

Using the TTT Serial PWM Controller Chip

Pin descriptions () indicates marking on the chip label.

- 1 (+) +3V to +5.5V operating voltage, 5V is best setting.
- 2 (F) Forward pin (bit 0 of control word) to L298 or whatever
- 3 (R) Reverse pin (bit 1 of control word) to L298 or whatever
- 4 (/C) This is the /Clear or reset pin, when pulled low the chip will reset
- 5 (O) This is the PWM output
- 6 (SI) 9600 baud Serial input
- 7 Currently unused
- 8 (G) This is the ground pin for the chip

With a single three wire connection at 9600 baud you can use the TTT PWM chip to control the direction and speed of a DC motor. The TTT PWM serial PWM controller is based on a 4MHz PIC 12C508 microcontroller. PWM means Pulse Width Modulation, one variation of which is keeping the frequency constant and changing the duty-cycle of the waveform. This is the PWM this chip uses. The TTT PWM chip outputs a constant 1KHz square wave whose "on time" is proportional to the formula **setting/127**. 0 is full off, 127 is full on. Using PWM you can set the speed of an electric motor by varying the % on-time of the waveform. This wave form is then sent to some high-power motor controller like an L293, L298 or FET H-Bridge or any other thing you may wish to use. You can also use the output of the PWM chip as a digitally controllable DC voltage reference by feeding the output into an RC integrator.

When installing the TTT PWM into your project there are a few electrical guidelines that should be followed.

1. Install a .1uf ceramic cap near the chip, this eliminates most noise problems.
2. I do not recommend using the same voltage line to power your motors as you are to power the chip, it will probably get very "noisy".
3. Pull the serial input line high (SI pin) with a 4.7K or 10K resistor if you are really cautious.
4. Make sure that you have installed .1uf or .01uf caps from each terminal of your motor to the motor's case. If you are getting spurious resets, then attach a cap between the two motor tabs as well.

To communicate to the TTT PWM use a normal RS232 connection at 9600 baud. The RS232 is NON-inverted, or TRUE RS232. To set the speed of the motor use single byte whose format is: [0NNNNNNN]. Where NNNNNNN is the speed desired, 0-127. 0 is full off, 127 is full on. To set the motor direction bits use a single byte whose format is: [100000RF] where bit 7 is '1', 'F' is the forward bit (to an L298) and 'R' is the reverse bit (to an L298). Note that you can use these bits any way you like, they are simply latched here as a convenience.

On reset or power-up, the TTT PWM will default to the 0 speed The PIC12C508 will change timing characteristics at different voltages in this configuration so it is best if it gets 5V for proper. Erratic behavior will occur if it gets a lower voltage supplied to the (+) pin.

If lots of positioning information is being sent over a short period of time (unusual circumstance) the motor may exhibit some "jitter". This is normal and unavoidable for a chip that only runs at 4MHZ. With normal operation no jitter should be observed.

This is a Parallax Basic Stamp II Example of how to use the TTT PWM chip.

```
speed      var   byte
direction  var   byte

N9600      con   84
PWM        con   2

speed = 63                                'half speed
direction = 129                            'bit 7 set and bit 0 = 1, bit 1 = 0 (forward)

serout PWM,N9600,[0]                       'turn off motor (don't need to do this)
serout PWM,N9600,[direction]               'set up direction
serout PWM,N9600,[speed]                   'now set speed

stop
end
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