1. Servos

External potentiometer with extended travel Assembly Instructions

The following instructions are based around Hitec servos in particular the HS-645MG and Savox SC1258 and Savox SH-1290; other servos can however have the same modification done to them, the only difference being that they may be constructed slightly differently but the principles are the same. The step by step instruction may vary slightly.

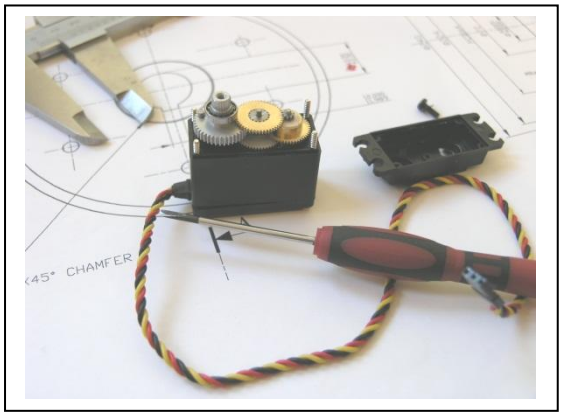
This modification is essential if you want to use the Skyline RSGS stabilization board to control and stabilize your camera gimbal. Please be aware that some servo (such as Hitec) will start with no signal pulse which makes them difficult to use with the skyline.

NOTE:
Please review the following instructions before you carryout the modification.

- Read the instructions carefully before you begin, and familiarize yourself with the parts involved;
- The servo modifications involved void any return policies from the manufacturer and retailer.

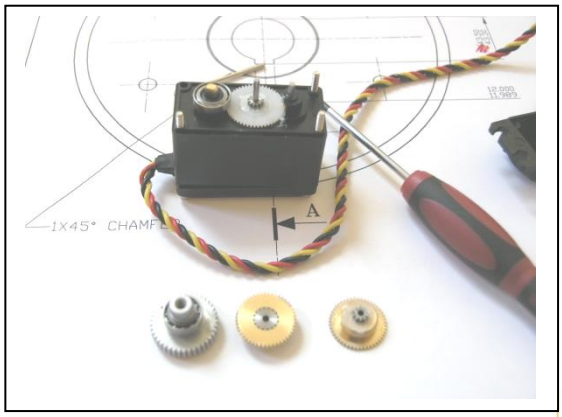
Tools Needed:

- Standard pliers
- Small Philips head screw driver
- 3.5mm drill bit
- Soldering iron
- Servo extension



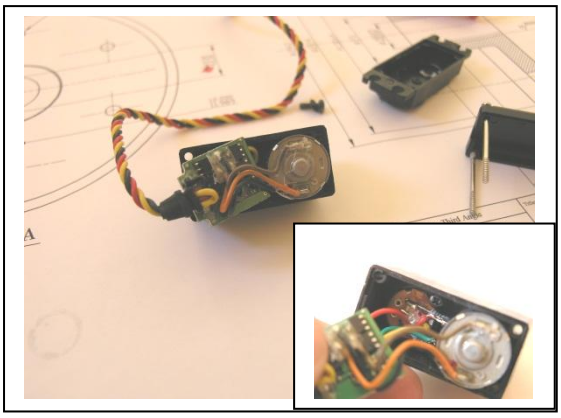
Step 1:

- Remove the four screws from the bottom of the servo.
- Remove the top gear case to expose the drive gears; most standard servos have the same gear layout as shown in the pictures.



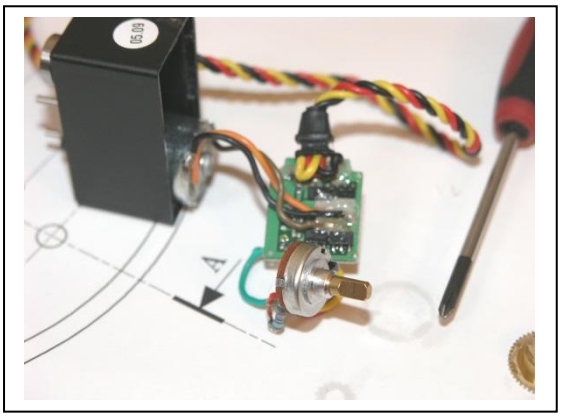
Step 2:

- Remove the top middle gear first and then the main out put gear.
- On most servos there are normally either ball bearings or bushes to support the out put gear; you will need to remove the top bearing or bush;
- Not all servos will have bearings or bushes. The outer cover serves as the support in these cases.



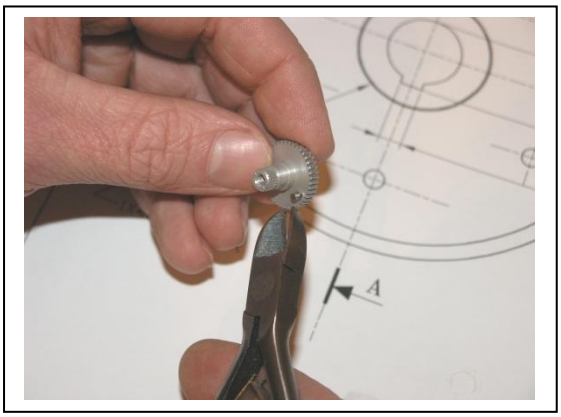
Step 3:

- Remove the bottom case from the servo as pictured;
- Remove the electronics and the potentiometer.
- The potentiometer is usually held in place with a screw or a snap fit. If there is any damage to the snap fit “fingers” that hold the potentiometer in place; do not worry as they will not be used.



Step 4:

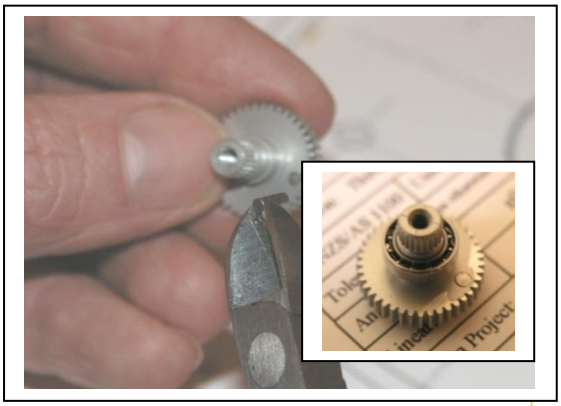
- This is what the servo should look like with the potentiometer and electronics removed.



Step 5:

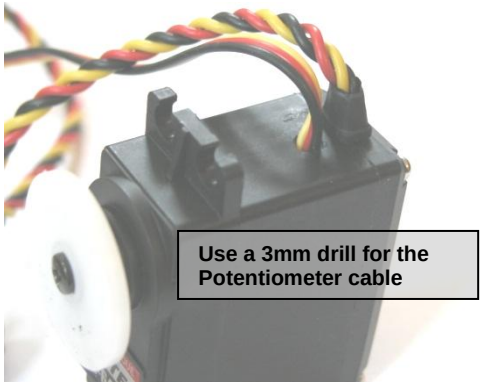
- We now need to remove the small pin stop on the output gear to allow it to spin 360 degrees;
- The best way to remove the pin is to use a pair of pliers. You will need to hold the pin firmly and with a twisting motion loosen the pin to remove it.
- Be careful not to damage the teeth on the gear.

Note:
Do not worry about the potentiometer mating guide in the gear, it does not need to be removed.



Step 6:

- This is what the gear should look like with the pin removed;
- If you are finding it difficult to remove the pin, you can use a small hand file to file the pin until it is flush with the gear face; as shown in the picture on the right.
- Once you have either filed the pin or removed it entirely; check that there is no damage to the gear.
- If you find any damage please use a small hand file or 320 grit sand paper to remove any burs.



Step 9:

- The female end of the servo extension cable is now used to connect the wiring to the original potentiometer wires within the servo;
- You will need to drill a 3mm hole in the servo case, so that the wires can be passed through to be soldered to the wires inside.

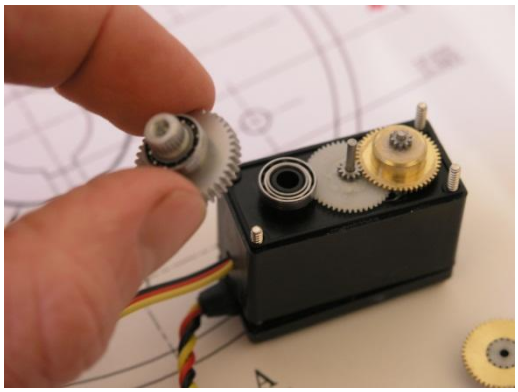
Step 10: SAVOX Servo Connection

- To remove Savox motor and circuit board you need to remove the two small screws under the gear train;
- Then pull out the motor and circuit board

Step 11: Servo Connection

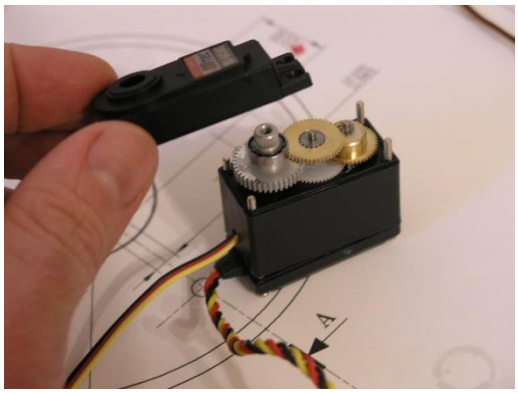
- The female end of the servo extension cable is now used to connect the wiring to the original potentiometer wires within the servo;
- With the Savox servo you do not need to drill a hole in the case. Instead you can use a file and file a deeper slot in the servo case to allow the two servo cable to exit the servo case.
- You need to cut the legs of the potentiometer and remove the pot – cut the legs half way up.
- Solder the connector on to the three legs on the board –
- From left to right - analogue ground (**Black)** , analogue varying voltage **(RED)** , then analogue power (White or **Yellow**)
- For Hitec servos, analogue ground **(RED)**, analogue varying voltage (**Yellow**), then analogue power (**green**)

- The Skyline will use **analogue ground** (Skyline black wire pot wire) and **analogue varying voltage** (Skyline red or white pot wire) as its output to the servo to mimic the pot.



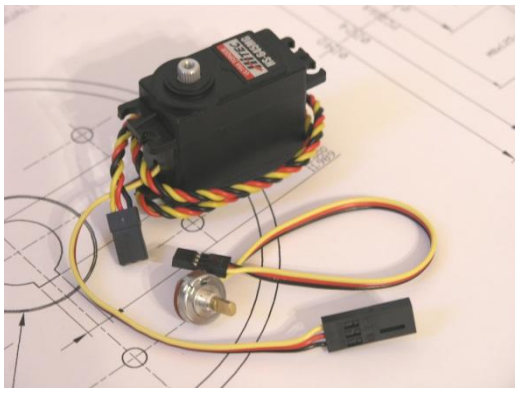
Step 13:

- Replace the servo circuit board and wiring and close the back of the servo.
- Assemble the gears back as shown.
- Insure there is on dust, grit or solder splatter in the gears, make sure everything is clean.



Step 14:

- This is what the gears should look like when in place;
- Make sure the bearings are on the output gear and in the correct place;
- Once everything is seated correctly, place the top gear case back on the servo.



Step 15:

- Screw the servo back together and it is ready to be tested.