BACKUP SYSTEMS

Consumers can choose from a wider range of aftermarket vehicle-backup systems since our report last year, including new and improved designs.

All such systems are intended to help drivers detect objects within the blind spot behind the vehicle.

New are camera systems such as the Audiovox and AutoMan we tested that offer a "picture in the mirror" feature. The display is on a mirror that fits on top of or replaces the existing rear-view mirror, so you don't have to choose between looking at the display and at the rear-view mirror while backing up. The AutoMan also combines a camera with an audible sensor, so you can see and hear potential trouble. We would like to see more backup warning systems on the market that combine camera and sensor technologies.

Backup systems are typically marketed as parking aids, not safety equipment. But our tests show that the camera models can also help drivers avoid backover-accident injuries and fatalities.

Deaths increase. Ninety-one children were killed in 2003 by drivers who didn't see them while backing up, according to Kids and Cars, a nonprofit organization working to improve child safety around vehicles. Those deaths represented a 57 percent increase from 2002. During the first six months of 2004, more than 40 deaths have been attributed to backover accidents, many involving vehicles with large blind spots.

Kids and Cars compiles these statistics; the federal government does not track such incidents. Janette Fennell, president of the organization, believes that backover accidents are underreported and that the actual number of children killed or injured is much higher.

Blind spots grow with vehicle size. A likely reason for the increase in injuries is that minivans, pickups, and SUVs account for more than half of all vehicles sold. Many have large rear-view blind spots.

Last year, CONSUMER REPORTS began measuring the blind spot of each vehicle we test, checking the distance for short drivers (5 feet 1 inch tall) and for those of average height (5 feet 8 inches tall). The biggest blind spot: 51 feet for a short driver in a Chevrolet Avalanche pickup. But even small sedans can have blind spots of more than 40 feet. We regularly update vehicle blind-spot information, which is available free of charge online at *www.ConsumerReports.org*.

HOW TO CHOOSE

Aftermarket companies offer three types of backup systems: rear-view cameras, sensor systems, and wide-angle lenses. Use First Things First, below, to decide which type best suits your needs. For all camera and sensor systems, we recommend professional installation.

First things first

Determine whether you want primarily a parking aid or a safety aid.

SENSOR SYSTEMS Parking only

Detect objects behind the vehicle and use beeping or flashing signals to tell the driver how close they are.

Pros Automatically alerts the driver when objects are near or if something has moved behind the car. Less expensive than cameras.

Cons Driver can't see behind vehicle. Ultrasonic models don't work well in bad weather. Microwave models don't detect objects if vehicle and object are stationary.

Price $275 to $395.

CAMERA SYSTEMS Safety or parking

When the vehicle is in reverse, a small camera sends an image to a video screen that gives the driver a wide-angle view of the area behind the vehicle.

Pros Allows the driver to see people, animals, and objects that might otherwise be hidden in the vehicle's rear blind spot.

Cons Pricey. No active warning system; camera systems are effective only if the driver looks at the display while backing up.

Price $400 to $800.

WIDE-ANGLE LENS Safety or parking

Sticks to the rear window and helps shrink the vehicle's rear blind spot.

Pros Inexpensive. Easy to install.

Cons Details are hard to see. Lens still leaves a sizable blind spot. Effective use is limited to vehicles with a near-vertical rear window. Can interfere with normal visibility.

Price $20.

No matter what type of system you choose, consider these things when deciding on a specific model:

Know how the device mounts on your vehicle. Camera and sensor systems that are mounted on the vehicle's bumper or bodywork may necessitate drilling. They may not be the best choice if you lease your vehicle.

If you have a hitch, you can consider a model that mounts in the trailer-hitch receiver. But you would have to remove the system to use your hitch.

Other camera and sensor models mount on the license-plate frame. But some states prohibit frames because they can obscure the plate.

Within types, features vary. This is especially true with the sensor models we tested. The ultrasonic systems were generally the most sensitive, but their performance was adversely affected by rain, snow, or other inclement weather.

The microwave-based sensor systems we tested were not affected by weather but are less sensitive as a group. They also don't warn the driver unless the vehicle or object behind it is moving.

The display quality of the camera-based models is very good, although it doesn't match that of the larger screens on some carmakers' systems. Most of the system displays turn on when the vehicle shifts into reverse, but one, the Audiovox, must be turned off and on manually.

The AutoMan combines a camera with sensors, so we tested each system independently; it is listed with camera systems in the Ratings.

All the systems we tested are potentially useful. They're a good complement to looking around the vehicle before entering, and checking the rear window and rear-view mirror just before and while moving in reverse.

CR Quick Recommendations

All of the models below work as parking aids; as safety aids, the camera systems work better. The best camera models had the widest fields of view and the clearest displays. The **Ratings** rank models by performance. **Quick Picks** highlights models to consider based on other factors such as price.

QUICK PICKS

If you want primarily a parking aid:

1 Grote $275, CR Best Buy
2 EchoMaster $275, CR Best Buy
3 Rostra $350

All three are sensor models. The Grote (1) is the most sensitive model we tested. It installs on the license-plate bracket and requires no drilling into the vehicle, so it is recommended for leased cars. The EchoMaster (2) wasn't quite as sensitive. It is the only model we tested whose visual alert is optional. (The others had both audible and visual alerts.) The pricier Rostra (3) was the only higher-rated model not affected by inclement weather.

If you want an effective safety aid:

7 HitchCAM $800
8 Audiovox $400
9 HitchCAM $800

The Audiovox (8) has a large LCD screen that mounts on your rear-view mirror, so you see both images. Its display must be be turned on manually; shifting into reverse doesn't activate it. Installation involves drilling. The pricey HitchCAM (7) mounts on a license-plate frame and requires minimal drilling. The HitchCAM (9) locks into a vehicle's existing hitch to prevent theft. Its field of view doesn't quite match that of the others.

Ratings backup systems

• **Availability** Most models at stores through 2005.

Excellent · Very good · Good · Fair · Poor

1 Grote

2 EchoMaster

8 Audiovox

Within types, in performance order. Blue key numbers indicate Quick Picks; see box at left.

Key number	Brand & model	Price	Overall score (0–100; P F G VG E)	Sensitivity	Field of view	Display	Ease of installation	Affected by weather	Screen size (in.)
	SENSOR MODELS								
CR BEST BUY 1	**Grote** Obstacle Detection System 78520	$275		●		●	○	Yes	–
CR BEST BUY 2	**EchoMaster** EM-PV	275		◒		●	◒	Yes	–
3	**Rostra** Obstacle Sensing System 250-1594	350		◒		●	○	No	–
4	**Reverseguard** RG10C RG10B	395		○		●	◒	Yes	–
5	**Guardian Alert** Hitch Receiver 1601A 1602B	300		○		●	◒	No	–
6	**Guardian Alert** License Plate Frame 1700C	300		◒		●	○	No	–
	CAMERA MODELS								
7	**HitchCAM** Framecam HCFC-1B HCFC-1C	800			●	●	○	No	2 ¾ x 2
8	**Audiovox** RVMPKG3 RVMPKG2	400			●	●	●	No	3 ¼ x 2 ½
9	**HitchCAM** HC-001C HC-001BK, HC-002C, HC-002BK, HC-101C, HC-101BK	800			◒	●	◒	No	2 ¾ x 2
10	**HitchCAM** Unicam HCUC-1	700			◒	●	◒	No	2 ¾ x 2
11	**AutoMan** Deluxe Vision System VS2 VS1	600		◒	◒	◒	●	No	2 x 1 ½

Guide to the Ratings

Overall score is based on display quality and field of view for camera systems, and the display usefulness and sensitivity of the sensor models. **Sensitivity** reflects the performance of sensor systems at detecting various objects and relating relative distance to the driver. **Field of view** is the visible area covered by the camera systems. **Display** denotes the quality of the image on the monitor; for the sensor systems, the effectiveness of the audible and visible warning devices. **Ease of installation** is a judgment of how much skill and time is required to install a model.