

PICAXE-08M SERVO DRIVER (AXE024)

Description:

The PICAXE-08M servo driver board is primarily designed to allow the PICAXE-08M chip to control up to three radio control style servos for robot models. It is also designed to be compatible with the AXE045 colour sensor module for colour detection and sorting projects.

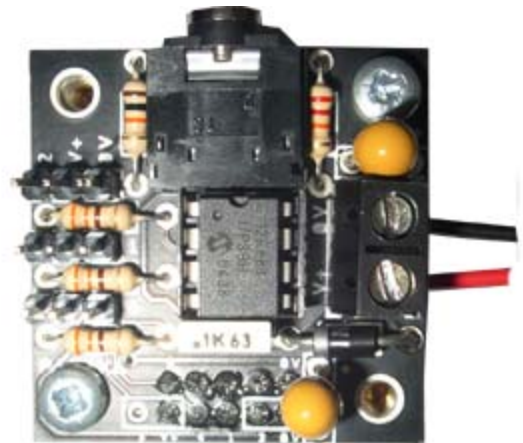
Assembly Overview:

The servo driver board is a high quality plated through PCB and is therefore relatively straight forward to assemble. However a number of the electronic components are polarised, so please ensure these components are fitted the correct way around before soldering (see table below).

Tools required (not supplied):

- Soldering iron and solder
- Side Cutters
- Small pair of pliers

Soldering experience is assumed.



Contents:

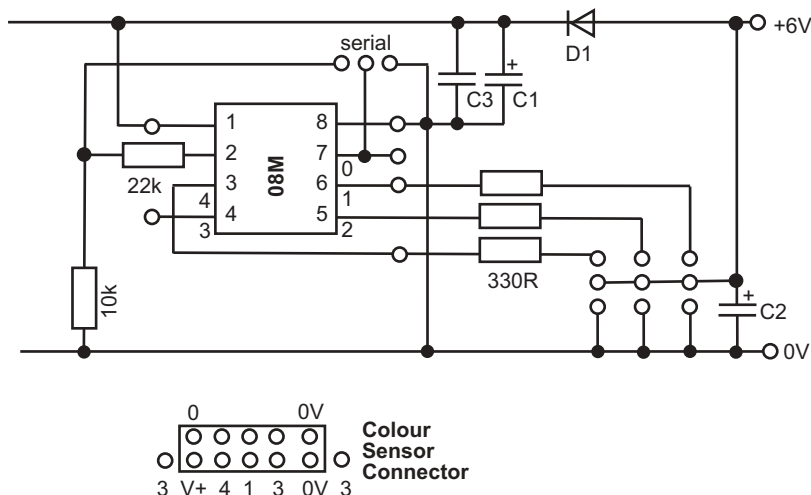
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|--------|---------|---|
| • PCB | AXE024 | PICAXE-08M Servo Driver PCB |
| • IC1 | ICH008 | 8 pin IC socket |
| • IC1 | AXE007M | PICAXE-08M microcontroller |
| • H1-3 | CON037 | 10 way header (snap into 3x3 way) |
| • R1 | RES22K | 22k resistor (red red orange gold) |
| • R2 | RES10K | 10k resistor (brown black orange gold) |
| • R3-5 | RES330 | 330 resistor (orange orange brown gold) |
| • C1-2 | CAP012 | 33uF tantalum capacitor |
| • C3 | CAP001 | 100nF (104) polyester capacitor |
| • D1 | RES041 | 1N4001 diode |
| • CN1 | CON039 | 3.5mm stereo socket |
| • CN2 | CON005 | 2 pin screw terminal block |
| • BAT | BAT016 | battery clip |
| • BAT | BAT011 | 4 x AA battery box |

*** +, - marked on PCB

*** bar end marked on PCB

(*** denotes components which must be soldered the correct way around. See notes above).

Circuit Diagram:



Assembly Instructions:

1. Solder the resistors and diode in position, ensuring correct polarity of the diode.
2. Solder the stereo download socket sockets in position. Ensure the stereo socket 'clicks' into position flat on the PCB prior to soldering (it does not matter if solder joins the two 'pairs' of contacts each side).
3. Solder the 8 pin IC socket in position. Note that due to an unavoidable change in brand of the stereo socket, clearance between the IC and stereo socket is now very tight. Ensure all 8 pins of the IC socket can be soldered by pushing the socket in place at a slight angle.
4. Solder the capacitors in position. Ensure correct polarity of the two tantalum capacitors (long leg is +ve).
5. Solder the 3x 3-pin headers (snapped to size from 10 way header) and the 2 way terminal block in position.
6. Insert the PICAXE-08M microcontroller supplied into the 8 pin socket, pin1 to the left.
7. (Colour sensor only) Solder the 2x5 way socket (part CON045- provided separately) to the underside of the PCB (ie solder joints on top of PCB). See the AXE045 datasheet for more details.

Using the Servo Driver Board with the AXE045 Colour Sensor:

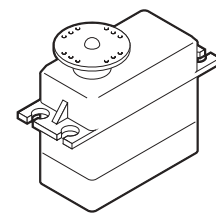
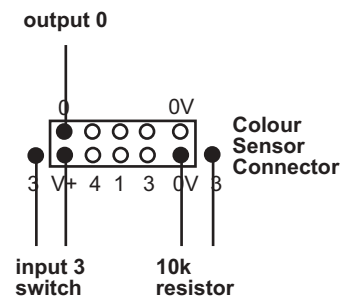
Please see the separate AXE045 Colour Sensor datasheet.

PICAXE-08M Input/Output Pin Connections:

Outputs 1, 2 and 4 are connected to the three pin servo headers. The three pins provide 0V, V+ and signal. Although these pins are normally used as outputs, they may also be used as inputs if desired.

Output 0 is connected to the top left pad of the 2x5 way connector (see diagram). This pin may only be used as an output. Remember that this output is also used as the serial output pin and so will 'pulse' on and off during a new PICAXE program download.

Input 3 is connected to a centre pad, and also to the two pads either side of, the 2x5 way connector. It may only be used as a digital input. When used with an input switch the two switch contact wires should be connected between the two pads on the left marked 3 and V+ (see diagram). A 10k pull-down resistor should also be connected between the two pads on the right (marked 0V and 3) as shown by the diagram.



Connecting Servos:

Each servo should be connected to the three pin header (output 1, 2 or 4). The black wire of the servo should be connected to the inner pin (yellow/white on outside).

Power Supply:

The servo driver board is designed to operate at 6V (4 x alkaline cells) or 4.8V (4 x rechargeable cell). A diode provides a 0.7V voltage drop before the PICAXE chip, which therefore operates at an acceptable maximum of 5.3V. **Do not** use a 7.2V or 9V battery pack without regulating the PICAXE supply to 5V, as this will damage the PICAXE chip. The board will also operate from a regulated 5V or 6V DC supply.

Electrical Noise:

Servos can produce a large amount of electrical noise whilst operating. If your program behaves erratically, particularly resetting often, this can be a symptom of electrical noise on the power rails. Simply remove the servo and test the program again - if normal operation follows removal of the servo this will isolate the problem to noise from the servo. Use further capacitors to suppress the noise on the power rails.

Sample Program:

This sample program will operate the MOD025 servo bug model. The bug will move forward by use of three servos on the outputs 1, 2 and 4.

```
**** Program constants
' Delay to slow down servo motion (30ms default)
  symbol servo_delay = 30

**** Initialisation
init:
' set servos to known position
  servo 1,120
  servo 2,120
  servo 4,120
  pause servo_delay

**** Move forward
move_forward:
  for b1 = 120 to 180
    servo 1,b1
    pause servo_delay
  next b1

  for b1 = 120 to 180
    servo 4,b1
    servo 2,b1
    pause servo_delay
  next b1

  for b1 = 180 to 120 step -1
    servo 1,b1
    pause servo_delay
  next b1

  for b1 = 180 to 120 step -1
    servo 4,b1
    servo 2,b1
    pause servo_delay
  next b1

  goto move_forward
```

