

Slit Lamp Imaging Guide



BX 900®
PHOTO SLIT LAMP

 **HAAG-STREIT**
INTERNATIONAL
Precision by Tradition

Preamble

On August 3rd, 1911, Alvar Gullstrand introduced the first rudimentary model of the slit lamp illuminator.

An occasion of tremendous significance to ophthalmology had just taken place. Gullstrand described a device with the potential to advance the understanding of the eye and its problems as profoundly as did the direct ophthalmoscope 50 years earlier. By 1916, Henker had developed a practical combination of Gullstrand's illuminator and Czapski's corneal microscope, marking the first major advance in methods of examining the external eye in more than a century. In 1936 Comberg established the co-pivotal and iso-centric relationship between the microscope and slit illuminator and, in 1938, Goldmann's collaboration with Haag-Streit produced the first par-focal instrument which also featured the single control lever design in use to this day. Goldmann also influenced the shift to Köhler illumination, greatly improving the efficiency of the slit lamp illuminator, the very heart of this marvellous device.

These significant milestones, with contributions from a host of other individuals, have coalesced into the highly sophisticated instruments that are placed at our disposal today. In light of such capabilities in instrumentation, it follows that our results in slit lamp examination and slit lamp photography will rest on the level of sophistication we apply to the practice of these challenging and stimulating art forms.

Csaba L. Mártonyi, COPRA, CRA
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BX User Guide

This guide is intended to assist all those who seek to capture images of the eye, using the slit lamp, to improve the quality of their photography by using simple to follow illumination diagrams and high quality image examples. We hope this book provides inspiration and motivation to anyone who is involved the art of documenting the unique properties and pathologies of the eye and through Haag-Streit we offer a number of instruments to help you.

The Haag-Streit BX 900[®] slit lamp marries the latest imaging technology with the proven versatility, optical brilliance and build quality of the Haag-Streit tradition. The BX 900[®] is the leading slit lamp-imaging device and is designed to assist the Ophthalmic Photographer in his demanding profession. Furthermore it will also provide a valuable asset for all EyeCap[™] Specialists who demand the highest clinical and educational standards.

Haag-Streit greatly appreciates and thanks all those who have contributed to this publication with special thanks to Cees van Beek of Leyenburg Hospital, Den Haag who provided many of the images.

Haag-Streit AG

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BX 900® PHOTO SLIT LAMP



1. Cable guide
2. Flash housing
3. Flash intensity changer for background illumination
4. Objective tube
5. Camera body
6. Eyepiece with double cross hair reticle
7. Mirror housing
8. Background illumination
9. Mirror and Diffusion filter
10. Cold light source
11. Shutter release bar
12. Photo control unit

The Haag-Streit Photo-Slit Lamp BX 900® is based on the Slit Lamp BQ 900®. It is therefore possible to use the same instrument both for ocular examination and documentation. A photo-slit lamp is a combination of a biomicroscope, and illumination system and the photo attachment. The Photo-Slit Lamp BX 900® and the Slit Lamp BQ 900® share the same microscope. The illumination system of the photo-slit lamp has in addition a flash unit and a background illumination. Two different light sources are available: the flash illumination and the modelling light. On the following page the different components will be explained.

1. The cable guide contains the high voltage cable for the flash light.
2. The flash housing contains the flash tube. Firing the BX 900® trigger will simultaneously deliver a flash through the illumination system and, via a glass fibre cable, the fill background illumination, while synchronising with the camera shutter.
3. The background illumination changer has seven settings:

○ = 100 % ◐ = 50 % ◑ = 25 %

◒ = 10 % ◓ = 5% ● = 0 % ● = blue filter

These selections are only for the fill flash of the background illumination. The modelling light is controlled by the cold light source.
4. The camera body is mounted on the top of the biomicroscope allowing full visibility of the patient's eyes from either side of the microscope. Not all cameras available on the market can be used. Haag-Streit has selected a number of models and has made the necessary adaptations. The correct function of the photo-slit lamp is guaranteed only by the use of cameras that are recommended by Haag-Streit. A list of current camera models is available at: www.haag-streit.com. Note that the camera has to be in the «MANUAL» operating mode and the shutter speed should be set to 1/90 sec. The recommended ISO rating for general use is 200 and colour temperature of the flash is 6000k but users have the option to apply other settings as required.
5. The 12.5x eyepiece with double cross hair reticule is inserted into the right ocular of the microscope. This must be correctly focused for the user's eye to ensure sharp images are captured. Note that the setting on the eyepiece is not the user's refractive error.
6. The principal component of the Haag-Streit Photo-Slit Lamp BX 900® is the mirror housing with its built-in diaphragms. It mounts between the magnification changer and the binocular tube. When capturing an image all light is directed, via a mirror, to the camera. This allows the maximum utilisation of the available light: 100% for the examination and 100% for the image. The built-in diaphragm setting with five apertures is applied automatically on image capture. For the aperture intervals: Step 1 = largest aperture, Step 5 = smallest aperture. The small knobs on each side of the mirror housing can be used during examination to quickly activate the diaphragm to the pre-set position. This allows a preview prior to capture so that the image subject and depth of field may be checked.
7. The background illumination is swivel-mounted on a horizontal level and is illuminated through two glass fibre cables. The flash fill light comes from the flash housing and the modelling light comes from the cold light source. The modelling light is used to show where any reflection of the fill flash will fall.
8. The cold light source is mounted under the table and it provides the background modelling illumination.
9. With the diffusion filter the slit beam can be covered allowing overview pictures with diffuse illumination.
10. The shutter release bar is conveniently positioned in front of the joystick on the cross-slide. It can be used either right or left-handed.
11. The photo control unit is mounted under the left hand side of the table and has the main switch for the power supply. On the front side there are two switches and four error light indicators. With the main power switch it is possible to turn off the entire electrical system of the slit lamp. The camera may be turned off separately. The power switch on the front side is only for the photo control unit. With the flash-intensity switch in the high position, the flash light increases by one aperture step. Optical and acoustic warning signals will be activated in the case of an error when the shutter release bar is pressed. Once the cause of the problem has been removed, press the shutter release bar and the optical warning signal will be cancelled and the camera will be ready for use.

TECHNICAL DATA BX 900®

BIOMICROSCOPE

Magnification Changer	6.3x	10x	16x	25x	40x
Ocular Magnification	12.5x				
Range of Adjusting Oculars	+8 to -8 dioptres				
Reticle	right ocular				
Inter-pupillary Distance	52 – 78 mm				

SLIT LAMP ILLUMINATOR


Slit Height	1 – 8 mm
Slit Width	0 – 8 mm
Spotlight	0.2, 1, 2, 3, 5, 8 mm diameter
Horizontal Arc	+/- 90°
Vertical Arc	5°, 10°, 15°, 20°
Filters	blue, green (red free), N. D. 10%
Slit Beam Diffuser	yes
Light Source Illumination Device	6V 4.5A Tungsten
Light Source Background Illumination	Halogen

PHOTO ATTACHMENT

Image Delivery	Quick Return Mirror 100% light for examination or photography
Objective Tube Focal Length	170 mm
Light Source Flash Light	normal 200 Ws, high 400 Ws





DEPTH OF FIELD

dependent on magnification and aperture

Magnification 	Extent of depth of focus (+/- in mm) with aperture				
	1	2	3	4	5
6.3x	1.3	1.8	2.6	3.6	5.2
10x	0.5	0.7	1	1.4	2
16x	0.2	0.3	0.4	0.5	0.8
25x	0.1	0.1	0.15	0.2	0.3
40x	0.05	0.05	0.05	0.1	0.15

Values will be increased by 35% in transparent media of the eyes

IMAGE AND MAGNIFICATION DATA

Setting at magnification changer 	Chip dimensions			Size of field in mm	
	Magnification in plane of the chip	24x36 mm Mono 	15x22.5 mm Mono 	Magnification in plane of the chip	24x36 mm Stereo 
6.3x	0.63x	38x57	23.8x35.7	0.63x	38x28.5
10x	1x	24x36	15x22.5	1x	24x18
16x	1.6x	15x22.5	9.4x14.1	1.6x	15x11
25x	2.5x	9.5x14	6x9	2.5x	3.5x7
40x	4x	6x9	3.88x5.6	4x	6x4.5

Circles: visible field of the eyepiece

PHYSICAL AND OPTICAL CONDITIONS

The binocular examination of the eyes with the slit lamp takes place in a three-dimensional space with great depth of field. Normal slit lamp imaging is a two-dimensional documentation with a very small depth of field. The difference between stereo viewing and monocular imaging can sometimes prove troublesome. However, viewing monocularly can help. Note only the image through the right eyepiece is recorded.

The photographer's view through the eyepieces is not the same as the recorded image. Through the eyepieces a circular image is visible whereas the image captured is rectangular (see page 6). The Haag-Streit BX 900® has no measurements for the light-intensity and no automatic exposure system. It is therefore useful to take notes in the early stages of using the BX. Downloading images into EyeCap™ or a suitable image viewer will enable instant evaluation and will enable adjustments to be made that optimise the image. The practical examples will help, but they are only starting-points.

The BX 900® eyepiece has a cross hair on the operator's right hand side. The accommodative abilities of the photographer's own eye are normally not noticeable during examination. However it is important that the photographer establishes the correct eyepiece setting to compensate for any accommodation. Only viewing a sharp image of the cross hair overlaying a focused image of the eye ensures capturing of a sharply focused image.

It should also be considered that the examiner's attention is focused on the details that are of interest and by selective viewing the brain suppresses certain artefacts. The camera however does not!

TYPES OF ILLUMINATION

The correct illumination will allow optimal recording of ocular pathology.

DIFFUSE ILLUMINATION

The slit lamp beam should be completely opened and covered by the diffusing filter. The background illumination can be used in conjunction with the slit illumination for more uniform lighting. The diffuse illumination is normally used for overview pictures with low magnification (10x and 16x).

DIRECT FOCAL ILLUMINATION

Direct focal illumination refers to projecting the light on the subject at the plane of focus. Unlike diffused light, concentrated light penetrates transparent structures. With a centred slit beam there is always direct focal illumination.

INDIRECT ILLUMINATION

With indirect illumination the light does not fall directly on the pathology. The slit beam is decentered and projected just adjacent to the subject area and it is illuminated by scattered internally reflected light.

RETROILLUMINATION

Retroillumination is an indirect illumination too. Light reflected from the fundus or iris illuminates the pathology from behind. If the slit beam is decentered and higher magnification is used, unwanted reflections can be minimised.

PHOTOGRAPHY WITH THREE-MIRROR CONTACT LENS OR 90-DIOPTER LENS

With these instruments there are more optical interfaces (air / glass and glass / cornea). All interfaces cause reflexes and therefore it is better to take images without the background illumination. Furthermore any scratches or damage to the lens will increase the number of image artefacts.

If the space between the diagnostic contact lens and the slit illuminator is very small, the background illumination can be locked in the centre position.

STANDARD SETTING

The BX 900® has many different adjustments in order to give optimal illumination and exposure. It is advantageous to always start with a standard setting and to make adjustments after each image captured.

An example for a standard setting is the diffuse illumination:

1. Main switch on, photo control unit POWER ON and camera body on.
2. After waiting a few seconds, set the flash intensity on HIGH.
3. 100% Background illumination
45° Angle between microscope and background illumination
Slit beam vertical

Slit beam fully open (slit width and height)

Slit beam centred (screw tightened)

100% slit illumination (without filter)

Slit beam covered with the diffusion filter

Angle between microscope and illumination device 30°–45°

Magnification 10x

Aperture 4 with a sensor rating ISO 200

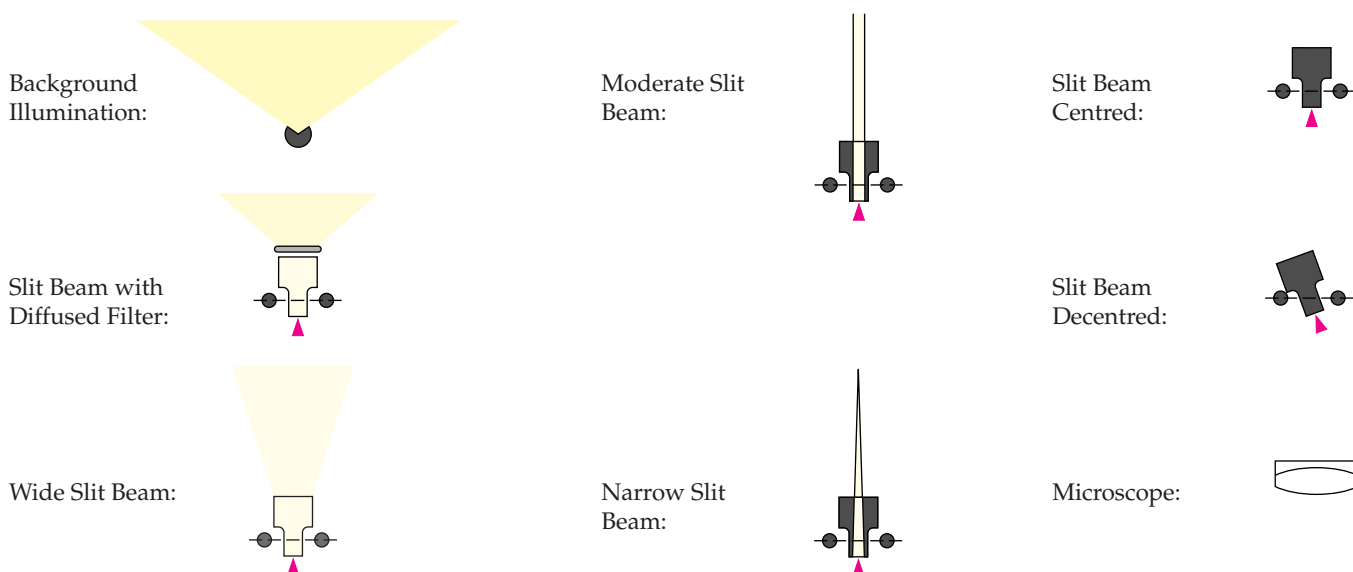
4. Define the image field, close the left eye (note the difference between eyepiece and photo tube picture)
5. Focus control (eyepiece setting correct?)
6. Capture Image.

ILLUMINATION AND EXPOSURE SETTINGS

The following table shows the different settings of illumination and exposure adjustments. This table is also used for practical examples and will give a starting point.

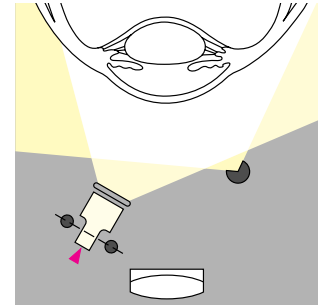
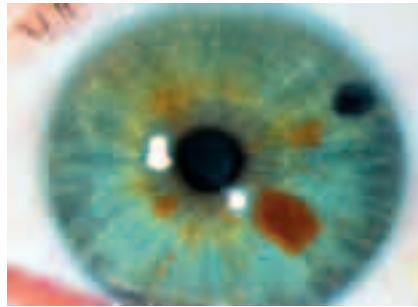
ISO:	200			
Flash Intensity:	high / normal			
Background:	100%, 50%, 25%, 10%, 5%, 0%, blue filter			
Angle:	0°–90°			
Slit Beam:	0 (= closed) to 8 mm (= full open)			
Filter:	blue, red free (green), grey (10% N. D.), diffused			
Angle:	0° – 90°			
Magnification:	10x	16x	25x	40x
Aperture:	1 – 5	1 – 5	1 – 5	1 – 5

PICTOGRAMS



OVERVIEW

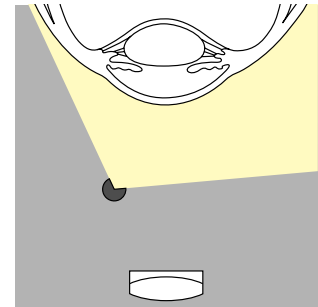
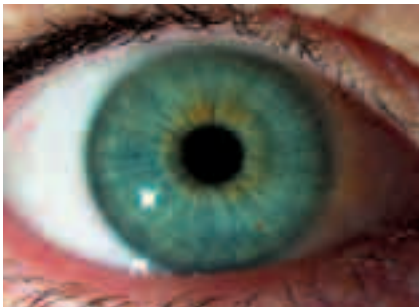
DIFFUSE ILLUMINATION WITH SLIT ILLUMINATION AND BACKGROUND ILLUMINATION



The diffuse illumination with slit beam and background illumination gives a shadow-free illumination with natural colours and two light reflexes. This is most useful for low magnification overview images.

ISO:	200			
Flash Intensity:	high			
Background:	100%			
Angle:	30°–45°			
Slit Beam:	fully open			
Filter:	diffused			
Angle:	30°			
Magnification:	10x	16x	25x	40x
Aperture:	4	4	3	2

DIFFUSE ILLUMINATION WITH BACKGROUND ILLUMINATION ONLY

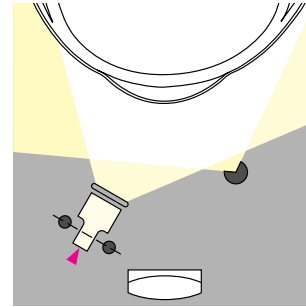
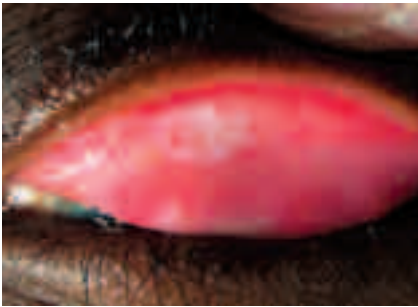


The diffuse illumination with only the background illumination increases the contrast. The structures of the iris are more visible and there is only one light reflex.

ISO:	200			
Flash Intensity:	high			
Background:	100%			
Angle:	30°–45°			
Slit Beam:	closed			
Filter:	–			
Angle:	–			
Magnification:	10x	16x	25x	40x
Aperture:	4	3	3	2

LIDS

DIFFUSE ILLUMINATION

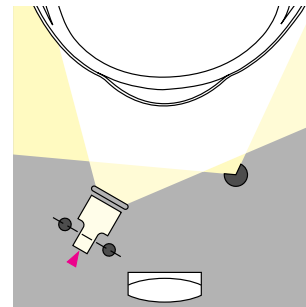
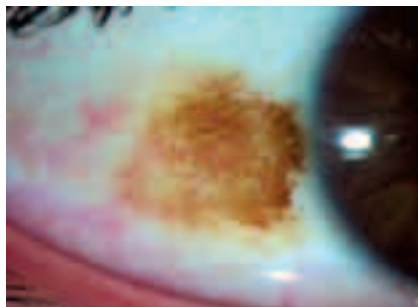
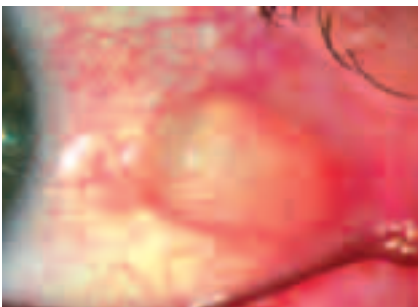


Diffuse illumination provides evenly balanced lighting.

ISO:	200			
Flash Intensity:	low			
Background:	50%			
Angle:	30°–45°			
Slit Beam:	fully open			
Filter:	diffused			
Angle:	30°			
Magnification:	10x	16x	25x	40x
Aperture:	4	4	3	2

CONJUNCTIVA

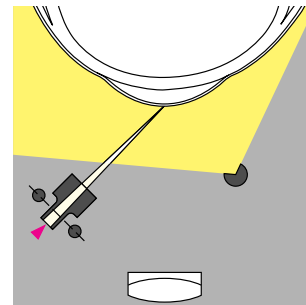
DIFFUSE ILLUMINATION



Diffuse illumination provides evenly balanced lighting. Exposure control is more varied due to increased reflectivity.

ISO:	200			
Flash Intensity:	low			
Background:	50%			
Angle:	30°–45°			
Slit Beam:	fully open			
Filter:	diffused			
Angle:	30°			
Magnification:	10x	16x	25x	40x
Aperture:	5	5	4	3

NARROW SLIT



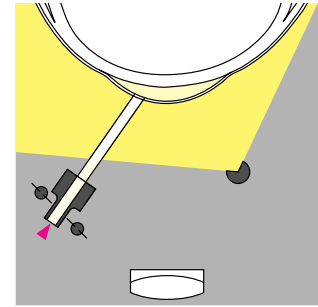
A centred, narrow slit beam projected at a 45° angle demonstrates surface topography and trans-illumination of the lesion. The background illumination gives the position of the slit beam.

ISO:	200			
Flash Intensity:	high			
Background:	25%			
Angle:	30°–45°			
Slit Beam:	0.1 mm			
Filter:	–			
Angle:	45°			
Magnification:	10x	16x	25x	40x
Aperture:	3	2	2	1

INDIRECT ILLUMINATION



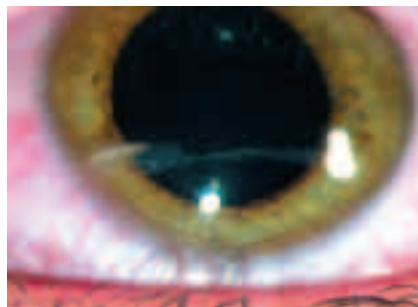
A moderately wide and decentred slit beam is projected just adjacent to the border of the lesion. The light penetrates conjunctiva and illuminates the clear fluid below. In the presence of blood or scar tissue, the light is absorbed.



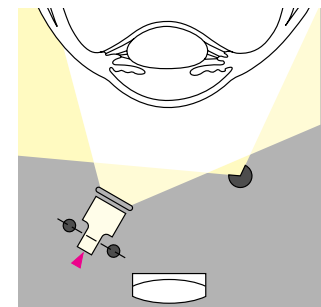
ISO:	200			
Flash Intensity:	high			
Background:	10%			
Angle:	30°–45°			
Slit Beam:	2–4 mm			
Filter:	–			
Angle:	decentred			
Magnification:	10x	16x	25x	40x
Aperture:	2	2	1	1

CORNEA

DIFFUSE ILLUMINATION



This illumination technique can only be used in the presence of dense corneal pathologies because diffuse light does not penetrate very well through the cornea. Dilating the pupil can enhance pathology by creating a darker background.

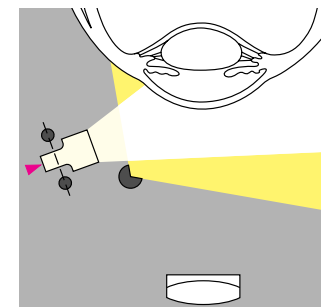


ISO:	200			
Flash Intensity:	high			
Background:	100%			
Angle:	30°–45°			
Slit Beam:	fully open			
Filter:	diffused			
Angle:	30°			
Magnification:	10x	16x	25x	40x
Aperture:	4	4	3	2

WIDE SLIT BEAM – TANGENTIAL ILLUMINATION

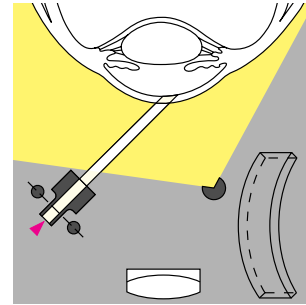
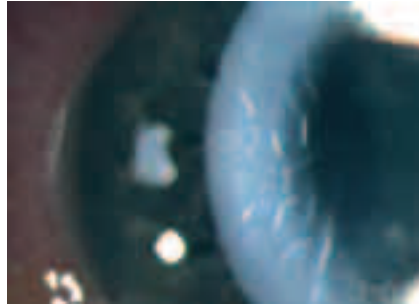
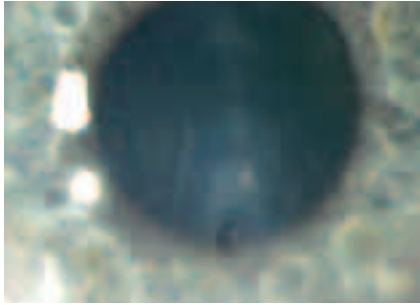


This technique can provide more information as the oblique illumination is reflected and refracted by the cornea and any pathology. Experiment with the illumination angle slit beam width for optimum results.



ISO:	200			
Flash Intensity:	high			
Background:	0%–25%			
Angle:	45°			
Slit Beam:	open			
Filter:	10%			
Angle:	60°–80°			
Magnification:	10x	16x	25x	40x
Aperture:	–	4	3	2

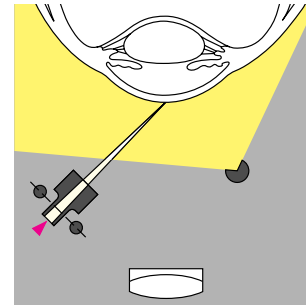
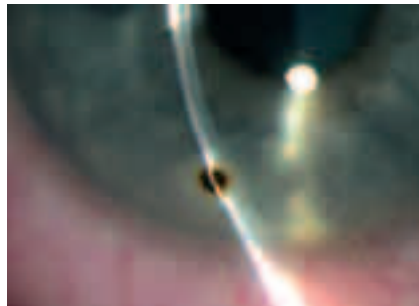
MODERATE SLIT BEAM WITH SEPARATION OF ILLUMINATED EPITHELIUM AND ENDOTHELIUM



The moderate beam produces two different layers of illumination, one on the epithelium and one on the endothelium. Note the corneal changes are closer to the posterior reflection and therefore they lie deep in the cornea.

ISO:	200			
Flash Intensity:	high			
Background:	0%–25%			
Angle:	30°			
Slit Beam:	2–3 mm			
Filter:	–			
Angle:	45°			
Magnification:	10x	16x	25x	40x
Aperture:	–	3	3	2

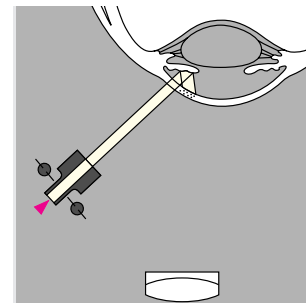
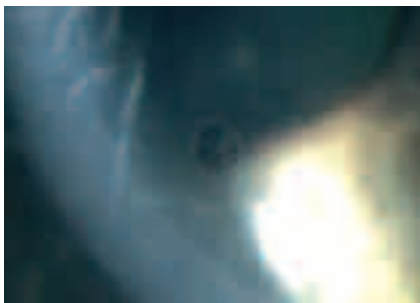
NARROW SLIT BEAM – OPTICAL SECTIONING



A narrow focal slit beam is projected at a 45° to 60° angle. It cuts an optical section through the cornea like a knife. With this technique it is possible to locate the layer of the pathological changes. These examples demonstrate endothelial and surface pathology.

ISO:	200			
Flash Intensity:	high			
Background:	0–10%			
Angle:	45°			
Slit Beam:	0.1 mm			
Filter:	–			
Angle:	45°–60°			
Magnification:	10x	16x	25x	40x
Aperture:	–	1	1	–

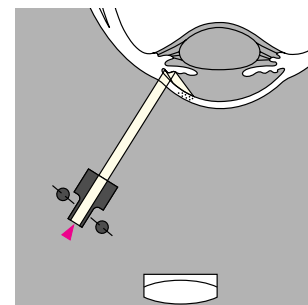
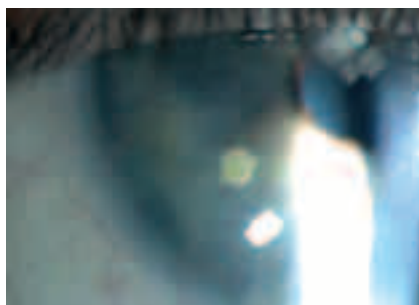
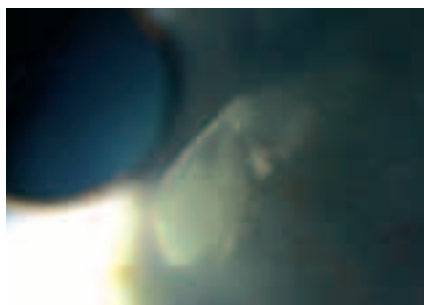
DIRECT RETROILLUMINATION FROM THE IRIS



A moderate slit beam is decentred and angled to project onto the iris directly behind the pathology. The light reflects and backlights the cornea. If there is some cataract present the lens can also be used to reflect light directly onto the area of interest.

ISO:	200			
Flash Intensity:	high			
Background:	0%			
Angle:	–			
Slit Beam:	1–2 mm			
Filter:	–			
Angle:	decentred			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	1

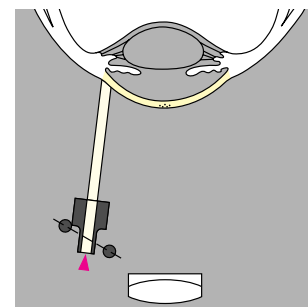
INDIRECT RETROILLUMINATION FROM THE IRIS



The moderate slit beam is now decentred even more and angled to project onto the iris adjacent to the area behind the area of interest. The background is dark and the edges of non-pigmented lesions are well defined by the diffuse light reflecting from the iris.

ISO:	200			
Flash Intensity:	high			
Background:	0–10%			
Angle:	–			
Slit Beam:	1–2 mm			
Filter:	–			
Angle:	decentred			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	1

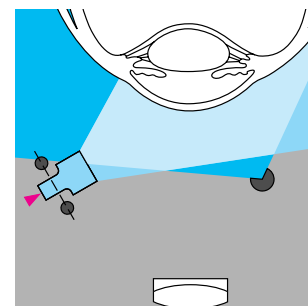
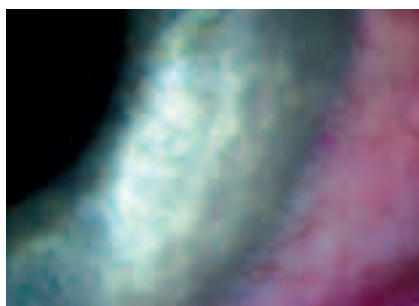
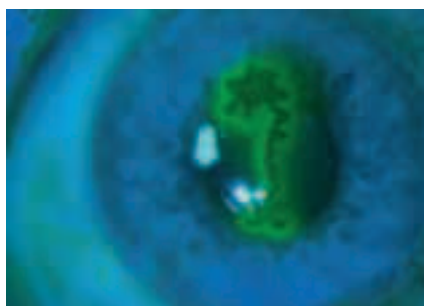
SCLEROTIC SCATTER



The wide decentred slit beam is projected onto the limbus. The light striking the limbus is internally reflected through the corneal tissue like a fibre optic. Corneal changes or abnormalities can be visualised by reflecting the scattered light. Careful post capture cropping can enhance images.

ISO:	200			
Flash Intensity:	high			
Background:	0%			
Angle:	–			
Slit Beam:	2 mm			
Filter:	–			
Angle:	decentred			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	1

TOPICAL ADMINISTRATION OF SODIUM FLUORESCEIN



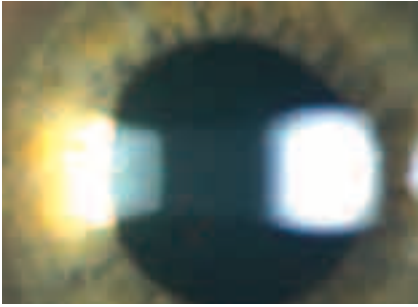
Sodium fluorescein is applied gently to the bulbar conjunctiva. The patient should blink once or twice for the dye to be dispersed over the eye. If the epithelium of the conjunctiva or the cornea is damaged, the fluorescein stains the underlying tissue. The remaining dye fluoresces a yellow green colour when excited by the blue light. Healthy epithelium does not stain.

Rose Bengal is a dye that can be used to demonstrate abnormal epithelial cells. The dye is applied like sodium fluorescein and is usually imaged using direct white light.

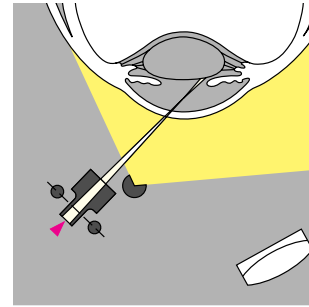
ISO:	200			
Flash Intensity:	high			
Background:	blue filter			
Angle:	30°			
Slit Beam:	fully open			
Filter:	blue filter			
Angle:	60°–80°			
Magnification:	10x	16x	25x	40x
Aperture:	3	3	2	1

ANTERIOR CHAMBER, CHAMBER ANGLE

AQUEOUS FLARE – TYNDALL'S PHENOMENON

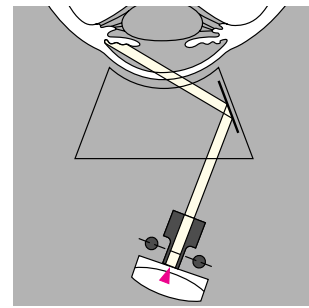
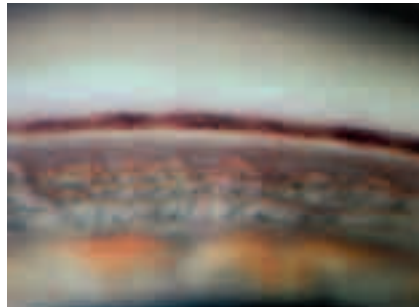
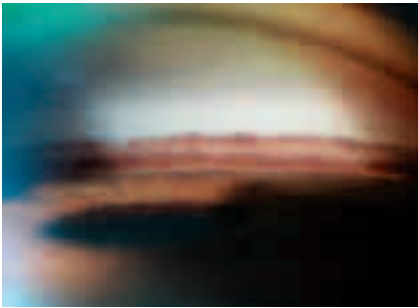


Cells, pigment or proteins in the aqueous humour reflect the light like a faint fog. To visualise this the slit illuminator is adjusted to the smallest circular beam and is projected through the anterior chamber from a 42° to 90° angle. The strongest reflection is possible at 90°.



ISO:	200			
Flash Intensity:	high			
Background:	0%–25%			
Angle:	30°			
Slit Beam:	0.1–1 mm			
Filter:	–			
Angle:	50°			
Magnification:	10x	16x	25x	40x
Aperture:	–	1	1	1

CHAMBER ANGLE – GONIOPHOTOGRAPHY



The desired mirror of the gonioscopy lens is positioned opposite to the area of pathology. A wide slit beam is projected in the desired mirror from a near coaxial position to the biomicroscope. Light reflections can be eliminated by tilting the lens.

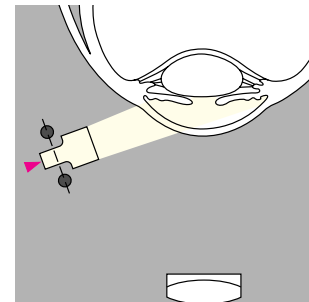
ISO:	200			
Flash Intensity:	high			
Background:	0%			
Angle:	–			
Slit Beam:	2 mm			
Filter:	–			
Angle:	10°			
Magnification:	10x	16x	25x	40x
Aperture:	–	5	5	4

IRIS, IRIS-ANGIOGRAPHY

WIDE SLIT BEAM - TANGENTIAL ILLUMINATION

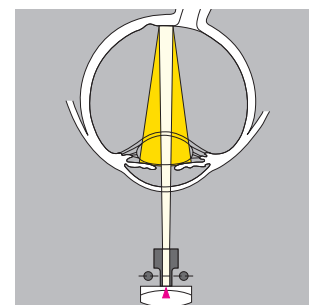
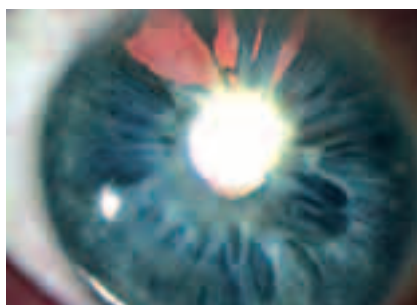
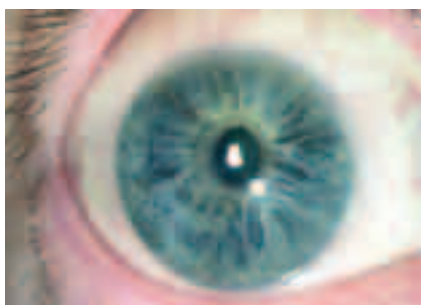


The wide slit beam is projected at an oblique angle of 80° – 90° onto the iris. This illumination creates strong shadows and the surface texture is enhanced. If the headrest doesn't allow a wide oblique angle it is sometimes necessary to turn the patient's head a little away from the light.



ISO:	200			
Flash Intensity:	high			
Background:	0%–10%			
Angle:	45°			
Slit Beam:	open			
Filter:	–			
Angle:	80°			
Magnification:	10x	16x	25x	40x
Aperture:	5	5	4	4

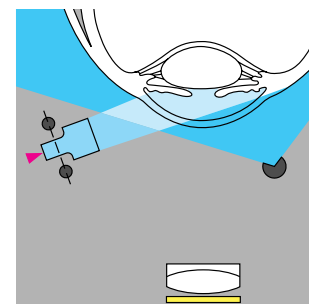
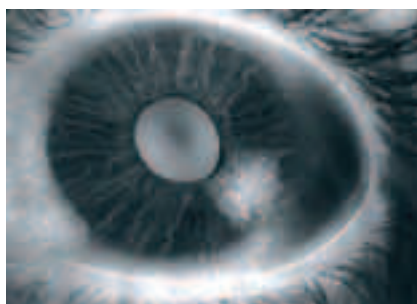
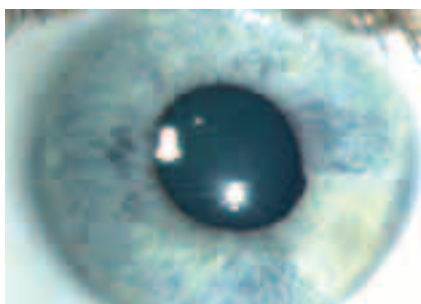
IRIS TRANSILLUMINATION



The slit illuminator is positioned coaxially to the biomicroscope and adjusted to provide a small circular beam of light. This beam is projected through the pupil which should be at mid dilation. The light reflects from the fundus and backlights the iris. Normally the iris pigment absorbs the light, but pigmentation defects let the red fundus light pass through..

ISO:	200			
Flash Intensity:	high			
Background:	0%–10%			
Angle:	45°			
Slit Beam:	Ø 1–2 mm			
Filter:	–			
Angle:	coaxial			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	1

IRIS ANGIOGRAPHY

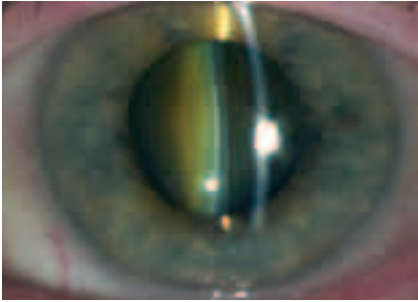


The illumination technique of the iris angiography is like the tangential illumination with the background illumination opposite the slit beam. Both slit illuminator and background illumination have a blue excitation filter. The yellow barrier filter is positioned between the magnification changer and the mirror housing. The barrier filter only works on the image from the right eyepiece which is directed to the camera. Control of the focus of the image during the angiography is possible through the left eyepiece.

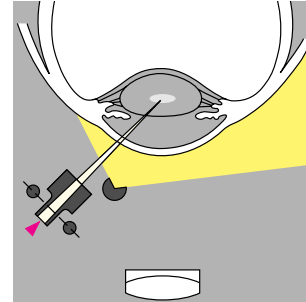
ISO:	800			
Flash Intensity:	high			
Background:	blue filter			
Angle:	45°			
Slit Beam:	open			
Filter:	blue filter			
Angle:	45°–60°			
Magnification:	10x	16x	25x	40x
Aperture:	–	1	–	–

LENS

NARROW SLIT BEAM – OPTICAL SECTIONING

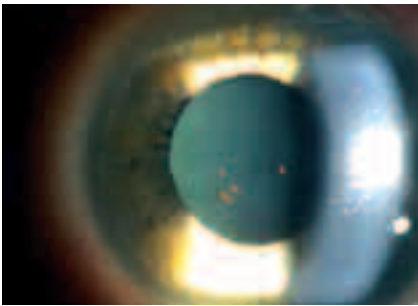


A narrow focal slit beam is projected at a 45° angle to the lens as an optical section is made. Because of the problematic depth of field it is not possible to photograph the entire lens section in focus. It is therefore necessary to focus on the anterior or the posterior lens surface.

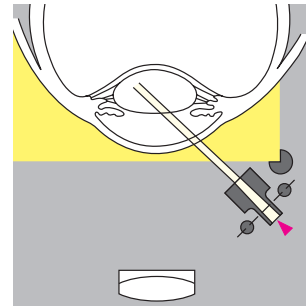


ISO:	200			
Flash Intensity:	high			
Background:	25%			
Angle:	45°			
Slit Beam:	0.1 mm			
Filter:	–			
Angle:	45°			
Magnification:	10x	16x	25x	40x
Aperture:	–	1	1	–

MODERATE SLIT BEAM – DIRECT ILLUMINATION

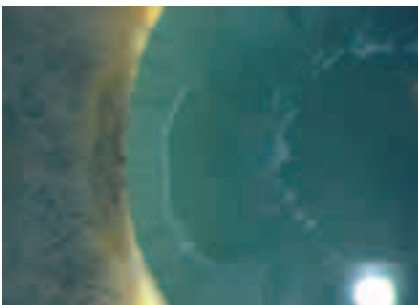


A moderate slit beam is projected at a 45° angle to the lens pathology and is directly illuminated. Dilatation of the pupil is required for effective imaging.

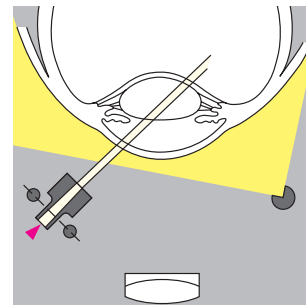


ISO:	200			
Flash Intensity:	high			
Background:	10%			
Angle:	45°			
Slit Beam:	2–4 mm			
Filter:	–			
Angle:	45°			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	2	1

MODERATE SLIT BEAM – TANGENTIAL ILLUMINATION

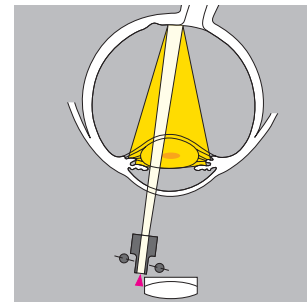


A moderate to wide slit beam is projected at an angle greater than 45° to provide oblique tangential illumination that can enhance detail by providing shadows. Pupil dilation will aid this illumination technique.



ISO:	200			
Flash Intensity:	high			
Background:	10%			
Angle:	45–60°			
Slit Beam:	2–6 mm			
Filter:	–			
Angle:	45–60°			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	2	1

RETROILLUMINATION FROM THE FUNDUS – RED-REFLEX PHOTOGRAPHY

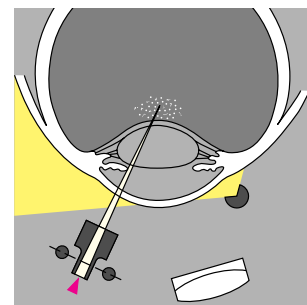


The slit illuminator is positioned in an almost coaxial position with the biomicroscope. A wide slit beam is decentered and adjusted to a half circle by using the slit width and height controls. The decentred slit beam is projected near the pupil margin through a dilated pupil. Careful composition can minimise the direct reflection.

ISO:	200			
Flash Intensity:	high			
Background:	0%			
Angle:	–			
Slit Beam:	2 mm			
Filter:	–			
Angle:	decentred			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	1

VITREOUS

NARROW SLIT BEAM

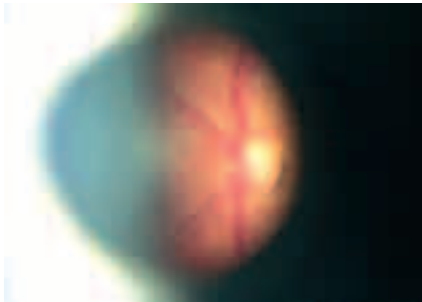


Without diagnostic lenses it is only possible to examine and to document the anterior part of the vitreous. Anterior Vitreous pathology can be seen with a narrow slit beam. Only when the dioptric power of the eye is reduced is it possible to focus more posteriorly.

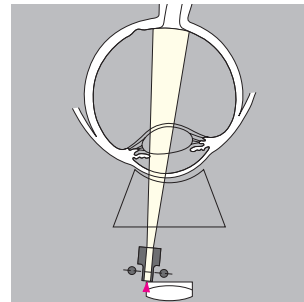
ISO:	200			
Flash Intensity:	high			
Background:	0%–10%			
Angle:	45°			
Slit Beam:	0.1–1.0 mm			
Filter:	–			
Angle:	45°			
Magnification:	10x	16x	25x	40x
Aperture:	–	1	1	–

FUNDUS

CENTRAL RETINA PHOTOGRAPHS WITH THE THREE-MIRROR CONTACT LENS

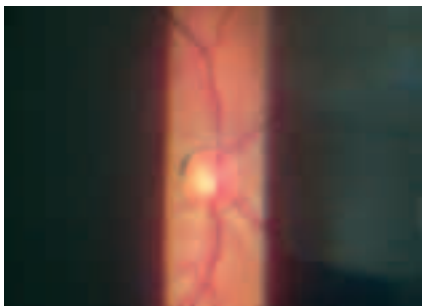


The posterior pole can be documented with the centre of the three-mirror contact lens. The slit lamp illuminator is in an almost coaxial position. If the slit beam is too wide disturbing light reflections may occur.

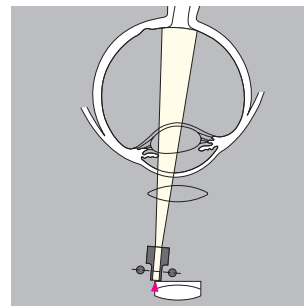


ISO:	200			
Flash Intensity:	high			
Background:	0%			
Angle:	–			
Slit Beam:	2 mm			
Filter:	10%			
Angle:	5°–10°			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	1

CENTRAL RETINA PHOTOGRAPHS WITH A 90-DIOPTER LENS



Diagnostic contact lenses are sometimes contraindicated after intra-ocular surgery. In such cases the use of the 90- dioptre lens is necessary. The handling of this lens is more difficult because there is no physical contact with the eye. A moderate slit beam in the almost coaxial position gives the best results.



ISO:	200			
Flash Intensity:	high			
Background:	0%			
Angle:	–			
Slit Beam:	2 mm			
Filter:	10%			
Angle:	5°–10°			
Magnification:	10x	16x	25x	40x
Aperture:	–	2	1	–

Recommended Reading

Clinical Slit Lamp Biomicroscopy and
Photo Slit Lamp Biomicrography
Martonyi, Bahn & Meyer

Time One Ink, Ltd.
Sedona, AZ

Copies of this and other books of interest
to the Ophthalmic Photographer can be
found at;
<http://www.twinchimney.com>

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Leyenburg Hospital, Den Haag, Netherlands

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