

# ***electronize***

**Quality Electronic Equipment**

## **10A / 15A Electronic Speed Controllers**

The speed controller is available in 4 versions covering a wide range of system voltages and continuous motor load current up to 15 amp.

The electronic control plugs directly into the 'throttle' output of the receiver with no need for a servo. There is no need to match the electronic control to the motor other than to stay within the maximum ratings. The same control will work equally well with a large or small motor.



In general an electronic controller will always give smoother control because there are no step changes as with servo controls. To improve things even further, these speed controls are designed to smooth the receiver signal and operate at a medium frequency, optimised for slow speed control. This minimises the sudden start effect which is quite pronounced on many units.

## **Features**

### **All Units**

- Standard radio control servo signal (standard connector supplied)**
- Smooth P.W.M. forward and reverse speed control**
- Low loss Power MOSFET current switching**
- Protection against reversed motor battery**
- Adjustable balance for zero speed position**
- Adjustable 'span' to match maximum speed to throttle stick travel**
- 2 to 24 volt motor battery operation - type 1500-001/003 and 1500-010/012 only**

**All units available in DIY kit version**

## Type 1500-001/010 and 1500-002/011

10 amp. continuous load rating.

45 amp. short term stall rating. (continuous MOSFET rating)\*

## Type 1500-003/012 and 1500-004/013

15 amp. continuous load rating.

45 amp. short term stall rating. (continuous MOSFET rating)\*

## Type 1500-002/011/004/013 only

5 volt regulator (BEC) for single battery operation.

1 amp. regulator rating with overload protection. 7 to 24 volt motor battery operation.



\*Beware suppliers who quote MOSFET rating as continuous controller rating!

# Technical Details and Dimensions

The speed control units are based on a PWM (Pulse Width Modulation) integrated circuit, a reversing relay and a 45 amp. Power MOSFET switching transistor. Screwdriver adjustments are provided for both balance and span. The balance centres the dead band around the stop position of the control stick whilst the span sets the maximum speed to coincide with the full travel of the stick. In our new version of the controller the old ZN409 IC has been replaced, allowing a higher switching frequency to give even smoother control from the lowest possible speed without the 'sudden start' effect common on many other designs.

Until recently almost all electronic controllers used Darlington type transistors to switch the motor current. Unfortunately these transistors have a built in volt drop. Starting at about 1 volt at light load and rising to 2 to 3 volts at its maximum rating. This of course reduces the motor performance, especially if the system operates with a battery of only 6 volts. All that lost performance appears as heat, and controllers using Darlington transistors always need a bulky heatsink to cool the transistor.

A much better type of transistor, the Power MOSFET, has been available for many years but was too expensive for this type of application. In recent years, like most electronic equipment, the price has dropped. The Power MOSFET is still three or four times the price of a Darlington but it is a far more efficient device. The Power MOSFET in the 1500-001/010 and 1500-002/011 controllers drops about 0.02 volts at 1 amp rising to only about 0.3 volts at 10 amp. In the 1500-003/012 and 1500-004/013 controllers it drops about 0.06 volts at 1 amp. rising to only about 0.1 volts at 15 amp. With such a low volt drop a small flat plate, the back of the case, is all the heatsink that is needed. In addition, the Power MOSFET is voltage controlled and draws no additional current from either battery. A 10 amp. unit with a Darlington needs around 1 amp. just to control the transistor, and

this is frequently drawn from the receiver battery.

The receiver circuit needs a reasonably stable voltage in order to operate reliably and a separate motor battery is usually used. However, when the motor battery is significantly higher than the receiver voltage, it is convenient to regulate this voltage down to the 5 volts needed by the receiver, and dispense with the receiver battery. A suitable voltage regulating integrated circuit will provide a far more stable receiver supply than the usual separate battery system. The type 1500-002/011 and 1500-004/013 controllers include a voltage regulator designed for automotive use. It is more expensive than the more common devices but it is intended to operate down to -40 degrees centigrade with the battery barely able to turn the engine. As a result it will continue to supply the receiver until the motor battery falls well below 6 volts. The regulator also has extra protection built in, including protection from a reversed motor battery!

