

## Collimating VC200L / VMC 200L optical tubes

### 1. Before you start re-collimating the optical axis of your VC200L / VMC200L optical tubes

- ① The main mirror and secondary mirror of the VC200L / VMC200L optical tubes have been adjusted to the correct position at Vixen's factory before shipment. Make sure to mark the edge of the mirrors and holders for correct repositioning before you remove the mirrors for any reason. It will be very important to put the mirrors back in their original position so that you can reproduce the best view when re-collimated.
- ② Please take care not to lose washers between the secondary mirror holder where it attaches to the center of the spider vanes. The number of washers used for this part differs in each unit. The distance between the primary mirror and the secondary mirror has been adjusted precisely by using these washers.
- ③ You need to add an extension to the drawtube to collimate the secondary mirror. This may be the Flip Mirror system in the straight through position, or the 31.7mm Eyepiece Adapter and one of the 43mm Extension Tube #2957 or 60mm Extension Tube #2956 with the appropriate DC rings.

### 2. Adjusting the focuser (No need to adjust this part ordinarily.)

Remove the secondary mirror and holder from the front spider by grasping the secondary firmly and loosening all the collimation screws in the center of the spider. Leave the spider in place (Fig. 1). Insert a centering sight tube or Cheshire eyepiece into the eyepiece holder and look into it. As shown in figure 2, make the circle (a) of the secondary holder concentric with the outer circle (b) formed by the edge of field. Do this by adjusting the push/pull screws around the focuser body. Make sure to tighten the adjusting screws.

### 3. Collimating the secondary mirror

- ① When you install the secondary mirror and holder, make sure to replace the washers as described in section 1-②. Loosen the three 'push' collimation screws around the center of the spider ring and fix the mirror holder with only the center 'pull' collimation screw by turning it clockwise until the holder is roughly stable.
- ② Attach the extension tube to the focuser drawtube and insert the centering eyepiece into the eyepiece holder. Draw in the focuser tube entirely and look into the centering eyepiece. You see the four spider vanes radiating from the secondary mirror (Fig. 4-1). Some of the spider vanes may not seem to be of the same length if the secondary mirror is badly out of collimation (Fig. 3).
- ③ When you extend the drawtube to the maximum, you see the roots of the vanes go out of the field of view. Adjust the tilt of the secondary mirror by turning the three 'push' collimation screws until all four vanes appear or go out simultaneously (Fig. 4).

### 4. Collimating the primary mirror

Look into the centering eyepiece in the eyepiece holder to see whether the reflection on the

primary mirror is centered or not (Fig 5). If the circle (f) looks off-center (not concentric with the circle (e)), adjust the three pairs of the 'push and pull' collimation screws on the primary mirror holder (outer ring of screws on back of the scope) so as to bring the reflection of the secondary mirror to the center of the field of view.

## 5. Star Test

Once the coarse collimation adjustments are made, take the telescope out at night and check star images.

- ① Under steady seeing conditions, aim the telescope at a second-magnitude star more than 45 degrees above the horizon at low magnification. (Do not use a star diagonal.)
- ② Place the star near center of the field and make the star image slightly out-of-focus to see whether the rings surrounded the star (= diffraction rings) are concentric. If the optical axis is not aligned correctly, the off-centered diffraction rings will appear as shown in the figure 6-1.
- ③ Move the optical tube so as to displace the star image a little from the center of the field toward a direction of off-centered rings. (Fig. 6-2)
- ④ Adjust slightly the collimation screws of the primary mirror so as to bring the out-of-focus star image back toward the center of the field. Repeat the steps ③ and ④ until the diffraction rings turn to be concentric. (Fig. 6-3)
- ⑤ Exchanging for an eyepiece with high magnification will allow you to make more accurate optical collimation.

Figure 1

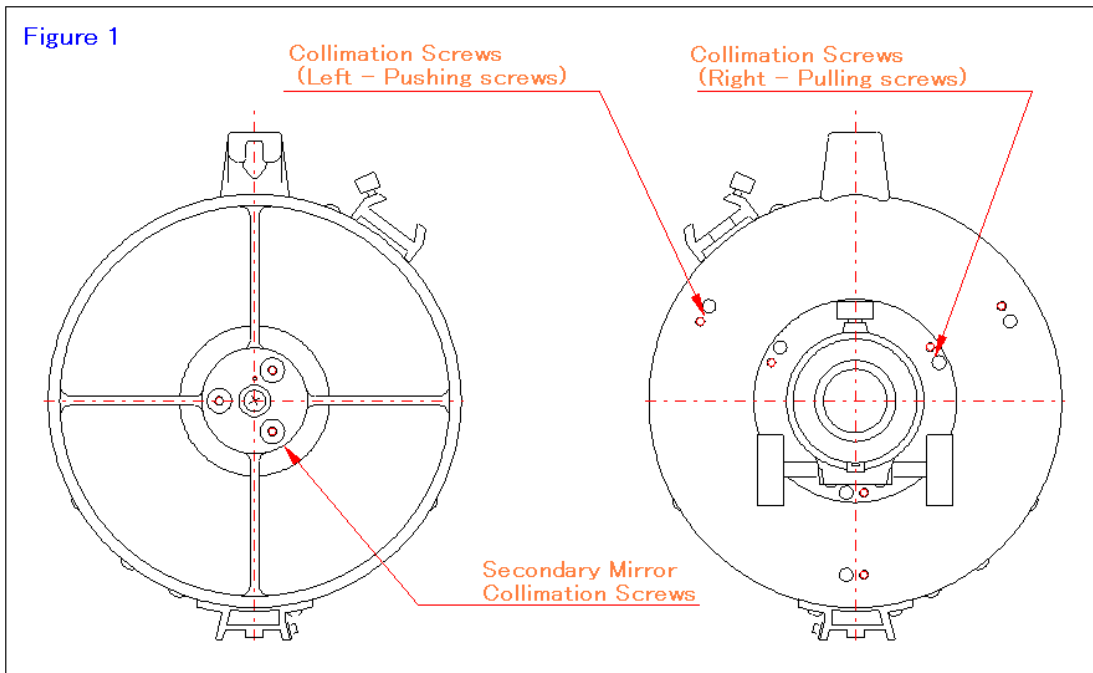


Figure 2

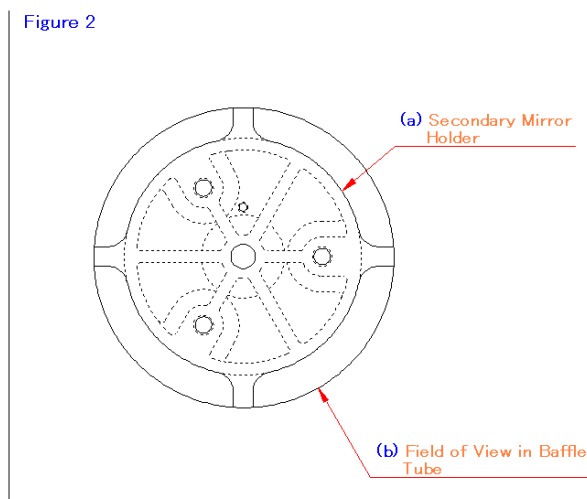


Figure 3

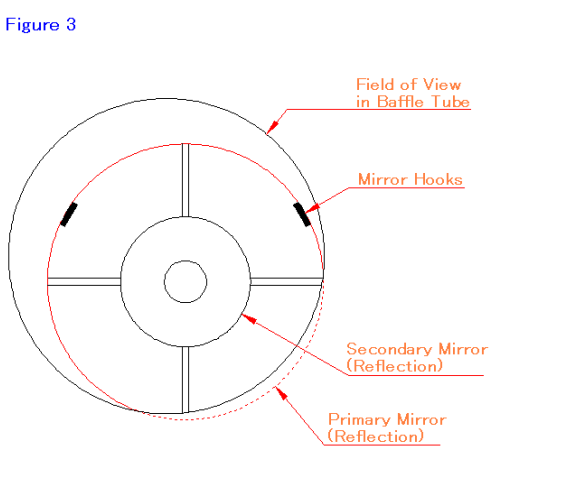


Figure 4

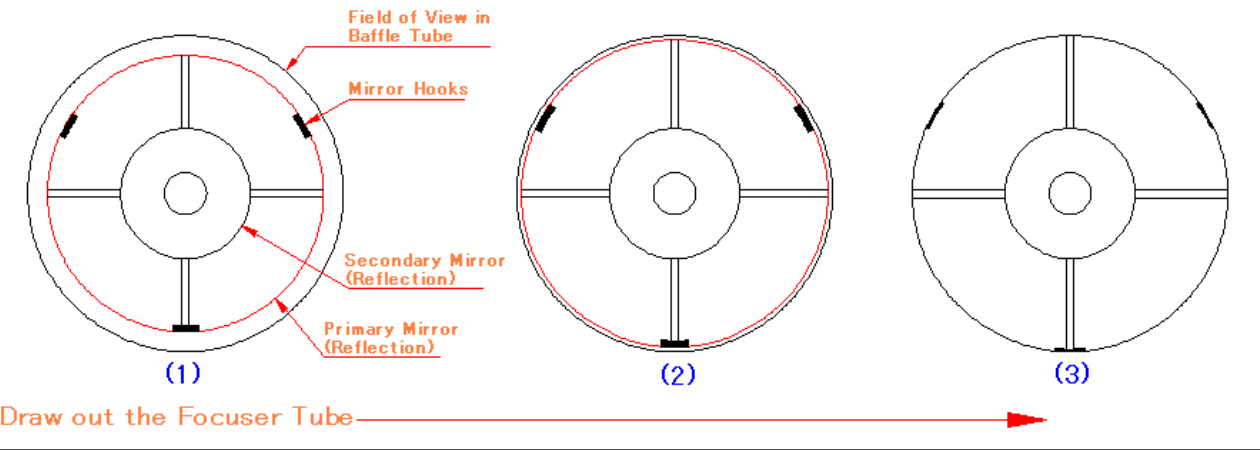


Figure 5

