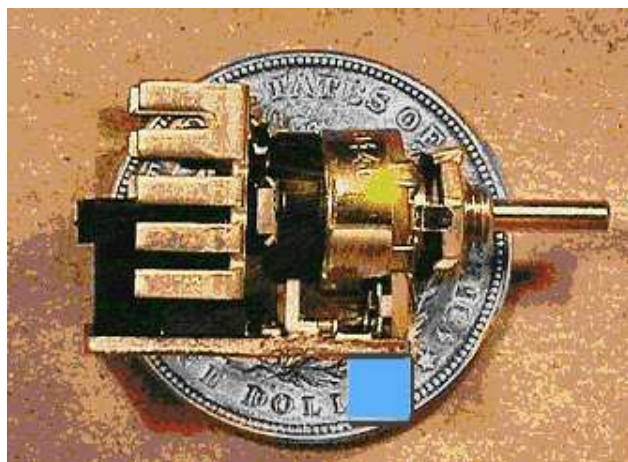PerihelionDesign.com

Eric M. Jones
113 Brentwood Drive
Southbridge MA 01550-2705
508-764-2072
emjones@charter.net

# *Extremely General Purpose Non-MAC Servo Controller*

**Servo Controller Features:**

- **ON/OFF switch at CCW end**
- **Weighs less than 1/2 oz (14 g)**
- **Thermal Overload Protection**
- **"Safe Area" Protection**
- **80 dB ripple filter**
- **Overcurrent protection**

**Specifications:**

- **Input voltage 8-37 VDC**
- **1A guaranteed output current**
- **6VDC servo voltage supply**
- **PWM to Servo is 50Hz 1-2 mS.**
- **Shaft is 0.125" Diam. Bushing is 1/4"Long, 1/4"-32 thd.**
- **Anti-Rotation lugs**
- **Size w/o shaft: 0.67 W; 0.78 L; 0.82 H**

**Note: We sell RAC trimmer box controllers too!**

**Free Shipping to Mex-Can-US
US$49.99 each Knob included**

**Perihelion Design developed the EGPNMSC for builders who want to use their own Futaba, Hitec, JR Micro, and other standard R/C servos for simple tasks such as controlling heaters or air vents, opening baggage or dipstick doors, and zillions of other jobs. Since servos require a special pulse-width signal usually supplied by an R/C radio or microprocessor, using them has been not particularly straightforward until now.**

**These servos could in fact also trim elevators, ailerons, or rudders, because little R/C servos are very powerful devices. Example: A Futaba S3004 ball bearing servo weighs just 1.4 ounces, can be had for a few bucks and will develop a whopping 3 1/2 inch-pounds of torque! Much bigger servos are easily available, as well as metal parts and some pretty tough high-quality stuff. We don't know of a good jackscrew servo, but there is one out there someplace. Look out MAC and RAC!**

**Servos are not meant to apply force continuously, since they will draw excessive currents. Please see our "Servo Control Theory 101" note.**

**For Use In Experimental Aircraft Only**

## Servo Control Theory 101

Not so complicated—The controller puts out a little signal on the white wire to tell the servo what it wants. This signal has a pulse width of 1 ms for "left" 1.5 mS for "center" and 2 mS for "right" and similar for all positions in between. It repeats 50 or so times a second. The controller also has a little 6V regulator onboard just to make installation simple. The servo "knows" where it is by reading its position potentiometer, that moves with the mechanical output. When the controller pot is adjusted to a new position, the signal pulse width changes and thus instructs the servo logic IC to move the motor to the new position. The IC handles endpoints, hysteresis, dead-band, velocity, compensation and all

sorts of details. In effect the servo IC drives the motor to make the servo position potentiometer match the controller position potentiometer, and of course moves whatever you want in the process. The servo orientation-- that is—which way the servo moves when you turn the controller pot-- is determined by how the servo and controller are internally wired.
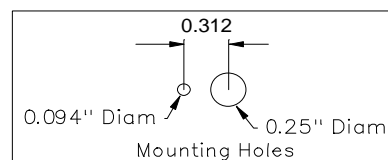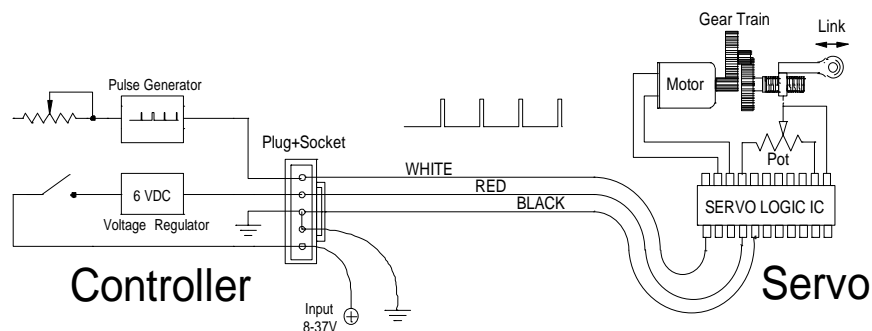




## Some more things to know—

1) The servo gear train usually moves a lot more than the servo controller can command. So if you take a Futaba S3004 in you hands, you can manually turn the output shaft 180 degrees, but in actual operation it will only swing 60 degrees.
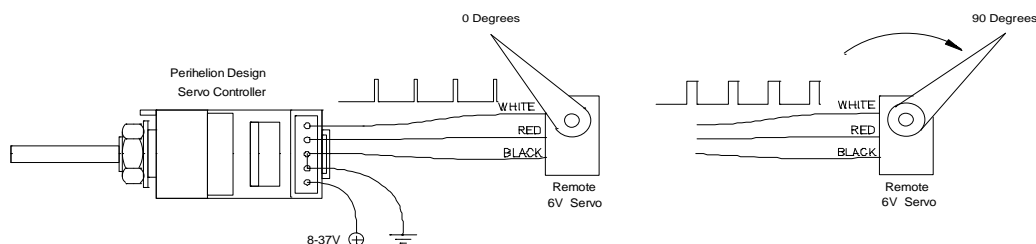


2) A servo is much better at changing positions than applying force. Neither the servo motor nor the servo controller is designed for applying force continuously. Furthermore, you could if desired, supply power to the servo motor externally—that is, from another power supply. This will save the servo controller but it adds to the risk of servo motor burnout. However, you can use this trick to drive a huge servo. The signal is the exactly same—but the 6V at huge current would be supplied by another power supply.
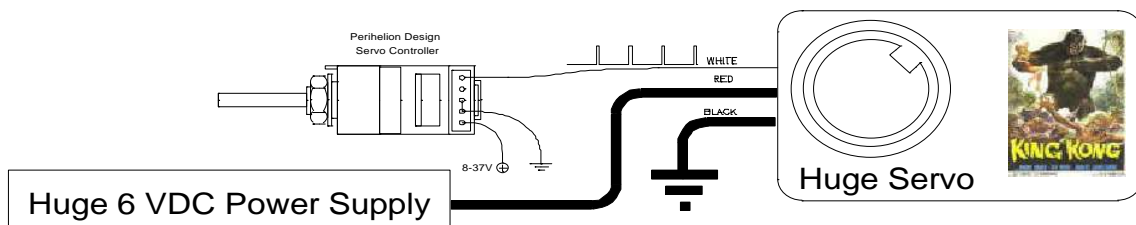


Now you are an expert in Servo Control Theory….

Addendum—

We have added two 10-turn trimmer pots to the EGPNMSC circuit.
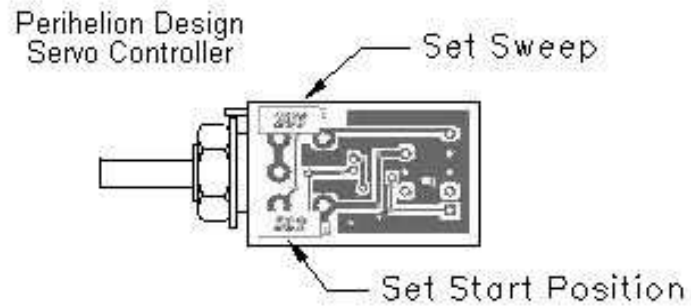


The function of these trimmers will be self-explanatory when the servo is operating. The 20k ohm trimmer will set the total sweep angle of the servo, the 5k-ohm trimmer will set the bottom-end start position. This change will make it easier to use the EGPNMSC in a variety of applications.

Regards,
Eric M. Jones
15MAR09