

# Power Master SEVEN

## Unlimited Speed Controller

### Purpose

Power Master 7 is the ultimate speed control for racing model cars with unlimited motors. It is essentially the same as PM6 but with a larger BEC, much larger brake, and can handle 2.5 times the voltage of most other car speed controls.

### Features

- High Voltage (30 Vdc **maximum**, 18 cells max recommended)
- High variable current (190Amps for 10 secs, 120Amps continuous)
- BEC, 4 amps peak.
- Programmed for maximum power output and quick response.
- Very low on resistance (0.7m $\Omega$  or 0.0007 $\Omega$ ) for minimum loss and high available currents.
- Brake resistance of 3 m $\Omega$  or 0.003 $\Omega$  and continuous current of 25 Amps.
- Small package, lightweight. (~7g without leads)
- Micro controller controlled full digital operation for proper performance under adverse conditions (dust, moisture, electrical interference and vibration).
- Innovative design.
- Uses the very latest and best available surface mount components for the highest possible power output from the smallest package.
- Programmable for brake, power, neutral positions, ramp up & initial brake (brake during neutral).
- Accommodates all radios, allowing complete control over power and brake spans.
- No Radio Signal failsafe. Applies brake after 1/8th sec. without radio signal, and flashes LED.
- LED which shows radio signal failure, full throttle, neutral, full brake, and assists in programming.
- Programmable soft power up to assist in preventing wheel spin. Ramping can be from 0 sec to approx. 0.6 sec. for full throttle range.
- Programmable Initial Brake. Initial Brake from 0 to 50% of full brake
- Switch less programming.
- Dual Brown Out detection provides protection for radio & Speed Control by reducing power drawn from battery when the loaded battery voltage is below ~5V. Provides almost instant restart and prevents reprogramming caused by bad battery connections or short circuits for small time intervals.

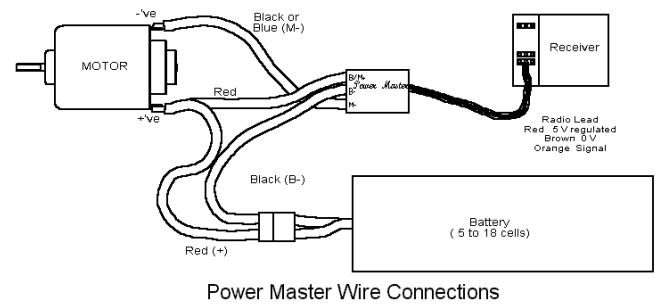
### Mounting

Power Master can be attached to the car with double-sided tape or with cable ties. Find a ventilated position if very high currents are required.

### Connections

Power Master requires no external schottky diode, as it is included in the device.

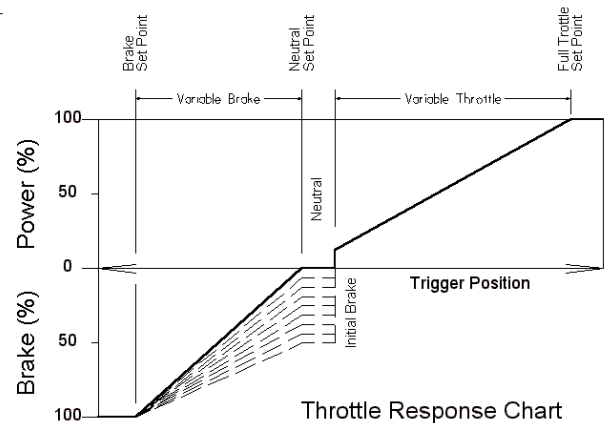
Keep motor and battery wires as short as possible to reduce power loss and radio interference and keep radio wires away from power leads. Wire battery, motor and radio lead as per the following diagram.



### Programming

**Power Master has been programmed and tested, but will require reprogramming to suit your radio.**

Power Master is programmable for Full Throttle, Neutral, and Full Brake positions, Ramp Up and Initial Brake. The following graph shows Power Master's response after programming.



To program Power Master follow this procedure:-

1. Turn on the transmitter and apply full throttle.
2. Whilst still applying full throttle, plug in the controller to the battery. (PM will need to have been unplugged for at least 3 seconds prior to this step {can be up to 10 seconds}. If any voltage is stored in PM, PM will do a brown out quick start up and avoid the programming sequence).
3. PM replies with two (2) flashes on the LED. (If 2 flashes aren't received, increase the throttle trim and repeat steps 1 & 2 again. If still no response, reverse the throttle output from the radio repeat steps 1 & 2 again. Most radios have reversing switches for this.
4. After receiving 2 flashes, return the throttle to Neutral. After 2 seconds PM saves the Neutral setting and responds with 1 flash.
5. Move the throttle to where you want full throttle to occur. After 2 seconds PM saves the Full Throttle setting and responds with 1 flash.
6. Move the throttle where you want Full Brake to occur. After 2 seconds PM saves the Full Brake setting and responds with 3 flashes.
7. Programming is finished and PM is programmed with no ramping and no Initial Brake.

So normal sequence is :-

```
F.Throttle ** _ _ Neutral * _ _  
F.Throttle * _ _ F.Brake *** ready
```

where (\*) = LED flash and ( \_ ) = 1 second

### Ramping & Initial Brake

- i. If after step 3 above the throttle is held at Full Throttle for a further 2 seconds, PM will reply with two (2) more flashes on the LED.
- ii. Return the throttle to Neutral and re-apply within 1 second. The LED goes off and then back on. PM counts 1 step of Ramp. You can skip this step or repeat it up to 8 counts. Each count programs PM with approx. 0.07 second ramp (it will take PM 0.07 sec to achieve full throttle from neutral if full throttle is applied suddenly) up to a max. ramp time of ~0.6 seconds.
- iii. Return the throttle to Neutral. PM will wait 1 second and flash 3 times as before.
- iv. Apply the throttle again during the next 1 second and Step ii will be repeated but this time for Initial Brake. As before, this step can be skipped or repeated up to 8 times giving a maximum of 50% brake during Neutral.
- v. Return the throttle to Neutral. PM will wait 1 second and flash 3 times. Ramping and Initial Brake are now programmed.

Sequence is :-

```
F.Throttle ** _ _ maintain F.Throttle **  
Pulse throttle (0 to 8 times for Ramping)  
Neutral _ *** Pulse throttle (0 to 8  
times for Initial Brake) Neutral _ ***  
ready
```

where (\*) = LED flash and ( \_ ) = 1 second

Note :- Both the previous sequences can be repeated as often as you wish, each one being completely independent of the other, so that Ramping & Initial Brake can be readily reprogrammed without effecting the throttle positions.

If either of Ramping or Initial Brake is programmed to 8 steps, PM will automatically proceed to the next Step without waiting for the 1 second of Neutral.

## Battery Eliminator Circuit

The BEC operates from a single Low Voltage Drop-out regulator, which can handle up to 4 Amps continuous under the correct circumstances. The limiting factor is power dissipation. The BEC on Power Master can dissipate around 2W continuously. This means that at battery voltages above 5.5 V you can no longer draw 4 A continuously. The amount you can draw is given by the following formula :-

$$\text{Cont. Current Draw (A)} = \frac{2}{\text{Battery voltage} - 5}$$

This means that with a battery of 28 V, only 87 mA average can be drawn continuously. Peak currents can still be 4 Amps. At 7.2V (6cells) the continuous current can be 0.9 Amps. Over currents will cause the BEC to reach its thermal limit,

which will reduce the current available, or may cause BEC failure.

This may not be a problem, as 400 mA will run a standard size JR servo stalled (maximum current). Usually steering servos have little continuous load on them of a properly setup car.

If more receiver/servo power is required, the red wire can be removed from the Power Master servo lead, and a separate battery can be used to run the radio.

**Warning** - Power Master casing/heatsink may not be isolated. Prevent contact with motor or battery terminals.

**Warranty** - Power Master is warranted for life against faulty parts or workmanship. Abuse, reverse connections & exceeding maximum ratings are not covered.

### Specs

Dimensions	28 x 24 x 10 mm for h version. 33 x 24 x 10 mm for v version. Only cased version available
Weight	~7g without leads
Rating	6 - 30Vdc, 190 Amp (10 seconds)
Max. current	644 Amp continuous, 2480 peak (mosfet spec.)
Tested continuous current	120 Amps
Suitable Motor	Any
BEC radio connection	5Vdc, 4 Amp
PWM frequency	4 kHz fixed
Throttle	Fully variable from 12% to full (12% will just move most cars)
Ramping	Adjustable 0 to 0.6 seconds (8 steps)
Brake	Fully variable from Initial Brake to Max
Initial Brake	Adjustable 0 - 50% (8 steps)
Maximum mosfet temp.	60°C

### Contact

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### Disclaimer

*Although great care was taken in designing, programming and assembly of this speed controller, the end user will take all responsibility for any damage or injury caused by any device containing this controller. Due to the nature of radio control, no guarantees can be given as to the safe use of this product.*