

Standard Workshop Practices

01-03

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Vehicle in Workshop

When working on a vehicle in the workshop always ensure that:

- The handbrake is applied or the wheels are securely chocked to prevent the vehicle moving forwards or backwards.
- If the engine is to be run, there is adequate ventilation, or an extraction hose to remove exhaust fumes.
- There is adequate room to jack up the vehicle and remove the wheels, if necessary.
- Fender covers are always fitted if any work is to be carried out in the engine compartment.
- The battery is disconnected if working on the engine, underneath the vehicle, or if the vehicle is jacked up.
- If using welding equipment on the vehicle, a suitable fire extinguisher is readily available.

 **CAUTION:** When electric arc welding on a vehicle, always disconnect the alternator wiring to prevent the possibility of a surge of current causing damage to the internal components of the alternator.

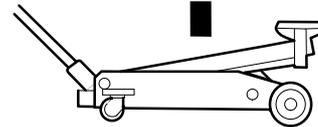
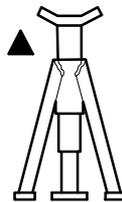
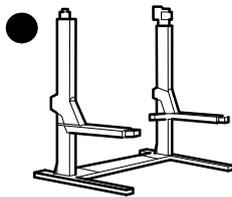
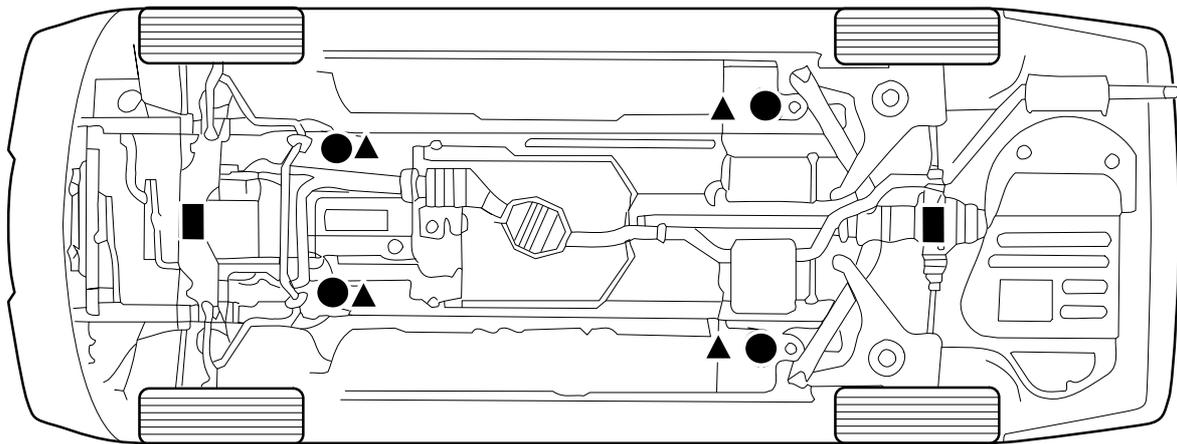
Vehicle Jacking

If possible, always position the vehicle on a hard level surface. If the vehicle must be jacked up on a soft surface use load spreading blocks under the jack.

Before commencing any repairs that involve jacking the vehicle, it is essential that the following instructions are fully understood.

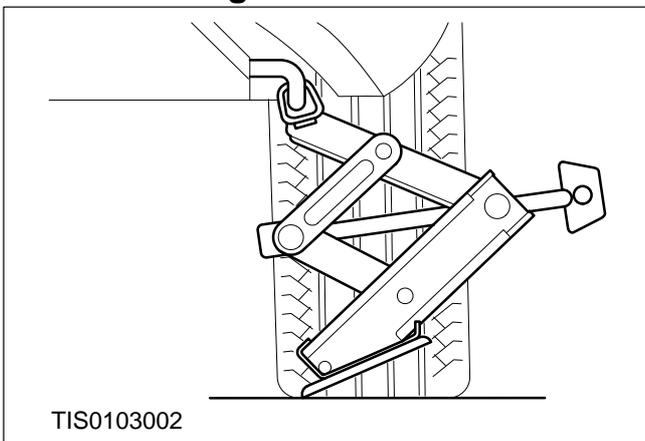
It is important that only the correct jacking and support locations are used at all times.

All workshop jacking and hoisting is acceptable only with the vehicle at maximum kerb weight or less.



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Owner Jacking



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The owner jack should be located on the provided pin in the wheel housing at the ends of the rocker panels.

Before starting to lift the vehicle it is vital that the position of the base is adjusted so that the large area of the base is flat on the ground with sufficient clearance to rotate the handle. When this is achieved the vehicle may be raised by turning the handle clockwise.

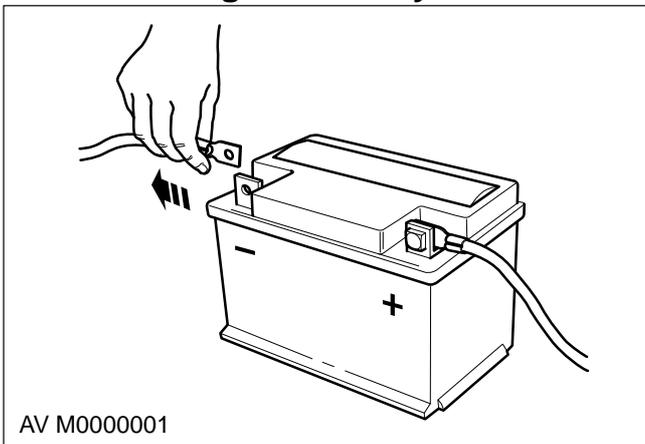
Towing the Vehicle

When towing is necessary, the vehicle towing eyes should be used. The rope must be securely fastened to the towing eyes and must also be attached to the other vehicle such that the rope will not foul the bodywork.

⚠ CAUTION: When the vehicle is being towed the ignition switch must be in position II (steering lock released and warning lights illuminated). Only then will the steering, direction indicators, horn and stop lights be operational.

Alternatively the vehicle can be transported on a low loader or a trailer.

Disconnecting the Battery



Always disconnect the battery before commencing repair operations which require:

- The vehicle to be jacked up
- Work on the engine
- Arc welding

NOTE: Before disconnecting the battery ensure that the radio keycode is known and, on vehicles fitted with EEC ignition systems, make sure that no further data is required from the module as battery disconnection will erase the Keep Alive Memory (KAM) contained in this system. It is not necessary to disconnect or remove electronic control modules.

Alternatively the EMAT Radio Code Saver, FDEP No. 1683410, may be used. The unit plugs into the cigar lighter socket and connects to the vehicle battery terminals by two clips. With the battery disconnected from the vehicle system the Radio Code Saver will allow sufficient current to pass to maintain the radio memory, operate the clock and supply the door operated interior lights while isolating the battery in the event of a short circuit.

Reconnecting the Battery

 **WARNING:** If the battery has been on bench charge the cells may be giving off explosive hydrogen gas. Avoid creating sparks, and if in doubt cover the vent plugs or covers with a damp cloth.

Always ensure that all electrical systems are switched OFF before reconnecting the battery to avoid causing sparks or damage to sensitive electrical equipment.

Always reconnect the battery positive (+) lead first and the negative (–) last, ensuring that there is a good electrical contact and the battery terminals are secure.

Restart the clock (where fitted) and set it to the correct time.

Re-enter the radio keycode and 'preset' frequencies, if known.

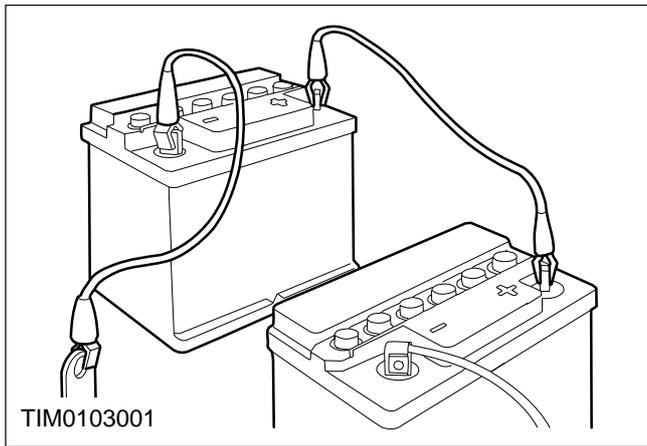
Connecting a Slave Battery Using Jump Leads

 **CAUTION:** Whilst it is not recommended that the vehicle is jump started, it is recognised that this may occasionally be the only practical way to mobilise a vehicle. In such an instance the discharged battery must be recharged immediately after jump starting to avoid permanent damage.

- Always ensure that the jump leads are adequate for the task. Heavy duty cables must be used.
- Always ensure that the slave battery is of the same voltage as the vehicle battery. The batteries must be connected in parallel.
- Always ensure that switchable electric circuits are switched off before connecting jump leads. This reduces the risk of sparks occurring when the final connection is made.

 **CAUTION:** A flat battery condition may have been caused by an electrical short circuit. If this condition exists there will be an apparently live circuit on the vehicle even when all normal circuits are switched off. This can cause arcing when the jump leads are connected.

 **WARNING:** If the slave battery has recently been charged and is gassing, cover the vent plugs or covers with a damp cloth to reduce the risk of explosion should arcing occur when connecting the jump leads.



Always connect the jump leads in the following sequence:

- Slave battery positive first then vehicle battery positive.
- Slave battery negative next and then vehicle earth at least 12 inches (300 mm) from the battery terminal e.g. engine lifting bracket.

⚠ WARNING: Ensure that the ends of the jump leads do not touch each other or earth against the vehicle body at any time while the leads are attached to the battery. A fully charged battery, if shorted through jump leads, can discharge at a rate well above 1000 amps causing violent arcing and very rapid heating of the jump leads and terminals, and can even cause the battery to explode.

- Always reduce the engine speed to idle before disconnecting the jump leads.
- Before removing the jump leads from the vehicle that had the discharged battery, switch on the heater blower (high) or the heated rear screen, to reduce the voltage peak when the leads are removed.
- Always disconnect the jump leads in the reverse order to the connecting sequence and take great care not to short the ends of the leads.

Do not rely on the alternator to restore a discharged battery. For an alternator to recharge a battery, it would take in excess of 8 hours continuous driving with no additional loads placed on the battery.

Component Cleaning

To prevent ingress of dirt, accumulations of loose dirt and greasy deposits should be removed before disconnecting or dismantling components or assemblies.

Components should be thoroughly cleaned before inspection prior to reassembly.

Cleaning Methods

Dry Cleaning

NOTE: Compressed air is sometimes 'wet' so use with caution, especially on hydraulic systems.

Removal of loose dirt with soft or wire brushes.

Scraping dirt off with a piece of metal or wood.

Wiping off with a rag.

Blowing dirt off with compressed air.

(Eye protection should be worn when using this method).

Vacuum Extraction

Removal of dry dust using vacuum equipment. This method should always be used to remove friction lining material dust (asbestos particles).

Steam Cleaning

This method of cleaning can be used on most vehicle components except electrical assemblies. Exposed metal surfaces should be protected, immediately after steam cleaning, to prevent corrosion.

Solvent Cleaning



WARNING: Most solvents require careful handling and some are harmful. Refer to Section 01-01 and to the manufacturer's literature for safety precautions.

Various solvents are available which are suitable for component cleaning. Some components such as brake hydraulic parts and electrical assemblies should be cleaned only with recommended solvents – refer to Section 01-05 or to the section of the manual relevant to the component.

Component Inspection



CAUTION: The information contained in this section is intended as a general guide to inspection of components. It does not supersede the detailed information given in individual subsections' General Specifications or Repair Operations which must always take precedence.

Components may be inspected during repair or overhaul for the following reasons:

- To examine for damage
- To measure wear
- To assess whether the component is likely to function satisfactorily until its next probable overhaul.

Damage

Damage should be assessed under the following categories.

Broken

The component, or a vital part of it, may be fractured in such a way as to make it unusable or irreparable.

Distorted

The component may be bent, twisted, dented or misaligned.

Scored

The function of the component must be taken into account when assessing the effects of scoring on working surfaces. For instance, minor surface scratches or light scoring will cause a brake hydraulic cylinder to fail, but will have little effect in an engine cylinder bore. At the other extreme, robust, heavy duty components, such as suspension spring bushes, will still function satisfactorily even with very deep scores in their surface.

Cracked

In some components cracks may be difficult to find, such as in a cylinder head or block where the crack may widen when the engine is hot, and close up again when cool. It may be necessary to use special equipment, such as penetrating dye or magnetic flux, to detect the presence and extent of a suspected crack.

Corroded, Eroded or Pitted

This is the deterioration of the surface of components, usually as a result of chemical action.

Chemical/Physical Action

Non-metallic components can be adversely affected, such that hardening, softening, cracking etc., may result. For example rubber seals in brake systems may be affected by contaminated fluid, paint finishes by brake fluids etc.

Torn or Cut

Damage to non-metallic components such as oil seals, gaiters, weatherstrips, etc.

Wear

Where the amount of wear allowable on a component is important, limits of wear will usually be given in General Specifications in the relevant subsection of the manual. Where no wear limits are given, the component should be inspected to establish whether the amount of wear apparent on the working surfaces is such that it will seriously affect the function or operation of the component.

Assessment of the Future Useful Life of a Component

If a component has been removed from a high mileage vehicle and a further high mileage is anticipated, this factor should be taken into account when the component is inspected.

When the wear, damage or deterioration of a component is such that it is likely to have only a limited future life, even after overhaul, it may be more economical to renew it.

Where wear, damage or deterioration is apparent on a component which is critical to the safe operation of the vehicle, such as brakes or steering, to the extent that its future life is obviously limited, that component or assembly must be renewed and not overhauled.

Calibration of Essential Measuring Equipment

 **WARNING:** Failure to comply may result in personal injury or damage to components.

It is of fundamental importance that certain essential equipment e.g. torque wrenches, multimeters, exhaust gas analysers, rolling roads etc., are regularly calibrated in accordance with the manufacturers instructions.

Licence Plate Mounting

The necessary parts required for fixing licence plates to unregistered vehicles will be found in a plastic bag placed in the vehicle glove box.

Fitting Instructions

Drill or pierce the licence plate with two 6,5 mm diameter holes at 230 mm between hole centres, each one 115 mm from the vertical centre line of the plate and on the horizontal centre line.

Front – All Variants

Press the expansion nuts supplied firmly into the pierced holes in the front bumper. Screw the licence plate to the expansion nuts using two AB 10 x 22 mm screws.

Rear – All Variants

Check to ensure that the plugs are firmly pressed into the panel holes. Failure to ensure a correct fit could lead to water leaks. Align the plate with the plugs and pierce the sealing membranes by screwing two AB 10 x 16 mm screws carefully into the plugs until the plate is secure.