

Complete Teardown, Cleaning, and Reassembly of the Olympus BH-PRE Centering Nosepiece

Revision 2



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Introduction

The microscopes in the Olympus BH and BH-2 lines 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, high-quality alternative to the Chinese-made scopes prevalent today.

One issue that might be encountered when purchasing a polarizing version of one of these scopes is that the grease in the BH-PRE modular centering nosepiece assembly may be dried and gummy, resulting in stiff or gritty motion of the nosepiece and/or poorly functioning objective centering.

Another issue that may be encountered is with the mechanical detents in the revolving nosepiece. After many years of hard service, especially if the revolving nosepiece has not been periodically lubricated throughout its life, one or more of the detent stops may be worn to the point where the detents are sloppy, and the affected objectives do not maintain proper radial indexing. At best, this is annoying to the operator, and at worst can render the modular nosepiece unusable.

This document describes the complete teardown, cleaning, lubrication, and reassembly of the BH-PRE modular centering nosepiece assembly used on the Olympus BHA-P, BHSP, and BHTP microscope stands. Completion of this maintenance procedure should restore the proper feel to the motion of the nosepiece and should restore proper operation of the objective-centering mechanisms. Additionally, this maintenance should reduce or prevent further wear of the mechanical detent stops. Note that if the detent stops are already excessively worn, there is no repair for this other than the replacement of the revolving turret.

Scope of this Document

The procedure detailed in this document applies to the BH-PRE modular centering nosepiece assembly for the Olympus BHA-P, BHSP, and BHTP microscope stands. Note that the existing Olympus BH and BH-2 service literature does not address the teardown and repair of any of the revolving nosepiece assemblies for these microscopes, as these assemblies were considered unserviceable, and field removal and replacement of the entire assembly was the only remedy offered by Olympus.

Tools Needed

The following tools will be needed to complete the teardown, cleaning, lubrication, and reassembly of the BH-PRE modular centering nosepiece assembly.

- Center punch or nailset tool
- Electric heat gun (item 1 of [Appendix 1](#))
- Lens-spanner tool (item 5 of [Appendix 1](#))
- Screwdriver set, JIS (item 2 of [Appendix 1](#))

A Few Words about JIS Screws

Screws with JIS heads are frequently found in much of the 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 driver 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.

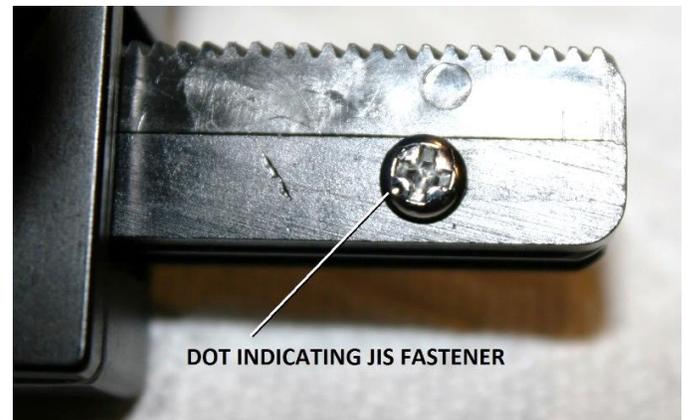


Figure 1 – The head of a typical JIS screw

Supplies Needed

The following supplies will be needed to complete the teardown, cleaning, lubrication, and reassembly of the BH-PRE modular centering nosepiece assembly.

- Cleaning solvent (see recommendations below)
- Lubricant (see recommendations below)

Recommended Lubricant Type

Plastilube® Brake Grease or Mobilgrease 28 grease (item 6 of [Appendix 1](#)) are recommended for use in the BH-PRE modular centering nosepiece assembly. Both Plastilube® Brake Grease and Mobilgrease 28 are medium-consistency greases which will remain stable and serviceable in this application for many years to come.

Recommended Solvents

Some type of cleaning solvent will be needed to remove the old grease from the various components of the BH-PRE centering nosepiece. 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 MSDS sheet 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 (isopropyl alcohol or 409 Cleaner may be safely used to clean most painted surfaces). Additionally, many solvents will dissolve or damage plastic parts. Do not allow untested solvents to contact the plastic positioning knobs or X-Y positioning racks, as these parts may be damaged by exposure to these solvents. 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 the 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.

Before Starting with the Overhaul

Before beginning the removal and teardown of the BH-PRE nosepiece assembly, perform the following.

Remove the Objectives from the Nosepiece

Before beginning the teardown of the BH-PRE modular centering nosepiece assembly, remove all of the objectives from the revolving turret and store them someplace where they will be protected from physical damage, dust, and debris.

Label Parts for Identification and Reassembly

During the teardown of the BH-PRE modular centering nosepiece assembly, be sure to bag and tag the various parts as they are removed, to prevent their loss and to facilitate their proper identification during the reassembly process.

The BH-PRE Modular Centering Nosepiece

Figure 2 shows the BH-PRE modular centering nosepiece assembly used on the Olympus BHA-P, BHSP, and BHTP microscope stands.



Figure 2 – The BH-PRE modular centering nosepiece

The BH-PRE modular revolving nosepiece assembly consists of a four-position turret assembly, which is made up of an inner stationary base, an outer revolving turret with three adjustable objective mounts, miscellaneous parts and a protective cover. Attached to the turret assembly is a machined dovetail slide, for mounting the BH-PRE onto the arm of the microscope stand (see Figure 3).

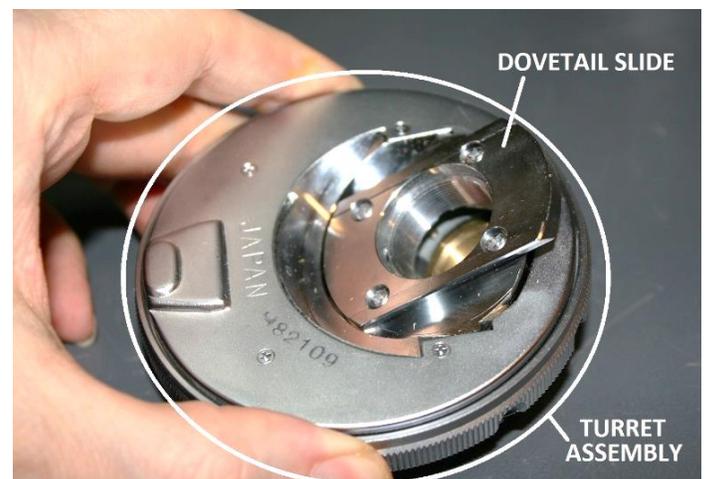


Figure 3 – Basic components of the BH-PRE

The turret assembly has four objective-mounting positions, one of which is referred to as the fixed mount, since it is physically fixed to the revolving turret, and the remaining three, which are referred to as the centering mounts, since they are floating relative to the revolving turret, and their positions may be adjusted to obtain proper centering, relative to the fixed mount. The positioning of each of the three centering mounts can be adjusted via a pair of orthogonal centering screws located on the knurled outer perimeter of the revolving turret, near each of the three floating objective carriers (see [Figure 4](#)).

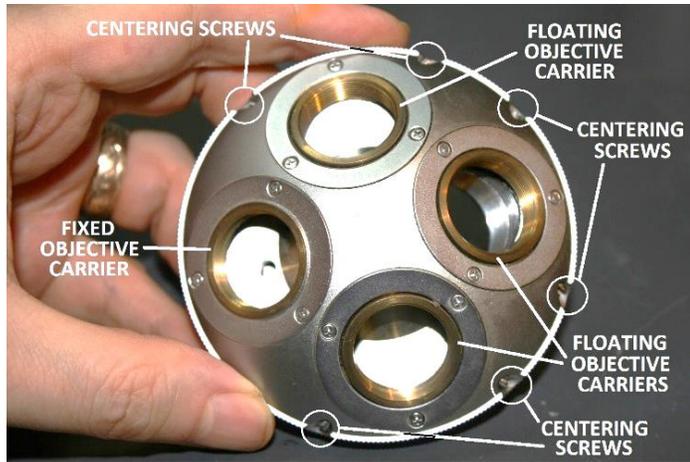


Figure 4 – Objective-mounting and centering parts

Servicing the BH-PRE Nosepiece Assembly

The procedure to disassemble, clean/regrease, and reassemble the BH-PRE modular centering nosepiece assembly is detailed in the following sections.

Remove the Dovetail Slide

The dovetail slide attaches to the stationary base of the turret assembly via four M2.6X5 pan-head screws. Use a suitable JIS screwdriver to remove these four M2.6X5 screws (see [Figure 5](#)) and then remove the loose dovetail slide from the turret assembly (see [Figure 6](#)).

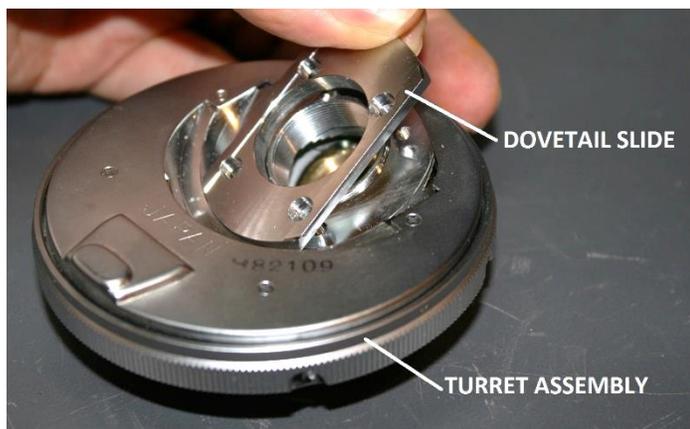


Figure 5 – Remove four screws securing the dovetail slide

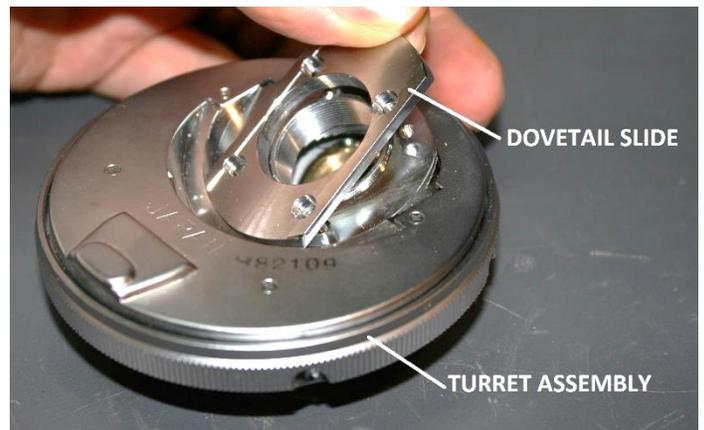


Figure 6 – Remove the dovetail slide

Remove the Cover from the Turret Assembly

Use a suitable JIS screwdriver to remove the four M2X3 countersink screws securing the protective cover (see [Figure 7](#)) and remove the protective cover from the turret assembly (see [Figure 8](#)).



Figure 7 – Remove screws securing the cover in place



Figure 8 – Remove the protective cover

[Figure 9](#) shows a view of the turret assembly, after the protective cover has been removed. This image identifies the names of the various components of the

turret assembly, which are referenced throughout the remainder of this document.

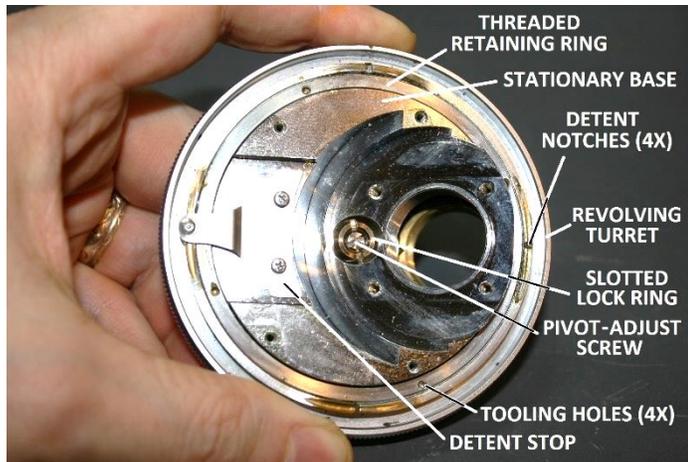


Figure 9 – The turret assembly (without cover)

Remove the Objective-Centering Screws

Use a suitable slotted screwdriver (or alternatively, use the Olympus centering wrenches that were supplied with the BH-PRE modular centering nosepiece) to remove the six headless objective-centering screws from the holes in the knurled outer perimeter of the revolving turret (see Figure 10).

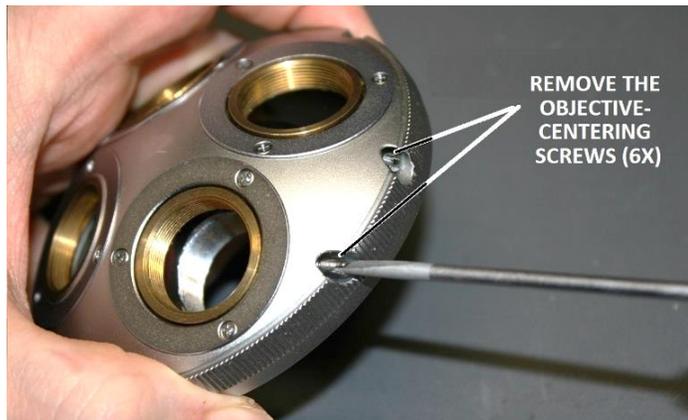


Figure 10 – Remove the objective-centering screws

Remove the Mechanical Detent Stop

Use a suitable JIS screwdriver to remove the two M2x4 pan-head screws securing the mechanical detent stop plate onto the stationary base of the turret assembly (see Figure 11). These small screws are staked in place with adhesive and can be surprisingly stubborn to remove, so be sure to use the proper JIS screwdriver to prevent damaging the screw heads. It will also help to thoroughly heat the screws with a heat gun before attempting to loosen them. Once the screws start to loosen, back them out a bit and apply a bit of penetrating oil (item 7 of Appendix 1) to the threads, then run them back in again to draw the oil into the

tapped holes. Allow the oil to work for a bit then proceed remove the screws.

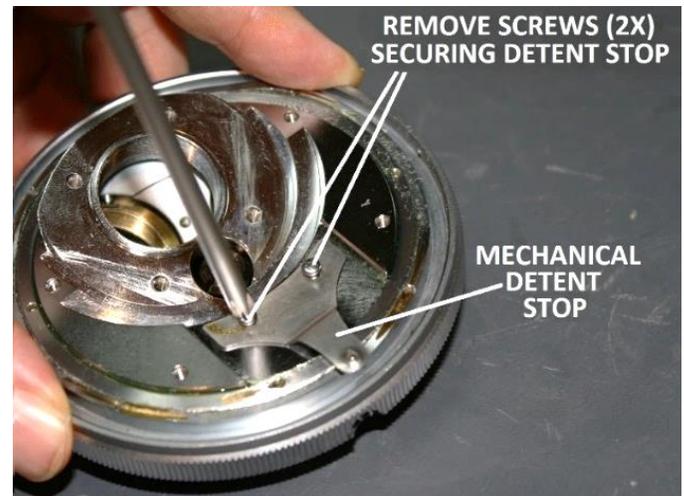


Figure 11 – Remove screws securing the detent stop

Remove the loose mechanical detent stop from the stationary base (see Figure 12).



Figure 12 – Remove the mechanical detent stop

Remove Lock Ring for Pivot-Adjustment Screw

The slotted lock ring for the pivot-adjustment screw (see Figure 9) can be difficult to remove unless the proper tool is used. Do not attempt to remove the slotted lock ring and pivot-adjustment screw unless you have access to such a tool, since the slot in the lock ring will likely be damaged if you use an improper tool, making removal of the lock ring much more difficult¹. A suitable tool for this task can be easily made by filing or grinding a relief notch for the pivot-adjustment screw in the center of the blade of a large slotted screwdriver, as shown in Figure 13. Note that if you decide to make such a tool, be sure that the tip of the screwdriver you select has a blade width matching the outer diameter of

¹ Don't even think about using a pair of needle-nose pliers to loosen the slotted lock ring. It will end badly if you do this. Don't ask me how I know this.

the slotted lock ring and that the thickness of the blade is such that it will seat fully into the slot of the slotted lock ring.



Figure 13 – Tool to remove the slotted lock ring

Loosen and Remove the Slotted Lock Ring

Before attempting to loosen the slotted lock ring, the revolving turret must first be locked in position relative to the stationary base, to allow for sufficient torque to be applied to the slotted lock ring so that it can be broken loose and removed. A suitable method to lock the revolving turret in place is to first spin the revolving turret until the bore in the stationary base aligns with the fixed (i.e., non-centering) objective-mounting hole in the revolving turret. With these holes aligned, find a small screwdriver with a handle of the appropriate size to fit into the holes, and insert the screwdriver into the holes such that the handle drops into the bores (see Figure 14). This will prevent the revolving turret from moving relative to the stationary base while torque is being applied to loosen the slotted lock ring, without causing any damage to the fragile brass threads in the fixed objective mount.



Figure 14 – Insert screwdriver into bores to lock turret

While firmly holding the turret assembly in one hand (by gripping the knurled outer perimeter of the revolving turret) use the slotted screwdriver with the notched tip (see Figure 13) to loosen the slotted lock ring that is securing the pivot-adjustment screw to the stationary base (see Figure 15). Be very careful to prevent the tip of the tool from slipping out of the slot in the lock ring, or the slot will be damaged, making removal more difficult.

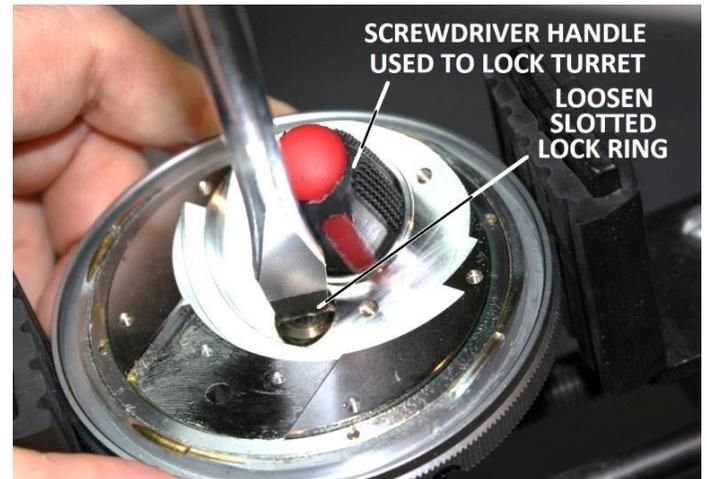


Figure 15 – Loosen the slotted lock ring

Once the slotted lock ring has been loosened, remove the screwdriver handle from the bores in the revolving turret and the stationary base (which is locking the revolving turret to the stationary base) to get it out of the way. Unscrew and remove the slotted lock ring from the pivot-adjustment screw (see Figure 16).



Figure 16 – Remove the loosened slotted lock ring

Remove the Pivot-Adjustment Screw

With the slotted lock ring removed, use a suitable slotted screwdriver to unscrew and remove the pivot-adjustment screw from the center bore of the stationary base (see Figure 17). There is a 1/4" bearing ball in the center bore of the stationary base, beneath

the pivot-adjustment screw. Do not allow this bearing ball to fall out or it may become lost.



Figure 17 – Remove the pivot-adjustment screw

Remove the Center-Pivot Bearing Ball

Use tweezers or other suitable tool to remove the 1/4" bearing ball from the center bore of the stationary base (see Figure 18).



Figure 18 – Remove the center-pivot bearing ball

Remove the Threaded Retaining Ring

The stationary base is held inside the recess of the revolving turret by the threaded retaining ring (see Figure 9). Place the turret assembly into a suitable work vise and use a heat gun to thoroughly heat the turret assembly to soften the internal grease. Then use a center punch or nailset tool to loosen the threaded retaining ring by placing the tip of the tool into one of the four tooling holes in the threaded retaining ring (see Figure 9) and driving the threaded retaining ring counter-clockwise by carefully tapping the tool with a small hammer or mallet (see Figure 19). Be careful and do not accidentally put the center punch or nailset tool into one of the four detent notches in the revolving turret, instead of into one of the four tooling holes in the threaded retaining ring, or the revolving turret will

be irreparably damaged when the punch is struck by the mallet.



Figure 19 – Loosen the threaded retaining ring

Continue loosening the threaded retaining ring and remove it, being careful that the perimeter bearing balls beneath the threaded retaining ring do not fall out and become lost in the process (see Figure 20).



Figure 20 – Remove the threaded retaining ring

Remove the Perimeter Bearing Balls

Carefully remove the 3/32" bearing balls (there are 86 of them) from the perimeter of the stationary base. A small magnet can come in handy here (see Figure 21).



Figure 21 – Remove the perimeter bearing balls

Remove the Stationary Base from the Turret

Once the perimeter bearing balls have been removed, lift the stationary base free of the recess in the revolving turret and remove it (see [Figure 22](#)).



Figure 22 – Lift and remove the stationary base

Remove the Floating Objective Carriers

Use a suitable JIS screwdriver to remove the three M2X4 pan-head screws securing the flat retaining ring holding one of the three floating objective carriers in place on the revolving turret (see [Figure 23](#)) and remove the flat retaining ring (see [Figure 24](#)).



Figure 23 – Remove screws securing flat retaining ring



Figure 24 – Remove flat retaining ring

Carefully remove the floating objective carrier from the mounting recess in the revolving turret (see [Figure 25](#)).

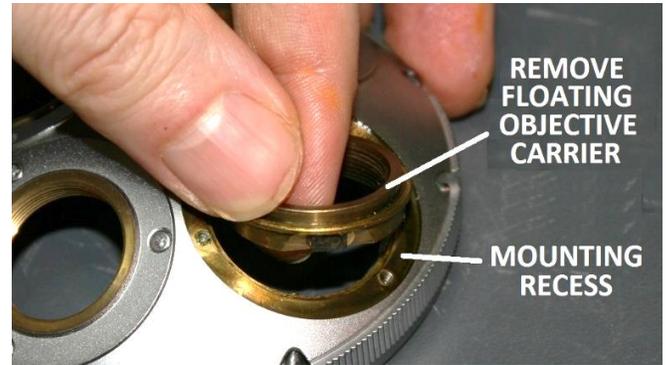


Figure 25 – Remove the floating objective carrier

Repeat the above procedure to remove the two remaining floating objective carriers.

Remove the Fixed Objective Carrier

Note: It is not necessary to remove the fixed objective carrier to perform this service. The removal and reassembly is shown here for the sake of completeness.

FOR REFERENCE: Use a suitable JIS screwdriver to remove the three M2X4 pan-head screws securing the fixed objective carrier into place on the revolving turret (see [Figure 26](#)) and remove the fixed objective carrier (see [Figure 27](#)).



Figure 26 – Remove screws securing fixed objective carrier



Figure 27 – Remove the fixed objective carrier

Remove the Centering Plungers and Springs

Use tweezers or needle-nose pliers to carefully grasp the three centering plungers protruding from the center hub of the revolving turret and remove them, along with their associated springs (see [Figure 28](#)). If the plungers are not protruding far enough from the hub to be gripped with the tweezers or needle-nose pliers, it is because the grease has become very thick and is preventing the plunger spring from extending the plungers. If this is the case, drip a bit of a suitable solvent (e.g., acetone) into the plunger bores and heat the hub of the revolving turret with a heat gun until the grease loosens and the plungers pop out and can be removed.

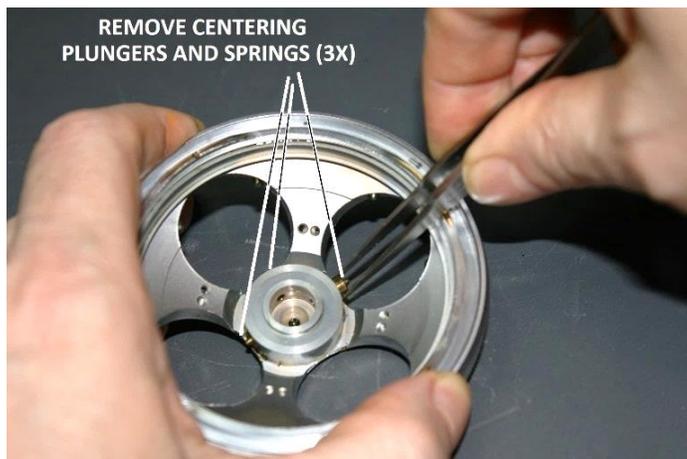


Figure 28 – Remove the centering plungers and springs

Clean Grease from the Various Components

Use a suitable solvent (e.g., acetone) to thoroughly clean all of the old grease from the various components of the BH-PRE modular centering nosepiece assembly.

Grease the Plunger Bores in the Hub

Use a toothpick to apply a suitable grease (item 6 of [Appendix 1](#)) into the three plunger-bore holes in the center hub of the revolving turret (see [Figure 29](#)).



Figure 29 – Grease the plunger bores in the center hub

Insert Plungers and Springs into Bores in Hub

Use tweezers or needle-nose pliers to carefully reinsert the three plunger extension springs into the three freshly greased bores in the center hub of the revolving turret. Next, insert the three plungers into the bores, on top of the plunger extension springs (see [Figure 30](#) and [Figure 31](#)).



Figure 30 – Reinstall plungers and springs into the hub



Figure 31 – Plungers and springs installed into hub

Reinstall the Floating Objective Carriers

Apply a light coating of grease (item 6 of [Appendix 1](#)) to the flat bearing surfaces for the floating objective carriers in the three mounting recesses of the revolving turret and to the flat bearing surfaces of the three floating objective carriers (see [Figure 33](#)). The mounting recesses for the floating objective carriers can be identified by the presence of the two tapped, orthogonal holes in the outer perimeter of the revolving turret, for the centering screws. The mounting recess for the fixed objective carrier does not have these two orthogonal holes, since this objective carrier is fixed in place and therefore does not have centering screws (see [Figure 32](#)).

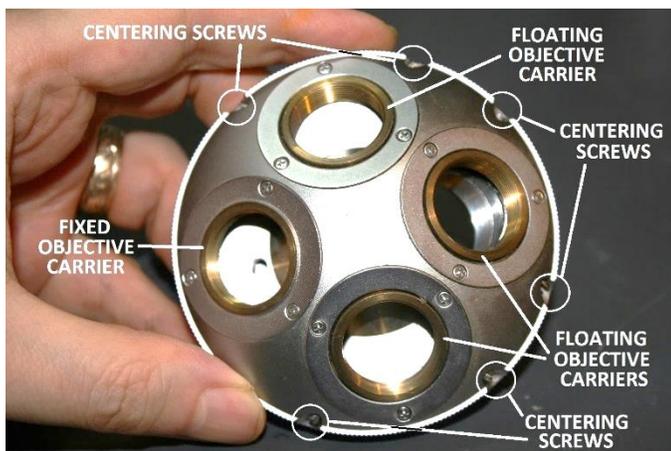


Figure 32 –The fixed and floating objective carriers



Figure 33 – Lightly grease these bearing surfaces

Engage the V-notch of one of the floating objective carriers with the pointed tip of the plunger in one of the floating mounting recesses, and carefully press the floating objective carrier to depress the plunger and seat it into the mounting recess (see [Figure 34](#)). When properly positioned, the V-notch in the objective carrier will be engaged with the plunger tip and the two flat surfaces on the objective carrier will be aligned with the two tapped, orthogonal holes for the centering screws in the knurled outer perimeter of the revolving turret.



Figure 34 – Insert carrier into position in mounting recess

Hold the floating objective carrier firmly in place in the mounting recess of the revolving turret (see [Figure 35](#))

and place one of the flat retaining rings over the floating objective carrier, aligning the three holes in the flat retaining ring with the tapped holes in the mounting recess (see [Figure 36](#)).



Figure 35 – Hold carrier in place in the mounting recess

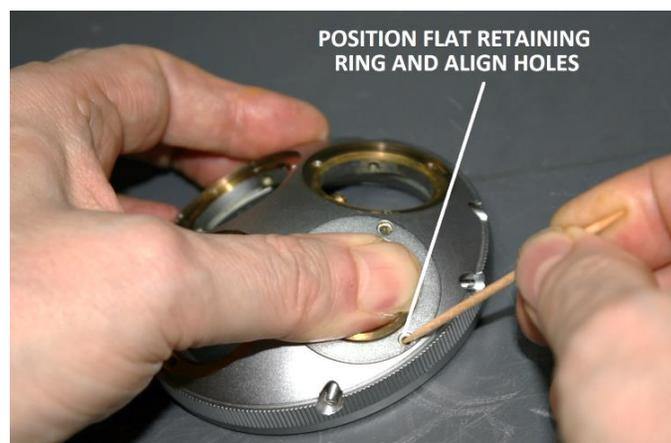


Figure 36 – Position flat retaining ring and align holes

Use a suitable JIS screwdriver to reinstall three M2X4 countersink screws to secure the flat retaining ring in position over the floating objective carrier in the mounting recess (see [Figure 37](#)).



Figure 37 – Secure flat retaining ring for floating carrier

Repeat the assembly procedure detailed above to reinstall the two remaining floating objective carriers into the two vacant floating-objective mounting recesses in the revolving turret.

Reinstall the Fixed Objective Carrier

Once the three floating objective carriers have been reinstalled, position the fixed objective carrier into the remaining (fixed) mounting recess in the revolving turret (see [Figure 38](#)), aligning the three holes in the carrier with the tapped holes in the mounting recess.



Figure 38 – Position fixed carrier into the mounting recess

Use a suitable JIS screwdriver to reinstall three M2X4 pan-head screws to secure the fixed objective carrier into the fixed mounting recess of the revolving turret (see [Figure 39](#)).



Figure 39 – Reinstall screws to secure the fixed carrier

Reinstall Stationary Base into Revolving Turret

Hold the stationary base such that the center pivot is facing downwards, and then lower the stationary base into the recess of the revolving turret (see [Figure 40](#)).



Figure 40 – Reinstall stationary base into revolving turret

Apply Ring of Grease for the Perimeter Balls

The next step is to apply grease into the ring in which the perimeter bearing balls will be placed. Carefully apply a ring of grease (item 6 of [Appendix 1](#)) into the channel formed between the outer perimeter of the stationary base and the inner perimeter of the recess in the revolving turret (see [Figure 41](#)). Do not apply too much grease here, to minimize the squeeze-out that will occur when the threaded retaining ring is reinstalled to hold the stationary base into the recess of the revolving turret.



Figure 41 – Apply ring of fresh grease for the bearing balls

Reinstall the Perimeter Bearing Balls

Use tweezers to carefully set the 3/32" bearing balls (item 3 of [Appendix 1](#)) into the grease ring (see [Figure 41](#)), placing the 86 bearing balls as close together as possible as you proceed (see [Figure 42](#)).



Figure 42 – Place the bearing balls into the ring of grease

Reinstall the Threaded Retaining Ring

Loosely engage the threads of the threaded retaining ring with the threads in the revolving turret (see [Figure 43](#)), being very careful to not cross-thread the retaining ring in the process.



Figure 43 – Engage the threaded retaining ring

Use a suitable lens-spanner tool with pointed tips (item 5 of [Appendix 1](#)) to tighten the threaded retaining ring, by placing the two points of the lens-spanner tool into a pair of opposing tooling holes on the threaded retaining ring and rotating the ring clockwise until it is tightened (see [Figure 44](#)). Alternatively, you can use a center punch or nailset tool to snug the threaded retaining ring by placing the tip of the tool into one of the four tooling holes and lightly tapping the tool with a small hammer or mallet to drive the threaded retaining ring clockwise until it has been tightened.

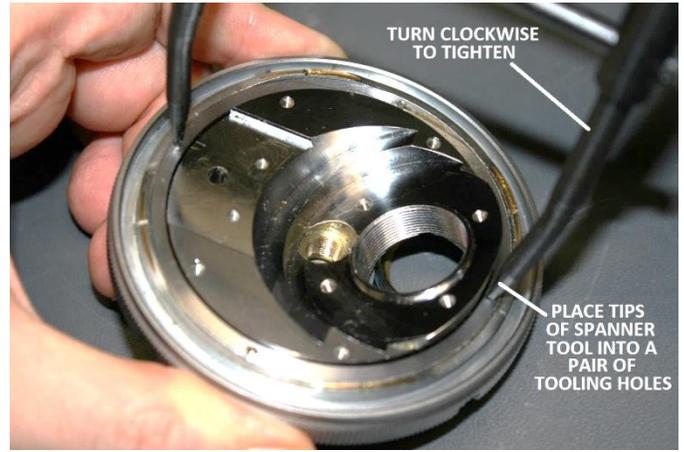


Figure 44 – Tighten the threaded retaining ring

While holding the stationary base in one hand, spin the revolving turret multiple times in both directions with the other hand, to drive out any excess grease from beneath the threaded retaining ring. Use dry cotton swabs as necessary to remove any grease squeeze-out (see [Figure 45](#)). Do not use a solvent here, otherwise the solvent may run into the revolving turret mechanism and foul the grease within.



Figure 45 – Remove grease squeeze-out with dry swabs

Apply Grease to the Center-Pivot Bore

Apply a small amount of grease (item 6 of [Appendix 1](#)) into the center-pivot bore of the stationary base for the 1/4" bearing ball (see [Figure 46](#)).



Figure 46 – Apply grease to the center-pivot bore

Reinstall the Center-Pivot Ball into the Bore

Now that the center-pivot bore has been greased, reinstall the ¼" bearing ball (item 4 of [Appendix 1](#)) into the freshly greased center-pivot bore. The grease will hold the center-pivot bearing ball in the proper position during subsequent reinstallation of the pivot-adjustment screw (see [Figure 47](#)).



Figure 47 – Place bearing ball into the center-pivot bore

Apply Grease to Top of the Center-Pivot Ball

Apply a small amount of grease (item 6 of [Appendix 1](#)) onto the exposed top of the ¼" bearing ball in the center-pivot bore before reinstalling the pivot-adjustment screw (see [Figure 48](#)).



Figure 48 – Apply grease to the top of the bearing ball

Reinstall the Pivot-Adjustment Screw

Use a suitable slotted screwdriver to reinstall the pivot-adjustment screw into the threaded bore in the center of the stationary base (see [Figure 49](#)). Carefully snug the pivot-adjustment screw just to the point where a slight bit of resistance is felt. Test the feel of the revolving turret. If the motion feels rough, back the

screw off a bit until it feels smooth. Leave the pivot-adjustment screw in this position.



Figure 49 – Reinstall the pivot-adjustment screw

Reinstall the Slotted Lock Ring

Without allowing the pivot-adjustment screw to rotate, carefully engage the threads of the slotted lock ring with the pivot-adjustment screw (see [Figure 50](#)) and tighten the slotted lock ring until it is just slightly snug.



Figure 50 – Reinstall the slotted lock ring

Spin the revolving turret until the fixed objective mount in the revolving turret aligns with the bore in the stationary base. Insert a suitably sized screwdriver handle into these bores to lock the revolving turret relative to the stationary base. Without allowing the pivot-adjustment screw to rotate, use a suitable tool (see [Figure 13](#)) to snug the slotted lock ring down to lock the pivot-adjustment screw in place (see [Figure 51](#)).



Figure 51 – Tighten the slotted lock ring

Verify the Feel of the Revolving Nosepiece

Hold the turret assembly by gripping the stationary base in one hand and spin the revolving turret with the other hand. The motion of the turret should not feel gritty, erratic, or excessively stiff. If it does, loosen the slotted lock ring, readjust the pivot-adjustment screw, and retighten the slotted lock ring as described above until the turret motion feels acceptable.

Clean Off Any Visible Grease

Use a suitable solvent (e.g., mineral spirits) and a clean rag or tissue to thoroughly clean any visible grease from the exterior of the turret assembly. Be careful while removing the excess grease, to prevent any of the solvent from dripping into the revolving turret mechanism and fouling the grease within.

Reinstall the Mechanical Detent Stop

Place the mechanical detent stop into position on the stationary base, aligning the two holes in the mechanical detent stop with the tapped holes in the stationary base (see [Figure 52](#)). Make sure the stop ball on the detent stop is facing downwards.



Figure 52 – Place the mechanical detent stop in position

Use a suitable JIS screwdriver to reinstall two M2X4 pan-head screws to secure the mechanical detent stop into place on the stationary base (see [Figure 53](#)).

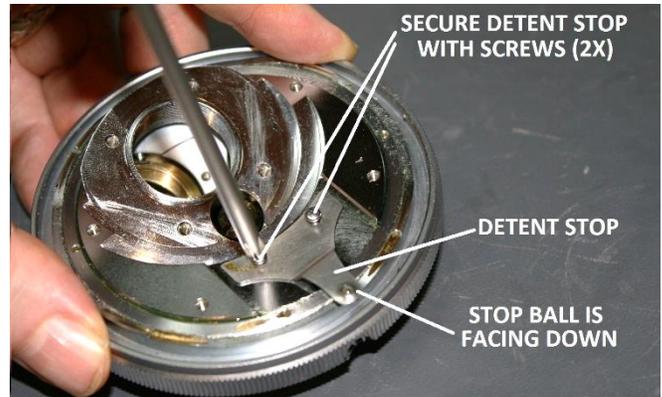


Figure 53 – Secure the detent stop with two screws

Apply Grease to the Mechanical Detents

Apply fresh grease (item 6 of [Appendix 1](#)) to the four mechanical detent notches in the revolving turret (see [Figure 54](#)). Be careful that you do not get grease anywhere else.

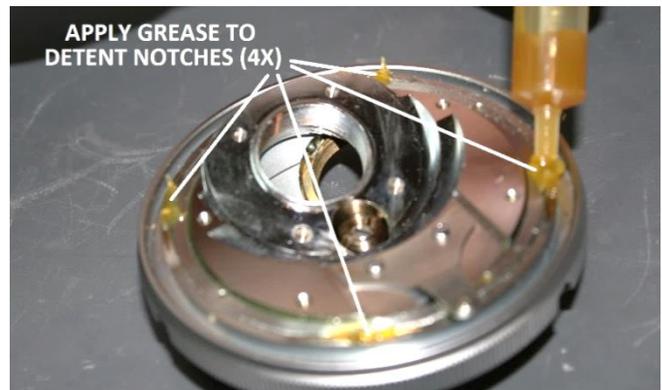


Figure 54 – Apply grease to the four detent notches

Reinstall the Protective Cover

Place the protective cover into position on the back side of the turret assembly, lining up the four holes in the protective cover with the tapped holes in the stationary base (see [Figure 55](#)).



Figure 55 – Position the cover on the turret assembly

Use a suitable JIS screwdriver to reinstall four M2X3 countersink screws to secure the protective cover onto the stationary base (see [Figure 56](#)).

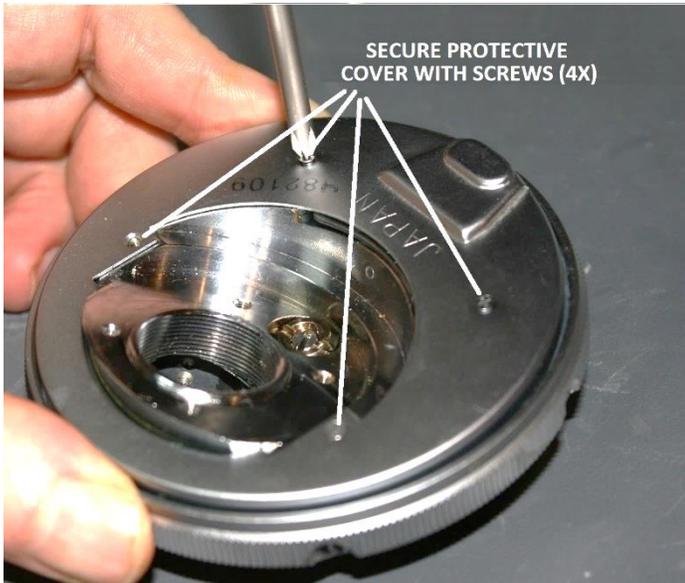


Figure 56 – Secure protective cover using four screws

Reinstall the Dovetail Slide

Place the machined dovetail slide into position on the back side of the turret assembly, lining up the four holes in the dovetail slide with the tapped holes in the stationary base (see [Figure 57](#)). Be sure to orient the dovetail slide such that the relief notch (see inset of [Figure 57](#)) is facing downwards and towards the slotted lock ring on the pivot-adjustment screw.



Figure 57 – Position dovetail slide onto stationary base

Use a suitable JIS screwdriver to reinstall four M2.6X5 pan-head screws to secure the machined dovetail slide onto the stationary base of the turret assembly (see [Figure 58](#)).

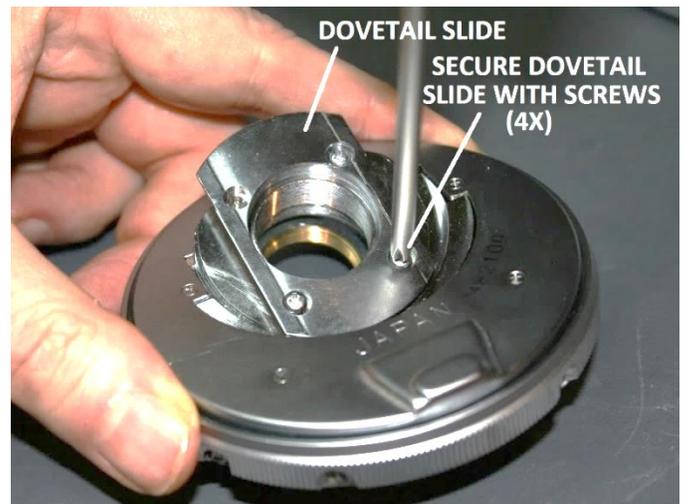


Figure 58 – Secure dovetail slide onto the stationary base

Reinstall the Objective-Centering Screws

Clean any dirt or grease from the threads of the six objective-centering screws and apply a bit of fresh grease (item 6 of [Appendix 1](#)) to the threads each one (see [Figure 59](#)). Wipe away any excess grease.



Figure 59 – Lightly grease threads of the centering screws

Use a suitable slotted screwdriver to reinstall the six objective-centering screws into the tapped bores on the knurled outer perimeter of the revolving turret (see [Figure 60](#)).



Figure 60 – Reinstall the centering screws

Ready for Service

The newly reconditioned BH-PRE modular centering nosepiece assembly is now ready to be put back into service (see [Figure 61](#)).



Figure 61 – BH-PRE is ready to be put back into service

Requirements for Periodic Maintenance

Periodic cleaning and application of fresh grease to the mechanical detent notches in the stationary base is necessary to minimize wear of the mechanical detents, thereby maximizing the useful service life of the BH-PRE modular centering nosepiece assembly. This can be easily accomplished by simply removing the protective cover, cleaning and regreasing the detent notches, and then reinstalling the protective cover per the procedures detailed in this document. The machined dovetail slide does not need to be removed to perform this periodic maintenance. If the BH-PRE modular centering nosepiece assembly sees heavy usage, this service should be performed on a six-month interval².

Problems with the Turret Assembly

A few problems with the turret assembly can sometimes be found in the reassembled nosepiece. The first will be seen if one or more of the mechanical detents are excessively worn. This will cause radial float of the turret in the affected objective positions, and these objectives will have trouble returning to and maintaining their proper index position. This can make it difficult to utilize some illumination types, such as phase contrast, since the phase annuli will not be able to hold an acceptable alignment due to variations in objective indexing.

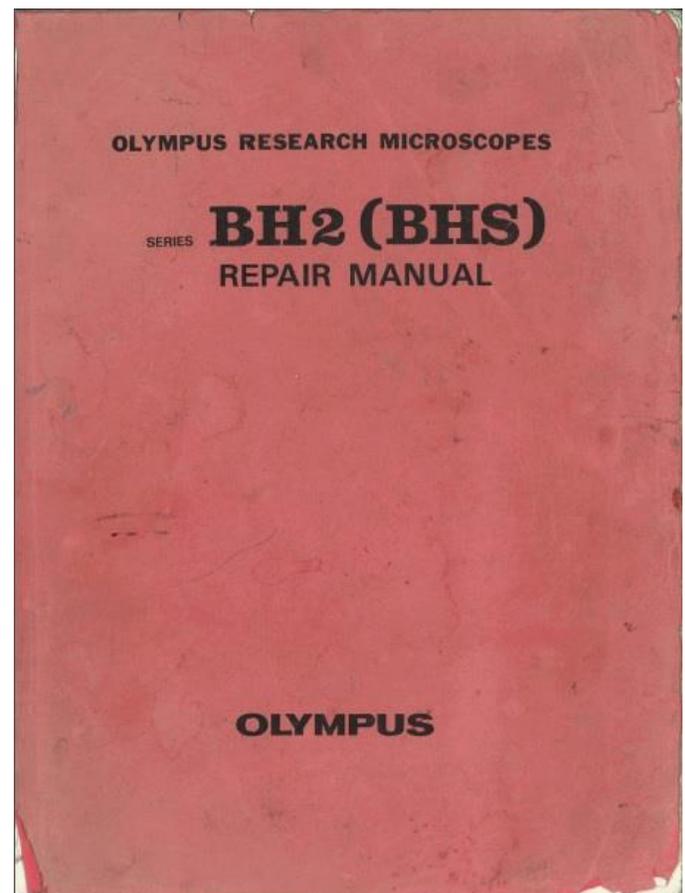
The other problem that may be seen is caused by overall float of the revolving turret, relative to the center point of the stationary base. If there is excess play in the center-pivot ball, such that the turret is not held in the exact center point, the whole turret may move slightly, resulting in poor objective centering, and all that that entails. This problem may be encountered if the threaded retaining ring has not been properly snugged down, or if the center pivot-adjustment screw has not been properly adjusted to remove the play in the center-pivot mechanism.

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.

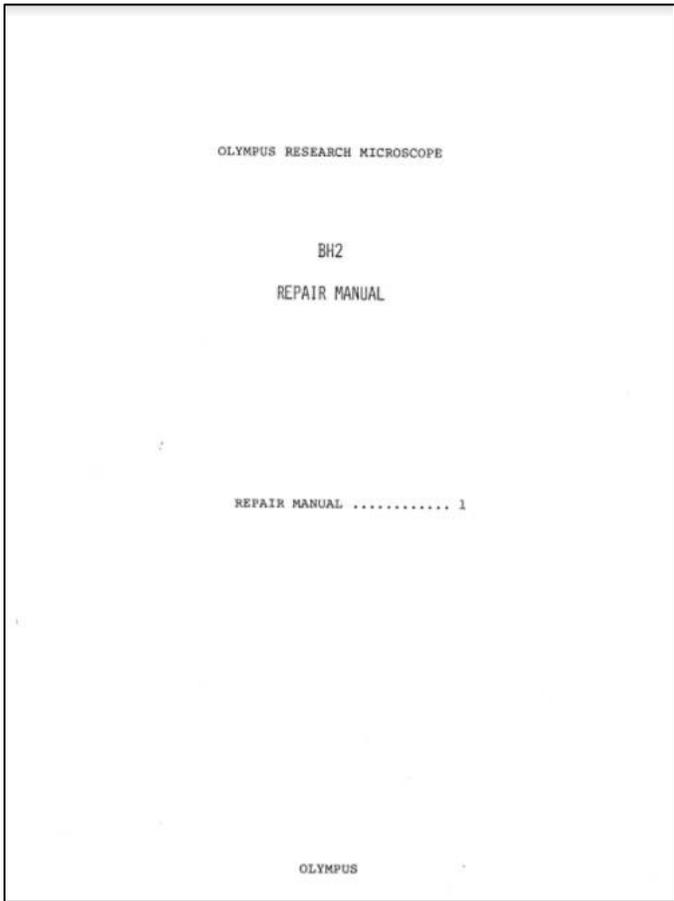
Original Olympus Documentation

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



Olympus Research Microscopes Series BH2 (BHS) Repair Manual

² Field experience has shown that even heavily used scopes (such as those used in hospitals and clinical lab settings), when lubricated on a six-month interval, can be expected to provide many years of trouble-free service.



Olympus Research Microscope BH2 Repair Manual

Appendix 1

Sources for Replacement Parts, Tools, and Supplies Referenced in this Document

Table 1 lists specific information for the various parts, tools, and supplies discussed in this document. The pricing and availability listed below is accurate as-of April 2021 but is subject to change without notice.

Item	Description	Manufacturer	Manufacturer Model #	Vendor	Vendor #	Price
1	Heat Gun, electric, 1500W	Warrior	---	Harbor Freight	56434	\$16.99
2	Screwdriver set, JIS, 4 pieces	Hozan	JIS-4	Amazon	---	\$21.40
3	Bearing balls, chrome steel, 3/32" G25, 100 count	various	---	Amazon	---	\$9.49
4	Bearing balls, chrome steel, 1/4", G25, 100 count	various	---	Amazon	---	\$5.20
5	Lens-spanner tool, pointed tips	various	---	Amazon	---	\$14.99
6	Brake Grease, Plastilube®, 75 cc	Plastilube®	ATE70015	Amazon	---	\$10.88
	Brake Grease, Plastilube®, 75 cc	Plastilube®	ATE70015	Autohausaz	1161688	\$4.85
	Mobilgrease 28, 13.7 oz	Exxon	MIL-PRF-81322	Amazon	---	\$22.73
7	Kroil Penetrating Oil, 8 Oz	Kano	---	Amazon	---	\$16.49

Table 1 – Parts, Tools, and Supplies

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

Vendor	URL	Local Phone	Toll Free	Fax	email
Amazon	www.amazon.com	---	---	---	---
Autohausaz	www.autohausaz.com	---	---	---	sales@autohausaz.com
Harbor Freight Tools	www.harborfreight.com	---	1-800-423-2567	---	---

Table 2 – Vendor Listing