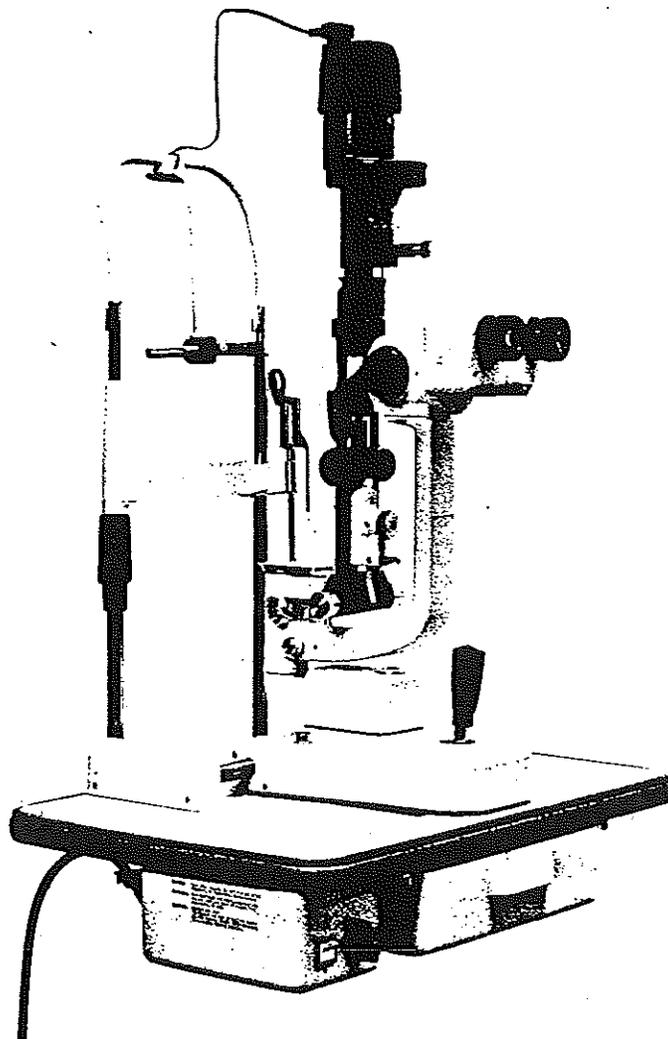
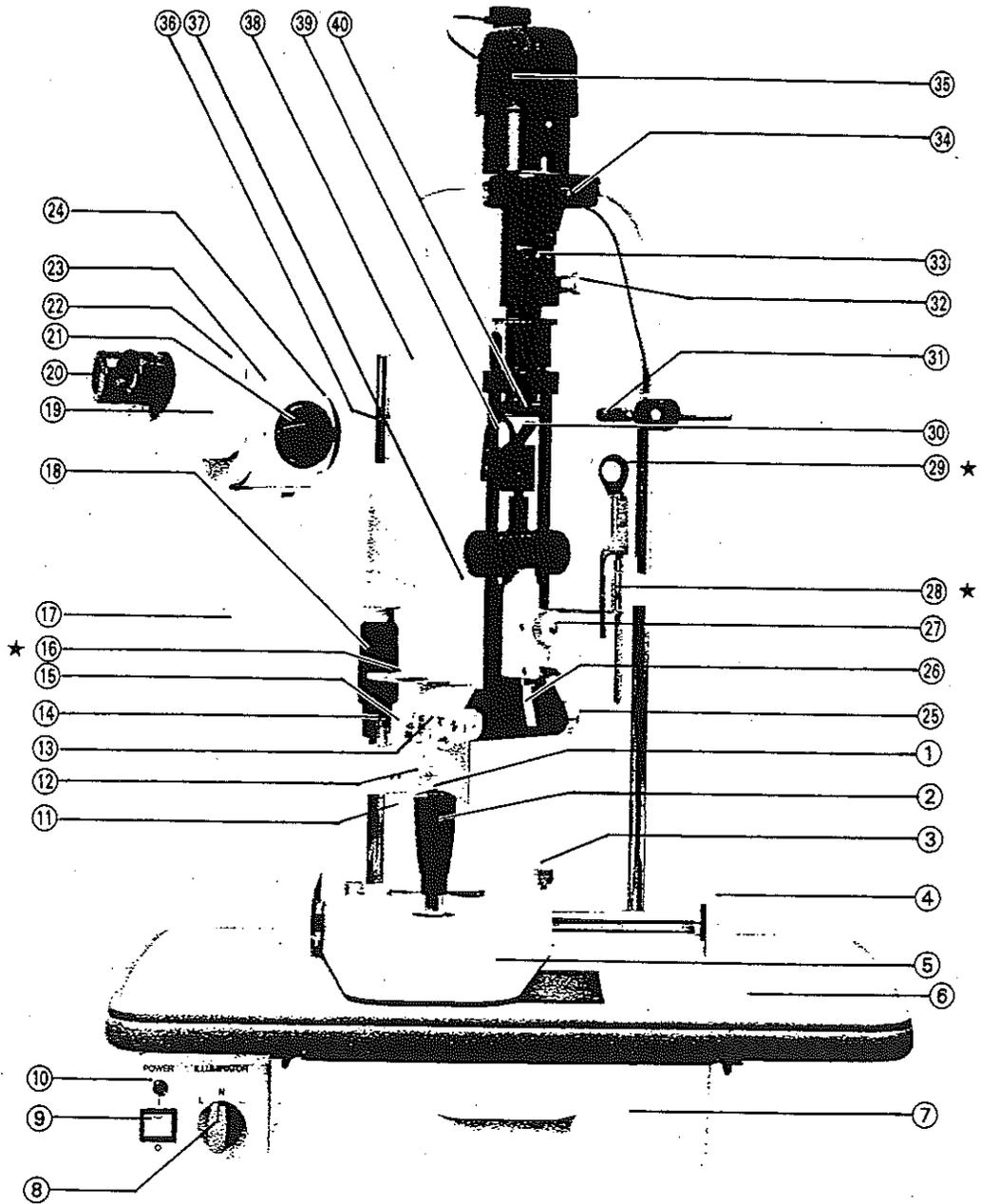

SLIT LAMP
SL-7E



Thank you for purchasing the TOPCON Slit Lamp SL-7E. To get the best use from the instrument, please carefully read these instructions and place it in a convenient location for future reference.

PRECAUTIONS

1. Always use or keep this instrument where it will be unaffected by heat, humidity or dust, and avoid exposing the instrument to direct sunlight.
2. Check that all cables are correctly and firmly connected.
3. Never touch the lens or prism surfaces with your finger or with any hard object.
4. Always turn the power source off before disconnecting the cables or when replacing the bulb and the Xenon flash lamp.
5. When disconnecting the cables, do not use excessive force and never attempt to unplug the connection by directly pulling on the cable.
6. If any trouble occurs with your instrument or its accessories, first refer to the troubleshooting guide in this manual and carry out the checks listed. If nothing is found by your check, then ask your dealer or TOPCON to service it.
7. Always turn the power source off and replace the cover on the instrument when it is not in use.



(★ Option)

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1. NOMENCLATURE

- ① **Photo-Flash Release Button**
- ② **Omni-directional Joystick**
For fine control of the instrument, incline this lever toward the intended direction. Turning the joystick controls the vertical movement.
- ③ **Cross-Slide Locking Screw**
- ④ **Rail Cover**
Covers the base tracking system.
- ⑤ **Cross-Slide Base**
Supports the microscope and illumination arms; moves in response with the joystick.
- ⑥ **Table-Top**
- ⑦ **Accessory Drawer**
For storing the focusing test rod and other accessories. (Not supplied with Unit Model Slit Lamp.)
- ⑧ **Brightness Control Switch**
Three brightness levels are available - L(low), N(normal), and H(high). Avoid using the instrument continuously at the high setting as the service life of the bulb will be shortened.
- ⑨ **Main Power Switch**
- ⑩ **Pilot Lamp**
- ⑪ **Balance Spring**
Balance for cross-slide vertical control is designed for the weight with no photographic attachment. For balance when the photographic attachment is attached, set the spring.
- ⑫ **Microscope Arm Locking Knob**
Locks the rotational movement of the arm.
- ⑬ **Angle Scale**
: Match the long center on the microscope arm with the protractor scale on the illumination arm for establishing angles between the two arms.
: When the '0' setting on the protractor is matched with the shorter index line toward the practitioner, the right ocular will be occluded.
: When the '0' setting on the protractor is matched with the shorter index line toward the patient, the left ocular will be occluded.
- ⑭ **Click-Stop Roller**
Indicates when the illumination arm is at the center or '0' position with the microscope arm, or at 10° to either the right or left of the central position.
- ⑮ **Illumination Arm Locking Knob**
When the knob is tightened, the illumination arm is coupled to the microscope arm and they will rotate together. When loosened, the illumination arm rotates independently.
- ⑯ **Hruby Lens Guide Plate (Option)**
Also used as a mounting plate for the applanation tonometer.
- ⑰ **Arm Cover**
For photography, replace this arm cover with the other model.
- ⑱ **Chin-rest Elevation Control**
- ⑲ **Converging Binocular Tubes**
Allows for the interpupillary distance adjustment
- ⑳ **12.5x Magnification Eyepiece**
Before using the slit lamp, always obtain the proper dioptric settings for each eyepiece, otherwise a properly focused slit image will be unattainable. (See 3.1 Diopter Compensation on page 10)
- ㉑ **Magnification Selection Dial**
Five different magnifications are provided.

- 22 **Converging Binocular Tubes Fixing Screw**
- 23 **Applanation Tonometer Mount**
Accepts the Model R-900 Goldmann Applanation Tonometer as well as the pachometer attachments.
- 24 **Objective Lens**
- 25 **Slit Width Control Knob**
The slit width can be continuously varied from 0 to 10mm. A convenient scale is engraved on the left knob to provide approximate indications.
- 26 **Illumination Inclination Lever**
Four 5° inclination stops are provided - up to 20°.
- 27 **Centering Knob**
Loosening the knob allows the illumination to be moved from the parafoveal position for indirect retro-illumination. Tightening the knob brings the illumination into a parafoveal position with the microscope optics.
- 28 **Hruby Lens Holder (Option)**
- 29 **Hruby Lens (Option)**
Used for observation of the fundus and posterior segment of the vitreous body.
- 30 **Mirror**
Both long and short mirrors are provided. The long mirror is routinely used for most examination procedures. The short mirror is used when the long mirror interfere with the observation pathway, such as during funduscopy.
- 31 **Fixation Target**
Two types of fixation targets are available. One allows for diopter adjustments to aid the patients ability to view the target clearly while the other is an illuminated fixed spot target.
- 32 **Aperture and Slit Length Control Knob**
By turning this knob, the illumination aperture and length of the slit are controlled. Rotating the lamphouse in the horizontal direction by this knob rotates the slit.
- 33 **Filter Selection Lever**
Four filters are included.
- 34 **Aperture and Slit Length Display Window**
- 35 **Lamphouse**
- 36 **Lever Marker**
When the horizontal center of the patient's eye is placed in line with this level marker, the elevation of the microscope, which is controlled by the joystick, will also be at its center position.
- 37 **Chin-rest**
- 38 **Forehead Rest**
- 39 **Diffusion lens**
Used for anterior portion at low magnification, and for enlarging the illumination field for photography.
- 40 **Slit Diaphragm Control Ring**
Turn the ring, and the slit focal depth may be changed continuously. The ring is usually turned counterclockwise, when it is used, till it stops.

3

2. ASSEMBLY

These instructions are for assembling the Model SL-7E. Slit Lamp after all the components have been carefully removed from the shipping carton.

2.1 Components

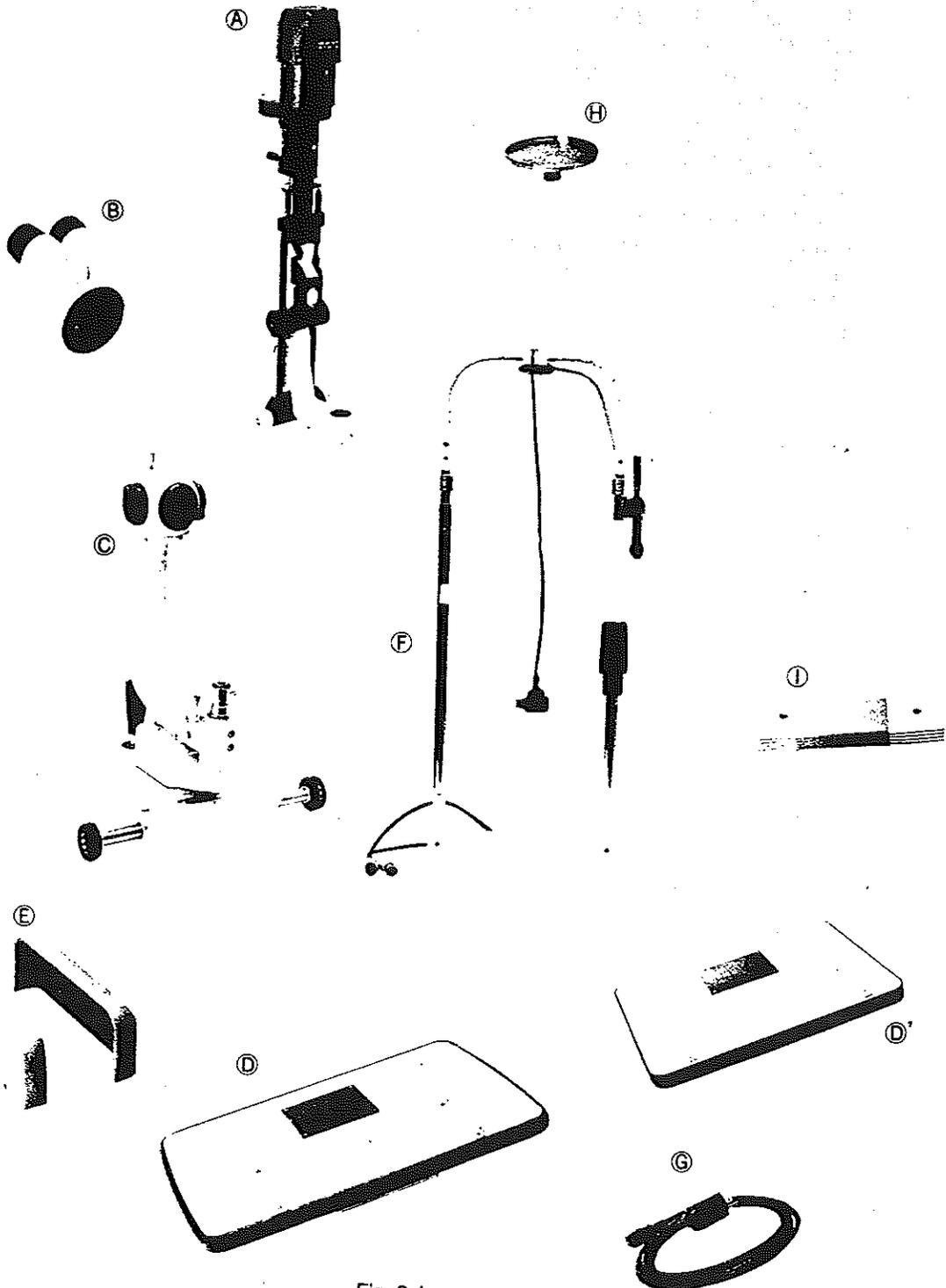


Fig. 2-1

Description

		Q'ty
Ⓐ	Illumination Assembly	1
Ⓑ	Converging Binocular Tubes	1
Ⓒ	Cross-slide Base Assembly	1
Ⓓ	Table-Top with Power Supply or Ⓓ' Unit Model Table-Top with Power Supply	1
Ⓔ	Rail Cover	2
Ⓕ	Chin-Rest Assembly	1
Ⓖ	Power Cable	1
Ⓗ	Arm Hole Cover	1
Ⓘ	Chin-Rest Paper	1
Ⓙ	Spare Fixation Target Bulb	1
Ⓚ	Focusing Test Rod	1
Ⓛ	Fixation Target	1
Ⓜ	Short Mirror	1
Ⓝ	Spare Long Mirror	1
Ⓟ	Spare Illumination Bulb	1
Ⓟ	Spare Socket	1
Ⓠ	Spare Fuse	3
	(Taped onto the rear of the power supply)	
Ⓡ	Spare Chin-Rest Paper Pin	2
Ⓢ	Brush	1
Ⓣ	Dust Cover	1
Ⓤ	Instruction Manual	1
Ⓥ	Accessory Box supplied with Unit Model Slit Lamp	1
Ⓦ	Screwdriver	1
Ⓧ	Phillips Screwdriver	1
Ⓨ	Wrench (not supplied with Unit Model Slit Lamp)	1

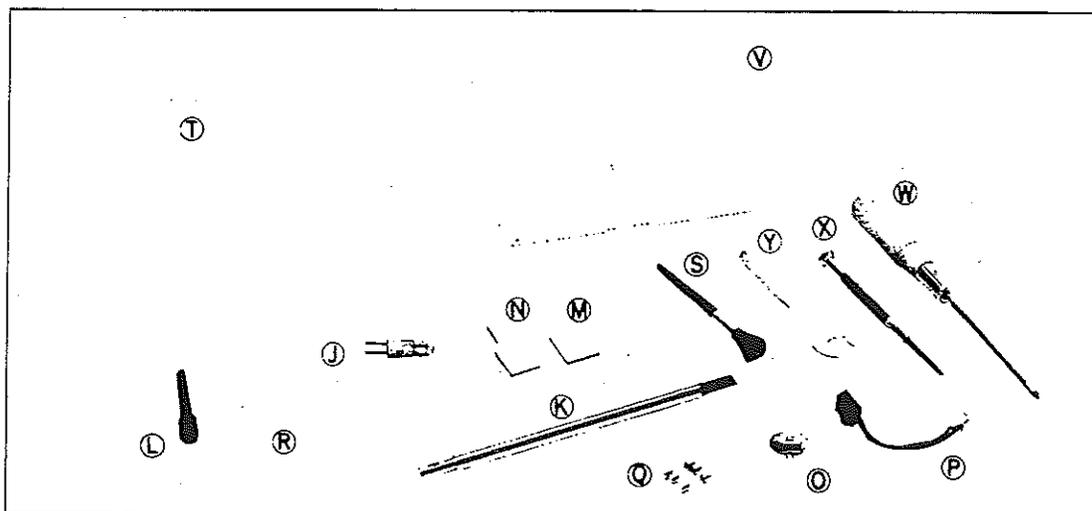


Fig. 2-2

2.2 Assembly Procedure

No special tools are required. Included tools are:

Screwdriver (Ⓢ)

Philips screwdriver (Ⓟ)

Wrench (Ⓜ)

(not supplied with unit model slit lamps)

(1) Selecting Voltage and Fuse

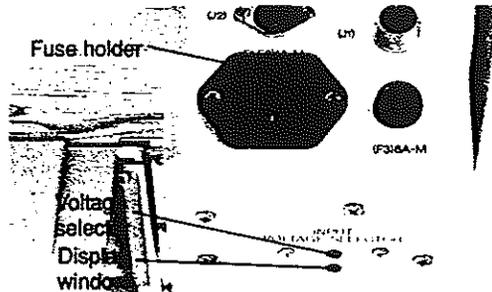


Fig. 3

- * Check the setting on the voltage selector, which is located on the bottom of the power supply.
- * If the selector does not match the outlet voltage, turn the selector to the proper setting with the philips screwdriver (Ⓟ).
- * Turn the center of the fuse holder with the screwdriver (Ⓢ), remove the fuse and check it's rating. Insure that the fuse is the correct rating for the supplied voltage:
100V or 120V - 1A
220V or 240V - 0.5A

(2) Mounting the Table-Top Ⓛ or Ⓛ'

(a) To attach the table-top on the instrument table AIT-20:

- * Remove the cover from the instrument table. Use wrench (Ⓜ) to unscrew 3 screws the cover.

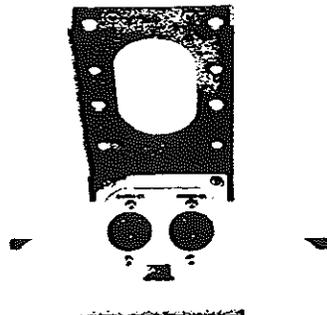


Fig. 4

- * Put Ⓛ on the table, and mount it onto the table, using attached 4 bolts.

Note:

If it is necessary to reverse the table direction, remove power supply from the Ⓛ bottom, and fit it onto the opposite side.

- * Connect Ⓞ to the table outlet and the power supply.

Ball the surplus cord, put it in the cover, and attach the cover.

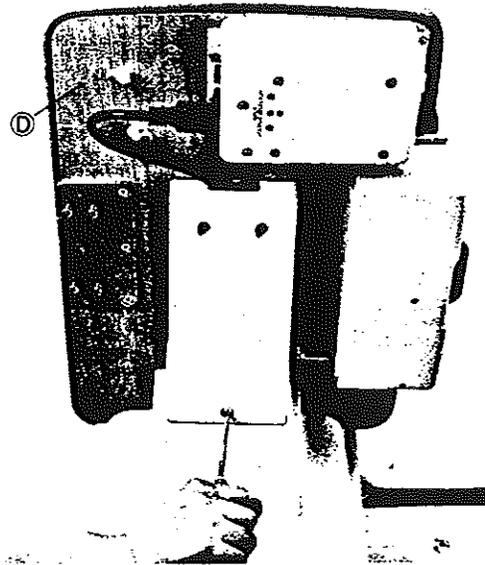


Fig. 5

- (b) To attach the table-top on the instrument table AIT-10- IT-1, use the four 8 x 24mm bolts with locking washers.

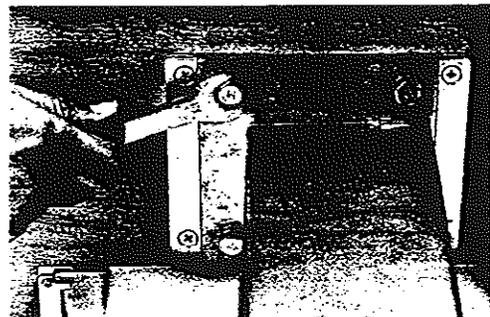


Fig. 6

- * Raise the table-top to allow the bolts to pass through the mounting flange.

- * Place the table-top on the mounting flange of the instrument table and screw the bolts into the mounting bracket. The controls of the power supply should face the practition-

- er. Tighten the bolts securely with the included wrench ⑦.
- (c) To attach the unit model table-top to the Ophthalmic Unit:

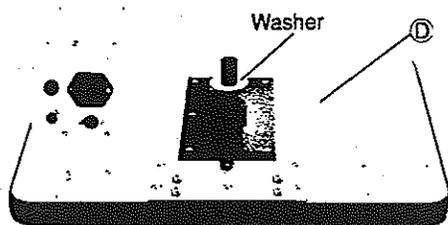


Fig.7

- * Peel off the tape which secures the plastic washer to the mounting bracket's shaft.
- * Insert the shaft of the mounting bracket into the hole of the arm on the ophthalmic unit. The plastic washer should be between the mounting bracket and the arm.

Note:

The power supply is attached to the left side of the unit top (practitioner's view). If the ophthalmic stand is located to the left of the ophthalmic chair, the power supply must be relocated to the right side of the unit top to prevent interference with the arm. In the instance, remove the four wood screws which attach the power supply to the unit top, re-position the power supply in a similar position to the right side of the unit top, and re-attach the power supply with the four screws.

(3) Mounting the Chin-Rest ⑥

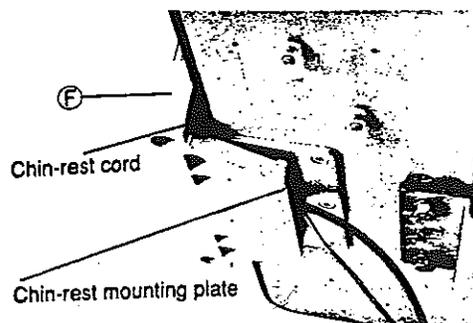


Fig.8

- * Remove the four screws which are attached to the chin-rest mounting plate with screwdriver ⑧.

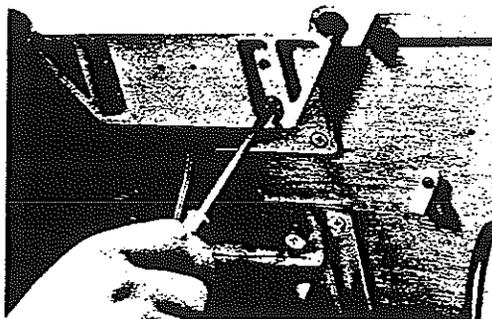


Fig. 9

- * Place the chin-rest cord in the gap between the chin-rest mounting plate and the chin-rest assembly. While making sure that the cord is not being pinched by the mounting plate, re-tighten the previously removed screws.

(4) Mounting the Cross-Slide Base Assembly and Rail Covers

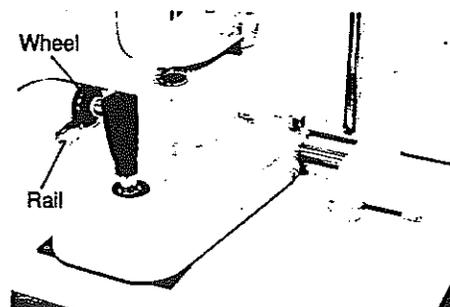


Fig.10

- * Place the wheels of the Cross-Slide base assembly evenly on the table rails.
- * After checking to see that the main unit moves smoothly on the rails.
- * Remove the four screws which are attached to the rail with the Philips screw-driver ⑩.
- * Place the rail cover to the rail, re-tighten the previously removed screws.

(5) Mounting the Illumination Assembly (A)

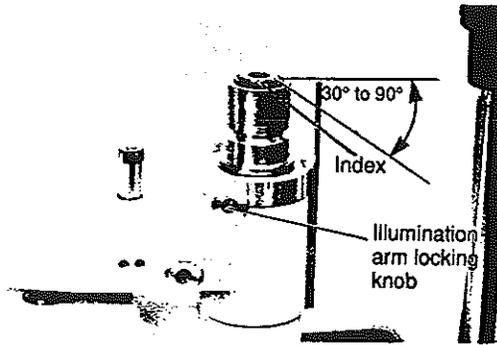


Fig.11

- * Loosen the illumination arm locking knob which is located on the base assembly.
- * Turn the brass bearing on the arm support shaft so that the red dot is 30° to 90° from the shaft index.
- * Loosen the set screw in the illumination arm with the Phillips screwdriver (D).

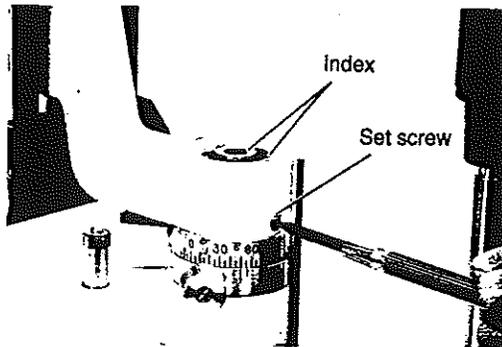


Fig. 12

- * Lower the illumination arm carefully into position while lining up the two red dots.
- * When the dots are properly aligned, re-tighten the set screw firmly to properly secure the illumination arm to the shaft of the base assembly.

(6) Mounting the Converging Binocular Tubes (B)

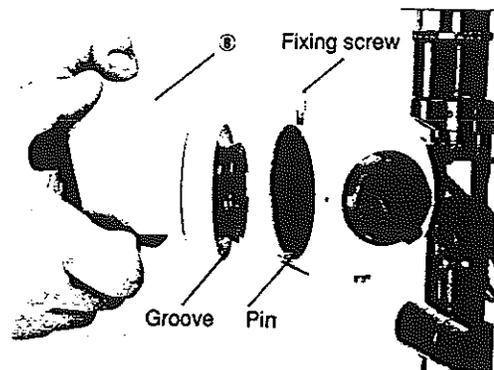


Fig. 13

- * Match the pin on the microscope body with the groove on the binocular tubes.
- * Fasten the fixing screw to secure the binocular eyepiece to the main body.
Note: Avoid touching any of the lens surfaces.

(7) Removing the Illumination Shipping Pad

- * The pad is attached to protect the slit closure mechanism of the illumination arm assembly during shipping.
- * Remove the rubber band and gently pull the pad out.

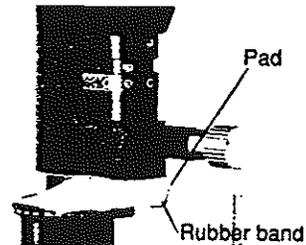


Fig. 14

(8) Connecting Cables

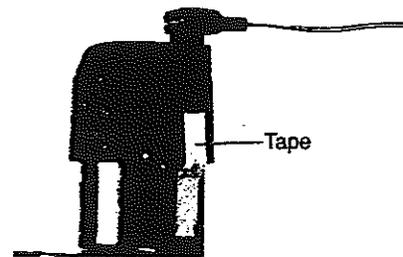


Fig. 15

- (a) Connect the cable from the top of the chinrest to the lamphouse cover on illumination assembly.

- * Peel off the tape which secures the lamp-house cover during shipping.

(b) Connect the chin-rest cable, main body cable and power cable to the power supply.

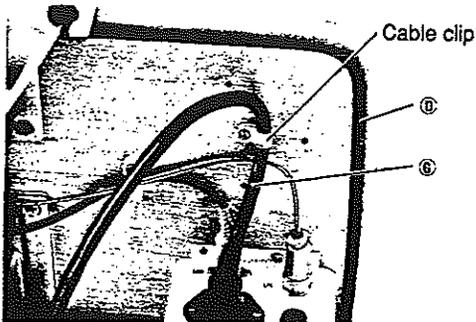


Fig. 16

(c) Remove the cable clips from the bottom of the table-top, slip them over the chin-rest and power cables and re-attach them to the table-top.

(9) Installing the Chin-Rest Paper

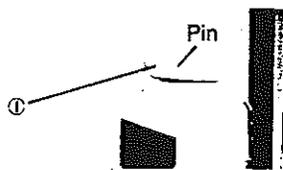


Fig. 17

- * Remove the two pins from the Chin-rest.
- * Place the pins through the holes in the chin-rest paper. Remove the wrapping from the chin-rest paper.
- * Align the pins with the holes in the chin-rest and secure the paper to the assembly.

(10) Spare Parts

- * With the table model, an accessory drawer is provided to store the spare parts (①-⑤).

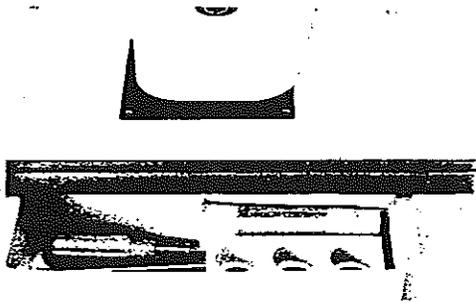


Fig. 18

- * With the unit model, an accessory box is supplied to store the spare parts (③-⑤).

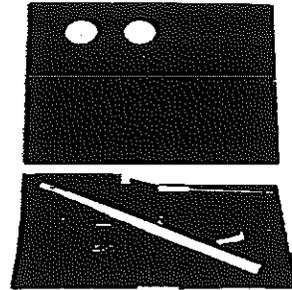


Fig. 19

(11) Mounting the Hruby Lens and Hruby Lens Guide Plate (Option)

Mount the Hruby lens holder and the Hruby lens rail unit onto the chin-rest assembly, using four screws.

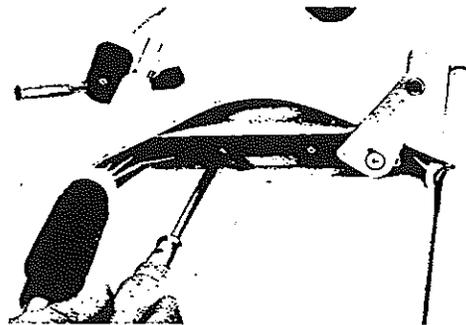


Fig. 20-1

- * Insert the Hruby lens and Hruby lens holder, which is located on the chin-rest assembly. Do not touch the lens surface.

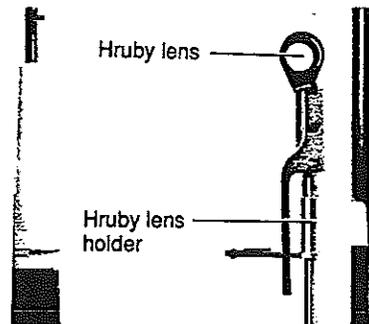


Fig. 20-2

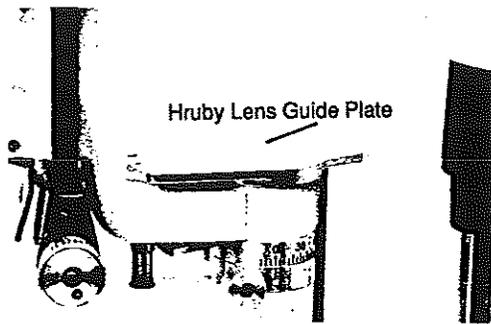


Fig. 21

*Place the guide plate in the hole of the main body's carrier arm. The pointed end should face the chin-rest.

2.3 Checking Procedure

(1) Power Plug

- * The instrument is supplied with a 3-wire plug. If the plug does not match the power outlet, either replace the plug or use an approved adapter.
- * Make sure that the instrument is always properly grounded.

(2) Illumination and instrument Functions

- * Turn the power supply on and observe that the illumination is passing through the opened slit controls.

* Check to insure that the fixation device is illuminated.

* Check to see that the slit width and length controls, filter lever and magnification changer lever operate smoothly and properly.

(3) After the installation is completed, turn the power supply off and cover the instrument with the dust cover.

3. OPERATION PROCEDURES

3.1 Preparation — diopter compensation and interpupillary distance adjustment

Before using the instrument, always carry out the diopter compensation and interpupillary distance adjustments.

(1) Use of the focusing test rod

The focusing test rod, which is a standard accessory, is used to establish the proper microscope settings for each use. The rod is inserted in the hole, which normally contains the Hruby lens guide plate. Place the rod in the hole and turn it so that the flat black surface is perpendicular to the microscope's objective lens.

(2) Preparation of illumination unit

Turn the main power switch ⑨ ON. Set the brightness control switch ⑩ at the 'N' position then set the slit width control knob ⑪ so that slit size is approximately 2 to 3mm wide.

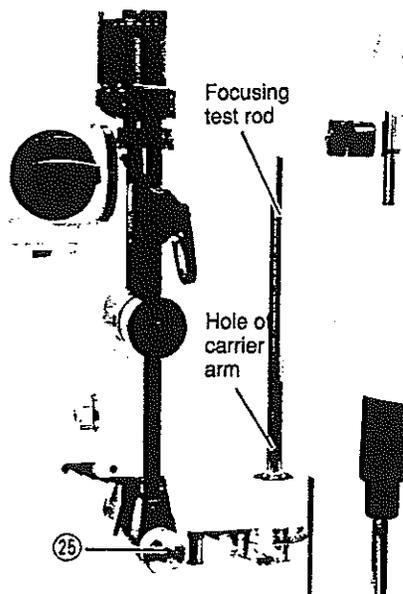


Fig. 22

(3) Diopter compensation

One of the binocular eyepieces ⑫ has a (+/-) scale. Usually this is placed in the right ocular as an aid in obtaining properly focused photographs with the optional accessory photographic attachment.

To establish the current dioptic setting:

*First, turn the eyepiece ring in a counter-clockwise(+) direction until it stops.

*Now, turn the ring in a clockwise direction until a sharp, slit image is seen on the focusing test rod.

*Follow the same procedure for the other ocular.

- * Denote the diopter values on each ocular for future reference.

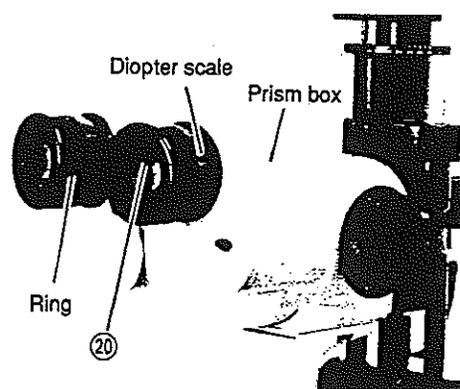


Fig. 23

(4) Interpupillary distance adjustment

While looking through the eyepieces at the image on the focusing test rod, adjust the converging binocular's prism box, so that the image is fused and a stereo-scopic image results.

3.2 Patient position and fixation target

(1) Positioning patient's head

Have the patient place his chin on the chin-rest ⑰ and forehead against the forehead rest ⑱. Adjust the chin-rest elevation control ⑲ so that the patient's outer canthus is at the approximate height of the level marker ⑳.

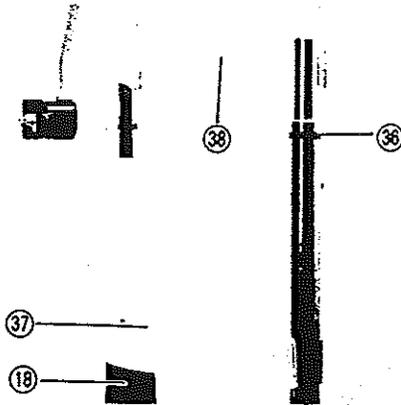


Fig. 24

(2) To establish patient fixation

To maintain patient fixation, have the patient observe the fixation target ㉑ with the eye not being tested. To alter fixation, move the position of the target by the fixation target lever.

The fixation target, which allows diopter compensation, provides a dot and concentric circle target. The ring target permits focusing in the range from $-15D$ to $+10D$.

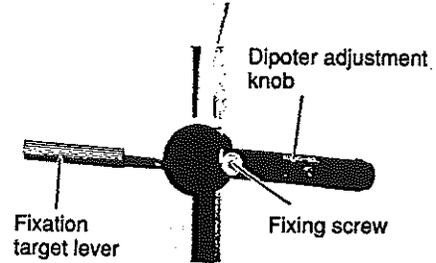


Fig. 25

Fixation target allowing diopter compensation

The luminous target is used for examination of myopic eye exceeding $-15D$. To replace the target, loosen the locking screw and remove the target assembly. (Avoid overloosening the screw, or it may drop.)

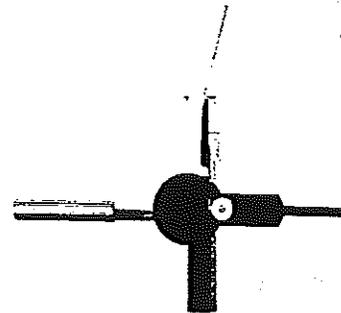


Fig. 26

Luminous fixation target

3.3 Base operation

(1) Horizontal gross adjustment

To adjust the microscope's position horizontally, move the base ㉒ while keeping the joystick ㉓ in the vertical position.

(2) Horizontal fine adjustment

For fine adjustment, such as alignment or focusing, tilt the joystick ㉓ to the left or the right.

(3) Vertical fine adjustment

For fine vertical adjustment, turn the joystick ㉓ clockwise to raise the microscope and counter-clockwise to lower it.

(4) Locking the base

To lock the base ㉒, tighten the cross-slide locking screw ㉔.

(5) Focusing

* Gross adjustment for alignment of focusing is done by the operation described in (1).

* Fine adjustment for alignment or focusing should be done by the operations described in (2) and (3) while looking through the microscope.

3.2 Patient position and fixation target

(1) Positioning patient's head

Have the patient place his chin on the chin-rest ⑩ and forehead against the forehead rest ⑪. Adjust the chin-rest elevation control ⑫ so that the patient's outer canthus is at he approximate height of the level marker ⑬.

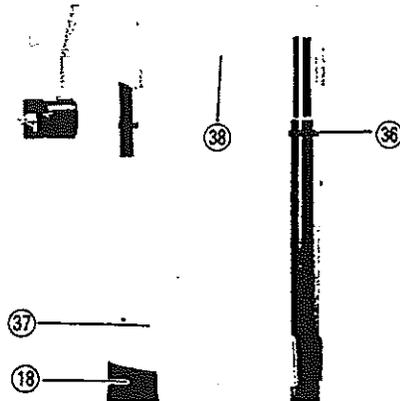


Fig. 24

(2) To establish patient fixation

To maintain patient fixation, have the patient observe the fixation target ⑮ with the eye not being tested. To alter fixation, move the position of the target by the fixation target lever.

The fixation target, which allows diopter compensation, provides a dot and concentric circle target. The ring target permits focusing in the range from $-15D$ to $+10D$.

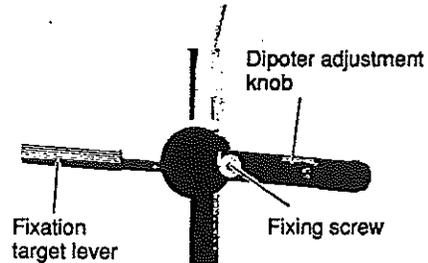


Fig. 25

Fixation target allowing diopter compensation

The luminous fixation target is used for examination of myopic eye exceeding $-15D$. To replace the target, loosen the locking screw and remove the target assembly. (Avoid overloosening the screw, or it may drop.)

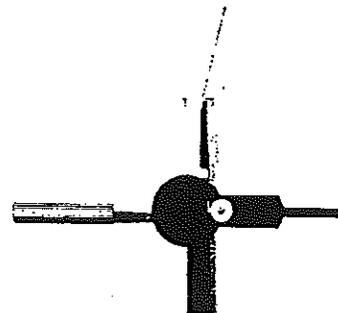


Fig. 26

Luminous fixation target

3.3 Base operation

(1) Horizontal gross adjustment

To adjust the microscope's position horizontally, move the base ⑯ while keeping the joystick ② in the vertical position.

(2) Horizontal fine adjustment

For fine adjustment, such as alignment or focusing, tilt the joystick ② to the left or the right.

(3) Vertical fine adjustment

For fine vertical adjustment, turn the joystick ② clockwise to raise the microscope and counter-clockwise to lower it.

(4) Locking the base

To lock the base ⑯, tighten the cross-slide locking screw ⑰.

(5) Focusing

- * Gross adjustment for alignment of focusing is done by the operation described in (1).
- * Fine adjustment for alignment or focusing should be done by the operations described in (2) and (3) while looking through the microscope.

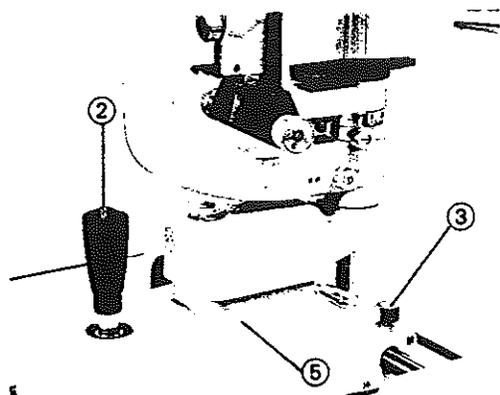


Fig. 27

3.4 Operation of the illumination unit

(1) Altering the slit size

By operating the slit width control knob (25), the slit width can be changed from 0 to 9mm (at the 9mm size, the slit becomes a circle). The scale should be used simply as a guide-line. Your examination purpose will dictate the correct slit size.

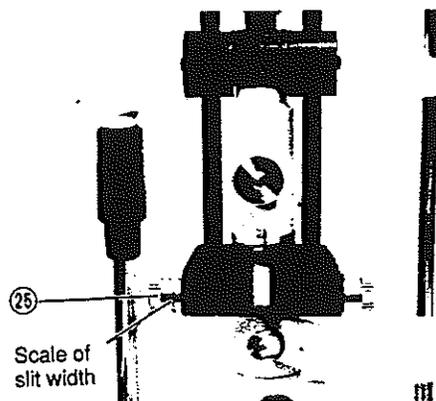


Fig. 28

(2) Changing aperture and slit length

By operating the aperture and slit length control knob (32), 7 different circular beams of light are available at full aperture: 9, 8, 5, 3, 2, 1 and 0.2mm dia.. With a slit image, the slit length can be changed continuously from 1 to 9mm with this knob.

The values obtained are indicated through the display window (34).

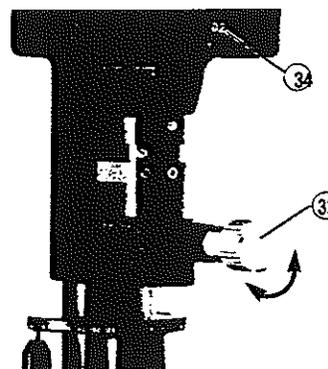


Fig. 29

(3) Rotating the slit image

By moving the aperture and slit length control knob (32) horizontally, the slit image is rotated from the vertical through any oblique angle to the horizontal.

The angle of image rotation is indicated by the rotation angle scale.

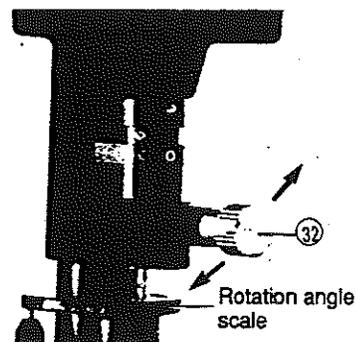


Fig. 30

(4) Decentering the slit beam

The illumination can be moved from the parfocal position with the microscope by loosening the centering knob. The illuminated image then would move away from the center of the microscope's field of view. It is of particular benefit in indirect retro-illumination techniques. To return the slit image to the center of the field of view, tighten the slit centering knob ⑳ firmly.

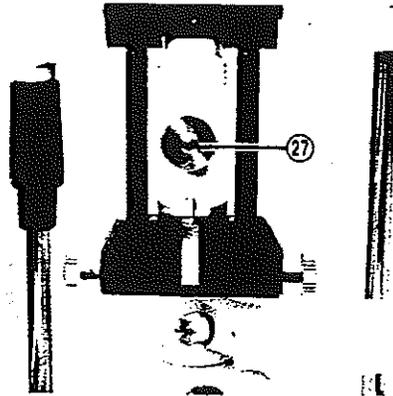


Fig.31

(5) Oblique illumination

Oblique illumination is used for sectional or fundus examination by use of a contact lens, etc. (i.e. gonioscopy). As the inclination lever ㉞ is released, and the arm is pulled towards you, the illumination unit inclines by 5° steps to 20°. Since the illumination unit may contact the patient's face, proceed carefully.

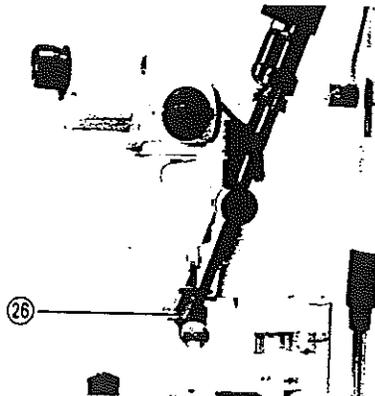


Fig. 32

(6) Reflection mirror

Two mirrors are supplied with the SL-7F, one is a long mirror ㉠ and the other is a short mirror which has no protruding surfaces. Usually, for most examinations, the long mirror is

used. However, when the angle between the illumination unit and the microscope is within approximately 3° to 10°, the observed image is disturbed. In this case, use the short mirror.

When using the short mirror, incline the illumination unit to more than 10°.



Fig. 33

* Replacing the mirror

- 1) Set the angle between the microscope and illumination arms to exceed 30°.
- 2) Incline the illumination column at 10° or more.
- 3) Remove the long mirror by holding on to the extended surface.
- 4) Insert the beveled side of the short mirror.
- 5) When removing the short mirror, since it has no extension, use an object with a sharp end to carefully push it out as shown below.

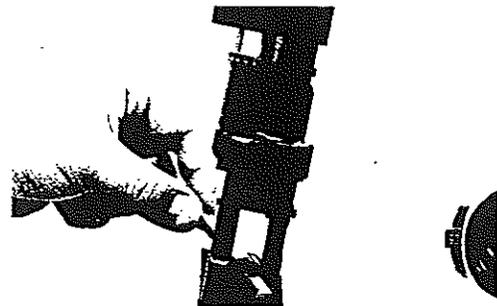


Fig. 34

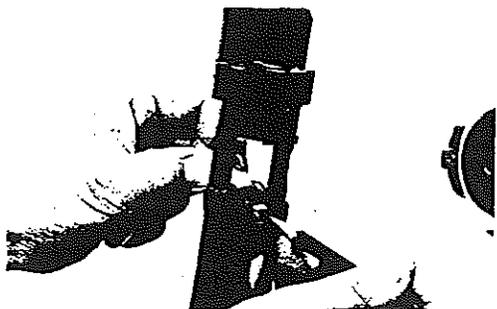


Fig. 35

(7) Filter selection

By shifting the filter selection lever ⑳, four different filters can be inserted into the illumination pathway.

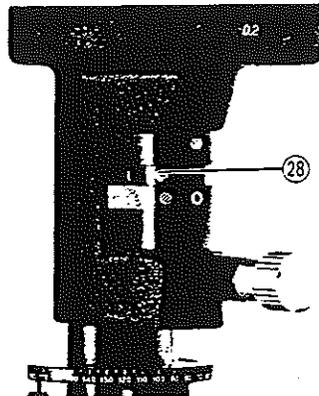
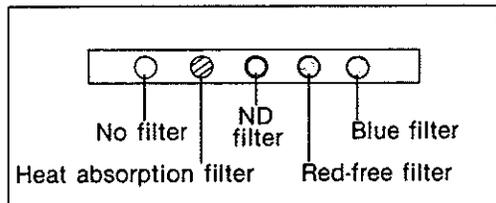


Fig. 36

Usually, the heat absorption filter is used for patient comfort.

(8) Slit diaphragm

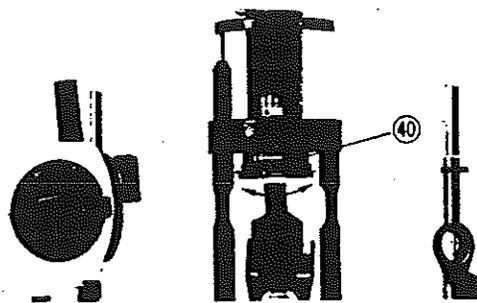


Fig. 37

Turn the slit diaphragm ring ④, and the depth of a vertical slit image can be continuously adjusted (NA0.01 - 0.06).

Make the slit narrow and turn the ring counterclockwise, and the slit illumination focal depth will be less. Turn it clockwise, and the depth will be more.

*As the focal depth is set deeper, illumination will be darker. Then, increase the light intensity accordingly.

*Use the slit diaphragm normally with the ring turned counterclockwise to the full.

3.5 Fundus observation with the Hruby lens (Option)

In routine applications, only the anterior segment of the vitreous body can be examined because of the refraction effects of the cornea and crystalline lens. However, with the Hruby Lens, examination of the fundus and the posterior segment of the vitreous body is possible.

Operation procedure:

- (1) The pupil should be well dilated by administering a mydriatic approximately 20 minutes before the examination.
- (2) Insert the Hruby Lens guide plate ⑮ into the hole at the rotational axis of the illumination and microscope arms.
- (3) Raise lever (A) shown in the illustration below, and move the Hruby Lens holder toward you so that it now can move to the right and left under the chin-rest. Insert the lower end of the Hruby Lens ⑳ shank in the groove on the guide plate.
- (4) Center the illumination and microscope arms so that they face the patient's eye.
- (5) Align lever (B), shown in the illustration below, with the center of the microscope's field of view. Then move the lever (B) backward and forward to position close to the patient's eye.
- (6) Use the joystick ① to focus on the fundus. The slit width and length will have to be adjusted to reduce the undesirable reflections seen in the field of view.
- (7) To view a different segment, either turn the microscope and illumination arms or have the patient alter fixation by manipulating the fixation target.

- (8) If the long mirror interferes in the examination, replace it with the short mirror.

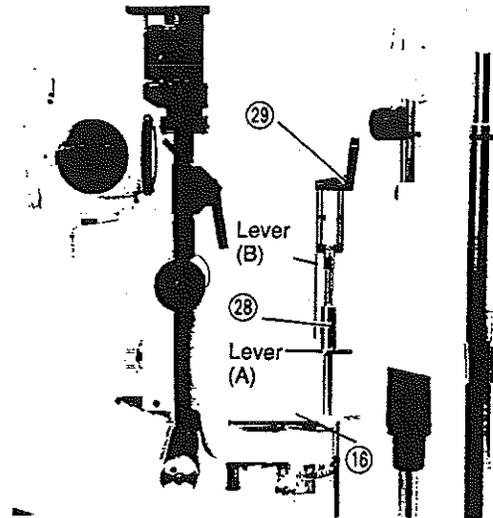


Fig. 38

Note:

- When moving the instrument to examine the fellow eye, first have the patient move away from the chin-rest and the patient's nose may come in contact with the Hruby Lens.
- (9) After the procedure, move the Hruby Lens to the storage position on the right side of the chin-rest.

4. MAINTENANCE

4.1 Replacing the bulb

When replacing the main bulb, use care and follow the prescribed procedure, as the internal metal components become extremely hot.

- * Turn the main power switch ⑧ OFF.
 - * Pull out the plug which is attached to the lamphouse cover ⑨.
- Turn the lamphouse cover and remove it from the illumination unit.

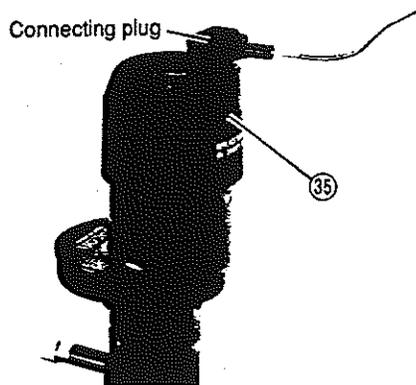


Fig. 39

- * Loosen the two clamping screw as illustrated below, turn the clamping lever in direction of the arrow, and remove the socket and bulb assembly.

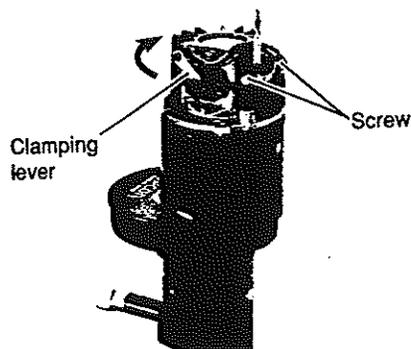


Fig. 40-1

- * Remove the old bulb — use care as it may be extremely hot — and insert the new bulb into the socket.
- * Place the bulb assembly into the housing

by aligning the guide with the groove in the bulb flange.

- * The groove in the bulb flange should be properly aligned with the guide, otherwise uneven illumination will result.
- * Replace the cover in its original position and turn in a clockwise direction. Insert the the connecting plug.
- * Turn the main power switch ON and check to see that the new bulb is illuminated.

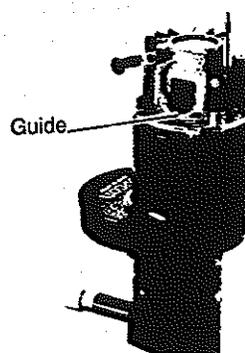


Fig. 40-2

- (2) Replacing the fixation target bulb
- * Turn the main power switch ⑧ OFF.
 - * Loosen the locking screw and remove the fixation target. (Do not over-loosen the locking screw, or it may drop.)
 - * Hold the top of the bulb and pull it out; then insert the new bulb.
 - * Insert the fixation target, then tighten the locking screw.
 - * Turn the main power switch ON and check to see that the fixation bulb is properly illuminated.

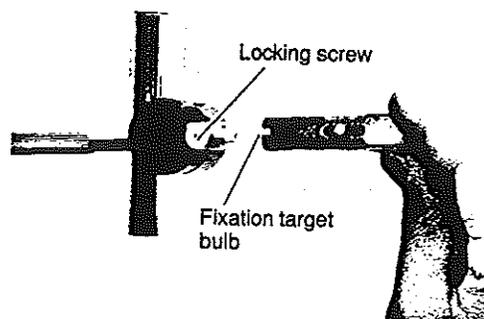


Fig. 41

4.2 Replacing the fuse

- * First, turn the main power switch ⑨ OFF, and remove the power cable from the outlet.
- * With a screwdriver, turn the center of the fuse holder.
- * Replace it with a new fuse and then tighten the center of the fuse holder.
- * Always use the same type of fuse as indicated in the holder.

F1, F2: 1A (100V, 120V)
 0.5A (220V, 240V)
 F3: 6A

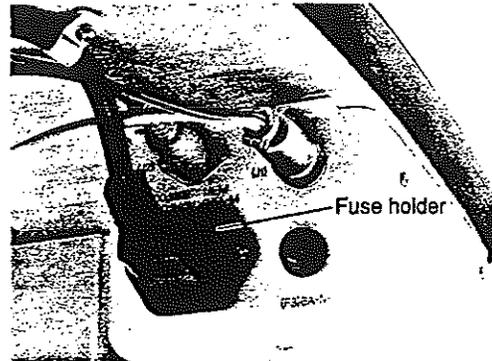


Fig. 42

4.3 Replacing the chin-rest paper

If the chin-rest paper supply is depleted, remove the pins on the chin-rest, place the new package of paper over the chin-rest and replace the two locating pins.



Fig. 43

4.4 Adjustment of the slit width control knob

If the movement of the slit width control knob ⑩ becomes too light and the slit width tends to collapse, adjust the tension by tightening the screw in the center of the knob.



Fig. 44

4.5 Adjustment of the inclination movement

If the tension on the inclination mechanism becomes too light, the proper movement can be re-obtained by tightening the screws on both sides of the pivot joint.

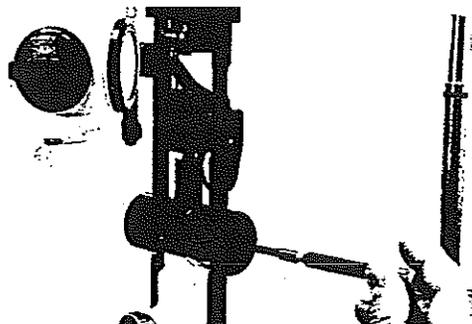


Fig. 45

4.6 Cleaning

(1) Cleaning the lens and mirror

If any dust settles on the lens or mirror, remove it as follows:

Use the cleaning brush, which is included in the standard accessories, to remove the dust. In case any dust still remains, wipe it off using a soft cotton cloth moistened with a little alcohol. Never use your finger or any hard object for cleaning.

(2) Cleaning the gliding plate, base rail and shaft

If the gliding plate or cross-slide rail and shaft are dirty, an unsmooth vertical or horizontal movement of the cross-slide results. Clean them by using a dry cloth.

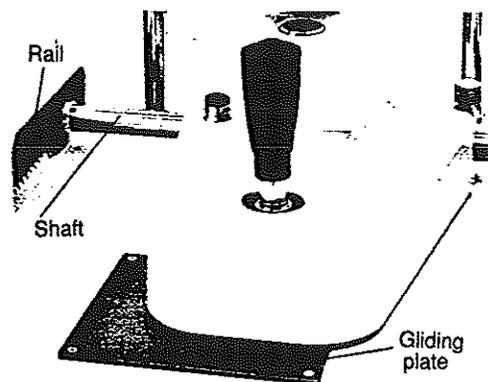


Fig. 46

(3) Cleaning the plastic parts

To clean the plastic parts, such as chin-rest and forehead rest, use only a cloth moistened with a solution of neutral detergent and water to wipe off the accumulated dust. Avoid using other types of cleansers.

4.7 Ordering supplies

To order the following replacement parts, be sure to specify the product name, part number and quantity required.

Product name	Part number	Appearance
Illumination bulb	40340 20700	
Chin-rest paper	40310 40820	
Fuse 1A (100V,120V) 0.5A (220V,240V) 6A	44635 60030 44670 81040 44635 60040	
Socket	44670 25900	
Fixation target bulb	40350 42110	

5. BEFORE REQUESTING SERVICE — TROUBLE SHOOTING GUIDE

If any problem should occur, first consult the following trouble shooting table, and follow the suggested instructions. Then, if the trouble is not corrected, contact your nearest TOPCON dealer.

Trouble	Possible Cause	Remedy	Refer to
No illumination	Power cable is not properly connected to the power outlet.	Connect cable to the outlet.	P.7
	Main power switch is still OFF.	Turn main power switch  ON.	—
	The plug on the lamp house cover is loose.	Insert the plug firmly.	P.7
	The bulb socket is damaged from the heat.	Replace the socket.	P.16
	The bulb has burned out.	Replace the bulb.	P.16
	Fuse has blown.	Replace the fuse.	P.17
Slit light is too dim	The bulb is not correctly inserted.	Insert bulb correctly.	P.16
	Filter lever is at ND position, or at an intermediate position.	Set the filter lever  to the correct position.	P.14
	Slit diaphragm control ring  is closed.	Turn the control ring counterclockwise.	P.14
	Voltage selector setting is incorrect.	Check voltage selector and set it to the correction position.	P.5
Fuse has blown	Voltage selector setting is incorrect.	Check voltage selector and set it to the correction position.	P.5
	Type of fuse used is correct.	Replace with the correct type as specified.	P.17
Slit width closes by itself	Tension on the slit width control knob is too weak.	Tighten the screw at the center of slit width control knob  to adjust the tension.	P.17
Fixation bulb does not light	The connecting cable between power source and chin-rest is not correct.	Insert the power cable firmly in outlet.	P.7
	The fixation target bulb has burned out.	Replace the fixation target bulb.	P.15

6. OPTIONAL ACCESSORIES

6.1 35mm Photographic Attachment for TOPCON 35mm camera

6.1.1 NOMENCLATURE

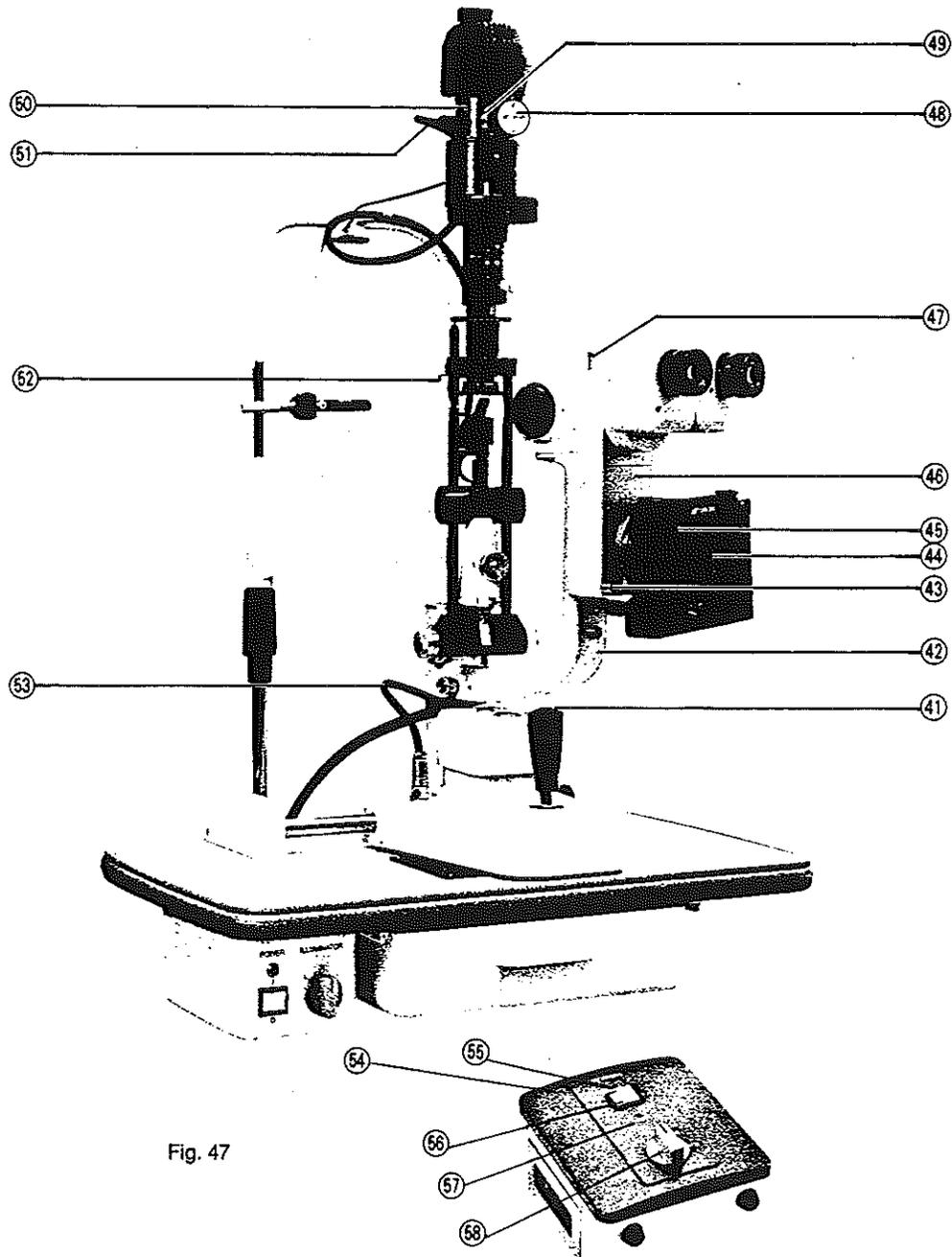


Fig. 47

- ④① **Shutter release button**
- ④② **Photographic arm cover (with connector and cord)**
- ④③ **Camera detach/attach lever**
To detach/attach the 35mm camera to the photographic attachment.
(See page 28)
- ④④ **Memo holder**
To contain the outer box lid of film in use.
- ④⑤ **TOPCON 35mm camera with motor drive**
- ④⑥ **Full frame attachment for TOPCON 35mm camera**
The image in the right ocular is photographed. The stereoscopic attachment can be also installed in place of this attachment.
- ④⑦ **Photographic attachment detach/attach lever**
To detach/attach the photographic attachment to the main body of the slit lamp. (See page 28)
- ④⑧ **Xenon relay cord**
- ④⑨ **Xenon lamp**
- ⑤① **Relay lens unit**
- ⑤② **Background illumination unit**
To provide a soft fill light for slit photography.
- ⑤③ **Background illumination selection lever**
3 settings: 2 light intensity settings and fully occluded setting out are available: L (low), H (high), and occluded.
- ⑤④ **Base relay cord**
- ⑤⑤ **Power supply for the photographic system**
- ⑤⑥ **Pilot lamp**
- ⑤⑦ **Power switch**
- ⑤⑧ **Charge lamp**
When the power supply is completely recharged, the lamp illuminates. If an exposure is made when the lamp is not light, there will be insufficient light for a proper exposure. First check that the charge lamp is illuminated before activating the shutter release. Charging of the power supply takes approximately 6 seconds or less for 160WSx2 maximum output.
- ⑤⑨ **Flash intensity selector dial**
5 light intensity steps are available. Selection should not be done while the power supply is being recharged (when charge lamp ⑤⑧ is off).

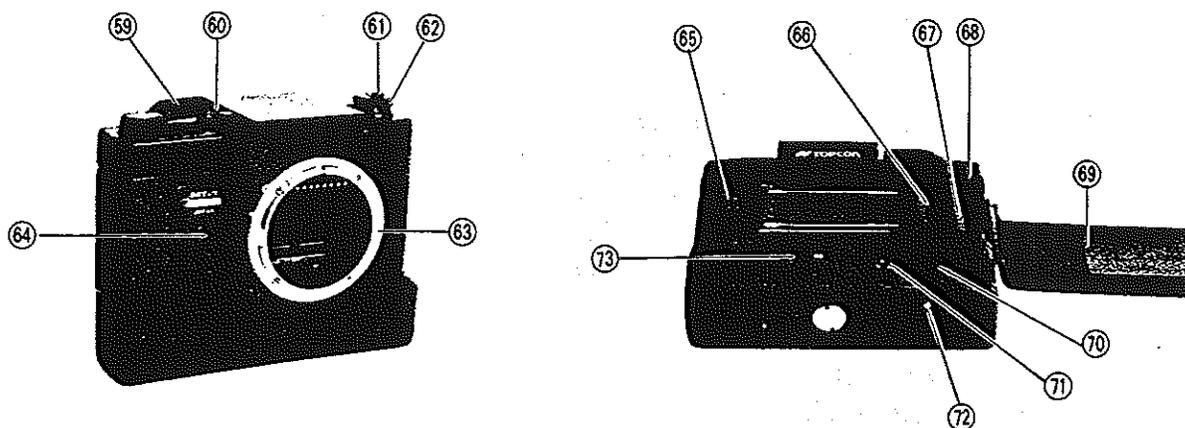


Fig. 48

- TOPCON 35mm camera with motor drive

- ⑤⑨ **Film winding lever**
- ⑥⑩ **Finder attachment button**
- ⑥① **Rewind crank**
- ⑥② **Back-cover release knob**
- ⑥③ **Mount**
- ⑥④ **Shutter release lever**
Turn this lever to release the shutter when motor drive switch is turned off for manual advancing.
- ⑥⑤ **Cartridge chamber**
- ⑥⑥ **Sprocket**
- ⑥⑦ **Spool groove**
- ⑥⑧ **Film counter**
Illuminated when film is loaded.
- ⑥⑨ **Back-cover**
- ⑦⑩ **Motor drive switch**
In case film stops in the course of advancing and alarm lamp ⑦① lights on, turn this switch off, and advance or rewind film manually.
- ⑦① **Alarm lamp**
Illuminates on when film stops in the course of advancing. Turn off the motor drive switch ⑦⑩.
- ⑦② **Rewind button**
- ⑦③ **Photographing speed selector**
S: Single photography
1: Continuous photography of 1 frame/sec.
2: Continuous photography of 2 frames/sec.

6.1.2 ASSEMBLY

These instructions describe the installation of the 35mm photographic attachment for TOPCON 35mm camera onto the Model SL-7E Slit Lamp. Please read them carefully and keep them in a convenient location for future reference.

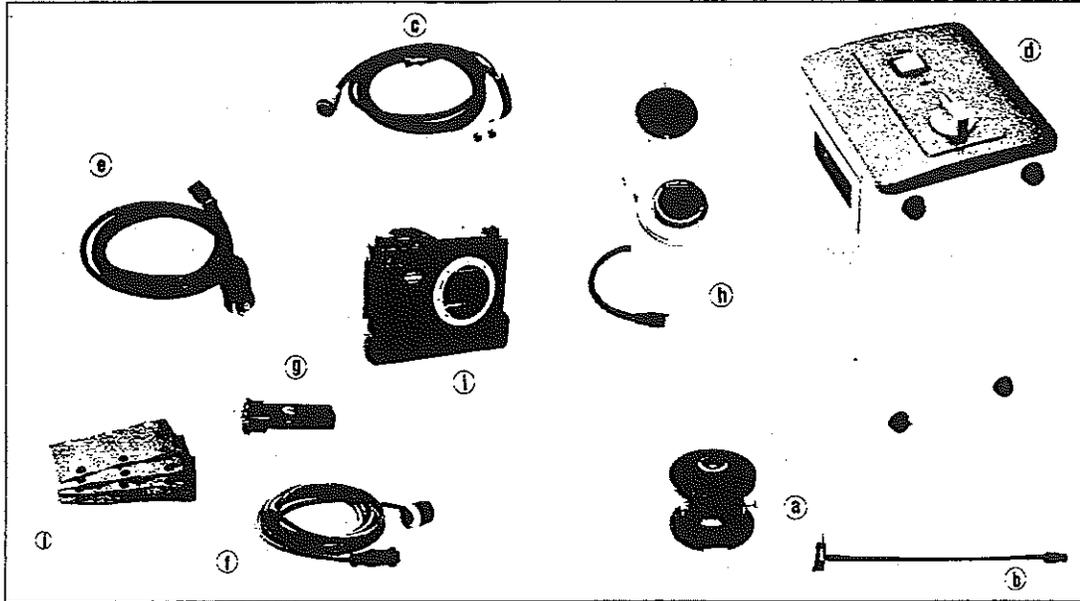


Fig. 49

6.1.2.1 Components

	Description	Q'ty
③	Relay lens unit	1
④	Background illumination unit	1
⑤	Photographic Arm Cover (with connector and cord)	1
⑥	Power supply	1
⑦	Power cable	1
⑧	Xenon relay cord (with 4 cord clips)	1
⑨	Xenon lamp	1
⑩	Full frame attachment for TOPCON 35mm camera	1
⑪	TOPCON 35mm camera with motor drive	1
⑫	Cord Holder	4

6.1.2.2 Assembly Procedure

(1) Mounting the relay lens unit

(a)

- (a) Remove the lamphouse cover by unplugging the illumination cord and turning the cover counterclockwise.

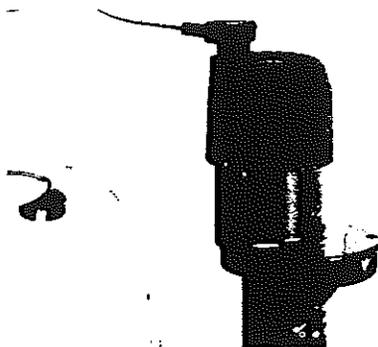


Fig. 50-1

- (b) Remove the two lamphouse screws and pull up the lamphouse.

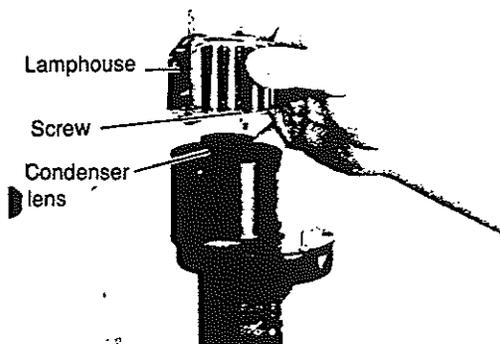


Fig. 50-2

Do not move the condenser lens.

(Note) Dust or dirt may enter the slit mechanism if the condenser lens is removed.

- (c) Put the relay lens unit on the condenser lens.
(The notch faces the examiner.)

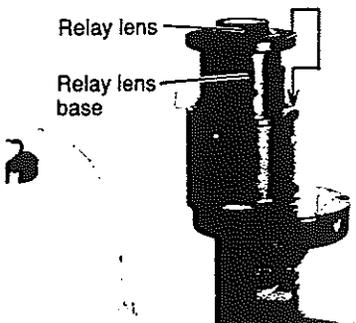


Fig. 51

Remove the four philips screws from the top of the relay lens and use them to attach the lower portion of the relay to the top of the condenser lens.

- (d) Use the two screws that were removed in (b) to mount the lamphouse.
(e) Reverse the steps as described in (a) to mount the lamphouse cover and the illumination cord.

(2) Attaching the Background Illumination unit (b)

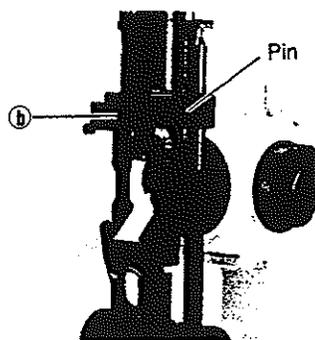


Fig.52

- * Insert the pins of the background illuminator into their respective mounting positions above the mirror on the illumination column.
- * Loosen the setscrew on the side of the relay lens unit.
- * Insert the end of the fiber optic light guide into the opening and then secure the guide with the setscrew.

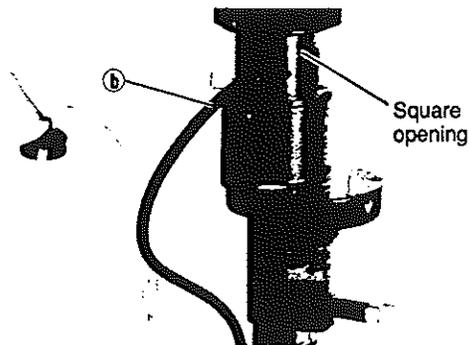


Fig. 53

(3) Attaching the photography arm cover ⑥

- (a) Bring the microscope arm left, loosen the clamp screw and remove the arm cover. (The removed cover will be necessary no more.)

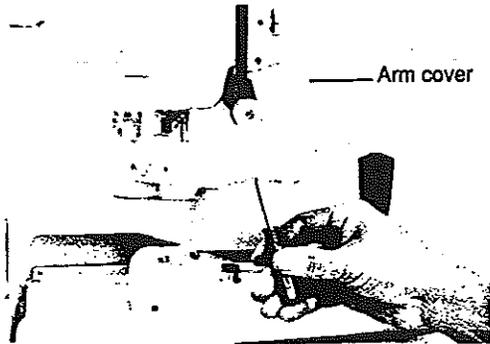


Fig. 54

- (b) Place the cord on the arm left side so that it may interfere with the rotation of the microscope arm. Secure the photographic arm cover to the arm, using attached two screws.

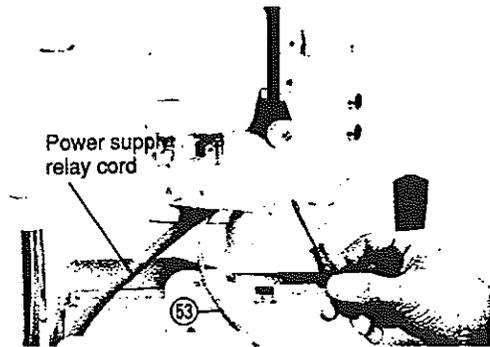


Fig. 55

- (c) Connect the base relay cord ③ to the cross-slide.

Pass between the chin rest poles and connect the power supply relay cord to the photography power supply ④.

- (d) Clip the power supply relay cord onto the table backside at such a length (about 50cm) that the cord may not interfere with the cross-slide in operation.

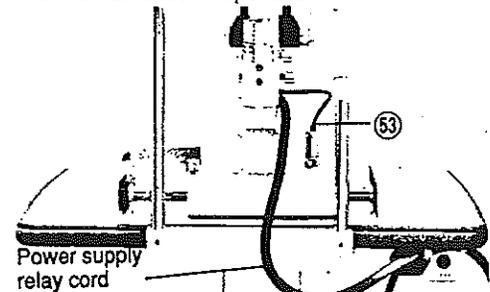


Fig. 56

(4) Attaching the Xenon relay cord ①

①

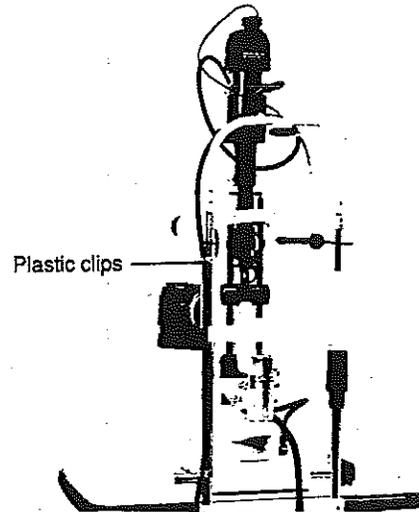


Fig. 57-1

- * Remove the four screws from the support rod portion of the chin-rest. With the plastic clips, secure the cord to the frame of the chin-rest.
- * Connect the other end of the cord to the power supply.
- * The additional clips and wood screws are used to secure the cord to the bottom of the wooden tale-top.

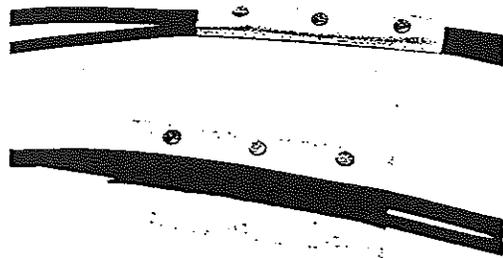


Fig. 57-2

- * Bind the power supply relay cord and the xenon relay cord at an equal interval, using (j).

(5) Attaching the Xenon Lamp ⑨

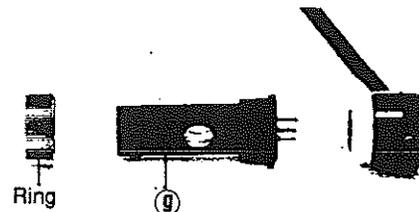


Fig. 58

- * Remove the chrome ring from the end of the Xenon socket. Insert the Xenon lamp and secure it with the chrome ring.
- * Insert the Xenon lamp into the square cord should be in the up direction so that the opening in the flash housing will be facing the background illumination bundle.

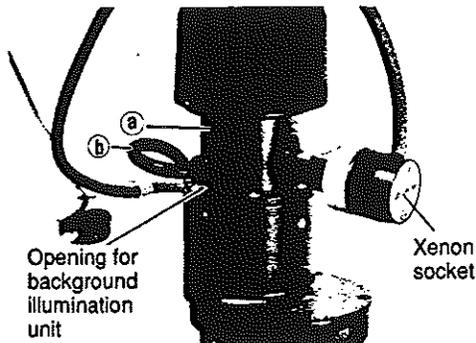


Fig. 59

(6) Mounting the Full frame attachment ①

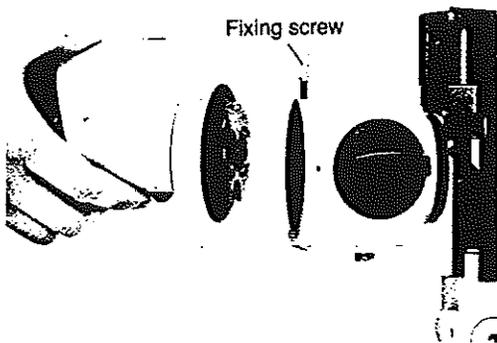


Fig. 60

- (a) Loosen the fixing screw and remove the binocular tube.

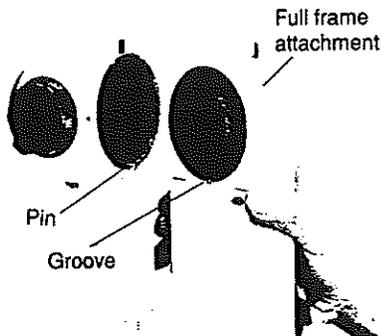


Fig.61

- (b) Match the pin on the microscope body with the groove on the Full frame attachment.
- (c) Turn the fixing screw to secure the Full frame attachment to the microscope body.
- (d) Reassemble the binocular tube using the reverse order of steps (a).

(7) Attaching the cord

Fit the full-frame attachment cord onto the photographic arm cover.



Fig.62

(8) Mounting the 35mm Camera ①

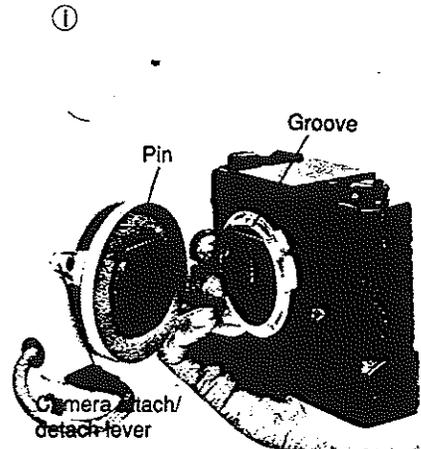


Fig. 63

- * Move the side locking lever clockwise and remove the cover cap.
- * Remove the cover from the 35mm camera body.
- * Match the pin of the camera attachment to the groove in the 35mm camera body and place the camera body mount over the camera attachment's mount. Turn the side locking lever in a counter-clockwise direction to secure the 35mm camera body.

(9) Setting the balance spring ⑩

Give an adjustment to the spring for vertical balance when attaching the Camera attachment

- (a) Down the cross-slide to the lowest position. Remove the cap.
- (b) Turn counterclockwise and remove a screw to put it on the cup side in place.
- (c) Put similarly the other screw on the cup side in place.

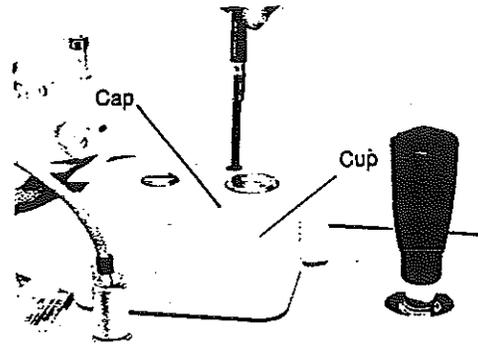


Fig. 64

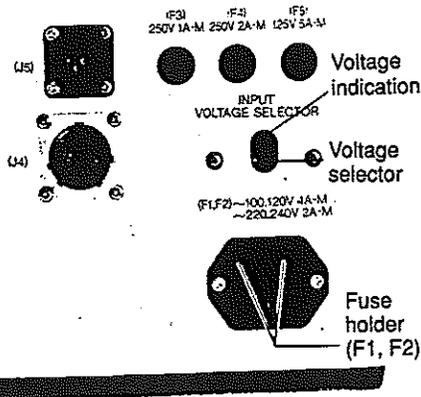
6.1.2.3 Checking Procedure**(1) Checking the Voltage Selector and Fuse**

Fig.65

- * Insure that the photographic power supply and fuse F1, F2 are matched to the input supply voltage.
- * Access to the fuse can be gained by removing the fuse lid.
- * If the Voltage Selector does not match the outlet voltage, turn the selector to proper setting with the screwdriver. The voltage selected will appear in the window cut-out.

(2) Checking the Power Cord

- * The instrument is supplied with a 3-wire plug. If the plug does not match the input power outlet, either replace the plug or use an approved adapter.
- * Make sure that the power supply is properly grounded.

(3) Checking the 35mm Camera

- * Turn the photographic power supply 'ON' and check to see that the pilot and charge lamps are illuminated.
- * Depress the shutter release button on top of the omni-directional joystick. The flash will go off and the camera body will advance the film.
- * Turn the power switch 'OFF' upon completion of this test.

6.1.3 OPERATION PROCEDURES

(1) To detach the camera body

While holding the camera ⑤ turn the camera detach/attach lever ⑥ counter-clockwise. When the lever reaches the stop, pull the camera body towards you.

(2) To attach the camera body

- * Turn the detach/attach lever ⑥ counter-clockwise and leave it where it stops.
- * Align the pin of the photographic attachment with the groove of camera mount and insert the camera mount over the photographic mount. Then turn the detach/attach lever ⑥ clockwise to secure the 35mm camera body.

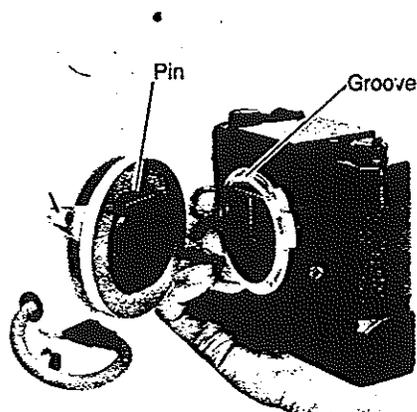


Fig. 66

6.1.3.2 Attaching/detaching the photographic attachment

To detach the photographic attachment, loose the fixing screw and remove the binocular tube.

Then remove the cord, loose the fixing screw and remove the full frame attachment.

To attach the photographic attachment, refer to 6.1.2.2 (6).

Full frame or stereo attachment can be attached to the SL-7E.

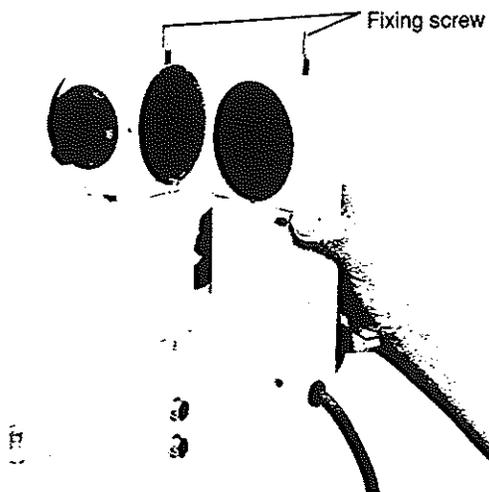
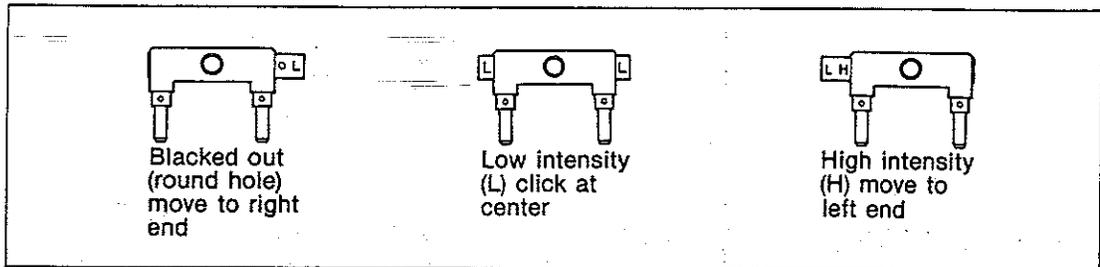


Fig. 67

6.1.3.3 Background illumination



The background illumination is used to provide a fill light during slit photography. By operating the selection lever ⑤, 2 steps of light intensity as well as a fully blacked out setting are available: occluded, L (low) and H (high). Warning: In the inclined illumination setting, it is impossible to use the background illumination.

- * To incline the illumination unit, pull out the end of background unit ⑤ which houses the adjustment mechanism and insert the pin in the side hole of the relay lens unit containing the end of the background unit.
- * If the illumination is inclined while the background illuminator is in its normal position, use care that the end of the background illumination unit does not come in contact with the patient's forehead. When using a contact viewing lens, use extreme care as the unit may come in contact with either the contact lens or the fingers supporting the lens.

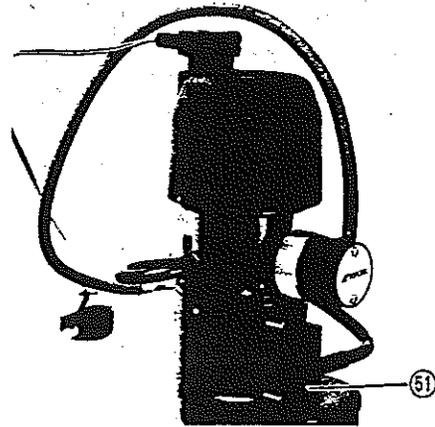


Fig.68

- * In the inclined illumination setting, the background illumination will not be directed onto the reflection mirror. Therefore, the object will not be illuminated by this device.

6.1.3.4 Diffusion lens

When using the diffusion lens ⑥, place it in front of the reflection mirror. If it is not being used, turn it down.

Warning:

- * When using the diffusion lens, allow approximately 30 degrees distance between the microscope arm and illumination arm. If this is not done, shading by the diffusion lens or illumination support shaft may shadow some of the picture.
- * When using the diffusion lens, set the slit size at the full aperture setting, otherwise the available light will be reduced. At the same time, occlude the background illumination.

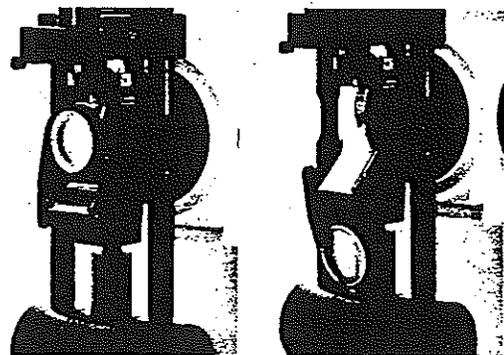


Fig. 69

6.1.3.5 Loading film

Loading 35mm camera with film: when loading film into camera mounted onto the body

(1) Turn motor drive switch  on.

At this time, never attempt to move shutter release lever . If the lever is used with camera mounted on instrument body, rapid advance will be caused, and trouble may result.

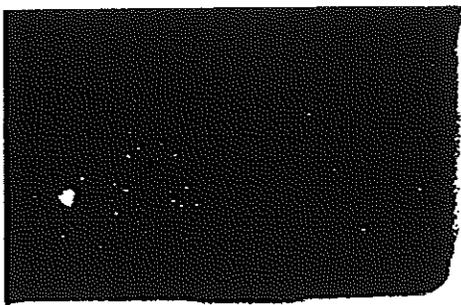


Fig.70

(2) Pull upward back-cover release knob  fully. 35mm camera back cover will be opened.

(3) Put film in cartridge chamber  while keeping the back-cover open with back-cover release knob pulled up.

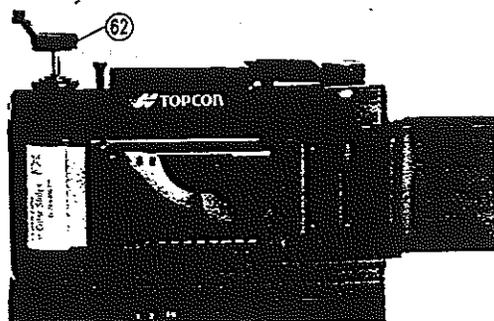


Fig.71

(4) Push down back-cover release knob while turning it so that the convex of film cartridge may be engaged with back-cover release knob groove.

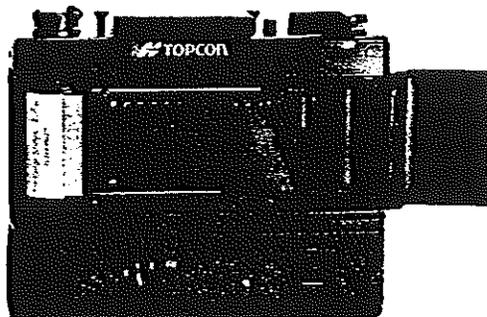


Fig.72

(5) Pull out the lead of film and insert it correctly in the spool groove .

Do not touch the aperture mask on the film rail. It is easily deformed.

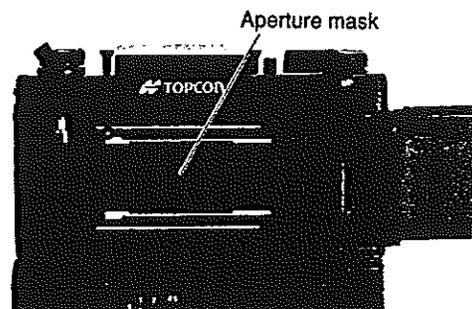


Fig.73

(6) Engage film perforations with sprocket  teeth and check it before releasing shutter release button .

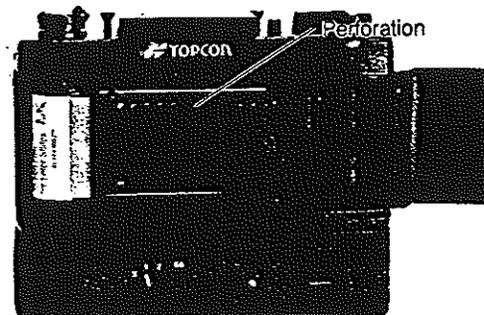


Fig.74

Set photography speed selector  at S and release shutter release button . Do not advance film manually. If manually advancing is required, be sure to turn motor drive switch  off.

* If motor drive does not work after manual advance, turn motor drive switch off once, then on again, and motor drive is ready for operation.

(7) Check to see that film has not slackened and cartridge is in place.

If cartridge is not in place, turn rewind crank  clockwise till it stops, and correct slackened film in cartridge.

(8) Make sure that film is properly advanced before closing back-cover. Press back-cover gently till it is locked.

* If rewind crank turns counterclockwise when each time film is advanced, film is correctly advanced.

When film is not advanced, repeat film loading procedure as perforations may not have engaged with sprocket teeth.

- * When film is loaded, film counter $\text{\textcircled{S}}$ will be illuminated. This is useful to check the number of remaining frames of film.
- (9) Release the shutter till film counter $\text{\textcircled{S}}$

shows the first frame.

Now, film counter gives numbers of exposed frames in the order of S, 1, 2, ... 36 and E.

- (10) Start photography when film counter $\text{\textcircled{S}}$ shows the first frame.

6.1.3.6 Photographic magnification and field-of-view

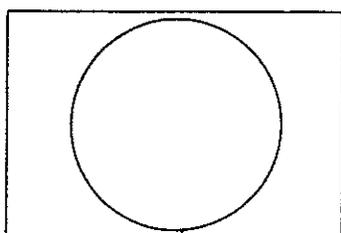
The following table lists the photograph magnifications. The field-of-view shown in the ocular is fully covered by photography.

Note:

At the low magnification of 6x, photography is not recommended due to insufficient magnification and insufficient illuminated range.

Microscope image	Full-frame	Stereo
6x	Impossible	Impossible
10x	1.0x	0.7x
16x	1.6x	1.0x
25x	2.5x	1.7x
40x	4.0x	2.7x

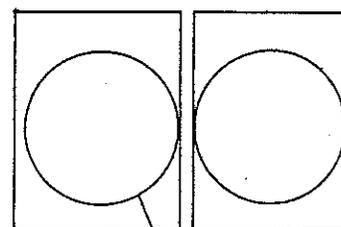
Full-Frame Photography
(convert onto the film)



Field of
photography
(24mm x 36mm)

Field of view
($\text{\textcircled{O}}$ 22.5mm)

Stereo Photography
(convert onto the film)



Field of
photography
(22mm x 16mm)

Field of view
($\text{\textcircled{O}}$ 15.2mm)

Fig. 75

6.1.3.7 Exposure setting

- * Determine the suitable exposure value based on the following:
- * What portion of the eye is to be photographed what magnification ratio is used.
- * Which of the illumination systems is being used: slit illumination, background illumination, or diffusion lens illumination.
- * Setting of Xenon lamp intensity.
- * The table below lists the value for a normal eye with a brown iris when using ASA 200

film.

- * In actual use, the photography conditions vary according to the situation. For instance, in many situations, the subject is not a normal eye, the iris has different coloring, and the area to be photographed is different with each patient. Accordingly, the exposure to be used varies. Calculate a suitable exposure value for the patient based on this table.

Photographing magnification (microscope magnification)		1.0x (10x)	1.6x (16x)	2.5x (25x)	4.0x (40x)
Cornea, crystalline lens (slit width 0.1mm)		4	4	5	
Anterior portion	Background illumination. H	4	4		
	Diffusion lens illumination	2	2		
Iris	Full slit aperture			*1	*1
	Diffusion lens illumination		2	3	
Conjunctiva	Background illumination. H		3	4	
	Diffusion lens illumination		1	2	2

The  means that either is insufficient light, the size of the illuminated area is too small, or the setting is out of the range in which photograph is possible.

- * Using the background illumination
- * For photographing the cornea or lens, use the background illumination in one of the following ways based on the situation.
 - H: Maximum background illumination is provided to entire area in the photographic frame.
 - L: Background illumination is approximately open-half of the "H" setting.
 - O (fully occluded): Only the slit image will appear on the picture.

* When doing anterior photography of the iris and conjunctiva, focus by widening the slit. Once the area to be photographed is properly focused, return the slit to the original size and activate the shutter.

- * When the diffusion lens is being used, set the slit size to full aperture (9mm dia) and set the background illumination setting to the occluded position.

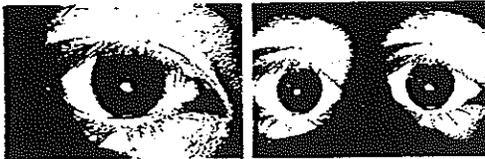
The setting marked with * means photography with 9mm diameters slit size.

6.1.3.8 Precautions for photography

Once the area to be photographed and the exposure settings are determined, focus correctly and press the shutter release button. Once the button is pressed, the shutter of camera is released and simultaneously the Xenon lamp flashes. After the exposure, the autowinder automatically advances the film frame.

[Precautions for photography]

- * Correctly adjust the diopter settings of the oculars before taking any photographs, otherwise the picture may be out of focus.
- * In photographing with the full-frame attachment, only the image through the right ocular will be transferred to the film. Therefore, carry out the alignment and focusing using only the right ocular as the image may vary from that obtained using both oculars.
- * Shadow caused by the mirror or shaft
When the microscope and illumination arm are placed in a straight line (open angle 0°), the picture may be obstructed by the long mirror, shaft or diffusion lens resulting in a picture as shown below.



Full-Frame
Photography

Stereo
Photography

Fig.76

6.1.3.9 Removing the film

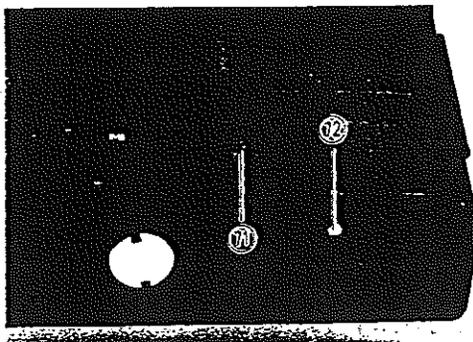


Fig. 78

- (1) Alarm lamp ⑪ lights when film frames are ended. Turn motor drive switch ⑩ off.
Checking film frame number:
When film counter ⑨ shows the last frame of

- * Avoid changing flash intensity selection dial ⑧ the Xenon lamp is activated or the power supply is being charged.
- * Before pressing the shutter release button ④, check that charge lamp ⑦ is illuminated. The charge lamp lights within 6 seconds after the Xenon lamp is flashed.

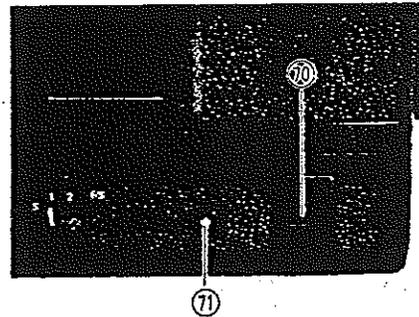


Fig. 77

- * Always check the number of frames available. When all frames available are exposed, the alarm lamp ⑪ will still illuminate.
- a) Turn the motor drive switch ⑩ OFF, rewind the film, and then remove the exposed film.
- b) If the film perforation holes become damaged, film transportation may stop and exposures may be made without realizing that the all available frames have been used.

- film (36 in case of 36-frame film, and 24 in case of 24-frame film), film advancing will stop automatically, preventing further photography. Load a new film when it is intended to continue photography. When film is removed, the film counter illumination will go out.
- (2) Press rewind button ⑫ by finger tip.
 - (3) Raise rewind crank ⑬ and turn it clockwise till you hear film come out of sprocket ⑭.
 - (4) Pull up back-cover release knob ⑮. When back-cover is opened, film counter ⑨ at the same time returns to S.
 - (5) Remove film.

6.1.4 MAINTENANCE

6.1.4.1 Replacing the Xenon Lamp

If the Xenon lamp becomes discolored or sufficient light for photography or observation is not provided, replace the Xenon lamp as follows:

- (1) Turn the power switch $\text{\textcircled{S}}$ OFF.
- (2) Loosen the locking screw at the side of relay lens unit $\text{\textcircled{S}}$ and pull out the Xenon socket unit.

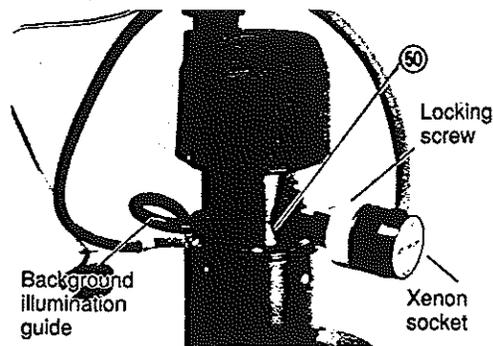


Fig. 79

- (3) Remove the ring of Xenon socket and pull out the Xenon lamp $\text{\textcircled{A}}$.

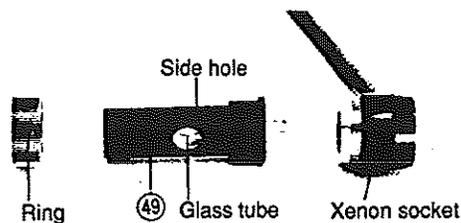


Fig. 80

- (4) Insert the new bulb in Xenon socket and secure it by reinstalling the ring.

Note: Do not touch the glass tube of Xenon lamp. If any foreign matter such as finger prints, etc. adhere to the glass tube, it will result in cloudiness which will shorten its service life.

- (5) Insert the Xenon socket assembly while placing it so that the side hole in the Xenon lamp is directed toward the background illumination guide. Finally, fix it in place by using the locking screw.

6.1.4.2 Replacing the Fuse

- * First turn power switch $\text{\textcircled{S}}$ OFF, and remove the power cable from the input outlet.
- * With a screwdriver, turn the center part of the fuse holder at the back of the power unit. The fuse will come out.
- * Replace it with a new fuse, then retighten the center of the fuse holder.

Always use the correct size fuse as indicated on the holder.

F1, F2: 4A (100V, 120V)
2A (220V, 240V)

F3: 1A

F4: 2A

F5: 5A

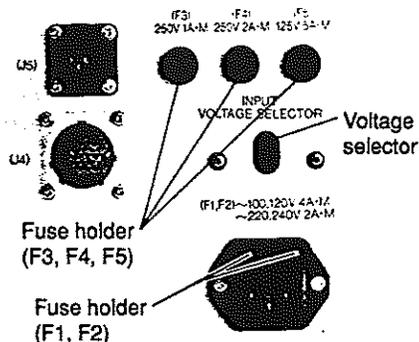


Fig. 81

6.1.4.3 Cleaning the Optical System

If any dust settles on the components of the optical system, remove them by blowing with a cleaning brush which is included in the standard accessories. In case any dust still remains, wipe off it off using a soft cotton cloth moistened with alcohol. Never use a finger or any hard object for cleaning.

6.1.4.4 Ordering supplies

To order the following replacement parts, be sure to specify the product name, part number and quantity required.

Product name	Part number	Appearance
Xenon lamp bulb	40365 40000	
Fuse 4A (100V, 120V) 2A (220V, 240V) 1A 5A	44691 50030 44691 50050 44691 50040 44691 50060	

6.1.5 BEFORE REQUESTING SERVICE—TROUBLE SHOOTING GUIDE

If any problem should occur, first consult the following trouble shooting table, and follow the suggested instructions. Then, if the trouble is not corrected, contact your nearest TOPCON dealer.

Trouble	Possible Cause	Remedy	Refer to
Shutter release does not operate	The power plug to camera attachment is disconnected.	Firmly connect cable to outlet	—
	Power switch on the power supply is OFF.	Turn power switch  ON.	—
	Motor drive switch is OFF.	Turn motor drive switch  ON.	P.30
No Xenon lamp flash	Service life of Xenon lamp is expended.	Replace the Xenon lamp.	P.34
	Photographed before charging cycle was completed.	First check that charge lamp lights, then photograph.	P.33
Autowinder does not operate	Motor drive switch is OFF.	Turn motor drive switch  ON.	P.30
	All film frames were exposed.	Rewind and remove exposed film.	P.33

Trouble	Possible Cause	Remedy	Refer to
Photograph is too dark.	Xenon lamp is cloudy.	Replace the Xenon lamp.	P.34
	Xenon lamp is not properly installed.	Check the direction in which the lamp is inserted.	P.25
	Filter setting is for using ND filter. (Except when using direct or diffusion illumination)	Set the filter lever to the correct position	—
	Slit size is not set at full aperture, (Except when using direct or diffusion illumination).	Set the slit size to full aperture.	—
	Photographed before charging cycle is completed.	First check that charge lamp lights, then photograph.	P.33
	Selection lever for background illumination is out of the position.	Check position of selection lever [Ⓔ] . Photograph with the lever at the correct setting.	P.29
	The slit diaphragm control ring is closed.	Turn the control ring [Ⓔ] counterclockwise.	P.14
Photograph is out of focus	Diopter setting of eyepiece is wrong.	Carry out correct diopter compensation.	—
	Observation is made using left eye.	The photographic image is taken from the right ocular pathway with the full-frame attachment. Use the right ocular for observation.	P.33
Shadow or shade appear on the picture.	Possibly some foreign matter is adhered to the objective lens surface.	Remove any foreign matter.	P.33
	Shaft of illumination unit, mirror of diffusion lens obstructed some of the light being directed to the optical head.	Check the relationship between those units so that no obstructive occurs.	P.33

6.1.6 FEATURES

- * The camera is located beneath the oculars so that it does not interfere with routine clinical procedures.
- * The shutter release button is conveniently placed on top of the joystick.
- * Press the shutter release button, and the quick return mirror will be put into operation. Use full (100%) light for photography. (When photography is not being done, 100% of the light can be utilized for clinical observation.)
- * An adjustable, background illumination is provided.
- * A diffusion lens, which evenly disperses the light during gross macro-photography, is included.
- * The motor drive allows for convenient shutter activation and automatic film advance.

6.1.7 SPECIFICATIONS

Optical axis for photography:	Right ocular pathway
Photographic magnifications:	(0.6x) 1.0x, 1.6x, 2.5x, 4.0x
Camera body:	TOPCON 35mm camera with motor drive
Background illumination:	Light guide illumination, two brightness controls and a full occluded position.
Diffusion lens:	Used for photography the anterior portion of eye.
Light for photography:	Xenon lamp DC 280V, maximum output 160WSx2
Power source for photography	
Frequency:	50/60Hz
Input voltage:	100V, 120V, 220V and 240V
Flash intensity:	20WS, 40WS, 80WS, 160WS, 160WSx2
Time for charging:	Max. 6 sec.
Maximum power consumption:	300VA

6.2 35mm Photographic Attachment for other camera

6.2.1 NOMEMCLATURE

(See 6.1.1 NOMENCLATURE" for other parts than described below.)

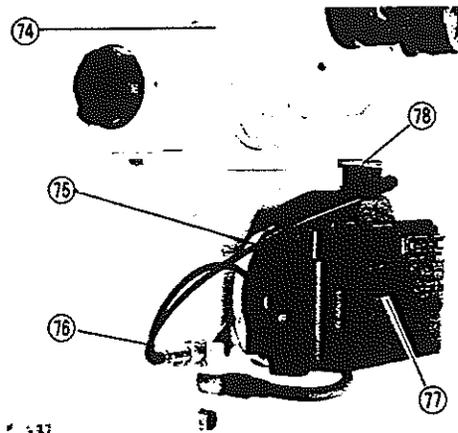


Fig. 82

⑦ Full frame attachment for other 35mm camera

The image in the right ocular is photographed. The stereoscopic attachment can be also installed in place of this attachment.

⑧ Mount adapter for other 35mm camera

Adapter to mount a camera ⑦ to the full-frame attachment ⑦

* It depends on the camera.

⑨ Camera cord for other 35mm camera

Synchronizing and release cord to connect a camera ⑦ to the full-frame attachment ⑦

* It depends on the camera.

⑩ Other 35mm camera

They are out of supply. Provide a suitable one as desired.

Recommended cameras

* MINOLTA

α -5000, 7000, 9000, 7700i

* Canon

EOS-620

EOS-630, 650 (with grip GR-20)

* Nikon

F-301, 501, 801

⑪ Hot shoe adapter

Adapter to take out X-contact from any of the other camera.

The adapter is out of supply. Provide a suitable one as small as possible.

6.2.2 ASSEMBLY

These instructions describe the installation of the 35mm photographic attachment for other camera onto the Model SL-7E Slit Lamp. Please read them carefully and keep them in a convenient location for future reference.

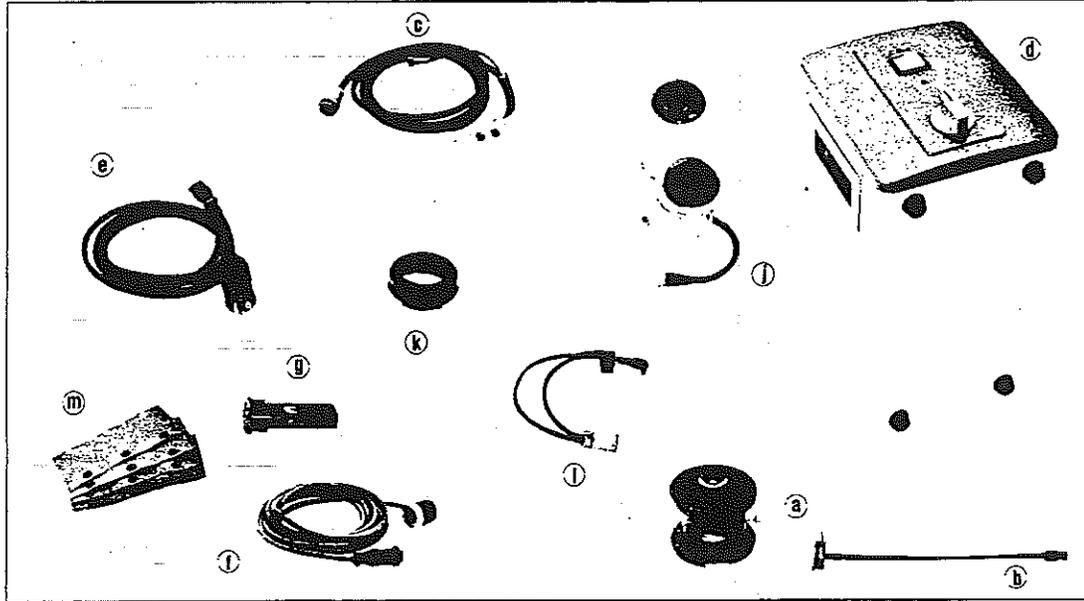


Fig. 83

6.2.2.1 Components

Description	Q'ty
Ⓐ Relay lens unit	1
Ⓑ Background illumination unit	1
Ⓒ Photographic arm cover (with connector and cord)	1
Ⓓ Power supply	1
Ⓔ Power cable	1
Ⓘ Xenon relay cord (with 4 cord clips)	1
ⓖ Xenon lamp	1
Ⓛ Full frame attachment for other camera	1
Ⓚ Mount for other camera (It depends on the camera.)	1
Ⓜ Cord for other camera (It depends on the camera.)	1
Ⓜ Cord Holder	4

* The item Ⓚ and Ⓜ will be separately supplied according to the camera type.

6.2.2.2 Assembly procedure

See 6.1.2.2 (1) - (7) for (1) - (7).

- (1) Mounting the Relay Lens unit ③
- (2) Attaching the Background Illumination unit ⑥
- (3) Attaching the photography arm cover ⑥
- (4) Attaching the Xenon relay cord ①
- (5) Attaching the Xenon Lamp ⑨
- (6) Mounting the Full frame attachment ①
- (7) Attaching the cord
- (8) Mounting the mount ⑫ for other cameras.
 - (a) Mount the adapter onto a camera in the same as lens renewal.
 - (b) Loosen a little the mount adapter clamp screw, bring the pin to the camera top center as shown in the photo, and retighten the screw.

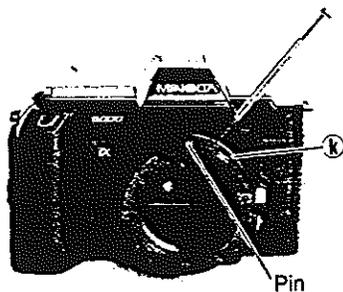
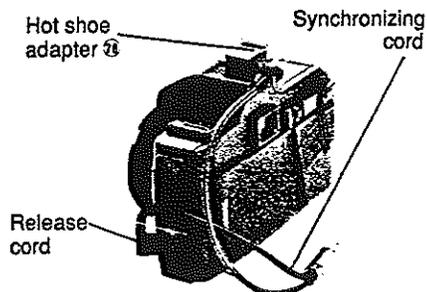


Fig. 84

- (9) Mounting the cord ① for other cameras
 - (a) Mount a hot shoe adapter ⑭ to the hot shoe of a camera.
 - (b) Connect a synchronizing cord to the adapter, and a release cord to the camera.



- Fig. 85

- (10) Mounting the 35mm camera ⑰
 - (a) Match the pin of the mount adapter for other camera ⑰ to the groove in the full

frame attachment ⑰ and place the camera attachment's mount. Turn the side locking lever in a clockwise direction to secure the 35mm camera body.

- (b) Connect to the full-frame attachment a camera cord.



Fig.86

- (11) Setting the balance spring

See 6.1.2.2 (9).

6.2.2.3 Checking Procedure

(1) Checking the 35mm camera

- * Turn the camera switch on.
 - * Set the camera photography mode at M (manual).
 - * Provide a release speed of 1/30.
 - * Set the Photographing speed selector at S (Single photography).
- See 6.1.2.3 for the other items.

6.2.3 OPERATION PROCEDURES

See 6.1.3.1 - 4, 6, 7 for 6.2.3.1 - 4, 6, 7.

6.2.3.1 Attaching/detaching the camera body**6.2.3.2 Attaching/detaching the photographic attachment****6.2.3.3 Background illumination****6.2.3.4 Diffusion lens****6.2.3.5 Loading film**

(See the instruction manual of the camera to be used.)

6.2.3.6 Photographic magnification and field-of-view**6.2.3.7 Exposure setting****6.2.3.8 Precautions for photography**

- * Turn the camera switch on.
 - * Set the camera photography mode at M (manual).
 - * Provide a release speed of 1/30.
 - * Set the photographing speed selector at S (single photography).
- (See 6.1.3.8 for the other items.)
- * Be sure to switch the camera off after photographing.

6.2.3.9 Removing the film

(See the instruction manual of the camera to be used.)

6.2.4 MAINTENANCE

(See 6.1.4)

6.2.5 BEFORE REQUESTING SERVICE – TROUBLE SHOOTING GUIDE

If any problem should occur, first consult the following trouble shooting table, and follow the suggested instructions. Then, if the trouble is not corrected, contact your nearest TOPCON dealer.

Trouble	Possible Cause	Remedy	Refer to
Shutter release does not operate	The camera main switch was not turned on.	Turn the camera main switch on.	P.41
	The camera batteries have exhausted.	Renew the batteries as instructed in the camera instruction manual.	—
	The cord of a camera is not in place.	Connect the cord in place.	P.40
Photograph is too dark.	The camera photography mode is not set at M (manual).	Set the camera photography mode at M (manual), and provide a release speed of 1/30 as instructed in the camera instruction manual.	P.41
	The shutter speed is not proper.	Provide a release speed of 1/30 as instructed in the camera instruction manual.	P.41

(See 6.1.5 for the other items)

6.2.6 FEATURES

(See 6.1.6)

6.2.7 SPECIFICATIONS

Camera body

Other cameras are available. Select one among the recommended cameras.

(See 6.1.7 for the other items.)

6.3 Stereo Photographic Attachment



Fig. 87

(1) Features

Easily exchangeable with full-frame attachment.

Two stereoscope, images are taken in a single frame.

The same image as seen through the microscope is obtained.

(2) Specifications

Photographic

magnification: (0.4x), 0.6x, 1x, 1.6x, 2.6x

(See page 28 for how to use).

Stereo viewer - separately available to view the stereoscopic picture.

* Two types of attachment are available; for TOPCON 35mm Camera and for other 35mm Camera.

6.4 Polaroid attachment PA-7F

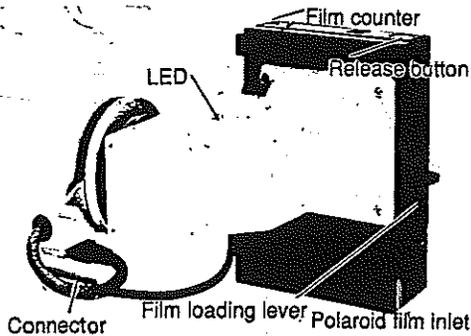


Fig. 88

(1) Features

Possible to attach it in place of 35mm camera attachment.

(2) Specifications

Photographic

magnification: (1.5x), 2.4x, 3.8x, 6.0x, 9.4x

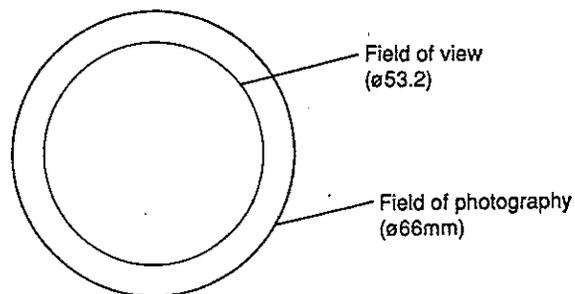
Image format: 66mm diameter

Film used: Polaroid 600 or 779 type.

* Polaroid® registered trade mark of Polaroid Corporation.

* Relation of field of view to photography

(Convert onto the film)



(3) Mounting

* If the full-frame attachment for a camera of a different brand is used, a Polaroid mount adapter is necessary, in addition to a Polaroid attachment.

Loosen three setscrews on the mount adapter side, match the adapter pin with the Polaroid mount groove, and retighten the setscrews to mount the adapter well.

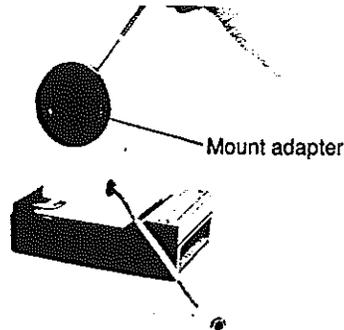


Fig. 90

- (a) Detaching the 35mm camera
- (b) Attaching the Polaroid Camera Attachment
(Refer to 6.1.3.1 Attaching/detaching the camera body)
- (c) Connecting the cord
Connect the connector to the Photographic Arm cover.

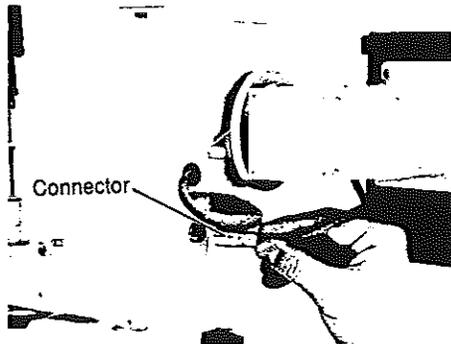


Fig. 91

(4) How to use

(a) Loading the Polaroid film pack

* Inserting the Polaroid film pack

Push film loading lever in the direction of the arrow and open Polaroid film inlet. Hold the Polaroid film pack as shown in the photo and insert the film pack completely and close the film inlet cover. If the Polaroid film pack is not inserted properly, the film inlet cover will not close.

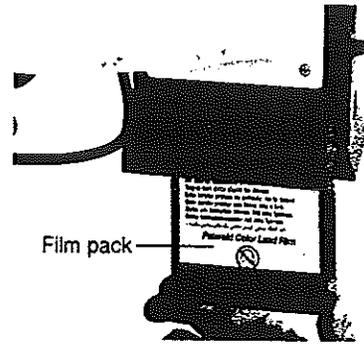


Fig. 92

* Ejecting the Backing Paper

Depress release button once to eject the backing paper. (By depressing the release button, the backing paper will be ejected automatically.)

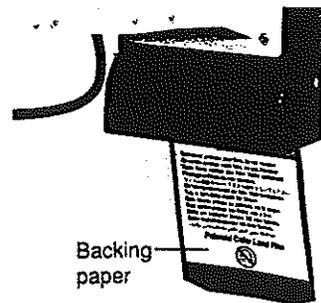


Fig. 93

(b) Photographing

When the area to be photographed and exposure are decided, depress the release button on the top of the joy-stick control lever. Development of the Polaroid film is completed within 3 - 5 minutes.

(c) Counting Remaining Film

A Polaroid film pack contains 10 sheets of film. As the film is exposed and ejected, consecutive numbers starting with '1' are displayed at the film counter. When the counter shows '10', no further film remains in the pack.

(d) Replacement of Film Pack

By pushing the film loading lever in the direction of the arrow, the Polaroid film inlet opens and the film pack is ejected. Pull the empty pack out and replace it with a fresh pack.

(e) LED

The LED will light when any of the following is the case:

- * No film pack has been loaded.
- * The remaining film sheet is zero.
- * The backing paper has not been removed.

(f) Exposure setting

The correct exposure is affected by the coloration of the area being photographed, the type of photography being done, as well as the photographic magnification. The correct exposure is determined by a combination of the adjustment of the slit width, flash intensity (Xenon-output), background illumination, and diffusion lens illumination..

The following table indicates the standard exposure for a normal eye with a brown iris. As it is offered as a wide, variations may be necessary when photographing under different conditions.

EXPOSURE TABLE

Microscope Magnification		10x	16x	25x	40x
Photographic Magnification		2.4	3.8	6.0	9.4
Cornea & Crystalline lense (Slit Width 0.1mm)		4	4	5	-
Anterior Portion	Background illumination.....H	4	4	-	-
	Diffusion lense illumination (Slit Width Max)	1	1	-	-
Iris	Full slit operature (Slit Width Max.)	-	-	1	2
	Diffusion lense illumination (Slit Width Max)	-	1	2	-
Conjunctiva	Back ground illuminationH	-	3	4	-
	Diffusion lense illumination (Slit Width Max)	-	1	2	2

6.5 Non-contact specular attachment

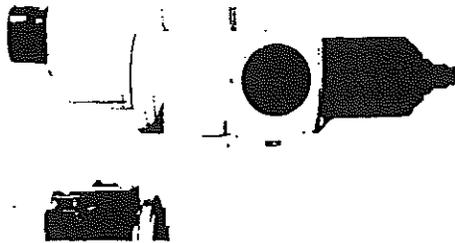


Fig.94

(1) Feature

By replacing the objective lens with this attachment, observation and photography of endothelium of cornea are possible.

As it is of the non-contact type, no anesthesia is required.

As ample instrument working distance is provided, the attachment will not contact the eyelashes.

(2) Specifications

Magnification and field of view:

Microscope image magnification	10x	16x	25x	40x
Observation magnification	110x	175x	280x	437x
Actual field-of-view	0.25 x1.63 (mm)	0.25 x1.28 (mm)	0.25 x0.8 (mm)	0.25 x0.5 (mm)
Photographic magnification	/	17.5x	28x	44x

Working distance: 15mm

6.6 Photo Keratoscope Attachment

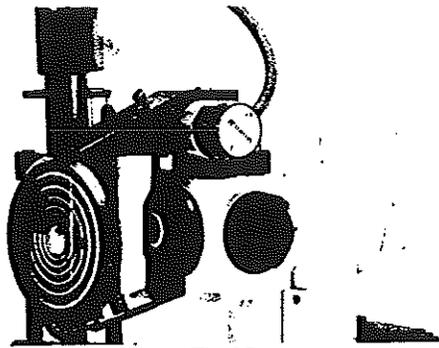


Fig.95

(1) Features

Used for observation and documentation of the corneal form. Especially valuable in evaluating the cornea in both pre and post operative patients.

Documentation is easily achieved with either the 35mm or Polaroid Photographic Attachments.

(2) Specifications

Corneal area covered by placido rings:

Approx. 8mm \varnothing

Pattern forms:

7 ring patterns

min. 2mm, max. 8mm

(on normal eyes)

Working

distance: 20mm

6.7 Observation Tube

(1) Features

- * With the observation tube, the co-observer will see the same image as the operator.
- * The observation tube can be attached to either the right or left side of the slit lamp. An image rotator is built-in to provide the co-observer with an erect image.

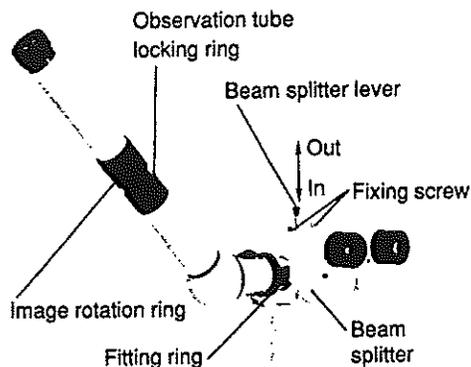


Fig.96

(2) Specifications

- * Eyepiece: 12.5x
- * Magnification: 6x, 10x, 16x, 25x, 40x (same as main microscope)
- * Beam Splitter: 50:50
- * Image Rotation Angle: 360°

(3) Mounting

- (a) Loosen the fixing screw, and remove the converging binocular tubes.

- (b) Attach the beam splitter assembly to the microscope body with the fixing screw.

- (c) Re-attach the converging binocular tubes to the beam splitter with the fixing screw.

- (d) As shown in the photograph, match the teeth on the beam splitter to the grooves on the observation Tube, and insert the observation Tube into the beam splitter. With the observation Tube in a secure position, turn the fitting ring and lock into place.

(4) How to use

- (a) By raising the observation tube locking ring, the whole tube can be rotated 360° along the mount axis. After setting the tubes in the observer's most convenient position, release the observation tube lock ring. At this point the monocular tubes will lock into place.

- (b) Down the beam splitter lever, and separate the beam into the observation tube.

- (c) After setting the beam splitter lever to the 'IN' position, adjust the diopter power on the eyepiece. Insert the focusing test rod in the guide plate hole and project a slit image. Turn the eyepiece diopter adjustment ring counter-clockwise until it stops. Now, turn the ring clockwise until a sharp slit image is seen on the focusing test rod.

- (d) If the image is not erect, turn the image rotation ring until the image appears correctly.

6.8 TV Attachment

(1) Features

- Provide a convenient and effective method of conducting a demonstration to a large audience.
- Allows images to be placed on video tapes and them replayed for patient consultation. (with additional optionally purchased equipment)

- Beam Splitter 50:50
- Relay Lens Apertures
F-numbers 11-45 (Continuously)
Display 11, 16, 22, 32, 45
- Recommended TV cameras
Camera tube size 2/3 inch

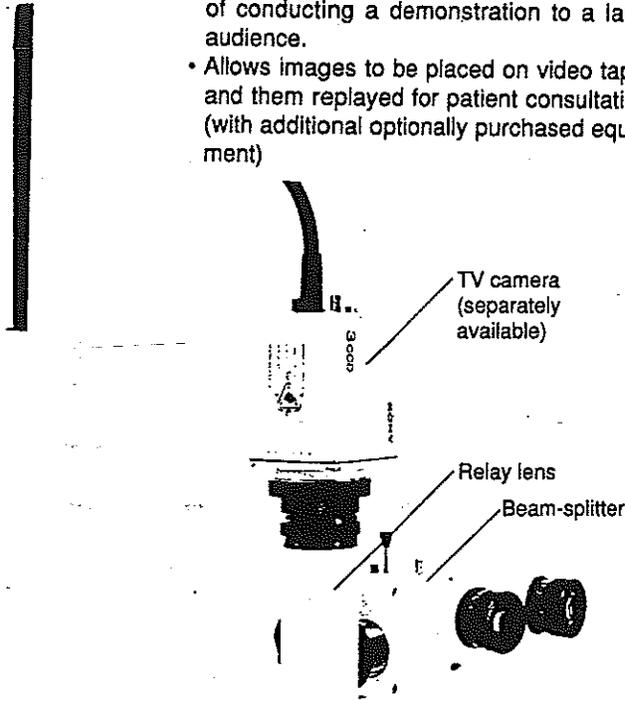


Fig.97

(2) Specifications

- Magnifications

Observation Magnification	TV relay Magnification	Field of TV
40x	1.7x	3.9x5.3
25x	1.1x	6.2x8.2
16x	0.7x	9.9x13.1
10x	0.4x	15.7x21.0
6x	0.3x	24.6x32.8

- Relation of Field of View to TV

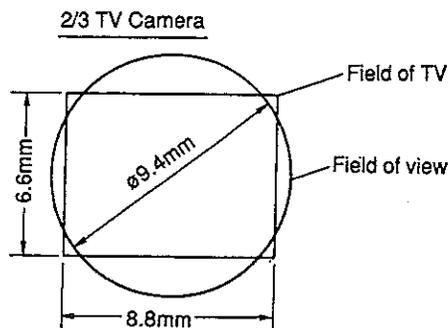


Fig.98

Mounts	Description
C-mount	Sony DXC-1850 Hitachi Denshi DK-3300
P-mount	Ikegami Tsushinki MK-309C(P)
Sony bayonet mount	Sony DXC-750
Hitachi bayonet mount	Hitachi Denshi DK-5050A Hitachi Denshi DK-7000

- In addition to the above mounts, Sony and Hitachi bayonet mounts are also available. Purchase a TV relay lens according to your TV camera.

(3) Mounting

- Attach the beam splitter to the microscope body
(Refer to "6.7 observation tube")
- Match the teeth on the beam splitter to the grooves on the Relay Lens, and insert the Relay Lens into the beam splitter. With the Relay Lens in a secure position, turn the fitting ring and lock into place.
- Clamp the cable holder stand to a suitable position, along the edge of the table top, with the vise at the bottom.

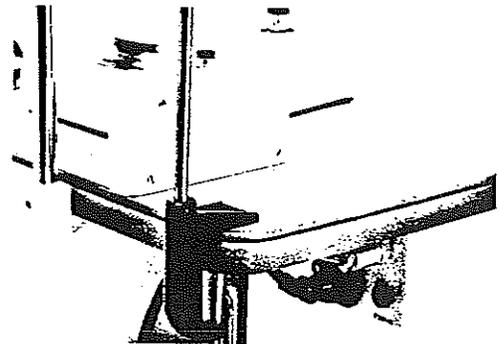


Fig. 99

- (d) Revolve both mount fixing ring and mount and detach the mount from the relay lens.
 (e) Attach the mount to the lens mount of the TV camera.
 (f) Next, place the TV camera on top of the relay lens and lock securely with the mount fixing ring.

When doing so, however, first, orient the TV camera with its tripod socket or base surface facing outwards (i.e., away from the binocular microscope prism housing), in order to orient the TV image properly.

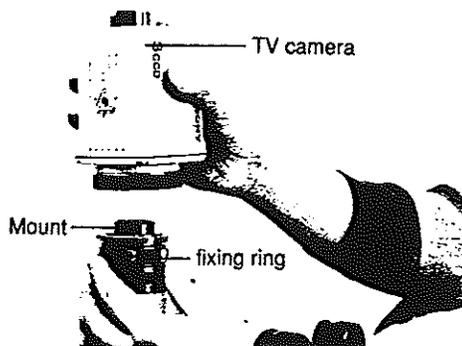


Fig.100

- (g) Unscrew the cable holder fixing screws, insert the TV camera cable and re-attach the cable holder, with its fixing screws.

When doing so, however, be sure to leave sufficient slack in the cable, to take care of movements of the slit lamp.

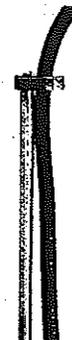


Fig.101

(4) How to use

- (a) Revolve the eyepiece adjustment rings and adjust the dioptric power to the user's eyesight.
 (b) Down the beam splitter lever, and separate the beam into the relay lens.
 (c) Since proper exposure will depend on the magnification and the subject, adjustments should be made of the illumination, with the aperture lever of the relay lens and the brightness control switch of the power supply unit.

6.9 Pachometer Attachment

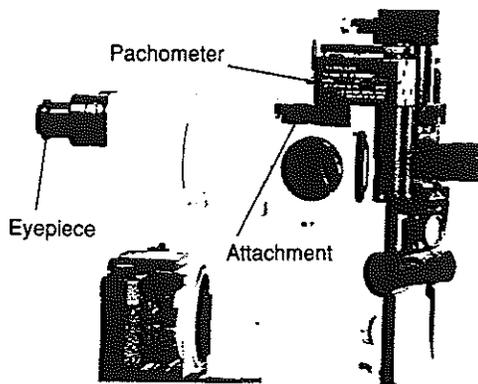


Fig. 102

(1) Features

- Two LED alignment targets are projected onto the cornea to assure repeatable alignment of the slit beam. With the Mishima-Hedby method, the slit beam can be accurately positioned perpendicular to the corneal surface.
- A separate LED illumination is placed near the scale to enhance reading, even in a darkened environment.
- A magnifier is placed over the scale for easier reading.

(2) Specifications

- * Measuring range 0 to 1.2mm
- * Minimum reading 0.02mm

6.10 Barrier Filter

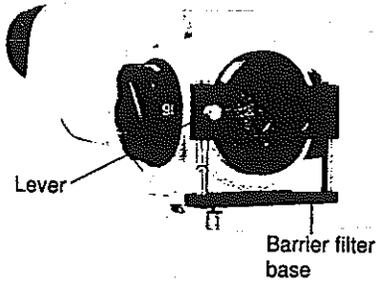


Fig. 103

(1) Features

- When checking the contact lens for fitting, it is easy to have an image in good contrast.
- It allows anterior fluorescent observation and photography.

(2) Specifications

- Separation wavelength 520nm

(3) Mounting

- Use setscrews to mount the barrier filter base onto the objective lens bottom mounting surface, matching the pins with the holes, as shown in the photo.

(4) How to use

- Apply fluorescent agent to the patient's eye.
 - Insert a blue filter.
- (See 3.4 (7) Filter selection.)
- Up the lever and set the filter.

6.11 12.5X Measuring Eyepiece

When this accessory is used in place of the normal eyepiece, linear and angle measurements become possible. It is used for the fitting of toric contact lenses as well.

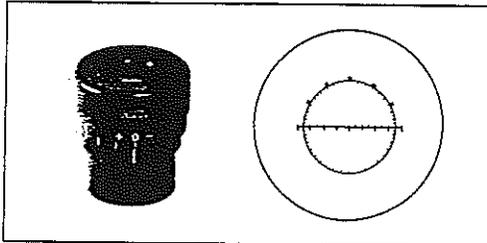


Fig.104

Scale Specifications

- Linear Scale: 16mm
0.5mm minimum graduations
- Angle Scale: 360°
5° minimum graduations

Measuring Parameters

- Linear Scale: To be used at 10 x magnification only
- Diopter Compensation range:
-5D to +3D
- Angle Scale: No limitations

6.12 Hruby lens

See P. 8 (11) for mounting, and P. 15 3.5 for using.

6.13 Applanation Tonometer

Depending on personal preference, either the Haag-Streit AG Model R-900 or Model T-900 could be used for measuring intraocular pressure.

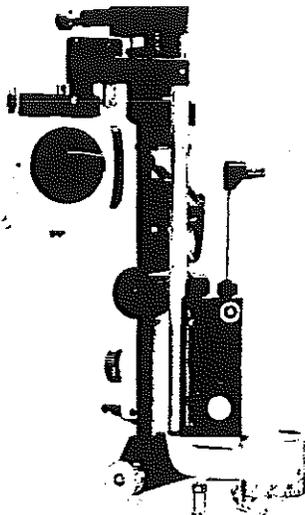


Fig. 105 Model R900

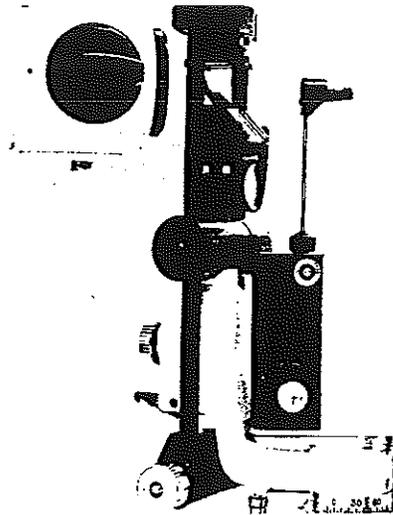


Fig. 106 Model T900

7. FEATURES OF THE MODEL SL-7E

- (1) The omni-directional joystick allows for the line base positioning as well as the instrument's elevation to be conveniently elevation controlled with one hand.
- (2) With the new converging binocular tubes, fusion of the image is enhanced.
- (3) A more natural stereoscopic view is provided.
- (4) By incorporating the optional 35mm photographic attachment, the Model SL-7E can be converted to a photo-slit lamp at any time. Because of the quick return mirror, the SL-7E remains a fine clinical instrument.
- (5) A wide range of other optional accessories provided a high degree of flexibility which allows the instrument to grow in value as additional requirements are met.

8. SPECIFICATIONS

Microscope					
Type:	Galileo magnification changer with converging binocular tubes				
Magnification Selection:	5 steps by drum rotation				
Eyepiece:	12.5x				
Magnification Ratio:	6x	10x	16x	25x	40x
(Field of view)	(35.1mm)	(22.5mm)	(14.1mm)	(8.8mm)	(5.6mm)
Interpupillary					
Distance Adjustment:	55mm to 75mm				
Diopter Adjustment:	-5D to 3D				
Illumination					
Slit Projection					
Magnification	2/3x				
Slit Width:	Continuous from 9mm to 0mm (at 9mm, slit becomes a circle)				
Slit Length:	Continuous from 8mm to 1mm				
	OR				
	Aperture settings at 9, 8, 5, 3, 2, 1 and 0.2mm dia.				
Slit Angle:	0° to 180° with horizontal scanning capability				
Slit Inclination:	5°, 10°, 15°, and 20° steps				
Filters:	Blue, red-free, 13% ND, and heat-absorbing				
Lamps:	6V, 20W Halogen Lamp				
Base					
Longitudinal Movement:	90mm				
Lateral Movement:	100mm				
Fine Base Movement:	15mm				
(with joystick)					
Vertical Movement:	30mm				
Chin-rest					
Vertical Movement:	80mm				
Fixation target:	Luminous target 6V, 0.2A bulb				
Hruby Lens					
Hruby lens:	-58.7 diopters (Option)				
Power					
Input (primary):	AC 100V, 120V, 220V and 240V; adjustable by built-in voltage selector				
Frequency:	50/60 Hz				
Output (secondary):	Main bulb 4.0V, 5.2V and 6.4V				
	Fixation bulb 4.5V				
Power Consumption:	26VA				
Dimensions & Weight					
Table model:	550mm x 370mm				
Unit Model:	440mm x 350mm				
Weight:	21kg. (table model)				
	20kg. (unit model)				

* Subject to changes in design and/or specifications, without advance notice.



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