

Introduction to the PICAXE Microcontroller



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Introduction to the PICAXE Microcontroller

KEY TO THIS PROGRAM

If you like this program:
Fall asleep with your head forward

If you dislike this program:
Fall asleep with your head backward.

All the heads should be forward
when I am finished :-)

Introduction to the PICAXE Microcontroller

PROGRAM OUTLINE

- History of the PICAXE
- PICAXE Processor Line
- PICAXE Commands
- PICAXE Programming
- PICAXE Sample Program and Cautions
- Sample PICAXE Project – Timer

Introduction to the PICAXE Microcontroller

I. History of the PICAXE

- Based upon the Microchip PIC Series of Microcontrollers.
- PICAXE is a pre-loaded “Basic Interpreter” or “bootstrap firmware code”.

Introduction to the PICAXE Microcontroller

I. History of the PICAXE

- Produced by a UK (British) company called Revolution Education Ltd. (Rev-Ed)
- The first PICAXE interpreter was produced in 1999 but has been vastly improved and expanded since that time.

Introduction to the PICAXE Microcontroller

II. PICAXE Processor Line

- Currently there is a wide selection of processors available in the PICAXE line.
- Available in 8 Pin to 40 Pin DIP packages.
- Available also in Surface Mount: (SOIC, and TQFP Packages).

Introduction to the PICAXE Microcontroller

II. PICAXE Processor Line

PICAXE M2 SERIES Standard Series of Controllers

Processor	Program Memory	I/O Pins	RAM	Clock
PICAXE 08M2	2048 Bytes (2K)	6	128 Bytes	4-32 MHz
PICAXE 14M2	2048 Bytes (2K)	12	512 Bytes	4-32 MHz
PICAXE 18M2	2049 Bytes (2K)	16	256 Bytes	4-32 MHz
PICAXE 20M2	2048 Bytes (2K)	18	512 Bytes	4-32 MHz

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II. PICAXE Processor Line

PICAXE X2 SERIES

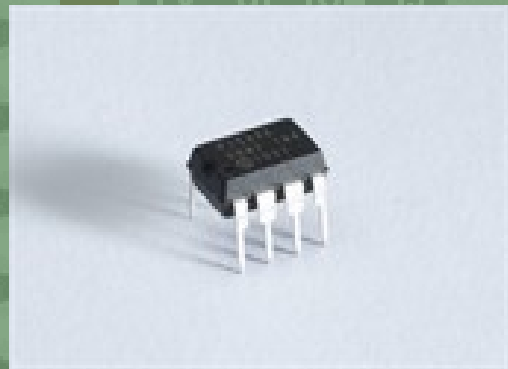
Advance Series of Controllers
More Features, Ports, and Speed

Processor	Program Memory	I/O Pins	RAM	Clock
PICAXE 20X2	4096 Bytes (4K)	18	256	4-64 MHz
PICAXE 28X2	4096 Bytes (4K)	22	1280	4-64 MHz
PICAXE 40X2	4096 Bytes (4K)	33	1280	4-64 MHz

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II. PICAXE Processor Line

PICAXE 08M2



PICAXE 14M2



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II. PICAXE Processor Line

PICAXE 18M2



PICAXE 20M2



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II. PICAXE Processor Line

PICAXE 20X2



PICAXE 28X2



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II. PICAXE Processor Line

PICAXE 40X2 – TOP OF THE LINE

600 mm DIP Package – All others 300mm DIP Package



Introduction to the PICAXE Microcontroller

II. PICAXE Processor Line

PICAXE 08M2
MODULE



PICAXE 28X2
MODULE



Introduction to the PICAXE Microcontroller

III. PICAXE Commands

- Originally, microcontrollers were programmed in assembler
- More recently, nearly all microcontroller programming is done in C++
- The PICAXE is programmed in BASIC!!

Introduction to the PI CAXE Microcontroller

III. PI CAXE Commands

Digital Input/Output Commands

COMMAND	DETAILS	COMMAND	DETAILS
High	Switch an output pin on	Pwmout	Generate a continuous pulse width modulation
Low	Switch an output pin off	Pwmduty	Set duty cycle of a pulse width modulation output
Toggle	Switch an output between on and off	Input	Set a pin as in input
Sound	Generate simple sounds	Output	Set a pin as an output
Button	Detect and debounce a pushbutton switch	If Pin	Respond to the state of an input pin

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III. PICAXE Commands

Time Delays and Variables

COMMAND	DETAILS	COMMAND	DETAILS
Pause	Pause for a defined number of milliseconds	For/Next	Repeat a loop for number of time. Return from loop
Pauseus	Pause for a defined number of microseconds	If / Else	Conditionally execute program code. Alternative
Wait	Delay for a number of seconds	Endlf	End of If / Else statement
Sleep	Sleep for a period of time	Gosub / Return	Call a routine Come back from routine
Doze	Reduce pwr consumed for a short period of time	Goto	Continue program execution from label

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IV. PICAXE Programming

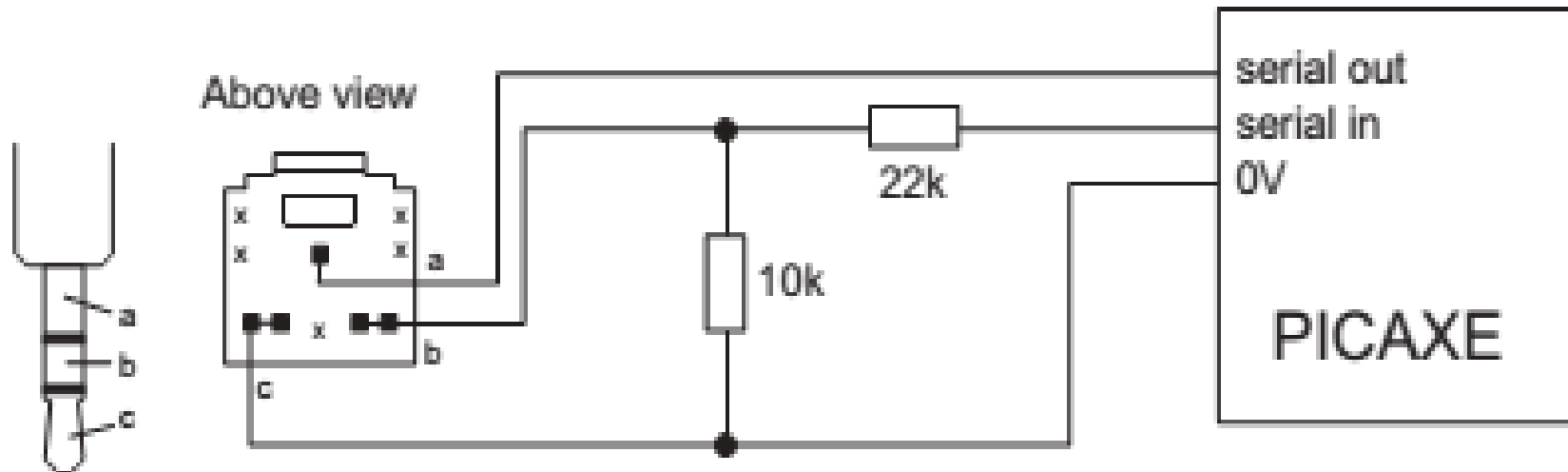
- PICAXE is programmed with a serial connection
- Programming Pins: SERIN, SEROUT, GND.
- Programming can be done with a Windows Based PC with a RS232 Serial or USB Port.

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IV. PICAXE Programming

Serial Port Programming

Can use a DB-9 Male in Place of 3.5 mm Connector



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IV. PICAXE Programming

USB Port Programming Uses a USB to Serial Adapter.



USB Serial Cable
#AXE027



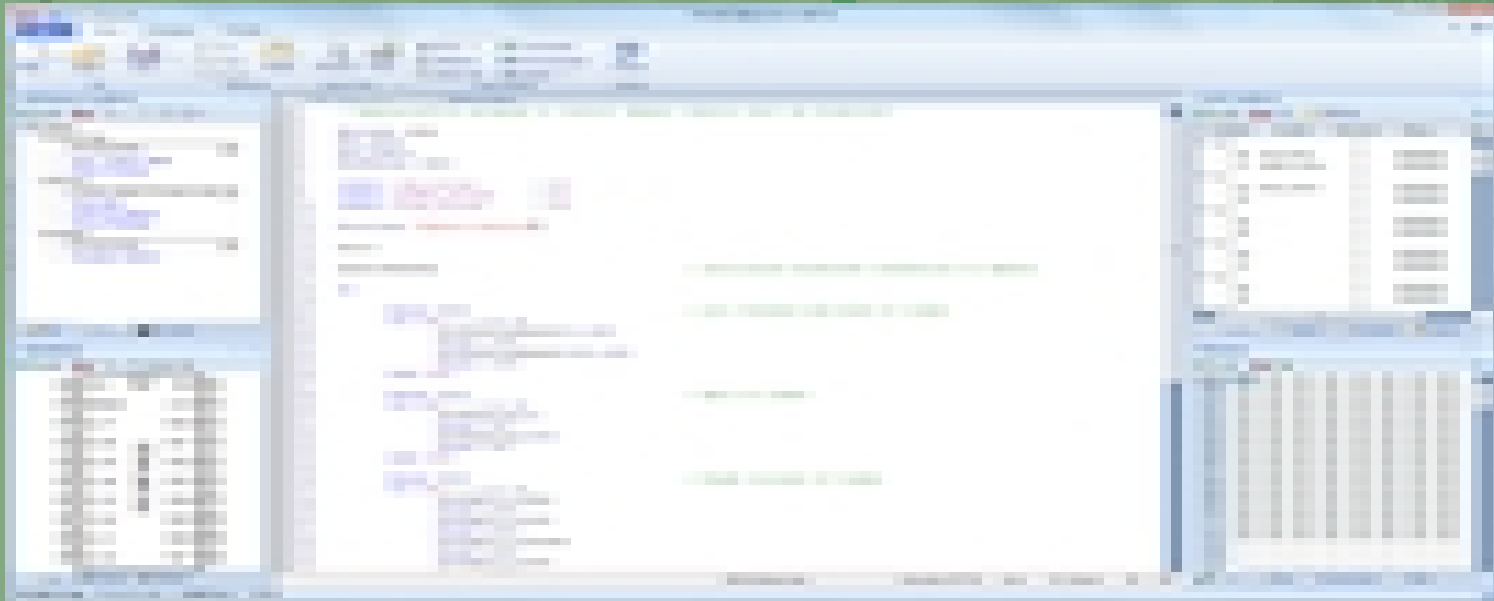
USB Serial Adapter
#AXE029

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IV. PICAXE Programming

Programming Software:
PICAXE Editor 6

(Replaces PICAXE Programming Editor V5)



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IV. PICAXE Programming

Items needed to start with
PICAXE Programming and Experimenting:

- **Computer with Windows, Linux, or Mac OS.**
More programming applications available with Windows.
- **Serial Cable or USB to Serial Converter:**
If computer has USB Ports only or if desired Port.

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IV. PICAXE Programming

Items needed to start with
PICAXE Programming and Experimenting:

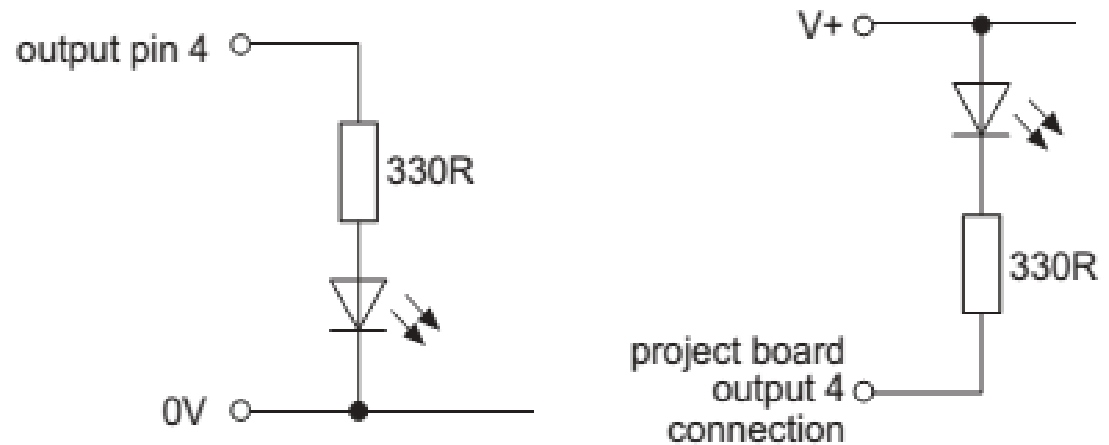
- 3VDC TO 5VDC Power Supply or Battery.
DO NOT EXCEED 5VDC.
- PICAXE Controller of choice.
- Solderless Breadboard with parts needed to breadboard desired circuit..

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V. PICAXE SAMPLE PROGRAMS AND CAUTIONS

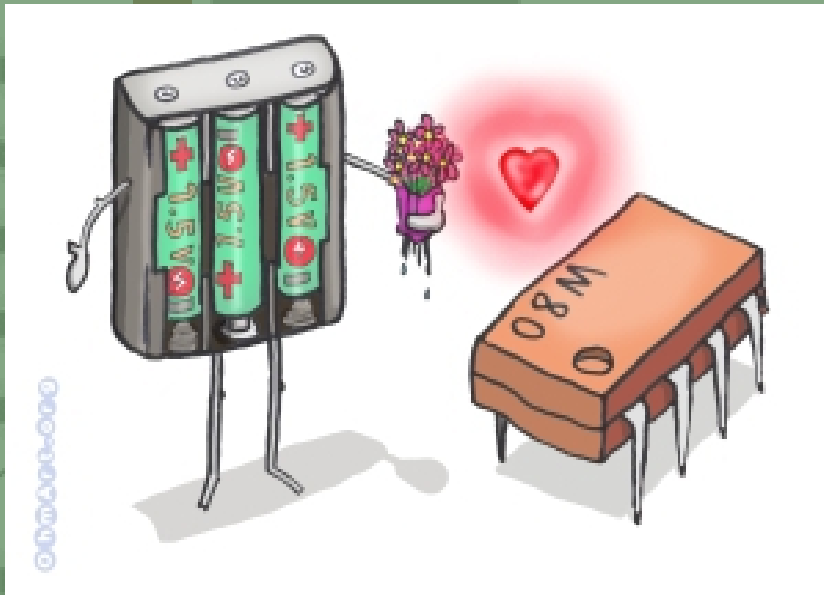
Quick Program: BLINKING LED
Turns Port 4 (PIN 3) On and off in a continuous loop.

```
main:    high 4
         pause 1000
         low 4
         pause 1000
         goto main
```



Introduction to the PICAXE Microcontroller V. PICAXE SAMPLE PROGRAMS AND CAUTIONS

Do not apply more than 5VDC to your PICAXE!!



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V. Sample PICAXE Project

DEMONSTRATION TIME:

A 3 minute or 10 minute timer with a PICAXE 08M2 Processor with less parts count than a comparable 555 Timer and the 555 Timer cannot do 2 time modes without more parts count.

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CONTACT INFORMATION

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I V. PICAXE Programming

Programming Software:

