



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

*Nikon's new telephoto zoom is a winner.*



*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 15 groups; 5 ED elements.
Other Features	Rotating collar and removable tripod foot, VR (vibration reduction), focus limit switch, manual focus override, AF-S lens focusing motor, internal focus, 77mm filter size. Comes with HB-29 hood and CL-M2 semi-soft case. Focuses to 4.6' (1.4m) in manual focus, 4.9' (1.5m) in autofocus.
Size and Weight	About 215mm long, 49.2 ounces (1395g) with collar.
Price	US\$1700 (street)

## The Basics

Nikon has had at least six 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.

All six of these lenses are universally regarded as being sharp, 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 is the sharpest, the one-ring next sharpest, and the short-lived two-ring non AF-S as the weakest of the three. Frankly, however, they're all quite sharp and unless your handling is perfect, I doubt you'd be able to distinguish between them. One common rap on all three 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 these earlier lenses have a common design history (especially the autofocus versions), Nikon's replacement, the AF-S 70-200mm f/2.8G ED IF VR, appears to be a completely new optical design. So let's take a closer look at the basics.

This is a very complex lens, with 21 elements in 15 groups. By comparison, previous designs tended to be 15 or 16 elements in 11 groups. Five of the elements are now ED (low dispersion glass), up from three in previous designs. The aperture is a 9-blade

## Quick Evaluation

**Highly recommended;** perhaps Nikon's sharpest zoom ever.

★★★★★ features  
 ★★★★★ performance  
 ★★★★★ build  
 ★★★★★☆ value

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 VR update: 6/3/2004  
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## 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 (N65, N75, N80, D40, D40x, D50, D70, D70s, D80, D100, D200, S2, S3, S5, Pro/14n, SLR/n).

**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.

**Lose the AF-ON button.** VR does not operate unless 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.

type and appears to have moved slightly in position. It seems clear that Nikon has not settled on a tweaking--this is a new lens design.

Overall, the new lens is longer and smaller in diameter than the one it replaces, though it retains the two-ring design (near ring is for zooming, far ring is for focusing). 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.

At the very front of the lens is the focus scale (but with no depth of field or infrared markings) and focus hold buttons. On the camera side of the zoom ring are a set of four buttons:

- 1 *Manual Focus button*: In the **M/A** position the lens works as usual (autofocus with manual 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 **2.5m** position, the lens only focuses from 8.2' to infinity.
- 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 new. Unlike previous designs, 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. I was skeptical when I first heard about this feature, but 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 new collar makes it a no-brainer to go back and forth between tripod and handheld.

## Handling

I've seen reviews by others that indicate that the reviewer thinks this lens handles better than its predecessor. I guess I'd agree with that contention, but then, I didn't think the previous AF-S 80-200mm lens handled well. (I need to admit that I loved the one-ring AF 80-200mm. This lens was convenient to use and the huge ring fell into your hand no matter how or where you grabbed the lens. It was also shorter than the current design.)

The new 70-200mm is longer than any of the previous AF designs, though the barrel is a slightly smaller diameter (good for small hands). Personally, I find it a little too long and the focus and zoom rings too narrow. It's taken me awhile to get used to grabbing the focus ring so far in front of the camera (the focus ring has a "curb" on it that makes it easily distinguished, assuming you reach out that far). Further, the focus hold buttons are out *beyond* the focus ring. On the one hand, you won't accidentally touch them; but you'll also find your hand-held shooting stability destabilized if you have to reach out to them (good thing this lens has VR; but this is a design flaw in my view, as the buttons are in the position you'd expect them to be for tripod use and not for VR use). Personally, I'd rather have the focus hold buttons in the focus ring itself so I don't have to move my hand when handholding the lens. I.e., press the shutter release to get a focus point, override it with the focus ring and press a button to hold it *without* having to move my hand position.



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 close-in work, your only choice is the **Full** position, unfortunately. More troubling, however, is that all four control switches on the lens are grouped together and all are two-position 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).

Nikon's last two telephoto releases (the 80-400mm VR and the 300mm f/4 AF-S) had what some felt were questionable tripod collars. The 70-200mm lens features a new design that should answer all the complaints from those critics. 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 following amusing note: "*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.*" That still seems pretty clear to me (i.e., if you're panning off a tripod, you might want to turn VR back ON). It's only when you read the other sections of the manual that you start 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 17 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 you have 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.]

Also on the positive side, the new pinch-release lens cap design finally makes some sense to me (I couldn't figure out why Nikon was spending *any* engineering time on a new lens cap when there are so many other things that could use some work). When you have the (big) lens hood on this lens, you can still reach in and remove (or replace) the lens cap. Of course, this new design lens cap seems to pop off accidentally more often than the old edge-squeeze designs, so it isn't a total win. Still, I like being able to leave the hood on and get the cap on or off without too much hassle. (If you've ever set up but waiting somewhere where there's "gook" in the air, such as at the Volcano in Hawaii, you'll know why.)

The included lens hood, by the way, is a large one of the bayonet type. You can reverse bayonet it onto the lens to carry it, though this makes the lens bulkier to carry.

## Performance

Performance typically boils down to two things: autofocus speed and sharpness. So let's just cut to the chase: this is one of Nikon's sharpest lenses, and the AF-S system works just as fast and as quietly on this lens as it does on any other.

Target testing shows that not only is this lens sharper wide open than its predecessors, it has excellent corner sharpness and slightly better than expected sharpness at small apertures (where diffraction starts to take a bit of sharpness away). I can't say it often enough: this is a *sharp* lens.



*How sharp is this lens? Here's a blowup from the center of the frame with the TC-20e on and the lens wide open (i.e., at 400mm; 1/45 and f/5.6, VR off and lens mounted on tripod). While I see a bit of softening due to the teleconverter, this is still quite good performance. Without a converter, this lens is as sharp as any Nikon has ever produced.*

But other performance factors are probably of interest to you if you're going to pay US\$1700 for a lens. Here, too--with one exception--this is one of Nikon's best efforts to date. For example, light falloff is relatively low in the corners, though still present to a small degree through f/4. Prior 80-200mm designs have very observable falloff if you shoot, say, a bird against a blue sky at anything wider than f/8. That's simply not true of this new lens. Falloff is still there (as it is with almost all lenses), but it's present only at the widest apertures and only in small increments. Digital body users need not worry about it at all.

To me, however, the most striking performance factor of this lens is the bokeh (visual quality of out of focus areas). Even with VR off this lens renders out of focus areas in a very pleasing manner, with no touch of harshness or edge artifacts. With VR on, this lens may rank right up there with the classic bokeh champions (such as the Nikkor 85mm f/1.4). If you're looking for a portrait lens that captures your subject sharply and produces no distractions in an out-of-focus background, look no further.

On the downside, I was very disappointed in the focus abilities of this lens. No, not the speed or accuracy, both are which are what you'd expect from an AF-S lens (fast and accurate). No, what's disappointing is the close focus distance--5' (1.5m) at 70mm isn't particularly close. This has been my biggest peeve with the previous 80-200mm lenses, as well: I remember sitting on the bumper of my vehicle on safari in Africa when a lioness walked by closer than I could focus (!). You'll probably be shooting something

less dangerous (though some wedding photographers have encountered brides and moms that are probably more vicious and more likely to hurt the photographer), but you'll still want closer focus. One of the things I've always liked about the 85mm Nikkors is that they focus down to about 3' (1m), allowing you to get tight portraits. Sure, you can zoom in with the 70-200mm, but that changes the depth of field; you want to shoot those portraits at 70mm f/2.8 to get enough depth of field to cover the most important facial features but still throw the background into that gorgeous out-of-focus bokeh. Zoom into 135mm and the depth of field squishes to a very tight area and the background deteriorates into a plain wash of color.

Performance with the TC-14e teleconverter is nothing short of astonishing. How good is it? Well, I can't see any differences between the 70-200mm at 200mm with a TC-14e and the highly regarded [300mm f/4 AF-S!](#) That's both unexpected and unprecedented. In other words, if you need a 300mm f/4 AF-S, just get the 70-200mm and a TC-14e. You'll get a more versatile lens and lose no sharpness.

With the TC-20e teleconverter, the results are still good (see above), but sharpness is slightly compromised in the corners. I would characterize the results as being an "better-than-adequate" 400mm f/5.6. You might be able to do better with a dedicated 400mm or the 300mm f/4 AF-S with a TC-14E, but the 70-200mm and TC-20e combination will get you by if you don't have one.

If there's a measurably weak aspect to the 70-200mm's performance, it is ghosting. When you shoot directly into a light source, those 21 elements and 30 air/glass transitions start to work against you. This lens is much more likely to produce a ghost of one of those elements (or the lens aperture) than the previous lenses. Moreover, this lens seems more prone to contrast decreases than previous designs when light directly hits the front element. You can help reduce the latter possibility by using the supplied lens hood. The hood is deep and shades the front element from just about anything except light sources that appear directly in the frame.

I've saved the most obvious performance questions for last. One of the first things I get asked about this lens is "does the VR work?" I've postponed discussing this aspect of performance because I need this lens to work without VR before I can even consider using it at slow shutter speeds or in moving vehicles. As should be obvious by now, even without VR this would be a remarkable lens. And yes, the VR works. Rather than me describing how good it is, let me give you a recent example. I had this lens with me at my 2003 California desert workshops. While we were waiting for one of the students to get back out of the slot canyon in Anza Borrego State Park, one of my other students saw that I had the 70-200mm on my D100 and asked: "does the VR really work?" I just handed him the camera, showed him where the VR switch was, and said "try it." Now the portions of the shots that follow aren't examples of compositional greatness or even perfect sharpness, but it'll give you a quick idea of just how much the VR system can improve handheld results (and we were getting blasted by wind gusts, so hand holding was definitely a challenge and the Ocotillo bushes were moving in the wind).





These images were shot at 1/8 of a second at 200mm; *no* sharpening was imposed in camera nor added after the fact, and these are 100% crops from a section of each photo. The first one is without VR, the second one with. The student's response? "Wow!" (Remember, we had a storm blowing through, so these branches weren't rock steady to start with!) I tend to shoot on a tripod most of the time, but in the instances where I've gone handheld, I've been impressed by the job the VR does.

So yes, VR works. In my opinion, it works very well (perhaps a bit better on this lens than on the [80-400mm VR](#)), though it is not a substitute for a tripod or good holding technique.

## Drawbacks

- 1 **Expensive.** VR seems to have added about US\$400 to the price. At US\$1895, this is a pricey lens that you won't be buying on impulse. Eventually, as demand is met, I suspect we'll see this lens offered more in the US\$1700 range, but that still makes it Nikon's most expensive optic other than the exotic teles.
- 1 **Ghosts.** When you have light sources in the frame, this lens tends to produce ghosts more often than the preceding lenses in this line. You'll want to always use the supplied hood.
- 1 **Handling issues.** This is a lens that *absolutely requires* that you turn the camera off before removing it or mounting it. If you use internal flash or the AF-On button, you'll find some more of the little gotchas (see right-column). Minor quibbles, such as the four switches being indistinguishable by touch and the total lack of depth of field information mar what would otherwise be a world-beater design.

## Positives

- 1 **Sharp.** One of Nikon's sharpest lenses ever. Sharp at every aperture. Sharp with teleconverters. And the VR helps you achieve that sharpness.
- 1 **Beautiful bokeh.** Gorgeous out-of-focus rendering, perhaps as good as any existing Nikkor.
- 1 **VR and AF-S in one package.** Nikon can finally match Canon in features. VR doesn't slow the speed of focus of this lens, and AF-S doesn't keep VR from working. Nicely done.