

Mounting Instructions

Brand:	Obsession
Model:	N/A
Size:	20" WITH 3/4" Rocker floor!
Axis:	Azimuth with 1.125" Roller
Options available:	Ground board (required)
Revision Level (mechanical instructions):	1.5
Software Revision Level required:	any
Hardware Revision Level required:	any

Parts Check: (Standard kit)	Gearbox assembly mounted on 2" x 6" plate including: Knurled aluminum roller 1.125" dia Springs 3½" (2) Spring brackets w/nylon SS locknuts (2) 1/2" SS Bolt w/ nylon SS locknut/washer/UHMW Mounting screws for spring bracket (2) (#10 3/4" length)
Manual Override control: (Option: Ground Board)	Manual flat mount toggle clamp 1/4-20 x 2" SS rod w/ SS nuts, lobed washer, cable Pivot post (3/4" OD chrome plated or stainless steel) E Clip for above Bronze bearing 3/4" ID to be used Bronze bearing 1" ID for hole centering (discarded) Ground board (3/4" thick 23 5/8" diameter) Pivot post mounting plate ¼-20 bolt with lockwasher 8-32 bolt with lockwasher

Tools Required: (Standard kit)	Hand drill w/ 1 3/8", 1", 9/16", 3/8", and 1/8" (pilot) wood bits Screw drivers (flat and/or Phillips) Tape measure Socket set or crescent wrench Soft cotton bath towel Loctite or equivalent recommended
Estimated Assembly time:	30 – 60 minutes - motor/roller assembly ~30 minutes for "Manual" control assembly

NOTE: Descriptions and details of any options could also be included in these instructions. If so they are prefaced with the term "(option)". If the item is ultimately required but could have been provided by RXDesign or by the end user, this is where the user would do the installation of the item using his own or the one purchased from RXDesign.

NOTE: when handling the round ground board be careful not to damage the outside edge, as it must be smooth, flat, and perpendicular to its top. Do not rest it on its edge at any time, always leaving it on one of its faces if placing it down - preferably on a cloth surface.

NOTE: The 20" Obsession scope has been shipped with either a double rocker base board (1.5" thick) or a single (3/4" thick). Please ensure you have ordered the right version before proceeding! An easy way to tell which version you have is to measure the ground board bolt - if 2" you have the single - if 2.5" you have the double.

- 1) Remove the mirror and safely store it away. [Take the opportunity to clean it maybe!?!]
- 2) Lift mirror box off of the rocker and safely set it aside.
- 3) Ensure there are no added components inside the rocker box from the center hole to the outside corner for a "strip" width of 4" as shown below.

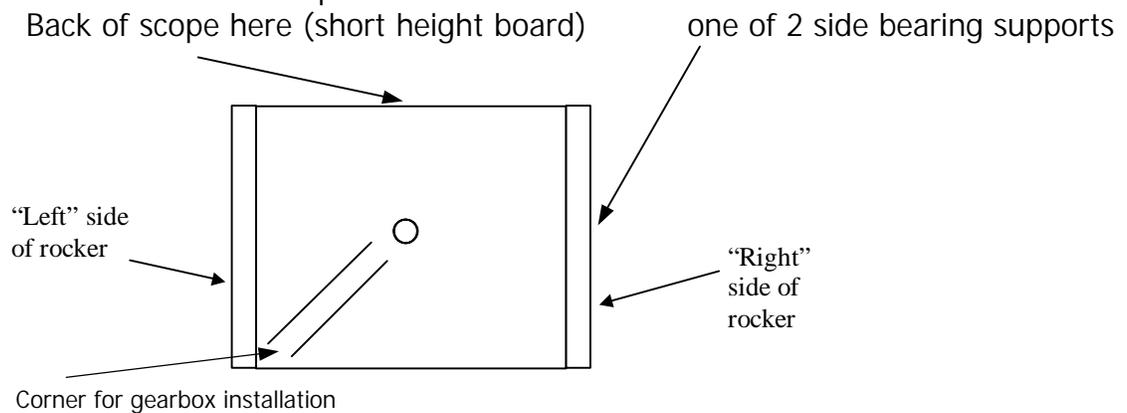


Figure 1 TOP VIEW OF ROCKER BOX

- 4) Remove the stock ground board and set it aside. Place the scope on blocks so as to clear the floor when drilling.
- 5) (option GB - install round ground board and center pivot point)
Insert the 1" ID bronze bearing into the center hole depression area – using a small wooden dowel or other tool carefully tap it in so it is perpendicular with the inside surface. It will not go all the way in but it needs to be "plumb" to the floor of the rocker (straight). Using this bearing as an alignment tool carefully drill a 1" diameter hole through the rocker bottom. Have someone stand at the side and make sure the drill is vertical. *This is important!* Do not force the bit.

NOTE: If installing the Powered Ground Board option the following step requires the orientation of the 3/4" ID bearing to be such that the tapped hole for the + (red) power connection is towards the rear of the scope as shown on the PGB Template.
Also note relative to the powered ground board: a "channel" is required to exit the "+" power terminal. You may want to look at steps 11 & 12 of the PGB instructions to do this after step 5 above. (Can be done later but some might want to do it now).

- 6) Carefully tap the $\frac{3}{4}$ " ID bronze bearing into this hole until the flange of the bearing is $\sim\frac{1}{4}$ " ($\sim\frac{5}{8}$ " if double bottom) below the surface and resting on the inside shoulder. This bearing needs to be plumb or straight in – it cannot be cocked. If the bearing does not sit level with the scope inside bottom it may be necessary to take the bearing back out to clean the inside "shoulder" of paint. Do not tap on the inside of the radius of the bearing as this will cause it to mushroom and bind when the pivot post is placed into it. The recessed depth "shoulder" is important for proper encoder height (= $\frac{3}{4}$ " max encoder body into rocker). You can use the 1" drill guide to tap in the $\frac{3}{4}$ " flanged bearing (if powered GB remove the screw from the bearing!).
- 7) Stick the $\frac{3}{4}$ " pivot post into the hole in the ground board from the inside of the rocker – inserting the end with 2 holes in first. Tighten the $\frac{1}{4}$ -20 bolt into the post from the bottom of the ground board. Repeat with the 8-32 bolt. Attach the feet to the ground board using the numbers and arrows on the bottom of the feet to match the board.
- 8) Flip the rocker box upside down being careful not to scratch it (the cloth comes in handy for this). Flip the ground board over and insert the ground board and its pivot post into the underside of the rocker. The ground board should be parallel to the scope bottom as it goes in - The ground board should rotate freely and should not be cocked at all. If it is cocked you will need to remove the ground board and bearing from the rocker and clean the paint off the inside shoulder of the inside hole in the rocker. DO NOT oversize the hole as it relies on the "press" fit of the bearing to maintain perpendicularity.
- 9) With the ground board in place on the bottom of the scope and using a pencil mark a circle on the bottom white glassboard surface at the point of the radius of the ground board – scribing directly *against* the surface of the ground board – taking care not to introduce parallax with the pencil (the curve needs to be directly at the edge of the ground board). This radius mark should be located at the corner noted above for the gearbox location (Figure 1)... be careful it IS this corner! See Figure 2 below.



Figure 2 Radius mark from ground board edge

- 10) Remove the ground board and set it aside being careful not to damage the edge.
- 11) Cut the supplied AZ Template from its sheet being careful to cut along the dotted lines. Lay the template so the inside edge (inside radius) of the template sits on the radius line drawn in the previous step. CAREFULLY holding the template in place against the radius pencil mark and even with the sides of the scope. Push a push-pin into the Roller (1 3/8" hole) "+" mark shown on the template through the template and into the glassboard. Check to be sure the template is still in the correct position against the radius **and** against BOTH edges.
- 12) Using a second push pin mark the swivel hole (1/2") by pushing the pin through its "+" mark. Remove the pins and template and identify the holes – marking them with a pencil or pen. If they are not clear - do not guess - repeat the exercise!
- 13) Confirm the swivel post hole is a distance of 6 1/2" from the *outside altitude bearing side* of the rocker box. Also confirm it is a distance of 1 7/8" from the *outside front* of the scope. MOST important the roller hole center needs to be 1/2" from the radius edge.
- 14) Using the 1/8" bit drill a pilot hole through the bottom of the rocker at the center point marked for the roller. Do not push too hard or drill too fast as you do not want to damage the wood on either side. Have someone stand to the side and confirm you are drilling straight. Repeat for the swivel hole.
- 15) Using a 1 3/8" wood-bit carefully drill a hole through the bottom of the rocker at the pilot hole for the roller. **Make sure you have the right hole** (the hole farthest from the scope edges). Do not push too hard or drill too fast as you do not want to damage the wood on either side. Do not drill all the way through... when you are sure the point of the wood bit is *just* through flip the assembly right side up, place it on some blocks so not to damage the floor or the bit, and continue drilling from the inside.
- 16) The finished results should look like Figure 3 below with the distance from the inside edge of the altitude side wall to the center of the hole just drilled being ~2 5/8".

Alt side bearing wall

front (tall) wall

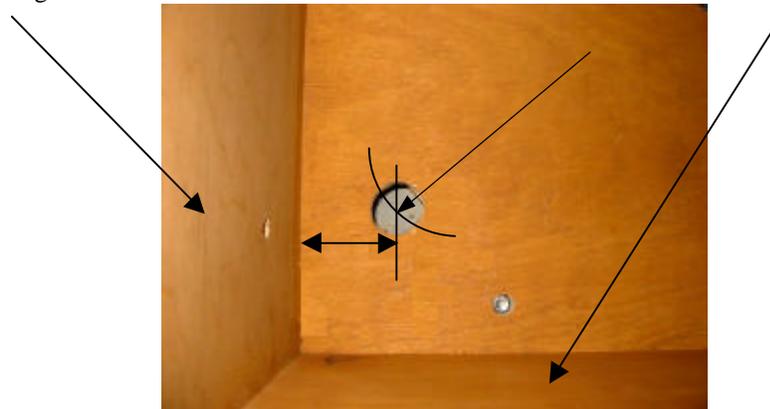
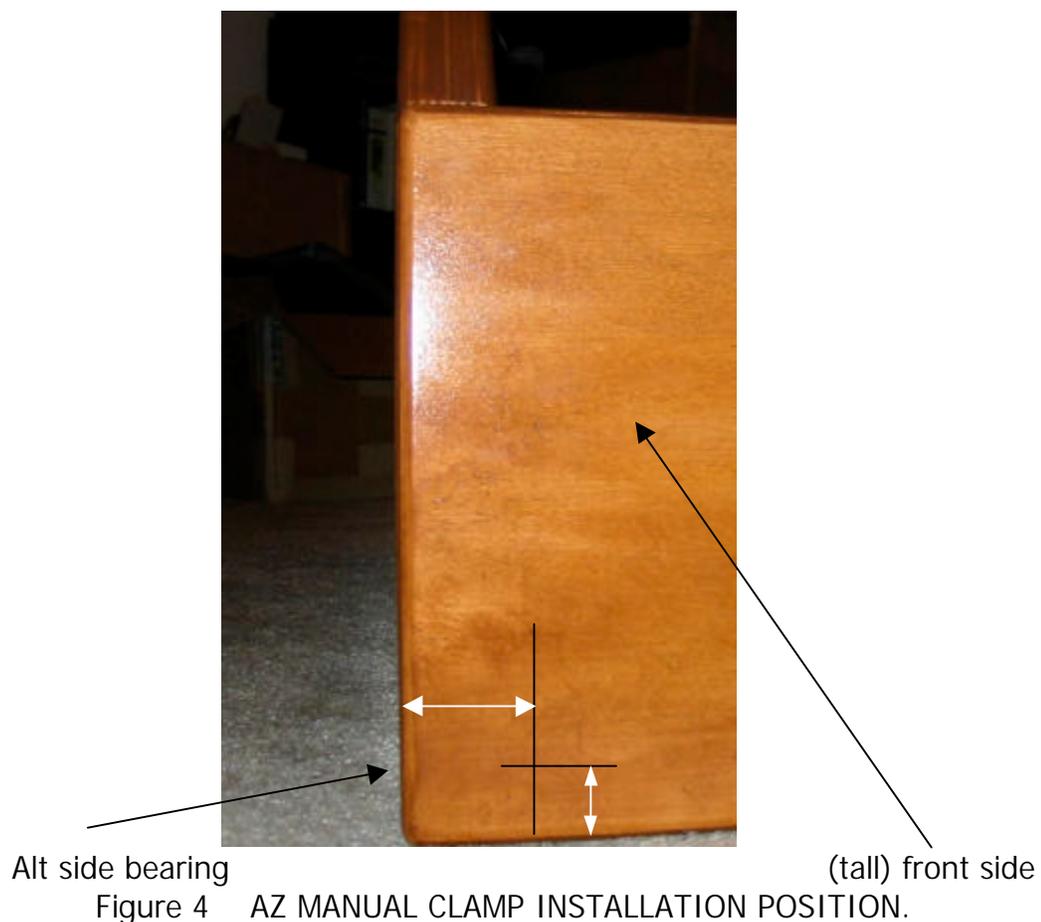


Figure 3 Inside of rocker showing roller hole placement

- 17) Flip the rocker upside down again (underside now up).
- 18) Using the 1/2" wood bit drill through the swivel hole. You more than likely do not have an overly long bit to reach the hole from the inside (and thus prevent wood chipping) so drill slowly when it gets close to being through so as not to damage the inside surface wood. Ensure the bit is vertical to the back of the rocker by having someone watch from the side (checking at 90 degree angles). It is important that this hole is drilled straight through the bottom surface without an angle. This hole can be seen, with its bolt partially installed, in figure 3 above.
- 19) If the manual control lever is to be used mark a point on the outside of the scope - on the front panel (tall panel). The point should be 1 9/16" from the outside edge (from the alt side bearing panel) and 1 1/8" from the bottom of the rocker (measure from the wood bottom - not the glassboard!). See Figure 4.
- 20) Carefully drill a 9/16" hole through the front panel at this mark. Go slow as it will chip the inside of the board. Once through run the drill in and out to ream this out slightly. (You can also use a rat tail file to *slightly* oversize this hole - you do not want to use a larger drill bit however).



21) Remove the pivot post from the ground board.

If you have purchased the Powered Ground Board option please refer to its instructions now.

22) Carefully install the provided "E" clip to the top of the pivot post.

23) Install an encoder (assumes user supplied encoder *installation* kit with flat plate for encoder mounting – the encoder should already be installed onto this plate) by carefully inserting the shaft into the hole at the top of the $\frac{3}{4}$ " steel pivot post. Adjust the depth so the threaded shank of the encoder just about to touch the pivot post (gap of 0.005 - 0.020" is fine - i.e. very small but visible). Tighten the set screw on the pivot post down onto the shaft.

24) Carefully lift the rocker and tip it sideways – resting it on a soft cotton towel. Any orientation is fine. The bottom of the box should now be vertical.

25) Install the above encoder/pivot post into the rocker box mounted bronze bearing from the inside of the rocker box. Do not force the post into the bearing – it will go freely when it is aligned correctly.

26) With the pivot point E clip resting on the bronze bearing (i.e. in as far as it is permitted to go) ensure the encoder/plate rotate freely in the rocker.

27) Carefully place the round ground board, aligning it with and inserting the pivot point into the center hole of the ground board. The "legs" should be on the outside, the Teflon pads on the inside.

28) Rotate the ground board until the 2 alignment/attachment holes in the bottom of the post are lined up with the holes in the bottom plate of the ground board.

29) Insert either the 8-32 or the $\frac{1}{4}$ -20 bolt with lockwasher into its hole and finger tighten. Install the other screw/lockwasher and finger tighten. Tighten both screws tight alternating between them as you tighten (drum style).

30) Carefully turn the scope back on its bottom, resting on the ground board. Rotate to ensure the movement is free, light, and without restrictions.

31) Fix the AZ encoder arm going to the right side of the rocker as seen from the front.

This completes the installation of the ground board/encoder.

32) Hold the AZ Manual clamp and move the lever arm to one side – so that the internal "plunger" is recessed into the body of the clamp. If the plunger is sticking out you are on the wrong side – move the lever 180 degrees.

33) "Twist" the AZ clamp control into the previously drilled 9/16" front panel hole from

the outside surface. The clamp has a base block of aluminum that can be used to get the clamp all the way in (using a box end wrench or crescent wrench). End up with the handle (as described in 31) aligned going off to the right (towards the center of the scopes front panel) when the "shaft" is internal or drawn in. DO NOT OVERTIGHTEN.

Figure 5 AZ manual clamp in Manual position (disengaged)



- 34) Holding the motor assembly pass the roller through the large floor hole being careful not to "ding" the ground board edge.
- 35) Push the 1/2" bolt up through the swivel point hole from the bottom outside (head on the outside). Push it up flush against the bottom of the box and through the hole in the plate. Place the UHMW washer then the SS washer over the bolt. Finally tighten it down using the nylon 1/2" lock nut. Tighten the nut down just tight enough to feel the swivel action start to get a bit tighter - no more than this. The plate should now be flush to the floor and swivel pretty freely back and forth - touching the knurled shaft onto the ground board at one point and moving away from the ground board by at about 1/8" as it swivels. The plate should not be free to "bend" or twist and should remain flat to the floor even when pressed up against the ground board.
- 36) Remove the outside nut from the 1/4-20 threaded rod (in the AZ manual clamp).
- 37) Set the toggle clamp to the "Manual" position (see figure 5). The internal "plunger" should be drawn into the clamp and thus away from the swivel plate. Place the lobed washer/cable from the AZ motor assembly onto the end of the threaded rod followed by the 1/4-20 nut. Do not worry about adjustments at this time. Keep it loose. See figure 6 below.

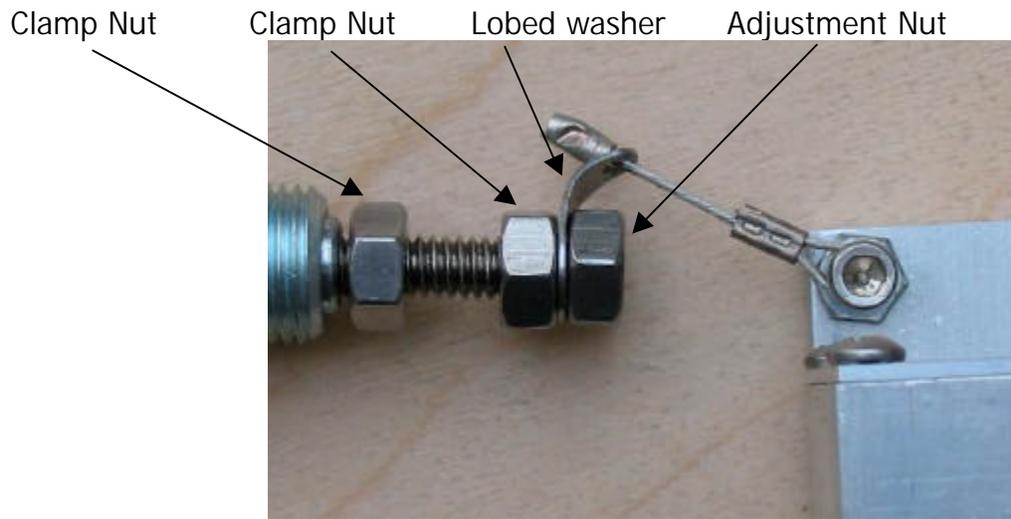


Figure 6 AZ clamp adjust cable

- 38) Swivel the AZ plate in a manner to move the knurled roller away from the ground board until it hits the opposite side of the cut hole. The ground board should be able to turn freely at this point (the knurled roller visibly away from the ground board by at least 1/16" - preferably 1/8"). Make sure the AZ clamp is in the Manual position as described above (figure 5) - the piston pulled into the assembly.
- 39) Loosen the inside clamp nut and move the Adjustment nut on the threaded rod - moving it away from the swivel plate until the cable is just tight. Tighten the inside clamp nut on the 1/4-20 bolt against the lobed washer. It does not have to be overly tight - just draw it up until it appears tight. There will be room for additional adjustment when completed.
- 40) Move the AZ clamp to the straight out position ("Engaged") - pointing away from the scope face and causing the plunger to stick into the inside of the scope box.
- 41) Pull the spring bracket back away from the motor and perpendicular to the gearbox body as shown in figure 7 below. With the eyebolt on the spring bracket set with its nut at the end of the threads (max extension) pull the spring until it is stretched, end of loop to end of loop 4 - 4 1/4". Mark and drill the mounting hole for the bracket (the back hole is usually more convenient to use by either is fine - only one per bracket is necessary). Use a 1/8" pilot hole and the supplied #10 3/4" (not the 1" Altitude screws) wood screw to mount the bracket. Repeat with the second spring/bracket. Ensure the bracket is straight inline with the spring - pointing parallel with the motor (gold tube). See Figure 7

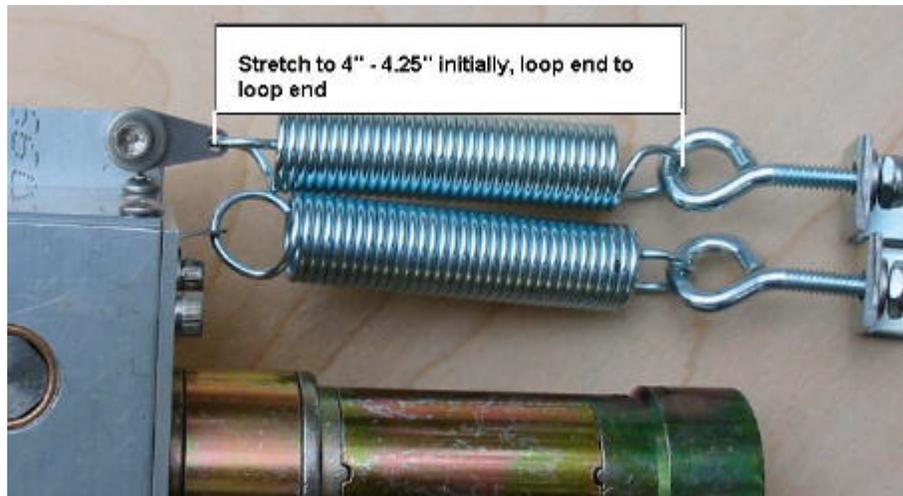


Figure 7 Spring initial tension setting for bracket placement

- 42) After the spring brackets are mounted and while in the "Engaged" position (AZ manual red toggle arm straight out from scope) tighten both springs an equal amount - loop end to loop end = $5 \frac{1}{8}$ ". It may be easier to do this with someone else helping - put a phillips screw driver into the screw loop and use this to pull the spring while tightening the nut. Be aware lots of tension is required! This will not wear the ground board excessively – only imprint a slight gear pattern onto it. If the scope slips – add more tension. The system is not, however, designed to operate in winds that are greater than what the scope optics (secondary usually) will allow – typically = 10 mph. If more than this and the scope is equipped for manual operation it is advised the user switch to manual.
- 43) Move the AZ clamp to the "Manual" position (flat against the front)... the assembly should pull away from the ground board by $\sim 1/8$ ". Ensure the scope rotates freely 360 degrees in this position. If not or if the gap is less than $1/16$ " adjust the adjustment nut on the threaded rod inward away from the motor assembly - pulling the roller farther away from the ground board. If there is not enough room on the threaded rod screw the rod into the toggle clamp assembly further.
- 44) Move the AZ clamp to the "Engaged" position (straight out)... the roller should be firmly engaged on the ground board and there should be visible slack in the clamp cable assembly.
- 45) Tighten the 2 clamp nuts (see figure 6) one against the clamp body to ensure the rod does not loosen up. The other against the lobed washer/cable assembly on the threaded rod. DO NOT MOVE THE OUTSIDE ADJUSTMENT NUT - only the inside.
- 46) Route the motor and encoder wires to the ServoCAT box - plugging them in appropriately. RUN THE MOTOR LEADS (brown cable from motor/gearbox) separate from all other scope cables including power, encoder (from gearbox), DSC encoder, etc. Except for very short distances maintain at least 2" spacing between motor and all other leads. Refer to the ServoCAT manual to set up the gearing.

The ServoCAT configuration file for Obsession retro kits is "Obs Retro.dat". Copy it from the CD under \tools and into the C:\program files\servoCAT-Sky directory. Run the ServoCAT program and \file\open this file to change any variables. Defaults are already set. Click on "20 Obs" for this scope size.

*DO NOT PUT THE MIRROR BOX BACK ON THE ROCKER - GO STRAIGHT TO THE ALTITUDE
INSTALLATION MANUAL*

This completes the installation of the Azimuth gear system mechanics (along with the ground board and the powered ground board options if obtained).