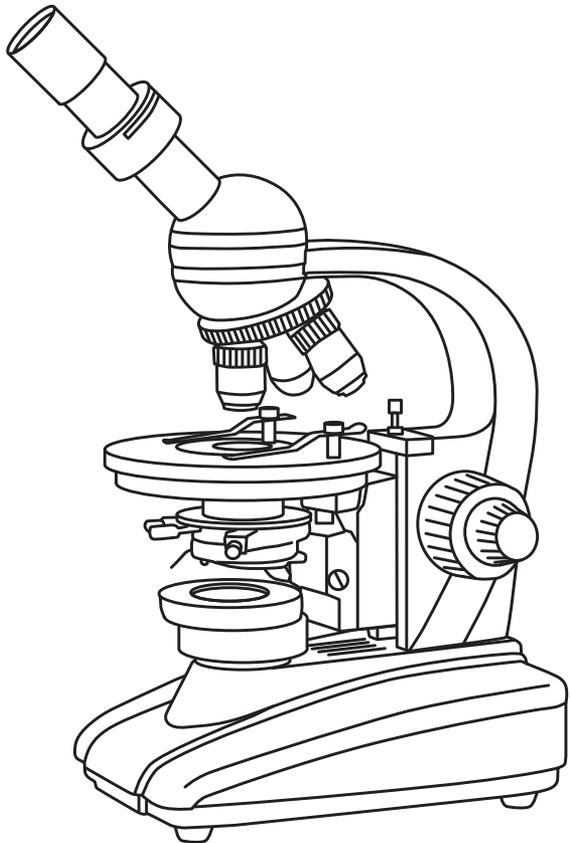




ken-a-vision[®]
KNOWLEDGE THROUGH VISION

Comprehensive Polarizing Scope

Instruction Manual
T-1941



Thank you for purchasing a Comprehensive Polarizing Scope

Packing List

Dust Cover

Fuse

10x Widefield Eyepiece with Graduated Cross Hair

Instruction Manual

Warranty Card & Sheet

Application

The Ken-A-Vision Comprehensive Polarizing Scope has a multitude of applications. A primary use of polarizing microscopes is in geological applications such as the studying of rock thin sections. A polarizing microscope used with anisotropic materials allows the study of the absorption color and boundaries between minerals of differing refractive indices. Additionally, isotropic and anisotropic materials can be differentiated in specimens such as natural and industrial minerals (manufactured, refined or extracted). Every day materials such as ceramics, polymers, and cements can be examined for their structure. More recently many highly ordered biological materials such as wood, starch, urea, DNA and collagen reveal new structural properties when examined under polarized light.

Polarized light is a contrast-enhancing methodology that can improve the quality of images obtained with birefringent materials, and may be better than images obtained with darkfield or brightfield illumination, phase contrast or fluorescence microscopy.

The Ken-A-Vision Comprehensive Polarizing Scope may be used both as a polarizing microscope (both analyzer and polarizer filters in light pathway) or as a brightfield microscope with the filters rotated out of position.

SPECIFICATIONS

Catalog Number	T-1941
10x Widefield Eyepiece with cross hair reticle (graticule)	X
Monocular Head	X
3 Hole, Reversed Nose Piece	X
4x, 10x, 40xR DIN Objective Lenses	X
Coarse and Fine Coaxial Focal Adjustment	X
Rotating Stage with Clips; Marked in 360 ° Increments	X
Stage Marked in 360 ° Increments	X
Analyzer Filter (may be rotated in or out)	X
Polarizer Filter (may be rotated in or out)	X
Illuminator 20 Watt Halogen Bulb (with light rheostat)	X
Rheostat (variac) for Light Intensity Adjustment	X
Adjustable Abbé Condenser	X
Iris Diaphragm	X
Bertrand Lens	Optional
Compensators/Retardation Plates	Optional

Specifications subject to change without notice

Cross hair reticle (graticule) marks the center of the field of view

Microscope Preparation

Open packing box carefully, and lift microscope out of shipping container. Remove all packing materials on eyepieces, stage, and illuminator.

Check the coarse focus tension. The knobs are oversized, designed for better gripping. The coarse (larger) focus knob should turn easily to change the focus. The stage should move up and down when either the coarse or fine adjust knobs are turned. Watch the up-down motion of the stage; it should not drift or slip on its own.

Check the stage stop feature. The stage stop is a knurled thumb screw with a lock nut found on the main frame, just behind the stage. To check the stage stop, place a prepared slide in normal position for viewing. Place the 40x objective into viewing position and move the coarse focus knob until the object and stage are as close together as they can be WITHOUT TOUCHING. Look through the eyepiece at the slide, and get the specimen into focus. The objective should be very close to the slide, but not touching. If the stage stop is not set correctly, loosen the locking nut and thumb screw, and reset the stage stop, tightening both when correct position is attained.

Microscope Use and Instructions

Visit the Ken-A-Vision Web site <http://www.ken-a-vision.com/pdf/MicroscopePrimer.pdf>, for a Microscope Primer on general microscope usage.

Power Switch

Plug your microscope into a power source. This microscope has an on/off switch at rear right of the microscope. On the left side of the Microscope is a rheostat for adjustment of light intensity. Be sure it is turned up once microscope is on.

Rotating Circular Stage

Your Ken-A-Vision Comprehensive Polarizing Scope comes equipped with a 360-degree rotatable circular stage for performing orientation studies in polarized light. This stage has a goniometer divided into 1-degree increments.

It is important that the stage is centered within the optical axis. Find the two centering knobs located on the front of the stage, sticking out about 45 degrees from the center line. To center the optical axis, while looking through the microscope eyepiece, first reduce the iris diaphragm to its minimum level. Using the adjusting centering knobs while looking

through the eyepiece, be sure that a uniform field of light is present with no shadows at any edge of the field. The condenser is spring loaded at the back of the stage and may be pushed in using the knurled center knob. Once the optical axis is aligned, the diaphragm may now be reopened to full diameter.

The viewfield of the microscope was factory set, and will rotate with a little deviation off of center.

Just above the nose piece find a slot in the body tube. Note that it is positioned between the polarizer and the analyzer polarizing lenses and by convention runs in a southeast-northwest direction. The primary purpose of this slot is to allow insertion of an accessory or retardation plates between the polarizer and analyzer, in a specific orientation with respect to the polarizer and the analyzer lens vibrational directions. (Additional notes and descriptions of various kinds of compensators may be found at www.ken-a-vision.com in a short primer on polarized light and polarizing microscopy).

Focus

The basic principle involved in Polarizing Microscopy is to take advantage of the fact that over 90 percent of all solid substances (anisotropic) have optical properties that vary depending upon the orientation of the incident light with the crystallographic axis. As specimens are examined under polarized light, there are refractive indices created which are dependent upon both the propagation direction of light through the substance and on the vibrational plane coordinates due to the polarizing lenses. The anisotropic specimen will act as a beam splitter, dividing light rays into two parts. The polarizing microscope exploits this interference of the split light rays as they are re-united along the same optical pathway.

Place a specimen slide under the stage clips. Using the coarse adjust knob, lower the stage until the specimen is in focus. Use the smaller fine adjust knob to now sharpen the focus and attain maximum resolution. This first step may be done with the polarizing filters in or out of the light pathway.

Using the Comprehensive Polarizing Scope - Polarizing Microscopy

Good practice is to check your Comprehensive Polarizing Scope by doing the following quick exercise. Do this without any specimen in the light pathway to be sure that the polarizer and analyzer filters are correctly aligned.

The polarizer lens is located in a filter holder attached to the illuminator, below the condenser of the microscope. It is capable of being rotated 360-degree (360°). Below the front of the polarizer is a small line indicating a "zero" or starting point. Align the 0° mark on the polarizer with that 'zero' line. When the polarizer is aligned with that mark, the lens is said (by convention) to be set to East-West (abbreviated E-W). Now rotate the analyzer polarizing lens into position within the eye tube. The convention here is that the vibrational direction of this lens is in the North-South orientation (abbreviated N-S). In this position, light from the illuminator will be mostly, if not entirely blocked (extinguished), and if you look through the microscope it should be dark at even the brightest light setting.

Now rotate the polarizer and try to determine the point when the most light comes through the two filters. This should occur at 90°. Total extinction should reoccur at 180°, and maximum light again at 270° with total extinction again at 360° or 0°. Accuracy of this alignment is important, when retardation and/or compensation plates are inserted into the optical path for measurement purposes.

The iris condenser, supplied as part of the Abbé condenser, controls the angle of the illumination cone that passes through the microscope's light pathway. Reducing the opening size of this iris diaphragm decreases the cone angle and increases the contrast of images observed. For polarization studies and for greatest accuracy, use the dimmer (variatic) switch to change the intensity of illumination, rather than the iris diaphragm.

Eyepiece

The widefield eyepiece is locked into place to avoid loss. A set of crossed, perpendicular lines are mounted in the eyepiece.

The analyzer filter is provided within the eyepiece tube, directly below the eyepiece. This must be in the eye tube when using the microscope as a polarizing scope, and may be rotated out of the light line, when using the scope as a Brightfield illuminated microscope.

Care and Maintenance

Your microscope is a fine precision instrument and should be treated with care. When not in use, it should be protected from dust by the plastic cover provided. Lenses and eyepieces should be cleaned periodically with optical lens tissue which is soft and lint free. Painted surfaces can be cleaned with a moistened cloth.

Ken-A-Vision has quality technicians on staff to repair or service your microscopes. Ken-A-Vision recommends service every two years for optimal life of the product. Contact Ken-A-Vision at 1.816.353.4787, Extension 5620 for more details.

Technical Specifications for Model No. T-1941 Comprehensive Polarizing Scope

For the technical specifications on the Comprehensive Polarizing Scope, visit the Ken-A-Vision Web site <http://www.ken-a-vision.com/t1941.asp>

Accessories

If you are interested in purchasing accessories or replacement parts for your Comprehensive Polarize Scope visit our Web site, <http://store.kenavision.com/catalog/> or contact your local Ken-A-Vision Dealer.



Ken-A-Vision reserves the right to make design improvements and other changes in accordance with the latest technology. There is no obligation to make changes in products already manufactured. Patents Pending Copyright 2008 Ken-A-Vision Corporation.



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