

INVESTIGATION OF HISTORICAL 7X40 BINOCULARS

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INTRODUCTION.

In the past century quite a number of 7x40 binoculars entered the market. This binocular type seems to be most attractive for the military and the majority of the binoculars investigated here are from military origin. Below some pictures of the investigated binoculars:



Photo 1 from left to right: Rollei 7x42, Carl Zeiss NVA 7X40, Aus Jena 7x40B/GA, Docter 7x40B/GA, PZO 7x45C



Photo 2 from left to right: Präzision Telemono 7x40, Carl Zeiss NVA 7X40, Aus Jena 7x40B/GA, Docter 7x40 and PZO 7x45C

Specifications of the different binoculars are listed in the added table and by the measured transmission spectra. All these 7x40 binoculars are made for special purposes, since they are not or hardly usable for general use like birding or nature watching. They are useful on board of a ship for example or for stationary police or military use.

-1- ROLLEI 7X42

This peculiar shaped binocular is identical to and a copy of the Avimo 7x42, that was used by the British army among others during the Falkland war. The Rollei/Avimo binoculars have a particular shape because the Porro prisms are not aligned in a horizontal plane with the other optical components as generally is done, but they are aligned in a angle of around 45° with respect to the objective tube, see photo1. It gives the Avimo/Rollei its characteristic shape, but it makes handling of the binocular

not very appealing to me. The British AVIMO 7x42 was in the 1980's made for British troops, police and NATO forces. The civilian Rollei version came in two versions: one with black rubber armor (the one investigated here) and a metal one with silver finish. The binocular cannot be focused, it is sharp from 15 m to infinity, so British soldiers in the Falkland trenches could not observe snakes with their Avimo binocular in the trenches (if there were snakes at all). When you need spectacles the Rollei can theoretically be used with spectacles, but the harmonica shaped eye rubbers are rather stiff, so it is a tough challenge, but theoretically it must be possible with an eye relief of 23 mm, so try before you buy. As already mentioned, the shape of the binocular body is special because the eyepieces and the objectives are not positioned in a horizontal plane as generally is the case with Porro prism binoculars, but the prisms are positioned in a 45° angle to the binocular body to accommodate the optical path through the Porro prisms. The difference becomes very clear by comparing the pictures of the Rollei 7x42 with the Zeiss NVA 7x40, see photograph 1. With a weight of almost 1200 g it is certainly not a feather weight. With light transmission of values of 70% and more is certainly not performing bad. Today the Russian BELOMO factory in St. Petersburg makes copies of this binocular.

2. CARL ZEISS NVA 7X40

This very heavy (almost 1300 grams) and plump binocular was used by the National Volks Arme (the National People Army) of the East German authorities. With a weight of almost 1300 g it is a heavy weight, so if your gun refused you could also finish your enemy with this instrument. The binocular is standard equipped with a strong strap, an eyepiece cover and objective caps that are connected with metal hinges to the binocular body. When the binocular is carried with the strap around the neck, it aligns itself spontaneously in an almost horizontal position, not really pleasant when walking around. Surprisingly enough observation with this binocular is a nice experience. The very thick body feels comfortable in the hands (if they are big enough) and the images are rock steady. The edges are not sharp and the transmission values of around 55% are not to be excited about. Users with spectacles have a hard time, since here the harmonica shaped rubber eyecups offer challenges to get the whole binocular image in the eye. But these rubber eyecups are not designed for use with spectacles but for use with a gasmask on the face and in that case a longer eyerelief makes sense. Conclusion; a nice collector item, but not suited at all for daily use. In the table one can find the technical data collected from this binocular.

3. AUS JENA 7X40 B/GA ALSO NAMED AS CARL ZEISS JENA 7X40 EDF

After WW-2 the world class optical company CARL ZEISS JENA was situated in occupied East Germany under communist government. After long and tedious legal battles, the name Carl Zeiss was not allowed in western countries, therefore in these countries the brand name AUS JENA was used for binoculars and other optical instruments made in the East German Zeiss company and a new Zeiss West company was formed and situated in Oberkochen, West Germany. That Zeiss West company later and still would use the original Hensoldt factory in Wetzlar for the Zeiss-West binocular and optics/optical instrument production.

The Aus Jena 7x40 B/GA investigated here (for details see the added table and the measured transmission spectrum) is a very solid built instrument and feels good in the hands. Focusing occurs by turning each eyepiece separately: the classic individual focus system of military binoculars. With an eye relief of 16 mm and not very flexible rubber eyecups, spectacle users face a challenge. Color representation of the optical system is strongly yellow; the transmission spectrum confirms it: not flat but strongly curved with most of the blue transmission blocked. The eye relief of 16 mm and a strong yellow color representation makes it not a very attractive binocular for nature watching or birding.

The Schmidt-Pechan roof prisms of the Aus Jena 7x40 are not supplied with phase-coatings and that affects resolution.

The binocular is standard equipped with a very strong strap and a solid eyepiece cover. Historically an interesting binocular, very strong and reliable, but as far as I am concerned not really pleasant for daily use.

4. DOCTER 7X40 B/GA

When Zeiss Jena stopped to exist, the company was bought by Docter, a company originally situated in Wetzlar, where it also made car illumination parts and optics but no binoculars. In Jena Docter continued the production of the original Aus Jena 7x40 B/GA, but with some small changes: the roof prisms were still not supplied with phase coatings for better resolution, but lenses and coatings were chosen so, that the binoculars lost its strong yellow color cast, see the added transmission spectrum. The green color of the metal parts, were made black, but further properties were identical to the Aus Jena 7x40B/GA with the advantages and disadvantages I have described about that binocular, see the added table and the transmission spectrum. The Docter 7x40 B/GA is a very strong and reliable binocular but not the first choice for everybody.

5. PZO 7X45C

PZO= the Polish Optical Factory started in 1931 in Warsawa, Poland as successor of the optical factory founded in 1921 by Henryk Kolberg, see my paper on PZO. PZO had a large production program and binoculars were only a fairly small part of it next to microscopes, refractometers etc. In the PZO binocular program the 7x45 has a special position, since many were made for the military: very strong and heavy binoculars with excellent optical performance. Amidst this military program the PZO 7x45C investigated here is a civilian version of the 7x45 made for army use. It seems fairly rare. The civilian version does not use special filters: it is just the plain optics. I got the PZO 7x45C in 1991 when I visited Poland for a few weeks of mountain walking and stopped by to render a visit to the company.

I did not use it a lot for the following reasons: it is very heavy and the harmonica shaped eyecups with roughly the shape of a banana are not very friendly for spectacle users (for military use it makes sense in case a gas mask is applied). The binocular body has a solid rubber armor that is equipped with protruding rubber spikes, so the binocular does not slip in your hands. A leather strap, eyepiece cover and objective covers are standard attached to the binocular. Overall, it looks and feels as very well made and a strong and reliable instrument. The individual eyepiece focus mechanism feels solid and turning goes very smooth. I have listed a number of parameters in the added table. The measured transmission spectrum underlines the observation, that colors are slightly shifted to yellow-red without giving it a very yellow bias as found in the Aus Jena 7x40B/GA.

6. PRÄZISION TELEMONO 7X40.

This peculiar 7x40 monocular is made in Japan, but nowhere on the binocular I could find abbreviations pointing to the producer. Focusing takes place by turning the objective ring, but the eyepiece can also be turned to make further adjustments. With 166m/1000 it has a fairly large FOV and a close focus value of 1,97 m is also all right but you have to take a lunch with you since turning of the focusing wheel takes forever despite the few turns necessary. Handling is OK and the binocular is equipped with a small strap for carrying it in one hand. A nice collector item.

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TABLE 1

Binocular	Carl Zeiss Jena NVA 7x40	Aus Jena 7x40GA	Docter 7x40B/GA	PZO 7X45C	Rollei 7x42	Präzision Telemono 7x40
Weight	1287 g	942 g (with strap and eyepiece cover)	996 g (with strap and eyepiece cover)	1219 g	1187 g	463 g
Objective diameter (mm)	38,9 mm	40,0 mm	40,0 mm	44,1 mm	41,8 mm	39,9 mm
Exit pupil (mm)	5,7 mm	5,6 mm	5,6 mm	6 mm	5,5 mm	5,7 mm
Magnification	6,8x	7,1x	7,1x	7,4x	7,6x	7x
Eyerelief (mm)	17 mm	16mm	16 mm	15 mm	23mm	16 mm
Field of view (m/100m)	148m/1000 m	131m/1000m	131m/1000m	123m/1000m	124m/1000m	166m/1000m
Close focus (m)	Left: 5,7 m Right: 8,7m	5,6m	5,4 m	8,8 m	> 15 m	1,97 m
Prism type	porro	Schmidt-Pechan roof	Schmidt-Pechan roof	porro	porro	porro
Diopter range	+/-3 dpt	+/- 7 dpt	+/- 7 dpt	+/- 5 dpt	n.a.	n.a.
Range between both eyes	51-75 mm	55-80 mm	55-80 mm	49-72 mm	48-90 mm	n.a.
Rev. CF-∞	0,75	0,5	0,5	1	n.a.	1
Phase correction coating	Not necessary	no	no	Not necessary	Not necessary	Not necessary
Light transmission						
500 nm	54,7%	70,2%	68,2%	63,5%	75%	68,2%
550 nm	56,8%	75,7%	67,6%	70,9%	79%	75%
Waterproof	yes	yes	yes	yes	yes	no
Price	100-200 euro	200-400 euro	999 euro	100-400 euro	100-400 euro	10-25 euro



