

SWII Fork Mount User Instructions

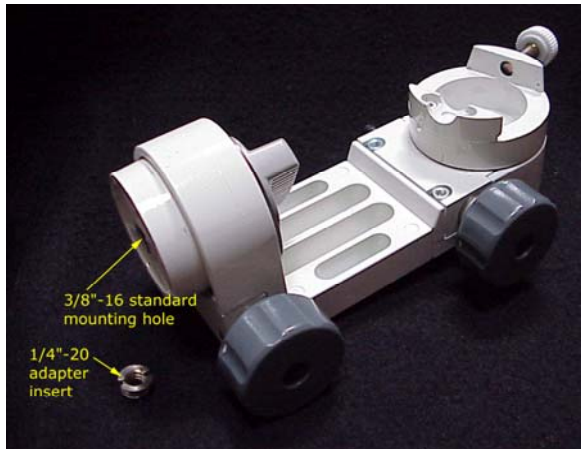
Introduction

This document describes the use of the versatile and lightweight Borg SWII single-arm fork mount. The SWII fork is available alone (part #3101) for mounting on a standard photo tripod, for use with a custom Borg Slik tripod (part #3305), or included in a complete observing set with a Series 80 Borg refractor.

The fork mount includes a quick-release for the optical tube assembly (OTA), slow motion knobs in both axes, and graduated scales for use in equatorial operation. It is intended for visual use only with lightweight scopes such as the Borg Series 80 and mini Borg units.



Mounting Options



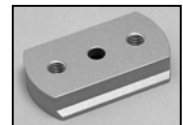
For mounting on a standard photo tripod, the SWII fork includes a photo standard 3/8"-16 hole in its base. This allows for mounting directly to common photographic tripods such as Bogen tripods. With the use of a threaded insert (not supplied but commonly available at photographic equipment stores) the fork may be mounted on tripods with the standard 1/4"-20 screw or doubled-up on a tripod with an adjustable photographic head already mounted.

For use with the ultra-compact Borg/Slik tripod, the fork attaches with a special base that allows for easy adjustment of tilt for alt-azimuth or equatorial operation.

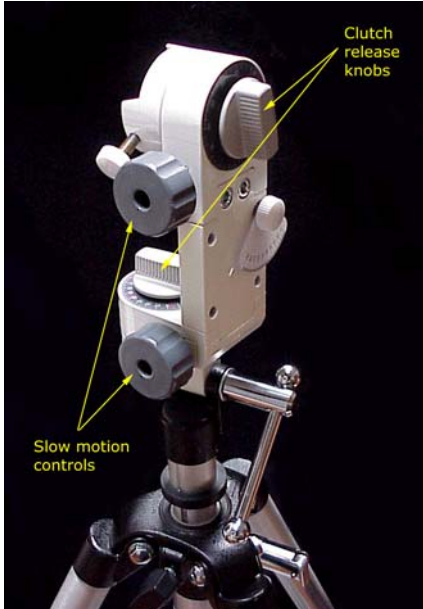
Attaching the Optical Tube Assembly



Attachment of the OTA to the fork head requires the use of the Series 80 tube holder (part #5503 shown at left), or the Universal Attachment Block (part #3102 shown at right), which have the proper mating quick-release dovetail interface. The Universal Attachment Block has a 1/4"-20 threaded hole which can accommodate a Mini Borg OTA, camera, or any lightweight telescope with a standard photo tripod interface. When using rings to hold the OTA, loosen the mount clutches and slide the OTA within



the rings to get to the best possible balance position to insure that the mount's movements are smooth.



Alt-azimuth Operation

The Borg single-arm fork mount may be used directly in alt-az mode as shown at left. Simply mount the fork on the tripod with its base level and ignore the equatorial dial markings on each axis. The slow motion knobs (dark gray) can be used for fine adjustment of pointing. To rapidly position the scope, turn the clutch knobs (light gray) counterclockwise to loosen them slightly and push the scope to the desired position. Note that you should hold the OTA firmly in one hand while releasing or tightening the clutches as an unbalanced scope may suddenly swing free and hit the tripod.

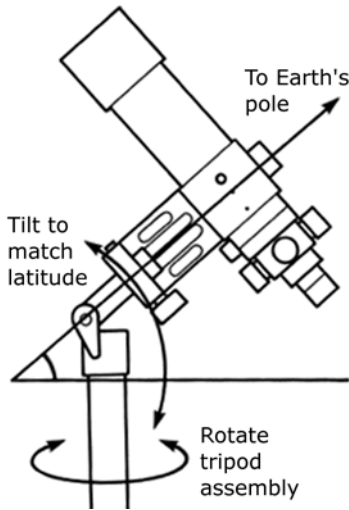
In alt-az operation, one common problem with telescope mountings is that viewing of zenith is restricted because the mount interferes with the OTA when pointed vertically. When using the Borg/Slik tripod, you can get around this by simply tilting the head back just far enough for the OTA to clear the head and tripod.

If the fork head is attached to a photo tripod, you can either use a doubled-up mounting configuration (fork mount attached to the mount's photo head), or simply shorten a leg of the tripod. Note that shortening a leg can cause the tripod arrangement to be unstable, so counterweighting the tripod may be necessary. Alternatively, for Borg Series 80 scopes, a Takahashi tube holder may be used in conjunction with the Borg Universal Attachment Block as shown. The combination allows the OTA to clear the head/tripod for viewing the zenith.



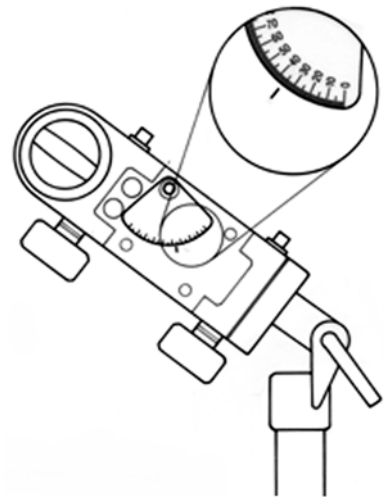
Equatorial Operation for Convenient Tracking

The Borg single-arm fork head also allows for equatorial operation in either the Northern or Southern hemispheres, simplifying tracking of astronomical objects as the Earth rotates. This is especially handy in conjunction with the slow motion controls when using high power for planetary viewing.



To use the fork in equatorial mode, alignment with the Earth's axis of rotation is required. Begin by rotating the entire tripod assembly so that the RA axis of the fork mount is pointing north if you are in the northern hemisphere or south if you are in the southern hemisphere. If you are using a compass to determine the direction of the pole, be sure to compensate for magnetic deviation for maximum accuracy.

Next, tilt the head back to align with the pole. In the northern hemisphere this can be accomplished at night conveniently by sighting on Polaris, which is less than 1 degree from the Earth's North Pole. Otherwise, set the tilt to match the latitude of your observing position. If the tripod itself is level, you can use the fork's built-in latitude angle scale as shown at right.



Loosen the scale's pivot screw slightly until the triangular scale can swing freely. Then tilt the head back until the index mark is lined up with your latitude.

Once you have aligned the mount with the Earth's pole, you can then maintain astronomical objects in view by simply turning the RA slow motion control to compensate for the Earth's rotation. Note that for most applications, exact alignment with the pole is not necessary. If you are viewing at low powers and/or not tracking an object for a long interval, rough alignment may be all that is necessary. Misalignment of the polar axis will simply cause some drift in the Dec axis, necessitating occasional corrections using the Dec slow motion control in addition to the RA tracking adjustments.

Using the Setting Circles

Setting circles are also provided on the Borg single-arm fork mount for convenience in locating objects for which coordinates are given (e.g. comets or deep sky objects). To use the setting circles, the mount must be polar aligned with as much accuracy¹ as possible as described above.

The Declination (Dec) axis has a fixed scale under the dec clutch knob. When properly adjusted, pointing the OTA perpendicular to the Right Ascension (RA) axis should result in a reading of zero degrees. When pointing at the pole, the dial should read 90 degrees. If you are utilizing the universal attachment block, insure that the OTA is mounted on the block parallel to the long axis of the attachment block. When aligned, the reading of the Dec dial corresponds directly to the Dec coordinate in the sky where the telescope is pointing.

The right ascension (RA) axis dial is designed for use in the Northern Hemisphere². It is free to rotate independent of the RA axis since as the Earth rotates, the dial must be adjusted accordingly. This also

¹ Setting circle accuracy is, in practice, limited by the resolution of the setting circle scales as well as the accuracy with which the mount is polar aligned. These are intended strictly for casual visual use and not for applications requiring high precision.

² The RA marks must be corrected for Southern Hemisphere use with the equation $RA(\text{south}) = 24 - \text{Reading} \pmod{24}$.

means that when the RA setting circle is to be used to locate an object, it must first be rotated to match the sky coordinates. This is done by pointing at a bright star with known coordinates, setting the RA circle to match, and then moving the scope at the desired target's coordinates using the setting circle readings.

For convenience, the RA dial is marked with the positions of six bright stars³ in red lettering. These have been chosen so that at least one of these bright stars is above the horizon no matter what time of the night or time of the year you happen to be observing:

Label	Season	Star / Constellation	RA	Dec	Magnitude
R	Spring	Regulus / Leo	10 ^h 08 ^m	+12°	1.3
S	Spring	Spica / Virgo	13 ^h 25 ^m	-11°	0.9
Al	Summer	Altair / Aquila	19 ^h 50 ^m	+09°	0.8
An	Summer	Antares / Scorpius	16 ^h 29 ^m	-26°	1.0
Ad	Fall	Alpha Andromeda	00 ^h 08 ^m	+29°	2.1
B	Winter	Betelgeuse / Orion	05 ^h 55 ^m	+07°	2.1

As an example, here are the steps for locating the winter object M42, the Orion Nebula:

1. Align the mount to Polaris (the north pole) as described in the previous section.
2. Using the lowest power eyepiece (H-50 in the Borg SWII set), center Betelgeuse, then rotate the RA setting circle dial until 'B' is at the RA index mark.
3. Verify that the Dec reading is at the 7 degree mark. If it is within about 2 degrees, proceed to the next step. Otherwise, readjust your polar alignment and try again (i.e. go back to step 1).
4. Now move the telescope to the coordinates of M42 (RA=05^h35^m, Dec=-5°) while watching the setting circle scale readings. Move the telescope by releasing the clutches, push the scope close to the target coordinates, tighten the clutches again, and then use the slow motion controls for fine adjustment.
5. M42 should now be within the field of view of your eyepiece.

If you are having trouble locating objects, here are some suggestions:

- Practice centering bright objects first.
- Use an alignment star that is close to the target object.
- Use the lowest possible power eyepiece when attempting to locate objects. If the object is not within view after moving to the target coordinates, it could indicate that the polar alignment has not been accurately set. If this is the case, carefully search around the coordinate point using the slow motion controls of the mount.
- Take care not to bump the tripod when moving between the alignment star and the target.
- Center the alignment star carefully. This will insure the best possible accuracy when moving to the target.
- Do not delay going from the alignment star to the target. If you wait too long, rotation of the earth will cause your pointing in RA to be off when you attempt to move to the target.

³ Alignment star markings are not intended for Southern Hemisphere use and should be disregarded.

Mount Adjustments

Occasionally, your mount may require some adjustments as described below. In all cases, be sure to use the proper sized tool to avoid damaging screws or the mount.

- Adjustment of the RA Axis Free Movement and Clutch Tension
 1. Unscrew the RA clutch knob completely by turning it counter-clockwise until it comes off. Take care to not lose the washer found on the shaft under the knob.
 2. Remove the setting circle plastic dial.
 3. Adjust the RA axis tension using the 3 Phillips screws found under the RA dial. Tighten the screws to stiffen the resistance of the axis to turning or loosen them to reduce friction.
 4. If necessary, adjust the 4 screws found on the opposite side of the axis from the clutch knob. Rotate the base of the head until the screws are aligned with the 4 holes in the base so that a screwdriver may be inserted for the adjustment.
 5. Replace the RA dial and clutch knob. The RA dial should remain free to rotate.

- Adjustment of the Dec Axis Free Movement and Clutch Tension
 1. Unscrew the Dec clutch knob completely by turning it counter-clockwise until it comes off. Take care to not lose the washer found on the shaft under the knob.
 2. Remove the setting circle plastic dial. This is set in a fixed position with double-sided tape, so it will have to be carefully pried off using a sharp edged tool. Note its position so that it can be put back in the proper orientation when reassembling the Dec assembly.
 3. Adjust the Dec axis tension using the 3 Phillips screws found under the dial. Tighten the screws to stiffen the resistance of the axis to turning or loosen them to reduce friction.
 4. If necessary, adjust the 4 screws found on the opposite side of the axis from the clutch knob. Rotate the OTA interface side of the Dec axis until the screws are aligned with the 4 holes in the OTA interface so that a screwdriver may be inserted for the adjustment.
 5. Replace the Dec dial (taking care to restore the original alignment) and the Dec clutch knob. If you've forgotten to mark the original alignment of the dial, remember that the dial should read 90 degrees when the OTA is pointing perpendicular to the RA axis.

- Adjustment of the RA or Dec Knob Play
 1. Grip the knob firmly and use a screw driver to loosen the Philips screw located in the center of the knob.
 2. Grip the opposite end of the slow motion shaft tightly with pliers and turn the knob 30-45 degrees clockwise.
 3. Tighten the Philips screw in the center of the knob to finish.

Note that this procedure corrects knob slippage on the slow motion shaft and not the backlash of the control

- Tightening the Borg/Slik Tripod Attachment

Over time, the attachment point of the fork head to the Borg/Slik tripod may become worn enough to prevent the head from being tightly coupled, especially when tilted for equatorial mode operation. In this case, place a washer between the attachment screw and the tripod holes as shown.