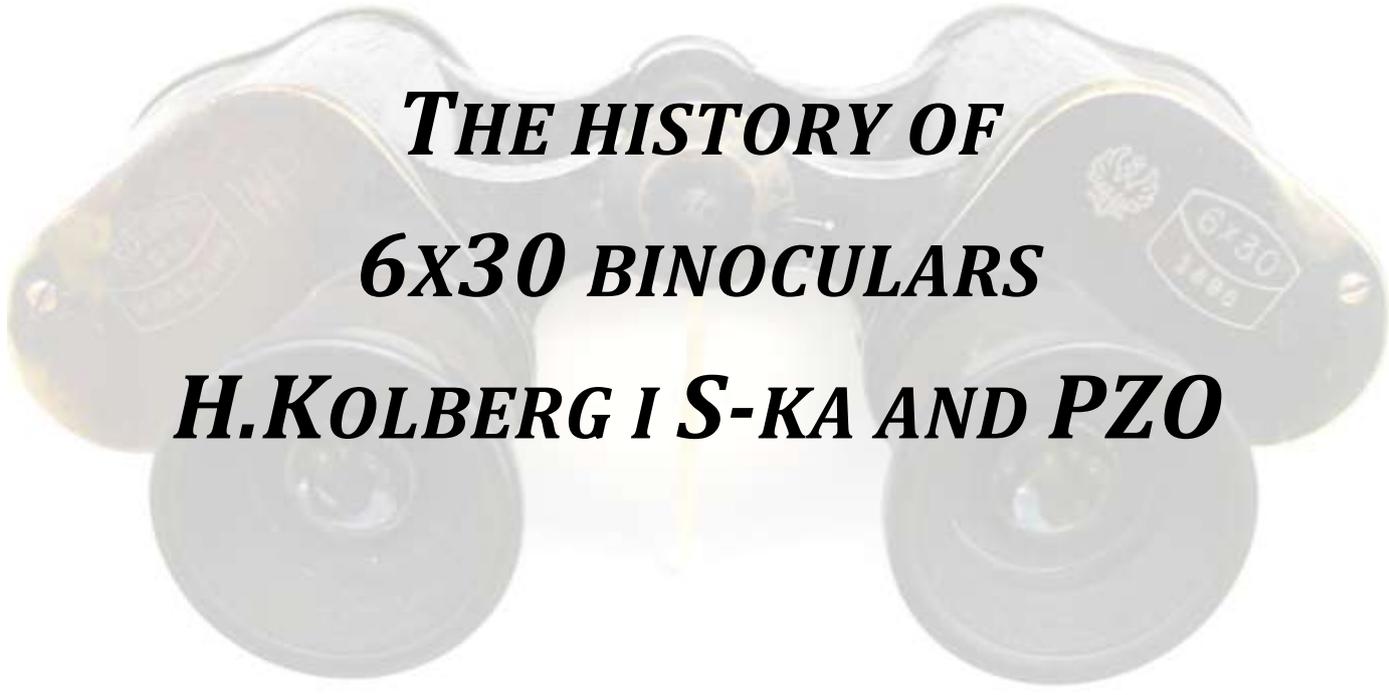


By Anna Vacani MA



***THE HISTORY OF
6X30 BINOCULARS
H.KOLBERG I S-KA AND PZO***

June 2010

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The history of 6x30 binoculars H.Kolberg and PZO

The history of the binoculars, H.Kolberg and PZO, derived from the book by Dr Piotr Matejuk – “Wojskowe Przyrzady Optyczne w II Rzeczpospolitej” (The military optical instruments in the II Polish Republic) and many other sources.

Acknowledgements

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My sincere thanks are due to Dr Piotr Matejuk for the consultation of the H.Kolberg issue at the time of writing my paper.

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Chapter 1

Introduction

The history of a Polish 6x30 binocular produced before WWII, with technical parameters given by the Polish Ministry of Defence, is a very interesting in many ways, through its very beginning, to the last piece of the production¹.

This particular model had been produced by two companies in Poland:

- Fabryka Aparatur Optycznych i Precyzyjnych H.Kolberg i S-ka.S.A (Factory of Optical and Precise Instruments² -joint stock company), later renamed: Polskie Zakłady Optyczne S.A. (Polish Optical Factory);
- H.Kolberg i S-ka z o.o (limited liability Company).

This study includes the production history of this particular 6x30 binocular, in Poland before WWII, by those companies.

The collectors will be helped to determine, which 6x30 binocular is in their collection.

Chapter 2

The optical demands in Europe before WWII

The binocular H. Kolberg i S-ka was the most modern binocular, at the time, when it was produced. The development of the binocular was evolved, during the whole production sequence, since the first year to the final one (1922 - 1939). It contains all modern technical achievements, in the optical field at the time, and the requirements of the new strategies of the war.

The end of WWI had brought the new tactics to be used in the war. The static tactic was changed in WWII. The armies were spread out on the large battle field. The armies in the war were not forming the front line opposite each other, like it had been over centuries, but the front of the war became very long, not regular and on a big area.

The new equipment for fighting became a very important part of the war. The most essential became the observation tools: periscopes, range-finders, gun sights and in many advanced types of binoculars.

The main production, of military optical instruments in Europe, to 1918, was in Germany, France and Great Britain.

The German optical industry had taken the foremost place in the production of optical instruments since 1846, when it was established the Carl Zeiss factory in Jena. In 1880 the factory had employed 600 workers, on an area of 70 000 m²³. In 1914 the factory C. Zeiss Jena employed 5300 workers, including 45 scientists.

The Carl Zeiss Jena optics became well known and very famous. Most armies and navies used Zeiss optical instruments (including the UK).

¹ DR. Piotr Matejuk 'Wojskowe Przyrzady Optyczne w II Rzeczpospolitej', 1997 (*The military optical instruments in the II Polish Republic*) Dr. Piotr Matejuk has been Trader Director of the PZO for many years.

² Memorial w sprawie Polskich Zakladow Optycznych Sp. Akc. Nr 207 tjn LM/IL, Warszawa pazdziernik 1935, (*Report about PZO S.A No 207, October 1935*)

³ Filix Auerbach - *Das Zeisswerk und Carl -Zeiss Stiftung in Jena*, Jena 1914

During WWI the French production of optical instruments developed in a significant way. For instance, in 1914 binocular production was 1500 per month, when in 1918 the quantity rose to 13 000.

Chapter 3

A short history of Polish optics

The creation of Polish optical had begun in XIX century. At that time Poland was under the invaders – Russia, Prussia and Austro-Hungarian. In the XIX century many optical instruments were produced on Polish land.

The first factory, mentioned in the literature, was G.Gerlach Fabryka Instrumentow Geodezyjnych i Rysunkowych, established in 1816 by mechanic J.Migdalski, who sold the company in 1850 to brothers Gerlach. The factory opened its own shops in Warsaw, Petersburg and in Moscow.⁴



Warsaw 1913 - the advertisement of G.Gerlach Factory

Another factory – Michał Pick Fabryka Optyczno-Mechaniczna – opened in 1820 - had a significant meaning for the Polish optical field. The factory produced scientific instruments and surveying instruments. Additionally, since the beginning of the year 1877, 70 new optical mechanics were educated in the factory.

The third factory, on Polish land, in XIX century was – Aleksander Ginsberg i S-ka Zakład Optyczno-Mechaniczny "FOS" – established by Aleksander Ginsberg in 1898 in Warsaw. It was the most dynamic developing optical factory in Warsaw, and the main optical factory in the Russian Empire⁵. The factory produced: cameras, objectives, precise and optical instruments for the military, prismatic binoculars and many others instruments.

⁴ Przemysł fabryczny w Królestwie Polskim rok 1911.(Industry in Polish Kingdom on 1911)

⁵ A.M. Bahrah, *Iz istorii optycznego priborostroenija*, Moscow, 1951 (*The production history of optical instruments*)

In 1915 the factory was evacuated to Petersburg⁶.



Warsaw 1904 - The advertisement of "FOS"



FOS 10x Scissor binocular produced in 1910⁷

⁶ *Przemysł fabryczny w Królestwie Polskim rok 1911 (Industry in Polish Kingdom on 1911)*

⁷ The picture is from Dr. Piotr Matejuk collection - with the copyright clearance for this only publication.



The description on the scissor binocular: left side – 1910y, FOS Warsaw No12295; right side – magnification 10, graduations of the reticule plate 1/90

Chapter 4

The H.Kolberg i S-ka Factory establishment

In 1918 Poland became a sovereign country. The very experienced and educated personnel, from previous times, were able to reconstruct the optical production in independent Poland, in new factories. One of them was H.Kolberg i S-ka in Warsaw.

The factory was established in October 1921 by Leon Malecki, Henryk Kolberg and Kazimierz Karol Mieszczkański.⁸

The factory was established as a limited liability Company, with the capital Mkp. (Polish Mark) - 3000.

In 1922 the company was transformed into a joint stock Company with the shareholders (investors):

- Henryk Kolberg – 40%,
- Bank Handlowy w Warszawie – 20%
- Other shareholders -40%

The company was named, Fabryka Aparatur Optycznych i Precyzyjnych H.Kolberg i S-ka.S.A - Factory of Optical and Precise Instruments⁹, H.Kolberg S.A, in the further part of this text.

The basic document of the company, its statutes, was justified by; the Minister of Industry and Trade, and the Minister of Finance. It was published in Monitor Polski (Government Journal) No 99 dated 01.05.1922.¹⁰

The company had signed the first contract, for the Ministry of Defence (MOD) - Department III of Artillery and Armament¹¹, for the production of 1000 prismatic binoculars.

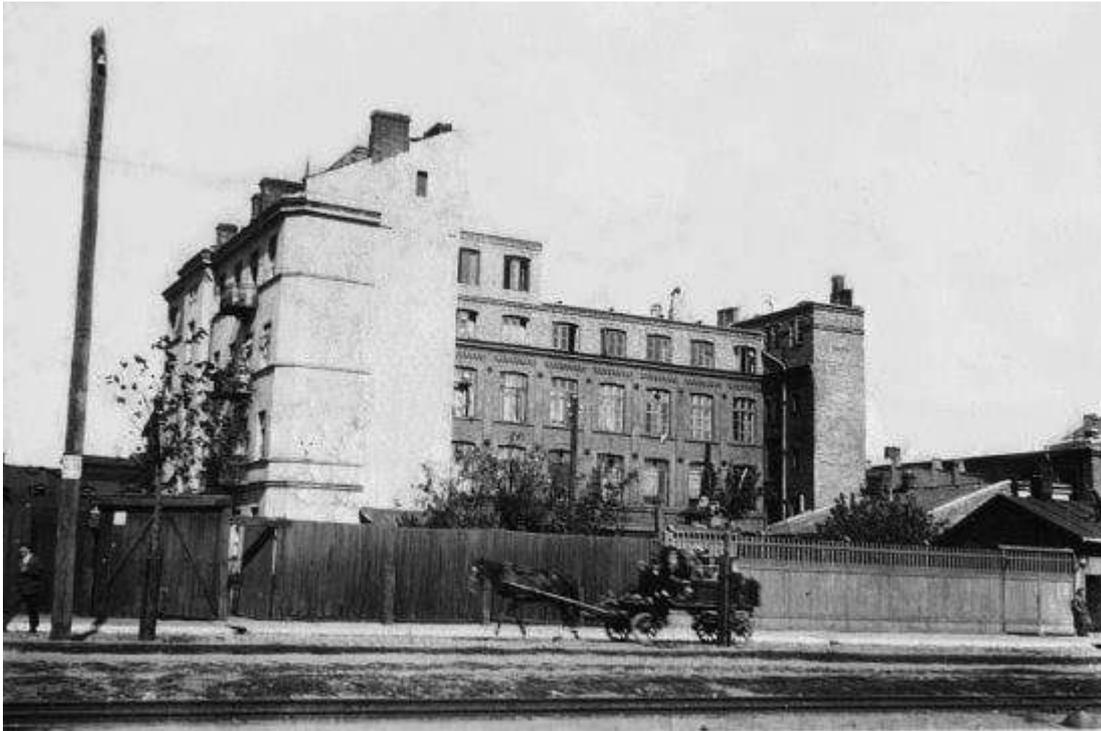
The contract necessitated a larger place, to produce the greatly increased quantity of instruments. The company bought, in Warsaw, an ex- Snuff-boxes Factory building 1500m², on the land 583,51m² at 35, Grochowska street (present Grochowska Street No 316), where the company was situated until 02.11.1995.

⁸ Archiwum Panstwowe m.st.Warszawy, Ksiega Rejestrow Handlowych. (*National Archive for capitol Warsaw, The book of Trade Registries*)

⁹ Memorial w sprawie Polskich Zakladow Optycznych Sp. Akc. Nr 207 tjn LM/IL, Warszawa pazdziernik 1935, (*Report about PZO S.A No 207, October 1935*), a copy in Anna & Terry Vacani collection

¹⁰ The company registration was written into: Trade Registry of Law Court in Warsaw, section B under number-XI-2246, at 17.11.1922.

¹¹ Ministerstwo Spraw Wojskowych – Departament III Artylerii i Uzbrojenia



The building at Grochowska Street 316 bought by the factory, in June 1923¹²

The contract for the MOD was important for the new company H.Kolberg.

Chapter 5

The production history and design of the 6x30 binocular

The MOD was very supportive of H.Kolberg Company in many ways. The contract, in 18 points of “Technical orders of prismatic binocular with case”, described all basic technical parameters for the binocular. The last point says:

“To make binocular production easier, Department III of Artillery and Armament lends the Company H.Kolberg i S-ka S.A. construction drawings of the Russian binocular 6x (type Zeiss). The Company has to make 2 copies of the drawings, and has to return the original drawings, and one copy, in 10 days from the date of the contract signature”.

The beginning of the binoculars production was based on a Russian technical documentation. Presumably, the inciter of that solution was M.E. K. Hercyk-Pałubinski, the former manager of the Optical Department in Zakład Obuchowski in St.Petersburg, where this binoculars’ model had been produced since 1907.

The chosen model is the similar type of a design as Zeiss Silvamir binoculars.

The first problem of the factory is, in some ways, interesting for the collectors of Kolberg i S-ka S.A. binoculars.

¹² The picture is on the web: <http://www.pzo.waw.pl/pl/historia>

The original quantity of binoculars to be produced for the MOD was 1000 pairs, but a German producer of machines, for the manufacture of optical elements (presumably produced for Carl Zeiss as well), asked for higher price, than was in the contract. The Kolberg i S-ka S.A. was not able to pay it.

The factory asked the MOD to raise the quantity of the binoculars, in the contract, to 4000. The MOD agreed, and this allowed the factory to pay for the above mentioned machines¹³.

The design of the H.Kolberg binocular

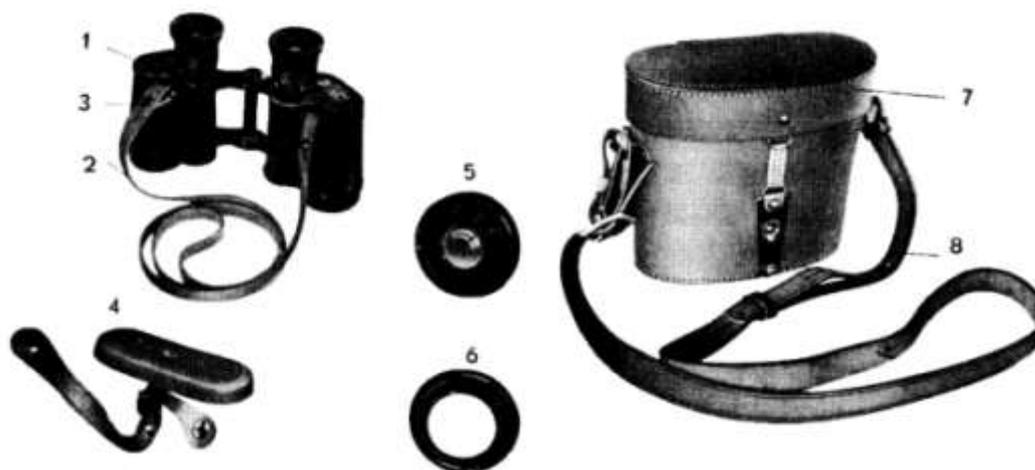
At the time when H.Kolberg was built up, not many models 6x30 were produced, in the Europe.

This model was perfect for military purposes through given an enhanced plastic effect. The 6x30 models were also in great demand for the use of officers in the armies of many countries.

Optically, H.Kolberg binocular, it is one of the best built up at the time. The prisms are of the Porro type.

The magnification of the binocular is 6 times, and the objective diameter is 30 mm. The light transmitting power is 25, as the diameter of exit pupil is 5 mm (5²). The binocular 6x30 has got big exit pupils.

The field of view is 150 yards¹⁴ at a distance of 1000 yards.



The picture from the Catalogue of prismatic instrument at 1936, position I 25.

Prismatic 6x30 binocular

1 – Binocular, 2 – the binocular strap, 3 - strap fastener, 4 – rain cover

5 – A pair Filters, 6 – spare eyecup, 7 – the case, 8 – the case strap

All of the optical parts were produced out of French glass from the Parra Montois Company, or the German Schott Company. Optical glass was not produced in Poland at that time. The binocular is build up with individual eyepiece focusing.

¹³ Central Military Archive (CMA) I 300.32.54 - The Kolberg i S-ka letter to Department III Artillery and Armament of the MOD dated 23.07.1923

¹⁴ One yard = 0,9144m

The first produced binoculars had aluminium sand cast body. The top and the bottom prism housing cover plates were made of brass. The dioptre scale is as one section with the ocular eyepiece focusing ring. This applies only to H.Kolberg and PZO binoculars. It is not the same design in the OPW and eug binoculars, produced during the WWII in Warsaw. Furthermore, the lens tube is made from brass as well. The binocular weight, without the case, is 653 grams.

The body is covering with an early version of vulcanite plastic imitation leather. The quality of the cover is exceptionally good. Making a comparison with other 6x30 binoculars, as Leitz binoculars, the H.Kolberg and PZO binoculars' covering is much stronger. One regular problem is with body covering. Often it is not complete in the places, where the binocular was held. The temperature and the human perspiration made it harder and it cracked.

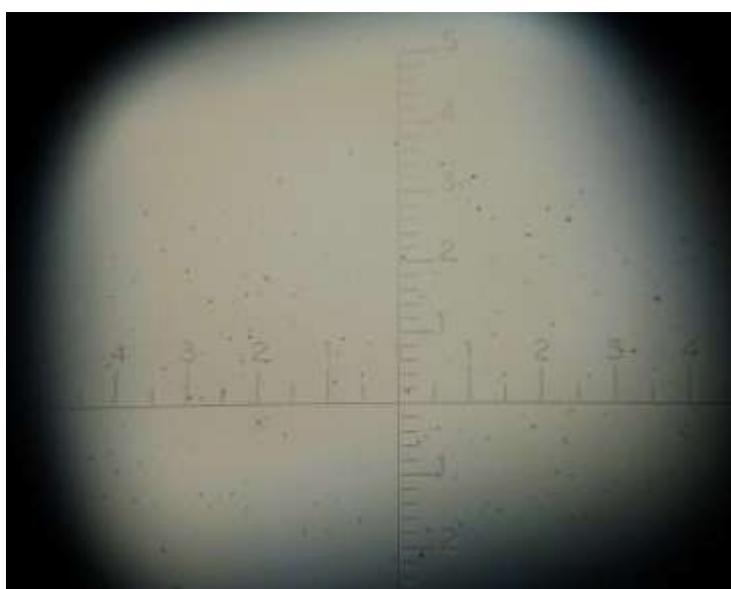
The descriptions, on the left and right plate of the binoculars, were written into achromatic objective lenses shape. It looks, as it is show below, on the binocular made in 1925:



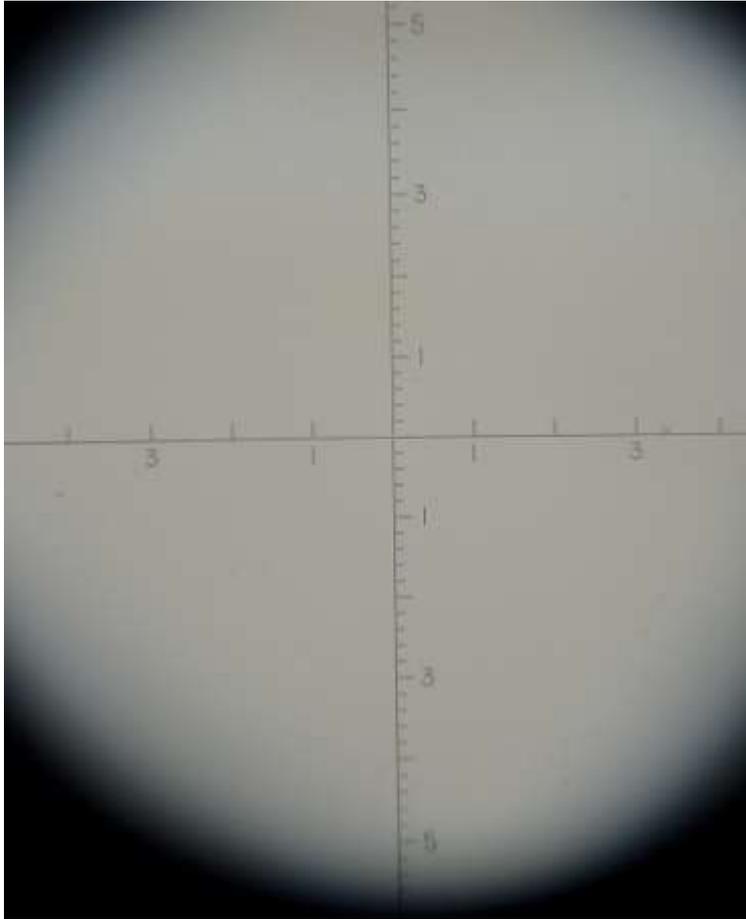
*The description on the left plate:
H.Kolberg i S-ka Warszawa,
WP – Wojsko Polskie (Polish Army)*



The right plate of the binoculars



*The reticule in the right eye piece
tube of the H.Kolberg binocular-
1925*



The reticle in the right eye piece tube of the H.Kolberg binocular-1930

The reticle's graphic design was changed for the period of binoculars production.

In the history of the Polish optic field, **only H.Kolberg and PZO factories** produced binoculars marked with the letters **WP – Wojsko Polskie (Polish Army)** and **with the Polish eagle**.

Chapter 6

The technical development

In 1924-1927 the binocular production amounted to 500 per month. This level of production led to eliminate imports of binocular from Germany¹⁵.

The construction of the binocular was constantly improved on request of the IBMU - Institute of Military Weapon Research.

In 1928 production was much slower because of a technical problem – 'misting up' of glasses. In 1927 were produced 1618 binoculars, when in 1928 only 1163 were made.

Interior fogging or "misting", of the lenses and prisms, was a common problem in many optical factories, at that time.

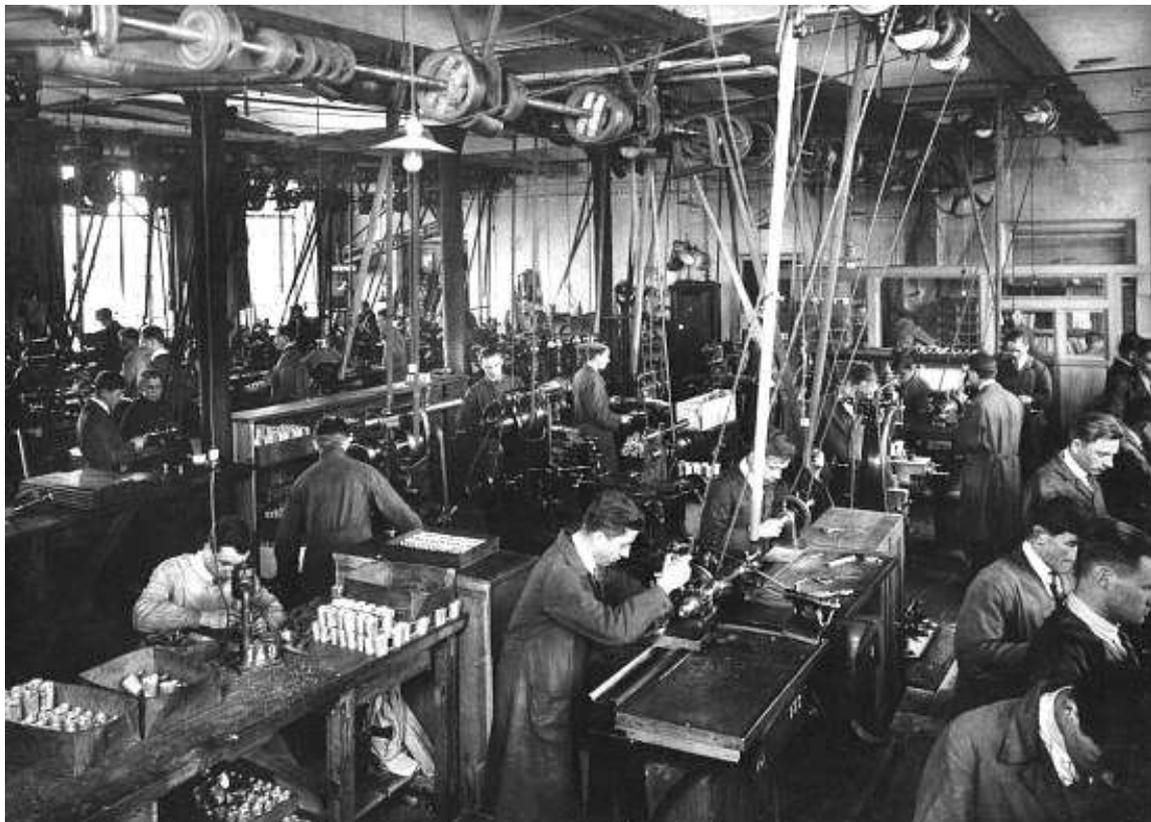
The research on, how to solve this problem, was carried out independently by the factory, and Institute of Military Weapon Research (IBMU).

¹⁵ CMA I 360.1.318. - The contract Nr 6-1924, dated 21.08.1924, for buying from Carl Zeiss Jena 2000 pieces prismatic binoculars type Silvamar, for \$24, 40 USD each, was the last contract for importing binoculars 6x30.

The factory representative, M.E. T.Malinowski, after a visit to the Optical Institute in Paris and other Paris factories, confirmed the problem in France as well.

The problem was presumably caused by **the type of lubricant used, at that time, in optical factories**. The lubricant produced a gas and caused the misting, particularly at high temperatures.¹⁶ As the London weather webpage is showing, it was a very hot summer in 1928: [London Weather - 1928 Rather Sunny but a Dull Spring](#).

The factory H.Kolberg i S-ka S.A. and the IBMU, researching the ‘mist’ problem, were working on a new technical construction of the binocular as well. The results of this research led the factory to apply a new technical arrangement (scheme), and a new design of focal length plane on the binocular.



Mechanical Workshop in PZO in 1930's

The new optical arrangement provided better resolving power and eliminated chromatic aberration. A special committee of the IBMU, working from January to May 1929, says:

¹⁶ It is Terry's Vacani conclusions- the international specialist of old optic instruments.

“The binocular produced by the H.Kolberg i S-ka S.A. Company, in its new optical arrangement, has a much better sharpness and chromatic aberration than before. It achieved the same level as binoculars produced by: KRAUSS, GOERTZ, and ZEISS.”¹⁷



Optical Polishing Room in PZO in 1930's

A further improvement was made to the binocular body. The body was made of aluminium. The need to reduce the price of the binoculars necessitated a change to the method of the binoculars body casting.

The mould (cast) of the body began to be made under pressure. This method reduced the time and cost of the binocular production.

The body was made of a different type of metal: corpus of aluminium and both plates; the top and the bottom were made of brass.

However, it is necessary to mention another assessment of the binoculars. The binoculars 6x30 were not used by Polish Naval Forces due to the conclusion of the Commander of the Forces, Jozef Unrug: “The binoculars H.Kolberg 6x30 are not suitable for night observation. They do not have enough light collecting power, and the eyes become tired very quickly. In addition, the binoculars are - too heavy” – the letter was dated 28.11.1932.

After the Commander's declaration a research body was established. This carried out a comparison of: the English marine binocular Barr & Stroud 7x50, and French binocular Krauss 7x50. After 3 years of examination was the conclusion made, on 29.11.1935, that the Krauss binocular is much better for use by Polish Naval Forces.

¹⁷ CAM I 300.34.270. – Protocol Committee IBMU dated 2.05.1929



Optical Assembly Workshop in PZO, in 1930's

In 1929, a new version of technical requirements for the 6x30 binoculars was finished, and was accepted, on 11.06.1929, by the Committee for Technical Issue of Armaments, at the IBUM.



The x-ray picture of the H.Kolberg binocular (production 1930)

The fact that the number of produced binoculars increased considerably, allowed the Ministry of Defence to order that: all officers of the Polish army and the newly graduated officers of the Officers Schools had to have prismatic binocular 6x30, with the reticule, produced by Company H.Kolberg i S-ka S.A., with case. This requirement had to be achieved by 1.01.1929¹⁸. The cost of the binocular was established at 290 zloty¹⁹.



*The Polish cavalry officer with Kolberg binoculars;
The picture was taken at the beginning of 1930's.²⁰*

The cases were produced by Company A.Chojecki in Warsaw; they were priced at 37 zloty (equivalent to 555 zloty in 2009). The first H.Kolberg cases were supplied with the strap wrapped around the case.

¹⁸ The Journal of Orders Nr 29/27, position 358, the order of the Ministry of Military Issue.

¹⁹ On 29.04.1924 the Polish Bank exchanged money - 'Polish Mark' was exchanged into 'Polish zloty'. 1 zloty was equal to 0, 1687 gram of gold. 1 zloty was equivalent to 15 zloty in the present time (2009).

²⁰ The picture was sent from the collection of Pathe39 www.weu1918-1939.pl - with the copyright clearance for this only publication.



The case from Anna & Terry Vacani collections

Later PZO cases, from 1931, were produced as it is in the picture below in light brown colour:



These cases were embossed with the year of manufacture and the maker's identifications. The PZO cases for the civilian market were a little different, as you can see on the picture below:



The picture from Muzeum

*Warsaw Uprising- With the copyright clearance for this only publication*²¹

²¹ <http://www.1944.pl/> The picture has taken by Katarzyna Utracka MA – V-ice Head of History Department of Museum Warsaw Uprising

The good quality of the binocular was confirmed in 1931, in the USA. The binocular took part in a competition, on 17 March 1929 – 15 June 1931, organized by the Headquarters of Field-Artillery of the American Army.

The binocular received top marks for its brightness.

Here is a copy of the protocol from the trials of the binocular, at Fort Bragg, partly translated into Polish language, by PZO, in December 1931:²²

3

Załącznik Nr.8

TAJNE

Wykazanie.

Wyciąg z protokołu prób, dokonanych z lornetkami
Artylerji Polowej Stan.Zjedn.Amer.Płn.Fort Bragg.

Grudzień 1931 .

SPRAWCZDANIE Z PRÓB lornetek polowych
Komisji Artylerji Polowej z roku 1929, Nr.18, Akta 413,7.
OKRES TRWANIA PRÓB: 15 marca 1929 - 15 czerwiec 1931.
-:-:-:-:-:-:-:-:-:-:-

WYSZCZEGÓLNIENIE SPRZĘTU: badane lornetki były następujące:

.....
1 lornetka H.Kolberg i Ska, powiększ.6^x /otrzymana w sierp.1930/
.....

DYSKUSJA :

.....
3/ Skórszana pokrywka, wyłożona sukmem, taka, jak jest używana przy okularach lornetek Kolberg, jest bardzo pożądana.
4/ Pas stosowany do futerażów lornetek Kolberg i umocowany nakołko futerażu jest lepszy od pasów umocowanych tylko po bokach futerażu.

Z pośród lornetek, jakie zostały uznane za odpowiednie,
lornetka Kolberg została ogólnie uznana za najlepszą z powodu
swej jasności.

WNIOSEK :
Komisja zaleca, że lornetki Kolberg są w zupełności odpowiednie dla zaopatrzenia w nie artylerji polowej.

A.C. FITZHUGH
Captain, Field Artillery
Recorder.

C.S. BLAKELY
Lt.Col. 16th Field Artillery
President

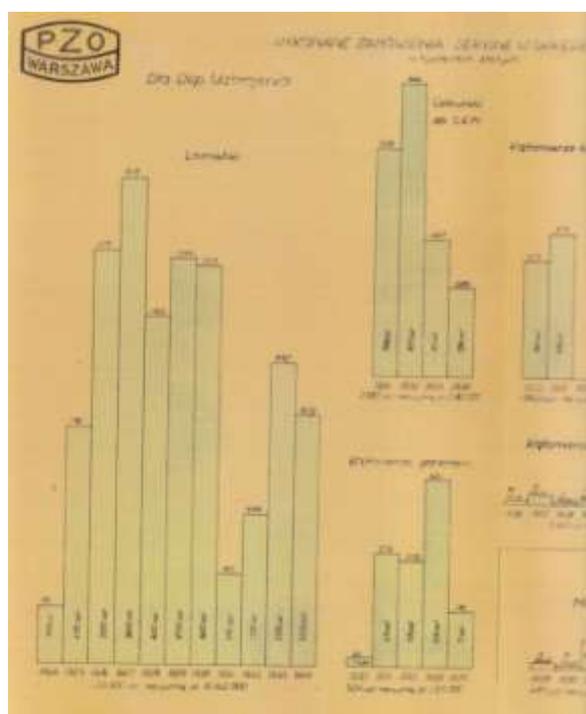
²² Unfortunately I do not have the original American Protocol, and it seems too difficult to obtain it from the USA archives.

The opinion of the Competitions Committee in the USA caused an offer to be made for the factory H.Kolberg i S-ka S.A.; to export binoculars to the USA, for the Field-Artillery officers. The offer was made by the Military Attaché at the American Embassy in Warsaw, Major S.G. Emmer Yeager. A contract was not signed because of the high price required for the binoculars, by H.Kolberg i S-ka S.A.

Chapter 7

The number of the binoculars produced in 1924-1931 by H.Kolberg i S-ka S.A

The H.Kolberg i S-ka S.A. binoculars were serial numbered. We can tell in which year a binocular was produced - from an original document. It shows; which numbers were produced in which year²³. It is the only original document which had survived the war:



Report about PZO S.A No 207, October 1935, Page.1&2 (from the collection of Anna and Terry Vacani)

²³ Memoriał w sprawie Polskich Zakładów Optycznych Sp. Akc. Nr 207 tjn LM/IL, Warszawa październik 1935, (Report about PZO S.A No 207, October 1935)

The number of the binoculars produced in 1924-1931, by H.Kolberg i S-ka S.A, presumably begun from number 11, as ten prototypes were made:

The year of production	The factory number on the binoculars
1924	11 - 1000
1925	1001 - 5100
1926	5101 - 10300
1927	10301 - 15900
1928	15901 - 20000
1929	20001 - 24700
1930	24701 - 29300
1931 (to 29.05.1931)	29301 - 29762²⁴

It is the nearest way to find out the approximate year of a binoculars' production. The archives, of all optical factories, were nearly all destroyed during the war. The only ones, which are survived, are in the Central Military Archives of the MOD, and in The Polish Institute and Sikorski Museum in London.

Chapter 8

The name is changed into PZO.

We have to come back to the Factory's history.

As mentioned before, the factory was established in October 1921. The period of 1921 -1924 was the time while the whole company was organized.

The production of the binocular began in 1924, as the H.Kolberg i S-ka model.

²⁴ The numbers were counted approximately, as the production in 1931 (whole year) was 1110 pieces. The binoculars were produced with PZO logo, from 29.05.1931.



*H. Kolberg i S-ka No 1896 (1925 production) from the collection
Of Anna & Terry Vacani*

The production of the binocular with the logo – **H. Kolberg** was carried out **until 27.05.1931**, when the factory changed its name into **PZO** – Polskie Zakłady Optyczne (Polish Optical Factory).



The binoculars' logo was changed into PZO



*The PZO binoculars from the collections of Anna & Terry Vacani (1936 production)
(A kind present from Dr. Stephen Rohan)*

The rest of the description, on the binoculars' top plates, remained the same.

Chapter 9

The short history of PZO

The company's change name was caused by two reasons:

- The main shareholder, Henryk Kolberg, sold his shares;
- The worldwide economical crises (1929 – 1933).

The MOD budget was much smaller than in previous years. It necessitated a reduction of the binocular orders for the army.

The management of the company had two options: to sell the factory to the Polish government, or to find an investor from abroad.

The final decision was made at a General Meeting of Shareholders, on the 29 May 1931. Some of the shares were sold to French companies. The shares that belonged to Henryk Kolberg were sold to:

- Optique et Precision de Levallois (OPL),
- Societe des Etablissements Krauss (SEK)
- And Factories Barbier, Bernard ET Turenne.

At the same meeting the decision was made; to change the name of the Company into Polskie Zaklady Optyczne S.A (PZO) – Polish Optical Factory.

The information about nationalisation of the company, at that time, is false²⁵.

The company stayed as a private joint stock company, to the very last day before evacuation, in September 1939.

Here is a copy of the letter sent to all shareholders of the company, informing them of the name change:



The shares were changed as well:



A PZO share for 100 zloty

²⁵ The Polish Institute and Sikorski Museum in London, file No BI 116/50, Leon Malecki-General Director PZO SA. – His relation in February 1940, Paris.

The development of PZO was very fast. During the time between 29.05.1931 and the war, the factory began to produce new instruments, as the Polish army had begun the modernization process.

The necessity for the modernization, of the army, was caused by the armaments race in the world from 1933. The race reached the highest point in 1936.

Additionally, the PZO produced a very small number of binoculars for the civilian market. Here is the price list in the PZO catalogue No 5, on 1935²⁶. This price list was sent to the shop "Pantehnika" in Warsaw, Bracka Street 18, in 1935.



Page No. 1, of the Catalogue

²⁶ The copy of the PZO price list on 1936 in the collection of Anna and Terry Vacani A part of the collection of professor Antoni Piaskowski

MIKROSKOPY I PRZYRZĄDY LABORATORYJNE

Nr.	PRZEDMIOT	Zł.
1102	Mały mikroskop szkolny	Kompl. 115.—
1105	Trychinoskop	" 260.—
1107	Mikroskop laboratoryjny i szkolny	Bez objekt. i okular. 327.—
1109	Mikroskop laboratoryjny	" 465.—
1110	Mikroskop szkolny	" 305.—
1111	Mikroskop laboratoryjny i szkolny	" 345.—
1112	Mikroskop szkolny	" 295.—
1114	Mikroskop do badań naukowych	" 520.—
1115	Mikroskop do badań naukowych	" 675.—
1116	Mikroskop do badań naukowych	" 645.—
500	Obiektyw achromatyczny 4 ^x	sztuka 42.—
501	" " 10 ^x	" 46.—
502	" " 40 ^x	" 85.—
503	" " 60 ^x	" 90.—
504	" " immers. 100 ^x	" 135.—
601	Okular Huygensa 5 ^x	" 16.—
602	" " 10 ^x	" 16.—
603	" " 15 ^x	" 16.—
108	" " 8 ^x z podziałką	" 32.—
101	" " 10 ^x ze wskaźnikiem	" 25.—
103	Szkiełka przedmiotowe z podziałką	" 5.—
104	Podwójny okular 10 ^x ze wskaźnikiem	" 180.—
105	Kondensator dwusoczewkowy	" 50.—

Nr.	PRZEDMIOT	Zł.
106	Przyrząd krzyżowy	sztuka 180.—
107	Nasadka kolankowa na tubus mikroskopu	" 60.—
109	Podziałka przedmiotowa	" 20.50
1001	Statyw preparacyjny, bez lupy	" 25.—
1001a	" " " "	" 25.—
1002	Planktoskop z 2 akwarjami, bez lupy	Kompl. 30.—
1003	Mikrotom	sztuka 135.—
1008	Stół preparacyjny	" 110.—
1202	Komplet preparacyjny	Kompl. 60.—
201	Mikroakwarjum demonstracyjne pionowe	sztuka 11.—
202	Mikroakwarjum pionowe	" 6.—
202a	" poziome	" 6.—
203	Kondensator projekcyjny φ 112 m.m.	" 24.50
204	" " φ 30 m.m.	" 11.50

U W A G A : Mikroskopy bez obiektywów i okularów nie sprzedajemy

LORNETKI

Nr.	PRZEDMIOT	Zł.
1004	Lornetka pryzmatyczna 6×30, z futerałem skórzanym	sztuka 350.—
1005	Lornetka pryzmatyczna 8×30, z futerałem skórzanym	" 425.—
1006	Lornetka pryzmatyczna 8×40, z futerałem skórzanym	" 450.—
1007	Pojedyncza lornetka pryzmat. 6×30, z futerałem skórz.	" 140.—



Page No. 2, with the prices of binoculars in zloty in 1936 ('lornetki')

In the PZO catalogue, on pages 20 and 21, there are pictures and short descriptions of the binoculars, which had been on the civilian market in Poland, in 1935.

L O R N E T K I P O L O W E



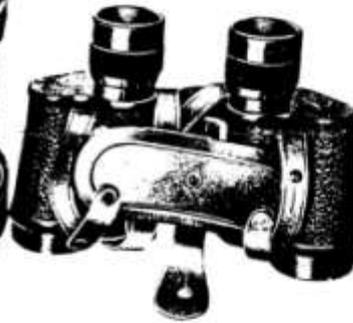
Nr. 1004. Lornetka
pryzmatyczna
6^x

Rys. 33.

Nastawianie na ostrość okularami, niezależnie dla każdego oka. Lornetka ta posiada nie tylko duże pole widzenia, ale i znaczną siłę światła.



Nr. 1005. Lornetka
pryzmatyczna
8^x



Rys. 34.

Nastawienie na ostrość okularami, niezależnie dla każdego oka. Mimo silnego powiększenia daje ona równie duże pole widzenia jak lornetka 6x. Siła światła jest dostateczna do obserwacji w dzień.



The PZO catalogue from 1935 page No. 20



Nr. 1006. Lornetka pryzmatyczna 8^x

Nastawienie na ostrość okularami, niezależnie dla każdego oka.

Rys. 35.

Lornetka ta łączy w sobie zalety znacznego powiększenia z dużą jasnością, która ułatwia obserwację nawet przy słabym świetle (np. o zmroku).



Nr. 1007. Pojedyncza lornetka pryzmatyczna 6^x

Służy do użytku jednoocznego. Jest połówką lornetki Nr. 1004 i posiada jak i ta, dużą jasność oraz szeroki kąt widzenia.

Rys. 36.

Nie daje oczywiście tak plastycznego obrazu jak lornetka dwuokularowa, jednakże zasługuje na uwagę, dzięki swej bardzo nieznacznej wadze i niskiej cenie.

Nr.	Powiększenie	Średnica obiektywu mm.	Sila światła	Pole widzenia mtr. na 1 klm.	Waga bez futerału gr.
1004	6x	30	25	150	653
1005	8x	30	14,1	150	750
1006	8x	40	25	110	827
1007	6x	30	25	150	279

Lornetki dostarczamy wraz z futerałem i częściami zapasowymi



The PZO catalogue from 1935, page No. 21, with integrated the table of some technical descriptions of the binoculars²⁷.

The PZO factory produced all its optical equipment, up to 5.09.1939. On 06.09.1939 the factory was evacuated to Lvov.

The entire binocular production for the Department of Armament MOD, by the H.Kolberg i S-ka S.A. and later the PZO factory, was about 60,000²⁸.

²⁷ The translation of the head columns: Nr. - catalogue No; Powiększenie - magnification; Średnica obiektywu mm - objective diameter mm; Sila światła - light power; Pole widzenia meter na 1 km - field of vision; Waga bez futerału gr. - binoculars' weight without the case in grams.

Chapter 10

The number of the binoculars produced in 1931 – 1939 by PZO²⁹

We can find the approximate year of a PZO binocular production from the quantity of the 6x30 binoculars produced by the factory, each year, as specified in PZO's Report, dated – October 1935.

The production run numbers, in period 1935 – 1939, are calculated on the documents from: The Polish Institute and Sikorski Museum in London³⁰, and PZO information³¹.

The year of production	The factory number on the binoculars (approx)
1931 (from 05.1931)	29 763 – 30 400
1932	30 401 – 32 121
1933	32 122 – 36 072
1934	36 073 – 39 300
1935	39 301 – 42 689
1936	42 690 – 46 090
1937	46 091 – 48 091
1938 ³²	48 092 – 50 092
1939 (to 4-5 th September)	50 093 – 52 443

²⁸ Kozłowski E., *Wojsko Polskie 1936-1937, Proby modernizacji i rozbudowy*, Warszawa 1974 (*Polish Army 1936-1937 the attempt of modernisation and development*)

²⁹ Memorial w sprawie Polskich Zakładów Optycznych Sp Akc Nr 207 tjn LM/IL, Warszawa październik 1935, załącznik nr 4 (*Report about PZO S.A No 207, October 1935, annex No 4*)

³⁰ The Polish Institute and Sikorski Museum in London A.I.8

³¹ The PZO information, dated 25.10.1937, about the quantity production of 6x30 binoculars, in the period 1924-1936

³² In 2009, on Allegro (Polish Auction) was seen PZO binocular, produced in 1938 with the production number – 49 024

Chapter 11

The other factory named H.Kolberg i S-ka Spolka z o.o

When in 1931 Henryk Kolberg sold his shares in Company H.Kolberg i S-ka S.A. (joint stock company), then on 28.09.1933, he opened a new company, named H.Kolberg i S-ka z o.o (limited liability Company), and registered in Warsaw - 22, Chocimska street³³.

The company became a competitor for PZO.

The factory produced 6x30 binoculars, identical to PZO and for the MOD as well.

On the 25.04.1937, the factory signed a contract, for the MOD, for producing 2200 quantity 6x30 binoculars with technical parameters No 520096, given by the MOD. It was the identical technical number issued to the PZO by the MOD.

The company produced about 2600 binoculars, in the period 1937-31.08.1939, for the MOD³⁴.

The first binocular prototypes made for an inspection by the MOD, were numbered 80,002 and 80,003³⁵.

The factory number of the binoculars produced, in 1937-1930, by H.Kolberg i S-ka o.o:

The year of production	The factory number on the binoculars
1937³⁶ – 31.03. 1939	80,003 – 81,203
1.04 – 30.04.1939	81,204 – 81,503
01.05 – 31.05.1939	81,504 – 81,803
01.06 – 30.06.1939	81,804 – 82,003
01.07 – 31.07.1939	82,004 – 82,304
01.08 -31.08.1939	82,305 – 82,605
01.09 – 05.1939	82,600 – 82,754³⁷ (approx)

³³ Archiwum m st Warszawy, Rejestr Handlowy Dzial B NR LXIII 9107 Sadu Okregowego w Warszawie (*National Archive for capitol Warsaw, The book of Trade Registries*)

³⁴ The Polish Institute and Sikorski Museum in London A.I.8

³⁵ CAW (Central Military Archives) I 360.1.319 - The letter No 353 dated 27.05.1938 of Main Expert of the Headquarters of Weapon Items to the Technical Armament Institute

³⁶ CAW (Central Military Archives) I 360.1.319. Pismo KZU Nr 606-2-5/CO2 z wrzesnia 1938 do firmy Kolberg i S-ka. (*The letter MOD dated October 1938 to H.Kolberg i S-ka – An agreement of MOD for the beginning of 6x30 binoculars production by H.Kolberg i S-ka*)

³⁷ In September 2009 the H.Kolberg 6x30 binocular No 82754 was seen on a Polish auction

The army informed all optical factories (PZO, H.Kolberg i S-ka z o.o and others), that they had to be evacuated, on 6.09.1939, to Lvov.

In Anna and Terry Vacanis collection is the binocular with the number 82568. This binocular was brought from Russia. It was appeared as the last production of H.Kolberg i S-ka z o.o.



H.Kolberg i S-ka No 82568 from the Collection of Anna & Terry Vacani

However, the number 82568 does not look like the last one. In September 2009 the H.Kolberg binocular No 82754 was seen at a Polish auction.



H.Kolberg binocular, at a Polish auction

After the analysis of the all documents from The Polish Institute and Sikorski Museum in London, the binocular at the Polish auction looks like it could be produced in September 1939.

The factory was not destroyed during the war and all equipment: machinery, bodies of binoculars, and tooling, on the direction of Polish government, was moved to PZO in January 1945. The company was finally unregistered on 14.10.1954³⁹.

Chapter 12

The visual differences between binoculars from H.Kolberg i S-ka S.A. (a joint stock Company) and from H.Kolberg i S-ka z o.o. (a limited liability Company)

The same binocular produced, on the same technical parameters given by the MOD, by two factories similarly named, is a little confusing for the collectors.

It is best to look at the factory number. If the number is over 80 000, it is a product of the second H.Kolberg (limited company) after 1937.

The other recognisable feature mark is the eagle. The eagle is the sign of Poland. The graphic design of the emblem was often changed over the centuries.

When at 11 November 1918 Poland became a sovereign country the sign of Poland looked as below:



The Polish eagle 1919-1927

³⁹ *Przemysł Optyczny w Polsce- praca zbiorowa,(Optical Industry in Poland –collective book – many authors).*

And the eagle on the binocular produced by H.Kolberg S-ka S.A. in 1924 looks as below:



H.Kolberg i S-ka No 1896 (1925 prod) from the collection of Anna & Terry Vacani

The graphic design was changed again, at 13 December 1927, by the Polish President.⁴⁰ The new style of the eagle does not have a cross on the crown, and the shape of the wings has also been changed. It looks as below:



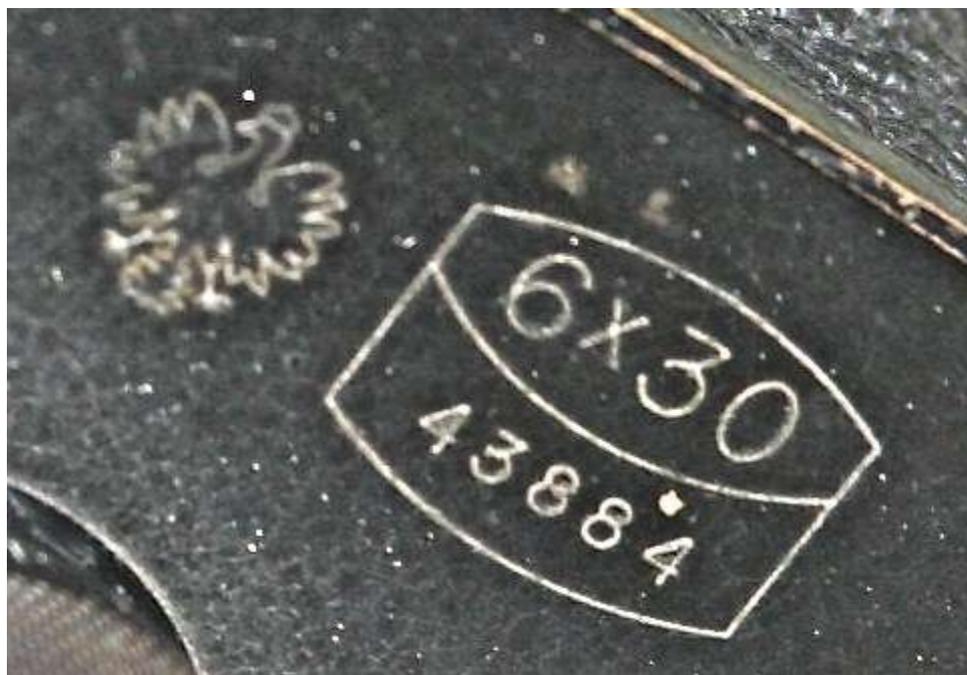
The Polish eagle 1927 – 1945

⁴⁰ Dz. Ust. R. P. nr 115 z 28 grudnia, 1927, poz. 980 (Dz. Ust. – the official gazette announcing new legislation in Polish Republic, No 115 dated 28 December, 1927, p.980)

The graphic of the eagle on the H.Kolberg i S-ka z o.o. binoculars produced from 1937 changed as well:



The PZO changed the shape of the eagle, as it looks on the picture below:



The PZO binoculars from the collections of Anna & Terry Vacani

It appears that not only the eagle shape was changed. The texture of the paint, on the whole body, is different. It is crystalline type of paint.

Chapter 13

The war time in PZO and H.Kolberg

The factories producing for MOD; PZO and H.Kolberg i S-ka were evacuated, on 6.09.1939, to the factory – “Jan Bujak.Fabryka Przyrzadow Miernicznych” in Lvov. The idea of the factory’s movements and the continuation of the production looked good, but in reality it appeared that Lvov would be invaded by the German Army as well. The city was invaded, but by the Russian army.

As related by Cpt. R. Frejszmidt, (the commandant of the evacuated trains) the evacuated equipment (**including the items ready for MOD**) and all cars were confiscated by the Russian army.

In Warsaw all machines were left undamaged. All evacuated workers came back to Warsaw and they worked in the factory, during the whole war.

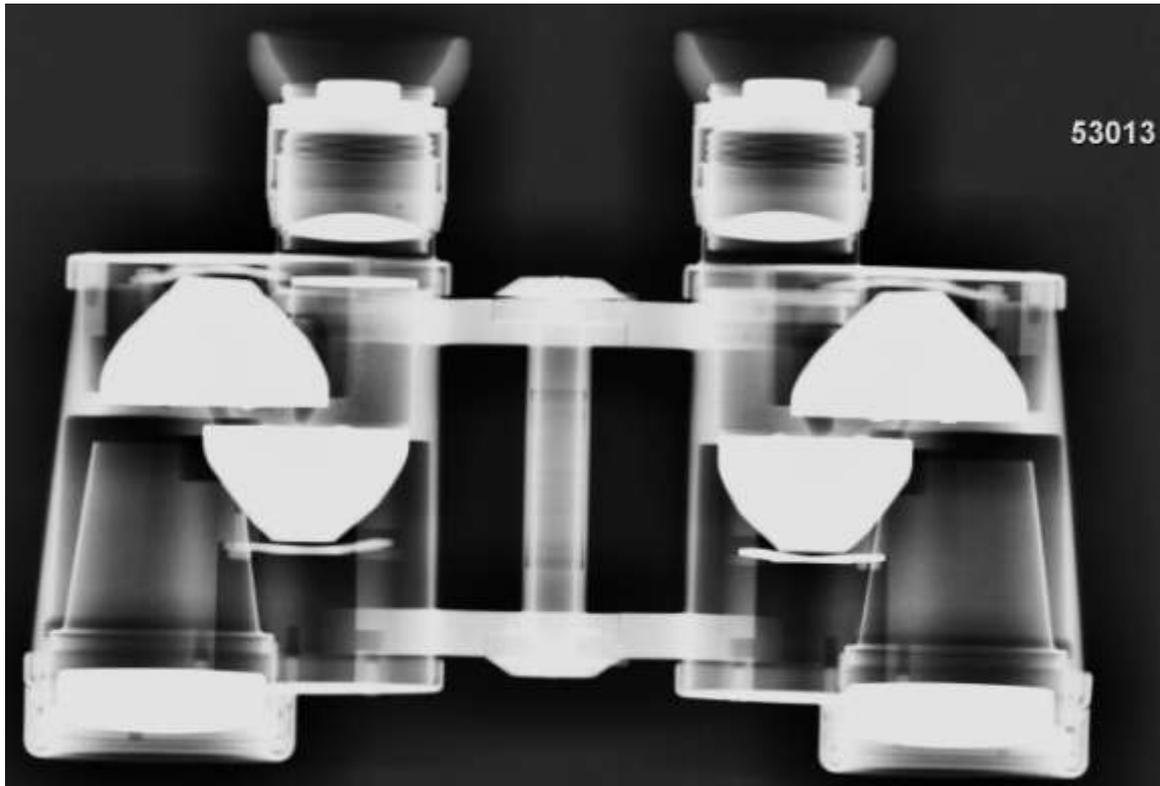
The name of the factory PZO was changed, by the German authority, into ‘Optische Präzisions-Werke GmbH’, from October 1939.⁴¹



6x30 binocular produced by Optische Präzisions-Werke GmbH from Anna & Terry Vacani collection - produced about December 1939-January 1940

⁴¹ - Dr.Piotr Matejuk – *Wojskowe Przyrzady Optyczne w II Rzeczpospolitej*. The author was the Trader Director of PZO for many years.

- Dr Wolfgang Wimmer from Carl Zeiss Archives Jena (look at the page 38)



The x-ray picture of the OPW binocular (production No 53013)

The description on the binoculars, produced by Optische Präzisions-Werke GmbH, was changed from May 1941. The mark 'OPW' was superseded with the German wartime code 'eug'⁴².



6x30 eug KF Dienstglas, No 60986 from the collection of Anna and Terry Vacani

⁴² List der Fertigungskennzeichen für Waffen, Munition und Gerät (Nach Buchstabengruppen geordnet) Berlin 1944 Gedruckt im Oberkommando des Heeres. Originalgetreuer Nachdruck, herausgegeben von Karl R. Pawlas, Publizistisches Archiv für Militär- und Waffenwesen, Nürnberg 1977

The factory was managed as a Carl Zeiss Jena affiliate⁴³.

The binoculars' model produced, by Optische Präzisions-Werke GmbH, was different from the binoculars produced before the war, by PZO and H.Kolberg factories.

In August 1944 the factory was evacuated by the Germans. All machines were moved to the Carl Zeiss Jena factory, Feinapparate-Bau G.m.b.H., Werk Thurn (flm), in Czechoslovakia, at present Teplice-Sanow.

Next, in September 1944 the Factory Optische Präzisions-Werke GmbH was blown up by German Army.



The PZO buildings, after the war - 35 Grochowska Street

After the war the 'Temporary Polish Government', on 23.07.1945, made a decision that the PZO had to be rebuilt, and continue production, as a part of the arms industry. The factory name was partly changed; from 'Polskie Zakłady Optyczne S.A.' into 'Polskie Zakłady Optyczne' – PZO.

The H.Kolberg factory produced optical equipment during the whole German occupation, including the binoculars for the German Army, and the factory name remained unchanged⁴⁴. It is not clear, what kind of the binoculars the factory was produced for German army.

⁴³ Archives New Files, *Alexandrian Microfilms No 1810128* (microfilms from German archives from the WWII period, produced in Alexandria US – the general name 'Alexandrian Microfilms'. In Poland are 24,000 roles of them

As the Polish historian, Professor Tomasz Strzembosz, writes: 'in the war time – in July 1944, about 600 binoculars were illegally captured by partisans from H.Kolberg i S-ka z o.o'⁴⁵.

Unfortunately, I do not know which model was captured by partisans. In the post-war literature, the information on this subject is not clear. Prof T. Strzembosz described the captured binoculars, as 'military binoculars'.

The partisan's action on H.Kolberg factory was made just before Warsaw Uprising, on the 1 August 1944.



Photo of the insurgents in Warsaw Uprising (with the binocular), by Joachim Joachimczuk - Nickname 'Joachim' dated at 27/08/1944⁴⁶

⁴⁴ *Informator przemyslu i handlu m. Warszawy i Okregu warszawskiego*, Warszawa 1942, s. 135 (Industry and trade Informator for city Warsaw and suburbs, Warsaw 1942)

⁴⁵ Prof Tomasz Strzembosz, *Akcje Zbrojne Podziemnej Warszawy 1939-1944*, PIW 1983 s.480-481 (*The Offensive Actions of Warsaw Underground Activities 1939-1944*, by Prof Tomasz Strzembosz pp.480-481)

⁴⁶ The picture was sent from the Muzeum Powstania Warszawskiego (Museum Warsaw Uprising) with the copyright clearance for this only publication. <http://www.1944.pl/>
You can find out more photos from Warsaw Uprising – with binoculars, on the USA web page: <http://www.warsawuprising.com/photos.htm>



Photo of the insurgents in Warsaw Uprising (with the binocular), by Sylvester Braun, copyright has expired for this picture⁴⁷

As Dr.Wolfgang Wimmer, from Carl Zeiss Archiv Jena, says:

‘We have only a small file concerning PZO and H. Kolberg. There was no difference made between PZO and H. Kolberg in this file. It looks there as if it is the same company. Afterwards the PZO was confiscated and Carl Zeiss leased it and ran there the "Optische Präzisions-Werke GmbH., Warschau" (OPW)’.⁴⁸

Analysing all facts, I can conclude that the factory was produced the same binoculars as Optische Präzisions-Werke GmbH (PZO) produced; 6x30 eug.

Next confirmation of my hypotheses is the document I have kindly received from a former worker of the factory H. Kolberg during the war; Professor PhD sc Lieutenant General (retied) Jerzy Modrzewski, from Poland.

The document it is a statement, made on 18 April 1970, by a former officer of the Home Army – Armii Krajowej (the Polish underground army of the Resistance Movement during World War II with its Commander-in-chief in England). The statement was made about Mr Mączyński Zygmunt a Manager of Inspection in Factory H.Kolberg i S-ka during the WWII.

⁴⁷ <http://www.histografica.com/view.aspx?p=f8mzpgye>

⁴⁸ Dr Wolfgang Wimmer has sent to me this information, on 10th of March 2010

The document is signed by Rowecki Stanisław and is added the number of his Identification document of the Society of Fighters for Freedom and Democracy –Warsaw 196306/1667/67

It is difficult to judge how many binoculars 6x30 H.Kolberg and the PZO were left after the war.

The whole amount of 6x30 binoculars was produced by two factories:

- About 55,000, by PZO (including H.Kolberg S.A.)
- And approximately about 2,754, by H.Kolberg z o.o.

It appeared that not every officer was issued with binoculars. At the beginning of the war about 150,000 officers' were mobilized⁵⁰.

When the war was begun, the MOD had issued the order that; all equipment, including the binoculars, must be destroyed after the loss of a battle, or before surrender.

Thousands of Polish officers were murdered in 1940 in Russia, it is difficult to judge how many⁵¹. The personal files (21,857) of Polish officers were destroyed on Khrushchev's instructions on 3.03.1959.

To this day many mass graves of Polish officers are discovered on the land of the former Soviet Republics. Some binoculars were found in the officers graves, as well.

Maybe some of the binoculars are in the possession of the families of Russian soldiers?

This occurred to me, because the last 6x30 binocular H.Kolberg I bought from a man who travelled to Russia (look at the picture in chapter 11, page 28).

Chapter 14

Summarising

The whole history of factory H.Kolberg can cause confusion, because the factory changed their name many times from 1921 to 1941.

Here is a chronology of the changes, in the order, in which they occurred:

- In October 1921 was established Fabryka Aparatur Optycznych i Precyzyjnych H. Kolberg i S-ka (Factory of Optical and Precise Instruments H.Kolberg i S-ka), in Warsaw at Leszno Street. In June 1923, the factory moved the address to 35, Grochowska Street, Warsaw. The facility was producing mainly military items, for Ministry Of Defence of Poland, among them 6x30 binoculars. Further information could be finding in the chapter 4.
- On 29.05.1931, at a General Meeting of Shareholders, the factory changed its name into 'Polskie Zakłady Optyczne S.A.' (Polish Optical Factory S.A.) - PZO. The company stayed, as a private joint stock company, to the September 1939, and at the same address in Warsaw at 35, Grochowska Street.

⁵⁰ Kozłowski E., *Wojsko Polskie 1936-1937*, Warszawa 1974 (*Polish Army 1936-1937*)

⁵¹ The Stalin's' decision No P13/144 dated 5.03.1940.

- On 29.09.1933, a new company named H.Kolberg i S-ka z o.o (limited liability Company) was established. The company was located in Warsaw at 22, Chocimska Street (with the main entrance at 5, Kujawska Street). The Company remained at this address to the January 1945. The factory was produced for Polish MOD as well, including 6x30 binoculars. During the war military binoculars (presumably eug), for German army, were produced at H.Kolberg i S-ka z o.o. The company was finally unregistered on 14.10.1954.
- In October 1939, the name of factory PZO was changed, by German authority, into 'Optische Präzisions-Werke GmbH', at the same address at 35, Grochowska Street. The factory produced binoculars, marked OPW, and next under wartime code, eug. The factory buildings were damaged at the end of the war.
- On 23.07.1945, the Temporary Polish Government decided that; the PZO had to be rebuilt and continue production, as part of the arms industry, under the name 'Polskie Zakłady Optyczne', as the government factory. The factory was located at the same address 35, Grochowska Street. Later the number was changed into No 316, as Grochowska Street urbanized.

After the war, the binoculars produced by factory PZO, were not marked with the eagle symbol and with the letters WP – Wojsko Polskie (Polish Army) any more.

We can say that the H.Kolberg and PZO binoculars are built up very strongly; mechanically and optically. At these nearly 90 years old binoculars, we have not seen any one out of collimation. The cementing is very strong as well.

Chapter 15

Appendix

A few words about other instruments produced by Company H.Kolberg i S-ka and PZO.

As we see, in the Document of PZO from 1935, the factory made 5 prototypes of **8x40** binoculars. It was selling in the optical shops for civilian use, as MOD had not signed a contract for this model. However, the binoculars were bought by civilian formation – 'Liga Obrony Przeciwlotniczej i Przeciwgazowej' (League Air Defence and Anti-Gas Defence). The picture, of this binocular, was published in the PZO catalogue, from 1935 – see chapter 9, page 23.

The factory PZO built up more prototypes: **8x30** prismatic binocular – ten prototypes; military binocular Galilean type – 10 prototypes. Unfortunately, the factory did not sign a military contract on these models⁵². The binocular 8x30 was selling in the optical shops.

⁵² Memorial w sprawie Polskich Zakładów Optycznych Sp. Akc. Nr 207 tjn. LM/IL, Warszawa październik 1935, załącznik Nr 3 (*Report about PZO S.A No 207, October 1935, annex No 3*)

Among the new instruments, produced by PZO, were; sight, and observations items, and range-finders for:

- Antiaircraft's artillery,
- Anti-tank artillery and
- Armoured units.

The important optical production was for Polish Naval Forces. There were produced, in cooperation with Nedinsco, some instruments for ships, and optical parts for artillery headquarters of Polish submarines; **ORP Orzeł** launched on 15 January 1938, and **ORP Sęp** - launched on 17 October 1938. The submarines were built up at the Dutch shipyard *Rotterdamse Droogdok Maatschappij*.

Here is the documentary film about launching the **ORP Orzeł** at the Dutch shipyard and arriving at the Polish harbour Gdynia:

<http://www.youtube.com/user/Pathe1939#p/u/142/mKuVtqAdsBU>

The company produced mainly for the MOD. Only 3, 7%, of the whole production, was for the civilian market, as microscopes, magnifying glasses and ocular lenses⁵³.

The cooperation, with H.Kolberg S-ka S.A., was valued very well by the MOD. In consequence:

1. The Department of Armament ordered the following instruments, to be produced by the factory (since May 1931 PZO):

- Pocket dial-sights;
- Dial-sight-compass (constructor major engineer Ludwik Berezowski);
- Sight for ckm (heavy machine gun);
- Panoramic dial-sight.

2. The Department of Air Force ordered:

- The first order was to repair of air photo cameras;
- To produce for the Department pilot's compass model Z-6 – from 1930;
- Photo guns model K-28;
- Sights for bombardment model RH-32 (constructor – Capt. Engineer Robert Hirszbard);
- Photo cameras types KR and KW.

3. The biggest contract of PZO was for the Polish Navy.

- In 1934, the contract was signed for the central instrument for artillery, for the management of the battery fire.
- In 1935, was signed the contract for; optical instruments for the management of artillery fire and torpedo weapons;
- In 1935, PZO signed the licence contract to Netherland Company Nedinsco for built up periscopes for Polish U-boats⁵⁴.

⁵³ Memorial w sprawie Polskich Zakladow Optycznych Sp. Akc. Nr 207 tjn. LM/IL, Warszawa pazdziernik 1935, zalacznik Nr 3 (*Report about PZO S.A No 207, October 1935, annex No 3*)

4. The Heavy Armoured Department ordered;
 - The sights for the tanks type 7TP and the sight – verifiers.
5. The Sapper Admiralty ordered;
 - The sights – part of anti-aircraft searchlights.

The company produced 95% of the optical instruments, requirements of the army. In this way, it is understandable that some documents were evacuated from Poland, after the invasion of the German Army.

There are two educational films for students, filmed in PZO, made in 1976 by Warsaw Polytechnic – Engineering College. The films are in the Polish language, but in my opinion translation is not necessary as the films are showing the production of lenses and prisms.

<http://www.bmo.pl/page3.php> from the page you can choose:

1. Film – „Technologia produkcji soczewek w PZO” (The technology of lenses production in PZO)
2. Film – „technologia produkcji przyrządów w PZO” (The technology of prism production in PZO)

The films are old, but in some ways educational. If you have not seen this kind of production, it will be interesting to see.

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⁵⁴ Monitor Polski Nr 54 z 7.03.1932, poz.62 Zarządzenie Prezesa Rady Ministrów z dn.25.02.1932 (Government Journal No 54 dated 7.03.1932 – The order of PM)