INTRODUCTION

Please read the following information carefully before installing and using the Scan Optics SO-2200LED binocular indirect ophthalmoscope. Scan Optics is responsible for the safety, reliability and performance of the equipment only if it is used in accordance with these instructions.

This device is designed for use by a certified practitioner. Environmental storage and packing conditions of 60-95% relative humidity and 10-40 °C are recommended. No parts or accessories are supplied in sterile condition.

Apart from those identified in the instructions within this manual, there are no user-serviceable parts in this device. Scan Optics will retain the discretion to advise whether any repairs may be carried out by external qualified technical personnel, or whether part(s) of the device must be returned to the manufacturer's premises for service or repairs to be carried out under warranty or otherwise. Where appropriately qualified technical personnel are identified, Scan Optics will make available on request information which may assist in maintaining or repairing this device.

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CAUTION

Do not use the power pack if there is any evidence of damage to the mains supply cord.

Do not disassemble this device.

Do not immerse any part of this device, charger or charger power supply in liquids, or expose them to liquids generally.

Do not open or dismantle the battery unit, dispose of in fire, or short circuit - may ignite, explode, leak, or become heated causing personal injury.

Do not plug any device other than the SO-2208 head mounting assembly into the top of the SO-2218 battery unit.

Do not plug any other device other than the SO-2207 power pack into the bottom of the SO-2218 battery unit.

Do not plug or unplug the head mounting assembly into the battery unit while the battery unit is switched on.

Do not use this device if damaged.

This equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

Parts of this device may get hot after extended use.

PARTS LIST

Head mounting assembly

Battery unit

Power pack with DC output lead.

Mains power lead

User manual (this manual)

REPLACEMENT PARTS AND OTHER ACCESSORIES

Mains power lead (Aus)	SO-2209
Power pack	SO-2207
Head mounting assembly	SO-2208
Teaching mirror	SO-2211
Red-free filter	SO-2212
Cobalt blue filter	SO-2213
Battery unit	SO-2217
Low voltage lead (for head mount assembly)	SO-2219
20D Hand condensing lens	SO-2220
28D Hand condensing lens	SO-2228

USING THE INSTRUMENT

Place the head mounting assembly on your head in the same way as a pair of spectacles. Adjust the head strap as necessary to achieve a firm, comfortable fit. Connect the head mounting assembly to the battery unit by plugging the lead into the socket on the top of the battery unit. Switch the battery unit on and adjust the light output by rotating the intensity knob. The blue 'lamp on' indicator will light up. Switch the unit off again when it is not being used. Do not plug or unplug the head mounting assembly into the battery unit while the battery unit is switched on.

Note that the instrument will not operate when the battery unit is being charged by the power pack.

WORKING DISTANCE

The distance from the hand-held condensing lens to the instrument during use should be approximately 400mm; the instrument will then form an image of the fundus 600mm from the observer. Convergence to this point and a corresponding accommodation of about +1.5D by the examiner will then be required.

REFLECTIONS

The corneal reflex is often a problem of indirect ophthalmoscopy. Elimination of the corneal reflex involves separating the image of the lamp filament and the images of the sight holes (in this case the examiner's pupils) in the pupil plane of the examined eye. A mydriatic may be necessary to dilate the pupil sufficiently for the images to fall within the pupil area. The pupil diameter needs to be about 3.5mm with a 30D condensing lens. The hand-held condenser should be moved both longitudinally and laterally to find the best position to minimise the corneal reflex. Note however, that longitudinal movement will also alter the field of illumination and lateral movement will move the fundus image laterally. Movement of the hand-held condenser may require adjustment of the angle of the lamphouse.

The hand-held condenser lens surface reflections can be moved by tilting the lens, when the reflections will move in opposite directions.

FUNDUS EXPLORATION

To explore the fundus it should be remembered that the image will move in the same direction as the hand condenser. For example, to explore the area of the right eye from the disc to the macula the condenser must be moved to the left. Condenser movements can be used to explore small areas.

To explore the periphery of the retina, the patient should be asked to rotate the eye. To explore the lower retina, for example, the patient should be asked to look downwards, and to explore the upper retina, to look upwards.

OPTOMETER

The SO-2200LED binocular indirect ophthalmoscope can be used to estimate the refractive error of an eye. Observe the image size as the hand condensing lens is moved from a point close to the eye (say 30mm) to a point further away (say 120mm) in a line from inside to outside the point where the first principle focus of the lens is at the anterior focus of the eye. If the image size remains constant, the eye is emmetropic; if the image diminishes, the eye is hypermetropic and if the image size increases, the eye is myopic. If the eye is astigmatic, a meridional difference in magnification may be seen. At the point where the first principal focus of the lens is at the anterior focus of the eye (that is, a lens to cornea distance of about 60mm) magnification of the image is independent of refractive error. Normally however, the lens is closer to the eye than this, so the image magnification is greater in hypermetropia and less in myopia than emmetropia (that is, the linear field of view varies with refractive error). The angular field however, being limited by the condensing lens aperture, is constant.

HAND CONDENSING LENSES

Condensing lenses of powers between 15D and 30D are available from several manufacturers. These lenses have a major influence on both the illuminating and viewing optical systems, and it is important that only high quality lenses are used. Scan Optics offer high quality lenses in powers of 20D and 28D.

When held, the higher power surface should be towards the observer, for correct aberration control. A higher power lens will increase the field of view, reduce the image magnification, increase the image brightness and reduce the pupil size needed.

ADJUSTING THE LIGHT PATCH

You may need to adjust the nose pads on the spectacles to achieve the most comfortable fit. If needed, the light patch position may be fine adjusted up or down by rotating the small knurled nut on top of the lamp housing. The light intensity may be changed by using the control knob on top of the battery unit. No other adjustments are required.

CHARGING THE BATTERY UNIT

1. Connect the plug on the power pack to the socket on the underside of the battery unit. *This will disconnect the output from the battery unit. Note that the instrument will not operate when the battery unit is being charged by the power pack.*
2. Connect the 'figure 8' socket end of the mains power lead to the power pack.
3. Connect the plug on the mains power lead to a suitable source of mains AC power and switch it on. Both the green LED on the power pack AND the green 'Charger power in' indicators should light up.
4. Observe the status of the middle LED on the battery unit: If the battery unit requires charging, the yellow 'Charging' indicator will light up. It will take between 90-100 minutes to charge a fully exhausted battery. When the yellow 'Charging' indicator will switches off, the battery unit is fully charged. In this case, a small trickle current from the power pack will be used to detect the voltage status of the battery unit.

CLEANING THE INSTRUMENT

1. Only mild cleaning agents should be used to clean the exposed surfaces of the instrument.

2. Non-optical surfaces may be wiped down with a damp cloth
3. Optical surfaces including the spectacle lenses, front viewing lens and front lamphouse lens may be gently cleaned using pure alcohol or optical cleaning foams.
4. Always blow dust from optical surfaces before attempting to clean them.
5. Do not use excessive force when cleaning the front viewing lens of the device.

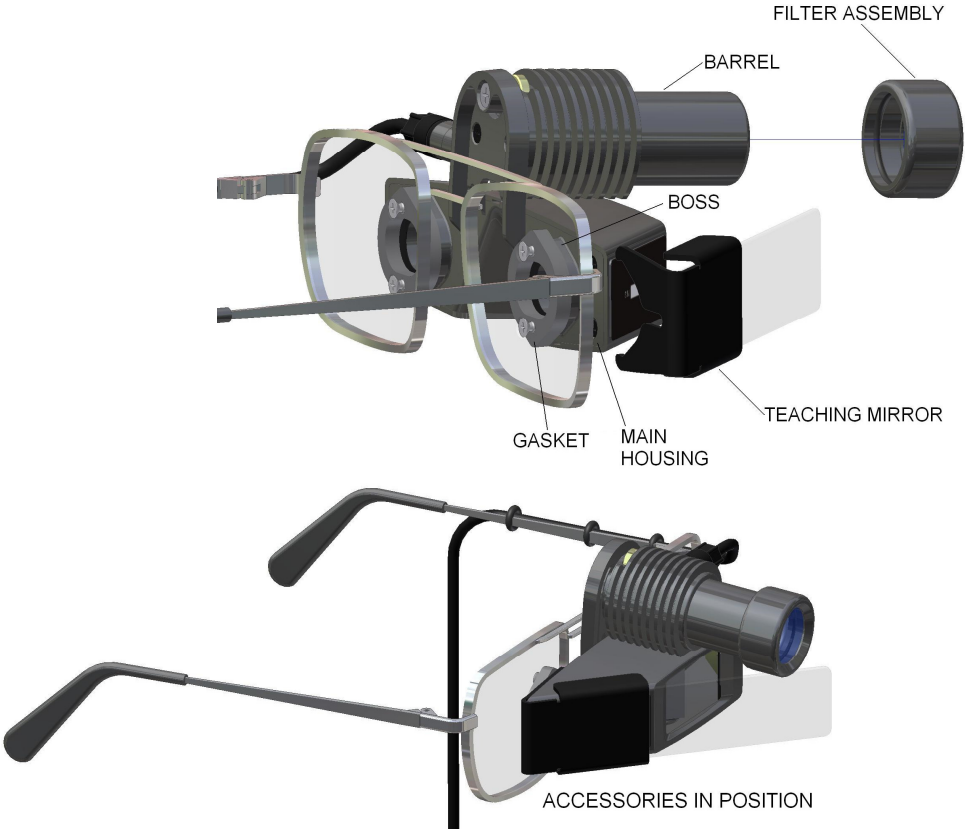
ATTACHING ACCESSORIES

TEACHING MIRROR

The SO-2211 teaching mirror allows simultaneous observation of an image by the person wearing the instrument and another observer positioned at their side. To attach the teaching mirror, slide the black bracket in between the gasket on the front of the spectacles and the main housing. Clip it on to the boss. The teaching mirror may be clipped on either side of the instrument.

FILTER ASSEMBLY

Various filter assemblies such as the SO-2212 red-free filter may be attached to the light source. Simply slide the assembly in place over the barrel.



TROUBLESHOOTING

SYMPTOM	CAUSE	REMEDY
Light dim	Intensity set low	Increase intensity.
	Low battery voltage	Recharge battery unit.
No light visible	Battery unit switched off	Turn on battery unit.
	Battery unit exhausted	Recharge battery unit.
	Charging socket connected	The instrument will not work while the battery unit is being charged. Disconnect the power pack lead from the battery unit charging socket to use the instrument.
	Head mount assembly connector dislodged from lead	Reconnect the lead to the head unit.
No light visible, blue indicator LED does not come on when battery unit is switched on	The head mounting unit was plug in whilst the battery unit was in the 'ON' position. The safety circuit activated to prevent damage to the battery unit.	Reset the safety circuit by switching the unit to the 'OFF' position and ensuring the head mounting unit is firmly plugged into the battery pack. Connect the charging socket into the battery unit briefly (5 seconds) and then remove the charging socket.
Light patch not central in viewing area	Adjustment required for new user head shape	Adjust the nose pads as necessary to position the head mounting assembly relative to your eye point.
		Use the adjusting nut to move the light path up or down.

For any other problems, consult your local distributor or Scan Optics.

SPECIFICATIONS

TYPE

Class	Class I medical device (MDD and TGA)

OPTICS

Working distance	400 mm to hand-held lens

LAMP

Type	LED
Rated life	10 years (based on average use)
Voltage	7 volts
Power	1W led (81m/W)
Colour temperature	3000K (typ)

BATTERY UNIT

Battery type	Li Ion
Battery voltage	3.7V
Capacity	1.45 hours at maximum intensity
Input charging voltage	13.8V dc
Output	7.0V, 80-350mA

POWER PACK

Type	Class II and Internally Powered Equipment
Input voltage	100-240 volts 50/60 Hz
Output voltage	13.8V dc
Power consumption	0.5A at 115V 0.25A at 230V

RECOMMENDED OPERATING ENVIRONMENT

Temperature	10 - 40˚C
Relative humidity	60-95%

COUNTRY OF ORIGIN

Australia

ISO 9001

Scan Optics is a Quality Endorsed Company, certified to the International Organisation for Standardisation (ISO) standard ISO 9001, *Quality Systems - Model for quality assurance in design, development, production, installation and servicing.* This certification recognises the importance placed by Scan Optics on providing the highest levels of quality in all aspects of business.

The rules for accreditation of a Quality Endorsed Company are laid down in the international standards ISO/IEC Guide 48 and EN 45012. They require a complete auditing of all company systems and procedures by an independent accredited certification body every three years. The QAS (Australia) accreditation is recognised by most of the world's major quality certification bodies including BSI(UK), UL(USA), QMI(Canada), and JQA(Japan). In addition, EQNet Quality Certification which is recognised by some twenty countries, and specific registration with any one of more than sixty national certification bodies, can be provided if required.

To achieve ISO 9001 accreditation requires quality in product design, in manufacture, in customer service and in all internal company systems.

Quality System™

Quality Endorsed Company

WARRANTY

All Scan Optics equipment has been designed and manufactured to provide reliable service and is warranted to be free from defects of material and construction at the time of purchase.

Should the instrument require repair or service due to faulty parts or labour during the period of two years from the date of purchase, this repair will be carried out by Scan Optics or its agents free of charge.

Terms and Conditions

This warranty will not apply if a defect is caused:

- during shipping or transit
- by humidity or dampness
- by operation on a supply voltage other than as specified in the instructions
- by incorrect connection to a power supply
- by alteration or repair by anyone other than a person authorised by Scan Optics, or
- by any other misuse, accident or neglect.

Service and Repair

In the case of a warranty claim Scan Optics should be immediately contacted, either directly or through the agent, distributor, donor or supplier of the equipment. You will need to provide copies of the purchase or delivery documents.

Scan Optics will then send instructions regarding the repair, replacement or return of the equipment.

When freight is arranged by Scan Optics or its agent, the cost of the freight will be accepted by Scan Optics; all other freight costs are the responsibility of the purchase

OUR COMMITMENT TO YOU

We at Scan Optics are committed to the highest quality in our products and in the services we
provide.
Our goal is for you to be a satisfied customer of Scan Optics.
We undertake:

- to listen carefully to what you tell us
- to be accurate and honest in telling you about our products and services
- to communicate with you professionally and in clear language
- to deal promptly with any complaints or concerns you may have with us

WE WELCOME YOUR FEEDBACK

If you would like to comment on any matter relating to a Scan Optics product or service, you can contact us in the following ways:

- by telephone, on 61 (8) 8234 9120
- by facsimile, on 61 (8) 8234 9417
- by e-mail, at admin@scanoptics.com.au

At Scan Optics we have a system of continuous product improvement. We welcome suggestions at any time for modifications and improvements. If you wish to discuss a particular item of equipment, please tell us the model and serial number.

We also welcome customers and users of Scan Optics equipment to visit us. If you are able to do so, please contact us so we can make arrangements.