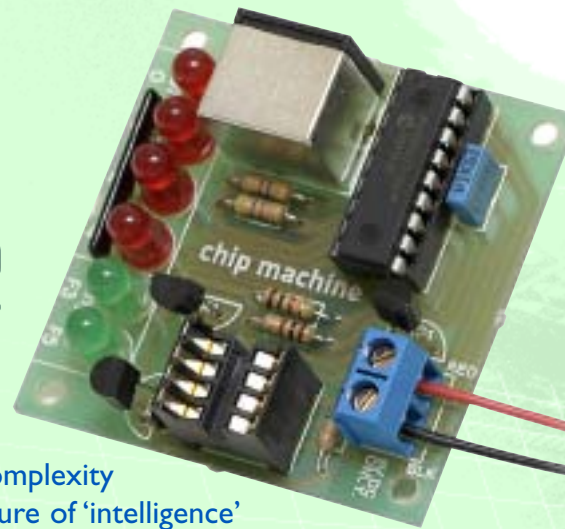


Chip Machine

The lowest cost PIC alternative



All too often PIC work is avoided on the grounds of cost or complexity and opportunities to integrate some perceived and actual measure of 'intelligence' into product designs and graphic product work is lost. Chip Machine provides a suitably robust budget addition for Key Stage 3 and some Key Stage 2 work.

Chip Machine is an ultra low-cost route into basic PIC work and is a great interim step-up from the acclaimed TEP *IQ board*. At a fraction of the unit cost of the IQ and with far greater functionality.

The Chip Machine utilises the standard **12F629 8 pin PIC** and configures it with four outputs and two inputs and uses a limited functional set of commands. Requiring quite literally just a keyboard and Chip Machine programmer this provides a flexible and mobile alternative to other PIC programmers and has no dependency on software or a computer in the classroom or workshop.

8 Pin PIC 12F629 for use with the Chip Machine. Provides four outputs and two inputs.



Setting up

The keyboard is plugged into the programmer board and the 12F629 blank PIC is inserted in the ZIF socket. Programming is via a small number of keys on the keyboard that are best identified with colours, labels or a simple keyboard mask that only exposes the required keys. Power is supplied to the programmer from a 9V battery or 6 AA batteries.



PS/2 enhanced keyboard with 6 additional hot keys. IBM compatible suitable for use with Windows 98/ Windows NT/Windows 2000.

What can it do?

The Chip Machine can program the PIC to turn any of its 4 outputs ON or OFF in any combination over a period of time. The intervals between ON and OFF can be varied. You can store up to four separate programs in the PIC. When the PIC is controlling something, switches connected to the two inputs will tell it which program to run. For example, program 1 might drive a couple of buggy motors connected to outputs 1 and 3. As soon as a switch (connected to one of the inputs) on the front of the buggy hits an obstacle, program 1 stops and the second one starts running - e.g., to sound a warning buzzer connected to output 4.

Programming

Using a simple line by line planning sheet is useful to plan a program and keep track of each line as entered as there is no screen to refer to.

There are four (4) separate program blocks and each has a maximum of 32 lines providing discrete sequences that 'loop' unless prompted by one of the two inputs to branch or GOTO the next program block. Essentially this provides a limited IF statement. If an input is pressed then the program goes to the next program block. A row of red and Green LED flags on the programmer board indicate the data or instruction entered for each line.

The four outputs are oddly numbered as 0, 1, 2, 4 and inputs are numbered 3 and 5.

Basic commands / program functions

KEY INPUT		Description of Command Flag	
Press Key N – Clears the memory in the PIC			
OUTPUT			
Press Key 0 -	Output 0 on or High	- Red LED 0 on	
Press Key 1 -	Output 1 on or High	- Red LED 1 on	
Press Key 2 -	Output 2 on or High	- Red LED 2 on	
Press Key 4 -	Output 4 on or High	- Red LED 4 on	
WAIT			
Press Key F9	Wait 1 second	NumLock	LED on
Press Key F10	Wait 2 seconds	CapLock	LED on
Press Key F11	Wait 3 seconds	ScrollLock	LED on
Program			
Press NO KEY	Program 1	2 Green LED's off	
Press Key F3	Program 2	No 1 Green LED on	
Press Key F5	Program 3	No 2 Green LED on	
Press Key F3&F5	Program 4	2 Green LED's on	
SAVE			
Press ENTER	SAVES LINE	All LED's flash on	
Program PIC – All saved lines			
Press Key P	Save to PIC	Red LED's on Green Flash once	



A row of red and Green LED flags on the programmer board indicate the data or instruction entered for each line.

Common faults with programming Chip Machine include:

- Not saving each line of program with the ENTER key
- Reversing the correct position of the 8pin PIC and not observing exactly the command input indicated by the LED flags. This is because 'dirty' contacts in the keyboard will sometimes cause no input to register or because keying in the command twice nulls or deletes the original keystroke!
- Losing your way- with a simple system like this it is easy to think you can remember the commands and sequence you input. This really is not the case and pupils should develop and record sequences in their folio and or use a line by line pre printed planning sheet.
- Not waiting for the final programming sequence of LEDs to complete before removing the PIC. This is important and easily overlooked.

Project boards

Using PIC project boards is the simplest option for running the PIC in a project and uses 3 AA or AAA batteries. They represent an economic alternative to making your own as they are supplied complete with all components except the PIC. The board features a 2003A Darlington Driver to drive output devices like lamps, buzzers, motors and of course LEDs.



Chip Machine project board supplied as a kit of parts ready for assembly. Please note that the kit DOES NOT INCLUDE the PCB terminal blocks. Inputs and outputs may be soldered directly to the board. Alternatively, PCB terminal blocks may be purchased separately.



For regular re-use in prototyping you will need to fit PCB terminal blocks so that pupils can attach and re-attach different outputs and switch inputs to the board easily.

Applications

For animated displays, games, safety devices or security projects and pupil projects requiring some basic operational 'intelligence' this should prove a useful addition to the workshop.

- Chip Machine Starter Pack – Stock code CM1 001
- Chip Machine Project Board – Stock code CM1 004
- Chip Machine Programmer – Stock code PCA 002
- 12F629 PIC – Stock code CHI 032
- Replacement Keyboard – Stock code COM 001



teaching resources

Departments with a severely restricted budget will get a great deal for a small investment. What it might lack in sophistication it amply repays in simplicity and low cost. Chip Machine is not intended for serious electronics based teaching but as an introduction to PIC work and sequential programs.

If you are using Chip Machine in an interesting project or application we would like to hear from you.



Single Chip Machine project board supplied fully assembled. The board includes PCB terminal blocks for easy connection of switches and output components. Simply plug in a programmed PIC, connect a battery and it's ready to go!