

Special issue: airbags

STATUS

INSURANCE
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FOR
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SAFETY

REPORT

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Rare Bird Only a few should get airbag on/off switches

Like the bald eagle, people who may be endangered enough to need airbag on/off switches in their vehicles are few in number.

Starting January 19, 1998, the National Highway Traffic Safety Administration (NHTSA) will permit the retrofitting of manual airbag on/off switches for vehicle owners who properly complete a form stating they've read an informational brochure and are among a small number of people potentially at risk of airbag injury. The form must be sent to NHTSA for approval.

Brochures and request forms will be available at dealerships, repair

shops, state motor vehicle offices, NHTSA's Internet site at www.nhtsa.dot.gov, AAA offices, and at other locations. Airbag switches must be key-operated and have warning lights to indicate when an airbag is off. Once airbags are turned off, they will remain off until they are turned back on with a key — they don't automatically switch on when a car ignition starts.

The agency will begin processing requests for switches on December 18.

"Our decision is a practical solution that allows turning off of an airbag for some people who are at risk, then turning it back on for people not at risk," Secretary of Transportation Rodney Slater said in a November 18 press conference held to announce the new rule. "Our research shows that under most circumstances an airbag switch is unnecessary," he said. By June, NHTSA will propose new testing procedures that are expected to lead to more advanced airbag systems.

"The Institute hopes NHTSA's decision doesn't result in large numbers of people getting switches because only a minority of motorists potentially are at risk of serious injury from inflating airbags," says Institute President Brian O'Neill. "Nearly all drivers and passengers can virtually eliminate this risk by simply buckling up and positioning themselves properly in the vehicle. So there's no need to get a switch. Turning off an airbag almost never makes sense."

NHTSA defines the four risk groups for on/off switch approval as drivers unable to sit at least 10 inches away from the steering wheel, drivers who transport more children ages 1 to 12 than can safely fit in back, drivers who must place a rear-facing infant seat in front, and people who for



Few need an on/off switch

processed by the chief counsel's office as of October 31, according to spokesman Tim Hurd. Most of these requests were made in 1997. Under the new airbag rule, people in the defined risk categories or who have family members at risk may submit to NHTSA a switch request form. Deactivation still will be allowed on a case-by-case basis only if no retrofit switch for a vehicle is offered by the automobile manufacturer. Even if a switch can be bought through an aftermarket supplier, NHTSA will authorize deactivation for a select group of people. Dealers and repair shops may require owners to sign liability waivers.


Passenger airbag on/off switches will continue to be allowed in new vehicles with no back seat or a very narrow one so that rear-facing infant seats may be positioned in front without putting a baby at risk of an airbag injury. These will be the only vehicles permitted to have factory-installed switches for passenger airbags — about 2 million of them are on the road today. Consumers will not be able to purchase new vehicles with factory-installed on/off switches for driver airbags.

NHTSA's original proposal unveiled a year ago would have permitted either switches or airbag disconnection on demand (see *Status Report*, Vol. 31, No. 10, Dec. 7, 1996). But many groups including automakers, some insurers, and others, opposed this approach and lobbied officials at NHTSA and at the White House Office of Management and Budget to drop the permissive disconnect option.

medical reasons are at high risk of airbag injury. Dealers and repair shops must notify NHTSA when a switch or switches are installed. No work can be done without an authorization letter.

The rule change comes after more than a year of debate about the best way to reduce airbag injuries. Airbags have saved more than 2,600 lives so far and have prevented hundreds of thousands of serious injuries. But 87 people have been killed by airbags in low severity crashes since 1990. Fatalities include 35 adult drivers and 3 adult passengers, 37 children between ages 1 and 9, and 12 infants (10 restrained in rear-facing infant seats and 2 in infant seats on adult passengers' laps).

NHTSA's practice has been to allow airbag deactivation on a case-by-case basis primarily for people who for medical reasons are very likely to be injured by a deploying airbag. NHTSA has granted 4,359 requests for deactivation out of 5,027

A white, textured, circular object, possibly a piece of fabric or paper, with a scalloped edge. In the center, there is a circular cutout containing the text "Should I get an on/off switch?".

Should
I get an
on/off
switch?

Most shorter drivers can eliminate risk without on/off switches

Minor seating adjustments help shorter drivers sit farther away from airbags

Among drivers who use belts, the possibility of a serious airbag inflation injury is cause for concern if there's less than 10 inches between the belted driver and the steering wheel. Most drivers, even short ones, normally sit with at least this much distance to the wheel.

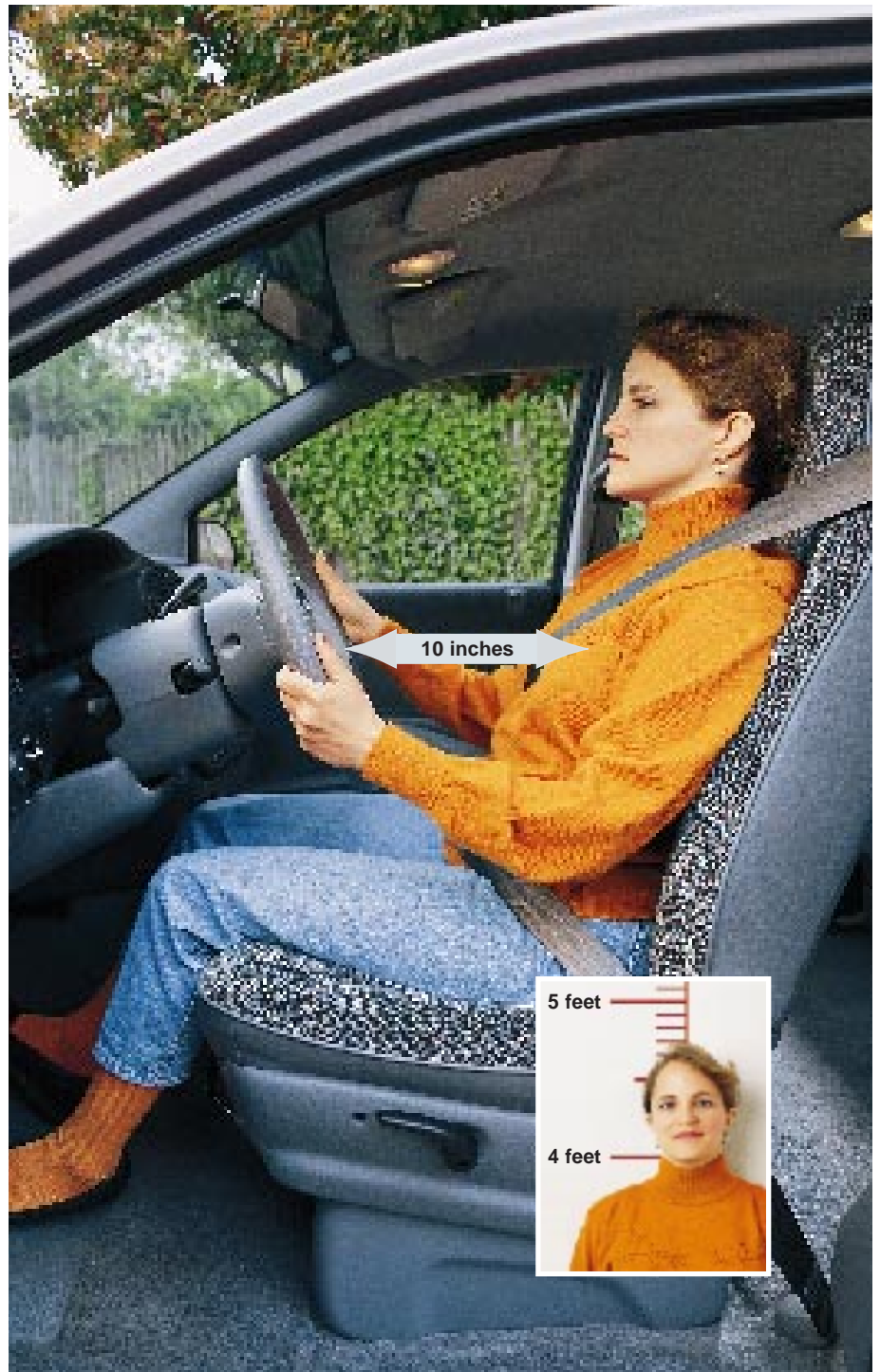
This is the finding of new Institute research that measured the distance between the center of the chest and the steering wheel hub for 587 volunteers seated in their usual driving positions in their own vehicles.

Standardizing volunteers' heights and ages to the distribution of the adult population, researchers estimate about 5 percent of women sit less than 10 inches from the steering wheel. Even among short women (5 foot-1/2 inch or shorter), two out of three still sit at least 10 inches away.

"Most drivers need only buckle up to avoid the risk of a serious airbag injury. Only a small proportion of belted drivers are potentially at risk," says Susan A. Ferguson, the Institute's research vice president who directed the study.

The findings vary with car size. About 40 percent of the short women in large and midsize cars sat closer than 10 inches to the steering wheel, compared with 27 percent in small cars. "This may be because the steering wheel and accelerator pedal are about 2 inches farther apart in large cars than in small ones," Ferguson notes. "When the pedal is located well under the instrument panel, a driver has to sit closer to reach the accelerator."

A related Institute study involved 13 drivers, all 4 foot-8 inches to 5 foot-2 inches. Each was asked to sit in a comfortable driving position in 12 vehicles of varying sizes. Most chose positions at least 10 inches back from the steering wheel, but 3



of the 13 failed to do so in one or two vehicles even after being encouraged to move as far back as possible.

All drivers who sat too close had at least 9 inches to the wheel so, in most cases, "only minor adjustments were needed to eliminate the risk of a serious airbag injury," Ferguson explains. She suggests not only pushing the seat back, if possible, but also

tilting the steering wheel down and raising the seat up to achieve 10 inches and still drive comfortably. Some cars have telescoping steering wheels that can help with this.

For a copy of "Survey of Driver Seating Positions in Relation to the Steering Wheel" by D. De Leonardis et al., write: Publications, 1005 N. Glebe Rd., Suite 800, Arlington, VA 22201.

It's legal now. In a change of policy, the National Highway Traffic Safety Administration says you may apply for a switch to turn off your driver or passenger airbag. But this doesn't mean you should get a switch. For most people they aren't appropriate.

Are you possibly at risk of airbag injury? Is someone in your family? It isn't your size, gender, or age that determines risk. It's your position in relation to an airbag. Anyone who's very close to, or on top of, an airbag as it begins to inflate can be injured or killed. Most people who have been harmed by airbags weren't using belts or child restraints, and braking before impact caused them to move close to airbags before inflation.

Now weigh airbag risks against the benefits, because airbags and belts work together as a system. One without the other isn't as effective. Together, they double the protection against head injury afforded by belts alone.

So are you one of the few who's possibly at risk? Is your family? Probably not, but check these guidelines.

Driver side: To avoid serious airbag injury risk, a driver of any size or age should always buckle up and sit at least 10 inches away from the steering wheel. Belted drivers potentially at risk are the very few positioned so the center of the chest is closer than 10 inches to the center of the steering wheel.

If you sit closer than this, try other options before an airbag on/off switch because, without airbags, even belted drivers move forward in serious frontal crashes. Their faces often hit the steering wheel. Try a new seating position. Some drivers who lean forward need only sit back.



Only if it isn't possible to get back and away from the steering wheel should you consider an on/off switch — for example, if you've tried but cannot comfortably drive while sitting back at least 10 inches. Or if you're a woman late in pregnancy who needs to drive and cannot get your abdomen away from the steering wheel.

But remember this: Sitting close presents its own risks. Without an airbag, your face is likely to hit the steering wheel in a serious frontal crash.

Most 1998 and later cars will have redesigned airbags with less powerful inflators that reduce serious injury risk. In these cars, there's probably no need for an on/off switch even if you cannot get 10 inches from the steering wheel.

Passenger side: There's no significant airbag injury risk to properly belted adults sitting back in the seat. The risk on the passenger side is mostly to infants and children who are unrestrained or unbelted — and the remedy is usually as simple as properly restraining kids in a back seat. Sitting in back

always was safer, even before airbags, and now it's more important because it will keep kids away from inflating airbags.

Never put a rear-facing restraint in front when there is a passenger airbag. The baby's head would be too close to the airbag. Instead, secure the infant restraint to the center back seat.

An on/off switch so you can occasionally put a baby in the front seat might seem like a good idea, but if you're in a hurry it's easy to forget about the switch. Besides, it's always safer in back. So there's only a rare need for an on/off switch — for example, when an infant with medical problems requires constant observation and the driver is the only other person in the vehicle. Then there might be no choice except to put the baby in the front seat, and a passenger airbag would present a risk. Of course, paying constant attention to a baby distracts from driving and involves its own risks.

If there are too many infants or small children to put them all in a back seat, it's okay for an older child to ride in the front seat, even with a passenger airbag, if the vehicle seat is pushed all the way back and the child is secured in a lap/shoulder belt and sitting back in the seat. Sitting back is important because leaning forward to, for example, fiddle with radio dials can put the child's head close to the airbag.

If you routinely transport too many kids to put them all in the back and worry about keeping the child up front sitting back and away from the passenger airbag, you may wish to get an on/off switch. If you do get one, remember to use it correctly.

Kids safer restrained in back in vehicles with and without passenger airbags

A new study from the Institute shows children are nearly always safer when they ride in the back seat — even if a vehicle doesn't have a passenger airbag.

Death rates per 1,000 children ages 5-12 involved in fatal crashes

	Death Rate
Front seat lap/shoulder belt users	165
Rear seat lap/shoulder belt users (1990-96 models)	107
Lap belt only users (1981-87 models)	137
No restraints used	180

Many studies have found rear seat child and adult passengers are safer than front passengers, but the Institute study is first to compare effects of children's seating positions in vehicles with and without passenger airbags. Using data from the federal Fatality Analysis Reporting System, researchers studied 26,233 children ages 12 and younger in vehicles involved in fatal crashes during 1988-95.

Sitting in back reduced children's fatality risk, whether or not they were restrained. That is, unrestrained children in rear seats had a 37 percent lower death risk than unrestrained children in the front. For restrained children, those in rear seats had a 38 percent lower death risk than restrained children in front. In vehicles without passenger airbags, rear seating cut the overall risk of fatal injury by 35 percent. For vehicles with passenger airbags, rear seating cut the fatality risk by 53 percent.

The benefits of rear seating were even greater for restrained children in vehicles with passenger airbags. Young children re-

strained in child safety seats had an 80 percent lower risk of fatal injury. Those using lap/shoulder belts had a 71 percent risk reduction.

"This study provides further evidence that parents and other care providers should be strongly encouraged to restrain infants and children in rear seats whether or not the vehicles have airbags," says Elisa R. Braver, the Institute senior researcher who authored the study. "Rear seat travel will reduce child passengers' risk of death in severe frontal collisions and roll-overs. Traveling in back also will eliminate injuries from deploying passenger airbags."

The study found that children were safer in back in a variety of crashes — frontal, rollover, and side impacts — with the exception of rear impacts. In these impacts, children who were seated in back had a 61 percent higher risk of fatal injury than children who rode in the front seat.

Braver points out that relatively few fatal passenger car crashes are rear impacts — 5 percent. The most common fatal crashes are frontal impacts. These crashes account for 62 percent of fatal car collisions, and side impacts account for 25 percent of fatal car collisions.

"Both restraint use and seating position are critically important," Braver says. For example, although riding restrained in the back is safer than riding restrained in front, it's safer for children to ride restrained in front seats than unrestrained in back. Unrestrained children ages 5-12 seated in back had an 11 percent higher risk of death than children in front using lap/shoulder belts.

Institute researchers also examined injury based on where children sat in the back seat — in the center or the outboard positions. Children ages 0-12 in rear center seats had a 9 to 24 percent lower risk of fatal injury than children in rear outboard seats.

For a copy of "Risk of Death Among Child Passengers in Front and Rear Seating Positions" by Elisa R. Braver et al., write: Publications, 1005 N. Glebe Rd., Suite 800, Arlington, VA, 22201.



Child seats soon may be simpler to place in the back due to fixed attachment points

The days of struggling to properly install hard-to-fit child seats in cars may be coming to an end. The National Highway Traffic Safety Administration (NHTSA) soon will require that all child seat designs be compatible with permanent attachment points that will, in turn, be required in the rear seats of passenger vehicles.

"The Institute strongly supports NHTSA's proposal for uniform child seat attachments, a system that is long overdue," remarks Institute President Brian O'Neill. "In addition to increasing the proper use of child seats, the attachments should increase the number of children seated in back, the safest place for them."

The Institute also backs NHTSA's proposal to improve head protection for kids in forward-facing restraints. This will have the practical effect of requiring top tethers on child seats and tether attachment points in passenger vehicles.

It's long been known that child seats, used correctly, are effective in protecting children from death and serious injury in vehicle crashes — 71 percent effective, NHTSA estimates. It's also known that many child seats are improperly installed or otherwise misused, says the agency, dropping the on-the-road effectiveness estimate to 59 percent.

The solution? "The child seat and motor vehicle industry is unanimous that the means of attaching child restraints to the vehicle interior should be easier, more efficient and without incompatibility problems," states NHTSA.

Simply put, all child seats on the market should fit easily into designated vehicle anchorages. The best type of anchorage system still is being debated.

NHTSA proposes to adopt a system General Motors designed. Child seats would come with their own belts, which in the vehicle would buckle into special flat latchplates designed solely for this purpose. The similarity to safety belts will make the system familiar to consumers and keep down costs, GM and NHTSA explain.

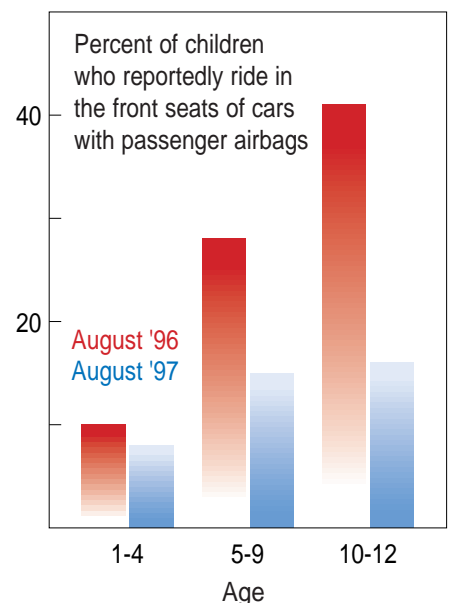
Chrysler, Ford, and European automakers BMW, Land Rover, Mercedes-Benz, Volkswagen, and others want NHTSA to require vehicles to have 6 mm diameter round bars, also known as D-rings, instead of the proposed flat latchplates.

This modification would make it easier for manufacturers to install in vehicles rigid attachment systems designed to fit child seats with rigid connectors. The International Standards Organization (ISO) favors this design. With D-rings instead of latchplates, vehicles with rigid attachment systems could accommodate GM-type child seats with flexible belt connectors as well as ISO-type seats with rigid connectors.

"Rigid attachment systems have been shown by dynamic crash tests to provide superior protection to children in side impacts," says Elisa Braver, Institute senior research analyst, in a letter to NHTSA supporting the D-ring modification. "Another advantage is that they do not require parents to tighten any belts, whereas the belt attachment systems will require manual tightening. Parents often fail to sufficiently tighten belts."

While agreeing that both restraint types should be accommodated, NHTSA proposes requiring vehicles with rigid anchorages to have special adapters making them comparable to flat latchplates and compatible with GM-type child restraints.

The need for special adapters and the added expense involved could be avoided simply by requiring D-rings, Braver says. Using D-rings also would facilitate international harmonization of child seat attachment systems.





With on/off switches, some belts may have to be replaced

Airbag on/off switches could be problematic for vehicles with force-limiting safety belts optimized to work with airbags.

These belts are designed to prevent some injuries that occur in serious frontal crashes when shoulder belts exert forces on occupants' upper bodies, causing rib fractures or other injuries. Because airbags provide additional restraint and spread crash forces across the upper body rather than localizing them (as belts do), automakers are able to modify shoulder belt designs to limit the forces belts exert on the upper body. BMW, Mercedes, Toyota, GM, and Ford are among the many companies using them.

Take away the airbag and you take away an important part of the restraint system, safety engineers say. If an airbag isn't there to limit forward motion, a load-limiting or constant-force retractor belt could allow a person to hit the steering wheel or other interior components in some serious frontal crashes. The National Highway Traffic Safety Administration (NHTSA) includes a section on these belts in a brochure vehicle owners must read before applying for an airbag on/off switch.

"Any company that has belt force limiters is going to be in a difficult situation

because they went the extra yard to ensure the system performs the way it should," says Donna Boland, director of public relations for Mercedes. Because airbags and belts are designed to work as a system, "that system as is cannot be utilized without the airbag," Boland says.

Load-limiting or force-limiting belts limit loads on the body by enabling the shoulder belt to spool out when the forces exceed the design loads. This allows the occupant's upper body to move forward to decelerate with the deflating airbag. Unlike less sophisticated tear-stitch belts, these constant-force retractor or load-limiting retractor belts allow gradual movement of the upper body. In a tear-stitch system, extra webbing in the lap belt rips in a crash, lengthening the belt and allowing much less well controlled forward movement into the deflating airbag.

Institute offset crash tests have indicated problems with tear stitch designs but not with shoulder belt load-limiting retractors. An Institute offset frontal crash of a 1996 Toyota Previa passenger van with tear-stitch lap belts illustrates the problem. The dummy finished the test partially reclining with the lengthened belt up over its abdo-

men. The tear-stitch belt contributed to poor dummy kinematics in this case.

Manufacturers now are debating what to do — change belts to standard, non-load-limiting ones? Leave them alone? Refuse to allow on/off switches in these vehicles?

Volvo uses load-limiting retractors in some 1998 model SNV70s, and 1998 model C70s will have them, too. "If a person with a load limiter retractor gets permission from the government and Volvo to disconnect the airbag, those belts will be changed," says William Shapiro, Volvo's manager of regulatory compliance and environmental affairs.

GM will replace belts in cars with load-limiting belts if a customer wants an on/off airbag switch, says Mia Kelly, assistant director of communications. These vehicles include 1995-97 Rivas and Auroras and 1997-98 Corvettes.

Toyota and Nissan won't replace load-limiting belts in vehicles that get switches, company spokesmen say. Mercedes engineers haven't decided what to do if vehicle owners want an airbag on/off switch.

Ford, GM, and Nissan are among automakers expected to have on/off switches for sale in January for about \$75 to \$200. Chrysler and Toyota estimate they'll have switches available in the spring.

Volvo won't have switches in January but is developing them. "We want to provide all viable options for our customers," says Jeannine Fallon, Volvo spokesperson. "But we will discourage our customers as much as possible from having switches installed when they are available."

BMW will install passenger airbag on/off switches only in its Z3 model — a two-seater already approved for switches under an earlier rule. There are no current plans to put switches in other models, says Karl-Heinz Ziwick, BMW's general manager of environmental engineering. "The only justifiable reason for using an on/off switch is in the case of a rear-facing infant seat," Ziwick explains. NHTSA, however, has specified a wider risk group eligible for them. "Perhaps we may have to do something in the future," Ziwick says, but nothing has been decided. He adds, "It's a very awkward situation."

Hold on unbelted barrier test may be extended, different size dummies used

The unbelted airbag barrier compliance test may be suspended until performance test requirements for advanced airbags are developed under a tentative deal worked out by Congress and the Department of Transportation. The pending legislation also includes a provision permitting dummies representing children and women to be used in compliance tests.

The proposal is an amendment to the Senate's Intermodal Surface Transportation Efficiency Act of 1997. Senators Dirk Kempthorne (R-Idaho) and John McCain (R-Arizona) have led the movement on Capitol Hill to revamp the way automakers are required to conduct airbag compliance tests. If the proposed legislation is enacted, there will be no unbelted airbag barrier tests until the National Highway Traffic Safety Administration (NHTSA) completes rulemaking on advanced airbags and the rule takes effect. Plus, automakers for the first time may be required to run airbag compliance tests with dummies of various sizes instead of dummies representing only average-size males.

NHTSA will begin rulemaking by June 1, 1998, according to Secretary of Transportation Rodney Slater. The agency will do a cost-benefit analysis of advanced airbags and estimate when they can be in production vehicles. The legislation requires NHTSA to complete rulemaking within one year, and a phase-in of advanced airbags must begin by September 2002. All vehicles must have them by September 2005 unless Congress or the Secretary determines that manufacturers need more time.

Slater agreed to support the measure, although he doesn't support a complete suspension of unbelted testing which he called a "needless action that detracts us from the essential goal of increased belt use." In a September 16 letter to the Senate

Committee on Environment and Public Works Slater said, "Removing this crash testing requirement will adversely affect our teenagers and young adults, who have the lowest seat belt use and the highest crash rates."

NHTSA issued a rule in March to permit a sled test instead of a 30 mph barrier crash test to fulfill the unbelted test requirement so automakers could use depowered airbags in new models. This rule contains a "sunset provision" that will reinstate the unbelted barrier test after September 1, 2001. The American Automobile Manufacturers Association, the Association of International Automobile Manufacturers (AIAM), and the Institute have petitioned NHTSA to remove the expiration date. Passage of the Kempthorne and McCain legislation would mean the unbelted barrier test would remain suspended until after the sled test sunset date.

The sled test is an alternative to the unbelted barrier crash test — the test which has dictated airbag energy levels in many vehicles. The decelerations specified for the sled test are less severe than typically experienced in a barrier crash test. This allows auto manufacturers to use airbags that deploy with less force in many vehicles. (See *Status Report*, Vol. 32, No. 2, Feb. 15, 1997.)

Some automakers want NHTSA to end all unbelted testing because U.S. belt use has increased. "If restraint systems are optimized for belted occupants, unbelted occupants would still be provided protection by the airbag in a frontal crash, and belted and unbelted out-of-position occupants would have a lower risk of injury from the airbag in real-world crashes," AIAM said in a petition to NHTSA.

Advocates for Highway and Auto Safety argues against ending the unbelted barrier test because one-third or more motorists don't use belts. For these people, "airbags are the only line of defense in a crash," Advocates said in a letter to Kempthorne.

Says Institute President Brian O'Neill, "One of the problems with this debate has been the confusion between protecting unbelted people with airbags and the appropriate tests to specify minimum levels of performance.

Passage of the Kempthorne legislation would mean the unbelted barrier test would remain suspended until after the sled test sunset date.

"We strongly oppose any return to the 30 mph barrier crash test with unbelted dummies, not because we believe airbags shouldn't protect unbelted occupants — they should — but because it is a bad test that doesn't reflect the circumstances of many unbelted people involved in serious frontal crashes.

"In real-world crashes, unbelted people often are out-of-position at the time of impact because of hard braking or other pre-impact maneuvers. In contrast, at the time of the barrier impact, the unbelted dummies are sitting back in their seats with every joint locked, requiring 1 g force before they will move."

O'Neill adds, "It's a mistake to assume airbags tested with belted dummies won't protect unbelted people. Appropriate tests with belted dummies also will result in airbags that will protect unbelted people."

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1005 N. Glebe Rd., Arlington, VA 22201 703/247-1500 Fax 247-1678 Internet: www.highwaysafety.org

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