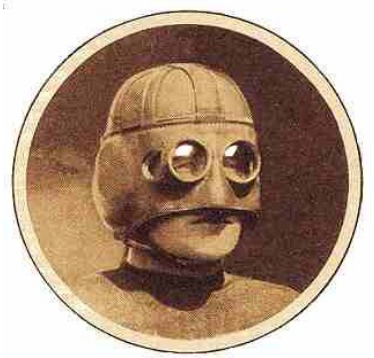

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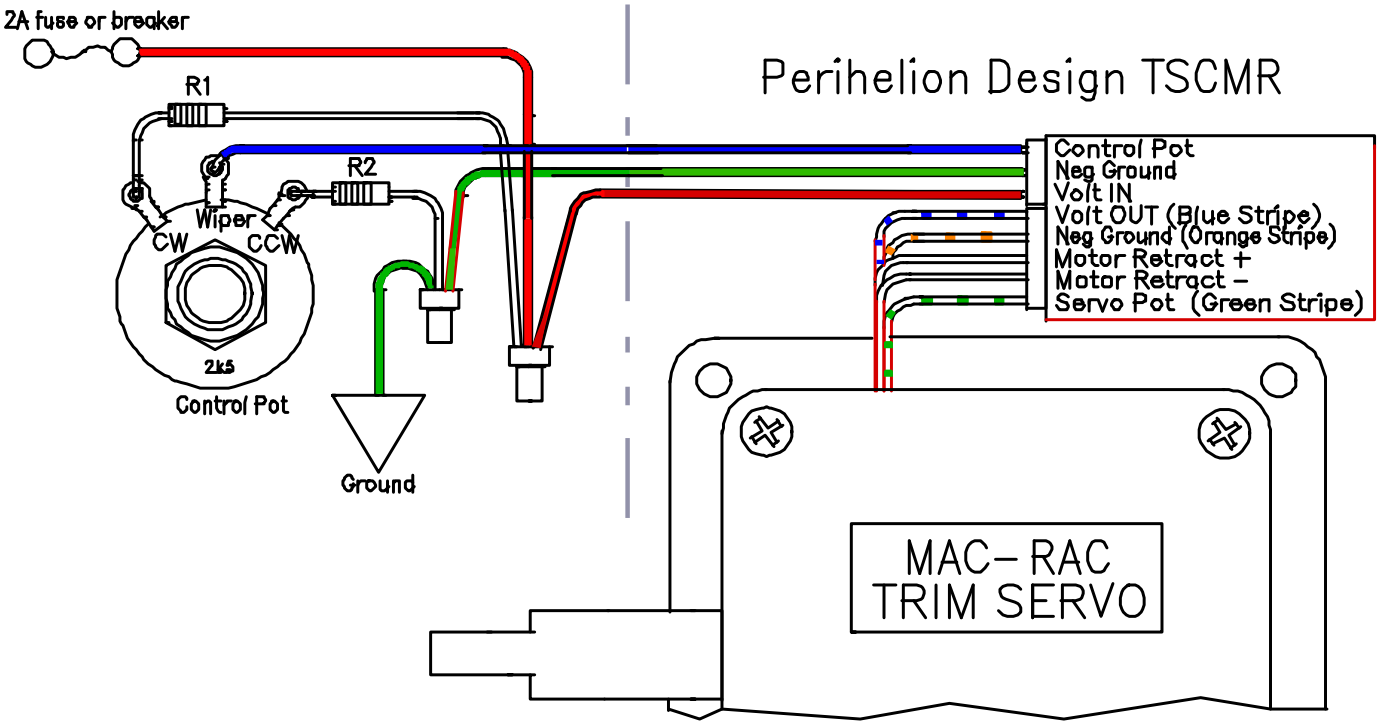
True Servo Conversion for M.A.C.-R.A.C. "Sort-of-Servo"

True servos read a control signal and use a motor to move mechanical part as commanded. Feedback is required to complete the control loop. Servos are mechanical control systems, that allow remote operation, programmed or magnified forces.

The standard MAC-RAC controls the motor with two pushbuttons and uses the visual feedback from their LED bar graph as well as the pilot's sense of stick forces. So it is really a "*Sort-of-Servo*". The MAC-RAC would be a *real* servo if its internal potentiometer wiper voltage (which indicates its position) were fed back to a logic controller to drive the motorized mechanism to a desired position automatically.

But of course…! Perihelion Design has developed the TSCMR for builders who want to use their MAC-RAC as a true servo, to trim the elevator, ailerons, or rudder or for simple jobs such as controlling heater or air vents, opening a baggage or dipstick door, and other tasks.

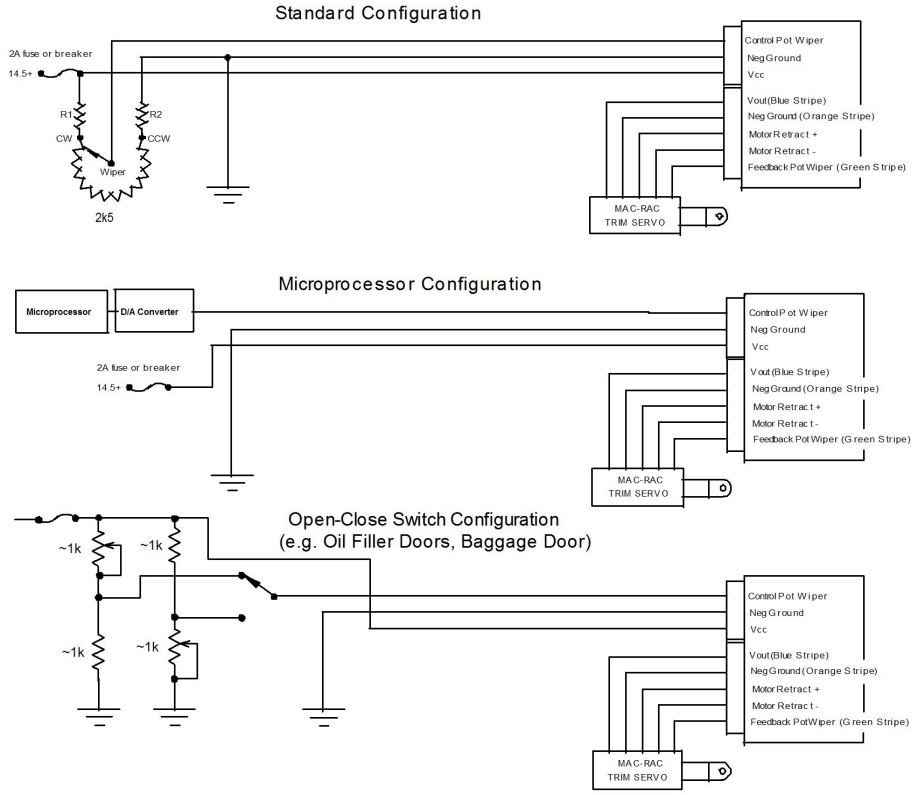


Advantages---True servo operation allows the pilot to position a control knob or wheel and have the servo go to the commanded position and stop.

Differences between Perihelion Design's EGPNMSC and TSCMR Servo Controllers--

Perihelion Design's EGPNMSC (Extremely General Purpose Non-MAC Servo Controller) is designed to drive Futaba and other servos that require a pulse-width modulated signal as well as a 6VDC power source.

Perihelion Design's TSCMR (True Servo Controller for MAC-RACs) is designed to drive MAC and RAC trim controllers. The TSCMR converts the system that uses pushbuttons and an LED bar graph to a true servo system.



TSCMR Features:

- Reverse voltage protection
- Over-voltage shutdown
- Over-current shutdown
- Sets servo position according to signal voltage.
- Ideal for adapting to many flap and trim control types
- EZ Computer control via D/A converter
- Servo cannot lose synchronization.
- No pushbuttons or relays to fail

Specifications:

Input voltage 14.5 VDC
1A guaranteed output current
Size: 0.30 W; 1.4 L; 0.82 H
Weighs less than 1/2 oz (14 g)

TSCMR Notes:

1) The RAC Trim Box has a "dead-band" in the extend direction only, where the trim box rod will extend without changing the feedback potentiometer. RAC/MAC designed it like this on request of Vans who wanted slightly more extension.

2) There is no information from RAC on how long the feedback potentiometers are expected to work, how smooth they are, how linear they are, what the end resistances are or if vibration and cycling damages them. RAC does offer a complete repair service that works very well.

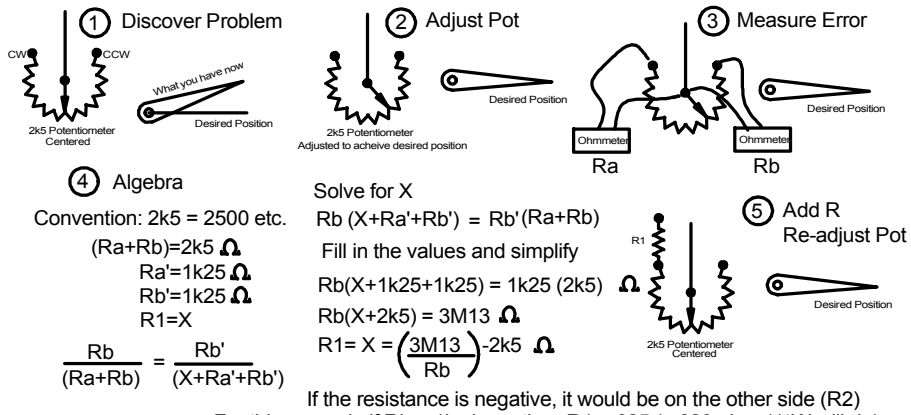
3) Internal capacitors on the motor will improve performance and lower noise.

4) We recommend that the TSCMR module be located very near the Trimmer box.

5) Our most common customer service issue is caused by the customer not attaching the two identical white motor leads in the correct polarity. Do this separately before attaching the leads. “Motor Retract +” means that the motor retracts the square actuator rod when V+ is attached to that lead (and V- to the other lead).

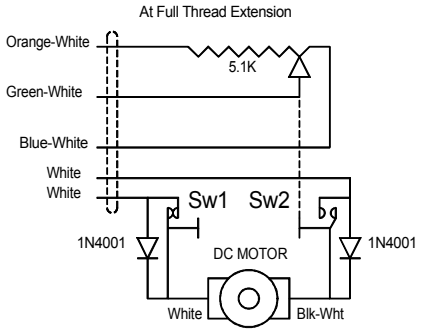
6) R1 and R2 can be temporarily replaced by a 1k pot to set up the end points, then replaced by fixed resistors. Otherwise R1 and R2 can be calculated as shown.

(Nerd Stuff) How to set optional R1 or R2



If the resistance is negative, it would be on the other side (R2)
For this example if Rb = 1k ohms, then R1 = 625 (a 620 ohm 1/4W will do)
Usually corrections will be less than 500 ohms.

Here’s a simple electronic schematic that shows how the MAC-RAC works: The servo is shown at the position where the brass actuator thread is fully extended (the square rod is fully retracted). The limit switch SW2 has opened, allowing ONLY movement in the opposite direction. The 1N4001 diode conducts only until the limit switch SW2 again closes (almost immediately). The motor can drive the rod all the way to the other end so that the other switch SW1 opens, or the motor can stop anywhere in between



MAC8A Schematic

Rev: emjones 14MAY2013