

**BAUSCH & LOMB**

**VERTICAL ILLUMINATOR**

for

**OPAQUE SPECIMENS**


***Reference Manual***

**BAUSCH & LOMB**


OPTICAL COMPANY



ROCHESTER 2, N. Y.



## Guarantee ★



From raw materials to final inspection, Bausch & Lomb products are made under the rigid control of mechanical and optical experts. The formulae for the glass used in optical elements and the design and manufacture of both optical and mechanical parts contribute to one purpose—a product which will afford you the highest satisfaction.

If a product of our manufacture proves defective in material or workmanship, an appropriate adjustment will be made. This guarantee does not cover damage in transit, damage caused by carelessness, misuse or neglect, or unsatisfactory performance as a result of conditions beyond our control.

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# Bausch & Lomb Vertical Illuminators

Bausch & Lomb engineers have designed your Vertical Illuminator to provide uniform and controlled illumination for all powers so that top image quality may be fully realized.

Each model is easily used with any standard biological, metallurgical, or polarizing microscope.

Given the proper care and treated with respect, your Vertical Illuminator will give you a lifetime of satisfactory service.

## Description

The three models of Vertical Illuminators supplied differ in the arrangement of the reflector elements and/or the method of attaching the objective.

## DeLuxe Models

These incorporate field and aperture diaphragms; plano, clear glass reflector for full aperture illumination and a prism reflector for half aperture illumination.

*No. 31-34-42* with quick change nosepiece to accept objectives mounted on non-centerable objective handles.

*No. 31-34-43* with quick change nosepiece to accept objectives mounted on individually centerable objective carriers.

## Simplified Model

*No. 31-34-90*, similar in appearance to the DeLuxe model, but with plano clear glass reflector only for full aperture illumination. Objectives screw directly into the illuminator body.

Depending upon the equipment order, (indicated by -11 or -12 following catalog number) a fixed, or

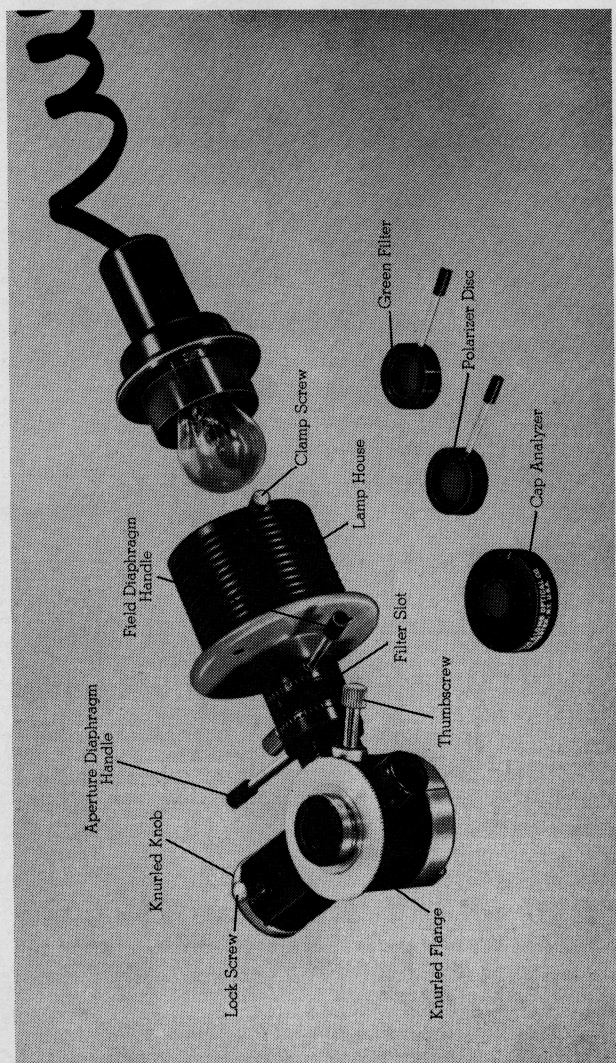


Figure 1

adjustable-voltage transformer is supplied through which the lamp of the vertical illuminator is operated from a 115 volt 60 cycle AC line. A rheostat is supplied for operation from a DC line.

Figure 1 shows the No. 31-34-42 vertical illuminator with parts indexed for reference.

### **Attaching the Vertical Illuminator to the Microscope**

If the microscope to which the vertical illuminator is to be attached is equipped with a single nosepiece, or a multiple, revolving type nosepiece, this must first be removed. A metal key is required to remove the revolving nosepiece. Remove one of the objectives from the nosepiece and set the opening in the revolving part in line with the body tube. Insert a flat, metal key through the opening and engage the slots of the nosepiece retaining ring. The key used should fit the slots closely to prevent the key slipping while unscrewing the lock ring.

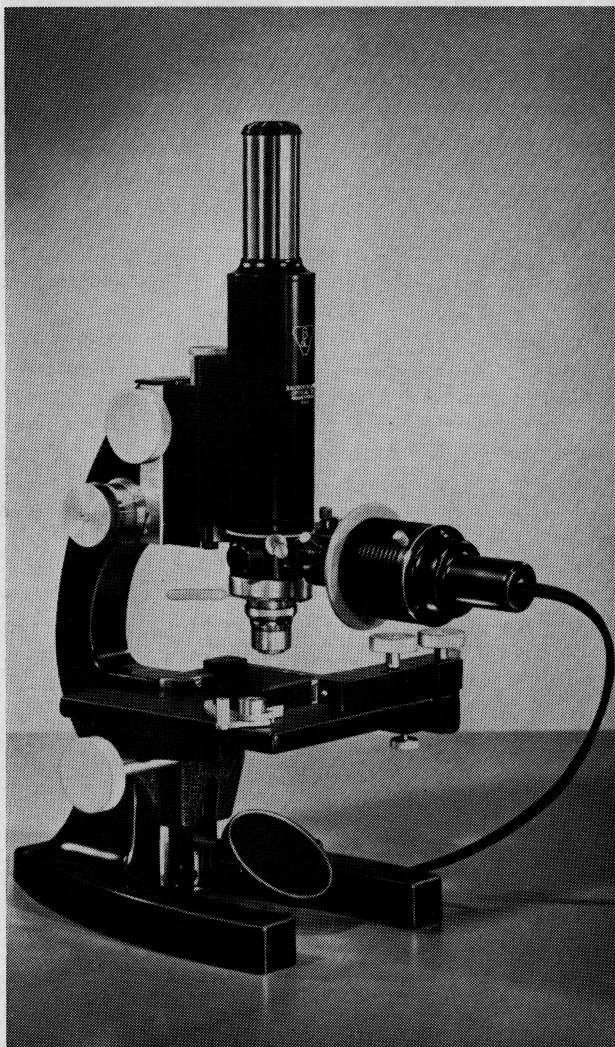
### **DeLuxe Models**

To attach this model to the microscope loosen the thumbscrew (Figure 1) about one turn. This releases the clamp of the knurled flange, permitting it to revolve freely. Screw the vertical illuminator to the nose of the microscope body, holding the unit in place with one hand and rotating the knurled flange with the other. With the flange screwed up tightly, swing the lamp house around to the front of the microscope and tighten the thumbscrew to fix the illuminator in that position.

Figure 2 shows the illuminator properly attached to the microscope.

### **Simplified Model**

This model illuminator is shown in Figure 3. The method of attaching the unit to the microscope is the



*Figure 2*

same as described above for the DeLuxe model, except that the knurled flange is clamped by means of the slotted lock screw indexed in Figure 3.

**NOTE:** The vertical illuminator body accounts for that portion of the microscope body-tube length taken up by the nosepiece. The vertical illuminator is primarily employed with objectives designed for use with uncovered objects and for a body-tube length of 215mm. When it is desired to use these objectives with the vertical illuminator on a biological type microscope with a tube length of 160mm, the difference in tube length should be compensated for by the insertion of the tube-length compensating lens (catalog No. 31-34-36) in the rear of the vertical illuminator.

### **To Insert or Replace Lamp in Vertical Illuminator**

To remove the lamp socket assembly from the lamp house, first loosen the clamp screw (Figure 1) at the rear of the housing. Withdraw the socket assembly from the lamp house. Remove the lamp from the socket by rotating the lamp about one-quarter turn counter-clockwise. This will release the pre-focusing flange from the holding pins, permitting the lamp to be lifted from the socket. To insert a new lamp, rotate the prefocusing flange on the lamp base to align the slots with the holding pins in the socket and rotate the lamp clockwise to lock it in place. (The lamp may be inserted in the socket in one position only as determined by the slots in the flange.) Insert the socket assembly into the lamp house and lock in place by tightening the clamp screw.

When ordering replacement lamps, specify catalog No. 31-31-79.

### **Attaching the Objective to the Vertical Illuminator**

1. No. 31-34-42 DeLuxe Model with quick change, non-centerable nosepiece: Screw the objective into an



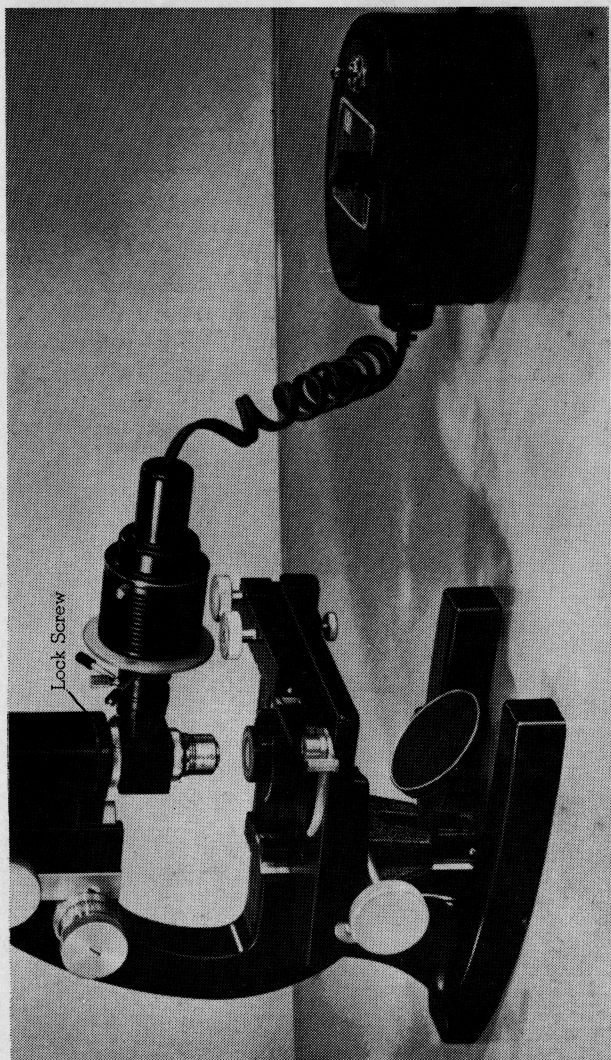


Figure 3



objective handle and attach to the vertical illuminator by placing the notches of the objective handle between the two spring clips on the nose of the illuminator and then turning the handle backward or forward about a quarter-turn to lock it in position. (See Figure 4).

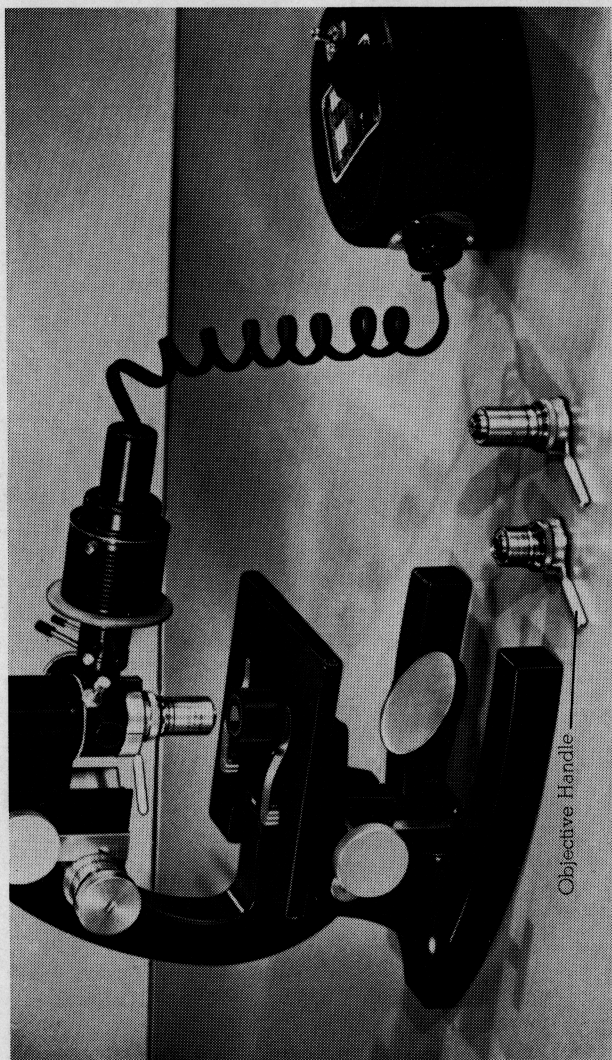
2. No. 31-34-43 DeLuxe Model with quick change centering nosepiece: The objective screws directly into the slotted objective carrier of the centering nosepiece (Figure 5). To attach the objective to the illuminator, turn the lock (Figure 5) to the horizontal position and slip the open end of the slot in the objective carrier over the pin in the illuminator nosepiece. Slide the objective on all the way and turn the lock back into the vertical position. Objectives are individually centered by turning the two square headed screws projecting from the objective carrier. Two centering keys are provided to fit the screws.

3. No. 31-34-90 Simplified Model. (Single nosepiece): Objective screws directly into the body of the vertical illuminator (See Figure 3).

### **Operation of the Vertical Illuminator, DeLuxe and Simplified Models**

Connect the cord from the vertical illuminator lamp housing to the transformer (or rheostat) supplied. Insert the plug at the end of the cord into the socket in the transformer case and turn the plug clockwise to lock it in place. Connect the plug on the transformer cord to the proper line voltage as indicated on the transformer name plate. Turn the illuminator on by means of the switch on the transformer.

At the outset it is best to use the lower power objective and the plano glass reflector. In the case of the DeLuxe Models containing both prisms and plano glass, the latter is in operating position when the



*Figure 4*

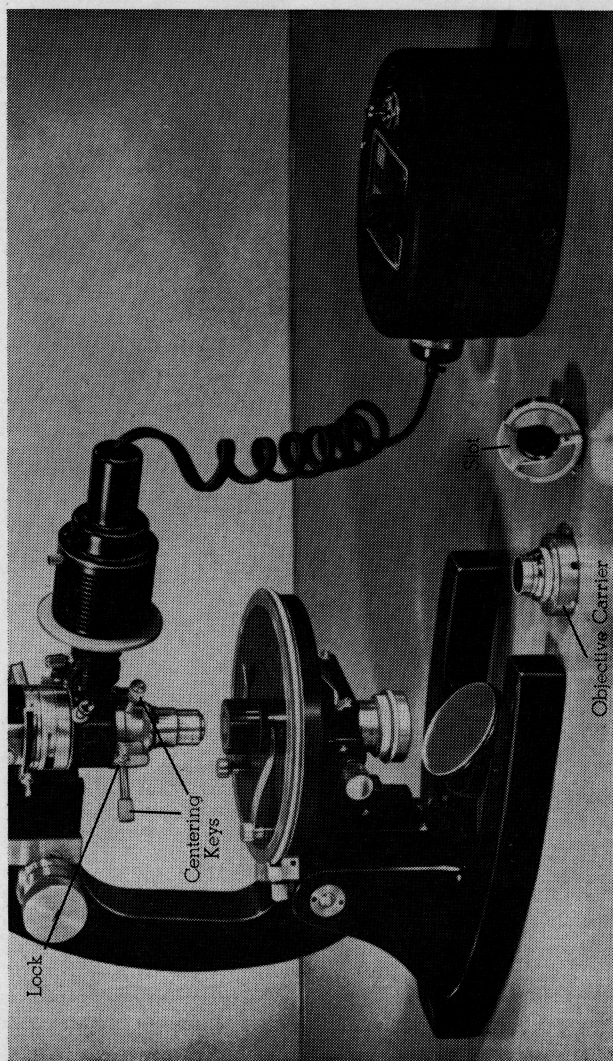
knurled knob (Figure 1) is pushed in flush against the end of the square tube on the side of the illuminator.

The handle farthest from the lamp house (Figure 1) controls the aperture diaphragm, while the handle nearest the lamp house controls the field diaphragm. Both diaphragms should be opened wide. Move the field diaphragm handle downward to its stop and move the aperture diaphragm handle upward to its stop.

Place a polished specimen on the microscope stage and focus carefully on its surface. Close the field diaphragm part way by moving the field diaphragm handle downward until an image of the diaphragm is seen in the field of view. If the image of the diaphragm is not centered in the eyepiece field, a slight turn of the knurled knob should bring it to center. In the case of the Simplified Model, the reflector setting is fixed by the lock screw (Figure 3). In order to turn the reflector, it is necessary to first loosen this screw slightly. After adjusting the reflector, tighten the screw to secure the reflector's position.

The field diaphragm may be adjusted in size to suit the operator's wishes. It may be desired in some cases to restrict the diaphragm to a point where the illuminated field is considerably smaller than that passed by the eyepiece. In general, however, the field diaphragm should be opened up until its image lies just outside the eyepiece field. This gives maximum contrast for the full eyepiece field.

The aperture diaphragm should now be reduced until the desired contrast is obtained in the structure of the specimen. Do not use the aperture diaphragm as a means of controlling image brightness. Closing it down too far results in a blurring of the fine detail in the specimen. Avoid sacrificing too much detail for the sake of a slight increase in contrast gained by stopping down the aperture diaphragm excessively.



*Figure 5*

To introduce the prism reflector in place of the plane glass, in the DeLuxe Models simply pull outward on the knurled knob (Figure 1) until the slide reaches its stop position. The field diaphragm should be centered by turning the knurled knob, just as in the case of the plane glass reflector. The prism illuminator gives oblique illumination and finds its principal application in specimens showing considerable surface relief. It is mainly recommended for the lower power objectives, 16mm or longer in focal length.

A filter slot (Figure 1) is provided for the green filter or for the polarizer disc. A sliding cover closes the filter slot against dust when no filter is in use or serves to hold the filter securely in place when introduced. The cover slides around the illuminator tube and should be moved by its knurled handle.

To examine a specimen in polarized light, the polarizer disc (catalog No. 31-34-95, Figure 1), should be inserted in the filter slot with the handle in the vertical position. The vibration direction of this polarizer is parallel to the slots in the rim of the mount, i.e., perpendicular to the handle. If the handle of the polarizer disc is tilted away from the vertical, the polarizing action occurring at the reflector surface in the vertical illuminator causes the light to become elliptically polarized, and complete extinction by an analyzer is not possible. The plane glass reflector is much preferable to the prism reflector for polarized light work. The suggested analyzer is the 31-57-11 cap analyzer (Figure 1), which cups on over the eyepiece and can be oriented in any desired direction.

### **To Remove Reflectors for Cleaning DeLuxe Model**

Loosen the lock screw (Figure 1) and pull out on the knurled knob, withdrawing the entire reflector mount



assembly. The surfaces of the prism or plane glass reflector should be dusted with a clean camel hair brush or wiped with a piece of lens tissue.

### **Simplified Model**

Loosen the lock screw (Figure 3) and pull outward on the knurled knob. Clean the glass reflector plate as suggested above. On re-inserting the reflector mount, be sure the clamp screw is loosened sufficiently to permit the clamp held by the screw to slide over the reflector mount bearing.

### **Caution**

When putting the microscope equipped with a vertical illuminator into its case, be sure to remove the lamp socket assembly from the lamp house, as it projects out so far as to strike the back of the case.

### **Using the Vertical Illuminator with Independent Illuminator Units**

DeLuxe units Catalog Nos. 31-34-42-01, 31-34-90-01  
Simplified unit Catalog No. 31-34-90-01

In some instances, particularly in the case of photomicrography where more light than is supplied by the attachable illuminator may be required, it is desirable to set up the vertical illuminator with a separate illuminator unit (The Bausch & Lomb illuminator units, Nos. 42-44-42-65 and 42-44-85-65 are especially designed for this purpose).

The DeLuxe and Simplified Model vertical illuminators designated above are supplied without the attachable illuminator expressly for this application. The attachable illuminator can be unscrewed from the diaphragm and filter support tube in case it is desired to convert a complete vertical illuminator for use with an independent illuminating unit.



Follow the same procedure for attaching illuminator to microscope as outlined previously and attach a suitable microscope objective.

The diaphragms operate the same with an external illuminator as in the case of the attached illuminator and the instructions given for their use should be followed. (See page 00).

If it is desired to convert one of the Vertical Illuminator Models without illuminator to a complete, self contained unit, the No. 31-33-32-11 or -12 attachable illuminating unit may be obtained and screwed directly to the diaphragm and filter support tube of the vertical illuminator.

The condenser lens of the illuminating unit should be focused to give an image of the light source sufficiently large to completely fill the opening in the end of the tube projecting out from the illuminator.

The light source must be carefully centered with respect to its condenser lens, and the axes of the Vertical Illuminator tube and lamp carefully brought into alignment.



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If shipment shows evidence of rough handling, have the agent note on the receipt "Received in bad order"; or if "concealed damage" is revealed after unpacking, call the representative of the transportation company within 48 hours and have him make out a "Bad order" report. Unless this procedure is followed, you lose all right to recovery from the carrier.

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