



Airbags are just one of the many safety features in today's automobiles, and another is the three-point seat belt, without which the airbag is not totally effective. The first seat belt was introduced a half-century ago. Back in the 1950s, the padded dashboard was introduced, and with much fanfare via a new medium called television, when an egg was dropped from atop a stepladder onto a dashboard without breaking.

But safety did not sell cars back then. Power, chrome and radical designs were what excited car buyers. Nevertheless, constant safety improvements were made. The chrome horn ring, which impaled more than one driver involved in an accident, was removed. A collapsible spacer was installed in the steering column to reduce chest trauma. Door handles and window cranks were designed with safety in mind and not to intrude into the passenger compartment. Single-circuit brake systems were replaced with dual circuits, then came dual-diagonal circuits. Even the rearview mirror was developed with a breakaway feature.

More recently, antilock brake systems (ABS) were introduced. Bumpers, which used to be a slab of steel, are now designed to crush, absorbing energy before it reaches the rest of the vehicle and its occupants — at least below speeds of 5 miles per hour. Now the entire car is designed to bend and distort upon impact — through what is called crumple zones — to help dissipate energy and protect the people inside. There are even beams in the doors to offer added protection from side-impact collisions.

But no single safety component has received more praise, or come under more criticism and scrutiny, than the airbag. Also known as a supplemental inflatable restraint (SIR) or supplemental restraint system (SRS), the airbag has saved more than 8,800 lives, according to the

[National Highway Traffic Safety Administration](#) (NHTSA). Airbags are called “supplemental” because they are supposed to be used with — or as a supplement to — seat belts. Although they may save an unbelted person from death, maximum effectiveness is achieved only by combining a seat belt and an airbag.

### History

Ford began research into airbags for automobiles in the early 1970s but did not install them in any of its vehicles. However, federal regulations requiring passive restraints prompted General Motors to develop airbags on a test fleet of 1973 Chevrolet Impalas. Automatic seat belts, a more economical feature, eventually won out. Mercedes-Benz was the first car company to offer airbags in all of its 1986 models exported to the United States. Ironically, Chrysler — now DaimlerChrysler — was the first domestic automaker to promote airbags across the board.

Some people also may recall Chrysler’s 1990 television commercial featuring two LeBarons (one coupe and one convertible), which collided head-on near Culpeper, Va. It was reportedly the first collision between two airbag-equipped cars, and both drivers survived. Chrysler went on to be a champion of airbags and was the first to install them in minivans.

Initially, airbags were installed only on the driver’s side; but in 1993, passenger-side airbags were offered. Starting with 1998 models, both driver- and passenger-side airbags have been required in passenger cars. The same setup has been required in vans and light trucks since 1999.

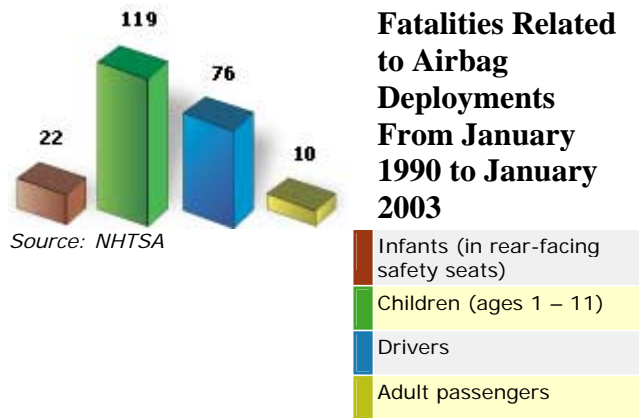
When the government first began mandating airbags, the requirement said they must be able to protect an unbelted, 160-pound person in a 35-mph crash. Unfortunately, the force needed to protect such a person turned out to be fatal for smaller adults and children.

### Statistics and Controversy About Airbags

More than 120 million vehicles now feature airbags, and another 1 million new

vehicles with airbags are sold each month, according to the [Insurance Institute for Highway Safety \(IIHS\)](#). The National Highway Traffic Safety Administration, a division of the Department of Transportation, states that the combination of seat belts and airbags is 81 percent effective in preventing serious head injury and 66 percent effective in preventing serious chest injury. That means 81 of every 100 people who would have suffered a serious head injury, and 66 of every 100 people who would have suffered chest injury in a crash, were spared that fate because they wore seat belts and were in vehicles equipped with airbags.

As of January 2003, the National Highway Traffic Safety Administration reports that there have been 10,271 lives saved due to airbags. NHTSA reports that since 1990, airbag deployment has killed 227 people in low-severity crashes, including 76 drivers, 10 adult passengers, 119 children between the ages of 1 and 11, and 22 infants. Of the 76 adult drivers killed, 28 were women under 5 feet 2 inches tall, and 4 of the 10 adult passengers killed were females smaller than that height.



Depowered, or second-generation, airbags were introduced in 1998 when Ford featured them on the Lincoln Navigator. They deploy with much less force, which is intended to minimize the risk of injury during low-speed collisions. Federal law now also permits the installation of a switch for deactivating front airbags.

Airbags cause far more incidental injuries and broken bones than fatalities, but NHTSA does not track these. Those who tend to be at greater risk for these incidental injuries include small children in the front seat, infants in rear-facing safety seats in the front seat and motorists who must sit within 10 inches of the steering wheel — often short, young, female drivers. Pregnant women and people with medical problems such as bone mass loss (osteoporosis) often sustain more injuries than drivers without these medical conditions.

Motorists who wear eyeglasses or sunglasses increase the risk of injury, but

the American Academy of Ophthalmology suggests that drivers and passengers face other, more serious dangers by not using the proper eyewear. Even monocular people who have vision in just one eye are encouraged to keep the airbag connected.

Drivers who grip the steering wheel in the traditional 10 o'clock and 2 o'clock positions risk having their arms broken by a deploying airbag. Instructors now promote 9 o'clock and 3 o'clock hand positions as a precaution. While some drivers like to hold the steering wheel with one hand at the 12 o'clock position, a deploying airbag not only will make the motorist punch himself in the face, but it will severely fracture that arm. Imagine what may happen to someone smoking a pipe or eating a lollipop.

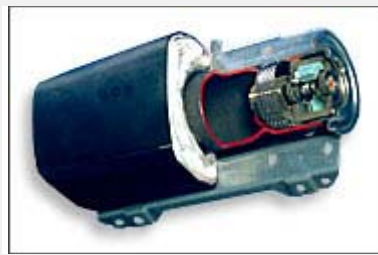
#### How Airbags Work

Using the simplest of terms, airbags work like balloons. And like balloons, airbags are filled with a gas that eventually leaks out. The big difference in this comparison is that an airbag's inflation and deflation occur almost instantaneously. Let's take a closer look.



The airbag, or pillow, is made of a flexible fabric such as nylon or polyester that inflates in a head-on collision. Airbags will not deploy if a vehicle is struck from behind, although the airbags in the striking car may go off. The driver's airbag emerges from the steering wheel, where it is stored. If a vehicle is equipped with a passenger-side airbag, it will deploy from inside the dashboard, where it is

stowed. Driver's bags usually are round, while passenger-side airbags are more of a rectangular or box shape.



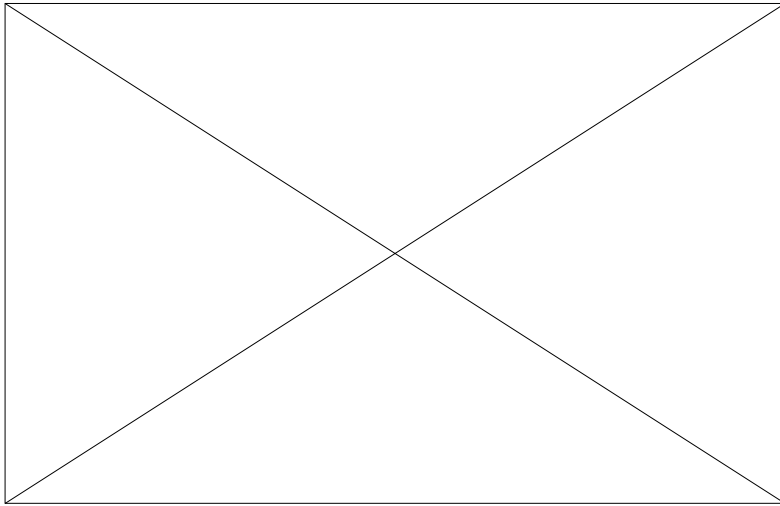
While front airbags are located uniformly, side-impact airbags are stored in a variety of places; there are no regulations or a general consensus yet. Some automakers place them in the doors, and others put them in the seats or armrests. No matter where the airbags are stored, all of them are carefully folded within their housings and liberally dusted with cornstarch or talcum

powder to act as a lubricant as they deploy.

But the bags are just one of several components that make up the airbag system, which includes sensors, control modules (although some are combined in a single unit), an igniter and a propellant.

When a collision occurs, a vehicle decelerates very quickly — even in a crash at speeds as low as 10 to 15 miles per hour. Sensors detect this abrupt change. Mechanical sensors behave like a switch by closing and completing an electrical circuit that sets off the airbag igniter. Today, new technology has conformed these sensors into solid-state, electronic decelerometers that send a

signal to a control module to energize the igniter that lights off the inflator.



The impact sensor usually is located near the fenders or behind the headlights, and a safing sensor is centrally located inside the car. The safing sensor ensures that airbags do not deploy accidentally. In a collision, the impact and safing sensors must agree that an airbag deployment is necessary. In addition, the sensors won't trigger when the ignition is turned off, so someone bumping your car in a parking lot will not deploy the airbags.

Once triggered, however, the airbag inflator operates on the same principal as a bullet or rocket. When its primer ignites the gunpowder in a bullet or when rocket fuel burns, rapidly expanding gases force the projectile out the front of the gun or propel the rocket through a nozzle. When the sodium azide pellet in an airbag inflator ignites, the rapidly expanding gases fill the bag at a rate of about 200 mph (320 kilometers per hour).

Incidentally, when an airbag deploys, it sounds similar to a 12-gauge shotgun. The gas produced is harmless nitrogen — the very gas that makes up 80 percent of the air we breathe. After deployment, holes in the back of the bag allow the nitrogen gas to escape at a predetermined rate. The bag then deflates and cushions the body to a slower stop — a less intense deceleration than hitting a solid object. All this happens in about 1/25 second.

#### How Airbags Are Tested

Originally, airbags were tested by running a vehicle into a barrier at 30 mph with the typical male test dummy sitting rigidly in his seat. But in real-world crashes, the driver usually is “out of position” due to steering maneuvers, panic braking or bracing for the crash. In a rigid barrier test, the car hits the wall at a 90-degree angle — both straight head-on and again at a 30-degree angle.

In an effort to make the tests more realistic, and especially for testing depowered airbags, a sled test was developed. Instead of crashing into a wall,

the vehicle is mounted to a sled that decelerates quickly. Because it is less severe than the barrier test, the sled allows automakers to use less powerful airbags and dummies not wearing seat belts. The sled test, developed in 1997, set the maximum speed at 25 mph.

Rigid barrier testing has returned, but the top speed has been reduced. The test specifications now call for speeds between 20 and 25 mph for unbelted dummies, and the minimum speed has been changed from 0 to 20 mph to reduce the likelihood of automakers setting the trigger threshold too low. The new test also calls for crashing into a deformable barrier using a small, female crash dummy — a more typical scenario of crashes that involve two vehicles. However, this could present a problem for some impact sensors that may inaccurately register the crash because of the “crash pulses” — rather than the hard whack — they pick up. The new NHTSA rule also lets carmakers either automatically switch off the airbags or allow the airbag to deploy at a safer rate if the driver is a small adult female or if children are riding in the vehicle.

#### Types of Airbags

What started as the driver-side airbag has proliferated into many types of devices: passenger-side, side-impact, curtain-type, knee and chest airbags — even rear-seat side-impact airbags. Ford has developed the rollover airbag that deploys a curtain to protect occupants’ heads in the event of an SUV rollover accident. Most airbags depend on thermal expansion for volume. The hot gas that makes an airbag inflate cools quickly and causes sagging within a few milliseconds. Ford’s new rollover bag uses a cooler gas to sustain inflation for up to six seconds. The automaker plans to install these devices in all of its SUVs by 2005.

The basic, driver-side airbag has gone through some changes since it was first introduced. It initially was designed to protect an unbelted, 160-pound, 5-foot-10-inch male driver. This airbag design has been responsible for some severe injuries and deaths.

Then second-generation, or depowered, airbags were developed, which are gentler on an occupant during a crash. Depowered bags have two stages of deployment: full power, for when an occupant is belted in, and reduced power, for protecting unbelted occupants. And there’s also third-generation airbags, known as “smart” airbags, which compute numerous factors such as weight, height, belt use and so on to determine the type of deployment.



Side airbags come in three styles, designed for specific bodily protection: for the head, the body (thorax), and the head and thorax. Airbags designed to protect the head have shown that a crash may be more survivable, even for people who are “out of position” — turned or slouching in their seats. Head injuries are a leading cause of death in side-impact crashes.

In addition, side airbags are being offered in numerous designs, locations and deployment methods. One of the challenges is to design a bag that deploys much faster than a front airbag. The bending hood, fenders and bumper dissipate much of the frontal crash energy, and it takes about 30 to 40 milliseconds for the force to reach the occupant.



In T-bone crashes, the bags must deploy in only 5 to 6 milliseconds. One method, used by Volvo, has been to install the airbag in the seat side bolster and the sensor in the bottom of the seat frame. When contact is made, the bag deploys before the person's body begins accelerating sideways. BMW has been installing airbags in the doors, which enables the company to use a larger airbag. This larger airbag is

used in conjunction with BMW's Head Protection System (HPS), a separate airbag that deploys along the side of the impact and can stay inflated for roughly five seconds to reduce injuries in the event of a second or third thrashing.

Find out which vehicles feature [standard and optional airbags](#).

#### Increasing Passenger Safety

There is a right and a wrong way to be a driver or passenger in a vehicle equipped with airbags. For maximum safety, you should obey a few simple but essential rules. First, the airbag system must be operational. When you turn the key, but before the engine starts, the "airbag" or "SRS" light should glow briefly, which indicates that the system is OK. If it doesn't glow, the bulb may be burned out or the system could have a problem. If the light comes on while you are driving, get the airbag system checked by a trained mechanic as soon as possible; this could be the indication of a problem, and you will be unprotected.

#### Seating Positions

Do you remember your parents telling you to sit up straight and not slouch? They may have been preparing you to drive an airbag-equipped vehicle. Adults should sit firmly back in the seat and then securely fasten the seat belt — properly placing the lap belt below the waist and across the pelvis, with the shoulder belt across the chest and above, not under, the outer arm. Make sure the belt fits snugly by removing any slack in a "window shade"-type pretensioner system. If your seat belt is loose, your body will hurtle toward the airbag as it inflates. Combining the two velocities means an injury is likely.

The driver should be at least 10 inches away from the center of the steering wheel to allow space for the airbag to inflate. Move your seat as far back as comfortably possible. If that doesn't offer adequate space, tilt the seatback back a notch or two, making sure you are still able to reach the steering wheel comfortably. A cushion between you and the seatback also may provide comfort and the necessary distance from the steering wheel to keep you from

the direct line of impact if the airbag were to deploy. If you are unable to reach the brake and gas pedals after you move the seat back, several companies offer pedal extenders that are easily installed by a technician or advanced do-it-yourselfer.

There are other precautions you can take to maximize your safety in airbag-equipped vehicles. If you have tilt steering, aim the wheel at your chest and not your face. Place your hands at the 9 o'clock and 3 o'clock positions on the steering wheel. Using the 10-and-2 positions could lead to broken arms if an airbag deploys. If you are in the habit of draping your hand over the top of the wheel, you not only will smack yourself in the face, but your arm will probably be broken if the airbag goes off. Despite the temptation, don't attempt to blow the horn if you are about to crash.

Similarly, if you are a passenger, do not reach out to brace yourself if a crash is imminent. The rectangular shape of the passenger airbag, plus its forceful deployment, could badly damage your arms and shoulders. Unless passengers sit up straight, they are likely to suffer an injury in a crash; sitting sideways can result in spine and neck injuries.

#### Infants and Children

Each of the 50 states, Washington, D.C., Puerto Rico and all U.S. territories have laws that require infants and small children to ride in child-safety seats until they are old enough to safely wear seat belts. [Click here](#) to read those laws. During a collision or sudden stop, an unbelted adult holding a child will likely crush the child between himself and the instrument panel or windshield — most likely killing the child. Even if the adult is buckled up, in as little as a 30-mph collision, a 10-pound child will fly from the adult's arms with a force approaching 200 pounds — more than virtually anyone can hold onto. It's likely that the child would hit the dashboard or windshield.

The solution to this scenario is to put children in properly installed safety seats every time they travel in a vehicle — and not just on long trips. In fact, most accidents happen within 25 miles of home. If children ride with others — like the baby sitter, grandparents or friends — make sure a properly installed child-safety seat is used every time. And it's important not to put a safety seat in the front seat of a vehicle equipped with a passenger-side airbag. The airbag could

bash the safety seat with a force that could seriously injure or kill a baby.



This image shows a possible outcome when a passenger-side front airbag deploys with a rear-facing child seat in the front. (Associated Press photo)

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Because of airbag dangers, all children younger than 12 years old or who weigh less than 80 pounds should ride in the backseat. If this isn't possible because the vehicle is a pickup truck, two-seat sports car or not equipped with a backseat, consider installing an airbag cutoff switch.

Once children reach 12 years old or weigh more than 80 pounds and can fit comfortably in a standard seat belt, they may sit in the front if the seat belt can be worn properly. This means the lap belt lays low and snug across the hips without riding up over the stomach, and the shoulder belt does not stretch across the face or the front of the neck. Their legs should reach over the front of the seat with their backs against the seatback.

#### Airbag On/Off Switches

Since January 1998, motorists can choose to have an on/off airbag switch installed in their vehicle if they feel they are at risk of sustaining injuries from airbag deployment. For the average driver or passengers, who are older than 12 years old, airbags are a safety benefit. Therefore, leaving the airbag system activated is safer than deactivating it, according to the National Highway Traffic Safety Administration, as long as occupants are more than 10 inches away from the airbag's cover.



Airbag On/Off Switch

In addition, NHTSA reports that most adults who have been killed by airbags were not properly restrained. Forty-four of the 69 drivers killed, and seven of the eight adult passenger fatalities, involved occupants who were totally unbelted. Two of the drivers who were belted had medical conditions that caused them to slump over the steering wheel immediately before the crash. A few of the drivers did not use their seat belts correctly, while it's

believed that the others who died were sitting too close to the steering wheel. These statistics fly in the face of the original regulation that stated airbags must protect a 160-pound, unbelted male in a collision, an unfortunate irony. So who should get an on/off airbag switch installed? If you or someone who uses your vehicle falls into one of the four risk groups defined by NHTSA, you can request an on/off switch. But unless you can prove that you fall into one of the following groups, you won't get permission to install an on/off switch:

1. Drivers who cannot distance themselves 10 inches away from the steering wheel. This includes anyone who cannot properly operate the vehicle if he or she is sitting more than 10 inches away from the steering wheel. NHTSA draws a clear distinction between those who sit closer than 10 inches out of habit versus necessity. If you fall in the latter category, NHTSA recommends that you consult with your dealer

these modifications add just an inch or two from the steering wheel, the chances of injury are reduced.

2. Drivers or passengers with unusual medical conditions — people who have been told by a doctor that an airbag poses a special risk to them because of their condition. This involves anyone whose health or safety is at a greater risk by having an activated airbag than it otherwise would be even if belted.
3. Infants in rear-facing infant seats. This applies to vehicle owners who drive automobiles that lack a rear seat, such as pickup trucks and two-seat sports cars, or are equipped with rear seats that are too small for a safety seat to fit properly. This group also includes children with a medical condition that may require vigilance from the driver. Many 2002 pickup and roadster models feature a factory-installed on/off switch for the passenger airbag.
4. Children between 1 and 12 years old. This pertains to vehicle owners who drive automobiles that have no rear seat, have a rear seat that is too small to properly accommodate young passengers or have a child with a medical condition that must be monitored.

#### How to Get an On/Off Switch

An on/off switch simply lets you deactivate the airbag system for the driver's side, passenger's side or both. By law, it must be key-operated, and a light must come on when the system is turned off. A message on or near the light will say "DRIVER AIRBAG OFF" or "PASSENGER AIRBAG OFF." The airbag remains off until it is turned back on with the key.

Before you equip your vehicle with this switch, you must get permission from NHTSA. You need to fill out a "Request for Air Bag On-Off Switch" form. It is available from NHTSA by calling 888/DASH2DOT (888/327-4236) or visiting their [Web site](#). NHTSA will send you an authorization letter once it approves your request.

Next, take the authorization letter, along with a form for the installer to fill out and return to NHTSA after the job is done, to your favorite repair shop. The form comes with the authorization letter and must be returned within seven days of the switch's installation. It is a relatively simple, straightforward procedure, but good luck finding a shop that is willing to do it. Many shops refuse to handle this procedure because they fear they will get sued if someone is injured or killed because the airbag didn't go off. Even if you sign a waiver that relinquishes your right to sue, that may not prevent someone who borrowed your car from doing so.

Nevertheless, there are a growing number of shops willing to do the job. If your favorite technician won't install an on/off switch, you can get a [list of shops](#) that will from NHTSA. This list may not be up to date, so new shops may not be included while others listed may have dropped out.

The on/off switch works basically like every other electrical switch, except a

key is necessary to activate it. A professional technician has the necessary information for installing the switch in the proper circuit. Do not attempt this installation yourself because tampering with the wrong wire may set off the airbag, which could injure you. It also will cost you plenty to replace a deployed airbag.

There is one more thing you may want to consider if you decide to deactivate the airbag(s). If your car has a load-limiting or force-limiting seat belt, you could sustain serious injuries if the airbag does not deploy. These belts spool out at an engineered load factor that allows you to move forward just as the airbag is deflating. This helps reduce injuries to shoulders and ribs caused by rigid belts. If the airbag is not there as the belt spools out, you could hit the steering wheel. It's wise to have the load-limiting belt replaced if you choose to have an on/off switch installed.

#### Legislation and the Future

Although airbags are credited with saving more than 8,000 lives, they come with drawbacks. More than 200 people, including 129 children, have been killed by them. In response to the public outcry, the National Highway Traffic Safety Administration has issued a Notice of Proposed Rulemaking that would mandate "smart" airbags in some new cars as early as September 2002 and in all cars and light trucks by September 2005.

#### 'Smart' Airbags

Airbags of the future will deploy at different rates or with different intensities based on the person sitting in the vehicle's seat. Ideally, the airbag will deploy differently, depending on whether a seat occupant is a child or adult and if they are wearing a seat belt.

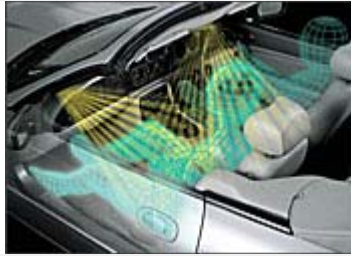
Ford began installing such airbags in its 2000 Taurus model. The company states that the advanced restraint system is a collection of a dozen components that allows the car to "think" about the crash, "understand" its severity, "examine" the driver's position in the seat and if he or she is wearing a seat belt, and "decide" how to deploy the safety system. With this system, dual-stage airbags inflate at two different rates depending on the situation described above.

"Smart" airbags, also called third-generation airbags, can be found on the BMW 3 Series, 5 Series and 7 Series; Honda Accord; Acura RL; and Mercedes-Benz S-Class and CL coupe, among others. Many "smart" systems employ a switch in the seat belt buckle telling the controller that the occupant is buckled up.

The technology that makes them "smart" varies among automakers. For instance, General Motors installed a "bend sensor" in the seats of 2000 Cadillac Seville. Developed by Flexpoint Inc., the sensor is reportedly so sophisticated that it can distinguish between a child, a bag of groceries or an adult in the seat. It measures not only the weight but also the pattern of the object.

Some of the other sensing devices include a type of scale that would calculate the size of the person (or object) sitting on the seat. One drawback, however,

indicates that the sensor doesn't know if the seat belt is being used, let alone if it's being used properly. In addition, ultrasonic wave generators could provide a two-dimensional rendering of the seat's occupant — much like a sonogram is used to find irregularities for medical purposes. Infrared beams, like those on which TV remote control systems function, would operate similarly.



Jaguar's Adaptive Restraint Technology System uses sensors in the front pillars and roof console to monitor an occupant's position. (Photo courtesy of Jaguar)

In September 2000, Jaguar announced that a new Adaptive Restraint Technology System (ARTS) would be standard on all 2001 XK series sports cars. Using ultrasonic sensors in the front pillars and new roof console, the system can determine the presence and position of a front-seat passenger in relation to the door equipped with the airbag.

Likewise, if the right-front occupant gets too close to the dashboard, sensors in the roof console will trigger a warning light to notify the passenger that the airbag has been turned off. When the passenger moves back, another sensor will reactivate the airbag.

Furthermore, the XK's driver's seat has a sensor in the seat track to measure the driver's distance from the steering wheel. Additional sensors in both seat belt buckles inform the system if occupants are not wearing seat belts. Jaguar claims the XK is the first production car in the world to employ this new ultrasonic sensing technology.

Other restraint technology that automakers are developing include a system that operates much like an antitheft security tag, which has been tested on child-safety seats. Similar to a security tag on a pair of jeans that sets off a store's alarm, the safety seat "resonator" alerts the airbag controller of an infant on board. Unfortunately, the system cannot detect if the seat is installed properly. Automakers also are experimenting with reflective capacitive sensors, which could determine the mass of an object in a seat and differentiate between a human and a sack of groceries.

Electrical field systems, which would use antennas to receive the reflected signals, have been proposed. This technology would be advantageous because these systems can "watch" the occupant in real time and know when that person is out of position.

### Legislation and the Future of Side-Impact Airbags

There are no current regulations that govern side-impact airbags, and vehicle manufacturers are experimenting with various designs. The Alliance of Automobile Manufacturers, which consists of 13 automakers worldwide, put together a Technical Work Group responsible for developing common guidelines and presented them to NHTSA in August 2000. The guidelines are part of an eight-point action plan regarding the design and implementation of side-impact airbags. The group has pinpointed the following guidelines and goals:

As part of the eight-point plan, Alliance members will design side airbag systems according to the final procedures adopted by the Alliance.

Upon request of the NHTSA, Alliance members will voluntarily confirm that side airbags have been designed according to the new procedures.

Automakers will provide information in product feature buyer guides that specifies which vehicles have side airbags designed under the procedures adopted by the Alliance.

Alliance members will communicate safety information on side airbags through owner's manuals and other publications.

The Alliance will continue to review crash investigation information involving vehicles equipped with side airbags.

The Alliance also will continue to review the biomechanical and scientific basis of the procedures as part of its ongoing research efforts to advance motor vehicle safety.

The procedures will be transferred to an international voluntary standards organization, when appropriate, to ensure the sustainability of the side airbag test procedures.

#### Controversy Over Airbag Testing Methods

The National Highway Traffic Safety Administration continues to meddle with the airbag test methods and criteria. The agency originally wanted unbelted dummies crash tested at 30 miles per hour, but it relented to a 25-mph test in the interest of safety. Some quarters, however, continue to press for the 30-mph test saying that most accidents occur at speeds at least this high.

In opposition, others claim that testing at the 25-mph speed would be a disincentive for automakers to develop advanced airbags. Meanwhile, they claim this would force carmakers to go back to the high-powered airbags that they consider life threatening — especially in low-speed crashes.

The Insurance Institute for Highway Safety (IIHS) supports the 25-mph test (with unbelted dummies). The IIHS claims that the airbags will result in better protection for unbelted people than if the same test were run at 30 mph because higher speeds demand a higher-energy airbag. According to an IIHS report, "NHTSA ultimately didn't agree with all of the arguments against 30-mph testing . . . but that many uncertainties associated with the higher speed were enough to decide the issue at least for the short term. Thus, the 25-mph requirement has been issued as an interim final rule."

The tests also include a new "family" of dummies that represent the 50th percentile dad; his small, 5th percentile wife; and their three children, ages six,

three and one. Additionally, the criteria for measuring head and chest injuries have been refined, and a new test to measure neck injury has been introduced.

### Salvaged and Stolen Airbags

In some crashes where the airbag(s) deploy(s), the cost of repairing the vehicle may be more than it is worth. But there are still many times that the car can be repaired, repainted and returned to the owner in like-new condition. One major cost in repairing a vehicle after a crash is getting an airbag reinstalled, which may cost between \$600 and \$1,000 or more, plus labor.

One way to keep repair costs down is to use salvaged parts. Installing used fenders, doors, hoods and trunk lids has long been a practice in the collision repair industry. In fact, some insurance companies have been known to use extreme pressure on body shops to use salvaged parts. But within the automotive service industry, the debate over salvaged airbags rages. The Automotive Recyclers Association (ARA) claims that salvaged, undeployed airbags are essentially the same as new, original equipment manufacturer (OEM) parts and that the repair industry, insurance industry and motoring public can save money by using them.



This steering wheel contains the proper airbag components. Unfortunately, it's difficult to spot a tainted or fake airbag.

As a way of demonstrating the effectiveness of salvaged, undeployed airbags, the ARA contracted Garwood Laboratories Inc. of Pico Rivera, Calif., to test 200 airbags. All but one deployed within 29 to 32 milliseconds — the designed time. One airbag took 400 milliseconds to deploy, and it later was discovered to have come from a car that had been in a flood.

On the other hand, the Automotive Occupant Restraints Council warns that salvaged airbags should never be used due to safety issues that surround them. The Automotive Service Association, which represents its member collision repair shops, agrees, and has since 1998, saying that

shop owners could be placed at risk of lawsuits.

A number of factors come into play when determining the use of salvaged airbags. One issue that clouds the use of these recycled parts includes whether an airbag may have come from a vehicle in which it failed to deploy in the first place. The airbag could be damaged by environmental factors, such as sun or rain, or through mishandling. Another concern involves the possibility that an airbag, although it physically fits a vehicle, may be the incorrect airbag for a particular car.

By any means, salvaged or recycled airbags are being sold and installed, but most resellers don't keep track of the buyers. This means there is little information from the field to track or determine an airbag's effectiveness.

Since most major insurance companies oppose the use of salvaged airbags, it is theorized that do-it-yourselfers — or those paying for collision repairs out of their own pockets — may be the primary users.

There are yet other issues that have surfaced regarding both the use of

salvaged airbags and the procedures involved in repairing bags. Because of the high replacement cost, a black market for stolen airbags has sprung up and continues to grow since the early 1990s. In an attempt to get a handle on this problem, State Farm Insurance researched the issue between 1993 and 1996. The company found that the rate of airbag theft tripled during that period. State Farm estimates that 15,000 airbag thefts annually results in costing all insurance companies as much as \$253 million per year.

Another way mechanics keep the high cost of airbag repair down is to fill the steering column with such items as paper towels, foam peanuts, beer cans and tennis shoes. Unscrupulous mechanics then charge consumers the regular price for the necessary airbag "repairs." California was the first state to ban this practice. The new law comes with a \$5,000 fine and a one-year jail sentence. Florida passed an even tougher law in 2001 that says installers of fake airbags could be sentenced up to 15 years and forced to pay a \$10,000 fine. If you need a new airbag installed, ask the mechanic to show you an invoice that proves the module came from a manufacturer or an authorized dealership. There is little vehicle owners can do and virtually no way to determine if a stolen airbag has been installed in your car. One suggestion is to seek out a reputable collision repair shop. To avoid becoming a victim, follow the usual rules: Lock your doors, park in well-lit areas and don't leave attractive items on the seat that may entice thieves.