

## SPECIFICATIONS

### CAPACITY AND GRADE

#### Engine:

|                      |             |
|----------------------|-------------|
| Lubricant .....      | Castrol GTX |
| Sump capacity —      |             |
| With filter .....    | 4.6 litres  |
| Without filter ..... | 4.3 litres  |

#### Cooling system:

|                                    |            |
|------------------------------------|------------|
| Capacity .....                     | 7.5 litres |
| Corrosion inhibitor quantity ..... | 0.4 litres |

#### Manual transmission:

|               |             |
|---------------|-------------|
| Lubricant —   |             |
| 4 speed ..... | SAE 30      |
| 5 speed ..... | Dexron II   |
| Capacity —    |             |
| 4 speed ..... | 2.7 litres  |
| 5 speed ..... | 2.85 litres |

#### Automatic transmission:

|                 |            |
|-----------------|------------|
| Lubricant ..... | Dexron II  |
| Capacity .....  | 7.4 litres |

#### Rear axle:

|                 |            |
|-----------------|------------|
| Lubricant ..... | SAE 90W    |
| Capacity .....  | 1.4 litres |

#### Steering gear:

|                       |                              |
|-----------------------|------------------------------|
| Lubricant —           |                              |
| Manual steering ..... | Molybdenum disulphide grease |
| Power steering .....  | Dexron II                    |

#### Front suspension:

Ball joint lubricant . Molybdenum disulphide grease

Brake fluid type ..... Disc brake fluid

#### Fuel tank:

|                        |           |
|------------------------|-----------|
| Fuel requirement ..... | 97 octane |
| Capacity .....         | 60 litres |

*NOTE: Lubricant capacities shown are approximate only. The correct lubricant level should be checked at the filler plug or dipstick.*

### 1. HOW TO GREASE AND OIL CHANGE

#### TOOLS, STORES AND EQUIPMENT REQUIRED

- 1 Set of ring spanners.
- 1 Adjustable spanner.
- 1 Hydraulic jack.
- 1 Set of car ramps.
- 1 Set of chassis stands.
- 1 Hand grease gun with flexible attachment.
- 1 Oil can.
- 1 Oil gun.
- 1 Filter removal tool.
- 1 Oil receptacle and parts washing tin.
- 1 Funnel.
- 1 Wire brush.
- 1 Parts washing brush.
- 1 Tin of brake fluid.

- 1 Tin of engine oil.
- 1 Tin of transmission oil.
- 1 Tin of rear axle oil.
- 1 Tin of ball joint grease.
- 1 Stick of dry lube.

*NOTE: All lubricant capacities and grades for the various assemblies can be obtained by referring to Specifications.*

#### TO DO THE JOB

(1) Run the front of the vehicle onto the car ramps, stop the engine, apply the handbrake and chock the front wheels.

(2) Raise the rear of the vehicle with the jack and place chassis stands under the rear axle assembly.

*NOTE: It is best if the vehicle is kept as level as possible to avoid false readings when checking the lubricant levels.*

(3) Using a wire brush and a cloth, clean around the engine sump drain plug, transmission and rear axle filler plugs and the grease nipples.

(4) Place a drain tin under the engine sump, remove the sump drain plug with the appropriate size ring spanner and allow the sump to completely drain.



Location of engine sump drain plug with splash guard removed.

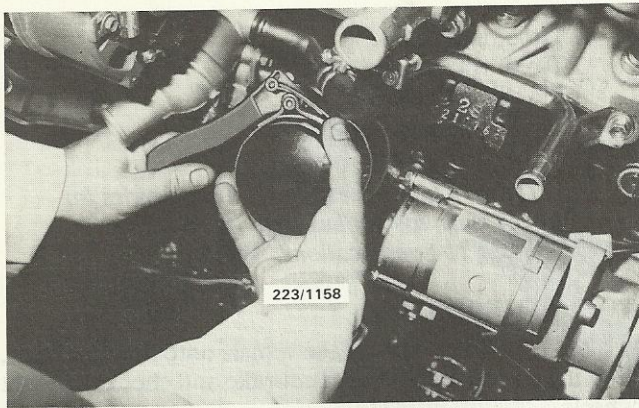
*NOTE: It is best to drain the engine sump with the oil at operating temperature. However if the oil is hot take care to avoid scalding.*

When the sump has completely drained, instal and securely tighten the sump drain plug. Wipe around the plug after installing.

*NOTE: Before installing the sump drain plug check the plug sealing gasket to ensure that it is serviceable.*

(5) If the engine oil filter is to be renewed, remove the oil filter with the removal tool and allow the residual engine oil to drain into the drain tin. Smear oil onto the sealing gasket of the new filter and tighten the filter by hand as per the tightening instructions supplied with the new filter.



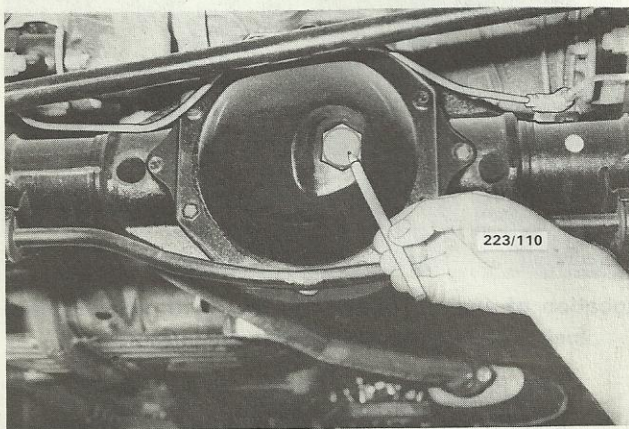


Removing the engine oil filter using a filter removal tool.

**IMPORTANT:** Before installing the new filter ensure that the sealing gasket from the old filter has not come away from the old filter and adhered itself to the filter sealing seat on the engine.

(6) Remove the filler plug from the manual transmission and the rear axle. Use the finger or a bent piece of wire to check the oil levels. The correct level is when the oil is level with, or fractionally below the bottom of the plug hole.

If the oil level is low use the oil gun to fill the transmission or rear axle to the correct level with the specified oil.

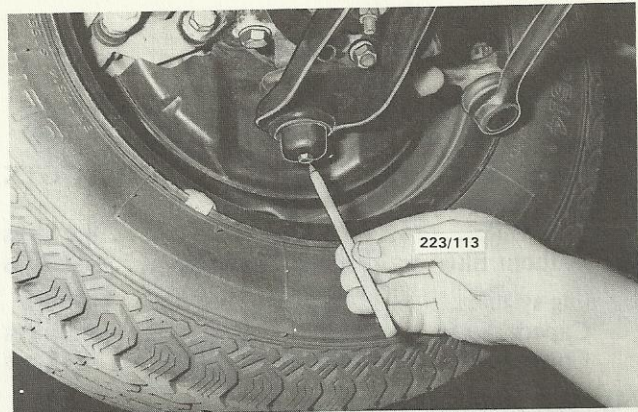


View of the rear axle filler plug.

When satisfied that the levels are correct instal and firmly tighten the plugs. Wipe around the plugs with a cloth after installing.

**NOTE:** If an automatic transmission is fitted to the vehicle, refer to the Automatic Transmission section for the correct procedure to check and top up the hydraulic fluid level.

(7) Fill the grease gun with the specified grease and grease the grease nipples until the grease is forced out of the joints. Take care not to dislodge the dust and water seals from the ball joints. Renew grease nipples that are blocked or damaged.

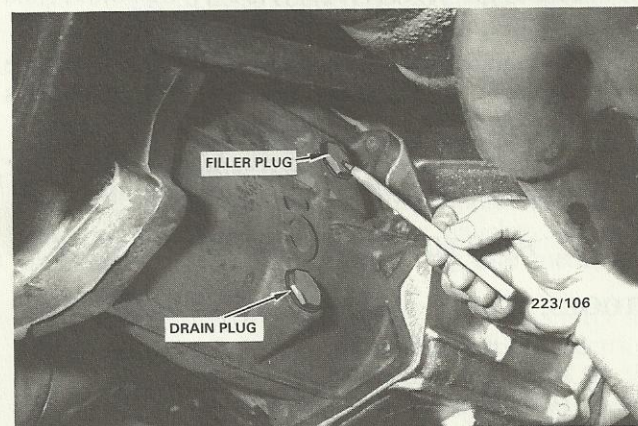


Remove the plugs, instal grease nipples and lubricate the suspension ball joints at the recommended intervals.

**NOTE:** It may be necessary to remove the plugs and instal grease nipples before greasing.

(8) Using the funnel, fill the engine with the specified amount and grade of engine oil and start and run the engine for a few minutes. Ensure that the oil pressure warning lamp goes out. Stop the engine, wait for a few minutes and check the oil level on the dipstick. If necessary add oil to bring the level to the full mark on the dipstick.

**NOTE:** To prevent overfilling initially, it is good policy not to pour all of the specified amount of the oil into the engine in one go as sometimes the amounts specified are only approximate. It is best to hold back at least half a litre and top up to the full mark on the dipstick after the engine has been run for a few minutes.



Locations of 5 speed manual transmission filler and drain plugs.

(9) Check thoroughly for oil leaks at the engine sump plug and engine oil filter if a new filter was fitted.

(10) Referring to the Service Schedule, lubricate and check all other items which coincide with the grease and oil change intervals.

(11) Lower the vehicle to the ground, road test and check for oil leaks.



## 2. SERVICE SCHEDULE

| JOB   | daily<br>or<br>1000 km | THOUSAND KILOMETRES |    |    |    |    |    |    |    |
|---|------------------------|---------------------|----|----|----|----|----|----|----|
|   |                        | 10                  | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| <b>ENGINE</b>   |                        |                     |    |    |    |    |    |    |    |
| (1) Check the oil level on the distick each time the fuel tank is topped up or every 1,000 km. Top up as necessary with the correct grade of engine oil.  | ●                      |                     |    |    |    |    |    |    |    |
| (2) Drain and refill the engine sump and renew the engine oil filter every 10,000 km or 6 months.   |                        | ●                   | ●  | ●  | ●  | ●  | ●  | ●  | ●  |
| <i>NOTE: When the vehicle is subjected to extreme or severe conditions, it is advisable to change the engine oil and oil filter every 5,000 km.</i>   |                        |                     |    |    |    |    |    |    |    |
| (3) Check the exhaust pipes, mufflers and mountings for deterioration every 20,000 km or 12 months.   |                        |                     | ●  |    | ●  |    | ●  |    | ●  |
| <b>COOLING SYSTEM</b>   |                        |                     |    |    |    |    |    |    |    |
| (1) Check the coolant level in the radiator or coolant reservoir daily or every 1,000 km.   | ●                      |                     |    |    |    |    |    |    |    |
| <i>NOTE: If the engine is at normal operating temperature use care when removing the radiator cap to avoid scalding.</i>  |                        |                     |    |    |    |    |    |    |    |
| (2) Drain, flush and refill the cooling system every 20,000 km or 12 months.  |                        |                     | ●  |    | ●  |    | ●  |    | ●  |
| (3) Check the radiator hoses, heater hoses and drive belts every 20,000 km or 12 months.  |                        |                     | ●  |    | ●  |    | ●  |    | ●  |
| <b>FUEL SYSTEM</b>  |                        |                     |    |    |    |    |    |    |    |
| (1) Inspect the air cleaner element every 20,000 km or 12 months.   |                        |                     | ●  |    | ●  |    | ●  |    | ●  |
| (2) Renew the fuel filter every 40,000 km or 24 months or more frequently when operating in dusty conditions.   |                        |                     |    |    | ●  |    |    |    | ●  |
| (3) Renew the air cleaner element every 40,000 km or 24 months or more frequently when operating under dusty conditions.  |                        |                     |    |    | ●  |    |    |    | ●  |
| <i>NOTE: Do not wash the viscous paper type element in petrol or solvent of any kind.</i>   |                        |                     |    |    |    |    |    |    |    |
| (4) Check the choke operation every 20,000 km or 12 months.   |                        |                     | ●  |    | ●  |    | ●  |    | ●  |
| <b>MANUAL TRANSMISSION</b>  |                        |                     |    |    |    |    |    |    |    |
| (1) Check the oil level every 10,000 km or 6 months and top up as necessary.  |                        | ●                   | ●  | ●  | ●  | ●  | ●  | ●  | ●  |
| (2) Drain and refill every 40,000 km or 24 months.  |                        |                     |    |    | ●  |    |    |    | ●  |
| <b>AUTOMATIC TRANSMISSION</b>   |                        |                     |    |    |    |    |    |    |    |
| (1) Check the automatic transmission fluid level every 10,000 km or 6 months. The check should be performed after a run with the transmission at operating temperature, the engine running and the selector lever in the Park position. |                        | ●                   | ●  | ●  | ●  | ●  | ●  | ●  | ●  |
| (2) Service the transmission at intervals of 40,000 km or 24 months. Fill the transmission with the specified type and amount of new lubricant.   |                        |                     |    |    | ●  |    |    |    | ●  |



| JOB  | daily<br>or<br>1000 km | THOUSAND KILOMETRES |             |             |                  |             |             |             |                  |
|--|------------------------|---------------------|-------------|-------------|------------------|-------------|-------------|-------------|------------------|
|  |                        | 10                  | 20          | 30          | 40               | 50          | 60          | 70          | 80               |
| <b>STEERING GEAR</b><br>(1) Check the level of the fluid in the power steering reservoir and inspect for fluid leaks every 10,000 km or 6 months.<br>(2) Inspect the steering gear and linkage for security, damage and wear every 20,000 km or 12 months.   |                        | ●                   | ●           | ●           | ●                | ●           | ●           | ●           | ●                |
| <b>FRONT SUSPENSION</b><br>(1) Inspect the suspension ball joint boots for damage every 10,000 km or 6 months.<br>(2) Remove, clean and repack front hub bearings every 40,000 km or 24 months.<br>(3) Clean the area surrounding the suspension ball joints, remove the threaded plugs, instal grease nipples and grease the joints every 40,000 km or 24 months.<br>(4) Check and tighten the front suspension bolts and nuts as required and inspect the components for wear and damage including the suspension strut upper mounting bearings every 20,000 km or 12 months.<br>(5) Check the wheel alignment every 40,000 km or 24 months. |                        | ●                   | ●           | ●           | ●<br>●<br>●      | ●           | ●           | ●           | ●<br>●<br>●      |
| <b>REAR SUSPENSION</b><br>(1) Inspect the rear suspension links, bushes and coil springs every 20,000 km or 12 months.<br>(2) Check the rear wheel alignment every 40,000 or 24 months.  |                        |                     | ●           |             | ●<br>●           |             | ●           |             | ●<br>●           |
| <b>BRAKE SYSTEM</b><br>(1) Check the master cylinder reservoir every 10,000 km or 6 months.<br>(2) Inspect all hydraulic brake lines for damage and chafing, paying particular attention to the flexible hoses, every 10,000 km or 6 months.<br>(3) Inspect the disc brake pads for wear every 10,000 km or 6 months. Inspect the calipers for leakage.<br>(4) Inspect the rear brake shoe linings and drums for wear every 20,000 km or 12 months. Inspect the rear wheel cylinders for leakage. Adjust the rear brakes and handbrake as necessary.<br>(5) Renew the brake fluid in the entire system every 40,000 km or 24 months.           |                        | ●<br>●<br>●         | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>●<br>● |
| <b>ELECTRICAL SYSTEM</b><br>(1) Check and top up the battery electrolyte with distilled water as required or at least monthly. Never allow the electrolyte level to fall below the plates.<br>(2) Clean and adjust the spark plugs every 10,000 km or 6 months and check the high tension leads and distributor cap for deterioration and cracks.<br>(3) Renew the spark plugs every 20,000 km or 12 months.<br>(4) Check all electrical equipment including lights, horn and windscreen wipers every 10,000 km or 6 months.   | ●                      | ●                   | ●           | ●           | ●<br>●           | ●           | ●<br>●      | ●<br>●      | ●<br>●<br>●      |



| JOB  | daily<br>or<br>1000 km | THOUSAND KILOMETRES |    |    |    |    |    |    |    |
|--|------------------------|---------------------|----|----|----|----|----|----|----|
|  |                        | 10                  | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| <b>BODY</b><br><br>(1) Check and lubricate the following components every 10,000 km or 6 months with dry lubricant: Door locks and strikers, bonnet catch, luggage compartment lid or tailgate lock and striker. Lubricate with a few drops of engine oil: Door hinges, throttle linkage and handbrake cable.<br>(2) Check all body and chassis nuts and bolts for security every 20,000 km or 12 months.  |                        | ●                   | ●  | ●  | ●  | ●  | ●  | ●  | ●  |
| <b>EMISSION CONTROL</b><br><br>(1) Check and adjust the carburettor idle speed, idle mixture and fast idle speed setting every 20,000 km or 12 months.<br>(2) The following components should be checked every 20,000 km or 12 months: PCV valve, spark control system, EGR system, charcoal canister, throttle positioner (manual transmission only), vacuum hoses and connections, ventilation hoses and connections, and vapour lines and connections.  |                        |                     | ●  |    | ●  |    | ●  |    | ●  |
| <b>WHEELS AND TYRES</b><br><br>(1) At least once a fortnight check and adjust the tyre pressures when the tyres are cold. Frequent loss of pressure should be investigated and the leakage rectified.<br><i>NOTE: The recommended tyre pressures and the sizes of tyres which can be fitted to the vehicle are printed on a placard positioned on the inside of the drivers door.</i><br>(2) Inspect the tyres regularly for damage and abnormal wear. Any abnormal wear may be due to one or more of the faults shown in the illustrations in Tyre Wear Trouble Shooting in the Wheels and Tyres section.<br><i>NOTE: To preserve tyre life it is good policy to periodically have the front wheels balanced, the wheels rotated and the steering geometry checked on a reliable wheel alignment machine.</i><br><i>Under no circumstances mix radial ply and conventional ply tyres. Fit only tyres of the same construction to all four wheels.</i> |                        |                     | ●  |    | ●  |    | ●  |    | ●  |



**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.

## 1. TUNE-UP SPECIFICATIONS

|   |                 |
|---|-----------------|
| Firing order .....  | 1-3-4-2         |
| Spark plug type:  |                 |
| Nippon Denso .....  | WI6 EXR-U       |
| NGK .....   | BPR 5EY         |
| Spark plug gap .....  | 0.8 mm          |
| Spark plug tightening torque .....  | 20 Nm           |
| Idle speed:   |                 |
| Manual transmission .....   | 700 rpm         |
| Automatic transmission .....  | 750 rpm         |
| Fast idle speed:  |                 |
| With power steering .....   | 2,800 rpm       |
| Without power steering .....  | 2,600 rpm       |
| * Ignition timing at idle speed .....   | 10 ± 2 deg btdc |
| ** Compression pressure:  |                 |
| Nominal .....   | 1178 kPa        |
| Minimum .....   | 880 kPa         |
| Drive belt deflection:  |                 |
| Power Steering .....  | 8-12 mm         |
| Alternator .....  | 14-19 mm        |
| Air pump .....  | 6-8 mm          |
| Air conditioner .....   | 6.5-7.5 mm      |
| * Ignition timing to be set with the vacuum advance hose disconnected and the engine idling no higher than 900 rpm.                             |                 |
| ** Typical compression pressure with the engine hot at cranking speed. Variation between highest and lowest readings should not exceed 100 kPa. |                 |

## 2. TUNE-UP OPERATIONS

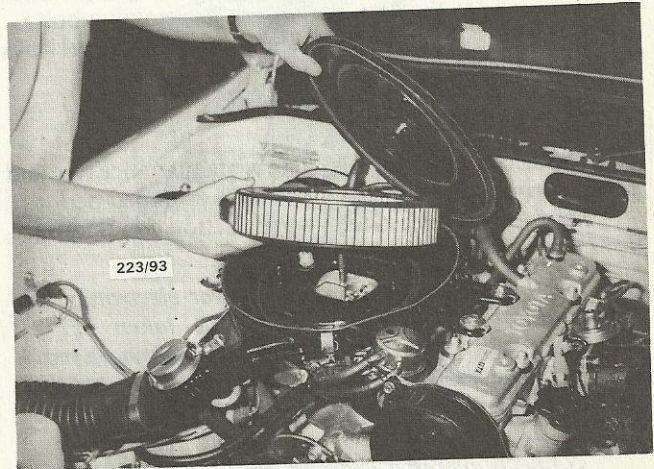
**Special Equipment Required:**  
To Test Compression — Compression gauge

### TO SERVICE AIR CLEANER

The air cleaner is fitted with a paper type element. The element should be regularly inspected and cleaned, and it should be renewed at the recommended intervals of 40,000 km or 24 months. This distance is only a guide for normal operating conditions and should be reduced accordingly if the vehicle is operating under extremely dusty conditions.

**NOTE:** Paper air cleaner elements should not be washed in petrol or any other type of cleaning solvent. If the element has been washed in solvent or has become oil soaked then it should be discarded and a new element fitted.

- (1) Remove the wing nut retaining the air cleaner top cover.
- (2) Release the retaining clips, remove the top cover from the main body and take out the air cleaner element.



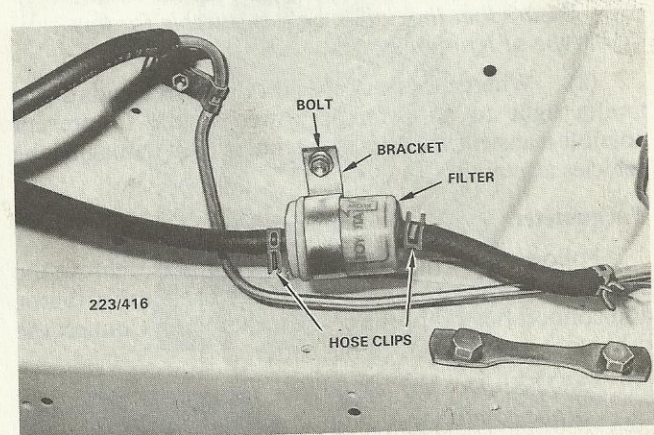
**Renew the air cleaner element at the recommended intervals.**

- (3) Discard the element as necessary and wipe off any dust or oil accumulation inside the main body and top cover.
- (4) If the element is serviceable thoroughly clean the element by blowing it from the inside to the outside with moisture free compressed air.
- (5) Instal the element to the main body. Fit the top cover, ensuring that the mating arrows are aligned and engage the retaining clips.
- (6) Instal the wing nut and securely tighten.

### TO RENEW FUEL FILTER

**NOTE:** The fuel filter should be renewed at intervals of 40,000 km.

- (1) Remove the fuel filter bracket retaining bolt and slide the bracket off the filter.
- (2) Release the hose clips on the fuel hoses at the filter.



**Installed view of the fuel filter.**



(3) Hold a suitable container beneath each hose in turn, pull the hoses from the filter and drain the hoses into the container. If necessary plug the fuel tank hose.

(4) Slide the hoses onto their respective connections on the new filter and secure with the retaining clips. Slide the bracket onto the filter and instal the retaining bolt.

(5) Start and run the engine and check for fuel leaks at the filter connections.

### TO SERVICE DISTRIBUTOR

The electronic ignition system is maintenance free and permits trouble free operation over an extended period.

Refer to the Electrical System section for Specifications and Trouble Shooting.

*NOTE: When working on or near electronic ignition systems care should be taken as dangerous high voltages are present in the primary and secondary circuits.*

*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.*

### HOW TO CONNECT ELECTRICAL TEST EQUIPMENT

*NOTE: Some types of tachometers, timing lights and ignition system analysers are not compatible with this type of electronic ignition system. It is therefore recommended that the manufacturer of the test equipment should be consulted before proceeding to use the equipment.*

#### Timing Light

(1) Connect the timing light to the engine following the instrument manufacturers instructions.

*NOTE: Do not connect or disconnect the timing light with the engine running as voltage surges could damage the alternator. Do not allow the high tension leads to open circuit as damage to the ignition system could result. Ensure that the timing light is suitable for this type of ignition system.*

(2) Where necessary connect the power leads of the timing light to an external power source to prevent possible transient voltages in the timing light damaging the vehicles alternator.

#### Tachometer

Following the manufactures instructions, remove the rubber cap from the service connector for the distributor and connect the test probe of the tachometer. Connect the other tachometer leads to the battery.

*NOTE: Do not allow the tachometer test probe connector to short to earth as damage to the test equipment or ignition system may result.*

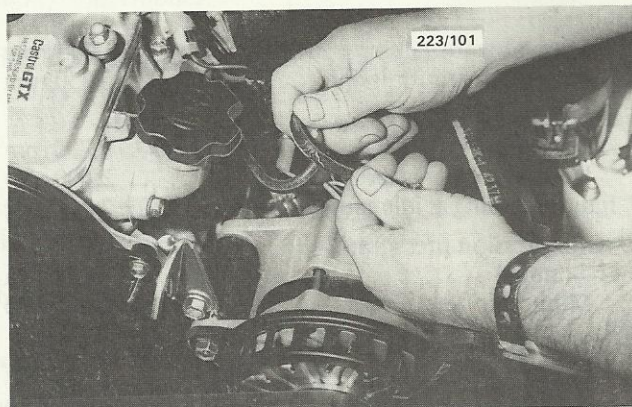
### TO SERVICE HIGH TENSION LEADS

Check the leads for perishing or cracking and renew as required. Never attempt to repair defective carbon impregnated core leads.

The leads may be carefully cleaned using a cloth moistened with kerosene then wiping completely dry.

If an ohmmeter is available the electrical resistance of the leads may be checked as follows:

(1) With the distributor cap and leads removed as an assembly, test one lead at a time, connecting the meter probes at the spark plug end of the lead and at the corresponding terminal inside the cap. Resistance should be less than 25,000 ohms.



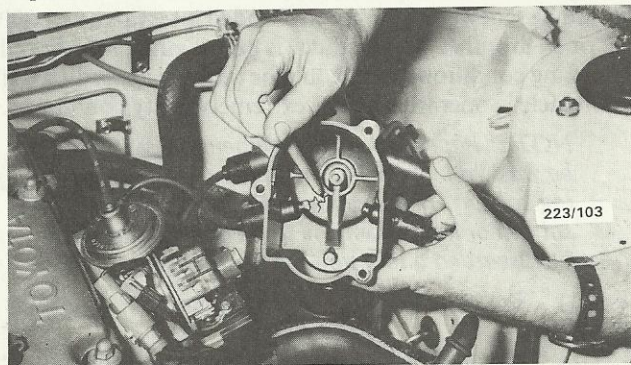
Check the high tension leads for cracks and deterioration.

(2) If the resistance is more than 25,000 ohms, remove the lead from the distributor cap and check the resistance in the lead only. The lead should be renewed if the resistance is still more than 25,000 ohms.

(3) High distributor cap resistance may be due to oxide deposits on the cap terminals. These deposits should be removed by digging into the deposit with a pointed instrument and flicking the deposit off the terminal.

Check the distributor cap for cracks and tracking between the high tension terminals on both the inside and outside of the cap. Renew the cap if cracks or tracking are evident.

Check the carbon brush in the centre of the distributor cap for evidence of arcing and renew as necessary.



Check the distributor cap for cracks and tracking.

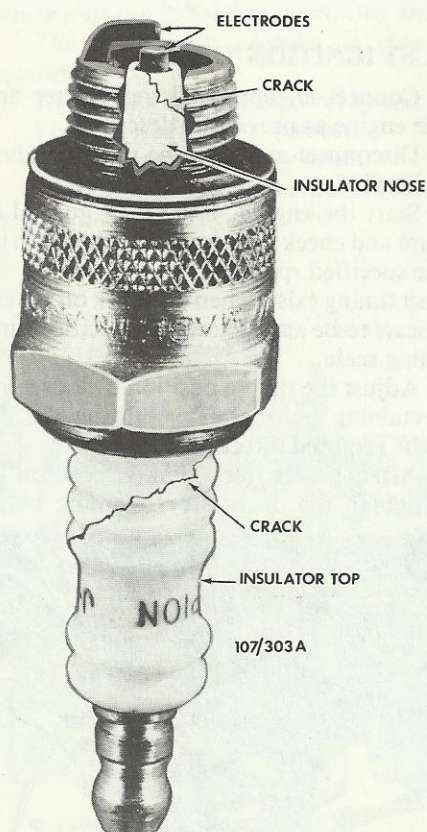


## TO SERVICE SPARK PLUGS

The spark plugs should be removed for inspection, cleaning and resetting at intervals of 10,000 km.

To prevent internal damage to the high tension leads when disconnecting them from the spark plugs, pull on the rubber boots not on the cables themselves. If necessary suitably mark the leads so they may be returned to their original positions.

Before removing the spark plugs ensure that the area around the plugs is clean to prevent foreign matter entering the cylinders when the plugs are removed.



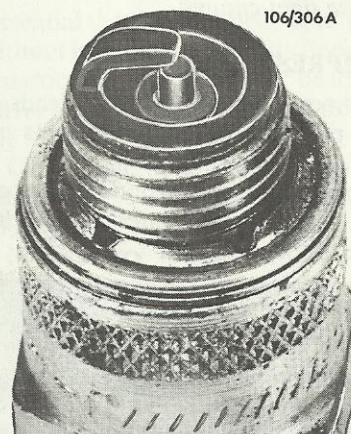
Cutaway view of spark plug showing crack in the insulator nose which can be caused by exerting pressure against the centre electrode when adjusting the gap. Other crack shown on the insulator is caused by tilting the plug spanner.

Spark plugs removed from an engine in good condition operating under normal conditions should have a light powdery deposit ranging in colour from light brown to greyish tan. After considerable service the electrodes will show signs of wear or normal burning. Spark plugs showing a thick black deposit indicate an engine in poor mechanical condition or possibly that a plug with too low a heat range has been fitted.

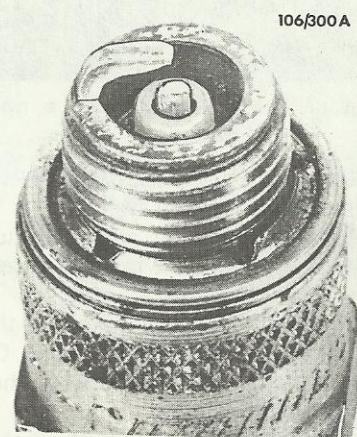
Spark plugs showing a white or yellowish deposit indicate sustained high speed driving or possibly that plugs of too high a heat range have been fitted, particularly when these deposits are accompanied by blistering of the porcelain and burning of the electrodes.



When plug electrodes are eroded to this degree the spark plug can be considered worn out and should be replaced using a spark plug of the recommended heat range.



Black damp deposits can be caused by excessive oil consumption or incorrect plug type. Spark plugs in this condition are usually not firing.



Spark plug with burnt electrodes and white blistered appearance. Possibly due to incorrect plug type, loose plug or motor running too hot.



If the heat range is correct, clean the plugs on a sand blasting machine and blow clean with compressed air.

Ensure that all traces of abrasive grit are removed from the well in the plug body.

Carefully open the electrodes and lightly file the electrodes flat with a points file.

Check the gaps between the electrodes preferably with clean wire gauges. If wire gauges are unavailable then use clean feeler gauges. If necessary move the earth electrode to obtain the correct gap. Never attempt to move the centre electrode otherwise damage to the porcelain insulator will result.

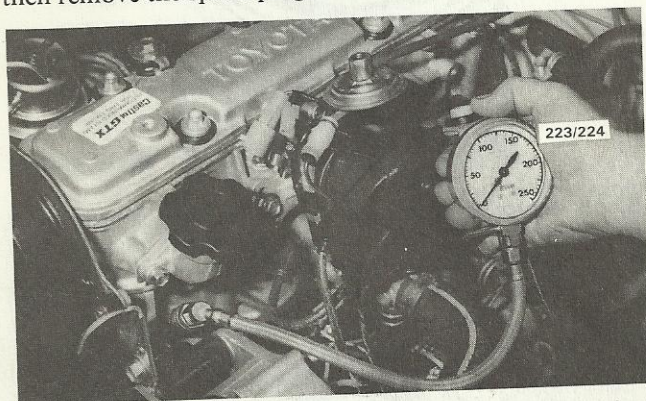
Clean the spark plug threads, screw the plugs into the cylinder head finger tight then use a tension wrench to tighten the plugs to the specified torque.

*NOTE: If a torque wrench is unavailable extreme care must be taken when tightening taper seat spark plugs. If the plugs are tightened with the fingers and then taken up an additional 1/4 of a turn with a socket then they will be quite tight enough.*

### TO TEST COMPRESSION

(1) Disconnect the high tension leads from the spark plugs by pulling on the rubber boots not on the cables.

(2) Ensure that the area around each spark plug is clean to prevent foreign matter entering the cylinders and then remove the spark plugs.



Checking cylinder compression using a compression gauge.

(3) Disconnect the low tension supply lead from the distributor to isolate the ignition system.

(4) Apply a compression gauge to number one spark plug hole according to the manufacturer's instructions of the instrument being used.

(5) Have an assistant fully open the throttle and operate the starter switch to rotate the engine. Observe the compression gauge and stop the engine when the gauge has reached the highest reading.

(6) Record the reading and then check the compression of the remaining cylinders in the same manner.

(7) Compare all readings taken. Refer to Specifications for minimum pressure and maximum cylinder variation.

(8) If a low reading is taken on one or more cylinders the trouble source maybe isolated as follows:

(a) Inject a small amount of engine oil into the spark plug hole of the cylinder concerned ensuring that the oil is evenly distributed within the cylinder.

(b) Repeat the compression test on the cylinder concerned.

A substantial increase of compression pressure indicates faulty or worn piston rings, piston or cylinder. No increase of compression pressure indicates burnt, obstructed or sticking valves, or a leaking or blown head gasket.

### TO ADJUST IGNITION TIMING

(1) Connect an approved tachometer and timing light to the engine as previously described.

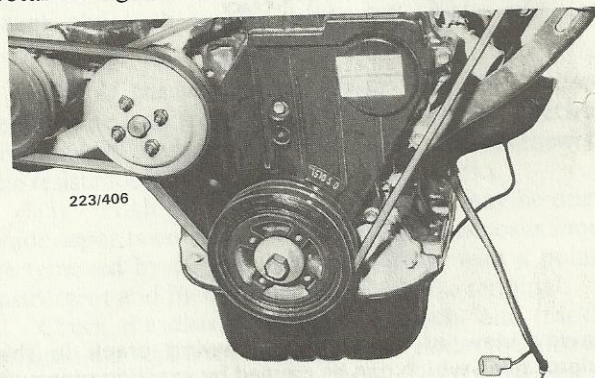
(2) Disconnect and plug the vacuum advance hose from the distributor.

(3) Start the engine, bring it to normal operating temperature and check the timing position with the timing light at the specified rpm.

Correct timing exists when the mark on the crankshaft pulley appears to be adjacent to the specified timing mark on the timing scale.

(4) Adjust the timing position by loosening the distributor retaining bolts and by turning the distributor slowly in the required direction.

(5) After the correct timing position has been obtained tighten the distributor retaining bolts and re-



View of the ignition timing marks on the crankshaft pulley and timing belt cover.

check the timing. Connect the vacuum advance hose to the distributor.

(6) After adjusting the ignition timing, reset the idle speed to Specifications. Remove the test equipment and connect any detached wires.

### TO ADJUST IDLE SPEED, IDLE MIXTURE AND FAST IDLE SPEED

*NOTE: The following procedure to adjust the idle speed and mixture setting on carburetors without a limiter cap on the idle mixture screw is only a temporary measure. Final mixture adjustments to the legal CO concentrations must be made using a gas analyser.*



On carburetors with a limiter cap installed to the idle mixture screw, the limiter cap must be destroyed to gain access to the idle mixture screw slot. No attempt should be made to break the limiter cap and adjust the idle mixture without the proper equipment to measure and adjust the CO concentrations.

The idle mixture does not normally require adjustment as it is factory set to meet emission control requirements.

Before finally adjusting the idle speed ensure that the following conditions are met:

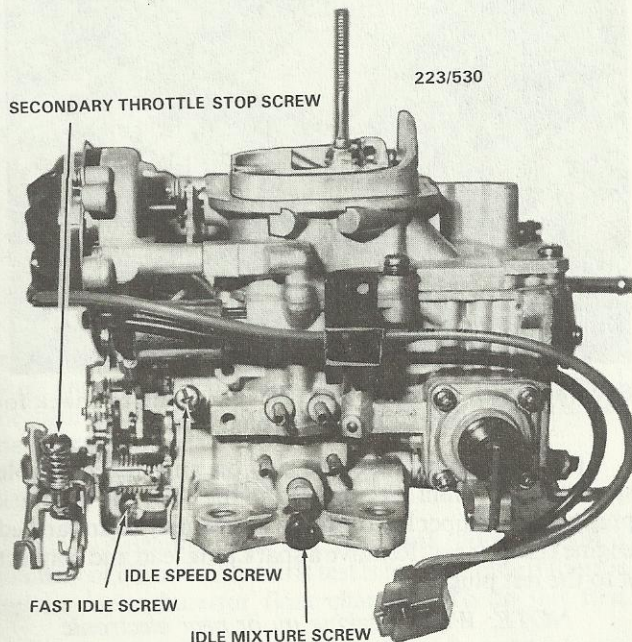
The air cleaner element is clean and installed.

The ignition timing is correctly set.

The fuel float level is correct.

The choke valve is fully open.

There are no vacuum leaks from damaged vacuum hoses or leaking gaskets.



View of the carburettor showing adjusting screws.

(1) To shut off the air injection system disconnect the small vacuum hose from the (ASV) Air Switching Valve at the rear of the air pump and plug the hose. Refer to the Emission Control section as necessary.

(2) Connect an approved tachometer to the engine as previously described, start and run the engine until it reaches normal operating temperature.

(3) Adjust the idle mixture screw in or out to obtain the highest rpm at which the engine will run smoothly.

(4) Turn the idle speed adjusting screw to obtain an idle speed 80 rpm higher than that listed in Specifications.

(5) Repeat operations (3) and (4) until the idle mixture adjustment can not improve the idle speed.

(6) Screw the idle mixture screw inwards until the idle speed listed in Specifications is obtained.

(7) On vehicles fitted with power steering, adjust the engine idle speed to 850 rpm by turning the idle speed adjusting screw inwards.

(8) Remove the plug and connect the hose to the air switching valve.

(9) Switch off the engine and remove the air cleaner top cover.

(10) Disconnect the vacuum supply hose from the choke opener and plug the hose.

(11) Hold the throttle valve open slightly, push the choke valve closed and release the throttle valve. Ensure that the fast idle screw is resting on the highest step of the fast idle cam and instal the air cleaner top cover.

(12) Start the engine without touching the throttle and adjust the fast idle speed with the adjusting screw to Specifications. Switch off the engine, instal the vacuum pipe to the choke opener and instal the air cleaner top cover.

### TO ADJUST DRIVE BELTS

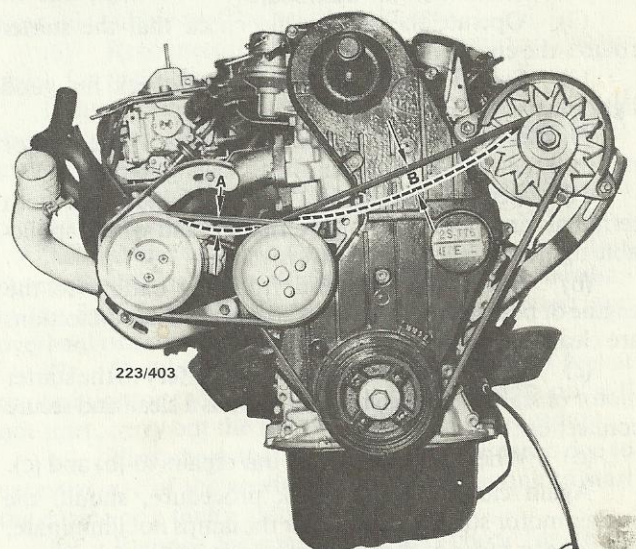
It is essential that all drive belts be adjusted to prevent slip but without imposing excessively upon the component bearings, particularly the alternator bearings.

The drive belts should be adjusted using the following procedure:

(1) Using finger and thumb pressure, push firmly on the belt concerned in the middle of the longest run to assess deflection and compare with Specifications.

(2) If necessary loosen the accessory pivot and adjusting bolts and move the accessory in the adjustment slot provided to achieve the correct drive belt tension. On vehicles fitted with air conditioning, loosen the idler pulley clamping nut, adjust the drive belt tension by turning the adjusting bolt in the required direction and retighten the clamping nut.

(3) When the correct belt tension is obtained, tighten the accessory pivot and adjusting bolts securely and recheck the belt tension.



Front view of the engine showing the drive belt arrangement. Deflection A = 6-8 mm B = 14-19 mm



**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 engine 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 identified by referring 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 or more of these three systems.

Reports from field engineers of motoring organisations prove 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.

### 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 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).

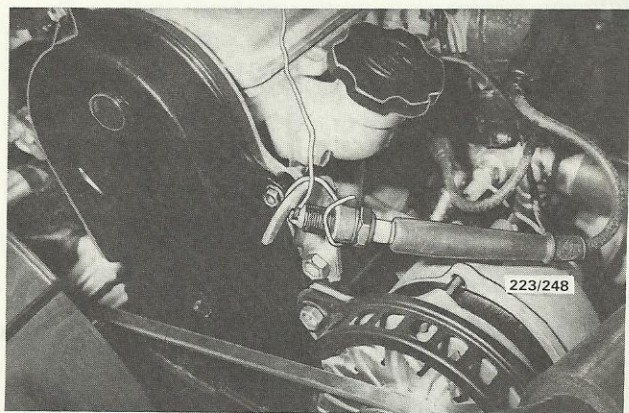
Again carry out the check procedure, should the starter motor still not operate, or the lamps not illuminate, then one or more of the following faults may be the cause:

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/starter switch faulty. On automatic transmission models, faulty neutral safety switch.

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:



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

(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 trying 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.*

(2) Have an assistant operate the starter motor.

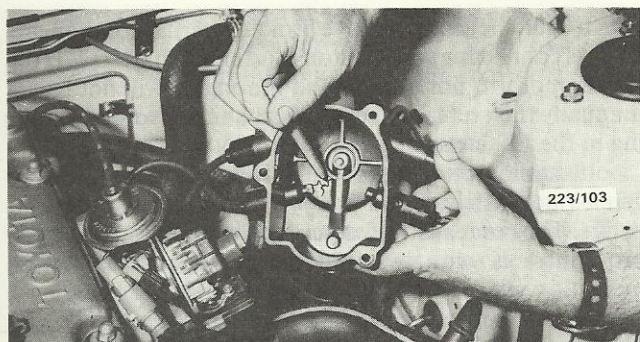
(3) Check that a spark, if any, jumps the gap on the test spark plug. If there is no spark, carry on with point (4). If the spark is satisfactory proceed to point (5).

(4) 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





**Check the distributor cap for cracks and tracking.**

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 have dry, clean and secure connections in the distributor cap.

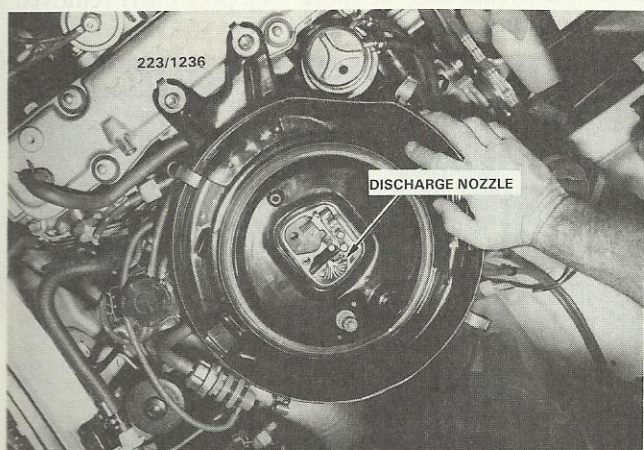
(e) Check that the carbon brush in the centre of the distributor cap interior face is clean and dry and ensure that the carbon brush moves freely in and out of its locating hole.

*NOTE: Do not carry out any further tests on electronic ignition systems as the primary and secondary circuit can produce dangerous high tension voltages. Refer to the Electrical System section for correct testing procedure.*

(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



**Check for discharge of fuel at the accelerator pump nozzle.**

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 the fuel are seen to discharge from the accelerator pump discharge nozzle it is an indication that the fuel system is functioning OK.

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

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

(3) Disconnect the fuel supply pipe from the carburettor and position the end in a suitable container. Have an assistant 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).



**Check for fuel flow at the carburettor supply pipe.**

(4) Disconnect the fuel supply hose from the fuel tank to the inlet side of the fuel pump.

(5) Remove the fuel tank filler cap and have an assistant listen at the filler pipe opening. Blow down through the fuel pipe towards the tank and provided the pipe 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: Fuel line obstructed or fractured. Blocked fuel filter.

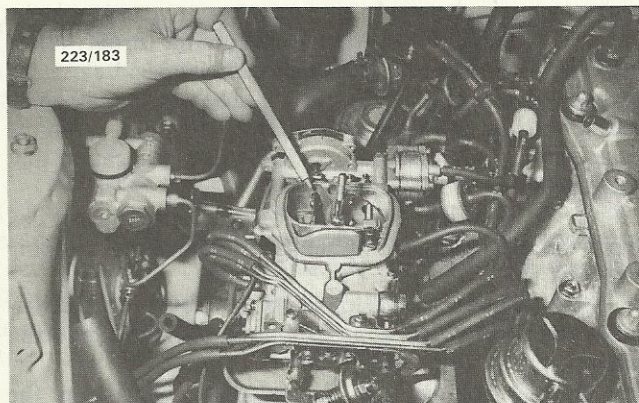
Air bubbles heard in tank but no delivery from fuel pump: Faulty fuel pump. Refer to the appropriate heading in the Fuel System section of this manual for test and overhaul or renewal procedures.

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

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

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





Check that the choke valve is fully open at normal operating temperature.

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

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

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

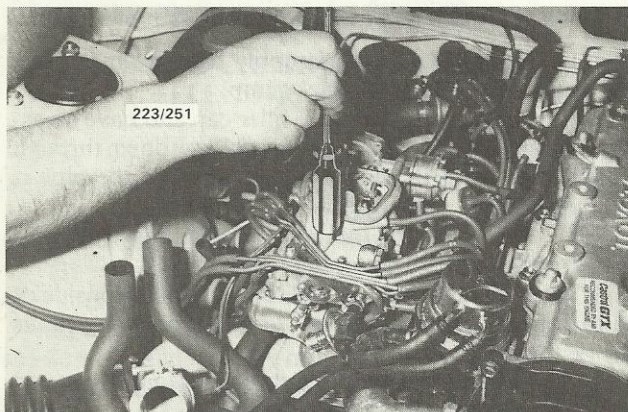
Where fitted, blocked carburettor gauze filter.

Stuck needle valve or obstructed seat.

Choke valve not operating correctly.

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

Fractured hoses or loose connections between the brake servo unit and the inlet manifold.



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

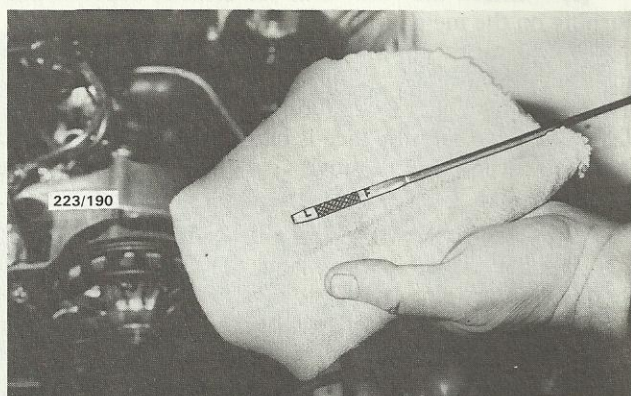
#### 4. TO CHECK MECHANICAL SYSTEM

The following procedure assumes that the starter motor will rotate the engine. If not, depress the clutch pedal 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 by hand. This will establish whether the fault lies in 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 Engine Mechanical Trouble Shooting in the Engine section.

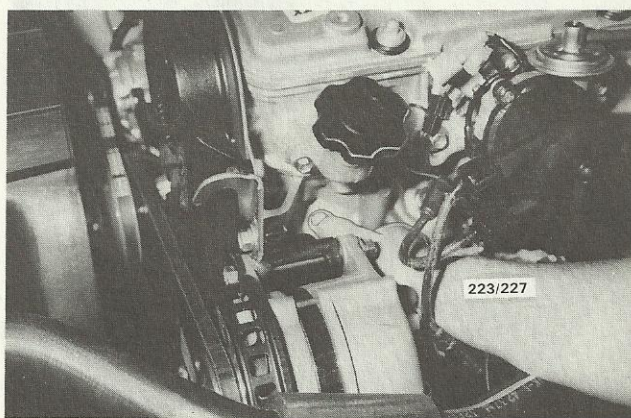
It should be noted that the only way that compression can be accurately tested is by means of a compression gauge. The crude method described in the following check procedures is only intended to give a rule of thumb indication when checking for causes of engine failure.

(1) Remove the radiator cap and check for loss of coolant 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 engine oil for correct level and dilution on the dipstick.

(2) Isolate the ignition by disconnecting the low tension wire from the distributor. Remove each spark plug and firmly block the spark plug hole with the pad of a thumb or finger. Have an assistant fully open the throttle and operate the starter switch to rotate the engine. Check that the compression pressure is strong enough to force past the thumb sealing the spark plug hole and also examine the thumb and the spark plug previously removed for indications of water.



Rule of thumb method of checking cylinder compression.



If the above checks show a loss of water and this is evident in the engine oil or on the thumb or spark plug, then one or more of the following faults may be the cause:

Blown cylinder head gasket.

Cracked cylinder block or cylinder head.

Warped cylinder head and/or cylinder block faces.

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

Broken pistons and/or piston rings.

Burnt, bent 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, check that the rotor arm rotates as the engine turns over.

(4) Remove the rocker cover and, again with the assistant operating the starter, 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 and valves do not operate: Broken timing belt. Sheared drive key in camshaft or crankshaft gears. Broken camshaft.

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 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 rocker cover and turn the engine clockwise until number one piston is at tdc on the compression stroke. In this position the valves of number four cylinder should be "rocking" and the distributor rotor arm should be pointing to the number one high tension lead segment in the distributor cap.*