

Chapter 3

Roadside Trouble Shooting

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Description



The ignition system in this vehicle is capable of producing dangerous voltages in the high tension circuits. Extreme care must be used when working on or near the ignition system to prevent severe electrical shock.

This chapter deals with the common causes of failure of an engine to start. Roadside breakdowns other than engine failure can be identified by reference to the Trouble Shooting heading in the chapter on the particular component affected.

For an internal combustion engine to run, three basic requirements are ignition, fuel and compression. Failure to start can usually be attributed to a fault in one of these three systems, with ignition or electrical faults the most common, followed by fuel system faults and lastly, mechanical or compression failure.

Jump Starting a Vehicle

Jump starting a vehicle can be dangerous if the procedure described below is not performed correctly. If any doubt exists, it is recommended that the services of a competent mechanic be obtained.

The range of vehicles covered by this manual are equipped with complex electronic circuitry which can be damaged by voltage surges. These voltage surges can be generated when jump starting or being jump started by another vehicle.

If available, use jumper leads equipped with a surge protection device and follow the lead manufacturers instructions carefully, particularly regarding the connection and disconnection of the leads.

- 1 Ensure that the booster battery is 12 volts and the negative terminal is earthed.
- 2 Ensure that the vehicles are not touching and that the ignition and all accessories on both vehicles are switched Off.
- 3 Ensure that the transmissions on both vehicles are in Park or Neutral and the handbrakes are firmly applied.
- 4 Remove the vent caps from the battery and check the electrolyte level. Replenish with distilled water as necessary.
- 5 Place the vent caps loosely over the cell apertures.

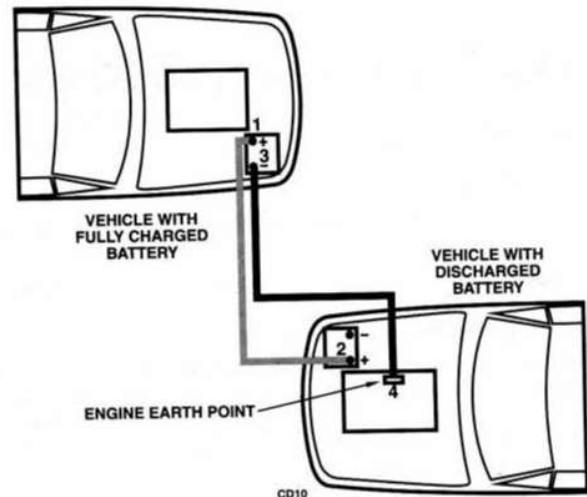


Illustration of jumper lead connections. Connect in the order shown and disconnect in the reverse sequence.

- 6 Connect one end of the red jumper lead to the positive (+) battery terminal of the booster battery and the other end of the red lead to the positive (+) battery terminal of the discharged battery.



The battery emits hydrogen gas which is explosive. Do not expose the battery to naked flames or sparks.

Do not lean over the battery when connecting the jumper leads.

Do not allow the ends of the jumper leads to touch one another or any part of the vehicle.

- 7 Connect one end of the black jumper lead to the negative (-) battery terminal of the booster battery and the other end of the black lead to a good earthing point on the engine of the vehicle with the discharged battery.



Do not connect the jumper lead directly to the negative (-) battery terminal of the discharged battery.

- 8 Start the engine on the vehicle with the booster battery and run the engine at a moderate speed for a few minutes.
- 9 Start the engine on the vehicle with the discharged battery.
- 10 Leave the engines of both vehicles running for at least 10 minutes. This will partially charge the discharged battery and reduce the risk of damage to electronic circuitry from voltage surges.

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- 11 Switch the engines of both vehicles Off and disconnect the jumper leads in the reverse order of the connecting sequence.
- 12 Attempt to start the engine of the vehicle with the discharged battery.
- 13 If the battery has not charged sufficiently to start the engine, reconnect the jumper leads as previously described and start the engines of both vehicles.
- 14 Switch On the headlamps of the vehicle with the discharged battery.
- 15 Disconnect the jumper leads in the reverse order of the connecting sequence. Switch the headlamps Off.

Ignition and Electrical System Checks

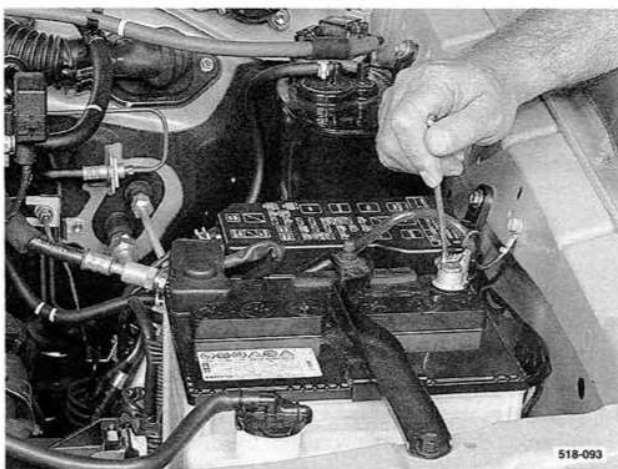
All vehicles covered by this manual are equipped with a security system which relies on coded signals sent from the ignition switch via the engine immobiliser module to the engine electronic control unit (ECU) to permit the vehicle to be started.

If a fault develops in the engine immobiliser system, the security lamp will continue to flash after the key is inserted in the ignition.

- 1 Insert the key into the ignition and observe the security lamp on the instrument cluster. If the lamp stops flashing when the key is inserted, proceed to step 4.
- 2 If the lamp continues to flash, insert another key into the ignition and check that the security lamp is stops flashing. If the security lamp stops flashing, a problem is indicated in the first key. Refer to the security system heading in Body Electrical (chapter 16).
- 3 If the security lamp continues to flash, a fault is indicated in the security system. Using the wiring diagrams at the rear of Body Electrical (chapter 16) as a guide, check the wiring and connections between the key reader, security ECU and the engine ECU for continuity and shorts to earth. Also check the power supply and earth circuits for these components.

If no fault can be found, refer to the security system heading in Body Electrical (chapter 16) for procedures to check the security system components.

- 4 Attempt to start the vehicle. If the starter motor will not rotate the engine, or rotates the engine slowly, switch on the headlamps and check for good light intensity. Should the lamps not illuminate or the starter motor not rotate the engine, proceed as follows:



Ensure that the battery terminals are clean and secure.



On automatic transmission models, ensure that the transmission is in Park or Neutral.

- a Disconnect the battery terminals and clean both terminals and posts. Connect the terminals and where applicable, tighten firmly but not excessively.



When disconnecting or connecting battery terminals, ensure that the ignition is in the Off position to prevent damage to the electronic components and always disconnect the negative (earth) terminal first and connect it last.

- b Check that the earth lead from the battery to the engine or body frame is not broken and that the connections are clean and secure.
- c Check that the lead from the battery to the starter motor or starter solenoid is intact and has a clean and secure connection.
- d Check the fusible links located in the engine compartment fuse and relay box.
- e Attempt to start the vehicle. Should the starter motor still not operate or the lamps not illuminate, one or more of the following faults may be the cause:

No starter motor operation or lamps: Battery flat or defective.

Lamps illuminate but no starter operation: Starter motor drive jammed in mesh with flywheel ring gear. Starter motor or solenoid defective. Ignition switch faulty. Starter relay faulty. On automatic transmission models, faulty inhibitor switch.



If a faulty starter relay is suspected, swap the relay with a known good one.

Lamps dim and starter operation sluggish: Discharged battery or fault in starter motor. Battery flat due to broken drive belt or defective alternator. Faulty battery due to cell breakdown.

If the battery and starter motor operation proves satisfactory but the engine still fails to start, continue as follows:



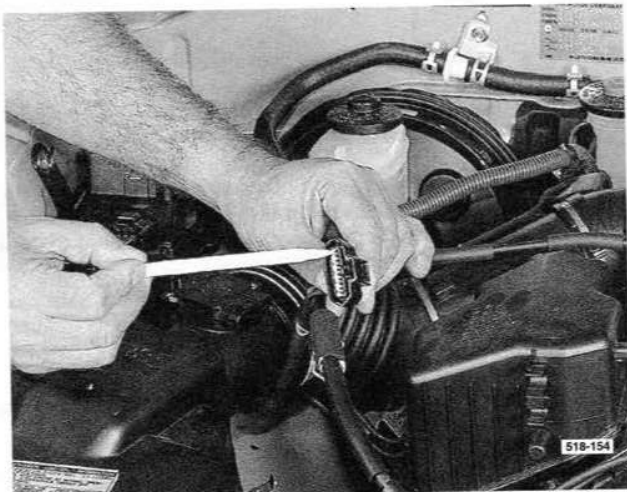
Checking for spark using a test spark plug.



Electronic ignition systems produce dangerous voltages in the high tension circuits. For this reason, extreme care must be taken when performing the following checks.

When disconnecting the wiring from any component, ensure that the ignition switch is Off to prevent possible damage to the electronic components.

- 5 Open the electrode gap of a serviceable spark plug as much as possible. Securely earth the spark plug using a jumper lead or by tying the plug to an earthed engine component.
- 6 Disconnect a high tension lead from a spark plug on the passenger side cylinder head and connect it to the test spark plug.
- 7 Have an assistant operate the starter motor and check that a spark repeatedly jumps the gap on the test spark plug.
- 8 If the spark is strong and blue, remove the spark plugs and check their condition and the electrode gap as described in Engine (chapter 4).



Check that all wiring connections are clean and secure.

- 9 If there is no spark, check the EFI relay and fusible link AM2 located in the engine compartment fuse and relay box. Also check the ignition fuse in the interior fuse and relay box.

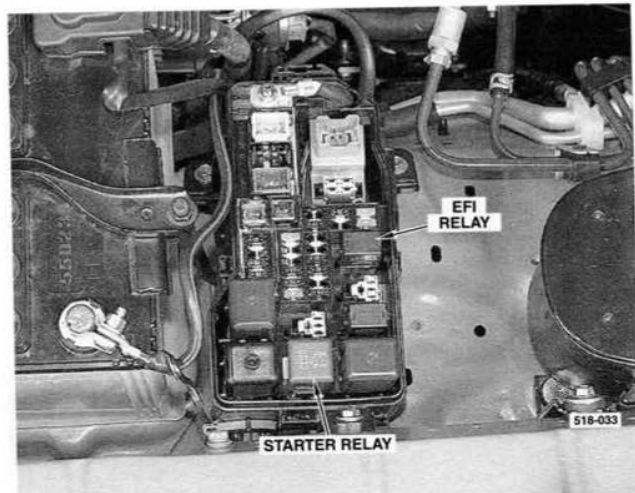


A click should be audible from the EFI relay when the ignition is switched between the On and Off positions.

- 10 Check the high tension leads to ensure that they are dry and that the insulation is not cracked or perished. Check the ends of the leads for burning or corrosion.
Refer to Part 1 of Fuel and Engine Management (chapter 7) for further ignition system checks.
- 11 Ensure that all electrical connections and earth leads are clean and secure.

Fuel System Checks

Due to the complex nature of the EFI system, it is recommended that should the following checks prove satisfactory but the engine fails to start and the mechanical system is operational, reference be made to Fuel and Engine Management (chapter 7) of this manual or an authorised workshop be consulted.



The EFI relay is located in the engine compartment fuse and relay box.

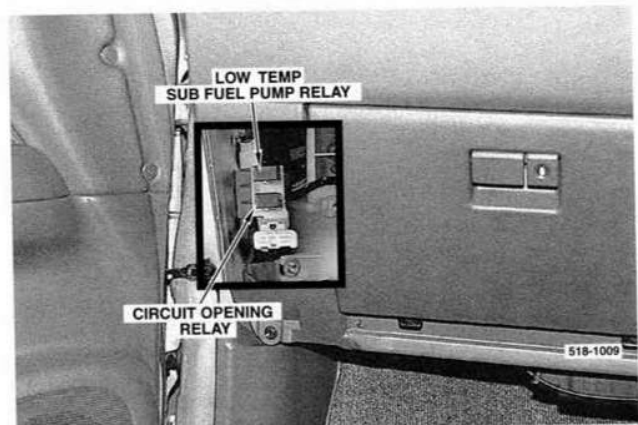
- 1 Check that at least one fuel tank contains a reasonable quantity of fuel and that is the tank selected.
- 2 Check that all fuel hose connections are secure.
- 3 Check for a damaged vacuum hose or loose connections between the brake booster and the inlet manifold.
- 4 Check for a loose or damaged air inlet hose between the air cleaner and the throttle body.
- 5 Remove the fuel filler cap and while listening through the filler neck opening, have an assistant switch the ignition On. The fuel pump should be heard to operate. Switch the ignition Off.

If the pump cannot be heard, squeeze the fuel return hose at the inlet manifold and switch the ignition On. Fuel should be felt flowing through the hose indicating correct fuel pump operation.

If the pump is not operating, switch from the sub to main tank and vice versa and recheck operation of the fuel pump.

If the pump is still not operating, check the circuit opening relay located behind the passenger side of the dashboard. Refer to Fuel and Engine Management (chapter 7).

- 6 If the engine still fails to start and no fault is found with the mechanical or ignition systems, check the fuel pump and injector circuits as described in Part 1 of Fuel and Engine Management (chapter 7).



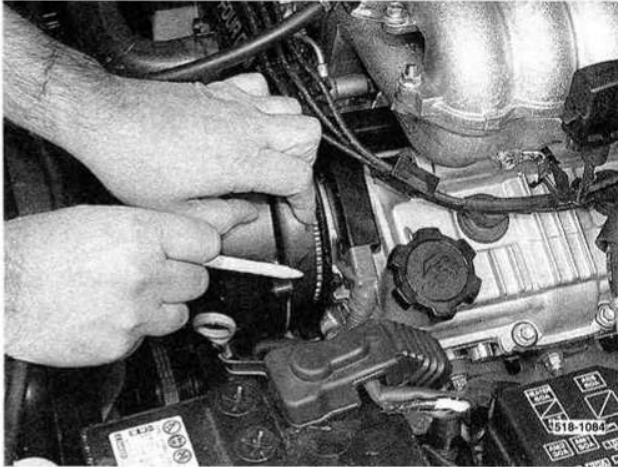
Location of the circuit opening relay.

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Mechanical Systems Checks

Faults in the mechanical system that will prevent engine operation can be caused by a broken timing belt, loss of cylinder compression or internal component failure which prevents the crankshaft rotating.

- 1 Remove the spark plugs and attempt to rotate the crankshaft pulley manually. If the crankshaft turns, remove the bolts retaining the upper timing belt cover and partially withdraw the cover to check the condition of the timing belt. If the timing belt is servicable proceed to step 4.

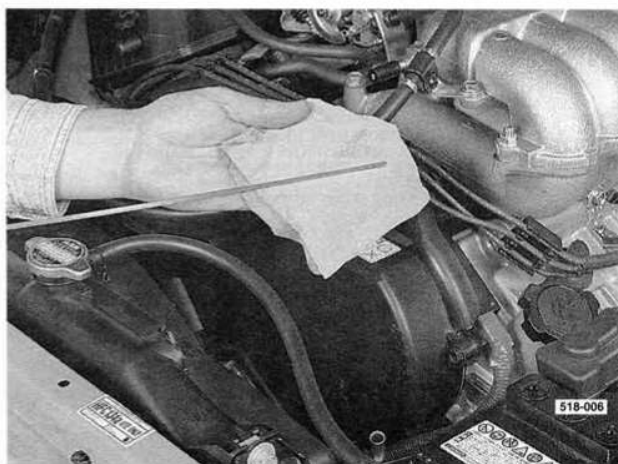


Check the timing belt for breakage, stripped teeth etc.

- 2 If the crankshaft pulley cannot be turned, remove the starter motor and again attempt to turn the crankshaft pulley. If the pulley now turns, it indicates that the fault is in the starter motor drive mechanism.

i On manual transmission models, depress the clutch pedal to disengage the transmission from the engine to eliminate the transmission as the problem source.

- 3 If the crankshaft pulley cannot be turned, it indicates engine seizure or broken internal components such as the connecting rods, pistons or crankshaft. Refer to the Engine Mechanical Trouble Shooting heading in Engine (chapter 4).



Check the engine oil for emulsified oil indicating internal coolant leakage.

i Engine seizure can be caused by overheating due to loss of coolant. If this has occurred, the engine may free up when it has cooled. Allow the engine to cool before filling the cooling system.

- 4 Check the radiator for loss of coolant. If coolant loss is evident, check carefully for any signs of external leakage. Remove the engine oil dipstick and check for emulsification of the oil. When oil mixes with water it turns creamy and the oil level may increase.

If the oil is emulsified, it indicates internal coolant leakage. Check the following possible causes:

Blown cylinder head gasket.

Distorted cylinder head or cylinder block faces.

Cracked cylinder head or block.

- 5 Remove the EFI relay from the engine compartment fuse and relay box and install one of the spark plugs. Operate the starter motor and listen to the sound that the engine makes as it is cranking.

i If coolant is discharged from any of the spark plug holes, internal coolant leakage is indicated. Check for a blown head gasket, cracked cylinder head or block, or distorted cylinder head or block sealing faces.

- 6 Move the spark plug to each of the cylinders and repeat the test. By performing the test on all cylinders, a rough comparison of compressions can be made to determine if there is any loss of compression in any cylinder.

A cylinder with normal compression will cause a resistance which in turn creates a load on the engine when it is rotating. However, if the compression is low, there will be little if any resistance and the engine will rotate easily and smoothly with little change to the sound when the spark plug is installed.

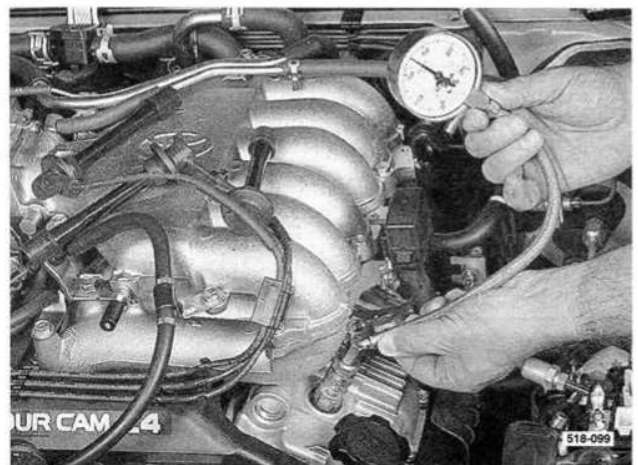
i Cylinder compression can only be accurately checked using a compression gauge. The previous method is intended only to give a rough indication of cylinder compressions in the case of roadside breakdown.

- 7 If any of the cylinders have low compressions, check the following possible causes:

Burnt or broken valve(s).

Broken piston(s).

Broken timing belt.



Checking the engine compression using a compression gauge.