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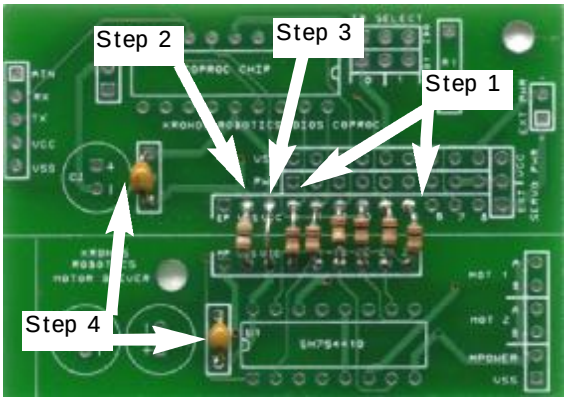
EZMotor1

Assembly and Hookup Manual v1.0

The EZMotor1 Motor Driver was designed for easy assembly and hookup.

The interface uses a single IOport at 9600 baud. Once the motors are connected you can issue a single command to move a two motor bot (differintial) in different directions.

Assembly

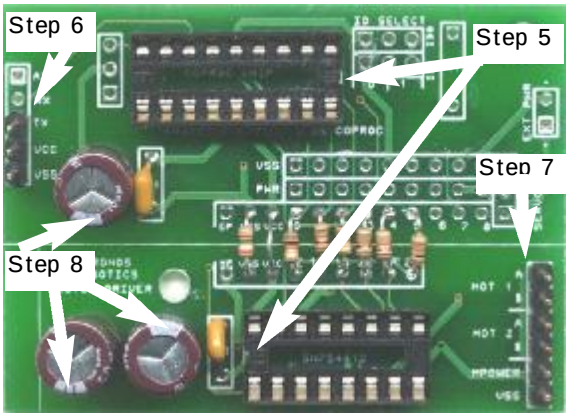


Step 1
Install the 10K resistors accross the bridge as shown. 10K = Brown,Black,Orange

Step 2
Install the 39 Ohm resistor accross the Vss bridge as shown. 39 = Orange,White,Black

Step 3
Install one of the cut off leads from the risistors across the Vcc Bridge as shown.

Step 4
Install the two .1uf capacitors as shown.



Step 5
Install the 2 sockets as shown. Note that the arrows are pointing at the notches.

Step 6
Install the three pin header into positions marked Vss, Vcc, and Tx.

Step 7
Install the six pin header as shown.

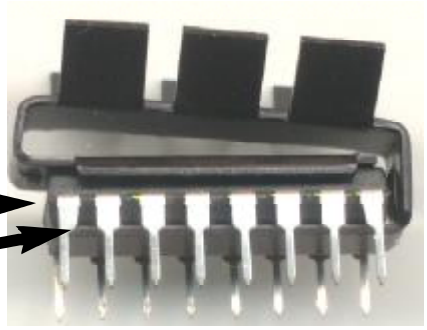
Step 8
Install the three 100uf capacitors as shown.

Note that the arrows are pointing to the negative band on the capacitors.

Step 9

Insert the heatsink over one of the SN754410 chips as shown.

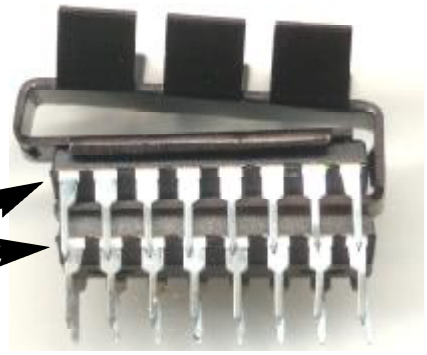
Make sure the notch on the chip is facing out.



Step 10

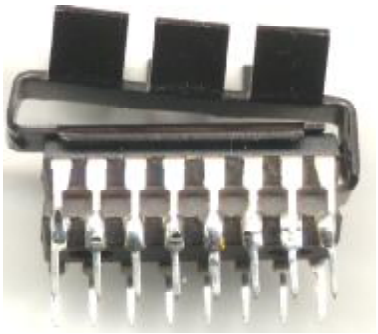
Now place the chip/heatsink assembly on top of the 2nd SN754410 chip. Make sure the notches on the two chips are facing the same direction.

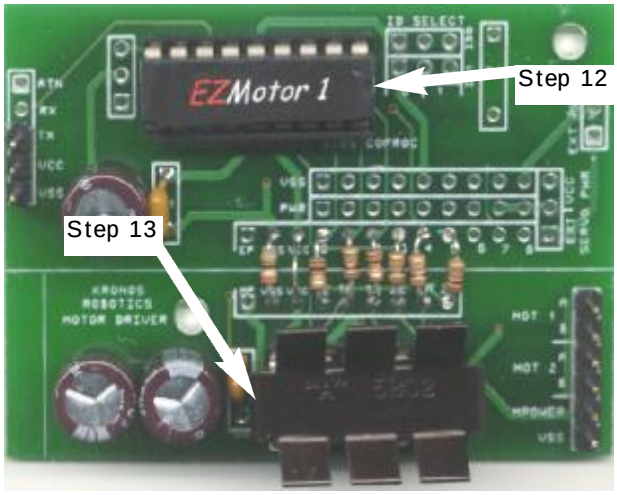
Important:
The heatsink must be in place.



Step 11

Solder the leads together as shown. Don't leave the soldering iron on the chip for more than a coupled of seconds. Allow the chips to cool if they get too warm during the soldering.





Step 12
Insert the EZMotor chip into the 18 pin socket. Be the notch in the chip is facing right.

Step 13
Insert the heatsink/driver chip assembly into the 16 pin socket. Make sure the notches on the chips are facing left.

9600 Baud Serial In -
5vdc -
Vss -

- Motor 1 Lead A
- Motor 1 Lead B
- Motor 2 Lead A
- Motor 2 Lead B
- Motor Power 4.5 - 36 Volts
- Motor Power Gnd

WARNING
The Motor Power Gnd and Vss are not electrically the same. When connecting motor power it must be connected to both the Motor Power and Motor Power Gnd.

Power Options

There are two ways to connect power to the EZMotor1 controller.

Single Power Source

In this mode a single battery is used to power both the logic and motor.

The main advantage to this method is that you only have 1 power source to manage. This will reduce weight and complexity.

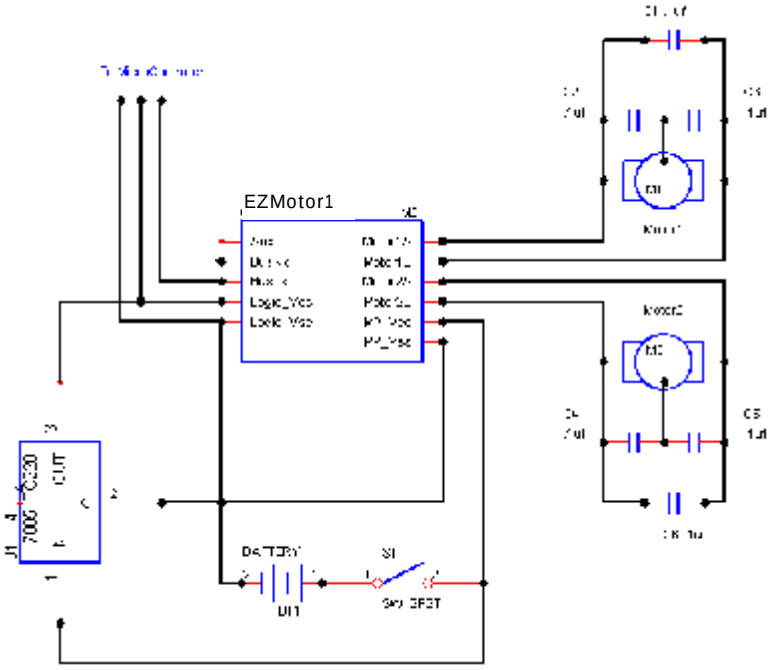
The disadvantages are that the the power source for the logic (microcontroller) wont be as clean. This can cause problems with some sensors.

Note that if the motors require more than 15v or so you will probably have to use a dual power source.

Some microcontrollers supply there own voltage regulators. In these cases connect the battery output to that chip or boards Vin.

You will still need to connect the Vcc (5v regulated) from the microcontroller to the EZmotor Logic Vcc.

Note if the motor controller refuses to operate when the motors are engaged or the microcontroller keeps resetting then the power source is not large enough to power both the motors and controllers. Also make sure you have ample gauge wires from power source to micro controller.

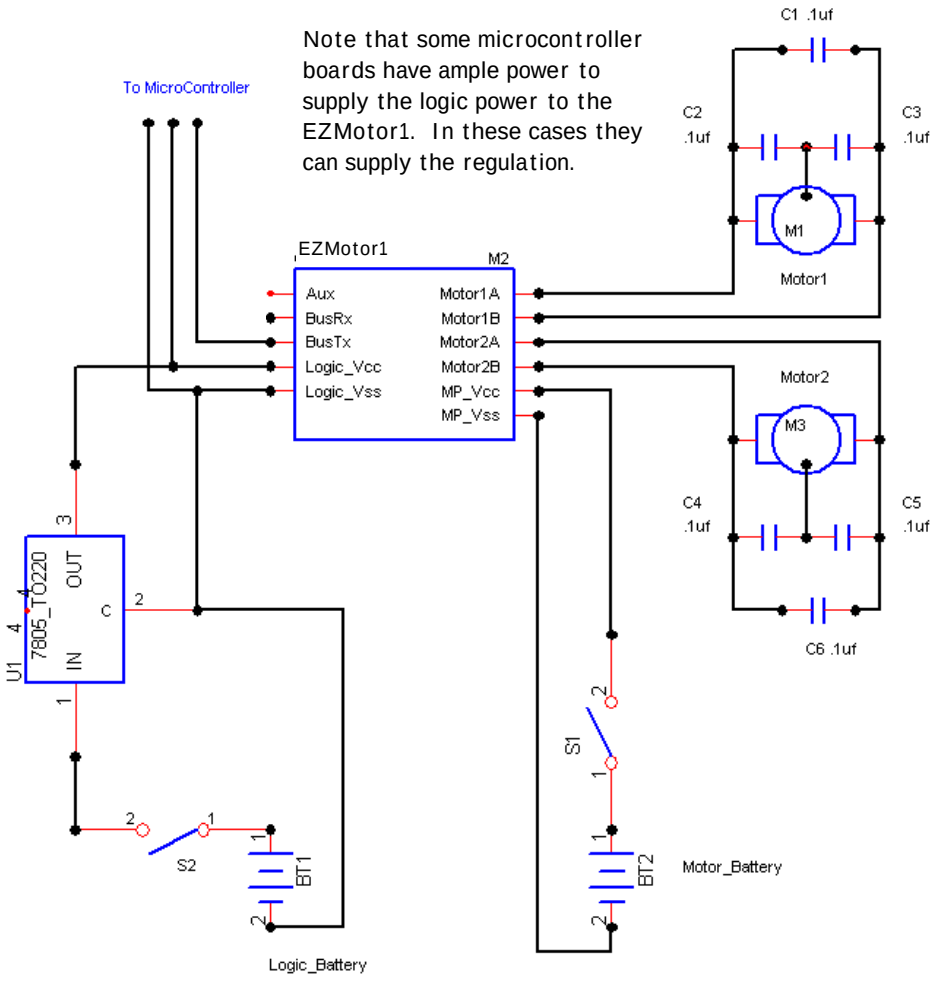


Dual Power Source

In this mode you use a battery to power the logic and a seprate battery for the motor power.

The main advantage to this system is the motors are isolated from the logic. This makes for a very clean power source.

The disadvantage is the extra weight and management needed for two power sources. With very small bots this is just not an option.



Motor Commands

Motor 1 Forward
Cmd 0
Sets Motor 1 to run in the forward direction. Note that if Motor 1 moves in the reverse direction you will need to reverse the leads.

Motor 1 Reverse
Cmd 1
Sets Motor 1 to run in the reverse direction. Note that if Motor 1 moves in the forward direction you will need to reverse the leads.

Motor 1 Stop
Cmd 2
Stops Motor 1 and applies the breaks. (Electronic)

Motor 1 Coast
Cmd 3
Disables the PWM and causes Motor 1 to coast. Note that the current direction is maintained.

Motor 1 Not Coast
Cmd 4
Enables the PWM and resumes direction.

Motor 2 Forward
Cmd 5
Sets Motor 2 to run in the forward direction. Note that if Motor 2 moves in the reverse direction you will need to reverse the leads.

Motor 2 Reverse
Cmd 6
Sets Motor 2 to run in the reverse direction. Note that if Motor 2 moves in the forward direction you will need to reverse the leads.

Motor 2 Stop
Cmd 7
Stops Motor 2 and applies the breaks. (Electronic)

Motor 2 Coast
Cmd 8
Disables the PWM and causes Motor 2 to coast. Note that the current direction is maintained.

Motor 2 Not Coast
Cmd 9
Enables the PWM and resumes direction.

Bot Forward
Cmd 10
Sets the Bot to move forward. Note that you must have both motors set up to run in the correct direction.

Bot Reverse
Cmd 11
Sets the Bot to move backwards. Note that you must have both motors set up to run in the correct direction.

Bot Left
Cmd 12
Sets the Bot to spin to the left.

Bot Right
Cmd 13
Sets the Bot to spin to the right.

Bot Stop
Cmd 14
Tells the Bot to stop.

Bot Skid Right
Cmd 15
Sets the Bot to do a slow turn to the right.

Bot Skid Left
Cmd 16
Sets the Bot to do a slow turn to the left.

Bot Skid Left in Reverse
Cmd 17
Sets the Bot to do a slow turn to the left in reverse.

Bot Skid Right in Reverse
Cmd 18
Sets the Bot to do a slow turn to the right in reverse.

Damper On
Cmd19
Turn damper operations on (Default)

The EZMotor1 has a built in damper that is activated by default. The damper helps preserve the motor and battery life. When ever a motor changes direction or stops the damper is activated and the motor goes into coast mode for a very short duration. The default is 500ms. Each motor has its own timer that is activated when the motor changes direction. While the timer is active commands will still change the direction of the motor but its forced into coast mode until the time as elapsed. Note that this time is not accumulative. In other words once timer is activated you can not add to the timer by constantly changing directions.

Damper Off
Cmd 20
Turn damper operations off

Motor 1 Speed
Cmd 21,xxx where xxx=speed (1-255) Default = 200
Sets the speed of Motor 1. The range is must be within 0-255, with 0 stopping the Motor and 255 running full speed. Note that speed is actually the duty cycle of the PWM so that the effective range is actually 60-255 or so. Also note the the PWM duty cycle affects the breaks as well.

Motor 2 Speed
Cmd 22,xxx Where xxx=speed (1-255) Default = 200
Sets the speed of Motor 2. The range is must be within 0-255, with 0 stopping the Motor and 255 running full speed. Note that speed is actually the duty cycle of the PWM so that the effective range is actually 60-255 or so. Also note the the PWM duty cycle affects the breaks as well.

Bot Speed
Cmd 23,xxx,yyy Where xxx=Right Speed and yyy=Left Speed
Sets the speed of both motors at once.

Damper Delay
Cmd 24,xxx,yyy Where xxx=Damper Speed High and yyy=Damper Speed Low
Sets the damper delay. Default damper delay is 50ms (high=0,low=50). The first byte is the high byte the second is the low byte. The unit is approximatly 1 ms.

Code Examples

```
Athena IRBot
'EZMotor1 Athena test

  const sport 5 'EZMotor1 Serial Port
  const irport 9 'IR module Port

  dim cmd,device
  PULSEINTIMEOUT=250

  output sport
  high sport
  pause 100 'Give it time to resync

  serout sport,23,128,128 'Set Bot Speed

loop:
   irin irport,cmd,device

  pauseus 200
  branch cmd,botstop,loop,loop,loop,loop,loop,loop,loop,loop,loop _
         ,loop,loop,loop,loop,loop,loop,botfwd,botbwd,botright,botleft

  goto loop


botstop:
  serout sport,14 'BOTSTOP
  goto loop
botfwd:
  serout sport,10 'BOTFWD
  goto loop
botbwd:
  serout sport,11 'BOTREV
  goto loop
botleft:
  serout sport,12  'BOTLEFT
  goto loop
botright:
  serout sport,13  'BOTRIGHT
  goto loop
```

Basic Stamp

```
Simple Stamp Demo moves bot forwards and backwards
'{$STamp BS2}
    serout 8,84,[23,128,128] 'Set Bot Speed


loop:
  serout 8,84,[0] 'Bot Forward
  pause 2000
  serout 8,84,[1] 'Bot Backward
  pause 2000
goto loop
```

Specs

PWM Frequency
200Hz

Board Power Requirements
4.5v - 5.5v
5 ma

Motor Power Requirements
4.5v - 36v
1.2v Drops across driver
Current depends upon motor load
1.5 Amps per motor Continuous
2 Amps per motor Peak

Serial Interface
9600 baud TTL level
8,n,1
Simple command structure