

STATUS REPORT



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In group of 9, Saturn SL2 stands out

Saturn is the second largest planet and has the most moons. It's also the easiest to identify among the nine planets because of its distinctive rings.

Saturn — the car — is distinctive, too. Among nine small four-door cars the Institute recently tested at 5 mph, the 1997 Saturn SL2 sustained virtually no damage in three of four impacts. Overall, it sustained \$655 damage (see table, p.2) and is the only one of the nine cars tested to sustain less than \$1,000 repair costs. In fact, damage to the Saturn is less than damage to any passenger vehicle model, large or small, subjected to Institute bumper tests in years. It ranks among the best since the 1981 Ford Escort.

In contrast, the 1997 Mitsubishi Mirage and Kia Sephia sustained more than \$2,500 damage in the same four crash tests, and there was more than \$3,000 damage to the worst performer, the Hyundai Elantra. "This expensive damage in low-speed crashes costs consumers in many ways," Institute President Brian O'Neill points out. "It means higher insurance bills, deductibles paid out of consumers' pocket-books, and, just as important, the major inconvenience of getting around without a car while it's in the repair shop. It should be unacceptable for damage in four crash tests at walking

DAMAGE REPAIR COSTS

1997 Small Four-Door Cars in Crash Tests at 5 Miles per Hour

	Front Into Barrier	Rear Into Barrier	Front Into Angle Barrier	Rear Into Pole	Total Damage
Saturn SL2 \$14,910	\$105	\$ 50	\$500	\$ 0	\$ 655
Volkswagen Jetta GL \$17,465	141	0	713	236	1,090
Dodge Neon Highline \$14,080	148	84	347	513	1,092
Honda Civic LX \$15,845	55	105	815	469	1,444
Ford Escort LX \$14,095	237	148	741	626	1,752
Mazda Protege LX \$15,940	599	135	461	700	1,895
Mitsubishi Mirage DE \$14,410	562	243	856	972	2,633
Kia Sephia LS \$13,385	353	435	727	1,298	2,813
Hyundai Elantra \$12,764	228	386	717	1,711	3,042

Repair costs reflect July 1997 prices. Car prices are mfg. retail plus options, freight.

SAME CARS, EARLIER MODELS: 1981 FORD ESCORT STILL BEST AT 5 MPH

The Institute has tested earlier versions of some of these 1997 cars including the best performing Saturn SL2. The 1993 SL2 ranked third among nine cars tested, sustaining more than \$2,000 damage in the four impacts at 5 mph (see *Status Report*, Vol. 28, No. 3, March 13, 1993).

"It's a notable improvement from 1993 to '97, which is heartening because it's a main reason for our low-speed crash tests," Institute President Brian O'Neill says. "We want to give consumers information about how well cars resist damage, of course, and we want to encourage manufacturers to improve the bumpers on their cars. In this case, Saturn provides a good example of factoring damage resistance into car redesign."

But not every change is for the better. The Ford Escort performs in the middle of the pack of 1997 models. In contrast, the 1981 Escort sustained \$0 damage in the same four crash tests. "So the 1981 Escort is still best," O'Neill notes. "The 1997 Saturn is the best we've seen in years. It's among the best in the last 16 years of crash testing at 5 mph."



speed to total anything like 25 percent of a car's sticker price, which is the case with the Elantra."

In addition to the best and worst, the Institute tested five 1997 cars with repair costs ranging from about \$1,000 to almost \$2,000. Three models in addition to the Saturn performed well in the front- and rear-into-flat-barrier impacts — Volkswagen Jetta, Dodge Neon, and Honda Civic. The Jetta sustained no damage in the rear test.

The test series includes front and rear flat-barrier impacts plus two localized impacts, front-into-angle-barrier and rear-into-pole. All tests are conducted at 5 mph.

Reasons for the widely varying performances of the small four-door cars in these tests wouldn't be discernible to a casual observer. The front and rear bumper systems on the nine cars tested include similar components — a large plastic cover over a reinforcement bar plus, on all cars except the Elantra, material like foam or eggcrate to absorb the crash energy.

"Damage resistant bumpers aren't features consumers can shop for by examining the vehicles," O'Neill explains, "because bumpers mostly look about the same. Crash tests are needed to find out

how well the energy is managed in low-speed impacts, and this is why we conduct our tests. We want consumers to know how various cars perform."

What does explain the differing performances of the nine small four-door cars? The quality of the bumper reinforcement bar and the amount and placement of the energy-absorbing material like foam under the bumper cover are important factors. So is the distance a bumper extends from a car body. There has to be enough space for a well-constructed bumper system to absorb crash energy before it reaches the expensive sheet metal car parts that cost



so much to fix or replace. These factors together determine performance.

The Saturn has a strong but light-weight bumper reinforcement bar and enough energy-absorbing material to manage minor impacts. The result is no damage at all in the most demanding crash test, rear-into-pole, and minor damage in the two flat-barrier impacts — so minor that many car owners might not bother to get it fixed. Significant damage occurred only in the front-into-angle-barrier test.

In contrast, O'Neill notes, "the poor performers have flimsy bumpers that collapse instead of absorbing the energy of a minor impact. They allow lots of energy to reach the car body, causing expensive damage to sheet metal parts and costing lots of money for repairs."

While some small four-door cars are economical, others may have deceptively affordable sticker prices. As soon as a minor impact occurs, owners of these cars may find they're anything but affordable to repair.



Elantra's stratospheric repair cost total

The 1997 Hyundai Elantra (top) was by far the worst performer. One reason is that the bumper systems on this car, alone among the models tested, include no energy-absorbing material underneath the plastic cover. There's just a plastic bar. The cost to repair damage to the Elantra after the Institute's 5 mph tests totaled about one-fourth of its retail price.

"This car is economical in one sense," Institute President Brian O'Neill points out. "The sticker price is lowest among the nine cars tested. But is the Elantra really economical when it sustains so much damage in such minor impacts?" Other poor performers include the Kia Sephia (left) and Mitsubishi Mirage (right). These three models sustained about \$1,000 or more damage in the rear-into-pole test — a test the best performing Saturn SL2 withstood with no damage at all.

All cars except the SL2 and Escort sustained damage beyond the bumper in the pole test, and trunk lids on the Sephia and Elantra were too damaged to repair. They had to be replaced and painted for \$577 (Sephia) and \$661 (Elantra).



Elderly Drivers

at high risk of fatal
intersection crashes

Intersections are dangerous places for drivers of all ages, and they pose a special risk for older drivers.

Drivers ages 65-69 are more than twice as likely to be in fatal multivehicle intersection crashes as drivers ages 40-49, new Institute research shows. Drivers 85 and older are about 11 times more likely than these younger drivers to be in fatal multivehicle intersection crashes.

Older drivers are at highest risk of crashing when they travel straight at traffic lights, stop at stop signs, and drive in locations with no traffic controls (such as driveways and alleys) compared with drivers ages 40-49, researchers say. These so-called "ran traffic control" crashes are the predominant type among older drivers, accounting for more than half of all fatal involvements for drivers 75 and older.

The problem seems to be related to situations when the older driver must evaluate changing information from the left and right before pulling into the intersection. For instance, at a stop sign the driver must check for traffic on the left, then check for traffic on the right, and pull into the intersection when it is safe.

Improved side impact protection, especially airbags, will help protect older drivers from serious injury in intersection crashes, researchers note. Lowering their crash involvement likely will involve reducing or simplifying the situations in which they must make quick decisions.

Countermeasures to reduce crash risk include signals with full left-turn protection, four-way stop signs, and one-way streets intersecting one-way streets.

Overall crash risk, very high among young drivers, declines until about age 40 or 50. It then rises gradually until age 65 or 70 and at an accelerating rate in succeeding years.

For a copy of "Fatal Crash Risk for Older Drivers at Intersections" by D.F. Preusser et al., write: Publications, Insurance Institute for Highway Safety, 1005 N. Glebe Rd., Arlington, VA 22201.



Three-second head start gives pedestrians advantage at intersections

Traffic signals allowing pedestrians to cross an intersection several seconds before oncoming cars reduce conflicts between pedestrians and turning vehicles as well as the incidence of pedestrians yielding the right-of-way to turning vehicles. These are the principal findings of a new Institute study.

Providing pedestrians a three-second head start through the use of a leading pedestrian interval — a signal that allows pedestrians to begin crossing prior to the release of turning vehicles — was studied at three intersections in St. Petersburg, Florida. Researchers recorded the number of conflicts between pedestrians and turning vehicles and the number of times a pedestrian yielded to a turning vehicle

both before and after leading pedestrian intervals were installed. Conflicts were defined as any situation in which the driver engaged in abrupt braking or either the driver or pedestrian took sudden evasive action to avoid a collision.

After leading pedestrian interval signals were installed, conflicts were nearly nonexistent. The odds of a conflict for pedestrians leaving the curb during the beginning of the walk period were reduced by about 95 percent, from 2.8 to 0.2 per 100 pedestrians. The likelihood of a pedestrian yielding to a turning vehicle decreased by about 60 percent.

“Leading intervals provide pedestrians early access to crosswalks, giving them an advantage over motor vehicles in compe-

tion to occupy an intersection,” says Richard A. Retting, the Institute’s senior transportation engineer. “So intervals are an inexpensive means to intervene on behalf of pedestrians.”

He adds that while past research has shown warning signs and pavement markings also reduce conflicts between pedestrians and cars, such devices do so by raising a pedestrian’s awareness of potential threats from turning vehicles (see *Status Report*, Vol. 31, No. 7, Aug. 10, 1996).

For a copy of “Field Evaluation of a Leading Pedestrian Interval Signal Phase at Three Urban Intersections” by R. Van Houten et al., write: Publications, Insurance Institute for Highway Safety, 1005 N. Glebe Rd., Arlington, VA 22201.

Aware of airbag risks, most drivers still want vehicles with airbags

Results of a second Institute survey of vehicle owner attitudes about airbags indicate drivers know about airbag injury risks, and most still would buy another vehicle with airbags.

The Institute surveyed by telephone 900 drivers of vehicles with either dual airbags or driver-only airbags. Responses were gathered August 1 and 2 in three states — Michigan, North Carolina, and Texas — from a random sample of owners of 1994-97 model airbag-equipped vehicles. Seven months earlier, the Institute found similar attitudes among drivers surveyed in the same states (see *Status Report*, Vol. 32, No. 2, Feb. 15, 1997).

Seventy-nine percent of respondents said they would want at least a driver airbag in their next car. Sixty-six percent said they would want dual airbags. When asked if they feel safer or more at risk in vehicles with airbags, 81 percent of drivers said they feel safer. Eighty-six percent said adult passengers also are safer. Responses were different when drivers were asked about child passengers. Sixty-eight percent said they think children are more at risk in vehicles with airbags.

Drivers 5 feet 4 inches and shorter are more likely than taller drivers to feel at risk of airbag injury, the survey indicates. Thirty-two percent of these drivers said they feel at risk of serious injury from a deploying airbag, compared with 13 percent of taller drivers.

Fewer than one-third of all respondents said they are concerned enough about

airbags to consider having them either permanently or temporarily deactivated or are undecided about deactivation. However, when respondents considered the costs of deactivation and were informed about airbag effectiveness, only 12 percent still wanted to deactivate driver airbags, and just 16 percent said they wanted to deactivate passenger airbags. The National Highway Traffic Safety Administration is considering a rule to allow consumers to have their airbags deactivated without the special permission the agency now requires (see *Status Report*, Vol. 32, No. 2, Feb. 15, 1997).

Drivers who transport children in vehicles with passenger airbags were asked where children usually sit in their vehicles. More than half (56 percent) said kids always ride in back. Drivers who transport kids in front say they do so mainly because children want to sit there. Forty-four percent of these drivers said the children sit in front because they want to, and 12 percent say kids sit in front because the drivers want them there.

Few respondents attributed their reasons for transporting kids in front to such things as lacking room in the back (6 percent), carpooling (4 percent), separating the children (4 percent), or constant monitoring of an infant (2 percent).

“Vehicle owners are hearing the message about airbag benefits and risks,” says Susan A. Ferguson, Institute vice president. “Aware of potential airbag injury risks to children and smaller adults, surveyed owners still want airbags in their vehicles, and they know to sit children in back where they will be safer,” she says.

“It’s interesting to note that when parents allow children to sit in front it’s usually because children want to sit there, not because they need to. This finding indicates that very few people need to deactivate their airbags if the federal government allows it. Drivers — especially shorter drivers — can reduce their airbag injury risk by using safety belts and sitting at least 10 inches away from the steering wheel. Passengers should use belts, too.”

AIRBAG SURVEY RESULTS

	<u>Driver Airbag</u>	<u>Passenger Airbag</u>
Percentage of respondents concerned enough about airbags to consider on/off switch or disconnection	30	29
Percentage of respondents willing to pay \$150-200 for on/off switch	9	16
Additional percentage willing to pay for on/off switch if price were \$50-100	4	5
Percentage of respondents willing to pay about \$50 to have airbag disconnected	9	10
Percentage of respondents who still want on/off switch or airbag disconnection after being informed of airbag effectiveness and how injury risk can be reduced	12	16

Note: “Driver” column reflects 900 surveyed
 “Passenger” column reflects 549 with dual airbags



Most truckers die in single-vehicle crashes

In most fatal crashes involving passenger vehicles and large trucks, the people in the passenger vehicles die. When truck drivers die, it's usually in single-vehicle crashes, and more than half of these are rollovers, according to research from the the University of Michigan Transportation Research Institute, which compiled data on nearly 75,000 trucks involved in fatal crashes from 1980 through 1994 as part of the Trucks Involved in Fatal Accidents project. The data indicate about 550 truck drivers died in highway crashes each year from 1991 through 1994. Single-vehicle crashes accounted for two-thirds of these trucker fatalities. Twenty-seven percent involved crashing into fixed objects including trees, embankments, and bridges. Rollovers are a major factor in trucker deaths. Rollovers occurred in 57 percent of all truck driver fatalities between 1991 and 1994. In comparison, rollovers occurred in only 7 percent of crashes in which the truck driver survived. Ejection also plays a significant role. Nearly 32 percent of all fatally injured truck drivers were either partially or totally ejected, compared with only 1 percent of truckers who survived their crashes. Collisions with other trucks were the most common cause of truck driver deaths in multivehicle crashes. About 15 percent of all truck driver deaths involved collisions with other trucks, and about 10 percent involved passenger vehicles. For a copy of "The Trucks Involved in Fatal Accidents Project," write: UMTRI Research Review, University of Michigan, Transportation Research Institute, 2901 Baxter Rd., Ann Arbor, MI 48109-2150.

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