TOPCON

TOPCON PHOTO SLIT LAMP
Model SL-5D

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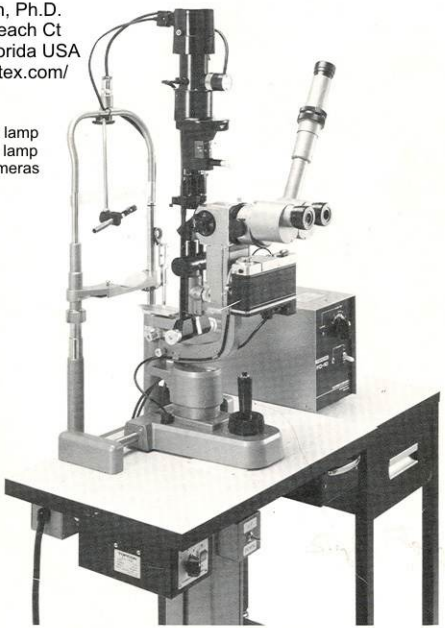
Topcon SL-5D slit lamp
Topcon SL-6E slit lamp
Topcon retinal cameras



Congraturations on your choice of the TOPCON Photo Slit Lamp, Model SL-5D, which is based on the time-proven Model SL-3D Slit Lamp and, retains almost all of its attractive features and specifications. We are sure that it will also give you years of unfailing service, as well as being an attractive instrument for your office.

This instruction manual covers the assembly, operation, care and maintenance of the TOPCON Phto Slit Lamp, Model SL-5D, for use on the TOPCON Adjustable Instrument Tables, Models AIT-2 and AIT-3, and/or TOPCON Ophthalmic Stands.

May we suggest that you read this instruction manual carefully, in the order that it is written, before you even touch the instrument.

Thoroughly familiarize yourself with the instrument and you will be able to get the full benefit of a superior instrument.

IMPORTANT

READ BEFORE TOUCHING THE INSTRUMENT.

1. Please check the primary voltage and see that it matches that of your line current If the primary voltage is different, it can be adjusted if you follow instructions on "Checking Voltage".
2. Please check the plug on the power cord, too. If it is not suitable for the receptacle, it can be exchanged or attached (if not connected) by following instructions on "Checking the Electric Plug".
3. Do not touch the surfaces of lenses and mirrors with your fingers or any hard object.
4. Do not switch the light on unnecessarily.
5. Always turn the power switch④ to OFF when connecting the power cord to the line current or when exchanging lamps.
6. When disconnecting the power cord, or any other cord, grip the connector or plug firmly and do not pull the cord.
7. Do not change the flash control switch setting while the Xenon flash lamp is discharging or while it is being charged, as this will lead to troubles in the power supply unit.
8. Do not depress the shutter release button⑪ while the film winding of the auto winder. Otherwise, the auto winder will stop midway.
9. Do not depress the shutter release button for a long time.
10. Do not take a picture beyod the normal exposure number.
11. Do not leave the instrument in a location which is too dusty, has excessive moisture or where the sun will hit it directly.
12. Always keep the instrument covered with the vinyl dust cover, except when in actual use.
13. Please note that there may be minor differences in the actual instrument delivered to you which are not covered in this instruction manual because such improvements do not differ greatly from the instructions and/or illustrations.

CONTENTS

1. FEATURES OF THE TOPCON PHOTO SLIT LAMP, MODEL SL-5D

1) Camera can be attached without cluttering microscope area and without hampering slit lamp operations.
2) Unit construction photographic system and observation tube makes attachments and exchanges very simple.
3) Stereophotographs can be taken very easily, with one shot, by simply exchanging the normal photographic attachment.
4) Three magnification changes for observation and photography, with higher magnification also possible by interchanging eyepieces.
5) Photographs are possible, with simple auto-winding operations, by simply depressing the release button on the joystick control lever.
6) Background illumination can be added to the slit lamp photograph, as well as adjusted in brightness.
7) A beam splitter unit is inserted between objective and the prism housings, with the observation tube fixed to either of the two beam splitter mounts on the unit. As in the case of the photographic unit, the optical path is partially diverted only when the observer uses a lever for this purpose.
8) Goldmann Applanation Tonometers T900 and R900 can also be used.

Model R 900

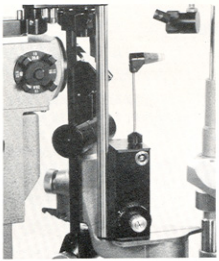


Fig. 1

Model T 900

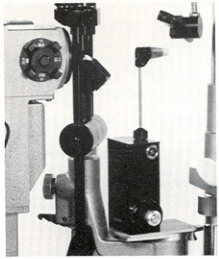


Fig. 2

2. SPECIFICATIONS

Microscope	
Type	Galileo type direct viewing binocular stereoscopic microscope, with erect image
Objective	f=106.4mm
Working distance	100.2mm
Magnification changing system	Revolver drum, with 3 magnification changes
Eyepieces	12.5× (exchangeable with optional 20× eyepieces)
Total magnifications and field of view	10×(22.5mmφ), 16×(14mmφ) and 25.6×(8.8mmφ)
Interpupillary distances	55mm to 78mm
Diopter adjustments	+3D to −5D
Slit illumination system	
Projection magnification	2/3×
Illuminated field	
Slit width	Continuously variable from 0 to 9mm(field of view is round at 9mm)
Slit length	Continuously variable from 1mm to 8mm
Aperture diameters	7 stops, 9, 8, 5, 3, 2, 1 and 0.2mmφ
Slit angle	Consecutively variable from vertical to horizontal: horizontal scanning through 180° from zero; slit projection can be inclined to 5°, 10°, 15° and 20°
Filters	Blue, red-free, 13% neutral density and heat absorbing filters built in.
Lamp	6V 27W precentered tungsten filament lamp; brightness adjustable in 3 stages
Fixation Targets	
Annular type	Adjustable from −15D to +10D
Luminous type	Interchangeable with annular target
Lamp	6V 0.2A
Base	
Longitudinal movement	80mm
Lateral movement	100mm
Fine cross-slide adjustments	9.5mm in both longitudinal and lateral directions
Vertical movement	30mm
Chin-rest vertical range	80mm
Power Unit:	
Primary	50/60 Hz; AC 100V, 115V, 200V, 220V and 240V; adjustable with built-in voltage selector
Secondary	AC 4.5V, 6V and 7.5V; adjustable with rotary switch
Power consumption	45VA
Standard Accessories	
Hruby lens	−58.8D, for examinations of the vitreous body and fundus
Hruby lens guide plate	Also doubles as mount for Goldmann Applanation Tonometer T900.

Dimensions & Weight

Table surface	560mm × 356mm
Height from table surface	755mm
Weight (Body)	21 kgs.

Optional Accessories

35mm Photographic attachment set for normal photography

Optical axis for photography	Right side
Photographic magnifications	0.9×, 1.4×, 2.2×
Camera body	Exclusive TOPCON camera with Auto Winder
Flash illumination	280V 200WS Xenon flash lamp; also used for background illumination 2 stages brightness adjustment and black-out
Power unit	
Primary	50/60 Hz; AC 100V, 120V, 200V, 220V and 240V; adjustable with voltage selector
Secondary	Adjustable in 5 stages 20, 40, 80, 160 and 200WS
Power consumption	300 VA

Stereo Photographic attachment

Photographic magnification	0.6×, 1×, 1.6×

Observation Tube

Type	Beam splitter mount type, with optical path moved in/out as required; can be attached on either of two attachment mounts of beam splitter unit; built-in image rotator prism

20× Hi-eyepoint eyepiece w/scale and wo/scale

Type	Sleeve insert type(exchangeable with standard 12.5× eyepieces)
Total magnification	16×, 25.6× and 40×

Adjustable Instrument Table

There are two types of adjustable instrument tables available.

The Model AIT-2 adjustable instrument table is a free-rolling instrument table which can be moved around freely on four casters and fixed with a stopper. At the same time, table height can also be adjusted from 700mm to 900mm above the floor level, with height adjustments made by simple foot switch operations. The model has a lifting capacity of 100kgs.(220 lbs.) and an electrical outlet for connections of instruments placed on top of the table, with the secondary voltage corresponding to the primary one.

The Model AIT-3 adjustable instrument table also has four casters, with stoppers, for free-wheeling movements, and a spare electrical outlet for connection of the instrument used on it. However, the equipment is as a rule, not supplied with the table, with the table① of the Model SL-5D Photo Slit Lamp being attached directly on top of the elevating mechanism of the Model AIT-3 adjustable instrument table. Motorized lifting action is activated by a lever switch located on the column with the maximum lifting capacity 50kgs.(110 lbs.)

Both modeles can be supplied for use with A.C. 100, 115, (AIT-2), 117 (AIT-3), 200, 220 or 240 volts, as specified at the time of order.

Fig. 3 **AIT-2**

Fig. 4 **AIT-3**

Ophthalmic Stands

There are three ophthalmic stands models available for use with SL-5D, or Models IS-10, IS-20 and IS-30, which all have an electrical outlet for utilization by the instrument.

The optional accessory and equipment noted above are available against special orders and extra cost. They are all recommended for optimum performance of the TOPCON Photo Slit Lamp. At the same time, it should be noted that there may be changes in these accessory and/or equipment in the future.

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

3. NOMENCLATURE

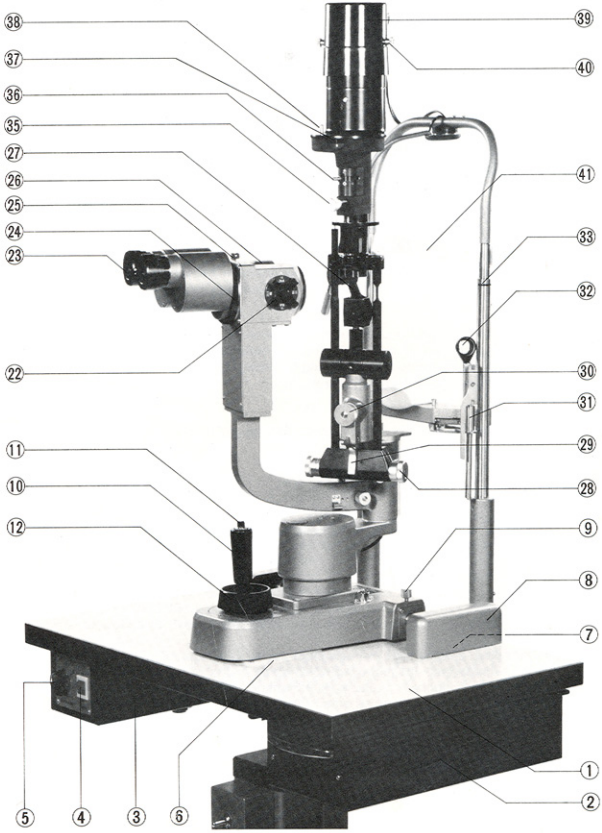


Fig. 5

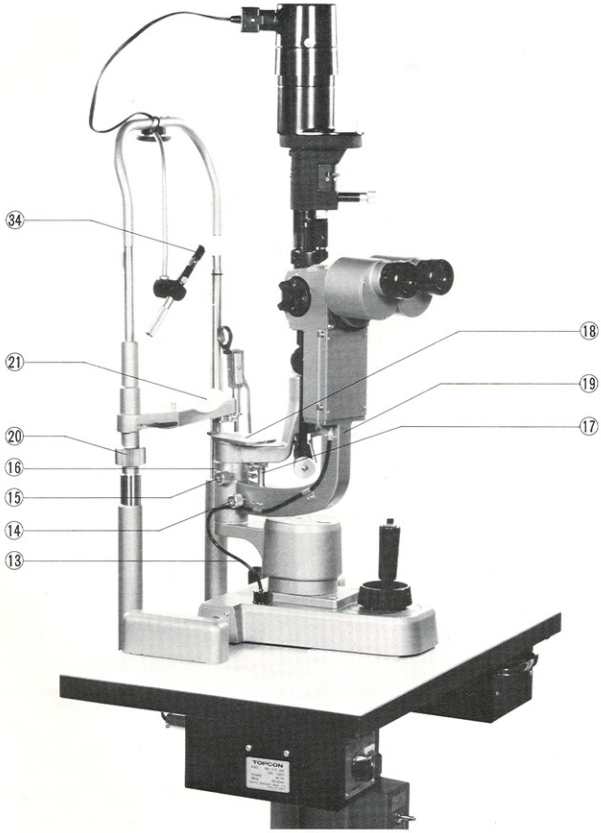


Fig. 6

① Table	Exclusive table for use on the TOPCON Adjustable Instrument Table, Model AIT-2 or Model AIT-3. Has gliding plate and twin toothed rails, for providing the cross-slide base section with free moving capability for locating the instrument. (Replaced with smaller exclusive table for use on TOPCON Ophthalmic Stand but with same gliding plate and toothed rails.)
② Accessory drawer	Provided on the above table only for storage of standard accessories, such as eyepiece lenses, mirrors, test rods, etc. (Not available on table for use with Ophthalmic Stand.)
③ Power unit	Available on both types of tables with built-in step-down transformer for use with AC 100, 115, 200, 220, and 240 volts, as set with voltage selector㊷.
④ Power switch	Main switch for the power unit.
⑤ Illumination control switch	Has three settings or —L(4.5)—N(6)—H(7.5). Used for controlling secondary voltage to the slit lamp and, consequently, brightness of the slit image.
⑥ Gliding plate	Provides the cross-slide base with free movement in all directions and, therefore, must be kept clean and smooth.
⑦ Rail	Toothed rails are provided for accepting the twin rollers of the base, and provide longitudinal movement.
⑧ Rail cover	Snap-in covers are provided for both toothed rails⑦.
⑨ Base fixing screw	Used to fix the base from moving. Loosened by counter-clockwise revolution and tightened by clockwise revolution.
⑩ Control lever	Used upright for locating the base (after loosening the base fixing screw). The tip of the control lever is tilted slightly, in the required direction, for making fine adjustments in the position.
⑪ Release button	For releasing shutter of the camera body.
⑫ Eleavating wheel	Used to elevate or lower the instrument.
⑬ Connected cord	Between the base and the microscope.
⑭ Microscope arm fixing knob	Locks microscope arm⑲ from rotating; when loosend, permits rotation of the microscope arm.
⑮ Slit lamp arm fixing knob	Couples slit lamp arm and microscope arm⑲ when tightend; slit lamp arm rotates alone, when loosened.
⑯ Protractor scale	Scale is used for reading the angle between the microscope arm⑲ and the slit lamp arm.
⑰ Click-stop roller	The click-stop roller indicates when the slit lamp arm is at 0°, or central position, or 10° to the right or left of the central position.
⑱ Hruby lens guide plate	Used for coupling Hruby lens, when placed in the socket of the rotation axis of the microscope and slit lamp arms. Also for use as tonometer mount in coupling Goldmann Applanation Tonometer Model T900.
⑲ Microscope arm	Can be rotated freely or in coupled movement

with the slit lamp arm.

⑳ Chin-rest adjusting wheel — Used for adjusting the height of chin-rest㉑.

㉑ Chin-rest — Supports the patinet's chin and can be adjusted up or down, to locate the patient's eyes at the correct height.

㉒ Magnification changer handle — Rotated for making three changes in magnification.

㉓ 12.5× eyepiece lenses — Sleeve insert type eyepiece lenses which can be exchanged for optional 20× eyepiece lenses.

㉔ Fixing ring — The ring is revolved, the prism housing can be detached. After that, the align the pin of the beam spliter Unit to its notch

㉕ Beam splitter lever — For photography, the lever must be pushed IN.

㉖ Tonometer mount — For use of Goldmann Applanation Tonometer Model R900.

㉗ Mirror — Reflection mirror for the slit illumination system. Long mirror can be exchanged for the short mirror㊿, in cases where the long mirror obstructs the microscope's lines of sight.

㉘ Slit width adjusting wheels — Either wheel can be used for adjusting the width of the slit illumination from 0 to 9mm, by rotating in either direction.

㉙ Slit inclination stopper — Stopper plate for 5° intervals in the inclination of the slit illumination system up to 20°.

㉚ Centering knob — The knob is loosened, by counter-clockwise revolution, which will permit movement of the slit image away from the center of the field of view.

㉛ Hruby lens attachment mount — A sliding mount used for attachment of the Hruby lens. Can be located over the guide plate for use in front of either eye.

㉜ Hruby lens — Used on the Hruby lens attachment mount㉛ coupled to the guide plate⑱, for examinations of the vitreons body and the fundus.

㉝ Level marker — Used to indicate the proper height for the patient's eyes, as adjusted by raising or lowering the chin-rest.

㉞ Annular fixation target — Adjustment from −15 to +10 diopters, to suit patient's refractive power.

㉟ Slit diaphragm plate handle. — Rotation around the axis of the handle produces 7 aperture changes of 9, 8, 5, 3, 2, 1 and 0.2mm, which is then followed by infinitely variable changes in the slit length from 1 to 8mm, as indicated on the slit diameter/length scale㊲. There are also click-stops at the 1 to 8mm settings, in the latter case. Swinging the same handle in the horizontal plane will also rotate the slit image consecutively from the vertical to the horizontal in both directions.

㊱ Filter lever — Used for insertion of 4 filters or heat absorbing, 13% neutral density, red free and blue, as well as an open aperture at the beginning. The filters and open aperture are indicated by symbols or an open circle, a grey colored, a circular, a green-colored round and a blue-colored indexes.

㊲ Slit diameter/length scale. — Shows 7 click stop apertures and the infinitely variable slit length produced with the slit diaphragm plate handle.

㊳ Setting pin for background illumination — When the background illumination hit the patient's fore head, it is stored on the pin.

㊴ Lamphouse cover — Encloses the slit illumination lamp.

㊵ Lamphouse cover fixing screws — These fixing screws are loosend for the detachment of the lamphouse cover㊴, when it is necessary to exchange the slit lamp or clean the condenser lens.

㊶ Head rest

㊷ Voltage selector and fuse holder — Can be adjusted for primary voltages of AC 100, 115, 200, 220, or 240V, after unscrewing the fuse holder cover which holds.

㊸ Power cord

㊹ Cord holder

㊺ Head rest attachment mount

㊻ Wire holding plate

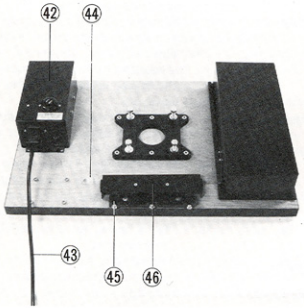


Fig. 7

㊼ Slit illumination lamp	Exposed when lamphouse cover㊴ is detached.
㊽ Test rods	For use in adjusting the eyepiece lenses to the user's eyesight.
㊾ Chin-rest pads	Used on the chin-rest for providing a clean, hygenic surface for each patient.
㊿ Luminous fixation target	Used in place of the annular fixation target.
(51) Short mirror	Used in place of the long mirror when the lines of sight of the microscope is obstructed.
(52) Fuse	Glass-shielded fuse.

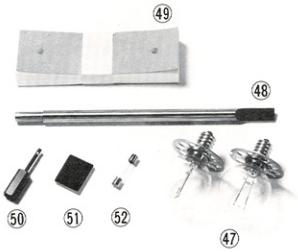


Fig. 8

4. ASSEMBLY

1) Unpacking the instrument

SL-5D is disassembled and packed carefully for export shipments.
Normally, the instrument(Body and standard accessories) is packed in one styrol-foam box, with cut-outs for inserting individual parts.
(Remarks: Optional accessories are packed separately)

ⓐ Table, with power unit and accessory drawer	1 each
ⓑ Base section and microscope	1 each
ⓒ Illumination section and lamps	1 each
ⓓ Chin-rest and head rest section	1 each
⑧ Rail cover	1 pair
⑱ Hruby lens guide plate.	1 each
㉗ Long mirror(spare)	1 each
㉜ Hruby lens	1 each
㊸ Power cord	1 each
㊼ Slit illumination lamp(spare)	2 each
㊽ Test rods	1 each
㊾ Chin-rest pads	1 pack
㊿ Luminous fixation target	1 each
㊶ Short mirror	1 each
㊷ Fuse(spare)	1 each
ⓔ Vinyl dust cover	1 each
ⓕ Cleaning brush	1 each
ⓖ Silicon cloth	1 each
ⓗ Instruction manual	1 each

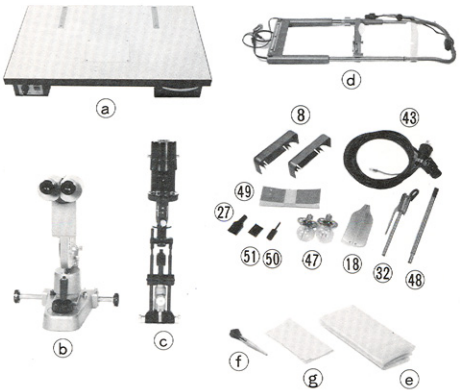


Fig. 9

2) Assembling and Instalation

(1) Checking the plug and the voltage

Before actually assembling the instrument, first check the primary voltage of the instrument and the electric plug connected to the power cord. Next, check the voltage set with the voltage selector㊷.

(2) Installation of the Instrument

The Slit Lamp can be used on top of the TOPCON Adjustable Instrument Table, or on the lower instrument arm of the TOPCON Ophthalmic Stand, as well as being used on other similiar equipment.

As noted, however, Model SL-5D is available with two types of table or an exclusive table① for use on the adjustable instrument table, which is larger and has a power unit and an accessory drawer, and an exclusive table for use on the ophthalmic stand, which is smaller, has a power unit only and also a protrusion or short pole for fitting the socket on the lower instrument arm.

a) Attachment on the TOPCON Adjustable Instrument Table, Model AIT-2.
If the adjustable instrument table has also been purchased newly for use with the SL-5D, then the table top should not be assembled on top of the elevating mechanism.

Unscrew the four attachment bolts which will be found on the bottom side of the table①, temporarily screwed into their screwholes. Use these four bolts for fixing the table① on top of the elevating mechanism of the adjustable instrument table as shown in Fig. 10.

Once the table① has been fixed securely, pull up the bellows covering the elevating mechanism and fix it securely to the bottom surface of the table① with five fixing plates.

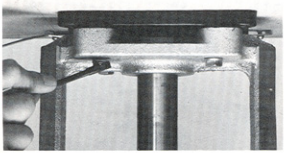


Fig. 10

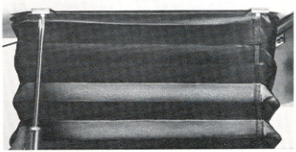


Fig. 11

The positions of the fixing plates can be determined by the screwholes which have been started for easier attachment.

It will not be possible to fix the bellows on the side of the accessory drawer, due to the lack of space. (See Fig. 11)

Should you be using an adjustable instrument table which has been purchased previously, this case, detach the bellows from the bottom surface of the table and then detach the table plate. Attach the table① of the SL-5D as noted in the above instance.

b) Attachment on the TOPCON Adjustable Instrument Table, Model AIT-3.
The bolts attached to the reverse side of fitting table should be removed, and the SL-5D must be fitted by means of the bolts which is attached to the AIT-3(Fig.12) (The bolts attached to the reverse side of the table become useless)

c) Attachment on the Ophthalmic Stand
Simply insert the pole or column protruding from the bottom surface of the table into the socket on the lower instrument arm of the ophthalmic stand and tighten the fixing screw.

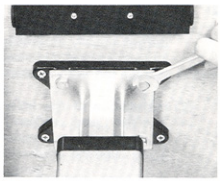


Fig. 12

The power unit is attached on the bottom surface of the table for use in a set-up in which the lower instrment arm comes from the ophthalmic stand placed on the right-side of refracting chair(when facing the patient). Thus, if the ophthalmic stand is located on the left-side of the refracting chair, it will be found that the power unit will prevent complete rotation of the lower instrument arm, unless it is re-located on the right bottom surface of the table. Simply unscrew six fixing screws of the power unit and re-attach the power unit, as required. There are six openings showing where screwholes have been started for this purpose.

(3) Attachment of the Chin-rest and Head Rest Section

Unscrew three attachment screws on the head rest attachment mount㊺ and fix the chin-rest and head rest section to the table ① with three attachment screws. (See Fig.13)

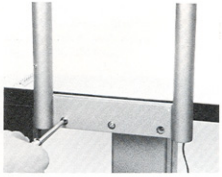


Fig. 13

(4) Connecting the cord

Confirm that power switch④ is turned to OFF. After confirming, connect the cords for illumination bulb and for fixation light which are found under chin-reat, with the power unit. ③.

Next, detach the wire holding plate㊻ from the head rest attachment mount㊺, by unscrewing its fixing screw.

Furthermore, pass the cord through the cord holder㊹ fitted to the lower face of table and fix it (See Fig. 14)
Connect the power cord㊸ with the power unit.

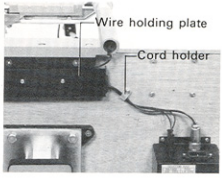


Fig. 14

(5) Checking the electric plug

Check whether the electric plug connected to the power cord matches that of

the room receptacle. If not, exchange it for a suitable one. On the other hand, the electric plug may not be connected at all, because of specialiazed requirements in your region, in which case, connect a suitable plug.

There are three electric wires in the power cord.

Among three wires, the green/yellow(or green) wire should be connected to the grounding terminal.

(6) Setting up the Base

Simply place the base section on top of the table(1), with the outrigger rollers aligned on top of the toothed rails (7).

Next, insert the rail covers(8) in place, over the rails. Insert the flange, on the base of the cover, between the slight opening which exists between the rail and the surface of the table. (See Fig. 15)

Tighten the base fixing screw(9) to facilitate further work.

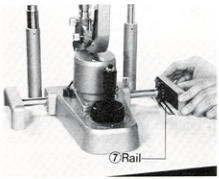


Fig. 15

(7) Attachment of the Slit Lamp Arm

Loosen the microscope arm fixing knob screw and rotate the microscope arm (19) 60° or 90° to the right or left, from its central position, which will be more convenient for attaching the slit lamp arm.

Next, loosen the setscrew protruding on the outside of the slit lamp arm's attachment socket so that it no longer protrudes inside the socket.

Finally, lower the slit lamp arm carefully into position, as in Fig. 16, while, at the same time, lining up two red dots. When properly aligned, screw in the setscrew tightly, as in Fig. 17, so that the slit lamp arm cannot be detached.

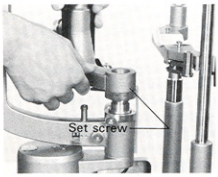


Fig. 16

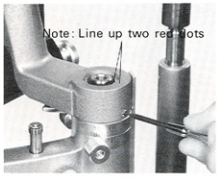


Fig. 17

Connect the cord which is found on the chin-rest with the Lamphouse cover(39).

(8) Fixing the Chin-Rest Pads

Pull out the pad fixing pins, on both sides of the chin-rest, by, first, pushing them up from below.

Next, take a suitable quantity of the pads and place them on top of the chin-rest. Finally, fix them in place, by passing the two pad fixing pins through the openings of the pads. (See Fig. 18)

Tear off one tissue pad each, after examining a patient, which will place a new one in place for the next patient.

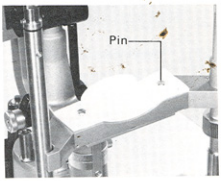


Fig. 18

(9) Storage of Accessories

Store the standard accessories supplied with the instrument in the accessory drawer②, as shown in Fig. 19, in the case of table①.

When the Slit Lamp is used on the lower instrument arm of the ophthalmic stand, there is no accessory drawer and the standard accessories should be stored in the box supplied for this purpose. (See Fig. 20)

Fig. 19

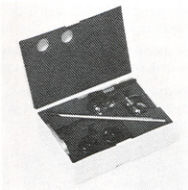


Fig. 20

5. OPERATIONS

1) Preparations

(1) Use the instrument in a dark room

(2) Insert the plug of the power cord㊸ into the nearest convenient room receptacle
Confirm that the grounding was completed

(3) Set the beam splitter lever to "OUT".
("IN" is used in case of photography)
Insert the test rods㊽ into the opening on top of the post around which the microscope arm and slit lamp arm rotate

(4) Switch on the power switch④ and check whether the slit illumination lamp㊼ and the fixation target lamp are illuminated or not.

(5) Project a suitable slit image on the test rod㊽.
Revolve the slit width adjusting wheel㉘ to adjust the width of the slit and revolve the milled knob of the slit diaphragm plate handle㉟, around the axis of the handle, to change the length of the slit.

(6) The cross-scales seen in the field of view of one of the eyepieces㉔ is used for adjusting the eyepieces to the user's eyesight. (The cross-scales can be placed in the field of view of either eyepiece, as found suitable.)

The eyepiece, in which the cross-scales can be seen, should be used for making dioptric adjustments for both eyes of the operator, with the required dioptric power for the other eye transferred to the other eyepiece.

Dioptric adjustments are made by, first, drawing out the eyepiece lens fully, by revolving the eyepiece adjustment ring. This will result in the cross-scales appearing blurred and indistinct. Next, slowly turn the eyepiece adjustment ring in, until the cross-scales are seen clearly and distinctly and then stop. If the eyepiece adjustment ring is revolved beyond the point of clear focus, then draw the eyepiece lens out completely once and repeat the adjustment.

The eyepiece adjustment ring has a dioptric scale engraved on it, with each scale division representing one diopter. If you can remember the dioptric adjustments for both eyepieces, it will only be necessary to set the adjustment rings to the required settings on the scales of the eyepieces, without going through the above adjustments each time. (Fig. 21)

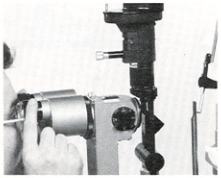


Fig. 21

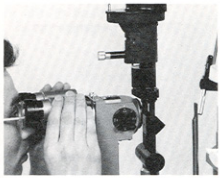


Fig. 22

(7) Adjust the pupillary distance.
The pupillary distance between the binocular eyepieces is adjusted by simply rotating the prism housings outwards to increase the distance and inwards to decrease the distance.

The adjustment range is from 55mm to 78mm, (See Fig. 22)

When the pupillary distance is adjusted

properly for the user's eyes, the left and right fields of view will coincide completely.
A really satisfactory stereoscopic examination is only possible when the individual eyepieces are focused carefully for both eyes of the user and the pupillary distance is also carefully adjusted. Therefore, it is very important that these adjustments be made carefully before conducting any examination with the instrument.

(8) Check the slit image on the test rod.
The slit image focused on the test rod㊽ must be checked under the following two conditions :—
a) Tighten the slit lamp arm fixing knob⑮ and rotate the slit lamp arm and microscope arm together around the upright post (see Fig. 23), and.
b) Loosen the slit lamp arm fixing knob⑮, tighten the microscope arm fixing knob⑭ and rotate the slit lamp arm only around the upright post (see Fig. 24)

Fig. 23

Fig. 24

In both instances, the slit image should not appear to move, should stay in the center of the field of view of the microscope and should also not become blurred and indistinct.

The test rod is used to check whether the slit lamp and microscope are rotating around the same axis and whether the slit lamp and microscope are focused on the identical plane.

The accuracy of the instrument should be checked, from time to time, in the above manner.

2) Examinations

(1) Seat the patient.
Have the patient sit down before the instrument, with the chin placed on the chin-rest ㉑ and the forehead against the head rest ㊶.
Rotate the chin-rest adjusting wheel⑳ so that the patient's eyes are approximately level with the level marker㉝.

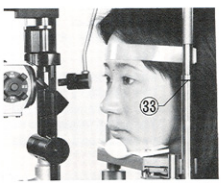


Fig. 25

(2) Adjust brightness of the slit illumination.
At first, switch on the power switch④. Next the slit lamp is illuminated when the illumination control switch⑤ is set to L(4.5) N(6) or H(7.5) with the brightness of the illumination increasing in three steps, as the voltage is increased (as indicated by these figures). When the lamp is set to H, the lamp is overloaded considerably, with a consequent increase in brightness and a shortening of the service-life. Using the lamp at L means that the service-life of the lamp can be extended. The illumination control switch should be set to the lowest permissible setting. (See Fig. 26)

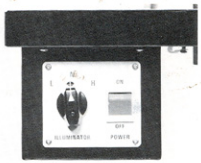


Fig. 26

(3) Fixing the patient's line of sight.
The patient's line of sight is fixed, by having the patient fixate the fixation target with the eye that is not being examined. The direction of the line of sight is changed by simply adjusting the position of the fixation target, as found suitable. (See Fig. 27)

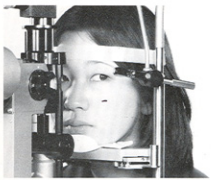


Fig. 27

Two types of fixation targets are available with the instrument. One is the annular fixation target, with dioptric adjustments (see Fig. 28), while the other is the luminous fixation target (see Fig. 29).

The latter is attached to the fixation target, in place of the front half of the annular fixation target which is detached.

The annular fixation target is adjusted for the patient's refractive power with the fixation target adjustment lever, in order that the target is located at the far point of the patient's eye, thus eliminating accomodation while fixating the target, as well as convergence. The range of adjustment is from −15 through 0 to +10 diopters.

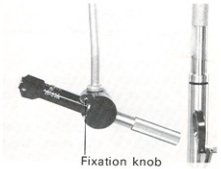


Fig. 28

The luminous fixation target is a simple one. Detach the end with the annular target and attach the luminous fixation target in its place, leaving the balance of the fixation target, with the lamp, in place.
Do not loose the fixation knob too much in case of exchanging because it is worried about the dropping down of the knob.

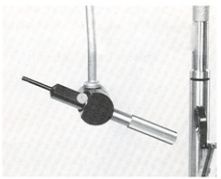


Fig. 29

(4) Focus the slit image on the iris.
The slit image should be roughly focused on the iris of the patient's eye, at this time, with the naked eye, i.e., not through the microscope.
First, loosen the base fixing screw⑨ which will permit free movement of the base in the horizontal plane. Hold the control lever⑩ upright and position the base section. At the same time, use the elevating wheel⑫ and adjust the height of the microscope. Finally, re-tighten the base fixing screw.

The slit image should be finely focused, after adjusting the width and length of the slit image, etc.

(5) Adjust the slit width.
Rotate one of the two slit width adjusting wheels㉘ which will produce continuously variable changes in the width of the slit image, from 0 to 9mm. At 9mm, however, the slit will simply become a circular patch of light. (See Fig. 31)
These wheels can be rotated in either direction, as the cycles are continuously repeated.

(6) Adjust the slit length.
Rotate the knurled knob of the slit diaphragm plate handle㉟ around the axis of the handle which will produce seven changes in the slit length of 9mm, 8mm, 5mm, 3mm, 2mm, 1mm and 0.2mm, followed by infinitely variable changes from 1mm to 8mm, with click-stops at the 1mm and 8mm setting, in the latter case.
If the slit should be opened to its maximum width, at this time, the former changes will produce circular beams of 9mm, 8mm, 5mm, 3mm, 2mm, 1mm and 0.2mm diameters re-spectively.
The changes in lengths (diameters) produced by the seen apertures, as well as the infinitely variable slit lengths produced by a wedge-shaped diaphragm, are indicated on the slit diameter/length scale㊲ over the slit diaphragm plate handle. The scale for the infinitely variable changes has a minimum division of 0.1mm.

(7) Rotating the slit.
Rotating the slit diaphragm plate handle㉟ around the vertical axis of illumination in the horizontal plane, will, on the other hand, rotate the slit image continuously through 90°, from the vertical to the horizontal, with click-stops at the vertical, oblique and horizontal positions.

Fig. 30

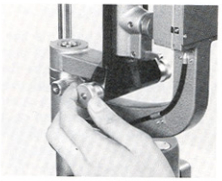


Fig. 31

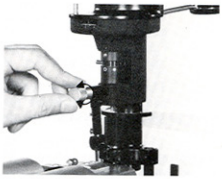


Fig. 32

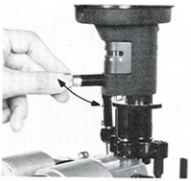


Fig. 33

The oblique and horizontal positions are convenient for gonioscopy and fundus examination in which oblique and horizontal optical sections are required. (See Fig. 33)

(8) Swinging the slit image.
The slit image can be swung across the eye, by loosening the centering knob㉚ and rotating the slit illumination around its vertical axis. Displacing the slit image away from the center of the field of view, in this manner, will produce indirect illumination, retro-illumination, scleral scatter, etc.
The slit illumination will be returned to the center of the field of view, when the centering knob is re-tightened.
The centering knob should be tightened securely for normal examinations.(See Fig. 34)

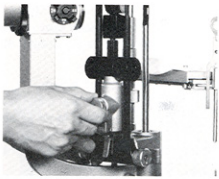


Fig. 34

(9) Inclining the slit illumination system.
Release the slit inclination latch㉙ and pull the lamphouse end towards the operator, which will incline the slit illumination system up to 20° of the vertical.
The slit image will be introduced at an angle of 20° below the horizontal and, with the horizontally-located slit, will have the same effect as swinging the vertical slit image. Inclining the horizontal optical section is particularly valuable for gonioscopy and fundus examinations.
The slit inclination stopper engages the slit inclination latch㉙ at 5° intervals, for producing four angles of inclination, or 5°, 10°, 15° and 20°. (See Fig. 35)

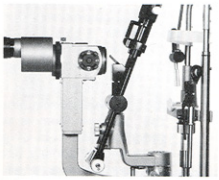


Fig. 35

(10) Choice of reflection mirror and the exchange of mirrors.
Two types of reflection mirrors are available for use in deflecting the slit illumination toward the patient's eye, or a long mirror㉗, with a tapered handle end, and a short mirror㊶, which is a simple square. (See Fig. 36)

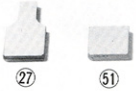


Fig. 36

The long mirror is normally used with the vertical slit illumination for standard types of examinations. However, it may obstruct the line of sight of either objective, either partially or completely, when the slit lamp arm and microscope are used at angles of setting between about 3° to 10°, because of the longer tapered mirror section. Thus, if completely unhindered binocular observation is required at these angle settings, with either the vertical or inclined slit, the long mirror should be exchanged for the short mirror as the shorter mirror will not obstruct the line of sight of the objective.

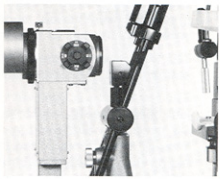


Fig. 37

When using the short mirror, the slit illumination system can be inclined by 10° for reflecting the complete illumination spot. (See Fig. 37)

(11) Insertion of filters.
Four filters are inserted into the light path with the filter lever㊱ which is simply rotated horizontally, to the right or left, as the case may be, and set to the required symbol or setting.

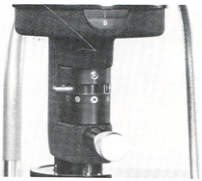


Fig. 38

The symbols are a grey-colored round index (◉) for the heat absorbing filter, a circular index (○) for the 13% neutral density filter, a green-colored round index (●) for the red-free filter, a blue-colored round index (●) for the blue filter and a plain circle which indicates the open aperture.

The blue filter is used for applanation tonometry and examinations with fluorescein, the red-free filter is used for obtaining a green-colored field of greater contrast, the 13% neutral density filter is used for general observation over a wide field with the slit opened to the maximum aperture and the heat absorbing filter is used with the overloaded lamp (when used at H(7.5 volts)) with the opened slit.

(12) Magnification changes
The magnifications of the observation can be changed by simply rotating the magnification changer handle㉒, i.e., three different total magnifications 10×, 16× and 25.6× with 12.5× standard eyepieces.
12.5× eyepieces can be exchanged optional 20× eyepiece lenses.
The above changes produce three different magnifications 16×, 25.6× and 40×.

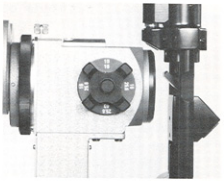


Fig. 39

3) Fundus Examination

Only the forward one-third portion of the vitreous body can be examined with the preceding examination. since it is not possible to focus the slit image further into the vitreous body due to refraction by the cornea and crystalline lens.

The Hruby lens, a preset lens of −58.6 diopters, is, therefore, supplied for the examination of the fundus and the posterior part of the vitreous body.

The Hruby lens is used on the Hruby lens attachment mount㉛ coupled to the Hruby lens guide plate⑱, which should be fixed on the opening in the rotational axis of the slit lamp arm and microscope arm. When coupled in this manner, the Hruby lens follows all movements of the microscope while its distance to the patient's eye remains fixed, thus greatly facilitating examinations of the posterior segment of the eye with the slit lamp immediately after examining the anterior segment.

(1) No special preparation is required of the patient, if the pupil will stay open wide enough. If not, a few drops of mydriatic may have to be given to the patient's eye about 20 minutes before the examination, in order to keep the pupil dilated suffi-

ciently.

(2) Place the Hruby lens guide plate⑱ in place on top of the rotational axis of the slit lamp and microscope arms.

(3) Pull the lever Ⓐ of the Hruby lens attachment mount㉛ forward which will free the attachment mount㉛ and let it slide laterally below the chin-rest. Locate the attachment mount ㉛ over the Hruby lens guide plate⑱ and insert the shank of the Hruby lens㉜ into the attachment mount㉛, with the lower end of the shank engaging the groove of the guide plate⑱. If necessary, loosen the locking ring to permit the shank to lower sufficiently for coupling. (See Fig. 40)

(4) Center the slit lamp arm and microscope arm approximately so that they face the patient's eye.

(5) Depending on whether the patient is myopic or hyperopic, move the Hruby lens forward or backward. with the control lever Ⓑ, so that a slit image is focused on the fundus. (See Fig. 41)

(6) When observing the peripheral part of fundus, it will be carried out through the guide of eye by the fixation target or by rotating the microscope around the upright post.

(7) The elimination of reflecting light will be carried out by changing the slit width, moving the inclination latch and rotating the slit arm.

When rating the slit lamp arm, the observation will be prevented by the long mirror, therefore the short mirror will be used. (Cf. How to use (10))

(8) When the Hruby lens is not being used, simply pull the Hruby lens up so that the lower end of the shank no longer engages the coupling groove of the guide plate. Then, move the Hruby lens attachment mount㉜ to the right, as far as it will go, and revolve the lever Ⓐ to the right, too.
The Hruby lens can be left in this position until it is next used. (See Fig. 42)

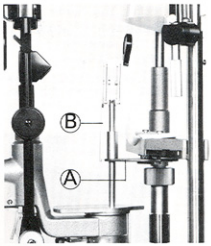


Fig. 40

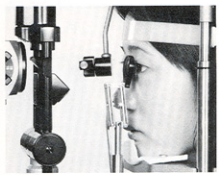


Fig. 41


Fig. 42

4) Exchanging the Mirrors

As noted, there are two types of mirrors, or long and short, which can be used interchangeably.

To exchange them,

(1) Increase the angle between the microscope and the illumination,

(2) Incline the illumination system about 10°,

(3) Pull out the mirror.

While the long mirror is easily pulled up, by gripping its tapered end (as in Fig. 43), the short mirror must be pushed up slightly, with the sharp point of a pencil, etc., (as in Fig. 44) before it can be pulled up.

Do not touch the surfaces of the mirrors during exchange and place the unused mirror in its slot of the accessory drawer.

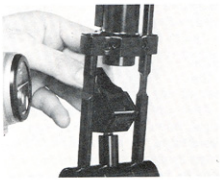


Fig. 43

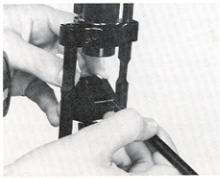


Fig. 44

6. CARE AND MAINTENANCE

1) Exchange of the Slit Illumination Lamp

The slit illumination lamp should be exchanged, in the following manner, by taking off the lamphouse cover㊴ and exposing the vertically suspended precentered tungsten filament lamp.

(1) First, set the power switch④ to OFF and cut off electricity to the slit illumination lamp.
If the slit lamp has been in use, prior to exchanging the lamp, it will still be quite hot and, therefore, wait several minutes until the lamphouse cover has cooled sufficiently for handling.

(2) Loosen the two lamphouse cover fixing screws㊵ and lift up the lamphouse cover ㊴, which will expose the lamp. Simply lift out the old bulb and replace it with a new one.

(3) When inserting the new lamp bulb, see that the notch on the flange of the centering base is accurately coincided to the locating plate and/or that the flange is well-seated and not riding high on one side, as otherwise, a slit image will not be projected. (See Fig. 45)

(4) When correctly inserted, replace the lamphouse cover and tighten the fixing screws㊵ while pressing down on the cover㊴. (See Fig. 46)

(5) Set the power switch⑤ to ON and check illumination of the slit illumination lamp.

Fig. 45

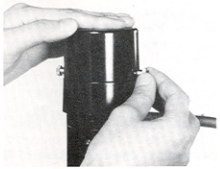


Fig. 46

2) Exchange of the Fixation Target Lamp

The fixation target lamp should be exchanged, as follows, by taking off the front target end and exposing the lamp bulb.

(1) Loosen the knurled knob of the fixation target㉞ slightly and detach the target end. (Do not turn the knob too much, as it will become detached.)

(2) Grip the exposed lamp bulb and put out until it comes off.

(3) Replace with a new bulb and check illumination of the target. (See Fig. 47)

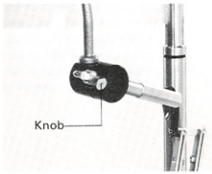


Fig. 47

3) Exchange of the Fuse

The fuse should be exchanged, in the following manner, when both pilot lamp④ and slit illumination lamp㊼ do not light up when the power switch④ is set to ON.

(1) Set the power switch to OFF.

(2) Revolve the fuse holder㊷ cover in the arrow-indicated direction and it will come off, together with the glass-shielded fuse. (See Fig. 48)

(3) Insert the replacement fuse in the fuse holder and replace the cover.

(4) Finally, set the power switch④ to ON and check whether the pilot lamp and slit illumination lamp actually light up.

Use a glass-shielded fuse, which is, normally, available on most markets.

Fig. 48

4) Adjustment of the Slit Width Adjusting Wheels

If the slit width adjusting wheels㉘ rotate too freely, even resulting in accidental changes of the slit width, or the movement of the wheels is tight, adjust the friction of the adjusting wheels.

The friction adjustment screw is located in the center of the right-hand slit width adjusting wheel. Therefore, adjust the screw with the minus screwdriver, until the tension is just right. (See Fig. 49) Turning the screw in the clockwise direction will produce a tighter movement while counter-clockwise rotation of the screw will slacken the friction of the wheels.

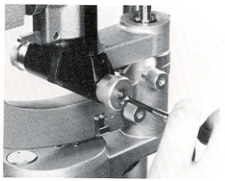


Fig. 49

5) Adjustment in the Inclination of the Illumination System

If the illumination system moves too smoothly, adjustment must be made as follows.

Adjustment screws are located on both sides of the rotational axis, as in Fig. 50. Both screws must be adjusted with a minus screwdriver until the proper tension is obtained. and, it should be noted that, both screws must be adjusted by the same amount. As with the slit width adjusting wheels, clockwise rotation will increase friction while counter-clockwise rotation will slacken friction.

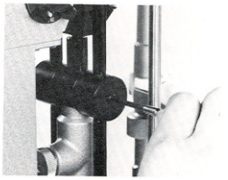


Fig. 50

6) Cleaning the Instrument

(1) Cleaning the Lenses and Mirrors

As a general rule, the surfaces of the lenses and mirrors should not be touched, as much as possible.

When dirty, try to brush away the dust and dirt with the accessory cleaning brush.

If the lens and/or mirror cannot be cleaned by brushing, however, wipe the surface with a soft, well-washed cotton cloth, linen cloth, etc., which can be lightly dipped into a solution of 4 parts ether and 1 part alcohol. Do not wet the cloth excessively but repeat, if necessary. Furthermore, do not rub the surface but wipe lightly, repeating, if necessary, until the surface is clean. Do not use anything which might scratch the delicat surfaces.

(2) Cleaning the Condenser Lens of the Slit Illumination

The condenser lens of the slit illumination system may have to be cleaned, if the illumination seems slightly dark.

First, detach the lamphouse cover㊴ by unscrewing the fixing screws㊵.

Next, unscrew the four knurled knobs which will be exposed, as in Fig. 46.

Then, pull up the lamphouse which will expose the surface of the condenser lens. Clean the surface in the same manner noted above.

The lamphouse can only be replaced so that the locating plate, for the lamp's centering base chip, is located on the side of the patient. (See Fig. 51)

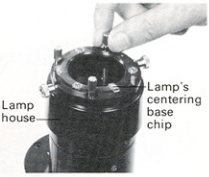


Fig. 51

(3) Cleaning the Gliding Plate and Rails

The gliding plate⑥ and rails⑦ on the table① must be cleaned from time to time, to insure smooth movement of the base over the table.

Otherwise, if these parts should become dirty, with dust, dirt and other foreign matters, as well as with medicines and other solutions which might drop, the movement of the base over the table area will become heavy.

Clean the gliding plate with the silicon cloth and the rails with a brush. If the former should become too dirty, it can also be cleaned with a cloth soaked in a soapy solution or in detergent, but the gliding plate should then be wiped dry with a clean cloth.

(4) Cleaning the Plastic Parts

The plastic parts of the instrument, such as chin-rest, head rest, etc., should not be cleaned with any kind of chemical solution.

Use the silicon cloth to keep these parts clean. If further cleaning is required, wipe them with a cloth soaked in a light detergent solution or in soapy water. When cleaned in this manner, however, finish with a clean wet cloth to eliminate any residue and then wipe dry with a clean cloth, too.

7. OPTIONAL ACCESSORIES

7-1 35mm PHOTOGRAPHIC ATTACHMENT SET

1) Nomenclature

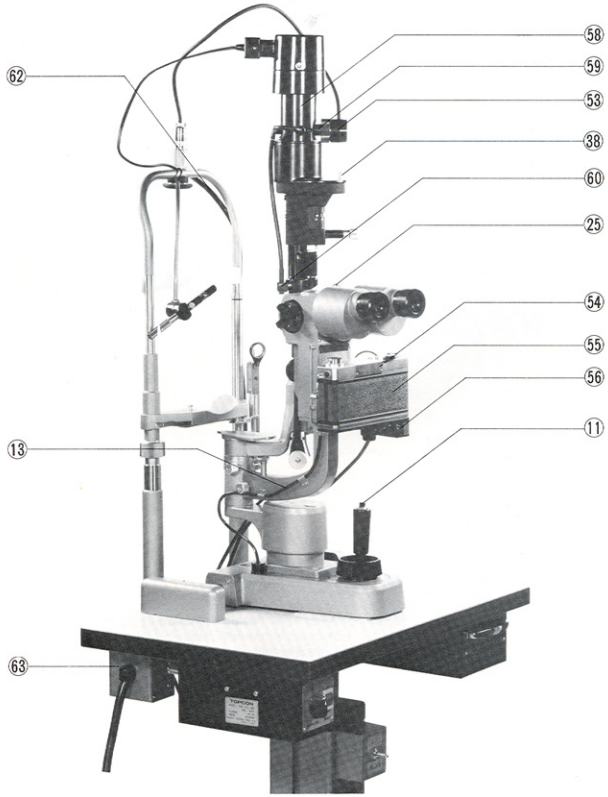


Fig. 52

㊸ Trigger coil
㊳ Setting pin for background illumination
㉕ Beam splitter lever
㊹ Solenoid release
㊺ 35mm camera body
㊻ Auto winder
⑪ Release button
㊼ Shutter relay cord
㊽ Relay lens
㊾ Xenon lamp
㊿ Background illumination
(61) Normal (Full frame) photographic attachment
(63) Connected cord
(62) Xenon relay cord
(63) Cord relay box
(64) Power supply box
(65) Flash control switch
(66) Power switch
(67) Pilot lamp
(68) Charge lamp
(69) Consent
(70) Voltage selector/fuse holder
(71) Power cord
(72) Camera fixing lever
(73) Attachment fixing lever (See Fig.54)

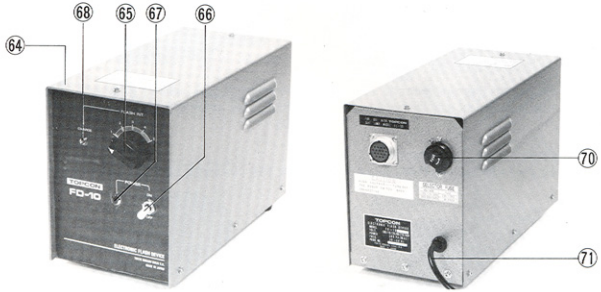


Fig. 53

Normal (Full frame) photographic attachment

Stereo photographic attachment (It is available at extra cost against 35 mm photographic Attachment set)

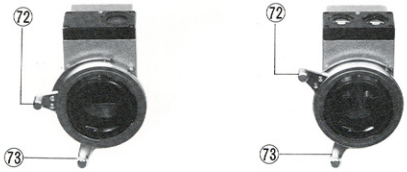


Fig. 54

(74) Film winding lever
(75) Exposure counter
(76) Shutter release button (camera)
(77) Rewind crank
(78) Back cover lock
(79) Rewind button (camera)
(80) Auto winder switch
(81) Red lamp
(82) Auto winder cord
(83) Illumination control lever

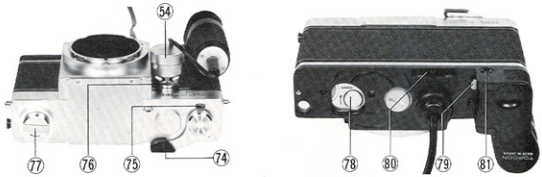


Fig. 55

2) Assembling and Installation

Once everything has been unpacked, check the contents against the following list.

Contents	Quantity
(64) Power supply box	1 each
(55) 35mm camera body with auto winder	1 each
(54) Solenoid release	1 each
(61) Normal (full frame) photographic attachment	1 each
(58) Relay lens	1 each
(60) Background illumination	1 each
(59) Xenon lamp	1 each
(53) Trigger coil	1 each
(63) Cord relay box	1 each
(62) Xenon relay cord	1 each
(57) Base relay cord	1 each

Fig. 56

3) Attachment of the Photographic Unit

(1) Attaching the Relay Lens

(a) Detach the lamphouse cover, after loosening two lamphouse cover fixing screws ㊵.

(b) Unscrew four knurled lamphouse attachment screws and pull the lamphouse up. (See Fig. 57)

(c) Unscrew four spacer bars and detach.(See Fig. 58)

(d) Unscrew four spacer ring fixing screws and then detach the spacer ring. (See Fig. 58 and Fig. 59)

(e) Unscrew four attachment screws on the top surface of the relay lens section and use them to attach the relay lens section in place of the spacer ring on top of the condenser lens. (See Fig. 60)

(f) Next, screw in the four spacer bars in the screwholes from which the four attachment screws were detached in (e). Then, assemble the lamphouse, illumination bulb and lamphouse cover, in the reverse order of (a) and (b).

Note: The four spacer ring fixing screws and the spacer ring will no longer be required, once the relay lens section is assembled in the above manner.

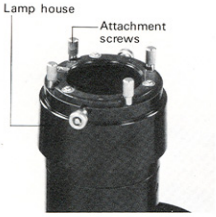


Fig. 57

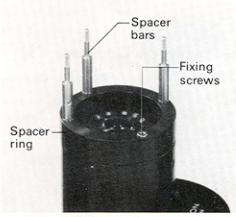


Fig. 58

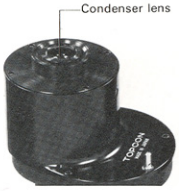


Fig. 59

Fig. 60

(2) Attachment of the Background Illuminator

(1) Insert the pins of the background illuminator into receptacles at the lower end of the illumination section. (See Fig. 61)

(2) Loosen the setscrew on the side of the ralay lens section and detach the plug. (See Fig. 62)
Insert the end of the optical fiber light guide from the background illuminator into the opening(from which the plug was taken out) and then fix securely with the setscrew.
Hook the optical fiber light guide on its hook, to keep it from dangling. (Fig. 62)

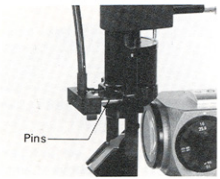


Fig. 61

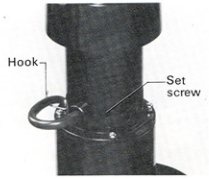


Fig. 62

(3) Attachmentof the Cord Relay Box

Fix the flange of the cord relay box securely with the four wood screws (See Fig. 63)

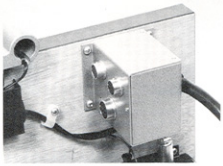


Fig. 63

(4) Connecting the Xenon Relay Cord

(a) Take off two screws of the upper part of the chin rest.
Fix it by those two screws as shown Fig. 64.

(b) Fix the cord at three points by the cord holder of the pole of chin rest and the screws of the pole. (See Fig. 64)

(c) Connect the other end of the cord to the cord relay box.

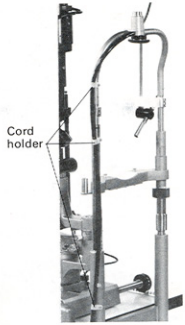


Fig. 64

(5) Attaching the Xenon Flash Lamp

(a) Take off the ring of the trigger coil(53) and insert the Xenon lamp(59) and fix it with the ring (See Fig. 65)

Fig. 65

(b) Insert the Xenon flash lamp into the square opening on the side of the relay lens section, from the user's side so that the connecting cord will be on the top side. Then, fix it with the setscrew on the right side.

(c) Connect the other end of the connector cord to the connector on the top frame of the chin-rest and head rest section.

There is an opening on the side of the Xenon flash lamp for siphoning light off for the background illumination.
Therefore, if this opening is located on the side of the optical fiber light guide, the connecting cord from the Xenon flash lamp will be oriented on the top.

Fig. 66

(6) Attaching the Photographic Attachment

(a) Take off the front and rear plates on the box frame section below the binocular microscope. (See Fig. 67)

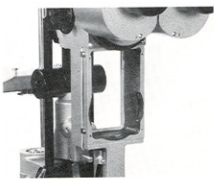


Fig. 67

(b) Move the attachment fixing lever(73), on the bottom of the camera attachment mount(of the photographic attachment), to the left, insert the photographic attachment into the box frame opening below the binocular microscope and then move the fixing lever to the right, which will fix the attachment securely. (See Fig. 68)

(7) Attaching the Camera Body

(a) Screw the solenoid release(54) into the shutter release button(76). Connect the cord which comes from solenoid release with the auto winder (See Fig. 69)

(b) Move the camera fixing lever, on top of the camera attachment mount of the photographic attachment, upwards, insert the camera body mount over the camera attachment mount and then lower the fixing lever which will fix the camera body securely. (See Fig. 70 and Fig. 71)

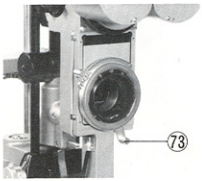


Fig. 68

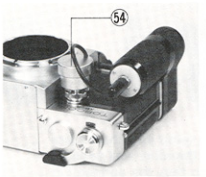


Fig. 69

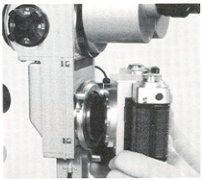


Fig. 70

(8) Connecting the Cords

(a) Shutter release cord
Connect one end to the connector on the base and the other end to the cord relay box. (See Fig. 72)

(b) Auto Winder cord
The connector cord from the Auto Winder should be connected to the cord relay box, with the dangling cord hooked on a hook available on the microscope arm.(See Fig.72)

(c) Confirm if the voltage selector(70) of photographing power supply has been set to the fixed voltage.
The connector cord from the cord relay box should be connected to the Power Supply As the ground wire comes out of the power supply plug of power cord(71), be sure to ground such wire.

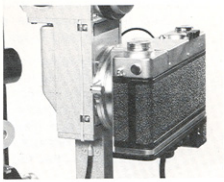


Fig. 71

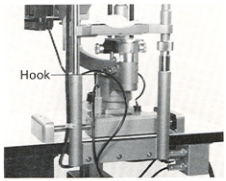


Fig. 72

4) How to Use a Photographic Attachment

(1) Loading Film in the Camera Body

(a) Detach the camera body by rotating the camera fixing lever⑫ upward.

(b) Open the back cover of the camera body, by push-turning the back cover lock⑱ in the arrow indicated direction.
The back cover will spring open if it is not being pressed. (See Fig. 73)

(c) Pull up the rewind knob⑰ fully.
Place a fresh film cartridge in the empty film chamber and push the rewind knob back into engage the film cartridge.
If necessary, rotate the rewind knob slightly so that the two engage fully. (See Fig. 74)

(d) Pull out the leading end of the film and insert it deeply into one of the multi-slots of the take-up spool. (In case of stopping winding lever, depress the shutter release button through the solenoid release)
Revolve the serrated flange of the film take-up spool so that the film perforations at the top and bottom fully engage the film transport sprocket teeth.
Once the perforations are fully engaged, in the above manner, close the back cover, by simply pushing it in until it catches and is locked securely. (See Fig. 75)

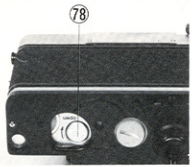


Fig. 73

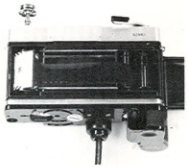


Fig. 74


Fig. 75

(e) Rotate the rewind crank⑰ in the arrow indicated direction slowly, which will take up any slack of the film in the cartridge.
Push the film winding lever⑭ until it makes a full stop, while, at the same time, checking whether the rewind knob is rotating counter-clockwise. (thus showing that the film is being advanced properly)

(f) Depress the shutter release button through the solenoid release.
A blank shot will be taken and then the film will be advanced one frame, with the shutter and exposure counter being charged and advanced respectively, too.
Repeat the blank shot once more which will normally take care of any frames which may have been exposed during film loading.
Then, the exposure counter⑮ shows "1".

(g) Attach the camera body by rotating the camera fixing lever⑫ downward.

(2) Exposure Counter

The exposure counter⑮ on the camera body requires no adjustments because it is automatic.
Whenever the back cover of the camera body is opened, the exposure counter automatically returns to the starting-mark, i.e., white dot index.
The exposure counter is additive and shows the number exposed.

3) Changing of Photographic Magnification

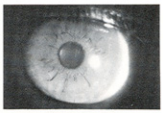
Photographic magnification can be changed by rotating the magnification changer handle㉒.

Observation	Normal(full frame) Photography	Stereo Photography
10 ×	0.9×	0.6×
16 ×	1.4×	1 ×
25.6×	2.2×	1.6×

Normal(full frame) Photography

0.9×

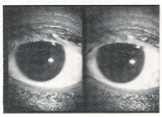
1.4×



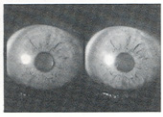
2.2×

Stereo Photography

0.6×



1×



1.6×

Fig. 76

4) Background Illumination

(a) In case of slit photography, when photographing the background to know what position of eye is cut by slit, in case of photographing the ocular anterior which requires a large field of illumination and in case of conjunctive photographing which requires only low quantity of light the background illumination is used.

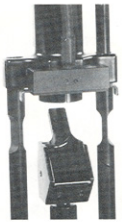
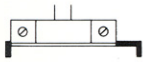
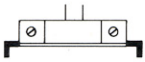


Fig. 77

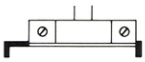
(b) The background illumination is adjustable for high or low, or may also be blacked out, with the following adjustments, as seen from the user's side.(See Fig. 78)



No background illumination
(Lever moved to the far right)



Low
(Lever centered click-stop.)



High
(Lever moved to the far left.)

Fig. 78

(c) The background illumination will not be reflected by the mirror into the patient's eye.

(d) The background illuminator may hit the patient's forehead, when the slit illumination system is inclined. In such cases, therefore, detach the background illuminator (refer to Attachment of the Background illuminator), wrap it around the slit illumination system and store the background illuminator on the setting pin for the background illumination (38) over the slit mechanism (See Fig. 79)

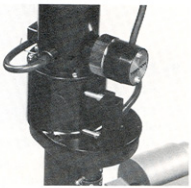


Fig. 79

5) Exposure Guide for Photography

The correct exposure is affected by the subject and the photographic magnification. Therefore, the correct exposure will be decided the adjustment of slit width, flash intensity and the background illumination.

The following table indicates the standard exposure with the normal eye of brownish iris, 0.1mm of slit width.

The recommended film is Kodak Ektachrome, Daylight, ASA 200, transparency film.

The actual photography is for affected eye, so the correct exposure will vary depending upon the photographic position and the condition of the patient. You are, therefore, requested to rectify according to the standard value.

Magnification of microscope	10×				16×				25.6×			
Photographic Condition	Magnification of Normal Photography 0.9×		Magnification of Stereo Photography 0.6×		Magnification of Normal Photography 1.4×		Magnification of Stereo Photography 1×		Magnification of Normal Photography 2.2×		Magnification of Stereo Photography 1.6×	
	F.I	B.I	F.I	B.I	F.I	B.I	F.I	B.I	F.I	B.I	F.I	B.I
Corneal and Crystalline lens(Slit width approx.0.1mm)	4	L	4	L	5	L	4	L	5	L	5	L
Iris									2		1	
Ocular anterior	4	H	4	H	5	H	5	H				
Conjunctiva					3	H	2	H	5	H	4	H

F.I : Flash Intensity : 1(20WS)–2(40WS)–3(80WS)–4(160WS)–5(200WS)
B.I : Background Illumination : H(High) L(Low)

Remarks : (a) Asterisk(＊)indicates no background illumination, with the slit completely opend for photographing iris.

(b) For photographing the ocular anterior and conjuctiva, the illumination field, being max. 9mmϕ, will not cover the full frame, therefofe, photographing will be by the background illumination only.
Focusing is made under the open slit and upon adjusting focus the slit is immediately closed completely and photographing button is pushed to take a photograph.

6) Photography

The shutter release button is on the top of the control lever, with the shutter actually relessed by the solenoid release screwed into the cable release socket of the camera shutter release button, while the film is advanced and the shutter is charged with the Auto Winder attachment.

The Auto Winder, solenoid release and connector cords must, therefore, all be connected securely for photography to take place.

IMPORTANT
The lever over the binocular microscope must be pushed IN for photography. When left OUT, the shutter will not be released and the Xenon flash lamp will not illuminate. (See Fig. 80)

＊ When you push the release button(11), confirm that the charge lamp(68) of power supply for photographing is illuminated. The charge lamp will be illuminated within 5 minutes after xenon lamp was lighted.

＊ When you pushed the release button, you have to keep your hands off immediately. Keeping on pushing may overheat the solenoid release, which would cause some damage.

＊ Do not push the release button while the film is being wound up by auto winder. If you do, the auto winder may stop in the way of winding the film up. At such a time, the red lamp(81) of auto winder remains illuminated (In normal case, the red lamp is illuminated only while the auto winder is in action) In such a case, you are requested to wind it up by winding lever (74). When the film is wound up, the red lamp turns off, returning to normal condition.

＊ Refrain from photographing beyond the limited number of film. If you do, the following matters would occur :

The red lamp(81) of auto winder remains illuminated. Turn the auto winder switch(80) to OFF and rewind the film.

The perforation of film is, rarely, broken, it is feared that photographing should be kept outwardly in spite of the completion of film. (See Fig. 81)

Fig. 80

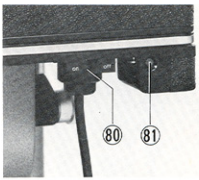
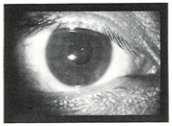


Fig. 81

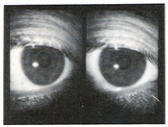
7) Obstruction by mirrors and pole

When putting the microscope and illumination in a straight line (open angle 0°), the picture will be obsetructed as shown in the figure on the right by the long mirror㉗. (See Fig. 82)

When moving the illumination to the microscope, be careful obstructing by the long mirror and the pole. (Normal photography is to be carried out by the right eye of microscope while the stereo photography is to be carried out from both eyes.)



Normal Photography



Stereo Photography

Fig. 82

8) Unloading the film

Detach the camera body and depress the rewind button㉙ on the auto winder (See Fig. 83)

Unfold the rewind crank㉗ and turn it in the arrow-indicated direction.

On that occasion, the rewind knob will float up naturally during the rewind operation. Rewind smoothly and evenly, until tension decreases which will be a sign that the film has slipped off the take-up spool.

Open the back cover of the camera body and pull up the rewind knob fully.

Tilt the camera body slightly and the cartridge will fall out. (See Fig. 84)

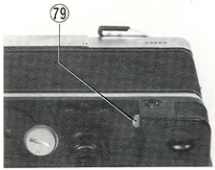


Fig. 83

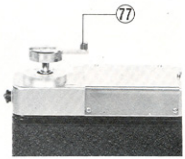


Fig. 84

7-2 ATTACHMENT OF THE OBSERVATION TUBE

1) Nomenclature

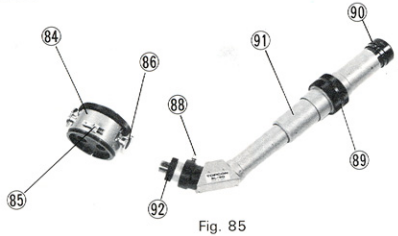


Fig. 85

90 Eyepiece
89 Image rotating ring
88 Fixing knob
85 Beam splitter lever
84 Beam splitter
86 Attachment mount (See Fig.81)

2) Installing the Beam Splitter Unit

(1) Detach the prism housing of the binocular microscope.
(Revolve the milled black-colored ring 24 in the counter-clockwise direction.) (See Fig. 86)

(2) Align the pin of the beam splitter unit 84 to its notch and insert fully, in place of the prism housing. Then, revolve the fixing ring and attach. (See Fig. 87)

(3) Attach the prism housing to the rear of the beam splitter unit in the same manner as (2).

3) Attachment of the Observation Tube

Take off the cap from either of the two attachment mounts (on both sides of the beam splitter unit) and insert the observation tube. Finally, lock securely with the fixing ring 92. (See Fig. 88)

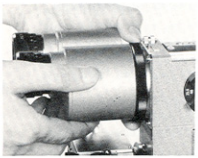


Fig. 86

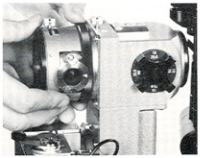


Fig. 87

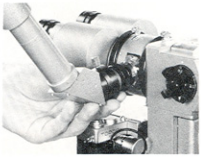


Fig. 88

4) How to use observation tube.

(1) Loosen the fixing knob(88), in the illustration, which will permit the observation tube to be rotated freely for orienting at an angle suitable by the observer. Then, tighten the fixing knob. (See Fig. 85)

(2) Turn the beam splitter lever(85) to IN so as to be able to observe, and adjust the diopter of the eyepiece lens. (See Fig. 86)

(3) The image in the field of view can be oriented suitably with the image rotation ring(89).

※ When the beam splitter lever(85) is OUT, the all lights go to the operator's side and when it is IN, as the light is halved between the operator's side and observation tube side, the light is decreased for the operator.

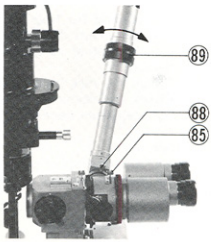


Fig. 89

※ When the beam splitter lever(25) for photogfaphing is turned to IN, the light is so insufficient for both observation tube and operator that the observation is difficult. Consequently, in case of photographing, the observation by observation tube is impossible.

7-3 20X HI-EYEPOINT EYEPIECE

Total magnification 16X.26.6X and 40X

Fig. 90

8 . OTHER TROUBLES AND PARTS ORDER

1) **Before Calling for Help**
If the instrument does not work, please check the following, before calling for help.
* Check whether all connector cords and/or cables are correctly and securely connected.
* Check the fuse holder and replace blown-out fuses.
* Check the illumination lamp, fixation target lamp and also xenon flash lamp and replace, when necessary.

2) **Spare parts**
When ordering spare parts for the SL-5D, please give the following full name and parts number, as well as the quantities.

Description	Parts Number	Appearance
Illumination tungsten bulb	4031025611 4031025620	
Fixation target bulb	4035042110	
Xenon flash lamp	4036540000	
Chin-rest pads	4031040820	

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Printed in Japan 8309-1.65W