

## Nikon Action Extremes 8x40, 10x50 and 12x50 with comparison to Orion Ultraview 10x50 and Pentax PCF WP 10x50 among others. By Ed Zarenski



Pentax PCF WP 10x50 and Nikon AE 10x50 and 12x50

I've been using these Nikon AE binoculars for about 6 or 7 months now. I've had plenty of opportunity to match and rematch combinations and observe under all kinds of conditions. Most all the others I've had for several years. The Pentax PCF WP I've had for several months. It has turned out to be my favorite out of this group. But these Nikons offer a pretty good binocular for the money. Here are the end results of all the notes I recorded when observing. You should be able to find some information here that is of some value to you if you have any one of these binoculars in mind.

Clear skies, and if not, CloudyNights.

Edz  
1-23-05

### **Price**

I paid \$129 for the Nikon AE 8x40, \$139 for the 10x50 and \$154 for the 12x50 in July 04 from Adorama. Five years ago, I paid \$169 for the Orion Ultraview 10x50. It still sells for \$169 today. Recently I bought a used Pentax PCF WP 10x50 for \$100. The new PCF WP II 10x50 sells for \$179 new. A few years back I bought (used) a Pentax PCF III 12x50 for \$85 and a Swift Ultra Lite 8x42 for \$125. The PCF III is discontinued. The PCF WP II 12x50 sells for \$189 new. The Swift 8x42 sells for \$189 new.

### **Mechanical Build**

The binocular housing (eyepiece holder, focusing, prism housing) is identical on all three sizes of Nikon AE mentioned here. The 12x50s and 10x50s cannot be told apart from one another without looking for the 10x50 or 12x50 label on the housing. The 8x40 has the identical housing, but just has shorter objective barrels. All three are waterproof.

The eyecups are twist-out, semi-hard, with a click notch that holds at 3 extended positions. With the eyecups turned all the way in, 6mm of the eye relief is used up. The lens is recessed 5.5-6mm below the top of the eye guard when the eye guard is completely closed down. Each click out adds 3mm extension.



I like these twist out ratcheted eyecups

The objective lens caps are the cheapest excuse for a lens cap I've seen. It's a good thing I don't choose my binoculars by the lens cap they come with. Nikon should go back to standard lens cap covers for the objectives. The eyepiece caps are pretty nice.

The Nikon AE 10x50 has a right diopter focusing style identical to the Orion Ultraview. But the Nikon finger grips are larger and in such a position when I reach for it it's right where my fingers want it to be. On the Orion, the finger nubs are not where my fingers go and the grip is smaller. The Nikon is much easier.

- The Interpupillary Distance (IPD) measures 55mm to 73mm on all three sizes. That is a fairly wide range, with a good low setting that allows kids with close set eyes to use these easily.
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- The Nikon AE 12x50 weighs 37 oz. and the Pentax PCF III weighs 34 oz. The Nikon 12x50 SE weighs 31 oz.
- The Nikon AE 10x50 weighs 36 oz. The Pentax PCF WP 1x50 weighs 35 oz. while the Orion Ultraview 10x50 weighs 32 oz.
- The Nikon 8x40 weighs 31 oz. and the Swift Ultra Lite 8x42 weighs 22 oz.
- The Nikon AEs are slightly heavier than similar models and much heavier than premium models, not a benefit if you want it as a handheld binocular.

Stand the Pentax PCF 12x50 up on end next to the Nikon AE 12x50, they are almost exactly the same size.

The Nikon 12x50 prism housing is larger than the Pentax 12x50. Remember, I said earlier, these Nikons use the same prism/eyepiece housing on all three, the 12x50, 10x50, and the 8x40. That makes the prism housing on the 8x40s larger than the Pentax 12x50, much larger than the housing on the 8x42 Swift Ultralite and it makes the 10x50 size somewhat larger than the Orion Ultraview 10x50.

- The Nikon AE 8x40 has a close focus of 16 feet.
- The Nikon AE 10x50 has a close focus of 20 feet.

- The Nikon AE 12x50 has a close focus of 23 feet.

### **Eye Relief**

The eye relief is listed as 17mm on the Nikon AE 10x50 and Nikon AE 8x40. On the Nikon AE 12x50 it is listed as 16mm. I measured exactly 17mm on both the 10x50 and 8x40 and 16mm for the 12x50.

In the Nikon Action EX models, I am able to see 100% of the FOV with my glasses on and the eye cups closed down. In fact, even with the eyecups extended out 1 notch, I was still able to see the entire FOV with my glasses on, in all models.

The eyecup full extension adds an additional 9mm recess. When the eyecups are fully extended, the lens is recessed 15mm in from the top of the eyecups. I verified that I was easily able to see the entire FOV in all models without my glasses and with the eyecups extended fully out.

Comparing to the Orion Ultraview 10x50, the Orion is fine with the eyecups down, but with the eyecups fully extended, would not allow me to see the entire FOV, even without my glasses. About 10-15% of the fov is blocked. The lens recess with the cups down is 3mm and with the cups fully extended 14mm (eye cups fully extended adds an additional 11mm recess).

### **Ergonomics**

The 8x40 and 10x50 were both easily handheld. The 12x50 was a little heavy and approaching my limit for hand held power. The 8x40 although easily held, I found a bit low powered for my almost exclusive astronomy use. The 8x40s are an excellent size for my group astronomy sessions with school children.

I've hand held 12x50s for a while, but with 12x, I can't eliminate all the motion. In fact I can't even completely eliminate it at 10x, but at 10x it becomes much less bothersome, so a 10x binocular or a 12x binocular is the maximum I consider hand held.

### **Resolution**

The on-axis resolution of these Nikon AE binoculars is very good. The pinpoint sharpness and fine point of light that can be focused allowed for some pretty fine resolution. But I found it drops off really fast and gets really poor quickly.

In the 10x50 AE, I was easily able to resolve the components of a 22" double star and I could see the elongation and suspected seeing the two components of a 14" double. That's pretty impressive for a 10x binocular. The 12x model was able to easily resolve the 14" double star and elongated the components of  $\gamma$  Delphinus, 9.6" double, again very impressive resolution. The 8x model was able to see the 22" double, but with difficulty to tell that they were separated. All in all, the on-axis resolution is quite impressive. It goes downhill really fast after that.

Confirming what I mentioned earlier, for on axis sharpness of resolution the Nikon 10x50 beat out the Orion Ultraview 10x50. I simply could not focus the Orion to as fine a pinpoint as the Nikon. A pair of stars 22" apart was clearly more separated finer pinpoints in the Nikon than in the Orion.

### **TFOV**

For total True Field of View (TFOV), I sighted across various star fields. Both the Orion 10x50 and the Nikon 10x50 measured almost exactly the same field of view, just a hair less than  $6.1^\circ$ . In all cases, the Orion was just a hair wider or better than the Nikon. The Pentax 10x50 has a narrower field of view than both the Nikon AE and the Orion Ultraview. The Pentax is  $5.0^\circ$ .

I checked the Nikon Action Ex 12x50. The 12x50s saw the span from B Cas to n Cas. TFOV measured  $5.2^\circ$ , just barely. The Pentax PCF III 12x50 has a TFOV of  $4.1^\circ$ .

The Nikon AE 8x40 has a TFOV of  $8.0^\circ$ .

### **Sharpness Across the Field**

The following measurements are recorded by observing various double stars while placing another charted field star on the very edge of the field. The field star used for the distance measurement is noted. Then later, the sketches are compared to Charts and the distance from edge to the double star resolved is easily determined. In this way I can get fairly accurate measurements of resolution along the axis from the edge. I have a table of measurements that I have collected.

The excellent Nikon 12x50 SE has one of the best measures towards the edges for sharpness resolution of any fixed power binocular I own. It can clearly see 14" out to 50% for an apparent resolution (sharpness of image) equal to  $12 \times 14.2 = 170$  arcseconds. An 18" double is seen at 65% out and I can see 22" at 80% out (70% handheld) for an apparent resolution of  $12 \times 22 = 264$  arcseconds at 80% out. Of the other 20-25 binoculars I've owned only the Pentax 16x60 came close and only the Oberwerk BT100 exceeded that performance.

In the 10x50 AE model, 50% out from center the image is good, stars are slightly enlarged, a 22" double can still be seen as double. By 60% out from center the distortion begins. Stars don't turn into slightly unfocused enlarged blobs, they elongate into curved streaks as if you were seeing a half-hour long time exposure photo pointed at the north star. At 60% out, the image is fair, OK for wide-field background, but not clear enough to see the 22" double split, it's now an elongated line. 70% out from center, the image is poor, the double is an elongated blob, all stars have a radial elongation. The further out from center the longer the streaks get. Between 70% to 80% out from center, the curved streaks that are supposed to be stars are really distracting. Stars near the edge of the FOV are extended lines several arcminutes long.

As far as sharpness out from center, the Nikon AE 10x50 and the Orion Ultraview 10x50 were nearly identical. If the distortion can be noted on star fields, it is present in

whatever you choose to look at. The Pentax PCF WP 10x50 has pinpoint sharpness. Unlike these other two mentioned it does not drop off quickly, but sharpness holds fairly well out towards the edges.

The 12x50 AE did a little better than the 10x50. I would say it was decent out to 70% from center. But the 10x50 has a wider field of view. So really both the 10x50 and the 12x50 are producing approx. the same undistorted field of view of about 3.3°. The 8x40 model suppresses this distortion a little more than the others. The lower magnification makes it less apparent.

For detailed viewing, only the central 50%, possibly to 60% in the Orion, is effective. For wide angled finding, you could use the field out to 70%. The net effective field out to 70% provides a 4.25° usable field of view in both models of 10x50. Beyond that, everything is distorted.

None of these three Action Extreme binoculars rival the field of sharpness out from center seen in the Oberwerk 15x70, Pentax PCF WP 10x50, Pentax PCF III 12x50, or the Swift Ultralite 8x42. These other four binoculars have good image quality to between 70% and 80% out from center.

The Pentax PCF WP 10x50 have good image quality to between 70% and 80% out from center. The Pentax has a narrower field of view than both the Nikon AE and the Orion Ultraview. The Pentax is 5.0°, both the others have 6.1°. BUT, in favor of the Pentax, at 75% out in the Pentax you can still see double stars as stars with decent resolution. The Pentax PCF WP 10x50 has a sharper wider-field image than either of the above. At 80% to 85% out in the Pentax, you are still able to use 4.25° of the field for observing. You can use the entire 5.0° field for wide-angle finding.

The Pentax PCF III 12x50 has a TFOV of only 4.1°, but it is so sharp across the field, it is fine for detailed views out to 70% and the view is acceptable for wide-field views all the way to 90% out. That gives a good 3.7° usable field of view.

The Nikon AE 12x50 actually measures Tfov of 5.2°. The 12x50 has good resolution sharpness out to 60% of the field and a usable field of view of 70%. That would give 3.6°, just slightly less than the Pentax. Both the Pentax PCF III 12x50 and the Pentax PCF WP 10x50 exceed the resolution ratings for the Nikon AE 12x50, by going about 10% wider.

### **Aberrations**

Often times I'll check curvature and chromatic aberration. I couldn't find any notes I had recorded for either of these. I can say if there is curvature present, it doesn't bother me for astronomy. I suspect there is some CA present. There is in almost every binocular. But I don't usually use binoculars for astronomy viewing of such bright objects that CA becomes an issue. On the occasional evening when I do view the moon with binoculars, there is usually some CA present. I don't see it in most of my other viewing.

## Coatings

One way to tell, comparatively, how much light gets through the coatings is to look for how much light is being reflected back off the coatings. You really can't tell much by looking at just one binocular. You need to see a range of binoculars to see different amounts of reflection. If you can see more light reflected off the coatings then less light is getting through. What you want are coatings that reflect the least amount of light.



Pentax PCF WP 10x50  
Nikon AE 10x50  
Nikon AE 12x50

The Fujinon FMT-SX and the Nikon SE, are the best of all the binoculars I own. Probably next best to those are the coatings on the Oberwerk BT100. The Pentax PCF WP 10x50 are very good, as are the Swift Ultra Lite and the Oberwerk 15x70. If you look at the Action Extremes with no other binocular next to them to compare, the coatings look great. I have three pair of the Nikon AE's, the 12x50, the 10x50 and the 8x40. The coatings are perfectly consistent across the three.

When you compare the Nikon Action Extreme coatings up against these others, the Swift Ultralite 8x42, the Oberwerk 15x70/'03, my 5-year-old Orion Ultraview 10x50 and a new Pentax PCF WP 10x50, it's a different story. The Nikon AE objective coatings reflect more light than all of them. They are all fully multi coated, but there is a significant difference in the quality of the FMC on the Nikon AE vs the Pentax PCF WP, at least on the ones I own.



From the top down  
Swift Ultra Lite 8x42

Pentax PCF WP 10x50  
Nikon AE 12x50  
Pentax PCF III 12x50

The Nikon AE coatings appear to reflect about the same as my Pentax PCF III 12x50. I'd say the only binoculars the Nikon AE coatings equaled for least reflections were the older generation Pentax PCF III and the older version Oberwerk'02.

### **Limiting Magnitude**

The Nikon AE 10x50 could see about the same limiting magnitude as the Orion Ultraview 10x50. The Nikon AE 12x50 sees just a tenth of a magnitude deeper than the Pentax PCF III 12x50. Confirming the coating comparison, the Pentax PCF WP 10x50 could see stars several tenths magnitude deeper than both Nikon and Orion 10x50. The 10x50 AE spotted stars to mag 10.2 and the 12x50 AE saw stars as deep as 10.5. The Pentax PCF WP 10x50 could see stars to mag 10.4.

### **Viewing**

With the 10x50s and 12x50s I captured nice views of M11, M27, M71, Alberio, Sagitta, Delphinus, CR399, and the Cygnus Milky Way. In the Nikon 10x50 held braced, I saw M15 as a small but obvious globular. Other handheld views in the 10x50 include M52, NGC 7789, M39, NGC 752, M42, and M45.

The 10x50 AE binoculars can see many open clusters and in a good dark sky will find a large number of galaxies and nebula. Limiting magnitude can reach just deeper than mag 10.0 to 10.2 and you can separate stars as close as 16" to 15" and with effort 14".

With the Nikon AE 12x50 you can see as deep as mag 10.4 to 10.5. Generally, field of view is about 5.0°, but Pentax are narrower. Some doubles at 14" and 13" can be separated, but a double at 10" can only be seen elongated. M57 can barely be seen as more than just starlike. Many deep sky objects can be easily found. On one night M31 filled 40% of the FOV. For me this 12x is about the limit of handheld astronomy.

### **Comparisons**

I'd consider the Orion Ultraview 10x50 comparable in optical/mechanical respects to the Nikon AE 10x50, with these exceptions:

- I see no prism edge light cutoff in the Nikon AE. The Ultraview has two edges cutoff.
- The Ultraview has much better coatings. The Nikon reflects much more light.
- The Nikon AE has greater range of right diopter adjustment. Even with glasses, the Orion is turned well into the minus diopter range to focus.
- The Nikon AE has a more ergonomic right diopter adjustment, larger finger grips.

- The Nikon focuses to a finer pinpoint.
- The Nikon 10x50 weighs 36 oz. while the Orion 10x50 weighs 32 oz.

The Orion won't allow seeing the entire fov with the eyecups fully out. They really have only about 15-16mm of usable eye relief. The Nikon has about 17mm. Both have a 6.1° field of view.

I'd consider the Pentax PCF WP 10x50 better than the Nikon AE 10x50, with notes:

- The Pentax PCF WP 10x50 coatings reflect less light than Nikon AE.
- The click-stop right diopter on the Pentax has excellent feel and positive positioning.
- Eye relief is not a problem on either Pentax or Nikon with or without glasses.
- The Pentax 10x50 weighs 36oz. The Nikon 10x50 weighs 36 oz.
- The Pentax has a narrower field of view than both above. The Pentax is 5.0°.
- The Pentax has a sharper wide-field image. At 75% out in the Pentax you can still see stars as stars, with decent double star resolution, better than both above.
- The Pentax has a wider usable field of view, better than both above.
- The Pentax sees a several tenths magnitude deeper in limiting magnitude.

### **Summary**

Which one is the right binocular for you? You need to consider several things:

What's the size field of view you would like to be viewing thru? 8°, 6° or 5°.

Do you want to reach the limits of a binocular or just use it for casual viewing? You won't get to the limits with any size binocular hand held. To reach the limits in any given size, you need to take coating effectiveness and sharpness of field into consideration and possibly consider a more expensive binocular.

Will you hand hold some of the time or all the time? Some time a 12x50 is fine. Most of the time a 10x50 is fine. If you plan to always hand hold you might want a 10x50 or 8x40.

How much do you want to see? The more magnification you use the more you get to see, almost regardless of the size of the aperture. But you don't want to totally ignore the light gathering capability of the aperture. You'll need that for faint diffuse objects.





The Nikon AE is a good deal in the \$129 to \$159 price range. I would stop to consider buying the Nikon AE 10x50 for \$139 before paying \$169-\$189 to buy the Orion Ultraview 10x50, even though the Ultraview has nicer coatings. I would consider the Pentax PCF WP 10x50 a better binocular than both and would consider paying a little more for it, even though it has a narrower field. I consider the 12x50 AE a little better performer than the 10x50 AE, although heavy but with a 5.2° Tfov, that's a pretty good field of view. The 10x50 AE is more versatile. The 8x40 is a good deal in a hand held binocular, but I just find I want more power for astronomy. It would be the best choice for young kids. If the Nikons remain at the price point of \$129, \$139 and \$154 as advertised at Adorama (click place in shopping cart to see final price), they are a good value in binoculars. Currently (Jan. 20, 05) shipping is free.

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