POP PHOTO CAMERA TEST

NIKON N2020 AF

Serial No. 5106936

By Norman Goldberg
and Julia Passof

MANUFACTURER'S SPECIFICATIONS

• ***Type of camera***
Integral-motor dual autofocus 35-mm SLR (single-lens reflex).
• ***Exposure system***
Light-intensity feedback measurement for programmed and automatic modes, TTL full-aperture centerweighted exposure measurement in manual; employs one silicon photo diode. Three program (dual, normal, and high-speed) auto exposure modes plus A (aperture-priority) and manual. Exposure-bias control over ±2 EV range in ½-EV increments. Film-speed range ISO 25 to 5000 for DX-coded film; ISO 12 to 3200 for non-DX film. Metering range EV 1 to EV 19 at ISO 100 with f/1.4 lens.
• ***Shutter***
Electronically controlled vertical-traveling focal-plane shutter with stepless speeds from 1 to 1/2,000 sec in the program and automatic-exposure modes; lithium niobate oscillator-controlled speeds from 1/2,000 sec to 1 sec on manual; electronically controlled long exposures at B setting. Electronic flash synch at 1/125 sec or slower in programmed or auto modes; synch at 1/250 sec in manual setting.
• ***Viewfinder***
Fixed eyelevel pentaprism type; 0.85X magnification with 50-mm lens set at infinity; approx. 92 percent frame coverage. (See opposite page for illustration of screen and viewfinder readout.)
• ***Autofocusing modes***
Dual autofocusing modes—Single Servo (S) and Continuous Servo (C) with AF Nikkor lenses; autofocus with nearly 40 AI lenses with Autofocus Teleconverter TC-16A; focus assist available on manual focus mode with AF Nikkor, Nikkor, or Series E lenses with a maximum aperture of f/4.5 or faster.
• ***Other features***
Auto film advance to first frame after shutter-release button is pressed; single (S) or continuous (C) firing from 1.4 to 2.5 frames per second. Autofocus flash photography possible with Nikon Autofocus Speedlight SB-20.
• ***Size and Weight***
Body only: 148.5x97.5x54.5 mm; 610 grams.
• ***Distributor and price***
Nikon Inc., 623 Stewart Ave., Garden City, NY 11530. Price: $479, body only; $210.50 for 35–70-mm f/3.3-4.5 lens.

IN THE FIELD

By George Schaub

Making the move from a conventional single-lens reflex to an autofocus model is like changing from a stick shift to an automatic transmission. At first you resist, feeling that the driving experience will be diminished. Then you slowly begin to see how easy it is to get around in rush-hour traffic. Before long you forget what it was like to shift manually.

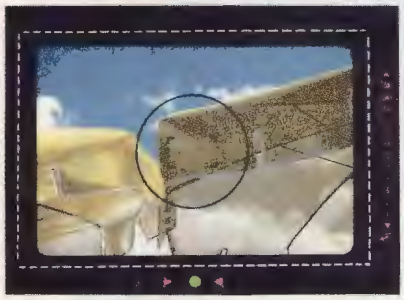
A little practice with an autofocus (AF) SLR such as the Nikon N2020 teaches you what it can and cannot do; exploiting AF is a matter of trading off some control for convenience, then overriding when necessary. AF *is* faster than manual focusing in most situations that the average photographer will encounter. To see how far this new technology has progressed, we tested the N2020 thoroughly, then enlisted the help of two professionals. The task of Los Angeles-based sports photographer Richard Mackson and New York fashion photographer Jade Albert was simply to push the camera to its limits. (See the next spread for their results.)

A new series of AF Nikkor lenses was introduced with the N2020, and a 35→70-mm f/3.5-4.5 zoom from this group was used in most of our tests. The basic Nikon lensmount has been preserved, however, so that virtually all Nikkor and Nikon Series E lenses also fit and work properly on the camera. These non-AF lenses must be focused manually, except for Nikkor AI-S lenses with apertures of f/2.8 or faster. They can be attached to the accessory Nikon TC-16A teleconverter for autofocus operation on the N2020. Unfortunately, I found this arrangement unable to match the focusing speed or accuracy achieved with AF Nikkor lenses.

The N2020 is very similar in appearance and control layout to the current Nikon N2000. The only major differences are on the front-of-camera controls that relate to the AF system.

A switch on the front of the N2020 is used to choose one of three focusing modes. Its S setting refers to "single-servo" autofocus. In this position, the user slightly depresses the shutter-release button until correct focus has been achieved and confirmed by a green light in the viewfinder. Until that light turns on, the camera won't fire. Once the camera is in focus, it will hold that setting for as long as you depress the shutter-release button. This makes it easy to recompose the picture and place the main subject off-center.

In the more action-oriented C ("continuous") mode, the AF system keeps focusing as you search for the perfect picture. Again, a green light indicates proper



Right side of viewfinder has Exposure Indicator LEDs, with over- and underexposure warning, shutter-speed indicators. Bottom has Focus Indicator LEDs with green "in focus" dot, X for "focus not possible." Center Focus Brackets show AF sensor area.

Meter-sensitivity pattern

Centerweighted average

focus, but here you can fire away whether or not the light is on. You can also lock the focusing on a particular subject, using the AF-lock button on the front of the camera. (It takes a little practice to differentiate this control from the nearby autoexposure-lock button.)

The final focusing mode is M-for-manual, which must be used with non-AF lenses, or with AF lenses in situations where autofocusing is impossible. In this mode, a set of arrows in the viewfinder tells you which way to turn the lens.

The AF system has difficulty with dark subjects, as well as those with high reflectivity, heavy backlighting, low contrast, very fine repeating patterns, or those made up of all horizontal lines. Under such conditions, a red warning X appears in the viewfinder. In borderline situations, the green light in the finder blinks as the camera attempts to autofocus.

The question of AF speed is one that continually came up during our field tests. For slow-moving subjects, I was able to pan the camera to keep the subject in the viewfinder's central AF brackets. Another effective method is to use the AF system to prefocus on a spot, then lock in that setting and shoot when the subject is just about to get there.

The N2020 has four auto-exposure modes, including aperture priority (you select the f-stop, the camera chooses the shutter speed); program (camera selects both aperture and shutter speed); program-high (camera chooses aperture and shutter speed with a preference for higher speeds, to stop subject action and reduce camera movement); and program dual (in which the camera chooses either program or program-high, according to the focal length of the lens in use). There's also a manual-exposure mode, in which you can use the camera's lightmeter, then make your own decisions.

Shutter speeds are displayed on the right side of the viewfinder, but no aperture information is available in the programmed modes. The N2020 also lacks a depth-of-field preview button, which can be frustrating when the sharp-focus zone is of great importance.

Test rolls exposed in the N2020 using the 35→70-mm AF Zoom Nikkor lens displayed the excellent image quality I've come to associate with Nikon lenses. Although I had some doubts about being in focus when shooting in the AF modes, most of the pictures turned out sharp. Automatic exposures were generally right on the button, although the auto-exposure lock came in handy for shooting transparency film with its narrow exposure latitude.

Like many photographers, I resisted AF as an unwanted encumbrance. But, after working with the N2020, and seeing the results, I've come to recognize AF as an effective aid in many shooting situations. Just as I became a convert to using auto-exposure with overrides, so am I becoming convinced of the reliability, and newfound freedom, of an AF SLR. ✪

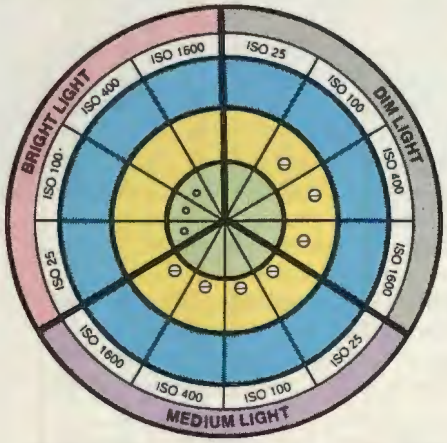
Dashed line shows mechanical coupling between body and lens for motorized autofocus. Exposure readings can be locked by pressing "AE-L" button. Autofocus settings are locked with "AF-L" button. Three-position rotary switch selects between manual focus, continuous focus, or single-shot focus.

Layout of controls permits most of them to be seen from above. As shown here, camera is set for normal AE program, single shot, silent beeper. Lens is set for programmed AE, with focus at infinity and zoom control at 50-mm for greatest compactness.

Camera Test continues →

LAB RESULTS

☐ EXPOSURE ACCURACY:



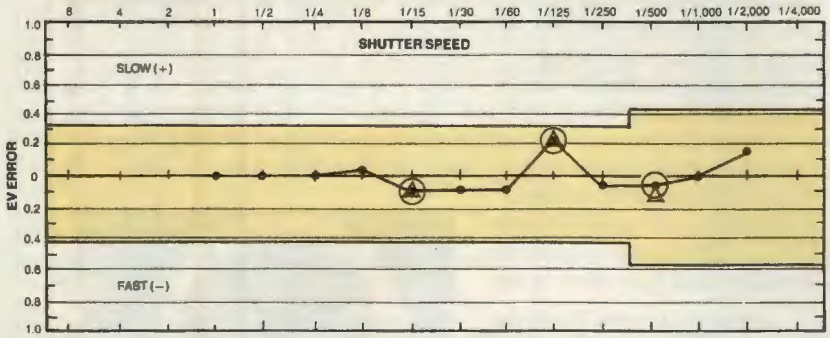
= 0 EV Error (Perfect Exposure)
= ±0.5 EV (ANSI Tolerance)
= ±1.0 EV (JIS Tolerance)

⊕ = Overexposure
⊖ = Underexposure
o = 0 EV Error

1 EV (Exposure Value) = 1 stop difference in exposure
ANSI = American National Standards Institute
JIS = Japan Institute of Standards
Dim Light = EV 5, Medium Light = EV 10,
Bright Light = EV 15, all at ISO 100

Results shown are for standard program mode; other modes gave similar results.
Blank spaces show limits of camera range.

☐ SHUTTER ACCURACY:



Yellow area = ANSI (American National Standards Institute) tolerance (Broader at 1/400 sec and faster)

● Performance at room temperature

△ Performance at –4 F (Tested at 1/15, 1/125, and 1/500 sec)

○ Performance at 120 F (Tested at 1/15, 1/125, and 1/500 sec)

Blanks indicate no response under these conditions.

☐ NOISE LEVEL:

Well below average—7.5 millivolts on our scale. (Average for all cameras tested during past five years is 20.06 millivolts.)

☐ VIBRATION LEVEL:

Below average—0.2333 volts on our scale. (Average for all cameras tested during past five years is 0.3345 volts.)

☐ TIME LAG:

Average: 112 to 184 milliseconds. (See text). Time lag is the time between the first pressure on the trip button and the beginning of exposure. (Average for all cameras tested in last five years is 115 milliseconds.) Note: 1,000 milliseconds = 1 second.

☐ AUTOFOCUS SENSITIVITY:

AF sensitivity range at ISO 100: EV 2 to EV 18. **AF contrast requirement at low-light limit**: 2.0 EV. **AF contrast requirement, average light (EV 10, ISO 100)**: 0.8 EV.

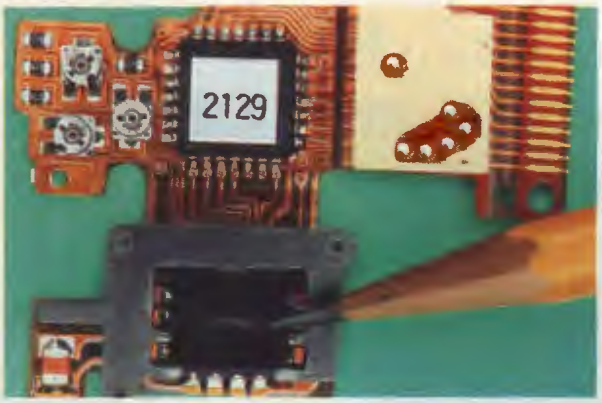
☐ VIEWFINDER:

Apparent distance of image: 1.0 meters. **Apparent distance of exposure data:** 0.67 meters. For maximum viewing comfort, the difference between the apparent distance of the viewfinder image and that of any scale should be as small as possible.

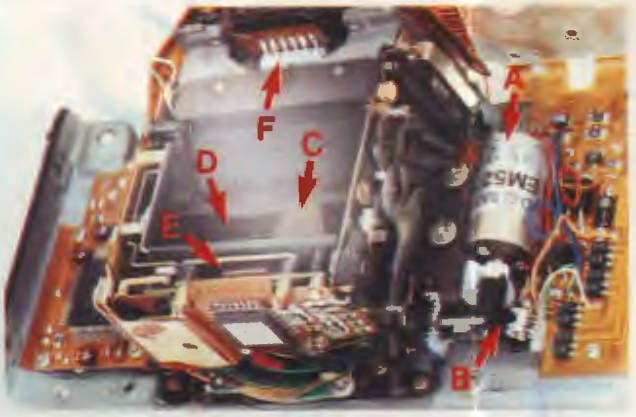
☐ STRIPDOWN REPORT:

Materials used: Interior, good; **exterior,** good except for weak plastic rewind knob. **Repair access:** Fair. **Assembly and finish: Interior,** good; **exterior,** good. **Seal against dirt:** Fair. **Modular construction?** Mostly. **Repair key parts easily?** Fair. **Do frequently made adjustments require major stripdown?** No.

Lens Test is on page 93



Focus detector module is Honeywell's TCL (through-camera-lens), containing two rows of microscopic lenses. Behind each lens are two silicon detectors. Each looks at opposite halves of the camera lens' exit pupil. The resulting signals are said to be in phase when the focus is correct.



Focus motor (A) has chopper disc on the end of its shaft. Disc spins within infrared emitter-detector unit (B) which measures motor's speed. Light from lens comes through center of main mirror (C), bounces off piggyback mirror (D), then down to focus detector module (E). Six contacts (F) transmit focus signals to finder.

THE INSIDE STORY

Don't think of the N2020 as an N2000 with piggybacked autofocusing capability; instead, consider the N2000 as an N2020 without autofocus. An inside look reveals that the similar body design used for both cameras was originally designed to be an autofocus SLR.

The N2020's autofocus system is based on Honeywell's TCL (through-camera lens) detection module, complete with its associated circuitry. It works by comparing the left and right halves of the camera lens' exit pupil. When the subject is in focus, the two halves match and can be said to be in phase.

The amount and direction of the phase shift is directly related to the required focus correction. Thus, appropriate signals, influenced by others coming from the lens, are sent to the focusing motor. These signals include information about the focal length and how much focusing motion there is from close-up to infinity.

All AF Nikkors have CPU (A) connected to contact array (B) for signal exchange with camera. Zoom lenses like this also have digital switch (C) that traces focal-length setting. Steel input shaft (D) couples to camera's focus drive motor.

The system's microcomputer commands the focusing motor to make so many revolutions, based on the combined data from the lens and the focus detection module. A prediction is made that correct focus will be reached, for example, if the focusing motor makes 375 clockwise revolutions. These are counted by the spinning of a chopper wheel within an infrared emitter-detector module that produces 16 pulses per revolution.

The initial revolutions are at full speed, but as the goal is approached the motor slows down, then momentarily stops at what appears to be almost the best-focus. The system quickly makes a subtle further motion that brings the lens into its best-focus position. It's similar to the focusing motion by a person operating the camera.

When I measured the performance characteristics of the focusing system with a 50-mm f/1.4 lens in the camera's manual mode, I found that it substantially exceeded Nikon's specifications for low-light capability. They say EV 4 (at ISO 100), but I measured EV 2 as the lower limit. At this light level, the system required a contrast of 2 EV to focus consistently. It got along with less than half as much contrast (0.8 EV) at light levels of 5 EV and higher. It needed 1.0 EV and 1.2 EV contrast at EV 4 and EV 3 respectively.

Still focusing manually with a 50-mm f/1.4 Nikkor on the camera, I measured the "focus OK zone," the region within which the focus detection system is satisfied with the sharpness of the image. The mid-point of this zone is what we call the "focus offset," the agreement between the focusing aid and the film plane. The OK zone measured 0.22 mm, with a focus offset of +0.06 mm. (See this month's "Shoptalk" for more on these figures.)

The rest of the camera is nearly identical to the Nikon N2000 (see "Camera Test" in POP PHOTO, March '86). The motor is unconventional in that its armature consists of the fine wire windings only; they're not wound around an iron structure to form pole-pieces. The result is quite a low mass armature—perfectly suited for abrupt starts, stops, and reversals. Longer time lags almost always occur with this camera when it's used rather slowly in its single-shot mode.

Current consumption varied with the operating mode. The maximum was 700 milliamperes with all systems in operation, including motorized autofocus. This is a relatively low amount, promising good battery life. To Nikon's credit, their instruction booklet charts the number of 36-exposure rolls per set of batteries. It includes such variable as temperature, operating modes, and lens types.

One surprise on the chart was that at room temperature (68 F) using AAA batteries, 50 percent more shots can be expected when using the 35→70-mm zoom lens than with the 50-mm f/1.8; yet at 14 F the results are equal. According to Nikon's figures, typical use of the camera should yield about 20 rolls per set of batteries; that's 720 exposures at just a few pennies per shot. Nice going, Nikon!

Norman Goldberg