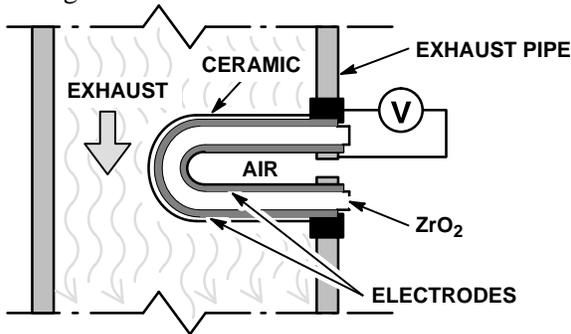




## O<sub>2</sub> Sensors: How They Work & Why They Quit

Many people are mystified about the workings of that device in the exhaust system called the oxygen sensor (O<sub>2</sub>S). How does something in the exhaust stream *generate* voltage and help the engine control module (ECM) to adjust the air/fuel mixture? What makes an O<sub>2</sub>S go bad?

The heart of a typical O<sub>2</sub>S is a thimble-shaped element made of a special material called zirconium dioxide (ZrO<sub>2</sub>). The inner and outer surfaces of this element each have an electrode made of a layer of thin porous platinum. The O<sub>2</sub>S is designed so that the inner surface of this element is exposed to ambient air (the atmosphere), while the outer surface, which also has a porous ceramic coating, is exposed to the exhaust gases.



While some oxygen is still present in burned exhaust gases, there's obviously more oxygen present in the atmosphere. Because the oxygen proportions differ between the inner and outer surfaces of the element, and thanks to the special properties of the ZrO<sub>2</sub>, a voltage is generated between the two electrodes.

Keeping in mind that the amount of oxygen in the atmosphere is relatively constant, the voltage output will vary as the amount of oxygen in the exhaust gases varies. Less voltage is generated when the air/fuel mixture is lean because of the higher oxygen content in the exhaust. More voltage is generated when the air/fuel mixture is rich because of the lower oxygen content in the exhaust. By monitoring this voltage, the ECM knows how rich or lean the air/fuel mixture is, and it adjusts the mixture accordingly.

So what makes an O<sub>2</sub>S stop working properly? Carbon from exhaust? Sounds logical, but no, the number one enemy of an O<sub>2</sub>S is silicone.

When the exhaust side of the element is exposed to silicone, the pores of the protective ceramic coating become clogged. Once this occurs, the exhaust side receives less oxygen. As a result, the O<sub>2</sub>S generates more voltage than it normally would for a given air/fuel mixture. This may cause the ECM to lean the mixture enough to cause driveability

problems or trigger the malfunction indicator lamp (MIL).

If the ambient air side of the element is contaminated with silicone, the porous electrode becomes clogged, reducing the oxygen on that side. Then the O<sub>2</sub>S will generate less voltage, so the ECM tries to compensate by richening the mixture. This too may deteriorate driveability or trigger the MIL.

Sometimes the source of the silicone may be the fuel, but the more likely sources are the silicone sprays, greases, and adhesives used in most service departments these days. When you use these products, don't let them get into the engine's air intake tract, the exhaust system (upstream of the O<sub>2</sub>S), or the vents on the O<sub>2</sub>S.



## Strange Sun Burns

From the "strange but true" file: The clear plastic suction cups used to attach radar detectors, compasses, and note holders to the windshield can magnify the sun's rays much like a magnifying glass. This can leave burn marks or cause the dash or other vinyl components to "bubble." Similarly, burns in the headliner can be caused by the sun hitting other reflective objects left in the car.

If a car comes in with a melted clock face, find out if the customer uses a silver reflective sun screen. Sometimes these screens don't fit all the way up against the base of the windshield, leaving the clock (particularly on '90-95 Integras) or part of the dash exposed. The sun screen then acts like a mirror, focusing intense heat on the exposed areas.



## Short Circuits Ruin Early Bose Amps

Before you replace a Bose amplifier in a '91, '92, or early '93 Legend LS, check all of the speaker wires for a short to ground. Shorted speaker wires are the main cause of these Bose amplifier failures, and if you don't repair the short, the replacement amp will be ruined as well. (The late '93 and later amps are protected from speaker wire shorts.) As a reminder, remanufactured amps now come with fluorescent orange stickers that instruct you to repair wiring problems before installing the amp.



## '94 Integra: No Inner Brake Pad Shims

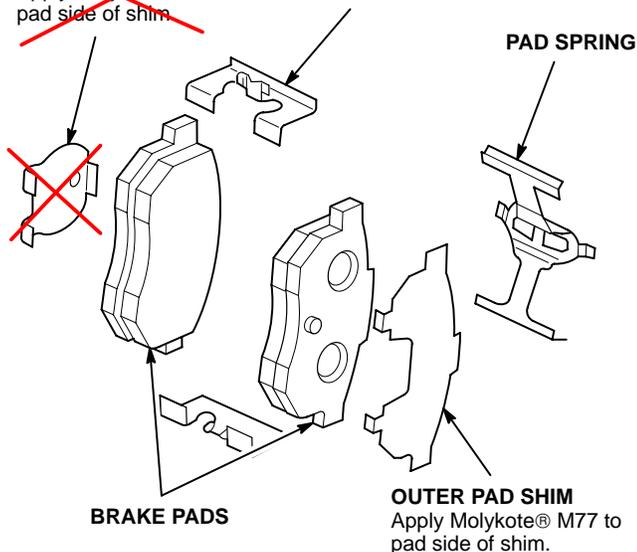
The rear inner brake pad shim shown on page 19-23 of the '94 Integra S/M shouldn't be there. Cross it out; the car doesn't use an inner shim. The '95 Integra S/M has been corrected.

### ~~INNER PAD SHIM~~

~~Apply Molykote® M77 to pad side of shim.~~

### RETAINER

### PAD SPRING



### BRAKE PADS

### OUTER PAD SHIM

Apply Molykote® M77 to pad side of shim.



## Brake System Light Stays On When Cold

If the parking brake/brake system light stays on when the car is cold, but it goes off after the engine warms up, the brake fluid level switch in the master cylinder reservoir cap is probably at fault. However, check the brake fluid level first. If the brake fluid level is right on the low-level threshold, using the brakes for a while (which warms and expands the fluid) may raise the brake fluid level enough to turn off the light. (If you have this symptom on an ABS-equipped car, whatever the cause, don't forget to clear the code 2 from the ABS control unit.)



## Recycled Coolant

Beware of recycled coolants, even those that are commercially recycled. Because the recycler can't determine the condition of the coolant base, the type and amount of metal particles present, and what, if any additives were used, they could cause problems. Genuine Honda coolant is the *only* coolant recommended for use in Acura automobiles.



## Legend/Vigor ATF Strainer Maintenance

Occasionally, Tech Line is asked, "Do the ATF strainers in Vigors and '91-95 Legends need to be replaced at any of the service intervals?" No, this is a lifetime strainer. Even if you have a transmission apart for some other reason, the strainer can be reused unless it's permanently clogged or damaged.



## Legend Fuel Pump/Sending Unit R & R

You need to correct the Fuel and Emissions sections of your '91-94 Legend S/Ms and the Electrical sections of your '93-94 Legend S/Ms. To access either the fuel pump or the fuel gauge sending unit, you don't remove the rear seat; instead, you remove the front trunk panel and the spare tire lid. The access panel for those components is behind the rear bulkhead.



## Legend SRS Voltage Chart Correction

The SRS diagnostic voltage chart in the '93-94 Legend S/Ms contains an error. The probable failures at the end of the Mode G rows are reversed. The top row is for the passenger's seat belt pretensioner, and the bottom row is for the driver's seat belt pretensioner. Correct your manuals as shown here.

10.5 -14.5	0	2.0 -8.5	10.5 -14.5	-	-	F	Open in front passenger's airbag inflator.
10.5 -14.5	0	2.0 -8.5	10.5 -14.5	-	-	G	Open in driver's seat belt pretensioner.
10.5 -14.5	0	2.0 -8.5	10.5 -14.5	-	-	G	Open in front passenger's seat belt pretensioner.
10.5 -14.5	0	2.0 -8.5	10.5 -14.5	-	-	H	Short in seat belt pretensioner trigger transistor.

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