MEKATRONIX SERVO HACK
Create a D.C. Gearhead Motor from a Servo

by
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Limited Liability: *The user holds Mekatronix harmless for the consequences of this hack and the user assumes all responsibility thereto.*

Caution*: This hack essentially destroys the servo capability and converts the servo to a DC gearhead motor. Do not perform it unless you have soldering and manual skills and the objective of creating a DC gearhead motor.*
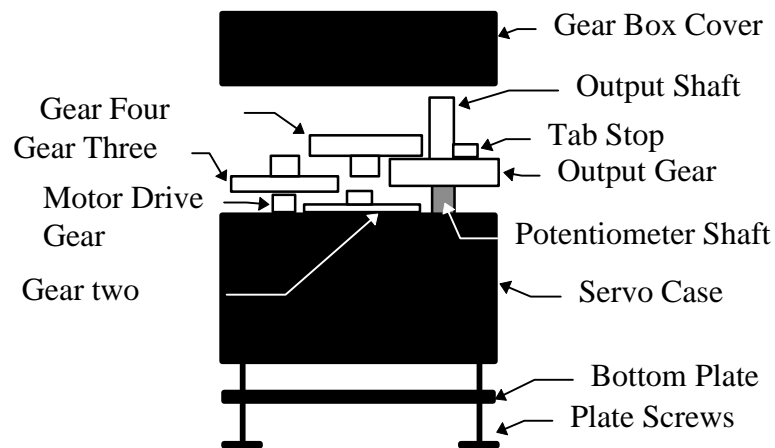

Figure 1. Disassemble by removing four lower screws. Cut away the tab stop, remove potentiometer tab inside *Output Gear*, set potentiometer shaft at center setting and replace cover.

1   Instructions for Servos without Ball Bearings

Refer to Figure 2. These directions are for servos without separate screws for the top cover plate.
1. Remove horn from servo output shaft.
2. Remove 4 screws from bottom plate of servo. Take off the bottom plate and set aside.
3. Carefully remove top plastic cover. See Figure 2 for the gear arrangement.
4. Remove the gears.
5. Pick up the large output gear, , gear number 5. The large output gear has a brass bushing. Find the gear stop tab, a small piece of plastic projecting out from the gear shaft. Cut this tab off close to the surface of the gear. Scrap any remaining plastic off the surface to make it smooth. Removing the stop tab will allow the output shaft to turn freely.
6. Pick up the servo case. On the top, notice two small motor mounting screws located opposite the output shaft.
7. Remove the motor mounting screws.
8. The potentiometer shaft projects into the output gear and should be visible with the output gear removed. Push the potentiometer shaft against a flat surface to separate the electronic PC board and motor away from the case.
9. Carefully remove the board and motor, which are attached as a single unit.
10. Unsolder the motor from the PC board. Remember where the red and black wires connect on the motor terminals.
11. Clip the three wire cable away from the PC board.

12. Keep the motor and the cable. The PC board will not be used.
13. Put the motor back into the servo case. Screw in the motor mounting screws.
14. Strip away and remove the yellow cable.
15. Pull enough of the red and black wire through the rubber cable grommet to reach the motor terminals. Tin and solder the red and black wire to the appropriate motor terminals.
16. Place the rubber grommet back in place and put the bottom plate on.
17. Turn the servo over, keeping the bottom plate in place. Remount the gear train in proper sequence.
18. Cover the gear train with the top cover.
19. While holding the top cover, the servo case and the bottom plate in place, insert the 4 case screws and tighten opposite corners.
20. The hack is complete.

Testing
Apply a DC voltage (between 5 and 10 volts) to the red and black wires. The motor should run. The geartrain makes a loud noise when it runs, but if you hear a loud, periodic clicking noise, the plastic stop tab may not have been removed completely. In that case you will need to scrap more of the plastic stop tab off the output gear (step 5).

2   Instructions for Servos with Ball Bearings
The procedure is similar to the procedure above. Figure 2 illustrates an exploded view of a servo with ball bearings and separate top and bottom plate screws.
1. Remove horn from servo output shaft.
2. Remove 4 screws from bottom plate of servo. Take off the bottom plate and set aside.
3. Carefully remove 4 screws from top plastic cover. Try to keep the bearings intact and mounted on the case. The ball bearing races often come off the mounts and separate, exposing the ball bearings and creating the potential for losing the tiny balls. Grease will tend to keep the balls in the raceway, but be very attentive and careful so that you do not loose any.
4. Remove the gears. See Figure 2 for the gear arrangement.
5. Pick up the large output gear, gear number 5. Find the gear stop tab, a small piece of plastic projecting out from the gear shaft. Cut this tab off close to the surface of the gear. Scrap any remaining plastic off the surface to make it smooth. Removing the stop tab will allow the output shaft to turn freely.
6. Pick up the servo case. On the top, notice two small motor mounting screws located opposite the output shaft.
7. Remove the motor mounting screws.
8. The potentiometer shaft projects into the output gear and should be visible with the output gear removed. Push the potentiometer shaft against a flat surface to separate the electronic PC board and motor away from the case.
9. Carefully remove the board and motor, which are attached as a single unit.
10. Unsolder the motor from the PC board. Remember where the red and black wires connect on the motor terminals.
11. Clip the three wire cable away from the PC board.
12. Keep the motor and the cable. The PC board will not be used.
13. Put the motor back into the servo case. Screw in the motor mounting screws.
14. Strip away and remove the yellow cable.
15. Pull enough of the red and black wire through the rubber cable grommet to reach the motor terminals. Tin and solder the red and black wire to the appropriate motor terminals.
16. Place the rubber grommet back in place and put the bottom plate on.
17. Snuggly, but not tightly, screw in the four bottom plate screws, opposite corners first. Tighten.
18. Remount the gear train in proper sequence. Be sure the bearings are mounted properly and no balls have fallen out.
19. Cover the gear train with the top cover. Insert the 4 case screws and snuggly fasten, opposite corners first. Tighten.

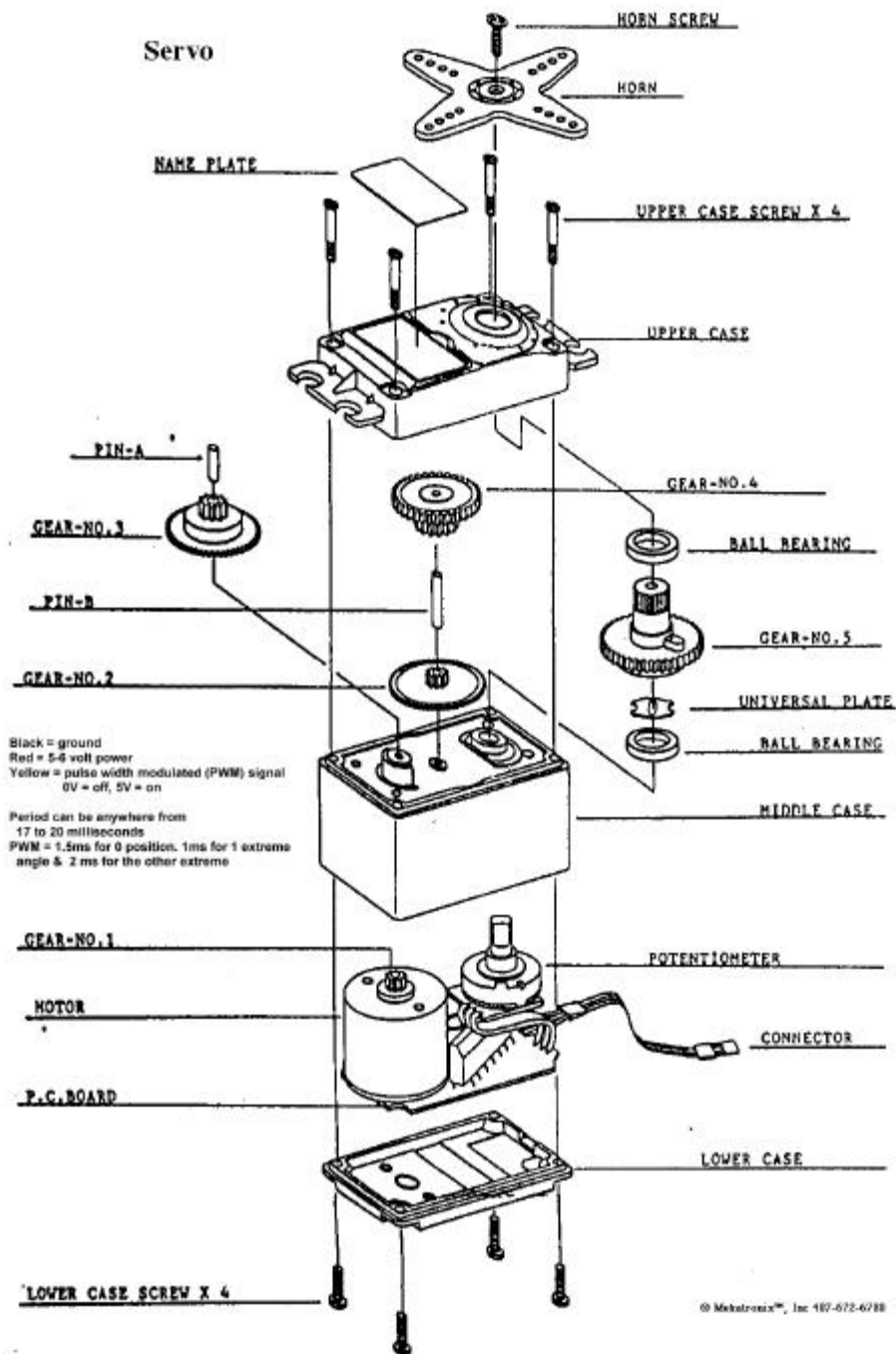20. The hack is complete. Test the hack as described earlier.

Figure 2. Exploded view of a another type of servo illustrating the gear arrangement and assembly/disassembly.