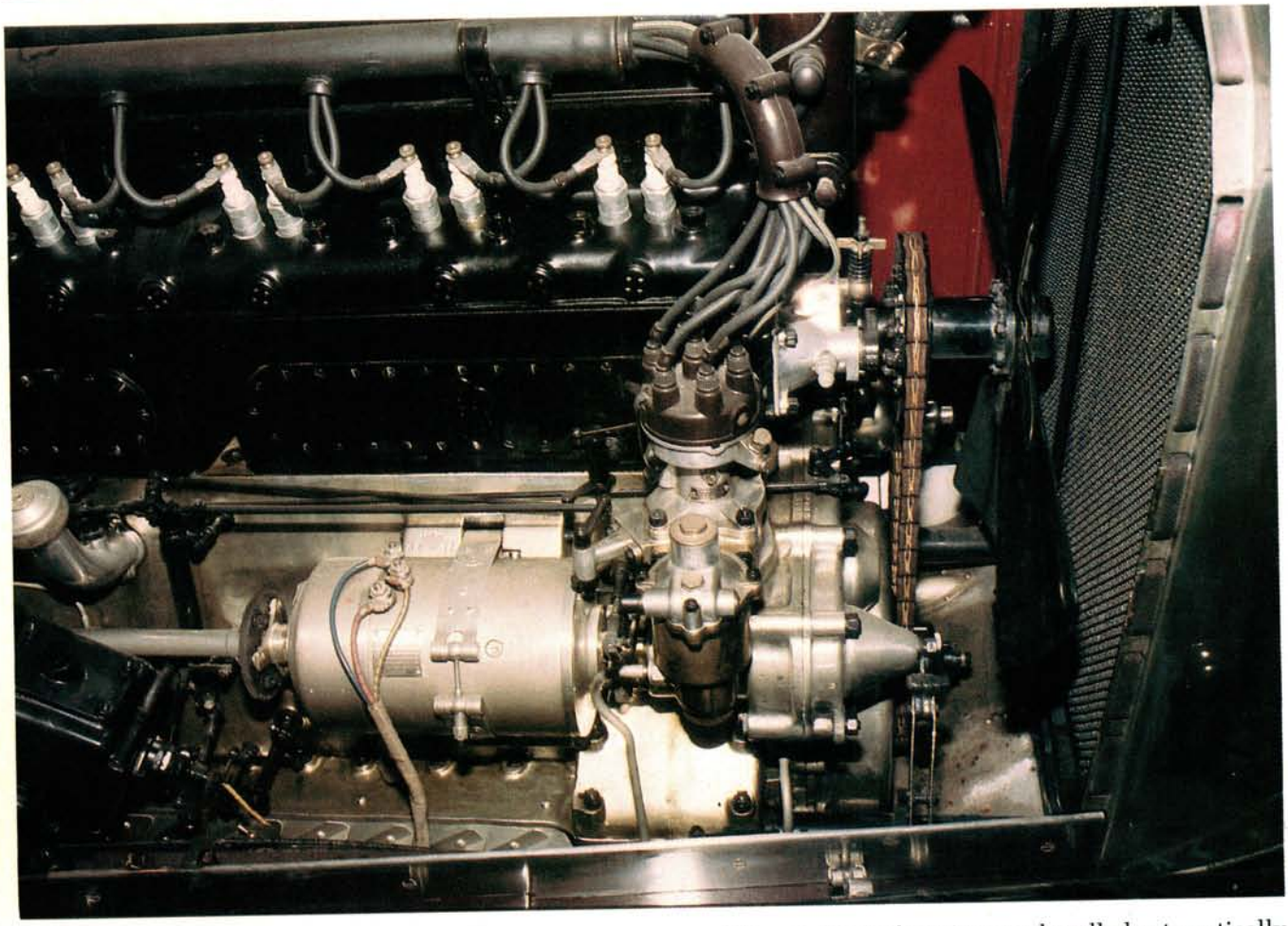
Electrical Service



Do you think today's cars are getting too complicated? Do you long for the good old days before automotive electronics made your life as a repair technician a living hell? Some things were simpler back then, but others were actually more complicated.

Consider the engine compartment of the classic Rolls-Royce pictured here. The first thing that you notice is that the engine has two spark plugs for each cylinder. That's because there are two separate ignition systems: a coil and distributor, and also a magneto system. Pretty high tech.

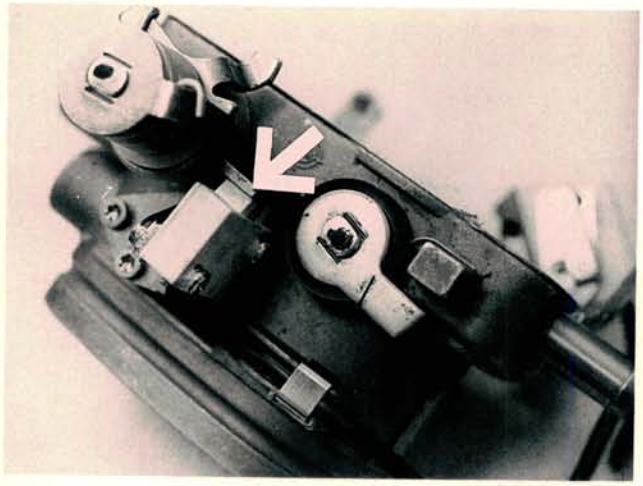
The driver had his choice of using either ignition system and could make his selection from inside the car while he was motoring down the road. If fuel quality was really poor, he might need to use both systems at once. Staggering the timing between the two systems kept the mixture burning. The driver had to "dial in" the timing to get the best available performance from the engine.

Of course these functions are handled automatically today. Electronic control units can continuously adjust the ignition timing for each cylinder without even asking for the driver's permission. How many drivers do you think you could talk into twisting a lever on the steering column to set their own ignition timing?

It's a real trade off. Drivers want more convenience, so repair technicians get more electronic complexity. Unless you run a restoration shop, it doesn't look like there's any going back to the good old days. We've got to either keep up or fall behind.

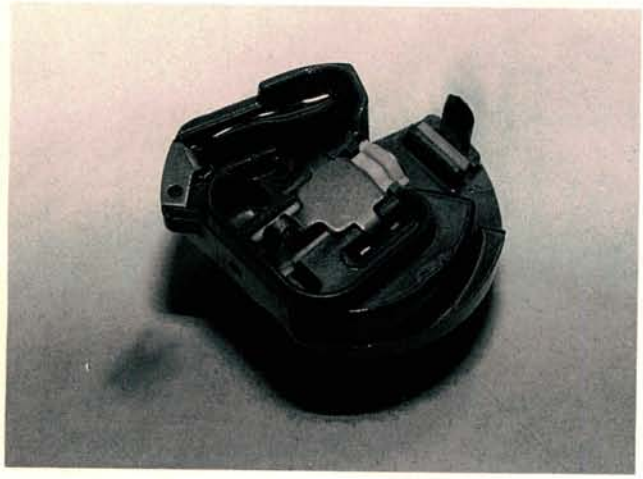
To help you stay in the race, we've gathered this month's selection of *Electrical Service* tips. As usual, they run the gamut from simple to complicated problems on a wide variety of makes and models. There should be something here for just about everyone, regardless of your specialty.

Our thanks to the Crawford Auto-Aviation Museum in Cleveland, Ohio for letting us photograph the Rolls-Royce.



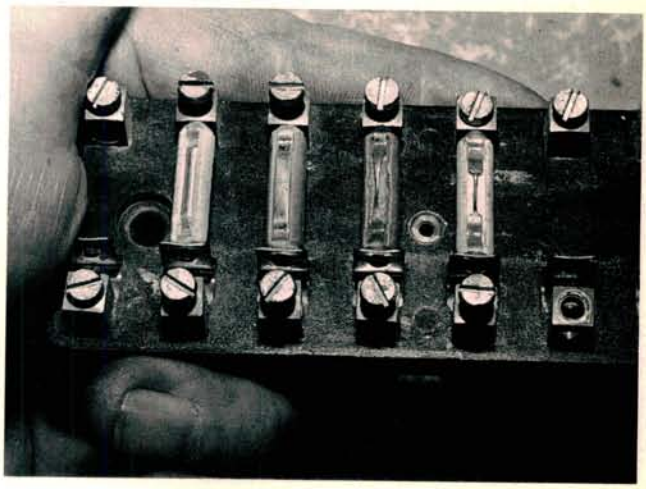
Volkswagen Idle Surge

A defective throttle switch may cause a rough idle or low speed surge on 1988 and later Digifant-equipped Volkswagens. We removed the throttle housing so you could see the switch. The switch contacts should close only when the throttle is closed. If the switch contacts stay closed when the throttle is opened, the Digifant control unit will send incorrect control signals to the ignition and injectors. Test the switch and replace it if the contacts stay closed when the throttle is opened.



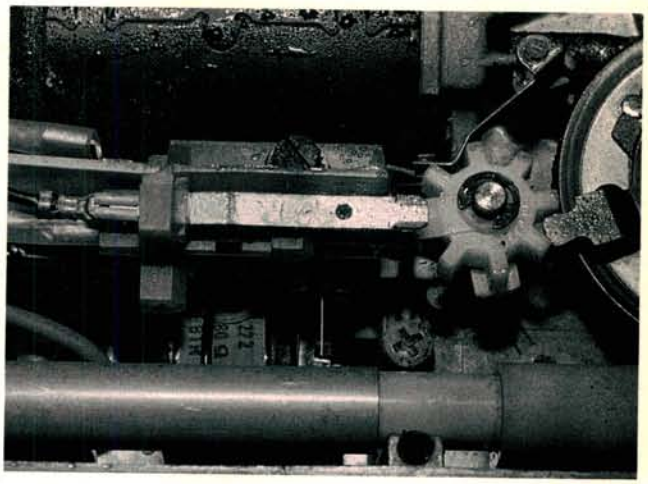
Volkswagen Rotor Governor

A faulty distributor rotor may cause the engine to cut out on some 1969 to 1971 Volkswagen Type 1, 2, and 4 vehicles. The rotor has a built in centrifugal governor cutout that prevents the engine from over revving. Low speed cut out may be caused by a weak governor spring. The rotor can be replaced with a conventional non-governor rotor, but the engine may be damaged by over revving. Some late 60's and early 70's Mercedes, Porsche, and BMW models also used similar rotor designs.



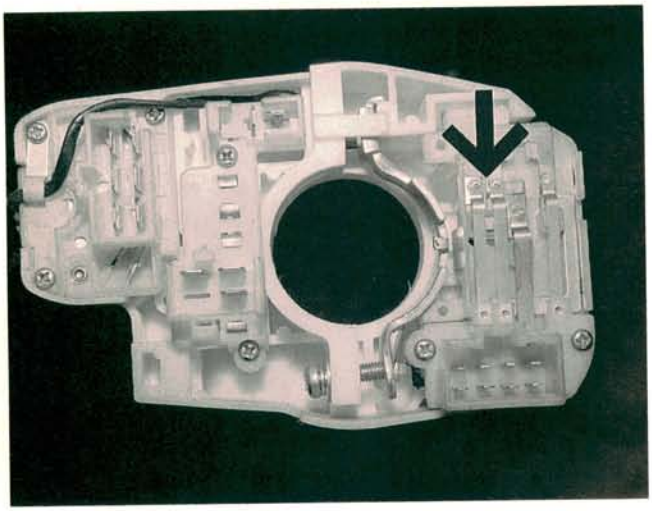
Porsche 911 Fuse Panel

Loose or corroded fuse panel terminals on older Porsche 911s may cause problems, especially on high current draw circuits such as the air conditioning or headlights. Poor contact between the tips of the ceramic fuses and the fuse panel terminals causes extra resistance and heat. If the fuse and terminals get hot enough, they can melt the fuse panel plastic, loosening the fuse panel terminals as well as the buss bar connections at the back of the panel.



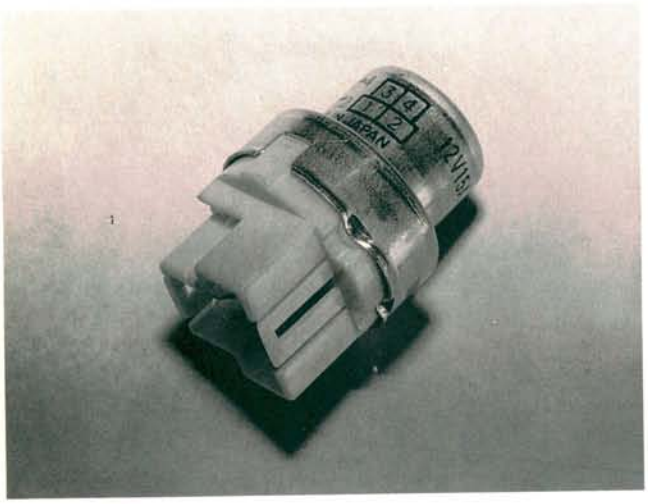
Porsche Power Antenna Failure

Moisture accumulation can cause battery problems on all Porsche models equipped with power antennas. Water can leak past the antenna mast and collect inside the antenna motor. The moisture may cause these relay contacts (arrow) to stick closed when the antenna is raised or lowered. This problem may go unnoticed if the car is driven regularly. But the small current drain will run the battery dead if the car sits for a few days at a time. Replace the antenna to correct the water leakage and battery drain.



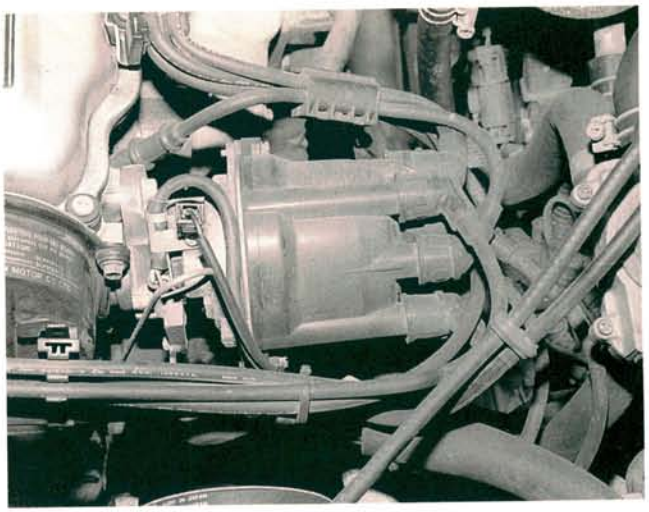
Nissan Headlight Switch

A defective headlight switch may cause intermittent headlight operation on some 1986 Nissan Pulsars. The headlights will switch off and on, even though the headlight switch is in the on position. Replacing the defective switch isn't always necessary. Remove the steering column covers to expose the switch. These contacts on the back of the switch are the culprits (arrow). Clean the switch contacts, test the switch operation, then reinstall the column covers.



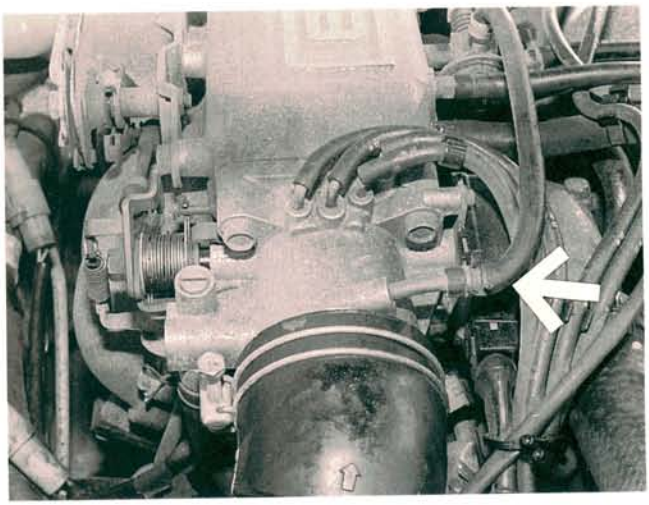
Toyota Main Relays

A defective EFI Main Relay or Main Power Relay may cause intermittent stalling, flickering dash lights, or a no start condition on 1982-84 Toyota Cressidas. The relays are identical and are located in the main fuse panel behind the battery. Temporarily swapping the relays will get the car started if only the EFI Main Relay has failed. Heat caused by normal relay operation may damage the plastic internal relay parts over time, causing an open circuit. Replace both relays to correct the problem.



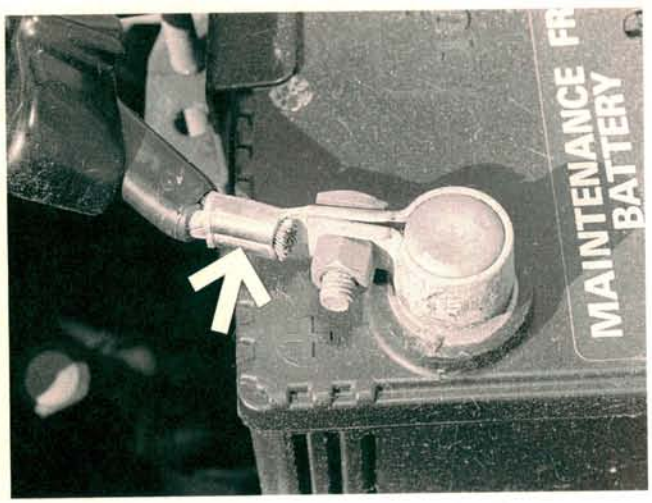
Nissan Distributor Caps

Installing the wrong distributor cap can cause hesitation problems on 1987 Nissan Stanzas and 200SXs. These models were equipped with either a Hitachi or Mitsubishi distributor. The distributors caps used on these distributors look the same at a glance and can be easily installed on the wrong distributor. Find out which distributor you've got by checking the distributor body. Don't rely on the cap markings because someone may have already installed the wrong cap.



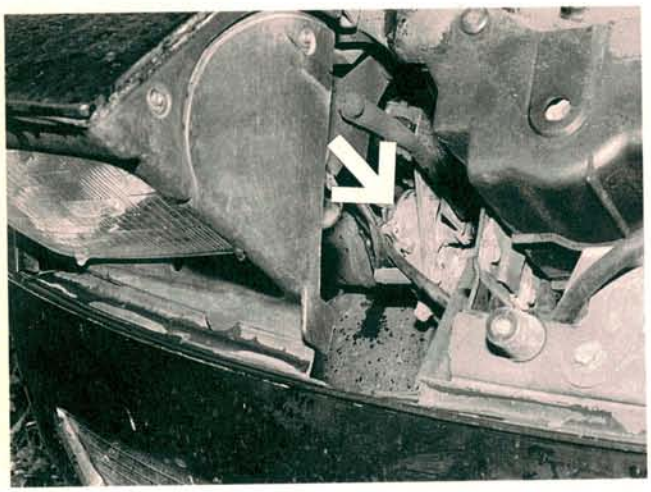
Toyota Throttle Switch

A misadjusted throttle switch (arrow) or defective throttle switch circuit may cause a rough idle or other driveability problems on Toyota models equipped with 22 R engines. To test the throttle switch and circuit, check the ignition timing with the engine idling at operating temperature. Now ground the test connector. If the timing is at its base setting, the throttle switch is operating normally. If the throttle switch circuit is open, timing won't return to the base setting when the test connector is grounded.



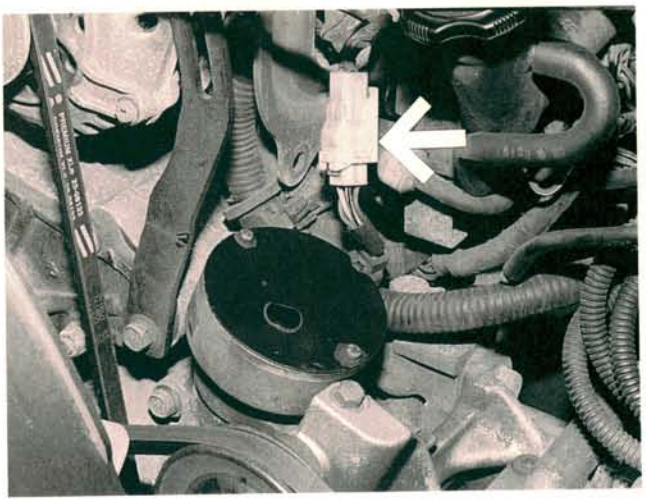
Stalling Mazda

Some 1986 Mazda 323s may stall intermittently due to a poor connection between the positive battery cable and the inside of the positive battery terminal clamp. The stalling usually occurs when a voltage surge is combined with an already heavy electrical load. This causes a momentary open circuit at the battery cable. The engine will usually restart immediately. Engine and vehicle speed have no affect on the stalling problem. Replace the positive battery cable harness to correct the problem.



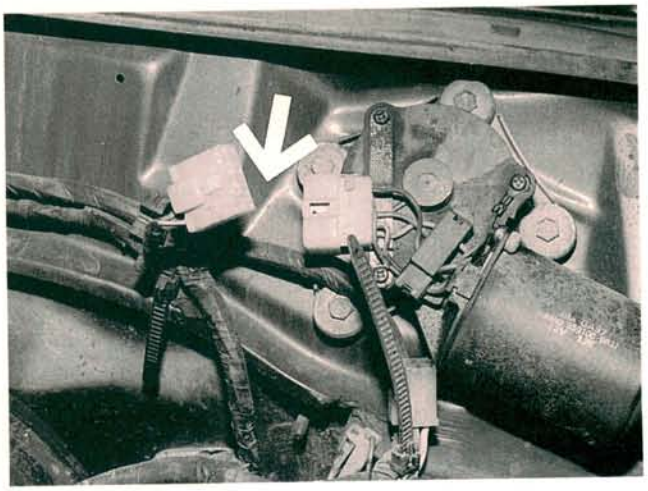
Mazda RX-7 Headlight Operation

The right headlight assembly on 1986 Mazda RX-7s may operate erratically and park improperly. Two switches inside the headlight motor cut power to the motor when the headlight door has reached the full up or down position. If either switch fails, the motor does not shut off when it reaches the park position, and the headlight assembly continues to cycle. The internal switches are not serviceable. Replace the headlight motor to correct the problem.



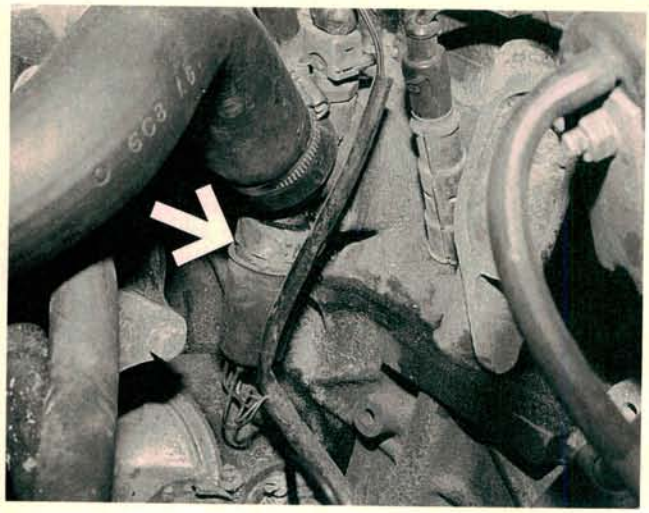
Mazda RX-7 Crank Angle Sensor

A faulty wiring harness connector at the crank angle sensor may cause some 1986 Mazda RX-7s to buck and/or stall. Check the blue/white crank angle sensor wire for continuity at both sides of the connector (arrow). Engine heat affects the connector. A connector that checks good when the engine is cold may break contact when underhood temperatures increase. The wiring terminals inside the connector can also break contact even though the harness connector fits together tightly.



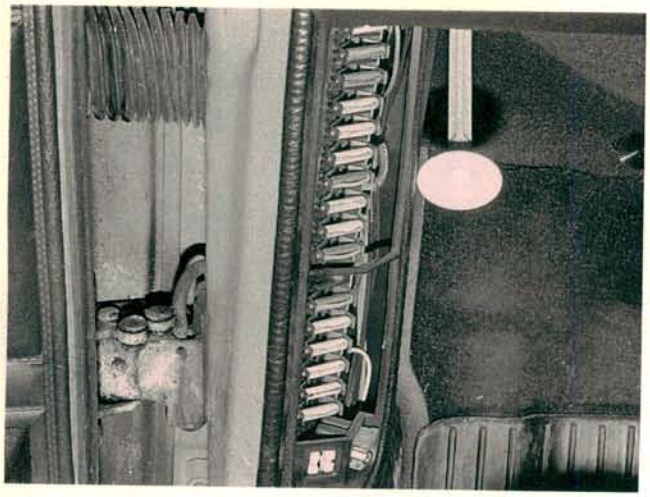
Mazda Wiper Motor Operation

A corroded wiring harness connector may wear out the windshield washer pump and make the wiper motor run continuously on some 1986 Mazda 626s. Corroded terminals in the connector can short together, making the wiper and washer motors run all of the time. The washer motor usually locks up after it runs out of washer solvent. To correct the problem, clean the corrosion from the connector, seal it with dielectric grease, and replace the washer motor.



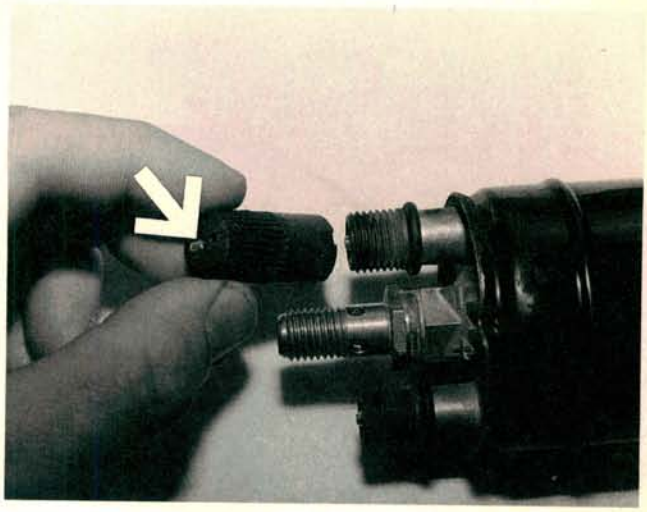
Audi Starting Problems

A defective combination sensor may cause intermittent temperature gauge operation and hard cold starting problems on 1985 and later Audi 5000s. The combination sensor is mounted below the engine end of the upper radiator hose (arrow), and includes a temperature gauge sensor and a cold start injector thermo time switch. If the upper radiator hose develops a small leak, antifreeze may corrode the combination sensor wiring harness connector. Repair or replace the corroded harness connector.



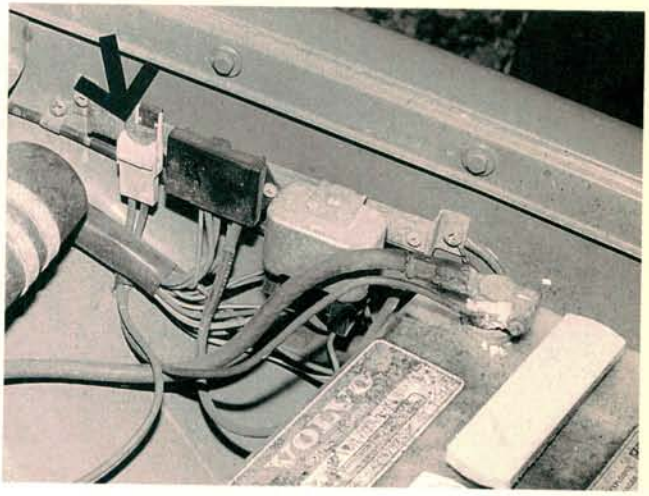
Volvo Ceramic Fuses

Corrosion at fuses 5, 7, or 13 may cause stalling or no start problems on 1980 and later Volvo 240s. The ceramic fuses often corrode where their tips meet the fuse box terminals. A corroded fuse terminal may stop passing current, even though it isn't blown and is still touching the terminals. Voltage drop and heat at the corroded terminals can also melt the fuses. Fuse problems like these are the cause of 50 percent of the Volvo tow ins at the shop that gave us this tip.



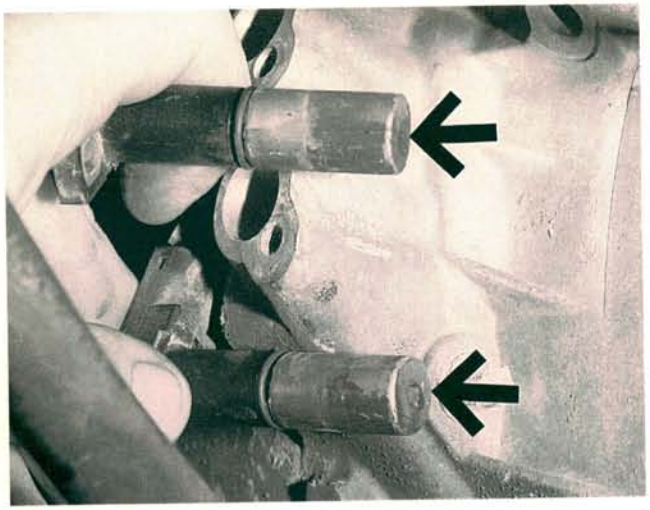
Audi Fuel Pumps

Fuel pump wiring harness connectors can cause problems on fuel injected Audi models. The wires inside these screw-on, waterproof harness connectors can become damaged when removing or reinstalling the fuel pump connectors. Broken wire strands can cause an open circuit. If replacement connectors aren't available, install a fuel pump with stud-type terminals instead. Make sure the new pump's pressure and delivery specifications match the original pump. Waterproof all wiring connections.



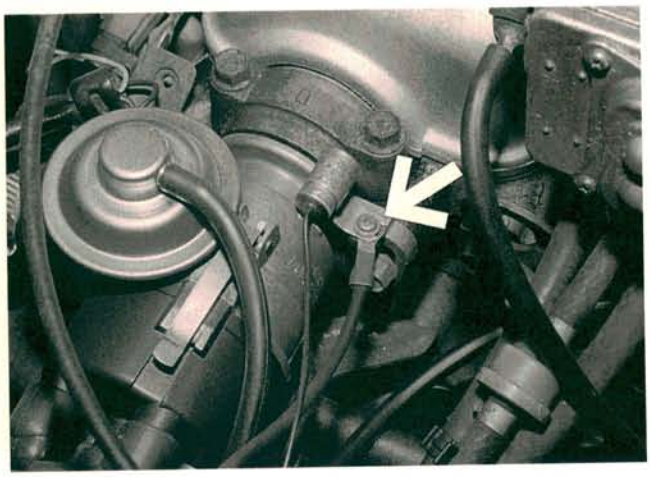
Volvo 240 Fuel Pumps

Positive battery voltage is routed to the fuel pump through this in-line fuse (arrow) on Volvo 240 models. No starts or intermittent fuel pump operation may be caused by terminal corrosion on the underside of the fuse holder. The fuse holder gets its power directly from the positive battery terminal clamp, so corrosion at the terminal clamp can cause the same symptoms. These heavily corroded battery terminals look like a problem that's getting ready to happen.



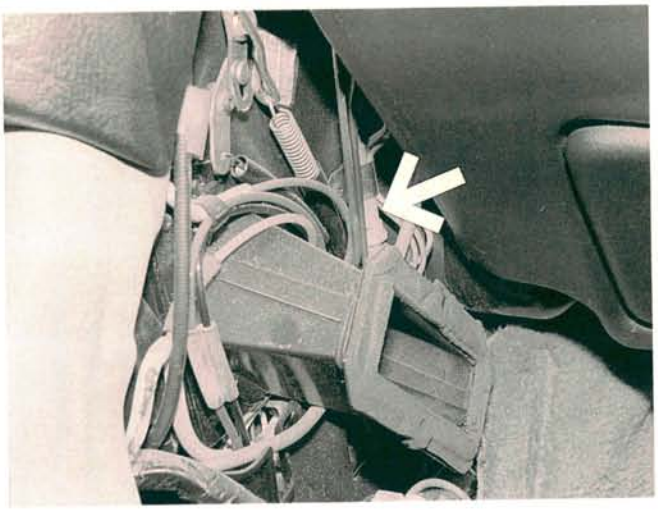
BMW Driveability Problems

Driveability problems on all BMW models equipped with Dual Sensor Motronic engine management systems may be caused by a poor signal from either the RPM or Mark Sensor. Corrosion or dirt on the sensor tips insulates the sensors from the trigger teeth on the flywheel, weakening the sensor signals. Removing and cleaning the sensors will usually correct the problem. If the problem persists, check for chipped or missing flywheel teeth. Damaged teeth may cause backfiring, surging, and poor throttle response.



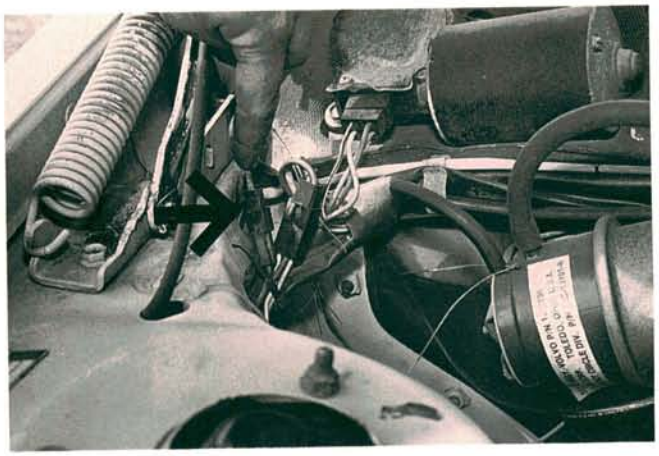
Grounds For Aggravation

Poor ground connections cause problems on many vehicles. Wiring harness eyelet terminals are usually made of steel. If a grounding eyelet is bolted to an aluminum component like this distributor housing, the electrical/chemical reaction between these dissimilar metals can cause corrosion. The physical connection between the parts may be good, but corrosion causes the electrical connection to be lost. Aluminum bolted to steel, or a steel bolt installed in aluminum can also cause these problems.



Jaguar XJ-6 Air Conditioning

The air conditioning on some Jaguar XJ-6 models may not operate, even though all of the fuses in the fuse box are good. The air conditioning control head has a separate in-line power supply fuse which may be blown. To reach the inline fuse, remove both screws from the vent cover on the right side of the center console. Remove the vent and the center console side panel. Reach through the opening to locate the in-line fuse. The A/C fuse in the fuse box protects the A/C compressor clutch circuit.



Volvo Stalling or No Start

Corroded terminals at these multi-pin connectors below the right hood hinge may cause an intermittent stalling or no start condition on 1982-84 Volvo 240s. The wiring harness carries the dwell signal from the ignition control unit to the LH Jetronic control unit. The fuel injection control unit will shut down the injectors if it loses the dwell signal. Damaged connectors can be removed and replaced with solder joints and shrink wrap. The connectors are only needed for factory assembly.