

## SPT400 Tilt System Instructions

Make sure your kit includes the following parts

- (5) ABS Plates
- (1) Quad Hub Mount A (545420)
- (16) 6-32 x 3/8" Pan Head Phillips Machine Screws
- (4) 6-32 x 1/4" Pan Head Phillips Machine Screws
- (4) #4 x 1/2" Flathead Phillips Plastic Screws
- (2) 1/4" Bore Aluminum Clamping Hubs
- (1) 1/4" Bore Precision Bearing
- (4) #4 x 1/4" Black Truss Head Phillips Screws
- (2) 6-32 x 3/8" Socket Head Cap Machine Screws
- (1) Military Grade Precision Potentiometer
- (1) Spur Gear
- (1) Servo Pinion Gear
- (4) 4-40 x 3/8" Pan Head Phillips Machine Screws
- (2) 4-40 x 1" Aluminum Threaded Standoffs

### Tools Needed:

- Phillips Head Screwdriver
- Flat Head Screwdriver
- 7/64" Hex Head Driver
- Hammer
- Needle Nose Pliers
- Soldering Iron



1. Install the 6-32 x 3/8" socket cap screws into the clamping hubs as shown. **Do not tighten!**

2. Attach the Quad Hub Mount to the smooth side of the side plate with 2 x 6-32 x 3/8" Pan Head Phillips Machine screws.

3. Install the 1/4" precision bearing into the textured side of the remaining side plate. This is a tight fit and may need to be lightly tapped with a hammer.

4. Mount the bearing side plate to the bottom plate using 2 x 6-32 x 3/8" Pan Head Phillips Machine screws.



5. Install the (2) aluminum standoffs as shown using the (4) 4-40 x 3/8" machine

6. **Upright #1 Assembly:** Attach a clamping hub to the smooth side of one of the uprights with (4) 6-32 x 3/8" pan head screws so that the 1/2" collar on the clamping hub fits inside of the 1/2" bore of the upright.

7. **Upright #2 Assembly:** Attach a clamping hub to the smooth side of the remaining upright with (4) 6-32 x 3/8" pan head screws so that the 1/2" collar on the clamping hub faces away from the upright.

8. The aluminum clamping hub shown above is not included in the kit but comes with all of our pan systems (or can be purchased separately). A clamping hub will allow you to easily attach the tilt to another structure. If you have a clamping hub, attach it to the base plate with (4) 6-32 x 3/8" pan head Phillips Machine screws at this time.



9. Slide the potentiometer through the plate opposing the bearing hole. Before passing through the bearing on the opposing side, install the lockwasher, jam nut, and the upright that was assembled in step 7. Tighten the jam nut to secure the potentiometer but **do not** tighten the clamping hub.

10. Note the metal "index tab" that slides into the ABS side plate to help align the potentiometer.

11. This is what your tilt system should look like so far.



12. Attach the spur gear to the hub on the remaining upright (assembled in step 8) with 6-32 x 1/4" pan head screws. Note that the cupped portion of the gear faces toward the upright.



13. Slide the upright assembly onto the potentiometer shaft as shown. **Do not tighten the clamping hub!**



14. Attach the top plate as shown using the (4) #4 x 1/2" flathead screws. This is a tight fit and may need to be tapped on with a hammer.



15. You are now ready to install your servo that has been modified for continuous rotation (see servo modification instructions).



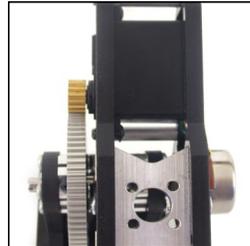
16. Place the servo in the frame as shown.



17. Fasten the servo to the frame with the (4) #4 x 1/4" black truss head phillips screws. **Do not tighten screws so that you can adjust the gear mesh in the next step.**



18. Insert the pinion gear onto the servo and re-install servo screw. Slide the servo toward the hub gear to achieve a snug (but not tight) gear mesh and tighten the servo mounting screws.



19. Move the tilting assembly on the potentiometer shaft as needed in order to properly align the face of the spur gear with the face of the pinion gear.



20. Remove the stock potentiometer on your modified servo and solder the potentiometer wires to the external potentiometer in the following order:  
 Left: Green  
 Middle: Yellow  
 Right: Red



21. This is how your tilt system should look; it is almost complete!

## 22. Adjusting the neutral position:

- Rotate your tilt assembly by hand to the position shown at right.
- Rotate the potentiometer shaft with a flat blade screwdriver to as close to its middle position as you can. To help you find the middle position, rotate the potentiometer shaft back and forth between the two mechanical stops a few times and then leave it half way in-between.
- Snug up the clamping hub on the outer upright assembly so that when the tilt plate rotates, it also rotates the potentiometer shaft.
- Turn your servo controller on making sure that the controller is in the neutral (center) position.
- The tilt system should remain close to the position shown in the picture above. If so, you can run the tilt back and forth to make sure that it will not contact either mechanical limit.
- If the tilt system is not properly indexed as shown above, loosen the outer clamping hub and adjust as needed by rotating the potentiometer shaft with a flat blade screwdriver. Note that the tilt will rotate the opposite direction of the potentiometer shaft.
- Once you find the correct position, turn the servo controller off and tighten the two clamping hubs. If you attempt to operate the unit without the clamping hubs tightened the potentiometer will not rotate and the feedback will not occur which may result in damage to the gears.
- Once the hubs are tightened you may operate the unit with your controller. If the tilt plate is able to make contact with the framework of the SPT400 at either extreme, re-adjust your neutral position as needed. If the tilt plate makes contact with the framework at both extremes, decrease the PWM signal range that is being sent to the tilt system. If you have any questions please email [tech@servocity.com](mailto:tech@servocity.com) or call 620-221-0123.

