user@pasus ~ - Shell - Console
Session Edit View Bookmarks Settings Help
/home/user/My Documents> ./picaxe08m test.bas

PICAXE-08M Enhanced Compiler. Version 0.1
Copyright (c) 1996-2008 Revolution Education Ltd
All rights reserved.
www.picaxe.co.uk

Compiled successfully.
Memory used = 14 out of 256 bytes.

Searching for hardware on /dev/ttyUSB0.
Downloading program.
.....
PASS - programmed PICAXE-08M v9.2 successfully.
/home/user/My Documents> █
```

*Linux (Xandros) on eeePC*

## Use within a Console Terminal

Each compiler consist of a console application with a filename that is the same as the type of chip supported e.g. picaxe08m

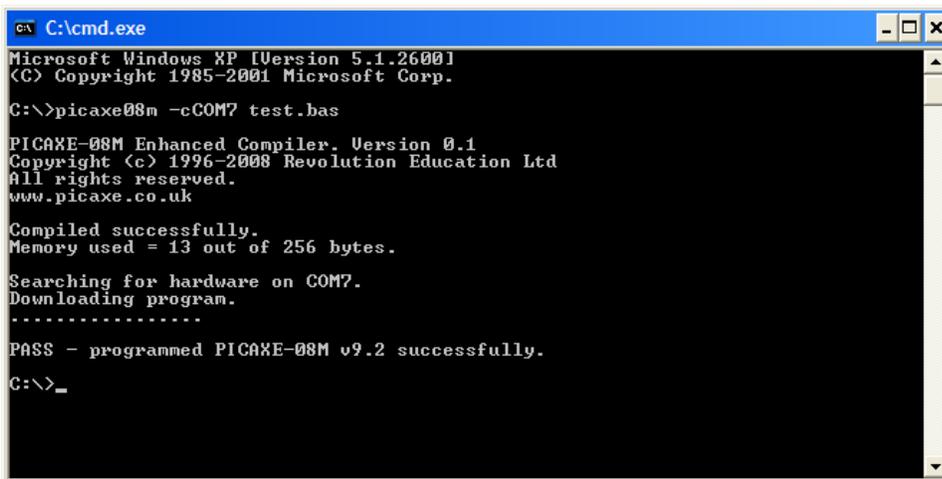
The compiler is used with the following common command line switches.

picaxeXXX filename.bas	= download (default port)
picaxeXXX -cPORT filename.bas	= download (named port)
picaxeXXX -s filename.bas	= syntax check
picaxeXXX -cPORT -s filename.bas	= syntax check
picaxeXXX -cPORT -t filename.bas	= download and terminal
picaxeXXX -cPORT -d filename.bas	= download and debug
picaxeXXX -h	= display help

where

-cPORT	assign serial/USB port for downloading
-s	syntax check only (no download)
-d	leaves the serial port open for 'debug' data after download
-t	leaves the serial port open for 'sertxd' data after download
-h	displays help
filename.bas	file to be downloaded

*switches cannot currently be combined, so use, for instance, -s -t not -st*



```
C:\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\>picaxe08m -cCOM7 test.bas

PICAXE-08M Enhanced Compiler, Version 0.1
Copyright (c) 1996-2008 Revolution Education Ltd
All rights reserved.
www.picaxe.co.uk

Compiled successfully.
Memory used = 13 out of 256 bytes.

Searching for hardware on COM7.
Downloading program.
.....

PASS - programmed PICAXE-08M v9.2 successfully.
C:\>_
```

*Windows PC*

## How do I use the command line compiler?

Use your favourite text editor to save a simple BASIC program as a raw text file. Make sure the file is saved with a '.bas' extension, e.g. test.bas

As an example we will first carry out a syntax check of the file (using the `-s` switch) without download. Assuming that both the picaxe08m compiler and the BASIC text file are both in the current folder:

Open a console terminal, and type in

```
picaxe08m -s test.bas          (Windows)
./picaxe08m -s test.bas       (Linux)
./picaxe08m -s test.bas       (Mac)
```

If you need to use spaces within the filename, enclose the filename within speech marks e.g.

```
picaxe08m -s "c:\Documents and Settings\Administrator\Desktop\test.bas"
./picaxe08m -s "/home/user/My Documents/test.bas"
```

When you hit return the program will be compiled and either a success or fail message will be displayed. If the compile fails the line number of the mistake will be reported.

Next we need to try a download. The only difference here is we need to include the name of the serial/USB port (as appropriate for your system) using the `-c` switch.

```
picaxe08m -cCOM1 test.bas          (Windows)
./picaxe08m -c/dev/ttyUSB0 test.bas (Linux)
./picaxe08m -c/dev/tty.usbserial-xxxx test.bas (Mac)
```

*Remember to change the port name as appropriate for your computer – see the AXE027 datasheet for more details.*

Note there is no space between the `-c` and port name e.g.

```
-cCOM1 not -c COM1
```

Remember also that everything is cAsE sEnSiTiVe e.g.

```
-c/dev/ttyUSB0 not -c/dev/ttyusb0
```

That's it! Hopefully you will now have a downloaded program in your PICAXE chip!

Other switches to try are:

```
-d    leaves the serial port open for 'debug' command variables display
-t    leaves the serial port open for 'sertxd' output
-h    displays help
```

### **Use with an AXE026 serial cable.**

For Windows the AXE026 port name is the COM port e.g.  
COM1

For Linux the AXE026 port name is the COM port device e.g.  
/dev/ttyS0  
(Linux is 0 indexed, so COM1 is known as ttyS0, COM2 is ttyS1 etc.)

For iPhone, iPod Touch the serial port name is  
/dev/tty.iap

### **Use with an AXE027 USB cable.**

For Windows the AXE027 port name is the allocated virtual COM port e.g.  
COM6

For Linux the AXE027 port name is  
/dev/ttyUSB0

For Mac the AXE027 port name is  
/dev/tty.usbserial-xxxx  
(where xxxx is a unique system serial number)

For Windows CE the AXE027 port name is the allocated virtual COM port e.g.  
COM0

Please see the AXE027 datasheet for detailed installation instructions:  
[www.rev-ed.co.uk/datasheets/axe027.pdf](http://www.rev-ed.co.uk/datasheets/axe027.pdf)

## **Source Code**

A separate compiler is available for each PICAXE chip type (picaxe08m, picaxe18x etc).

The compilers are generated from the same 'C' source code on each platform. This ensures there will be no difference in the compiled PICAXE program no matter which computer platform is used.

However the 'serial/USB downloader' source code within the compiler does need to be slightly customised for each platform (as required by the operating system kernel). Support for future additional platforms may be possible, but that depends completely on compatibility with how the operating system kernel interacts with serial and USB devices.

The compilers are free to use, but are copyrighted and not open-source. Revolution Education Ltd do not release the source code to any of their compilers (including Linux versions).

## **Integrating into third party applications.**

The compilers may be integrated into third party applications e.g. you may wish to develop a graphical 'flowcharting' application that generates PICAXE programs.

However the compilers are copyrighted and so may not be distributed by third parties without prior written permission. This prevents copyright issues and also helps to deter old versions of the compiler being distributed when a newer version is available.

Therefore there are two routes available for distribution of a third party application that uses the compiler:

- 1) Distribute your application without the PICAXE compiler. Advise users to download the drivers themselves from the software pages at [www.picaxe.co.uk](http://www.picaxe.co.uk) This method is most suited to hobbyist / free applications.
- 2) Apply to Revolution for a licence to incorporate the PICAXE compilers within your application installation. This method is most suitable for commercial applications.

## Integration Process.

There are two main methods of integration into third party applications.

Experienced programmers may wish to simply redirect, trap and parse the stdout and stderr streams. This method is beyond the scope of this documentation.

However less experienced programmers will find use of the .err report file easier to integrate into their application. The .err report file is automatically generated each time the compiler is run. The filename of the report file is identical to the source file, but with the extension changed from .bas to .err

Error messages are always directed to both stderr and the .err report file.

The process for integration is as follow:

- 1) Third party application saves the text to be compiled in a temporary file in a folder that has read and write permissions e.g. test.bas
- 2) Third part application checks that the compiler file is present. If not a message to download the files from [www.picaxe.co.uk](http://www.picaxe.co.uk) should be displayed.
- 3) Third party application checks for, and deletes if present, any existing test.err report file (that may be left over from a previous download).
- 4) Third party application shells the compiler, checking the handle of the compiler (in a loop) to wait until the compiler terminates. A 10 second timeout is recommended good programming practise.
- 5) Third party application looks for test.err report file. If the file is empty (filesize 0) download was successful. If the download failed the report file will contain the error details and line/column position within the BASIC program. The third party application can then open the report file, read this data and display to the user (and optionally highlight the problem line on screen)..

Notes:

- Source code of sample VB6 and VB.net Windows applications to demonstrate this process are available at [www.picaxe.co.uk](http://www.picaxe.co.uk).
- The compiler uses 'line by line syntax parsing'. This is a 'pattern matching' system that terminates when a BASIC code line does not match one of the acceptable predefined patterns. Therefore the line/character position reported is the position that pattern matching terminates, which is **not** the same as the actual typing mistake in the BASIC line. Therefore the column position **cannot** be relied upon to indicate the exact position of the typing error within the line.
- A line/column report of 0,0 indicates a non-syntax type of error – e.g. serial port not available.
- By default the error file does not report the 'pass' situation (in this case the .err file is empty). However if you wish to have the 'pass' message also duplicated in the error report file for your application simply add a -p switch to the command line.
- The compiler is also capable of exporting a special 'simulation listing' file for implementation of software that performs on-screen circuit simulation. This is quite complex, so for further file format details please contact Technical Support directly.