ROSS OF LONDON, A CHRONOLOGY

The entries in italics may not be directly related to ROSS but are included to show a more rounded picture
compiled by Terence Wayland

DATE	INFORMATION	SOURCE & COMMENT
1798	Andrew ROSS born, the son a John ROSS a Staymaker of Fleet Street.	Who was Who G.Clifton, Dictionary of British Scientific Instrume Makers 1550-1851
	A.ROSS was educated at Christ Church School also known as the Blue Coat School.	The Photographic Journal 15 October 1859 P. Abrahams drew the compiler's attention to this article, an obituary of Ross.
1813	20 July Andrew ROSS apprenticed to John CORLESS a member of the Joiners Company at 19 Newcastle Street, Strand.	G.Clifton, Dictionary of British Scientific Instrumer Makers 1550-1851. Corless was a maker of mathematical instruments
C.1820	A.ROSS on completion of his apprenticeship worked for thee years for a mechanical engineer.	Photographic Journal 15 October 1859
C.1823	A.ROSS went to work for W.T.GILBERT a manufacturer of levels, theodolites and astronomical instruments. Whilst working for Gilbert he constructed and divided an Astronomical Circle that was sent to the Cape of Good Hope.	Photographic Journal 15 October 1859
1823	Thomas ROSS born	Highgate Cemetery Burial Records
	Joseph Jackson LISTER a London wine merchant and an amateur microscope enthusiast starts to develop the modern microscope. Microscopes had not developed as well as telescopes because of the difficulty in making very small achromatic lenses.	G.L.Turner, The Great Age of the Microscope
1827/1828	Andrew ROSS was the works manager for W.T.Gilbert of London. Gilbert obtained a contract to manufacture a large lens	A.Simpson,Bulletin of the Scientific Instrument Society No 41.

	to the orders of David BREWSTER a well known scottish optical physicist. The lens was for use in a lighthouse. In 1828 W.T.GILBERT went bankrupt.	The British Journal of Photography 26 March 187 reported that Gilbert had died and the firm closed
1829	*J.J.LISTER read a paper to the Royal Society setting out the principles that were to be the foundation of the achromatic microscope.*	Introduction in the Abridgement of Specifications, Philosophical Instruments 1830-1855. Patent Office (British Library)
1830	*J.J.LISTER begins grinding his own lenses and writes a paper on the design of microscope objective lenses.*	Internet
	Andrew ROSS sets up in business at 5 Albermarle Street off St John's Square, Clerkenwell.	G.L.Turner Collecting Microscopes
	9 June, Johan Heinrich DALLMEYER born at Loxton, Westphalia	Who was Who and Encyclopaedias
1831	Andrew ROSS supplies microscopes from 5 Albermarle St.	G.L. Turner, Collecting Microscopes
	A. ROSS constructs a 1/4 inch microscope objective of three achromats (six elements).	J.Hogg, The Microscope
	ROSS made a combination, simple and compound microscope for a William VALENTINE a plant anatomist of Nottingham. It incorporated a micrometric fine focus control. The instrument was illustrated in 1832 in volume 48 of the Transactions of the Society of Arts, plate 6.	
1832	Andrew ROSS shown as trading as a Machinist at 15 St John's Square, Clerkenwell.	Robsons Directory 1832, The earliest directory entry found for ROSS.
	ROSS publishes a paper in the Transactions of the Society of Arts on the design of a simple microscope *J.J.LISTER was made a Fellow of the Royal Society.*	G.L.Turner, The Great Age of the Microscope
1833	Andrew ROSS shown as a Mathematical Instrument Maker. at 15 St John's Square	Robsons Directory 1833 two other tenants were listed, G.H.Pegler and

		G.Totten.
	He attends the Mechanics Institute.	G.Clifton, Dictionary of British Scientific Instrumer Makers 1550-1851
1834	ROSS shown as a Mathematical Instrument Maker This style of entry continued until 1839.	Kelly's Directory 1834. Kelly's was published at the start of each year, so was compiled during the previous year.
1836	*19 July, John STUART born at Lossiemouth into a farming family*	Who was Who All the census records however show 'about 1838
	8 November and 13 December, A ROSS read two papers to the Society of Arts entitled, Practical Illustrations of the Achromatic Telescope. The first paper dealt with the design of lenses and explained the problems of spherical and chromatic aberrations and the relationship between refraction and dispersion. The second concentrated on the methods for designing a high quality achromatic objective and included various formulae.	The Photographic Journal 15 October 1859, Volume Li of the Transactions of the Society of Ar Ross received the Society's Silver Medal for this work.
1837	ROSS constructed a small quantity of microscopes with a ball and socket joint at the top of the pillar, allowing the tube to be adjusted to almost any direction.	M.E.Rudd and D.H.Jaecks, Bulletin of the Scientific Instrument Society No 49.
	ROSS collaborates with J.J.LISTER on making a microscope and a new 1/8 inch objective to LISTER's designs.	G.L.Turner, Great Age of the Microscope
	ROSS invents an adjusting object glass (also known as the correction collar) to be fitted to higher power instruments. It consisted of a ring attached to the barrel that could be turned so that the relative distance between the first and second lenses could be varied. This was necessary to allow for changes in the spherical aberration due to the variations in the thickness of the glass cover slips placed over specimens. He also designed a new stand to reduce the effects of vibration.	Internet and G.L.Turner, The Great Age of the Microscope The Penny Cyclopaedia page 184.
	ROSS read a paper on these improvements to the Royal Society of Arts and was awarded the Gold Isis medal.	Introduction to the Abridgement of Specifications, Philosophical Instruments ,1830-1855.

	A ROSS price list shows £14 for a stand, £7-7s-6d for Compound Bodies and £1-1s-0d for a Condensing Lens on a stand. A comparison of early models indicated no two models were identical.	Scientific Instruments Bulletin No 49.
1838	The membership list of the Society of Arts shows an address at 33 Regent's Circus, Piccadilly for ROSS	Article in Bulletin of the Scientific Instrument Society No 49
	ROSS published 'An adjusting Objective Glass' in the Transactions of the Royal Society instituted in London for the encouragement of Arts, Manufactures and Commerce.	Scientific Instruments Bulletin No 49.
	29 October a letter from A.ROSS to William FOX TALBOT with reference to work done by him on adaptors for a microscope Kelly's Directory continues to show 15 St John's Square.	Correspondence of W.H.Fox Talbot at De Montfort University Internet site.
1839	Andrew ROSS one of the founders of the Microscopical Society He wrote an article for the Penny Cyclopaedia for the diffusion of Useful Kowledge. He described two microscopes and objectives fitted with a correction collar.	G.L.Turner, The Great Age of the Microscope The Penny Cyclopaedia vol. 15
	9 September ROSS wrote to FOX TALBOT concerning some work attempting to remove scratches from a silvered surface. Address is shown at 33 Regent's Circus.	Correspondence of W.H.Fox Talbot at De Montfort University Internet site. According to A.Ross's obituary in the Photograph Journal. He was not initially interested in the photographic market and it wasonly the persisten of his son Thomas that caused the firm to take it
	October ROSS wrote to FOX TALBOT about a microscope and two camera obscurae (sic).	
	1 November ROSS wrote to FOX TALBOT re experiments for obtaining a flat field in a camera and regarding the silvering of plates for making a daguerrotype like image.	
	December, The London Physiological Journal included a very	Copy in British Library

	favourable review of ROSS's Improved Achromatic Compound and Simple Microscope with two pages of illustrations.	
1840	ROSS's trading style became Andrew ROSS and Co. Opticians The Co. referred to a partnership with J.J.Lister	Kelly's Directory 1840 Works on microscopes state the partnership was from 1837 to 1841.
	January, A.ROSS privately published the text of his lectures entitled Practical Illustrations of the Achromatic Telescope.	Practical Illustrations of the Achromatic Telescope Copy in the Whipple Library, Cambridge Universit Brought to the compiler's attention by P.Abraham
1841	ROSS made for a Mr. H.Collen possibly the first cemented and compound portrait lens.	The British Journal of Photography 26 March 187
1842	The trading style was Andrew ROSS Optician indicating the connection with LISTER had ended.	Kelly's Directory 1842
	ROSS started marking his microscopes with serial numbers.	M.E.Rudd and D.H.Jaecks, the Bulletin of the Scientific Instrument Society No 49.
	By August ROSS had moved to 21 Featherstone Buildings Holborn at the corner with Red Lion Street.	
	A.ROSS issued a four page catalogue of Optical, Mathematical and Philosophical Instruments. Two microscopes costing £17-17-0 and £36-15-0 and a range of accessories were listed, there were several terrestrial and astronomical telescopes including a newly constructed binocular night telescope, also spectacles, magic lanterns and hygrometers.	Museum of the History of Science, Oxford, Collection of catalogues.
	5 August ROSS wote to FOX TALBOT concerning his giving lessons (on photography ?) and locating premises in the Hampstead area	Correspondence with W.H.Fox Talbot at De Montfort University Internet Site
1843	ROSS brought out his most famous microscope stand that was copied by many other firms. It had a flat Y shaped foot with the microscope mounted on trunnions rising from the foot. This system lowered the centre of gravity. This basic design	G.L.TURNER, The Great Age of the Microscope and Collecting Microscopes.

	remained in production until the late 1880's.	
1845	*In the United Kingdom the Excise Tax on glass manufacturing imposed in 1695 was abolished. This tax had greatly hindered the development of optical glass. In fact much optical glass had been imported from France and Switzerland.*	G.L.Turner The Great Age of the Microscope
	J.H.DALLMEYER goes to Osnabruck to further his education	Encyclopaedias
1847	*J.H.DALLMEYER apprenticed to an optician soon shows his great talent.*	Encyclopaedias
	By the end of the year Andrew ROSS was trading from 2 Featherstone Buildings, Holborn.	Kelly's Directory 1848
1948	An engraving of ROSS's microscope appears in John QUECKETT's book, A practical Treatise on the Use of the Microscope.	
1849	*Chance Brothers in Birmingham able to produce good quality optical glass. Chance Brothers maintained a virtual monopoly in the U.K. in the making of optical glass into the 20 th. century. They became part of the Pilkington Group.*	G.L.Turner, The Great Age of the Microscope
	ROSS manufactures the Gillett Achromatic Condenser for use with microscope.	Scientific Instrument Bulletin No. 41
1850	J.H.DALLMEYER moved to England where he obtained employment with a W.HEWITT who had worked for ROSS.	Encylopaedias
	Andrew ROSS brought out further modifications to his microscope including a rotating stage and a simple sub-stage assembly with rectangular and rotary motions.	G.L.Turner, Collecting Microscopes
	A Mr COLLIS started working for ROSS.	Christie's Catalogue Dec.2002
1851	W.HEWITT returned to work for ROSS together with	Internet

	DALLMEYER. However DALLMEYER left ROSS because he considered his position in the firm was too low for his ability.	Dallmeyer worked for some time asan agent for Coffee importers.
	John Henry BARTON born in Bowden Cheshire.	Census 1911
	30 April, Andrew ROSS (52 years) , his wife Elizabeth (53 years) and 2 apprentices (William Cave and Henry Key) are at 2 Featherstone Buildings. Thomas ROSS (28 years) and his wife Jane (25 years) are at 9 Wakefield Road.	National Census, there is no mention of Ross's 4 daughters.
	At the Great Exhibition ROSS entered a microscope that won the Gold Prize. *Ross exhibits a microscope, the mechanical parts of which are exceedingly good; the movements are very smooth and true; the is on a plan which is solid and steady, and at the same time not cumbrous. The objects-glasses are constructed with different kinds of glass in the different compound lenses, forming a combination so as to double up the secondary spectrum, and this is done so well that scarcely any separation of colours can be detected."* 12 Microscopes had been entered of which 7 were of foreign manufacture.	A.Ross also served as an Associate Juror on goo falling into Class 24, Glass. He also received favourable comment on a large Equatorial Telescope. A photographic portrait lens constructed on Petzval's principles was displyed.
	ROSS received the only award for lenses specially manufactured for photographic purposes.	Referred to on the Awards for the International Exhibition, London 1862.
	A.ROSS was at the height of his fame, his microscope objectives had attained the limits for non-immersion types.	
	ROSS was making telescopes,microscopes and camera lenses.	G.L.Turner The Great Age of Microscopes and Collecting Microscopes.
1852	Thomas OTTEWILL started supplying ROSS with cameras which were sold with ROSS's name on them.	Christies' Catalogue Dec 2002
	ROSS asked DALLMEYER to return. He declined until he obtained the post of Scientific Adviser. He was entrusted with	Internet

	the testing and finishing of the finest products.	
	A. ROSS issued an eight page catalogue of Optical, Philosophical and Mathematical Instruments. Four compound and a number of single microscopes were listed with accessories. More than ten telescopes from £2-0-0 top £14-0-0 were listed, the binocular night telescope with leather case was £5-0-0 and an achromatic opera glass was £6-15-0. Astronomical telescopes were from £15-0-0 to £250-0-0. *A.R. begs to announce that from a laborious practical investigation of the construction and manufacture of the achromatic telescope, he has arranged a new process for their production, which answers the perfection of that important instrument; also that in terrestrial and naval telescopes, the contact contact surfaces of the object glasses are united by a permanently transparent cement, which obviates the loss of light by relections and prevents that decomposition of the glass which occurs in marine telescopes.* A range of photographic lenses for portraiture and landscapes were listed with cameras from £2-15-0 to £11-10-0.	M.o.t.H.O.Science, Oxford
1853	By the end of the year ROSS had expanded to occupy 2 and 3 Featherstone Buildings.	Kelly's Directory 1854
	J.STUART enters business in Edinburgh.	Who was Who His obituary in the British Journal of Photography (which he ownedfor a while) claims that his fathe gave him £100 and sent him to Canada and the U.S.A. On returning to the U.K. he took up photography. He travelled to Spain, Portugal and Italy taking photographs especially landscapes. He contributed many views to Francis Frith.
	Francis WENHAM publishes a paper on the advantages of, and a method of construction of a stereoscopic microscope. WENHAM 1824 - 1908 was by profession an engineer. In 1841 he had been apprenticed to a subsidiary of the Great Western Railway. He took part in the construction of the Great Britain steamer. He followedan active career in marine engineering	L.V.Martin, article on Internet

	He visited Egypt wth the photographer Francis FRITH. He took up microscopes and designed binocular heads using prisms. He later took an interest in aviation and coined the word aeronaut.	
1854	25 January, Thomas ROSS and J.DALLMEYER obtained Rights of Burial in Highgate Cemetery (Western). Grave No 8605 Square 12.	Friends of Highgate Cemetery records. The following members of the Ross family were buried on this plot. Elizabeth (1858), Isabella (185 Andrew (1859), Elizabeth (1862), Jane (1864) an Thomas (1870).
1854	James SWIFT left working for ROSS to set up his own business making microscopes at 15 Kingsland Road.	B.Bracegirdle, Notes on Modern Microscope Manufacture, (but also see 1857)
	J.H.DALLMEYER marries ROSS's second daughter Hannah. He takes charge of the manufacture of telescopes. He does not get on with Thomas ROSS who takes charge of the photographic business.	G.L. Turner The Great Age of the Microscope an Collecting Microscopes
1855	WENHAM suggested an alternative objective system for microscopes to that used by ROSS.	
	ROSS offered the Long Baseboard Camera for sale, it was a ROSS design but probably made by Ottewill.	N.Channing and M.Dunn, British Camera Makers
1856	WENHAM developed techniques for photography through microscopes.	
1857	James SWIFT left ROSS to start own business.	G.L.Turner, Great Age of the Microscope. (alternative to 1854)
1858		
	29 January, Elizabeth ROSS buried in Highgate Cemetery, Swains Lane.	Burial Record 16056.
	26 October Andrew ROSS makes his Will. He was resident at 93 Pentonville Road. He appointed as Executors his son Thomas and his son in law J.H.DALLMEYER. He made provisions for	Copy of A.Ross's will proved 6 October 1859

his three unmarried daughters Elizabeth, Sarah and Martha.
The business is to be divided between Thomas ROSS and J.H. DALLMEYER approximately 2/3 to Thomas and 1/3 to DALLMEYER.
They were left all patents and patent rights. (No patents have been found in the name of Andrew ROSS)
Thomas ROSS to have tools, machinery and implements on the ground floor and the lower parts in the workshops and stores of No's 2 and 3 Featherstone Buildings appropriate to the manufacture of microscope stands, terrestial telescopes and their glass. Photographic instruments, all rough glass and brass, general materials for such instruments. All the furniture and fixtures employed in storing and selling such instruments.

J.H.DALLMEYER to have all tools machines, implements together with auxillary machines especially employed in the manufacture of astronomical telescopes in and about the 2nd and 3rd floors of 2 and 3 Featherstone Buildings together with all materials fixtures and fittings and furniture employed in their manufacture and all sizes of glass and brass apertaining to astronomical telescopes.

To both Thomas ROSS and J.H.DALLMEYER equally, with Thomas having the first choice. All optical glass specially for microscope objectives and all the special tools, apparatus fixtures employed in their manufacture.

To Thomas ROSS and J.H.DALLMEYER in the proportions 3/4 to 1/4. All finished stock and stationery, microscopical objectives and all other trade goods not previously mentioned in or about 2 and 3 Featherstone Buildings and workshops and stores.

There was provision for settling any disputes between Thomas ROSS and J.H.DALLMEYER
There was a request for Thomas ROSS and J.H.DALLMEYER

	to work in partnership for at least 12 months after Andrew's death. Any residual estate was to be divided between Thomas ROSS and J.H.DALLMEYER in the proportions 2/3 to 1/3.	
	Andrew ROSS was commissioned by Warren de la Rue and the Royal Society to construct a Photoheliograph designed by de la Rue to photograph the sun on a daily basis.The objective was of 3.5 inches diameter with a focal length of 50 inches corrected for violet photographic rays. The fast exposures were made possible by a spring loaded roller blind shutter. It was installed at Kew Observatory.	H.C. King, The History of the Telescope There is an illustration on WWW. scienceand soc co.uk The instrument was transferred to Greenwich in 1873
1859	The Negretti and Zambra Catalogue included several of ROSS's photographic lenses at prices from £5-15-0 to £54-0-0	Negretti & Zambra Catalogue in British Library N & Z started issuing large catalogues in 1851 They specialized in weather recording instruments but also sold optical and scientific equipment.
	A son Thomas Rudolph born to J.H.DALLMEYER and wife Hannah.	
	Hannah dies.	Internet
	5 September Andrew ROSS dies at 93 Pentonville Road. His estate is valued at £60,000. Thomas ROSS and J.H.DALLMEYER separate DALLMEYER taking his share of the estate and setting up in business at 19 Bloomsbury Street by December.	Dallmeyer's share was worth approximately £20,0
	28 September T.SUTTON applies for a patent for a lens for taking wide angle views. This lens was later made by ROSS and incorporated in a panoramic camera.	
	15 October, The Photographic Journal carried an obituary of Andrew ROSS giving an outline of his career and commenting on the high value placed on his photographic lenses.	British Library, brought to complier's attention by P.Abrahams.
	14 December Thomas ROSS elected as a member of the Microscopical Society.	G.L.Turner, The Great Age of the Microscope

1860	Business trading style now Thomas ROSS Optician	Kelly's Directory 1860
	J.STUART working as a professional photographer. Travels extensively on the Continent and America. He was noted for landscapes and architectural photographs.	Who was Who
	Hugo SCHRODER a designer of microscope stands at 31 Hollandscer Brook, Hamburg.	B.Bracegirdle, Notes on Modern Microscope Manufacturers
1861	ROSS made the Thomas SUTTON Wet Plate camera, a panoramic camera producing a long narrow negative. It was fitted with SUTTON's Patent Spherical Water Lens made by ROSS, it used special curved plates.	
1862	ROSS exhibited many items at the London International Exhibition including binoculars including some with aluminium mounts. Thomas ROSS won medals for his hand telescopes, microscpes and photogrphic lenses	Catalogue of the International Exhibition, London 1862 Juries Reports for Classes XIII and XIV.
	Also offer the Universal Binocular Camera,(made by Ottewill).	N.Channing and M.Dunn, British Camera Makers
1863	First entries by T. ROSS under Telescope Makers and Photographic Apparatus Makers	Kelly's Directory 1863
	Mr COLLIS leaves ROSS to work with Thomas OTTEWILL making cameras	Christies Catalogue December 2002
1865	ROSS one of sixteen microscope makers in the United Kingdom	G.L.Turner, The Great Age of the Microscope
	Thomas ROSS (Son and successor of the late Andrew ROSS) Optician, Manufacturer of Microscopes, Telescopes, Photographic lenses, photographic camers and apparatus, race field and opera glasses, philosophical instruments.	Kelly's Directory 1865 This wording remained until 1869
1867	23 January T.ROSS applies for a patent concerning the use of different qualities of crown and flint glasses in the construction of	Patent 174 of 1867

	lenses.	
	Advertisement by Ottewill and Collis claims to have been for 15 years manufacturers to ROSS	Christie's Catalogue December 2002
	Late in the year the business moves to 53 Wigmore Street, Cavendish Square, london	Kerlly's Directory 1868
1869	6 March, T.ROSS applied for a patent for an improvement to magic lantern slides.Two discs are used, one of glass with the pictures framed on it and the other opaque with radial slits. The discs rotate at differnt speeds to create the illusion of motion.	Patent 681 of 1869
	Late in the year the business moves to 7 Wigmore Street, Cavendish Square, junction with Wimpole Street. Wording in Directory changes to; Thomas ROSS, Gold Medal Paris for microscopes, telescopes and instruments of precision, highest awards obtained at all the exhibitions where he has competed. Manufacturer of first class microscopes, telescopes, photographic lenses and apparatus, binocular glasses, barometers etc. Catalogues on application	Kelly's Directory 1870 This wording until 1872
1870	24 march. Thomas ROSS living at No 1 Upton Villas, Kilburn makes his will. The executrixes and trustees to be Mary Ann ROSS, his wife and Mary Anne HEMPSON, a spinster of 75 Conningham Road, Shepherds Bush. Provision was made for his sister Sarah ROSS. His son Andrew Thomas to have a watch (previously owned by Andrew ROSS) and a quantity of scientific goods and philosophical instruments. Effectively everything else including the business was left to his widow. *To continue the business of optician and to occupy the premises together with all the fixtures and fittings, furniture and other articles in those premises used for business (for as long she wishes or unless she remarries).*	Copy of Thomas ROSS's will proved 24 January 1871

	During 1870 Francis WENHAM joins ROSS as a technical adviser, particularly regarding microscopes and John STUART joins ROSS to manage the photographic section.	L.V.Martin Internet article Who was Who re STUART
	16 December Thomas ROSS dies at 1 Upton Villas, Kilburn.	Copy of T.Ross's will
	21 December, Thomas ROSS buried at Highgate Cemetery.	Burial Records 38810
1871		
	2 April, John STUART (34 years), a landscape photographer is at Elm Grove, Hammersmith with one female servant. Mary Ann ROSS (29 years) an Opticians Widow is at 1 Upton Villas with her 3 year old son Andrew Thomas and 3 servants. Visiting is Elsie STUART, the younger sister of John STUART.	National Census
	10 October a patent granted posthumously to T.ROSS. An improvement on patent 681/1869. Re slides on a rotating disk and a second disk with one slot. Known as 'The Wheel of Life'. A Phenakistoscope Lantern slide.	Patent 2685 of 1871
1872?	At a date yet unknown John STUART marries Thomas ROSS's widow Mary Ann. (she has a son 4/5 years of age Andrew Thomas ROSS).	Despite extensive search of marriage registers 1871 to 1880 no record of the marriage has been yet found.
1872	30 May , Francis Herbert WENHAM applies for a patent regarding an improvement in Achromatic Object Glasses for Microscopes.	Patent 1640 of 1872
1873	Entry in Directory changes to; Thomas ROSS and Co. (Successors of the late Andrew ROSS) Opticians, manufacturers of microscopes, telescopes, photographic lenses, photographic cameras and photographic apparatus, spectacles, race, field and opera glasses, philosophical instruments etc.	Kelly's Directory 1873

	13 February, a daughter Edith Mary born to John and Mary Ann STUART.	No birth certificate yet located. Details from baptis in 1880.
	F.H.WENHAM introduces a redesigned microscope stand which also has a short lever operating on the nose piece.	
1874	The directory entry was amended to; ROSS and Co. Manufacturing Opticians for first class microscopes, telescopes, photographic lenses and apparatus, binocular glasses. Catalogue available.	Kelly's Directory 1874
	27 November, John William HASSELKUS born	Who was Who
1875	The directory amended to; ROSS and Co. Opticians, manufacturers of microscopes, telescopes, photographic lenses, cameras and apparatus, spectacles, race, field and opera glasses, philosophical instruments. Also entries as Photographic Lens Makers and Spectacle Makers	Kelly's Directory 1875
	Directory also has an advertisement by ROSS. Microscopes from £10 to £150, Telescopes from £2-12-6 to £21, Field, Race and Opera Glasses from £2 to £20, Lenses and cameras from £3 to £60, Barometers from £-3 to £7-7, Theodolites, sextants and compasses, Spectacles from 5s.to $20.00	
	January, the Microscope catalogue runs to 48 pages.Other catalogues are available for Ross New Portrait Lenses, Ross New Group Lenses,Ross Landscape Lenses, Ross Stereoscopic Lenses, Ross C.D.V.Lenses, Ross Cabinet Lenses,Ross Extra Rapid Lenses, Ross New Symmetrical Lenses, Ross Studio and Field Cameras, Ross Portable Tent, Ross Photographic Outfits,Ross Astronomical Telescopes,	

	Ross Military Telescopes, Ross Naval Telescopes, Ross Sporting Telescopes, Ross Race Glasses, Ross Opera Glasses, Ross Spectacles, Ross Sextants and Compasses, Ross Theodolites, Ross Aneroid Barometers, Ross Thermometers. Lenses, Ross Studio and Field Cameras, Ross Portable Tent,	
	26 March, The British Journal of Photography inclded an article on Andrew ROSS.	British Library, brought to compiler's attention by P.Abrahams. It was a reduced version of the 185[illegible] obituary.
	By end of year new premises at 164 New Bond Street for sales 7 Wigmore Street address shown as Optical Works and for wholesale and export business.	Kelly's Directory 1876 164 was on the corner of Grafton Street.
1876	1 August, John STUART of 7 Wigmore Street,applies for a british patent on the basis of a communication from Joseph ZENTMAYER re improvements in the substage for microscopes	Patent 3078 of 1876
1877	Directory amended to; ROSS and Co. Established 1830, Optician Gold Medals London 1862 and Paris 1867 for first class microscopes, telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application.	Kelly's Directory 1877
	6 February, F.H.WENHAM applied for a patent for an improvement to the ZENTMAYER microscope substage.	Patent 496 of 1877
	By end of the year, the premises at 7 Wigmore had been vacated.	Kelly's Directory 1878
1878	Directory amended to; ROSS and Co. Established 1830. Opticians Gold Medals London 1862, Paris 1867, Philadelphia 1876 for first microscopes, telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application.	Kelly's Directory 1878
1879	Directory entry amended.	Kelly's Directory 1879

	ROSS and Co. Established 1830. Opticians, Gold Medals London 1862, Paris 1867, Philadelphia 1876 and Paris 1878 for first class microscopes, telescopes, photographic lenses and apparatus, race glasses etc. Catalogues on application. This wording remained until 1882.	
	15 September, a daughter, Elsie born to John and Mary Ann STUART.	GRO birth records Croydon Area Vol 2a page 209
1880	The ROSS Microscope Catalogue features designs based on the ZENTMAYER and WENHAM patents.	G.L.Turner, The Great Age of the Microscope Museum o.t. H.O.Science, Oxford, 4 page price lis Optical Works at the Haunch of Venison Yard. Br Street.
	6 April, Baptism of Edith Mary and Elsie STUART at St. Marks Church Battersea Rise, Wandsworth. THe STUART's address was given as Duppas Hill, Croydon. John STUART was shown as a photographer and optician.	Baptism Records
1881	12 January, F.H.WENHAM applied for a patent for an improvement to microscope stands. The basis for the WENHAM Radial Microscope.	Patent 151 of 1881
	3 April, J.STUART,his wife Mary Ann,and their 1 year old daughter, Elsie are at Holly Lodge, Clapham with 2 servants. STUART's stepson Andrew Thomas ROSS is a boarder at Streatham School.	1881 Census,there is no mention of daughter Edi The surname is spelt as STEWART in the record.
	By the end of the year The business had moved to 112 New Bond Street with a factory located at the Haunch of Venison, Brook Street.	Kelly's Directory 1882
1882	Directory entry amended to; ROSS and Co. Opticians, Gold Medals London 1851 and 1862 Paris 1867 and Philadelphia 1876 and Paris 1878, for first class microscopes, telescopes and photographic lenses and	Kelly's Directory 1882

	apparatus, race glasses etc. Catalogues on application. This wording remained until 1889.	
	ROSS brought out trhe WENHAM Radial Microscope WENHAM had been engaged in a public argument with american optician Robert TOLLES over optical theories on microscope objectives. TOLLES was proved correct and WENHAM gave up microscopy entirely to concentrate on aeronautics. WENHAM was succeeded as technical adviser by Dr Heinrich Hugo SCHRODER	
1883	January Microscope Catalogue issued with 33 pages plus covers.The cover indicates clients include H.M. The Queen, the Prince and Princess of Wales and the Duke of Edinburgh. Also the governments of Great Britain,Germany, France, Italy, Russia, Sweden, Turkey and Egypt. There was a range of microscopes from £6-6-0 to £100-0-0. Other catalogues available were for Military Telescopes, Deerstalking Telescopes, Tourist Telescopes, Astronomical Telescopes, Naval Telescopes, Sextants and Quadrants, Compasses, Surveying Equipment,Mercurial and Aneroid Barometers, Thermometers, Drawing Instruments, Photographic Lenses, Race and Field Glasses, Opera Glasses, Marine and Night Glasses and Spectacles.	1883 Microscope Catalogue
1885	J.STUART in charge of ROSS and Co.	Who was Who
1887	An application for a patent for the improvement of lenses was abandoned. No details shown.	Patent 3160 of 1887
1888	John STUART's address shown as The Hollies, Clapham Common, Northside.	Kelly's Directory 1888
	29 March, Dr Heinrich Hugo SCHRODER of 5 The Terrace, Clapham Common and John STUART appllied for a patent in respect of the production of a telescope that could provide	Patent 4835 of 1888

	variable magnification whilst maintaining focal adjustment, apparent field and aplanatism.	
	7 April, Dr. Heinrich Ludwig Hugo SCHRODER, Optician and John STUART, Optician applied for a patent for an improved photographic lens.. Known as the ROSS Concentric, it was possibly the first anastigmat lens.	Patent 5194 of 1888
	ROSS offering a Dry Plate Camera.	N.Chaning and M.Dunn, British Camera Makers
1889	Directory entry amended to; ROSS and Co. Opticians, Gold Medals London 1851 and 1862, Paris 1867 and Philadelphia 1876 and Paris 1878, for first class microscopes, telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application. Wording remains until 1892.	Kelly's Directory 1889
	During the year John STUART acquires Stonehurst a very large house in about 300 acres in Ardingly, Sussex. An Observatory was in the gardens.	Internet article, Stonehurst is located directly opposite to the entrance to Wakehurst Place. It was sold by auction after STUART's death in 19
	John STUART, Optician and George HARROP,Engineer applied for a patent for an improved iris diaphragm.	Patent 1334 of 1889
	ROSS brought out a variable power gun sighting telescope based on Patent 4835 of 1888. It was awarded the Grand Prix at the Paris Exhibition. It was to be the forerunner of many types of naval gun sighting telescopes and became standard with the British, Italian Japanese and other navies.	Who was Who
	20 May, W. SAUNDERS applied for a patent in respect of a camera in the form of a field glass. In use the eyepiece end was pointed at the subject and the film was located at the objective end	Patent 8378 of 1889 See Patent 2725 of 1891
1890		
	ROSS offer the Portable Divided Camera	N.Channing and M.Dunn, British Camera Makers

1891	During the year the business acquired premises at No 3 Northside, Clapham Common . Workshops were erected in the garden to replace those at the Haunch of Venison.	Clapham Local History Unit
	The showroom moved from 112 to 111 New Bond Street. remaining until 1917.	Kelly's Directory
	John STUART is shown as the occupier of Stonehurst, (a large house and estate) in Ardingly.	Kelly's Directory for Surrey and Sussex.
	14 February, W.SANDERS applied for a patent in respect of a camera in the form of a field glass. It was different from patent 2725 of 1889 in that the photographic part could be removed and replaced with components so that it could be used as a field glass.	Patent 2725 of 1891 Ross acquired rights to the patent
	Professor H.Van HEURCK a well known authority on microscopes noted that ROSS still enjoyed a well merited reputation.	G.L.Turner, Collecting Microscopes
	5 April, John STUART is at a Cottage in Ardingly with one servant. Andrew Thomas ROSS (23 years) his wife Catherine Edith (21 years) daughter of 9 months and 2 servants are at Turner's Hill, near Ardingly.	National Census, there was no listing for Mary An ROSS and her 2 daughters.
	John H.Barton, wife and two sons at 18 Greame Street, Moss Side, Hulme, Lancs.	National Census
1892	Directory entry amended to; ROSS and Co. Opticians, Manufacturers of microscopes, telescopes, photographic lenses and apparatus, spectacles race and opera glasses. Gold medals London 1851 and 1862, Paris 1867 and 1878, Philadelphia 1876, Inventions 1885, Grand Prix and Gold Medal Paris 1889, Kingston Jamaica 1891.	Kelly's Directory 1892
	ROSS produced the Photoscope Binocular Camera based on W.SANDERS patent 2725 of 1891. The camera attachment to fit ROSS binoculars was advertised from £4-10s. to £6. To	Bonham's Catalogue May 2008. The lot sold for more than £16,000.

	fit other makers increased the price by 5s. A complete kit in a case was £12-12s.	
	ROSS producing a quarter plate twin lens reflex camera fitted with two ROSS Homocentric lenses. Also the Bond Street Folding Hand Camera.	N.Channing and M.Dunn, British Camera Makers
	John STUART abandoned two patent applications.	Patents 9213 and 9214 of 1892, subject matters not stated.
	7 June J.STUART applied for a patent in respect of a means of shutting out the light from the centre of a lens by means of an iris or interchangeable discs.	Patent 10,748 of 1892
	No 3 Northside, Clapham Common acquired No 2 Northside also acquired.	Clapham Local History Unit
1893	Directory Wording amended to; ROSS and Co. Gold Medals London 1851 and 1862, Paris 1867 and Philadelphia 1876, Paris 1878 and Inventions Exhibition 1885, Grand Prix and Gold Medals Paris 1889, Kingston Jamaica 1891, for first class microscopes, telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application.	Kelly's Directory 1893
	9 July, Zeiss patent their prismatic binoculars in Germany *Bar and Stroud stop development on a prismatic binocular*	W.Reid, Scientific Instrument Society Bulletin No.
	J.STUART abandoned a patent application	Patent 9118 of 1893 no details given.
	Workshops built in the garden of 3 Northside, Clapham Common.	Clapham Local History Unit
	31 December, Net Profit for year, £5,067-19s-4d.	Ross Ltd Prospectus 6 July 1897
1894	Directory wording amended to; ROSS and Co. Gold Medals London 1851 and 1862, Paris 1867, Philadelphia 1876, Paris 1878 and Inventions Exhibition	Kelly's directory 1894

	1885, Grand Prix and Gold Medal Paris 1889, Kingston Jamaica 1891, award Chicago 1893 for first class microscopes telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application This wording remained until 1897.	
	Zeiss takes out British patents 5639 and 7942 protecting their prismatic binoculars and telescopes.	
	28 April. Dr.H.L.H.SCHRODER, Optician and J.STUART Gentleman, applied for a patent in respect of a new system or combination of lenses suitable for photography, lantern, microscope, projection or other like purpose.Details are given of the various types of glsses to be used.	Patent 8492 of 1894
	7 June, Marshall Arthur WEIR, Engineer applied for a patent in respect of a means of attaching to a camera a box holding a number of films ready for use.	Patent 11094 of 1894 ROSS obtained the right to use this patent.
	13 October, Paul RUDOLPH of Carl ZEISS applied for a British patent for an improved photographic objective lens. The lenses incorporated four or eight elements.	Patent 19,509 of 1894. ROSS obtained the rights to use this patent. Their catalogues offered both Zeiss and Ross equals Zeiss lenses.
	J.STUART abandoned a patent application to do with microscopes.	Patent 24,537 of 1894
	31 December, Net Profit for the year £5,721-8s-9d	Ross Ltd Prospectus 6 July 1897
1895	19 January,John Henry BARTON, Opticians Assistant and J.STUART, Optician applied for a patent in respect of a hood or shield that could be moved vertically and held by a catch when access was needed for adjustments on Magic Lanterns.	Patent 1287 of 1895 This is the first reference to J.H.Barton
	9 May, J.STUART , Optician and Sidney MUGGERIDGE, Cabinet Maker applied for a patent in respect of a design for a twin lens relex camera, the New Model Twin Lens Camera.	Patent 9236 of 1895 N.Chaning an M.Dunn, British Camera Makers.

J.STUART abandoned a patent application to do with microscopes.	Patent 21,753 of 1895
16 August, The Admiralty having received complaints about the quality of their telescopes considered applying to several well known opticians for new samples for testing. From a list of 15 six were chosen including ROSS and Co. They were sent a vague specification told the sample would be paid for and that if successful there might be an order for 50.	N.A. ADM 116/407 The other five were, T.Cooke and Sons Ltd.,Elliot Brothers, Dollond and Co., Sir Howard Grubb and Troughton and Simms.
19 September, ROSS and Co. wrote to the Admiralty offering to submit one or two samples and asking for more detailed specifications. They repeated their requests on 1 and 4 October.	N.A. ADM 116/407
8 October, The Admiralty wrote to ROSS and Co and six other firms, (Negretti and Zambra had been added to the list) giving more details to be of about 45 X power and of best definition, not more than four foot in length, the size of the objective to be limited by expense and preferably not cemented because damp conditions would be harmful to any cement. A tripod was also wanted.	N.A. ADM 116/407 Ross had suggested a 3 inch objective.
18 November, ROSS and Co. wrote to the Admiralty outlining the specifications of their sample telescope. They provided drawings of two types of tripods.	N.A. ADM 116/407 The Admiralty consulted its officers and one Lieutenant came up with an attachment for connecting a telescope to a vessel's bridge rails. There are no further details of the tests in the file.
19 December, Albert Arthur SMITH , Inventor and J. STUART Gentleman applied for a patent in respect a camera fitted with a double extension where both extension are operated simultaneously by the same rack and pinion.	Patent 24,390 of 1895 A.A. Smith later went to work for Aitchison and managed the Wray (Optical Works) Ltd becomin Managing Director.
During the year J.STUART's daughter Edith married John ATTLEE M.D. at Clapham Church.	ATTLEE was associated with STUART in Henry Greenwood and Co Ltd, publishers of the British Journal of Photography and the Photographic Almanac.

31 December, Net Profit for the year £6,227-1s-11d.	Ross Ltd Prospectus 6 July 1897
1896	
January, ROSS and Co. issued two catalogues, No 1 for photography No 2 ,(56 pages), of Microscopes (19 pp), Telescopes (3 pp), Field Marine and Opera Glasses (4pp), Barometers and Thermometers (5 pp), Sextants, Compasses, Surveying and Drawing Instruments (8 pp), Spectacles (7 pp) and Magic Lanterns (2 pp). The microscopes included three sizes of the New Anglo-Continental Stands, the Wenham Radial and Ross Zentmayer were still listed The binocular section included the PHOTOSCOPE convertible Field Glass and Camera made to Sanders Patent. There was a list of 31 Field Glasses with either fixed bridges or hinges from £2-10 to £11-0-0, (hinge was extra), there were over eighty opera glasses. Some were described as Ross Best Hand made Field and Race Glasses, cheaper models were described as Superior Machine made. *By the erection of improved plant and the great facilities afforded by their new optical works, Ross and Co. have been enabled to effect an important reduction in the prices of their celebrated Field, Marine and Opera Glasses, equal to 20 per cent on patterns mounted in brass, ivory, shell etc. and to nearly 30 per cent on those mounted in aluminium.* Zeiss prismatic binoculars 4X, 6X and 8X (£6 -0-0 to £8-0-0) and Stereo Telescopes 6X, 8X and 10X (£7-10-0 to £10-10-0) were offered.	Museum o.t. H.O.Science, Oxford The catalogue is prefixed as Foreign but all prices are in sterling.
16 January, The Admiralty sent handwritten memorandums to a large number of optical firms.Samples of powerful telescopes were requested to be sent to the Admiralty Pattern Room, 72 Great Queen Street, Lincoln's Inn Fields, London WC .	N.A. ADM 116/407 Firms who had submitted samples in 1895 were told that any submissions would not affect the trial of the earlier sample.
17 January, ROSS and Co. replied to the memorandum sending four telescopes , No.s 5, 6, 7 and 8 and a case for the No 8.	N.A. ADM 116/407 What happened to these samples is not recorded in the file.
6 May, Zeiss exhibit their prismatic binoculars at the Royal Society	F.Watson, Zeiss Historica Vol. 21 No. 2.

	Conversazione.	By the end of the year Zeiss had produced over 4,000 prismatic glasses.
	J.STUART plans to set up a limited company ROSS LIMITED which will buy the business of ROSS & Co. from him and fund an expansion in the manufacture of lenses, microscopes, telescopes and optical instruments.	Stock Exchange Intelligence
	31 December, Net Profit for the year £6,720-1s-5d.	Ross Ltd Prospectus 6 July 1897
1897	Directory wording amended to; ROSS and Co. Gold Medals London 1851 and 1862, Paris 1867, Philadelphia 1876, Paris 1878 and Inventions Exhibition 1885 Grand prix and Gold Medal 1889, Jamaica 1891 3 awards Chicago 1893. For first class microscopes, telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application	Kelly's Directory 1897
	9 February, Voigtlander advertise their prismatic binoculars in the journal NATURE.	F.Watson, Zeiss Historica Vol 21 No. 2.
	Zeiss issues licences to Bausch and Lomb, in the U.S.A., and to Krausse et Cie, in Fance, to manufacture prismatic binoculars according to the Zeiss Patent. Initially Zeiss supplies lenses to Bausch and Lomb.	L. Gubas, An Introduction to the Binoculars of Ca Zeiss Jena. It is not known if Ross and Zeiss discussed a licensing agreement re binoculars although Ross made lenses under the Zeiss patents.
	28 June, ROSS LIMITED is registered with its address at 111 New Bond Street, London West.	Stock Exchange Intelligence (annual publication) The Company Registration No. is 53115
	1 July, ROSS Ltd takes control of the business. John STUART to receive £24,722 in cash and £60,000 in Ordinary Shares. STUART is to be Managing Director for at least five years. £40,000 worth of Preference Shares are offered to thepublic. The business year will end on 31 December each year. To simplify the first year's reports the trading of ROSS and Co. and ROSS Ltd	Ordinary Shareholders have 2 votes per share. STUART remains the M.D. until 1920. Preference Shareholders have 1 vote per share b get first chance of dividends at 5%. STUART's shareholding means he has control of

will be aggregated to make a full year.
The other first Directors are John ATTLEE M.D., Mr D.A. TRAILL CHRISTIE and Francis H. WENHAM.

6 July, the Prospectus for ROSS Ltd. is published. offering 40,000 Cumulative Preference Shares at £1. each. The busines is described as manufacturers of photographic lenses and cameras, microscopes, telescopes, field, race and marine glasses and other optical instruments and scientific apparatus. It was claimed the firm had thousands of customers, wholesale and retail, on the books including the British Admiralty, War and Ordnance Survey Offices, the Government Departments of India, of the principal colonies and many Foreign States and Royal Personages. It is proposed to largely extend the premises and the machinery.
The assets to be acquired (from ROSS and Co.) include freehold (Clapham) and leasehold premises (New Bond Street) £20,550., machinery, plant and tools £4,492-4s-7d., current stock and materials £30,660-6s-10d., book debts (guaranteed by the vendor, STUART) cash and creditors £5,283-5s.
The estimated amount for extending the works is £10,000.
The purchase price of ROSS and Co. is £84,722-7s-10d. The contract was dated 30 June 1897.
The freehold works at Clapham Northside have a frontage of about 100 feet and a depth of about 320 feet. The premises are well built and sumounted by an observatory. They have a handsome and imposing frontage with ornamental iron railings enclosing the forecourt.
The main building comprises numerous well lighted workrooms with external additions and basemenmts storerooms and convenient residential accomodation for the Managing Director. The whole extending to about 14,500 square feet.
Outside is a side entrance for workmen with gateway enclosure and large coach house.
In the centre of the Works is a large open space for testing optical instruments and in the rear is a large piece of land for enlarging the

the Company until 1920.
J.ATTLEE is STUART's son in law and WENHAM had been associated with ROSS and Co. in the 1870's as scientific adviser on microscopes.
D.A. TRAILL is Stuart's brother in law.

The Times Prospectuses 1897. In the City of London Guildhall Library.

premises.
111 New Bond Street consists of a corner business premises (leasehold) in one of the finest situations in London with a frontage of 50 feet. The shop occupies the whole of the groundfloor, is well lighted and has a very handsome modern front, a broad staircase leads to a spacious showroom on the first floor where there is also a dark room. On the second floor is the Manager's room,the housekeeper's room etc.. On the top floor is a large room. A lift runs between all floors and the basement in which are packing and store rooms, a strong room and five cellars, the workmen's and goods entrance and heating apparatus.

Corner of Brook Street.

The works were to be at the Haunch of Venison ir Brook Street . It is not clear whether this meant in the building previously used as an inn or in work shops in the yard at the rear.

20 August John Henry BARTON an Optician's Assistant of 19 Honeywell Road, Wandsworth Common, London applied for a patent for a prismatic binocular.The patent covers a means of adjusting the distance between the eyepieces. The left and right bodies are mounted in bars at the top and bottom of the bodies. The bodies rotate about the axes of the objectives. The amount of rotation is limited by means of curved arms at top and bottom.

Patent 19,255 of 1897
The inital application is only in Barton's name.

However on 13 December 1898 the name of John STUART, Managing Director of ROSS Ltd is added as a co-applicant.
It became normal practice for ROSS Ltd's patents to be taken out in the name of a Director rather than in the name of the Company.

ROSS's first series of prismatic binoculars which came onto the market in 1899 was based on this patent.
ROSS Ltd secured patent protection in France an the U.S.A. for Barton's design.
Until the expiry of ZEISS's prismatic binocular patent in 1908 ROSS like other makers had to ensure that the distance between the centres of the objectives was no greater than that of the eyepieces.

ROSS Ltd. brought out a catalogueof 160 pages for the years 1897-98 price 1 shilling. pages 1 - 72 dealt with photograpic equipment, 73 -

Museum o.t. H.o.Science, Oxford

	92 with lanterns and cinematographic items, 93 -96 with bicycles, 98 101 with telescopes, 101 - 103 Field and Opera Glasses, 104 - 105 Zeiss prismatic binoculars, 107 compasses, 108 - 112 barometers and thermometers, 113 - 141 microscopes and accessories, 144 - 149 Theodolites, levels and sextants, 150 - 156 spectacles. The many photographic lenses available included those conforming to designs patented by Carl Zeiss and C.P, Goerz for which ROSS were the sole manufacturing licensees within the British Empire. Eight pages were devoted to telephoto lenses. The cameras included stereoscopic and twin lens models, The Weir Ross film camera had 3 pages as did the photoscope binocular/camera. The lanternsincluded the New Patent Science Lantern at £42-0-0. A new arc lamp to Hepwort's patent was £5-5-0. The cinematographs ranged from £36-0-0 to £ 65-0-0. Telescopes for military, sporting and naval purposes were from £2-10-0 to £16-10-0 in brass. Astronomical telescopes were from £8-0-0 to £225-0-0. Gun Director telescopes and rifle scopes were also available. The range of galilean glasses and binocular telescopes and Zeiss instruments were as the previous 1896 catalogue. Microscopes included the Eclipse range, the Anglo-Continental, the Wenham Radial and Ross Zentmayer. A large range of micro-photographs	
	21 December, J.STUART and J.H.BARTON applied for a patent for a foot-piece to carry an arc lamp or lime-light.	Patent 30,247 of 1897.
	By the end of the year additional premises had been acquired at 31 Cockspur Street, Charing Cross.	This address was occupied until 1912.
	Construction was started on a new factory at the Clapham premises. Net Profit was £5,149.	Annual Report for 1897. A virtally complete set of Ross Ltd annual reports and accounts is held in the archives of the City of London Guildhall Librar The Preference Shareholders received £3,000 in dividends,
1898	Directory wording amended to;	Kelly's Directory 1898

	ROSS Ltd. Gold Medals and Highest Awards at all Great International Exhibitions for first class microscopes, telescopes and photographic lenses and apparatus, race glasses etc. Catalogues on application. This wording remained until 1901	
	The new factory buildings were substantially completed , they were to be equipped with new machinery and plant including electric motive power and lighting..	Annual Report 1898
	July, the retail premises at 31 Cockspur Street were opened.	Annual Report
	At 111 New Bond Street a room was set aside to demonstrate Lantern apparatus.	Annual Report
	August F.H. WENHAM resigns as a Director because of age and travelling problems.	Annual Report
	14 October John STUART and John Henry BARTON applied for a patent to improve and simplify the construction of arc lamps used for projection.	Patent 21,638 of 1898
	Much work was devoted to perfecting the new prismatic binocular. and to a new series of microscopes, photographic lenses and hand cameras.	Annual Report
	31 December, Net Profit £3,794, £2,000 in dividends paid.	Balance Sheet
1899	During the year J.H.BARTON abandoned a patent application in respect of an unkown matter.	Patent 7,973 of 1899
	26 July J.STUART and J.H.BARTON applied for a patent for an improvement in the construction of Prismatic Binoculars. The top and bottom plates have extensions through which the hinge passes. In the patent drawing the bottom extensions are capable of adjustment for collimation purposes.	Patent 15,376 of 1899 This method of using the top and bottom plates to form the hinge was used by ROSS for over 30 years and copied by other British makers. ROSS brought out their second series of prismatic binoculars based on this patent

		probably in late 1900
	Mr TRAILL CHRISTIE stood down as a Director and was replaced by Mr.E.H. BARTLETT to represent the Preference Shareholders.	Annual Report
	15 September , £10,000 Preference Shares were offered to the public, J.STUART guaranteed to buy any that were not taken up.	Circular
	December, the Company prepared to open a shop in Paris at 35 Boulevard du Temple.	Annual Report
	The outbreak of War in South Africa led to a 100% increase in business during the year.	Annual Report 1899
	31 December, Net Profit £2,798, £2104 paid in dividends.	Balance Sheet
1900	January ROSS LTD brought out a catalogue which included the first model prismatic binoculars.The cataloge was approximately 5 inches by 3.75 inches and had 24 pages. The binoculars were available in four powers, 6X, 8X,10X and 12X. With eyepiece focussing the 6 and 8 powers cost £8-0-0 and the 10 and 12 powers cost £10-0-0 . Centre focussing models cost an extra £1-0-0 Mononoculars were also available for £3-15-0 and £4-15-0.	ROSS LTD Catalogue According to the catalogue the prismatic binoculars had been supplied to hundreds of Officers of the South African Field Force. This indicates that they had been available in 1899.
	Also in the catalogue were non prismatic binocular telescopes of five sizes constructed in brass or aluminium prices ranged from £5-5-0 to £13-0-0 There were 28 variations of other non prismatic binoculars from £2-0-0 to £13-10-0 depending on size and finish. The catalogue also listed telescopes, compasses, barometers, sextants and spectacles.	Examination of specimens suggests these models were of French manufacture.
	4 January ROSS LTD becomes the first british firm to advertise a prismatic binocular in the magazine NATURE.	F.Watson,Zeiss Historica Magazine Vol 21 No 2.
	During the year J.STUART took up residence at No 3 Northside Clapham Common.	Clapham Local History Unit He had probably sold the Hollies and used a flat when visiting from Ardingly.

For the year ending 31 March, the Director of Amy Contracts reported the purchase of 619 Heliographs, 205 Telescopic Sights, 715 Telescopes and 1148 Binoculars. Binoculars bought from abroad cost £1050. No details of suppliers were given.

N.A. WO 395/1-3
Previous Reports had not included such informati

An Abridged Photographic Catalogue of 16 pages, nine were devoted to lenses of ROSS, Zeiss and Goerz designs all made by ROSS.

Museum O.T.H.o.Science, Oxford

Later in the year ROSS Ltd's Abridged Optical catalogue no longer lists the 6X models. It does list prismatic binoculars by ZEISS 4X,6X,8X,10X and 12X and by GOERZ 3X,6X,9X and 12X.

July, a 48 page Price List and catalogue for Prismatic Binoculars, Telescopes and Microscopes was issued. Four pages were given to the ROSS prismatic glasses.
A special feature in the new ROSS' Model Prismatic Binocular is the manner in which the body tubes are connected by bars at each end with an intermediate triangular support, so that the body tubes partially rotate on the axis of the object-glass, while the distance between the eye-pieces is altered, thus affording a ready means of adjustment to to suit the width between the eyes of different users."

Museum O.T.H.o. Science, Oxford

11 July J.STUART and John William HASSELKUS, Engineer applied for a patent for an improved central focussing mechanism incorporating differential gearing.

Patent 12538 of 1900
This focussing mechanism is used on ROSS's second series of prismatic binoculars. The hinge joining the eyepieces is often stamped patent 11-7-1900

24 September ROSS LIMITED applied for a patent on the basis of a communication from WARNER and SWASEY of Cleveland,Ohio. The application was for an improved means of adjusting and fixing the prisms.The prisms have grooves in the side into which a small metal plate projects. This plate is secured by a screw.The prism can be moved and then secured in position by tightening the screw.

Patent 16,996 of 1900
Warner and Swasey brought out a prismatic binocular in the USA that was very similar to the ROSS second series.A Warner and Swasey catalogue of 1904 claims that their binocular came out in 1900. Actual models seen have a 1902 US patent date on them.

	During the year the main engine broke down seriously deranging output of Government contracts. It was necessary to install extra automatic, labour saving machinery. To pay for this J. STUART made a substantial loan to the Company. Despite these problems the business increased compared to 1899.	Annual Report 1900
	31 December, Net Profit £6,410, £2,500 dividends paid.	Balance Sheet
1901	Directory wording amended to; ROSS Ltd. Opticians, manufacturers of microscopes & telescopes, photographic lenses & apparatus, spectacles, race & opera glasses etc. Gold medals & highest awards at all great international exhibitions. This wording remained until 1912. ROSS Ltd now had a telephone, Gerrard 3540 and a telegraphic address, ROSSANO for 111 New Bond Street.	Kelly's Directory 1901
	The ROSS Photographic Catalogue for this year ran to 120 pages. The catalogue was divided into seven sections.1, ROSS Lenses, 2,ROSS-ZEISS lenses, these were lenses of Zeiss manufacture and copies made by ROSS, 3, ROSS-GOERZ lenses, these were of Goerz and ROSS manufacture plus Anschutz cameras.4, Shutters, 5,ROSS Cameras,6,Outfits and 7, (Magic) Lanterns. ROSS described themselves as the Oldest Photographic Opticians in England.	
	12 February J.H.BARTON applied for a patent for an improvement in the construction of prismatic glasses. The prisms were to be enclosed to prevent dust and moisture settling on the surfaces.	Patent 2,951 of 1901 No Director of ROSS Ltd is named in the application and J.H.Barton may have been acting independently.
	31 March, J.STUART , 63 years, with wife Mary Ann, 59 years, and daughter Elsie, 21 years, at 3 Northside Clapham Common with 2 servants.	1901 Census
	Andrew Thomas ROSS, 33 years, with his wife Catherine, 31 years and 4 children and 4 servants at Pearcelands, Ardingley.	Described as living on own means. Pearcelands is near Stonehurst, Ardingley.

John H.BARTON, wife, two sons and one servant at 19 Honeywell Road, Wansworth. Described as an Optical Worker.

For the year ending 31 March, the Director of Army Contracts reported the purchase of 1582 Heliographs, 691 Telescope Sights, 1716 Telescopes and 3297 Binoculars. Value of foreign binoculars was £1920. No suppliers details given.

N.A. WO 395/1-3

J.H.BARTON abandoned a patent application for an unknown subject.

Patent 15,774 of 1901

18 September J.STUART Managing Director, J.H.BARTON Optician's Assistant and J.W.HASSELKUS applied for a patent for an improvement in prismatic telescopes and binoculars. The prisms are supported in plates which have circular holes to allow the light rays to pass.The plates are secured to the bodies by small screws which allow a measure of adjustment.

Patent 18,667 of 1901

ROSS published an 88 page Catalogue of Military, Naval, Field and Opera Glasses, New Prism Binoculars, Sporting, Military and Naval Telescopes, Binocular Telescopes, Gun Telescopes etc.. It was divided into five sections. I, Binoculars and Telescopes, this included ROSS's new (Second Series) prismatic binoculars of a simpler construction compared the first series. The top and bottom plates of the prism boxes were extended to become parts of the hinge. They were available in 8X, 10X an12X powers and either eyepiece or centre focussing, prices from £8-0-0 to £10-10-0. Also available were monoculars. 2, Microscopes and accessories. 3, Barometers and other weather recording apparatus. 4, Drawing, Measuring and Surveying Equyipment. 5, Spectacles and Magnifiers.

Museum O.T.H. o Science, Oxford.
The Catalogue may have been published earlier i the year but this copy included a reprint of a magazine article of October praising the virtues o the new binocular

The Paris branch had not been a success and was to be closed at the end of the year.

The overall business for the year was satisfactory. Gross sales exceeded those of 1900 but competition was increasing. The

Annual report 1901

Company was forced to give increased discounts to wholesalers and spent more on advertising.
More machinery was being installed at the Clapham Works,

31 December, Net Profit £6,055, £2,500 dividends paid. Balance Sheet

1902 23 January, Lt.Colonel T.V.W.PHILLIPS Royal Artillery gave a lecture entitled Field Glasses and Telescopes at the Royal Artillery Institution. Members of the optical trade attended inluding a Mr RICHMOND representing ROSS LTD. Minutes of Proceedings of the Royal Artillery Institution Vol. XXVIII, (British Library)

During the year ROSS published a booklet entitled;
Prism Binoculars, The Ross Bird Stalker a book for Field Naturalists authored by Charles Dixon. Price sixpence. Mr Dixon wrote an 18 page report praising the qualities of ROSS's prismatic binoculars for nature studies.
The booklet also has a catalogue section.

Mr DIXON was a famous naturalist of the period. The Binocular illustrated is clearly ROSS's second series of prismatic binoculars.

The Second series of prismatic binoculars had three powers, 8X, 10X and 12X. The eyepiece focussing versions cost £8-0-0, £9-0-0 and £10-0-0. The centre focussing models cost another 10 shillings . Monoculars were also available.
No binocular telescopes were listed. 34 non prismatic binoculars inluding all finishes were listed priced from £2-5-0 to £11-0-0. Hinges added 10 shillings and 6 pence or 21 shillings according to size.
In the booklet three new catalogues were offered. Number 1 for photographic and projection equipment. Number 2 for Microscopes Telescopes, binoculars,barometers and spectacles. Number 3 for Photographic sundries and materials.

ROSS LTd. published Catalogue F of 64 pages for Standard Microscopes and Accessories, incuding for micro-photography. Also equipment for X-ray work and Spectroscopes. An insert indicated prices of their prism field glassses had been reduced.Now ranged from £7-5-0 to £9-10-0. Museum O.T.H.o. Science, Oxford

There was no reference to the Wenham or Zentmayer microscopes.

For the year ending 31 March the Director of Army Contracts reported the purchase of 630 Heliographs, 82 Telescope Sights, 1411 Telescopes and 5810 Binoculars. £5182 was spent on foreign binoculars.	N.A. WO 395/1-3 The Director noted, " It will be seen that the numb of telescopes and binoculars obtained was very large. Our purchases in the past were small and t an inferior pattern. The demand for improved appliances sprang up as soon as the troops bega to move over the country, as was, at times, as lar as could be dealt with. " also " A considerable portion of these goods, (either as components or as finished articles), is made on the Continent, a part of the supplies furnished direct by continenta makers. The question as to how far it will be possibleto insist upon entire production in this country is being taken up but any such condition would probably require strict supervision."
July, Mr A. CUNNINGHAM was appointed to the Board to repesent the Preference Shareholders.	Annual Report
The end of the War in South Africa disturbed the Company's buiness. Retail sales also suffered because of poor weather and the King's illness. However the export and wholesale apects were growing. Additions to the Factory's plant were almost complete. The capital for the labour saving machinery provided by J.STUART was partially repaid by an issue to him of £5,000 Preference Shares.	Annual Report 1902
During the year GOERZ bring out their PERNOX prismatic binocular. It was the first 6 X 30 and advertised as a night glass.	It was a very advanced design with one piece boc for improved sealing and the prisms were located in a brass 'cage'.
J. AITCHISON obtains Patent 26,169 for prismatic binoculars incorporating large objectives, Barlow lenses and adjustable diaphragms.	These were available in several powers of magnification and were widely advertised.
December, J.H.DALLMEYER Ltd. advertise their prismatic binoculars	These were not successful.

in the journal NATURE. They contain all the optics in a single body. To achieve movement of the eyepieces 8 prisms are used.

31 December, Net Profit £3,845, £2,625 dividends paid. Balance Sheet

1903 ROSS Ltd's Abridged Catalogue ran to 50 pages. 1 to 29 related to photographic equipment,30 to 32 Magic Lanterns, 33 to 34 Prism Binoculars, 35 to 36 Field Glasses, 37 Opera Glasses, 37 to 39 Telescopes, 40 Compasses, 41 Aneroids and Sextants, 42 Barographs, 43 to 45 Microscopes and 46 to 47 Spectacles.
The prism binoculars were available with eyepiece focussing 8X £6-10-0,10X £7-15-0 and 12X £8-15-0 and with centre focussing 8X £7-5-0,10X £8-10-0 and 12X £9-10-0. They were described as the Improved Model and and as London Made.
Monoculars were also available.
38 variations of Field Glasses (excluding being fitted with a hinge) were listed from £2 to £11.
51 variations of Opera Glasses frpm £2 to £7 were listed.
Non prismatic binocular telescopes in five sizes of either brass or alumium cost from £4-10-0 to £13-0-0.
Seven other catalogues were offered one of which was dedicated to Telescopes and Binoculars.

These are the second series of prismatic binoculars

During the year ROSS entered their prismatic binoculars into a competition for contracts with the United States Navy. They competed against Zeiss,Bausch and Lomb, C.P.Goerz, Voigtlander and Warner and Swasey.

P.Abrahams, Internet
Warner and Swasey won. Their binocular was ver similar to Ross's.

For the year ending 31 March, the Director of Army Contracts reported the purchase of 450 Heliographs, 155 Telescopic Sights, 575 various Telescopes Portable, 628 various Telescopes and 13500 Binoculars. The value of binoculars from abroad was £10928. No details of suppliers was given.

N.A. WO 395/1-3
The Director noted, " The quantity of binoculars ordered in 1902 - 1903 was very large, and as wil be seen.....a considerable portion of them was obtained as usual from the Continent. " and " It ha decided to distinguish in future between the various places of manufacture of these articles, and to give the preference, as far as possible, to home production. It has hitherto been considered

		impossible to make this distinction for the class of article.
	1 October, J.STUART and J.W.HASSELKUS applied for a patent to improve upon an earlier telescope patent (4835 of 1888) granted to J.STUART and Dr.SCHRODER. These improvements consisted of provision for collimation and protection of the user from recoil. The Patent attracted the approval of the Admiralty.	Patent 21,120 of 1903
	J.W. HASSELKUS was appointed the Works Manager.	
	There was a depression in the year's trading, retail sales were down and prices had been reduced. A trusted Book Keeper who had been with ROSS for 15 years had been detected in embezzlement of over £7,000. He was sentenced to imprisonment. The new plant was reducing the costs of manufacture. The Company had secured Naval, Military and Indian Government contracts.	Annual Report 1903
	31 December, Net Profit £3,036, £2,750 dividends paid.	Balance Sheet
1904		
	16 March,J.STUART and J.W.HASSELKUS applied for a patent to further improve on telescope patents 4,385 of 1888 and 21,120 of 1903. This improvement related to the construction of cross-wires	Patent 6,447 of 1904
	For the year ending 31 March, the Report of the Director of Army Contracts noted the purchase of, 989 Heliographs, 356 Telescopic Sights, 1832 various Telescopes Portable, 484 various Telescopes and 2820 Binoculars. £576 was spent on foreign binoculars. No suppliers details were given.	N.A. WO 395/1-3
	During the year the German firm of Goerz patented the Dial Sight. The British Government obtained licensing rights so they could be made in the United Kingdom.	Contracts were subsequently awarded to ROSS L R.and J. Beck Ltd. and Barr and Stroud. for the N Dial Sight.
	Trade was still depressed especially in retail sales but manufacturing contracts increased. Freehold premises adjacent to the Clapham	Annual Report 1904

	Works were purchased.	
	The Leeds firm of KERSHAW was making cameras to be sold by ROSS such as the ROSS Reflex.	N.Channing and M.Dunn, British Camera Makers
	31 December, Net Profit £7,849, £6,350 dividends paid.	Balance Sheet
1905	31 Cockspur Street acquired a telephone, Gerrard 5417 and its own telegraphic address, ANASTIGMAT.	Kelly's Directory 1905
	For the year ending 31 March, the Director of Army Contracts reported the purchase of 285 Heliographs, 14 Telescopic Sights, 697 various Telescopes Portable, 223 various Telescopes and 100 Binoculars. There were no foreign purchases. No details of suppliers given.	N.A. WO 395/1-3
	May, the Admiralty authorised the re-equipping of the entire fleet with new sighting equipment. It was to take two years. A total of 4000 sights of five dfferent types were bought.ROSS Ltd. made two of the models, W.Ottway and Co. Ltd made all five models.	The Admiralty in liaison with W.Ottway and ROSS had developed from 1900 this new range of sights
	30 May to 3 June the First Optical Convention was held at the Northampton Institute, Clerkenwell. J.STUART was a Founder Member.No papers were delivered by ROSS personnel. The Catalogue published by the Convention listed several ROSS products including; two variable power telescopes for military use, several telescopes for Naval, Military and Deer Stalking purposes. 3 opera glasses, 5 field glasses and 5 binocular telescopes, prismatic binoculars in 8X,10X and 12X ,either central or eyepiece focussing and prismatic monoculars,2 microscopes of the 'Continental' pattern. Camera lenses,the Cabinet, the Homocentric ROSS-ZEISS (made under licence) and ROSS -GOERZ, 3 projection lanterns,7 microscope objectives, a Phopto-Micrographic camera, the improved Portable Square Bellows Camera, the Century the Triple Extension Century and the New Model Twin Lens Cameras. an Enlarging Lantern and 3 Projection Arc Lamps.	Proceedings of the Optical Convention 1905 Catalogue of Optical and General Scientific Instruments 1905

	C.V.DRYSEDALE speaks at the Convention on the advantages of cemented prisms and possible improvements to both galilean and prismatic glasses.	C.V.Drysedale acted as a technical advisor to J. Aitchison.
	William WATSON and Son Ltd list prismatic binoculars in their catalogue. The 'Perspect' of their own manufacture is of the Ross pattern. They also sell various German makes.	Catalogue 1905
	Retail sales were still depressed. However the Manufacturing, Wholesale and Export Departments were operating in a satisfactory manner. There were Government Contracts on hand. It was intended to purchase a powerful new engine and dynamo for motive power and lighting.	Annual Report 1905
	31 December, Net Profit £12,106, £10,250 dividends paid.	Balance Sheet
1906		
	For the year ending 31 March the Director of Army Contracts reported the purchase of 117 Heliographs, 3 Telescopic Sights, 165 various Portable Telescopes, 421 various Telescopes and 60 Binoculars. No foreign purchases, no details of suppliers.	N.A. WO 395/1-3
	Trading during the year had improved. Gross turnover and net profit had increased. The Company was ready to install new machinery and workshop.	Annual Report 1906
	31 December, Net Profit £12,324, £11,750 dividends paid.	Balance Sheet
1907	ROSS LTD issued their Manufacturing Opticians Photographic Catalogue.Pages 1 to 55 were of photographic equipment. Pages 56 to 58 were of prismatic binoculars, 59 and 60 of galilean type binoculars and page 61 of telescopes.	ROSS Ltd Catalogue
	The catalogue showed codewords for the prismatic binocluars for use when placing orders.They did not appear on the actual glasses. Eyepiece focussing models listed were 6x (POACH) at £5-5-0, 8X (POET) at £5-10-0, 10X (POINT) at £6-10-0 and 12X (POOR) at £7-10-0.	The codewords are based on POrro for eyepiece focussing and PRism for centre focussing. Thus PO +vowels A,E,I and O and letters to make a word. Then PR + O + N,O, P and S. and letters to make a word.

Centre focussing models listed were 6X (PRONG) at £5-5-0, 8X (PROOF) at £6-10-0, 10X (PROP) at £7-10-0 and 12X (PROSE) at £8-10-0.
All models have an objectives of about 3/4 inches.
On page 58 there are details of a Large Aperture model, it is of 6X with objectives of one and 3/16 inches with eyepiece focussing.
The codeword is PULL and the cost £8-10-0.

The Army and Navy Stores Catalogue included one page of prismatic binoculars. Six ROSS models were listed of 8X,!0X and 12X. Also shown were three models by VOIGTLANDER,three by DOLLOND, three by GOERZ, three by ZEISS and three by LUMEX. The LUMEX were the most costly with the 12X at £11-10-0.

Army and Navy Stores Catalogue 1907

The illustration of the LUMEX shows it to be of the distinctive appearance of PERPLEX made by SCHUTZ of Kassel

15 February, J.STUART Managing Director of ROSS Ltd and A. WOODS, Gentleman applied for a patent in respect of an Improvement in Connection with Photographic Exposure Shutters known as Self-closing Focal plane Shutters.

Patent 3,810 of 1907

For the year ending 31 March the Director of Army Contracts reported the purchase of 60 Dials, Electric Range, 98 Field Plotters, 16 Telescope Levels, 110 Heliographs,710 various Portable Telescopes, 137 various Telescope Sights and 174 Binoculars. £191 was spent on foreign binoculars, no details of suppliers.

N.A. WO 395/1-3

November, The British Miltary seals the first pattern for a prismatic binocular, of 8 x power with 19 mm objectives and equipped with a graticule.

W.Reid, Army Museum Yearbook.
The actual make is unknown, it is described as of Zeiss type construction. Plate XIV in the Handbo of Artillery Instruments 1914 shows a No 1 Prisma Binocular.

December, LEITZ advertise prismatic binoculars in the journal NATURE.

F.Watson, Zeiss Historica Vol. 21 No. 2.

Trading for the year was satisfactory despite an exceptionally wet summer. A new foundry and plant was completed costing about

Annual Report 1907

	£3,000. This increased the capacity of the Works.	
	31 December, Net Profit £10,566, £10,250 dividends paid.	Balance Sheet
1908	ROSS Ltd issued two catalogues at sixpence each. No 1 was for Photographic Equipment and Magic Lanterns. No 2 for Microscopes Telescopes, Binoculars, Field Marine and Opera Glasses, Barometers and Spectacles. However No 1 included 2 pages of prism binoculars and 2 pages of Field, Marine and Opera Glasses. With eyepiece focussing 6X £5-5-0, 8X £5-10-0,10X £6-10-0 and 12X £7-10-0. With central focussing 6X £6-5-0,8X £6-10-0, 10X £7-10-0 and 12X £8-10-0. Monoculars in 8X,10X and 12X.	ROSS LTD Catalogue No 1
	There were also two large aperture glasses. An 8X central focussing model with one inch objectives at £7-5-0, code word PONTUS and a 6X eyepiece focussing model with one and 3/16 inch objectives at £8-10-0 code word PULL. There were 57 Field and Marine Glasses,(excluding hinged versions) from £2-5-0 to £6-10-0. There were 73 Opera Glasses from £1-5-0 to £7-0-0.	The illustrations show these models to have markedly tapering bodies.
	ROSS Ltd. published a small format (8 X 5 inches) Catalogue of 36 pages, entitied Aids to Vision for Naval and Military Officers, Sportsmen Naturalists Etc. ROSS's prismatics were as the above catalogue. Zeiss prismatic glasses 6X, 8X and 12X and Zeiss Teleplasts 3X, 5X and 10x were also listed. Binocular Telescopes in brass or aluminium A large range of galilean glasses was listed including two Large Aperture (2.25 inches O.G.) of 10 lenses and 3.5X power. There were references to other products and catalogues.	Museum O.T.H. o. Science, Oxford
	For the year ending 31 March the Director of Army Contracts reported the purchase of 770 Clinometers, 7 Dials, 104 Field Plotters, 160 Mekometers, left and right, 3 Rangefinders Depression, 3 Marindin Rangefinders, 10 Telescope Levels, 118 Heliographs, 217 various Portable Telescopes, 136 various Telescope Sights and 122 Binoculars. £312 was spent on foreign binoculars. No suppliers details.	N.A. WO 395/1-3 In later years suppliers were named. No reference to any prismatic binoculars

1 April 1908 to 31 March 1909 ROSS received a contract from the Army for a quantity of Signalling Mk II Telescopes at £1-18-7 each.	N.A. WO 395/1-3 A total of 852 were ordered from ROSS, Ottway a Clarkson.
Albert Arthur SMITH a Manager at ROSS's Clapham works had talks with the AITCHISONS and left ROSS to work with WRAY OPTICAL LTD. The company started making prismatic binoculars similar to ROSS's second series.	J.AITCHISON had bought Wray to act as a manufacturer for items to be sold in Aitchison's shops. SMITH rose to become Managing Director of WRAY as also did his son.
During the year there was a reduction in Government contracts and new models were introduced leading to reduced profits.	Annual Report 1908
31 December,Net Profit £5,841, £7,350 dividends paid.	Balance Sheet
1909	
January, the British Military adopt a second pattern of prismatic binocular, a 6 X 30.	The No.2 follows the ROSS construction with the hinges formed from extensions of the top and bottom plates.
January, The Army purchase 1500 prismatic binoculars from Carl Zeiss, Jena of the No 2 Pattern, 6 X 30, at £5-00 each, (£7,500). The only binocular purchase for year ending 31 March.	N.A. WO 395/3. first recorded purchase of prismatic binoculars, noted as a non-competitive bid.
ROSS offer the Panros Folding Focal Plane Camera made by ROSS	N.Channing and M.Dunn, British Camera Makers
1 April to 31 March 1910 ROSS Ltd. received contracts from the Army for ; 250 Telescopes, Signalling Mk II @ £1-17-3 each, 1000 Prismatic Binoculars @ £4-10-0 each and 12 Mk V Galilean Glasses @ £1-7-6 each. ROSS Ltd. were required to repay £66-8-0 in respect of a Rangefinder order.	National Archives, WO 395/1 -6 Reports of the Director of Army Contracts.
24 August , Frank Philip WHITEHEAD and John STUART applied for a patent for a folding reflex camera.	Patent 19,432 of 1909
2 November, Carl Zeiss (London) Ltd. was registered . The Memorandum of Association shows the Company was established	By establishing a British Company Carl Zeiss was in a better position to seek British military contract

to take over as a going concern the business of Carl Zeiss, Jena as conducted at the Works at Bittacy Hill, Mill Hill and at Margaret Street, London.

New Government contracts were obtained during the year, turnover and net profits improved. The workshops and plant needed to be enlarged.

Annual Report 1909
The contracts would include the No.2 Prismatic Binocular (6X 30) adopted in 1909

Andrew Thomas ROSS still resident at Pearcelands,Ardingly.

Kelly's Directory 1909
Not listed by 1911

31 December, Net Profit £9,073, £8,750 dividends paid.

Balance Sheet

1910

During the year ZEISS introduce the first 7 X 50 prismatic binocular.

ROSS Ltd. issued a 24 page (8 X 5 inches) Price List of Useful Presents. Heading the list were the New (Third Series) Model Large Aperture STERO PRISM BINOCULARS including 6 X 21, 8 X 24, 10 X 24 and 6 X 30 in eyepiece and centre focussing versions costing from £6-5-0 to £8-10-0. Also a 12 X 30 eyepiece focussing only at £9-0-0. Monoculars were also available. A 3 X 13 prismatic opera glass at £5-15-0 was offered. The range of galilean glasses and telescopes was as in 1908.
Several pages offered weather recording instruments including the Helio-Chronometer at £10-10-0 , two pages referred to cameras, other items covered were compasses and spectacles.

Museum O.T.H.o. Science, Oxford

23 March, £5,000 preference shares in ROSS Ltd. were offered and taken up.

The authorised total of £60,000 Preference Share had been reached.

1 April to 31 march 1911, ROSS Ltd. received contracts from the Army for ; 374 Prismatic Mk II Binoculars @ £4-10-0 each, a share in an order for 1000 Prismatic Mk II Binoculars @ £3-9-2, (W.Watson and Sons Ltd made the balance), a share in 538 Directors No 3 Mk I @ £9-0-8 each, (shared with T.Cooke and Sons Ltd., Ottway and E.R.

N.A. WO 395/1 - 6

Watts). 20 Dial Sights No 7 @ £35-0-0 each, A share in 923 Telescopes Signalling Mk III @ £2-4-2 each, (shared withNegretti and Zambra, Ottway, Troughton and Simms and W.Watsonand Sons Ltd.). 25 Telescopes Variable Power (5-21) @ £11-17-6 each.	
12 April, J.STUART and G.JOCHUMSEN apply for a patent respecting roller blind shutters.	Patent 8,874 of 1910
14 June, Johannis Wilhelm (known as John William), HASSELKUS of 37 Narbonne Avenue, Clapham Common, takes the Oath of Allegiance and becomes a Naturalised Briton.	London Gazette, 1 July 1910
July, The Workshop extensions were completed at a total cost of £12,000 and the arrears of large contracts dealt with.	Annual Report
15 July, ROSS LTD and F.P.WHITEHEAD apply for a patent in respect of reflex cameras.	Patent 16,924 of 1910
12 October, Carl ZEISS apply for a patent in respect of a design for an objective employing four elements. (Zeiss had obtained a German patent 15 October 1909). An improvement on patent 19509 of 1894.	Patent 23,604 of 1910 ROSS made lenses to these specifications.
18 November,J.W.HASSELKUS and J.STUARTapply for a patent for a periscope with a wide field of view.	Patent 26,862 of 1910.
Trading for the year satisfactory despite poor weather and two General Elections.	Annual Report 1910
31 December, Net Profit £11,917, £8,898 dividends paid.	Balance Sheet
1911	
During the year ROSS Ltd acquired the Royal Warrant.	
The British Military redesignate the 1907 pattern binocular as the No.1 the 1909 pattern as the No.2 (Mk I without a graticule, Mk II with). A	The No.3 was accepted in both the ROSS and ZEISS forms of construction.

	No.3, 6 X 24 was also introduced , (also with Mk I and Mk II versions).	
	ROSS offer the New Focal Plane Reflex Camera, said to be made by ROSS.	N.Channing and M.Dunn, British Camera Makers
	1 April to 31 March 1912, ROSS Ltd. obtained Army contracts for ; a share in 83 Night Galilean Glasses @ £1-14-0 each, (shared with Baroux and Bion and W.Watson and Sons Ltd.). A share in 769 Prismatic Mk I Binoculars @ £3-10-6 each, (shared with W.Watson and Sons Ltd. and Carl Zeiss (London) Ltd.). 644 Prismatic Mk II Binoculars @ £4-12-2 each. A share in 710 Prismatic Mk III Binoculars @ £3-11-0 each, (shared with Aitchison and Carl Zeiss (London) Ltd. 15 Narrow, 128 Medium and 15 Wide Mk V Galilean Glasses @ £1-7-6 each. 100 Dial Sights No 7 @ £35-0-0 each.	N.A. WO 395/1 - 6 A total of 2364 binoculars were purchased by the Director of Army Contracts.
	John H.BARTON, 60 years of age, a Manufacturing Optician, Field Glasses, at 19 Honeywell Road with his wife, one son a servant and two visitors.	National Census.
	26 October, J.W.HASSELKUS and J.STUART apply for a patent for an improvement on their patent 26862 of 1910.	Patent 23,726 of 1911
	The year's turnover increased but net profits were reduced. Mainly due to contracts being less renumerative. There was large initiatory expenditure upon an important class of new instrument for Government requirements that are as yet non productive but expected to be profitable in future.	Annual Report 1911 Possibly the periscope
	31 December, Net Profit £7,609, £6,600 dividends paid.	Balance Sheet
1912	Directory wording amended to; ROSS LIMITED, opticians by appointment to His Majesty the King manufacturer of microscopes & telescopes, photographic lenses & apparatus, spectacles, race & opera glasses etc. Gold medals & highest awards at all great international exhibitions. This wording remained until 1917	Kelly's Directory 1912

	29 January, J.STUART and William BIELICKE apply for a patent for a telephoto lens of five elements.	Patent 2347 of 1912
	1 April to 31 March 1913, ROSS Ltd, received Army orders for : 1080 Prismatic Mk I Binoculars @ £3-12-6 each, 114 Prismatic Mk II Binoculars @ £4-11-2 each, 196 Dial Sights No 7@ £37-10-0, 304 Telescopes Signalling Mk III @ £2-7-6.	N.A. WO 395/1 - 6 A total of 2685 binoculars were purchased by the Director of Army contracts
	June The Second Optical Convention was held at South Kensington No papers were given by ROSS personnel.	Proceedings of the Optical Convention 1912
	ROSS offer the Folding Reflex Camera	N.Channing and M.Dunn, British Camera Makers
	By the end of the year the Cockspur Street premises had been closed and the telegrapic address for 111 New Bond Street changed to ROSSANO WESDO. The Optical Works at Clapham Common was equipped with a telephone Battersea 376 and a telegraphic address ROSSICASTE CLAPCOM.	
		The Annual Report gave no production informatio
	31 December, Net Profit £6,361, £6,600 dividends paid.	Balance Sheet
1913	ROSS advertised the KEROS camera which was made for Ross by KERSHAW	
	6 February, John STUART's wife Mary Ann dies.	She was buried in Ardingly Churchyard.
	1 April to 31 March 1914, ROSS Ltd. received orders from the Army for : 175 Prismatic No 3 Mk I Binoculars @ £3-12-6 each, 74 Prismatic No 2 Mk II Binoculars @ £4-10-0 each. 592 Prismatic No 3 Mk II @ £3-17-6 each. 204 Dial Sights No 7 @ £37-7-4 each.	N.A. WO 395/1- 6 A total of 3082 binoculars were purchased by the Director of Army Contracts. This was the last Director's Report unt6il the year ending 31-3-1921

	23 December, J.STUART and J.W.HASSELKUS apply for a patent for a camera lens of four elements.	Patent 29,636 of 1913
		The Annual Report gave no production details
	31 December, Net Profit £7,021, £6,600 dividends paid.	Balance Sheet
1914	1 January, the Registered Office of ROSS LTd changed to 3 Northside , Clapham Common, London SW.	Stock Exchange Records, Guildhall Library City of London
	28 July, World War One Commences.	
	There were only four makers of prismatic binoculars, ROSS Ltd. Aitchison Ltd, W.Watson and Sons Ltd and Carl Zeiss (London) Ltd. Only small quantities had been produced, largely because it was easy to import from the continent and sell the goods as being of their own make.	Ministry of Munitions History Aitchison owned Wray (Optical Works) Ltd. Barton Linnard Ltd were also making binoculars including the Minim.
	39% of manufacturing time was occupied by production of the lenses and prisms, 31% on the mechanical parts, 27% on assembly and adjustment and 3% on bronzing, enamelling and engraving. *Many firms lacked suitable machinery and the Ministry encouraged and subsidised the aquisition of such equipment during the war. Most were dependent on imported screws (mainly from Switzerland) Out of about 190 firms there were only 5/6 men capable of optical computing and 12 who could undertake original optical design. The formulae of the more important German glasses was unknown and much work had to be undertaken to work out new formulae.*	Originally the final assembly and adjustment was carried out by one skilled worker who was expecte to complete 10/11 binoculars a week. Later most of the assembly was done by unskilled workers and production rates increased.
	19 August, ROSS receive a contract for 18 Stereoscopic Telescopes and 18 Stands.	N.A. MUN 5/131, not delivered by 1 July 1915
	21 August, ROSS receive a contract for 150 Dial Sights No 7 Mk II	N.A. MUN 5/131, all delivered by 23 June 1915
	22 August, ROSS receive a contract for 420 Signalling Telescopes.	N.A. MUN 5/131, all delivered by 1 July 1915

	For 810 No 2 Mk II Prismatic Binoculars, For 1,350 No 3 Mk I Prismatic Binoculars, of which 100 were to be graticuled and for 451 ' Lumina ' Prismatic Binoculars.	594 delivered by 30 June 1915. 1,010 delivered by 30 June 1915 451 delivered by 30 June 1915
	1 September, ROSS receive a contract for 50 Dial Sights No 7 Mk II.	N.A. MUN 5/131, 47 delivered by 23 June 1915.
	26 September, ROSS receive a contract for 4 Stereoscopic Telescopes and 2 Stands.	N.A. MUN 4/745 and MUN 5/131
	20 October, ROSS receive a contract for 25 stereoscopic telescopes and stands.	N.A. MUN 4/745
	12 November, ROSS receive a contract for 500 Signalling Telescopes	N.A. MUN 5/131 All delivered by 1 July 1915
	17 November, ROSS receive a contract for 42 stereoscopic telescopes and 40 stands.	N.A. MUN 4/745 and MUN 5/131, all delivered by July 1, 1915
	19 November, J.STUART and J.W.HASSELKUS apply for a patent for improvements in telescopes based on patents 4835 of 1888 and 21120 of 1903.	Patent 22,766 of 1914
	24 November, ROSS receive a contract for 7 Stereoscopic Telescopes and 5 Stands.	N.A. MUN 5/131 None delivered by 1 July 1915
	16 December, Carl Zeiss (London) Ltd. receive a contract for 1,000 No 3 Mk I Prismatic Binoculars.	N.A. MUN 4/745
	27 December, ROSS receive a contract for 150 Dial Sights No 7 Mk II	N.A. MUN 5/131 5 delivered by 23 June 1915
		The Annual Report gave no production details
	31 December, Net Profit £7,827, £7,800 dividfends paid.	Balance Sheet
1915	The properties owned by ROSS Ltd included numbers 2,3 and 4 Northside Clapham Common and 35 Macaulay Road. J.STUART the Managing Director moved out prior to the demolition	Local History Unit

of 2 and 3 to make way for a new building.

17 January, ROSS receive a contract for 50 Variable Power Telescopes and cases.	N.A. MUN 5/131 Nil delivered by 1 July 1915
19 January, ROSS receive a contract for 350 Dial Dights No 7 Mk II	N.A. MUN 5/131, nil delivered by 23 June 1915
27 January, ROSS receive a contract for 50 10 X 14 inch Trench Periscopes.	N.A. MUN 5/131, All delivered by 1 July 1915
9 February, Heath and Co. of Observatory Works, Crayford, Kent receive a contract for 500 Prismatic binoculars.	N.A. MUN 4/745
11 March, ROSS receive a contract for 800 No 2 Mk II Prismatic Binoculars w/o cases and 800 No 3 Mk I Prismatic Binoculars w/o cases.	N.A. MUN 5/131, none delivered by 30 June 1915
9 June, the Ministry of Munitions was formed to ensure that the production of war materials was carried out efficiently. The Optical Munitions and Glassware department dealt with the supply of all optical instruments. The Ministry had statutory powers to Control firms considered essential under Control. *The Ministry found that the British precision instrument industry was (particularly compared to that in Germany), inefficient. Many of the firms were small and relied on craftsmen rather than machinery. The annual value of outputs did not exceed £250,000. Before the War 60% of optical glass came from Germany, 30% from France and only 10% from the United Kingdom (Chance Brothers).* *The trade believed that it needed men with several years training to produce a prism. A.Hilger produced prisms for such firms as ROSS Ltd, R. and J. Beck Ltd. and Barr and Stroud Ltd.*	By the end of the War the value was around £5,000,000. In 1914 Chance Brothers produced 1000 Lbs of optical glass per month. By 1918 it w over 14,000 lbs per month. By 1919 using machinery semi-skilled workers could produce a prism in 30 minutes. At the end of the War about 1400 persons of whic 340 were female were engaged on lens and prism making. Wages for male workers rose from£2-0-7 in December 1914 to £3-17-9 by December 1918. Women were paid at lower rates.

15 June, ROSS a Mr McGILCHRIST OF ROSS Ltd. wrote to a Mr. SAMUELS at the War Office on the subject of faults found in optical glass supplied by Chance Brothers.	N.A. BT 66/1
22 June, W.Watson and Sons Ltd. receive a contract for 2,000 No 3 Prismatic Binoculars with cases.	N.A. MUN 4/745
28 June, ROSS receive a contract for 525 No 7 Dial Sights, later increased to 531.	N.A. MUN 4/745
At the end of July the Directors of ROSS Ltd. visited the Ministry of Munitions asking not to be placed on the Controlled List. They said that if they were put upon the Controlled List thay would have to look at matters from an entirely new stand point and that as an old family concern devoting their entire output to Government purposes they would resent being put upon it. The Optical Munitions Department was about to invest £25,000 in extending ROSS's factory to build special Dial Sights which were in short supply.	N.A. MUN 4/55 The Optical Munitions and Glassware Departmen supported Ross's request and the War Office whi wanted all firms put on the Controlled List agreed to a delay. The manufacturers realised that the expansion imposed during the War would make their firms unviable at the end of the War.
11 August, ROSS receive a contract for 2,000 No 7 Dial Sights. Later 142 to be modified to Russian requirements.	MUN 4/745
4 September, Bellingham and Stanley of 71 Hornsey Rise, N 19 receive a contract for Prismatic Binoculars. By 31-3-1917 145 had been delivered and 780 were due.	N.A. MUN 4/745
29 September, ROSS receive a contract for 1,500 10 X 14 inch Periscopes. (By 31-3-1917 1258 had been delivered.)	N.A. MUN 4/745
During the Autumn supplies of binoculars from British makers was so low the Ministry of Munitions entered into negotiations (via Swiss intermediaries) with Germany for binoculars in return for rubber. The Germans offered immediate supply of 16000 to 20000 prismatic and 10000 to 12000 non prismatic binoculars followed by regular	The Official History of the Ministry of Munitions Vc

	monthly supplies of 20000 to 30000 prismatic and 5000 non prismatic binoculars and up to 10000 telescopes. British production increased and the negotiations ended.	
	18 October, a contract was issued for 20,000 binoculars to Bausch and Lomb.	N.A. 4/745
	30 October, J.W. HASSELKUS and other optical representatives meet with the Optical Munitions Department to discuss complaints about the glass supplied by Chance Brothers. Barr and Stroud and Adam Hilger claim the fault is a lack of homogenity. ROSS Ltd and R.and J. Beck blame faulty annealing. HASSELKUS provides experimental evidence. ROSS continue work on testing Chance's glass.	N.A. MUN 4/5006
	12 November, W.Watson and Sons Ltd. receive contracts for 500 No 2 Mk I and 5,000 No 3 Mk I Binoculars with cases	N.A. MUN 4/745
	20 December, Aitchison and Co. receive a contract for No 3 Prismatic Binoculars. 1970 delivered by 31-3-1917.	N.A. MUN 4/745
	23 December, ROSS receive a contract for 200 Telemeter Art. Prismatic Telescopes, order increased to 500. (By 31-3-1917 1,934 delivered ?).	N.A. MUN 4/745
	23 December, R and J Beck Ltd. receive a contract for 2,500 No 2 Mk I Binoculars. 80 were delivered, the contract was cancelled.	N.A. MUN 4/745
	By the end opf the year ROSS had submitted plans for extending their factory.	M.E.W.Williams, The Precision Makers
		The Annual Report gave no production informatio
	31 December, Net Profit £10,335, £9,000 dividends paid.	balance Sheets
1916	12 January, a contract for 1,300 No 2 Mk I binoculars at £5-11-6 each. One for 1,700 No 3 Mk I binoculars without cases at £4-12-6 each,	N.A. MUN 4/5006, 5307 and 5308 The contracts listed for the War years and taken

later reduced to 1,436. Also a contract for graticuling No 3 Mk I binoculars. Many of the No 2 Mk I's went to Sherwood and Co. for graticuling.	from the above files are only a portion of the total Many contracts were amended or reduced later. N.A. MUN 5/131
By 13 January the War Office had its way and ROSS Ltd. had been placed on the Controlled List.	N.A. MUN 4/55 Carl Zeiss (London) Ltd., Barr and Stroud Ltd. a Newton and Wright Ltd were also Listed at this ti The other optical fims were added to the List duri the year.
24 January, E.R.Watts and Son Ltd. receive a contract for 1,000 Weiss Pattern Prismatic Binoculars.	N.A. MUN 4/745 They appear to be of Zeiss type construction with centre focussing. Weiss Instruments Co of Denver ?
15 February, The Ministry of Munitions ordered 5000 Gundlach Manhattan prismatic binoculars from the U.S.A.	N.A. MUN 5/312 By 27 December 1917 4414 had been delivered
A new building with an impressive facade was built on the Clapham site. Noteworthy for its construction during the war as part of the Government's attempt to cultivate key industries previously dominated by Germany.	Local History Unit The building still stands as at 2010 The old factory buildings were being demolished in April 2010.
R.S.WHIPPLE representing the Ministry of Munitions went to America seeking supplies of optical munitions. He was unsuccessful. The only contracts entered into were for prismatic binoculars from Bausch and Lomb and from Crown Optical Company.	The Official History of the Ministry of Munitions Vo On receipt in the U.K. the binoculars did not meet with approval and the contracts were ended.
April, ROSS Ltd. and other firms encouraged by the Government joined the British Optical Instrument Makers Association.	M.E.W.Williams, The Precision Makers
April, ROSS were engaged on making 375 Dial Sights for the Russian Government. Owing to a misunderstanding the sights were not graduated to the Russian specifications. They had to be re-graduated, interfering with other work on Dial Sights.	N.A. MUN 4/5006

25 May, Theodore Hamblin Ltd (Precision Optical Co. Ltd.) 5 Wigmore Street, W 1 receive a contract for 2,000 No 2 Prismatic Binoculars. By 31-3-1917 13 had been delivered.	N.A. MUN 4/745
27 May, ROSS receive a contract for 250 Variable Power No 2 Telescopes with leather end caps.	N./A. MUN 4/745
31 May, ROSS receive a contract for Spare Parts for Dial Sights worth £1004.	N.A. MUN 45006, 5307 and 5308
31 May, Heath and Co. receive a contract for 2,000 No 2 Prismatic Binoculars, By 31-3- 1917 179 delivered.	N.A. MUN 4/745
9 June, Dollond an Co. receive a contract for 1,500 Prismatic Binoculars and 266 Galilean Binoculars. By 31-3-1917 899 prismatic delivered.	N.A. MUN 4/745
June, £2000 was awarded to A.Kershaw and Sons Ltd to set up a production line for prismatic binoculars.	The Official History of the Ministry of Munitions Vc
15 June, A.Kershaw and Sons Ltd. receive a contract for 25,000 prismatic binoculars.	N.A. MUN 4/745
27 June, Heath and Co. receive a contract for 427 Type 4044 Prismatic Binoculars.	N.A. MUN 4/745
July, ROSS Ltd. to attend a conference with Optical Munitions Department to settle the financial terms for a monocular.	N.A. MUN 4/5006
17 July, ROSS receive a contract for 292 2.5X Telescopes.	N.A. MUN 4/2573
26 July, ROSS receive a contract for 72 No 14 Trench Periscopes with screw attachment and 25 screws, carrying ball socket.	N.A. MUN 4/745
28 July, J. Brimfield and Co. of Berwick House, Oak Lane, East Finchley, N 2. receive a contract for No 3 Mk I Prismatic Binoculars. The number due was 5,000, by 31-3-1917 518 had been delivered.	N.A. MUN 4/745

31 July, ROSS receive a contract for 48 Moderating Lenses for Steroscopic Telescopes.	N.A. MUN 4/745
18 August, a continuous contract to the Zeiss works Mill Hill for fitting graticules to binoculars. Factory bought by ROSS in June 1917.	N.A. MUN 4/5006, 5307 and 5308
21 August, Barr and Stroud Ltd receive a contract for 120,000 Prisms initally at 1,500 per week rising to 6,000 by 1-1-1917.	N.A. MUN 4/745 The Company had its own glass foundry, they did not make binoculars until after the war.
21 August, Chance Brothers receive a contract for 120,000 moulded prisms for No 3 Mk I Binoculars.	N.A. MUN 4/745
21 August, the Crown Optical Company receive an order for 10,000 binoculars. 37 delivered by 31-3-1917.	N.A. MUN 4/745
30 August, ROSS recerive a contract for Spares for Dial Sights. Not delivered by 29-12-1917. Contract cancelled.	N.A. MUN 4/5006, 5307 and 5308
5 September, ROSS receive a continuous contract for No 7 Dial Sights at £48-10-6 each. By 6-1-1919 3,512 had been delivered and 780 were outstanding.. The contract was cancelled without compensation.	N.A. MUN 4/5006, 5307 and 5308
12 September, ROSS receive a contract for 144 screws for Ebonite eyecups.	N.A. MUN 4/745
26 September, ROSS receive a contract for 144 Caps for Object Glass for No 1 Variable Power Telescopes.	N.A. MUN 4/745
12 November, W.Watson and sons ltd. receive a contract for 2,500 No 3 Mk I and 300 No 2 Mk I Binoculars in cases.	N.A. MUN 4/745
16 October, ROSS receive a contract for 5 pairs of object glasses 6" focus, 1" diameter and 5 pairs of prisms length 1.45", width 0.7".	N.A. MUN 4/745
25 October,ROSS receive a contract for 144 Telescopes for Artillery	N.A. MUN 4/745

	Telemeter Mk IV.	
	31 October, The High Court issued a Winding Up Order to the Board of Trade in respect of Carl Zeiss (London) Ltd. under the terms of the Trading with the Enemy (Amendment) Act 1916.	
	November, ROSS reported receiving a consignment of faulty glass from Chance Brothers.	N.A. MUN 4/5006
	21 November, a contract for 400 Dial Sights at £50 each.	N.A. MUN 4/5307 and 5308
	4 December, ROSS receive a contract for 25 8.5" F4.5 XPRES Lenses	N.A. MUN 4/745
	5 December, ROSS receive contracts for 346 3X - 9X Telescopes,414 3X Telescopes and 134 2.5X Telescopes for the Admiralty.	N.A. MUN 4/2573
	15 December, ROSS receive a contract for ten 10 foot Periscopes. None had been delivered by 31-3-1917.	N.A. MUN 4/745
	December, Barr and Stroud have completed their extension and have machinery for producing large quantities of binocular prisms. Output will eventually be up to 500 per week.	N.A. MUN 4/5006
	December, 6 set of apparatus from Paris are sent to Kershaw to assist in setting up test equipment for binoculars.	N.A. MUN 4/5006
	ROSS Ltd. is visited by the Optical Munitions Department to view their methods of manufacture and testing.	N.A. MUN 4/5006
	31 December, Net Profit £9,360, £9,000 dividends paid.	The Annual Report only noted that the Factory wa under the control of the Ministry of Munitions for tl whole year.
1917	Directory wording amended to; ROSS LIMITED, opticians, by appointment to His Majesty the King manufacturers of microscopes & telescopes, prismatic binoculars, periscopes, photographic lenses & apparatus,	Kelly's Directory 1917 The first entry for prismatic binoculars, the last for microscopes.

spectacles, race & opera glasses etc. Gold medals and highest awards at all great international exhibitions.

January, representatives from the Optical Munitions Department visited ROSS to view a large Ottway prism. It was noted that the workshop was ready to manufacture an auto-collimating telescope for the examination of prisms. By the end of January ROSS had been successful after 3 months computational work in adapting their XPRES lens to cover a 5 X 4 inch plate as required by the Aeronautical Department.	N.A. MUN 4/5006
January, Adam Hilger submitted a sample set of binocular prisms, the performance was not satisfactory. They were also having problems with eyepiece lenses for binoculars.	N.A. MUN 4/5006
12 January, ROSS receive a contract for 26 8.5" XPRES Lenses and 125 10" F4.5 Lenses. 66 delivered by 31-3-1917.	N.A. MUN 4/745
25 January, ROSS receive a contract for 6 sets of Projection Apparatus XPRES Lenses, 6 sets Projection Apparatus Homocentric Lenses.	N.A. MUN 4/745
29 January, ROSS receive a contract for 144 No 2 Binoculars.	N.A. MUN 4/745
February, Kershaw return prisms to Barr and Stroud.	N.A. MUN 4/5006 It is noted that there is a general problem in obtaining good quality optical sets for binoculars.
March, work started on a new factory in Derby to produce optical glass.	The Official History of the Ministry of Munitions,Vc
March, prisms made by Chance Brothers were sent for testing. All yielded different results.	N.A. MUN 4/5006
8 March, ROSS received two contracts for Spares for Dial Sights and one for 1,400 Mk I 1,400 Neutral Lenses for Telescopes at £0-5-0 each. 795 delivered by 29-12-17. 28-1-1919 contract cancelled without compensation.	N.A. MUN 4/5307 and 5308

12 March, ROSS receive a contract for one stand for a steroscopic Telescope.	N.A. MUN 4/745
16 March, ROSS receive a contract for ten No 7 Dial Sights Mk II.	N.A. MUN 4/745
21 March, ROSS receive a contract for 500 No 14 Trench Periscopes at £14-10-0 each. 301 delivered by 29-12-1917.	N.A. MUN 4/5307 and 5308
23 March, ROSS receive a contract for 125 Stereoscopic Telelscopes Hinged Mk I.	N.A. MUN 4/745
May, a set of binocular lenses from T. Cooke and Sons supplied to Kershaw gave an improvement over those supplied by Taylor, Taylor Hobson. Kershaw's own lenses were considered , remarkably good.	N.A. MUN 4/5006
May, the Optical Munitions Department set up a trial of brass binocular bodies owing to the shortage of aluminium.	N.A. MUN 4/5006 The firm of W.Watson and sons Ltd undertook thi and obtained a patent for a'drawn' body.
8 May, ROSS received a contract for Spare Parts for Dial Sights for £602. Not delivered by 29-12-1917 contract cancelled.	N.A. MUN 4/5307 and 5308
14 May, the Ministry of Munitions ordered 10000 prismatic binoculars made by the Crown Optical Company inthe U.S.A.	N.A. MUN 5/312 By 27 December 1917 2790 had been delivered.
17 May, ROSS receive a contract for 400 10" XPRES F4.5 Lenses at £13-3-6. By 6-1-1919 289 delivered, contract to be completed by the delivery of 300 by 31-5-1919. Also 200 8.5" XPRES F4.5 Lenses at £8-14-0 each. To be completed by 31-5-1919.	N.A. MUN 4/5307 and 5308 ROSS received £250 in compensation.
22 May, ROSS receive a contract for 300 No I graticuled Variable Power Telescopes at £13 each. By 29-12-1917 200 delivered.	N.A. MUN 4/5307 and 5308
23 May, ROSS receive contracts for 400 3X - 9X Telescopes and 675 3X - 9X Telescopes for the Admiralty.	N.A. MUN 4/2573. The contracts were at different prices.

28 June, optical equipment obtained up to this date included 6463 Prismatic Binoculars,13554 Galilean Binoculars, 2986 Telescopes and 583 Periscopes.	N.A. MUN 4/5006
13 June, ROSS LTD purchased from the Controller appointed by the Board of Trade the assets of Carl Zeiss (London) Ltd. including a factory in Bittacy Road, Mill Hill and premises at 13 and 14 Great Castle Street, London W. Great Castle Street was occupied until 1936. ROSS Ltd also took over any Ministry contracts that Zeiss had obtained during the previous 3 years. ROSS installed a Mr GILCHRIST as Manager at Great Castle St.	N.A. MUN 4/4084 Letter from Ross Ltd. dated 13 July 1917
W.E. 12 July, a meeting at Clapham between J.W. HASSELKUS and Ministry of Munitions Officials including Professor Sir. H.JACKSON. Mr. HASSELKUS stated that at the Mill Hill Works binoculars from W.Watson and Sons Ltd were being graticuled alongside their own production. On inspection at Woolwich more of the Watson binoculars were being rejected than the ROSS becuse of deposits on the graticule. Professor JACKSON suggested that weak acid bath after polishing was probably the best way to deal with the problem. (Barr and Stroud did this and Kershaw's binoculars had been free of complaint.) Mr. HASSELKUS said that it was the hygroscopic nature of the glass that was responsible for some of the trouble and showed them a prism taken from a binocular rejected at Woolwich. He stated it was possible to detect a deposit with a crystalline structure. The Officials were not convinced.	N.A. MUN 4/5006
13 July, ROSS receive a contract for 50 No 7 Dial Sights at £50 each.	N.A. MUN 4/5307
17 July, ROSS LTD. write to Ministry of Munitions advising of purchase of Carl Zeiss (London) Ltd. Requested that invoices for work at Mill Hill be kept separate from those at Clapham.	N.A. MUN 4/084
W.E. 16 August, Binoculars for the Admiralty held up by a shortage of eyecups.	N.A. MUN 4/5006

Telescopic Gunsights for the Admiralty submitted by ROSS LTD. and Ottway Ltd. The Ottway was considered the better optically. However the ROSS version was designed with a view to simplicity of optical construction, using only two types of easily obtainable glass, A Ministry inspection of work on telescopes for the Admiralty was prevented by a Manager. ROSS were officially instructed to allow inspections on work in progress. An inspection was carried out on the new factory extension, being equipped with two binocular workshops.	
W.E. 24 August, J.W.HASSELKUS visited the Ministry of Munitions to discuss 'dilution' , the practice of replaced skilled men with untrained workers, often female. ROSS feared difficulties with the Unions over rates of pay. The Ministry suggested trying to achieve a compromise as had been already done with one of ROSS's female glass works. The Ministry supported ROSS's application for an exemption from call up for a man engaged on turning eyepieces.	N.A. MUN 4/5006
W.E. 31 August, ROSS submitted sample of prisms which had been polished but not fitted into instruments. They were showing signs of detioration.	N.A. MUN 4/5006
W.E. 6 September, the Mill Hill Works now owned by ROSS were visited by Ministry Inspectors. They were impressed with the general enthusiasm of the staff who were increasing their output . Now producing 75 binoculars a week. Any increase is dependant on the supplies of optical glass, of alumium bodies sent from France and of covered bodies from Silvertown. More machinery was needed. The Ministry supported a claim for exemption regarding a lens worker.	N.A. MUN 4/5006 The supplies of vulcanised bodies from Silvertow were being investigated by the Ministry
21 September, ROSS receive a contract for 125 Mk I Stereoscopic Telescopes, hinged in wood cases at £35 each. 112 delivered by 6-1-1919, contract to be finished by 28-2-1919.	N.A. MUN 4/5307 and 5308
W.E. 28 September, ROSS delivering 2.5X telescopes at 20 per fortnight, variable power, 3X - 9X telescopes at 25 per fortnight and 3X telescopes at 10 per week. Binocular deliveries are uncertain	N.A. MUN 4/5006

because of a shortage of eyecups. There are 300 awaiting eyecups. It was hoped eyecups from A.H.Clackson Ltd would arrive soon.	
6 October, the Ministry visited ROSS at Clapham to view work on a new mess room and packing shed. ROSS have got out plans for a workshop to build 8X Naval telescopes. They are negotiating for a site.	N.A. MUN 4/5006
9 October, ROSS receive a contract for 30 Ten foot Periscopes at £40 each. Not delivered by 29-12-1917.	N.A. MUN 4/5307
W.E. 11 October, ROSS still unable to make deliveries of binoculars No.2, No. 3 and for the Admiralty owing to lack of eyecups. A further 25 or 50 3X - 9X telescopes probably next week and 25 other telescopes contingent upon supplies of wooden cases. 156 No 14 Periscopes delivered to date, a falling off due to lack of leather cases, only 15 will be delivered this week. 46 10" and 70 8.5" EXPRES lenses delivered to date. A further 11 10" this week and 12 8.5" next week. There is only enough glass for 13 more 10" lenses, none for 8.5".	N.A. MUN 4/5006
Kershaw delivered 500 No.3 binoculars in the last 3 weeks	N.A. MUN 4/5006 (33% were rejected at Woolwic
16 October, ROSS receive a contract for 500 No 14 Trench Periscopes in leather cases at £15 each. Completed by 6-1-1919.	N.A. MUN 4/5307
W.E. 18 October, ROSS advised that Admiralty now require binoculars to be water tight. Eyecups from the India Rubber and Gutta Percha Co. for ROSS , held up owing to a consignment of bad rubber. A.H. Clackson having trouble getting mouldings from Siemens. *Samples of the Crown Optical Co binoculars were examined. Noted they showed an improvement over earlier samples but the definition on the axis is only moderately good falling away rapidly towards the margin.*	N.A. MUN 4/5006
20 October, ROSS receive a contract for 25 20" F6 AERO Lenses at £27-10-0 each. Completed by 6-1-1919.	N.A. MUN 4/5307 and 5308
22 October, ROSS receive a contract for 1,200 Graticules for No 2	N.A. MUN 4/5307 and 5308

Telescopes at £1-5-0 each. 731 delivered by 31-1-1919. Cancelled.	ROSS received £120 compensation.
W.E. 25 October, Sir H.JACKSON visits ROSS LTD. regarding the filming noted on the polished surfaces of lenses and prisms. ROSS produced evidence that certain types of glass are much more susceptible to atmospheric influences than others. Professor JACKSON has modified his earlier views.	N.A. MUN 4/5006
W.Watson and Sons Ltd. delivering 150 binoculars a week	N.A. MUN 4/5006
26 October, ROSS receive a contract for 6 Lenses worth £85. Not delivered by 29-12-1917.	N.A. MUN 4/5307 and 5308
27 October, ROSS receive a contract for 2 Collimating Lenses at £15 each	N.A. MUN 4/5307 and 5308
6 November, ROSS receive a contract for six 6" TESSAR Lenses at £6-10-0 each.	N.A. MUN 4/5307 and 5308
W.E. 8 November, ROSS not yet able to make their Admiralty binoculars water tight without closing down their production line. Ministry decide loss of production outweighs need for sealing. Binocular deliveries at 75 per week, 2.5X telescopes at 60 per week, variable power at 50 per week and high angle 3X at 30 per week. A Foreman discharged a workman for alleged bad workmanship. A Manager dismissed a man who was ready to leave a few minutes before the normal time. About 150 engineers downed tools on Monday afternoon alleging victimisation of the former, who had been with ROSS for 4.5 years without a previous complaint. The work complained had been allowed to lie unexamined for a month. It was alaso alleged bad language had been used. Mr. STEVEN from the Ministry attended. He asked the men to return to work at once and he would investigate with the help of the Amalgamated Society of Engineers. The men had not returned by Tuesday morning and the glass workers and instrument makers had also come out on strike, about 550 staff. Mr STEVEN met with Mr DUDLEY of the Union. They arranged that the workers should	

return to work by 4 o'clock. The worker sacked for going early should be reinstated, the other man was to have his work inspected by the Union representative and Mr. STEVEN. His discharge to be withdrawn pending the result of the examination.
The Ministry felt that the ROSS Management was at fault. They wrote to ROSS advising on amended procedures.

21 November, ROSS receive a contract for 264 No 3 Mk II Binoculars at £5-5-0 each. This was the balance of an amended contract of 12-1-1916. — N.A.. MUN 4/5307 and 5308

W.E. 22 November, Mr.HASSELKUS visited Blythe to inspect a submarine periscope. He was shown two types. — N.A. MUN 4/5006
Mr PEDDLE of Derby Crown Glass Co. visited the ROSS works at Clapham to examine the periscope there. Mr. HASSELKUS showed to him various types of optical glass of continental and U.K. manufacture. ROSS have lent to Chance Brothers a Polariscope. They are not using it. It could be returned and sold to Derby Crown Glass Co.

24 November, ROSS receive a contract for 14 6" TESSAR Lenses at £6-10-0 each. — N.A. MUN 4/5307 and 5308

W.E. 29 November, ROSS submitted drawings for a giant periscope to the Ministry of Munitions. — N.A. MUN 4/5006

30 November, Ministry Officials visit ROSS at Clapham to check on the progress of the new workshop for 8 power telescopes. — N.A. MUN 4/5006

W.E. 6 December, the worker involved in the strike at Clapham in November for alleged bad work has left ROSS of his own accord. — N.A. MUN 4/5006
The Ministry memo now calls him an agitator.
There was a meeting between Mr HASSELKUS, Professor Sir H. JACKSON, Mr LAMPLOUGH of Chance Brothers and Ministry Officials to discuss supplies of glass for the lenses of rangefinders. It was agreed the glass should be supplied in circular plano slabs polished both sides.

12 December, ROSS receive a contract for 6,000 Admiralty Pattern 343 Binoculars (6 X 30) at £7-15-0 each By 6-1-1919 4,020 delivered 21-2-1919 the contract is cancelled, later ROSS received £2,000 compensation.	N.A. MUN 4/5308 and 5308 Some of these binoculars had radium spots on th graticules.
W.E. 13 December, ROSS have delivered 54 No.3 binoculars per week for the last 10 weeks. 75 will be delivered this week and output should rise to 80 per week in 2/3 months time. 1336 Admiralty binoculars have ben supplied of which 213 are under inspection. 285 were delivered during the last 4 weeks. Eyecups are coming in from A.H. Clackson. 203 2.5X telescopes delivered to date, but only 30 in the last month. 129 variable power 3X - 9X, illuminated delivered to date, 25 last month, 75 non-illuminated delivered to date, 25 last month. ROSS having trouble with the lubricant grease for focussing mechanisms. ROSS have a few polishing spindles not fully occupied, could be used for prisms or graticule glass. They could increase the output of binocular prisms by about 50%. ROSS submit 4 samples of 8X Gunsight telescopes, considered generally satisfactory. *A sample of the Gundlach Manhattan prismatic binocular was examined by the Ministry. Definition was fairly good over half of the field. Colour correction was poor, there were traces of astigmatism and the prisms were not correctly adjusted.*	N.A. MUN 4/5006
W.E. 17 December, At the ROSS Mill Hill works following the publication of a resolution passed by the local branch of the Tool |Makers Society. (That the Government was to take steps for an immediate peace.). The man who posted the notice was dismissed by the manager. The manager was a man of German origin who strong exception to the notice and reacted. There was talk of a strike. Mr HASSELKUS and Mr STEVEN of the Ministry attended Mill Hill and met with the unions and discussed the situation. It was agreed to reinstate the worker but there was to be no more peace propaganda.	N.A. MUN 4/5006
20 December, ROSS received two contracts, one for 9 Homocentric	N.A. MUN 4/5307 and 5308

	F5.6 Lenses at £6 each and one for 10,000 8X Gunsight Telescopes at £10-14-0 each. By 6-1-1919 six had been delivered. The quantity was reduced to 3,000 and there was difficulty in obtaining the lenses. By 31-3-1919 9 delivered, ROSS received £20,000 in compensation.	
	W.E. 27 December, ROSS submit a variable power 5X - 15X telescope with a modified illumination device for the cross hairs.	N.A. MUN 4/5006
	28 December, ROSS receive a contract for 2 Collimating Lenses at £15 each.	N.A. MUN 4/5307 and 5308
	31 December, Net Profit £9,685, £9,000 dividends paid.	The Annual Report noted that the Factory was un the control of the Ministry of Munitions for the whc year. No mention of the Zeiss acquisition.
1918	Directory wording amended to; ROSS LIMITED, opticians by appointment to His Majesty the King manufacturers of telescopes, prism binoculars, periscopes, photographic lenses & apparatus, race & opera glasses etc. Gold medals and highest awards at all great international exhibitions The telephone number for Great Castle Street was CENtral 4007 There were two telephone numbers for the Clapham Common works Battersea 376 and 702.	Kelly's Directory 1918 This was the last entry for 111 New Bond Street.
	January, A. Kershaw and Sons Ltd. to manufacture lenses for prismatic binoculars.	The Official History of The Ministry of Munitions V
	John STUART awarded the C.B.E.	London Gazette 4 January 1918
	W.E. 10 January, delivery of XPRES lenses now at 28 per week, a total of 147 8.5" lenses and 91 10" lenses so far. 12 AERO 20" and 25" lenses delivered to date. ROSS only have glass for another 14 lenses. 1515 No 3 binoculars delivered to date, 185 will be cleared in a few weeks. ROSS is concentrating on the Admiralty contract. 286 binoculars from a new contract delivered at 75 per week. *The National Physical Laboratory has rejected binoculars from ROSS W.Watson and Sons Ltd, the Precision Optical Co. and Heath. The*	N.A. MUN 4/5006

causes are being investigated.
The ROSS Works at Mill Hill are having difficulty in producing satisfactory graticules. Half of those produced have to be thrown away because of faulty glass or bad etching. The engraving machine has been improved. With respect to 8X telescopes glass is received from Clapham in a partly roughed state. They are putting in hand proof plates and awaiting new machinery.

W.E. 17 January, Chance Brothers making blanks for ROSS photographic lenses.	N.A. MUN 4/5006
19 January, ROSS at Mill Hill receive a contract for No 3 Mk II Binoculars. 12-11-1918 the Ministry gave thre weeks notice to end contract. 800 binoculars were completed by 6-1-1919 with 209 rejects to be remedied.18-1-1919 the contract was considerd complete and ROSS received £4,500 compensation.	N.A. MUN 4/5307 and 5308 Note that Mill Hill may be closed by June 1919 in File.
W.E. 7 February, ROSS at Mill complain bitterly of W.Watson and Sons Ltd. binoculars being so made that the graticules inserted by ROSS become flecked with dirt. Suggested that Watson does its own graticuling. ROSS awarded a contract for 30 stereo telescope moderating lenses. Have not finished a previous order for 600.	N.A. MUN 4/5006
9 February, ROSS receive a contract to Graticule 400 ROSS No 2 Mk I Binoculars. By 6-1-1919 399 completed.	N.A. MUN 4/5307 and 5308
11 February, ROSS receive a contract for 75 20" F6 Lenses. By 6-1-1919 59 delivered. 14-1-1919 contract closed, ROSS to receive £335-10-7 compensation.	N.A. MUN 4/5307 and 5308
16 February, ROSS receive a contract for 301 3X Telescopes. By 6-1-1919 256 delivered, balance to be completed in 5/6 weeks.	N.A. MUN 4/5307 and 5308
22 February,ROSS receives two contracts, one for three quantities (675, 277 and 642), of Variable Power, 3X - 9X ,Telescopes for the Admiralty. By 6-1-1919 deliveries were Nil, 227 and 369. By 14-1-1919	N.A. MUN 4/5307 and 5308

it was decided that no more were required. ROSS received £3,450 compensation. The other contract was for six 20" Collimators.	
W.E. 28 February, work on the factory extension at Clapham should be finished by September or October. ROSS provided with details of various melts of glass from Chance Brothers for use on AERO and Triplet lenses. J.W.HASSELKUS hopeful of the result. There was another meeting betewwn Chance Brothers and ROSS at Clapham to exchange views on the controversy on testing methods.	N.A. MUN 4/5006
7 March, ROSS receive a contract for a continuous supply of No 2 Mk II Binoculars. 12-11-1918 Notice was given to end the contract. At 12-2-1919 260 were due for delivery.	N.A. MUN 4/5307 and 5308
13 March, ROSS receive a contract for 30 7 foot 6 inch Periscopes	N.A. MUN 5/131 Order cancelled after 6 deliverec
18 March, ROSS receive a contract for 75 Condenser Cells. By 6-1-1919 4 had been delivered, the contract was to continue.	N.A. MUN 4/5307 and 5308
Also a contract for 100 10X Periscopes with War Office graticules.	N.A. MUN 5/131, nil delivered by 1 July 1915
28 March, ROSS receive a contract for No 2 Mk II Prismatic Binoculars to be delivered at 20 per week.	N.A. MUN 4/2573. It was noted in the file that the Hill Works could not make No 2's.
April, because of shortages in the forces over one hundred of ROSS's workers lost their protection from call up . The Company did not apply .for any exemptions.	The Official History of the Ministry of Munitions, V
W.E. 4 April, ROSS submit 3x - 9X vp Telescopes with modified illumination. They are having difficulty in obtaining supplies of graticule quality glass.	N.A. MUN 4/5006
5 April, ROSS receive a contract for 179 Variable Power, 5X - 15X Telescopes.	N.A. MUN 4/5307 and 5308
W.E. 16 April, an AERO 20" lens was found where the chemical focus had not coincided with the visual focus. Discussions with Chance Brothers to find the cause.	N.A. MUN 4/5006

6 May, ROSS are delivering 50 Dial Sights per week but labour unrest may cause some delay in near future.	N.A. MUN 4/2572
W.E. 7 May, the MILL HILL Works receive castings from a French firm for the Zeiss pattern binoculars. These are not producing powdery deposits as do some coming from Hunsicker Alexis also from France.	N.A. MUN 4/5006 Hunsicker Alexis of Paris made Zeiss Pattern Binoculars.
9 May, ROSS receive a contract for 150 Mk IV Telemeters.	N.A. MUN 4/5307 and 5308
11 May, ROSS receive a contract for 67 6 X 30 Binoculars.	N.A. MUN 4/5307 and 5308
The Derby Crown Glass Company Ltd started small scale production of optical glass.	The Official History of the Ministry of Munitions Vc
W.E. 11 June, Ministry Officials visited the Mill Hill Works. Graticuling work now improved.	N.A. MUN 4/5006
24 June, ROSS receive a contract for 838 Admiralty Pattern 343 Binoculars with radium spots and graticules. By 6-1-1919 165 had been delivered and 328 were awaiting glass. 21-2-1919 Ministry to cancel contract and replace with a Post War contract, total number to be delivered 743 at 20 per week from 1-3-1919.	N.A. MUN 4/5307 and 5308
W.E. 25 June, imported from France were 854 prismatic binoculars and 759 galilean. The total number of binoculars obtained under Orders in Council so far were 6586 prismatic and 14102 galilean.	N.A. MUN 4/5006
2 July, ROSS receive contracts for lenses for 7ft 6in and 10ft periscopes and for the repair of one No 3 Mk II binocular.	N.A. MUN 4/165
W.E. 3 July, the Mill Hill Works are graticuling 50 Variable Power No 2 Telescopes per week. The output of binoculars has been low owing to influenza. Average weekly output for last two months was 46 graticuled Hunsicker and Alexis and 36 Watson. Rejections are down to 7%.	N.A. MUN 4/5006

At Clapham the Ministry noted that the female staff were doing satisfactory work in machine shops on telescopes, periscopes and in the binocular and dial adjusting shops. Work on the 20" F7.5 AERO lenses is proceeding satifactorily. owing to labour troubles output of No 7 Dial Sights is low at 30 to 40 per week. When labour position improves up to 60 per week.
12 of the 7' 6" Periscopes delivered a further 6 at the end of the week. The output of Admiralty Pattern binoculars averaging 16 per week. The first batch of the No 2 binoculars (6 X 30) was in the adjusting shop output will soon be up to 20 per week.
The factory extension will be ready for occupation in August.

W.E. 3 July, imported from France 1406 prismatic binoculars. Total binoculars obtained under Orders in Council, 6586 prismatic and 14102 galilean. N.A. MUN 4/5006

3 July, ROSS receive a contract for 700 2.5X telescopes at £10-15-6 each, delivery at 15 per week from 11 September. N.A. MUN 4/5006

4 July, ROSS receive a contract for one Telemeter , Artillery Mk IV telescope at £2-17-0 for the India Office. Delivery by 11 July. N.A. MUN 4/5006

6 July, ROSS receive a contract for AIRO and TESSAR Lenses. N.A. MUN 5/131

W.E. 9 July, the delay in the erection of ROSS's new factory works is the main reason for the shortage of Naval telescopes. Manufacture of parts well forward, with thousands of parts in stock.
Imported from France were 674 prismatic binoculars and 983 galilean. N.A. MUN 4/5006

13 July, the Department for Optical Munitions noted the following statistics regarding the supply of binoculars during the war. A total of 268313 had been delivered. Of these 141,485 (52.7%) were prismatic. Of these 54,179 (20.1%) were British, 27,533 (10.2%) were American, 52,908 (19.7%) were French plus 6,865 (2.5%) Orders in Council. Galilean types totalled 126,828 (47.2%) made up of 3,008 (1.1%) British, 109,717 (40.8%) French and 14,103 (5.2%) Orders in

This was last time such a detailed breakdown was shown. Thereafter only the total number delivered

Thus the French were the largest suppliers of binoculars contributing 161,825 (60.5%).

Council.	
W.E. 16 July, The India Rubber, Gutta Percha and Telegraph Works Company Ltd. identified as suitable for making india rubber eyecups for ROSS and Kershaw binoculars for the Admiralty. The rubber is keyed to a metal base.	N.A. MUN 4/5006
16 July, ROSS receive a contract for one 6" F4.5 EXPRES lens at £7-10-0.	N.A. MUN 4/5006
19 July, ROSS receive three contracts, one for 10X -20X hinged stereo telescopes at £35-0-0. Delivery 4 every 2 weeks from the end of September and then 4 per week by the end of January 1919. One for 50 20" AERO lenses at £41-10-0 and 50 14" AERO lenses at £22-10-0. Delivery 15 per week . One for 3 Field lenses at £1-5-0 and 2 Projection units at £2-10-0. Delivery on 2 August.	N.A. MUN 4/5006
20 July, ROSS receive a contract for 7 Admiralty prismatic binoculars at £8-13-0. Delivery by 20 November 1918.	N.A. MUN 4/5006
W.E. 23 July, imported from France, 691 prism binoculars and 440 galilean. Total of binoculars obtained under Orders in Council, 15945 prismatic and 24432 galilean.	N.A. MUN 4/5006
Over the period 14 May 1918 to 26 July 1918 69% of binoculars were rejected at testing. The main defect was the filming of lenses and prisms.	N.A. MUN 4/5006
W.E. 30 July, ROSS (and others) learn that the War Office will not authorise the adaptation of the No 7 Dial Sight Mk IV. This despite the fact that suppliers have been making the parts.	N.A. MUN 4/5006
17 August, ROSS receive a contract for 1,000 No 14 Periscopes. By 6-1-1919 43 delivered, 700 in progress. The contract was ended on receipt of the 700. No compensation paid.	N.A. MUN 4/5307 and 5308
23 August, ROSS receive a contract for 100 6" TESSAR F4.5 Lenses.	N.A. MUN 4/5307 and 5308

4 September, ROSS receive a contract for 100 6" F4.5 TESSAR lenses at £6-10-0. Delivery to be 15 per week once an earlier contract is finished.	N.A. MUN 4/5006
9 September, ROSS receive three contracts. One for 36 Periscopes No 14 Mk I eyecups at 3 shillings. One for the repair of one 20" AERO lens with iris diaphragm at £1-10-0. One for ROSS to purchase damaged Dial; Sights at £10 each.6-1-1919 after purchasing 300 ROSS ask for contract to be dropped.	N.A. MUN 4/5006 MUN 4/5307 and 5308
W.E. 10 September, the Derby Crown Glass Co. report on their progress on a new glass mainly for ROSS LTD. *Total binoculars obtained under Orders in Council so far were 6625 prismatic and 14111 galilean.*	N.A. MUN 4/5006
18 September, ROSS receive a contract for continuous graticuling. 6-1-1919 150 delivered and 223 in workshop. Awaits decision .	N.A. MUN 4/5307 and 5308
8 October, ROSS receive a contract for 100 Admiralty Pattern 343A Binoculars. Nil delvered by 6-1-1919. 28-2-1919 contract replaced by a Post War contract for 100 at 15 per week from 30-4-1919.	N.A. MUN 4/5307 and 5308
9 October, ROSS receive a contract for Admiralty Pattern 343A Binoculars with radium spots and graticules. By 6-1-1919 none had been delivered. Inpectors recommend cancellation without compensation.	N.A. MUN 4/5307 and 5308
W.E. 26 October, recently large numbers of finished prisms for binoculars were rejected on account of defective rounding of the ends and lack of symmetry about the plane perpendicular to the hypotenusal face of the prism and through the apex. To get rid of these new jigs had to be made. Now completed it is anticipated that weekly deliveries will be 4000 pairs.	N.A. MUN 4/167
29 October, ROSS receive a contract for 50 10'6" Periscopes at	N.A. MUN 4/5006

£42-10-0 each. Delivery 5 per week from 29 January 1919. Another for 6" Periscopes.	MUN 4/5307 and 5308
30 October, ROSS receive a contract for 23,000 No 2 Mk I Binoculars By 6-1-1919 200 delivered, ROSS claim 700 could be completed.	N.A. MUN 4/5307 and 5308
4 November, ROSS receive a contract for 400 3X Telescope Sights. By 6-1-1919 none delivered, Inspectors recommend 200 be finished without compensation.	N.A. MUN 4/5307 and 5308
W.E. 2 November, the new Leeds factory (Kershaw) will be producing lens sets at the rate of 50 per week soon and will increase to 200 sets per week.	N.A. MUN 4/167
W.E. 9 November, the Optical Munitions Department received a request from the Air Ministry for information on Binoculars which are said to increase the depth of vision under water. Information on polarised light sent.	N.A. MUN 4/167
C. 9 November, ROSS receive a continuous contract for Dial Sights to be delivered at 60 per week. Amended to apply to Mk III's only from 1-2-1919.	N.A. MUN 4/2572
W.E. 16 November, the Optical Munitions department expressed concern at the forthcoming Armistice. *The position of the Scientific Industry is awkward.It has taken 4 years to extend output by 20X. It is doubtful it can resume peace time production without dislocation under 12 months. If existing contracts are terminated within the next 2/3 months something like 50% of the workforce will have to be discharged. e.g. there are two firms engaged on No. 7 Dial Sights. Their factories are laid out for bulk production. Dial Sights take 4 to 5 months to pass through the shop. It means those workers engaged on the initial stages will be discharged immediately. Many firms may go into liquidation.*	N.A. MUN 4/167
19 November, HASSELKUS wrote to the Controller , Optical Munitions Supply regarding the state of contracts for Dial Sights. It was ROSS's	N.A. MUN 4/167

	largest contract involving up to 350 staff. Some 1330 Dial Sights were almost ready and ROSS asked for a further 800 to be assembled they would be delivered at 20 to 25 per week so as to allow gradual re-allocation of the workforce.	
	W.E.30 November, the Optical Munitions department reported that one of the manufacturers submitted a binocular body made of brass The general construction was considered satisfactory. *The French Government refused to immediately cancel orders for binoculars*	N.A. MUN 4/167 N.A. MUN 4/5309 a note in this file identifies W.Watson and son Ltd. as the developer of a bra body produced by a stamping process.
	W.E. 7 December,Optical Munitions received reports from Paris on experiments on spotting objects against different backgrounds by the use of polarising prisms.	N.A. MUN 4/167
	20 December, The Anti Aircraft Searchlight Committee were considering seeking an improved binocular. The No 2 was the best they had. Good reports had been heard of the Zeiss 8 X 40, an example SN 704552 was supplied to the London Electrical Engineers for testing.	N.A. AVIA 7/2769
	December, ROSS consulted by Ministry re converting Dial Sights to Millieme Graduations. Advised would cost £15 per sight.	N.A. MUN 4/2574
	The annual accounts for the years 1916 and 1917 were presented to the shareholders.	The Annual Report noted that the Factory was un the control of the Ministry of Munitions for the whc year.
	31 December, Net Profit £9,041, £9,000 dividends paid.	Balance Sheet
1919	January, Ministry of Munitions Officials carry out a rigorous inspection at ROSS's Clapham Works checking on the state of numerous contracts. In the course of discussions Mr. HASSELKUS tells the Inpectors that the working week has dropped from 60 to 48 hours per week, also piece-work has stopped and claims the men are ' hanging out the job '.	N.A. MUN 4/5308

30 January, HASSELKUS wrote to the Liqidator, Optical Munitions regarding the situation on items rejected by Inspectors and for which the contracts had been cancelled. There had not been time to re-submit the items.	If ROSS could not re-submit there would occur a substantial loss.
27 February, ROSS receive a contract for 384 2.5X Telescopes for the Admiralty.	N.A. MUN 4/2573
28 February, ROSS receive a contract for 200 3X Telescopes for the Admiralty	N.A. MUN 4/2573
13 March, during a discussion on aerial photography there was favourable comment on ROSS's Airo lenses developed during the War from their Xpres lenses. ROSS was able to prodce the F.6 Airo lens using only two types of glass.	Transactions of the Optical Society vol. 20. Major C.W.Gamble ex RAF led the discussion.
C.30 April, ROSS receive a contract for Trench Periscopes.	N.A. MUN 4/2572
John STUART was awarded the C.B.E. with reference to the war effort of ROSS Ltd.	
9 May, minutes of the Anti Aircraft Searchlight Committee refer to experiments carried out at the Imperial College of Science and Technology by L.C. MARTIN on the performance of Night Glasses. A list of the desirable qualities was drawn up, included was not more than 6X magnification, an objective of 45 to 50 mm, the number of glass to air surfaces to be as few as possible with thje prisms cemented. Reference was made ro a Zeiss glass with a 60 mm objective. It was suggested that several firms including ROSS, Ottway, Dollond, Aitchison, Barr and Stroud and Sir H.Grubb should be approached.	N.A., AVIA 7/2769
3 July, The Director of Admiralty Contracts invited binocular makers to submit designs for a night binocular.	W.Reid, Scientific Instrument Society No. 54. The Naval Pattern 6 X 30 had not compared wel to the Zeiss 7 X 50.

9 July,Information received from ROSS Ltd is referred to in the Minutes of the Anti Aircraft Searchlight Committee. The company had received enquiries from the Admiralty for a Night Glass. The Company pointed out that such a binocular would be long and heavy and of limited application. If however a 5 X 35 would be suitable this could be produced in large numbers as there would be also a public demand.	N.A. AVIA 7/2769
24 July, the London Electrical Engineers write to Barr and Stroud, Grubb, Dollond, Ottway and ROSS setting out the basic requirement for a night Glass.	N.A. AVIA 7/2769
31 July, ROSS receive a contract for six Admiralty Pattern 343 (6X 30) fitted with Silvertown Eyeguards incorporating an automatic adjusting bridge.	N.A. MUN 4/2573
19 August, ROSS receive a contract to repair two Periscopes.	N.A. MUN 4/2573
8 September, Sir H. GRUBB writes to the Director of Contracts at the Admiralty advising he is developing an entirely new telescope without prisms.	N.A. AVIA 7/2769 He also writes to the London Electrical Engineers
24 October, Barr and Stroud write to the London Electrical Engineers regarding developing Night Glasses. They advise they do not think it suitable to silver the surfaces of prisms made from Hard Crown glass. Thet suggest using Baryta Light Flint which could increase the field of view and reduce the focal length.	N.A. AVIA 7/2769
ROSS Ltd. with Negretti and Zambra Ltd andE.R.Watt Ltd consider whether to set up a marketing company in Italy.They did not.	M.E.W.Williams, The Precision Makers
BARR and STROUD start making binoculars and offer a 6X night model for consideration.	W.Reid, Barr and Stroud Binoculars and the Roy Navy.
J.H.BARTON applies for a patent for a three piece cemented prism.	Patent 141961, see the Linnard Barton Ltd, Britannic, illustration in Seeger's Military Binoculaı and Telescopes.

	William Watson and Son Ltd claimed to have manufactured 35,000 prismatic binoculars and 5,500 gunsights during the War.	Watson Catalogue
	10 December, ROSS LTD. was amongst several manufacturers of Scientific Instruments to make an Agreement witrh the Unions on pay and hours. The working week would be based on 47 hours. Pay for skilled metal workers, (over 22 and with 5 years experience), 1s. 11d. per hour. For skilled glass workers, (over 22 and 5 years experience), from 1s. 81/2d to 2s. 1d. per hour. Women were to receive 10d. per hour.	N.A. LAB 83/842 This agreement came into force on 1 May 1920. Rates of pay declined over the next few years. By September 1922 women were down to 7d. per ho
	The annual accounts for the years 1918 and 1919 were presented to the shareholders.	The Annual Report gave no production informatio
	By the end of the year the Board of Trade had assumed responsibility for optical munitions.	
	31 December, Net Profit £6,919, £6,600 dividends paid.	Balance Sheet
1920		
	16 January, the London Electrical Engineers write to Dollond and Co. asking if they have a suitable binocular (for anti aircraft work). Dollond reply no but they will be introducing an 8 X 38.	AVIA 7/2769
	20 January, ROSS Ltd deliver a 6 X 50 Night Glass SN 86452 to the London Electrical Engineers for examination.	N.A. AVIA 7/2769
	24 January, Barr and Stroud inform the London Electrical Engineers that they are not working on the Night Glass currently but on a new series of binoculars to be produced immediately as part of their reconstruction programme.	N.A. AVIA 7/2769
	The Company breaks away from a reliance on optical goods and obtains the rights to manufacture a gas heater invented by a Mr WENKEN.	Clapham Observer (the dating is suspect)

The Government releases many binoculars as surplus equipment. Sold at low prices that hit the British makers..

W.Reid, Army Museum Yearbok 1983

Aitchison and Co. bought up all the surplus American prismatic glasses and sold them at prices less than half of those charged by British makers for comparative new binoculars.

Aitchison catalogues 1921.

Sir Charles PARSONS acquires the Derby Crown Glass Company with a view to competing with Chance Brothers.

D.F.Horne, Optical Instruments and their Applications.

ROSS Ltd. advertising occupied 18 pages of The British Journal Almanac. The company announced manufacture had been resumed of cameras and lenses.Four cameras all available in different sizes and finishes. Lenses offered in numerous versions (22 in one case) incuded the Xpres, the Combinable, the Telecentric, the Homocentric, the Rapid Portrait, the Ilex and the Lukos.

Unsurprisingly German lenses were not listed.

June, The Admiralty Research Laboratory announced that the Experimental Optical Branch of the Compass Department was transferred to the Department of Scientific Research and Experiment and removed to the National Physical Laboratory (Teddington) into temporary quarters provided by the Director N.P.L. until such time as the new Admiralty Laboratory is ready. Instructor Commander T.Y. Baker would be in charge. There were 11 other staff including Lt. Col. R.A. Benson representing the War Office, two Assistants, one Optical Computer, two Draughtspersons, one Clerk, three Instrument Makers and one Lab boy. Another Assistant and two more Instrument Makers were to be recruited.

N.A. DSIR 3/276

10 December, an Extraordinary General Meeting of the Company was held. The Capital of the Company was to be increased to a total of £180,000 by the issue of £60,000 new 'A; Ordinary shares. The whole of this issue was taken up by Sir Charles Algernon PARSONS. Holder of 'A' Odinary shares were entitled to nine votes per share.

Sir Charles PARSONS K.C.B.,F.R.G. was a son c the Earl of Rosse. He was famous for the development of turbine engines to power ships ar electrical generators. He also owned the firm of

		Grubb, makers of astronomical telescopes. He moved that company to a location near his engineering works.
	Post War conditions including labour relations meant there was a slump in trade.	Annual Report
	31 December, Net Profit £3,054, £3,000 dividends paid.	Balance Sheet
1921	Directory entry as 1918	Kelly's Directory 1922 Last inclusion of race and opera glasses.
	19 January, ROSS Ltd. write to the London Electrical Engineers to ask about the sample binocular submitted a year previously.	N.A. AVIA 7/2769
	31 January, The London Electrical Engineers reply to ROSS asking to retain the binocular for tests in the spring.	N.A. AVIA 7/2769
	1 February, at a Board Meeting Sir Charles PARSONS was elected to be a Director and Chairman of ROSS Ltd.	He controlled 540,000 votes out of a total of 720,(
	2 February, ROSS write to the London Electrical Engineers, agreeing to the retention but stating the cost on one binocular would be £35 and £23-10-0 for several.	N.A. AVIA 7/2769
	18 February,Mr. E.H. BARTLETT and Mr. A CUNNINGHAM resigned as Directors. They were replaced by John William HASSELKUS and Charles Morrison McGILCHRIST. Mr HASSELKUS was appointed Joint Managing Director with John STUART.	STUART was now 85 years of age.
	During the year The Dictionary of British Scientific Instruments was published by the British Optical Instrment Industry. An organisation of 28 manufacturers including ROSS Ltd. ROSS claimed to be able to supply several hundred different products under several main headings, measuring istruments, surveying equipment, photographic items, microscope accessories,, drawing instruments,telescopes and binoculars.The following were unique to ROSS,An eye speculum	This was essentially a trade catalog advertising what the members could supply after the downtur at the end of the War. Virtually all the members claimed to be able to supply similar goods. The range of items makes it unlikely that members such as ROSS actually made all the items they offered.

an Eclipsarcom (for studying eclipses), a Facio Meter (measures the face for fitting spectacles), a Fighting Map board ,Freezing Apparatus, A Maxim Fire Director and Protractor, the Burroughs Adding Machine and a Calligraph (Writing machine).

8 March, T.Y.BAKER of the Admiralty Research Laboratory writes to the Secretary of the Royal Engineers Board..
I have to inform you that no definite reports of Mssrs ROSS Prismatic Binocular are yet available as the Admiralty desire to carry out comparative trials between the ROSS glass and similar instruments from Messrs Barr and Stroud and Sir howard Grubb. The two last mentioned have not yet submitted their sample instruments.
A cursory examination of the ROSS binocular shewed that it had a fair sized field and good light gathering pwers but it was very big and heavy. I understand the firm have proposed to make another pair in which the overall length will be cut down with probably a loss of definition at the edge of the field.

For the year ending 31 March the Director of Army Contracts reported the purchase of 3 Stereoscopic Telescopes No 1 Mk 1A from ROSS Ltd, 17 Sighting Telescops from W.Ottway and Co. Ltd and 256 Prismatic Binoculars from A. Kershaw and Son Ltd.

N.A. WO 595/4-6
No further purchases of binoculars were recorded until the year ending 31-3-1927.

31 March, The Ministry of Munitions was formally wound up under the terms of The Cessation Act.

26 April, T.Y.Baker of the Admiralty Research Laboratory wrote to J. HASSELKUS requesting his attendance at a meeting of the Optical Society in Cambridge on 21 May. The subject to be, The Future of Geometrical Optics.

N.A. ADM 212/85
Baker contacted many persons in the optical instrument industry.

21 May, J.W.HASSELKUS contributed to a discussion on the possible improvements in lens design.

Transactions of the Optical Society Vol. 22. The main speaker was Commander T.Y.Baker
Baker delivered an address on the subject of improving lens design. He stated that the present method of tracing rays through the various glass was cumbrous involving several thousand

	calculations which even an expert could only do a six an hour. He claimed that an algebraic method was needed. N.A. ADM 212/80
Amalgamated Photographic Manufacturers Ltd formed with its Registered Office at 3 Soho Square. The main subsidiaries were A.Kershaw and Son Ltd and Marion and Co. ROSS supplied lenses to them.	N.Channing and M.Dunn, British Camera Makers
22 June, J.HASSELKUS , with other trade representatives, attended a Conference on Optical intruments where representatives of the Armed forces put foward their requirements and the manufacturers responded. T.Y.BAKER (Admiralty) set out the requirements for an improved Officer of the Watch telescope.. HASSELKUS stated that the problem was largely of cost and complexity and gave details.	N.A. ADFM 212/77 As a result of the Conference a more detailed specification was drawn up for a telescope.
16 August, The National Physical Laboratory completed a Report on testing binoculars submitted for the Admiralty trials. They included a ROSS 6.25 X 50, a Barr and Stroud C.F. 12 6.5 X 48, two Kershaw monoculars and a ROSS Admiralty Pattern 343, 6 X 30 which was the standard Naval glass.	N.A. ADM 212/84 There are no papers between 1922 and 1926 in the file.
The Kershaw monoculars were the least successful. The ROSS was described as a good glass but had defects. The glass was noted as having a green tinge. There was aberration near the edge of the field fringed with green. I t was a bulky design and clumsy to hold. There was no central stem so it could not be placed in the normal binocular holder. The weight and length were similar to the Barr and Stroud. It just superior to the AP 343 not as good as the Barr and Stroud.	There was no illustration of the ROSS . The NPL lists its details as; O.G. 50mm,Magnification 6.25 FOV.6.75", Apparent FOV 42, length 10.5 ",weigh 62 ozs,eye relief 16mm, light transmission 52%. The Barr and Stroud's light transmission was 66% the testers asked Barr and Stroud to reduce the weight, use finer focussing threads, fit sun shields and lugs for a strap.
16 August, Sir H.GRUBB submitted a sample of his binoculars based his new design to the admiralty. *Tests found its light efficiency was only 42%. It was a 6 X 42 with 7* field of view. It weighed 8lb 12oz !*	N.A. AVIA 7/2769 letter to the Searchlight Experimental Establishme successors to the London Electrical Engineers.
31 August, the Director of Inspection, Optical Systems at Plumstead received from the Royal Engineers Board one Barr and Stroud 6X	N.A. AVIA 7/2769

	binocular in a wooden case, two Zeiss binoculars SNs 411158 and 1020304 and a 6X ROSS SN 86452.	
	1 September,the Captain of H.M.S. Excellent submitted a report on the Admiralty Night Glass Trials.The Barr and Stroud CF12 was adjudged the best with the ROSS SN 86456 next..	N.A. AVIA 7/2769. T.Y.Baker supplied copies of the report to the Searchlight Committee.
	1 October, The Safeguarding of Industries Act imposes an Import Duty of 33 1/3 % on optical goods.	F.Twyman, The Future of the British Optical Indus In force until 1926 when it was extended to 1936 at 50%.
	12 December, J.W.HASSELKUS and ROSS LTD applied for a Patent for an improvement to Cinematographic Projection equipment J.W.HASSELKUS, ROSS LTD and Harry MOORE applied for another Patent for Improvements to Projection Equipment	Patent No 195,028 Patent No 197,707
	The Company reported its first year of trading at a loss.	Annual Report
	31 December, Net Loss of £2,187, £1,500 dividends paid.	Balance Sheet
1922	Directory entry amended to; ROSS LIMITED, opticians by appointment to his Majesty the King manufacturers of telescopes, prism binoculars, periscopes, photographic lenses & apparatus, kinematic projectors etc. Gold medals and highest awards atall international exhibitions. Wording remained until 1948.	Kelly's Directory 1922 First entry for kinematic projectors
	22 February to 10 March, ROSS Ltd exhibited at the British Industries Fair, Manufacturers of Cinematograph Projectors, Photographic Lenses,Lenses for Aeronautical Cameras, Photographic Cameras, Prism Field Glasses, Telescopes Sporting, Military and Naval.	Grace's Guide, Internet The Fairs started in 1915 and were held annually until 1939
	15, 16, 17 May and 19 June, A Committee was convened under the auspices of the Safeguarding of Industries Act 1921 to hear an application by members of the optical and scientific trades for more	N.A. BT 55/79 There was an Import Duty of 33 1/3 % in force bu the applicants wanted this increased. Essentially

protection against 'unfair' competition from foreign manufacturers. The were ten witnesses from the applicants,including C.Beck of R. and J. Beck Ltd, W.E.Watson Baker of W.Watson and Son Ltd and C.M McGILCHRIST of ROSS Ltd. There ten witnesses against the application including a J.W.Atha who was the United Kingdom Agent for Carl Zeiss and Goerz. Much of the evidence was 'in camera' to protect sensitive commercial information and allow full disclosure.

Mr. McGILCHRIST in his evidence stated that ROSS Ltd made photographic lenses, prismatic binoculars, telescopes and practically all the optical instruments used in the Admiralty and Army. He showed the Committee examples of comparable ROSS and Zeiss lenses. He said that a large proportion of ROSS's lenses went to camera makers . The prices charged to the makers was 50% of the retail prices, in some cases the selling prices were the same as the cost price. For example for a lens selling at £10-15s the cost of machining was £1-9s (14%), wages £4-3s-3d (41%) and overheads £4-8s-9d (44%).
Pre War workers had been paid 10 1/2d per hour for a 48 hour week, the current rate was 1s 8 1/2d per hour for a 47 hour week. In 1913 ROSS had employed 303 men, in 1920 351 men and 13 women, in 1921 316 men and 9 women. By April 1922 there were 191 men and 11 women.

The Committee reported that it had found insufficient evidence to show that such articles manufactured in Germany were being offered for sale in the U.K. at prices below the cost of production. It was noted that the market for prism binoculars was considerably disturbed by the large quantity of surplus war stores.

4 July, ROSS LTD,J.W.HASSELKUS and George RICHMOND apply for a patent for a design of a telephoto lens.

the German manufacturers, especially Zeiss, were their main target.
Mr Watson Baker spoke on Prism Binoculars, his firm were probably the largest maker at the end o the War. Mr. McGILCHRIST spoke on lenses.
Watson Baker told the Committee that before the War he believed there were four firms, employing about 500 men, making binoculars. By the end of the War he said there were nine firms. (Not name Of these two had Indian Government contracts. T rest were making only small quantities for retail sa Although the duty had risen by 33 1/3% the prices German products had only risen by 16 2/3%.

The Committee remarked
that witnesses when referring to values changed between manufacturing, wholesale and retail prices without clarity.

The main witness against the application was Mr. W. Atha who had since the end of the War becon the U.K. Agent for Zeiss and Goerz. He pointed o that for 18 months after the Armistice no German Imports had been allowed. That the British camer makers were not using German lenses and that ROSS was the only firm whose binoculars were more expensive than Zeiss's comparable models. His prices charged to retailers were 33 1/3% less than the retail prices.
He acknowledged that wages in Germany were le than in the U.K. but they were increasing.
He claimed that Zeiss representatives visited the U.K. both before and after the War to meet British makers with a view to setting prices.

Patent No 188,621

	five elements are used.	
	The Directors reported another year's trading loss.This despite an increase in sales. It was blamed on the high cost of production and the fact that selling prices had to be reduced. It was hoped that the market had absorbed the surplus war stocks.	Annual Report Some firms such as Aitchison had done well by buying up war surplus binoculars and selling them at low prices.
	31 December, Net Loss of £8,801, £1,500 dividends paid.	Balance Sheet
1923	12 January, J.W.HASSELKUS and ROSS LTD apply for a patent on improvements relating to Arc Lamps suitable for Cinematographic Purposes.	Patent No 213,994
	ROSS LTD have an office at 100, Deansgate, Manchester.	Advertisement in The Ward Lock Guide to the Lake District.
	1 October, a memorandum to the Secretary of the Royal Engineer's Board, The ROSS binocular No. 86452 was not on our charge and I cannot trace that this establishment paid for them.	N.A. AVIA 7/2769
	31 December, third trading loss. Net Loss of £13,551, No dividend.	Annual Report
1924		
	During the year Arthur David Clere PARSONS joined the Board of Directors.	He was a nephew of Sir Charles PARSON. Sir Charles' only son had been killed during the War.
	29 January, Commander T.Y.BAKER attended a Board of Trade Conference where they discussed the country's needs of optical glass in the event of an emergency.It was considered that the stocks held by Chance Brothers and Derby Crown Glass would be inadequate. it was possible Chance might stop production and Derby was financially dependent on Sir Charles Parsons. Baker put forward a scheme that would require around £30,000. It was decided to approach the Treasury. *BAKER wrote a lengthy report to his superiors on the 'Present Position of the Optical Instrument Industry '. He pointed out that the*	ADM 212/87 The result of the Application to the Treasury is no recorded in the file.

	manufacture of optical munitions was carried by very few firms. 95% was done by Barr and Stroud, Cooke Troughton and Simms, Taylor, Taylor and Hobson, A.Kershaw and Son, Aldis Brothers, ROSS, R and J. Beck, W.Ottway and Sons, Adam Hilger and W.Wilesand Sons. These firms also cater to the civilian market but at the present this is very low. Photographic lenses and binoculars are almost dead. Also handicapped by foreign (mainly German and French) competition. In Germany six times as many workers employed as in the United Kingdom. Orders from the Services are few. Every firm working at a loss for the last three years. Cooke, Troughton and Simms have lost £32,000 in last three years. ROSS have written to the Admiralty begging for work. Cooke, Troughton and Simms and Adam Hilger are controlled by Vickers. ROSS is in the hands of Sir Charles PARSONS, Taylor, Taylor and Hobson also do engineering work and can keep going. The industry if further reduced would not be able to cope in the event of a war. The industry is dependent on having sufficient skilled personnel. Prisms can be planed on machines by semi-skilled workers, but if the glass is not homogeneous then this defect has to be compensated for by deviating from a true plane. This needs great skill. There is an insufficient number capable of making roof prisms. *In Germany Zeiss have 3,000 men and Goerz may have 2,000 and the German Government will not allow a reduction in the workforce even though the civilian marketis dead. France has more firms than Germany that are fairly busy with binoculars and cinematographic equipment.*	
	31 December, Net Loss of £5,123, no dividends.	Annual Report
1925	Telephone number for Great castle Street premises amended to Langham 2240.	Kelly's Directory 1925
	During the year Owen George HAY joined ROSS Ltd. as an Optical Designer after a five year course on Technical Optics at Imperial College.	N.A. ADM 212/85

	24 February, The British Scientific Instrument Research Association held a meeting at its offices, 26 Russell Square, London to consider what steps may be taken to prevent the British Optical Industry being undermined by unfair foreign competition. Twelve persons attended including J.HASSELKUS of ROSS and Commander T.Y.Baker of the Navy. It was claimed that the German competition was severe and unfair.It was said that the public, incorrectly, believed that German optical and scientific goods were better than British products. A committee was set up to consider what couild be done to improve the situation.	N.A. ADM 212/89 Commander Baker and officers from the Army an Royal Air Force attended this meeting in'a private capacity'.
	7 March, Commander Baker wrote to the Director of Scientific Research of the Admiralty on his attendance on 24 February. He suggested the Admiralty could give valuable assistance to the trade's campaign. The Admiralty could let it be known that only British glass is used in Service Instruments because it is better. The public could be informed that the Admiralty is the largest purchaser in the U.K. (if not the world) of optical instruments. Reports on German equipment could be published.	N.A. ADM 212/89
	20 May, Commander T.Y. BAKER drafted a three page letter to the TIMES newspaper on the subject of British Optical Glass. In this he extolled the virtues of British optical glass and asked that 'the man in the street ' should insist on having British glass in his equipment.	N.A. ADM 212/87 The TIMES correspondence was later included in ROSS Ltd.'s Binocular Catalogue.
	8 June, J.HASSELKUS as Chairman of the Optical and Scientific Instrument Manufacturers Association made an Agreement with the Womens' Section of the National Union of General and Municipal Workers that women would receive 7 1/2d. per hour.	N.A. LAB 83/842
	31 December, Net Loss of £3,800, no dividends.	Annual Report
1926	1 January, a Lt. Colonel EVANS visited the ROSS Works to inspect an example of a new 6X Wide Angle binocular. He was researching	N.A. AVIA 7/3073 This later became the No 4. MkI and its civilian

	to find a suitable binocular for Anti-aircraft duties. He recommended purchase of one to conduct comparative tests with an earlier ROSS 6 X 50 prism binocular. (The same one as submitted for Naval trials some years earlier SN 86452) He commented, the weight is half that of the 6 X 50, the slight indistinctness on the fringe of the field is not I think a serious defect and is not normally noticeable, the very large field should be most valuable.	version the STEPNAC. The file fades away and there are no entries until 1928. A note dated 1 October 1928 refers to the impending issue of the No 4 Mk I to Anti Aircraft and Territorial units.
1926	12 to 17 April, the Third Optical Convention was held at Imperial College.J.W.HASSELKUS gave a talk on the development of a new Spectrometer which was able to provide more accurate readings. A paper on the development of telephoto lenses included reference to two models patented by ROSS LTD. An exhibit on historically important items included two microscope objectives by Andrew ROSS.	Proceedings of the Optical Convention 1926
	Almost 20 pages of the Exhibition Catalogue related to ROSS LTD products; Military, Sporting and Royal Naval Telescopes. Prismatic Binoculars of ROSS Pattern construction included, 6X 23 6X 30, 8X 24, 8X 30, 10X 24 and 12X 30 in both centre and eyepice focussing. Two new prismatic binoculars of Zeiss Pattern construction, 6X 30 and 9X 35 were illustrated with 'Extra Wide Fields of View, 11' and 7.77' respectively.One pair of Galilean Fieldglasses of 5X with 1.8" objectives, the bridge is rigid. A 4" Refracting telescope is listed suitable for terrestrial and astronomical use. Four 'Look-Out' telescopes with objectives 2.5" to 4" and seven Astronomical telescopes, all refractors. Seven types of cameras available in different sizes, the Standard Reflex, the Stereoscopic Reflex, the Tropical Standard Reflex, the Bijou Standard Reflex,the Panros, the Improved Square Bellows and the Sports Camera. There were numerous lenses under such names as, the Xpres, the Teleros, the Homocentric, the Combinable, the Rapid Portrait and the Wide Angle. The ROSS Kinematograph Projector and Searchlight Arc Lamps. included in the Entertainment provided to visitors was a demonstration by ROSS of Stereoscopic Cinematography using	Catalogue of the 3rd Optical Convention. The previous conventions had been in 1905 and 191 The 6X was later named the STEPNAC The 9X was later named the STEPMAB These were the first ROSS prismatic binoculars to follow the Zeiss pattern of construction

pairs of projectors.

24 April, J.STUART died, buried at Ardingly, Sussex. The Shares in ROSS Ltd were placed in the control of his executors and Trustees. £1,000 Ordinary ROSS shares were left to Sir Herbert JACKSON KBE. £500 Preference ROSS shares were left to Charles Morrison McGILCHRIST (Business Manager and Director), £500 Preference ROSS shares were to both George Edward BROWN and Alfred Walter BROOKS of Henry Greenwood and Co. Ltd. The following ROSS Ltd employees were left small amounts of money. John Henry RICHMOND, George Arthur RICHMOND, Ernest Whitehead WOODS, Hugh Robert NICHOLSON, Harry MOORE, William Thomas JONES, Henry MATHEWS, Paul SPRANGER, Henry CLARKE, Walter John CHAFFIELD, Ralph T. BARNARD, Henry MITCHELL, Christopher MILLER, Herbert BURROUGHS, Sydney BARTRUM, Henry CHEELD, Leon ROUGEOT, Henry LUKER and William James TARRANT.	Proved will of J.STUART. His executors were The Public Trustee, John ATTLEE M.D. and John Stua ATTLEE , Electrical Engineer, both of 65 Grosver Street, Hyde Park and Arthur Gould WEST Accountant. After provision for members of his fa including his stepson Andrew Thomas ROSS. So shares had to be sold to raise £3,000 to pay to certain charities. The gross value of the Estate was £56,917-2-10. The net value of the Personal Estate was £39,44 5-9.
7 November, Captain T.Y. BAKER noted his thoughts on binoculars for night use regarding the assumed superiority of Zeiss binoculars. Glasses specified 6 X 40 to 50 have exit pupils of approximately 7mm. The Naval Pattern 343 has 5mm exit pupils. The beam of light has half the area of the German glass. *There are British glasses with larger exit pupils than the 343 but are either of lower magnification or have large objectives. The former do not show much detail, the larger are expensive.* *A new pattern night glass design from the Adfmiralty Reseach Laboratory is under trial. It has a magnification of 3.5X and an object glass of 24mm, giving a 7mm exit pupil.* *To increase the O.G. to 30mm and increasing the magnification to 4.5X would increase the cost by 20%. To increase to 6 X 40 would double the cost. We could obtain a glass as good as Zeiss but it would be more expensive than the 343.* *The ROSS and Kershaw 6 X 30's are as good as any in the world.*	N.A. ADM 212/84
The Directors reported that despite the effects of the General Strike and unsettled labour conditions the year's sales were similar to those	Annual Report

	of 1925.	
	31 December, Net Loss of £3,825, no dividends .	Balance Sheet
1927	Telephone numbers for the Clapham Common premises now Battersea 0376 and 0702.	
	4,5 and 6 January, ROSS exhibited at the 17th Annual Exhibition of the Pyhsical and Optical Societies. Four prismatic binoculars having Extra Wide Fields were listed, 6X 7X, 9X and 12X. No details were shown for their range of Stereo Prism Binoculars. No Galilean models were listed. The telescope range included a Stereoscopic Observation model with revolving eyepieces giving powers of 10X and 20X There was a range of four cameras, the Bijou Standard Reflex, the ROSS Sports, the Standard Reflex and the Panros Folding. The range of lenses included the ROSS Apochromatic Process Xpres. The range of Kinematograph Projectors included one for home use.	Catalogue 17th Annual Exhibition The 7X was later named the STEPNADA. The 12X was later named the STEPRAD
	William Watson and Son Ltd offer 13 prismatic binoculars,1 prismatic opera glass, 4 galilean glasses and 13 telescopes. Customers could have prescription eyepieces on the prismatic binoculars for an extra 10 shillings.	Watson Binocular Catalogue,41st Edition.
	For the year ending 31 March, the Director of Army Contracts reported the purchase of 192 binoculars. No details given.	N.A. WO 395/4-6 £2500 was spent on repairs to binoculars. No further reference to binocular purchases until the year ending 31-3-1936.
	7 April,Note by Captain T.Y. BAKER on a proposal to buy foreign binoculars. *The proposal to purchase foreign binoculars is contrary to the general decision to buy British manufactured optical instruments. The Zeiss Binoctar glass has nothing remarkable except the price, largely due the fact Jena workers are paid 9d per hour against 1shilling and 6d in the United Kingdom, and partially due to Zeiss cutting the price for*	N.A. ADM 212/84

Advertising purposes.
The main users of night binoculars are the Navy and Merchant Marine.
It is a wrong belief that the Germans possess secrets of optical design. It is forgotten that in 1921 ROSS, Kershaw and Barr And Stroud submitted specimens of prismatic night binoculars. The Barr and Stroud with 66% light transmission represented a great advance due to good design and good optical glass.
The trials were dropped due to the cost of the binoculars. Barr and Stroud have given up making binoculars.
ROSS have conentrated on more ordinary types that can be produced in numbers. They did make 12 binoculars of a pattern based on the model submitted to the Admiralty and have sold six. The Manager at ROSS has discussed costs with the Admiralty Reseach Laboratory and when made in batches of only twelve at a time, the cost cannot be less than £30-0-0. Lower if in mass production but not as low as the German's £10-15-0.

There was correspondence between F.TWYMAN of Hilger Ltd and J.W.HASSELKUS on rates of pay . HASSELKUS reported that ROSS had joined The Engineering Employers Federation and had found that the optical manufacturers were paying somewhat above the average Federation rates of pay.

M.E.W.Williams, The Precision Makers

16 June, Capt. T.Y.BAKER made another note regarding night binoculars. He compared the specifications of the current Zeiss 7 X 50 with the Barr and Stroud and ROSS models submitted for the 1921 trials. The Fields of view were 7.3, 6.9 and 6.75 respectively, the length 7", 10.5" and 10.5". Weights, 2.5lb, 4.25 lb and 3.75 lb. Light transmission, 57%, 66% and 52%.
The Zeiss had very good definition in the centre for an angluar field of 3.5, thereafter it fell off rapidly with the extreme margin not usable for observation. Both the Barr and Stroud and the ROSS had good central definition. At the margins both were satifactory with the Barr and Stroud slightly better.
He pointed out that the Zeiss was made in large numbers and thought had been given to its size and weight. The samples from Barr and

N.A. ADM 212/84

	Stroud and ROSS were one offs. The Zeiss has a better field of view but the other had been designed seven years previously and eyepice design had progressed. ROSS now sell a binocular with an apparent field of view of 70. *The average prismatic binocular passes 50 to 60 % light. The ROSS was very good and the Barr and Stroud superlatively good.*	The 6 X 30 STEPNAC
		Another series of trials was to be held in 1928 Barr and Stroud submitted 4 samples, ROSS 2, Kershaw 2, Dollond 1 and Hughes 1.
	27 September J.W.HASSELKUS and George Arthur RICHMOND applied for a Patent for an improved wide angle photographic lens of six elements.	Patent 295,519
	The Directors reported that there had been an increased demand during the year but keen competition had kept prices low. However a Net Profit of £1,411. No dividends.	Annual Report
1928	3 January, J.W.HASSELKUS and Owen Geoge HAY applied for a Patent for an improved Interferometer for testing optical lenses.	Patent 305,350
	10,11 and 12 January, ROSS exhibited at the 18th Annual Exhibition of the Physical and Optical Societies. The range was virtually the same as the previous year. Some cameras by other makers, Newman and Guardia, Sinclair and Adams, fitted with ROSS lenses were included. A new telescope the Dominion with a 4 inch objective and an aluminium tapering body was listed. The home projector was not listed.	Catalogue 18th Annual Exhibition
	24 January, J.W.HASSELKUS applied for a Patent for improvements to Prismatic Systems suitable for Telescopes. It involves the fusing together of prisms or prisms and lenses by the application of heat and pressure.	Patent 301,672
	30 April,J.W.HASSELKUS and Harry MOORE applied for a Patent	Patent 308,503

in respect of a means of mounting an optical system such as prisms on a transparent plate with a means of fine adjustment.	
30 April. J.W.HASSELKUS and G.A.RICHMOND applied for a Patent in respect of an improved lens system for telescopes having a wide field of view.	Patent 309,749
22 May, Admiralty Research Laboratory wrote to Barr and Stroud, a preliminary examination showed that the exit pupils on 2 of their samples were less than 7mm. Barr and Stroud replied this was due to diaphragms and could be amended.	N.A. ADM 212/84
12 June, J.HASSELKUS was appointed to the Technical Optics Advisory Committee which assisted in constructing the optics courses at Imperial College.	N.A. ADM 212/85 There were few applicants for the courses. It held its first meeting on 26 June 1931' T.Y.Baker and 10 others on the Committee.
23 July, Barr and Stroud submit Type C.F. 15 of 7X and Type C.F. 12 of 6X powers. They noted that the prisms had 'air bells' left in owing to the urgency. There would be no problem in producing prisms free of this defect.	N.A. ADM 212/84
24 July, Kershaw submitted first of their submissions to the Admiralty.	N.A. ADM 212/84
1 October,Note on Government File that the issue of the new pattern Anti Aircraft binoculars ,(No 4 Mk I), had not yet been made.	AVIA 7/3073
9 October, the fourth sample from Barr and Stroud submitted, of 6.5X with a field of view of 7.5.	N.A. ADM 212/84
15 October, the Admiralty sent the ten entrants for the night binocular trials to the National Physical Laboratory for comparison with the Zeiss 7 X 50.	N.A. ADM 212/84 Unfortuneately none of the test details are in the file.
6 December, Memorandum by Capt. T. Y. BAKER on the initial trials of the night binoculars. All the competing firms had been asked to supply glasses with 7mm exit pupils. The glasses supplied were	N.A. ADM 212/84

	mainly similar to to the Zeiss model. Only Barr and Stroud and ROSS submitted models with a radical departure from ordinary designs. Both have achieved extra light transmission by cementing the prism surfaces together. The ROSS glass shows a performance well in advance of the others although there is a slight drop at the centre compared to the Barr and Stroud. *Two of the Barr and Stroud glasses fall away considerably towards the edge of the field due to the prisms being too small and of a too low refractive index. Would mean replacing the exceptionally transparent Borosilicate Crown or Hard Crown with a Light Flint for which the coefficient of absorption would be greater.* *One of Barr and Stoud's and ROSS's were both superior to the Zeiss. Only one of the ten submitted was definitely inferior* *Three of the Barr and Stroud's have been designed to be as light as possible but have considerable length.* The ROSS is short and bulky. The weight is in excess of of the Zeiss but could be reduced. ROSS are putting this binocular into commercial production and have taken 1/2 lb. off the weight. *The ROSS and one of the Barr and Stroud's are the most suitable for adoption.*	As later advertised in the 1930 British Journal Photographic Almanac as the STEPNITE with large Bakelite prim boxes.
	29 December, the binoculars in the Admiralty's trials were sent to H.M.S. Excellent for further tests.	N.A. ADM/212/84
	The greater demand for the Company's products continued through the year. Unfortuneately savings in manufacturing costs were balanced by reduced selling prices. A net profit of £1,750-10s-8d was achieved.	Annual Accounts
1929	8,9 and 10 January, ROSS exhibited at the 19th Annual Exhibition of the Physical and Optical Societies. There was no change from the previous year.	Catalogue 19th Annual Exhibition
	28 January, J.W.HASSELKUS and G.A.RICHMOND applied for a Patent for an improved photographic lens of six elements.	Patent 323,138

British Industries Fair, ROSS Ltd shown as Manufacturers of Photographic Lenses, Cameras, Prism Binoculars, Field Glasses, Opera Glasses, Telescopes Terrestrial and astronomical, Cinematograph Projectors, Search-lighjt Arc Lamps, Optical Lanterns, Aeronautical, Astronomical and Nautical Instruments, Lenses and Prisms of all kinds.

Grace's Guide, Internet

14 May, J.W.HASSELKUS and William Thomas JONES applied for a Patent for Improvements relating to Fire Traps for Cinematograph Projection Apparatus.

Patent 333,576

3 August, Captain CARR, Secretary of the Research and experimental Board wrote to Capt.T.Y.BAKER. His Board was interested in any form of binocular which would facilitate the spotting of an aerial or other target at night. Was it possible that a superior glass may have been found to the 6X ROSS wide angle (10.45 degrees) adopted two to three years ago for Anti Aircraft work.

N.A. ADM 212/84

The No 4 Mk I

23 September,Capt. T.Y.BAKER wrote back to the Research and Experimental Board re Searchlight Committee on the subject of Night Binoculars. He enclosed a copy of the Report compiled by the National Physical Laboratory. The best three were two by Barr and Stroud and one by ROSS.

N.A. ADM 212/84

The one by ROSS had distinctly better light transmission than the Zeiss and was superior to all the others away from the centre of the field.

He noted it was customary practice for binocular makers to cut down the size of the prism to save expense, normally only half the entrant beam gets through to the edge of the field.

He stated that the Admiralty had purchased 16 pairs of the ROSS glasses and the Barr and Stroud C.F. 15 for extended trials.

He gave his opinion that 7 X magnification might be too high for Anti Aircraft work. With 7 X the apparent field of view cannot be much more than 50 to 65 without serious loss of definition unless a more complicated eyepiece is used. this would have more glass to air surfaces resulting in less light transmission. The Admiralty tests had

	shown that high light transmission togther with a 7mm exit pupil was essential. The specification should include only 8 air to glass surfaces and a 7mm exit pupil. Within these limits it is not possible to get a field of more than 55 which gives a real field of 9' at 6 X or 11' at 5 X. None of the binoculars submitted to the Admiralty would fit those specifications. ROSS and Barr and Stroud have reduced the weights of their glasses since the N.P.L. report. ROSS have cut weight by reducing metal parts while keeping the same optical system.	
	12 October, the Research and Experimental Board wrote to the Admiralty Research Laboratory thanking them for a copy of the N.P.L. report on 11 pairs of binoculars for night work. They requested that two models, a ROSS SN 100911 and and a Barr and Stroud C.F. 15 for extended trials.	N.A. AVIA 7/3076 re A.A. Binoculars.
	14 November, a Memorandum from the 1st A.A. Searchlight Battalion to the H.Q. 1st Air Defence Brigade noted. ' The Binocular Prismatic No 4 Mk 1 (ROSS Pattern) have given complete satisfaction and are definitely superior to any other pattern so far tried out in this Battalion'.	N.A. AVIA 7/3076
	28 November, The Admiralty wrote to ROSS LTD. asking when the last five of the 16 binoculars ordered could be expected. Also when would the two Periscopes for Torpedo Control be completed.	N.A. ADM 212/84
	30 November, ROSS LTD. replied to the Admiralty. The five binoculars would be delivered on 19 December,the periscopes by 10 December.	N.A. ADM 212/84
	31 December, the Company's sales showed a satisfactory increase with a Net Profit of £6,502. No dividends .	Annual Accounts
1930	Telephone numbers for the Clapham Common premises now Battersea 3876 and 3877.	Kelly's Directory 1930

ROSS Ltd had 8 pages of advertising in the British Journal Photographic Almanac.over 70 photographic lenses and prisms were listed at prices from £6-10-0 to £125-0-0. No binoculars were listed but in the section describing new products was an item on the new Stepnite Stero prism binocular. It was of 7X with 50mm objectives. The price was £21-10-0. The illustration shows eyepiece focussing and large prism boxes (of baklite). Also covered in the new items section was a cinematograph camera lens. Advertisements by some camera makers, including for use on aircraft, showed they utilised ROSS lenses.	British Journal Photographic Almanac
6 January, the Admiralty sent out letters to the firms who had submitted night binoculars , Hughes, Dollond and Kershaw were told 'others were more satisfactory'. The binoculars were returned.	N.A. ADM 212/84 The final result is not recorded i the file.
9 January, Mr. McGILCHRIST of ROSS Ltd. wrote to the Superintendent of The Admiralty Research Laboratory acknowledging the return of 2 pairs of binoculars	
January, 20th Annual Joint Exhibition of the Physical and Optical Societies. ROSS exhibited a new model of the Dominion Telescope where the 100mm Objective and the prismatic eyepiece are connected by a bellows instead of tubing. When not in use the telescope can be folded flat on its supporting tube. The weight of the telescope had been reduced to 4.75 lbs and the stand to 8 lb, less than half of the earlier version. Also shown were cinematic projectors for talking films and new lenses in the Xpres F1.9 range.	Review in Journal of Scientific Instruments 1930 Vol 7.
A.KERSHAW and Sons Ltd. list 29 prismatic binoculars from 6 X 14 to 16 X 50, most with a choice of eyepiece or central focussing. Prices range from £9 to £19-	Kershaw 1930 Catalogue.
1 April to 31 March 1931 ROSS obtained a contract to supply 550 binoculars to South Africa.	N.A. WO 395/6, in 1929 South Africa had been rebuked for buying Zeiss binoculars.

18 November The High Court of Justice issued an Order for meetings of the shareholders to decide on a re-organisation of the Company's finances.
The Company had to provide details of the Directors addresses and shareholdings.
The Hon. Sir Charles Algernon PARSONS KCB, 1 Upper Brook Street, Nil Ordinary Shares, 60,000 'A' Ordinary Shares, 2,005 Preference Shares.
Dr. John ATTLEE, 65 Grovsvenor Street, W 1., Nil Ordinary Shares, Nil 'A' Ordinary Shares, 500 Preference Shares.
John HASSELKUS, 29 Macaulay Road, London SW 4., 1,800 Ordinary Shares, Nil 'A' Ordinary Shares, 525 Preference Shares.
Charles Morrison McGILCHRIST, 4 South Ridgeway Place, London SW 19., 675 Ordinary Shares, Nil 'A' Ordinary Shares, 925 Preference Shares.
Arthur David Clere PARSONS, Crewes Place, Warlingham, Surrey., 100 Ordinary Shares, Nil 'A' Ordinary Shares, 300 Preference Shares.

Annual Accounts

N.A. J 107/68

24 November, Shareholders were notified of two resolutions to be voted on.
1. The Capital of the Company to be reduced from £180,000 (60,000 Preference Shares of £1, 60,000 'A' Ordinary Shares of £1 and 60,000 Ordinary Shares of £1) to £120,000 (60,000 Preference Shares of £1, 60,000 'A' Ordinary Shares of 10 shillings and 60,000 Ordinary Shares of 10 shillings).
2.That upon the reduction of the capital taking place (a) the Capital of the Company be increased by £60,000 divided into 60,000 Ordinary Shares of £1, (b) the arrears of dividends on the Preference Shares to 31 December 1929 to be cancelled, (c) From 1 January 1930 the dividend on the Preference Shares to be 6% and (d) the Preference Shares to be called Preferred Ordinary Shares.

Notice to Shareholders
A letter accompanied the Notice. It informed the Shareholders that the Balance Sheet at 31 December 1928 the Profit and Loss Account had a debit of £17,352 and the Business Purchase Account (from 1897) was £23,736. For the year ending 31 December 1929 the Directors decided write down the stock by £10,000 and the debit to the Profit and Loss Account increased to £21,064

The Preference Dividend was in arrears from 1 January 1923 and no dividend on the Ordinary Shares had been paid since 1920.

It was claimed that if the Resolutions were accept then the debit to the Profit and Loss Account and the Business Purchase Account would be wiped c

	At 4 pm 19 December an Extraordinary General Meeting was held at 3 Northside Clapham Common and the two Resolutions were passed.	
	31 December,The Directors reported that the effect of the resolutions was to provide £60,000 to offset against the Company's debts. The net trading profit was £17,133-2s-2d.	Annual Report £3,600 was paid in dividends to the Preferred Shareholders.
1931	January, The British Industries Fair was held on four sites, Olympia, White City and the Albert Hall in London and in Birmingham. Olympia dealt with light industries including exhibits by ROSS Ltd. of photographic lenses, cinematograph projectors and a lightweight telescope.	Nature Journal, February 28, 1931
	11 February, Sir Charles Algernon PARSONS died while on a sea voyage to the west indies. His shares in ROSS Ltd (and other companies) were to be managed by six trustees including his nephew Arthur David Clere PARSONS. J.W. HASSELKUS was elected Chairman	The gross value of the estate was £810,395-8-9 t net value of personal estate was £602,434-13-7. The bulk went to his widow Dame Katherine and provisions were made for his daughter and nephews friends, employees and certain institutions.
	23 March, The High Court approved the Two Resolutions of 19 December.	Letter to Shareholders issued 15 May 1931
	BARR and Stoud were awarded the contract for the Naval 7 X 50 night binocular. The aluminium prism boxes were replaced by ones of bakelite.	W.Reid, Barr and Stroud Binoculars and the Roya Navy.
	KERSHAW now list 23 prismatic binoculars from 3 X 14 to 16 X 50, from £7-12s to £19. There are fewer eyepiece focussing models.	Kershaw Catalogue 1931.
	28 August, The Loan Exhibition of British Optical Instruments was opened at the Science Museum. ROSS Ltd. showed various binoculars including a three power prismatic telescope, several photographic lenses and a portable cinematograph.	Nature Journal 19 September 1931

October, A No 4 Mk I binocular was sent by the Research and Experimental Board/Air Defence Experimental Establishment to the Admiralty Research Laboratory for inspection. The accompanying letter asked the reviewers to bear in mind that AA Spotters will usually be searching for targets in the neighbourhood of a searchlight so can never be so truly night adapted as on a ship. The problem for Spotters is to locate a target whose general position is only vaguely given by sound or the searchlight beam. The targets are aircraft with a wing span of 75 to 100 feet at 30,000 to 40,000 feet altitude. It had been thought that an increase of field even at the expense of magnification would enable the target to be more easily picked up. It wasa thought that edge definition need not be important. It also asked whether a 7mm exit pupil was essential in view of the nearness of the searchlight and was it possible to keep with 8 air/glass surfaces without an increase in weight.

N.A. AVIA 7/3076
Re A.A. binoculars
Trials for night binoculars carried on throughout the 1930's mainly between the No 4 Mk I (6 X 30) and what became the No 5 (7 x 50) and the No 6 (4 X 24). The trials appeared to give different res All were made by by ROSS.

24 October Captain Baker of the Admiralty Research Laboratory replied to the Air Defence Experimental Establishment.. Generally the No 4 Mk 1 seems to be the best design you can get as no observer will be dark adapted. A 5mm exit pupil should be large enough. The wide field is a desirable feature. Were the exit pupil to be increased to 6mm and definition retained the instrument would in size and weight. The No 4 Mk 1 appears to hav 10 air/glass surfaces and light transmission greater than 56% cannot be expected. It might be possible to cement the prisms. This would give 61% light transmission but would involve alterations and extra cost.

N.A. 7/3076

2 November, Colonel Silvester Evans of the Air Defence Experimental Establishment wrote to ROSS Ltd. stating that they were considering possible improvements in the No 4 Mk 1 Night binoculars which were the same as the STEPNAC with an 11' field of view. There are ten air glass surfaces, may it be possible to improve the light transmission by cementing the two prisms. If practicable what would be the effects on light transmission, cost, weight and overall dimensions.

N.A. AVIA 7/3076

	3 November, ROSS Ltd. replied to Col. Silvester Evans inviting him to attend their Clapham Works. The Colonel found out that the Admiralty had a binocular of 3 1/2 magnification with a 13 degrees field of view made by ROSS Ltd. It was designed for use in a fixed mounting with long eye relief to protect the face from gun blast.	N.A. AVIA 7/3076 This may have been the binocular gunsight G.372
	10 November, Col. Silvester Evans wrote to ROSS Ltd. concerning his visit and his enquiry regarding low power, large field binoculars.	N.A. AVIA 7/3076
	15 November, ROSS Ltd. wrote to Col. Silvester Evans. They were proceeding with the design of a low power, large field binocular with increased light transmitting power. They could not give an estimate until the type of prisms to be used were decided. They referred to two binoculars ordered by the Admiralty which cost £44 owing to the very complicated prisms used and the provision of long eye relief.	N.A. AVIA 7/3076
	31 December, the Directors' Report was minimal a Net Profit of £1,869-3s-9d was shown.	Annual Report No dividends were paid
1932	5,6 and 7 January, 22nd Annual exhibition of Scientific Instruments and Apparatus. ROSS exhibited their ranges of Binoculars, Telescopes, Cameras and Lenses and Projectors.The range of Extra Wide Field Binoculars included 6X, 7X cf,8X, 9X cf and 12X. A new addition to this range was the 7 X 50 with eyepiece focussing illumination was claimed to be greater than other 7 X 50's by 137% at the margins and 20% at the centre. The stereoscopic observation Telescope was shown as having 40mm objectives. New items were the TRITELBIN a three power prismatic binocular telescope with rotating eyepieces giving 12X, 24X and 42X and the TRITELMON a mocular version. A new Epidiascope was demonstrated.	Catalogue 22nd Exhibition The 8X was later named the STEPLAWE The 9X cf was later named the STEPRUVA The 7X 50 was later named the STEPNITE This was the second version with al metal construction, the forerunner of the No.5

	12 February, ROSS Ltd wrote to Col. Silvester Evans regarding wide angle low magnification binoculars enclosing a drawing showing the outline of the proposed binocular. The object glass is 1 inch, the exit pupil 1/4 inch and of 4X magnification. By using cemented prisms an gain of 10% in light transmission over the No 4 Mk1 was achieved, (62% compared to 52%).	N.A. AVIA 7/3076 This drawing is not in the file
	25 July, a pair of the new 4X binoculars were sent for testing to Warley.	N.A. AVIA 7/3076
	29 August, Warley reported on the 4X binoculars. The field of view was appreciably greater than with the service pattern No 4. The brilliance was much improved, targets were distinguished much more easily than with the service pattern. The 4X magnification was not a disadvantage compared to 6X. The extra weight was not appreciable. In general it was considered a great improvement.	N.A. AVIA 7/3076
	1 September, the Air Defence Experimental Establishment had two pairs of the ROSS 4X binoculars. Extra pairs would cost £15 each if ordered in fours or fives. Delivery would take three months.	N.A. AVIA 7/3076
	12 December, Charles Morrison Mc GILCHRIST died,he had been a Director since February 1918.	Annual Report
	31 December, it was noted that there was a general trade depression and a Net Loss of £5,204.	Annual Report No dividends were paid
1933	Telephone numbers for Clapham Common premises now Macaulay 2472 and 2473.	Kelly's Directory 1933
	3,4 and 5 January ROSS exhibited at the Annual Exhibition of Scientific Instruments and Apparatus. No new items were listed.	Catalogue 23rd Exhibtion
	1 April to 31 March 1934 ROSS obtained an Army contract to supply 21 Telescope Ring Sights, A.A. Mk I (an Aldis pattern) @ £55-0-0 each	N.A. WO 395/6

	4 July, J.W.HASSELKUS and O.G.HAY applied for a Patent for improvements to Telescopic Gunsights.	Patent 422,270
	22 September, a brief Air Defence report on further trials of ROSS's 4X binoculars. The field was considered larger and more brilliant than the old type but heavier and more tiring to use.	N.A. AVIA 7/3076 A.A. Binoculars
	7 December,J.W.HASSELKUS and O.G.HAY applied for a Patent for improvements in Optical Apparatus suitable for Telescopic Sighting Devices.	Patent 425,383
	31 December, The Directors stated that there was still no revival in the optical trade. It had only been possible to gain contracts by quoting unrenumerative prices. There was a trading loss of £9,149-0s-4d.	Annual Report No dividends were paid
1934	9, 10 and 11 January, ROSS exhibited at the Annual Exhibition of Scientific Instruments and Apparatus. The only changes from the previous year were 2 additions to the Extra Wide Field models. A 10X 50 and a 12X 50 both with eyepiece focussing.	Catalogue 24th Exhibition This may have been the last Annual Exhibition ROSS attended. The 10X 50 was later named the STEPSAK and the 12X 50 the STEPSUN
	ROSS had an eight page advertisement in the British Journal Almanac. Five pages were of lenses, one page was for the Epidiascope, one for the Standard Reflex Camera and one for the 7X 50 Stepnite binocular.	This advertisement continued in the Almanac up to and including 1938
	6 March, the basic specifications for an Anti Aircraft binocular were drawn up. The optical construction to be of a cemented prism combination, the objective to have a clear aperture of 1 inch, a magnification of 4X and a 12 degree field of view. *9 March , It was recommended that all future supplies of Night Binoculars to Anti Aircraft Search Light Units should have characteristics similar to those used in the field trials in 1932/1933.*	N.A. AVIA 7/3076 A.A. Binoculars

	24 July, a ROSS 4 X 24 night binocular was examined and reported on. Definition, colour correction and brilliancy were described as very good. However the balsaming of the prisms was defective and the adjusting screws easily loosened. The body walls were thin. The Report concluded that this binocular was not suitable for service conditions.	N.A. AVIA 7/3076
	30 August, The Cinescope Publicity Company Ltd. and J.W. HASSELKUS applied for a Patent for improvements relating to Advertising Projectors.	Patent 443,729
	December, T.Y.BAKER and J.F.SUTTON apply for a patent for a method of allowing the prism system in a frame to be detached from the body	Patent 449,552 There is no evidence of its application by ROSS.
	31 December, There still had not been a revival in the optical industry the Net Loss was £5,907.	Annual Report No dividends were paid.
1935		
	18 March, Andrew Thomas ROSS dies at 62 Red Down Road Coulsdon. He was described as of Independent Means and left a gross estate of £597-0s-4d.	It was clear from the terms of his will that he had been estranged from his own wife and children for several years. There is no evidence that he ev took an active interest in the ROSS business.
	During the year ROSS Ltd. contributed the prism and collimator system to the construction of a spectrograph which was fitted to the telescope at the Mount Wilson Observatory.	H.C.King, The History of the Telescope The spectrograph was designed by R.J.Bracey of the British Scientific Instrument Research Association. R. and J. Beck Ltd. made the objecti
	15 April, The Committee of Imperial Defence, Principal Supply Officers Committee within the Board of Trade. Under the Heading, Notes on The Optical Makers Industry, there was concern about the state of the industry. " e.g. ROSS losing money at a rate that will make it impossible to carry on much longer."	N.A. SUPP 3/82

	6 June, A ROSS 7 X 50 binocular was adopted by the military as the No. 5, for Coastwatching.	Very similar to the second version of the STEPNI with smaller alumium prism boxes.
	13 September, a memorandum from a station at Chesil compared the experimental ROSS 4X binocular to the No 4 Mk I. The 4X was considered superior.	N.A. AVIA 7/3076
	8 November, a memorandum to the Superintendent of the Air Defence Experimental Establishment notes that provision is actually being made of the following binoculars, No 5, 7 degrees X 7magnification for Coast Watchers and D.E.L., No 6 12 degrees X 4 magnification for Anti Aircraft Spotters.	N.A. AVIA 7/3076
	31 December, There has been a marked improvement but the Net profit is only £725-13s-3d.	Annual Report No dividends were paid.
1936		
	10 February, The Admiralty informed the Technical Optics Advisory Committee that Captain T.Y.BAKER would be replaced by another officer.	N.A. ADM 212/85
1936	Two new Directors were appointed to the Board, Captain Thomas Yeomans BAKER R.N. (as Scientific Adviser) and William Thomas JONES.	Captain BAKER was the holder of several patents mainly for navigational aids but one for a binocula He had an important role in selecting the Navy's night binocular and had fought for improved optical instruments since the end of the Great Wa W.T. JONES had been the Works Manager.
	20 January, part of a Report from a Major Kerrison, (attached to the Admiralty Research Laboratory) noted that ROSS Ltd. and Barr and Stroud were being approached regarding tendering for 10 X 70 binoculars for night use with anti aircraft sound locators.	N.A. AVIA 7/3014
	17 February, The British Industries Fair, the largest trade fair in the world,opened with the scientific instruments displayed at Olympia. ROSS Ltd. showed the latest appliances for cine- photography both	Nature Journal 22 February 1936

for silent and sound films. Also shown were binoculars and lenses. Notable was a large Epidiascope capable of projecting an object 13" square. The illumination was derived from 4 1000 Watt bulbs and a cooling fan is incorporated.

In the year to 31 March the Government had spent £26,150 on binoculars and telescopes. N.A. WO 395/6

1 April to 31 March 1937, ROSS needed financial assistance from the Government to acquire necessary plant, to take part in the Re-armament Programme. N.A. WO 395/6

5 June, a memorandum from the Royal Engineers Board to the Air Defence Experimental Establishment noted , after many months delay we understand that binoculars prismatic No 6 are being issued to you for trial. They are intended for Spotters, searching in or near a search light beam and not for night glasses for searching for targets when the beam is not exposed. For the latter purposes the Navy Pattern night glass is more suitable. N.A. AVIA 7/3076

9 June, J.W.HASSELKUS and G.A.RICHMOND applied for a Patent for Improvements in and Relating to Objectives Suitable for Photographic Purposes involving 5 elements. Patent 472,191

29 August, a Report on trials with the ROSS No 5 from the 1st Anti Aircraft Battalion noted it had been in continuous use during the past month being tried against both the No 6 prismatic and the normal Spotters glass. They have much greater light transmitting power than either the No 4 Mk I or the contract made No 6 binoculars and have been very effective. They are well made, need no modification, recommend adoption. N.A. AVIA 7/3076
Regarding the No 6, it stated they are too low powered to be of use in identifying targets. Its light transmitting power does not seem to be any better than that of the present Spotters glass and are far inferior to the No 5. They were not considered that they were any advance on the on the present No 4 Mk I.

9 September, the President of the Royal Engineers Board wrote, It may be that for all round practical purposes the No 5 is more useful for anti Aircraft Spotters than the No 6. and, If this is the case the No 5 could be adopted for all Searchlight Units....and two patterns of night would be unnecessary.	N.A. AVIA 7/3076
25 September, ROSS Ltd. wrote to the Air Defence Experimental Establishment at Biggin Hill providing the specifications of War Office type binoculars, The No 4 Mk I, the No 6 and the No 5 (refering to a particular model Serial; No. 104825 held by A.D.E.E.)	N.A. AVIA 7/3076 In the various files it is clear the the STEPNITE ar the No 5 were considered to be the same.
30 September, A memorandum from A.D.E.E. to the Royal Engineers Board states that the information in ROSS's letter of 25 September shows that the No 5 and the No 6 have the same light transmission of 68%, therefore the report from the 1st A.A. Battalion on 29 August must be in error. The No 6 may not have enough power for identification, but it was not designed for that purpose but as a Spotters glass.	N.A. AVIA 7/3015
13 October,a memorandum from the Chief Inspector of the Engineers and Signals to the Chief Inspector Armaments refers to problems fitting No 5 and No 6 binoculars to Sound Locators owing to failure to meet tolerances.	N.A. AVIA 7/3015
12 November, Col. Silvester Evans suggests that Searchlight detachments should have both No 5 and No 6 binoculars.	N.A. AVIA 7/3076
13 November, Another Report on trials of No 5 and No 6 binoculars. These had involved the practical detection of aircraft on moonless nights. In this trial the No 6 was declared at least as good as the No 5 and overall slightly better. It was recommended for the use of Spotters.	N.A. AVIA 7/3076
16 November, ROSS Ltd. wrote to Col. Silvester Evans at A.D.E.E. enclosing a drawing of the Government Pattern No 6 Mk I with reference to a change in overall length.	N.A. AVIA 7/3076 the drawing is also noted with the date 27-5-35. The objective glass is described as being 25.4mm
16 November, a memorandum from the Air Defence Experimental	N.A. AVIA 7/3014

	Establishment to the Royal Engineers Board said the No 6 binocular was to be preferred for Spotters as identification of aircraft was not one of their duties.	
	16 November, a memorandum from Major Kerrison at the Admiralty Research Laboratory re High Power Night Glasses. After a visit to Goerz in Vienna both the Admiralty and the war Office decided to investigate the possiblities of using night glasses of higher power than those currently in use. The Admiralty ordered two 10X binoculars with exit pupils of 7 or 8mm, 5 degrees field of view and six air/glass surfaces, one from Barr and Stroud and one from ROSS. Both of the binoculars were of the straight through type. The Army ordered two 10X binoculars from ROSS with 7 or 8 mm exit pupils. One to have six air/glass surfaces with a 5 degree field of view. The other 8 air/glass surfaces and 7 degrees field of view. They were to have angled eyepieces. The ROSS straight through 10X had been delivered.	N.A. AVIA 7/3014
	Late in the year ROSS Ltd's London Showroom moved to 26 Conduit Street, W.1., telephone MAYfair 4316. The telegraphic address remained as ROSSANO WESDO. This address remained until 1948.	Kelly' Directory 1937
	December, having ordered 5,000 No 6 binoculars, they were declared obsolete, though they remained in service.	W.Reid Army Yearbook 1983 ROSS marketed an identical 4 X 24 model as the STEPLOW.
	31 December, the Net Profit was £2,606 . However due to the Government's Defence Programme, the orders will be the highest for 18 years.	Annual Report
1937	J.W.HASSELKUS and G.A.RICHMOND applied for a Patent for Improvements in or Relating to Objectives suitable for Photographic Purposes having six elements.	Patent 507,590

February,The British Industries Fair was held, ROSS LTd. again displayed their products including a portable epidiascope with a 500 Watt lamp.

Nature Journal 27 February 1937

ROSS Ltd. were listed as a member of the Scientific Instrument Manufacturers Association of Great Britain, (formerly the British Optical Instrument Manufacturers Association) of 329 High Holborn, London.

S.I.M.A. advertisement
One notable exception to membership was Barr a Stroud Ltd.

8 March, John ATTLEE MD died at Wellingborough where his daughter Rosalind lived. There was no reference to any ROSS Ltd shares in his will. He had been a Director since the start of the Company in 1897.
His son John Stuart ATTLEE was elected as a Director.

His gross estate was £24,329-12-0, the net personal estate was £18,110-19-7. Two thirds of the estate went to his daughter Rosalind, one thir to his son John Stuart ATTLEE.

For the year ending 31 March the Director of Army Contracts reported the spending of £161,398 on Binoculars and £274,906 on Telescopes (no details). Some Financial assistance was given to ROSS Ltd and to Cooke, Troughton and Simms Ltd. in order to acquire plant.

N.A. WO 395/4-6

2 November, a Report on trials of Night Glasses with the Mk VIII Sound Locator. Binoculars included the prototype 10 X 70s, 7 X 50s and the 6X usually fitted to the Sound Locators. (These were special binoculars fitted with prisms at the objective end which allowed the sky to be reflected to the observer who looked downwards.) The results were inconclusive, the 7 X 50s showed a slight advantage, the 10 X 70's with angled eyepieces were awkward to mount and for the observers.

N.A. AVIA 7/3014

10 November, J. HASSELKUS visited the Air Defence Experimental Establishment at Biggin Hill. He discussed modifications to the prism fitted to the binoculars used with the Sound Locators. His suggestion was to substitute a mirror for the prism. This had the advantage of saving £20 on each unit but had the disadvantage that the image of the target in azimuth would be reversed.

N.A. AVIA 7/3014
The A.D.E.E. felt it was not suitable for the curren Mk VIII Sound Locator but might be of use on the Mk IX although the gearing woul need amending to reverse the drive.

19 November, the A.D.E.E. wrote to ROSS Ltd. requesting that full details of their modifications ne sent the Armaments Inspection

N.A. AVIA 7/3014
N.A. AVIA7/3015 contains drawings.

Department at Plumstead.

31 December, the Company's Net Profit was £15,788 . The Plant was fully occupied, working under high pressure.	There was a change in the format of the Compan Accounts. £5,872 was paid out in Dividends and £2,000 was placed in a Staff Benevolent Fund.

1938

BARR and STROUD complained about the accuracy of the tests. Future tests were to be less subjective using an interferometer.

21 January, There had been a brief trial of ROSS,s suggested mirror with a Sound Locator binocular. It was considered that the reveresed image incurred no handicap provided the operator was trained in its use. it was recommended that six should be made up for further testing.	N.A. AVIA 7/3014
The No5 Mk II was introduced. It was slightly longer, the graticule was fitted between the field lens and the prism, the prism mounts were reinforced and the focussing ring was narrower	W.Reid, Army Museum Yearbook 1983
24 March, a memorandum from the Royal Engineers and Signals Board considers obtaining a Goerz 10 X 80 binocular and comparing it to a ROSS 10X binocular.	N.A. AVIA 7/3014 A Goerz is ordered as a duty free temporary impo The ROSS 10 X 70 used was the one with 8 air/ glass surfaces and a Field of view of 8.25 degree It was on a base plate with grooved slides carryin two separate telescopes with right angle eyepiece It had a light transmission of 61% compared to 46 on the Goerz. Generally the ROSS was thought t be superior. However the eye relief on the ROSS was only 13mm against 19mm on the Goerz.
25 March, a manuscript note in the file refers to the ROSS 4 X , 12 degree field as the STEPAIR.	N.A. AVIA 7/3014
For the year ending 31 March the Director of Army Contracts reported	N.A. WO 395/6

that £220.000 had been spent on Binoculars and Telescopes. No details supplied.	This was the final report by the Director of Army Contracts.
1 April, the cost of the ROSS 10 X 70 would be in the region of £55 if proceeded with.	N.A. AVIA 7/3014
2 May, an Admiralty Report confirmed allegations that the German Binoctar 7 X 50 binocular to the issued Navy binocular. Three binoculars already in the stock of the Admiralty Research Laboratory a Barr and Stroud Pattern 1900 purchased in 1931, a ROSS STEPNITE purchased in 1932 and a Zeiss BINOCTAR from 1927 and a more recent Barr and Stroud 1900A were compared. Under daylight conditions the Zeiss came first, the ROSS second and the Barr and Strouds' third and fourth. To counter any claim that the STEPNITE was an exceptional model nine other STEPNITES were borrowed from the War Office. Their examination showed that the STEPNITES being supplied to the War Office were definitely inferior to the model bought in 1932. ROSS Ltd. admitted they were aware of the deterioration. The early STEPLITE supplied to the civilian market had prisms of Barium Light Flint specially selected to be free of bubbles. For the purposes of large contracts this process so increased optical production costs that ROSS were 'compelled' to substitute less seedy Light Flint Glass then went on to use Ordinary Dense Flint Glass. ROSS claimed it was neither possible nor practicable to introduce concurrent changes in lens curves to balance the variation in the refractive properties of the prism glass, with the result that there has inevitably been introduced a certain loss of covering power in the definition. Nevertheless even the ROSS glasses with the Dense Flint prisms was superior to the Barr and Stroud glass. The current Zeiss BINOCTAR had a light transmission of 61% but less than the British glasses. However it possessed the best definition.	N.A. ADM 204/2024 The cementing of optical components reduced glass to air surfaces and improved light transmission but extra lens elements removed aberrations.
29 July, ROSS had submitted a proposal for modifying the prism cradle mount on a Sound Locator with a view to reducing its weight.	N.A. AVIA 7/3014 Nothing in file to confirm whether idea taken up o

	Parts made from gun metal to be made from alumium and stainless steel.	not.
	11 August, Thomas Yeomans BAKER and J.W.HASSELKUS applied for a Patent for Improvements in and Relating to Range Finders.	Patent 579,036
	6 September, the firm of Cooke, Troughton and Simms Ltd put forward a new binocular design for use with Sound Locators incorporating a mirror and a reversing prism which avoids the reversed image of the ROSS suggestion in November 1937.	N.A. AVIA 7/3014 Apparently 500 binocular telescopes for Sound Locators were wanted and contracts should be placed by Januiary 1939.
	27 September, Cooke Troughton and Simms offer to make a sample binocular for £150 plus £50 for drawings.	N.A. AVIA 7/3014
	18 November, Cooke Troughton and Simms write saying they have stopped work on sample because of confusing instructions from different departments.	N.A. AVIA 7/3014 A sample was delivered on 27 January 1939 By 11 October 1939 it was decided not to proceed with this design.
	31 December, the Net Profit was £25,486 out of which £9,105 was paid in Tax. The factory was still working at great pressure.	Annual Account, £6,910 paid out in Dividends, £1,540 paid into the Staff Benevolent Fund.
C.1939	The ROSS Binocular and Telescope Catalogue lists the following; Extra Wide Field Models The STEPLOW 4X 24, eyepiece focus £14-00-00 The STEPLITE 7X 30, centre focus £16-10-00 The STEPLUX 7X 50, centre focus £25-00-00 The STEPNITE 7X 50, eyepiece focus £23-13-00 The STEPMUR 10X 50 centre focus £27-05-00 The STEPSAK 10X 50 eyepiece focus £25-17-00 The STEPSUN 12X 50 centre focus £28-05-00 The STEPRAY 12X 50 eyepiece focus £26-19-00 The STEPNADA centre focus £15-02-06 The STEPNAC 6X 30 eyepiece focus £14-06-00	Undated ROSS Catalogue A civilian version of the Military No 6, probably a means of using up surplus production.

	The STEPLAWE 8X 30 eyepiece focus £14-06-00 The STEPRUVA 9X 35 centre focus £17-06-06 The STEPMAB 9X 35 eyepiece focus £16-10-00 The STEPRAD 12X 35 eyepiece focus £17-12-00 Wide Field Model The STEPROSE 8X 24 centre focus £13-09-06 Monoculars The STEPIB 6X 30 £7-14-00 The STEPIF 7X 30 £805-00 The STEPMONITE 7X 50 £12-13-00 The STEPIK 8X 30 £7-14-00 The STEPIC 9X 35 £8-16 The STEPMONAK 10X 50 £13-05-00 The STEPID 12X 35 £8-16-00 The STEPMONRAY 12X 50 £14-06-00 Graticules could be fitted to eyepiece focusing models for £1-07-06 Telescopes !8 models of draw type telescopes were listed with one to four draws with objectives 1.25 to 3 inches, costing from £5-10-00 to £28-06-06 Prismatic Telescopes The TRITELBIN binocular 12X,24X 42X 60mm objective, £93-10-00 or £88-00-00 according to stand. The TRITELMON monocular, £44-00-00 or £38-10-00 according to stand Astronomical Objectives Two elements 3 to 8 inches in diameter £13-04-00 to £176-00-00 Three elements 3 to 8 inches £19-16-00 to £352-00-00. Rifle Sight Variable Power 1.75X to 4X £16-10-00	The last model to use the Ross pattern hinge.
1939	The Factory was fully employed working for the re-armament programme	Annual Report
	ROSS had an eight page advertisement in the British Journal Almanac. Five pages were devoted to photographic lenses, two to Epidiascopes and one to binoculars. Illustrated were 7X 50 centre focus STEPLUX and the 7X 30 centre focus STEPLITE.	British Journal Almanac 1939

	The Army and Navy Stores Catalogue listed 7 ROSS prismatic binoculars, the STEPLITE,STEPNITE,STEPSAK, STEPRAY, STEPNADA,STEPLAWE and STEPRUVA prices as ROSS catalogue.	Army and Navy Stores Catalogue 1939
	TAYLOR and HOBSON provided with Government funds to obtain and equip a factory to produce 2,000 No. 2 binoculars a month.	W.Reid, Army Museum Yearbook 1983.
	BARR and STROUD producing up to 1,000 binoculars per month.	R.Moss and I.Russell, Range and Vision. Barr & Stroud produce 75,000 7X 50s during Wa
	3 September, War is Declared.	
	9 October, J.W.HASSELKUS and Gordon Henry COOK applied for a Patent for Improvements in or Relating to Objectives suitable for Photographic Purposes.of five elements.	Patent 535,480
	31 December, the Net Profit was £58,102 out of which £42,811 was paid out as Tax.	Annual Accounts, £5,250 paid out in Dividends, £1,950 to the Staff Benevolent Fund.
1940	6 December, T.Y.BAKER of 11 Westernhay Road, Leicester and J.W.HASSELKUS applied for a Patent for Improvements in Naval Range Finders.	Patent 580,804
	The Government had 6809 No. 5 Binoculars in stock.	W.Reid, Army Museum Yearbook 1983.
	6 September, the Ministry of Supply conceives the idea of a number of Shadow Factories for Optical Instruments. These factories would provide extra manufacturing capacity for several firms an also allow for war damage as had been suffered by ROSS LTD.	N.A. WO 185/86
	19 September, a meeting in Room 213 Great Westminster House, Horseferry Road to discuss the proposals for Shadow Factories. Present were, Sir Frank SMITH, Director of Instrument Production, Mr. A.W. ANGUS his deputy, Commander J. McKENZIE GRIEVE from the Admiralty, Captain T.MARTIN Assistant Director Instrument Production,Mr. A.SIMMS of Cooke, Troughton and Simms,	N.A. WO 185/86

Mr. G.WHIPPLE of E.R.Watts and Son Ltd.,Mark TAYLOR and E.ORAM of Taylor, Taylor and Hobson Ltd.,F. MORRISON of Barr and Stroud, Commander W.P. PIRIE of A.Kershaw and Sons Ltd., Mr. W.E. WATSON BAKER and C.REYERSBACH of W.Watson and Sons Ltd. and Mr. A.D.C. PARSONS of ROSS LTD.
Sir Frank outlined the basis of the scheme, factories to be housed in existing buildings and to be able to use up to 1500 workers. Each firm to suply a quota of skilled men and the necessary machinery to start off.
It was agreed; 1. The Government should be financially responsible for setting up, 2. Jigs and tools were to be duplicated in readiness for use at the shadow factory, 3. Where more than one firm occupied premises they could share a shop for glass roughing and polishing. 4. In machine shops machines to be used in common, care to be taken to avoid duplication and to keep equipment working at full capacity, 5. Management arrangements might be difficult would need careful consideration. 6. There should be two sites, one for northern firms and one for southern firms.
Mr MORRISON of Barr and Stroud said that co-operatives would be very hard to achieve, definite sole occupancy alternatives would be preferable. Barr and Stroud had already decentralised in Scotland. It was decided that Barr and Stroud would not need to be involved.
The needs of the Armed Services and the Ministry of Supply would be considered equally in deciding which instruments would be included in the scheme.
ROSS LTD. and E.R.Watts and Sons Ltd (in Camberwell) had already suffered from enemy action were to take the initial steps to provide a nucleus for one of the new factories.

6 November, One of the main difficulties being raised was that of moving and housing workers in the new areas. It was decided to look as far as possible for premises not too distant from the parent firm. Four possible premises had been located.

N.A. WO 186/85

1. In Nottingham, up to 48,000 square feet on three floors in part of the Players cigarette factory. It would need air raid shelters built. This was for ROSS LTD and E.R.Watts and Sons Ltd. They would be the only firms to share premises.

2. In Leicester 11,000 square feet at Oadby for Taylor, Taylor and Hobson. There was an alternative at Kent Street in Leicester.
3. In York 14,000 square feet in Terry's chocolate works for Cooke, Troughton and Simms. There was an alternative in Rowntrees chocolate works.
4. In Leeds 15,000 square feet in a building belonging to Leeds Gas Corporation, this was for A.Kershaw and Sons Ltd.

22 November, the four premises were requisitioned by the Ministry of Supply. N.A. WO 186/85

29 November, ROSS LTD and E.R.Watts and Sons Ltd wrote identical letters to the Ministry of Supply regarding the Shadow Factories. They pointed out that whilst the move was under way and until it was fully operational production would drop. They wanted to run it as a joint concern. They requested that no additional financial burdens be placed on the firms either now or after the war in respect of capital charges and revenue charges. They requested the usage of progress payments as used with the Admiralty. They asked for freedom as to the instruments or components to be manufactured in the new works. They wanted a full statement of future requirements of instruments before planning the factory. They wanted a van with sufficient fuel to be provided for transport between London and Nottingham.They wanted direct telephone lines between the works. They asked for assistance in dispersal schemes. Labour was consiodered the most difficult problem assurance was wanted re billetting and allowances for those transferred from London including financial assistance for those moving home. N.A. WO 186/85

6 December, the Ministry of Supply decides that the firms occupying shadow factories will only work on government contracts which will be costed. All instruments will be for the Services, no manufacturing for civilian trade. The Ministry will rent the premises and may pass on to the firms involved. The expense of new plant will also be borne by the Ministry and will remain Government property. N.A. WO 186/85

	December, The half yearly Report of the British Scientific Instrument Research Association noted that ROSS Ltd. were constructing a new reflecting lens mirror with a very wide aperture F.1. for use with an infra red telescope to be tested by the Admiralty Research Laboratory	N.A. ADM1/15159
	31 December, the Net Profit was £54,717 of which £49,824 was paid out in Tax.	Annual Accounts,£3,300 paid out in Dividends an £2,000 to the Staff Benevolent Fund.
1941	13 January, a meeting in Room 126 great Westminster House between the Ministry of Supply Officials and Mr. A.D.C. PARSONS and J.W.HASSELKUS for ROSS LTD. and Mr. G.WHIPPLE for E.R.Watts and Son Ltd. to discuss the firms' letters of 29 November. The Ministry expressed the view that the scheme should be regarded as containing elements of dispersal and of extra capacity, not exclusively one or the other. Mr. HASSELKUS stated that ROSS wanted to avoid dispersal as such. It would seriously interfere with production. Their intention was to create additional or alternative capacity especially for the No.5 Binocular and Identification Telescopes. The Ministry agreed ROSS was a special case and a complete manufacturing unit for No. 5 Binoculars should be set up without robbing the existing plant at Clapham. The factory had been requisitioned in Nottingham. The occupiers would be tenants of the Ministry and called upon to pay rent. Mr. HASSELKUS said he was anxious about the magnitude of such a rent in view of the high capital cost. He feared the rent would be so high that the occupier would make a considerable financial loss. The Ministry said it was not their purpose to impose a heavy burden on contractors. On this basis the firms agreed to rental charges. Captain HUME suggested the formation of a Company to operate the Nottigham factory by the two occupiers , sharing the costs and keeping it separate from the parent companies. Mr. HASSELKUS said it was the intention of the two firms to pool resources, they would discuss Captain HUME's suggestion. The Ministry stated they would pay the bulk of the costs for preparing the building, including the installation of new plant and machinery.	N.A. WO 186/85

They would also cover the costs of transferring any machinery from London. The firms should approach the Labour Exchange regarding the costs of transferring personnel.
Mr. HASSELKUS asked was it intended that the firms should bear the heavy financial burden of the working capital.
The Ministry suggested the firms should ask their bankers to provide this, it might be necessary to provide suitable guarantees by the parent firms. Could not the new Company be a sub-contractor to the parent firms.
The Ministry would bear the cost of a motor lorry between London and Nottingham. The firms should approach the Post Office regarding the direct telephone lines.

The Parker-Hale Ltd. Catalogue include a ROSS Variable Power (1.75X - 4X) telescopic sight. The objective is an achromatic doublet, the eyepiece consists of two achromatic doublets, the erecting lens is a triplet. The cost is £15.

Parker-Hale Ltd Catalogue 1941

During 1941 and 1942 the Admiralty Research Laboratory and the National Physical Laboratory carried out comparative tests on four Zeiss 7 X 50 binoculars from a captured submarine. Two were of Porro 1 type, one Septarem and one heavy (14 lbs) fixed focus model. They were compared to a number of Barr and Stroud AP 1900'S, two ROSS Stepnites and a ROSS G.352 binocular. Optically there was not much difference between the German and British although the German lens coating was slightly better. However in the area of sealing and water tightness the German equipment was noticeably superior. All of the British hand held binoculars failed the tests. Apart from leaking from the eyepieces and objectives the ROSS's also displayed porous bodies.

N.A. ADM 1/15124, ADM 204/566 and ADM 204/5

31 January, T.Y.BAKER, J.W.HASSELKUS and ROSS LTD applied for a Patent for improvements in or relating to Bubble Sextants.

Patent 581,722

The British Optical Industry was compared badly to the German and American industries. There was a lack of skilled workers, little

F.Twyman, The Future of the British Optical Indus published privately.

research and a lack of commercial enterprise. Exceptions were ROSS Ltd's and Taylor Hobson Ltd's contributions to the cinema with with lenses for projectors and cameras.

31 March, Mr. A.D.C. PARSONS of ROSS LTD. wrote to the Ministry of Supply.He had visited the Nottingham premises and discussed the requirements for alterations with Players. He was impressed by their efficiency and economy. He estimated that £16,000 was needed for services and machinery installation.	N.A. WO 186/85
5 April, Ministry memorandum, costs for Nottingham up to £115,607.	N.A. WO 186/85
22 May, there was a meeting of Royal Air Force Officials where the use of binoculars on board aircraft was discussed. Some trials had been carried out with ROSS 7 X 50's and Hughes 2.5X galilean glasses. The results were not conclusive but the 7 X 50's showed good value for air to ground use. The Committee wanted to trial the ROSS No 6 4X binoculars, particularly as the Army was making that model obsolescent and they might well become available. It was noted that Coastal Command did not have any binoculars, they should also trial the ROSS 7 X 50's and 4 X 24's. It was pointed out that no existing fighter was suitable for binocular use owing a lack of space and vibration.	N.A. AIR 20/3508
4 June, Nottingham Instruments Ltd. was registered, the first Article of Association stated that the object of the Company was to carry on the business of Opticians and manufacturers of and dealers in photographic lenses, cameras, microscopes, telescopes, field, race, opera and marine glasses, binoculars and other optical, photographic and similar instruments.	N.A. WO 186/85
The share capital was £100 split 74 shares to ROSS LTD. and 26 to E.R.Wattts and Son Ltd. ROSS could appoint three directors including the Chairman, E.R.Watts could appoint two directors.	Ross Ltd. Annual Balance Sheets note the £74.
13 June, Mr. A.D.C.PARSONS of ROSS LTD. wrote to Captain MARTIN at the Ministry of Supply. Until the completion of legal formalities ROSS LTD. has financed all the outgoings concerning the	N.A. WO 186/85

Nottigham factory. Now the new company, Nottingham Instruments Ltd. has been registered and it is felt that the terms suggested at the meeting on 13 January should be adopted. In the near future machine tools etc. will come in at an increasing rate, calling for considerable sums. The Westminster Bank will act for N.I.Ltd. Our situation has been fully explained to Sir Charles LIDBURY of Westminster Bank. He would like to assist but as the new Company has only a capital of £100 and no assets he requires assurances from the Ministry. He would send Bank representatives to the Ministry.

17 June, a meeting in Room 266,the Adelphi between Officials of the Ministry of Supply, Mr. WHIPPLE of E.R.Watts and Son Ltd, Mr. A.D.C. PARSONS and two Solicitors representing ROSS LTD. They discussed the financial terms for operating the Nottingham factory. Captain HUME of the Ministry said there was no objection to starting off the factory on an agency basis, giving the Management the option to discontinue the agency at any time and take over as a private enterprise on the following terms; N.A. WO 186/85

1. The tenancy can be ended at any time by the Ministry, the Company to occupy for the period of requisition.
2. All Government work to have priority.
3. The rent to be (a) for building, that payable by the department under requisition and (b) for plant, 4% of cost, plus depreciation at Income Tax values.
4. Any planning fee or other payment for supervision of the arrangement of the Nottingham factory not to be claimed by the Management Company.

it was generally agreed that the simplest methods should be used to place orders with Nottingham. They would be subject to the same cost control as in London.

The question of any fee paid by the Ministry to Nottingham Instruments Ltd. for the management was discussed. Captain HUME suggested that any fee would cover all supervising services by ROSS and E.R. Watts and direct payment for full time employees at Nottingham out of the imprest. Travelling and subsistence for the London based Directors waould come out of the imprest.

It was estimated that approximately £200,000 of capital would be

engaged in the Nottingham business and turnover might be above £250,000. Mr. PARSONs suggested a fee of £3,000 per annum. Captain HUME said he would consult in the Ministry.

27 June, a meeting in Room 266 , the Adelphi between Ministry Officials, Mr. WHIPPLE of E.R.Watts and Son Ltd., Mr.A.D.C. PARSONS of ROSS LTD. and Mr. NORRIS of Westminster Bank. N.A. WO 186/85

The meeting was in continuation of the meeting of 17 June. The Ministry put forward three choices for carrying out future contracts.

1. Contracts could direct to Nottingham Instruments Ltd.
2. N.I. Ltd. could act as a sub-contractor to the parent companies.
3. That N.I. Ltd. should be a Ministry of Supply Agency factory with N.I. Ltd. managing the factory for a fee.

If 1 or 2 adopted, the working capital would have to be provided by N.I. Ltd. £25,000 was the suggested peak requirement.

Mr NORRIS said in view of the £100 capital of N.I. Ltd. the bank would not entertain such a sum. Even the award of contracts would not satisfy the bank.

Neither ROSS nor E.R.Watts was prepared to give guarantees as suggested earlier.

The Ministry pointed out that if operated as an Agency then there would not be any profits to the parents companies. Nor would they be able to utilise Nottingham in the event of air raid damage.

ROSS and E.R. watts said this was an argument against Agency status.

Captain HUME said if ROSS and E.R. Watts wanted to retain freedom of action at Nottingham and operate for their gain then the financing must be met by them.

7 July, Mr. A.D.C. PARSONS wrote to Ministry on behalf of ROSS LTD and Nottingham Instruments Ltd. regarding the meeting on 27 June. Set out the three options so far;

1. Contracts to the parent companies who would sub-contract to N.I. Ltd. The parent companies to provide the working capital.
2. Contracts direct to N.I. Ltd., but N.I. Ltd. free to undertake any work on the understanding it would not interfere with Ministry of Supply contracts. The parent companies would provide the working capital.

3. N.I.Ltd. would act as an Agent of the Ministry. The Ministry would bear the entire financial burden.
Since the inception of the Shadow Factory Scheme which was intended to increase production and provide a degree of dispersion, ROSS and E.R. Watts had expressed the view they would be unable to bear any financial burden.
ROSS and E.R.Watts appreciated the Ministry's views on private enterprise but would point out that since the great expansion in the optical industry during and just prior to the war. Both ROSS and E.R. Watts have expanded to several times their previous size. The expansion was mainly financed privately mainly on property close to the main bases of the Companies.
Nottingham, is quite different, all the labour will have to be trained. It will be necessary to denude the London factories of their best workers.
The parent Companies want to proceed on following lines;
By adopting options one or two the parent companies would incur a considerable financial burden without any financial gain. It is impossible to estimate accurately as there are so many uncertainties.
PARSONS suggests a fourth option, on the understanding they are protected from loss in respect of Nottingham Instruments Ltd.
Suggested wording, ' The Ministry of Supply will indemnify Messers ROSS LTD. and E.R.Watts and Son Ltd. from any expenses or losses incurred or made by N.I.Ltd. if and so far as such expenses or losses are not repaid out of profits made from contracts carried out for the Ministry of Supply at Nottingham, and accordingly, forthwith on the cessation or determination of such contracts to be carried out at Nottingham or in the event of the volume of work entailed by such contracts being insufficient to warrant the continuance of the Nottingham factory the Ministry will p[ay to Messers ROSS LTD. and E.R.Watts Ltd. a sum equal to the amount of the expenses or losses in respect of the Nottingham factory which have not at that date been repaid or recovered out of profits made by such contracts.'

The minimal references in the Balance Sheets of Ross Ltd. suggests that option 3 may have been adopted.

8 July, Ministry of Supply memo, concern that the Nottingham factory was not yet in production. It was most desirable that the products of ROSS and E.R.Watts be dispersed and increased. It will give a measure of insurance should they suffer major war damage. Can the

N.A. WO 186/85

There is nothing later in the file to suggest what was the outcome of these discussions on financir

financial arrangements be speeded up.

Nottingham Instruments Ltd.

30 July, J.W.HASSELKUS and other trade representatives attended the 3rd meeting of the Sub Committee on the Ideal Organisation of the Scientific and Optical Instrument Industry. The Ministry Officials stated it was essential that the Industry be organised on an efficient basis to meet not only Wartime needs but also to face overseas peace time competition. The Chairman asked HASSELKUS to prepare a note of the set up of the German Industry as at 1938. The role of the Scientific Instrument Makers Association was considered, it represented most of the major firms with the exception of Barr and Stroud Ltd. It was suggested that firms in the same line of production should amalgamate. That there should be a series of amalgamations resulting in production units of 500 to 1000 workers.That there should be a separate research and development group making its results available to members of the Association.
HASSELKUS said that it was possible that voluntary co-operation between members might be started under the auspices of S.I.M.A. and that coercion at present, at any rate, would be unecessary. With regard to checking competition it should be borne in mind that many firms were now entering for the first time the scientific and optical instrument market under the pressure of war requirements, so that competition in the future would tend to become even more intensive than before unless some form of co-operation were established

N.A. BT 28/1187
The Sub Committee had be set up by the Commit
on Imperial Defence in July 1939.
The file has no reference to any meetings after th

By August Capt. T.Y.BAKER and W.T. JONES had left the Board of Directors .Owen George HAY and William Thomas RICKETTS were appointed to the Board.

A.G.M.

21 August, J.W.HASSELKUS and Joseph HAMAK applied for a Patent for Improvements relating to the Mounting of Optical Devices. It involved providing a means of restricting lateral movements of an optical component such as a prism fitted to a plate.

Patent 551,479
Possibly for the No.5 Mk IV.

21 November, the No 5 Mks III and IV were introduced. The Mk III had a new objective lens assembly, The Mk IV a new prism assembly to facilitate manufacture.

W.Reid, Army Museum Yearbook 1983

	31 December, the Net Profit was £57,962 of which £49,112 was paid out in Tax.	Annual Accounts, £4,050 was paid out in Dividen £2,000 went to the Staff Benevolent Fund.
1942	The ROSS advert covered eight pages. Three pages of camera lenses. One page was devoted to a range of Wide Angle Survey Lenses for aerial work. One page to developing lenses, Two to Epidiascopes and one page on the STEPLUX binocular.	The British Journal Almanac 1942
	12 February, The Admiralty called for reports on the suitability of the Pattern 2112 10 X 70 binoculars (by ROSS Ltd.) for air or surface purposes by day and night compared with the Pattern 1900 (7 X 50) type.	N.A. ADM 1/15123
	June, A crackle paint finish was introduced as an alternative to the usual vulcanite covering.	W.Reid, Army Museum Yearbook 1983
	June, a National Physical Laboratory report on testing various binoculars including 3.5 X 24 Sn. 117185, 7 X 50 Sns. 112916 and 113847 by ROSS and a Zeiss 8 X 56, came to the conclusion that exit pupils of 7mm were best for night use and 'blooming' the lenses improved light transmission.	N.A. ADM 212/95 112916 with coating gave 76% light transmission, 113847 uncoated gave 65%.
	22 August, the Director of Naval Ordnance requested a large scale test on Barr and Stroud AP 1900 binoculars with regard to their sealing 40 current production samples with serial numbers between 34294 and 41096 were put through tests for sealing and water tightness. It was established that had been improvements in the threads of the eyepieces and the fitting of rubber rings in the objectives. However less than half passed the water tightness test. Most leakages were from the objectives, then the eyecup and the prism box joints. A new compound, Balsamoid, was used to cement the prisms and this was very strong.There was criticism of the factory assembly with many samples found to contain flecks of paint, moisture and hairs.	N.A. ADM 204/568
	31 December, the Net Profit was £99,478 of which £91,315 was paid out in Tax.	Annual Accounts, £4,050 was paid out in Dividen

1943	During the year A.D.C.PARSONS appointed Chairman and Managing Director	Annual Report for 1946
	8 February, noted in a memorandum from the Superintendent of the Admiralty Research Laboratory that ROSS had been given developmental contracts in respect of experiments to determine the most suitable magnification for future tank telescopes.	N.A. ADM 1/15147 The Admiralty Research Laboratory undertook research and development of optical equipment for the Services.
	30 March, J.HASSELKUS writes to a Dr. Spencer in the Ministry of Aircraft Production regarding the development of a prototype 20 inch lens for aerial photography. In the course of the letter he refers to three orders for a total of 5200 lenses.	N.A. AVIA 15/3089 Over the course of the years 1943 to 1947 ROSS (and other firms including Wray and Taylor, Taylo Hobson) submit several prototypes in focal lengtl 12 to 50 inches. Those above 20 inches had to b of the telephoto type to fit into the standard came housings. They were compared to the standard 20 inch (from 1918) and standard 36 inch lenses Generally there was an improvement but usually i was considered not enough to justify putting the prototypes into production.The question was raise why the lack of improvement ? Was it due to the quality of the glass used or due to poor design. Tl file does not give any answer. N.A. files relating to tests include, AVIA 6/12879, 6/12891, 6/12897, 6/12900, 6/12913, 6/12922, 6/12940, 6/12941 and 6/12961.
	August, the Royal Aircraft Establishment Farnborough reported on tests of a ROSS 20" ASTRO Lens No 174856 in comparison with a 20" AVIAR lens from 1918 and a 36" Booth Telephoto by ROSS No 275667. The tests were conducted at a height of 18,000 feet. It was found that the new ASTRO lens did not provide an improved overall performance. It was suggested that improvements of the off-axis performance should be attempted.	N.A. AVIA 6/12871
	8 October, J.W.HASSELKUS and William Thomas RICKETS applied for a Patent for Improvements relating to the Mounting of	Patent 568,590

	Lenses or other Optical Elements. A means of providing an airtight seal using molten metal.	
	The No 5 Mk V was introduced with improved sealing against rain or immersion in water.	W.Reid Army Museum yearbook 1983 Patent 568,590
	13 October, The Admiralty Research Laboratory reported on claims that usage of the ROSS 10 X 70 Binocular, Pattern 2112, was causing eyestrain to the users. The Laboratory carried out extensive tests using eleven observers and a sample binocular, SN. 114256. It was found that the main causes were incorrect focussing technique , (users frequently set the eyepieces with excessive negative focus) and incorrect interocular distances. However it was noted that some instruments were out of alignment owing to their war time service.	N.A. ADM 204/649
	29 November, The Admiralty Research Laboratory reported into the Utility of Night Glasses with 8mm exit pupils.Two ROSS binoculars were used, a 10 X 80 Admiralty Pattern 12114 and a 5 X 40 Air Ministry Pattern Mk IV, 6E/383. Sets of 'stops' were fitted to the objective lenses to vary the size of the exit pupils from 2mm to 8mm in 1mm increments. The tests showed that the 8mm exit pupil compared to the standard 7 X 50 Admiralty Pattern 1900 gave a 10% improvement at half moonlight,15% at starlight and 25% on dark nights.	N.A. ADM 204/649 The 10 X 80 was SN. 110684.
	J.W.HASSELKUS awarded the C.B.E.	London Gazette 31 December 1943
	31 december, the Net Profit was £109,221 of which £101,044 was paid out in Tax.	Annual Accounts, £4,050 paid out in Dividends.
1944		The Annual Accounts for 1944 were missing.
	The Directors were J.HASSELKUS, Chairman and Managing Director, A.D.C. PARSONS Deputy Chairman, J.S.ATTLEE, O.G.HAY and W.T. RICKETTS.	Stock Exchange Year Book for 1945. Voting Rights were 1 vote per share for Preferred Shares,2 votes per share for Ordinary Shares, (originally mainly held by J.STUART) and 9 votes per share for A Ordinary shares (originally held b

		Sir C.A.PARSONS).
	January, The American Services contracted Universities to carry out research into binoculars suitable for night use. One set of tests compared binoculars with 5mm exit pupils but having magnifications from 6 X to 10X. The 6X and 7X gave better results than predicted, the higher powers were not considered as good. *Another set of tests compared binoculars with 50mm and 70mm objectives with varying exit pupils from 3.5mm to 10mm. The best 50mm result was with a 10X fitted with a wide angle eyepiece (7 *). This gave a 10% improvement. With the 70mm 10X also gave the best result being 5% better than the 10 X 50.*	N.A. ADM 212/95
	22 June, The Advisory Council on Scientific Research and Technical Development produced a Report re the future provision of scientific instruments. It proposed a strong committee representing the Fighting Services, D.S.I.R.,the Research Council and other interested user bodies. It should be able to advance substantial grants to encorage research, design and development. It should not have any administrative connection with the B.S.I.R.A.. Particular attention to be paid to instruments not yet made in the United Kingdom. The Government has agreed to remit tax on monies spent on research. After the War the Government will not put large quantities of scientific instruments onto the surplus market, as happened after the Great War The Government when placing contracts should take into account the level of research and development and not just go for the lowest tender. The internal organisation of the industry leaves much to be desired. Firms should be encouraged to make greater use of university trained staff, not just for reseach but for supervision and executive positions.	N.A. WO 195/6541
	31 December, Net Profit was £17,475.	Annual Report, £4,050 dividends paid.
1945	22 May, J.W.HASSELKUS and G.A.RICHMOND applied for a Patent for Improvements in and relating to Objectives Suitable for Photographic Purposes, inluding aerial survey.	Patent 592,144

	21 June, The Tank Armament Research Unit reported on trials with a ROSS Variable Power Telescope SN 54649. They came to the conclusion that the optimum instrument was between 5X to 7.5X with a 40' field of view.	N.A. WO 194/639
	After the War the British authorities interrogated a Professor Schober a German optical expert. He reported that in night use a correction of -2 dioptres compared to the daylight setting gave maximum acuity. Trials involving a thousand observers showed it was a definite advantage to have 7mm exit pupils. This conflicted with Zeiss's view that 5mm was best. In his view the best hand held specification was 8 X 50.	N.A. ADM 212/95 By German Navy
	31 December, Net Profit was £23,624.	Annual Accounts, £4,455 dividends paid.
1946	The ROSS advert covered eight pages. On the first page ROSS announced they were being released from War Work and would return to supplying peace time goods. On the second page it was stated that wherever possible all glass air surfaces would be 'coated' Then three pages of photographic lenses.One page lists the binoculars available, all coated on lenses and prisms. The STEPLITE 7X 30, centre focus, £28-05-00 The STEPNADA 7X 30, centre focus, £24-05-00 The STEPLUX 7X 50, centre focus, £35-05-00 The STEPNITE 7X 50, eyepiece focus, £33-05-00 The STEPRUVA 9X 35, centre focus, £27-05-00 The STEPMUR 10X 50, centre focus, £38-05-00 The STEPSAK 10X 50, eyepiece focus, £36-10-00 The STEPSUN 12X 50, centre focus, £39-15-00 The STEPRAY 12X 50, eyepiece focus, £38-00-00	The British Journal Almanac 1946
	One page on an Epidiascope and the last page on the ROSS G.C. Cinema Projector. The review section carried items on the ROSS coated enlarging lenses and the STEPLUX binocular.	The Epidiascope cost £59-10-0

	24 May, ROSS LTD and Gordon Henry COX applied for a Patent for Improvements relating to Wide Aperture Objectives using six elements. A development of Patent 507,590	Patent 612,474
	The Admiralty Gunnery Establishment, Teddington acting on an instruction in April conducted comparison tests on British and foreign binoculars with a view to disproving the claims that british binoculars were inferior. 117 foreign binoculars were obtained (of which 91% were German), 71 were of 6 X 30 specification the remaining 46 were either 7 X 50 or 10 X 50. british binoculars consisted 6 No. 2's and 6 No. 5's (3 ROSS and 3 N.I.L.) Generally the British 6 X 30's compared favourably except for weight and fineness of the graticules. The No.5's were generally at a disadvantage in respect of angular field, colour correction, eye freedom and graticules. There was no evidence that the British binoculars were inferior in magnification or definition compared to the stated specifications. In the parallelism tests 1 british and 21 foreign failed. Some Zeiss 10 X 50's were noted as having a 7 degree field of view compared to the 5 of other 10 X 50's . It was noted that except for two Leitz models all the German binoculars were coated.	N.A. ADM 263/156 The No.5 Mk 5's were ROSS 84238, 92015 and 93916 and N.I.L.105173, 107097 and 107153.
	24 October, by this date A.D.C.PARSONS B.A. was Chairman and Managing Director, O.G.HAY was Joint Managing Director, J.HASSELKUS C.B.E. (for War Work), W.T. RICKETTS and George WANSBOROUGH (who had replaced J.S.ATTLEE).	Annual Report It is not known why J.S.ATTLEE left the Board. H died in 1986 and was buried in the STUART famil grave at Ardingly.
	31 December, A Net Loss of £55,574, no dividend paid.	Annual Accounts, (the Company estimated it was due a repayment of £52,200 from the Governmer in respect of the Excess Profits Tax.)
C.1947	ROSS issued a loose leaf binocular catalogue. Several pages give advice on selection. All the nine models listed in 1946 are illustrated aqnd described. The prices are as 1946	Binocular Catalogue

1947	An Olive drab finish was authorised for service binoculars	W.Reid Army Museum Yearbook 1983
	15 to 26 February, British Industries Fair, ROSS Ltd. shown as Manufacturers of Cinematograph Projectors, Arc Lamps, Epidiascopes, Photgraphic Lenses, Binoculars, Telescopes, Scientific and Optical Instruments including Autocollimating Goniometer and Optical Benches and Special Optical Systems.	Grace's Guide, Internet 1st Fair after the War
	Nine binoculars listed, 7X 30 STEPLITE at £28-05s, 9X 35 STEPRUVA £27-05s,, 7X 30 STEPNADA £24-05s, 7X 50 STEPNITE £33-05s, 7X 50 STEPLUX £35-05s, 10X 50 STEPSAK £36-10s, 10X 50 STEPMUR £38-05s, 12X 50 STEPRAY £38-00s and 12X50 STEPSUN £39-00s.	1947 Catalogue
	During the year A.D.C. PARSONS resigned as Chairman and Managing Director owing to ill health, he remained a Director. J.HASSELKUS,now 72 years of age, was appointed Chairman and Joint Managing Director.	Annual Report
	13 November, an Extraordinary Meeting passed a Resolution that the number of Directors be not less than two nor more than six.	
	5 December at the A.G.M.a Mr Edwin ORAM was appointed a Director.	
	December, a Binocular leaflet was issued listing nine models. The STEPLITE has been replaced by the STEPVUE an 8X 30 and the STEPNADA has been replaced by the STEPTRON 8X 30. Claimed lenses and prisms were coated.	ROSS LIMITED leaflet dated 1247
		Annual Accounts for 1947 missing
1948	ROSS advertise the JUNIOR EPISCOPE no price stated	Advertisement
	March, A KERSHAW and SONS Ltd. acquired by Rank Precision Industries Ltd.	*They continued to make binoculars for the civilian market until C.1958 and obtained military contrac*

until C.1975

15 June, from this date the members of the Board of ROSS Ltd were Mr Lisle Horsford SPEIRS A.C.A. Chairman, John HASSELKUS C.B.E. Deputy Chairman and Joint Managing Director, Owen George HAY Joint Managing Director, Frederick William GREENWOOD, Edwin ORAM and William Thomas RICKETTS.

Letter to Stock Exchange 2 July 1948

25 June,The British Photographic Industries Ltd at its AGM announced it had acquired control of ROSS LTD by purchasing all 60,000 "A" Ordinary Shares which carried 75% of the voting rights (but only 25% of the available Capital). Some of the 60,000 Ordinary Shares were also obtained.
The purchase cost £200,000.
A new company, Barnet, Ensign Ross Ltd was to be set up to deal with the maketing of the group's products.

BPI correspondence in the Walthamstow Local History Archives.
BPI was effectiovely a holding company owning several companies supplying photographic equipment and materials. The main subsidiary was Barnet Ensign Ltd formed in 1945. The factory in Walthamstow made cameras under the Ensign name.
At one time they had been the largest camera makers in the British Empire with 7,000 workers.
In the years ending 31 December 1946 and 1947 B.P.I. had made trading profits of £57,721 and £94,698 and nett profits of £21,928 and £32,233.

There had been a severe decline in camera making. It was anticipated that a merger with ROSS Ltd would have the combined resources to make a strong business force.

5 July, a six month exposure trial on Admiralty type binoculars was completed in Port Harcourt, Nigeria. The binoculars were mainly of Barr and Stroud manufacture. The main purpose of the trial was to test various forms of anti-fungal paint.

N.A. AVIA 45/374
A photograph in the file showed that one of the models was a Barr and Stroud prototype CF 44 SN 89971 and another was a ROSS 7 X 56 SN 124932.

23 September, an Extraordinary General Meeting passed a resolution

It is possible this was to allow J.HASSELKUS to

	to allow paying pensions to former ROSS Ltd. staff	receive a pension when he left the Company afte 48 years.
	October, J.HASSELKUS resigned from ROSS LTD, his home address 29 Macaulay Road was adjacent to the works.	Who was Who
	31 December, year ending annual accounts separated the finances of BPI and ROSS Ltd. ROSS's trading profit was £36,495, Nett profit was £7,824. The Directors reported that sales declined during the second half of the year but export sales increased compared to 1947. The Directors of BPI were L.H.SPEIRS, F.W.GREENWOOD, A.W.SPROULL, E.S.BIRD and M.L.HILL. The Directors of ROSS LTD were L.H.SPIERS A.C.A. Chairman. Major General A.W.SPROULL C.B.,C.B.E.,B.Sc., F.C.G.I., M.I., Mech. E. M.I.E.E. Deputy Chairman and Joint Managing Director, O.G.HAY Joint Managing Director, W.T.RICKETTS, F.W. GREENWOOD and E.ORAM. Production of cameras continued at Walthamstow whilst lenses and binoculars was at Clapham.	BPI Annual Accounts, Walthamstow Local History Archives. ROSS LTD continued to submit annual accounts to the Stock Exchange whilst there were still some independent shareholders. B.P.I.'s trading profit was £95,773 and nett profit was £28,345
	31 December, ROSS LTD and G.A.RICHMOND applied for a Patent for Improvements relating to Ojectives Suitable for Photographic purposes. For wide angle lenses suitable for survey work, as in Patent 472,191.	Patent 656,011
1949	The Directory entry was amended to ; ROSS LIMITED Opticians, makers of 35mm cinematograph apparatus, 35mm projection lenses & prismatic binoculars. Gold medals and highest awards atall great International Exhibitions.	Kelly's Directory 1949 Last entry for 26 Conduit Street.
	A small booklet was issued by BARNET,ENSIGN and ROSS Ltd. announcing the uniting of two of the greatest and oldest british manufacturing companies and the adoption of a single entity.	Company Literature

	it claimed it was able to provide a full range of photographic and optical equipment. The new company could muster resources unmatched.	
	George Arthur RICHMOND, Chief Optical Designer at ROSS Ltd. awarded the O.B.E.	London Gazette 3 June 1949
	28 June, at AGM of B.P.I. the Directors reported that there was no dividend on the investment in ROSS Ltd.	
	George PENNIKET. Foreman at ROSS Ltd. awarded the B.E.M.	London Gazette 30 December 1949
	31 December, the nett profit of ROSS Ltd was £2024. Sales had contracted but due to economies made and improved methods of manufacture a small profit was achieved. An Optical System for Television Projection was being developed.	Annual Report No dividends paid
1950	The Directory entry now read; BARNET,ENSIGN ROSS LTD, Ensign cameras, roll films, X- ray films, photographic apparatus, Barnet photographic plates, flat films and papers. The addresses were shown as; Fulbourne Road, Walthamstow, E 17, Telelegraphic address BARENSCO EASPHONE LONDON, Telephone number LARkswood 5555. Ross Cinematograph apparatus 35 Regent Street, W.1. Telelephone number MAYfair 4316.	Kelly's Directory 1950 Barnet, Ensign Ross Ltd was set up to act as the marketing and trading arm of the group.
	3 May, the Board had the same six personnel as 1948 but Major General SPROULL was no longer Joint Managing Director, O.G.HAY was sole M.D.	
	23 November, ROSS LTD applied for a Patent for binoculars suitable for spectacle users. They incorporated much longer eye relief (approximately 24mm) than usual but the feature covered by the patent was a pad of rubber (or plastic) attached to the top of the focusing spindle which was to be held against the forehead, thus keeping the eyepieces at the correct distance. These pads were to	Patent 687,383. The drawings show what became the 8X 40 Spectaross model. Two other models for spectacle users were later produced. The 8X 35 Spectacle Solaross and the 9X 50 SPECNORI model. The inventor is shown as Owen George HAY

	be of different lengths to suit individual needs.	
	31 December, ROSS Ltd. made aTrading Profit of £28,360 and a Nett Profit of £3,936. The Directors claimed that new products recently developed were in production and the Company had a share in the Re-armament programme.	Annual Report, no dividend was paid. The Trading Profit of B.P.I. was £42,184 and the Profit was £3,973.
1951		
	10 January, J.W. HASSELKUS dies.	Who was who
1951	21 March, ROSS LTD applied for a Patent for improvements in telescopic rifle sights. The inventor was Douglas Gordon HUNTER.	Patent 704,350
	22 March, ROSS LTD aplied for a Patent for Improvements to Graticules for Optical Sighting Instruments employing a photo-engraving method. The inventor was Owen George HAY.	Patent 705,927
	4 July, by this date E.ORAM and W.T.RICKETTS had stood down from the Board.	Annual Report
	8 November, Owen George HAY of ROSS LTD applied for a Patent for a Optical Cement for joining lenses	Patent 708,362
	31 December, There was a Nett Profit of £20,866. The new products have had a satisfactory reception. The Company had a considerable volume of work for the Re-armament programme.	Annual Report. B.P.I.'s Annual report noted that ROSS Ltd's figur were now incorporated in theirs. B.P.I. made a Trading Loss of £59,000.
1952	The Directory entry was amended; BARNET,ENSIGN ROSS LIMITED Ensign cameras, roll films, X-ray films, photographic apparatus, Barnet photographic plates, flat films & papers. Ross cinematographic apparatus. The Regent Street address was dropped.	Kelly's Directory 1952
	BARNET ENSIGN ROSS LTD placed an eight page advertisement in theBritish Journal Almanac. Binoculars are referred to on the last page.Few details are given, only that the range covers from 8X to	.The British Journal Almanac (1952) Adverts.

	12X and states there is a new ROSS Operos Theatre Glass. Six cameras, four Ross camera lenses, three enlarging lenses and three lenses for use with Leica cameras are illustrated. There is also mention of projection equipment.	
	5 September, ROSS LTD, inventor O.G.HAY, applied for a Patent for a Photographic Device for Recording Television Images.	Patent 719,747
	17 september, at the A.G.M. of B.P.I. the Chairman stated that the results for 1951 were most disappointing despite the inclusion of ROSS Ltd's figures for the first time. The demand for sensitised paper had slackened, the projected sales of cameras at home and abroad had not been achieved, there was increased competition from Germany,Italy, Belgium and Japan. Camera production was to be halted until stocks were sold off.	B.P.I.'s Annual Accounts at Walthamstow Local History Archives.
	By the end of the year L.H.SPEIRS had been replaced as Chairman by R.L. TILLETT F.C.A. and a Mr. A.E.GREEN had joined the Board of ROSS Ltd.	Annual Report
1953	3 January, ROSS Ltd.'s financial year ended. There was a Nett Profit of £16,704.	Annual Report B.P.I.'s financial year also ended on 3 January. B.P.I. reported a Trading Loss of £200,396. B.P.I.'s Directors were R.L.TILLETT, A.E.GREEN F.W.GREENWOOD ,O.G.HAY and A.W.SPROUI
1953	During the year the name of Barnet, Ensign and Ross Ltd. changed its name to ROSS ENSIGN Ltd.	This probably reflected the greater importance of the ROSS contribution to B.P.I Ltd as the group's fourtunes declined.
	BARNET ENSIGN ROSS again placed an eight page advertisement in the Almanac. The front page reflected it was Coronation year. The content was little changed. Binoculars were said to range from 7X to 12X. The reviews in the Almanac covered the Operos Theatre Glasses A small galilean system with a magnification of about 2.5X The price was £5-5s plus 2s-1d purchase tax on the case. Also reviewed was the Spectaross 8X 40. It was supplied with four sizes	The British Journal Photographic Almanac 1953

	of pads, the price was £39 plus £2-0s-7d purchase tax on the case.	
	April,an eight page binocular brochure was issued. No company name is shown, just ROSS LONDON, Models shown were the Stepruva, Steptron, Stepvue, Steplux, Stepsun. Stepmur, Spectaross Tropical 7 and 10 and the Operos opera glass (new).	Ross London brochure 4/53.
	16 November, Barnet Ensign Ltd (inventor Edgar George ANSELL) applied for a patent for Improvements in Focusing Devices for Photographic Enlargers	*Patent 751,752* *Barnet Ensign Ltd was another B.P.I. Company*
	25 November, Barnet Ensign Ltd (inventor Douglas Gordon HUNTER) applied for a patent for Improvements to Photographic Shutters with a Flashgun .	Patent 757,353
	30 November, ROSS LTD, (inventor Owen George HAY) applied for a patent for Improvements in or relating to Stereoscopic Cameras	Patent 775,763
	By the end of the year a Mr F.N.DOIG had joined the Board of ROSS Ltd.	Annual Report
1954	1 January, end of ROSS Ltd.'s financial year. A Nett Loss of £3,405 was reported.	Annual Report B.P.I. reported a trading loss.
	The Directory entry was amended to; ROSS ENSIGN LTD. Ensign cameras, photographic apparatus & materials. Ross lenses binoculars & projectors. The telegraphic address was amended to; ENROS EASPHONE LONDON.	Kelly's Directory 1954 Replaced Barnet, Ensign Ross Ltd
	Another eight page advertisement appeared in the British Journal Almanac. Cameras listed were the new Ful-Vue Super, the Snapper The Selfix 16-20, 12-20, 820 Special and Autorange 16-20. Three pages dealt with the range of camera and enlarger lenses. An enlarger and film splicer. Nine binoculars were listed, the same as in	The British Journal Almanac 1954

	the April 1953 brochure. The Almanac include reviews of several Ross Ensign products; Process Lenses and Prisms, the Selfix 820 Special, Ross Guage Projection Lenses, Ross Optical Cement and the Ensign Snapper.	
	September, at the A.G.M. of B.P.I. Ltd. the Chairman admitted that there had been an unprecedented loss, partly due to poor trading and partly due to the closing down of parts of the Group. A factory in Warwick for making sensitised paper had been closed. It was agreed that the business should concentrate on photographic and optical equipment. Government Orders were hoped for. It was said that attention was being given to new designs and improved methods of manufacture.	B.P.I. Annual Report at Walthamstow Local Histo Archives.
	By the end of the year production at Walthamstow had ended and equipment was to be transferred to Clapham.	
	By the end of the year A.W.SPROULL and A.E.GREEN had left the Board of ROSS Ltd. and a Mr P.S. ANDREWS A.C.A., A.A.A. joined.	
	31 December, ROSS Ltd. reported a Nett profit of £16,227	Annual Report The B.P.I. Annual Report showed a Trading Loss of £75,042.
	December 31	A report in July 1962 made to Whitefriars Investm Trust Ltd stated that ROSS Ltd, ROSS ENSIGN L and BARNET ENSIGN Ltd together made a loss o $106,916.00
1955	The Directory address was amended to; Clapham Common, SW4, telephone number MACaulay 2472. The telegraphic address wasROSSICASTE LONDON.	Kelly's Directory 1955 This reflected the closing of the factory at Walthamstow and consolidation of manufacture at Clapham Common.
	The British Journal Almanac carried an eight page advertisement for ROSS ENSIGN LTD now with an address at Clapham Common. The front page showed various manufacturing processes. Three pages covered cameras, two pages enlarger and lenses, one	The British Journal Photographic Almanac 1955

	page on an Epidiascope and one on binoculars. The same nine models as 1954 were listed but the Tropicals were renamed Heavy Duty. The review section covered the Selfix 12-20 Special.	
	5 May, ROSS LTD, (inventor Maurice Henry Arthur DELLER) applied for a patent for a Reverse Telephoto Lens	
	At tthe A.G.M. of B.P.I. Ltd. the Chairman reported another year (1954) of substantial loss. It had been forseen that the concentration of manufacturing facilities into the ROSS factory at Clapham would result in severe dislocation. However it took longer than expected and was not completed until well into 1955. There was a breakdown in the stock department and manufacturing difficulties with one of the Group's best known products. However debts were paid off.	B.P.I.'s Directors were R.L.TILLETT, P.S.ANDRE\ O.G.HAY, F.W,GREENWOOD and F.N.DOIG.
	31 December, ROSS Ltd. reported a Nett Loss of £2,162. The Directors were R.L.TILLETT Chairman, O.G.HAY, P.S. ANDREWS, O.G.HAY and F.W.GREENWOOD.	This was the last Annual Report found for ROSS
	December 31	B.P.I. reported a Trading Loss. A report in July 1962 to Whitefriars Investment Tr Ltd. states that ROSS Ltd, ROSS ENSIGN Ltd an BARNET ENSIGN Ltd together made a loss of $61,779.00
1956	The Directory entry was amended to; ROSS ENSIGN LTD. Binocular Makers. This wording remained until 1965. The telegraphic address was amended to; ROSSICASTE SOUPHONE LONDON.	Kelly's Directory 1956
	The British Journal Photographic Almanac carried a four page advertisement by ROSS ENSIGN LTD. Very few details of the cameras and other items were provided. The review section covered the Autorange 820 Camera.	The British Journal Photgraphic Almanac 1956
		B.P.I. reported it's seventh consecutive loss.

	December 31	A report in July 1962 to Whitefriars Investment Tr Ltd. states that ROSS Ltd, ROSS ENSIGN Ltd an BARNET ENSIGN Ltd. together made a loss of $80,193.00
1957	The British Journal Almanac had only a two page advertisement by ROSS ENSIGN LTD, one page showed four cameras, the other three binoculars, the Stepsun, the Spectaross and the new Solaross 9 X 35.	The British Journal Photographic Almanac 1957 Ross's last advertisement in the BJ P Almanac
	1 March. From this date ROSS Ltd. was a private company with no need to submit reports to theStock Exchange.	B.P.I. records, Walthamstow Local History Archive
	26 June, ROSS LTD. took out a full page advertisement in Punch. It showed an illustration of 9X 35 Solaross and listed theaddresses of 133 british dealers.'	Reflecting the virtual demise of Ross Ensign and Barnet Ensign.
	December 31	A report in July to 1962 Whitefriars Investment Tr Ltd. states that ROSS L:td., ROSS ENSIGN Ltd. a BARNET ENSIGN Ltd. together made a loss of $30,559.00
1958		
	February,The Board of B.P.I. Directors was reconstituted with a brief to reduce the costs of production and effect economies in overheads. The Directors were R.H.LOVETT, A.C.PARSONS and H.W.LONG.	Walthamstow Local History archives
	A.Kershaw and Sons Ltd. cease making binoculars.	J.Hebditch, booklet on choosing binoculars 1959
	31 December, British Photographic Industries Ltd reported the first year of profit after seven years of losses. The gross profit was £11,186 after deductions the nett profit was £756. The overall deficit was £300,964.	B.P.I. Chairman's Statement 9 of B.P.I.s smaller subsidiaries had gone into voluntary liquidation, leaving Ross Ltd, Ross Ensign Ltd and Barnet Ensign Ltd.
	December 31	A report in July 1962 to Whitefriars Investment Tr Ltd. states that ROSS Ltd., ROSS ENSIGN Ltd. a BARNET ENSIGN Ltd. together made a profit of

$54,976.00

1959 January, The range of binoculars included; STEPTRON 8X 30, STEPVUE 8X 30,STEPRUVA 9X 35, SPECTAROSS 8X 40, STEPLUX 7X 50, TROPICAL 7X 40, STEPMUR 10X 50, STEPSUN 12X 50, and TROPICAL 10X 50. The SOLAROSS range consisted of a 7X 42,9 X 35, 12X 40, 15X 40 and the SPECTACLE 8X 35 model.
There was also a 20 X 60 Prismatic Spotting Scope.

British Trust for Ornithology booklet, How to choo and use field glasses.

This was originally sold by Parker-Hale Ltd as the Bisley Scope , later it carried the Ross name only

1959 A.G.M. of B.P.I. Ltd, the Chairman reported that the small profit was a welcome change after seven years of losses. Nine of the smaller subsidiaries which had ceased to trade were put into voluntary liquidation.The three remaining subsidiaries were ROSS Ltd, ROSS ENSIGN Ltd and BARNET ENSIGN Ltd. Two new Directors L.LEVER and M.DAVIS had worked full time on the changes.
O.G.HAY was the Technical Director of the three subsidiaries and H.R.PRICE was the Works Director of ROSS Ltd.

14 April, British Photographic Industries Ltd. of 3 Northside Clapham Common issued a Circular Letter to Stockholders with a Notice of Resolution regarding the sale of ROSS LTD, ROSS ENSIGN LTD and BARNET ENSIGN LTD. The Directors have entered into a conditional contract with SMITHEAST INVESTMENTS LTD to sell the 3 companies for £240,000 cash. Also the buyer will discharge all the inter company debts in full, (worth another £200,000). The contract is conditional upon being agreed the the B.P.I. shareholders. The purchasers will continue the present business. A further condition is that Mr.O.G.HAY who is Technical Director to all three Companies and Mr. H.R.PRICE who is Works Director of ROSS LTD will remain in post while all other Directors resign.
The Circular stated that the Directors owned 32% of B.P.I.'s issued capital and that the holder's of another 46% were in favour of the sale.

SMITHEAST INVESTMENTS Ltd. was a Trust set in favour of the children of a Louis LARHOLT. It w said that Mr LARHOLT had no beneficial interest in the Company.

1 May, The Resolution was passed at an Extraordinary Meeting.

	16 June, A Circular confirmed the sale of ROSS Ltd, ROSS ENSIGN Ltd and BARNET ENSIGN Ltd. to SMITHEAST INVESTMENTS Ltd. for £450,950.	Walthamstow Local History Archives. Smitheast Investments Ltd. was ostensibly a Trus set up for the benefit of the children of Louis Larholt. On paper Mr Larholt had no position with Smitheast Investments.
	19 June, SMITHEAST INVESTMENTS Ltd agreed to sell the Issued Share Capital in ROSS Ltd, ROSS ENSIGN Ltd. and BARNET ENSIGN Ltd to WHITEFRIARS INVESTMENT TRUST Ltd in return for 500,000 5 shilling shares in Whitefriars.	Whitefriars Annual Accounts in City of London Guildhall Library Archives. The Chairman and Managing Director of WHITEFRIARS INVESTMENT TRUST Ltd was Louis LARHOLT. Whitefriars was a holding company. It purchased subsidiary companies and collected the profits of these subsidiaries as dividends to the shareholde It charged large amounts for 'Management Services' to the subsidiaries. Whitefriars Financial year ended on 30 April. LARHOLT as MD of Whitefriars also became hea of the Boards of the subsidiary companies.
	29 July, Whitefriars Shareholders held an Extraordinary General Meeting and confirmed the agreement of 19 June.	Whitefriars Annual Accounts it was also agreed to increase the capital of the company to £1,000,00 by the creation of 2,800,000 5 shilling shares.
	17 October , ROSS LTD, (inventors Owen George HAY and Alan Charles SIBERT) applied for a patent for Improvements in and relating to Measurement of Rotor Angles in Alternators.	Patent 870,738
1960		
	30 April, ROSS Ltd., ROSS Ensign Ltd. and BARNET ENSIGN Ltd. contributed £139,265 to Whitefriar's income for the past year.	Whitefriars Annual Accounts
1961	2 Febrary, BARNET ENSIGN Ltd. ceased to trade. B.E.Ltd. was in discussions with the Inland Revenue over a liability in the region of £12,000.	Whitefriars Annual Accounts. (It is not clear whether the money was owed by o BARNET ENSIGN Ltd.)

	During the year ROSS Ltd. sold the freehold of its property at Northside Clapham Common for £266,000. After paying off an overdraft and l loans £55,000 was used to buy a company, Electrical Agencies (London) Ltd. ROSS Ltd. was to pay the new owner a rental of £25,000 per annum on a 42 year lease. This transaction necessitated the removal of machinery, the use of staff in the removal rather than production, the hiring of outside contractors.A considerable amount of production and trading was lost.	Although on paper ROSS Ltd. owned the new company . All this was carried out on the instructi of Whitefriars who collected most of the money. The identity of the purchaser is never revealed in the Whitefriars documents on file. More than 300 machines had to be moved.
	30 April, end of Whitefriars' Financial Year the ROSS companies had contributed £139,215 to the year's results.	Whitefriars Annual Accounts, probably mainly fro selling freehold.
1962	ROSS ENSIGN LTD was listed as one of nine suppliers of Galilean binoculars and one of sixteen suppliers of prismatic binoculars in the U.K. There were entries for ROSS LTD under Optical Glass and Lenses, (Achromatic,Anastigmatic,Bloomed,Camera and Photographic,Cinematograph,Condensers,Enlarging, Projectors and Telescopes) SOLAROSS was listed as a trade name of ROSS LTD	The British Instruments Directory and Buyers Gui 3rd Edition. The other suppliers were; Avimo Ltd, Barr & Stroud Ltd,Henry Browne & Son Ltd, B.Cooke & Son Ltd,Heath & Company, Heath Navigational Ltd,John Lilley & Co Ltd, Negretti & Zambra Ltd, Newbold & Bulford Ltd, Optical & Mechanical Instruments Ltd, W.Ottway & Co Ltd, Rank Precision Instruments Ltd, J.H.Steward Ltd, A.L.Vincent & Co.,Watson Manasty & Co Ltd, A.West & Partners Ltd and Wray (Optical Works Ltd.
	30 April, ROSS Ltd. and ROSS ENSIGN Ltd showed a trading loss of $22,000.00 ROSS ENSIGN Ltd was in discussions with the Inland Revenue over a tax liability in the region of £45,000.	Whitefriars Annual Accounts. Whitefriars made a net loss of £63,812. (It is not clear whether the money was owed by o to ROSS ENSIGN Ltd.)
	30 April, Share certificates representing Whitefriars' investment in ROSS Ltd., ROSS ENSIGN Ltd. and BARNET ENSIGN Ltd. were lodged with the National Union Bank as secuities for a loan.	Whitefriars Annual Accounts
	6 July, LARHOLT entered into a deed of mortgage with a bank. The bank advanced Mr LARHOLT £310,000 and he deposited with the	Whitefriars Annual Accounts

bank documents including a certificate for 500,000 Whitefriars shares.

August, a ROSS ENSIGN LTD price list showed the following items;
Solaross Models; 7 X 42 £25 -15s -4d, 8 X 40 £17 -17s -0d, 9 X 35 £19 -15s -4d, 12 X 40 £26 -0s -4d, 16 X 60 £32 -8s -8d and the spectacle 8 X 35 £28 -10s -4d.
Steptron 8 X 30 £36 -2s -0d, Stepvue 8 X 30 £35 -8s -0d, Stepruva 9 X 35 £38 -4s -3d, Spectaross 8 X 40 £47 -5s -8d, Steplux 7 X 50 £51 -17s -2d, Tropical 7 X 40 £53 -6s -10d , Stepmur 10 X 50 £56 -5s -2d, Stepsun 12 X 50 £57 -4s -5d and the Tropical 10 X 50 £62 -3s -9d.
Prismatic 20 X 60 Spotting Scope £26 -15s -0d.
A Epidiascope at £125 and an Episcope at £111 -15s -0d.
Also three Resolux enlarging lenses.

A Ross Ensign Pricelist stamped with the dealers' name, J.H.Steward 406 The Strand, London.
The attached catalogue shows name as ROSS Lt it does not include the SOLAROSS models 8X 40 and 16X 60 suggesting recently introduced.

19 October, The Clapham News and Observer published an article based on an interview with Mr H.R. PRICE, Managing Director of ROSS Ltd. There were 400 employees, some in their eighties. The Shop Steward in the glass polishing department was a Mr WARDLAW.
ROSS had worked with the English Glass Corporation in developing machines to simplify the making of wine glasses. A micro-reader introduced in 1961 is gaining much interest. Binoculars were the bread and butter lines of the Company.Mr PRICE said, 'We are the premier optical company in the United Kingdom at the moment but we want to be once again the premier company in the world'.

Clapham News and Observer, 19-10-1962
Clapham Common Library.

20 October, The interest on the £310,000 loan became due.
Mr LARHOLT resigned and a new Board was constituted and an investigation into Mr LARHOLT's activities , including unauthorised issuing of share certificates, was conducted.
The Stock Exchange suspended any dealings in Whitefriars shares.

Whitefriars Annual Accounts.The enquiry reporte that under LARHOLT Whitefriars had suffered fro embarkation into ventures which were not completed, but involved heavy expenses and the payment of very high and unjustified dividends. Tl subsidiaries had received calls for money which had drained resources and affected profitability. Whitefriars claimed LARHOLT owed the Compan £447,000. Recovery put into the hands of Solicito Proceedings stopped when Company went into

		receivership.
	31 December, profit from 1 May , for the ROSS Companies was estimated at around £20,000.	Whitefriars Annual Accounts. It was stated that ba weather in early 1963 probably meant that the estimated profit would not be obtained.
1963	March, A Catalogue listed the following; Solaross binoculars 8 X 40, 10 X 40, 8 X 35 Spectacle, 9 X 35, 12 X 40 and 16 X 60. The 7 X 50 Steplux, 8 X 30 Steptron, 8 X 40 Spectaross, 9 X 35 Stepruva, 10 X 50 Stepmur, 12 X 50 Stepsun and the 7 X 40 and 10 X 50 Tropicals. A 20 X 60 Spotting Scope, three Resolux enlarging lenses an Epidiascope and a Micro Reader.	Ross of London Catalog, no company name. bears stamp of J.H.Steward, 406 The Strand. The SOLAROSS 7X 42 and 15X 40 models were not listed.
	30 April, ROSS Ltd and ROSS ENSIGN Ltd had net loss of £6,730.	Whitefriars Annual Accounts
	21 November, at the A.G.M. of Whitefriars shareholders for the financial year ending 30 April 1962 hear the Chairman, Mr A.J.R. WHITEWAY report on the enquiry into the Company's position.	
1964	The telegraphic address was altered to; ENROS LONDON SW.	Kelly's Directory 1964
	8 Firms describe themselves as binocular makers, Barr and Stroud Ltd., Henry Browne and Son Ltd., Heath Navigational Ltd., Hilger and Watts Ltd., Newbold and Bulford Ltd., Rank Precision Instruments Ltd., (Kershaw) A.L.Vincent and Co. and Wray (Optical Works) Ltd.	The British Instrument Directory and Buyers Guid Ross is not included.
	15 May, Whitefriars gave notice of its A.G.M. on 10 June. Shareholders were advised that it had not been possible to settle the loan of £310,000 by means of a rights issue as the Stock Exchange suspension was still in place. Therefore a new loan of £332,000 had been obtained from Neubar SA, Geneva to pay off the first loan. he new loan was secured by a debenture upon the Company's assets including the subsidiaries.	Whitefriars Annual Accounts, an advance to be pa at 8% per annum by 27 July 1964.

	5 June, Neubar SA of Geneva appointed a Mr K.R.Cork F.C.A. as Receiver and Manager of Whitefriars and its subidiaries. including ROSS Ltd. and BARNET ENSIGN Ltd.	Whitefriars letter dated 25 Agust 1964. The Stock Exchange had not lifted the suspension on share dealings.
	10 June, Whitefriars A.G. M. held.	
1965	A Moss Bros. Catalog included Ross binoculars. 8 X 40 Spectaross, 9 X 50 Specnorma (new),8 X 35 Spectacle Solaross, 9 X 35 Stepruva, 11 X 50 Stepeleven (new), 8 X 30 Steptron, 7 X 40 Tropical, 7 X 50 Steplux, 8 X 40 Solaross, 9 X 35 Solaross, 10 X 40 Solaross (new ?), 12 X 40 and 16 x 60 Solaross. A 20 X 60 Spotting Scope. The Wallace Heaton Blue Book priced the Stepruva at £43 -4s -9d, the Specnorma at £59 -4s -5d and the Stepeleven at £57 -4s -5d.	Moss Brothers Catalogue of Binoculars and Telescopes. The 11 X 50 replaced the 10 X 50 Stepmur and 12 X 50 Stepsun models. WRAY was the only other british maker listed.
	May , the Army in the Far East carried out local tests on Yashica 6 X 30 binoculars to test the viability of replacing Kershaw No 2's. It was costing £3 per annum to service the Kershaws and £12-6-8 to replace . The Yashicas could be purchased for less than £4 each. Trials showed that the Yashicas were satisfactory for those users who did not need a graticule. It was planned to retain 860 Kershaws and purchase 1560 Yashicas.	N.A. WO 291/2352 The calculations in the file showed it was cheaper to replace the Yashicas after one year's service than to maintain the Kershaw No 2's.
	During the year Dollond and Aitchison dispose of WRAY (OPTICAL WORKS) Ltd to Hilger Watts Ltd. (later part of the Rank group).	H.Barty-King, Eyes Right.
1966	The Directory entry was amended to; ROSS LTD Optical Instrument Manufacturers This continued until 1974.	Kelly's Directory 1966
	20 July, by this date the Receiver of Whitefriars reported that all the tangible assets had been realised.	Stock Exchange Yearbook The Stock Exchange Yearbook entry for AVIMO shows R.L.Ross Ltd as a subsidiary, (noted for patenting a valve), it had no connection with ROS Ltd.

1967	There is no reference to ROSS Ltd etc.	Stock Exchange Yearbook 1967
1968	*Hilger and Watts Ltd. becomes a susidiary of Rank Precision Industries Ltd., the Ottway factory closes.*	B.Bracegirdle, Notes on Modern Microscope Manufacture
1969	April, the Royal Armoured Corps Equipment Trials Wing carried out tests comparing a Nottingham Instruments Ltd No 5 Mk 5 with fixed (by taping) eyepieces to a ROSS No 5. with standard eyepieces. generally users preferred the fixed eyepiece model. The lack of eye relief was noted. A general specification for a replacement binocular included longer eye relief, better sealing against dampness, sand and dust, better physical strength and cheaper to maintain.	N.A. WO 341/121
	30 December ROSS OPTICAL Ltd, Horsham, awarded a Royal Warrant as suppliers of binoculars.	The London Gazette The award was repeated until December 1978
1970	ROSS OPTICAL LTd. is listed as a subsidiary of Frank H.Ayling Ltd which is owned by ENSTOCK TRUST Ltd.	Stock Exchange Yearbook 1970. Enstock Trust L is a Holding Company owning a number of engineering businesses. Frank H.Ayling, company founded in 1927, by 19 it employed 500 on various engineering business Ross Optical's company registration No. was 77345,it was previously called Natber Trading Co Ltd.,probably an 'off the shelf company'.
1970?	A ROSS OPTICAL LTD Catalogue illustrates the following. The Solaross range includes the 8 X 35 Spectacle (£35-10-5), the 16 X 60 Cornwall, the 12 X 40 Kent (£33-10-5), the9 X 35 Lancaster (£25-17-5), the 8 X 40 Norfolk (£24-4-0). The 8 X 30 Steptron (£47-11-2), the 11 X 50 Stepeleven, the 9 X 35 Steptruva (£50-1-11) and the 7 X 50 Steplux (£66-18-0)/ Also a 20 X 60 Spotting Scope.	On the back page of the catalogue it is shown that Ross Optical Ltd of 4 Northside, Clapham Common is a company within the Ayling Industries Group.Some prices have been written against the illustrations in pre decimal form so no later than 1970. No.4 was an 18 century house used as an office. The main building at No 3 became known as Enstock House.

	Barr and Stroud Ltd,during the year their overdraft rose to £317,000.	R.Moss and I.Russell, Range and Vision
1971	ROSS OPTICAL Ltd. shown as a subsidiary of Enstock Trust Ltd.	Stock Exchange Yearbook
	During the year the Wray (Optical Works) Ltd. factory closes.	H.Barty-King, Eyes Right.
	During the year Barr and Stroud Ltd. cease making binoculars.	W.Reid, Barr & Stroud Binoculars and the Royal Navy R.Moss and I.Russell, Range and Vision
1972		
	7 February, Rothschild Investment Trust Ltd acquires Enstock Trust Ltd. and its subsidiaries including ROSS OPTICAL Ltd.	Stock Exchange Yearbook 1972 Companies House check in 1984 showed ROSS OPTICAL Co. Ltd. owned by Rothschild Investme Trust Ltd. in 1972. By 2010 all C.H. records to do with ROSS and its owners had been destroyed. This was the last reference to ROSS OPTICAL Lt in Stock Exchange Yearbooks.
1973	Neither ROSS Ltd nor ROSS OPTICAL Ltd are listed in the Stock Exchange Yearbook, nor any subsequent Yearbook.	Stock Exchange Yearbook
1974		
	9 January, ROSS Ltd. dissolved and removed from Register of Companies.	Companies House, letter to compiler All records were destroyed.
	30 July, Application for a patent for Improvements in Binoculars by ROSS OPTICAL LTD of Ayling House, Kings Road, Horsham, Sussex, (Inventor William Bert PEAD). The name of the applicant was amended to Frank H.AYLING LTD of New Court, St Swithins's Lane, London EC4P 4DV. The application was in respect of a binocular constructed from die cast bodies. The prisms (of the Porro type) were accessed by removable plates on the sides of the bodies. The appearance of the binocular is not unlike the AVIMO 7 X 42	Patent 1,512,630 The concept is not dissimilar to that described in Patent 449,552 (1934 application by T.Y.Baker and J.F.Sutton) New Court was the registered address for Rothschild Investment Trust Ltd of which Frank H Ayling Ltd was a subsidiary

	and was almost certainly the model with which Ross Optical tried to obtain the Ministry of Defence contract for a new General Purpose Binocular.	
1975	The Directory entry was amended to; ROSS LTD	Kelly's Directory 1975 This was the last entry for ROSS
	The premises at Clapham were empty.	Local History Papers.
1978		
	29 December, ROSS OPTICAL Ltd, Horsham, received the last Royal Warrant as suppliers of Binoculars.	The London Gazette
1982	8 February, M.C.Bird 1 Serjeants Inn, London EC4 1JD appointed as Liquidator of ROSS OPTICAL Ltd.	The London Gazette 11 February 1982 Ross Optical Ltd is shown as an Investment Company.

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