

Teardown, Cleaning, and Reassembly of the Miscellaneous Parts of the Olympus BH-2 Microscope Frames

Revision 2



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Introduction

The microscopes in the Olympus BH-2 line have largely been replaced in the professional and clinical world, due to their advancing age and the lack of repair parts from Olympus. A great many of these microscopes were produced in their day, and because of this they are readily available on the used market for very reasonable prices. Thanks to their excellent build quality and solid optical performance, these scopes are now very popular with hobbyists, providing an affordable and high-quality alternative to the Chinese-made scopes prevalent today.

Problems that might be encountered when purchasing one of these scopes is that various mechanical systems may be stiff, sluggish, or even completely seized, due to the decades-old grease in the microscope. Procedures for servicing the major components of the Olympus BH-2 stands are covered in other documents in this series. This document describes the complete teardown, cleaning/lubrication, and reassembly of the various minor sections that are not covered elsewhere. This should allow a hobbyist with reasonable mechanical abilities to service these portions of the applicable microscope stands.

Scope of this Document

This document describes the complete teardown, cleaning/lubrication, and reassembly of the various minor sections of the Olympus BHS, BHSP, BHSU, BHT, BHTP, and BHTU microscopes, covering the following components.

- Viewing-Head Lock Screw (two versions)
- Nosepiece Slide Mount (two versions)
- Field Diaphragm Assembly (two versions)
- Light Inlet Assembly
- Light Exit Assembly (two versions)

Tools Needed

The tools listed in the sections below will be needed to service the various minor sections of the BHS, BHSP, BHSU, BHT, BHTP, and BHTU microscope stands.

- Pliers, needle-nose
- Pliers, soft jaw
- Screwdriver set, JIS (item T2 of [Appendix 1](#))
- Screwdriver set, slotted
- Lens-Handling Suction Tool (item T4 of [Appendix 1](#))
- Lens Spanner Tool, bent tips (item T3 of [Appendix 1](#))

A Few Words about JIS Screws

Screws with JIS heads are found in much of the older equipment designed and manufactured in Japan. JIS screws look very much like standard Phillips screws, but they differ in that JIS screws were designed to not cam-out under torque, whereas Phillips screws were designed to intentionally cam-out as a means to limit

the torque applied to the fasteners. Because of this crucial difference in the geometry of the two screw types, JIS screws will be damaged by standard Phillips drivers if too much torque is applied. JIS screws can usually be identified by the presence of a single dot, or by an “X”, stamped into one of the four quadrants of the cross-point depression (see [Figure 1](#)).

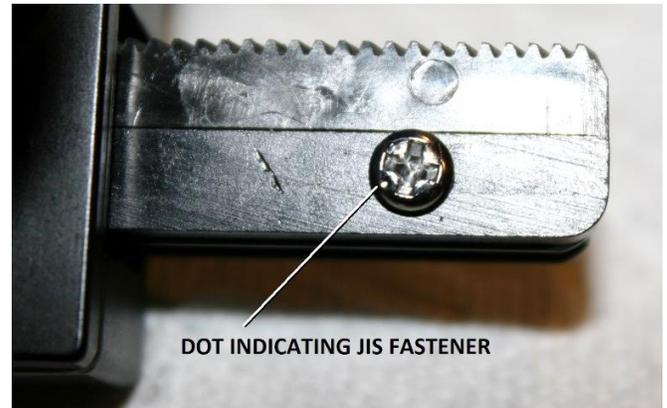


Figure 1 – Head of a typical JIS screw

Supplies Needed

The supplies listed in the sections below will be needed to service the various minor sections of the BHS, BHSP, BHSU, BHT, BHTP, and BHTU microscope stands.

- Cleaning Solvent (see [Recommended Solvents](#) section)
- Cotton Swabs
- Grease (see [Recommended Lubricants](#) section)
- Pipe Cleaners
- Tissues, oil-free (item S5 of [Appendix 1](#))
- Lens Cleaning Solution (item S4 of [Appendix 1](#))
- Lens Duster Bulb (item T6 of [Appendix 1](#))
- Light Oil, PTFE (item S3 of [Appendix 1](#))

Recommended Lubricants

Plastilube® Brake Grease (medium consistency) can be used on the various minor sections of the BHS, BHSP, BHSU, BHT, BHTP, and BHTU stands (item S1 of [Appendix 1](#)). Molykote 44 Light (item S2 of [Appendix 1](#)) can be used on the knurled field-adjustment ring of the Light Exit Assembly. Both greases will remain serviceable for many years to come.

Recommended Solvents

Some type of cleaning solvent will be needed to remove the old grease from the various minor sections of the BHS, BHSP, BHSU, BHT, BHTP, and BHTU stands. Solvents that can be used are acetone, diethyl ether, heptane, hexane, mineral spirits, turpentine, and xylene.

Safety Considerations with Solvents

Regardless of which solvent is chosen, make sure that adequate ventilation is present during the cleaning process, and that any necessary personal protective

equipment is utilized to minimize exposure. Consult the relevant safety data sheet (MSDS or SDS) before using any unfamiliar solvents. Many of the solvents listed above are flammable, and their vapors may represent an explosion hazard if mishandled. Whichever solvents are chosen, be sure to follow all manufacturer's instructions and safety precautions.

Solvent Compatibility with Parts and Finishes

Many solvents will damage the finish of painted surfaces or will dissolve or damage plastic parts. Isopropyl alcohol or 409 Cleaner may be safely used to clean most painted and plastic surfaces. Do not allow untested solvents to contact the paint or the various plastic parts, to prevent damage. Before using any solvent to clean plastic parts, test a small amount of the solvent in an inconspicuous area of the part (such as inside a knob) to ensure compatibility with the plastic. Never use xylene to clean nylon parts, as xylene dissolves nylon. Isopropyl alcohol and trichloroethylene will cause swelling of nylon due to solvent absorption. The list of solvents generally considered safe for nylon includes acetone, diethyl ether, heptane, mineral spirits, naphthalene, and turpentine.

Viewing Head Locking Screw

Viewing Head Locking Screw (BHS, BHSP, BHT, BHTP)

The locking thumbscrew for the viewing head on the BHS/BHT stands differs from that used on the BHSU/BHTU stands. The BHS/BHT locking thumbscrew includes a spring-loaded plunger and consists of six separate parts. This thumbscrew can be identified by the presence of the slotted end-screw in the knurled outer barrel (see [Figure 2](#)).

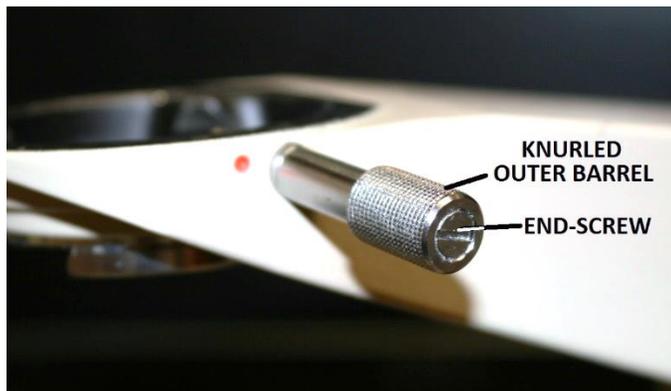


Figure 2 – The viewing head locking screw (BHS/BHT)

This type of locking screw can be difficult to turn, and the spring-loaded plunger can be stiff or sluggish, due to the presence of old grease and contaminants in the mating threads and in the plunger mechanism of the locking screw.

Viewing Head Locking Screw (BHSU, BHTU)

The locking thumbscrew for the viewing head on the BHSU/BHTU stands does not have the spring-loaded plunger and consists of just two parts. This locking thumbscrew can be identified by the lack of the slotted end-screw (see [Figure 3](#)). This type of locking screw can also be difficult to turn due to the presence of old grease and contaminants in the mating threads of the locking screw.



Figure 3 – The viewing head locking screw (BHSU/BHTU)

Servicing Locking Screw (BHS/BHSP/BHT/BHTP)

To restore proper freedom of motion to a stiff BHS/BHT locking thumbscrew, the locking thumbscrew must be completely disassembled so that any thick or hardened grease can be thoroughly removed, and then reassembled with fresh grease per the following procedure.

Disassemble the Locking Screw (BHS/BHT)

To disassemble the spring-loaded BHS/BHT locking thumbscrew, start by grasping the knurled portion of the outer barrel of the thumbscrew with soft-jaw pliers, to hold it stationary (see [Figure 4](#)).



Figure 4 – Hold the threaded outer barrel stationary

While holding the knurled outer barrel stationary with the soft-jaw pliers, use a suitable slotted screwdriver to unscrew and remove the slotted end-screw from the knurled outer barrel (see [Figure 5](#)).



Figure 5 – Loosen and remove the slotted end-screw

After the slotted end-screw has been removed, rotate the knurled outer barrel clockwise (if necessary) until the smooth end of the knurled outer barrel contacts the stationary inner barrel (see [Figure 6](#)).

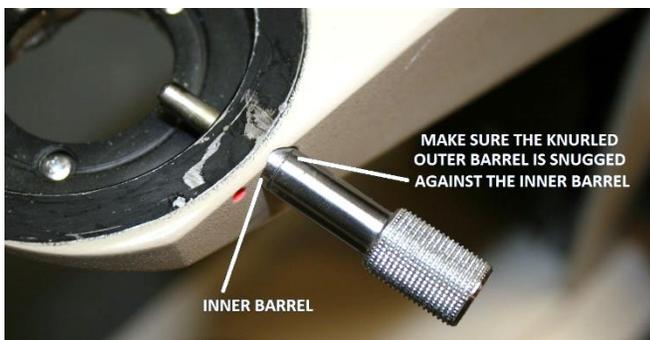


Figure 6 – Snug the knurled outer barrel down

The next step is to remove the e-clip from the groove in the end of the plunger shaft. In order to expose the end of the plunger shaft to access the e-clip, the plunger must be held in the fully depressed position. One way to do this is to use a dovetail mounting disk from an old binocular head (see [Figure 7](#)) to depress the plunger.



Figure 7 – Mounting disk from an old binocular head

Carefully place the circular dovetail of the mounting disk (see [Figure 7](#)) into the dovetail recess for the viewing head, using the circular dovetail to depress the plunger while seating the mounting disk into the recess (see [Figure 8](#)).



Figure 8 – Place mounting disk into the dovetail recess

Once the mounting disk has been properly seated into the dovetail recess for the viewing head, slide the mounting disk towards the locking screw and observe that the end of the plunger shaft, with the attached e-clip, protrudes from the knurled outer barrel of the thumbscrew when the mounting disk has been slid as far as it can go towards the locking screw (see [Figure 9](#)).

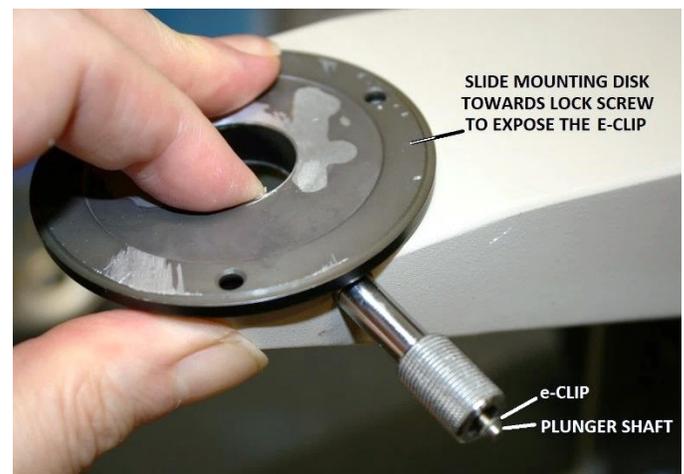


Figure 9 – Slide the mounting disk to expose the e-clip

Use a suitable clamp with non-marring jaws to hold the mounting disk in the slid-over position in the dovetail recess, thereby keeping the e-clip on the end of the plunger shaft fully exposed (see [Figure 10](#)). Once the clamp is secured to hold the mounting disk in this position, the plunger will remain depressed such that there is sufficient access to remove the e-clip from the plunger shaft.

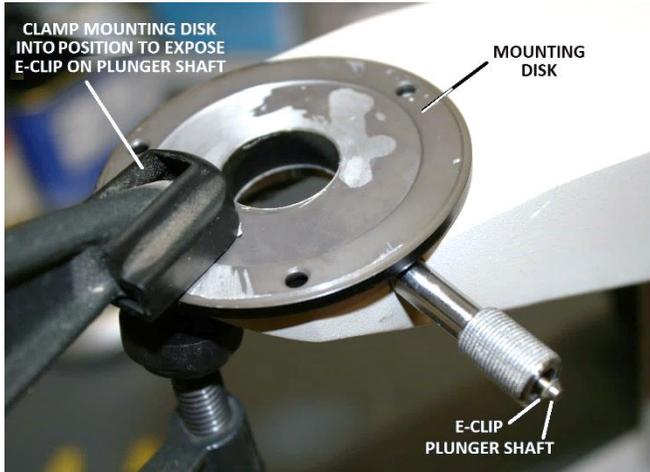


Figure 10 – Secure mounting disk so the e-clip stays out

If, like most people, you do not have a spare mounting disk from an old binocular head laying around, be creative and improvise some other way to hold the plunger in the depressed position so that you can access and remove the e-clip from the plunger shaft (see **Figure 11**, photo courtesy Joe Haralson).



Figure 11 – Where there's a will there's a way

Use a pair of needle-nosed pliers to carefully grasp and remove the e-clip from the groove in the end of the plunger shaft (see **Figure 12**).

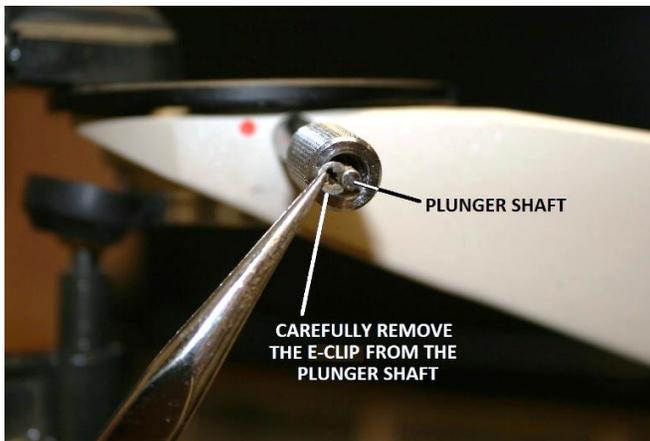


Figure 12 – Carefully remove e-clip from the plunger shaft

Remove the clamp holding the mounting disk in place, and remove the mounting disk from the dovetail recess of the viewing head, to allow the spring-loaded plunger to re-extend within the mounting recess (see **Figure 13**).

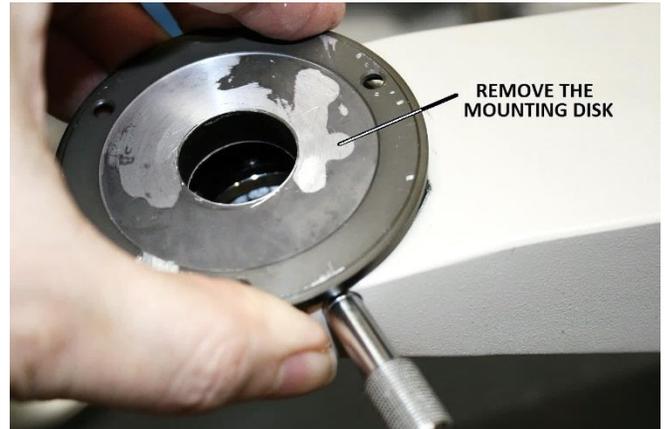


Figure 13 – Remove mounting disk from dovetail recess

Grasp the exposed end of the plunger within the mounting recess and withdraw the plunger rod from the bore of the stationary inner barrel of the locking screw (see **Figure 14**).

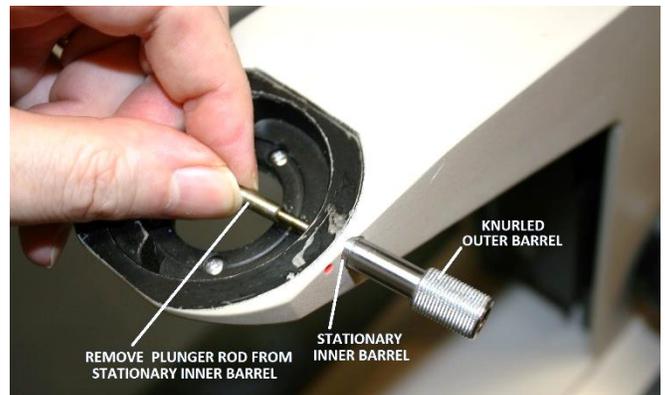


Figure 14 – Remove plunger rod from the inner barrel

Use tweezers or some other suitable tool to remove the extension spring from within the bore of the stationary inner barrel of the locking screw (see **Figure 15**).



Figure 15 – Remove spring from stationary inner barrel

Unscrew and remove the knurled outer barrel from the stationary inner barrel of the thumbscrew (see [Figure 16](#)). Do not try to remove the stationary inner barrel.

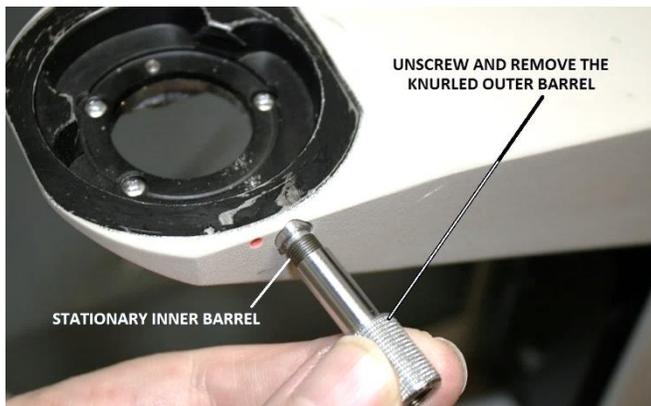


Figure 16 – Unscrew and remove knurled outer barrel

Clean Components of the Locking Screw (BHS/BHT)

Use a cotton swab and a suitable solvent to remove any grease or other contaminants from the exposed threads and from the outer surface of the stationary inner barrel of the locking thumbscrew (see [Figure 17](#)).

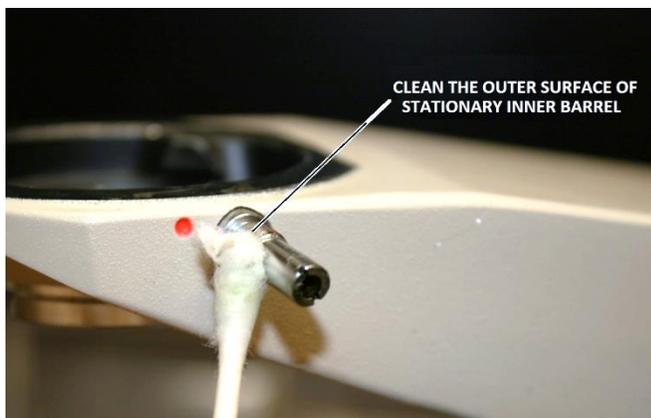


Figure 17 – Clean the outside of stationary inner barrel

Use a pipe cleaner and a suitable solvent (acetone) to remove any grease or other contaminants from the bore of the stationary inner barrel of the locking thumbscrew (see [Figure 18](#)).

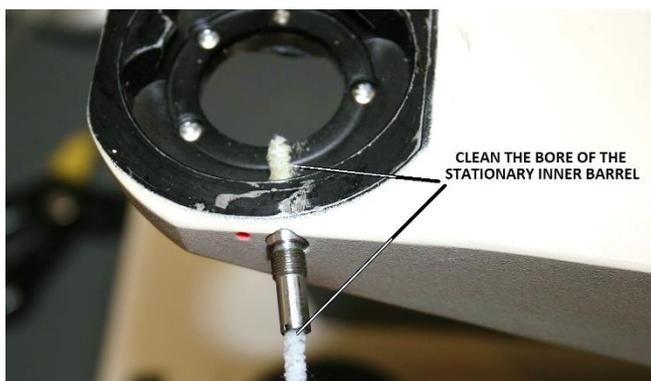


Figure 18 – Clean the bore of the stationary inner barrel

Use a cotton swab and a suitable solvent (acetone) to remove any grease or other contaminants from the surface of the plunger rod (see [Figure 19](#)).

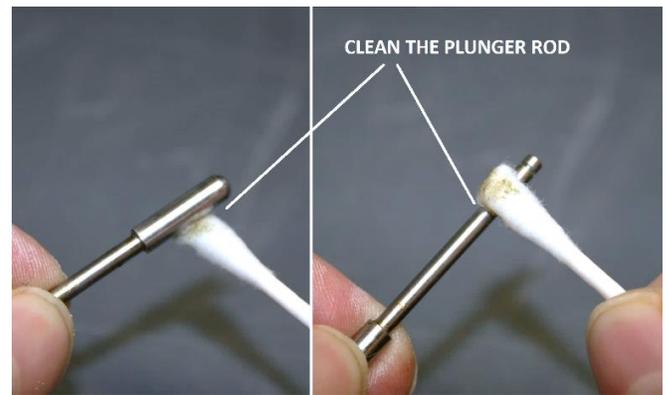


Figure 19 – Thoroughly clean the plunger rod

Use a pipe cleaner or cotton swab, with a suitable solvent (acetone) to remove any grease or other contaminants from the inner threads and from the bore of the knurled outer barrel of the locking screw (see [Figure 20](#)).

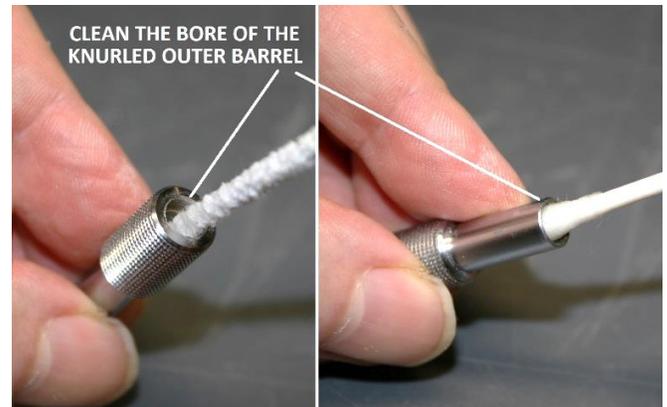


Figure 20 – Clean threads and bore of the outer barrel

Use an acid brush and a suitable solvent (acetone) to wash the extension spring, or soak the extension spring in the solvent and agitate it, to remove any grease or contaminants (see [Figure 19](#)).

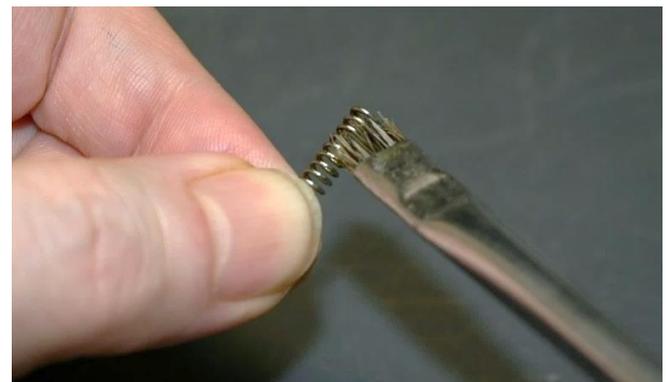


Figure 21 – Wash the grease from the extension spring

Reassemble the Locking Thumbscrew (BHS/BHT)

Insert the extension spring into the bore of the stationary inner barrel of the locking thumbscrew (see [Figure 22](#)).

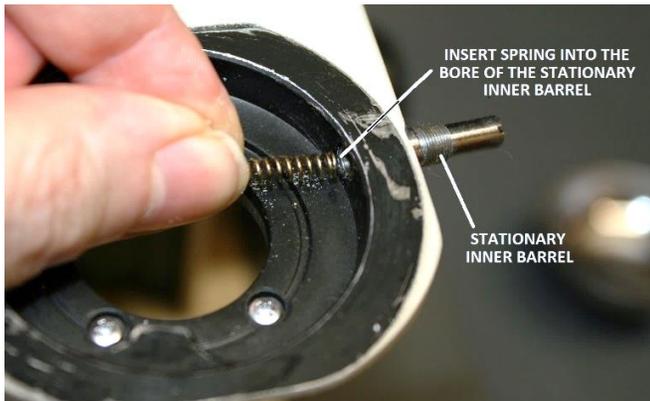


Figure 22 – Insert spring into the bore of the inner barrel

Apply a light coating of a suitable grease (item S1 of [Appendix 1](#)) to the shaft of the plunger rod (see [Figure 22](#)). Do not grease the larger-diameter plunger end.

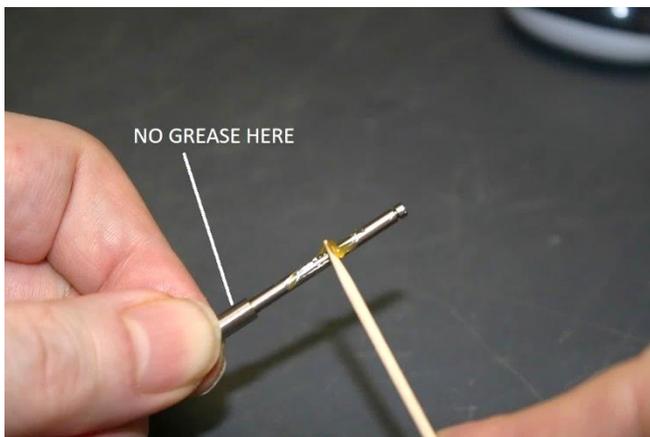


Figure 23 – Lightly grease the shaft of the plunger rod

Insert the freshly greased plunger rod into the bore of the stationary inner barrel of the locking thumbscrew (see [Figure 24](#)).

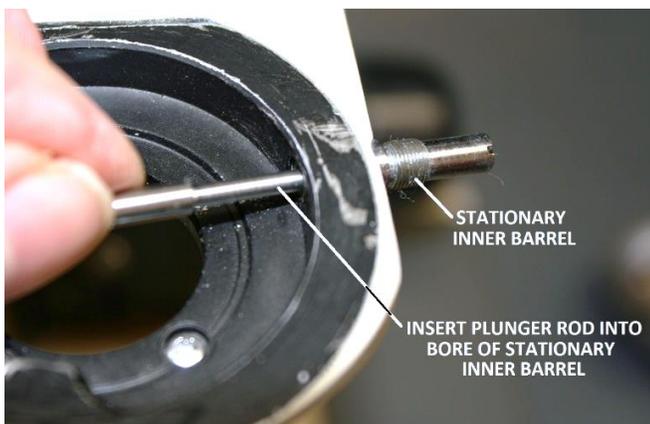


Figure 24 – Insert plunger into bore of the inner barrel

Apply a light coating of a suitable grease (item S1 of [Appendix 1](#)) to the exposed threads of the stationary inner barrel of the locking thumbscrew (see [Figure 25](#)).

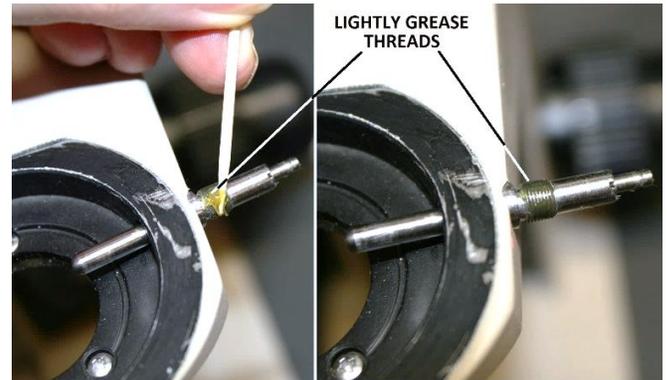


Figure 25 – Apply grease to threads of the inner barrel

Reinstall the knurled outer barrel onto the freshly greased stationary inner barrel of the locking thumbscrew and snug it down until the smooth end of the knurled outer barrel contacts the stationary inner barrel (see [Figure 26](#)).



Figure 26 – Reinstall the knurled outer barrel

Test the freedom of motion of the plunger by depressing the plunger with your finger, then releasing it and allowing it to return to the fully extended position (see [Figure 27](#)). The plunger should move without any signs of binding, excess friction, or sluggishness.

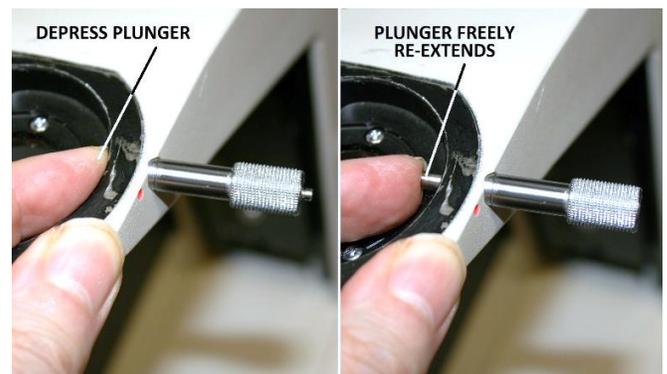


Figure 27 – Test the motion of the spring-loaded plunger

Once again, place the circular dovetail of the viewing head mounting disk into the dovetail recess for the viewing head, using the circular dovetail to depress the plunger while seating the mounting disk into the recess (see [Figure 28](#)).



Figure 28 – Place the mounting disk into dovetail recess

Once the mounting disk has been seated into the dovetail recess, slide the mounting disk towards the locking thumbscrew so that the plunger shaft protrudes from the knurled outer barrel of the locking screw (see [Figure 29](#)).

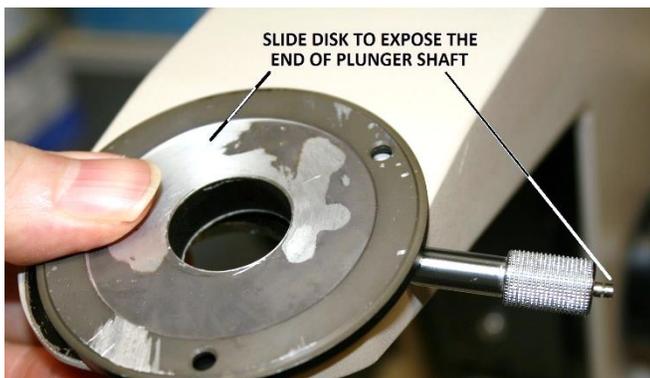


Figure 29 – Slide mounting disk to expose the shaft end

Use a suitable clamp with non-marring jaws to hold the mounting disk in the slid-over position to keep the end of the plunger shaft exposed (see [Figure 30](#)).



Figure 30 – Clamp mounting disk to keep shaft exposed

Use needle-nosed pliers to carefully reinstall the e-clip into the ring groove in the exposed end of the plunger shaft (see [Figure 31](#)).

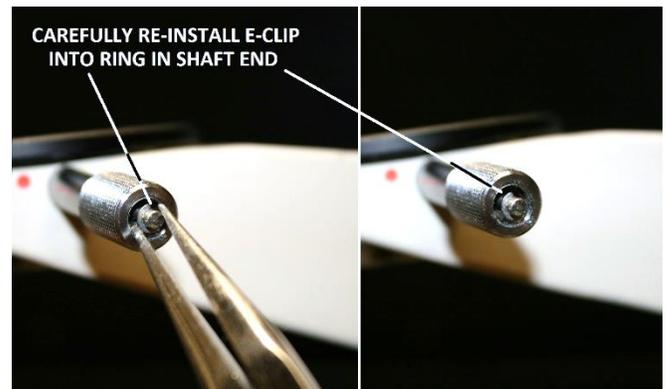


Figure 31 – Carefully reinstall e-clip into plunger groove

Loosen the locking thumbscrew and remove the clamp and mounting disk from the dovetail recess for the viewing head, to allow the spring-loaded plunger to fully re-extend into the viewing head recess (see [Figure 32](#)).



Figure 32 – Remove mounting disk from dovetail recess

Use a slotted screwdriver to loosely reinstall the slotted end-screw into the threaded bore of the knurled outer barrel of the locking screw (see [Figure 33](#)).

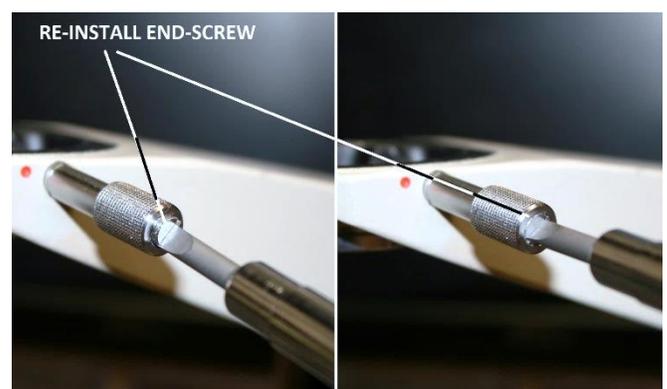


Figure 33 – Reinstall end-screw into knurled outer barrel

Grasp the knurled portion of the knurled outer barrel with soft-jaw pliers to hold it stationary, and use the slotted screwdriver to tighten the slotted end-screw (see [Figure 34](#)).

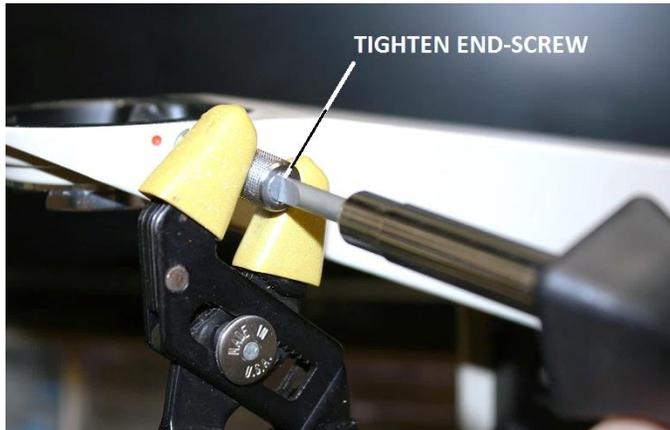


Figure 34 – Grip the knurling and tighten the end-screw

This completes the overhaul of the BHS/BHT viewing head locking thumbscrew. The newly refurbished locking screw is now ready to provide many more years of trouble-free service (see [Figure 35](#)).

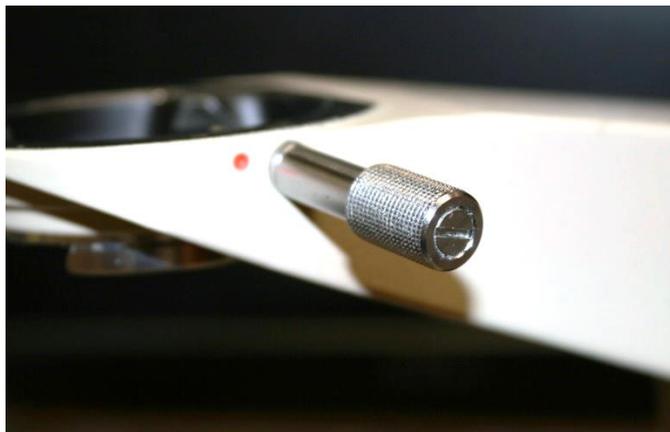


Figure 35 – Locking thumbscrew ready for use (BHS/BHT)

Servicing Viewing Head Locking Screw (BHSU/BHTU)

To restore proper freedom of motion to a stiff BHSU/BHTU locking thumbscrew, the locking thumbscrew must be removed from the pillar arm so that any thick or hardened grease or contaminants can be removed from the threads, and then reinstalled into the pillar arm with fresh grease.

Remove the Locking Thumbscrew (BHSU/BHTU)

Place a suitable dust-free cloth or lens tissue over the exposed optics in the dovetail recess for the viewing head (see [Figure 36](#)) and place a piece of cardboard over this cloth or tissue, to fully protect the exposed optical element from debris and damage during

removal and reinstallation of the viewing head locking thumbscrew (see [Figure 37](#)).



Figure 36 – Protect the exposed optics with tissue

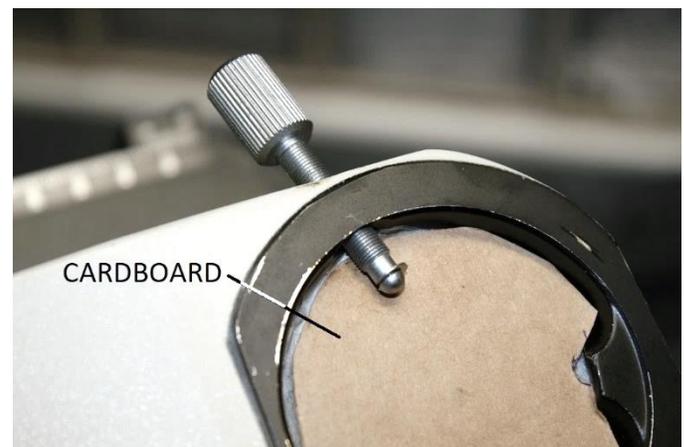


Figure 37 – Protect the exposed optics with cardboard

Use a needle nose pliers to carefully grasp and remove the e-clip from the groove in the end of viewing head locking thumbscrew (see [Figure 38](#)).



Figure 38 – Remove e-clip from the end of thumbscrew

Unscrew and remove the viewing head locking thumbscrew from the tapped hole in the BHSU/BHTU pillar arm (see [Figure 39](#)).



Figure 39 – Unscrew and remove the locking thumbscrew

Clean the Locking Screw (BHSU/BHTU)

Use an acid brush and a suitable solvent to clean any grease or contaminants from the threads of the locking thumbscrew (see [Figure 40](#)).



Figure 40 – Clean the threads of the locking thumbscrew

Clean Tapped Threads for Locking Screw (BHSU/BHTU)

Use a cotton swab and a suitable solvent (acetone) to clean any grease or contaminants from the threads of the tapped hole in the pillar arm (see [Figure 41](#)).



Figure 41 – Clean the threads of the tapped hole

Reinstall the Locking Thumbscrew (BHSU/BHTU)

Apply a light coating of grease to the threads of the locking thumbscrew (see [Figure 42](#)). Wipe away any excess grease.

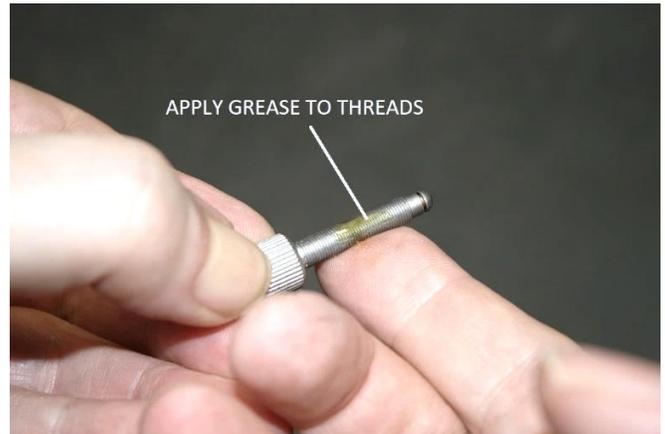


Figure 42 – Apply grease to threads of the thumbscrew

Carefully screw the freshly greased locking screw into the tapped hole in the BHSU/BHTU pillar arm (see [Figure 43](#)) until the ring groove in the end of the locking thumbscrew is visible within the dovetail recess for the viewing head (see [Figure 44](#)). Thoroughly remove any visible grease squeeze-out.



Figure 43 – Screw the thumbscrew into the tapped hole

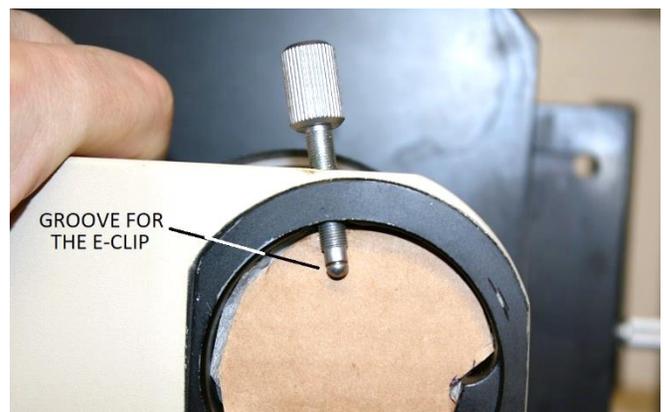


Figure 44 – The ring groove for the retaining e-clip

Use needle-nose pliers to carefully reinstall the e-clip into the ring groove in the end of the locking thumbscrew (see [Figure 45](#)), to retain the thumbscrew.



Figure 45 – Carefully reinstall the e-clip into ring groove

Remove the protective cardboard and the cloth or tissue from the dovetail recess for the viewing head (see [Figure 46](#)).



Figure 46 – Remove protection for the exposed optics

This completes the overhaul of the BHSU/BHTU locking thumbscrew. The newly refurbished thumbscrew is now ready to provide many more years of trouble-free service (see [Figure 35](#)).

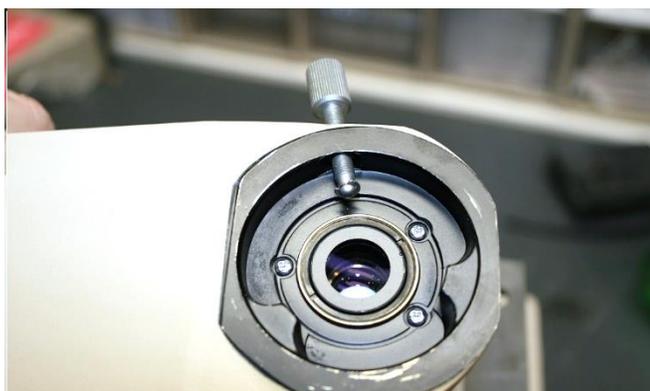


Figure 47 – Refurbished thumbscrew ready for use (BHSU/BHTU)

Nosepiece Slide Mount

There are two versions of nosepiece slide mounts used on the BHS/BHT microscopes. The older style is shown in [Figure 48](#), and the newer style is shown in [Figure 49](#). Note that the nosepiece slide mounts rarely require service but are included here for the sake of completeness.



Figure 48 – Nosepiece slide mount (old style)



Figure 49 – Nosepiece slide mount (new style)

Remove the Nosepiece Slide Mount (BHS/BHT)

Remove the nosepiece slide mount from the BHS/BHT stand per the following.

Remove Nosepiece Locking Thumbscrew (BHS/BHT)

Carefully loosen and remove the nosepiece locking thumbscrew from the pillar arm (see [Figure 50](#)).

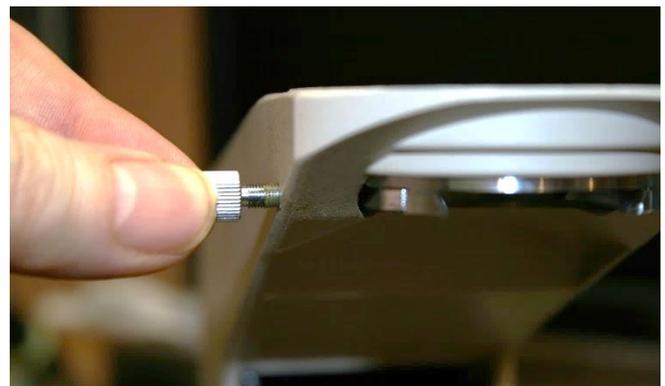


Figure 50 – Remove the nosepiece locking thumbscrew

Compare the nosepiece locking thumbscrew to those shown in [Figure 51](#), to determine whether your scope has the old-style or new-style nosepiece slide mount. Note that the old-style thumbscrew has a plastic tip, whereas the new style does not.



Figure 51 – Nosepiece locking thumbscrews

Remove the Nosepiece Slide Mount (BHS/BHT)

Note: if your scope has the old-style slide mount, there is no real reason to remove it from the pillar arm, since it can be easily cleaned in place.

Using a suitable JIS screwdriver, loosen and remove the three m2.6x4 screws securing the nosepiece slide mount to the BHS/BHT pillar arm (see [Figure 52](#)).

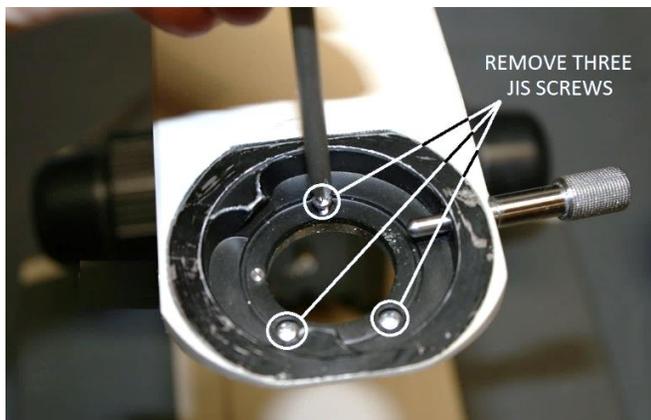


Figure 52 – Remove screws securing the slide mount

Remove the nosepiece slide mount from the BHS/BHT pillar arm (see [Figure 53](#)).

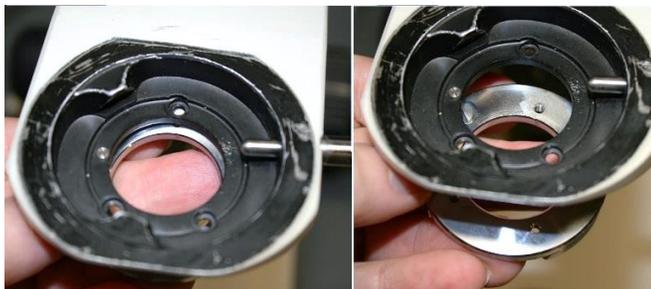


Figure 53 – Remove the slide mount from the pillar arm

Clean Threads for the Locking Thumbscrew (BHS/BHT)

Using a pipe cleaner and a suitable solvent (e.g., acetone), clean the inner threads of the tapped nosepiece lock screw in the BHS/BHT pillar arm (see [Figure 54](#)).



Figure 54 – Clean tapped hole for the locking thumbscrew

Servicing the Old-Style Slide Mount (BHS/BHT)

This section applies only to the older style slide mount (see [Figure 48](#)). The newer style slide mount is covered in the next section.

Clean Components of Old-Style Slide Mount (BHS/BHT)

Use a suitable plastic-safe solvent (e.g., alcohol) to clean any grease or contaminants from the threads of the nosepiece locking thumbscrew (see [Figure 55](#)). Do not use acetone on this piece, as acetone may attack the plastic tip. If you do not have a suitable plastic-safe solvent available, you can remove the plastic end-piece from the thumbscrew, clean it with acetone or another solvent, then replace the end-piece after it has been cleaned.



Figure 55 – Clean threads of locking thumbscrew (old style)

Use a suitable solvent (acetone) to clean any grease or contaminants from the slide-mount base (see [Figure 56](#)).

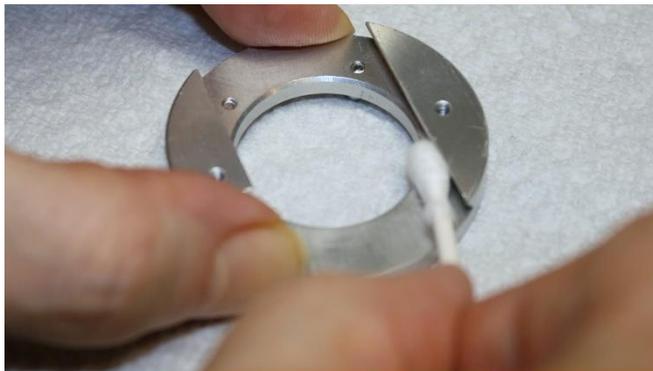


Figure 56 – Thoroughly clean slide-mount base (old style)

The older style nosepiece slide mount is now ready to be reinstalled onto the stand and put back into service (see [Figure 57](#)).



Figure 57 – Slide-mount parts ready for use (old style)

Servicing the New-Style Slide Mount (BHS/BHT)

This section applies only to the newer style assembly (see [Figure 49](#)). The older style assembly is covered in the previous section.

Disassemble the New-Style Slide Mount (BHS/BHT)

Using a suitable slotted screwdriver, loosen and remove the stop screw for the nosepiece slide-mount locking block (see [Figure 58](#)).



Figure 58 – Remove the locking-block stop screw

Using a suitable slotted screwdriver, loosen and remove the pivot screw for the nosepiece slide-mount locking block (see [Figure 59](#)).

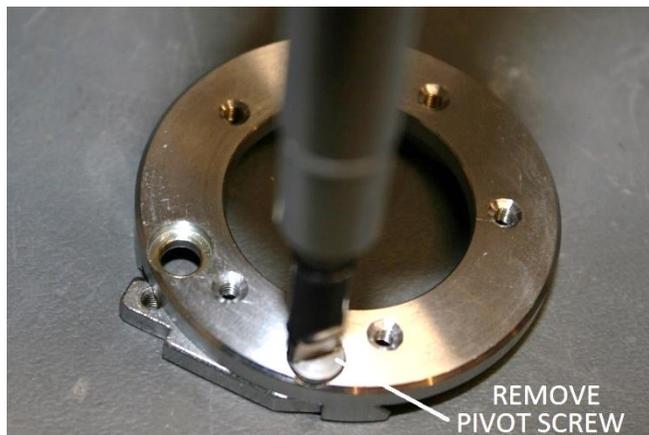


Figure 59 – Remove the locking-block pivot screw

Separate the locking block from the slide-mount base (see [Figure 60](#)).



Figure 60 – Separate locking block from slide-mount base

Clean Components of New-Style Slide Mount (BHS/BHT)

Using a cotton swab and a suitable solvent (acetone), thoroughly clean the nosepiece slide-mount base, paying special attention to the surface upon which the locking block slides and the dovetail bearing surfaces. (see [Figure 61](#)).



Figure 61 – Thoroughly clean slide-mount base (new style)

Using a cotton swab and a suitable solvent (acetone), thoroughly clean the mating surface of the nosepiece locking block, where it slides on the mount base (see [Figure 62](#)).

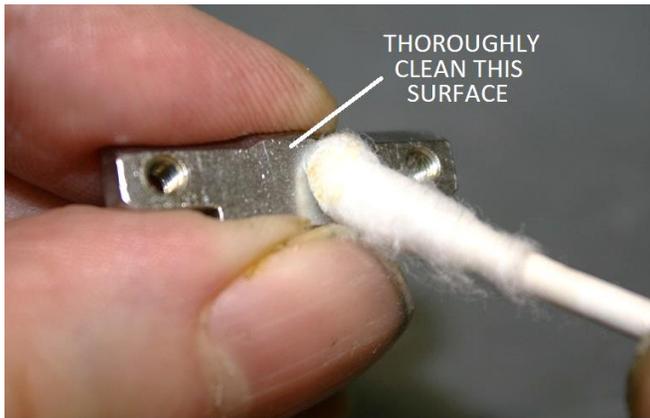


Figure 62 – Clean the nosepiece locking block

Use a suitable solvent (acetone) to clean any grease or contaminants from the threads of the nosepiece locking thumbscrew (see [Figure 63](#)).

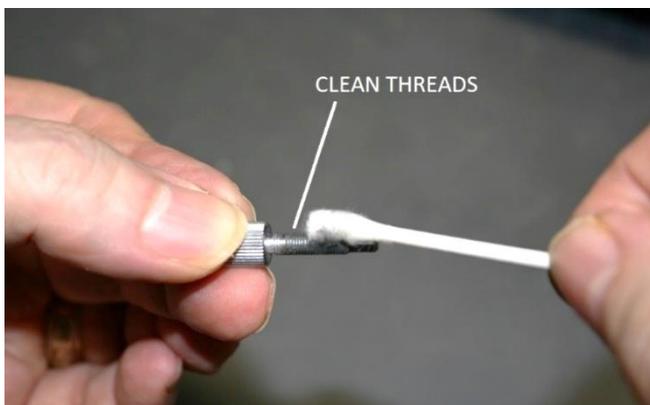


Figure 63 – Clean threads of the locking thumbscrew

Reassemble the New-Style Slide Mount (BHS/BHT)

Position the nosepiece locking block beneath the nosepiece slide-mount base, making sure the bearing surface of the locking block is in contact with the mount base (see [Figure 64](#)).



Figure 64 – Position locking block under slide-mount base

Align the pivot-screw hole in the nosepiece slide-mount base with the tapped hole in the nosepiece locking block and use a suitable slotted screwdriver to reinstall the pivot screw (see [Figure 65](#)).

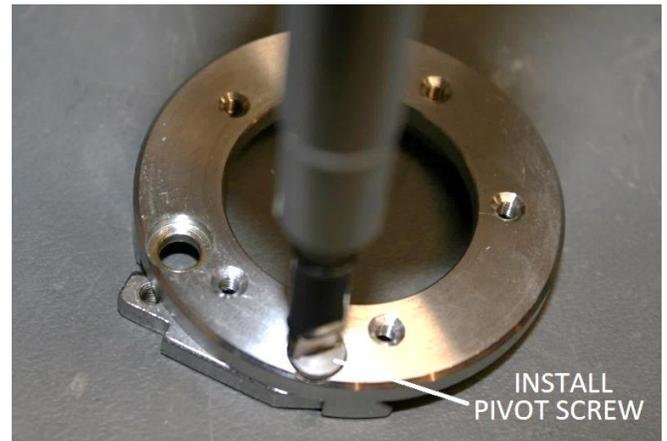


Figure 65 – Reinstall the locking-block pivot screw

Align the stop-screw hole in the nosepiece slide-mount base with the tapped hole in the nosepiece locking block and use a suitable slotted screwdriver to reinstall the stop screw (see [Figure 66](#)).



Figure 66 – Reinstall the locking-block stop screw

The newer style nosepiece slide mount is now ready to be reinstalled into the stand and put back into service (see [Figure 67](#)).



Figure 67 – Slide-mount parts ready for use (new style)

Reinstall the Nosepiece Slide Mount (BHS/BHT)

Reinstall the nosepiece slide mount onto the BHS/BHT pillar arm per the following.

Reinstall the Slide-Mount Block

Place the nosepiece slide mount into position on the BHS/BHT pillar arm. See [Figure 68](#).



Figure 68 – Place the nosepiece slide mount into position

Carefully align the three holes in the viewing head recess of the BHS/BHT pillar arm with the three tapped holes in the nosepiece slide mount base. See [Figure 69](#).



Figure 69 – Align drilled holes with tapped holes

Using a suitable JIS screwdriver, reinstall the three m2.6x5 screws to secure the nosepiece slide mount to the BHS/BHT pillar arm (see [Figure 70](#)).

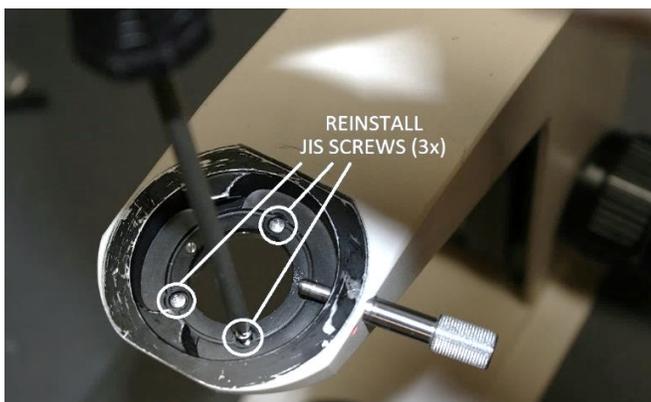


Figure 70 – Secure nosepiece slide mount with screws

Reinstall the Slide-Mount Locking Thumbscrew

Apply a light coating of grease to the threads of the nosepiece slide-mount locking thumbscrew (see [Figure 71](#)). Wipe away any excess grease.



Figure 71 – Lightly grease the thumbscrew threads

Carefully reinstall the nosepiece locking thumbscrew into the tapped hole in the BHS/BHT pillar arm (see [Figure 72](#)). Wipe away any visible grease squeeze-out.



Figure 72 – Reinstall the nosepiece locking thumbscrew

Nosepiece Slide Mount is Ready for Use

The nosepiece slide mount and locking screw are now ready to provide years of trouble-free service (see [Figure 73](#)).



Figure 73 – Newly serviced slide mount ready for use

Field Diaphragm Assembly

There were two versions of the field-diaphragm assembly used on the BHS, BHSP, BHSU, BHT, BHTP, and BHTU microscopes. The older style field-diaphragm assembly is shown in [Figure 74](#), and the newer style is shown in [Figure 75](#).



Figure 74 – Field-diaphragm assembly (old style)



Figure 75 – Field-diaphragm assembly (new style)

Remove the Field-Diaphragm Assembly

Using a suitable JIS screwdriver, loosen and remove the two m2.6x6 screws securing the field-diaphragm assembly to the base casting (see [Figure 76](#)).



Figure 76 – Remove screws securing the field diaphragm

Remove the (now loose) field-diaphragm assembly from the base casting (see [Figure 77](#)), being very careful so as to not damage the Light Exit Assembly with the field-diaphragm assembly (the two assemblies are very close in proximity, and the reflective coating of the primary-surface mirror of the Light Exit Assembly is extremely fragile).



Figure 77 – Remove the field diaphragm assembly

Servicing the Field-Diaphragm Assembly (Old Style)

This section applies only to the older style field-diaphragm assembly (see [Figure 74](#)). The newer style field-diaphragm assembly is covered in the next section.

Disassemble the Field-Diaphragm Assembly (Old Style)

The various components of the older style field diaphragm assembly are shown in [Figure 78](#) (except for the stop pin, which is shown in [Figure 79](#)).

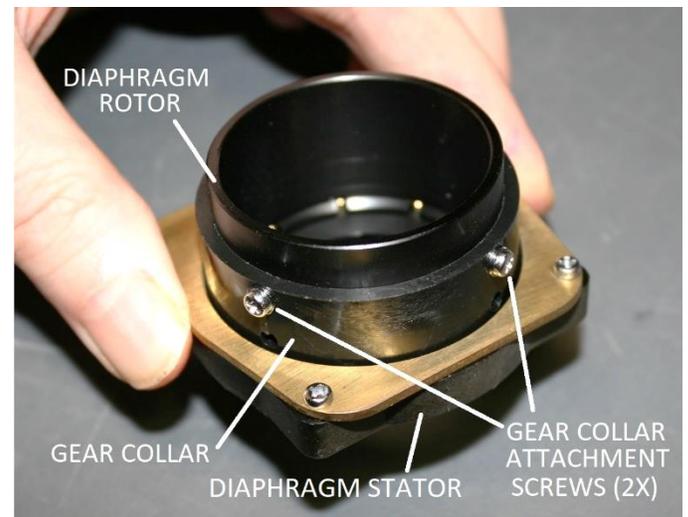


Figure 78 – Components of the field diaphragm (old style)

Using a suitable slotted screwdriver, loosen and remove the slotted diaphragm stop pin from the diaphragm rotor. See [Figure 79](#).



Figure 79 – Remove the slotted diaphragm stop pin

Using a suitable JIS screwdriver, loosen and remove the two m2.6x5 screws holding the plastic gear collar in place on the diaphragm rotor. See **Figure 80**.

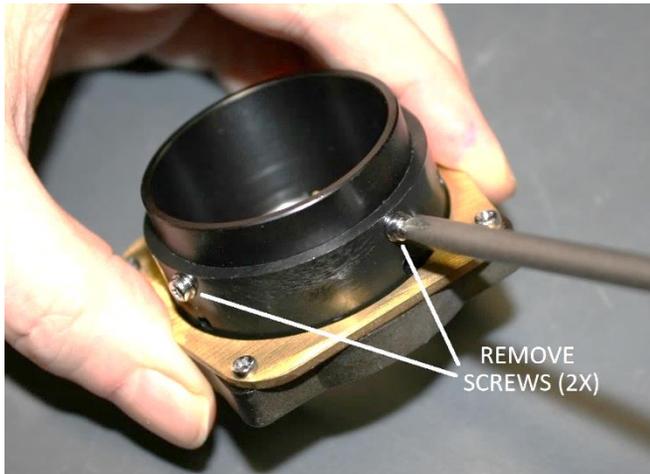


Figure 80 – Remove two screws securing the gear collar

Lift and remove the plastic gear collar from the diaphragm rotor if it will come loose. See **Figure 81**.



Figure 81 – Lift and remove the plastic gear collar

Using a suitable JIS screwdriver, loosen and remove the four m2.6x5 screws securing the brass retaining plate onto the metal diaphragm stator. See **Figure 82**.

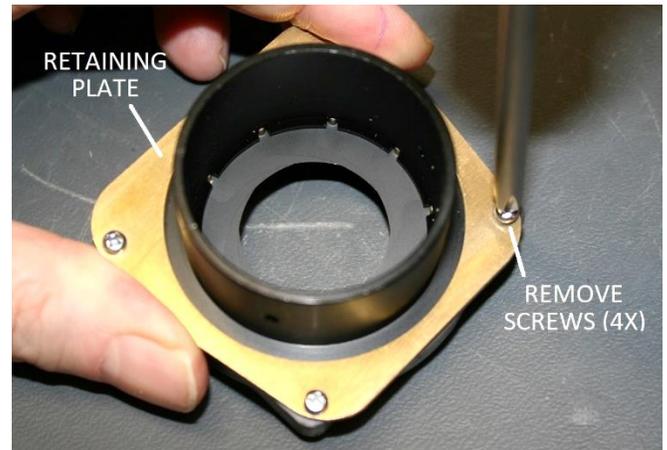


Figure 82 – Remove screws securing brass plate to stator

Lift and remove the brass retaining plate from the metal diaphragm stator. See **Figure 83**.

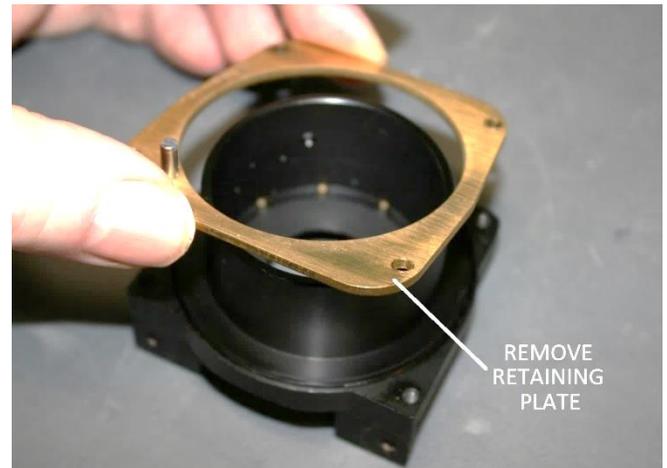


Figure 83 – Lift and remove the brass retaining plate

Carefully lift and remove the diaphragm rotor from the metal diaphragm stator. See **Figure 84**.



Figure 84 – Carefully lift and remove the diaphragm rotor

Beneath the diaphragm rotor, there are 10 diaphragm leaves positioned within the circular recess of the metal diaphragm stator. See [Figure 85](#).

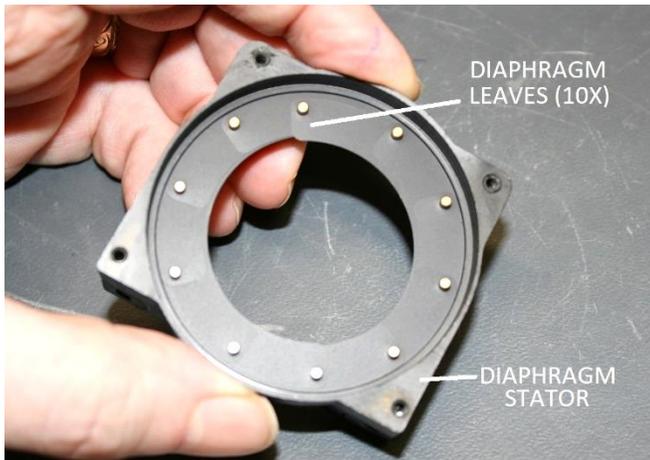


Figure 85 – Diaphragm leaves in the metal stator

Remove the 10 diaphragm leaves from the metal diaphragm stator by carefully lifting the individual leaves such that the pivot pins come free of the pivot holes in the stator. See [Figure 86](#).



Figure 86 – Carefully remove the diaphragm leaves

Clean Components of Field Diaphragm Assembly (Old Style)
Using a suitable solvent, such as acetone, thoroughly clean the metal diaphragm stator. See [Figure 87](#).



Figure 87 – Thoroughly clean the diaphragm stator

Using a suitable solvent, thoroughly clean the diaphragm leaves. See [Figure 88](#). If the leaves are metal, acetone may be used to clean them. If the leaves are plastic, do not use acetone, but instead, use a plastic-safe solvent, such as alcohol.

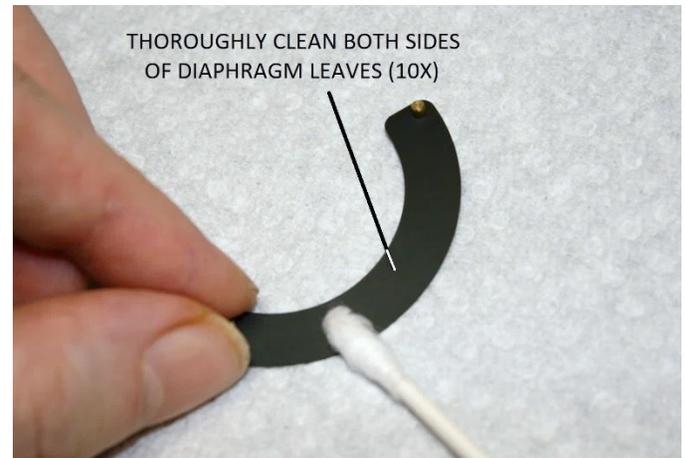


Figure 88 – Thoroughly clean the diaphragm leaves

Using a suitable solvent, thoroughly clean the diaphragm rotor (see [Figure 89](#)). If the rotor is metal, acetone may be used to clean it. If the rotor is plastic, do not use acetone, but instead, use a plastic-safe solvent, such as alcohol.

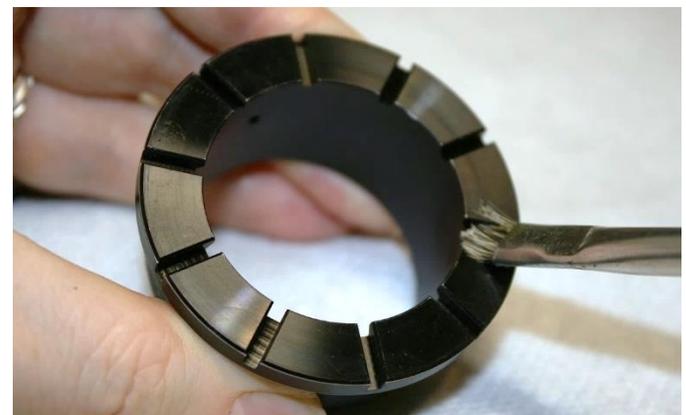


Figure 89 – Thoroughly clean the field diaphragm rotor

Reassemble the Field Diaphragm Assembly (Old Style)
Exercise caution when handling the diaphragm leaves during reassembly, as any oil or contamination on the leaves can impair proper operation of the iris mechanism. When reinstalling the diaphragm leaves into the metal diaphragm stator, it is important that the pivot pin at the end of the leaves with relief notches (if present) are placed into the holes in the metal diaphragm stator (See [Figure 90](#) inset), and not the pins on the opposite ends of the leaves. These recesses provide clearance to prevent the leaves from interfering with adjacent leaves. Note that the leaves in some

diaphragms do not have these recesses, and the ends of these leaves are therefore interchangeable.

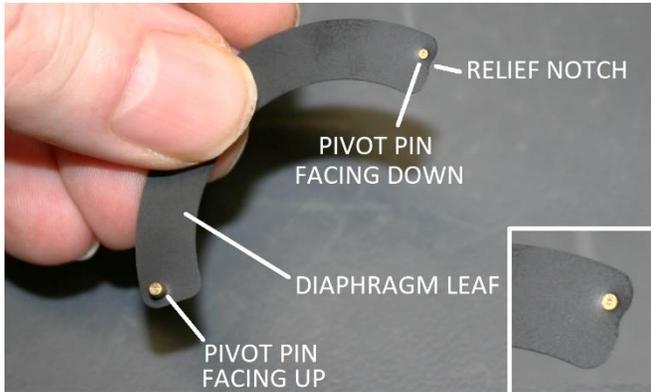


Figure 90 – Features of the field diaphragm leaves

Using a pencil, mark the location of the 10 pivot holes in the metal diaphragm stator on the walls of the stator. See **Figure 91**.

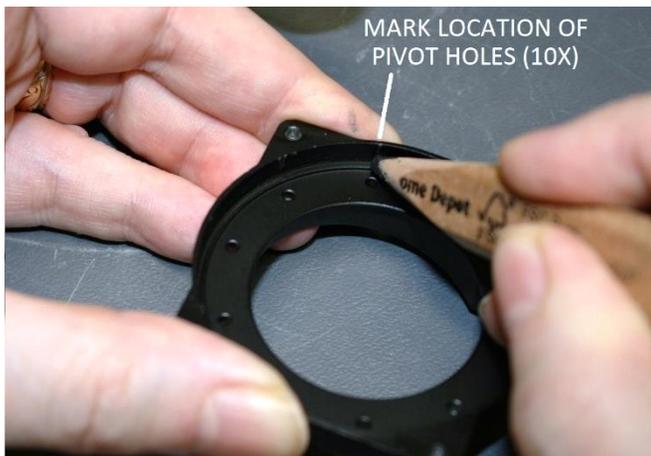


Figure 91 – Mark the location of the pivot holes in stator

Lay the metal diaphragm stator on the work surface. Reinstall one the diaphragm leaves by placing the pivot pin on the end with the relief notch (see **Figure 90** if applicable) into one of the pivot holes in the metal diaphragm stator. See **Figure 92**.

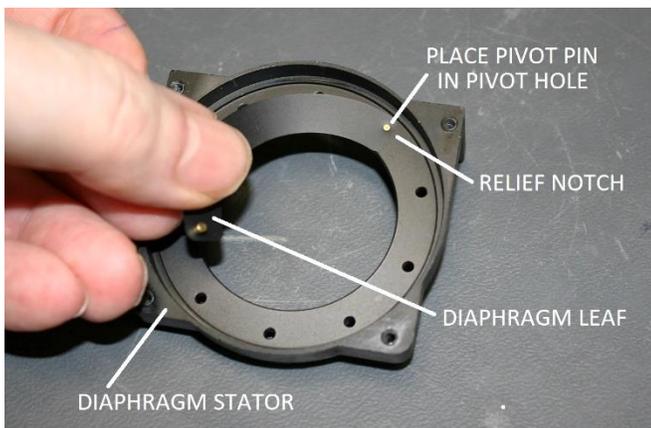


Figure 92 – Reinstall first diaphragm leaf into the stator

Position the first diaphragm leaf against the side wall of the metal diaphragm stator, as shown in **Figure 93**.

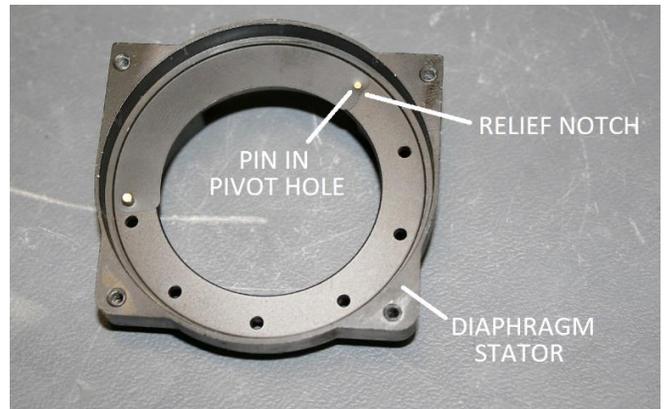


Figure 93 – First leaf installed in field diaphragm stator

In a similar manner to the first, reinstall the second diaphragm leaf into the metal diaphragm stator, overlapping the first leaf, as shown in **Figure 94**.



Figure 94 – Install the second diaphragm leaf

Continue installing diaphragm leaves (**Figure 95** shows four leaves installed) until the first seven have been installed. See **Figure 96**.



Figure 95 – Continue installing the field diaphragm leaves



Figure 96 – First seven field diaphragm leaves installed

At this point, you will have to change the way you reinstall the remaining three leaves, since the pivot holes for these last three leaves are now covered by other leaves. To proceed from here, place your index finger on the leaves as shown in **Figure 97**.



Figure 97 – Use index finger to hold the leaves down

While holding the leaves down with your index finger, lift the free ends of the leaves up with your thumb, to allow room to slip the next leaf into place. See **Figure 98**.



Figure 98 – Lift free end of leaves to slip the next one in

Carefully slip the end of the eighth leaf (the end with the relief notch, if applicable) under the lifted ends of the existing leaves and place the pivot pin into the appropriate hole beneath the lifted leaves. Use the pencil markings on the wall of the diaphragm stator to aid in finding the obscured pivot hole. See **Figure 99**.



Figure 99 – Slip seventh leaf under the lifted leaves

In a similar manner, proceed to reinstall the remaining two leaves. Once all of the leaves are in place, carefully position the diaphragm leaves up against the side wall of the metal diaphragm stator. See **Figure 100**.



Figure 100 – Position leaves against the stator side wall

Align the hole for the stop-pin in the diaphragm rotor with the right/front tapped hole in the metal diaphragm stator (see **Figure 101**) and carefully reinstall the diaphragm rotor over the installed leaves, making sure the radial notches in the rotor drop down over the upward-pointing pivot pins on the leaves (see **Figure 102**).

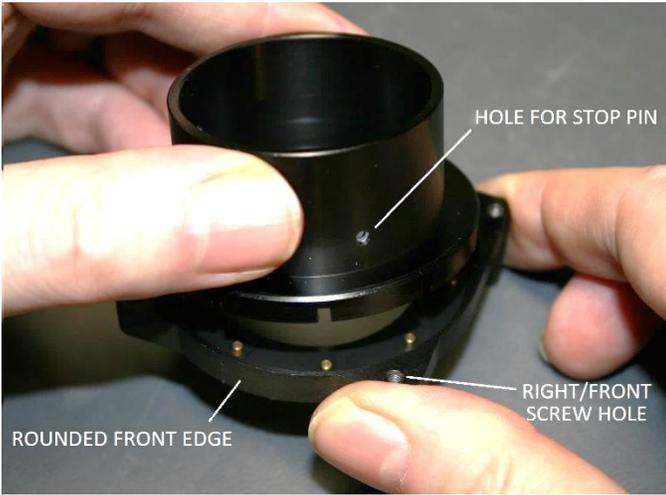


Figure 101 – Proper orientation of field diaphragm rotor



Figure 102 – Carefully reinstall the field diaphragm rotor

Carefully rotate the diaphragm rotor, making sure the leaves move smoothly without interference or binding. See **Figure 103**.



Figure 103 – Verify smooth operation of field diaphragm

Carefully rotate the diaphragm rotor until the diaphragm closes down to a pinhole aperture, being careful not to go beyond this point. See **Figure 104**.

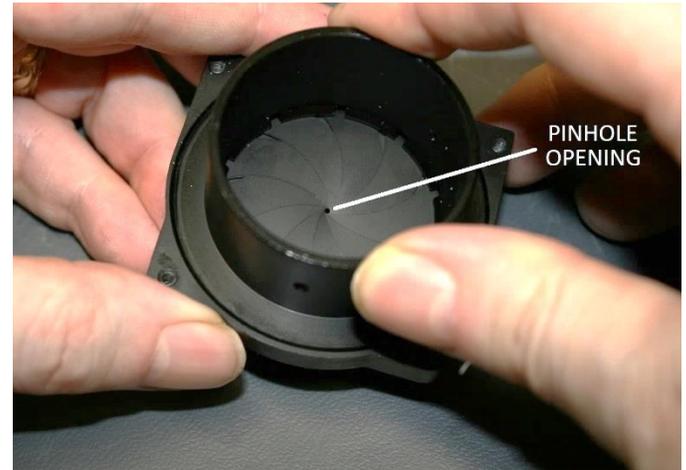


Figure 104 – Close field diaphragm to a pinhole aperture

Observe the orientation of the diaphragm rotor relative to the metal diaphragm stator. The two orthogonally located holes for the screws should be in the position shown in **Figure 105**.

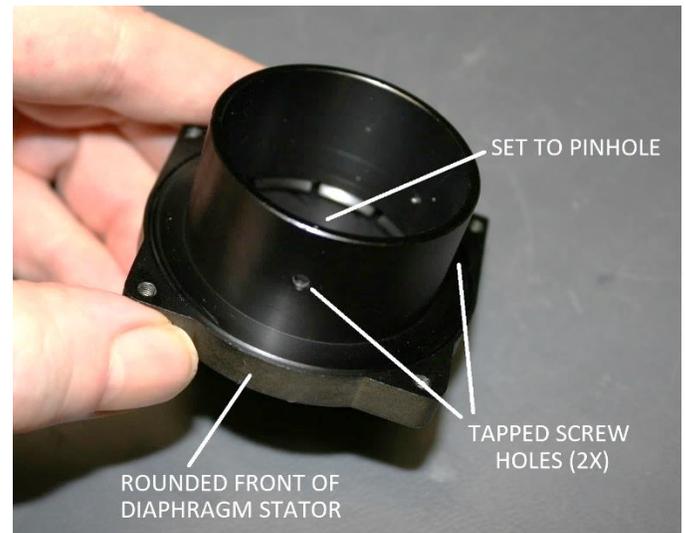


Figure 105 – Orientation of the screw holes in the rotor

If the two orthogonal screw holes are not in the proper position as shown in **Figure 105**, carefully rotate the diaphragm rotor until the aperture diaphragm is once again wide open, then lift and remove the diaphragm rotor and reinstall it in such an orientation that the locations of the two orthogonal screw holes will match those shown in **Figure 105** when the diaphragm is closed down to a pinhole aperture.

With the slotted stop pin on the brass retaining plate facing upwards, place the retaining plate into position on the metal diaphragm stator, aligning the shape of

the plate with that of the stator, and aligning the four holes in the plate with the four tapped holes in the stator. See **Figure 106**.

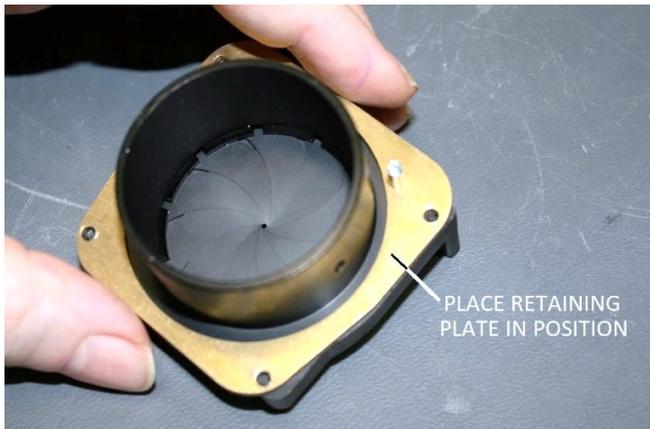


Figure 106 – Reinstall brass retaining plate onto stator

Using a suitable JIS screwdriver, reinstall the four m2.6x5 screws to secure the brass retaining plate into position on the metal diaphragm stator. See **Figure 107**.

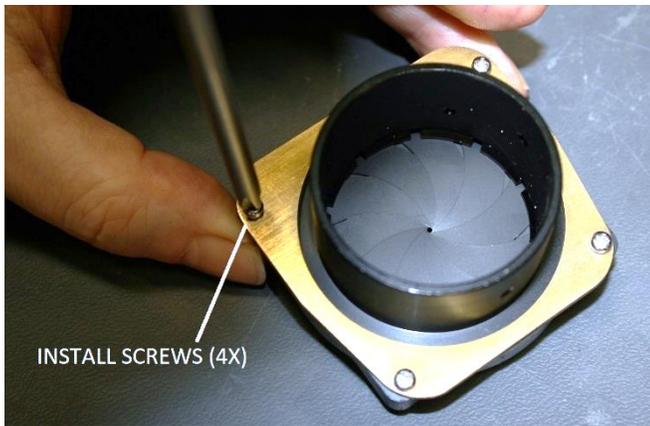


Figure 107 – Reinstall screws to secure the retaining plate

Carefully place the plastic gear collar over the barrel of the diaphragm rotor, aligning the two holes in the collar with the two tapped holes in the barrel of the rotor. See **Figure 108**.



Figure 108 – Reinstall plastic gear collar onto the rotor

Using a suitable JIS screwdriver, reinstall the two m2.6x5 screws to secure the plastic gear collar in place on the diaphragm rotor. See **Figure 109**.



Figure 109 – Secure the gear collar with two screws

Using a suitable slotted screwdriver, reinstall the slotted stop pin through the hole in the gear collar and into the field diaphragm rotor. See **Figure 110**.



Figure 110 – Reinstall the slotted stop pin into the rotor

Test that the field diaphragm opens and closes smoothly when the gear collar is rotated, and that the slotted stop pin in the diaphragm rotor hits the upright slotted stop pin in the brass retaining plate, to prevent the diaphragm from closing too far. The field diaphragm assembly is now ready to be reinstalled into a microscope and put back into service. See **Figure 111**.

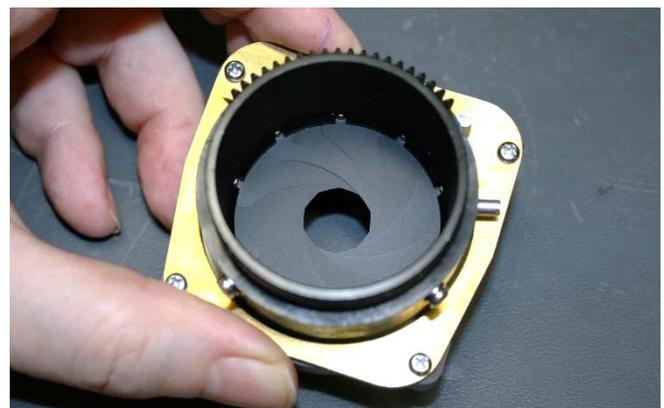


Figure 111 – Ready to be installed into scope (old style)

Servicing the Field Diaphragm Assembly (New Style)

This section applies only to the newer style assembly (see [Figure 75](#)). The older style assembly was covered previously in this document.

Disassemble the Field Diaphragm Assembly (New Style)

Using a suitable JIS screwdriver, loosen and remove the four m2.6x5 screws securing the brass retaining plate onto the metal diaphragm stator. See [Figure 112](#).

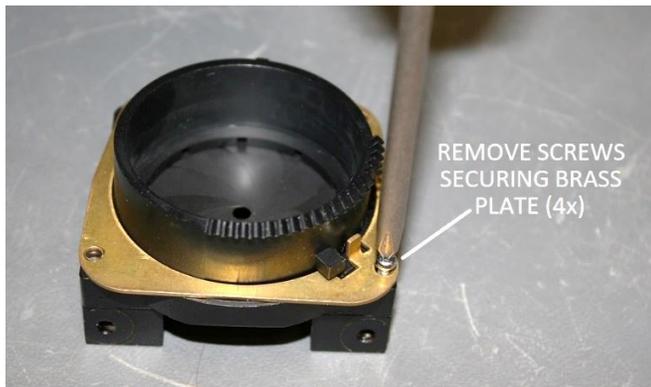


Figure 112 – Remove screws securing brass plate to stator

Rotate the brass retaining plate until the notch in the plate aligns with the tab on the plastic diaphragm rotor. See [Figure 113](#).

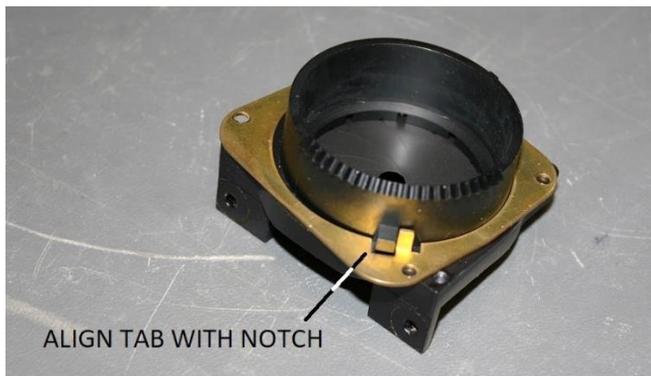


Figure 113 – Align plastic tab with notch in brass plate

Lift and remove the brass retaining plate from the metal diaphragm stator. See [Figure 114](#).

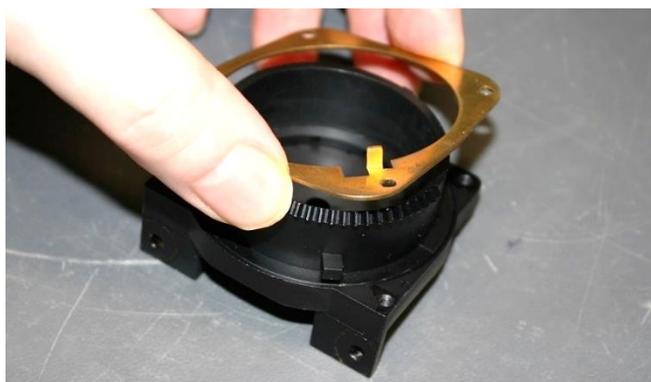


Figure 114 – Lift and remove the brass retaining plate

Carefully lift and remove the plastic diaphragm rotor from the metal diaphragm stator. See [Figure 115](#).

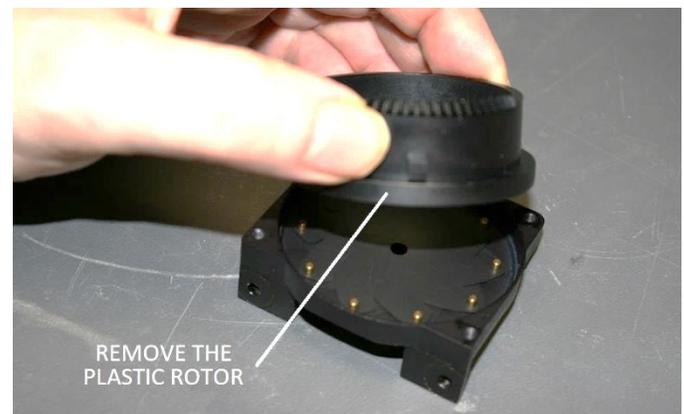


Figure 115 – Lift and remove the plastic rotor from stator

Beneath the diaphragm rotor, there are 10 diaphragm leaves positioned within the circular recess of the metal diaphragm stator (see [Figure 85](#)). Disassemble the leaves of the iris diaphragm per [Figure 86](#) and accompanying text.

Clean Components of Field Diaphragm Assembly (New Style)

Using a suitable solvent, thoroughly clean any contamination from the diaphragm leaves (see [Figure 88](#)). Acetone may be used if the leaves are metal. Do not use acetone if the leaves are plastic, as this will dissolve the plastic. Use a plastic-safe solvent, such as alcohol, if this is the case. Using a suitable solvent such as acetone, clean any contamination from the metal diaphragm stator (see [Figure 87](#)). Using a suitable solvent such as alcohol, clean any contamination from the plastic diaphragm rotor. Do not use acetone here, as this will dissolve the plastic. See [Figure 116](#).

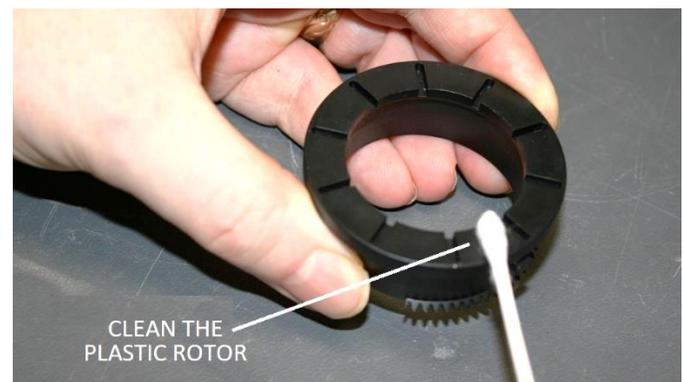


Figure 116 – Thoroughly clean the plastic rotor

Reassemble the Field Diaphragm Assembly (New Style)

Carefully reassemble the diaphragm leaves into the circular recess of the metal diaphragm stator per [Figure 90](#) through [Figure 100](#) and the accompanying text.

With the diaphragm leaves positioned against the side wall of the metal diaphragm stator, carefully reinstall the plastic diaphragm rotor over the installed leaves, making sure the radial notches in the rotor drop down over the upward-pointing pivot pins on the leaves. Be sure to install the rotor with the keying shown in [Figure 117](#).

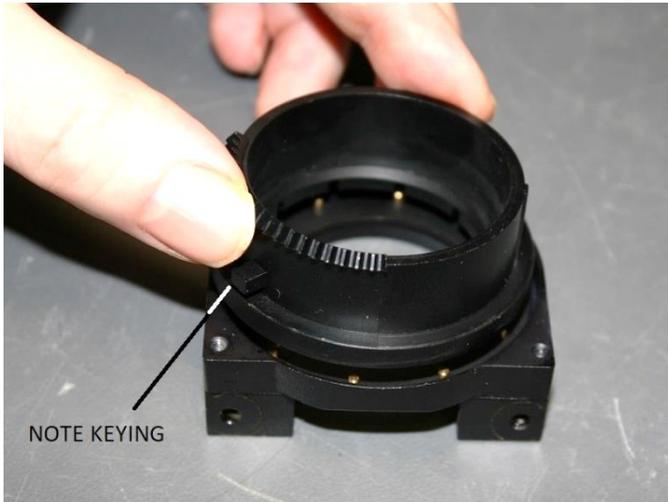


Figure 117 – Carefully place the plastic rotor into position

Carefully rotate the diaphragm rotor, making sure that the leaves move smoothly without interference, excessive resistance, or binding.

Once the leaves have been verified to be moving, place the brass retaining plate into position on the metal diaphragm stator, aligning the shape of the plate with that of the stator, and aligning the four holes in the plate with the four tapped holes in the stator. See [Figure 118](#).

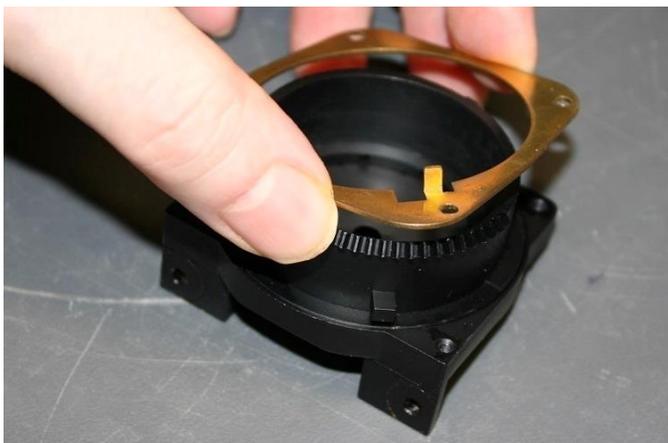


Figure 118 – Reinstall brass retaining plate onto stator

Using a suitable JIS screwdriver, reinstall the four m2.6x5 screws to secure the brass retaining plate into position on the metal diaphragm stator. See [Figure 119](#).

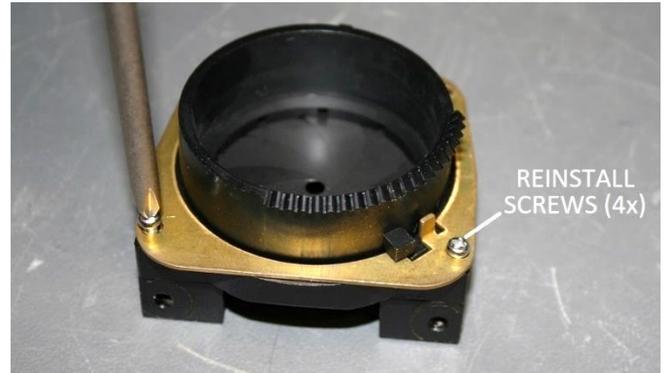


Figure 119 – Reinstall screws to secure the retaining plate

Test that the diaphragm opens and closes smoothly when the plastic rotor is rotated, and that the stop tab on the plastic rotor hits the upright stop tab on the brass retaining plate, to prevent the diaphragm from closing too far (see [Figure 120](#)). If the plastic stop tab does not hit the metal tab at the correct minimum aperture size, remove and reinstall the plastic rotor as described above, paying careful attention to the orientation of the plastic collar relative to the metal diaphragm stator.

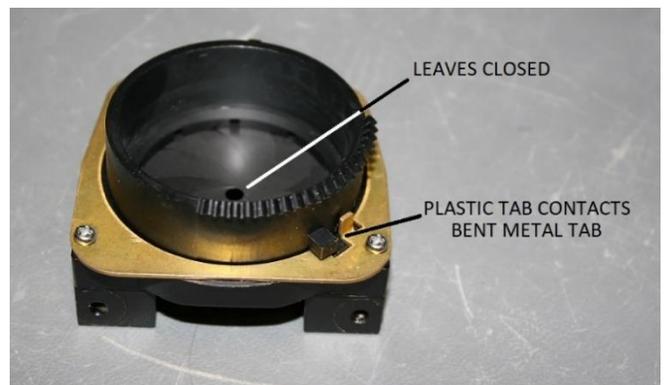


Figure 120 – Plastic stop tab hits tab on retaining plate

The newer style field diaphragm assembly is now ready to be reinstalled into a scope and put back into service. See [Figure 121](#).



Figure 121 – Ready to be installed into scope (new style)

Reinstall the Field-Diaphragm Assembly

Place the field diaphragm assembly into position in the base casting, oriented as shown in **Figure 122**.

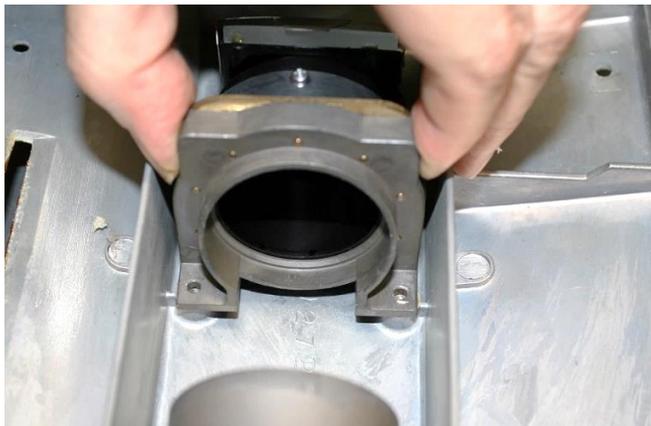


Figure 122 – Place field diaphragm assembly into position

Align the two holes in the field diaphragm assembly with the tapped holes in the base casting, and using a suitable JIS screwdriver, reinstall the two m2.6x6 screws to secure the field diaphragm assembly to the base casting (see **Figure 123**).

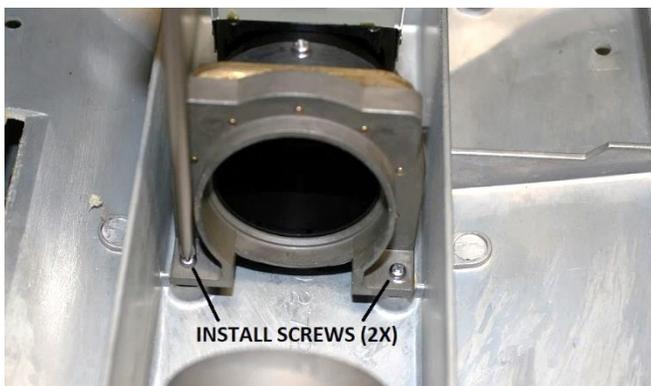


Figure 123 – Secure field diaphragm assembly to base

Light Inlet Assembly (BHT/BHTU)

The Light Inlet Assembly of the BHT/BHTU is shown in **Figure 124**.



Figure 124 – Light Inlet Assembly for the BHT/BHTU

Remove Light Inlet Assembly (BHT/BHTU)

Using a 1.3mm or .050" hex tool, loosen and remove the two m2.6x3 setscrews securing the Light Inlet Assembly into the bore of the base casting (see **Figure 125**).

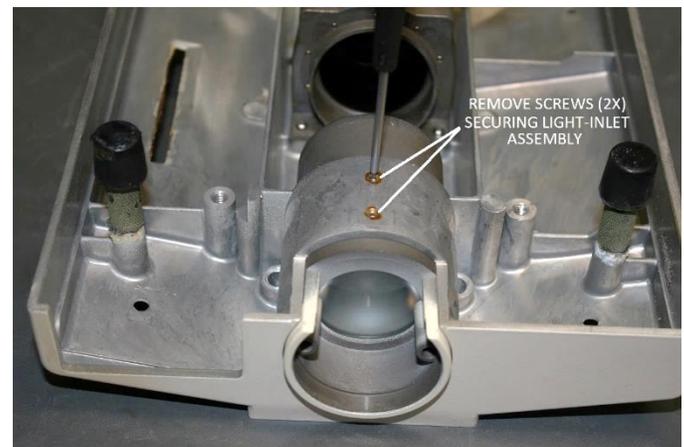


Figure 125 – Remove setscrews securing barrel to base

Remove the Light Inlet Assembly from the bore in the base casting by pulling it straight backwards (see **Figure 126**).



Figure 126 – Remove the Light Inlet Assembly from base

Servicing the Light Inlet Assembly (BHT/BHTU)

Note: It is rarely necessary to service the Light Inlet Assembly on the BHT/BHTU scopes. This section is included in this document for the sake of completeness. The BHT/BHTU light inlet assembly may be serviced per the following.

Disassemble the Light Inlet Assembly (BHT/BHTU)

Use a suitable lens spanner tool (item T3 of **Appendix 1**) to carefully loosen and remove the upper retaining ring from the end of the metal barrel (see **Figure 127** and **Figure 128**), being careful to not scratch the exposed glass disk in the process of removal.



Figure 127 – Carefully loosen the upper retaining ring



Figure 128 – Remove the upper retaining ring

Use a suitable lens suction tool (item T4 of [Appendix 1](#)) to carefully lift and remove the adiabatic glass disk (i.e., IR-absorbing filter) from within the recess in the end of the metal barrel (see [Figure 129](#)).



Figure 129 – Carefully lift and remove adiabatic glass disk

Remove the upper spacer tube from within the metal barrel (see [Figure 130](#)).

Teardown, Cleaning, and Reassembly of the Miscellaneous Parts of the Olympus BH-2 Microscope Frames

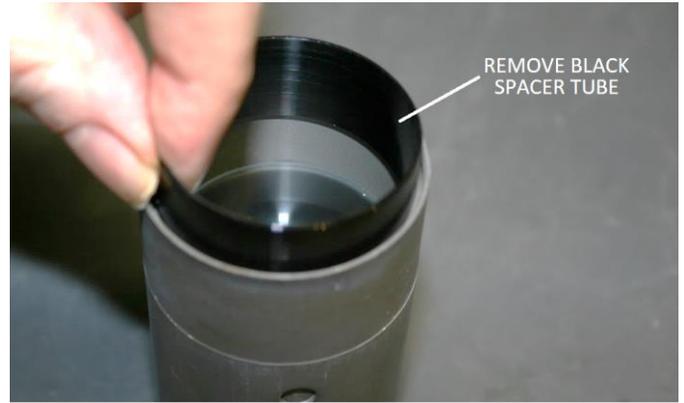


Figure 130 – Remove the upper spacer tube

Use a suitable lens suction tool (item T4 of [Appendix 1](#)) to carefully lift and remove the upper glass diffusion disk from within the metal barrel (see [Figure 131](#)).



Figure 131 – Carefully lift and remove frosted glass disk

Reach in and remove the lower spacer tube from within the metal barrel (see [Figure 132](#)).



Figure 132 – Remove the lower spacer tube

Remove the glass collector lens from within the metal barrel (see [Figure 133](#)), by placing your index finger on top of the lens, inverting the barrel, and allowing the lens to fall out, being very careful so as to not scratch the lens on the metal barrel in the process.



Figure 133 – Remove the glass collector lens

Use a suitable lens spanner tool (item T3 of [Appendix 1](#)) to loosen and remove the lower retaining ring from within the metal barrel (see [Figure 134](#), [Figure 135](#), and [Figure 136](#)).

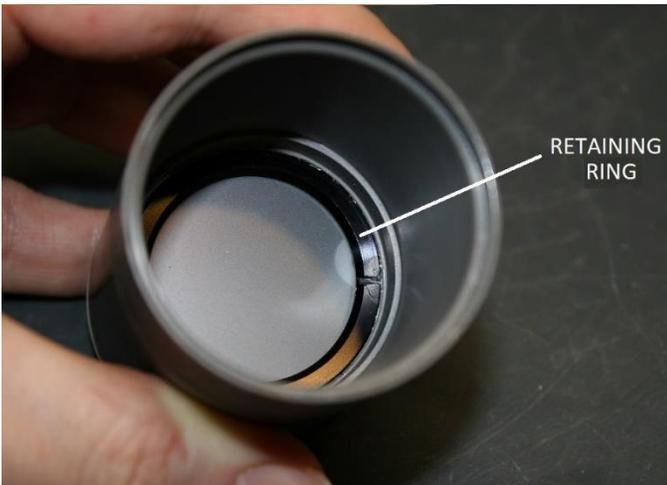


Figure 134 – The lower retaining ring in the barrel



Figure 135 – Loosen the lower retaining ring



Figure 136 – Remove the lower retaining ring

Use a suitable lens suction tool (item T4 of [Appendix 1](#)) to carefully lift and remove the lower frosted glass disk from within the metal barrel (see [Figure 137](#)).



Figure 137 – Carefully remove lower glass diffusion disk

Clean Components of Light Inlet Assembly (BHT/BHTU)

Use a suitable lens-cleaning solution (item S4 of [Appendix 1](#)) and dust-free, non-abrasive optical wipes (item S5 of [Appendix 1](#)) to clean the various optical components of the Light Inlet Assembly.

Reassemble the Light Inlet Assembly (BHT/BHTU)

Use a suitable lens suction tool (item T4 of [Appendix 1](#)) to carefully lift and place the lower glass diffusion disk into the lower recess in the metal barrel (see [Figure 138](#)).



Figure 138 – Place lower diffuser in the recess in barrel

Carefully place the lower retaining ring (the smaller of the two) into the metal barrel (see [Figure 139](#)).



Figure 139 – Place lower retaining ring into metal barrel

Use a suitable lens spanner tool (item T3 of [Appendix 1](#)) to engage and snug the lower retaining ring into the metal barrel (see [Figure 140](#)).



Figure 140 – Engage and snug the lower retaining ring

Carefully lower the glass collection lens into the metal barrel (with the convex side facing upwards) and seat it onto the lower retaining ring within the metal barrel (see [Figure 141](#)).



Figure 141 – Place collector lens into metal barrel

Carefully place the lower spacer tube into the metal barrel and press it down until it contacts the glass collector lens (see [Figure 142](#)).



Figure 142 – Install lower spacer tube into metal barrel

Use a suitable lens suction tool (item T4 of [Appendix 1](#)) to carefully lift and place the upper glass diffusion disk (the larger of the two diffusion disks) into the metal barrel, on top of the lower spacer tube (see [Figure 143](#)).



Figure 143 – Carefully place large diffuser disk into barrel

Carefully place the upper spacer tube into the metal barrel and press it down until it contacts the upper diffuser disk (see [Figure 144](#)).



Figure 144 – Install the upper spacer tube into barrel

Use a suitable lens suction tool (item T4 of [Appendix 1](#)) to carefully install the clear adiabatic glass disk into the metal barrel and seat it on the upper spacer tube (see [Figure 145](#)).



Figure 145 – Install adiabatic disk into the metal barrel

Use a suitable lens spanner tool (item T3 of [Appendix 1](#)) to reinstall the upper retaining ring (the larger of the two) into the metal barrel and snug it down against the adiabatic glass disk (see [Figure 146](#) and [Figure 147](#)).



Figure 146 – Place upper retaining ring into position

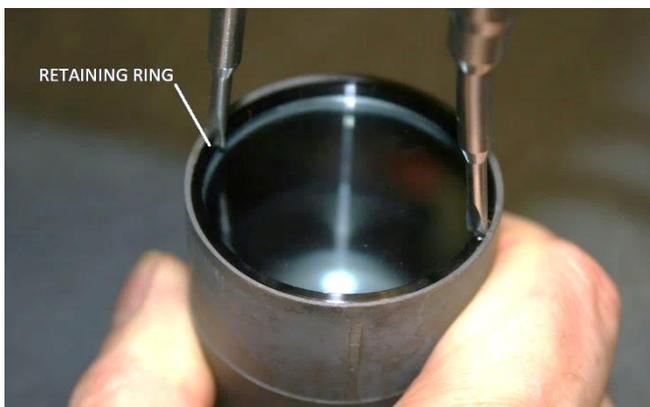


Figure 147 – Snug upper retaining ring to the glass disk

The Light Inlet Assembly is now ready to be reinstalled into the microscope stand (see [Figure 148](#)).



Figure 148 – Ready to reinstall the Light Inlet Assembly

Reinstall Light Inlet Assembly (BHT/BHTU)

Observe the outer surface of the metal barrel of the Light Inlet Assembly to find the two bite marks in the circular depressions machined into the metal barrel (see [Figure 149](#)). Since these bite marks were made by the setscrews that originally secured the Light Inlet Assembly in the correct location in the base casting, they can be used as witness marks to reinstall the Light Inlet Assembly back into its original location.

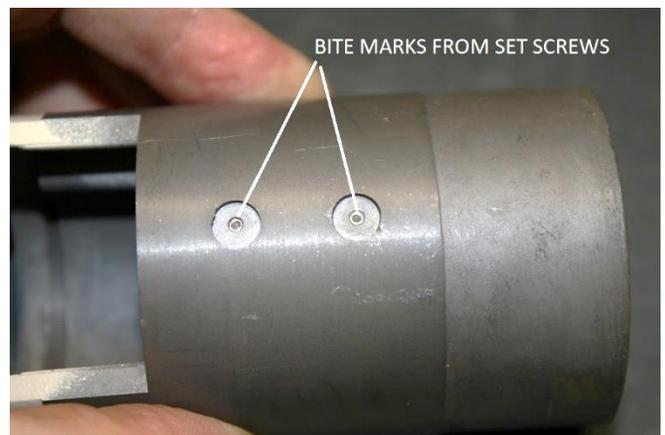


Figure 149 – Bite marks to act as alignment witness marks

Carefully insert the light inlet assembly into the bore of the base casting, as shown in [Figure 150](#).



Figure 150 – Insert Light Inlet Assembly into the bore

Using a flashlight if necessary, peer into the two tapped holes in the base casting and adjust the position of the Light Inlet Assembly until the two bite marks on the outer surface of the metal barrel can be seen through these two tapped holes. Using the bite marks as witness marks to properly position the Light Inlet Assembly, carefully position the Light Inlet Assembly until the bite marks are well centered within the tapped holes (see [Figure 151](#)).

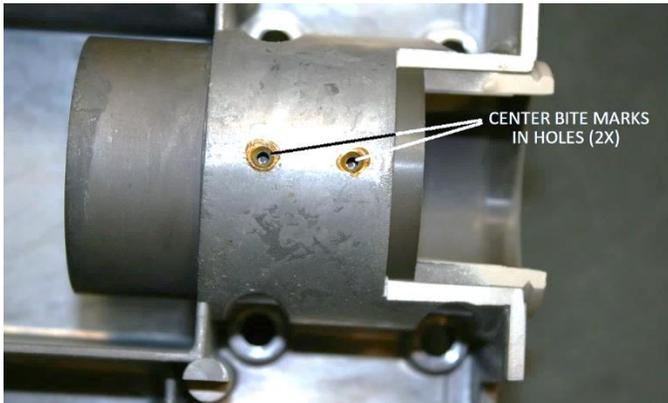


Figure 151 – Center the bite marks relative to the holes

Using a 1.3mm hex tool, reinstall the two m2.6x3 setscrews to secure the Light Inlet Assembly into the bore of the base casting (see [Figure 152](#)). When the setscrews bite into the original bite marks, the Light Inlet Assembly will be locked in the same physical position from which it was originally removed.

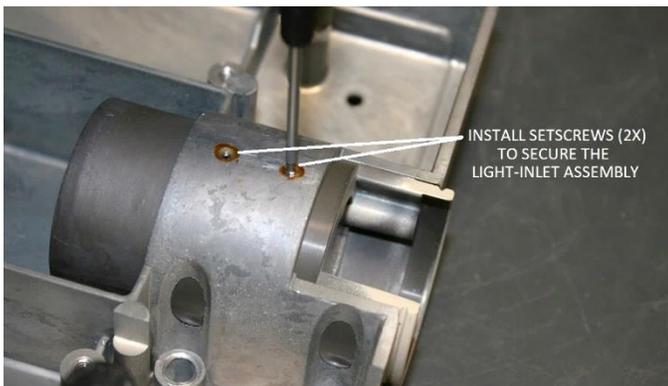


Figure 152 – Reinstall setscrews to secure the barrel

Light Exit Assembly

There were two distinct mechanical configurations of the Light Exit Assembly used on the BH-2 microscopes. These versions differ in the construction of the knurled field-adjustment ring and the filter holder. Both versions are shown in top view in [Figure 153](#) and in bottom view in [Figure 154](#), with the plastic/metal version on the left, and the all-plastic version on the right, in both figures.



Figure 153 – Top view of the Light Exit Assemblies



Figure 154 – Bottom view of the Light Exit Assemblies

PLASTIC/METAL VERSION: The plastic/metal version, as shown on the left-hand side of both [Figure 153](#) and [Figure 154](#), utilizes a machined brass insert molded into the knurled plastic field-adjustment ring, with the brass insert functioning as the bearing surface upon which the knurled ring rotates (with a coating of grease). The filter holder of this version is constructed of metal. Since the plastic/metal design relies on grease to allow the knurled ring to rotate freely, these are subject to gumming up and becoming hard to rotate as the grease ages.

ALL-PLASTIC VERSION: The all-plastic version, as shown on the right-hand side of [Figure 153](#) and [Figure 154](#), utilizes an all-plastic knurled field-adjustment ring (i.e., without a brass insert) as well as a plastic filter holder. The bearing surfaces of the all-plastic version are of course plastic, and since this version did not include grease (although a light oil is usually present in these), the field-adjustment ring on this version does not typically stiffen up, since it contains no grease to gum up the mechanism as it ages. Externally, these two assemblies look very similar, as can be seen in [Figure 153](#).

Servicing the Light Exit Assembly

The Light Exit Assembly can be serviced per the following.

Disassemble the Light Exit Assembly

Rotate the knurled field-adjustment ring to the fully clockwise position to set the field diaphragm to the wide-open position (see [Figure 155](#)).



Figure 155 – Fully open the field diaphragm

Using a suitable JIS screwdriver, remove the three m2x7 screws securing the filter holder in place in the recess of the knurled field-adjustment ring (see [Figure 156](#)).

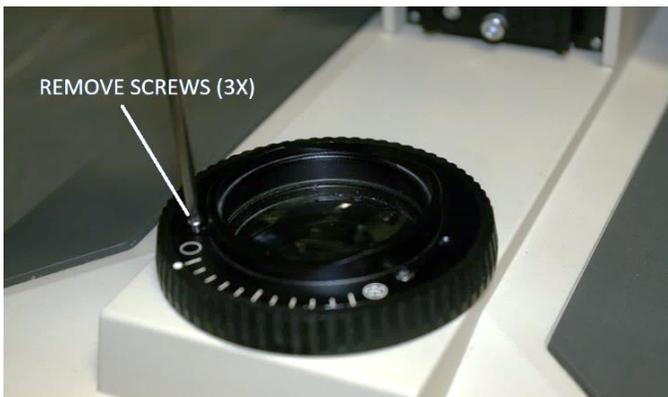


Figure 156 – Remove screws securing the filter holder

Lift and remove the filter holder from the recess in the knurled field-adjustment ring (see [Figure 157](#)).



Figure 157 – Lift and remove the filter holder

Lift and remove the knurled field-adjustment ring from the frame of the Light Exit Assembly (see [Figure 158](#)).



Figure 158 – Lift and remove the field-adjustment ring

Use a suitable lens spanner tool (item T3 of [Appendix 1](#)) to loosen the threaded retaining ring holding the glass field-exit lens in place in the frame (see [Figure 159](#) and [Figure 160](#)).

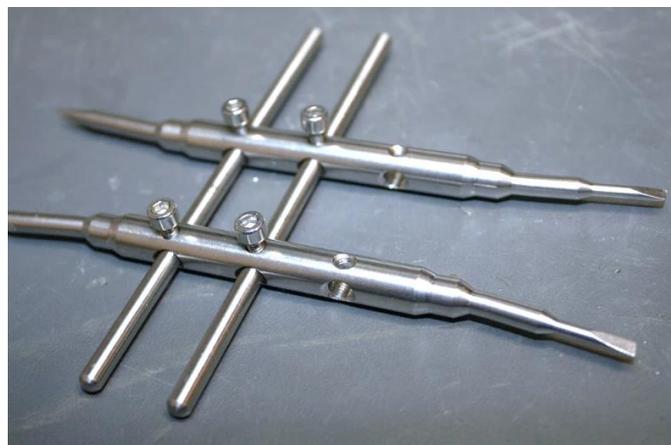


Figure 159 – Lens spanner tool with bent tips



Figure 160 – Loosen the threaded retaining ring

Once the threaded retaining ring has been loosened with the spanner tool, continue to unscrew the ring by hand until it disengages from the threads of the frame of the Light Exit Assembly (see [Figure 161](#)).



Figure 161 – Unscrew and remove threaded retaining ring

Using a suitable lens suction tool (item T4 of [Appendix 1](#)), carefully lift and remove the glass field-exit lens from the frame of the Light Exit Assembly (see [Figure 162](#)).



Figure 162 – Lift and remove the glass field-exit lens

Use a lens duster bulb (item T6 of [Appendix 1](#)) to remove as much loose dust and debris as possible from the glass field-exit lens (see [Figure 163](#)).



Figure 163 – Blow loose dust from the glass lens

Use a suitable lens-cleaning solution and lint-free tissue (items S4 and S5 of [Appendix 1](#)) to carefully clean the glass field-exit lens (see [Figure 164](#)).



Figure 164 – Clean both sides of the field-exit lens

Using a suitable lens suction tool (item T4 of [Appendix 1](#)), carefully place the glass field-exit lens back into the recess in the frame of the Light Exit Assembly (see [Figure 165](#)).



Figure 165 – Place field-exit lens back into the recess

Carefully engage the threaded retaining ring with the threads in the frame of the Light-Exit Assembly and tighten it until it is finger tight, being careful not to smudge the glass lens (see [Figure 166](#)).



Figure 166 – Engage the threaded retaining ring

Use a suitable lens spanner tool (item T3 of [Appendix 1](#)) to snug the threaded retaining ring a bit to secure the glass field-exit lens into place in the frame (see [Figure 167](#)). Only tighten the retaining ring enough so that the glass lens does not rattle in the recess of the frame. Do not overtighten the retaining ring or you may chip the fragile glass lens.



Figure 167 – Snug the threaded retaining ring

Note: Removal of the frame of the Light Exit Assembly from the base casting is generally not necessary, unless the primary-surface mirror needs to be cleaned.

IF APPLICABLE: If the primary surface mirror on the Light Exit Assembly needs to be cleaned, use a suitable JIS screwdriver to remove the three m2.6x6 screws securing the frame of the Light Exit Assembly to the base casting of the stand (see [Figure 168](#)).

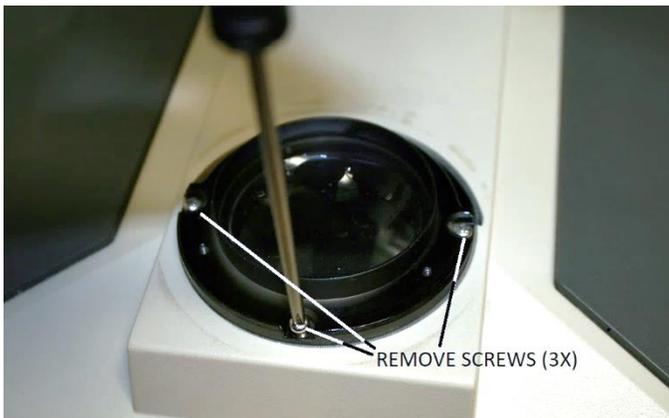


Figure 168 – Remove screws securing frame to the base

Carefully lift and remove the frame of the Light Exit Assembly from the base casting, making sure to not damage the fragile reflective coating on the primary surface mirror in the process (see [Figure 169](#)).



Figure 169 – Carefully lift frame clear of the base casting

Clean the Components of Light Exit Assembly

Using a soft cleaning pad and a suitable solvent (acetone), clean away any contamination from the area around the cutout in the base casting (see [Figure 170](#)).



Figure 170 – Clean the area around the base cutout

Using cotton swabs and a suitable solvent (e.g., acetone), thoroughly remove all grease and contaminants from the metal frame of the Light Exit Assembly (see [Figure 171](#)).



Figure 171 – Thoroughly clean the light-exit frame

IF APPLICABLE: Use a lens duster bulb to remove as much loose dust and debris as possible from the primary

surface mirror of the Light Exit Assembly (see [Figure 172](#)). Do not touch the mirror with the duster.



Figure 172 – Blow all loose dust from the mirror surface

Next, place the frame of the Light Exit Assembly into a suitable container to catch the cleaning solution and rinse water (see [Figure 173](#)).



Figure 173 – Place the frame into a suitable catch pan

Apply a suitable optical cleaning solution (item S4 of [Appendix 1](#)) over the entire reflective surface of the mirror (see [Figure 174](#)). Allow the cleaning solution to soften the debris on the mirror surface for a bit before proceeding with the cleaning.



Figure 174 – Wet the reflective surface of the mirror

Use a soft-bristled brush (item T5 of [Appendix 1](#)) to very gently clean the reflective surface of the primary surface mirror, by gently wiping the wetted surface with the soft-bristled brush (see [Figure 175](#)), applying only as much pressure with the brush as necessary to dislodge the dust and debris from the fragile surface of the mirror.

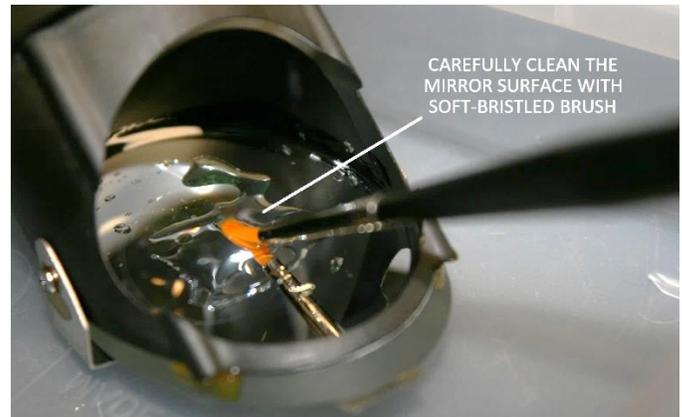


Figure 175 – Carefully clean the primary surface mirror

After the primary surface mirror has been gently cleaned in the above manner, thoroughly rinse away the cleaning solution and loosened dust and debris with lots of distilled or deionized water (see [Figure 176](#)).



Figure 176 – Rinse the mirror with distilled/deionized water

Do not attempt to dry the mirror surface with any sort of cloth or tissues, otherwise the fragile reflective surface coating will be permanently damaged.

Use a lens duster bulb (item T6 of [Appendix 1](#)) to blow away as much of the rinse water as possible (see [Figure 177](#)), being careful to not allow the duster to contact the fragile mirror coating. After you have blown away as much of the rinse water as possible, allow the complete frame to thoroughly air-dry in a dust-free environment before proceeding with reassembly of the Light Exit Assembly. No water spots should remain on

the mirror surface if the rinse was sufficiently thorough, and if the rinse water was sufficiently free of contaminants.



Figure 177 – Blow away most of the rinse water

Using cotton swabs and a suitable solvent (e.g., alcohol), thoroughly clean the knurled field-adjustment ring (see **Figure 178**, plastic/brass version shown). Do not use acetone here, as acetone will attack the plastic.



Figure 178 – Thoroughly clean the field-adjustment ring

Using cotton swabs and a suitable solvent (e.g., alcohol), thoroughly clean the filter holder (see **Figure 179**, metal version shown). Do not use acetone on the plastic version, as acetone will attack the plastic.



Figure 179 – Thoroughly clean the filter holder

Reinstall the Light Exit Assembly Frame onto the Base
IF APPLICABLE: Carefully position the frame of the Light Exit Assembly into the cutout on the base casting, making sure you do not touch or damage the fragile primary surface mirror (see **Figure 180**).



Figure 180 – Re-install Light Exit frame into base cutout

Align the three holes in the Light Exit frame with the tapped holes in the base casting (see **Figure 181**).



Figure 181 – Align holes in the frame with tapped holes

Using a suitable JIS screwdriver, reinstall the three m2.6x6 screws to secure the Light Exit frame to the base casting (see **Figure 182**).



Figure 182 – Secure the Light Exit frame to the base

Refer to the *Collimating the Integral Substage Lighting* section of this document to determine whether or not to collimate the substage lighting at this time.

Reassemble the Light Exit Assembly

PLASTIC/BRASS VERSION: If the knurled field-exit ring is the type with the brass insert molded into place, apply a light coating of a suitable light grease (item S2 of **Appendix 1**) to the upper brass bearing surface within the knurled ring (see **Figure 183**).



Figure 183 – Apply grease to brass surface in field ring

Place the knurled field-adjustment ring into position over the frame of the Light Exit Assembly, with the vertical edge of the geared portion on the underside of the ring contacting the straight edge in the right-hand side of the cutout in the base casting (see **Figure 184**).



Figure 184 – Place the knurled field ring into position

ALL PLASTIC VERSION: If the Light Exit Assembly is the all-plastic type (i.e., if the knurled field-adjustment ring does not contain a brass insert), apply a thin coating of a suitable light oil (item S3 of **Appendix 1**) to the bearing surface of the plastic filter holder (see **Figure 185**).



Figure 185 – Apply oil to the plastic filter holder

Place the filter holder into the center recess of the knurled field-adjustment ring (see **Figure 186**).



Figure 186 – Place the filter holder into recess of field ring

Rotate the filter holder until the three screw holes in the filter holder align with the three tapped holes in the frame of the Light Exit Assembly (see **Figure 187**).



Figure 187 – Align holes in filter holder with tapped holes

While temporarily holding the filter holder in this position within the recess of the knurled field-adjustment ring, rotate the knurled field-adjustment ring and observe its range of motion. It may not be possible to adjust the ring such that the pointer goes

from the dot at the maximum clockwise end of its travel to the dot at the maximum counterclockwise end of its travel (see [Figure 188](#) and [Figure 189](#)).



Figure 188 – Field ring at maximum clockwise point



Figure 189 – Field ring at maximum counterclockwise point

If you are unable to adjust the knurled field-adjustment ring throughout its full range of motion as described above, this means that the field diaphragm was not at its fully open position when the knurled field-adjustment ring was positioned over the frame of the Light Exit Assembly, or the knurled ring was not oriented properly per [Figure 184](#) when placed into position.

If this happens, simply remove the filter holder and the knurled field-adjustment ring, and then reinstall them to obtain a different mesh point of the geared portion of the knurled ring with the field diaphragm assembly, such that the full range of motion can be obtained (see [Figure 188](#) and [Figure 189](#)). It may take a few attempts to find the correct mesh point.

Once the full adjustment range of the field diaphragm has been verified, use a suitable JIS screwdriver to reinstall the three m2x7 screws to secure the filter holder in place (see [Figure 190](#)).



Figure 190 – Secure filter holder in recess of knurled ring

The Light Exit Assembly is now reassembled and ready to be put back into service.



Figure 191 – Light Exit Assembly ready for service

Collimating the Integral Substage Lighting

If during the course of servicing the microscope stand, the Light Exit Assembly and/or the pillar arm have been loosened or separated from the base casting, it is recommended that you perform a collimation of the substage lighting system, per the [Collimating the Substage Lighting of the Olympus BH-2 Microscopes](#) document in this series, before using the microscope. Although this collimation is not strictly required¹, it should be done if you wish to obtain the best optical performance that your microscope is capable of providing.

A Few Words About Dust Protection

The bases of the BHS/BHSU and the BHT/BHTU stands are reasonably well sealed against dust intrusion during normal operation when the lamphouses are installed. There are, however, a few things to be aware of for

¹ A great many of the BH-2 scopes in use today have been disassembled for service at one time or another and have not been re-collimated upon completion of the repair.

long-term storage of these stands. On the BHT/BHTU stands, the barrel of the Light Inlet Assembly seals the light-inlet port on the back of the base, whether or not the 20W lamphouse is installed, so long-term storage of BHT/BHTU scopes should not be a problem.

The rear opening of the BHS/BHSU scopes is a different story, however. The light-inlet port on these scopes is only sealed when the 100W lamphouse is attached to the stand, since the light-inlet optics are integral to the lamphouse and are not integral to the stand. Accordingly, if the BHS/BHSU stand is stored without the 100W lamphouse attached, the light-inlet port on the back of the base will be wide open, allowing dust and insects to enter and foul on the primary surface mirror.

Olympus provided a plastic dust cap (see [Figure 192](#), photo courtesy Joe Haralson) with the BHS/BHSU models, to be used to seal the light port whenever the 100W lamphouse is not installed onto the BHS/BHSU stand. If you have this dust cover with your microscope, be sure to use it to keep the dust and insects out of the base whenever your microscope is stored without the 100W lamphouse attached to the stand. [Figure 193](#) shows the Olympus dust cap in place on a BHS frame (photo courtesy Joe Haralson).



Figure 192 – Dust cap for BHS/BHSU light port (top view)

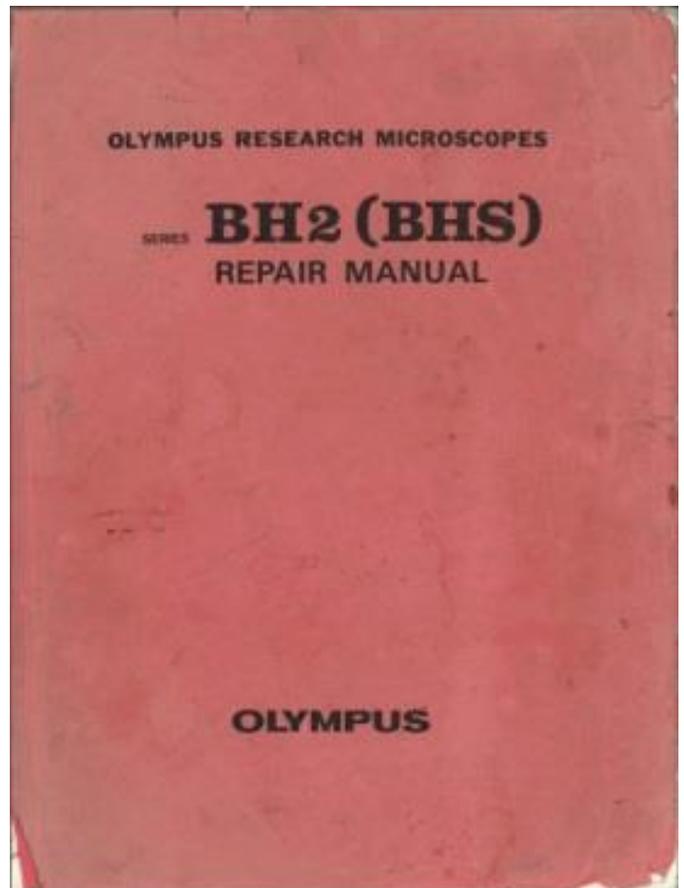
If you do not have such a cover, just be sure to improvise some method of keeping dust and insects from entering the open light port of the stand when stored without the lamphouse attached.



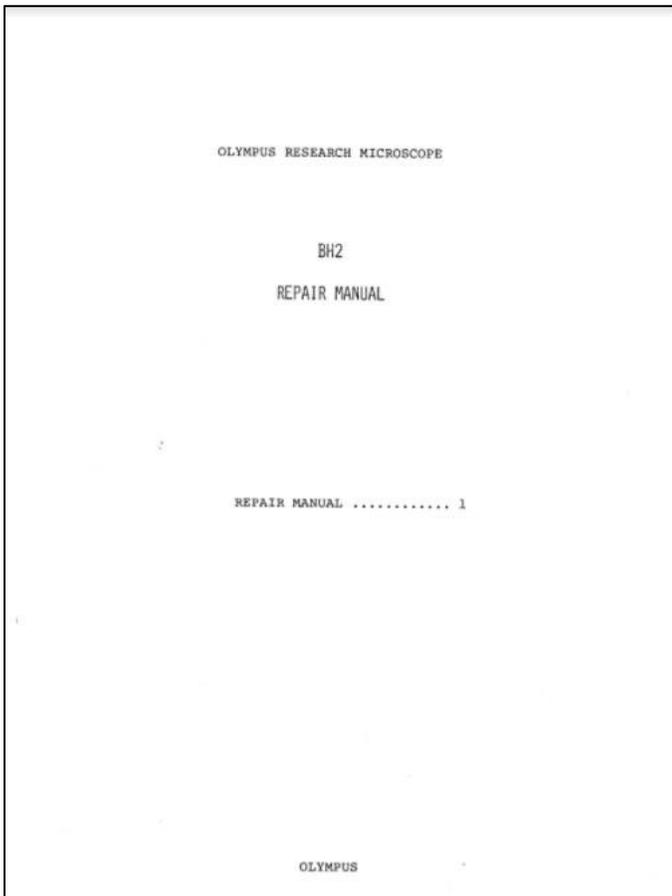
Figure 193 – Light port capped for storage (BHS/BHSU)

Original Olympus Documentation

Scanned versions of the following PDFs are available for download at various microscope-related hobbyist sites on the internet. These can be found by searching for the titles in an internet search engine, such as Google.



Olympus Research Microscopes Series BH2 (BHS) Repair Manual



Olympus Research Corporation BH2 Repair

How to Contact the Author

Please feel free to direct any questions or comments regarding this document (or BH-2 microscopes in general) to the author at the email address included on the cover page of this document.

Appendix 1

Parts, Supplies, and Tools Referenced in this Document

Table 1 and **Table 2** list specific information for the various tools and supplies discussed in this document. These tables list only the items that may be difficult to source locally. The pricing and availability listed below is accurate as-of May 2021 but is subject to change without notice.

Item	Description	Manufacturer	Mfg. Part #	Vendor	Vendor #	Price
T1	Allen driver, 1.3mm, .050" x 50mm	Wiha	96413	Amazon	---	\$10.18
T2	Screwdriver set, JIS, 4 pieces	Hozan	JIS-4	Amazon	---	\$19.00
T3	Lens Spanner Tool, with bent tips	Neewer	---	Amazon	---	\$18.99
T4	Lens Suction Tool	---	---	Amazon	---	\$8.99
T5	Paint Brushes, Sable Hair	Bosobo	---	Amazon	---	\$8.99
T6	Silicone Air Blaster Bulb	---	---	Amazon	---	\$7.99

Table 1 – Tools referenced in this document

Item	Description	Manufacturer	Mfg. Part #	Vendor	Vendor #	Price
S1	Plastilube® Brake Grease, 75ml	ATE	ATE70015	Autohausaz	1161688	\$10.88
S2	Molykote 44 Light Grease, 0.5oz	Dow	---	Amazon	---	\$9.99
S3	Super Lube, Synthetic Oli w/ PTFE, 4oz	Super Lube	51004	Amazon	---	\$10.99
S4	Sparkle Lens Cleaning Solution	CLS	---	Amazon	---	\$18.43
S5	Lens cleaning Tissue, 50 sheets	Tiffen	---	Amazon	---	\$8.95

Table 2 – Supplies referenced in this document

Table 3 lists the contact information for the vendors referenced in **Table 1** and **Table 2**.

Vendor	URL	Telephone	Toll Free	email
Amazon	www.amazon.com	---	---	---
Autohausaz	www.autohausaz.com	---	1-800-240-4620	sales@autohausaz.com

Table 3 – Vendor listing