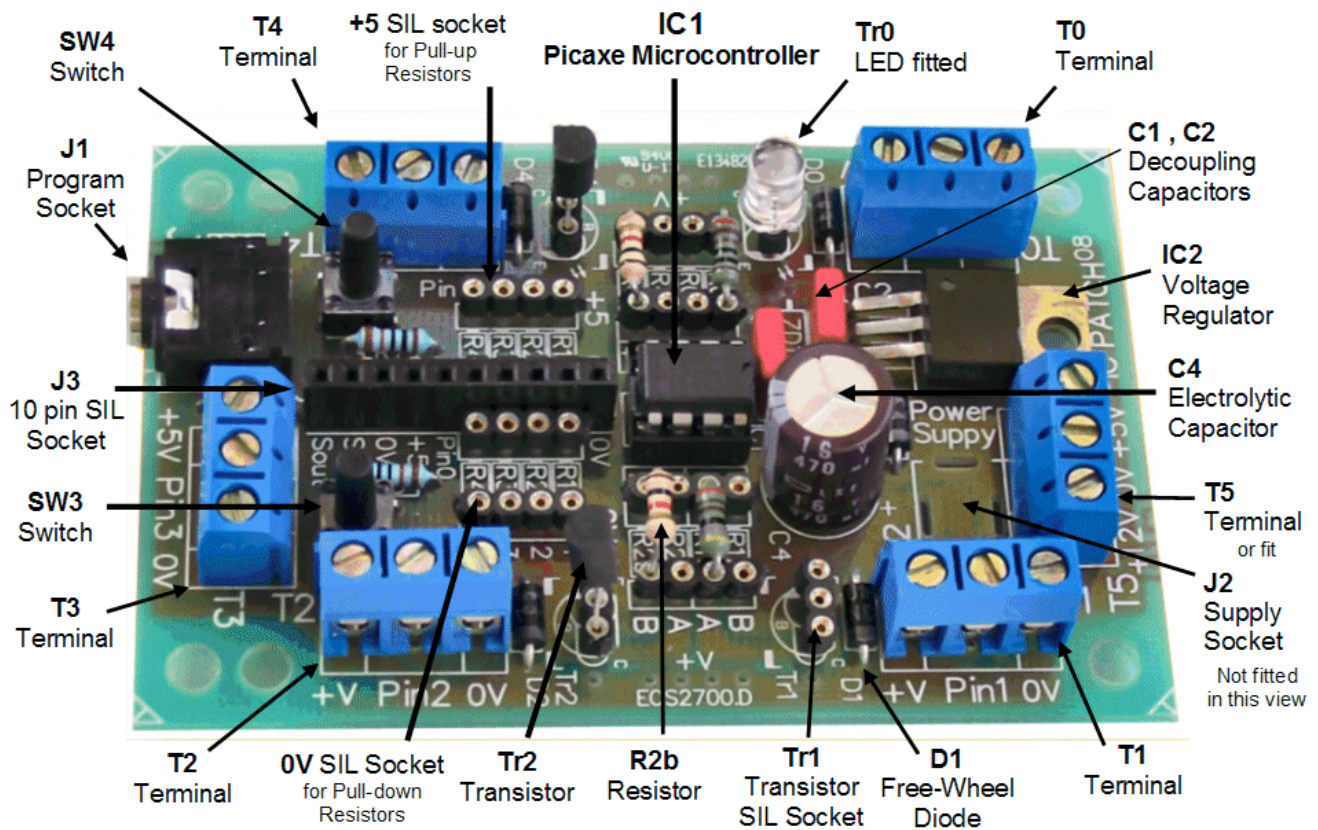


## DATA SHEET



## PicPatch<sup>08</sup>

### Microcontroller Application Circuit Board

#### Data and Specifications

- The multipurpose microcontroller interface.
- Suitable for education and permanent control system applications.
- Document A000084 Rev D PicPatch<sup>TM</sup> Series Data Sheet

## PIC Microcontroller Patch Board

PicPatch<sup>08</sup> microcontroller interface circuit board adaptable to suit different applications.

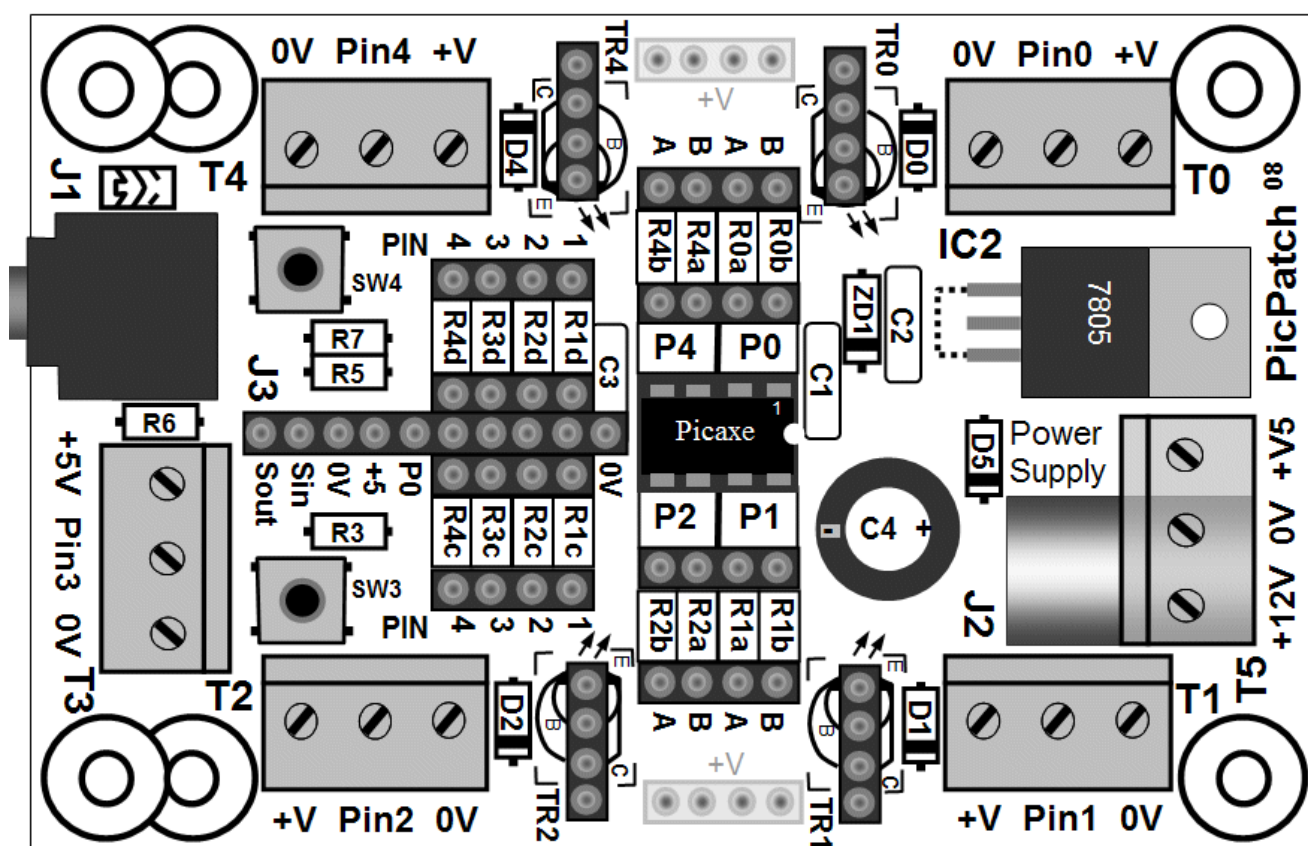
### FEATURES

- Suited for Picaxe08 and Picaxe08M 8 pin Pic microcontroller patch board.
- Power supply options with or without 5V voltage regulator.
- Power supply socket or screw terminal option.
- Serial programming via RS232 serial communication network.  
Serial-Out pin common to port pin 0
- Reconfigurable networks on IO pin ports.
- 10 Way Expansion port connector.

**TABLE 1**

PicPatch Port Pin configurations		
Software Terminal Designation	Micro IC1 Pin no.	Possible Circuit Configuration
<b>Pin 0</b>	<b>IC1-7</b>	Transistor output and Serial-Out
<b>Pin 1</b>	<b>IC1-6</b>	Input / Transistor output Analogue input
<b>Pin 2</b>	<b>IC1-5</b>	Input / Transistor output Analogue input
<b>Pin 3</b>	<b>IC1-4</b>	Input
<b>Pin 4</b>	<b>IC1-3</b>	Input / Transistor output Analogue input

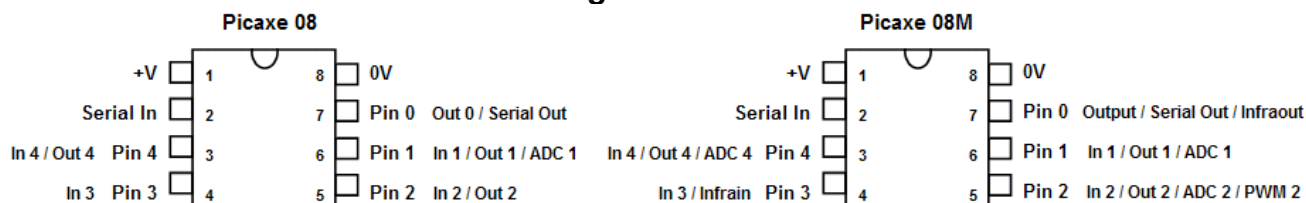
**FIGURE 1. PicPatch<sup>08</sup> Printed Circuit Board (PCB) Layout**



### APPLICATIONS

Suitable for general purpose type control systems with sensor inputs, output driver devices and serial communication to a remote computer programming and monitoring station.

Ideal for electronic education to demonstrate the fundamentals of basic software programming, electronic sensor interfacing and output driver devices such as an LED, lamp, relay, solenoid, small electric motor, Piezo beeper, magnetic beeper, etc.

**FIGURE 2. Microcontroller Pin Configuration**


## DESCRIPTION

The PicPatch<sup>08</sup> is a small 8 pin microcontroller circuit board that can be easily adapted and programmed for low budget control systems and remote monitoring applications. Basic applications may include robotics, musical door bell, intruder alarm system, weather monitoring, irrigation and environmental process control. Interfacing sensors and output control devices to the Pic Microcontroller chip is both simple and quick to assemble. "Pic" is a trademark of Microchip Technologies.

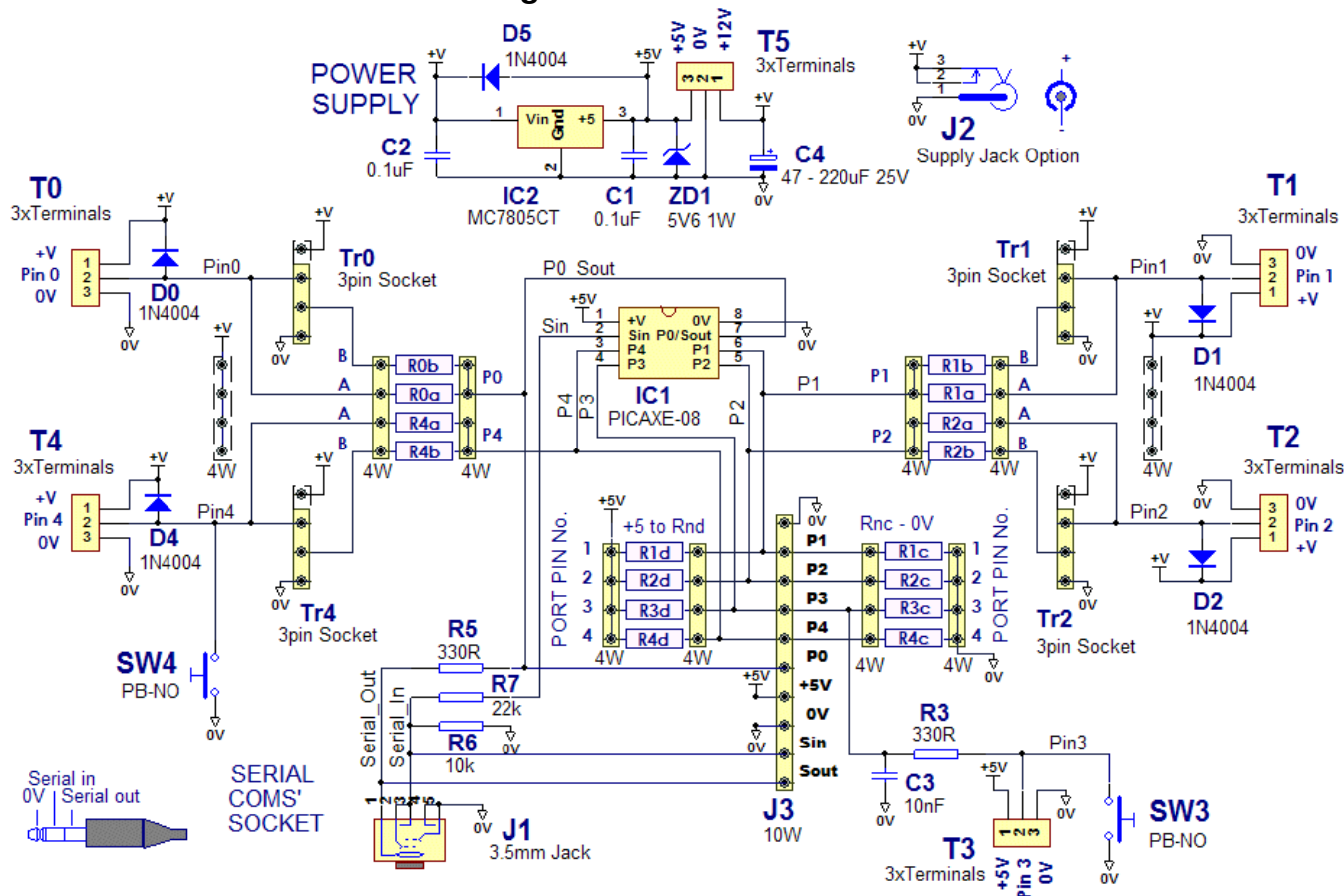
The PicPatch<sup>08</sup> has provision on the circuit board for circuitry to be assembled for each microprocessor port pin which provides the flexibility to interface and configure circuitry suitable for various sensors and output devices.

This interface circuitry network can also utilise single inline (SIL) component sockets which will provide quick component insertion and replacement.

Should the SIL sockets be used a soldering iron is only required initially to assemble the circuit board.

This easy interfacing provides a valuable education tool for teaching basic electronics and developing a custom made multipurpose micro control system that can be reprogrammed for different applications.

Utilising the Picaxe 08 or Picaxe 08M microcontroller chip, which is a trade mark of Revolution Education, their Basic Editor program provides the user with a complete microcontroller system that is very quick to learn and simple to develop. Refer to last page for contact details.

**FIGURE 3. PicPatch<sup>08</sup> Circuit Diagram**


## OPERATION

The PicPatch<sup>08</sup> has four INPUT / OUTPUT port pins and serial communication, Transmit “SERIAL OUT” and Receive “SERIAL IN” port pins for communication to the Personal Computer (PC).

Port pin 0 is the same port as the Serial-Out pin, if a beeper is connected to PIN 0 a squeal sound will be heard as information is sent from the PIC microcontroller to the PC.

The PicPatch<sup>08</sup> circuit diagram Figure 3 and the circuit illustrations for each port pin (See Fig. 4 to 8) will be used as a basic guide for configuring the interface circuitry.

Refer to the Revolution Education and Basic editor program manual for details on developing software programs suitable for the PicPatch<sup>08</sup>.

Remember to configure the port pins according to the application examples illustrated in the manual. Failure to do so may cause undesirable side effects or possible component damage.

## COMPONENT LIST TABLE 2 Main components list

<b>*Note:</b> For 4.5Vdc battery pack replace IC2 with a wire link between Pins 1 & 3. See dotted line in Fig.1.				
Quantity	DESIGNATORS	VALUE	COMPONENT	COMMENT
2	R3, R5	330Ω 1/4W	Resistor	Orange, Orange, Black, Black
1	R6	10kΩ 1/4W	Resistor	Brown, Black, Black, Red
1	R7	22kΩ 1/4W	Resistor	Red, Red, Black, Red
5	D0, D1, D2, D4, D5	IN4004	Diode	Check orientation.
12 +2	2x R1a, R1b, R2a, R2b. 2x R0a, R0b, R4a, R4b. 2x R1c, R2c, R3c, R4c. 2x R1d, R2d, R3d, R4d. 4x TR0, TR1, TR2, TR4. *Optional 2x +V Rails.	4 pin SIL Single-In-Line socket	SINGLE-IN-LINE Sockets	If a multiple pin SIL socket is supplied cut into groups of 4 pins using a sharp blade knife or small sharp blade side-cutters.
2	C1, C2	100nF 25V	Capacitor	0.1uF Supply Decoupling.
1	C3	10nF 25V	Capacitor	0.01uF Signal Filtering.
1	IC1	Picaxe08/M Pic Micro	Microchip Tech <sup>7</sup> Revolution Education	<b>*Check orientation Indent</b>
2	SW3, SW4	Switch	Push button Switch	Push pins into PCB one side at a time
1	C4	47 to 220uF 25V	Electrolytic Capacitor	Check (+) orientation
6	T0, T1, T2, T3, T4, T5*	3 Terminals	Terminal Block	Place with wire entry holes facing out
1x	J1	3.5mm Socket	3.5mm Jack Socket	Serial Com Program Port
1x	IC2	MC7805 / LM7805	5V Voltage Regulator	Check orientation
1x	ZD1	5V6 1W	Zener Diode	*Optional transient protection
1x	J2	Supply Plug	2.5mm DC pc mount	*Alternative option for T5
1x	J3 (*Can not fit C3)	10 pin Socket	2.5mm SIL Socket	*Optional expansion port



## **POWER SUPPLY NOTES**

### **4.5V Battery operation: (3x AA Battery pack)**

For 5V Regulated Power Packs and 4.5V Battery supplies place a wire jumper to link pins 1 & 3 of IC2, Refer to dotted line on Figure 1.

Check capacitor C4 pin alignment is correct for (+) and (-) polarity.

Placing C4 is optional for battery operation but we recommend fitting C4 for all motor and relay applications. For larger transient current loads in excess of 200mA, increase the capacitor value by 100uF for each 100mA increase in loading.

### **12V to 24Vdc Power pack or battery operation:**

For supply voltage in excess of 5.5Vdc fit IC2 the 5V Voltage Regulator.

The maximum load is 50mA without a heat sink fitted and 100mA with a heat sink fitted.

If the load current on the +5V rail exceeds 50mA the regulator will get hot and may shut down to protect itself from over heating. If the regulator exceeds 70°C fit an “L” shaped aluminium heatsink between the regulator tab and circuit board to improve heat dissipation. Use a M3 machine screw, spring washer and M3 nut to fix the heatsink and regulator to the circuit board.

## **PORT PIN CONFIGURATION**

The PicPatch<sup>08</sup> circuit board is designed specially to use the Picaxe 08 or Picaxe 08M microcontroller chips, which is a trade mark of Revolution Education. Pic is a trade mark of Microchip Technologies series of 8 pin Pic Microcontrollers. The Picaxe Editor Program, download from the Revolution Education Website, has examples of how to program the microcontroller chip and various circuit configurations that can be implemented on the PicPatch circuit board.

Information provided by KEI Ltd on projects using PicPatch<sup>08</sup> will use this data sheet as a reference guide to describe and illustrate how to connect each configuration of components suited to the application.

The components on the circuit board are numbered to help identify the Pin naming associated with each

port pin on the microcontroller. The resistors on the circuit diagram in Figure 2 use the port pin number, however in the following circuit examples we will use the letter “n” as a substitute with the port pin number. E.g. Rna Rnb Rnc Rnd. Refer to Figures 1, 3 and 4 to 8.

Rna – These resistors connect directly between the micro pin and the associated terminal connector centre screw terminal. If the micro pin is configured as an input this resistor is fitted in conjunction with a filter capacitor fitted across the micro pin to 0V. This provides filtering of unwanted electrical noise and improves immunity from Electrostatic Discharge (ESD). If the micro pin is configured as an output this resistor provides current limiting such as driving an Light Emitting Diode LED, or impedance protection to guard the micro pin from over-current from potential short circuits to neighbouring supply rails 0V,+5V,+V etc.

Rnb - When the micro pin is configured as an output to drive a Transistor these resistors, which connect between the micro pin and middle pin of the transistor SIL socket, are used to limit the base current to a transistor. The centre pin or base “B” pin for BC546, BC337 Transistors.

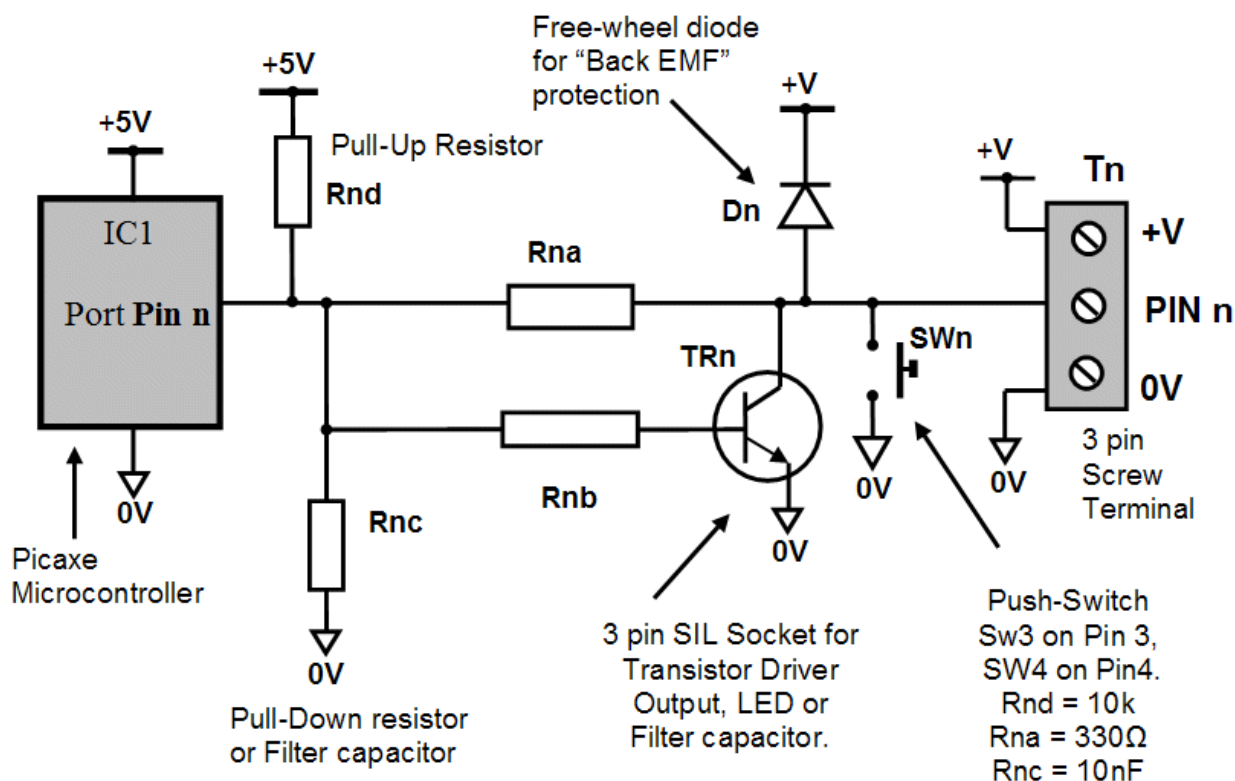
Rnc - These resistors connect directly between the micro pin and the 0V supply rail.  
This position is used for a “Pull-Down” resistor or input filter capacitor position.

Rnd - These resistors connect directly between the micro and the +5Vdc supply rail.  
This position is used for a “Pull-Up” resistor.

Port pins 0 and pin 3 do not have some resistors as listed, as these pins have limited functions with some Pic microcontrollers.

The following diagrams illustrate typical port pin circuit configurations.

**FIGURE 4. Port pin 1, 2 & 4 circuit diagram (Output / Input / Analogue Input)**



**FIGURE 5. Port pin 0 circuit diagram (Serial Out / Output / Infraout)**

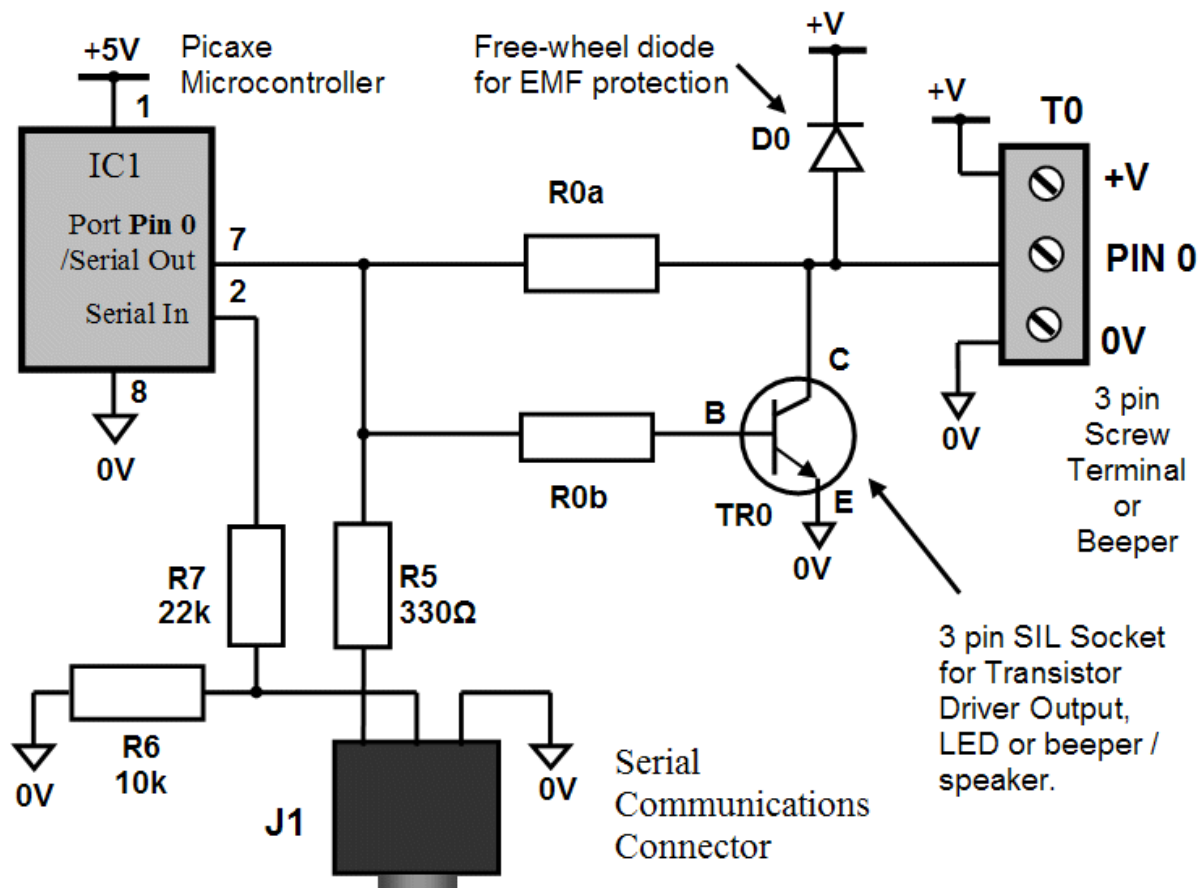


FIGURE 6. Port pin 3 circuit diagram (Input / Infrain)

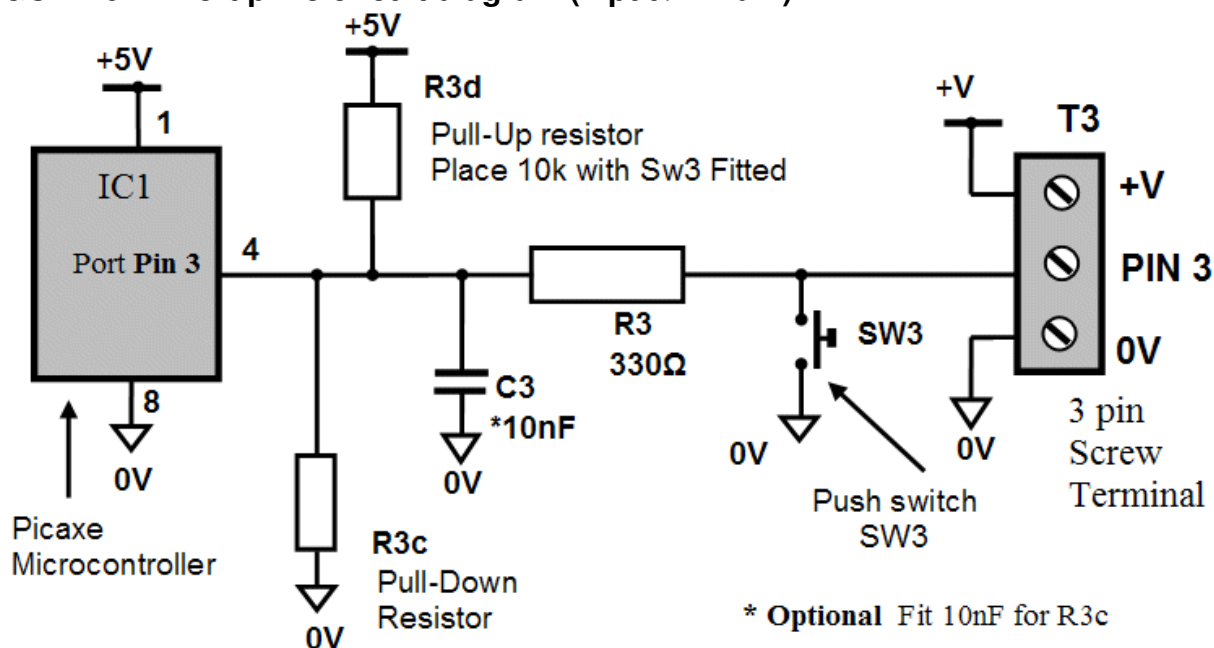


FIGURE 7. Transistor driver circuit diagram ( Pins 0,1,2,4 ).

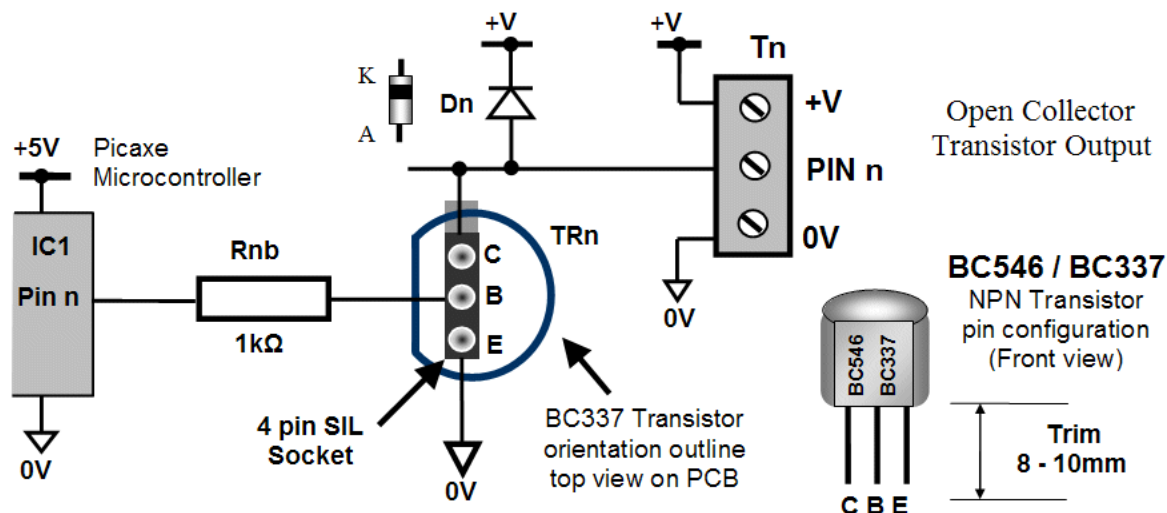
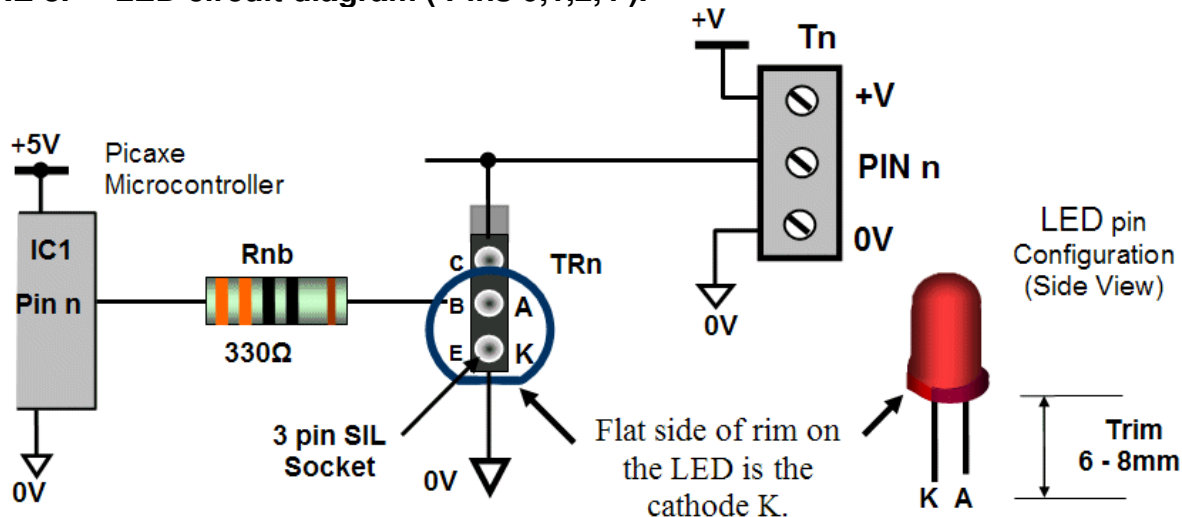


FIGURE 8. LED circuit diagram ( Pins 0,1,2,4 ).



**TABLE 3. Quick Reference Electrical Specifications**

**Important – Do not get confused with IC1 pin number and the pin Name used in Software.**

IC1 Pin No.	Editor Pin Name	Description	Electrical Specifications
1	Positive	Power Rail	3 to 5Vdc (Positive 5Volt Rail) 2 or 3x 1.5Vdc Batteries Idle No Load Current draw = 600uA Sleep Nap No Load Current draw = 100uA
2	Serial In	Program download	Digital Out High = Supply voltage – 0.1V (No Load) Digital Out High = 12mA out to 0V Rail Digital Out Low = 0.0V (No Load)
3	Pin 4	Input / Output Analogue Input <b>08M</b>	Digital Out High = 27mA in from +5V Rail Digital In 1 = High >= 0.9V
4	Pin 3	Input	Digital In 0 = Low <= 0.85V ADC In 0.0 Volts = 0 (08 and 08M)
5	Pin 2	Input / Output Analogue Input <b>08M</b>	ADC In 50% Supply Voltage = 128 ADC In 66.6% Supply Voltage = 160max Picaxe <b>08</b> ADC In 100% Supply Voltage = 255max Picaxe <b>08M</b>
6	Pin 1	Input / Output Analogue Input	PWM Out 128 = Average half Supply Voltage PWM Out 255 = Maximum Supply Voltage - 0.1V
7	Pin 0	Output Serial Out	Also used for program download
8	0V	Ground Rail	0V (Ground or Zero Volt Power Rail)

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