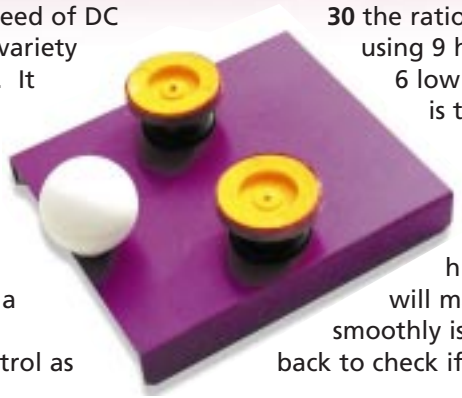
P-P-PIC up a Programme!

DC Motor Speed Controller, by Kieron McGeever

This programme, using the TEP Chip Factory, turns the PIC chip into a four speed DC motor controller which can be used to speed up, slow down or vary the speed of DC electric motors in a variety of students projects. It does this by producing a square wave output 1 and varying the on/off time ratio. This has the advantage over a potential divider or variable resistor control as it maintains full voltage and current supply to the motor whilst controlling its speed. It is the same as switching the motor on and off very quickly; the speed is then determined by how long the motor is on to the time that it is switched off.



'this programme could be used to control the speed of a simple ping pong ball machine'

Line 00 sets all the outputs to low. I always start this way. **Line 1** then sets the variable x to zero.
Lines 02 to 05 check to see which output is high and then sets an appropriate value for x. If no input is high, x remains zero and the programme loops back to the start via line 06. Each value of x set by **Lines 07, 09, 11 and 13** sends the programme to a loop, which sets an on/off ratio at the output 1. The easiest way to set the ratio of high to low would be to use the wait command, but the lowest value that wait can be set to, 1/10 of a second, is far too course for this application and would just pulse the motor on and off like a flashing LED.

The motor needs to be turned on and off much faster than this to get a smooth speed output. This is done by repeating the high and low commands in each loop in an appropriate ratio. In **Lines 15 to 30** the ratio is set to 3:2 by using 9 high commands to 6 low commands, which is the lowest practical speed for an ordinary DC motor. (The lowest number of high commands that will make the motor turn smoothly is 5). Line 30 loops back to check if one of the inputs is high. If not, Line 06 returns the programme to Line 15, and so on.

Lines 31 to 42 set the ratio 2:1
Lines 44 to 54 set the ration 4:1 and
Line 55 sets the motor full on.
This programme sets the ratios for a standard 6-volt DC motor. Different motors and different applications might need different ratios, but the basic process remains the same. The best results are found by experimentation
REMEMBER: interface your motor to the Chip with a transistor.

```
00          out     000
01    let x = 000
02    if 0 on goto    07
03    if 1 on goto    09
04    if 2 on goto    11
05    if 3 on goto    13
06          goto    x
07    let x = 015
08          goto    x
09    let x = 031
10          goto    x
11    let x = 044
12          goto    x
13    let x = 055
14          goto    x
15          high    1
16          high    1
17          high    1
18          high    1
19          high    1
20          high    1
21          high    1
22          high    1
23          high    1
24          low     1
25          low     1
26          low     1
27          low     1
28          low     1
29          low     1
30          goto    02
31          high    1
32          high    1
33          high    1
34          high    1
35          high    1
36          high    1
37          high    1
38          high    1
39          low     1
40          low     1
41          low     1
42          low     1
43          goto    02
44          high    1
45          high    1
46          high    1
47          high    1
48          high    1
49          high    1
50          high    1
51          high    1
52          low     1
53          low     1
54          goto    02
55          high    01
56          goto    02
57
```

For more PIC programmes, visit the TEP website.
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