ROSS
LONDON

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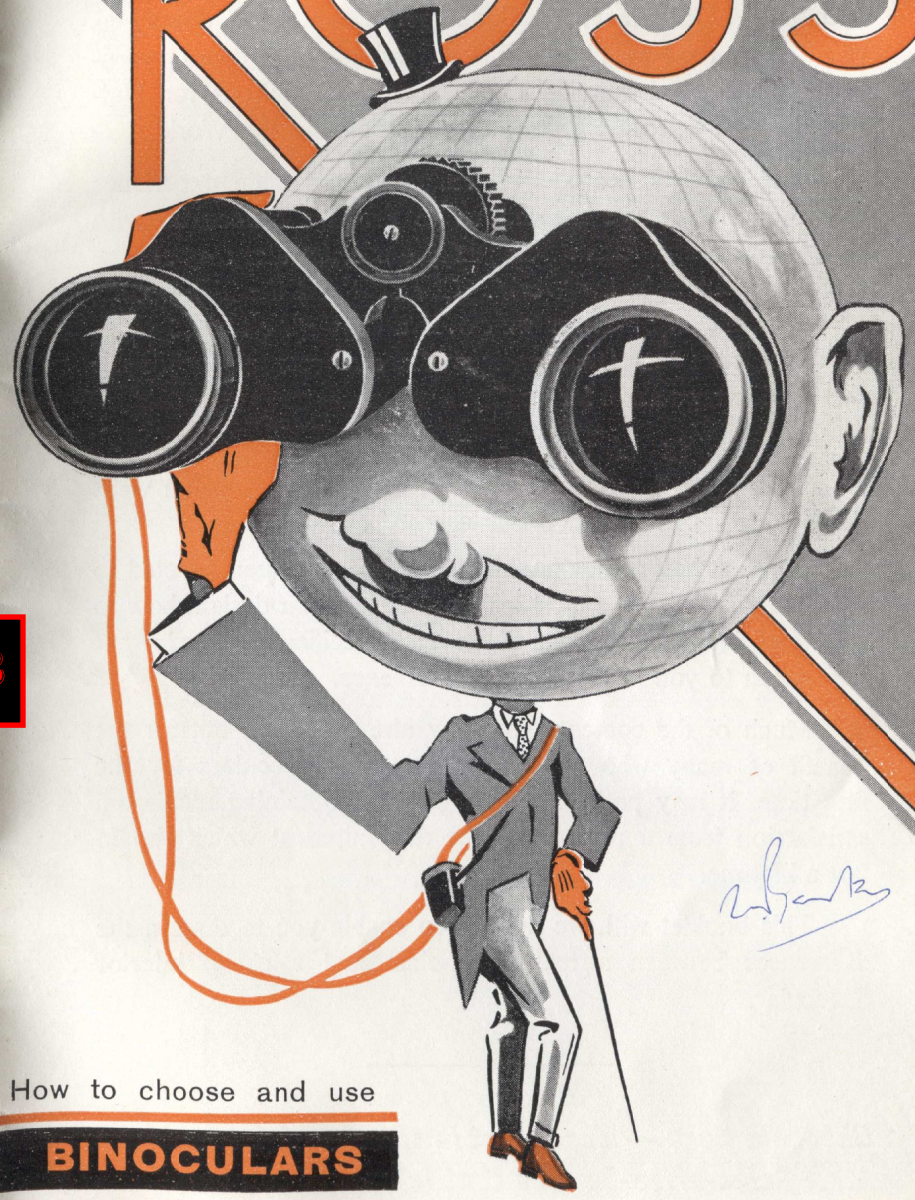
THE WORLD RELIES ON

ROSS



How to choose and use

BINOCULARS

ALL THIS BACKGROUND OF EXPERIENCE IS AVAILABLE TO YOU

ROSS LTD. have continuously since 1830 manufactured Telescopes, Binoculars and Scientific Instruments to the highest Standards of accuracy, functional performance and quality as specified by the Naval and Military Services of our own Government and several Foreign Governments, as well as for Universities and Scientific Laboratories throughout the World.

Our technical knowledge, resources and wide experience over the years have enabled us to produce Binoculars with progressive refinements which justify our claim that they are the finest Binoculars in the World. Our skill and the high quality of our products have, for well over a century, attracted to us technical contracts from various Governments as well as a world-wide reputation for quality.

The delight of using really fine binoculars is greatly enhanced when they are correctly suited to the work you want them to do.

The first half of this booklet, therefore, has been devoted to explaining some of the technicalities of binocular design, how to read and interpret the manufacturers' specifications and what they mean to you in binocular performance.

Much of the contents you may already know, but for the benefit of many who will be investing in binoculars for the first time, it may prove a useful guide in obtaining maximum satisfaction from a precision piece of equipment which should last a lifetime.

This booklet will, we hope, also enable you to discern the differences between a really first-class and a cheap inferior Binocular.

Choose a Ross — The finest in the world, backed by a Sales-after-Service that is second to none.

THE BINOCULAR AND ITS FUNCTION

ROSS LONDON

The precise function of a binocular is of course to give an enlarged image of a distant object so that it can be seen more clearly than would be possible with the naked eye.

A telescope will do exactly the same of course but with one big difference. Binoculars give natural stereoscopic vision because you are using both eyes thus providing depth and correct perspective to the image.

Other advantages which the binocular has to offer are in the matter of compactness, light weight and field of view. All these will be discussed later, meanwhile it is proposed to explain how the modern prismatic binocular has been developed from the simple field glass still in use but largely superseded by the more convenient binocular with its relatively high performance and optical efficiency.

PRISMATIC AND GALILEAN BINOCULARS

The earliest type of double telescope to come into general use for observation at a distance consisted of a pair of tubes joined together and each carrying a positive objective lens and a negative eye lens of shorter focal length. Such an instrument is today called a Galilean "Field Glass' and is available in many forms. This type of glass has many limitations, the chief of these is the fact that the effective angular field is controlled by the diameter of the object glass. In addition, Galilean glasses are very bulky for powers in excess of about 4 × and are seldom provided with interocular adjustment.

The modern prismatic binocular, on the other hand, is not hampered by these limitations. It is capable of being produced to give high magnification combined with a reasonable angular field in a light, compact, form.

Prismatic construction enables a binocular to have a wider separation for its objective lenses than the user has for his eyes, thus giving a considerably enhanced stereoscopic effect and allowing the use of lenses of superior size. The eye-pieces can be adjusted to compensate for the individual optical differences between the eyes of the user and the whole instrument can be "bent" for comfortable use at the required interocular separation.

A high degree of optical excellence is possible with the more complex eye-piece design of a prism binocular combined with a high standard of definition and clarity with freedom from colour fringing.

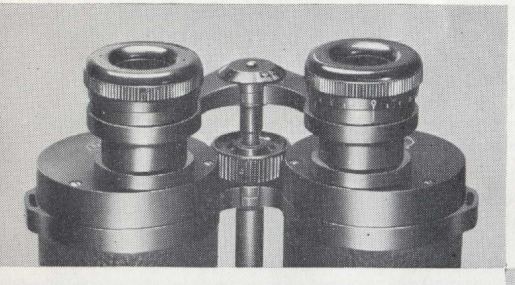
HOW TO FOCUS YOUR BINOCULAR

ROSS LONDON

In order that you may use your binocular with the greatest comfort and to the best advantage it is necessary that it be adjusted correctly. In the case of binoculars with centre-focusing it will be found that one of the eye-pieces is separately adjustable for focus and carries a calibrated scale.

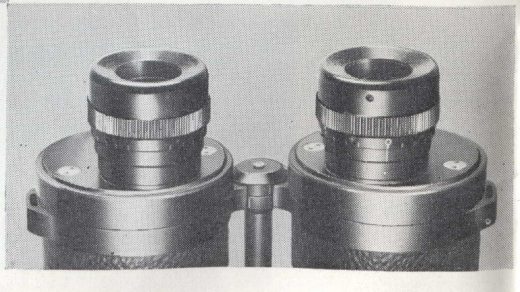
First hold your binocular in front of your eyes and train it on a distant object, then cover the objective on the side having the adjustable eye-piece and adjust the focusing wheel until the distant object is sharp and clear. Now place the cover over the other objective and look through the adjustable eye-piece at the same distant object. Without altering the centre focusing adjustment, rotate the eye-piece until sharp focus is obtained. Both sides of the binocular are now focused and the adjustable eye-piece setting should be noted so that it can be easily re-set in the same position when required. The scale on this eye-piece is calibrated in "Dioptres" which is an optical measure of power used, in this case, purely for convenience. Look at the distant object through both halves of the binocular simultaneously and if two distinct circular fields of view are seen the binocular is not adjusted to your particular inter-pupillary distance. This may be corrected by bending the binocular at its hinge until the two fields of view fuse together into a single circle. The interocular scale on the binocular will then indicate the separation of the eye-piece axes in m/m and this should be noted for easy re-setting.

With models not having centre-focusing both eye-pieces are adjustable and both eye-pieces have calibrated scales, in this case the amount of movement of the eye-pieces will be considerably more than that available for the single adjustable eye-piece of a centre-focusing instrument.



The centre screw method of focusing is the one generally adopted today because of the extra convenience which it affords the user. Compensation for any difference in the user's eyes is achieved by adjustment of the calibrated ocular on the right, the mechanism for this method of focusing, particularly on high power glasses, must be made to close precision limits since any slackness in this part of the binocular would cause misalignment and poor vision.

The eyepiece method of focusing is reserved for specialist binoculars where extra mechanical strength is required or where there is danger of the binocular being exposed to excessive damp. Eyepiece focusing reduces the number of moving parts thus enabling the binocular to be sealed against damp as well as securing a very rigid construction. In this type of binocular each eyepiece is focused separately.



Focusing must be carried out independently with each eye-piece for any particular object distance and such instruments are not suitable for use where rapid adjustment from near to far objects is desired.

An independent eye-piece focusing binocular finds its main application in marine or aerial use where object distances are always relatively great and where its extra sturdiness of construction is an asset. It is even possible to eliminate the eye-piece adjustment entirely in some instruments which will only be used by persons with normal vision under arduous service conditions.

THE MEANING OF MAGNIFICATION

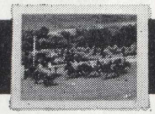
The magnification or power of a binocular is simply the number of times the image seen through the glass is larger than the same object when viewed with the naked eye.

This magnification figure usually followed by a multiplication sign, is clearly engraved on most binoculars. Thus a binocular marked 7 × can be taken to show an object seven times as large in height and width as is seen by the naked eye at the same distance. Conversely, an object seen clearly with the unaided eye at, say 100 yards, can be seen just as clearly at 700 yards through a 7 × binocular. All this, of course, presupposes that the glass has a reasonably high light transmission. But remember, binoculars can only magnify the object, they cannot increase the light falling on that object.

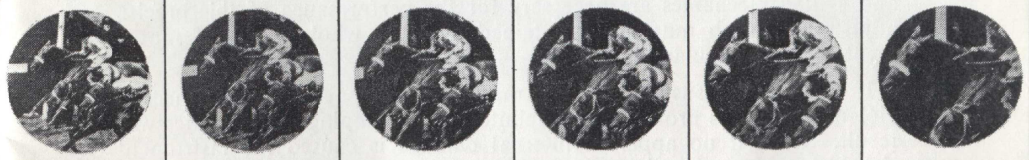
As will be seen later, magnification is only one of many aspects of good binocular design and must be considered strictly in relation to the many other qualities which the user will require if he is to obtain full benefit from binocular vision.

It is sometimes useful to be able to check the magnification. This is quite simply achieved by focusing on a small well-defined object about 100 feet away. Turn the binoculars on their side so as to apply only one eye to the binocular, viewing the object with the other unaided eye at the same time. A fairly accurate estimation of the difference in the sizes of the images and the actual degree of magnification can be obtained in this way.

SCENE AS VIEWED BY THE NAKED EYE



THE SAME SCENE VIEWED WITH BINOCULARS OF DIFFERENT MAGNIFICATIONS



7 x	8 x	9 x	10 x	12 x	15 x

RELATIVE BRIGHTNESS

The relative brightness number of a binocular is a term used in America as an indication of the light gathering power of the instrument. For a binocular of any particular magnification, the relative brightness number will increase as the diameter of the objective lenses are increased. Numerically, it is the square of the effective objective lens diameter divided by the square of the magnification. Thus it is proportional to the area of the exit pupil which is the image of the objective lens formed by the remainder of the optical system a little way outside the eye-piece. All the light which passes through the instrument must pass through this image and if the user's eye pupils are not at least as large as the exit pupil it will not be fully utilised.

In the case of a binocular with a small exit pupil, accurate setting of the correct interocular distance is essential if the whole of the field of view is to be seen. On the other hand, an instrument with large exit pupils is, in general, heavy, bulky and expensive. As the available light is reduced and the observer's pupil dilates so the large exit pupil glass becomes more and more efficient until the limit is reached when exit pupil and observer's eye pupil are of equal size. It is obvious from this that a glass which is intended to be used only under conditions of bright illumination need not be fitted with objectives of especially large diameter and will consequently be lower in price. Glasses with extra large objective lenses are often called "night glasses" because they are intended for use when the user's pupils ar highly dilated and not because of any special "seeing in the dark" properties they might have.

When choosing a glass, an instrument should be selected whose exit pupils are sufficiently large for the worst light conditions which the user is likely to meet.

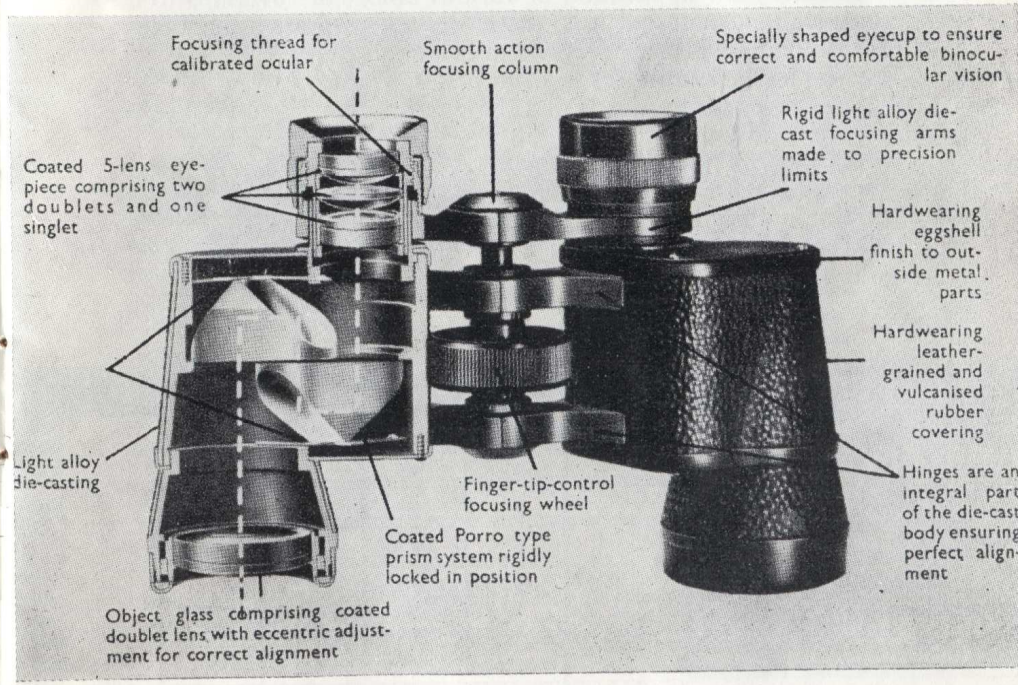
BINOCULAR CONSTRUCTION

A sound binocular must be constructed to retain its efficiency indefinitely. It must be fabricated from materials selected for rigidity and durability as well as for light weight and convenience of manufacture. A high class binocular will be as light and compact as possible consistent with its specification and will usually rely on precision light alloy die-castings for its major components. In this way an instrument can be made both lighter and more rigidly accurate than is possible by any other means. Special attention must be paid to the method employed for retaining the prisms in their correct positions. Certain inferior kinds of binocular rely entirely on plaster or similar material to retain their prisms in alignment, but this makes it impossible for the prisms to be removed for cleaning and replaced in their original position.

The moving parts must be accurately made and correctly lubricated so that they will give long wear-free service. These parts are made from special light bearing alloys and are finished with a hard protective

anodic film. Hinges and focusing movements should all work smoothly without play or backlash, and focusing movements must not spoil the optical alignment. Comfort in use is a characteristic of good binocular construction both as regards physical and optical comfort. A well finished glass will have a durable, easily gripped covering and it will fit the hands without strain.

Eye comfort is a prime requisite and apart from the need of first class accuracy in alignment, sufficient "eye relief" must be available. Eye relief is a term applied to the distances between the outer surface of the eye-piece and the exit pupil. If this distance is inadequate the full instrument field will only be available when the eye cups are pressed hard up to the user's eyes. Spectacle wearers can, therefore, only secure an uninterrupted view of the whole instrument field by using a glass specially designed to give a "long" eyepoint. There is only one type of glass made with this feature and its use is greatly to be recommended.



HOW TO CHOOSE YOUR MODEL

Choosing a binocular is like choosing a car. It depends on your own personal needs in the matter. Just as some cars will give you speed and performance and others will give you running economy, so binoculars can be chosen to give high power or a wide field at the expense of other equally desirable features.

Any binocular is a compromise between somewhat conflicting requirements and the best binocular to choose is the one which affords, in greatest measure, the particular features you desire.

The prospective buyer will have gained a fair understanding of the function of binoculars from a study of the preceding pages and will be in a better position to assess the suitability or otherwise of the many types of binocular which are available.

First of all, and this applies generally to any binocular for whatever purpose it is required, choose the magnification which is adequate for your needs. Having established the magnification such considerations as weight and bulk, light gathering power and field of view will narrow the choice to one or two models from which your final selection will be made.

Obviously the application of various binoculars overlaps to a considerable extent and it is, therefore, not wise for a manufacturer to be too specific. A general guide to suitable glass for various purposes is given below. What will be obvious from this is that the more general purpose glasses fall within the 7 × and 10 × range.

If we take as examples, three extreme applications it will show the importance of suiting you choice to the job

	7 ×	8 ×	9 ×	10 ×	12 ×	15 ×
Aircraft Spotting	•			•	•	
Athletics & Games		•	•			
Bird Watching		•	•	•		
Climbing		•	•			
Cricket		•	•			
Horse Racing		•	•	•		
Motor Racing		•	•	•		

you want your binocular to do. A yachtsman approaching a harbour, perhaps in failing light, wants every particle of light his binocular can give him, his interest is only to pick out navigation symbols and land marks, so large diameter object glasses are a virtual essential. He will find it difficult to hold his binoculars completely steady and movement would be unnecessarily exaggerated if he were to use a high power glass. The obvious choice, therefore, lies between a 7 × 42 and a 7 × 50.

The racegoer, on the other hand, might require almost the opposite, a comparatively high power glass which will enable him to identify the horses on the far side of the course.

As a final example, if we take an ornithologist, his prime requirement is for the highest possible magnification, commensurate with compactness for carrying over long periods without fatigue. An 8 × or 9 × fulfills these conditions ideally.

Finally a word about glasses for spectacle wearers and those binoculars specially built to withstand hard usage under climatic extremes.

The spectacle wearer has a special problem, whatever the specification of the binoculars selected, because he must either remove his spectacles or lose an appreciable amount of the field of view. To overcome this difficulty special models with a long eye point are available and two such are described in the following pages.

The use of glasses in particularly bad weather conditions such as would be encountered by whaling or fishing fleets demands a more robust construction than is normally necessary for the majority of binocular applications. In such glasses the optical components are bonded and sealed so that even after total immersion in water the optical efficiency is unimpaired.

15 ×	12 ×	10 ×	9 ×	8 ×	7 ×	
					•	Navigation
					•	Night Use
•	•					Stalking
			•	•		Touring
•						Target Shooting
	•		•	•	•	Wild Fowling
					•	Yachting

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7 × 42
SOLAROSS

The Solaross 7 × 42 has an optical performance similar to the larger 7 × 50 Steplux binocular below. It is one of five recent additions to the Ross range priced to bring Ross quality binoculars within reach of a much wider public.

ROSS LONDON

7 × 50
STEPLUX

With its tremendous light-gathering power and wide field this world-famous glass offers the best combination of all the features which make a binocular useful on every occasion. Chief among its advantages is the brilliant, clear image obtained under the most adverse lighting conditions. A reason why it is invariably chosen by yachtsmen and all who require good vision at night or in failing light.

SPECIFICATION	SOLAROSS 7 X 42	STEPLUX 7 X 50
Magnification	7 ×	7 ×
Object glass diameter	42 mm.	50 mm.
Field of view (real)	6°	7° 8′
Field of view (linear at 1,000 yds)	105 yds.	125 yds.
Field of view (apparent)	42°	50°
Exit pupil diameter	6 mm.	7.1 mm.
Approx. weight	24 oz. (680 grammes)	32 oz. (900 grammes)

ROSS LONDON

8 × 30
STEPVUE

A well balanced binocular, easy to hold steady and provided with large comfortable eyecups. Its extremely light weight (15 ozs.) and compact shape make it one of the most popular models in the Ross range, with power enough for most holiday, sporting and racing events.

Magnification .....8 ×
Object Glass .....30 mm.
Field of view at 1,000 *yards* .....122 yds.
Exit pupil diam. .....3.75 mm.
Weight (approx.) .....15 ozs.

ROSS LONDON

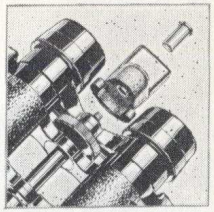
8 × 30 STEPTRON

An ideal model for travelling and particularly for ladies. It has an extremely wide field of view combined with good stereoscopic vision at all distances. The light value is greatly improved in this and every Ross binocular by the "coating" of all interior optical surfaces. As with all Ross binoculars it is supplied with a real English hide carrying case complete with lanyard and full length adjustable carrying strap.

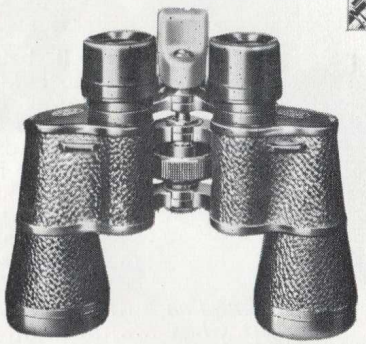
SPECIFICATION	STEPTRON 8 X 30
Magnification	8 ×
Object glass diameter	30 mm.
Field of view (real)	8° 15°
Field of view (linear at 1,000 yds.)	144 yds.
Field of view (apparent)	66°
Exit pupil diameter	3.75 mm.
Approx. weight	20 oz. (560 grammes)

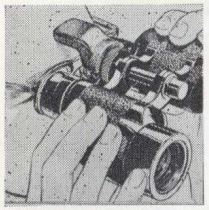
ROSS LONDON

8 × 40 SPECTAROSS



Exploded view to show the brow pad assembly.





Correct brow pad fitting with binocular eyepieces close to, but not touching, spectacles.

In the past spectacle wearers have had either to endure the inconvenience of constantly removing their glasses or, in keeping them on, enjoy only very limited benefit from the use of their binoculars.

It is not generally realised how much the interposition of spectacles when using ordinary binoculars reduces the field of view, or, more simply, how much of the scene you lose.

The binoculars shown on this page correct this deficiency by restoring this lost field of view for the spectacle wearer, at the same time making full use of the corrected vision provided by the spectacles. Spectacle binoculars are an exclusive Ross development, and are supplied with brow pads of four different sizes to provide a made-to-measure fit for every spectacle wearer. Opticians and binocular dealers will advise on the best fitting.

8 × 35 SPECTACLE SOLAROSS

SPECIFICATION	SPECTACLE SOLAROSS 8 × 35	SPECTAROSS 8 × 40
Magnification	8 ×	8 ×
Object glass diameter	35 mm.	40 mm.
Field of view (real)	5°	6° 15′
Field of view (linear at 1,000 yds.)	87 yds.	109 yds.
Field of view (apparent)	40°	50°
Exit pupil diameter	4.4 mm.	5 mm.
Approx. weight	24 oz. (680 grammes)	25 oz. (705 grammes)

ROSS LONDON

9 × 35 SOLAROSS

The popular demand for 9 × binoculars has been answered by Ross designers with this new high performance low-cost glass. The Solaross has a practical specification to suit a wide variety of needs and follows the established Ross tradition for fine workmanship and finish. It is, moreover, backed by the full weight of Ross optical experience.

9 × 35 STEPRUVA

A moderately powerful binocular with a wide application to racing needs and such events as point-to-point, sheep dog trials, etc., which are held in open country and where the extra power and bright image afforded by this model are of considerable value. The Stepruva is a lightweight glass of small bulk which can be carried all day without discomfort. All interior optical surfaces are hard coated to give increased light transmission.

SPECIFICATION	SOLAROSS 9 × 35	STEPRUVA 9 × 35
Magnification	9 ×	9 ×
Object glass diameter	35 mm.	35 mm.
Field of view (real)	5° 34′	7° 20′
Field of view (linear at 1,000 yds.)	97 yds.	128 yds.
Field of view (apparent)	50°	66°
Exit pupil diameter	3.9 mm.	3.9 mm.
Approx. weight	21 oz. (590 grammes)	24 oz. (680 grammes)

The Ross "Step" range is supplied in this magnificent silk lined presentation casket and, as with all Ross binoculars, the purchase price includes a real English leather carrying case and neck sling.

10 × 50 STEPMUR

As a suggestion for anyone interested in observing wild life this 10 × 50 glass is recommended as affording the requisite power, a fairly wide field and plenty of light. An ideal glass for all who habitually work at long range.

The coated lenses and prisms in this model will be found a very real advantage in maintaining image detail under poor as well as glaring lighting conditions.

The handsome solid leather, velvet lined carrying case which is a feature of Ross binoculars gives perfect protection of your glasses during of lifetime of hard usage.

SPECIFICATION	STEPMUR 10 × 50
Magnification	10 ×
Object glass diameter	50 mm.
Field of view (real)	6° 36′
Field of view (linear at 1,000 yds.)	115 yds.
Field of view (apparent)	66°
Exit pupil diameter	5 mm.
Approx. weight	34 oz. (960 grammes)

12 × 40 SOLAROSS ►

This alternative model from the new Solaross series gives the same high degree of magnification but with some small sacrifice in light transmission and field of view. Its light gathering power is quite sufficient however for it to be used under any but very poor lighting conditions.

◄ 12 × 50 STEPSUN

For the user to whom high magnification is more important than field of view, the Stepsun offers a sensible choice. Binoculars of this type must of course be mechanically and optically perfect to close precision limits. For this reason Ross binoculars are generally chosen for service use where the situation requires a glass of high magnification.

SPECIFICATION	12 × 40 SOLAROSS	12 × 50 STEPSUN
Magnification	12 ×	12 ×
Object glass diameter	40 mm.	50 mm.
Field of view (real)	4° 10′	5° 30′
Field of view (linear at 1,000 yds.)	73 yds.	96 yds.
Field of view (apparent)	50°	66°
Exit pupil diameter	3.3 mm.	4.2 mm.
Approx. weight	24 oz. (680 grammes)	33 oz. (935 grammes)

16 × 60 SOLAROSS

For long range views which are beyond the scope of most binoculars this glass offers a thrilling opportunity for really exciting close ups of game or bird subjects. Although high power glasses are generally recommended for use from a steady position, the lightweight construction and cleverly balanced design of these glasses are such that they can be held perfectly steady in the hands for considerable periods.

From the specification it will be seen that a remarkable performance in width of field and light gathering power has been achieved for glasses of such high magnification. The provision of centre screw focusing is also a considerable achievement in a binocular of this type, since the slightest mechanical slackness in the focusing system would at once be manifest at this magnification.

SPECIFICATION	16 × 60 SOLAROSS
Magnification	16 ×
Object glass diameter	60 mm.
Field of view (real)	3° 6′
Field of view (linear at 1,000 yards)	54 yds.
Field of view (apparent)	50°
Exit pupil diameter	3.7 mm.
Approx. weight	43 ozs.

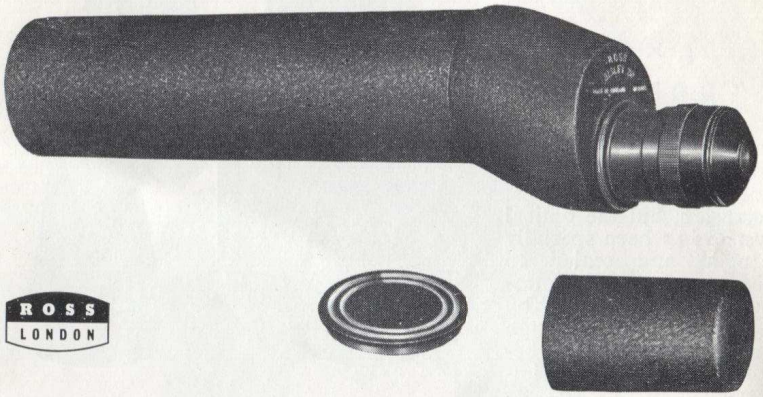
7 × 40 TROPICAL

In the two models on this page, not only is the body fully proofed against corrosion, but the optical system has been specially bonded and sealed to give permanent protection against damage by salt water even though the glasses should become completely immersed.

10 × 50 TROPICAL

As with the 7 × 40 Model described above extra strength and secure sealing are ensured by using eyepiece focusing instead of the usual centre screw adjustment. These glasses are robustly built to withstand severe mechanical shock and are recommended where binoculars must be subjected to really hard wear and bad weather conditions.

SPECIFICATION	7 × 40 TROPICAL	10 × 50 TROPICAL
Magnification	7 ×	10 ×
Object glass diameter	40 mm.	50 mm.
Field of view (real)	9° 25′	6° 36′
Field of view (linear at 1,000 yds.)	165 yds.	115 yds.
Field of view (apparent)	66°	66°
Exit pupil diameter	5.7 mm.	5 mm.
Approx. weight	31 oz. (880 grammes)	38 oz. (1,070 grammes)



ROSS 20 × PRISMATIC SPOTTINGSCOPE

For making observations which are outside the scope of hand-held binoculars this Prismatic Spottingscope offers a fine precision instrument of great power.

Essential equipment for the marksman and a most useful specialised instrument for the keen naturalist. It can be used with a bipod or with a universal tripod fitting for use from a hide or observation post.

The optical system is coated on all interior surfaces, and light gathering power is such that it can be used long after failing light would render other instruments useless.

SPECIFICATION	20× PRISMATIC SPOTTINGSCOPE
Magnification	20 ×
Object glass diameter	60 mm.
Field of view (real)	2°
Field of view (linear at 1,000 yds.)	35 yds.
Field of view (apparent)	40°
Exit pupil diameter	3 mm.
Approx. weight	31 oz. (880 grammes)

ROSS RESOLUX LENSES

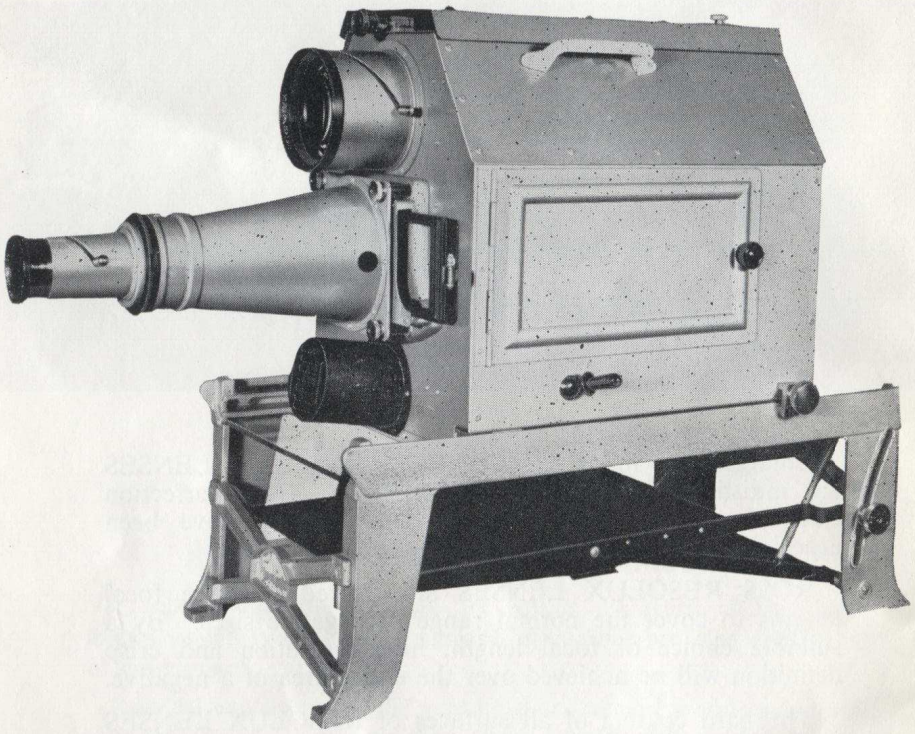
Enlargements made by using ROSS RESOLUX LENSES are indistinguishable from contact prints. This perfection can only be obtained by using lenses which have been especially computed for short projection distances.

ROSS RESOLUX LENSES are offered in three focal lengths to cover the normal range of negative sizes. By a suitable choice of focal length, high resolution and crisp definition will be achieved over the entire area of a negative.

The hard coating of all surfaces of RESOLUX LENSES not only increases the speed of the lens but also reduces "scattered light" to a minimum, producing contrast and brilliance—results which are not possible with uncoated lenses.

Each RESOLUX LENS is in a satin chrome mounting and is fitted with "click" iris stops, marked in exposure factors for ease of operation in the dark room. They are manufactured to the standard of excellence which ROSS have maintained for well over a century and are remarkably low priced.

APERATURE	FOCAL LENGTH	NEGATIVE SIZE COVERED
f/3.5	2″ (5 cm.)	1″×1½″ or 24×36 mm.
f/4	3½″ (9 cm.)	2¼″×2¼″ or 6×6 cm.
f/4	4⅜″ (11-cm.)	2¼″×3¼″ or 6×9 cm.



THE ROSS EPIDIASCOPE

To anyone with the responsibility for teaching or training in any form, the ROSS Epidiascope is a necessity. The ease with which documents, photographs or any printed material can be projected, in full original colour, and magnified many times bring facts to the notice of students in a manner that cannot be equalled by any other method. In addition, Lantern Slides can be shown and a lecture given that includes both mediums, as the changeover from one to the other can be made instantaneously. A further convenience is the built-in pointer that enables the lecturer to indicate any particular feature on the screen without leaving the instrument.

May we send you a copy of our leaflet "The ROSS Epidiascope" giving full details of this important aid to education.

THE ROSS MICROREADER

All Organisations, whether commercial or official, are experiencing difficulty in storage of the enormous amount of documents of all kinds that must be retained for record purposes, and are increasingly turning to some form of micro-record system. Furthermore much scientific data and information is only easily obtainable in this form now and an instrument for reading them is a necessity. A complication arises, however, as there are various types of record, some being on card and others on film which hitherto have required individual readers.

The ROSS Microreader is designed to handle all the present known types of micro-record and we shall be pleased to send you our descriptive leaflet which we feel sure will enable you to overcome any problems of this kind that you may have.