
1.0 Introduction

Your Cambridge Instruments Galen™ III Professional Microscope is the most recent addition to our line of professional laboratory microscopes for the biological and medical sciences. Its exclusive design features, professional quality, and full range of accessories make it a truly versatile instrument for most laboratory applications.

Optional accessories allow you to adapt your Galen III Professional Microscope to Bright Field, Dark Field, Phase Contrast, Polarized Light, or Photomicrography.

The Galen III Professional Microscope is a member of the Cambridge Instruments family of quality microscopes, which includes the sophisticated StereoZoom®, and MicroZoom® Microscopes for college and laboratory use.

Cambridge Instruments is a world leading manufacturer of scientific and optical instrumentation, as well as quality ophthalmic instruments. The Galen III Professional Microscope and all our instruments are backed by our worldwide sales and service organizations.

2.0 Unpacking

Remove the microscope components from the packing carton and, before any of the packing material is discarded, check the components against the following standard equipment list:

1. Stand, which includes supporting arm, focusing mechanism, mechanical stage, nosepiece and mirror or integral illumination system.
2. Viewing head (monocular, binocular or triocular depending upon the model ordered).
3. Objectives as ordered.
4. Eyepiece(s) as ordered.

5. Abbe condenser with aperture diaphragm and swing-out filter holder (bright field models).
6. Blue filter.
7. Plastic cover.
8. Immersion oil.
9. Spare Lamp.

Optional accessory items such as phase contrast, dark field condenser, carrying case and camera accessories are not shipped as part of the standard equipment. These items are shipped in separate packages.

3.0 Preparation

3.1

Objectives

Remove the objective lens units from their plastic containers and attach to the revolving nosepiece holes, from the lowest magnification to the highest, in a clockwise fashion. Then move the 10X objective into working position. Always rotate the nosepiece by using the knurled nosepiece ring.

3.2

Viewing Head

Loosen the viewing head clamp screw a turn or two and carefully seat the head onto the microscope arm. Lock the head in any desired orientation by tightening the clamp screw.

3.3

Condenser

Loosen the condenser clamp screw a turn or two and insert the condenser from below. Position the condenser with the handle of the aperture diaphragm conveniently accessible. Tighten the condenser clamp screw finger-tight. To eliminate light irregularity when using low-power objectives such as 4X, and 10X, raise and lower the condenser using the condenser adjustment knob.

3.4

Filter

The filter holder is attached to the condenser by a pivot allowing you to swing the filter into or out of the light path, as desired. Swing the filter holder outward and, insert the filter.

3.5

Eyepieces

Place eyepiece(s) into eyepiece tube(s). The built-in eyeguards may be pulled out to reduce stray light. This completes assembly of the microscope.

4.0 Operation

Plug the microscope power cord into a suitable grounded electrical outlet. A grounded 3-wire cord is provided.

CAUTION

As a safety precaution, the power cord has been grounded to the microscope base. Never use a 2-prong adapter between the power cord and the power source; it will render this feature ineffective.

Move the illuminator switch to the "on" position. To obtain the desired illumination slide the light control rheostat. The degree of light intensity depends on individual conditions such as specimen contrast, objective magnification, eye accommodation, etc. Too little or too much light is not recommended. The "energy saving" illuminator indicator lamp remains lit when the illuminator is in use.

4.1

Auto Focus Stop

Before focusing, turn the auto focus stop knob counterclockwise for free stage motion. After focusing, if the auto focus stop is required (to prevent the stage from moving past a certain point), tighten the auto focus knob by turning it clockwise.

4.2

Binocular & Triocular Head

Setting Interpupillary Distance - Using two hands, grasp the head face plate moving the eyepiece tubes together or apart until the full field of view is simultaneously visible through both eyepieces. An improper adjustment will cause operator fatigue and will upset the objective parfocality. Once the proper setting is achieved, note the reading on the interocular scale. Rotate the diopter ring on the right eyepiece tube to the same reading as noted on the interocular scale. Close the left eye, or cover the left eyepiece with opaque material, and carefully focus the microscope with the fine adjustment knob. Close the right eye, and without touching either adjustment knob, rotate the left diopter ring until the specimen is in sharp focus for the left eye.

If the interocular and diopter ring adjustments have been made properly, you will:

- Note the same state of focus in the right and left eyepieces whenever any specimen is brought into focus with either the coarse or fine adjustment knob.
- Comfortably see the full field of view through both eyepieces while holding the head in a fixed position.
- Need only a fine adjustment "touch-up" to bring the specimen into sharp focus as one objective on the nosepiece is exchanged for another.

If these effects are not observed, go back and repeat the adjustments. To eliminate the need for repeating these adjustments each time you use the microscope, memorize the scale values. Wearers of eyeglasses with strong corrections may require slightly different optimum settings for the diopter rings from those obtained by the above procedure. The previous instructions assume that both eyes have about the same degree of correction. However, if you have one eye requiring much greater correction than the other, use the following procedure: Set the diopter ring on the eyepiece tube which corresponds to your "strong" eye (the one which is best or closest to normal) to the reading noted on the interocular scale. Close the "weak" eye and carefully focus the microscope with the fine adjustment knob. Now close the "strong" eye and, without touching either adjustment knob, rotate the diopter corresponding to your "weak" eye until the specimen is in sharp focus.

4.3 Focusing

Coarse Adjustment - Turn the coarse adjustment knob counterclockwise. The stage will stop at the bottom of its travel. Turning the knob in the opposite direction will raise the stage.

Place a specimen slide on the center of the stage. Using a 10X objective and a 10X eyepiece for preliminary observation, bring the specimen into focus with the coarse adjustment knob.

CAUTION

To prevent damage to the specimen and objective, use the following focusing procedure:

- Look at the slide directly (not through the eyepieces) and raise the stage by slowly turning the coarse adjustment knob clockwise. Continue raising the stage until the cover glass nearly touches the objective or the stage reaches its upper limit.
- Look at the specimen through the eyepieces and turn the coarse adjustment knob counterclockwise to lower the stage, bringing the specimen into focus.

Then adjust the autofocus stop knob as described in Section 4.1. The other objectives will remain in parfocality with no danger of touching the specimen slide. If the stage moves too freely, using the coarse adjustment tension knob, adjust the tension, turning clockwise to tighten, counter-clockwise to loosen.

4.4 Blue Daylight Filter

If the light is excessively yellow, place the blue daylight filter in the condenser filter holder.

4.5 Mechanical Stage

The specimen movement range is about 50mm x 75mm. This is accomplished by rotating the mechanical stage control knobs.

Reading vernier:

"m" is the main scale, "n" is the vernier scale

$$1 \text{ division of } n = \frac{9 \text{ divisions of } m}{10}$$

Note Fig. 1. The n scale is positioned between 12mm and 13mm of m. Find the nearest point where m and n are aligned to determine the added millimeter division.

Example:

The figure shows 20 of m is aligned with 8 of n, which is 0.8mm. Therefore, the reading is 12mm of m plus 0.8mm of n, or 12.8mm. This reading is the sum of the m indication, plus the n reading at the closest aligned point.

CAUTION

Retract the mechanical stage fully when you've finished using the microscope. If the mechanical stage is fully extended either way, it is possible to damage the stage when attempting to put the microscope into the carrying case.

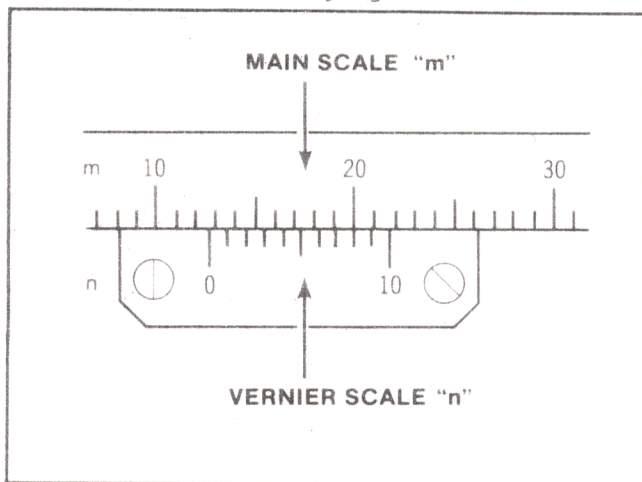


Fig. 1

4.6 For Best Results

If you have carefully followed the preceding instructions, the microscope can be operated over a wide range of conditions with a minimum of adjustments. There are variables, however, which you might want to change from specimen to specimen.

- The light level should be adjusted to the lowest level compatible with comfortable viewing; this will greatly extend the life of the lamp. The optimum lamp setting will change depending upon specimen density and objective magnification.
- When specimens of inherently low contrast are examined, contrast usually can be improved by reducing the condenser numerical aperture (NA) to about 75 percent of the objective NA. This is best

accomplished by removing one of the eyepieces and looking down the eyepiece tube at the illuminated back aperture of the objective. While observing this aperture, close down the condenser aperture diaphragm until the size of the objective back aperture is reduced to about 75 percent of its original size.

- Specimens with contrast so low that the specimen is invisible or barely visible often can be made visible by closing down the condenser aperture diaphragm to a pinhole size.
- An alternate and often superior method of improving contrast is to use oblique illumination.

5.0 Maintenance

Your Galen III Microscope has been engineered for long life with a minimum of maintenance required. In general, routine maintenance on your part is limited to keeping the microscope clean. Two important steps to remember are:

- Never leave the microscope with any of the objectives or eyepieces removed.
- Always protect the microscope with the dust cover when not in use.

5.1 Cleaning

Accumulated dirt on the metal surface should be cleaned with a damp cloth. If this is inadequate, a mild soap solution should be used.

The outer surfaces of the optics should be inspected from time to time for dirt and dust. Dust is best removed by an air stream from a rubber air bulb. Remove more persistent dirt with a soft cloth or cotton swab dampened in a mild solution of soap and water, alcohol, or as a last resort, xylol. A small amount of absorbent cotton wound on the end of a tapered stick makes a handy tool for cleaning recessed optical surfaces. Avoid excessive use of solvents as this may cause problems with cemented optics, or the flowing solvent may pick up grease from the mounts, making cleaning more difficult.

Clean immersion objectives immediately after use by removing the oil with lens tissue or a clean soft cloth.

Occasionally the underside of the mechanical stage fingers may become coated with immersion oil and require cleaning.

This is accomplished by covering $\frac{1}{2}$ or more of the condenser aperture with an opaque piece of paper.

- Both of these methods of contrast enhancement introduce diffraction effects which reduce the ability of the microscope to resolve the fine details of the specimen and are not recommended where a critical examination of the specimen is required. Instead, the technique of phase contrast microscopy should be employed.

Accessories for converting your standard Galen III Microscope into a phase contrast microscope are available.

Detach the mechanical stage by removing the three screws on the underside of the stage table. When cleaning the oil from the underside of the stage fingers, be careful not to remove or contaminate the lubricant in the stage slide ways. Reinstall the mechanical stage on the stage table with great care to prevent damage to the slide way, rack, or pinion.

5.2 Lamp Replacement

The only component in your Galen III Microscope which requires periodic replacement is the illuminator lamp. Before replacement, UNPLUG the instrument. Move the mechanical stage to the extreme right position and carefully place the microscope on its left side. Open the lamp window in the bottom plate by pulling the window knob. After the lamp has cooled, carefully remove it from its socket and replace with a new lamp. When replacing the Tungsten-Halogen lamp, be careful not to touch the new lamp with your fingers.

CAUTION

Never operate the microscope illuminator unless the lamp window is securely in place.

5.3 Service

All optical and mechanical equipment requires periodic servicing to keep it performing properly and compensate for normal wear. Anticipating this need by establishing a schedule of regular preventive maintenance will help to assure long life and sustained optimum performance by your instrument. It will also help prevent unexpected trouble and the necessity of having the instrument serviced at inconvenient times.

Such a program of planned preventive maintenance, involving a thorough cleaning, checking and adjustment of mechanisms is recommended.

This work should be performed by qualified personnel with the proper training and equipment. Cambridge Instruments, or your Cambridge Instruments service dealer can arrange this service. Should unexpected trouble be experienced with your instrument — proceed as follows:

- Contact your Cambridge Instruments dealer. He may be able to suggest simple remedies to correct the apparent difficulty without having to send the instrument out for servicing.

- If however, it becomes necessary to return your instrument, pack the microscope carefully in a crush resistant carton with at least three inches of shock absorbing material surrounding it to prevent in-transit damage. Should a suitable carton not be available, one may be ordered from the factory.
- A detailed letter should be included* in the shipping carton, preferably fastened to the instrument, describing the trouble experienced. This information will enable the service technician to make required repairs promptly.

*Please mark on the shipping container **FIRST CLASS LETTER ENCLOSED**. First Class postage must be paid only on the letter. The carton will be accepted at standard package rates.