Servo Modification For Continuous Rotation

How to convert a standard R/C servo into
a continuously rotating drive motor.

This procedure results in a servo motor having continuous rotation in both forward and reverse directions, and with some degree of speed control from slow to full in both directions. *BUT NOTE: the servo does not retain any of its position control abilities.*

NOTICE: This procedure is provided for information purposes only, and is recommended only for experienced hobbyists. Caution: This procedure involves making permanent, irreversible changes (that are not at all undoable, even), and that will certainly and undoubtably void the product's warranty.

WARNING: Servo details and designs may vary greatly between manufacturers and even within the same product over time. Inspect your servo's actual design and features carefully before proceeding with any modifications. Mondo-tronics makes no claims to the accuracy or fitness of this information for any particular use, or appropriateness for any particular device. Proceed boldly at your own risk. :-)

I. Parts Required

1	each	Hitec HS-300 servo (or similar servo)
2	each	Resistor, 2.2K ohm 1/4 Watt 5%
1	each	Shrink tubing 3/8" or black electrical tape

II. Tools Required

Small "+" screwdriver
Small "-" screwdriver
Hobby knife
Side cutters
Needle nose pliers
Soldering iron
Solder

III. Modification Procedure

1) Open the servo housing by removing the 4 bottom screws.

2) Carefully remove the top and remove all the gears and retaining ring making sure to note their positions for proper reassembly. Use care to not loose any of the parts.

3) Locate the last and largest gear in the drive train, the one with the shaft that extends outside the case.

4) Locate the stop molded into the top surface of the gear. Carefully trim it off with a sharp hobby knife.

5) Use the needle nose pliers to unscrew retaining nut holding the potentiometer shaft in the servo housing.

6) Remove the bottom cover from the servo and gently lift out the small printed circuit board (PCB).

7) Press on the shaft of the potentiometer and remove it from the servo housing.

8) Cut the three wires on the potentiometer in half. Then trim and tin the ends of the wires still attached to the PCB with solder.

9) Twist the two 2.2K resistors closely together and solder them. When cool, trim the ends to about 3 mm long.

10) Solder the red wire from the PCB to one end of the resistor pair, the green to the other end and the yellow to the center where the two resistors join.

11) Slide the resistors into shrink tubing and shrink it (or wrap in tape) to prevent electrical contact.

12) Unsolder the wires remaining on the potentiometer.

13) Pry up on the tabs on the bottom of the potentiometer and remove the bottom.

14) Clip off the wipers inside the potentiometer.

15) Locate the stop notch on the top side of the potentiometer. Use a side cutter to make two sharp cuts into the body of the potentiometer on either side of the stop notch.

16) Bend and break away the potentiometer wall, and flatten the stop notch, using caution to not damage any other part of the potentiometer. Check that the potentiometer can now rotate freely. If not trim or flatten any remaining obstruction.

17) Return the potentiometer into the servo body, and retaining it with the washer and nut. Tighten securely.

18) Carefully pack the new resistor pair and shrink tube into the servo body, and replace the PCB. Make sure the resistors do not touch or interfere with the rotation of the potentiometer.

19) Carefully reassemble the gears and bearing ring, returning them to their original positions.

20) Replace the top and bottom covers. Secure with screws.

IV. Test the Modified Servo

1) Connect the servo to an appropriate R/C receiver or electronic driver circuit.

2) Apply power.

3) Send a “high” or “forward” signal. The servo should rotate in one direction continuously at full speed.

4) Send a “low” or “reverse” signal. The servo should rotate in the opposite direction at full speed.

5) If you are using a computerized driver circuit (like the Mini Serial Servo Controller, #3-205) you should be able to find an exact value (usually in the range of 150 to 220) that will cause the servo to stop rotation entirely. Values slightly to either side of this number will produce slowly increasing rotation in both directions, permitting some degree of speed control.

6) Double check that all screws are secure.

7) Label the servo as modified for continuous rotation.

V. Advanced Tips

You may use 1% precision resistors for greater repeatability if you are modifying more than one servo and want greater consistency.

Alternately, you may attach a new 10KΩ potentiometer in place of the two resistors, connected to the circuit board, but pulled outside, passing the wires through a small notch cut in the side of the case. Then you can adjust the potentiometer to the centered "nul" position. This makes for easy readjustment.

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