



AF-S Zoom-Nikkor ED 70-200mm f/2.8G VR II

Nothing like a controversy or two.

Quick Evaluation

Highly recommended;
Ignore the controversies:
it's a darned good lens.

Absolute Scale:

★★★★★ features
★★★★★ focus speed
★★★★☆ optics
★★★★☆ build

Value Scale:

★★★★☆ features
★★★★☆ focus speed
★★★★☆ optics
★★★★☆ build

★★★★☆ overall value

The high price of the lens means that when measured on value, the primary aspects all suffer a bit. But on an absolute scale without cost being considered, most of the aspects of this lens are near as good as one can expect.

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Original Review: 2/8/2010
Lens source: purchased

Limitations

The 70-200mm lens has a few limitations you need to be aware of:

Internal flash cycling. VR doesn't work when the internal flash is being recycled.

Turn the camera off. Nikon's been telling us to turn the camera off before changing lenses, and it's never been more true. If VR is active when you remove the lens from the camera, weird things can and do happen.

AF-ON, VR Off. VR does not operate until you partially press the shutter release. Thus, if you use the AF-ON button to acquire focus and then stab at the release, you're probably not giving the VR enough time to do its job fully. You can press the AF-ON button to trigger focus, and then press the shutter release partway to let the VR acquire and stabilize, but some people find this to be awkward.

Nikon has thrown in virtually every possible feature with this new lens, resulting in an alphabetic menagerie added to its official name.

Lens Formula	21 elements in 16 groups; 7 ED elements.
Other Features	Rotating collar and removable tripod foot, VR (vibration reduction), focus limit switch, manual focus override, Nano coating, rubber weather seal gasket at mount, AF-S lens focusing motor, internal focus, 77mm filter size. Comes with HB-48 hood and CL-M2 semi-soft case. Focuses to 4.6' (1.4m).
Size and Weight	About 8.1" (205mm) long, 54.3 ounces (1540g) with collar.
Price	US\$2400 (street)



The Basics

Nikon has had at least seven previous f/2.8 telephoto zooms in this range:

- 1 [80-200mm f/2.8 ED](#). This manual focus lens was first introduced in 1978 at Photokina. The lens has a unique rotating tripod collar and was a two-ring design, but only a handful were produced.
- 1 [80-200mm f/2.8 ED](#). The most common of the manual focus versions uses a one-ring design and a full depth of field scale engraved on the barrel. The lens is distinguished by a huge 95mm front thread. Introduced in 1982, again, not a lot of these lenses were made.
- 1 [AF 80-200mm f/2.8 ED](#). The first of the autofocus versions appeared in 1987. Curiously, unlike most early AF conversions, Nikon appears to have made a few optical changes in this conversion, adding an element and making the front element the standard 77mm size used in most pro lenses.
- 1 [AF 80-200mm f/2.8D ED IF](#). The first D version appeared in 1992 and added no rotating front element.
- 1 [AF 80-200mm f/2.8D ED IF](#). A two-ring version of the classic design appeared next.
- 1 [AF-S 80-200mm f/2.8D ED IF](#). In 1999, Nikon added an AF-S version of the two-

ring design, making a few other minor changes, as well.

- 1 [AF-S 70-200mm f/2.8G ED VR](#). In 2002, Nikon completely redesigned the lens, changing almost everything about their perennial best-seller and adding VR.

All seven of these lenses are universally regarded as being quality designs. Arguments abound about which of the AF versions is sharper than the other, with the most commonly held view appearing to be that the AF-S 80-200mm is the sharpest, the one-ring next sharpest, and the short-lived two-ring non AF-S as the weakest of the three 80-200mm models. The 70-200mm is regarded differently on DX bodies (great) than on FX bodies (just good due to corner issues). Frankly, however, they're all quite sharp where you need them to be and unless your handling is perfect, I doubt you'd be able to distinguish between them. One common rap on all the recent entrants is that there is a fair amount of light drop-off in the corners on full frame cameras, and I'd agree with that assessment.

While all the 80-200mm lenses have a common design history (especially the autofocus versions), Nikon's replacement, the AF-S 70-200mm f/2.8G ED IF VR, was a completely new optical design. The latest iteration of that lens--the subject of this review--is as much different than it is the same as its predecessor, and different in some subtle ways.

This is a very complex lens, with 21 elements in 16 groups. By comparison, the old 80-200mm designs tended to be 15 or 16 elements in 11 groups. Seven (!) of the elements are now ED (low dispersion glass), up from three in the 80-200mm designs and five in the previous 70-200mm. The aperture is a 9-blade type.

Overall, the new lens is slightly shorter than the one it replaces (by almost a half inch [10mm]), but it's also a bit heavier (about 2.5 ounces [70g]). If you count the lens hood, the new lens is another five-eighths of an inch shorter than its predecessor. Instead of 11.5" sticking out in front of your camera, now you've only got 10.5."

AF-S means that the lens has a built-in motor for focusing, doesn't rotate the front element during focus, focuses very fast and reliably, and allows you to override autofocus by simply grabbing the focus ring and turning it.

The focus ring is at the front of the lens (curiously behind a surface that's gripped like a ring but isn't). The Zoom ring is the one closer to the body. Between the rings is the focus scale (but with no depth of field or infrared markings). The focus scale was far forward on the original 70-200mm. One thing that's missing: focus hold buttons. On the camera side of the zoom ring are a set of four buttons:



- 1 *Focus button*: In the **M/A** position the lens works as usual (autofocus with manual override). In the new **A/M** position it still works the same, but is less sensitive to accidental override. In the **M** position, the lens focuses only

manually.

- 1 *Focus Limiter button*: In the **Full** position the lens will focus at any point from its nearest focus point to the furthest. In the **5m** position, the lens only focuses from 16.4' to infinity. (This is different than the original 70-200mm, which had its limiter at 8.2' [2.5m]).
- 1 *VR button*: In the **ON** position, VR is active; in the **OFF** position, VR isn't used.
- 1 *VR Type button*: In the **Normal** position, VR will detect panning and not try to correct for it. In the **Active** position, VR takes out all motion.



The tripod mount is the same as the original 70-200mm. This consists of two pieces: a rotating collar on the lens that isn't removable, and a foot that locks onto the collar via a hot shoe-type connector. The foot removes and remounts easily, and the twist knob on its side definitely locks it securely onto the collar. The nice thing about this design is that you can take the foot off without taking the lens off the camera. Since VR begs for using the lens handheld, this collar makes it a no-brainer to go back and forth between tripod and handheld.

One final note: the serial number has moved off a gold plate and onto the bottom of the lens near the mount. It's (finally!) easier to read and has more digits to it. I guess Nikon is expecting to make lots of these lenses. (Actually, this allows them to still use their region coded first two numbers without having to iterate the region code for popular lenses. I was told that the old restricted digit numbering was due to the etching equipment they used, so obviously Nikon finally updated their etcher.)

The lens is made in Japan.

Handling

Well, we've come to the first area of controversy. You'd think that a 70-200mm labeled II would be a pretty direct replacement for the 70-200mm it replaced. For the discerning photographer, it isn't. Consider the following table:

	70-200mm I	70-200mm II
70mm at close focus	80mm	70mm
70mm at 3m	75mm	72mm
70mm at infinity	72mm	72mm
200mm at close focus	182mm	134mm
200mm at infinity	196mm	192mm

What?!? For some time lenses have been marked with approximations. The basic formula is that you calculate focal length with the lens focused at infinity. And if you're within a few percent, you round to some well-known numbers. So, under this agreed-upon industry standard, both the original and the new version of the 70-200mm are, well, 70-200mm lenses.

However, all bets are off at closer focus distances. Some lens designs "breathe." That's the term for changing focal length with focus distance. The 18-200mm is a notorious heavy breather: it is so significantly short of 200mm at its closest focus distance that even casual users notice this. You can calculate the focal length of a lens at its closest focus distance by using the formula **minimum_focus / ((1/reproduction_ratio) + reproduction_ratio + 2)**. The Nikon 17-55mm DX, for instance, works out to be

50mm under that formula, which is pretty much a non-breather. The older 70-200mm calculates to 182mm, which is still pretty much a non-breather (it's only lost 7% of its focal length). But the new 70-200mm? Well, it's a pretty heavy breather: it loses 29% of its focal length as you focus closer. What's that look like? Well, here are the two 70-200mm lenses side by side as we move further away. First at the short focal length (70mm). The old 70-200mm is on the left, the new on the right:



Next at the long focal length (200mm):





2m



3m



5m



10m

Thus, right from the start we have a clear difference between the the old and the new, and it shows up as a "handling" issue for some users. Some event photographers complained loudly and bitterly about this issue when they noticed it. If you're a music photographer and stuck at the front of the stage for the first three songs, having a lens that's perhaps 185mm (old version) when focused on the lead singer is a bit different than 147mm (new version). Indeed, that's awful close to the gap between two old primes (135mm and 180mm). However, note that if you have some flexibility of movement, basically taking one step forward when the subject distance is less than 2.5m (10') will get you very close to the equivalent of the old 70-200mm.

But this also ties into another handling issue: why is the new restricted focus range 16' to infinity? I don't find that limitation very useful, but it's interesting to note that the lens is 176mm at that distance, fairly close to the maximum focal length of about 192mm. In other words, Nikon put the limiter where it is because the lens starts breathing heavily as you get to closer focus distances than 5m. I call cop out on the designers. It appears to me that they took the easy way out for placement of the focus limiter and didn't really think about where we photographers might want to see it.

For those that are concerned about reach, here's the full table of approximate focal lengths reached at 200mm:

	Marked 200mm is really:
1.4m	134mm
2m	147mm
3m	164mm
5m	176mm
10m	186mm
Infinity	192mm

Of course, no one complaining about the focus breathing at the long end of the new lens seemed to have noticed that the *other* end of the focal length range was better.

The new lens is pretty much a 70mm lens (within 3%) at any focus distance, while the old lens was too long by as much as 14% (i.e. 80mm instead of 70mm).

I'm of mixed feelings about the focal length issues. I kind of like the focus breathing, as I like to be close to subjects, yet I don't want to be looking up their nostrils. 200mm at 1.5m is a bit much for me when shooting people. And the old 79mm at 1.5m at the other end was distinctly confining, too. But I'm sure there are shooters out there that will prefer the old lens to the new lens on just this single item, even if that means giving up some of the other advantages of the new lens. This is a choice I can't make for you. Different shooting styles will dictate different lenses (old or new 70-200mm).

The new 70-200mm is a bit shorter than the previous model (good), but has a barrel that stays constant in diameter through its length, resulting in the zoom and the near portion of the focus rings being larger in diameter. If you've got small hands, you won't like this change. I also miss the focus hold buttons that were at the front of the earlier lens. (Boy, Nikon didn't make liking this new lens easy!)

Okay, some good news: on my samples, the zoom and focus rings are slightly stiffer and have a much smoother feel than the old version. The zoom still goes from short to long in a quarter turn. Focus moves from near to far in almost a half turn, allowing precision without (usually) forcing you to reposition your hand when going from one extreme to the other. The older focus ring took only about a third of a turn, and coupled with that short throw and the slightly "loose" feel, I found it harder to manually focus with precision than I do the new lens.

I've complained about Nikon's focus limit buttons on previous lenses, and this lens doesn't completely end that trend, though I prefer the two-range button on this lens to the three-range previously used. If you're using the lens for work any closer than 16' (5m) your only choice is the **Full** position, unfortunately. As before, all four control switches on the lens are grouped together and all are switches. That means that you won't be making changes to lens settings by feel unless you absolutely memorize which button is where (hint: the top two are AF related, the bottom two VR; the top switch in both groupings is a slightly wider "ON/OFF" switch and the ON position is toward the front of the lens, the narrower bottom switches in each pair set options; this is the same as previously, thank goodness).

The 70-200mm lens features the same tripod collar as its predecessor. Instead of removing the whole collar, which has always required dismounting the lens from the camera, this new version has a hot-shoe like apparatus that allows you to remove the mounting foot (leaving the rotating collar behind). You can get the foot on and off the lens very quickly, yet the whole thing is quite stable when you need it to be. There's only one drawback that I can see, and that's that the mount is slightly low in profile; on some heads if you mount the lens on the head then the bottom of the camera body can hit long handles (but then why are you even using a video-type panning head? See my [Tripod 101](#) article!). In short, I want this collar (or some variation) on all my telephotos! [The manual, by the way, has the same amusing note as the predecessor did: "*When using a tripod, be sure to fully tighten the tripod collar lock screw, otherwise the lens may fall off the tripod accidentally and cause bodily injury.*" That unspecified bodily injury, of course, would be the concussion you get from banging your head against the wall after doing something so stupid with a very expensive lens.]

Which brings us to VR and tripods. Once again Nikon's manuals seem to be causing some confusion. The manual is explicit: "*When the lens is mounted on a tripod, set the vibration reduction ON/OFF switch to OFF.*" Of course, the next sentence starts the confusion: "*However, set the switch to ON when using a tripod without securing the tripod head, or when using a monopod.*" This one is tricky. If you're a tripod on something that has vibration in it (like the deck of a cruise ship), you'll need to be in Active VR, but otherwise you want to be in Normal VR.

Some other sections of the manual will have scratching your head. For example, the description of Normal versus Active VR says "*In this mode [Active], the lens does not automatically distinguish panning from camera shake.*" Okay, so if you're panning on a tripod, you should be in Active mode, right? Probably not. You don't want the VR to fight your panning, only to correct the motion in the axis you're not moving.

Curiously, Nikon's documentation only hints at, but never quite makes clear, how VR handles panning. Page 18 of the English section has one of the worst diagrams I've ever seen; it's a poor attempt to tell you when to use each VR mode. In this case, 100 words is worth any number of Nikon diagrams, so here they are: When you pan the camera in Normal VR mode, two of the four stabilizers are deactivated (for a horizontal

pan the "left"/"right" pair are deactivated; for a vertical pan the "top"/"bottom" pair). When you rotate the lens the actual physical stabilizers that are deactivated change, though the intent stays the same. Thus, up/down motion is *always* taken out in a horizontal pan regardless of whether you've positioned the camera and lens for a vertical or horizontal shot. In short, if you pan in Normal VR mode, the lens tries to take motion out that isn't a pan.

Active VR takes away this automatic panning detection--all four stabilizers are always active. Thus, in Active VR mode, the lens assumes you want to remove *all* motion. Do you need to put the lens into Active VR mode to remove motion when you're not panning? Not really. Most photographers produce much more up/down motion (due to stabbing at the shutter release) than they do left/right motion. But if the platform you are shooting from has lots of strong vibrations you need to remove--as you might when shooting from a vehicle with its engine on--set the VR to Active to be sure that nothing is interpreted as a pan. [Okay, that was more than 100 words, but hopefully clearer than Nikon's diagram.]

The lens comes with the pinch-style front lens cap, a bayonet lens hood that's shorter than the predecessor but still reverses on the lens, plus a soft case. The lens is made in Japan.

Performance

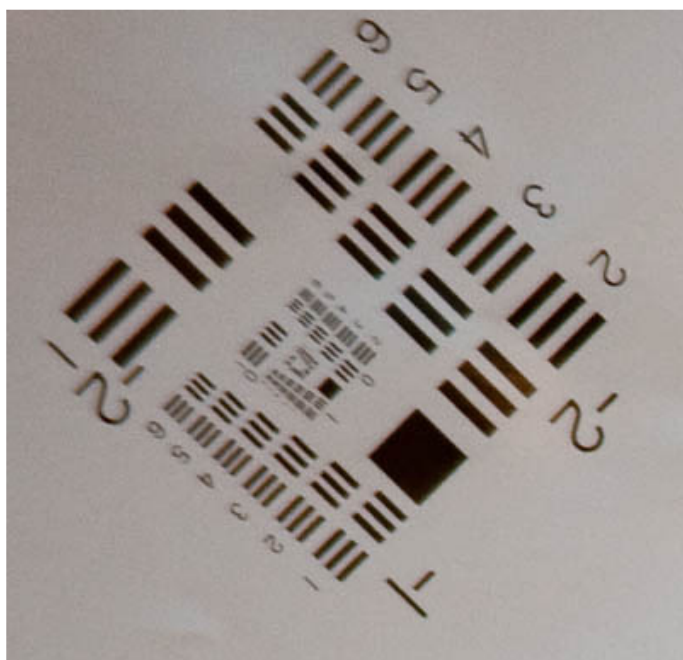
Everyone was waiting for this lens mainly for two things: edge-to-edge sharpness on FX bodies, and less vignetting on FX bodies. Well, good news: these two things are considerably improved. In the sections that follow, I'll use a one word descriptor that tells you how the new version fares against the old version in each performance category, followed by more detail.

Aperture: Better. This new lens is about t/3.2. What's a t/stop? Well, an f/stop is a theoretical aperture (length divided by opening). A t/stop is the actual transmission property of the lens, and it's almost always lower than the marked f/stop because each air/glass transition in the lens is robbing just a bit of light. For what it's worth, the new 70-200mm is perhaps a sixth of a stop faster in t/stop than the old one (which was about t/3.4).

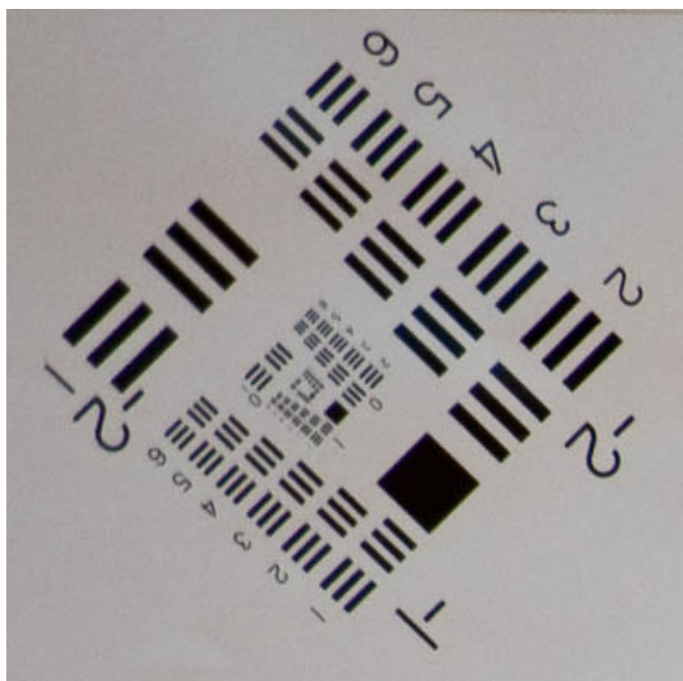
Autofocus: Same. I don't see any large scale differences between the old and new lens. The new lens may focus a trifle faster in a few situations, but both lenses are capable performers.

Sharpness: Better. Here's where things change, at least for FX users. But let's get the DX users out of the way first: if you're using a DX body and not thinking about upgrading, either one of the 70-200mm lenses work just fine for you. The new one has ever so slightly better corner performance for DX, but I don't judge this enough to get excited over.

FX users see a different story. The old 70-200mm was weak in the corners. Here's the weakest corner of my old lens (which had a slight side-to-side, top-to-bottom variation):

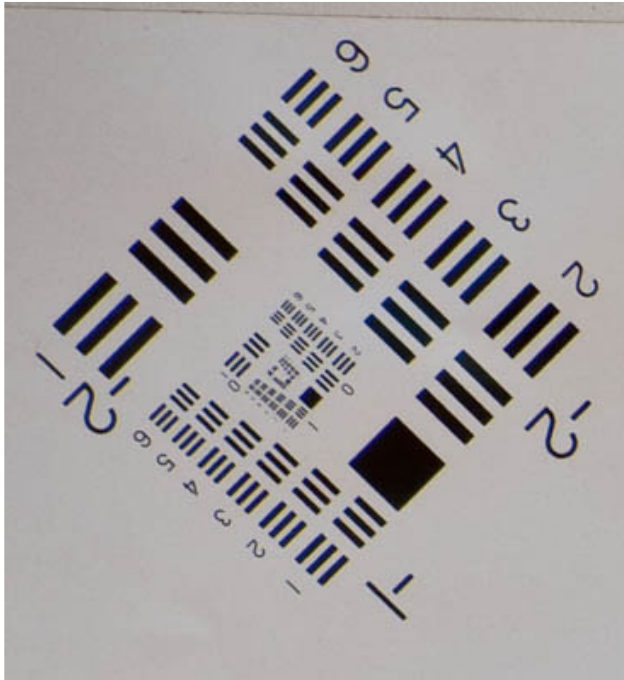


The slightly drab look is due to vignetting (I haven't fully corrected it in these examples). But notice that the bars all seem to have a little extra out of focus edge to them, with the energy headed into the upper left corner. At first I was worried that this was camera movement, but on examining the central samples, they were fine. This is a clear sharpness issue in this corner (again, the worst of the four by a slight amount). Now let's compare that to the new 70-200mm:



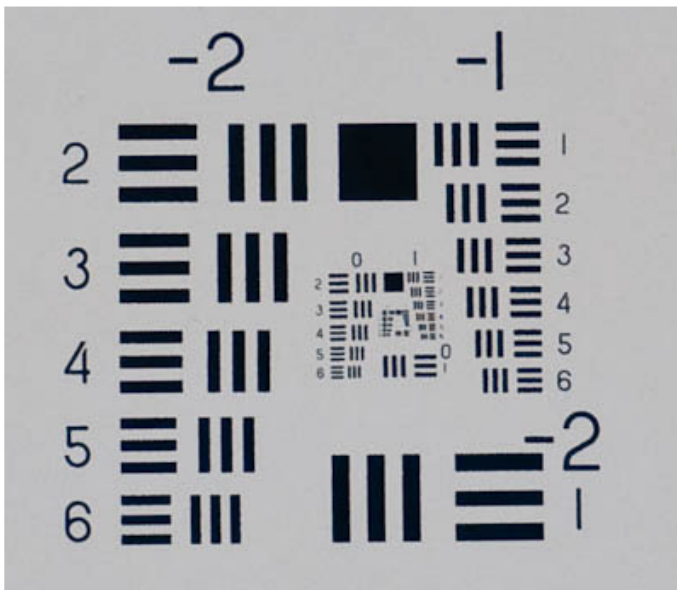
Still not perfect, but much improved in almost every way. Moreover, I saw the same performance in all four corners, so my new sample is well centered.

Here's the same patch at f/11:



Now we're cooking. This is from a D3x: note how well the smallest detail on the chart stays crisp even as we go past the point where the D3x can resolve. Not many lenses can match that level of performance at any aperture.

So, about sharpness for FX users: good enough to be usable wide open into the corners on a D3x, and it improves to as good as we can expect from a lens on the D3x by about f/8. Since someone will ask, here's the center at f/2.8:



Excellent, and it gets slightly better than this by f/5.6. Again, no complaints about sharpness with this lens, even on a D3x, even wide open, even in the corners once we close down a stop or two.

I haven't tested with converters, as I don't yet have the new converter that Nikon introduced with this lens.

Light Falloff: Better. Light falloff for DX users is almost negligible (two-thirds of a stop or so). For FX users light falloff is tangible (over a stop) and easily observable at the wider apertures, but not nearly as bad the previous version of this lens.

Chromatic aberration: Slightly better. The older lens wasn't exactly a terrible performer when it came to chromatic aberration, but you could see it in the corners on an FX body. The new lens, I see nothing I'd take the time to correct. That's not to say

there's none, but as you might be able to see from the corner example off a D3x, above, it just isn't obvious. When chromatic aberration gets down to the one pixel level on a D3x, I simply don't worry about it.

Flare: Same. The older lens was pretty good when shooting into the light, and the new lens seems only a tiny bit better. I haven't shot enough in indoor arenas to see if the Nano coating helps with ghosting, but I suspect that it does from the few examples I've looked at so far. Still, the old lens wasn't bad in this respect, so the new lens is just pushing "very good" into "very good."

Distortion: Similar. DX users aren't going to see a lot of linear distortion in their results, though it's definitely there. The old lens had less than a percent of barrel distortion at the wide end and less than a percent of pin cushion at the telephoto end. Just quickly eyeballing images, I didn't see any difference between the two lenses on DX, but when I measured them, the new lens was ever so slightly better. On FX this is more apparent: I can clearly see that the barrel and pincushion effects at the two ends are slightly less pronounced just by eyeball, though there's still enough distortion left on FX that you will want to correct for it if you need straight lines in your shots.

Bokeh: Slightly better. I don't do a lot of testing for bokeh, but I immediately noticed that out of focus areas wide open didn't have much clutter to them. The lack of chromatic aberration helps keep out of focus highlights from getting edges. The older lens often got edges on its out of focus areas when shooting wide open. The bokeh on the new lens doesn't match the all time best lenses Nikon has made, but it's quite good.

If you've been keeping score, that's five things basically similar to the previous lens, three things clearly better, and nothing worse (other than focal length breathing, which doesn't fall under the performance heading.) I don't think we can really find fault here: performance-wise this is a better 70-200mm than the old one.

Before we leave the 70-200mm and get to the final score card, we need to address yet another controversy (what, another one?). Early in the 70-200mm's shipments there were Internet forum reports of "defects" internally in the lens. In particular, two different things tended to be reported. First, some observed that what looked like positioning rings inside the lens had crumpled or distorted "threads." First, these aren't really threads, they're a form of light baffling. Basically, by having a slightly rough, non-flat surface just in front of the element inside the lens that's most exposed, it keeps light from reflecting sideways into the element and lowering contrast. Nikon claims that the process they use to create that part--a form of metal molding--doesn't always create "perfect" baffles, but sometimes produces gaps or rough areas. But enough folk shined flashlights deep into their lenses and saw something that didn't look "perfect" and complained on the Internet that Nikon finally had to issue an official statement about it. In short, that's not a lens defect and it doesn't impact performance.

The second reported "flaw" tended to take the form of "I see highly reflective bits inside my lens" or sometimes "there's a lot of dust inside my lens." Again, these reflections don't usually show up unless you're shining a flashlight into the lens (and at an angle). This one is trickier. That's because it is possible to get some appearance of reflective bits off the materials that Nikon uses internally in most of their lenses. But in some cases, it very well could be dust or bits that shouldn't be there. The only way to tell which is which is to have someone who knows what they're looking at take a look at your lens, unfortunately. I've examined a handful of 70-200mm lenses now, and none have a true defect in them. That doesn't mean that there aren't samples out there that don't, but I would expect this to be very rare.

Compared to the Previous 70-200mm

So do you buy version number I or number II?

DX users can pretty much use either. From a true performance standpoint, the gains from the new version are not dramatic when used on DX. I'd say that a DX user is best off with whatever close focus focal length performance they want. If you want to retain focal length up close, stay with the old version, but if you'd like a little loosening of the frame up close, the new version is better (especially considering it really goes to 70mm). Yes, if I'm picking nits, the new version is still sharper than the old version on DX. But frankly, I don't see enough difference to get excited about.

FX users have sort of the opposite initial take: if corner sharpness and brightness is at all important to you, the new lens is much, much better than the old one. This becomes even more apparent on the D3x. Personally, for sports, I don't mind a drop in the

corners of the old lens, but some people get upset about that. They won't with this lens. If you can ignore the corners, it's that focal length breathing that's going to dictate which lens you prefer: tight and consistent=I, loose and looser=II.

Drawbacks

- 1 **Priced higher.** The dollar/yen exchange has been pushing the pro lenses up, as they're produced and assembled in Japan. So as the yen goes North and the dollar South, our lens prices follow the yen, not the dollar.
- 1 **Breathes a lot.** The long end of the lens loses focal length as you focus closer. Enough to notice and cause issues for people who are used to the old lens from a fixed position.
- 1 **Small steps backward.** Losing the focus hold buttons and setting the focus limiter at 16' are steps backward in handling. Top end lenses shouldn't get marginalized by small details like this.

Positives

- 1 **Improved optics.** FX users in particular will find that they can finally look into the corners without cringing.
- 1 **A bit ripped.** The lens lost an inch in length and gained muscle. Feels better all around for the most part.
- 1 **The whole enchilada.** Nikon's best VR. AF-S. D3x-worthy optics. Nano coated and weather-sealed. Good bokeh. It all adds up to a very good package.

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