

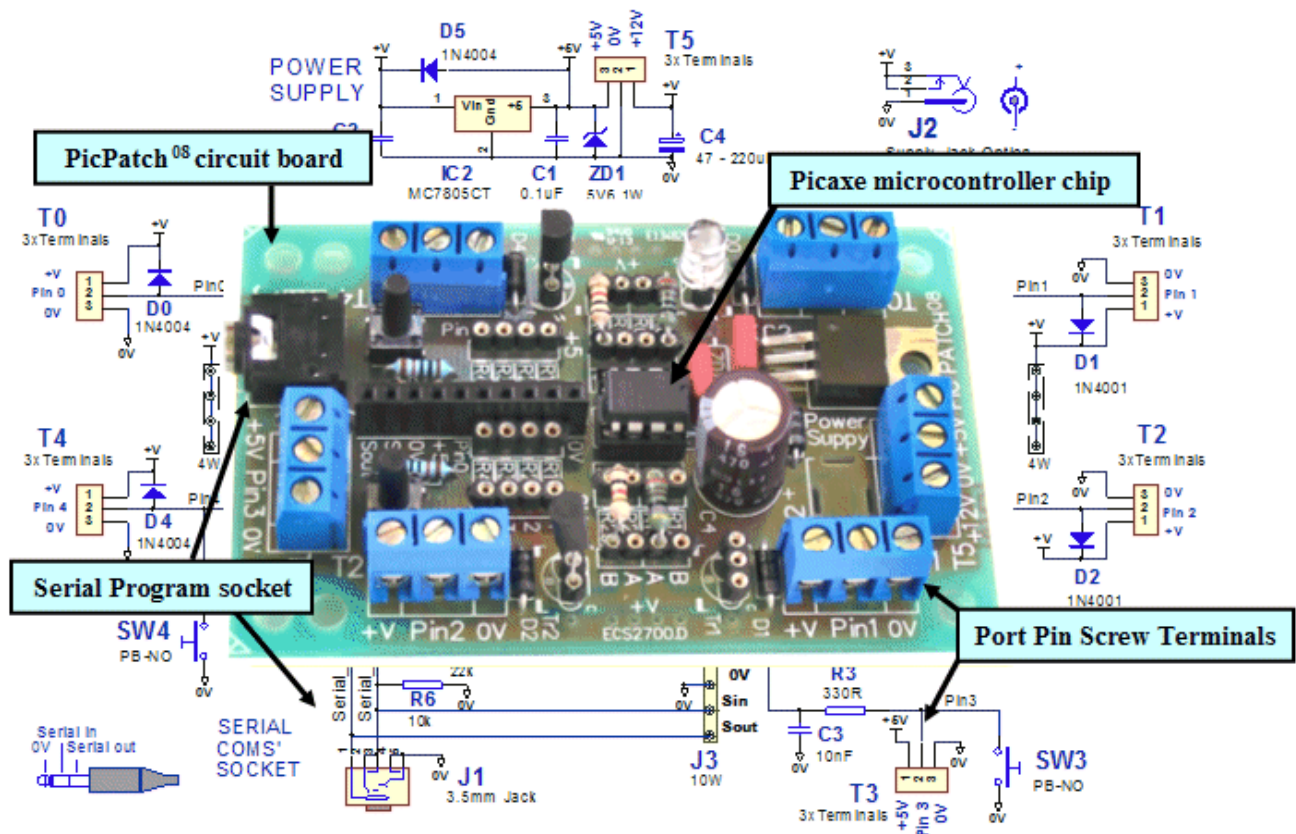


How to get started with

PicPatch⁰⁸

The beginners guide to microcontrollers and electronic projects using PicPatch™

- Do you want to have fun learning electronics and applying your knowledge in practical ways?
- PicPatch will help you start and develop your own electronic microcontroller project at little cost.
- This data sheet is a simple introduction and guide to help you get started.



Introduction

Today Electronics and Micro control technology becomes more integrated in everyday life worldwide with smarter consumer products and services. This technology provides a very wide area of career opportunities and is fun to work with. However for most people this technology may seem too difficult to understand therefore it is important this technology is made more accessible at a level that can be simply understood and acquired.

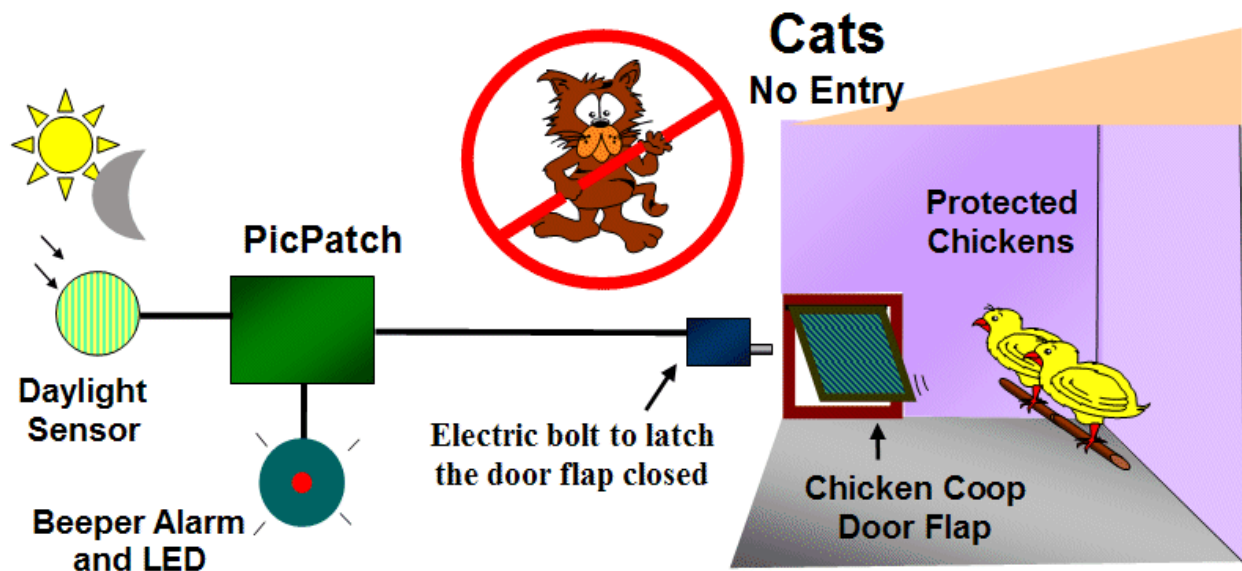
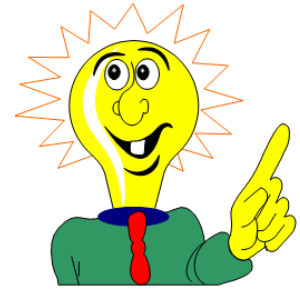
To help bridge this gap PicPatch™, a trade mark of KEI Ltd, is a project application board used for small electronic microcontroller systems. KEI will provide a variety of projects to help you learn and build simple control systems, where ultimately you can develop projects suitable for your own applications. This document explains in simple step by step illustrations where to go and what to do. Other documents also available include the PicPatch Data Sheet and Assembly Instructions.

What can you do with PicPatch?

PicPatch is a circuit board that can be assembled and easily adapted to suit an unlimited number of small control system applications. Anyone keen to have fun will be able to build a simple electronic microcontroller system.

There are endless examples of what you can use PicPatch for. An example would be using a day light sensor to detect when it is evening and locking the door flap of a chicken coop so that during the night the neighbour's cat can not get access. A beeper sounds momentary in the house to let you know when the flap has been locked and again in the morning when the latch has been released.

If you have your own cat and you would like to know when it is safe to put the cat out at night, a Light Emitting Diode (LED) could be used to indicate when the door flap is locked.



Practical example: Chicken Coop Door Lock.

How do you use PicPatch?

The PicPatch microcontroller circuit board can be set up in various ways with different components and software program to accommodate different applications. The PicPatch⁰⁸ uses the Picaxe 08 microcontroller, which is a trade mark of Revolution education, who have developed a Software Editor program which you can download for free from www.picaxe.com Website.

It is important to consider the application requirements before you decide on which PicPatch project board to use. For your first projects the PicPatch⁰⁸ is a good way to start learning about electronics and programming software. The information available is simple to understand with step by step guides on what to do or where to go to find helpful information.

Overview

The following diagram illustrates some examples what is used to develop a microcontroller system.

1. Personal Computer -

Initially used to program the microcontroller

2. PicPatch -

Microcontroller project board

3. Sensors -

Light, Heat, Switches, etc

4. Electromechanical -

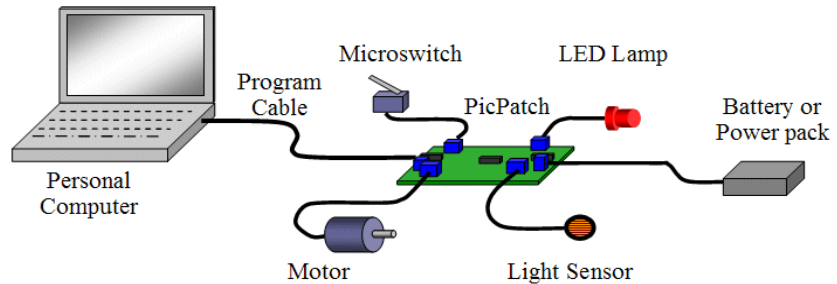
Motor, Solenoid, Relays

5. Indicators -

Light, LED, Speaker, Beeper

6. Power Supply -

Battery pack or Power pack



PicPatch kitsets

Depending on your experience there are several kitset options available.

Elementary Kit:

This kit is suitable for those who have had no experience in electronics and who may just wish to find out a little more about what electronics can do and how to program a microcontroller.

Essentially not much damage should occur if a component was connected incorrectly.

The Elementary kit provides the PicPatch circuit board, the microcontroller, a 4.5V battery pack and the components to assemble the PicPatch circuit board.

An assortment of components are provided to help build the first level of projects, these include:

- Light sensor for detecting variation in light intensity LDR (Light Dependant Resistor)
- Thermal sensor for detecting temperature NTC (Negative Temperature Coefficient) Resistor
- Light indicator for visual information and effects LED (Light Emitting Diode)
Blue, Green, Orange and Red.
- Beeper for audible indication and sound effects, Ceramic Disk resonator

An assortment of resistors and transistors are provided to help interface with these and other devices to the microcontroller. Examples of how to interface these devices are presented in the Basic Editor program under Help list in the "Picaxe Manual 3 – Interfacing circuits".

Other examples of projects and circuit ideas are presented at the KEI website or in published articles in various electronic magazines and electronic books.

Standard Kit:

This kit is more suited for those who have had a some experience with electronics and understand what is required to avoid damage to the microcontroller chip such as over voltage or over current. The Standard kit includes all of the components of the Elementary Kit, doubles the number of sensors and LEDs, and adds the following:

- Rotary Potentiometer - Variable level control and position sensing
- 25mm 8 ohms Speaker - Louder sound effects
- Piezo Beeper - Audible alarm sound
- Small electric motor - Mechanical movement control and speed sensing
- 10 way socket - For a circuit board expansion port
- 2x Push button switches - Manual control operations
- 5 volt Voltage Regulator - Operation from higher voltage supplies (9V to 24Vdc)

Advanced Kit:

This Kit comes with the Picaxe 08M microcontroller which is suitable for more advance applications. The Advanced kit includes all of the components in the Elementary and Standara Kits including the following:

- Infrared LED and
- Infrared Reciever IC - For Infrared remote control applications
- Microswitch (50mm lever) - Suitable and a trip switch for alarm system applications
- 2x 4 Pin headers - Connection to 1-wire remote thermal sensors and servo motors
- 2.5mm DC supply Socket. - DC Power jack socket for Power Pack supply

These kits will provide many hours of learning and entertainment; the interaction of light, thermal effects and mechanical movement can be sensed and acted upon in many ways with the use of the microcontroller. It will open opportunities to experiment and adapt projects that ultimately provide practical application tools as well as permanent project applications.

Step 1. Preparation.

Get the right equipment, tools and materials that you will need to construct the PicPatch. You will need:

1. Soldering Iron with a small diameter tip (preferable temperature controlled to approximately 310°C), a soldering iron stand and a damp sponge for cleaning the iron tip.
2. Safety glasses to protect your eyes while trimming component leads.
3. A test multimeter which can measure voltage (Volts), resistance (Ohms) and current (Amps).
4. Small side cutters, Small needle nose pliers and small screw driver with a 2.5 - 3mm flat blade.
5. Solder wick reel or Hand operated desoldering pump for removing unwanted solder bridges.
6. Personal Computer with an RS232 serial com port. If your PC has only USB com ports available you can contact your local Electronic or Computer retail outlet to purchase a USB to RS232 converter unit.
7. 3x 1.5V AA Batteries.
8. Any additional tools and material suitable for your application such as a wire stripers, antistatic mat and wrist strap, hot glue gun and glue sticks.



Step 2.

Purchasing the right PicPatch Kitset. This will depend on your experience and component resource. Visit www.kei.co.nz and order online the required kitset and program cable.

If you are an education provider such as a school or polytechnic etc then you are entitled to a discount. You will need to register on line when you purchase the kits.

Note: Remember to order a programming cable if you do not already have one.

You can download the PicPatch Data Sheet and a simple Level 1 project data sheet.

Step 3.

Download the **Picaxe microcontroller Editor** program from www.Picaxe.com website and install it onto your PC. You will be required to log into this website and supply your contact details and Email address. You will then receive by Email an access code to operate the editor program once it has been installed.

Step 4.

Download the PicPatch data sheets and help files from www.kei.co.nz and read them carefully before going on to step 5. Assembly instructions area available in colour from this website. The KEI help files include such information as Good soldering practices.

Step 5.

Assemble the PicPatch circuit board according to the assembly instructions that are provided with the Kitset.

Note; Take special care to identify and correctly place the correct components and keep the solder joints clean and tidy as per the soldering instructions.

Step 6.

Preliminary testing. Follow the instructions to make sure there are no short circuits or poor connections and that the PicPatch is communicating correctly.

Connect the various components into the 4 pin Single-In-Line (SIL) sockets as instructed for the flashing LED project and develop in the Editor program the software program as listed.

Connect the serial cable supplied in the kit to the COM-1 RS232 port of your computer. Switch on the power switch on the Battery Pack and press the ► to download the flashing Led program into the microcontroller. There will appear a line of blue segments indicating the program is downloading into the microcontroller chip.

This first program is to help you become familiar with the Editor program, the Basic programming language. It also verifies that the Picaxe microcontroller is communicating and that there are no short circuits, missing components or poor connections in the communication circuit and between the supply +5 to 0V.

The Basic program instructions are explained in the Help button menu on the Editor program under "Picaxe Manual 1 – Getting Started" and "Picaxe Manual 2 – Basic Commands".

References:

"PicPatch" is a trade mark of KEI Ltd.

"Picaxe" is a trade mark of Revolution education.

"Pic" is a trade mark of Microchip Technology Inc.

Websites:

For the PicPatch project board and other information contacts visit www.kei.co.nz

For the Revolution Education Picaxe Basic Editor Program visit www.picaxe.com

Reference Material:

- PicPatch⁰⁸ Data Sheet – Technical description and circuit configurations.
- PicPatch⁰⁸ Assembly instructions – Assembly, inspection and preliminary testing.
- PicPatch⁰⁸ Projects – Project ideas and information.

Environmental:

Keeping environmental friendly –

- The PicPatch kitsets are supplied with lead free solder.
- We ask if you dispose of any materials to discard them in the appropriate way.
- Keep the carton which the kit comes in for storing your assembled PicPatch.

ATTENTION!**Personal Safety Precautions.**

We wish to advise our customers that when assembling any kitset product, follow good safely practices wear appropriate safety equipment and keep your worksite safe and tidy.

Electrical Safety Precautions.

Before commencing electrical work which involves voltages in excess of 32Vac or 50Vdc seek advice from your local electrician, qualified service technician or training provider.

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