RC10 – Assembly Manual
Deep Sky Instruments

January 21, 2009
Version: Preliminary

Secondary Mirror Assembly

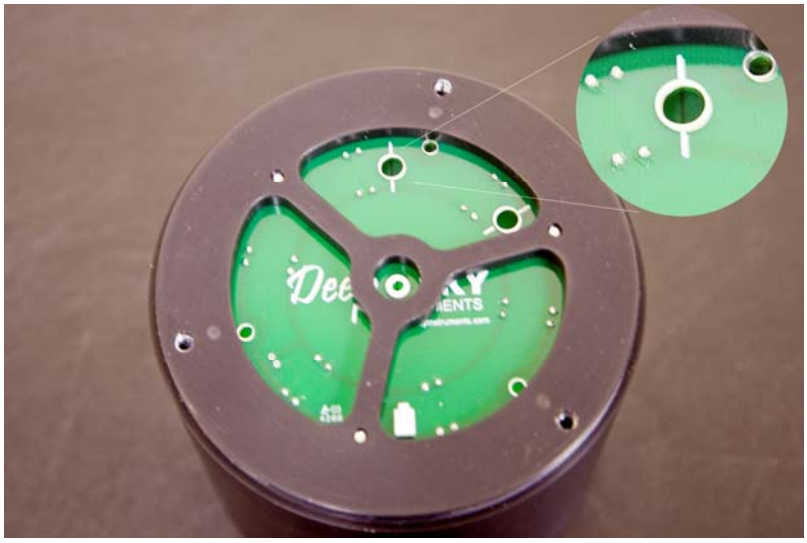
The secondary mirror assembly consists of the secondary mirror, secondary baffle and secondary back plate. The secondary back plate contains the secondary dew heater which is simply an array of resistors.

Insert the secondary mirror into the secondary mirror baffle being careful not to damage the secondary mirror. The fit will be fairly tight so the secondary mirror must be kept square to the secondary baffle. Make sure the secondary mirror seats completely and does not get wedged.

Once the secondary mirror is fully seated, be careful to keep the secondary mirror baffle upright so the secondary mirror does not fall out.

The secondary mirror back plate may now be screwed into place. Do not force this as the threads are fine and can easily be cross-threaded. If the back plate does not thread easily, inspect the threads for debris and clean as necessary.

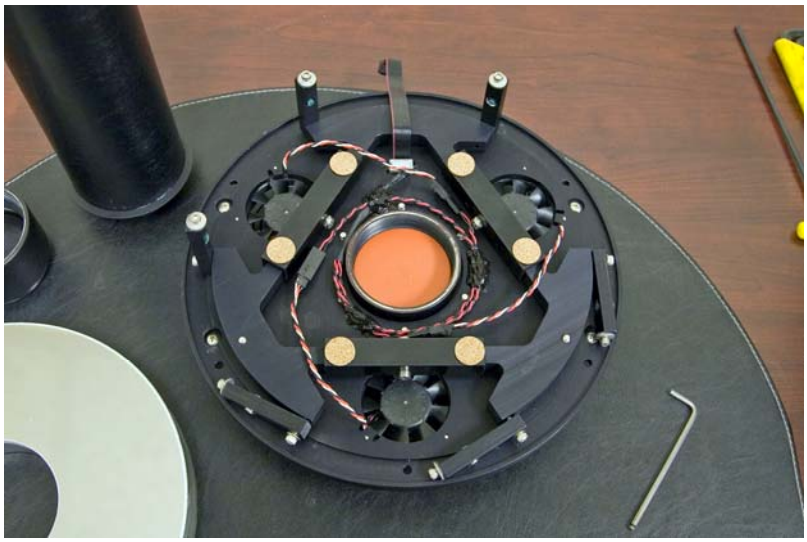
The back plate should only be tightened enough so that the secondary mirror does not move within the cell. Over tightening may result in pinching the secondary mirror and distorting the telescope image.



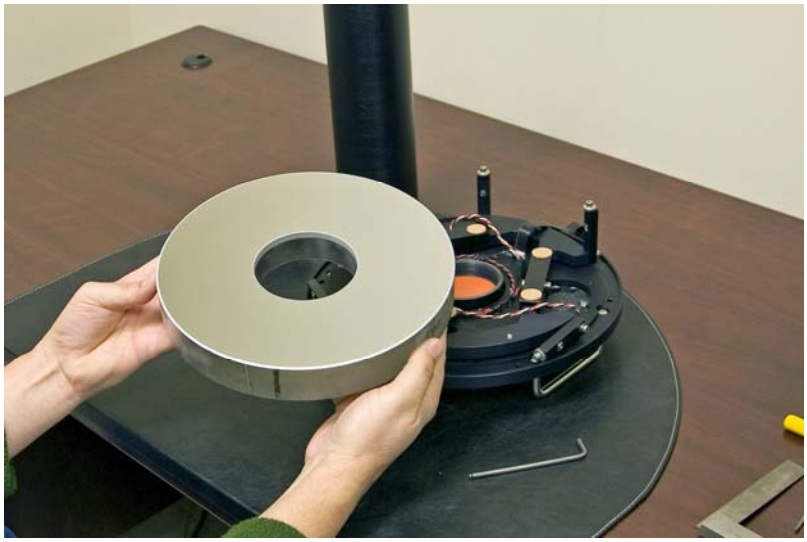
The primary and secondary mirrors are a matched set and must be aligned relative to each other. This is done by pointing the alignment marks on each mirror upwards. The alignment mark on the back of the secondary mirror should be visible in the alignment hole in the dew heater PC board as shown above. This can be problematic as the secondary mirror will tend to move as the back plate is tightened. Some trial and error may be necessary. The secondary mirror may be moved relative to the secondary mirror baffle by pointing the open end of the baffle up while loosening/tightening the back plate.

Primary Mirror Assembly

The primary mirror assembly consists of the OTA back plate, primary mirror, mirror cell and clips, primary mirror baffle and corrector/field flattener (RC10C) or spacer (RC10).

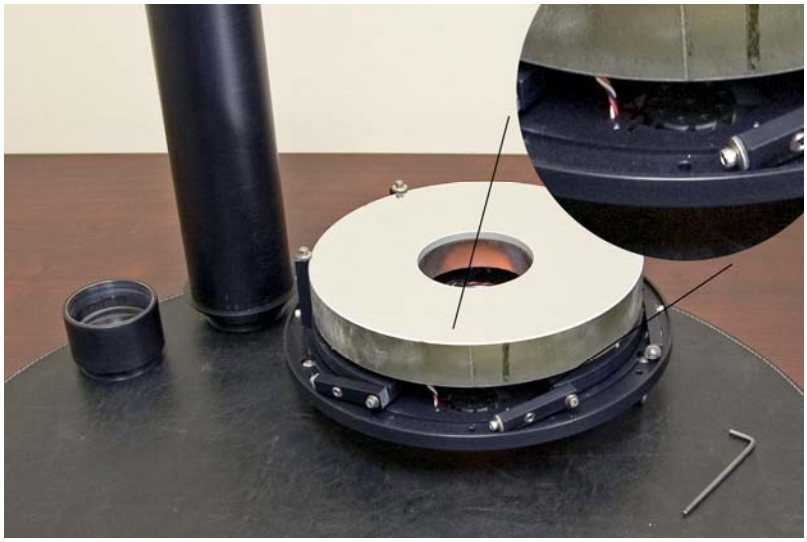


The primary mirror cell is a six point floatation cell consisting of three rockers. The primary mirror is held in place and centered by six mirror clips. Three of these clips are shown in there final position while three are loose. The cooling fan wiring is secured to the back plate to the OTA body and provides control of the secondary focuser and dew heater.



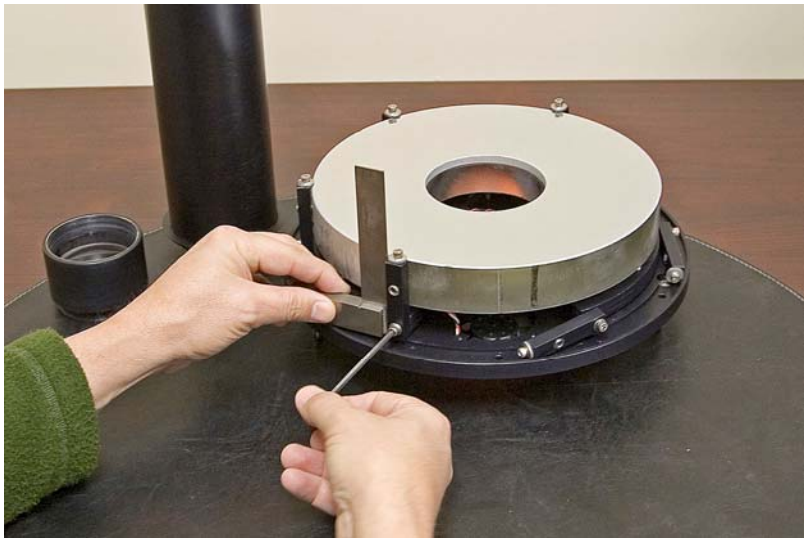
The primary mirror should be handled with care to avoid damage and contact with the optical surface.

Carefully place the primary mirror on the primary mirror cell. It should be roughly centered. If the mirror was removed for cleaning by loosening three of the mirror clips, it may be returned to its previous position using the other three clips as a reference.

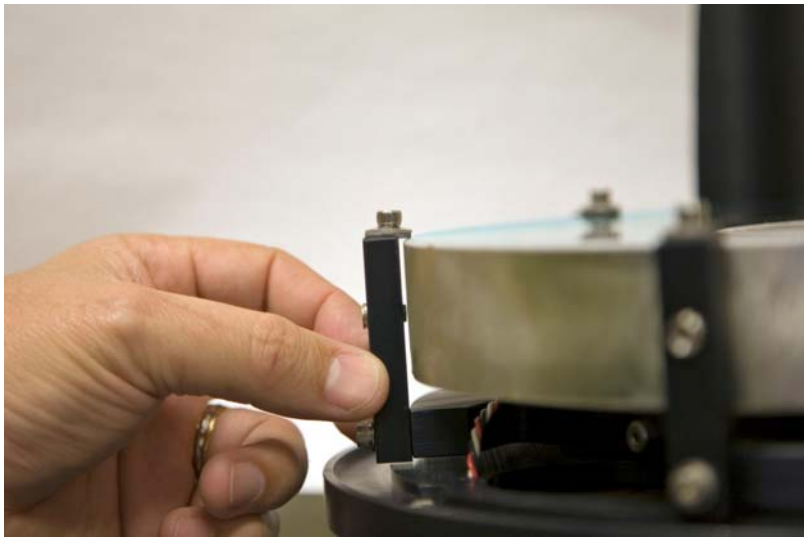


The alignment mark on the primary mirror must be located in the up position as shown. The top of the back plate is opposite from the ribbon cable. Note that the alignment mark is the scribed mark on the side of the primary mirror and not the black mark. You can verify this by looking at the back of the mirror where the alignment mark is clearly shown.

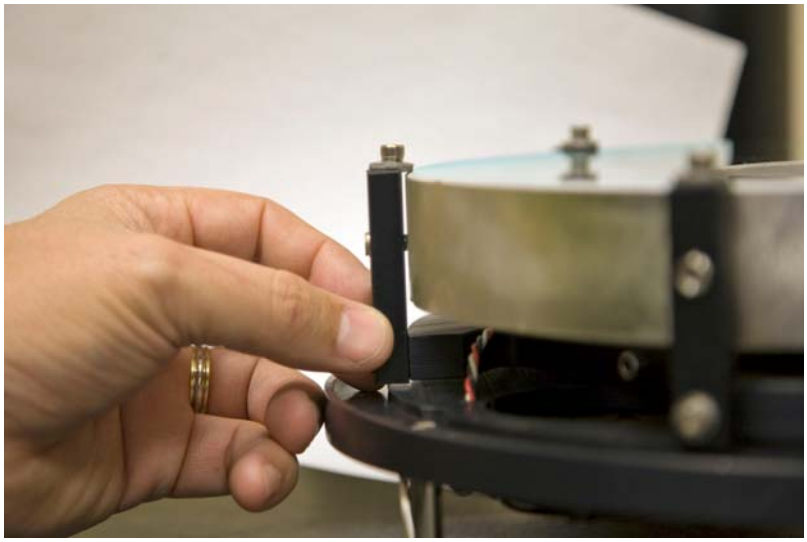
Once the primary mirror is in place, the mirror clips may be replaced. This is done with a properly sized hex wrench.



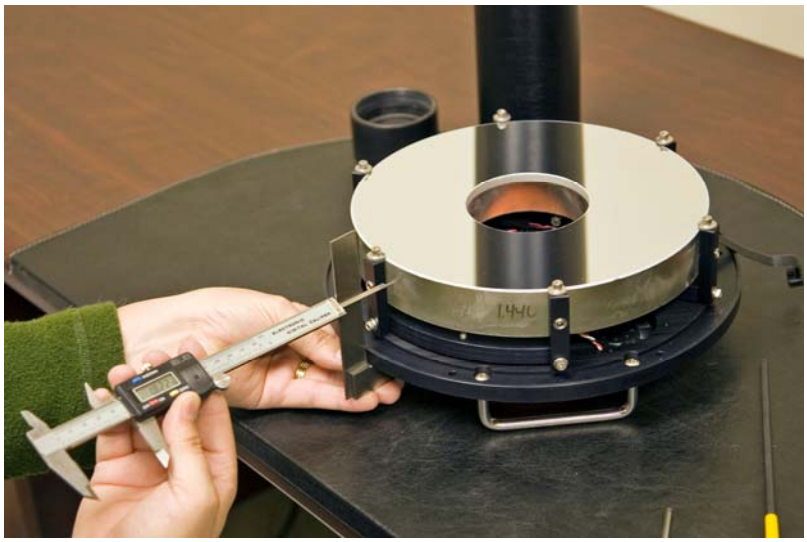
The mirror clips should be square to the back plate.



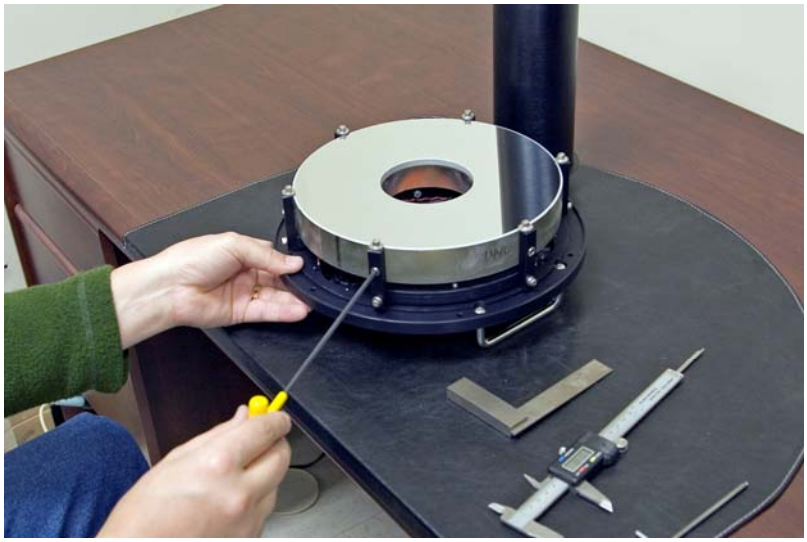
Each clip should just touch the top of the lip of the primary mirror but should not apply any downward force. Once in the correct position, the mirror clip should be secured snugly.



Nylon tipped set screws are used to center and support the primary mirror. These set screws should just touch the primary mirror but not exert any force which could pinch the mirror and degrade performance. These set screws are adjusted at the factory and secured with a thread locking adhesive (Loctite). It is recommended that these set screws not be adjusted unless absolutely necessary.



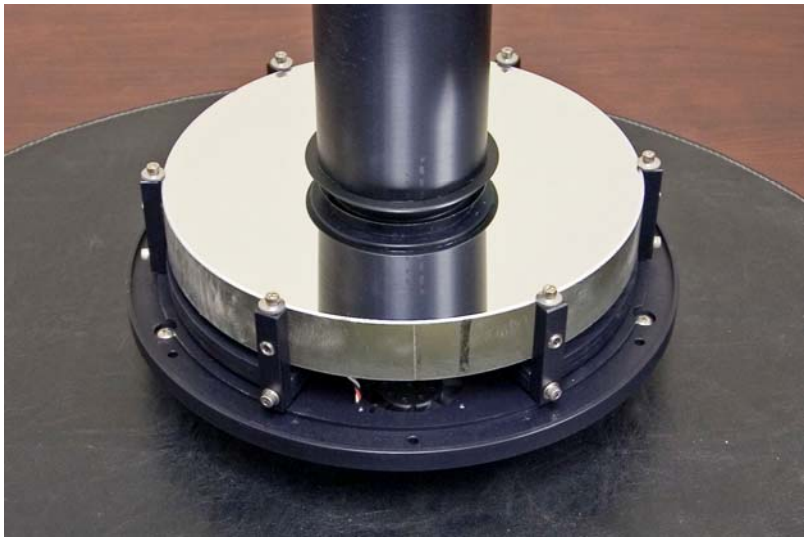
The mirror should be centered in the back plate. If required, the set screws may be adjusted to accomplish this. One procedure using calipers and a square is shown above. This generally works well as the mirror's outer diameter is fairly round. The mirror is centered when opposite measurements are within 0.01 inches or so. Misalignment by significantly more than this can lead to astigmatism.



Any adjustments to the set screws should be made with an appropriately sized hex wrench.

The corrector/field flattener cell (RC10C) or spacer (RC10) firmly screws into the rear of the primary mirror baffle tube.

This assembly then screws into the back plate adapter. Be very careful not to damage the primary mirror.



The completed primary mirror assembly is shown above with the primary mirror alignment mark in the up position. Make sure that all mirror clips are at the proper height and completely secured before handling the assembly. The back plate handles provide a safe way of handling the assembly.

Secondary Mirror Assembly Installation

The secondary mirror assembly may now be installed into the OTA. It is inserted into the tube from the rear.

The secondary focuser assembly is not intended to be serviceable in general. In order to install the secondary mirror assembly, you must reach between the spider vanes and lift the assembly into place. Make sure the top of the assembly is installed upwards as shown. A long handled hex wrench should be used to secure the assembly.

All three secondary mirror collimation screws should be secured in this fashion. The secondary mirror collimation set screws are generally not touched so that the assembly is returned to roughly the same position it was in before it was removed.

The secondary dew heater connects to the secondary focuser assembly with a two position connector as shown. The connector has a positive latch to help stay connected but will pull apart if something should bind to avoid permanent damage.

Here is the dew heater connector shown in place.

Primary Mirror Assembly Installation

The primary mirror assembly is best installed with the OTA standing on end as shown. It is highly recommended that this procedure be performed by two persons. Care should be taken not to damage the primary mirror or drop something onto the secondary mirror. The primary mirror baffle is inserted into the OTA first and the assembly is carefully lowered.

While holding the primary mirror assembly just above the OTA, the ribbon cable connector must be connected to the mating connector inside the OTA. The ribbon cable is just long enough accomplish this.

This is how the cable looks after the connection is made. Once connected, be careful not to pull against the cable.

The excess cable must be stowed behind the primary mirror. This is done by slowly lowering the primary mirror assembly into place. The side nearest the connector (bottom) should be held away from the OTA and a flat thin object (a steel ruler in the picture above) is used to push the excess cable behind the primary mirror. The back plate may then be lowered into position.

The back plate mounting holes should be aligned with the corresponding holes in the OTA. Make sure the back plate is completely seated and nothing is being pinched. The fastener screws should screw with little or no force if the holes are properly aligned. Do not force these screws as this may be an indication that something is not right.

Once assembled, the scope may be re-collimated. Collimation is detailed in a separate document.

Notes

- AP 2.7 inch threads are used for attaching accessories to the OTA. They are also used to attach the internal corrector/field flattener and primary mirror baffle. These threads may allow for some lateral play until they are tightened. They will tend to self-center when tightening as long as it is done slowly and without forcing them in any particular direction. It is important to do this to help keep things properly centered.
- All serviceable hardware is standard English sizes, not metric.
- Please email all comments and corrections to support@DeepSkyInstruments.com.