It’s been almost five years since our last radar/lidar detector test (CD, April 1997). Since all the major manufacturers have either updated their wares or introduced all-new models, the time is right for a fresh look at the high-end segment of the detector market.

Radar is still the most popular form of speed detection—some 100,000 guns are in use, and roughly 20,000 new ones are sold each year. A radar gun works by transmitting a microwave beam at your car. When that beam reflects off the moving vehicle, it changes frequency, and the reflected frequency is used to calculate speed. Traffic radar, which is regulated by the Federal Communications Commission (FCC), operates on three frequency ranges. The oldest is X-band, from 10.500 to 10.550 gigahertz (GHz); about 10 percent of all radar guns use this band. The biggest chunk, about 60 percent of guns, operates on K-band, at 24.050 to 24.250 GHz. Increasingly popular is Ka-band, which spans a wide range of frequencies from 33.400 to 36.000 GHz; Ka-band accounts for 30 percent, including photo-radar units.

Photo radar involves a camera set up at the side of the road that automatically photographs the license plates of speeding vehicles. These devices are popular in Europe, although their use in the U.S. has stalled—just nine police jurisdictions in four states have designed to rely on them.

Conventional radar can be used in either a stationary or moving patrol car and can transmit its signal coming or going, front or rear. And don’t count anymore on using that slow-moving semi-truck in the right lane to shield your smaller but faster-moving Corvette. This technique used to work with older radar guns that would only display the speed of the truck, the stronger reflected signal. Most newer radar guns can clock both vehicles at once and pick out the faster-moving one. The state-of-the-art Stalker Dual DSR radar unit is especially lethal; it can clock cars in opposing lanes or in the same lane the patrol car is in, whether the target is oncoming or moving away. With other units, the officer has to determine whether the gap to the target is opening or closing. The Dual DSR does all this automatically and makes clocking speeders easier than shooting rats in a barrel.

All radar guns can also be set in a steady-state mode and used to monitor traffic continuously. Or the gun can be switched to an instant-on mode in which the operator flicks the unit on and off to instantaneously measure the speed of passing cars. This “instant-on” mode is much more difficult to distinguish because the detector must sniff out the occasional brief zap intended for another vehicle in front or behind. Detecting and correctly identifying these brief signals is your only defense.

Because the FCC allows many other devices to operate on the police radar bands, detector warnings do not always signify the presence of police radar. Automatic door openers at markets and malls, burglar-alarm motion sensors, and other devices broadcast on X-band and to a lesser extent on K-band. Some radar detectors even emit a weak signal on a frequency in the Ka-band spectrum, thereby sending false alarms to fellow motorists.

Lidar is another, especially fearsome speed-enforcement tool. A lidar gun works by firing a series of laser light pulses (with a wavelength of 904 nanometers) at a target vehicle. The device times the return of the reflected pulses and uses that number to compute the vehicle’s speed. The lidar gun sends a narrow beam at its target, even at a distance of 1000 feet, the most intense portion of it is only six feet wide—narrow enough to pick a single car out of a crowd.

But this narrow beam is also the lidar gun’s major weakness. Unlike radar, it must be precisely aimed from a stationary position, typically at a range of 500 to 1200 feet. Lidar cannot be used in mobile units. Unfortunately, because there is almost no “signal scatter” for a laser detector to pick up, most detectors can’t warn you when Smokey is using lidar until the beam is already focused on your car—and that’s usually too late to avoid a speeding ticket.

With roughly 25,000 of these units in use and their numbers growing by 4000 to 5000 a year, lidar represents a very serious threat. Fortunately, detectors are being improved, and on several occasions we’ve been able to pick up the scatter signal of a laser clocking from a car ahead of ours in time to haul down our speed.

Radar warning has improved, too, but a lot of effort has been focused on “bells and whistles” unrelated to warning drivers of speed-monitoring devices. Faced with a stagnant market—over the past five years, detector sales have remained stuck at about 1.1 million units per year—manufacturers appear to be...
Our detector in this test displays a comparable trend; another to record the driver’s voice for up to 90 seconds’ worth of memos; and features such as weather radar are also being touted.

After 25 years of evaluating detectors, we’ve refined our technique to a few simple, repeatable tests. To avoid any stray microwave radiation that would produce false alarms, we conducted our tests on the roads of the Daimler-Chrysler proving ground in southeast Michigan. Radar testing took place on an unobstructed 2.5-mile straightaway. A gun of each kind—X-, K-, and Ka—was rigidly mounted, one at a time, in a police cruiser that was positioned on a downgrade at one end of the straightaway. By carefully setting each “trap,” we adjusted the position so that even the best detector could not find the signal at the far end of the 2.5-mile straight. This trap replicates a real-world scenario in which a perpetrator would be clocking traffic from a low spot in the median or from a dip in the road. It also allowed us to avoid any radar “hot spots” caused by hills and mesas that can set off both strong and weak detectors in the same spot.

We tested the detectors’ sensitivity, range, with each radar gun in steady-state and insta-mom modes. The farther away a detector found its alarm, the more effective it would be at providing a timely warning to the target. Each detector’s sensitivity was evaluated in unfiltered “highway” mode and in the most filtered, or selective, “city” mode. We drove toward the radar guns in both modes and measured the distance at which each detector sounded its first audible warning.

Lidar is used at shorter distances, typical up to 1200 feet. A lidar beam looks like a cone, and a lidar detector must be able to see the fringe beam, or the weak threat signal strength. We pick up weak reflections off cars in the traffic ahead. We use two different tests to measure a detector’s ability to find the edge of that beam or its scattered remnants.

In the first test, we clamped a lidar gun to the top of a stack of cinder blocks five feet high and aimed it precisely at a center of a 32-foot-wide platform 1000 feet away. We then placed each detector behind a piece of windshield glass and moved it laterally toward the center of the platform to determine its sensitivity to the lidar beam. We do this test with the detectors facing forward and to the rear; this measures each detector’s front- and rear lidar sensitivity.

Our second test determines the angular field of view of each detector. We mounted a detector in the center of the windshield and then drove forward and backward, at various angles, through a beam aimed across the road. (Police try to keep within an angle of 15 degrees to either side of the target vehicle’s line of travel to reduce the amount of error in their speed measurements.) All the detectors in this test responded to a lidar beam within this narrow field, but we think a wide field of view would most reliably enable a detector to see this beam. It should also be better able to pick up any scattered reflections coming off an object off the targeted car.

We conducted two more tests at the proving grounds: one to determine whether the detector is invisible to a VG-2 "detector detector"—a device used by authorities in Canada and states where radar detectors are illegal—and the other to check each detector’s propriety in falsely setting off others. Finally, we drove a 1/4-mile urban loop around Ann Arbor to check each unit’s resistance to false alarms. Highway mode and most highly filtered city mode were tested. Unlike other tests, we do not accept samples from the manufacturers, removing the possibility that we might receive a juiced-up “ringer unit” (this has indeed happened in the past). Each of our detectors was purchased by a nonstaff member and mailed to his home. As in past detector tests, our numerical ratings are the sum of six separate evaluation as follows: Overall total points, 50. A total of 100 points, 50 are assigned to a detector’s radar sen-sitivity (range), 10 to its lidar sensitivity, 15 to selectivity (a score calculated by com-paring a detector’s sensitivity with the number of false alarms it sounds), 15 to the ergonomics (readability of displays, intu-itiveness of knobs and switches, mount design, effectiveness of audio warning), 10 points to a calculated city-mode score that compares how well this mode reduces false alarms without diminishing the detector’s sensitivity, and a final 5 points are awarded for loudness with the strongest receiver getting 5 points and the weakest just 1.

In a perfect world, the ultimate radar/lidar detector would sniff out only police radar or lidar, pinpoint its location, and then concisely communicate that information back to you. Although such a device doesn’t yet exist, the Valentine One comes the closest to that ideal and thus ranks highest in this test of top-notch detectors. In highway mode, the Valentine One could detect X-band radar from almost two miles away and K- and Ka-band radar from about a mile and a half. Only the Escort Passport in Ka-band came close to the Valentine’s range in highway mode. Falsing in highway mode is a common occurrence with most of these detectors—our average in our tests was 12.5 false alarms and the Valentine One scored poorer for this test than most of the others, at 14 false alarms. The Valentine has two city-mode filters, and switching to its “most filtered” setting reduced the number of false alarms to eight (the city-mode average for falses was 6.7). That’s still a few more than we’d like, but the Valentine’s patented radar-direction arrows and depressive mode made it easy to disentangle the signal from the noise.

The LED arrows indicate whether the radar/lidar threat is behind you, to the left, or to the right. The small numeric display tracks the number of sources. We’ve said this before and it’s still true: Once you live with the arrows, you’ll wonder how you ever managed without them.

The Valentine One’s ability to detect lidar was slightly better than its performance in our ‘97 face-off. It still has, by a large margin, the widest angle of view both from front and rear. Facing forward, only the Passport matched its ability to find the laser beam’s edge at 1000 feet. The big change to the Valentine is that all the electronics have been packaged into a first-generation “thin” case. In previous models, the lateral detection of lidar sensors had forced Valentine to use a thicker, bulkier case. A column of LEDs beneath the display shows an electronic compass.

The Escort Passport’s score was lower in our comparison, yet it tied the Valentine One for first place in most of our tests. The Escort did well in this test of steering aids, with a third-place score of 73. That’s the closest a detector has ever come to the Valentine One in any of our comparisons. That 24-point spread correlates with its price, which is a fourth cheaper than the Valentine. Escort’s latest detector offers good performance and a long list of features for tailoring it to the owner’s individual tastes. The Escort Passport was well priced, picking up K- and X-band signals from close to a mile away and Ka-band signals from more than a mile, even in instant-on tests. In good sensitivity, also contributed to a high selectivity score. On our test loop, the Passport falsed 14 times, a score worse than average. The number of falses dropped to just three when we switched to its most-filtered city mode. In this setting, the X-band sensi-tivity to superfluous signals bouncing around was reduced, and the K-band sensi-tivity was unaffected, which is more desirable since a K-band warning is usu-ally the cops. In addition to its highway and city modes, the Passport also has a sensitive setting to filter out false signals. In this mode, after an initial face-off, the Passport did a type of "false alarm filter" and its strength are only visually displayed on the LED screen.

Detecting lidar was another area in which the Passport performed well,
scoring a maximum 10 points. Its front and rear laser sensors both detected 10 feet of beam width at 1000 feet, and its front angle of view was only five fewer degrees than the Valentine’s 112. However, its 108-degree rear angle of view was 49 fewer degrees than that of the Valentine. Remember, a wider field of view improves a detector’s chances of picking up the scattered reflections of a laser beam aimed at another car, and this increases your odds of getting warned and not caught speeding.

Since it looks slim and trim, the Passport’s 12 inches make it the pokiest detector of the bunch. Its audible warnings are clear and easily discerned, and the LED screen displays the warning in a very legible font. The LED display also has a green-white-blue color scheme. The LED display is easy to read and displays the kind of signal being received and its strength. Various audible warnings and display screens are just a few of the options that can be programmed to the user’s tastes, but it’s not much different from what the owner’s manual claims. We found the standard warning list to be very easy to navigate.

The Passport receiver displays Warning System alerts, digital voice announces the message, and the screen displays it in text form. The VG-2 detector detector couldn’t outpace the 980, either. The Bel 980 has a suggested retail price of $340, but we bought ours via the Internet for $230. Like the exceptor of the shortcomings in its rear laser vision, the 980’s performance of its auto-mute functions almost as well as the Passport.

The Bel 980 didn’t finish far behind its cousin, the Passport, in this face-off. Bel and Escort merged about five years ago, so this result wasn’t surprising. On average, the 980’s X-band sensitivity in highway mode was second only to the Valentine’s, and its K- and Ka-band highway ranges were only about 1400 feet less than those of the Passport. The 980’s K-band setup was the only one that missed a warning, but this was an audible warning only meaning it will likely miss some laser pulses coming from that direction.

A handy tutorial mode made it extremely easy to figure out the 980’s array of audible and visual alerts. Radar and lidar warnings start with a digital voice prompt that’s followed by beeping tones. The LED screen visually identifies the signal and shows its strength with a bar graph. There are beeps, and then they’re silent for a while. Some people like to turn off the audible warnings, but there are some drawbacks to doing so. The LED screen is too bright and makes it hard to pick up on the screen.

The 980’s front laser sensitivity was satisfactory, detecting 8.5 feet of beam width. Its rearward capability was much less—it could find only four feet of beam width. The same was true for its laser field of view, which was 105 degrees for the front but only a narrow 41 degrees from the rear. The 980’s warning distance, miles, less than those of the Passport. The 980’s X-band range was the only one that missed a warning, but this was an audible warning only meaning it will likely miss some laser pulses coming from that direction.

While the Cobra ties the Valentine One for most expensive detector in the test, we managed to buy one online for a remarkably discounted price of $249. Its price suggested it would perform on a par with the $399 Passport and Valentine One. However, the model we received was the Cobra 9500XTR, which is priced at $319.

The Cobra in highway mode sniffed out the presence of X-band radar roughly 300 feet sooner than the Passport. The Cobra was capable of picking up K-band signals at a range of just over a half-mile but could only sense K-band at less than a half-mile. This level of sensitivity is acceptable if the user is paying close attention.

The Cobra falsely 14 times in highway mode. We switched to city mode and rang up 11 falses. The Cobra has only one city mode, which when engaged doesn’t sound an audible warning until it gets close to the radar gun and the radar signal strength exceeds a preset limit. During X-band testing at the proving ground, we also got Ka-band warnings when the only signal being transmitted for miles around was the X-band beam from our own gun.

The Cobra’s laser sensitivity was second only to that of the Passport and Valentine. It detected nine feet of beam width from the front and eight feet from the rear at 1000 feet, and its angle of view forward was a respectable 94 degrees. However, the field of view from the rear was a considerably narrower 56 degrees.

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difficult to discern one tone from another in any of the optional settings, so we left the voice on. An LED screen also identifies the signal and its strength but is so small and narrow that the characters displayed on it can barely be read. They were hard to make out in full daylight, too, even with its brightness turned all the way up, the display was too dim to get a clear reading quickly.

When the Whistler detects a VG-2 in its midst, it goes into a cloaking mode by turning itself off—adios radar warning. It then checks for the presence of VG-2 every 30 seconds, and if it finds it’s gone, it turns itself back on. The 1780 can record up to 90 seconds of memos. For the sleephead, there’s an optional Stay-Alert feature that will beep at the driver every 20 to 30 seconds, and if the user fails to respond by pushing a button within five seconds, the LED flashes “Get rest.”

We bought our Whistler via the Internet for a discounted $209. That’s still a major-league price, and the 1780 needs to improve its radar and lidar sensitivities to be a serious player.

Uniden LRD 987
Overall Score: 34

In every comparison test we do, someone has to finish last. In this case, it happens to be the Uniden LRD 987 but by only the slimmest of margins. The Uniden was the smallest and least obtrusive detector in our test, but unfortunately, it was also short on performance.

In highway-mode tests, its X-band sensitivity averaged a little more than 2000 feet. Its K-band and Ka-Band sensitivities were a little worse at about 1500 and 1500 feet. These distances are barely adequate: if the cops are using instant-on radar, which greatly diminishes the 987’s chances of picking up pulses aimed at cars farther down the road. The 987 failed 10 times on the urban loop in highway mode. Its poor sensitivity rather than its falsing contributed most of all to its low selectivity rating.

Lidar sensitivity was another weak area. From the front, it detected 8.3 feet of beam width but only 4.0 feet of beam width from the rear at 1000 feet. The Uniden also had the narrowest angle field of view both forward and rearward. This might make it less apt to pick up the scatter of laser beams from cars up ahead that are being clocked.

The 987, comes with one city mode. Engaging it reduced the number of falsing on our loop to just two, the best in this test. The city mode works by flashing a visual warning on the LED screen when it first senses a radar signal, and there’s no audible warning until the signal strength exceeds a preset limit. The problem is that the city mode works the same way with all three radar bands and only sounds a warning 500 to 800 feet from the radar gun. That’s way too close for comfort.

A digital voice sounds the initial alert, and then beeping tones take over, monitoring its strength. The LED screen displays the type of signal being detected, and a bar graph shows its strength. There are three buttons on the top of the 987. The audio button turns off the LED screen or can adjust its dimness, the auto button activates an auto-mute mode, and the city button switches that option on or off.

Bright reflections on a sunny day made the curved-plastic face plate on the 987 difficult to view. We had trouble with the suction-cup windshield mount, which had to be adjusted by bending it, and the button on the detector for releasing it from the mount was stiff and hard to use. It broke after only a couple months on the job.

With a suggested retail price of $150 (we found ours on the Internet for $120), this is hardly a high-end detector. Testing confirms that conclusion.

### Overall Ratings

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<tr>
<th>Detector Manufacturers</th>
<th>Whistler Group</th>
</tr>
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| 13016 North Walton | Bentonville, Arkansas 72712
| 800–531–0004 | www.whistlergroup.com
| | |

### False Alarms

#### (urban traffic loop)

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<thead>
<tr>
<th>Detector Manufacturers</th>
<th>Whistler</th>
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</table>
| 6440 West Chester Road | West Chester, Ohio 45069
| 800–433–3487 | www.escortradar.com
| | |

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<tr>
<th>Detector Manufacturers</th>
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| 10280 Alliance Road | Cincinnati, Ohio 45242
| 800–331–0303 | www.valentine1.com
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<tr>
<th>Detector Manufacturers</th>
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| 4700 Amon Carter Boulevard | Ft. Worth, Texas 76155
| 800–297–1023 | www.uniden.com
| | |

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<tr>
<th>Detector Manufacturers</th>
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| 6500 West Cortland Street | Chicago, Illinois 60707
| 773–489–0087 | www.cobraelectronics.com
| | |

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<tr>
<th>Detector Manufacturers</th>
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| 6422 Dunsmuir Drive | Mississauga, Ontario L5L 1J9
| 800–341–2288 | www.beltronics.com
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| 6500 West Cortland Street | Chicago, Illinois 60707
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| 10280 Alliance Road | Cincinnati, Ohio 45242
| 800–331–0303 | www.valentine1.com
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<th>Detector Manufacturers</th>
<th>Escort</th>
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| 5440 West Chester Road | West Chester, Ohio 45069
| 800–433–3487 | www.escortradar.com
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