

CAUTION: *To prevent severe electrical shock, extreme care must be taken when working on or near the electronic ignition system as dangerous high tension voltages are produced in both the primary and secondary circuits. See text for precautionary notes.*

This section deals with the common causes of engines failure to start, as inevitably there will come a time when every driver will experience this problem and will therefore, need to call upon his own resources to rectify the trouble. Roadside breakdowns other than engine failure can be indentified by reference to the Trouble Shooting section on the particular component affected.

1. TROUBLE SHOOTING

Trouble shooting is only a process of elimination and provided the procedure is carried out correctly and systematically an accurate diagnosis of the trouble can be made in the minimum amount of time.

For an internal combustion engine to run there are three basic requirements, these are ignition, fuel and compression. There are other factors of course but as a rule an engine's failure to start can be attributed to a fault in one of these three systems.

Reports from field engineers of motoring organisations prove that the biggest percentage of engine breakdowns are in the order of ignition or electrical failure first, followed by fuel, with mechanical or compression failure the least common.

Should the engine fail to start, first check that there is adequate fuel in the tank and if so, carry out the following checking procedures in the order described.

SERVICE PRECAUTIONS FOR UNLEADED PETROL MODELS

The catalytic converter fitted to unleaded petrol models is susceptible to damage due to overheating and excess fuel contamination, therefore the following precautions should be observed if the vehicle is running abnormally or fails to start.

Do not push or tow start the vehicle.

Do not prime the carburettor by pouring fuel down the carburettor throat.

Do not allow the ignition system to be disconnected while the vehicle is in motion and the transaxle is in gear, i.e. do not switch off the ignition, do not drive the vehicle if an intermittent fault is evident in the ignition system.

Do not allow the engine to idle with any ignition high tension leads disconnected.

Do not allow the engine to idle for prolonged periods if the engine is misfiring or idling roughly.

Refer to the Emission Control section for further information.

2. TO CHECK IGNITION AND ELECTRICAL SYSTEMS

(1) Switch on the ignition and check for warning lamp illumination on the dashboard.

(2) Operate the starter and check that the starter rotates the engine at a steady speed.

(3) Switch on the headlamps and check for good light intensity.

Should the lamps not illuminate or the starter motor not turn the engine, carry out the following steps.

(a) Remove the battery terminals and clean both terminals and posts. Refit the terminals and where applicable tighten firmly but not excessively.

(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) Where necessary carry out repairs to (b) and (c).

Again carry out the check procedure, should the starter motor still not operate, or the lamps not illuminate, then 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.

Lamps dim and starter operation sluggish: Discharged battery or fault in starter motor. Battery flat due to broken fan 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:

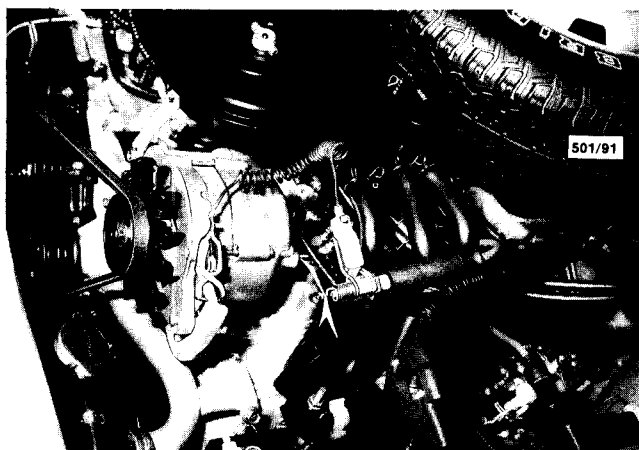
(1) Open the electrode gap on an old serviceable spark plug to 6 mm. Securely earth the body of this spark plug using a jumper lead or by tying the plug to an earthed engine component. Remove a spark plug lead and connect it to the test plug.

NOTE: When working on or near electronic ignition systems care should be taken as high voltages are present in the primary and secondary circuits which could result in severe electrical shocks.

The ignition switch should be turned off before removing or refitting any electrical connections, otherwise damage to the ignition system as well as severe electrical shock could result.

When the distributor cap is removed ensure that the distributor cap clips are clear of the distributor otherwise serious damage to the distributor could result if the starter is operated.

- (2) Have an assistant operate the starter motor.
- (3) Check that a spark, if any, jumps the gap on the test spark plug. If there is no spark, carry on with point (4). If the spark is satisfactory proceed to point (5).

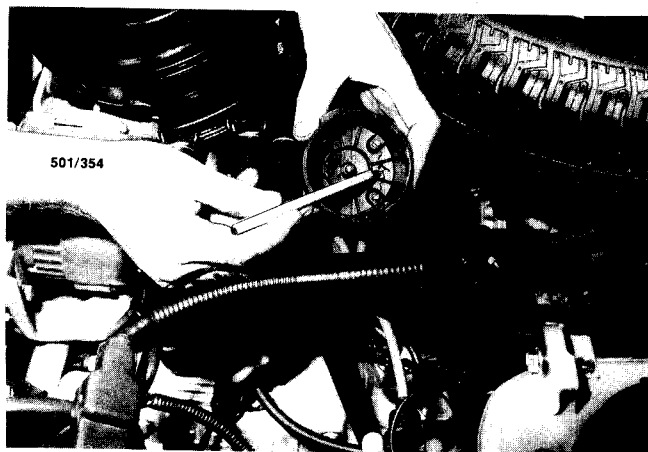


Securely earth the body of a test spark plug to check for spark at the spark plug leads and the coil lead.

- (4) Disconnect the coil lead from the distributor cap and connect it to the test spark plug. Carry out the check procedure previously described for the spark plug leads in points (2) to (3). If there is a strong blue spark then the fault lies within the distributor cap, rotor arm or spark plug leads.

Should there be no spark on both or either tests, turn the ignition off then carry out the following checks:

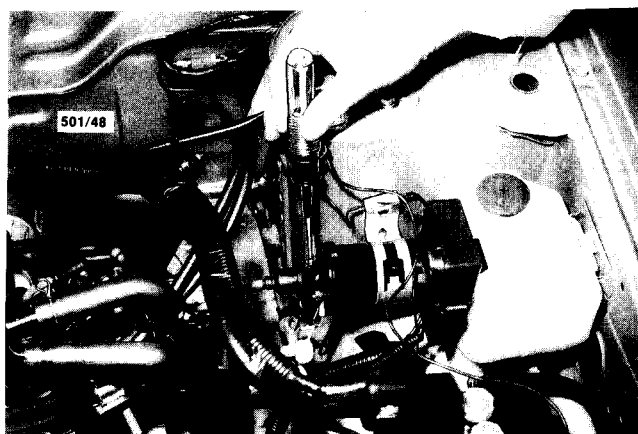
- (a) Check the spark plug leads to ensure that they are perfectly dry and that the insulation is not cracked.
- (b) Check the distributor cap to ensure that it is dry and clean. Examine both inside and outside of the cap for cracks or tracking, particularly between the spark plug segments in the cap.
- (c) Check the rotor arm for cracks, deposits and burning on the metal arm.
- (d) Ensure that the spark plug leads and the coil lead have dry, clean and secure connections on the distributor cap.
- (e) Check that the carbon brush in the centre of the distributor cap interior face is clean and dry and ensure that the carbon brush moves freely in and out of its locating hole.



Check the distributor cap for cracks and tracking.

- (f) Check that the low tension wires on the ignition coil are intact and have clean and secure connections.

- (g) Check that low tension current is reaching the ignition coil when the ignition is switched On. Use a test lamp between the coil low tension terminals and a good earth. Where applicable, ensure that the breaker points are open or insulated when making the test. Should the test lamp light on the ignition switch (+) side of the coil but fail to light on the distributor (-) side of the coil, then it is possible that the coil primary circuit is faulty. Remove and test the coil or replace with a known serviceable unit.



Check the power at the coil positive terminal with a test lamp.

- (h) Ensure that the low tension leads in the distributor and the earth wire are intact, clean and secure.

NOTE: No further tests are recommended for electronic ignition systems. Should there still be no spark, the electronic control unit or pick up may be considered faulty. It is advisable to have the ignition system checked by an automotive electrician having the appropriate test equipment.

Check, and if necessary, clean and adjust the contact breaker points, see appropriate heading in the Engine Tune-up section.

Again carry out the check procedure, should there still be no spark or a weak or yellow spark, then one or more of the following faults may be the cause:

Defective coil, capacitor or high tension leads. If the contact points check showed severe burning or pitting of the point faces then this would indicate a possible capacitor failure. Renew the capacitor and breaker points.

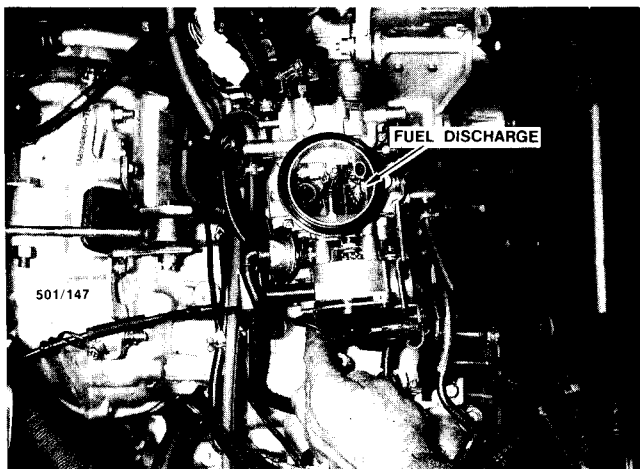
(5) If the above checks prove the spark to be satisfactory but the engine still fails to start, remove all spark plugs and check their condition and electrode gap against the information given in the Engine Tune-up section under the appropriate heading.

3. TO CHECK FUEL SYSTEM

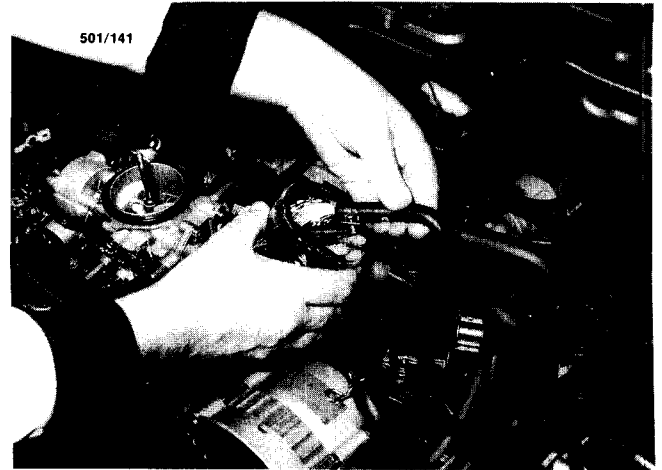
(1) Assuming that the fuel tank does contain a quantity of clean fuel the first test is to determine if there is fuel in the carburettor float chamber. To do this, first remove the air cleaner from the carburettor and with the choke valve open look down the carburettor throat. While looking down the carburettor throat, open and close the throttle several times by actuating the throttle linkage by hand. If squirts of fuel are seen to discharge from the accelerator pump discharge nozzle it is an indication that the carburettor float chamber is full of fuel and that the fuel system is functioning OK.

NOTE: Do not operate the throttle linkage excessively, as excess fuel may damage the catalytic converter on unleaded petrol models.

If on the other hand no fuel was being discharged from the accelerator pump nozzle then proceed as follows:



Checking for discharge of fuel at the carburettor accelerator pump nozzle.



Check for fuel flow at the carburettor supply line.

(2) Disconnect the low tension wire at the + coil terminal to prevent the engine from possibly starting during the next part of the test.

(3) Disconnect the fuel supply line at the carburettor and position the end in a suitable container. Have an assistant turn the ignition switch to the On position or on 1986-1987 models, operate the starter and note if fuel is being discharged into the container. Proceed to point (7) if fuel flow is satisfactory, if not continue with points (4) to (6).

(4) Working in the engine compartment on 1979-1984 models and under the rear of the vehicle on 1985-1987 and some Utility models, disconnect the fuel supply line from the tank to the inlet side of the pump.

(5) Remove the fuel tank filler cap and have an assistant listen at the tank filler aperture. Blow down through the fuel line towards the tank and provided the line is clear, air bubbles will be heard in the tank.

(6) Reconnect the fuel pipe to the pump and again check for fuel delivery from the fuel pump.

If there is no delivery of fuel to the carburettor side of the fuel pump then one or more of the following faults may be the cause:

No air bubbles heard on tank test: Pipe obstructed or fractured. Fuel line filter blocked.

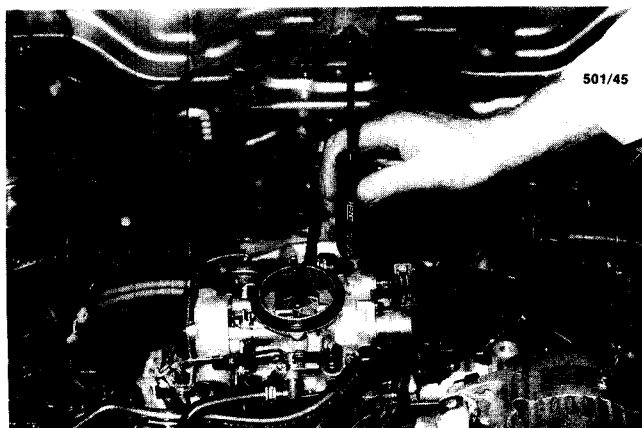
Air bubbles heard in tank but no delivery from the fuel pump: Faulty fuel pump.

Refer to the appropriate heading in the Fuel System section for fuel pump test procedure.

(7) Should there be a satisfactory supply of fuel at the carburettor end of the fuel pipe but the engine will still not start, carry out the following additional procedure.

(a) First check that flooding is not the cause due to excessive use of choke and/or accelerator when attempting to start the engine.

(b) Remove the spark plugs and check for petrol saturation of the electrodes, if evident thoroughly clean and dry before replacement.



Float bowl flooding can sometimes be rectified by tapping in the vicinity of the needle valve and seat.

(c) If flooding persists, check the float and the needle valve for sticking and also ensure that the float is not punctured allowing it to fill with fuel.

(d) Check the air filter for choked filter element.

If flooding is not the cause and there is an adequate supply of fuel to the carburettor, one or more of the following faults may be the cause:

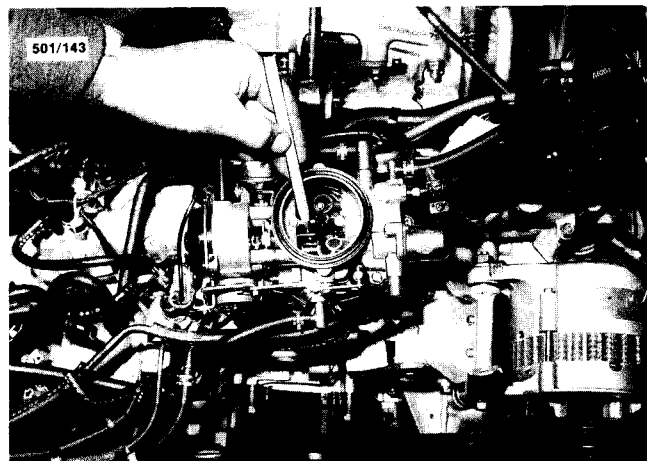
Where fitted, blocked carburettor gauze filter.

Stuck or obstructed needle valve.

Choke valve not operating correctly.

Air leaks around the inlet manifold or carburettor mounting flanges because of distortion or defective gaskets.

Fractured hose or loose connections between the brake vacuum unit and the inlet manifold.



When the engine is at operating temperature, the choke valve should be fully open.

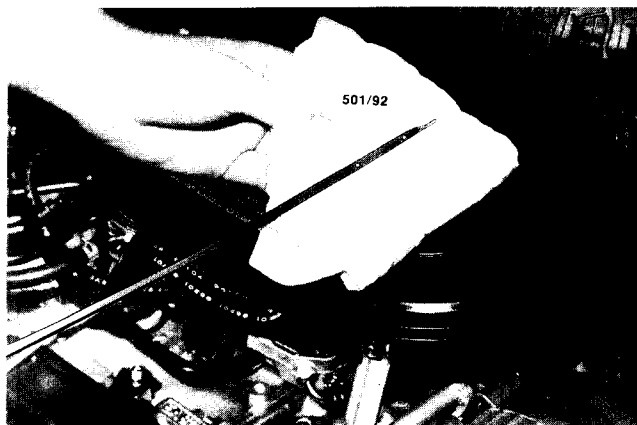
4. TO CHECK MECHANICAL SYSTEM

The following check procedure assumes that the starter motor will rotate the engine, if not, press in the clutch to disengage the engine from the transmission in case the fault lies within the transmission. If the

starter will still not rotate the engine it will be necessary to remove the starter motor and attempt to turn the engine over manually. This will establish whether the fault lies with the starter motor which could be jammed or defective, or the engine which could be seized or have broken internal components such as connecting rods, pistons and crankshaft etc. If the starter motor is not at fault and the engine will not rotate manually then refer to the heading Engine Mechanical Trouble Shooting in the Engine section for the possible causes.

It should be noted that the only way that compression can be accurately tested is by means of a compression gauge. The crude method described in the following check procedure is only intended to give a rule of thumb indication when checking for causes of engine breakdown.

(1) Remove the radiator cap and check for loss of water from the radiator. If so, check carefully for any indication of external leakage and remove the engine oil dipstick and check for emulsification of the oil; when water mixes with oil it will turn creamy and the oil level will also have increased. If the oil is emulsified the following checks are not required.



Check the oil for correct level and dilution on the dipstick.

(2) Isolate the ignition by disconnecting the lead from the top of the coil. Remove each of the spark plugs in turn and firmly block the spark plug hole in the cylinder head with the pad of the thumb or finger. Have an assistant fully open the throttle and operate the starter switch to rotate the engine, check that the compression is strong enough to force past the finger sealing the plug hole and also examine the finger and the spark plug previously removed for indications of water.

NOTE: On unleaded petrol models, remove the Ignition Coil/Fuel fuse from the fuse box to prevent excess fuel being drawn into the engine and possibly damaging the catalytic converter.

If the above checks show a loss of water and this is evident in the engine oil or on the finger or spark plug,

then one or more of the following faults may be the cause:

Blown cylinder head gasket.

Cracked cylinder or cylinder head.

Warped cylinder head or cylinder block faces.

If the crude compression check showed any weak, lack of or inconsistent compressions, then any of the above faults could also be the cause plus the following:

Broken piston(s).

Burnt or broken valves.

Provided the previous checks do not indicate an internal leakage of water continue with the following:

(3) Remove the distributor cap and, with an assistant operating the starter switch, check that the rotor arm rotates as the engine turns over.

(4) Remove the rocker covers and, again with an assistant operating the starter switch, check that all the valves open and close as the engine turns over.

If the rotor arm or the valves do not operate with engine rotation then one of the following faults may be the cause:

Rotor arm does not turn but valves operate:

Distributor drive shaft broken or drive gear stripped.

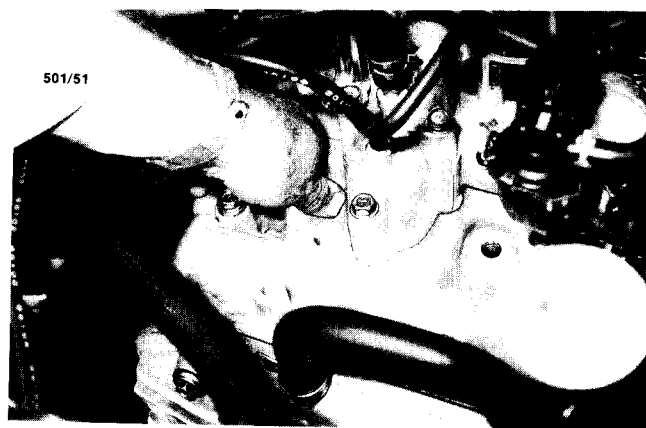
Rotor arm turns but valves do not operate, OHV engines: Broken or stripped timing gear.

Valves operate on one side of the engine only, OHC engines: Broken timing belt.

Provided all the previous checks have been carried out correctly and the operator is quite satisfied that none of the components are at fault then all that remains is for the ignition and the valve timing to be checked. It should be noted however, that if loss of timing proves to be the fault then the cause for this

occurring must be sought, if, the vehicle has started and run satisfactorily up to the point of engine failure.

NOTE: In order to check the ignition and valve timing it will be necessary to remove the distributor cap and the left hand rocker cover and turn the engine clockwise via the crankshaft pulley until No 1 piston is at tdc on the compression stroke. In this position the valves of No 4 cylinder should be 'rocking' and the distributor rotor should be pointing to the No. 1 high tension lead segment in the distributor cap. The cylinders are numbered No 1 — right hand front, No 2 left hand front, No 3 right hand rear, No 4 left hand rear.



Check for compression by placing a thumb over the spark plug hole and have an assistant operate the starter.