



# RANGE ROVER

L322

**WORKSHOP MANUAL - SERVICE PROCEDURES**

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## How To Use This Manual

### Introduction

This Manual is designed to assist skilled technicians in the efficient repair and maintenance of Range Rover vehicles.

Individuals who undertake their own repairs should have some skill and training, and limit repairs to components which could not affect the safety of the vehicle or its passengers. Any repairs required to safety critical items such as steering, brakes, suspension or supplementary restraint system should be carried out by a Land Rover Dealer. Repairs to such items should NEVER be attempted by untrained individuals.

### General

To assist in the use of this Manual, it is divided into sections and sub-sections. The section title is given at the top of each page and the relevant sub-section is given at the bottom.

There is a single contents section at the front of the Manual, which is divided by section and sub-section. Each section is numbered from page 1.

The individual items comprising repair operations are to be followed in the sequence in which they appear. Items numbers in the illustration are referred to in the text.

Adjustment, Repair and Overhaul operations include reference to Service Tool numbers and the associated illustration depicts the tool in use. The operations also include reference to wear limits, relevant data, torque figures, and specialist information and useful assembly details. Each adjustment, repair or overhaul operation is given its own Service Repair Operation (SRO) number.

**WARNINGS, CAUTIONS and NOTES** have the following meanings:

**WARNING:** *Procedures which must be followed precisely to avoid the possibility of injury.*

**CAUTION:** *Calls attention to procedures which must be followed to avoid damage to components.*

**NOTE:** *Gives helpful information.*

### References

References to the LH or RH side given in this Manual are made when viewing the vehicle from the rear. With the engine and gearbox assembly removed, the crankshaft pulley end of the engine is referred to as the front.

Operations covered in this Manual do not include reference to testing the vehicle after repair. It is essential that work is inspected and tested after completion and if necessary a road test of the vehicle is carried out particularly where safety related items are concerned.

### Dimensions

The dimensions quoted are to design engineering specification with Service limits where applicable.

# INTRODUCTION

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## Testbook - Fault Diagnostic Equipment

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The new Range Rover is equipped with a number of electronic control systems to provide optimum performance of the vehicle's systems.

Diagnostic equipment (TESTBOOK/T4) is available to assist with the fault diagnostic abilities of the dealer workshop. In particular, the equipment can be used to interrogate the electronic systems for diagnosis of faults which may become evident.

This manual is produced as a reference source to supplement TESTBOOK/T4. When available, the equipment should be used as the primary means of fault diagnosis on electronically controlled systems.

Features of the equipment include:

- Fully upgradable support for the technician
- Structured diagnostics to accommodate all skill levels
- Touch screen operation – TESTBOOK only
- Direct print-out of screen information and test results

## Repairs and Replacements

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When replacement parts are required it is essential that only Land Rover recommended parts are used.

Attention is particularly drawn to the following points concerning repairs and the fitting of replacement parts and accessories.

Safety features and corrosion prevention treatments embodied in the vehicle may be impaired if other than Land Rover recommended parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification. Torque wrench setting figures given in this Manual must be used. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed.

Owners purchasing accessories while travelling abroad should ensure that the accessory and its fitted location on the car conform to legal requirements.

The Terms of the vehicle Warranty may be invalidated by the fitting of parts other than Land Rover recommended parts.

*NOTE: The fitting of non-approved Land Rover parts and accessories, or the carrying out of non-approved alterations or conversions, may be dangerous and could affect the safety of the vehicle and occupants, and also invalidate the terms and conditions of the vehicle warranty.*

All Land Rover recommended parts have the full backing of the vehicle Warranty.

Land Rover Dealers are obliged to supply only Land Rover recommended parts.



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## Specifications

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Land Rover are constantly seeking to improve the specification, design and production of their vehicles and alterations take place accordingly. While every effort has been made to ensure the accuracy of this Manual, it should not be regarded as an infallible guide to current specifications of any particular vehicle.

This Manual does not constitute an offer for sale of any particular vehicle. Land Rover Dealers are not agents of Land Rover and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

# INTRODUCTION

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## Abbreviations and Symbols

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A	Amperes	dia.	Diameter
AAP	Ambient Air Pressure	DIN	Deutsche Industrie Normen (German Industrial Standards)
AAT	Ambient Air Temperature	dc	Direct current
ABDC	After Bottom Dead Centre	DCV	Directional Control Valve
ABS	Anti-Lock Brake System	DOHC	Double Overhead Camshaft
ABS / TC	Anti-lock Brake System / Traction Control	DSP	Digital Signal Processing
ac	Alternating current	DTI	Dial Test Indicator
A/C	Air Conditioning	DMF	Dual Mass Flywheel
ACE	Active Cornering Enhancement	DVD	Digital Versatile Disc
ACEA	Association of Constructors of European Automobiles	EACV	Electronic Air Control Valve
AFR	Air Fuel Ratio	EAT	Electronic Automatic Transmission
AP	Ambient Pressure	EBD	Electronic Brake pressure
APP	Accelerator Pedal Position	ECD	Distribution
ASC	Anti-shunt Control	ECM	European Community Directive
ATC	Air Temperature Control	ECT	Engine Control Module
ATDC	After Top Dead Centre	ECU	Engine Coolant Temperature
AUX	Auxiliary	EDC	Electronic Control Unit
AVC	Automatic Volume Control	EEPROM	Electronic Diesel Control
BBDC	Before Bottom Dead Centre		Electronic Erasable Programmable Read Only Memory
BBUS	Battery Backed Up Sounder	EGR	Exhaust Gas Recirculation
BCU	Body Control Unit	EKA	Emergency Key Access
BDC	Bottom Dead Centre	ELR	Emergency Locking Retractor
bhp	Brake Horse Power	EN	European Norm
BP	Boost Pressure	EOBD	European On Board Diagnostics
BPP	Brake Pedal Position	EON	Enhanced Other Network
BS	British Standard	ERL	Electrical Reference Library
BTDC	Before Top Dead Centre	ETC	Electronic Traction Control
BWD	Backward	EUI	Electronic Unit Injector
C	Celsius	EVAP	Evaporative Emission
CAN	Controller Area Network	EVR	Electronic Vacuum Regulator
CD	Compact Disc	F	Fahrenheit
CDC	Centre Differential Control	ft.	Feet
CDL	Central Door Locking	FBH	Fuel Burning Heater
CD - ROM	Compact Disc - Read Only Memory	FET	Field Effect Transistor
CFC	Chlorofluorocarbon	FIP	Fuel Injection Pump
CHMSL	Centre High Mounted Stop Lamp	FTC	Fast Throttle Control
CKP	Crankshaft Position	FWD	Forward
CLV	Calculated Load Value	>	Greater than
cm	Centimetre	g	Gramme or Gravity
cm <sup>2</sup>	Square centimetre	gal.	Gallons
cm <sup>3</sup>	Cubic centimetre	GMT	Greenwich Mean Time
CMP	Camshaft Position	GPS	Global Positioning System
CPP	Clutch Pedal Position	h	Hour
CO	Carbon Monoxide	hc	High compression
CO <sub>2</sub>	Carbon Dioxide	HC	Hydro Carbons
COB	Clear Over Base	HDC2	Hill Descent Control
CR	Common Rail	HDOP	Height Dilatation Of Precision
CVS	Canister Vent Solenoid	HDPE	High Density Polyethylene
dB	Decibels	HFS	Heated Front Screen
DDM	Driver's Door Module	Hg	Mercury
deg.	Degree, angle or temperature	HO <sub>2</sub> S	Heated Oxygen Sensor
DI	Direct Injection		



HMW	High Molecular Weight	min.	Minimum
HRW	Heated Rear Window	-	Minus (tolerance)
HSLA	High Strength Low Alloy	'	Minute (angle)
ht/HT	High tension	mm	Millimetre
IACV	Idle Air Control Valve	mph	Miles per hour
IAT	Intake Air Temperature	MPi	Multi-Point injection
ICE	In-Car Entertainment	MV	Motorised Valve
i.dia.	Internal diameter	MY	Model Year
IDM	Intelligent Driver Module	NAS	North American Specification
IF	Intermediate Frequency	(-)	Negative (electrical)
in	Inch	Nm	Newton metre
in <sup>3</sup>	Cubic inch	No.	Number
ILT	Inlet Throttle	NO <sub>2</sub>	Nitrogen Dioxide
IPW	Injector Pulse Width	NO <sub>x</sub>	Oxides of Nitrogen
ISO	International Organisation for Standardisation	NTC	Negative Temperature Coefficient
ITS	Inflatable Tubular Structure	NRV	Non Return Valve
k	Thousand	OBD	On Board Diagnostics
kg	Kilogramme	OBM	On Board Monitoring
kg/h	Kilogrammes per hour	o.dia.	Outside diameter
km	Kilometre	OAT	Organic Acid Technology
km/h	Kilometres per hour	ORM	Off-road Mode
kPa	KiloPascal	Ω	Ohm
KS	Knock Sensor	PAS	Power Assisted Steering
<	Less than	PCB	Printed Circuit Board
l	Litre	PCV	Positive Crankcase Ventilation
lb(s)	Pounds	PDC	Parking Distance Control
lbf	Pounds force	PDOP	Position Dilation Of Precision
lbf.in	Pounds force inches	PI	Programme Information
lbf/in <sup>2</sup>	Pounds per square inch	PPS	Pulse Per Second
lbf.ft	Pounds force feet	PS	Programme Service
λ	Lambda	psi	Pounds per square inch
lc	Low compression	pts.	Pints
LCD	Liquid Crystal Display	%	Percentage
LCM	Light Control Module	+	Plus (tolerance) or Positive (electrical)
LED	Light Emitting Diode	±	Plus or minus (tolerance)
LEV	Low Emission Vehicle	PTC	Positive Temperature Coefficient
LH	Left-Hand	PTFE	Polytetrafluoroethylene
LHD	Left-Hand Drive	PVC	Polyvinyl chloride
LSM	Light Switch Module	PWM	Pulse Width Modulation
LVS	Liquid Vapour Separator	RDS	Radio Data Service
m	Metre	r	Radius
μ	Micro	:	Ratio
MAF	Mass Air Flow	ref	Reference
MAP	Manifold Absolute Pressure	REG	Regionalisation
MET	Mechanical, Electrical and Trim	rev/min	Revolutions per minute
MFD	Multi-Function Display	RF	Radio Frequency
MFU	Multi-Function Unit	RGB	Red / Green / Blue
MFL	Multi-Function Logic	RH	Right-Hand
max.	Maximum	RHD	Right-Hand Drive
MEMS	Modular Engine Management System	ROM	Read Only Memory
MID	Multi-Information Display	RON	Research Octane Number
MIG	Metal/Inert Gas	ROV	Roll Over Valve
MIL	Malfunction Indicator Lamp	ROW	Rest Of World
MPa	MegaPascal	SAE	Society of Automotive Engineers
MOSFET	Metal Oxide Semiconductor Field Effect Transistor	SAI	Secondary Air Injection
		"	Second (angle)

## INTRODUCTION

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SLABS	Self Levelling and Anti-Lock Brake System
SLS	Self Levelling Suspension
SOHC	Single Overhead Camshaft
SPE	Single Point Entry
sp.gr	Specific gravity
SRO	Service Repair Operation
SRS	Supplementary Restraint System
std.	Standard
synchro	Synchronizer or synchromesh
TA	Traffic Announcement
TDC	Top Dead Centre
TMAP	Temperature, Manifold Absolute Pressure
TMC	Traffic Management Channel
TP	Throttle Position
TP	Throttle Position
TV	Torsional Vibration
TWC	Three-way Catalyst
TXV	Thermostatic Expansion Valve
UK	United Kingdom
US	United States
US gallons/h	US gallons per hour
V	Volt
Var.	Variable
VDOP	Velocity Dilatation Of Precision
VICS	Vehicle Information Communications System
VIN	Vehicle Identification Number
VIS	Variable Intake System
VRS	Variable Reluctance Sensor
VSS	Vehicle Speed Signal
VCC	Variable Camshaft Control
W	Watt
WOT	Wide Open Throttle



## GENERAL INFORMATION

### General Precautions

#### Dangerous substances

Modern vehicles contain many materials and liquids which if not handled with care can be hazardous to both personal health and the environment.

***WARNING: Many liquids and other substances used in motor vehicles are poisonous and should under no circumstances be consumed and should, as far as possible, be kept from contact with the skin. These liquids and substances include acid, anti-freeze, asbestos, brake fluid, fuel, windscreen washer additives, lubricants, refrigerants and various adhesives.***

***Always read carefully the instructions printed on labels or stamped on components and obey them implicitly. Such instructions are included for reasons of your health and personal safety. Never disregard them.***

#### Synthetic rubber

Many 'O' rings, seals, hoses, flexible pipes and other similar items which appear to be natural rubber, are in fact, made of synthetic materials called Fluoroelastomers. Under normal operating conditions this material is safe and does not present a health hazard. However, if the material is damaged by fire or excessive heating, it can break down and produce highly corrosive Hydrofluoric acid.

Contact with Hydrofluoric acid can cause serious burns on contact with skin. If skin contact does occur:

- Remove any contaminated clothing immediately.
- Irrigate effected area of skin with a copious amount of cold water or limewater for 15 to 60 minutes.
- Obtain medical assistance immediately.

Should any material be in a burnt or overheated condition, handle with extreme caution and wear protective clothing (seamless industrial gloves, protective apron etc.).

Decontaminate and dispose of gloves immediately after use.

#### Lubricating oils

Avoid excessive skin contact with used lubricating oils and always adhere to the health protection precautions.

***WARNING: Avoid excessive skin contact with used engine oil. Used engine oil contains potentially harmful contaminants which may cause skin cancer or other serious skin disorders.***

***WARNING: Avoid excessive skin contact with mineral oil. Mineral oils remove the natural fats from the skin, leading to dryness, irritation and dermatitis.***

#### Health protection precautions

The following precautions should be observed at all times.

- Wear protective clothing, including impervious gloves where practicable.
- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Do not put oily rags in pockets.
- Avoid contaminating clothes (particularly those next to the skin) with oil.
- Overalls must be cleaned regularly. Discard heavily soiled clothing and oil impregnated footwear.
- First aid treatment should be obtained immediately for open cuts and wounds.
- Apply barrier creams before each work period to help prevent lubricating oil from contaminating the skin.
- Wash with soap and water to ensure all oil is removed (proprietary skin cleansers and nail brushes will help).
- Use moisturisers after cleaning; preparations containing lanolin help replace the skin's natural oils which have been removed.
- Do not use petrol/gasoline, kerosene, diesel fuel, oil, thinners or solvents for cleaning skin.
- Where practicable, degrease components prior to handling.
- If skin disorders develop, obtain medical advice without delay.
- Wear eye protection (e.g. goggles or face shield) if there is a risk of eye contamination. Eye wash facilities should be provided in close vicinity of the work area.

# GENERAL INFORMATION

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## Safety Instructions

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Whenever possible, use a lift or pit when working beneath vehicle, in preference to jacking. Chock wheels as well as applying parking brake.

### Jacking

Always refer to Lifting and Towing Section of this manual, prior to jacking vehicle.

Always use the recommended jacking points.

Always ensure that any lifting apparatus has sufficient load capacity for the weight to be lifted.

Ensure the vehicle is standing on level ground prior to lifting or jacking.

Apply the handbrake and chock the wheels.

***WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.***

Do not leave tools, lifting equipment, spilt oil, etc. around or on the work bench area. Always keep a clean and tidy work area.

### Brake pads

Always fit the correct grade and specification of brake pads. When renewing brake pads, always replace as complete axle sets.

### Brake hydraulics

Observe the following recommendations when working on the brake system:

- Always use two spanners when loosening or tightening brake pipe or hose connections.
- Ensure that hoses run in a natural curve and are not kinked or twisted.
- Fit brake pipes securely in their retaining clips and ensure that the pipe cannot contact a potential chafing point.
- Containers used for brake fluid must be kept absolutely clean.
- Do not store brake fluid in an unsealed container, it will absorb water and in this condition would be dangerous to use due to a lowering of its boiling point.
- Do not allow brake fluid to be contaminated with mineral oil, or put new brake fluid in a container which has previously contained mineral oil.
- Do not re-use brake fluid removed from the system.
- Always use clean brake fluid or a recommended alternative to clean hydraulic components.
- After disconnection of brake pipes and hoses, immediately fit suitable blanking caps or plugs to prevent the ingress of dirt.
- Only use the correct brake fittings with compatible threads.
- Observe absolute cleanliness when working with hydraulic components.

### Cooling system caps and plugs

Extreme care is necessary when removing expansion tank caps and coolant drain or bleed screws when the engine is hot, especially if it is overheated. To avoid the possibility of scalding, allow the engine to cool before attempting removal.

### Air suspension

Whenever working on the air suspension system, suitable eye protection must always be worn.



### Environmental Precautions

#### General

This section provides general information which can help to reduce the environmental impacts from the activities carried out in workshops.

#### Emissions to air

Many of the activities that are carried out in workshops emit gases and fumes which contribute to global warming, depletion of the ozone layer and/or the formation of photochemical smog at ground level. By considering how the workshop activities are carried out, these gases and fumes can be minimised, thus reducing the impact on the environment.

#### Exhaust fumes

Running car engines is an essential part of workshop activities and exhaust fumes need to be ventilated to atmosphere. However, the amount of time engines are running and the position of the vehicle should be carefully considered at all times, to reduce the release of poisonous gases and minimise the inconvenience to people living nearby.

#### Solvents

Some of the cleaning agents used are solvent based and will evaporate to atmosphere if used carelessly, or if cans are left unsealed. All solvent containers should be firmly closed when not needed and solvent should be used sparingly. Suitable alternative materials may be available to replace some of the commonly used solvents. Similarly, many paints are solvent based and the spray should be minimised to reduce solvent emissions.

#### Refrigerant

It is illegal to release any refrigerants into the atmosphere. Discharge and replacement of these materials from air conditioning units should only be carried out using the correct equipment.

#### Checklist

Always adhere to the following.

##### Engines:

- Don't leave engines running unnecessarily;
- Minimise testing times and check where the exhaust fumes are being blown.

#### Materials:

- Keep lids on containers of solvents;
- Only use the minimum quantity;
- Consider alternative materials;
- Minimise over-spray when painting.

#### Gases:

- Use the correct equipment for collecting refrigerants;
- Don't burn rubbish on site.

#### Discharges to water

Most sites will have two systems for discharging water: storm drains and foul drains. Storm drains should only receive clean water, foul drains will take dirty water.

The foul drain will accept many of the normal waste waters such as washing water, detergents and domestic type wastes, but oil, petrol, solvent, acids, hydraulic oil, antifreeze and other such substances should never be poured down the drain. If in any doubt speak to the Water Company first.

Every precaution must be taken to prevent spillage of oil, fuel, solvents etc. reaching the drains. All handling of such materials must take place well away from the drains and preferably in an area with a kerb or wall around it, to prevent discharge into the drain. If a spillage occurs it should be soaked up immediately. Having a spill kit available will make this easier.

#### Additional precautions

Check whether the surface water drains are connected to an oil water separator, this could reduce the pollution if an incident was to occur. Oil water separators do need regular maintenance to ensure effectiveness.

# GENERAL INFORMATION

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## ***Checklist***

Always adhere to the following.

### Disposal:

- Never pour anything down a drain without first checking that it is environmentally safe to do so, and that it does not contravene any local regulations or bye-laws;
- Have oil traps emptied regularly.

### Spillage prevention:

- Store liquids in a walled area;
- Make sure that taps on liquid containers are secure and cannot be accidentally turned on;
- Protect bulk storage tanks from vandalism by locking the valves;
- Transfer liquids from one container to another in an area away from open drains;
- Ensure lids are replaced securely on containers;
- Have spill kits available near to points of storage and handling of liquids.

## ***Spill kits***

Special materials are available to absorb a number of different substances. They can be in granular form, ready to use and bought in convenient containers for storage. Disposal of used spill-absorbing material is dealt with in 'Waste Management' section.

## **Land contamination**

Oils, fuels and solvents etc. can contaminate any soil that they are allowed to contact. Such materials should never be disposed of by pouring onto soil and every precaution must be taken to prevent spillage reaching soil. Waste materials stored on open ground could also leak, or have polluting substances washed off them that would contaminate the land. Always store these materials in suitable skips or other similarly robust containers.

## ***Checklist***

Always adhere to the following.

- Don't pour or spill anything onto the soil or bare ground;
- Don't store waste materials on bare ground, see 'Spillage prevention' list.

## **Legal compliance**

Some sites may have a discharge consent for effluent discharge to the foul drain for a car wash etc. It is important to know what materials are allowed in the drain and to check the results of any monitoring carried out by the Water Company.

Where paint-spraying operations are carried out it may be necessary to apply to the Local Authority for an air emissions licence to operate the plant. If such a licence is in operation, additional precautions will be necessary to comply with the requirements, and the results of any air quality monitoring must be checked regularly.

## ***Checklist***

Always adhere to the following.

- Know what legal consents and licences apply to the operations;
- Check that the emissions and discharges comply with legal requirements.

## **Local issues**

A number of environmental issues will be of particular concern to residents and other neighbours close to the site. The sensitivity of these issues will depend on the proximity of the site and the layout and amount of activity carried on at the site.

Noise is a major concern and therefore consideration should be given to the time spent carrying out noisy activities and the location of those activities that can cause excessive noise.

Car alarm testing, panel beating, hammering and other such noisy activities should, whenever possible, be carried out indoors with doors and windows shut or as far away from houses as possible.

Running vehicle engines may be an outside activity which could cause nuisance to neighbours because of both noise and smell.

Be sensitive to the time of day when these activities are carried out and minimise the time of the noisy operation, particularly in the early morning and late evening.

Another local concern will be the smell from the various materials used. Using less solvent, paint and petrol could help prevent this annoyance.

Local residents and other business users will also be concerned about traffic congestion, noise and exhaust fumes, be sensitive to these concerns and try to minimise inconvenience from deliveries, customers and servicing operations.



## GENERAL INFORMATION

### **Checklist**

Always adhere to the following.

- Identify where the neighbours who are likely to be affected are situated;
- Minimise noise, smells and traffic nuisance;
- Prevent litter by putting waste in the correct containers;
- Have waste skips emptied regularly.

### **Use of resource**

Another environmental concern is the waste of materials and energy that can occur in day to day activities.

Electricity for heating, lighting and compressed air uses resources and releases pollution during its generation.

Fuel used for heating, running cars or vans and mobile plant is another limited resource which consumes large amounts of energy during its extraction and refining processes.

Water has to be cleaned, piped to site and disposed of; all of which creates more potential pollution.

Oil, spares, paint etc., have all produced pollution in the process of manufacture and they become a waste disposal problem if discarded.

### **Checklist**

Always adhere to the following.

Electricity and heating:

- Keep doors and windows closed in the winter;
- Switch off machinery or lights when not needed;
- Use energy efficient heating systems;
- Switch off computers and photocopiers when not needed.

Fuel:

- Don't run engines unnecessarily;
- Think about whether journeys are necessary and drive to conserve fuel.

Water:

- Don't leave taps and hose pipes running;
- Mend leaks quickly, don't be wasteful.

Compressed air:

- Don't leave valves open;
- Mend leaks quickly;
- Don't leave the compressor running when not needed.

Use of environmentally damaging materials:

- Check whether a less toxic material is available.

Handling and storage of materials:

- Have the correct facilities available for handling liquids to prevent spillage and wastage as listed above;
- Provide suitable locations for storage to prevent frost damage or other deterioration.

### **Waste Management**

One of the major ways that pollution can be reduced is by the careful handling, storage and disposal of all waste materials that occur on sites. Legislation makes it illegal to dispose of waste materials other than to licensed waste carriers and disposal sites. This means that it is necessary to not only know what the waste materials are, but also to have the necessary documentation and licenses.

#### **Handling and storage of waste**

Ensure that waste materials are not poured down the drain or onto soils. They should be stored in such a way as to prevent the escape of the material to land, water or air.

They must also be segregated into different types of waste e.g. oil, metals, batteries, used vehicle components. This will prevent any reaction between different materials and assist in disposal.

#### **Disposal of waste**

Disposal of waste materials must only be to waste carriers who are licensed to carry those particular waste materials and all the necessary documentation must be completed. The waste carrier is responsible for ensuring that the waste is taken to the correct disposal sites.

# GENERAL INFORMATION

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Dispose of waste in accordance with the following guidelines.

- **Fuel, hydraulic fluid, anti-freeze and oil:** keep separate and dispose of to specialist contractor.
- **Refrigerant:** collect in specialist equipment and reuse.
- **Detergents:** safe to pour down the foul drain if diluted.
- **Paint, thinners:** keep separate and dispose of to specialist contractor.
- **Components:** send back to supplier for refurbishment, or disassemble and reuse any suitable parts. Dispose of the remainder in ordinary waste.
- **Small parts:** reuse any suitable parts, dispose of the remainder in ordinary waste.
- **Metals:** can be sold if kept separate from general waste.
- **Tyres:** keep separate and dispose of to specialist contractor.
- **Packaging:** compact as much as possible and dispose of in ordinary waste.
- **Asbestos-containing:** keep separate and dispose of to specialist contractor.
- **Oily and fuel wastes (e.g. rags, used spill kit material):** keep separate and dispose of to specialist contractor.
- **Air filters:** keep separate and dispose of to specialist contractor.
- **Rubber/plastics:** dispose of in ordinary waste.
- **Hoses:** dispose of in ordinary waste.
- **Batteries:** keep separate and dispose of to specialist contractor.
- **Airbags - explosives:** keep separate and dispose of to specialist contractor.
- **Electrical components:** send back to supplier for refurbishment, or disassemble and reuse any suitable parts. Dispose of the remainder in ordinary waste.
- **Electronic components:** send back to supplier for refurbishment, or disassemble and reuse any suitable parts. Dispose of the remainder in ordinary waste.
- **Catalysts:** can be sold if kept separate from general waste
- **Used spill-absorbing material:** keep separate and dispose of to specialist contractor.
- **Office waste:** recycle paper and toner and ink cartridges, dispose of the remainder in ordinary waste.

## General Fitting Instructions

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### Component removal

Whenever possible, clean components and surrounding area before removal.

- Blank off openings exposed by component removal.
- Immediately seal fuel, oil or hydraulic lines when apertures are exposed; use plastic caps or plugs to prevent loss of fluid and ingress of dirt.
- Close the open ends of oilways exposed by component removal with tapered hardwood plugs or conspicuous plastic plugs.
- Immediately a component is removed, place it in a suitable container; use a separate container for each component and its associated parts.
- Clean bench and provide marking materials, labels and containers before dismantling a component.

### Dismantling

Observe scrupulous cleanliness when dismantling components, particularly when brake, fuel or hydraulic system parts are being worked on. A particle of dirt or a cloth fragment could cause a serious malfunction if trapped in these systems.

- Blow out all tapped holes, crevices, oilways and fluid passages with an air line. Ensure that any 'O' rings used for sealing are correctly replaced or renewed, if disturbed during the process.
- Use marking ink to identify mating parts and ensure correct reassembly. Do not use a centre punch or scribe to mark parts, they could initiate cracks or distortion in marked components.
- Wire together mating parts where necessary to prevent accidental interchange (e.g. roller bearing components).
- Wire labels on to all parts which are to be renewed, and to parts requiring further inspection before being passed for reassembly; place these parts in separate containers from those containing parts for rebuild.
- Do not discard a part due for renewal until after comparing it with a new part, to ensure that its correct replacement has been obtained.

### Cleaning components

Always use the recommended cleaning agent or equivalent. Ensure that adequate ventilation is provided when volatile degreasing agents are being used. Do not use degreasing equipment for components containing items which could be damaged by the use of this process.



### General inspection

All components should be inspected for wear or damage before being reassembled.

- Never inspect a component for wear or dimensional check unless it is absolutely clean; a slight smear of grease can conceal an incipient failure.
- When a component is to be checked dimensionally against recommended values, use the appropriate measuring equipment (surface plates, micrometers, dial gauges etc.). Ensure the measuring equipment is calibrated and in good serviceable condition.
- Reject a component if its dimensions are outside the specified tolerances, or if it appears to be damaged.
- A part may be refitted if its critical dimension is exactly to its tolerance limit and it appears to be in satisfactory condition. Use 'Plastigauge' 12 Type PG-1 for checking bearing surface clearances.

### Ball and Roller Bearings

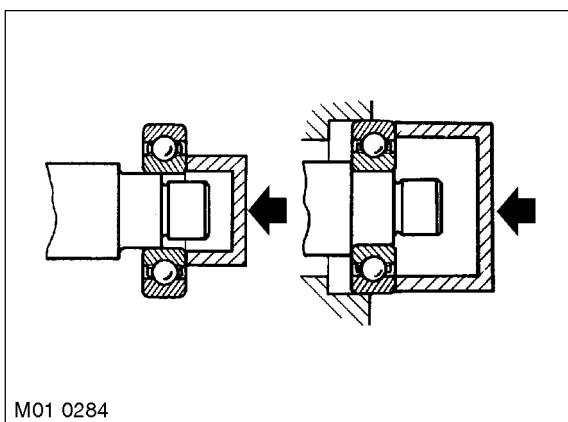
#### General

When removing and installing bearings, ensure that the following practices are observed to ensure component serviceability.

- Remove all traces of lubricant from bearing under inspection by cleaning with a suitable degreasant; maintain absolute cleanliness throughout operations.
- Conduct a visual inspection for markings on rolling elements, raceways, outer surface of outer rings or inner surface of inner rings. Reject any bearings found to be marked, since marking in these areas indicates onset of wear.
- Hold inner race of bearing between finger and thumb of one hand and spin outer race to check that it revolves absolutely smoothly. Repeat, holding outer race and spinning inner race.
- Rotate outer ring gently with a reciprocating motion, while holding inner ring; feel for any check or obstruction to rotation. Reject bearing if action is not perfectly smooth.
- Lubricate bearing with generous amounts of lubricant appropriate to installation.
- Inspect shaft and bearing housing for discolouration or other markings which indicate movement between bearing and seatings.
- Ensure that shaft and housing are clean and free from burrs before fitting bearing.
- If one bearing of a pair shows an imperfection, it is advisable to replace both with new bearings; an exception could be if the faulty bearing had covered a low mileage, and it can be established that damage is confined to only one bearing.
- Never refit a ball or roller bearing without first ensuring that it is in a fully serviceable condition.
- When hub bearings are removed or displaced, new bearings must be fitted; do not attempt to refit the old hub bearings.

## GENERAL INFORMATION

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M01 0284

- When fitting a bearing to a shaft, only apply force to the inner ring of the bearing. When fitting a bearing into a housing, only apply force to the outer ring of the bearing.
- In the case of grease lubricated bearings (e.g. hub bearings) fill the space between bearing and outer seal with the recommended grade of grease before fitting seal.
- Always mark components of separable bearings (e.g. taper roller bearings) when dismantling, to ensure correct reassembly. Never fit new rollers in a used outer ring; always fit a complete new bearing assembly.

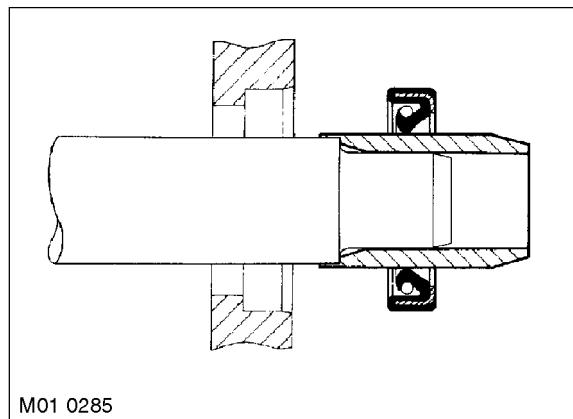
## Oil Seals

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### General

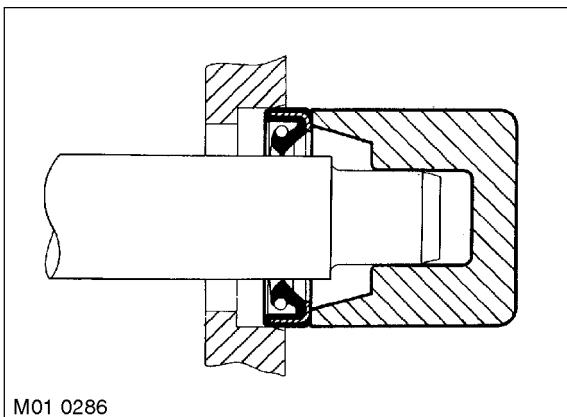
Always renew oil seals which have been removed from their working location (whether as an individual component or as part of an assembly). NEVER use a seal which has been improperly stored or handled, such as hung on a hook or nail.

- Carefully examine seal before fitting to ensure that it is clean and undamaged.
- Ensure the surface on which the new seal is to run is free of burrs or scratches. Renew the component if the original sealing surface cannot be completely restored.
- Protect the seal from any surface which it has to pass when being fitted. Use a protective sleeve or tape to cover the relevant surface.
- Lubricate the sealing lips with a recommended lubricant before use to prevent damage during initial use. On dual lipped seals, smear the area between the lips with grease.
- If a seal spring is provided, ensure that it is fitted correctly. Place lip of seal towards fluid to be sealed and slide into position on shaft. Use fitting sleeve where possible to protect sealing lip from damage by sharp corners, threads or splines. If a fitting sleeve is not available, use plastic tube or tape to prevent damage to the sealing lip.



M01 0285

- Grease outside diameter of seal, place square to housing recess and press into position using great care, and if possible a 'bell piece' to ensure that seal is not tilted. In some cases it may be preferable to fit seal to housing before fitting to shaft. Never let weight of unsupported shaft rest in seal.



M01 0286

- Use the recommended service tool to fit an oil seal. If the correct service tool is not available, use a suitable tube approximately 0.4 mm (0.015 in.) smaller than the outside diameter of the seal. Use a hammer **VERY GENTLY** on drift, if a suitable press is not available.
- Press or drift the seal in to the depth of its housing with the sealing lip facing the lubricant to be retained if the housing is shouldered, or flush with the face of the housing where no shoulder is provided. Ensure that the seal does not enter the housing in a tilted position.

## Joints and Joint Faces

### General

Fit joints dry unless specified otherwise.

- Always use the correct gaskets as specified.
- When jointing compound is used, apply in a thin uniform film to metal surfaces; take care to prevent jointing compound from entering oilways, pipes or blind tapped holes.
- If gaskets and/or jointing compound is recommended for use; remove all traces of old jointing material prior to reassembly. Do not use a tool which will damage the joint faces and smooth out any scratches or burrs using an oil stone. Do not allow dirt or jointing material to enter any tapped holes or enclosed parts.
- Prior to reassembly, blow through any pipes, channels or crevices with compressed air.

# GENERAL INFORMATION

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## Locking Devices

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### General

Always replace locking devices with one of the same design.

### Tab washers

Always release locking tabs and fit new locking washers. Do not re-use locking tabs.

### Locking nuts

Always use a backing spanner when loosening or tightening locking nuts, brake and fuel pipe unions.

### Roll pins

Always fit new roll pins of an interference fit in the hole.

### Circlips

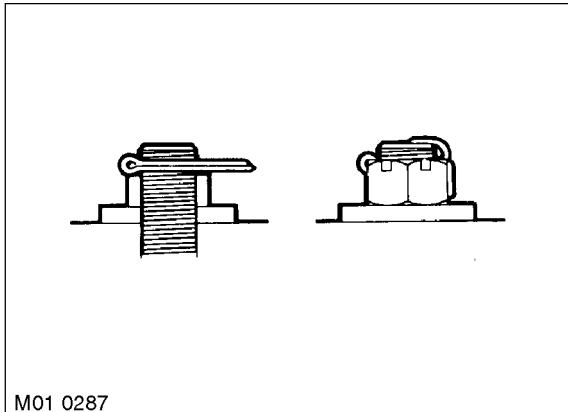
Always fit new circlips of the correct size for the groove.

### Keys and keyways

Remove burrs from edges of keyways with a fine file and clean thoroughly before attempting to refit key.

Clean and inspect key closely; keys are suitable for refitting only if indistinguishable from new, as any indentation may indicate the onset of wear.

### Split pins



Always fit new split-pins of the correct size for the hole in the bolt or stud.



## Screw Threads

### General

Metric threads to ISO standards are used.

Damaged nuts, bolts and screws must always be discarded. Cleaning damaged threads with a die or tap impairs the strength and fit of the threads and is not recommended.

Always ensure that replacement bolts are at least equal in strength to those replaced. Castellated nuts must not be loosened to accept a split-pin, except in recommended cases when this forms part of an adjustment.

Do not allow oil or grease to enter blind threaded holes. The hydraulic action on screwing in the bolt or stud could split the housing.

Always tighten a nut or bolt to the recommended torque figure. Damaged or corroded threads can affect the torque reading.

To check or re-tighten a bolt or screw to a specified torque figure, first loosen a quarter of a turn, then re-tighten to the correct torque figure.

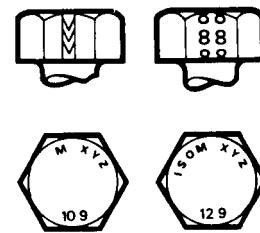
Oil thread lightly before tightening to ensure a free running thread, except in the case of threads treated with sealant/lubricant, and self-locking nuts.

## Bolt and Nut Identification

### Bolt identification

A large number of the nuts and bolts used on New Range Rover must be discarded after removing or loosening them. Refer to the repair sections in this Manual for further information.

**CAUTION: All rear suspension fixings must be replaced whenever they are removed.**



M01 0288

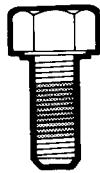
An ISO metric bolt or screw made of steel and larger than 6 mm in diameter can be identified by either of the symbols ISO M or M embossed or indented on top of the bolt head.

In addition to marks identifying the manufacturer, the top of the bolt head is also marked with symbols indicating the strength grade, e.g. 8.8; 10.9; 12.9; 14.9. As an alternative, some bolts and screws have the M and strength grade symbol stamped on the flats of the hexagon.

## GENERAL INFORMATION

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### Encapsulated bolts and screws



M01 0289

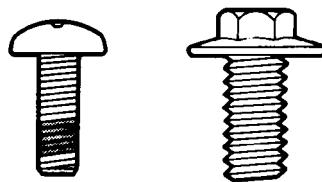
Encapsulated bolts and screws have a micro-encapsulated locking agent pre-applied to the thread. They are identified by a coloured section which extends 360° around the thread. The locking agent is released and activated by the assembly process and is then chemically cured to provide the locking action.

Unless a specific repair procedure states otherwise, encapsulated bolts may be re-used providing the threads are undamaged and the following procedure is adopted:

- Remove loose adhesive from the bolt and housing threads.
- Ensure threads are clean and free of oil and grease.
- Apply an approved locking agent.

An encapsulated bolt may be replaced with a bolt of equivalent specification provided it is treated with an approved locking agent.

### Self-locking bolts and screws



M01 0290

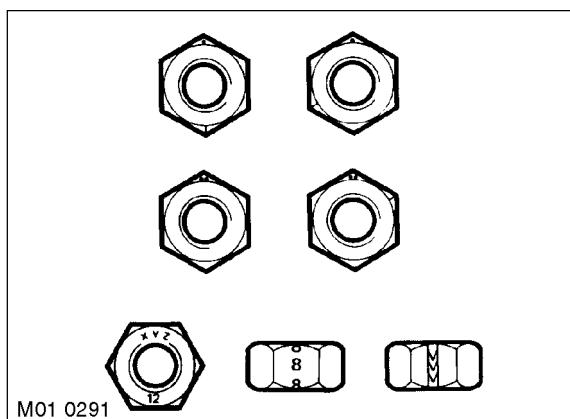
Self-locking bolts and screws, i.e. nylon patched or trilobular thread can be re-used providing resistance can be felt when the locking portion enters the female thread.

Nylon patched bolts and screws have a locking agent pre-applied to the threads. They are identified by the presence of a coloured section of thread which extends for up to 180° around the thread.

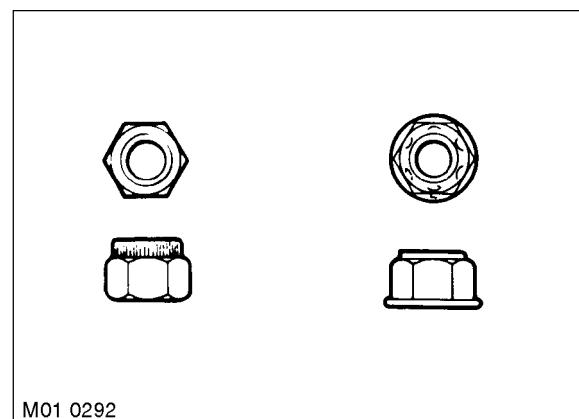
Trilobular bolts (i.e. Powerlok) have a special thread form which creates a slight interference with the thread of the hole or nut into which it is screwed.

**DO NOT** re-use self-locking fasteners in critical locations (e.g. engine bearings, flywheel). Always use the correct replacement self-locking nut, bolt or screw.

**DO NOT** fit non self-locking fasteners in applications where a self-locking nut, bolt or screw is specified.

**Nut identification**

M01 0291

***Self-locking nuts***

M01 0292

A nut with an ISO metric thread is marked on one face or on one of the flats of the hexagon with the strength grade symbol 8, 12, or 14. Some nuts with a strength grade 4, 5 or 6 are also marked and some have the metric symbol M on the flat opposite the strength grade marking.

A clock face system is sometimes used as an alternative method of indicating the strength grade. The external chamfers or a face of the nut is marked in a position relative to the appropriate hour mark on a clock face to indicate the strength grade.

A dot is used to locate the 12 o'clock position and a dash to indicate the strength grade. If the grade is above 12, two dots identify the 12 o'clock position.

When tightening a slotted or castellated nut, never loosen it to insert a split pin except where recommended as part of an adjustment. If difficulty is experienced, alternative washers or nuts should be selected, or the washer thickness reduced.

Where bearing pre-load is involved, nuts should be tightened in accordance with special instructions.

Self-locking nuts, i.e. nylon insert or deferred thread nuts can be re-used providing resistance can be felt when the locking portion of the nut passes over the thread of the bolt or stud.

Where self-locking nuts have been removed, it is advisable to replace them with new ones of the same type.

# GENERAL INFORMATION

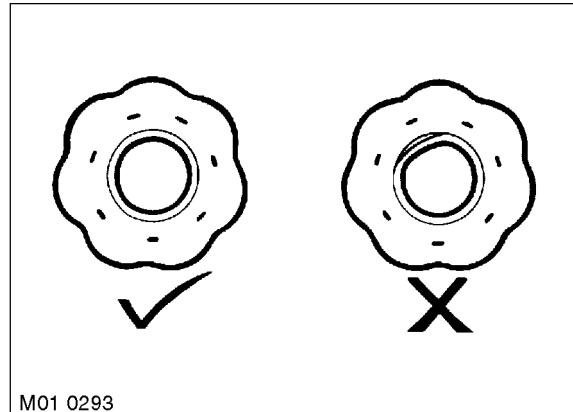
## Flexible Pipes and Hoses

### General

When removing and installing flexible hydraulic pipes and hoses, ensure that the following practices are observed to ensure component serviceability.

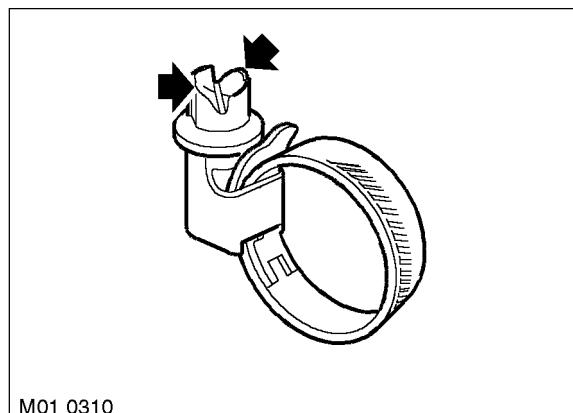
- Before removing any brake or power steering hose, clean end fittings and area surrounding them as thoroughly as possible.
- Obtain appropriate plugs or caps before detaching hose end fittings, so that the ports can be immediately covered to prevent the ingress of dirt.
- Clean hose externally and blow through with airline. Examine carefully for cracks, separation of plies, security of end fittings and external damage. Reject any faulty hoses.
- When refitting a hose, ensure that no unnecessary bends are introduced, and that hose is not twisted before or during tightening of union nuts.
- Fit a cap to seal a hydraulic union and a plug to its socket after removal to prevent ingress of dirt.
- Absolute cleanliness must be observed with hydraulic components at all times.
- After any work on hydraulic systems, carefully inspect for leaks underneath the vehicle while a second operator applies maximum brake pressure to the brakes (engine running) and operates the steering.

### Fuel system hoses



All fuel hoses are made up of two laminations, an armoured rubber outer sleeve and an inner viton core. If any of the fuel system hoses have been disconnected, it is imperative that the internal bore is inspected to ensure that the viton lining has not become separated from the armoured outer sleeve. A new hose must be fitted if separation is evident.

### Fuel system hose clips



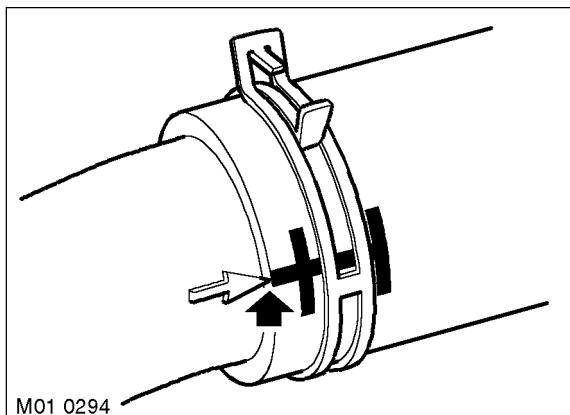
Certain fuel system hoses are of the 'break-off head' type, where a portion of the slot in the screw head shears off when the clip is tightened to a pre-determined torque. These clips may be removed using a screwdriver and must be replaced with a new clip of the same type. Clips must be tightened until the portion of the slot shears off. Do not attempt to tighten clips by any other method.



### Cooling system hoses

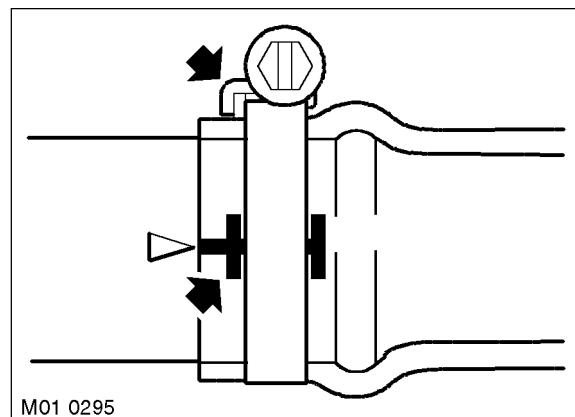
The following precautions **MUST** be followed to ensure that integrity of cooling hoses and their connections to system components are maintained.

#### Hose orientation and connection

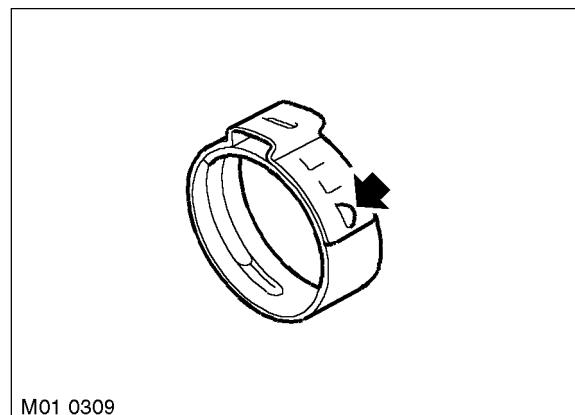


Correct orientation of cooling hoses is important in ensuring that the hose does not become fatigued or damaged through contact with adjacent components. Where 'timing' marks are provided on the hose and corresponding connection, these must be used to ensure correct orientation. Hoses must be pushed fully onto their connection points. Usually, a moulded form on the stub pipe provides a positive indicator.

#### Hose clips



Markings are usually provided on the hose to indicate the correct clip position. If no markings are provided, position the clip directly behind the retaining lip at the end of the stub as shown. Worm drive clips should be oriented with the crimped side of the drive housing facing towards the end of the hose, or the hose may become pinched between the clip and the stub pipe retaining lip. Worm drive clips should be tightened to 3 Nm (2 lbf.ft) unless otherwise stated. Ensure that hose clips do not foul adjacent components.



'Oetiker' clips may be removed by bending the tag (arrowed) and releasing the free end of the clip. Clips must not be re-used. When fitting new clips, ensure clip is correctly positioned on hose before tightening and ensure that when clip is tightened, the tag is located in longitudinal slot in free end of clip (arrowed in illustration).

## GENERAL INFORMATION

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### **Heat protection**

Always ensure that heatshields and protective sheathing are in good condition. Replace if damage is evident. Particular care must be taken when routing hoses close to hot engine components, such as the exhaust manifold and the Exhaust Gas Recirculation (EGR) pipe. Hoses will relax and deflect slightly when hot; ensure this movement is taken into account when routing and securing hoses.

### **Service Tools**

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Special service tools have been developed to facilitate removal, dismantling and assembly of mechanical components in a cost effective and time efficient manner. The use of such special tools also helps prevent the potential for damage to components. Service tools may be obtained from:

All orders and enquiries from the United Kingdom and European countries except Germany, Austria, Switzerland and Spain and countries not in the following list should be sent direct to :

#### **SPX UK Ltd;**

Genoa House,  
Everdon Park,  
Daventry,  
Northants,  
NN11 5YJ.  
England,

 00 44 (0) 1327 303467 / 303455

 00 44 (0) 1327 706632

e-mail: [spxsalesuk@servicesolutions.spx.com](mailto:spxsalesuk@servicesolutions.spx.com)

Overseas orders for the following countries should be placed with the local SPX distributor.

#### **Germany, Austria and Switzerland**

**SPX Europe GMBH,**  
Porchestraße 4,  
63512 Hainburg,

Germany

 00 49 61829590

 00 49 6182959299

#### **Spain**

**SPX Iberica SA,**  
C/Francisco Aritio,  
158 nave 72 (Nudo Oeste)  
19004 Guadalajara,

Spain

 00 34 949208381

 00 34 949208327



## North America

**SPX Corporation,**  
665, Eisenhower Drive,  
Owatonna,  
MN 55060,

USA  
 00 18 772979110  
 00 18 005787375

## Australia

**SPX Australia,**  
28, Clayton Road,  
Notting Hill,  
Victoria 3168,

Australia  
 00 (61) 00395446222  
 00 (61) 00395445222  
e-mail: sales@spx.com.au

## Japan and East Asia

**Jatek Ltd,**  
5 - 53, Minawacho 2-chome,  
Kohoku-ku,  
Yokohama,  
Kanagawa 223-0051,

Japan  
 00 81 455627700  
 00 81 455627800

## Rolling Road Testing

### General

**IMPORTANT: Use a four wheel rolling road for brake testing if possible.**

### Four wheel rolling road

Provided that front and rear rollers are rotating at identical speeds and that normal workshop safety standards are applied, there is no speed restriction during testing except any that may apply to the tyres.

**CAUTION: Ensure that gearbox selector lever is at 'N', hill descent control is not selected and handbrake is released.**

When checking brakes, run engine at idle speed to maintain servo vacuum.

### Two wheel rolling road

If brake testing on a two wheel rolling road, then the following precautions must be taken:

- Disconnect propeller shaft from the transfer box shaft driving the axle whose wheels are NOT on the rolling road.
- Neutral selected in gearbox.

# GENERAL INFORMATION

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## Fuel Handling Precautions

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Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. The vapour is heavier than air and will always fall to the lowest level. The vapour can be easily distributed throughout a workshop by air currents; consequently, even a small spillage of fuel is potentially very dangerous.

The following information provides basic precautions which must be observed if fuel is to be handled safely. It also outlines other areas of risk which must not be ignored. This information is issued for basic guidance only, if in doubt consult your local Fire Officer.

### General

Always have a fire extinguisher containing FOAM, CO<sub>2</sub>, GAS or POWDER close at hand when handling or draining fuel or when dismantling fuel systems. Fire extinguishers should also be located in areas where fuel containers are stored.

Always disconnect the vehicle battery before carrying out dismantling or draining work on a fuel system.

**CAUTION: To prevent damage to the navigation computer software, a waiting period of two minutes must elapse after the ignition is switched off before the battery leads are disconnected.**

Whenever fuel is being handled, drained or stored, or when fuel systems are being dismantled, all forms of ignition must be extinguished or removed; any leadlamps must be flameproof and kept clear of spillage.

**WARNING: No one should be permitted to repair components associated with fuel without first having specialist training.**

**WARNING: Do not remove fuel system components while the vehicle is over a pit.**

### Fuel tank draining

Fuel tank draining should be carried out in accordance with the procedure outlined in the **FUEL DELIVERY** section of this manual and observing the following precautions.

**WARNING: Fuel must not be extracted or drained from any vehicle while it is over a pit. Extraction or draining of fuel must be carried out in a well ventilated area.**

*The capacity of containers must be more than adequate for the amount of fuel to be extracted or drained. The container should be clearly marked with its contents and placed in a safe storage area which meets the requirements of local authority regulations.*

### Fuel tank removal

When the fuel line is secured to the fuel tank outlet by a spring steel clip, the clip must be released before the fuel line is disconnected or the fuel tank is removed. This procedure will avoid the possibility of fumes in the fuel tank being ignited when the clip is released.

As an added precaution, fuel tanks should have a 'FUEL VAPOUR' warning label attached to them as soon as they are removed from the vehicle.

### Fuel tank repairs - plastic tank

No attempt should be made to repair a plastic fuel tank. If the structure of the tank is damaged, a new tank must be fitted.

### Body repairs

Plastic fuel pipes are particularly susceptible to heat, even at relatively low temperature, and can be melted by heat conducted from some distance away.

When body repairs involve the use of heat, all fuel pipes which run in the vicinity of the repair area must be removed, and the tank outlet plugged.

**WARNING: If welding is to be carried out in the vicinity of the fuel tank, the fuel system must be drained and the tank removed before welding commences.**



## Electrical Precautions

### General

The following guidelines are intended to ensure the safety of the operator while preventing damage to the electrical and electronic components fitted to the vehicle. Where necessary, specific precautions are detailed in the individual procedures of this manual.

### Equipment

Prior to commencing any test procedure on the vehicle ensure that the relevant test equipment is working correctly and any harness or connectors are in good condition. It is particularly important to check the condition of the lead and plugs of mains operated equipment.

### Polarity

Never reverse connect the vehicle battery and always ensure the correct polarity when connecting test equipment.

### High voltage circuits

Whenever disconnecting live ht circuits always use insulated pliers and never allow the open end of the ht lead to contact other components, particularly ECU's. Exercise caution when measuring the voltage on the coil terminals while the engine is running, high voltage spikes can occur on these terminals.

***WARNING: – VEHICLES FITTED WITH BI-XENON HEADLAMP BULBS:– The following precautions must be observed. Failure to comply may result in exposure to ultra violet rays, severe electric shock, burns or risk of explosion.***

- Safety goggles and gloves must be worn.
- Ensure that headlamps are switched off before removing bulbs.
- Do not touch the glass portion of the bulb.
- On no account should headlamps be switched on with the bulb removed from the headlamp.
- Bulb testing may only be carried out with the bulb fitted in the headlamp.
- Bulbs must be disposed of in accordance with local authority bye-laws.

### Connectors and harnesses

The engine compartment of a vehicle is a particularly hostile environment for electrical components and connectors:

- Always ensure electrically related items are dry and oil free before disconnecting and connecting test equipment.
- Ensure disconnected multiplugs and sensors are protected from being contaminated with oil, coolant or other solutions. Contamination could impair performance or result in catastrophic failure.
- Never force connectors apart using tools to prise apart or by pulling on the wiring harness.
- Always ensure locking tabs are disengaged before disconnection, and match orientation to enable correct reconnection.
- Ensure that any protection (covers, insulation etc.) is replaced if disturbed.

Having confirmed a component to be faulty:

- Switch off the ignition and disconnect the battery.
- Remove the component and support the disconnected harness.
- When replacing the component keep oily hands away from electrical connection areas and push connectors home until any locking tabs fully engage.

### Battery disconnection

It is imperative that the key is removed from the ignition before disconnecting the battery. A time of 2 minutes must also elapse before disconnection.

Failure to do so could result in:

- Navigation computer hardware damage
- Incorrect fuel gauge reading

Before disconnecting the battery, disable the alarm system and switch off all electrical equipment. If the radio is to be serviced, ensure the security code has been deactivated.

**CAUTION: Never disconnect the battery with the ignition switched on.**

**CAUTION: To prevent damage to the navigation computer hardware, a waiting period of two minutes must elapse after the ignition is switched off before the battery leads are disconnected.**

**CAUTION: To prevent damage to electrical components, always disconnect the battery when working on the vehicle's electrical system. The ground lead must be disconnected first and reconnected last.**

**CAUTION: Always ensure that battery leads are routed correctly and are not close to any potential chafing points.**

## GENERAL INFORMATION

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After re-connecting the battery, the steering wheel must be turned to full LH and RH lock (with engine running). This allows the DSC system to relearn the steering wheel position. Failure to do so will result in a variety of instrument warning lights being illuminated.

### Battery charging

Only recharge the battery with it removed from the vehicle. Always ensure any battery charging area is well ventilated and that every precaution is taken to avoid naked flames and sparks.

### Ignition system safety precautions

The vehicle's ignition system produces high voltage and the following precautions should be observed before carrying out any work on the system.

***WARNING: Before commencing work on an ignition system, ensure all high tension terminals, adapters and diagnostic equipment are adequately insulated and shielded to prevent accidental personal contacts and minimise the risk of shock. Wearers of surgically implanted pacemaker devices should not be in close proximity of ignition circuits or diagnostic equipment.***

### Disciplines

Switch off the ignition prior to making any connection or disconnection in the system to prevent electrical surges caused by disconnecting 'live' connections damaging electronic components.

Ensure hands and work surfaces are clean and free of grease, swarf, etc. Grease collects dirt which can cause electrical tracking (short-circuits) or high-resistance contacts.

When handling printed circuit boards, treat with care and hold by the edges only; note that some electronic components are susceptible to body static.

Connectors should never be subjected to forced removal or refit, especially inter-board connectors. Damaged contacts can cause short-circuit and open-circuit fault conditions.

Prior to commencing test, and periodically during a test, touch a good vehicle body earth to discharge static charge. Some electronic components are vulnerable to the static electricity that may be generated by the operator.

### Grease for electrical connectors

Some under bonnet and under body connectors may be protected against corrosion by the application of a special grease during vehicle production. Should connectors be disturbed in service, repaired or replaced, additional grease should be applied: Part No. BAU 5811, available in 150 gm tubs.

*NOTE: The use of greases other than BAU 5811 must be avoided as they can migrate into relays, switches etc. contaminating the contacts and leading to intermittent operation or failure.*



## Supplementary Restraint System (SRS) Precautions

The following precautions must be adhered to when working on the SRS system.

**WARNING:** All components of the SRS must be replaced every 15 years.

**WARNING:** Do not use rear facing child seats in the front passenger seat if the vehicle is fitted with a passenger airbag.

### General Precautions

The SRS contains components which could be potentially hazardous to service personnel if not serviced and handled correctly. The following guidelines are intended to alert personnel to potential sources of danger and emphasise the importance of ensuring the integrity of SRS components fitted to the vehicle.

**WARNING:** Always follow the 'SRS Precautions' and the correct procedures for working on SRS components. Persons working on SRS systems must be fully trained and have been issued with copies of the safety guidelines.

**WARNING:** It is imperative that before any work is carried out on the SRS system, the appropriate information is read thoroughly.

**WARNING:** The airbag modules contain extremely flammable and hazardous compounds. Contact with water, acids or heavy metals may produce harmful or explosive results. Do not dismantle, incinerate or bring into contact with electricity before the unit has been deployed.

**WARNING:** Always replace a seat belt assembly that has withstood the strain of a severe vehicle impact or if the webbing shows signs of fraying.

**WARNING:** Always disconnect the vehicle battery before carrying out any electric welding on a vehicle fitted with an SRS system.

**CAUTION:** Do not expose airbag modules or seat belt pre-tensioners to temperatures exceeding 85° C (185° F).

It should be noted that these precautions are not restricted to operations performed when servicing the SRS system. The same care should be exercised when working on ancillary systems and components located in the vicinity of SRS components; these include but are not limited to:

- **Steering system** - Steering wheel airbag, rotary coupler
- **Front fascia** - Passenger front airbag
- **Interior trim** - Head airbag modules - front and rear
- **Seats** - Front seat belt pre-tensioners
- **Electrical system** - SRS harnesses, link leads and connectors
- **Front doors** - Side (thorax) air bags

### Making the system safe

Before working on or in the vicinity of SRS components, ensure the system is rendered safe by performing the following operations.

- Remove the ignition key
- Disconnect battery, earth lead first
- Wait 10 minutes for the SRS power circuit to discharge before commencing work

The SRS uses energy reserve capacitors to keep the system active in the event of electrical supply failure under crash conditions. It is necessary to allow the capacitors sufficient time to discharge (10 minutes) in order to avoid the risk of accidental deployment.

# GENERAL INFORMATION

## Installation

In order to ensure system integrity, it is essential that the SRS system is regularly checked and maintained so that it is ready for effective operation in the event of a collision. Carefully inspect SRS components before installation. Do not install a part that shows signs of being dropped or improperly handled, such as dents, cracks or deformation.

**WARNING:** The integrity of the SRS systems is critical for safety reasons. Ensure the following precautions are always adhered to.

**WARNING:** Do not fit accessories or other objects to trim panels (e.g. 'A' Post) which cover ITS airbags.

- Never install used SRS components from another vehicle or attempt to repair an SRS component.
- When repairing an SRS system, only use genuine new parts.
- Never apply electrical power to an SRS component unless instructed to do so as part of an approved test procedure.
- Special fixings are necessary for installing an airbag module – do not use other fixings and ensure that all fixings are tightened to the correct torque.
- Always use new fixings when replacing an SRS component.
- Ensure the SRS diagnostic control unit (DCU) is correctly installed. There must not be any gap between the DCU and the bracket to which it is mounted. An incorrectly mounted DCU could cause the system to malfunction.

**CAUTION:** When fitting an head airbag module, ensure the securing clips are locked and do not trap the airbag. Take care not to trap the head airbag when fitting interior trim components e.g. 'A' post trim, headlining.

**CAUTION:** Ensure SRS components are not contaminated with oil, grease, detergent or water.

**CAUTION:** Torque wrenches should be checked regularly to ensure that all fixings are tightened to the correct torque.

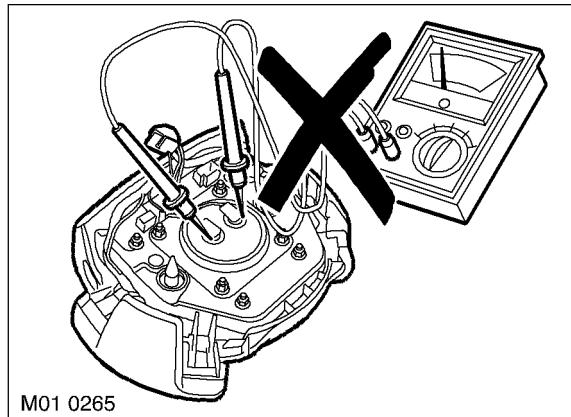
*Note: Following seat belt pre-tensioner deployment, the seat belts can still be used as conventional seat belts, but will need to be replaced as soon as possible to establish full SRS protection.*

*Note: If the SRS components are to be replaced, the part number/bar code of the new unit must be recorded.*

## SRS component testing precautions

The SRS components are triggered using relatively low operating currents, always adhere to the following precautions:

**WARNING:** Do not use a multimeter or other general purpose test equipment on SRS system components or accidental deployment may occur. Use only Testbook/T4 to diagnose system faults.

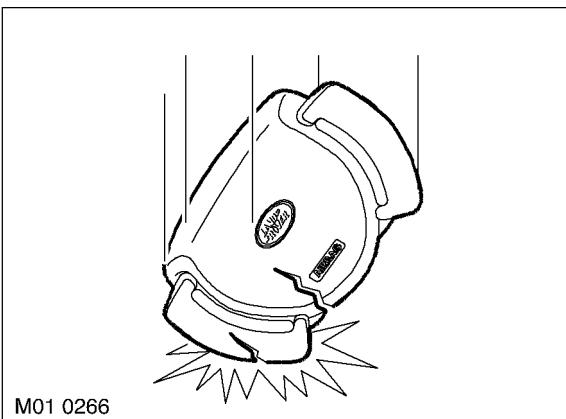


**WARNING:** Do not use electrical test equipment on the SRS harness while it is connected to any of the SRS system components, it may cause accidental deployment and personal injury.

## Handling and storage

Observe the following precautions when handling SRS components.

**WARNING:** There are regulations for the storage of SRS components which must be observed, consult your local authority for details. The SRS components are sensitive and potentially hazardous if not handled correctly; always comply with the following handling precautions:

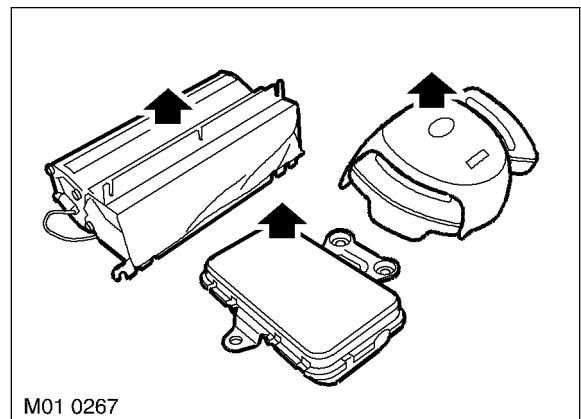


- Never drop an SRS component. The airbag diagnostic control unit is a particularly shock sensitive device and must be handled with extreme care. Airbag modules and seat belt pre-tensioner units could deploy if subjected to a strong shock.
- Never wrap your arms around an airbag module. If a module has to be carried, hold it by the cover with the cover uppermost and the base away from your body.
- Never transport airbag modules or seat belt pre-tensioners in the cabin of a vehicle. Always use the luggage compartment of the vehicle for carrying airbag modules and seat belt pre-tensioner units.

**WARNING:** *Never attach anything to an airbag cover or any trim component covering an airbag module. Do not allow anything to rest on top of an airbag module.*

**WARNING:** *Always keep components cool, dry and free from contamination.*

**CAUTION:** *Do not apply grease or cleaning solvents to seat belt pre-tensioner units, component failure could result.*



**WARNING:** *Store the airbag module with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with sufficient force to cause serious injury.*

**WARNING:** *Airbag modules and seat belt pre-tensioners are classed as explosive devices. For overnight and longer term storage, they must be stored in a secure steel cabinet which has been approved as suitable for the purpose and has been registered with the local authority.*

**WARNING:** *Store the airbag module or seat belt pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked loadspace of the vehicle and inform the workshop supervisor.*

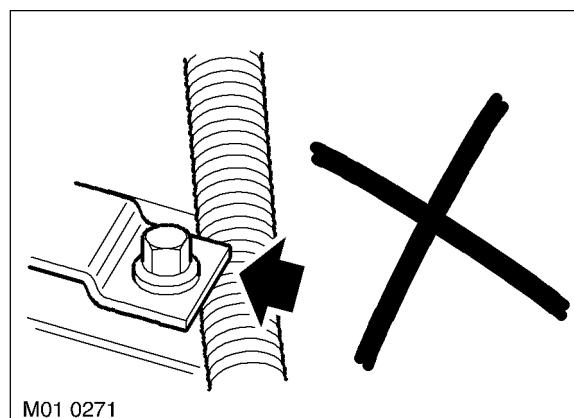
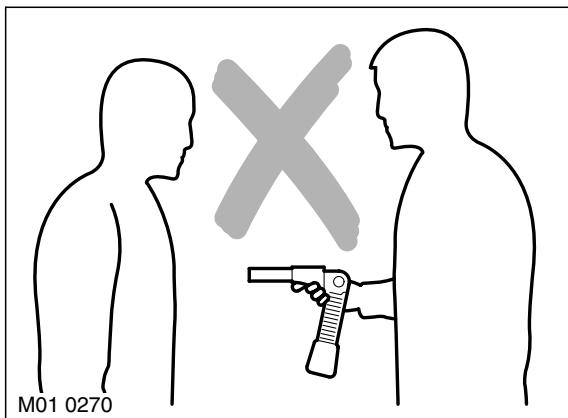
**CAUTION:** *Improper handling or storage can internally damage the airbag module making it inoperative. If you suspect the airbag module has been damaged, install a new module and refer to the deployment/disposal procedures for disposal of the damaged module.*

**WARNING:** *Keep new inflatable tubular structure (ITS) airbag module in the original packaging until just prior to fitting. Place the old ITS module in the empty packaging for carriage.*

**WARNING:** *When handling an inflatable tubular structure (ITS) airbag module, hold by the gas generator housing, DO NOT hold by the airbag. Do not wrap the thumb around the gas generator while holding. Do not drape airbag over shoulder or around neck.*

## GENERAL INFORMATION

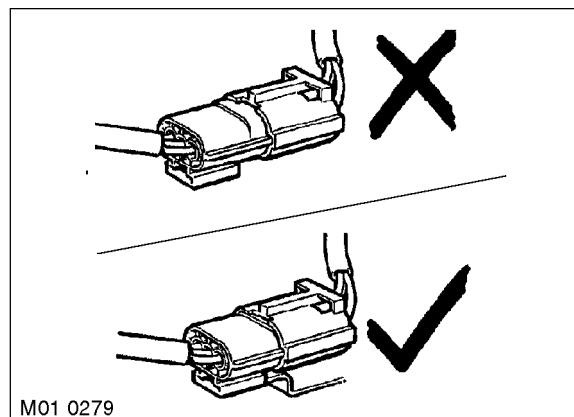
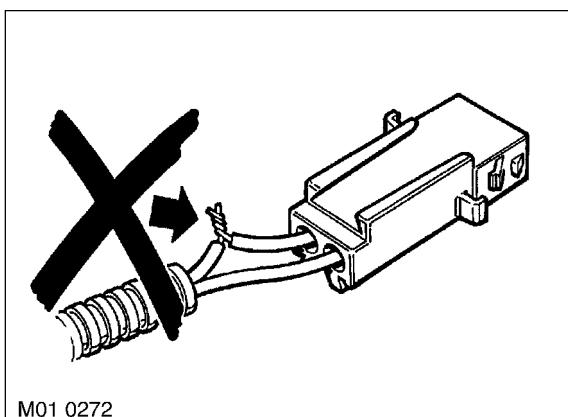
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**For seat buckle type pre-tensioners, hold by the piston tube, with the open end of the piston tube pointing towards the ground and the buckle facing away from your body. Do not cover the end of the piston tube. DO NOT hold buckle type pre-tensioners by the bracket assembly or cable. Never point the piston tube towards your body or other people.**

### SRS harness and connectors

Always observe the following precautions with regards to SRS system electrical wiring:



**WARNING: Always ensure SRS wiring is routed correctly. Be careful to avoid trapping or pinching the SRS wiring. Do not leave the connectors hanging loose or allow SRS components to hang from their harnesses. Look for possible chafing points.**

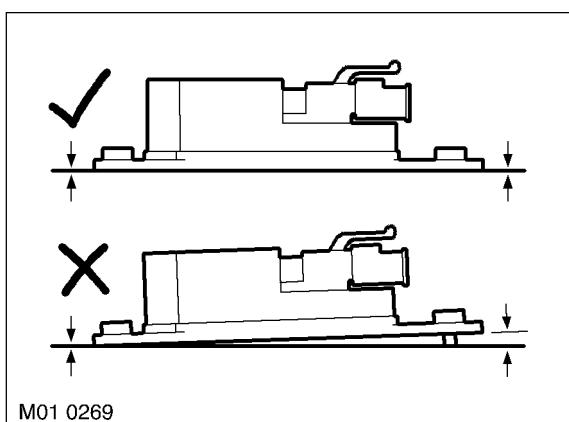
### Side impact crash sensor inspection

After any degree of side body damage, inspect both side impact crash sensors. Replace a crash sensor if there is any sign of damage or deformation to the sensor fixings.

### CAUTION: Observe the following precautions:

- Never attempt to modify, splice or repair SRS wiring.
- Never install electrical equipment such as a mobile telephone, two-way radio or in-car entertainment system in such a way that it could generate electrical interference in the airbag harness. Seek specialist advice when installing such equipment.

**NOTE: SRS wiring can be identified by a special yellow outer sleeve protecting the wires (black with yellow stripe protective coverings are sometimes used).**



Ensure the side impact crash sensors are installed correctly. There must be no gap between the sensor and the mounting. Use either the fixings supplied with the replacement or new fixings and tighten to the correct torque.

**CAUTION:** Take extra care when painting or carrying out bodywork repairs in the vicinity of the crash sensors. Avoid direct exposure of the crash sensors or link harnesses to heat guns, welding or spraying equipment. Take care not to damage sensor or harness when refitting components.

#### **Rotary coupler precautions**

**CAUTION:** Always follow the procedure for fitting and checking the rotary coupler as instructed in the SRS repairs section. Comply with all safety and installation procedures to ensure the system functions correctly. Observe the following precautions:

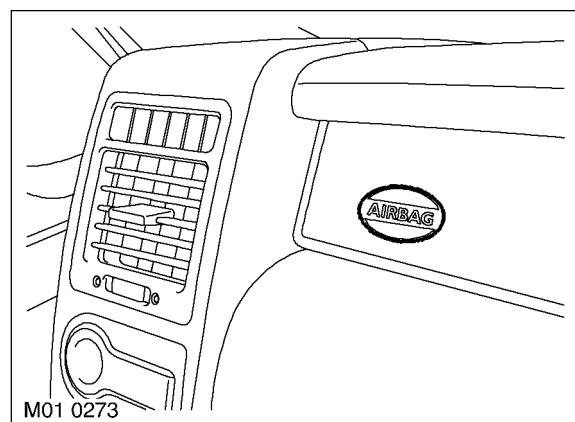
- Do not unlock and rotate the rotary coupler when it is removed from the vehicle.
- Do not turn the road wheels when the rotary coupler is removed from the vehicle.
- Always ensure the rotary coupler is removed and installed in its central position and with the front road wheels in the straight ahead position - refer to SRS repair section for the correct removal and installation procedure.
- If a new rotary coupler is being installed, ensure the locking tab holding the coupler's rotational position is not broken; units with a broken locking tab must not be used.

#### **Airbag location labels**

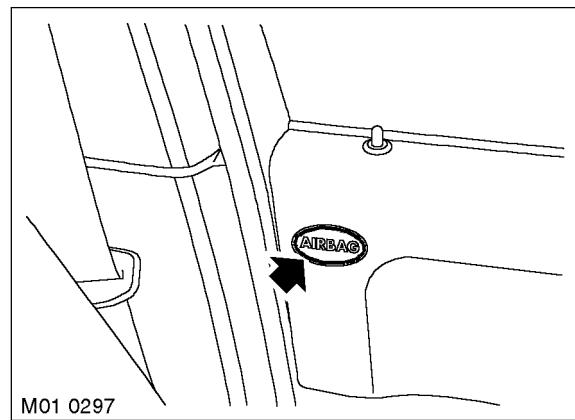
Airbag location labels are displayed at various positions in the vehicle. SRS components have additional warning labels displayed on them to indicate that particular care is needed when handling them. These include airbag modules, crash sensors, and seat belt pre-tensioners.

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**NOTE:** The following list indicates possible locations and content for warning labels. The exact positions and content may vary dependent on model year, legislation and market trends.

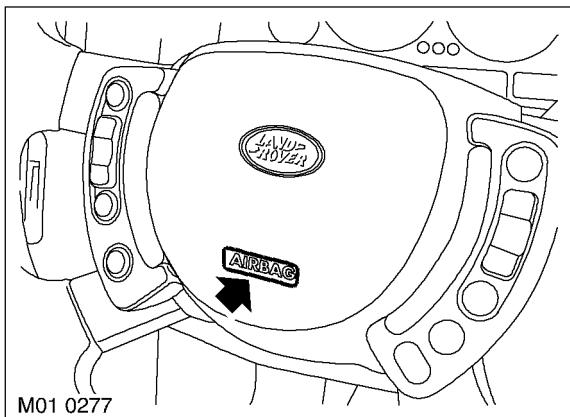


**Passenger side fascia label**



**Driver/passenger door label**

## GENERAL INFORMATION

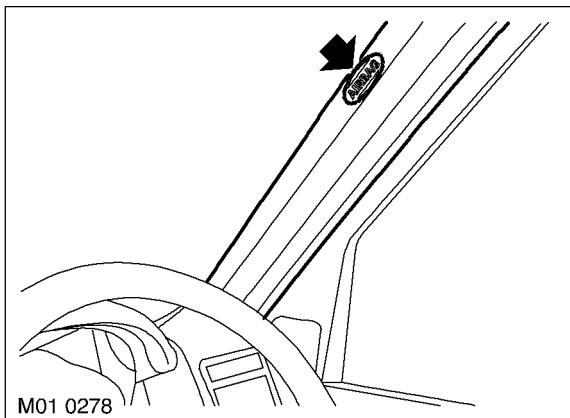


**Steering wheel label**

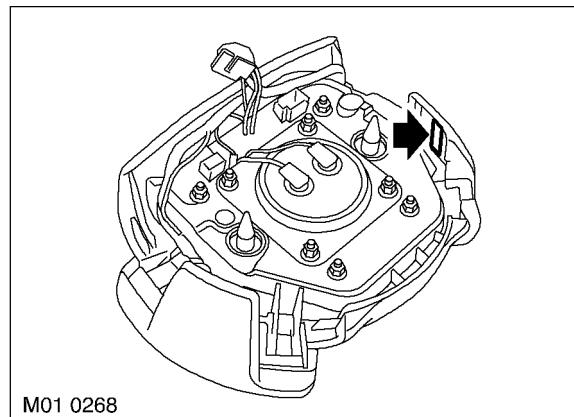
Always exercise caution when working with components, refer to the appropriate repair operation when replacing components; do not attempt to prise open or repair module case.

Modules contain high pressure gas and flammable material. To prevent personal injury, observe the following:

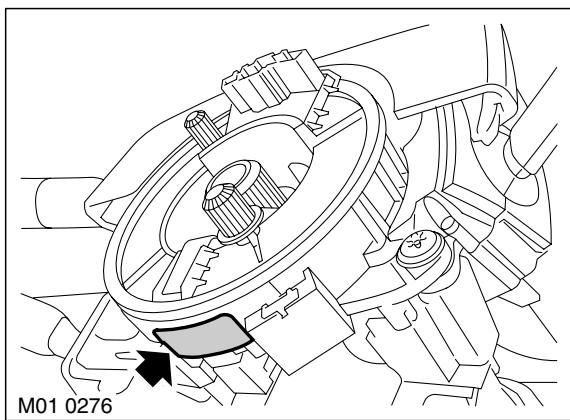
- Do not repair, dismantle, incinerate or bring into contact with electricity (such as voltmeters).
- Do not store in a place where temperature reaches 93° C (200° F) or higher.
- Do not install components in another vehicle.
- Do not install any foreign objects between airbag and its cover or within modules.
- Service or dispose of components as directed in the appropriate repair operation.



**'A' Post label**

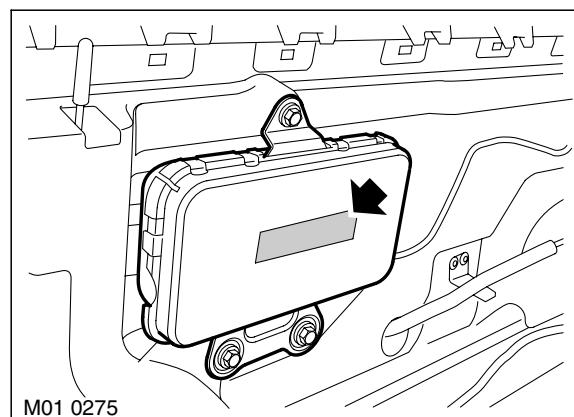


**Driver's airbag module label**



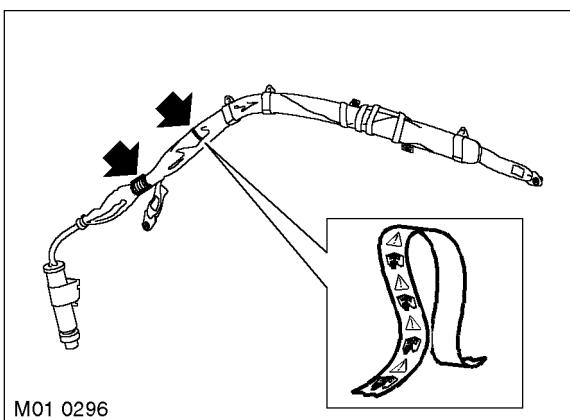
**Rotary coupler label - part no. location**

The Land Rover part number must be recorded if an airbag module is to be replaced.



**Passenger's airbag module label**

Bar codes or part numbers are attached to certain components which are critically related to correct operation. The number(s) must be recorded if the component is to be replaced.



**Front head airbag module label**

A label is attached to the airbag module identifying the need for caution and the importance of referring to the relevant section of the repair manual before commencing work on the SRS components.

**WARNING:** *The use of correct trim components is critical to the correct functioning of the airbag modules during deployment. Do not re-use SRS related interior trim components if they show signs of damage; always use new components.*

#### **VEHICLE RECOVERY**

##### **Towing - SRS components not deployed**

Normal towing procedures are unlikely to cause an airbag to deploy. However, as a precaution, switch the ignition off and then disconnect both battery leads – negative (-) lead first.

##### **Towing - SRS components deployed**

Once the driver's airbag has been deployed, the vehicle must have a front suspended tow. However, as a precaution, switch the ignition off and then disconnect both battery leads – negative (-) lead first.

#### **Airbag and pre-tensioner deployment**

Deployment procedures and precautions as detailed in this manual should be strictly adhered to. Only personnel who have undergone the appropriate training should undertake deployment of airbag and pre-tensioner modules. The following precautions must be complied with:

- Only use deployment equipment approved for the intended purpose.
- Deployment of airbag / pre-tensioner modules should be performed in a well ventilated area which has been designated for the purpose.
- Ensure airbag / pre-tensioner modules are not damaged or ruptured before attempting to deploy.
- Notify the relevant authorities of intention to deploy airbag and pretensioner units.
- When deploying airbag pre-tensioner units, ensure that all personnel are at least 15 metres (45 feet) away from the deployment zone.
- Ensure deployment tool is connected correctly, in compliance with the instructions detailed in the SRS section of this manual. In particular, ensure deployment tool is NOT connected to battery supply before connecting to airbag module connector.
- When deploying seat belt pre-tensioners, ensure pre-tensioner unit is secured correctly to the seat.
- When removing deployed airbag modules and pre-tensioner units, wear protective clothing. Use gloves and seal deployed units in a plastic bag.
- Following deployment of any component of the SRS system within the vehicle, all SRS components must be replaced. DO NOT re-use or salvage any parts of the SRS system.
- Do not lean over airbag module when connecting deployment equipment.

If a vehicle is to be scrapped, undeployed airbag modules and pre-tensioner units must be manually deployed. In this case airbags can be deployed in the vehicle; before deployment, ensure the airbag module is secure within its correct mounting position. Deployment of the driver's airbag in the vehicle may damage the steering wheel; if the vehicle is not being scrapped, deploy the module outside of the vehicle.

**WARNING:** *During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.*

# GENERAL INFORMATION

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## SRS Component Replacement Policy

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The following information details the policy for replacement of SRS components; either as a result of a vehicle accident or as a result of vehicle age.

***WARNING: All components of the SRS must be replaced every 15 years.***

### Impacts which do not deploy the airbags or pre-tensioners

Check for structural damage in the area of the impact paying particular attention to bumper armatures, longitudinals and bracketry.

### Impacts which deploy the airbags or pre-tensioners

The replacement and inspection policy is dependent on the type and severity of the crash condition. The following guidelines are the minimum that should be exercised as a result of the deployment of specific SRS components.

**Check for structural damage in the area of the impact paying particular attention to bumper armatures, longitudinals and bracketry.**

**CAUTION: The SRS DCU must be replaced after every deployment has occurred.**

**CAUTION: The SRS side impact sensor must be replaced after every side deployment has occurred. Only replace the side impact sensor on the deployed side.**

### **Front airbag deployment (driver and passenger)**

If the front airbags are deployed, the following components must be replaced:

- Driver airbag module
- Passenger airbag module
- Fly leads (where applicable) connecting front airbag modules to SRS harness
- Front seat belt buckle pre-tensioners
- Rear seat belt pre-tensioners - if fitted
- Driver's seat belt retractor - if fitted
- Rotary coupler
- SRS DCU

In addition, the following should be inspected for damage and replaced as necessary:

- Front passengers seat belt retractor - webbing, tongue latching, 'D' loop, body anchorage point
- Rear seat belt buckles - webbing, buckle covers, body anchorage, and tongue latching function
- Fascia moulding adjacent to passenger airbag module
- Steering wheel
- Front seat frames and head restraints
- Steering column - if adjustment is lost or if there are signs of collapse
- Seat belt height adjusters
- Rear seat belts

### **Side (Thorax airbags)**

If the side (thorax) airbags are deployed, the following components must be replaced on the side of the vehicle on which the deployment occurred:

- Side (thorax) airbag.
- Both side impact sensors.
- SRS DCU.

In addition, the following should be inspected for damage and replaced as necessary:

- Front seat belts - retractors, webbing, tongue latching, 'D' loop, body anchorage points
- Rear seat buckles - webbing, buckle covers, tongue latching, body anchorage points
- Front seat frame and head restraints
- Door trim casing
- Seat belt height adjusters
- Rear seat belts

### **Head airbag modules**

If the head airbag modules are deployed, the following components must be replaced on the side of the vehicle on which deployment occurred:

- Head airbag modules
- Link lead between airbag gas generator and SRS harness
- Airbag retaining clips
- Internal trim finisher
- Front seat belt buckle pre-tensioners
- SRS DCU
- Both side impact crash sensors

In addition, the following should be inspected for damage and replaced as necessary:

- Headlining
- Mounting brackets
- Front seat belts – retractors, webbing, tongue latching, 'D' loop and body anchorage points.
- Rear seat belt buckles – webbing, buckle covers, tongue latching and body anchorage points
- Adjacent trim components
- Seat belt height adjusters



### Rear impacts

If the seat belt pre-tensioners are deployed during a rear impact, the following components must be replaced:

- Seat belt pre-tensioners.
- SRS DCU.
- Front and rear seat belt retractors used during impact.

In addition, the following components should be inspected for damage and replaced as necessary:

- Front seat frames and head restraints
- Seat belt height adjusters
- Front seat belts, retractors, webbing, tongue latching, 'D' loop and body anchorage points
- Rear seat belt buckles, webbing, buckle covers, tongue latching, and body anchorage points
- SRS side impact sensor.

### Periodic replacement of SRS components

The performance of the propellants within airbags and pre-tensioners will deteriorate over a period of time.

***As a result, it is essential that airbags, seat belt pre-tensioners and the rotary coupler are replaced every 15 years.***

### Air Conditioning System Precautions

#### General

The air conditioning system contains fluids and components which could be potentially hazardous to the service engineer or the environment if not serviced and handled correctly. The following guidelines are intended to alert the service engineer to potential sources of danger and emphasise the importance of ensuring the integrity of the Air Conditioning operating conditions and components fitted to the vehicle.

Where necessary, additional specific precautions are detailed in the relevant sections of this Manual which should be referred to prior to commencing repair operations.

The refrigerant used in the air conditioning system is HFC-134a (Hydrofluorocarbon) R134a.

***WARNING: Servicing must only be carried out by personnel familiar with both the vehicle system and the charging and testing equipment. All operations must be carried out in a well ventilated area away from open flame and heat sources.***

***WARNING: R134a is a hazardous liquid and when handled incorrectly can cause serious injury. Suitable protective clothing, consisting of face protection, heat proof gloves, rubber boots and rubber apron or waterproof overalls, must be worn when carrying out operations on the air conditioning system.***

## GENERAL INFORMATION

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### Remedial actions

If an accident involving R134a should occur, conduct the following remedial actions:

- If liquid R134a enters the eye, do not rub it. Gently run large quantities of eye wash over affected eye to raise the temperature. If an eye wash is not available, cool, clean water may be used to flush the eye. After rinsing, cover the eye with a clean pad and seek immediate medical attention.
- If liquid R134a is splashed onto the skin, run large quantities of water over the affected area to raise the temperature. Implement the same action if the skin comes in contact with discharging cylinders. Wrap the contaminated body parts in blankets (or similar materials) and seek immediate medical attention.
- If the debilitating effects of inhalation of R134a vapour is suspected, seek fresh air. If the affected person is unconscious, move them away from the contaminated area to fresh air and apply artificial respiration and/or oxygen and seek immediate medical attention.

***WARNING: Due to its low evaporating temperature, R134a must be handled with care. R134a splashed on any part of the body will cause immediate freezing of that area. Also, refrigerant cylinders and replenishment trolleys when discharging will freeze skin to them if contact is made.***

### Service precautions

Observe the following precautions when handling components used in the air conditioning system:

- Air conditioning units must not be lifted by their hoses, pipes or capillary lines.
- Hoses and lines must not be subjected to any twist or stress; the efficiency of the system will be impaired by kinks or restrictions. Ensure that hoses are correctly positioned before tightening couplings, and ensure that all clips and supports are utilised.
- Flexible hoses should not be positioned close to the exhaust manifold (less than 100mm) unless protected by heat shielding.
- Completed assemblies must be checked for refrigeration lines touching metal panels. Any direct contact of components and panels may transmit noise and so must be eliminated.
- The appropriate torque wrench must be used when tightening refrigerant connections to the stipulated value. An additional spanner must be used to hold the union to prevent twisting of the pipe when tightening connections.
- Before connecting any hose or pipe, ensure that refrigerant oil is applied to the seat of the new 'O' rings, **BUT NOT** to the threads of the connection.
- All protective plugs must remain in place to seal the component until immediately prior to connection.
- Ensure components are at room temperature before uncapping, to prevent condensation of moisture from the air that enters it.
- Components must not remain uncapped for longer than 15 minutes. In the event of a delay, the caps must be fitted.
- When disconnecting, immediately cap all air conditioning pipes to prevent ingress of dirt and moisture into the system.
- The receiver/drier contains desiccant which absorbs moisture. It must be positively sealed at all times. A receiver/drier that has been left uncapped must not be used, fit a new unit.
- The receiver/drier should be the last component connected to the system to ensure optimum dehydration and maximum moisture protection of the system.
- Whenever the refrigerant system is opened, the receiver/drier must be renewed immediately before evacuating and recharging the system.
- Use alcohol and a clean lint-free cloth to clean dirty connections.
- Ensure that all new parts fitted are marked for use with R134a.

When a major repair has been completed, a leak test should be conducted; refer to the Air Conditioning section of this manual for the correct procedure.

**Refrigerant oil**

Refrigerant oil easily absorbs water and must not be stored for long periods. Do not pour unused refrigerant oil back into the container. Always use an approved refrigerant oil.

**☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**

When replacing components in the A/C system, drain the refrigerant oil from the component being replaced into a graduated container. On assembly, add the quantity of refrigerant oil drained to the new component.

**Compressor**

A new compressor is sealed and pressurised with Nitrogen gas. When fitting a new compressor, slowly release the sealing cap; gas pressure should be heard to vent as the seal is broken.

**CAUTION:** A new compressor should always be sealed and could be pressurised with nitrogen gas. To avoid possible oil loss, release the sealing cap(s) slowly. Do not remove the cap(s) until immediately prior to connecting the air conditioning pipes to the compressor.

**Rapid refrigerant discharge**

If the air conditioning system is involved in accident damage and the system is punctured, the refrigerant will discharge rapidly. The rapid discharge of refrigerant will also result in the loss of most of the oil from the system. The compressor must be removed and all the remaining oil in the compressor drained and refilled as instructed in the air conditioning section of this manual.

**Precautions for refrigerant recovery, recycling and recharging**

When the air conditioning system is recharged, any existing refrigerant is first recovered from the system and recycled. The system is then charged with the required weight of refrigerant and volume of refrigerant oil.

**WARNING:** Refrigerant must always be recycled before re-use to ensure that the purity of the refrigerant is high enough for safe use in the air conditioning system.

*Recycling should always be carried out with equipment which is design certified by Underwriter Laboratory Inc. for compliance with SAE J1991. Other equipment may not recycle refrigerant to the required level of purity.*

*A R134a Refrigerant Recovery Recycling Recharging Station must not be used with any other type of refrigerant.*

*Refrigerant R134a from domestic and commercial sources must not be used in motor vehicle air conditioning systems.*

**CAUTION:** The system must be evacuated immediately before recharging commences. Delay between evacuation and recharging is not permitted.

**Air Conditioning Compressor Replacement**

A new compressor is supplied filled with a full charge ( $X \text{ cm}^3$ ) of refrigerant oil.

**☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Capacities.** A calculated quantity of oil must be drained from the new compressor before fitting. To calculate the quantity of oil to be drained:

- 1 Remove the drain plug from the old compressor.
- 2 Invert the compressor and gravity drain the oil into a calibrated measuring cylinder. Rotate the compressor clutch to ensure the compressor is completely drained.
- 3 Note the quantity of oil drained ( $Y \text{ cm}^3$ ).
- 4 Calculate the quantity of oil to be drained from the new compressor using the following formula:

$$X \text{ cm}^3 - (Y \text{ cm}^3 + 20 \text{ cm}^3) = Q \text{ cm}^3$$

- 5 Remove the drain plug from the new compressor and drain  $Q \text{ cm}^3$  of oil. Fit and tighten the compressor drain plug.

# GENERAL INFORMATION

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## Body Repairs

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### General

Unlike previous Range Rovers that had a body shell bolted to a chassis frame, the new Range Rover has a steel monocoque body. This new monocoque construction gives significant improvements in torsional rigidity and bending stiffness. Front, side and rear sections of the shell are designed as 'energy absorbing' zones. This means they are designed to deform progressively when subjected to impact in order to minimise the likelihood of injury to vehicle occupants.

It is essential that design dimensions and strength are restored in accident rectification. It is important that neither structural weakness nor excessive local stiffness are introduced into the vehicle during body repair.

Repairs usually involve a combination of operations ranging from straightening procedures to renewal of individual panels or panel assemblies. The repairer will determine the repair method and this decision will take into account a balance of economics between labour and material costs and the availability of repair facilities in both equipment and skills. It may also involve considerations of the vehicles' downtime, replacement vehicle availability and repair turn-around time.

It is expected that a repairer will select the best and most economic repair method possible, making use of the facilities available. The instructions given are intended to assist a skilled body repairer by expanding approved procedures for panel replacement. The objective is to restore the vehicle to a safe running condition by carrying out a repair which is as close as is feasible to original standard. The results should not advertise to the experienced eye that the vehicle has been damaged, although the repair might not be identical in all respects to the original factory build. Commercial bodyshop repair facilities cannot always duplicate methods of construction used during production.

Operations covered in this Manual do not include reference to testing the vehicle after repair. It is essential that work is inspected and suspension geometry checked after completion. Where necessary a road test of the vehicle should be carried out, particularly where safety-related items are concerned.

Where major units have been disconnected or removed it is necessary to ensure that fluid levels are checked and topped up where necessary. It is also necessary to ensure that the repaired vehicle is in a roadworthy condition in respect of tyre pressures, lights, washer fluid etc.

Body repairs often involve the removal of mechanical and electrical units and associated wiring. Where necessary, refer to the relevant section of this Workshop Manual for removal and refitting instructions.

Taking into consideration the differences in body styles, suspension systems, engine and transmission layouts, the location of the following components as applicable to a particular vehicle is critical:

- Front suspension upper damper mountings.
- Sub frame mountings and additional front suspension mounting points.
- Engine mountings.
- Rear suspension upper damper mountings.
- Rear suspension mountings or lower pivots.

Additional points which can be used to check alignment and assembly are:

- Inner holes in cross member - side - main floor.
- Holes in front bulkhead.
- Holes in rear longitudinals.
- Holes in rear lower panels.

Apertures for windscreen, rear screen, bonnet and doors can be measured and checked using the dimensional information provided and also by offering up an undamaged component as a gauge.

### Straightening

Whenever possible, structural members should be cold straightened under tension. Do not attempt to straighten with a single pull but rework the damaged area using a series of pulls, releasing tension between each stage and using the opportunity to check alignment.

### Body jig

Unless damage is limited to cosmetic panels, all repair work to body members must be carried out on a body jig, to ensure that impact damage has not spread into more remote parts of the structure. Mounting on a jig will also ensure that the straightening and panel replacement procedures do not cause further distortion.

If original dimensions cannot be satisfactorily restored by these methods, damaged structural members should be replaced. Damaged areas should be cut away using a high speed saw, NOT an oxy-acetylene torch.



As a rule, body dimensions are symmetrical about the centre line. A good initial check for distortion is therefore to measure diagonally and to investigate apparent differences in dimensions.

### **Inspection**

Every accident produces individual variations in damage. Each repair is influenced by the extent of the damage and the facilities and equipment available for its rectification.

Most accident damage can be visually inspected and the approximate extent of damage assessed.

Sometimes deformation will extend beyond the directly damaged area, and the severity of this must be accurately established so that steps can be taken to restore critical body components to their original dimensions. An initial check can be carried out by means of drop checks or, preferably, trammels.

Crash repair/alignment equipment is available which will accurately check for body twist.

## **GENERAL INFORMATION**

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## Engine - Td6

<b>General</b>	
Type	3.0 litre in-line direct injection diesel, 4 valves per cylinder, turbocharged and intercooled
Cylinder arrangement	6 in-line, No. 1 cylinder at front of engine
Bore	84.00 mm (3.307 in)
Stroke	88.00 mm (3.465 in)
Capacity	2924 cm <sup>3</sup> (178.4 in <sup>3</sup> )
Firing order	1 - 5 - 3 - 6 - 2 - 4
Compression ratio	19.0 : 1
Direction of rotation	Clockwise viewed from the front of the engine
Maximum power	130 Kw (172 bhp) @ 4000 rev/min
Dimensions:	
⇒ Length	778 mm (30.6 in)
⇒ Width	676.6 mm (26.6 in)
⇒ Height	800.3 mm (31.5 in)
<b>Fuel injection system</b>	
Type	Common rail, direct injection fed by Bosch high pressure delivery pump
Maximum governed speed	4750 rev/min
Idle speed	790 ± 50 rev/min
Glow plugs	6 – 1 per cylinder, positioned centrally in portion inlet side.
Turbocharger	Garrett GT 2256V
Emissions standard	EU3 - Class N1, Group 3
<b>Valve timing</b>	
Inlet valves:	
⇒ Opens	8° BTDC
⇒ Closes	28° ABDC
Exhaust valves:	
⇒ Opens	36° BBDC
⇒ Closes	4° ATDC
<b>Lubrication</b>	
Type	Wet sump, pressure fed
Oil pump type	Crankshaft driven, eccentric rotor
Pump outer rotor to body clearance	0.080 to 0.156 mm (0.0031 to 0.062 in)
Filter type	Disposable canister with full flow by-pass
Relief valve opening pressure	4.2 bar (60.9 lbf.in <sup>2</sup> )
Low oil pressure switch opening pressure	0.2 to 0.6 bar (3.0 to 8.8 lbf.in <sup>2</sup> )
Minimum oil pressure at idle	0.5 bar (7.0 lbf.in <sup>2</sup> )
Oil pressure at 3500 rev/min	Not less than 3.0 bar (43.5 lbf.in <sup>2</sup> )
Maximum regulated oil pressure	4.2 ± 0.5 bar (61 ± 7.0 lbf.in <sup>2</sup> )
<b>Cylinder head</b>	
Type	Aluminium alloy, gravity die casting
Port configuration	Cross flow
Maximum warp	0.03 mm (0.001 in)

## GENERAL DATA

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<b>Valves</b>	
Stem diameter - Inlet and exhaust:	
Stem to guide clearance: ⇒ Inlet	5.968 ± 0.0070 mm (0.235 ± 0.0003 in) 0.025 to 0.055 mm (0.001 to 0.002 in)
⇒ Exhaust	0.040 to 0.070 mm (0.0015 to 0.003 in)
Valve head stand down: ⇒ Inlet	0.73 ± 0.1 mm (0.029 ± 0.004 in)
⇒ Exhaust	0.56 ± 0.1 mm (0.022 ± 0.004 in)
Valve seat angle: ⇒ Inlet and exhaust	46°
Valve seat width: ⇒ Inlet and exhaust	1.45 ± 0.25 mm (0.114 ± 0.02 in)
Valve springs:	
Type	Parallel, single coil
Free length	47.5 mm (1.87 in)
Fitted length	32.0 mm (1.26 in)
Cylinder head gasket:	
Type	Multi-layer steel
Gasket selection:	
⇒ 1 hole	Piston protrusion up to 0.92 mm (0.036 in)
⇒ 2 hole	Piston protrusion 0.93 to 1.03 mm (0.040 to 0.041 in)
⇒ 3 hole	Piston protrusion above 1.03 mm (0.041 in)
Camshafts:	
Type	Clear chill hollow casting, negative cam radius
Drive	Simplex chain
Radial run-out	0.05 mm (0.002 in)
End-float	0.15 to 0.33 mm (0.006 to 0.013 in)
Bearing clearance	0.047 to 0.088 mm (0.002 to 0.003 in)
Tappets	Hydraulic lash adjusters with roller finger levers
<b>Cylinder block</b>	
Type	Cast iron with hollow beam structure
Cylinder bore diameter:	
Standard *	84.000 to 84.018 mm (3.3071 to 3.3078 in)
⇒ Service limit	84.040 mm (3.3087 in)
Intermediate *:	84.080 to 84.095 mm (3.3102 to 3.3109 in)
⇒ Service limit	84.120 mm (3.3118 in)
1st oversize *	84.250 to 84.267 mm (3.3169 to 3.3176 in)
⇒ Service limit	84.290 mm (3.3185
Cylinder bore ovality:	
Standard*	0.1 mm (0.004 in)
⇒ Service limit	0.04 mm (0.0016 in)
Cylinder bore taper:	
Standard*	0.1 mm (0.004 in)
⇒ Service limit	0.04 mm (0.0016 in)
<i>Note: * Measurements to be taken at top, centre and bottom of cylinder bore at 90° to crank-shaft centre line.</i>	



<b>Crankshaft</b>	
Main bearing journal diameters:	
Standard: ⇒ Yellow	59.977 to 59.983 mm (2.3613 to 2.3615 in)
⇒ Green	59.970 to 59.976 mm (2.3610 to 2.3613 in)
⇒ White	59.964 to 59.970 mm (2.3608 to 2.3610 in)
1st undersize: ⇒ Yellow	0.25 mm (0.0098 in) - nominal 59.727 to 59.733 mm (2.3515 to 2.3517 in)
⇒ Green	59.720 to 59.726 mm (2.3512 to 2.3514 in)
⇒ White	59.714 to 59.720 mm (2.3509 to 2.3512 in)
2nd undersize: ⇒ Yellow	0.50 (0.0196 in) - nominal 59.477 to 59.483 mm (2.3416 to 2.3418 in)
⇒ Green	59.470 to 59.476 mm (2.3413 to 2.3416 in)
⇒ White	59.464 to 59.469 mm (2.3411 to 2.3413 in)
Bearing radial play	0.027 to 0.063 mm (0.0011 to 0.0025 in)
Big-end journal diameter	44.975 to 45.008 mm (1.7707 to 1.7720 in)
Maximum out of round - Main and big-end journals	0.02 mm (0.0008 in)
Crankshaft end float	0.08 to 0.163 mm (0.0031 - 0.0064 in)
<b>Main bearings</b>	
Quantity	7 (6 main, 1 thrust)
Type	Grooved in cylinder block, plain in main bearing caps
<b>Big-end bearings</b>	
Type	Plain in cylinder block, sintered in connecting rod caps
<b>Pistons</b>	
Type	Graphite compound skirt with combustion chamber in crown and oil cooling channel
Maximum clearance in cylinder bore – (Measured at 12.0 mm (0.47 in) from bottom of skirt, at 90° to gudgeon pin)	0.15 mm (0.006 in)
Diameter – (Measured 40.0 mm (1.5 in) from bottom of skirt, at 90° to gudgeon pin) ⇒ Standard ⇒ Intermediate ⇒ 1st oversize	$83.950 \pm 0.009$ mm ( $3.3051 \pm 0.0004$ in) $84.030 \pm 0.009$ mm ( $3.3083 \pm 0.0004$ in) $84.200 \pm 0.009$ mm ( $3.3150 \pm 0.0004$ in)
Piston rings Type: ⇒ Top compression ring ⇒ 2nd compression ring ⇒ Oil control ring	2 compression, 1 oil control Barrel edged, chrome plated Taper faced Bevelled ring with spring
New ring to groove clearance: ⇒ Top compression ⇒ 2nd compression ⇒ Oil control ring	Not measured 0.050 to 0.090 mm (0.0026 to 0.0035 in) 0.030 to 0.070 mm (0.0012 to 0.0030 in)
New ring fitted gap – (Measured 30 mm (1.2 in) from top of cylinder bore) ⇒ Top compression ⇒ 2nd compression ⇒ Oil control ring	0.20 to 0.35 mm (0.007 to 0.014 in) 0.30 to 0.45 mm (0.012 to 0.018 in) 0.20 to 0.40 in (0.007 to 0.016 in)
Gudgeon pins Fit in connecting rod Length	Fully floating, retained by circlips Press fit 68 mm (2.7 in)
Bush bore diameter	30.007 to 30.016 mm (1.201 to 1.202 in)

## GENERAL DATA

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Connecting rods	
Type	Forged 'H' section, horizontally split big-end bearing cap 135 mm (5.32 in)
Distance between centres	0.05 mm (0.002 in)
Parallel deviation	0.5 mm (0.02 in)
Parallel distortion	



## Engine - V8

<b>General</b>	
Cylinder arrangement	90° V8 - Cylinders numbered from front of engine - No. 1 cylinder on RH bank, No. 5 cylinder on LH bank
Bore	92.00 mm (3.622 in)
Stroke	82.70 mm (3.255 in)
Capacity	4398 cm <sup>3</sup> (268.31 in <sup>3</sup> )
Firing order	1 - 5 - 4 - 8 - 6 - 3 - 7 - 2
Compression ratio:	10:1
Direction of rotation	Clockwise viewed from the front of the engine
Maximum power:	210 Kw (285 PS) @ 5400 rev/min
Maximum torque	440 Nm (324 lbf.ft) @ 3600 rev/min
Idle speed Normal	600
A/C operational	700
A/C operational (with Load Balance operational).	750
Spark plugs make/type: ⇒ Non NAS	NGK BKR 6EK
⇒ NAS	BOSCH F8 LDCR
Gap	Non adjustable
Fuel grade: ⇒ Non NAS	95 RON minimum unleaded
⇒ NAS	AKI Octane rating 90 - 92
<b>Cylinder head</b>	
Cylinder head height: ⇒ New	140.0 mm (5.5 in)
Maximum warpage ⇒ Reface limit	0.05 mm (0.0019in) 0.3 mm (0.012 in)
Valve guide internal diameter: ⇒ Standard	6.0 mm (0.236 in)
⇒ 1st oversize	6.1 mm (0.240 in)
⇒ 2nd oversize	6.2 mm (0.244 in)
Valve seat angle - Inlet and exhaust	45°
Valve seat width: ⇒ Inlet	1.25 ± 0.25 mm (0.05 ± 0.011 in)
Valve seat width: ⇒ Exhaust	1.65 ± 0.35 mm (0.061 ± 0.014 in)
Valve seat outside diameter: ⇒ Inlet	34.5 mm (1.36 in)
⇒ Exhaust	30.0 mm (1.21 in)
Valve stem to guide clearance	0.5 mm (0.021 in)
Camshaft bearing journal width	21.90 mm +0.00 mm -0.06 mm (0.862 in +0.000 in -0.002 in)
<b>Camshaft</b>	
Bearing journal width	22.10 mm +0.10 mm -0.00 mm (0.87 in +0.004 in -0.000 in)
Bearing radial play	0.040 to 0.074 mm (0.001 to 0.003 in)
Bearing end-float	0.20 to 0.36 mm (0.008 to 0.014 in)

## GENERAL DATA

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<b>Valves</b>	
Valve head diameter: ⇒ Inlet ⇒ Exhaust	35.0 mm (1.411 in) 30.5 mm (1.200 in)
Stem diameter - Inlet valves: ⇒ Standard ⇒ Service limit ⇒ 1st oversize ⇒ Service limit ⇒ 2nd oversize ⇒ Service limit ⇒ Exhaust valves ⇒ Standard ⇒ Service limit ⇒ 1st oversize ⇒ Service limit ⇒ 2nd oversize ⇒ Service limit	6.0 mm (0.24 in) 5.96 mm (0.234 in) 6.1 mm (0.240 in) 6.06 mm (0.238 in) 6.2 mm (0.244 in) 6.16 mm (0.242 in)  6.0 mm (0.24 in) 5.94 mm (0.23 in) 6.1 mm (0.240 in) 6.04 mm (0.237 in) 6.2 mm (0.244 in) 6.14 mm (0.242 in)
Valve face angle - Inlet and exhaust	45°
<b>Lubrication</b>	
Type	Wet sump, pressure fed
Pump type	Crankshaft driven eccentric rotor
Oil filter	Disposable element
Minimum oil pressure at idle Oil pressure at 3500 rev/min Maximum regulated oil pressure	0.5 bar (7.0 lbf.in²) Not less than 3.0 bar (43.5 lbf.in²) 4.2 ± 0.5 bar (61 ± 7.0 lbf.in²)
<b>Cylinder block</b>	
Cylinder bore: ⇒ Standard Cylinder bore: ⇒ Service limit	92.000 mm (3.622 in) 91.90 mm (3.618 in)
Permitted bore concentricity	92.000 ± 0.007 mm (3.622 ± 0.0003 in)
<b>Crankshaft</b>	
Main bearing journal diameter: ⇒ Standard - Yellow ⇒ Standard - Green ⇒ Standard - White ⇒ 1st undersize - Yellow ⇒ 1st undersize - Green ⇒ 1st undersize - White ⇒ 2nd undersize - Yellow ⇒ 2nd undersize - Green ⇒ 2nd undersize - White ⇒ 3rd undersize - Yellow ⇒ 3rd undersize - Green ⇒ 3rd undersize - White	69.984 + 0.006 mm (2.755 + 0.0002 in) 69.977 + 0.006 mm (2.754 + 0.0002 in) 69.971 + 0.005 mm (2.753 + 0.0001 in) 69.734 + 0.006 mm (2.746 + 0.0002 in) 69.727 + 0.006 mm (2.745 + 0.0002 in) 69.721 + 0.005 mm (2.744 + 0.0001 in) 69.484 + 0.006 mm (2.736 + 0.0002 in) 69.477 + 0.006 mm (2.7353 + 0.0002 in) 69.471 + 0.005 mm (2.735 + 0.0001 in) 69.234 + 0.006 mm (2.726 + 0.0002 in) 69.227 + 0.006 mm (2.725 + 0.0002 in) 69.221 + 0.005 mm (2.724 + 0.0001 in)
Clearance in main bearings	0.020 to 0.046 mm (0.0008 to 0.002 in)
End float	0.085 to 0.257 mm (0.0033 to 0.010 in)
Maximum run-out - measured at centre main bearing journal, with crankshaft supported on front and rear main bearing journals	0.15 mm (0.006 in)
Thrust bearing widths	32.0 to 32.6 mm (1.260 to 1.283 in) in increments of 0.2 mm (0.008 in)
<b>Connecting Rods</b>	
Maximum permitted weight deviation between rods (less bearing shells)	± 3.0 grammes (0.10 ozs)
Small end bush inside diameter: ⇒ Nominal ⇒ Service limit	22.0 mm (0.866 in) 22.012 mm (0.867 in)



<b>Big-end bearings</b>	
Diametrical clearance	0.020 to 0.056 mm (0.0007 to 0.0022 in)
Diameter - Standard	48.00 mm (1.891 in)
⇒ Service limit	47.97 mm (1.888 in)
⇒ 1st oversize	47.75 mm (1.879 in)
⇒ Service limit	47.72 mm (1.878 in)
⇒ 2nd oversize	47.50 mm (1.870 in)
⇒ Service limit	47.47 mm (1.860 in)
⇒ 3rd oversize	47.25 mm (1.860 in)
⇒ Service limit	47.25 mm (1.850 in)
<b>Pistons and piston rings</b>	
Piston running clearance in cylinder bore:	0.006 to 0.038 mm (0.0002 to 0.0015 in)
Piston to cylinder bore clearance: Maximum - worn engine	0.1 mm (0.004 in)
Piston ring type:	2 compression, 1 oil control
⇒ Top compression ring	Plain
⇒ 2nd compression ring	Tapered face
⇒ Oil control ring	3 piece, steel band
Piston ring fitted gap in cylinder bore:	
⇒ Top compression ring gap	0.1 to 0.3 mm (0.003 to 0.011 in)
⇒ 2nd compression ring gap	0.2 to 0.4 mm (0.008 to 0.016 in)
⇒ Oil control ring gap	0.2 to 0.9 mm (0.008 to 0.035 in)
Clearance in groove:	
⇒ Top compression ring	0.02 to 0.060 mm (0.0008 to 0.0023 in)
⇒ 2nd compression ring width	0.02 to 0.060 mm (0.0008 to 0.0023 in)
⇒ Oil control ring width	Not measured
<b>Drive plate</b>	
Maximum axial run-out - measured on periphery of flywheel	0.35 mm (0.014 in)

## GENERAL DATA

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### Fuel system - Td6

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Type	Common rail injection with high and low pressure systems
High pressure pump	Chain driven from engine.
High pressure pump delivery pressure: ⇒ Low pressure ⇒ High pressure	1.5 to 5.0 bar (21.75 to 72.5 lbf.in <sup>2</sup> ) 200 to 1350 bar (2900 to 19575 lbf.in <sup>2</sup> )
Advance delivery pump	Electric, located in fuel tank
Secondary fuel pump	In-line, electric, positioned on side of fuel tank
Fuel rail pressure sensor	Inserted in end of fuel rail
Injectors	Electronic unit injectors
Filter	In-line canister with replaceable element and integral pressure sensor

### Fuel system - V8

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Type	Direct injection
Pump	Electric, located in fuel tank
Regulated pump output pressure	3.5 bar (50.75 lbf.in <sup>2</sup> )
Fuel pump delivery	170 litres/hr (211 pints/hr) (234 US pints/hr)
Injectors	Electronic unit injectors
Filter	In-line canister



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**Cooling system - Td6**

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Type	Pressurised, thermostatically controlled with remote header tank
Cooling fans	Viscous coupled and axial flow electric
Coolant pump	Centrifugal impeller, belt driven from crankshaft
Thermostat	Waxstat
Thermostat opening temperature	85 °C (185 °F)

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**Cooling system - V8**

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Type	Pressurised, thermostatically controlled with remote header tank
Cooling fans	Viscous coupled and axial flow electric
Coolant pump	Centrifugal impeller, belt driven from crankshaft
Thermostat	Waxstat
Thermostat operating temperature	85 °C (185 °F)

## GENERAL DATA

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### Transfer box

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Make/Type	New Venture Gears - NV225 - two speed reduction on main gearbox output. Front and rear drive permanently engaged by means of a Torsen differential. High/low selection by means of an electronic stepper motor
Ratios: ⇒ High range ⇒ Low range	1.00 : 1 2.694 : 1




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## Automatic gearbox - Td6 engine

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Make/Type	General Motors GM5 automatic, type 5L40-E, 5 speed with Steptronic control and sport mode
Gears	5 forward, 1 reverse
Gear ratios:	
⇒ First	3.42:1
⇒ Second	2.21:1
⇒ Third	1.60:1
⇒ Fourth	1.00:1
⇒ Fifth	0.75:1
⇒ Reverse	3.03:1
Shift speeds:	
⇒ Low to high	30 kph (48 mph)
⇒ High to low	10 kph (16 mph)
Road speed @ 1000 rev/min:	
⇒ 5th - High	44.76 kph (27.8 mph)
⇒ 1st - High	9.86 kph (6.1 mph)
⇒ 1st - Low	3.66 kph (2.3 mph)

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## Automatic gearbox - V8 engine

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Make/Type	ZF automatic, type 5HP24A, 5 speed with Steptronic control and sport mode
Gears	5 forward, 1 reverse
Gear ratios:	
⇒ First	3.57:1
⇒ Second	2.20:1
⇒ Third	1.51:1
⇒ Fourth	1.00:1
⇒ Fifth	0.80:1
⇒ Reverse	4.10:1
Shift speeds:	
⇒ Low to high	30 kph (48 mph)
⇒ High to low	10 kph (16 mph)
Road speed @ 1000 rev/min:	
⇒ 5th - High	46.74 kph (29 mph)
⇒ 1st - High	10.47 kph (6.5 mph)
⇒ 1st - Low	3.89 kph (2.4 mph)

## GENERAL DATA

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### Propeller and drive shafts

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Propeller shafts - type	Front - 50 mm (1.9 in) diameter - nominal with sliding joint and SGF coupling Rear - 60 mm (2.4 in) diameter - nominal with constant velocity joints, flexible coupling and intermediate support bearing
Drive shafts - type	Front - Variable length incorporating constant velocity joints at each end of shaft Rear - Fixed length incorporating constant velocity joints at each end of shaft

### Front differential

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Type	Hypoid gear differential with fully floating drive shafts Rear - 60 mm (2.4 in) diameter - nominal with constant velocity joints, flexible coupling and intermediate support bearing
Reduction ratio: ⇒ Td6 Model ⇒ V8 Model	4.10:1 3.73:1

### Rear differential

---

Type	Hypoid gear differential with fully floating drive shafts
Reduction ratio: ⇒ Td6 Model ⇒ V8 Model	4.10:1 3.73:1



## Steering

Type	Speed proportional
Steering wheel turns lock to lock	3.5
Steering wheel diameter	400 mm (15.7 in)
Turning circle, kerb to kerb	11.6 metres (38.0 feet)
PAS pump:	
Td6 Model	ZF FP4
V8 Model	ZF FP6
PAS pump pressure:	
At idle	8 bar (116 lbf/in <sup>2</sup> )
At full lock	133 bar (1928.5 lbf/in <sup>2</sup> ) - Maximum
Steering geometry:	
Camber angle at standard height:	
⇒ Front	-20' ± 30'
⇒ Rear	-1° ± 30'
Maximum difference - Right to Left hand - Front and rear	30'
King pin inclination	11° 46'
⇒ Castor angle	6° 41'
Wheel alignment:	
⇒ Front	0° ± 14' (total)
⇒ Rear	20' ± 12' - Toe in (total)
Thrust angle (rear)	0° ± 12'
Track:	
⇒ Front	1629 mm (63.5 in)
⇒ Rear	1626 mm (63.4 in)

## GENERAL DATA

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### Front and rear suspension

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Type - Front	Independent, Macpherson struts with air springs, gas tube dampers, height sensors and anti-roll bar
Type - Rear	Independent with air springs, gas tube dampers, height sensors and anti-roll bar
Nominal height from hub centre to wheel arch (not liner):* ⇒ Front ⇒ Rear	493 ± 2 mm (19.4 in ± 0.08 in) 483 ± 2 mm (19.0 in ± 0.08 in)

\* Measurement taken with vehicle at unladen weight and suspension in 'on road' setting.



## Brakes

Type	Servo assisted, self-adjusting with front/rear split hydraulic system, pin sliding calipers and dynamic stability control
Disc type and diameter: ⇒ Front - ventilated ⇒ Rear - solid	344 mm (13.5 in) 354 mm (13.9 in)
Front disc thickness: ⇒ New ⇒ Service limit ⇒ Thickness variation	30.0 mm (1.18 in) 28.4 mm (1.12 in) 0.010 mm (0.0004 in)
Rear disc thickness: ⇒ New ⇒ service limit ⇒ Thickness variation	12.0 mm (0.47 in) 10.4 mm (0.41 in) 0.010 mm (0.0004 in)
Maximum disc run-out: ⇒ Front ⇒ Rear	0.073 mm (0.0028 in) with wheel fitted 0.075 mm (0.003 in) with wheel fitted
Minimum pad material thickness - Front and rear:	3.0 mm (0.12 in)
Handbrake - Type	Drum in hat, manually adjusted, operated by twin cables
Handbrake drum diameter	210 mm (8.3 in)
Master cylinder bore diameter: ⇒ Primary ⇒ Secondary	27 mm (1.1 in) 20.6 mm (0.8 in)
Brake servo boost ratio	5.6 :1
Dynamic stability control - Make/type	Bosch DSC 5.7 with ABS, Electronic Brake Force Distribution (EBD), Emergency Brake Assist (EBA), Electronic Traction Control (ETC), Hill Descent Control (HDC), Engine Drag Control (EDC), Cornering Brake Control (CBC) and Dynamic Stability Control (DSC)
Hill descent control (HDC) speeds - Closed throttle, brakes released: ⇒ Low range - Forward ⇒ High range - Forward ⇒ Low range - Reverse ⇒ High range - Reverse	6 km/h (4 mph) 10 km/h (6.2 mph) 3.5 km/h (2.2 mph) 6 km/h (4 mph)

## GENERAL DATA

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### Wheels and tyres

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Wheel size:		
⇒ Alloy		7 <sup>1</sup> / <sub>2</sub> J x 18 8J x 19 8 <sup>1</sup> / <sub>2</sub> J x 20 5 <sup>1</sup> / <sub>2</sub> J x 19 Space saver - Certain models only
Tyre size		
⇒ With 7 <sup>1</sup> / <sub>2</sub> J x 18 wheels		235/65 R18 110H 255/60 R18 112H
⇒ With 8J x 19 wheels		255/55 R19 111Q - Multi-terrain
⇒ With 8 <sup>1</sup> / <sub>2</sub> J x 20 wheels		255/55 R20 111H 255/55 R20 111V
⇒ With 5 <sup>1</sup> / <sub>2</sub> J x 19 Space saver		T175/80 R19 122M Space saver
Tyre Pressures		
All tyres except space saver - normal operating conditions	Front Rear	2.3 Bar (33 lbf.in <sup>2</sup> ) 2.5 Bar (36 lbf.in <sup>2</sup> )
All tyres except space saver- vehicle at GVW	Front Rear	2.5 Bar (36 lbf.in <sup>2</sup> ) 3.0 Bar (44 lbf.in <sup>2</sup> )
Space saver	Front and rear	4.2 bar (60 lbf.in <sup>2</sup> )

**WARNING: The following precautions must be observed when using the space saver spare wheel:**

- **The space saver spare wheel is for temporary use only, it must be replaced with the repaired standard wheel as soon as possible.**
- **Only one space saver is to be used on the vehicle at any one time with a maximum speed of 50 mph (80 km/h) being observed.**
- **The inflation pressure of the space saver tyre must be maintained at 4.2 bar (60 lbf.in<sup>2</sup>).**
- **The use of snow chains is not permitted on the space saver spare wheel.**
- **Take care when driving, the space saver tyre is smaller in size and is inflated to a higher pressure than the standard tyres; it will provide a harsher ride and may have less traction on some surfaces.**

**NOTE:** The tyre size is displayed on the outer wall of each tyre.

**Normal operating conditions:** Carrying up to 4 passengers and luggage.



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## Air conditioning

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Type	CFC free, sealed closed loop
Compressor:	
⇒ Displacement	177.7 cm <sup>3</sup> /rev (10.84 in <sup>3</sup> /rev)
⇒ Relief valve operating pressure	34.3 to 41.4 bar (497 to 600 lbf.in <sup>2</sup> )
⇒ Refrigerant oil quantity	110 cc (3.8 fl.ozs)
⇒ Refrigerant oil	Nippon Denso ND-8
⇒ Refrigerant	HFC - R134A
⇒ Refrigerant charge quantity	510 ± 10 grammes (17.8 ± 0.8 ozs)
Oil quantities lost when changing individual components:	
⇒ Condenser/receiver drier	30 ml
⇒ Evaporator	20 ml
⇒ Pipe/hose	10 ml

## GENERAL DATA

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### Electrical - Td6

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System	12 volt, negative earth
Battery:	
⇒ Type	12 volt
⇒ Capacity	110 amp hour
Alternator:	
⇒ Type	Valeo A14V, air cooled
⇒ Maximum output	150 amp
Starter motor:	
⇒ Type	Nippon Denso, E95 RL
⇒ Power	2.2 kW

### Electrical - V8

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System	12 volt, negative earth
Battery:	
⇒ Type	12 volt
⇒ Capacity	110 amp hour
Alternator:	
⇒ Type	Bosch KF, water cooled
⇒ Maximum output	150 amp
Starter motor	
⇒ Type	Nippon Denso, 112V RA
⇒ Power	1.8 kW



## Dimensions

Overall length	4950 mm (193.1 in)
Overall width (including mirrors)	2191 mm (85.4 in)
Overall width (mirrors folded)	2009 mm (78.4 in)
Overall height *: ⇒ Access ⇒ Motorway ⇒ Standard ⇒ Off road	1820 mm (71.1 in) 1840 mm (71.7 in) 1863 mm (73.1 in) 1913 mm (74.6 in)
Minimum ground clearance - Off road *	281 mm (10.9 in)
Wheelbase	2880 mm (112.3 in)
Maximum wading depth	500 mm (19.5 in)

\* Measurement taken with vehicle at unladen weight.

## Weights

Condition	kgs	lbs
Unladen weight *: ⇒ Td6 Model ⇒ V8 Model	2435 to 2570 2440 to 2570	5366 to 5664 5377 to 5664
<i>Note: * Depending on options fitted.</i>		
Max.GVW: ⇒ Td6/V8 Models ⇒ Front/rear split - Td6/V8 Models	3050 1200	6722 1850
Max. front axle load - Td6/V8 Models Max. rear axle load - Td6/V8 Models	1530 1850	3372 4077
Max. braked trailer - Td6/V8 Models Down hitch load - Td6/V8 Models	3500 250	7714 551

**CAUTION: Axle weights are non additive. The individual maximum weights and gross vehicle weight must not be exceeded.**

## **GENERAL DATA**

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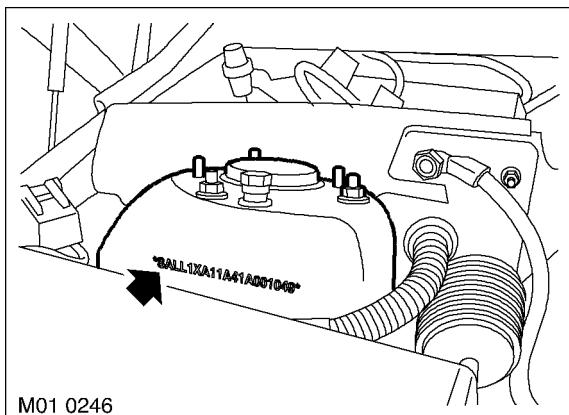


## Vehicle Identification Number

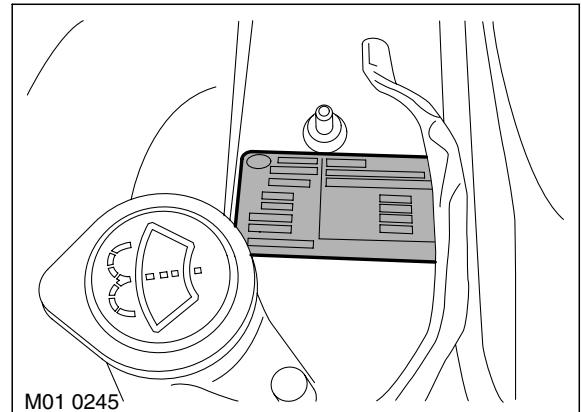
### Location

The Vehicle Identification Number (VIN) plate is on a label; attached to the inner wing, in front of the LH suspension turret. The VIN is also stamped in the following locations:

- On a plate behind the LH lower corner of the windscreens.
- On the front of the RH suspension turret.

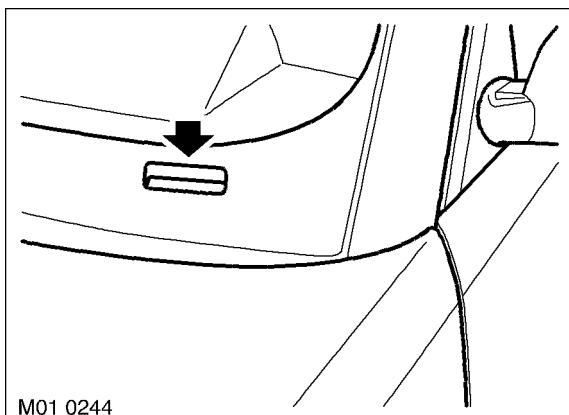


RH Suspension turret VIN



Inner wing VIN

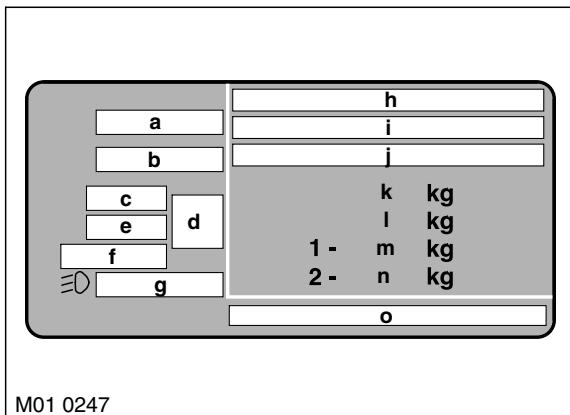
On NAS, Canadian and Gulf models, the inner wing VIN plate is replaced by a paint colour label. The VIN plate can be found on the forward face of the LH 'B/C' post.



Windscreen VIN

# IDENTIFICATION NUMBERS

## VIN plate content



The VIN plate contains the following information:

- a** Model name
- b** Engine description
- c** Country text
- d** Diesel indicator
- e** Colour code/group
- f** Reserved
- g** Headlight code
- h** Land Rover
- i** EU type approval
- j** Vehicle Identification Number (VIN)
- k** Total weight
- l** Towing weight
- m** Front axle weight
- n** Rear axle weight
- o** Exterior paint sticker

## Vehicle identification number - except NAS and Canada

Example: **SALLMAMA41A001099**

<b>SAL</b>	Manufacturer's identifier (Land Rover UK)
<b>LM</b>	Marque/Model M = Range Rover
<b>A</b>	Class A = 2880 mm (113 in)
<b>M</b>	Body Style - 4 door variant
<b>A, B or C</b>	Engine A = 4.4 V8 Petrol Catalyst B = 4.4 V8 Petrol Non Catalyst C = 3.0 Td6 Diesel
<b>3 or 4</b>	Transmission 3 = RHD automatic gearbox 4 = LHD automatic gearbox
<b>1, 2 or 3</b>	Model Year 1 = 2001 Model year 2 = 2002 Model year
<b>A</b>	Assembly plant A = Solihull
<b>6 figures</b> = Serial number	

## Vehicle identification number - NAS and Canada

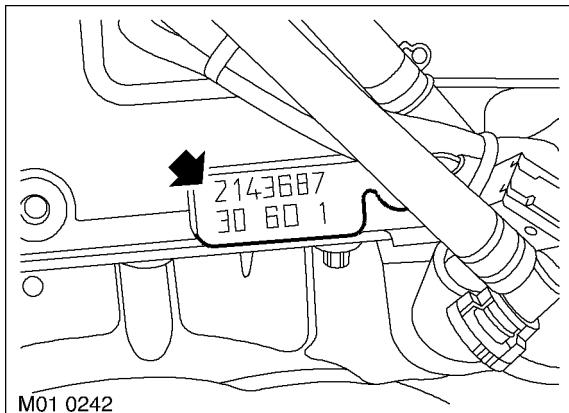
Example: **SALMA11401A001099**

<b>SAL</b>	Manufacturer's identifier (Land Rover UK)
<b>M</b>	Marque/Model M = Range Rover
<b>A</b>	Class
<b>1</b>	Body Style 1 = 4 door Station Wagon
<b>1</b>	Engine 1 = 4.4 V8 Petrol 2 = 3.0 Td6 Diesel
<b>4</b>	Transmission 4 = LHD automatic gearbox
<b>O</b>	Check digit
<b>1, 2 or 3</b>	Model Year 1 = 2001 Model year 2 = 2002 Model year 3 = 2003 Model year
<b>A</b>	Assembly plant A = Solihull
<b>6 figures</b> = Serial number	



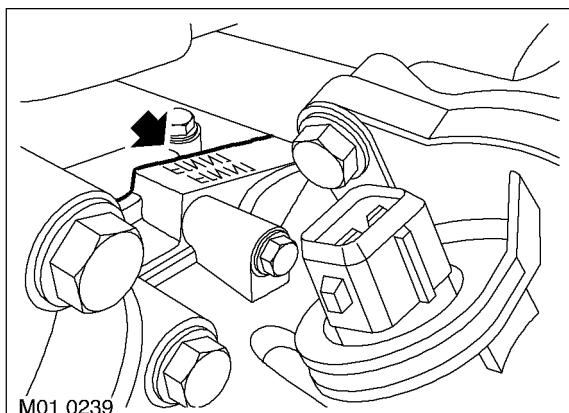
## Identification Number Locations

### Engine number



*Td6 Engine*

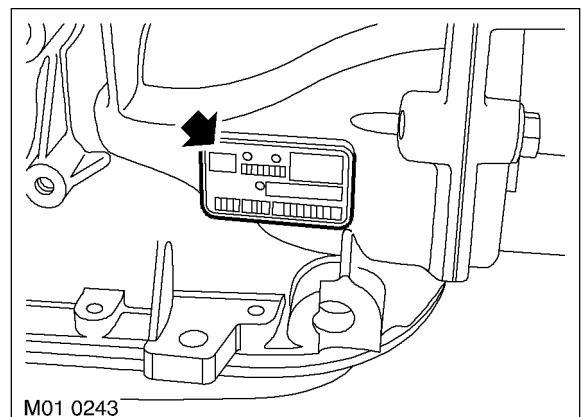
The Td6 engine serial number is stamped on the LH side of the cylinder block



*V8 Engine*

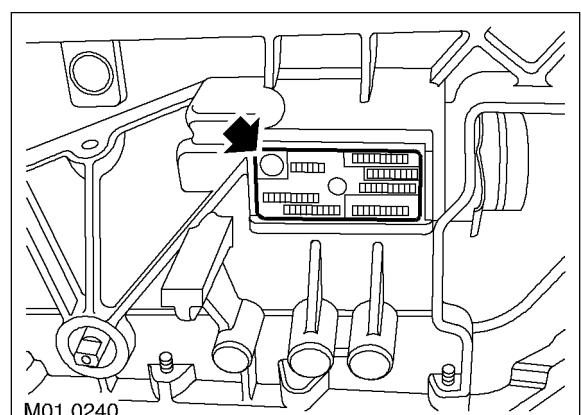
The V8 engine serial number is stamped on the top of the cylinder block at the front of the engine, beneath the throttle housing.

### Td6 automatic gearbox number



The GM automatic gearbox serial number is on a plate attached to the LH side of the gearbox.

### V8 automatic gearbox number

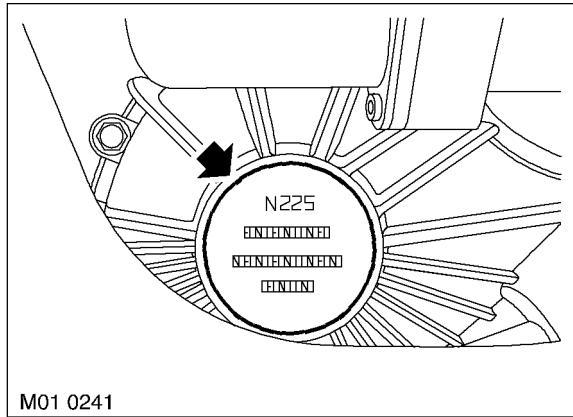


The ZF automatic gearbox serial number is on a plate attached to the LH side of the gearbox.

## IDENTIFICATION NUMBERS

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### Transfer box number



The New Venture Gears transfer box serial number is etched on a boss located at the rear of the unit above the oil drain plug.

### Paint code - NAS, Canadian and Gulf markets only



The vehicle paint colour is shown on the LH inner wing.

*NOTE: Only the paint colour is shown, and not the paint code.*



## TORQUE WRENCH SETTINGS

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### Maintenance

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Spark plugs	31 Nm	23 lbf.ft
Td6 oil sump drain plug	23 Nm	17 lbf.ft
Td6 oil filter cap	25 Nm	18 lbf.ft
V8 oil sump drain plug	17 Nm	13 lbf.ft
V8 oil filter cap	25 Nm	18 lbf.ft
Td6 (GM) Automatic gearbox oil filler/level plug	20 Nm	15 lbf.ft
V8 (ZF) Automatic gearbox oil filler/level plug	35 Nm	26 lbf.ft
Road wheel nuts	140 Nm	103 lbf.ft

# TORQUE WRENCH SETTINGS

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## Engine Td6

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Camshaft sprocket retaining screws ● Stage 1 ● Stage 2	20 Nm 35°	15 lbf.ft 35°
Vacuum pump bolts	22 Nm	16 lbf.ft
Camshaft bearing cap screws	10 Nm	7 lbf.ft
Camshaft oil feed rail	10 Nm	7 lbf.ft
Timing chain tensioner access plug	30 Nm	22 lbf.ft
Crankshaft pulley bolt: ● Stage 1 ● Stage 2 ● Stage 3	40 Nm 60° Further 60°	30 lbf.ft 60° Further 60°
Crankshaft rear oil seal housing: ● M6 Bolts ● M8 Bolts	10 Nm 22 Nm	7 lbf.ft 16 lbf.ft
Cylinder head bolts * +: ● Stage 1 ● Stage 2 - Loosen all bolts ● Stage 3 - Tighten all bolts ● Stage 4 - Tighten all bolts ● Stage 5 - Tighten all bolts	80 Nm 1/2 Turn 50 Nm 90° Further 90°	59 lbf.ft 1/2 Turn 37 lbf.ft 90° Further 90°
Cylinder head to timing cover Allen screws	20 Nm	15 lbf.ft
Timing chain guide upper pins ++	20 Nm	15 lbf.ft
Engine lifting bracket Torx screws	25 Nm	18 lbf.ft
Camshaft cover bolts	10 Nm	7 lbf.ft
Acoustic cover Allen screw	5 Nm	3.7 lbf.ft
Engine access cover bolts	5 Nm	3.7 lbf.ft
Engine to gearbox bolts	45 Nm	33 lbf.ft
Engine mounting to bracket nuts	100 Nm	74 lbf.ft
Gearbox to engine sump Torx bolts	22 Nm	16 lbf.ft
Closing plate to gearbox bolts	10 Nm	7 lbf.ft
Cross member bolts	68 Nm	50 lbf.ft
Engine rear mounting to cross member nut and bolt	100 Nm	74 lbf.ft
Engine left hand mounting bolts +: ● Stage 1 ● Stage 2	20 Nm Further 90°	15 lbf.ft Further 90°
Engine left hand mounting to sub-frame bolts	100 Nm	74 lbf.ft
Engine bracket to engine left hand mounting nut	100 Nm	74 lbf.ft
Engine right hand mounting to sub-frame bolts	56 Nm	41 lbf.ft
Engine bracket to engine right hand mounting nuts	100 Nm	74 lbf.ft
Oil filter cap	25 Nm	18 lbf.ft
Oil pump pick-up strainer bolts	10 Nm	7 lbf.ft
Oil pump pick-up strainer support bracket bolts	10 Nm	7 lbf.ft
Oil pump drive gear Torx bolt	25 Nm	18 lbf.ft
Oil pump bolts	25 Nm	18 lbf.ft
Oil sump bolts: ● M6 Bolts ● M8 Bolts	10 Nm 22 Nm	7 lbf.ft 16 lbf.ft
Dipstick tube bolt	6 Nm	4.4 lbf.ft
Oil pressure switch	14 Nm	10 lbf.ft

## TORQUE WRENCH SETTINGS



TORQUE DESCRIPTION	METRIC	IMPERIAL
Oil cooler to oil filter housing bolts	22 Nm	16 lbf.ft
Timing chain lubrication jet bolt	10 Nm	7 lbf.ft
Fuel pump sprocket retaining nut	65 Nm	48 lbf.ft
Fuel pump drive chain lower guide pin Allen screw +++	24 Nm	18 lbf.ft
Timing chain tensioner bolts	10 Nm	7 lbf.ft
Timing cover bolts	15 Nm	11 lbf.ft
Ancillary belt tensioner arm nut	10 Nm	7 lbf.ft
Compressor mounting bracket bolts	25 Nm	18 lbf.ft
Alternator and jockey pulley bracket bolts	45 Nm	33 lbf.ft
Ancillary drive belt upper idler pulley Allen screw	25 Nm	18 lbf.ft
Connecting rod - big-end bearing cap bolts * +:		
● Stage 1	5 Nm	4 lbf.ft
● Stage 2	25 Nm	18 lbf.ft
● Stage 3	Further 70°	Further 70°
Crankshaft - main bearing cap bolts * +:		
● Stage 1	20 Nm	15 lbf.ft
● Stage 2	Further 70°	Further 70°

\* Correct tightening sequence must be followed

+ New bolts must be fitted

++ New pins must be fitted

+++ New Allen screw must be fitted

# TORQUE WRENCH SETTINGS

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## Engine V8

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Crankshaft pulley to hub bolts +	22 Nm	16 lbf.ft
Crankshaft pulley bolt + ● Stage 1 ● Stage 2 ● Stage 3 ● Stage 4	100 Nm Further 60° Further 60° Further 30°	74 lbf.ft Further 60° Further 60° Further 30°
Crankshaft rear oil seal housing bolts	12 Nm	9 lbf.ft
Left hand/Right hand cylinder head bolts * +: ● Stage 1 ● Stage 2 ● Stage 3	30 Nm Further 80° Further 80°	22 lbf.ft Further 80° Further 80°
Left hand/Right hand camshaft covers nuts/bolts *	10 Nm	7 lbf.ft
VCC solenoid	25 Nm	18 lbf.ft
Left hand/Right hand VCC unit Torx bolt: ● Initial torque ● Checking continuity torque ● Final torque	15 Nm 40 Nm 110 Nm	11 lbf.ft 30 lbf.ft 81 lbf.ft
Left hand/Right hand exhaust camshaft sprocket Torx bolt: ● Initial torque ● Checking continuity torque ● Final torque	15 Nm 40 Nm 125 Nm	11 lbf.ft 30 lbf.ft 92 lbf.ft
Spark plugs	31 Nm	23 lbf.ft
Gearbox to engine Torx bolts	45 Nm	33 lbf.ft
Bell housing top Torx bolts	25 Nm	18 lbf.ft
Engine mountings to mounting bracket nuts	100 Nm	74 lbf.ft
Differential to engine sump bolts	110 Nm	81 lbf.ft
Battery positive lead to stud nut	18 Nm	13 lbf.ft
Cross member bolts	68 Nm	50 lbf.ft
Engine rear mounting to cross member bolts	100 Nm	74 lbf.ft
Engine left hand mounting to sub-frame bolt +	56 Nm	41 lbf.ft
Engine right hand mounting to sub-frame +	56 Nm	41 lbf.ft
Oil filter cap	25 Nm	18 lbf.ft
Lower oil sump bolts	10 Nm	7 lbf.ft
Oil sump to bell housing Torx bolts	53 Nm	39 lbf.ft
Upper oil sump to cylinder block: ● M6 x 8.8 mm ● M6 x 10.9 mm ● M8 x 8.8 mm	10 Nm 12 Nm 22 Nm	7 lbf.ft 9 lbf.ft 16 lbf.ft
Oil filter return pipe to sump	30 Nm	22 lbf.ft
Oil baffle plate	10 Nm	7 lbf.ft
Oil pressure switch	27 Nm	20 lbf.ft
CMP sensor bolt	10 Nm	7 lbf.ft
Timing cover bolts	15 Nm	11 lbf.ft
Timing chain tensioner plug	40 Nm	30 lbf.ft
Lower timing gear cover to cylinder block bolts: ● Initial tighten - all bolts ● Final tighten - 6 mm bolts ● Final tighten - 8 mm bolts	5 Nm 10 Nm 22 Nm	4 lbf.ft 7 lbf.ft 16 lbf.ft
Lower timing gear cover to upper sump bolts	12 Nm	9 lbf.ft



## TORQUE WRENCH SETTINGS

TORQUE DESCRIPTION	METRIC	IMPERIAL
Connecting rod - big-end bearing cap bolts * +: ● Stage 1 ● Stage 2 ● Stage 3	5 Nm 20 Nm Further 80°	4 lbf.ft 15 lbf.ft Further 70°
Crankshaft - main bearing cap bolts * +: ● Stage 1 ● Stage 2	20 Nm Further 100°	15 lbf.ft Further 100°
Crankshaft - main bearing cap adjustable spacers	10 Nm	7 lbf.ft
Crankshaft - main bearing cap adjustable spacer bolts ● Stage 1 ● Stage 2	20 Nm Further 45°	15 lbf.ft Further 45°

+ New bolts must be fitted

\* Correct tightening sequence must be followed

# TORQUE WRENCH SETTINGS

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## Emission control - Td6

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Depression valve Allen screws	8 Nm	6 lbf.ft
Injector harness screws	2 Nm	1.5 lbf.ft
EGR valve bolts	10 Nm	7 lbf.ft
EGR solenoid valve nuts	10 Nm	7 lbf.ft
EGR cooler Allen screws	25 Nm	18 lbf.ft
Intercooler hose assembly to EGR valve Wait 10 minutes and re-torque intercooler hose assembly to EGR valve	6 NM 6 Nm	4.4 lbf.ft 4.4 lbf.ft

## Emission control - V8

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TORQUE DESCRIPTION	METRIC	IMPERIAL
SAI pump bolts: ● Upper ● Lower	22 Nm 5 Nm	16 lbf.ft 4 lbf.ft
SAI control valve to manifold bolts	10 Nm	7 lbf.ft
HO2S +	50 Nm	37 lbf.ft

+ Apply anti-seize compound to threads



## Engine management system - Td6

TORQUE DESCRIPTION	METRIC	IMPERIAL
Engine coolant temperature sensor (ECT)	15 Nm	11 lbf.ft
Crankshaft position sensor (CKP) Allen screw	8 Nm	6 lbf.ft
Camshaft position sensor (CMP) Allen screw	8 Nm	6 lbf.ft
Air cleaner cover Allen screws	8 Nm	6 lbf.ft
Accelerator pedal to bracket Allen screw	10 Nm	7 lbf.ft
Engine fuel temperature sensor (EFT)	13 Nm	10 lbf.ft
Fuel low pressure sensor to filter clamp Torx bolt	6 Nm	4.4 lbf.ft
Fuel high pressure sensor	38 Nm	28 lbf.ft
Combined mass air flow/intake air temperature sensor (MAF/IAT) Torx screws	6 Nm	4.4 lbf.ft
Fuel injection pump nuts	24 Nm	18 lbf.ft
High pressure fuel pipe unions	20 Nm	18 lbf.ft
Fuel pump sprocket retaining nut	65 Nm	48 lbf.ft
'E' box cover Allen screws	2 Nm	1.5 lbf.ft
Turbocharger oil drain pipe bolts	10 Nm	7 lbf.ft
Turbocharger oil feed pipe banjo bolt	25 Nm	18 lbf.ft
Turbocharger bolts	50 Nm	37 lbf.ft
Turbocharger support bracket bolts	25 Nm	18 lbf.ft
Turbocharger duct Allen screws	8 Nm	6 lbf.ft
Intercooler hose assembly to turbocharger	6 Nm	4.4 lbf.ft
Wait 15 minutes and re-torque intercooler hose assembly to turbocharger	6 Nm	4.4 lbf.ft
Boost control solenoid valve nuts	10 Nm	7 lbf.ft
Vacuum reservoir nut	10 Nm	7 lbf.ft
Turbocharger boost pressure sensor bolt	8 Nm	6 lbf.ft
Fuel pressure regulator bolts	10 Nm	7 lbf.ft
Cooler intake duct bolts	3 Nm	2.2 lbf.ft
Injector studs	10 Nm	7 lbf.ft
Injector clamp nuts	10 Nm	7 lbf.ft
Injector harness clamp screws	2 Nm	1.5 lbf.ft
Injector pipe unions	20 Nm	15 lbf.ft
Glow plugs	20 Nm	15 lbf.ft
Glow plug ECU lead nut	6 Nm	4.4 lbf.ft

## TORQUE WRENCH SETTINGS

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### Engine management system - V8

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Spark plugs	31 Nm	23 lbf.ft
Ignition coil nuts	4 Nm	3 lbf.ft
Earth lead to camshaft cover nut	4 Nm	3 lbf.ft
'E' box cover Allen screws	2 Nm	1.5 lbf.ft
Engine coolant temperature sensor (ECT)	15 Nm	11 lbf.ft
Crankshaft position sensor (CKP) Allen screw	10 Nm	7 lbf.ft
Camshaft position sensor (CMP) bolt	10 Nm	7 lbf.ft
Knock sensor (KS) bolts	20 Nm	15 lbf.ft
Accelerator pedal to bracket Allen screw	10 Nm	7 lbf.ft
Inlet manifold bracket bolts	10 Nm	7 lbf.ft



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**Fuel Delivery System - Td6**

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Fuel filter to mounting bracket bolt	6 Nm	4.4 lbf.ft
Fuel pressure sensor to filter retaining clamp Torx bolt	6 Nm	4.4 lbf.ft
Fuel pump locking ring	35 Nm	26 lbf.ft
Fuel tank RH access panel nuts	10 Nm	7 lbf.ft
Fuel tank to body bolts	45 Nm	33 lbf.ft
Fuel tank shield nuts and bolts	25 Nm	18 lbf.ft

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**Fuel Delivery System - V8**

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Fuel pump locking ring	35 Nm	26 lbf.ft
Fuel tank RH access panel nuts	10 Nm	7 lbf.ft
Fuel tank to body bolts	45 Nm	33 lbf.ft
Fuel tank shield nuts and bolts	25 Nm	18 lbf.ft

# TORQUE WRENCH SETTINGS

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## Cooling System - Td6

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Cylinder block drain plug	25 Nm	18 lbf.ft
Viscous fan coupling unit bolts	10 Nm	7 lbf.ft
Viscous fan coupling nut	45 Nm	33 lbf.ft
Thermostat housing bolts	8 Nm	6 lbf.ft
Coolant rail bolts	10 Nm	7 lbf.ft
EGR pipe heat shield Torx bolts	25 Nm	18 lbf.ft
Coolant rail to thermostat housing bolts	8 Nm	6 lbf.ft
Coolant pump bolts	10 Nm	7 lbf.ft

## Cooling System - V8

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Cylinder block drain plug	25 Nm	18 lbf.ft
Viscous fan coupling to unit bolts	10 Nm	7 lbf.ft
Viscous fan coupling nut	45 Nm	33 lbf.ft
Coolant manifold to cylinder heads bolts	10 Nm	7 lbf.ft
Multiplug to bell housing bolt	25 Nm	18 lbf.ft
Engine harness to coolant manifold bolt	10 Nm	7 lbf.ft
Coolant gallery sealing plate to cylinder block bolts	10 Nm	7 lbf.ft
Thermostat housing bolts	10 Nm	7 lbf.ft
Coolant pump bolts	10 Nm	7 lbf.ft
Coolant pump pulley bolts	10 Nm	7 lbf.ft
Secondary air injection pipe bolts	10 Nm	7 lbf.ft



## TORQUE WRENCH SETTINGS

### Manifold and Exhaust System - Td6

TORQUE DESCRIPTION	METRIC	IMPERIAL
Exhaust mounting brackets to body nuts *	25 Nm	18 lbf.ft
Exhaust flange to front pipe nuts +	45 Nm	33 lbf.ft
Front pipe to turbocharger nuts	42 Nm	31 lbf.ft
Inlet manifold: ● Bolts ● Nuts	10 Nm 15 Nm	7 lbf.ft 11 lbf.ft
Intermediate pipe to tail pipe sleeve clamp nuts	48 Nm	35 lbf.ft
Intermediate pipe to front pipe nuts	25 Nm	18 lbf.ft
Intermediate pipe mounting bracket to body nut	68 Nm	50 lbf.ft
Vacuum pipe support bracket bolt	6 Nm	4.4 lbf.ft
Dipstick tube bracket bolt	6 Nm	4.4 lbf.ft
Exhaust manifold nuts	24 Nm	18 lbf.ft

+ New nuts and bolts must be fitted

\* Not intermediate pipe mounting bracket

### Manifold and Exhaust System - V8

TORQUE DESCRIPTION	METRIC	IMPERIAL
Exhaust mounting brackets to body nuts	25 Nm	18 lbf.ft
Exhaust flange to front pipe nuts +	45 Nm	33 lbf.ft
Intermediate pipe to front pipe sleeve clamp nuts	48 Nm	35 lbf.ft
Intermediate pipe to tail pipe sleeve clamp nuts	48 Nm	35 lbf.ft
Rear cover to inlet manifold Torx screws	10 Nm	7 lbf.ft
Brackets to inlet manifold bolts	10 Nm	7 lbf.ft
Fit front cover to inlet manifold Torx screws	10 Nm	7 lbf.ft
Inlet manifold nuts	15 Nm	11 lbf.ft
Exhaust manifold nuts	23 Nm	17 lbf.ft

+ New nuts must be fitted

## TORQUE WRENCH SETTINGS

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### Transfer Box

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Oil drain plug	25 Nm	18 lbf.ft
Oil filler/level plug	25 Nm	18 lbf.ft
Mass damper Torx screws	23 Nm	17 lbf.ft
Transfer gearbox to automatic gearbox Torx bolts	43 Nm	32 lbf.ft
Mounting to cross member nut and bolt	100 Nm	74 lbf.ft
Multiplug bracket to transfer box bolts	25 Nm	18 lbf.ft
Front and rear output flange nut +	100 Nm	74 lbf.ft
Transfer gearbox ECU fuse nuts	6 Nm	4.4 lbf.ft

+ New nuts must be fitted




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**Automatic Gearbox - Td6**


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TORQUE DESCRIPTION	METRIC	IMPERIAL
Fluid drain plug +	20 Nm	15 lbf.ft
Fluid filler/level plug +	20 Nm	15 lbf.ft
Selector cable trunnion nut	15 Nm	11 lbf.ft
Gearshift selector to carrier nuts	25 Nm	18 lbf.ft
Selector lever to selector shaft nut	10 Nm	7 lbf.ft
Detent spring bolts	10 Nm	7 lbf.ft
Selector cable support bracket to gearbox bolts	10 Nm	7 lbf.ft
Countershaft speed sensor Torx bolt	10 Nm	7 lbf.ft
Mainshaft speed sensor bolt	10 Nm	7 lbf.ft
Gearbox to engine Torx bolts:		
● M8	25 Nm	18 lbf.ft
● M12	72 Nm	53 lbf.ft
Gearbox blanking plate Torx bolts	25 Nm	18 lbf.ft
Fluid cooler pipes to gearbox clamp bolt	25 Nm	18 lbf.ft
Intermediate plate to gearbox bolt	10 Nm	7 lbf.ft
Drive plate to torque convertor bolts	45 Nm	33 lbf.ft
Cross member bolts	68 Nm	50 lbf.ft
Mounting to cross member nut	100 Nm	74 lbf.ft
Bell housing top Torx bolts	72 Nm	53 lbf.ft
Extension housing bolts	10 Nm	7 lbf.ft
Sump bolts	10 Nm	7 lbf.ft
Fluid cooler bolts	10 Nm	7 lbf.ft
Fluid cooler pipe clamp bolts	10 Nm	7 lbf.ft
Valve body bolts	10 Nm	7 lbf.ft

+ New plug must be fitted

# TORQUE WRENCH SETTINGS

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## Automatic Gearbox - V8

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Fluid drain plug	25 Nm	18 lbf.ft
Fluid filler/level plug	35 Nm	26 lbf.ft
Selector cable trunnion nut	15 Nm	11 lbf.ft
Gearshift selector to carrier nuts	25 Nm	18 lbf.ft
Selector cable to selector lever nut	15 Nm	11 lbf.ft
Starter inhibitor switch bolts	10 Nm	7 lbf.ft
Starter inhibitor switch harness bracket bolt	10 Nm	7 lbf.ft
Starter inhibitor switch guard bolts	10 Nm	7 lbf.ft
Selector lever to inhibitor switch nut	10 Nm	7 lbf.ft
Selector shaft nut	10 Nm	7 lbf.ft
Shift solenoid retaining bracket Torx bolts	10 Nm	7 lbf.ft
Valve block Torx bolts	10 Nm	7 lbf.ft
Speed sensor to valve block clamp Torx bolt	10 Nm	7 lbf.ft
Multiplug bracket bolt	10 Nm	7 lbf.ft
Gearbox to engine Torx bolts	45 Nm	33 lbf.ft
Fluid cooler banjo bolt	37 Nm	27 lbf.ft
Fluid cooler pipe union	37 Nm	27 lbf.ft
Fluid cooler saddle clamp bolt	6 Nm	4.4 lbf.ft
Drive plate to torque converter bolts	45 Nm	33 lbf.ft
Selector cable support bracket bolts	10 Nm	7 lbf.ft
Cross member bolts	68 Nm	50 lbf.ft
Mounting to cross member bolt	100 Nm	74 lbf.ft
Top bell housing Torx bolts	25 Nm	18 lbf.ft
Output flange housing to gearbox Torx bolts	10 Nm	7 lbf.ft
Sump Torx bolts	10 Nm	7 lbf.ft



## Driveshafts

TORQUE DESCRIPTION	METRIC	IMPERIAL
Front road wheel nuts	140 Nm	103 lbf.ft
Hub nut +	420 Nm	311 lbf.ft
Hub to damper nuts and bolts	250 Nm	184 lbf.ft
Bearing support housing bolts	22 Nm	16 lbf.ft
Drive shaft to differential drive flange bolts +:		
● Stage 1	40 Nm	30 lbf.ft
● Stage 2	Further 60°	Further 60°
Support bearing to body nuts	21 Nm	15 lbf.ft
Front propeller shaft to transfer box drive flange, nuts and bolts +	110 Nm	81 lbf.ft
Rear propeller shaft to transfer box drive flange Torx bolts	85 Nm	63 lbf.ft
Rear propeller shaft to differential flange	70 Nm	50 lbf.ft
Rear propeller shaft, front section to rear section bolt	97 Nm	72 lbf.ft

+ New nuts/bolts must be fitted

## Final Drive

TORQUE DESCRIPTION	METRIC	IMPERIAL
Oil drain plug	65 Nm	48 lbf.ft
Oil filler/level plug	65 Nm	48 lbf.ft
Propeller shaft to differential flange nuts	70 Nm	52 lbf.ft
Propeller shaft support bearing nuts	21 Nm	15 lbf.ft
Differential rear cover bolts	45 Nm	33 lbf.ft
Differential to sub-frame +:		
● Bolts	100 Nm	74 lbf.ft
● Nuts	165 Nm	121 lbf.ft

+ New nuts/bolts must be fitted

## Front Differential

TORQUE DESCRIPTION	METRIC	IMPERIAL
Oil drain plug +	65 Nm	48 lbf.ft
Oil filler/level plug +	35 Nm	26 lbf.ft
Differential securing bolts	110 Nm	81 lbf.ft

+ Apply sealant, Part No. STC 50552 to threads

# TORQUE WRENCH SETTINGS

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## Steering

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Track rod end locknut	55 Nm	40 lbf.ft
Upper ball joint to hub nut	165 Nm	121 lbf.ft
Tie rod to sub frame nut	165 Nm	121 lbf.ft
Damper upper mounting nuts	56 Nm	40 lbf.ft
PAS pump high pressure pipe union	25 Nm	18 lbf.ft
PAS rack bolts/nuts +:		
● Stage 1	100 Nm	74 lbf.ft
● Stage 2	Further 90°	Further 90°
PAS hose banjo bolts:		
● M14	36 Nm	26 lbf.ft
● M16	40 Nm	30 lbf.ft
Column to PAS rack clamp screw	24 Nm	18 lbf.ft
Track rod ends to steering arm nuts +	80 Nm	59 lbf.ft
Road wheel nuts	140 Nm	103 lbf.ft
Track rod end ball joint nut +	80 Nm	59 lbf.ft
Lower steering column Torx clamp bolt	24 Nm	18 lbf.ft
PAS pump hose union nut	25 Nm	18 lbf.ft
PAS hose to mounting nut	10 Nm	7 lbf.ft
PAS pump brackets Torx bolts	25 Nm	18 lbf.ft
PAS pump to mounting - Td6:		
● M6 bolts	10 Nm	7 lbf.ft
● M8 bolts	25 Nm	18 lbf.ft
PAS pump to mounting - V8:		
● Allen bolts	10 Nm	7 lbf.ft
● Nut	25 Nm	18 lbf.ft
PAS pump pulley bolts	25 Nm	18 lbf.ft
PAS pump brackets Torx bolts	25 Nm	18 lbf.ft
PAS pump high pressure pipe union to	25 Nm	18 lbf.ft
Ancillary drive belt tensioner clamp bolts	30 Nm	22 lbf.ft
Steering wheel retaining bolt	63 Nm	46 lbf.ft

+ New nuts/bolts must be fitted



## Front Suspension

TORQUE DESCRIPTION	METRIC	IMPERIAL
Subframe to body bolts +: ● Stage 1 - All bolts ● Stage 2 - Rear bolts	165 Nm Further 90°	122 lbf.ft Further 90°
Subframe to front crossmember bolt	132.5 Nm	97 lbf.ft
Anti-roll bar heat shield nuts	2.5 Nm	1.8 lbf.ft
Anti-roll bar links nuts	100 Nm	74 lbf.ft
Road wheel nuts	140 Nm	103 lbf.ft
Anti-roll bar bush clamp nuts	19 Nm	14 lbf.ft
Ball joint bolts +	60 Nm	44 lbf.ft
Tie rod to ball joint nut	80 Nm	59 lbf.ft
Lower arm ball joint to hub nut	80 Nm	59 lbf.ft
Tie rod to sub-frame bolt: ● Stage 1 ● Stage 2	165 Nm Further 90°	121 lbf.ft Further 90°
Lower arm to sub-frame bolt: ● Stage 1 ● Stage 2	165 Nm Further 90°	121 lbf.ft Further 90°
Spring and damper assembly to top mounting nuts	56 Nm	42 lbf.ft
Air pipe to air spring connection	3.5 Nm	2.6 lbf.ft
Hub to damper bolts	250 Nm	184 lbf.ft
Ball joint to steering arm nut	80 Nm	59 lbf.ft
Caliper to hub bolts	110 Nm	81 lbf.ft
Hub to damper bolts	250 Nm	184 lbf.ft
Height sensor link to lower arm nut	8 Nm	6 lbf.ft
ABS sensor Allen screw	8 Nm	6 lbf.ft
Hub nut +	420 Nm	311 lbf.ft
Height sensor to mounting bracket Allen screws	5 Nm	3.7 lbf.ft
Link to height sensor nut	8 Nm	6 lbf.ft
Air reservoir to body bolts	8 Nm	6 lbf.ft
Air supply unit to body bolts	8 Nm	6 lbf.ft
Pipes to cross link valve unions	3.5 Nm	2.6 lbf.ft

+ New nuts/bolts must be fitted

# TORQUE WRENCH SETTINGS

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## Rear Suspension

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Lower arm to hub bolt +	250 Nm	184 lbf.ft
Hub nut +	420 Nm	311 lbf.ft
Upper arm to hub bolt +	165 Nm	121 lbf.ft
Brake pipe to upper arm Allen screw	5 Nm	3.7 lbf.ft
Air pipe connection	3.5 Nm	2.6 lbf.ft
Damper to lower arm bolt +	110 Nm	81 lbf.ft
Damper spindle nut	27 Nm	20 lbf.ft
Damper upper mounting nuts +	56 Nm	40 lbf.ft
Anti-roll bar bush clamp bolts +	38 Nm	28 lbf.ft
Anti-roll bar link nuts +	100 Nm	74 lbf.ft
Tie rod ball joint nut +	165 Nm	121 lbf.ft
Height sensor link to lower arm nut	19 Nm	14 lbf.ft
Tie rod to sub-frame bolt +	165 Nm	121 lbf.ft
Anti-roll bar link nuts +	100 Nm	74 lbf.ft
Lower arm to sub-frame bolts +	165 Nm	121 lbf.ft
Upper arm to sub-frame bolts +	165 Nm	121 lbf.ft
Sub-frame to body bolts +	165 Nm	122 lbf.ft
Height sensor to mounting bracket Allen screws	5 Nm	3.7 lbf.ft

+ New nuts/bolts must be fitted




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## Brakes

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Caliper to front hub bolts	110 Nm	81 lbf.ft
Caliper to rear hub bolts	65 Nm	48 lbf.ft
Mounting bracket and cover to pre-charge pump bolts	8 Nm	6 lbf.ft
Pre-charge pump bolt	8 Nm	6 lbf.ft
Pre-charge pump pipe to master cylinder unions	14 Nm	10 lbf.ft
Master cylinder feed to pre-charge pump union	14 Nm	10 lbf.ft
Alarm sounder to bracket nut	8 Nm	6 lbf.ft
Brake master cylinder nuts +	26 Nm	19 lbf.ft
Brake pipes to master cylinder unions	14 Nm	10 lbf.ft
Return spring bracket to pedal box nuts and bolts	10 Nm	7 lbf.ft
Handbrake lever to bracket nuts	21 Nm	15 lbf.ft
Brake bleed screws	14 Nm	10 lbf.ft
Caliper housing to carrier guide pins	33 Nm	24 lbf.ft
Vacuum pump bolts +	22 Nm	16 lbf.ft
ABS sensor Allen screw	8 Nm	6 lbf.ft
Modulator mounting bracket bolts	8 Nm	6 lbf.ft
ABS modulator brake pipe unions	18 Nm	13 lbf.ft
Pressure sensor to ABS modulator	20 Nm	15 lbf.ft
DSC sensor to mounting bracket bolts	8 Nm	6 lbf.ft
Handbrake cable to backplate bolt	8 Nm	6 lbf.ft
Handbrake cable support clip bolt	6 Nm	8.8 lbf.ft
Brake servo to pedal bracket nuts +	26 Nm	19 lbf.ft
ABS ECU Torx screws	2.9 Nm	2.2 lbf.ft
DSC sensor bolts	8 Nm	6 lbf.ft

+ New nuts/bolts must be fitted

# TORQUE WRENCH SETTINGS

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## Restraint Systems

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Seat belt reel Torx bolt	31 Nm	23 lbf.ft
Seat belt upper fixing Torx bolt	50 Nm	37 lbf.ft
Seat belt height adjuster Torx nut	31 Nm	23 lbf.ft
Seat belt guide bolts	6 Nm	4.4 lbf.ft
Seat belt pretensioner Torx bolt	48 Nm	35 lbf.ft
Switch units to airbag module Torx screws	2.5 Nm	1.8 lbf.ft
Airbag module bolts	22 Nm	16 lbf.ft
Crash sensor Torx screws	8 Nm	6 lbf.ft
Door airbag module to door bolts +	9 Nm	7 lbf.ft
DCU to body bolts	10 Nm	7 lbf.ft

+ New bolts must be fitted



## TORQUE WRENCH SETTINGS

### Body

TORQUE DESCRIPTION	METRIC	IMPERIAL
Lower tailgate striker bolts	25 Nm	18 lbf.ft
Front glass Torx bolts	10 Nm	7 lbf.ft
Front door glass regulator upper clamp bolts	10 Nm	7 lbf.ft
Front door glass regulator lower bolts +	10 Nm	7 lbf.ft
Rear door glass regulator upper bolts	10 Nm	7 lbf.ft
Rear door glass regulator lower bolts +	10 Nm	7 lbf.ft
Door pocket finisher nuts	3 Nm	2.2 lbf.ft
Door latch Torx screws	10 Nm	7 lbf.ft
Spoiler to tailgate bolts	10 Nm	7 lbf.ft
Bumper armature:		
● Bolts	10 Nm	7 lbf.ft
● Nuts	45 Nm	33 lbf.ft
Door mirror assembly to door Torx screws	10 Nm	7 lbf.ft
Door mirror motor to cheater, Torx screws	14 Nm	10 lbf.ft
'A' post trim screw	2 Nm	1.5 lbf.ft
Fascia to bulkhead nuts and bolts	25 Nm	18 lbf.ft
HEVAC to bulkhead nuts	10 Nm	7 lbf.ft
Steering column clamp Torx bolt	25 Nm	18 lbf.ft
Centre console support bracket bolts	10 Nm	7 lbf.ft
Handbrake mounting bracket to body bolts	25 Nm	18 lbf.ft
Automatic gearbox selector carrier nuts	25 Nm	18 lbf.ft
Centre fascia support bracket bolts	25 Nm	18 lbf.ft
Headlining to sunshine roof screws	2.5 Nm	1.9 lbf.ft
Seat securing nuts and bolts	45 Nm	33 lbf.ft
Seat belt to seat bolt	48 Nm	35 lbf.ft
Rear seat securing nuts and bolts	25 Nm	18 lbf.ft
Sun roof motor:		
● Torx screws	5 Nm	3.7 lbf.ft
● Allen screw	10 Nm	7 lbf.ft
Tailgate latch bolts	10 Nm	7 lbf.ft

+ New bolts must be fitted

# TORQUE WRENCH SETTINGS

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## Heating and Ventilation

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Plenum assembly nuts	10 Nm	7 lbf.ft
Positive cable to stud nut	20 Nm	15 lbf.ft
Heater pipe securing bolts	10 Nm	7 lbf.ft
Fuel burning heater mounting bracket bolts	10 Nm	7 lbf.ft
Fuse box bolts	6 Nm	4.4 lbf.ft

## Air Conditioning

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Compressor drive belt tensioner bolts	25 Nm	18 lbf.ft
A/C pipes to compressor bolts	22 Nm	16 lbf.ft
A/C compressor mounting bolts	25 Nm	18 lbf.ft
A/C pipes to condenser	10 Nm	7 lbf.ft
TXV to A/C pipes clamp bolts	6 Nm	4.4 lbf.ft
A/C pipes to bulkhead bolts	6 Nm	4.4 lbf.ft

## Wipers and Washers

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TORQUE DESCRIPTION	METRIC	IMPERIAL
Washer reservoir to body bolts	3 Nm	2.2 lbf.ft
Front wiper arm to spindle nut	34 Nm	25 lbf.ft
Wiper motor to bracket bolts	10 Nm	7 lbf.ft
Wiper linkage to motor nut	25 Nm	7 lbf.ft
Tailgate wiper arm to spindle nut	13 Nm	10 lbf.ft



## Electrical

TORQUE DESCRIPTION	METRIC	IMPERIAL
Jockey pulley carrier bracket bolts to alternator	45 Nm	33 lbf.ft
Battery cable to alternator nut	13 Nm	10 lbf.ft
Upper ancillary drive belt jockey pulley bolt	25 Nm	18 lbf.ft
Alternator to casing bolts	13 Nm	10 lbf.ft
Ancillary belt tensioner block bolts - Td6	25 Nm	18 lbf.ft
Ancillary drive belt tensioner to timing cover nut - Td6 +	10 Nm	7 lbf.ft
Idler pulley to mounting Allen bolt - Td6	25 Nm	18 lbf.ft
Ancillary belt tensioner bolts - V8	30 Nm	22 lbf.ft
Battery clamp bolts	10 Nm	7 lbf.ft
Body earth lead to stud nut	25 Nm	18 lbf.ft
Bonnet earth lead nut	6 Nm	4.4 lbf.ft
Starter motor lead nuts	6 Nm	4.4 lbf.ft
Battery cable to starter motor nut	15 Nm	11 lbf.ft
Starter motor Torx bolts	47 Nm	35 lbf.ft
Headlamp securing nuts	6 Nm	4.4 lbf.ft
TPM sensor valve	3.5 Nm	2.6 lbf.ft
TPM sensor Torx bolt	3.5 Nm	2.6 lbf.ft
Parking aid fuse box to body bolts	6 Nm	4.4 lbf.ft
Parking aid sounder securing nut	10 Nm	7 lbf.ft
Tailgate solenoid motor bolt	25 Nm	18 lbf.ft
Horn to mounting bracket nut	10 Nm	7 lbf.ft
Horn to armature bolt	10 Nm	7 lbf.ft
Immobilisation ECU to carrier bolt	3 Nm	2.2 lbf.ft
Tilt sensor alarm holder nuts	3 Nm	2.2 lbf.ft
Alarm receiver bolt	6 Nm	4.4 lbf.ft
Radio clamp nuts	6 Nm	4.4 lbf.ft
Lashing eye Allen bolt	25 Nm	18 lbf.ft
Amplifier mounting bracket nuts	6 Nm	4.4 lbf.ft
Amplifier Torx screw	6 Nm	4.4 lbf.ft
Transceiver Torx screw	6 Nm	4.4 lbf.ft
Antenna nuts	6 Nm	4.4 lbf.ft
Voice recognition module nuts	6 Nm	4.4 lbf.ft
Fuse box nuts	8 Nm	6 lbf.ft
Cable to fuse box nut	15 Nm	11 lbf.ft

+ New nut must be fitted

## TORQUE WRENCH SETTINGS

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## Lifting

The following instructions must be carried out before raising the vehicle off the ground.

- Use a solid level ground surface.
- Apply hand brake.
- Select 'P' on automatic gearbox selector.

To avoid damage occurring to the under body components of the vehicle the following jacking procedures must be adhered to.

### **DO NOT POSITION JACKS OR AXLE STANDS UNDER THE FOLLOWING COMPONENTS:**

- Body structure other than approved jacking points
- Bumpers
- Fuel lines
- Fuel tank
- Brake lines
- Front or rear suspension arms
- Transfer box
- Steering linkage
- Front or rear differential units
- Engine sump
- Automatic gearbox

*NOTE: For certain repair operations, it may be necessary to support the engine under the sump. In this case, a block of hardwood or a rubber block should be positioned on the jack lifting cup to protect sump.*

### **Vehicle jack**

The jack provided with the vehicle is only intended for use in an emergency, for changing a tyre. DO NOT use the jack for any other purpose. Refer to Owner's Handbook for vehicle jack location points and procedure. Never work under a vehicle supported solely by the vehicle jack.

### **Hydraulic jack**

A hydraulic jack with a minimum 1500 kg, 3,300 lbs load capacity must be used.

**WARNING: Do not commence work on the underside of the vehicle until suitable axle stands have been placed in their correct position.**

*Always chock the wheels when jacking. The handbrake may be ineffective when the wheels are off the ground.*

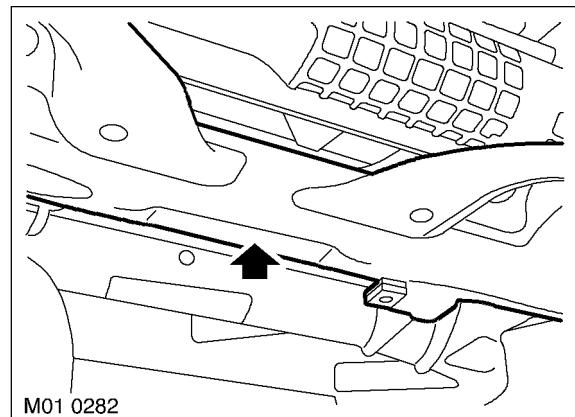
### **Raising and supporting the vehicle**

To assist in raising the vehicle, jacking points are provided as shown in the following illustrations.

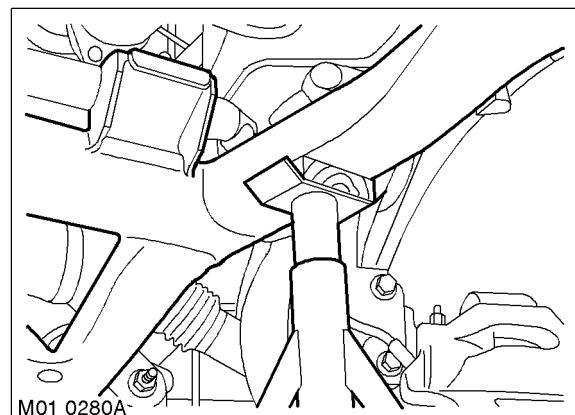
### **Raising the front of the vehicle**

Apply handbrake, select 'P' on automatic gearbox selector and chock rear wheels.

**WARNING: Always chock the rear wheels when jacking the front of the vehicle.**



Position cup of hydraulic arm under the centre of the front sub-frame, front cross member, as shown in illustration above.



*Axle stand positions - front*

Raise vehicle to enable axle stands to be positioned under, either, the front sub-frame, or the recommended customer jacking points.

**CAUTION: Place a piece of hardwood or a rubber block between each axle stand and the jacking point to avoid damaging the body / component.**

Carefully lower jack until vehicle sits securely on axle stands.

**WARNING: Always support the vehicle on axle stands when using a jack.**

Before commencing work on underside of vehicle re-check security of vehicle on stands.

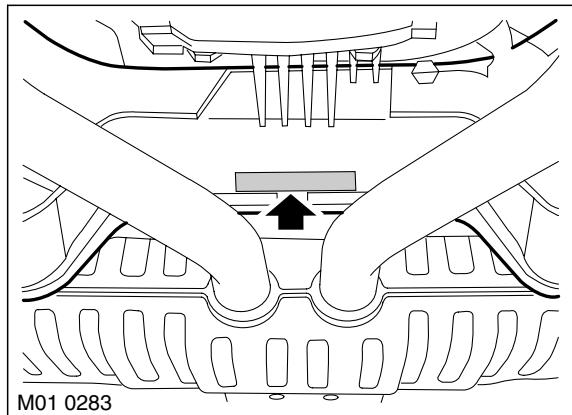
## LIFTING AND TOWING

Reverse procedure when removing vehicle from stands.

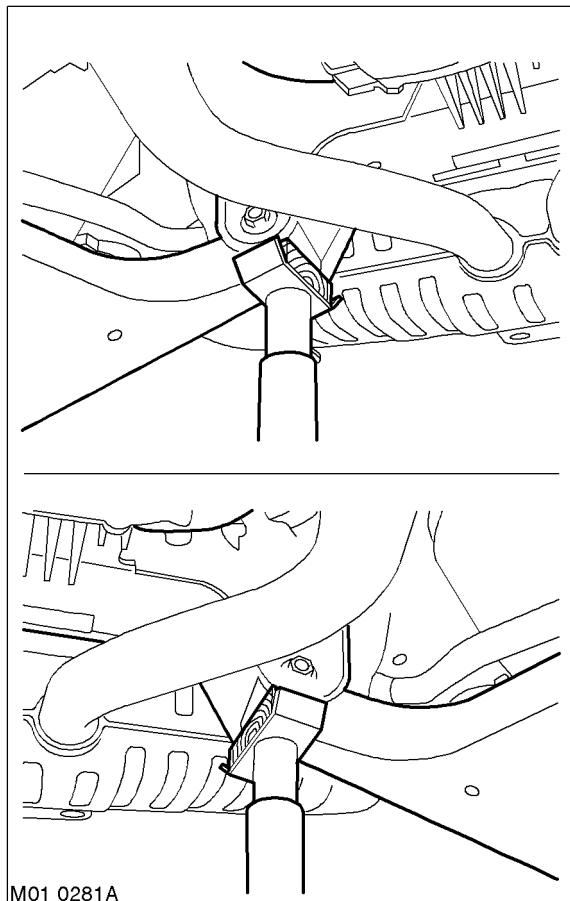
### Raising the rear of the vehicle

Select 'P' on automatic gearbox selector and chock front wheels.

**WARNING: Always chock the front wheels when jacking the rear of the vehicle.**



Position cup of hydraulic arm under the centre of the rear sub-frame, rear cross member, as shown in illustration above. The vehicle may also be lifted using the centre of the tow bar, if fitted.



Axle stand positions - rear

Raise rear of vehicle to enable axle stands to be positioned under the rear sub-frame. Alternatively, the axle stands may be positioned under, either, the recommended customer jacking points or the front mounting points of the rear sub-frame.

**CAUTION: Place a piece of hardwood or a rubber block between each axle stand and the jacking point to avoid damaging the body / component.**

**CAUTION: If any damage occurs to the washers on the front mounting points of the rear sub-frame, then the washers must be replaced.**

Carefully lower jack until vehicle sits securely on axle stands.

**WARNING: Always support the vehicle on axle stands when using a jack.**

Before commencing work on underside of vehicle re-check security of vehicle on stands.

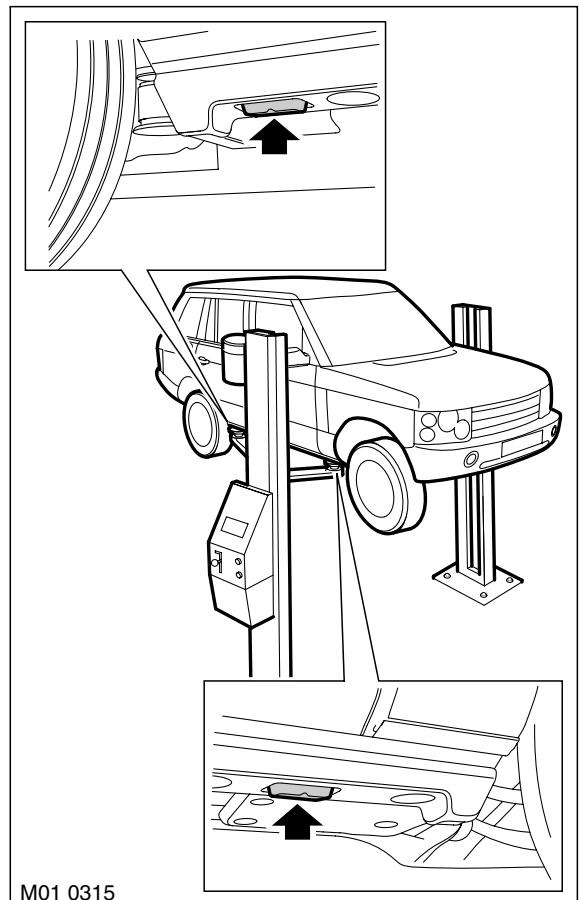
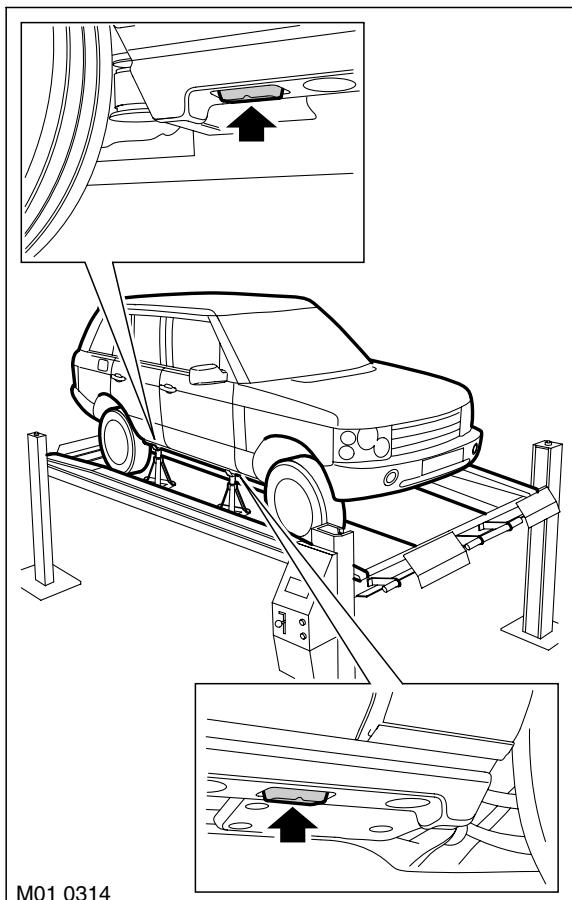
Reverse procedure when removing vehicle from stands.



### Wheel-free lift

The following warning must be read before attempting to lift the vehicle.

**WARNING:** *The vehicle cannot be supported safely in a wheel-free condition using the wheel-free facility of a four post ramp, and under no circumstances must this method be employed.*



A wheel free condition may only be achieved on a four post ramp by raising each end of the vehicle and positioning axle stands beneath the recommended customer jacking points.

**CAUTION:** Place a piece of hardwood or a rubber block between each axle stand and the jacking point to avoid damaging any components.

**WARNING:** The front and rear suspension lower arms must NOT be used as lifting / jacking points.

Alternatively, support the vehicle on an approved two post lift with the arms of the lift beneath the recommended customer jacking points.

**CAUTION:** Place a piece of hardwood or a rubber block between the lifting equipment and the jacking points to avoid damaging any components.

# LIFTING AND TOWING

## Towing

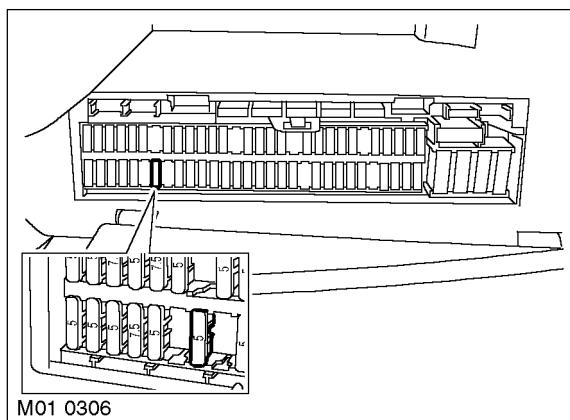
### Towing

The vehicle has permanent four wheel drive. The following towing instructions must be adhered to:

#### **Towing on 4 wheels with driver operating steering and brakes**

Select 'N' on automatic gearbox selector.

**CAUTION: If 'N' cannot be selected, vehicle must not be towed.**



Set the transfer box in neutral by inserting a spare 5 amp fuse in position 37 in passenger compartment front fusebox.

**CAUTION: If, due to an electrical fault, neutral cannot be selected due to battery disconnection, vehicle may be towed for a maximum period of 3 hours at a maximum speed of 30 km/h (20 mph).**

**CAUTION: The 5 amp fuse must be removed on completion of vehicle repair.**

Turn the ignition key to position 'II' for 15 seconds then turn key back to position 'I'.

**WARNING: Do not turn the ignition key to position 'O' or attempt to remove the key whilst the vehicle is being towed. If an electrical fault is suspected, disconnect the battery before turning ignition key to position 'II'.**

**CAUTION: Provided that the above procedures have been carried out and neutral was selected on transfer box, the vehicle may be towed for a maximum period of 6 hours at a maximum speed of 80 km/h (50 mph).**

Secure tow rope, chain or cable to the lashing/towing eye.

Release the handbrake.

**WARNING: The brake servo and power assisted steering system will not be functional without the engine running. Greater pedal pressure will be required to apply the brakes, the steering system will require greater effort to turn the front road wheels. The vehicle tow connection should be used only in normal road conditions, 'snatch' recovery should be avoided.**

#### **Suspended tow**

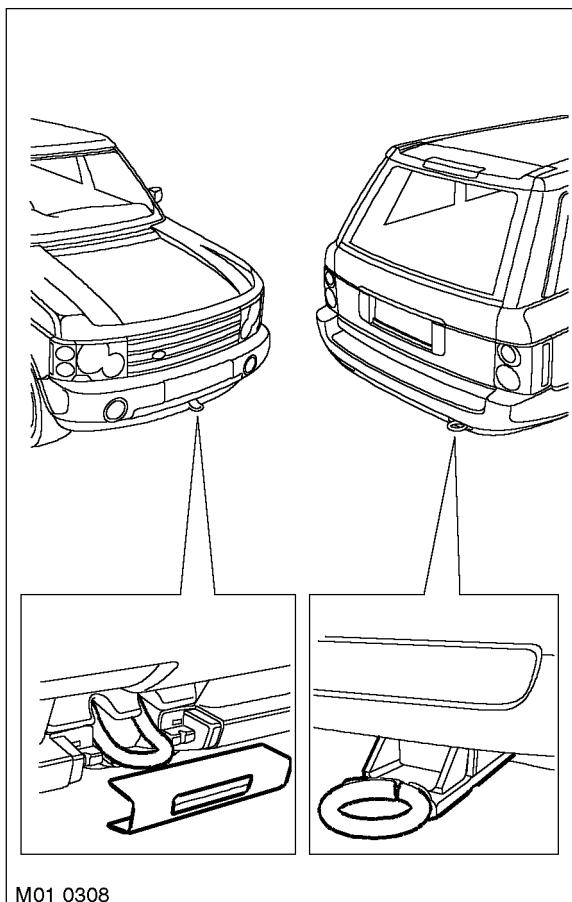
To prevent vehicle damage, the front or rear propeller shaft MUST BE removed, dependent upon which axle is being traile.

Mark propeller shaft drive flanges at transfer box and axles with identification lines to enable the propeller shaft to be refitted in its original position.

Remove the propeller shaft fixings, remove the shaft from the vehicle.

If the front axle is to be traile turn ignition key to position '1' to release steering lock.

**The steering wheel and/or linkage must be secured in a straight ahead position. DO NOT use the steering lock mechanism for this purpose.**

**Towing/lashing eyes**

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The single towing/lashing eyes at the front and rear of the vehicle are designed for vehicle recovery purposes only and must NOT be used to tow a trailer or caravan.

**Transporting****Transporting by trailer**

Lashing eyes are provided at the front and at rear of the vehicle. **DO NOT** secure lashing hooks or trailer fixings to any other part of the vehicle.

Position the vehicle on the trailer and apply the handbrake. Select 'N' on the automatic gearbox selector.

**Selecting 'P' will damage the parking pawl in the automatic gearbox.**

## LIFTING AND TOWING

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**Capacities - NAS****Capacities**

The following capacities are only an approximation of the amount of fluid required to fill the respective system.

**Capacities - UK \ EURO \ ROW**

Component	Metric Units
Fuel tank	98 litres
Engine - Td6: ⇒ Engine oil and filter change ⇒ Fill from dry	8.75 litres 9.5 litres
Engine - V8: ⇒ Engine oil and filter change ⇒ Fill from dry	8.5 litres 9.1 litres
GM Automatic gearbox: ⇒ Refill ⇒ Fill from dry	5.3 litres 9.7 litres
ZF Automatic gearbox: ⇒ Refill ⇒ Fill from dry	6.0 litres 9.9 litres
Transfer box: ⇒ Refill ⇒ Fill from dry	0.95 litres 1.0 litres
Front and rear differentials: Refill ⇒ Front ⇒ Rear Fill from dry ⇒ Front ⇒ Rear	0.75 litres 1.0 litres 0.8 litres 1.2 litres
Cooling system - Td6 Engine: ⇒ Refill ⇒ Fill from dry	11 litres 12.7 litres
Cooling system - V8 Engine: ⇒ Refill ⇒ Fill from dry	13.0 litres 17.3 litres

Component	US Units
Fuel tank	25.8 gal
Engine - V8: ⇒ Engine oil and filter change ⇒ Fill from dry	9.0 qt 9.6 qt
ZF Automatic gearbox: ⇒ Refill ⇒ Fill from dry	12.6 pt 20.9 pt
Transfer box: ⇒ Refill ⇒ Fill from dry	2.0 pt 2.1 pt
Front and rear differentials: Refill ⇒ Front ⇒ Rear Fill from dry ⇒ Front ⇒ Rear	1.6 pt 2.1 pt 1.7 pt 2.5 pt
Cooling system - Td6 Engine: ⇒ Refill ⇒ Fill from dry	23.3 pt 26.7 pt
Cooling system - V8 Engine: ⇒ Refill ⇒ Fill from dry	27.4 pt 36.7 pt

**Refrigerant - A/C system**

Charge weight	510 ± 10 g (17.8 ± 0.8 fl.ozs)
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# CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS

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## Fluids

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### Anti-freeze

Use only Texaco anti-freeze coolant (AFC). This is an ethylene glycol based anti-freeze (containing no methanol) with silicate non-phosphate corrosion inhibitors, to protect the cooling system

**CAUTION: If Texaco AFC is unavailable, use any ethylene glycol based anti-freeze (containing no methanol) with silicate non-phosphate corrosion inhibitors.**

The cooling system should be drained, flushed and refilled with the correct amount of anti-freeze solution at the intervals given on the Service Maintenance Check Sheet.

After filling with anti-freeze solution, attach a warning label to a prominent position on the vehicle stating the type of anti-freeze contained in the cooling system to ensure that the correct type is used for topping-up.

### Brake fluid

Use only Shell DOT 4 ESL brake fluid.

### PAS fluid

Use only Texaco Cold Climate PSF 14315 fluid.

### Air conditioning

Use only refrigerant HFC-R134a.

### Refrigerant oil

Use only Nippon Denso ND-oil 8.

Refrigerant oil absorbs water and must not be stored for long periods. Do not pour unused oil back into the container.

*NOTE: The total quantity of refrigerant oil in the system is 110 cc (3.8 fl.ozs).*

**CAUTION: Do not use any other type of refrigerant oil.**

## Anti-Freeze Concentration

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The overall anti-freeze concentration should not fall, by volume, below 50% to ensure that the anti-corrosion properties of the coolant are maintained. Anti-freeze concentrations greater than 60% are not recommended as cooling efficiency will be impaired.

The following recommended quantities of anti-freeze will provide frost protection to -36°C (-33°F):

### Engine - Td6

Concentration	50%
Amount of Anti-freeze to refill system:	5.5 litres (11.6 US pints)

### Engine - V8

Concentration	50%
Amount of Anti-freeze to refill system:	6.5 litres (13.75 US pints)



## Lubrication

### General

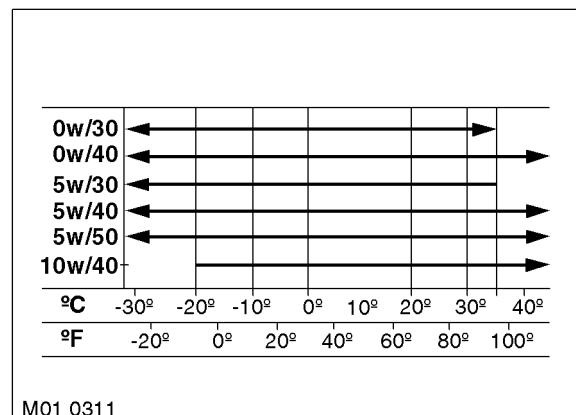
The engine and other lubricating systems are filled with high performance lubricants giving prolonged life.

**CAUTION: Always use a high quality oil of the correct viscosity range in the engine. The use of oil of the incorrect specification can lead to high oil and fuel consumption and ultimately to damaged components.**

Oil to the correct specification contains additives which disperse the corrosive acids formed by combustion and prevent the formation of sludge which can block the oil ways. Additional oil additives should not be used.

Always adhere to the recommended servicing intervals.

### Engine oil viscosity



The above chart indicates the ambient temperature ranges which each engine oil viscosity is suitable for.

### Engine oil - Td6

Use either a 5W/30, 5W/40, 5W/50 or 10W/40 oil, meeting specifications ACEA - A3/B3; and having a viscosity band recommended for the temperature range of your locality.

### Engine oil - V8

Use either a 0W/30, 0W/40, 5W/30 or 5W/40 oil, meeting specifications ACEA - A3/B3; (API: SJ/CD, ECII for NAS market), and having a viscosity band recommended for the temperature range of your locality.

### GM Automatic Gearbox oil

Use only Texaco ETL-7045E.

### ZF Automatic Gearbox oil

Use only Esso ATF LT 71141.

### Transfer box

Use only Castrol BOT 26 FMB 1

### Front and rear differential

Use only Castrol SAF-X0.

### Power steering

Use only Texaco Cold Climate PSF 14315 fluid

### Air Conditioning

Use lubricating oil Nippon Denso ND-8.

### General Greasing

Use Multipurpose Lithium Base Grease N.L.G.I. consistency No. 2.

# CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS

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## Anti-squeak lubrication

Use CYK100050L/CYK100070L to eliminate interior component squeaks on all plastic, rubber and leather surfaces.

## Bonnet latch

Lubricate cable and latch with oil.

## Locks, Latches and Hinges

Use Door Lock and Latch Lubricant, Part No. CYL 100020.

## Road Wheel Speed Sensor Lubrication

Use only lubricant having the following Part No.

Front – SSF 000010.

Rear – SSF 000020

*NOTE: This lubricant is only supplied with replacement road wheel speed sensors.*

## Cleaning Agents

General purpose cleaner:

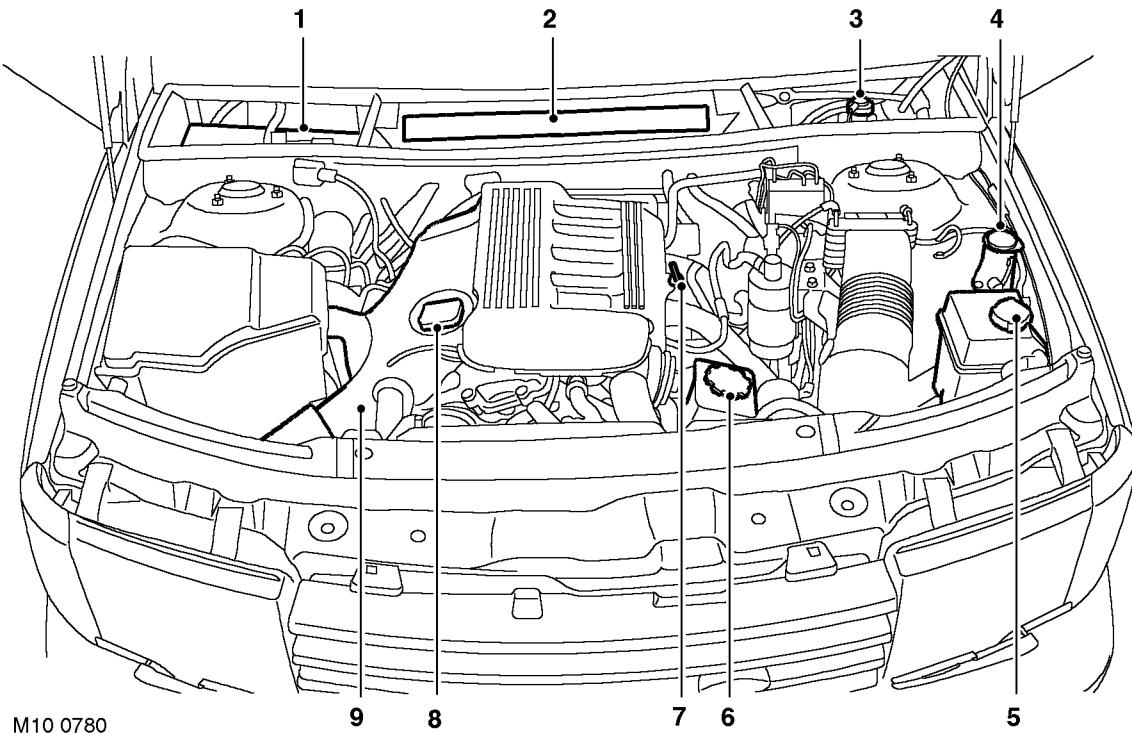
- 200 ml – Part No. STC 50543
- 400 ml – Part No. STC 50544

## Sealants

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The following table lists those sealants which are used during repair / overhaul procedures covered in this manual; it is essential that the sealant specified for a particular procedure is used at all times.

Component	Application	Land Rover Part No.
Td6 Engine	Camshaft cover gasket joint lines	STC 50550
Td6 Engine	Sump gasket joint lines	STC 50550
V8 Engine	Sump gasket joint lines	STC 50550
V8 Engine	Cylinder block to timing cover joint lines	STC 50550
V8 Engine	Cylinder head to camshaft cover joint lines	STC 50550
V8 Engine	Timing gear upper cover joint lines	STC 50550
V8 Engine	Timing gear lower cover joint lines	STC 50550
Front differential	Oil filler/ level and drain plugs	STC 50552

**Td6 Diesel engine underbonnet view**

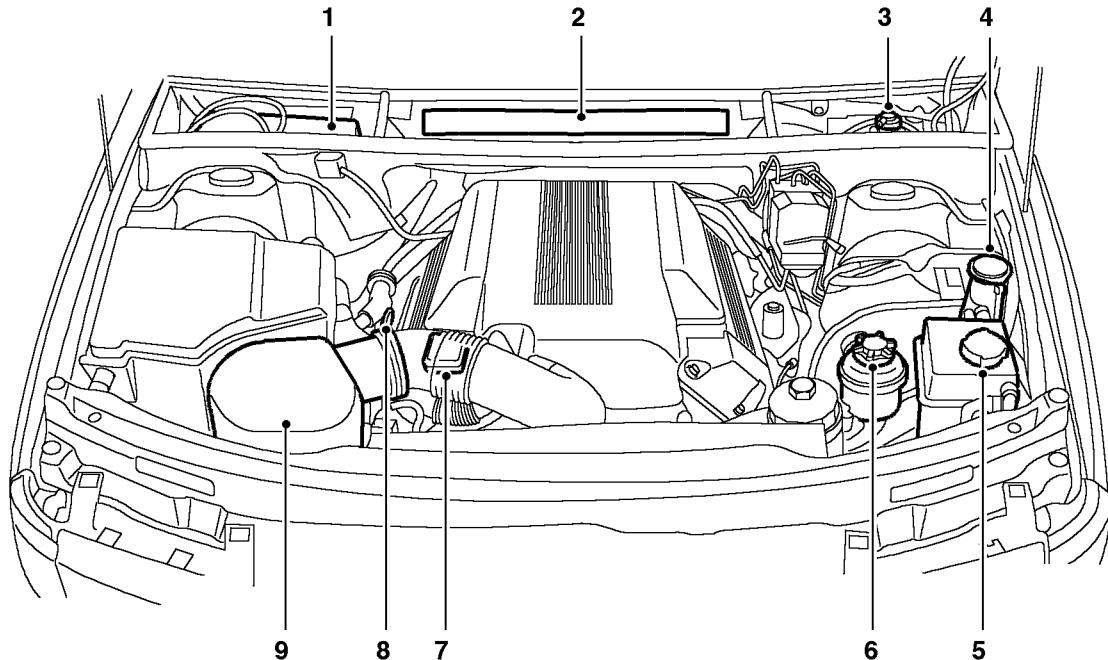
- 1 Battery - LHD illustrated, RHD on opposite side
- 2 Microfilter/activated charcoal filter
- 3 Brake fluid reservoir - LHD illustrated, RHD on opposite side
- 4 Screen/headlamp washer reservoir filler cap
- 5 Cooling system expansion tank filler cap
- 6 Power steering reservoir filler cap
- 7 Engine oil dipstick
- 8 Engine oil filler cap
- 9 Air cleaner

## MAINTENANCE

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### V8 Engine underbonnet view

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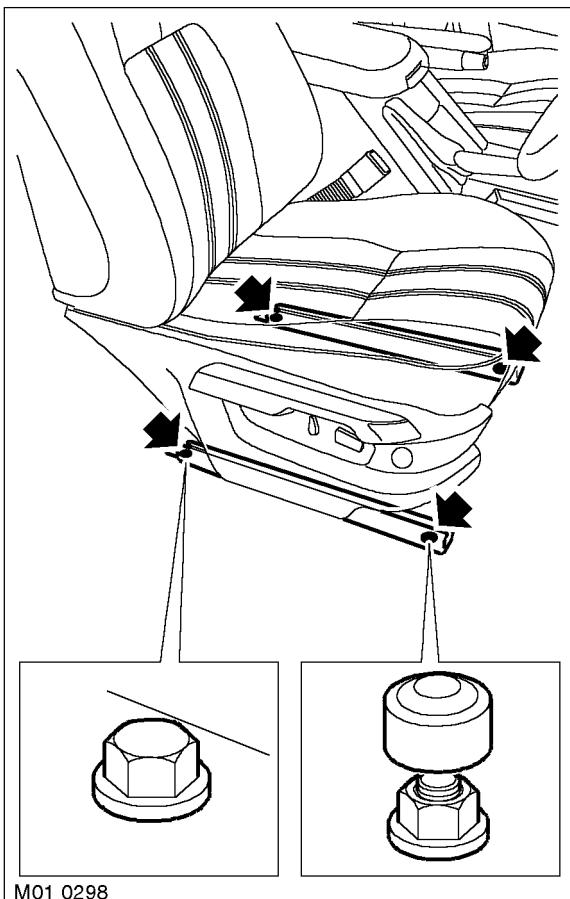
M10 0779

- 1 Battery - LHD illustrated, RHD on opposite side
- 2 Microfilter/activated charcoal filter
- 3 Brake fluid reservoir - LHD illustrated, RHD on opposite side
- 4 Screen/headlamp washer reservoir filler cap
- 5 Cooling system expansion tank filler cap
- 6 Power steering reservoir filler cap
- 7 Engine oil filler cap
- 8 Engine oil dipstick
- 9 Air cleaner



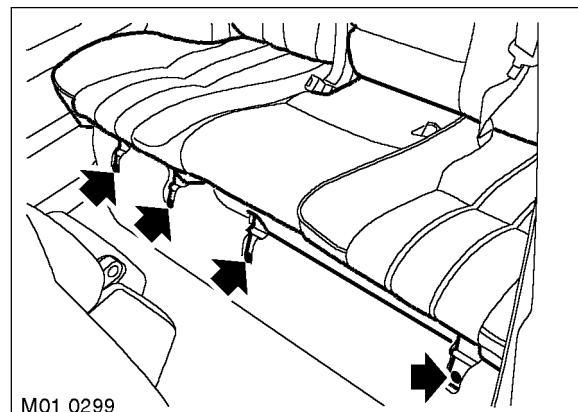
## Seats and seat belts

### Check



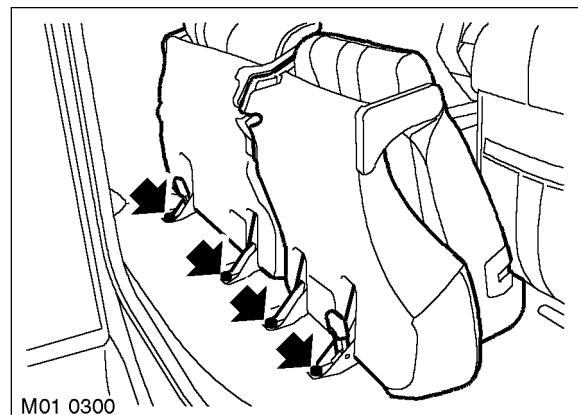
*Front seat fixings*

1. Check front seat fixings are secured to the floor and show no signs of movement.



*Rear seat front fixings*

2. Check rear seat front fixings are secured to the floor and show no signs of movement.

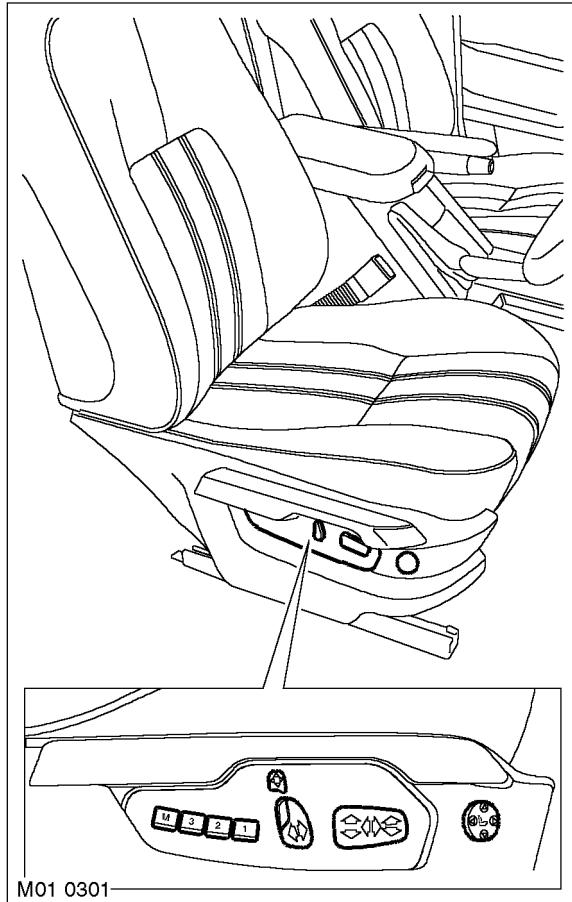


*Rear seat rear fixings*

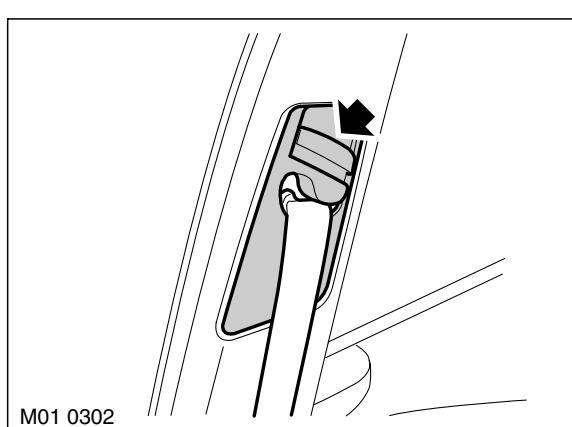
3. Release catch and fold each rear seat fully forwards, check seat rear fixings are secured to floor and show no signs of movement.
4. Check rear seat catch locking bars are secured to the floor and show no signs of movement.

## MAINTENANCE

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10. Check security of seat belt buckle mountings.
11. Connect each belt to the correct buckle, check seat buckle and tongue are secure. Release seat belt buckle and check for correct operation.



8. Check security of seat belt upper mountings.
9. Check for correct operation of seat belt height adjusters.



## Lamps, horns and warning indicators

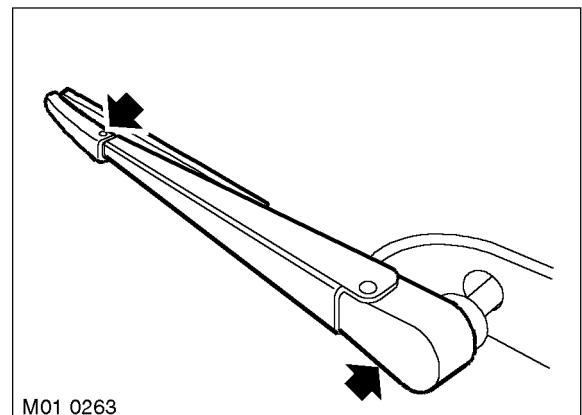
### Check

1. Switch on side, head and tail lamps and check operation.
2. Check operation of headlamp automatic levelling system.
3. Check turn signals and hazard warning lamps for correct operation.
4. Press brake pedal and check operation of brake lamps.
5. Check all exterior lamp lenses for clarity and condition. Pay particular attention to headlamp lenses for signs of stone chips or damage.
6. Check horn for loud, clear sound.
7. Switch on headlamps and check light reminder warning operates when door is opened.
8. Check operation of interior courtesy lights.
9. Check operation of all instrument pack warning and indicator lights.

## Wipers and washers

### Check

1. Operate screen washer and switch on wipers. Ensure washer jets are correctly aimed and check for smooth, smear free operation of wiper blades across screen at all speeds including intermittent.
2. Repeat operation for rear screen washers/wipers.
3. Repeat operation for headlamp washers/wipers.



4. Check all wiper blades for condition and signs of splits or damage.
5. Check security of wiper arms.

# MAINTENANCE

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## Handbrake

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### Check

- With the vehicle stationary, on a level surface, apply and release handbrake and check for correct operation.

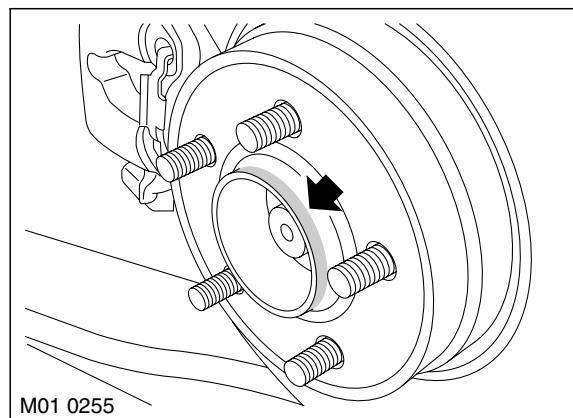
 BRAKES, REPAIRS, Pads - front.

## Road wheels

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### Remove and refit

- Mark the wheel to stud relationship to ensure that the wheels are refitted in the same position.
- Loosen wheel nuts. Raise the vehicle to a wheel-free condition, remove the wheel nuts and remove the wheels.
- Clean wheel hub centre and spigot.



- Apply a thin coat of anti-seize compound to wheel hub centre.
  - Refit wheels to original position.
  - Fit and lightly tighten wheel nuts.
  - Lower vehicle and tighten wheel nuts to 140 Nm (103 lbf.ft)
- CAUTION: When tightening wheel nuts, do not use power tools. Tighten nuts by diagonal selection using suitable torque wrench.**



## Tyres

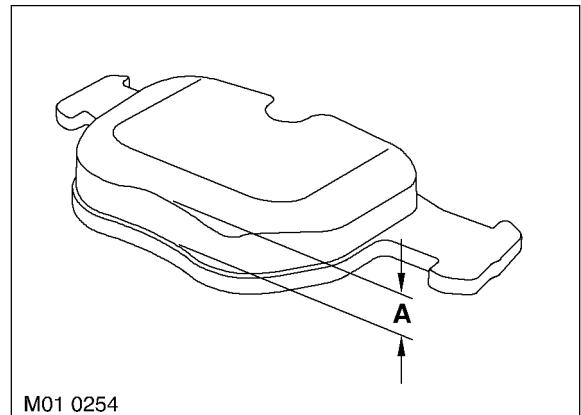
### Check

1. Check tyres for compliance with manufacturer's specification; visually for cuts, lumps, bulges, uneven tread wear and depth.
2. Check tyre pressures, condition and tread depth. Measure the tread depth across the width of the tyre and around the circumference.

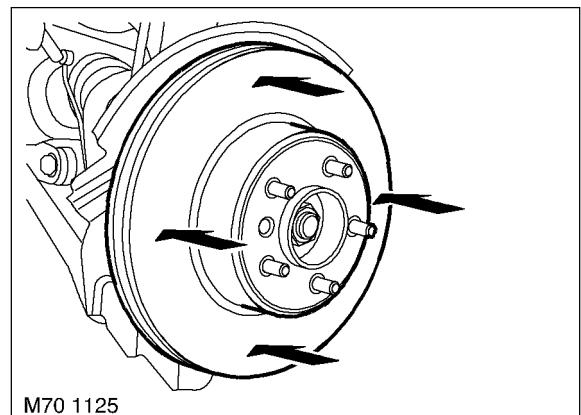
## Brake pads, discs and calipers

### Check

1. Remove front and rear brake pads.  
☞ BRAKES, REPAIRS, Pads - rear.  
☞ BRAKES, REPAIRS, Pads - front.



2. Check front and rear brake pads for wear, ensure all pads are wearing evenly.
  - Brake pad minimum thickness - Front and rear - 'A' = 3.0 mm (0.012 in)
3. Check brake discs for signs of cracking, excessive scoring or oil contamination.



4. Check thickness of brake discs, make 4 checks at 90° intervals:
  - Front = 28.4 mm (1.12 in)
  - Rear = 10.4 mm (0.41 in)
  - Thickness variation = 0.010 mm (0.0004 in)
5. Check calipers for signs of fluid leaks.
6. Clean excessive deposits of brake dust from pads, calipers and disc shields using brake cleaner.
7. Fit front and rear brake pads.  
☞ BRAKES, REPAIRS, Pads - rear.  
☞ BRAKES, REPAIRS, Pads - front.

# MAINTENANCE

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## Brake fluid

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### Replace

1. Replace brake fluid.  
 **BRAKES, ADJUSTMENTS, Brake system bleeding.**

## Fuel filter element - Td6 engine

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### Replace

1. Replace fuel filter element.  
 **FUEL DELIVERY SYSTEM - Td6, REPAIRS, Filter.**



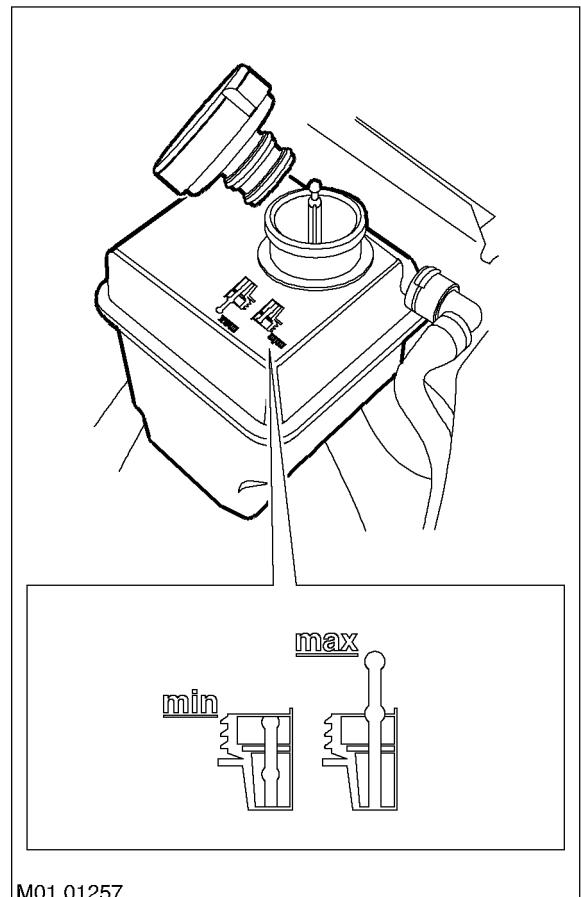
## Anti-freeze

### Replace

1. Replace anti-freeze.  
☞ **COOLING SYSTEM - Td6,  
ADJUSTMENT, Coolant - drain and refill.**  
☞ **COOLING SYSTEM - V8,  
ADJUSTMENTS, Coolant - drain, flush & refill.**

## Cooling system

### Check and top-up



1. Check coolant level, top-up if necessary.
2. With engine cold, remove expansion tank filler cap.
3. Top-up with recommended mixture of coolant and anti-freeze until float is at its highest position in the filler neck.  
☞ **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS, Anti-Freeze Concentration.**  
**CAUTION:** Ensure that coolant level is not above base of float when float is at its highest position.
4. Check anti-freeze concentration.  
☞ **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS, Anti-Freeze Concentration.**
5. Check 'O' rings on filler cap for condition, replace if necessary.
6. Fit expansion tank filler cap.

# MAINTENANCE

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## Spark plugs - V8 engine

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### Replace

Take great care when fitting spark plugs not to cross-thread plug, otherwise costly damage to cylinder heads will result. It is essential that only the correct grade of spark plugs, approved for this engine are fitted. Incorrect grade of spark plugs may lead to piston overheating and engine failure.

1. Disconnect battery earth lead.
2. Remove ignition coils.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Ignition coils - multiple - set.**
3. Remove 8 spark plugs.  
**CAUTION:** Do not attempt to clean or adjust spark plug gaps. If a spark plug problem exists, try substituting the defective spark plug with a new one.
4. Fit spark plugs and tighten to 31 Nm (23 lbf.ft).
5. Fit ignition coils.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Ignition coils - multiple - set.**
6. Connect battery earth lead.

## Air cleaner element - Td6 engine

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### Replace

1. Replace air cleaner element.  
 **ENGINE MANAGEMENT SYSTEM - Td6, REPAIRS, Element - air cleaner.**

## Air cleaner element - V8 engine

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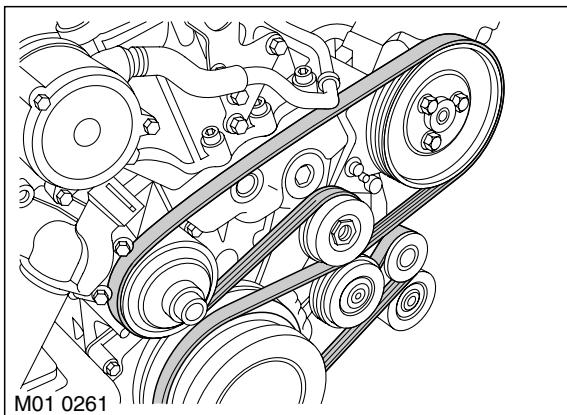
### Replace

1. Replace air cleaner element.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Element - air cleaner.**



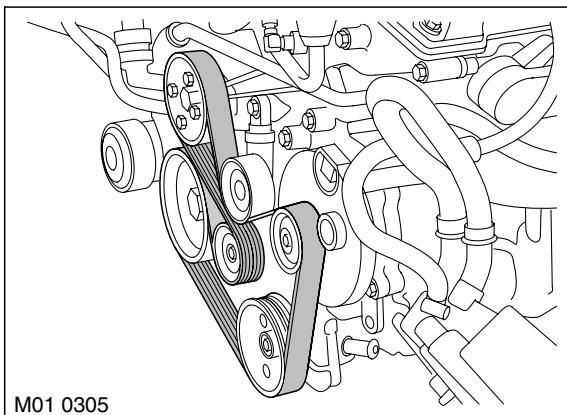
## Ancillary drive belt

### Check



*Td6 ancillary drive belt*

1. Check ancillary drive belt for signs of splits, fraying, oil contamination and wear.

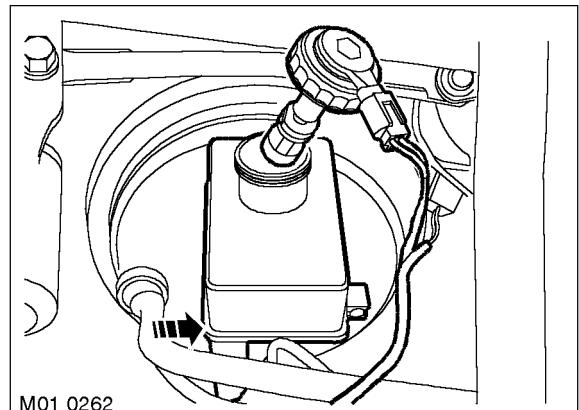


*V8 ancillary drive belt*

2. Check ancillary drive belt for signs of splits, fraying, oil contamination and wear.

## Fluid reservoirs

### Check/top-up – Brake fluid reservoir



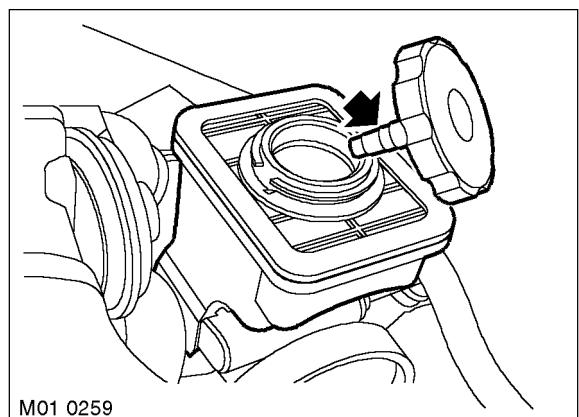
1. Check fluid level in brake fluid reservoir.
2. Clean area around filler cap, remove cap.
3. Top-up if necessary to correct level on reservoir using recommended fluid.

**CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS, Fluids.**

4. Fit filler cap.

### Check/top-up – PAS reservoir

#### Td6 engine

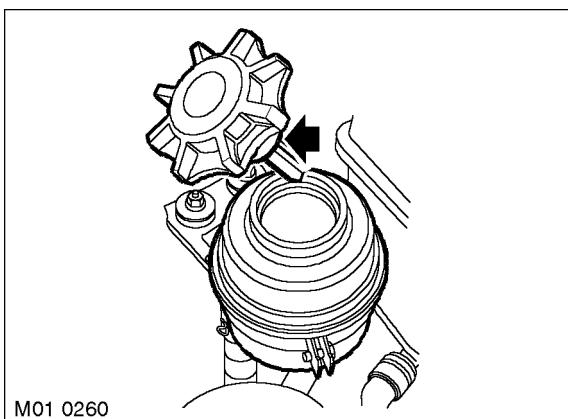


1. **Td6 engine** - Check fluid level in PAS fluid reservoir.

## MAINTENANCE

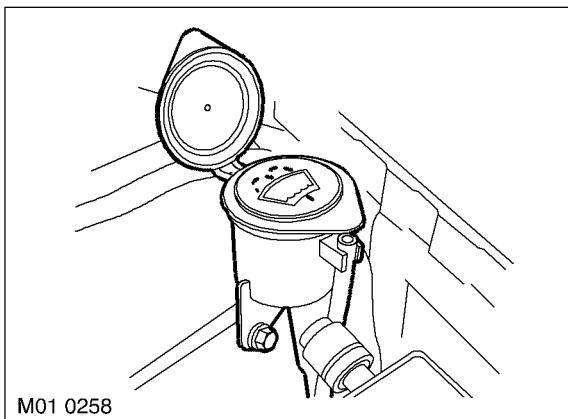
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### V8 engine



2. **V8 engine** - Check fluid level in PAS fluid reservoir.
3. **All engines** - Clean area around filler cap, remove cap.
4. Top-up if necessary to highest level mark on dipstick using recommended fluid.  
 **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS, Fluids.**
5. Fit filler cap.

### Check/top-up – Screen and headlamp washer reservoir

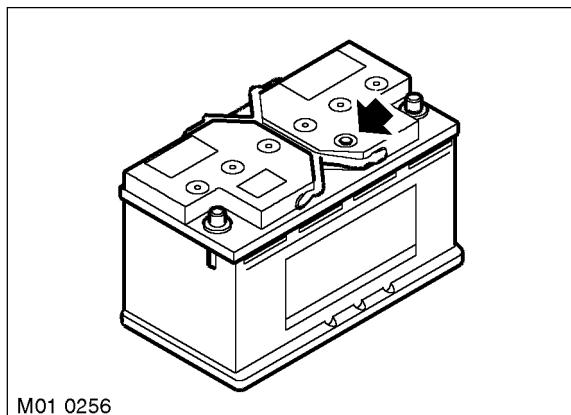


1. Check fluid level in washer reservoir.
2. Clean area around filler cap, remove cap.
3. Top-up if necessary to top of reservoir filler neck using recommended fluid.  
 **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS, Fluids.**
4. Fit filler cap.

### Battery

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#### Check



1. Check battery condition by checking colour of condition indicator.
  - Green = O.K.
  - Black = Battery requires charging.
  - Yellow = New battery required.

#### Clean

1. Clean and grease battery terminals with petroleum jelly.



## Engine oil and filter - Td6 engine

**WARNING:** Avoid excessive skin contact with used engine oil. Used engine oil contains potentially harmful contaminants which may cause skin cancer or other serious skin disorders.

### Replace

1. Raise vehicle on ramp.
2. Position suitable container beneath sump.
3. Clean area around oil drain plug.

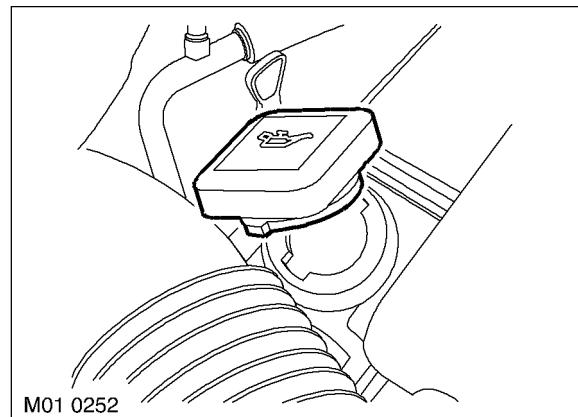


4. Remove oil drain plug, discard sealing washer.
5. Allow oil to drain.

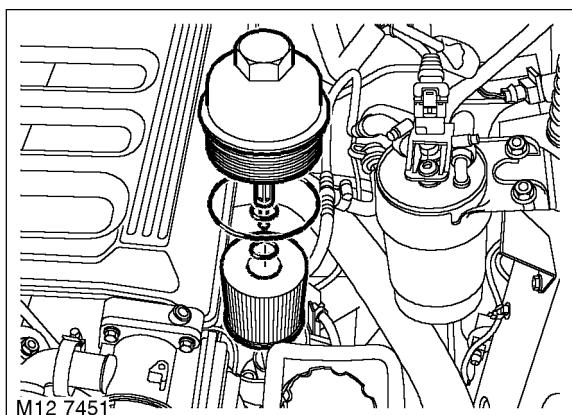
**WARNING:** Observe due care when draining oil as oil can be very hot.

6. Lower vehicle.

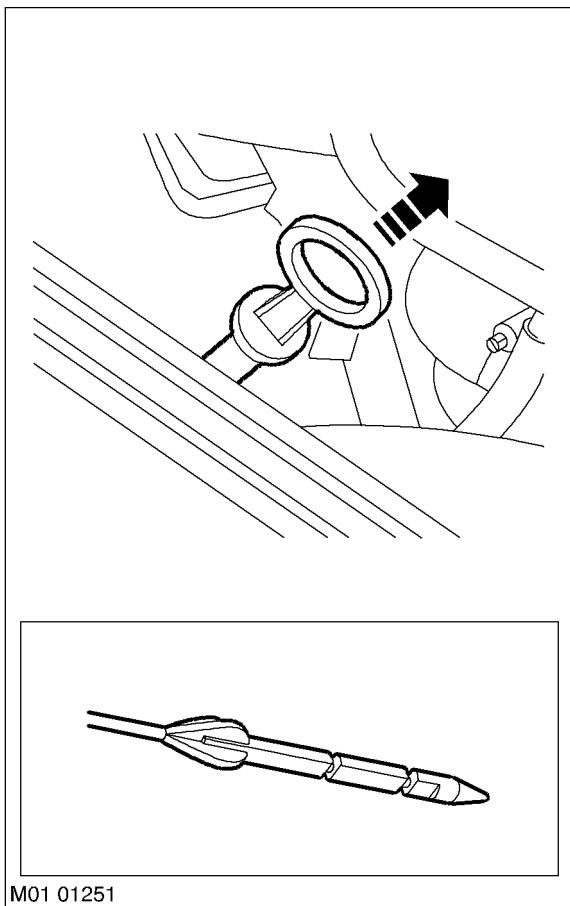
10. Clean filter housing and cap.
11. Fit new filter element.
12. Lubricate new 'O' rings with engine oil and fit to centre spindle and oil filter cap.
13. Fit oil filter cap and tighten to 25 Nm (18 lbf.ft).
14. Raise vehicle on ramp.
15. Fit new sealing washer to oil drain plug.
16. Fit oil drain plug and tighten to 23 Nm (17 lbf.ft).
17. Lower vehicle.



18. Remove oil filler cap.



7. Remove oil filter cap, remove and discard 'O' ring.
8. Remove and discard filter element.
9. Remove and discard 'O' ring from centre spindle.



### Engine oil and filter - V8 engine

**WARNING:** Avoid excessive skin contact with used engine oil. Used engine oil contains potentially harmful contaminants which may cause skin cancer or other serious skin disorders.

#### Replace

1. Raise vehicle on ramp.
2. Position suitable container beneath sump.
3. Clean area around oil drain plug.

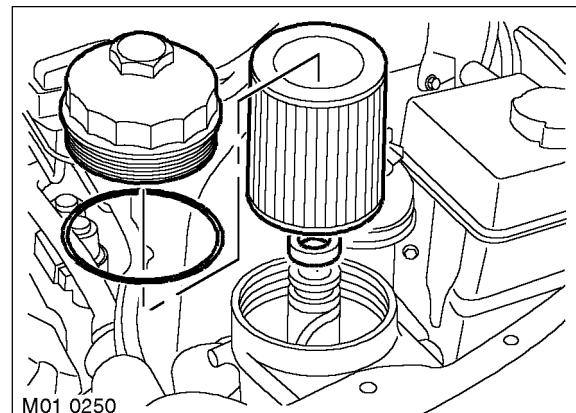


4. Remove oil drain plug and discard sealing washer.

5. Allow oil to drain.

**WARNING:** Observe due care when draining oil as oil can be very hot.

6. Lower vehicle.

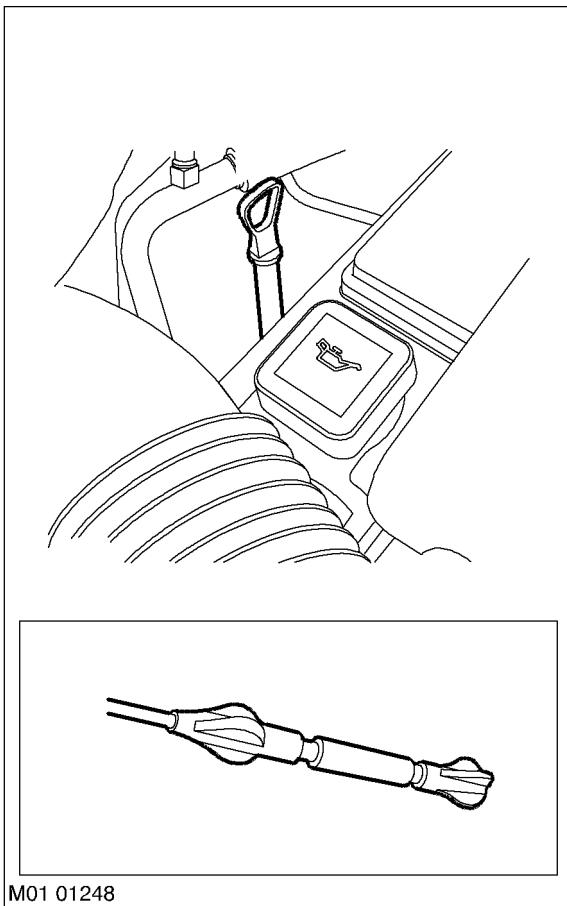


7. Remove oil filter cap, remove and discard 'O' ring.

8. Remove and discard filter element.



9. Remove and discard sealing ring from centre spindle.
10. Clean filter housing and cap.
11. Lubricate new 'O' ring and sealing ring with engine oil and fit to cap and centre spindle.
12. Fit new filter element ensuring that large diameter hole in centre of element is towards bottom of filter housing.
13. Fit oil filter cap and tighten to 25 Nm (18 lbf.ft).
14. Raise vehicle on ramp.
15. Fit new sealing washer to oil drain plug.
16. Fit oil drain plug and tighten to 23 Nm (17 lbf.ft).
17. Lower vehicle.

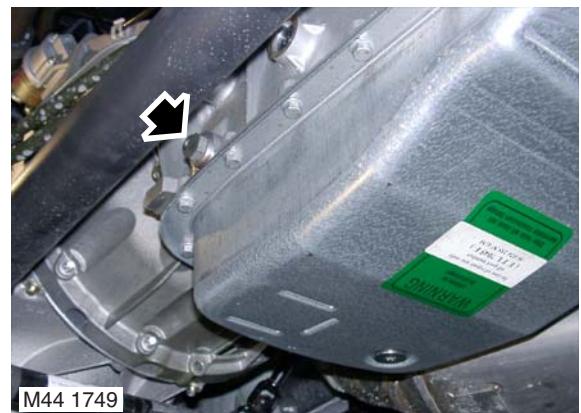


18. Remove oil filler cap and fill engine with recommended grade of oil to correct mark on dipstick.
-  CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
19. Start engine, run at idle until oil pressure light is extinguished.
20. Stop engine, recheck oil level.
21. Check for signs of oil leakage.

## Gearbox fluid - Td6

### Check/top-up

1. Position vehicle on lift.
  2. Apply handbrake and position chocks under front and rear wheels.
  3. Connect TestBook/T4 to monitor gearbox fluid temperature.
- CAUTION: The gearbox fluid level must only be checked when the temperature of the fluid is between 35°C and 45°C. The reading obtained will be incorrect if the fluid is outside this temperature range.**
4. Start engine, move selector lever from 'P' through all gear positions, pausing in each gear position for 2-3 seconds and return to 'P' position.



5. Clean area around filler/level plug.
  6. With the engine running, remove filler/level plug and allow excess fluid to drain off.
- WARNING: Observe due care when draining gearbox fluid as the fluid can be very hot.**
7. If no fluid loss is apparent when filler/level plug is removed, with the engine at idle, fill gearbox with recommended fluid until a small thread of fluid runs from filler/level plug hole.
- WARNING: Avoid excessive skin contact with mineral oil. Mineral oils remove the natural fats from the skin, leading to dryness, irritation and dermatitis.**
8. Move selector lever from 'P' through each gear position and return to 'P', allowing any excess fluid to drain off.
  9. Fit new filler/level plug and tighten to 20 Nm (15 lbf.ft).
  10. Disconnect TestBook/T4.

# MAINTENANCE

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## Gearbox fluid - V8

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### Check/top-up

1. Position vehicle on lift.
2. Apply handbrake and position chocks under front and rear wheels.
3. Connect TestBook/T4 to monitor gearbox fluid temperature.

**CAUTION:** The gearbox fluid level must only be checked when the temperature of the fluid is between 30° C and 40° C. The reading obtained will be incorrect if the fluid is outside this temperature range.

4. Start engine, move selector lever from 'P' through all gear positions, pausing in each gear position for 2-3 seconds and return to 'P' position.
5. Clean area around filler/level plug.



6. With the engine running, remove filler/level plug and allow excess fluid to drain off.

**WARNING:** Observe due care when draining gearbox fluid as the fluid can be very hot.

7. If no fluid loss is apparent when filler/level plug is removed, with the engine at idle, continue to fill gearbox with recommended fluid until a small thread of fluid runs from oil filler/level plug hole.

**WARNING:** Avoid excessive skin contact with mineral oil. Mineral oils remove the natural fats from the skin, leading to dryness, irritation and dermatitis.

8. Move selector lever from 'P' through each gear position and return to 'P', allowing any excess fluid to drain off.
9. Fit new sealing washer and tighten filler/level plug to 35 Nm (26 lbf.ft).
10. Disconnect TestBook/T4.



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**Brake hose, brake pipes, fuel pipes, hydraulic pipes and unions/electrical harnesses**

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**Check - general**

1. Check brake servo hose for cracks, leaks and chafing.
2. Check brake pipes and unions for chafing, leaks and corrosion and that all pipes and hoses are correctly routed and secure.
3. Check electrical harnesses for chafing and damage.

**Check – Td6/V8 engine fuel pipes**

1. Check visible fuel pipes and unions for chafing, leaks and corrosion and that all pipes and hoses are correctly routed and secure.

**Power steering and suspension**

1. Check for fluid leaks from power steering and suspension systems.
2. Check hydraulic pipes and unions for chafing, leaks and corrosion and that all pipes and hoses are correctly routed and secure.

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**Engine, automatic gearbox, transfer box, front and rear and differentials**

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**Check**

1. Check for oil leaks from engine, automatic gearbox , transfer box and front and rear differentials; pay particular attention to areas around oil seals.

# MAINTENANCE

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## Exhaust system

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### Check

1. Check for signs of exhaust system leaks, damage and security.

## Underbody

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### Check

1. Check all visible areas for corrosion.

## Body

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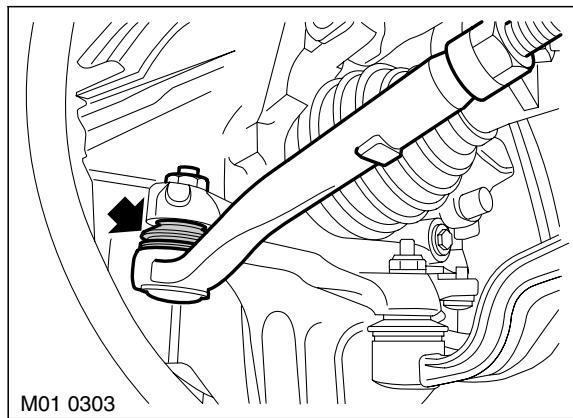
### Check

1. Check all visible areas (excluding body cavities) for corrosion.

## Steering rod ball joints and dust covers

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### Check



1. Check condition of ball joints and dust covers and security of fixings.



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## Road/roller test

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**WARNING:** *Roller test must be restricted to 3 mph (5 km/h). If 2 wheel rolling road is to be used, disconnect propeller shaft from the transfer box output shaft driving the axle which is NOT on the rolling road.*

### Testing

1. Check for correct operation of starter switch, ensure engine starts correctly; leave the engine running.
2. With vehicle stationary, turn steering from lock to lock. Check for smooth operation and ensure there is no undue noise from power steering pump or drive belt.
3. Check all vehicle systems for correct operation.
4. Check for unusual engine, gearbox and suspension noises.
5. Check braking system operation.
6. Check for smooth gear engagement.
7. Check engine performance.
8. Check operation of all instruments and warning devices where practicable.
9. Where possible, check for correct operation of hill descent control (HDC) mechanism. This should not be carried out if excessive journey time is required.
10. After road/roller test, carry out a final inspection of vehicle, with vehicle on a ramp.
11. Check all fluid levels and top-up if necessary.
12. **2 wheel rolling road:** Ensure propeller shaft is connected on completion of test.

## MAINTENANCE

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## Engine oil pressure check

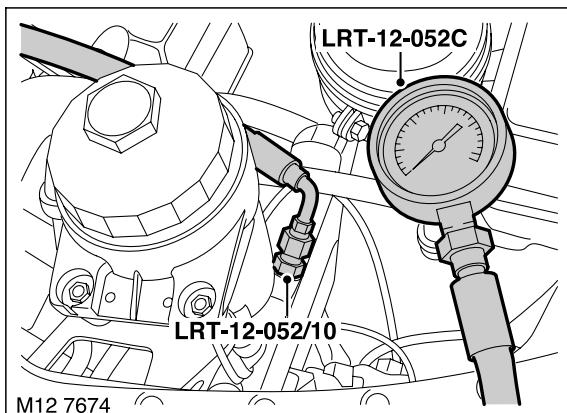
### » 12.90.09.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Check

1. Disconnect battery earth lead.
2. Remove oil pressure switch.  
 **Engine - V8, REPAIRS, Switch - oil pressure.**



3. Fit **LRT-12-052/10** to oil filter housing and fit **LRT-12-052C** to **LRT-12-052/10**, tighten unions.
4. Check engine oil level, top-up if necessary.
5. Connect battery earth lead.
6. Start and run engine until normal operating temperature is reached.
7. Note oil pressure readings with the engine running at idle and at 3500 rev/min.  
 **GENERAL DATA, Engine - V8.**
8. Switch off engine.
9. Disconnect battery earth lead.
10. Remove **LRT-12-052C**.
11. Remove **LRT-12-052/10**.
12. Clean oil spillage.
13. Fit oil pressure switch.  
 **Engine - V8, REPAIRS, Switch - oil pressure.**
14. Check engine oil level, top-up if necessary.
15. Connect battery earth lead.

## **ENGINE - V8**

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## Pulley - crankshaft

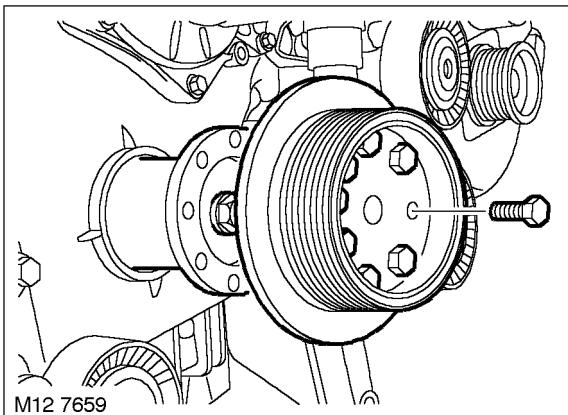
### 12.21.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove ancillary drive belt  
 **CHARGING AND STARTING, REPAIRS, Ancillary drive belt - V8.**
4. Remove viscous fan.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
5. Remove compressor drive belt.  
 **AIR CONDITIONING, REPAIRS, Drive belt - compressor - V8.**



6. Remove 8 bolts securing crankshaft pulley to hub assembly.
7. Remove crankshaft pulley.

#### Refit

1. Position crankshaft pulley to hub assembly, fit to locating dowel.
2. Fit 8 new bolts securing crankshaft pulley to hub assembly and tighten to 22 Nm (16 lbf.ft).
3. Fit compressor drive belt.  
 **AIR CONDITIONING, REPAIRS, Drive belt - compressor - V8.**
4. Fit viscous fan.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
5. Fit ancillary drive belt.  
 **CHARGING AND STARTING, REPAIRS, Ancillary drive belt - V8.**
6. Connect battery earth lead.

## Oil seal - crankshaft - front

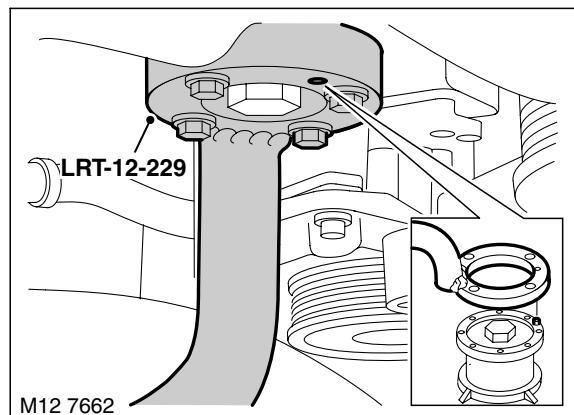
### 12.21.14

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

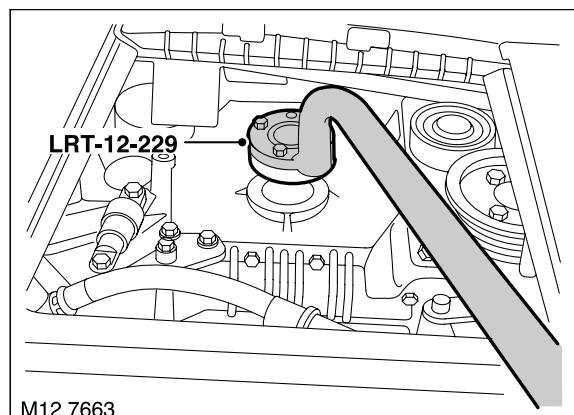
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

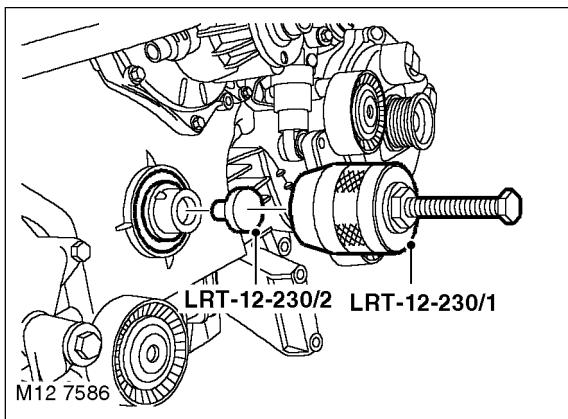
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove crankshaft pulley.  
 **Engine - V8, REPAIRS, Pulley - crankshaft.**



4. Fit LRT-12-229 to crankshaft pulley hub.



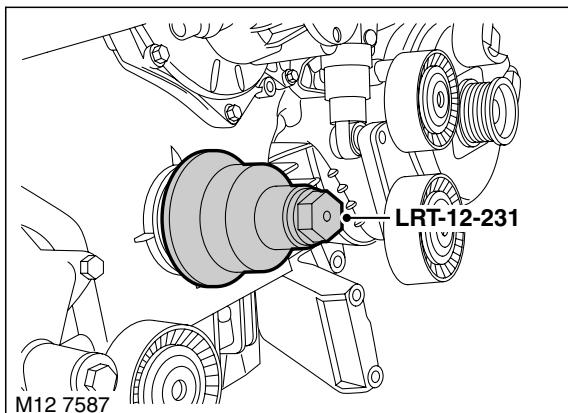
5. Position LRT-12-229 to rest on sub frame and remove crankshaft pulley bolt.
6. Remove LRT-12-229 from crankshaft pulley hub.
7. Remove crankshaft pulley hub.



8. Fit **LRT-12-230/1** and **LRT-12-230/2** to crankshaft seal and remove crankshaft oil seal.
9. Discard oil seal.

## Refit

1. Clean seal mating faces.



2. Fit new crankshaft oil seal to front cover using **LRT-12-231**.

*NOTE: Front crankshaft oil seal should be fitted flush to front timing cover.*

3. Remove **LRT-12-231**.
4. Clean crankshaft pulley hub and mating faces, fit crankshaft pulley hub to crankshaft.
5. Fit new bolt to crankshaft, lock crankshaft using **LRT-12-229** and initially tighten crankshaft bolt to 100 Nm (74 lbf.ft). Using an angle torque gauge tighten in the following sequence. Stage 1; 60°. Stage 2; 60°. Stage 3; 30°.
6. Remove **LRT-12-229** from crankshaft pulley hub.
7. Fit crankshaft pulley.  
☞ **Engine - V8, REPAIRS, Pulley - crankshaft.**
8. Connect battery earth lead.

## Oil seal - crankshaft - rear

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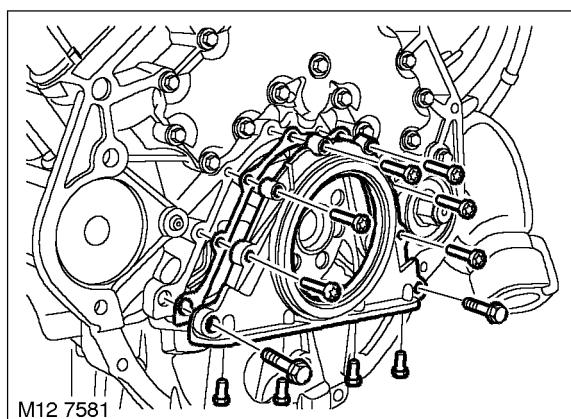
### ☞ 12.21.20

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

## Remove

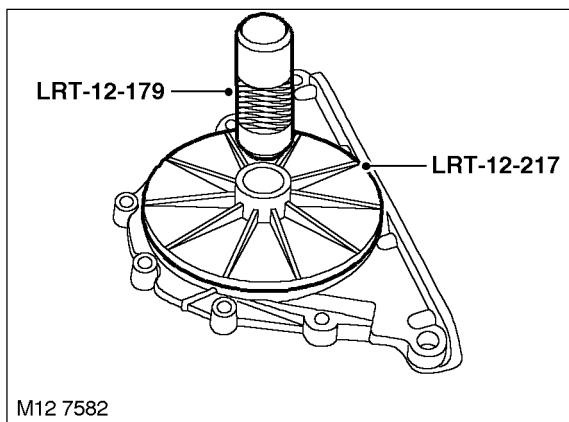
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain engine oil.
4. Remove torque converter drive plate.  
☞ **Engine - V8, REPAIRS, Torque converter drive plate.**



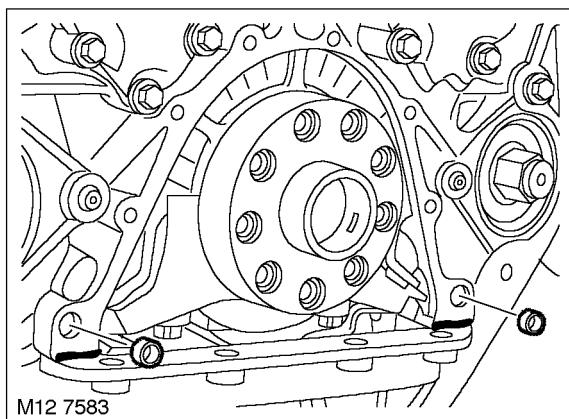
5. Remove 6 Torx bolts and 6 bolts securing crankshaft rear oil seal housing to cylinder block.
6. Remove crankshaft rear oil seal housing.
7. Discard gasket from crankshaft rear oil seal housing.
8. Remove crankshaft rear oil seal from housing.

## Refit

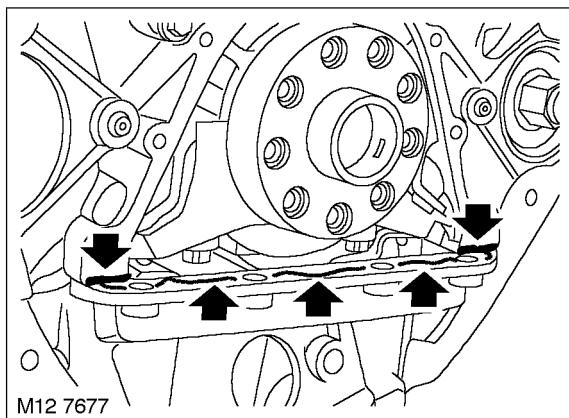
1. Clean crankshaft rear oil seal housing, locating dowels and mating faces on cylinder block and crankshaft oil seal running surface.



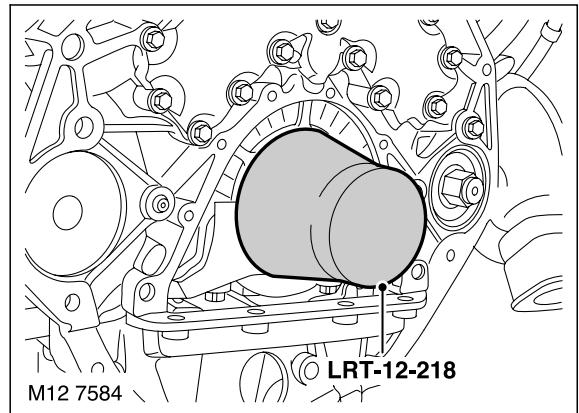
2. Fit **LRT-12-217** and **LRT-12-179** to new crankshaft rear oil seal and fit new seal to housing.



3. Check for correct fitment of dowels in cylinder block.
4. Fit new gasket to crankshaft rear oil seal housing.



5. Apply sealant , Part No. STC 50550 to upper oil sump gasket contact point.



6. Fit **LRT-12-218** to crankshaft. Apply a thin coat of oil to inner lip of crankshaft rear oil seal, fit seal and housing over **LRT-12-218**, fit onto dowels and remove tool.
7. Fit new washers to 6 Torx bolts, fit 6 Torx bolts and 6 bolts securing crankshaft oil seal housing to cylinder block and tighten to 12 Nm (9 lbf.ft).
8. Fit torque converter drive plate.
  - Engine - V8, REPAIRS, Torque converter drive plate.**
9. Fill engine with oil.
  - MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**
10. Connect battery earth lead.

# ENGINE - V8

## Gasket - cylinder head - LH

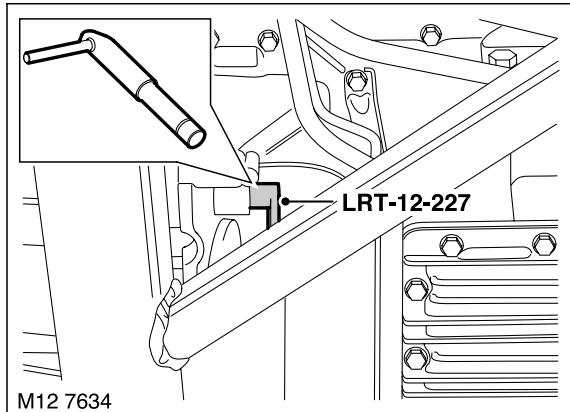
### 12.29.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

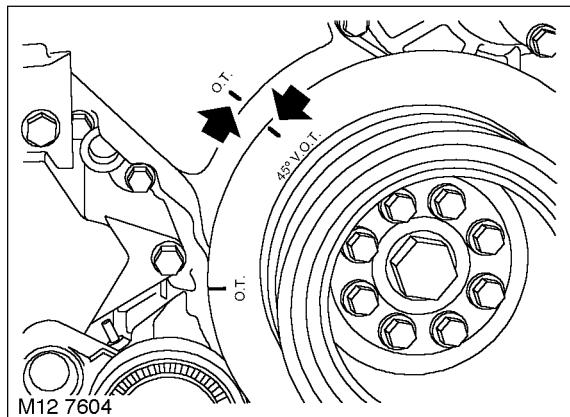
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

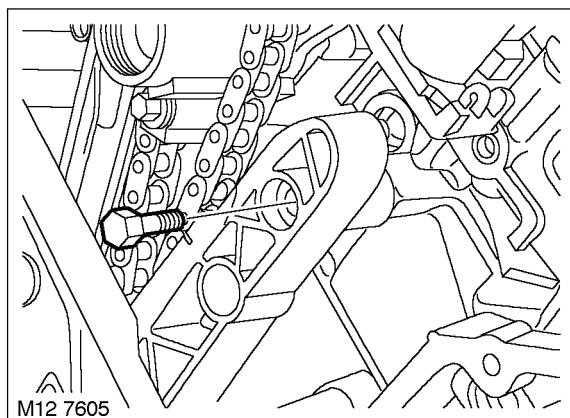
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Drain engine oil and remove oil filter.  
 **MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**
5. Remove LH exhaust manifold.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - exhaust manifold - LH.**
6. Remove coolant pump to coolant manifold pipes.  
 **COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**
7. Remove LH VCC unit.  
 **Engine - V8, REPAIRS, Variable camshaft unit - variable camshaft control (VCC) - LH.**



8. Remove LRT-12-227 from timing tool access hole.



9. Rotate engine crankshaft pulley anti-clockwise to align the 45° before TDC timing mark.  
*NOTE: Raise timing chain and hold under tension while turning crankshaft pulley.*
10. Remove LRT-12-223/6, LRT-12-223/5, LRT-12-223/3 and LRT-12-223/4 from LH cylinder head camshafts.

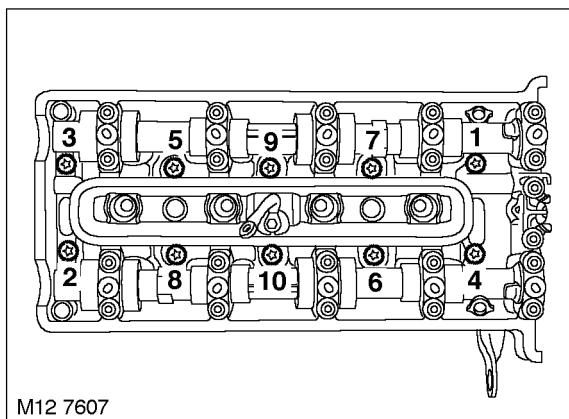


11. Remove bolt securing LH timing chain guide rail to LH cylinder head.

**Refit**

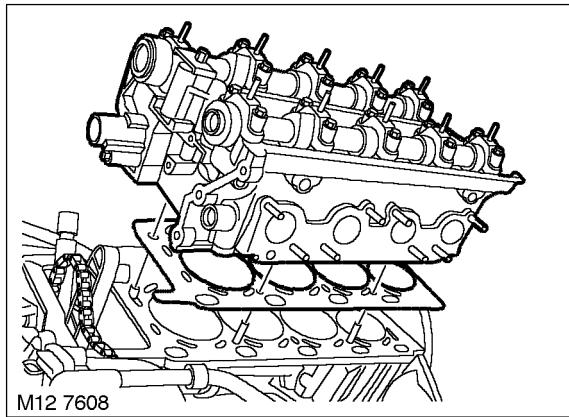
1. Clean mating faces of cylinder head and cylinder block, dowels and dowel holes. If necessary remove all traces of sealing compound with hard wood scraper. Ensure remnants do not remain in oil ways cooling ducts or bolt holes.

**CAUTION: Make sure no oil or coolant is left in the cylinder head bolt holes as damage to the cylinder block may occur when tightening the cylinder head bolts.**



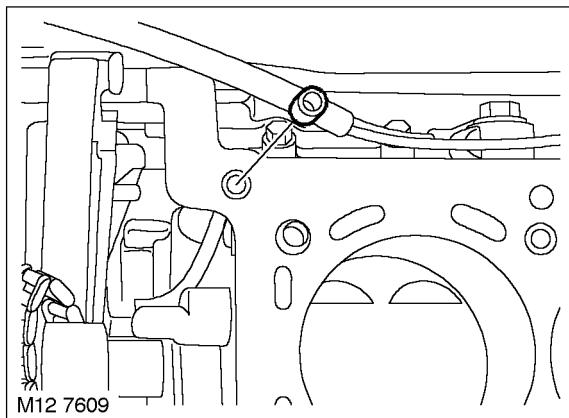
M12 7607

12. Working in the sequence shown, progressively loosen 10 cylinder head bolts.
13. Discard 10 cylinder head bolts and remove 10 cylinder head bolt washers.

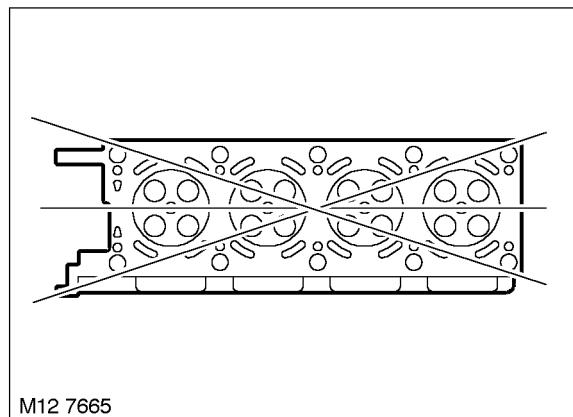


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14. With assistance, remove cylinder head assembly.
15. Discard cylinder head gasket.



16. Discard 'O' ring from cylinder block.

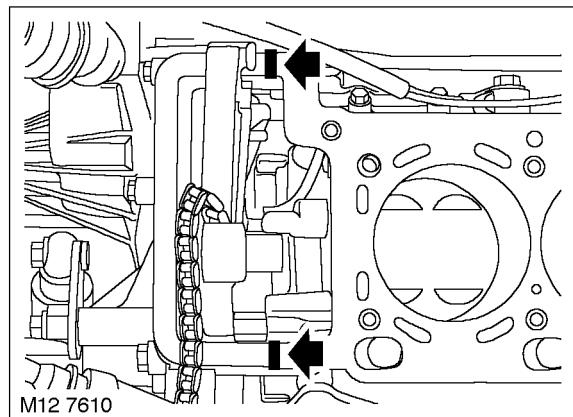


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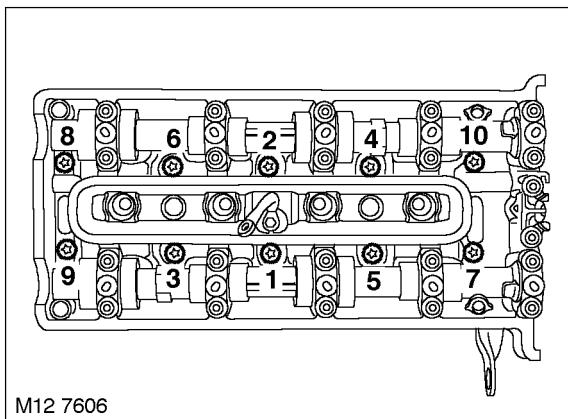
2. Using a straight edge and feeler gauges, check cylinder head for distortion along lines in illustration.

**GENERAL DATA, Engine - V8.**

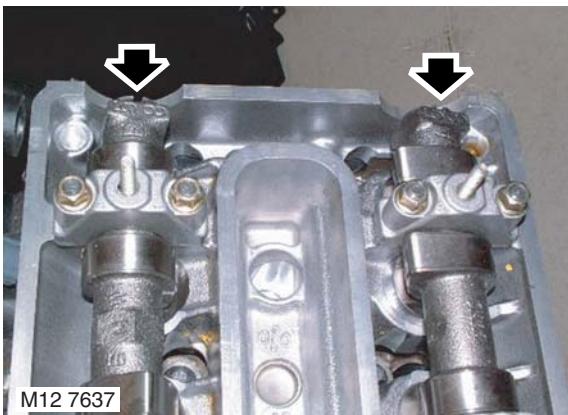
3. Fit new 'O' ring to cylinder block.



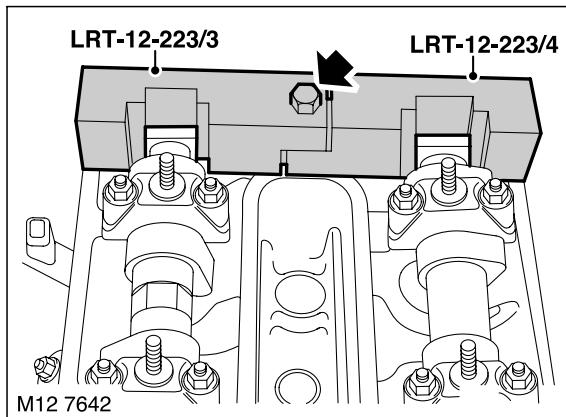
4. Apply sealant, Part No. STC 50550 to areas illustrated.
5. Fit new cylinder head gasket to locating dowels on cylinder block.
6. With assistance, fit cylinder head and carefully position cylinder head onto dowels.



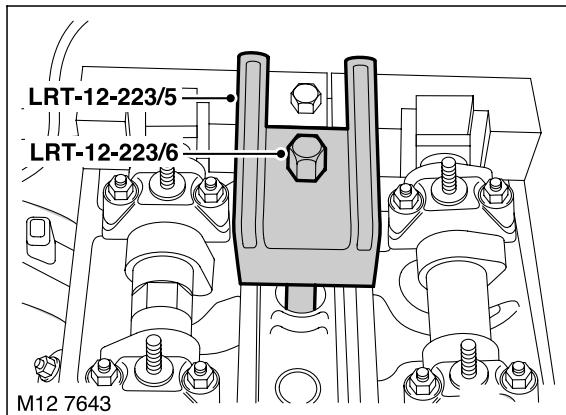
7. Fit cylinder head bolt washers and new cylinder head bolts. Tighten cylinder head bolts in sequence shown to 30 Nm (22 lbf.ft). Using an angle torque gauge tighten all bolts in sequence by a further 80° and then a final 80°.  
*NOTE: Do not remove special coating from new cylinder head bolts.*
8. Fit bolt securing LH timing chain guide rail to LH cylinder head and tighten.



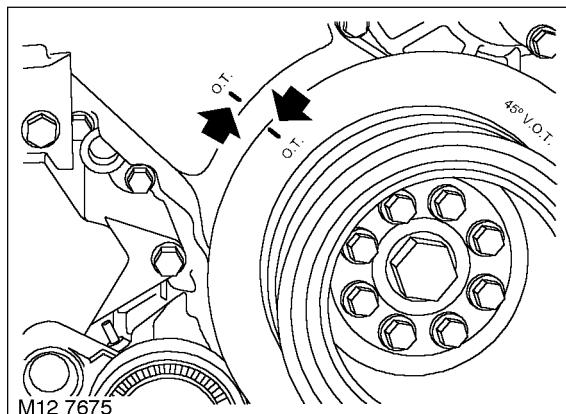
9. Carefully rotate camshafts until letter and cylinder number markings located on rear of camshafts are in an upright position.  
*NOTE: The twisting and apparent misalignment of the camshafts does not indicate incorrect engine timing.*
10. Loosen bolt securing LRT-12-223/4 to LRT-12-223/3.



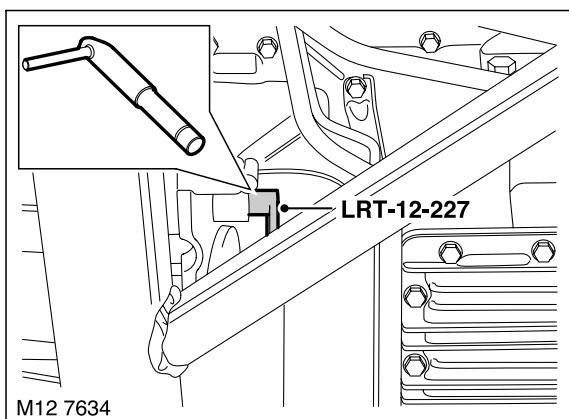
11. Fit LRT-12-223/4 and LRT-12-223/3 to rear of LH camshafts and tighten bolt securing tools.



12. Fit LRT-12-223/5, LRT-12-223/6 to LH cylinder head and tighten LRT-12-223/6 into spark plug thread.



13. Rotate engine crankshaft pulley clockwise to align TDC timing mark.  
*NOTE: Raise timing chain and hold under tension while turning crankshaft pulley.*



14. Position **LRT-12-227** through timing tool access hole and secure flywheel in TDC position.
15. Fit LH VCC unit.  
☞ **Engine - V8, REPAIRS, Variable camshaft unit - variable camshaft control (VCC) - LH.**
16. Fit coolant pump to coolant manifold pipes.  
☞ **COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**
17. Fit LH exhaust manifold.  
☞ **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - exhaust manifold - LH.**
18. Fit new oil filter and fill engine with oil.  
☞ **MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**
19. Fill cooling system.  
☞ **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
20. Connect battery earth lead.

## Gasket - cylinder head - RH

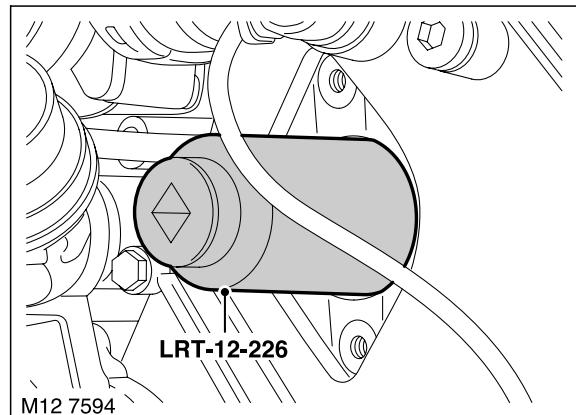
☞ **12.29.03**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

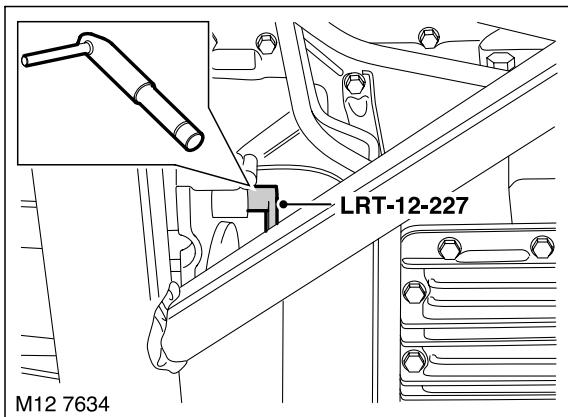
### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
☞ **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Drain engine oil and remove oil filter.  
☞ **MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**
5. Remove RH exhaust manifold.  
☞ **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - exhaust manifold - RH.**
6. Remove coolant pump to coolant manifold pipes.  
☞ **COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**
7. Remove RH VCC unit.  
☞ **Engine - V8, REPAIRS, Variable camshaft unit - variable camshaft control (VCC) - RH.**

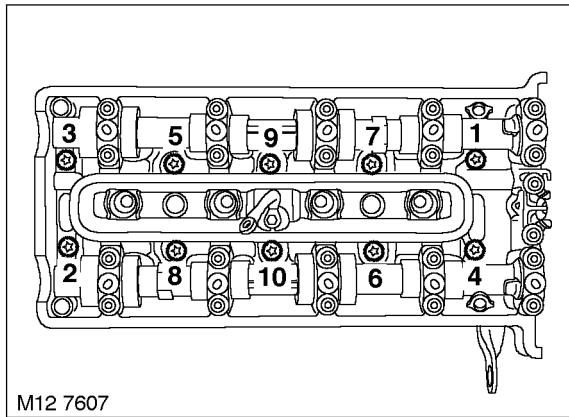


8. Fit **LRT-12-226** to VCC solenoid and remove solenoid.  
**CAUTION: Do not allow oil to come into contact with the drive belts while removing the solenoid.**

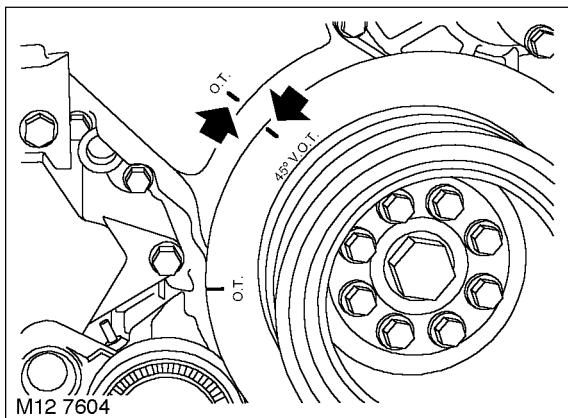
## ENGINE - V8



9. Remove **LRT-12-227** from timing tool access hole.



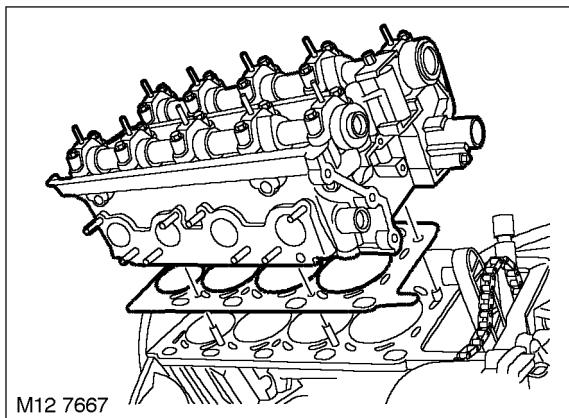
12. Working in the sequence shown, progressively loosen 10 cylinder head bolts.
13. Discard 10 cylinder head bolts and remove 10 cylinder head bolt washers.



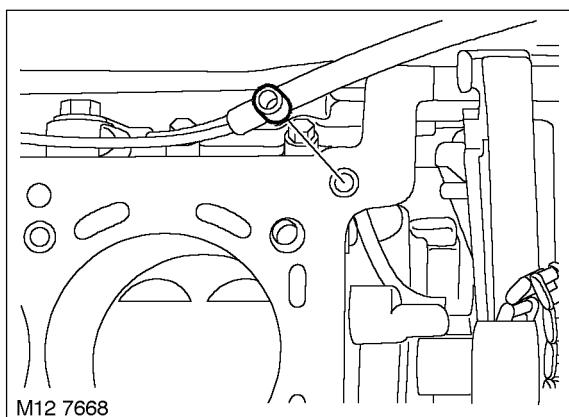
10. Rotate engine crankshaft pulley anti-clockwise to align the 45° before TDC timing mark.

*NOTE: Raise timing chain and hold under tension while turning crankshaft pulley.*

11. Remove **LRT-12-223/5**, **LRT-12-223/6**, **LRT-12-223/2** and **LRT-12-223/1** from RH cylinder head camshafts.



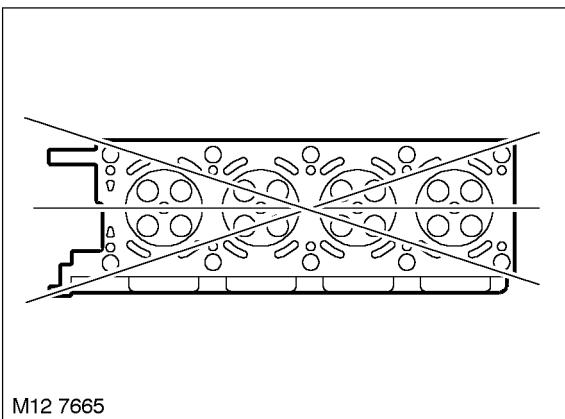
14. With assistance, remove cylinder head assembly.
15. Discard cylinder head gasket.



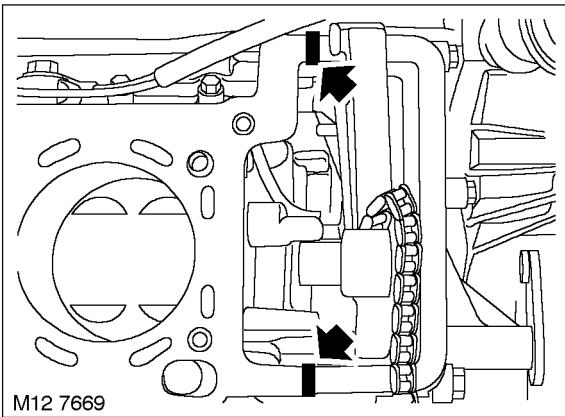
16. Discard 'O' ring from cylinder block.

**Refit**

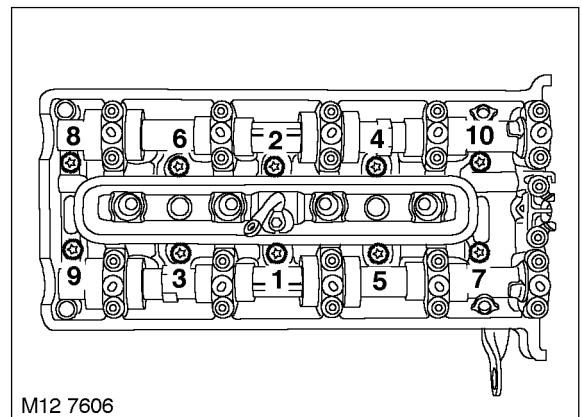
1. Clean mating faces of cylinder head and cylinder block, dowels and dowel holes. If necessary remove all traces of sealing compound with hard wood scraper. Ensure remnants do not remain in oil ways cooling ducts or bolt holes.
- CAUTION: Make sure no oil or coolant is left in the cylinder head bolt holes as damage to the cylinder block may occur when tightening the cylinder head bolts.**



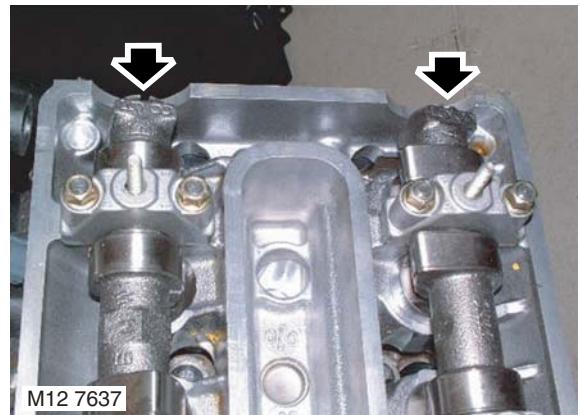
2. Using a straight edge and feeler gauges, check cylinder head for distortion along lines in illustration.
- GENERAL DATA, Engine - V8.**
3. Fit new 'O' ring to cylinder block.



4. Apply sealant, Part No. STC 50550 to areas illustrated.
5. Fit new cylinder head gasket to locating dowels on cylinder block.
6. With assistance, fit cylinder head and carefully position cylinder head onto dowels.

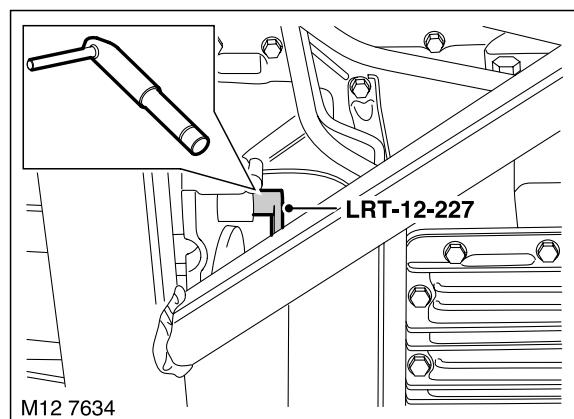
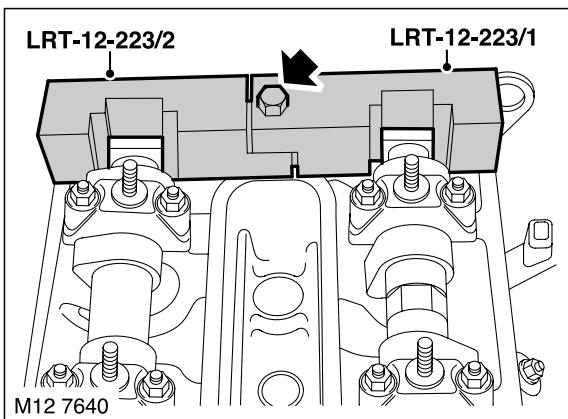


7. Fit cylinder head bolt washers and new cylinder head bolts. Tighten cylinder head bolts in sequence shown to 30 Nm (22 lbf.ft). Using an angle torque gauge tighten all bolts in sequence by a further 80° and then a final 80°.
- NOTE: Do not remove special coating from new cylinder head bolts.*

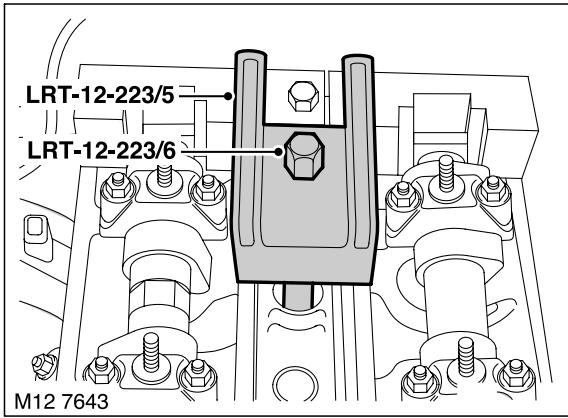


8. Carefully rotate camshafts until letter and cylinder number markings located on rear of camshafts are in an upright position.
- NOTE: The twisting and apparent misalignment of the camshafts does not indicate incorrect engine timing.*
9. Loosen bolt securing LRT-12-223/2 to LRT-12-223/1.

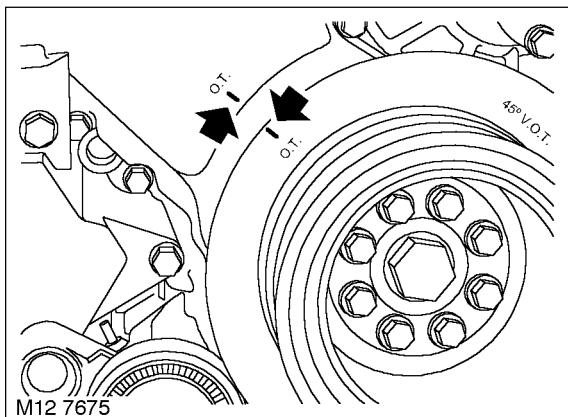
## ENGINE - V8



- Fit LRT-12-223/2 and LRT-12-223/1 to rear of RH camshafts and tighten bolt securing tools.



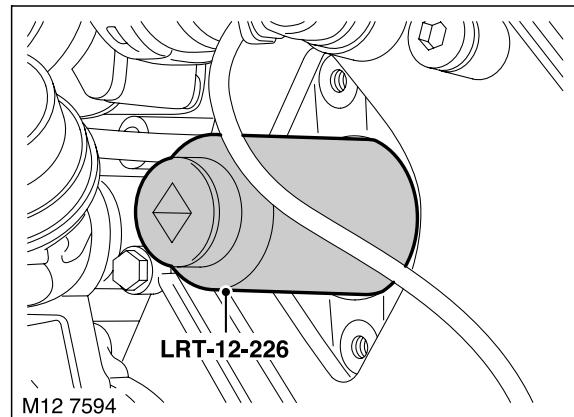
- Fit LRT-12-223/5, LRT-12-223/6 to RH cylinder head and tighten LRT-12-223/6 into spark plug thread.



- Rotate engine crankshaft pulley clockwise to align TDC timing mark.

*NOTE: Raise timing chain and hold under tension while turning crankshaft pulley.*

- Position LRT-12-227 through timing tool access hole and secure flywheel in TDC position.



- Fit LRT-12-226 to VCC solenoid and fit solenoid.

- Fit RH VCC unit.

**Engine - V8, REPAIRS, Variable camshaft unit - variable camshaft control (VCC) - RH.**

- Fit coolant pump to coolant manifold pipes.

**COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**

- Fit RH exhaust manifold.

**MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - exhaust manifold - RH.**

- Fit new oil filter and fill engine with oil.

**MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**

- Fill cooling system.

**COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

- Connect battery earth lead.



## Gasket - camshaft cover - LH

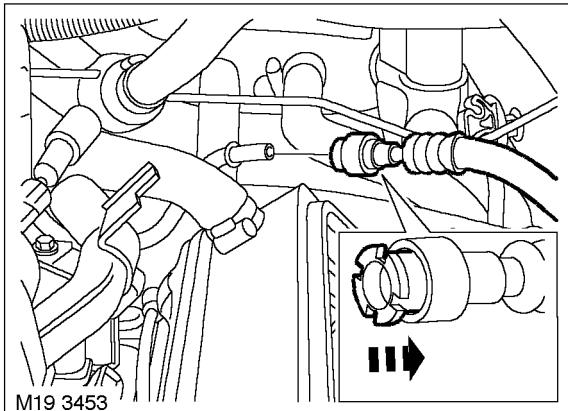
### 12.29.40

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

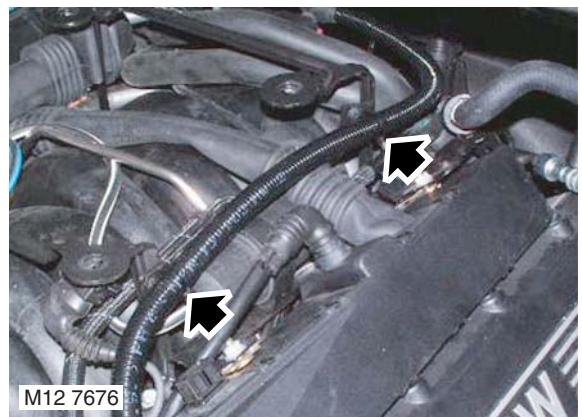
#### Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**
3. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
4. Depressurise fuel system.  
 **FUEL DELIVERY SYSTEM - V8, ADJUSTMENT, Fuel system - depressurise.**

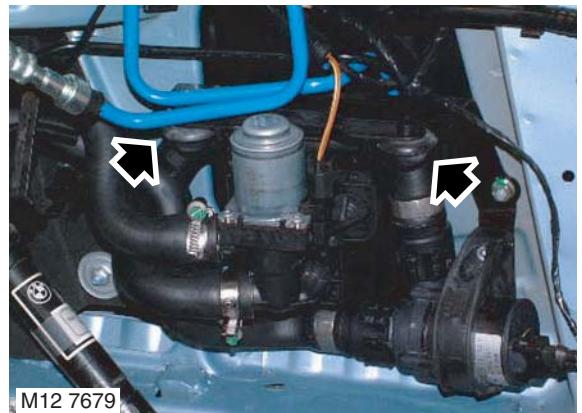


5. Disconnect fuel feed hose from fuel rail.

**CAUTION:** Always fit plugs to open connections to prevent contamination.

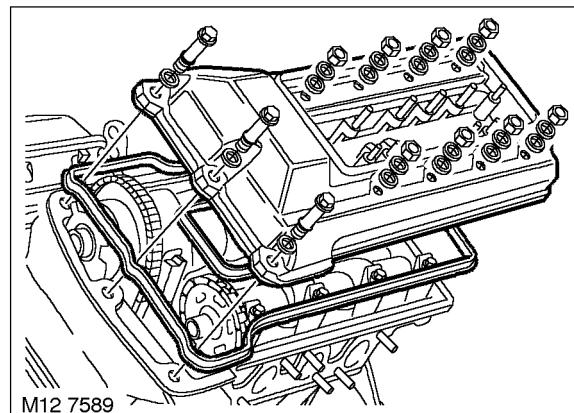
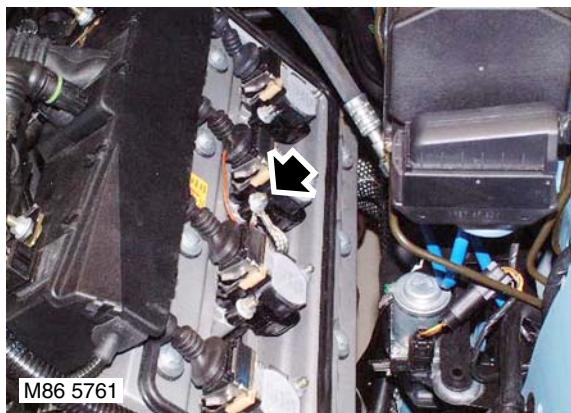


6. Release 2 clips securing battery cable to engine acoustic cover brackets.

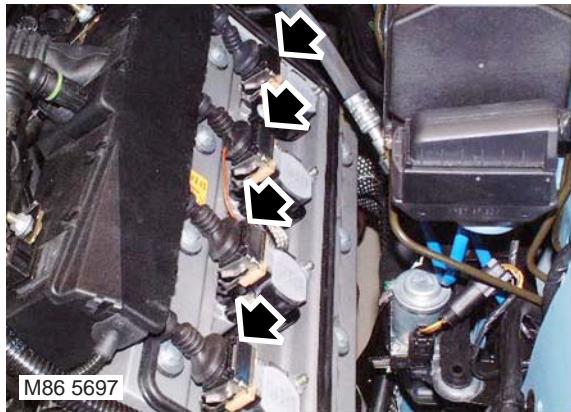


7. Release heater pump from mounting rubbers and move aside.
8. Release clip and disconnect breather hose from camshaft cover.
9. Remove LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**

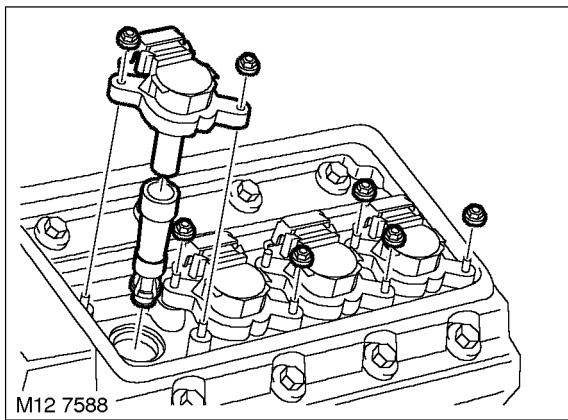
## ENGINE - V8



10. Remove nut and disconnect earth lead from camshaft cover.



11. Disconnect multiplugs from ignition coils.

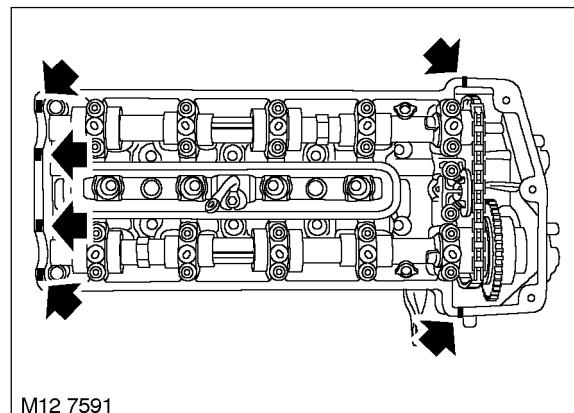


12. Remove 7 nuts securing ignition coils to camshaft cover. Remove 4 ignition coils.
13. Discard ignition coil cover gasket.

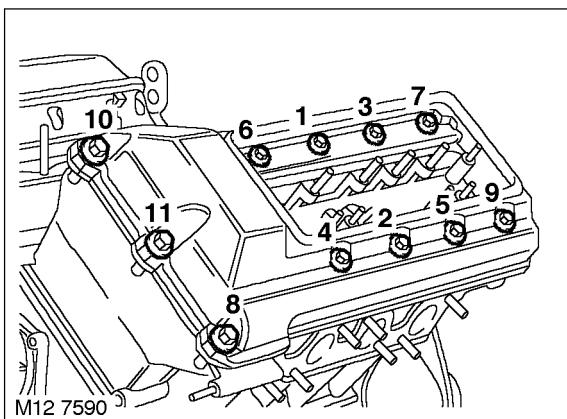
14. Remove 8 nuts and 3 bolts securing camshaft cover to cylinder head. Remove camshaft cover, discard 2 gaskets and 11 sealing washers.

### Refit

1. Clean camshaft cover and mating face of cylinder head.



2. Apply sealant, Part No. STC 50550 to areas illustrated.
3. Fit 2 new gaskets and 11 new sealing washers to camshaft cover and fit to cylinder head.



4. Fit 8 nuts and 3 bolts securing camshaft cover and progressively tighten in sequence shown to 10 Nm (7 lbf.ft).
  5. Fit 4 ignition coils.
  6. Fit 7 nuts securing ignition coils to camshaft cover and tighten to 4 Nm (3 lbf.ft).
  7. Connect multiplugs to ignition coils.
  8. Connect earth lead to camshaft cover and tighten nut to 4 Nm (3 lbf.ft).
  9. Fit new ignition coil cover gasket.
  10. Fit LH ignition coil cover.
- ☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
11. Connect breather hose to camshaft cover and secure with clip.
  12. Secure heater pump to mounting rubbers.
  13. Secure 2 clips on battery cable to engine acoustic cover brackets.
  14. Connect quick release fuel hose to fuel rail.
  15. Fit air intake plenum.
- ☞ HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
16. Fit engine acoustic cover.
- ☞ Engine - V8, REPAIRS, Acoustic cover - engine.**
17. Connect battery earth lead.

## Gasket - camshaft cover - RH

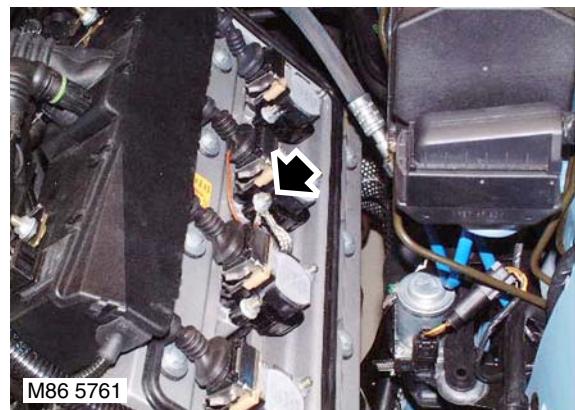
### ☞ 12.29.41

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

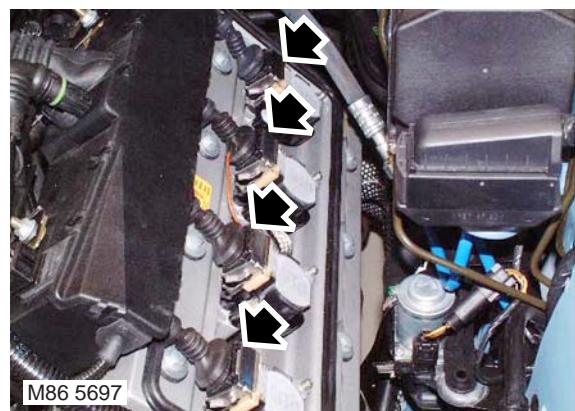
**☞ GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.
  2. Remove engine acoustic cover.
- ☞ Engine - V8, REPAIRS, Acoustic cover - engine.**
3. Remove air intake plenum.
- ☞ HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
4. Remove RH ignition coil cover.
- ☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**

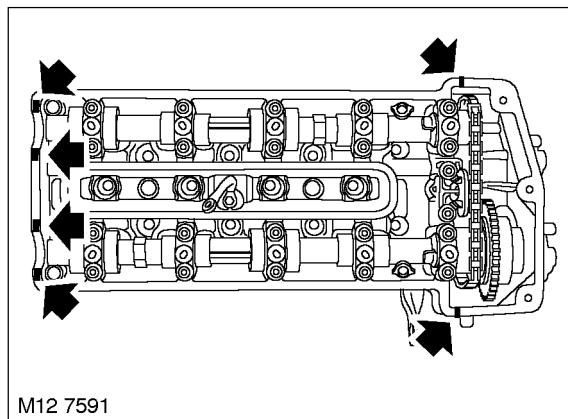
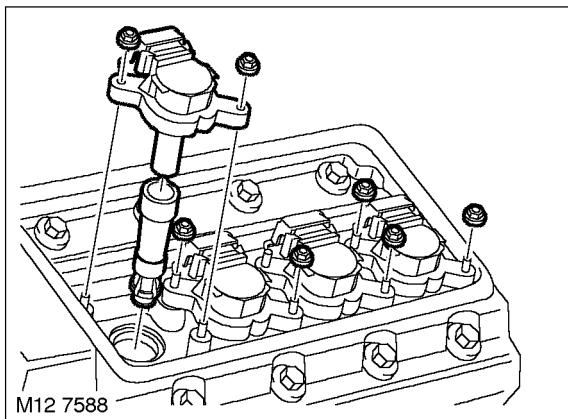


5. Remove nut and disconnect earth lead from camshaft cover.



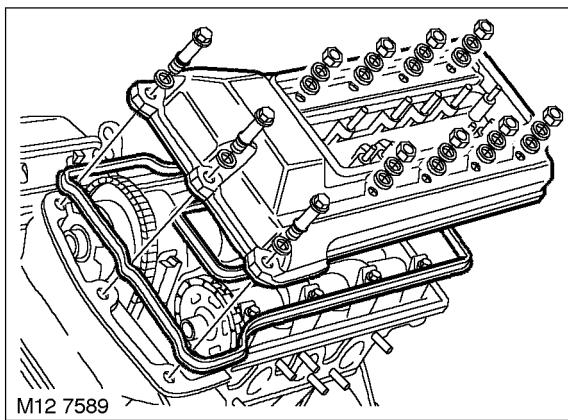
6. Disconnect multiplugs from ignition coils.

## ENGINE - V8



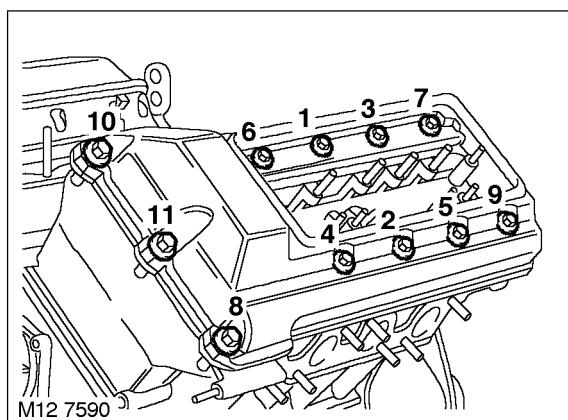
7. Remove 7 nuts securing ignition coils to camshaft cover. Remove 4 ignition coils.
8. Discard ignition coil cover gasket.
9. Remove dipstick tube.

**Engine - V8, REPAIRS, Tube - dipstick.**



2. Apply sealant , Part No. STC 50550 to areas illustrated.
3. Fit 2 new gaskets and 11 new sealing washers to camshaft cover and fit to cylinder head.
4. Fit dipstick tube.

**Engine - V8, REPAIRS, Tube - dipstick.**



10. Remove 6 nuts and 3 bolts securing camshaft cover to cylinder head. Remove camshaft cover, discard 2 gaskets and 11 sealing washers.

### Refit

1. Clean camshaft cover and mating face of cylinder head.

5. Fit 6 nuts and 3 bolts securing camshaft cover and progressively tighten in sequence shown to 10 Nm (7 lbf.ft).
6. Fit 4 ignition coils.
7. Fit 7 nuts securing ignition coils to camshaft cover and tighten to 4 Nm (3 lbf.ft).
8. Fit new ignition coil cover gasket.
9. Connect multiplugs to ignition coils.
10. Connect earth lead to camshaft cover and tighten nut to 4 Nm (3 lbf.ft).
11. Fit RH ignition coil cover.

**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**



12. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
13. Fit engine acoustic cover.  
☞ **Engine - V8, REPAIRS, Acoustic cover - engine.**
14. Connect battery earth lead.

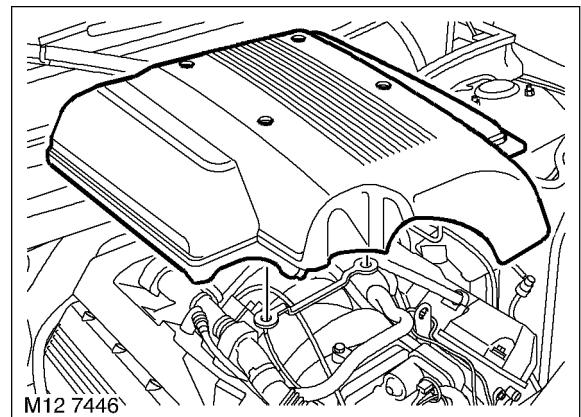
## Acoustic cover - engine

☞ **12.30.50**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

### Remove



1. Disconnect battery earth lead.
2. Release 4 Allen head turnbuckles and remove acoustic cover.

### Refit

1. Fit and secure engine acoustic cover.
2. Connect battery earth lead.

# ENGINE - V8

## Control solenoid - variable camshaft control (VCC) - LH

### 12.30.60

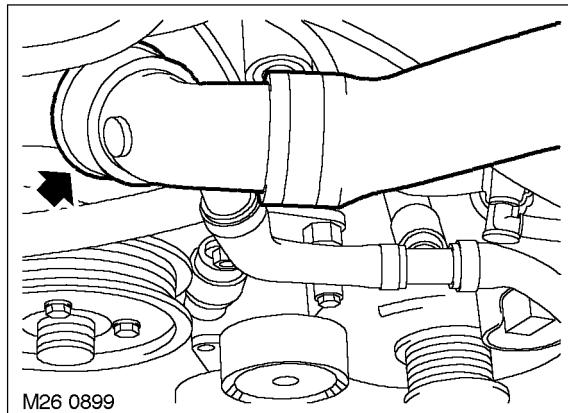
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

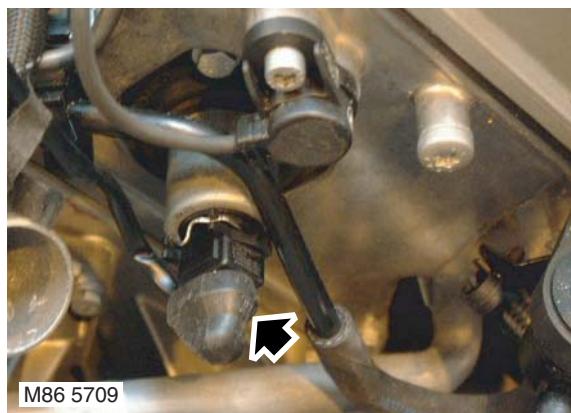
#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.

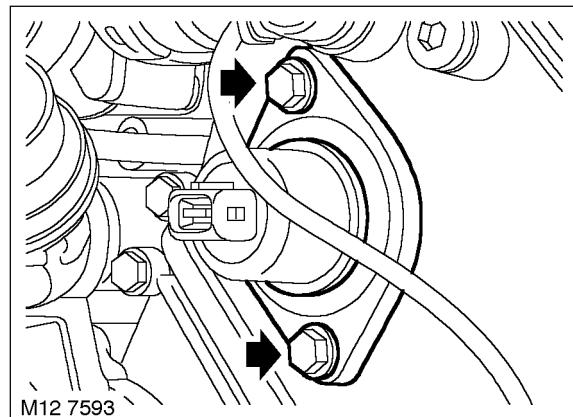
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**



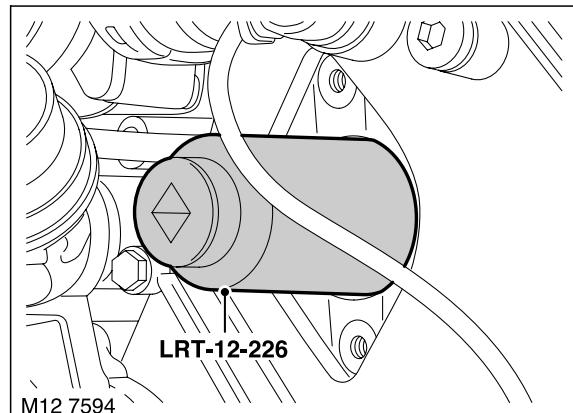
4. Release clip and disconnect coolant hose from coolant pump.



5. Disconnect multiplug from VCC solenoid.



6. Remove 2 bolts securing VCC solenoid seal and remove seal.



7. Fit LRT-12-226 to VCC solenoid and remove solenoid.

**CAUTION: Do not allow oil to come into contact with the drive belts while removing the solenoid.**

#### Refit

1. Fit LRT-12-226 to VCC solenoid and fit solenoid.
2. Tighten VCC solenoid to 25 Nm (18 lbf.ft) and remove LRT-12-226.
3. Clean VCC solenoid, VCC solenoid seal and mating faces.
4. Lubricate inner mating face of VCC solenoid seal.
5. Fit VCC solenoid seal, fit bolts and tighten.
6. Connect multiplug to VCC solenoid.
7. Connect coolant hose to coolant pump and secure with clip.
8. Fill cooling system.

 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

9. Connect battery earth lead.



## Control solenoid - variable camshaft control (VCC) - RH

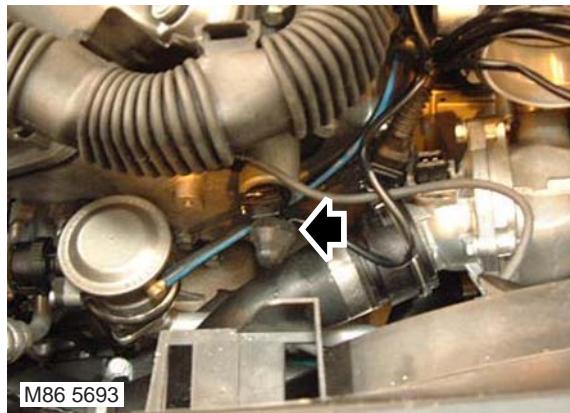
### 12.30.61

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

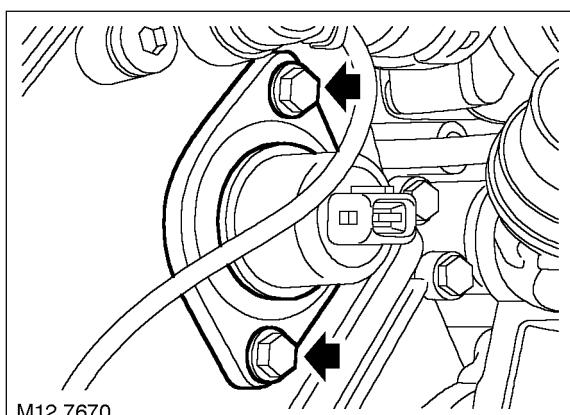
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

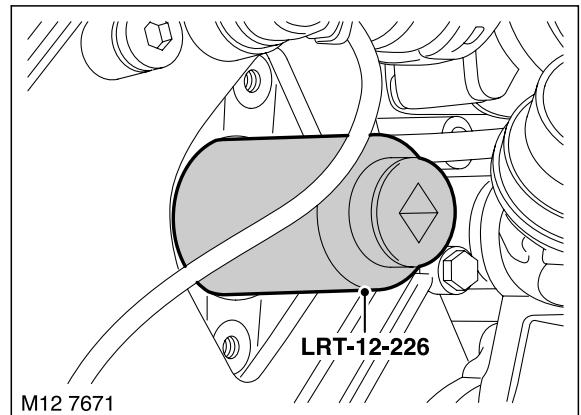
1. Disconnect battery earth lead.
2. Remove air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**



3. Disconnect multiplug from VCC solenoid.



4. Remove 2 bolts securing VCC solenoid seal and remove seal.



5. Fit LRT-12-226 to VCC solenoid and remove solenoid.

**CAUTION: Do not allow oil to come into contact with the drive belts while removing the solenoid.**

#### Refit

1. Fit LRT-12-226 to VCC solenoid and fit solenoid.
2. Tighten VCC solenoid to 25 Nm (18 lbf.ft) and remove LRT-12-226.
3. Clean VCC solenoid, VCC solenoid seal and mating faces.
4. Lubricate inner mating face of VCC solenoid seal.
5. Fit VCC solenoid seal, fit bolts and tighten.
6. Connect multiplug to VCC solenoid.
7. Connect air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
8. Connect battery earth lead.

# ENGINE - V8

## Variable camshaft unit - variable camshaft control (VCC) - LH

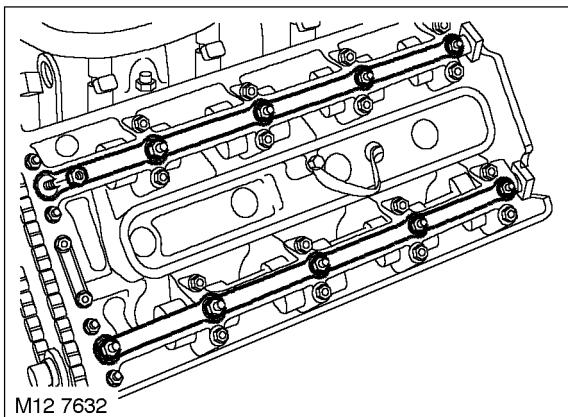
### 12.30.62

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

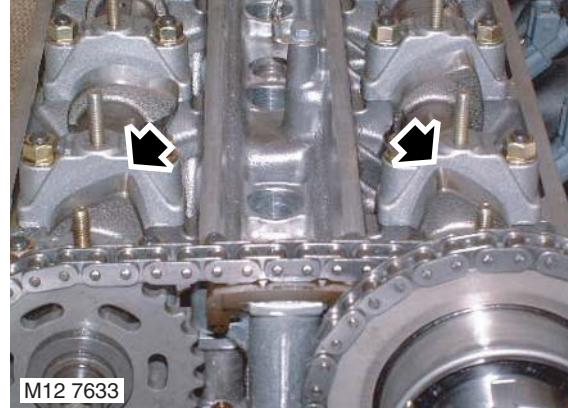
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

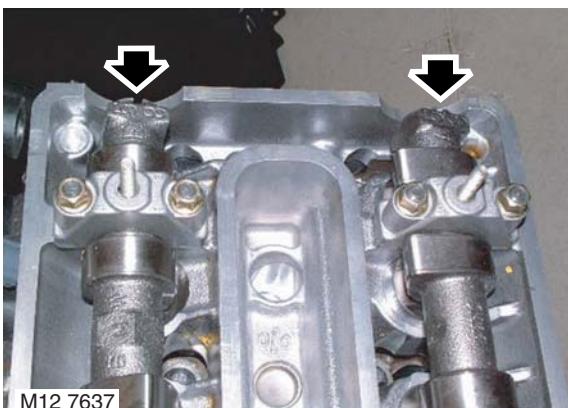
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove fan cowl.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
5. Remove LH camshaft cover.  
 **Engine - V8, REPAIRS, Gasket - camshaft cover - LH.**
6. Remove RH camshaft cover.  
 **Engine - V8, REPAIRS, Gasket - camshaft cover - RH.**
7. Remove 8 spark plugs.



9. Remove 20 nuts securing 4 camshaft oil lines to LH and RH cylinder heads and remove camshaft oil lines.

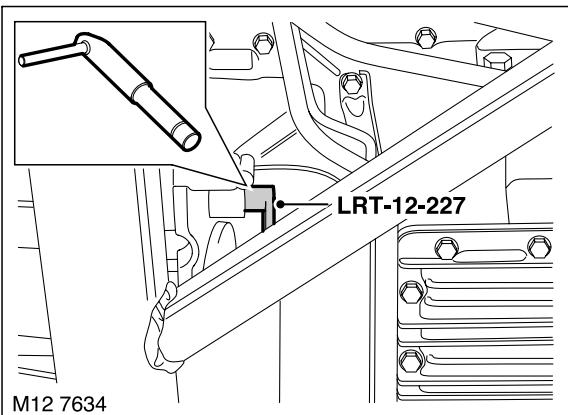


10. Rotate engine crankshaft pulley until cylinder 1 camshaft lobes are at TDC firing position.

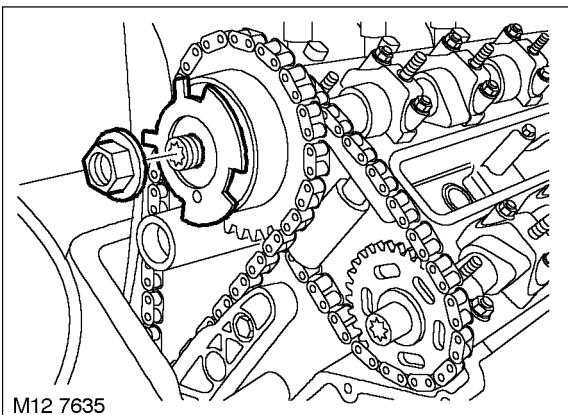


11. The rear of the camshafts may appear twisted and out of alignment when cylinder 1 is in the TDC firing position.

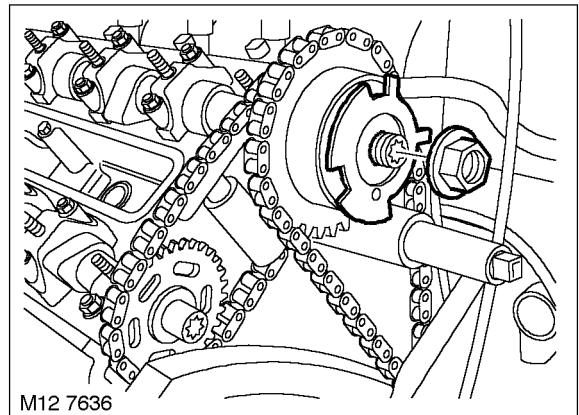
*NOTE: The twisting and apparent misalignment of the camshafts does not indicate incorrect engine timing.*



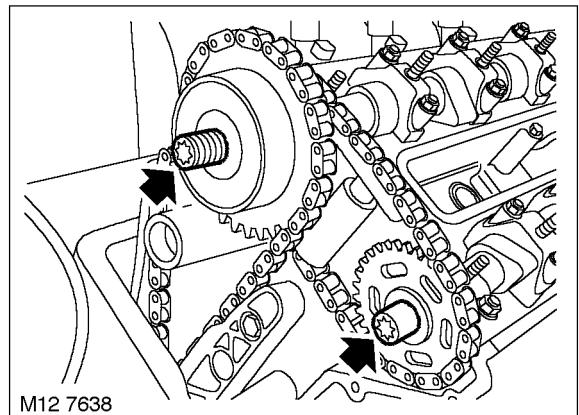
12. Position **LRT-12-227** through timing tool access hole and secure flywheel in TDC position.
13. Remove LH upper timing gear cover.  
☞ **Engine - V8, REPAIRS, Cover - timing gear - upper - LH.**
14. Remove RH upper timing gear cover.  
☞ **Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**



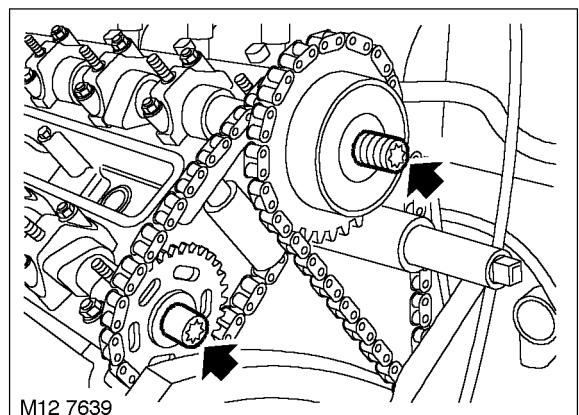
15. Remove nut securing LH CMP sensor ring and remove CMP sensor ring.  
*NOTE: Thread is left handed.*



16. Remove nut securing RH CMP sensor ring and remove CMP sensor ring.  
*NOTE: Thread is left handed.*



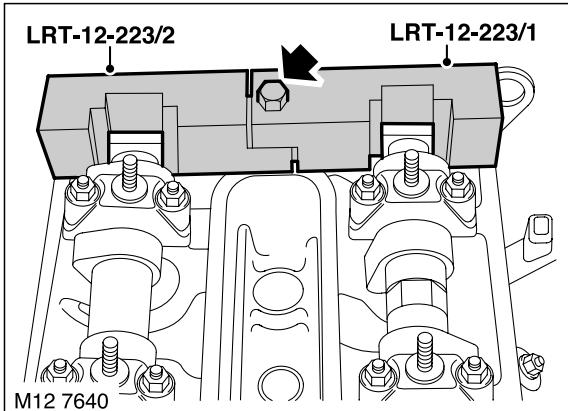
17. Loosen 2 Torx bolts securing LH VCC unit and LH exhaust camshaft sprocket 1/2 a turn.  
*NOTE: Thread is left handed.*



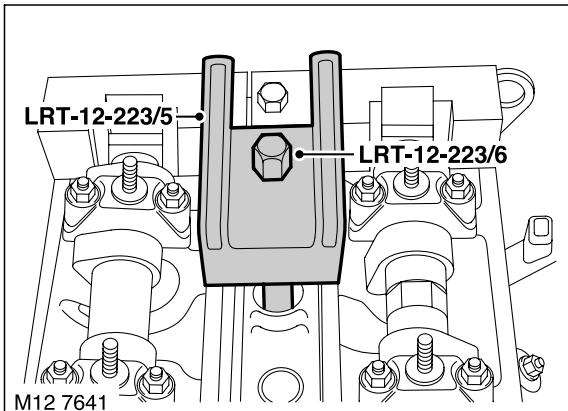
18. Loosen 2 Torx bolts securing RH VCC unit and RH exhaust camshaft sprocket 1/2 a turn.  
*NOTE: Thread is left handed.*

## ENGINE - V8

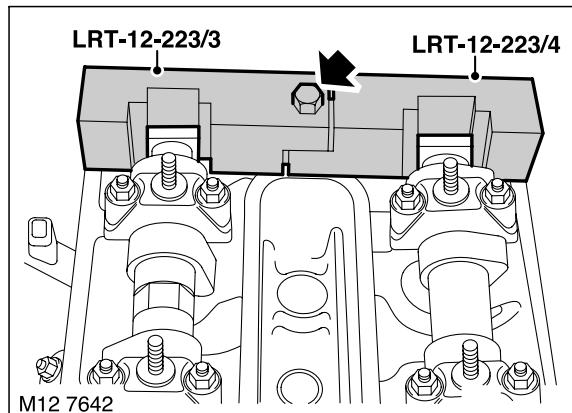
19. Loosen bolt securing **LRT-12-223/2** to **LRT-12-223/1**.



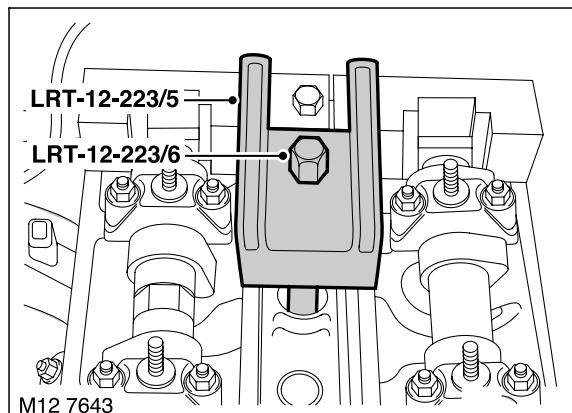
20. Fit **LRT-12-223/2** and **LRT-12-223/1** to rear of RH camshafts and tighten bolt securing tools.



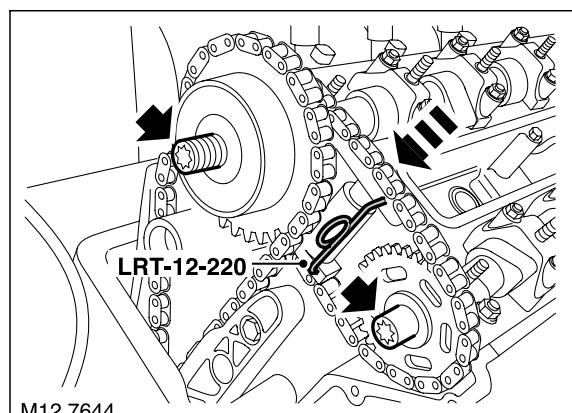
21. Fit **LRT-12-223/5**, **LRT-12-223/6** to RH cylinder head and tighten **LRT-12-223/6** into spark plug thread.  
22. Loosen bolt securing **LRT-12-223/4** to **LRT-12-223/3**.



23. Fit **LRT-12-223/4** and **LRT-12-223/3** to rear of LH camshafts and tighten bolt securing tools.



24. Fit **LRT-12-223/5**, **LRT-12-223/6** to LH cylinder head and tighten **LRT-12-223/6** into spark plug thread.



25. Compress LH exhaust timing chain tensioner, fit **LRT-12-220** to chain tensioner and remove 2 Torx bolts securing LH VCC unit and LH exhaust camshaft sprocket.

*NOTE: Thread is left handed.*



- 26.** Remove LH exhaust camshaft sprocket, LH exhaust camshaft chain and LH VCC unit.

*NOTE: Secure chain to cylinder head to prevent chain falling into lower timing gear cover.*

#### Refit

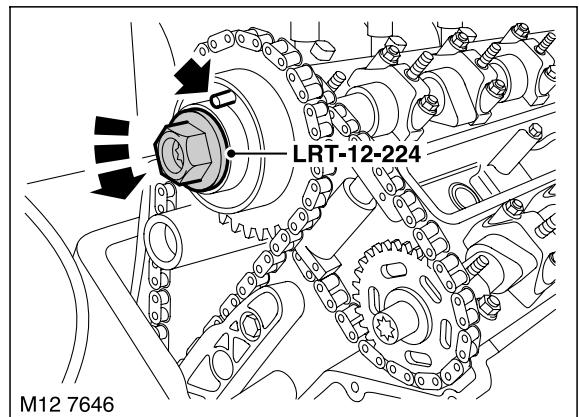
- Position LH exhaust camshaft chain to LH VCC unit and position LH exhaust camshaft sprocket to LH exhaust camshaft chain.

*NOTE: The VCC unit, exhaust camshaft chain and exhaust camshaft sprocket do not have timing marks on them. These parts may be freely fitted to the timing gear chain and camshafts in any position.*

- Position LH VCC unit to timing gear chain, fit VCC unit and exhaust camshaft sprocket to camshafts, fit and hand tighten 2 Torx bolts to eliminate excess play.

*NOTE: Thread is left handed.*

- Compress LH exhaust timing chain tensioner and remove **LRT-12-220**.



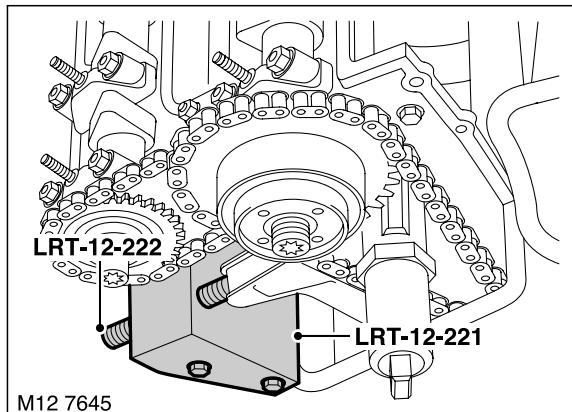
- Fit **LRT-12-224** to LH VCC unit, connect multimeter between pin on LH VCC unit and stud on LH oil line.

- Rotate LH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

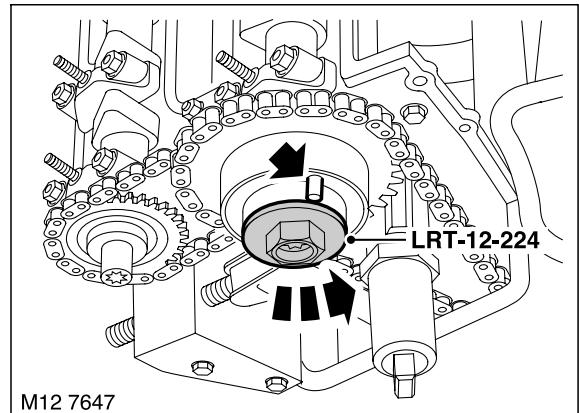
- Tighten Torx bolts securing LH VCC unit and exhaust camshaft sprocket to 15 Nm (11 lbf.ft) and loosen one quarter of a turn.

*NOTE: Thread is left handed.*



- Fit **LRT-12-221** to RH cylinder head, fit **LRT-12-222** to **LRT-12-221** and hand tighten.

*NOTE: Only screw in adjustment bolt until slight resistance is present.*



- Fit **LRT-12-224** to RH VCC unit, connect multimeter between pin on RH VCC unit and stud on RH oil line.

## ENGINE - V8

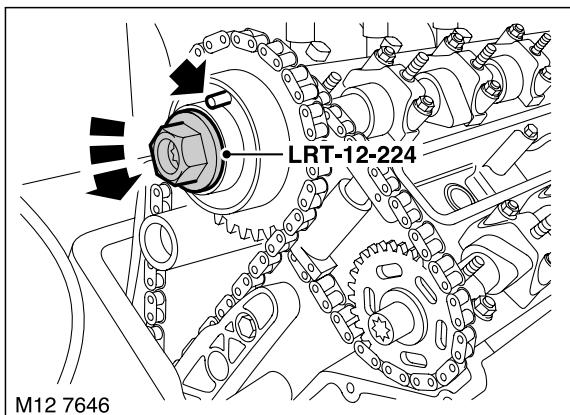
9. Rotate RH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position.  
Continuity should be present when the VCC unit reaches this position.*

10. Tighten Torx bolts securing RH VCC unit and exhaust camshaft sprocket to 15 Nm (11 lbf.ft) and loosen one quarter of a turn.

*NOTE: Thread is left handed.*

11. Adjust chain tension by tightening **LRT-12-222** to 0.7 Nm (6.3 lbf.in).



12. Fit **LRT-12-224** to LH VCC unit, connect multimeter between pin on LH VCC unit and stud on LH oil line.

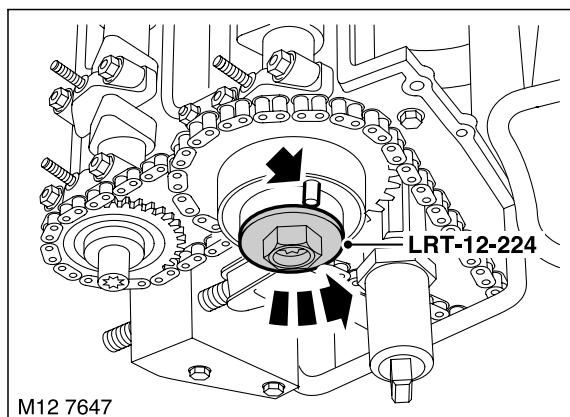
*NOTE: When the chain tension is adjusted the VCC unit will move and require adjusting to the LH stop.*

13. Rotate LH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position.  
Continuity should be present when the VCC unit reaches this position.*

14. Tighten LH VCC unit Torx bolt to 110 Nm (81 lbf.ft) and LH exhaust camshaft sprocket Torx bolt to 125 Nm (92 lbf.ft).

*NOTE: Thread is left handed.*



15. Fit **LRT-12-224** to RH VCC unit, connect multimeter between pin on RH VCC unit and stud on RH oil line.

*NOTE: When the chain tension is adjusted the VCC unit will move and require adjusting to the LH stop.*

16. Rotate RH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

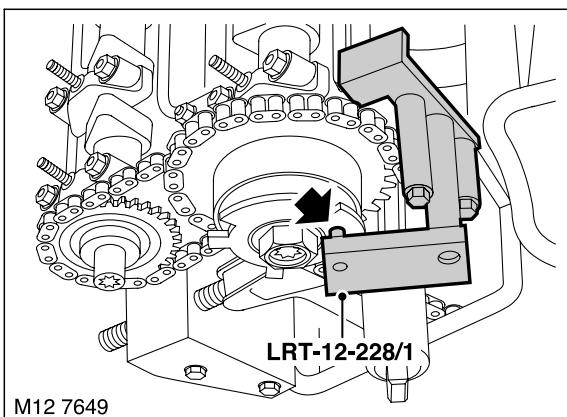
*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position.  
Continuity should be present when the VCC unit reaches this position.*

17. Tighten RH VCC unit Torx bolt to 110 Nm (81 lbf.ft) and RH exhaust camshaft sprocket Torx bolt to 125 Nm (92 lbf.ft).

*NOTE: Thread is left handed.*

18. Fit RH CMP sensor ring, fit and hand tighten securing nut.

*NOTE: Thread is left handed.*



- 19.** Position **LRT-12-228/1** locating dowel to RH CMP sensor ring, fit 2 bolts securing tool to RH cylinder head and tighten.

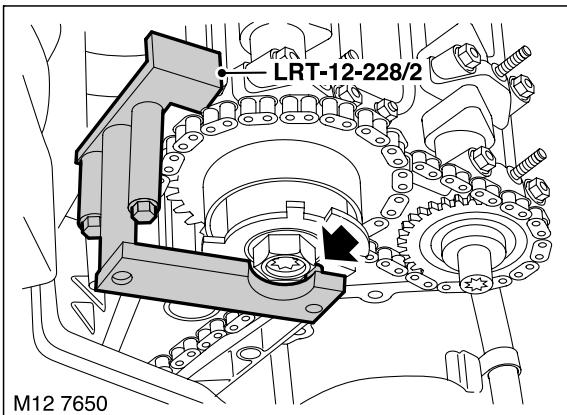
*NOTE: To ensure correct CMP sensor ring adjustment, make sure the tool is aligned flush with the cylinder head and lower timing gear cover before tightening the tool securing bolts.*

- 20.** Tighten nut securing CMP sensor ring to 40 Nm (30 lbf.ft) and remove **LRT-12-228/1** from RH cylinder head.

*NOTE: Thread is left handed.*

- 21.** Fit LH CMP sensor ring, fit and hand tighten securing nut.

*NOTE: Thread is left handed.*



- 22.** Position **LRT-12-228/2** locating dowel to LH CMP sensor ring, fit 2 bolts securing tool to RH cylinder head and tighten.

*NOTE: To ensure correct CMP sensor ring adjustment, make sure the tool is aligned flush with the cylinder head and lower timing gear cover before tightening the tool securing bolts.*

- 23.** Tighten nut securing CMP sensor ring to 40 Nm (30 lbf.ft) and remove **LRT-12-228/2** from LH cylinder head.

*NOTE: Thread is left handed.*

- 24.** Remove **LRT-12-223/5**, **LRT-12-223/6**, **LRT-12-223/2** and **LRT-12-223/1** from RH cylinder head camshafts.

- 25.** Remove **LRT-12-223/6**, **LRT-12-223/5**, **LRT-12-223/3** and **LRT-12-223/4** from LH cylinder head camshafts.

- 26.** Loosen **LRT-12-222**, remove 2 bolts securing **LRT-12-221** to RH cylinder head and remove **LRT-12-221**.

- 27.** Fit RH upper timing gear cover.

**Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**

- 28.** Fit LH upper timing gear cover.

**Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**

- 29.** Remove **LRT-12-227** from timing tool access hole.

- 30.** Fit 4 camshaft oil lines to LH and RH cylinder heads, fit and tighten 20 securing bolts.

- 31.** Fit engine lifting eye to rear of RH cylinder head and fit 2 bolts securing engine lifting eye and tighten.

- 32.** Fit and tighten 8 spark plugs to 31 Nm (23 lbf.ft).

- 33.** Fit RH camshaft cover.

**Engine - V8, REPAIRS, Gasket - camshaft cover - RH.**

- 34.** Fit LH camshaft cover.

**Engine - V8, REPAIRS, Gasket - camshaft cover - LH.**

- 35.** Fit fan cowl.

**COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**

- 36.** Fill cooling system.

**COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

- 37.** Connect battery earth lead.

# ENGINE - V8

## Variable camshaft unit - variable camshaft control (VCC) - RH

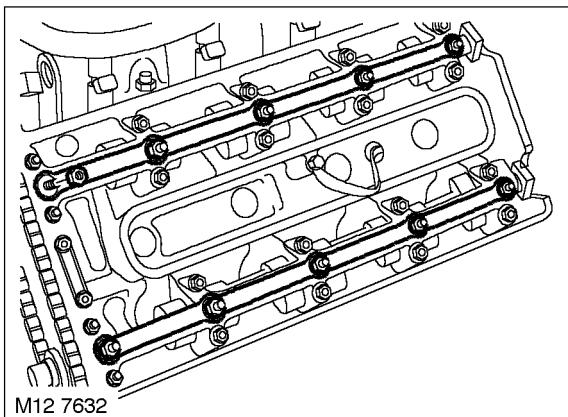
### 12.30.63

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

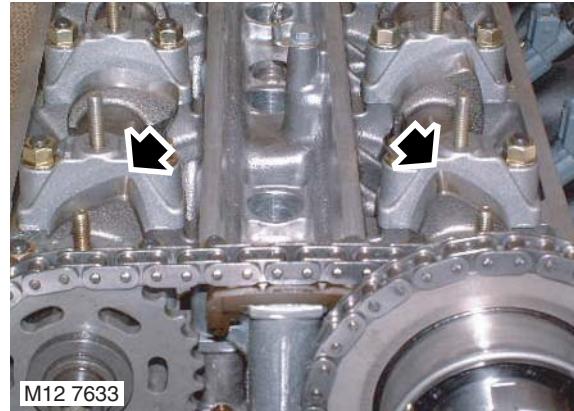
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

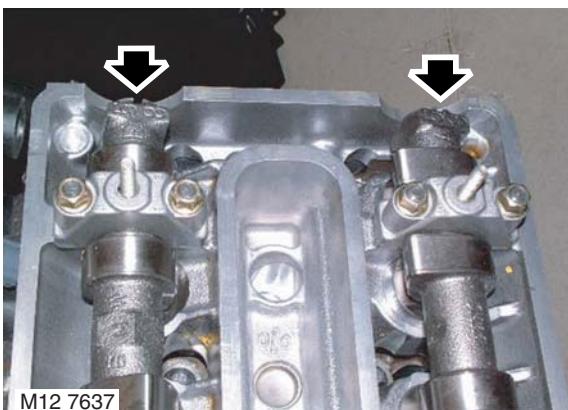
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove fan cowl.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
5. Remove LH camshaft cover.  
 **Engine - V8, REPAIRS, Gasket - camshaft cover - LH.**
6. Remove RH camshaft cover.  
 **Engine - V8, REPAIRS, Gasket - camshaft cover - RH.**
7. Remove 8 spark plugs.



9. Remove 20 nuts securing 4 camshaft oil lines to LH and RH cylinder heads and remove camshaft oil lines.

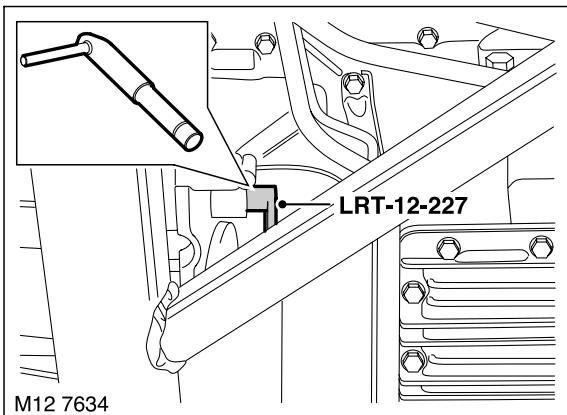


10. Rotate engine crankshaft pulley until cylinder 1 camshaft lobes are at TDC firing position.

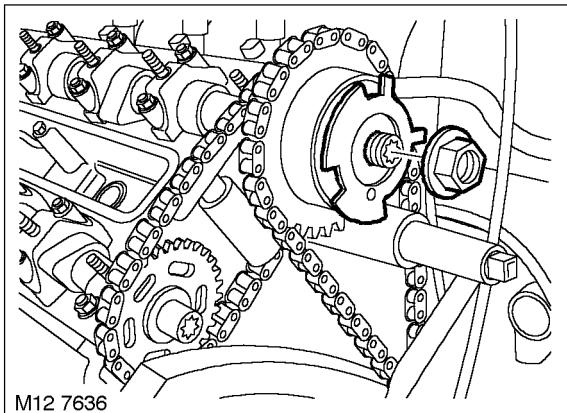


11. The rear of the camshafts may appear twisted and out of alignment when cylinder 1 is in the TDC firing position.

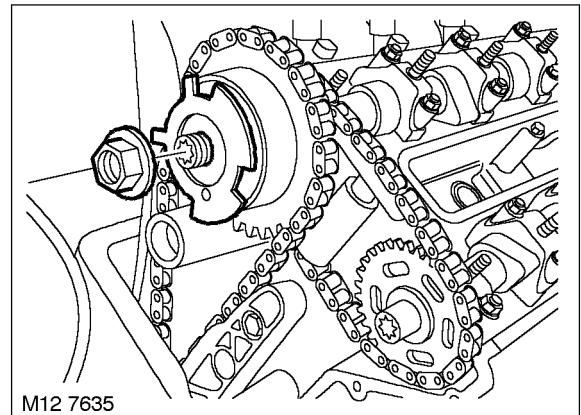
*NOTE: The twisting and apparent misalignment of the camshafts does not indicate incorrect engine timing.*



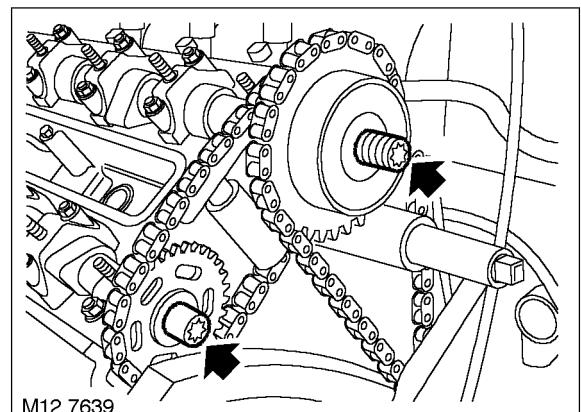
12. Position **LRT-12-227** through timing tool access hole and secure flywheel in TDC position.
13. Remove LH upper timing gear cover.  
☞ **Engine - V8, REPAIRS, Cover - timing gear - upper - LH.**
14. Remove RH upper timing gear cover.  
☞ **Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**



15. Remove nut securing RH CMP sensor ring and remove CMP sensor ring.  
*NOTE: Thread is left handed.*

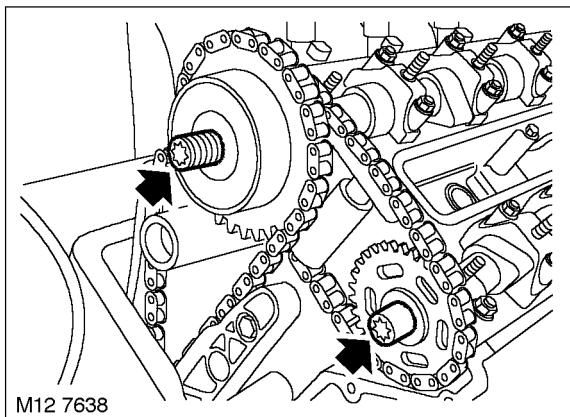


16. Remove nut securing LH CMP sensor ring and remove CMP sensor ring.  
*NOTE: Thread is left handed.*



17. Loosen 2 Torx bolts securing RH VCC unit and RH exhaust camshaft sprocket 1/2 a turn.  
*NOTE: Thread is left handed.*

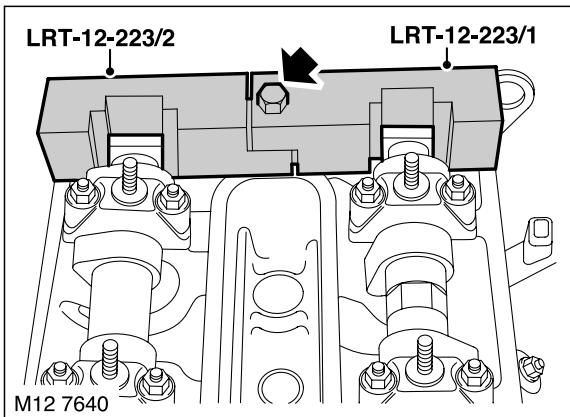
## ENGINE - V8



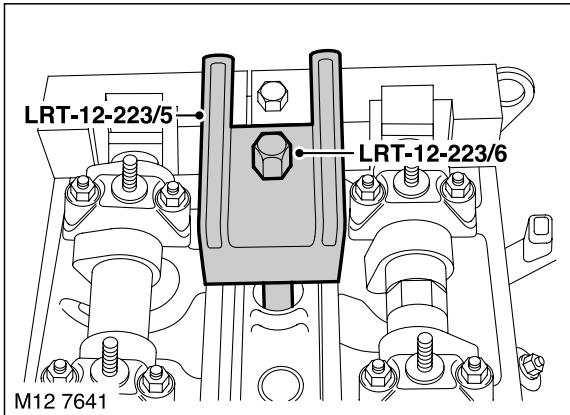
18. Loosen 2 Torx bolts securing LH VCC unit and LH exhaust camshaft sprocket 1/2 a turn.

*NOTE: Thread is left handed.*

19. Loosen bolt securing **LRT-12-223/2** to **LRT-12-223/1**.

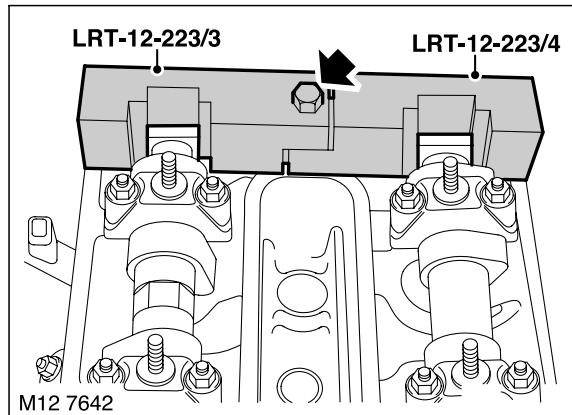


20. Fit **LRT-12-223/2** and **LRT-12-223/1** to rear of RH camshafts and tighten bolt securing tools.

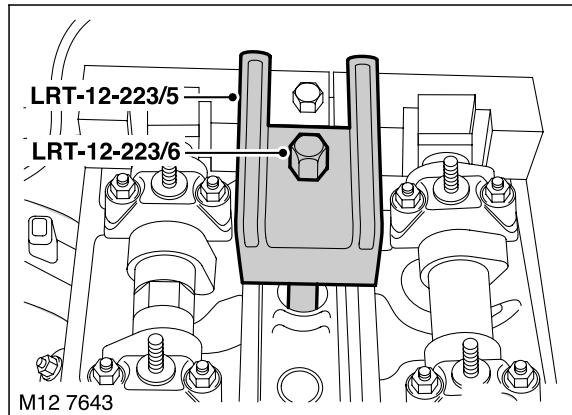


21. Fit **LRT-12-223/5**, **LRT-12-223/6** to RH cylinder head and tighten **LRT-12-223/6** into spark plug thread.

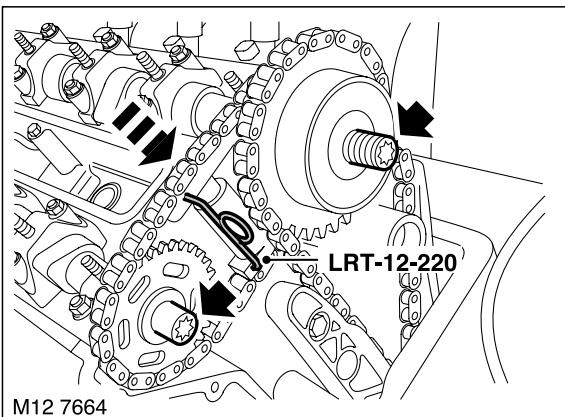
22. Loosen bolt securing **LRT-12-223/4** to **LRT-12-223/3**.



23. Fit **LRT-12-223/4** and **LRT-12-223/3** to rear of LH camshafts and tighten bolt securing tools.



24. Fit **LRT-12-223/5**, **LRT-12-223/6** to LH cylinder head and tighten **LRT-12-223/6** into spark plug thread.



25. Compress RH exhaust timing chain tensioner, fit **LRT-12-220** to chain tensioner and remove 2 Torx bolts securing RH VCC unit and RH exhaust camshaft sprocket.

*NOTE: Thread is left handed.*

26. Remove RH exhaust camshaft sprocket, RH exhaust camshaft chain and RH VCC unit.

*NOTE: Secure chain to cylinder head to prevent chain falling into lower timing gear cover.*

#### Refit

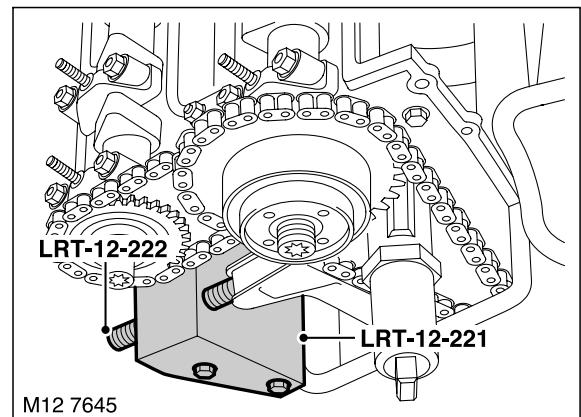
- Position RH exhaust camshaft chain to RH VCC unit and position RH exhaust camshaft sprocket to RH exhaust camshaft chain.

*NOTE: The VCC unit, exhaust camshaft chain and exhaust camshaft sprocket do not have timing marks on them. These parts may be freely fitted to the timing gear chain and camshafts in any position.*

- Position RH VCC unit to timing gear chain, fit VCC and exhaust camshaft sprocket to camshafts, fit and hand tighten 2 Torx bolts to eliminate play.

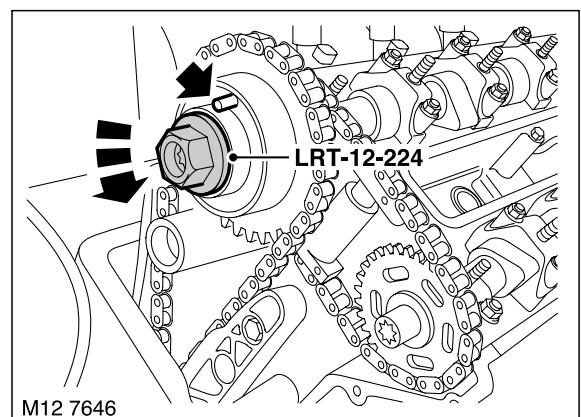
*NOTE: Thread is left handed.*

- Compress RH exhaust timing chain tensioner and remove **LRT-12-220**.



4. Fit **LRT-12-221** to RH cylinder head, fit **LRT-12-222** to **LRT-12-221** and hand tighten.

*NOTE: Only screw in adjustment bolt until slight resistance is present.*



- Fit **LRT-12-224** to LH VCC unit, connect multimeter between pin on LH VCC unit and stud on LH oil line.

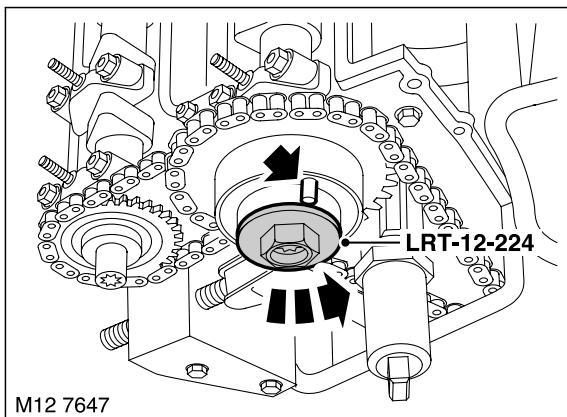
- Rotate LH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

- Tighten Torx bolts securing LH VCC unit and exhaust camshaft sprocket to 15 Nm (11 lbf.ft) and loosen one quarter of a turn.

*NOTE: Thread is left handed.*

## ENGINE - V8

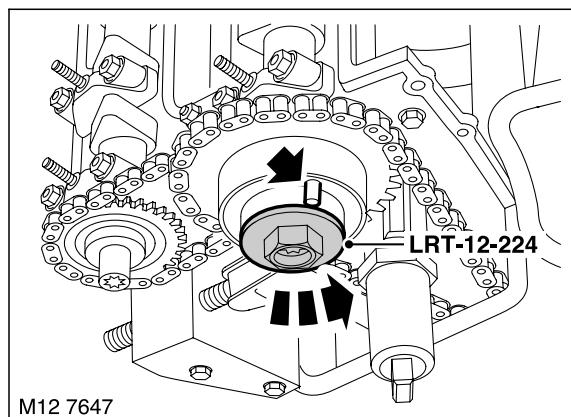


13. Rotate LH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

14. Tighten LH VCC unit Torx bolt to 110 Nm (81 lbf.ft) and LH exhaust camshaft sprocket Torx bolt to 125 Nm (92 lbf.ft).

*NOTE: Thread is left handed.*



15. Fit **LRT-12-224** to RH VCC unit, connect multimeter between pin on RH VCC unit and stud on RH oil line.

*NOTE: When the chain tension is adjusted the VCC unit will move and require adjusting to the LH stop.*

16. Rotate RH VCC unit using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

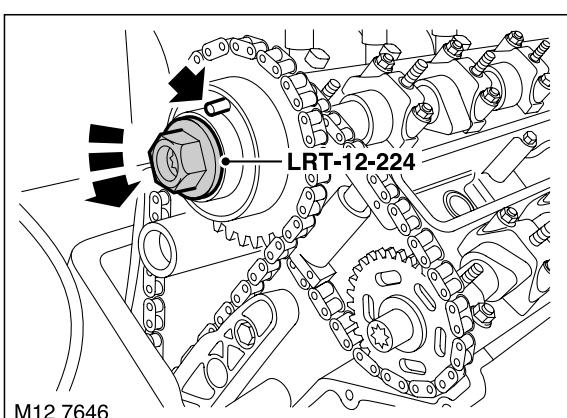
*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

17. Tighten RH VCC unit Torx bolt to 110 Nm (81 lbf.ft) and RH exhaust camshaft sprocket Torx bolt to 125 Nm (92 lbf.ft).

*NOTE: Thread is left handed.*

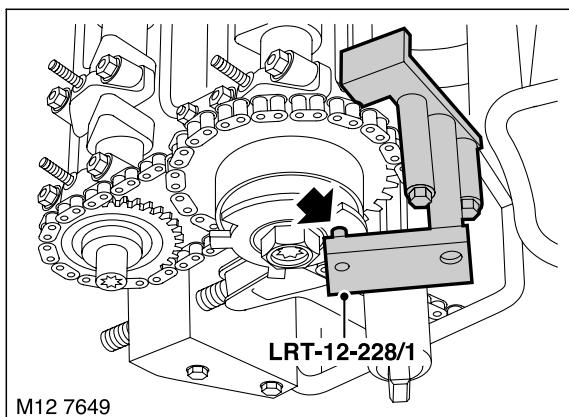
18. Fit RH CMP sensor ring, fit and hand tighten securing nut.

*NOTE: Thread is left handed.*



12. Fit **LRT-12-224** to LH VCC unit, connect multimeter between pin on LH VCC unit and stud on LH oil line.

*NOTE: When the chain tension is adjusted the VCC unit will move and require adjusting to the LH stop.*



- 19.** Position **LRT-12-228/1** locating dowel to RH CMP sensor ring, fit 2 bolts securing tool to RH cylinder head and tighten.

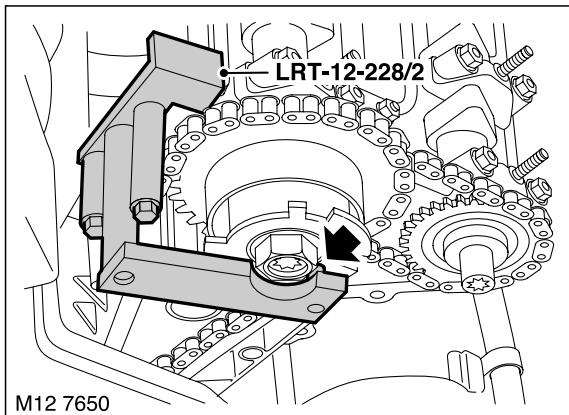
*NOTE: To ensure correct CMP sensor ring adjustment, make sure the tool is aligned flush with the cylinder head and lower timing gear cover before tightening the tool securing bolts.*

- 20.** Tighten nut securing CMP sensor ring to 40 Nm (30 lbf.ft) and remove **LRT-12-228/1** from RH cylinder head.

*NOTE: Thread is left handed.*

- 21.** Fit LH CMP sensor ring, fit and hand tighten securing nut.

*NOTE: Thread is left handed.*



- 22.** Position **LRT-12-228/2** locating dowel to LH CMP sensor ring, fit 2 bolts securing tool to RH cylinder head and tighten.

*NOTE: To ensure correct CMP sensor ring adjustment, make sure the tool is aligned flush with the cylinder head and lower timing gear cover before tightening the tool securing bolts.*

- 23.** Tighten nut securing CMP sensor ring to 40 Nm (30 lbf.ft) and remove **LRT-12-228/2** from LH cylinder head.

*NOTE: Thread is left handed.*

- 24.** Remove **LRT-12-223/5**, **LRT-12-223/6**, **LRT-12-223/2** and **LRT-12-223/1** from RH cylinder head camshafts.

- 25.** Remove **LRT-12-223/6**, **LRT-12-223/5**, **LRT-12-223/3** and **LRT-12-223/4** from LH cylinder head camshafts.

- 26.** Loosen **LRT-12-222**, remove 2 bolts securing **LRT-12-221** to RH cylinder head and remove **LRT-12-221**.

- 27.** Fit RH upper timing gear cover.

**Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**

- 28.** Fit LH upper timing gear cover.

**Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**

- 29.** Remove **LRT-12-227** from timing tool access hole.

- 30.** Fit 4 camshaft oil lines to LH and RH cylinder heads, fit and tighten 20 securing bolts.

- 31.** Fit engine lifting eye to rear of RH cylinder head and fit 2 bolts securing engine lifting eye and tighten.

- 32.** Fit and tighten 8 spark plugs to 31 Nm (23 lbf.ft).

- 33.** Fit RH camshaft cover.

**Engine - V8, REPAIRS, Gasket - camshaft cover - RH.**

- 34.** Fit LH camshaft cover.

**Engine - V8, REPAIRS, Gasket - camshaft cover - LH.**

- 35.** Fit fan cowl.

**COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**

- 36.** Fill cooling system.

**COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

- 37.** Connect battery earth lead.

# ENGINE - V8

## Engine & ancillaries - remove for access & refit

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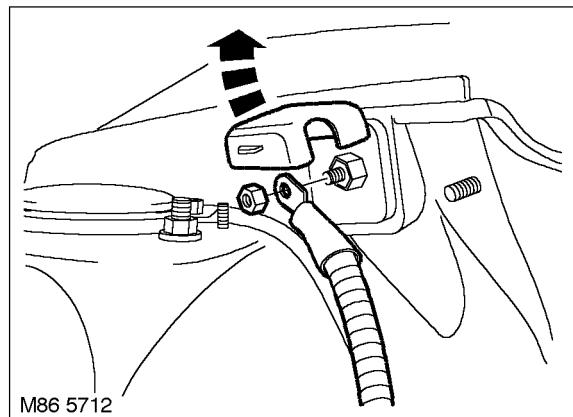
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### ☞ GENERAL INFORMATION, Electrical Precautions.

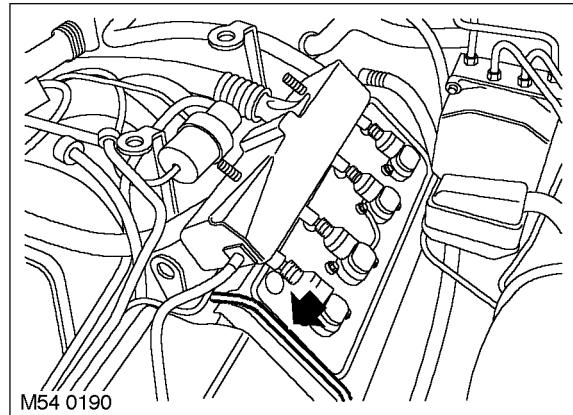
If fitting a replacement engine, a new dowel must be fitted, in the correct position, into the crankshaft boss. The procedure for this is detailed at the start of the 'refit' section.

#### Remove

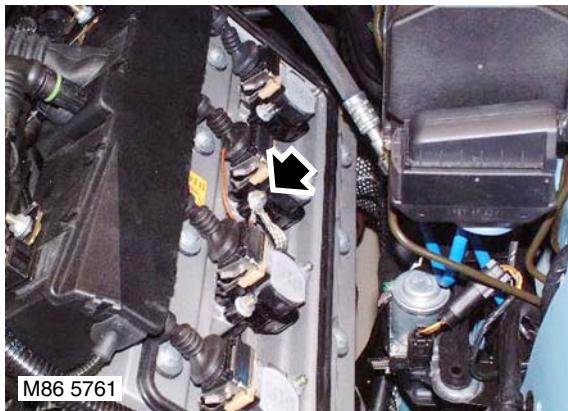
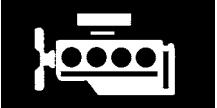
1. Release bonnet support stays, raise and secure bonnet in upright position.
2. Disconnect battery earth lead.
3. Remove air intake plenum.  
☞ HEATING AND VENTILATION, REPAIRS, Plenum - air intake.
4. Depressurise fuel system.  
☞ FUEL DELIVERY SYSTEM - V8, ADJUSTMENT, Fuel system - depressurise.
5. Recover refrigerant from A/C system.  
☞ AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.
6. Remove MAF/IAT sensor.  
☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Sensor - combined mass air flow (MAFS) & intake air temperature (IAT).
7. Raise front of vehicle and support on stands.  
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.
8. Drain cooling system.  
☞ COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.
9. Remove viscous coupling.  
☞ COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.



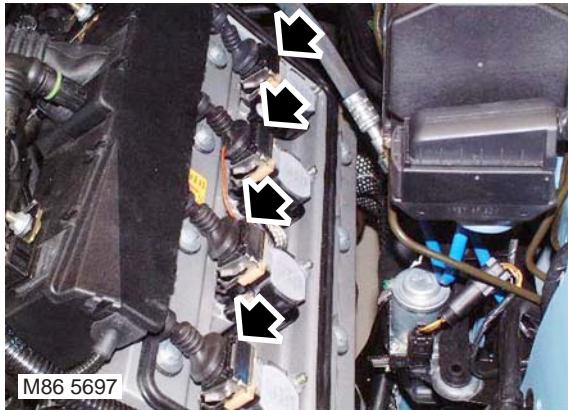
10. Release cover, remove nut and disconnect battery positive lead from stud.
11. Remove RH ignition coil cover.  
☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.
12. Remove LH ignition coil cover.  
☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.



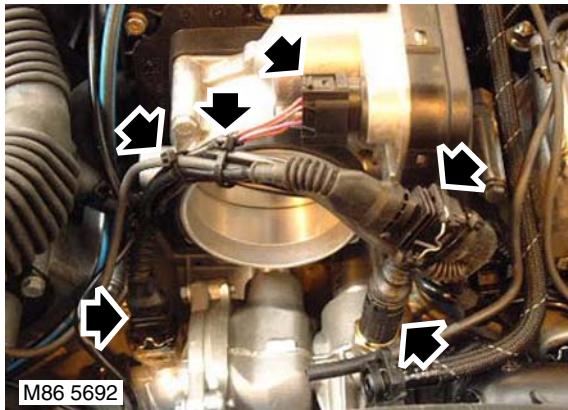
13. Position differential breather pipe clear of engine.



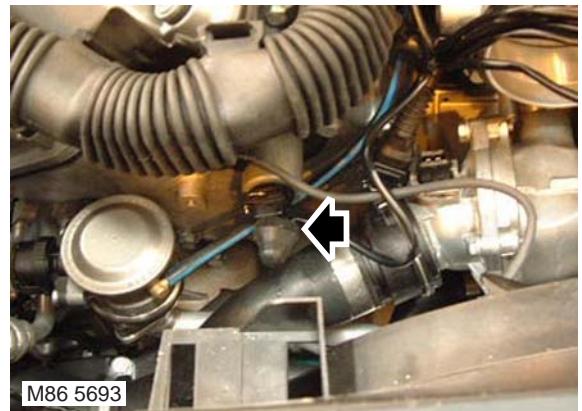
14. Remove nut and disconnect earth lead from LH camshaft cover.
15. Remove nut and disconnect earth lead from RH camshaft cover.



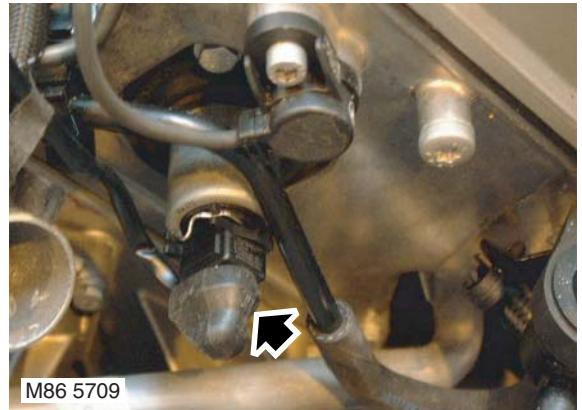
16. Disconnect multiplugs from ignition coils.



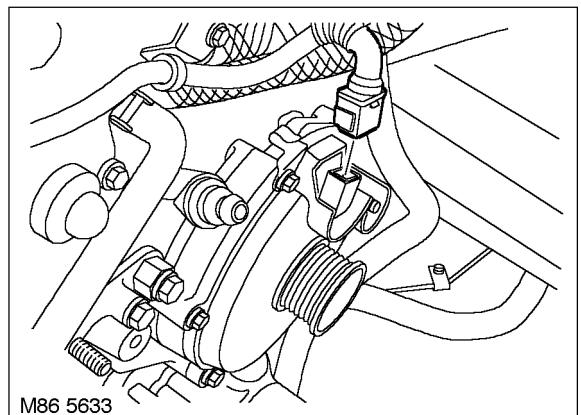
17. Disconnect multiplugs from throttle body, thermostat heater, CMP sensor and ECT sensor.
18. Cut 2 cable ties securing engine harness at throttle body and release harness.



19. Disconnect multiplug from RH VCC solenoid.
20. Release VCC multiplug harness from clip.

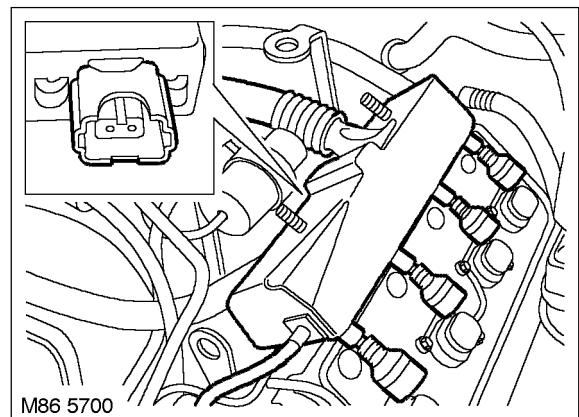
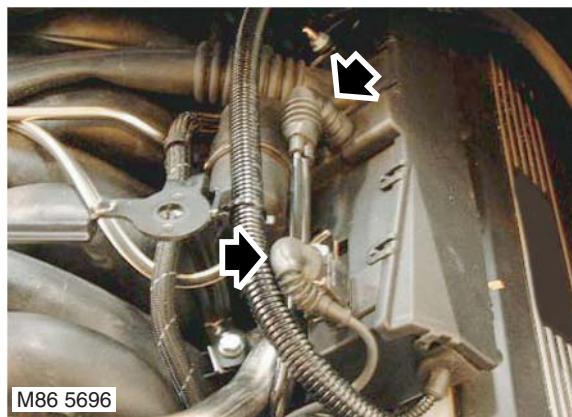


21. Disconnect multiplug from LH VCC solenoid.

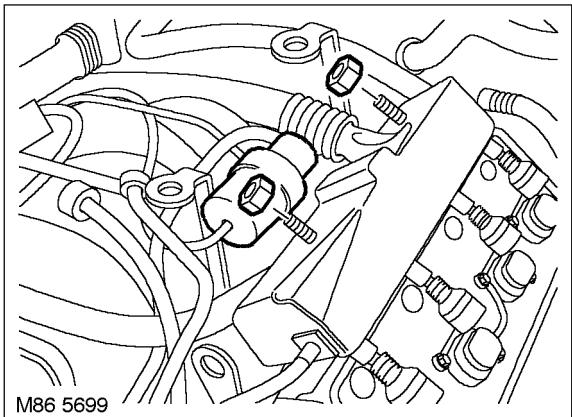


22. Disconnect multiplug from alternator.
23. Release alternator harness from 4 clips.

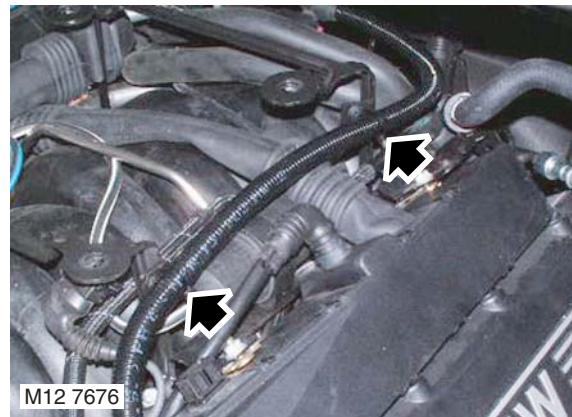
## ENGINE - V8



24. Disconnect multiplugs from LH CMP sensor and LH knock sensor.

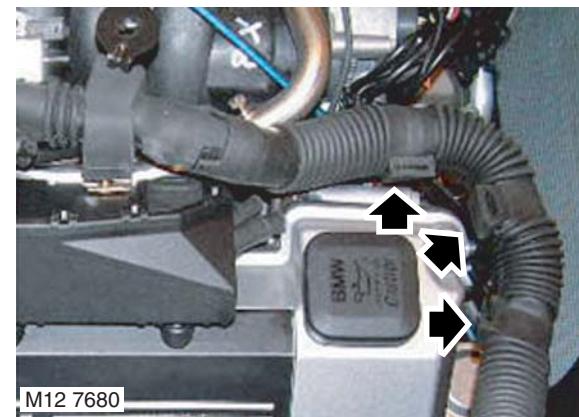


25. Remove 2 nuts securing LH fuel injector harness to fuel rail, release vacuum reservoir and mounting bracket from stud and position aside.

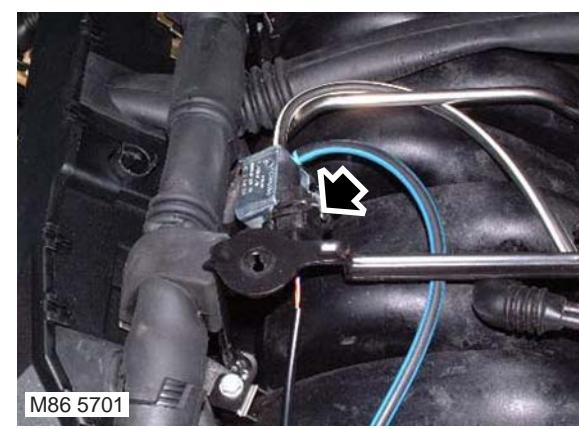


26. Release alternator harness from 2 clips on engine cover mounting brackets.

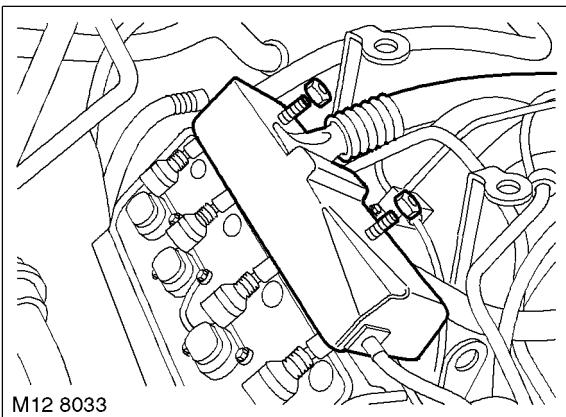
27. Disconnect multiplugs from LH fuel injectors



28. Release engine harness from clips and move clear of camshaft cover.



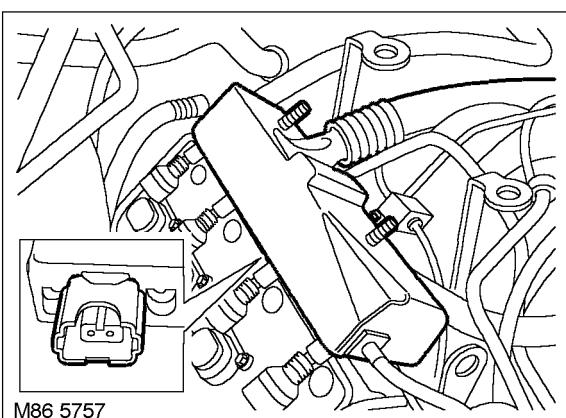
29. Disconnect multiplug from SAI control valve.



- 30.** Remove 2 nuts securing engine harness to induction manifold, remove washer and release SAI control valve from securing stud. Position valve aside.



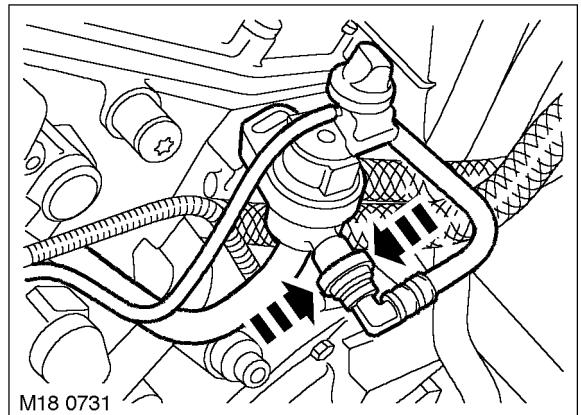
- 31.** Disconnect multiplug from RH KS.



- 32.** Disconnect multiplugs from RH fuel injectors

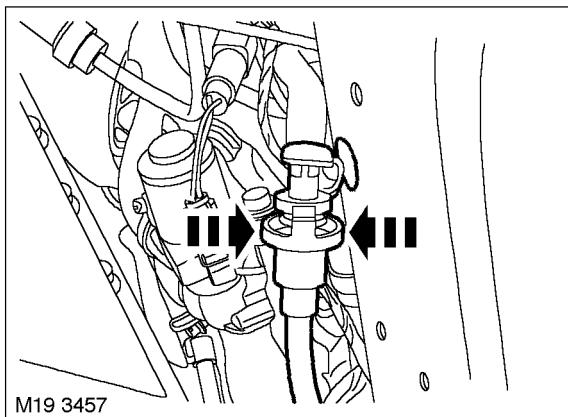


- 33.** Disconnect multiplug from charcoal canister purge control valve.  
**34.** Position engine harness to RH bulkhead.

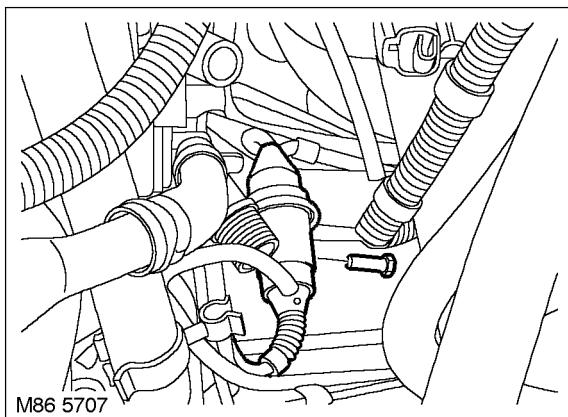


- 35.** Disconnect pipe from charcoal canister purge control valve.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**

## ENGINE - V8



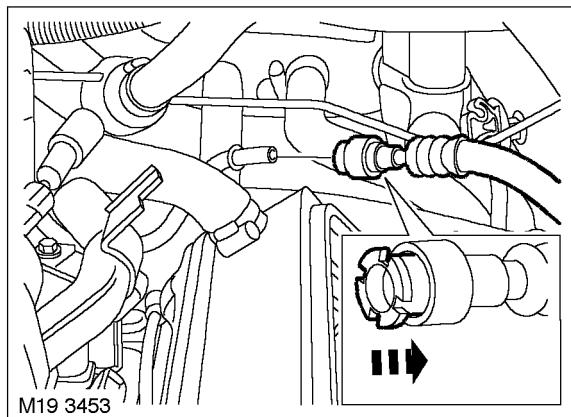
36. Remove charcoal canister purge valve pipe.
37. Release transmission breather pipes from clips at coolant manifold and position aside.
38. Release clips and disconnect heater hoses from coolant manifold.



39. Undo bolt securing gearbox multiplug bracket to gearbox bell housing and position aside.

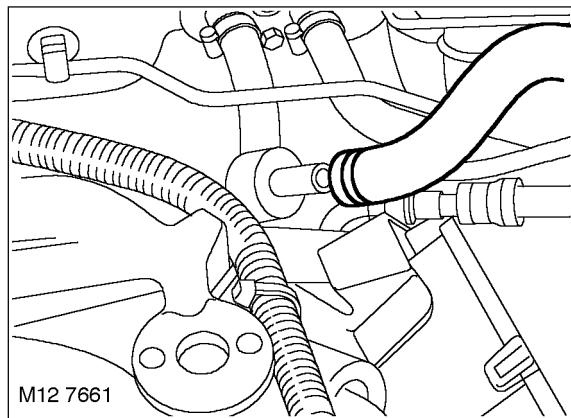


40. Disconnect multiplug from starter motor lead.
41. Position absorbent cloth around fuel feed pipe connection to collect spillage.

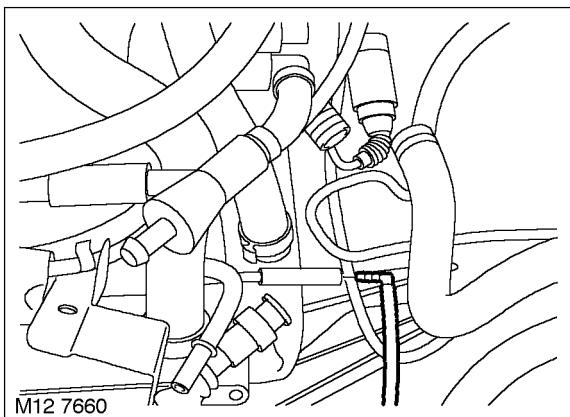


42. Disconnect fuel feed hose from fuel rail.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**

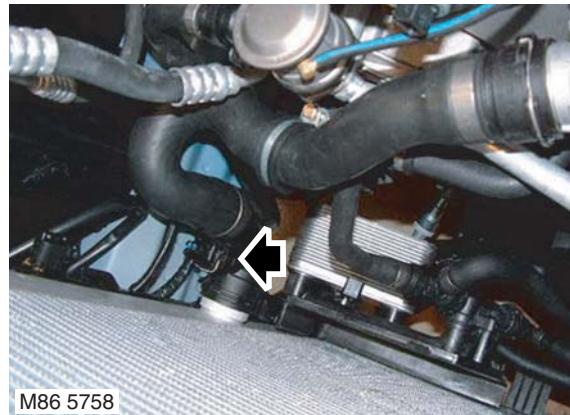
43. Remove absorbent cloth.



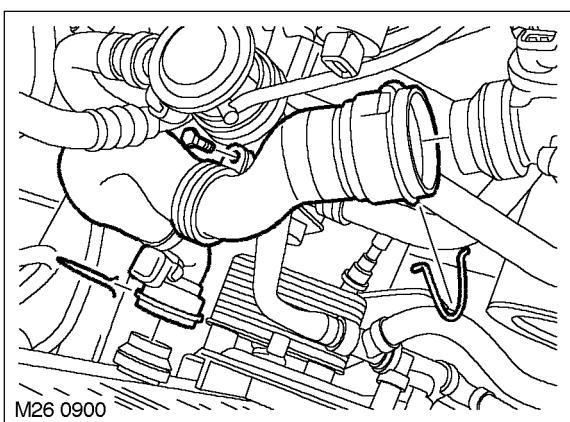
44. Release hose clip and disconnect brake servo vacuum hose from 1 way valve.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**



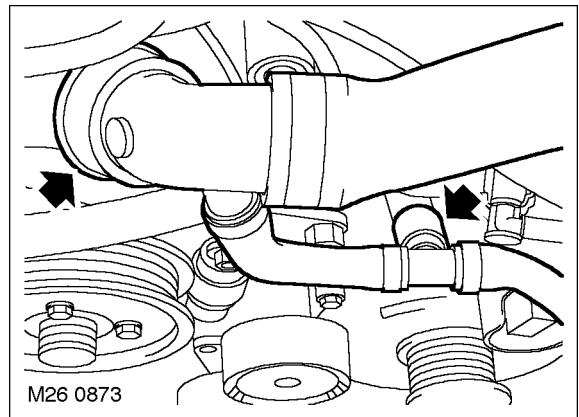
- 45.** Disconnect vacuum pipe from induction manifold.



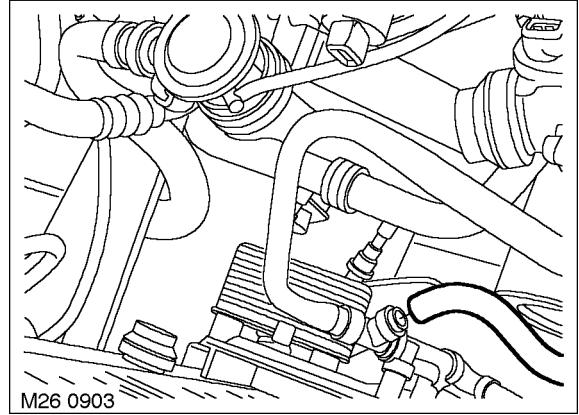
- 46.** Disconnect multiplug from radiator bottom hose.



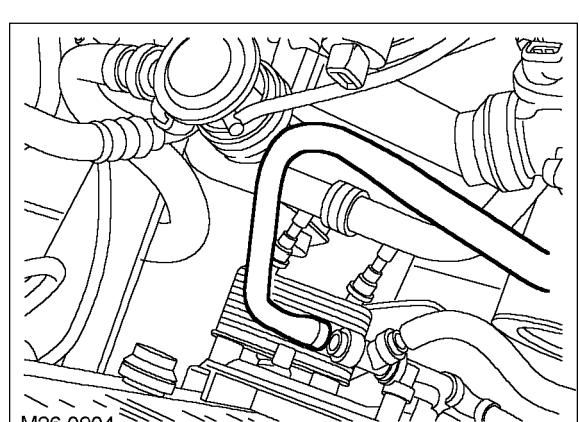
- 47.** Remove bolt securing radiator bottom hose to bracket, release clips and remove radiator bottom hose.  
**48.** Release clip and disconnect radiator top hose from radiator.



- 49.** Release clips and disconnect radiator top hose from coolant pump and alternator.



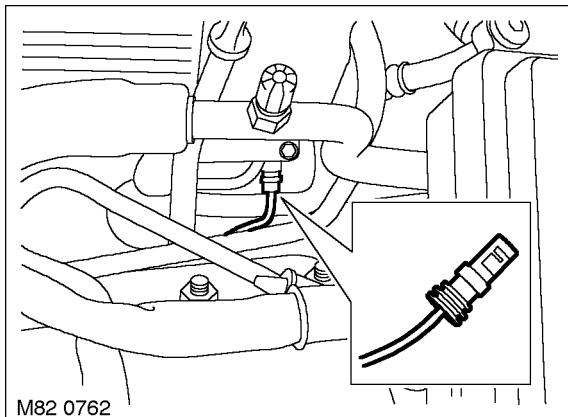
- 50.** Release clip securing radiator top hose to coolant 'T' junction and remove radiator top hose.



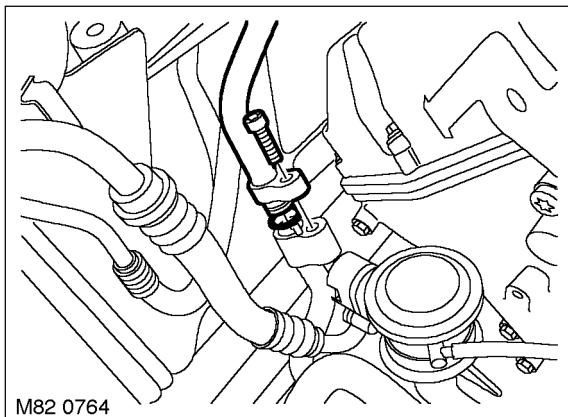
- 51.** Release clip and disconnect coolant hose from 'T' junction.

## ENGINE - V8

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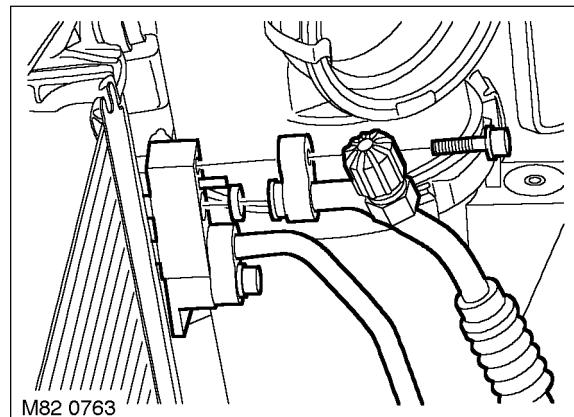


52. Disconnect multiplug from A/C compressor.



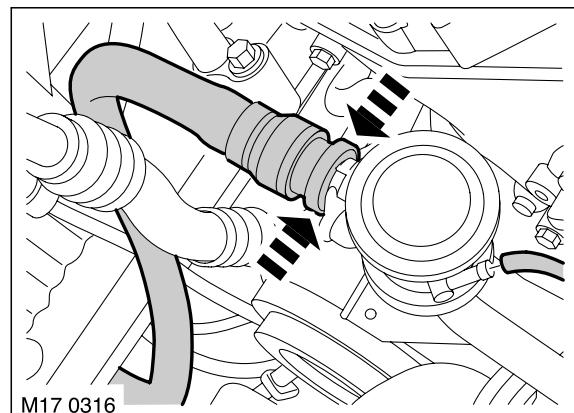
53. Remove Allen bolt securing A/C pipe to A/C compressor and disconnect A/C pipe. Discard 'O' ring.

**CAUTION:** Immediately cap all A/C pipes to prevent ingress of dirt and moisture into the system.



54. Remove Allen bolt securing A/C pipe to condenser and disconnect A/C pipe. Discard 'O' ring.

**CAUTION:** Immediately cap all A/C pipes to prevent ingress of dirt and moisture into the system.

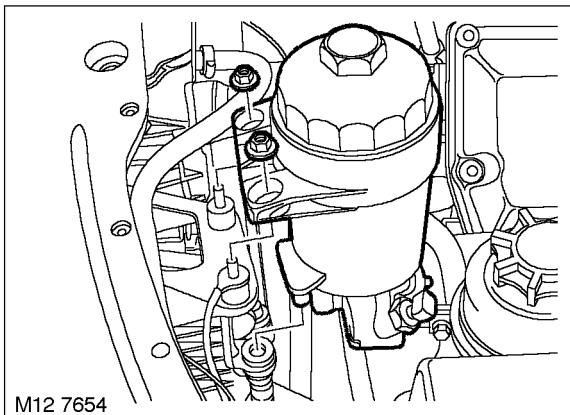


55. Disconnect 2 hoses from the SAI control valve.

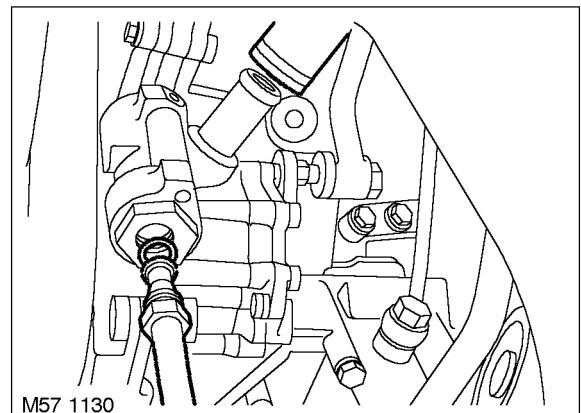
**CAUTION:** Always fit plugs to open connections to prevent contamination.



56. Disconnect multiplug from oil pressure switch.



57. Remove 2 nuts securing oil filter housing and release oil filter housing from mounting bracket.  
 58. Position oil filter housing and hoses aside and secure to engine with cable ties.  
 59. Position container to collect PAS fluid spillage.



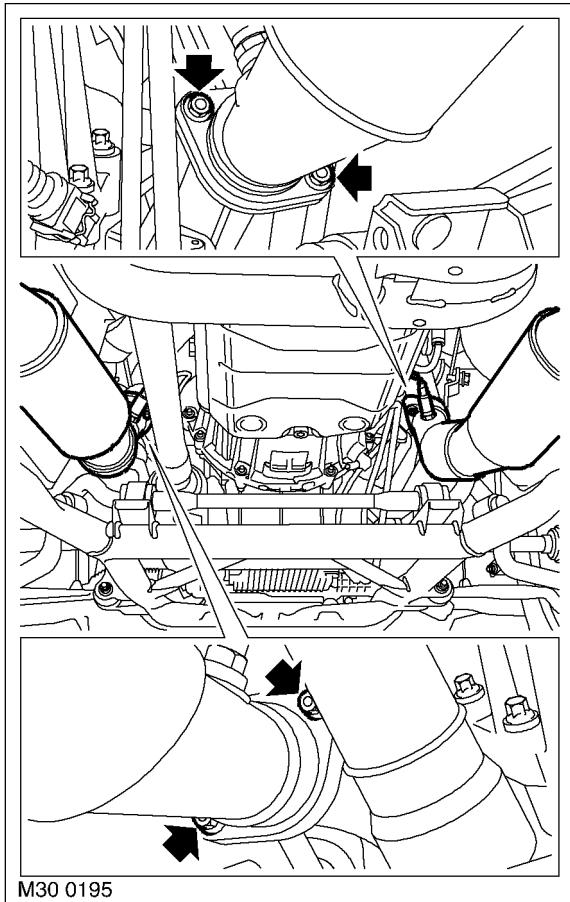
60. Release clip and disconnect fluid inlet hose from PAS pump. Undo union nut and disconnect PAS outlet hose from PAS pump. Discard 'O' ring.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

61. Remove container from below PAS pump.  
 62. Remove 4 bolts securing differential air flow panel to sub-frame and remove panel.

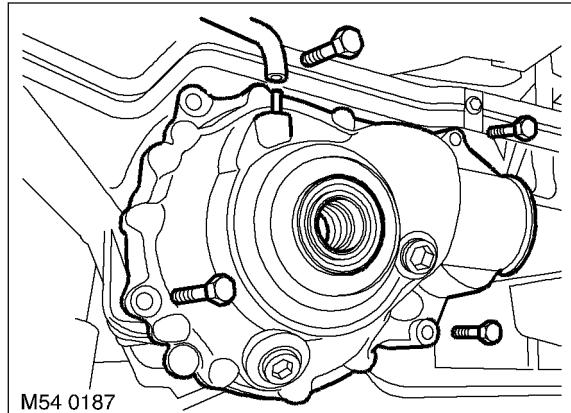
## ENGINE - V8

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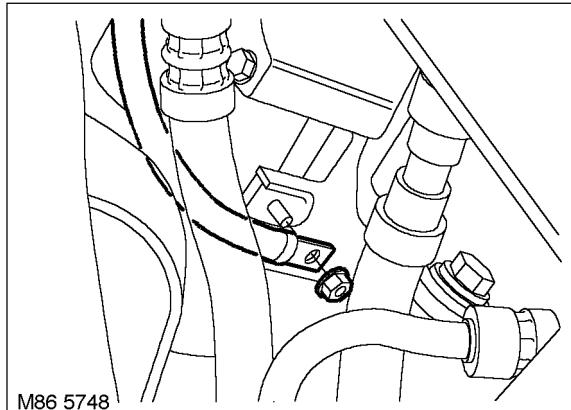
63. Remove 4 nuts securing front pipe flanges to exhaust manifolds and discard nuts.
64. Release exhaust front pipes from exhaust manifolds.
65. Remove front road wheels.
66. Remove RH front drive shaft.

**DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.**

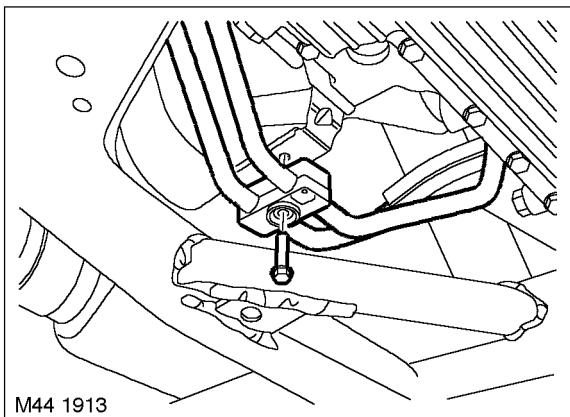


67. Remove differential breather hose. Remove 4 differential securing bolts and release differential from engine sump.

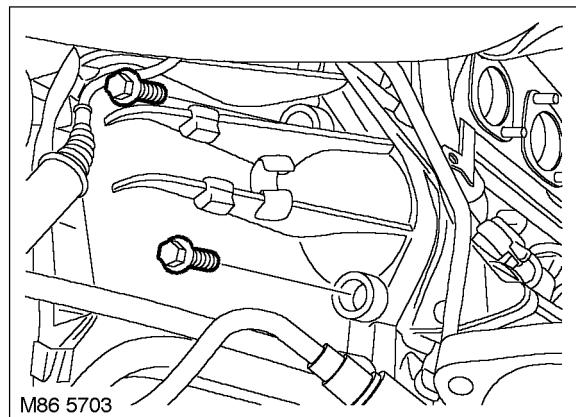
*NOTE: Securing bolt above pinion remains captive to differential.*



68. Disconnect engine earth lead.
69. Remove CKP sensor.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Sensor - crankshaft position (CKP).**

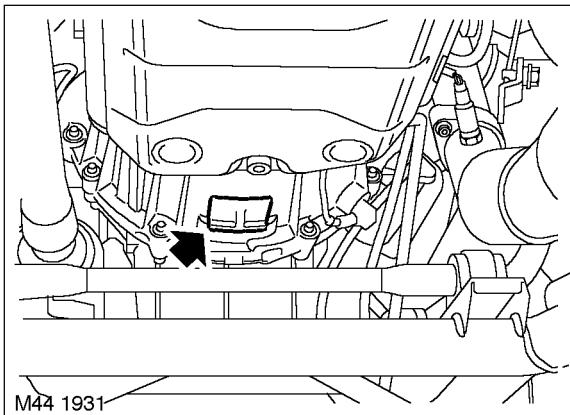


- 70.** Remove bolt securing transmission cooler pipes and release cooler pipes from bracket.

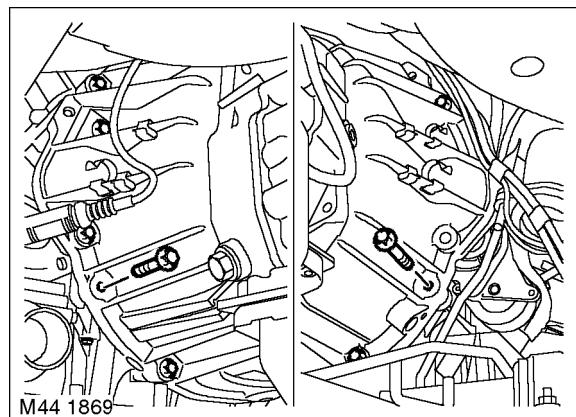


- 75.** Remove 2 bolts securing starter motor and release starter motor.

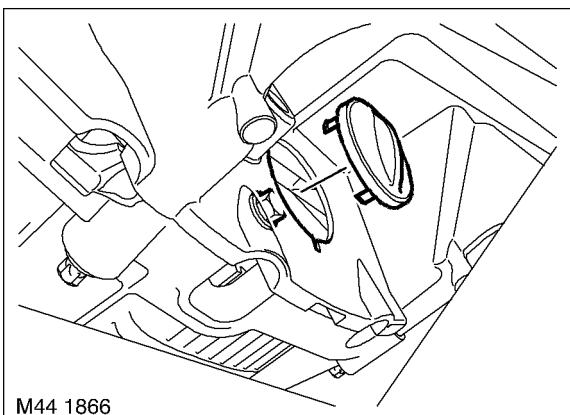
*NOTE: Starter motor remains captive to engine.*



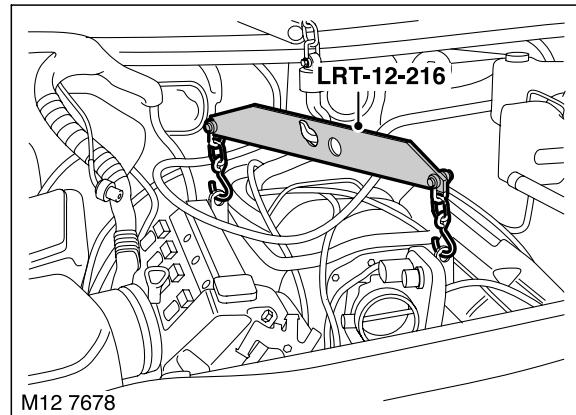
- 71.** Remove grommet from bottom of bell housing to gain access to torque converter.



- 77.** Remove 8 Torx bolts securing gearbox to engine.

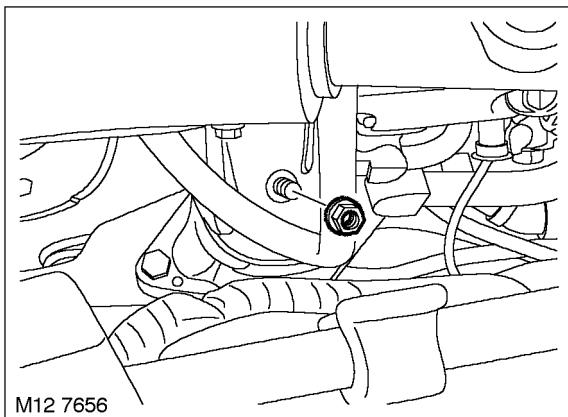


- 72.** Remove grommet from bell housing to gain access to torque converter securing bolts.  
**73.** Rotate crankshaft for access and remove 4 bolts securing torque converter to drive plate.  
**74.** Position torque converter clear of drive plate.

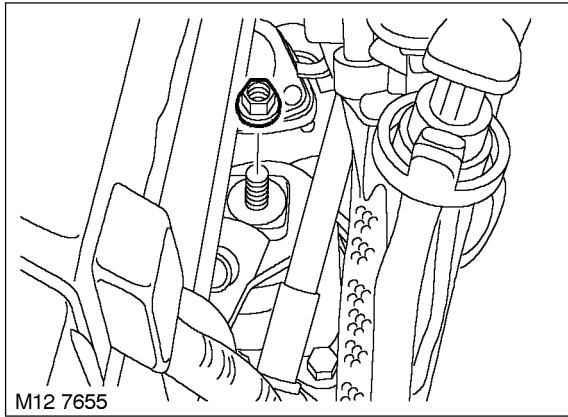


- 78.** Fit LRT-12-216 to engine lifting eyes.

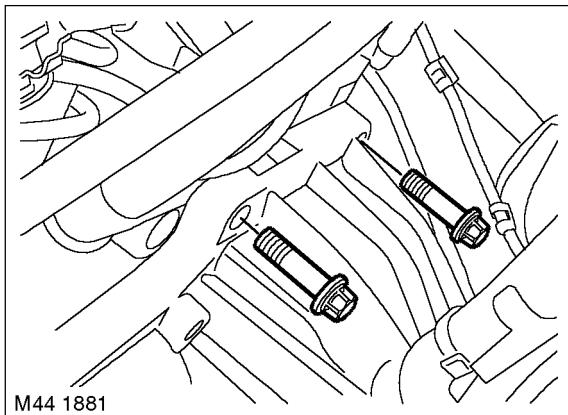
## ENGINE - V8



79. Remove nut securing RH engine mounting to engine mounting bracket.



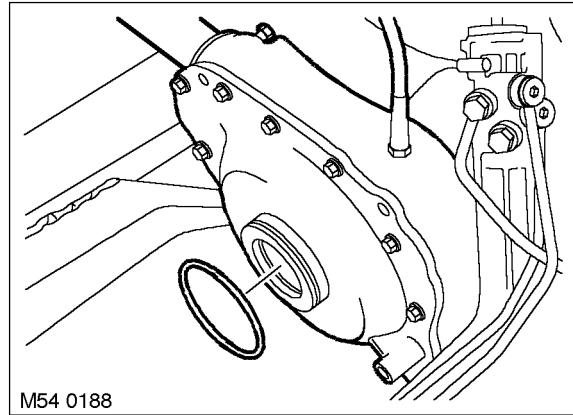
80. Remove nut securing LH engine mounting to engine mounting bracket.  
81. Connect chain to lifting bracket and take weight of engine.  
82. Raise engine clear of mountings.



83. Remove 2 Torx bolts from top of bell housing.

84. Release engine from dowels, carefully raise and guide engine clear of vehicle.

**CAUTION: To prevent damage to the radiator, do not allow engine to contact the radiator.**

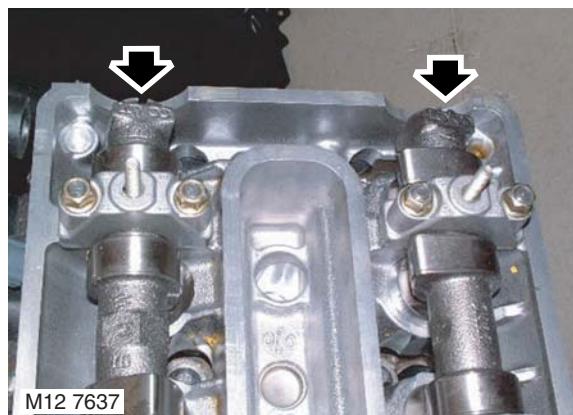


85. Discard differential 'O' ring.

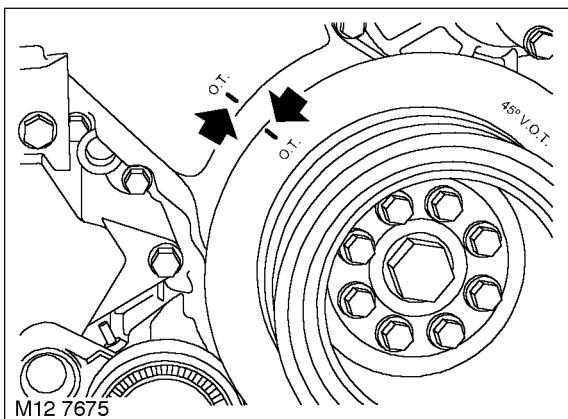
### Refit

*Procedure for fitting crankshaft dowel to a replacement engine, steps 1 - 10 only:*

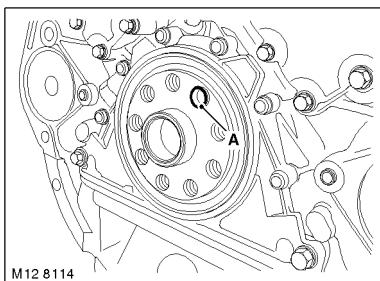
1. Remove RH camshaft cover gasket.



2. Rotate engine crankshaft pulley clockwise until letter and cylinder number stampings, located on rear of camshafts, are in upright position.

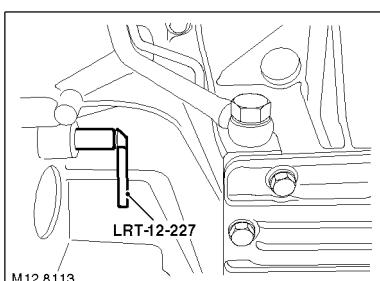


3. If necessary, continue to rotate crankshaft slightly to align TDC timing marks



4. Temporarily fit drive plate ensuring that hollow bush in drive plate securing bolt hole, is aligned with bolt hole 'A' in crankshaft boss.
5. Fit and lightly tighten 8 drive plate securing bolts.

*Do not fit a bolt in drive plate hole with hollow bush.*



6. Fit timing pin **LRT-12-227**, ensuring that it is inserted in hole in drive plate.  
*If necessary, rotate crankshaft slightly to enable timing pin to be inserted.*
7. Check that TDC timing marks are still aligned and that hole with hollow bush is still in position 'A'.

8. Remove timing pin **LRT-12-227**, and remove drive plate.
9. Fit crankshaft dowel into securing bolt hole at position 'A'.
10. Fit RH camshaft cover gasket.
11. **All engines:** Clean torque converter and drive plate mating faces.
12. Clean gearbox to engine mating faces, dowels and dowel holes.
13. Clean differential and engine sump mating faces.
14. Fit new 'O' ring to differential and lubricate with clean oil.
15. With assistance, carefully fit engine to gearbox. Ensure engagement of torque converter spigot and location onto dowels.

*NOTE: When fitting engine, guide the engine past differential mating face.*

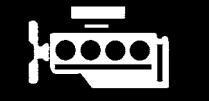
16. Ensure torque converter is fully engaged with gearbox.
17. Fit 8 Torx bolts securing automatic gearbox to engine, tighten to 45 Nm (33 lbf.ft)
18. Align starter motor to engine and tighten securing bolts to 45 Nm (33 lbf.ft).
19. Fit 2 top bell housing Torx bolts and tighten to 25 Nm (18 lbf.ft).
20. Remove support from gearbox.
21. Lower engine onto mountings.
22. Disconnect lifting chains.
23. Fit 2 nuts securing engine mountings to engine mounting brackets and tighten to 100 Nm (74 lbf.ft).
24. Remove engine lifting bracket.
25. Fit bolts securing drive plate to torque converter and tighten to 45 Nm (33 lbf.ft)
26. Fit grommets to bell housing.
27. Clean mating faces of exhaust front pipes and exhaust manifolds.
28. Align exhaust front pipes to exhaust manifolds.
29. Fit 4 new nuts securing exhaust front pipes to exhaust manifolds and tighten to 45 Nm (33 lbf.ft).
30. Carefully align differential to sump. Fit bolts, but do not tighten at this stage.
31. Align differential to transfer box front output flange. See Technical Bulletin, Final Drive section No: 0014
32. Tighten differential to engine sump securing bolts to 110 Nm (81 lbf.ft).
33. Connect breather hose to differential.
34. Connect engine earth lead to engine and tighten securing nut and bolt.
35. Fit differential air flow panel to sub-frame and tighten bolts to 45 Nm (33 lbf.ft).
36. Fit RH front drive shaft.

**DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.**

## ENGINE - V8

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37. Fit new 'O' ring to PAS hose union, connect hose to pump and tighten nut to 25 Nm (18 lbf.ft).
38. Connect supply hose to PAS pump and secure using new clip.
39. Fit oil filter housing to bracket and tighten securing nuts.
40. Connect multiplug to oil pressure switch.
41. Connect SAI control valve hoses.
42. Fit new 'O' rings to A/C pipes and lubricate with clean refrigerant oil.
43. Align A/C pipes to condenser and compressor. Fit Allen bolts securing A/C pipes to condenser and compressor and tighten to 25 Nm (18 lbf.ft).
44. Connect multiplug to A/C compressor.
45. Connect coolant hose to 'T' junction and secure clip.
46. Fit radiator top hose and secure with clips.
47. Fit radiator bottom hose, secure with clips and tighten 'P' clip securing bolt.
48. Connect multiplug to radiator bottom hose.
49. Connect vacuum pipe to inlet manifold.
50. Connect brake vacuum servo hose to 1 way valve and secure using new clip.
51. Clean fuel hose connections.
52. Connect fuel feed hose to fuel rail.
53. Connect multiplug to starter motor lead.
54. Position gearbox multiplug and bracket to bell housing and tighten securing bolt.
55. Connect heater hoses to coolant manifold and secure with clips.
56. Fit transmission breather pipes into clips.
57. Fit charcoal canister purge valve pipe.
58. Position engine harness to engine.
59. Connect multiplug to charcoal canister purge control valve.
60. Fit washer to fuel injector harness securing stud.
61. Position and secure engine harness to brackets with clips.
62. Connect multiplugs to RH fuel injectors.
63. Connect multiplugs to LH fuel injectors.
64. Connect alternator harness to 2 clips on engine cover mounting brackets.
65. Fit fuel hose and mounting bracket to LH fuel injector harness securing stud.
66. Fit vacuum reservoir and mounting bracket to LH fuel injector harness securing stud.
67. Fit 2 nuts securing fuel injector harness to induction manifold and tighten nuts.
68. Connect multiplugs to knock sensors.
69. Connect multiplugs to CMP sensors.
70. Secure alternator harness into 4 securing clips.
71. Connect multiplug to alternator.
72. Connect multiplug to SAI control valve.
73. Connect multiplugs to VCC solenoids.
74. Connect multiplugs to throttle body, thermostat heater, ECT sensor, and RH CMP sensor.
75. Align engine harness to throttle body and secure using new cable ties.
76. Connect multiplugs to ignition coils.
77. Connect engine harness earth leads to LH and RH camshaft covers and tighten nuts.
78. Position differential breather pipe to LH engine camshaft cover.
79. Fit LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
80. Fit RH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**
81. Fit viscous coupling.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
82. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
83. Remove stands and lower front end of vehicle.
84. Fit MAF/IAT sensor.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Sensor - combined mass air flow (MAFS) & intake air temperature (IAT).**
85. Recharge A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
86. Fit air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
87. Fit battery positive lead to stud, tighten nut to 18 Nm (13 lbf.ft) and close cover.
88. Connect battery earth lead.
89. Fill cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
90. Bleed PAS system.  
 **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
91. Connect support stays and close bonnet.



## Mounting - rear

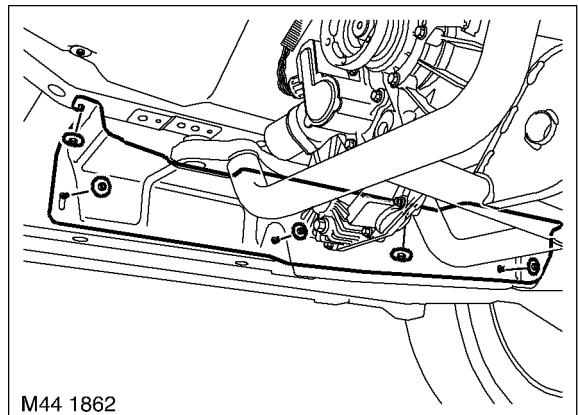
### 12.45.08

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

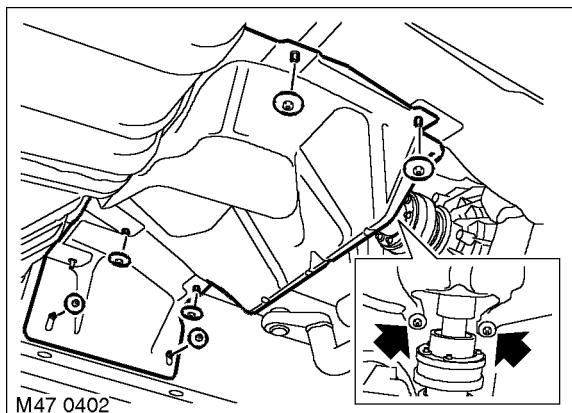
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

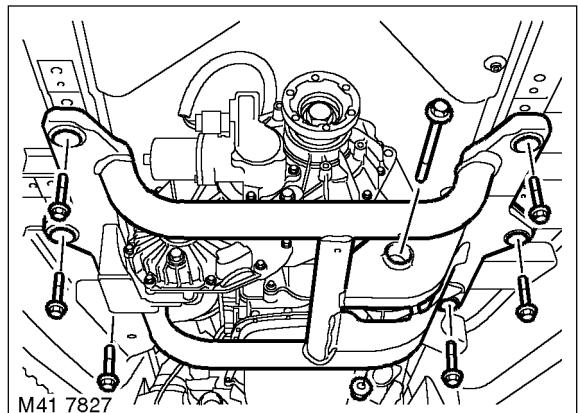
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Raise vehicle on lift.
4. Remove exhaust system.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**



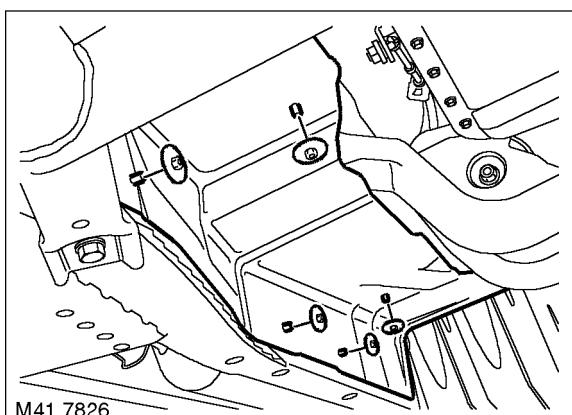
7. Remove 5 nuts, release and remove LH heat shield.



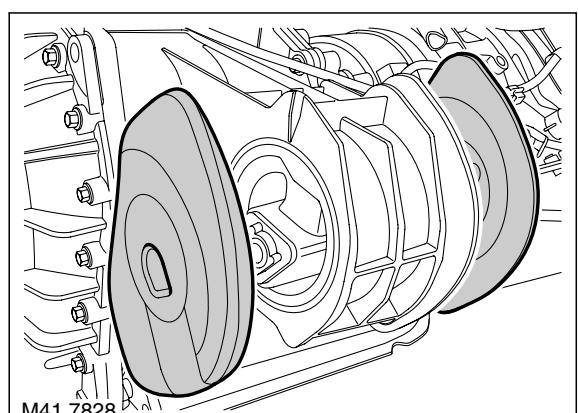
5. Remove 8 nuts securing centre heat shield and remove shield.



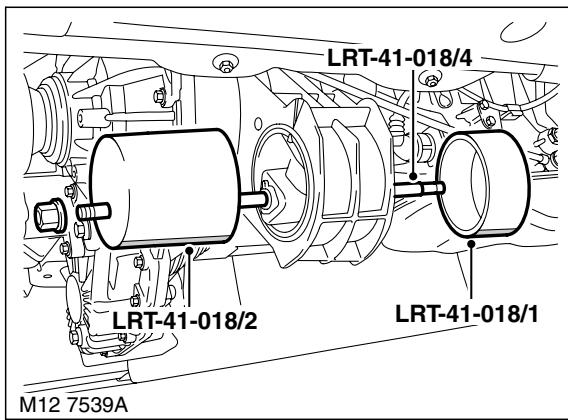
8. Support gearbox on a jack.
9. Remove nut and bolt securing mounting to cross member.
10. Remove 6 bolts securing cross member and remove cross member.



6. Remove 5 nuts, release and remove RH heat shield.



11. Remove snubbers from mounting.

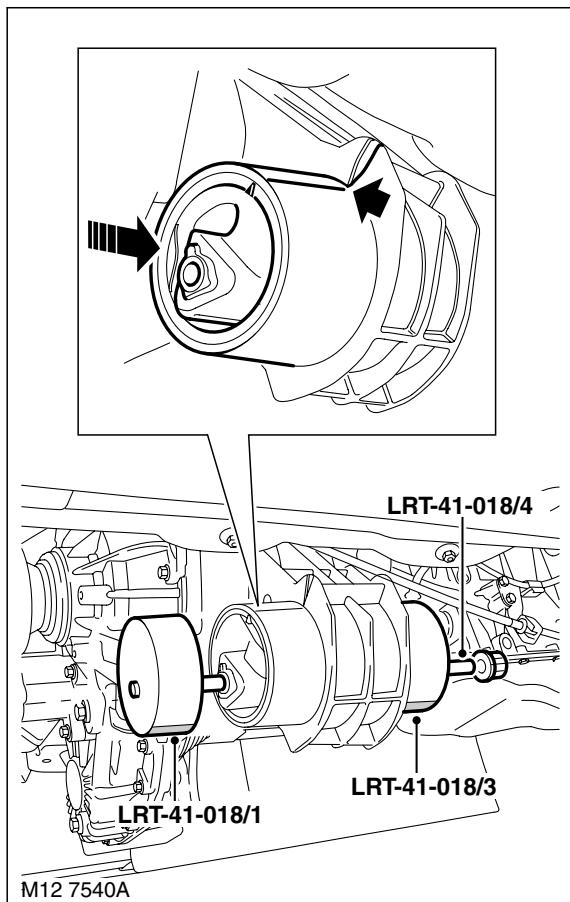


12. Lubricate centre screw **LRT-41-018/4** with Molybdenum Disulphide grease and assemble tool as shown to remove mounting from transfer gearbox.

**CAUTION:** Ensure tool alignment indicator is at the 6 o'clock position. The tool alignment indicator is a machined flat, on **LRT-41-018/1** and **LRT-41-018/2**.

## Refit

1. Clean mounting and mating faces.
2. Lubricate new mounting and bore in transfer gearbox casing to aid assembly.



3. Position new mounting to rear face of transfer gearbox, and start entry. Mounting to be parallel, with timing marks aligned.

*NOTE: Transfer timing mark to side of mounting to assist with alignment.*

4. Lubricate centre screw **LRT-41-018/4** with Molybdenum Disulphide grease and assemble tool as shown to fit mounting to transfer gearbox. Start with the centre screw at full length and when the mounting is approximately 75 percent fitted, reduce the length of the centre screw by screwing it fully into the base plate **LRT-41-018/1**. This will ensure the centre screw **LRT-41-018/4**, does not foul on the gearbox fluid pan.

**CAUTION:** Ensure tool alignment indicator is at the 6 o'clock position.

5. Ensure the mounting is fitted parallel. If necessary, use a mallet and tap the base plate to maintain a parallel fit.
6. Fit snubbers.
7. Fit cross member to mounting, fit nut and bolt but do not tighten at this stage.
8. Raise gearbox on jack.



9. Align cross member, fit bolts and tighten to 68 Nm (50 lbf.ft).
10. Remove support from gearbox.
11. Tighten nut and bolt securing mounting to cross member to 100 Nm (74 lbf.ft).
12. Fit LH heat shield and secure with nuts.
13. Fit RH heat shield and secure with nuts.
14. Fit centre heat shield and secure with nuts.
15. Fit exhaust system.
  - MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**
16. Connect battery earth lead.

## Engine mounting - LH

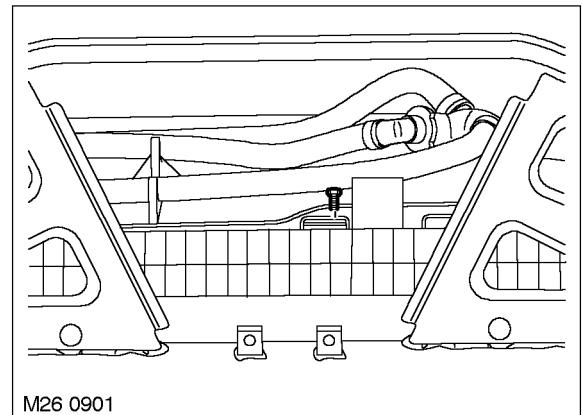
### 12.45.11

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.
2. Raise front of vehicle and support on stands.
3. Remove air intake plenum.
  - HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
4. Remove air intake hose.
  - ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
5. Remove undertray.
  - EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
6. Remove 4 bolts securing differential air flow panel and remove panel.

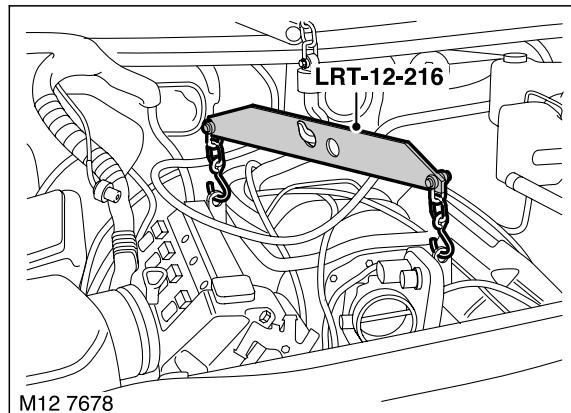


7. Remove screw securing fan cowl to radiator.

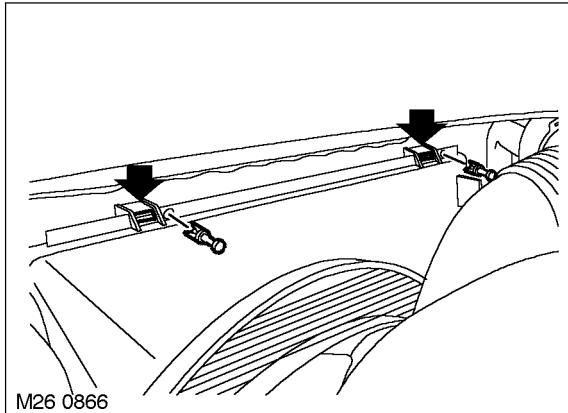
## ENGINE - V8



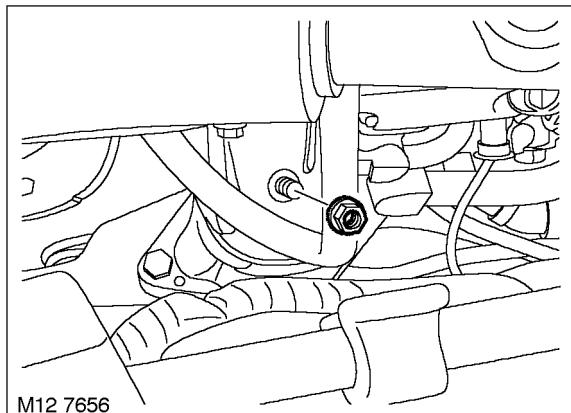
- Release auxiliary cooling fan multiplug from fan cowl.



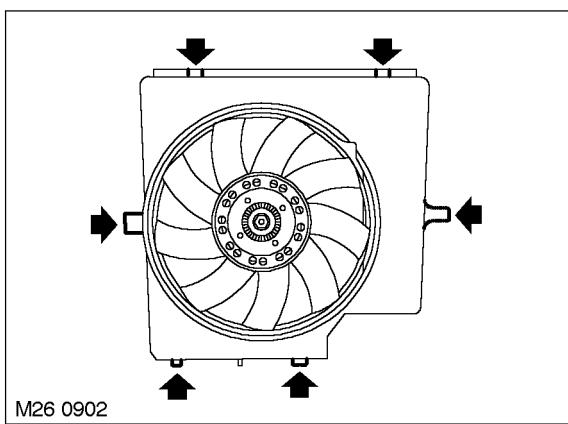
- Fit LRT-12-216 to engine lifting eyes.



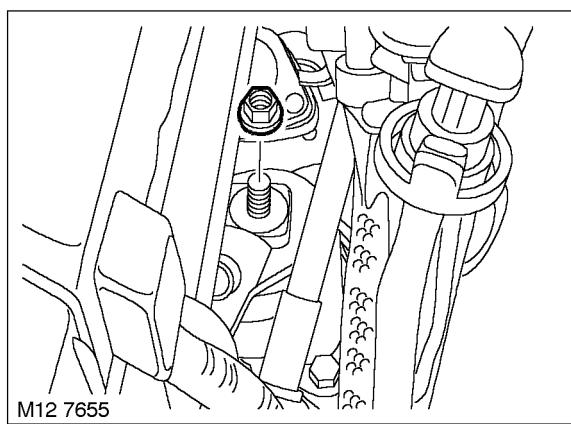
- Remove screws securing fan cowl.



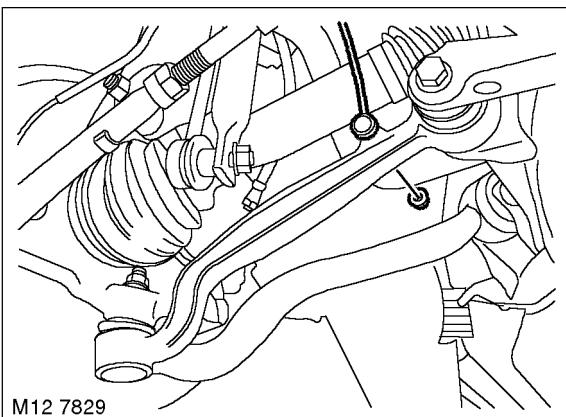
- Remove nut securing RH engine mounting to engine mounting bracket.



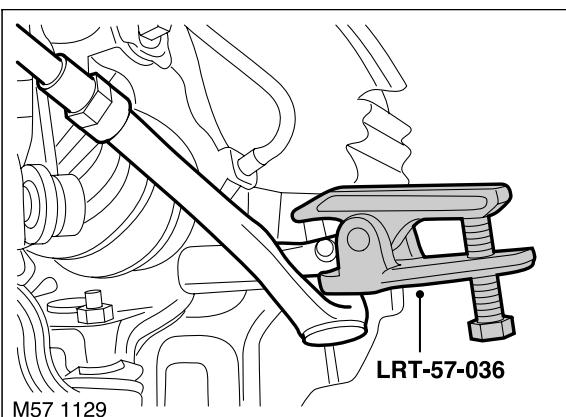
- Release fan cowl from radiator.



- Remove nut securing LH engine mounting to engine mounting bracket.
- Remove front road wheels.



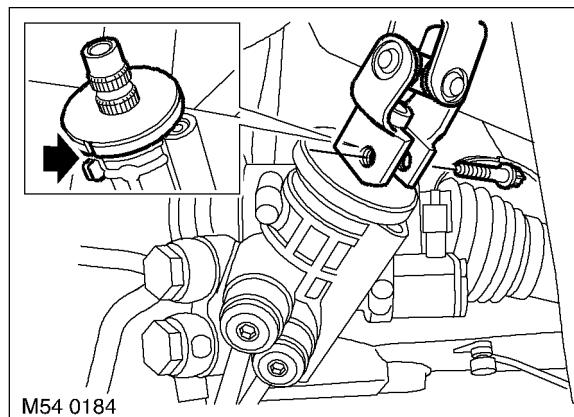
- 15.** Remove nut and disconnect link from LH front suspension height sensor.



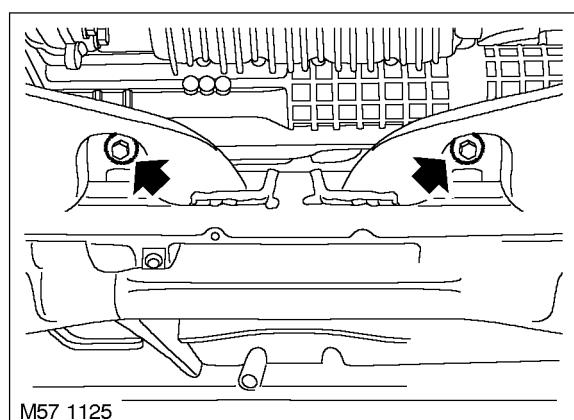
- 16.** Remove nuts securing RH and LH track rod end ball joints to steering arms. Discard nuts.  
**17.** Using **LRT-57-036** release track rod ends from steering arms.



- 18.** Disconnect multiplug from PAS rack pinion sensor.

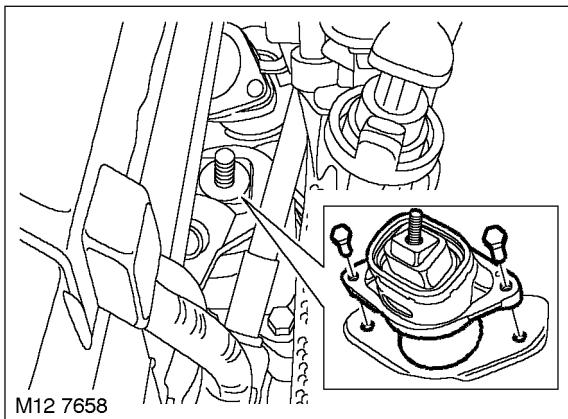


- 19.** Note fitted position of intermediate steering column. Remove Torx bolt from intermediate steering column clamp and disconnect column from PAS rack.



- 20.** Remove 2 Torx bolts and 2 nuts securing PAS rack, discard nuts and bolts.  
**21.** Release PAS rack from front sub-frame and position rack forward for access.  
**22.** Connect chain to engine lifting bracket and raise engine sufficiently only to clear mounting.  
**CAUTION:** To prevent damage to the radiator, guide the fan cowl clear of the radiator as it is raised with the engine.

# ENGINE - V8



23. Remove 2 bolts securing LH engine mounting to sub-frame and remove engine mounting, discard bolts

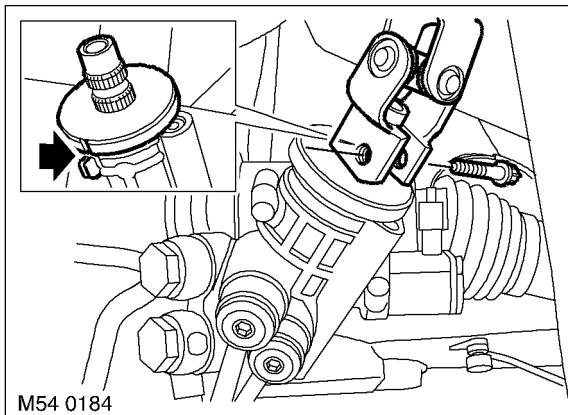
*NOTE: The LH engine mounting is removed from under the LH front wheel arch through the opening of the front sub-frame.*

## Refit

1. Clean engine mountings and mating faces.
2. Fit LH engine mounting to sub-frame and tighten new bolts to 56 Nm (41 lbf.ft).
3. Lower engine onto engine mountings.

*NOTE: Guide the fan cowl into position as the engine is lowered.*

4. Position PAS rack into front sub-frame and using new Torx bolts and nuts tighten to 100 Nm (74 lbf.ft), then tighten a further 90°.



5. Connect intermediate steering column to PAS rack and tighten securing clamp Torx bolt to 24 Nm (18 lbf.ft).

*NOTE: Make sure that intermediate steering column is correctly aligned to PAS rack.*

6. Connect multiplug to PAS rack pinion sensor.

7. Connect track rod ends to steering arms, using new nuts tighten to 55 Nm (41 lbf.ft).
8. Connect link to suspension height sensor and tighten nut.
9. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
10. Fit 2 nuts securing engine mountings to engine mounting brackets and tighten to 100 Nm (74 lbf.ft).
11. Remove engine lifting chains.
12. Remove engine lifting bracket.
13. Fit fan cowl to radiator and fit securing scrivets.
14. Fit auxiliary cooling fan multiplug to fan cowl.
15. Fit screw securing fan cowl to radiator.
16. Fit undertray.

## EXTERIOR FITTINGS, REPAIRS, Undertray - front.

17. Fit differential air flow panel and tighten bolts to 45 Nm (33 lbf.ft).
18. Remove stands and lower front end of vehicle.
19. Connect air intake hose.

## ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.

20. Fit air intake plenum.

## HEATING AND VENTILATION, REPAIRS, Plenum - air intake.

21. Connect battery earth lead.



## Engine mounting - RH

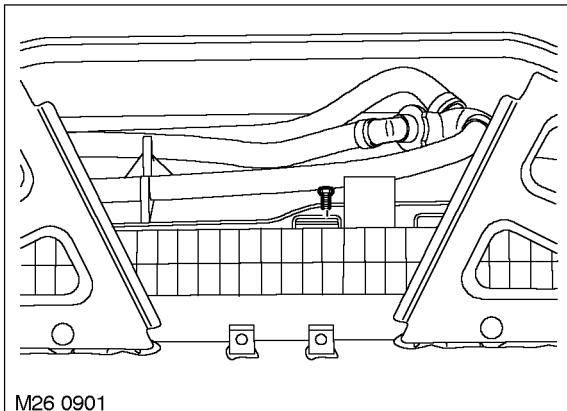
### » 12.45.12

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

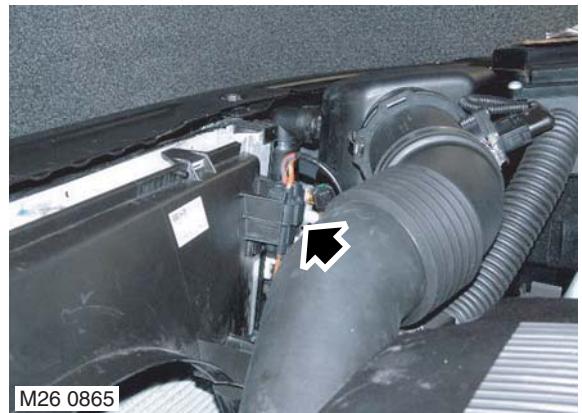
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
4. Remove air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
5. Remove undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**

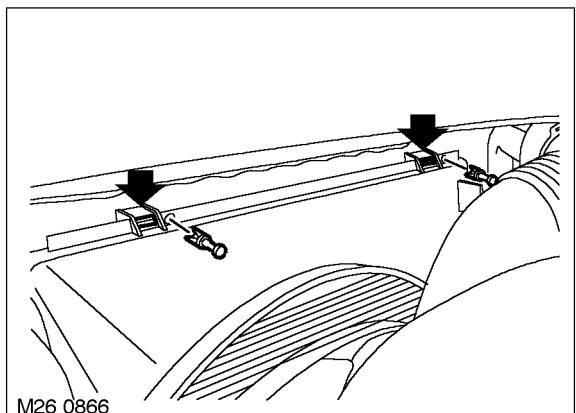


6. Remove screw securing fan cowl to radiator.

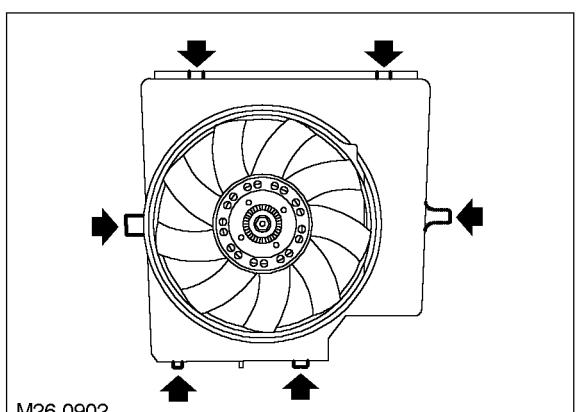


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7. Release auxiliary cooling fan multiplug from fan cowl.

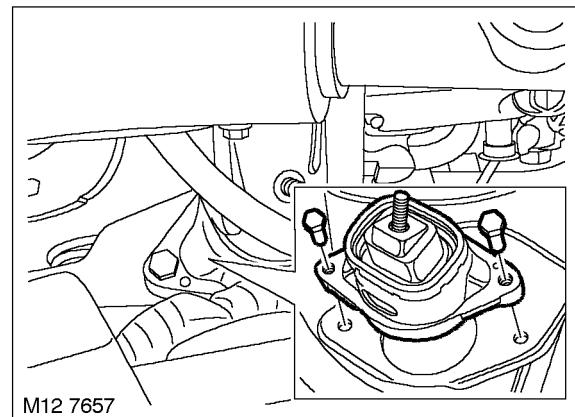
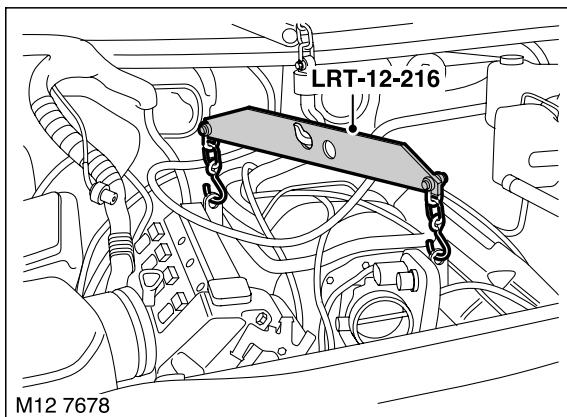


8. Remove screws securing fan cowl.

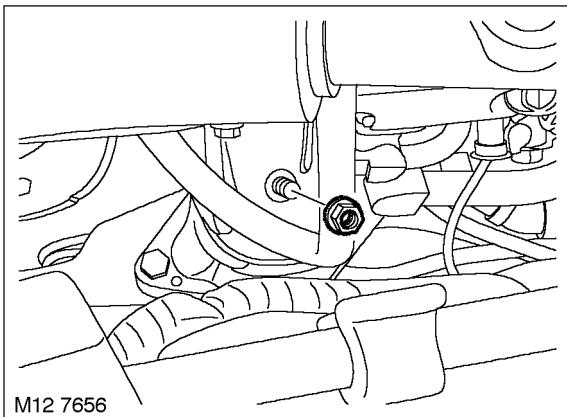


9. Release fan cowl from radiator.

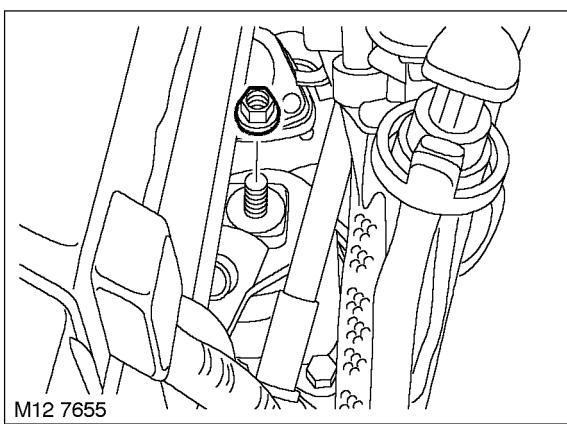
## ENGINE - V8



10. Fit LRT-12-216 to engine lifting eyes.



11. Remove nut securing RH engine mounting to engine mounting bracket.



12. Remove nut securing LH engine mounting to engine mounting bracket.
13. Connect chain to engine lifting bracket and raise engine sufficiently only to clear mounting.

**CAUTION: To prevent damage to the radiator, guide the fan cowl clear of the radiator as it is raised with the engine.**

14. Remove 2 bolts securing RH engine mounting to sub-frame, discard bolts.
15. Remove RH engine mounting.

*NOTE: The RH engine mounting is removed from underneath the vehicle between the gearbox bell housing and the sub-frame.*

### Refit

1. Clean engine mountings and mating faces.
2. Fit RH engine mounting to sub-frame and tighten new bolts to 56 Nm (41 lbf.ft).
3. Lower engine onto engine mountings.

*NOTE: Guide the fan cowl into position as the engine is lowered.*

4. Remove engine lifting chains.
5. Fit 2 nuts securing engine mountings to engine mounting brackets and tighten to 100 Nm (74 lbf.ft).
6. Remove engine lifting bracket.
7. Fit fan cowl to radiator and fit securing scrivets.
8. Fit auxiliary cooling fan multiplug to fan cowl.
9. Fit screw securing fan cowl to radiator.
10. Fit undertray.  
    ☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
11. Connect air intake hose.  
    ☞ **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
12. Fit air intake plenum.  
    ☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
13. Connect battery earth lead.



## Torque converter drive plate

### 12.53.13

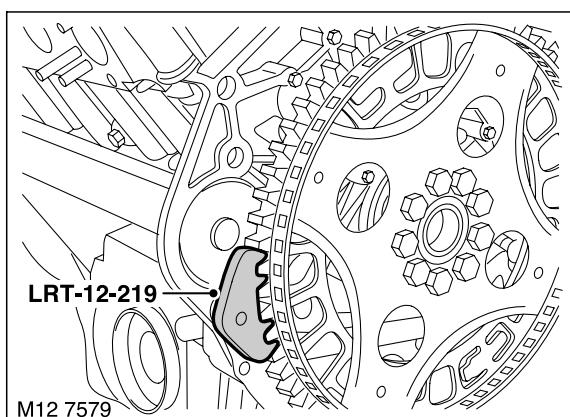
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

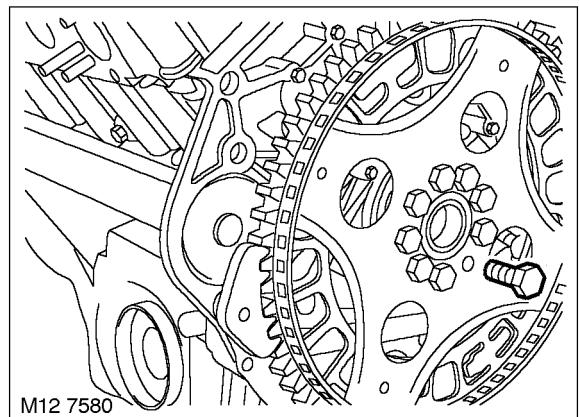
New drive plates do not have the hollow bush fitted. It is supplied with a new drive plate separately.

#### Remove

1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Remove gearbox and transfer gearbox assembly.
- AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gearbox/converter & transfer gearbox assembly - remove for access and refit.**



4. Position **LRT-12-219** to lock flywheel.



5. Reference mark the torque converter drive plate and crankshaft boss to aid fitment.  
*One of the drive plate fixing holes has a hollow bush fitted.*
6. Remove 9 bolts securing torque converter drive plate to crankshaft, discard the bolts.  
**Note the fitted position of the hollow bush.**
7. Remove torque converter drive plate and **LRT 12-219**.

#### Refit

1. If drive plate is to be replaced, ensure that the hollow bush, supplied with the replacement drive plate, is fitted into the same hole as on the original drive plate.
  2. Clean crankshaft bolt holes and torque converter drive plate dowel.
  3. Clean torque converter drive plate and mating face of crankshaft.
  4. Align reference marks, position torque converter drive plate to crankshaft and **LRT 12-219** to lock flywheel.  
**Ensure that the bushed hole in the drive plate is located onto the dowel.**
  5. Fit new bolts securing torque converter drive plate to crankshaft and tighten progressively to 120 Nm (89 lbf.ft).
  6. Remove **LRT-12-219** from flywheel.
  7. Refit gearbox and transfer gearbox assembly.
- AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gearbox/converter & transfer gearbox assembly - remove for access and refit.**
8. Connect battery earth lead.

# ENGINE - V8

## Filter - engine oil

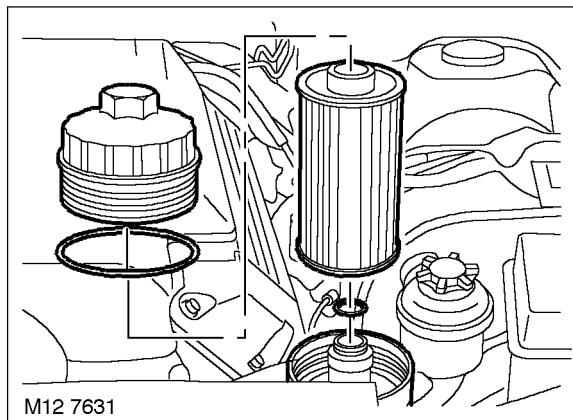
### » 12.60.04

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position absorbent cloth beneath oil filter housing to collect spillage.



2. Remove oil filter cap and filter element from oil filter housing. Remove oil filter element from oil filter cap. Discard filter element and 2 'O' rings.

### Refit

1. Clean oil filter cap and housing.
2. Fit 2 new oil filter 'O' rings and lubricate with clean engine oil.
3. Fit new oil filter element into oil filter cap.
4. Fit oil filter cap and tighten to 25 Nm (18 lbf.ft).
5. Remove absorbent cloth.
6. Clean oil filter cap and housing.
7. Remove engine oil dipstick.
8. Remove engine oil filler cap and fill engine to correct level.
9. Clean engine oil filler cap and mating face.
10. Fit engine oil filler cap.
11. Fit engine oil dipstick.
12. Start engine and run at idle speed until oil pressure warning light extinguishes.
13. Visually check oil filter cap for signs of leakage.
14. Stop engine, wait a few minutes, then check oil level. Top up if necessary.

## Tube - dipstick

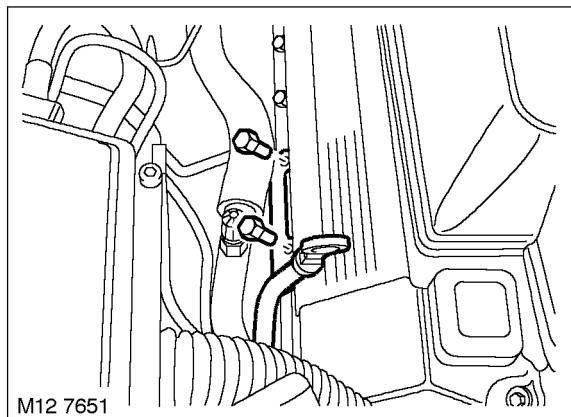
### » 12.60.09

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

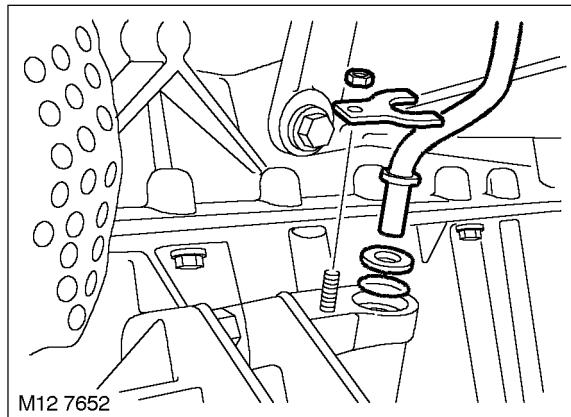
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove dipstick.



4. Remove 2 nuts securing dipstick tube bracket to camshaft cover.



5. Remove nut and clamp securing dipstick tube to oil sump.
6. Remove dipstick tube, washer and 'O' ring, discard 'O' ring.

**Refit**

1. Clean dipstick tube and mating faces in engine oil sump.
2. Fit new 'O' ring to oil sump and position dipstick tube and washer to oil sump.
3. Fit clamp securing dipstick tube to oil sump and tighten nut.
4. Fit and tighten 2 nuts securing dipstick tube bracket to camshaft cover.
5. Fit dipstick.
6. Check engine oil level, top-up if necessary.
7. Connect battery earth lead.

**Strainer - oil pick up**

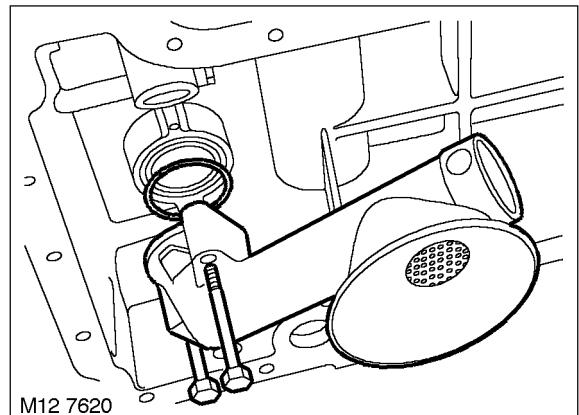
☞ **12.60.20**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

**Remove**

1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Remove lower oil sump.
- Engine - V8, REPAIRS, Gasket - lower oil sump.**



4. Remove 2 bolts securing oil pick-up strainer to oil pump, remove strainer and discard 'O' ring.

**Refit**

1. Clean oil pick up strainer and mating faces.
  2. Fit new 'O' ring to oil pump groove location, position oil pick-up strainer to oil pump.
  3. Fit and tighten 2 bolts securing oil pick-up strainer to oil pump.
  4. Fit lower oil sump.
- Engine - V8, REPAIRS, Gasket - lower oil sump.**
5. Connect battery earth lead.

# ENGINE - V8

## Pump - oil

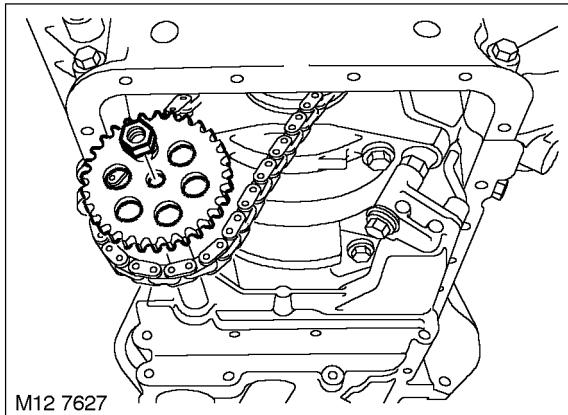
### 12.60.26

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

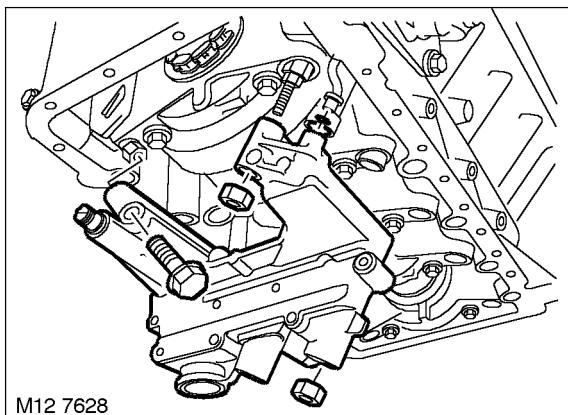
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove engine upper oil sump.  
 **Engine - V8, REPAIRS, Gasket - oil sump.**



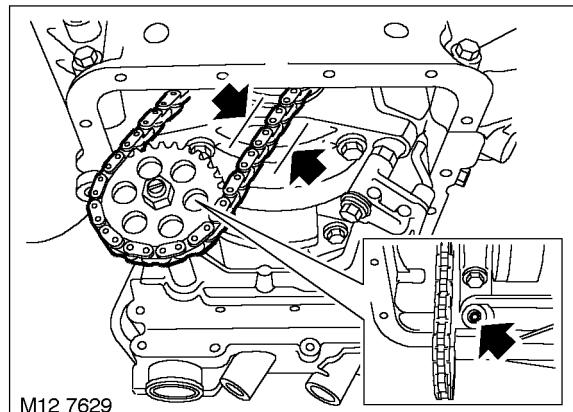
4. Remove nut securing sprocket to oil pump and remove sprocket.



5. Remove 2 nuts and 1 bolt securing oil pump to engine and remove oil pump.
6. Discard 'O' rings from oil pump and oil pipe.

### Refit

1. Clean oil pipes to oil pump mating faces, fit new 'O' ring seals and lubricate with clean engine oil.
2. Position oil pump to 2 oil pipes and engine, fit and tighten 2 nuts securing oil pump to engine.
3. Position sprocket to oil pump chain and fit sprocket to oil pump.
4. Fit and tighten nut securing sprocket to oil pump.



5. Adjust Allen bolt spacer to adjust oil pump chain deflection to between 8 mm (0.314 in) and 12 mm (0.470 in).  
*NOTE: The oil pump chain is adjusted by turning the Allen bolt spacer which is accessed through the oil pump securing bolt hole.*
6. Fit and tighten bolt securing oil pump to engine.
7. Fit engine upper oil sump.  
 **Engine - V8, REPAIRS, Gasket - oil sump.**
8. Connect battery earth lead.



## Gasket - lower oil sump

☞ 12.60.37

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

### Remove

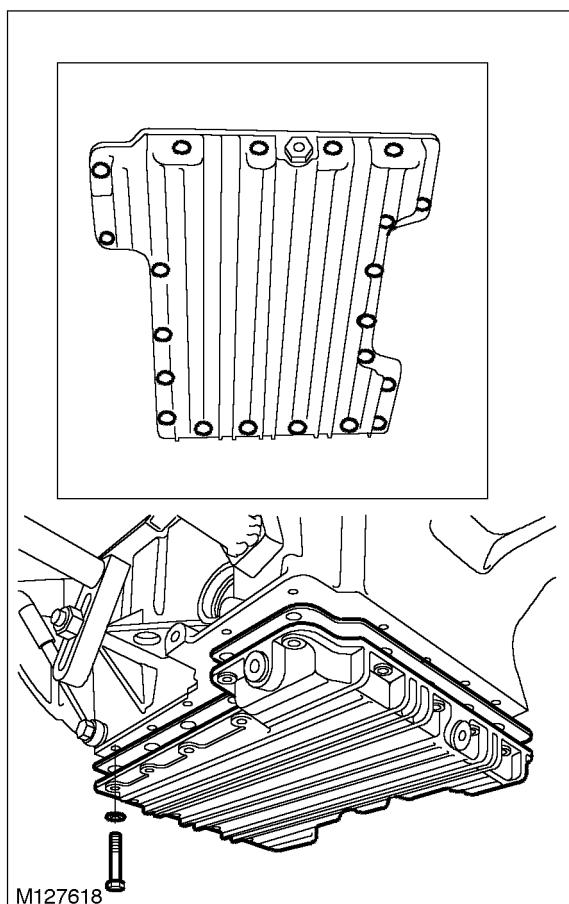
1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Drain engine oil.
- MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**

### Refit

1. Clean lower oil sump mating faces.
2. Fit new gasket to lower oil sump mating face.
3. Fit lower oil sump.
4. Fit 21 bolts securing lower oil sump and tighten to 10 Nm (7 lbf.ft).
5. Fill engine with oil.

**MAINTENANCE, PROCEDURES, Engine oil and filter - V8 engine.**

6. Connect battery earth lead.



4. Remove 21 bolts securing lower oil sump to upper oil sump. Remove lower oil sump and discard gasket.

# ENGINE - V8

## Gasket - oil sump

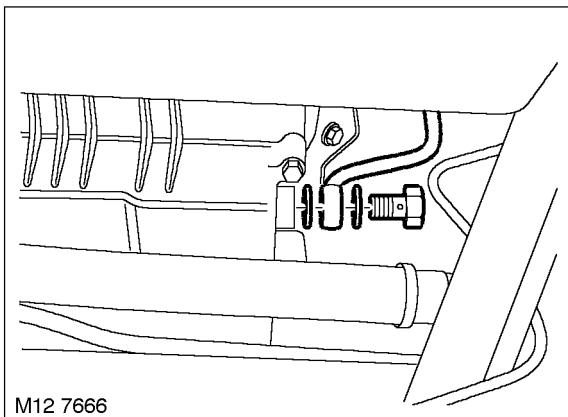
### 12.60.38

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

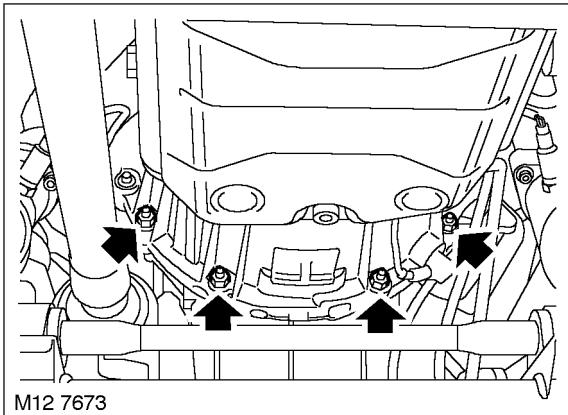
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

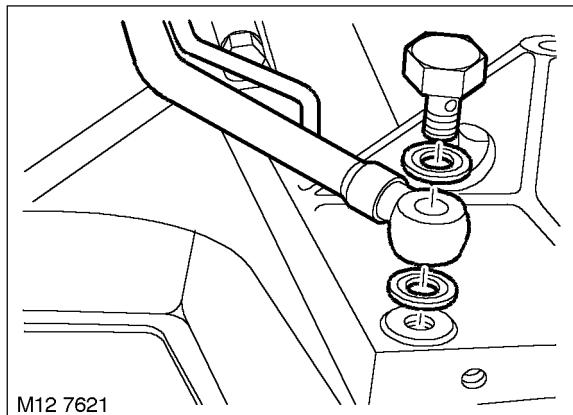
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove dipstick tube.  
 **Engine - V8, REPAIRS, Tube - dipstick.**
4. Remove PAS pump.  
 **STEERING, REPAIRS, Pump - power steering - V8.**
5. Remove differential.  
 **FRONT DIFFERENTIAL, REPAIRS, Differential assembly - V8.**
6. Remove oil pick-up strainer.  
 **Engine - V8, REPAIRS, Strainer - oil pick up.**



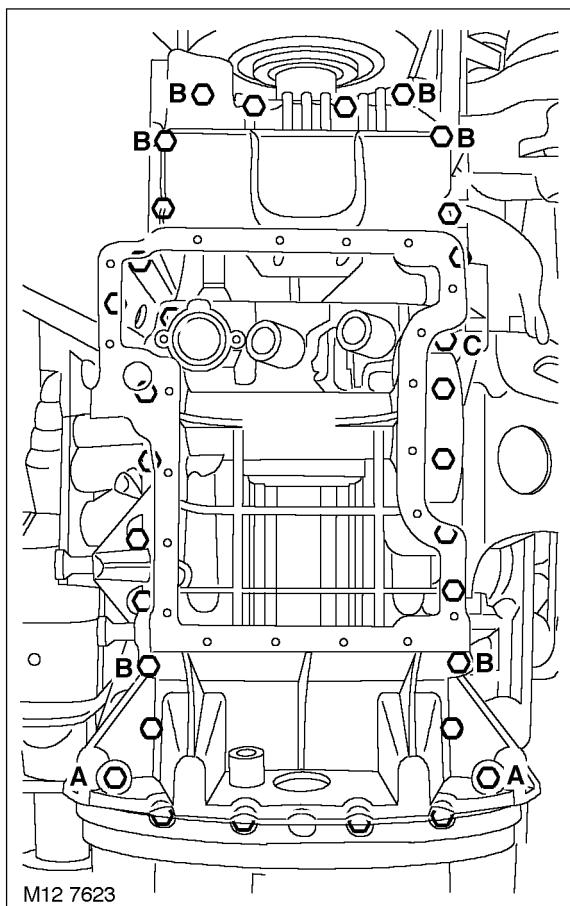
8. Remove banjo bolt securing engine oil filter return pipe to oil sump and discard 2 sealing washers.



9. Remove 4 Torx bolts securing oil sump to bell housing.



7. Remove banjo bolt securing engine oil return pipe to oil sump and discard 2 sealing washers.



4. Fit 4 Torx bolts securing oil sump to bell housing and tighten to 53 Nm (39 lbf.ft)
  5. Fit 2 new sealing washers, fit banjo bolt securing engine oil filter return pipe to oil sump and tighten to 30 Nm (22 lbf.ft).
  6. Fit differential.
- FRONT DIFFERENTIAL, REPAIRS, Differential assembly - V8.**
7. Fit oil pick-up strainer.

**Engine - V8, REPAIRS, Strainer - oil pick up.**

  8. Fit PAS pump.

**STEERING, REPAIRS, Pump - power steering - V8.**

  9. Fit dipstick tube.

**Engine - V8, REPAIRS, Tube - dipstick.**

  10. Connect battery earth lead.

10. Remove 31 bolts securing oil sump to engine cylinder block, note position of bolts as lengths vary.
  - A=M8 x 60 mm
  - B=M6 x 80 mm
  - C=M6 x 40 mm
  - All remaining bolts are M6 x 20 mm
11. Remove oil sump and discard gasket.

#### Refit

1. Clean oil sump and gasket mating faces.
2. Fit new gasket to sump, position sump to cylinder block, fit bolts but do not tighten at this stage.
3. Tighten 31 bolts securing upper oil sump to cylinder block, M6 x 8.8 mm to 10 Nm (7 lbf.ft), M6 x 10.9 mm to 12 Nm (9 lbf.ft) and M8 x 8.8 mm to 22 Nm (16 lbf.ft).

*NOTE: Note position of 6 mm bolts as they are two different lengths.*

# ENGINE - V8

## Baffle Plate

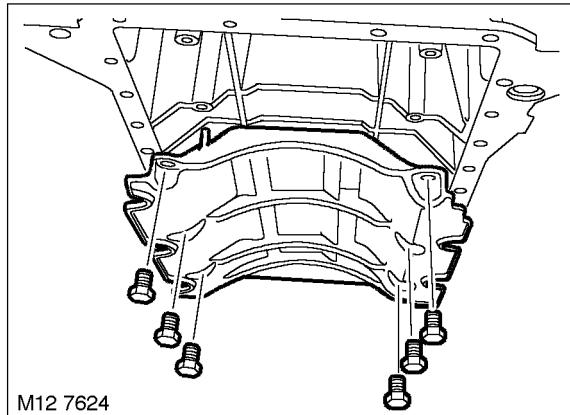
### 12.60.46

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove engine oil sump.  
 **Engine - V8, REPAIRS, Gasket - oil sump.**



4. Remove 6 bolts securing baffle plate and remove plate.

### Refit

1. Fit baffle plate and tighten bolts to 10 Nm (7 lbf.ft).
2. Fit engine oil sump.  
 **Engine - V8, REPAIRS, Gasket - oil sump.**
3. Connect battery earth lead.

## Switch - oil pressure

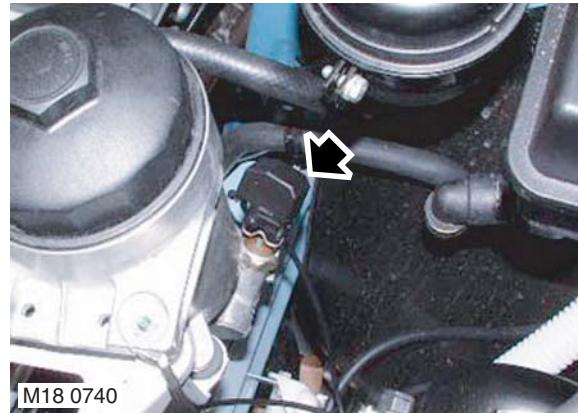
### 12.60.50

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

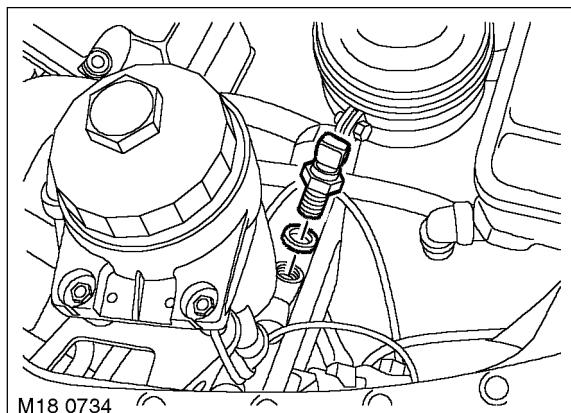
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from oil pressure switch.
3. Position absorbent cloth beneath oil filter housing to collect spillage.



4. Remove oil pressure switch from oil filter housing and discard sealing washer.

**Refit**

1. Clean oil pressure switch and oil filter housing mating faces.
2. Fit new sealing washer to oil pressure switch.
3. Fit oil pressure switch and tighten to 27 Nm (20 lbf.ft).
4. Connect multiplug to oil pressure switch.
5. Remove absorbent cloth.
6. Connect battery earth lead.
7. Connect exhaust extractor to tail pipes.
8. Start engine and run at idle speed until oil pressure warning light extinguishes.
9. Check for leaks from oil pressure switch.
10. Stop engine, wait a few minutes, then check oil level. Top up if necessary.
11. Disconnect exhaust extractor from tail pipes.

**Timing chain - includes align gears**

☞ **12.65.14**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

**Remove**

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove LH VCC unit.  
 **Engine - V8, REPAIRS, Variable camshaft unit - variable camshaft control (VCC) - LH.**
5. Remove lower timing gear cover.  
 **Engine - V8, REPAIRS, Cover - timing gear - lower.**
6. Remove timing chain.

**Refit**

1. Clean timing chain guides and sprockets.
2. Check timing chain guides and sprockets for excessive wear.
3. Lubricate timing chain with clean engine oil.
4. Fit timing chain to crankshaft sprocket and RH VCC unit.

*NOTE: The timing chain may be fitted in any position to the crankshaft sprocket and RH VCC unit sprocket.*

5. Secure timing chain to LH cylinder head until LH VCC unit is fitted.
6. Fit lower timing gear cover.  
 **Engine - V8, REPAIRS, Cover - timing gear - lower.**
7. Fit LH VCC unit.  
 **Engine - V8, REPAIRS, Variable camshaft unit - variable camshaft control (VCC) - LH.**
8. Fill cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
9. Connect battery earth lead.

# ENGINE - V8

## Cover - timing gear - upper - RH

☛ 12.65.39

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

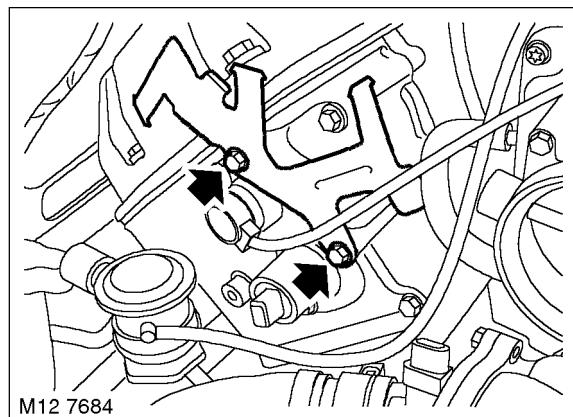
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

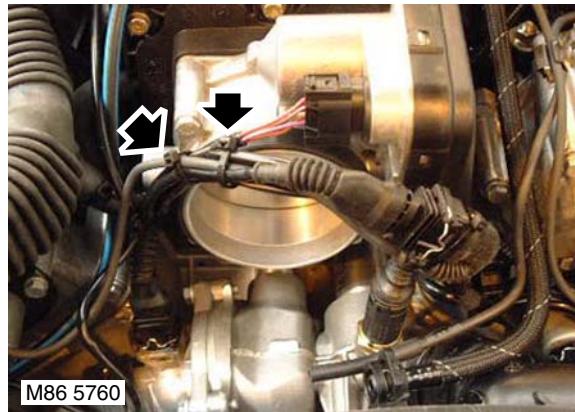
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove fan cowl.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**



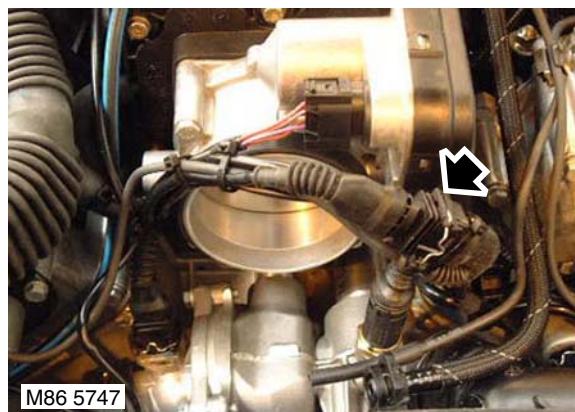
5. Release engine harness from bracket on RH upper timing gear cover.



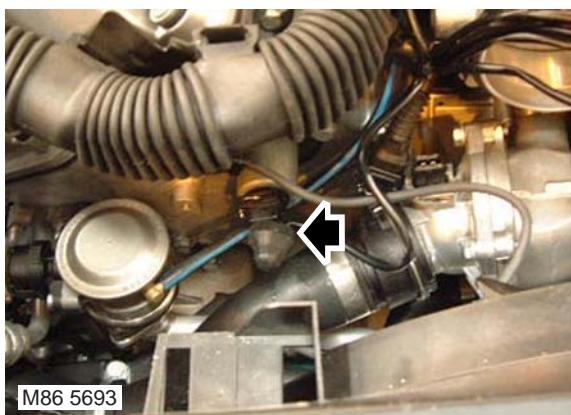
6. Remove 2 bolts securing engine harness bracket to RH timing gear cover and remove bracket.



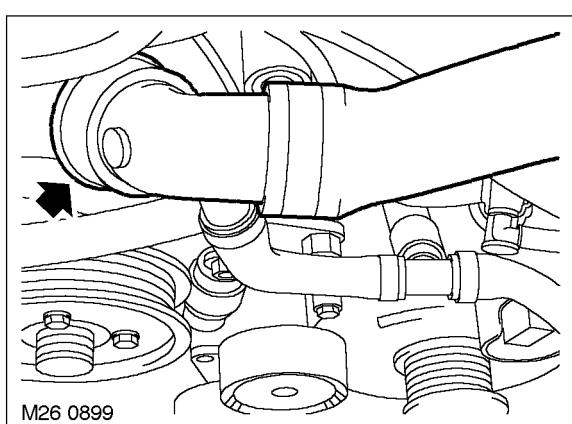
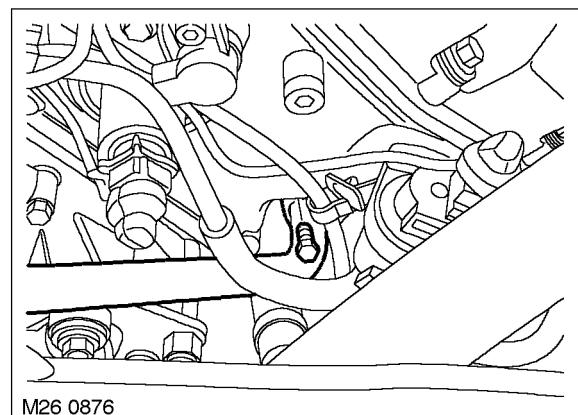
7. Cut 3 cable ties to release CMP sensor harness.



8. Disconnect multiplug from CMP sensor.

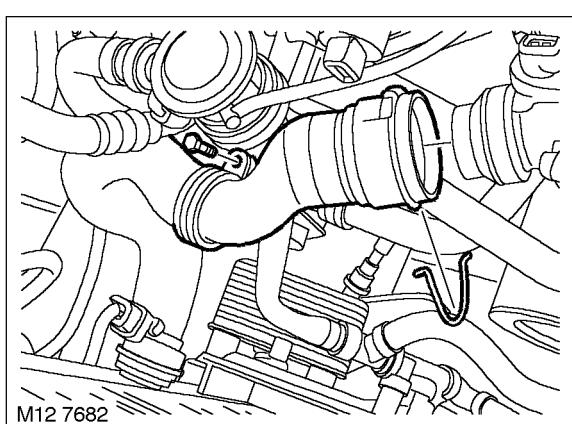
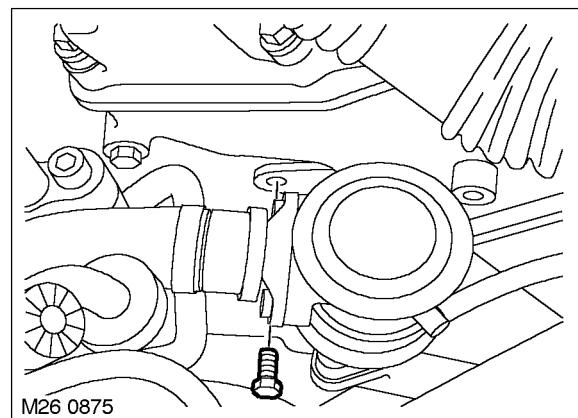


9. Disconnect multiplug from VCC solenoid.
10. Remove RH camshaft cover.  
**☞ Engine - V8, REPAIRS, Gasket - camshaft cover - RH.**



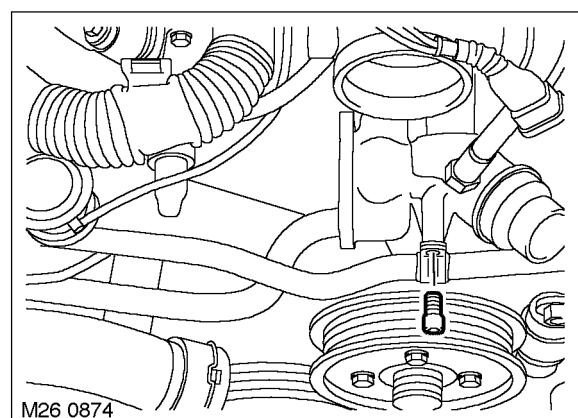
11. Release clip and disconnect coolant hose from coolant pump.

13. Remove bolt securing SAI pipe to LH cylinder head.



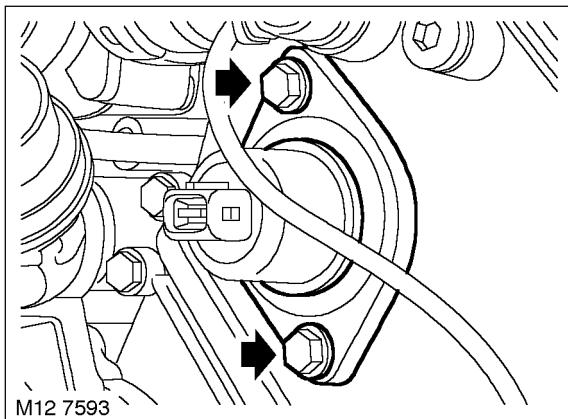
12. Release clip, disconnect radiator bottom hose from thermostat housing and remove bolt securing 'P' clip.

14. Remove bolt securing SAI pipe to RH cylinder head.

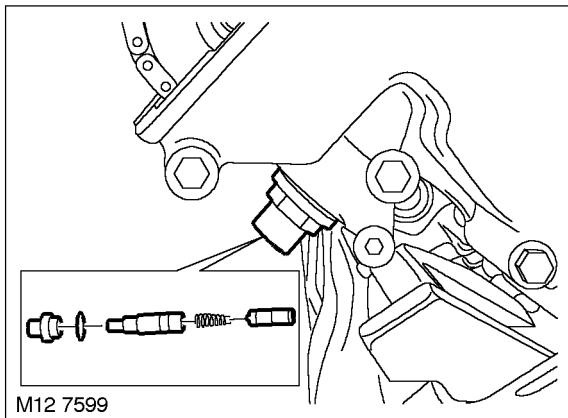


15. Remove Allen bolt securing secondary air injection (SAI) pipe clip to coolant pump.
16. Release SAI pipe from cylinder heads and position aside. Discard 'O' rings.

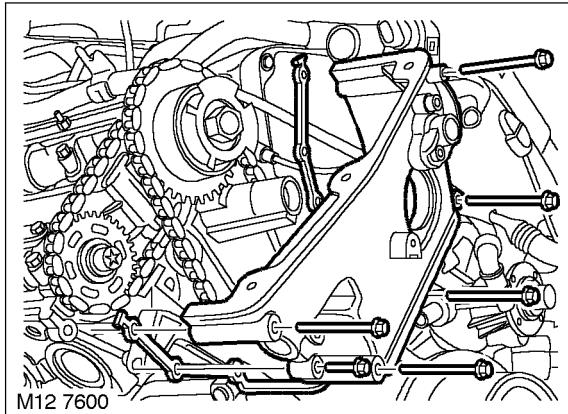
## ENGINE - V8



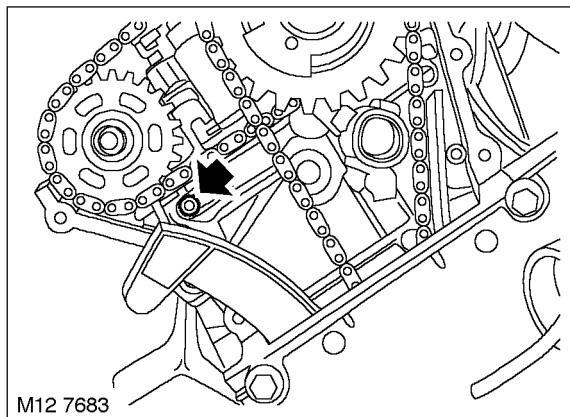
17. Remove 2 bolts securing VCC solenoid seal and remove seal.



18. Remove chain tensioner from timing gear cover and discard sealing washer. Separate oil tensioner body and allow oil to drain.



19. Remove 6 bolts securing timing gear cover to cylinder head and remove timing gear cover.
20. Discard timing gear cover gasket.

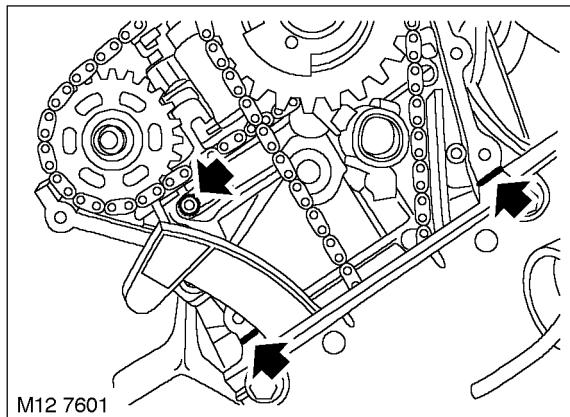


21. Discard timing chain tensioner 'O' ring.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*

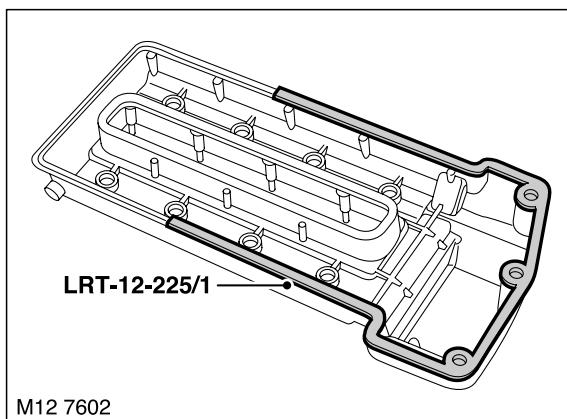
22. Remove bolt securing CMP sensor and remove sensor.
23. Discard 'O' ring.

### Refit

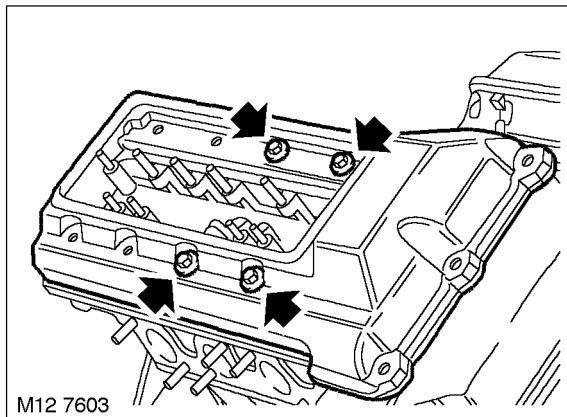
1. Clean CMP sensor and mating face.
2. Fit new 'O' ring to CMP sensor.
3. Fit CMP sensor, fit bolt and tighten to 10 Nm (7 lbf.ft).
4. Clean timing gear cover and mating face, clean dowels and dowel holes.
5. Fit new timing gear cover gasket.



6. Fit new chain tensioner 'O' ring and apply sealant, Part No. STC 50550 to areas illustrated.
7. Fit timing cover, fit and hand tighten 6 bolts.



8. Fit LRT-12-225/1 to RH camshaft cover.



9. Fit camshaft cover and tool, fit 4 bolts and tighten to 10 Nm (7 lbf.ft).
10. Tighten bolts securing timing gear cover to 15 Nm (11 lbf.ft).
11. Remove 4 bolts securing camshaft cover, remove camshaft cover and LRT-12-225/1.
12. Fit new sealing washer, fit timing chain tensioner and tighten plug securing chain tensioner to 40 Nm (30 lbf.ft).
13. Clean VCC solenoid, VCC solenoid seal and mating faces.
14. Lubricate inner mating face of VCC solenoid seal.
15. Fit VCC solenoid seal, fit bolts and tighten.
16. Fit 2 new 'O' rings to SAI pipe and position SAI pipe to engine. Fit and tighten 3 bolts securing SAI pipe to engine.

17. Connect 2 coolant hoses to coolant pump and secure with clips.
18. Fit RH camshaft cover.  
☞ **Engine - V8, REPAIRS, Gasket - camshaft cover - RH.**
19. Connect multiplug to VCC solenoid.
20. Connect multiplug to CMP sensor.
21. Secure CMP sensor harness with 3 cable ties.
22. Fit engine harness bracket to engine harness, fit and tighten 2 bolts.
23. Fit fan cowl.  
☞ **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
24. Fill cooling system.  
☞ **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
25. Connect battery earth lead.

# ENGINE - V8

## Cover - timing gear - upper - LH

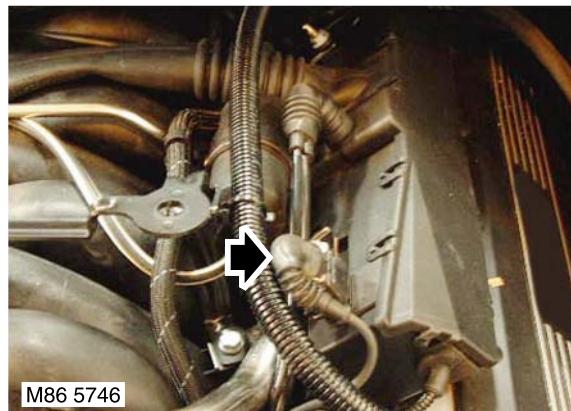
### → 12.65.41

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

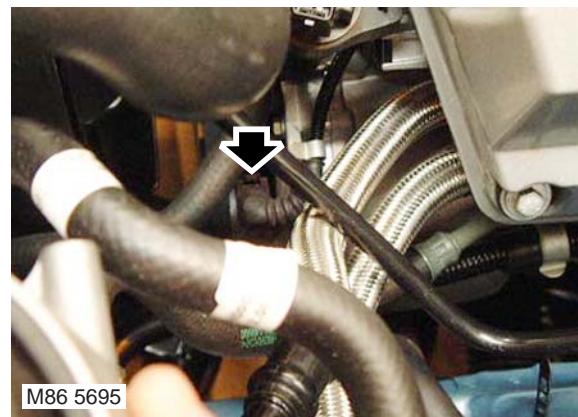
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

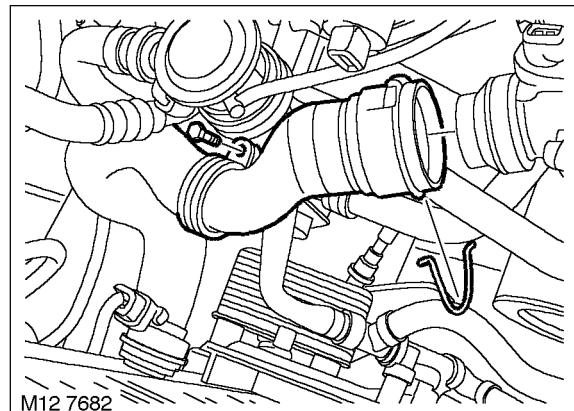
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove fan cowl.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
5. Remove charcoal canister purge solenoid valve.  
 **EMISSION CONTROL - V8, REPAIRS, Solenoid - canister purge.**
6. Release CMP sensor harness from clip and release clip from timing gear cover.



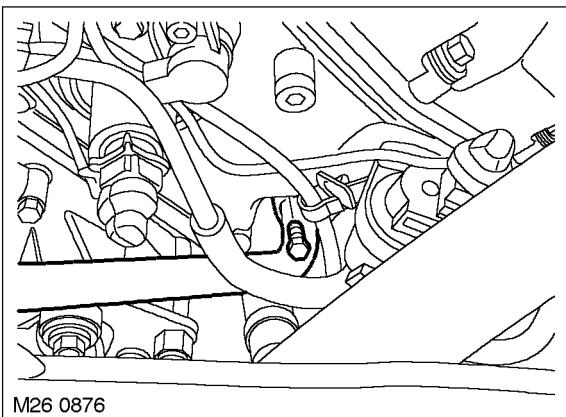
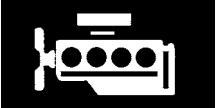
7. Disconnect multiplug from CMP sensor.
8. Release fuel vapour pipe from bracket on timing gear cover.



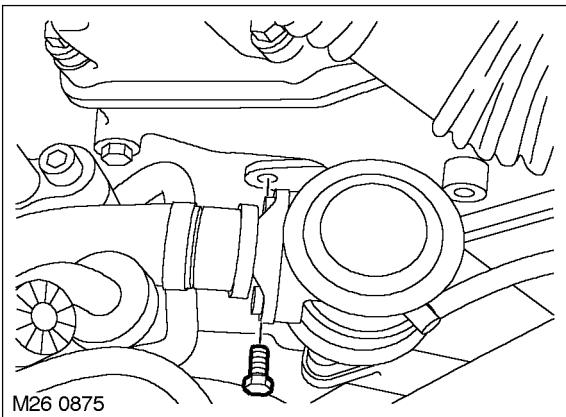
9. Disconnect multiplug from alternator.
10. Release alternator harness from 3 clips.
11. Remove LH camshaft cover.  
 **Engine - V8, REPAIRS, Gasket - camshaft cover - LH.**
12. Remove LH VCC solenoid valve.  
 **Engine - V8, REPAIRS, Control solenoid - variable camshaft control (VCC) - LH.**
13. Release clip and disconnect coolant hose from alternator.



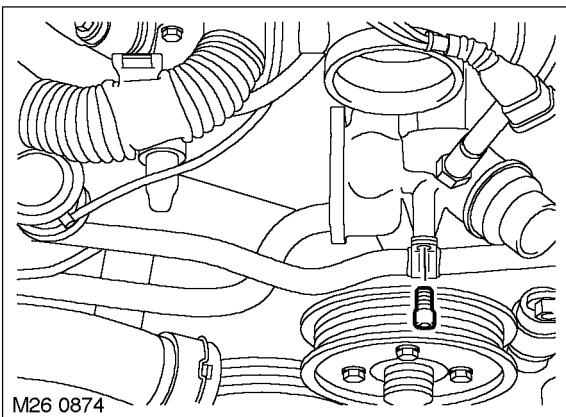
14. Release clip, disconnect radiator bottom hose from thermostat housing and remove bolt securing 'P' clip.



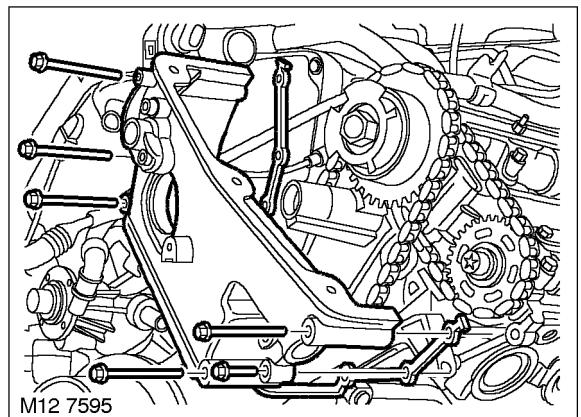
15. Remove bolt securing SAI pipe to LH cylinder head.



16. Remove bolt securing SAI pipe to RH cylinder head.



17. Remove Allen bolt securing secondary air injection (SAI) pipe clip to coolant pump.
18. Release SAI pipe from cylinder heads and position aside. Discard 'O' rings.



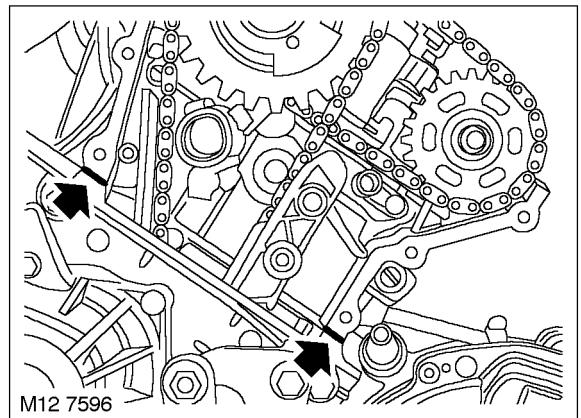
19. Remove 6 bolts securing timing gear cover to cylinder head and remove timing gear cover.
20. Discard timing gear cover gasket.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

21. Remove 2 bolts securing 2 brackets to upper timing gear cover and remove brackets.
22. Remove bolt securing CMP sensor and remove sensor.
23. Discard 'O' ring.

#### Refit

1. Clean CMP sensor and mating face.
2. Fit new 'O' ring to CMP sensor.
3. Fit CMP sensor, fit bolt and tighten to 10 Nm (7 lbf.ft).
4. Position 2 brackets to timing gear cover, fit bolts and tighten.
5. Clean timing gear cover and mating face, clean dowels and dowel holes.
6. Fit new timing gear cover gasket.



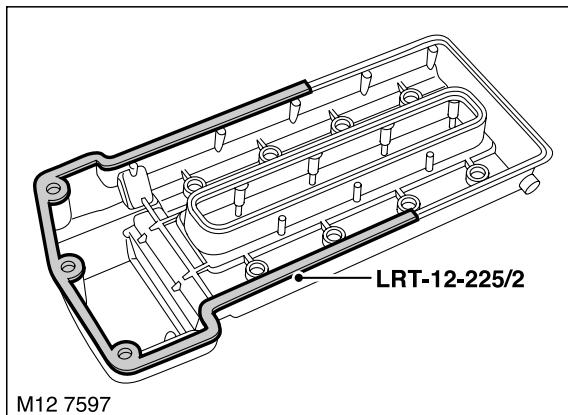
7. Apply sealant, Part No. STC 50550 to areas illustrated.

## ENGINE - V8

8. Fit RH lower bolt to timing gear cover and position cover to cylinder head.

*NOTE: It is not possible to fit the RH lower bolt after fitting the LH upper timing gear cover.*

9. Fit remaining 5 bolts and hand tighten 6 bolts securing timing cover.



18. Fit LH camshaft cover.

**Engine - V8, REPAIRS, Gasket - camshaft cover - LH.**

19. Connect multiplug to alternator and secure alternator harness to 3 clips.

20. Secure fuel vapour pipe to bracket on timing gear cover.

21. Connect multiplug to CMP sensor.

22. Secure CMP sensor harness to clip and secure clip to timing gear cover.

23. Fit fan cowl.

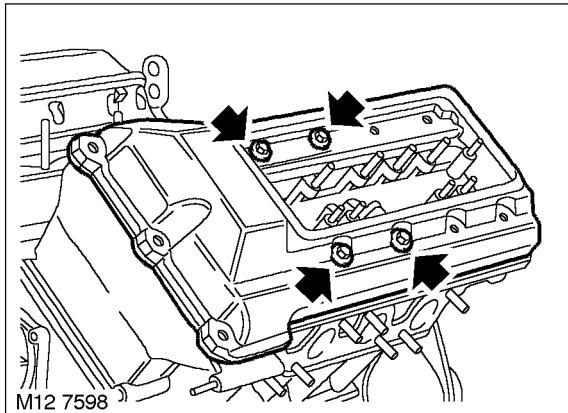
**COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**

24. Fill cooling system.

**COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

25. Connect battery earth lead.

10. Fit **LRT-12-225/2** to LH camshaft cover.



11. Fit camshaft cover and tool, fit 4 bolts and tighten to 10 Nm (7 lbf.ft).
12. Tighten bolts securing timing gear cover to 15 Nm (11 lbf.ft).
13. Remove 4 bolts securing camshaft cover, remove camshaft cover and **LRT-12-225/2**.
14. Fit 2 new 'O' rings to SAI pipe and position SAI pipe to engine. Fit and tighten 3 bolts securing SAI pipe to engine.
15. Fit bolt securing radiator lower coolant hose 'P' clip to bracket and tighten.
16. Connect coolant hose to alternator and secure with clip.
17. Fit LH VCC solenoid valve.

**Engine - V8, REPAIRS, Control solenoid - variable camshaft control (VCC) - LH.**



## Cover - timing gear - lower

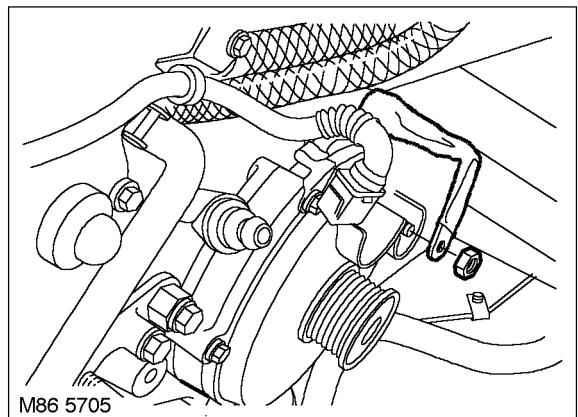
### » 12.65.43

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

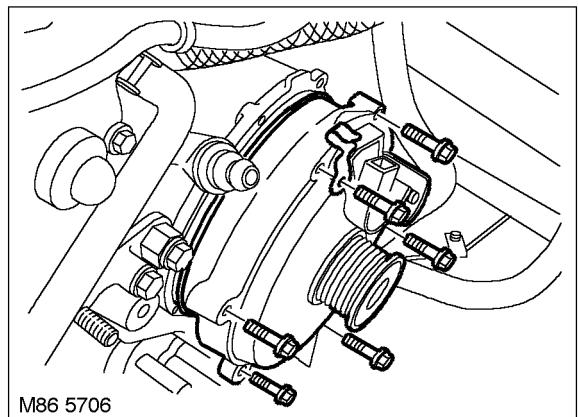
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

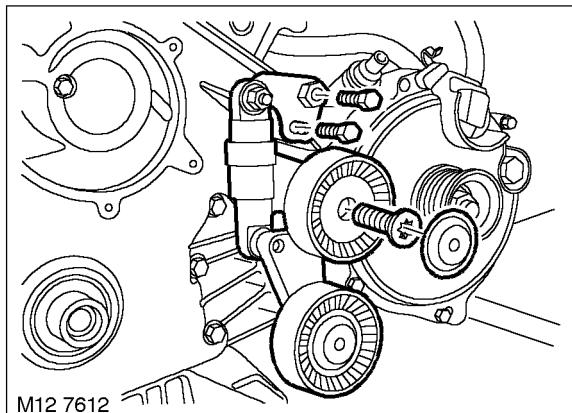
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove coolant pump.  
 **COOLING SYSTEM - V8, REPAIRS, Gasket - coolant pump.**
4. Remove LH upper timing gear cover.  
 **Engine - V8, REPAIRS, Cover - timing gear - upper - LH.**
5. Remove RH upper timing gear cover.  
 **Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**
6. Remove crankshaft front oil seal.  
 **Engine - V8, REPAIRS, Oil seal - crankshaft - front.**



10. Remove nut and disconnect battery cable from alternator.
11. Release battery cable from lower timing gear cover.

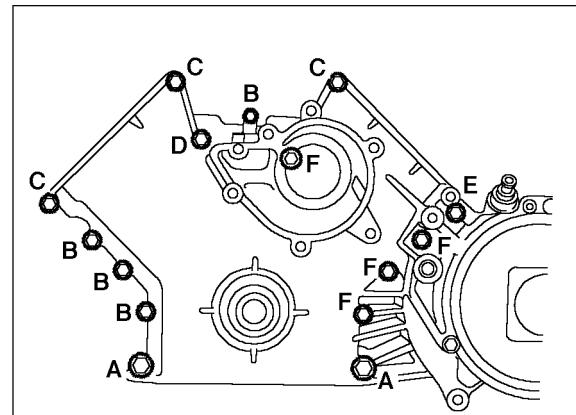
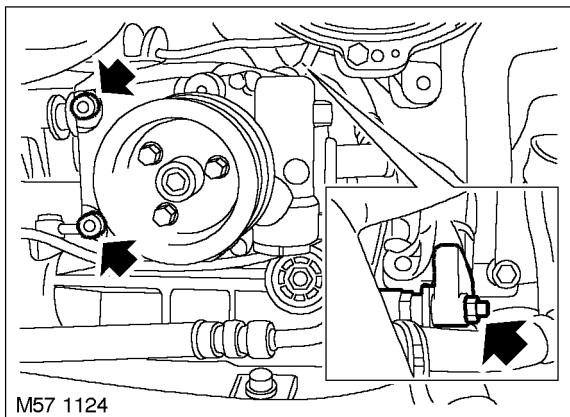


12. Remove 6 alternator securing bolts and alternator harness securing clip.
13. Release and remove alternator from engine timing cover.
14. Discard alternator 'O' ring.

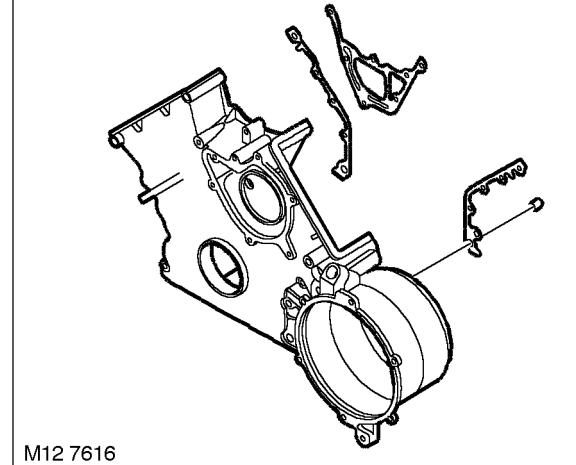
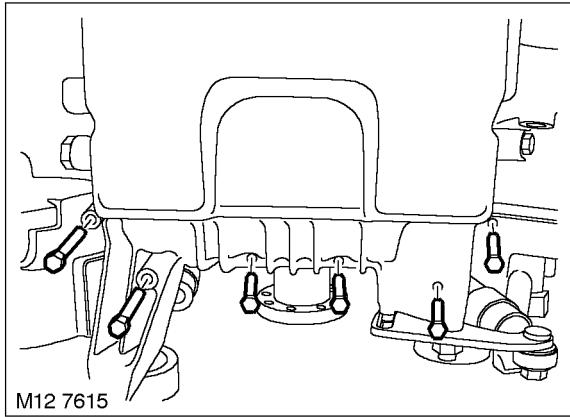


7. Remove 2 bolts securing ancillary drive belt tensioner to lower timing gear cover.
8. Remove dust cap from ancillary drive belt tensioner idler pulley and remove Torx bolt securing ancillary drive belt tensioner idler pulley.
9. Remove ancillary drive belt tensioner assembly.

## ENGINE - V8



15. Remove 2 Allen bolts and 1 nut securing PAS pump and move aside.



16. Remove 6 bolts securing lower timing gear cover to upper sump.

17. Remove 15 bolts securing lower timing gear cover to cylinder block.

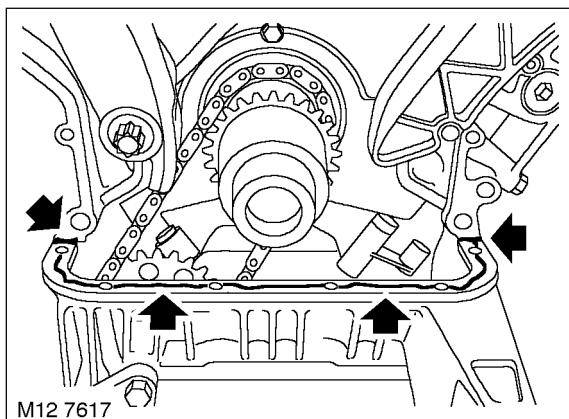
- A = M8 X 75 mm
- B = M6 X 40 mm
- C = M6 X 85 mm
- D = M6 X 80 mm
- E = M8 X 90 mm
- F = M6 X 60 mm

*NOTE: Note position of all securing bolts.*

18. Remove lower timing gear cover.  
19. Discard 3 lower timing gear cover gaskets.

### Refit

1. Clean timing gear cover and mating faces, clean dowels and dowel holes.



2. Apply sealant, Part No. STC 50550 to areas illustrated.
  3. Fit 3 new lower timing gear cover gaskets.
  4. Fit lower timing gear cover.
  5. Fit 15 bolts securing lower timing gear cover to cylinder block and initially tighten to 5 Nm (4 lbf.ft).
  6. Tighten 6 mm bolts securing lower timing gear cover to 10 Nm (7 lbf.ft) and 8 mm bolts securing lower timing gear cover to 22 Nm (16 lbf.ft).
- CAUTION: Check torque of all bolts once they have been tightened down.**
7. Fit 6 bolts securing lower timing gear cover to upper oil sump and tighten to 12 Nm (9 lbf.ft).
  8. Position PAS pump to mounting and fit Allen bolts and securing nut. Tighten Allen bolts to 10 Nm (7 lbf.ft) and securing nut to 25 Nm (18 lbf.ft).
  9. Clean alternator and engine timing gear cover mating face.
  10. Lubricate and fit new 'O' ring to alternator.
  11. Fit alternator and tighten securing bolts.
  12. Secure battery cable to lower timing gear cover.
  13. Connect battery lead to alternator and tighten nut securing battery lead to alternator to 13 Nm (10 lbf.ft).
  14. Fit ancillary drive belt tensioner assembly, fit Torx bolt securing ancillary drive belt tensioner idler pulley and tighten Torx bolt.
  15. Fit dust cap to ancillary drive belt tensioner idler pulley.

16. Fit 2 bolts securing ancillary drive belt tensioner to timing gear cover but do not tighten at this stage.
17. Fit crankshaft front oil seal.  
☞ **Engine - V8, REPAIRS, Oil seal - crankshaft - front.**
18. Fit RH upper timing gear cover.  
☞ **Engine - V8, REPAIRS, Cover - timing gear - upper - RH.**
19. Fit LH upper timing gear cover.  
☞ **Engine - V8, REPAIRS, Cover - timing gear - upper - LH.**
20. Fit coolant pump.  
☞ **COOLING SYSTEM - V8, REPAIRS, Gasket - coolant pump.**
21. Connect battery earth lead.

## **ENGINE - V8**

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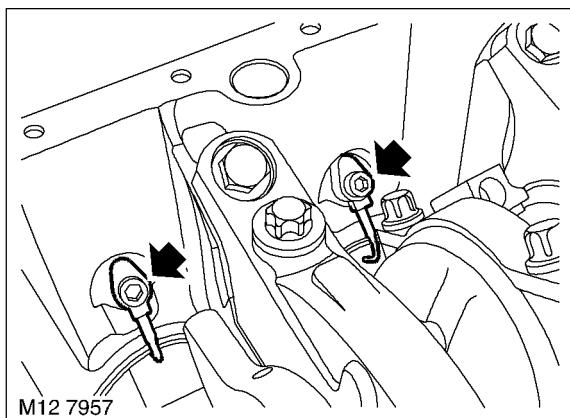


## Piston assemblies - engine set

### 12.17.03.01

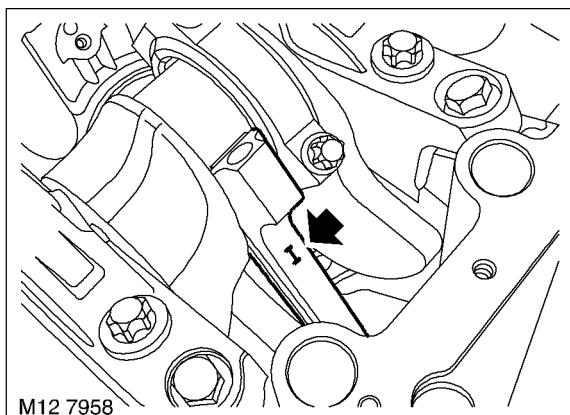
#### Remove

1. Remove cylinder head gaskets.  
☞ **Engine - V8, OVERHAUL, Gasket - cylinder head.**
2. Remove connecting rod bearings.  
☞ **Engine - V8, OVERHAUL, Bearings - connecting rods - engine set.**

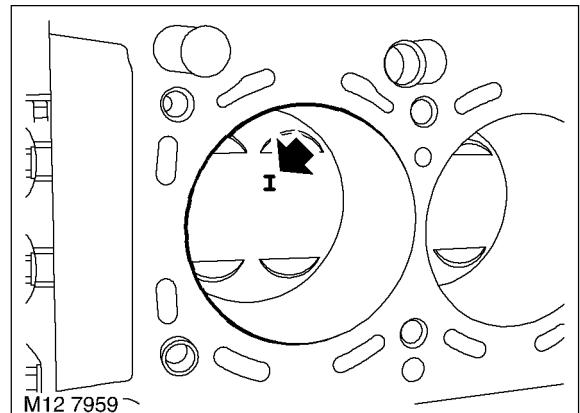


3. With a socket and bar fitted to crankshaft pulley bolt, rotate crankshaft for access to the lubrication jets.
4. Remove Allen screws securing lubrication jets and remove the jets.

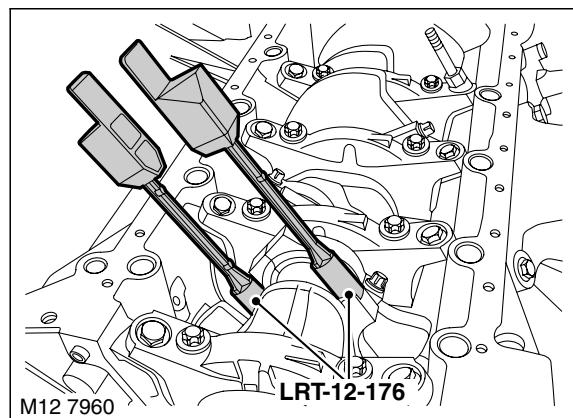
#### Disassembly



1. Mark connecting rod relative to its fitted position to aid reassembly.

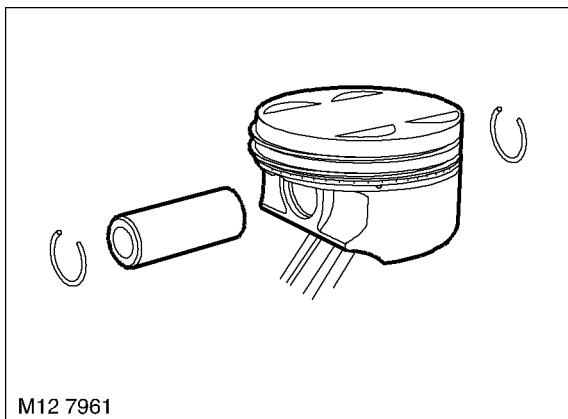


2. Mark piston relative to its fitted position to aid reassembly.

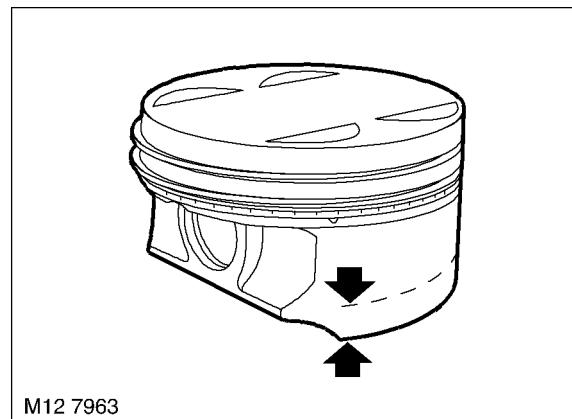


3. Fit guides **LRT-12-176** to connecting rod to protect cylinder bore and crankshaft journals.
4. Remove ridge of carbon from top of cylinder bore.
5. Carefully push piston assembly from cylinder bore.
6. Remove guides **LRT-12-176** from connecting rod.

## ENGINE - V8



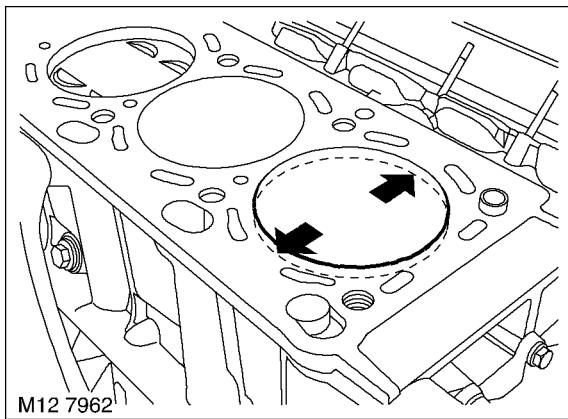
M12 7961



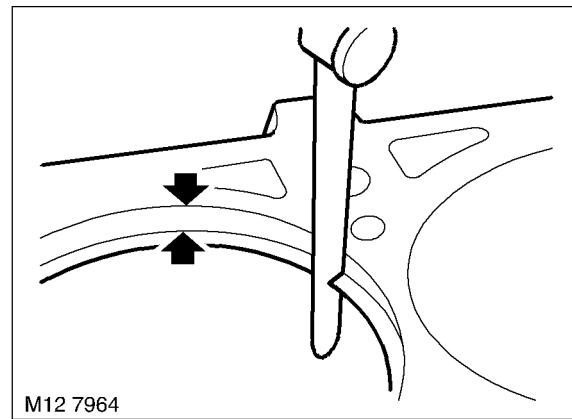
M12 7963

7. Hold connecting rods in a soft jawed vice.
8. Carefully remove and discard 2 retaining rings securing the gudgeon pin in the piston.
9. Push the gudgeon pin out of the piston and connecting rod, remove the piston.
10. Repeat for the 7 remaining pistons.

### Inspect



M12 7962



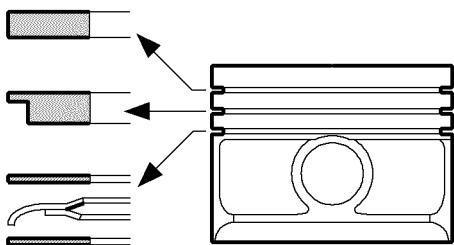
M12 7964

1. Clean cylinder bores, pistons, piston rings connecting rods and gudgeon pins.
2. *Pistons and cylinder bores:* check and record cylinder bore diameters at bottom, centre and top of bore ensuring that measurements are taken at the angle shown.
3. Repeat procedure at angle shown and from the 2 sets of measurements obtained, calculate cylinder bore ovality and taper.

**GENERAL DATA, Engine - V8.**

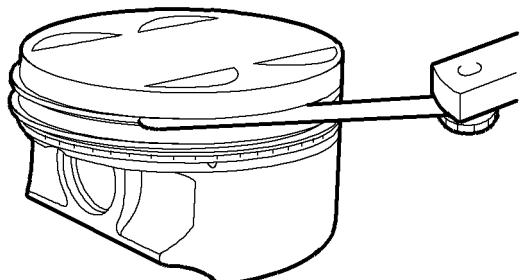
7. Check new ring fitted gap 30 mm from top of bore. Ensure rings are fitted square to bore when checking gap.

**GENERAL DATA, Engine - V8.**



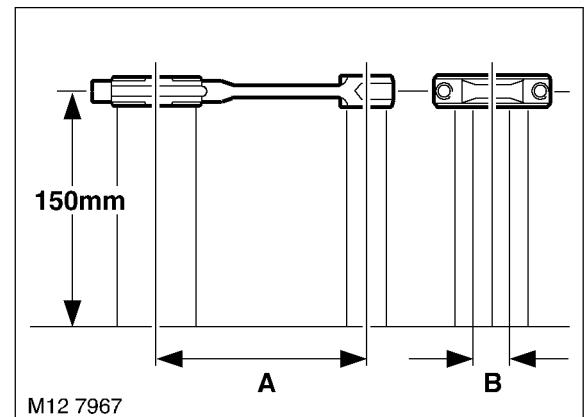
M12 7965

8. Fit oil control ring rails and expander, ensuring ends butt and do not overlap.
9. Fit 2nd compression ring with 'TOP' marking upwards.
10. Fit 1st compression ring with 'TOP' marking upwards.



M12 7966

11. Check piston ring to groove clearance.  
☞ **GENERAL DATA, Engine - V8.**
12. Check fit of gudgeon pin in piston, pin must be a tight, sliding fit with no perceptible side play.
13. Check small-end bushes for wear, check that gudgeon pin is a sliding fit in the bush with no perceptible side play. **Small end bushes cannot be replaced, a new connecting rod must be fitted.**

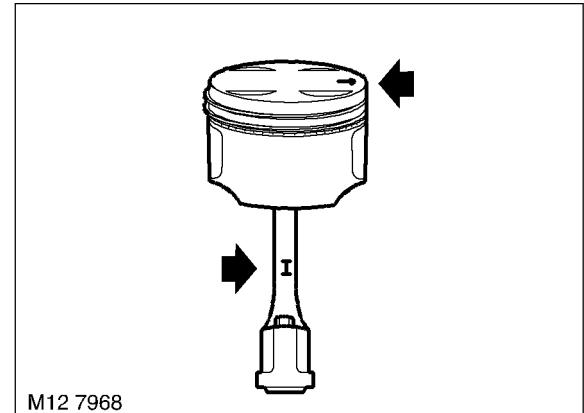


M12 7967

14. Check parallelism of connecting rods on both sides taking the measurement approximately 150 mm from the centre line of the connecting rod
15. ☞ **GENERAL DATA, Engine - V8.**  
Check for distortion on both sides of connecting rod.

#### Reassembly

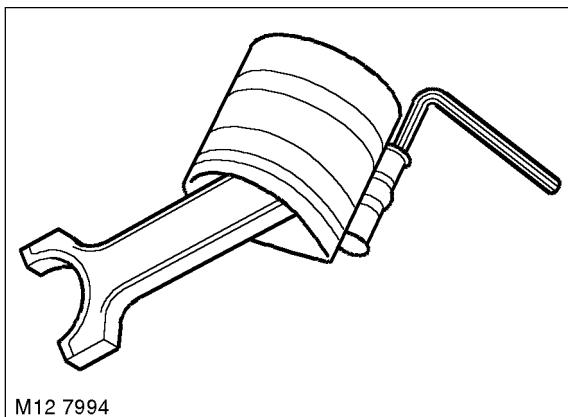
1. Clean cylinder bores, pistons, piston rings and connecting rods.



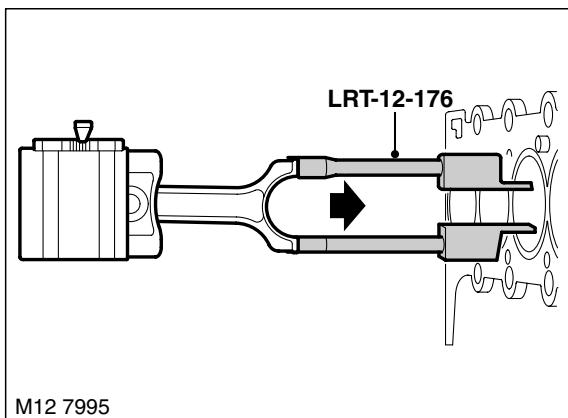
M12 7968

2. Fit each piston to its connecting rod ensuring that the arrow on the piston which points to the front of the engine is relative to the mark made on the connecting rod during disassembly.
3. Lubricate gudgeon pins and bushes with engine oil, fit gudgeon pins and secure with new retaining rings ensuring that they are fully seated in their grooves.
4. Lubricate pistons, piston rings and cylinder bores with clean engine oil.
5. Check that piston rings are free to rotate, position ring gaps at 120° to each other and away from the thrust side - LH side of piston - viewed from front of piston.

# ENGINE - V8



6. Using a piston ring clamp, compress piston rings.



7. Fit guides **LRT-12-176** to connecting rod to protect cylinder bore and crankshaft journals.
8. Fit connecting rod and piston into cylinder bore. Ensure arrow on piston is facing towards the front of the cylinder block and dimples on connecting rods that share a journal face each other as shown.
9. Remove guides **LRT-12-176** from connecting rod.

## Refit

1. Clean lubricating jet and mating face.
2. Fit lubrication jets and tighten Allen screws to 10 Nm (7 lbf.ft).
3. Fit connecting rod bearings.  
☞ **Engine - V8, OVERHAUL, Bearings - connecting rods - engine set.**
4. Fit cylinder head gaskets.  
☞ **Engine - V8, OVERHAUL, Gasket - cylinder head.**

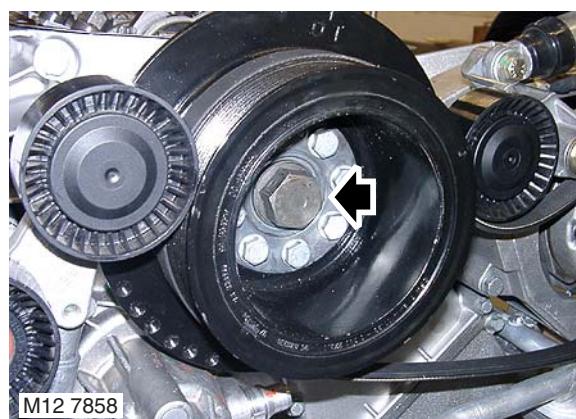
## Bearings - connecting rods - engine set

☞ **12.17.16.01**

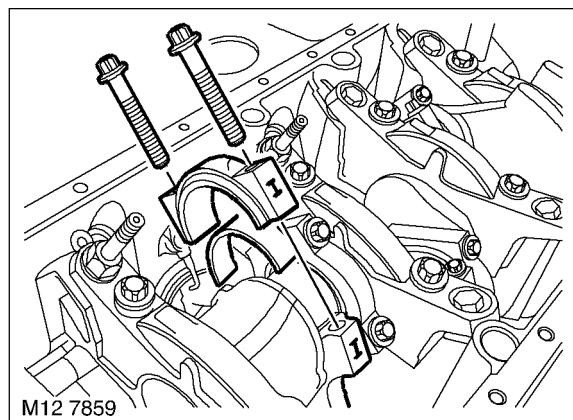
### Remove

1. Remove oil pump.  
☞ **Engine - V8, OVERHAUL, Pump - engine oil.**

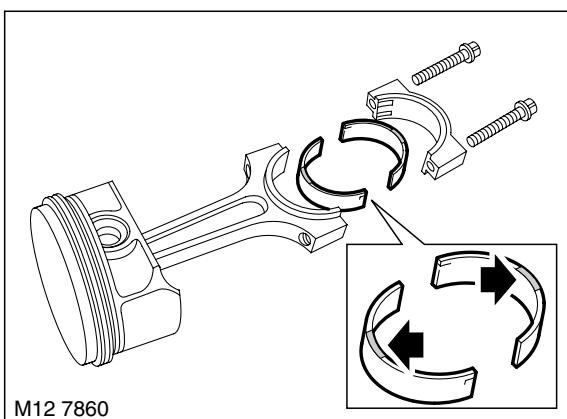
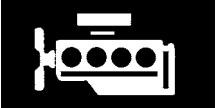
### Disassembly



1. With a socket and bar fitted to crankshaft pulley bolt, rotate crankshaft in direction of rotation to gain access to connecting rod bearing cap bolts.



2. Mark connecting rod and bearing cap in relation to cylinder number.  
*NOTE: Connecting rods and caps have reference marks which align for assembly.*
3. Loosen and remove big-end bearing cap bolts, do not discard bolts at this stage.
4. Remove big-end bearing cap, remove and discard bearing shell.
5. Move connecting rod clear of crankshaft journal.

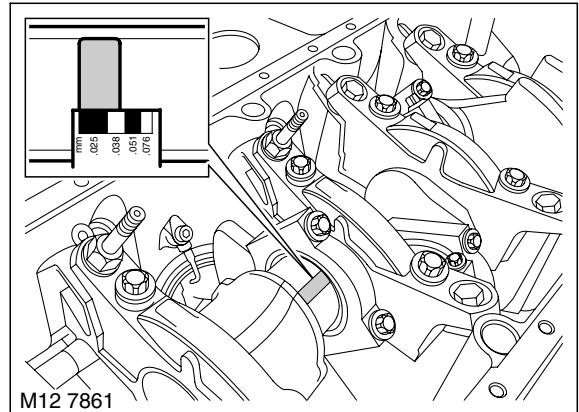


6. Remove bearing shell from connecting rod, discard the bearing shell.  
*NOTE: Blue colour coded big-end bearing shells are fitted to the connecting rods and Red colour coded big end bearing shells are fitted to the bearing caps.*
7. Repeat above procedure for remaining connecting rod bearings. Keep big-end bearing caps in fitted order.

#### Inspect

1. Wipe big-end journals, new bearing shells, connecting rods and bearing caps.
2. Measure and record each crankshaft big-end journal diameter, taking 4 measurements at 90° intervals on each journal.
- ☞ GENERAL DATA, Engine - V8.**
3. Clean and lubricate the original big end bearing cap bolts.
4. Position crankshaft with journal at BDC.
5. Fit a new BLUE colour coded big-end bearing shell to the connecting rod.
6. Fit a new RED colour coded big-end bearing shell to the bearing cap.
7. Pull connecting rod onto big-end journal.
8. Place a strip of Plastigauge across the big-end journal.
9. Fit big-end bearing cap, ensure reference marks on connecting rod and the cap are aligned.  
**CAUTION: Do not rotate the crankshaft when plastigauge is being used.**
10. Fit the original big end bearing cap bolts and tighten to 5 Nm (3.7 lbf.ft), then tighten to 20 Nm (15 lbf.ft) and finally, using an angle gauge, tighten a further 80°.  
**CAUTION: Do not rotate the crankshaft when plastigauge is being used.**

11. Remove bolts securing cap to connecting rod and remove the bearing cap.



12. Using the scale provided, measure the width of plastigauge on journal and compare with bearing clearance.
13. If correct bearing clearance cannot be obtained with the available bearing shells, the crankshaft must be replaced.
- ☞ GENERAL DATA, Engine - V8.**
14. Retain selected bearing shells with connecting rod and bearing cap.
15. Remove all traces of Plastigauge using clean engine oil and a cloth.
16. Repeat the above procedure for the remaining big-end bearings.
17. After completion of big-end bearing clearance checks, discard original bearing cap bolts.

#### Reassembly

1. Lubricate crankshaft journals and selected bearing shells with clean engine oil.
2. Pull connecting rod onto its journal making sure the bearing shell is located correctly.
3. Fit big-end bearing cap, ensure reference marks on connecting rod and the cap are aligned.
4. Clean and lubricate new big-end bearing cap bolts.
5. Fit the new big end bearing cap bolts and tighten to 5 Nm (3.7 lbf.ft), then tighten to 20 Nm (15 lbf.ft) and finally, using an angle gauge, tighten a further 80°.

#### Refit

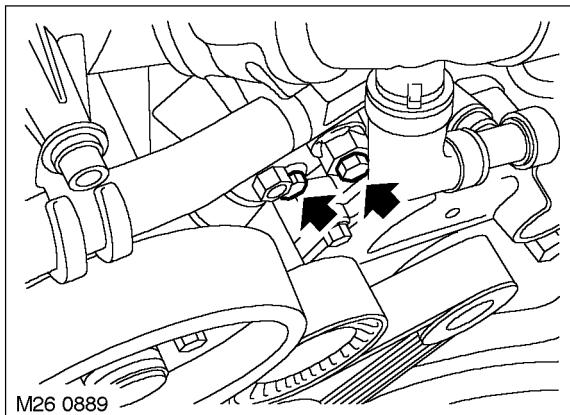
1. Fit oil pump.
- ☞ Engine - V8, OVERHAUL, Pump - engine oil.**

# ENGINE - V8

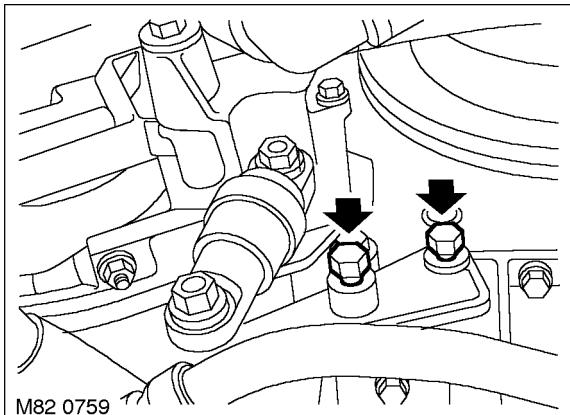
## Pulley - crankshaft

» 12.21.01.01

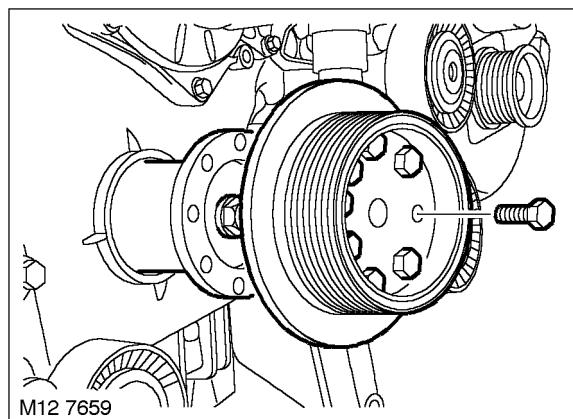
### Disassembly



1. Loosen 2 bolts securing ancillary drive belt tensioner and release tension from the belt.
2. Remove ancillary drive belt.



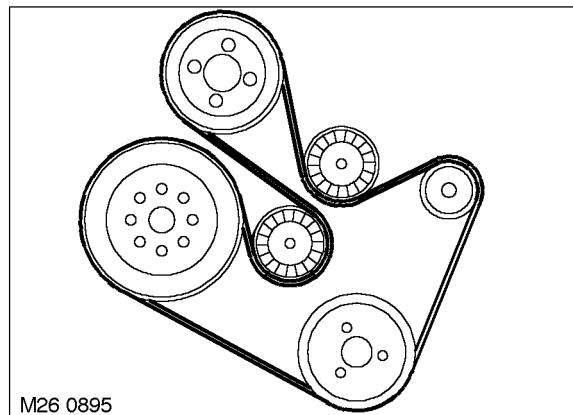
3. Loosen 2 bolts securing A/C compressor drive belt tensioner and release tension from the belt.
4. Remove compressor drive belt.



5. Remove 8 bolts securing crankshaft pulley to hub assembly.
6. Remove crankshaft pulley.
- 7.

### Reassembly

1. Clean crankshaft pulley and mating face.
2. Position crankshaft pulley to hub assembly, fit to locating dowel.
3. Fit 8 new bolts securing crankshaft pulley to hub assembly and tighten to 22 Nm (16 lbf.ft).
4. Clean A/C compressor drive belt pulleys.
5. Fit A/C compressor drive belt, rotate tensioner fully clockwise and tighten the tensioner bolts to 22 Nm (16 lbf.ft).
6. Clean ancillary drive belt pulleys.



7. Fit ancillary drive belt, rotate tensioner fully clockwise and tighten tensioner bolts to 22 Nm (16 lbf.ft).

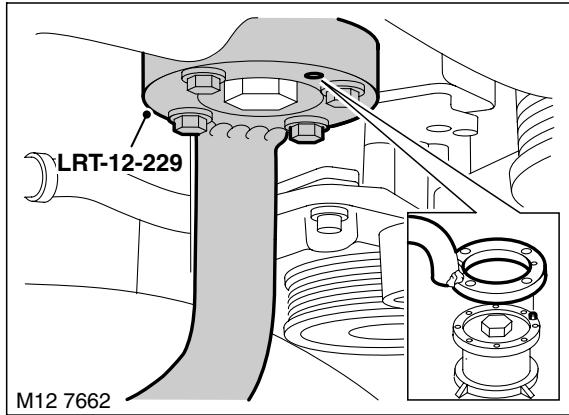


## Oil seal - crankshaft - front

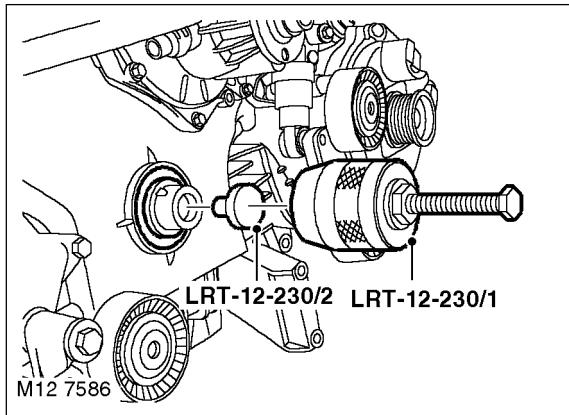
☞ **12.21.14.01**

### Disassembly

1. Remove crankshaft pulley.  
☞ **Engine - V8, OVERHAUL, Pulley - crankshaft.**



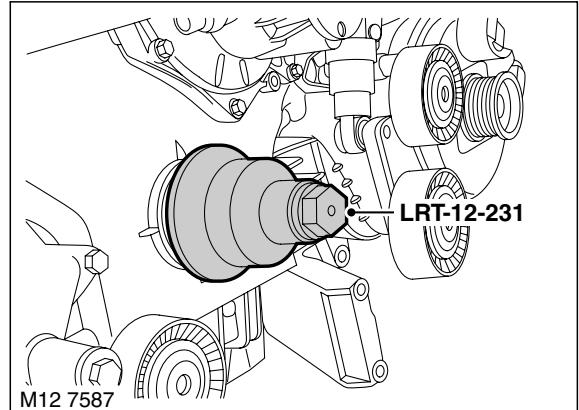
2. Fit **LRT-12-229** to crankshaft pulley hub.
3. With assistance, remove crankshaft pulley bolt.
4. Remove **LRT-12-229** from crankshaft pulley hub.
5. Remove crankshaft pulley hub.



6. Fit **LRT-12-230/1** and **LRT-12-230/2** to crankshaft seal and remove crankshaft oil seal.
7. Discard oil seal.

### Reassembly

1. Clean seal mating faces.



2. Fit new crankshaft oil seal to front cover using **LRT-12-231**.

*NOTE: Front crankshaft oil seal should be fitted flush to front timing cover.*

3. Remove **LRT-12-231**.
4. Clean crankshaft pulley hub and mating faces, fit crankshaft pulley hub to crankshaft.
5. Fit new bolt to crankshaft, lock crankshaft using **LRT-12-229** and initially tighten crankshaft bolt to 100 Nm (74 lbf.ft). Using an angle torque gauge tighten in the following sequence. Stage 1; 60°. Stage 2; 60°. Stage 3; 30°.
6. Remove **LRT-12-229** from crankshaft pulley hub.
7. Fit crankshaft pulley.  
☞ **Engine - V8, OVERHAUL, Pulley - crankshaft.**

# ENGINE - V8

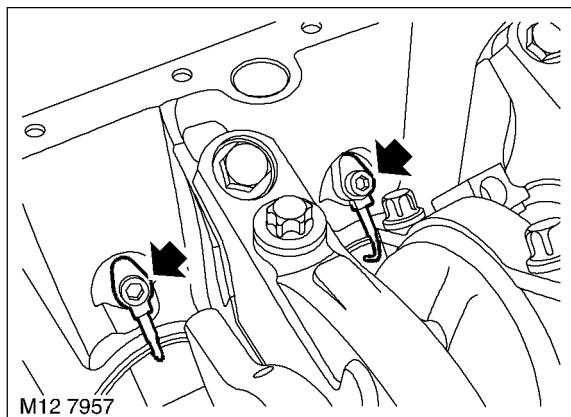
## Crankshaft and main bearings

### 12.21.33.01

If, after inspection, the crankshaft has to be replaced, it will be necessary to fit a new dowel into the crankshaft rear boss. Before discarding the original crankshaft, note the fitted position of the dowel.

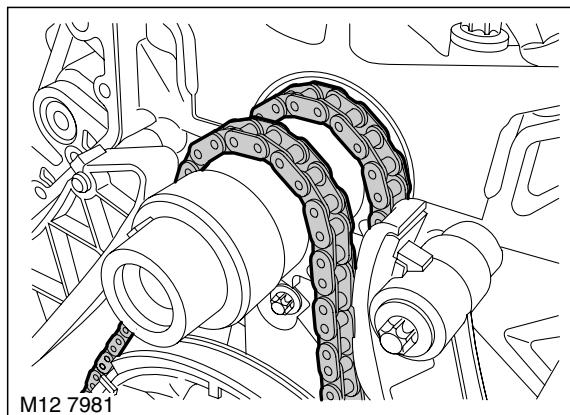
#### Remove

1. Remove cylinder head gaskets.  
☞ **Engine - V8, OVERHAUL, Gasket - cylinder head.**
2. Remove crankshaft rear oil seal.  
☞ **Engine - V8, OVERHAUL, Oil seal - crankshaft - rear.**
3. Remove timing gear lower cover.  
☞ **Engine - V8, OVERHAUL, Cover - timing gear - lower.**
4. Remove connecting rod bearings.  
☞ **Engine - V8, OVERHAUL, Bearings - connecting rods - engine set.**

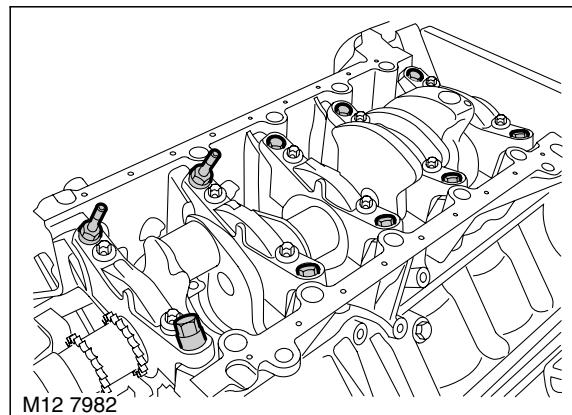


7. Remove Allen screws securing lubrication jets and remove the jets.
8. Push connecting rods away from crankshaft until the pistons crowns are flush with the top of the cylinder bores.

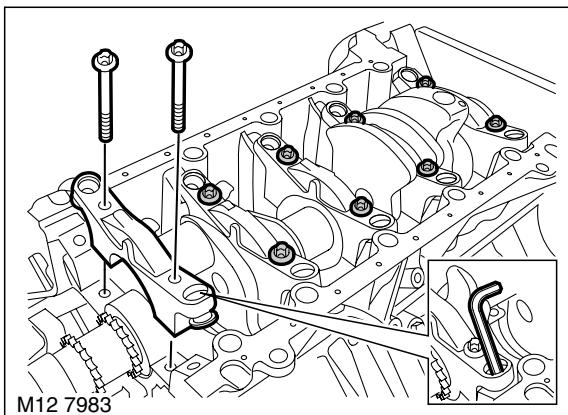
#### Disassembly



5. Release timing chain from crankshaft gear.
6. Remove oil pump drive chain from crankshaft gear.



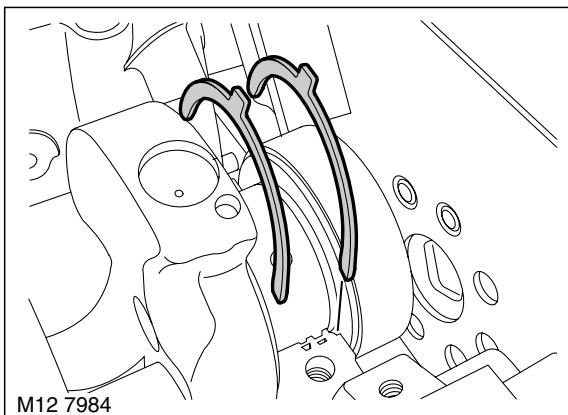
1. Remove 10 bolts securing main bearing cap and adjustable spacers. Discard bolts.
2. Remove 10 bolts securing main bearing caps to cylinder block, do not discard bolts at this stage.



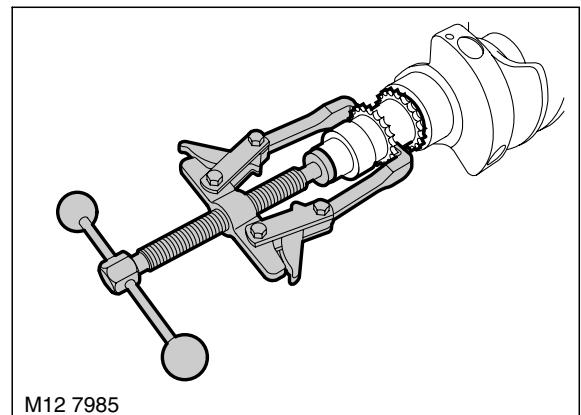
3. Using the adjustable spacers, carefully release and remove the 5 main bearing caps.

*NOTE: All main bearing shell locating keys must align. Bearing caps 1 to 3 are marked and number 5 main bearing cap carries the crankshaft thrust bearings. Number 4 main bearing cap is not marked.*

4. Remove crankshaft from cylinder block.

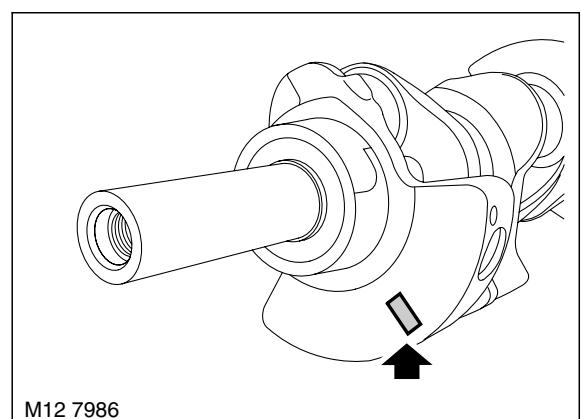


5. Remove and discard bearing shells from cylinder block and main bearing caps.
6. Remove crankshaft thrust washers.



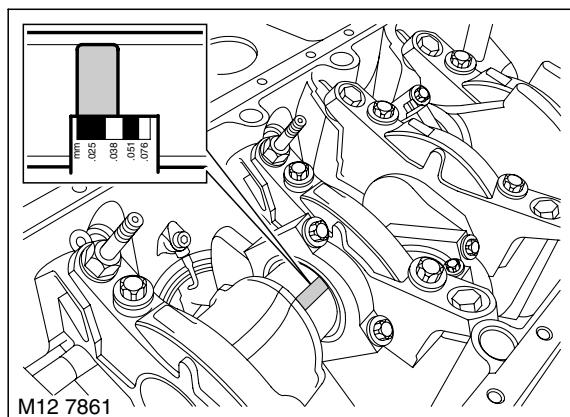
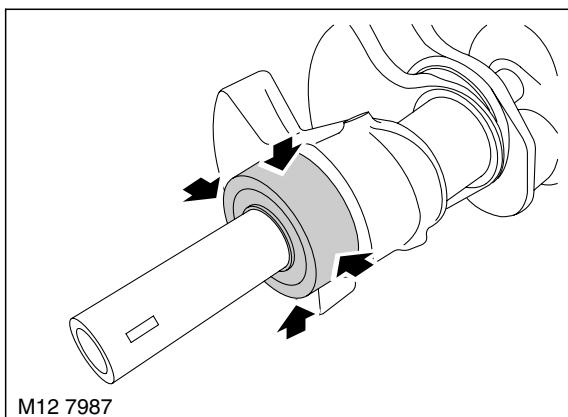
7. Use a puller and remove the crankshaft gear.
8. Remove key from crankshaft.

#### Inspect



1. Check paint mark on crankshaft front web to determine if main bearing journals have been ground undersize.

**GENERAL DATA, Engine - V8.**



2. Measure and record each main journal diameter. Take 4 measurements at 90° intervals on each journal to check size and ovality.
- GENERAL DATA, Engine - V8.**
3. If crankshaft journals are worn, oval, or scored, then the crankshaft must be replaced.
4. Clean crankshaft, ensure oil ways are clear of obstructions.
5. Clean main bearing caps and bearing shell locations in cylinder block; ensure bearing cap bolt holes are clean and dry.
6. Clean original main bearing cap bolts and lightly oil bolt threads.
7. If crankshaft or main bearing shells are being replaced, ignore previous colour code selection and fit only yellow coded bearing shells of appropriate size to the cylinder block.

**GENERAL DATA, Engine - V8.**

8. Lubricate bearing shells with engine oil.
9. Carefully fit crankshaft to cylinder block.
10. Fit adjustable spacers fully into main bearing caps.
11. Fit new appropriate size main bearing shells of the correct colour code to the main bearing caps.

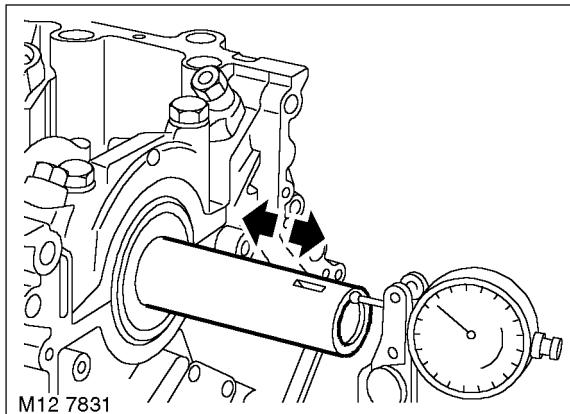
**GENERAL DATA, Engine - V8.**

12. Place a strip of Plastigauge across each main bearing journal.
13. Fit main bearing caps and fit original bolts. Tighten bolts evenly and progressively to 20 Nm (15 lbf.ft) then, using an angle torque gauge, tighten a further 100°.
- CAUTION: Do not rotate the crankshaft when plastigauge is being used.**
14. Progressively loosen and remove main bearing bolts, bearing caps and shells.
15. Using the scale provided, measure the width of Plastigauge on each main bearing journal and compare with specified bearing clearances.
- GENERAL DATA, Engine - V8.**
16. If clearances are incorrect, select alternative main bearing cap shell(s) from the range available and repeat check.
- GENERAL DATA, Engine - V8.**
17. Lift out crankshaft, remove all traces of Plastigauge from main bearing journals using clean engine oil and a cloth.
18. Fit selected bearing shells to main bearing caps.
19. Lubricate bearing journals and main bearing shells with clean engine oil.
20. Fit crankshaft and fit the main bearing caps numbers 1 to 4.
21. Clean crankshaft thrust washers.
22. Lubricate crankshaft thrust washers with clean engine oil.
23. Fit selected crankshaft thrust washers to cylinder block.

**CAUTION: Crankshaft thrust washers must be fitted with the oil grooves facing the crankshaft.**



24. Fit selected crankshaft thrust washers to number 5 main bearing cap and fit main bearing cap.  
**CAUTION: Crankshaft thrust washers must be fitted with the oil grooves facing the crankshaft.**
25. Fit original main bearing cap bolts, tighten bolts evenly and progressively to 20 Nm (15 lbf.ft) then, using an angle torque gauge, tighten bolts a further 100°.



26. Fit DTI as shown to check crankshaft end float. If end float is incorrect, remove bolts securing number 5 main bearing cap and remove thrust washers.  
☞ **GENERAL DATA, Engine - V8.**
27. If crankshaft end float is incorrect, measure and select thrust washers to give correct end float.  
☞ **GENERAL DATA, Engine - V8.**
28. Lubricate selected crankshaft thrust washers.
29. Fit selected crankshaft thrust washers to cylinder block.  
**CAUTION: Crankshaft thrust washers must be fitted with the oil grooves facing the crankshaft.**
30. Fit selected crankshaft thrust washers to number 5 main bearing cap and fit main bearing cap.
31. Remove and discard original bolts securing main bearing caps numbered 1 to 4.

#### Reassembly

1. Fit new main bearing cap bolts. Tighten bolts to 20 Nm (15 lbf.ft) then, tighten bolts a further 100°

**CAUTION: Do not remove special coating from main bearing cap bolts.**

2. Tighten main bearing cap adjustable spacers to 10 Nm (7 lbf.ft).
3. Fit new bolts securing main bearing caps through adjustable spacers and tighten to 20 Nm (15 lbf.ft) then, tighten bolts a further 45°.
4. Clean crankshaft gear and mating face on crankshaft.
5. Clean keys and key ways.
6. Fit key to crankshaft.
7. Heat crankshaft gear to a maximum of 150° Centigrade and fit gear to crankshaft.

#### Refit

1. Clean lubricating jets and mating faces.
2. Fit lubrication jets and tighten Allen screws to 10 Nm (7 lbf.ft).
3. Fit connecting rod bearings.  
☞ **Engine - V8, OVERHAUL, Bearings - connecting rods - engine set.**
4. Clean oil pump drive chain.
5. Lubricate oil pump drive chain with engine oil.
6. Fit oil pump drive chain to crankshaft gear.
7. Connect timing chain to crankshaft gear.
8. Fit timing gear lower cover.  
☞ **Engine - V8, OVERHAUL, Cover - timing gear - lower.**
9. Fit crankshaft rear oil seal.  
☞ **Engine - V8, OVERHAUL, Oil seal - crankshaft - rear.**
10. Fit cylinder head gaskets.  
☞ **Engine - V8, OVERHAUL, Gasket - cylinder head.**

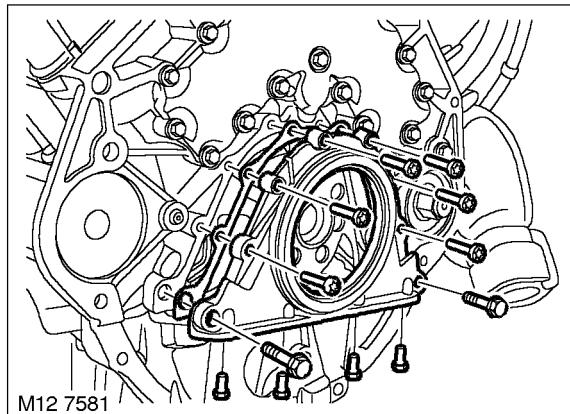
# ENGINE - V8

## Oil seal - crankshaft - rear

→ 12.21.20.01

### Disassembly

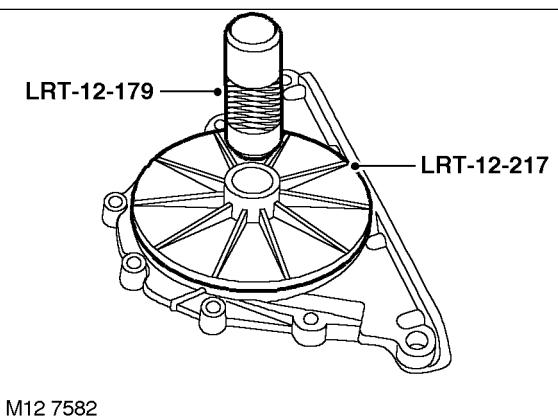
1. Remove torque converter drive plate.  
☞ Engine - V8, REPAIRS, Torque converter drive plate.



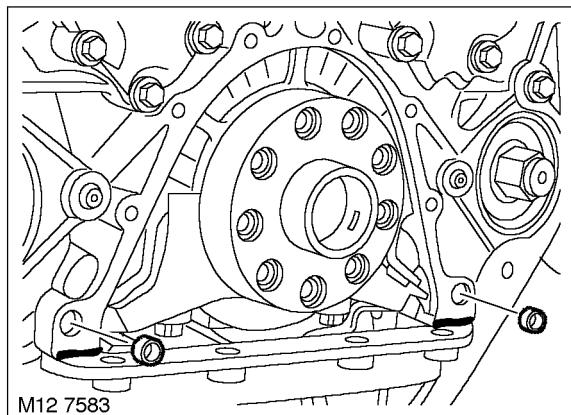
2. Remove 6 Torx bolts securing crankshaft rear oil seal housing and discard sealing washers.
3. Remove 6 bolts securing crankshaft rear oil seal housing.
4. Carefully release and remove crankshaft rear oil seal housing.
5. Discard gasket from crankshaft rear oil seal housing.
6. Remove crankshaft rear oil seal from housing.

### Reassembly

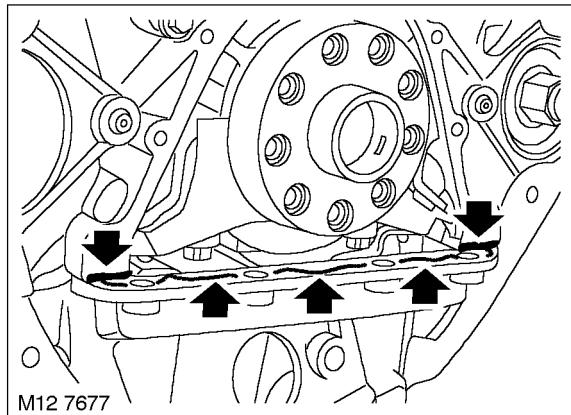
1. Clean oil seal housing, dowel and dowel holes.
2. Clean oil seal recess in housing and running surface on crankshaft.
3. Clean oil seal housing mating face on cylinder block and remove old sealant from sump gasket.



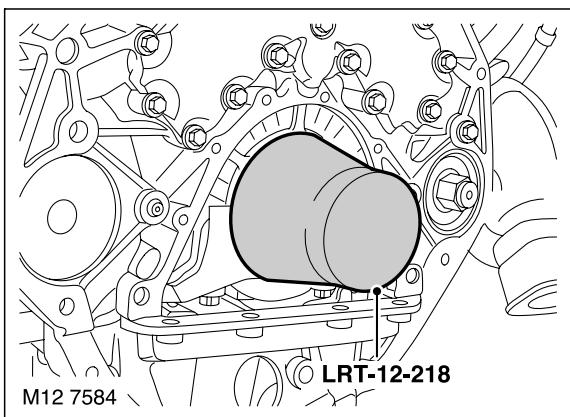
4. Fit LRT-12-217 and LRT-12-179 to new crankshaft rear oil seal and fit new seal to housing.



5. Check for correct fitment of dowels in cylinder block.
6. Fit new gasket to crankshaft rear oil seal housing.



7. Apply sealant to oil seal housing contact points as shown.



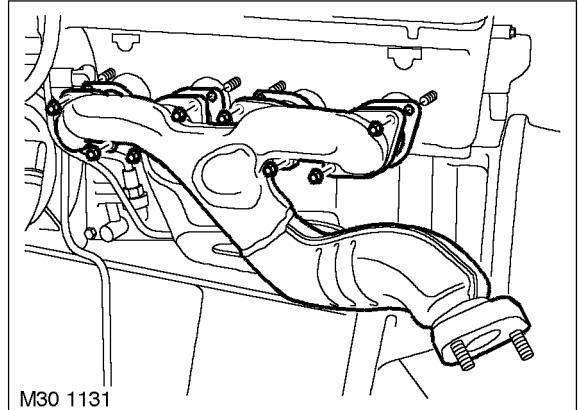
8. Fit **LRT-12-218** to crankshaft, apply a thin coat of oil to inner lip of crankshaft rear oil seal, fit seal housing over **LRT-12-218** onto dowels and remove **LRT-12-218**.
9. Fit new sealing washers to 6 Torx bolts, fit 6 Torx bolts and 6 bolts securing crankshaft oil seal housing to cylinder block and tighten to 12 Nm (9 lbf.ft).
10. Fit torque converter drive plate.

**Engine - V8, REPAIRS, Torque converter drive plate.**

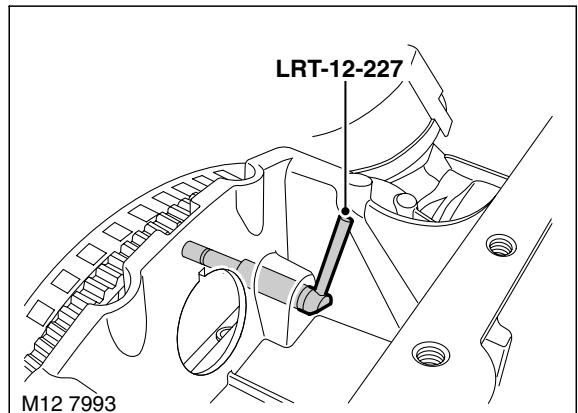
## Gasket - cylinder head

**12.29.02.01**

**Remove**



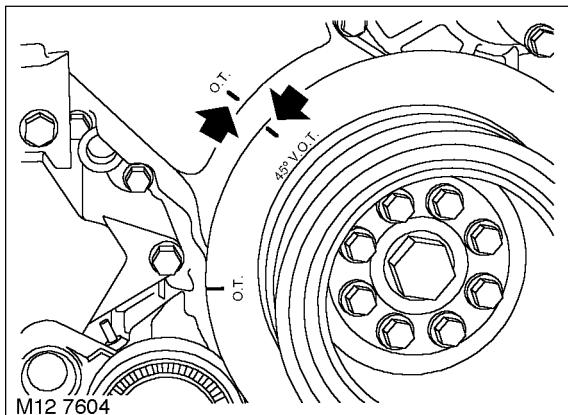
1. Remove 8 nuts securing exhaust manifold, remove exhaust manifold and discard nuts and 2 gaskets.
2. Remove coolant pump to coolant manifold pipes.  
 **Engine - V8, OVERHAUL, Pipe(s) - water pump to coolant manifold.**
3. Remove LH VCC unit.  
 **Engine - V8, OVERHAUL, Variable camshaft unit - variable camshaft control (VCC).**



4. Remove **LRT-12-227** from timing tool access hole.

# ENGINE - V8

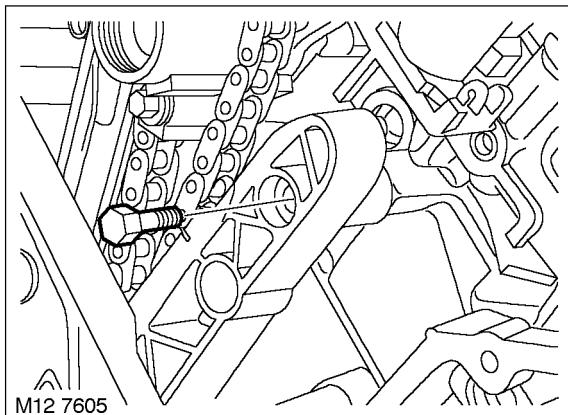
## Disassembly



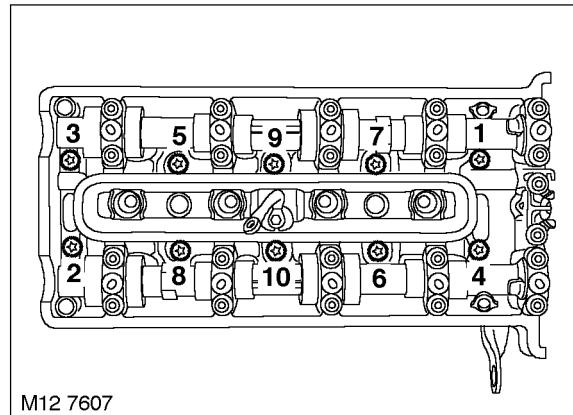
5. Rotate engine crankshaft pulley anti-clockwise to align the 45° before TDC timing mark.

*NOTE: Raise timing chain and hold under tension while turning crankshaft pulley.*

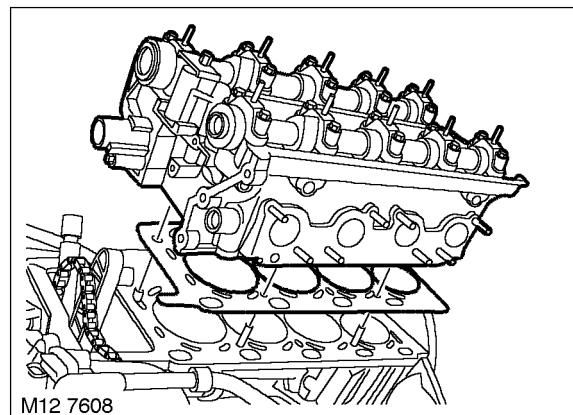
6. Remove **LRT-12-223/6**, **LRT-12-223/5**, **LRT-12-223/3** and **LRT-12-223/4** from LH cylinder head camshafts.



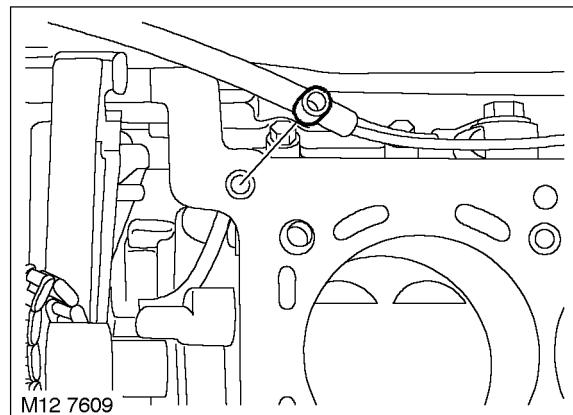
7. Remove bolt securing LH timing chain guide rail to LH cylinder head.



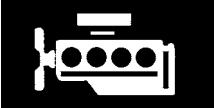
1. Working in the sequence shown, progressively loosen 10 cylinder head bolts.
2. Discard 10 cylinder head bolts and remove 10 cylinder head bolt washers.



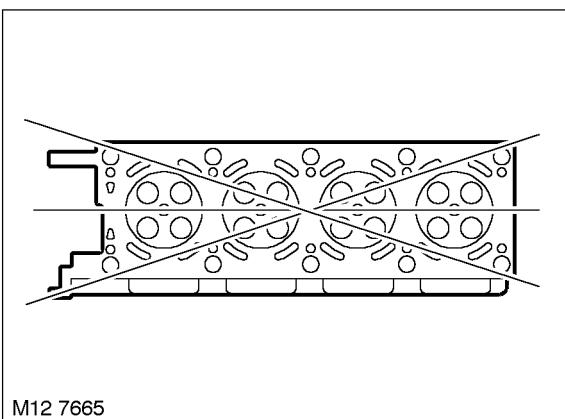
3. With assistance, remove cylinder head assembly.
4. Discard cylinder head gasket.



5. Discard 'O' ring from cylinder block to LH cylinder head mating face.

**Inspect**

1. Clean mating faces of cylinder head and cylinder block, dowels and dowel holes. If necessary remove all traces of sealing compound with hard wood scraper. Ensure remnants do not remain in oil ways cooling ducts or bolt holes.
- CAUTION: Make sure no oil or coolant is left in the cylinder head bolt holes as damage to the cylinder block may occur when tightening the cylinder head bolts.**

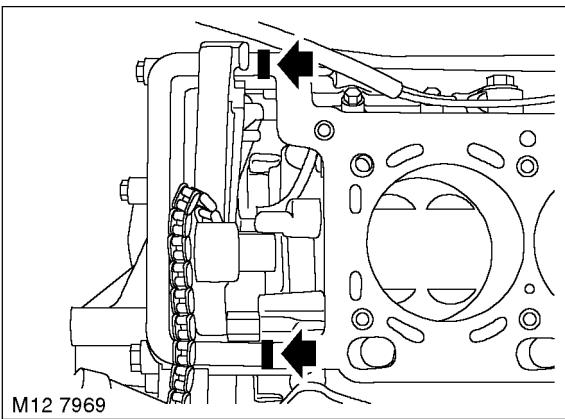


2. Using a straight edge and feeler gauges, check cylinder head for distortion along lines shown in illustration.

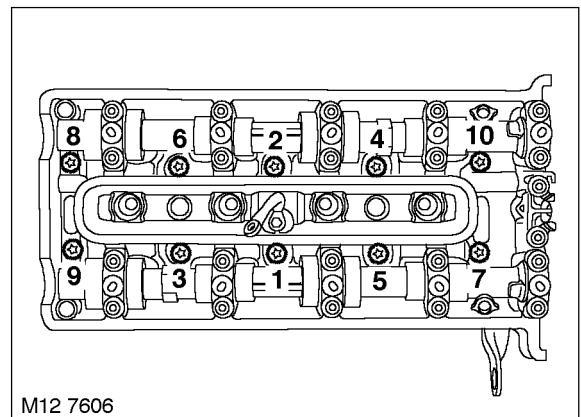
**GENERAL DATA, Engine - V8.**

**Reassembly**

1. Fit new 'O' ring to cylinder block.



2. Apply sealant STC 50550 to areas illustrated.
3. Fit new cylinder head gasket to locating dowels on cylinder block.
4. With assistance, fit cylinder head and carefully position cylinder head onto dowels.

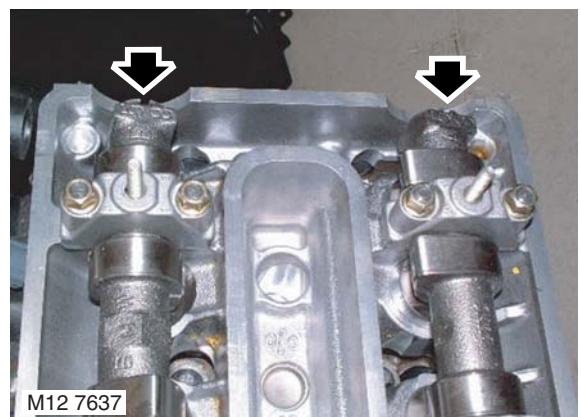


5. Fit cylinder head bolt washers and new cylinder head bolts. Tighten cylinder head bolts in sequence shown to 30 Nm (22 lbf.ft). Using an angle torque gauge tighten all bolts in sequence by 80° and then a final 80°.

*NOTE: Do not remove special coating from new cylinder head bolts.*

**Refit**

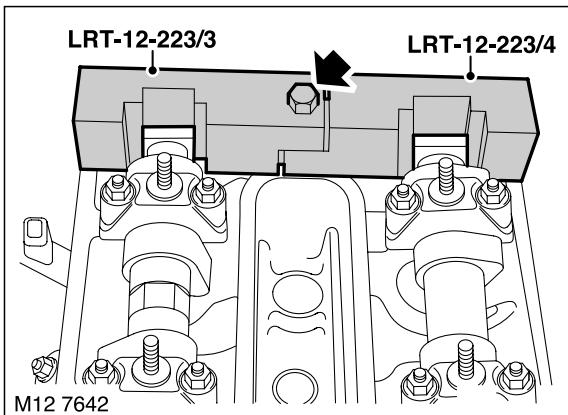
1. Fit bolt securing LH timing chain guide and tighten to 10 Nm (7 lbf.ft).



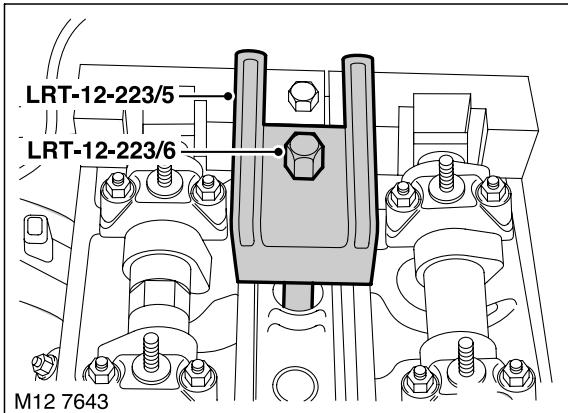
2. Carefully rotate camshafts until letter and cylinder number markings located on rear of camshafts are in an upright position.
3. Loosen bolt securing LRT-12-223/4 to LRT-12-223/3.

## ENGINE - V8

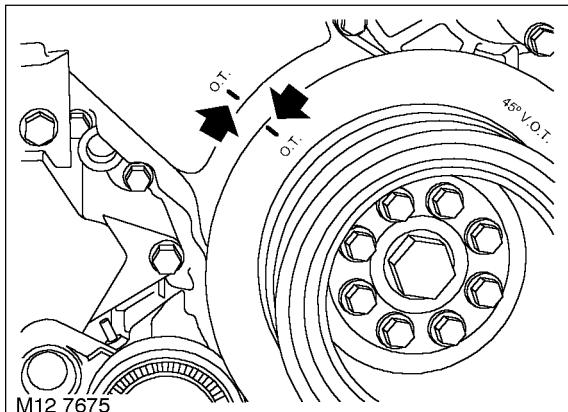
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- Fit **LRT-12-223/4** and **LRT-12-223/3** to rear of LH camshafts and tighten bolt securing tools.

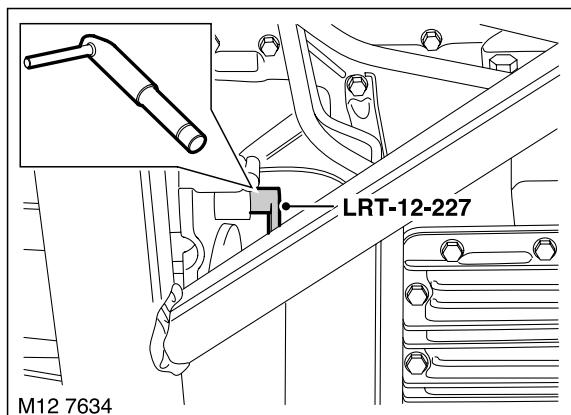


- Fit **LRT-12-223/5**, **LRT-12-223/6** to LH cylinder head and tighten **LRT-12-223/6** into spark plug thread.



- Rotate engine crankshaft pulley clockwise to align TDC timing mark.

*NOTE: Raise timing chain and hold under tension while turning crankshaft pulley.*



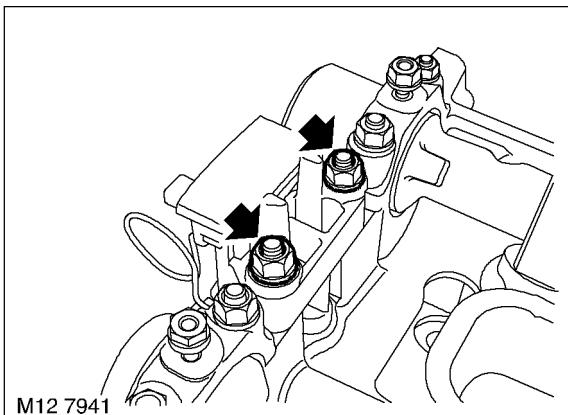
- Position **LRT-12-227** through timing tool access hole and secure flywheel in TDC position.
- Fit LH VCC unit.
  - Engine - V8, OVERHAUL, Variable camshaft unit - variable camshaft control (VCC).**
- Fit coolant pump to coolant manifold pipes.
  - Engine - V8, OVERHAUL, Pipe(s) - water pump to coolant manifold.**
- Clean exhaust manifold mating faces and fit new gaskets.
- Apply copper grease to exhaust manifold studs, fit exhaust manifold, fit 8 new nuts securing exhaust manifold and tighten to 23 Nm (17 lbf.ft).



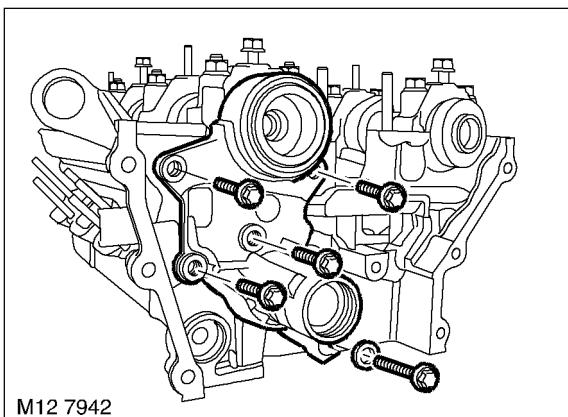
## Cylinder head - overhaul

» 12.29.19.01

### Disassembly

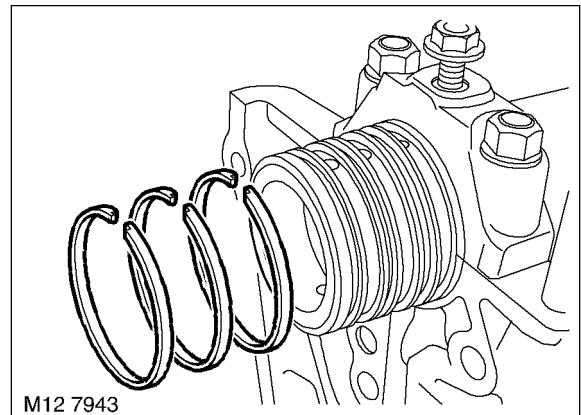


1. Remove 2 nuts securing exhaust camshaft drive chain tensioner, remove tensioner and discard 'O' ring.

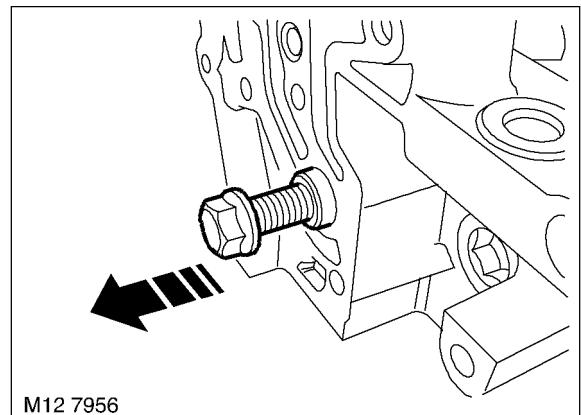


2. Remove 5 bolts securing VCC oil distribution housing. Remove sealing washer from long bolt and discard washer.
3. Remove VCC oil distribution housing, remove and discard gasket.

*NOTE: If distribution unit is worn, move unit backwards and forwards to release from sealing rings.*



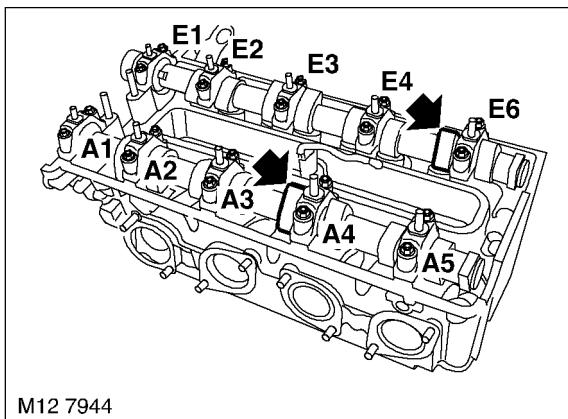
4. Carefully release and remove 3 VCC oil distribution sealing rings from the inlet camshaft.



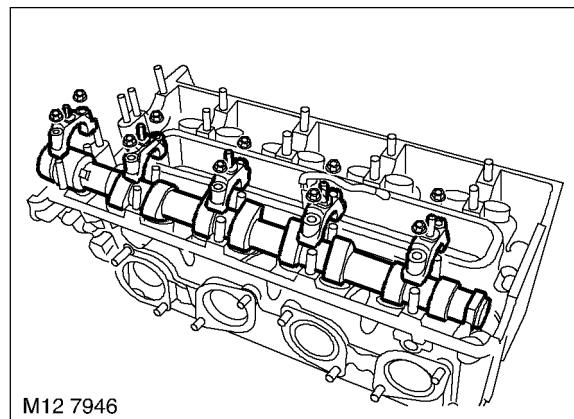
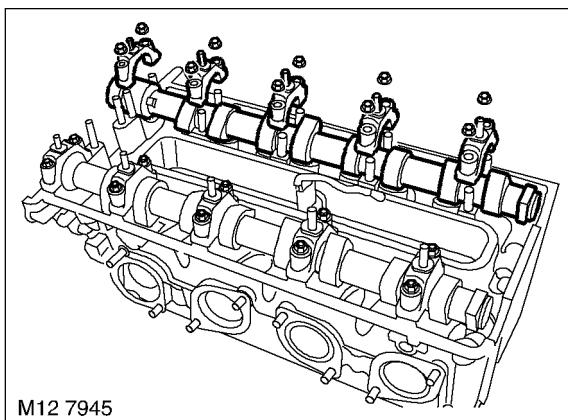
5. Fit an M10 bolt into the VCC non-return valve and by hand, remove the valve from the cylinder head. Discard 'O' ring.
6. Check camshaft end-float using a DTI.

☞ **GENERAL DATA, Engine - V8.**

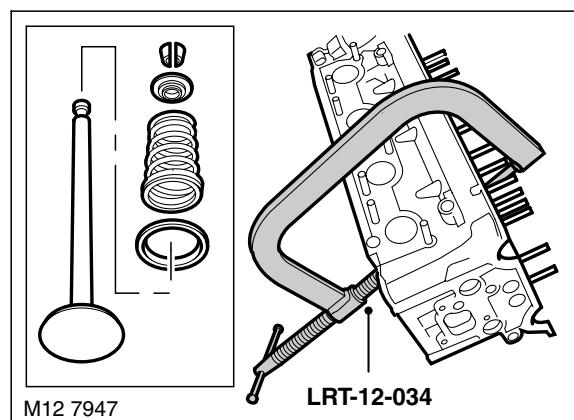
## ENGINE - V8



7. Using a spanner on the hexagon, rotate inlet camshaft until lobes of cylinder 8 face upwards.
8. Using a spanner on the hexagon, rotate exhaust camshaft until lobes of cylinder 6 face upwards.
9. Identify camshaft bearing caps for refitting. Inlet camshaft is marked 'E' with caps marked from 'E1' to 'E5' from driven end of camshaft when viewed from inlet side of cylinder head. Exhaust camshaft is marked 'A' with caps marked 'A1' to 'A5' from driven end of camshaft when viewed from inlet side of cylinder head.

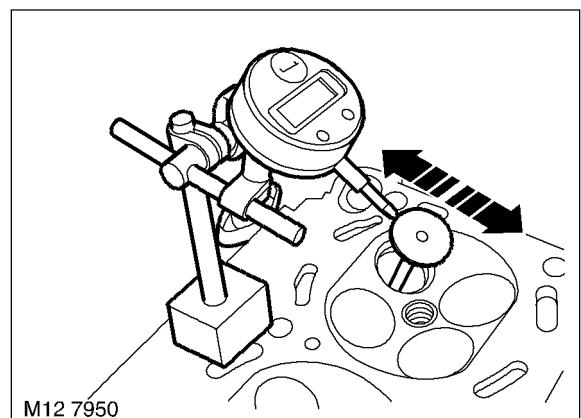
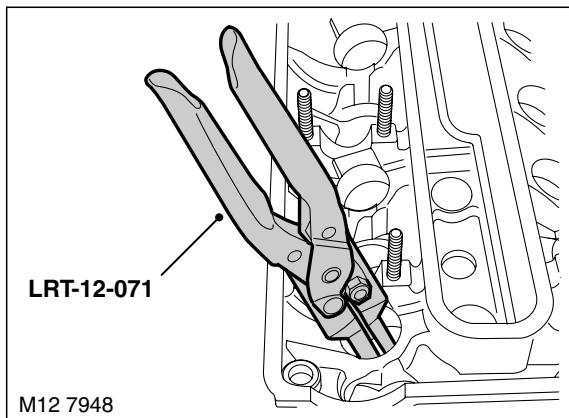
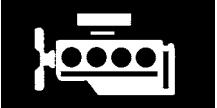


13. Evenly and progressively loosen and remove 10 nuts securing exhaust camshaft bearing caps.
14. Remove camshaft bearing caps.
15. Remove exhaust camshaft.
16. Remove tappets. Retain in fitted order if to be refitted.



17. Position LRT-12-034 to spring cap and compress valve spring.
18. Remove 2 collets and release valve spring compressor.

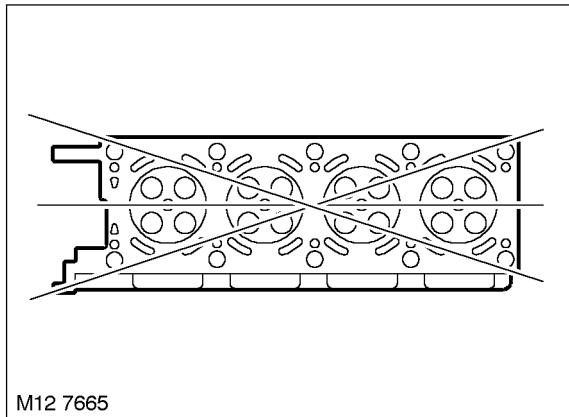
10. Evenly and progressively loosen and remove 10 nuts securing inlet camshaft bearing caps.
11. Remove camshaft bearing caps.
12. Remove inlet camshaft.



19. Remove valve stem oil seal using **LRT-12-071**. Discard stem seal.
20. Repeat procedure for remaining valves, keeping components in their fitted order.

#### Inspect

1. Inspect camshafts and replace camshafts if scored, pitted or excessively worn.  
 **GENERAL DATA, Engine - V8.**
2. Check camshaft, camshaft bearings in cylinder head and bearing caps for wear.  
 **GENERAL DATA, Engine - V8.**

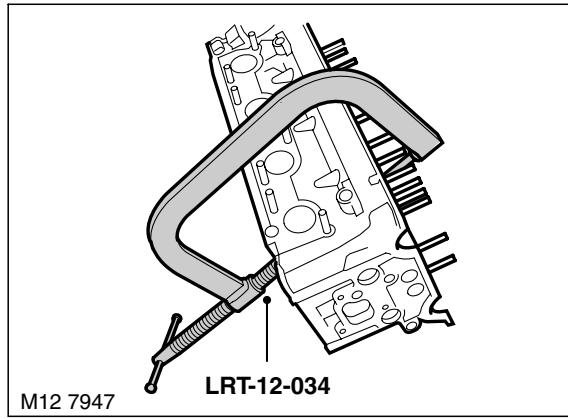
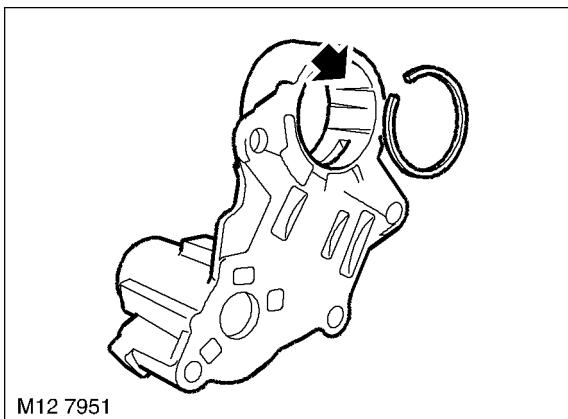


3. Using a straight edge and feeler gauges, check cylinder head for distortion along lines shown in illustration.

 **GENERAL DATA, Engine - V8.**

4. Clean valve seat, inspect for pitting, burning, cracks and wear.
5. Fit new valve to valve guide, with end of valve stem level with valve guide.
6. Mount dial gauge onto cylinder head and zero gauge on valve head. Move valve from side to side to measure valve guide wear.  
 **GENERAL DATA, Engine - V8.**
7. If valve movement is excessive, the guides can be reamed to accept valves with a larger stem diameter.  
 **GENERAL DATA, Engine - V8.**
8. If valve guides have been reamed to fit valves with a larger stem diameter then the valve seats must be cut as shown using **LRT-12-501, LRT-12-503 and LRT-12-517**.  
 **GENERAL DATA, Engine - V8.**
9. Ensure cutter blades are fitted correctly to cutter head. Adjust blades so that middle of the blade contacts the area to be cut. Use light pressure and remove the minimum of material.
10. Repeat as necessary for all valves, valve guides and valve seats.

# ENGINE - V8



11. Inspect the VCC oil distribution housing and sealing rings for signs of wear.

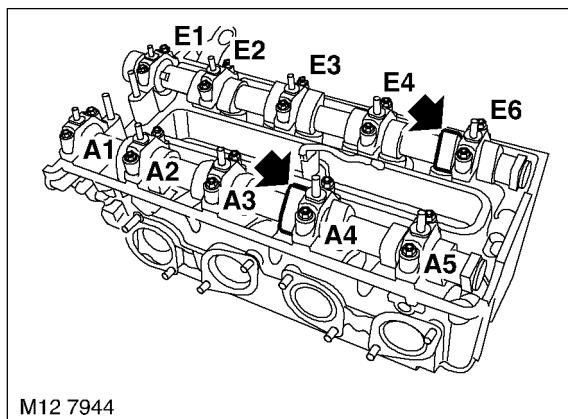
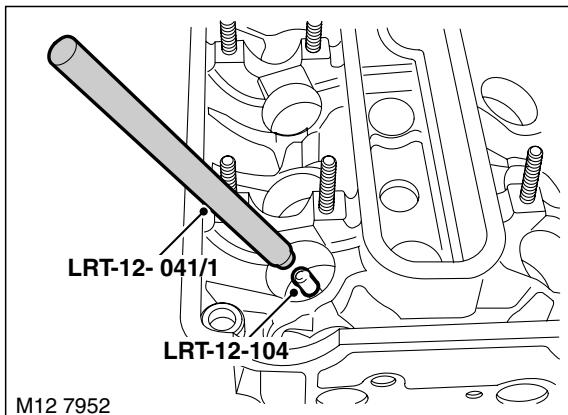
**GENERAL DATA, Engine - V8.**

**CAUTION:** Replace distribution housing and sealing rings if pitting or scoring is evident in a longitudinal direction.

## Reassembly

1. Clean combustion space valve guide and manifold ports, blow out with air line.
2. Clean valve, valve spring, spring seat, cap and collets.
3. Lubricate valve with clean engine oil and fit valve.

5. Fit valve spring seat, valve spring and spring cap.
6. Use **LRT-12-034** to compress valve spring. Fit collets and carefully release spring.
7. Repeat above for remaining valves.
8. Clean tappets, tappet bores and ensure oil ways are clear.
9. Lubricate tappets and tappet bores, fit the tappets in original positions.
10. Clean camshafts.
11. Clean camshaft bearings and caps. Ensure oil ways are clear.
12. Lubricate camshaft and camshaft bearings.



4. Fit **LRT-12-104** over valve stem, fit new seal to valve stem, and remove **LRT-12-104**. Press valve seal onto valve guide using **LRT-12-041/1**.

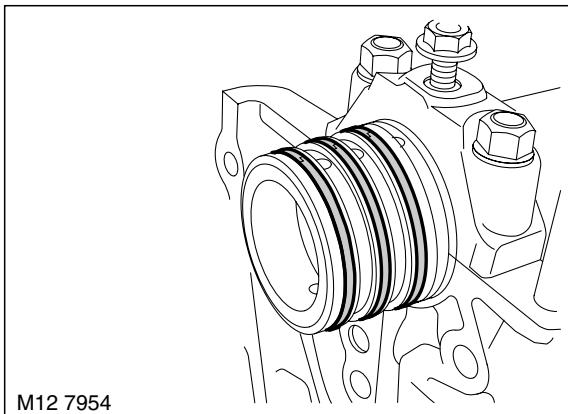
13. Fit exhaust camshaft with lobes of cylinder 6 facing upwards. Fit bearing caps marked "A" in correct order and tighten the nuts evenly and progressively to 14 Nm (10 lbf.ft).
14. Fit inlet camshaft with lobes of cylinder 8 facing upwards. Fit bearing caps marked "E" in the correct order and tighten the nuts evenly and progressively to 14 Nm (10 lbf.ft).
15. Clean VCC oil non-return valve and ensure oil ways are clear.



16. Using a new 'O' ring, fit the VCC oil non return valve to the cylinder head.

**CAUTION: VCC non-return valve to be fitted with M10 thread visible.**

17. Clean VCC unit oil distribution rings and grooves in inlet camshaft.  
 18. Lubricate VCC oil distribution rings and carefully fit rings to grooves in inlet camshaft.  
 19. Clean VCC oil distribution housing and mating face on cylinder head. Ensure oil ways are clear.  
 20. Fit VCC oil distribution housing gasket to cylinder head.

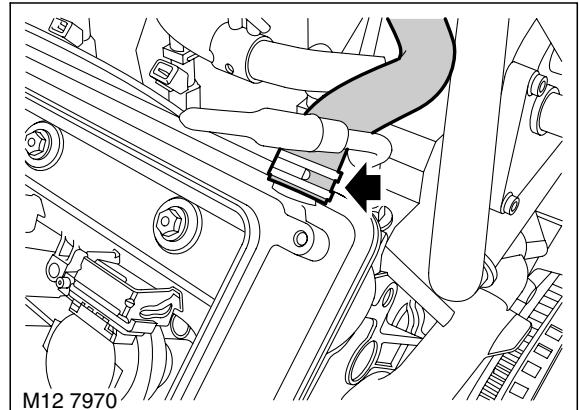


21. With all VCC ring gaps facing upwards, fit housing squarely over rings and align to cylinder head.  
 22. Fit a new sealing washer to the long bolt and tighten all bolts securing VCC housing to 10 Nm (7 lbf.ft).  
 23. Clean exhaust camshaft timing chain tensioner and mating face. Ensure oil way is clear.  
 24. Lubricate exhaust camshaft drive chain tensioner.  
 25. Using a new 'O' ring, fit exhaust camshaft drive chain tensioner and tighten bolts to 10 Nm (7 lbf.ft).  
 26. Clean exhaust manifold and cylinder head mating face.  
 27. Use new gaskets and fit exhaust manifold to cylinder head.  
 28. Fit nuts securing exhaust manifold and tighten to 24 Nm (18 lbf.ft).

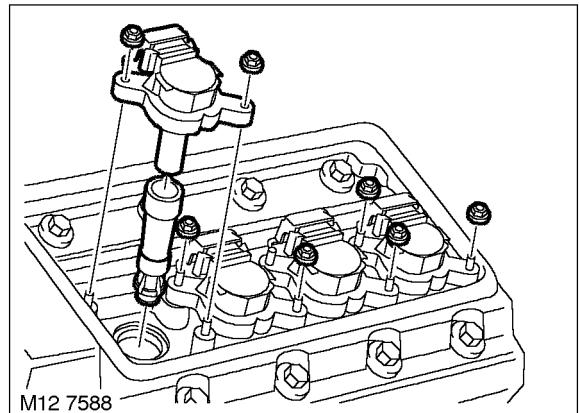
## Gasket - covers - camshaft

☞ 12.29.40.01

### Disassembly

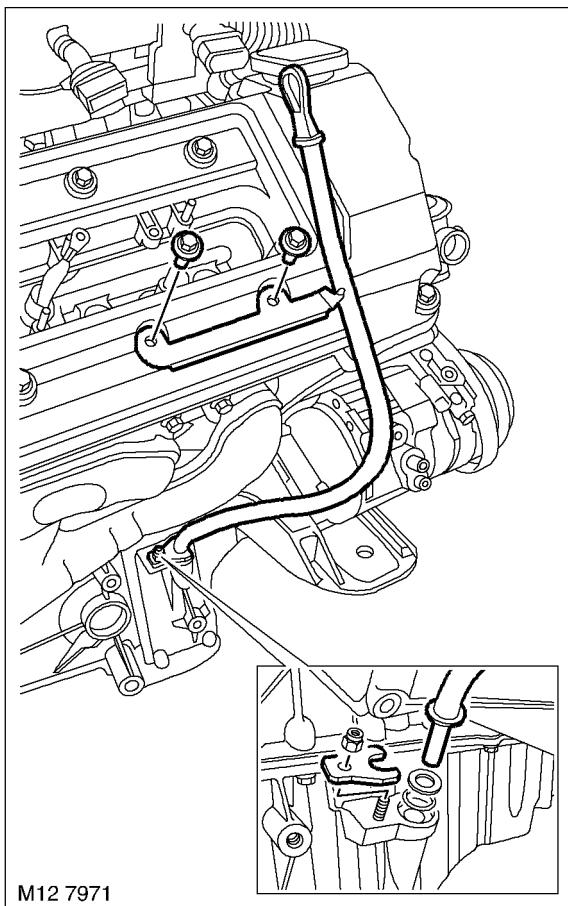


1. **LH camshaft cover:** Release clip and disconnect breather hose from camshaft cover.

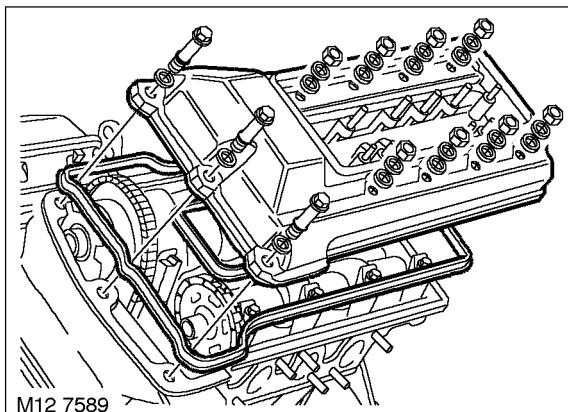


2. Remove 7 nuts securing ignition coils to camshaft cover. Remove 4 ignition coils.

# ENGINE - V8



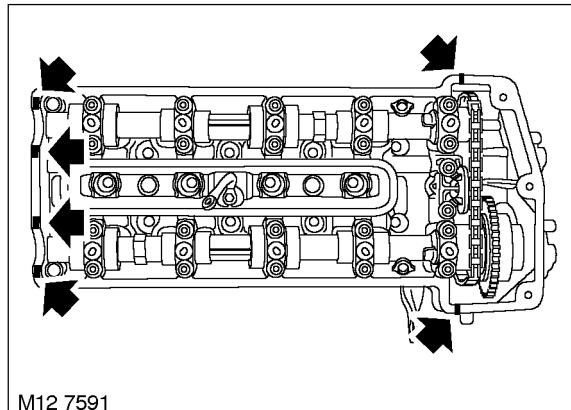
3. **RH camshaft cover:** Remove 2 nuts securing dipstick tube.
4. **RH camshaft cover:** Remove nut and clamp securing dipstick tube to oil sump.
5. **RH camshaft cover:** Remove dipstick tube and sealing washer, discard 'O' ring.



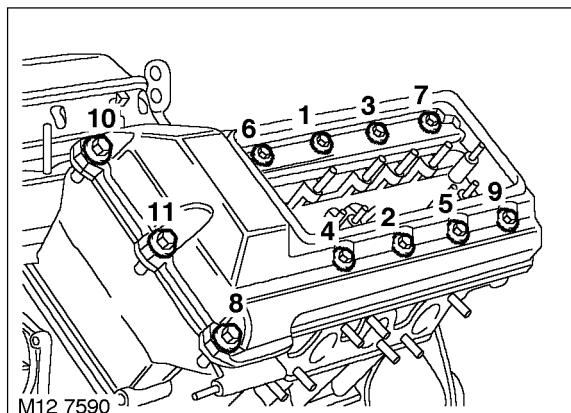
6. Remove 8 nuts and 3 bolts securing camshaft cover to cylinder head. Remove camshaft cover, discard 2 gaskets and 11 sealing washers.

## Reassembly

1. Clean camshaft cover and mating face of cylinder head.



2. Apply sealant STC 50550 to areas illustrated.
3. Fit 2 new gaskets and 11 new sealing washers to camshaft cover and fit to cylinder head.



4. Fit 8 nuts and 3 bolts securing camshaft cover and progressively tighten in sequence shown to 10 Nm (7 lbf.ft).
5. Fit 4 ignition coils.
6. Fit 7 nuts securing ignition coils to camshaft cover and tighten to 4 Nm (3 lbf.ft).
7. **RH camshaft cover:** Clean dipstick tube and mating face.
8. **RH camshaft cover:** Fit new 'O' ring and sealing washer to oil sump and position dipstick tube to oil sump.
9. **RH camshaft cover:** Fit and tighten nuts securing dipstick tube to 10 Nm (7 lbf.ft).
10. **RH camshaft cover:** Fit clamp securing dipstick tube to oil sump and tighten nut to 10 Nm (7 lbf.ft).
11. Connect breather hose to camshaft cover and secure with clip.

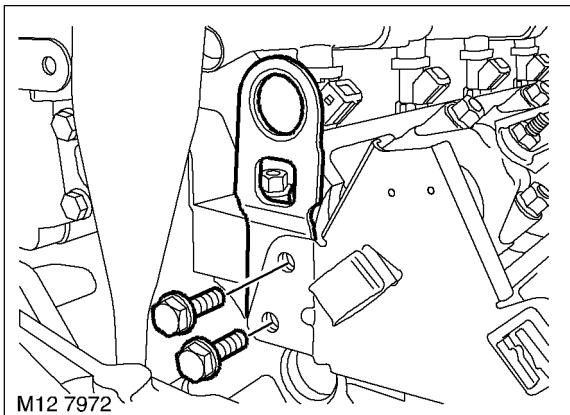


## Variable camshaft unit - variable camshaft control (VCC)

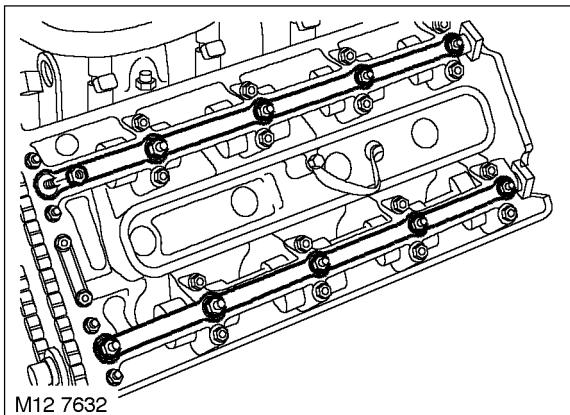
» **12.30.62.01**

### Remove

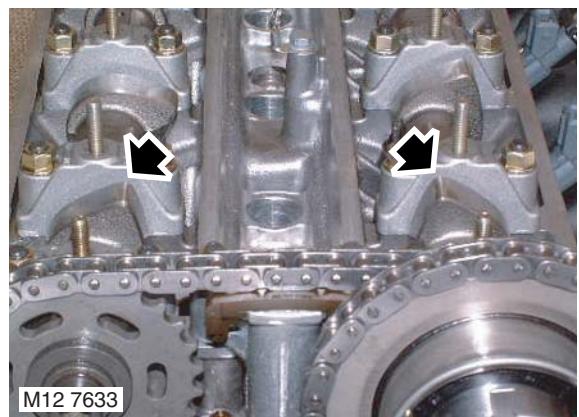
1. Remove camshaft covers.  
☞ **Engine - V8, OVERHAUL, Gasket - covers - camshaft.**
2. Remove 8 spark plugs.



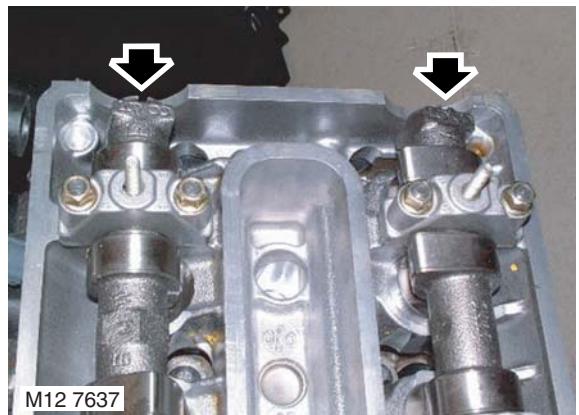
3. Remove 2 bolts securing engine lifting eye to rear of RH cylinder head and remove lifting eye.



4. Remove 20 nuts securing 4 camshaft oil lines to LH and RH cylinder heads and remove camshaft oil lines.



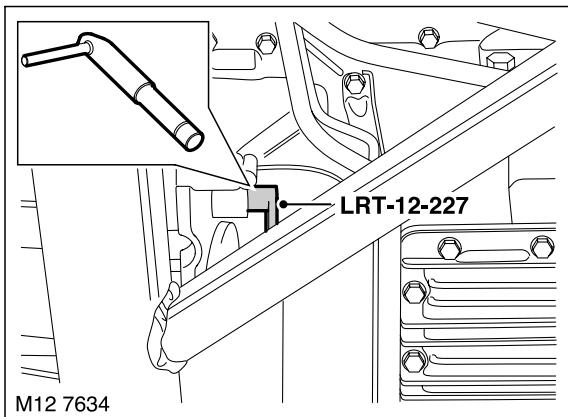
5. Rotate engine crankshaft pulley until cylinder 1 camshaft lobes are at TDC firing position.



6. The rear of the camshafts may appear twisted and out of alignment when cylinder 1 is in the TDC firing position.

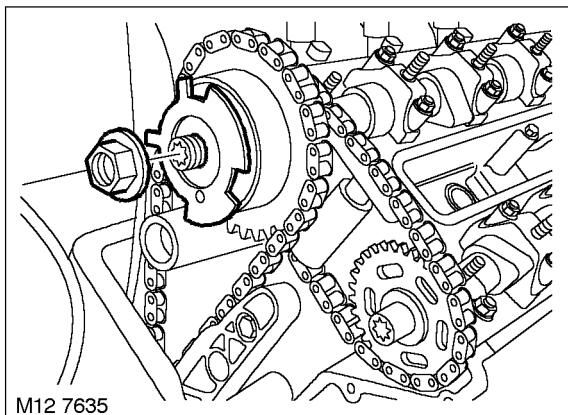
*NOTE: The twisting and apparent misalignment of the camshafts does not indicate incorrect engine timing.*

## ENGINE - V8

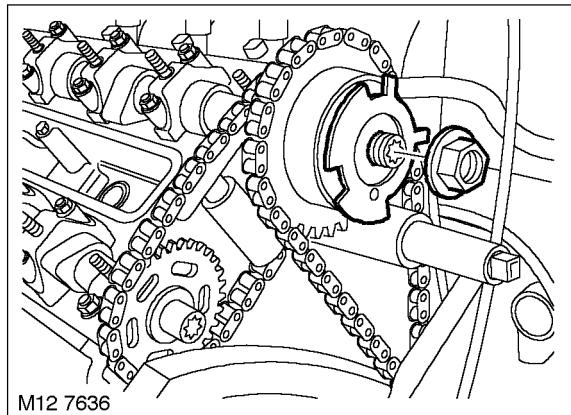


7. Position **LRT-12-227** through timing tool access hole and secure flywheel in TDC position.
8. Remove timing gear upper covers.  
☞ **Engine - V8, OVERHAUL, Cover - timing gear - upper.**

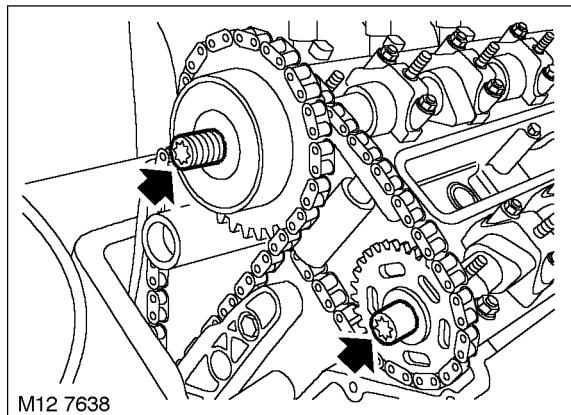
### Disassembly



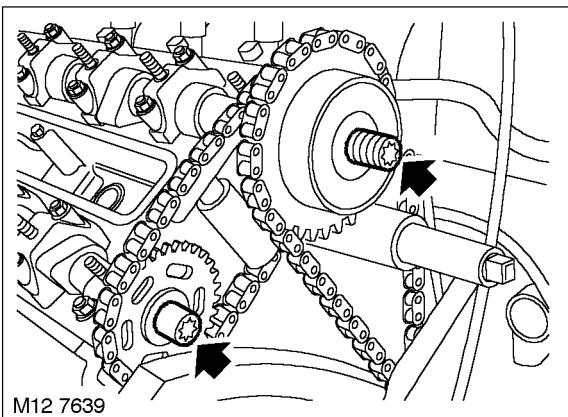
1. Remove nut securing LH CMP sensor ring and remove CMP sensor ring.  
*NOTE: Thread is left handed.*



2. Remove nut securing RH CMP sensor ring and remove CMP sensor ring.  
*NOTE: Thread is left handed.*



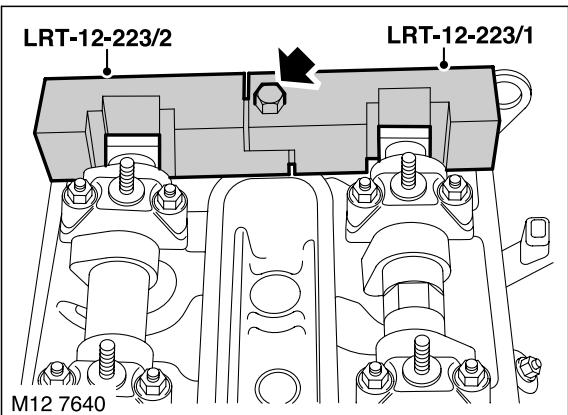
3. Loosen 2 Torx bolts securing LH VCC unit and LH exhaust camshaft sprocket 1/2 a turn.  
*NOTE: Thread is left handed.*



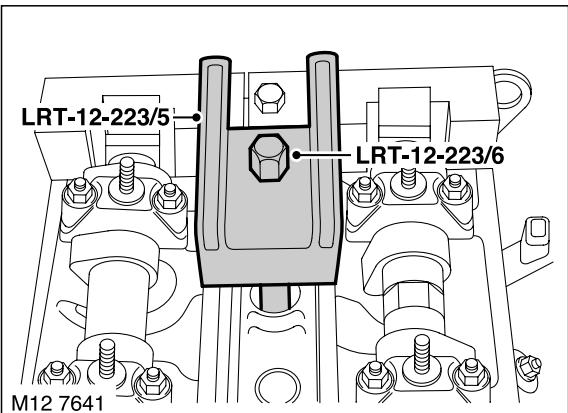
4. Loosen 2 Torx bolts securing RH VCC unit and RH exhaust camshaft sprocket 1/2 a turn.

*NOTE: Thread is left handed.*

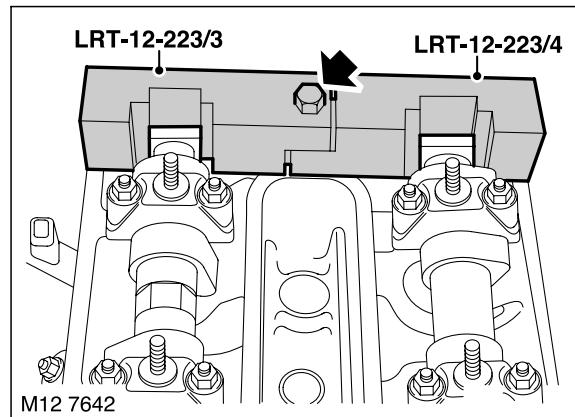
5. Loosen bolt securing **LRT-12-223/2** to **LRT-12-223/1**.



6. Fit **LRT-12-223/2** and **LRT-12-223/1** to rear of RH camshafts and tighten bolt securing tools.

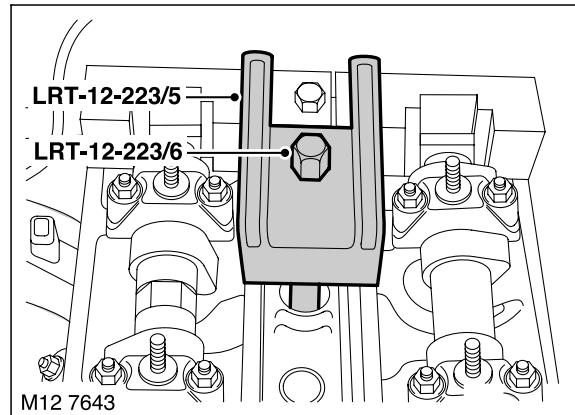


7. Fit **LRT-12-223/5**, **LRT-12-223/6** to RH cylinder head and tighten **LRT-12-223/6** into spark plug thread.



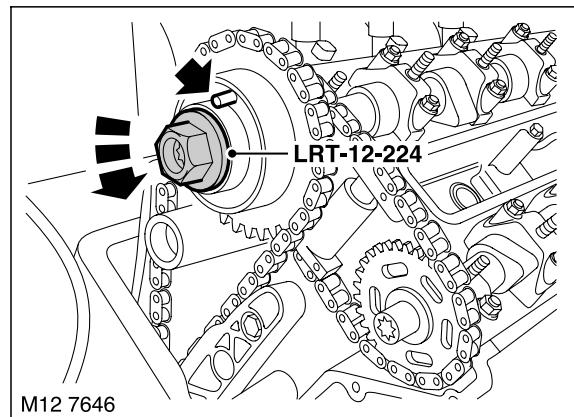
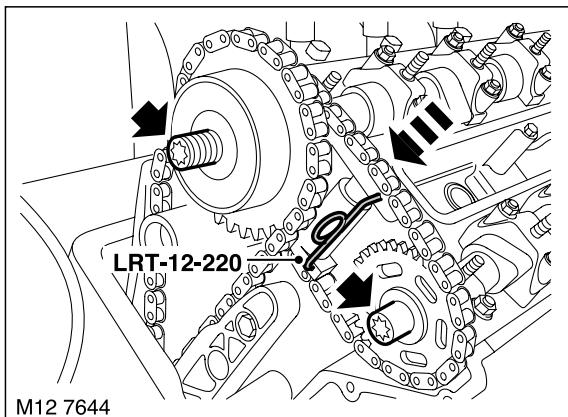
8. Loosen bolt securing **LRT-12-223/4** to **LRT-12-223/3**.

9. Fit **LRT-12-223/4** and **LRT-12-223/3** to rear of LH camshafts and tighten bolt securing tools.



10. Fit **LRT-12-223/5**, **LRT-12-223/6** to LH cylinder head and tighten **LRT-12-223/6** into spark plug thread.

## ENGINE - V8



11. Compress LH exhaust timing chain tensioner, fit **LRT-12-220** to chain tensioner and remove 2 Torx bolts securing LH VCC unit and LH exhaust camshaft sprocket.

*NOTE: Thread is left handed.*

12. Remove LH exhaust camshaft gear, LH exhaust camshaft chain and LH VCC unit.

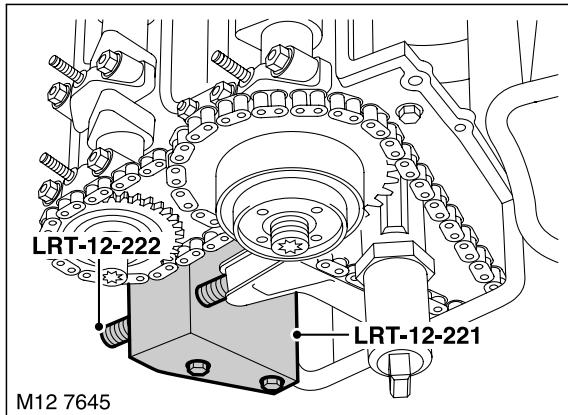
*NOTE: Secure chain to cylinder head to prevent chain falling into lower timing gear cover.*

### Reassembly

1. Position LH VCC unit to timing gear chain, fit VCC unit and exhaust camshaft sprocket to camshafts, fit and hand tighten 2 Torx bolts to eliminate excess play.

*NOTE: Thread is left handed.*

2. Compress LH exhaust timing chain tensioner and remove **LRT-12-220**.



3. Fit **LRT-12-221** to RH cylinder head, fit **LRT-12-222** to **LRT-12-221** and hand tighten.

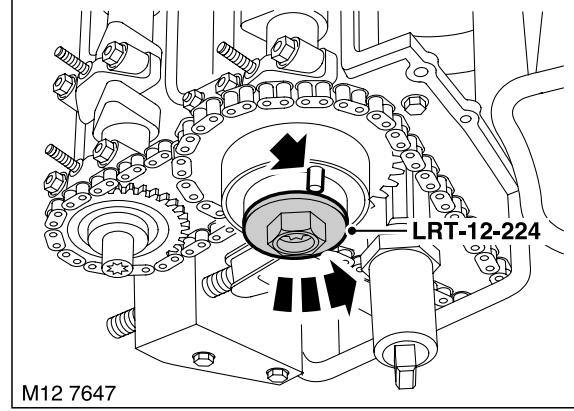
*NOTE: Only screw in adjustment bolt until slight resistance is present.*

4. Fit **LRT-12-224** to LH VCC unit, connect multimeter between pin on LH VCC unit and stud on LH oil line.
5. Rotate LH VCC unit anticlockwise using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

6. Tighten Torx bolts securing LH VCC unit and exhaust camshaft sprocket to 15 Nm (11 lbf.ft) and loosen one quarter of a turn.

*NOTE: Thread is left handed.*



7. Fit **LRT-12-224** to RH VCC unit, connect multimeter between pin on RH VCC unit and stud on RH oil line.



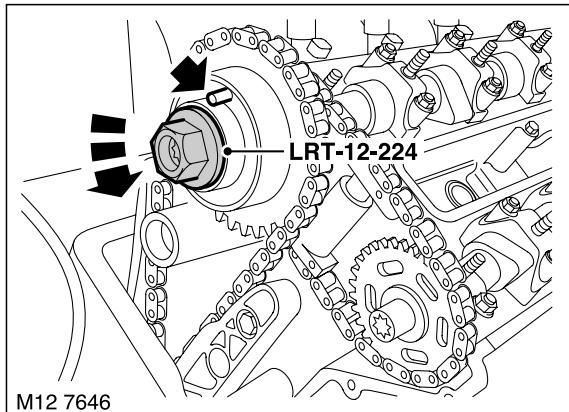
8. Rotate RH VCC unit anticlockwise using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

9. Tighten Torx bolts securing RH VCC unit and exhaust camshaft sprocket to 15 Nm (11 lbf.ft) and loosen one quarter of a turn.

*NOTE: Thread is left handed.*

10. Adjust chain tension by tightening **LRT-12-222** to 0.7 Nm (6.3 lbf.in).



11. Fit **LRT-12-224** to LH VCC unit, connect multimeter between pin on LH VCC unit and stud on LH oil line.

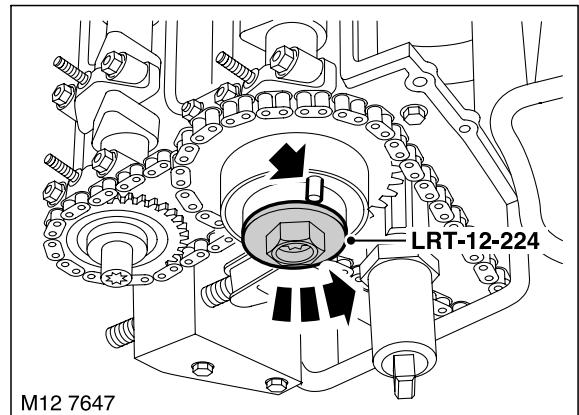
*NOTE: When the chain tension is adjusted the VCC unit will move and require adjusting to the LH stop.*

12. Rotate LH VCC unit anticlockwise using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

13. Tighten LH VCC unit Torx bolt to 110 Nm (81 lbf.ft) and LH exhaust camshaft sprocket Torx bolt to 125 Nm (92 lbf.ft).

*NOTE: Thread is left handed.*



14. Fit **LRT-12-224** to RH VCC unit, connect multimeter between pin on RH VCC unit and stud on RH oil line.

*NOTE: When the chain tension is adjusted the VCC unit will move and require adjusting to the LH stop.*

15. Rotate RH VCC unit anticlockwise using **LRT-12-224** to 40 Nm (30 lbf.ft) and using the multimeter, check continuity is present.

*NOTE: Rotating the VCC unit using LRT-12-224 will remove the oil cushion and make sure the VCC unit is at the full LH stop position. Continuity should be present when the VCC unit reaches this position.*

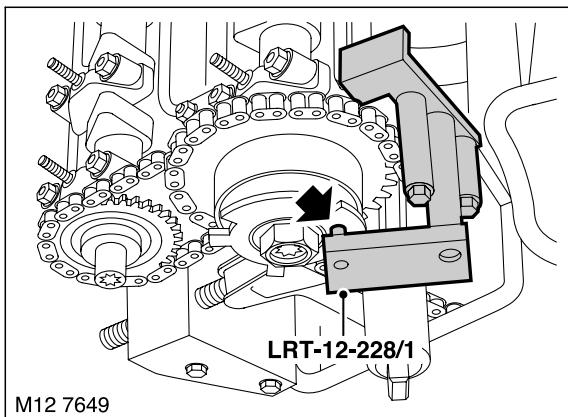
16. Tighten RH VCC unit Torx bolt to 110 Nm (81 lbf.ft) and RH exhaust camshaft sprocket Torx bolt to 125 Nm (92 lbf.ft).

*NOTE: Thread is left handed.*

17. Fit RH CMP sensor ring, fit and hand tighten securing nut.

*NOTE: Thread is left handed.*

## ENGINE - V8



18. Position **LRT-12-228/1** locating dowel to RH CMP sensor ring, fit 2 bolts securing tool to RH cylinder head and tighten.

*NOTE: To ensure correct CMP sensor ring adjustment, make sure the tool is aligned flush with the cylinder head and lower timing gear cover before tightening the tool securing bolts.*

19. Tighten nut securing CMP sensor ring to 40 Nm (30 lbf.ft) and remove **LRT-12-228/1** from RH cylinder head.

*NOTE: Thread is left handed.*

20. Fit LH CMP sensor ring, fit and hand tighten securing nut.

*NOTE: Thread is left handed.*

22. Tighten nut securing CMP sensor ring to 40 Nm (30 lbf.ft) and remove **LRT-12-228/2** from LH cylinder head.

*NOTE: Thread is left handed.*

23. Remove **LRT-12-223/5**, **LRT-12-223/6**, **LRT-12-223/2** and **LRT-12-223/1** from RH cylinder head camshafts.

24. Remove **LRT-12-223/6**, **LRT-12-223/5**, **LRT-12-223/3** and **LRT-12-223/4** from LH cylinder head camshafts.

25. Loosen **LRT-12-222**, remove 2 bolts securing **LRT-12-221** to RH cylinder head and remove **LRT-12-221**.

### Refit

1. Fit timing gear upper covers.

**Engine - V8, OVERHAUL, Cover - timing gear - upper.**

2. Remove **LRT-12-227** from timing tool access hole.

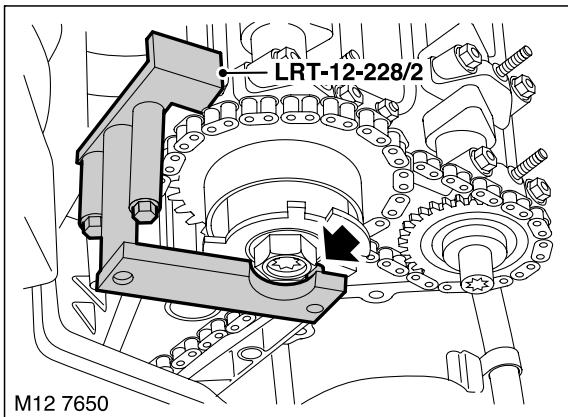
3. Fit 4 camshaft oil lines to LH and RH cylinder heads, fit and tighten 20 securing bolts.

4. Fit engine lifting eye to rear of RH cylinder head, fit and tighten 2 bolts securing engine lifting eye.

5. Fit and tighten 8 spark plugs to 23 Nm (17 lbf.ft).

6. Fit camshaft cover gaskets.

**Engine - V8, OVERHAUL, Gasket - covers - camshaft.**



21. Position **LRT-12-228/2** locating dowel to LH CMP sensor ring, fit 2 bolts securing tool to LH cylinder head and tighten.

*NOTE: To ensure correct CMP sensor ring adjustment, make sure the tool is aligned flush with the cylinder head and lower timing gear cover before tightening the tool securing bolts.*



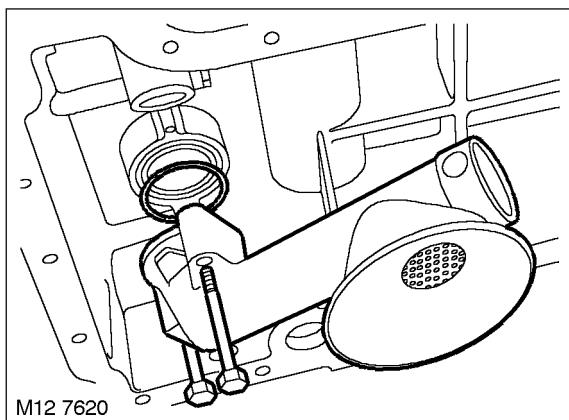
## Strainer - oil pick up

☞ 12.60.20.01

### Remove

1. Remove lower sump gasket.  
☞ Engine - V8, OVERHAUL, Gasket - sump bottom plate.

### Disassembly



1. Remove 2 bolts securing oil pick-up strainer to oil pump, remove strainer and discard 'O' ring.

### Inspect

1. Clean oil pick up strainer and mating faces.

### Reassembly

1. Fit new 'O' ring to oil pump groove location, position oil pick-up strainer to oil pump.
2. Fit 2 bolts securing oil pick-up strainer to oil pump and tighten bolts to 10 Nm (7 lbf.ft).

### Refit

1. Fit lower sump gasket.  
☞ Engine - V8, OVERHAUL, Gasket - sump bottom plate.

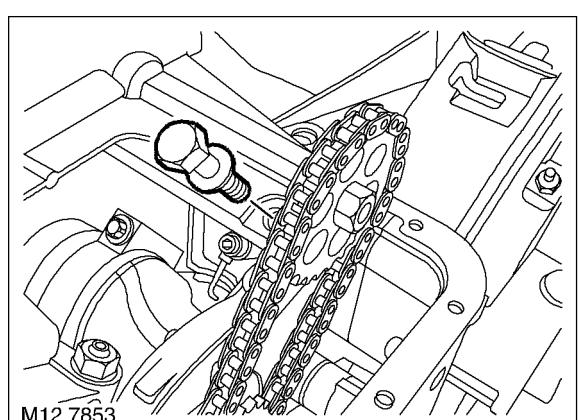
## Pump - engine oil

☞ 12.60.26.02

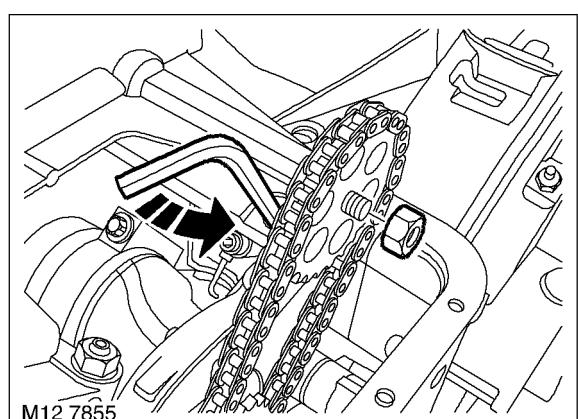
### Remove

1. Remove sump gasket.  
☞ Engine - V8, OVERHAUL, Gasket - oil sump.

### Disassembly



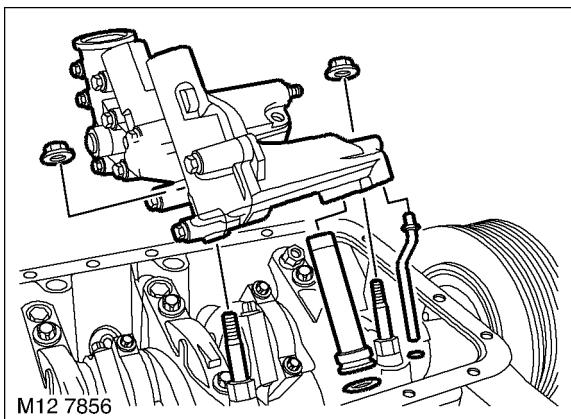
1. Remove bolt securing oil pump.



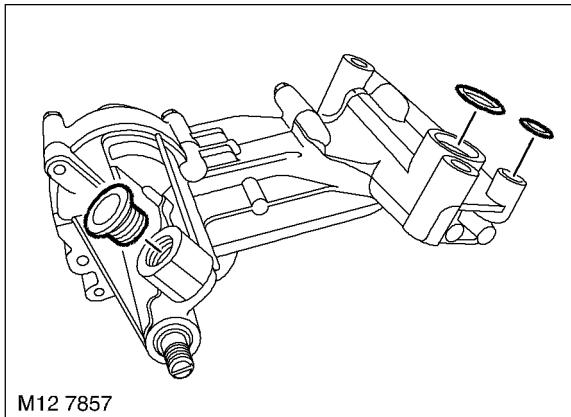
2. Rotate oil pump drive chain tensioning nut anti-clockwise to release the tension.
3. Remove nut securing gear to oil pump and remove the gear.

## ENGINE - V8

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4. Remove 2 nuts securing oil pump and remove the oil pump.



5. Remove oil feed and governing pipes from cylinder block, remove and discard 3 'O' rings.
6. Remove adjusting nut from oil pump.

### Inspect

1. Clean oil pipes, oil pump and mating faces.

### Reassembly

1. Lubricate new 'O' rings. Fit oil feed pipe 'O' rings to groove in pump and pipe and fit governing pipe 'O' ring to pipe.
2. Fit oil pipes to cylinder block.
3. Fit adjusting nut fully into the oil pump.
4. Lubricate the oil pump.
5. Fit oil pump, engage oil pipes and tighten 2 nuts securing the oil pump to 23 Nm (17 lbf.ft).

6. Clean the oil pump gear.
7. Fit oil pump gear to chain and oil pump. If necessary, rotate pump spindle to align the drive flats.
8. Fit nut securing gear to oil pump and tighten to 47 Nm (34 lbf.ft).
9. Rotate oil pump drive chain adjuster to give a deflection of 8 mm (0.314 in) to 12 mm (0.470) midway between sprockets.

*NOTE: The oil pump chain is adjusted by turning the Allen bolt spacer which is accessed through the oil pump securing bolt hole.*

10. Fit bolt securing oil pump and tighten to 23 Nm (17 lbf.ft).

### Refit

1. Fit sump gasket.  
 **Engine - V8, OVERHAUL, Gasket - oil sump.**

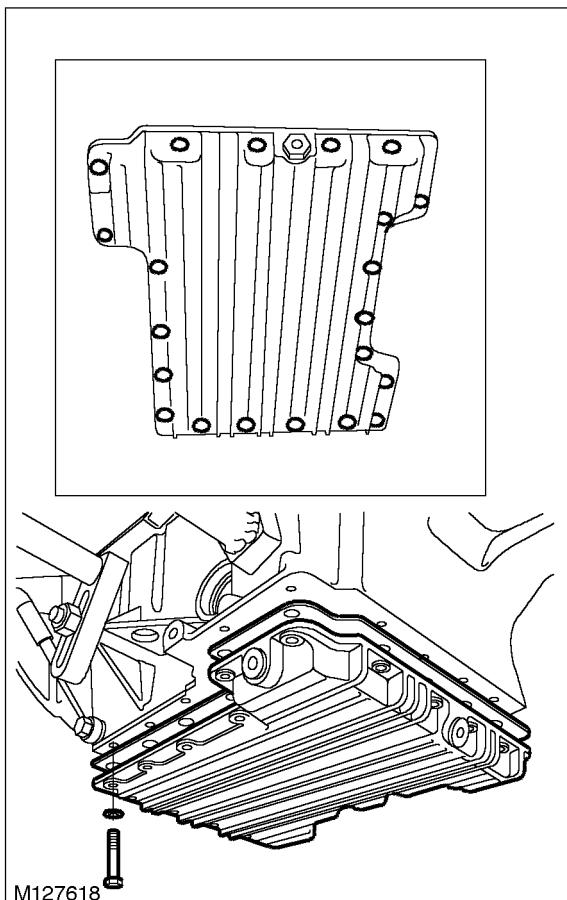


## Gasket - sump bottom plate

☞ 12.60.37.01

### Remove

1. Position container below engine sump drain plug, remove plug and discard sealing washer. Allow oil to drain.



2. Remove 21 bolts securing lower oil sump to upper oil sump. Remove lower oil sump and discard gasket.

### Disassembly

- 1.

### Inspect

- 1.

### Reassembly

- 1.

### Refit

1. Clean lower oil sump mating faces.
2. Fit new gasket to lower oil sump mating face.
3. Fit lower oil sump.

4. Fit 21 bolts securing lower oil sump and tighten to 10 Nm (7 lbf.ft).
5. Clean sump drain plug, fit new sealing washer and tighten to 25 Nm (18 lbf.ft).
6. Fill engine with oil.

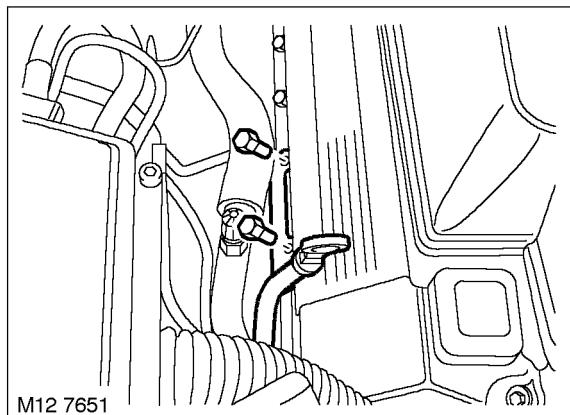
# ENGINE - V8

## Gasket - oil sump

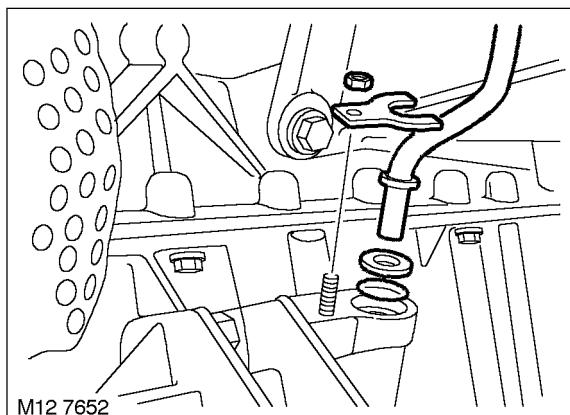
→ 12.60.38.01

### Remove

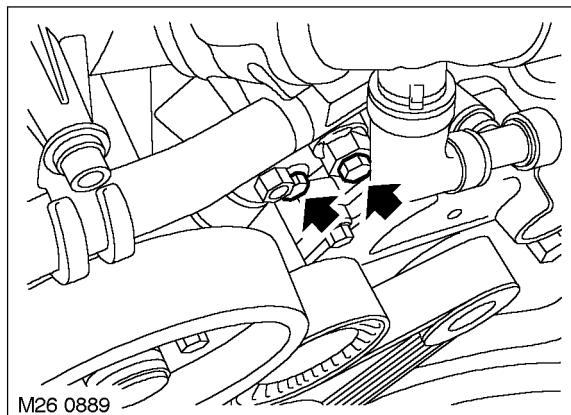
1. Remove dipstick.



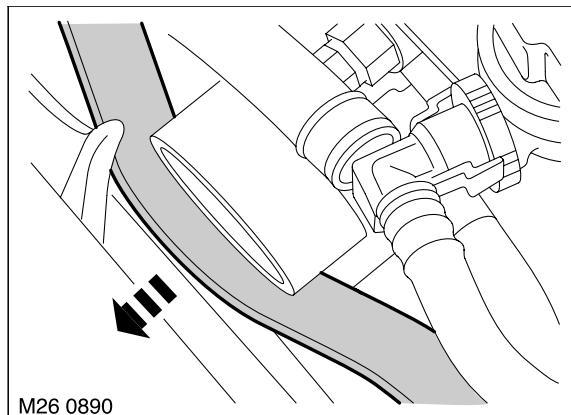
2. Remove 2 nuts securing dipstick tube bracket to camshaft cover.



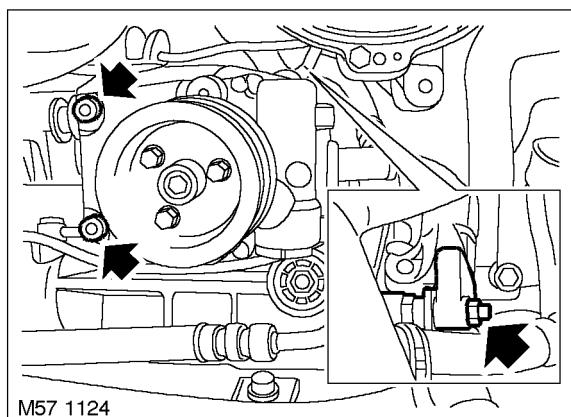
3. Remove nut and clamp securing dipstick tube to oil sump. Remove dipstick tube and sealing washer. Discard 'O' ring.



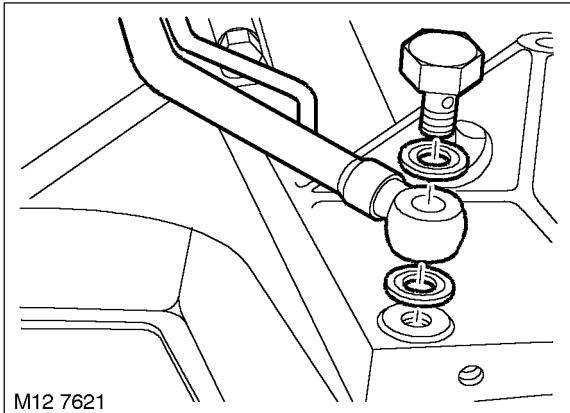
4. Loosen 2 bolts securing ancillary drive belt tensioner and release tension from the belt.



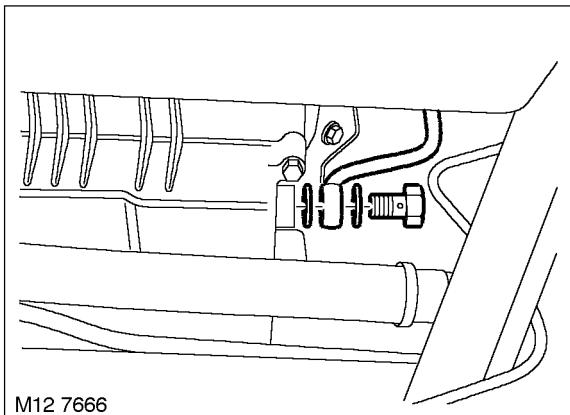
5. Remove ancillary drive belt.



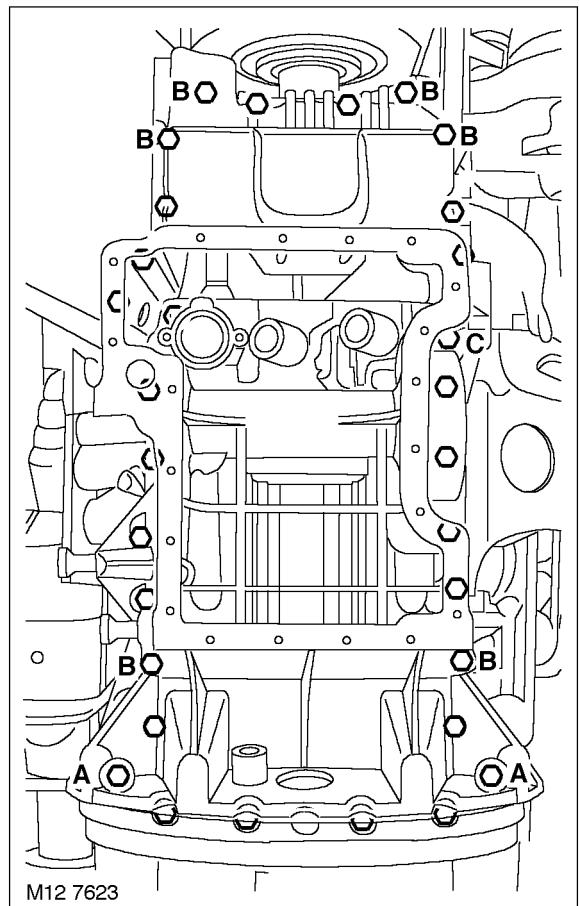
6. Remove 2 Allen bolts and one nut securing PAS pump, remove pump.
7. Remove oil pick-up strainer.  
→ Engine - V8, OVERHAUL, Strainer - oil pick up.

**Disassembly**

1. Remove banjo bolt securing engine oil return pipe to oil sump and discard 2 sealing washers.



2. Remove banjo bolt securing engine oil filter return pipe to oil sump and discard 2 sealing washers.



3. Remove 31 bolts securing oil sump to engine cylinder block.

*NOTE: Note position of all bolts as they are different lengths;*

- A=M8 x 60mm
- B=M6 x 80mm
- C=M6 x 40mm.
- All remaining bolts are M6 x 20mm.

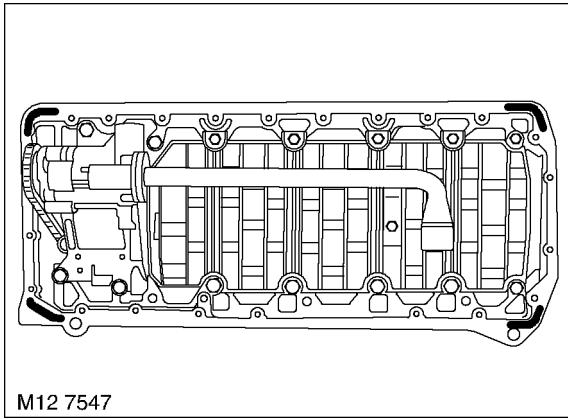
4. Remove oil sump and discard gasket.

**Inspect**

1. Clean oil sump and gasket mating faces.

# ENGINE - V8

## Reassembly



1. Apply a 2 mm bead of sealant to areas illustrated.
2. Fit new gasket, position oil sump to cylinder block, fit bolts but do not tighten at this stage.  
*NOTE: Note position of 6 mm bolts as they are two different lengths.*
3. Tighten 31 bolts securing upper oil sump to cylinder block ,M6 x 8.8mm to 10 Nm (7 lbf.ft), M6 x 10.9mm to 12 Nm (9 lbf.ft) and M8 x 8.8mm to 22 Nm (16 lbf.ft).
4. Clean engine oil filter and return pipe mating faces.
5. Fit 2 new sealing washers, fit banjo bolt securing engine oil filter return pipe to oil sump and tighten to 30 Nm (22 lbf.ft).

## Refit

1. Fit oil pick-up strainer.  
☞ **Engine - V8, OVERHAUL, Strainer - oil pick up.**
2. Clean PAS pump and mating faces.
3. Position PAS pump to mounting, fit Allen bolts and securing nut. Tighten Allen bolts to 10 Nm (7 lbf.ft) and securing nut to 25 Nm (18 lbf.ft).
4. Clean ancillary drive belt pulleys.
5. Fit ancillary drive belt, rotate tensioner fully clockwise and tighten tensioner bolts to 22 Nm (16 lbf.ft).
6. Clean dipstick tube and mating face.
7. Fit new 'O' ring and sealing washer to oil sump and position dipstick tube to oil sump.
8. Fit nuts securing dipstick tube to camshaft cover and tighten to 10 Nm (7 lbf.ft).
9. Fit clamp securing dipstick tube and tighten nut to 10 Nm (7 lbf.ft).
10. Fit dipstick.

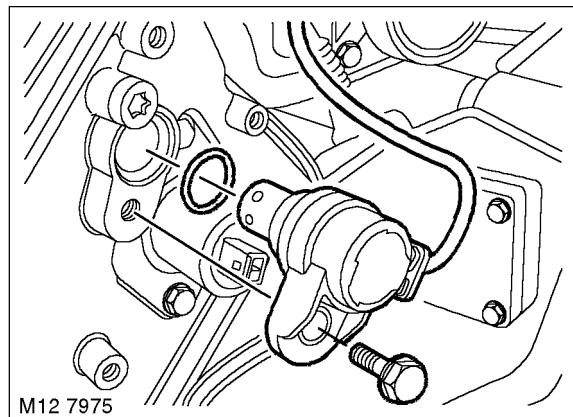
## Cover - timing gear - upper

☞ **12.65.41.01**

This procedure covers both LH and RH timing gear upper covers.

### Remove

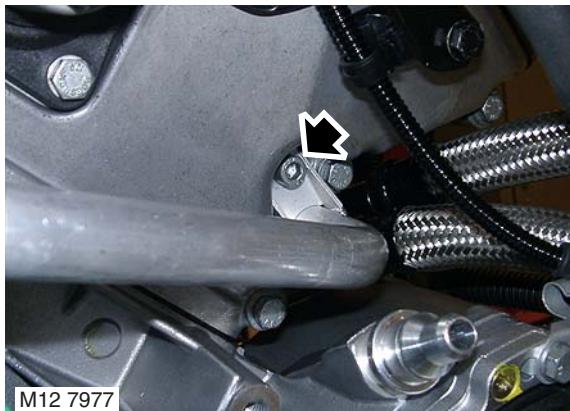
1. Remove camshaft cover.  
☞ **Engine - V8, OVERHAUL, Gasket - covers - camshaft.**
2. Remove VCC solenoid valve.  
☞ **Engine - V8, OVERHAUL, Variable camshaft unit - variable camshaft control (VCC).**



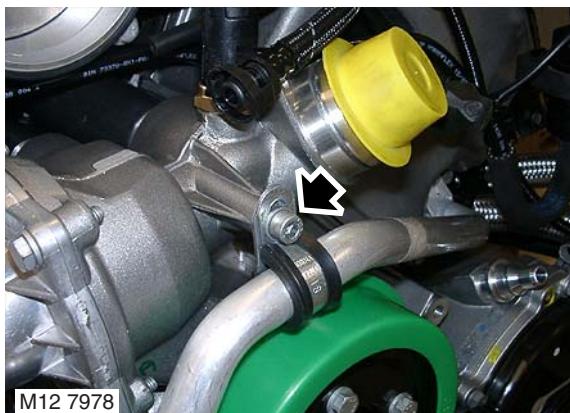
3. Remove bolt securing CMP sensor and remove sensor. Discard 'O' ring.



4. Remove bolt securing SAI pipe to RH cylinder head.

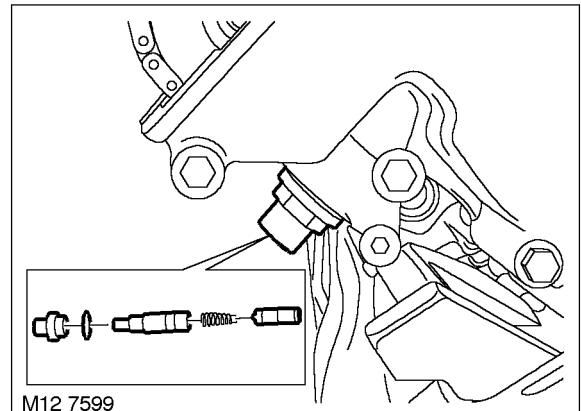


- Remove bolt securing SAI pipe to LH cylinder head.

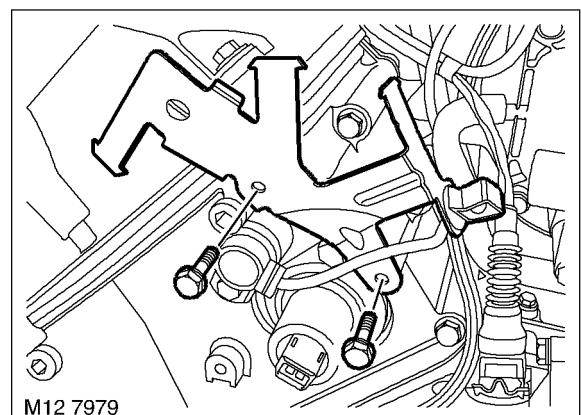


- Remove Allen bolt securing secondary air injection SAI pipe clip to coolant pump.
- Release SAI pipe from cylinder heads and position aside, discard 'O' rings.

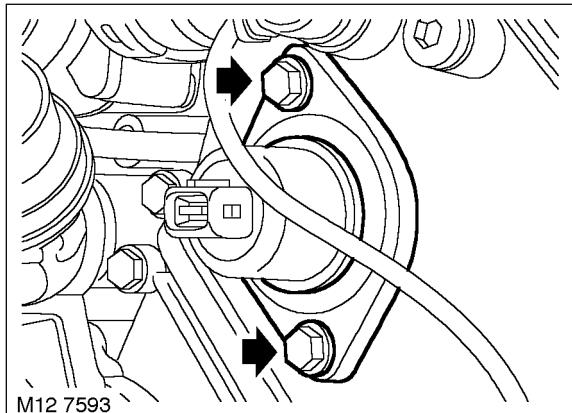
#### Disassembly



- RH upper timing gear cover:** Remove chain tensioner from timing gear cover and discard sealing washer.
- RH upper timing gear cover:** Separate chain tensioner body and allow oil to drain.

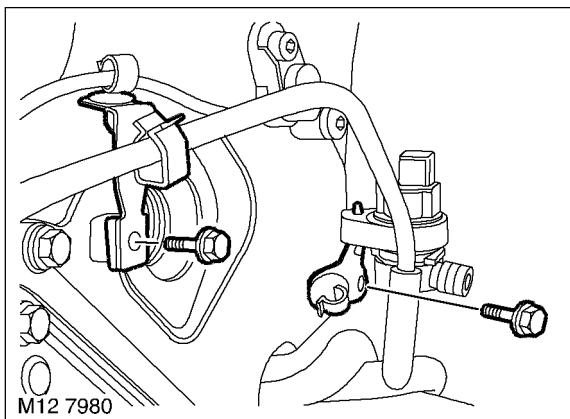


- RH upper timing gear cover:** Remove 2 bolts securing engine harness bracket to RH timing gear cover and remove bracket.

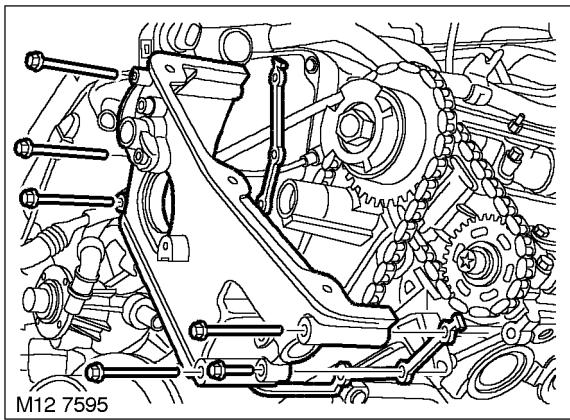


- RH upper timing gear cover:** Remove 2 bolts securing VCC solenoid seal and remove seal.

## ENGINE - V8

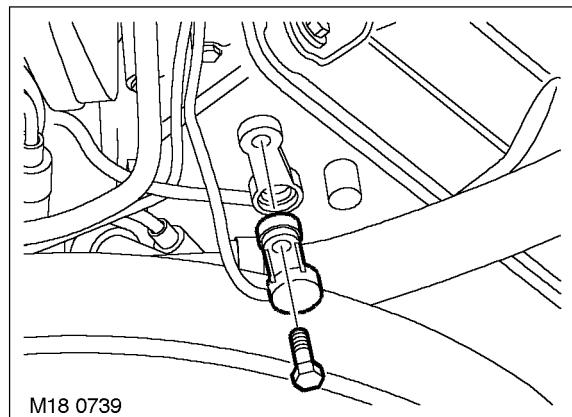


5. Remove 2 bolts securing 2 brackets to upper timing gear cover and remove brackets.



6. Remove 6 bolts securing timing gear cover to cylinder head and remove timing gear cover.
7. Discard timing gear cover gasket.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



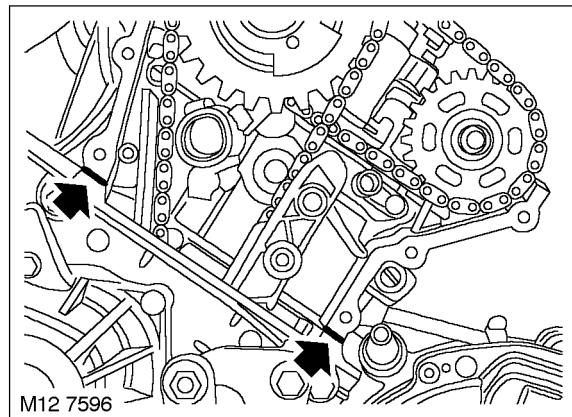
8. Remove bolt securing CMP sensor and remove sensor.
9. Discard 'O' ring.

### Inspect

1. Clean CMP sensor and mating face.

### Reassembly

1. Fit new 'O' ring to CMP sensor.
2. Fit CMP sensor, fit bolt and tighten to 10 Nm (7 lbf.ft).
3. Clean timing gear cover and mating face, clean dowels and dowel holes.
4. Remove bolt securing CMP sensor and remove sensor.



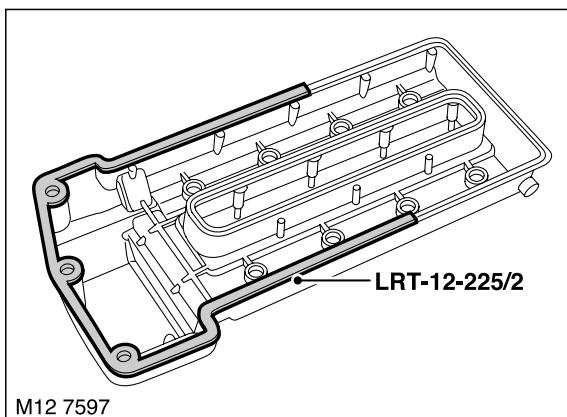
5. Apply sealant STC 50550 to areas illustrated.
6. Fit RH lower bolt to timing gear cover and position cover to cylinder head.

*NOTE: It is not possible to fit the RH lower bolt after fitting the LH upper timing gear cover.*

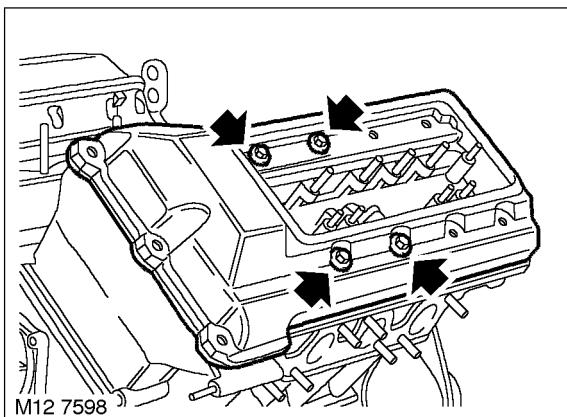
7. Fit remaining 5 bolts and hand tighten 6 bolts securing timing cover.

**Refit**

1. Fit 2 new 'O' rings to SAI pipe and position SAI pipe to engine. Fit 3 bolts and tighten 3 bolts securing SAI pipe to 10 Nm 7 (lbf.ft).
2. Fit LH VCC solenoid valve.  
☞ **Engine - V8, OVERHAUL, Variable camshaft unit - variable camshaft control (VCC).**
3. Fit LH camshaft cover.  
☞ **Engine - V8, OVERHAUL, Gasket - covers - camshaft.**



- 8. Fit LRT-12-225/2 to LH camshaft cover.**



9. Fit camshaft cover and tool, fit 4 bolts and tighten to 10 Nm (7 lbf.ft).
10. Tighten bolts securing timing gear cover to 15 Nm (11 lbf.ft).
11. Position 2 brackets to timing gear cover, fit bolts and tighten.
12. Remove 4 bolts securing camshaft cover, remove camshaft cover and **LRT-12-225/2**.
13. **RH upper timing gear cover:** Fit new sealing washer, fit timing chain tensioner and tighten plug securing chain tensioner to 40 Nm (30 lbf.ft).
14. **RH upper timing gear cover:** Clean RH VCC solenoid seal and mating faces.
15. **RH upper timing gear cover:** Lubricate inner mating face of VCC solenoid seal.
16. **RH upper timing gear cover:** Fit VCC solenoid seal, fit bolts and tighten.

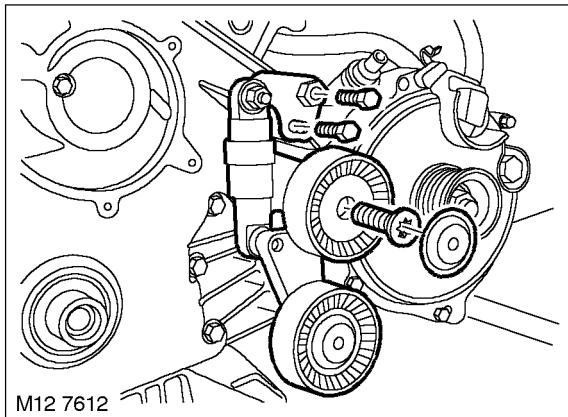
# ENGINE - V8

## Cover - timing gear - lower

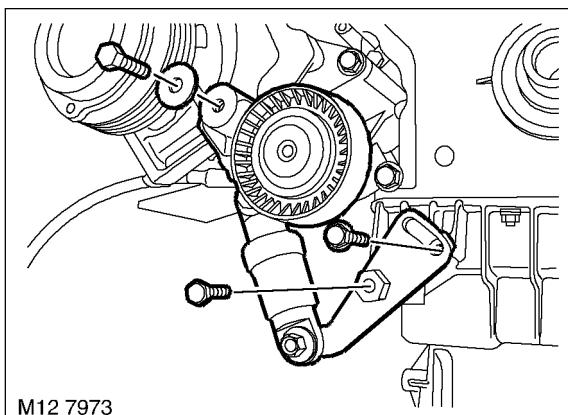
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### Remove

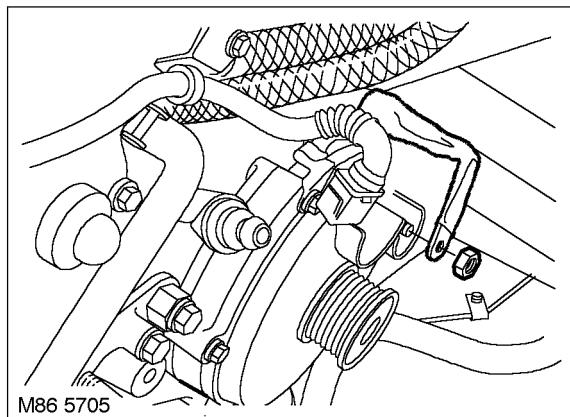
1. Remove timing gear upper covers.  
→ Engine - V8, OVERHAUL, Cover - timing gear - upper.
2. Remove crankshaft front oil seal.  
→ Engine - V8, OVERHAUL, Oil seal - crankshaft - front.



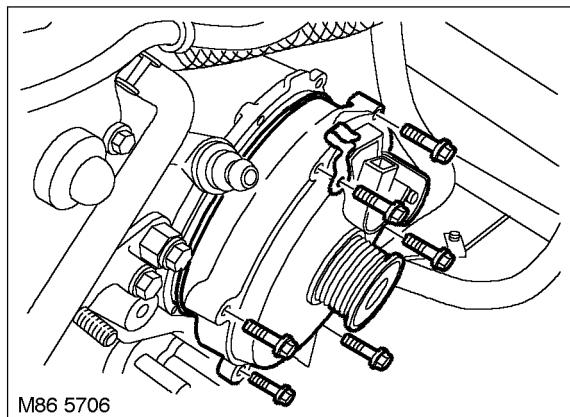
3. Remove 2 bolts securing ancillary drive belt tensioner to lower timing gear cover.
4. Remove dust cap from ancillary drive belt tensioner idler pulley and remove Torx bolt securing ancillary drive belt tensioner idler pulley.
5. Remove ancillary drive belt tensioner assembly.



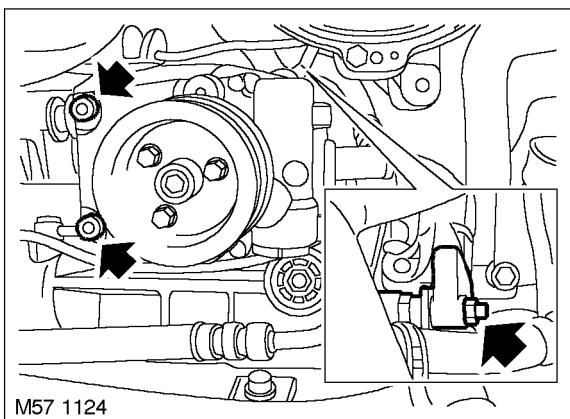
6. Remove 2 bolts securing A/C compressor drive belt tensioner.
7. Remove remaining bolt securing A/C compressor drive belt tensioner and remove tensioner.



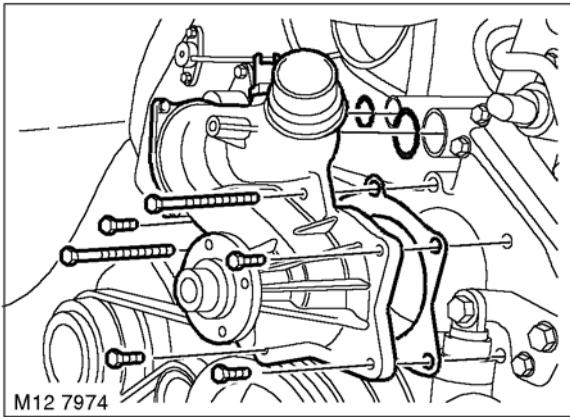
8. Remove nut and disconnect battery cable from alternator.
9. Release battery cable from lower timing gear cover.



10. Remove 6 alternator securing bolts and alternator harness securing clip.
11. Release and remove alternator from engine timing cover.
12. Discard alternator 'O' ring.

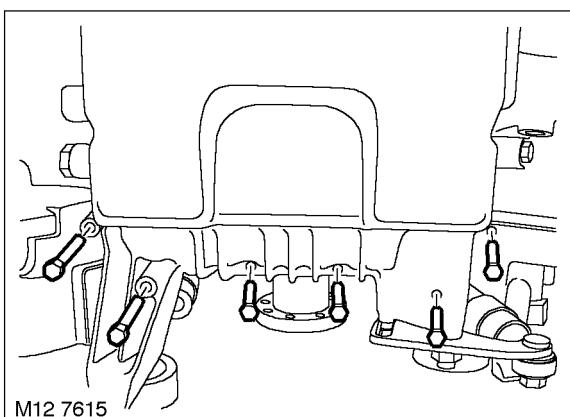


- 13.** Remove 2 Allen bolts and 1 nut securing PAS pump and move aside.

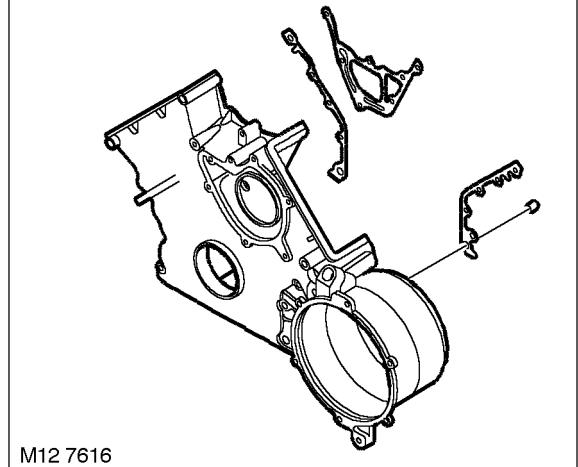
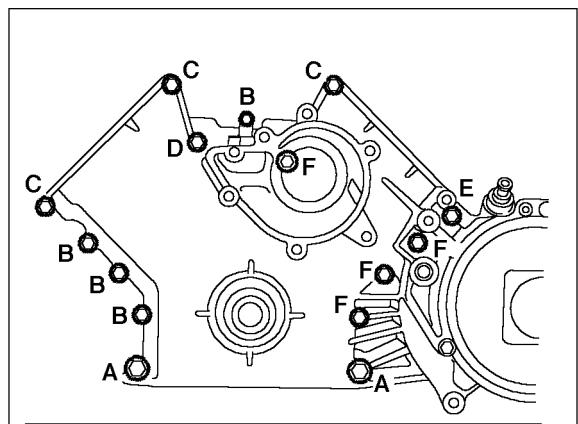


- 14.** Remove 6 bolts securing coolant pump  
**15.** Support coolant rail pipes and remove coolant pump, remove and discard coolant pump 'O' rings.

### Disassembly



- 1.** Remove 6 bolts securing lower timing gear cover to upper sump.



- 2.** Remove 15 bolts securing lower timing gear cover to cylinder block.

*NOTE: Note position of all bolts as they are different lengths:*

- A = M8 x 75 mm
- B = M6 x 40 mm
- C = M6 x 85 mm
- D = M6 x 80 mm
- E = M8 x 90 mm,
- F = M6 x 60 mm.

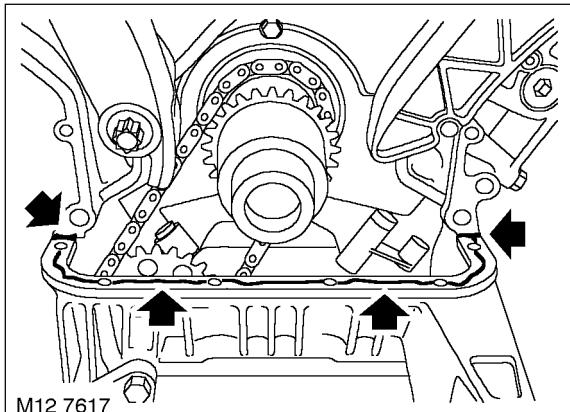
- 3.** Remove lower timing gear cover.  
**4.** Discard 3 lower timing gear cover gaskets.

### Inspect

- 1.** Clean timing gear cover and mating faces, clean dowels and dowel holes.

# ENGINE - V8

## Reassembly



12. Fit ancillary drive belt tensioner assembly, fit Torx bolt securing ancillary drive belt tensioner idler pulley and tighten Torx bolt.
13. Fit dust cap to ancillary drive belt tensioner idler pulley.
14. Fit 2 bolts securing ancillary drive belt tensioner to timing gear cover but do not tighten at this stage.
15. Fit crankshaft front oil seal.  
 **Engine - V8, OVERHAUL, Oil seal - crankshaft - front.**
16. Fit timing gear upper covers.  
 **Engine - V8, OVERHAUL, Cover - timing gear - upper.**

1. Apply sealant STC 50550 to areas illustrated.
2. Fit 3 new lower timing gear cover gaskets.
3. Fit lower timing gear cover.
4. Fit 15 bolts securing lower timing gear cover to cylinder block and initially tighten to 5 Nm (4 lbf.ft).
5. Tighten 6 mm bolts securing lower timing gear cover to 10 Nm (7 lbf.ft) and 8 mm bolts securing lower timing gear cover to 22 Nm (16 lbf.ft).
- CAUTION: Check torque of all bolts once they have been tightened down.**
6. Fit 6 bolts securing lower timing gear cover to upper oil sump and tighten to 12 Nm (9 lbf.ft).

## Refit

1. Lubricate new 'O' rings and fit to sealing grooves in coolant pump.
2. Clean coolant pump housing and mating faces.
3. Fit new gasket to coolant pump, fit pump to engine and secure with bolts tighten bolts to 10 Nm (7 lbf.ft).
4. Position PAS pump to mounting, fit Allen bolts and securing nut. Tighten Allen bolts to 10 Nm (7 lbf.ft) and securing nut to 25 Nm (18 lbf.ft).
5. Clean alternator and engine timing gear cover mating face.
6. Lubricate and fit new 'O' ring to alternator.
7. Fit alternator and tighten securing bolts.
8. Secure battery cable to lower timing gear cover.
9. Connect battery lead to alternator and tighten nut securing battery lead to alternator to 13 Nm (10 lbf.ft).
10. Position A/C compressor drive belt tensioner and secure with bolt but do not tighten at this stage.
11. Fit 2 bolts securing A/C compressor drive belt tensioner to upper sump but do not tighten at this stage.



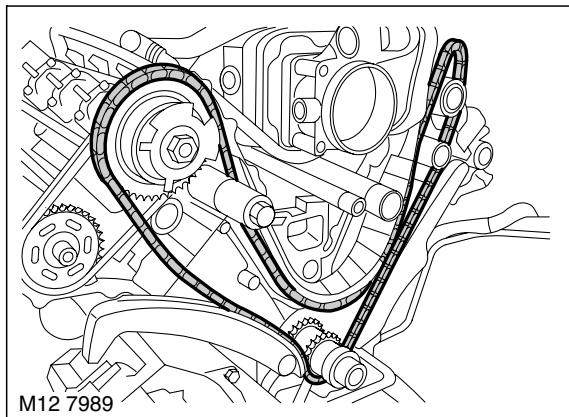
## Timing chain & guides

» **12.65.49.01**

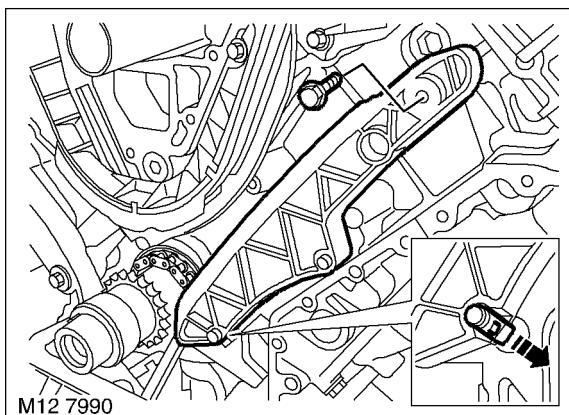
### Remove

1. Remove LH VCC unit.  
☞ **Engine - V8, OVERHAUL, Variable camshaft unit - variable camshaft control (VCC).**
2. Remove lower timing gear cover.  
☞ **Engine - V8, OVERHAUL, Cover - timing gear - lower.**

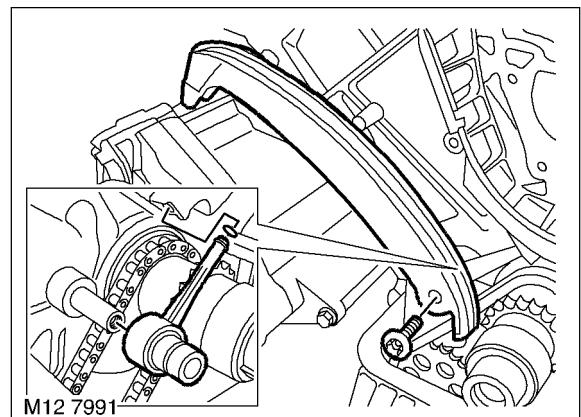
### Disassembly



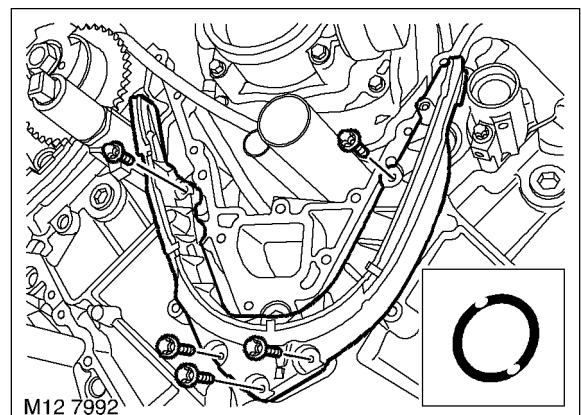
1. Remove timing chain.



2. Remove bolt securing LH timing chain guide.
3. Release clip securing LH timing chain guide and remove guide.



4. Remove Torx bolt securing RH timing chain tensioner guide.
5. Remove tensioner guide and discard 'O' ring.



6. Remove 5 Torx bolts securing timing chain centre guide.
7. Remove centre guide and discard 'O' ring, seal and restrictor.

### Inspect

1. Clean timing chain gears.
2. Check timing chain gears for excessive wear.

# ENGINE - V8

## Reassembly

1. Fit and lubricate new restrictor, seal and 'O' ring to centre timing chain guide.
2. Position centre timing chain guide and secure with Torx bolts, tighten to 10 Nm (7 lbf.ft).
3. Fit and lubricate 'O' ring to RH timing chain tensioner guide.
4. Fit RH timing chain tensioner guide and secure with Torx bolt tighten to 45 Nm (33 lbf.ft).
5. Fit LH timing chain guide and secure retaining clip.
6. Fit bolt to secure LH timing chain guide and tighten to 10 Nm (7 lbf.ft).
7. Lubricate timing chain with clean engine oil.
8. Fit timing chain to crankshaft sprocket and RH VCC unit.

*NOTE: The timing chain may be fitted in any position to the crankshaft sprocket and RH VCC unit sprocket.*

9. Secure timing chain to LH cylinder head until LH VCC unit is fitted.

## Refit

1. Fit lower timing gear cover.  
 **Engine - V8, OVERHAUL, Cover - timing gear - lower.**
2. Fit LH VCC unit.  
 **Engine - V8, OVERHAUL, Variable camshaft unit - variable camshaft control (VCC).**

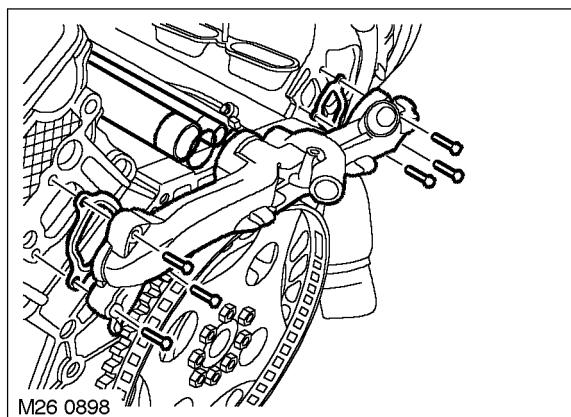
## Pipe(s) - water pump to coolant manifold

 **26.31.25.01**

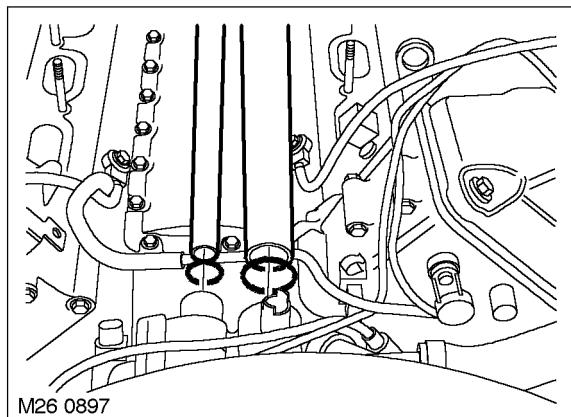
### Remove

1. Remove induction manifold.  
 **Engine - V8, OVERHAUL, Gasket(s) - induction manifold.**

### Disassembly



1. Remove 6 bolts securing coolant manifold to cylinder heads.
2. Remove coolant manifold.
3. Remove and discard coolant manifold gaskets.



4. Remove 2 coolant pipes from coolant pump.
5. Discard 'O' rings.

### Inspect

1. Clean gasket mating faces.
2. Clean 'O' ring grooves and ends of coolant pipes.



### Reassembly

1. Lubricate new 'O' rings with rubber grease and fit to grooves in coolant pump and coolant manifold.
2. Fit coolant pipes to the coolant pump.
3. Position new gaskets and coolant manifold to cylinder heads, fit bolts and tighten to 10 Nm (7 lbf.ft).

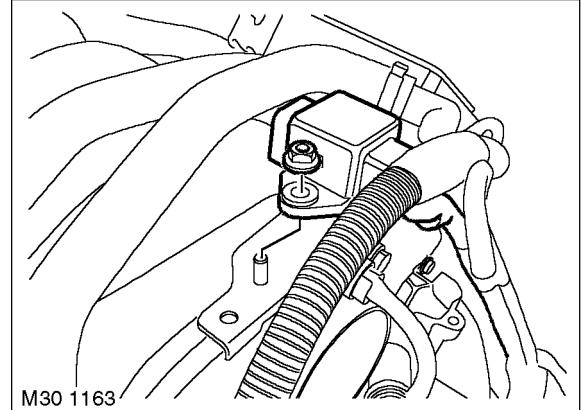
### Refit

1. Fit induction manifold.
- Engine - V8, OVERHAUL, Gasket(s) - induction manifold.**

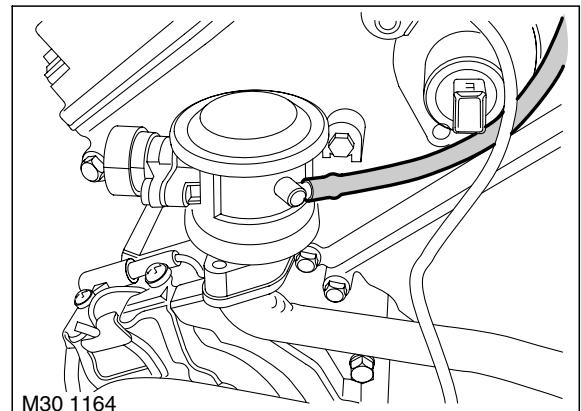
### Gasket(s) - induction manifold

☞ **30.15.08.01**

### Disassembly

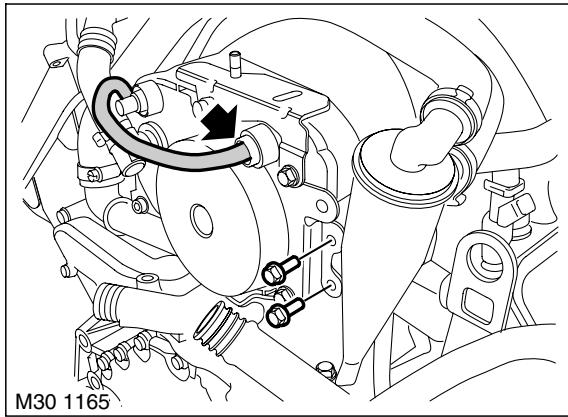


1. Remove nut securing positive terminal to bracket on inlet manifold and release terminal from bracket.

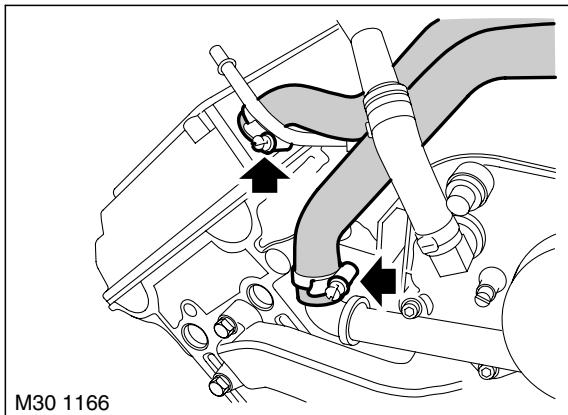


2. Disconnect vacuum hose from secondary air injection (SAI) control valve.
- CAUTION: Always fit plugs to open connections to prevent contamination.**

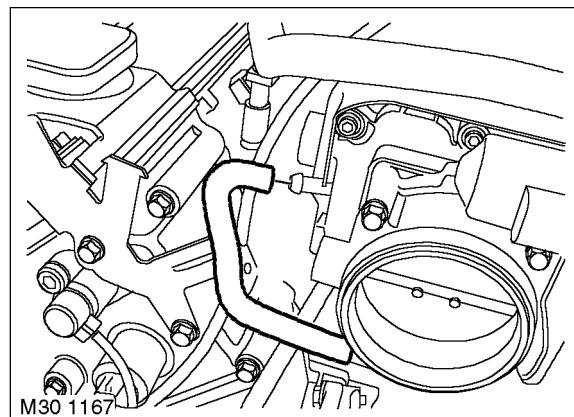
## ENGINE - V8



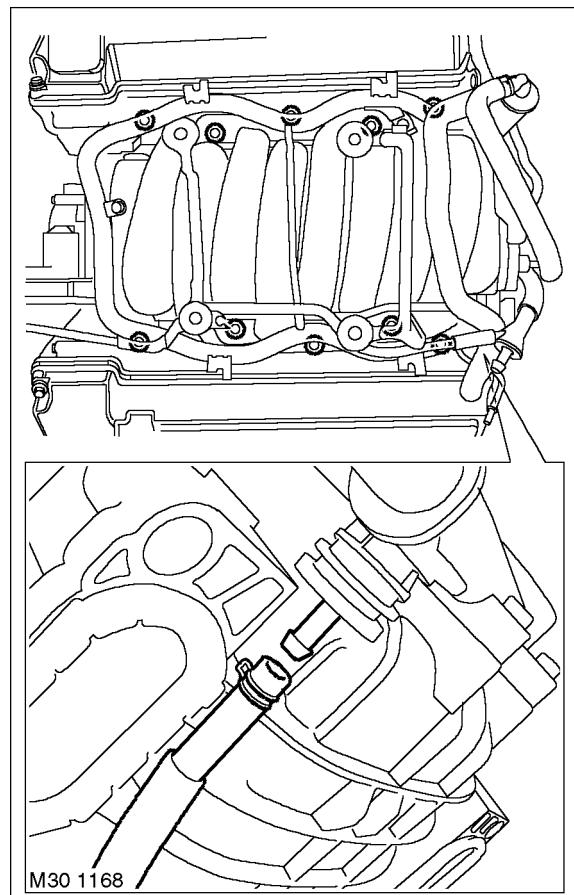
3. Disconnect SAI vacuum hose from inlet manifold end cover, note fitted position and remove reservoir and vacuum switch from inlet manifold.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**
4. Remove 2 bolts securing engine breather separator to bracket on inlet manifold and move the separator aside.



5. Loosen clip and disconnect engine breather hose from inlet manifold end cover.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**
6. Loosen clip and disconnect engine breather hose from LH camshaft cover.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**



7. Disconnect purge control valve hose from inlet manifold.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**



8. Remove 10 nuts securing induction manifold to cylinder heads and remove 10 spacers.
9. Raise inlet manifold for access to manifold drain hose.



10. Release clip and disconnect drain hose from inlet manifold. Discard clip.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

11. Remove induction manifold and discard 4 gaskets.

#### **Reassembly**

1. Fit new gaskets to inlet manifold.
2. Position inlet manifold, connect drain hose and secure the hose with a new clip.
3. Fit inlet manifold to studs, fit spacers and tighten nuts evenly and progressively to 15 Nm (11 lbf.ft).
4. Connect purge control valve hose to inlet manifold.
5. Connect engine breather hoses and tighten hose clips.
6. Position engine breather separator to bracket and tighten bolts to 6 Nm (4.4 lbf.ft).
7. Position SAI vacuum switch and reservoir to inlet manifold, connect hose to inlet manifold end cover.
8. Connect vacuum hose to SAI control valve.
9. Fit positive terminal to bracket on inlet manifold and tighten nut to 10 Nm (7 lbf.ft).

## **ENGINE - V8**

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## Evaporative loss control system (EVAPS) - leak test - NAS

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### » 17.90.02.01

The following procedure allows a fuel leak, indicated by the Malfunction Indicator Lamp (MIL), to be accurately located. It must only be carried out once it has been established that there are no obvious faults with any of the system components.

#### Check

1. Check components in fuel and EVAP system for obvious damage. Ensure all connections are properly secured.
2. Connect TestBook/T4 to validate system, and run a DMTL test.
3. Using TestBook/T4, force the DMTL to close.
4. The system must be checked using a EVAPS Diagnostic Testing Station **LRA-19-004 or LRA-19-005A**.
5. Connect **LRT-19-016** to engine bay fuel connections.
6. Release clip and disconnect hose from charcoal canister.
7. Carry out procedures given in the operating instructions, these are supplied with **LRA-19-004 and LRA-19-005A**.

#### Adjust

1. When leak has been detected, replace component as necessary and carry out leak test again to validate repair.
2. Connect hose to charcoal canister and secure with clip.
3. Disconnect adaptor **LRT-19-016** from connections.
4. Connect hose to purge valve.

## **EMISSION CONTROL - V8**

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## Solenoid - canister purge

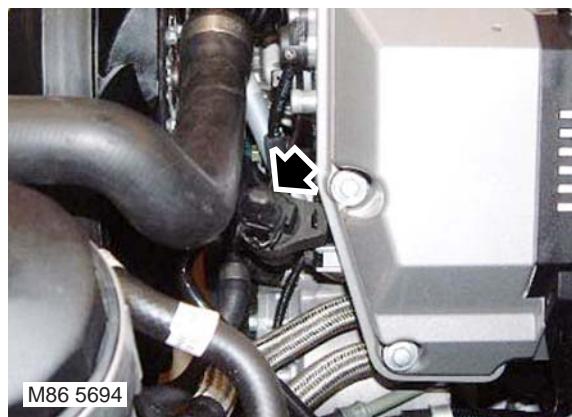
### 17.15.06

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

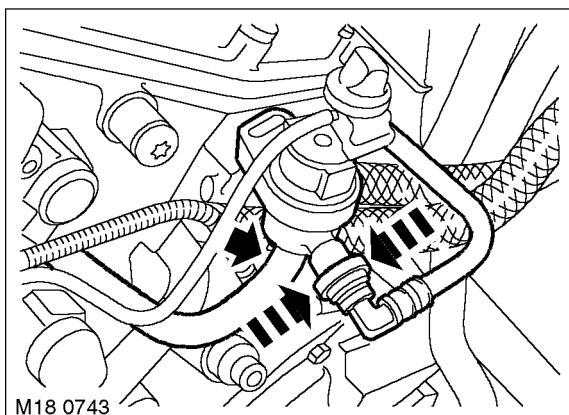
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from charcoal canister purge solenoid valve.



3. Disconnect 2 pipes from charcoal canister purge solenoid valve.
4. Remove charcoal canister purge solenoid valve from securing bracket.

#### Refit

1. Fit charcoal canister purge solenoid valve to securing bracket.
2. Connect 2 pipes to charcoal canister purge solenoid valve.
3. Connect multiplug to charcoal canister purge solenoid valve.
4. Connect battery earth lead.

## Charcoal canister

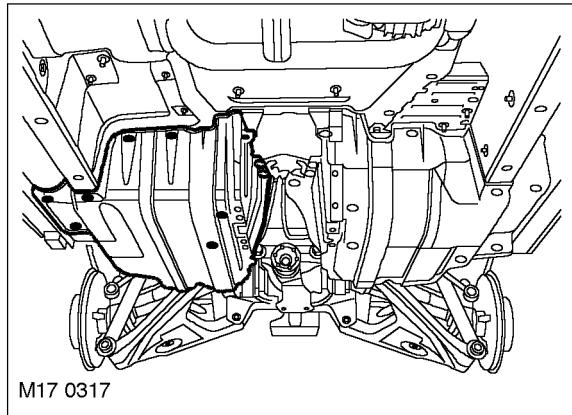
### 17.15.13

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

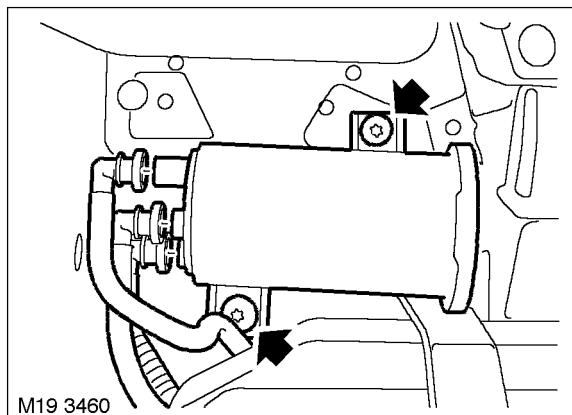
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**



4. Remove 8 bolts and 2 nuts securing RH fuel tank shield.



5. Disconnect 3 pipes from charcoal canister, remove 2 Torx bolts and remove charcoal canister.

### Refit

1. Fit charcoal canister, tighten 2 bolts and connect 3 pipes to charcoal canister.
2. Fit bolts and nuts securing RH fuel tank shield and tighten to 25 Nm (18 lbf.ft).
3. Remove rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
4. Connect battery earth lead.



## Valve - vacuum activation - secondary air injection (SAI)

### 17.25.02

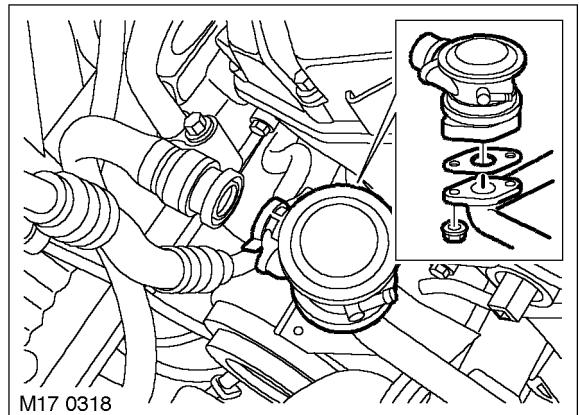
This procedure is also applicable to the gasket.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

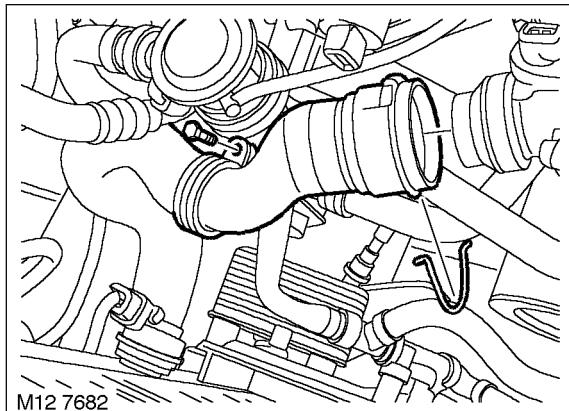
1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Remove air intake hose.
- ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
4. Drain cooling system.
- COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**



6. Disconnect vacuum pipe and pressure pipe from vacuum activation valve.
7. Remove 2 nuts, remove vacuum activation valve and discard gasket.

#### Refit

1. Clean SAI pipe and vacuum activation valve mating faces.
  2. Fit new gasket to SAI pipe.
  3. Fit vacuum activation valve to SAI pipe. Fit and tighten 2 nuts.
  4. Fit vacuum pipe and pressure pipe to vacuum activation valve.
  5. Connect radiator bottom hose to thermostat housing and secure with clip.
  6. Fill cooling system.
- COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
7. Connect air intake hose.
- ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
8. Connect battery earth lead.



5. Release clip, disconnect radiator bottom hose from thermostat housing and remove bolt securing 'P' clip.

## Relay - secondary air injection pump (SAI)

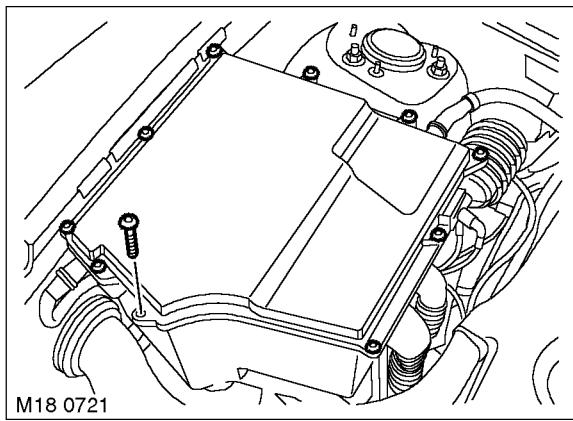
### 17.25.06

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Release SAI relay from 'E' box and disconnect multiplug.

#### Refit

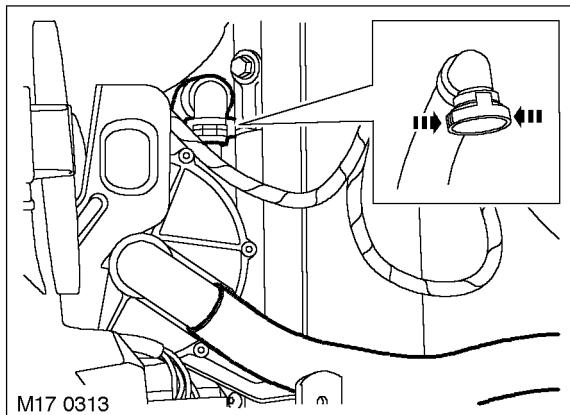
1. Position SAI relay, connect multiplug and fit relay to 'E' box.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect battery earth lead.

## Pump - secondary air injection (SAI)

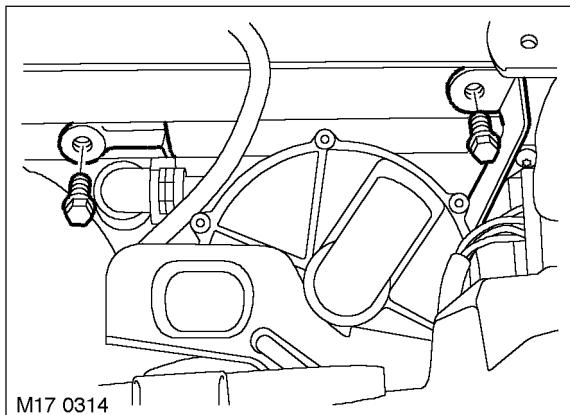
### 17.25.07

#### Remove

1. Position vehicle on lift.
2. Remove air cleaner housing.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Housing - air cleaner.**



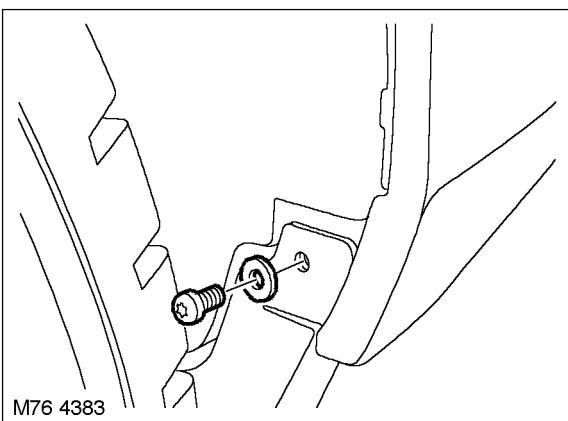
3. Release clip and disconnect air intake hose from SAI pump, discard clip.
4. Depress clip and disconnect air outlet hose from SAI pump



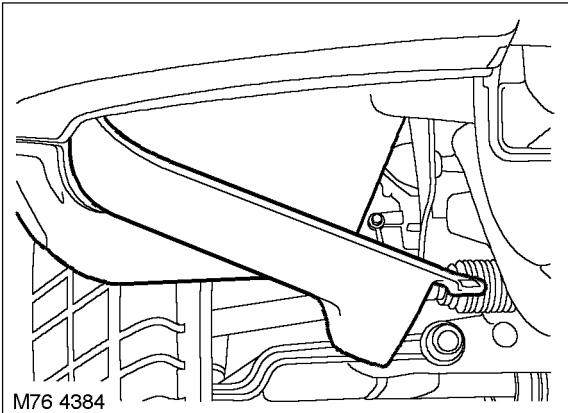
5. Remove SAI pump upper securing bolts.
6. Remove undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**

**Refit**

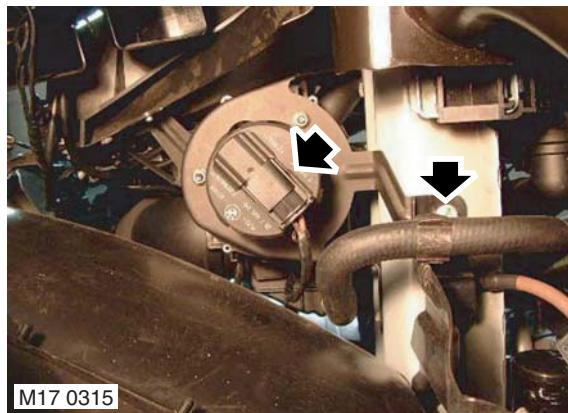
1. Fit SAI pump and loosely fit lower securing bolt.
  2. Fit SAI pump upper securing bolts and tighten to 22 Nm (16 lbf.ft).
  3. Tighten SAI pump lower securing bolt to 5 Nm (4 lbf.ft).
  4. Connect multiplug to SAI pump.
  5. Align front valance panel to front bumper.
  6. Fit and tighten screw securing RH front wheel arch liner to wing.
  7. Fit undertray.
- EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
8. Connect SAI pump air outlet hose to SAI pump.
  9. Fit new clip and connect air intake hose to SAI pump.
  10. Fit air cleaner housing.
- ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Housing - air cleaner.**



7. Remove screw securing RH front wheel arch liner to wing.



8. Release front valance panel from front bumper and position aside for access.



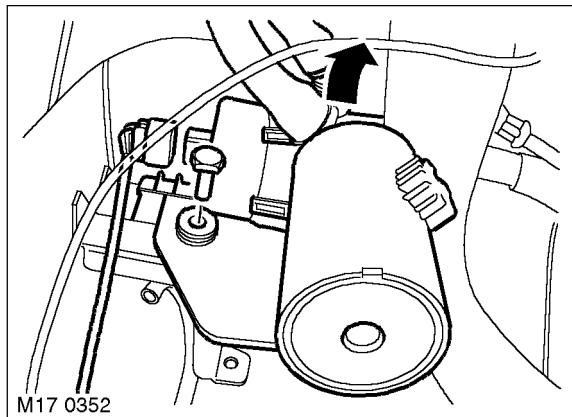
9. Disconnect multiplug from SAI pump, remove bolt securing SAI pump and remove SAI pump.

## Module - Tank Leakage Diagnostic (DMTL)

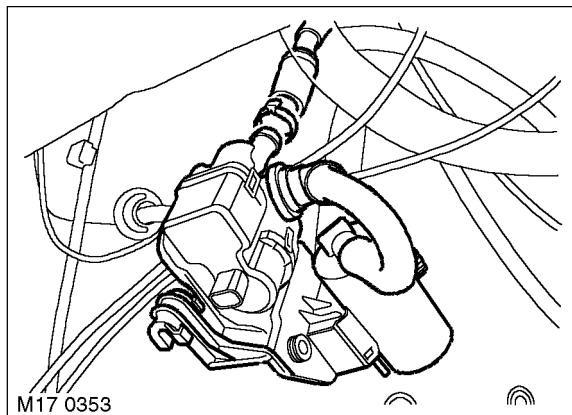
### 17.45.41

#### Remove

1. Disconnect battery earth lead.
2. Remove RH rear wheel arch liner.  
 **EXTERIOR FITTINGS, REPAIRS,  
Liner - rear wheel arch - single.**



3. Disconnect multiplug from DMTL.
4. Remove bolt securing DMTL to body and release from clips.



5. Position DMTL beneath fuel tank filler neck for access. Remove and discard clip securing vent pipe to DMTL.

**CAUTION:** Before disconnecting any part of the fuel system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into fuel system.

6. Release vent pipe and remove DMTL assembly.

7. Plug all connections.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

8. Release air filter pipe from DMTL.
9. Remove 3 Torx screws securing DMTL to bracket and remove DMTL.

#### Refit

1. Position DMTL to bracket and secure with screws. Connect air filter pipe.
2. Fit vent pipe to DMTL assembly and secure with new clip.
3. Position DMTL to body, fit bolt and tighten to 10 Nm (7 lbf.ft).
4. Connect multiplug to DMTL.
5. Fit RH rear wheel arch liner.  
 **EXTERIOR FITTINGS, REPAIRS,  
Liner - rear wheel arch - single.**
6. Connect the battery earth lead.



## Catalytic converter

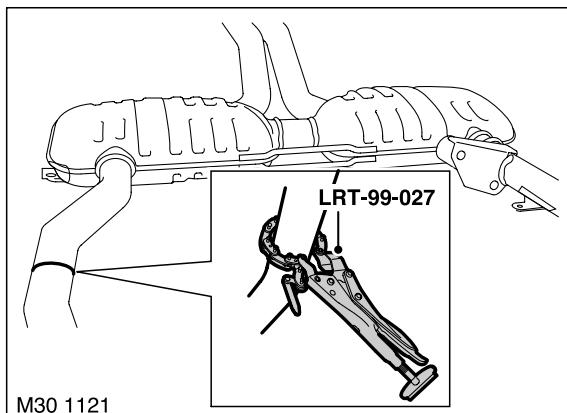
### 17.50.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove exhaust system.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**
4. Remove HO2S sensors from exhaust assembly and discard sealing washers.



5. Using **LRT-99-027**, cut pipe at point indicated by depression in pipe and remove front pipe section.

#### Refit

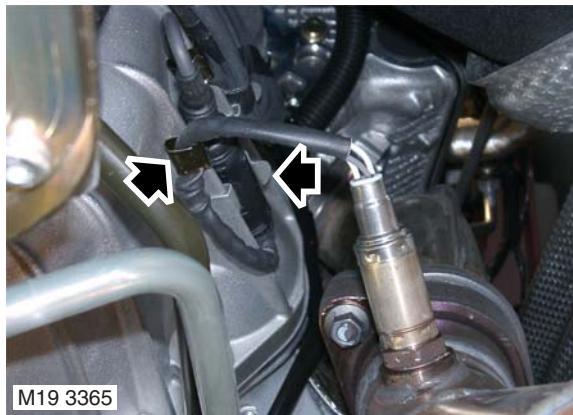
1. Fit new sealing washers and apply anti seize compound to threads of HO2S. Fit and tighten HO2S to 50 Nm (37 lbf.ft).  
**CAUTION: Ensure anti-seize compound does not contact sensor tip.**
2. Clean front pipe and mating face.
3. Fit front pipe and align flange, fit nuts but do not tighten at this stage.
4. Clean front pipe and intermediate pipe, fit joining sleeve.
5. Fit exhaust system.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**
6. Centralise connecting sleeve over joint, align intermediate pipe with front pipes and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
7. Check exhaust for correct alignment.
8. Connect battery earth lead.

### Sensor - heated oxygen (HO2S) - pre-catalyst

» 19.22.16

#### Remove

1. Raise vehicle on lift.



2. Release HO2S harness from clip.
3. Release HO2S multiplug from support bracket.
4. Disconnect HO2S multiplug from harness.
5. Remove HO2S.
6. Remove and discard HO2S sealing washer.

#### Refit

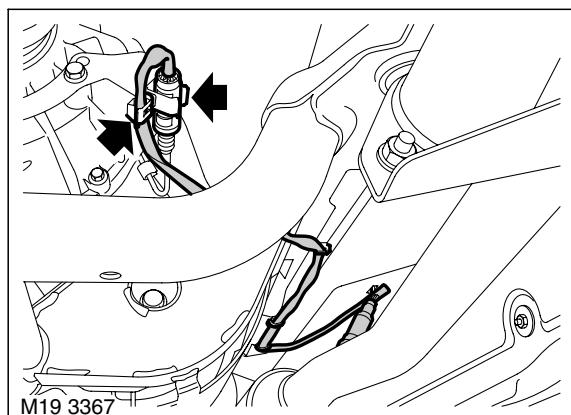
1. Clean HO2S and front pipe mating face.
2. Fit new sealing washer and apply anti seize compound to thread of HO2S. Fit and tighten to 50 Nm (37 lbf.ft).
- CAUTION: Ensure anti-seize compound does not contact sensor tip.
3. Connect HO2S multiplug and secure to support bracket.
4. Secure harness in clip.

### Sensor - heated oxygen (HO2S) - post catalyst

» 19.22.71

#### Remove

1. Raise vehicle on lift.



2. Release HO2S harness from clips.
3. Release HO2S multiplug from support bracket.
4. Disconnect HO2S multiplug from harness.
5. Remove HO2S and discard sealing washer.

#### Refit

1. Clean HO2S and front pipe mating face.
2. Fit new sealing washer and apply anti seize compound to thread of HO2S. Fit and tighten HO2S to 50 Nm (37 lbf.ft).
- CAUTION: Ensure anti-seize compound does not contact sensor tip.
3. Connect HO2S multiplug to sensor and secure to support bracket.
4. Secure harness in clips.



## Spark plugs

### 18.20.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Remove ignition coils.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Ignition coils - multiple - set.**
3. Clean area around spark plugs.
4. Remove 8 spark plugs.

#### Refit

1. Fit 8 spark plugs and tighten to 31 Nm (23 lbf.ft).
2. Fit 8 ignition coils.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Ignition coils - multiple - set.**
3. Connect battery earth lead.

## Relay - ignition coils

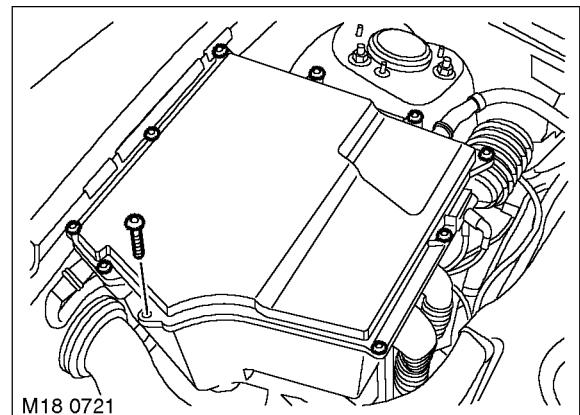
### 18.20.05

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

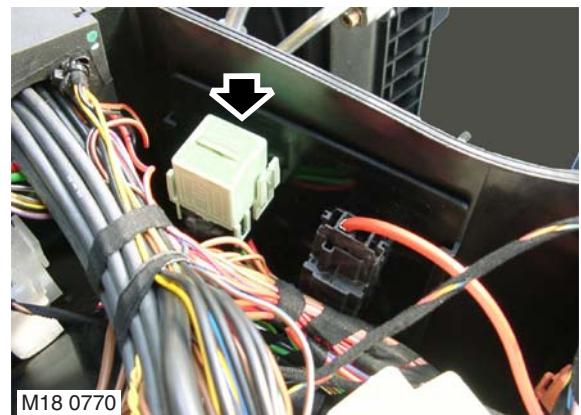
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Release relay from 'E' box and disconnect multiplug.

#### Refit

1. Position relay, connect multiplug and fit relay to 'E' box.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect battery earth lead.

# ENGINE MANAGEMENT SYSTEM - V8

## Ignition coils - multiple - set

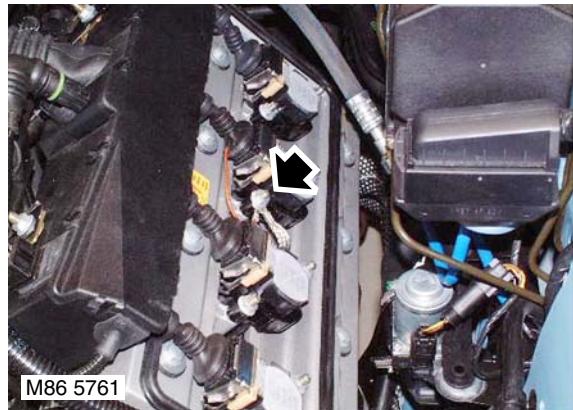
### 18.20.45

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

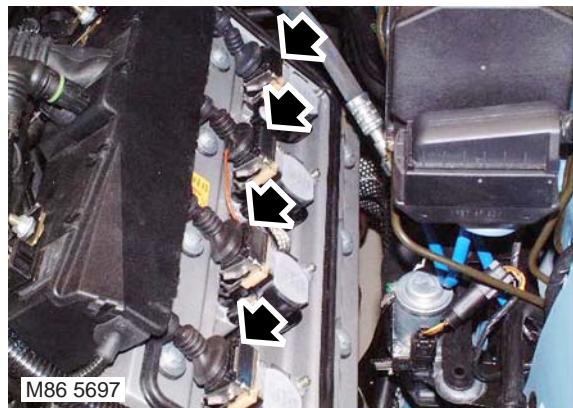
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

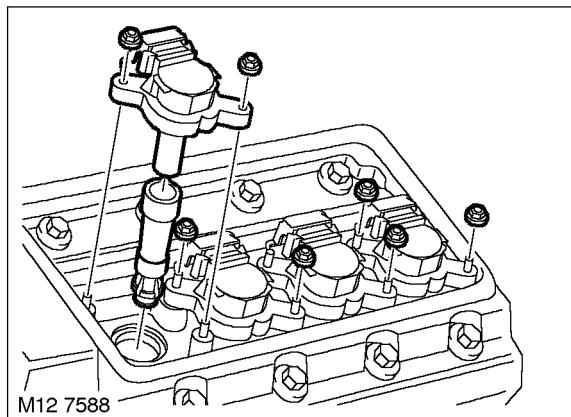
1. Remove engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**
2. Remove LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
3. Remove RH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**



4. Remove 2 nuts and disconnect earth leads from camshaft covers.



5. Disconnect multiplugs from ignition coils.
6. Discard ignition coil cover gasket.



7. Remove 14 ignition coil securing nuts. Remove 8 ignition coils.

### Refit

1. Fit 8 ignition coils.
2. Fit 14 nuts securing ignition coil and tighten to 4 Nm (3 lbf.ft).
3. Fit new ignition coil cover gasket.
4. Connect multiplugs to ignition coils.
5. Connect earth lead to camshaft cover and tighten nut to 4 Nm (3 lbf.ft).
6. Fit RH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**
7. Fit LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
8. Fit engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**



## Cover - Ignition coils - LH

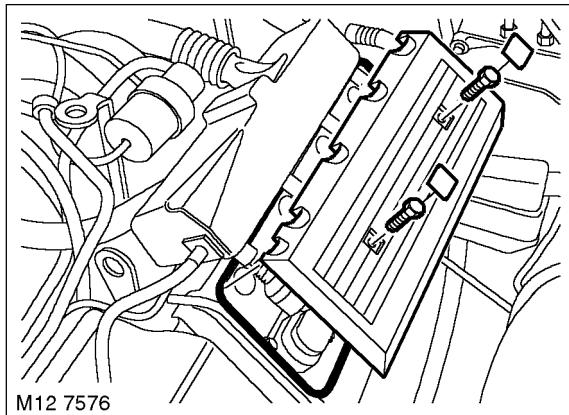
### 18.20.52

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

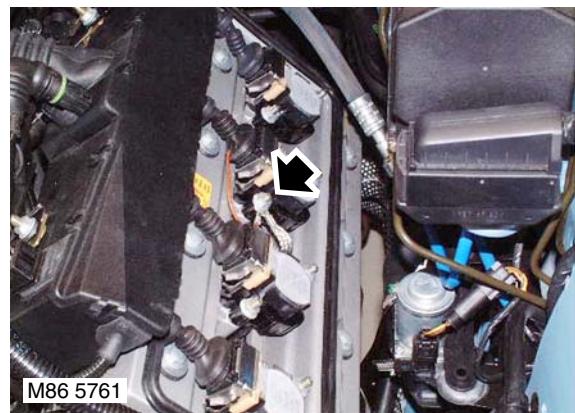
#### Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**



3. Remove 2 access covers from ignition coil cover.
4. Remove 2 bolts securing ignition coil cover to camshaft cover.
5. Remove LH ignition coil cover.
6. Remove 2 bolt spacers from ignition coil cover.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



7. Remove nut and disconnect earth lead from camshaft cover.



8. Disconnect multiplugs from ignition coils.
9. Discard ignition coil cover gasket.

#### Refit

1. Fit new ignition coil cover gasket.
2. Connect multiplugs to ignition coils.
3. Connect earth lead to camshaft cover and tighten nut to 4 Nm (3 lbf.ft).
4. Fit 2 bolt spacers to ignition coil cover.
5. Fit ignition coil cover, fit and tighten 2 bolts.
6. Fit 2 access covers to ignition coil cover.
7. Fit engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**
8. Connect battery earth lead.

## Cover - Ignition coils - RH

### → 18.20.53

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**

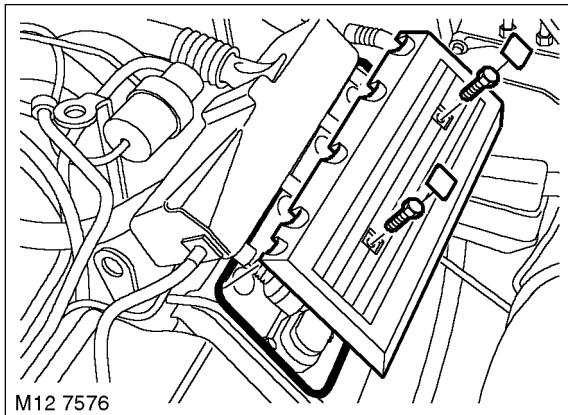


8. Disconnect multiplugs from ignition coils.
9. Discard ignition coil cover gasket.

### Refit

1. Fit new ignition coil cover gasket.
2. Connect multiplugs to ignition coils.
3. Connect earth lead to camshaft cover and tighten nut to 4 Nm (3 lbf.ft).
4. Fit 2 bolt spacers to ignition coil cover.
5. Fit ignition coil cover, fit and tighten 2 bolts.
6. Fit 2 access covers to ignition coil cover.
7. Fit engine acoustic cover.

 **Engine - V8, REPAIRS, Acoustic cover - engine.**



3. Remove 2 access covers from ignition coil cover.
4. Remove 2 bolts securing ignition coil cover to camshaft cover.
5. Remove RH ignition coil cover.
6. Remove 2 bolt spacers from ignition coil cover.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
7. Remove nut and disconnect earth lead from camshaft cover.



## Engine control module (ECM)

### 18.30.03

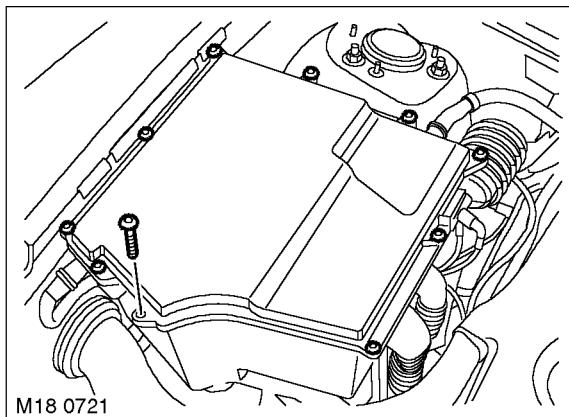
If the ECM is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

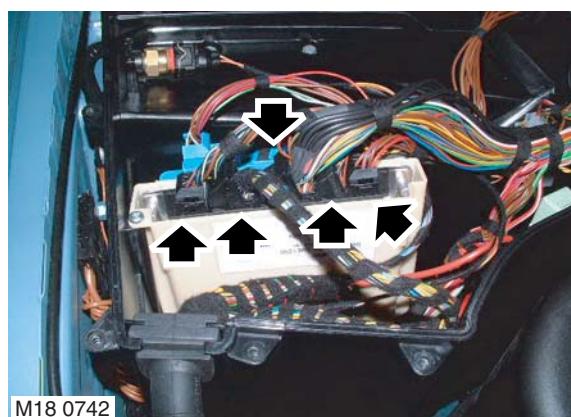
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect 5 multiplugs from ECM.
4. Release 2 clips and remove ECM.

#### Refit

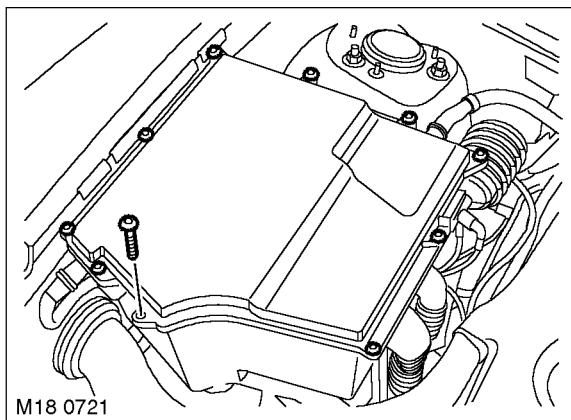
1. Fit new ECM and connect multiplugs.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect battery earth lead.
4. Reprogramme a new ECM using TestBook/T4.

## Relay - combined ignition & fuel ECU

» **18.30.06**

### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect and remove, ECM relay from 'E' box multiplug.

### Refit

1. Position relay to 'E' box mounting and connect multiplug.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect the battery earth lead.

## Sensor - engine coolant temperature (ECT)

» **18.30.10**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

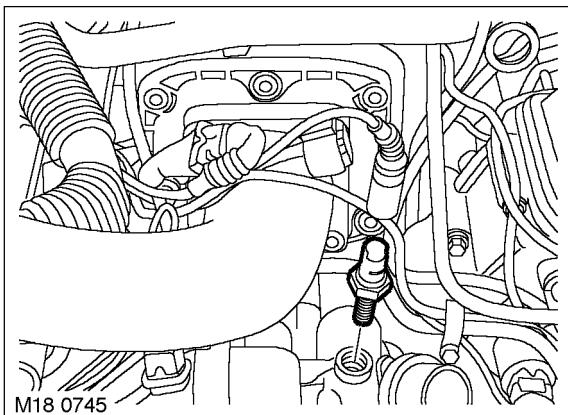
☞ **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from ECT sensor.
3. Position container beneath ECT sensor to collect coolant.



4. Using a deep socket, carefully remove ECT sensor and discard seal.

**Refit**

1. Ensure mating faces of ECT sensor and coolant pump are clean.
  2. Fit new seal and tighten ECT sensor to 15 Nm (11 lbf.ft).
  3. Connect multiplug to ECT sensor.
  4. Remove container.
  5. Dispose of coolant and clean container.
  6. Connect battery earth lead.
  7. Check and top up cooling system.
- MAINTENANCE, PROCEDURES, Cooling system.**
8. If a replacement sensor has been fitted re-set adaptions using TestBook/T4.

**Sensor - crankshaft position (CKP)**

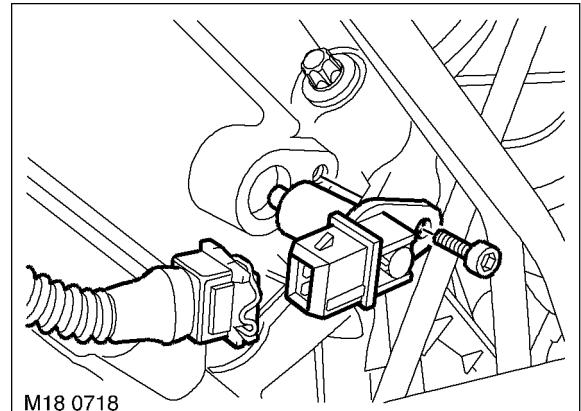
**18.30.12**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

**Remove**

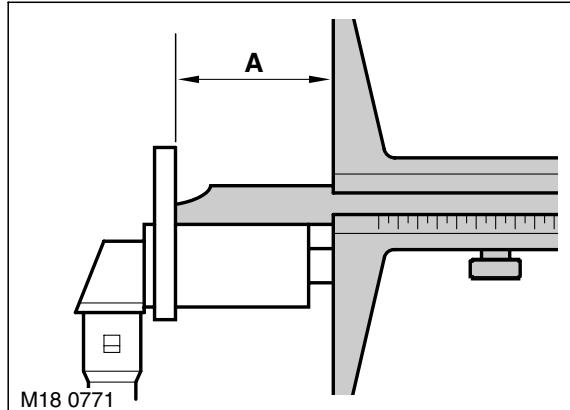
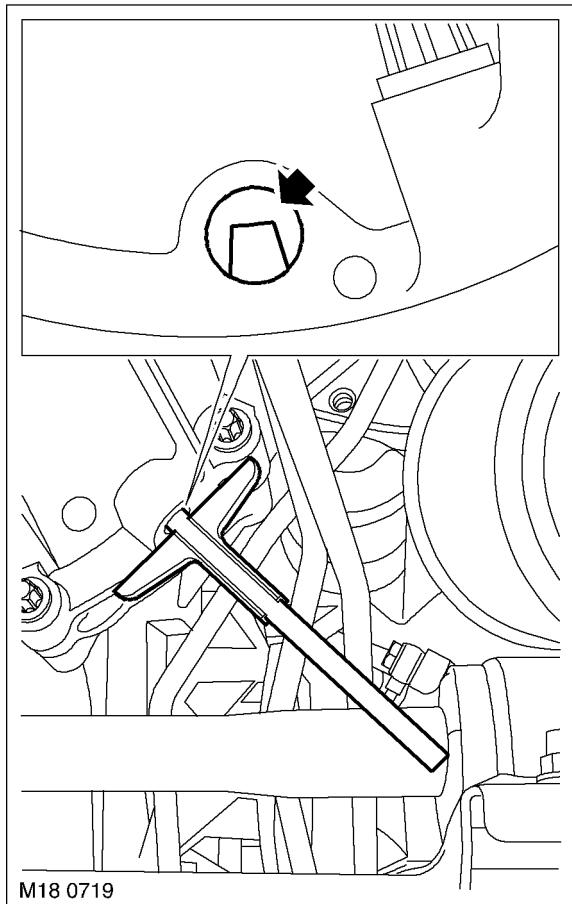
1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Raise vehicle and disconnect multiplug from CKP sensor.
4. Clean area surrounding CKP sensor.
5. Remove Allen screw and remove CKP sensor.

**Refit**

1. Clean casing mating face.



5. Measure length of CKP sensor between tip and mounting face, dimension 'A'. Record dimension.
6. Subtract length of CKP sensor, from sensor mating face to 'trigger' tooth dimension and record the resulting gap. The Air gap should be adjusted to 0.55 mm +/- 0.2 (.022 in +/- .0080), using available shims.
7. Fit shim to CKP sensor if required. Align CKP sensor to casing, fit bolt and tighten to 10 Nm (7 lbf.ft).
8. Connect CKP sensor multiplug.
9. Connect battery earth lead.
10. If a replacement sensor has been fitted re-set adaptions using TestBook/T4.

2. **Observe the following when replacing the transmission, incremental gear or the CKP sensor.** If one or more spacers are fitted between transmission and CKP sensor, the distance between the sensor and teeth on the incremental gear must be measured.
3. Rotate crankshaft until a full 'trigger' tooth is visible through aperture in casing. Ensure the tooth is centred to the hole.
4. Using a depth micrometer, measure depth from sensor mating face to 'trigger' tooth. Record measurement.



## Sensor - camshaft position (CMP) - LH

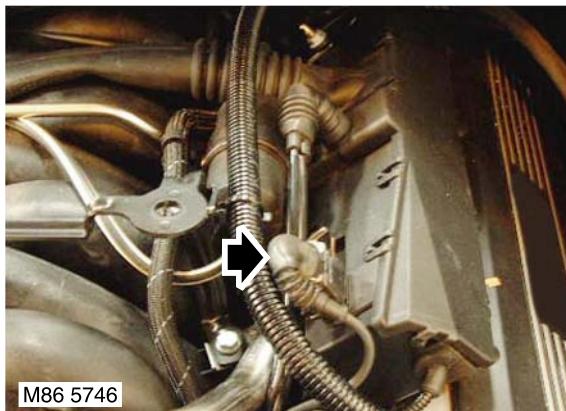
### 18.30.25

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

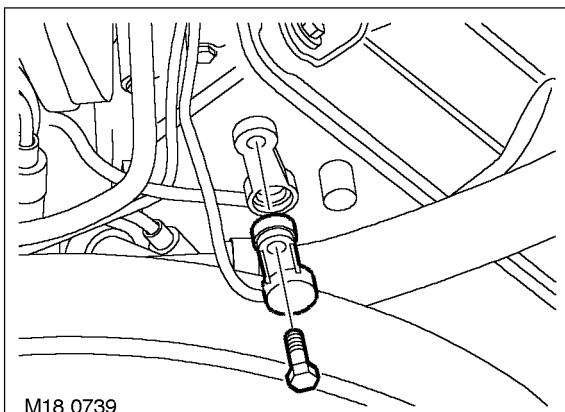
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**



3. Disconnect multiplug from CMP sensor.
4. Release CMP sensor harness from clip on camshaft cover.



5. Remove bolt securing CMP sensor and remove sensor. Discard 'O' ring.

#### Refit

1. Clean CMP sensor and mating face.
2. Fit new 'O' ring to CMP sensor.
3. Fit CMP sensor, fit bolt and tighten to 10 Nm (7 lbf.ft).
4. Connect multiplug to CMP sensor.
5. Secure CMP sensor harness to clip on camshaft cover.
6. Fit engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**
7. Connect battery earth lead.
8. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# ENGINE MANAGEMENT SYSTEM - V8

## Sensor - camshaft position (CMP) - RH

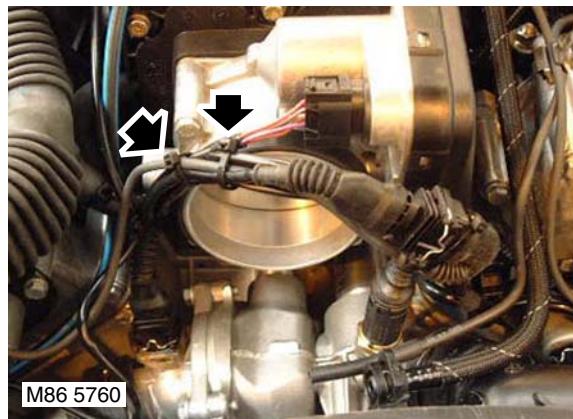
### 18.30.26

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

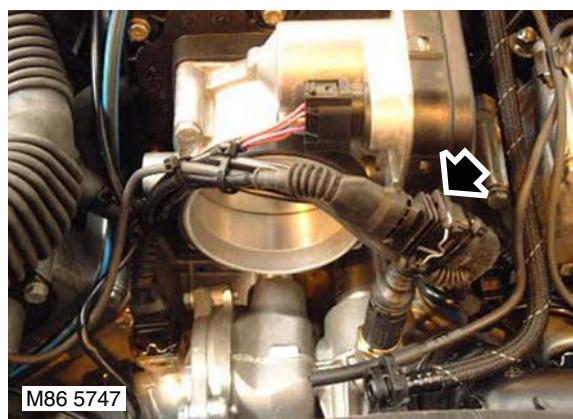
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

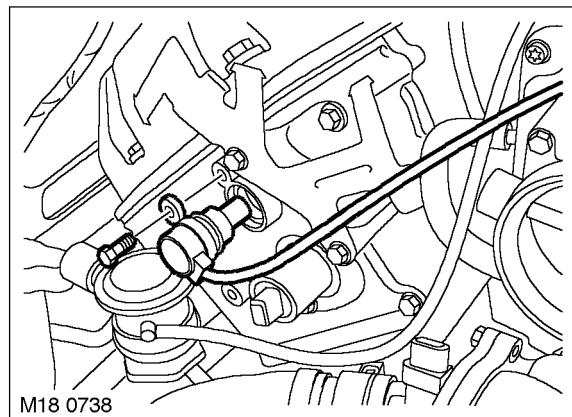
1. Disconnect battery earth lead.
2. Remove air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**



3. Cut 3 cable ties to release CMP sensor harness.



4. Disconnect multiplug from CMP sensor.



5. Remove bolt securing CMP sensor and remove sensor. Discard 'O' ring.

### Refit

1. Clean CMP sensor and mating face.
2. Fit new 'O' ring.
3. Fit CMP sensor, fit bolt and tighten to 10 Nm (7 lbf.ft).
4. Secure CMP sensor harness with 3 cable ties.
5. Connect multiplug to CMP sensor.
6. Connect air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
7. Connect battery earth lead.
8. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

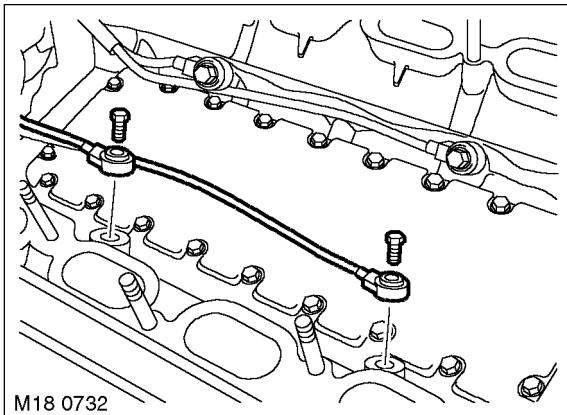
**Sensor - knock (KS) - LH****» 18.30.28**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

**Remove**

1. Disconnect battery earth lead.
2. Remove coolant pump to coolant manifold pipes.  
 **COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**



3. Remove 2 bolts securing KS to cylinder block, remove sensors.

**Refit**

1. Clean KS and mating faces on cylinder block.
2. Position KS to engine block, fit bolts securing KS and tighten to 20 Nm (15 lbf.ft).
3. Fit coolant pump to coolant manifold pipes.  
 **COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**
4. Connect battery earth lead.
5. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

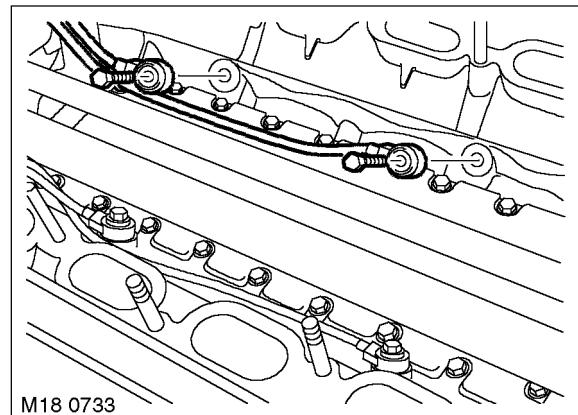
**Sensor - knock (KS) - RH****» 18.30.30**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

**Remove**

1. Disconnect battery earth lead.
2. Remove inlet manifold.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - inlet manifold.**



3. Remove 2 bolts securing KS to cylinder block, remove sensors.

**Refit**

1. Clean KS and mating faces on cylinder block.
2. Position KS to engine block, fit bolts securing KS and tighten to 20 Nm (15 lbf.ft).
3. Fit inlet manifold.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - inlet manifold.**
4. Connect battery earth lead.
5. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# ENGINE MANAGEMENT SYSTEM - V8

## Sensor - temperature - 'E' box

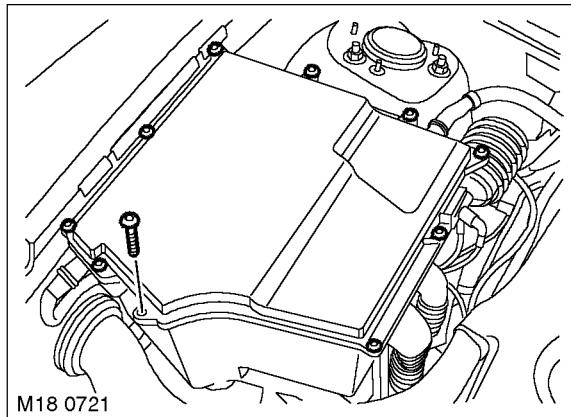
### 18.30.77

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

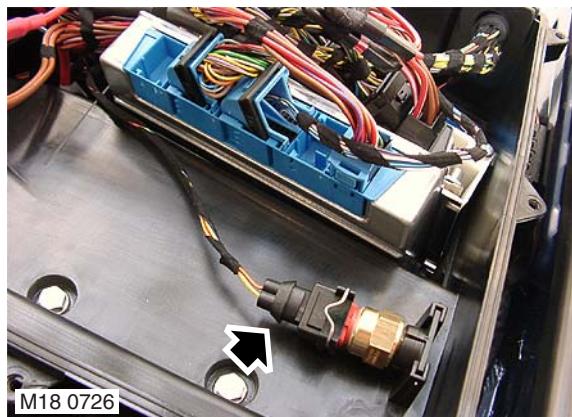
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect multiplug from 'E' box temperature sensor.
4. Remove 'E' box temperature sensor.

### Refit

1. Fit 'E' box temperature sensor to mounting.
2. Connect multiplug to 'E' box temperature sensor.
3. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
4. Connect battery earth lead.
5. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.



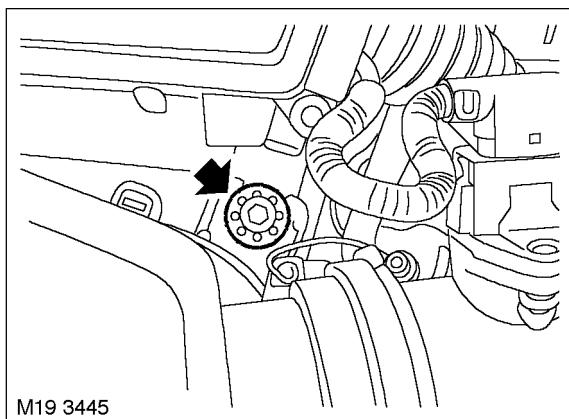
## Housing - air cleaner

» 19.10.01

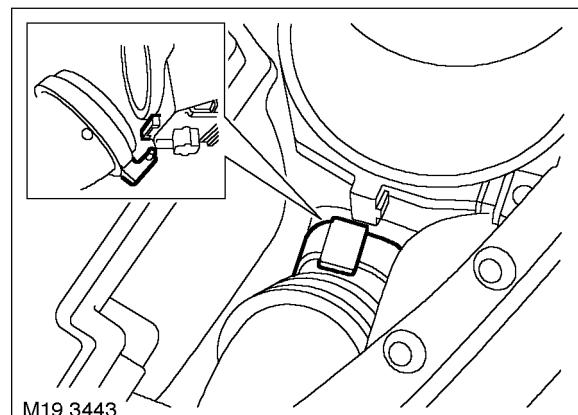
### Remove

1. Remove air cleaner element.

**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Element - air cleaner.**

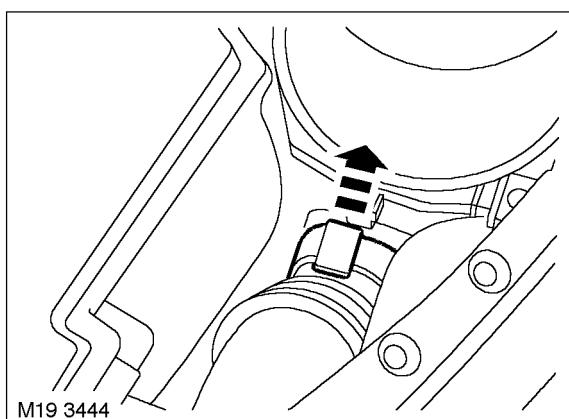


2. Remove bolt securing air cleaner lower housing.



2. Fit lower air cleaner housing, connect to air intake pipe and tighten securing bolt.  
*NOTE: Make sure that the air intake pipe is located into the lugs of the lower air filter housing before the lower air filter housing is fully seated onto its mountings.*
3. Fully seat air intake pipe securing clip to lower air cleaner housing.
4. Fit air cleaner element.

**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Element - air cleaner.**



3. Release clip securing air intake pipe to lower air cleaner housing.
4. Remove lower air cleaner housing.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

5. Remove mountings from lower air cleaner housing.

### Refit

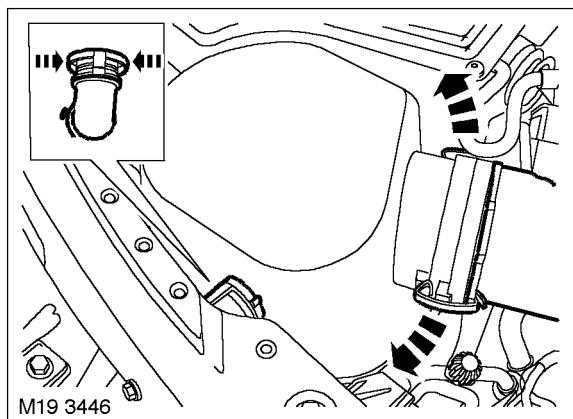
1. Fit mountings to lower air cleaner housing.

# ENGINE MANAGEMENT SYSTEM - V8

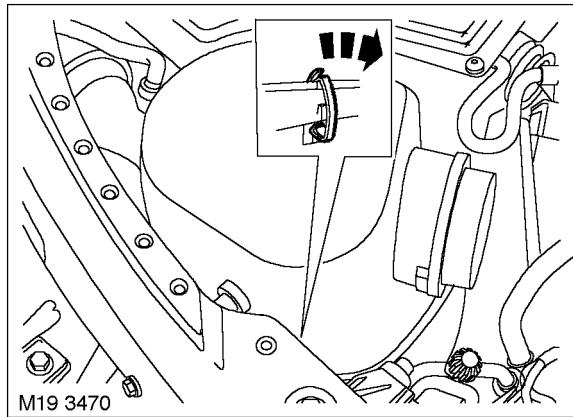
## Element - air cleaner

☛ **19.10.10**

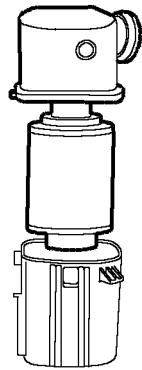
### Remove



1. Release 2 clips securing MAF/IAT sensor to upper air cleaner housing. Disconnect SAI pump air intake hose from upper air cleaner housing.



2. Release 4 clips and remove upper air cleaner housing.
3. Discard 'O' ring from upper air cleaner housing.



4. Remove air cleaner element.

### Refit

1. Clean air cleaner housing.
2. Fit air cleaner element.
3. Fit 'O' ring seal into upper air cleaner housing.
4. Lubricate 'O' ring.
5. Fit upper air cleaner housing and secure clips.
6. Connect SAI pump hose to upper air cleaner housing.

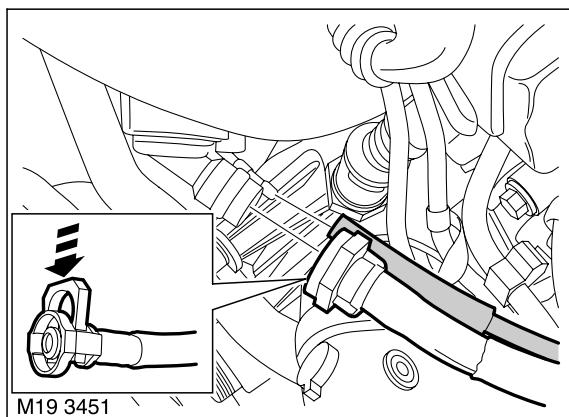


## Hose - air flow meter to throttle body

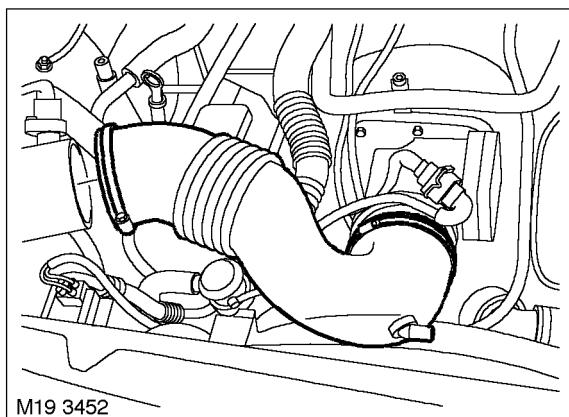
» 19.10.28

### Remove

1. Remove engine acoustic cover.  
☞ **Engine - V8, REPAIRS, Acoustic cover - engine.**



2. Disconnect vacuum pipes from air intake pipe.



3. Release 2 clips and disconnect air intake pipe from throttle body.
4. Remove air intake pipe.
5. Remove seal from air intake pipe, at MAF sensor connection end.
6. Remove clips from air intake pipe.

### Refit

1. Fit seal to MAF sensor.
2. Lubricate air intake pipe mating face of throttle body seal and MAF sensor seal to aid refit.
3. Fit clips to air intake pipe.
4. Fit and secure air intake pipe.
5. Connect vacuum pipes to air intake pipe.
6. Fit engine acoustic cover.  
☞ **Engine - V8, REPAIRS, Acoustic cover - engine.**
7. If a replacement sensor has been fitted, reset adaptions using TestBook/T4.

## Sensor - accelerator pedal position (APP)

### ☛ 19.20.01

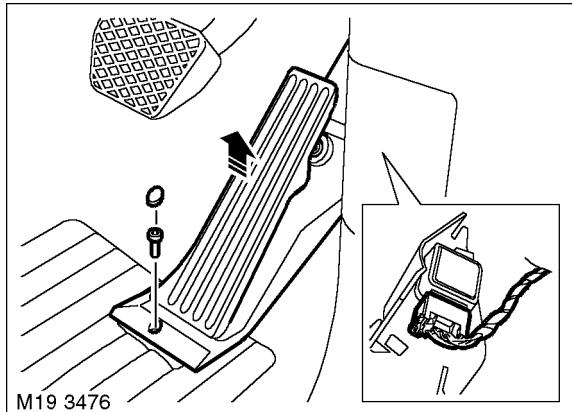
The APP sensor is not serviced separately from the throttle pedal.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.



2. Remove cap from screw and remove Allen screw securing throttle pedal.
3. Release pedal from bracket, disconnect multiplug from APP sensor and remove pedal.

### Refit

1. Position throttle pedal and connect multiplug to APP sensor.
2. Fit pedal to bracket, tighten Allen screw to 10 Nm (7 lbf.ft) and fit cap to screw.
3. Connect battery earth lead.
4. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

## Sensor - combined mass air flow (MAFS) & intake air temperature (IAT)

### ☛ 19.22.38

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

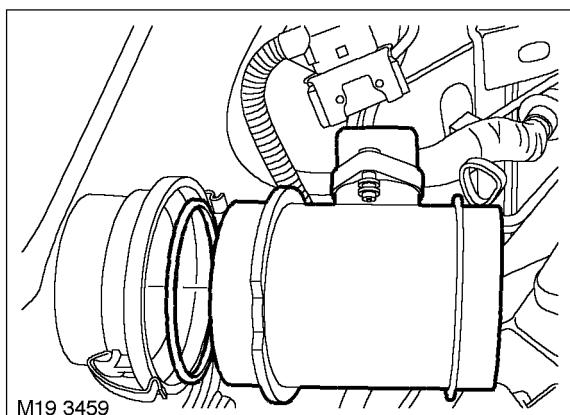
### Remove

1. Disconnect battery earth lead.
2. Remove air intake hose.

 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**



3. Disconnect multiplug from MAF/IAT sensor.



4. Release MAF/IAT sensor securing clips and remove sensor.

*NOTE: The 'O' ring may become released from upper air cleaner housing during the removal of the MAF/IAT sensor.*

**Refit**

1. Fit 'O' ring seal into upper air cleaner housing.
  2. Lubricate 'O' ring with clean engine oil.
  3. Fit MAF/IAT sensor into upper air cleaner housing and secure with clips.
  4. Connect multiplug to MAF/IAT sensor.
  5. Connect air intake hose.
- ☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
6. Connect battery earth lead.
  7. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

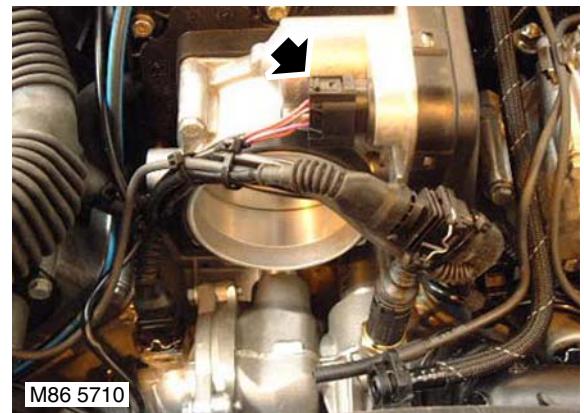
**Throttle body**

☞ **19.22.45**

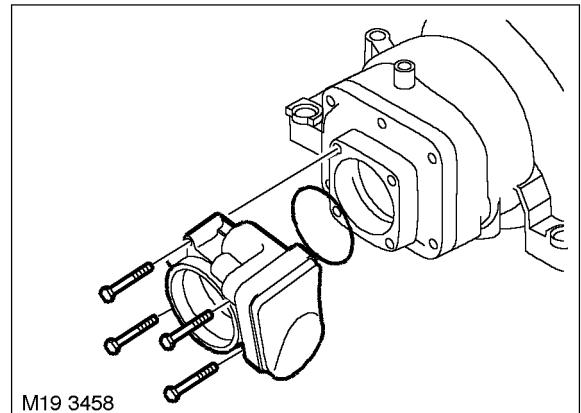
**Remove**

1. Remove air intake hose.

**☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**



2. Disconnect multiplug from throttle body.



3. Remove 4 bolts securing throttle body to inlet manifold and remove throttle body.
4. Discard 2 throttle body seals.

# ENGINE MANAGEMENT SYSTEM - V8

## Refit

1. Clean mating faces of throttle housing and inlet manifold.
  2. Fit 2 new throttle body seals.
  3. Fit throttle housing to inlet manifold and tighten 4 bolts to 10 Nm (7 lbf.ft).
  4. Connect multiplug to throttle body.
  5. Connect air intake hose.
-  **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
6. If fitting a new throttle body, reset adaptions using TestBook/T4.

## Fuel rail - remove for access & refit

 **19.60.04.99**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

## Remove

1. Disconnect battery earth lead.
2. Remove air intake hose.

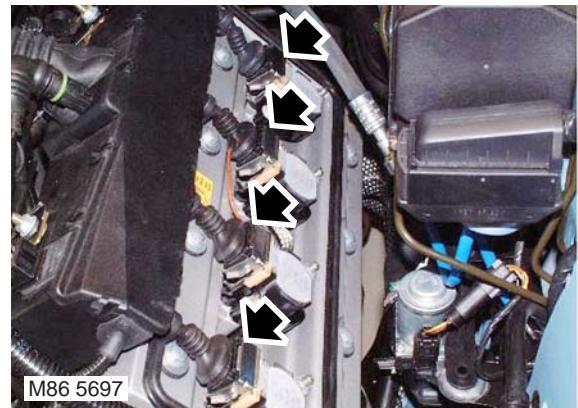
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**

3. Remove LH ignition coil cover.

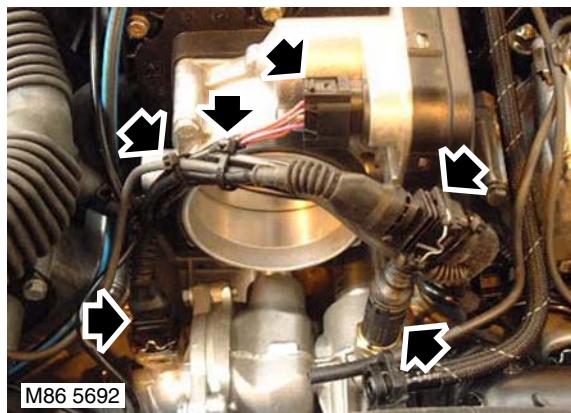
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**

4. Remove RH ignition coil cover.

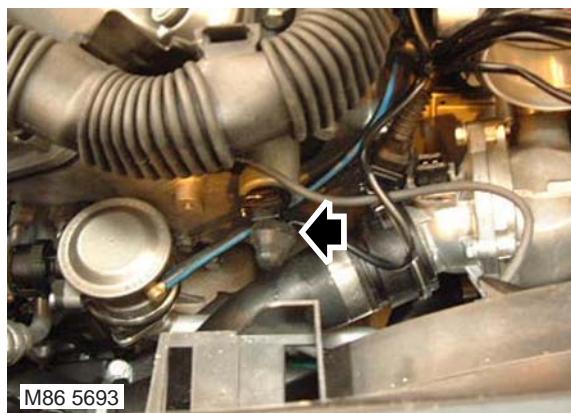
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**



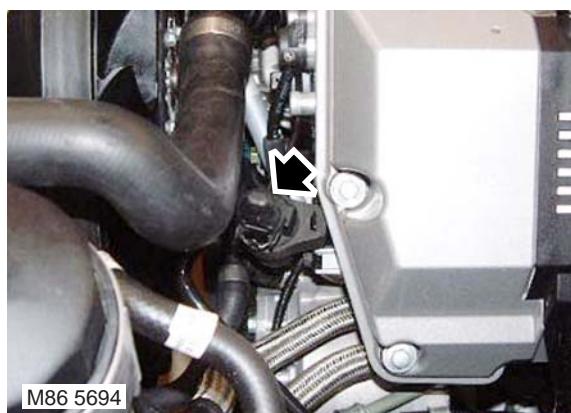
5. Disconnect multiplugs from ignition coils.



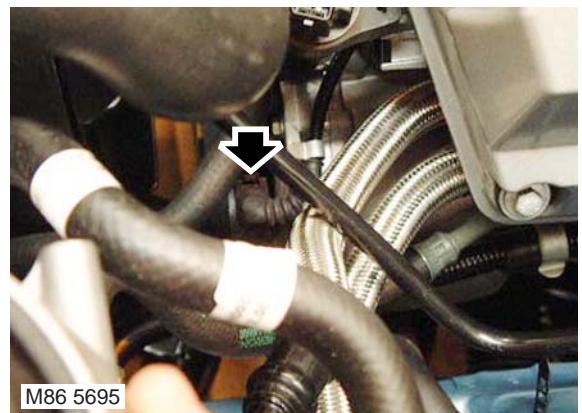
6. Disconnect multiplugs from throttle body, thermostat heater, CMP sensor and ECT sensor.
7. Cut 2 cable ties and release engine harness.



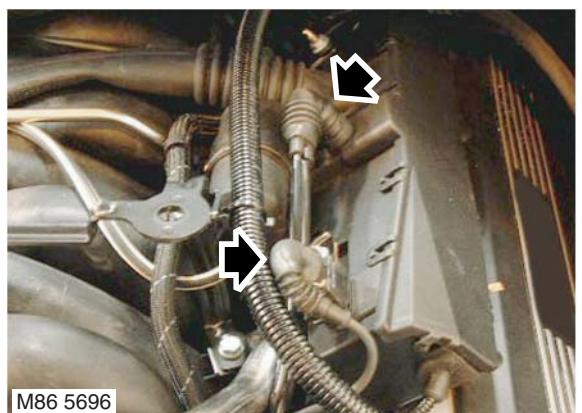
8. Disconnect multiplugs from VCC solenoids.
9. Release VCC multiplug harness from clip.



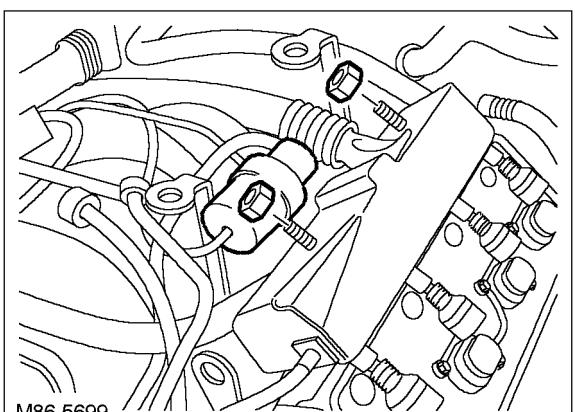
10. Disconnect multiplug from charcoal canister purge solenoid valve.



11. Disconnect alternator multiplug.
12. Release alternator harness from 4 clips.



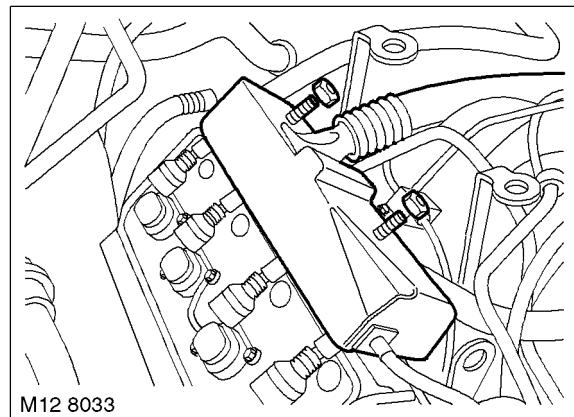
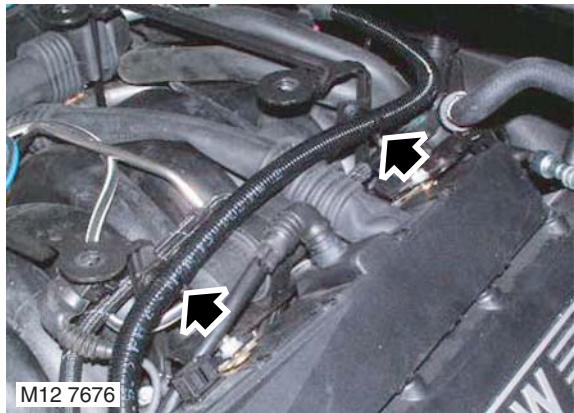
13. Disconnect multiplugs from KS and CMP sensor.



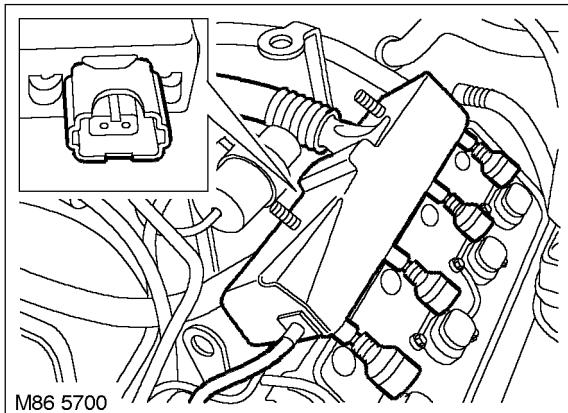
14. Remove 2 nuts securing fuel injector harness to fuel rail.
15. Release vacuum reservoir and mounting bracket from LH fuel injector harness securing stud.

## ENGINE MANAGEMENT SYSTEM - V8

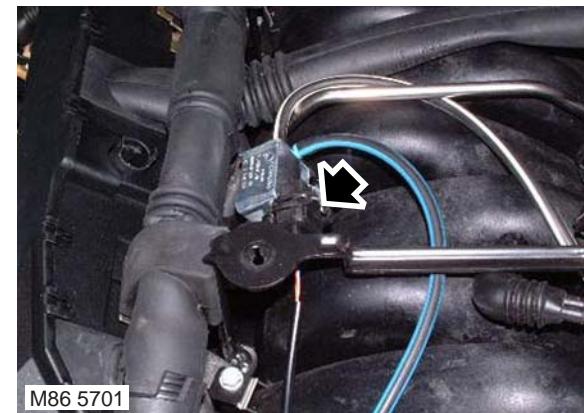
16. Remove fuel hose and mounting bracket from LH fuel injector harness securing stud.



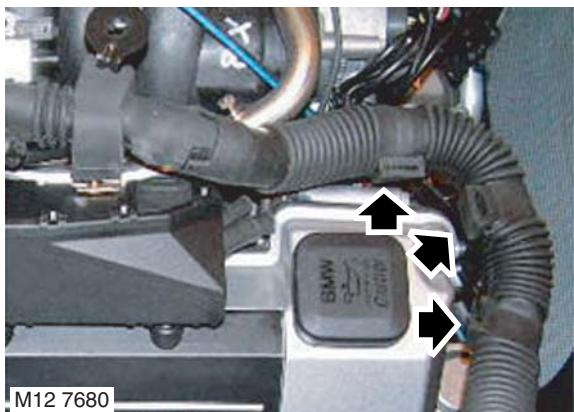
17. Release alternator harness from 2 clips on engine cover mounting brackets.



20. Remove 2 nuts securing engine harness to induction manifold



18. Disconnect multiplugs from LH fuel injectors.

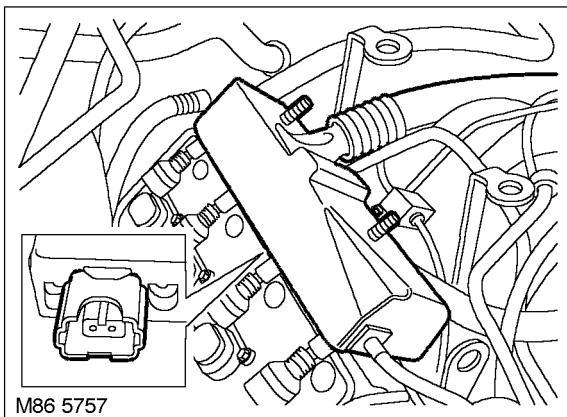


21. Disconnect multiplug from SAI solenoid.  
22. Remove SAI solenoid valve from RH fuel injector harness securing stud.  
23. Remove washer from fuel injector harness securing stud.

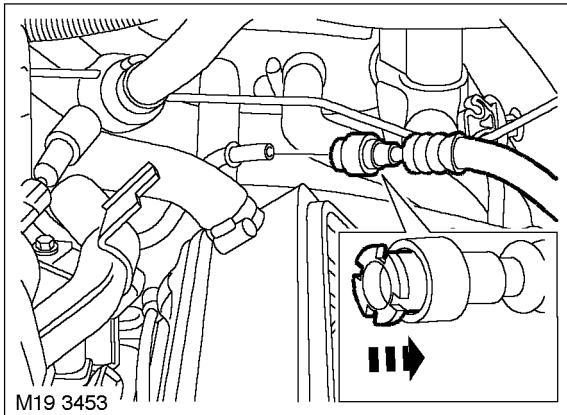


19. Release engine harness from clips and move clear of camshaft cover.

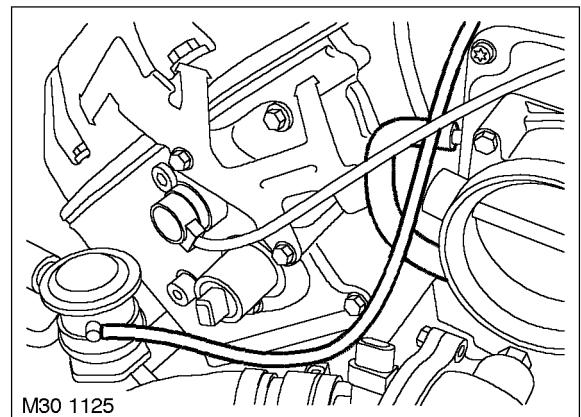
24. Disconnect multiplug from RH KS.



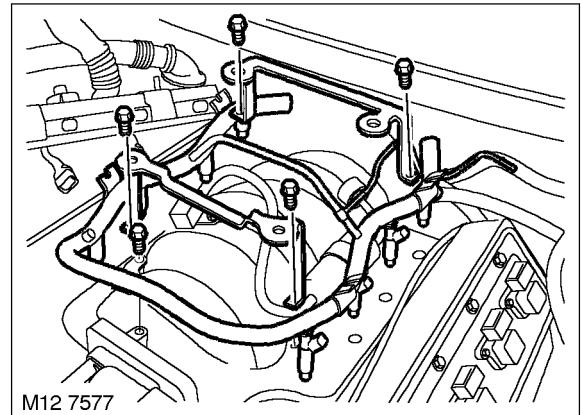
25. Disconnect multiplugs from RH fuel injectors.
26. Reposition injector harness.
27. Remove air intake plenum.  
**HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
28. Depressurise fuel system.  
**FUEL DELIVERY SYSTEM - V8, ADJUSTMENT, Fuel system - depressurise.**



29. Disconnect fuel feed hose from fuel rail.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**
30. Release clip and disconnect breather hose from camshaft cover.



31. Remove clip and disconnect purge solenoid valve vacuum hose. Disconnect SAI vacuum pipe.



32. Remove 4 bolts securing engine cover brackets and remove brackets from induction manifold.
33. Remove bolt securing fuel rail to induction manifold and remove fuel rail with injectors.

#### Refit

1. Clean injectors and recesses in inlet manifold.
2. Fit fuel rail with injectors to induction manifold and fit bolt.
3. Fit 2 new brackets to manifold and tighten 5 bolts to 10 Nm (7 lbf.ft).
4. Fit solenoid valve and connect vacuum pipe.
5. Reposition brake servo vacuum pipe.
6. Connect brake vacuum hose and secure with clip.
7. Connect breather hose to camshaft cover and secure with clip.
8. Clean fuel hose connections.
9. Connect fuel feed hose to fuel rail.
10. Fit air intake plenum.  
**HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
11. Reposition injector harness.

# ENGINE MANAGEMENT SYSTEM - V8

12. Connect multiplugs to RH fuel injectors.
13. Connect KS multiplug.
14. Fit washer to fuel injector harness securing stud.
15. Fit SAI solenoid valve to RH fuel injector securing stud.
16. Fit 2 nuts securing fuel injector harness to induction manifold and tighten.
17. Connect multiplug to SAI solenoid.
18. Position and secure engine harness to brackets with clips.
19. Connect multiplugs to LH fuel injectors.
20. Connect alternator harness to 2 clips on engine cover mounting brackets.
21. Fit fuel hose and mounting bracket to LH fuel injector harness securing stud.
22. Fit vacuum reservoir and mounting bracket to LH fuel injector harness securing stud.
23. Fit 2 nuts securing fuel injector harness to induction manifold and tighten.
24. Connect KS multiplug.
25. Connect multiplug to CMP sensor.
26. Connect alternator harness to 4 clips.
27. Connect alternator multiplug.
28. Connect multiplug to charcoal canister purge solenoid valve.
29. Connect VCC multiplug harness to clip.
30. Connect multiplugs to VCC solenoids.
31. Fit new cable ties, align and secure harness.
32. Connect multiplug to CMP sensor.
33. Connect multiplug to throttle body.
34. Connect multiplugs to ECT sensors.
35. Connect multiplugs to ignition coils.
36. Fit LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**
37. Fit RH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
38. Connect air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
39. If a new fuel rail has been fitted, reset adaptions using TestBook/T4.

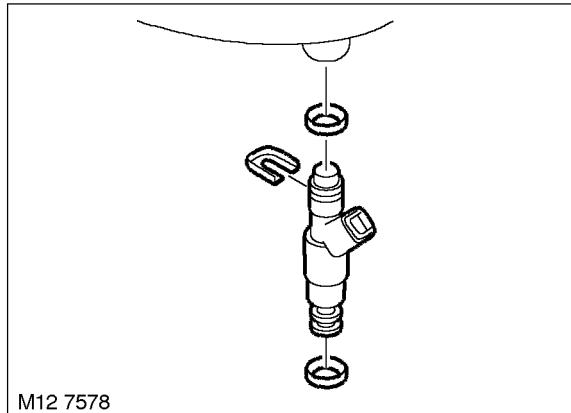
## Injectors - set

☞ **19.60.12**

### Remove

1. Remove fuel rail.

 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Fuel rail - remove for access & refit.**



2. Remove spring clips securing injectors to fuel rail and remove injectors. Discard 2 'O' rings from each injector.

### Refit

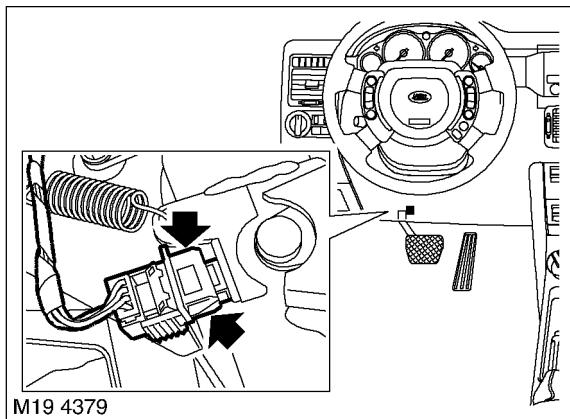
1. Lubricate new 'O' rings with silicone grease and fit to each end of injectors.
2. Fit injectors to fuel rail and secure with spring clips.
3. Fit fuel rail.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Fuel rail - remove for access & refit.**
4. If new injector(s) has been fitted, then TestBook/T4 must be connected and the adaptions reset.
  - System diagnostics
  - Engine management
  - Vehicle maintenance
  - Reset adaptions



## Sensor - brake pedal position

» 19.75.35

### Remove



1. Release brake pedal position sensor from holder, disconnect multiplug and remove sensor.
2. Remove holder from pedal bracket.

### Refit

1. Fit holder to pedal bracket.
2. Position brake pedal position sensor, connect multiplug and secure to holder.
3. With brake pedal released, ensure brake pedal position sensor is in contact with operating tang on brake pedal.
4. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

## **ENGINE MANAGEMENT SYSTEM - V8**

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## Fuel system - depressurise

### 19.50.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

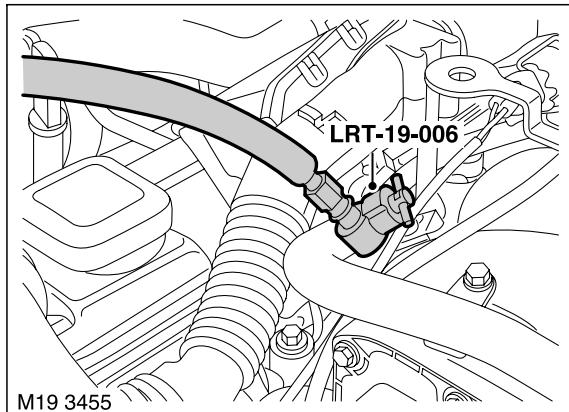
#### Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.

**Engine - V8, REPAIRS, Acoustic cover - engine.**

3. Remove cap from schraeder valve on fuel rail.

**WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*



#### Refit

1. Close valve on **LRT-19-006**.
2. Remove hose from **LRT-19-006**.
3. Remove tool **LRT-19-006** from schraeder valve.
4. Fit cap to schraeder valve on fuel rail.
5. Remove container.
6. Dispose of fuel and clean container.
7. Fit engine acoustic cover.

**Engine - V8, REPAIRS, Acoustic cover - engine.**

8. Connect battery earth lead.

4. Fit **LRT-19-006** and hose to schraeder valve.
5. Open valve on **LRT-19-006**. Release fuel system pressure and allow fuel to drain into suitable container.

**WARNING:** *Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.*

# FUEL DELIVERY SYSTEM - V8

## Fuel system - pressure test

### → 19.50.13

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Check

1. Disconnect battery earth lead.

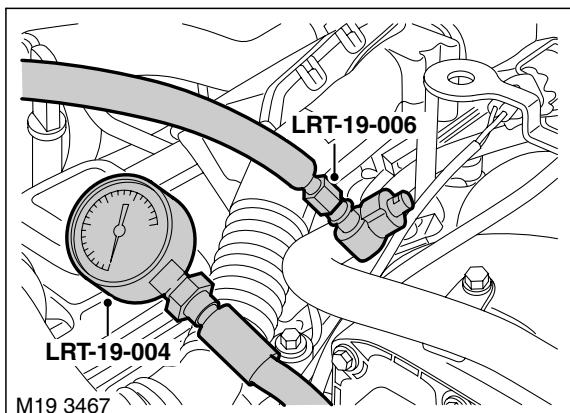
**WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*

2. Remove engine acoustic cover.

 **Engine - V8, REPAIRS, Acoustic cover - engine.**

3. Fit LRT-19-004 to LRT-19-006.

4. Remove schraeder valve cap.



5. Fit LRT-19-006 and LRT-19-004 to schraeder valve.
6. Open valve on LRT-19-006.
7. Connect battery earth lead.
8. Start engine and allow engine to idle.
9. Note fuel pressure gauge reading. Fuel pressure should be between 3.25 and 3.75 bar.
10. Switch off engine.
11. Disconnect battery earth lead.
12. Close valve on LRT-19-006.
13. Position absorbent cloth around schraeder valve to collect any fuel spillage.
14. Remove LRT-19-004 and LRT-19-006 from schraeder valve.

**WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*

15. Fit cap to schraeder valve.
16. Remove LRT-19-004 from LRT-19-006.
17. Fit engine acoustic cover.  
 **Engine - V8, REPAIRS, Acoustic cover - engine.**
18. Connect battery earth lead.



## Tank - drain

### 19.55.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Drain

1. Open fuel filler flap and remove cap.

**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

2. Connect fuel recovery appliance earth lead to vehicle.

**WARNING:** Fuel must not be extracted or drained from any vehicle while it is over a pit. Extraction or draining of fuel must be carried out in a well ventilated area.

3. Fit fuel recovery appliance extraction hose, insert hose through filler neck, turning hose slightly if necessary. **Chamfer end of bowser hose to approximately 30° to aid entry.**

4. Connect exhaust extractor to tail pipes.

5. Start engine.

6. Using a fuel recovery appliance, drain the fuel from the tank into a sealed container. Follow the manufacturers instructions for the connection and safe use of the appliance.

7. Stop engine when fuel warning light is displayed.

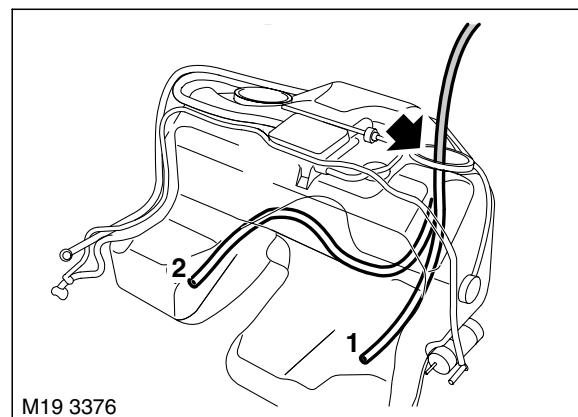
**CAUTION:** Do not allow fuel pump to run dry.

8. Disconnect battery earth lead.

9. Remove fuel tank LH module cover.

**FUEL DELIVERY SYSTEM - Td6, REPAIRS, Cover - tank module - LH.**

10. Remove extraction hose from filler neck and refit fuel cap.



11. Position extraction hose through aperture in fuel tank LH access hole and drain remaining fuel, number 1 in illustration. Repeat process in RH chamber draining remaining fuel, number 2 in illustration.
12. Remove extraction hose from fuel tank, disconnect earth lead from vehicle.

#### Refill

1. Fit fuel tank LH module cover.

**FUEL DELIVERY SYSTEM - Td6, REPAIRS, Cover - tank module - LH.**

2. Replenish fuel as required.

3. Connect battery earth lead.

4. Turn ignition key to position 1, allow time for fuel pump to prime.

5. Start engine.

6. Stop engine and disconnect exhaust extractors.

## FUEL DELIVERY SYSTEM - V8

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## Filter - main

### 19.25.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

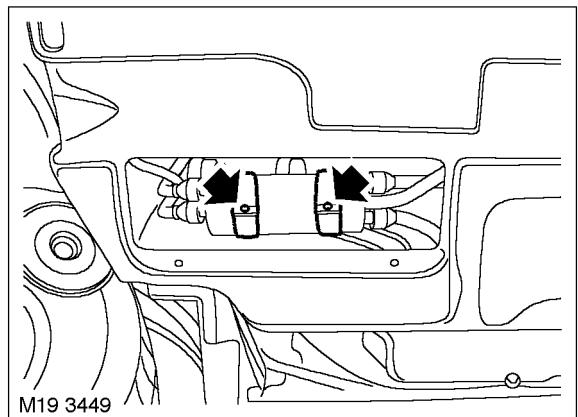
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Depressurise fuel system.

**FUEL DELIVERY SYSTEM - V8, ADJUSTMENT, Fuel system - depressurise.**

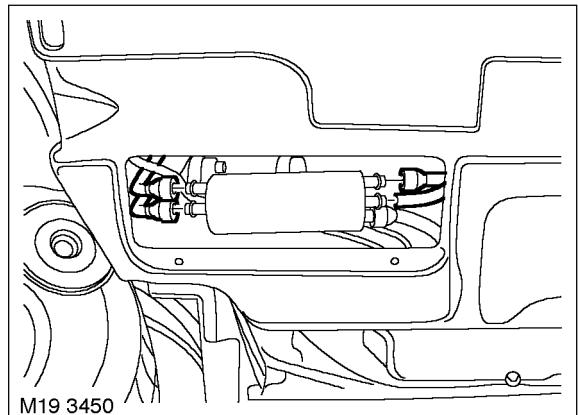
**WARNING:** *Depressurise the system before disconnecting any components. Fuel pressure will be present in the system even if the ignition has been switched off for some time.*



4. Remove 2 screws securing fuel filter access cover and remove fuel filter access cover.



5. Remove 2 screws securing fuel filter and release fuel filter from mounting brackets.
6. Position container to catch fuel spillage.



7. Disconnect 3 fuel hoses and 1 reference pipe, remove fuel filter.
- WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*

#### Refit

1. Connect fuel hoses to fuel filter.
2. Position fuel filter to mounting brackets and secure with screws.
3. Connect battery earth lead.
4. Start and run engine to check for leaks from fuel filter and hoses.
5. Remove container.
6. Fit fuel filter access cover and secure with screws.

# FUEL DELIVERY SYSTEM - V8

## Vapour separator

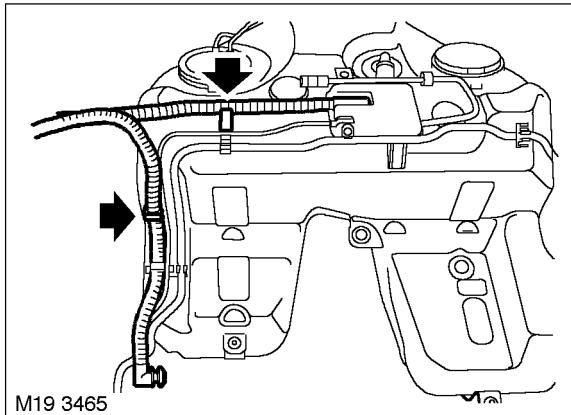
→ 19.25.09

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

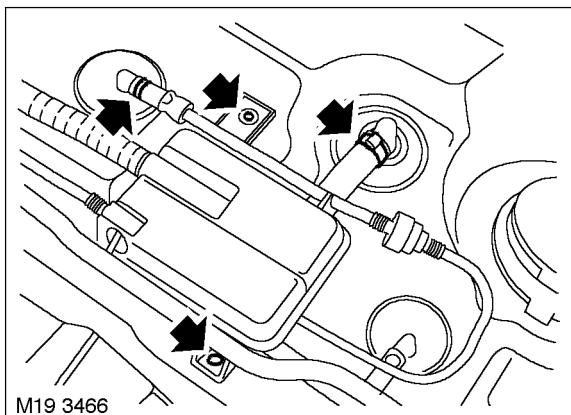
☞ **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove fuel tank.  
☞ **FUEL DELIVERY SYSTEM - V8, REPAIRS, Tank - fuel.**



4. Release fuel tank breather hose and charcoal canister vent pipe from securing clips on fuel tank.



5. Release 2 clips and disconnect 2 hoses from fuel tank. Remove 2 scrivets and remove vapour separator.

### Refit

1. Fit vapour separator to fuel tank and secure with 2 scrivets, connect 2 hoses to fuel tank and secure with clips.
2. Fit fuel tank breather hose and fuel tank vent pipes to fuel tank, secure with clips.
3. Fit fuel tank.  
☞ **FUEL DELIVERY SYSTEM - V8, REPAIRS, Tank - fuel.**
4. Connect battery earth lead.



## Pump - fuel tank

### 19.45.03

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

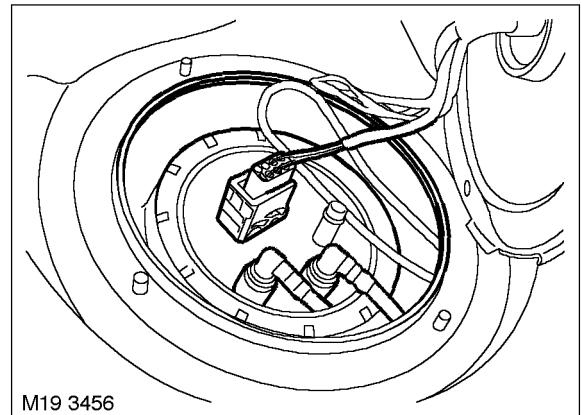
#### Remove

1. Drain fuel tank.

**FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**

2. Disconnect battery earth lead.

**CAUTION:** Before disconnecting the battery, ensure that the key is removed from the ignition. Failure to remove the key will result in the fuel gauge memorising its needle position before disconnection and reverting to it on re-connection of the battery.



4. Disconnect multiplug from fuel pump.
5. Position container to collect spillage.

**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

6. Noting fitted position, release fuel feed and return pipes from pump.

**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

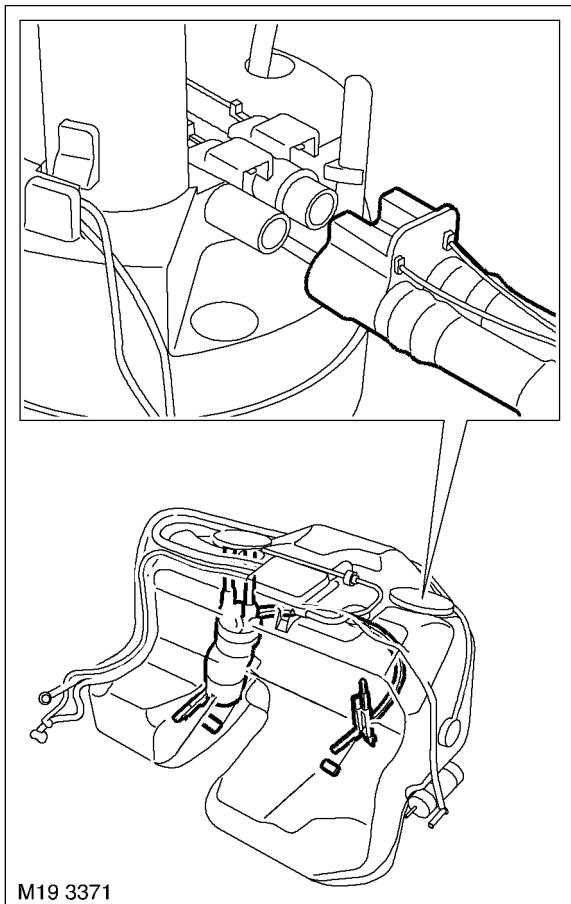
7. Collect fuel pipes, tie aside to aid pump removal.



3. Remove 4 nuts and remove fuel tank RH access cover.

**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

## FUEL DELIVERY SYSTEM - V8



13. Release tank LH sensor from mounting and remove.

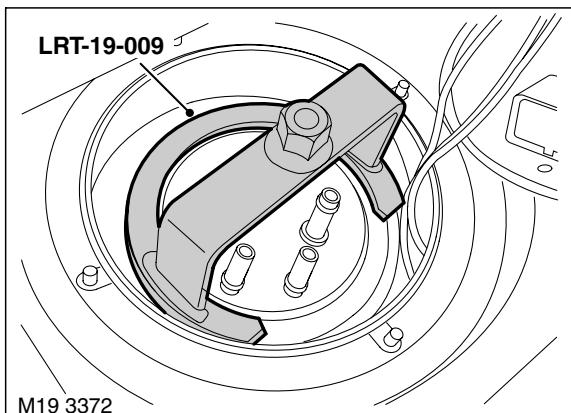
### Refit

1. Clean area surrounding fuel tank access.
2. Clean pump body and fit new tank seal to pump.
3. Connect combined fuel pipe and multiplug from tank LH sender to pump assembly.  
**CAUTION: Ensure clip is securely located after connection.**
4. Carefully fit pump and check seal is correctly seated. From LH aperture, check foot of pump to ensure correct alignment with tank.
5. Using **LRT-19-009**, fit locking ring and tighten to 35 Nm (26 lbf.ft).
6. Connect fuel pipes to pump.
7. Remove container.
8. Connect multiplug to fuel pump.
9. Position fuel tank RH access panel, fit nuts and tighten to 10 Nm (7 lbf.ft).
10. Connect battery earth lead.
11. Refill fuel tank.

 **FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**

12. Connect TestBook/T4, to ensure new fuel level senders are working correctly, and reset adaptions.

8. Through tank LH aperture, release clip and disconnect combined multiplug and fuel pipe connection from fuel pump body.
9. Clean area surrounding locking ring.



10. Using tool **LRT-19-009** remove locking ring from fuel tank.
11. Carefully release fuel pump tank unit assembly. Remove and discard seal.
12. Position container to collect spillage.



## Tank - fuel

### 19.55.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

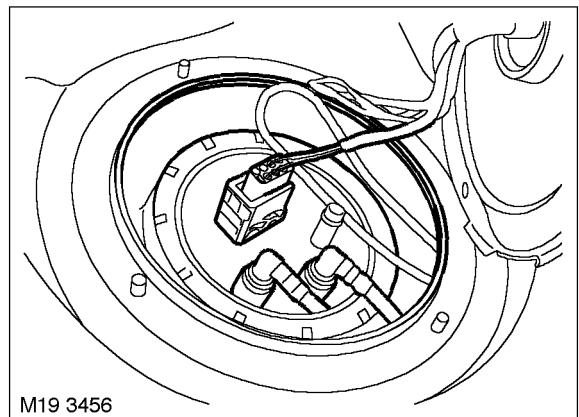
1. Disconnect battery earth lead.
2. Drain fuel tank.

**FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**

**WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*



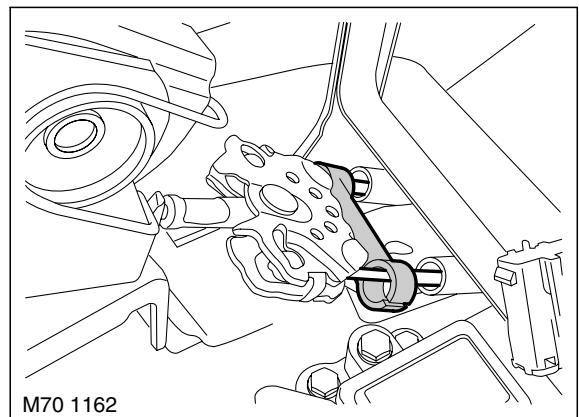
M19 3369



4. Disconnect multiplug from fuel pump.

5. Remove centre console.

**INTERIOR FITTINGS, REPAIRS, Centre console.**



6. Release cable securing clip from handbrake compensator, release handbrake cables from compensator and remove securing clip.

7. Remove rear propeller shaft.

**DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**

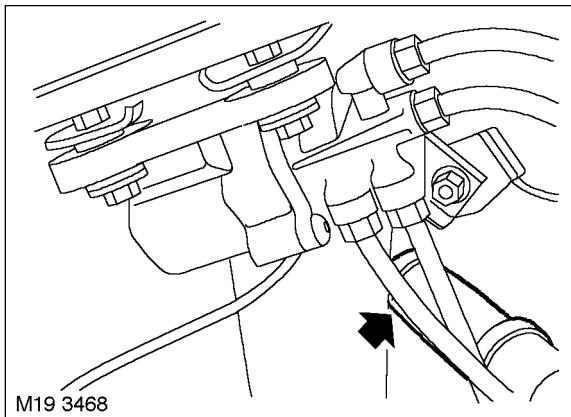
8. Withdraw handbrake cables from body and move aside for access.

9. Remove RH rear wheel arch liner.

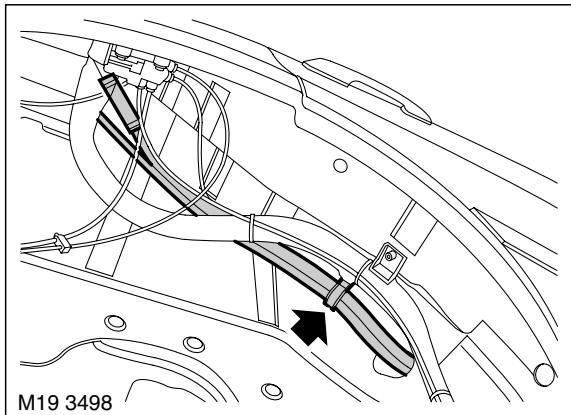
**EXTERIOR FITTINGS, REPAIRS, Liner - rear wheel arch - single.**

3. Remove 4 nuts and remove fuel tank RH access cover.

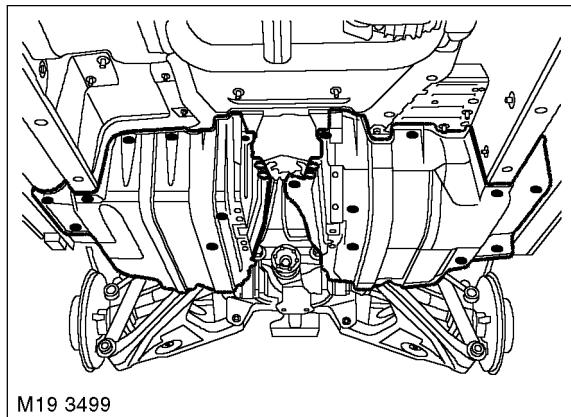
## FUEL DELIVERY SYSTEM - V8



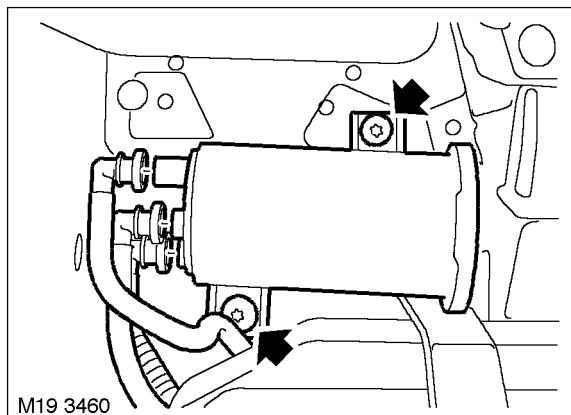
10. Release clip from breather hose and disconnect breather hose from filler neck.  
**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.



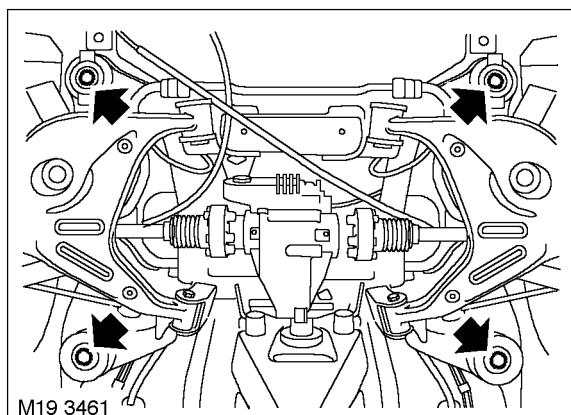
11. Release fuel tank breather and charcoal canister vent pipes from clip on filler neck.
12. Remove clip from breather hose and vent pipe.



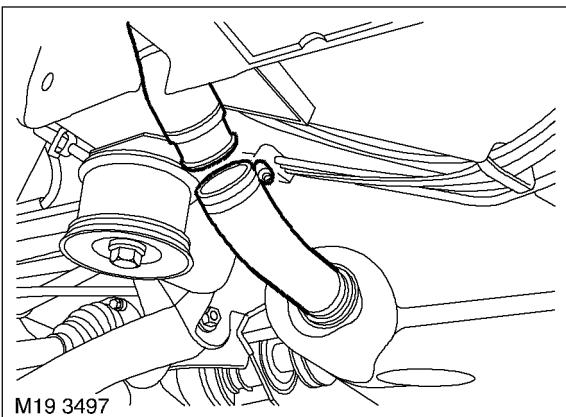
13. Remove 16 bolts and 4 nuts securing fuel tank shields.



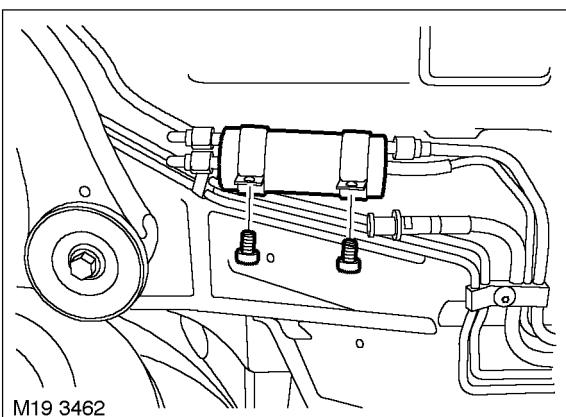
14. Disconnect 3 pipes from charcoal canister, remove 2 Torx bolts and remove charcoal canister.



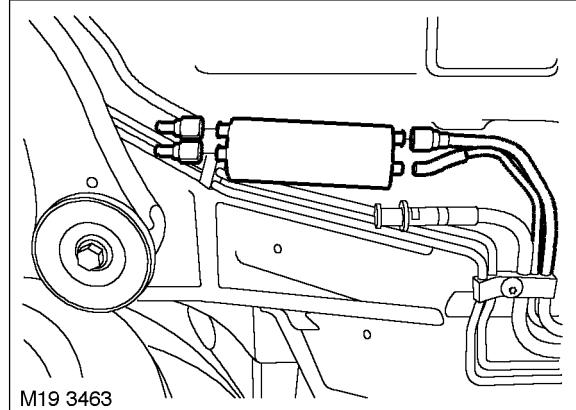
15. Loosen 4 bolts securing rear sub-frame to allow removal of tank shields.
16. Collect fuel tank shields.



- 17.** Disconnect fuel tank filler hose from fuel tank filler neck.



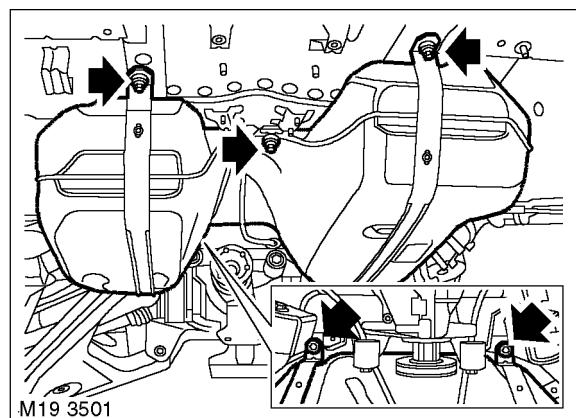
- 18.** Remove 2 screws securing fuel filter and release fuel filter from mounting brackets.  
**19.** Position container to catch fuel spillage.



- 20.** Disconnect 3 fuel hoses and 1 reference pipe, remove fuel filter.

**WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*

- 21.** Remove container.

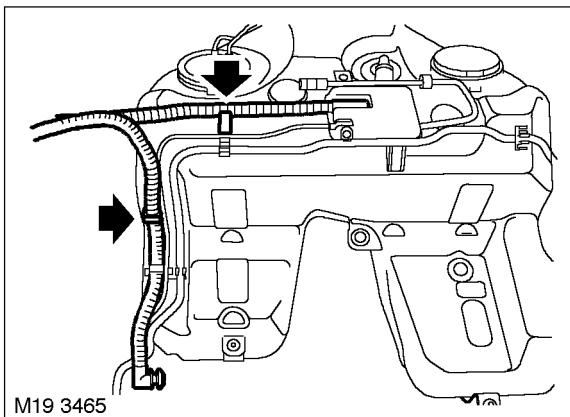


- 22.** With assistance remove 5 bolts securing fuel tank to body, lower and remove tank.

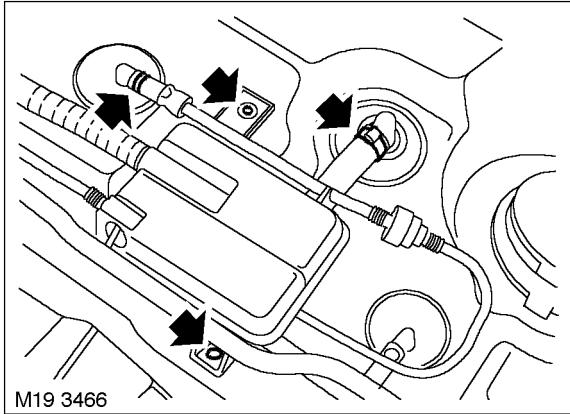
**NOTE:** *Pull vent and breather hoses through body while lowering fuel tank.*

**NOTE:** *Do not carry out further dismantling if component is removed for access only.*

## FUEL DELIVERY SYSTEM - V8



23. Release fuel tank breather hose and charcoal canister vent pipe from securing clips on fuel tank.



24. Release 2 clips and disconnect 2 hoses from fuel tank. Remove 2 scrivets and remove vapour separator.  
25. Remove charcoal canister to charcoal canister purge solenoid feed pipe from fuel tank.  
26. Remove 4 scrivets securing straps to fuel tank. Collect straps.

### Refit

1. Position straps to fuel tank and secure with scrivets.
2. Fit charcoal canister to charcoal canister purge solenoid feed pipe to fuel tank.
3. Fit vapour separator to fuel tank and secure with 2 scrivets, connect 2 hoses to fuel tank and secure with clips.
4. Fit fuel tank breather pipes and charcoal canister vent pipes to clip on fuel tank filler neck.
5. Position tank assembly and breather pipes to vehicle.

6. With assistance, fit bolts securing fuel tank to body and tighten to 45 Nm (33 lbf.ft).

*NOTE: Pass vent and breather hoses through body while fitting tank.*

7. Connect fuel hoses to fuel filter.
8. Position fuel filter to mounting brackets and secure with screws.
9. Fit fuel tank shields, but do not fit nuts and bolts.
10. Connect breather hose to filler neck, fit and secure clip.
11. Position fuel tank vent pipe to filler neck.
12. Connect fuel tank filler hose to fuel tank filler neck.
13. Tighten bolts securing subframe to body to 165 Nm (129 lbf.ft).
14. Fit charcoal canister, tighten 2 bolts and connect 3 pipes to charcoal canister.
15. Fit bolts and nuts securing fuel tank shields and tighten to 25 Nm (18 lbf.ft).
16. Fit fuel tank breather hose to fuel tank filler neck and secure with clip.
17. Fit fuel tank breather pipes and charcoal canister vent pipes to clip on fuel tank filler neck.
18. Fit securing clip to fuel tank breather hose and charcoal canister vent pipe.
19. Fit RH rear wheel arch liner.

**EXTERIOR FITTINGS, REPAIRS, Liner - rear wheel arch - single.**

20. Insert handbrake cables through body.
21. Fit rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
22. Fit handbrake cable retaining clip.
23. Fit handbrake cables to compensator.
24. Fit cable retaining clip to handbrake compensator.
25. Fit centre console.  
 **INTERIOR FITTINGS, REPAIRS, Centre console.**
26. Connect multiplug to fuel pump.
27. Fit RH fuel tank access cover and secure with 4 nuts.
28. Fill fuel tank with extracted fuel.  
 **FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**
29. Connect battery earth lead.



## Filler neck

### 19.55.07

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

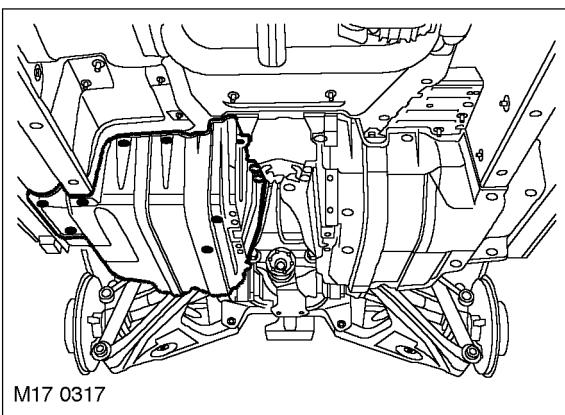
#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain fuel tank.

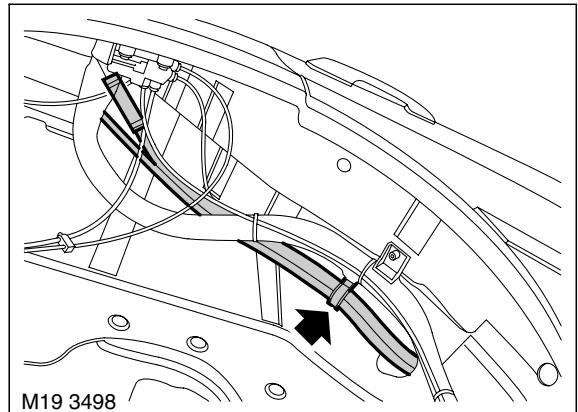
**FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**

**WARNING:** *The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.*

4. Remove propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
5. Remove RH rear wheel arch liner.  
 **EXTERIOR FITTINGS, REPAIRS, Liner - rear wheel arch - single.**



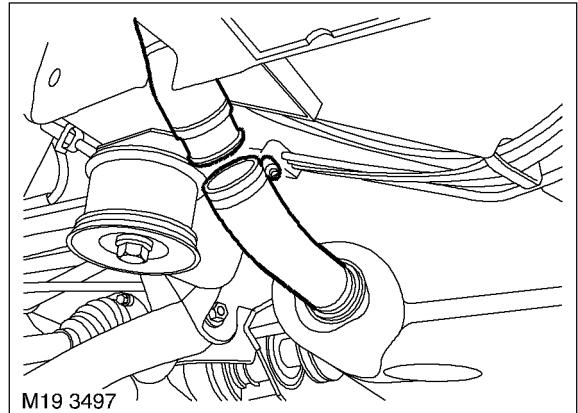
6. Remove 8 bolts and 2 nuts securing RH fuel tank shield.



7. Release fuel tank breather pipes and charcoal canister vent pipes from clip on filler neck.

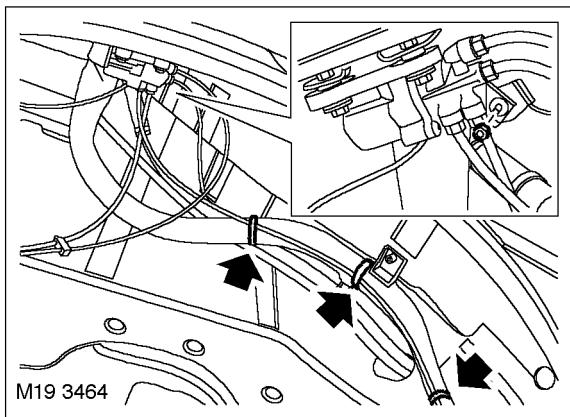
**WARNING:** *Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.*

8. Remove clip from fuel tank breather pipe and charcoal canister vent pipe.
9. Position container to catch fuel spillage.



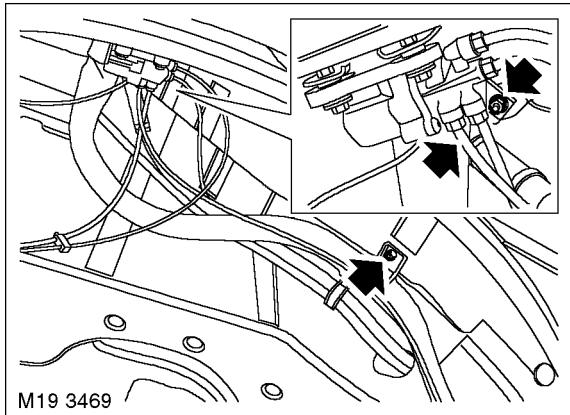
10. Disconnect fuel tank filler hose from fuel tank filler neck.
11. Remove container.
12. Dispose of fuel and clean container.

## FUEL DELIVERY SYSTEM - V8



8. Fit propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
9. Refill fuel tank with extracted fuel.  
☞ **FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**
10. Connect battery earth lead.

13. Cut 3 cable ties securing air suspension pipes to fuel tank filler neck.



14. Remove 2 nuts securing fuel tank filler neck to body, disconnect breather hose and remove fuel tank filler neck.

### Refit

1. Fit 2 nuts securing fuel tank filler neck to body, connect breather hose to fuel tank filler neck and secure with clip.
2. Fit 3 cable ties securing air suspension pipes to fuel tank filler neck.
3. Connect fuel tank filler hose to fuel tank filler neck.
4. Fit securing clip to fuel tank breather hose and charcoal canister vent pipe.
5. Fit fuel tank breather pipes and charcoal canister vent pipes to clip on fuel tank filler neck.
6. Fit bolts and nuts securing RH fuel tank shield and tighten to 25 Nm (18 lbf.ft).
7. Fit RH rear wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS, Liner - rear wheel arch - single.**



## Cover - tank module - LH

### 19.55.41

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.

**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

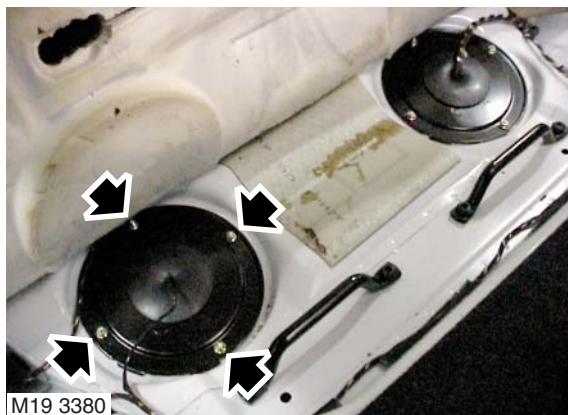
2. Remove 'D' post trim casing.

**INTERIOR FITTINGS, REPAIRS, Trim finisher - 'D' post - lower.**

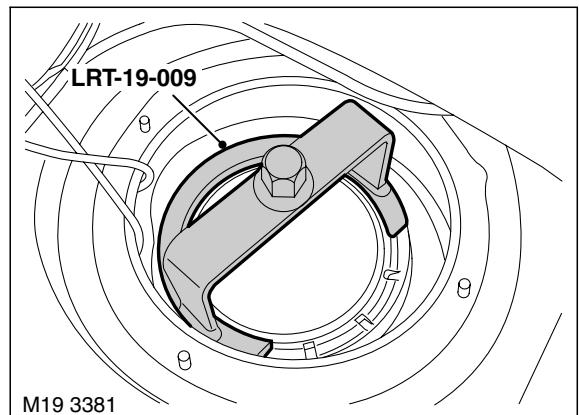
3. Remove opposite 'D' post trim.

4. Remove 2 Allen bolts securing spare wheel removal straps to cross member and move straps aside.

5. Release carpet, fold forward and tie aside.



6. Remove 4 nuts and remove fuel tank LH access cover.
7. Clean area surrounding locking ring.



8. Using tool LRT-19-009, remove locking ring from fuel tank.

**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

9. Remove access plug and discard fuel tank seal.

#### Refit

1. Clean area surrounding fuel tank access.
2. Clean fuel tank access plug and fit new tank seal.
3. Position fuel tank access plug, align timing and push fully home. Ensure seal is correctly fitted.
4. Using LRT-19-009 , fit locking ring and tighten to 35 Nm (26 lbf.ft).
5. Fit carpet.
6. Position spare wheel release straps fit bolts and tighten to 25 Nm (18 lbf.ft).
7. Fit 'D' post trim casings.

**INTERIOR FITTINGS, REPAIRS, Trim finisher - 'D' post - lower.**

8. Connect battery earth lead.

## FUEL DELIVERY SYSTEM - V8

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## Coolant - drain, flush & refill

### 26.10.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Drain

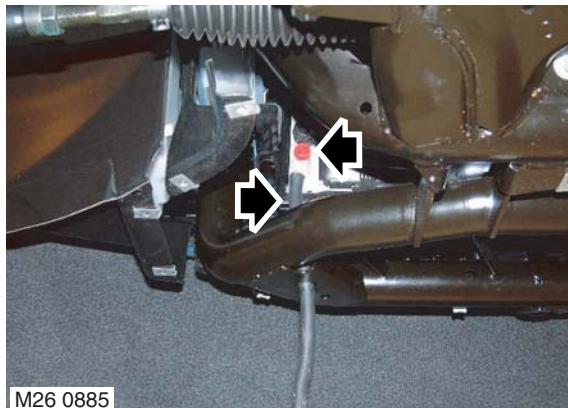
1. Position vehicle on lift.
2. Set heater controls to maximum.
3. Disconnect battery earth lead.
4. Remove coolant expansion tank cap.

**WARNING:** *Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.*

5. Remove undertray.

**EXTERIOR FITTINGS, REPAIRS, Undertray - front.**

6. Position container beneath radiator to collect coolant.

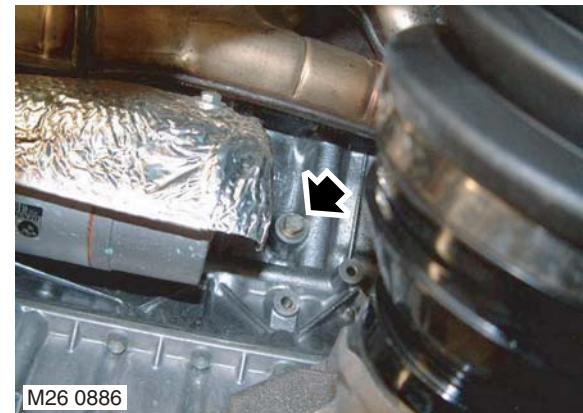


M26 0885

7. Fit tube to drain tap, open tap and allow coolant to drain.

**CAUTION:** Engine coolant will damage paint finished surfaces. If spilled, immediately remove coolant and clean area with water.

8. Position container beneath engine to collect coolant.

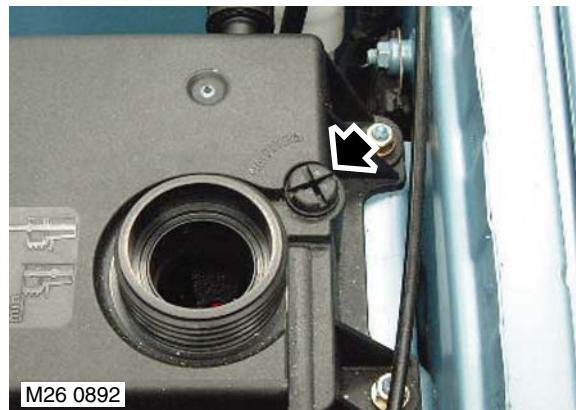


M26 0886

9. Remove cylinder block drain plug and allow coolant to drain. Discard sealing washer.
10. Remove container.

#### Refill

1. Close radiator drain tap and remove tube.
2. Using a new sealing washer, fit cylinder block drain plug and tighten to 25 Nm (18 lbf.ft).
3. Connect battery earth lead.
4. Connect exhaust extractor to tail pipes.

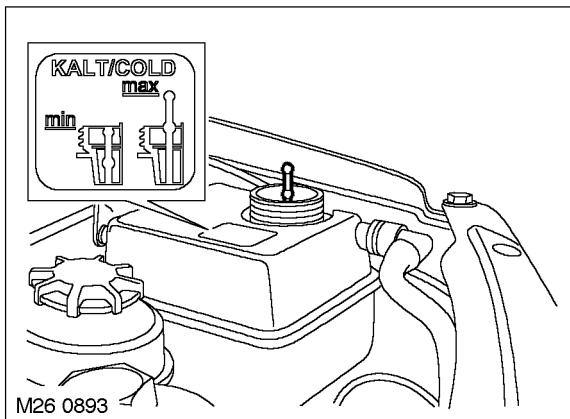


M26 0892

5. Remove bleed screw from expansion tank.
6. Fill cooling system, keeping coolant to neck of expansion tank until a steady stream of coolant is emitted from bleed screw hole. Fit and tighten bleed screw.
7. Fit coolant expansion tank cap.
8. Run engine until normal operating temperature is reached.
9. Switch off engine and allow to cool.

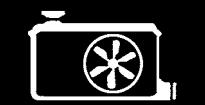
## COOLING SYSTEM - V8

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10. Check for leaks and fill expansion tank to 'MAX' mark.
11. Clean coolant from body and surrounding area.
12. Fit undertray.

 **EXTERIOR FITTINGS, REPAIRS,**  
**Undertray - front.**



## Coupling unit - viscous fan

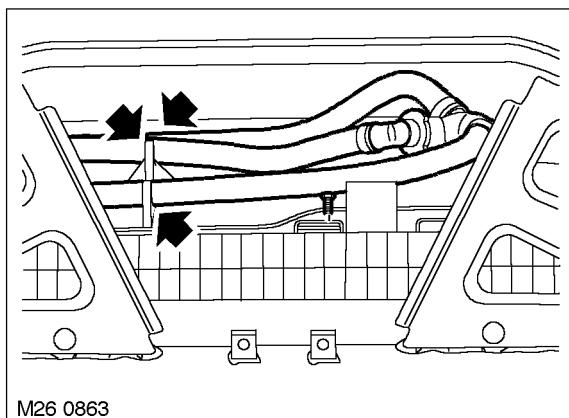
### 26.25.19

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

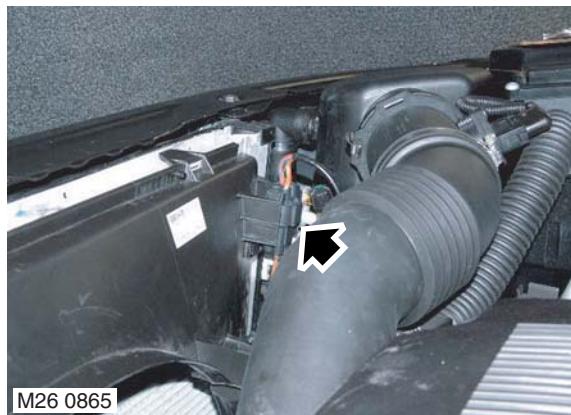
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

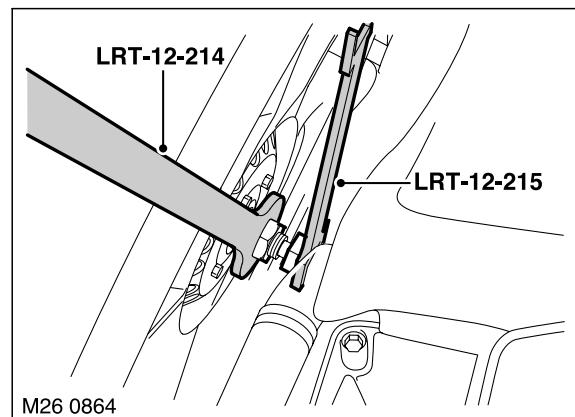
1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Remove undertray.
- EXTERIOR FITTINGS, REPAIRS, Undertray - front.**



4. Release 3 coolant hoses from clips on fan cowl. Remove screw securing fan cowl to radiator.

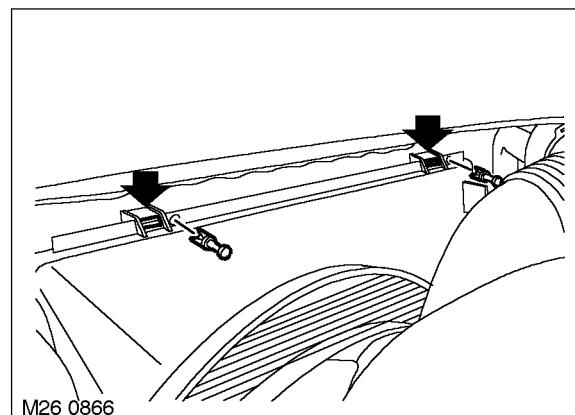


5. Disconnect harness multiplug and release cooling fan multiplug from mounting.



6. Use LRT-12-214 and LRT-12-215 to loosen viscous coupling lock nut and remove fan assembly from coolant pump.

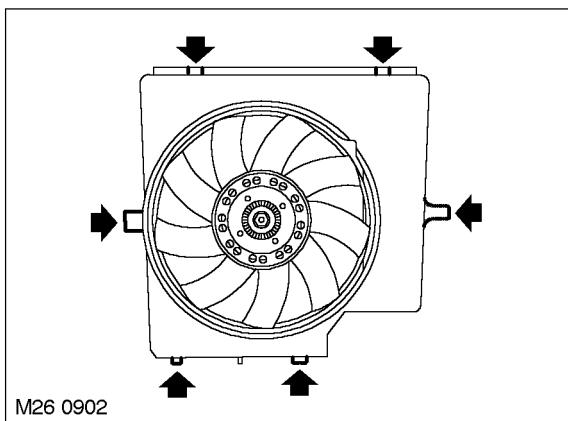
*NOTE: Thread is left handed.*



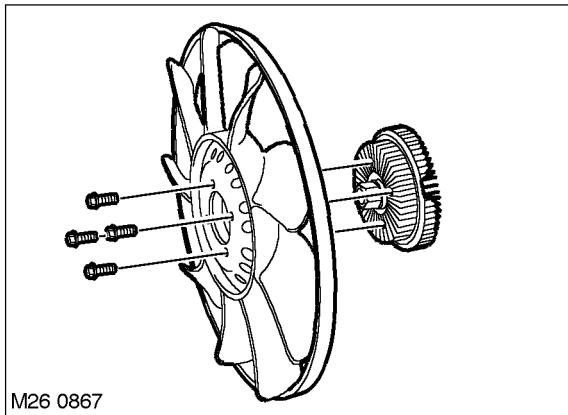
7. Remove screws securing fan cowl.

**CAUTION: The radiator matrix is a fragile component, to prevent damage do not allow the fan or fan cowl to contact the radiator.**

# COOLING SYSTEM - V8



8. Release cowl from mountings and remove cowl and fan assembly.
9. Place viscous coupling and fan to work bench.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*



10. Remove 4 bolts and remove coupling from fan.

## Refit

1. Clean coupling and fan mating faces.
2. Fit viscous coupling to fan and tighten 4 bolts to 10 Nm (7 lbf.ft).
3. Carefully fit fan and cowl assembly, secure the cowl to mountings.
4. Fit fan assembly to coolant pump. Using **LRT-12-214** and **LRT-12-215** tighten viscous coupling lock nut to 45 Nm (33 lbf.ft).
5. Fit cooling fan harness and multiplug to fan cowl.
6. Fit screw securing fan cowl to radiator.
7. Secure 3 coolant hoses to clips on fan cowl.
8. Fit undertray.  
    → **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
9. Connect battery earth lead.

## Manifold - coolant

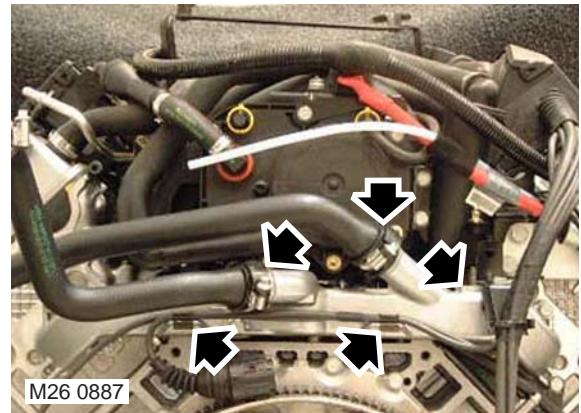
### → 26.30.64

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

→ **GENERAL INFORMATION, Electrical Precautions.**

## Remove

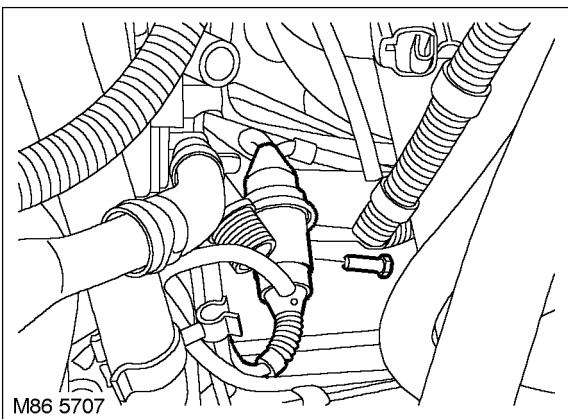
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain coolant.
- **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove air intake plenum.  
    → **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
5. Remove throttle body.  
    → **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Throttle body.**



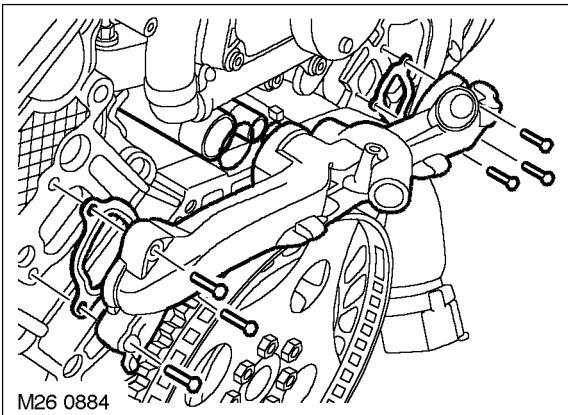
6. Remove bolt securing engine harness to coolant manifold.
7. Disconnect heater pipes from coolant manifold.
8. Release harness from 2 clips on coolant manifold.

**Refit**

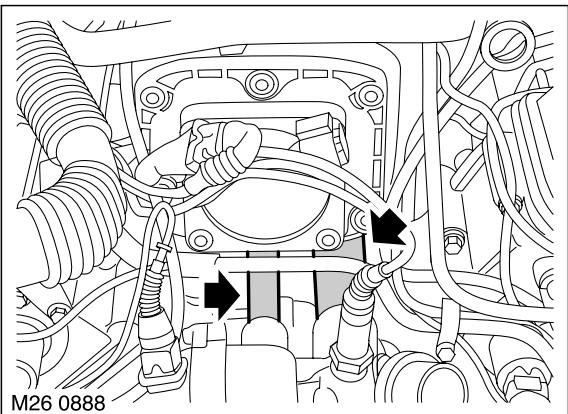
1. Clean coolant manifold and cylinder head mating faces.
2. Fit new 'O' rings to coolant manifold.
3. Fit harness retaining clips.
4. Position new gaskets and coolant manifold to cylinder heads, fit bolts and tighten to 10 Nm (7 lbf.ft).
5. Fit transfer gearbox breather pipe to clip.
6. Fit bolt securing multiplug to bell housing and tighten to 25 Nm (18 lbf.ft).
7. Fit harness into clips.
8. Connect heater pipes to coolant manifold.
9. Fit bolt securing engine harness to coolant manifold and tighten to 10 Nm (7 lbf.ft).
10. Fit throttle body.
  - ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Throttle body.**
11. Fit air intake plenum.
  - Engine - V8, REPAIRS, Acoustic cover - engine.**
12. Connect battery earth lead.
13. Refill cooling system.
  - COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**



9. Remove bolt securing multiplug to bell housing.
10. Release transfer gearbox breather pipe from clip.



11. Remove 6 bolts securing coolant manifold to cylinder heads.



12. Secure coolant pipes and remove coolant manifold.
13. Remove harness retaining clips.
14. Discard 'O' rings and gaskets.

# COOLING SYSTEM - V8

## Pipe(s) - coolant pump to coolant manifold

→ 26.31.25

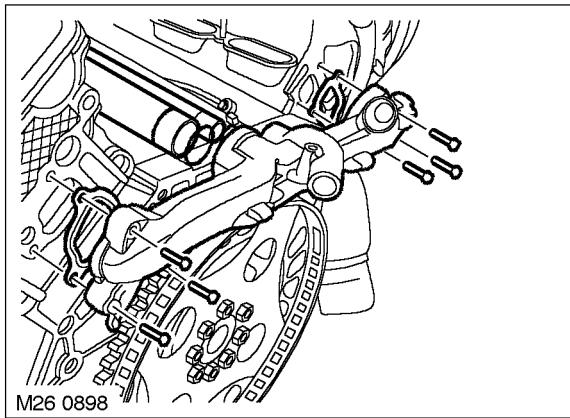
### Remove

1. Drain coolant.  
→ COOLING SYSTEM - V8,  
ADJUSTMENTS, Coolant - drain, flush & refill.
2. Remove inlet manifold.  
→ MANIFOLD AND EXHAUST SYSTEM  
- V8, REPAIRS, Gasket(s) - inlet manifold.
3. Remove bolt securing engine harness to coolant manifold.
4. Release harness from 2 clips on coolant manifold.
5. Release transfer gearbox breather pipe from clip.

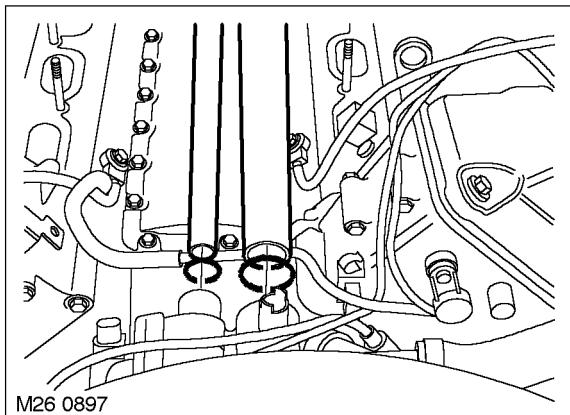
10. Discard 'O' rings.

### Refit

1. Clean gasket mating faces.
2. Fit new 'O' rings to coolant manifold.
3. Fit coolant pipes to the coolant pump.
4. Position new gaskets and coolant manifold to cylinder heads, fit bolts and tighten to 10 Nm (7 lbf.ft).
5. Fit transfer gearbox breather pipe to clip.
6. Fit harness into clips.
7. Fit bolt securing engine harness to coolant manifold and tighten to 10 Nm (7 lbf.ft).
8. Fit inlet manifold.  
→ MANIFOLD AND EXHAUST SYSTEM  
- V8, REPAIRS, Gasket(s) - inlet manifold.
9. Refill cooling system.  
→ COOLING SYSTEM - V8,  
ADJUSTMENTS, Coolant - drain, flush & refill.



6. Remove 6 bolts securing coolant manifold to cylinder heads.
7. Secure coolant pipes and reposition coolant manifold.
8. Remove and discard coolant manifold gaskets.



9. Remove 2 coolant pipes from coolant pump.



## Gasket - coolant gallery sealing plate

### 26.35.40

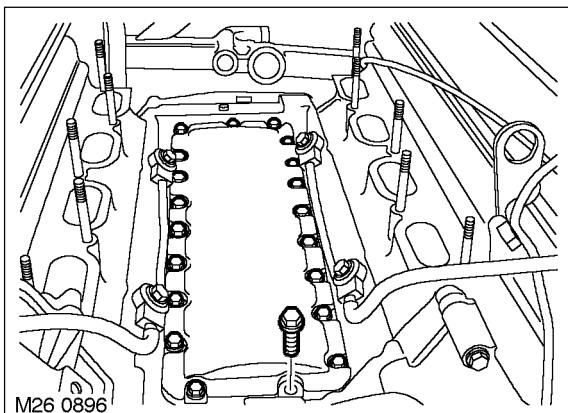
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove coolant pump to coolant manifold pipes.

**COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**



4. Remove 20 bolts securing coolant gallery sealing plate and remove the sealing plate.
5. Discard gasket from coolant gallery sealing plate and cylinder block.

#### Refit

1. Clean coolant gallery sealing plate and cylinder block mating faces.
2. Fit new gasket to coolant gallery sealing plate.
3. Fit and secure coolant gallery sealing plate to cylinder block, tighten bolts to 10 Nm (7 lbf.ft).
4. Fit coolant pump to coolant manifold pipes.

**COOLING SYSTEM - V8, REPAIRS, Pipe(s) - coolant pump to coolant manifold.**

5. Connect battery earth lead.

## Radiator

### 26.40.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

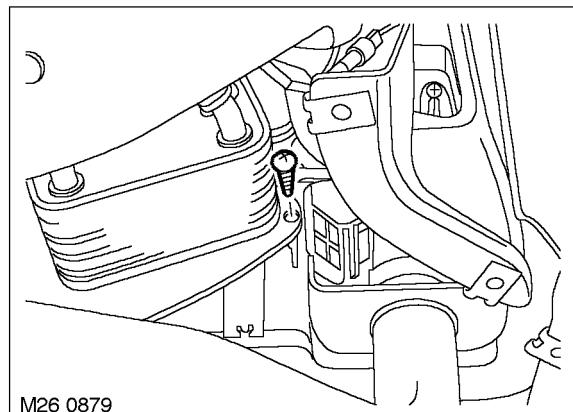
#### Remove

1. Disconnect battery earth lead.
2. Position vehicle on lift.
3. Drain cooling system.

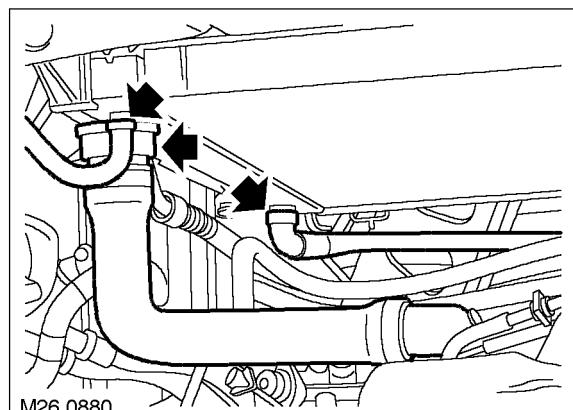
**COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

4. Remove fan cowl.

**COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**

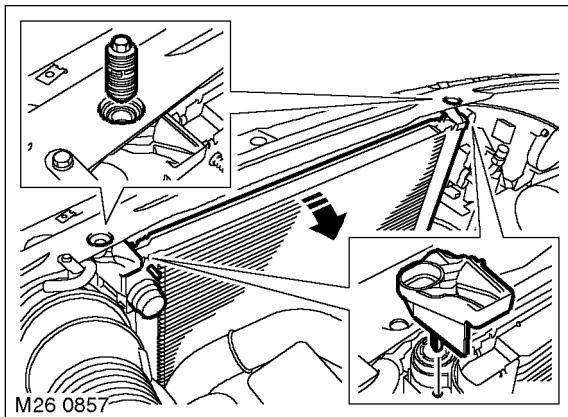


5. Remove screw and release gearbox cooler manifold from radiator.



6. Release hose clips and disconnect top hose, bottom hose and expansion tank hose from radiator.

# COOLING SYSTEM - V8



7. Remove radiator assembly retaining bolts from bonnet locking platform.
8. Ease radiator assembly rearward, release and remove radiator retaining clips.
9. Carefully remove radiator.

## Refit

1. Position radiator to mounting, fit and secure retaining clips.
2. Position and secure radiator assembly to bonnet locking platform.
3. Position gearbox cooler to radiator and tighten securing screw.
4. Connect hoses to radiator and secure with clips.
5. Fit viscous coupling.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
6. Connect battery earth lead.
7. Fill cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

## Thermostat

### 26.45.01

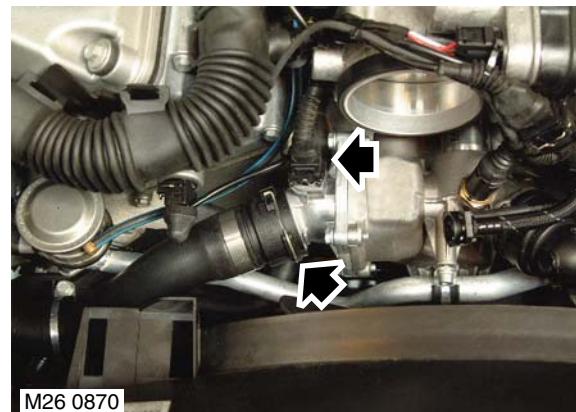
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

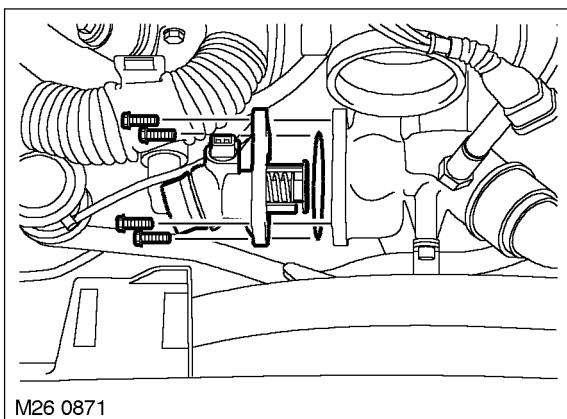
The thermostat heater is serviced with the thermostat and must not be removed.

## Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**



5. Disconnect multiplug from thermostat heater.
6. Release clip and disconnect radiator bottom hose from thermostat housing.



- Remove 4 bolts and remove thermostat housing from coolant pump. Discard seal.

#### Refit

- Clean mating face of thermostat housing and coolant pump.
  - Fit new seal to thermostat housing.
  - Fit thermostat housing and tighten bolts to 10 Nm (7 lbf.ft).
  - Connect radiator bottom hose to thermostat housing and secure with clip.
  - Connect multiplug to thermostat heater.
  - Connect air intake hose.
- ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
- Connect battery earth lead.
  - Fill cooling system.
- COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

## Gasket - coolant pump

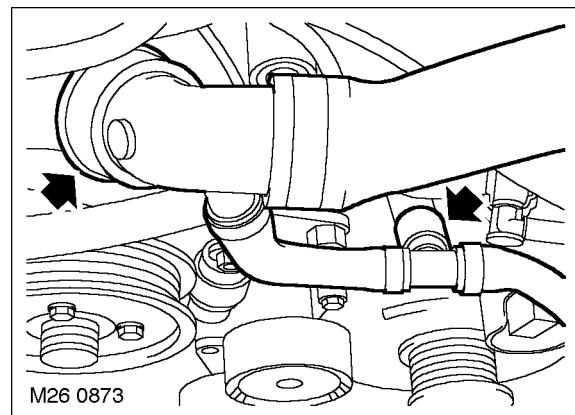
### 26.50.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

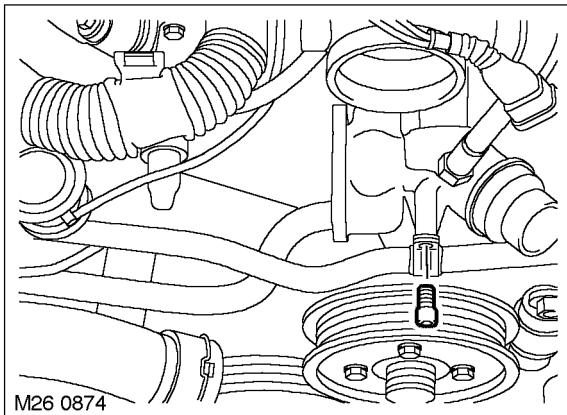
- Position vehicle on lift.
  - Disconnect battery earth lead.
  - Remove thermostat.
- COOLING SYSTEM - V8, REPAIRS, Thermostat.**
- Remove viscous fan.
- COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
- Remove ancillary drive belt.
- CHARGING AND STARTING, REPAIRS, Ancillary drive belt - V8.**



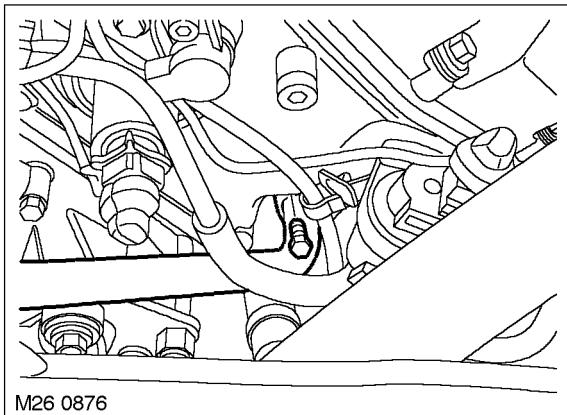
- Release clips and disconnect radiator top hose from coolant pump and alternator.

## COOLING SYSTEM - V8

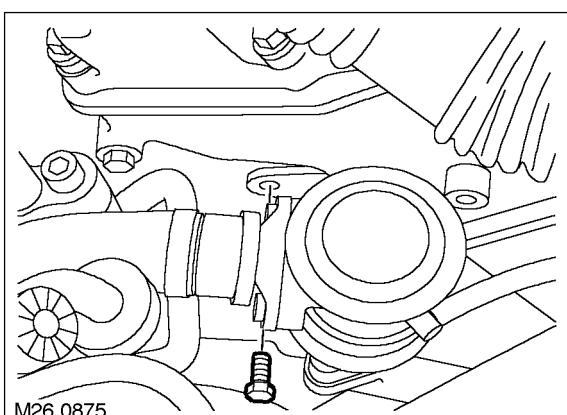
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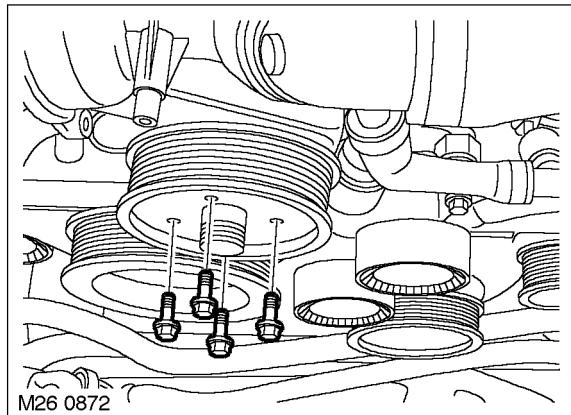
7. Remove Allen bolt securing secondary air injection (SAI) pipe clip to coolant pump.



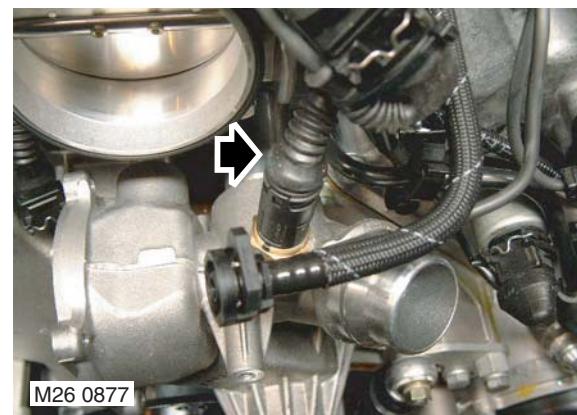
8. Remove bolt securing SAI pipe to LH cylinder head.



9. Remove bolt securing SAI pipe to RH cylinder head.
10. Release SAI pipe from cylinder heads and position aside. Discard 'O' rings.



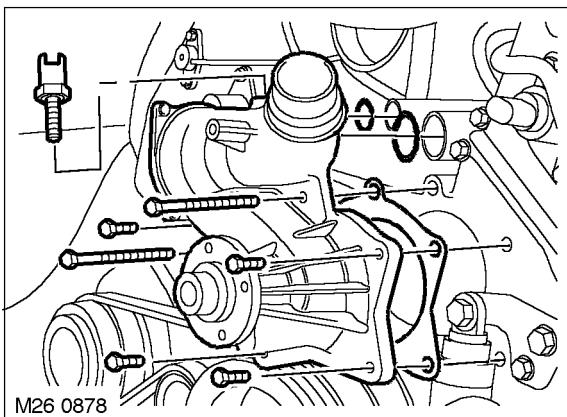
11. Using LRT-12-215 to hold coolant pump pulley, loosen 4 bolts securing coolant pump pulley.
12. Remove 4 bolts securing coolant pump pulley and remove pulley.



13. Disconnect ECT sensor multiplug.



## COOLING SYSTEM - V8



14. Remove 6 bolts securing coolant pump to cylinder block and remove coolant pump.  
*NOTE: Do not allow the coolant pipes to be released from the coolant manifold during the removal of the coolant pump. If the coolant pipes are released from the coolant manifold the 'O' rings must be replaced.*
15. Remove and discard 2 'O' rings from coolant pump.
16. Clean gasket mating faces.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
17. Remove ECT sensor and discard sealing washer.

### Refit

1. Using new sealing washer, fit ECT sensor and tighten to 14 Nm (11 lbf.ft).
2. Lubricate new 'O' rings and fit to sealing grooves in coolant pump.
3. Fit a new gasket and coolant pump to engine. Tighten bolts to 10 Nm (7 lbf.ft).
4. Connect ECT sensor multiplug.
5. Ensure mating faces of coolant pump pulley and flange are clean. Fit pulley and finger tighten securing bolts.
6. Using **LRT-12-215** to hold coolant pump pulley, tighten the bolts securing coolant pump pulley to 10 Nm (7 lbf.ft).

7. Lubricate new 'O' rings and fit to secondary air injection pipe. Fit secondary air injection pipe and tighten securing bolts to 10 Nm (7 lbf.ft).
8. Connect coolant hose to coolant pump and alternator.
9. Fit ancillary drive belt.  
☞ **CHARGING AND STARTING, REPAIRS, Ancillary drive belt - V8.**
10. Fit thermostat.  
☞ **COOLING SYSTEM - V8, REPAIRS, Thermostat.**
11. Fit viscous fan.  
☞ **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
12. Connect battery earth lead.

## COOLING SYSTEM - V8

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## Exhaust system & mountings

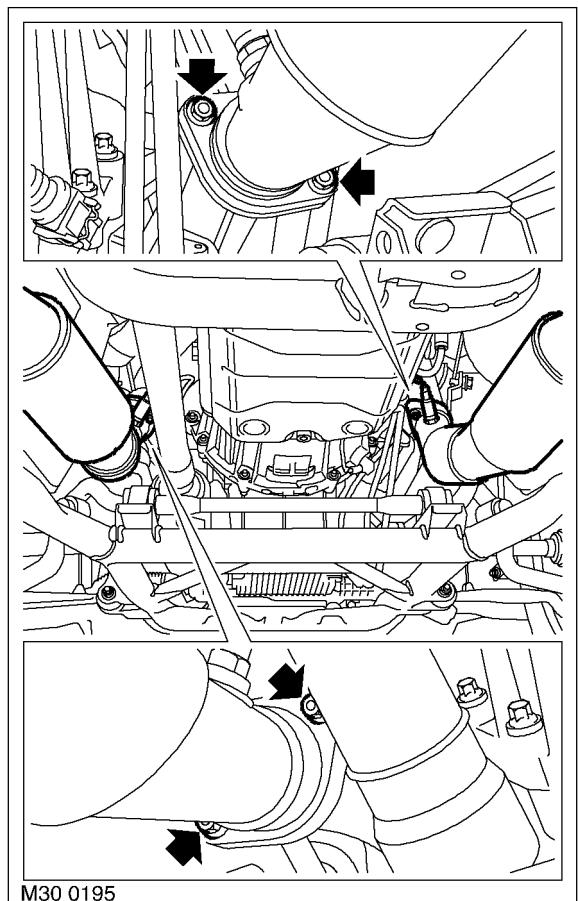
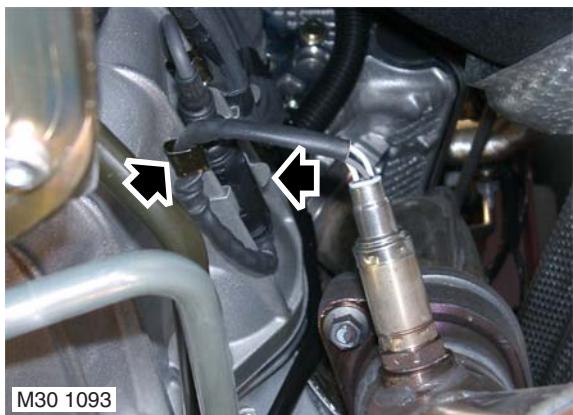
### 30.10.08

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

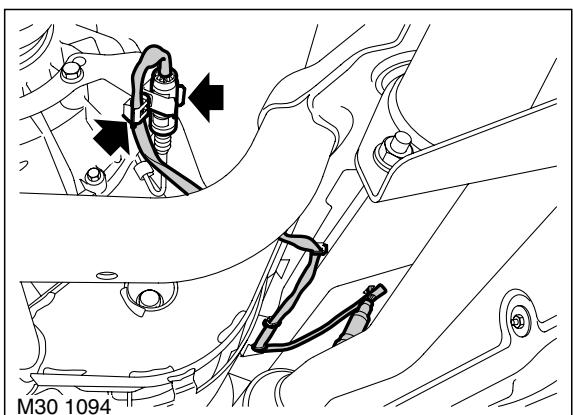
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



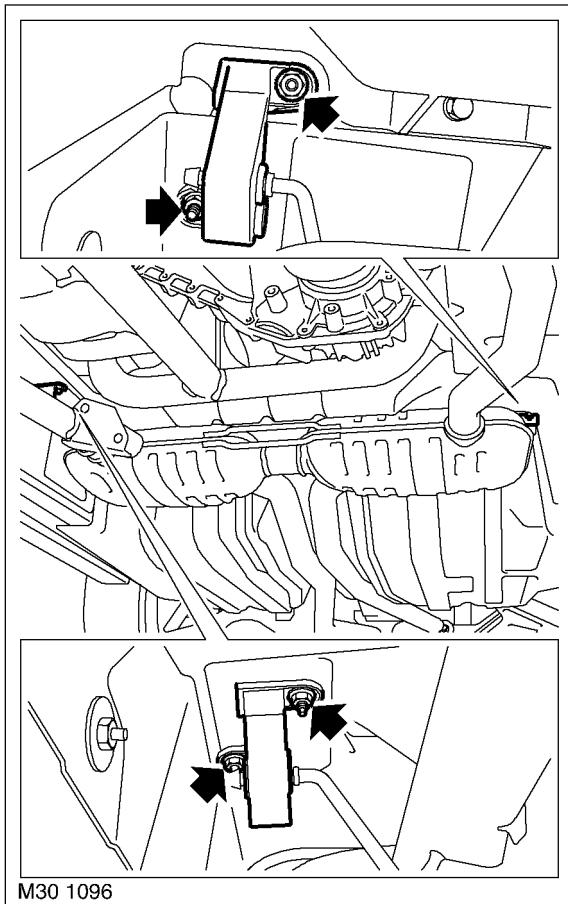
3. Release pre-catalyst harness leads from clips, remove multiplugs from retaining clips and disconnect.



5. Remove and discard 4 nuts securing front pipe flanges to exhaust manifolds, release front pipe from flanges and move aside.

4. Release post catalyst HO2S harnesses from clips, remove multiplugs from clips and disconnect.

## MANIFOLD AND EXHAUST SYSTEM - V8

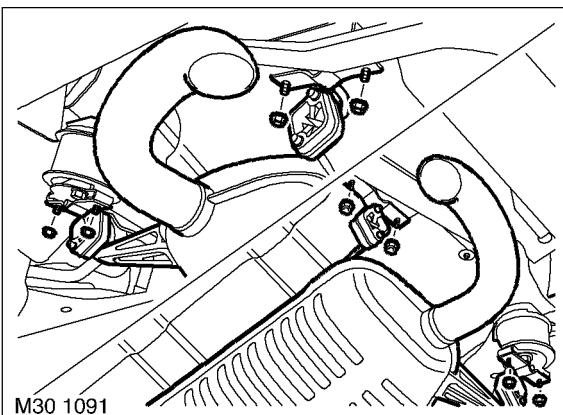


6. Remove and discard the 4 nuts securing intermediate silencer mountings to body.

9. Remove 6 mounting rubbers from main assembly, remove rubbers from body mounting brackets.
10. Remove HO2S sensors from exhaust assembly and discard sealing washers.

### Refit

1. Fit mass damper and tighten bolts to 25 Nm (18 lbf.ft).
2. Fit exhaust mountings.
3. Clean exhaust pipe and exhaust manifold down pipe flanges.
4. Clean HO2S, sealing washer and mating faces.
5. Fit new sealing washers and apply anti seize compound to threads of HO2S sensors. Fit and tighten sensors to 50 Nm (37 lbf.ft).  
**CAUTION: Ensure anti seize compound does not contact the tip of the HO2S sensor.**
6. Fit rubbers to exhaust mounting brackets and main assembly.
7. With assistance fit exhaust system to vehicle, align flanges to manifolds, fit and lightly tighten bolts. Fit one pair of rear silencer brackets to body and lightly tighten bolts.
8. Align remaining mounting brackets to body, fit nuts and tighten to 25 Nm (18 lbf.ft).
9. Check exhaust for correct alignment.
10. Align exhaust flange and tighten new nuts evenly to 45 Nm (33 lbf.ft).
11. Connect battery earth lead.
12. Start and run engine to check for leaks.



7. Remove 8 nuts securing rear silencer rubber mountings to body and with assistance remove exhaust assembly from vehicle.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

8. Remove 2 nuts and collect mass damper.



## Front pipe

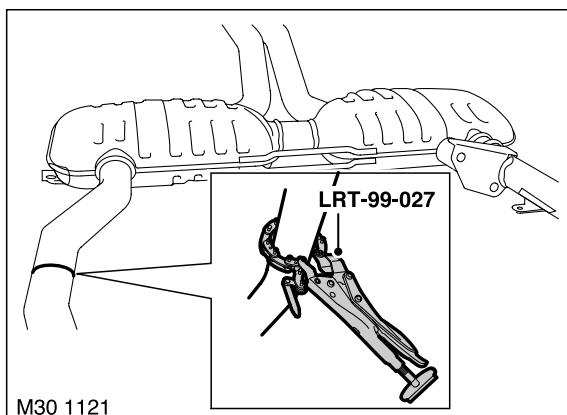
» **30.10.09**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove exhaust system.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**
4. Remove HO2S sensors from exhaust assembly and discard sealing washers.



5. Using **LRT-99-027**, cut pipe at point indicated by depression in pipe.

### Refit

1. Fit new sealing washers and apply anti seize compound to threads of HO2S sensors. Fit and tighten sensors to 50 Nm (37 lbf.ft).

**CAUTION: Ensure anti seize compound does not contact the tip of the HO2S sensor.**

2. Clean front pipe and mating face.
3. Fit front pipe and align flange, fit nuts but do not tighten at this stage.
4. Clean front pipe and intermediate pipe, fit joining sleeve.
5. Fit exhaust system.  
 **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**

6. Centralise connecting sleeve over joint, align intermediate pipe with front pipes and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
7. Check exhaust for correct alignment.
8. Connect battery earth lead.

# MANIFOLD AND EXHAUST SYSTEM - V8

## Intermediate pipe

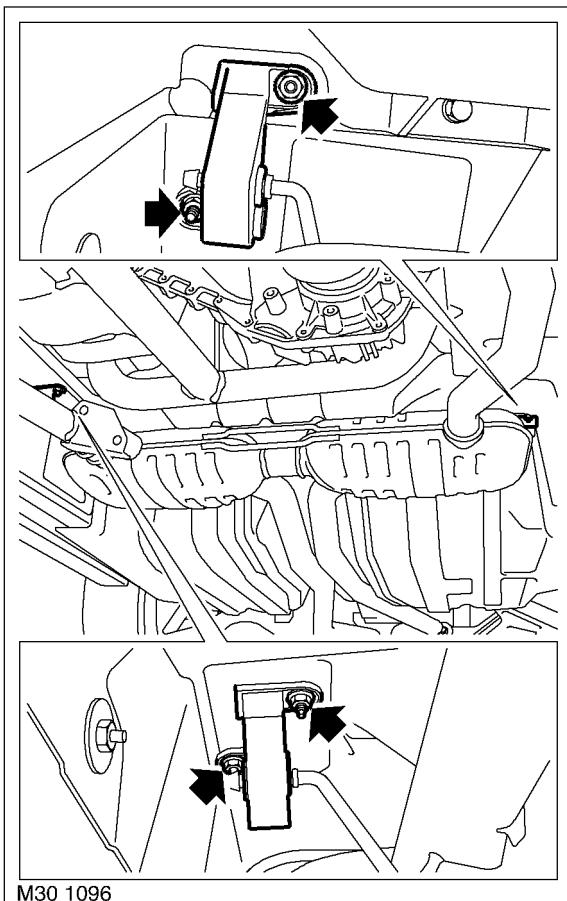
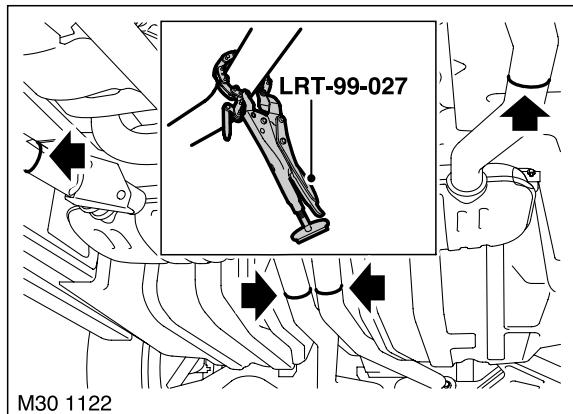
### 30.10.12

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Using **LRT-99-027**, cut pipe at point indicated by depression in pipe.

4. Remove 4 nuts securing intermediate silencer mountings to body.
5. With assistance, remove intermediate exhaust pipe.
6. Remove and discard 2 nuts securing exhaust vibration damper to intermediate exhaust pipe.
7. Remove mounting rubber.

### Refit

1. Fit mounting rubber.
2. Fit vibration damper to intermediate exhaust pipe and secure with 2 new nuts.
3. Clean tail pipe and fit joining sleeves.
4. With assistance, fit intermediate pipe locate mounting and fit nuts. Tighten mounting nuts to 25 Nm (18 lbf.ft).
5. Centralise connecting sleeve over joint, align intermediate pipe with front pipes and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
6. Centralise connecting sleeve over joint, align intermediate pipe with tail pipe and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
7. Check exhaust for correct alignment.
8. Connect battery earth lead.
9. Start and run engine to check for leaks.

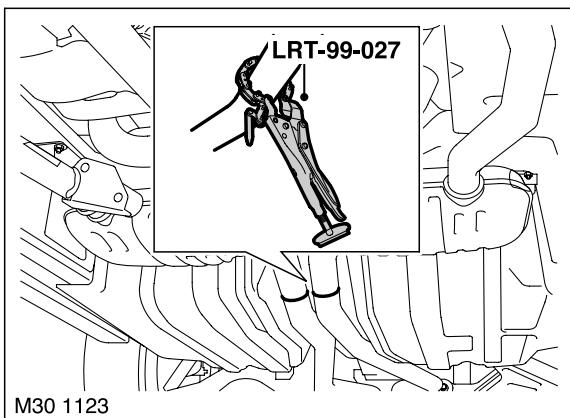


## Tail pipe & silencer

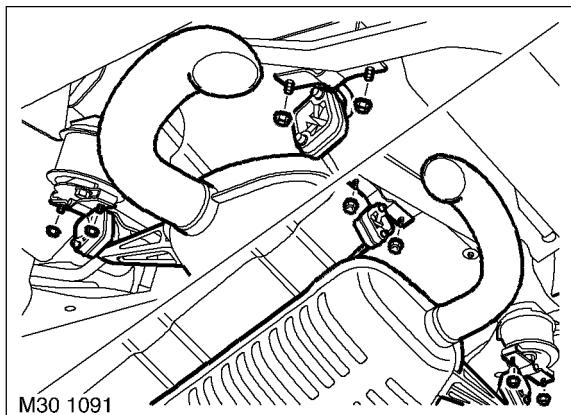
» 30.10.22

### Remove

1. Position vehicle on lift.



2. Using **LRT-99-027**, cut pipe at point indicated by depression in pipe.



3. Remove 8 nuts securing mountings and with assistance, remove tail pipe and silencer assembly.
4. Remove 4 exhaust mountings.

### Refit

1. Fit 4 exhaust mountings.
2. Clean intermediate pipe and fit sleeve.

3. With assistance, fit tail pipe and silencer assembly, locate mountings and fit nuts. Tighten nuts to 25 Nm (18 lbf.ft).
4. Centralise connecting sleeve over joint, align intermediate pipe with tail pipe and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
5. Check exhaust for correct alignment.
6. Connect battery earth lead.
7. Start and run engine to check for leaks.

# MANIFOLD AND EXHAUST SYSTEM - V8

## Gasket(s) - inlet manifold

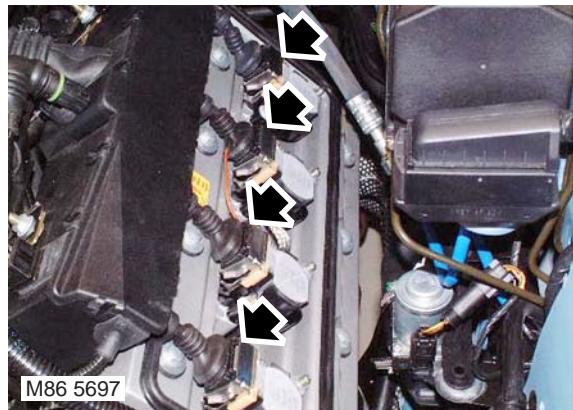
### 30.15.08

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

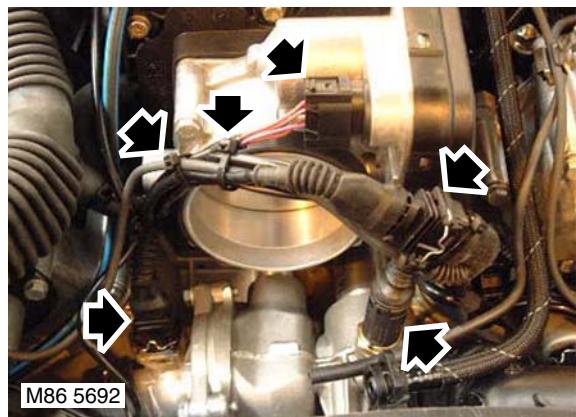
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

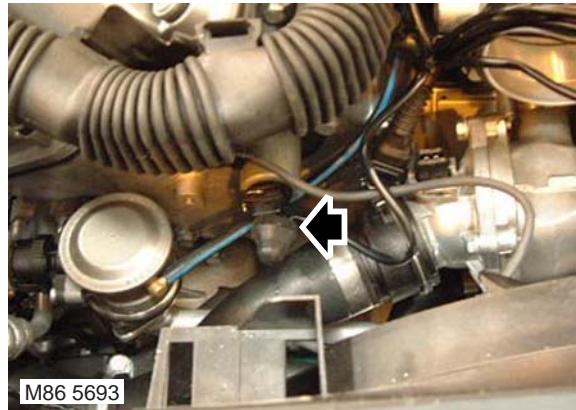
1. Disconnect battery earth lead.
2. Remove air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
3. Remove LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
4. Remove RH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**



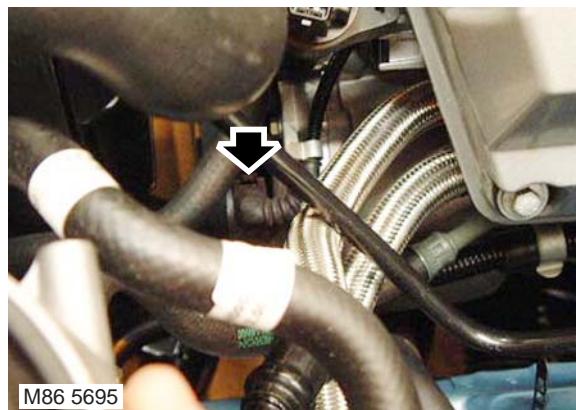
5. Disconnect multiplugs from ignition coils.



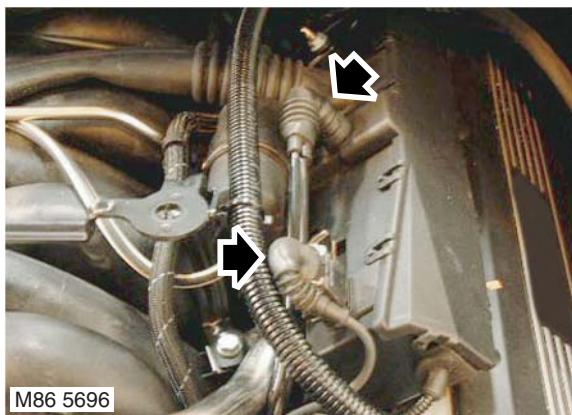
6. Disconnect multiplugs from throttle body, thermostat heater, CMP sensor and ECT sensor. Cut cable ties and release engine harness.



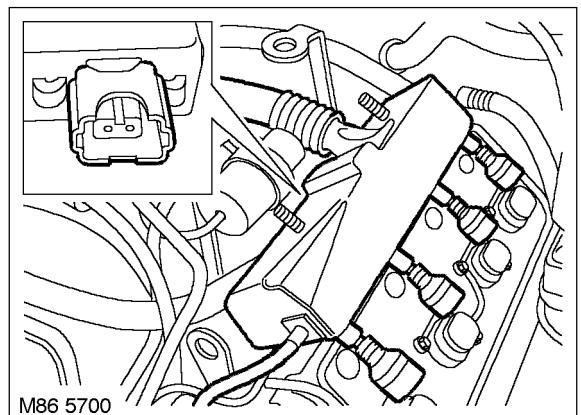
7. Disconnect multiplugs from VCC solenoids.
8. Release VCC multiplug harness from clip.



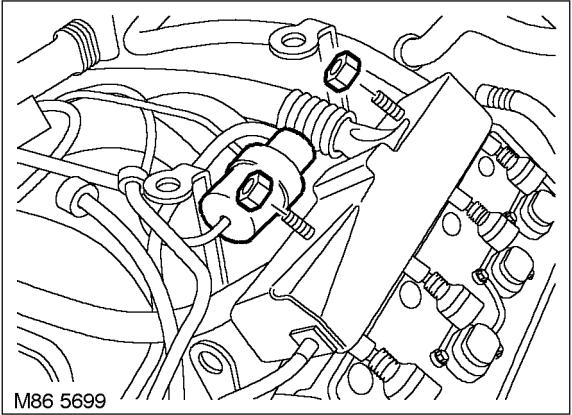
9. Disconnect multiplug from alternator.
10. Release alternator harness from 4 clips.



- 11.** Disconnect multiplugs from KS and CMP sensor.



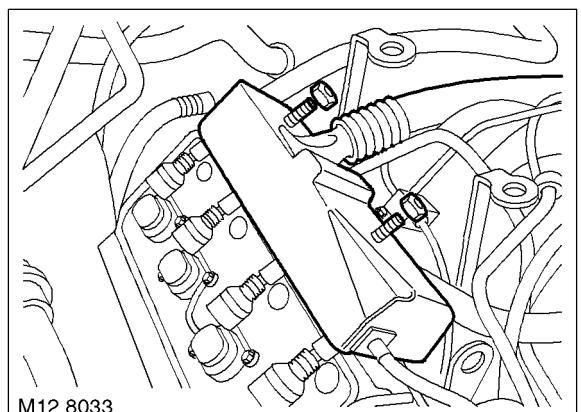
- 16.** Disconnect multiplugs from fuel injectors.  
**17.** Release engine harness from clips and move clear of camshaft cover.



- 12.** Remove 2 nuts securing fuel injector harness to fuel rail.  
**13.** Release vacuum reservoir and mounting bracket from LH fuel injector harness securing stud.  
**14.** Remove fuel hose and mounting bracket from LH fuel injector harness securing stud.  
**15.** Release alternator harness from 2 clips on engine cover mounting brackets.

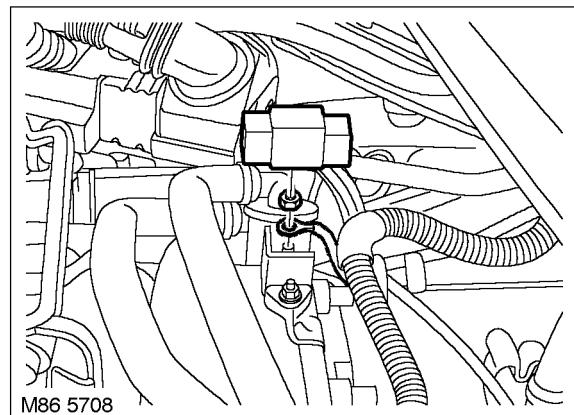


- 18.** Disconnect multiplug from charcoal canister purge solenoid valve.



- 19.** Remove 2 nuts securing engine harness to inlet manifold

## MANIFOLD AND EXHAUST SYSTEM - V8



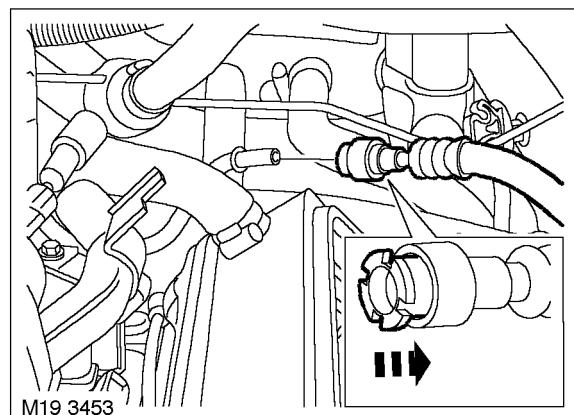
20. Disconnect multiplug from SAI solenoid.
21. Remove SAI solenoid valve from RH fuel injector harness securing stud.



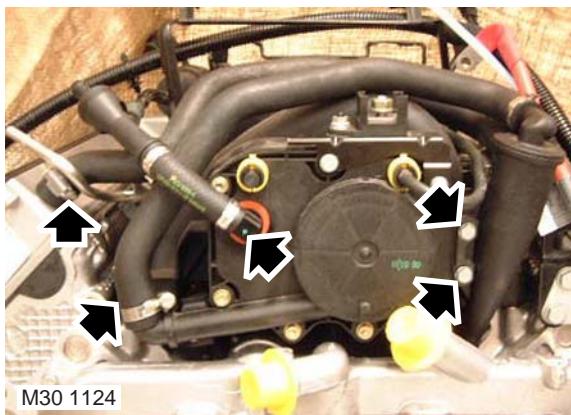
22. Disconnect multiplug from knock sensor.
23. Remove washer from fuel injector harness securing stud.
24. Disconnect multiplugs from fuel injectors.
25. Reposition injector harness.
26. Remove air intake plenum.

**HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**

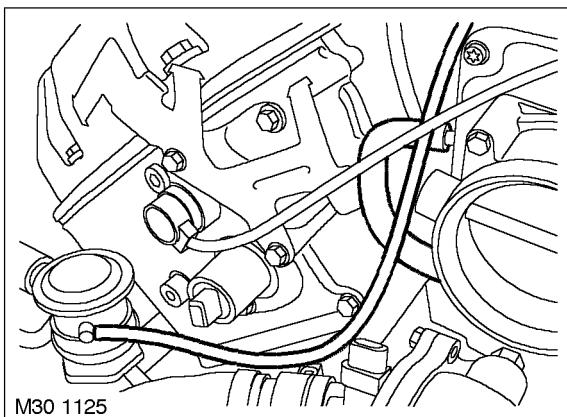
27. Release terminal cover, remove nut and disconnect 2 cables from terminal post.
28. Depressurise fuel system.  
 **FUEL DELIVERY SYSTEM - V8, ADJUSTMENT, Fuel system - depressurise.**



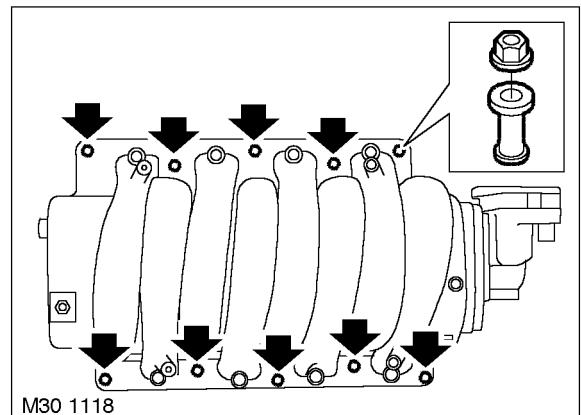
29. Disconnect fuel feed hose from fuel rail.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**



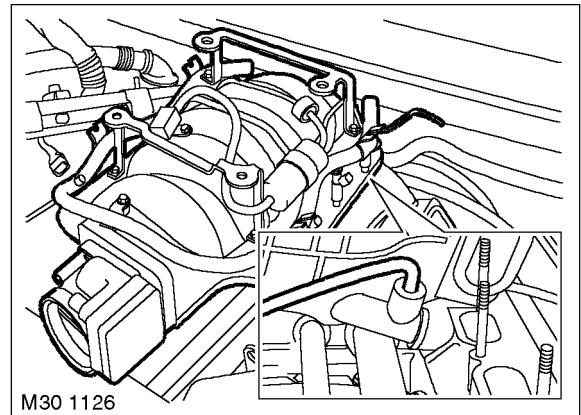
30. Release 2 clips and disconnect 2 breather hoses.
31. Remove clip and disconnect brake vacuum hose.
32. Remove 2 bolts securing oil separator to manifold.



33. Remove clip and disconnect purge solenoid valve vacuum hose. Disconnect SAI vacuum pipe.

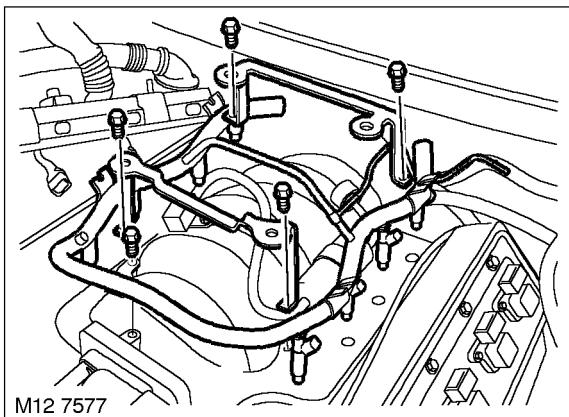


34. Remove 10 nuts securing inlet manifold to cylinder heads and remove 10 spacers.
35. Position brake servo vacuum pipe aside.

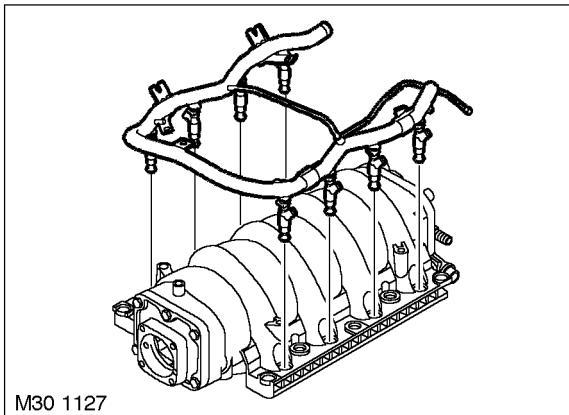


36. Lift inlet manifold and disconnect breather pipe.
  37. Remove inlet manifold and discard 4 gaskets.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
38. Disconnect vacuum pipe and remove solenoid valve.

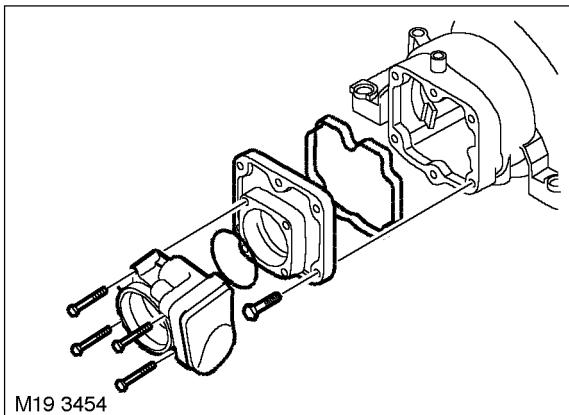
## MANIFOLD AND EXHAUST SYSTEM - V8



39. Remove 4 bolts securing engine cover brackets and remove brackets from inlet manifold.

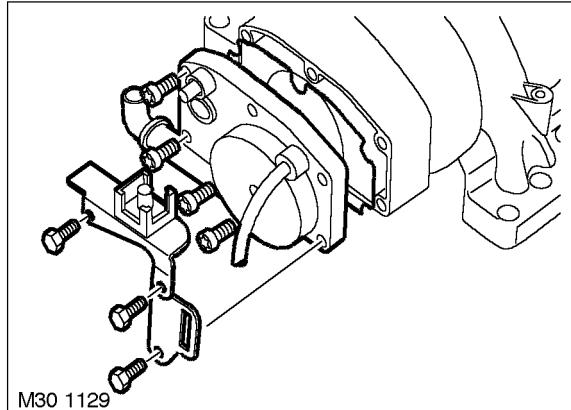


40. Remove bolt securing fuel rail to inlet manifold and remove fuel rail with injectors.  
41. Remove and discard lower 'O' rings from injectors.

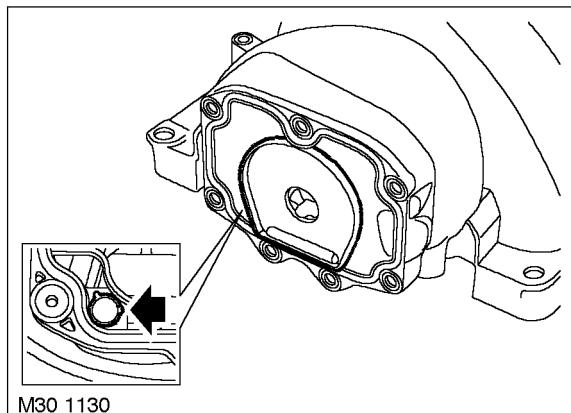


42. Remove 4 bolts securing throttle housing to inlet manifold and remove throttle body.  
43. Remove and discard 'O' ring from throttle housing.

44. Remove 6 Torx screws securing front cover to inlet manifold and remove front cover.  
45. Remove and discard front cover 'O' ring.



46. Remove 3 bolts securing 2 brackets to manifold rear cover.  
47. Remove 2 brackets.  
48. Remove 4 Torx screws securing inlet manifold rear cover and remove cover.



49. Remove and discard 'O' ring.  
50. Depress locking collars and remove vent pipe from inlet manifold.

### Refit

1. Fit vent pipe to inlet manifold.
2. Fit new 'O' ring to rear cover.
3. Fit rear cover to inlet manifold and tighten 4 Torx screws to 10 Nm (7 lbf.ft).
4. Fit 2 brackets and secure with 3 bolts and tighten to 10 Nm (7 lbf.ft).
5. Fit new 'O' ring to front cover.
6. Fit front cover to manifold and tighten 6 Torx screws to 10 Nm (7 lbf.ft).
7. Fit new throttle body seal.
8. Fit throttle housing to inlet manifold and tighten 4 bolts to 10 Nm (7 lbf.ft).
9. Lubricate new 'O' rings and fit to injectors.



10. Fit fuel rail with injectors to inlet manifold and fit bolt.
11. Fit 2 new brackets to manifold and tighten 5 bolts to 10 Nm (7 lbf.ft).
12. Fit solenoid valve and connect vacuum pipe.
13. Fit 4 new gaskets and install inlet manifold.
14. Connect breather pipe and install inlet manifold to studs.
15. Position brake servo vacuum pipe.
16. Fit 10 spacers and tighten 10 inlet manifold securing nuts to 15 Nm (11 lbf.ft).
17. Connect vacuum hose to inlet manifold front cover.
18. Connect brake vacuum hose and secure with clip.
19. Connect 2 breather hoses and secure with 2 clips.
20. Clean fuel hose connections.
21. Connect fuel feed hose to fuel rail.
22. Connect 2 cables to terminal post secure with nut and fit terminal cover.
23. Fit air intake plenum.

 **HEATING AND VENTILATION,  
REPAIRS, Plenum - air intake.**

24. Position injector harness.
25. Fit washer to fuel injector harness securing stud.
26. Fit secondary air vacuum switching valve to RH fuel injector securing stud.
27. Fit 2 nuts securing fuel injector harness to inlet manifold and tighten.
28. Connect multiplug to charcoal canister purge solenoid valve.
29. Position and secure engine harness to brackets with clips.
30. Connect fuel injector harness multiplugs.
31. Connect alternator harness to 2 clips on engine cover mounting brackets.
32. Fit fuel hose and mounting bracket to LH fuel injector harness securing stud.
33. Fit vacuum reservoir and mounting bracket to LH fuel injector harness securing stud.
34. Fit 2 nuts securing fuel injector harness to inlet manifold and tighten.
35. Connect knock sensor multiplug.
36. Connect multiplug to CMP sensor.
37. Connect alternator harness to 4 clips.
38. Connect alternator multiplug.
39. Connect multiplug to charcoal canister purge solenoid valve.
40. Connect VCC multiplug harness to clip.
41. Connect multiplugs to valve body solenoids.
42. Fit new cable ties, align and secure harness.
43. Connect multiplug to CMP sensor.
44. Connect multiplug to throttle body.
45. Connect multiplugs to ECT sensors.
46. Connect multiplugs to ignition coils.

47. Fit coil cover.

 **ENGINE MANAGEMENT SYSTEM -  
V8, REPAIRS, Cover - Ignition coils - RH.**

48. Fit coil cover.
-  **ENGINE MANAGEMENT SYSTEM -  
V8, REPAIRS, Cover - Ignition coils - LH.**
49. Connect air intake hose.
-  **ENGINE MANAGEMENT SYSTEM -  
V8, REPAIRS, Hose - air flow meter to  
throttle body.**
50. Connect battery earth lead.

# MANIFOLD AND EXHAUST SYSTEM - V8

## Gasket(s) - exhaust manifold - RH

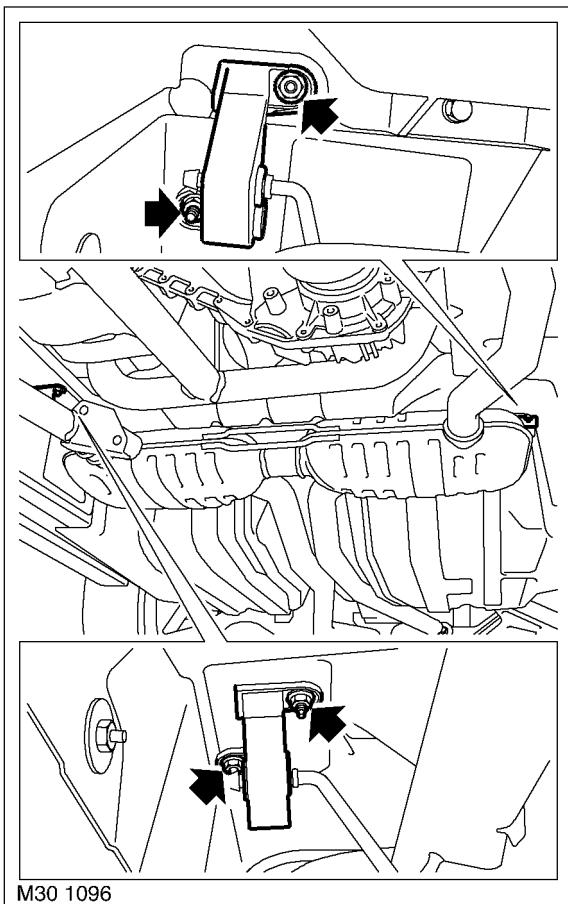
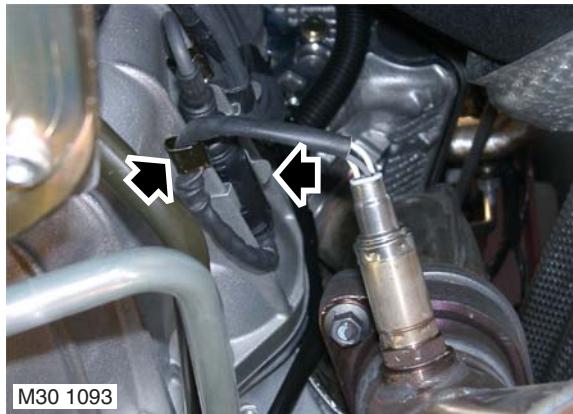
### 30.15.16

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

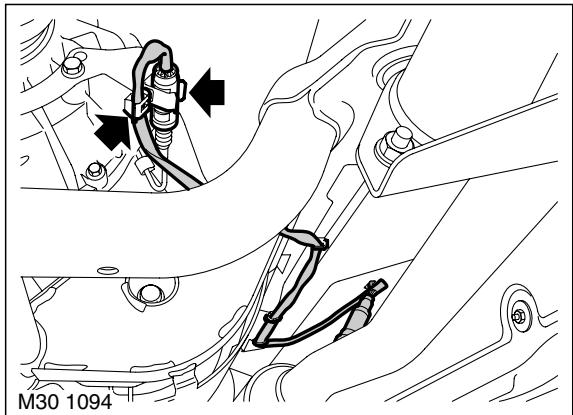
### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Release clips securing LH and RH pre-catalyst HO2S harness leads.

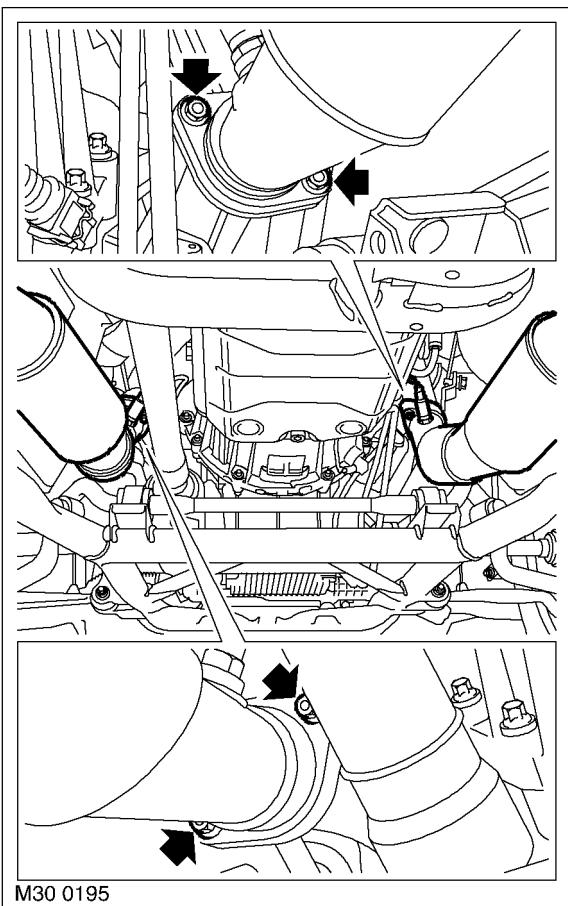
6. Remove 4 nuts securing front exhaust rubber mountings to body.



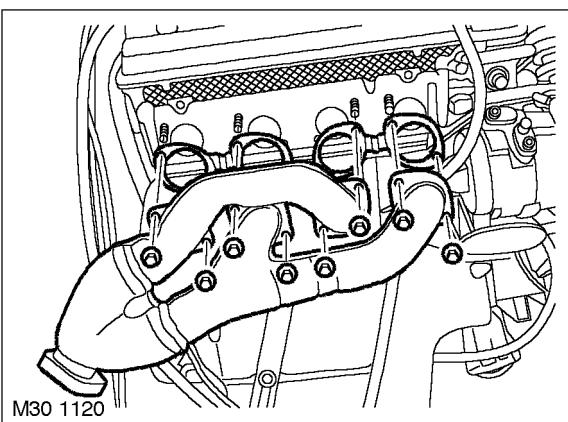
4. Release clips securing LH and RH post catalyst HO2S harness leads.
5. Support weight of exhaust with jack.

**Refit**

1. Clean exhaust front pipe and manifold mating faces and fit new gaskets.
2. Apply copper grease to exhaust manifold studs, fit exhaust manifold, fit 8 new nuts securing exhaust manifold and tighten to 23 Nm (17 lbf.ft).
3. Raise exhaust with jack, locate exhaust flange to exhaust manifold studs.
4. Fit 4 new nuts securing exhaust front pipes to exhaust manifolds and tighten to 45 Nm (33 lbf.ft).
5. Fit 4 nuts securing front exhaust rubber mountings to body and tighten to 25 Nm (18 lbf.ft).
6. Lower support jack.
7. Secure RH and LH HO2S harnesses to clips on centre heat shields and bell housing.
8. Connect battery earth lead.



7. Remove 4 nuts securing front pipe flanges to exhaust manifolds and discard nuts.
8. Lower exhaust on jack.



9. Remove 8 nuts securing exhaust manifold, remove exhaust manifold and discard nuts and 2 gaskets.

# MANIFOLD AND EXHAUST SYSTEM - V8

## Gasket(s) - exhaust manifold - LH

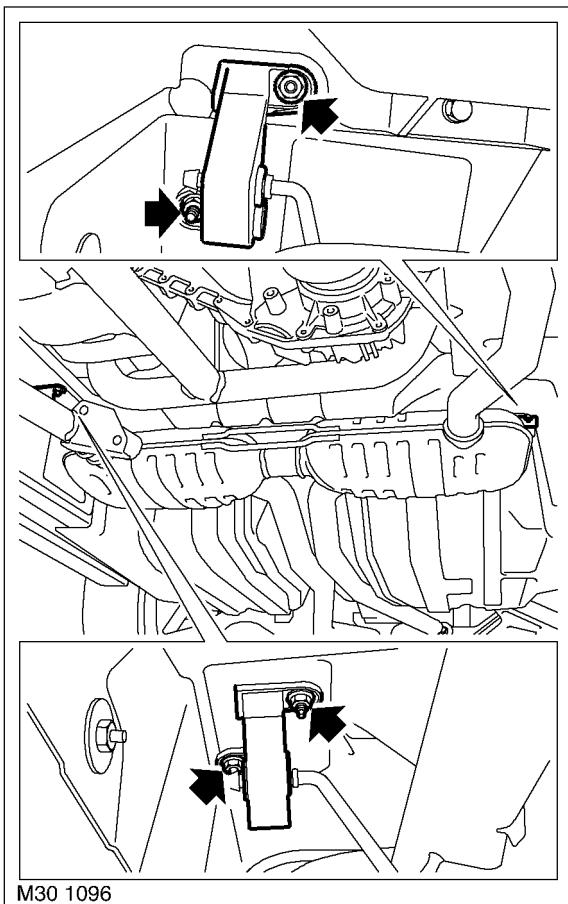
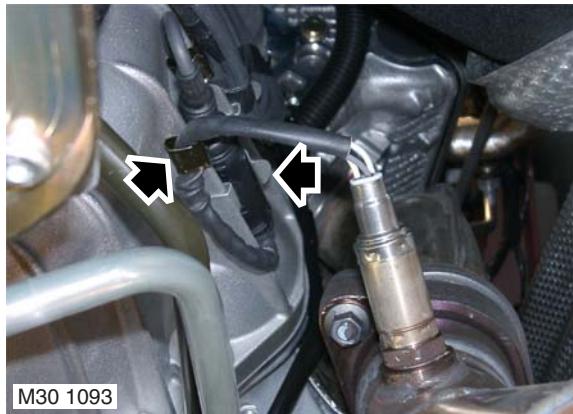
### 30.15.17

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

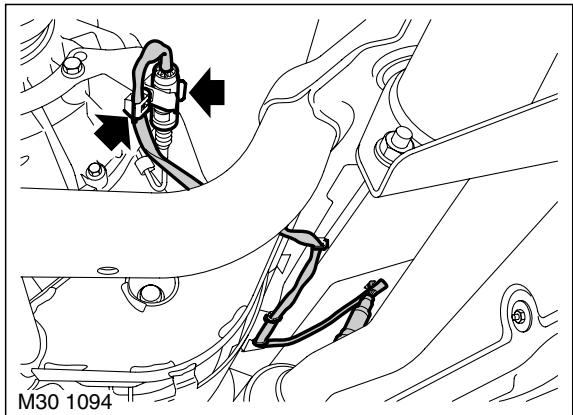
### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Release clips securing LH and RH pre-catalyst HO2S harness leads.

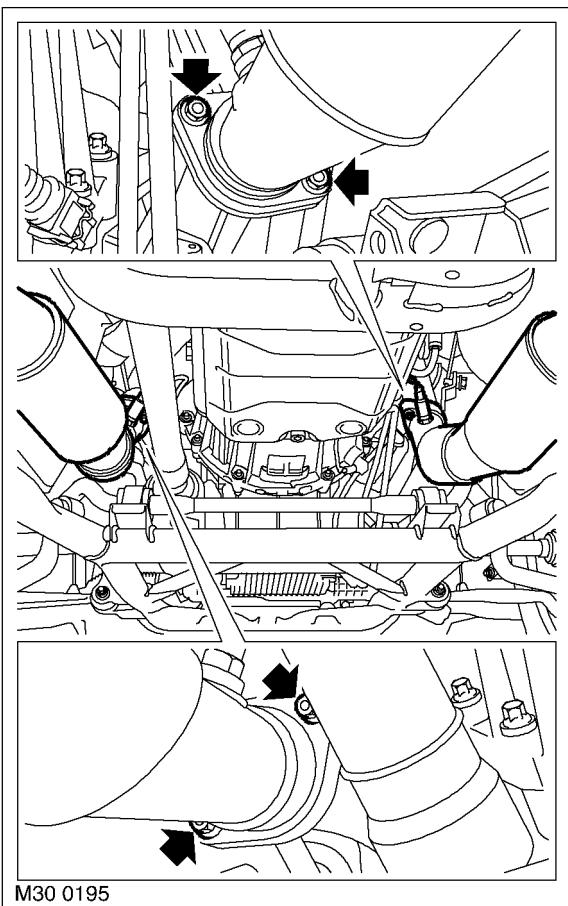
6. Remove 4 nuts securing front exhaust rubber mountings to body.



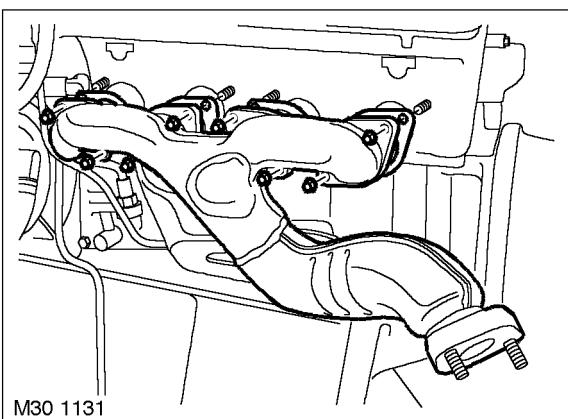
4. Release clips securing LH and RH post catalyst HO2S harness leads.
5. Support weight of exhaust with jack.

**Refit**

1. Clean exhaust front pipe and manifold mating faces and fit new gaskets.
2. Apply copper grease to exhaust manifold studs, fit exhaust manifold, fit 8 new nuts securing exhaust manifold and tighten to 23 Nm (17 lbf.ft).
3. Raise exhaust with jack, locate exhaust flange to exhaust manifold studs.
4. Fit 4 new nuts securing exhaust front pipes to exhaust manifolds and tighten to 45 Nm (33 lbf.ft).
5. Fit 4 nuts securing front exhaust rubber mountings to body and tighten to 25 Nm (18 lbf.ft).
6. Lower support jack.
7. Secure RH and LH HO2S harnesses to clips on centre heat shields and bell housing.
8. Connect battery earth lead.



7. Remove 4 nuts securing front pipe flanges to exhaust manifolds and discard nuts.
8. Lower exhaust on jack.



9. Remove 8 nuts securing exhaust manifold, remove exhaust manifold and discard nuts and 2 gaskets.

## **MANIFOLD AND EXHAUST SYSTEM - V8**

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# Valve timing - check & adjust

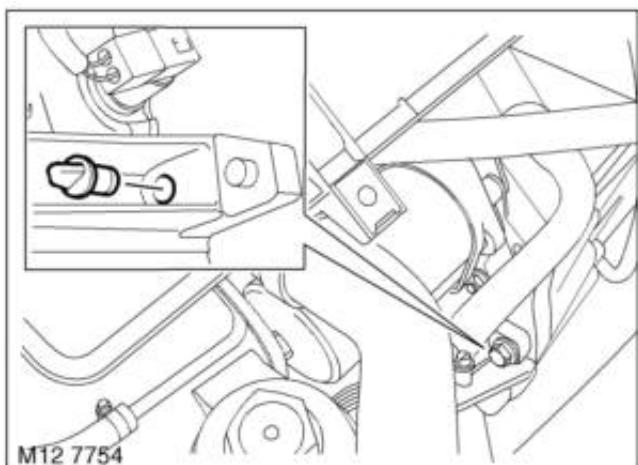
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Check

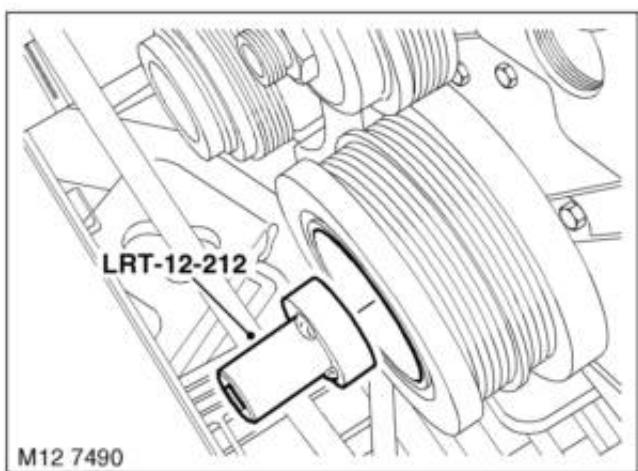
1. Disconnect battery earth lead.

2. Remove viscous fan.

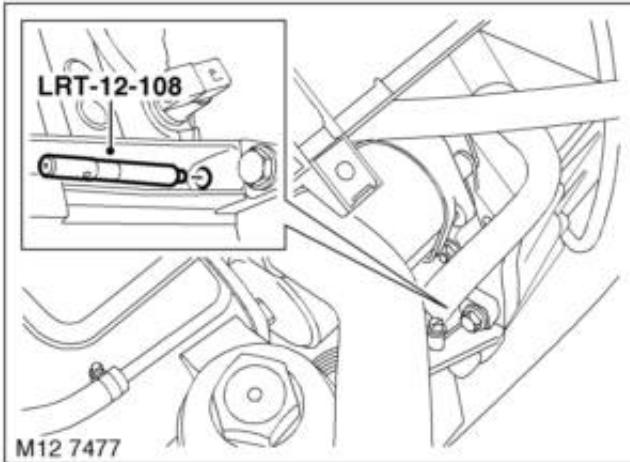
3. Remove camshaft cover gasket.



4. Remove blanking plug from crankshaft timing pin hole.



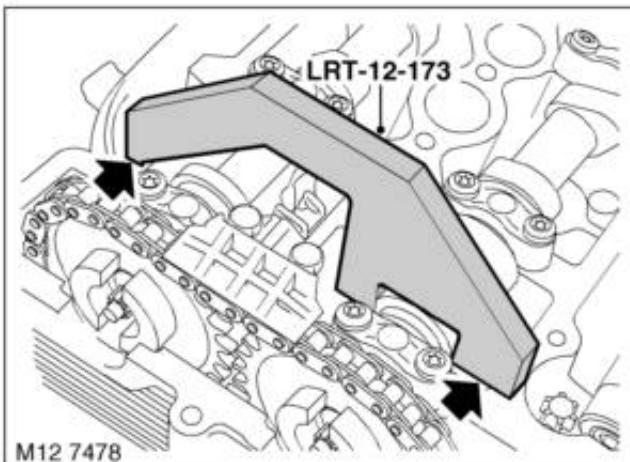
5. With LRT-12-212 fitted over pulley screws, rotate crankshaft in direction of rotation until No 1 cylinder is at TDC compression stroke.



6. Fit LRT-12-108 to lock crankshaft.

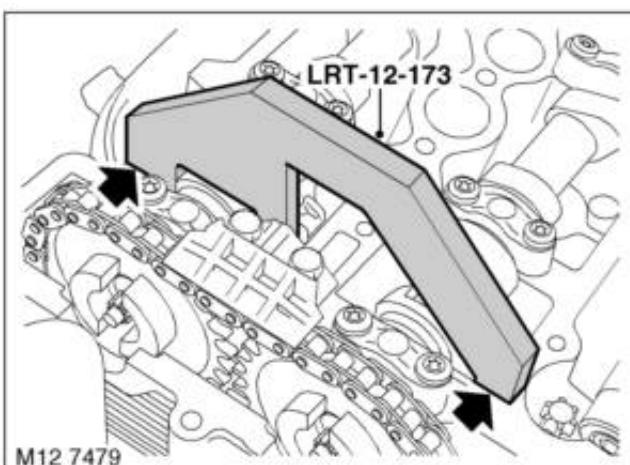


**CAUTION: Do not turn the engine against its direction of rotation.**



7. Fit LRT-12-173 to inlet camshaft.

8. If inlet camshaft is timed correctly, LRT-12-173 will contact both sides of camshaft cover gasket face on cylinder head.

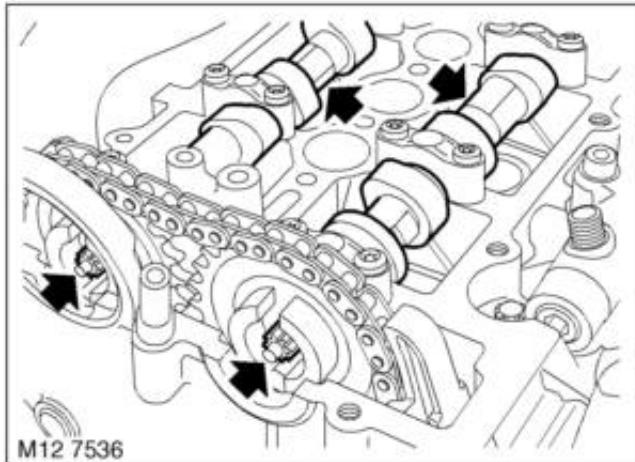


9. Remove LRT-12-173 from inlet camshaft and fit to exhaust camshaft.

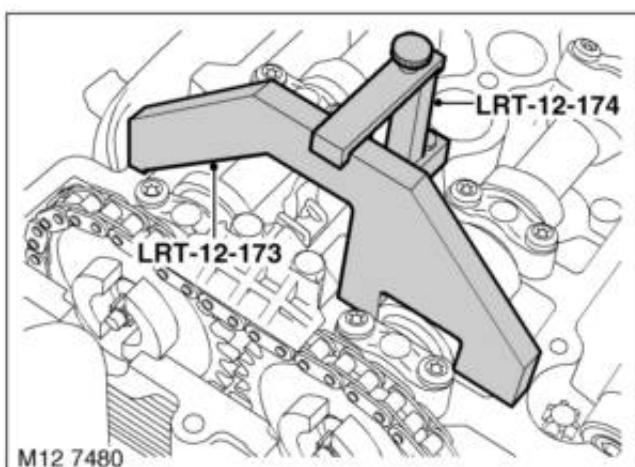
10. If exhaust camshaft is timed correctly, LRT-12-173 will contact both sides of camshaft cover gasket face on cylinder head.

# Adjust

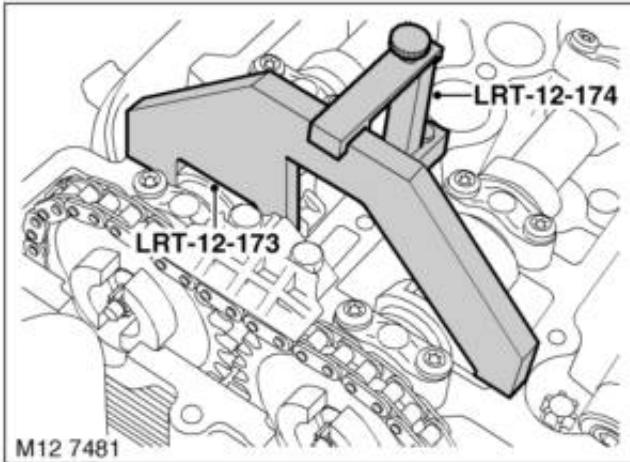
1. Release clip and disconnect hose from vacuum pump.
2. Remove and discard 2 bolts securing vacuum pump.
3. Remove vacuum pump and discard 'O' ring.



4. With LRT-12-108 fitted to lock crankshaft, use a spanner on hexagon to hold camshafts; remove and discard screws securing chain sprockets.
5. Fit new screws to sprockets, tighten screws sufficiently to allow sprockets to rotate with all side play eliminated.



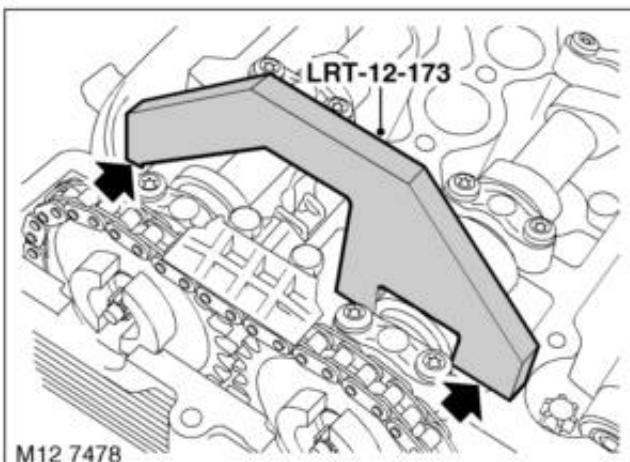
6. Fit LRT-12-174 to cylinder head.
7. Align inlet camshaft, fit LRT-12-173 to camshaft and tighten locking screw of LRT-12-174.
8. With a spanner on hexagon to hold exhaust camshaft, use an angle torque gauge and tighten screw securing exhaust camshaft sprocket to 20 Nm (15 lbf.ft) and then a further 35 °.
9. Loosen locking screw on LRT-12-174 and remove LRT-12-173 from inlet camshaft.



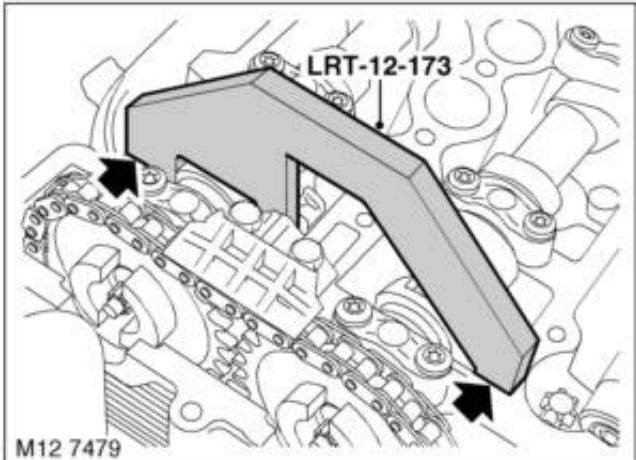
10. Align exhaust camshaft, fit LRT-12-173 to camshaft and tighten locking screw of LRT-12-174.
11. With spanner on hexagon to hold inlet camshaft, use an angle torque gauge and tighten inlet camshaft sprocket retaining screw to 20 Nm. and then a further 35°.
12. Remove LRT-12-174 and LRT-12-173.
13. Withdraw LRT-12-108 to unlock crankshaft.
14. With LRT-12-212 fitted over pulley screws, rotate crankshaft 2 revolutions in direction of rotation until No 1 cylinder is at TDC position.
15. Fit LRT-12-108 to lock crankshaft.



**CAUTION: Do not turn the engine against its direction of rotation.**



16. Fit LRT-12-173 to inlet camshaft.
17. If inlet camshaft is timed correctly, LRT-12-173 will contact both sides of camshaft cover gasket face on cylinder head.



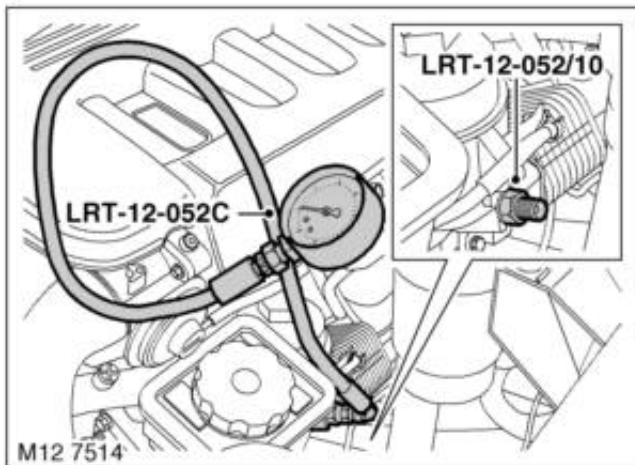
18. Remove LRT-12-173 from inlet camshaft and fit to exhaust camshaft.
19. If exhaust camshaft is timed correctly, LRT-12-173 will contact both sides of camshaft cover gasket face on cylinder head.
20. If necessary, repeat adjustment procedure.
21. Remove tools LRT-12-173 and LRT-12-108.
22. Fit blanking plug to crankshaft timing pin hole.
23. Clean vacuum pump and mating face.
24. Fit new 'O' ring to vacuum pump.
25. Rotate vacuum pump drive to align with camshaft, fit pump and tighten new bolts to 22 Nm (16 lbf.ft).
26. Connect hose to vacuum pump and secure with clip.
27. Fit camshaft cover gasket.
28. Fit viscous fan.
29. Connect battery earth lead.

# Engine oil pressure check

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Check

1. Disconnect battery earth lead.
2. Remove oil pressure switch.



3. Fit pressure switch sealing washer to LRT-12-052/10 gauge adaptor.
4. Fit and tighten adaptor LRT-12-052/10 to oil filter housing.
5. Fit LRT-12-052C gauge and tighten union.
6. Check engine oil level, top-up if necessary.
7. Connect battery earth lead.
8. Start and run engine until normal operating temperature is reached.
9. Note oil pressure readings with the engine running at idle and at 3500 rev/min.
10. Switch off engine.
11. Disconnect battery earth lead.
12. Remove pressure gauge.
13. Remove adaptor.
14. Clean oil spillage.

16. Check engine oil level, top-up if necessary.

17. Connect battery earth lead.

# Camshaft - inlet or exhaust

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

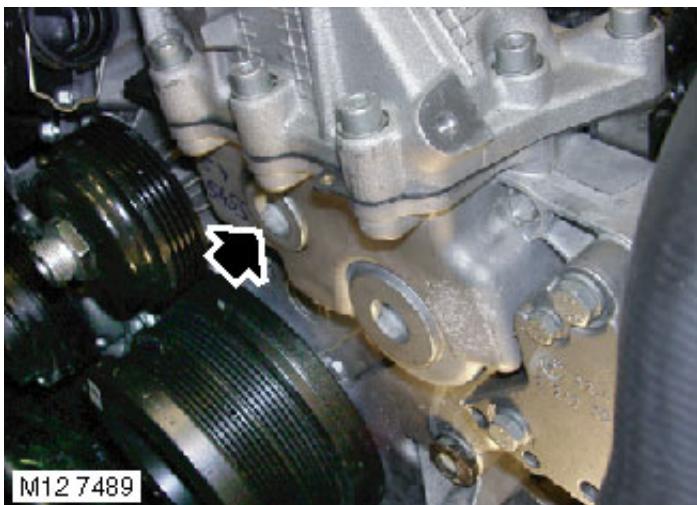
1. Disconnect battery earth lead.

2. Remove camshaft cover gasket.

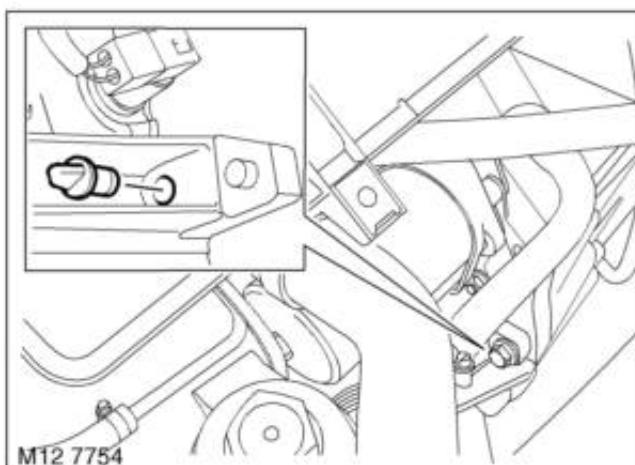
3. Remove EGR cooler.

4. Remove ancillary drive belt.

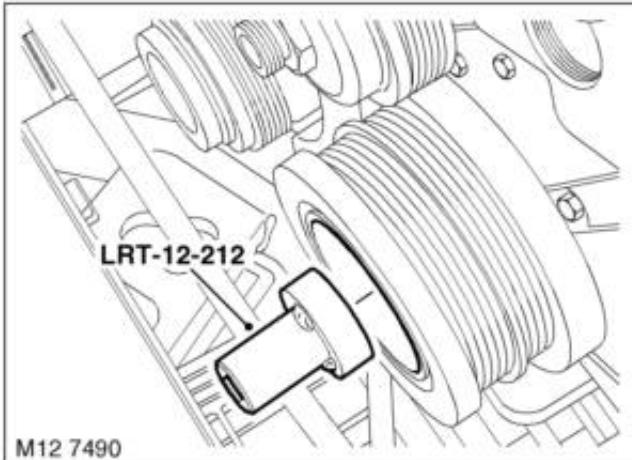
5. Remove vacuum pump.



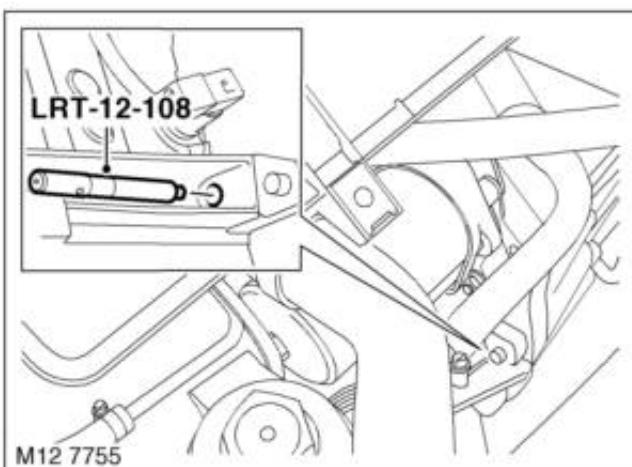
6. Remove chain tensioner access plug from timing cover.



7. Remove blanking plug from crankshaft timing pin hole.



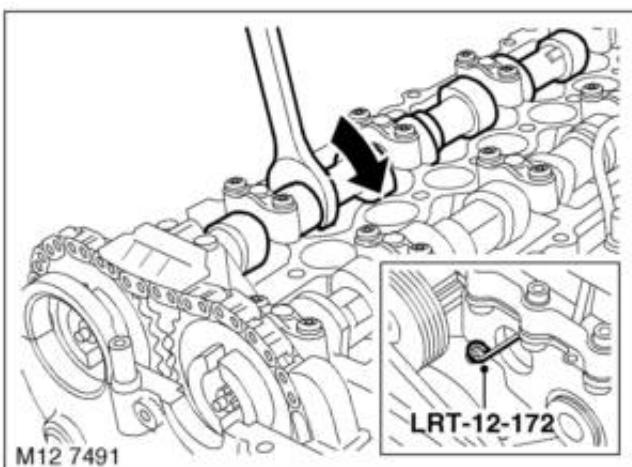
- With LRT-12-212 fitted over pulley screws, rotate crankshaft in direction of rotation until No 1 cylinder is at TDC compression stroke.



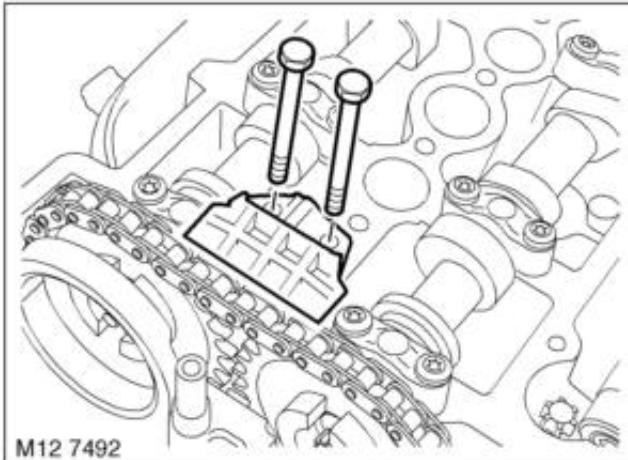
- Fit LRT-12-108 to lock crankshaft.



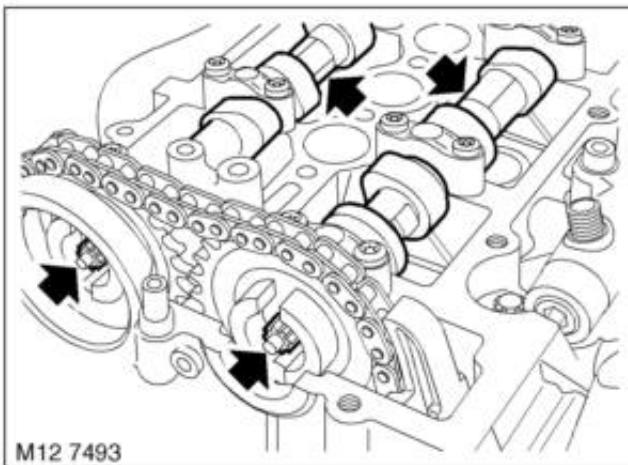
**CAUTION: Do not turn the engine against its direction of rotation.**



- With a spanner on hexagon, slowly rotate exhaust camshaft clockwise to fully compress chain tensioner.
- Fit LRT-12-172 to lock the tensioner.

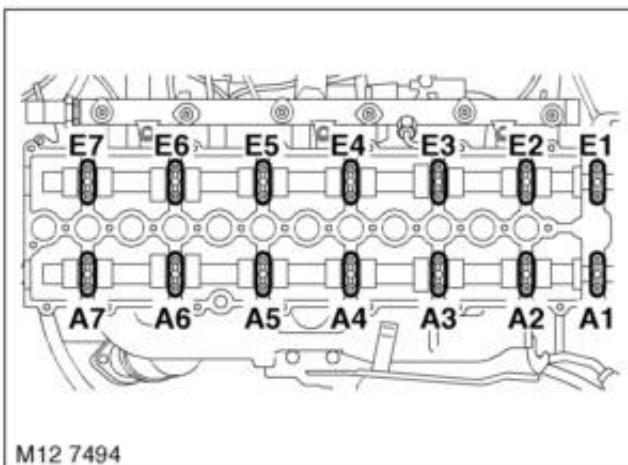


12. Remove 2 bolts and remove oil feed guide rail. Discard seal.



13. Hold camshafts with spanner on hexagon and loosen both camshaft sprocket retaining screws.
14. Withdraw LRT-12-108 and rotate crankshaft approximately 45° against direction of rotation to prevent damage to valves when rotating camshafts.

15. Remove and discard retaining screws and release sprockets from camshafts.



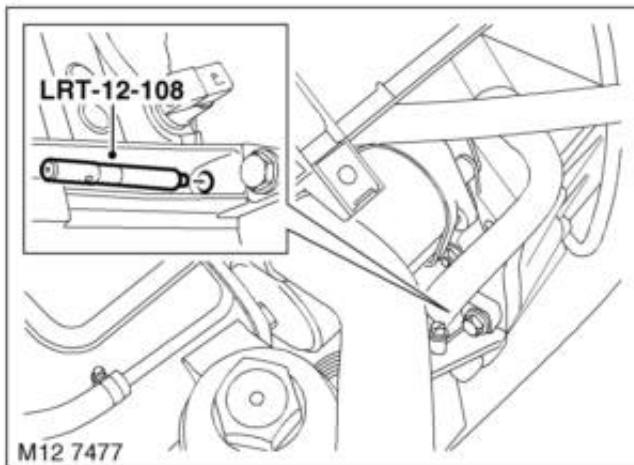
16. Identify camshaft bearing caps for refitting. Inlet camshaft is marked 'E' with caps marked from 'E1' to 'E7' from sprocket when viewed from exhaust side of engine. Exhaust camshaft is marked 'A' with caps marked 'A1' to 'A7' from sprocket when viewed from exhaust side of engine.
17. Evenly and progressively loosen and remove 14 screws securing camshaft bearing caps.

18. Remove camshaft bearing caps.

19. Remove camshaft.

## Refit

1. Clean camshaft, camshaft bearings and bearing caps.
2. Lubricate camshaft and camshaft bearings.
3. Fit camshaft to cylinder head, timed approximately No 1 cylinder at TDC firing position.
4. Fit camshaft bearing caps in correct order, fit screws and tighten evenly and progressively to 10 Nm (7 lbf.ft).
5. Fit sprockets to camshafts and tighten new screws sufficiently to enable rotation of sprockets but eliminate side play.
6. Clean oil feed guide rail and mating face.
7. Fit a new seal to oil feed guide rail.
8. Fit oil feed rail and tighten bolts to 10 Nm (7 lbf.ft).

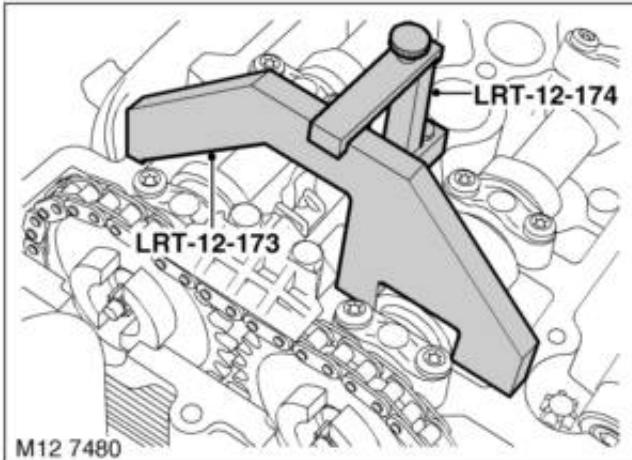


9. Rotate crankshaft in direction of rotation until LRT-12-108 can be fitted to lock crankshaft at TDC compression stroke.

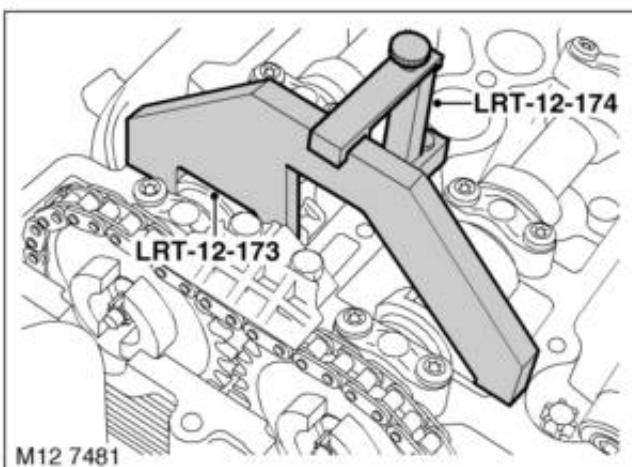


**CAUTION: Do not turn the engine against its direction of rotation.**

10. With spanner on hexagon, tighten exhaust sprocket securing screw, and rotate exhaust camshaft in direction of rotation until chain tensioner is compressed.
11. Remove LRT-12-172 from tensioner.
12. Loosen exhaust camshaft sprocket screw sufficiently to allow rotation of sprocket without side play.
13. Clean timing chain tensioner access plug and mating face.
14. Fit timing chain tensioner access plug and tighten to 30 Nm (22 lbf.ft).



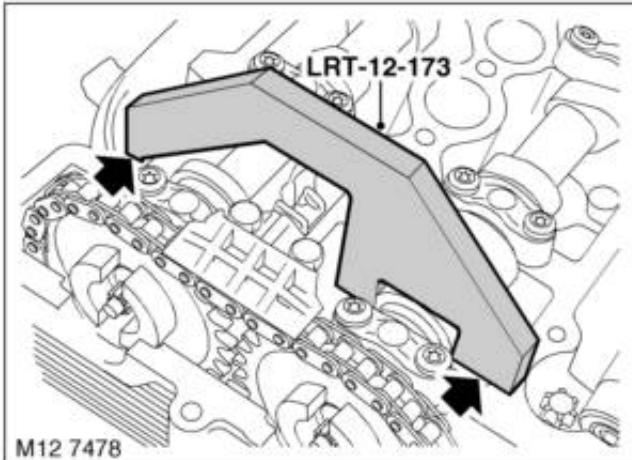
15. Fit LRT-12-174 to cylinder head.
16. Align inlet camshaft, fit LRT-12-173 to camshaft and tighten locking screw of LRT-12-174.
17. With spanner on hexagon to hold inlet camshaft, use an angle torque gauge and tighten inlet camshaft sprocket retaining screw to 20 Nm. and then a further 35°.
18. Loosen locking screw on LRT-12-174 and remove LRT-12-173 from inlet camshaft.



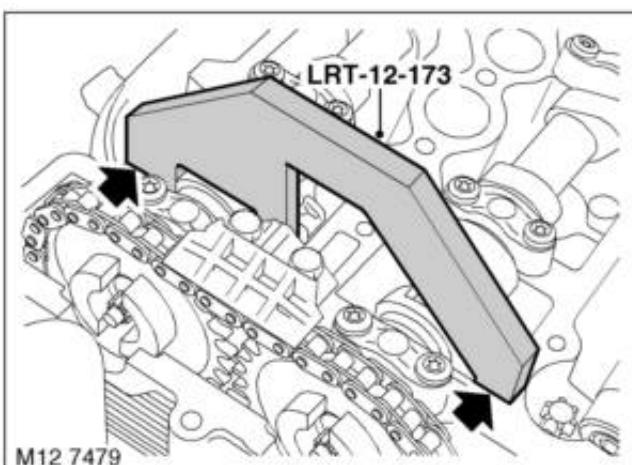
19. Align exhaust camshaft, fit LRT-12-173 to camshaft and tighten locking screw of LRT-12-174.
20. With spanner on hexagon to hold exhaust camshaft, use a suitable angle torque gauge and tighten screw securing exhaust camshaft sprocket to 20 Nm (15 lbf.ft) and then a further 35 °.
21. Remove LRT-12-174 and LRT-12-173.
22. Withdraw LRT-12-108 to unlock crankshaft.
23. With LRT-12-212 fitted over pulley screws, rotate crankshaft 2 revolutions in direction of rotation until No 1 cylinder is at TDC position.
24. Fit LRT-12-108 to lock crankshaft.



**CAUTION: Do not turn the engine against its direction of rotation.**



25. Fit LRT-12-173 to inlet camshaft.
26. If inlet camshaft is timed correctly, LRT-12-173 will contact both sides of camshaft cover gasket face on cylinder head.



27. Remove LRT-12-173 from inlet camshaft and fit to exhaust camshaft.
28. If exhaust camshaft is timed correctly, LRT-12-173 will contact both sides of camshaft cover gasket face on cylinder head.
29. If necessary, repeat adjustment procedure.
30. Remove tools LRT-12-174 and LRT-12-108.
31. Fit blanking plug to crankshaft timing pin hole.
32. Fit vacuum pump.
33. Fit ancillary drive belt.
34. Fit EGR cooler.
35. Fit camshaft cover gasket.
36. Connect battery earth lead.

# Pulley - crankshaft

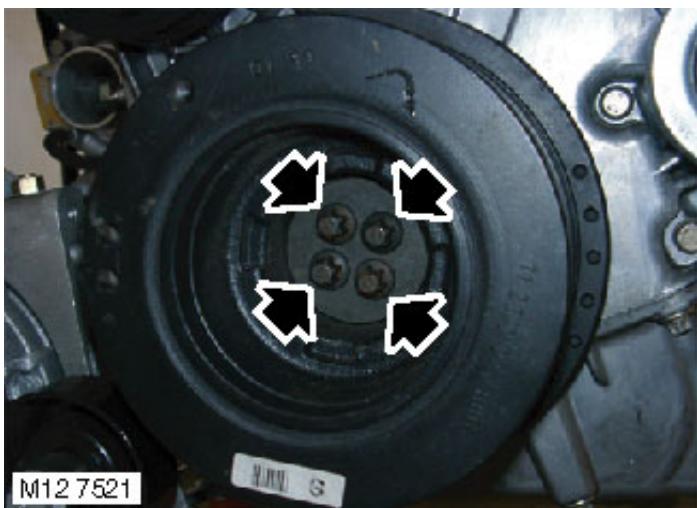
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.

2. Remove undertray.

3. Remove ancillary drive belt.

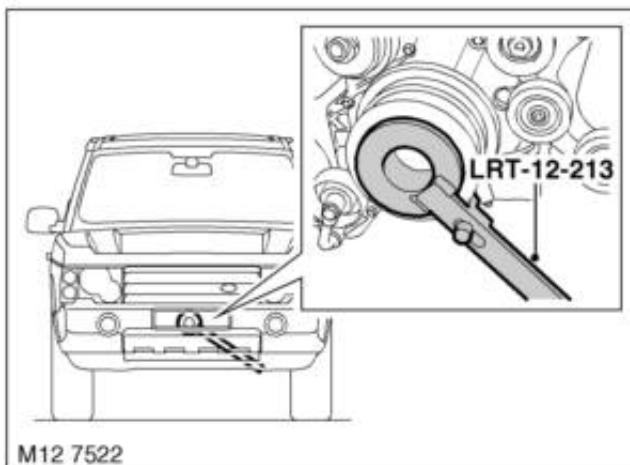


4. Remove and discard 4 Torx bolts securing pulley to crankshaft. Remove crankshaft pulley.

## Refit

1. Clean crankshaft pulley and mating face.

2. Fit crankshaft pulley.



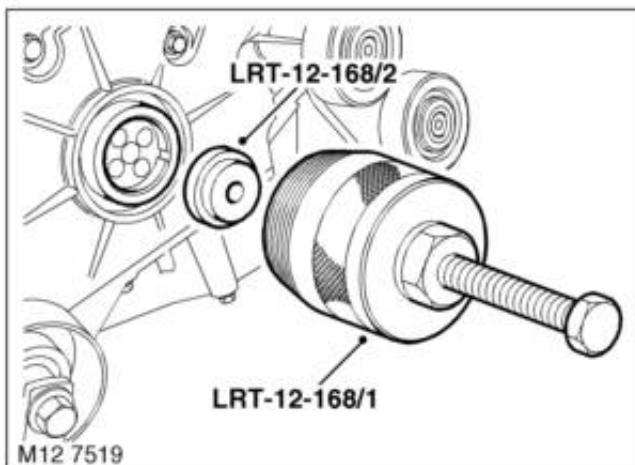
3. Fit new Torx bolts, using LRT-12-213 to hold pulley evenly and progressively tighten bolts to 40 Nm (30 lbf.ft). Then tighten by 60° plus a further 60°.
4. Fit ancillary drive belt.
5. Fit undertray.
6. Connect battery earth lead.

# Crankshaft front oil seal

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

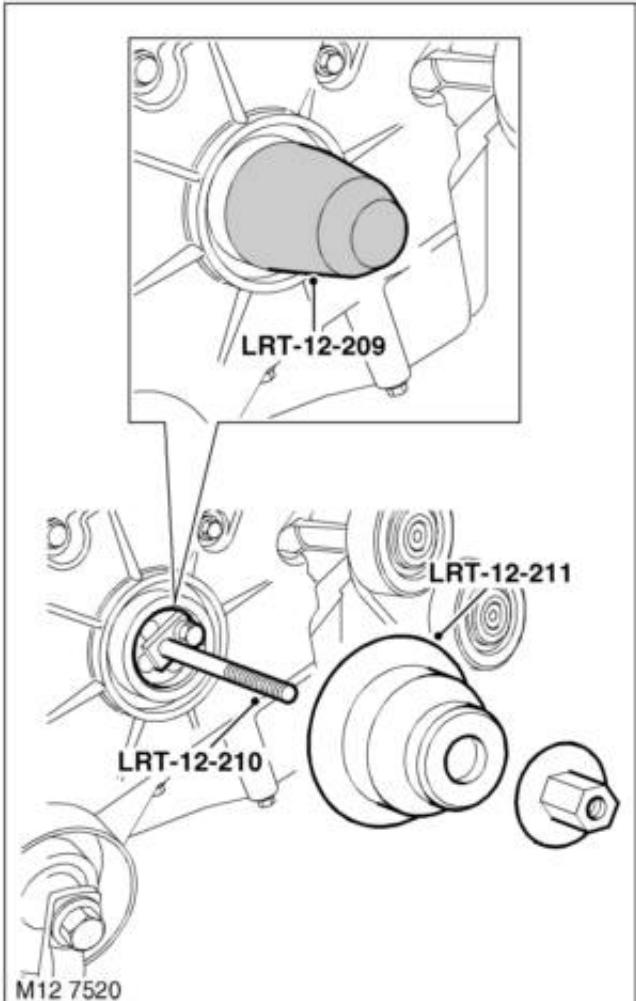
1. Disconnect battery earth lead.
2. Remove crankshaft pulley.



3. Fit thrust button LRT-12-168/2 to end of crankshaft.
4. Ensure bore of LRT-12-168/1 is free of burrs.
5. Fit LRT-12-168/1 to crankshaft front oil seal, tighten bolt to remove seal.
6. Remove thrust button from crankshaft.

## Refit

1. Clean oil seal recess in timing cover and running surface on crankshaft.



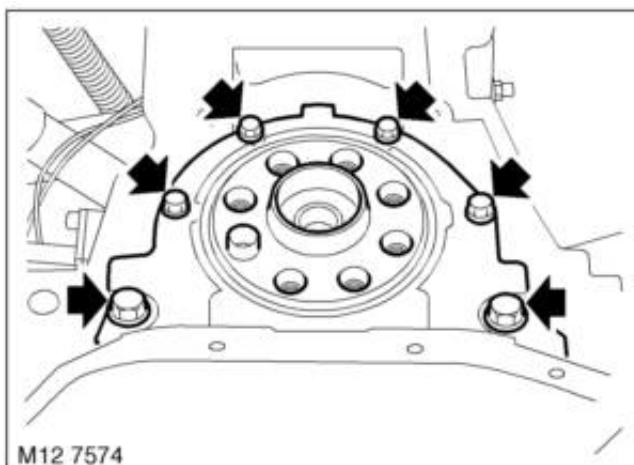
2. Fit oil seal guide LRT-12-209 to crankshaft.
3. Fit seal squarely onto crankshaft and remove guide.
4. Fit LRT-12-210 to crankshaft.
5. Fit LRT-12-211 over LRT-12-210, finger tighten nut until it locates on register.
6. Tighten nut until LRT-12-211 contacts timing gear cover.
7. Remove LRT-12-210 and LRT-12-211.
8. Fit crankshaft pulley.
9. Connect battery earth lead.

# Crankshaft rear oil seal

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Drain engine oil.
3. Remove torque converter drive plate.



4. Remove 6 bolts and oil seal housing. Discard gasket

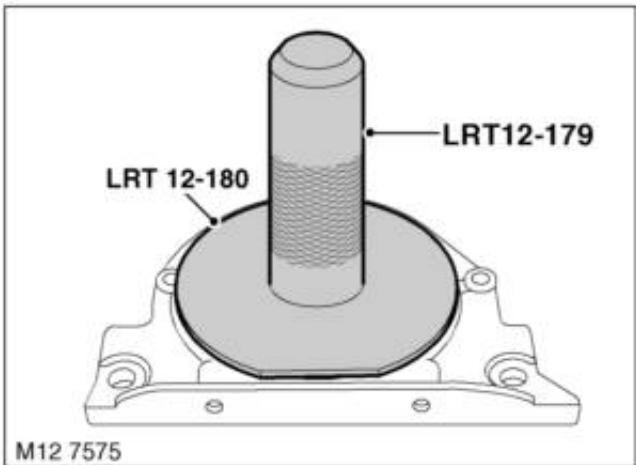


**CAUTION:** Care must be taken to ensure the sump gasket is not damaged during removal and refit of seal housing.

5. Remove and discard oil seal from housing.

## Refit

1. Clean oil seal housing and mating faces.



2. Remove seal protector from new oil seal, position oil seal to housing, drift in oil seal using LRT-12-179 and LRT-12-180 as illustrated. Refit seal protector to oil seal.
3. Fit new housing gasket to cylinder block and locate on dowels.
4. Position oil seal housing, locate on dowels, fit bolts and tighten M6 bolts to 10 Nm (7 lbf.ft) and M8 bolts to 22 Nm (16 lbf.ft), remove oil seal protector.
5. Fit torque converter drive plate.
6. Fit new oil filter and refill engine with oil.
7. Connect battery earth lead.

# Gasket - cylinder head

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

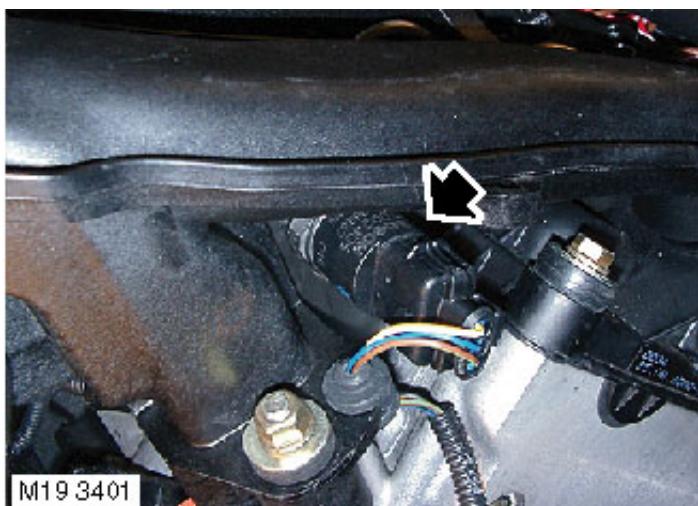
## Remove

1. Disconnect battery earth lead.

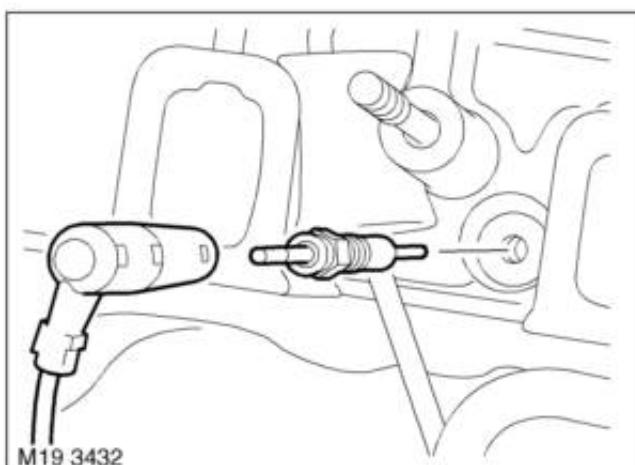
2. Drain cooling system

3. Remove EGR cooler.

4. Remove tappets.



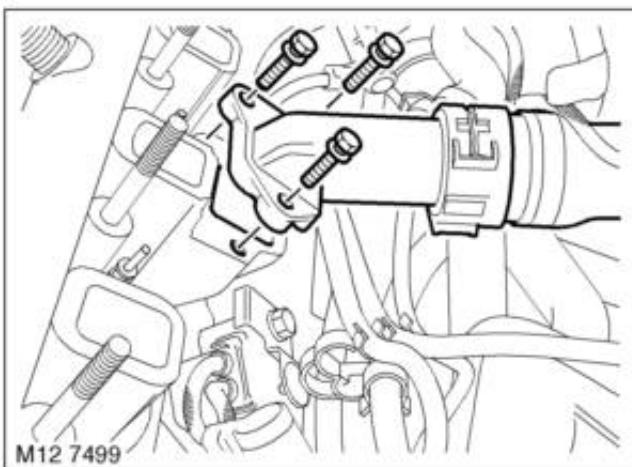
5. Disconnect multiplug from fuel pressure sensor.



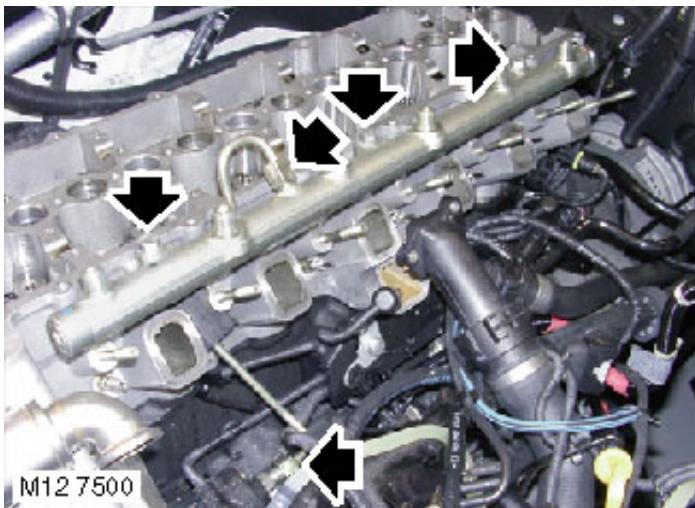
6. Disconnect connections from glow plugs.



7. Disconnect multiplug from coolant temperature sensor.



8. Remove 3 bolts and move coolant hose adaptor from cylinder head. Discard seal.

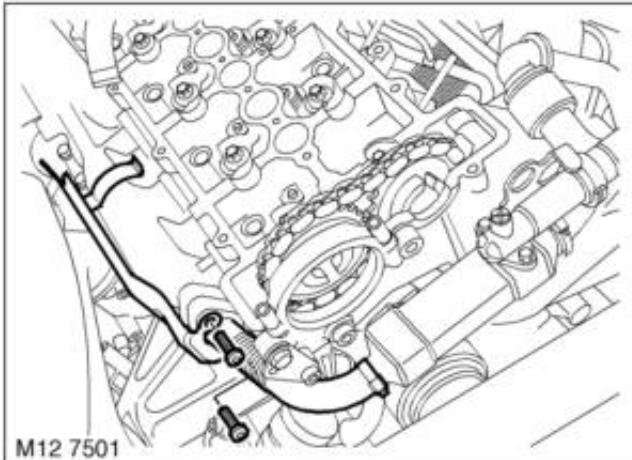


9. Loosen union nuts and remove fuel pipe from fuel rail and pump. Collect fuel pipe support bush.

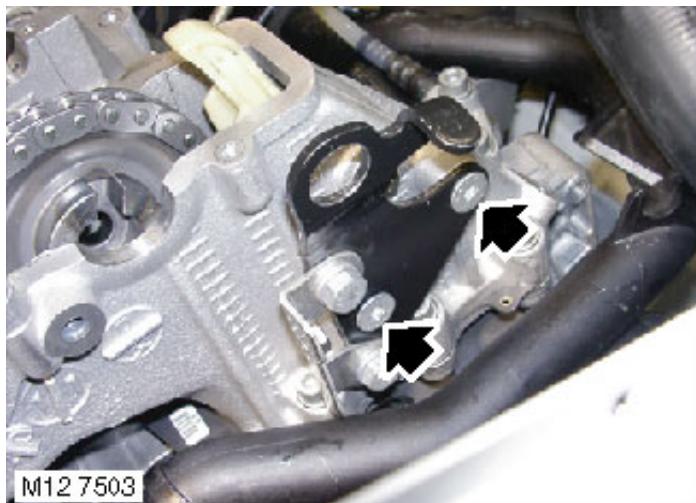


**CAUTION: Always fit plugs to open connections to prevent contamination.**

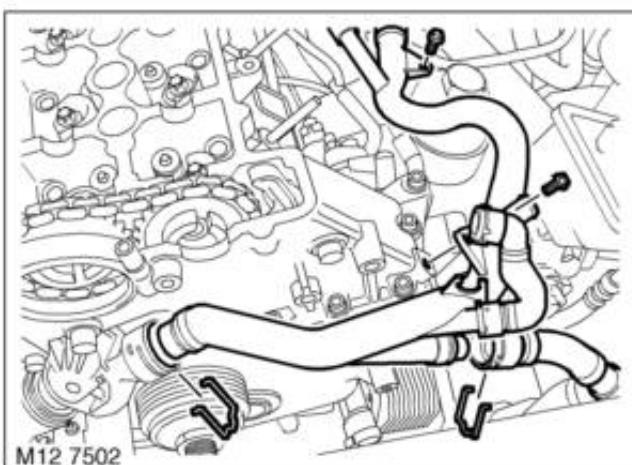
10. Remove 3 bolts and remove fuel rail.



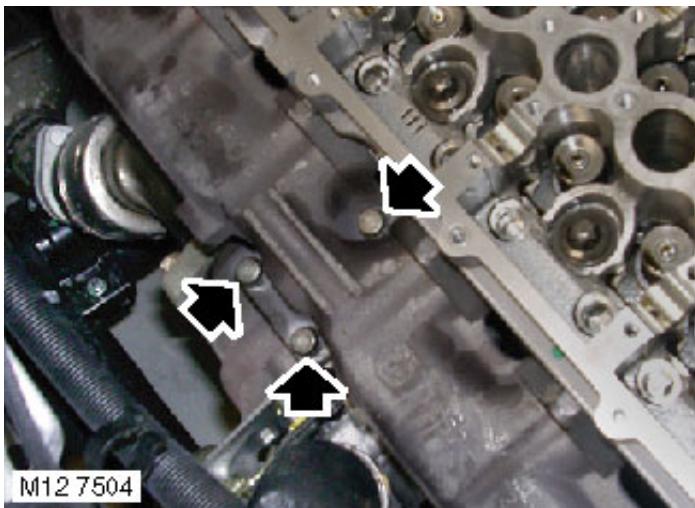
11. Remove 2 Torx screws securing heat shield and EGR pipe to exhaust manifold.
12. Remove heat shield.
13. Remove EGR pipe and clamp.



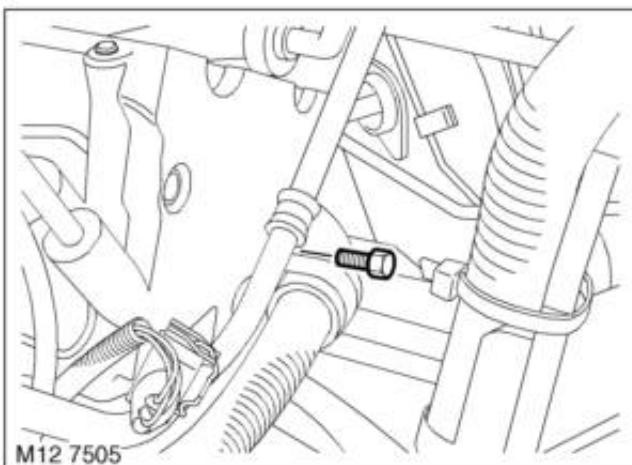
14. Remove 2 Torx screws securing engine lifting bracket and remove bracket.



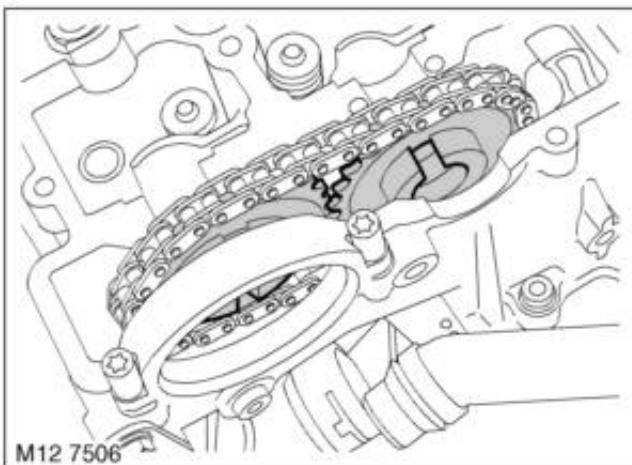
15. Release clip and disconnect expansion tank hose from coolant rail.
16. Remove 2 bolts securing coolant rail.
17. Release clip, disconnect coolant rail from thermostat housing and move rail aside.



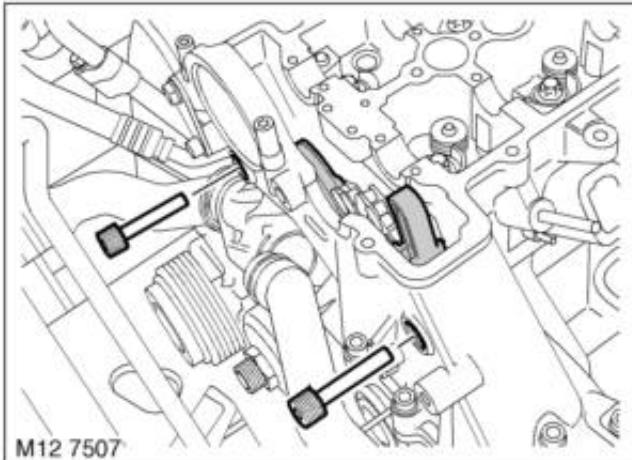
18. Remove 3 bolts securing turbocharger to exhaust manifold. Discard gasket.



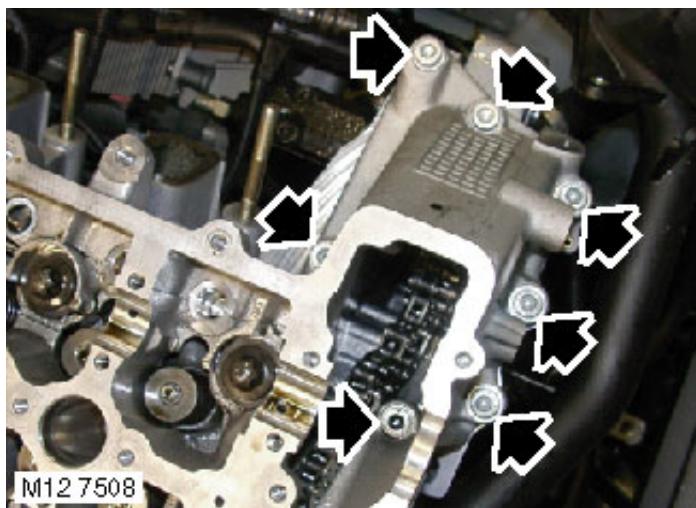
19. Remove bolt securing vacuum pipe clip and harness clip to cylinder head.



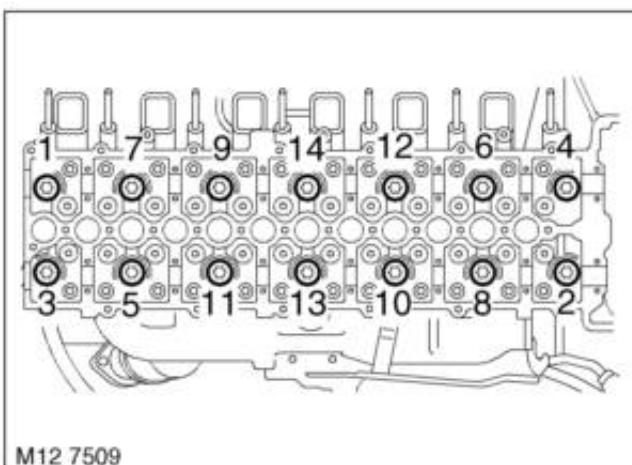
20. Remove camshaft sprockets from timing chain.



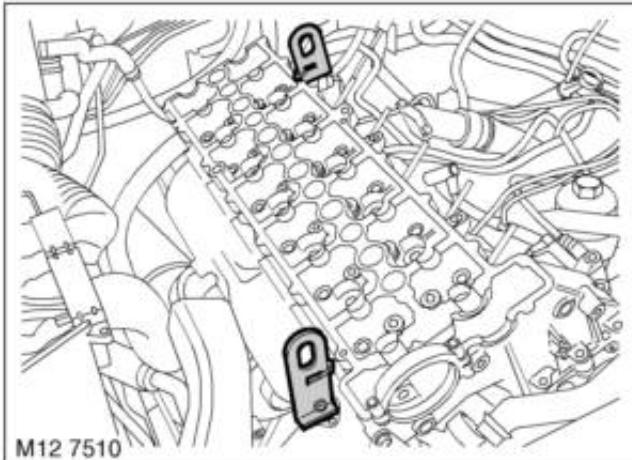
21. Remove and discard timing chain guide support pins.
22. Remove chain guides. Accessibility to remove guide from inlet side will improve when cylinder head is removed.



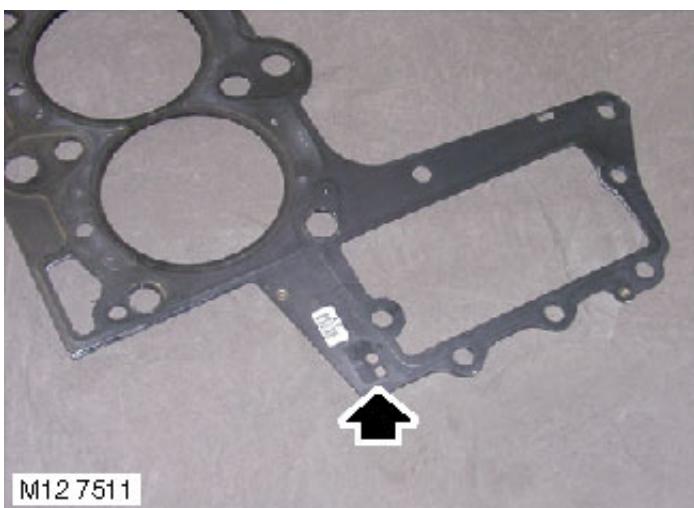
23. Remove 7 Allen screws securing cylinder head to timing cover.



24. Remove in sequence and discard 14 cylinder head bolts.



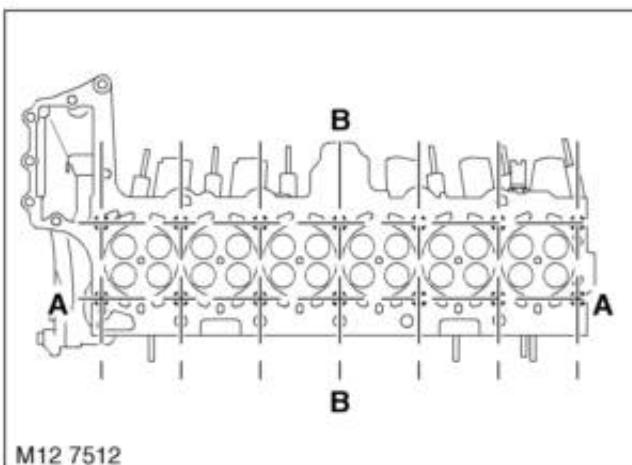
25. Fit and secure lifting brackets to cylinder head.
26. Connect lifting chains, release cylinder head from dowels and remove from vehicle. Care must be taken to avoid damage to protruding glow plugs.



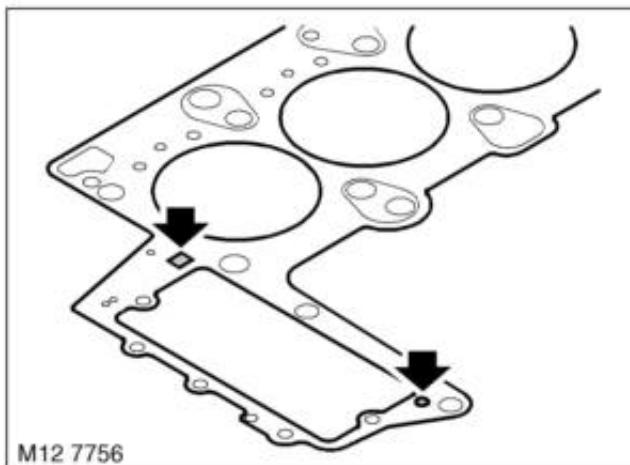
27. Identify thickness of cylinder head gasket by number of holes. Remove and discard gasket.

## Refit

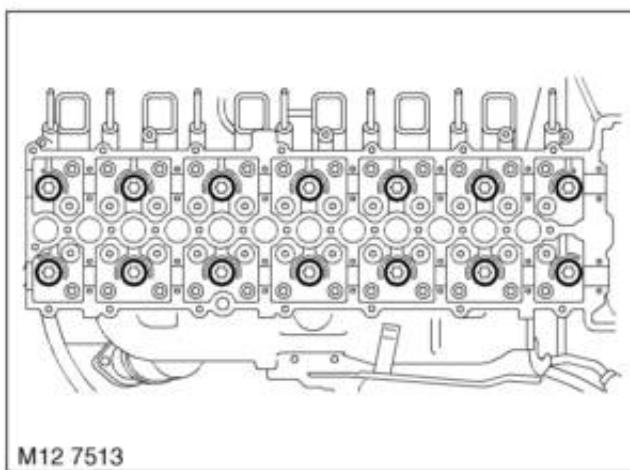
1. Clean mating faces of cylinder head and cylinder block, dowels and dowel holes. If necessary remove all traces of sealing compound with hard wood scraper. Ensure remnants do not remain in oil ways cooling ducts or bolt holes.



2. Using a straight edge and feeler gauges, check cylinder head for distortion along lines shown in illustration.
3. Replace cylinder head if figures obtained exceed those given. Cylinder head must not be refaced.
4. Select replacement gasket which must have the same thickness/number of holes as the original unless new piston and connecting rod assemblies have been fitted. If new piston and connecting rod assemblies have been fitted, check piston protrusion to determine gasket thickness/number of holes required.



5. Ensure sealing strips are intact on new cylinder head gasket and fit gasket to cylinder block.
6. Lightly oil new cylinder head bolts.
7. Carefully fit cylinder head and locate on dowels.



8. Fit new cylinder head bolts and tighten in sequence to 80 Nm (59 lbf.ft). Loosen all bolts one half turn, then tighten all bolts to 50 Nm (37 lbf.ft). Use an angle torque gauge and tighten all bolts in sequence by 90° and then a final 90°.
9. Tighten Allen screws securing cylinder head to timing cover to 20 Nm (15 lbf.ft).
10. Clean timing chain guides.
11. Fit timing chain guides, ensure guide on inlet side is located on its lower support pin and tighten both new upper pins to 20 Nm (15 lbf.ft).
12. Clean camshaft sprockets.

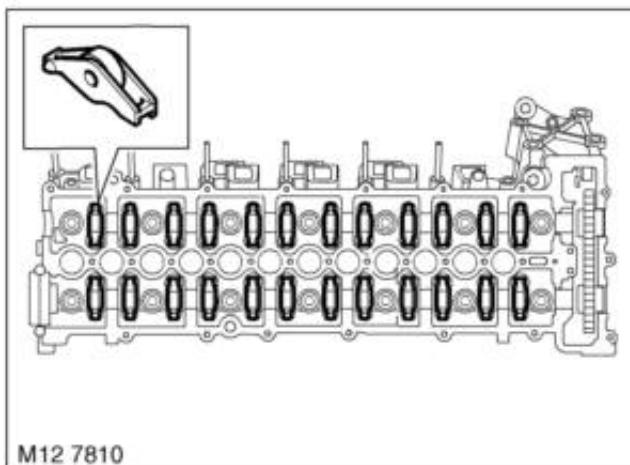
13. Fit camshaft sprockets to timing chain.
14. Clean turbocharger and exhaust manifold mating faces.
15. Use new gasket, align turbocharger and tighten bolts securing turbocharger to 50 Nm (37 lbf.ft).
16. Align vacuum pipe and harness clips and tighten bolt to 10 Nm (7 lbf.ft).
17. Clean coolant rail and mating faces.
18. Connect coolant rail to thermostat housing and secure with clip.
19. Fit bolts securing coolant rail and tighten to 10 Nm (7 lbf.ft).
20. Connect expansion tank hose and secure with clip.
21. Fit engine lifting bracket and tighten Torx screws to 25 Nm (18 lbf.ft).
22. Clean EGR pipe and mating face.
23. Fit EGR pipe, align heat shield and fit Torx bolts but do not tighten at this stage. Torx bolts to be tightened to 25 Nm (18 lbf.ft) when EGR cooler is fitted.
24. Clean coolant hose adaptor and mating face.
25. Use a new seal, fit coolant hose adaptor and tighten bolts to 8 Nm (6 lbf.ft).
26. Fit fuel rail and tighten bolts to 24 Nm (18 lbf.ft).
27. Fit fuel pipe and support bush, tighten unions to 20 Nm (15 lbf.ft).
28. Connect multiplug to coolant temperature sensor.
29. Fit connections to glow plugs.
30. Connect multiplug to fuel pressure sensor.
31. Fit tappets.
32. Fit EGR cooler.
33. Connect battery earth lead.
34. Refill cooling system.

# Tappets cam followers - head set

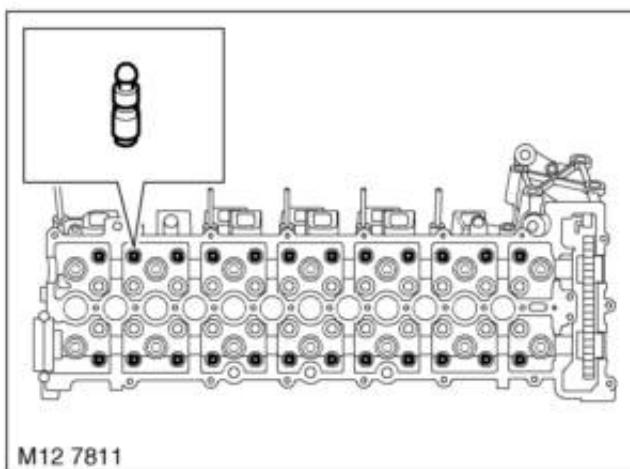
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove camshafts.



3. Remove rockers and retain in fitted order.



4. Remove tappets. Retain in fitted order if to be refitted.



**CAUTION:** Store hydraulic tappets in their fitted order and store inverted to prevent oil loss. Maintain absolute cleanliness when handling hydraulic tappets. Failure to observe these precautions can result in engine failure.

## Refit

1. Clean tappets and bores in cylinder head.
2. Lubricate tappets and bores with clean engine oil.
3. Fit tappets, in original order if not renewed.
4. Clean rockers.
5. Lubricate rockers with clean engine oil.
6. Fit rockers in original order.
7. Fit camshafts.
8. Connect battery earth lead.

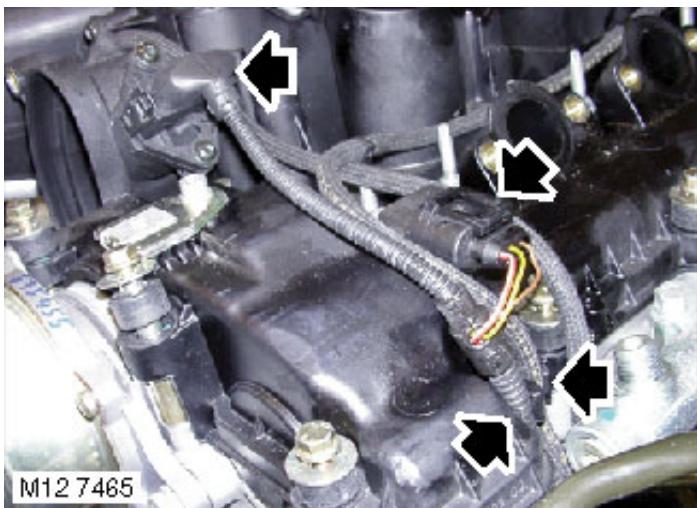
# Gasket - camshaft cover

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.

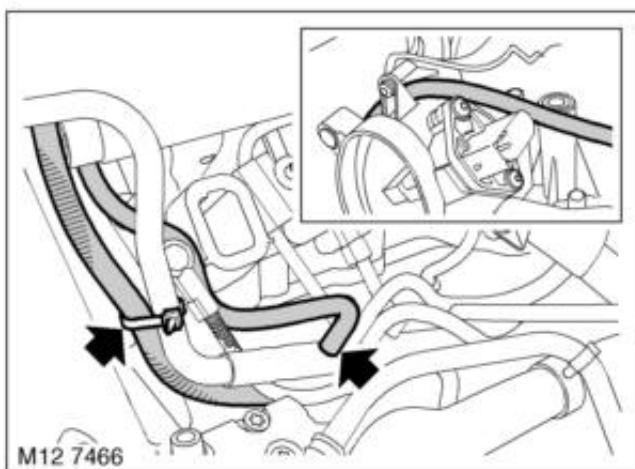
2. Remove injectors.



3. Disconnect multiplug from CMP sensor.

4. Disconnect multiplug from MAF/IAT sensor.

5. Release harness and vacuum hose from clip.

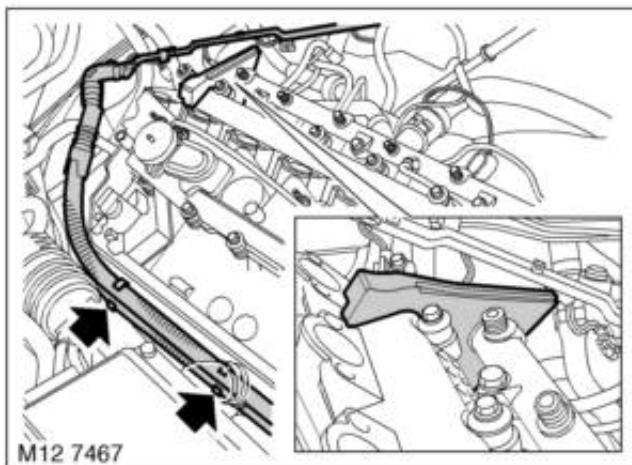


6. Remove clip securing vacuum hose and harness to vacuum pipe.

7. Disconnect hose from vacuum manifold.

8. Release vacuum hose from camshaft cover.

9. Release fuel return hose and harness from camshaft cover.



10. Release engine harness from clips and move clear of camshaft cover.

11. Remove grommet from fuel rail.



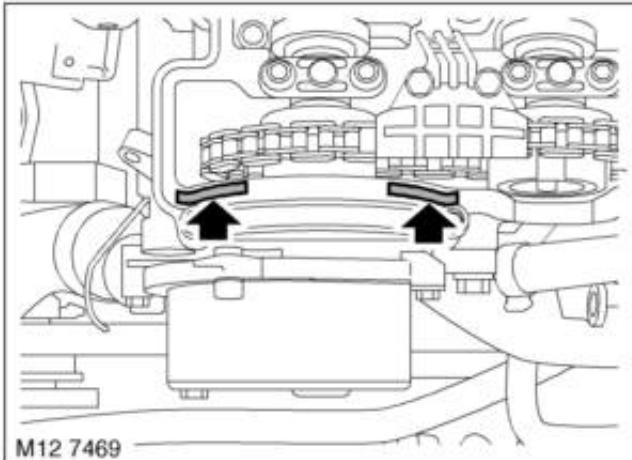
12. Progressively loosen and remove 18 bolts securing camshaft cover.

13. Remove camshaft cover and discard gasket.

## Refit

1. Clean camshaft cover and mating face of cylinder head.

2. Fit new gasket to camshaft cover and fit retaining bolts to cover and gasket.



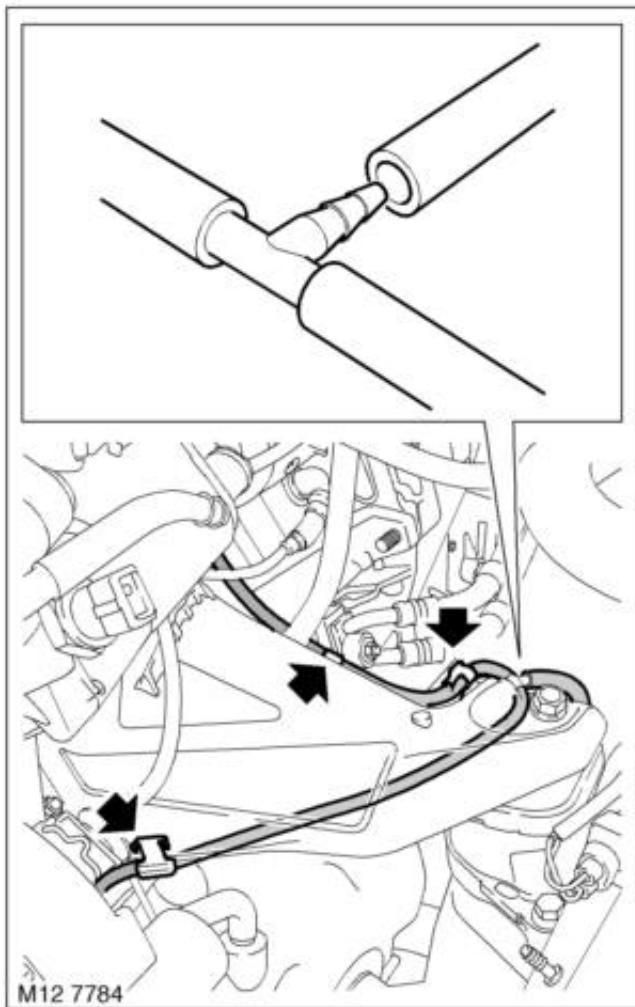
3. Apply a bead of sealant, Part No. STC 50550, 2 mm (0.1 in) high and 2 mm (0.1 in) wide to gasket mating face on cylinder head as shown.
4. Fit camshaft cover and tighten bolts evenly to 10 Nm (7 lbf.ft).
5. Fit grommet to fuel rail.
6. Fit engine harness to clips.
7. Secure fuel return hose and harness to camshaft cover.
8. Secure vacuum hose to camshaft cover and connect to vacuum manifold.
9. Fit clip to secure vacuum hose and harness to vacuum pipe.
10. Connect multiplug to MAF/IAT sensor.
11. Connect multiplug to CMP sensor.
12. Fit injectors.
13. Connect battery earth lead.

# Acoustic cover - engine

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

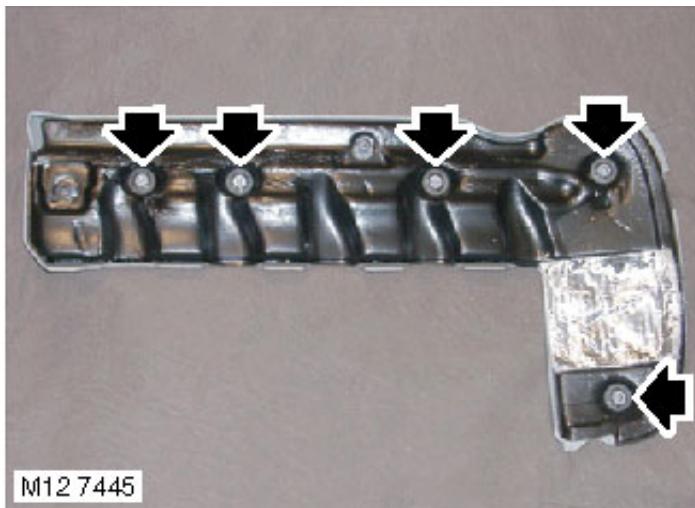
## Remove

1. Disconnect battery earth lead.
2. Remove engine access cover.



3. Remove Allen screw securing acoustic cover, release clip and remove cover.

**NOTE: Do not carry out further dismantling if component is removed for access only.**



4. Remove 5 clips securing acoustic padding to cover.

## Refit

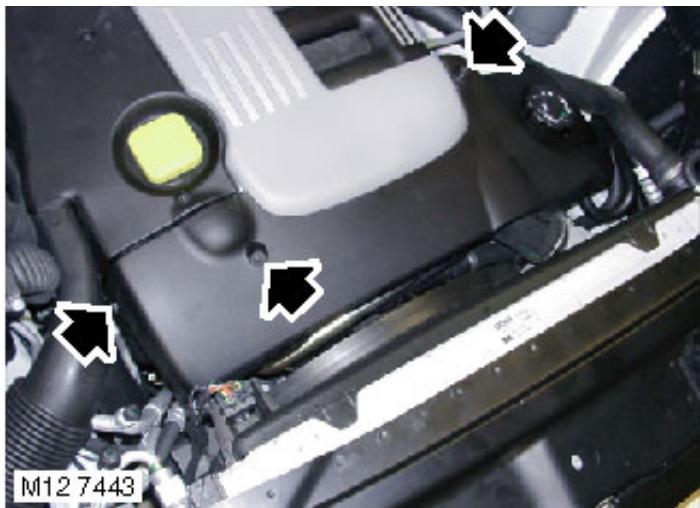
1. Fit padding to acoustic cover and secure with clips.
2. Fit acoustic cover and tighten Allen bolt to 5 Nm (3.7 lbf.ft).
3. Fit engine access cover.
4. Connect battery earth lead.

# Cover - engine access

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

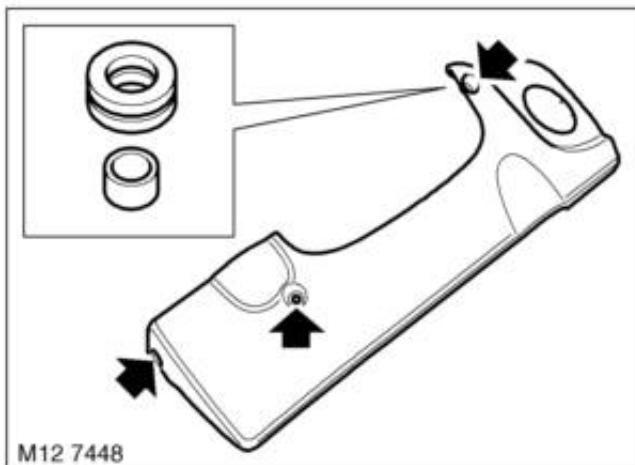
## Remove

1. Disconnect battery earth lead.

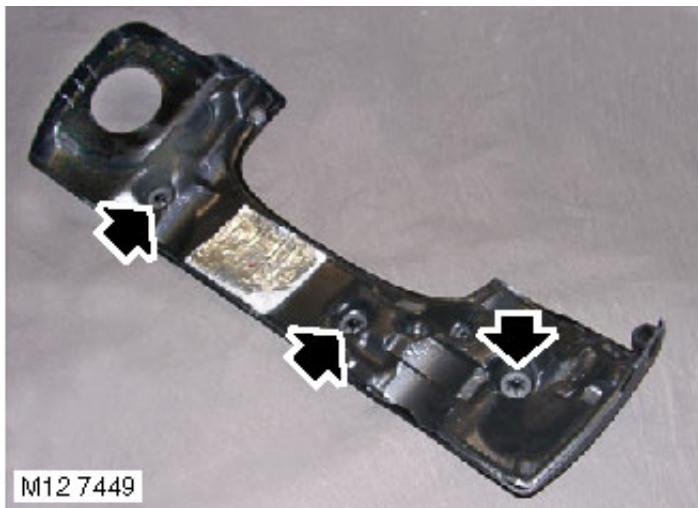


2. Remove 3 Allen screws securing engine access cover and remove cover.

**NOTE: Do not carry out further dismantling if component is removed for access only.**



3. Remove compression limiters and grommets from engine access cover.



4. Remove 3 clips securing acoustic padding to access cover. Remove padding.

## Refit

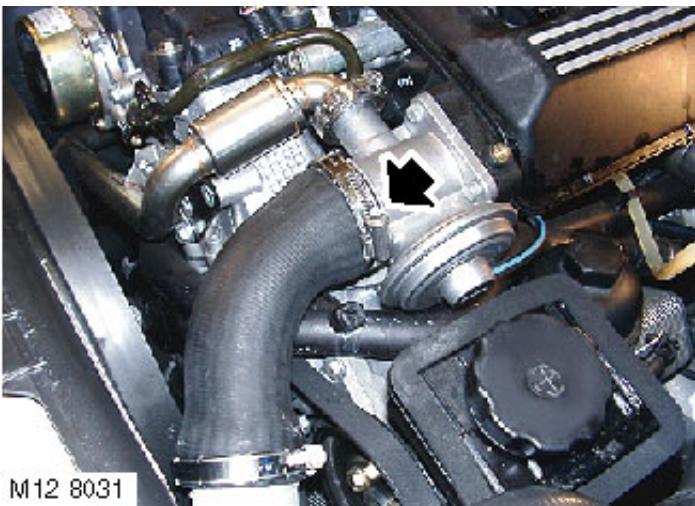
1. Fit acoustic pad and secure with clips.
2. Fit grommets and compression limiters.
3. Position engine access cover, fit and tighten bolts to 5 Nm (3.7 lbf.ft).
4. Connect battery earth lead.

# **Engine & ancillaries - remove for access & refit**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## **Remove**

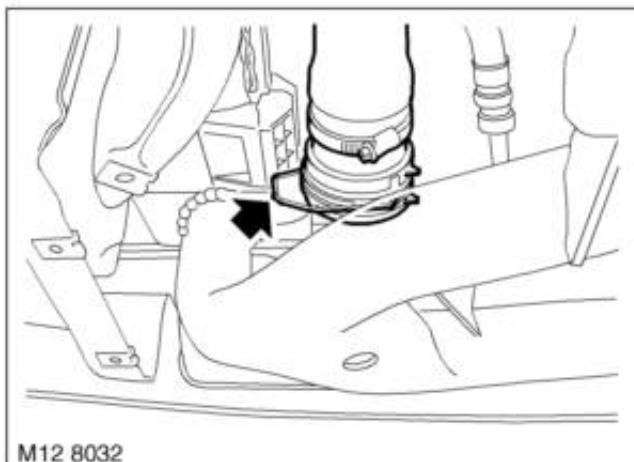
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Release cover, remove nut and disconnect battery positive lead from stud.
4. Remove air intake plenum.
5. Remove undertray.
6. Drain cooling system.
7. Drain engine oil.
8. Remove exhaust system.
9. Remove front propeller shaft.
10. Remove RH drive shaft support bearing housing 'O' ring.
11. Remove differential oil seal.
12. Remove engine acoustic cover.
13. Remove air filter element.
14. Remove auxiliary drive belt.
15. Remove starter motor.



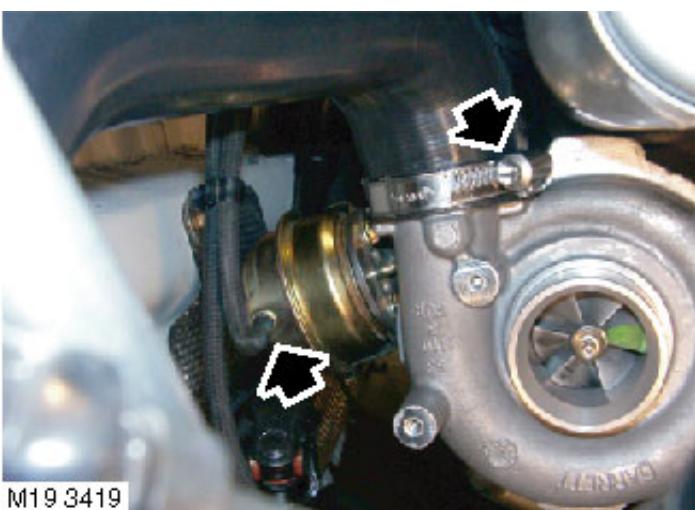
16. Loosen clip and disconnect intercooler intake hose from EGR valve. Discard clip.



**CAUTION: Always fit plugs to open connections to prevent contamination.**



17. Release clip and disconnect intercooler intake hose from intercooler. Remove hose.



18. Loosen clip and disconnect intercooler hose from turbocharger. Discard clip.

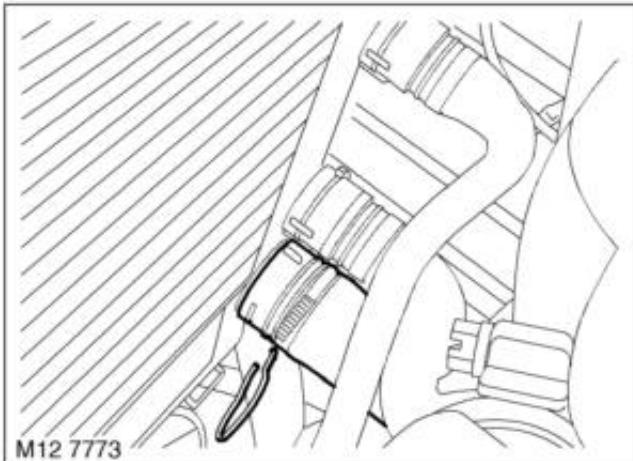


**CAUTION: Always fit plugs to open connections to prevent contamination.**

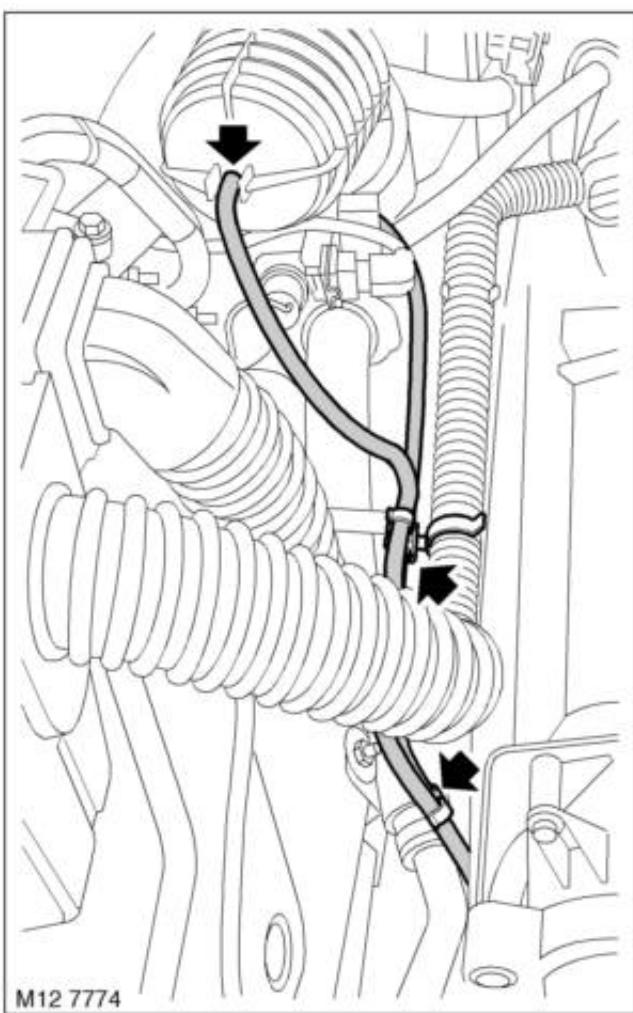
19. Disconnect vacuum hose from turbocharger boost control valve.



**CAUTION:** Always fit plugs to open connections to prevent contamination.



20. Remove clip, disconnect turbocharger hose from intercooler and remove hose.

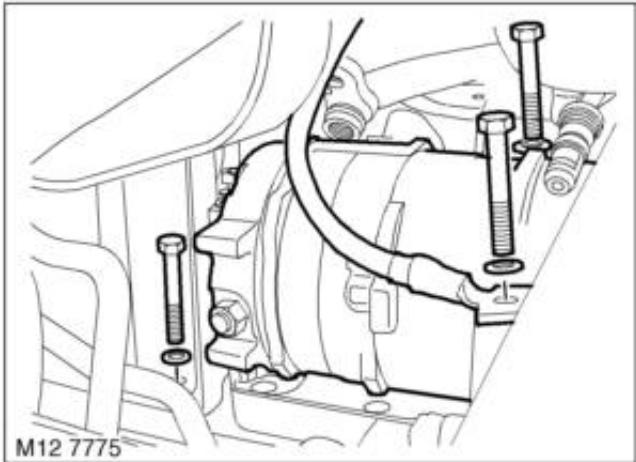


21. Disconnect vacuum hose from reservoir.

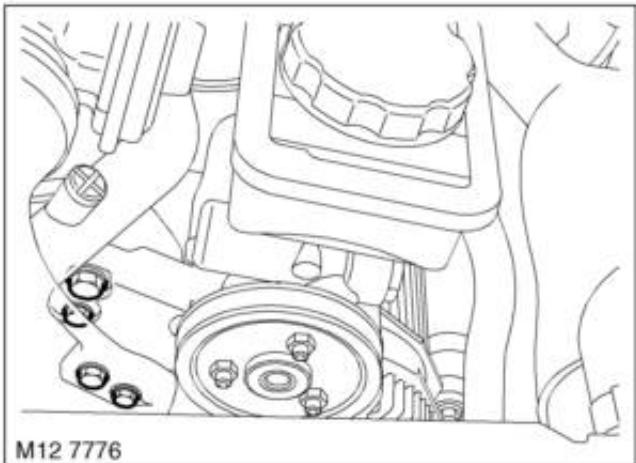


**CAUTION:** Always fit plugs to open connections to prevent contamination.

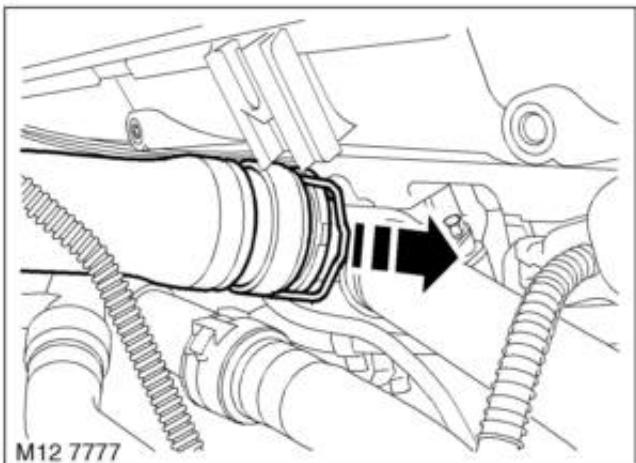
22. Release vacuum hoses from clips.



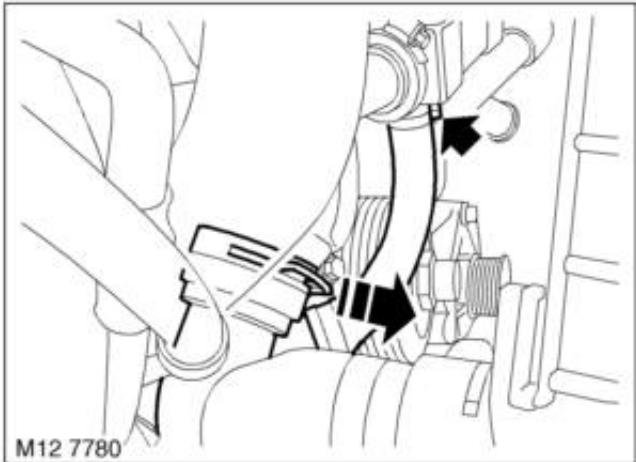
23. Remove 3 bolts securing A/C compressor, release compressor and tie aside.



24. Remove 4 bolts securing PAS pump to mounting, release pump and tie aside.

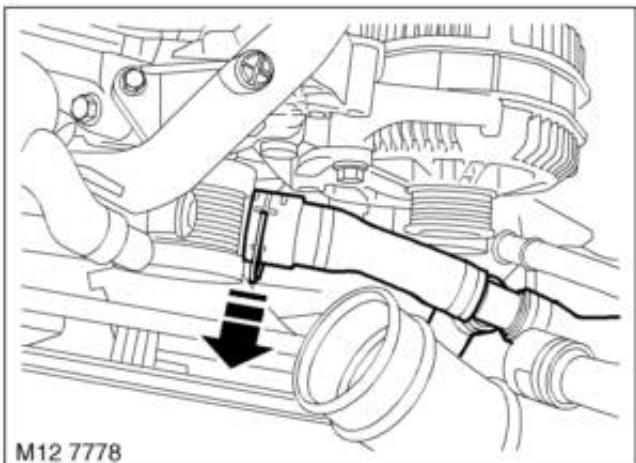


25. Release clip and disconnect radiator top hose from coolant outlet elbow.

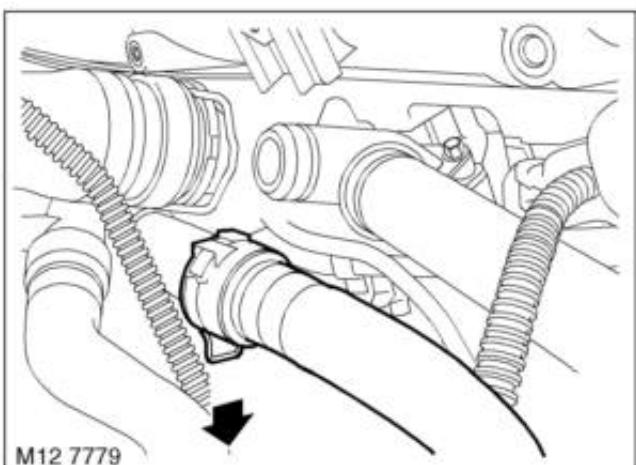


26. Release clip and disconnect radiator bottom hose from thermostat housing.

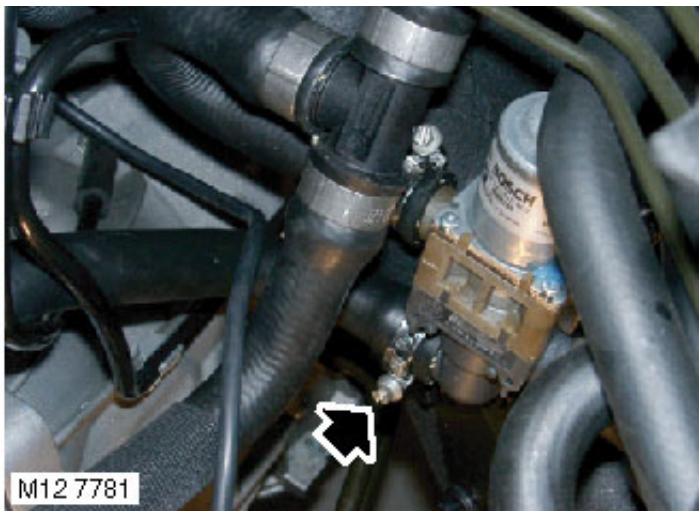
27. Loosen clip and disconnect coolant hose from EGR cooler.



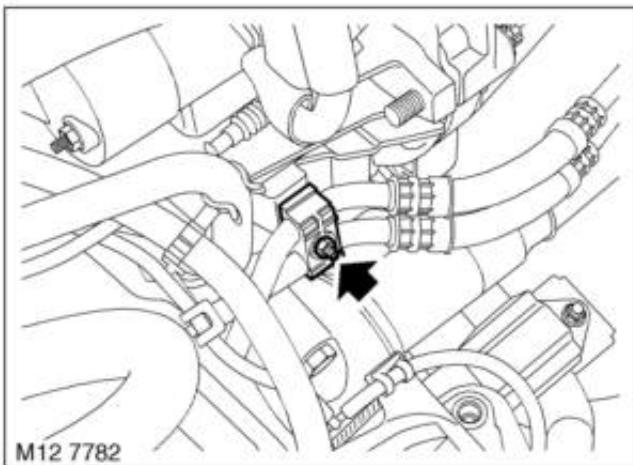
28. Release clip and disconnect expansion tank hose from coolant rail.



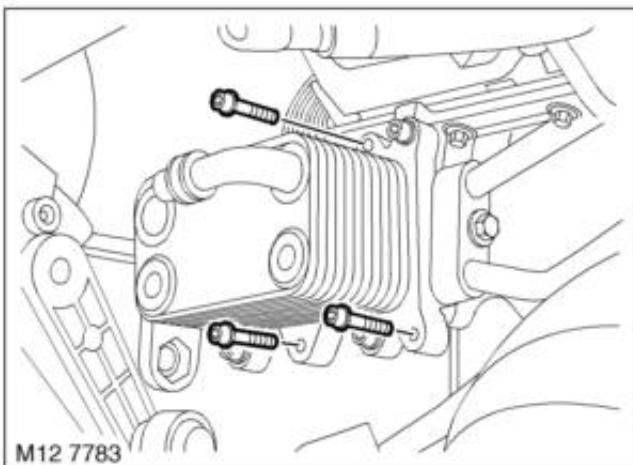
29. Release clip and disconnect heater hose from coolant rail.



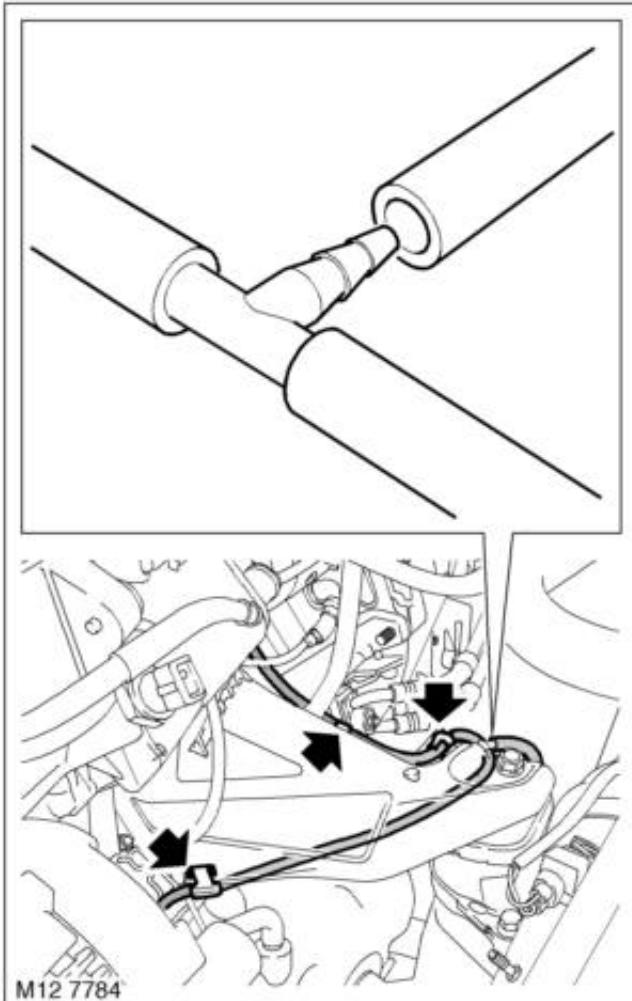
30. Loosen clip and disconnect hose from heater valve.



31. Loosen nut securing gearbox fluid cooler pipe bracket to sump.



32. Remove 3 Allen screws securing gearbox fluid cooler and tie cooler aside.

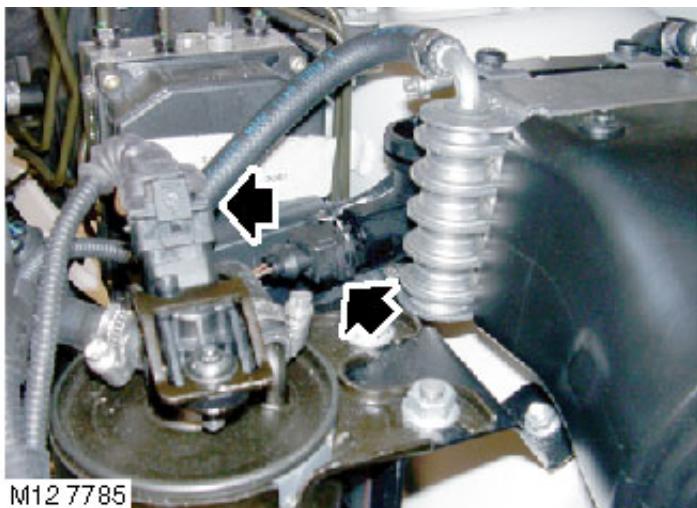


33. Release vacuum hose from 3 clips on engine LH mounting bracket.

34. Disconnect mounting vacuum supply hose from 'T' piece.

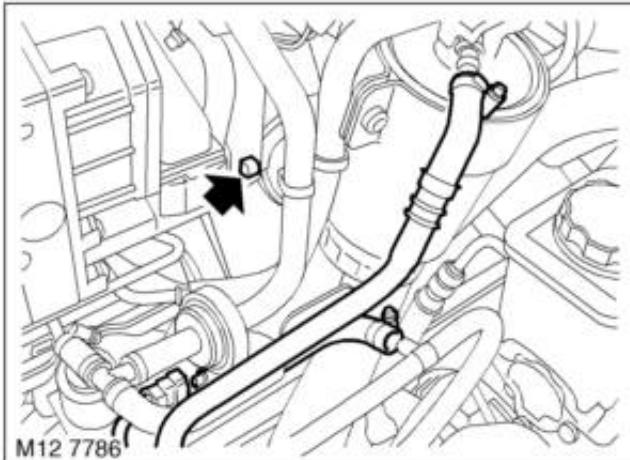


**CAUTION: Always fit plugs to open connections to prevent contamination.**

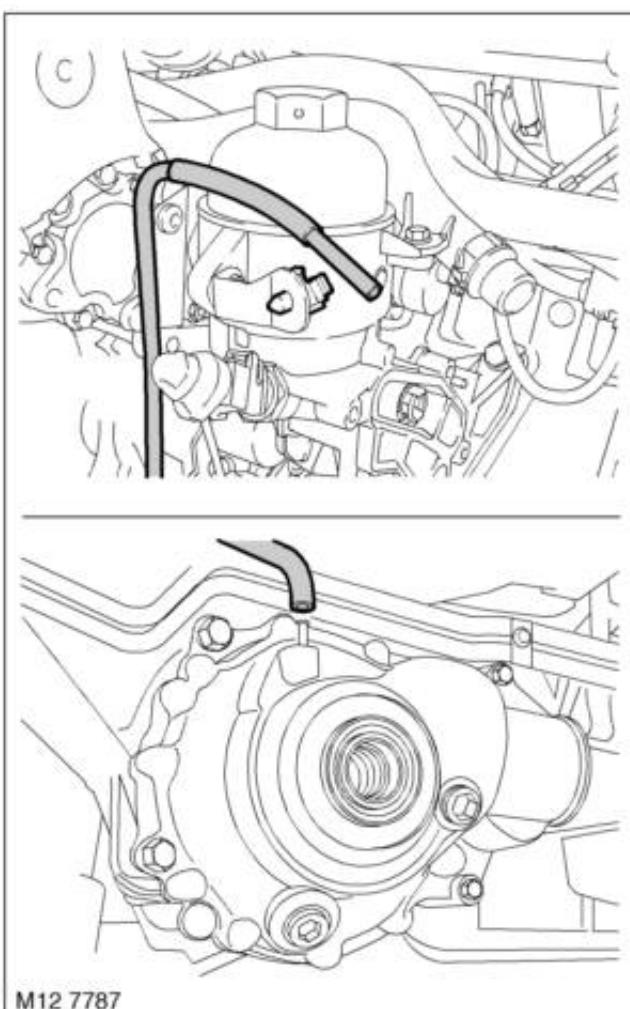


35. Disconnect multiplug from fuel pressure sensor.

36. Disconnect multiplug from fuel temperature sensor.

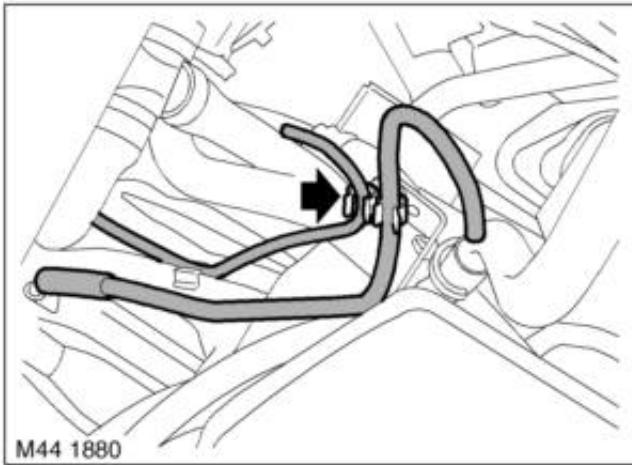


37. Release fuel pressure and temperature sensor harness from clip.
  38. Loosen clips and disconnect fuel hose from filter and fuel flow control valve hose from 'T' piece.
- ! CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**
39. Release and disconnect return hose from fuel flow control valve.



40. Release and remove differential breather pipe.

**! CAUTION: Always fit plugs to open connections to prevent contamination.**



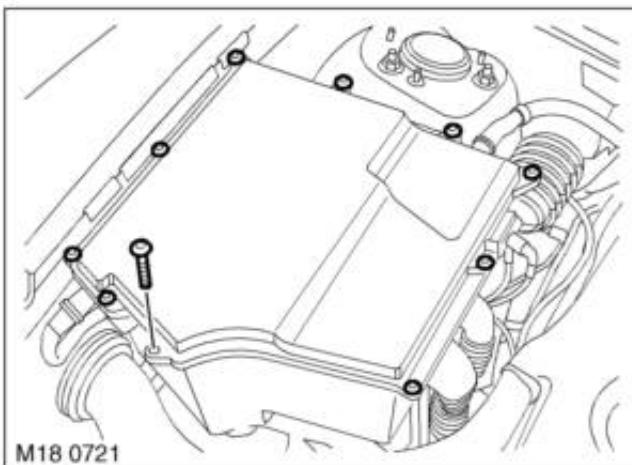
41. Release transmission breather pipes from clip and move aside.



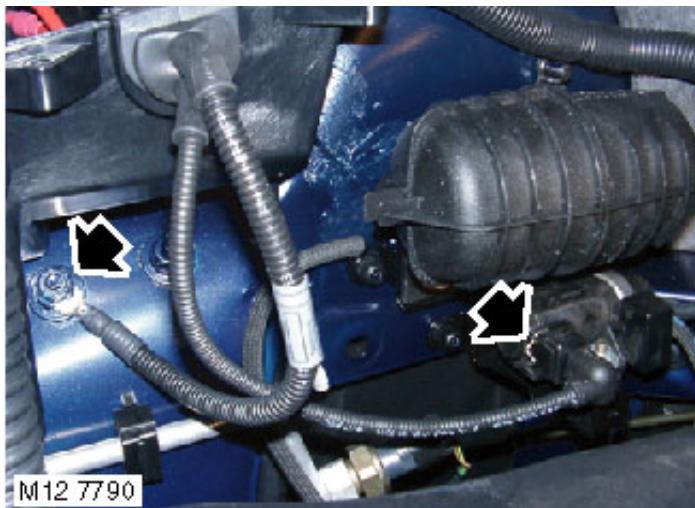
42. Remove clip and disconnect brake vacuum hose.



**CAUTION:** Always fit plugs to open connections to prevent contamination.

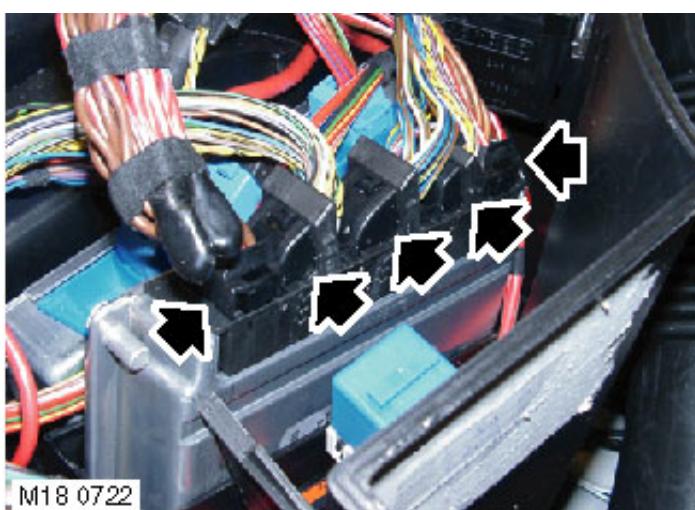


43. Remove 10 Allen screws securing 'E' box cover and remove cover.

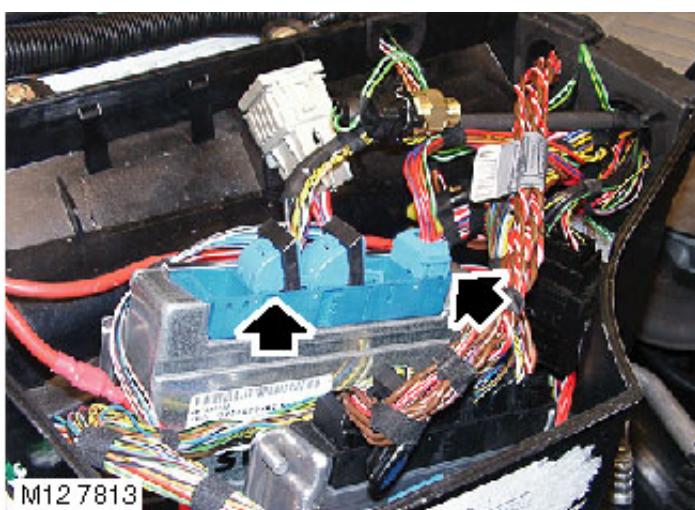


44. Remove nut securing earth lead to body, release lead from stud.

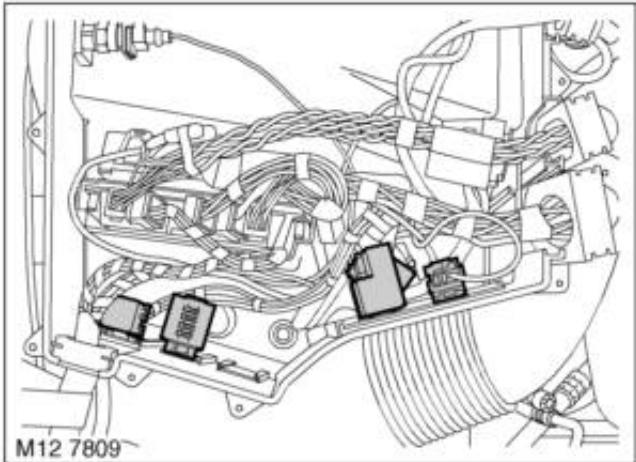
45. Disconnect multiplug from EGR solenoid valve.



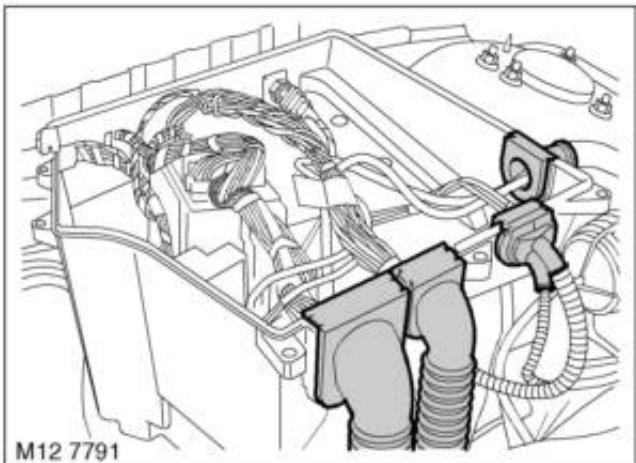
46. Disconnect 5 multiplugs from engine ECM.



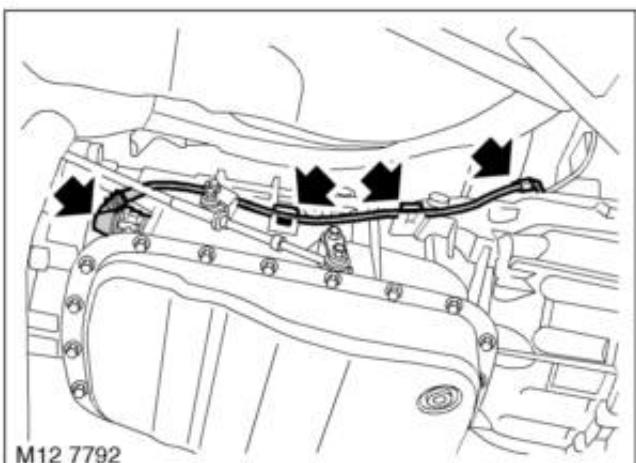
47. Disconnect 2 multiplugs from gearbox ECU.



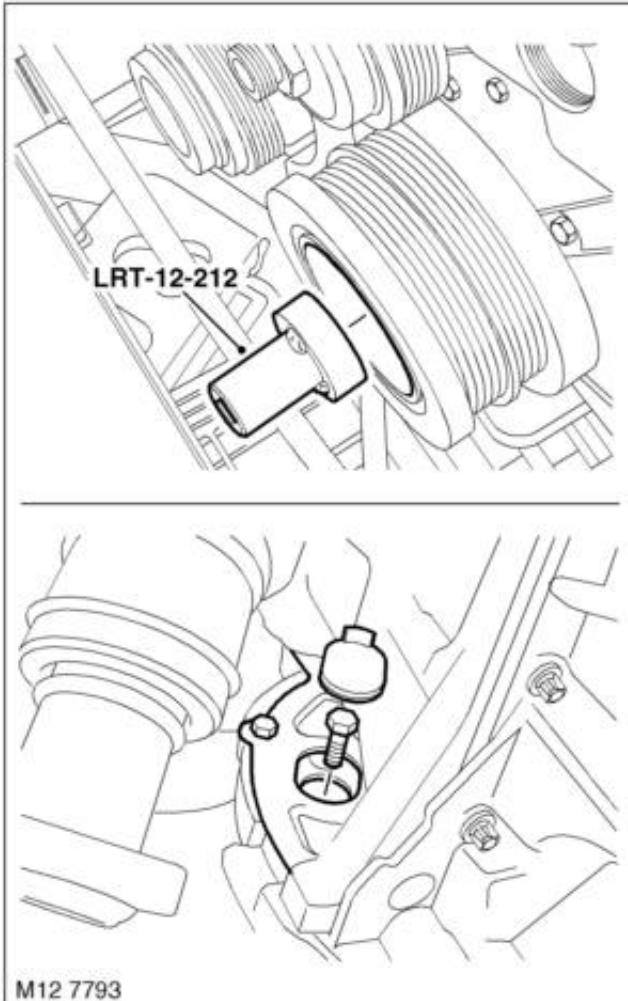
48. Release glow plug ECU mounting from 'E' box and disconnect multiplug.
49. Disconnect positive lead connection.
50. Release fuse block and relay from 'E' box.
51. Disconnect multiplug connection.



52. Release harness grommets from 'E' box.



53. Rotate to release and disconnect multiplug from gearbox.
54. Release gearbox harness from clips.



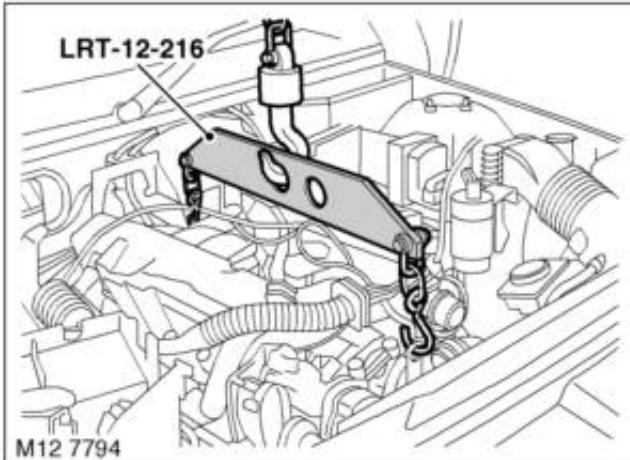
55. Remove grommet from closing plate to gain access to torque converter retaining bolts.
56. Use LRT-12-212 to rotate crankshaft for access and remove 3 bolts securing drive plate to torque converter.
57. Remove bolt securing closing plate to gearbox.



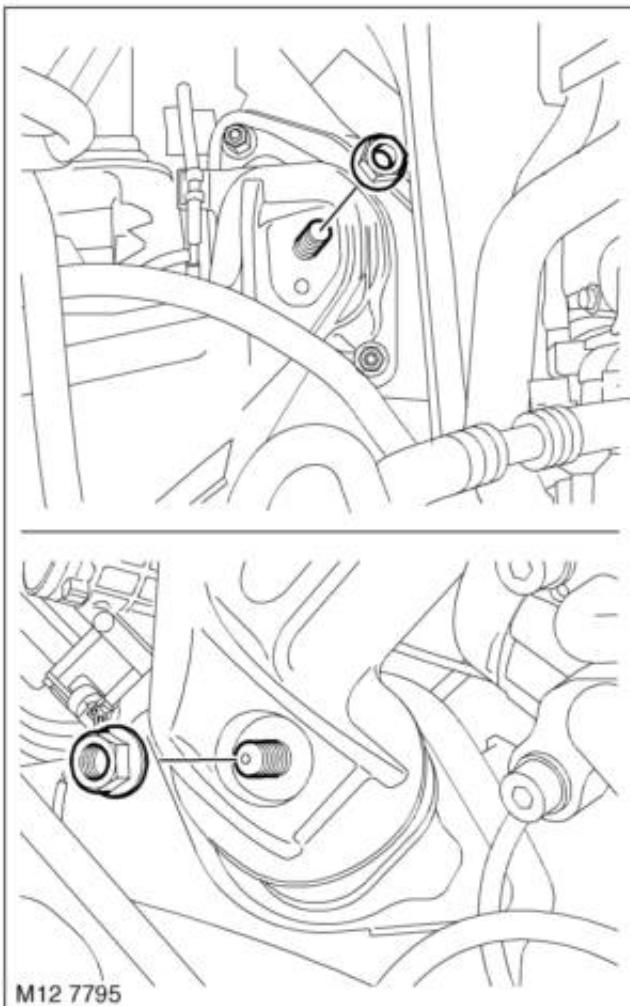
58. Disconnect multiplug from turbocharger boost pressure sensor.
59. Remove bolt securing turbocharger boost pressure sensor and remove sensor. Discard seal.



**CAUTION: Always fit plugs to open connections to prevent contamination.**



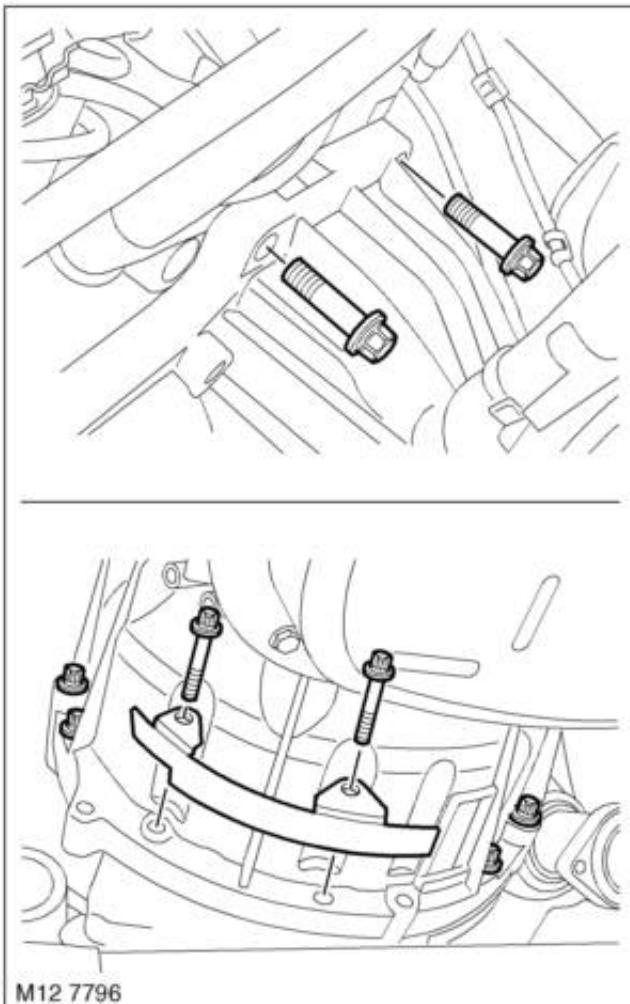
60. Fit LRT-12-216 to lifting chains and connect to engine lifting eyes.



61. Remove 2 nuts securing engine brackets to mountings.

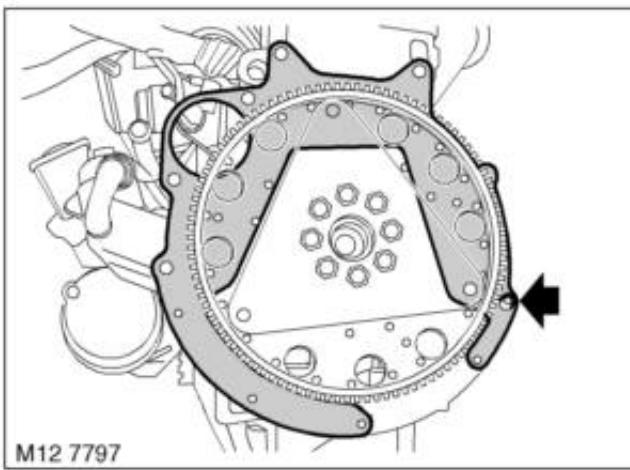
62. Raise engine clear of mountings.

63. Support gearbox.



64. Remove 4 Torx bolts securing gearbox to sump and remove plate.

65. Remove 4 Torx bolts securing gearbox to engine.



66. Release engine from dowels, carefully raise and guide engine clear of vehicle.



**CAUTION: Ensure torque converter remains with gearbox.**

67. Remove closing plate.

## Refit

1. Clean torque converter and mating faces.
2. Ensure torque converter is fully engaged with gearbox.
3. Clean gearbox to engine mating faces, dowels and dowel holes.
4. Clean closing plate.
5. Fit closing plate onto dowels.
6. With assistance, carefully fit engine to gearbox. Ensure engagement of torque converter spigot and location onto dowels.
7. Fit bolts securing gearbox to engine and tighten to 45 Nm (33 lbf.ft).
8. Remove support from gearbox.
9. Lower engine onto mountings.
10. Remove engine lifting chains.
11. Fit and tighten nuts securing engine brackets to mountings to 100 Nm (74 lbf.ft).
12. Fit plate to gearbox flange and tighten Torx bolts securing gearbox to sump to 22 Nm (16 lbf.ft).
13. Fit bolt securing closing plate to gearbox and tighten to 10 Nm (7 lbf.ft).
14. Fit bolts securing drive plate to torque converter and tighten to 45 Nm (33 lbf.ft)
15. Fit grommet to closing plate.
16. Connect multiplug to gearbox and fit harness into clips.
17. Position engine harness to 'E' box, make harness multiplug and positive lead connections, and fit multiplug to glow plug ECU.
18. Fit fuse block, relay and glow plug ECU to 'E' box.
19. Connect multiplugs to engine ECM and gearbox ECU.
20. Connect body earth lead to stud, fit nut and tighten to 25 Nm (18 lbf.ft).
21. Fit harness grommets to 'E' box.
22. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
23. Connect brake vacuum hose and secure with clip.
24. Fit starter motor.
25. Clean fuel hose connections.
26. Connect return hose to fuel flow control valve.
27. Connect hose to fuel filter and flow control valve hose to 'T' piece, tighten clips.

28. Connect multiplug to fuel temperature sensor.
29. Connect multiplug to fuel pressure sensor.
30. Fit sensor harness into clip.
31. Connect mounting vacuum supply hose and fit hose into clips.
32. Clean gearbox fluid cooler and mating face.
33. Position fluid cooler and tighten Allen screws to 10 Nm (7 lbf.ft).
34. Tighten nut securing fluid cooler pipe bracket to 10 Nm (7 lbf.ft).
35. Fit breather pipe to differential and secure in clip.
36. Fit transmission breather pipes into clip.
37. Clean turbocharger boost pressure sensor and mating face.
38. Fit new seal to turbocharger boost pressure sensor, fit sensor to inlet manifold and tighten bolt to 8 Nm.
39. Connect heater hose to coolant rail and secure with clip.
40. Connect hose to heater valve and tighten clip.
41. Connect expansion tank hose to coolant rail and secure with clip.
42. Connect top hose and secure with clip.
43. Connect bottom hose and secure with clip.
44. Connect coolant hose to EGR cooler and tighten clip.
45. Clean PAS pump and mating faces.
46. Position PAS pump to mounting and fit bolts. Tighten M8 bolts to 25 Nm (18 lbf.ft) and M6 bolts to 10 Nm (7 lbf.ft).
47. Clean A/C compressor mounting bracket and mating face.
48. Position A/C compressor, align earth cable and tighten bolts securing compressor to 25 Nm (18 lbf.ft).
49. Connect vacuum hose to turbocharger boost control valve.
50. Connect hose to vacuum reservoir.
51. Fit vacuum hose to clips.
52. Clean turbocharger and mating face on hose assembly.
53. Using a new retaining clip fit hose assembly, intercooler to turbocharger. Tighten clip to 6 Nm (4.4 lbf.ft).
54. Allow 15 minutes to elapse and re-torque retaining clip, hose assembly to turbocharger to 6 Nm (4.4 lbf.ft).

lbf.ft).

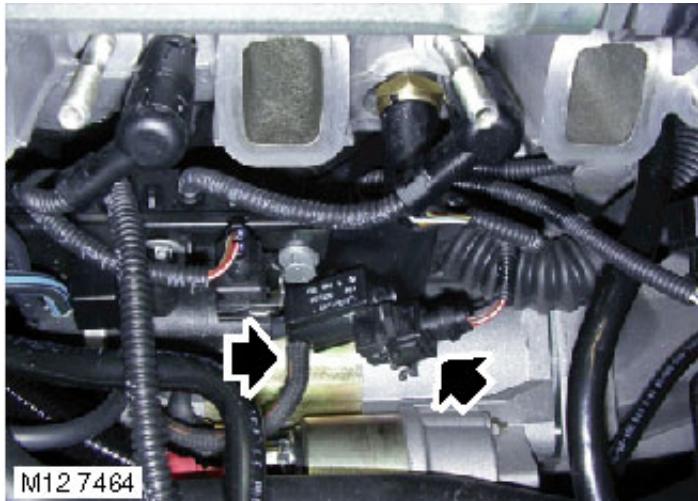
55. Clean EGR valve and mating face on air intake hose assembly.
56. Using a new retaining clip fit air intake hose assembly, intercooler to EGR valve. Tighten clip to 6 Nm (4.4 lbf.ft)
57. Allow 10 minutes to elapse and re-torque air intake hose to EGR valve retaining clip to 6 Nm (4.4 lbf.ft).
58. Fit auxiliary drive belt.
59. Fit air filter element.
60. Fit engine acoustic cover.
61. Fit differential oil seal.
62. Fit RH drive shaft support bearing housing 'O' ring.
63. Fit front propeller shaft.
64. Fit exhaust system.
65. Refill engine with oil.
66. Fit undertray.
67. Fit air intake plenum.
68. Fit battery positive lead to stud, tighten nut to 18 Nm (13 lbf.ft) and fit cover.
69. Connect battery earth lead.
70. Refill cooling system.

# Solenoid - vacuum control - engine mounting

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove inlet manifold gaskets.



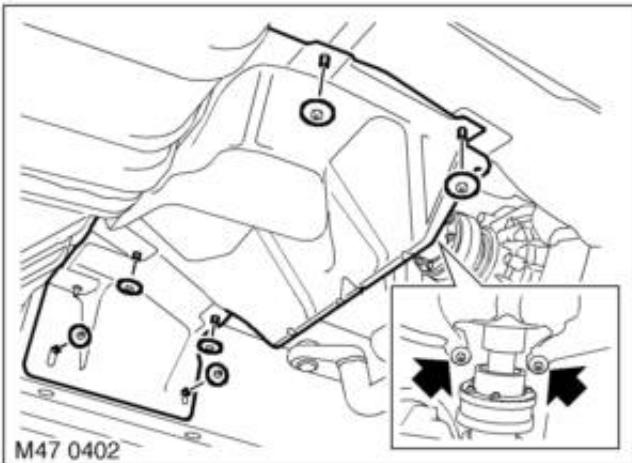
3. Disconnect multiplug from solenoid valve.
4. Release and remove solenoid from bracket.
5. Identify and disconnect vacuum hoses.

## Refit

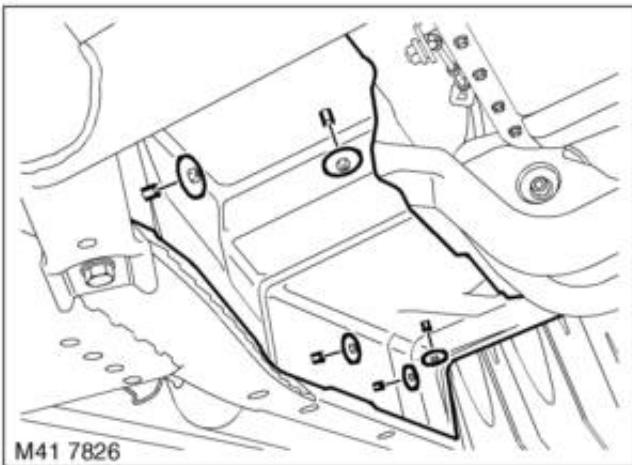
1. Position solenoid valve and connect hoses.
2. Fit solenoid to bracket and connect multiplug.
3. Fit inlet manifold gaskets.
4. Connect battery earth lead.

# Engine mounting - rear Remove

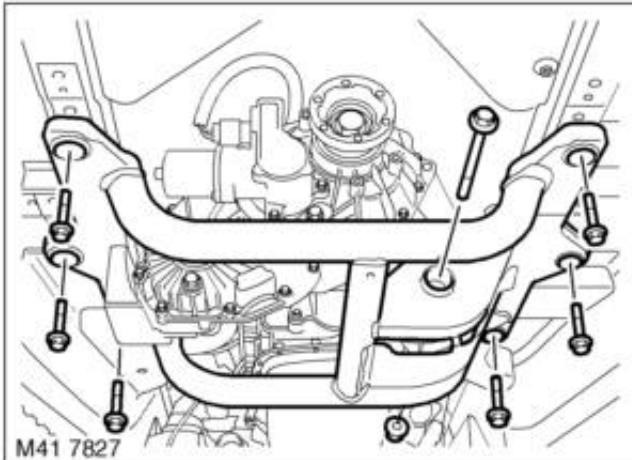
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Raise vehicle on lift.
4. Remove exhaust system.



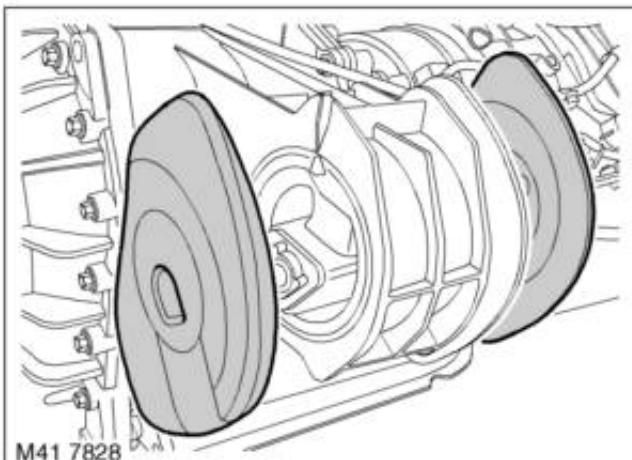
5. Remove 8 nuts securing centre heat shield and remove shield.



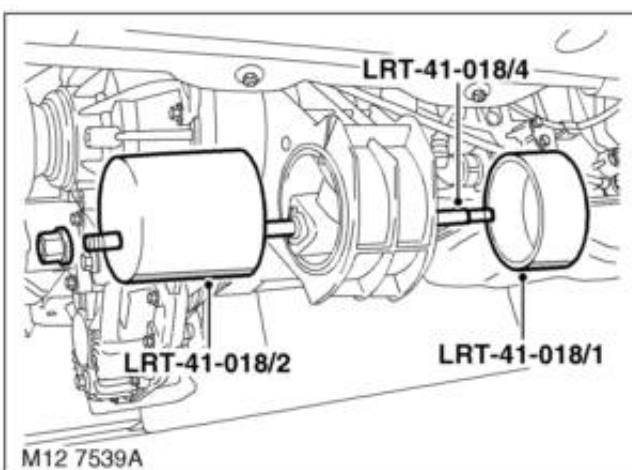
6. Remove 5 nuts, release and remove RH heat shield.
7. Support gearbox on a jack.



8. Remove nut and bolt securing mounting to cross member.
9. Remove 6 bolts securing cross member and remove cross member.



10. Remove snubbers from mounting.



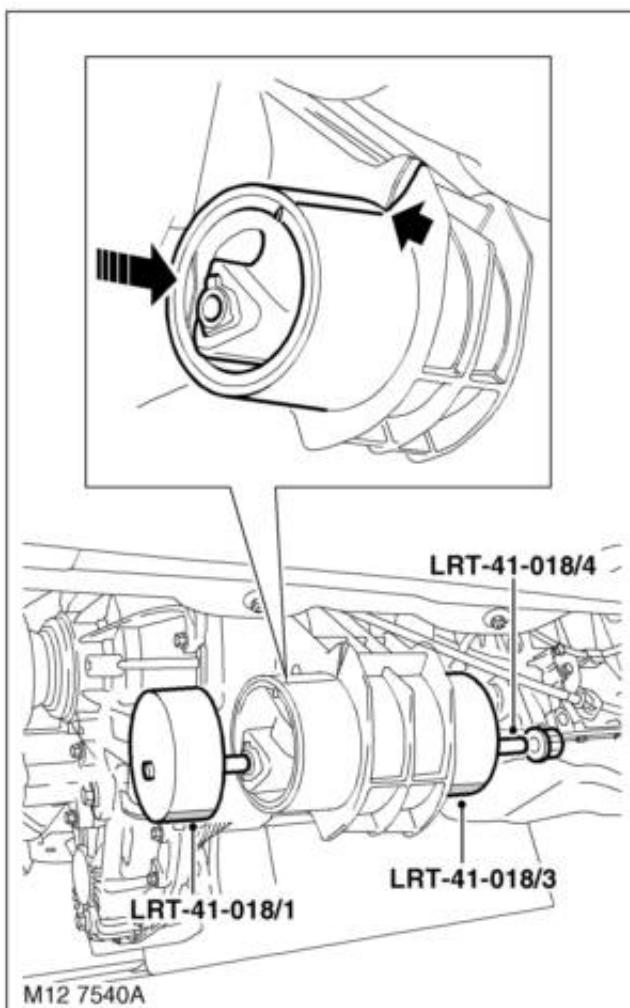
11. Lubricate centre screw LRT-41-018/4 with Molybdenum Disulphide grease and assemble tool as shown to remove mounting from transfer gearbox.



**CAUTION:** Ensure tool alignment indicator is at the 6 o'clock position. The tool alignment indicator is a machined flat on LRT-41-018/1 and LRT-41-018/2.

## Refit

1. Clean mounting and mating faces.
2. Lubricate new mounting and bore in transfer gearbox casing to aid assembly.



3. Position new mounting to rear face of transfer gearbox, and start entry. Mounting to be parallel, with timing marks aligned.

**NOTE: Transfer timing mark to side of mounting to assist with alignment.**

4. Lubricate centre screw LRT-41-018/4 with Molybdenum Disulphide grease and assemble tool as shown to fit mounting to transfer gearbox. Start with the centre screw at full length and when the mounting is approximately 75 percent fitted, reduce the length of the centre screw by screwing it fully into the base plate LRT-41-018/1. This will ensure the centre screw LRT-41-018/4 does not foul on the gearbox fluid pan.



**CAUTION: Ensure tool alignment indicator is at the 6 o'clock position.**

5. Ensure the mounting is fitted parallel. If necessary, use a mallet and tap the base plate to maintain a parallel fit.
6. Fit snubbers.
7. Fit cross member to mounting, fit nut and bolt but do not tighten at this stage.
8. Align cross member, fit bolts and tighten to 90 Nm (66 lbf.ft).

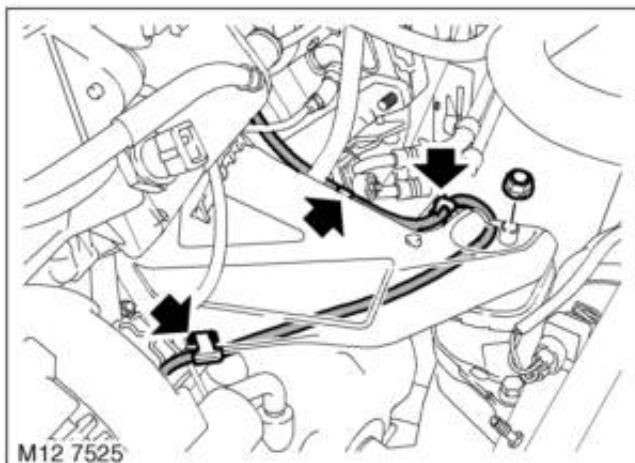
9. Remove support from gearbox.
  10. Tighten nut and bolt securing mounting to cross member to 74 Nm (54 lbf.ft).
  11. Fit heat shield and secure with nuts.
  12. Fit centre heat shield and secure with nuts.
  13. Fit exhaust system.
- 
14. Connect the battery earth lead.

# Mounting - LH

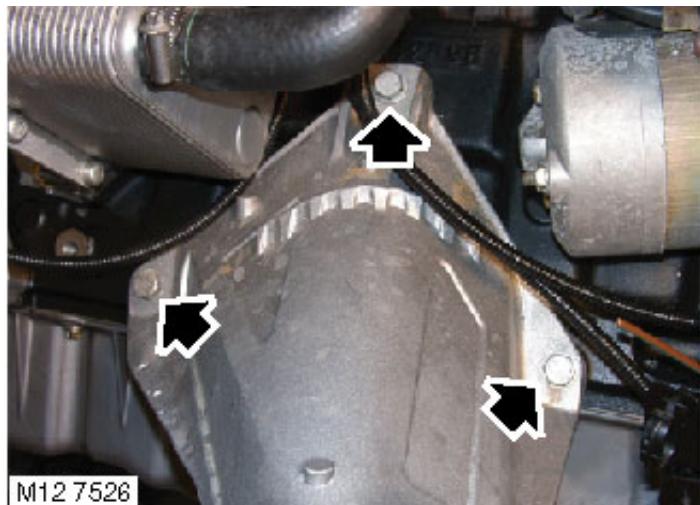
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

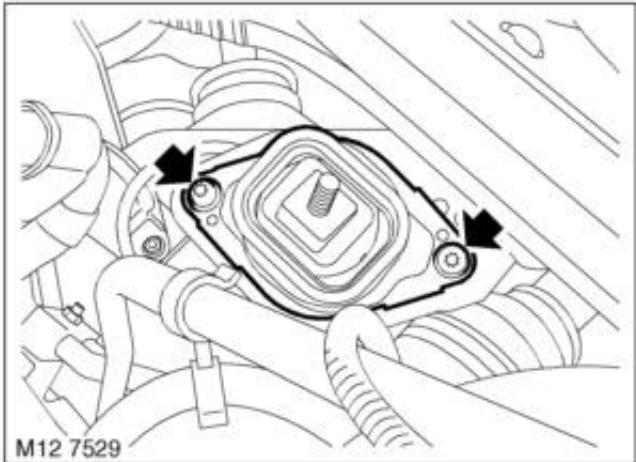
1. Disconnect battery earth lead.



2. Release vacuum hose from 3 clips on engine LH mounting bracket.
3. Remove nut securing engine LH mounting to bracket.
4. Support LH side of engine under sump.



5. Remove 3 bolts securing engine LH mounting bracket to engine and remove bracket.



6. Remove 2 bolts securing engine LH mounting to sub-frame, disconnect vacuum hose and remove mounting.



**CAUTION: Always fit plugs to open connections to prevent contamination.**

## Refit

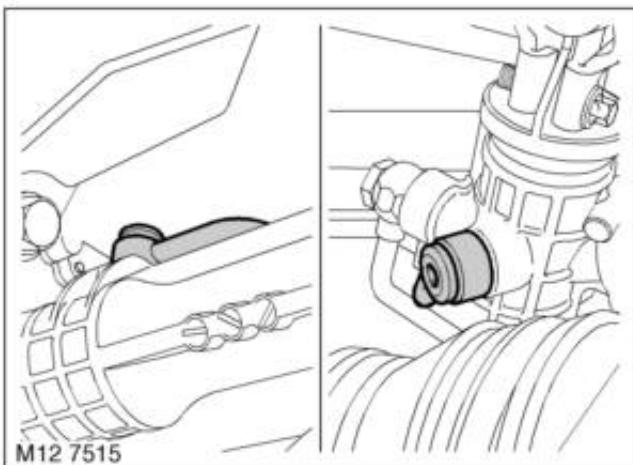
1. Clean mounting and mating faces.
2. Connect vacuum hose to mounting and fit mounting to sub-frame.
3. Fit bolts securing mounting to sub-frame but do not tighten at this stage.
4. Fit mounting bracket and tighten new bolts to 20 Nm (15 lbf.ft) plus 90°.
5. Tighten bolts securing mounting to sub-frame to 100 Nm (74 lbf.ft).
6. Fit and tighten nut securing engine bracket to mounting to 100 Nm (74 lbf.ft).
7. Remove support.
8. Fit vacuum hose to clips.
9. Connect battery earth lead.

# Engine mounting - RH

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove undertray.
4. Position container to collect fluid spillage.

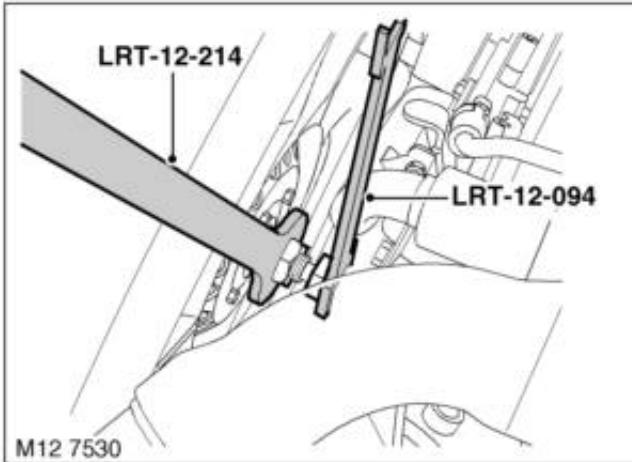


5. **RHD models:** Remove banjo bolts securing fluid transfer pipe to PAS rack, remove pipe and discard 'O' rings.



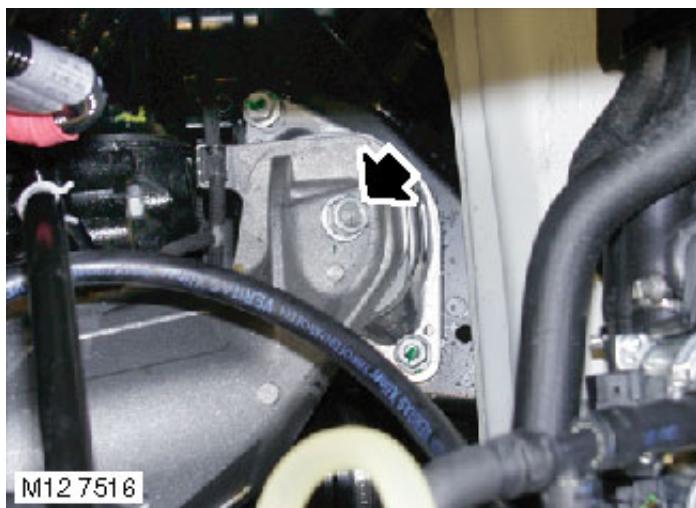
**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

6. Remove air intake plenum.
7. Remove turbocharger intake duct.

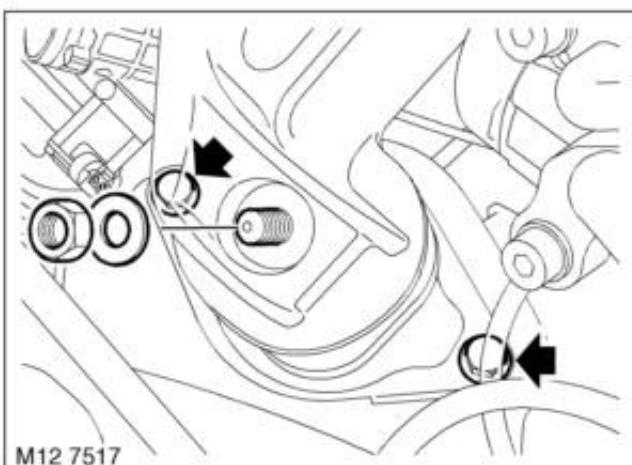


8. Use LRT-12-094 and LRT-12-214 to loosen viscous coupling lock nut and release fan assembly from coolant pump.

**NOTE: Thread is left handed.**

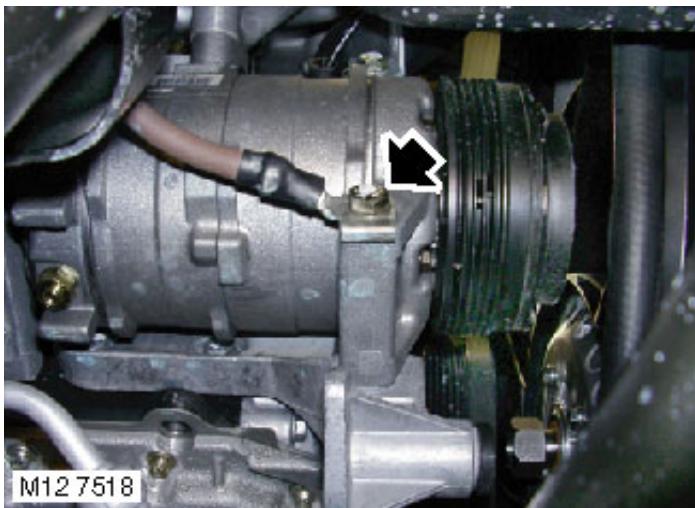


9. Loosen but do not remove nut securing engine bracket to LH mounting.

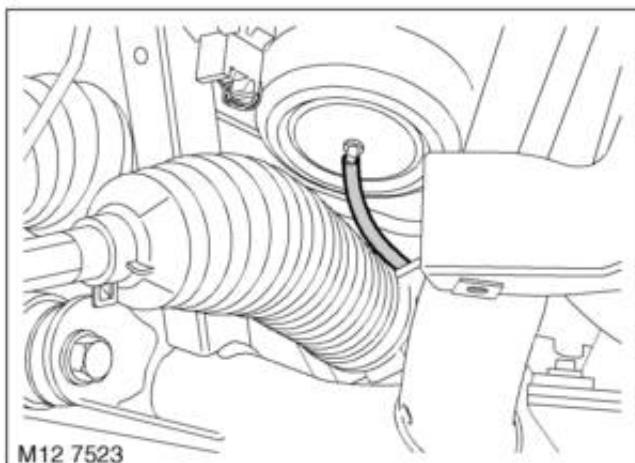


10. Remove nut securing engine bracket to RH mounting.

11. Remove 2 bolts securing engine RH mounting to sub-frame.



12. Remove A/C compressor retaining bolt and release earth lead.



13. Disconnect vacuum hose from mounting.



**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

14. Connect chain to engine lifting bracket and raise engine sufficiently only to clear mounting.
15. Remove engine mounting.

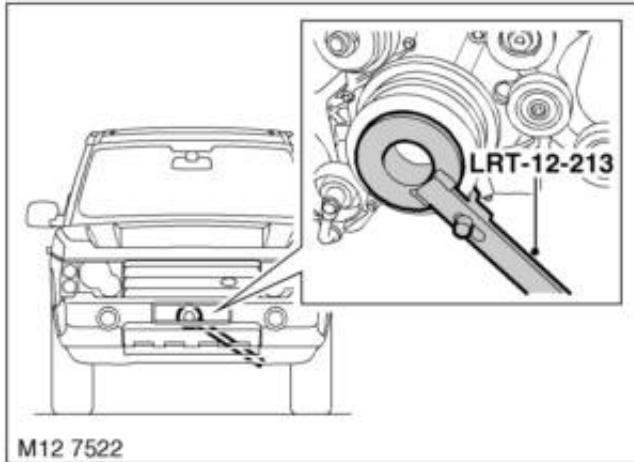
## Refit

1. Clean mounting and mating faces.
2. Fit mounting.
3. Fit bolts securing mounting to sub-frame but do not tighten at this stage.
4. Lower engine onto mounting.
5. Tighten bolts securing mounting to sub-frame to 56 Nm (41 lbf.ft).
6. Tighten nuts securing engine brackets to mountings to 100 Nm (74 lbf.ft).
7. Remove lifting chains.

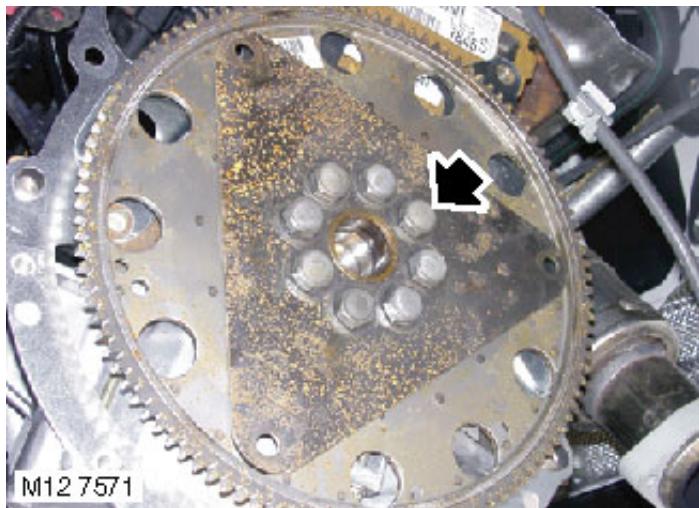
8. Connect vacuum hose.
9. Position earth lead and tighten compressor retaining bolt to 24 Nm (18 lbf.ft).
10. **RHD models:** Clean PAS fluid pipe and mating faces.
11. **RHD models:** Using new 'O' rings, fit PAS fluid pipe and tighten banjo bolts to 36 Nm (26 lbf.ft).
12. Fit fan to pulley and tighten viscous coupling nut to 40 Nm (30 lbf.ft).
13. Fit turbocharger intake duct.
14. Fit air intake plenum.
15. Fit undertray.
16. Connect battery earth lead.
17. **RHD models:** Bleed PAS system.

# Torque converter drive plate Remove

1. Remove gearbox assembly.

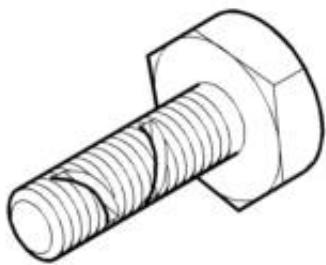


2. Fit LRT-12-213 locking wrench to crankshaft pulley.



3. Remove and discard 8 bolts securing drive plate to crankshaft.
4. Remove converter drive plate and starter ring.

## Refit



M12 7850

1. Clean adhesive from threads of flywheel bolt holes in crankshaft using an old flywheel bolt, with 2 saw cuts at an angle of 45° to the bolt shank.
2. Clean drive plate and mating face of crankshaft.
3. Position drive plate to crankshaft.
4. Fit new bolts, secure drive plate to crankshaft, evenly and progressively tighten to 115 Nm (85 lbf.ft).
5. Fit gearbox assembly.

# Gasket - housing - oil filter

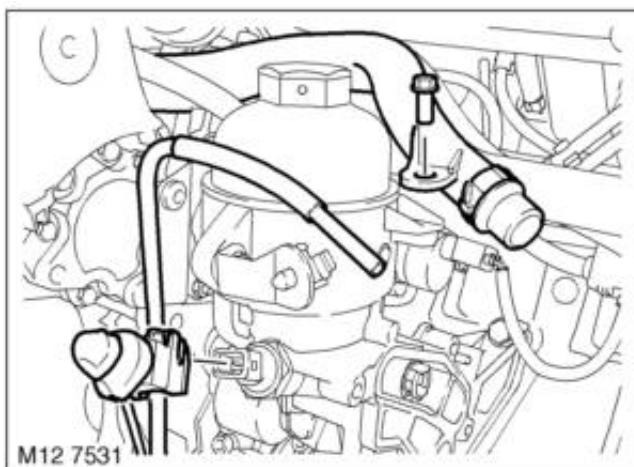
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

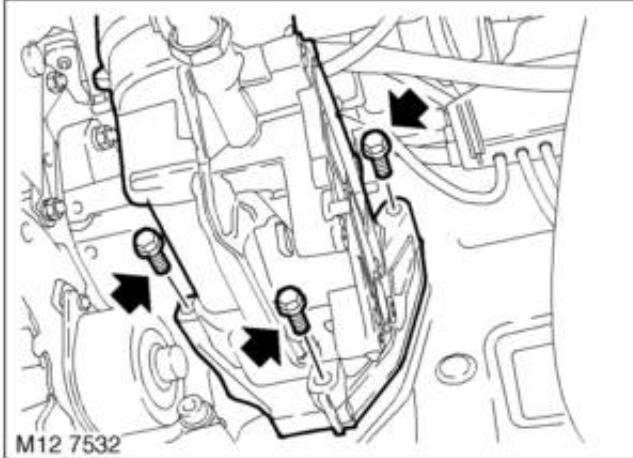
1. Disconnect battery earth lead.
2. Remove oil cooler gasket.



3. Disconnect multiplug from oil pressure switch.



4. Release axle breather pipe from clip and move pipe aside.
5. Remove bolt securing coolant rail to oil filter housing.
6. Position container underneath housing to collect any fluid spillage.



7. Remove 3 bolts securing oil filter housing to cylinder block and remove housing.
8. Remove and discard gasket from housing.

## Refit

1. Clean mating face on filter housing and cylinder block.
2. Fit new gasket to oil filter housing.
3. Fit oil filter housing and tighten bolts to 25 Nm (18 lbf.ft).
4. Fit bolt securing coolant rail to oil filter housing and tighten to 10 Nm (7 lbf.ft).
5. Secure axle breather in clip.
6. Connect multiplug to oil pressure switch.
7. Fit oil cooler gasket.
8. Connect battery earth lead.

# Filter - engine oil

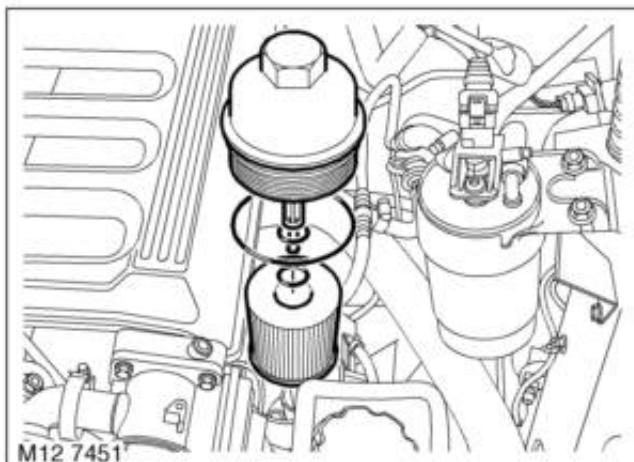
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove dipstick for access.
3. Position cloth beneath oil filter case to collect spillage.



**CAUTION:** Care must be taken to ensure that oil or fluid does not enter or contaminate the alternator.



4. Use a socket wrench to carefully loosen cap and allow oil to drain into sump.
5. Remove oil filter cap and discard 3 seals.
6. Remove and discard filter element.

## Refit

1. Clean filter cap and casing.
2. Fit new filter element to casing.
3. Fit new seals and lubricate with clean engine oil.
4. Fit oil filler cap and tighten to 25 Nm (18 lbf.ft).
5. Fit engine oil dipstick.
6. Connect battery lead.
7. Start engine and run at idle speed until oil pressure warning light extinguishes.

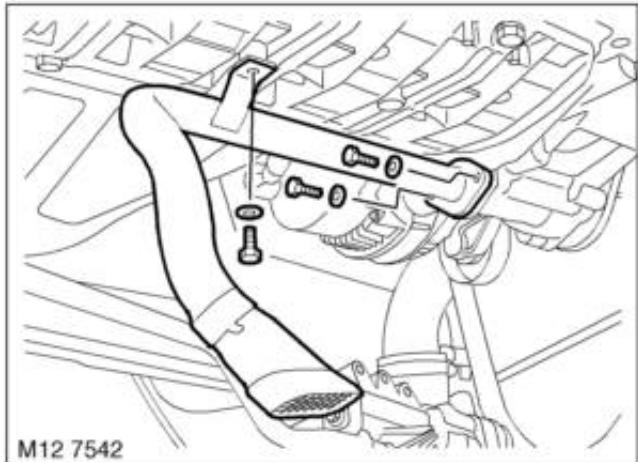
8. Stop engine. Recheck engine oil level.

# Strainer - oil pick up

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove sump gasket.



3. Remove bolt securing pick up strainer steady bracket.
4. Remove 2 bolts and remove oil strainer. Remove and discard gasket.

## Refit

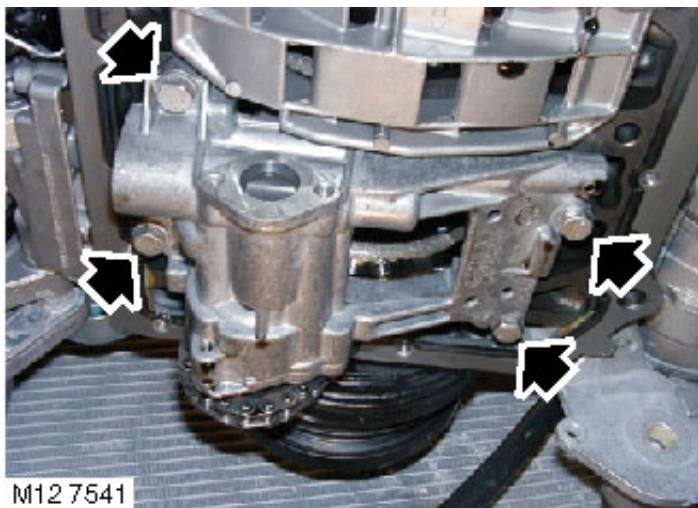
1. Clean oil pick up strainer and mating faces.
2. Fit new gasket to pick-up strainer, position strainer to oil pump, fit bolts and tighten to 10 Nm (7 lbf.ft).
3. Fit and tighten bolt securing oil pick-up strainer support bracket to 10 Nm (7 lbf.ft).
4. Fit sump gasket.
5. Connect battery earth lead.

# Pump - oil

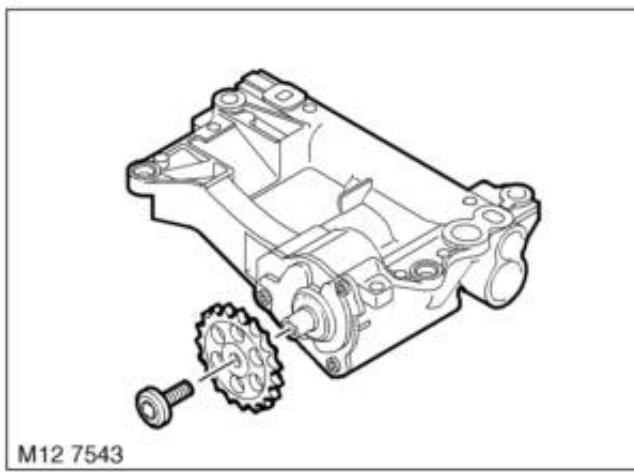
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove oil pick up strainer.



3. Remove 4 bolts securing oil pump to cylinder block.
4. Ease oil pump from dowels, release drive chain from oil pump drive gear and remove oil pump.



5. Position drive gear in a soft jawed vice and remove Torx bolt securing drive gear to oil pump, release vice and remove drive gear from oil pump.

## Refit

1. Clean drive gear and mating face on oil pump drive shaft.

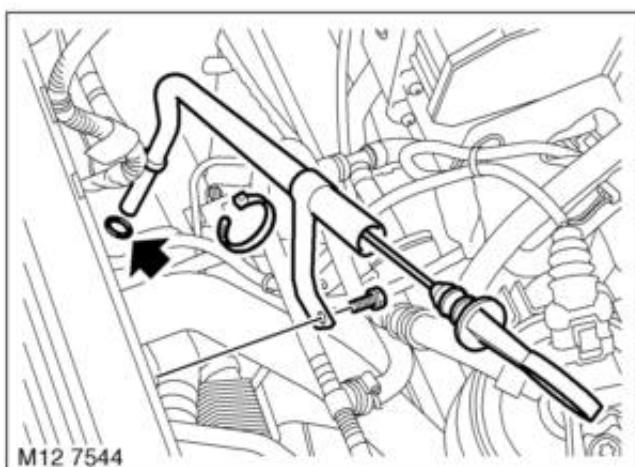
2. Position drive gear to oil pump, fit Torx bolt.
  3. Secure drive gear in soft jawed vice and tighten Torx bolt to 25 Nm (18 lbf ft).
  4. Fit oil pump to drive chain and locate on dowels. Tighten bolts to 25 Nm (18 lbf.ft).
  5. Fit oil pick-up strainer.
- 
6. Connect battery earth lead.

# Gasket - engine oil sump

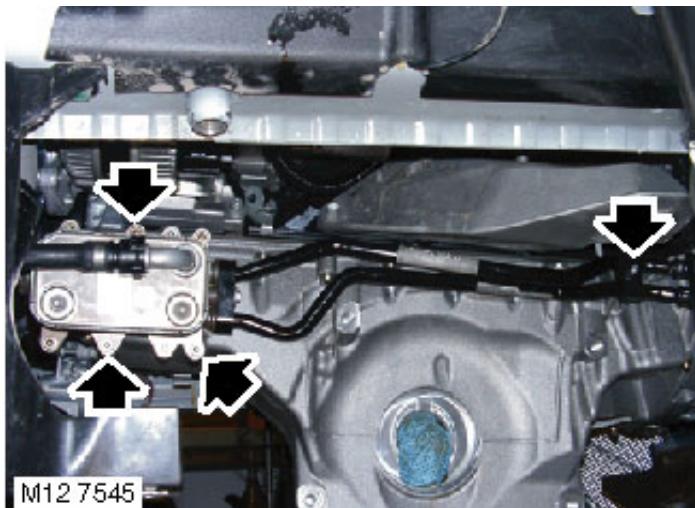
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

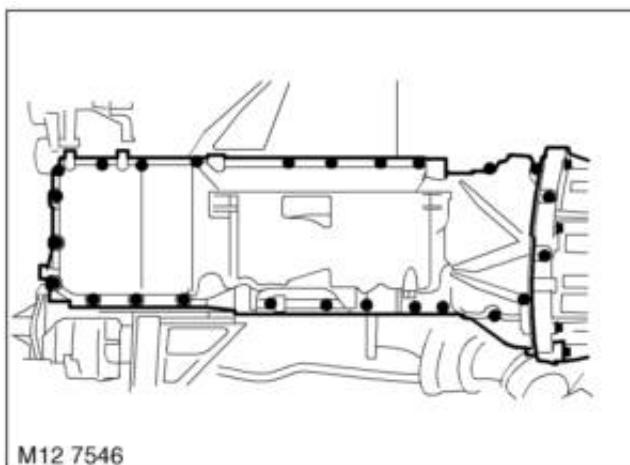
1. Disconnect battery earth lead.
2. Drain engine oil and remove oil filter.
3. Remove differential.



4. Remove cable tie securing harness to dipstick tube.
5. Release fuel hose clip from dipstick tube.
6. Remove dipstick.
7. Remove bolt securing dipstick tube.
8. Remove dipstick tube and discard 'O' ring.
9. Remove A/C compressor drive belt tensioner.



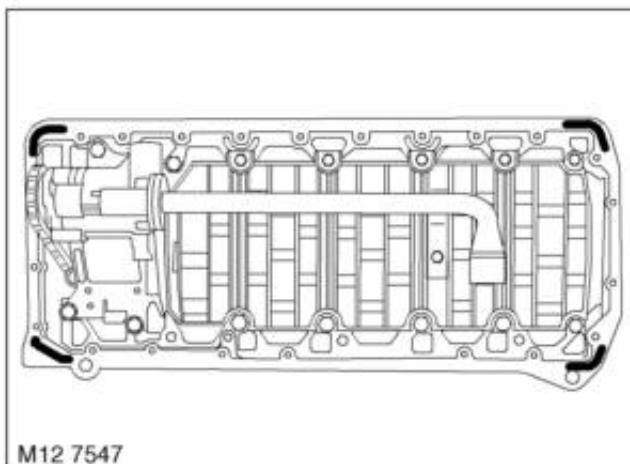
10. Loosen nut securing gearbox fluid cooler pipe bracket to sump.
11. Remove 3 Allen screws securing gearbox fluid cooler and tie cooler aside.



12. Remove 4 bolts securing gearbox to sump.
13. Remove 25 bolts securing sump and remove sump.
14. Remove and discard sump gasket.

## Refit

1. Clean oil sump and mating face.



M12 7547

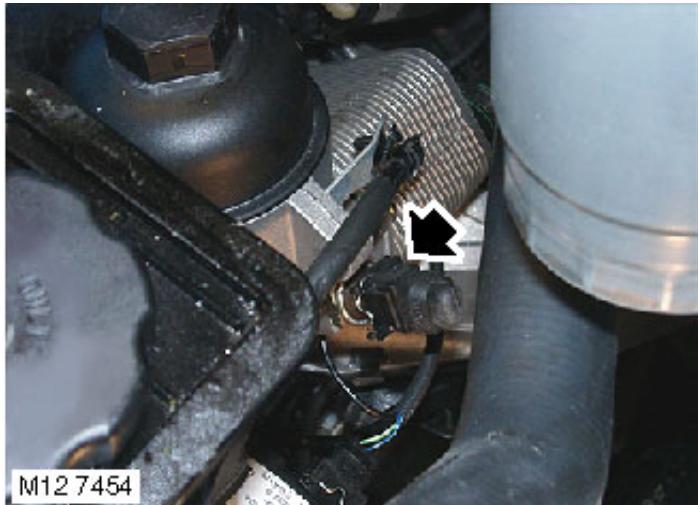
2. Apply a 2 mm (0.1 in) bead of sealant, Part No. STC 50550 to areas illustrated.
3. Fit new gasket to sump, position sump to cylinder block, fit bolts but do not tighten at this stage.
4. Fit bolts securing sump to gearbox housing, lightly tighten and then loosen bolts. This will align the rear sump flange to the gearbox.
5. Tighten sump bolts evenly and progressively, tighten M8 bolts to 22 Nm (16 lbf.ft) and M6 bolts to 10 Nm (7 lbf.ft).
6. Tighten bolts securing sump to gearbox to 22 Nm (16 lbf.ft).
7. Position fluid cooler and tighten Allen screws to 10 Nm (7 lbf.ft).
8. Tighten nut securing fluid cooler pipe bracket to 10 Nm (7 lbf.ft).
9. Fit A/C drive belt tensioner.
10. Clean dipstick tube and location in oil sump.
11. Fit 'O' ring to dipstick tube, fit tube and tighten bolt to 6 Nm (4.4 lbf.ft).
12. Fit fuel hose clip to dipstick tube.
13. Secure harness to dipstick tube.
14. Fit differential assembly.
15. Fit new oil filter and refill engine with oil.
16. Connect battery earth lead.

# Switch - oil pressure

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from oil pressure switch.
3. Position absorbent cloth to catch oil spillage.
4. Remove oil pressure switch and discard sealing washer.

## Refit

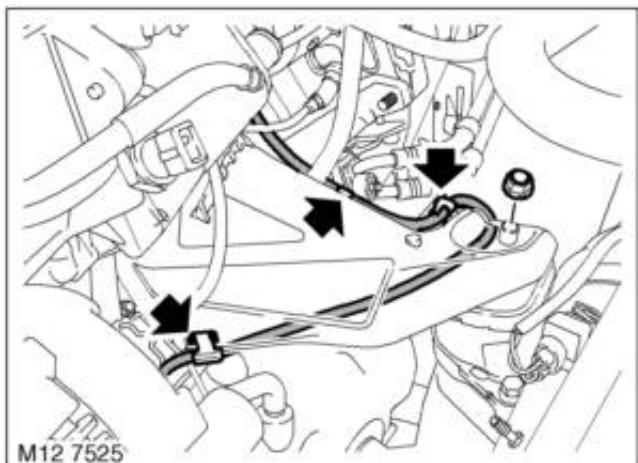
1. Clean oil pressure switch threads.
2. Fit new sealing washer to oil pressure switch.
3. Fit oil pressure switch and tighten to 14 Nm (10 lbf.ft).
4. Connect multiplug to oil pressure switch.
5. Check and if necessary top up engine oil.
6. Connect battery earth lead.

# Gasket - cooler - engine oil

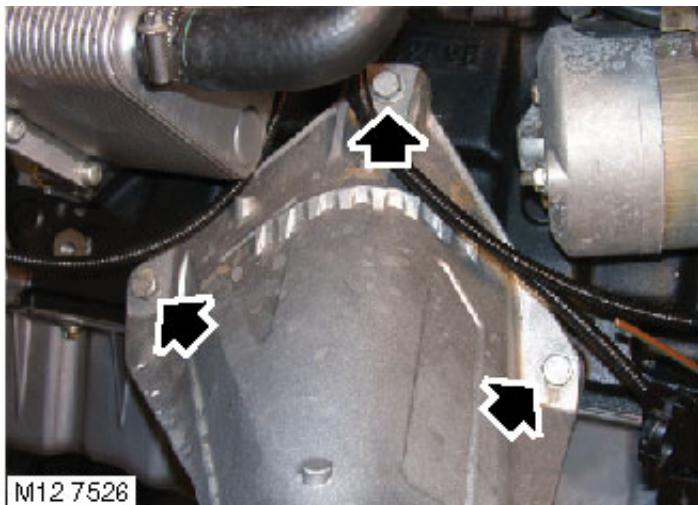
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

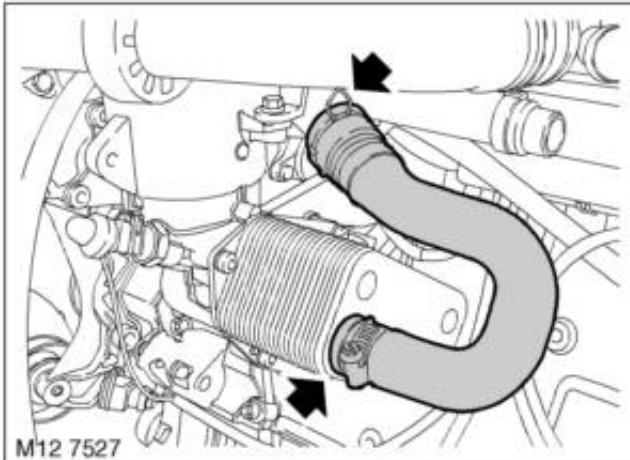
1. Disconnect battery earth lead.



2. Release vacuum hose from 3 clips on engine LH mounting bracket.
3. Remove nut securing engine LH mounting to bracket.
4. Support LH side of engine under sump.



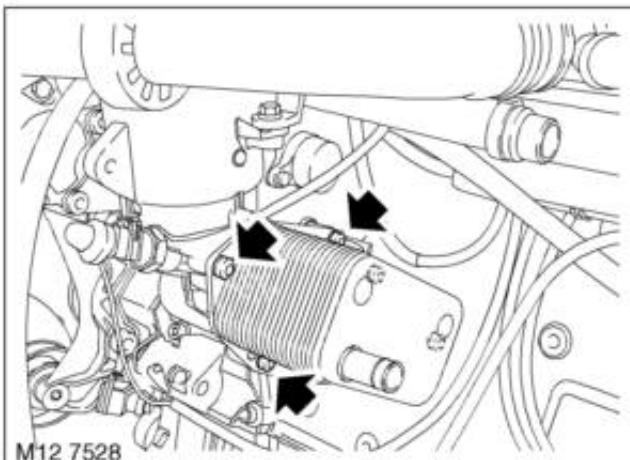
5. Remove 3 bolts securing engine LH mounting bracket to engine and remove bracket.
6. Drain cooling system.



7. Release and disconnect fluid cooler hose from coolant rail.
8. Loosen clip and remove coolant hose from fluid cooler.
9. Drain engine oil and remove oil filter.
10. Position container to collect fluid spillage.



**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**



11. Remove 5 Torx screws securing cooler to oil filter housing and remove cooler.
12. Remove and discard oil cooler gasket from oil filter housing.

## Refit

1. Clean oil cooler and mating face on oil filter housing.
2. Fit new gasket to oil filter housing.
3. Fit oil cooler to oil filter housing and tighten bolts to 22 Nm (16 lbf.ft).
4. Connect hose to oil cooler and secure with clip.
5. Connect coolant hose to coolant rail and secure with clip.

6. Fit mounting bracket and tighten new bolts to 20 Nm (15 lbf.ft), plus a further 90°.
7. Fit and tighten nut securing engine bracket to mounting to 100 Nm (74 lbf.ft).
8. Remove support.
9. Fit vacuum hose to clips.
10. Refill engine with oil.
11. Refill cooling system.
12. Connect battery earth lead.

# **Cover - timing gears**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## **Remove**

1. Disconnect battery earth lead.
2. Remove timing cover gasket.

## **Refit**

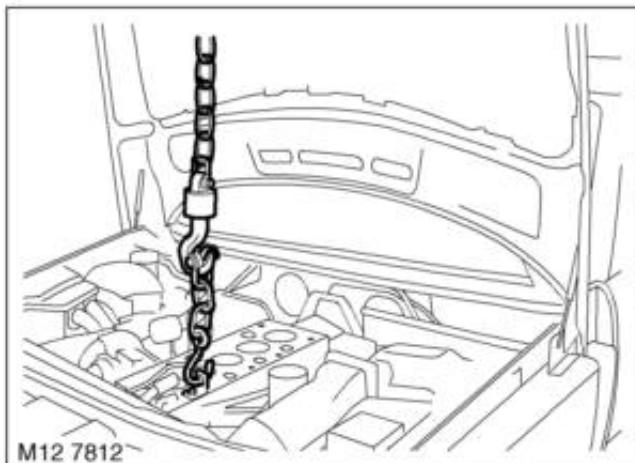
1. Fit timing cover gasket.
2. Connect battery earth lead.

# Gasket - timing gear cover

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

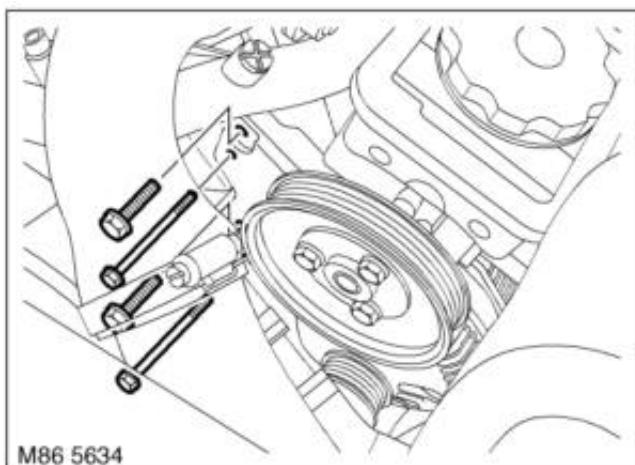
## Remove

1. Disconnect battery earth lead.
2. Remove cylinder head gasket.

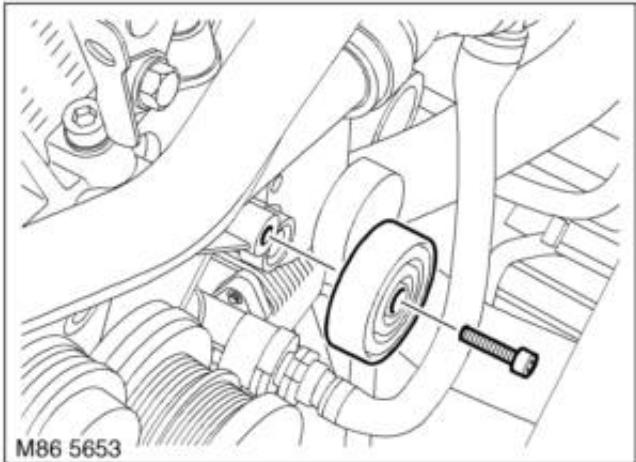


3. Fit lifting bracket to cylinder block and secure with bolt.
4. Connect chain to lifting bracket and take weight of engine.
5. Remove oil pump.

6. Remove crankshaft front oil seal.



7. Remove 4 bolts securing PAS pump to mounting, release pump and tie aside.

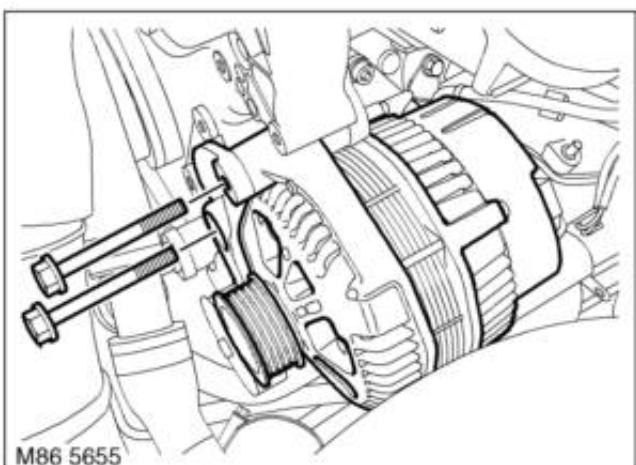


8. Remove Allen bolt securing ancillary drive belt upper idler pulley and remove pulley.

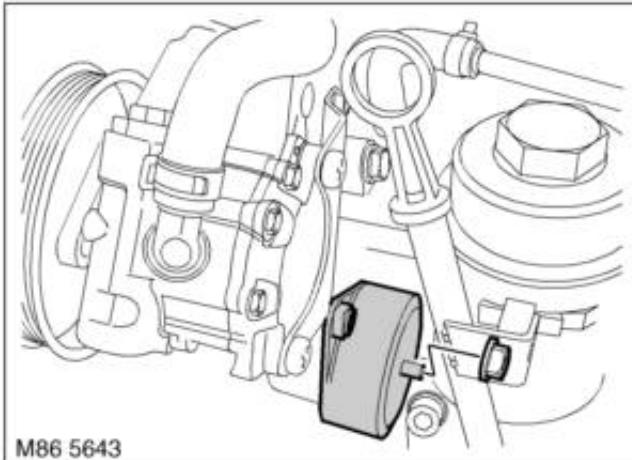


9. Remove nut securing battery cable to alternator, release cable and position aside.

10. Disconnect alternator multiplug.



11. Remove 2 bolts securing alternator to mounting, collect idler pulley bracket and remove alternator.



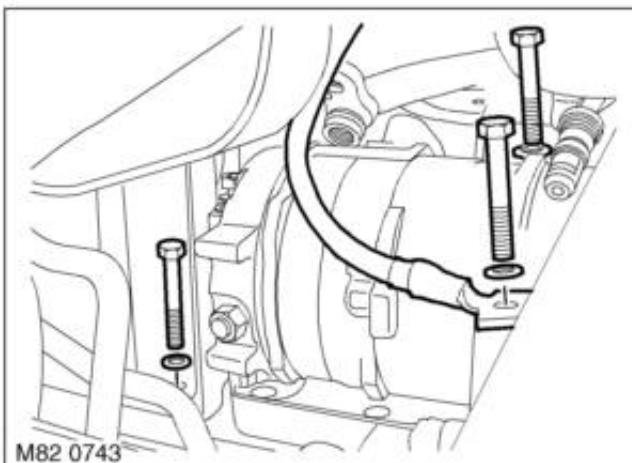
12. Remove nut securing ancillary drive belt tensioner and remove tensioner.
13. Remove and discard tensioner arm seal.



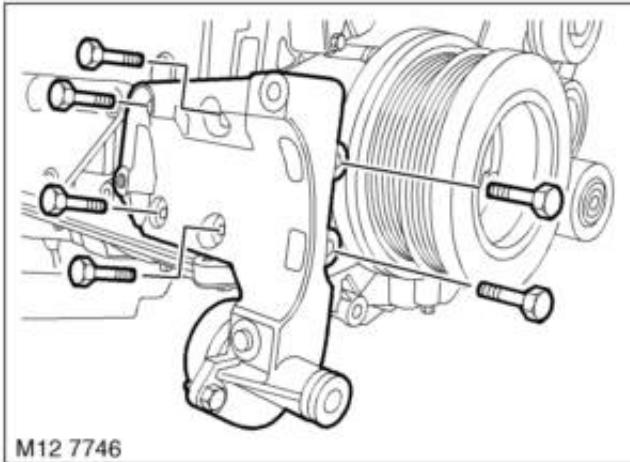
14. Release clip and disconnect outlet hose from intercooler.



**CAUTION: Always fit plugs to open connections to prevent contamination.**

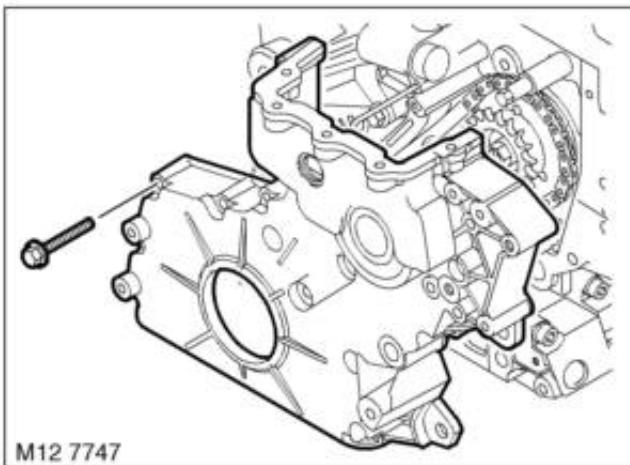


15. Remove 3 bolts securing A/C compressor, release compressor and tie aside.



M12 7746

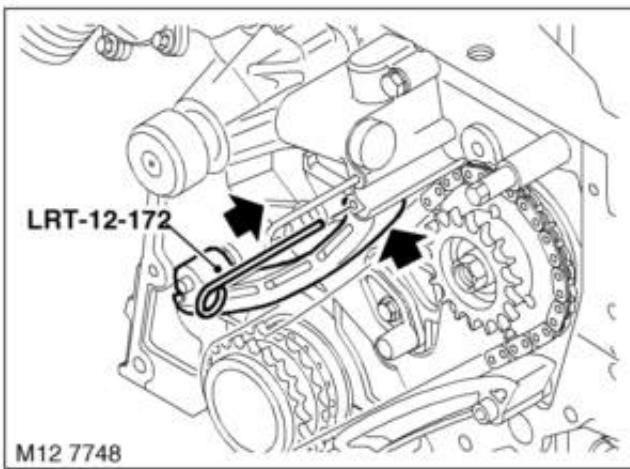
16. Remove 6 bolts securing air conditioning compressor bracket and remove bracket.



M12 7747

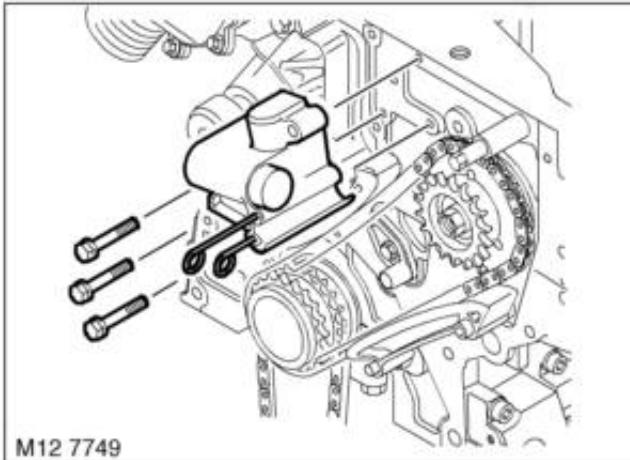
17. Remove 14 bolts, release and remove timing cover. Removal of bolts will release ancillary drive belt tensioner.

18. Remove camshaft drive chain from fuel pump sprocket.

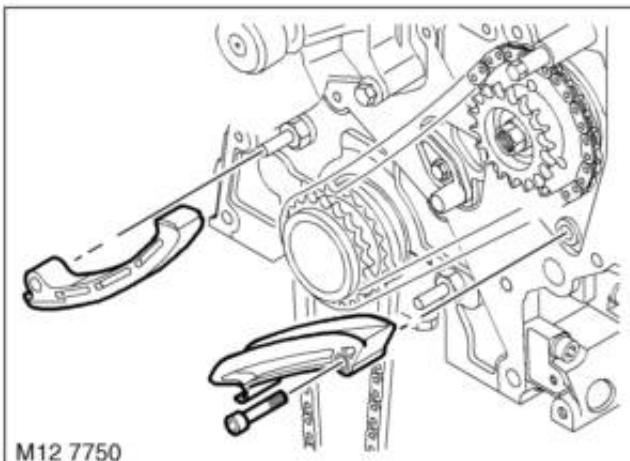


M12 7748

19. Press lower chain tensioner plunger fully into tensioner body and fit LRT-12-172 to lock plunger.

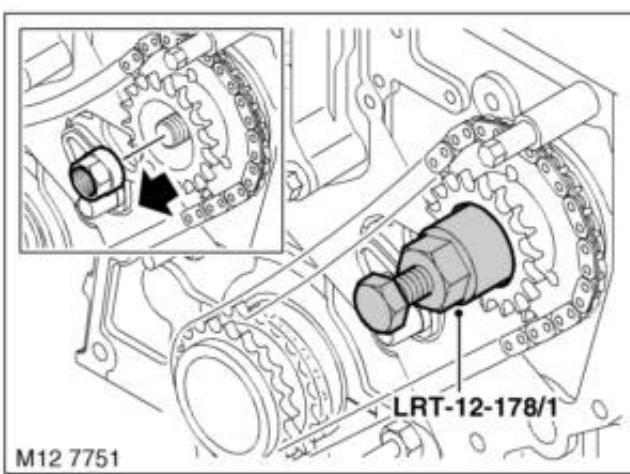


20. Remove 3 bolts and remove timing chain tensioner.



21. Remove fuel pump drive chain upper guide.

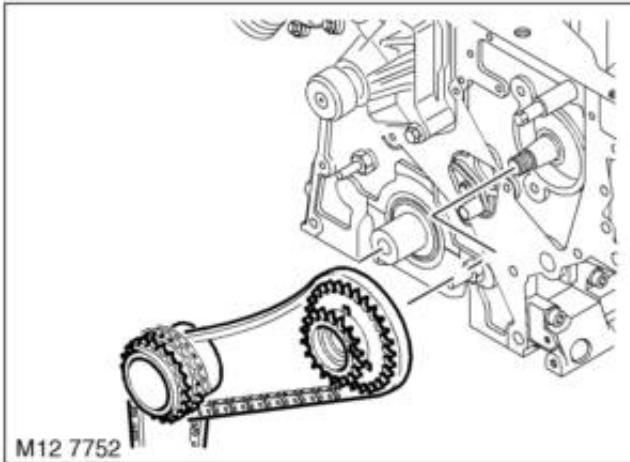
22. Remove Allen bolt and remove fuel pump drive chain lower guide. Discard Allen bolt.



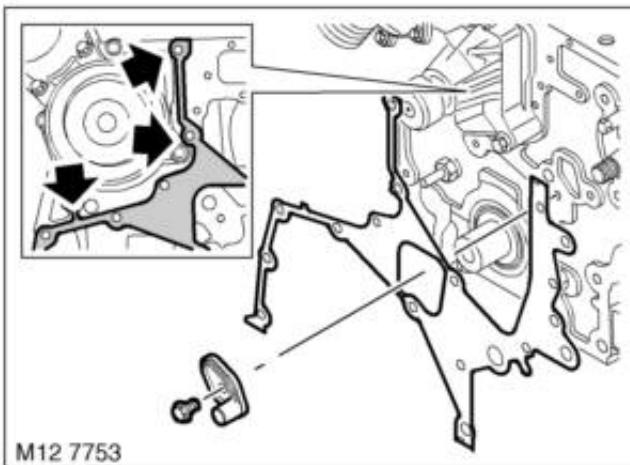
23. Restrain fuel pump sprocket and remove securing nut.

24. Fit LRT-12-178/1 to fuel pump sprocket and tighten centre screw to release sprocket from pump.

25. Remove LRT-12-178/1 from sprocket.



26. Remove sprockets and chains from crankshaft and fuel pump.



27. Remove bolt and remove chain lubrication jet.

28. Cut to release and remove timing cover gasket.

## Refit

1. Clean timing gear cover and mating face, clean dowels and dowel holes.
2. Cut to remove water pump gasket and fit new timing cover gasket to cylinder block.
3. Clean chain lubrication jet and mating face.
4. Fit chain lubrication jet and tighten bolt to 10 Nm (7 lbf.ft).
5. Clean crankshaft sprocket, fuel pump sprocket and mating faces.
6. Clean oil and fuel pump drive chains.
7. Lubricate chains and sprockets.
8. Assemble oil and fuel pump drive chains to crankshaft and fuel pump sprockets.
9. Fit sprockets and chains to crankshaft and fuel pump.
10. Fit fuel pump sprocket retaining nut and tighten to 65 Nm (48 lbf.ft).

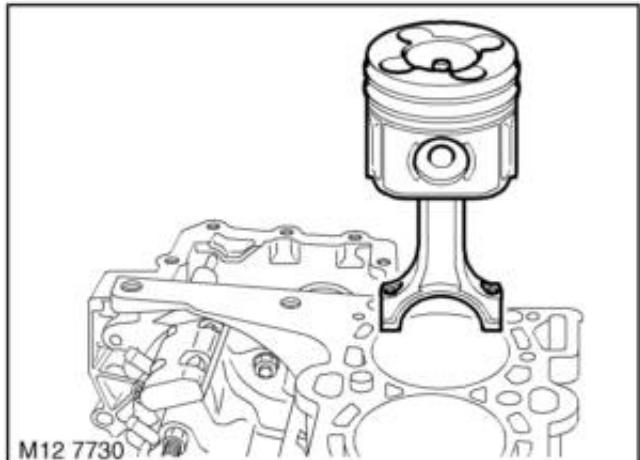
11. Clean fuel pump drive chain guides.
12. Fit fuel pump drive chain lower guide to pin and tighten new Allen bolt to 24 Nm (18 lbf.ft).
13. Fit fuel pump drive chain upper guide to pin.
14. Clean timing chain tensioner and mating face. Ensure oil way is clear.
15. Fit timing chain tensioner and tighten bolts to 10 Nm (7 lbf.ft).
16. Hold tensioner lower plunger against spring pressure, remove LRT-12-172 and release plunger onto chain guide.
17. Clean camshaft drive chain.
18. Lubricate camshaft drive chain.
19. Fit camshaft drive chain to fuel pump sprocket.
20. Clean timing cover.
21. Fit timing cover to cylinder block.
22. Temporarily fit ancillary belt tensioner pulley arm to align tensioner.
23. Evenly and progressively tighten timing cover bolts to 15 Nm (11 lbf.ft).
24. Remove ancillary belt tensioner pulley arm.
25. Fit seal to ancillary drive belt tensioner arm bush.
26. Fit ancillary belt tensioner arm and tighten nut to 10 Nm (7 lbf.ft).
27. Clean A/C compressor mounting bracket and mating face.
28. Fit A/C compressor mounting bracket and tighten bolts to 25 Nm (18 lbf.ft).
29. Clean A/C compressor and mating face, dowels and dowel holes
30. Position A/C compressor, align earth cable and tighten bolts securing compressor to 25 Nm (18 lbf.ft).
31. Clean intercooler hose and mating face.
32. Connect hose to intercooler and secure with clip.
33. Clean alternator and mating face.
34. Clean idler pulley bracket and mating face.
35. Fit alternator and jockey pulley bracket, tighten bolts to 45 Nm (33 lbf.ft).
36. Connect battery cable to alternator, fit nut and tighten to 13 Nm (10 lbf.ft).
37. Connect multiplug to alternator.
38. Clean ancillary drive belt upper idler pulley and mating face.

39. Fit ancillary drive belt upper idler pulley and tighten Allen bolt to 25 Nm (18 lbf.ft).
40. Clean PAS pump and mating faces.
41. Position PAS pump to mounting and fit bolts. Tighten M8 bolts to 25 Nm (18 lbf.ft) and M6 bolts to 10 Nm (7 lbf.ft).
42. Fit crankshaft front oil seal.
43. Fit oil pump.
44. Remove lifting chains.
45. Remove bolt securing lifting bracket to cylinder block and remove bracket.
46. Fit cylinder head gasket.
47. Connect battery earth lead.

# Piston assemblies - engine set Remove

1. Remove cylinder head gasket.
2. Remove connecting rod bearings.

## Disassembly

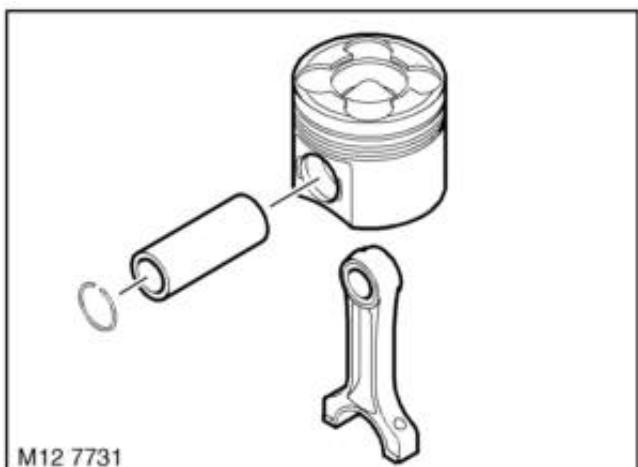


1. Remove ridge of carbon from top of cylinder bore.
2. Carefully push piston assembly from cylinder bore.



**CAUTION:** Ensure that connecting rods do not contact cylinder bores or oil squirt jets (if fitted).

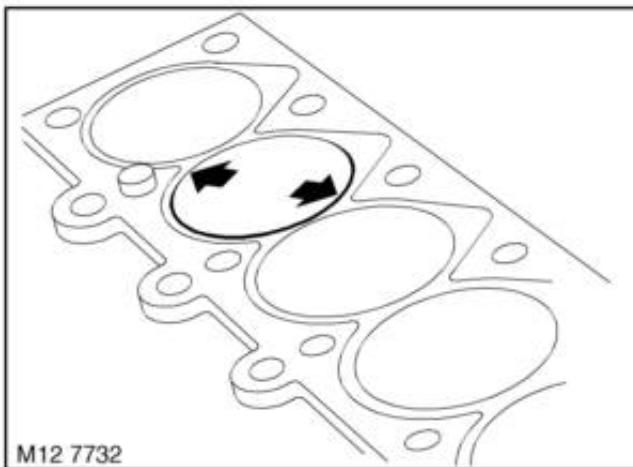
3. Repeat operation for the 5 remaining pistons.
4. Hold connecting rods in a soft jawed vice.



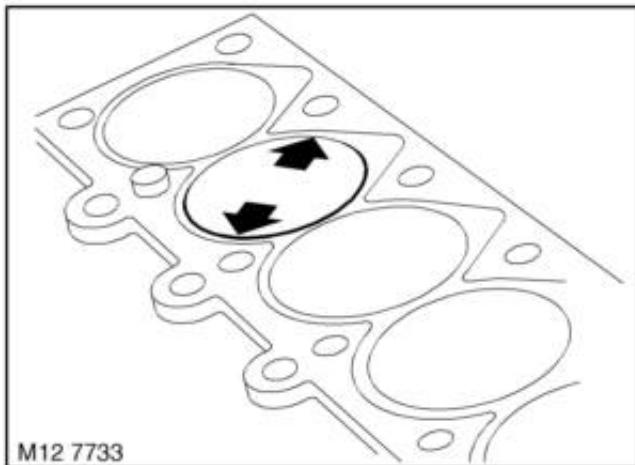
5. Carefully remove and discard 2 retaining rings securing the gudgeon pin in the piston.

6. Push the gudgeon pin out of the piston and connecting rod, remove the piston.

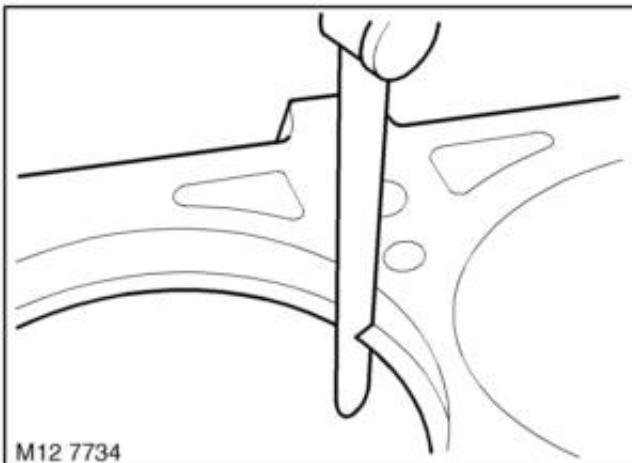
## Inspect



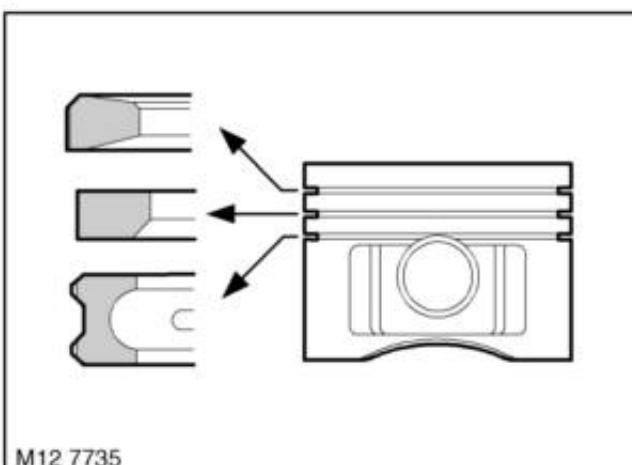
1. *Pistons and cylinder bores:* check and record cylinder bore diameters at bottom, centre and top of bore ensuring that measurements are taken at the angle shown.



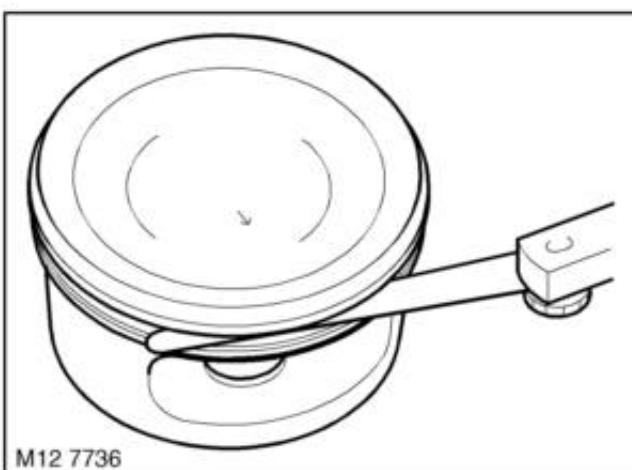
2. Repeat procedure at angle shown and from the 2 sets of measurements obtained, calculate cylinder bore ovality and taper.
3. Starting with No 1 piston, measure and record piston diameter at right angles to gudgeon pin holes, and 12 mm from bottom of piston skirt:
4. Compare piston diameter with cylinder bore size and determine piston to bore clearance.
5. Remove compression rings, oil control rails and expander from new piston.



6. Check new ring fitted gap 30 mm from top of bore. Ensure rings are fitted square to bore when checking gap.

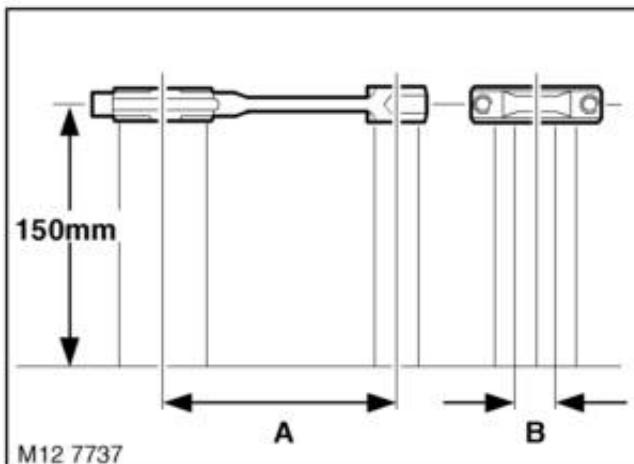


7. Fit oil control ring rails and expander, ensuring ends butt and do not overlap.
8. Fit 2nd compression ring with 'TOP' marking upwards.
9. Fit 1st compression ring with 'TOP' marking upwards.



10. Check piston ring to groove clearance.
11. Check fit of gudgeon pin in piston, pin must be a tight, sliding fit with no perceptible side play.

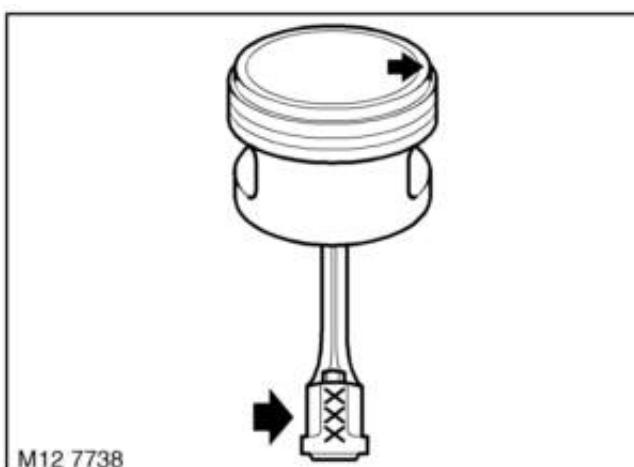
12. Check small-end bushes for wear, check that gudgeon pin is a sliding fit in the bush with no perceptible side play. **Small end bushes cannot be replaced, a new connecting rod must be fitted.**
13. Check connecting rod for distortion, fit a new BLUE colour coded 'sputter' big-end bearing shell to the connecting rod and a new RED colour coded bearing shell to the big-end bearing cap.
14. Fit bearing caps to connecting rods, fit original bolts and tighten to 5 Nm.



15. Check parallelism of connecting rods on both sides taking the measurement approximately 150 mm from the centre line of the connecting rod
16. Check for distortion on both sides of connecting rod.
17. After checking connecting rods for parallelism, remove bolts securing bearing caps and retain in fitted order.

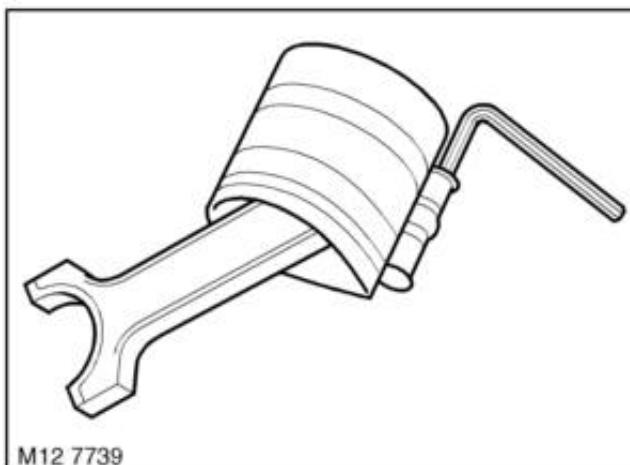
## Reassembly

1. Clean cylinder bores, pistons, piston rings and connecting rods.



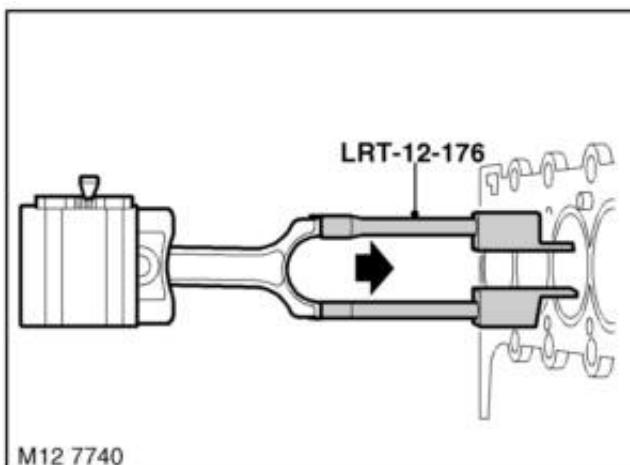
2. Assemble each piston to its connecting rod ensuring that the grade number on the connecting rod is positioned relative to the arrow on the piston crown as shown.
3. Lubricate gudgeon pins and bushes with engine oil, fit gudgeon pins and secure with new retaining rings ensuring that they are fully seated in their grooves.

4. Lubricate pistons, piston rings and cylinder bores with clean engine oil.
5. Check that piston rings are free to rotate, position ring gaps at 120° to each other and away from the thrust side - LH side of piston - viewed from front of piston.



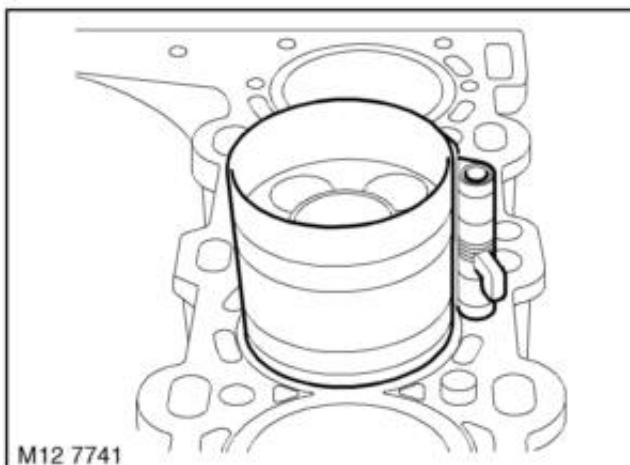
M12 7739

6. Using a piston ring clamp, compress piston rings.



M12 7740

7. Position guides LRT-12-176 to connecting rod to protect cylinder bore and bearing journal.



M12 7741

8. Insert connecting rod and piston into cylinder bore, ensuring that the arrow on piston crown is facing towards the front of the cylinder block.
9. Remove guides LRT-12-176 from connecting rod.

# **Refit**

1. Fit connecting rod bearings.

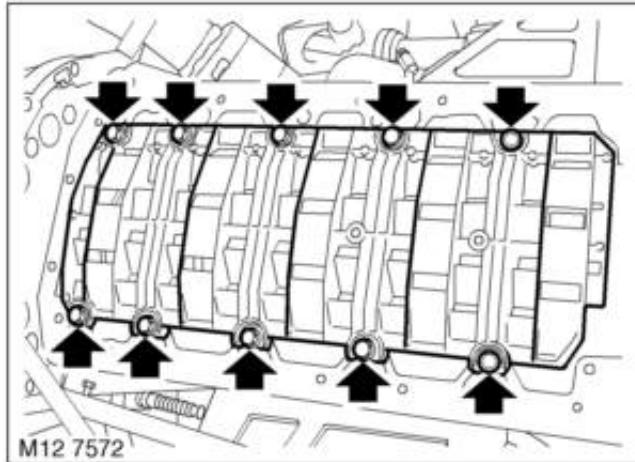
2. Check piston protrusion.

3. Fit cylinder head gasket.

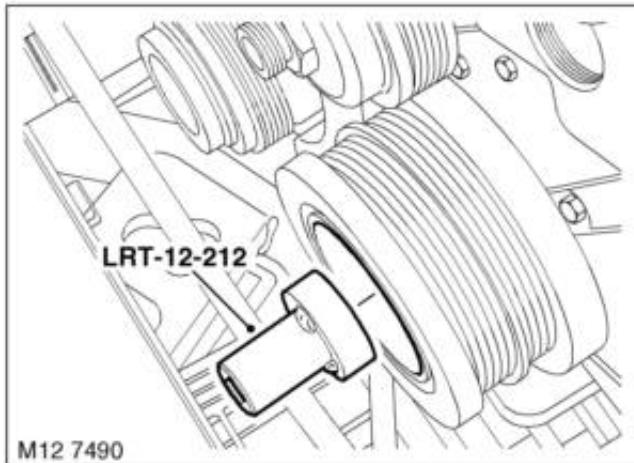
# Connecting rod bearings - engine set Remove

1. Remove oil pump.

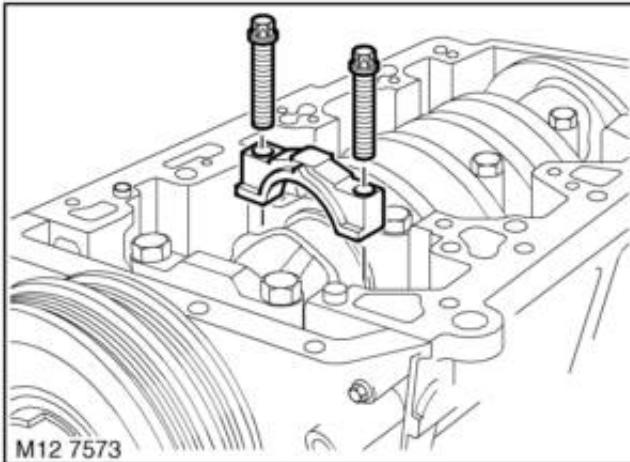
## Disassembly



1. Remove 10 bolts securing reinforcing plate to cylinder block and remove plate.



2. With LRT-12-212 fitted over pulley screws, rotate crankshaft to gain access to connecting rod bearing bolts.
3. Mark connecting rod and bearing cap in relation to cylinder number.

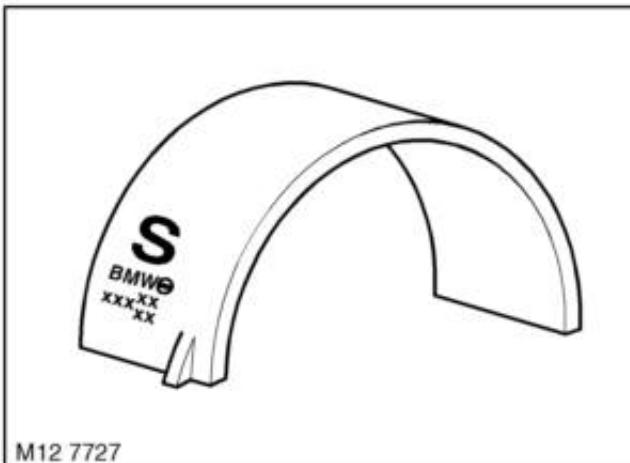


4. Loosen and remove big-end bearing cap bolts, do not discard bolts at this stage.



**CAUTION: The big-end bearing caps are dowel located, do not tap the bearing caps sideways.**

5. Remove big-end bearing cap, remove and discard bearing shell.



6. Rotate crankshaft sufficiently to move connecting rod clear of crankshaft journal.



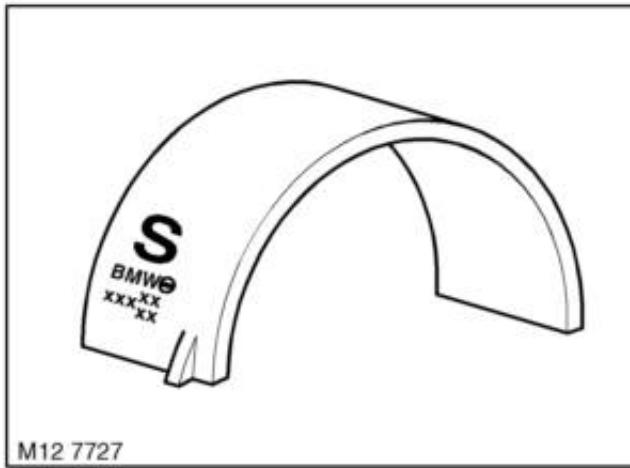
**CAUTION: The big-end bearing shell fitted in the connecting rod is of the 'sputter' type, and is identified by the letter 'S' or a series of xxx on the outside of the shell.**

7. Remove and discard bearing shell from connecting rod noting the letter 'S' marked on the outside of the bearing shell.
8. Repeat above procedure for remaining connecting rod bearings. Keep big-end bearing caps in fitted order.

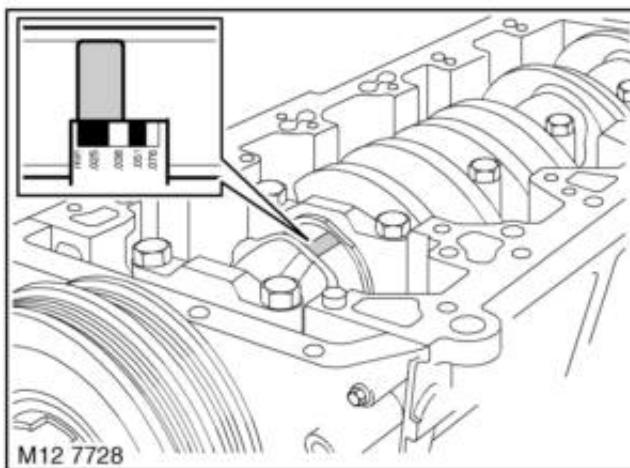
## Inspect

1. Wipe big-end journals, new bearing shells, connecting rods and bearing caps.
2. Measure and record each crankshaft big-end journal diameter, taking 4 measurements at 90° intervals on each journal.

3. Clean connecting rod bolts and lubricate bolts with engine oil.
4. Position crankshaft with big-end journals 1 and 6 at BDC.



5. Fit the new BLUE colour coded big-end bearing shell, marked with the letter 'S', to numbers 1 and 6 connecting rods.
6. Fit a new RED colour coded big-end bearing shell to numbers 1 and 6 big-end bearing caps.
7. Pull both connecting rods onto big-end journals.
8. Place a strip of plastigauge across 1 and 6 big-end journals.
9. Fit big-end bearing caps ensuring that the reference marks on connecting rod and bearing cap are aligned.
10. Fit original big-end bearing cap bolts and tighten to: Stage 1 - 5 Nm. Stage 2 - 25 Nm. Stage 3 - Using an angle torque gauge, tighten a further 70°.
11. Remove bolts securing bearing caps to connecting rods and remove bearing caps.



12. Using the scale provided, measure width of Plastigauge on each journal and compare with bearing clearance:
13. If correct bearing clearance cannot be obtained with the available bearing shells, the crankshaft must be replaced.
14. Retain selected bearing shells with 1 and 6 connecting rods and bearing caps.

15. Remove all traces of Plastigauge from big end journals using an oily cloth.
16. Repeat the above procedure for the remaining big-end bearings.
17. After completion of big-end bearing clearance checks, discard original bearing cap bolts.

## Reassembly

1. Lubricate crankshaft journals and selected bearing shells with clean engine oil.
2. Fit selected big-end bearing shells to connecting rods and big-end bearing caps ensuring that the 'sputter' bearing, marked with the letter 'S', is fitted to the connecting rod.
3. Pull connecting rods down to crankshaft journals making sure that bearing shells are correctly located in connecting rods.
4. Fit big-end bearing caps ensuring that the reference marks on connecting rod and bearing cap are aligned.
5. Lubricate new big-end bearing cap bolts with clean engine oil.
6. Fit new big end bearing cap bolts and tighten to: Stage 1 - 5 Nm. Stage 2 - 25 Nm. Stage 3 - Using an angle torque gauge, tighten a further 70°.
7. Clean reinforcing plate and mating face.
8. Position reinforcing plate, fit bolts and tighten evenly to 22 Nm.

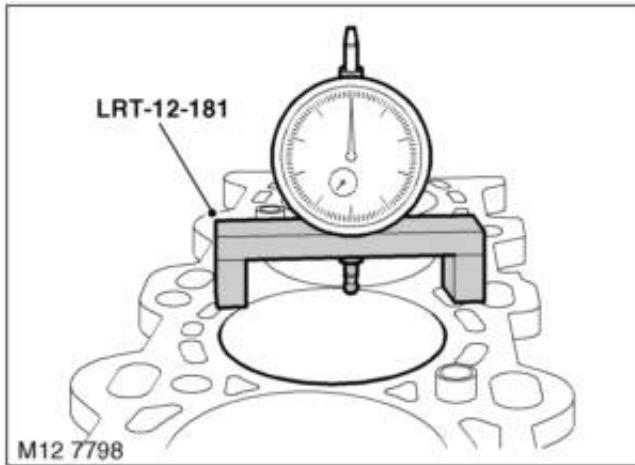
## Refit

1. Fit oil pump.

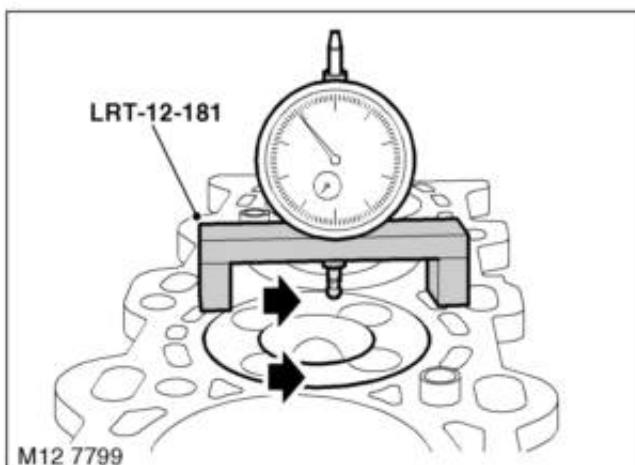
# Piston protrusion - check - head removed

## Check

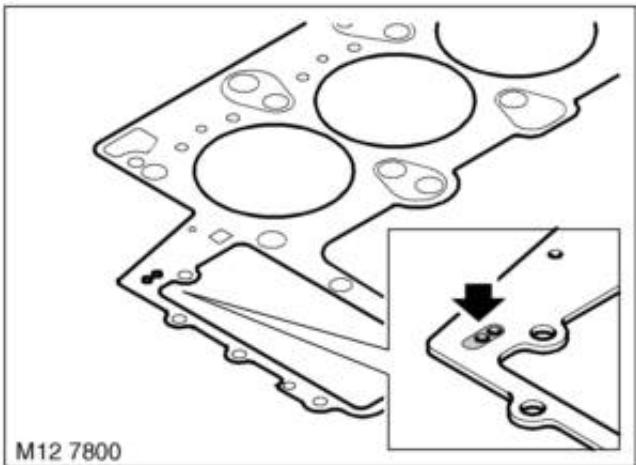
1. Cylinder block face and piston crowns must be clean.



2. Assemble a dial gauge to LRT-12-181 and position to cylinder block.
3. Preload and zero gauge on cylinder block.



4. Move gauge onto piston crown and measure protrusion in 2 places as shown. Determine piston TDC position by rocking crankshaft. Note and record piston protrusion measurement and repeat for all pistons.



5. The highest piston protrusion figure recorded, determines thickness of required cylinder head gasket.
6. Piston protrusion 0.92 mm to 1.03 mm (0.036 " to 0.040"), fit 2 hole cylinder head gasket.
7. Piston protrusion over 1.03 mm (0.040"), fit 3 hole cylinder head gasket.

# Crankshaft and main bearings Remove

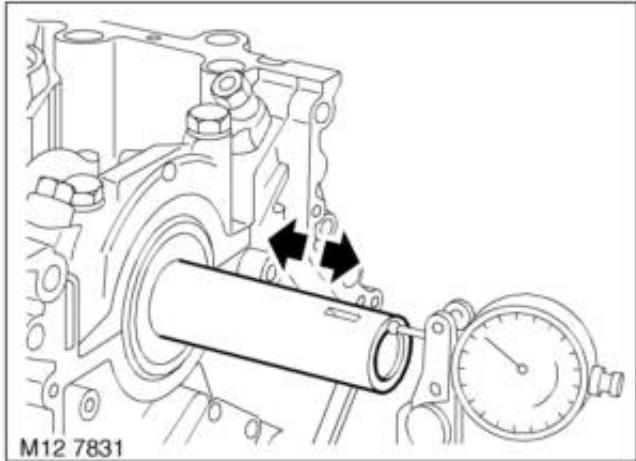
1. Remove timing cover gasket.

2. Remove crankshaft rear oil seal.

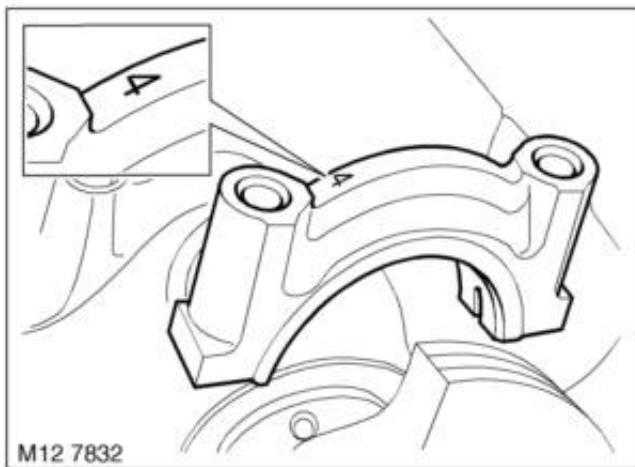
## Disassembly

1. Remove connecting rod bearings.

## Inspect



1. Check crankshaft end-float, position DTI gauge as shown, push crankshaft away from DTI and zero gauge. Push crankshaft in the opposite direction and note reading

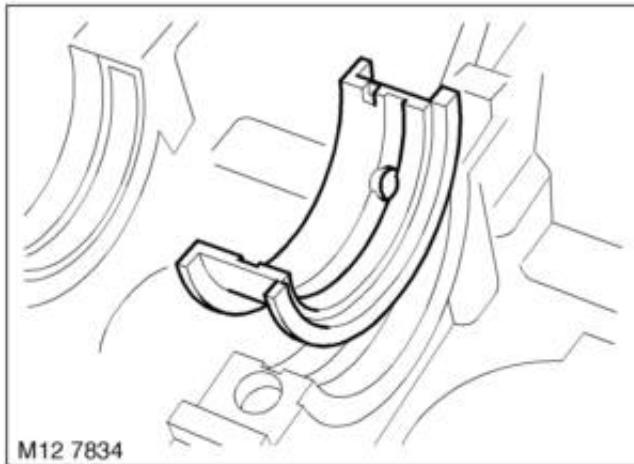


2. Remove 14 bolts securing main bearing caps to cylinder block, do not discard bolts at this stage.

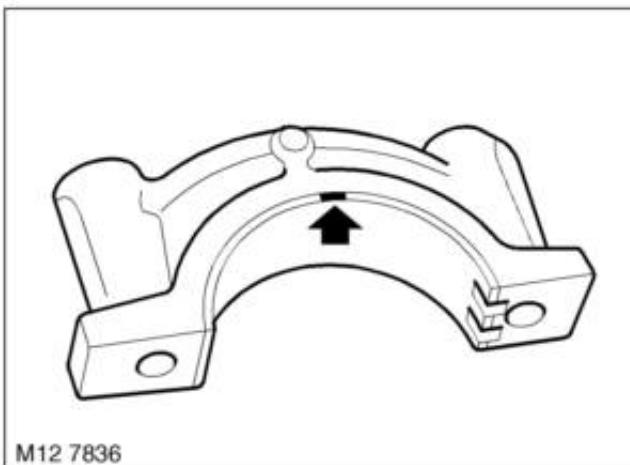
3. Carefully remove each main bearing cap noting that number 6 main bearing cap carries the integral

thrust/main bearing shell. Keep main bearing caps in fitted order.

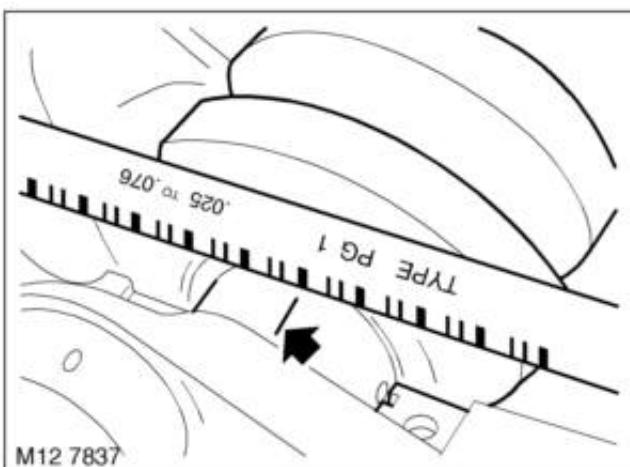
4. Lift out crankshaft from cylinder block.
5. Remove and discard bearing shells from cylinder block and main bearing caps.
6. Clean crankshaft, ensure oil ways are clear of obstructions.
7. Clean main bearing caps and bearing shell locations in cylinder block; ensure bearing cap bolt holes are clean and dry.
8. Clean original main bearing cap bolts and lightly oil bolt threads.
9. Measure and record each main journal diameter, taking 4 measurements of each journal at 90° intervals to check for appropriate specified size and ovality. Compare journal diameter specifications with the sizes given in the engine data section.
10. If standard or undersize journals are found to be oval, the crankshaft may be ground to the next undersize.
11. If journals are worn below the original colour code size but ovality is within limits, then the next size main bearing shells should be fitted in the main bearing caps and cylinder block when carrying out the Plastigauge check.
- 12.



13. **Check main bearing clearances:** Fit new appropriate size main bearing shells to cylinder block, noting that the thrust/main bearing shell is fitted to No. 6 journal position.
14. Position crankshaft to cylinder block. NOTE: Ignore colour marks on crankshaft webs, bearing selection must be made by measurement.



15. Fit new appropriate size main bearing shells, colour marked on edge of bearing shell, to the main bearing caps. Note the thrust/main bearing shell is fitted to number 6 main bearing cap.
16. Place a strip of Plastigauge across each main bearing journal.
17. Position crankshaft, main bearing caps and original bolts. Tighten main bearing cap bolts in a diagonal sequence to 20 Nm (15 lbf.ft), then a further 70°. Recheck crankshaft end-float.
18. Progressively loosen and remove main bearing bolts, bearing caps and shells.



19. Using the scale provided, measure the width of Plastigauge on each main bearing journal and compare with specified bearing clearances.
20. If clearances are incorrect, select alternative main bearing cap shell(s) from the range available and repeat check.
21. Lift out crankshaft, remove all traces of Plastigauge from main bearing journals using clean engine oil and a cloth.
22. Fit selected bearing shells to main bearing caps.
23. Lubricate bearing journals and main bearing shells with clean engine oil.
24. Position crankshaft, fit main bearing caps and original bolts.
25. Tighten bolts to 20 Nm (15 lbf.ft), then a further 70°.
26. **Check crankshaft end-float:** Position DTI gauge to front end of crankshaft, push crankshaft fully

rearwards and zero gauge.

27. Push crankshaft fully in the opposite direction and note crankshaft end-float reading on gauge.
28. If crankshaft end-float is incorrect, remove crankshaft and select combined thrust/main bearing shells from the range available to give the correct end-float, ensuring that correct colour coding/size of bearing shell is maintained.
29. There are 3 widths of thrust/main bearing shells available.
30. Fit selected thrust/main bearing shells to cylinder block and main bearing cap.
31. Position crankshaft, main bearing caps and original bolts. Tighten main bearing cap bolts in a diagonal sequence to 20 Nm (15 lbf.ft), then a further 70°. Recheck crankshaft end-float.
32. **If crankshaft end-float is correct:** Progressively loosen and remove main bearing cap bolts, discard bolts.

## Reassembly

1. Lightly oil threads of new main bearing cap bolts and fit to cylinder block.
2. Tighten main bearing cap bolts in a diagonal sequence to 20 Nm (15 lbf.ft), then a further 70°.

## Refit

1. Fit connecting rod bearings.
2. Fit timing cover gasket.
3. Fit crankshaft rear oil seal.

# Gasket - cylinder head

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

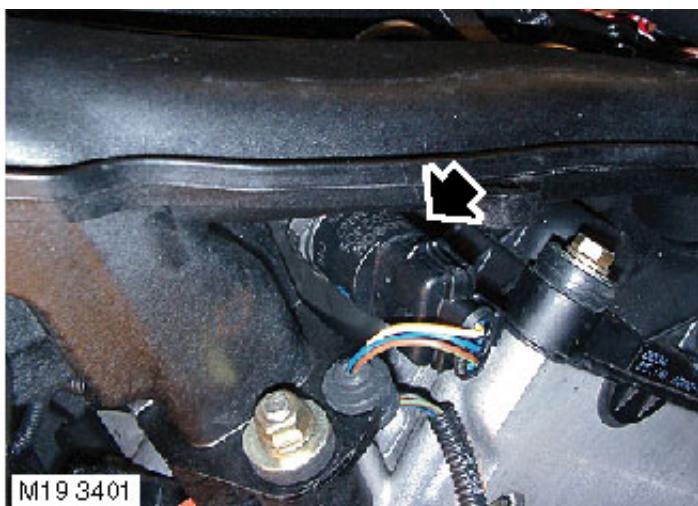
## Remove

1. Disconnect battery earth lead.

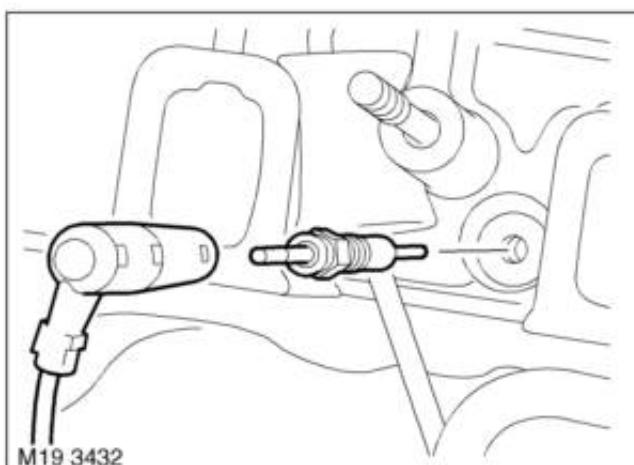
2. Drain cooling system

3. Remove EGR cooler.

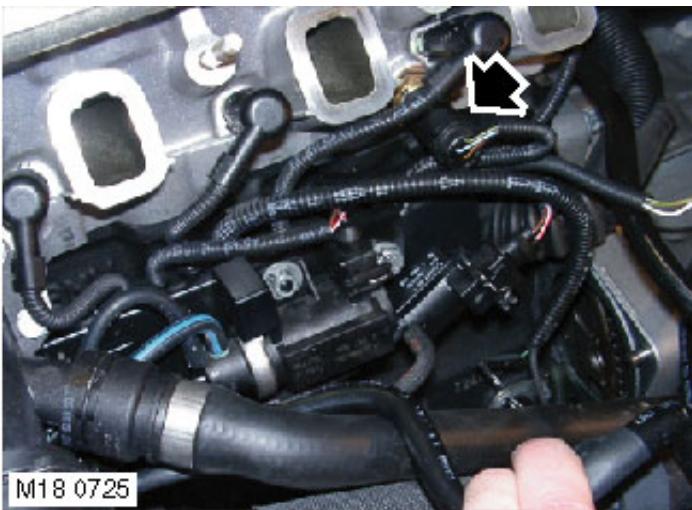
4. Remove tappets.



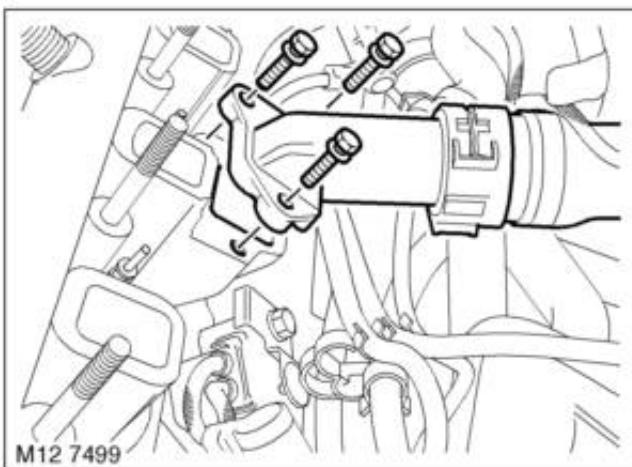
5. Disconnect multiplug from fuel pressure sensor.



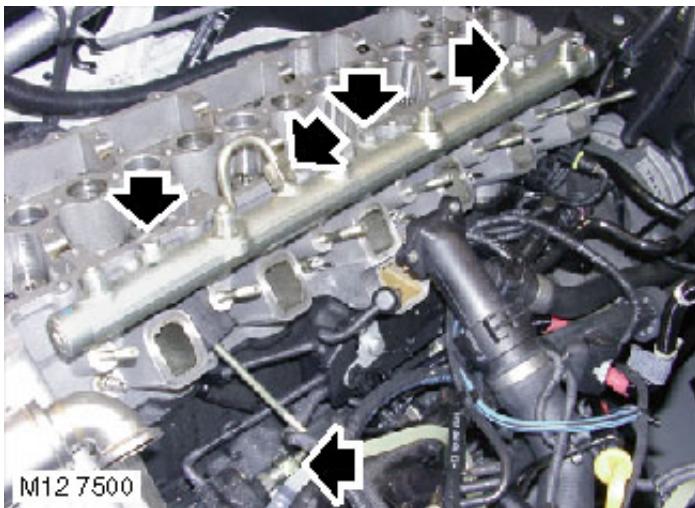
6. Disconnect connections from glow plugs.



7. Disconnect multiplug from coolant temperature sensor.



8. Remove 3 bolts and move coolant hose adaptor from cylinder head. Discard seal.

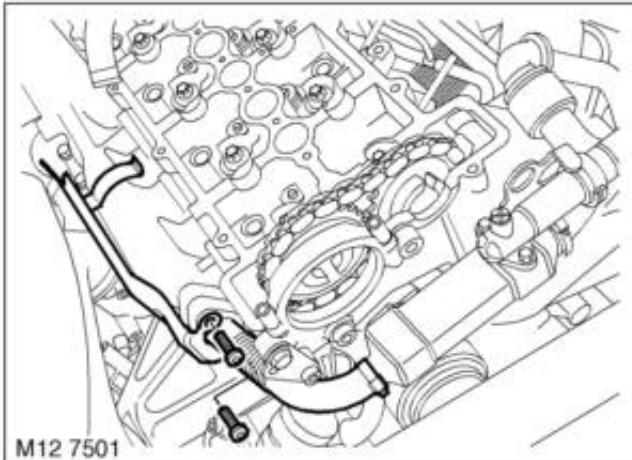


9. Loosen union nuts and remove fuel pipe from fuel rail and pump. Collect fuel pipe support bush.

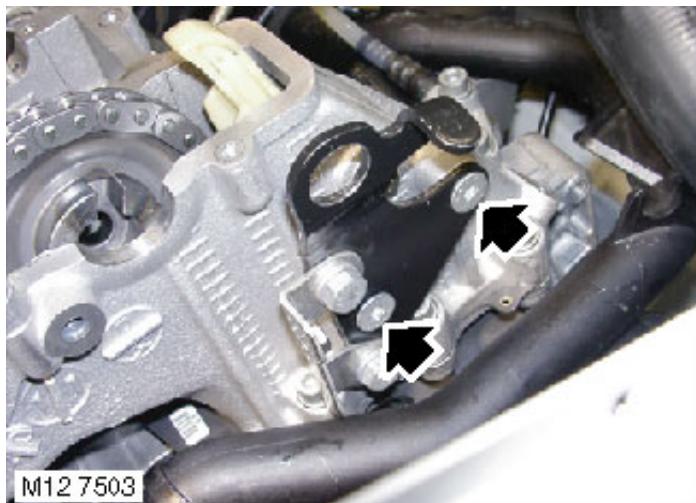


**CAUTION: Always fit plugs to open connections to prevent contamination.**

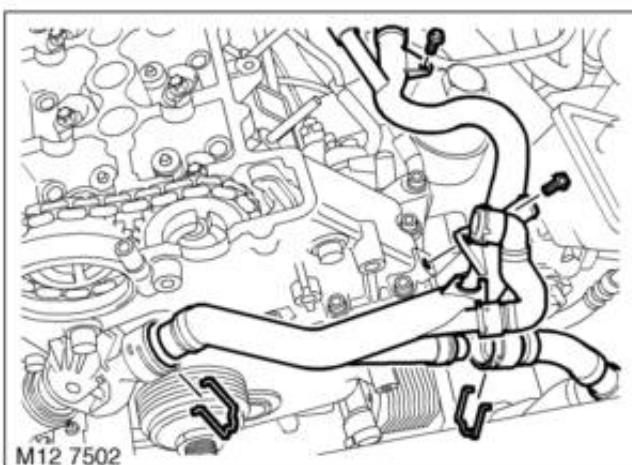
10. Remove 3 bolts and remove fuel rail.



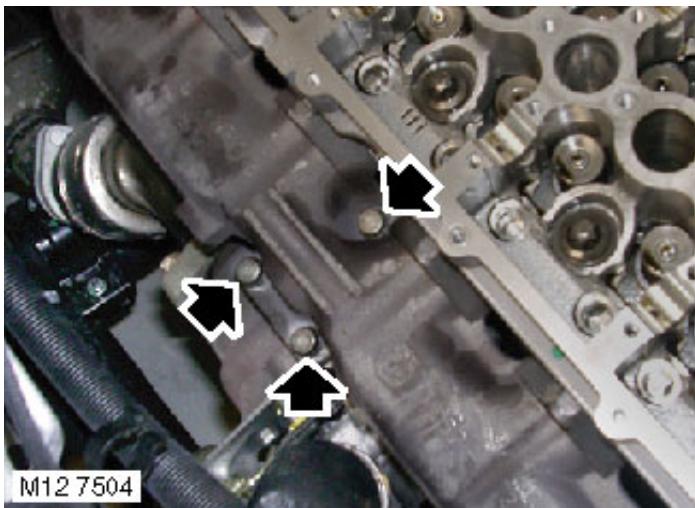
11. Remove 2 Torx screws securing heat shield and EGR pipe to exhaust manifold.
12. Remove heat shield.
13. Remove EGR pipe and clamp.



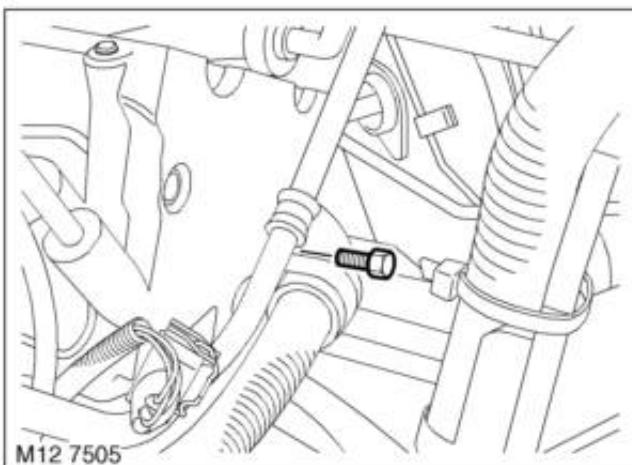
14. Remove 2 Torx screws securing engine lifting bracket and remove bracket.



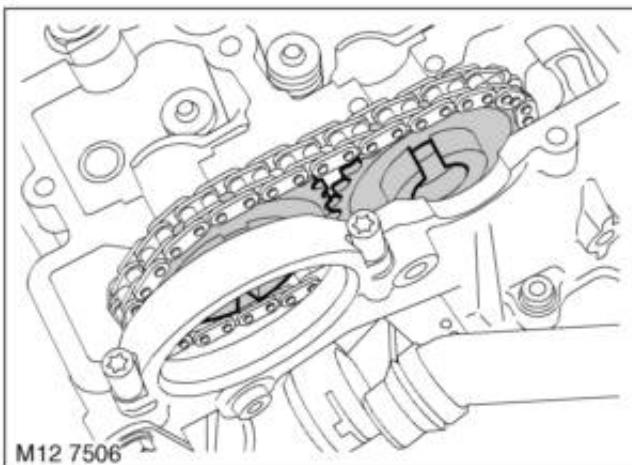
15. Release clip and disconnect expansion tank hose from coolant rail.
16. Remove 2 bolts securing coolant rail.
17. Release clip, disconnect coolant rail from thermostat housing and move rail aside.



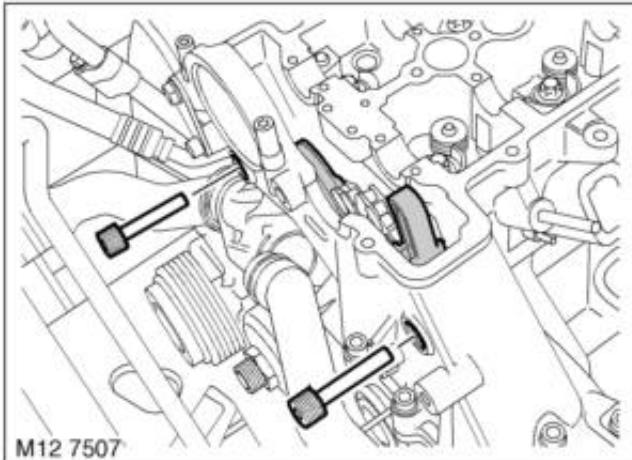
18. Remove 3 bolts securing turbocharger to exhaust manifold. Discard gasket.



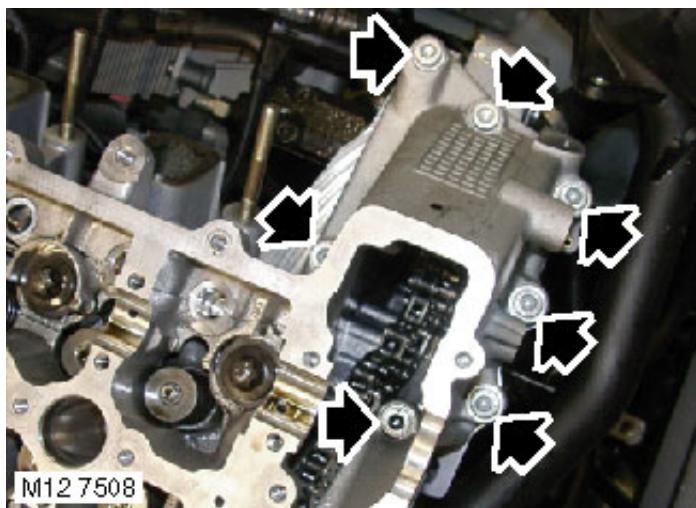
19. Remove bolt securing vacuum pipe clip and harness clip to cylinder head.



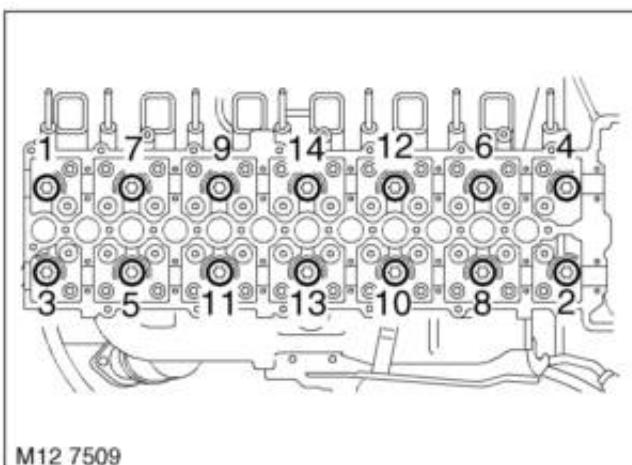
20. Remove camshaft sprockets from timing chain.



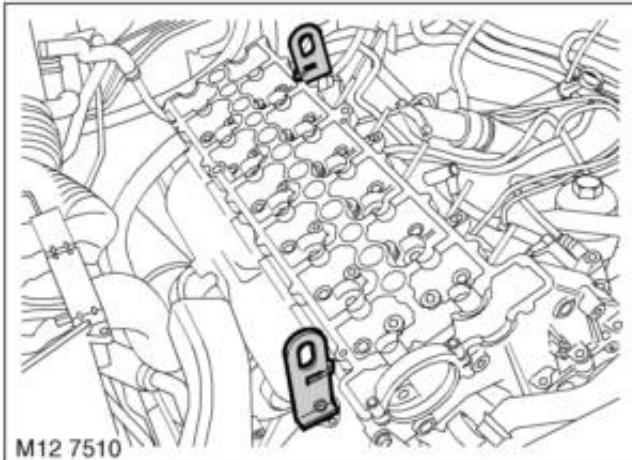
21. Remove and discard timing chain guide support pins.
22. Remove chain guides. Accessibility to remove guide from inlet side will improve when cylinder head is removed.



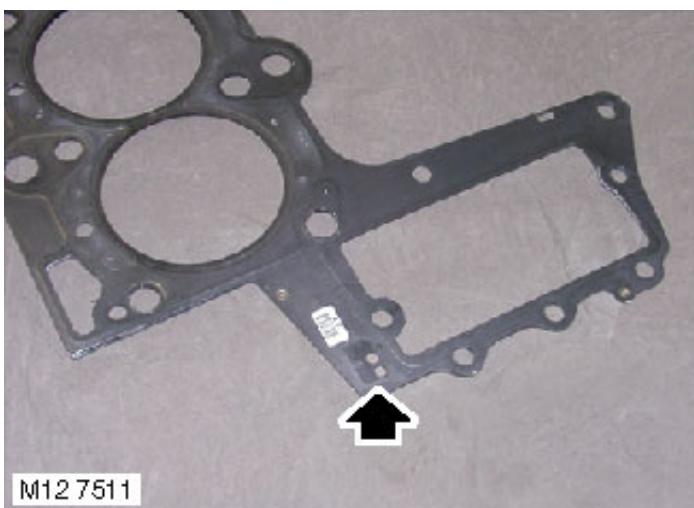
23. Remove 7 Allen screws securing cylinder head to timing cover.



24. Remove in sequence and discard 14 cylinder head bolts.



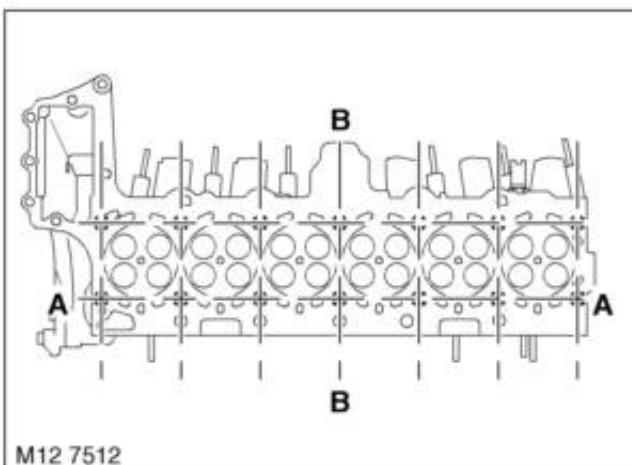
25. Fit and secure lifting brackets to cylinder head.
26. Connect lifting chains, release cylinder head from dowels and remove from vehicle. Care must be taken to avoid damage to protruding glow plugs.



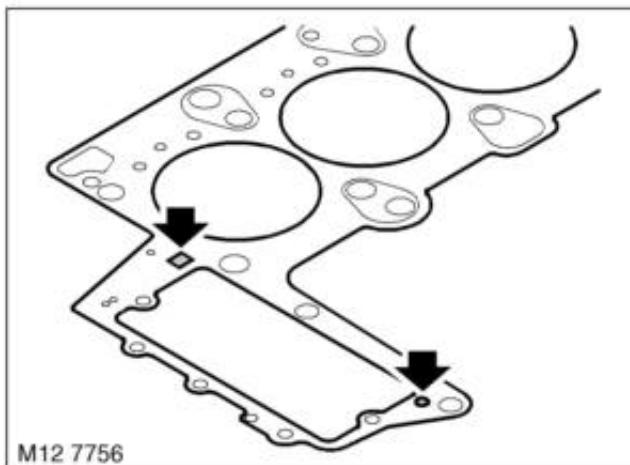
27. Identify thickness of cylinder head gasket by number of holes. Remove and discard gasket.

## Refit

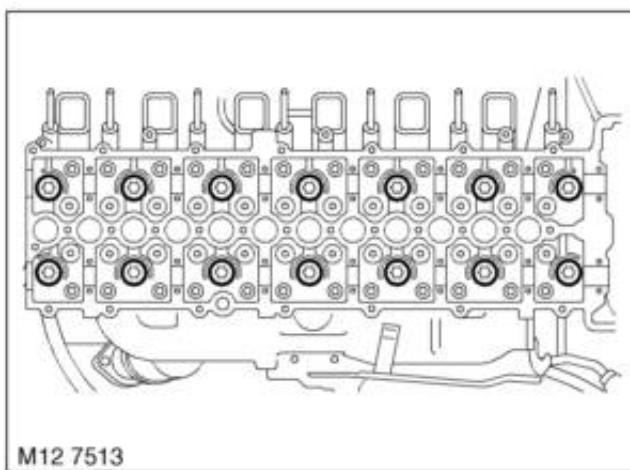
1. Clean mating faces of cylinder head and cylinder block, dowels and dowel holes. If necessary remove all traces of sealing compound with hard wood scraper. Ensure remnants do not remain in oil ways cooling ducts or bolt holes.



2. Using a straight edge and feeler gauges, check cylinder head for distortion along lines shown in illustration.
3. Replace cylinder head if figures obtained exceed those given. Cylinder head must not be refaced.
4. Select replacement gasket which must have the same thickness/number of holes as the original unless new piston and connecting rod assemblies have been fitted. If new piston and connecting rod assemblies have been fitted, check piston protrusion to determine gasket thickness/number of holes required.



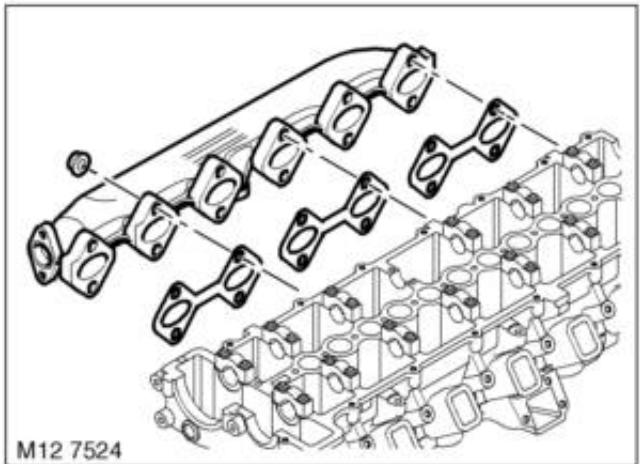
5. Ensure sealing strips are intact on new cylinder head gasket and fit gasket to cylinder block.
6. Lightly oil new cylinder head bolts.
7. Carefully fit cylinder head and locate on dowels.



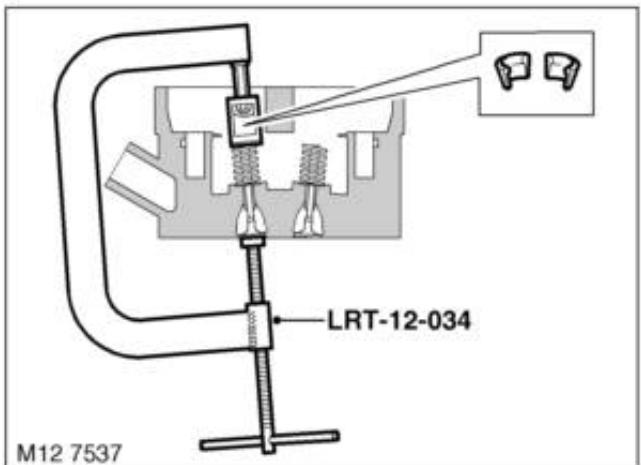
8. Fit new cylinder head bolts and tighten in sequence to 80 Nm (59 lbf.ft). Loosen all bolts one half turn, then tighten all bolts to 50 Nm (37 lbf.ft). Use an angle torque gauge and tighten all bolts in sequence by 90° and then a final 90°.
9. Tighten Allen screws securing cylinder head to timing cover to 20 Nm (15 lbf.ft).
10. Clean timing chain guides.
11. Fit timing chain guides, ensure guide on inlet side is located on its lower support pin and tighten both new upper pins to 20 Nm (15 lbf.ft).
12. Clean camshaft sprockets.

13. Fit camshaft sprockets to timing chain.
14. Clean turbocharger and exhaust manifold mating faces.
15. Use new gasket, align turbocharger and tighten bolts securing turbocharger to 50 Nm (37 lbf.ft).
16. Align vacuum pipe and harness clips and tighten bolt to 10 Nm (7 lbf.ft).
17. Clean coolant rail and mating faces.
18. Connect coolant rail to thermostat housing and secure with clip.
19. Fit bolts securing coolant rail and tighten to 10 Nm (7 lbf.ft).
20. Connect expansion tank hose and secure with clip.
21. Fit engine lifting bracket and tighten Torx screws to 25 Nm (18 lbf.ft).
22. Clean EGR pipe and mating face.
23. Fit EGR pipe, align heat shield and fit Torx bolts but do not tighten at this stage. Torx bolts to be tightened to 25 Nm (18 lbf.ft) when EGR cooler is fitted.
24. Clean coolant hose adaptor and mating face.
25. Use a new seal, fit coolant hose adaptor and tighten bolts to 8 Nm (6 lbf.ft).
26. Fit fuel rail and tighten bolts to 24 Nm (18 lbf.ft).
27. Fit fuel pipe and support bush, tighten unions to 20 Nm (15 lbf.ft).
28. Connect multiplug to coolant temperature sensor.
29. Fit connections to glow plugs.
30. Connect multiplug to fuel pressure sensor.
31. Fit tappets.
32. Fit EGR cooler.
33. Connect battery earth lead.
34. Refill cooling system.

# Cylinder head - overhaul Disassembly



1. Remove 12 nuts securing exhaust manifold, remove exhaust manifold and discard gaskets.

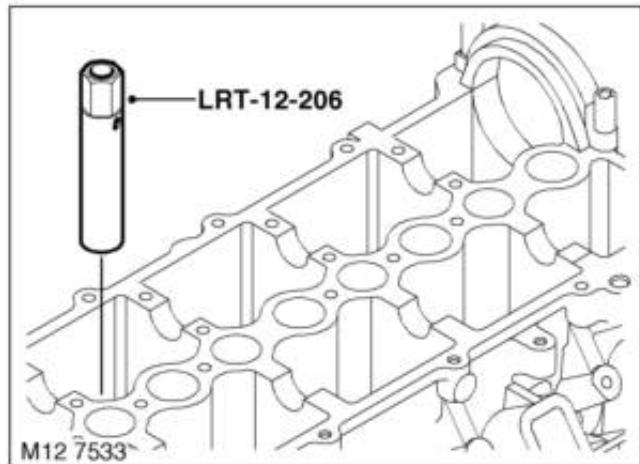


2. Position LRT-12-034to spring cap and compress valve spring.

3. Remove 2 collets and release valve spring compressor.

4. Remove valve spring and cap.

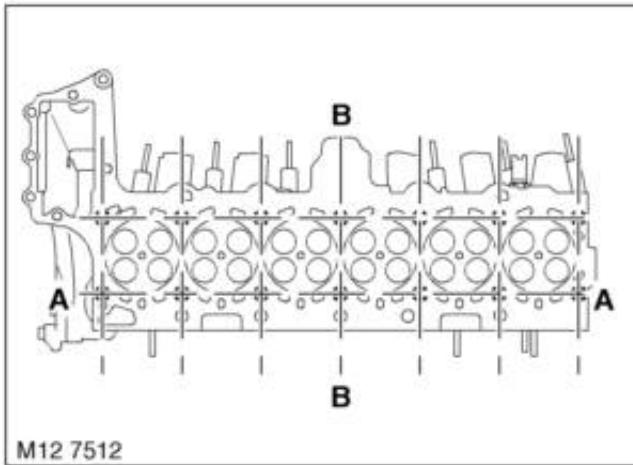
5. Remove valve from cylinder head.



6. Fit LRT-12-206 onto valve stem seal, rotate to lock and remove seal.

7. Repeat procedure for remaining valves, keeping components in their fitted order.

## Inspect



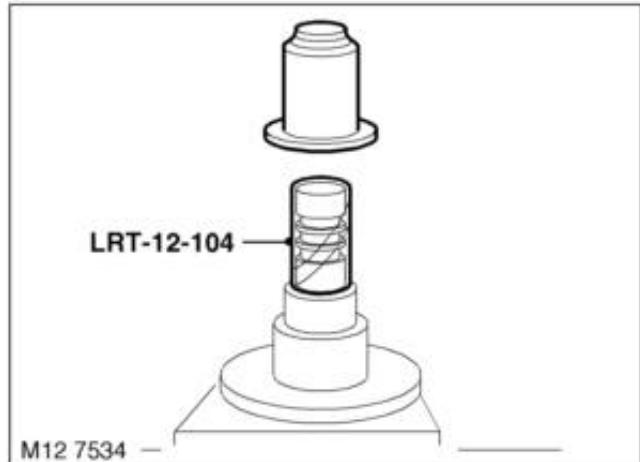
1. Using a straight edge and feeler gauges, check cylinder head for distortion along lines shown in illustration.
2. Clean and inspect valve seat.



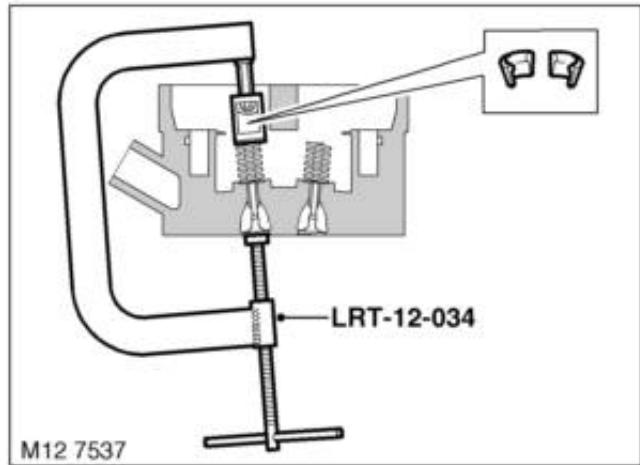
3. Fit new valve to valve guide, with end of valve stem level with valve guide.
4. Mount dial gauge onto cylinder head and zero gauge on valve head. Move valve from side to side to measure valve guide wear.

## Reassembly

1. Clean combustion space valve guide and manifold ports, blow out with air line.
2. Clean valve, spring cap and collets.
3. Lubricate valve with clean engine oil and fit valve.

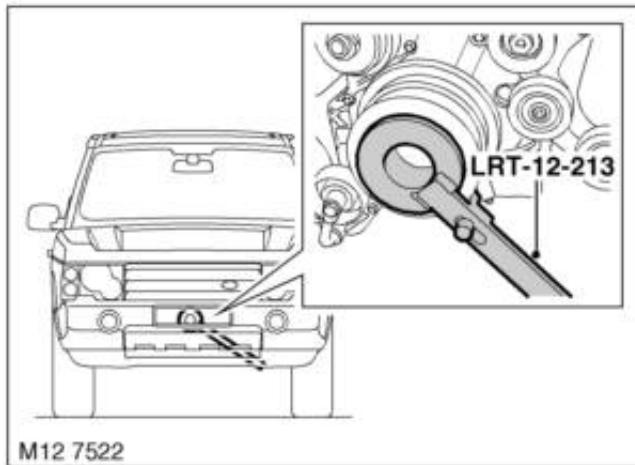


4. Fit LRT-12-104 over valve stem, fit new valve seal and remove LRT-12-104. Press valve seal fully over valve guide with LRT-12-207.
5. Fit valve spring and cap.

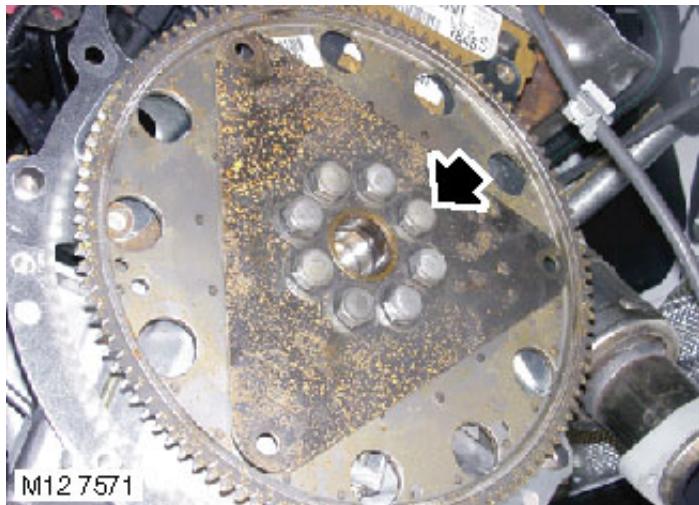


6. Use LRT-12-034 to compress valve spring. Fit collets and carefully release spring.
7. Repeat above for remaining valves.
8. Clean exhaust manifold and cylinder head mating face.
9. Use new gaskets and fit exhaust manifold to cylinder head.
10. Fit nuts securing exhaust manifold and tighten to 24 Nm (18 lbf.ft).

# Drive plate - automatic Disassembly

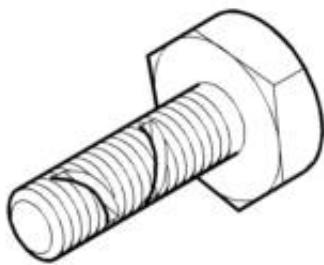


1. Fit LRT-12-213 locking wrench to crankshaft pulley.



2. Remove and discard 8 bolts securing drive plate to crankshaft.
3. Remove converter drive plate and starter ring.

## Inspect



M12 7850

1. Clean adhesive from threads of flywheel bolt holes in crankshaft using an old flywheel bolt, with 2 saw cuts at an angle of 45° to the bolt shank.
2. Clean drive plate and mating face of crankshaft.

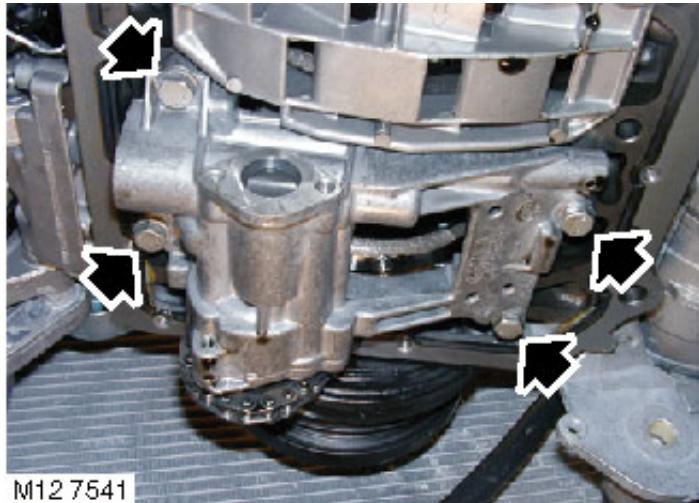
## Reassembly

1. Position drive plate to crankshaft.
2. Fit new bolts, secure drive plate to crankshaft, evenly and progressively tighten to 115 Nm (85 lbf.ft).

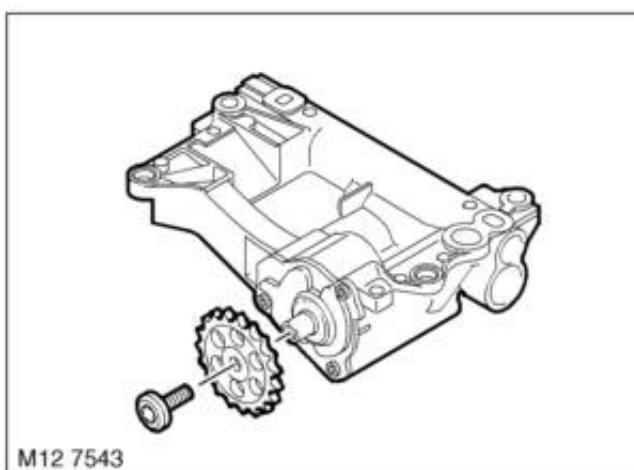
# Pump - engine oil Remove

1. Remove oil pick up strainer.

## Disassembly



1. Remove 4 bolts securing oil pump to cylinder block.
2. Ease oil pump from dowels, release drive chain from oil pump drive gear and remove oil pump.



3. Position drive gear in a soft jawed vice and remove Torx bolt securing drive gear to oil pump, release vice and remove drive gear from oil pump.

## Inspect

1. Clean drive gear and mating face on oil pump drive shaft.

## Reassembly

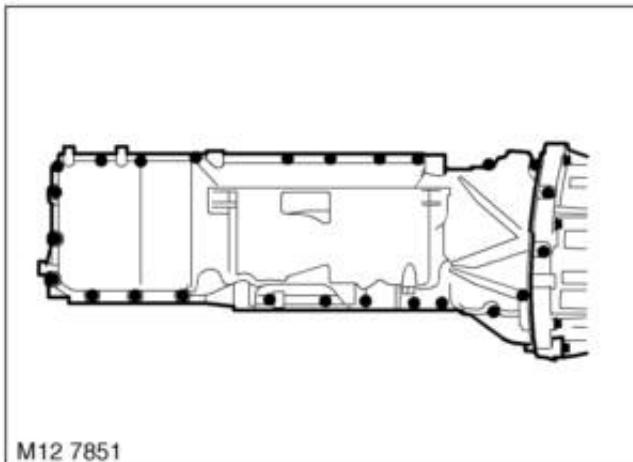
1. Position drive gear to oil pump, fit Torx bolt.
2. Secure drive gear in soft jawed vice and tighten Torx bolt to 25 Nm (18 lbf ft).
3. Fit oil pump to drive chain and locate on dowels. Tighten bolts to 25 Nm (18 lbf.ft).

## Refit

1. Fit oil pick-up strainer.

# Gasket - oil sump transmission to engine

## Disassembly

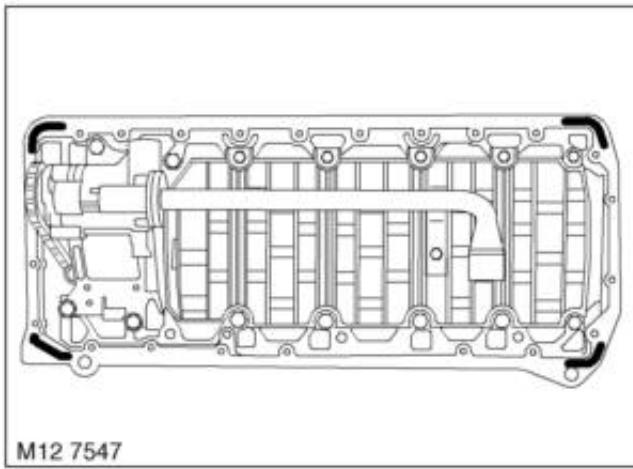


1. Remove 25 bolts securing oil sump and remove the oil sump.
2. Remove and discard the oil sump gasket.

## Inspect

1. Clean oil sump and gasket mating faces.

## Reassembly



1. Apply a 2 mm bead of sealant to areas illustrated.
2. Fit new gasket, position oil sump to cylinder block, fit bolts but do not tighten at this stage.
3. Fit bolts securing the oil sump to gearbox housing, lightly tighten and then loosen bolts. This will correctly align the rear sump flange to the gearbox.
4. Tighten the oil sump bolts evenly and progressively, tighten M8 bolts to 22 Nm (16 lbf.ft) and M6

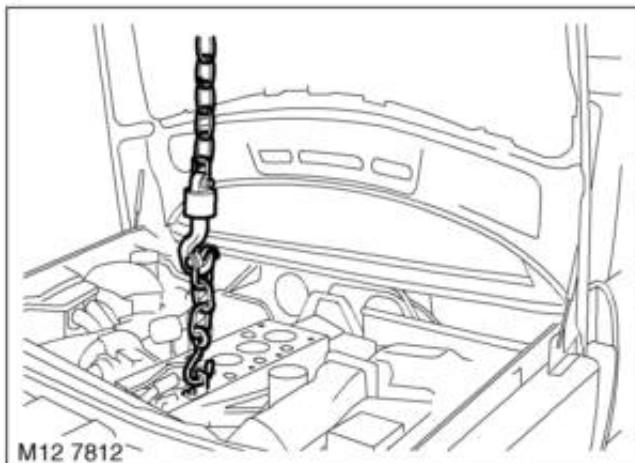
bolts to 10 Nm (7 lbf.ft).

# Gasket - timing gear cover

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

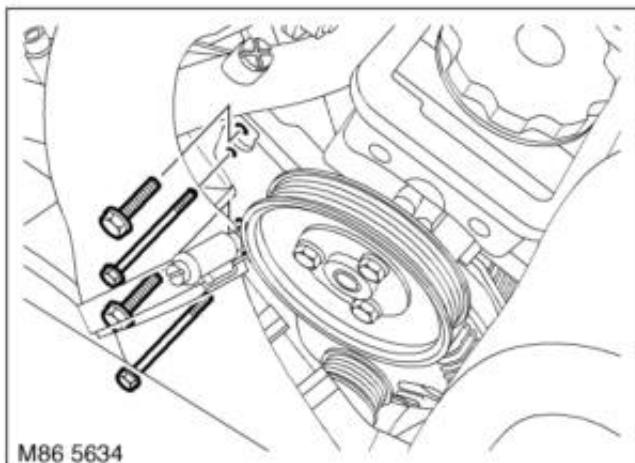
## Remove

1. Disconnect battery earth lead.
2. Remove cylinder head gasket.

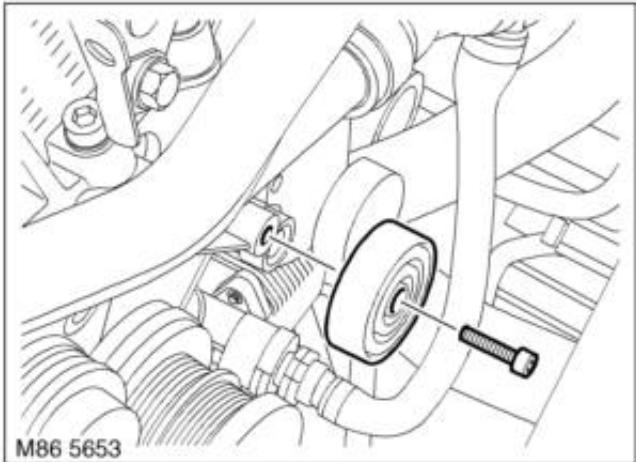


3. Fit lifting bracket to cylinder block and secure with bolt.
4. Connect chain to lifting bracket and take weight of engine.
5. Remove oil pump.

6. Remove crankshaft front oil seal.



7. Remove 4 bolts securing PAS pump to mounting, release pump and tie aside.

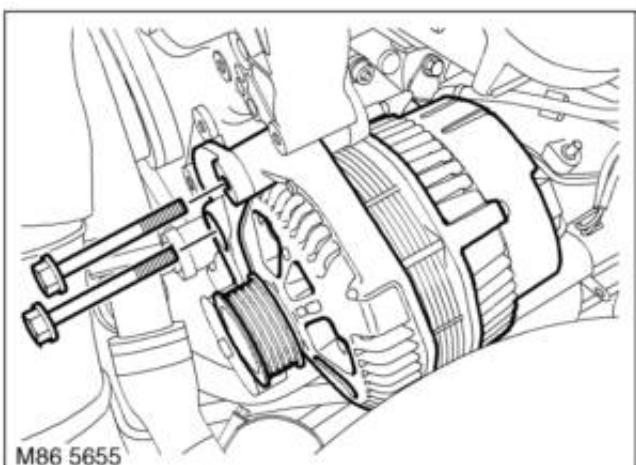


8. Remove Allen bolt securing ancillary drive belt upper idler pulley and remove pulley.

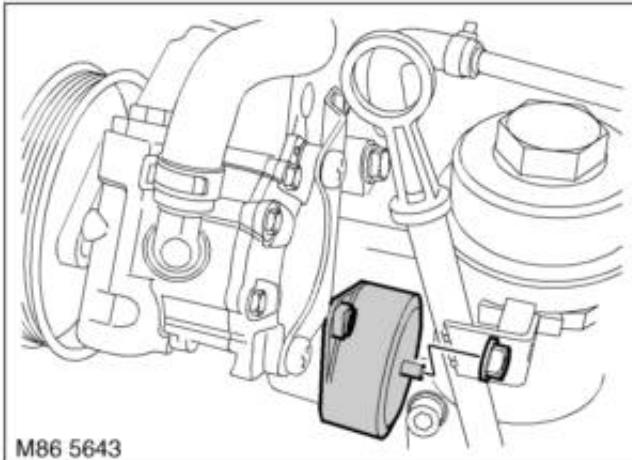


9. Remove nut securing battery cable to alternator, release cable and position aside.

10. Disconnect alternator multiplug.



11. Remove 2 bolts securing alternator to mounting, collect idler pulley bracket and remove alternator.



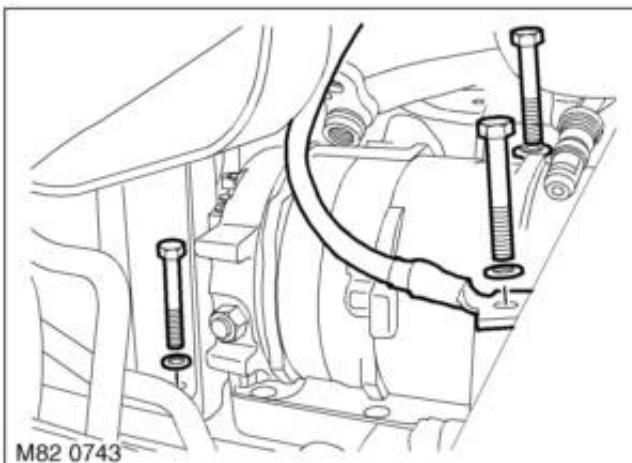
12. Remove nut securing ancillary drive belt tensioner and remove tensioner.
13. Remove and discard tensioner arm seal.



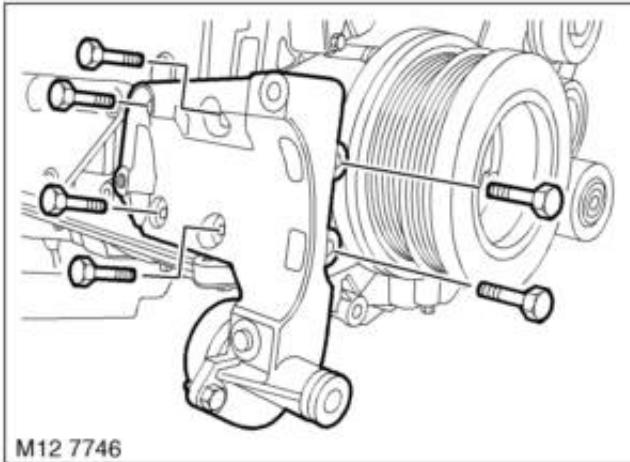
14. Release clip and disconnect outlet hose from intercooler.



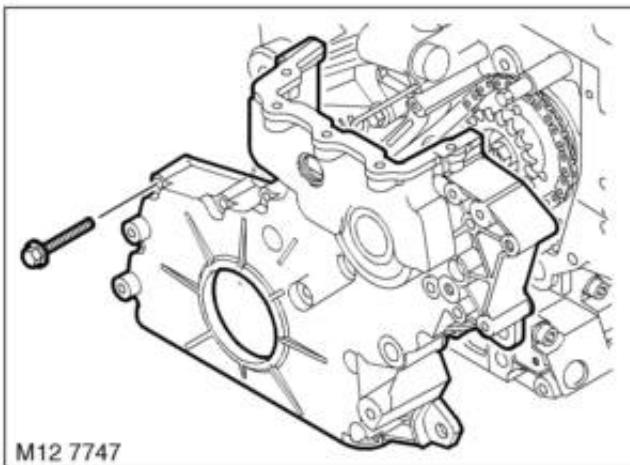
**CAUTION: Always fit plugs to open connections to prevent contamination.**



15. Remove 3 bolts securing A/C compressor, release compressor and tie aside.

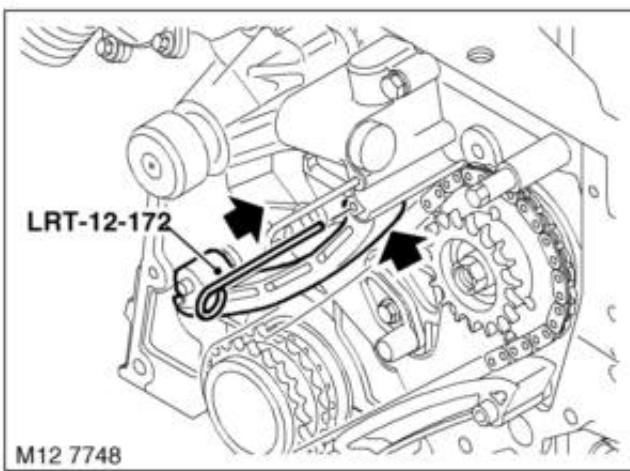


16. Remove 6 bolts securing air conditioning compressor bracket and remove bracket.

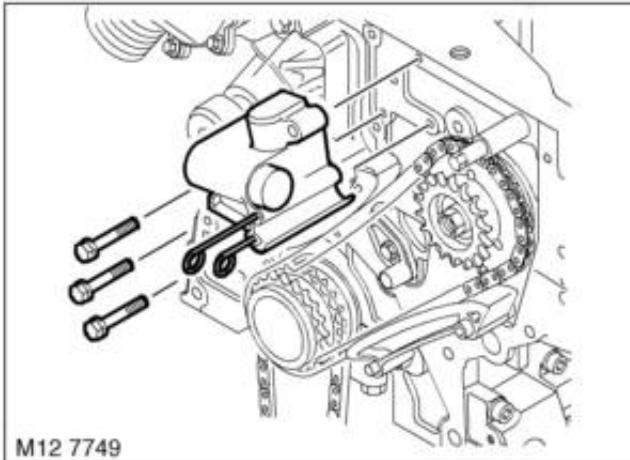


17. Remove 14 bolts, release and remove timing cover. Removal of bolts will release ancillary drive belt tensioner.

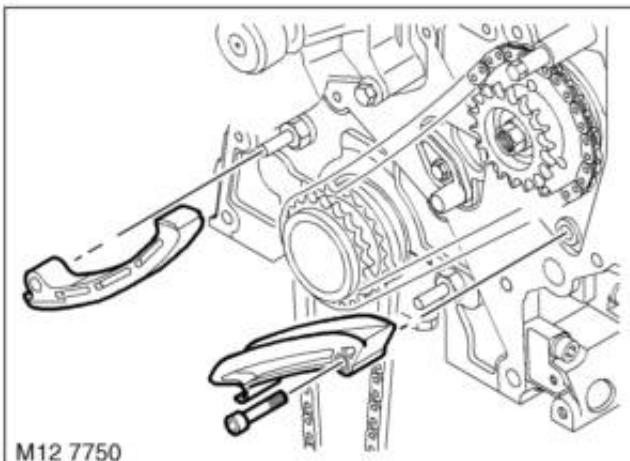
18. Remove camshaft drive chain from fuel pump sprocket.



19. Press lower chain tensioner plunger fully into tensioner body and fit LRT-12-172 to lock plunger.

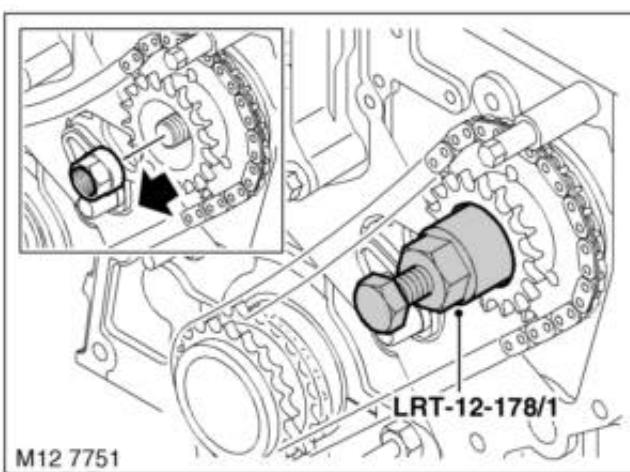


20. Remove 3 bolts and remove timing chain tensioner.



21. Remove fuel pump drive chain upper guide.

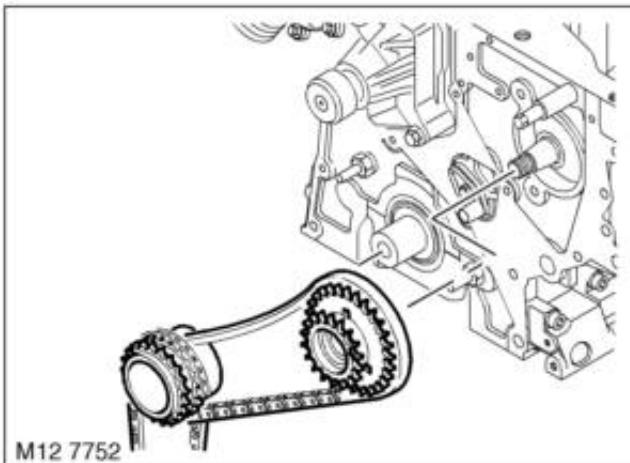
22. Remove Allen bolt and remove fuel pump drive chain lower guide. Discard Allen bolt.



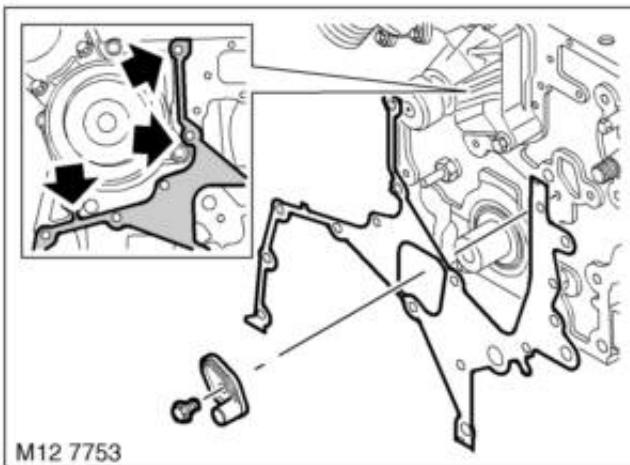
23. Restrain fuel pump sprocket and remove securing nut.

24. Fit LRT-12-178/1 to fuel pump sprocket and tighten centre screw to release sprocket from pump.

25. Remove LRT-12-178/1 from sprocket.



26. Remove sprockets and chains from crankshaft and fuel pump.



27. Remove bolt and remove chain lubrication jet.

28. Cut to release and remove timing cover gasket.

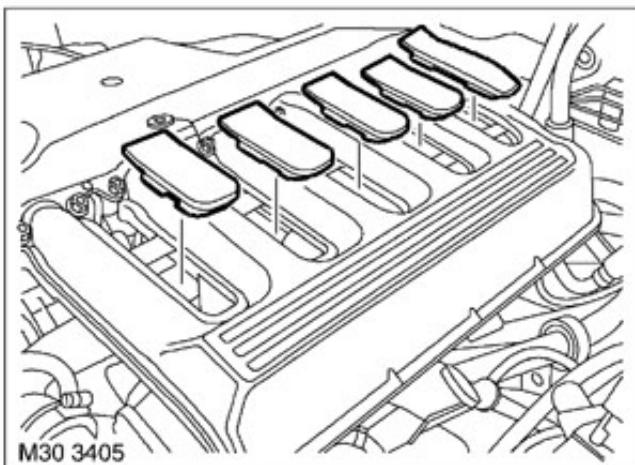
## Refit

1. Clean timing gear cover and mating face, clean dowels and dowel holes.
2. Cut to remove water pump gasket and fit new timing cover gasket to cylinder block.
3. Clean chain lubrication jet and mating face.
4. Fit chain lubrication jet and tighten bolt to 10 Nm (7 lbf.ft).
5. Clean crankshaft sprocket, fuel pump sprocket and mating faces.
6. Clean oil and fuel pump drive chains.
7. Lubricate chains and sprockets.
8. Assemble oil and fuel pump drive chains to crankshaft and fuel pump sprockets.
9. Fit sprockets and chains to crankshaft and fuel pump.
10. Fit fuel pump sprocket retaining nut and tighten to 65 Nm (48 lbf.ft).

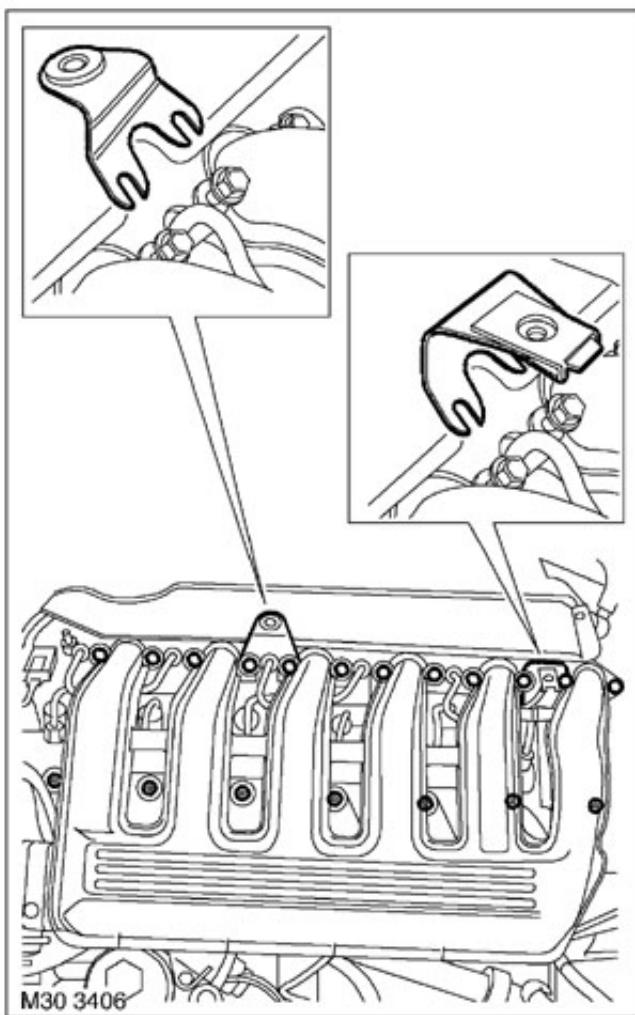
11. Clean fuel pump drive chain guides.
12. Fit fuel pump drive chain lower guide to pin and tighten new Allen bolt to 24 Nm (18 lbf.ft).
13. Fit fuel pump drive chain upper guide to pin.
14. Clean timing chain tensioner and mating face. Ensure oil way is clear.
15. Fit timing chain tensioner and tighten bolts to 10 Nm (7 lbf.ft).
16. Hold tensioner lower plunger against spring pressure, remove LRT-12-172 and release plunger onto chain guide.
17. Clean camshaft drive chain.
18. Lubricate camshaft drive chain.
19. Fit camshaft drive chain to fuel pump sprocket.
20. Clean timing cover.
21. Fit timing cover to cylinder block.
22. Temporarily fit ancillary belt tensioner pulley arm to align tensioner.
23. Evenly and progressively tighten timing cover bolts to 15 Nm (11 lbf.ft).
24. Remove ancillary belt tensioner pulley arm.
25. Fit seal to ancillary drive belt tensioner arm bush.
26. Fit ancillary belt tensioner arm and tighten nut to 10 Nm (7 lbf.ft).
27. Clean A/C compressor mounting bracket and mating face.
28. Fit A/C compressor mounting bracket and tighten bolts to 25 Nm (18 lbf.ft).
29. Clean A/C compressor and mating face, dowels and dowel holes
30. Position A/C compressor, align earth cable and tighten bolts securing compressor to 25 Nm (18 lbf.ft).
31. Clean intercooler hose and mating face.
32. Connect hose to intercooler and secure with clip.
33. Clean alternator and mating face.
34. Clean idler pulley bracket and mating face.
35. Fit alternator and jockey pulley bracket, tighten bolts to 45 Nm (33 lbf.ft).
36. Connect battery cable to alternator, fit nut and tighten to 13 Nm (10 lbf.ft).
37. Connect multiplug to alternator.
38. Clean ancillary drive belt upper idler pulley and mating face.

39. Fit ancillary drive belt upper idler pulley and tighten Allen bolt to 25 Nm (18 lbf.ft).
40. Clean PAS pump and mating faces.
41. Position PAS pump to mounting and fit bolts. Tighten M8 bolts to 25 Nm (18 lbf.ft) and M6 bolts to 10 Nm (7 lbf.ft).
42. Fit crankshaft front oil seal.
43. Fit oil pump.
44. Remove lifting chains.
45. Remove bolt securing lifting bracket to cylinder block and remove bracket.
46. Fit cylinder head gasket.
47. Connect battery earth lead.

# Gasket(s) - induction manifold Remove



1. Remove rubber inserts from inlet manifold.

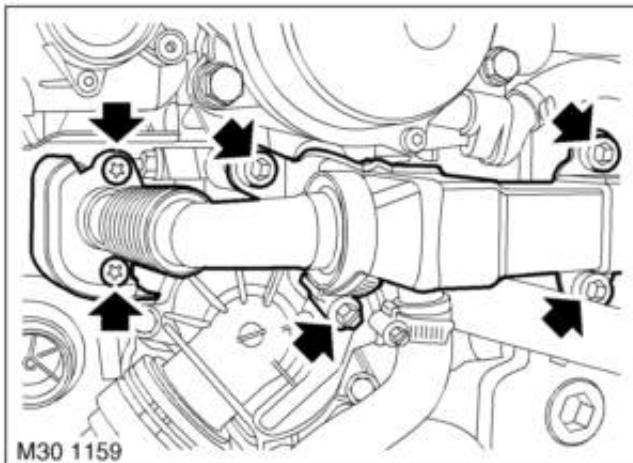


2. Remove 12 bolts and 7 nuts securing inlet manifold.
3. Remove inlet manifold and discard gaskets.
4. Cover engine air intake tracts.

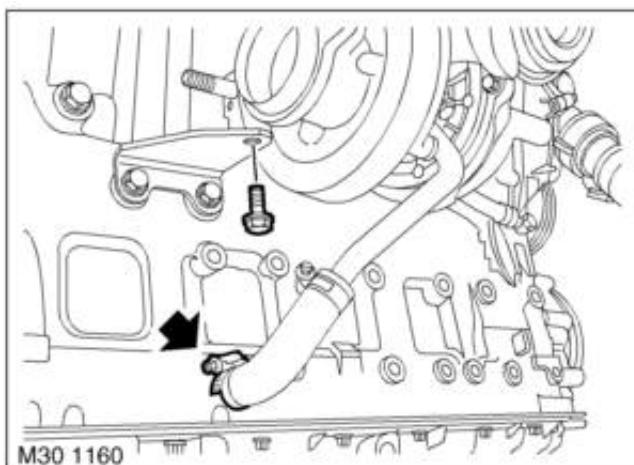
## **Refit**

1. Remove covers from engine air inlet tracts.
2. Clean inlet manifold and mating faces.
3. Clean EGR pipe flange and EGR valve mating face.
4. Fit new gaskets to inlet manifold.
5. Fit inlet manifold, fit acoustic cover brackets to bolts and tighten nuts and bolts evenly. Tighten bolts to 10 Nm (7 lbf.ft) and nuts to 15 Nm (11 lbf.ft).
6. Fit rubber inserts.

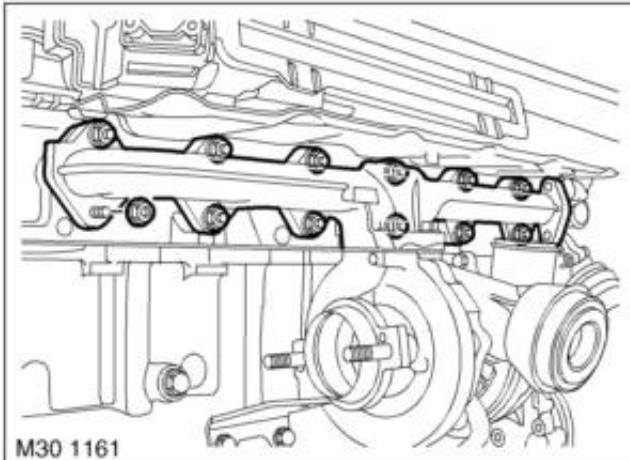
# Gasket(s) - exhaust manifold Remove



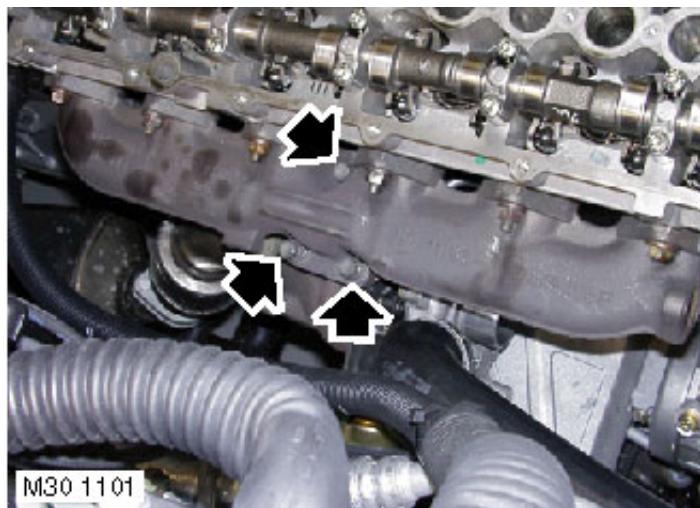
1. Loosen 3 Allen screws securing EGR cooler.
2. Loosen clamp screw securing EGR pipe to cooler and release clamp from cooler.
3. Remove 2 Torx screws securing heat shield and EGR pipe to exhaust manifold.
4. Release and remove heat shield from manifold.
5. Remove EGR pipe and clamp.



6. Remove clip and release turbocharger oil drain hose from sump.
7. Remove bolt securing the turbocharger to support bracket.



8. Remove 12 nuts securing exhaust manifold, remove exhaust manifold and discard gaskets.



9. Remove 3 bolts securing turbocharger to exhaust manifold. Discard gasket.

## Refit

1. Clean exhaust manifold and mating faces.
2. Use new gasket, align turbocharger and tighten bolts securing turbocharger to 50 Nm (37 lbf.ft).
3. Use new gaskets and fit exhaust manifold to cylinder head.
4. Fit nuts securing exhaust manifold and tighten to 24 Nm (18 lbf.ft).
5. Fit bolt securing turbocharger to support bracket and tighten to 25 Nm (18 lbf.ft).
6. Connect turbocharger drain hose and secure with clip.
7. Clean EGR pipe and mating face.
8. Fit EGR pipe and clamp to cooler, align clamp but do not tighten fully at this stage.
9. Fit heat shield to manifold and tighten Torx screws securing EGR pipe and heat shield to 25 Nm (18 lbf.ft).
10. Tighten clamp screw securing EGR pipe to cooler.

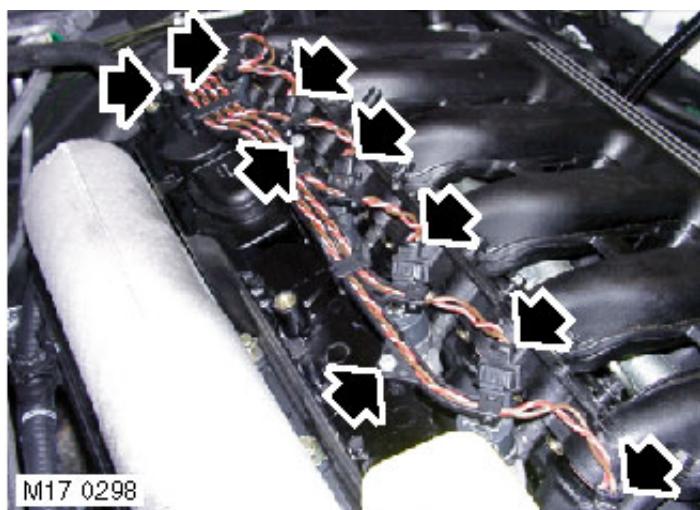
11. Tighten Allen screws securing EGR cooler to 25 Nm (18 lbf.ft).

# Valve - depression limiter

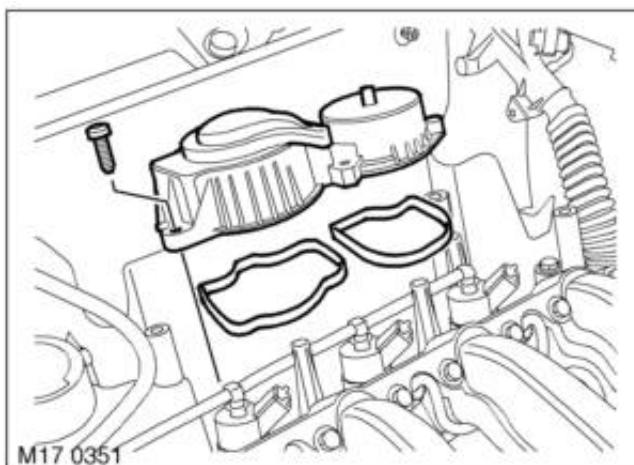
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.
3. Remove air cleaner element
4. Remove acoustic pad.



5. Disconnect multiplugs from injectors.
6. Remove 3 screws and move injector harness aside.



7. Remove 4 Allen screws and remove valve with filter assembly. Discard seals.

## **Refit**

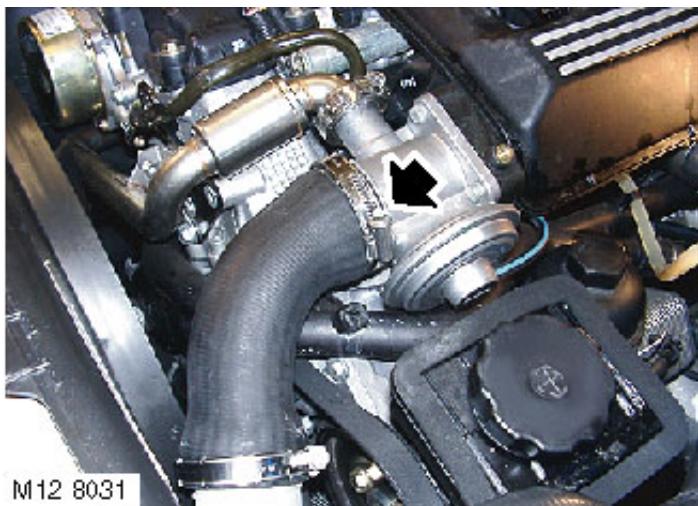
1. Clean filter, valve housing and mating faces.
2. Use new seals, fit filter and valve assembly, tighten Allen screws to 8 Nm (6 lbf.ft).
3. Position injector harness and tighten screws to 2 Nm (1.5 lbf.ft).
4. Connect multiplugs to injectors.
5. Fit acoustic pad.
6. Fit air cleaner element.
7. Fit engine acoustic cover.
8. Connect battery earth lead.

# Valve - exhaust gas recirculation (EGR)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

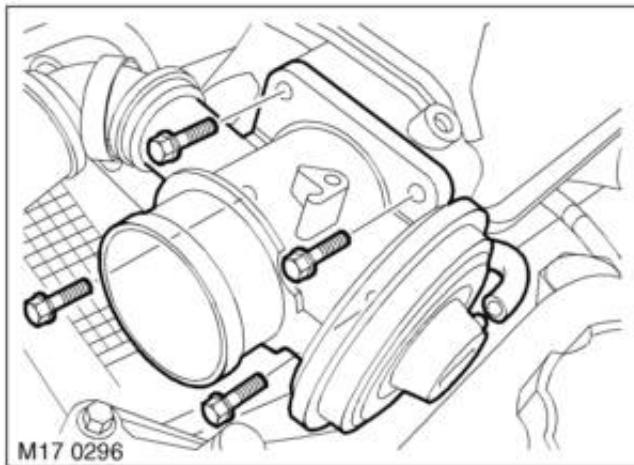
1. Disconnect battery earth lead.
2. Remove engine acoustic cover.



3. Loosen clip and disconnect air intake hose from EGR valve. Remove and discard clip.
4. Disconnect vacuum hose from EGR valve.
5. Loosen screw and remove clamp securing EGR pipe to valve.



**CAUTION:** Always fit plugs to open connections to prevent contamination.



6. Remove 4 bolts securing EGR valve and remove valve. Discard seal.

# Refit

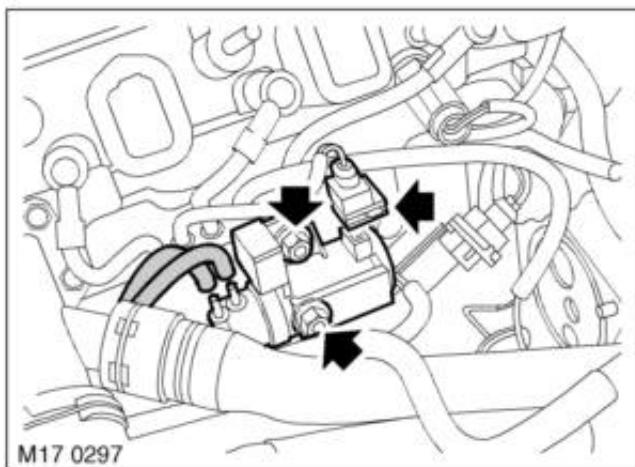
1. Clean EGR pipe flange and EGR valve mating face.
2. Fit new seal to inlet manifold.
3. Fit EGR valve and tighten bolts evenly to 10 Nm (7 lbf.ft).
4. Fit EGR pipe clamp and tighten screw.
5. Connect vacuum hose to EGR valve.
6. Clean EGR valve and mating face on air intake hose.
7. Using a new retaining clip, connect air intake hose to EGR valve. Tighten clip to 6 Nm (4.4 lbf.ft)
8. Allow 10 minutes to elapse and re-torque air intake hose to EGR valve retaining clip to 6 Nm (4.4 lbf.ft).
9. Fit acoustic cover.
  
10. Connect battery earth lead.

# Solenoid modulator valve - exhaust gas recirculation (EGR)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove inlet manifold gaskets.



3. Disconnect multiplug from EGR solenoid valve.
4. Remove 2 nuts and release EGR solenoid valve from bracket.
5. Identify and disconnect vacuum hoses.
6. Remove EGR solenoid valve.

## Refit

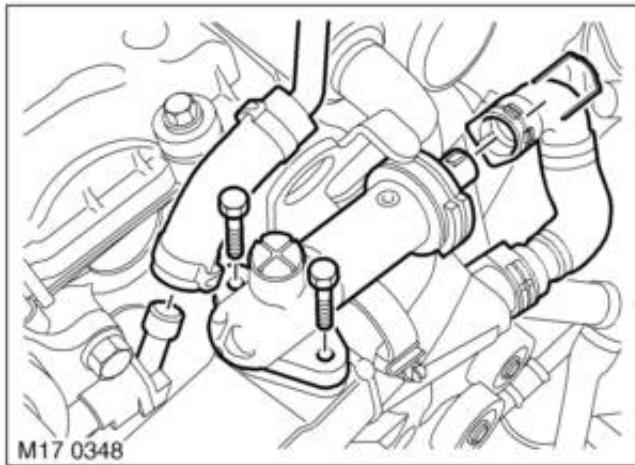
1. Position EGR solenoid valve and connect hoses.
2. Fit EGR solenoid valve to bracket and tighten nuts to 10 Nm (7 lbf.ft).
3. Connect multiplug to EGR solenoid valve.
4. Fit inlet manifold gaskets.
5. Connect battery earth lead.

# Thermal valve - exhaust gas recirculation (EGR)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove engine access cover.



3. Release clip and disconnect hose from vacuum pump.



**CAUTION:** Always fit plugs to open connections to prevent contamination.

4. Position container to collect coolant spillage.
5. Release clip and disconnect coolant hose from EGR thermal valve.
6. Remove 2 bolts securing EGR thermal valve to EGR cooler and remove valve. Discard 'O' ring.



**CAUTION:** Always fit plugs to open connections to prevent contamination.

## Refit

1. Clean EGR valve and mating face.
2. Fit new 'O' ring to cooler.
3. Fit EGR valve and tighten bolts to 10 Nm (7 lbf.ft).
4. Connect hose to vacuum pump and secure with clip.

5. Connect coolant hose to EGR thermal valve and secure with clip.

6. Fit engine access cover.

7. Connect battery earth lead.

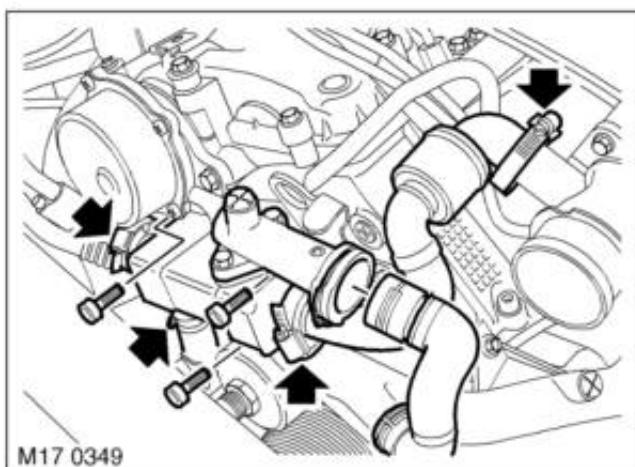
8. Refill cooling system.

# Cooler - exhaust gas recirculation (EGR)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove viscous coupling.
3. Position container to collect coolant.



4. Loosen clip and disconnect coolant hose from EGR cooler.



**CAUTION: Always fit plugs to open connections to prevent contamination.**

5. Release clip and disconnect coolant hose from EGR thermal valve.
6. Loosen and remove clamp securing EGR pipe to EGR valve.
7. Loosen and release clamps securing EGR pipes to EGR cooler.
8. Remove 3 Allen screws securing EGR cooler and remove cooler assembly.
9. Remove clamp securing pipe to cooler and remove pipe.

**NOTE: Do not carry out further dismantling if component is removed for access only.**

10. Remove 2 bolts securing thermal valve to EGR cooler and remove valve. Discard 'O' ring.

## Refit

1. Clean valve and mating face.
2. Fit new 'O' ring to cooler.

3. Fit valve and tighten bolts to 10 Nm (7 lbf.ft).
4. Clean EGR cooler and mating face.
5. Fit EGR cooler, fit Allen screws but do not tighten at this stage.
6. Clean EGR pipe and mating faces.
7. Fit EGR pipe, fit clamps and tighten screws.
8. Tighten Allen screws securing EGR cooler to 25 Nm (18 lbf.ft).
9. Connect coolant hose to thermal valve and secure with clip.
10. Connect coolant hose to EGR cooler and tighten clip.
11. Fit viscous coupling.
  
12. Connect battery earth lead.
13. Refill cooling system.

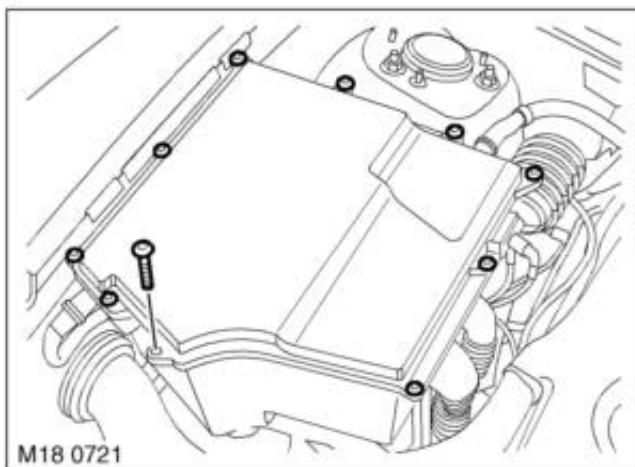
# Engine control module (ECM)

If the ECM is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

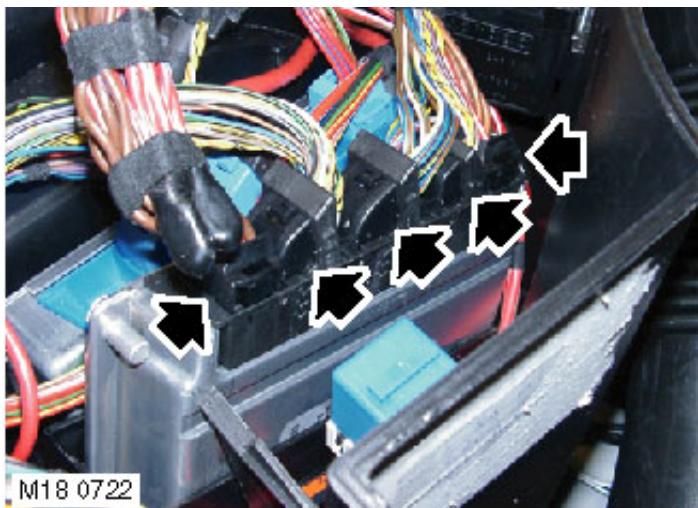
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect 5 multiplugs from engine ECM.

4. Remove ECM.

## Refit

1. Fit new ECM and connect multiplugs.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).

3. Connect battery earth lead.
4. Reprogramme a new ECM using Testbook/T4.



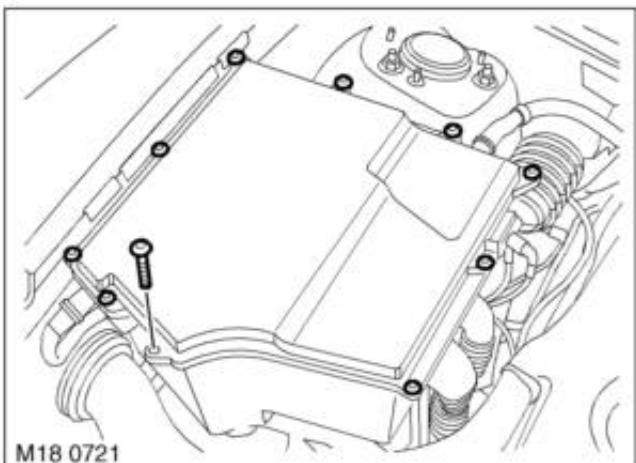
**The ECM can only be reprogrammed a maximum of 14 times.**

# Relay - combined ignition & fuel ECU

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect and remove, ECM relay from 'E' box multiplug.

## Refit

1. Position relay to 'E' box mounting and connect multiplug.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect the battery earth lead.

# Sensor - engine coolant temperature (ECT)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.

2. Drain coolant.

3. Remove inlet manifold gaskets.



4. Disconnect multiplug from ECT sensor.

5. Using a deep socket, carefully remove ECT sensor and discard seal.

## Refit

1. Ensure mating faces of ECT sensor and cylinder head are clean.

2. Fit new seal and tighten ECT sensor to 15 Nm (11 lbf.ft).

3. Connect multiplug to ECT sensor.

4. Fit inlet manifold gaskets.

5. Connect battery earth lead.

6. Fill cooling system.

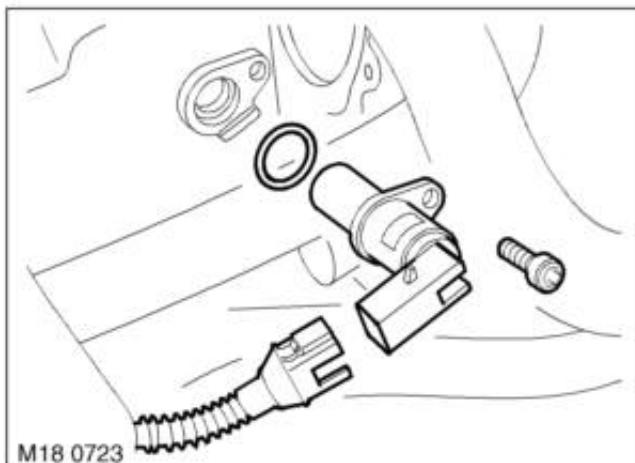
7. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Sensor - crankshaft position (CKP)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from CKP sensor.
3. Remove Allen screw and remove CKP sensor.
4. Remove and discard seal.

## Refit

1. Clean CKP sensor and mating face.
2. Fit new seal to CKP sensor.
3. Fit CKP sensor and tighten Allen screw to 8 Nm (6 lbf.ft).
4. Connect multiplug to CKP sensor.
5. Connect battery earth lead.
6. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Sensor - camshaft position (CMP)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove engine acoustic cover.



3. Disconnect multiplug from CMP sensor.
4. Remove Torx screw securing CMP sensor to camshaft cover.
5. Remove CMP sensor and discard seal.

## Refit

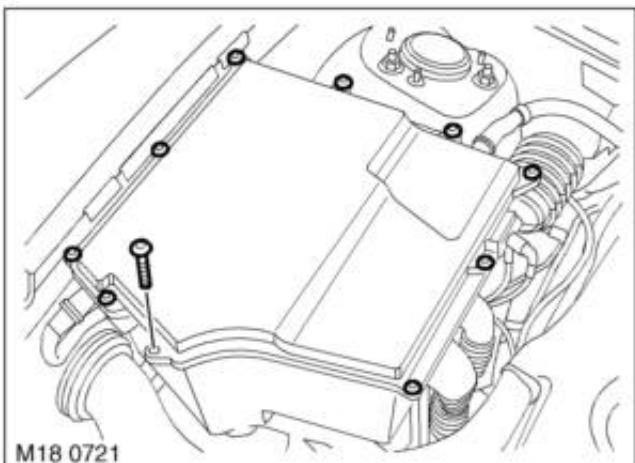
1. Clean CMP sensor and mating face.
2. Fit new seal to CMP sensor, fit sensor and tighten Torx screw to 8 Nm (6 lbf.ft).
3. Connect multiplug to CMP sensor.
4. Fit engine acoustic cover.
5. Connect battery earth lead.
6. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Cooling fan - 'E' box

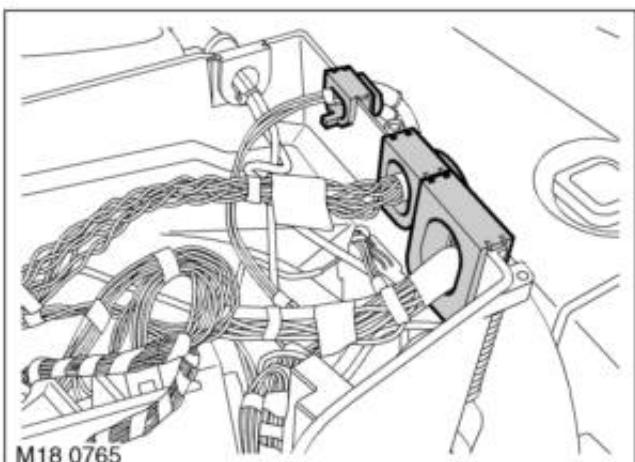
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

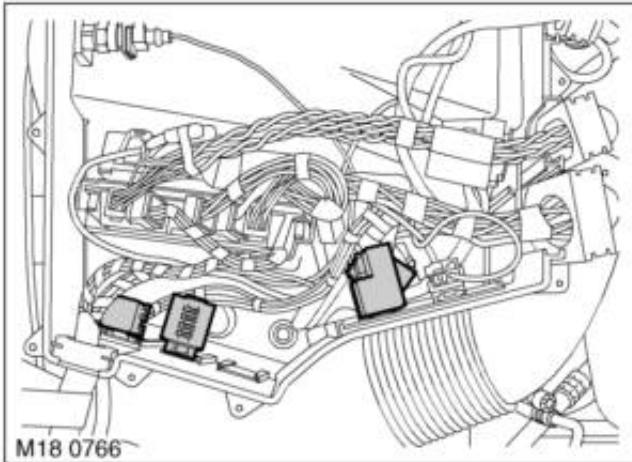
1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.

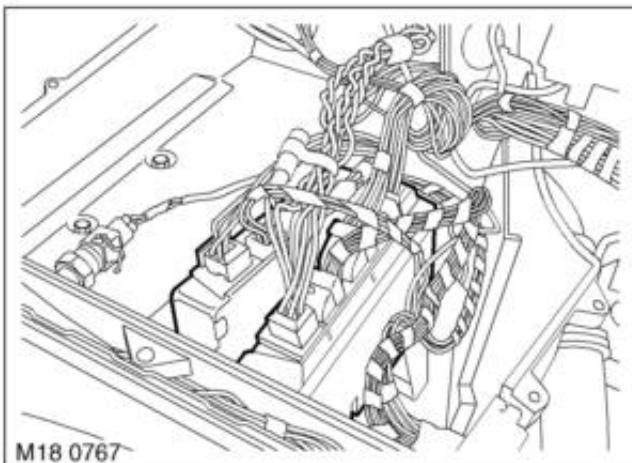


3. Remove 3 harness grommets from 'E' box.



4. Release glow plug ECU mounting from 'E' box.

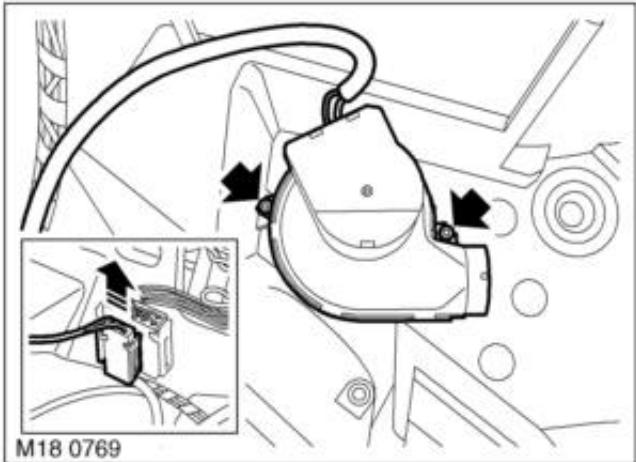
5. Release fuse block and relay from 'E' box.



6. Release engine ECM and gearbox ECU from 'E' box.



7. Remove 2 screws securing ECM support bracket and remove bracket.



8. Disconnect harness multiplug and release cooling fan multiplug from mounting.
9. Remove 2 Torx screws securing fan to 'E' box and remove fan.

## Refit

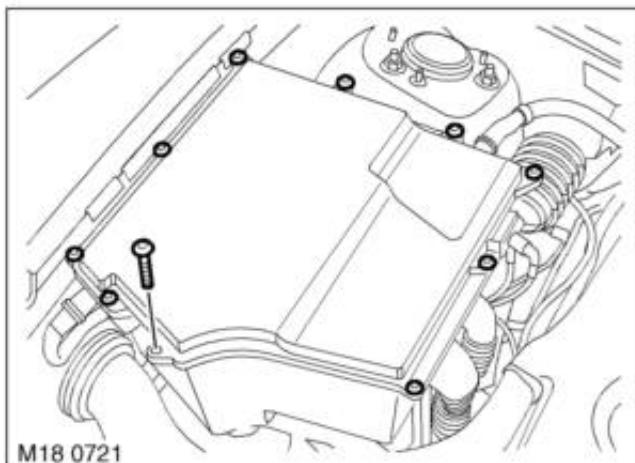
1. Fit fan and secure with Torx screws.
2. Fit fan harness to mounting and connect multiplug.
3. Fit ECM bracket and secure with screws.
4. Fit ECM and ECU into 'E' box.
5. Fit relay and fuse block into 'E' box.
6. Fit glowplug ECU into 'E' box.
7. Fit harness grommets to 'E' box.
8. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
9. Connect battery earth lead.

# Sensor - temperature - 'E' box

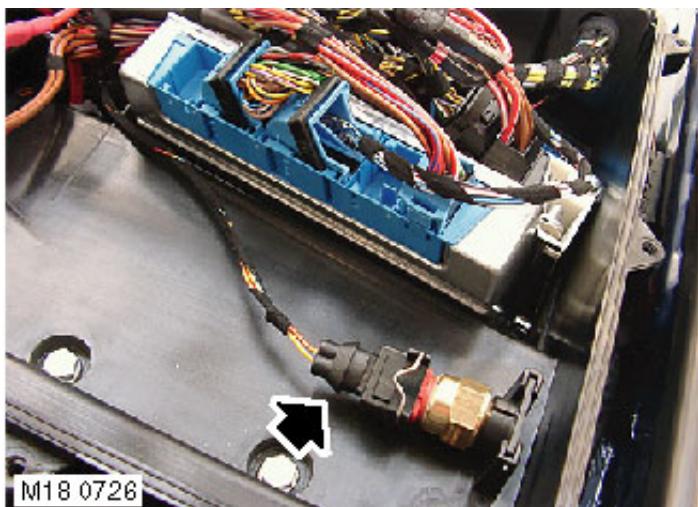
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect multiplug from 'E' box temperature sensor.
4. Remove 'E' box temperature sensor.

## Refit

1. Fit 'E' box temperature sensor to mounting.
2. Connect multiplug to 'E' box temperature sensor.
3. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).

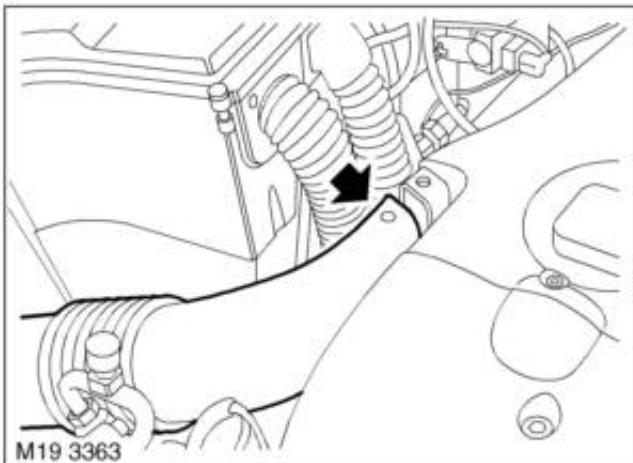
4. Connect battery earth lead.
5. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Element - air cleaner

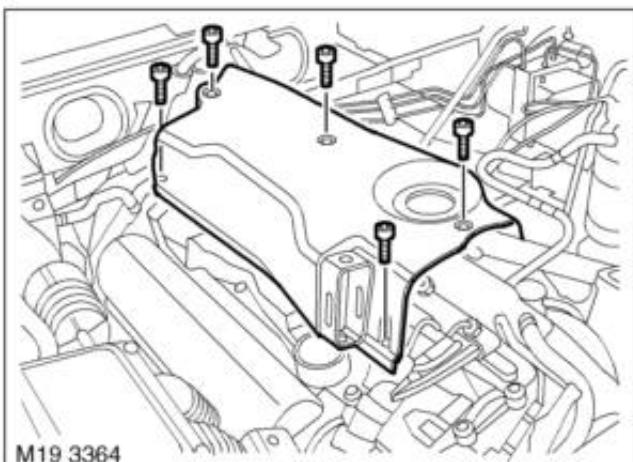
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Release intake duct from air cleaner housing.
3. Remove engine oil filler cap. Cover the aperture to prevent ingress of dirt.



4. Remove 5 Allen screws and remove air cleaner cover.
5. Remove air cleaner element.

## Refit

1. Clean air cleaner housing and cover.
2. Fit air cleaner element and engage spigot.
3. Fit air cleaner cover and tighten Allen screws to 8 Nm (6 lbf.ft).

4. Fit oil filler cap.
5. Fit and secure air intake duct.
6. Connect battery earth lead.

# Sensor - accelerator pedal position (APP)

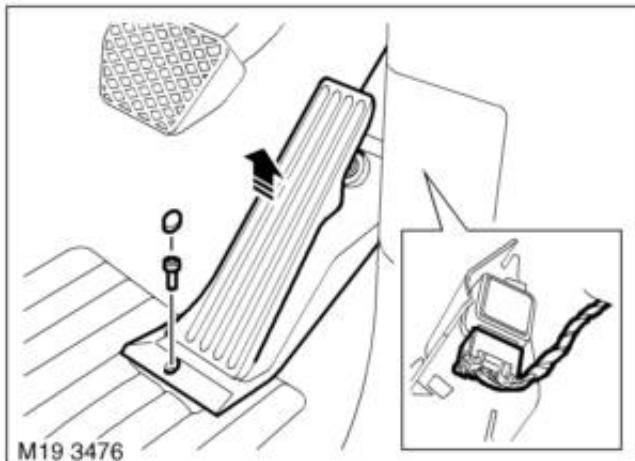
The APP sensor

is not serviced separately from the throttle pedal.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Remove cap from screw and remove Allen screw securing throttle pedal.
3. Release pedal from bracket, disconnect multiplug from APP sensor and remove pedal.

## Refit

1. Position throttle pedal and connect multiplug to APP sensor.
2. Fit pedal to bracket, tighten Allen screw to 10 Nm (7 lbf.ft) and fit cap to screw.
3. Connect battery earth lead.
4. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Sensor - engine fuel temperature (EFT)

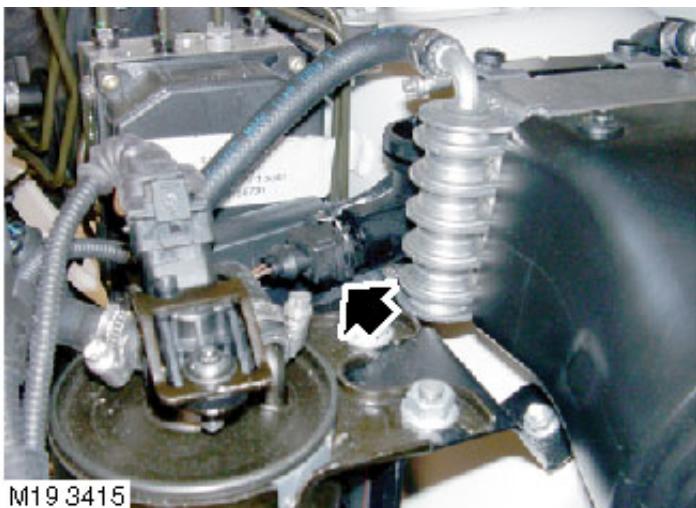
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Position absorbent cloth to collect fuel spillage.



**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.



3. Disconnect multiplug from EFT sensor.
4. Remove EFT sensor and discard sealing washer.



**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

## Refit

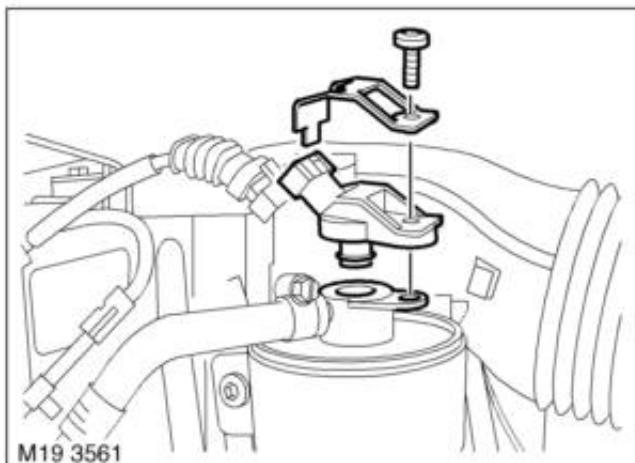
1. Fit new sealing washer and tighten EFT sensor to 13 Nm (10 lbf.ft).
2. Connect multiplug.
3. Connect battery earth lead.
4. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Sensor - fuel - low pressure

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from low pressure fuel sensor.
3. Remove Torx screw and clamp securing fuel pressure sensor to filter body, release sensor from filter.



**CAUTION:** Before disconnecting any part of the fuel system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into fuel system.

4. Discard 'O' ring from fuel pressure sensor.

## Refit

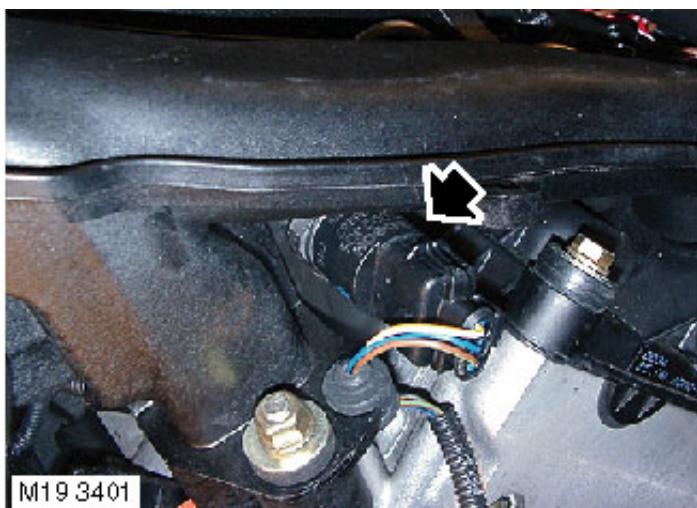
1. Clean fuel filter and sensor mating faces.
2. Using a new 'O' ring, fit fuel pressure sensor to filter, fit retaining clamp and tighten Torx bolt to 6 Nm (4.4 lbf.ft).
3. Connect battery earth lead.
4. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Sensor - fuel - high pressure

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove air intake plenum.
3. Position absorbent cloth to collect fuel spillage.



4. Disconnect multiplug from fuel pressure sensor.



**CAUTION:** Before disconnecting any part of the fuel system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into fuel system.

5. Use a deep socket and carefully remove fuel pressure sensor. Discard sealing washer.



**CAUTION:** Always fit plugs to open connections to prevent contamination.

## Refit

1. Clean fuel pressure sensor.
2. Fit new sealing washer to fuel pressure sensor. Use petroleum jelly to hold sealing washer in position on pressure sensor.
3. Fit fuel pressure sensor and tighten to 38 Nm (28 lbf.ft).
4. Connect multiplug to fuel pressure sensor.

5. Fit air intake plenum.

6. Connect battery earth lead.

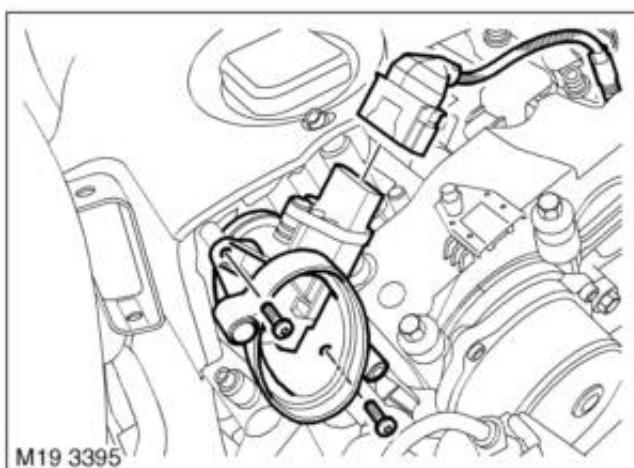
7. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Sensor - combined mass air flow (MAF) and intake air temperature (IAT)

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove turbocharger intake duct.



3. Remove 2 Torx screws securing MAF/IAT sensor.
4. Remove MAF/IAT sensor and disconnect multiplug.

## Refit

1. Clean MAF/IAT sensor and mating face.
2. Position MAF/IAT sensor and connect multiplug.
3. Fit MAF/IAT sensor and tighten Torx screws to 6 Nm (4.4 lbf.ft).
4. Fit turbocharger intake duct.
5. Connect battery earth lead.
6. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Pump - injection

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

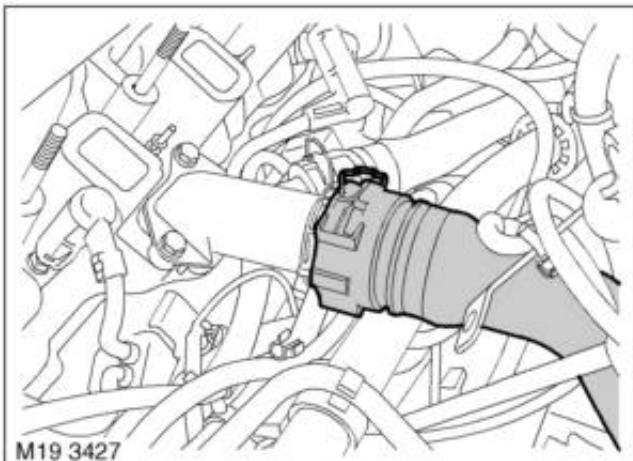
1. Disconnect battery earth lead.



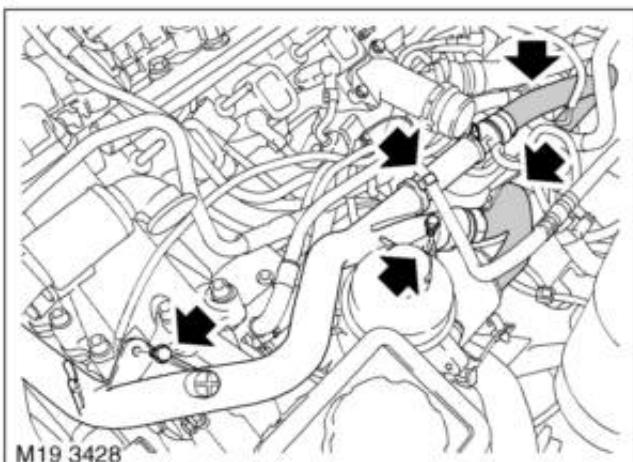
**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

2. Remove EGR cooler.

3. Remove inlet manifold gaskets.



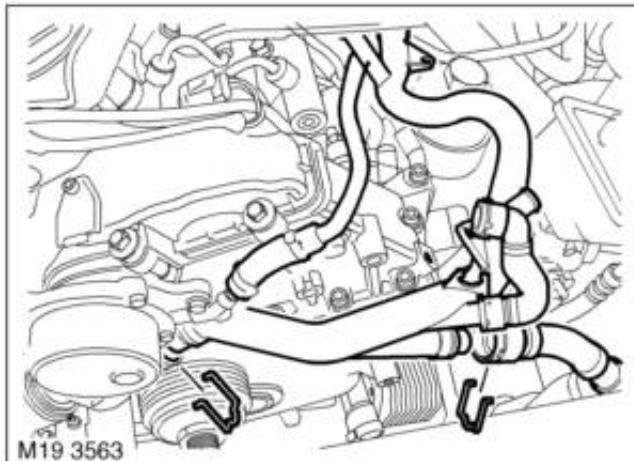
4. Release clip and disconnect top hose from coolant elbow.



5. Release clips and disconnect heater hose and gearbox fluid cooler hose from the coolant rail.

6. Release fuel pipe from clip securing it to coolant rail.

7. Remove 2 bolts securing coolant rail.



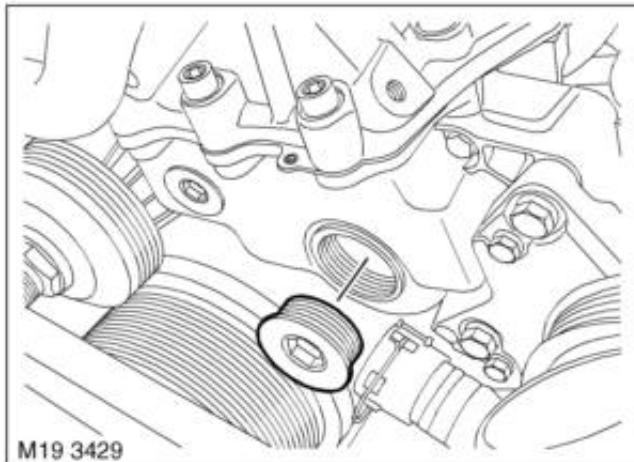
8. Release clip and disconnect hose from vacuum pump.



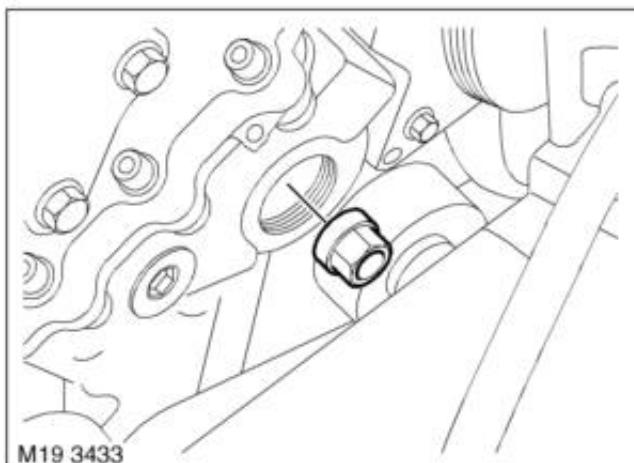
**CAUTION: Always fit plugs to open connections to prevent contamination.**

9. Release clip and disconnect expansion tank hose from coolant rail.

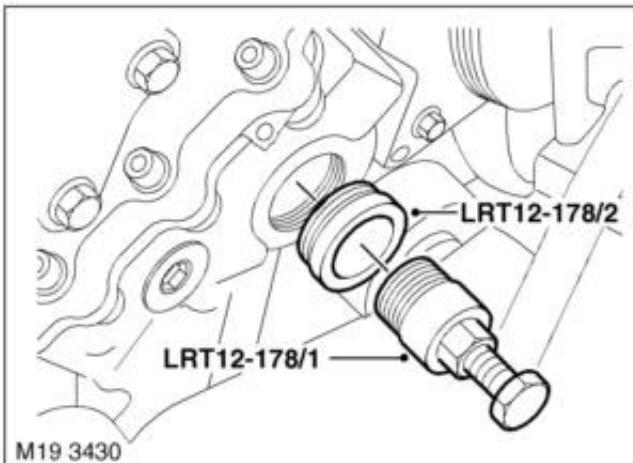
10. Release clip and remove coolant rail from thermostat housing.



11. Remove large access plug in timing case and discard seal.



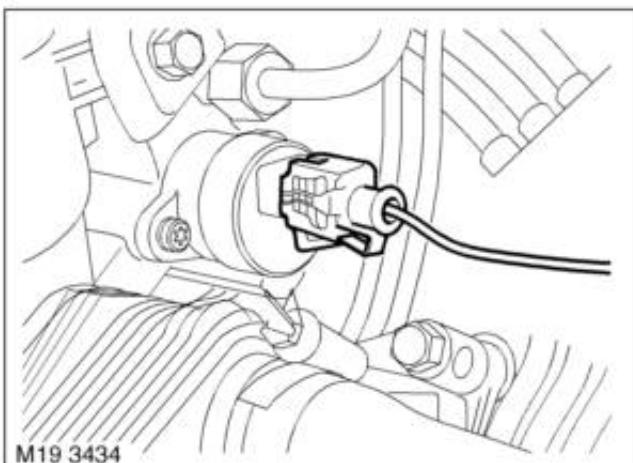
12. Remove fuel pump sprocket nut.



13. Fit LRT-12-178/2 into timing cover.
14. Fit LRT-12-178/1 to fuel pump sprocket and tighten centre screw to release sprocket from pump.



**CAUTION: Do not remove puller from sprocket until fuel pump is fitted.**



15. Disconnect multiplug from fuel pump.



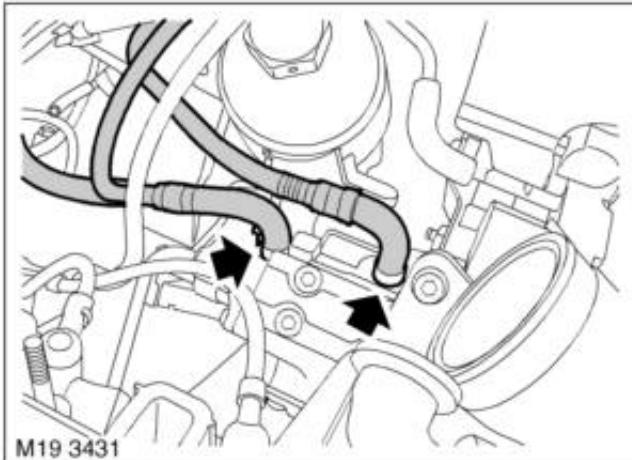
**CAUTION: Under no circumstances should the ignition be 'ON' at any position during disconnection of the fuel pump multiplug.**

16. Position cloth under fuel pump to collect fuel spillage.

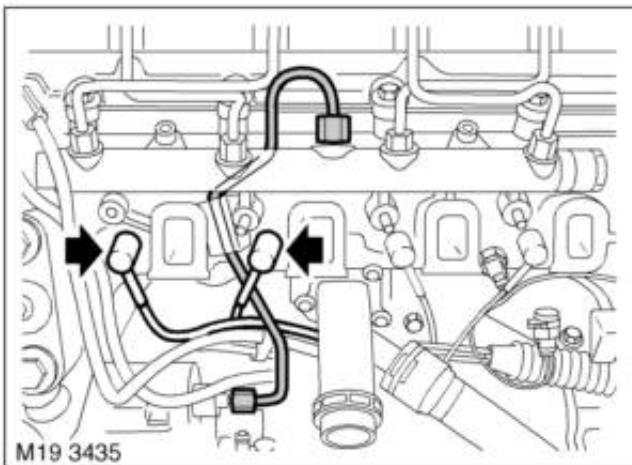


**CAUTION: Care must be taken to ensure that oil or fluid does not enter or contaminate the alternator.**

17. Cover alternator to prevent fluid contamination.



18. Loosen 2 clips and disconnect fuel hoses from pump.

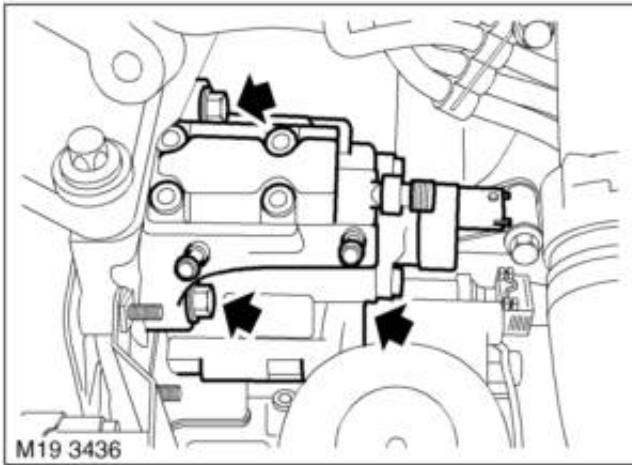


19. Loosen 2 nuts and remove high pressure fuel pipe. Remove pipe support bush.



**CAUTION: Always fit plugs to open connections to prevent contamination.**

20. Disconnect caps from No 1 and 2 glow plugs and move clear of fuel pump.



21. Remove 3 nuts, release and remove fuel pump. Discard gasket.

## Refit

1. Clean fuel pump and mating face.

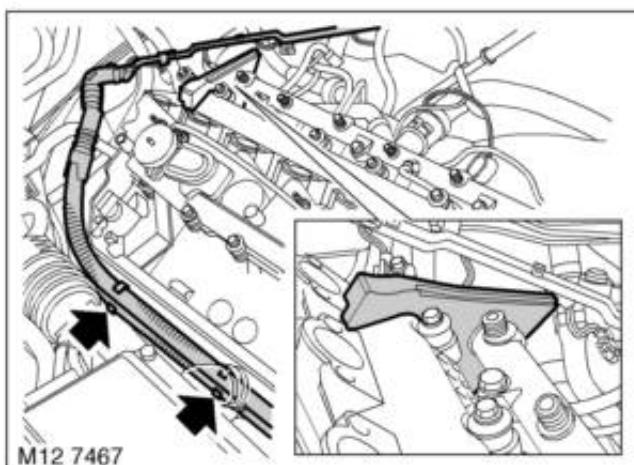
2. Fit new fuel pump gasket.
3. Fit fuel pump and tighten nuts to 24 Nm (18 lbf.ft).
4. Connect glow plug caps
5. Clean high pressure fuel pipe unions.
6. Fit fuel pipe and support bush, tighten unions to 20 Nm (15 lbf.ft).
7. Fit fuel hoses to pump and tighten clips.
8. Connect multiplug to pump.
9. RemoveLRT-12-178/2 and LRT-12-178/1.
10. Fit fuel pump sprocket retaining nut and tighten to 65 Nm (48 lbf.ft).
11. Clean access plug.
12. Fit timing chain tensioner access plug and new seal, tighten to 30 Nm (22 lbf.ft).
13. Clean thermostat housing and coolant rail.
14. Position coolant rail, fit bolts and tighten to 10 Nm (7 lbf.ft).
15. Connect hoses to coolant rail and secure with clips.
16. Connect top hose to coolant elbow and secure with clip.
17. Secure fuel pipe in coolant rail clip.
18. Connect hose to vacuum pump and secure with clip.
19. Fit inlet manifold gaskets.
20. Fit EGR cooler.
21. Connect battery earth lead.

# Turbocharger

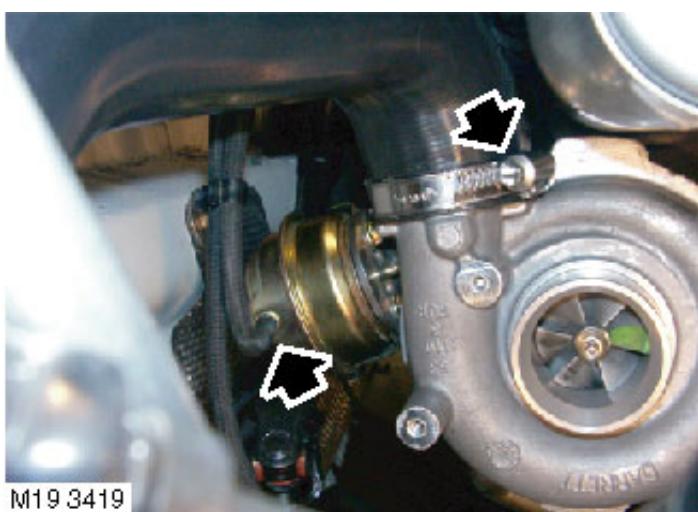
This procedure is also applicable for removal and fitting of the turbocharger gasket. Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove exhaust front pipe.
4. Remove air filter element.
5. Remove turbocharger intake duct.

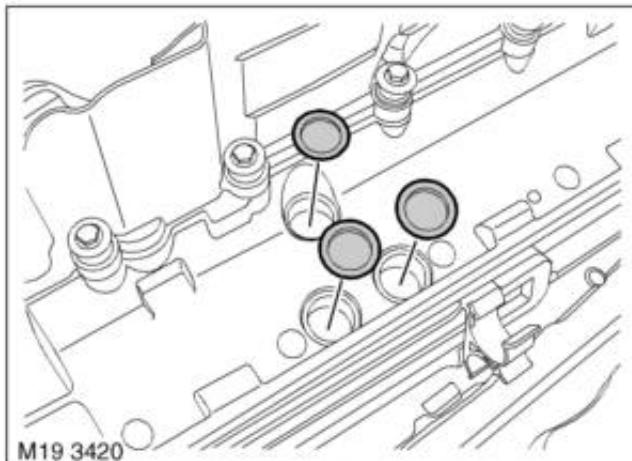


6. Release engine harness from clips and move clear of camshaft cover.

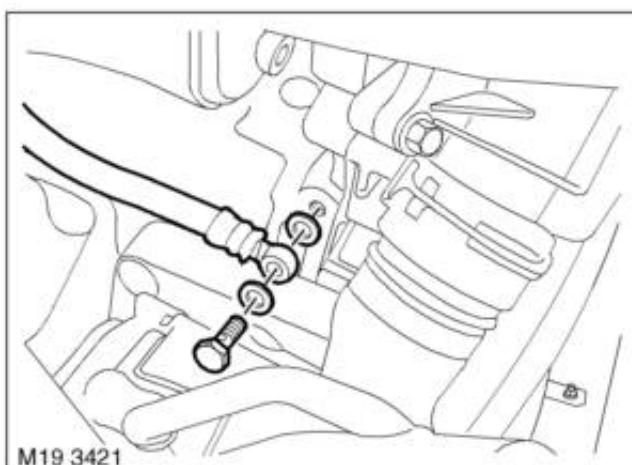


7. Loosen clip and disconnect intercooler hose from turbocharger. Discard clip.

8. Disconnect vacuum hose from turbocharger wastegate control valve.



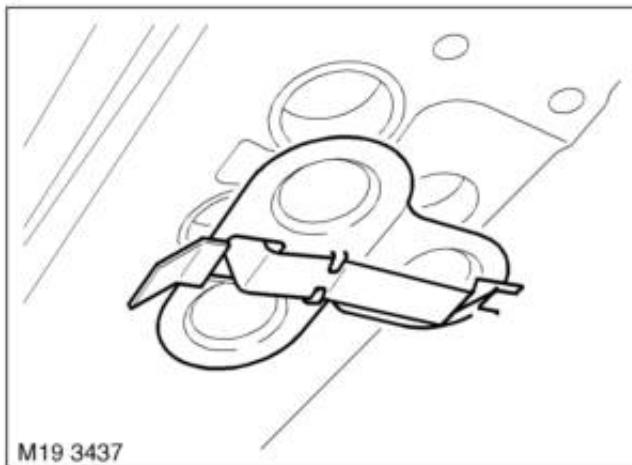
9. Remove 3 grommets from base of air filter housing.



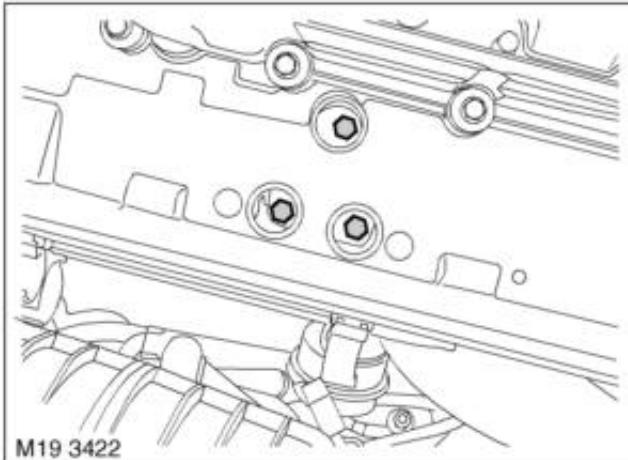
10. Remove turbocharger oil feed banjo bolt from cylinder block and discard sealing washers.



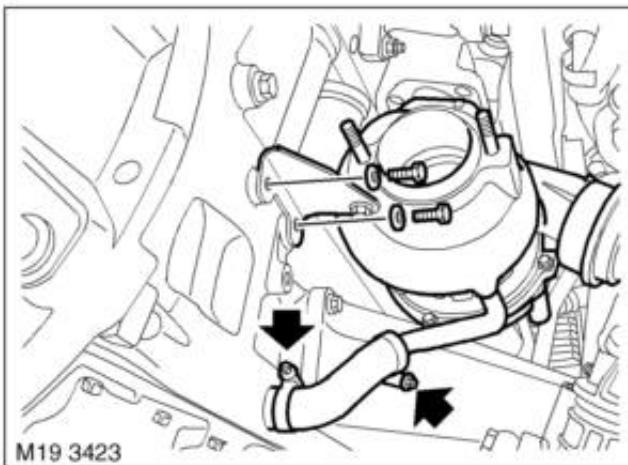
**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.



11. Release access plate from heat shield.



12. Remove 3 bolts securing turbocharger to exhaust manifold.

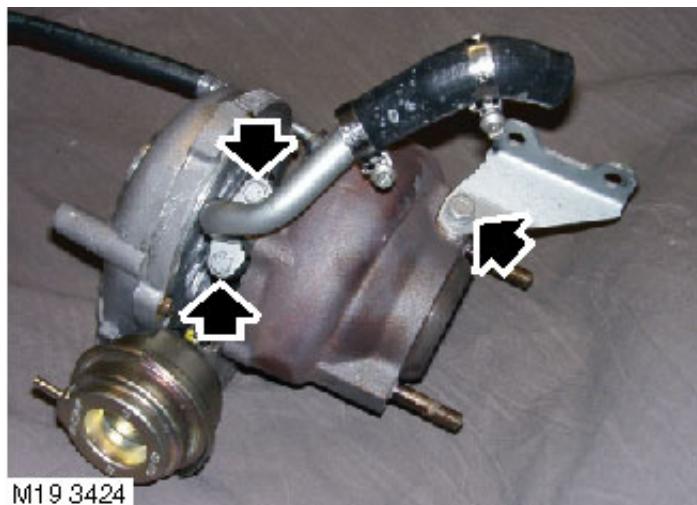


13. Loosen 2 clips and disconnect turbocharger oil drain hose from cylinder block.

14. Remove 2 bolts securing turbocharger support bracket to cylinder block and remove turbocharger.

15. Remove and discard turbocharger gasket.

**NOTE: Do not carry out further dismantling if component is removed for access only.**



16. Remove bolt securing support bracket and remove bracket.



17. Note fitted position of oil feed pipe, remove banjo bolt, remove feed pipe and discard sealing washers.



**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

## Refit

1. Clean turbocharger oil drain pipe and mating face.
2. Use new gasket, fit oil drain pipe and tighten bolts to 10 Nm (7 lbf.ft).
3. Clean oil feed pipe and mating face on turbocharger.
4. Use new sealing washers, fit oil feed pipe, align and tighten banjo bolt to 25 Nm (18 lbf.ft).
5. Clean turbocharger and mating face.
6. Fit turbocharger, fit bolts support bracket to cylinder block but do not tighten.
7. Use new gasket, align turbocharger and tighten bolts securing turbocharger to 50 Nm (37 lbf.ft).
8. Tighten turbocharger support bracket bolts to 25 Nm (18 lbf.ft).
9. Fit turbocharger drain hose and tighten clips.
10. Fit access plate to heat shield.
11. Fit grommets to filter housing.
12. Clean turbocharger oil feed pipe and banjo bolt.
13. Use new sealing washers, align oil feed pipe and tighten banjo bolt to 25 Nm (18 lbf.ft).
14. Connect vacuum hose to wastegate control valve.
15. Clean turbocharger and mating face on hose assembly.
16. Using a new retaining clip fit hose assembly, intercooler to turbocharger. Tighten clip to 6 Nm (4.4 lbf.ft).

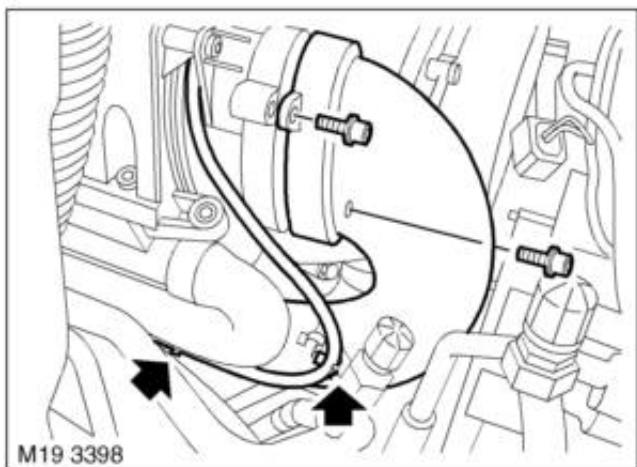
17. Allow 15 minutes to elapse and re-torque retaining clip, intercooler hose assembly to turbocharger to 6 Nm (4.4 lbf.ft).
18. Fit engine harness to clips.
19. Fit turbocharger intake duct.
20. Fit air filter element.
21. Fit exhaust front pipe.
22. Connect battery earth lead.

# Duct- intake - turbocharger

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove engine cover.
3. Release intake duct from air cleaner housing and tie aside.



4. Release vacuum hose from clips on duct.
5. Remove 2 Allen screws securing turbocharger intake duct to air cleaner housing.
6. Release duct from turbocharger and remove with breather hose.
7. Remove breather hose from duct.

## Refit

1. Fit breather hose to duct.
2. Fit duct and connect to turbocharger and air cleaner.
3. Connect breather hose to air cleaner.
4. Fit Allen screws securing turbocharger duct to air cleaner and tighten to 8 Nm (6 lbf.ft).
5. Fit vacuum hose to clips.
6. Fit intake duct to air cleaner.
7. Fit engine cover.

8. Connect battery earth lead.

# Intercooler

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

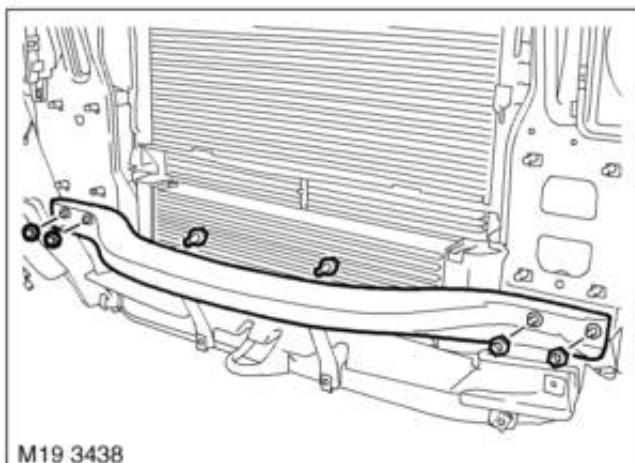
## Remove

1. Disconnect battery earth lead.

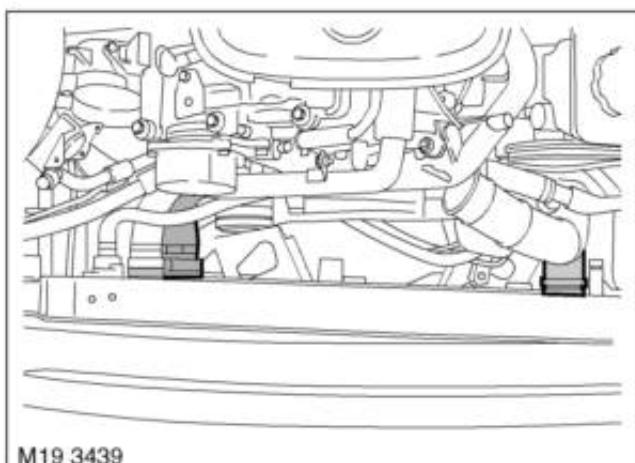
2. Remove fan motor.

3. Remove undertray.

4. Remove viscous coupling.

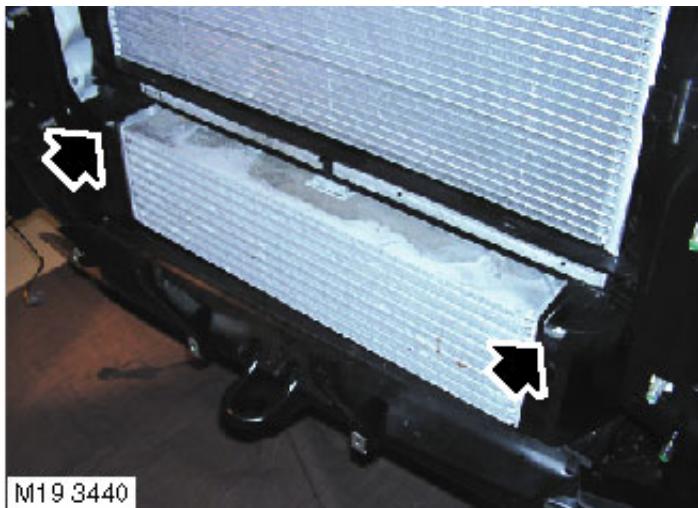


5. Remove 4 nuts and 2 bolts securing front cross member to subframe and remove cross member.



6. Release clip and disconnect inlet hose from intercooler.

7. Release clip and disconnect outlet hose from intercooler.



M19 3440

8. Release 2 clips securing intercooler to mounting, carefully remove intercooler.

## Refit

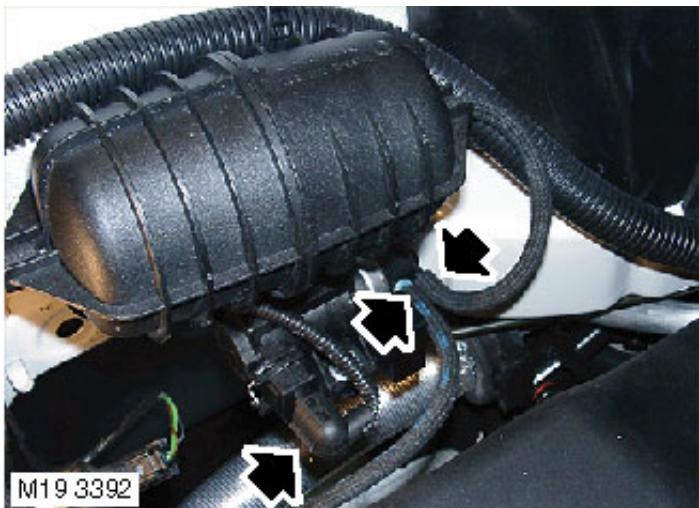
1. Position intercooler to mounting and secure clips.
2. Fit and secure intercooler hoses.
3. Position front cross member to subframe, fit nuts and bolts. Tighten nuts to 45 Nm (33 lbf.ft) and bolts to 25 Nm (18 lbf.ft).
4. Fit viscous coupling.
5. Fit undertray.
6. Fit fan motor.
7. Connect battery earth lead.

# Solenoid valve - boost control

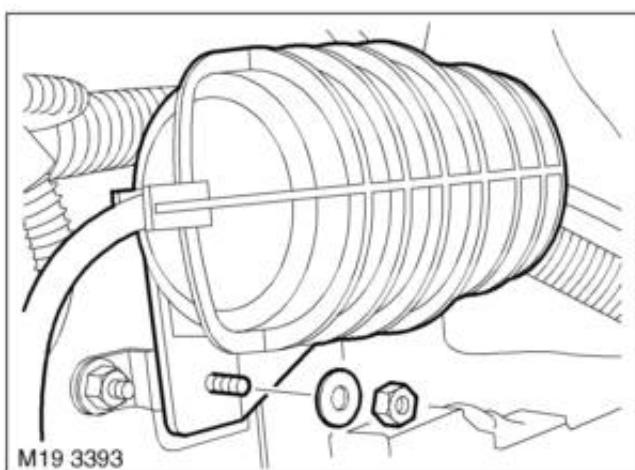
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

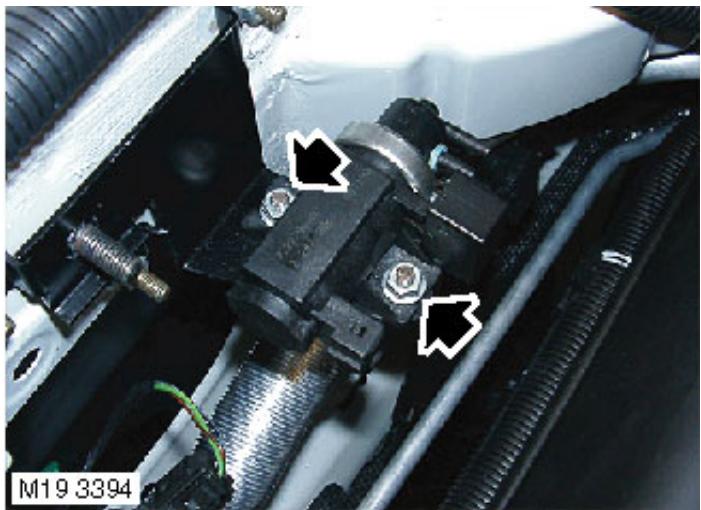
1. Disconnect battery earth lead.



2. Disconnect multiplug from turbocharger boost control solenoid valve.
3. Identify and disconnect vacuum hoses.



4. Remove nut securing vacuum reservoir and position reservoir aside.



5. Remove 2 nuts securing solenoid valve and remove valve from bracket.

## Refit

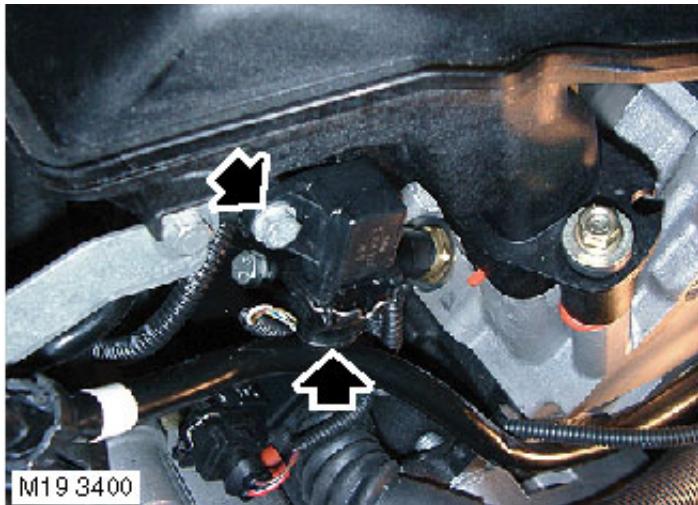
1. Fit solenoid valve and tighten nuts to 10 Nm (7 lbf.ft).
2. Connect vacuum hoses.
3. Connect multiplug.
4. Fit reservoir and tighten nut to 10 Nm (7 lbf.ft).
5. Connect battery earth lead.

# Sensor - turbocharger boost pressure

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove air intake plenum.



3. Disconnect multiplug from turbocharger boost pressure sensor.
4. Remove bolt securing turbocharger boost pressure sensor and remove sensor. Discard seal.

## Refit

1. Clean turbocharger boost pressure sensor and mating face.
2. Using a new seal, fit sensor and tighten bolt to 8 Nm (6 lbf.ft).
3. Connect multiplug to turbocharger boost pressure sensor.
4. Fit air intake plenum.
5. Connect battery earth lead.
6. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Regulator - fuel pressure

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

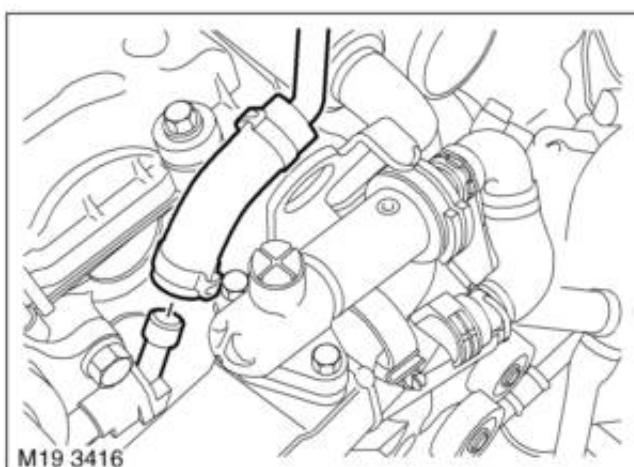
1. Disconnect battery earth lead.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

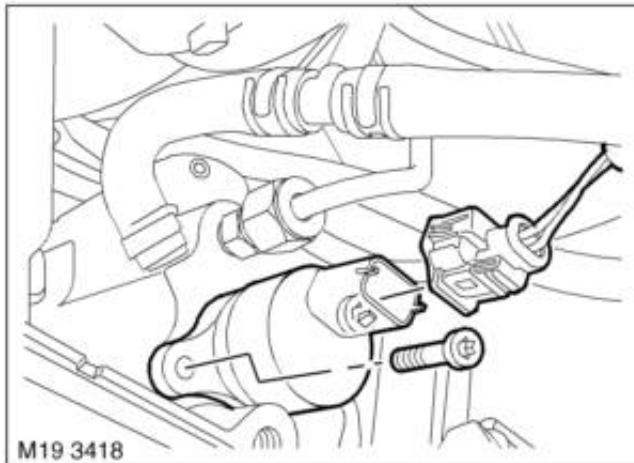


2. Remove 2 screws securing intake duct to fuel cooler.
3. Remove 2 bolts securing fuel cooler intake duct to bonnet locking platform.
4. Remove fuel cooler intake duct for access.
5. Remove inlet manifold.



M19 3416

6. Release clip and disconnect hose from vacuum pump, discard clip.
7. Move vacuum pipe aside for access.



8. Disconnect multiplug from fuel pressure regulator.
9. Position absorbent cloth to collect fuel spillage.



**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

10. Remove 2 'T30' Torx screws, move harness aside for access to rear screw. Carefully remove fuel pressure regulator. Discard 2 seals.

## Refit

1. Clean fuel pressure regulator and mating face.
2. Fit new seals to fuel pressure regulator.
3. Fit regulator, fit bolts and tighten to 10 Nm (7 lbf.ft).
4. Connect hose to vacuum pump and secure with new clip.
5. Connect multiplug to fuel pump.
6. Fit inlet manifold gaskets.
7. Fit intake duct assembly and secure to cooler with screws.
8. Secure cooler intake duct to bonnet locking platform and tighten bolts to 3 Nm (2.2 lbf.ft).
9. Connect battery earth lead.

# Injector

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

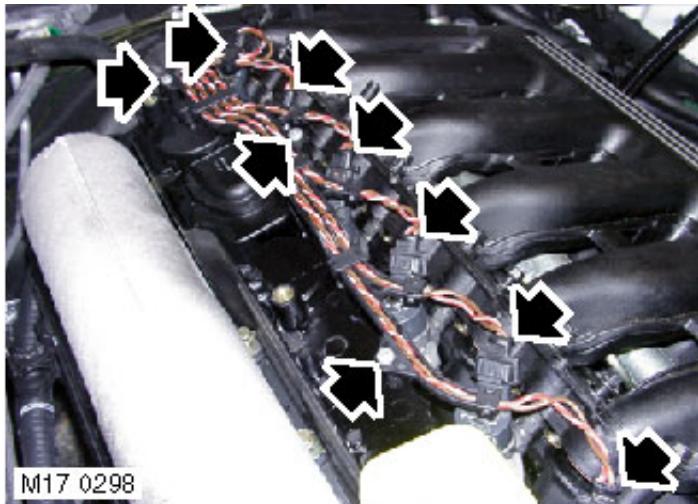
2. Remove injector pipes.

3. Remove air filter element.

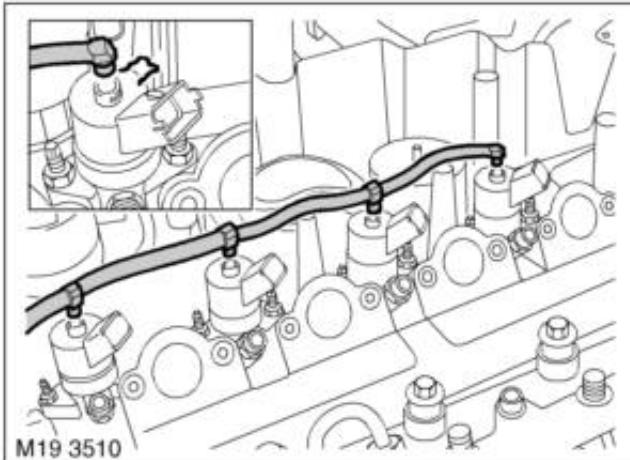
4. Remove acoustic pad.



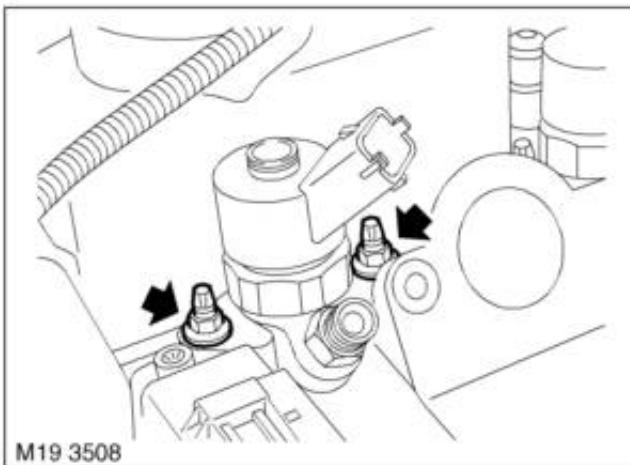
**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.



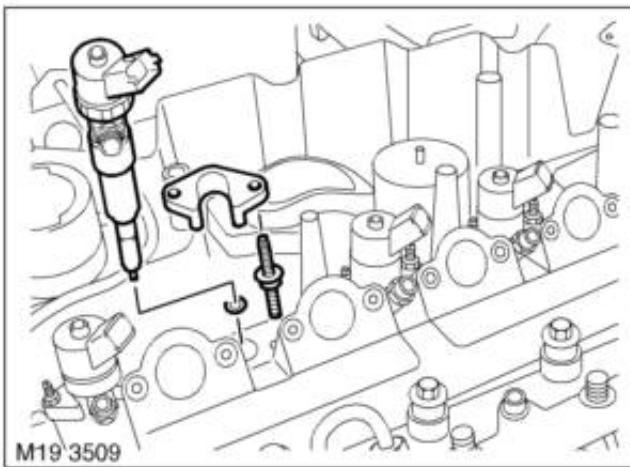
5. Disconnect multiplugs from injectors.
6. Remove 3 Torx screws and move injector harness aside.



7. Depress clips and remove fuel return hoses from injectors.



8. Remove 2 nuts securing injector.



9. Use Torx socket and rotate injector fixing studs anti-clockwise to extract injector.

10. Remove injector and clamp and discard sealing washer.

## Refit

1. Clean injector and seat in cylinder head.
2. Tighten injector studs to 10 Nm (7 lbf.ft).

3. Using a new sealing washer refit injector and clamp.
4. Tighten injector clamp nuts evenly to 10 Nm (7 lbf.ft).
5. Ensure fuel return hose connections are clean.
6. Fit new seals to fuel return hoses, depress clips and fit hoses to injectors.
7. Position injector harness and tighten screws to 2 Nm (1.5 lbf.ft).
8. Connect multiplugs to injectors.
9. Fit injector pipe.
  
10. Fit acoustic pad.
11. Fit air filter element.
  
12. Connect battery earth lead.
13. Use TestBook/T4 to initiate injector operation.

# Injector pipes

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.

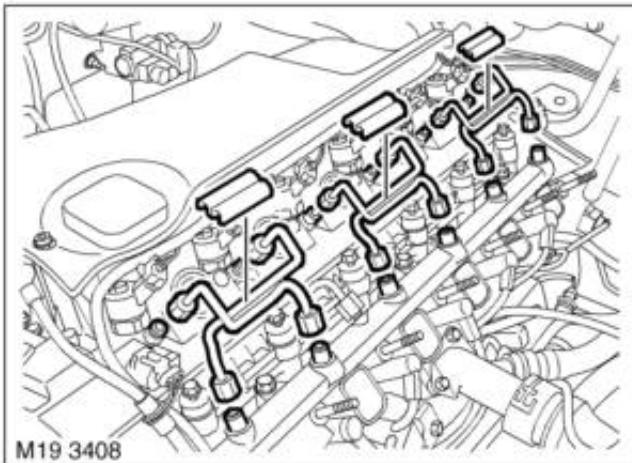


**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

2. Remove inlet manifold gaskets.
3. Position absorbent cloth to collect fuel spillage.



**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.



4. Remove clips from injector pipes.
5. Loosen unions and remove injector pipes.



**CAUTION:** To prevent damage to components, use two spanners when loosening or tightening unions.

## Refit

1. Clean injector pipe unions.
2. Fit injector pipes and tighten union nuts to 20 Nm (15 lbf.ft).

3. Fit clips to injector pipes.

4. Fit inlet manifold gaskets.

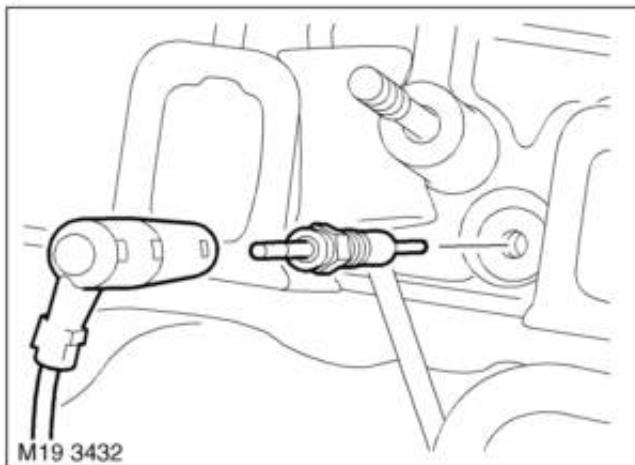
5. Connect battery earth lead.

# Glow plug

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove inlet manifold gaskets.



3. Remove connections from glow plugs.
4. Use a deep socket and remove 6 glow plugs.

## Refit

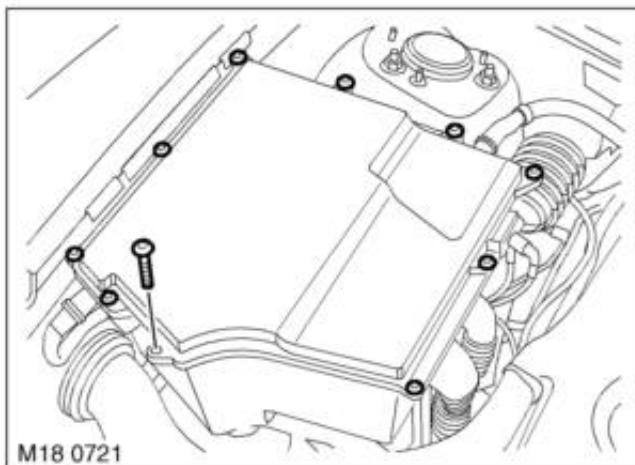
1. Thoroughly clean glow plugs and seating area in cylinder head.
2. Fit glow plugs and tighten to 20 Nm (15 lbf.ft).
3. Fit connections to glow plugs.
4. Fit inlet manifold gaskets.
5. Connect battery earth lead.

# Electronic control unit (ECU) - glow plugs

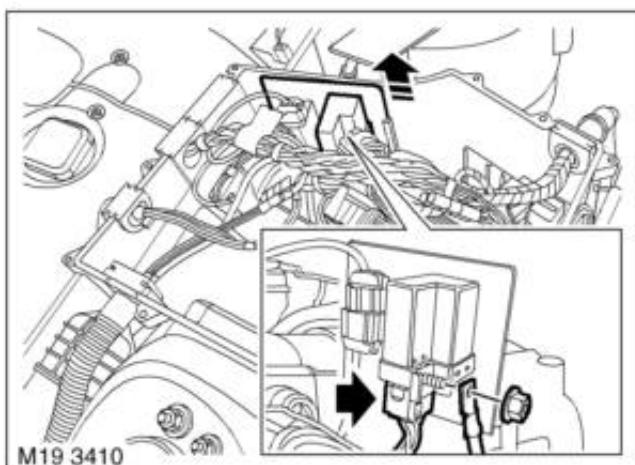
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



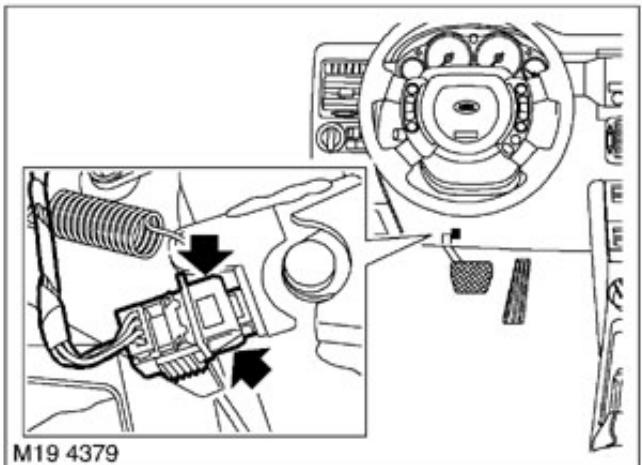
3. Release glow plug ECU from 'E' box.
4. Disconnect multiplug from glow plug ECU.
5. Remove nut securing lead, release lead and remove glow plug ECU.

## Refit

1. Position glow plug ECU, connect lead and tighten nut to 6 Nm (4.4 lbf.ft).
2. Connect multiplug, and fit glow plug ECU to 'E' box.

3. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
4. Connect battery earth lead.
5. If a replacement ECU has been fitted, re-set adaptions using TestBook/T4.

# Sensor - brake pedal position Remove



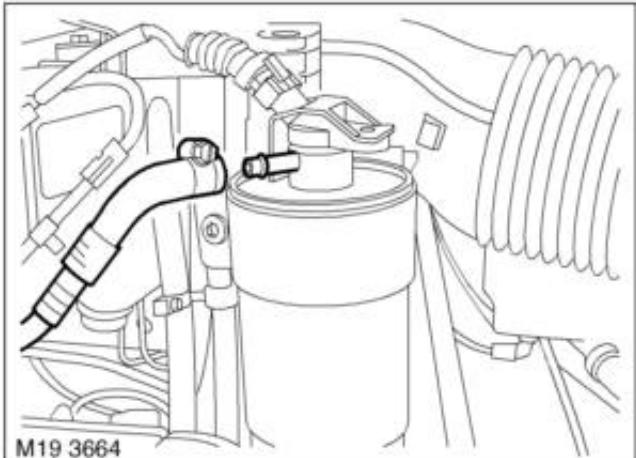
1. Release brake pedal position sensor from holder, disconnect multiplug and remove sensor.
2. Remove holder from pedal bracket.

## Refit

1. Fit holder to pedal bracket.
2. Position brake pedal position sensor, connect multiplug and secure to holder.
3. With brake pedal released, ensure brake pedal position sensor is in contact with operating tang on brake pedal.
4. If a replacement sensor has been fitted, re-set adaptions using TestBook/T4.

# Fuel system - pressure test Check

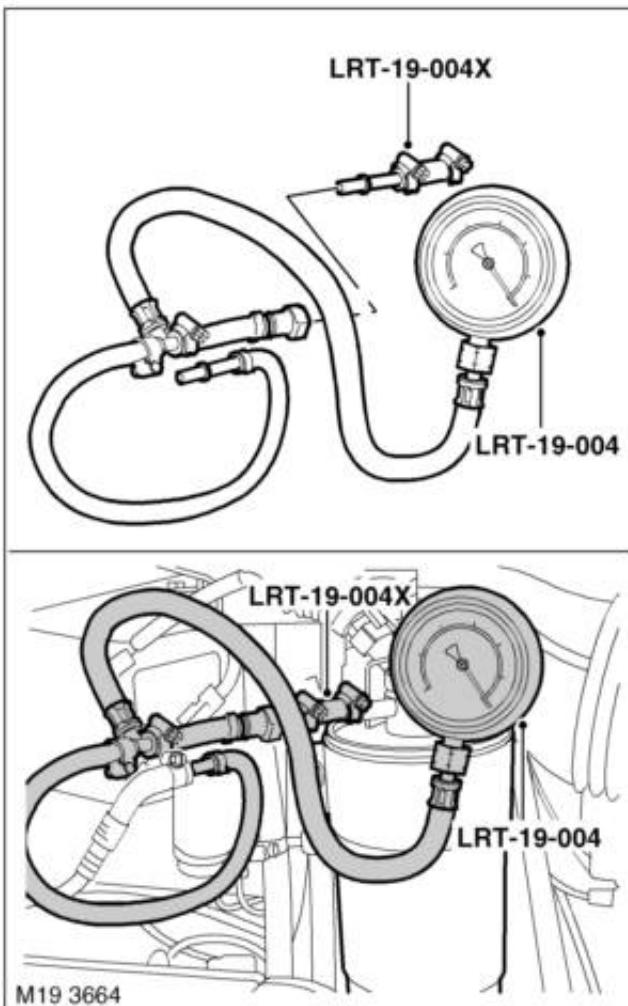
1. Disconnect battery earth lead.
2. Position absorbent cloth to catch spillage.



3. Release clip and disconnect fuel outlet hose from filter assembly.



**CAUTION:** Before disconnecting any part of the fuel system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into fuel system.



4. Connect stub pipe of LRT-19-004X and gauge LRT-19-004 to fuel filter outlet hose and secure with clip.
5. Fit stub pipe to hose connector, fit short hose to stub pipe and secure with clip.
6. Connect short hose to fuel filter outlet pipe and secure with clip.
7. Check security of fuel hose connections and cover fuel filter assembly with absorbent cloth.
8. Connect battery earth lead.
9. Insert the ignition key, turn the key to position II.
10. With ignition switch at position II, note the fuel pressure. If the pressure is below (3.5 bar±0.1 bar, with 11.5 volts±0.1 volt, at 20°C±5°C), Change secondary fuel pump.
11. Turn ignition to the off position and remove key from switch.
12. Disconnect battery earth lead.
13. Position absorbent cloth to collect fuel spillage.
14. Note reading on pressure gauge, when pressure reads '0' disconnect service tools from fuel filter.
15. Connect fuel outlet hose to fuel filter and secure with clip.
16. Connect battery earth lead.

17. Start and run engine to check for leaks from fuel filter and hoses.

18. Stop engine.

19. Remove short hose and stub pipe from LRT-19-004X.

# Tank - drain

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Drain

1. Open fuel filler flap and remove cap.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

2. Connect fuel recovery appliance earth lead to vehicle.



**WARNING:** Fuel must not be extracted or drained from any vehicle while it is over a pit. Extraction or draining of fuel must be carried out in a well ventilated area.

3. Fit fuel recovery appliance extraction hose, insert hose through filler neck, turning hose slightly if necessary. **Chamfer end of bowser hose to approximately 30° to aid entry.**

4. Connect exhaust extractor to tail pipes.

5. Start engine.

6. Using a fuel recovery appliance, drain the fuel from the tank into a sealed container. Follow the manufacturers instructions for the connection and safe use of the appliance.

7. Stop engine when fuel warning light is displayed.

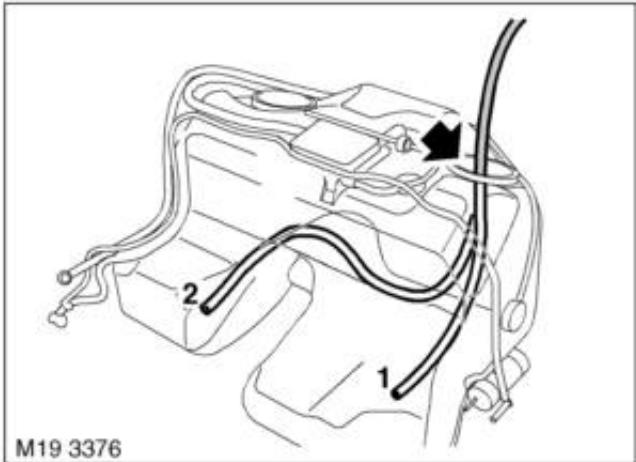


**CAUTION:** Do not allow fuel pump to run dry.

8. Disconnect battery earth lead.

9. Remove fuel tank LH module cover.

10. Remove extraction hose from filler neck and refit fuel cap.



11. Position extraction hose through aperture in fuel tank LH access hole and drain remaining fuel, number 1 in illustration. Repeat process in RH chamber draining remaining fuel, number 2 in illustration.
12. Remove extraction hose from fuel tank, disconnect earth lead from vehicle.

## Refill

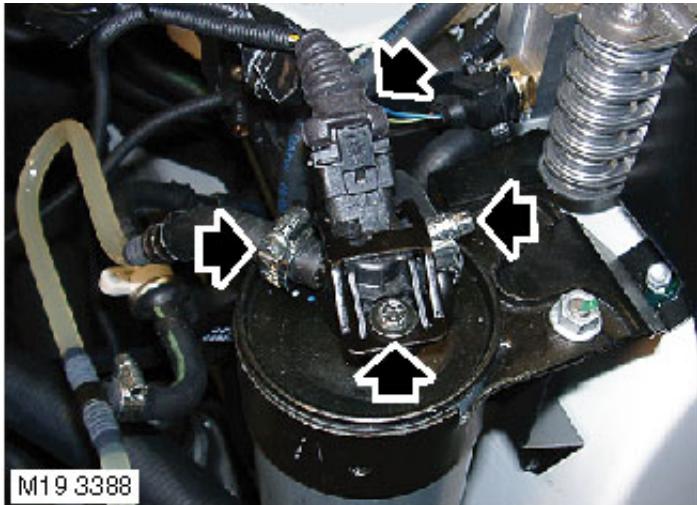
1. Fit fuel tank LH module cover.
2. Replenish fuel as required.
3. Connect battery earth lead.
4. Turn ignition key to position 1, allow time for fuel pump to prime.
5. Start engine.
6. Stop engine and disconnect exhaust extractors.

# Filter

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.



2. Disconnect multiplug from fuel pressure sensor.
3. Position absorbent cloth beneath fuel filter.
4. Remove Torx screw and clamp securing fuel pressure sensor to filter body, release sensor from filter.

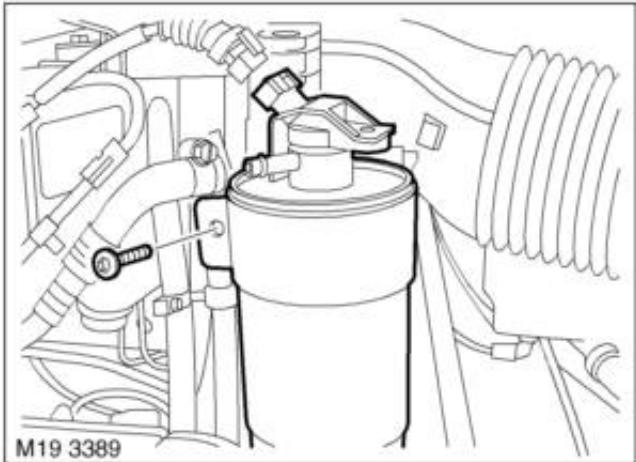


**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

5. Discard 'O' ring from fuel pressure sensor.
6. Note orientation of fuel hoses, loosen clip screws and disconnect both fuel hoses from filter head.



**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.



7. Remove screw securing fuel filter housing to bracket.
8. Remove fuel filter and head assembly.

## Refit

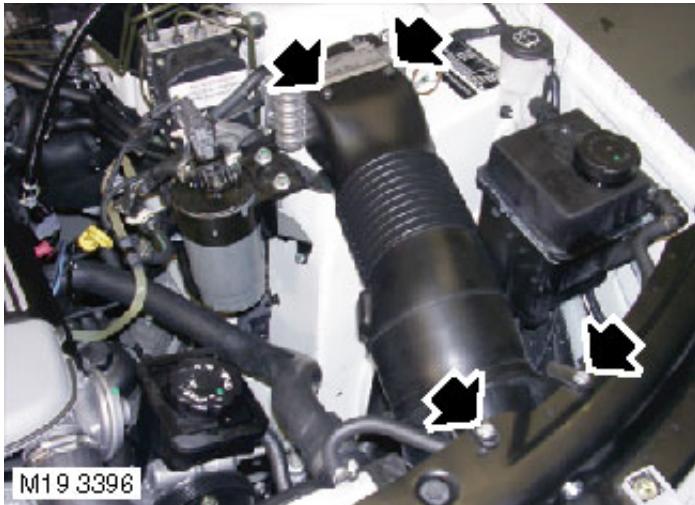
1. Clean area around fuel filter.
2. Fit fuel filter to mounting bracket and tighten bolt to 6 Nm (4.4 lbf.ft).
3. In the correct orientation, connect hoses to fuel filter head and tighten hose clips.
4. Using a new 'O' ring, fit fuel pressure sensor to filter, fit retaining clamp and tighten Torx bolt to 6 Nm (4.4 lbf.ft).
5. Connect multiplug to fuel filter head.
6. Connect battery earth lead.

# Matrix - fuel cooler

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

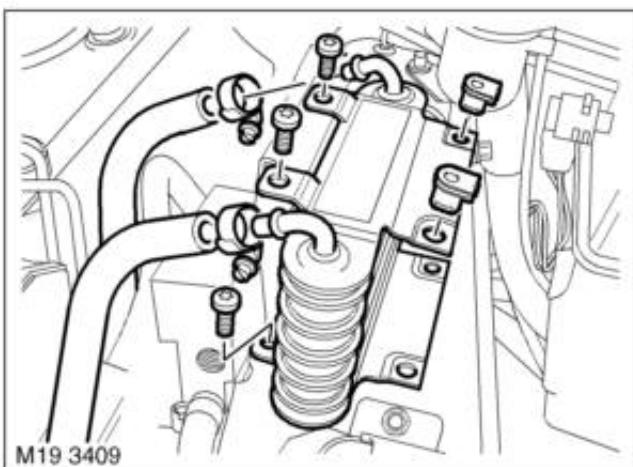
1. Disconnect battery earth lead.



2. Remove 2 bolts securing fuel cooler intake duct to bonnet locking platform.
3. Remove 2 screws securing intake duct to fuel cooler.
4. Remove intake duct assembly from vehicle.
5. Position absorbent cloth to collect fuel spillage.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.



6. Loosen 2 clips securing fuel hoses to cooler matrix.



**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

7. Disconnect fuel hoses from cooler matrix.
8. Remove 3 Torx bolts securing fuel cooler to mounting and collect cooler.

**NOTE: Do not carry out further dismantling if component is removed for access only.**

9. Remove 2 screw retaining clips from fuel cooler.

## Refit

1. Fit screw retaining clips to fuel cooler.
2. Fit cooler and tighten bolts to 10 Nm (7 lbf.ft).
3. Ensure connections are clean, then fit and secure flexible hoses.
4. Fit intake duct assembly and secure to cooler with screws.
5. Secure cooler intake duct to bonnet locking platform and tighten bolts to 3 Nm (2.2 lbf.ft).
6. Connect battery earth lead.

# Pump - fuel tank

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

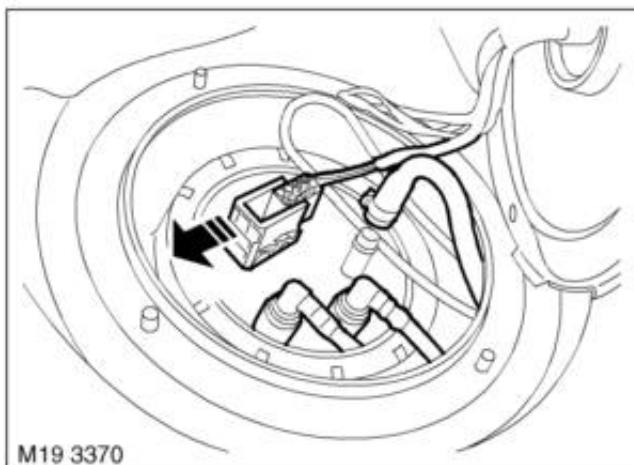
1. Drain fuel tank.
2. Disconnect battery earth lead.



3. Remove 4 nuts and remove fuel tank RH access cover.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.



4. Disconnect multiplug from fuel pump.
5. Position container to collect spillage.



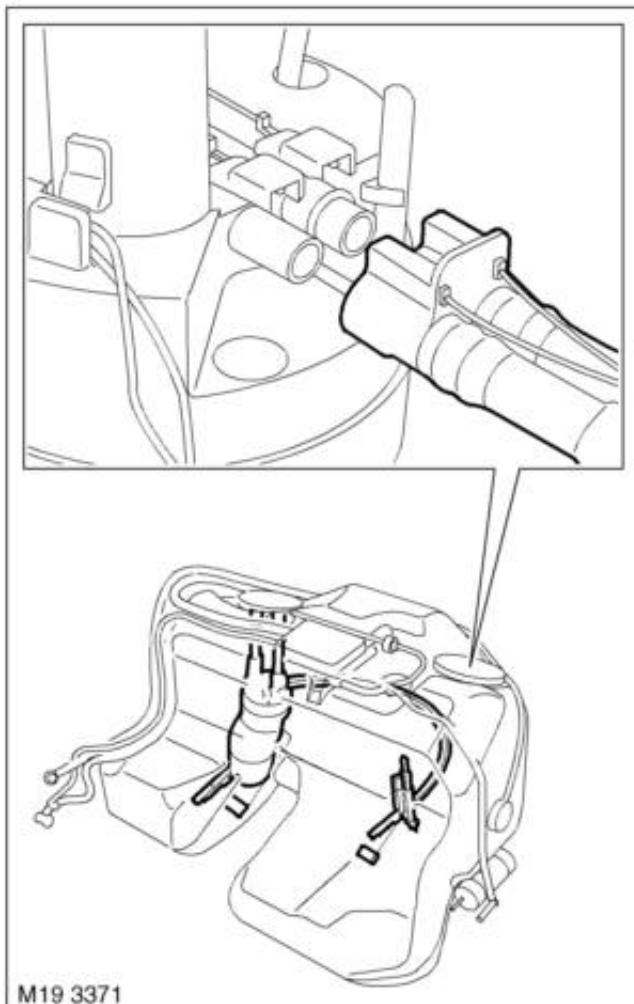
**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

6. Noting fitted position, release fuel feed and return pipes from pump. Release clip and disconnect fuel pump breather.

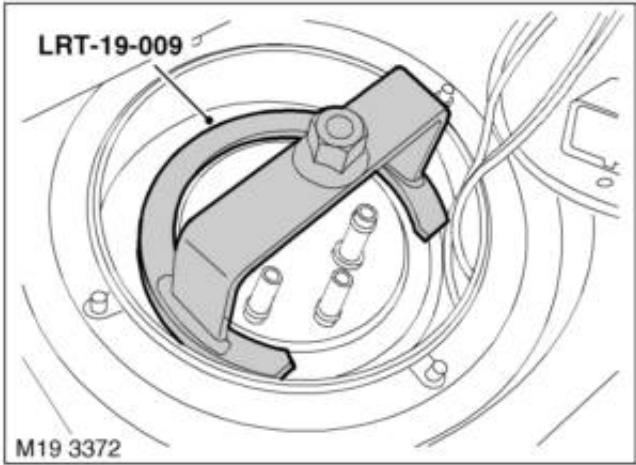


**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

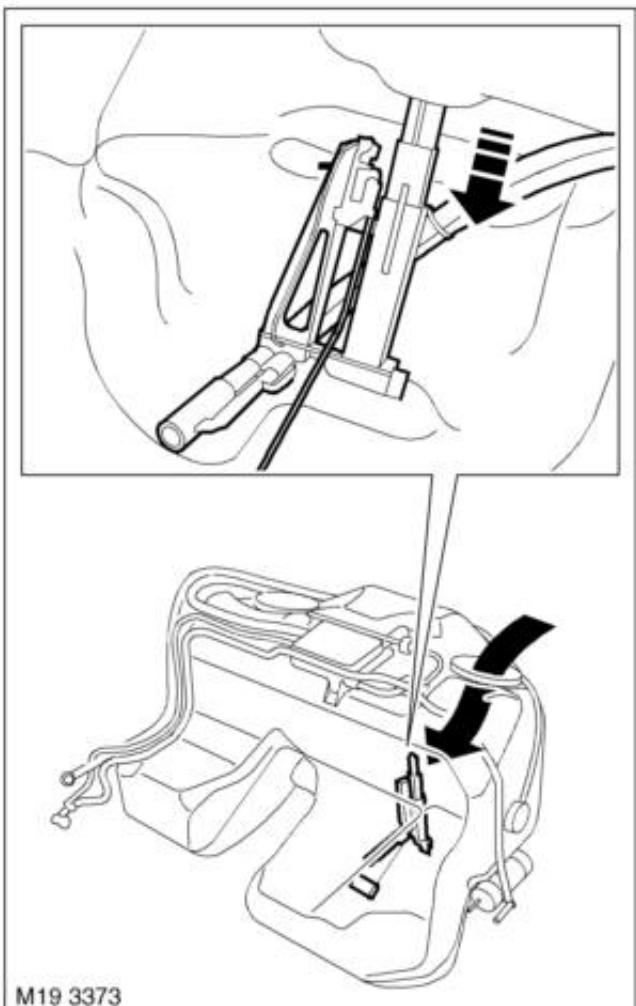
7. Collect fuel pipes and breather, tie aside to aid pump removal.



8. Through tank LH aperture, release clip and disconnect combined multiplug and fuel pipe connection from fuel pump body.



9. Clean area surrounding locking ring.
10. Using tool LRT-19-009, remove locking ring from fuel tank.
11. Carefully release fuel pump tank unit assembly. Remove and discard seal.
12. Position container to collect spillage.



13. Release tank LH sensor from mounting and remove.

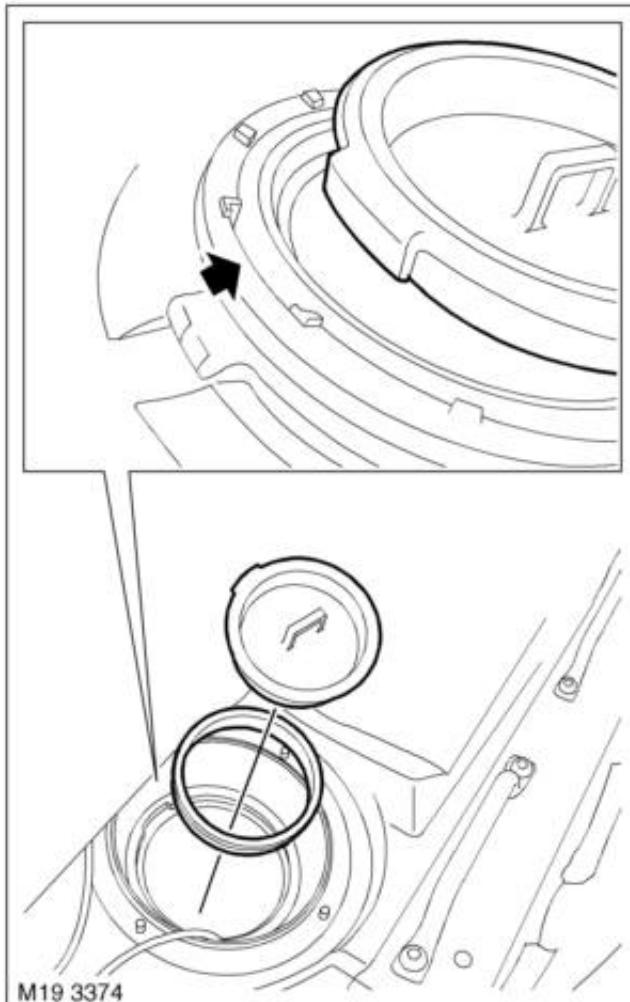
## Refit

1. Clean area surrounding fuel tank access.

2. Clean pump body and fit new tank seal to pump.
3. Connect combined fuel pipe and multiplug from tank LH sensor to pump assembly.



**CAUTION: Ensure clip is secure after connection.**



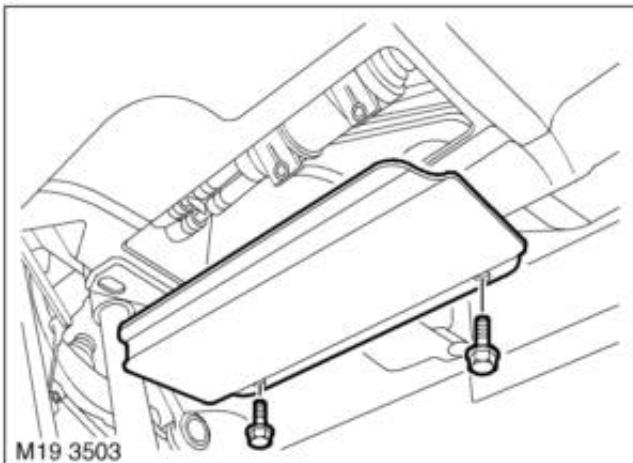
4. Carefully fit pump, align timing, check seal is correctly seated. From LH aperture, check foot of pump to ensure correct alignment with tank.
5. Using LRT-19-009, fit locking ring and tighten to 35 Nm (26 lbf.ft).
6. Connect fuel pipes and breather hose to pump.
7. Connect multiplug to fuel pump.
8. Position fuel tank RH access panel, fit nuts and tighten to 10 Nm (7 lbf.ft).
9. Fit carpet.
10. Connect battery earth lead.
11. Refill fuel tank.
12. Connect TestBook/T4 to ensure new fuel level senders are working correctly.

# Pump - secondary - fuel

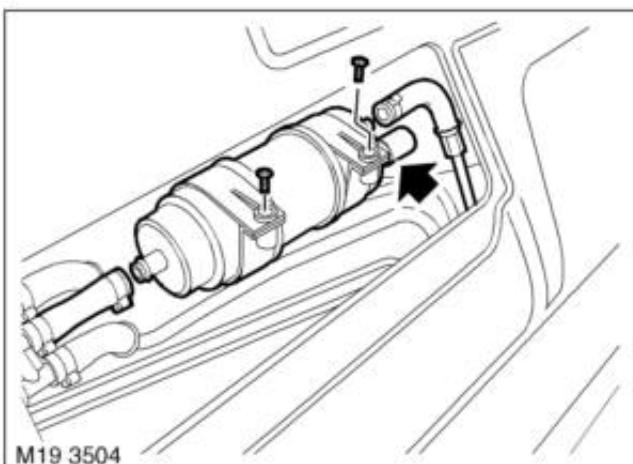
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Raise vehicle on lift.



3. Remove 2 screws securing fuel pump access cover.
4. Release and remove fuel pump access cover.



5. Remove 2 screws securing secondary fuel pump to mounting and release pump from mounting brackets.
6. Disconnect multiplug from secondary fuel pump.
7. Clamp secondary fuel pump inlet and outlet hoses.
8. Position container to collect spillage.



**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

9. Release clips securing fuel inlet and outlet hoses to secondary fuel pump.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

10. Remove secondary fuel pump.

**NOTE: Do not carry out further dismantling if component is removed for access only.**

11. Remove secondary fuel pump from rubber sleeve.

## Refit

1. Fit rubber sleeve to secondary fuel pump.
2. Connect hoses to secondary fuel pump and secure with retaining clips.
3. Remove hose clamps.
4. Connect multiplug to secondary fuel pump.
5. Position secondary fuel pump to mounting bracket and secure with screws.
6. Fit access panel and secure with screws.
7. Lower vehicle.
8. Connect battery earth lead.

# Tank

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

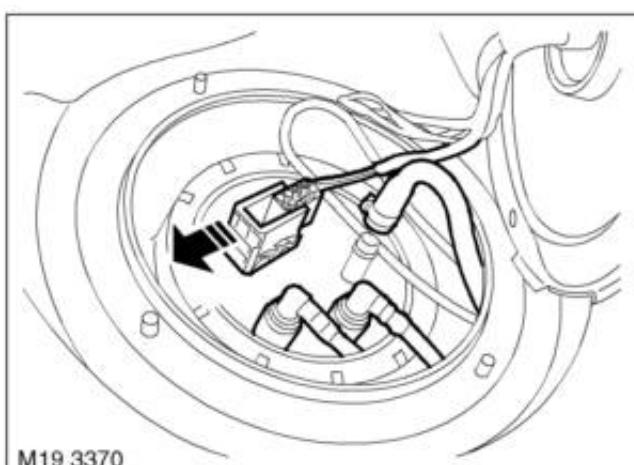
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain fuel tank.



**WARNING:** The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.



4. Remove 4 nuts and remove fuel tank RH access cover.



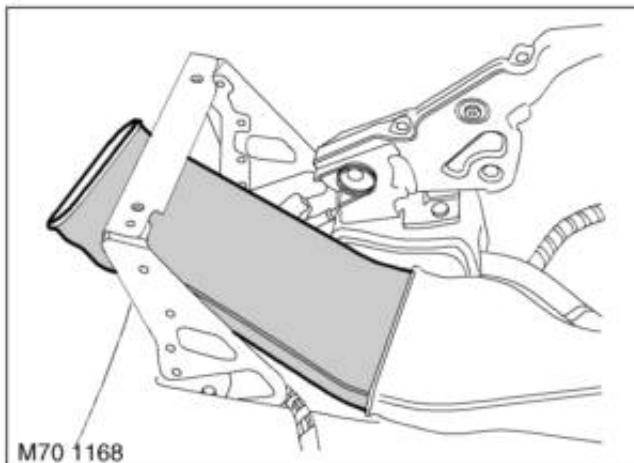
5. Disconnect multiplug from fuel pump.



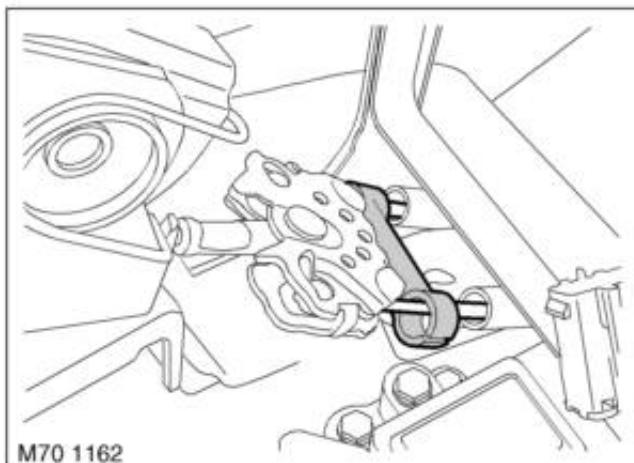
**CAUTION:** Under no circumstance should the ignition be 'ON' at any position, during

**disconnection of the fuel pump multiplug.**

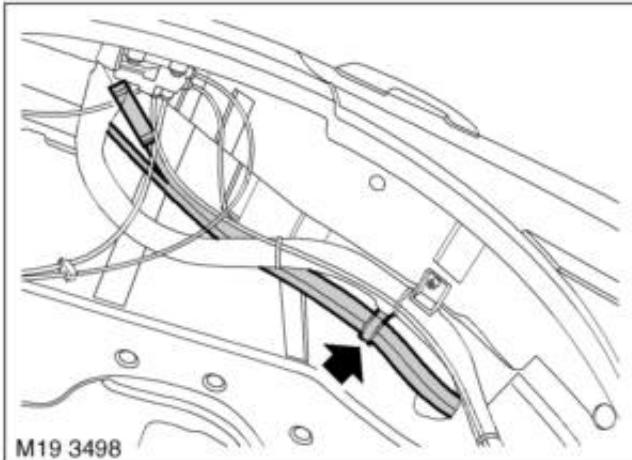
6. Remove centre console.



7. Remove intermediate section of rear air duct for access to handbrake cables.



8. Release cable retaining clip from handbrake compensator.
9. Release handbrake cables from compensator.
10. Remove propeller shaft.
11. Withdraw handbrake cables from body and move aside for access.
12. Remove RH rear wheel arch liner.



13. Release clip from breather hose and disconnect breather hose from filler neck.



**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

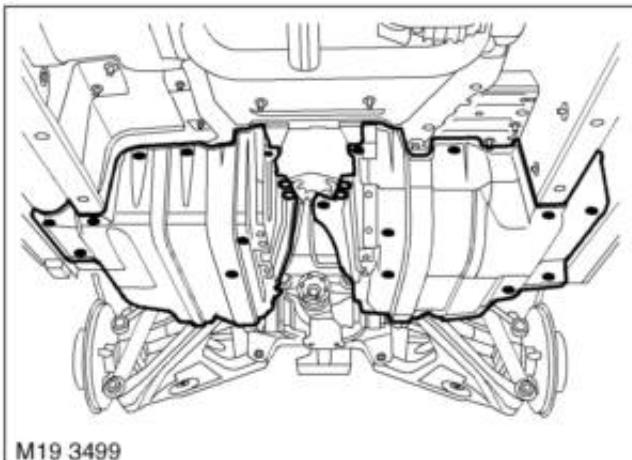
14. Release breather hose and charcoal canister vent pipes from clip on filler neck.

15. Remove clips from breather hose and vent pipe.

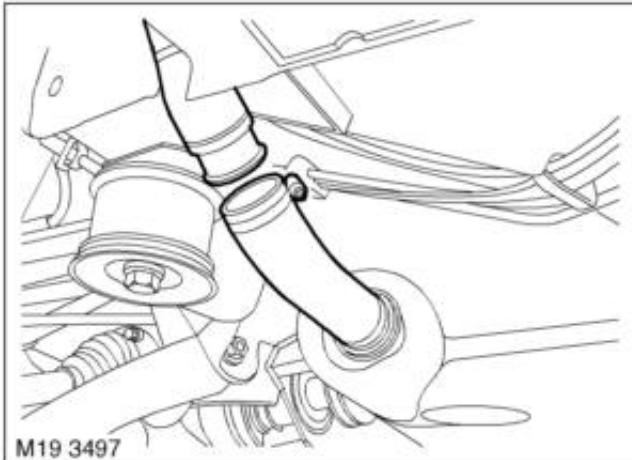
16. Remove LH rear road wheel.



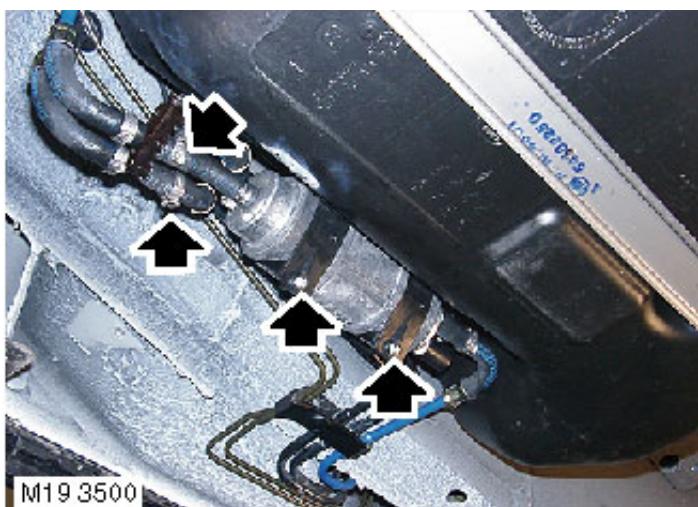
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.



17. Remove 16 bolts and 4 nuts securing fuel tank shields.



18. Remove tamper proof cover from filler hose clip and loosen clip.
19. Disconnect filler hose from filler neck.
20. Collect fuel tank shields.

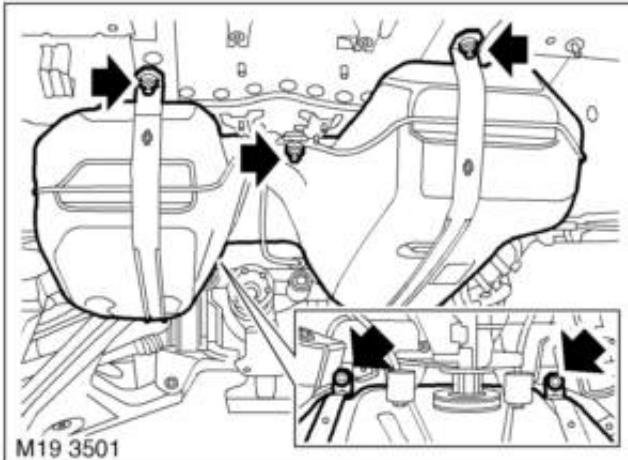


21. Remove 2 screws securing secondary fuel pump to mounting and release pump from mounting brackets.
22. Position container to catch fuel spillage.
23. Release 2 clips and disconnect fuel pipes from manifold at rear of secondary fuel pump.



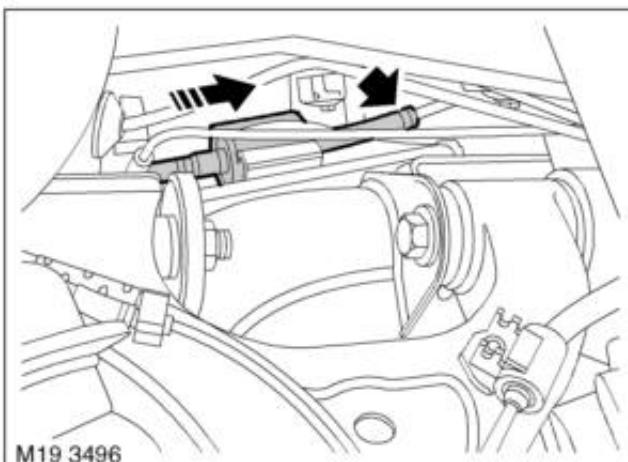
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

24. Tie secondary fuel pump aside.



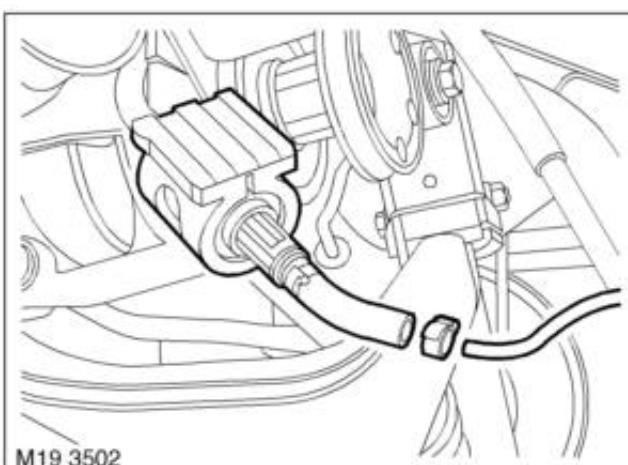
25. With assistance remove 5 bolts securing fuel tank to body, lower and remove tank.

**NOTE: Pull vent and breather hoses through body while lowering fuel tank.**



26. Release fuel burning heater (FBH) fuel pump from rubber mounting.

27. Position container to catch spillage.



28. Release clip and disconnect FBH feed hose from pump.

**NOTE: Do not carry out further dismantling if component is removed for access only.**

29. Disconnect breather hose and vent pipe from fuel tank.

30. Release filler neck breather pipes from fuel tank clips and remove.

31. Remove 4 scrivets securing straps to fuel tank. Collect straps.

## Refit

1. Connect breather hose and vent pipe to tank, secure with clips.
2. Position straps to fuel tank and secure with scrivets.
3. Position tank assembly and breather pipes to vehicle.
4. Connect FBH fuel hose to pump and secure with clip.
5. With assistance, fit bolts securing fuel tank to body and tighten to 45 Nm (33 lbf.ft).

**NOTE: Pass vent and breather hoses through body while fitting tank.**

6. Fit and secure FBH pump to mounting.
7. Connect breather hose to filler neck, fit and secure clip.
8. Position fuel tank vent pipe to filler neck.
9. Connect hose to filler neck and secure clip.
10. Connect hoses to secondary fuel pump and secure clips.
11. Position pump to mounting bracket and secure with screws.
12. Fit bolts and nuts securing fuel tank shield and tighten to 25 Nm (18 lbf.ft).
13. Fit RH rear wheel arch liner.
14. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
15. Fit propeller shaft.
16. Refill fuel tank with extracted fuel.
17. Fit centre console.
18. Connect battery earth lead.

# Cover - tank module - LH

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

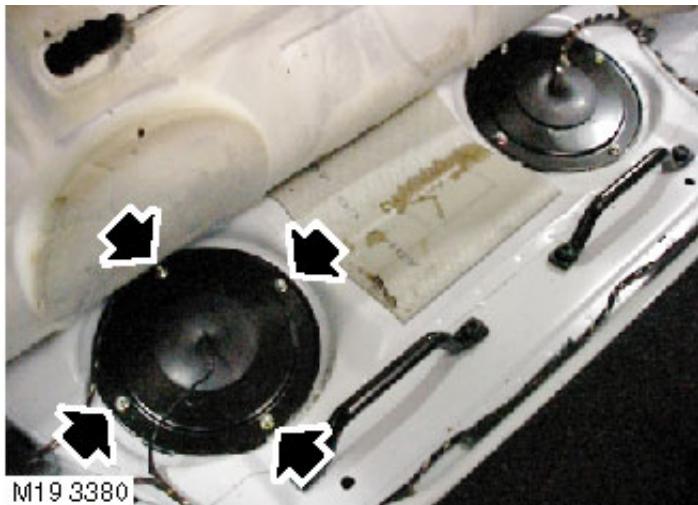
## Remove

1. Disconnect battery earth lead.

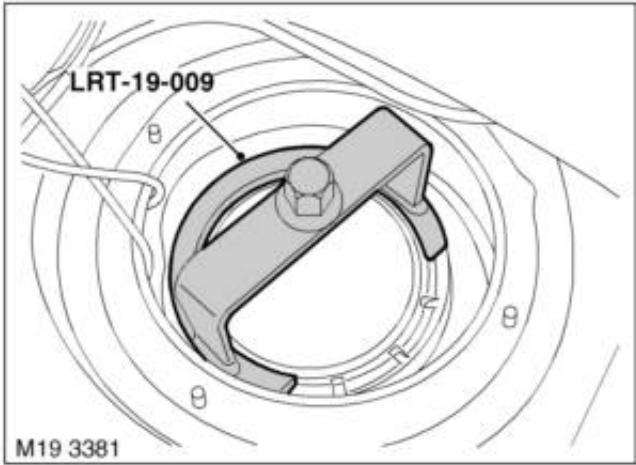


**WARNING:** Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO<sub>2</sub>, gas or powder close at hand when handling or draining fuel.

2. Remove 'D' post lower trim casing.
3. Remove opposite 'D' post trim.
4. Remove 2 Allen bolts securing spare wheel removal straps to cross member and move straps aside.
5. Release carpet, fold forward and tie aside.



6. Remove 4 nuts and remove fuel tank LH access cover.
7. Clean area surrounding locking ring.



8. Using tool LRT-19-009 remove locking ring from fuel tank.
9. Remove access plug and discard fuel tank seal.



**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

## Refit

1. Clean area surrounding fuel tank access.
2. Clean fuel tank access plug and fit new tank seal.
3. Position fuel tank access plug, align timing and push fully home. Ensure seal is correctly fitted.
4. Using LRT-19-009, fit locking ring and tighten to 35 Nm (26 lbf.ft).
5. Fit carpet.
6. Position spare wheel release straps fit bolts and tighten to 25 Nm (18 lbf.ft).
7. Fit 'D' post lower trim casings.
8. Connect battery earth lead.

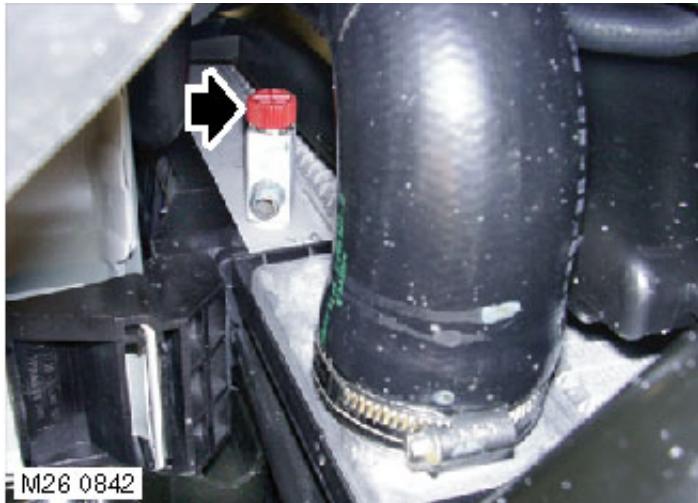
# Coolant - drain and refill

## Drain

1. Position vehicle on lift.
2. Set heater controls to maximum.
3. Disconnect battery earth lead.
4. Remove engine access cover.
  
5. Position container to collect coolant.
6. Remove coolant expansion tank cap.



**WARNING:** Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.



7. Fit tube to drain tap.
8. Open drain tap and collect coolant.



**CAUTION:** Engine coolant will damage paint finished surfaces. If spilled, immediately remove coolant and clean area with water.



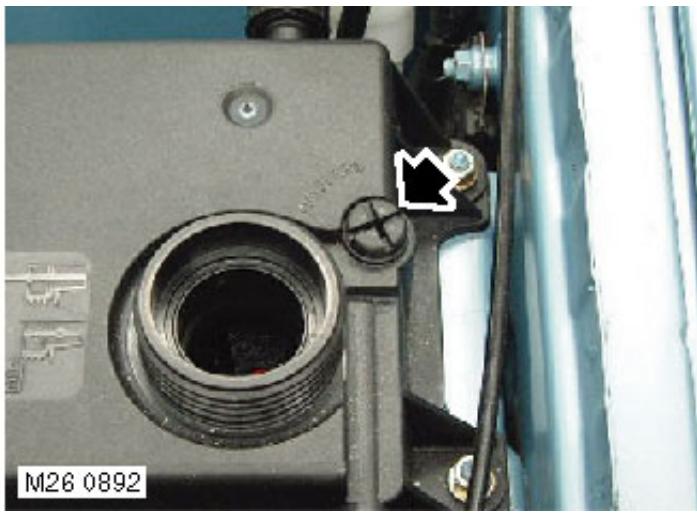
9. Remove cylinder block drain plug. Discard sealing washer.
10. Collect coolant.

## Refill

1. Clean cylinder block mating face and drain plug.
2. Using a new sealing washer, fit cylinder block drain plug and tighten to 25 Nm (18 lbf.ft).
3. Close radiator drain tap and remove tube.
4. Cover alternator to prevent fluid contamination.



**CAUTION:** Care must be taken to ensure that oil or fluid does not enter or contaminate the alternator.



5. Remove bleed screw from expansion tank.
6. Remove coolant bleed screws from coolant rail and EGR cooler.
7. Fill cooling system.
8. Close bleed screws to coolant rail and EGR cooler when a constant stream of coolant is emitted.

9. Remove cover from alternator.
10. Connect battery earth lead.
11. Connect exhaust extractor to tail pipes.
12. Start engine, bleed air from cooling system and allow engine to reach operating temperature.
13. Fit and close expansion tank bleed screw when a constant flow of coolant is emitted.
14. Visually check engine and cooling system for signs of coolant leaks.
15. Disconnect battery earth lead.
16. Wipe coolant from chassis and surrounding area.
17. Fit engine access cover.
  
18. Top up cooling system.
  
19. Connect battery earth lead.

# Coupling unit - viscous fan Remove

1. Disconnect battery earth lead.

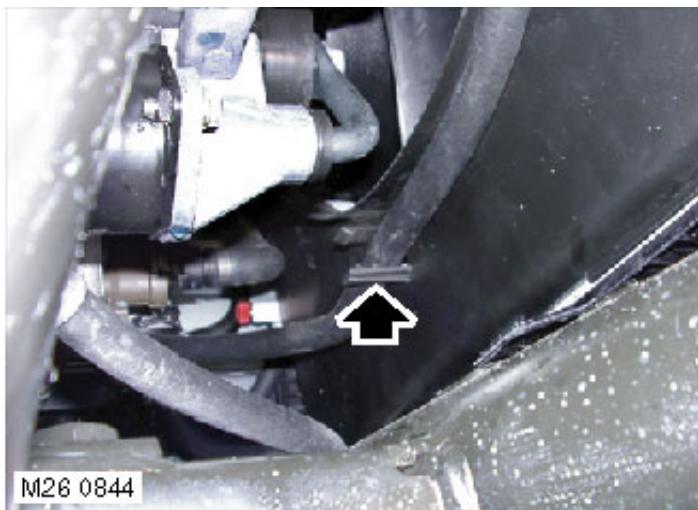
2. Remove undertray.

3. Remove engine cover.



4. Loosen clip and disconnect air intake hose from EGR valve. Remove and discard clip.

5. Position hose aside.



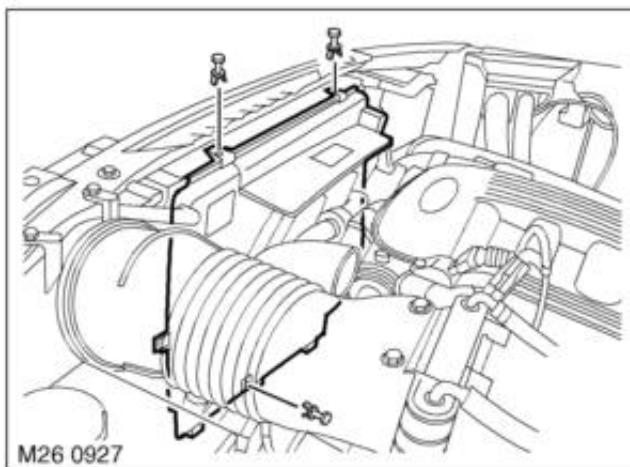
6. Release coolant hose from clip on cowl.



**CAUTION:** The radiator matrix is a fragile component, to prevent damage do not allow the fan or fan cowl to contact the radiator.

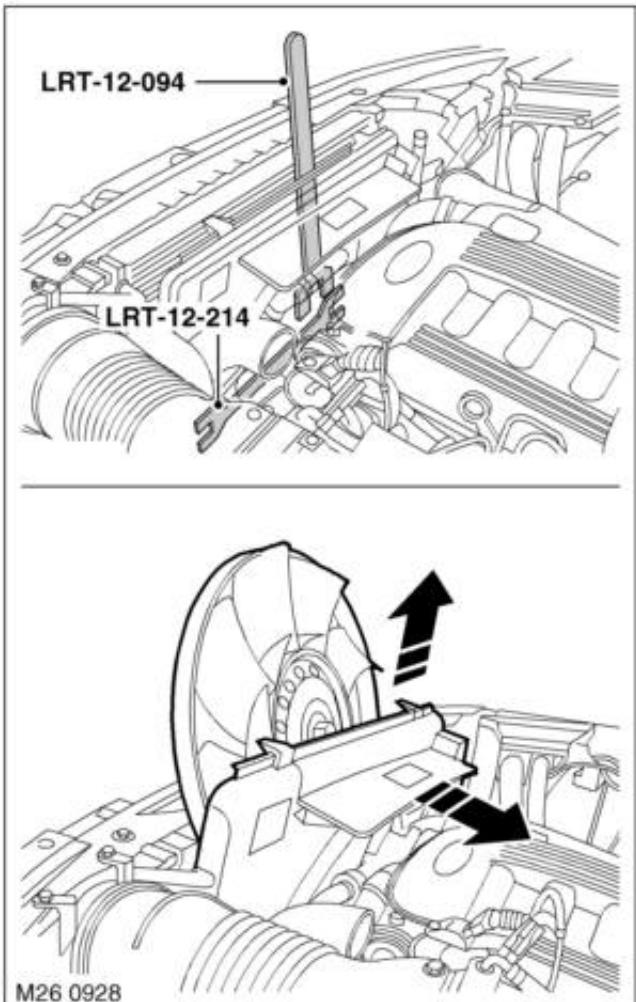


7. Release cooling fan multiplug and harness from fan cowl.



8. Release 2 scrivets from the top of the fan cowl and 1 scrivet from the bottom, securing fan cowl to cooling pack.
9. Release the lugs securing the fan cowl, at the sides and base, to the radiator pack by lifting vertically. Move the captive fan cowl rearward for access to the viscous coupling locking nut.

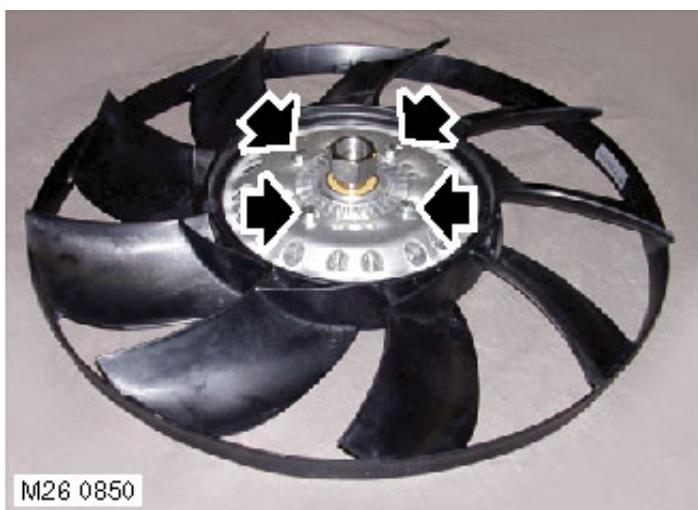
**NOTE: Do not carry out further dismantling if component is removed for access only.**



10. Use LRT-12-094 and LRT-12-214 to loosen viscous coupling lock nut and release fan assembly from coolant pump.

**NOTE: Thread is left handed.**

11. Remove cooling fan assembly.
12. Remove fan cowl.



13. Remove 4 bolts and remove coupling from fan.

## Refit

1. Clean coupling and fan mating faces.
2. Fit coupling to fan and tighten bolts to 10 Nm (7 lbf.ft).
3. Position the fan cowl to the radiator pack, but do not secure at this stage.
4. Fit fan to pulley and tighten viscous coupling nut to 45 Nm (33 lbf.ft).
5. Fit and secure fan cowl to the cooling pack.
6. Secure the fan cowl with scrivets.
7. Fit harness and multiplug to cowl.
8. Fit coolant hose into clip.
9. Clean EGR valve and mating face on air intake hose.
10. Using a new retaining clip, connect air intake hose to EGR valve. Tighten clip to 6 Nm (4.4 lbf.ft)
11. Allow 10 minutes to elapse and re-torque air intake hose to EGR valve retaining clip to 6 Nm (4.4 lbf.ft).
12. Fit engine cover.
13. Fit undertray.
14. Connect the battery earth lead.

# Radiator

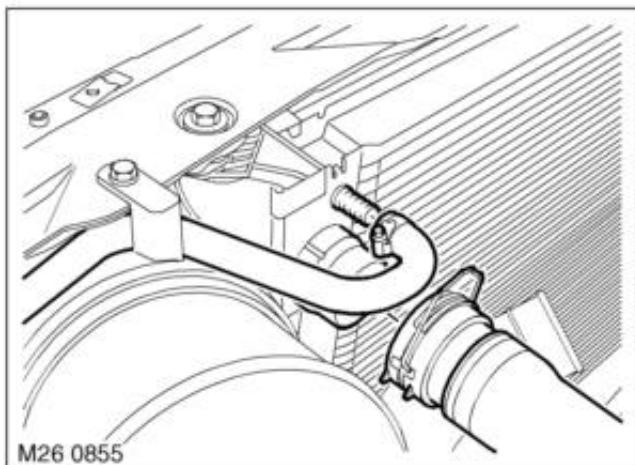
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

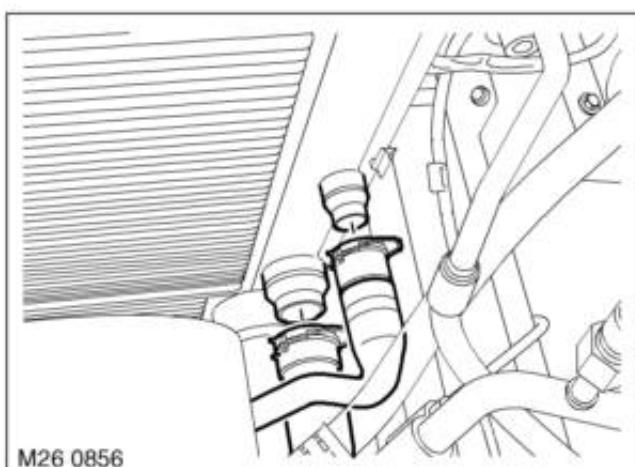
1. Disconnect battery earth lead.

2. Drain cooling system.

3. Remove viscous coupling.

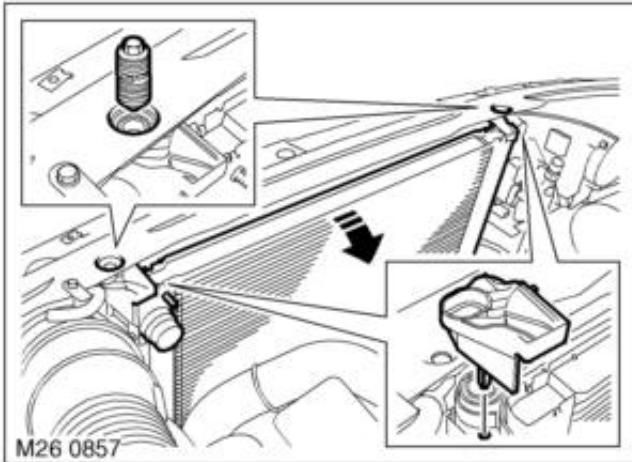


4. Release 2 clips securing radiator top hose and expansion tank hose to radiator. Disconnect both hoses.



5. Release clip and remove radiator bottom hose from radiator.

6. Release clip and remove transmission cooler hose from radiator.



7. Remove radiator assembly retaining bolts from bonnet locking platform.
8. Ease radiator assembly rearward, release and remove radiator retaining clips.
9. Carefully remove radiator.

## Refit

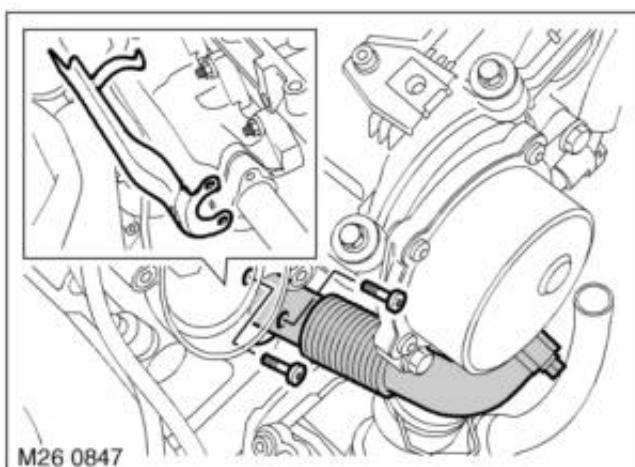
1. Position radiator to mounting, fit and secure retaining clips.
2. Position and secure radiator assembly to bonnet locking platform.
3. Connect and secure coolant hoses.
4. Fit viscous coupling.
5. Connect battery earth lead.
6. Refill cooling system.

# Thermostat

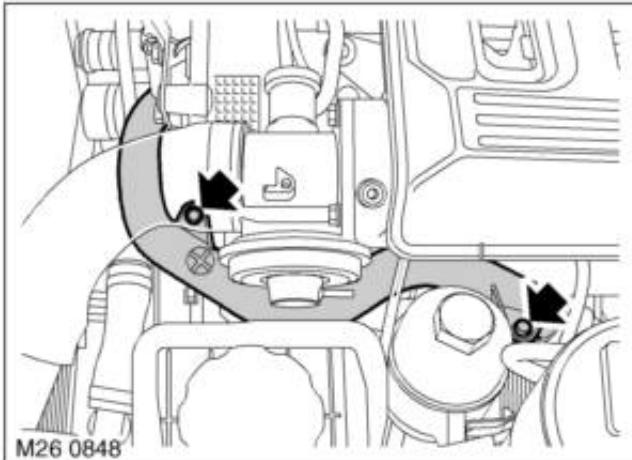
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

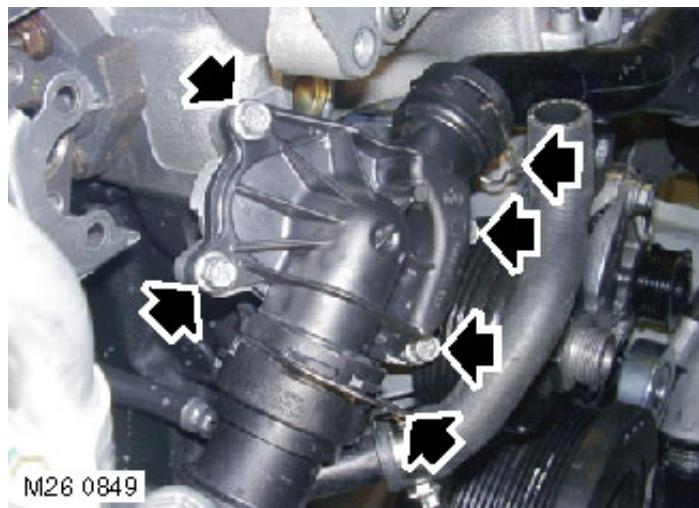
1. Disconnect battery earth lead.
2. Drain cooling system.
3. Remove engine acoustic cover.
4. Remove turbocharger intake duct.
5. Remove EGR cooler.



6. Remove 2 Torx screws securing heat shield and EGR pipe to exhaust manifold.
7. Move heat shield clear of EGR pipe flange.
8. Remove EGR pipe.



9. Remove 2 bolts securing coolant rail.



10. Release clip and disconnect coolant rail from thermostat housing.
11. Release clip and disconnect radiator bottom hose from thermostat housing.
12. Remove 4 bolts and remove thermostat housing from coolant pump. Discard seal.

## Refit

1. Clean thermostat housing and mating faces.
2. Fit thermostat housing and tighten bolts to 8 Nm (6 lbf.ft).
3. Fit bottom hose and secure with clip.
4. Fit coolant rail and secure with clip.
5. Fit bolts securing coolant rail and tighten to 10 Nm (7 lbf.ft).
6. Clean EGR pipe and mating face.
7. Fit EGR pipe, align heat shield and fit Torx bolts but do not tighten at this stage. Torx bolts to be tightened to 25 Nm (18 lbf.ft) when EGR cooler is fitted.
8. Fit EGR cooler.

9. Fit turbocharger intake duct.

10. Fit engine acoustic cover.

11. Connect battery earth lead.

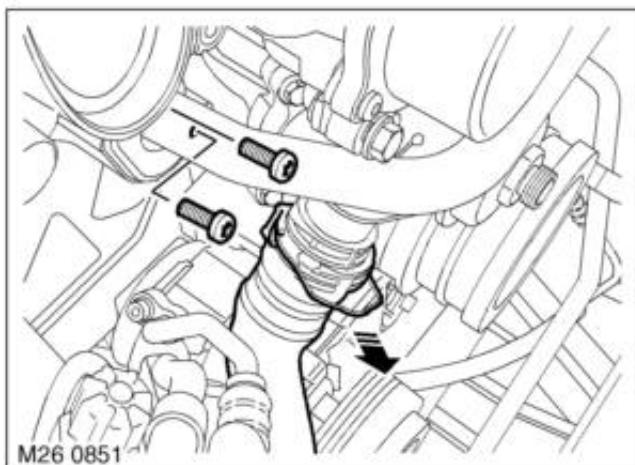
12. Refill cooling system.

# Coolant pump and thermostat

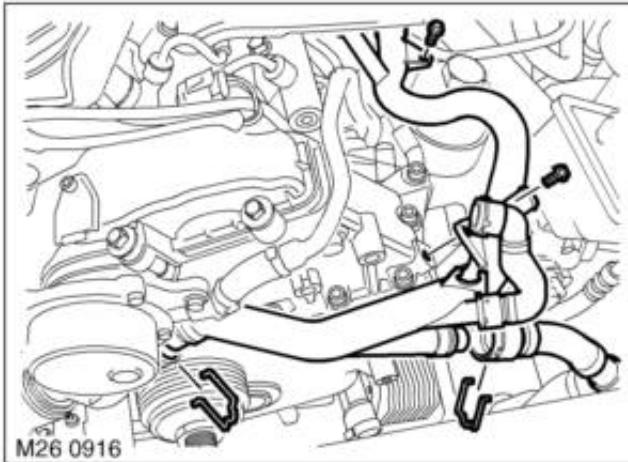
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.
2. Remove turbocharger intake duct.
3. Remove EGR cooler.
4. Remove ancillary drive belt.

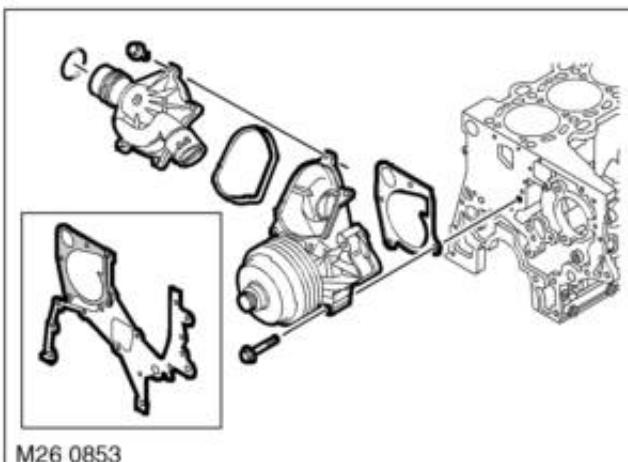


5. Disconnect radiator bottom hose from thermostat housing. Move hose aside for access.
6. Remove 2 Torx screws securing heat shield and EGR pipe to exhaust manifold.
7. Move heat shield clear of EGR pipe flange.
8. Remove EGR pipe.
9. Disconnect expansion tank hose from coolant rail.



10. Remove 2 bolts securing coolant rail.

11. Release clip, disconnect coolant rail from thermostat housing and move rail aside.



12. Remove 4 bolts and coolant pump.

13. If applicable, cut tags on coolant pump gasket (applies to original fit gaskets only).

14. Remove and discard coolant pump gasket.

15. Remove 4 bolts and remove thermostat housing from coolant pump. Discard seal.

## Refit

1. Clean mating face of thermostat housing and coolant pump.
2. Fit new seal to thermostat housing.
3. Fit thermostat housing to coolant pump. Fit and tighten bolts to 8 Nm (6 lbf.ft).
4. Clean coolant pump and mating faces on engine and upper coolant rail.
5. Fit new seal to coolant rail, fit rail to thermostat housing and tighten bolts to 8 Nm (6 lbf.ft).
6. Fit a new gasket and coolant pump to engine. Tighten bolts to 10 Nm (7 lbf.ft).
7. Connect radiator bottom hose to thermostat housing and secure with clip.

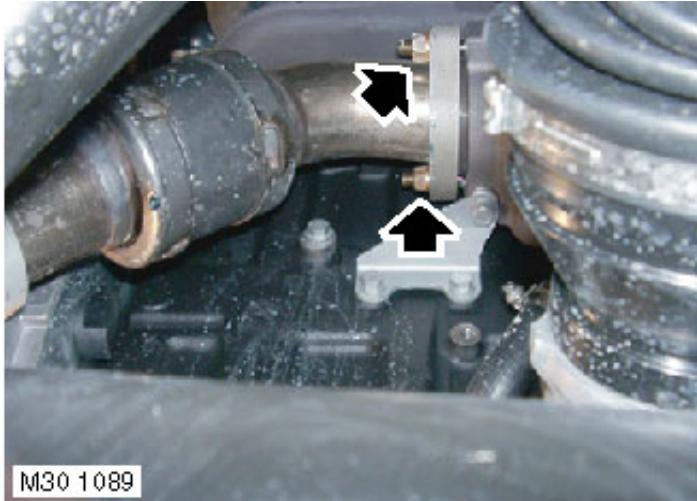
8. Connect expansion tank hose to coolant rail and secure with clip.
9. Clean EGR pipe flange and exhaust manifold mating faces.
10. Fit EGR pipe, align heat shield and fit Torx bolts but do not tighten at this stage. Torx bolts to be tightened to 25 Nm (18 lbf.ft) when EGR cooler is fitted.
11. Fit EGR cooler.
12. Fit ancillary drive belt.
13. Fit turbocharger intake duct.
14. Connect battery earth lead.

# Exhaust system and mountings

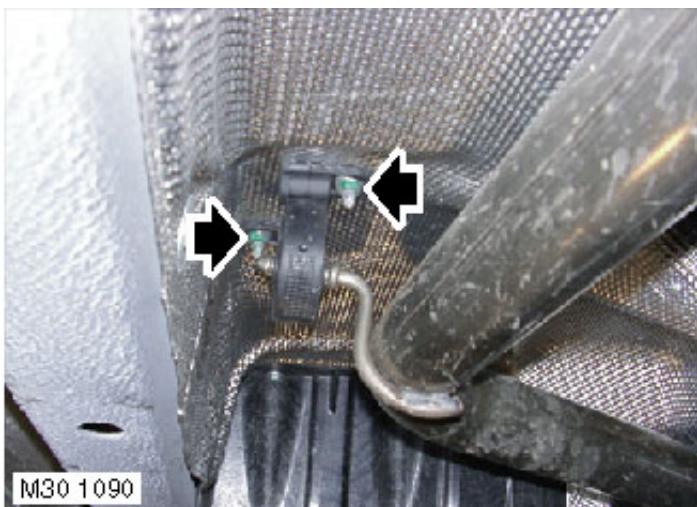
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

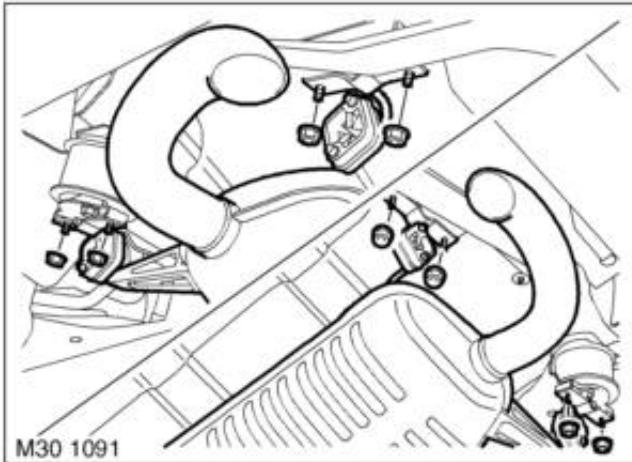
1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Remove and discard 2 nuts and bolts securing exhaust flange to front pipe.



4. Remove nut securing intermediate exhaust mounting to body.



5. Remove 8 nuts securing rear silencer rubber mountings to body and with assistance remove exhaust assembly from vehicle.

**NOTE: Do not carry out further dismantling if component is removed for access only.**

6. Remove 5 mounting rubbers from main assembly, remove rubbers from body mounting brackets.

## Refit

1. Clean exhaust pipe and exhaust manifold down pipe flanges.
2. Fit rubbers to exhaust mounting brackets and main assembly.
3. With assistance fit exhaust system to vehicle, align flanges, fit and lightly tighten nuts and bolts. Fit one pair of rear silencer brackets to body and lightly tighten nuts.
4. Align intermediate exhaust mounting bracket to body, fit nut and tighten to 68 Nm (50 lbf.ft).
5. Align remaining mounting brackets to body, fit nuts and tighten to 25 Nm (18 lbf.ft).
6. Check exhaust for correct alignment.
7. Align exhaust flange and tighten new nuts evenly to 45 Nm (33 lbf.ft).
8. Connect battery earth lead.
9. Start and run engine to check for leaks.

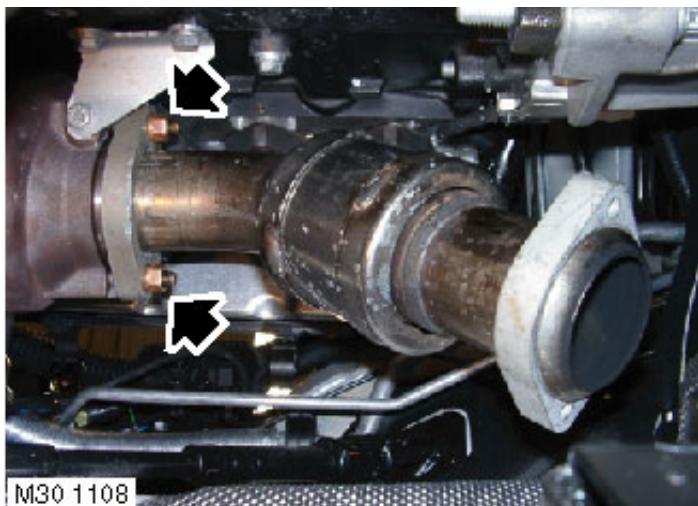
# Front pipe

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

The catalyst is part of the front pipe and is not serviced separately.

## Remove

1. Disconnect battery earth lead.
2. Remove exhaust system.



3. Remove 2 nuts securing front pipe flange to turbo charger and remove front pipe.

## Refit

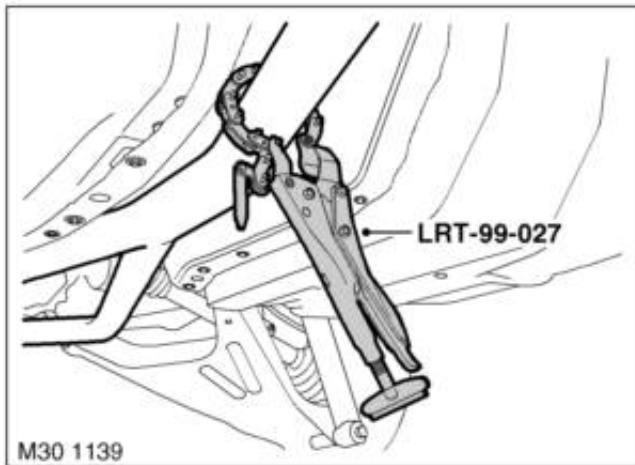
1. Clean front pipe and mating face.
2. Fit front pipe and align flange, fit nuts but do not tighten at this stage.
3. Fit exhaust system.
4. Tighten nuts securing front pipe to turbocharger to 42 Nm (31 lbf.ft).
5. Connect battery earth lead.

# Intermediate pipe

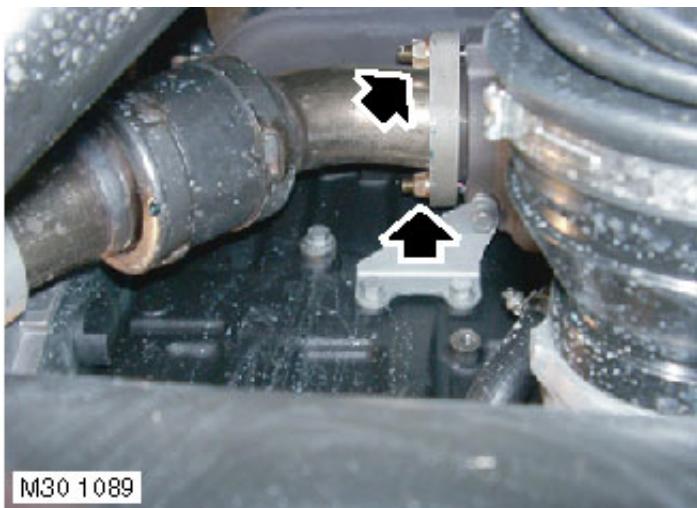
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

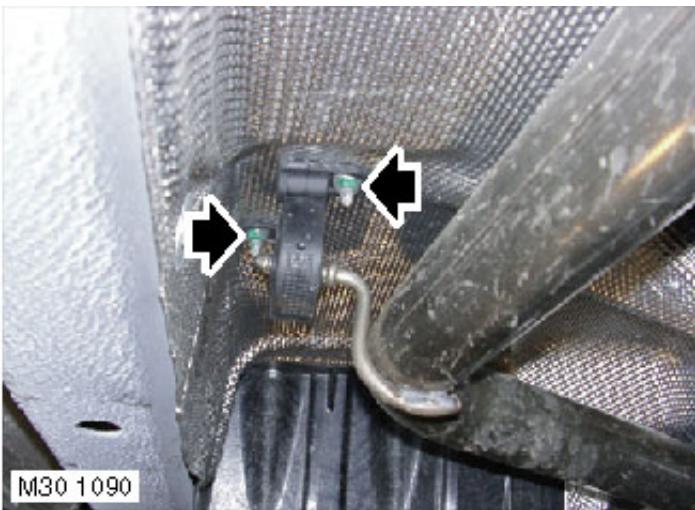
1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Using LRT-99-027, cut pipe at point indicated by depression in pipe.



4. Remove 2 nuts and bolts securing exhaust flange to front pipe.



5. Remove nut securing intermediate pipe mounting to body.
6. Remove intermediate exhaust pipe.
7. Remove mounting rubber.

## Refit

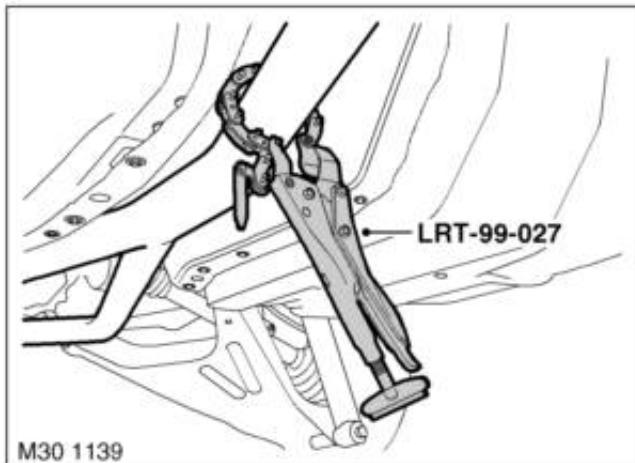
1. Fit mounting rubber.
2. Clean tail pipe and fit sleeve.
3. With assistance, fit intermediate pipe, align mounting and tighten nut to 68 Nm (50 lbf.ft).
4. Centralise connecting sleeve over joint, align intermediate pipe with tail pipe and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
5. Align intermediate pipe to front pipe, fit bolts and nuts and tighten to 25 Nm (18 lbf.ft).
6. Check exhaust for correct alignment.
7. Connect battery earth lead.
8. Start and run engine to check for leaks.

# Tail pipe and silencer

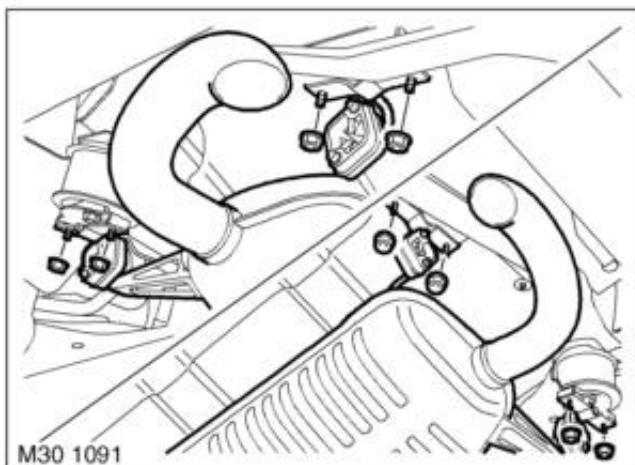
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Using LRT-99-027, cut pipe at point indicated by depression in pipe.



4. Remove 8 nuts securing mountings and with assistance, remove tail pipe and silencer assembly.
5. Remove 4 exhaust mountings.

## Refit

1. Fit exhaust mountings.
2. Clean intermediate pipe and fit sleeve.
3. With assistance, fit tail pipe and silencer assembly, locate mountings and fit nuts. Tighten nuts to 25

Nm (18 lbf.ft).

4. Centralise connecting sleeve over joint, align intermediate pipe with tail pipe and tighten sleeve clamp nuts to 48 Nm (35 lbf.ft).
5. Check exhaust for correct alignment.
6. Connect battery earth lead.
7. Start and run engine to check for leaks.

# Gaskets - inlet manifold

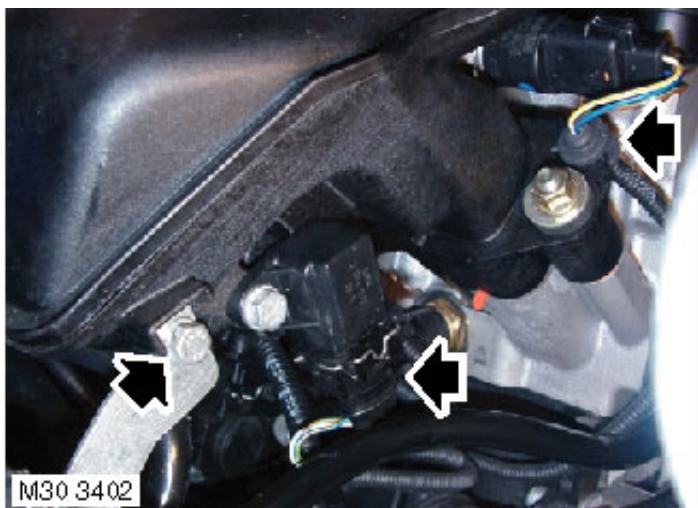
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

1. Disconnect battery earth lead.

2. Remove air intake plenum.

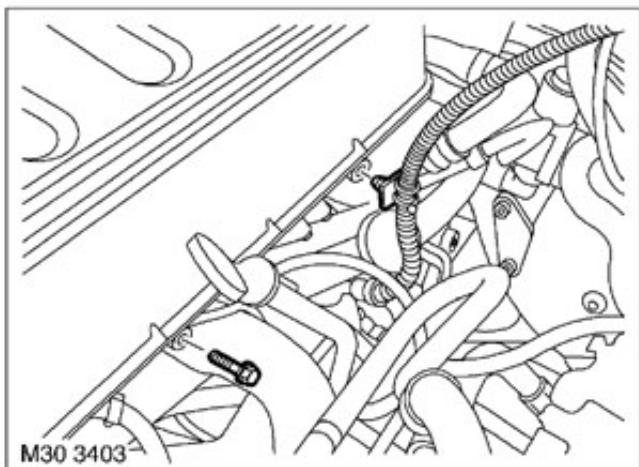
3. Remove engine acoustic cover.



4. Disconnect multiplug from turbocharger boost pressure sensor.

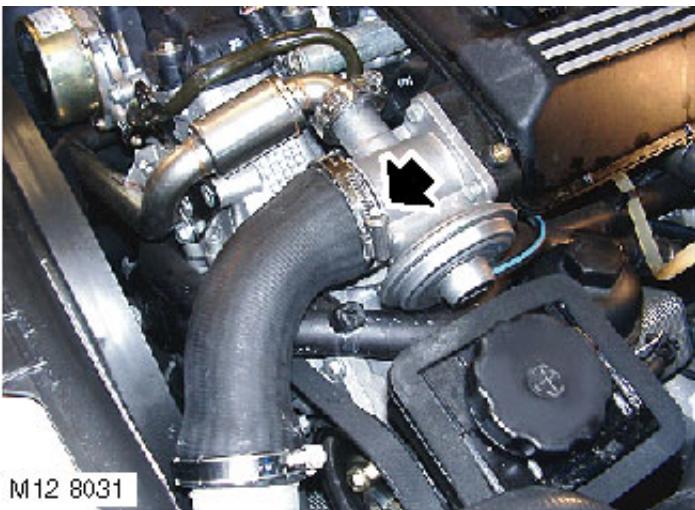
5. Remove bolt securing vacuum pipe support bracket to inlet manifold.

6. Release fuel pressure sensor harness grommet from inlet manifold.



7. Release positive lead clip from inlet manifold.

8. Remove bolt securing dipstick tube bracket to inlet manifold.



9. Loosen clip and disconnect air intake hose from EGR valve. Remove and discard clip.

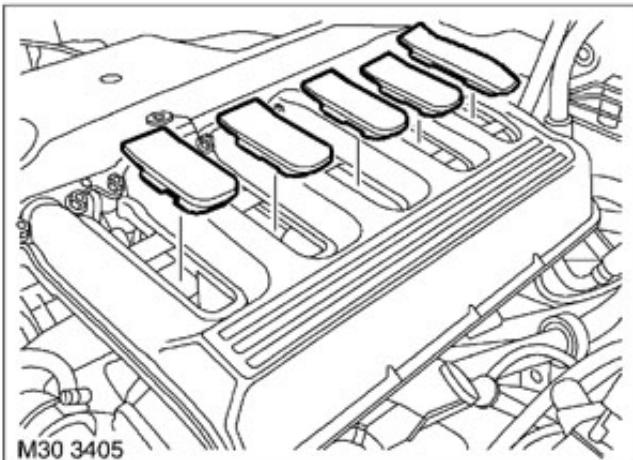


**CAUTION: Always fit plugs to open connections to prevent contamination.**

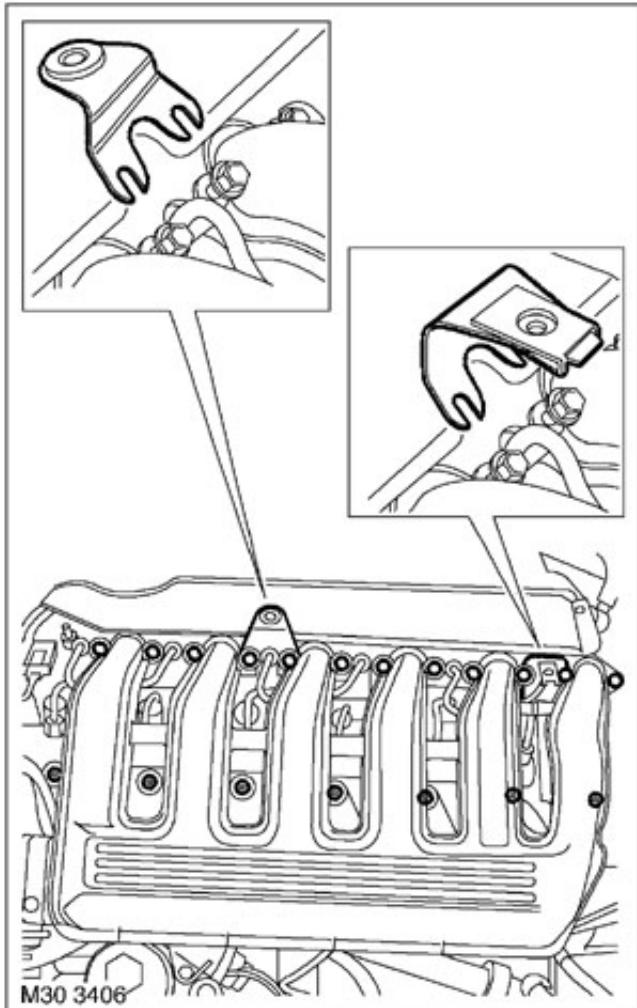
10. Position air intake hose aside.

11. Disconnect vacuum hose from EGR valve.

12. Loosen screw and remove clamp securing EGR pipe to EGR valve.



13. Remove rubber inserts from inlet manifold.



14. Remove 12 bolts and 7 nuts securing inlet manifold.
15. Remove inlet manifold and discard gaskets.
16. Cover engine air intake tracts.

## Refit

1. Remove covers from engine air intake tracts.
2. Clean inlet manifold and mating faces.
3. Clean EGR pipe flange and EGR valve mating face.
4. Fit new gaskets to inlet manifold.
5. Fit inlet manifold, fit acoustic cover brackets to bolts and tighten nuts and bolts evenly. Tighten bolts to 10 Nm (7 lbf.ft) and nuts to 15 Nm (11 lbf.ft).
6. Fit rubber inserts.
7. Fit fuel pressure sensor harness to inlet manifold.
8. Connect multiplug to turbocharger boost pressure sensor.
9. Fit bolt securing vacuum pipe support bracket and tighten to 6 Nm (4.4 lbf.ft).

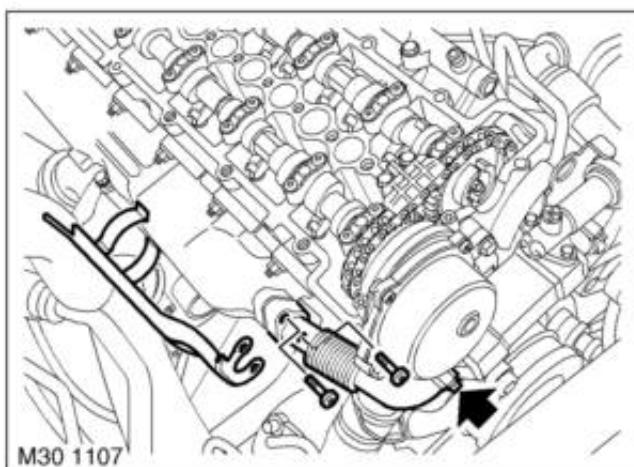
10. Fit bolt securing dipstick tube bracket and tighten to 6 Nm (4.4 lbf.ft).
  11. Fit positive lead clip to inlet manifold.
  12. Fit EGR pipe clamp and tighten screw.
  13. Connect vacuum hose to EGR valve.
  14. Clean EGR valve and mating face on air intake hose.
  15. Using a new retaining clip, connect air intake hose to EGR valve. Tighten clip to 6 Nm (4.4 lbf.ft)
  16. Allow 10 minutes to elapse and re-torque air intake hose to EGR valve retaining clip to 6 Nm (4.4 lbf.ft).
  17. Fit acoustic cover.
- 
18. Connect battery earth lead.

# Gasket - exhaust manifold

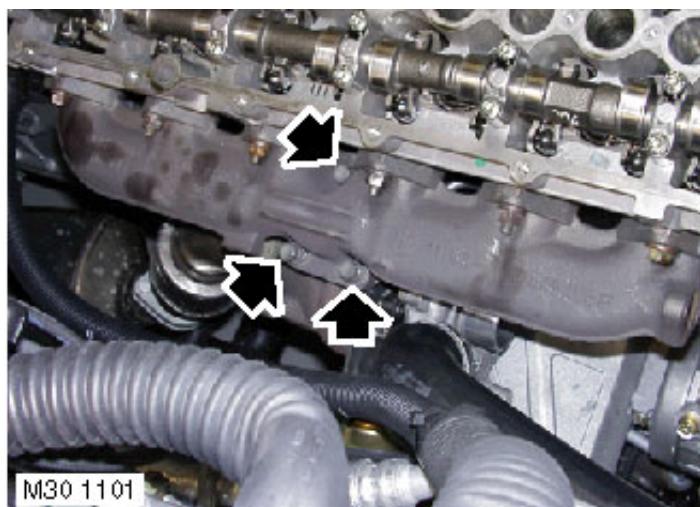
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## Remove

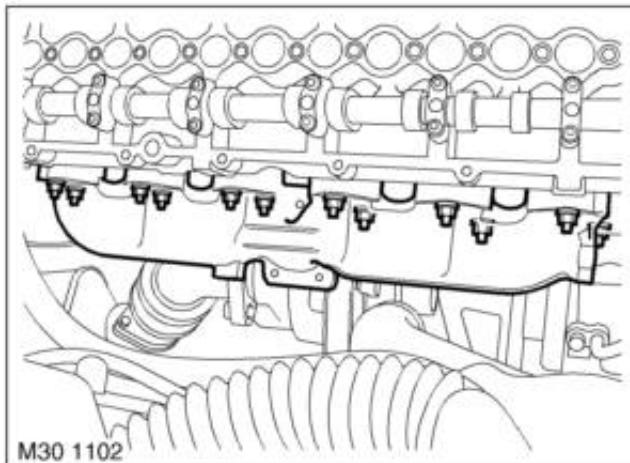
1. Disconnect battery earth lead.
2. Remove camshaft cover gasket.
3. Remove viscous coupling.
4. Loosen 3 Allen screws securing EGR cooler.
5. Loosen clamp screw securing EGR pipe to cooler and release clamp from cooler.



6. Remove 2 Torx screws securing heat shield and EGR pipe to exhaust manifold.
7. Release and remove heat shield from manifold.
8. Remove EGR pipe and clamp.



9. Remove 3 bolts securing turbocharger to exhaust manifold. Discard gasket.



10. Remove 12 nuts securing exhaust manifold, remove exhaust manifold and discard gaskets.

## Refit

1. Clean exhaust manifold and mating faces.
2. Use new gaskets and fit exhaust manifold to cylinder head.
3. Fit nuts securing exhaust manifold and tighten to 24 Nm (18 lbf.ft).
4. Use new gasket, align turbocharger and tighten bolts securing turbocharger to 50 Nm (37 lbf.ft).
5. Clean EGR pipe and mating face.
6. Fit EGR pipe and clamp to cooler, align clamp but do not tighten fully at this stage.
7. Fit heat shield to manifold and tighten Torx screws securing EGR pipe and heat shield to 25 Nm (18 lbf.ft).
8. Tighten clamp screw securing EGR pipe to cooler.
9. Tighten Allen screws securing EGR cooler to 25 Nm (18 lbf.ft).
10. Fit viscous coupling.
11. Fit camshaft cover gasket.
12. Connect battery earth lead.



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## Drain and refill

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» **41.20.04**

### Drain

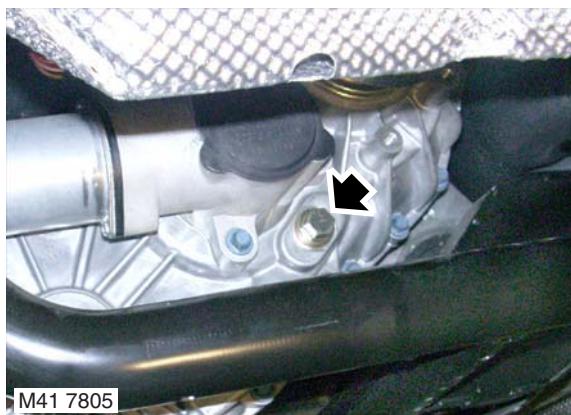
1. Position vehicle on lift.
2. Position container to collect spillage.



3. Remove drain plug and discard sealing washer.
4. Allow oil to drain.

### Refill

1. Clean drain plug and mating face, using new sealing washer, fit and tighten plug to 25 Nm (18 lbf.ft).
2. Clean area around filler/level plug.



3. Remove filler/level plug and discard sealing washer.
4. Fill gearbox until a thread of oil runs from filler/level hole, allow sufficient time for oil to find a common level.
5. Clean filler/level plug and fit new sealing washer.
6. Fit filler/level plug and tighten to 25 Nm (18 lbf.ft).

## **TRANSFER BOX**

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## Transfer gearbox - Td6

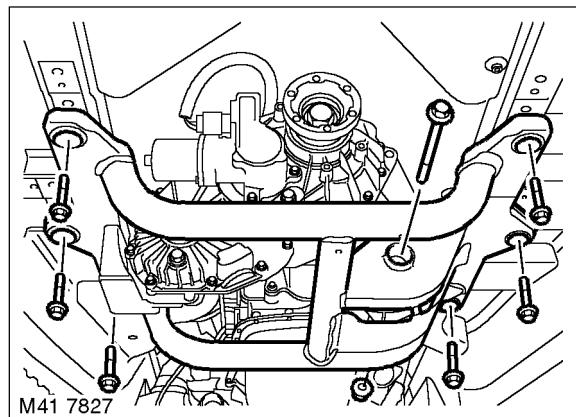
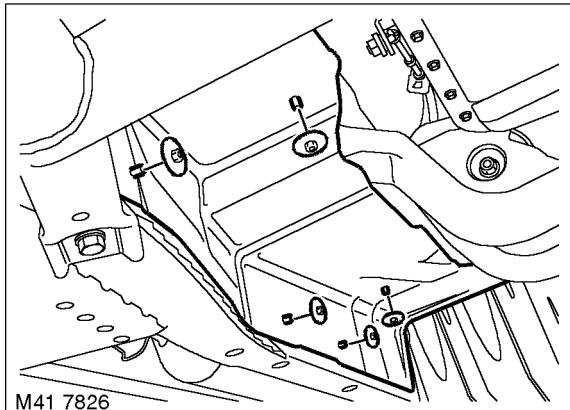
### 41.20.25.99

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

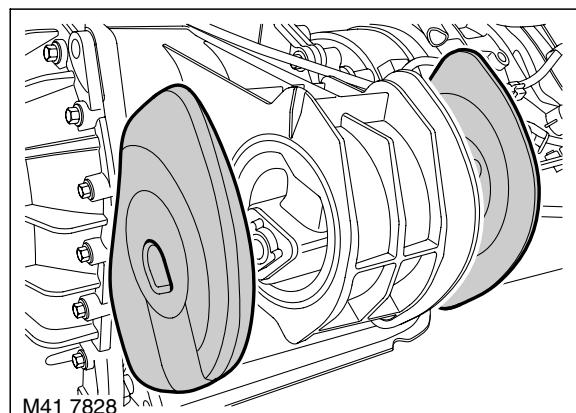
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove engine cover.  
 **ENGINE - Td6, REPAIRS, Cover - engine access.**
4. Remove viscous coupling.  
 **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
5. Raise vehicle on lift.
6. Drain transfer gearbox oil.  
 **TRANSFER BOX, ADJUSTMENTS, Drain and refill.**
7. Remove rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
8. Remove front propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**



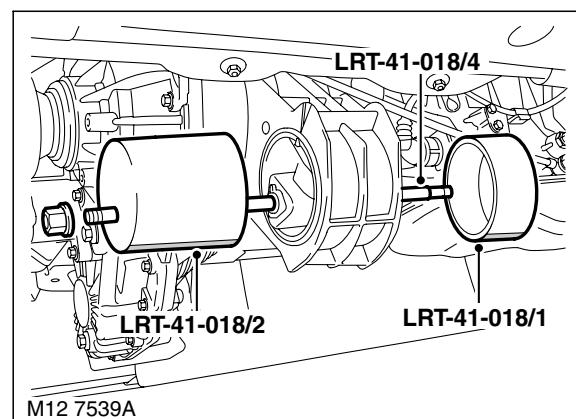
11. Remove nut and bolt securing mounting to cross member.
12. Remove 6 bolts securing cross member and remove cross member.



13. Remove snubbers from mounting.
  14. Lower gearbox on jack.
- CAUTION: Do not allow gearbox to hang on gear selector cable.**

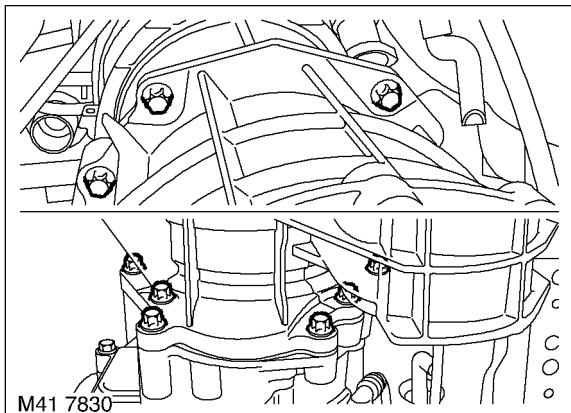
9. Remove 5 nuts, release and remove RH heat shield.
10. Support gearbox on a jack.

## TRANSFER BOX



15. Disconnect multiplug from high/low shift motor.
16. Disconnect breather hose from gearbox.

**CAUTION:** Always fit plugs to open connections to prevent contamination.



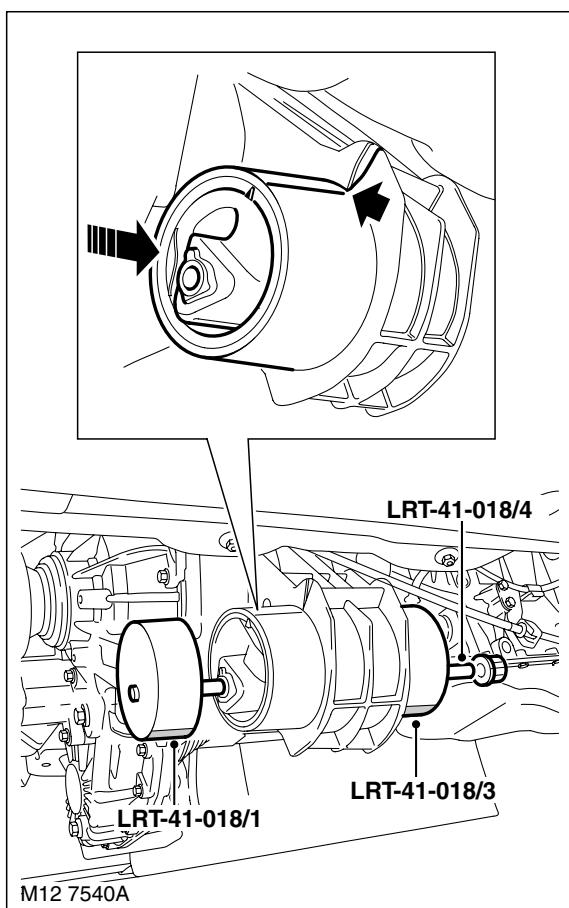
17. Support transfer gearbox on jack.
  18. Remove 9 Torx bolts and remove transfer gearbox.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
19. Remove 3 Torx screws securing mass damper and remove damper.

20. Lubricate centre screw LRT-41-018/4 with Molybdenum Disulphide grease and assemble tool as shown to remove mounting from transfer gearbox.

**CAUTION:** Ensure tool alignment indicator is at the 6 o'clock position. The tool alignment indicator is a machined flat on LRT-41-018/1 and LRT-41-018/2.

### Refit

1. Clean mounting and mating faces.
2. Lubricate new mounting and bore in transfer gearbox casing to aid assembly.



- Position new mounting to rear face of transfer gearbox, and start entry. Mounting to be parallel, with timing marks aligned.

*NOTE: Transfer timing mark to side of mounting to assist with alignment.*

- Lubricate centre screw **LRT-41-018/4** with Molybdenum Disulphide grease and assemble tool as shown, to fit mounting to transfer gearbox. Start with the centre screw at full length and when the mounting is approximately 75 percent fitted, reduce the length of the centre screw by screwing it fully into the base plate **LRT-41-018/1**. This will ensure the centre screw **LRT-41-018/4** does not foul on the gearbox fluid pan.

**CAUTION: Ensure tool alignment indicator is at the 6 o'clock position.**

- Ensure the mounting is fitted parallel. If necessary, use a mallet and tap the base plate to maintain a parallel fit.
- Clean damper and mating face.
- Fit damper and tighten Torx screws to 23 Nm (17 lbf.ft).
- Clean transfer gearbox and mating face dowels and dowel holes.

- Clean input shaft and mating face.
- Apply thin coat of anti-seize grease to shaft splines.
- Fit transfer gearbox and tighten Torx bolts to 43 Nm (32 lbf.ft).
- Connect breather hose to gearbox.
- Connect multiplug.
- Remove support from transfer gearbox.
- Fit snubbers.
- Fit cross member to mounting, fit nut and bolt but do not tighten at this stage.
- Raise gearbox on jack.
- Align cross member, fit bolts and tighten to 68 Nm (50 lbf.ft).
- Remove support from gearbox.
- Tighten nut and bolt securing mounting to cross member to 100 Nm (74 lbf.ft).
- Fit heat shield and secure with nuts.
- Fit rear propeller shaft.
  - DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
- Fit front propeller shaft.
  - DRIVESHAFTS, REPAIRS, Propeller shaft - front.**
- Refill transfer gearbox with oil.
  - TRANSFER BOX, ADJUSTMENTS, Drain and refill.**
- Fit viscous coupling.
  - COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
- Fit engine cover.
  - ENGINE - Td6, REPAIRS, Cover - engine access.**

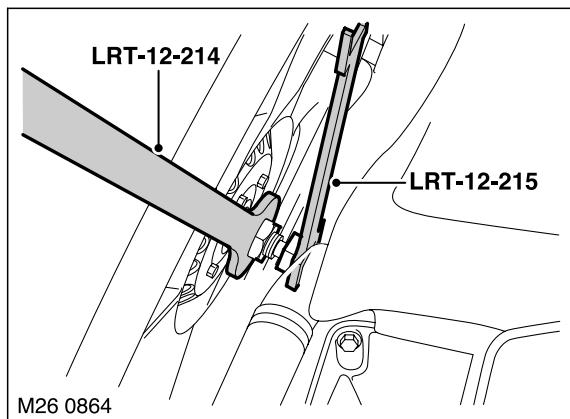
# TRANSFER BOX

## Transfer gearbox - V8

→ 41.20.25.99

### Remove

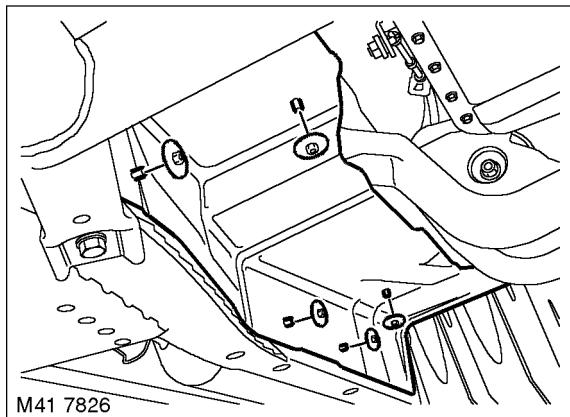
1. Position vehicle on lift.
2. Disconnect battery earth lead.



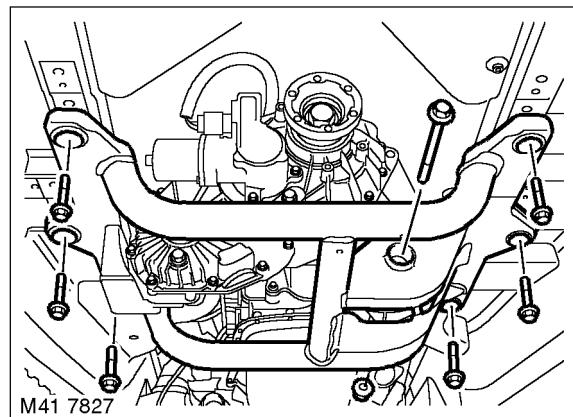
3. Use **LRT-12-214** and **LRT-12-215** to loosen viscous coupling lock nut and remove fan assembly from coolant pump.

*NOTE: Thread is left handed.*

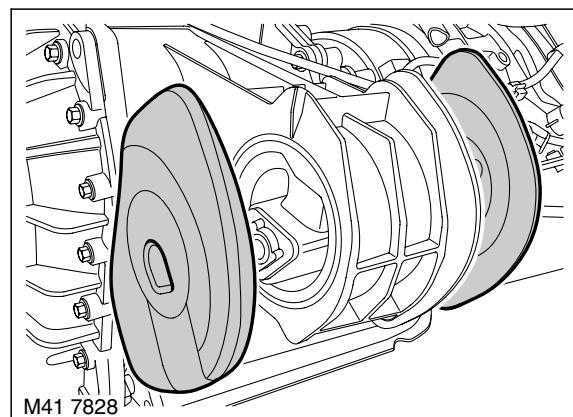
4. Raise vehicle on lift.
5. Drain transfer gearbox oil.  
☞ **TRANSFER BOX, ADJUSTMENTS, Drain and refill.**
6. Remove rear propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
7. Remove front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**



8. Remove 5 nuts, release and remove RH heat shield.
9. Support gearbox on a jack.



10. Remove nut and bolt securing mounting to cross member.
11. Remove 6 bolts securing cross member and remove cross member.

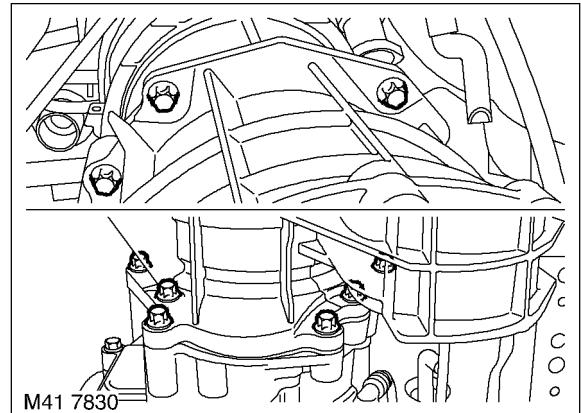


12. Remove snubbers from mounting.
13. Lower gearbox on jack.  
**CAUTION: Do not allow gearbox to hang on gear selector cable.**



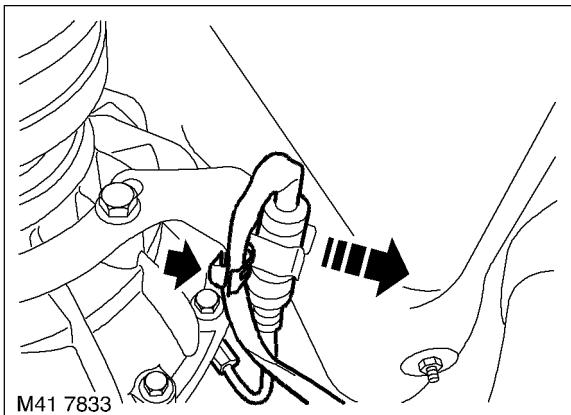
14. Disconnect multiplug from high/low shift motor.
15. Disconnect breather hose from gearbox.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

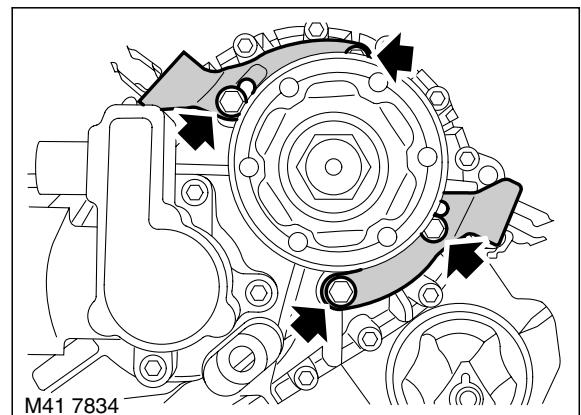


18. Remove 9 Torx bolts and remove transfer gearbox.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

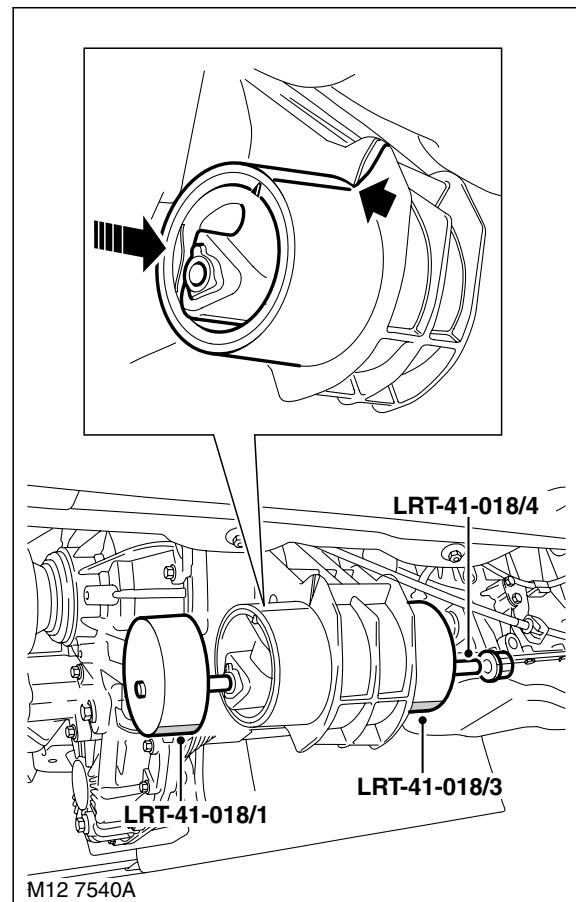
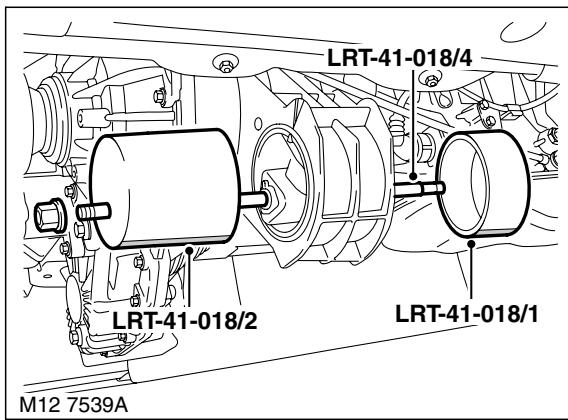


16. Release clips securing oxygen sensor leads to transfer gearbox.
17. Support transfer gearbox on jack.



19. Remove 4 bolts securing oxygen sensor multiplug retaining brackets from transfer gearbox.

## TRANSFER BOX



20. Lubricate centre screw **LRT-41-018/4** with Molybdenum Disulphide grease and assemble tool as shown to remove mounting from transfer gearbox.

**CAUTION:** Ensure tool alignment indicator is at the 6 o'clock position. The tool alignment indicator is a machined flat on LRT-41-018/1 and LRT-41-018/2.

### Refit

1. Clean mounting and mating faces.
2. Lubricate new mounting and bore in transfer gearbox casing to aid assembly.

3. Position new mounting to rear face of transfer gearbox, and start entry. Mounting to be parallel, with timing marks aligned.

*NOTE: Transfer timing mark to side of mounting to assist with alignment.*

4. Lubricate centre screw **LRT-41-018/4** with Molybdenum Disulphide grease and assemble tool as shown, to fit mounting to transfer gearbox. Start with the centre screw at full length and when the mounting is approximately 75 percent fitted, reduce the length of the centre screw by screwing it fully into the base plate **LRT-41-018/1**. This will ensure the centre screw **LRT-41-018/4**, does not foul on the gearbox fluid pan.

**CAUTION:** Ensure tool alignment indicator is at the 6 o'clock position.

5. Ensure the mounting is fitted parallel. If necessary, use a mallet and tap the base plate to maintain a parallel fit.
6. Fit multiplug brackets, tighten bolts to 25 Nm (18 lbf.ft)
7. Clean transfer gearbox and mating face dowels and dowel holes.
8. Clean input shaft and mating face.



9. Apply thin coat of anti-seize grease to shaft splines.
10. Fit transfer gearbox and tighten Torx bolts to 43 Nm (32 lbf.ft).
11. Connect multiplug.
12. Connect breather hose to gearbox.
13. Fit and secure oxygen sensor leads.
14. Remove support from transfer gearbox.
15. Fit snubbers.
16. Fit cross member to mounting, fit nut and bolt but do not tighten at this stage.
17. Raise gearbox on jack.
18. Align cross member, fit bolts and tighten to 68 Nm (50 lbf.ft).
19. Remove support from gearbox.
20. Tighten nut and bolt securing mounting to cross member to 100 Nm (74 lbf.ft).
21. Fit heat shield and secure with nuts.
22. Fit rear propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
23. Fit front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**
24. Refill transfer gearbox with oil.  
☞ **TRANSFER BOX, ADJUSTMENTS, Drain and refill.**
25. Fit fan to pulley and tighten viscous coupling nut to 45 Nm (33 lbf.ft).

## Oil seal - input shaft

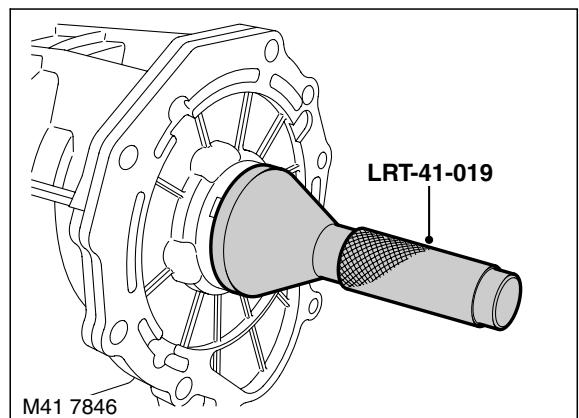
☞ **41.20.50**

### Remove

1. Remove transfer gearbox.  
☞ **TRANSFER BOX, REPAIRS, Transfer gearbox - Td6.**  
☞ **TRANSFER BOX, REPAIRS, Transfer gearbox - V8.**
2. Lever input shaft oil seal from transfer gearbox.

### Refit

1. Clean oil seal recess in transfer gearbox.



2. Using **LRT-41-019** fit seal to transfer gearbox.
3. Fit transfer gearbox.  
☞ **TRANSFER BOX, REPAIRS, Transfer gearbox - Td6.**  
☞ **TRANSFER BOX, REPAIRS, Transfer gearbox - V8.**

# TRANSFER BOX

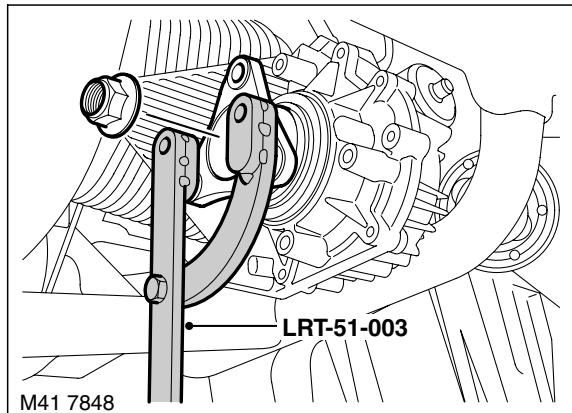
## Oil seal - front output shaft

☞ 41.20.51

### Remove

1. Drain transfer gearbox oil.  
☞ TRANSFER BOX, ADJUSTMENTS, Drain and refill.
2. Remove front propeller shaft.  
☞ DRIVESHAFTS, REPAIRS, Propeller shaft - front.
3. Diesel models only: Remove mass damper.  
☞ TRANSFER BOX, REPAIRS, Damper - vibration - Td6.
4. Release output shaft flange nut stake.

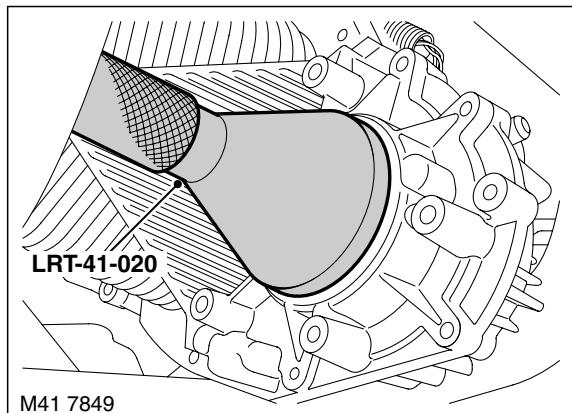
3. Clean drive flange and mating face.
4. Fit flange, use new 'O' ring and tighten new nut to 100 Nm (74 lbf.ft).
5. Stake output shaft flange nut to shaft.
6. Fit front propeller shaft.  
☞ DRIVESHAFTS, REPAIRS, Propeller shaft - front.
7. Diesel models only: Fit mass damper.  
☞ TRANSFER BOX, REPAIRS, Damper - vibration - Td6.
8. Refill transfer gearbox with oil.  
☞ TRANSFER BOX, ADJUSTMENTS, Drain and refill.



5. Using **LRT-51-003** to restrain drive flange, remove nut and remove drive flange. Discard nut and 'O' ring.
6. Remove seal from transfer gearbox.

### Refit

1. Clean oil seal recess in transfer gearbox.



2. Using **LRT-41-020** fit seal to transfer gearbox box.

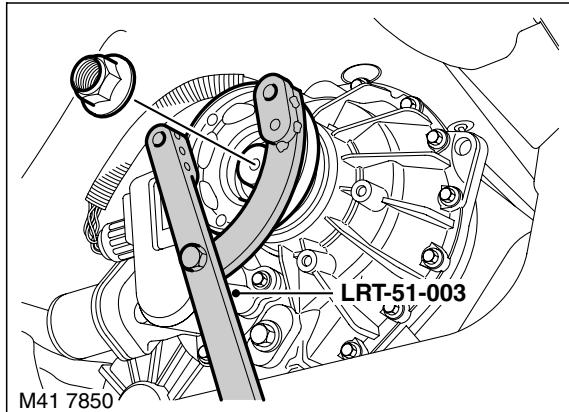


## **Oil seal - rear output shaft**

» **41.20.54**

### **Remove**

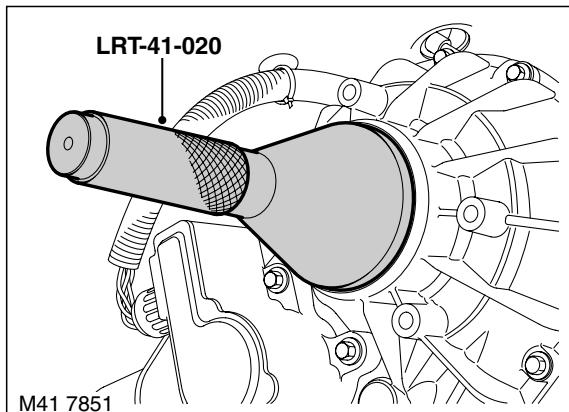
1. Remove rear propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
2. Release output shaft flange nut stake.



3. Using **LRT-51-003** to restrain drive flange, remove nut and remove drive flange. Discard nut and 'O' ring.
4. Remove seal from transfer gearbox.

### **Refit**

1. Clean oil seal recess in transfer gearbox.



2. Using **LRT-41-020** fit seal to transfer gearbox box.
3. Clean drive flange and mating face.
4. Fit flange, use new 'O' ring and tighten new nut to 100 Nm (74 lbf.ft).
5. Stake output shaft flange nut to shaft.

6. Fit rear propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
7. Check and if necessary, top up transfer gearbox oil.  
☞ **TRANSFER BOX, ADJUSTMENTS, Drain and refill.**

## TRANSFER BOX

### Fuse - transfer gearbox - electronic control unit (ECU)

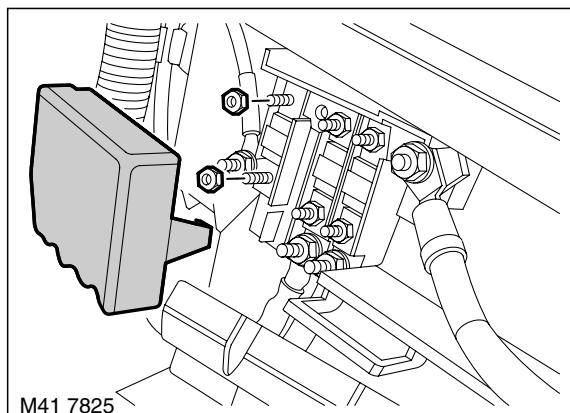
☛ 41.20.75

#### Remove

1. Remove battery carrier.  
☛ CHARGING AND STARTING,  
REPAIRS, Carrier - battery.



2. Release clips securing ECU cover to bulkhead.  
Remove cover.



3. Carefully release 2 clips and remove fuse box cover.
4. Locate fuse, remove 2 nuts and collect spacers. Remove and discard fuse.

#### Refit

1. Ensure fuse box terminals are clean.
2. Position fuse, fit spacers and nuts, tighten to 6 Nm (4.4 lbf.ft).
3. Fit fuse box cover.
4. Fit and secure ECU cover.
5. Fit battery carrier.

☛ CHARGING AND STARTING,  
REPAIRS, Carrier - battery.

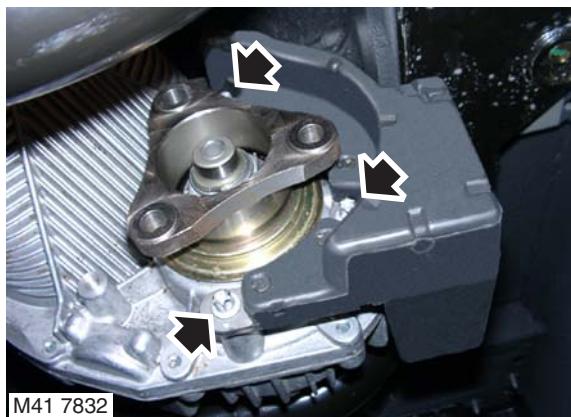


## Damper - vibration - Td6

» 41.20.85

### Remove

1. Remove front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**



2. Remove 3 Torx screws securing mass damper and remove damper.

### Refit

1. Clean damper and mating face.
2. Fit damper and tighten Torx screws to 23 Nm (17 lbf.ft).
3. Fit front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**

## Electronic control unit (ECU) - transfer gearbox

» 41.30.01

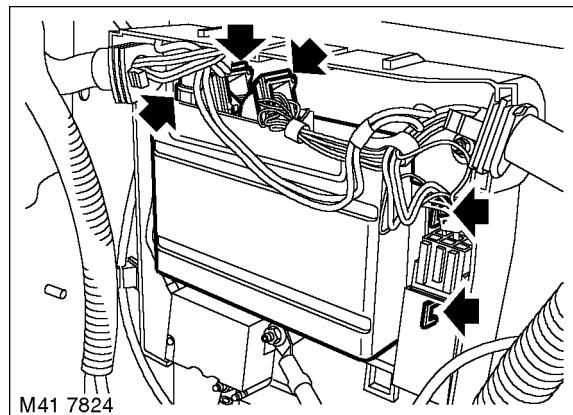
If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

### Remove

1. Remove battery.  
☞ **CHARGING AND STARTING, REPAIRS, Battery.**



2. Release clips securing ECU cover to bulkhead. Remove cover.



3. Release 2 clips securing ECU to bulkhead mounting bracket.
4. Release ECU from mounting, disconnect 3 multiplugs and remove ECU.

## TRANSFER BOX

### Refit

1. Position ECU, connect and secure multiplugs.
2. Fit ECU to mounting and secure clips.
3. Fit and secure cover.
4. Fit battery.

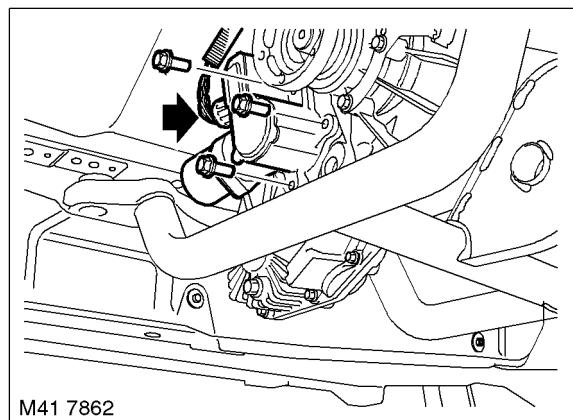
 **CHARGING AND STARTING,  
REPAIRS, Battery.**

### Actuator - ratio control

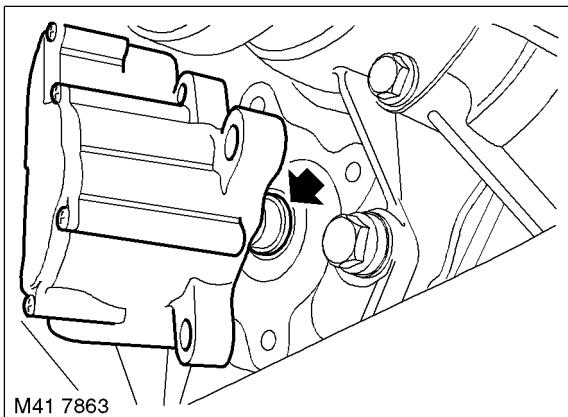
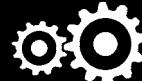
☞ **41.30.03**

#### Remove

1. Position vehicle on lift and select 'Low Range'.
2. Switch off ignition.
3. With neutral selected on automatic gearbox, check that a fuse is not fitted in position 37 of main fuse box. Remove fuse if fitted.
4. Raise the lift.
5. Ensure area to be dismantled is clean.
6. Position a container to collect any spillage.



7. Rotate multiplug anti-clockwise to release and disconnect from ratio control actuator.
8. Remove 3 bolts securing ratio control assembly to transfer gearbox.



9. Avoid disturbing the lead screw which should remain with the transfer gearbox. With extreme care, slowly release the ratio control assembly from the transfer gearbox. Use a small flat blade screw driver to prevent the lead screw moving out with the ratio control assembly, as shown.

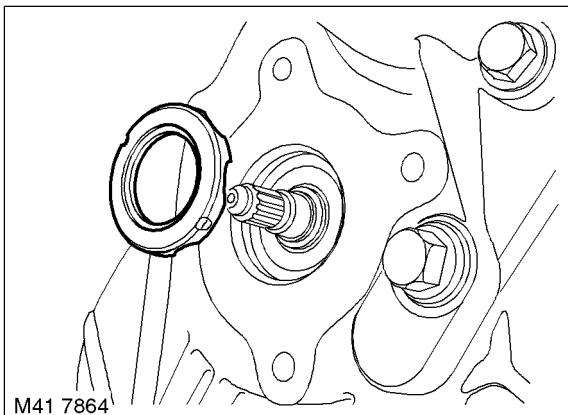
**CAUTION: If the lead screw is rotated or withdrawn internal transfer gearbox damage may result.**

10. Remove the 'O' ring.
11. Remove bearing only if released.

#### Refit

1. Ensure low range is selected by pushing selector shaft fully into transfer gearbox.
- CAUTION: If the lead screw is rotated or withdrawn internal damage may result.**

2. Clean bearing and mating face.



3. Lubricate and fit bearing, with 'legs' of bearing pointing towards the transfer gearbox, as shown.

4. Clean ratio control assembly and mating face on transfer gearbox.
5. Use a new 'O' ring, engage splines and fit ratio control assembly to transfer gearbox.  
*NOTE: The lead screw has a master spline.*
6. Fit and tighten bolts securing ratio control assembly to transfer gearbox to 28 Nm (21 lbf.ft).
7. Connect and secure multiplug to ratio control actuator.
8. Lower the lift.
9. To calibrate a new ratio control assembly, follow the steps below.
10. Fit spare fuse into position 37 in main fuse box.
11. With automatic gearbox in neutral, switch ignition on.
12. Switch off ignition.
13. Remove fuse from position 37.
14. Switch ignition on.
15. Operate switch to perform a high to low shift and back to high.
16. Drive vehicle to perform at least 3 high to low to high shifts cycles at permissible speeds above 6 mph (10 km/h).

## **TRANSFER BOX**

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## Gearbox fluid - drain & refill

### 44.24.02

#### Drain

- Position vehicle on lift.

**WARNING:** Observe due care when draining gearbox fluid as the fluid can be very hot.

- Apply handbrake and position chocks under front and rear wheels.

- Position container under gearbox.

**NOTE:** The fluid should be drained with the transmission at normal operating temperature.

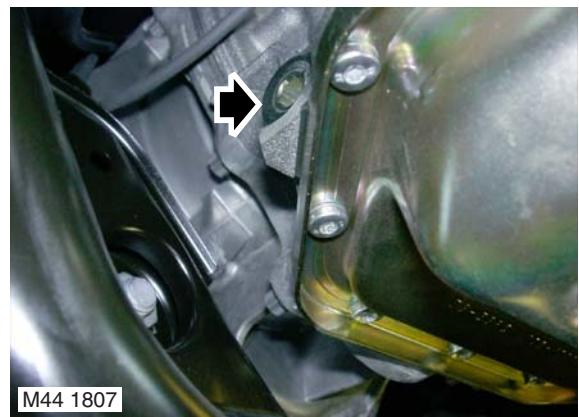
- Clean area around drain plug.



- Remove drain plug and discard sealing washer.
- Allow fluid to drain.
- Clean sump drain plug, fit new sealing washer and tighten to 25 Nm (18 lbf.ft).

#### Refill

- Clean area around filler/level plug.



- Remove filler/level plug and discard sealing washer.
- Add 3.5 to 4.0 litres of correct fluid through gearbox level/filler hole.
- Fit new sealing washer and tighten filler/level plug to 35 Nm (26 lbf.ft).
- Check and top-up fluid level.

**MAINTENANCE, PROCEDURES, Gearbox fluid - V8.**

## Selector cable - check and adjust

---

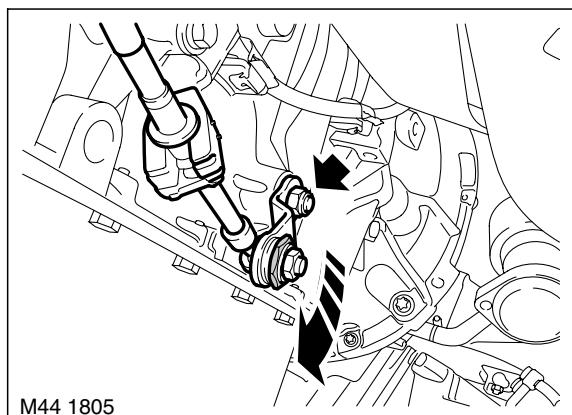
→ 44.30.04

### Check

1. Move selector lever from 'P', check gear engagement in each position and return to 'P'.
2. Check that the engine will start in 'P' and 'N' positions and that engine start is inhibited when drive positions are selected.

### Adjust

1. Position vehicle on lift.
2. Move the selector lever to 'P' position.
3. Raise vehicle on lift.



4. Using 2 spanners, restrain trunnion and loosen nut securing inner cable to selector lever.
5. Move selector lever on gearbox fully clockwise to engage 'P' position.
6. Tighten trunnion nut to 15 Nm (11 lbf.ft).
7. Lower vehicle on lift.
8. Move selector lever from 'P', check gear engagement in each position and return to 'P'.
9. Check that the engine will start in 'P' and 'N' positions and that engine start is inhibited when drive positions are selected.

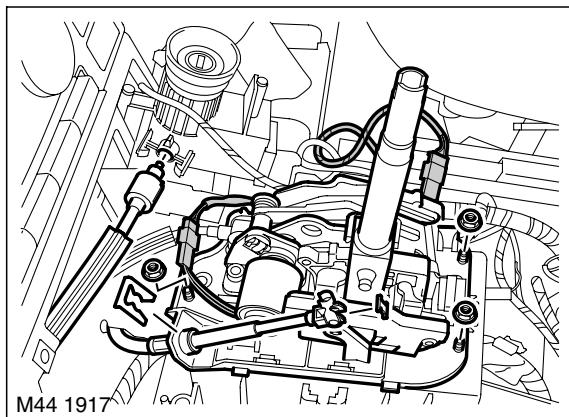


## Lever - gearshift selector assembly

» 44.15.04

### Remove

1. Remove centre console.
- INTERIOR FITTINGS, REPAIRS, Centre console.**



2. Disconnect shift interlock cable from ignition barrel.
3. Remove clip securing outer gear shift cable to mechanism.
4. Release and remove clip securing inner gear shift cable to mechanism, collect plastic spacer from cable.
5. Disconnect 2 multiplugs from selector mechanism.
6. Remove 3 nuts securing selector mechanism to carrier, remove mechanism.

### Refit

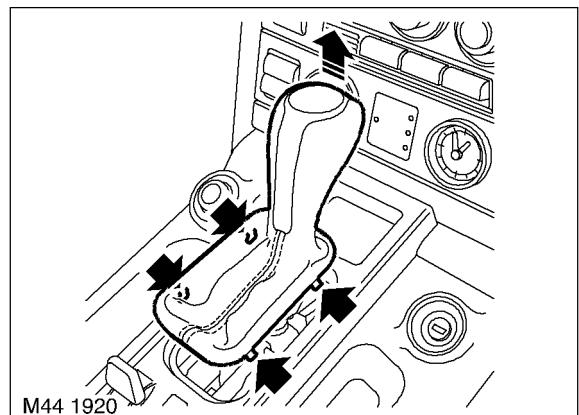
1. Position mechanism to carrier, fit nuts and tighten to 25 Nm (18 lbf.ft).
  2. Connect multiplugs to mechanism.
  3. Fit plastic spacer to selector cable, secure cable to mechanism.
  4. Connect shift interlock cable to ignition switch barrel.
  5. Fit centre console.
- INTERIOR FITTINGS, REPAIRS, Centre console.**

## Knob - selector lever

» 44.15.07

### Remove

1. Release 4 clips securing gear-lever gaiter to centre console.



2. Pull gear knob upwards to disengage locating tang from gear selector lever.

**WARNING: Gear knob will be released suddenly, keep face clear of gear knob during removal.**

### Refit

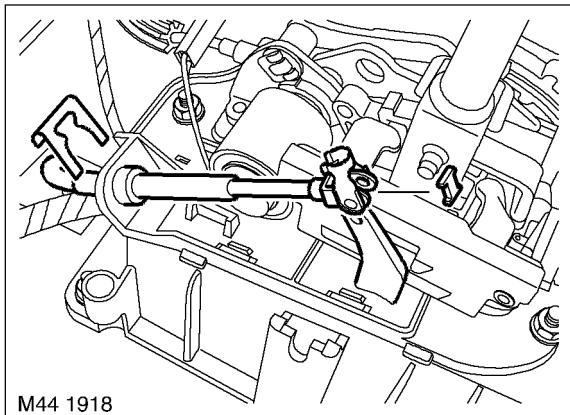
1. Position gear knob to gear selector lever engaging locating tang on knob with slot in selector lever.
2. Push gear knob fully on to gear selector lever.
3. Fit and secure gear lever gaiter.

## Rod/cable assembly - selector

→ 44.15.08

### Remove

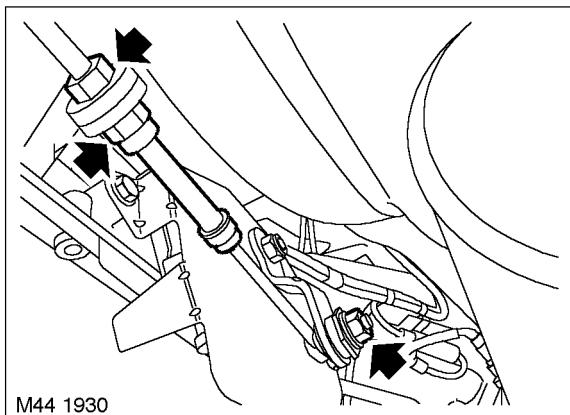
1. Position vehicle on lift.
2. Select 'P'.
3. Remove centre console.  
    ☞ **INTERIOR FITTINGS, REPAIRS,  
Centre console.**



### Refit

1. Position cable through access panel, fit grommet and carpet.
2. Position selector cable through bracket and selector lever and secure selector cable to bracket.
3. Tighten nut securing selector cable to selector lever to 15 Nm (11 lbf.ft).
4. Position cable to selector mechanism, fit spacer and secure with clips.
5. Fit centre console.  
    ☞ **INTERIOR FITTINGS, REPAIRS,  
Centre console.**

4. Remove clip securing outer gear shift cable to mechanism.
5. Release and remove clip securing inner gear shift cable to mechanism, collect plastic spacer from cable.



6. Loosen nut securing selector cable to selector lever and release selector cable from bracket.
7. Remove cable and grommet through carpet access panel.



## Switch - starter inhibitor

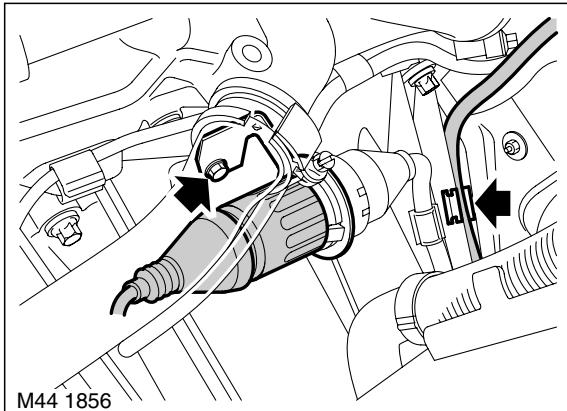
### 44.15.19

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

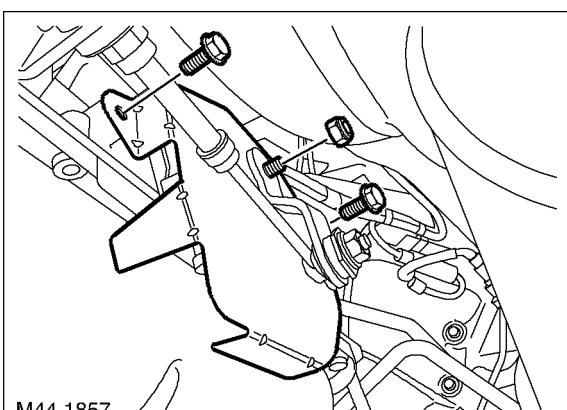
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**

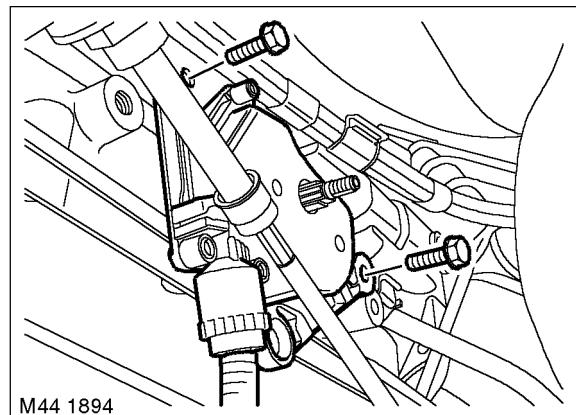


3. Disconnect multiplug from inhibitor switch.
4. Remove bolt securing inhibitor switch multiplug bracket and release harness from gearbox.
5. Disconnect breather hose from gearbox.
6. Raise vehicle on lift.



7. Release inhibitor switch harness from retaining clips and position aside.
8. Remove nut securing selector lever to inhibitor switch and release lever.

9. Remove 2 bolts securing inhibitor switch guard and remove guard.



10. Remove 2 bolts securing inhibitor switch to gearbox and remove inhibitor switch.

#### Refit

1. Clean inhibitor switch and mating face on gearbox.
2. Fit inhibitor switch onto dowel, fit bolts and tighten to 10 Nm (7 lbf.ft)
3. Fit and secure inhibitor switch harness and connect multiplug.
4. Position inhibitor switch harness bracket, fit and tighten bolt to 10 Nm (7 lbf.ft)
5. Fit inhibitor switch guard, fit and tighten bolts to 10 Nm (7 lbf.ft)
6. Fit selector lever to inhibitor switch, fit nut and tighten to 10 Nm (7 lbf.ft)
7. Lower vehicle.
8. Connect breather hose to gearbox.
9. Fit air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**

10. Connect battery earth lead.

## Fluid seal - selector shaft

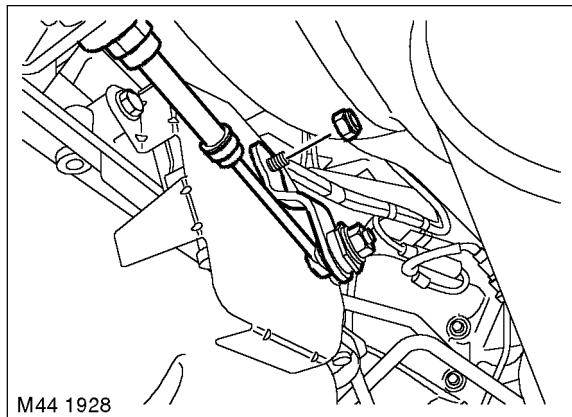
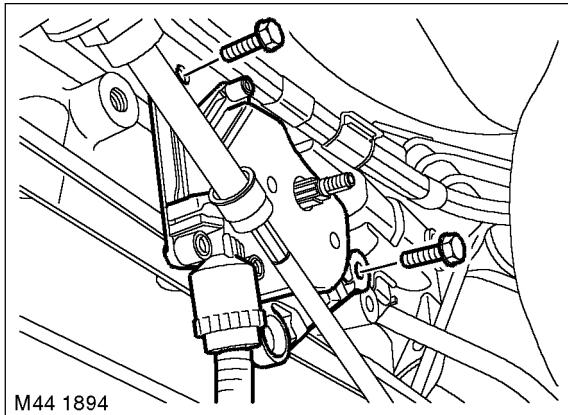
### 44.15.34

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

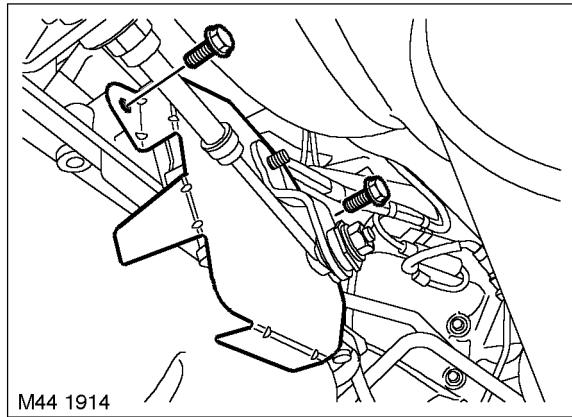
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.

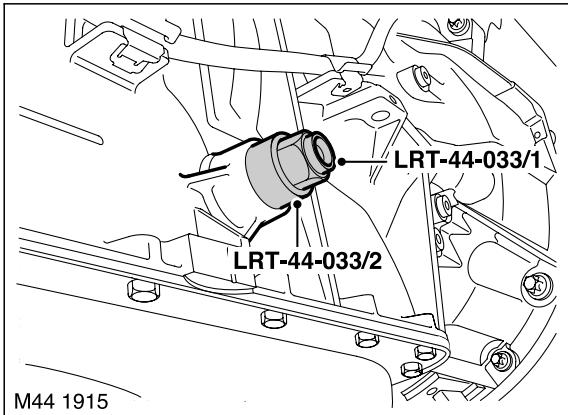


3. Remove nut securing selector lever to selector shaft and release lever.



4. Remove 2 bolts securing inhibitor switch guard and remove guard.

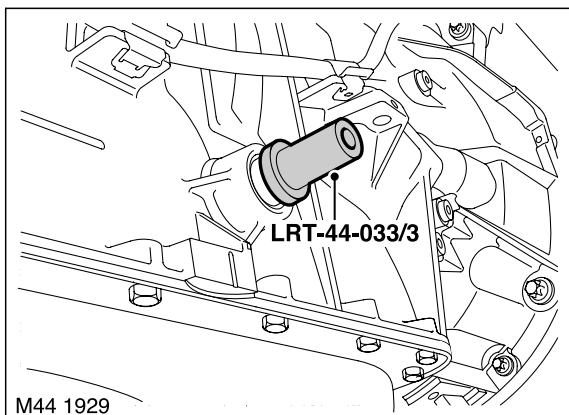
5. Remove 2 bolts securing inhibitor switch to gearbox and remove inhibitor switch from selector shaft.



6. Position **LRT-44-033/2** to seal recess and fit **LRT-44-033/1** to **LRT-44-033/2**. Tighten **LRT-44-033/1** and remove selector shaft oil seal.

#### Refit

1. Clean selector shaft and seal recess.



2. Using **LRT-44-033/3** fit new oil seal to selector shaft recess.
3. Clean inhibitor switch and mating face on gearbox.
4. Position inhibitor switch to dowel, fit 2 bolts securing inhibitor switch and tighten to 10 Nm (7 lbf.ft).
5. Position inhibitor switch guard to gearbox, fit 2 bolts securing inhibitor switch guard and tighten to 10 Nm (7 lbf.ft).
6. Position selector lever to selector shaft, fit nut securing selector shaft and tighten to 10 Nm (7 lbf.ft).
7. Connect battery earth lead.

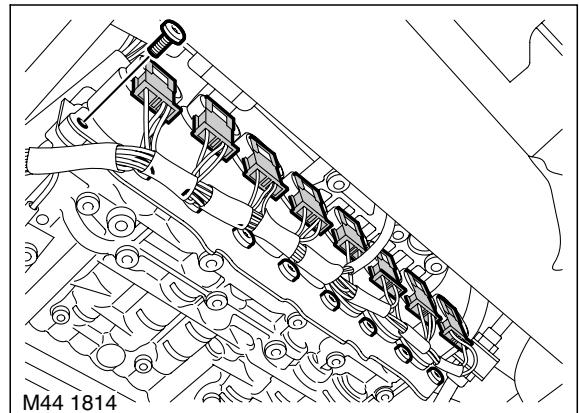
## Solenoid - shift

→ **44.15.45**

### Remove

1. Remove sump.

**AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gasket - fluid pan.**



2. Disconnect multiplugs from solenoid valves.
3. Remove 9 Torx bolts securing solenoid retaining bracket, remove bracket.
4. Remove solenoid valve and remove 'O' rings where fitted.

### Refit

1. Clean solenoid mating faces.
2. Fit new 'O' rings to solenoid and lubricate with transmission fluid.
3. Fit solenoid to valve block.
4. Fit solenoid retaining bracket, fit Torx bolts and tighten to 10 Nm (7 lbf.ft)
5. Connect multiplugs to solenoid valves.
6. Fit sump.

**AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gasket - fluid pan.**

## Electronic control unit (ECU) - Electronic automatic transmission (EAT)

### ☛ 44.15.46

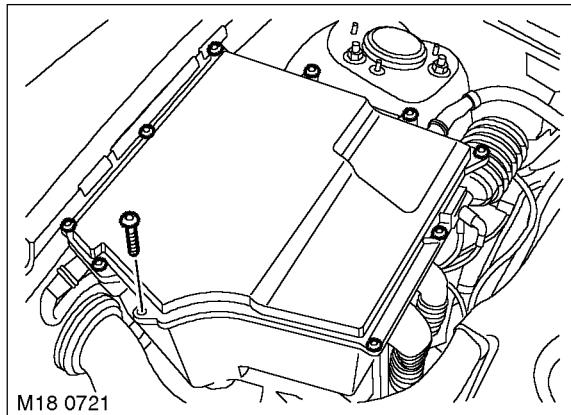
If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

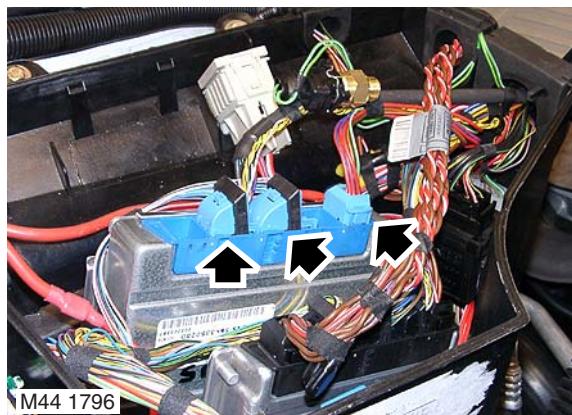
#### GENERAL INFORMATION, Electrical Precautions.

#### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect 3 blue multiplugs from EAT ECU.
4. Release EAT ECU from mounting bracket and remove from 'E' box.

#### Refit

1. Fit EAT ECU in mounting bracket and connect multiplugs.
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect battery earth lead.

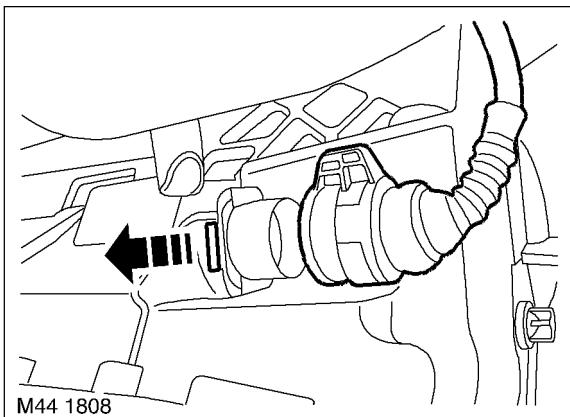


## Harness - solenoid valve

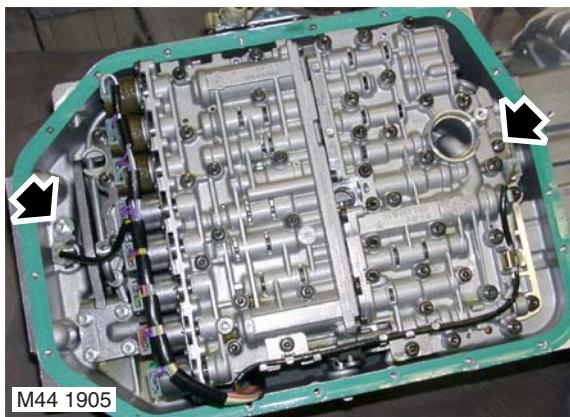
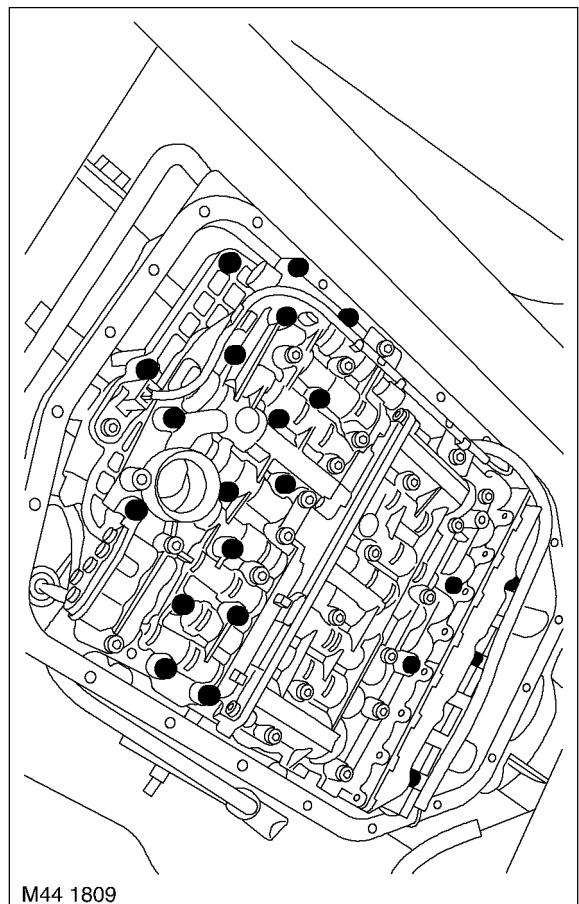
» 44.15.52

### Remove

1. Remove gearbox fluid filter.  
☞ AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Filter - fluid.

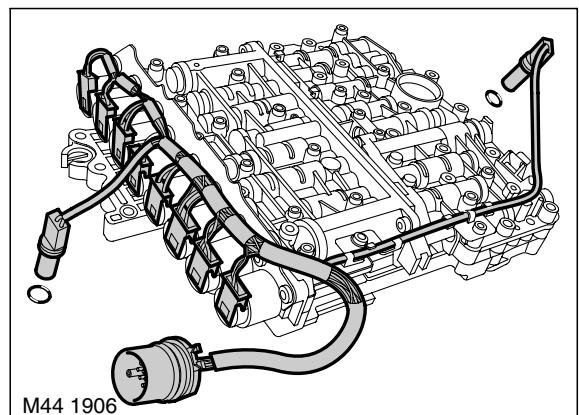


2. Disconnect multiplug from gearbox.
3. Remove retaining clip from multiplug and release plug from gearbox casing.



4. Remove 2 Torx bolts securing speed sensor clamps, remove clamps and sensors.

5. Evenly and progressively loosen and remove 22 large shouldered Torx bolts from valve block.
6. Remove valve block assembly.



7. Noting fitted position, disconnect 10 multiplugs from sensors and solenoids.
8. Remove harness, remove and discard 'O' rings.

# AUTOMATIC TRANSMISSION - ZF 5HP24

## Refit

1. Clean multiplug and gearbox recess.
2. Fit new 'O' rings to harness and lubricate with transmission fluid.
3. Position harness to valve block and secure with clips.
4. Connect multiplugs to sensors and solenoids.
5. Clean valve block and mating faces.
6. With assistance fit valve block and multiplug, ensure selector fork locates on peg.
7. Evenly and progressively fit and tighten 22 valve block Torx bolts to 10 Nm (7 lbf.ft)
8. Fit gearbox multiplug retaining clip.
9. Connect multiplug to gearbox connector.
10. Fit speed sensor to valve block, position clamp and tighten Torx bolt to 10 Nm (7 lbf.ft).
11. Fit gearbox fluid filter.

 AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Filter - fluid.

## Pick up - speed sensor - countershaft

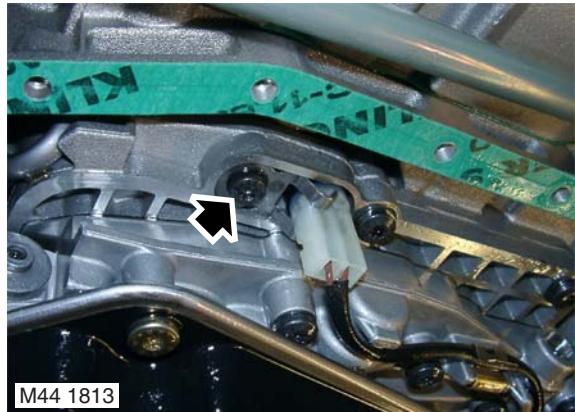
 44.15.55

This procedure also covers, pick up - speed sensor - mainshaft.

## Remove

1. Remove sump.

 AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gasket - fluid pan.



2. Remove Torx bolt securing speed sensor clamp and release sensor from valve block.
3. Disconnect multiplug from speed sensor.

## Refit

1. Clean countershaft speed sensor and sensor location.
2. Connect multiplug to countershaft speed sensor,
3. Fit speed sensor to valve block, position clamp and tighten Torx bolt to 10 Nm (7 lbf.ft).
4. Fit sump.

 AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gasket - fluid pan.

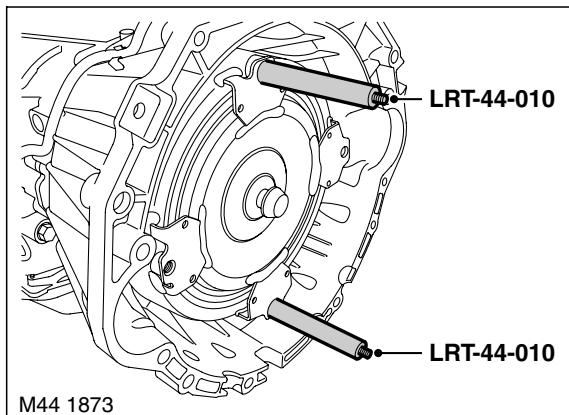


## Fluid seal - torque converter

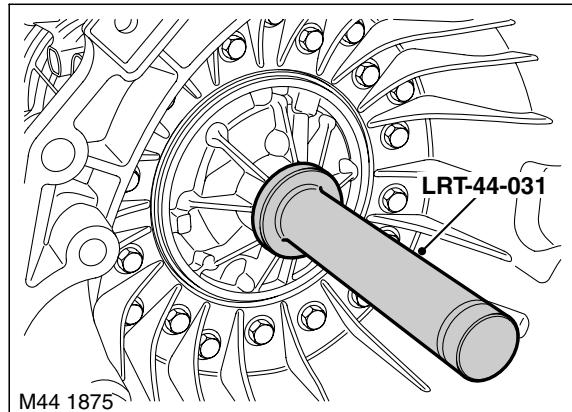
### 44.17.11

#### Remove

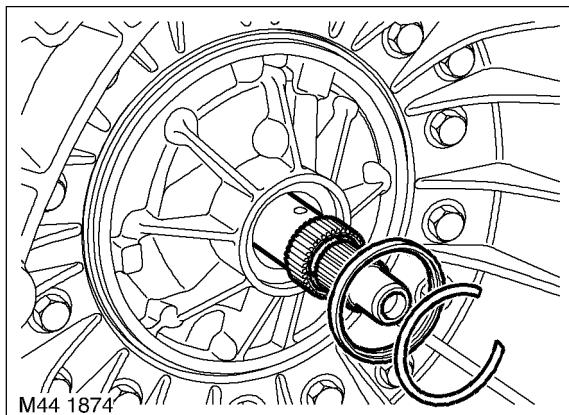
1. Remove transmission assembly.  
☞ **AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gearbox/converter & transfer gearbox assembly - remove for access and refit.**
2. Remove torque converter retaining plate.



3. Fit tool **LRT-44-010** to torque converter and remove torque converter from gearbox.



2. Using **LRT-44-031** fit new oil seal.
3. Fit retaining ring securing oil seal.
4. Fit torque converter to gearbox, ensure converter is fully located onto oil pump drive.
5. Remove tool **LRT-44-010** from torque converter.
6. Fit converter retaining plate and secure with bolts.
7. Fit transmission assembly.  
☞ **AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gearbox/converter & transfer gearbox assembly - remove for access and refit.**



4. Remove retaining ring securing torque converter oil seal.
5. Carefully remove oil seal.

#### Refit

1. Clean torque converter oil seal recess in gearbox. Lubricate torque converter oil seal with clean transmission fluid.

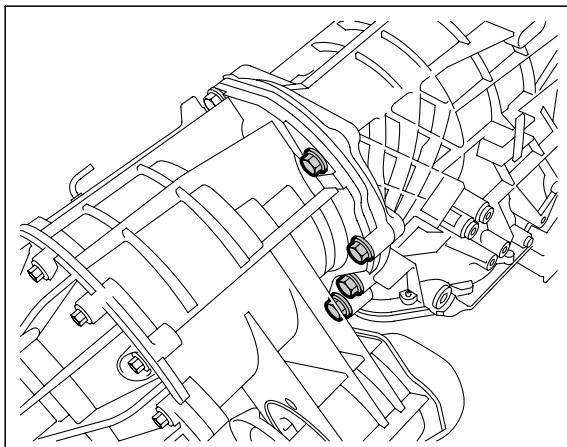
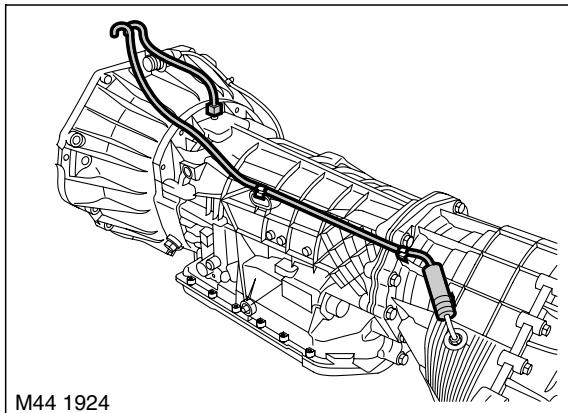
# AUTOMATIC TRANSMISSION - ZF 5HP24

## Gearbox & converter

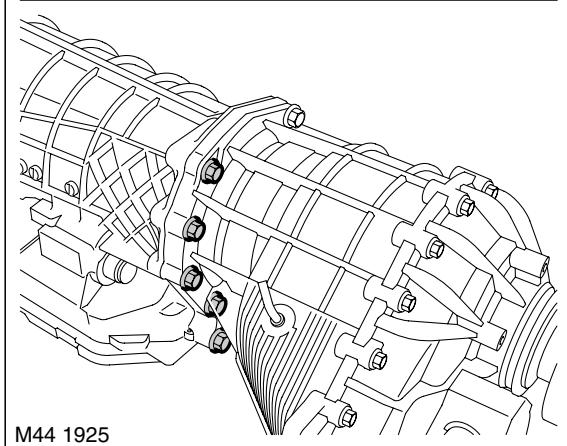
→ 44.20.02

### Remove

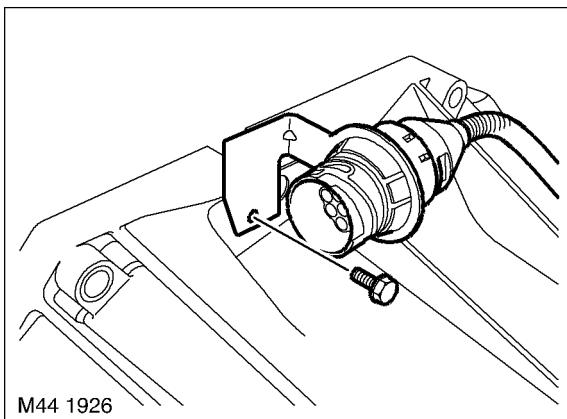
1. Remove transmission assembly.  
→ AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gearbox/converter & transfer gearbox assembly - remove for access and refit.
2. Remove gearbox assembly from transmission jack and lower onto bench.



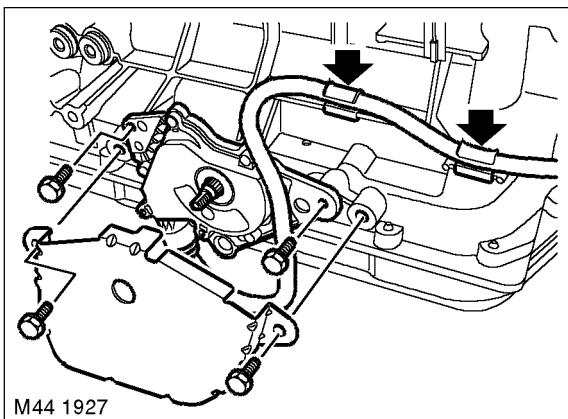
3. Release transfer gearbox breather pipe from clips.
4. Disconnect breather hose from gearbox.



5. Remove 9 Torx bolts and remove transfer gearbox.



6. Remove bolt securing inhibitor switch multiplug bracket and release harness from gearbox.



7. Remove 2 bolts securing inhibitor switch guard and remove guard.
8. Remove 2 bolts securing inhibitor switch to gearbox and remove inhibitor switch.

#### Refit

1. Clean inhibitor switch and mating face on gearbox.
2. Fit inhibitor switch onto dowel, fit bolts and tighten to 10 Nm (7 lbf.ft)
3. Fit inhibitor switch guard, fit and tighten bolts to 10 Nm (7 lbf.ft)
4. Fit inhibitor switch harness to gearbox and tighten multiplug bracket bolt to 10 Nm (7 lbf.ft).
5. Clean transfer gearbox and mating face dowels and dowel holes.
6. Align transfer gearbox to automatic gearbox, fit Torx bolts and tighten to 43 Nm (32 lbf.ft).
7. Connect breather hose to gearbox.
8. Secure transfer gearbox breather pipe to automatic gearbox casing.
9. Remove gearbox assembly from bench and secure on transmission jack.
10. Fit transmission assembly.

**AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gearbox/converter & transfer gearbox assembly - remove for access and refit.**

#### Gearbox/converter & transfer gearbox assembly - remove for access and refit

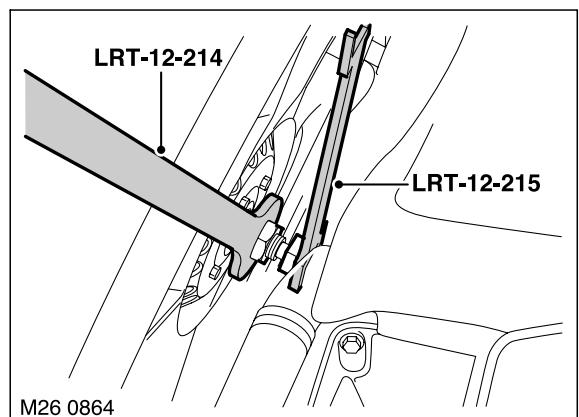
44.20.04.99

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

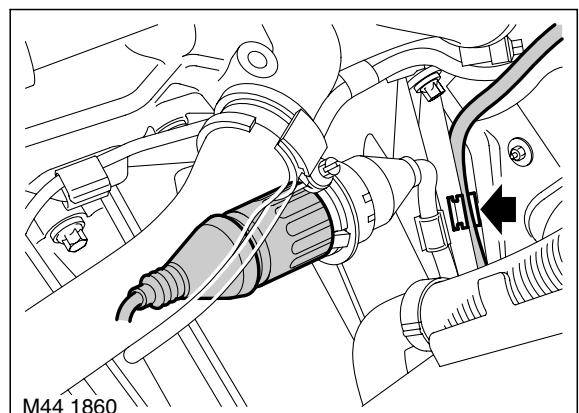
#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



3. Use **LRT-12-214** and **LRT-12-215** to loosen viscous coupling lock nut and remove fan assembly from coolant pump.  
*NOTE: Thread is left handed.*
4. Remove air intake plenum.

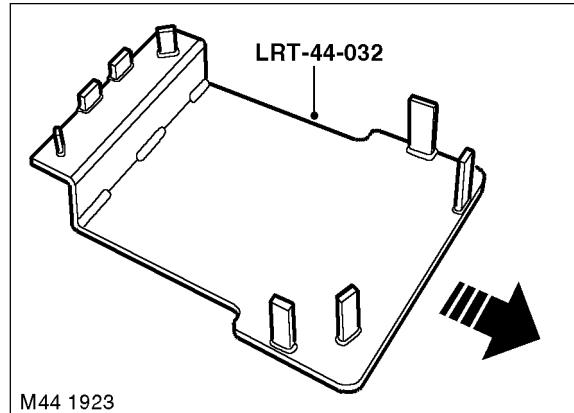
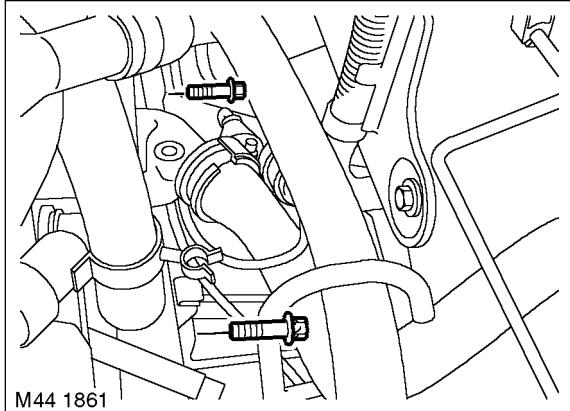
**HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**



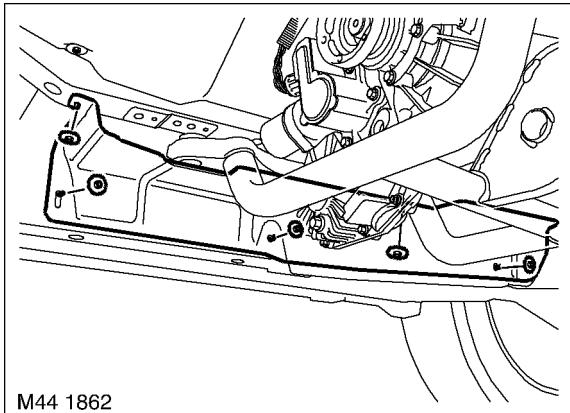
5. Disconnect multiplug from inhibitor switch harness.

## AUTOMATIC TRANSMISSION - ZF 5HP24

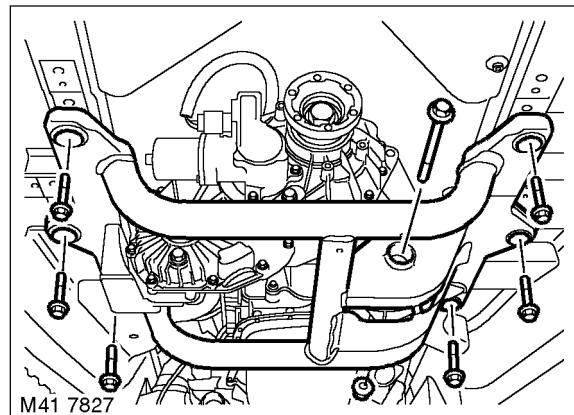
6. Release clips securing LH oxygen sensor lead from gearbox bell housing.



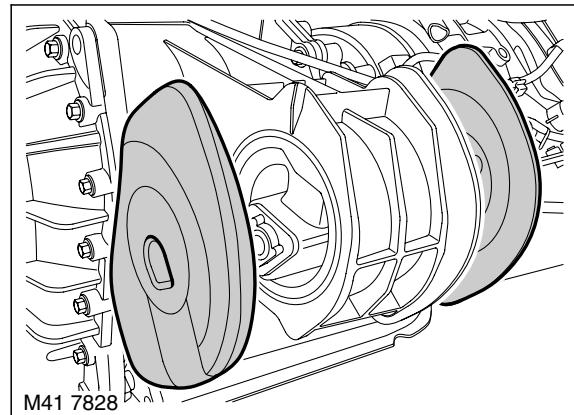
7. Remove 2 Torx bolts from top of bell housing.
8. Raise vehicle on lift.
9. Remove rear propeller shaft.  
☞ DRIVESHAFTS, REPAIRS, Propeller shaft - rear.
10. Remove front propeller shaft.  
☞ DRIVESHAFTS, REPAIRS, Propeller shaft - front.



11. Remove 5 nuts, release LH heat shield and remove.
12. Drain gearbox fluid.  
☞ AUTOMATIC TRANSMISSION - ZF 5HP24, ADJUSTMENTS, Gearbox fluid - drain & refill.



14. Remove nut and bolt securing mounting to cross member.
15. Remove 6 bolts securing cross member and remove cross member.

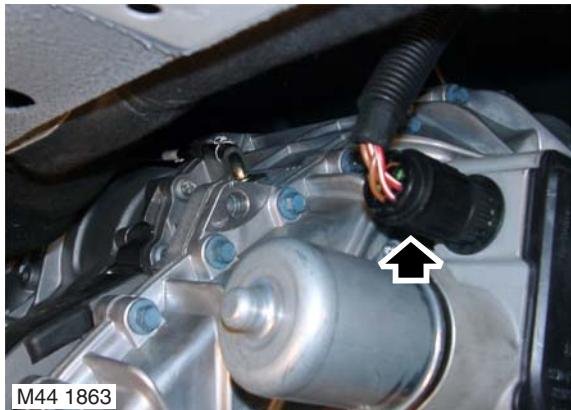


16. Remove snubbers from mounting.

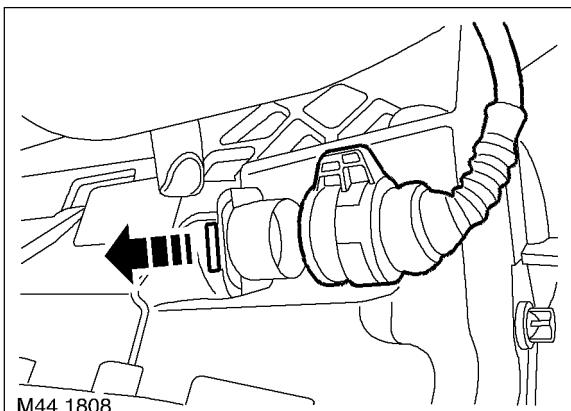


17. Lower gearbox on jack.

**CAUTION:** Do not allow gearbox to hang on gear selector cable.

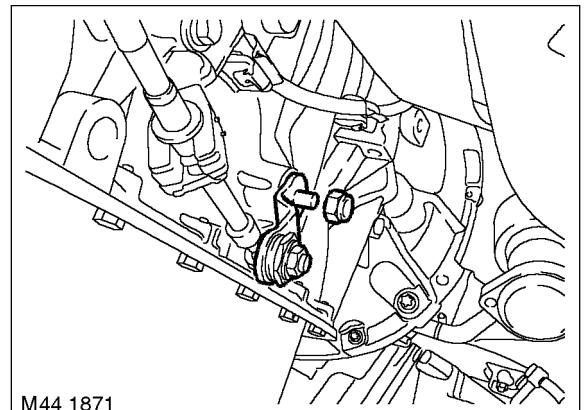


18. Disconnect multiplug from high/low shift motor.



19. Disconnect multiplug from gearbox housing.

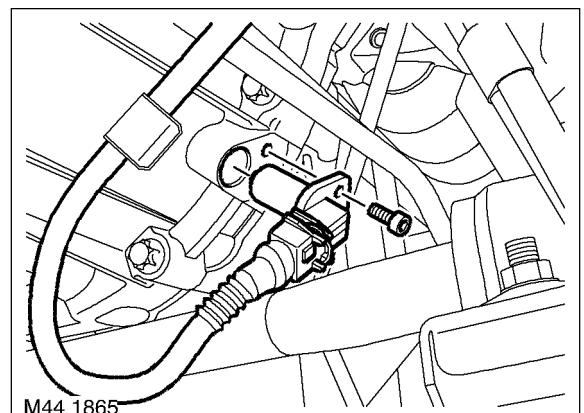
20. Release clips securing oxygen sensor leads to transfer gearbox.



21. Remove nut securing selector lever to gearbox selector shaft and release lever.



22. Remove 2 bolts securing selector cable support bracket to gearbox and tie cable aside.



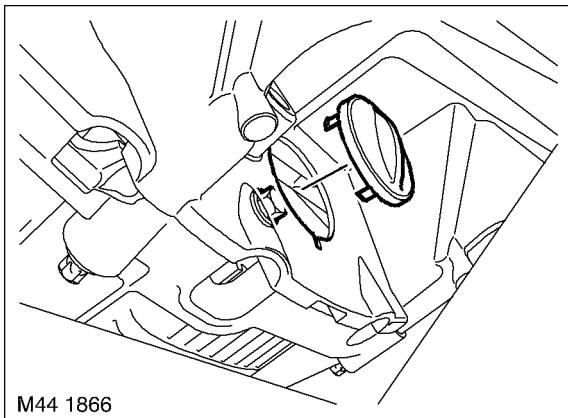
23. Remove bolt securing crankshaft sensor, remove sensor and position aside.

24. Release RH oxygen sensor harness from gearbox casing.

## AUTOMATIC TRANSMISSION - ZF 5HP24

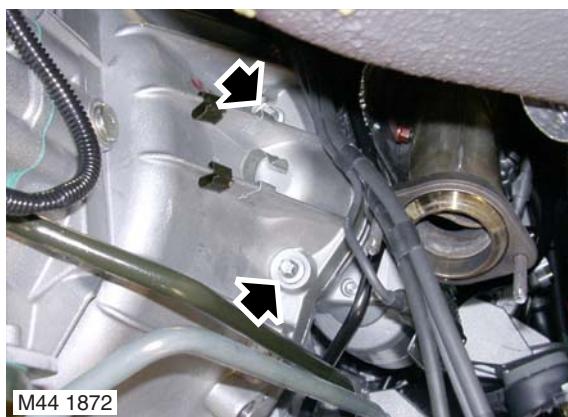
25. Remove undertray.

 EXTERIOR FITTINGS, REPAIRS,  
Undertray - front.



26. Remove grommet from bell housing to gain access to torque converter retaining bolts.

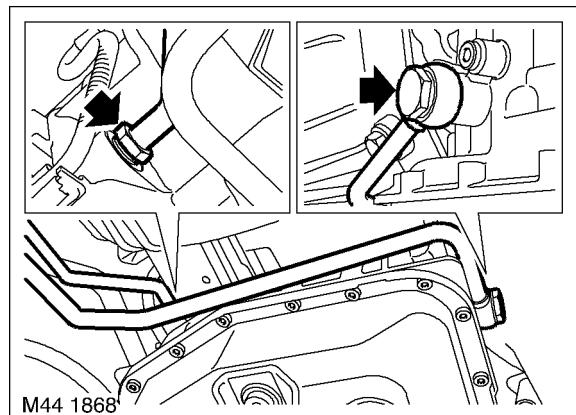
27. Rotate crankshaft for access and remove 4 bolts securing drive plate to torque converter.



28. Remove 2 bolts securing starter motor and tie aside.

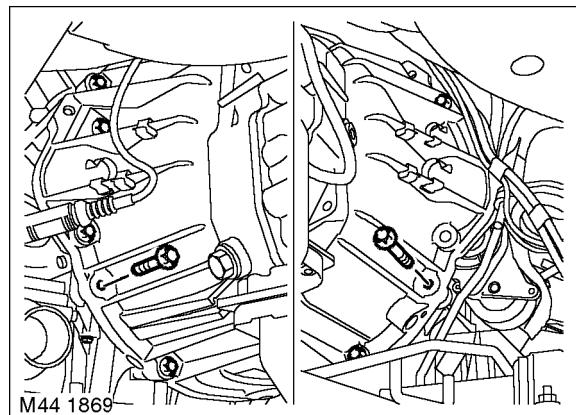


29. Remove bolt securing fluid cooler saddle clamp to sump.



30. Remove banjo bolt securing fluid cooler pipe to LH side of gearbox and discard sealing washers.

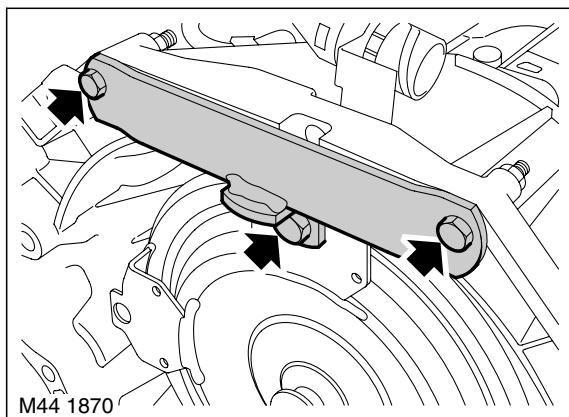
31. Release fluid cooler pipe from RH side of gearbox and discard 'O' ring.



32. Remove 8 Torx bolts from bell housing.



33. With assistance, carefully remove gearbox from engine. Ensure torque converter remains with gearbox.



34. Fit converter retaining plate and secure with bolts.

#### Refit

1. Clean mounting and mating faces.
  2. Remove torque converter retaining plate.
  3. With assistance, carefully fit gearbox to engine. Ensure engagement of torque converter spigot and gearbox housing onto dowels.
  4. Fit 8 Torx bolts securing automatic gearbox to engine, tighten to 45 Nm (33 lbf.ft)
  5. Clean fluid cooler pipes unions and mating faces.
  6. Position fluid cooler pipe to LH side of gearbox.
  7. Lubricate fluid cooler sealing washers with transmission fluid, fit banjo bolt to gearbox and tighten to 37 Nm (27 lbf.ft)
  8. Fit and lubricate new 'O' ring to fluid cooler pipe, fit pipe to gearbox and tighten to 37 Nm (27 lbf.ft).
  9. Position fluid cooler saddle clamp, fit bolt and tighten to 6 Nm (4.4 lbf.ft)
  10. Fit starter motor and tighten bolts to 45 Nm (33 lbf.ft).
  11. Fit bolts securing drive plate to torque converter and tighten to 45 Nm (33 lbf.ft)
  12. Fit grommet to gearbox bell housing.
  13. Fit undertray.
- ☞ EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
14. Fit oxygen sensor leads to gearbox casing.
  15. Clean crankshaft sensor and mating face.
  16. Position crankshaft sensor, fit bolt and tighten to 6 Nm (4.4 lbf.ft)
  17. Position selector cable support bracket to gearbox, fit bolts and tighten to 10 Nm (7 lbf.ft)
  18. Fit selector lever to inhibitor switch, fit nut and tighten to 10 Nm (7 lbf.ft)

19. Fit and secure oxygen sensor leads to transfer gearbox.
  20. Connect multiplug to gearbox connector.
  21. Connect multiplug to high/low shift motor.
  22. Raise gearbox on jack.
  23. Fit snubbers.
  24. Fit cross member to mounting, fit nut and bolt but do not tighten at this stage.
  25. Align cross member, fit bolts and tighten to 68 Nm (50 lbf.ft).
  26. Remove support from gearbox.
  27. Tighten nut and bolt securing mounting to cross member to 100 Nm (74 lbf.ft).
  28. Fit heat shield and secure with nuts.
  29. Fit rear propeller shaft.
- ☞ DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
30. Fit front propeller shaft.
- ☞ DRIVESHAFTS, REPAIRS, Propeller shaft - front.**
31. Lower vehicle.
  32. Fit top bell housing Torx bolts and tighten to 25 Nm (18 lbf.ft)
  33. Fit and secure LH oxygen sensor lead to gearbox bell housing.
  34. Connect inhibitor switch multiplug.
  35. Fit air intake plenum.
- ☞ HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
36. Fit fan to pulley and tighten viscous coupling nut to 40 Nm (30 lbf.ft).
  37. Connect battery earth lead.
  38. Fill gearbox with fluid.
- ☞ AUTOMATIC TRANSMISSION - ZF 5HP24, ADJUSTMENTS, Gearbox fluid - drain & refill.**

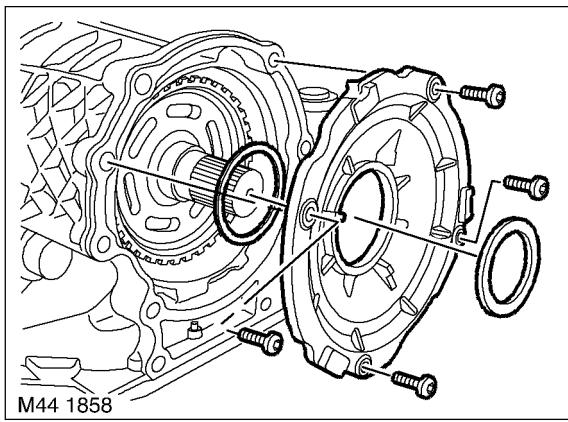
# AUTOMATIC TRANSMISSION - ZF 5HP24

## Fluid seal - rear

» 44.20.18

### Remove

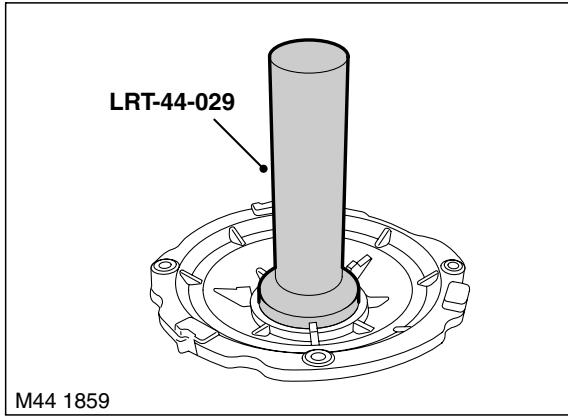
1. Remove transfer gearbox.  
☞ TRANSFER BOX, REPAIRS,  
Transfer gearbox - V8.



2. Remove 4 Torx bolts securing output flange housing and remove housing.
3. Remove bearing.
4. Carefully remove and discard oil seal and 'O' ring.

### Refit

1. Clean housing and mating faces.



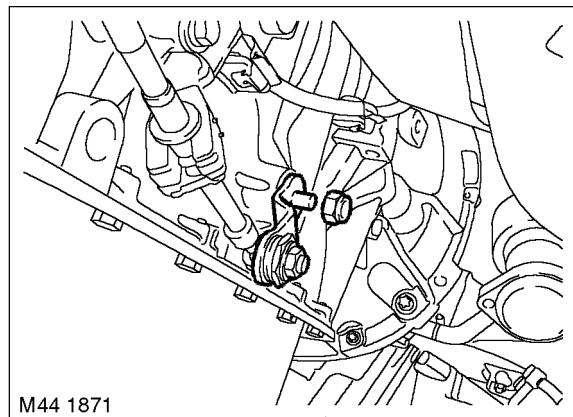
2. Using LRT-44-029 fit new oil seal.
3. Lubricate new 'O' ring and fit to housing.
4. Lubricate and fit bearing.
5. Fit housing to gearbox, fit and tighten Torx bolts to 10 Nm (7 lbf.ft)
6. Fit transfer gearbox.  
☞ TRANSFER BOX, REPAIRS,  
Transfer gearbox - V8.

## Gasket - fluid pan

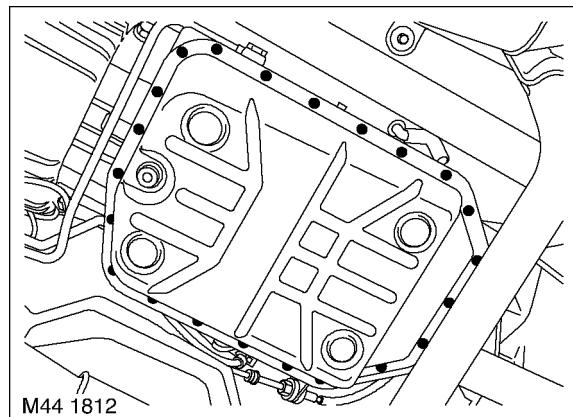
» 44.24.05

### Remove

1. Drain gearbox fluid.  
☞ AUTOMATIC TRANSMISSION - ZF  
5HP24, ADJUSTMENTS, Gearbox fluid -  
drain & refill.



2. Remove nut securing selector lever to gearbox selector shaft and release lever.
3. Remove 2 bolts securing inhibitor switch guard and remove guard.



4. Evenly and progressively loosen and remove 22 Torx bolts from sump.
5. Remove sump and discard gasket.

**Refit**

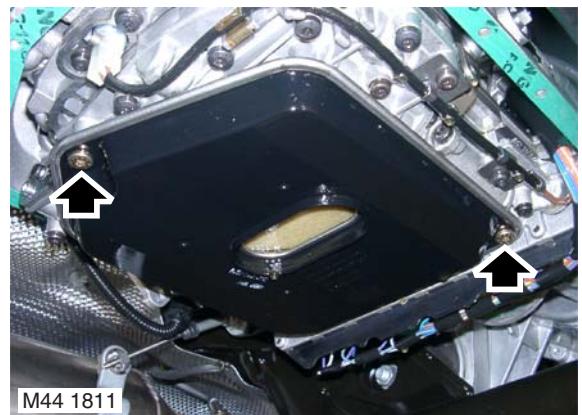
1. Clean gearbox sump mating surfaces.
2. Fit new gasket to sump, position sump to gearbox.
3. Evenly and progressively tighten sump Torx bolts to 10 Nm (7 lbf.ft).
4. Fit inhibitor switch guard, fit and tighten bolts to 10 Nm (7 lbf.ft)
5. Fit selector lever to inhibitor switch, fit nut and tighten to 10 Nm (7 lbf.ft)
6. Refill gearbox with transmission fluid.  
☞ **AUTOMATIC TRANSMISSION - ZF 5HP24, ADJUSTMENTS, Gearbox fluid - drain & refill.**

**Filter - fluid**

☞ **44.24.07**

**Remove**

1. Remove sump and discard gasket.  
☞ **AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gasket - fluid pan.**



2. Remove 2 Torx bolts and remove filter from valve block, discard 'O' ring.

**Refit**

1. Clean filter mating surfaces.
2. Ensure new filter has 'O' ring fitted, then fit filter to valve block.
3. Fit Torx bolts to gearbox filter and tighten to 6 NM (4.4 lbf.ft).
4. Fit sump.  
☞ **AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Gasket - fluid pan.**

## Fluid cooler

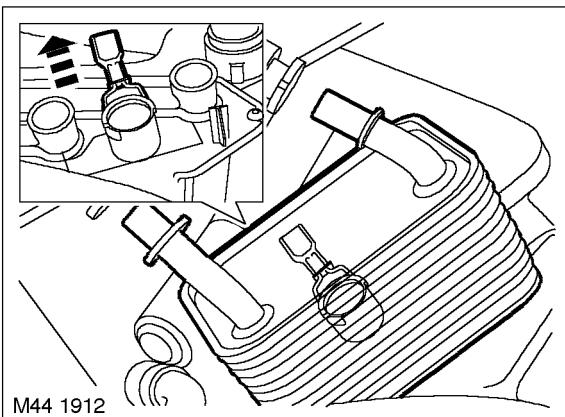
### → 44.24.10

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

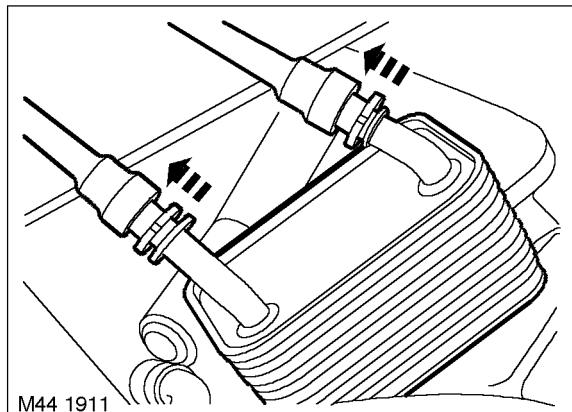
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Place container below gearbox fluid cooler.



6. Release clip securing gearbox fluid cooler and remove gearbox fluid cooler from manifold.
7. Discard 'O' rings.

### Refit

1. Clean gearbox fluid cooler mating faces.
2. Lubricate new 'O' rings with clean transmission fluid and fit 'O' rings to fluid cooler.
3. Fit gearbox fluid cooler to gearbox fluid cooler manifold and secure with clip.
4. Connect gearbox fluid cooler pipes to gearbox fluid cooler.
5. Remove container from below gearbox fluid cooler.
6. Connect battery earth lead.
7. Fill cooling system.  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
8. Check and top up gearbox fluid.  
 **MAINTENANCE, PROCEDURES, Gearbox fluid - V8.**
9. Check gearbox fluid cooler and connections for leaks.



5. Release quick release connectors and disconnect gearbox fluid cooler pipes from gearbox fluid cooler.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

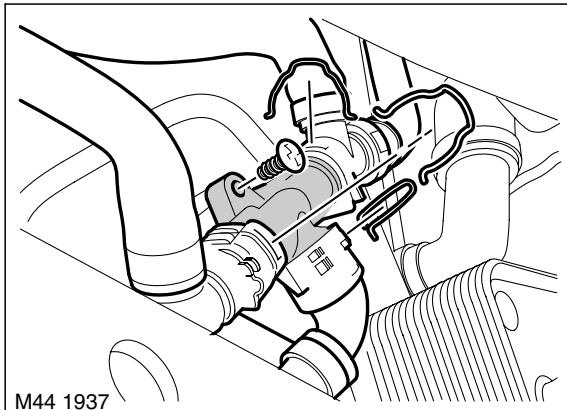


## Thermostat - fluid cooler

» 44.24.17

### Remove

1. Drain cooling system  
☞ COOLING SYSTEM - V8,  
ADJUSTMENTS, Coolant - drain, flush & refill.



2. Release clips and disconnect 3 coolant hoses from the transmission fluid cooler.
- CAUTION: Always fit plugs to open connections to prevent contamination.**
3. Remove Torx screw securing gearbox fluid cooler to cooling pack and remove the gearbox fluid cooler.
4. Remove and discard gearbox fluid cooler 'O' rings.

### Refit

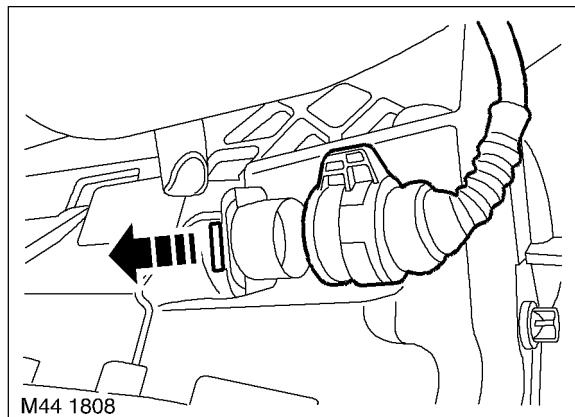
1. Clean hose connections.
2. Fit new gearbox fluid cooler 'O' rings.
3. Fit gearbox fluid cooler to cooling pack and secure with screw.
4. Connect coolant hoses to gearbox fluid cooler and secure with clips.
5. Fill cooling system.  
☞ COOLING SYSTEM - V8,  
ADJUSTMENTS, Coolant - drain, flush & refill.

## Valve body assembly

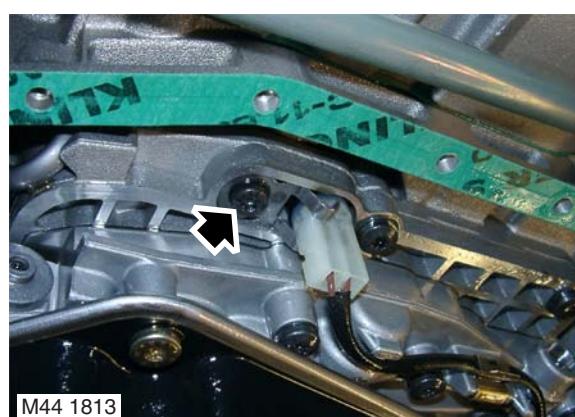
» 44.40.01

### Remove

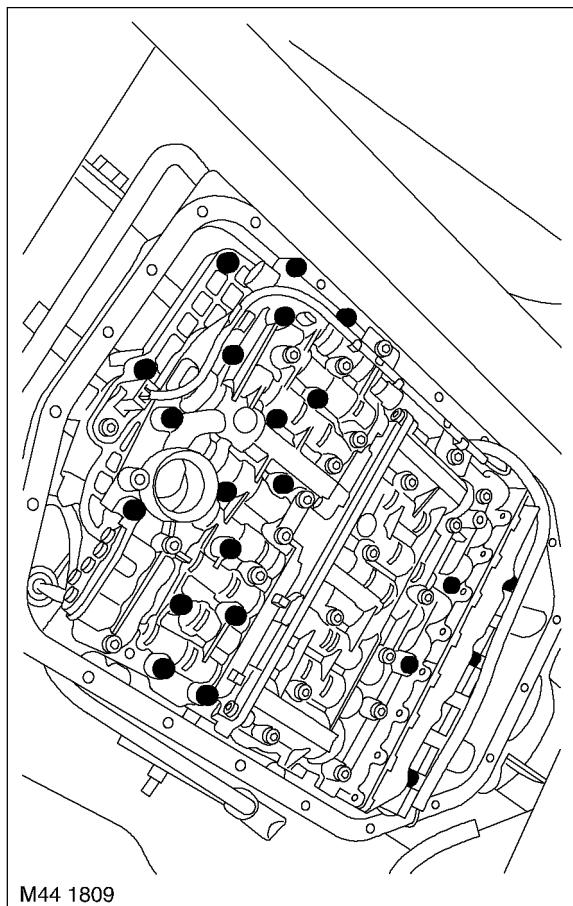
1. Remove gearbox fluid filter.  
☞ AUTOMATIC TRANSMISSION - ZF 5HP24, REPAIRS, Filter - fluid.



2. Disconnect multiplug from gearbox.
3. Remove retaining clip from multiplug and release plug from gearbox casing.



4. Remove 2 Torx bolts securing speed sensor clamps, remove clamps and sensors.



5. Evenly and progressively loosen and remove 22 large shouldered Torx bolts from valve block.
6. Remove valve block assembly.

### Refit

1. Clean valve block and mating faces.
2. With assistance fit valve block and multiplug, ensure selector fork locates on peg.
3. Evenly and progressively fit and tighten 22 valve block Torx bolts to 10 Nm (7 lbf.ft)
4. Fit gearbox multiplug retaining clip.
5. Connect multiplug to gearbox connector.
6. Fit speed sensor to valve block, position clamp and tighten Torx bolt to 10 Nm (7 lbf.ft).
7. Fit gearbox fluid filter.

 AUTOMATIC TRANSMISSION - ZF  
5HP24, REPAIRS, Filter - fluid.

# Gearbox fluid - drain & refill

## Drain

1. Position vehicle on lift.

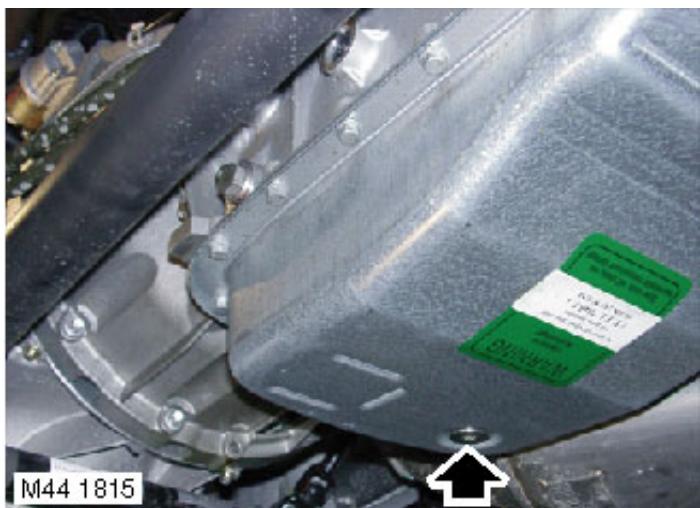


**WARNING: Observe due care when draining gearbox fluid as the fluid can be very hot.**

2. Apply handbrake and position chocks under front and rear wheels.
3. Position container under gearbox.

**NOTE: The fluid should be drained with the transmission at normal operating temperature.**

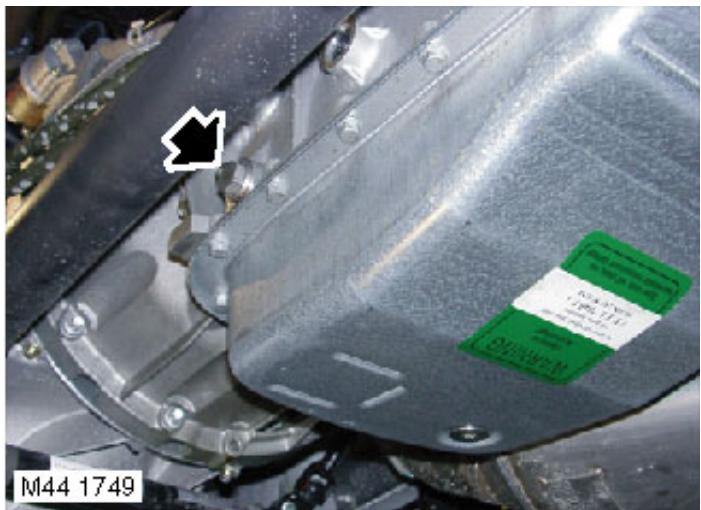
4. Clean area around drain plug.



5. Remove and discard drain plug.
6. Allow fluid to drain.
7. Clean drain plug mounting, fit new drain plug and tighten to 20 Nm (15 lbf.ft).

## Refill

1. Clean area around filler/level plug.



2. Remove and discard filler/level plug.
3. Add 3.5 to 4.0 litres of correct fluid through gearbox level/filler hole.
4. Fit new filler/level plug and tighten to 20 Nm (15 lbf.ft).
5. Check and top-up fluid level.

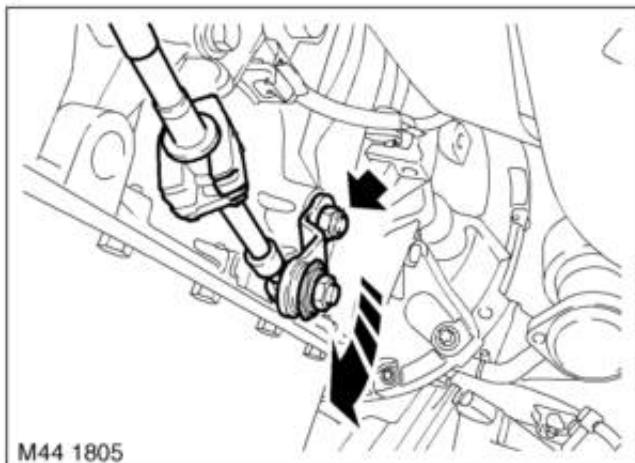
# Selector cable - check and adjust

## Check

1. Move selector lever from 'P', check gear engagement in each position and return to 'P'.
2. Check that the engine will start in 'P' and 'N' positions and that engine start is inhibited when drive positions are selected.

## Adjust

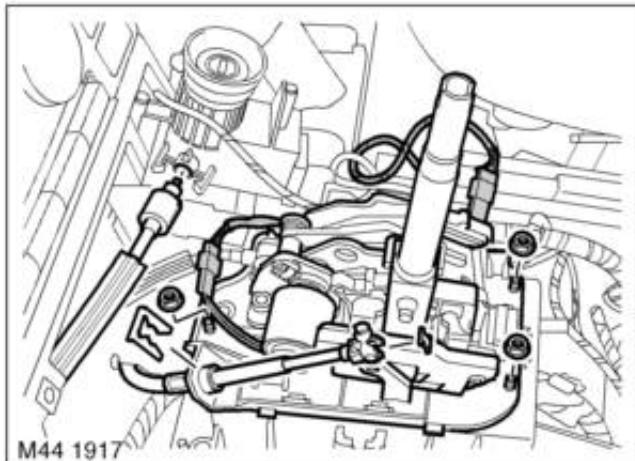
1. Position vehicle on lift.
2. Move the selector lever to 'P' position.
3. Raise vehicle on lift.



4. Using 2 spanners, restrain trunnion and loosen nut securing inner cable to selector lever.
5. Move gear change lever into 'P' position.
6. Move selector lever on gearbox fully clockwise to engage 'P' position.
7. Tighten trunnion nut to 15 Nm (11 lbf.ft).
8. Move selector lever from 'P', check gear engagement in each position and return to 'P'.
9. Check that the engine will start in 'P' and 'N' positions and that engine start is inhibited when drive positions are selected.

# Lever - gearshift selector assembly Remove

1. Remove centre console.



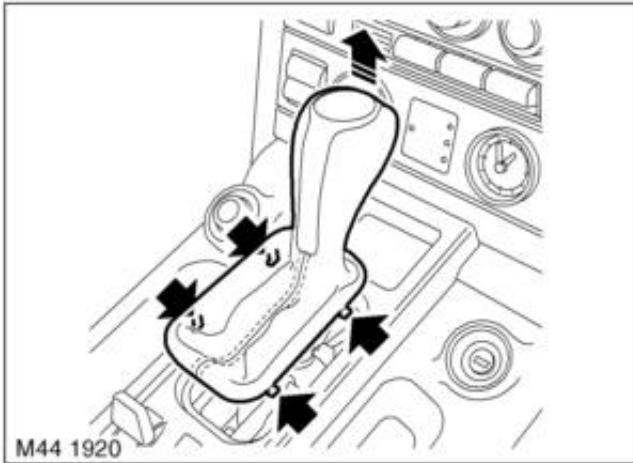
2. Disconnect shift interlock cable from ignition barrel.
3. Remove clip securing outer gear shift cable to mechanism.
4. Release and remove clip securing inner gear shift cable to mechanism, collect plastic spacer from cable.
5. Disconnect 2 multiplugs from selector mechanism.
6. Remove 3 nuts securing selector mechanism to carrier, remove mechanism.

## Refit

1. Position mechanism to carrier, fit nuts and tighten to 25 Nm (18 lbf.ft).
2. Connect multiplugs to mechanism.
3. Fit plastic spacer to selector cable, secure cable to mechanism.
4. Connect shift interlock cable to ignition switch barrel.
5. Fit centre console.

# Knob - selector lever Remove

1. Release 4 clips securing gear lever gaiter to centre console.



2. Pull gear knob upwards to disengage locating tang from gear selector lever.



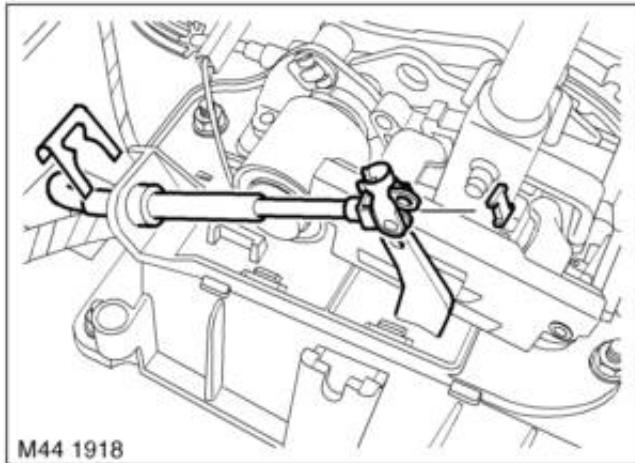
**WARNING: Gear knob will be released suddenly, keep face clear of gear knob during removal.**

## Refit

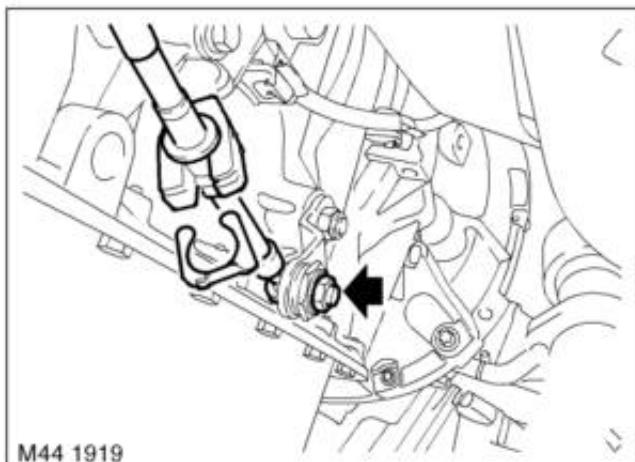
1. Position gear knob to gear selector lever engaging locating tang on knob with slot in selector lever.
2. Push gear knob fully on to gear selector lever.
3. Fit and secure gear lever gaiter.

# Rod cable assembly - selector Remove

1. Select 'P'.
2. Remove centre console.



3. Remove clip securing outer gear shift cable to mechanism.
4. Release and remove clip securing inner gear shift cable to mechanism, collect plastic spacer from cable.
5. Raise vehicle on lift.



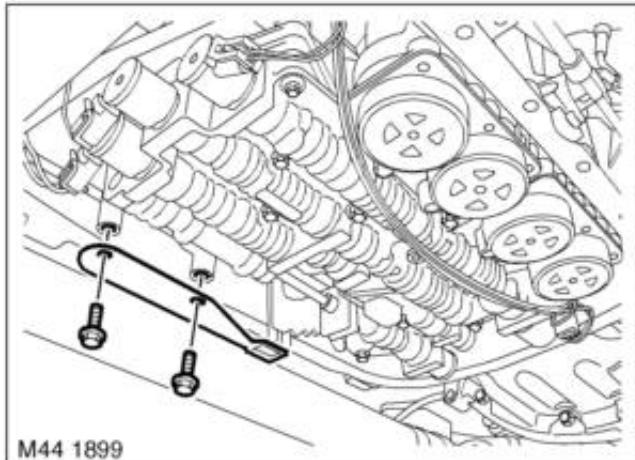
6. Remove clip securing selector cable to gearbox bracket.
7. Loosen selector cable trunnion nut and release cable.
8. Lower lift.
9. Remove cable and grommet through carpet access panel.

## Refit

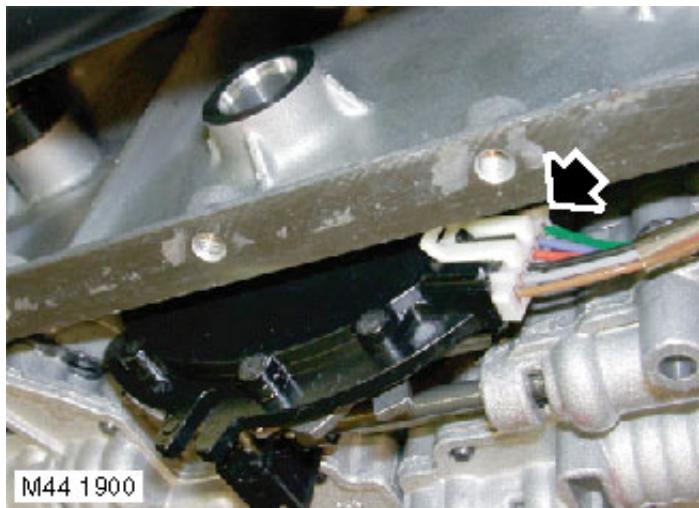
1. Position cable through access panel, fit grommet and carpet.
2. Raise vehicle on lift.
3. Position cable through gearbox bracket and trunnion, fit clip, tighten nut to 15 Nm (11 lbf.ft).
4. Lower lift.
5. Position cable to selector mechanism, fit spacer and secure with clips.
6. Fit centre console.

# Switch - starter inhibitor Remove

1. Remove exhaust system.
2. Remove gearbox fluid filter.
3. Remove and discard selector shaft fluid seal.



4. Remove bolts securing detent spring to valve body and remove spring.

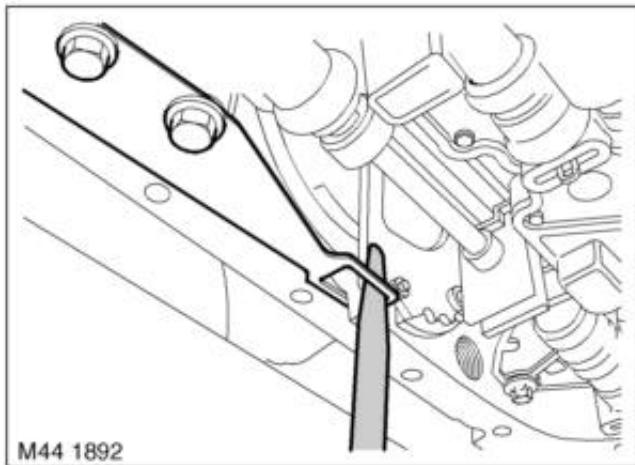


5. Disconnect multiplug from inhibitor switch.
6. Move selector shaft outwards allowing detent lever to drop.
7. Remove inhibitor switch from detent lever.

## Refit

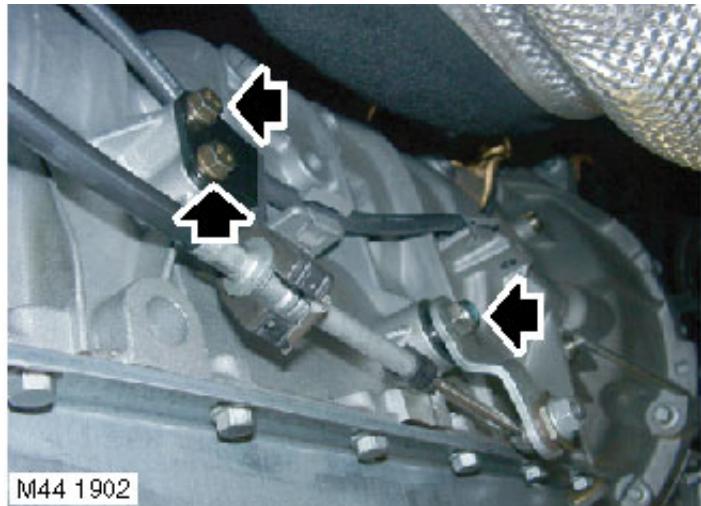
1. Clean inhibitor switch and mating face.

2. Position inhibitor switch to detent lever.
3. **Ensure inhibitor switch spacer has slot facing downwards.**
4. Position detent lever to selector shaft.
5. Position detent spring to valve body, fit but do not tighten bolts at this stage.

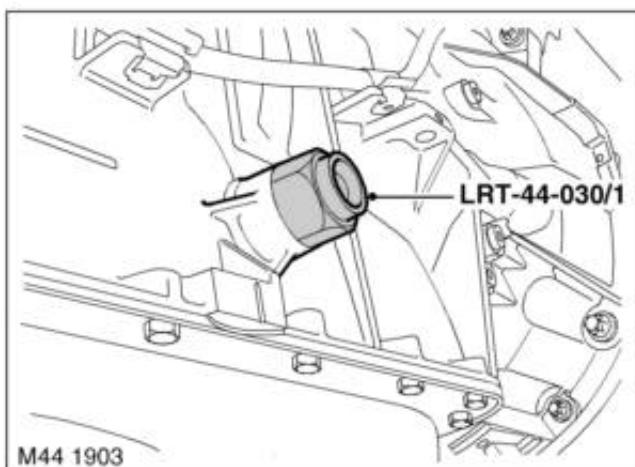


6. Place a 0.8 mm (0.032 in) spacer between detent lever and detent spring, tighten bolts to 10 Nm (7 lbf.ft)
7. Remove spacer from detent spring.
8. Connect inhibitor switch multiplug.
9. Fit selector shaft fluid seal.
10. Fit gearbox fluid filter.
11. Fit exhaust system.

# Fluid seal - selector shaft Remove



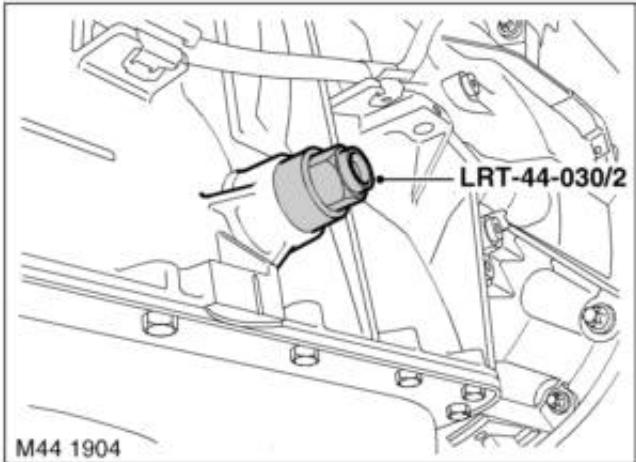
1. Remove nut securing selector lever to gearbox selector shaft and release lever.
2. Remove 2 bolts securing selector cable support bracket to gearbox and tie cable aside.



3. Using LRT-44-030/1 remove and discard fluid seal from gearbox.

## Refit

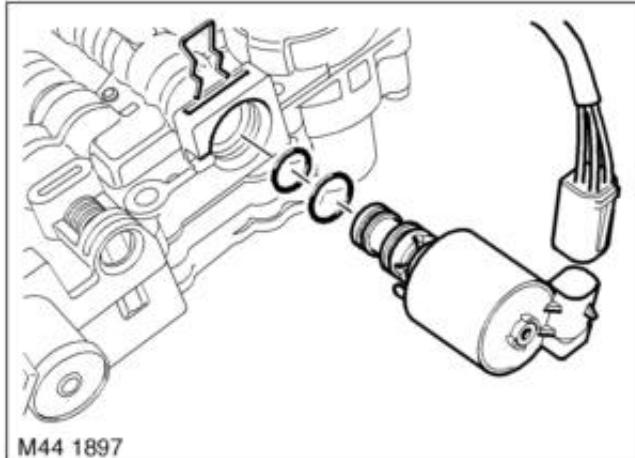
1. Clean selector shaft and seal recess.



2. Using LRT-44-030/2 fit selector shaft fluid seal.
3. Position selector lever to gearbox selector shaft, fit nut and tighten to 10 Nm (7 lbf.ft)
4. Position selector cable support bracket to gearbox, fit bolts and tighten to 10 Nm (7 lbf.ft)

# Solenoid - torque converter clutch Remove

1. Remove valve body assembly.



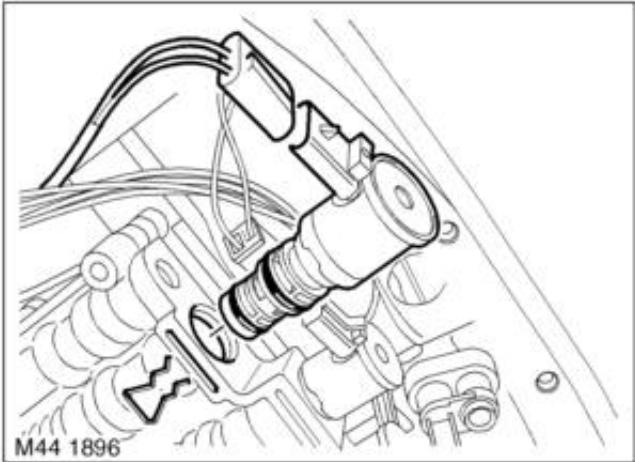
2. Disconnect multiplug from solenoid.
3. Release and remove solenoid retaining clip.
4. Remove solenoid from valve body and discard 'O' rings.

## Refit

1. Clean solenoid mating faces.
2. Fit new 'O' rings to solenoid and lubricate with transmission fluid.
3. Position solenoid to valve body and secure with clip.
4. Connect multiplug to solenoid.
5. Fit valve body assembly.

# Solenoid - shift Remove

1. Remove sump.



2. Disconnect multiplug from valve body solenoid.
3. Release and remove solenoid retaining clip.
4. Remove solenoid from valve body and discard 'O' rings.

## Refit

1. Clean solenoid mating faces.
2. Fit new 'O' rings to solenoid and lubricate with transmission fluid.
3. Position solenoid to valve body and secure with clip.
4. Connect multiplug to solenoid.
5. Fit sump.

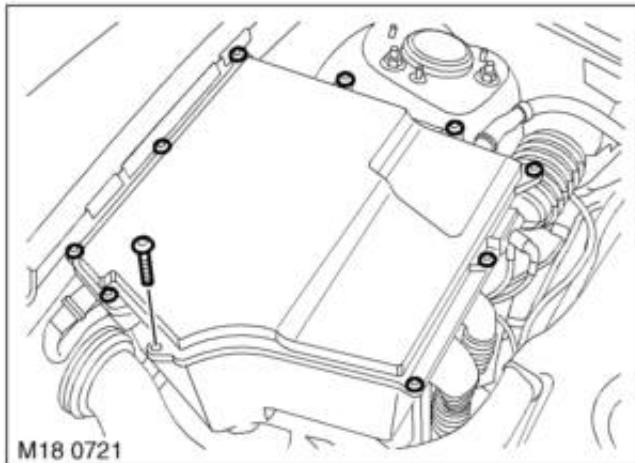
# **Electronic control unit (ECU) - Electronic automatic transmission (EAT)**

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

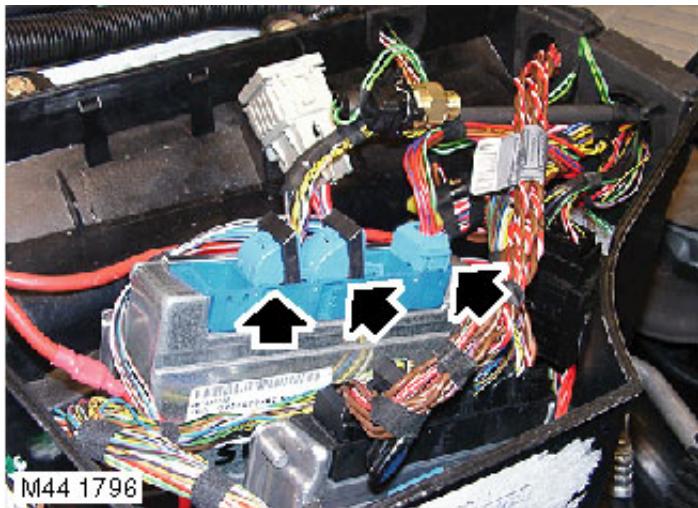
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

## **Remove**

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Disconnect 3 blue multiplugs from EAT ECU.
4. Release EAT ECU from mounting bracket and remove from 'E' box.

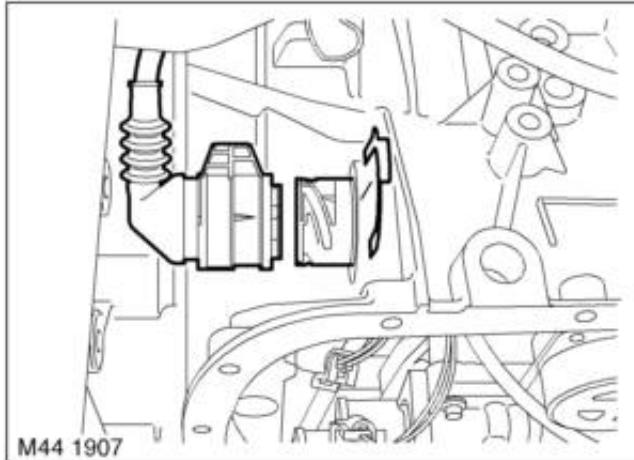
## **Refit**

1. Fit EAT ECU in mounting bracket and connect multiplugs.

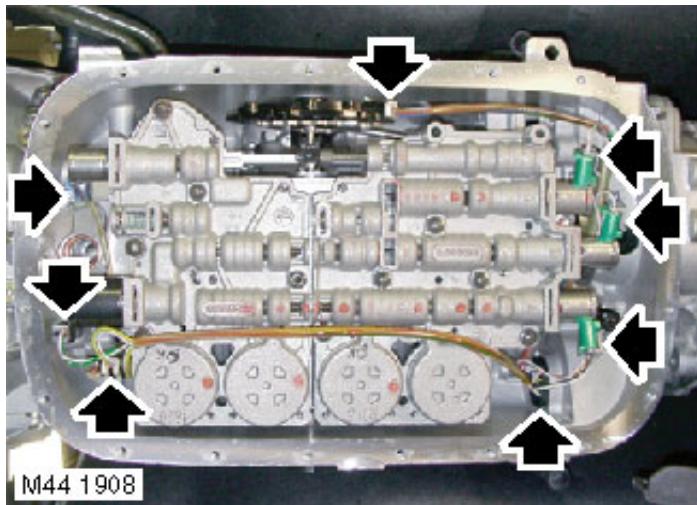
2. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
3. Connect battery earth lead.

# **Harness - solenoid valve - renew Remove**

1. Remove gearbox fluid filter.



2. Disconnect multiplug from gearbox.
3. Remove retaining clip from multiplug and release plug from gearbox casing.



4. Noting fitted position, disconnect 8 multiplugs from sensors and solenoids.
5. Remove harness, remove and discard 'O' rings.

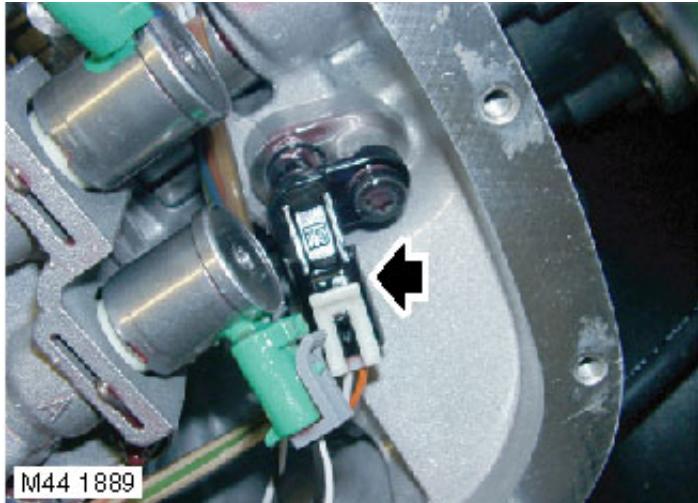
## **Refit**

1. Clean multiplug and gearbox recess.
2. Fit new 'O' rings to harness and lubricate with transmission fluid.
3. Position harness to gearbox and secure multiplug with retaining clip.
4. Connect multiplugs to sensors and solenoids.

5. Fit gearbox fluid filter.

# Pick up - speed sensor - countershaft Remove

1. Remove sump.



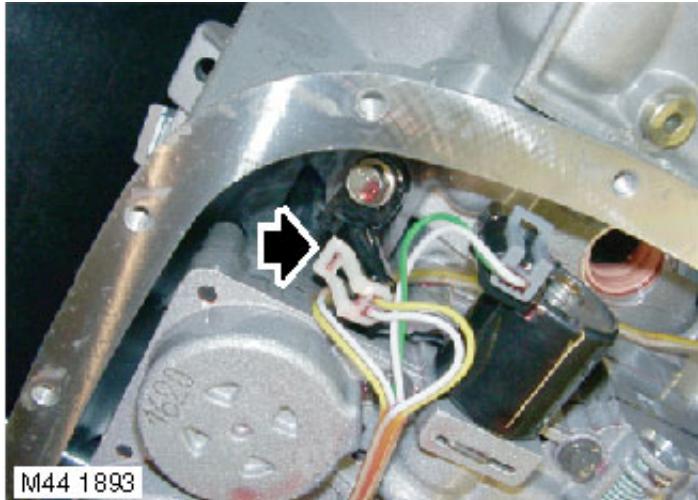
2. Disconnect multiplug from speed sensor.
3. Remove Torx bolt securing sensor to gearbox casing
4. Remove speed sensor and spacer.

## Refit

1. Clean speed sensor and mating face.
2. Position sensor and spacer to gearbox casing.
3. Fit Torx bolt to sensor and tighten to 10 Nm (7 lbf.ft)
4. Connect multiplug to sensor.
5. Fit sump.

# Pick up - speed sensor - mainshaft Remove

1. Remove gearbox fluid filter.



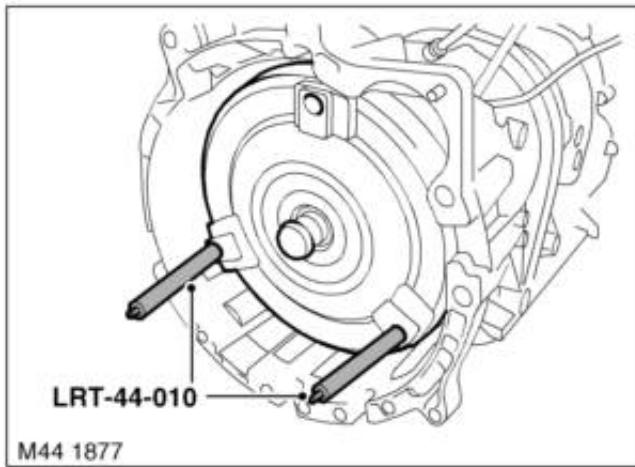
2. Disconnect multiplug from speed sensor.
3. Remove bolt securing sensor to casing.
4. Remove speed sensor.

## Refit

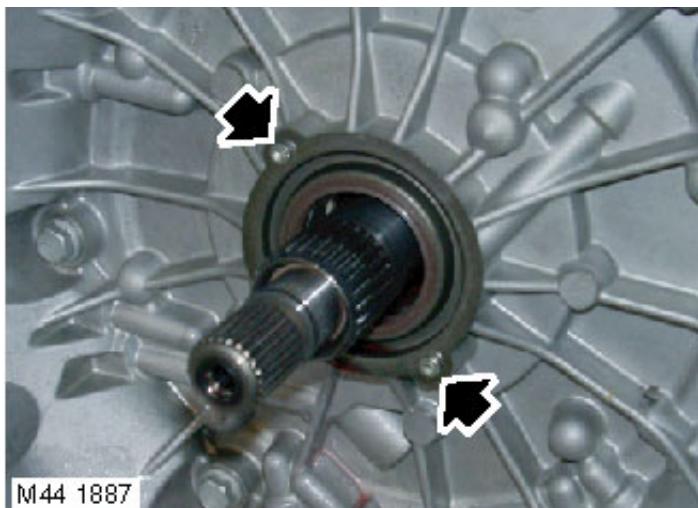
1. Clean speed sensor and mating face.
2. Position sensor to gearbox casing, fit bolt and tighten to 10 Nm (7 lbf.ft)
3. Connect multiplug to sensor.
4. Fit gearbox fluid filter.

# Fluid seal - converter - renew Remove

1. Remove transmission assembly.
2. Remove torque converter retaining plate.



3. Fit tool LRT-44-010 to torque converter and remove torque converter from gearbox.



4. Remove 2 bolts securing torque converter fluid seal.
5. Carefully remove and discard fluid seal.

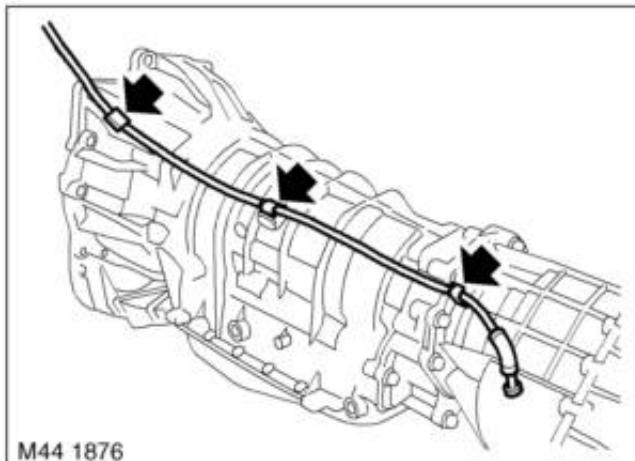
## Refit

1. Clean torque converter fluid seal recess in gearbox. Lubricate torque converter fluid seal with clean transmission fluid.
2. Carefully fit fluid seal to gearbox, fit and tighten bolts to 3 Nm (2.2 lbf.ft)
3. Fit torque converter to gearbox, ensure converter is fully located onto fluid pump drive.

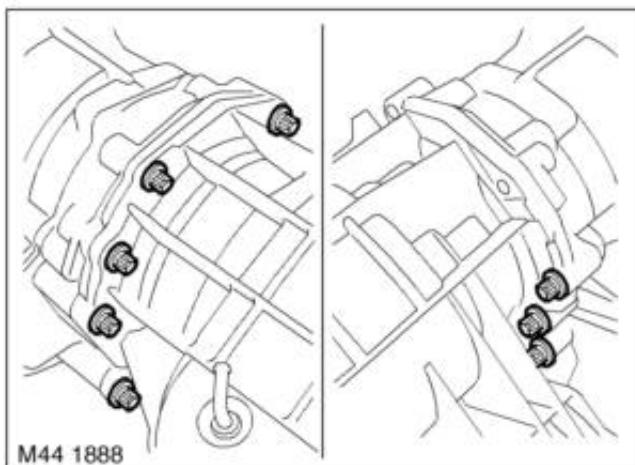
4. Remove tool LRT-44-010 from torque converter.
5. Fit converter retaining plate and secure with bolts.
6. Fit transmission assembly.

# Gearbox & converter Remove

1. Remove transmission assembly.
2. Remove gearbox assembly from transmission jack and lower onto bench.



3. Release transfer gearbox breather pipe from clips.



4. Remove 9 Torx bolts and remove transfer gearbox.
5. Disconnect breather hose from gearbox.

## Refit

1. Connect breather hose to gearbox.
2. Clean transfer gearbox and mating face dowels and dowel holes.
3. Align transfer gearbox to automatic gearbox, fit Torx bolts and tighten to 43 Nm (32 lbf.ft).
4. Secure transfer gearbox breather pipe to automatic gearbox casing.

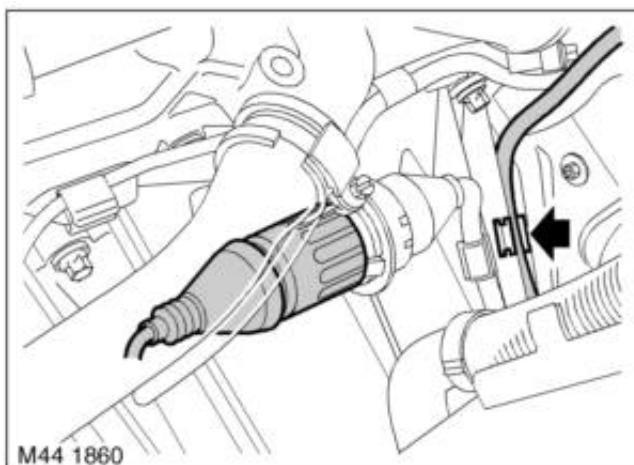
5. Remove gearbox assembly from bench and secure on transmission jack.

6. Fit transmission assembly.

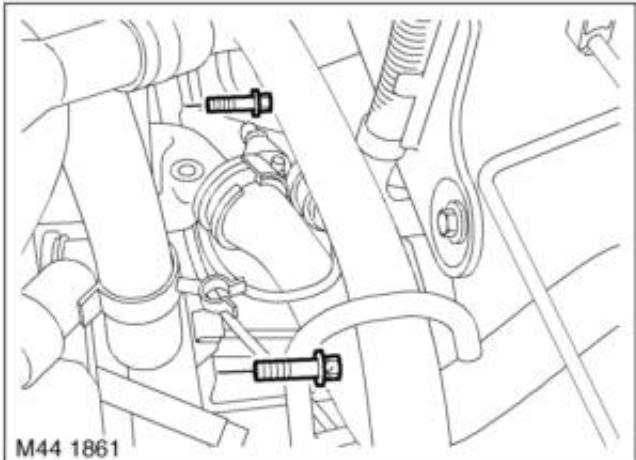
# Gearbox converter & transfer gearbox assembly - remove for access and refit

## Remove

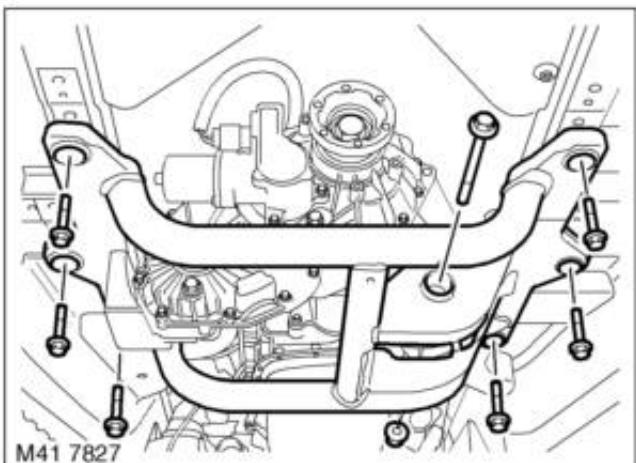
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove viscous coupling.
4. Release transfer gearbox and automatic gearbox breather pipes from clip on LH side of engine.
5. Remove starter motor.



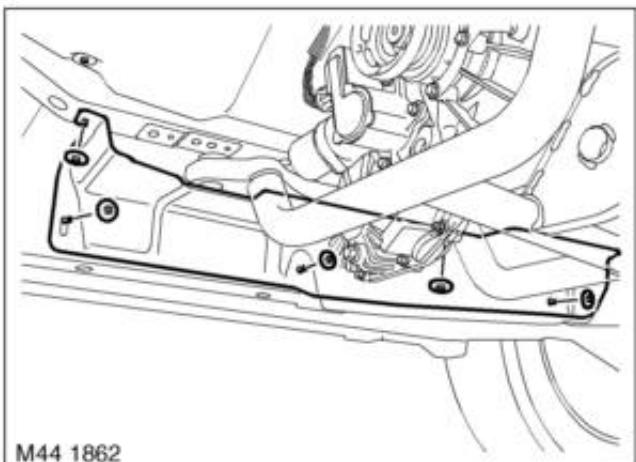
6. Remove 2 Torx bolts from top of bell housing.
7. Raise vehicle on lift.
8. Remove rear propeller shaft.
9. Remove front propeller shaft.
10. Drain gearbox fluid.



11. Using LRT-44-028 support gearbox on jack.



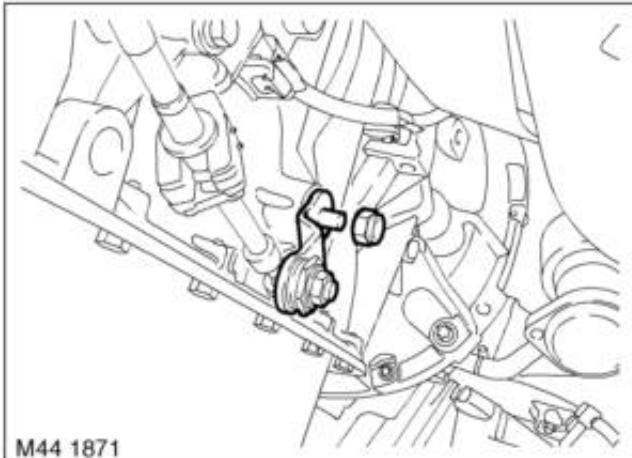
12. Remove nut and bolt securing mounting to cross member.
13. Remove 6 bolts securing cross member and remove cross member.



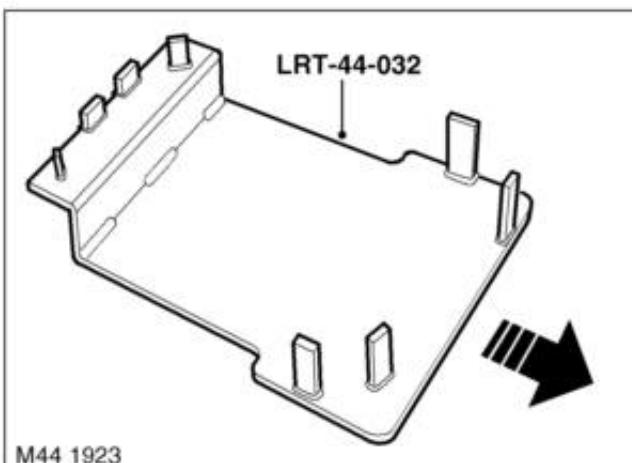
14. Remove snubbers from mounting.
15. Lower gearbox on jack.



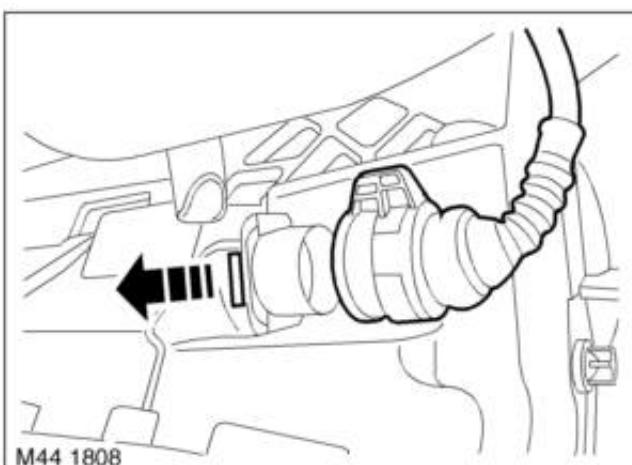
**CAUTION: Do not allow gearbox to hang on gear selector cable.**



16. Disconnect multiplug from high/low shift motor.

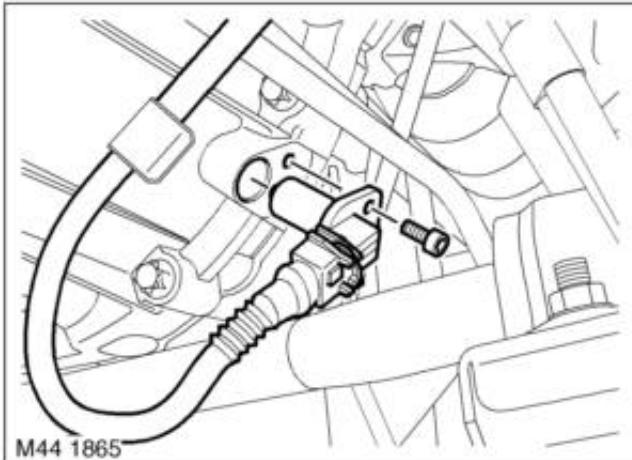


17. Disconnect multiplug from gearbox housing.

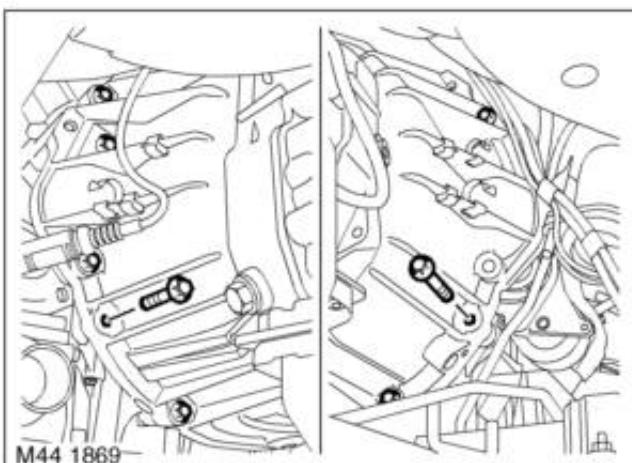


18. Remove nut securing selector lever to gearbox selector shaft and release lever.

19. Remove 2 bolts securing selector cable support bracket to gearbox and tie cable aside.



20. Remove grommet from bell housing to gain access to torque converter retaining bolts.
21. Use LRT-12-212 to rotate crankshaft for access and remove 3 bolts securing drive plate to torque converter.
22. Remove bolt securing intermediate plate to gearbox bell housing.



23. Remove bolt and gearbox fluid cooler pipe clamp.
24. Release both fluid cooler pipes, discard 'O' rings and position aside.
25. Remove 2 Torx bolts securing gearbox bell housing blanking plate and remove plate.
26. Remove 4 Torx bolts from bell housing.
27. With assistance, carefully remove gearbox from engine. Ensure torque converter remains with gearbox.
28. Fit converter retaining plate and secure with bolts.

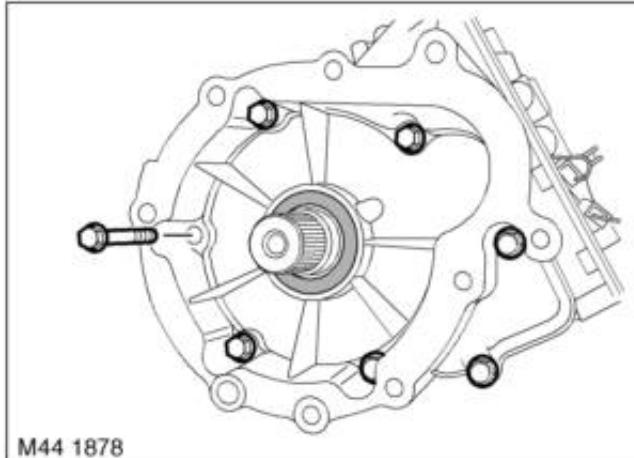
## Refit

1. Clean mounting and mating faces.
2. Remove torque converter retaining plate.
3. With assistance, carefully fit gearbox to engine. Ensure engagement of torque converter spigot and gearbox housing onto dowels.
4. Fit and tighten 4 Torx bolts securing gearbox to engine. M12 to 72 Nm (53 lbf.ft) M8 to 25 Nm (18 lbf.ft)
5. Position gearbox blanking plate, fit and tighten Torx bolts to 25 Nm (18 lbf.ft)
6. Clean fluid cooler pipe 'O' ring recess and mating face.

7. Fit new 'O' rings to fluid cooler pipes and lubricate with transmission fluid.
8. Position fluid cooler pipes to gearbox, fit clamp assembly and tighten bolt to 25 Nm (18 lbf.ft)
9. Fit bolt securing intermediate plate to gearbox and tighten to 10 Nm (7 lbf.ft)
10. Fit bolts securing drive plate to torque converter and tighten to 45 Nm (33 lbf.ft)
11. Fit grommet to gearbox bell housing.
12. Position selector cable support bracket to gearbox, fit bolts and tighten to 10 Nm (7 lbf.ft)
13. Position selector lever to gearbox selector shaft, fit nut and tighten to 10 Nm (7 lbf.ft)
14. Connect multiplug to gearbox connector.
15. Connect multiplug to high/low shift motor.
16. Raise gearbox on jack.
17. Fit snubbers to mounting.
18. Fit cross member to mounting, fit nut and bolt but do not tighten at this stage.
19. Align cross member, fit bolts and tighten to 68 Nm (50 lbf.ft).
20. Remove support from gearbox.
21. Tighten nut and bolt securing mounting to cross member to 100 Nm (74 lbf.ft).
22. Fit rear propeller shaft.
  
23. Fit front propeller shaft.
  
24. Lower vehicle.
25. Fit top bell housing Torx bolts and tighten to 72 Nm (53 lbf.ft)
26. Fit starter motor.
  
27. Fit transfer gearbox and automatic gearbox breather pipes into clip.
28. Fit viscous coupling.
  
29. Connect battery earth lead.
30. Fill gearbox with fluid.

# Fluid seal - rear extension housing Remove

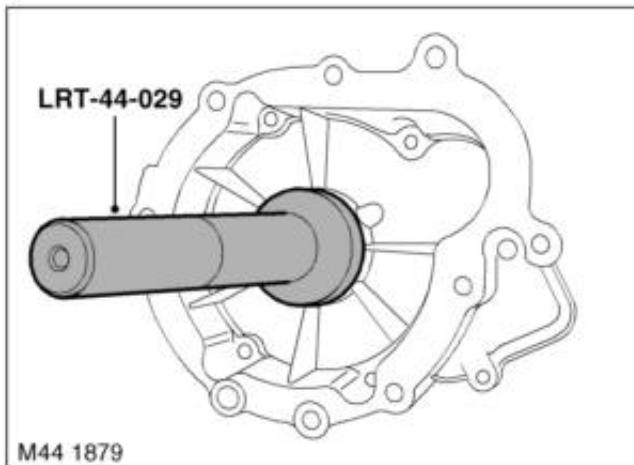
1. Remove transfer gearbox.



2. Remove 7 bolts securing extension housing to gearbox.
3. Remove extension housing and discard gasket.
4. Remove fluid seal from rear extension housing.

## Refit

1. Clean fluid seal recess.



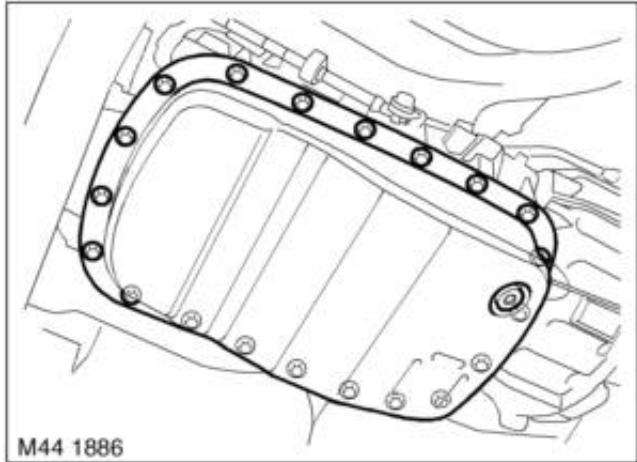
2. Using LRT-44-029 fit new fluid seal to extension housing.
3. Clean housing and mating faces.
4. Fit rear extension housing gasket.
5. Fit fluid seal protector sleeve from seal kit, over end of output shaft.

6. Position extension housing, fit and tighten bolts to 10 Nm (7 lbf.ft)

7. Fit transfer gearbox.

# Gasket - fluid pan Remove

1. Drain gearbox fluid.



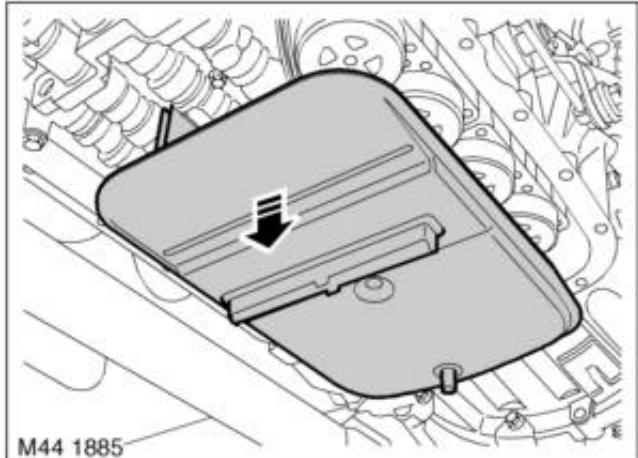
2. Evenly and progressively loosen and remove 20 bolts from sump.
3. Remove sump and discard gasket.

## Refit

1. Clean gearbox sump mating surfaces.
2. Fit new gasket to sump, position sump to gearbox.
3. Fit sump bolts, evenly and progressively tighten to 10 Nm (7 lbf.ft)
4. Refill gearbox with transmission fluid.

# Filter - fluid Remove

1. Remove sump plate and discard gasket.



2. Remove fluid filter from gearbox casing and discard seals.

## Refit

1. Clean filter mating surfaces.
2. Fit new seals to fluid filter and fit filter to gearbox.
3. Fit sump.

# Gearbox fluid cooler

## Remove

1. Disconnect battery earth lead.

2. Remove alternator.

3. Remove LH front road wheel.



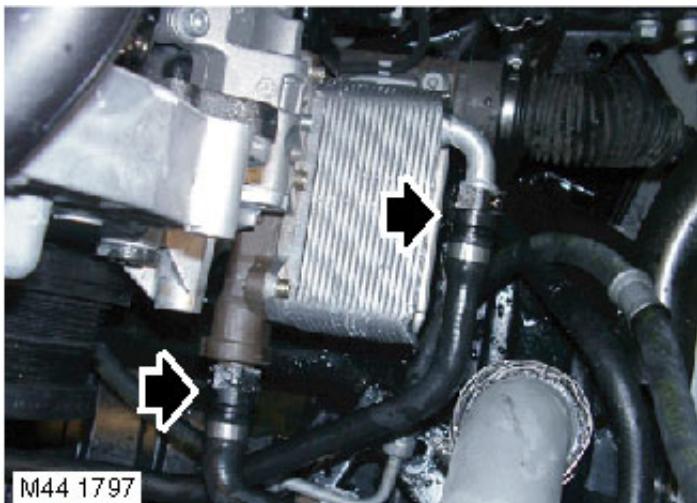
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

4. Position container to collect coolant spillage.



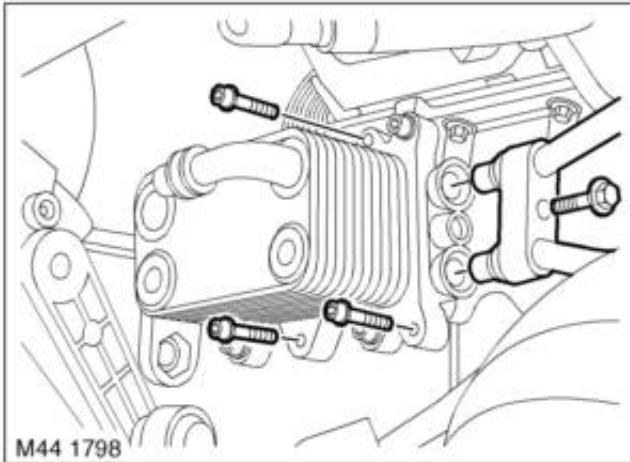
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

5. Clean area surrounding quick release connections.



6. Release 2 clips and disconnect coolant hoses from the gearbox fluid cooler.

7. Position container to collect fluid spillage.



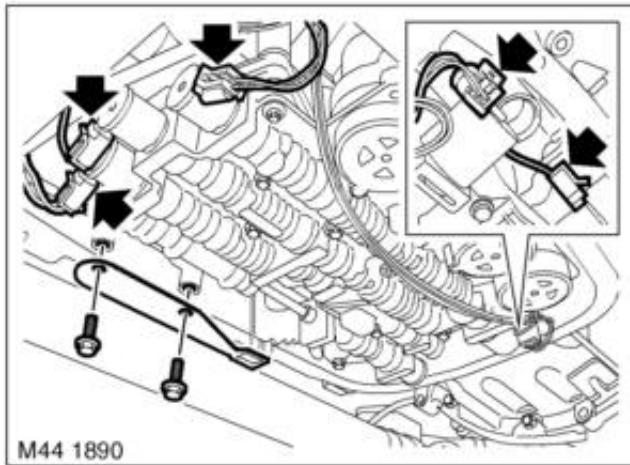
8. Remove bolt securing clamp, gearbox fluid cooler pipes to cooler.
9. Remove 3 bolts securing cooler to mounting.
10. Remove gearbox fluid cooler.
11. Remove and discard 2 'O' rings from gearbox fluid cooler pipes.

## Refit

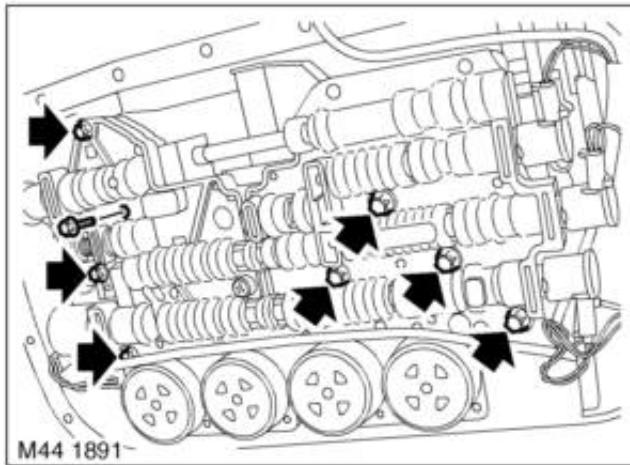
1. Clean gearbox fluid cooler mounting points.
2. Ensure fluid pipe connections are clean, lubricate new 'O' rings with clean transmission fluid and fit to pipes.
3. Position gearbox fluid cooler to mounting, align pipes to fluid cooler. Fit pipes, position clamp and finger tighten bolt.
4. Fit fluid cooler and tighten bolts to 10 Nm (7 lbf.ft).
5. Tighten gearbox fluid cooler pipe clamp bolt to 10 Nm (7 lbf.ft).
6. Connect and secure hoses to gearbox fluid cooler.
7. Fit alternator.
8. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
9. Refill cooling system.
10. Top-up gearbox fluid level.
11. Connect battery earth lead.

# Valve body assembly Remove

1. Remove gearbox oil filter.



2. Disconnect multiplugs from valve body solenoids.
3. Remove bolts securing detent spring to valve body and remove spring.

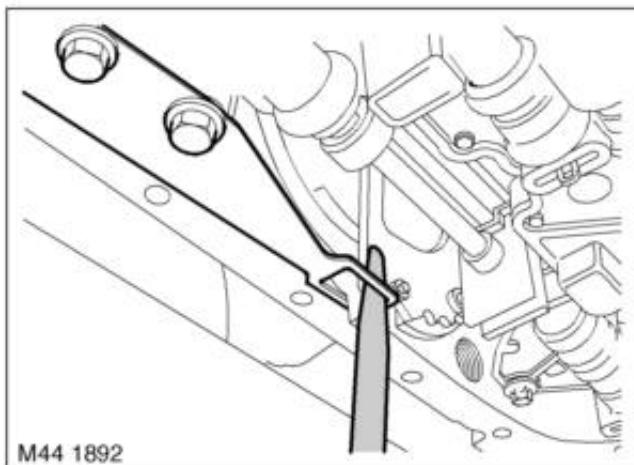


4. Evenly and progressively remove 8 Torx bolts securing valve body assembly to gearbox casing.
5. Remove valve body assembly.
6. Remove gearbox casing oil seals and discard.

## Refit

1. Clean gearbox seal mating faces.
2. Lubricate new oil seals with transmission fluid and fit to gearbox.
3. Clean valve body and mating faces.

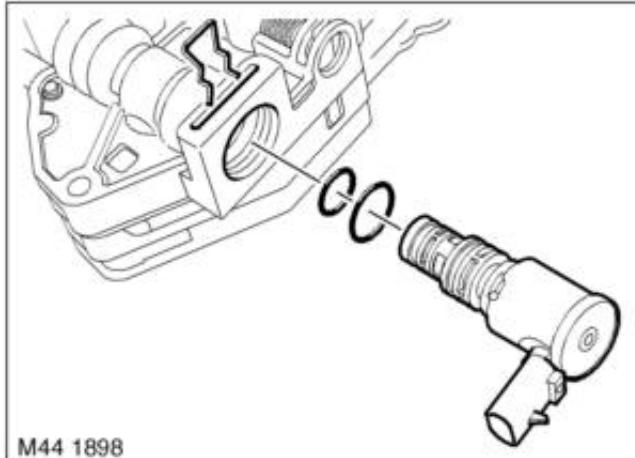
4. Position valve body assembly to gearbox using centring pin supplied with repair kit.
5. Fit bolts to valve body, evenly and progressively tighten to 10 Nm (7 lbf.ft)
6. Position detent spring to valve body, fit but do not tighten bolts at this stage.



7. Place a 0.8 mm (0.032 in) spacer between detent lever and detent spring, tighten bolts to 10 Nm (7 lbf.ft)
8. Remove spacer from detent spring.
9. Connect multiplugs to valve body solenoids.
10. Fit gearbox oil filter.

# Solenoid - pressure control Remove

1. Remove valve body assembly.



2. Disconnect multiplug from solenoid.
3. Release and remove solenoid retaining clip.
4. Remove solenoid from valve body and discard 'O' rings.

## Refit

1. Clean solenoid mating faces.
2. Fit new 'O' rings to solenoid and lubricate with transmission fluid.
3. Position solenoid to valve body and secure with clip.
4. Connect multiplug to solenoid.
5. Fit valve body assembly.



## Drive shaft - front - LH

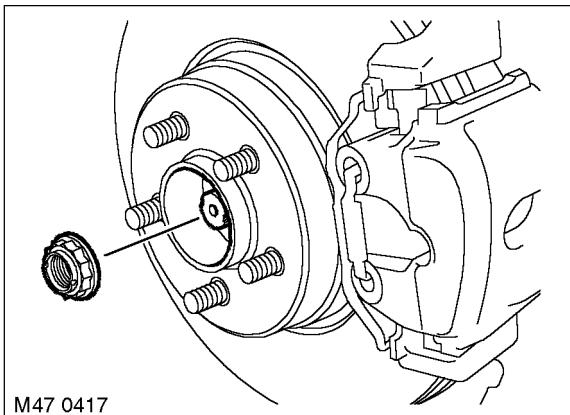
→ 47.10.01

### Remove

1. Raise front of vehicle.

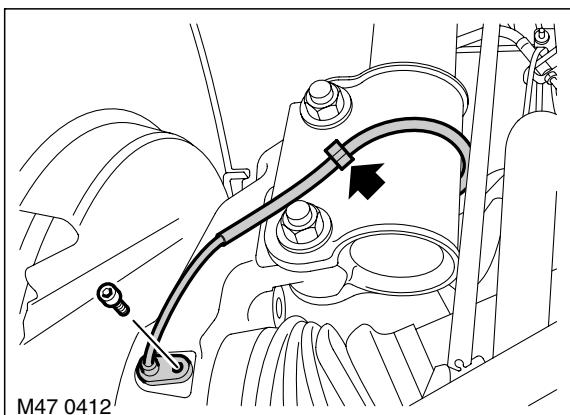
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.

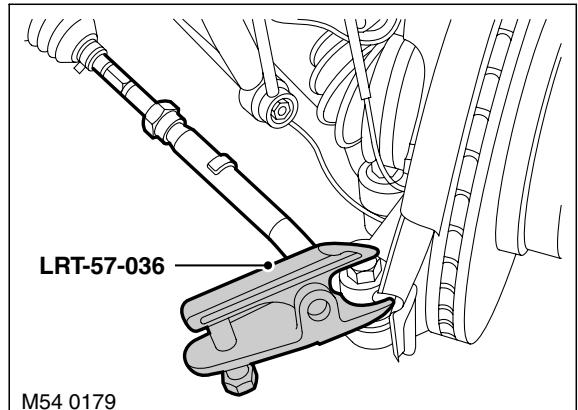


3. Release drive shaft hub nut stake.
4. With an assistant applying brakes, remove and discard drive shaft hub nut.
5. Remove brake disc.

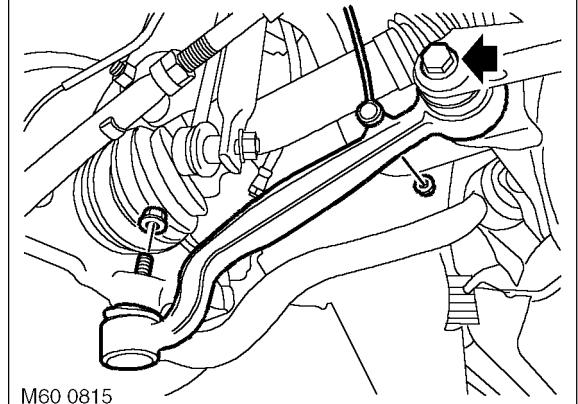
☞ **BRAKES, REPAIRS, Brake disc - front.**



6. Release ABS sensor lead from clip.
7. Release sensor lead from damper, remove Allen screw and release ABS sensor from hub.



8. Remove and discard nut securing track rod ball joint to steering arm.
  9. Fit an M14 nut to ball pin, flush with end of pin.
  10. Using **LRT-57-036** separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.
- CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



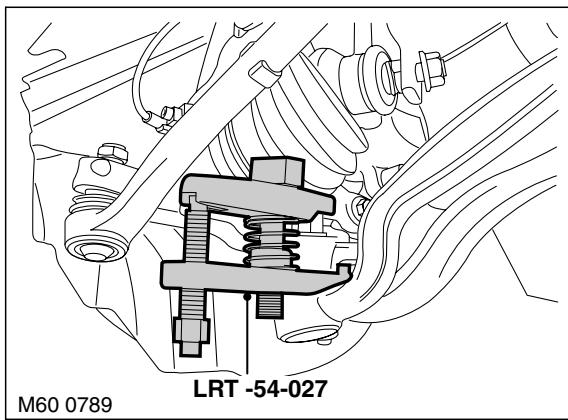
11. Remove nut securing height sensor link to lower arm and release link.

**CAUTION:** Use an open ended spanner on flats provided to prevent ball joint rotating.

12. Loosen bolt securing lower arm to subframe one quarter of a turn.
13. Remove nut securing lower arm ball joint to hub.

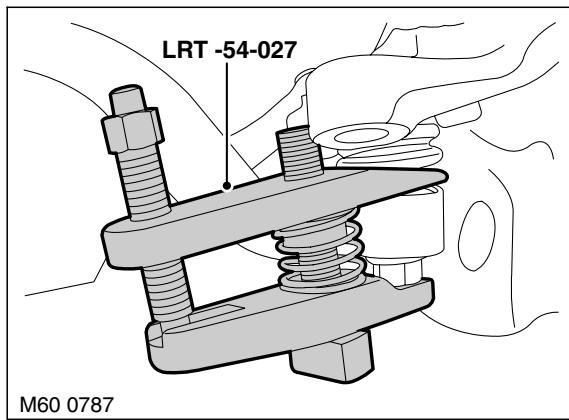
## DRIVESHAFTS

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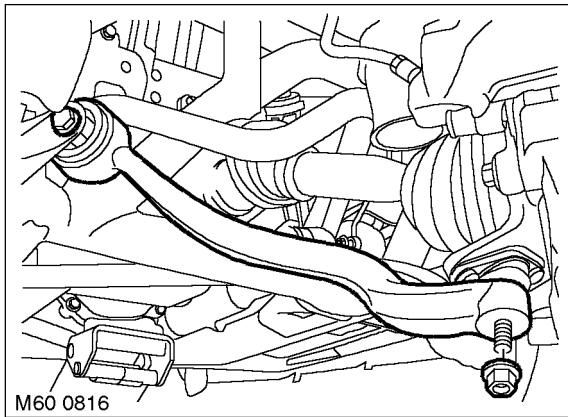
14. Using **LRT-54-027** release lower arm ball joint and disconnect lower arm from hub.

**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.

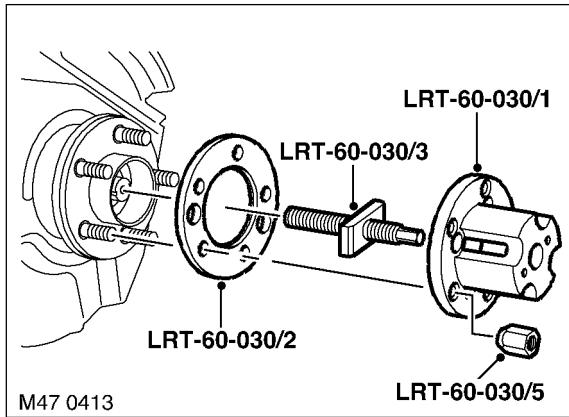


17. Using **LRT-54-027** release tie rod from ball joint

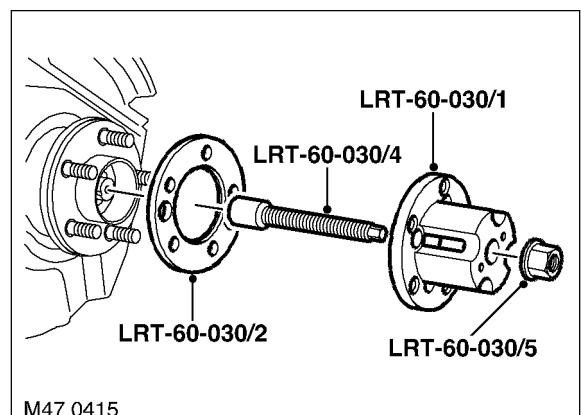
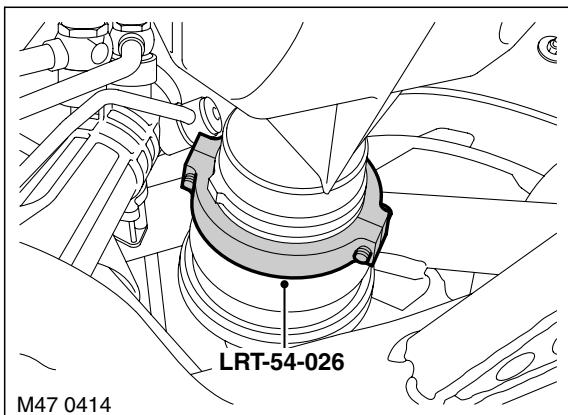
**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



15. Loosen bolt securing tie rod to subframe one quarter of a turn.
16. Remove nut securing tie rod to ball joint.



18. Fit centre screw **LRT-60-030/3** to **LRT-60-030/1** and fit to hub with spacer **LRT-60-030/2**. Secure with nuts **LRT-60-030/5**.
19. Tighten centre screw to press drive shaft from flange.
20. Remove tools.
21. Position container to collect oil spillage.



22. Fit **LRT-54-026** to drive shaft inboard joint.
23. Using levers, release drive shaft from differential.
24. Release drive shaft from hub.
25. Remove drive shaft assembly, keep drive shaft horizontal to avoid damaging differential oil seal.
26. Remove and discard drive shaft circlip.

#### Refit

1. Clean end of drive shaft and location in differential.
2. Fit new circlip to drive shaft.
3. Lubricate oil seal lip with clean differential oil.
 

 **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
4. Fit drive shaft ensuring circlip is fully engaged.
 

**CAUTION: Pull the drive shaft to ensure the circlip is fully engaged and retains the shaft.**
5. Clean drive shaft and flange splines.
6. Lightly lubricate splines and oil seal running surface.
 

 **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
7. Locate drive shaft in hub.

8. Fit **LRT-60-030/4** to drive shaft.
9. Fit **LRT-60-030/1** with spacer **LRT-60-030/2** and secure with nuts **LRT-60-030/5**.
10. Fit nut to **LRT-60-030/4** and tighten nut to pull drive shaft into drive flange.
11. Remove tools.
12. Clean ball joint tapers and taper seats.
13. Connect tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).
14. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).
15. Connect height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).
 

**CAUTION: Ensure height sensor arm is pointing outwards.**
16. Connect ball joint to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
17. Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.
 

 **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
18. Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).
19. Secure sensor lead to damper.
20. Fit front brake disc.
 

 **BRAKES, REPAIRS, Brake disc - front.**
21. Fit new hub nut and tighten to 420 Nm (311 lbf.ft).
22. Stake nut to shaft.
23. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
24. Remove stands and lower vehicle.
25. Tighten new bolt securing lower arm to subframe to 165 Nm (121 lbf.ft), plus a further 90°.

## DRIVESHAFTS

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26. Tighten new bolt securing tie rod to subframe to 165 Nm (121 lbf.ft), plus a further 90°.

**CAUTION: Nuts and bolts must be tightened with vehicle at normal ride height.**

27. Top-up differential with oil.

 **FRONT DIFFERENTIAL,**

**ADJUSTMENTS, Front differential - drain and refill.**

28. Check front wheel alignment.



**STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

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### Drive shaft - front - RH

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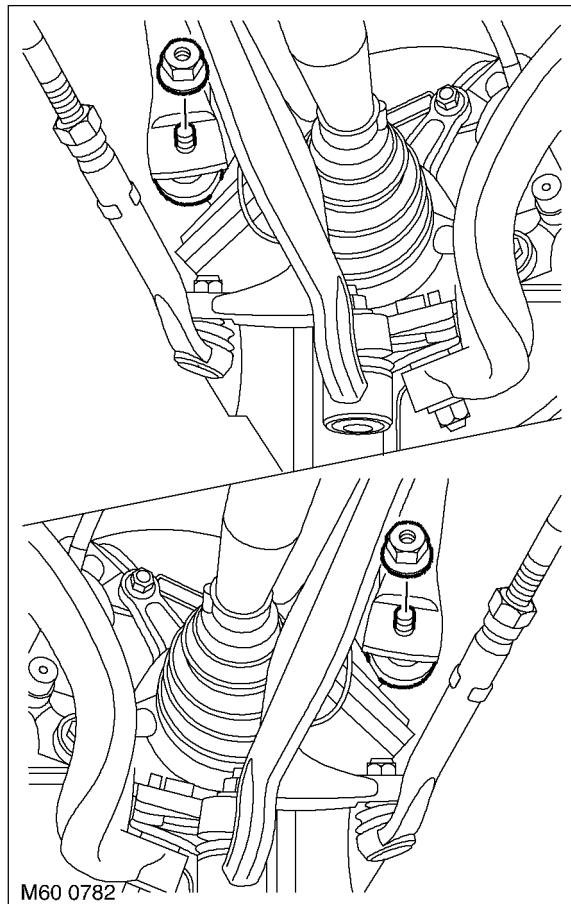
 **47.10.02**

#### Remove

1. Raise front of vehicle.

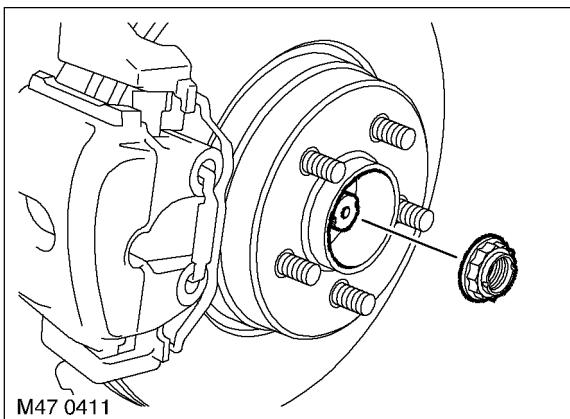
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

2. Remove front road wheels.



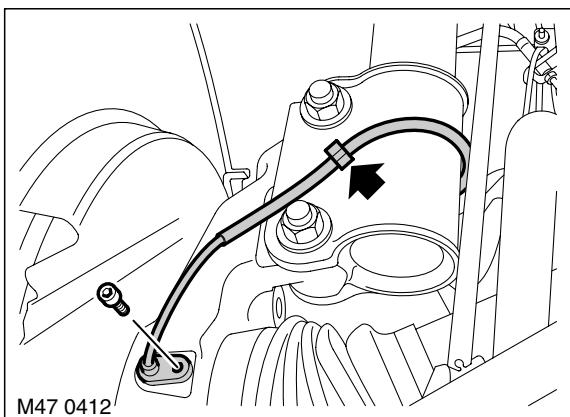
3. Remove nuts securing anti-roll bar links and release links from anti-roll bar.

**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**

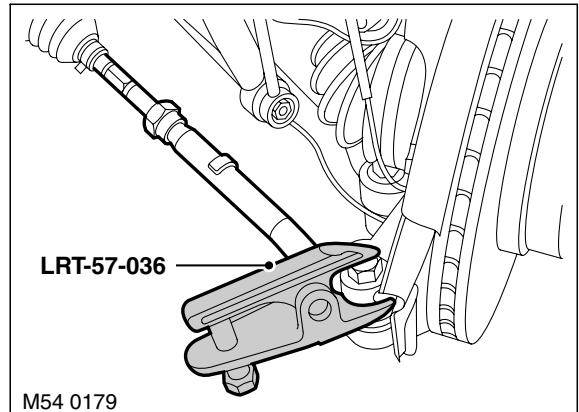


4. Release drive shaft hub nut stake.
5. With an assistant applying brakes, remove and discard drive shaft hub nut.
6. Remove brake disc.

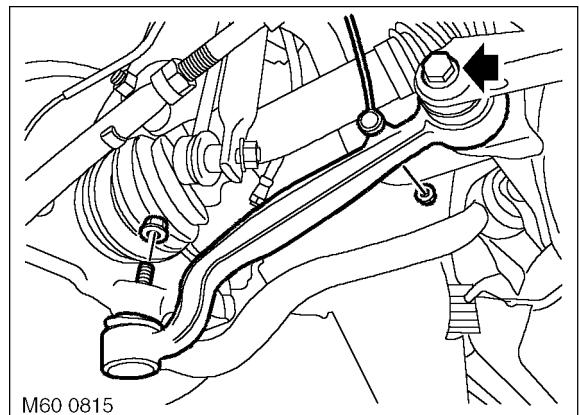
**BRAKES, REPAIRS, Brake disc - front.**



7. Release ABS sensor lead from clip.
8. Release sensor lead from damper, remove Allen screw and release ABS sensor from hub.



9. Remove and discard nut securing track rod ball joint to steering arm.
  10. Fit an M14 nut to ball pin, flush with end of pin.
  11. Using **LRT-57-036** separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.
- CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**



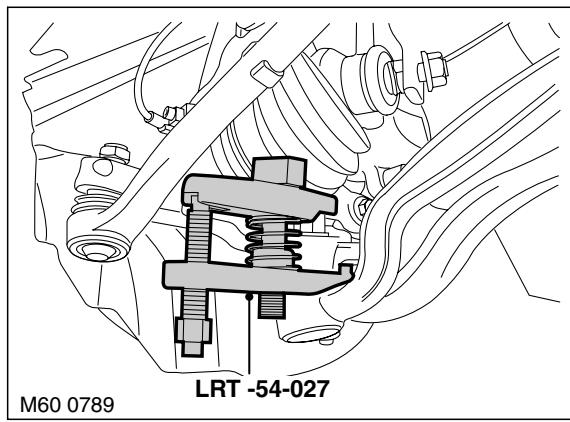
12. Remove nut securing height sensor link to lower arm and release link.

**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**

13. Loosen bolt securing lower arm to subframe one quarter of a turn.
14. Remove nut securing lower arm ball joint to hub.

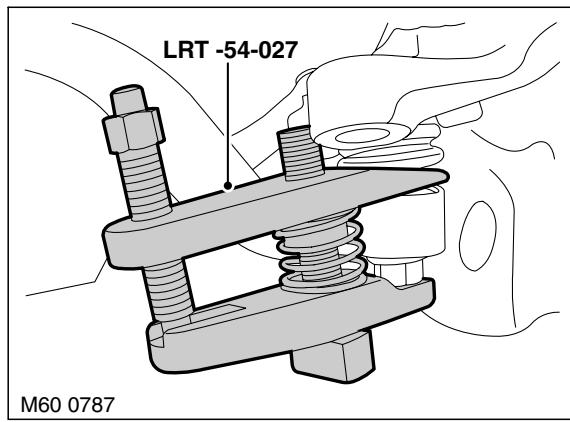
## DRIVESHAFTS

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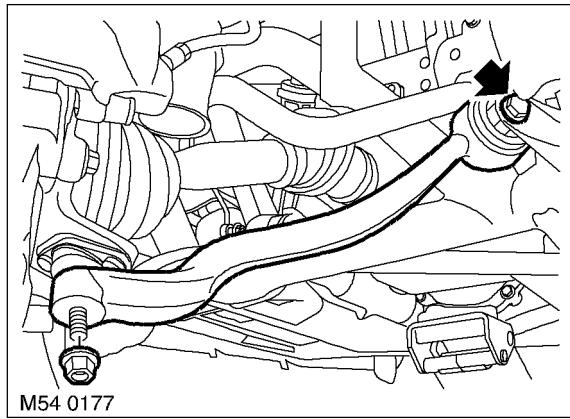
15. Using **LRT-54-027** release lower arm ball joint and disconnect lower arm from hub.

**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.

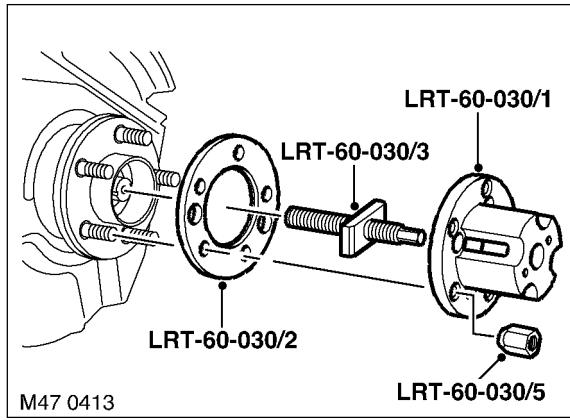


18. Using **LRT-54-027** release tie rod from ball joint

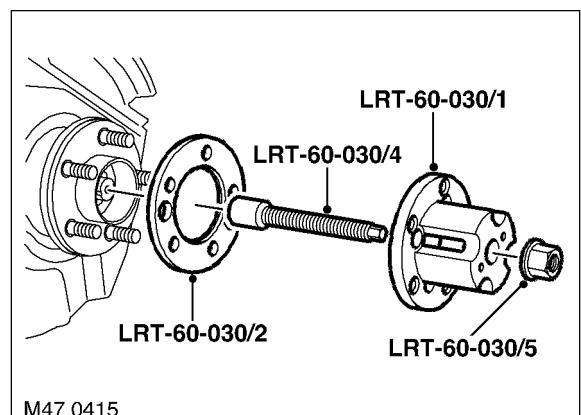
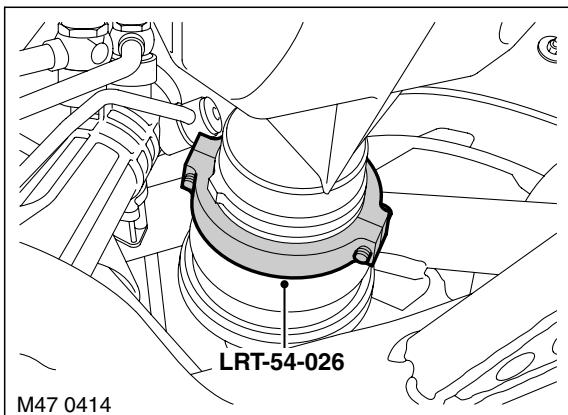
**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



16. Loosen bolt securing tie rod to subframe one quarter of a turn.
17. Remove nut securing tie rod to ball joint.



19. Fit centre screw **LRT-60-030/3** to **LRT-60-030/1** and fit to hub with spacer **LRT-60-030/2**. Secure with nuts **LRT-60-030/5**.
20. Tighten centre screw to press drive shaft from flange.
21. Remove tools.
22. Position container to collect oil spillage.



23. Fit **LRT-54-026** to drive shaft inboard joint.
24. Using levers, release drive shaft from differential.
25. Release drive shaft from hub.
26. With assistance, raise anti-roll bar to clear inboard joint.
27. Remove drive shaft assembly, keep drive shaft horizontal to avoid damaging differential oil seal.
28. Remove and discard drive shaft circlip.

#### Refit

1. Clean end of drive shaft and location in differential.
2. Fit new circlip to drive shaft.
3. Clean oil seal register.
4. Lubricate oil seal lip with clean differential oil.  
**☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
5. With assistance, raise anti-roll bar to clear inboard joint.
6. Fit drive shaft ensuring circlip is fully engaged.  
**CAUTION: Pull the drive shaft to ensure the circlip is fully engaged and retains the shaft.**
7. Clean drive shaft and flange splines.
8. Lightly lubricate splines and oil seal running surface.  
**☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
9. Locate drive shaft in hub.

10. Fit **LRT-60-030/4** to drive shaft.
11. Fit **LRT-60-030/1** with spacer **LRT-60-030/2** and secure with nuts **LRT-60-030/5**.
12. Fit nut to **LRT-60-030/4** and tighten nut to pull drive shaft into drive flange.
13. Remove tools.
14. Clean ball joint tapers and taper seats.
15. Connect tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).
16. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).
17. Connect height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).  
**CAUTION: Ensure height sensor arm is pointing outwards.**
18. Connect ball joint to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
19. Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.  
**☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
20. Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).
21. Secure ABS sensor lead to damper.
22. Fit front brake disc.  
**☞ BRAKES, REPAIRS, Brake disc - front.**
23. With an assistant applying the brakes, fit new hub nut and tighten to 420 Nm (311 lbf.ft).
24. Stake nut to shaft.
25. Connect anti-roll bar links, fit nuts and tighten to 100 Nm (74 lbf.ft).  
**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**
26. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
27. Remove stands and lower vehicle.

## DRIVESHAFTS

28. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft), plus a further 90°.

**CAUTION: Nuts and bolts must be tightened with vehicle at normal ride height.**

29. Tighten bolt securing tie rod to subframe to 165 Nm (121 lbf.ft), plus a further 90°.

30. Top-up differential with oil.

 **FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.**

31. Check front wheel alignment.

 **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

### Garter - bell & joint - outer - front

☞ 47.10.03

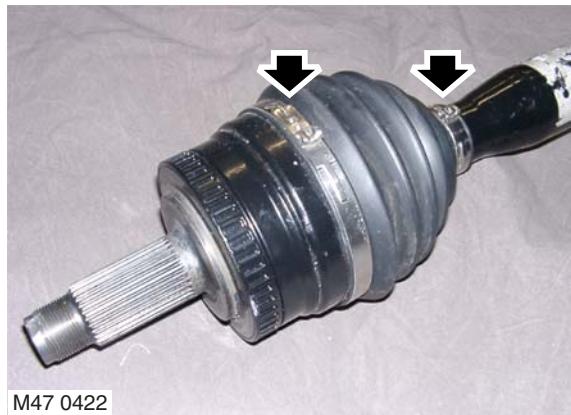
#### Remove

1. Remove drive shaft.

 **DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**

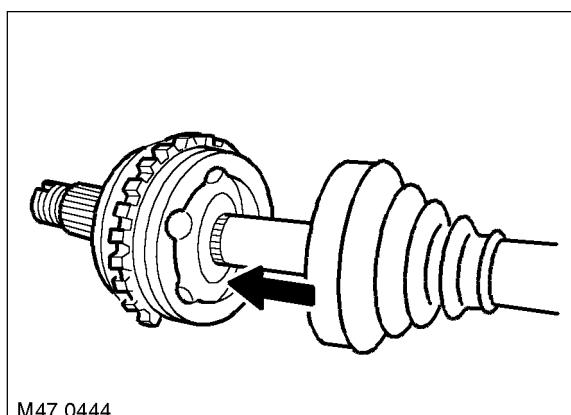
 **DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.**

2. Place drive shaft in vice.



3. Release and discard both drive shaft garter clips.

4. Slide garter along shaft to gain access to outer joint.



5. Using a drift against the inner part of the joint, remove joint from shaft.

6. Remove circlip from shaft and discard.

7. Remove garter from shaft.

**Refit**

1. Clean drive shaft.
2. Fit new gaiter to shaft.
3. Fit new circlip to drive shaft.
4. Position outer joint to shaft, use a screwdriver to press circlip into its groove and push joint fully onto shaft.
5. Apply grease from the sachet to the joint.
6. Position gaiter to joint and secure to joint and shaft with new clips.
7. Fit drive shaft.  
    ☞ **DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**  
    ☞ **DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.**

**Gaiter - inner joint**☞ **47.10.16****Remove**

1. Remove drive shaft.

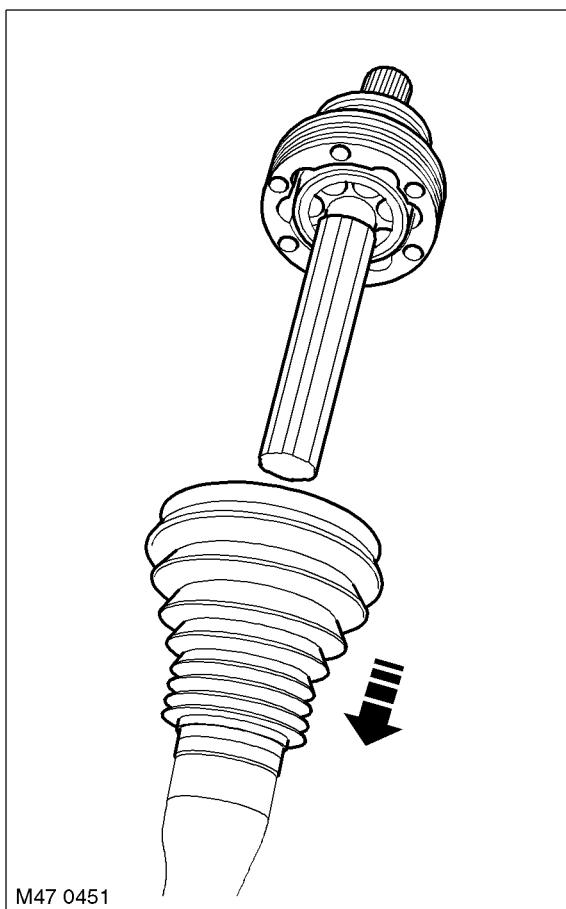
☞ **DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**☞ **DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.**

M47 0421

2. Release and discard both drive shaft gaiter clips.

*LH drive shaft illustrated.*

# DRIVESHAFTS



## Seal - drive shaft - front - RH

☞ 47.10.40

### Remove

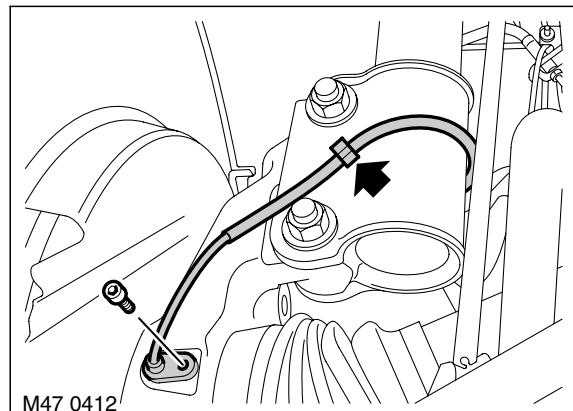
1. Raise front of vehicle.

**Warning:** do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove front road wheels.

3. Remove RH brake disc.

BRAKES, REPAIRS, Brake disc - front.



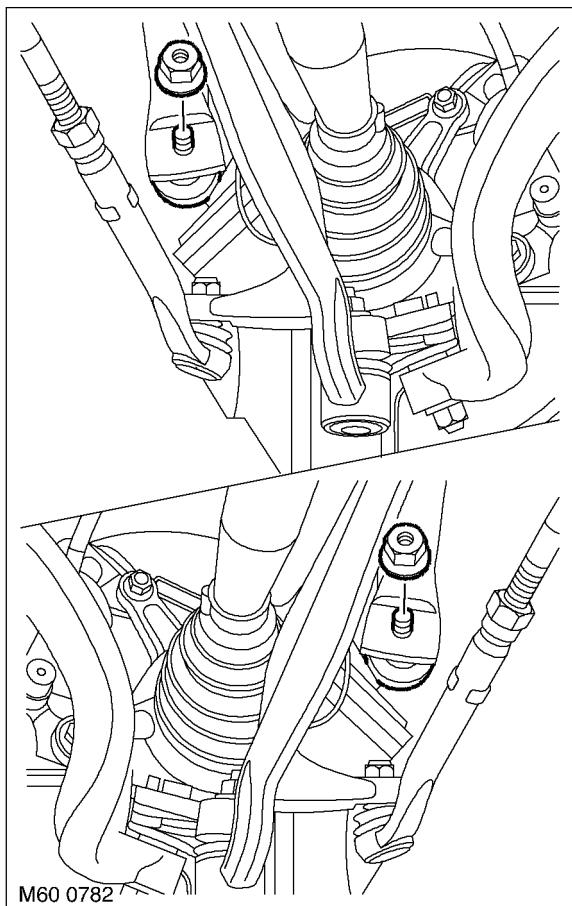
4. Release abs sensor lead from clip.

5. Release sensor lead from damper, remove allen screw and release ABS sensor from hub.

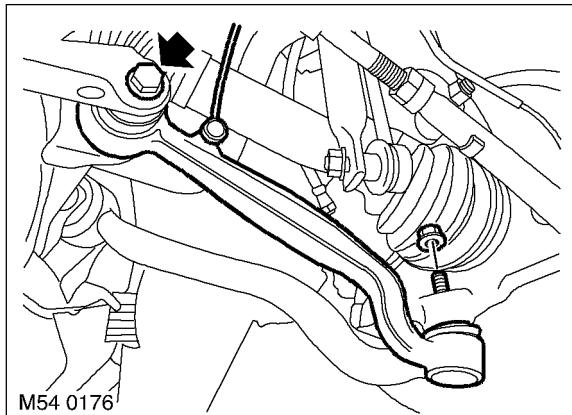
3. Slide gaiter along drive shaft to gain access to inner joint.
4. Remove excess grease from joint and inner member.
5. Reference mark drive shaft and joint for assembly purposes.
6. Remove joint and inner member from drive shaft.
7. Remove gaiter from shaft and discard.

### Refit

1. Clean drive shaft, joint and inner member.
2. Fit new gaiter to drive shaft.
3. Ensuring reference marks are aligned, fit joint and inner member to drive shaft.
4. Apply grease from the sachet to the joint.
5. Position gaiter to joint and secure to joint and shaft with new clips.
6. Fit drive shaft.  
 DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.  
 DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.



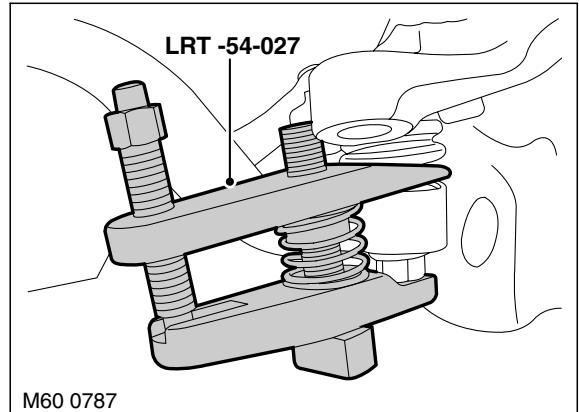
- Remove nuts securing anti-roll bar links and release links from anti-roll bar.



- Remove nut securing height sensor link to lower arm and release link.  
**Caution: use an open ended spanner on flats provided to prevent ball joint rotating.**

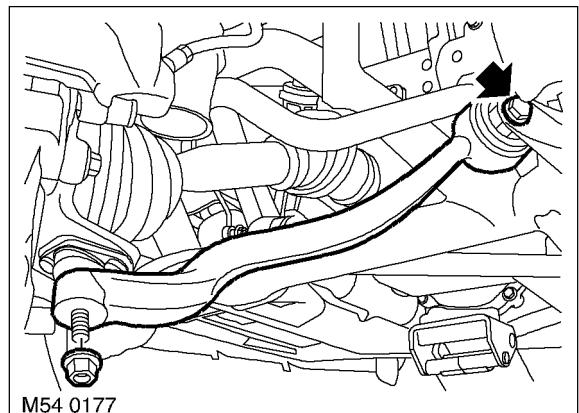
- Loosen bolt securing lower arm to subframe one quarter of a turn.

- Remove nut securing lower arm ball joint to hub.



- Using LRT-54-027 release lower arm ball joint and disconnect lower arm from hub.

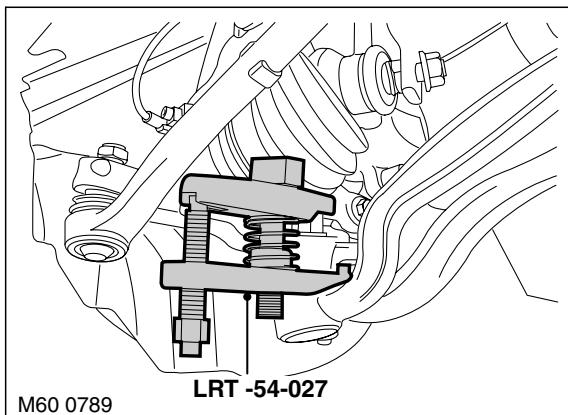
**Caution: ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**



- Loosen bolt securing tie rod to subframe one quarter of a turn.
- Remove nut securing tie rod to ball joint.

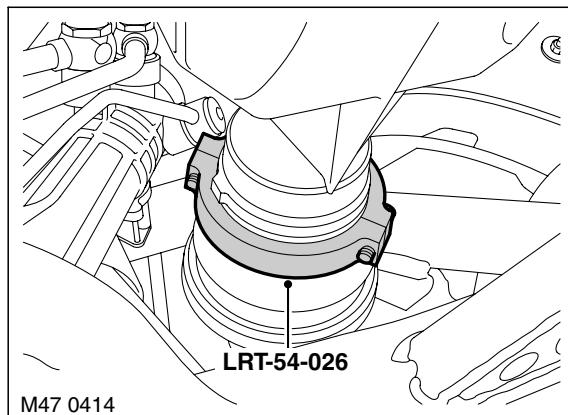
## DRIVESHAFTS

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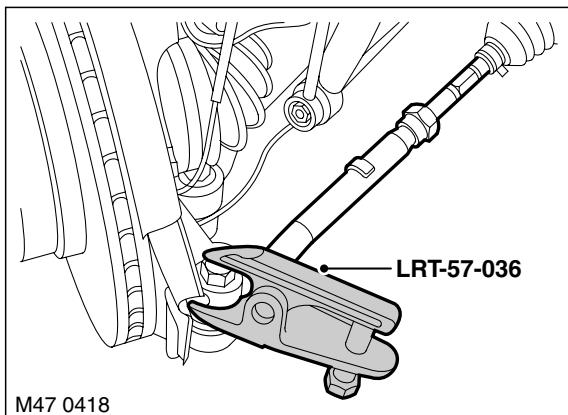
13. Using **LRT-54-027** release tie rod from ball joint

**Caution:** ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



18. Fit **LRT-54-026** to drive shaft inboard joint.

19. Using levers, release drive shaft from differential.

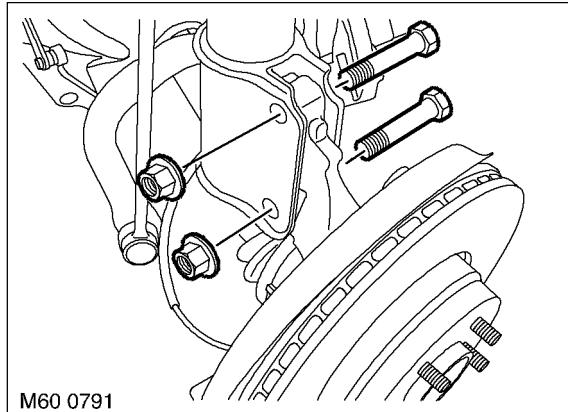


14. Remove and discard nut securing track rod ball joint to steering arm.

15. Fit an m14 nut to ball pin, flush with end of pin.
16. Using **LRT-57-036** separate ball pin from steering arm. Remove m14 nut and release ball pin from steering arm.

**Caution:** ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.

17. Position container to collect oil spillage.



20. Remove 2 nuts and bolts securing hub to damper.

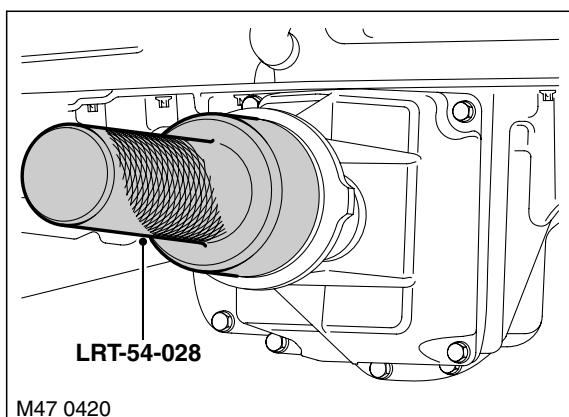
21. With assistance, remove hub and drive shaft assembly.

22. Remove and discard shaft retaining clip.

23. Carefully remove and discard oil seal.

### Refit

1. Clean oil seal register.



2. Use **LRT-54-028** to fit new oil seal.
3. Clean end of drive shaft.
4. Lubricate lip of oil seal with differential oil.
 

**☞ CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**
5. Fit new circlip to drive shaft.
6. Lightly lubricate splines and oil seal running surface.
 

**☞ CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**
7. With assistance, position hub and drive shaft assembly. Carefully fit drive shaft through seal, remove seal protector and push drive shaft fully home to engage retaining clip.
8. Align hub to damper and tighten nuts and bolts to 250 Nm (184 lbf.ft).
9. Clean ball joint tapers and taper seats.
 

**Caution: nuts and bolts must be tightened with vehicle at normal ride height.**
10. Connect Ball joint to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
11. Connect Tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).
12. Connect Height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).
13. Connect Lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).
14. Connect anti-roll bar links, fit nuts and tighten to 100 Nm (74 lbf.ft).
15. Clean abs sensor, smear sensor with an anti-seize grease and fit sensor to hub.
 

**☞ CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**
16. Fit Allen screw securing abs sensor and tighten to 8 Nm (6 lbf.ft).
17. Secure sensor lead to damper.

18. Fit front brake disc.
 

**☞ BRAKES, REPAIRS, Brake disc - front.**
19. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
20. Remove stands and lower vehicle.
21. Tighten Bolt securing lower arm to subframe to 165 Nm (121 lbf.ft), plus a further 90°.
22. Tighten Bolt securing tie rod to subframe to 165 Nm (121 lbf.ft), plus a further 90°.
23. Check front wheel alignment.
 

**☞ STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**
24. Top-up differential with oil.
 

**☞ FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.**

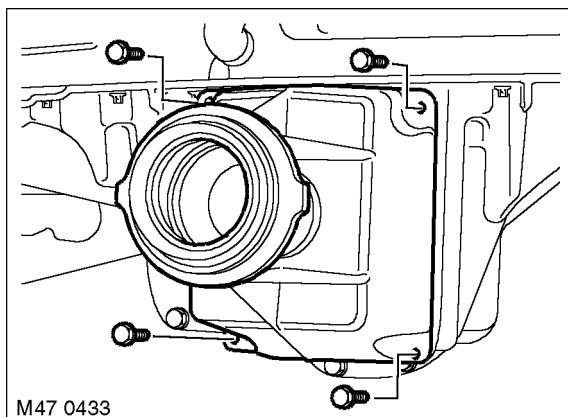
# DRIVESHAFTS

## Bearing driveshaft support

→ 47.10.41

### Remove

1. Remove RH drive shaft seal.  
☞ **DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.**



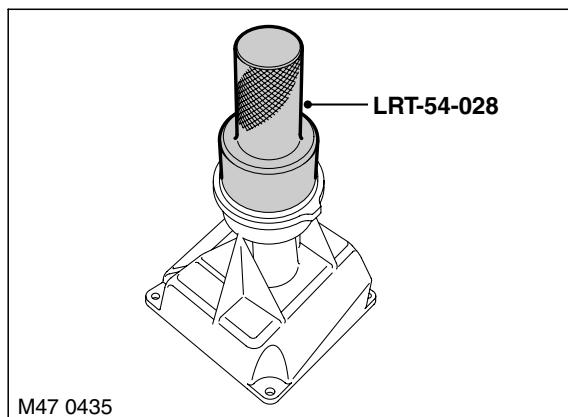
2. Remove 4 bolts, remove support housing and discard 'O' ring.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

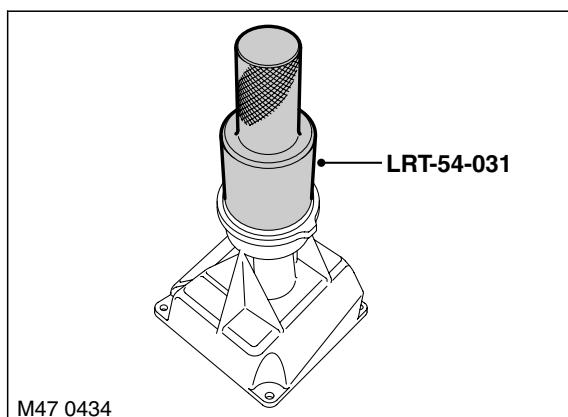
3. Remove oil seal from housing.
4. Remove bearing from housing.

### Refit

1. Clean bearing and mating face.
2. Lubricate bearing with clean differential oil.  
☞ **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**



5. Use **LRT-54-028** to fit new oil seal.
6. Clean 'O' ring groove, housing and mating face.
7. Lubricate new 'O' ring and fit to housing.
8. Carefully fit housing and tighten bolts to 22 Nm (16 lbf.ft).
9. Fit RH drive shaft seal.  
☞ **DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.**



3. Using **LRT-54-031** fit bearing to housing.
4. Clean seal and mating face.



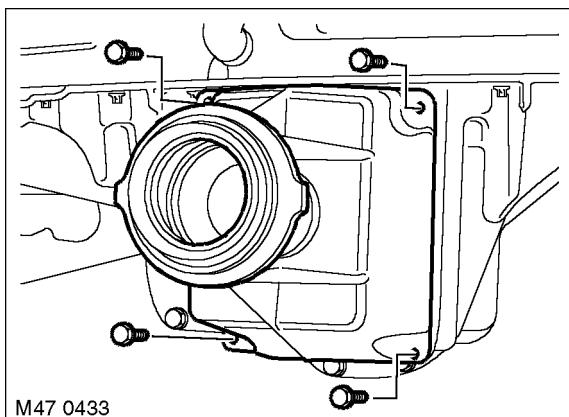
## 'O' Ring - driveshaft housing

☛ 47.10.43

### Remove

1. Remove RH drive shaft seal.

DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.



2. Remove 4 bolts, remove support housing and discard 'O' ring.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

### Refit

1. Clean 'O' ring groove, housing and mating face.
2. Lubricate new 'O' ring and fit to housing.
3. Carefully fit housing and tighten bolts to 22 Nm (16 lbf.ft).
4. Fit RH drive shaft seal.

DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.

## Drive shaft - rear

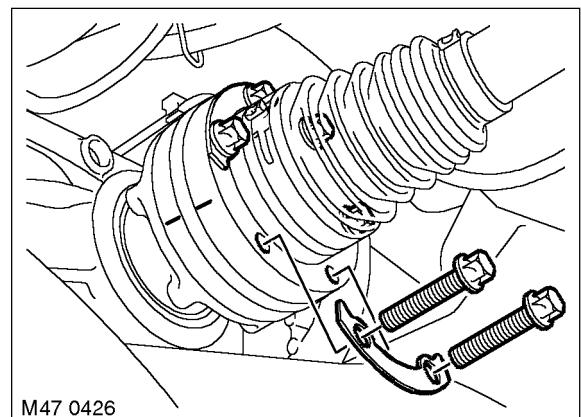
☛ 47.11.01

### Remove

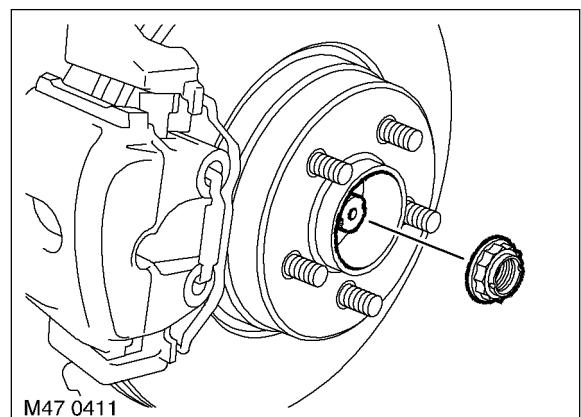
1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



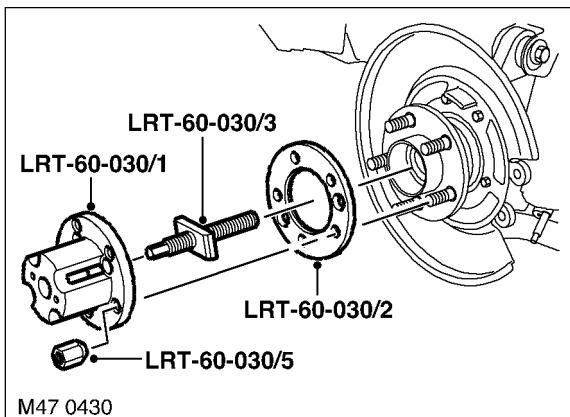
3. Remove 6 bolts securing drive shaft to differential drive flange and collect 3 bolt plates. Discard bolts.



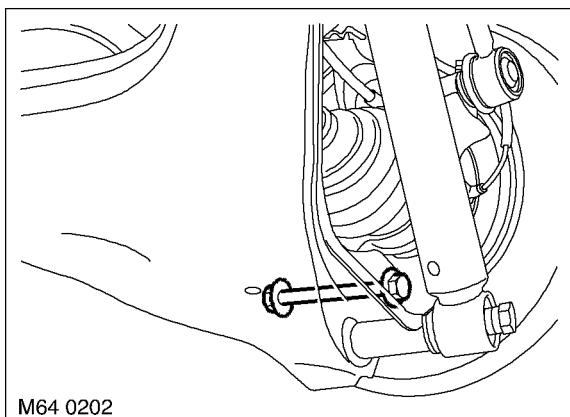
4. Release drive shaft hub nut stake.
5. With an assistant applying brakes, remove and discard drive shaft hub nut.
6. Remove brake disc.

BRAKES, REPAIRS, Brake disc - rear.

## DRIVESHAFTS



7. Fit centre screw **LRT-60-030/3** to **LRT-60-030/1** and fit to hub with spacer **LRT-60-030/2**. Secure with nuts **LRT-60-030/5**.
8. Tighten centre screw to press drive shaft from flange.
9. Remove tools.
10. Position jack to support the lower arm.

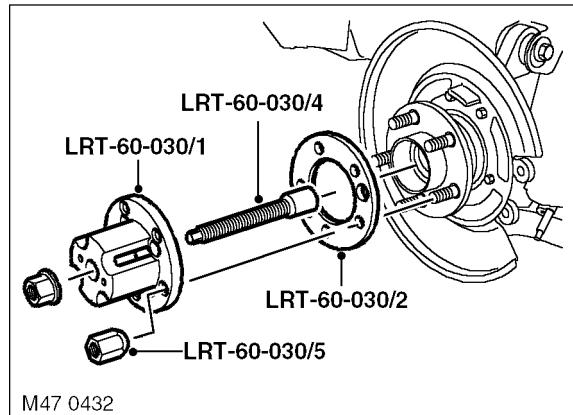


11. Remove nut and bolt securing lower arm to hub.
12. Lower support jack.
13. Release drive shaft from differential.
14. Release drive shaft from hub, and with assistance, raise upper arm and remove drive shaft.

### Refit

1. Clean end of drive shaft and location in differential.
  2. Clean drive shaft and flange splines.
  3. Lightly lubricate splines and oil seal running surface.
-  **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**
4. Clean lower arm and hub mating faces.

5. Locate drive shaft to differential and hub.
  6. Align hub to lower arm, fit and lightly tighten nut and bolt.
- CAUTION: Nuts and bolts must be tightened with vehicle at normal ride height.**



7. Fit **LRT-60-030/4** to drive shaft.
  8. Fit **LRT-60-030/1** with spacer **LRT-60-030/2** and secure with nuts **LRT-60-030/5**.
  9. Fit nut to **LRT-60-030/4** and tighten nut to pull drive shaft into drive flange.
  10. Remove tools.
  11. Fit brake disc.
-  **BRAKES, REPAIRS, Brake disc - rear.**
12. With an assistant applying the brakes, fit new hub nut and tighten to 420 Nm (311 lbf.ft).
  13. Stake nut to shaft.
  14. Clean bolt plates, position plates, fit new bolts securing drive shaft to differential drive flange and tighten to 40 Nm (30 lbf.ft) plus a further 60°.
  15. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
  16. Remove stands and lower vehicle.
  17. Tighten bolt securing lower arm to hub to 250 Nm (184 lbf.ft).

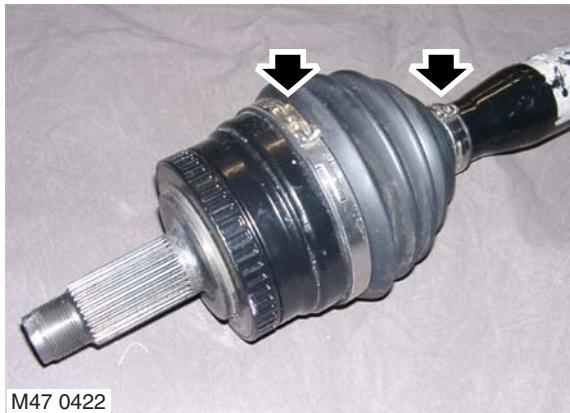


## Gaiter - bell & joint - outer - rear

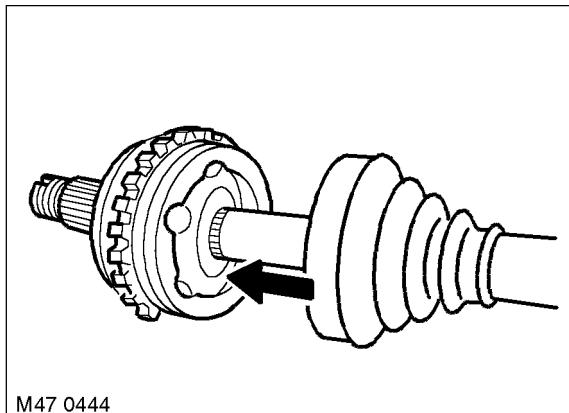
» 47.11.03

### Remove

1. Remove drive shaft.
- DRIVESHAFTS, REPAIRS, Drive shaft - rear.
2. Place drive shaft in vice.



3. Release and discard both drive shaft gaiter clips.
4. Slide gaiter along shaft to gain access to outer joint.



5. Using a drift against the inner part of the joint, remove joint from shaft.
6. Remove circlip from shaft and discard.
7. Remove gaiter from shaft.

### Refit

1. Clean drive shaft.
  2. Fit gaiter.
  3. Fit new circlip to drive shaft.
  4. Position outer joint to shaft, use a screwdriver to press circlip into its groove and push joint fully onto shaft.
  5. Apply grease from the sachet to the joint.
  6. Position gaiter to joint and secure to joint and shaft with new clips.
  7. Fit drive shaft.
- DRIVESHAFTS, REPAIRS, Drive shaft - rear.

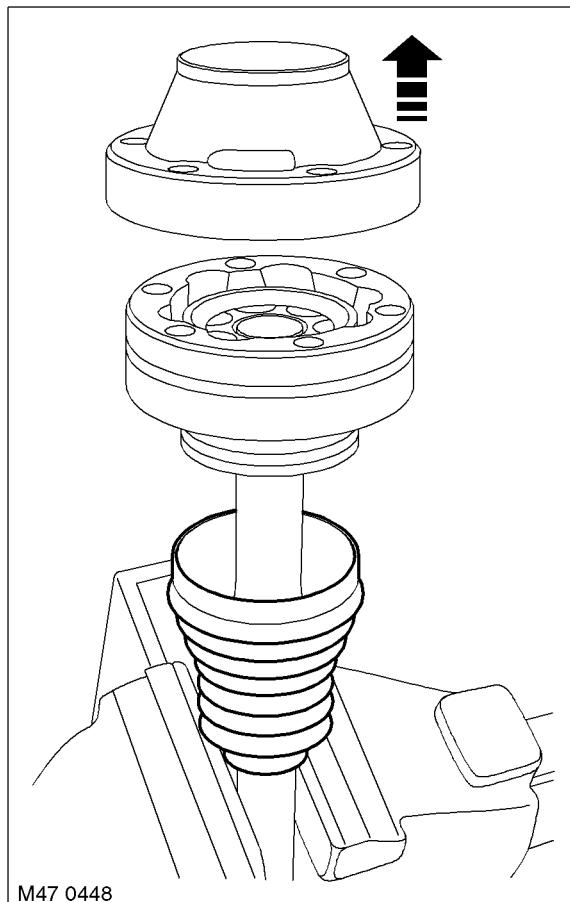
# DRIVESHAFTS

## Gaiter - inner joint

☛ 47.11.16

### Remove

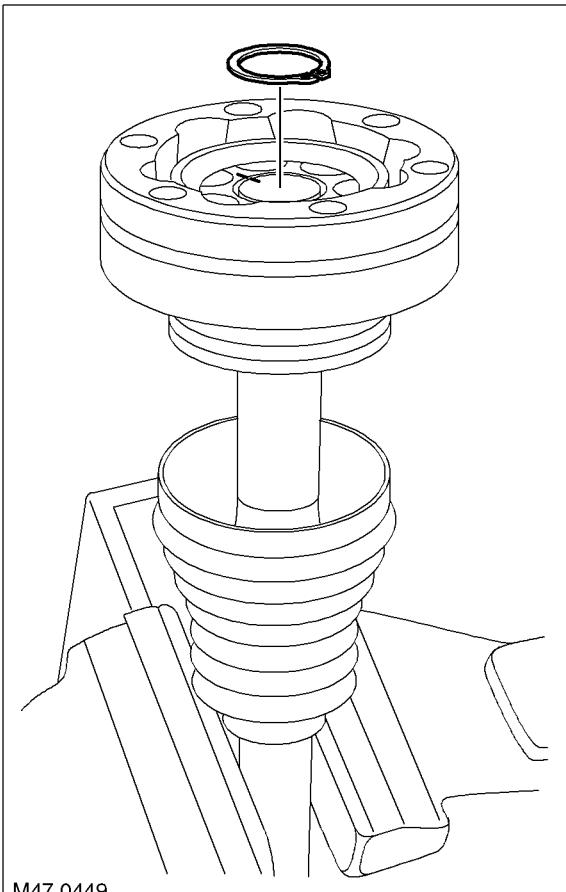
1. Remove rear drive shaft.  
☛ DRIVESHAFTS, REPAIRS, Drive shaft - rear.
2. Place drive shaft in vice.



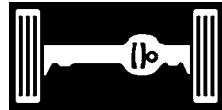
3. Remove and discard dust cover from drive shaft.



4. Release and discard both drive shaft gaiter clips.
5. Slide gaiter along drive shaft to gain access to inner joint.
6. Remove excess grease from drive shaft.



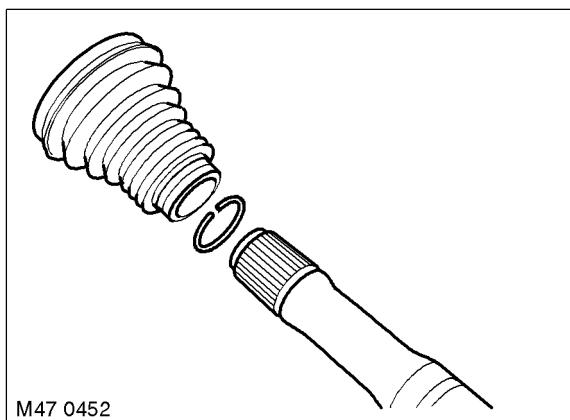
7. Remove and discard circlip from drive shaft.
8. Reference mark drive shaft and joint for assembly purposes.

**Refit**

1. Clean drive shaft and joint.
2. Fit gaiter to drive shaft.
3. Fit new joint retaining ring to drive shaft.
4. Ensure reference marks are aligned and fit joint to drive shaft.
5. Fit new circlip to drive shaft.
6. Apply grease from the sachet to the joint.
7. Position gaiter to joint and secure to joint and shaft with new clips.
8. Fit new dust cover to drive shaft.
9. Fit rear drive shaft.

DRIVESHAFTS, REPAIRS, Gaiter - bell & joint - outer - rear.

9. Supporting drive shaft joint, use **LRT-12-076** to remove joint from drive shaft.



10. Remove and discard joint retaining ring from drive shaft.
11. Remove gaiter from drive shaft.

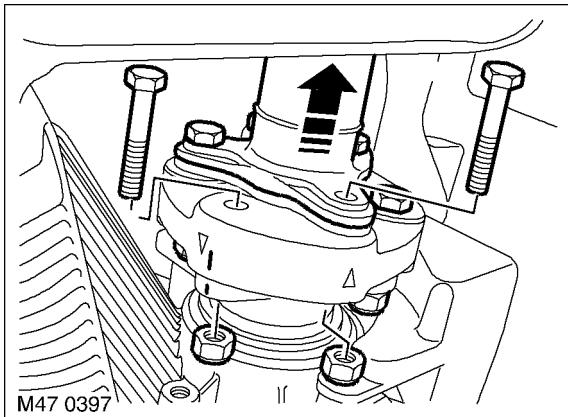
# DRIVESHAFTS

## Propeller shaft - front

→ 47.15.02

### Remove

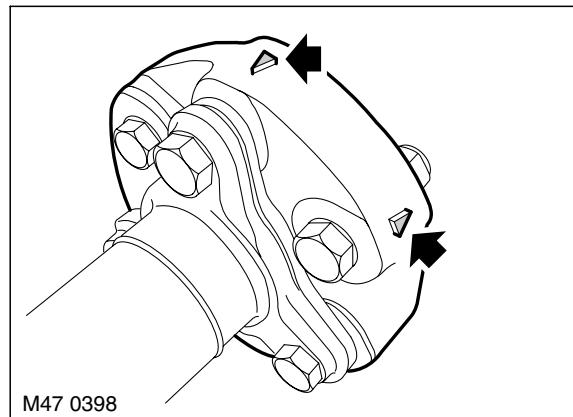
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Raise vehicle on lift.
4. Raise vehicle to allow propeller shaft to rotate.



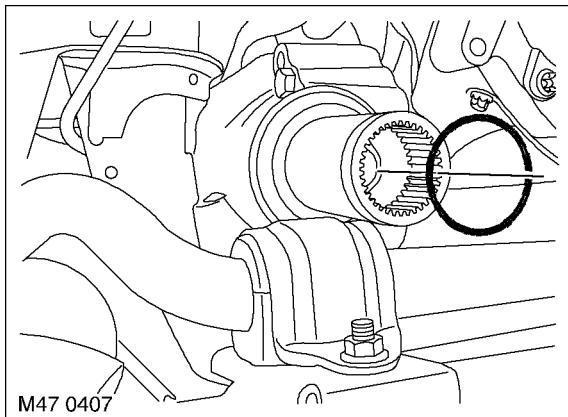
5. Remove 6 nuts and bolts securing drive flange and propeller shaft to coupling. Discard locking nuts.
6. Pull propeller shaft rearwards and remove coupling and centering flange.
7. Reference mark propeller shaft and differential to aid reassembly.
8. Remove propeller shaft.

### Refit

1. Clean propeller shaft splines.
  2. Fit new 'O' ring.
  3. Lightly lubricate splines and oil seal running surface.
- ☞ **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**
4. Fit propeller shaft.
  5. Check and if necessary, renew centering flange seal.



6. Clean coupling and flange mating faces.
7. Fit coupling and flange with arrows on coupling pointing towards securing bolts as illustrated.
8. Fit bolts securing coupling and tighten new nuts to 110 Nm (81 lbf.ft).
9. Lower vehicle onto it's wheels.
10. Lower lift.
11. Connect battery earth lead.



9. Remove and discard 'O' ring from differential output drive tube.

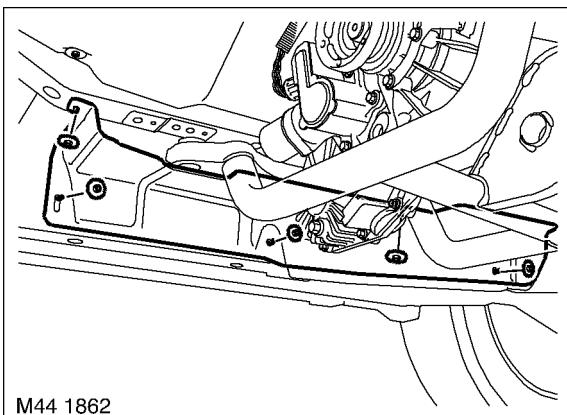


## Propeller shaft - rear

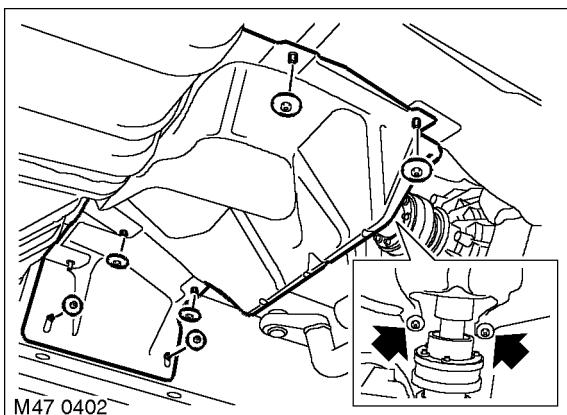
» 47.15.03

### Remove

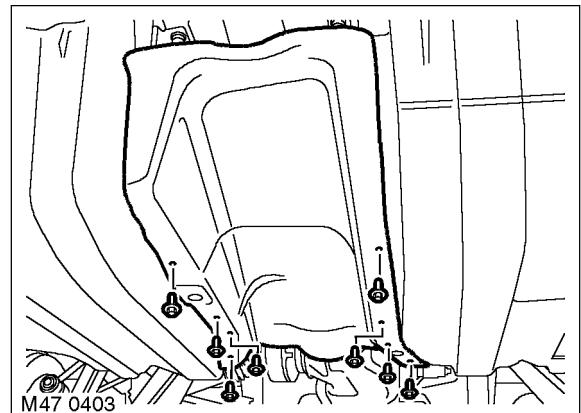
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove exhaust system.
  - MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Exhaust system & mountings.**
  - MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**



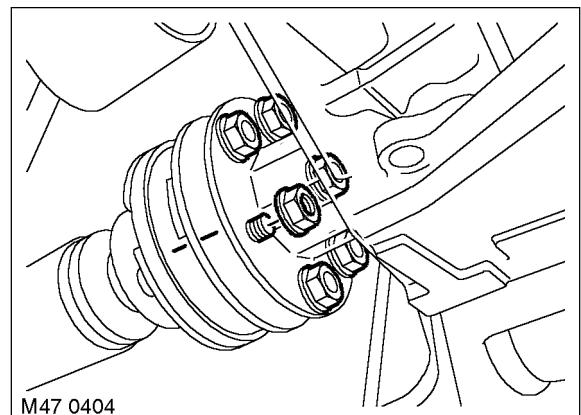
4. **Petrol models only:** Remove 5 nuts securing LH heat shield. Remove heat shield.



5. Remove 8 nuts securing centre heat shield and remove shield.



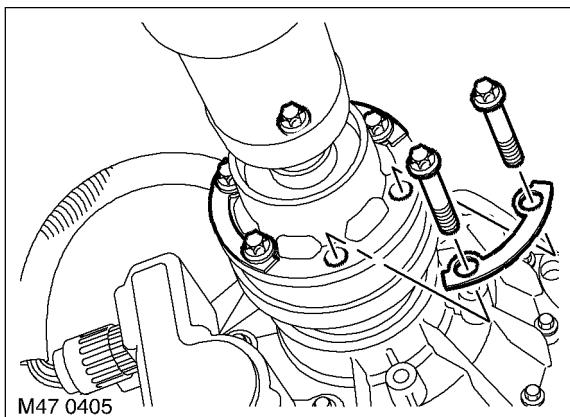
6. Remove 8 hexagonal headed screws securing fuel tank heat shield and remove shield.
7. Raise vehicle to allow propeller shaft to rotate.



8. Reference mark rear propeller shaft for reassembly.
  9. Remove 6 nuts securing propeller shaft to differential flange.
  10. Release joint from differential flange and support the shaft.
- CAUTION: To avoid damage to gaiter or joint, do not allow shaft to hang on joint.**

## DRIVESHAFTS

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8. Fit exhaust system.  
☞ **MANIFOLD AND EXHAUST SYSTEM**  
- V8, REPAIRS, Exhaust system & mountings.
9. Lower lift.
10. Connect battery earth lead.

11. Remove 6 Torx bolts securing propeller shaft to transfer gearbox flange.
12. Release joint from transfer gearbox flange and support the shaft.



13. Remove 2 nuts securing support bearing and remove propeller shaft.

### Refit

1. Fit propeller shaft, fit nuts securing support bearing but do not tighten at this stage.
2. Clean propeller shaft joints and mating faces.
3. Fit propeller shaft joints to flanges and align marks. Tighten Torx bolts securing propeller shaft to transfer gearbox flange to 85 Nm (63 lbf.ft) and tighten nuts securing propeller shaft to differential flange to 70 Nm (50 lbf.ft).
4. Tighten nuts securing support bearing to body to 21 Nm (15 lbf.ft).

**Ensure support bearing is not under any tension before tightening bolts.**

5. Fit fuel tank heat shield and secure with screws.
6. Fit centre heat shield and secure with nuts.
7. **Petrol models only:** Fit LH heat shield and secure with nuts.



## Support bearing - rear

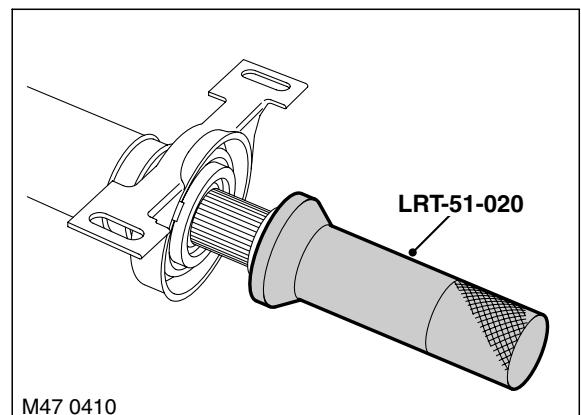
» 47.20.06

### Remove

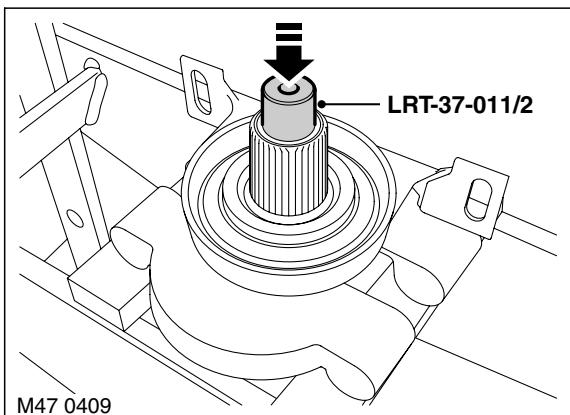
1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Remove rear propeller shaft.
- DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**



4. Reference mark rear propeller shaft for reassembly.
5. Remove bolt securing front part to rear part of propeller shaft.
6. Remove rear part of propeller shaft.
7. Remove shim from shaft.



2. Use **LRT-51-020** and fit support bearing to propeller shaft.
  3. Fit shim to shaft.
  4. Align marks and engage splines of front and rear part of propeller shaft.
  5. Ensure threads are clean and dry, apply Loctite STC 50552 to bolt thread, fit bolt securing propeller shafts and tighten to 97 Nm (72 lbf.ft).
  6. Fit rear propeller shaft.
- DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
7. Lower lift.
  8. Connect battery earth lead.



8. Use press bars under support bearing as illustrated.
9. Fit **LRT-37-011/2** to end of shaft and press propeller shaft from bearing.

### Refit

1. Clean propeller shafts, bearing and mating faces.

## **DRIVESHAFTS**

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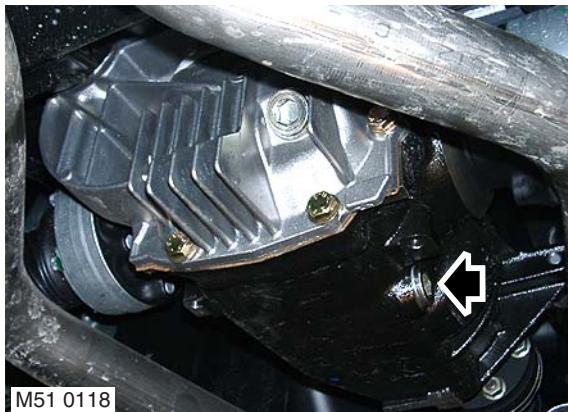
## Rear differential - drain and refill

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### » 51.25.02

#### Drain

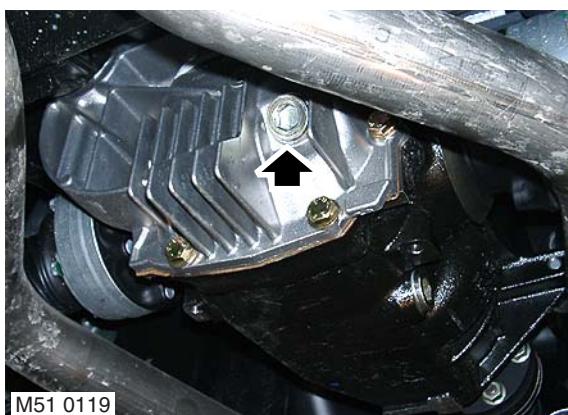
1. Raise vehicle on lift.
2. Position container to catch spillage.
3. Clean area surrounding drain and level plugs.



4. Remove drain plug, discard sealing washer and allow oil to drain.

#### Refill

1. Clean drain plug, fit new sealing washer and tighten plug to 65 Nm (48 lbf.ft).



2. Remove filler/level plug and discard sealing washer.
3. Fill axle using recommended lubricant until a thread of oil runs from level/filler plug. Allow time for lubricant to find common level.

**CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**

4. Fit new sealing washer and tighten filler/level plug to 65 Nm (48 lbf.ft).
5. Lower vehicle on lift.

## **FINAL DRIVE**

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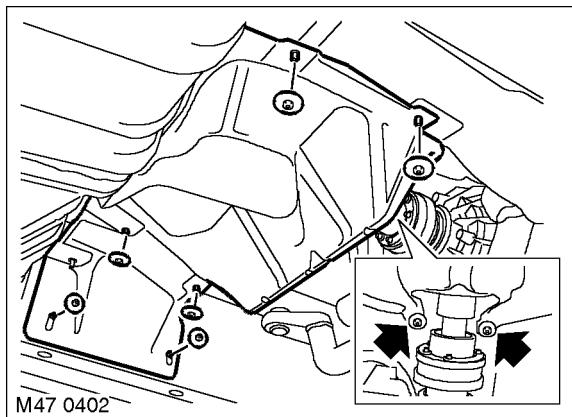
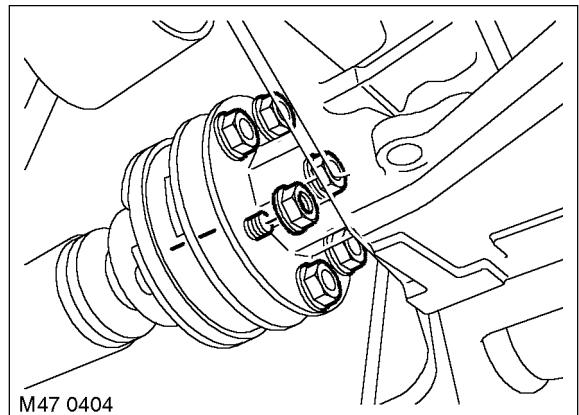


## Differential assembly

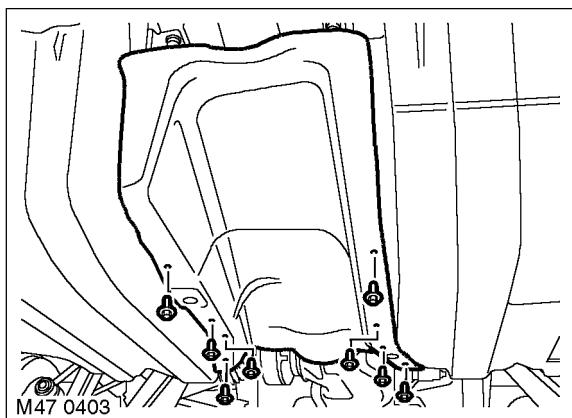
### 51.15.01

#### Remove

1. Position vehicle on lift.
2. Remove exhaust system.
  - MANIFOLD AND EXHAUST SYSTEM**
  - Td6, REPAIR, Exhaust system and mountings.
  - MANIFOLD AND EXHAUST SYSTEM**
  - V8, REPAIRS, Exhaust system & mountings.



3. Remove 8 nuts securing centre heat shield and remove shield.



4. Remove 8 hexagonal headed screws securing fuel tank heat shield and remove shield.

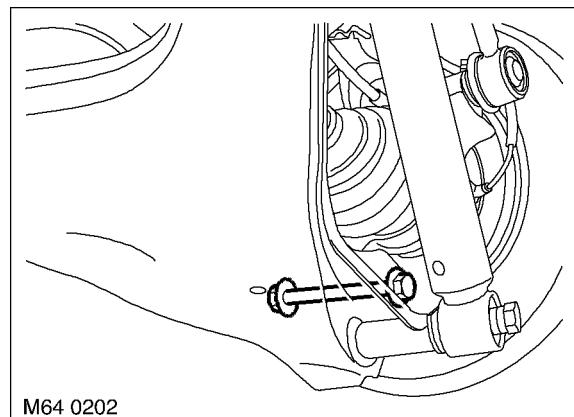
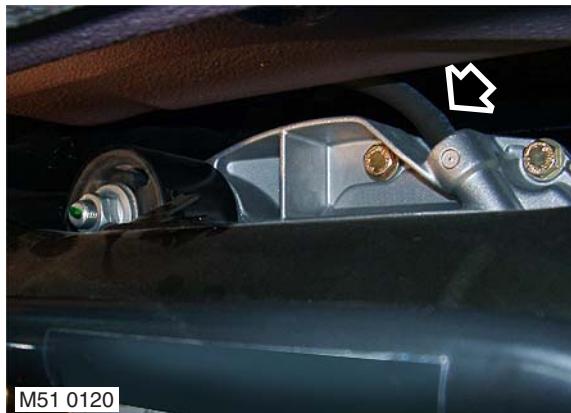
5. Reference mark propeller shaft and differential to aid reassembly.
6. Remove 6 nuts securing propeller shaft to differential flange.



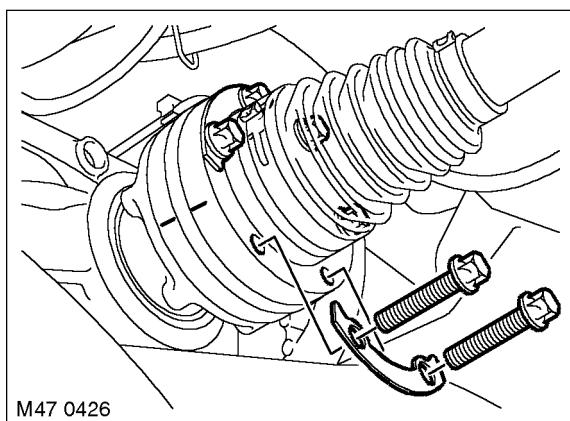
7. Remove 2 nuts securing propeller shaft support bearing, lower the propeller shaft, release flange from differential then temporarily support the bearing and secure with nuts.
8. Raise rear of vehicle and support under body.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**
9. Remove road wheels.

## FINAL DRIVE

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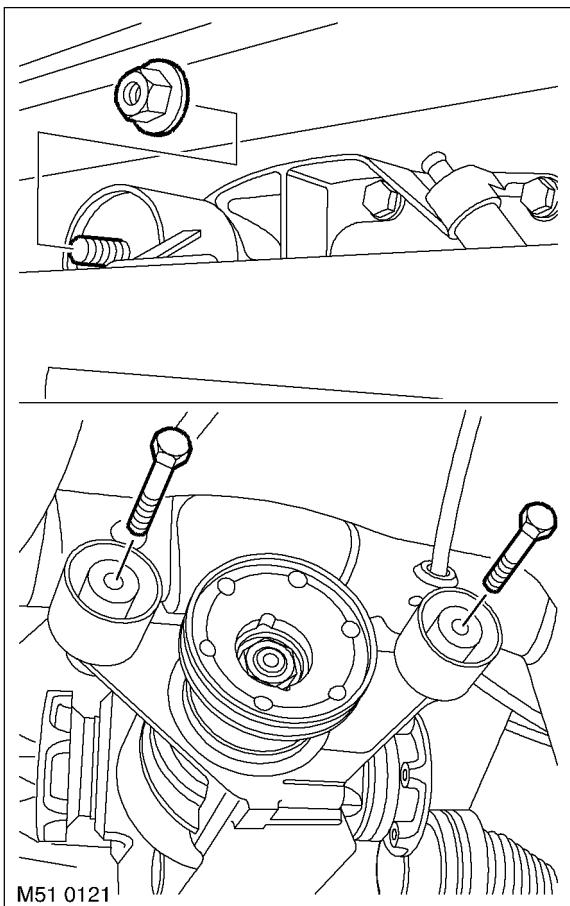


10. Disconnect breather hose from differential.
11. Drain oil from differential.  
☞ **FINAL DRIVE, ADJUSTMENTS, Rear differential - drain and refill.**



12. Reference mark drive shaft and differential flanges to aid reassembly.
13. Remove 6 bolts securing drive shaft to differential drive flange and collect 3 bolt plates. Discard bolts.
14. Position jack to support the lower arm.

15. Remove nut and bolt securing lower arm to hub.
16. Remove support jack
17. Release the lower arm from hub and disconnect drive shaft from differential.
18. Repeat procedure for other side.
19. Support weight of differential assembly on a jack.



20. Remove and discard 2 bolts and 1 nut and bolt securing differential to the subframe. Remove differential assembly.

#### Refit

1. Position jack and raise differential into position.
2. Fit new bolts securing differential to subframe and tighten front 2 bolts to 100 Nm (74 lbf.ft) and new rear nut and bolt to 165 Nm (121 lbf.ft).
3. Clean end of drive shaft and location in differential.
4. Locate drive shaft to differential.
5. Clean lower arm and hub mating faces.
6. Align hub to lower arm, fit and lightly tighten nut and bolt.
7. Clean bolt plates, position plates, fit new bolts securing drive shaft to differential drive flange and tighten to 40 Nm (30 lbf.ft) plus a further 60°
8. Repeat procedure for other side.
9. Connect breather hose to differential.
10. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
11. Remove stands and lower vehicle.
12. Tighten bolts securing lower arms to hubs to 250 Nm (184 lbf.ft).

13. Clean differential and propeller shaft flange mating faces.
  14. Remove nuts securing support bearing, connect propeller shaft to differential flange and locate support bearing. Fit nuts securing support bearing but do not tighten at this stage.
  15. Fit nuts securing propeller shaft to differential flange and tighten to 70 Nm (52 lbf.ft).
  16. Tighten nuts securing propeller shaft support bearing to 21 Nm (15 lbf.ft).
  17. Fit fuel tank heat shield and secure with screws.
  18. Fit centre heat shield and secure with nuts.
  19. Fill differential to correct level with oil.
- FINAL DRIVE, ADJUSTMENTS, Rear differential - drain and refill.**
20. Fit exhaust system.
 

**MANIFOLD AND EXHAUST SYSTEM**  
- Td6, REPAIR, Exhaust system and mountings.

**MANIFOLD AND EXHAUST SYSTEM**  
- V8, REPAIRS, Exhaust system & mountings.

# FINAL DRIVE

## Gasket - cover - rear - differential

» **51.15.05**

### Remove

1. Remove differential assembly.  
☞ **FINAL DRIVE, REPAIRS, Differential assembly.**



2. Remove 8 bolts securing differential rear cover.
3. Remove rear cover.
4. Remove and discard gasket.

### Refit

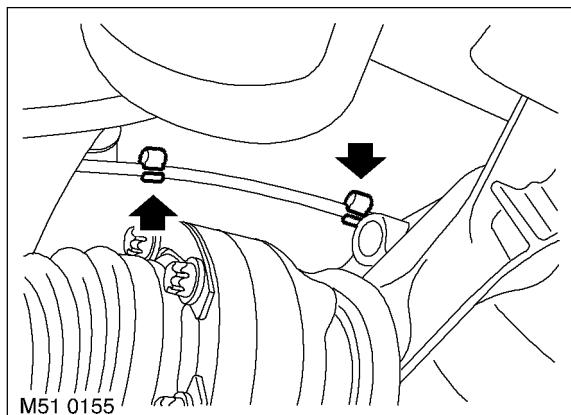
1. Clean rear cover and mating face on differential.
2. Position gasket and cover, fit bolts and working in a diagonal sequence, progressively tighten differential rear cover bolts to 45 Nm (33 lbf.ft).
3. Fit differential assembly.  
☞ **FINAL DRIVE, REPAIRS, Differential assembly.**

## Bush - differential mounting - each

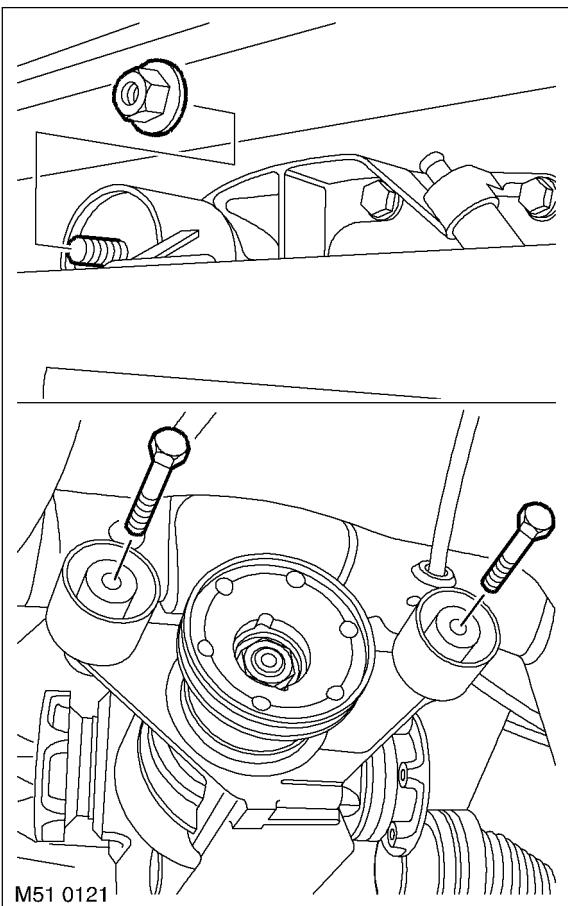
» **51.15.41**

### Remove

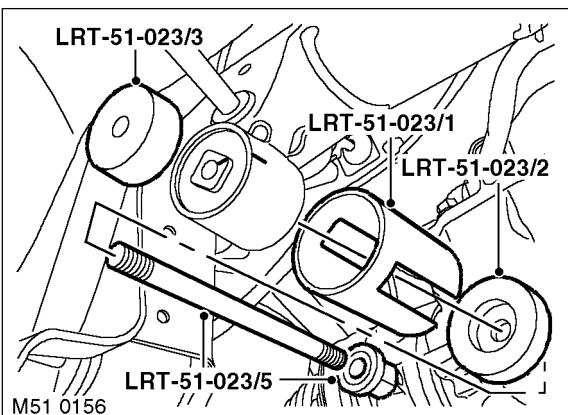
1. Raise vehicle on lift.
2. Disconnect battery earth lead.
3. Remove rear propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**



4. Release clips securing differential breather pipe to body.
5. Support rear differential on jack.



6. Remove and discard 2 bolts and 1 nut and bolt securing differential to sub-frame mountings.
7. Carefully lower jack, allow differential and drive shafts to rest on lower suspension arms.
8. Rotate differential through 90° for access.



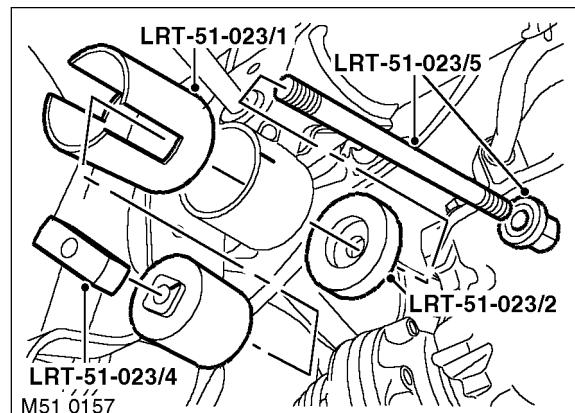
9. Fit LRT-51-023/3 to LRT-51-023/5. Fit and finger tighten nut.
10. Fit LRT-51-023/1.

**CAUTION: Ensure slots face away from bush.**

11. Fit LRT-51-023/2 to LRT-51-023/1, fit nut to drawbar and finger tighten.
12. Note fitted position of bush and paint mark sub-frame.
13. Remove bush from rear sub-frame.
14. Dismantle tool and recover bush.

#### Refit

1. Clean bush housing and mating faces.
2. Apply rubber lubricant to new bush and bore.



3. Fit new bush to LRT-51-023/1.
4. Fit LRT-51-023/4 through LRT-51-023/1 to retain bush.
5. Locate LRT-51-023/5 through bush housing in subframe and screw to LRT-51-023/4.
6. Fit LRT-51-023/2 to LRT-51-023/5. Fit and finger tighten nut.
7. Fit bush to rear sub-frame.
- CAUTION: Bush must be fitted so that it is flush with differential mating face.**
8. Remove and dismantle tool.
9. Position jack and raise differential into position.
10. Fit new bolts securing differential to subframe and tighten bolts to 100 Nm (74 lbf.ft) and new rear nut and bolt to 165 Nm (121 lbf.ft).
11. Remove support jack
12. Fit and secure differential breather pipe to clips on body.
13. Fit rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
14. Connect battery earth lead.

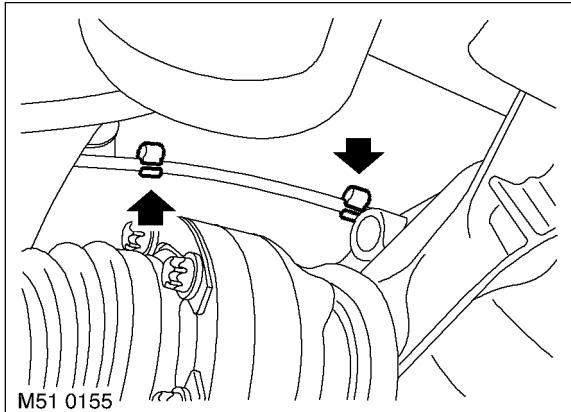
# FINAL DRIVE

## Bush - differential mounting - rear

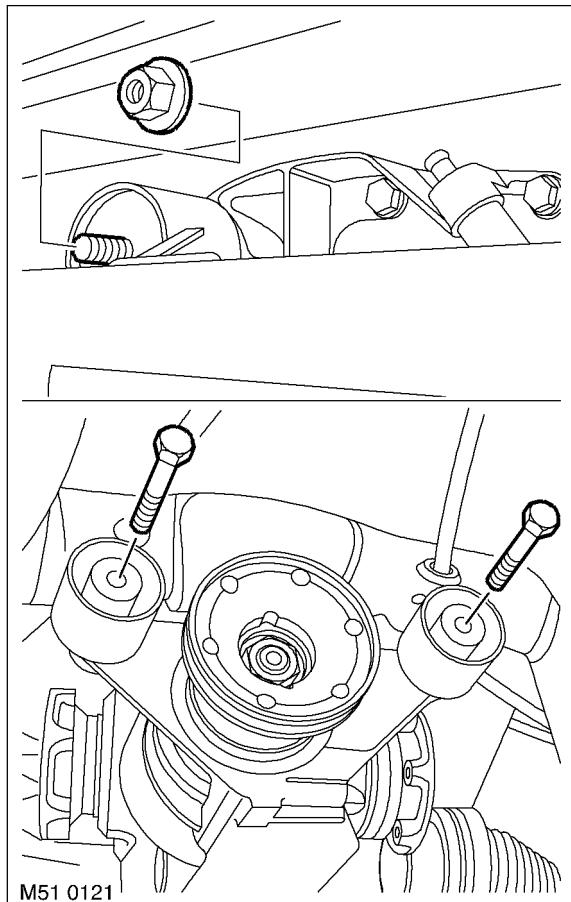
» **51.15.44**

### Remove

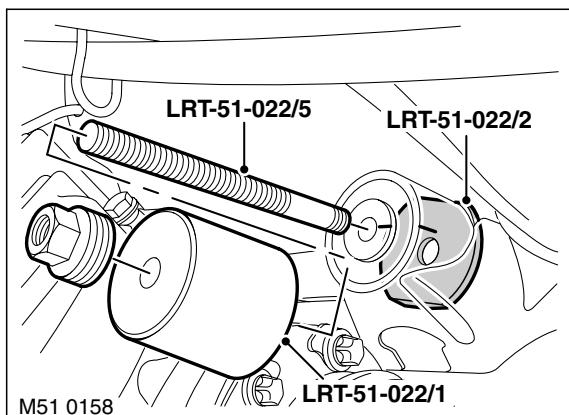
1. Raise vehicle on lift.
2. Disconnect battery earth lead.
3. Remove rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**



4. Release clips securing differential breather pipe to body.
5. Support rear differential on jack.



6. Remove 2 bolts and 1 nut and bolt securing differential to sub-frame mountings.
7. Carefully lower jack, allow differential and drive shafts to rest on lower suspension arms.
8. Rotate differential through approximately 135° for access and tie aside.
9. Note fitted position of bush and paint mark sub-frame.

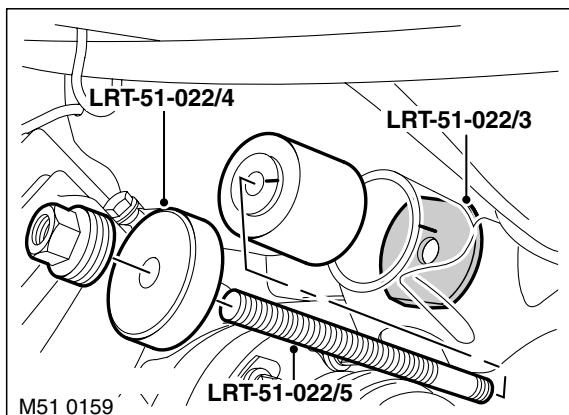


10. Fit new bolts securing differential to subframe and tighten bolts to 100 Nm (74 lbf.ft) and new rear nut and bolt to 165 Nm (121 lbf.ft).
11. Remove support jack
12. Fit and secure differential breather pipe to clips on body.
13. Fit rear propeller shaft.
  - DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
14. Connect battery earth lead.

10. Position **LRT-51-022/2** to sub-frame, fit **LRT-51-022/5** through the bush and screw to **LRT-51-022/2**.
11. Position **LRT-51-022/1** to **LRT-51-022/5**, fit nut to drawbar and finger tighten.
12. Remove bush from rear sub-frame.
13. Dismantle tool and recover bush.

#### Refit

1. Clean bush housing and mating faces.
2. Apply rubber lubricant to new bush and bore.



3. Position **LRT-51-022/3** to sub-frame.
4. Fit **LRT-51-022/5** to **LRT-51-022/3**.
5. Position new bush to **LRT-51-022/5**.
6. Fit **LRT-51-022/4** to **LRT-51-022/5** and finger tighten nut.
7. Fit bush to rear sub-frame.
8. Remove and dismantle tool.
9. Position jack and raise differential into position.

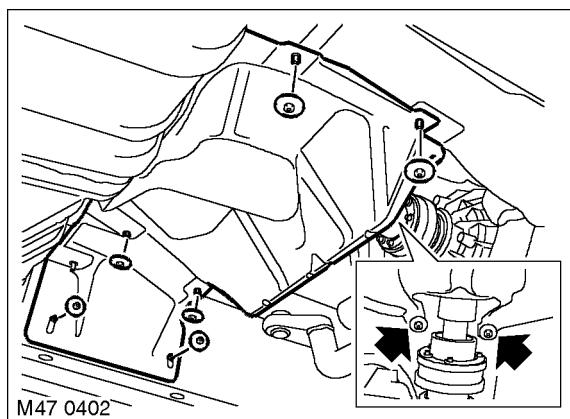
# FINAL DRIVE

## Oil seal - pinion

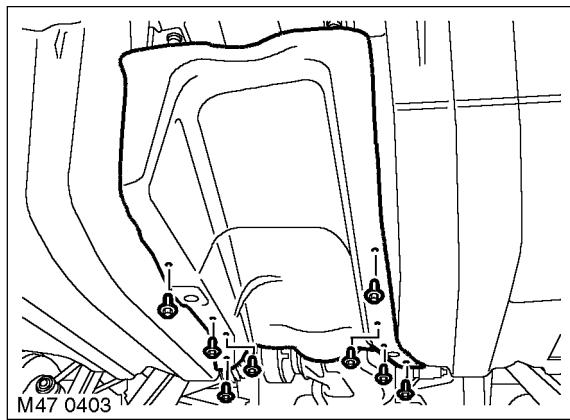
→ 51.20.01

### Remove

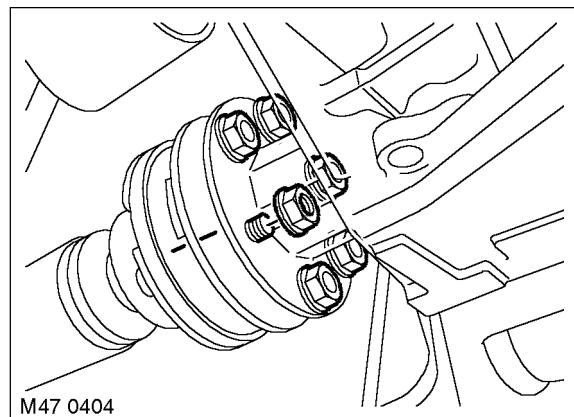
1. Raise vehicle on lift.
2. Remove exhaust system.  
→ **MANIFOLD AND EXHAUST SYSTEM**  
- Td6, REPAIR, Exhaust system and mountings.



3. Remove 8 nuts securing centre heat shield and remove shield.



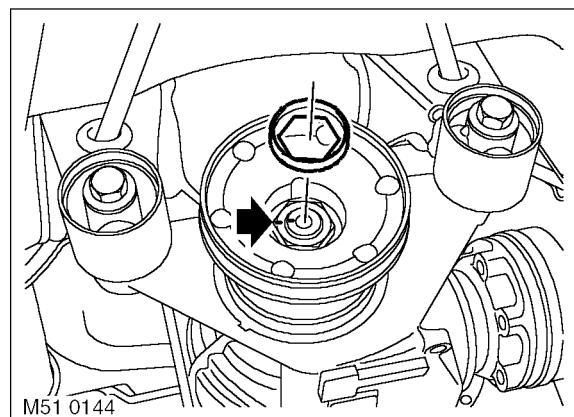
4. Remove 8 hexagonal headed screws securing fuel tank heat shield and remove shield.



5. Reference mark propeller shaft and differential to aid reassembly.
6. Remove 6 nuts securing propeller shaft to differential flange.



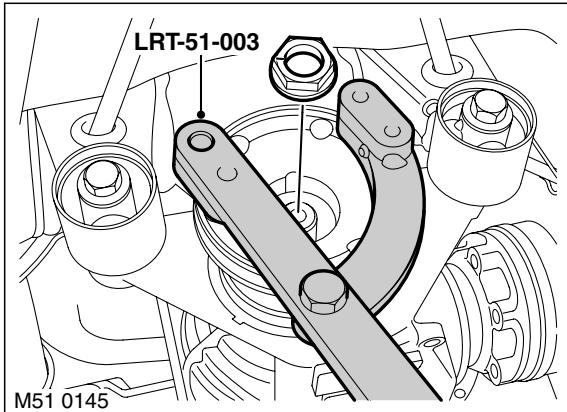
7. Remove 2 nuts securing propeller shaft support bearing, lower the propeller shaft, release flange from differential then temporarily support the bearing and secure with nuts.



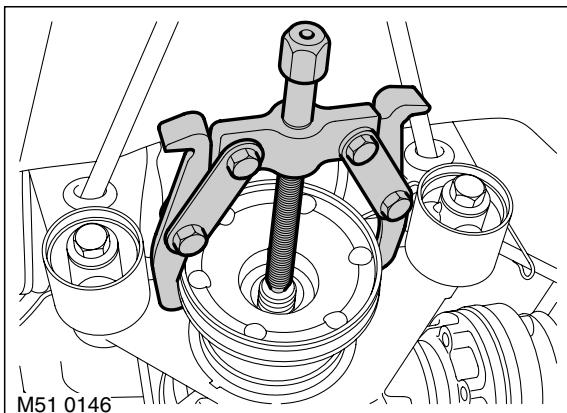
8. Remove and discard locking plate.



9. Reference mark pinion nut and pinion shaft to aid reassembly.



10. Using **LRT-51-003** restrain pinion flange and remove nut.  
11. Position container to collect oil spillage.

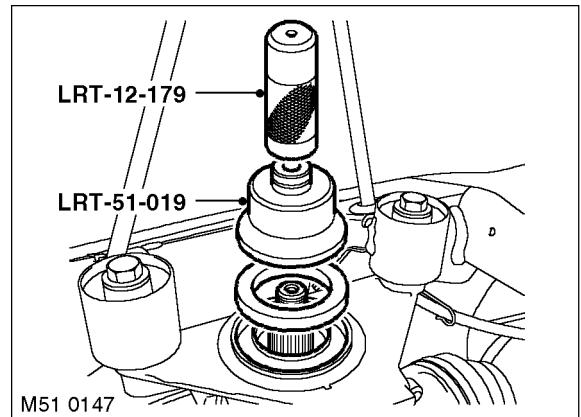


12. Using a two legged puller remove pinion flange.  
13. Carefully remove and discard oil seal, take care not to damage oil seal recess.

#### Refit

- Clean oil seal recess.
  - Using **LRT-12-179** with adapter **LRT-51-019**, fit new oil seal.
  - Clean pinion flange.
  - Fit pinion flange, fit nut, restrain flange using **LRT-51-003** and tighten nut to align reference marks.
- CAUTION: Do not tighten beyond reference marks.**
- Fit new locking plate.
  - Clean differential and propeller shaft flange mating faces.
  - Remove nuts securing support bearing, connect propeller shaft to differential flange and locate support bearing. Fit nuts securing support bearing but do not tighten at this stage.
  - Fit nuts securing propeller shaft to differential flange and tighten to 70 Nm (52 lbf.ft).
  - Tighten nuts securing propeller shaft support bearing to 21 Nm (15 lbf.ft).
  - Fit fuel tank heat shield and secure with screws.
  - Fit centre heat shield and secure with nuts.
  - Fit exhaust system.

- MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
- Top-up differential with oil.
  - FINAL DRIVE, ADJUSTMENTS, Rear differential - drain and refill.**



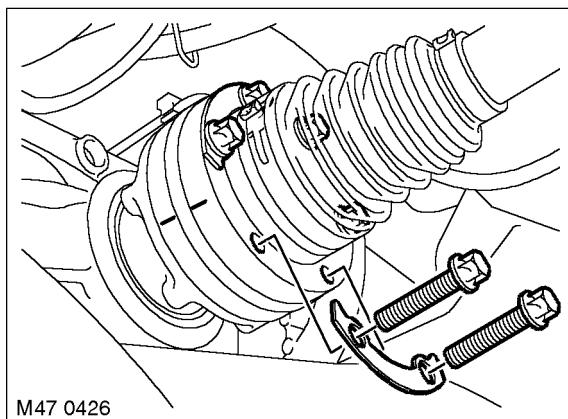
# FINAL DRIVE

## Oil seal - differential housing

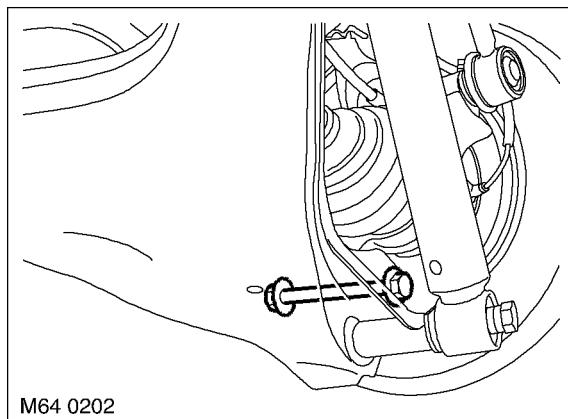
### 51.20.36

#### Remove

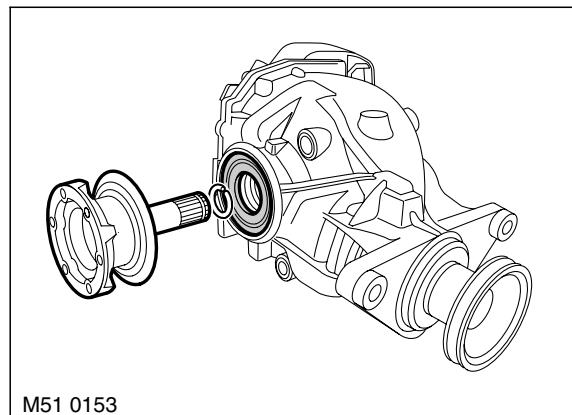
1. Raise rear of vehicle and support under body.  
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.
2. Remove road wheel.



3. Remove 6 bolts securing drive shaft to differential drive flange and collect 3 bolt plates. Discard bolts.
4. Position jack to support the lower arm.



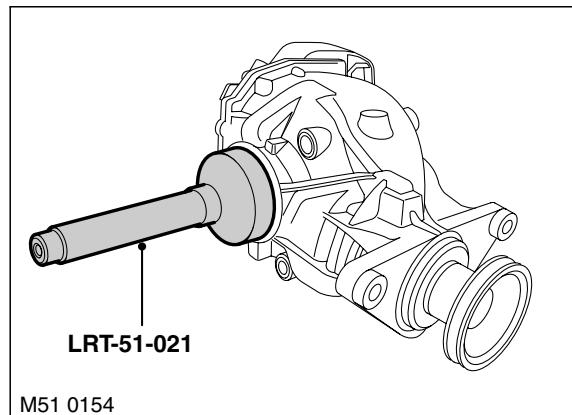
5. Remove nut and bolt securing lower arm to hub.
6. Lower support jack.
7. Release drive shaft from differential.
8. Position container to collect oil spillage.



9. Using a soft metal drift, release drive flange.
10. Remove drive flange.
11. Remove circlip from shaft and discard.
12. Carefully remove and discard oil seal, take care not to damage oil seal recess.

#### Refit

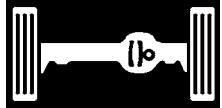
1. Clean oil seal recess.



2. Fit oil seal using **LRT-51-021**.
3. Clean drive flange and oil seal running surface.
4. Fit new circlip to shaft.
5. Lightly lubricate splines and oil seal running surface.

 **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**

6. Fit drive flange.  
**CAUTION:** Pull on drive flange to ensure circlip is fully engaged and retains flange.
7. Clean lower arm and hub mating faces.
8. Locate drive shaft to differential.
9. Align hub to lower arm, fit and lightly tighten nut and bolt.



10. Clean bolt plates, position plates, fit new bolts securing drive shaft to differential drive flange and tighten to 40 Nm (30 lbf.ft) plus a further 60°.
11. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
12. Remove stands and lower vehicle.
13. Tighten bolt securing lower arm to hub to 250 Nm (184 lbf.ft).
14. Top-up differential with oil.  
 **FINAL DRIVE, ADJUSTMENTS, Rear differential - drain and refill.**

## **FINAL DRIVE**

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## Front differential - drain and refill

### » 54.15.02

#### Drain

1. Position vehicle on lift.
2. Position container to catch spillage.
3. Clean area surrounding drain and level plugs.



4. Remove drain plug and collect fluid.

#### Refill

1. Apply sealant, Part No. STC 50552 to drain plug, fit and tighten to 65 Nm (48 lbf.ft).



2. Remove filler/level plug.
3. Fill differential using recommended lubricant, until a thread of oil runs from filler/level plug. Allow time for lubricant to find common level.  
☞ **CAPACITIES, FLUIDS,  
LUBRICANTS AND SEALANTS,  
Lubrication.**
4. Apply sealant, Part No. STC 50552 to filler/level plug, fit and tighten to 35 Nm (26 lbf.ft).

## **FRONT DIFFERENTIAL**

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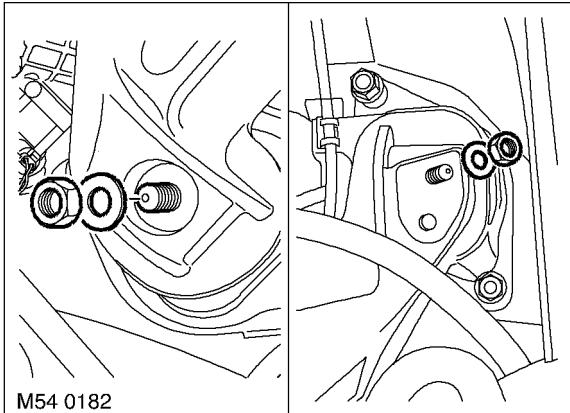


## Differential assembly - Td6

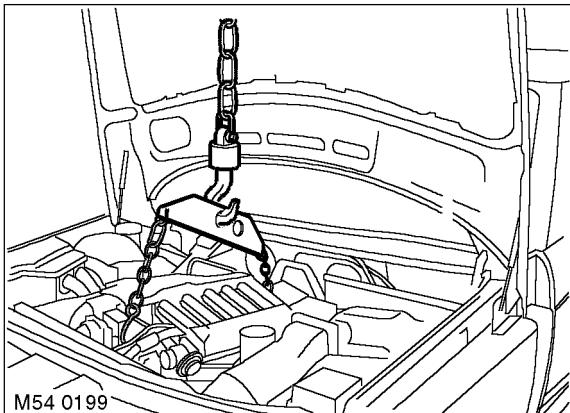
» 54.10.01

### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove cooling fan.  
☞ COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.
4. Remove air intake plenum.  
☞ HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.

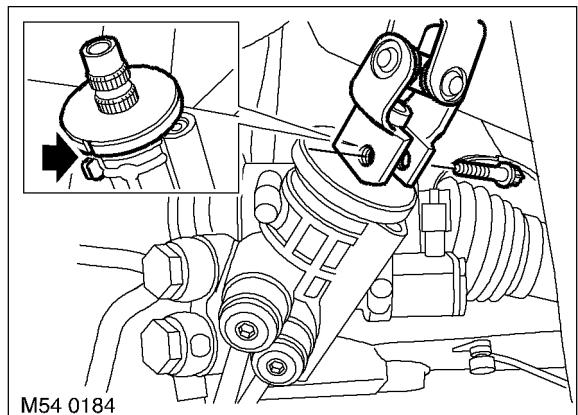


5. Remove 2 nuts securing engine brackets to mountings.



6. Fit LRT-12-216 to engine lifting eyes.
7. Connect chain to lifting bracket and take weight of engine.
8. Drain oil from differential.  
☞ FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.

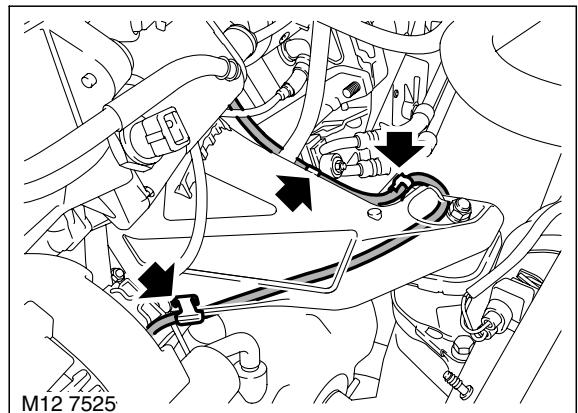
9. Remove front propeller shaft.  
☞ DRIVESHAFTS, REPAIRS, Propeller shaft - front.
10. Remove RH drive shaft seal.  
☞ DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.
11. Remove differential oil seal.  
☞ FRONT DIFFERENTIAL, REPAIRS, Oil seal - differential housing.



12. Remove Torx screw from steering column lower clamp.
13. Rotate steering wheel to straight ahead position, align pinion timing marks and remove ignition key.

**CAUTION: Do not turn the steering wheel with the intermediate shaft or universal joint disconnected as damage to the rotary coupler and the steering wheel switches may occur.**

14. Disconnect column from pinion.

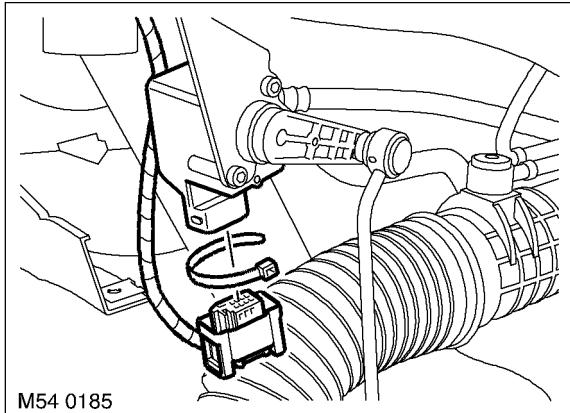


15. Release vacuum hose from 3 clips on engine LH mounting bracket.

## FRONT DIFFERENTIAL

16. Disconnect mounting vacuum supply hose from 'T' piece.

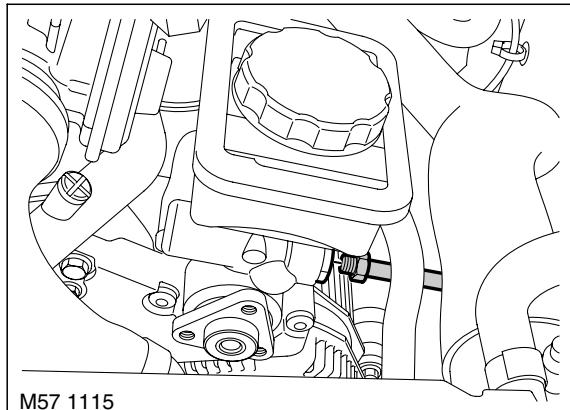
**CAUTION: Always fit plugs to open connections to prevent contamination.**



17. Note fitted position for refit then remove cable ties securing height sensor harness to sub frame and sensors.
18. Disconnect height sensor multiplugs.



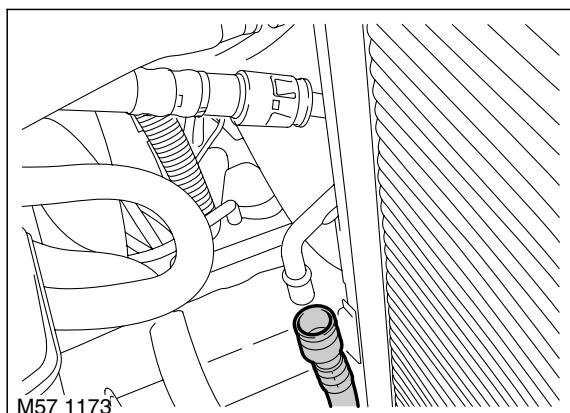
19. Disconnect multiplug from PAS rack pinion sensor.
20. Position container to collect PAS fluid spillage.



21. Loosen union nut, disconnect PAS outlet hose from pump and discard 'O' ring.

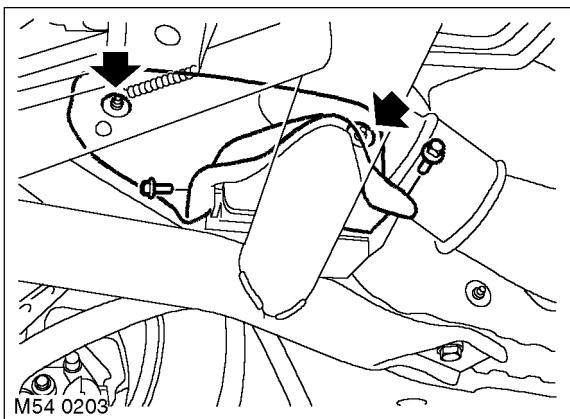
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

22. Remove nut securing PAS hose to mounting.

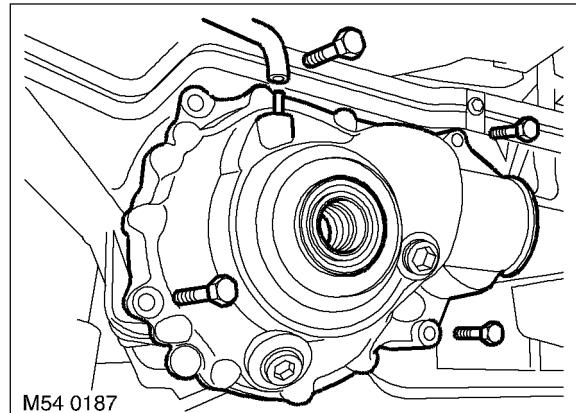


23. Release and disconnect PAS return hose from fluid cooler.

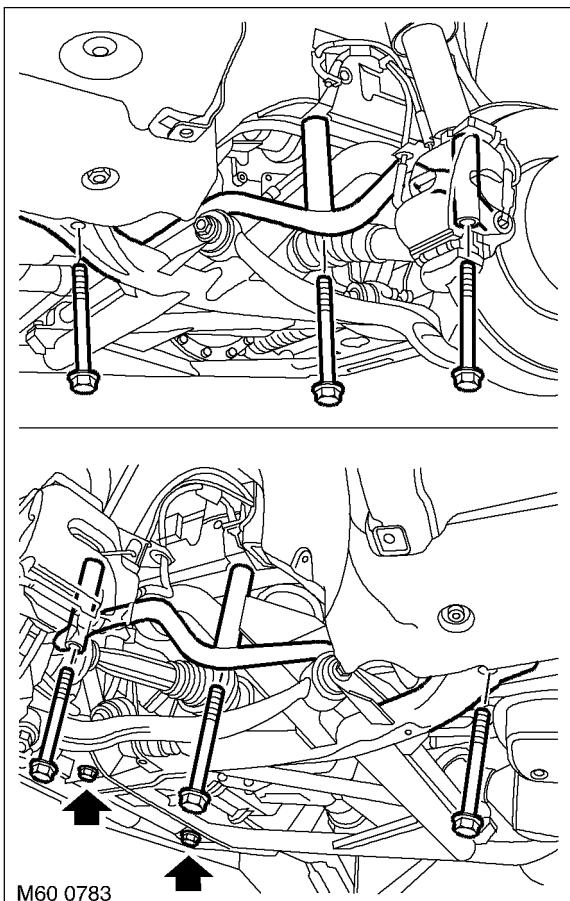
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**



- 24.** Remove 2 speed nuts securing each anti-roll bar heat shield to body and 2 bolts securing each heat shield to sub-frame. Remove heat shields.  
**25.** Use a transmission jack to support the sub frame.



- 28.** With assistance, lower and remove sub-frame assembly.  
**29.** Disconnect breather hose from differential.  
**30.** Remove 4 bolts securing differential and with assistance, remove differential. Remove and discard 'O' ring.



- 26.** Remove 6 bolts securing sub-frame.  
**27.** Remove 2 bolts securing sub-frame to cross member.

#### Refit

1. Clean differential and mating face.
2. Fit new 'O' ring to differential housing and lubricate with petroleum jelly.
3. With assistance, carefully fit differential. Fit bolts, but do not tighten at this stage.
4. Align differential to transfer box front output flange. See Technical Bulletin, Final Drive section, No: 0014
5. Tighten differential fixing bolts to 110 Nm (81 lbf.ft).
6. Connect breather hose to differential.
7. Clean sub-frame and body mating faces.
8. With assistance, fit sub-frame assembly.
9. Tighten 6 bolts securing sub-frame to body to 165 Nm (122 lbf.ft). Tighten 2 rear bolts a further 90°.
10. Tighten 2 bolts securing sub-frame to front cross member to 132.5 Nm (97 lbf.ft).
11. Fit anti-roll bar heat shields to body and tighten 2 bolts and speed nuts.
12. Lower engine onto mountings.
13. Tighten nuts securing engine brackets to mountings to 100 Nm (74 lbf.ft).
14. Clean PAS hose connections.
15. Connect PAS hose to cooler.
16. Fit new 'O' ring to PAS hose union, connect hose to pump and tighten nut to 25 Nm (18 lbf.ft).
17. Connect PAS hose to mounting and tighten nut to 10 Nm (7 lbf.ft).
18. Connect multiplug to PAS rack pinion sensor.
19. Connect height sensor multiplugs.
20. Correctly position height sensor harness and secure with cable ties.

## FRONT DIFFERENTIAL

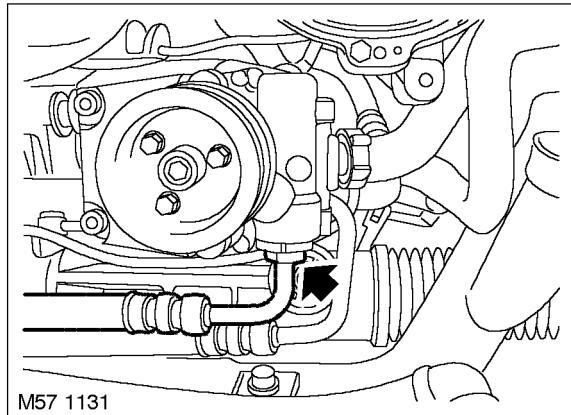
21. Connect vacuum hoses to 'T' piece and fit hoses to clips.
22. Ensure pinion timing marks are aligned and connect column to PAS rack. Fit and tighten clamp screw to 24 Nm (18 lbf.ft).
23. Fit differential oil seal.  
 **FRONT DIFFERENTIAL, REPAIRS, Oil seal - differential housing.**
24. Fit RH drive shaft seal.  
 **DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.**
25. Fit front propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**
26. Fill differential to correct level with oil.  
 **FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.**
27. Fit undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
28. Fit air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.**
29. Fit cooling fan.  
 **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
30. Connect battery earth lead.
31. Bleed PAS system.  
 **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
32. Check and if necessary adjust wheel alignment.  
 **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

## Differential assembly - V8

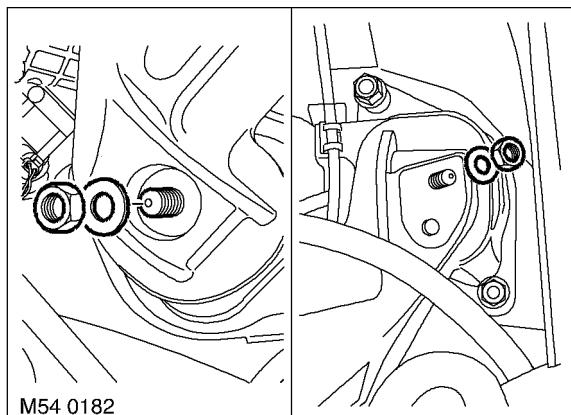
### 54.10.01

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.**
4. Remove viscous fan.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**



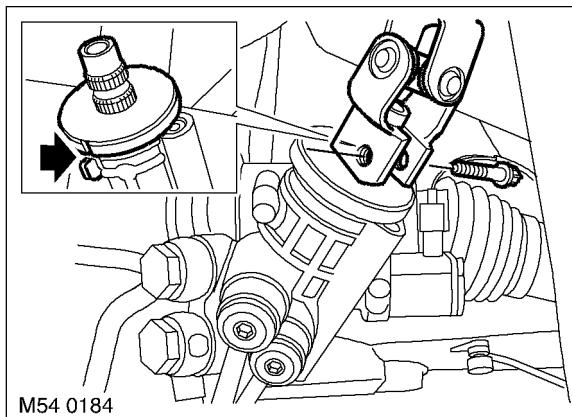
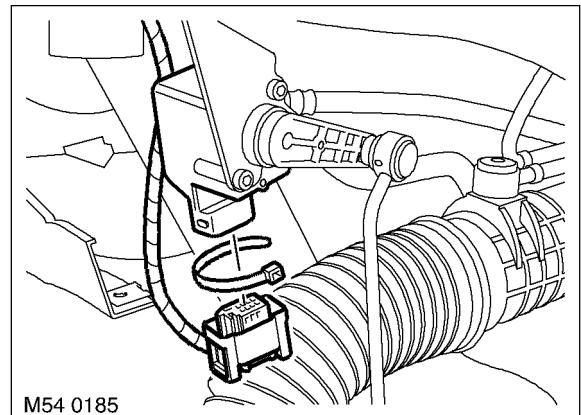
5. Place container beneath PAS pump, remove pipe union and allow fluid to drain. Plug connections.
6. Discard 'O' ring from PAS pipe.



7. Remove 2 nuts securing engine brackets to mountings.
8. Connect chain to lifting bracket and take weight of engine.



9. Drain oil from differential.  
☞ **FRONT DIFFERENTIAL,  
ADJUSTMENTS, Front differential - drain  
and refill.**
10. Remove front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller  
shaft - front.**
11. Remove RH drive shaft seal.  
☞ **DRIVESHAFTS, REPAIRS, Seal -  
drive shaft - front - RH.**
12. Remove differential oil seal.  
☞ **FRONT DIFFERENTIAL, REPAIRS,  
Oil seal - differential housing.**



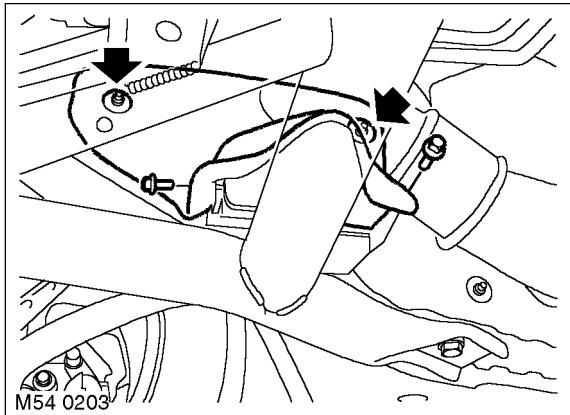
13. Remove Torx bolt from steering column lower clamp.
14. Rotate steering wheel to straight ahead position, align pinion timing marks and remove ignition key.  
**CAUTION: Do not turn the steering wheel with the intermediate shaft or universal joint disconnected as damage to the rotary coupler and the steering wheel switches may occur.**
15. Disconnect column from pinion.

16. Note fitted position for refit then remove cable ties securing height sensor harness to sub frame and sensors.
17. Disconnect height sensor multiplugs.

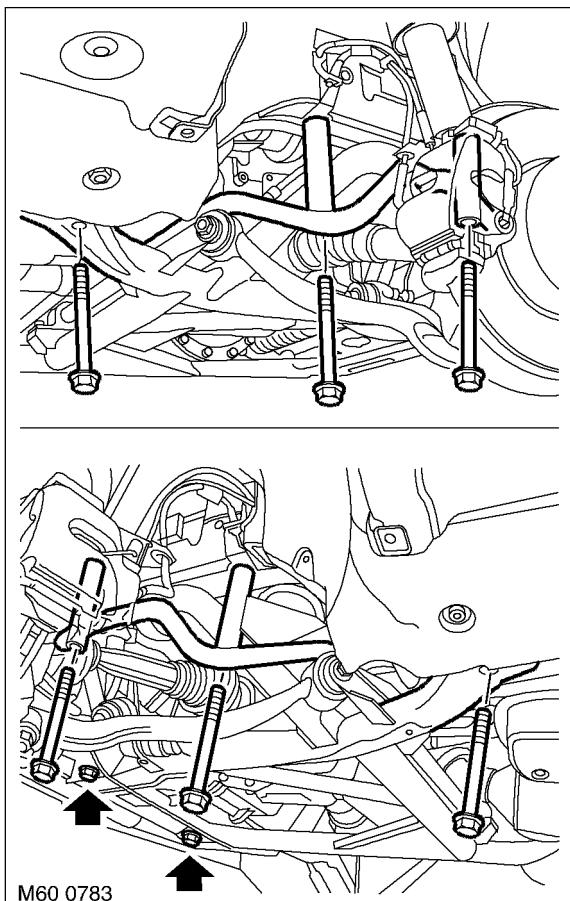


18. Disconnect multiplug from PAS rack pinion sensor.

## FRONT DIFFERENTIAL

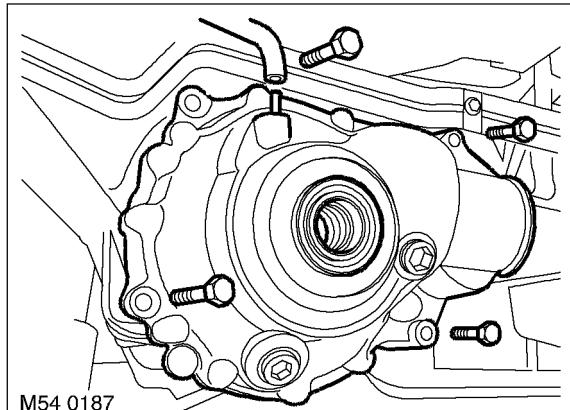


19. Remove 2 speed nuts securing each anti-roll bar heatshield to body and 2 bolts securing each heatshield to sub-frame. Remove heatshields.
20. Use a transmission jack to support the sub frame.



21. Remove 6 bolts securing sub-frame. Remove 2 bolts securing sub-frame to cross member (bolts arrowed).

22. With assistance, lower and remove sub-frame assembly.



23. Remove differential breather hose. Remove 4 differential securing bolts and with assistance, remove differential. Discard 'O' ring.  
*NOTE: Securing bolt above pinion remains captive to differential.*

### Refit

1. Clean differential and mating face.
2. Fit new 'O' ring to differential housing and lubricate with petroleum jelly.
3. With assistance, carefully fit differential. Fit bolts, but do not tighten at this stage.
4. Align differential to transfer box front output flange. See Technical Bulletin, Final Drive section, No: 0014
5. Tighten differential fixing bolts to 110 Nm (81 lbf.ft).
6. Connect breather hose to differential.
7. Clean sub-frame and body mating faces.
8. With assistance, fit sub-frame assembly.
9. Tighten 6 bolts securing sub-frame to body to 165 Nm (122 lbf.ft). Tighten 2 rear bolts a further 90°.
10. Tighten 2 bolts securing sub-frame to front cross member to 132.5 Nm (97 lbf.ft).
11. Fit anti-roll bar heatshields to body and tighten 2 bolts and speed nuts.
12. Lower engine onto mountings.
13. Tighten nuts securing engine brackets to mountings to 100 Nm (74 lbf.ft).
14. Connect multiplug to PAS rack pinion sensor.
15. Connect height sensor multiplugs.
16. Correctly position height sensor harness and secure with cable ties.
17. Clean PAS pump and pipe union.
18. Fit new 'O' ring to high pressure pipe, align to PAS pump and tighten union to 25 Nm (18 lbf.ft).



## FRONT DIFFERENTIAL

19. Check alignment and connect column to PAS rack. Fit and tighten new clamp bolt to 24 Nm (18 lbf.ft).
20. Fit differential oil seal.  
☞ **FRONT DIFFERENTIAL, REPAIRS, Oil seal - differential housing.**
21. Fit RH drive shaft seal.  
☞ **DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.**
22. Fit front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**
23. Fill differential to correct level with oil.  
☞ **FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.**
24. Fit viscous fan.  
☞ **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
25. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.**
26. Connect battery earth lead.
27. Bleed PAS system.  
☞ **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
28. Check and if necessary adjust wheel alignment.  
☞ **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

### Oil seal - differential housing

☞ **54.10.18**

#### Remove

1. Disconnect battery earth lead.
2. Raise front of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

3. Remove road wheel.
4. Remove brake disc.  
☞ **BRAKES, REPAIRS, Brake disc - front.**

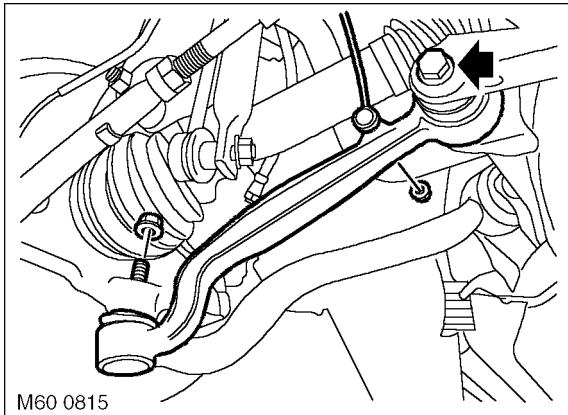


5. Release ABS sensor lead from clip.

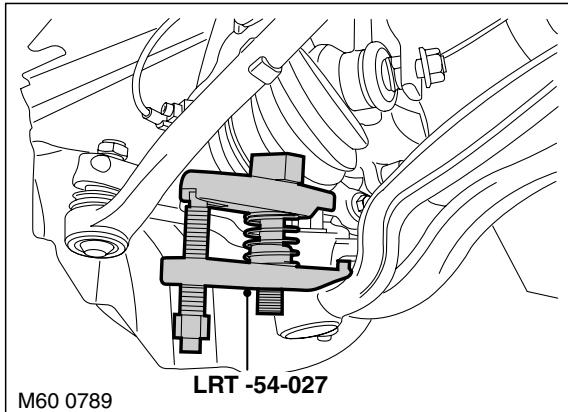


6. Release sensor lead from damper, remove Allen screw and release ABS sensor from hub.

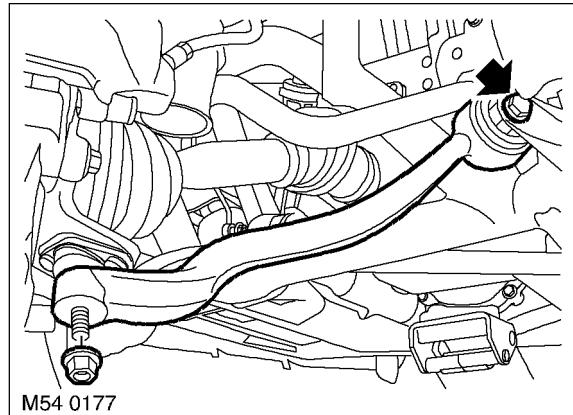
## FRONT DIFFERENTIAL



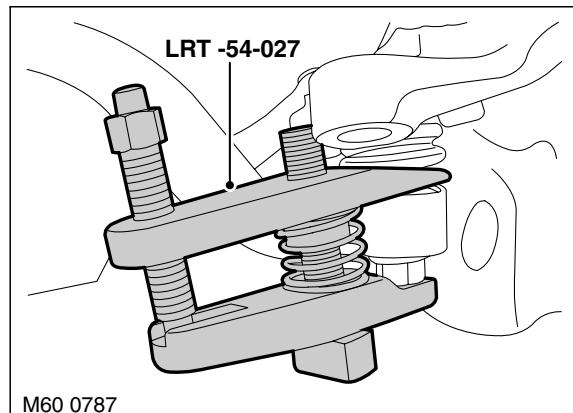
7. Remove nut securing height sensor link to lower arm and release link.  
**CAUTION:** Use an open ended spanner on flats provided to prevent ball joint rotating.
8. Loosen bolt securing lower arm to subframe one quarter of a turn.
9. Remove nut securing lower arm ball joint to hub.



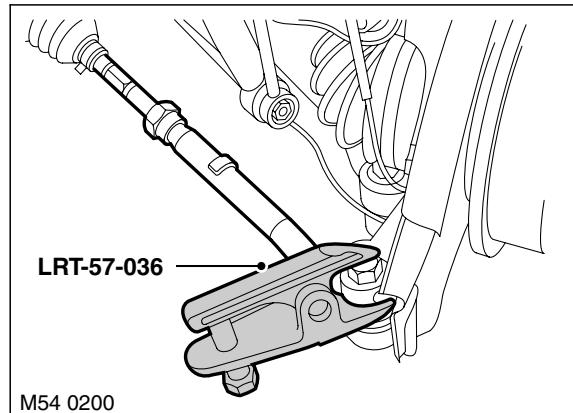
10. Using **LRT-54-027** release lower arm ball joint and disconnect lower arm from hub.  
**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



11. Loosen bolt securing tie rod to subframe one quarter of a turn.
12. Remove nut securing tie rod to ball joint.



13. Using **LRT-54-027** release tie rod from ball joint  
**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



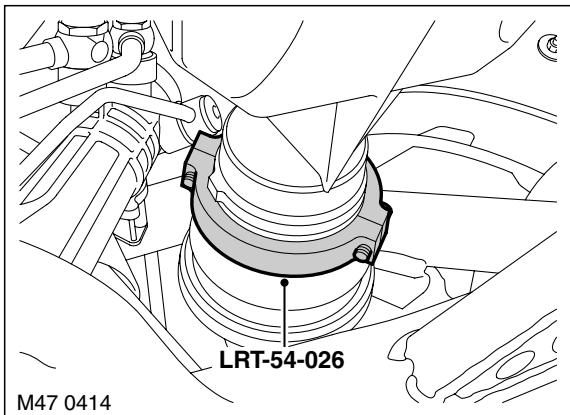
14. Remove and discard nut securing track rod ball joint to steering arm.



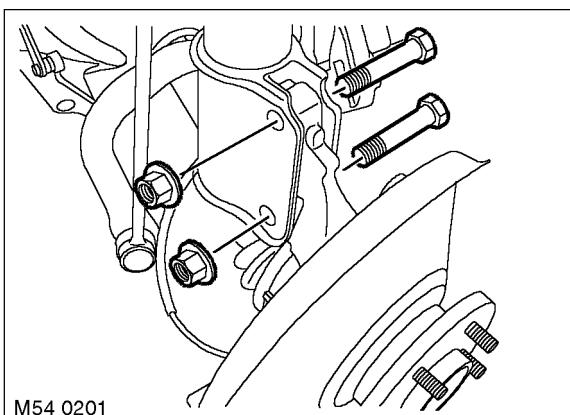
15. Fit an M14 nut to ball pin, flush with end of pin.
16. Using **LRT-57-036** separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.

**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.

17. Position container to collect oil spillage.



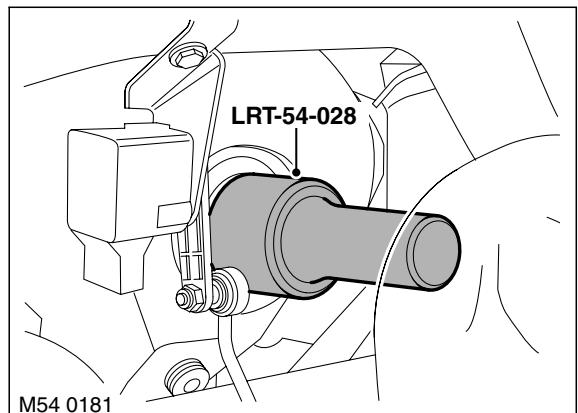
18. Fit **LRT-54-026** to drive shaft inboard joint.
19. Using levers, release drive shaft from differential.



20. Remove 2 nuts and bolts securing hub to damper.
21. With assistance, remove hub and drive shaft assembly.
22. Remove and discard shaft retaining clip.
23. Carefully remove oil seal from differential housing, discard oil seal.

#### Refit

1. Clean oil seal register.



2. Use **LRT-54-028** to fit new oil seal.
3. Clean end of drive shaft.
4. Lubricate lip of oil seal with differential oil.  
☞ **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
5. Fit new circlip to drive shaft.
6. Lightly lubricate splines and oil seal running surface.  
☞ **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
7. With assistance, position hub and drive shaft assembly. Carefully fit drive shaft through seal, remove seal protector and push drive shaft fully home to engage retaining clip.
8. Align hub to damper and tighten nuts and bolts to 250 Nm (184 lbf.ft).
9. Clean ball joint tapers and taper seats.
10. Connect ball joint to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
11. Connect tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).
12. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).
13. Connect height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).  
**CAUTION:** Ensure height sensor arm is pointing outwards.
14. Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.  
☞ **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
15. Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).
16. Secure sensor lead to damper.
17. Fit front brake disc.  
☞ **BRAKES, REPAIRS, Brake disc - front.**

## FRONT DIFFERENTIAL

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18. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).

19. Remove stands and lower vehicle.

20. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft), plus a further 90°.

21. Top-up differential with oil.



**FRONT DIFFERENTIAL,  
ADJUSTMENTS, Front differential - drain  
and refill.**

22. Connect battery earth lead.

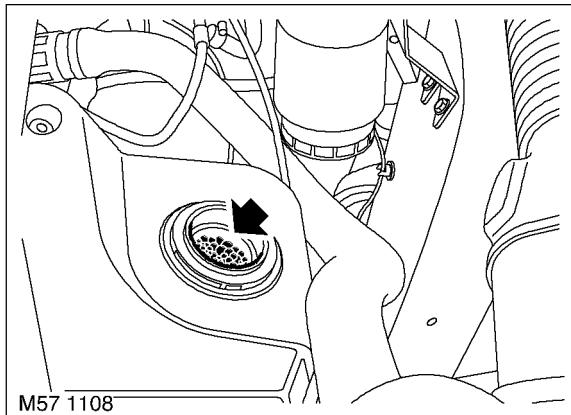


## Power assisted steering (PAS) system - bleed

» 57.15.02

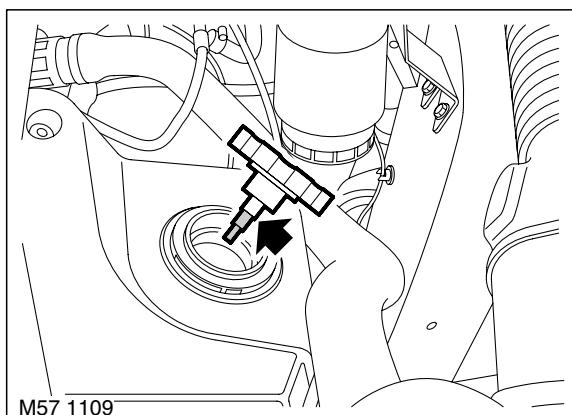
### Check

- Clean PAS fluid reservoir around filler cap and fluid level indicators.



- Check power steering fluid, if aerated, wait until fluid is free from bubbles then top-up reservoir to 'UPPER' level mark with recommended fluid.
- Fit reservoir filler cap.

### Bleed



- Remove filler cap from reservoir and fill to 'UPPER' level mark with recommended fluid. Fluid must always be present in reservoir during bleeding.
- Start engine and allow to run at idle for 10 seconds. Stop engine.
- Top-up steering fluid reservoir.
- Start engine and turn steering fully to LH and RH locks. Stop engine.
- Top-up steering fluid reservoir.

- Start and run engine for 2 minutes, turn steering fully to RH and LH locks.
- CAUTION: Do not hold steering at full lock for longer than 10 seconds.**

# STEERING

## Front wheel alignment - check & adjust

### » 57.65.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

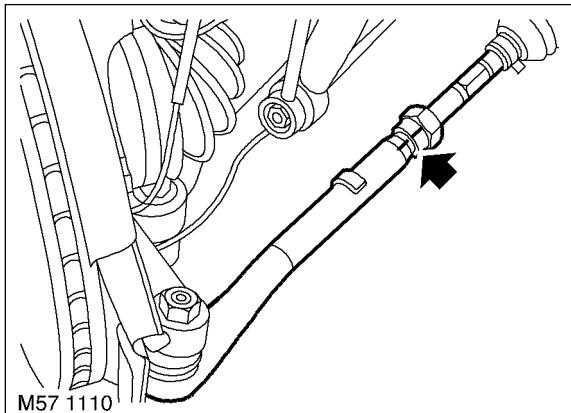
#### Check

1. Ensure tyre pressures are correct and vehicle is at correct ride height.
2. Roll vehicle backwards and forwards to relieve stresses in steering and suspension.
3. Ensure that wheel alignment equipment is properly calibrated.

*NOTE: Only use four wheel alignment equipment recommended for use by Land Rover.*

4. Check and if necessary adjust wheel alignment.

#### Adjust



1. Disconnect battery earth lead.
2. Mark position of steering ball joints for reference.
3. Loosen track rod end locknut.
4. Adjust by rotating track rod using hexagon on shaft. Do not allow gaiter to twist.  
**CAUTION: Both track rods must be rotated an equal amount.**
5. Recheck front wheel alignment.
6. Tighten track rod end locknut to 55 Nm (40 lbf.ft).
7. Connect battery earth lead.

## Steering geometry

### » 57.65.02

A change in camber means a change in toe, therefore camber must always be adjusted first.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

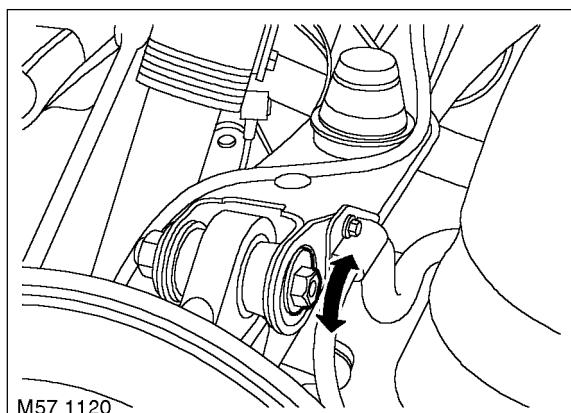
#### Check

1. Check steering joints, suspension joints and wheel bearings for wear or free play. Adjust or repair as required.
2. Ensure tyre pressures are correct and vehicle is at correct ride height.
3. Roll vehicle backwards and forwards to relieve stresses in steering and suspension.
4. Ensure that wheel alignment equipment is properly calibrated.

*NOTE: Only use four wheel alignment equipment recommended for use by Land Rover.*

#### Adjust

1. Disconnect battery earth lead.
2. Observe readings from test equipment and adjust geometry as required.  
 **GENERAL DATA, Steering.**
3. Rear wheel alignment adjust:
4. Adjusting camber:

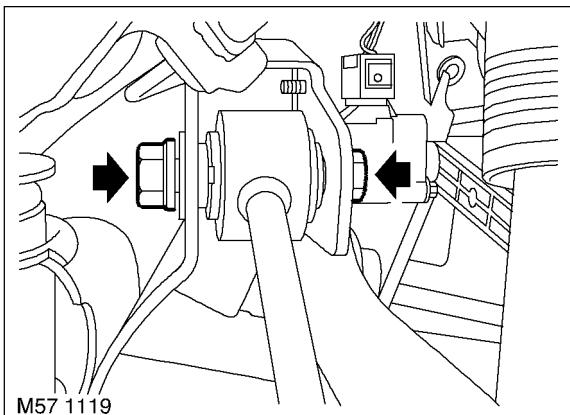


5. Loosen upper ball joint nut approximately 3/4 of a turn.
6. Turn eccentric and adjust camber to specified value.
7. Tighten nut securing upper ball joint to hub to 165 Nm (121 lbf.ft).



8. Repeat procedure for other side.

9. Adjusting toe:



10. Loosen nut securing tie rod approximately 3/4 of a turn.

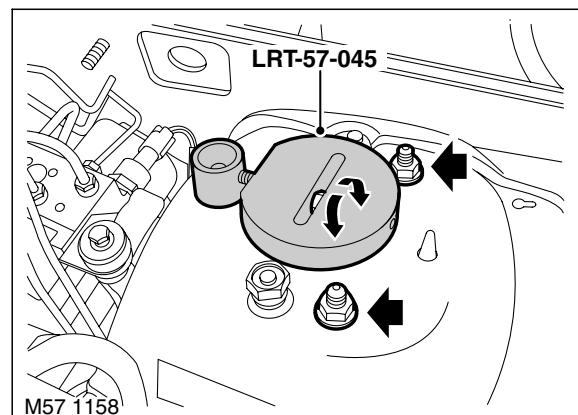
11. Turn eccentric and adjust toe to specified value.

12. Tighten nut securing tie rod to sub frame to 165 Nm (121 lbf.ft).

13. Repeat procedure for other side.

14. Front wheel alignment adjust:

15. Adjusting camber:



19. Fit LRT-57-045 to damper upper mounting.

20. Loosen remaining nuts securing damper upper mounting.

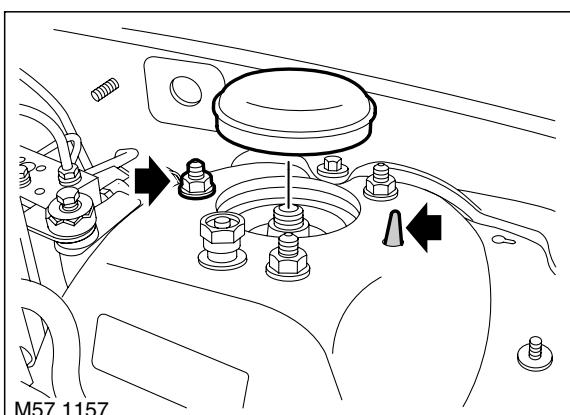
21. Adjust camber to specified value by turning nut in LRT-57-045.

22. Tighten damper upper mounting nuts to 56 Nm (40 lbf.ft).

23. Repeat procedure for other side.

24. Adjusting toe:

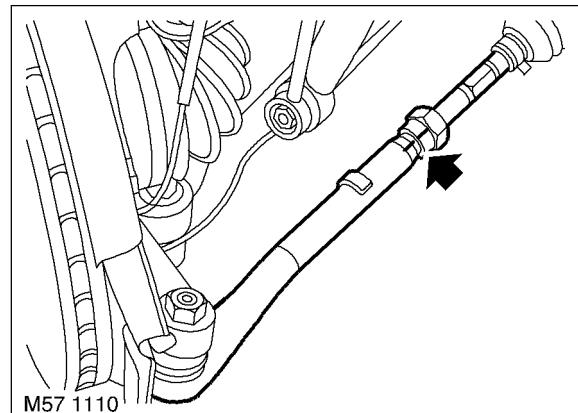
25. Set steering to straight ahead position and ensure pinion timing marks are aligned.



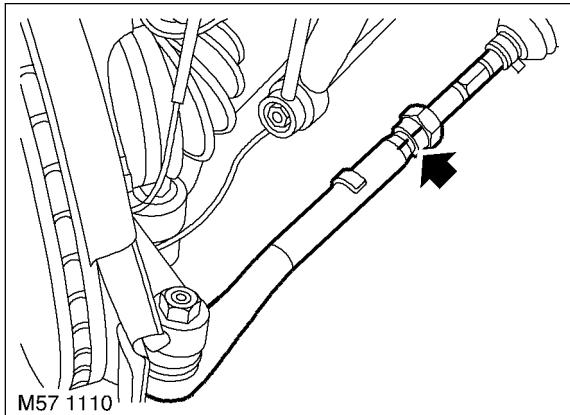
16. Remove cap from top mounting.

17. Break off locating pin.

18. Loosen nut securing damper upper mounting.



26. Mark position of steering ball joints for reference.



27. Loosen track rod end locknut.
28. Adjust by rotating track rod using hexagon on shaft. Do not allow gaiter to twist.  
**CAUTION: Both track rods must be rotated an equal amount.**
29. Recheck front wheel alignment.
30. Tighten track rod end locknut to 55 Nm (40 lbf.ft).
31. Connect battery earth lead.

## Power steering pressure test - Td6

### » 57.90.10.01

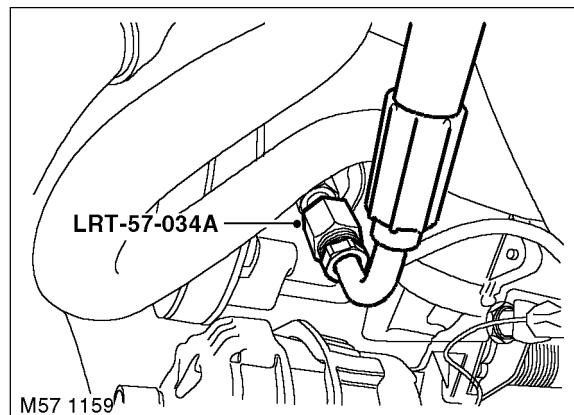
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

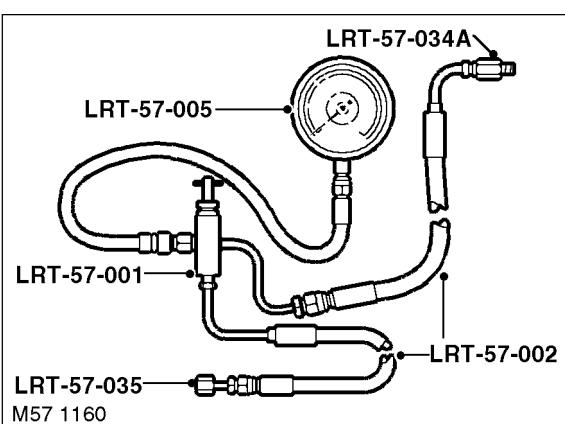
### Check

1. Disconnect battery earth lead.
2. Siphon PAS fluid from reservoir.
3. Position absorbent cloth to catch spillage.
4. Loosen union securing high pressure pipe to PAS pump and release pipe.

**CAUTION: Care must be taken to ensure that oil or fluid does not enter or contaminate the alternator.**



5. Fit adaptor **LRT-57-034A** to high pressure port of PAS pump.



6. Fit adaptor **LRT-57-035** to existing high pressure hose.
7. Fit hose **LRT-57-002** to each adaptor.
8. Fit pressure gauge **LRT-57-005** to test valve **LRT-57-001**
9. Connect hoses **LRT-57-002** to **LRT-57-001** and tighten unions.
10. Connect battery earth lead.
11. Ensure steering system and test equipment are free from leaks.
12. Maintain maximum fluid level during test.
13. With the test valve open, start the engine.
14. With the engine at idle, slowly turn the steering wheel and hold on full lock.
15. Repeat procedure for other lock.
16. Record pressure reading.
17. With the engine at idle, release the steering wheel. Pressure should read below 7 bar.
18. Pressures outside the above tolerance indicates a fault.
19. To determine if fault is in steering pump or steering rack, close the test valve for a maximum of 5 seconds.

**CAUTION: Pump damage will occur if test valve is closed for longer periods.**

20. If figures recorded fall outside the values given in **General Data**, replace the PAS pump.
21. If maximum pump pressure is correct, suspect the steering rack.
22. On completion stop engine, disconnect battery earth lead and siphon fluid from PAS reservoir.
23. Dismantle test equipment.
24. Clean PAS pump and pipe union.
25. Fit new 'O' ring to high pressure pipe, align to PAS pump and tighten union to 25 Nm.
26. Connect battery earth lead.
27. Refill and bleed PAS system.

**STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**

## Power steering pressure test - V8

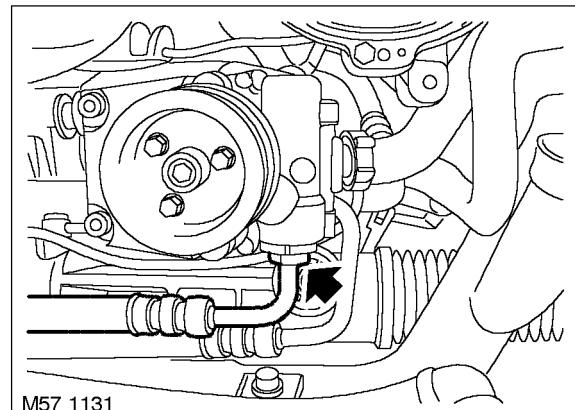
### 57.90.10.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

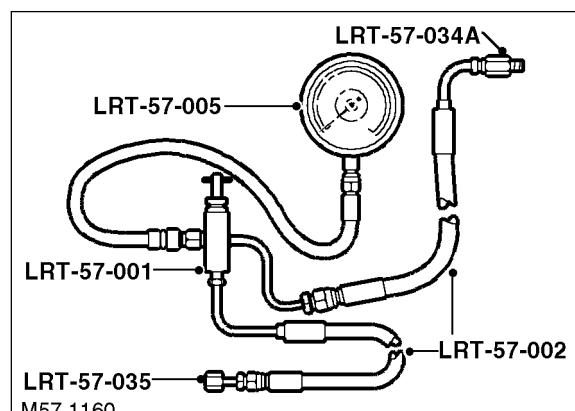
**GENERAL INFORMATION, Electrical Precautions.**

#### Check

1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Siphon PAS fluid from reservoir.
  4. Remove undertray.
- EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
5. Position a suitable container below PAS pump.



6. Loosen union nut, disconnect PAS outlet hose from pump and discard 'O' ring.



7. Fit adaptor **LRT-57-034A** to high pressure port of PAS pump.
8. Fit adaptor **LRT-57-035** to existing high pressure hose.

## STEERING

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9. Fit hose **LRT-57-002** to each adapter.
10. Fit pressure gauge **LRT-57-005** to test valve **LRT-57-001**
11. Connect hoses **LRT-57-002** to **LRT-57-001** and tighten unions.
12. Connect battery earth lead.
13. Ensure steering system and test equipment are free from leaks.
14. Maintain maximum fluid level during test.
15. With the test valve open, start the engine.
16. With the engine at idle, slowly turn the steering wheel and hold on full lock.
17. Repeat procedure for other lock.
18. Record pressure reading.
19. With the engine at idle, release the steering wheel. Pressure should read below 7 bar.
20. Pressures outside the above tolerance indicates a fault.
21. To determine if fault is in steering pump or steering rack, close the test valve for a maximum of 5 seconds.

**CAUTION: Pump damage will occur if test valve is closed for longer periods.**

22. If figures recorded fall outside the values given in **General data**, replace the PAS pump.
23. If maximum pump pressure is correct, suspect the steering rack.
24. On completion stop engine, disconnect battery earth lead and siphon fluid from PAS reservoir.
25. Dismantle test equipment.
26. Clean PAS pump and pipe union.
27. Fit new 'O' ring to high pressure outlet pipe union, align to PAS pump and tighten PAS pump high pressure pipe union to 25 Nm (18 lbf.ft).
28. Remove container from below PAS pump.
29. Dispose of PAS fluid and clean container.
30. Connect battery earth lead.
31. Refill and bleed PAS system.  
 **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
32. Fit undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**



## Power steering rack - left hand drive - Td6

### 57.10.01

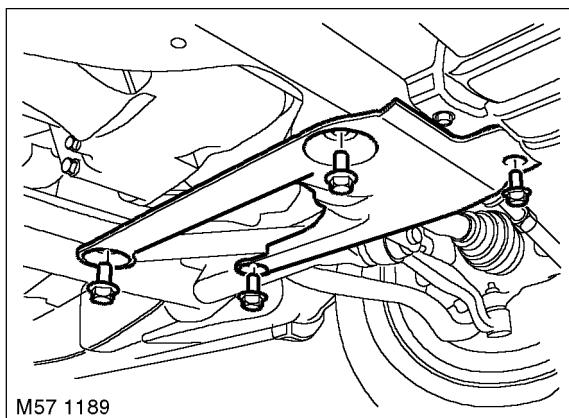
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

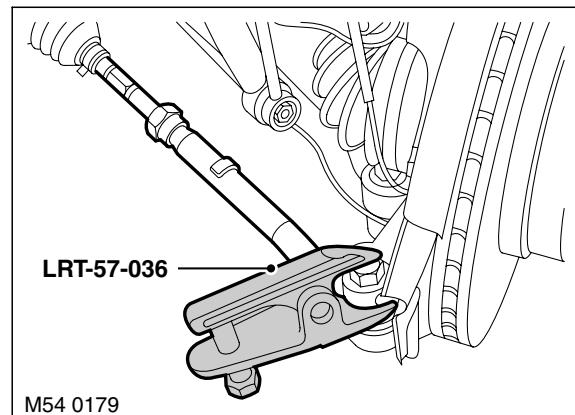
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Raise front of vehicle and support under body.
4. Remove front road wheels.
5. Remove undertray.

**EXTERIOR FITTINGS, REPAIRS, Undertray - front.**



6. Remove 4 bolts securing the air flow panel and remove panel.
7. Remove LH drive shaft.

**DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**



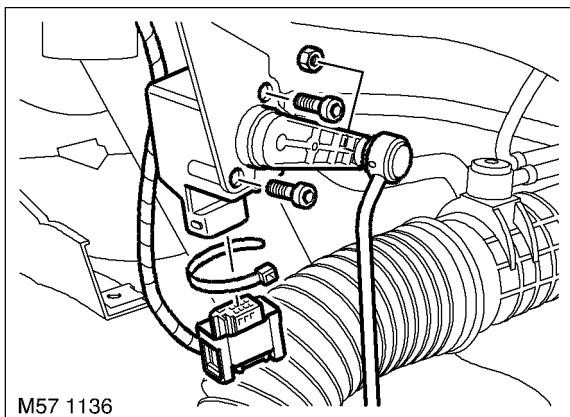
8. Remove and discard nut securing RH track rod ball joint to steering arm.
9. Fit an M14 nut to ball pin, flush with end of pin.
10. Using **LRT-57-036** separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.

**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**

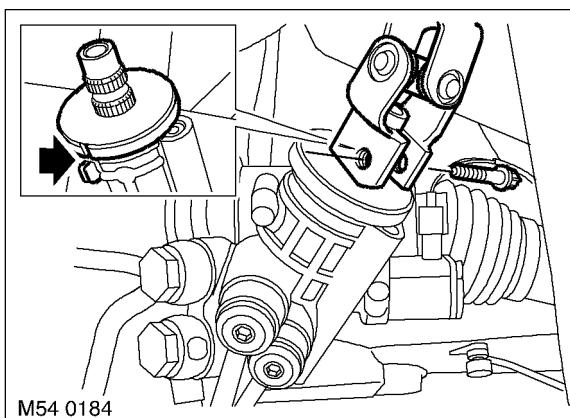


11. Remove 2 nuts securing links to anti-roll bar and disconnect links.

## STEERING



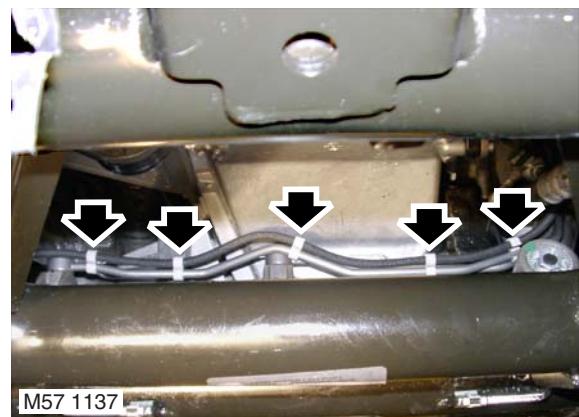
12. Note fitted position for refit and remove cable ties securing LH height sensor harness to subframe and sensor.
13. Disconnect height sensor multiplug.
14. Remove 2 bolts securing height sensor and remove height sensor.



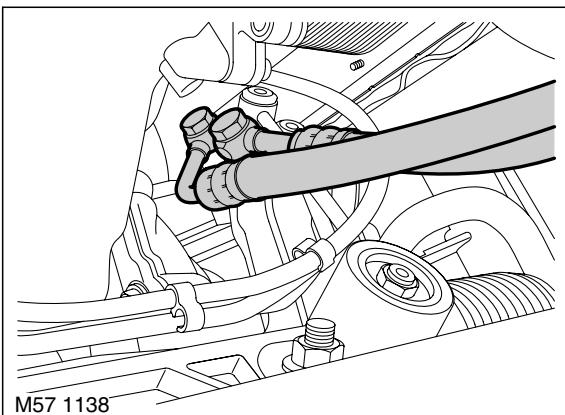
15. Remove Torx screw from steering column lower clamp.
16. Rotate steering wheel to straight ahead position, align pinion timing marks and remove ignition key.  
**CAUTION: Do not turn the steering wheel with the intermediate shaft or universal joint disconnected as damage to the rotary coupler and the steering wheel switches may occur.**

17. Disconnect column from pinion.

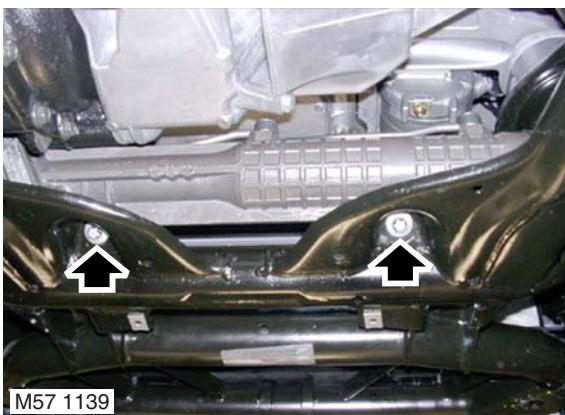
18. Disconnect multiplug from PAS rack pinion sensor.



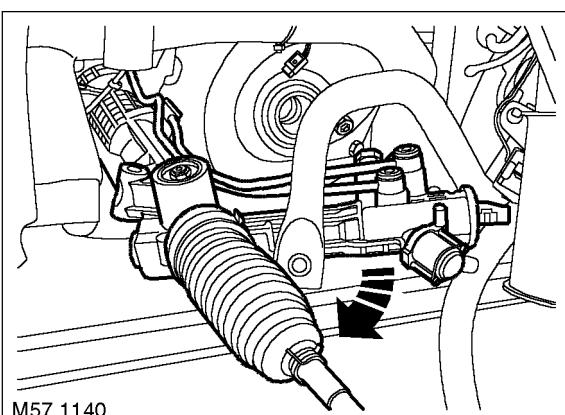
19. Release 5 clips securing engine mounting vacuum hose to PAS rack.
20. Position container to collect PAS fluid spillage.  
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**



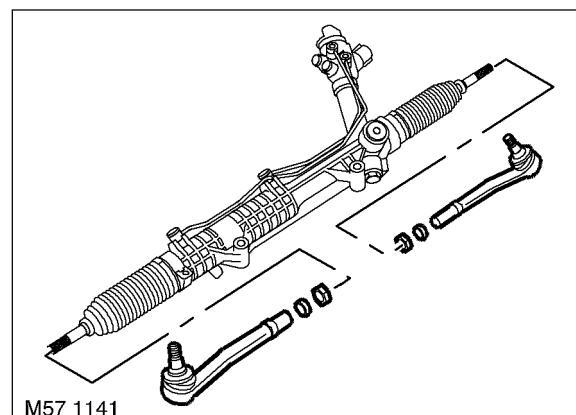
- 21.** Note orientation, remove banjo bolts securing fluid feed and return hoses to PAS rack and discard sealing washers.



- 22.** Remove 2 bolts and 2 nuts securing PAS rack, discard nuts and bolts.



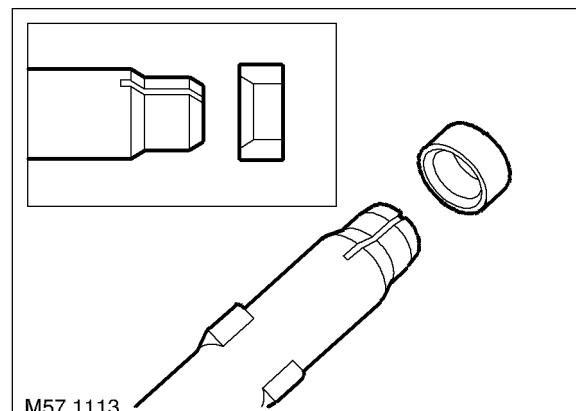
- 23.** With assistance, carefully release and rotate PAS rack. Remove rack from LH side.



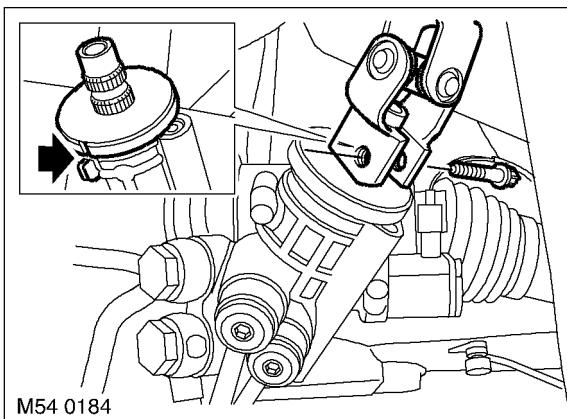
- 24.** Loosen track rod end locknuts.  
**25.** Remove track rod ends, note the number of turns for refit.  
**26.** Remove and discard locking rings.  
**27.** Remove locking nuts.

#### Refit

- Fit locking nuts to track rods.



- Fit locking rings to track rods, ensure taper faces track rod end.
- Fit track rod ends to track rods the number of turns noted on removal.
- Fit PAS rack, tighten new bolts and nuts to 100 Nm (74 lbf.ft), then tighten a further 90°.
- Secure vacuum hose to PAS rack.
- Clean fluid hoses and mating faces.
- Using new sealing washers, fit PAS hoses and tighten M16 banjo bolt to 40 Nm (30 lbf.ft) and M14 banjo bolt to 36 Nm (26 lbf.ft).
- Connect multiplug to PAS rack pinion sensor.



9. Ensure pinion timing marks are aligned and connect column to PAS rack. Fit and tighten clamp screw to 24 Nm (18 lbf.ft).
10. Position height sensor assembly to sub-frame, fit and tighten bolts to 2.5 Nm (1.8 lbf.ft).  
**CAUTION:** Ensure height sensor arm is pointing outwards.
11. Connect height sensor multiplug.
12. Correctly position height sensor harness and secure with cable ties. Ensure the harness is not under tension.
13. Connect anti-roll bar links, fit nuts and tighten to 100 Nm (74 lbf.ft).
14. Clean track rod end tapers and taper seats.
15. Connect track rod ends to steering arms, fit new nuts and tighten to 80 Nm (59 lbf.ft).
16. Fit LH drive shaft.  
**DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**
17. Fit air flow panel and tighten bolts to 45 Nm (33 lbf.ft).
18. Fit undertray.  
**EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
19. Lower the lift.
20. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
21. Remove stands and lower the vehicle.
22. Connect battery earth lead.
23. Bleed PAS system.  
**STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
24. Check and adjust front wheel alignment.  
**STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

## Power steering rack - left hand drive - V8

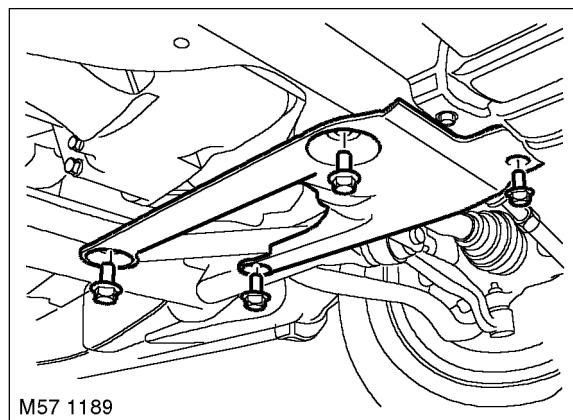
### 57.10.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

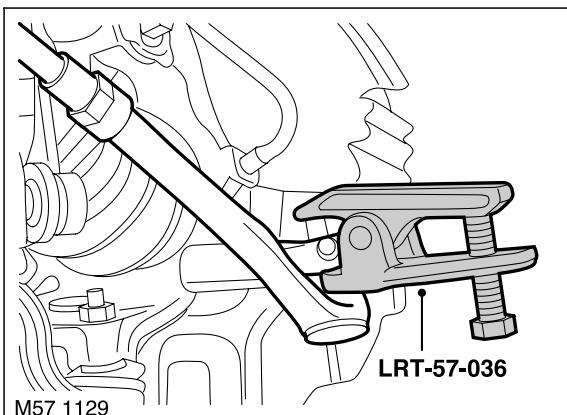
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Raise front of vehicle and support on stands.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**
3. Remove front road wheels.
4. Remove undertray.  
**EXTERIOR FITTINGS, REPAIRS, Undertray - front.**



5. Remove 4 bolts securing the air flow panel and remove panel.
6. Remove LH front height sensor.  
**FRONT SUSPENSION, REPAIRS, Height sensor.**
7. Remove LH front drive shaft.  
**DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**
8. Remove and discard nut securing RH track rod end ball joint to steering arm.

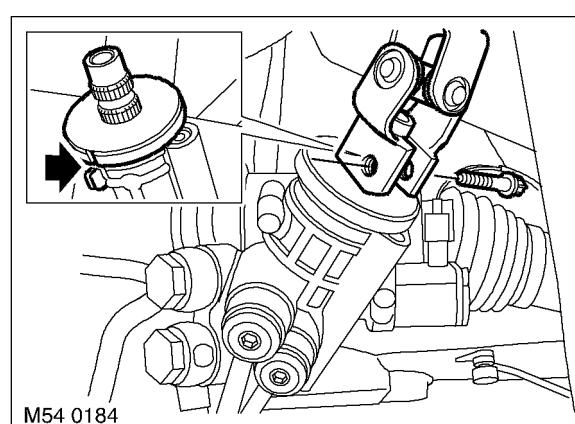


9. Using **LRT-57-036** separate ball pin from steering arm.

**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.

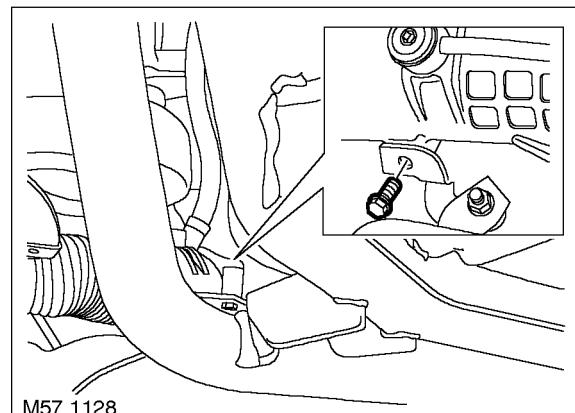


10. Disconnect multiplug from PAS rack pinion sensor.



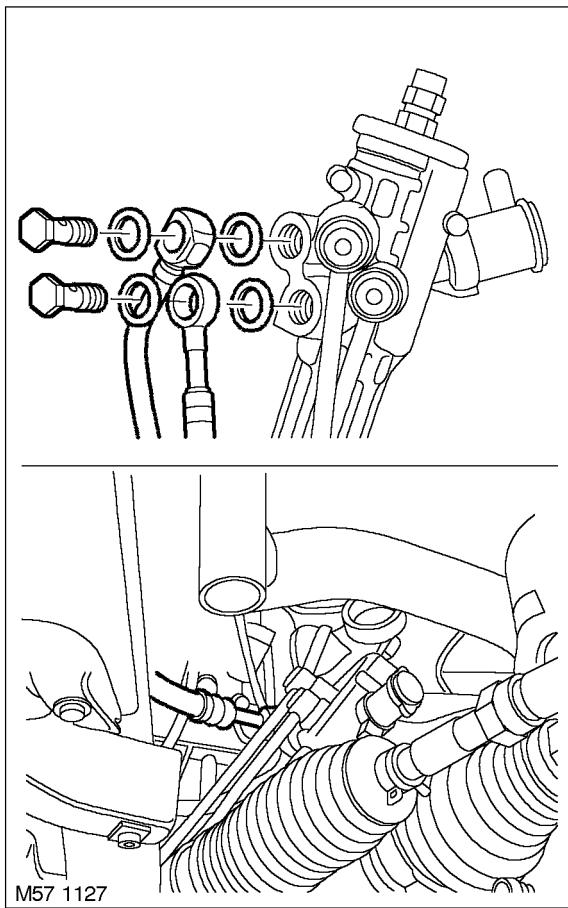
11. Note fitted position of lower steering column. Remove Torx bolt from clamp and disconnect lower steering column from PAS rack. Discard Torx bolt.

**CAUTION:** Do not turn the steering wheel with the lower steering column disconnected as damage to the rotary coupler and the steering wheel switches may occur.



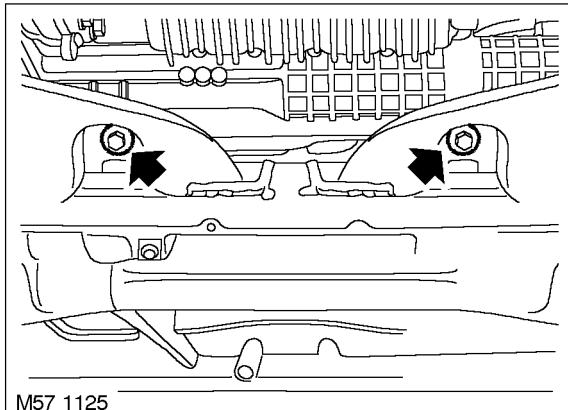
12. Remove bolt securing PAS feed hose to PAS rack.  
13. Position a suitable container below PAS rack to collect fluid spillage.

## STEERING

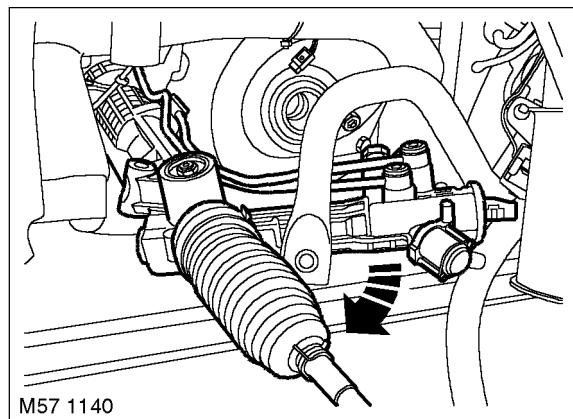


14. Note orientation, remove banjo bolts securing fluid feed and return hoses to PAS rack and discard sealing washers.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

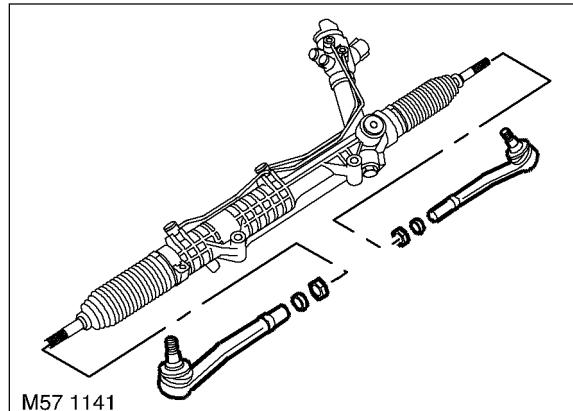


15. Remove 2 bolts and 2 nuts securing PAS rack, discard nuts and bolts.



16. With assistance, carefully release and rotate PAS rack. Remove rack from LH side.

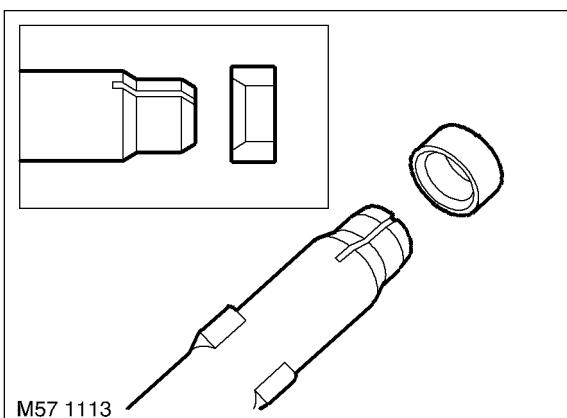
*NOTE: Do not carry out further dismantling if component is removed for access only.*



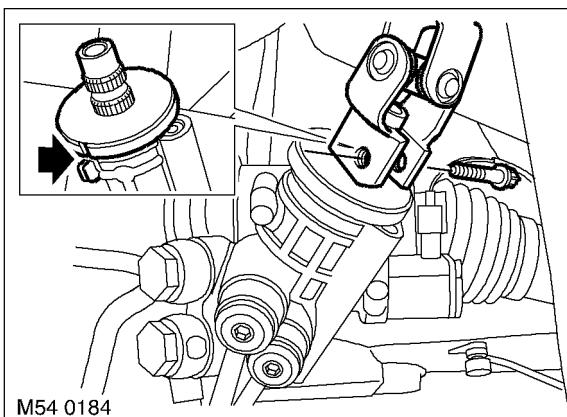
17. Loosen track rod end locknuts and remove track rod end ball joints from PAS rack. Note the number of threads for refit. Discard locking rings.

### Refit

1. Fit locking nuts to track rods.



2. Fit locking rings to track rods, ensure taper faces track rod end.
3. Clean ball joint tapers and taper seats.
4. Fit track rod end ball joints to track rods the same number of threads noted on removal.
5. Fit PAS rack, tighten new bolts and nuts to 100 Nm (74 lbf.ft), then tighten a further 90°.
6. Connect RH track rod end ball joint to RH steering arm.
7. Fit new track rod end ball joint securing nut and tighten to 80 Nm (59 lbf.ft)..
8. Clean PAS hoses and PAS rack mating faces.
9. Using new sealing washers, fit PAS hoses and tighten M16 banjo bolt to 40 Nm (30 lbf.ft) and M14 banjo bolt to 36 Nm (26 lbf.ft).
10. Align PAS feed hose to PAS rack and tighten securing bolt.



11. Connect lower steering column to PAS rack making sure that alignment tag is aligned.
12. Fit new PAS rack lower steering column Torx clamping bolt and tighten to 24 Nm (18 lbf.ft).
13. Connect multiplug to PAS rack pinion sensor.
14. Fit LH front drive shaft.

**DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**

15. Fit LH front height sensor.  
 **FRONT SUSPENSION, REPAIRS, Height sensor.**
16. Remove container from below PAS rack.
17. Fit air flow panel and tighten bolts to 45 Nm (33 lbf.ft).
18. Fit undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
19. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
20. Remove stands and lower front end of vehicle.
21. Connect battery earth lead.
22. Bleed PAS system.  
 **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
23. Check and adjust front wheel alignment.  
 **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**
24. Top-up differential with oil.  
 **FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.**

# STEERING

## Power steering rack - right hand drive - V8

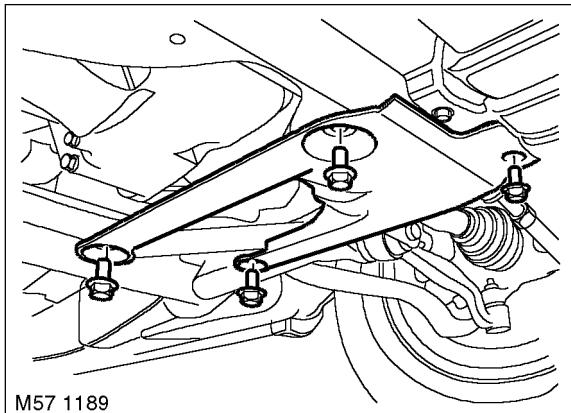
### 57.10.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

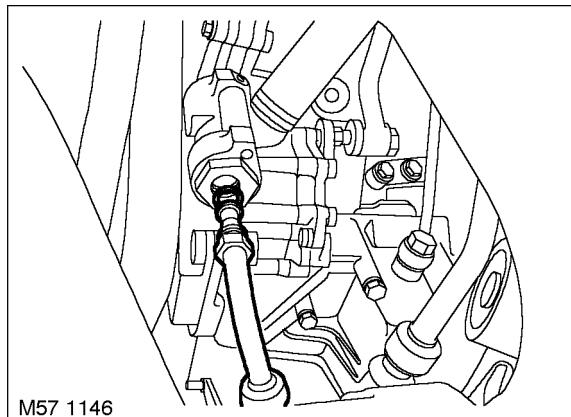
#### GENERAL INFORMATION, Electrical Precautions.

#### Remove

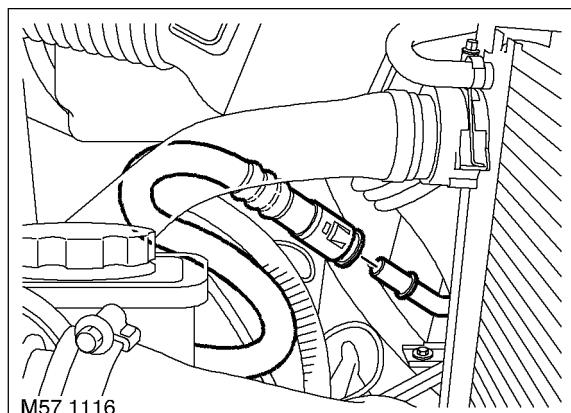
1. Disconnect battery earth lead.
2. Remove air intake plenum.  
 HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.
3. Raise front of vehicle and support under body.
4. Remove undertray.  
 EXTERIOR FITTINGS, REPAIRS, Undertray - front.



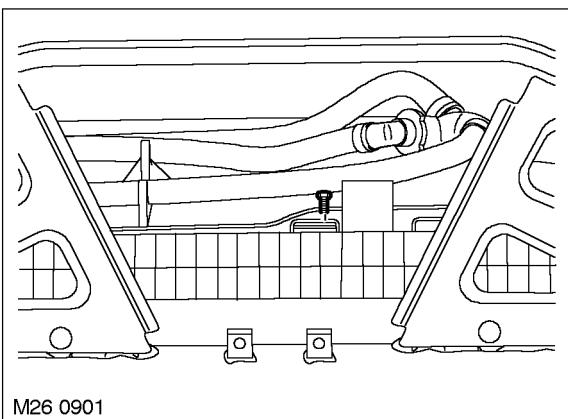
5. Remove 4 bolts securing the air flow panel and remove panel.
6. Remove front road wheels.
7. Remove RH front drive shaft.  
 DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.
8. Remove LH front drive shaft.  
 DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.
9. Position a suitable container below PAS pump.



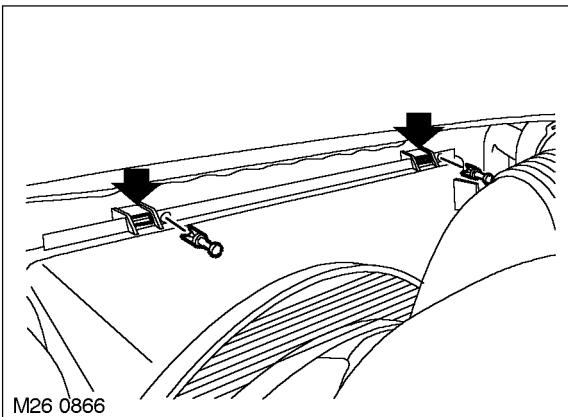
10. Loosen union nut, disconnect PAS outlet hose from pump and discard 'O' ring.  
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**
11. Release 2 straps securing PAS fluid return hose to sub-frame.



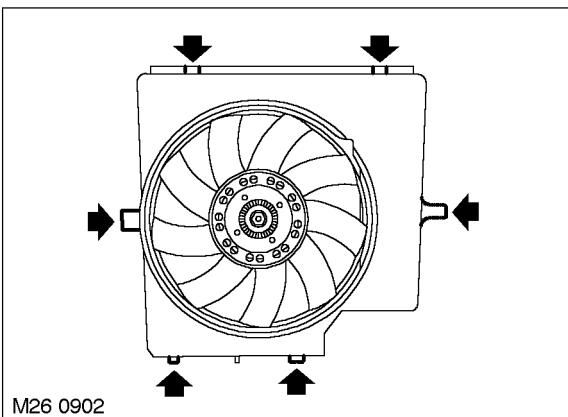
12. Release and disconnect PAS return hose from fluid cooler.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**
13. Remove container from below PAS pump.



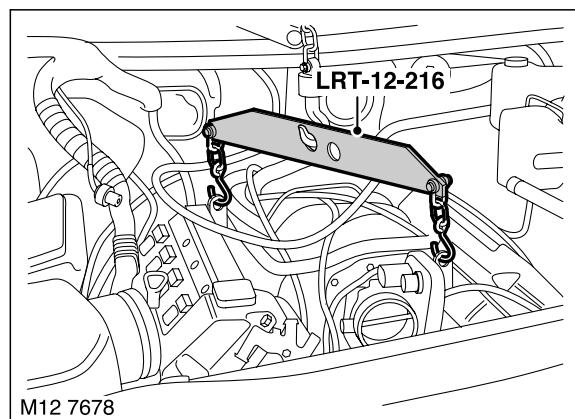
**14.** Remove screw securing fan cowl to radiator.



**15.** Remove scrivets securing fan cowl.

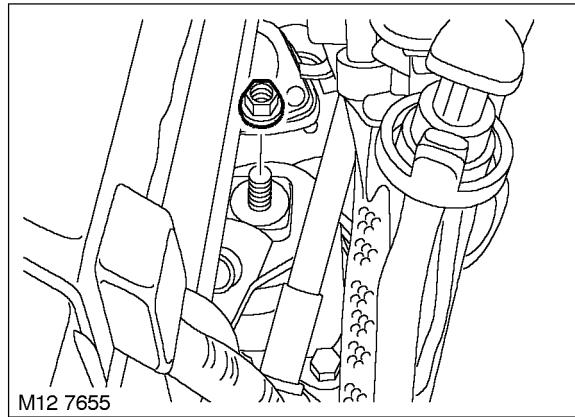


**16.** Release fan cowl from radiator.

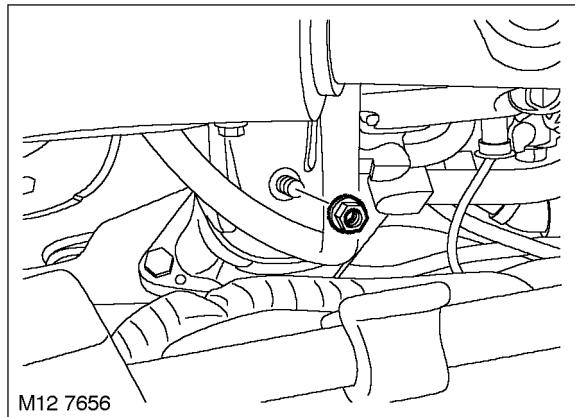


**17.** Fit **LRT-12-216** to engine lifting eyes.

**18.** Connect chain to lifting bracket and take weight of engine.



**19.** Remove nut securing LH engine mounting to engine mounting bracket.



**20.** Remove nut securing RH engine mounting to engine mounting bracket.

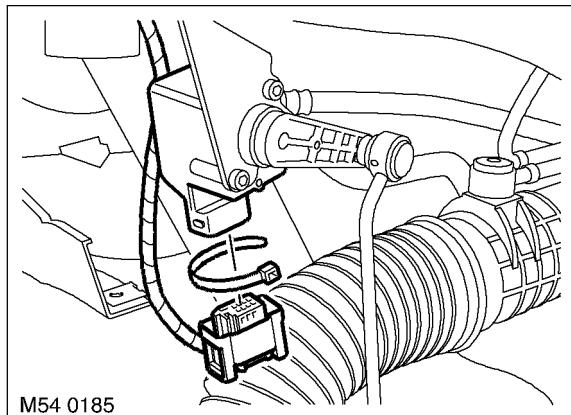
## STEERING

21. Raise engine sufficiently only to clear engine mountings.

**CAUTION: To prevent damage to the radiator, guide the fan cowl clear of the radiator as it is raised with the engine.**



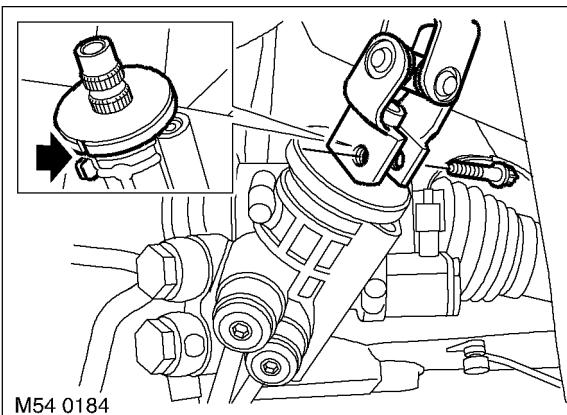
22. Disconnect multiplug from PAS rack pinion sensor.



24. Note fitted position for refit then remove cable ties securing front height sensor harness to sub frame and sensors. Disconnect multiplugs from front height sensors.

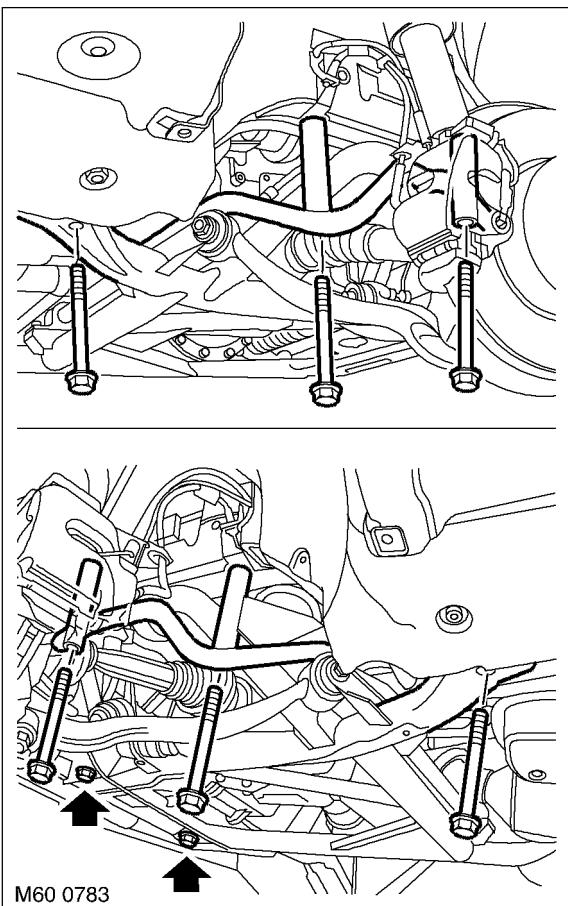
25. Remove 2 speed nuts securing each anti-roll bar heatshield to body and 2 bolts securing each heatshield to sub-frame. Remove heatshields.

26. Use a transmission jack to support the sub frame.



23. Note fitted position of lower steering column. Remove Torx bolt from clamp and disconnect lower steering column from PAS rack. Discard Torx bolt.

**CAUTION: Do not turn the steering wheel with the lower steering column disconnected as damage to the rotary coupler and the steering wheel switches may occur.**

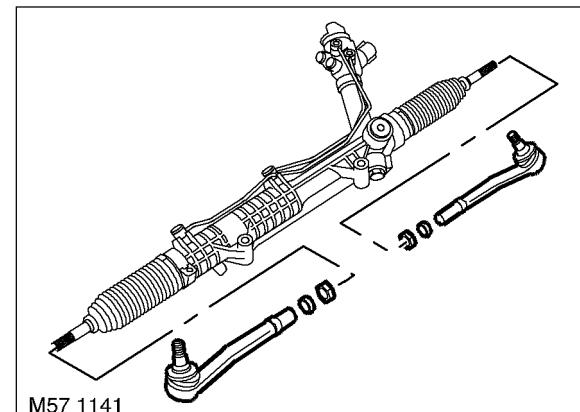


27. Remove 2 bolts securing sub-frame to cross member and 6 bolts securing sub-frame to body. Discard bolts.
28. With assistance, lower and remove sub-frame assembly.
29. Note orientation of PAS fluid feed and return hoses, remove banjo bolts and remove hoses. Discard sealing washers.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

30. Remove 2 bolts and nuts securing PAS rack, remove rack, discard nuts and bolts.

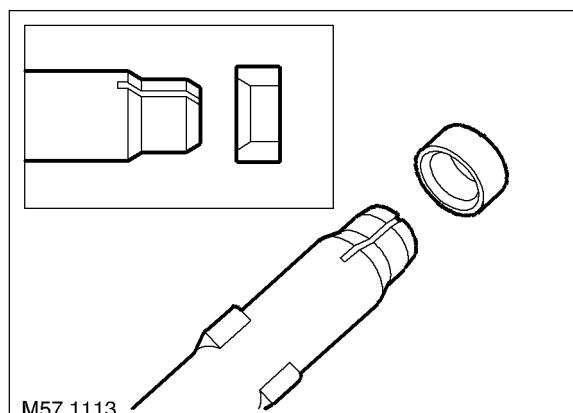
*NOTE: Do not carry out further dismantling if component is removed for access only.*



31. Loosen track rod end locknuts and remove track rod end ball joints from PAS rack. Note the number of threads for refit. Discard locking rings.
32. Remove track rod end lock nuts.

#### Refit

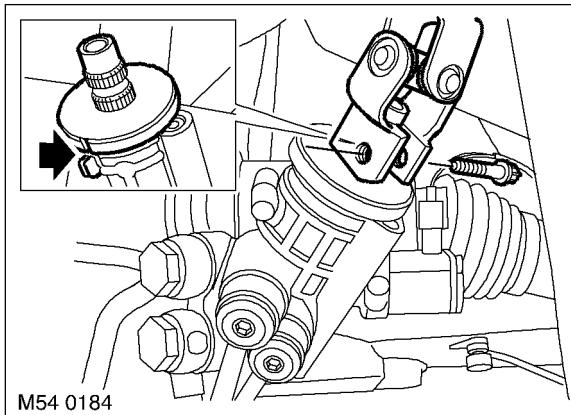
1. Fit locking nuts to track rods.



2. Fit locking rings to track rods, ensure taper faces track rod end.
3. Fit track rod end ball joints to track rods the same number of threads noted on removal.
4. Fit PAS rack, tighten new bolts and nuts to 100 Nm (74 lbf.ft), then tighten a further 90°.
5. Clean PAS hoses and PAS rack mating faces.
6. Using new sealing washers, fit PAS hoses and tighten M16 banjo bolt to 40 Nm (30 lbf.ft) and M14 banjo bolt.
7. Clean sub-frame and body mating faces.
8. With assistance, fit sub-frame assembly.
9. Using new bolts, tighten 6 bolts securing sub-frame to body to 165 Nm (122 lbf.ft), then tighten the two most rearward bolts a further 90°. Tighten bolts securing sub-frame to front cross member to 132.5 Nm (97 lbf.ft).

# STEERING

10. Fit anti-roll bar heatshield and tighten fixings.
11. Lower engine onto mountings.  
*NOTE: Guide the fan cowl into position as the engine is lowered.*
12. Fit fan cowl to radiator and fit securing scrivets.
13. Fit screw securing fan cowl to radiator.
14. Fit 2 nuts securing engine mountings to engine mounting brackets and tighten to 100 Nm (74 lbf.ft).
15. Remove engine lifting chains.
16. Remove engine lifting bracket.



30. Fit undertray.  
☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
31. Remove stands and lower front end of vehicle.
32. Check differential oil level.  
☞ **FRONT DIFFERENTIAL, ADJUSTMENTS, Front differential - drain and refill.**
33. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.**
34. Connect battery earth lead.
35. Bleed PAS system.  
☞ **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
36. Check and adjust front wheel alignment.  
☞ **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

17. Connect lower steering column to PAS rack making sure that alignment tag is aligned.
18. Fit new PAS rack lower steering column Torx clamping bolt and tighten to 24 Nm (18 lbf.ft).
19. Connect multiplug to PAS rack pinion sensor.
20. Connect height sensor multiplugs.
21. Correctly position height sensor harness and secure with cable ties.
22. Clean PAS pump and high pressure outlet pipe mating faces.
23. Fit new 'O' ring to high pressure outlet pipe union, align to PAS pump and tighten PAS pump high pressure pipe union to 25 Nm (18 lbf.ft).
24. Connect PAS return hose to fluid cooler.
25. Secure PAS fluid return hose into 2 straps on sub-frame.
26. Fit RH front drive shaft.  
☞ **DRIVESHAFTS, REPAIRS, Drive shaft - front - RH.**
27. Fit LH front drive shaft.  
☞ **DRIVESHAFTS, REPAIRS, Drive shaft - front - LH.**
28. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
29. Fit air flow panel and tighten bolts to 45 Nm (33 lbf.ft).



## Power steering rack - right hand drive - Td6

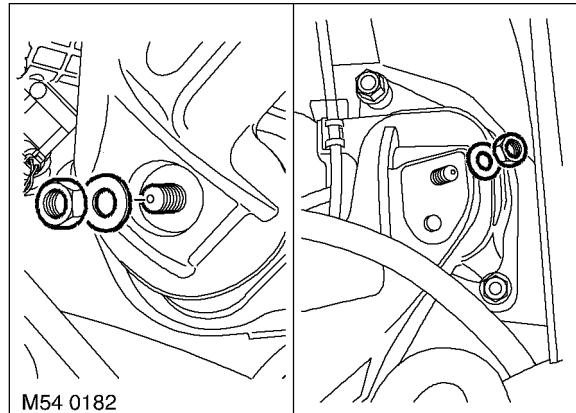
### 57.10.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

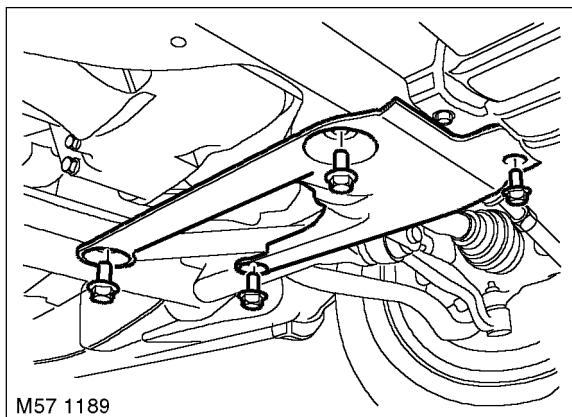
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Position vehicle on lift.
2. Disconnect battery earth lead.



6. Remove 2 nuts securing engine brackets to mountings.



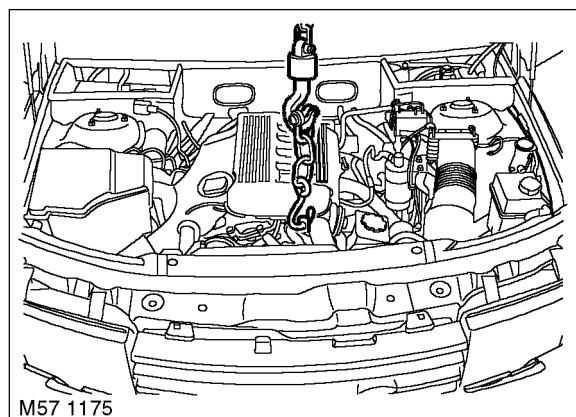
3. Remove 4 bolts securing the air flow panel and remove panel.

4. Remove viscous coupling.

**COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**

5. Remove air intake plenum.

**HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.**



7. Connect chain to lifting bracket and take weight of engine.

8. Remove front propeller shaft.

**DRIVESHAFTS, REPAIRS, Propeller shaft - front.**

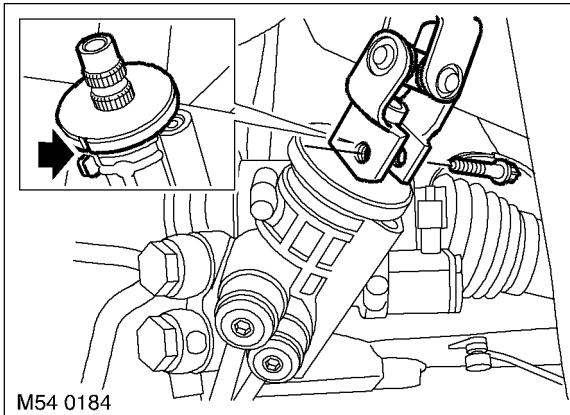
9. Remove RH drive shaft seal.

**DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.**

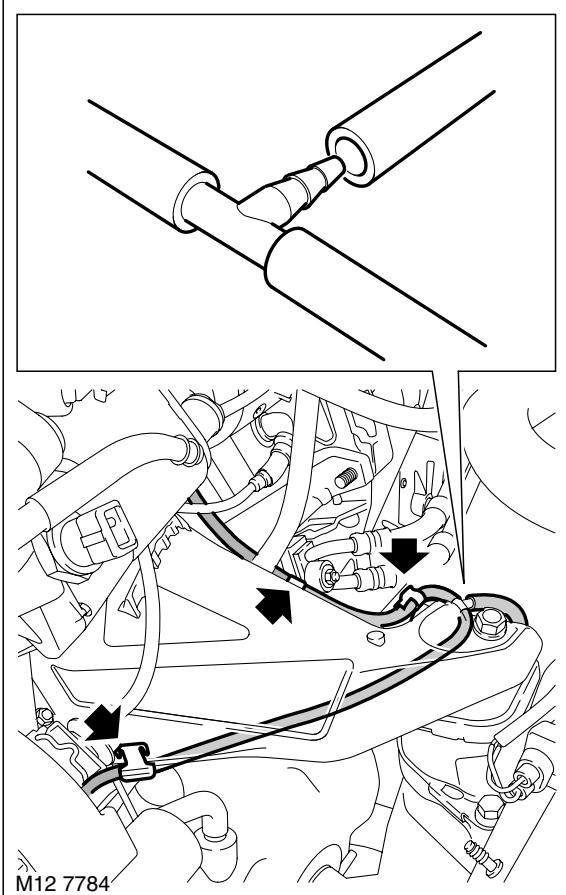
10. Remove differential oil seal.

**FRONT DIFFERENTIAL, REPAIRS, Oil seal - differential housing.**

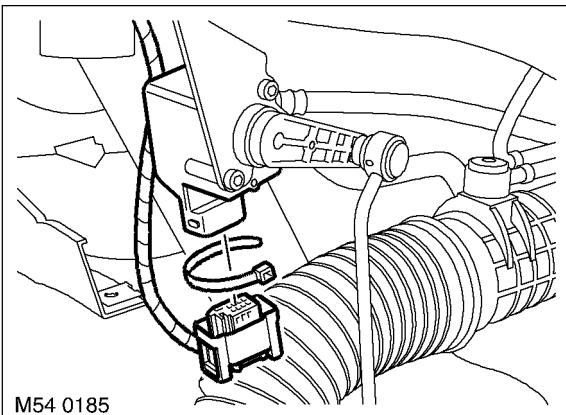
## STEERING



11. Remove Torx screw from steering column lower clamp.
12. Rotate steering wheel to straight ahead position, align pinion timing marks and remove ignition key.  
**CAUTION: Do not turn the steering wheel with the intermediate shaft or universal joint disconnected as damage to the rotary coupler and the steering wheel switches may occur.**
13. Disconnect column from pinion.



14. Release vacuum hose from 3 clips on engine LH mounting bracket.
15. Disconnect mounting vacuum supply hose from 'T' piece.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**



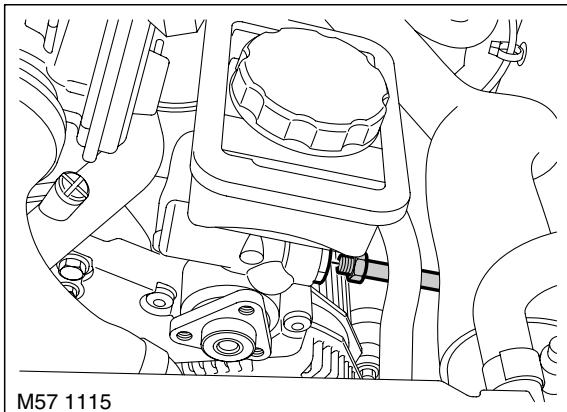
16. Note fitted position for refit then remove cable ties securing height sensor harness to sub frame and sensors.



17. Disconnect height sensor multiplugs.

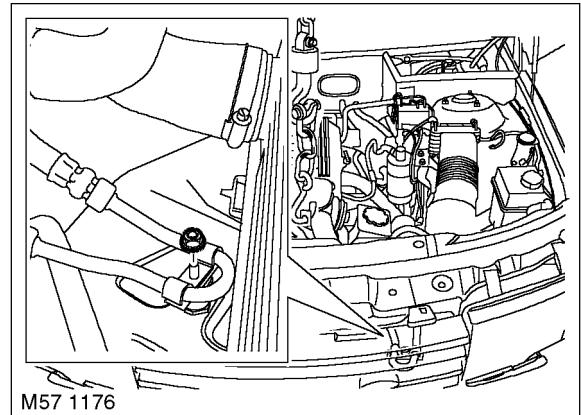


18. Disconnect multiplug from PAS rack pinion sensor.  
19. Position container to collect PAS fluid spillage.

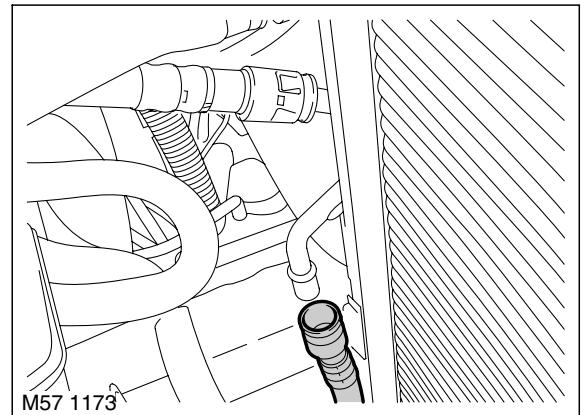


20. Loosen union nut, disconnect PAS outlet hose from pump and discard 'O' ring.

**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**



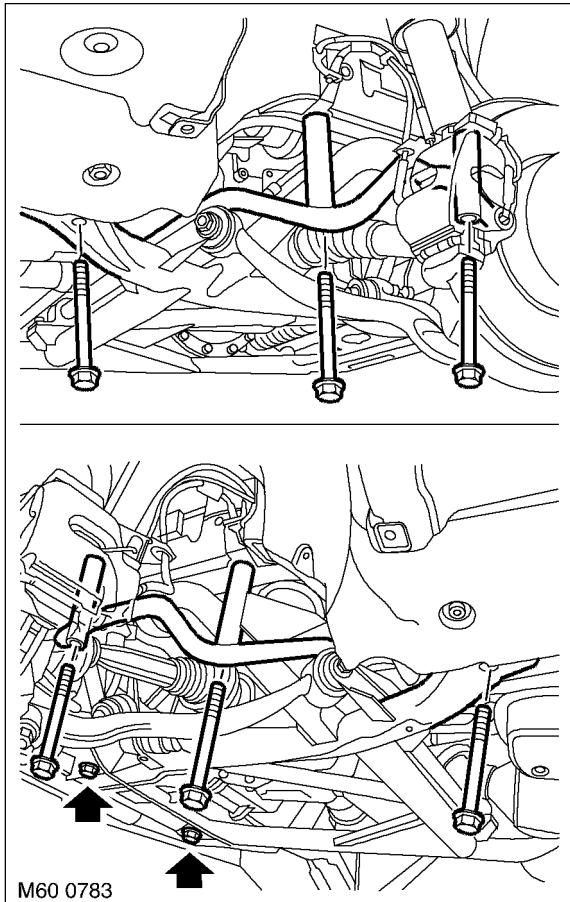
21. Remove nut securing PAS hose to mounting.



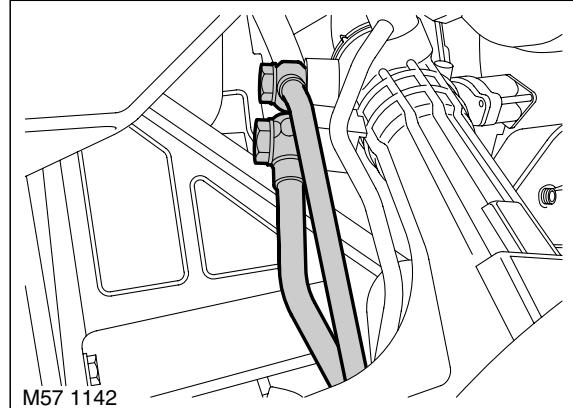
22. Release and disconnect PAS return hose from fluid cooler.  
23. If fitted: Remove 2 speed nuts securing each anti-roll bar heatshield to body and 2 bolts securing each heatshield to sub-frame. Remove heatshields.  
24. Use a transmission jack to support the sub frame.

## STEERING

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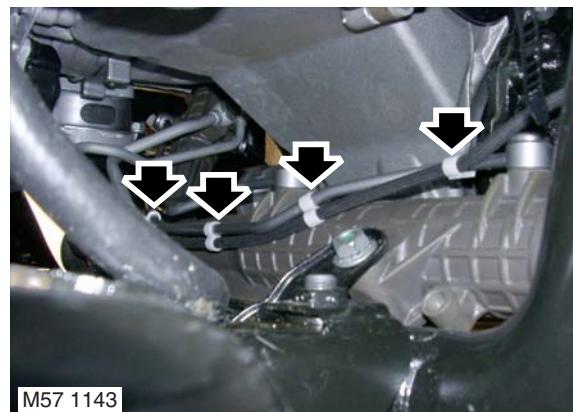


25. Remove 2 bolts securing sub-frame to cross member and 6 bolts securing sub-frame to body. Discard bolts.
26. With assistance, lower and remove sub-frame assembly.

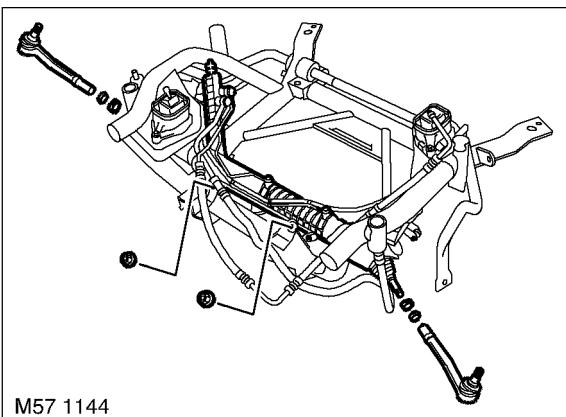


27. Note orientation, remove banjo bolts securing fluid feed and return hoses to PAS rack and discard sealing washers.

**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.



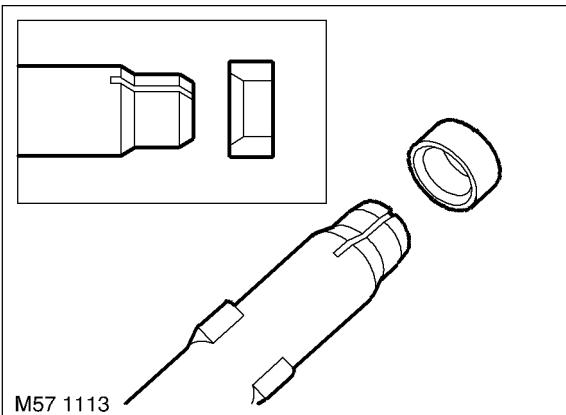
28. Release 5 clips securing engine mounting vacuum hose to PAS rack.



29. Remove 2 bolts and nuts securing PAS rack, remove rack, discard nuts and bolts.
30. Loosen track rod end locknuts.
31. Remove track rod end ball joints from PAS rack. Note the number of threads for refit.
32. Remove and discard locking rings.
33. Remove locking nuts.

#### Refit

1. Fit locking nuts to track rods.



2. Fit locking rings to track rods, ensure taper faces track rod end.
3. Fit track rod ends to track rods the number of turns noted on removal.
4. Fit PAS rack, tighten new bolts and nuts to 100 Nm (74 lbf.ft), then tighten a further 90°.
5. Secure vacuum hose to PAS rack.
6. Clean fluid hoses and mating faces.
7. Using new sealing washers, fit PAS hoses and tighten M16 banjo bolt to 40 Nm (30 lbf.ft) and M14 banjo bolt to 36 Nm (26 lbf.ft).
8. Clean sub-frame and body mating faces.
9. With assistance, fit sub-frame assembly.

10. Using new bolts, tighten 6 bolts securing sub-frame to body to 165 Nm (122 lbf.ft), then tighten the two most rearward bolts a further 90°. Tighten bolts securing sub-frame to front cross member to 132.5 Nm (97 lbf.ft).
11. Fit anti-roll bar heatshield and tighten fixings.
12. Lower engine onto mountings.
13. Tighten nuts securing engine brackets to mountings to 100 Nm (74 lbf.ft).
14. Clean PAS hose connections.
15. Connect PAS hose to cooler.
16. Fit new 'O' ring to PAS hose union, connect hose to pump and tighten nut to 25 Nm (18 lbf.ft).
17. Connect PAS hose to mounting and tighten nut to 10 Nm (7 lbf.ft).
18. Connect multiplug to PAS rack pinion sensor.
19. Connect height sensor multiplugs.
20. Correctly position height sensor harness and secure with cable ties.
21. Connect vacuum hoses to 'T' piece and fit hoses to clips.
22. Ensure pinion timing marks are aligned and connect column to PAS rack. Fit and tighten clamp screw to 24 Nm (18 lbf.ft).
23. Fit differential oil seal.  
☞ **FRONT DIFFERENTIAL, REPAIRS, Oil seal - differential housing.**
24. Fit RH drive shaft seal.  
☞ **DRIVESHAFTS, REPAIRS, Seal - drive shaft - front - RH.**
25. Fit front propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - front.**
26. Fit air flow panel and tighten bolts to 45 Nm (33 lbf.ft).
27. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Filter - fresh air intake.**
28. Fit viscous coupling.  
☞ **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
29. Connect battery earth lead.
30. Bleed PAS system.  
☞ **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
31. Check and adjust front wheel alignment.  
☞ **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

# STEERING

## Oil cooler - power steering - Td6

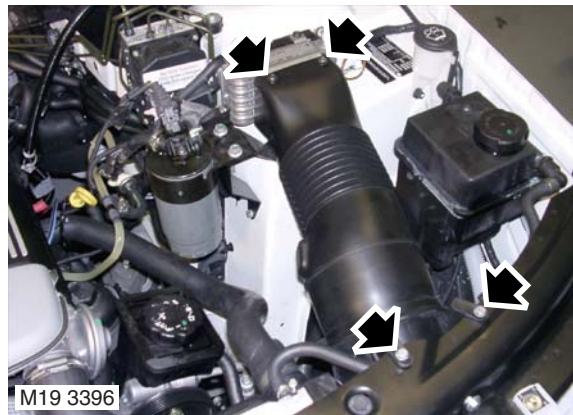
### 57.15.11

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

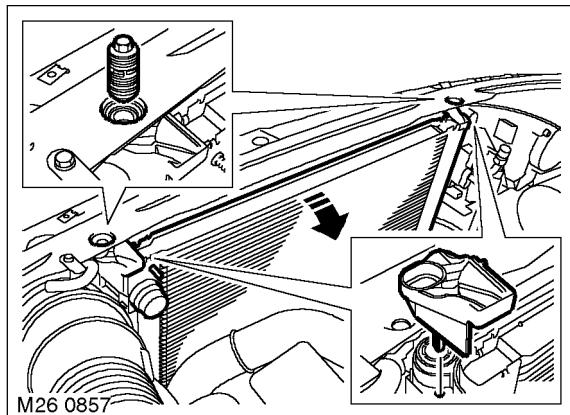
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

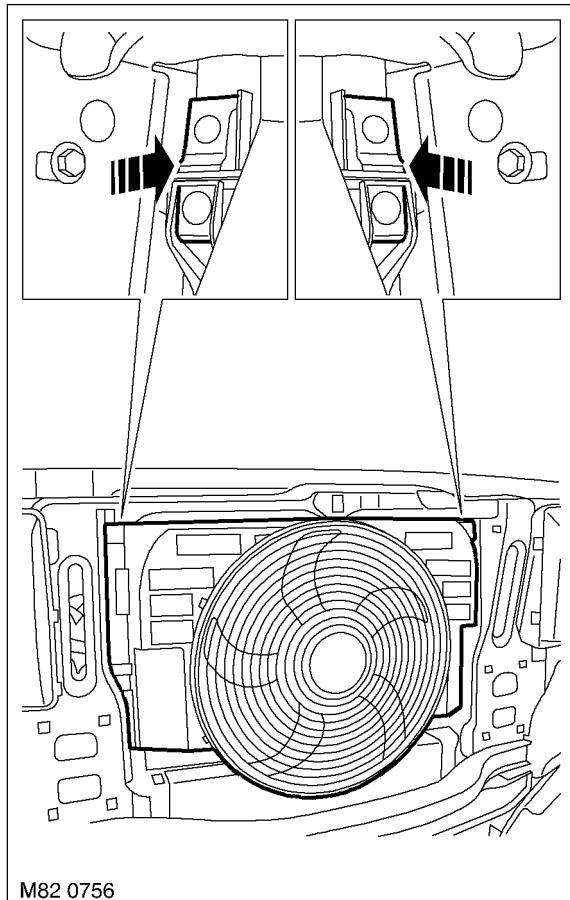
1. Disconnect battery earth lead.
2. Remove front grille.  
 **EXTERIOR FITTINGS, REPAIRS, Front grille.**
3. Remove viscous coupling.  
 **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**



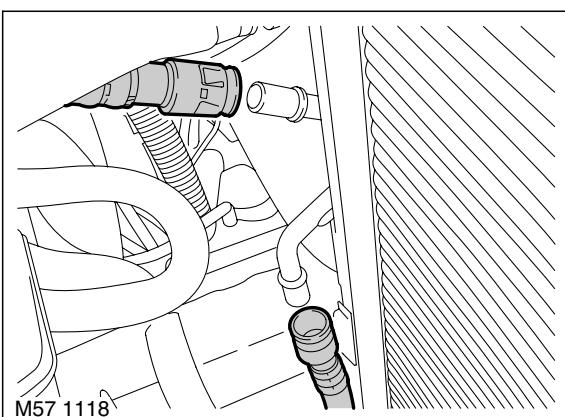
4. Remove 2 bolts securing fuel cooler intake duct to bonnet locking platform.
5. Remove 2 screws securing intake duct to fuel cooler.
6. Remove intake duct assembly from vehicle.



7. Remove 2 bolts securing radiator to bonnet locking platform.
8. Ease radiator assembly rearward, release and remove radiator retaining clips.



9. Release clips securing condenser fan cowl to radiator assembly, lift cowl from retainers.
10. Position container to collect PAS fluid spillage.



11. Release and disconnect PAS hoses from fluid cooler.

**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

12. Ease radiator assembly rearward, release PAS cooler from retaining clips and remove.

#### Refit

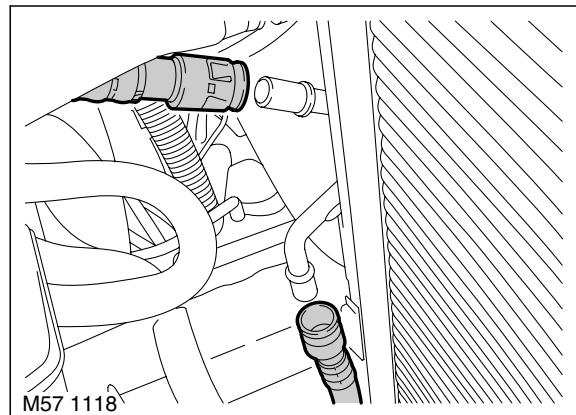
1. Clean PAS cooler pipe connections.
2. Fit and secure PAS cooler.
3. Fit and secure condenser fan cowl assembly.
4. Position radiator to mounting, fit and secure retaining clips.
5. Position and secure radiator assembly to bonnet locking platform.
6. Fit and secure PAS hoses to cooler.
7. Fit intake duct assembly and secure to cooler with screws.
8. Secure cooler intake duct to bonnet locking platform and tighten bolts to 3 Nm (2.2 lbf.ft).
9. Fit viscous coupling.  
☞ **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
10. Fit front grille.  
☞ **EXTERIOR FITTINGS, REPAIRS, Front grille.**
11. Connect battery earth lead.
12. Top-up PAS reservoir and bleed system.  
☞ **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**

## Oil cooler - power steering - V8

### ☞ 57.15.11

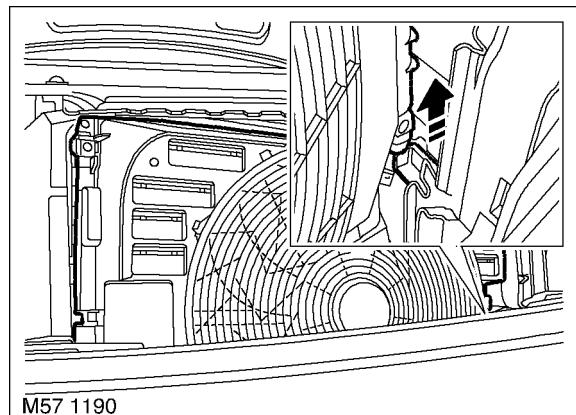
#### Remove

1. Disconnect battery earth lead.
2. Remove front grille.  
☞ **EXTERIOR FITTINGS, REPAIRS, Front grille.**
3. Remove radiator assembly.  
☞ **COOLING SYSTEM - V8, REPAIRS, Radiator.**
4. Position container to collect PAS fluid spillage.

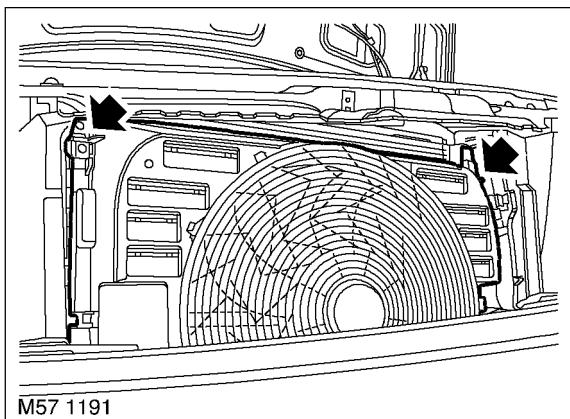


5. Release and disconnect PAS hoses from fluid cooler.

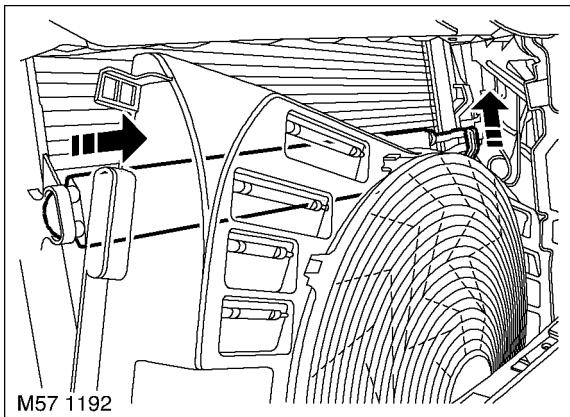
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

6. Release cooling pack from LH mounting bracket.



7. Release 2 clips securing fan cowl to cooling pack and position the fan cowl aside.



8. Carefully release and remove PAS cooler from the cooling pack.

## Refit

1. Clean PAS cooler pipe connections.
2. Fit and secure PAS cooler.
3. Fit and secure fan cowl to the cooling pack.
4. Fit cooling pack to the mounting bracket.
5. Fit and secure PAS hoses to cooler.
6. Fit radiator assembly.

**COOLING SYSTEM - V8, REPAIRS, Radiator.**

7. Fit front grille.  
 **EXTERIOR FITTINGS, REPAIRS, Front grille.**
8. Connect the battery earth lead.
9. Top-up PAS reservoir and bleed system.  
 **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**

## Pump - power steering - Td6

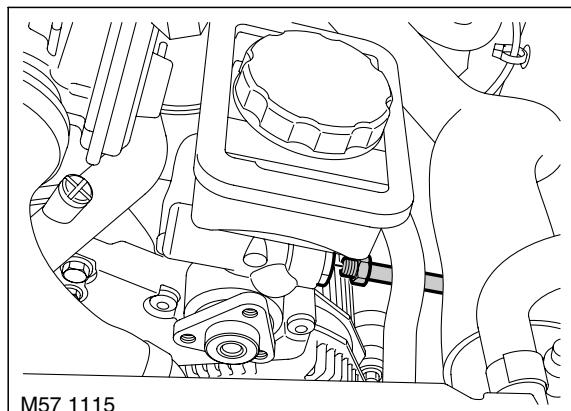
### 57.20.14

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

### Remove

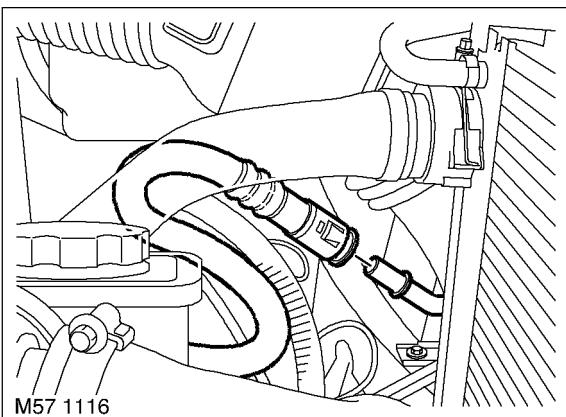
1. Disconnect battery earth lead.
2. Remove viscous fan.  
 **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
3. Remove ancillary drive belt.  
 **CHARGING AND STARTING, REPAIRS, Ancillary drive belt - Td6.**
4. Remove bolts and remove PAS pump pulley.
5. Cover alternator to prevent PAS oil contamination.



6. Place container beneath PAS reservoir, remove pipe union and allow fluid to drain. Plug connections.  
**CAUTION: Care must be taken to ensure that oil or fluid does not enter or contaminate the alternator.**
7. Discard 'O' ring.

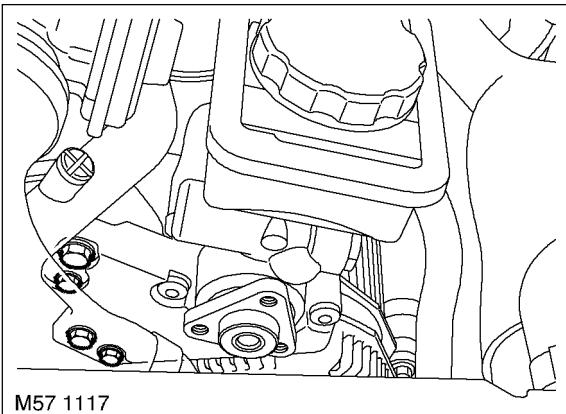
**Refit**

1. Fit brackets to PAS pump and tighten Torx bolts to 25 Nm (18 lbf.ft).
  2. Position PAS pump to mounting and fit bolts. Tighten M8 bolts to 25 Nm (18 lbf.ft) and M6 bolts to 10 Nm (7 lbf.ft).
  3. Clean PAS cooler pipe connections.
  4. Fit and secure fluid cooler hose to cooler.
  5. Clean PAS pump and pipe union.
  6. Fit new 'O' ring to high pressure pipe, align to PAS pump and tighten union to 25 Nm (18 lbf.ft).
  7. Position PAS pump pulley to PAS pump, fit and finger tighten bolts.
  8. Fit ancillary drive belt.
- CHARGING AND STARTING, REPAIRS, Ancillary drive belt - Td6.**
9. Tighten PAS pulley bolts to 25 Nm (18 lbf.ft).
  10. Fit viscous fan.
- COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
11. Connect battery earth lead.



8. Position container, release and disconnect return hose from PAS cooler.

**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.



9. Remove 4 bolts and remove PAS pump.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
10. Remove 5 Torx screws and remove brackets from PAS pump.

# STEERING

## Pump - power steering - V8

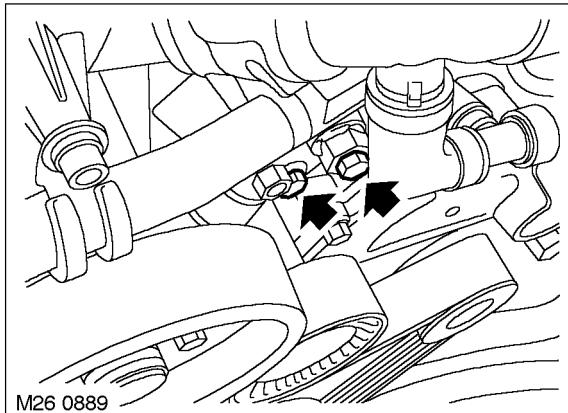
### 57.20.14

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

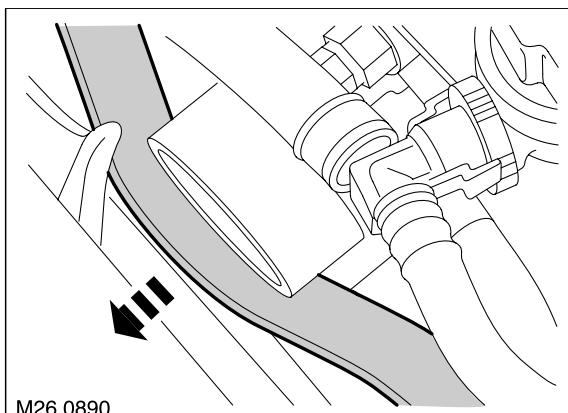
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

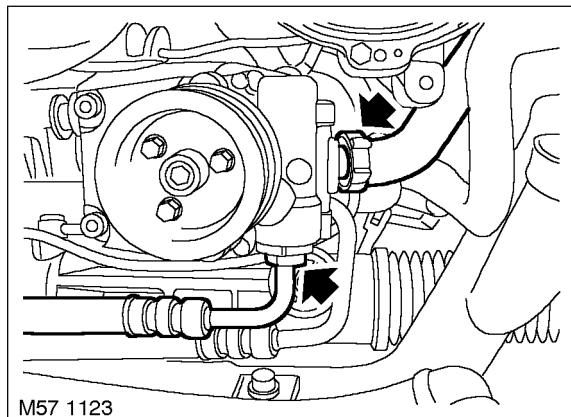
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**



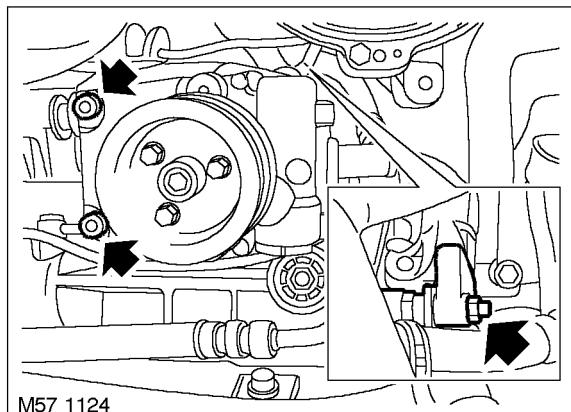
4. Loosen 2 ancillary drive belt tensioner bolts.
5. Rotate tensioner fully clockwise to release tension on drive belt.



6. Release ancillary drive belt from tensioner pulley.
7. Release ancillary drive belt from PAS pump pulley.



8. Place container beneath PAS pump, release pipe union and allow fluid to drain. Plug connections.
9. Release clip and disconnect PAS feed hose from PAS pump. Plug connections.



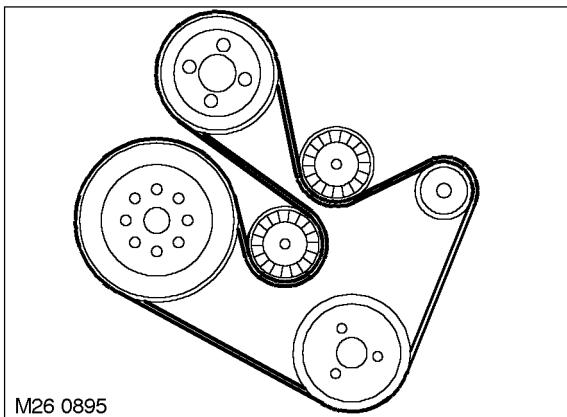
10. Remove 2 Allen bolts and 1 nut. Remove PAS pump.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
11. Hold PAS pump centre shaft using an Allen key and loosen PAS pump pulley bolts.
12. Remove bolts and remove PAS pump pulley.
13. Remove 5 Torx screws and remove brackets from PAS pump.

### Refit

1. Fit brackets to PAS pump and tighten 5 Torx bolts securing PAS pump brackets to 25 Nm (18 lbf.ft).
2. Position PAS pump pulley to PAS pump, fit and finger tighten bolts.
3. Secure PAS pump centre shaft using an Allen key and tighten 3 bolts securing PAS pump pulley to 25 Nm (18 lbf.ft).



4. Position PAS pump to mounting, fit Allen bolts and securing nut. Tighten Allen bolts to 10 Nm (7 lbf.ft) and securing nut to 25 Nm (18 lbf.ft).
5. Remove plug connections, connect PAS feed hose to PAS pump and secure with clip.
6. Clean PAS pump and pipe union.
7. Fit new 'O' ring to high pressure pipe union, align to PAS pump and tighten PAS pump high pressure pipe union to 25 Nm (18 lbf.ft).
8. Fit ancillary drive belt to all pulleys except tensioner pulley.



9. Fit ancillary drive belt to tensioner pulley. Ensure ancillary drive belt is aligned to all pulleys.
10. Tension ancillary drive belt.
11. Tighten tensioner clamp bolts to 30 Nm (22 lbf.ft).
12. Fit undertray.  
☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
13. Connect battery earth lead.
14. Fill and bleed PAS system.  
☞ **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**

## Column assembly - inner & outer

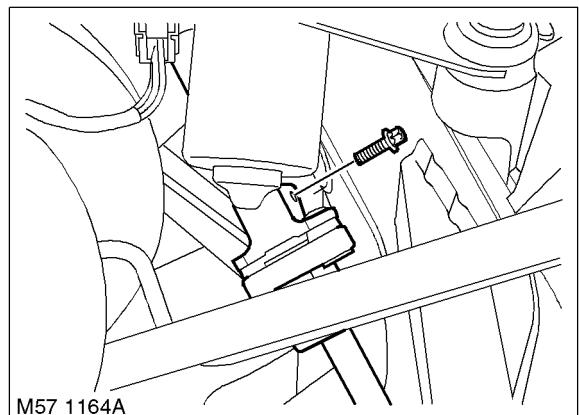
### » 57.40.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

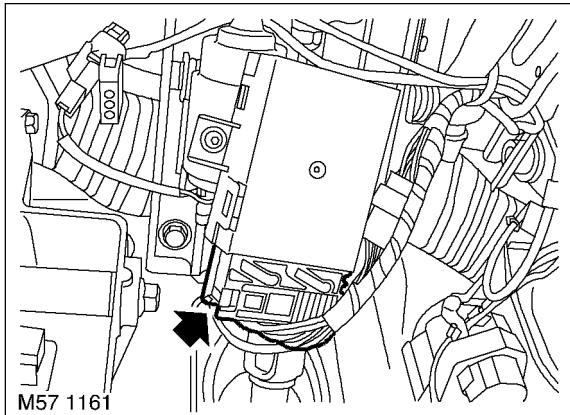
#### Remove

1. Move drivers seat fully rearwards for access.
2. Remove drivers side footwell closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS, Closing panel - driver's side.**
3. Secure bonnet in upright position using service clips.
4. If steering wheel is not locked, turn wheel to obtain better access to steering column shaft upper Torx clamp bolt.
5. Disconnect battery earth lead.

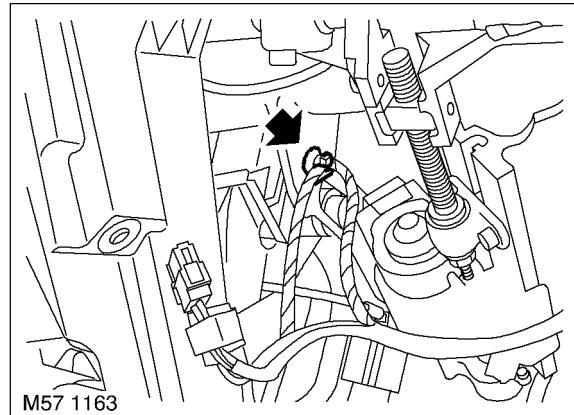


6. Working from under bonnet, remove and discard upper Torx bolt from steering coupling.
7. Remove rotary coupler assembly.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Rotary coupler.**

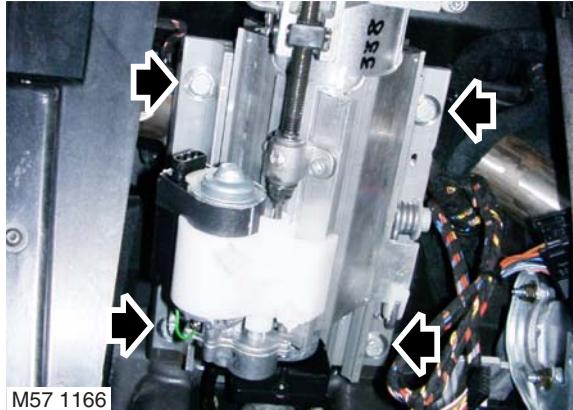
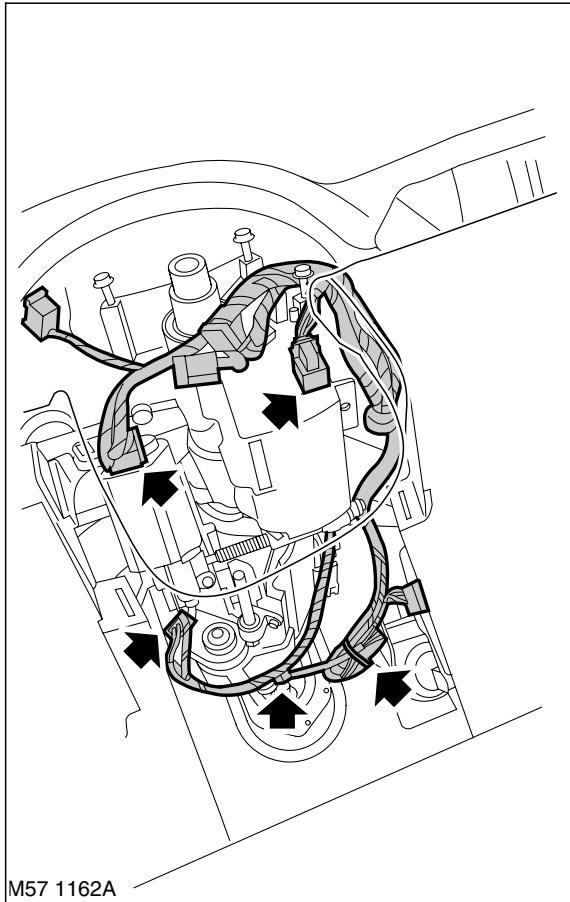
## STEERING



- 8. Models with manual steering column control only:** Disconnect multiplug from steering column control module.



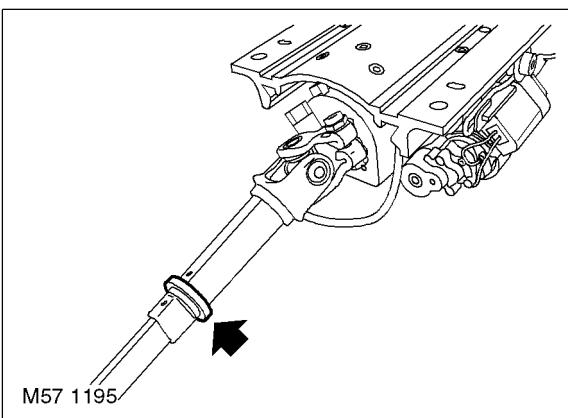
- 11. Release closing panel light harness, from securing clip in column frame.**



- 12. Remove 4 bolts from steering column, carefully release column shaft from steering coupling and with assistance, remove column assembly from vehicle.**

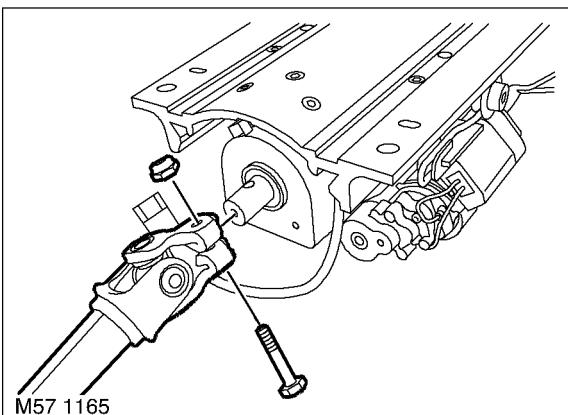
- 9. Disconnect multiplugs from steering column adjustment and lock motors.**  
**10. Remove cable tie and disconnect multiplug from steering angle sensor.**

**Protect fascia shroud adjacent to steering column aperture.**



- 13.** Ensure nylon sealing ring is fitted to steering shaft. If sealing ring is missing, remove it from column gaiter and fit to redundant steering shaft.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



- 14.** Remove nut and bolt from lower steering shaft to column, remove shaft.  
**15. Models with manual steering column control only:** Remove 2 screws from steering control module and remove module

#### Refit

- 1. Models with manual steering column control only:** Fit steering control module, secure with screws.
- 2.** Fit lower steering shaft to column and secure with nut and bolt, tighten to 25 Nm (18 lbf.ft).
- 3.** Lubricate steering column nylon sealing ring.  
☞ **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Capacities.**
- 4.** Carefully position steering column assembly to vehicle. With assistance align steering column shaft to steering coupling, ensure groove in shaft aligns with bolt hole in steering column.

- 5.** Fit steering coupling Torx bolt to ensure shaft is correctly aligned.
- 6.** Ensure nylon sealing ring is located in groove within steering column gaiter.
- 7.** Fit and finger tighten bolts securing steering column to fascia rail.
- 8.** Ensure fascia rail locating pegs are aligned to steering column assembly, tighten bolts to 25 Nm (18 lbf.ft).
- 9.** Working from under bonnet, tighten steering coupling Torx bolt to 25 Nm (18 lbf.ft).
- 10.** Fit closure panel light harness clip to frame and secure harness to column.
- 11.** Connect multiplug to steering angle sensor, secure harness with cable tie.
- 12.** Connect multiplugs to steering column adjustment and lock motors.
- 13. Models with manual steering column control only:** Connect multiplug to steering column control module.
- 14.** Fit rotary coupler assembly.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Rotary coupler.**
- 15.** Fit drivers side footwell closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS, Closing panel - driver's side.**
- 16.** Connect battery earth lead.
- 17.** Connect bonnet support gas struts to body.
- 18.** Check operation of steering column tilt, extension and lock motors.
- 19.** Testbook/T4 must be used to initiate a new steering angle sensor. The initiation procedure can be found in Testbook/T4 by selecting the following icons.
  - System diagnosis
  - ABS
  - Vehicle maintenance

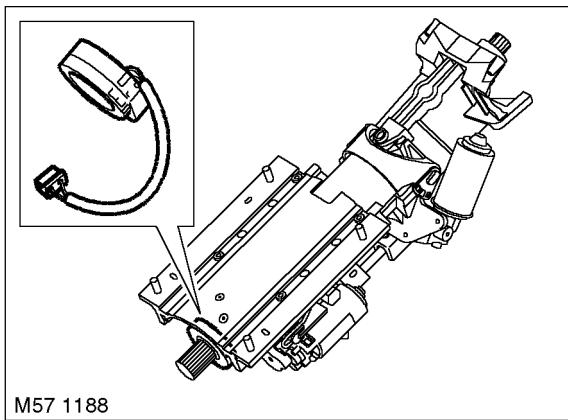
# STEERING

## Sensor- steering angle/column

### » 57.40.02

#### Remove

1. Remove steering column assembly.  
 **STEERING, REPAIRS, Column assembly - inner & outer.**



2. Release steering angle sensor from retaining clip and remove from shaft.

#### Refit

1. Position steering angle sensor to shaft and secure to retaining clip.

*NOTE: Make sure the steering angle sensor is correctly aligned to the steering shaft.*

2. Fit steering column assembly.

 **STEERING, REPAIRS, Column assembly - inner & outer.**

3. Testbook/T4 must be used to initiate a new steering angle sensor. The initiation procedure can be found in Testbook/T4 by selecting the following icons.

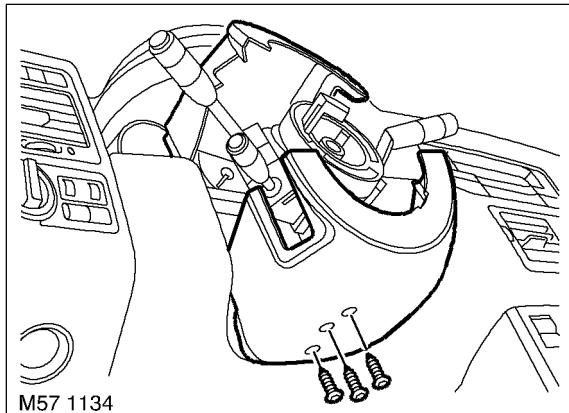
- System diagnosis
- ABS
- Vehicle maintenance

## Nacelle - column - complete

### » 57.40.29

#### Remove

1. Fully extend the steering column for access.



2. Remove 3 Torx screws securing steering column nacelle.

*Steering wheel removed from graphic for illustration purposes only.*

3. Release nacelle from clips securing assembly to column extension gaiter

4. Remove steering column nacelle.

#### Refit

1. Push steering column extension gaiter fully forwards and fit lower half of nacelle.

2. Fit and tighten the 2 T25 Torx screws.

**Ensure the lower half of nacelle does not foul the steering wheel.**

3. Fit upper half of nacelle and ensure that clips engage with lower half.

4. Secure upper half of nacelle with T20 Torx screw.

5. Fit and secure steering column extension gaiter to nacelle.

**Ensure the nacelle does not foul the steering wheel.**

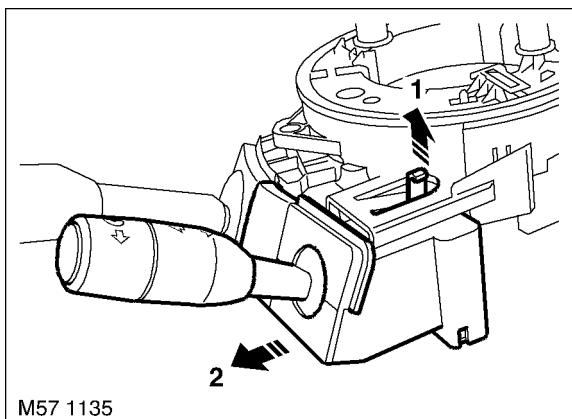


## Switch - column adjustment - control

» 57.41.05

### Remove

1. Remove rotary coupler.  
**☞ RESTRAINT SYSTEMS, REPAIRS,  
Rotary coupler.**



2. Release clip securing switch to rotary coupler and remove switch assembly.

### Refit

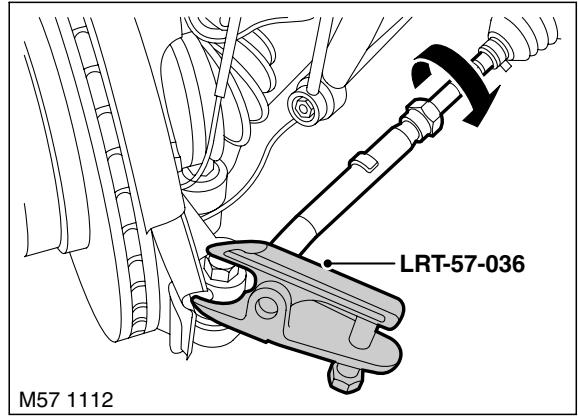
1. Position switch assembly to rotary coupler, fit and secure clip.
2. Fit rotary coupler.  
**☞ RESTRAINT SYSTEMS, REPAIRS,  
Rotary coupler.**

## Ball joint - track rod

» 57.55.07

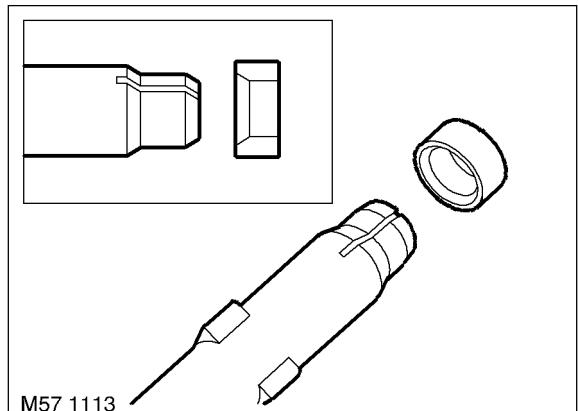
### Remove

1. Raise front of vehicle.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**
2. Remove front road wheel.



3. Loosen track rod end locknut.
4. Remove nut from ball pin and discard.
5. Fit an M14 nut to ball pin, flush with end of pin.
6. Using LRT-57-036 separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.
7. Remove track rod end, note the number of turns for refit.
8. Remove and discard locking ring.

### Refit



1. Fit locking ring ensuring taper faces towards track rod end.

# STEERING

2. Fit track rod end to track rod the number of turns noted on removal.
3. Clean track rod end taper and taper seat.
4. Connect track rod end to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stands and lower vehicle.
7. Check and adjust front wheel alignment.

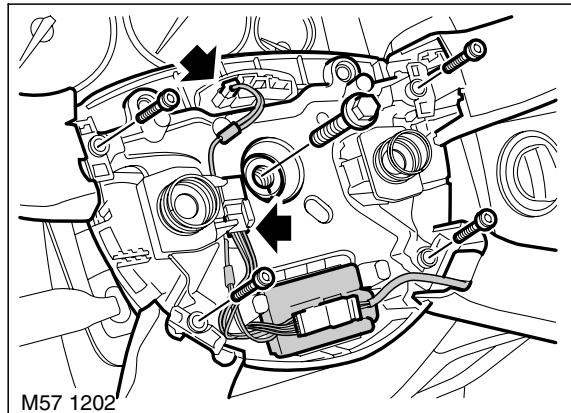
 **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

## Steering wheel

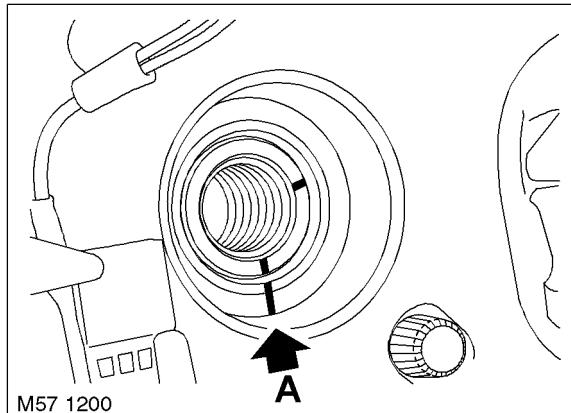
» **57.61.01**

### Remove

1. Remove airbag module from steering wheel.  
 **RESTRAINT SYSTEMS, REPAIRS, Airbag module - steering wheel.**



2. **Models with heated steering wheel:**  
Disconnect multiplug from rotary coupler.  
**CAUTION: Centralise the steering wheel with the road wheels in the straight ahead position. This will ensure that the rotary coupler is locked as the steering wheel is removed.**
3. Restrain steering wheel and remove retaining bolt.



*RHD vehicles*



- 4. RHD vehicles:** With the wheels in the straight ahead position, the bottom timing mark on the steering column must be aligned with the steering wheel mark, see illustration above.

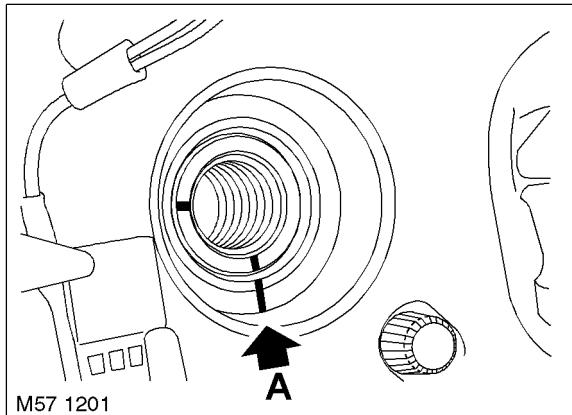
*NOTE: The steering column timing marks are 105° apart.*

- 6. Fit steering wheel retaining bolt and tighten to 63 Nm (46 lbf.ft).**

- 7. Models with heated steering wheel:** Connect multiplug to rotary coupler.

- 8. Fit drivers airbag.**

**RESTRAINT SYSTEMS, REPAIRS,  
Airbag module - steering wheel.**



*LHD vehicles*

- 5. LHD vehicles:** With the wheels in the straight ahead position, the bottom timing mark on the steering column must be aligned with the steering wheel mark, see illustration above.

*NOTE: The steering column timing marks are 105° apart.*

- 6. Note wheel to column alignment marks and remove steering wheel.**

*NOTE: Do not carry out further dismantling if component is removed for access only.*

- 7. Models with heated steering wheel:** Release multiplugs from clips on steering wheel and ECU, disconnect multiplug and remove the heated steering wheel ECU.

- 8. Remove 4 screws securing steering wheel trim and remove trim pieces.**

- 9. Remove airbag retainers.**

#### Refit

1. Fit airbag retainers.
2. Fit trim and secure with screws.
3. **Models with heated steering wheel:** Position heated steering wheel ECU, connect multiplug and fit ECU into location. Fit multiplugs into clips.
4. Ensure road wheels are straight ahead and rotary coupler is locked in correct position.
5. Carefully fit steering wheel, engage coupler and align to column.

# STEERING

## Switch unit - steering wheel

### » 57.61.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system.

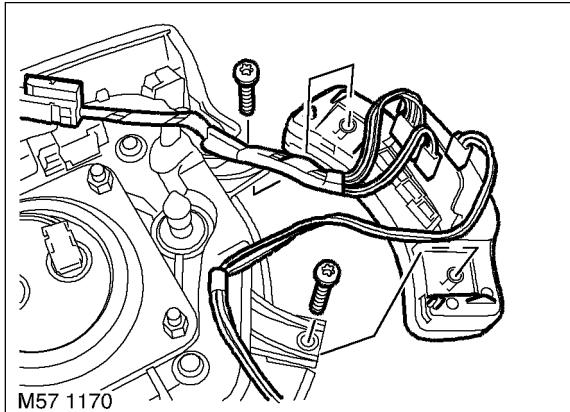
Disconnect the negative lead first. Never reverse connect the battery.

#### Remove

1. Make the SRS system safe.

#### GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.

2. Remove airbag module from steering wheel.  
 RESTRAINT SYSTEMS, REPAIRS, Airbag module - steering wheel.



3. Remove 2 Torx screws and release switch unit from airbag.
4. Disconnect multiplugs from switch unit and remove switch.

#### Refit

1. Position switch unit and connect multiplugs.
2. Fit switch unit to airbag and tighten Torx screws to 2.5 Nm (1.8 lbf.ft).
3. Fit drivers airbag.  
 RESTRAINT SYSTEMS, REPAIRS, Airbag module - steering wheel.
4. Connect battery leads, earth lead last.

## Electronic control unit (ECU) - heated steering wheel

### » 57.61.03

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

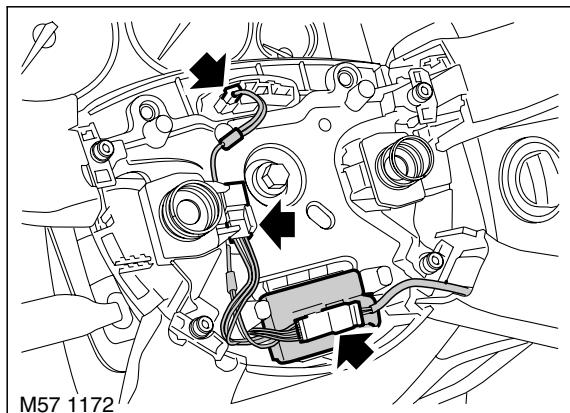
**WARNING:** Always disconnect both battery leads before beginning work on the SRS system.  
Disconnect the negative lead first. Never reverse connect the battery.

#### Remove

1. Make the SRS system safe.

#### GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.

2. Remove airbag module from steering wheel.  
 RESTRAINT SYSTEMS, REPAIRS, Airbag module - steering wheel.



3. Disconnect multiplug from rotary coupler.
4. Release multiplugs from clips on steering wheel and ECU, disconnect multiplug and remove the ECU.

#### Refit

1. Position ECU, connect multiplug and fit ECU into location. Fit multiplugs into clips.
2. Connect multiplug to rotary coupler.
3. Fit drivers airbag.  
 RESTRAINT SYSTEMS, REPAIRS, Airbag module - steering wheel.



## Air suspension system - depressurise and repressurise

### 60.50.38

#### Depressurise

1. Depressurise suspension using TestBook/T4.

**WARNING:** The air suspension system is pressurised up to:

- Up to VIN 106309 - 13.7 Bar (199 lbf/in<sup>2</sup>)
- From VIN 106310 - 11.8 Bar (171 lbf/in<sup>2</sup>)

**WARNING:** Ensure dirt or grease does not enter the system. Wear hand, ear and eye safety protection when working on the system.

#### Repressurise

1. Repressurise suspension using TestBook/T4.

**CAUTION:** The air springs must be fully pressurised before the weight of the vehicle is applied to them.

## Calibrate - air suspension

### 60.90.03

The air suspension system calibration must be carried out after the following components have been replaced:

- Air suspension ECU
- Height sensor
- Body panels incorporating suspension fixing points.

#### Check

1. Connect Testbook/T4 to the vehicle and select air suspension calibration.

**WARNING:** Always wear hand, ear and eye protection when working on the air suspension system.

#### Adjust

1. Observe the following cautions before calibrating the air suspension system.

**CAUTION:** The vehicle can be calibrated laden or unladen, but gross vehicle weight must not be exceeded. Tyres must all be the same size and set at the correct pressures.

**CAUTION:** Ensure the floor used for calibration is level and smooth in all directions to enable calibration to be carried out successfully.

2. Release handbrake and move gearbox selector to 'N' position.

3. Roll vehicle backwards and forwards to relieve stresses in the steering and suspension.

4. Return gearbox selector to 'P' position.

5. Using Testbook/T4 calibrate the air suspension.

6. **Models with Xenon headlamps:** After calibrating the air suspension, use Testbook/T4 to reset the headlamp levelling ECU and adjust the headlamps.

**CAUTION:** Failure to adjust the headlamps using Testbook/T4 will result in the incorrect setting of the headlamp alignment.

7. Check/adjust headlamp alignment.

**LIGHTING, ADJUSTMENTS, Headlamps - align beam.**

8. Disconnect TestBook/T4 from the vehicle.

## **FRONT SUSPENSION**

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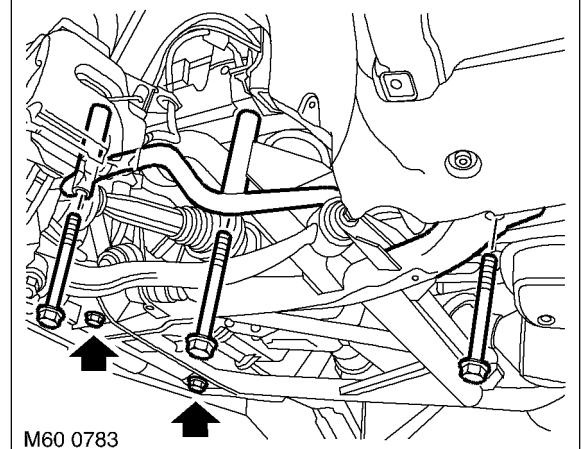
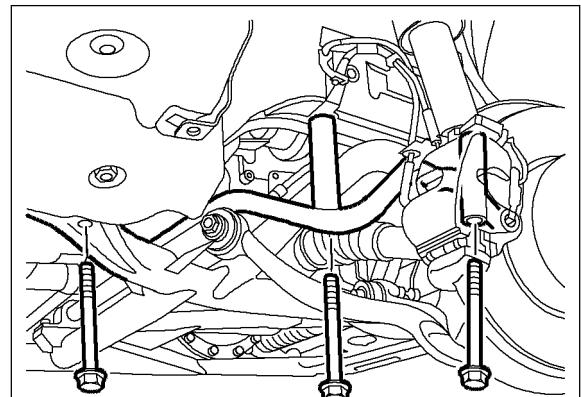
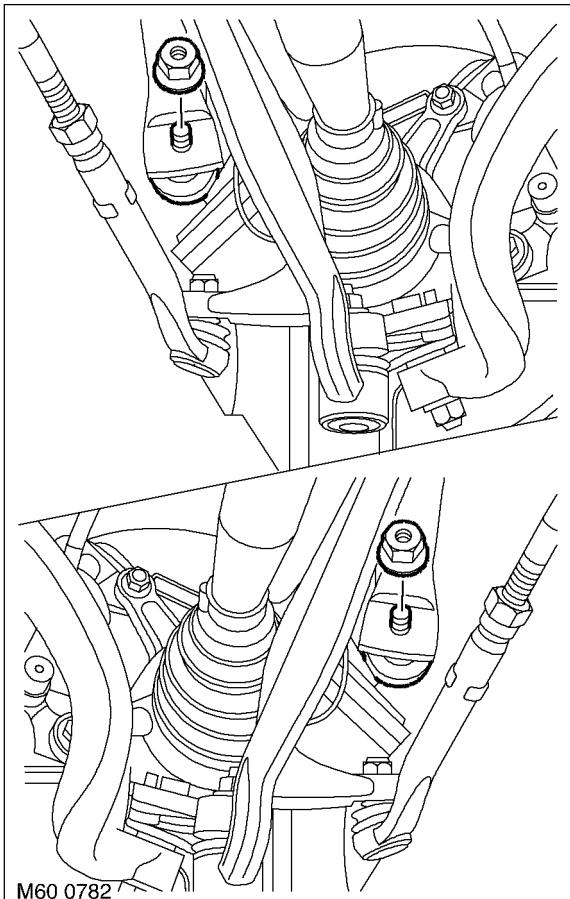


## Anti-roll bar

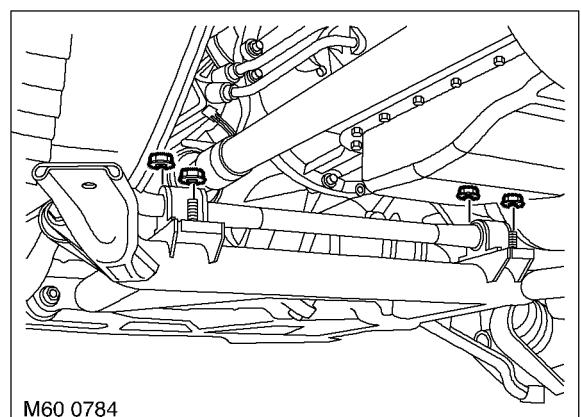
» **60.10.01**

### Remove

1. Remove undertray.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Undertray - front.**
2. Raise front of vehicle and support under body.  
**WARNING: Do not work on or under a  
vehicle supported only by a jack. Always  
support the vehicle on safety stands.**
3. Remove front road wheels.



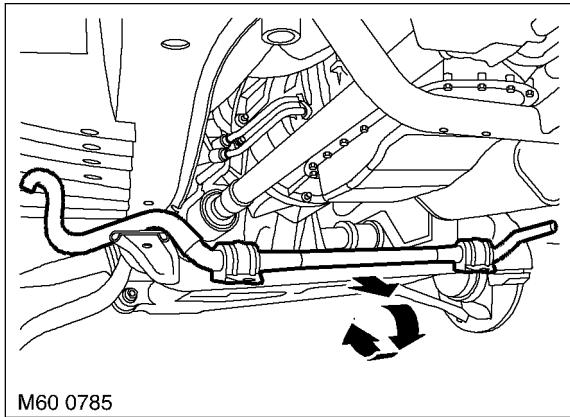
7. Remove 6 bolts and loosen 2 bolts, arrowed, securing front subframe. Discard removed bolts.
8. Lower rear of subframe.
9. Remove remaining anti-roll bar heatshield fixings and remove heatshield.



4. Remove nuts securing anti-roll bar links and release links from anti-roll bar.  
**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**
5. If fitted: Remove 2 speed nuts securing anti-roll bar heatshield to body and 2 bolts securing heatshield to sub-frame. Remove heatshield.
6. Support front subframe under rear cross-tube.

10. Remove 2 nuts securing each anti-roll bar bush clamp.

# FRONT SUSPENSION



11. Manoeuvre anti-roll bar over subframe and remove from vehicle.  
**CAUTION:** The anti roll bar clamps are supplied with the anti roll bar and must not be removed.

## Refit

1. Position anti-roll bar to subframe and manoeuvre into position.
2. Locate clamps and lightly tighten nuts.
3. Raise subframe, fit new bolts securing subframe to body and tighten to 165 Nm (122 lbf.ft). Tighten 2 rear bolts a further 90°.
4. Tighten bolts securing subframe to front crossmember to 132.5 Nm (97 lbf.ft).
5. Connect anti-roll bar links, fit nuts and tighten to 100 Nm (74 lbf.ft).
6. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
7. Remove supports and lower vehicle.
8. Fit undertray.  
 **EXTERIOR FITTINGS, REPAIRS,**  
**Undertray - front.**
9. Tighten anti-roll bar bush clamp nuts to 19 Nm (14 lbf.ft).
10. Fit anti-roll bar heatshields and tighten fixings.
11. Check wheel alignment.  
 **STEERING, ADJUSTMENTS, Front wheel alignment - check & adjust.**

## Link - anti roll bar

### 60.10.02

Road wheels must be in straight ahead position during this operation

#### Remove

1. Raise front of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

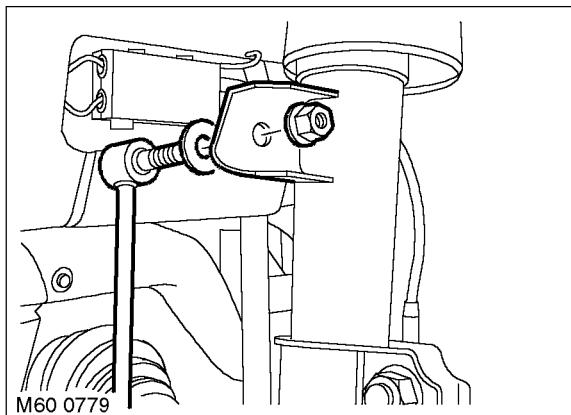
2. Remove road wheel.



3. Remove nut securing anti-roll bar link to anti-roll bar.

**CAUTION:** Use an open ended spanner on flats provided to prevent ball joint rotating.

4. Release link from anti-roll bar.



5. Remove nut securing anti-roll bar link to damper.



## FRONT SUSPENSION

6. Remove link and collect washer fitted to top ball joint.

**CAUTION: Note position of washer for refit.**

### Refit

1. Fit washer to ball joint, fit anti-roll bar link, fit nuts and tighten to 100 Nm (74 lbf.ft).
2. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
3. Remove stands and lower vehicle.

### Ball joint - tie rod

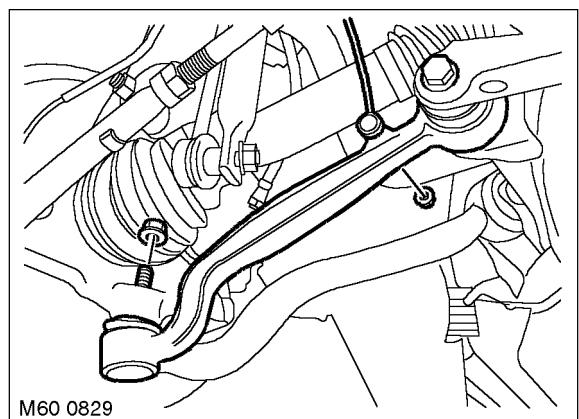
» **60.15.04**

#### Remove

1. Raise front of vehicle.

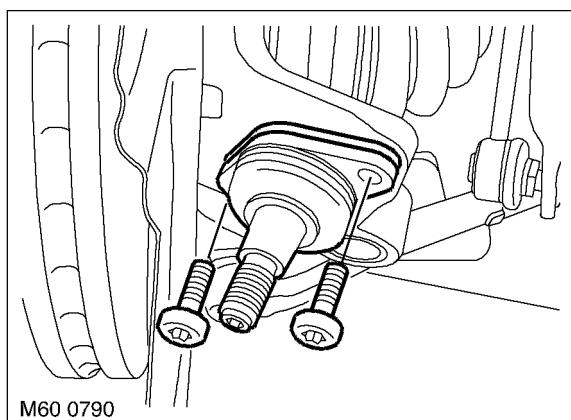
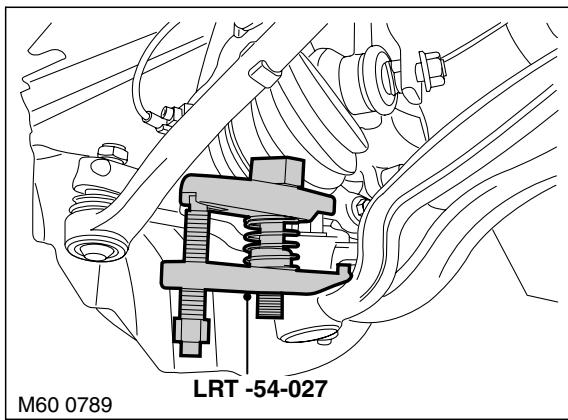
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

2. Remove road wheels.



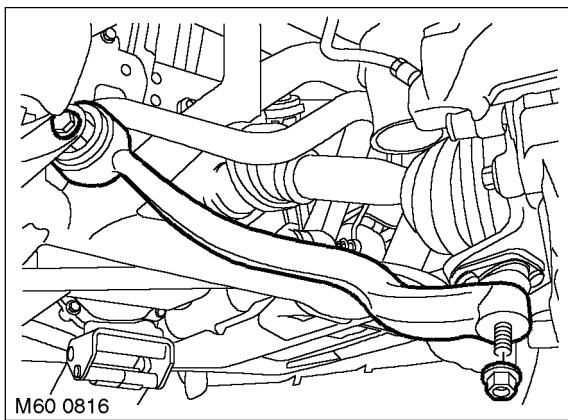
3. Loosen bolt securing lower arm to subframe one quarter of a turn.
4. Remove nut securing height sensor link to lower arm and release link.  
**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**
5. Remove nut securing lower arm ball joint to hub.

## FRONT SUSPENSION

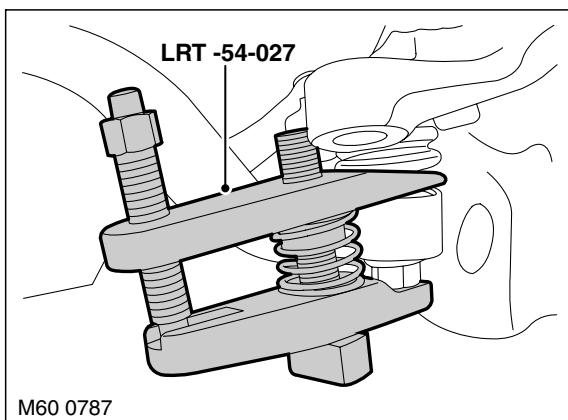


6. Using **LRT-54-027** release lower arm ball joint and disconnect lower arm from hub.

**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**



7. Loosen bolt securing tie rod to subframe one quarter of a turn.
8. Remove nut securing tie rod to ball joint.



9. Using **LRT-54-027** release tie rod from ball joint

10. Remove 2 bolts securing ball joint. Discard bolts.
11. Remove ball joint.

### Refit

1. Clean ball joint and mating face.
2. Position ball joint, fit new bolts and tighten to 60 Nm (44 lbf.ft).
3. Clean ball joint taper and taper seat.
4. Connect tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).
5. Clean ball joint taper and taper seat.
6. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).
7. Replace bolts securing lower arm to subframe and tie rod to subframe but do not tighten at this stage.
8. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
9. Remove stands and lower vehicle.
10. Tighten bolt securing tie rod to subframe to 165 Nm (121 lbf.ft) plus a further 90°.
11. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft) plus a further 90°.
12. Repeat procedure for other side.
13. Check front wheel alignment.



## Air spring assembly

### 60.21.01

Do not depressurise air suspension system before raising vehicle.

It is not necessary to depressurise the whole system, only the spring being replaced.

When removing Voss connectors from any air suspension component the connector must be left attached to the air pipe being removed. Do not remove the connector from the air pipe. Removing the connector from the air pipe could cause the connector to scratch the pipe and increase the likelihood of leaks.

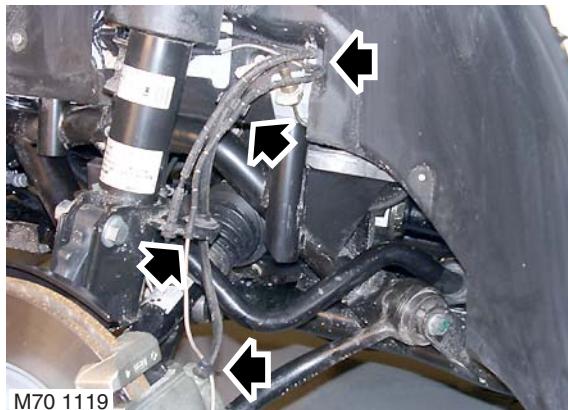
#### Remove

- Raise front of vehicle and support under body.

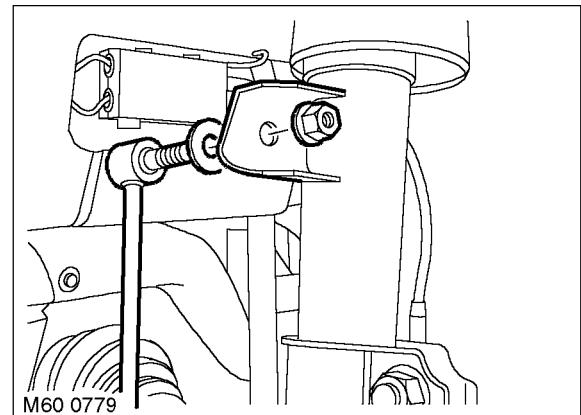
**WARNING:** *Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.*

- Remove road wheel(s).
- Depressurise air spring being replaced.

→ **FRONT SUSPENSION,  
ADJUSTMENTS, Air suspension system -  
depressurise and repressurise.**



- Release ABS sensor harness and brake hose from damper.
- LH side only:** Release brake pad wear sensor lead from damper.

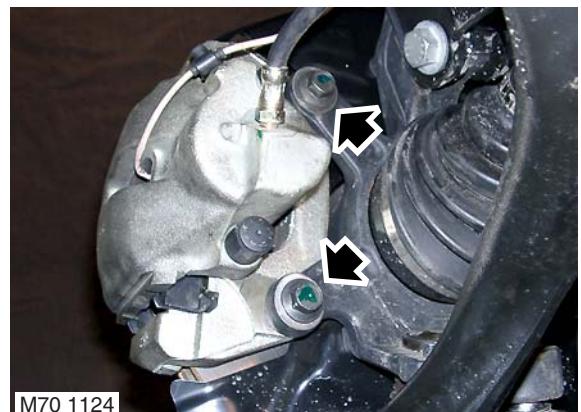


- Remove nut securing anti-roll bar link to damper.

**CAUTION:** Use an open ended spanner on flats provided to prevent ball joint rotating.

- Release anti-roll bar link and collect washer.

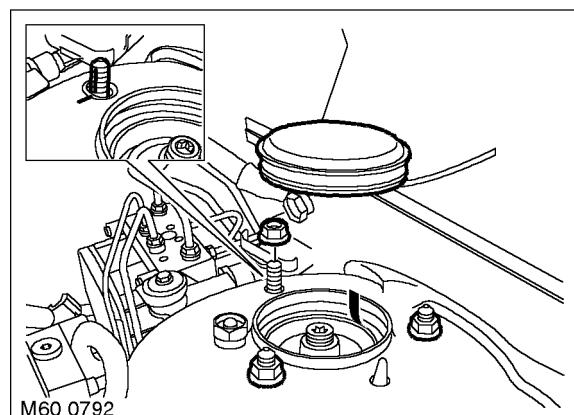
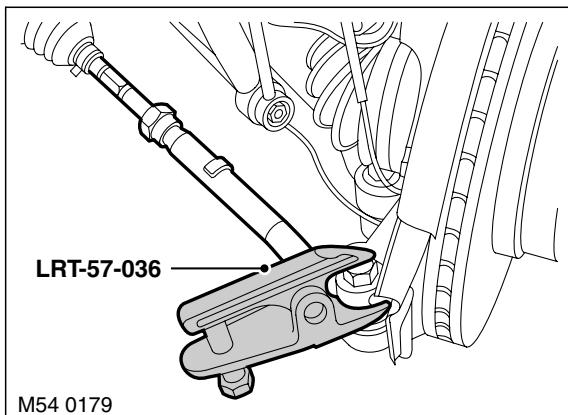
**CAUTION:** Note position of washer for refit.



- Remove 2 bolts securing brake caliper to hub. Release caliper from hub and tie aside.

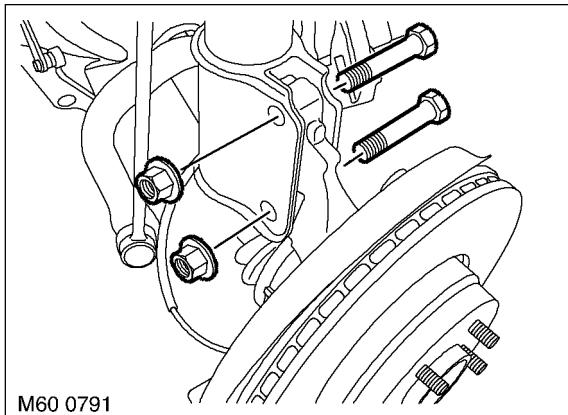
**CAUTION:** Do not allow caliper to hang on brake hose.

## FRONT SUSPENSION



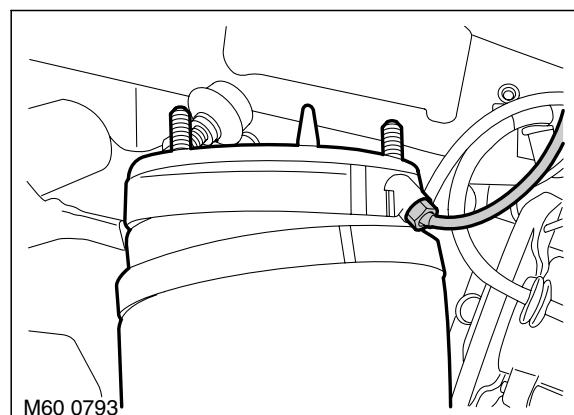
9. Remove nut from track rod end.
10. Fit an M14 nut to ball pin, flush with end of pin.
11. Using **LRT-57-036** separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.  
**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.

12. Position jack to support the lower arm.



13. Remove 2 nuts and bolts securing hub to damper.
14. Release hub from damper and lower arm, sufficiently to clear damper.

15. Remove cap from top mounting.
16. Remove inboard nut securing spring and damper assembly and mark relationship between stud and turret for refitting reference.
17. Remove 2 remaining nuts, release spring and damper assembly and lower sufficiently for access to air pipe connection.



18. Remove connector from air spring.  
**CAUTION:** Always fit plugs to open connections to prevent contamination.
19. Remove spring and damper assembly.
20. Remove and discard paper gasket from spring and damper assembly.

### Refit

1. Clean spring and damper location.  
**CAUTION:** Check air spring for signs of damage. If air spring is damaged, it must be replaced.
2. If fitting a new spring and damper assembly, remove air connector from new assembly.
3. Fit new paper gasket to spring and damper assembly.

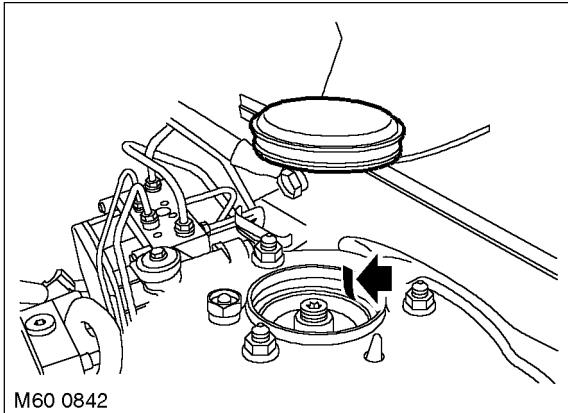


4. Position spring and damper assembly, connect air pipe but do not tighten union at this stage.

**CAUTION: Ensure air pipe connections are clean.**

18. Remove stand(s) and lower vehicle.

19. Check front wheel alignment.



5. Locate spring and damper assembly to body, fit top mounting nuts, align stud to reference mark and tighten nuts to 56 Nm (42 lbf.ft).

**CAUTION: Ensure paper tag on gasket is visible through large hole on suspension turret, arrowed in illustration.**

6. Fit cap to top mounting.
7. Tighten air pipe connection to 3.5 Nm (2.6 lbf.ft).
8. Connect hub to damper, fit bolts and tighten to 250 Nm (184 lbf.ft).
9. Clean ball joint taper and taper seat.
10. Connect ball joint to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
11. Clean mating faces of caliper and hub.
12. Position caliper to hub, fit bolts and tighten to 110 Nm (81 lbf.ft).
13. Secure brake hose and ABS sensor harness to damper.
14. **LH side only:** Secure pad wear sensor lead.
15. Fit washer, connect anti-roll bar link, fit nut and tighten to 100 Nm (74 lbf.ft).

**CAUTION: The washer is hardened and must be fitted in the correct position.**

16. Pressurise suspension.  
👉 **FRONT SUSPENSION, ADJUSTMENTS, Air suspension system - depressurise and repressurise.**  
**CAUTION: The system must be pressurised before putting weight of vehicle on suspension.**
17. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).

# FRONT SUSPENSION

## Hub

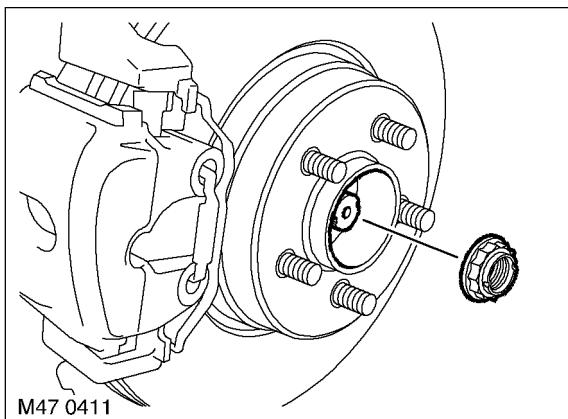
→ 60.25.01

### Remove

1. Raise front of vehicle.

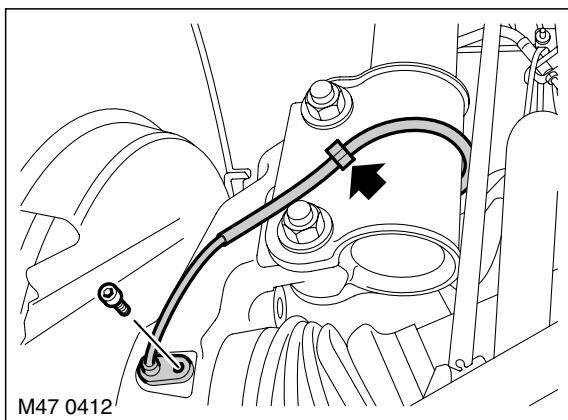
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.

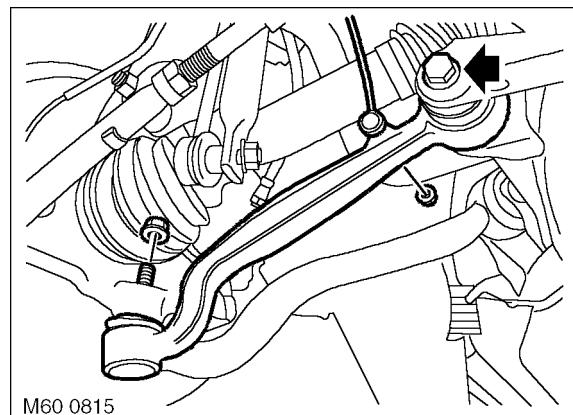


3. Release drive shaft hub nut stake.
4. With an assistant applying brakes, remove and discard drive shaft hub nut.
5. Remove brake disc.

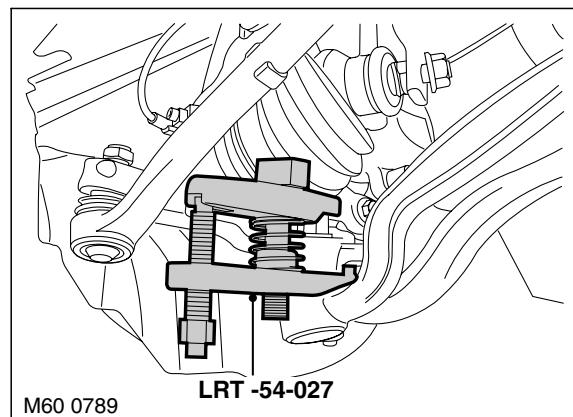
**BRAKES, REPAIRS, Brake disc - front.**



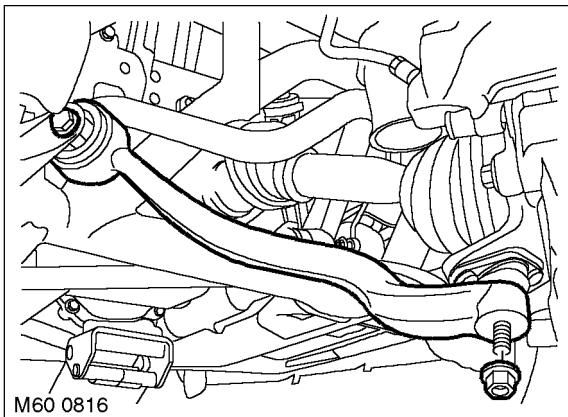
6. Release ABS sensor lead from clip.
7. Release sensor lead from damper, remove Allen screw and release ABS sensor from hub.



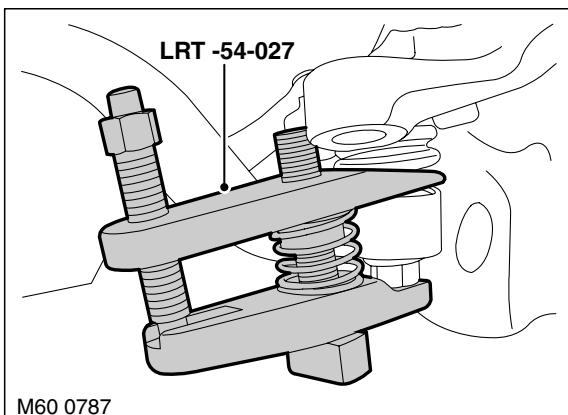
8. Remove nut securing height sensor link to lower arm and release link.  
**CAUTION:** Use an open ended spanner on flats provided to prevent ball joint rotating.
9. Loosen bolt securing lower arm to subframe one quarter of a turn.
10. Remove nut securing lower arm ball joint to hub.



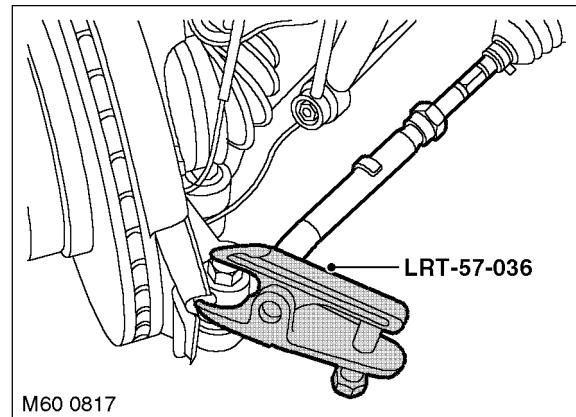
11. Using **LRT-54-027** release lower arm ball joint and disconnect lower arm from hub.  
**CAUTION:** Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.



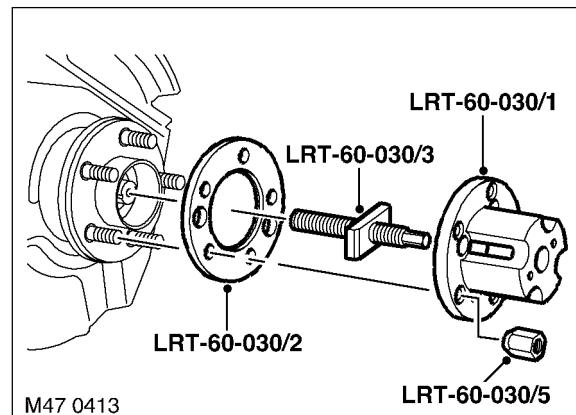
12. Loosen bolt securing tie rod to subframe one quarter of a turn.
13. Remove nut securing tie rod to ball joint.



14. Using **LRT-54-027** release tie rod from ball joint  
**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**

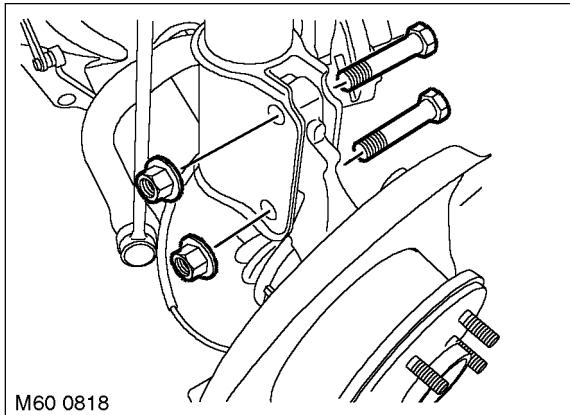


15. Remove and discard nut securing track rod ball joint to steering arm.
16. Fit an M14 nut to ball pin, flush with end of pin.
17. Using **LRT-57-036** separate ball pin from steering arm. Remove M14 nut and release ball pin from steering arm.  
**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**



18. Fit centre screw **LRT-60-030/3** to **LRT-60-030/1** and fit to hub with spacer **LRT-60-030/2**. Secure with nuts **LRT-60-030/5**.
19. Tighten centre screw to press drive shaft from flange.
20. Remove tools.

## FRONT SUSPENSION



21. Remove 2 nuts and bolts securing hub to damper.
22. Remove hub assembly.

### Refit

1. Clean hub to damper mating faces
2. Clean drive shaft and flange splines.
3. Lightly lubricate splines.
4. Position hub assembly and fit upper bolt, locate drive shaft to hub, align hub and fit lower bolt  
Tighten bolts securing hub to damper to 250 Nm (184 lbf.ft).

13. Replace bolts securing lower arm to subframe and tie rod to subframe but do not tighten at this stage.

14. Connect height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).

**CAUTION: Ensure height sensor arm is pointing outwards.**

15. Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.

**CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**

16. Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).

17. Secure sensor lead to damper.

18. Fit front brake disc.

**BRAKES, REPAIRS, Brake disc - front.**

19. Fit new hub nut and tighten to 420 Nm (311 lbf.ft).

20. Stake nut to shaft.

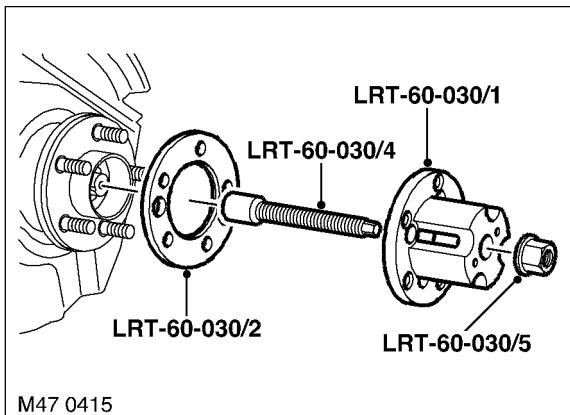
21. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).

22. Remove stands and lower vehicle.

23. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft) plus a further 90°.

24. Tighten bolt securing tie rod to subframe to 165 Nm (121 lbf.ft) plus a further 90°.

25. Check front wheel alignment.



5. Fit **LRT-60-030/4** to drive shaft.
6. Fit **LRT-60-030/1** with spacer **LRT-60-030/2** and secure with nuts **LRT-60-030/5**.
7. Fit nut to **LRT-60-030/4** and tighten nut to pull drive shaft into drive flange.
8. Remove tools.
9. Clean ball joint tapers and taper seats.
10. Connect ball joint to steering arm, fit new nut and tighten to 80 Nm (59 lbf.ft).
11. Connect tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).
12. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).



## Bearings - hub

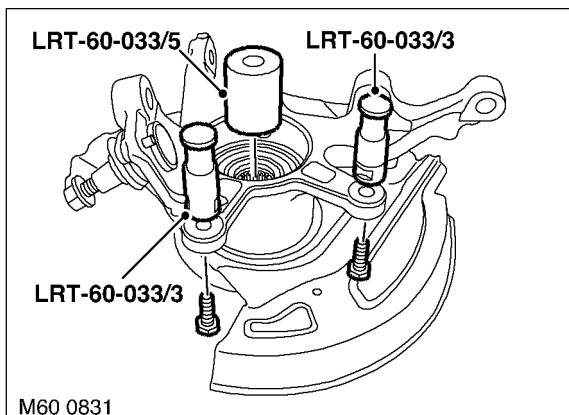
60.25.14

### Remove

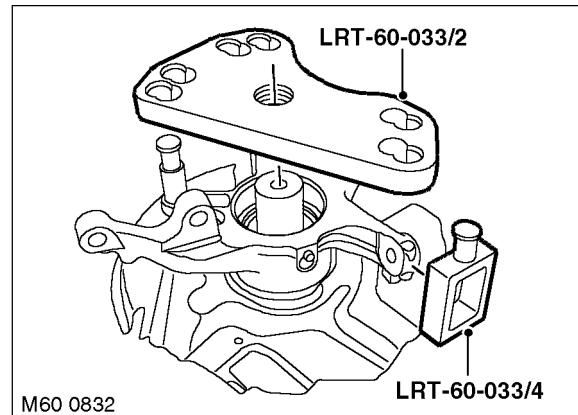
1. Remove hub assembly.  
FRONT SUSPENSION, REPAIRS, Hub.



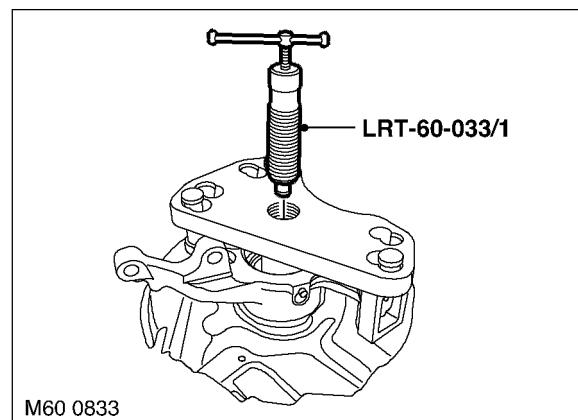
2. Remove 3 bolts securing brake disc shield.



3. Position pins, LRT-60-033/3 to brake caliper mounting bolt locations and secure with bolts.
4. Fit adapter, LRT-60-033/5 to drive flange.



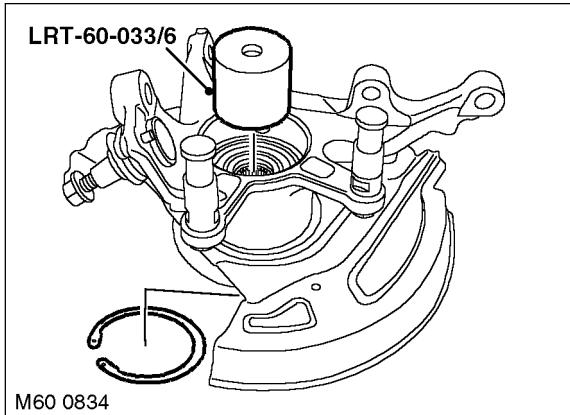
5. Locate plate, LRT-60-033/2 to pins, fit pin LRT-60-033/4 over steering arm and secure to plate.  
*NOTE: Pins locate in holes marked 'FRONT'*



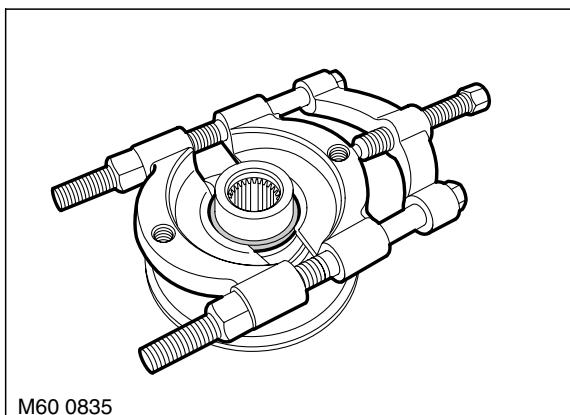
6. Screw hydraulic ram, LRT-60-033/1 into plate and press drive flange from hub.  
*NOTE: Outer bearing track will remain on drive flange.*
7. Remove plate LRT-60-033/2 and pin LRT-60-033/4.

## FRONT SUSPENSION

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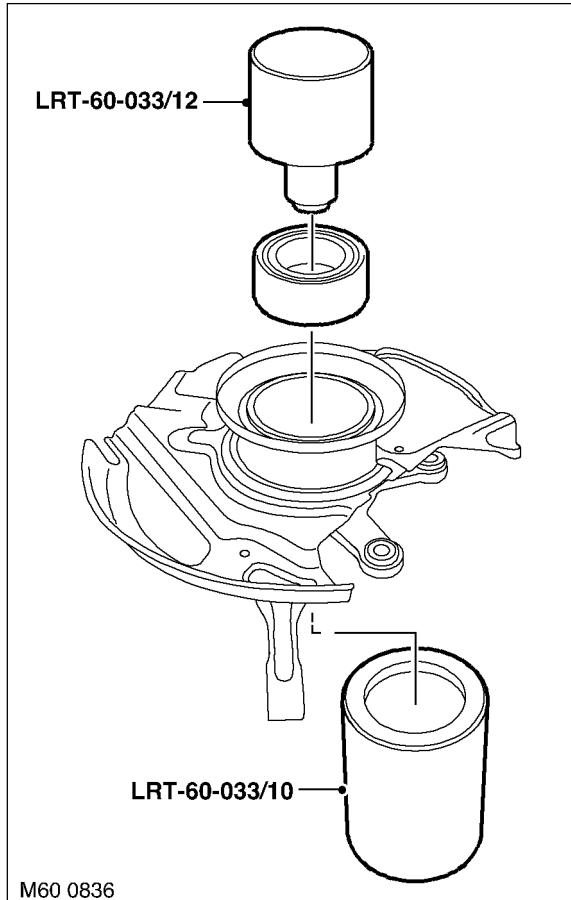
8. Remove and discard circlip.
9. Fit adapter, **LRT-60-033/6** to bearing and using method previously described, remove bearing.
10. Remove pins **LRT-60-033/3**.



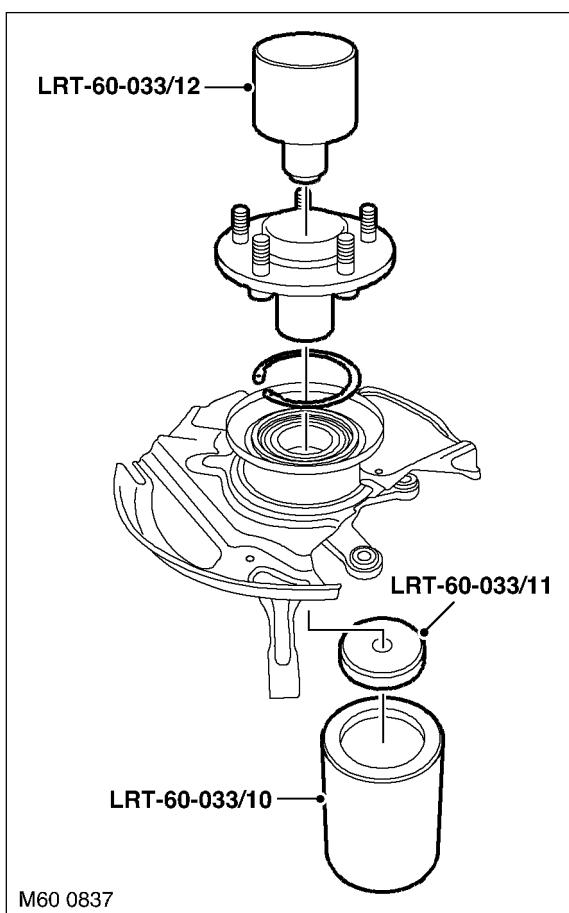
11. Remove bearing track from drive flange using a bearing separator.

### Refit

1. Clean hub and drive flange.



2. Position anvil, **LRT-60-033/10** to bed of hydraulic press and locate hub on anvil.
3. Ensure hub and bearing mating surfaces are clean and dry.
4. Apply stud/bearing fit, STC 50553 to bearing mating surface in hub for half its length.
5. Press bearing into hub using adapter **LRT-60-033/12**.



6. Fit new circlip.
7. Fit bearing support, **LRT-60-033/11** to anvil, and press flange into bearing using adapter **LRT-60-033/12**.
8. Remove tools.
9. Clean disc shield and mating face, align shield and fit and tighten bolts.
10. Fit hub assembly.

**FRONT SUSPENSION, REPAIRS, Hub.**

## Lower arm

### 60.35.03

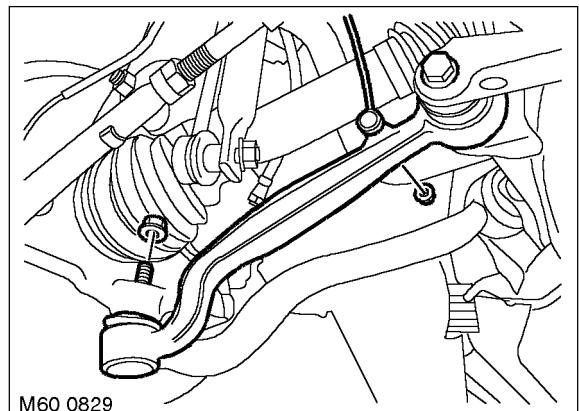
The Lower arm Ball Joints must be replaced as a pair.

#### Remove

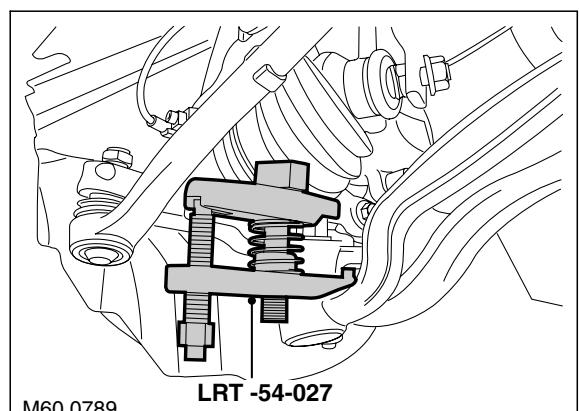
1. Raise front of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



3. Remove nut securing height sensor link to lower arm and release link.
4. Loosen bolt securing lower arm to subframe one quarter of a turn.
5. Remove nut securing lower arm ball joint to hub.



6. Using **LRT-54-027** release lower arm ball joint and disconnect lower arm from hub.

# FRONT SUSPENSION

7. Remove bolt securing lower arm to subframe.  
Discard bolt.
8. Remove lower arm.

## Refit

1. Position lower arm and align to subframe fit new bolt but do not tighten at this stage.  
**CAUTION: Nuts and bolts must be tightened with weight of vehicle on suspension.**
2. Clean ball joint taper and taper seat.
3. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).  
**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**
4. Connect height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).  
**CAUTION: Ensure height sensor arm is pointing outwards.**
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stand(s) and lower vehicle.
7. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft) plus a further 90°.
8. Check front wheel alignment.

## Bush - lower arm

### 60.35.26

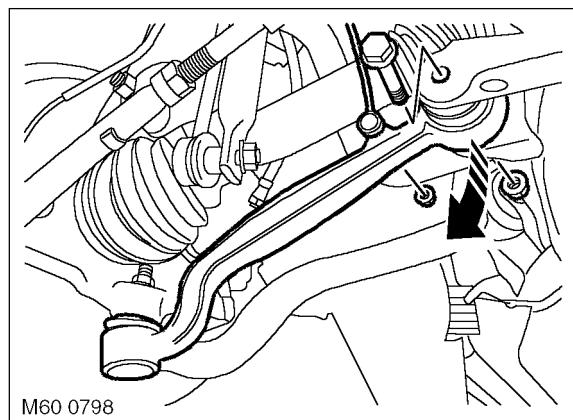
The lower arm bushes must be replaced as a pair.

#### Remove

1. Raise front of vehicle.

**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

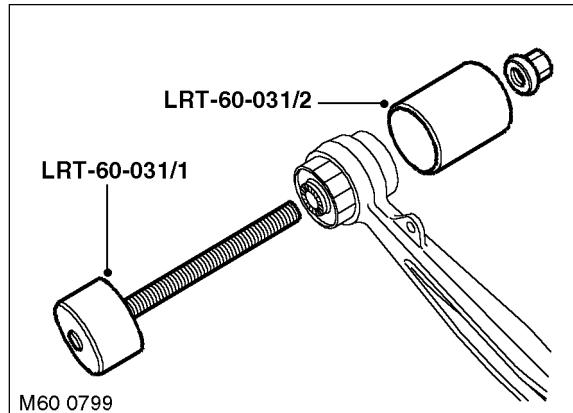
2. Remove road wheels.



3. Remove nut securing height sensor link to lower arm and release link.

**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**

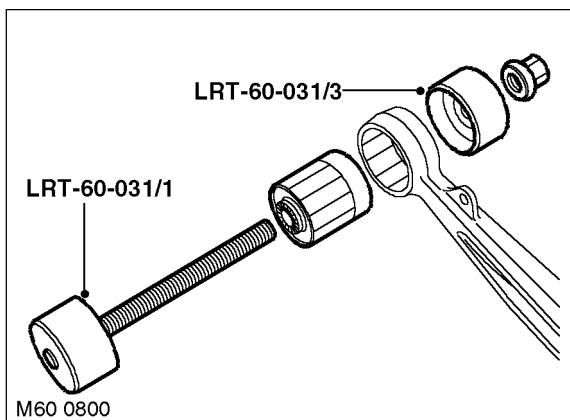
4. Remove bolt securing lower arm to subframe.  
Discard bolt.
5. Release lower arm from subframe.



6. Using **LRT-60-031/1** and **LRT-60-031/2** remove lower arm bush.

**Refit**

1. Clean bush and bush location in lower arm.



2. Using **LRT-60-031/1** and **LRT-60-031/3** fit bush to lower arm.
3. Position lower arm and align to subframe fit new bolt but do not tighten at this stage.  
**CAUTION: Nuts and bolts must be tightened with weight of vehicle on suspension.**
4. Connect height sensor link to lower arm, fit nut and tighten to 8 Nm (6 lbf.ft).  
**CAUTION: Ensure height sensor arm is pointing outwards.**
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stand(s) and lower vehicle.
7. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft) plus a further 90°.
8. Repeat procedure for other side.
9. Check front wheel alignment.

**Height sensor**

**60.36.01**

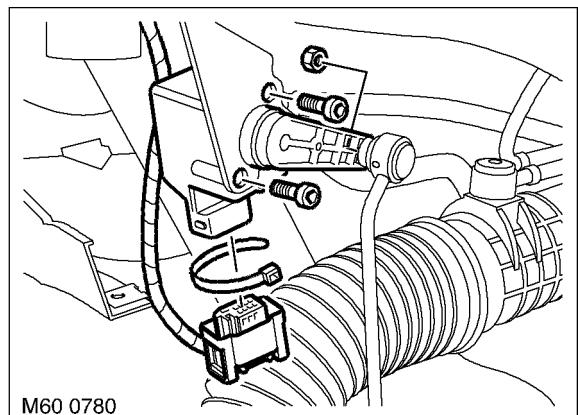
For models fitted with Xenon headlamps, the RH front and RH rear height sensors are different to those models with standard headlamps. The Xenon sensors can be identified by a white stripe on the back face of the sensor housing. These sensors can be fitted to models without Xenon headlamps. The sensors fitted to models without Xenon headlamps cannot be fitted to those with Xenon headlamps.

**Remove**

1. Raise front of vehicle.

**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

2. Remove road wheel.



3. Remove cable tie and disconnect multiplug.
4. Remove nut and disconnect link from sensor.  
**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**
5. Using a 4mm Allen socket, remove 2 Allen screws securing height sensor to mounting bracket and remove height sensor.

# FRONT SUSPENSION

## Refit

1. Ensure sensor and mounting bracket mating surfaces are clean.
2. Position height sensor to mounting bracket, fit Allen screws and tighten to 5 Nm (3.7 lbf.ft).
3. Connect link to height sensor, fit nut and tighten to 8 Nm (6 lbf.ft).  
**CAUTION: Ensure height sensor arm is pointing outwards.**
4. Connect multiplug and secure harness with cable tie, taking care not to exert excessive tension on wires as they enter multiplug.  
**CAUTION: Ensure 'O' ring seal is correctly located in multiplug.**
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stands and lower vehicle.
7. If a replacement sensor has been fitted, use TestBook/T4 to re-calibrate system.

 FRONT SUSPENSION,  
ADJUSTMENTS, Calibrate - air suspension.

## Tie rod

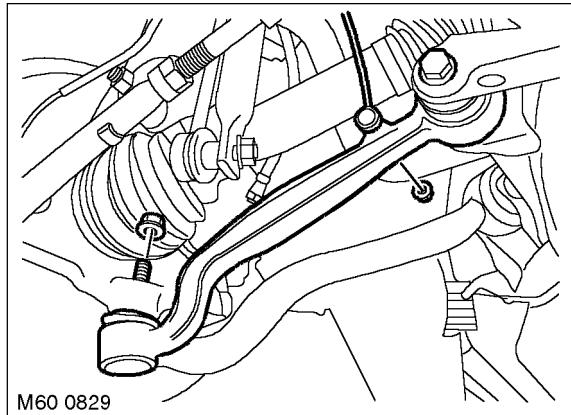
### 60.40.09

#### Remove

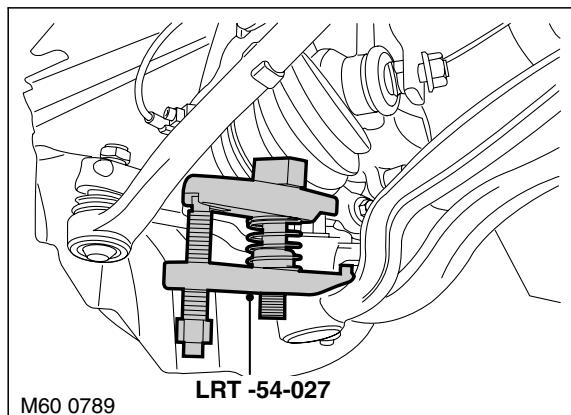
1. Raise front of vehicle.

**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

2. Remove road wheel.



3. Remove nut securing height sensor link to lower arm and release link.
4. Loosen bolt securing lower arm to subframe one quarter of a turn.
5. Remove nut securing ball joint to lower arm.

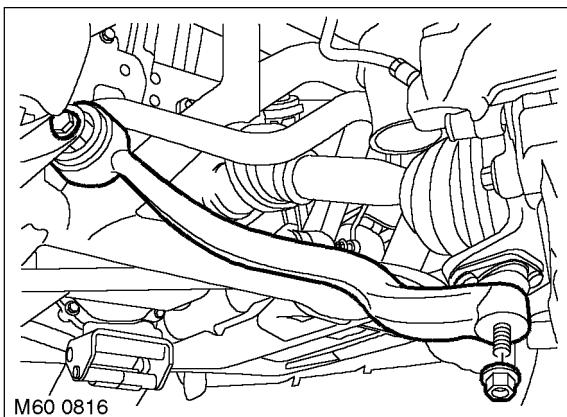


6. Using LRT-54-027 release lower arm ball joint and disconnect lower arm from hub.

**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**

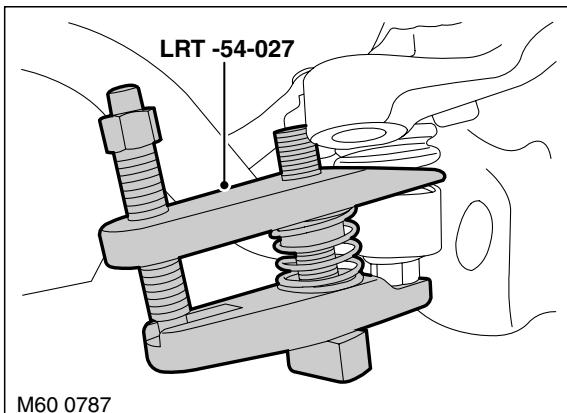


## FRONT SUSPENSION



6. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
7. Remove stands and lower vehicle.
8. Tighten bolt securing lower arm to subframe to 165 Nm (121 lbf.ft) plus a further 90°.
9. Tighten bolt securing tie rod to subframe to 165 Nm (121 lbf.ft) plus a further 90°.
10. Check front wheel alignment.

7. Loosen bolt securing tie rod to subframe one quarter of a turn.
8. Remove nut securing tie rod to ball joint.



9. Using **LRT-54-027** release tie rod from ball joint
10. Remove bolt securing tie rod to subframe.  
Discard bolt.
11. Remove tie rod.

### Refit

1. Clean ball joint tapers and taper seats.
2. Fit tie rod, fit new bolt but do not tighten at this stage  
**CAUTION: Nuts and bolts must be tightened with weight of vehicle on suspension.**

3. Connect tie rod to ball joint, fit nut and tighten to 80 Nm (59 lbf.ft).

**CAUTION: Ensure ball joint seal is not damaged. A damaged seal will lead to premature failure of the joint.**

4. Connect lower arm ball joint to hub, fit nut and tighten to 80 Nm (59 lbf.ft).
5. Replace bolt securing lower arm to subframe but do not tighten at this stage.

# FRONT SUSPENSION

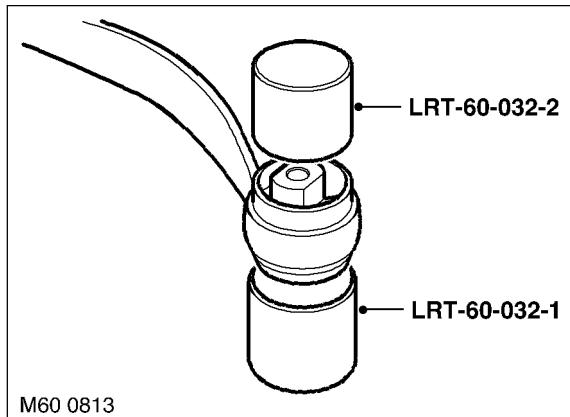
## Bushes - tie rods

### » 60.40.12

Caution: Bushes must be replaced in pairs.

#### Remove

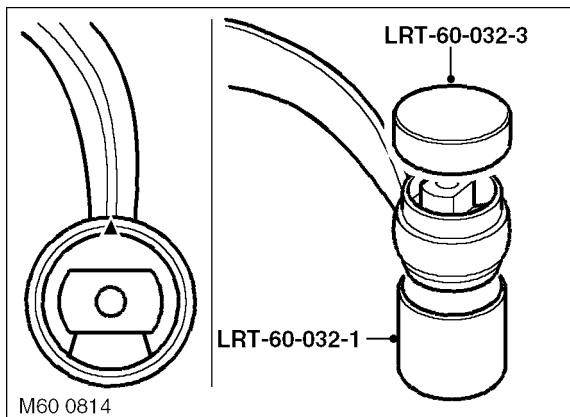
1. Remove tie rod.  
 **FRONT SUSPENSION, REPAIRS, Tie rod.**



2. Using **LRT-60-032/1** and **LRT-60-032/2** press bush from tie rod.

#### Refit

1. Ensure bush and bore are clean and free from grease.



2. Align bush as shown and fit bush using **LRT-60-032/1** and **LRT-60-032/3**.
3. Fit tie rod.  
 **FRONT SUSPENSION, REPAIRS, Tie rod.**
4. Repeat procedure for other side.

## Air reservoir

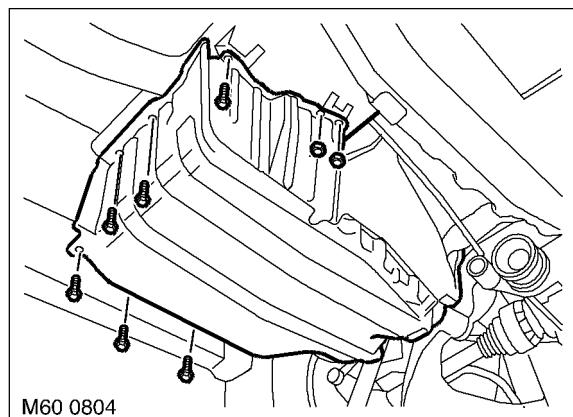
### » 60.50.03

The pressure switch in the air reservoir must not be removed. It is supplied with the air reservoir.

When removing Voss connectors from any air suspension component the connector must be left attached to the air pipe being removed. Do not remove the connector from the air pipe. Removing the connector from the air pipe could cause the connector to scratch the pipe and increase the likelihood of leaks.

#### Remove

1. Raise front and rear of vehicle and support under body.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**
2. Remove valve block assembly.  
 **FRONT SUSPENSION, REPAIRS, Valve block assembly.**



3. Remove 6 bolts and 2 nuts securing fuel tank shield and lower shield for access.

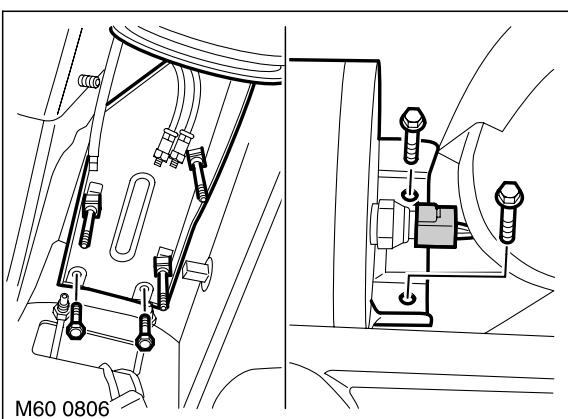
**Refit**

1. Fit valve block mounting studs and tighten nuts.  
**CAUTION:** Ensure the rubber blocks are correctly seated into depressions in valve block.

2. If fitting a new reservoir, remove air connector from new assembly.
3. Position reservoir, secure air pipes and connect multiplug.

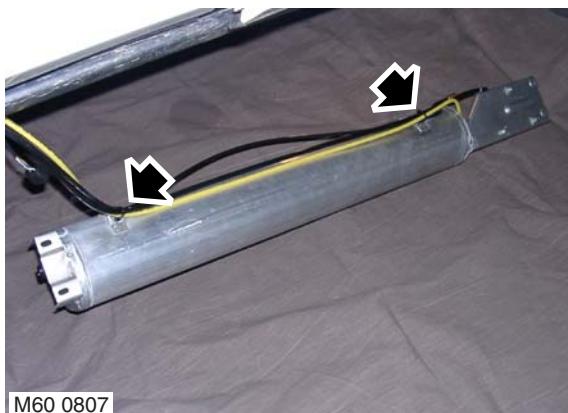
**CAUTION:** Take care not to trap pipes under reservoir brackets

4. Fit bolts securing air reservoir to body and tighten to 8 Nm (6 lbf.ft).
5. Fit bolts and nuts securing fuel tank shield and tighten to 25 Nm (18 lbf.ft).
6. Fit valve block.  
☞ **FRONT SUSPENSION, REPAIRS, Valve block assembly.**
7. Remove stands and lower vehicle.



4. Remove 4 bolts securing air reservoir, lower reservoir and disconnect multiplug from pressure switch.

**CAUTION:** Do not remove the pressure switch from the air reservoir.



5. Remove 2 clips securing air pipes and remove reservoir.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

6. Remove nuts securing valve block mounting studs and remove studs.

# FRONT SUSPENSION

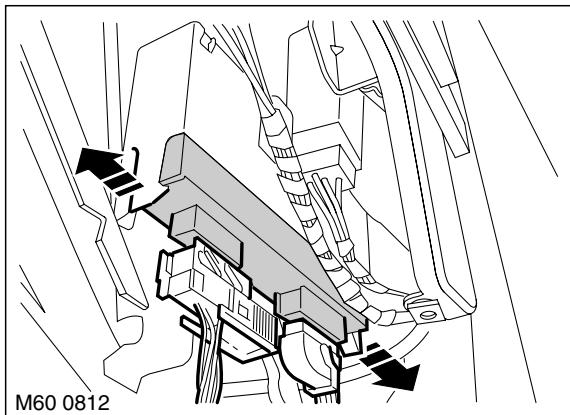
## Electronic Control Unit (ECU) - air suspension

### 60.50.04

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

#### Remove

1. Remove passenger's side lower fascia finisher.  
 **INTERIOR FITTINGS, REPAIRS,  
Finisher - lower - passengers side.**



2. Release 2 clips and withdraw ECU from holder.
3. Disconnect 2 multiplugs from ECU.
4. Remove ECU.

#### Refit

1. Position new ECU, connect multiplugs and secure ECU in holder.
2. Fit passenger's side fascia lower finisher.  
 **INTERIOR FITTINGS, REPAIRS,  
Finisher - lower - passengers side.**
3. Use TestBook/T4 to re-calibrate system.  
 **FRONT SUSPENSION,  
ADJUSTMENTS, Calibrate - air suspension.**

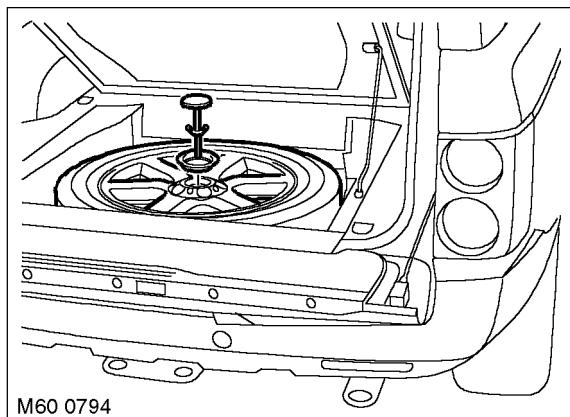
## Air supply unit

### 60.50.10

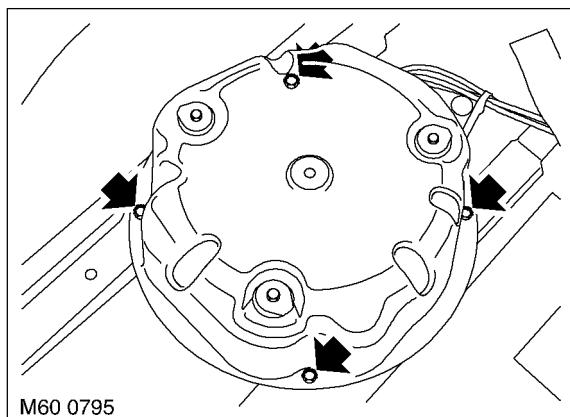
There is no need to depressurise the suspension in this procedure.

#### Remove

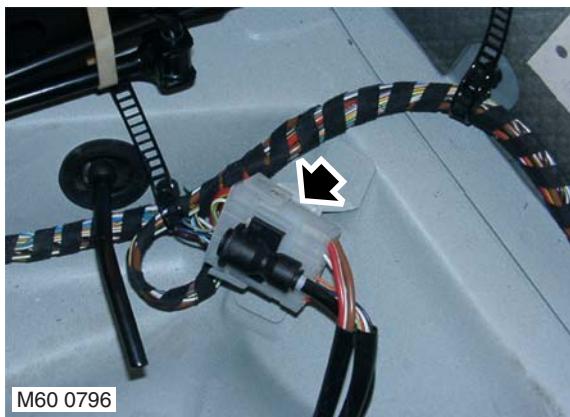
1. Remove spare wheel cover.



2. Release wing nut securing spare wheel to compressor housing, remove bolt and collect cup.
3. Remove spare wheel.



4. Remove 4 bolts securing air supply unit to body.



5. Depress locking ring and disconnect air pipe from air supply unit.
6. Disconnect multiplug from air supply unit.
7. Noting their exact fitted positions, release harness/pipe clips and remove cable ties.
8. Rotate harness multiplug and remove from mounting bracket.
9. Remove air supply unit.

#### Refit

1. Position air supply unit, fit and secure multiplug in mounting bracket.
2. Fit 4 bolts securing air supply unit to body and tighten to 8 Nm (6 lbf.ft).
3. Connect air pipe and supply unit multiplug.  
**CAUTION: Ensure large grommet in body is correctly fitted, failure to do so will result in water ingress.**
4. Secure harness/pipe in clips and replace cable ties in exact positions as noted on removal.  
**CAUTION: Pipe/harness may be trapped by spare wheel if not correctly positioned.**
5. Position spare wheel in well, fit retaining cup and secure wing nut.
6. Fit spare wheel cover.

## Valve block assembly

### 60.50.11

Do not depressurise air suspension system before raising vehicle

When removing Voss connectors from any air suspension component, the connector must be left attached to the air pipe being removed. Do not remove the connector from the air pipe. Removing the connector from the air pipe could cause the connector to scratch the pipe and increase the likelihood of leaks.

The valve block can be checked for correct operation using TestBook/T4.

#### Remove

1. Raise front of vehicle and support under body.

**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

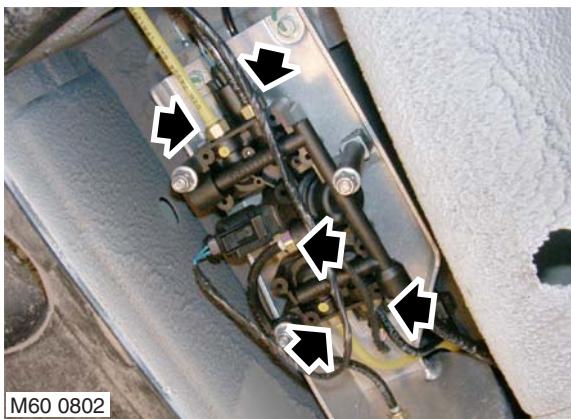
2. Depressurise suspension.

**FRONT SUSPENSION,  
ADJUSTMENTS, Air suspension system -  
depressurise and repressurise.**



3. Remove 2 speed nuts securing closing panel. Release and remove panel.

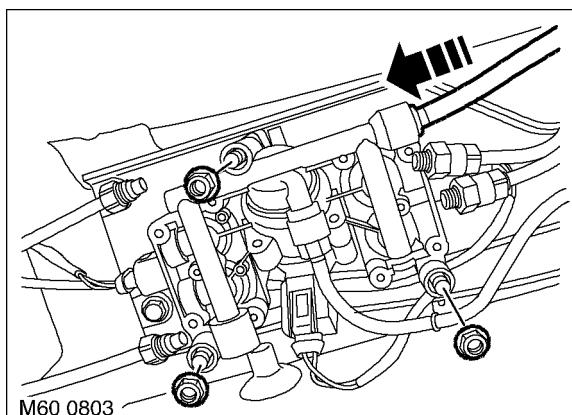
## FRONT SUSPENSION



4. Disconnect pipe from air reservoir.  
**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.
5. Noting their fitted positions, disconnect 4 pipes from valve block.

### Refit

1. If fitting a new valve block, remove Voss connectors from new block.
  2. Fit pipe to valve block but do not fully tighten union at this stage.  
**CAUTION: Ensure air pipe connections are clean.**
  3. Position valve block, connect multiplugs and compressor feed pipe.
  4. Locate valve block and fit and tighten nuts.
  5. Connect pipes to valve block and tighten unions to 3.5 Nm (2.6 lbf.ft).
  6. Connect pipe to air reservoir and tighten both unions to 3.5 Nm (2.6 lbf.ft).
  7. Fit closing panel and secure with speed nuts.
  8. Pressurise suspension.
- FRONT SUSPENSION,  
ADJUSTMENTS, Air suspension system -  
depressurise and repressurise.
9. Remove stands and lower vehicle.



6. Remove 3 nuts securing valve block.
7. Release valve block, depress locking ring and disconnect compressor feed pipe.
8. Disconnect 3 multiplugs and remove valve block.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
9. Remove pipe from valve block.



## Valve assembly - cross link

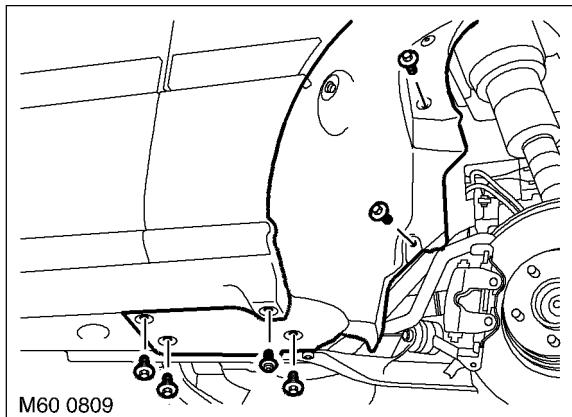
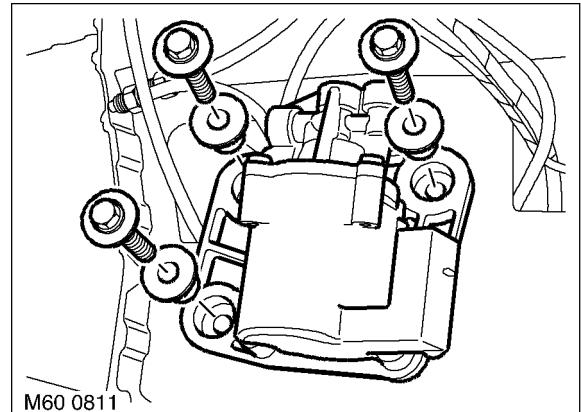
### 60.50.13

On later models the cross link valve assembly is not fitted.

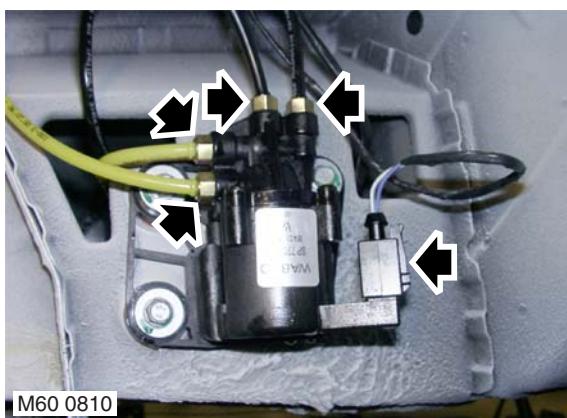
#### Remove

1. Raise front of vehicle and support under body.
2. Depressurise front air suspension springs.
- FRONT SUSPENSION,  
ADJUSTMENTS, Air suspension system -  
depressurise and repressurise.**
3. Remove RH front road wheel.

8. Disconnect multiplug.



4. Remove 5 hexagonal headed screws securing wheel arch liner.
5. Remove screw securing wheel arch liner.
6. Release wheel arch liner for access.



7. Noting their fitted positions, disconnect 4 pipes from cross link valve.

**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**

9. Remove 3 bolts securing cross link valve to body. Collect rubber spacers.
10. Remove cross link valve.

#### Refit

1. If fitting a new cross link valve, remove air connectors from new valve.
2. Position cross link valve, fit bolts and spacers, and tighten to 4.6 Nm (3.4 lbf.ft).
3. Connect multiplug.
4. Connect pipes to cross link valve and tighten unions to 3.5 Nm (2.6 lbf.ft).
- CAUTION: Ensure air pipe connections are clean.**
5. Locate wheel arch liner and secure with screws.
6. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
7. Pressurise suspension.
- FRONT SUSPENSION,  
ADJUSTMENTS, Air suspension system -  
depressurise and repressurise.**
8. Remove stands and lower vehicle.

## **FRONT SUSPENSION**

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## Suspension - depressurise and repressurise

---

### ☛ 64.50.38

#### Depressurise

1. Depressurise suspension using TestBook/T4.

**WARNING:** *The air suspension system is pressurised up to:*

- *Up to VIN 106309 - 13.7 Bar (199 lbf/in<sup>2</sup>)*
- *From VIN 106310 - 11.8 Bar (171 lbf/in<sup>2</sup>)*

**WARNING:** *Ensure dirt or grease does not enter the system. Wear hand, ear and eye safety protection when working on the system.*

#### Repressurise

1. Repressurise suspension using TestBook/T4.

**CAUTION:** *The air springs must be fully pressurised before the weight of the vehicle is applied to them.*

## REAR SUSPENSION

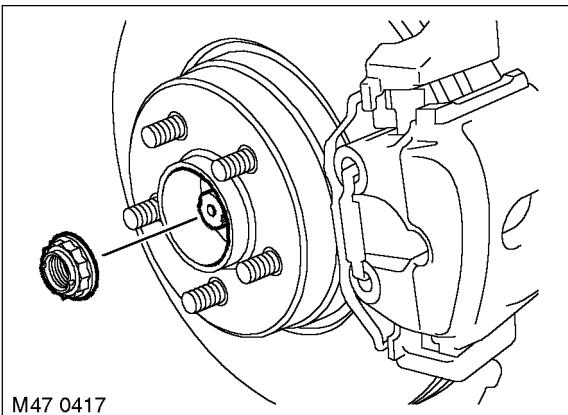
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**Hub****64.15.01****Remove**

1. Raise rear of vehicle.

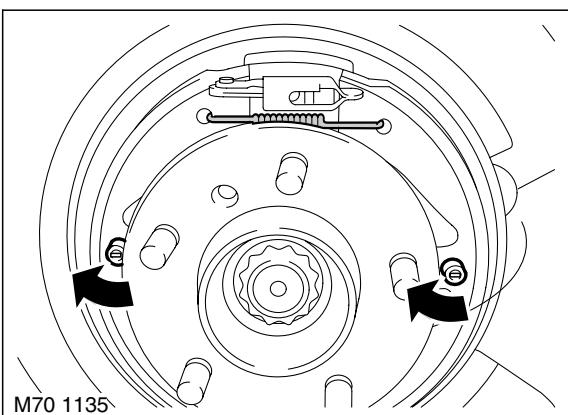
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



3. Release drive shaft hub nut stake.
4. With an assistant applying brakes, remove and discard drive shaft hub nut.
5. Remove brake disc.

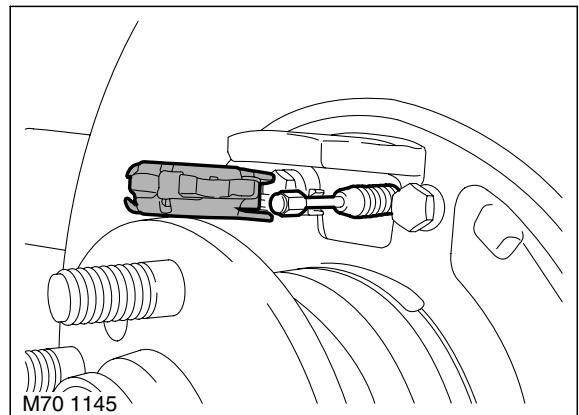
**BRAKES, REPAIRS, Brake disc - rear.**



6. Remove brake shoe upper return spring.
7. Rotate brake shoe retainers 90 ° and remove.

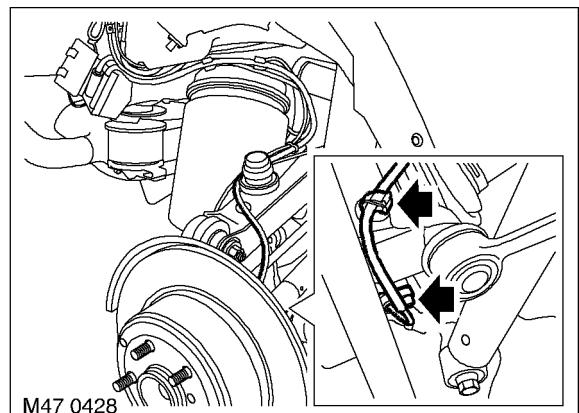


8. Remove brake shoe assembly complete with lower spring and adjuster.



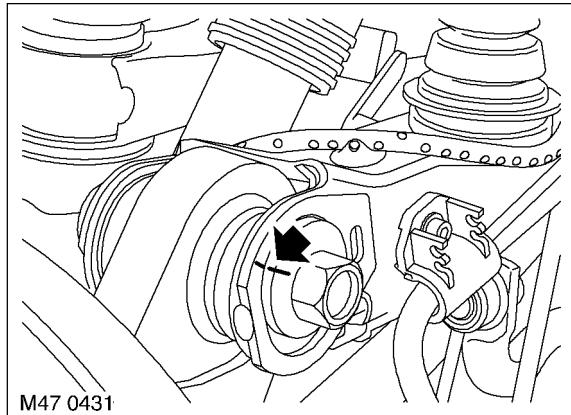
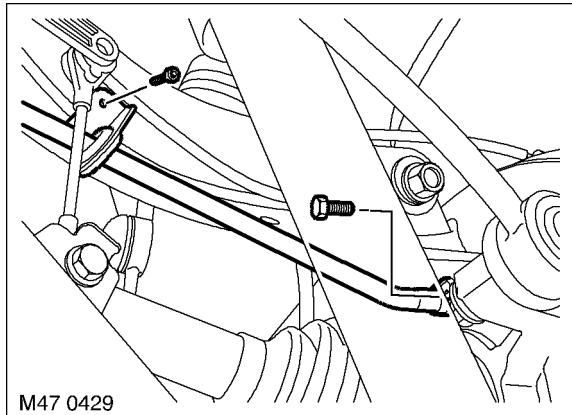
9. Remove shoe expander.
10. Remove tie rod.

**REAR SUSPENSION, REPAIRS, Tie rod.**

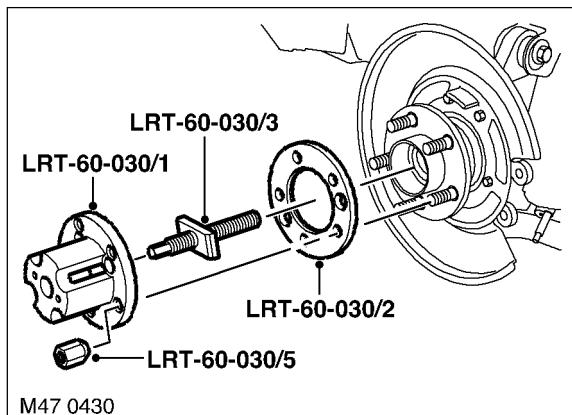


11. Release ABS sensor lead from hub.
12. Remove bolt securing ABS sensor, release sensor and position aside.

## REAR SUSPENSION

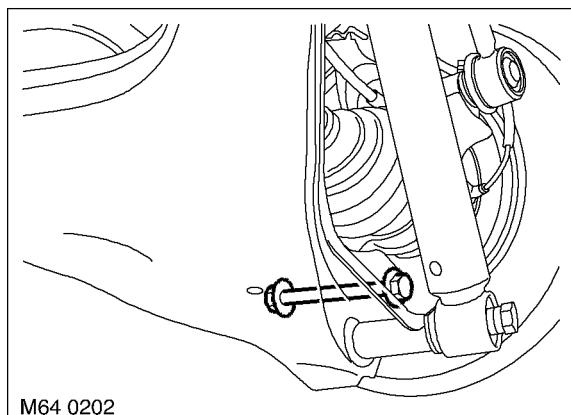


13. Remove Allen screw securing hand brake cable bracket.
14. Remove bolt securing handbrake cable to backplate.
15. Release handbrake cable from backplate.



16. Fit centre screw LRT-60-030/3 to LRT-60-030/1 and fit to hub with spacer LRT-60-030/2. Secure with nuts LRT-60-030/5.
17. Tighten centre screw to press drive shaft from flange.
18. Remove tools.

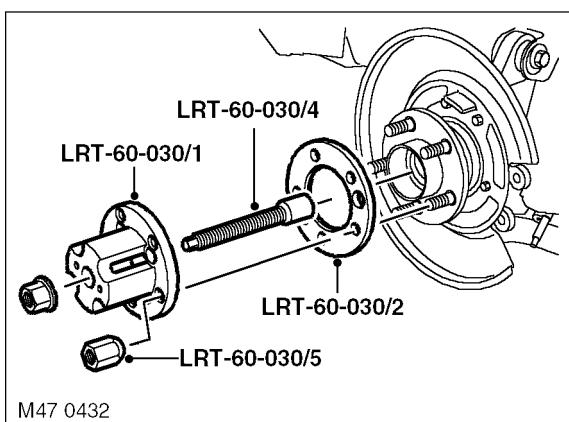
19. Reference mark eccentric in relationship to upper arm.
20. Remove and discard nut and bolt securing hub to upper arm. Release hub from arm.



21. Remove and discard nut and bolt securing lower arm to hub.
22. Remove hub assembly.

### Refit

1. Clean drive shaft and flange splines.
2. Lightly lubricate splines.
3. Clean hub and mating faces on upper and lower arms.
4. Position hub assembly, fit new lower bolt and locate drive shaft in hub.
5. Align hub to upper arm, fit new bolt, align eccentric to reference mark and lightly tighten.
6. Tighten bolt securing lower arm to hub to 250 Nm (184 lbf.ft).



7. Fit **LRT-60-030/4** to drive shaft.
8. Fit **LRT-60-030/1** with spacer **LRT-60-030/2** and secure with nuts **LRT-60-030/5**.
9. Fit nut to **LRT-60-030/4** and tighten nut to pull drive shaft into drive flange.
10. Remove tools.
11. Locate handbrake cable to backplate, fit bolt and tighten to 8 Nm (6 lbf.ft).
12. Position handbrake cable bracket to upper arm, fit Allen screw and tighten to 5 Nm (3.7 lbf.ft).
13. Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.
- ☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
14. Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).
15. Fit tie rod.
- ☞ REAR SUSPENSION, REPAIRS, Tie rod.**
16. Clean backplate and brake disc with brake cleaning fluid.
17. Clean expander.
18. Fit expander.
19. Position brake shoe assembly, fit retainers and upper return spring.
20. Fit brake disc.
- ☞ BRAKES, REPAIRS, Brake disc - rear.**
21. Fit new hub nut and tighten to 420 Nm (311 lbf.ft).
22. Stake nut to shaft.
23. Adjust handbrake.
- ☞ BRAKES, ADJUSTMENTS, Handbrake adjustment.**
24. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
25. Remove stands and lower vehicle.
26. Check wheel alignment.
27. Tighten bolt securing upper arm to hub to 165 Nm (121 lbf.ft).

## Ball joint - upper

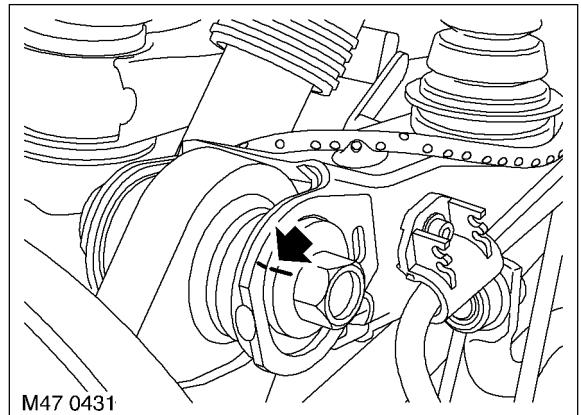
☞ 64.15.07

### Remove

1. Raise rear of vehicle and support under body.  
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.
2. Remove road wheel.

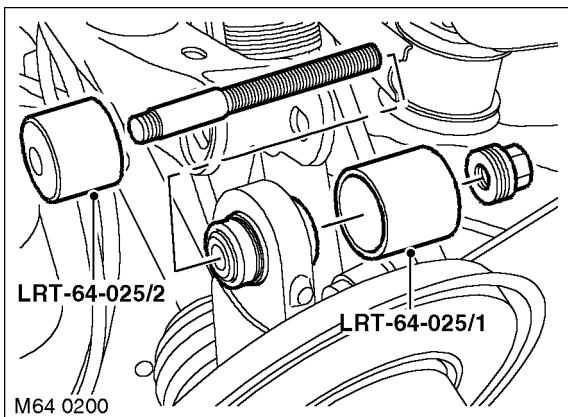


3. Release ABS sensor lead from upper arm.
4. Remove Allen screw securing brake pipe.
5. Position jack under damper mounting bracket to support lower arm.



6. Reference mark eccentric in relationship to upper arm.
7. Remove and discard nut and bolt securing hub to upper arm. Release hub from arm.

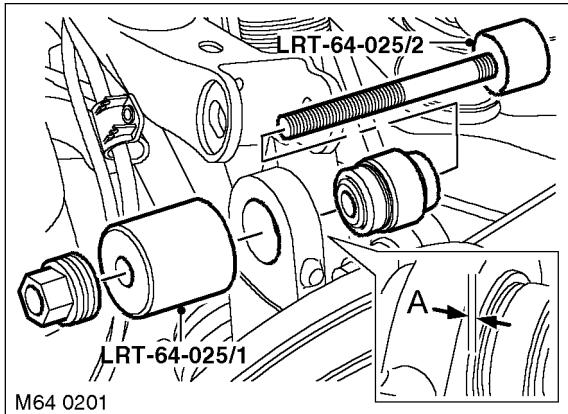
## REAR SUSPENSION



8. Remove ball joint using **LRT-64-025/1** with **LRT-64-025/2**, (RH side illustrated).

### Refit

1. Clean ball joint and location in hub.



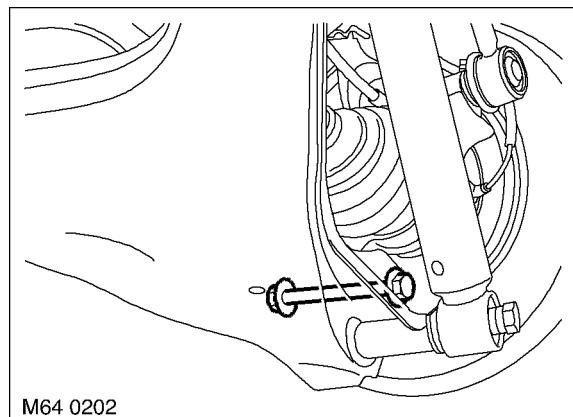
2. Fit ball joint with chamfer facing towards rear using **LRT-64-025/1** with **LRT-64-025/2** to give protrusion 'A' from machined face. Protrusion 'A' = 0.75 mm (0.030 in.).
3. Align hub to upper arm, fit new bolt, align eccentric to reference mark and lightly tighten.
4. Fit Allen screw securing brake pipe to upper arm and tighten to 5 Nm (3.7 lbf.ft).
5. Secure ABS sensor lead.
6. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
7. Lower vehicle.
8. Check wheel alignment.
9. Tighten bolt securing upper arm to hub to 165 Nm (121 lbf.ft).

## Ball joint - lower

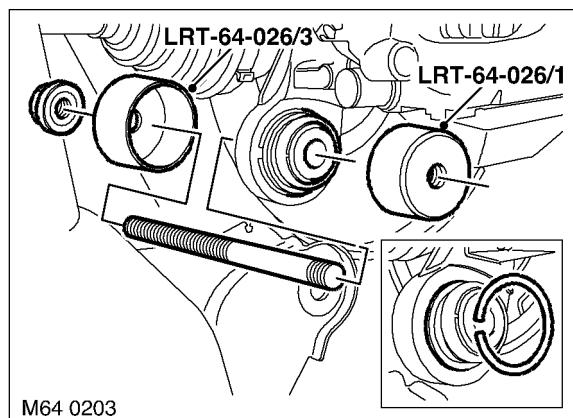
### 64.15.08

#### Remove

1. Remove tie rod.  
 **REAR SUSPENSION, REPAIRS, Tie rod.**
2. Position jack under damper mounting bracket to support lower arm.



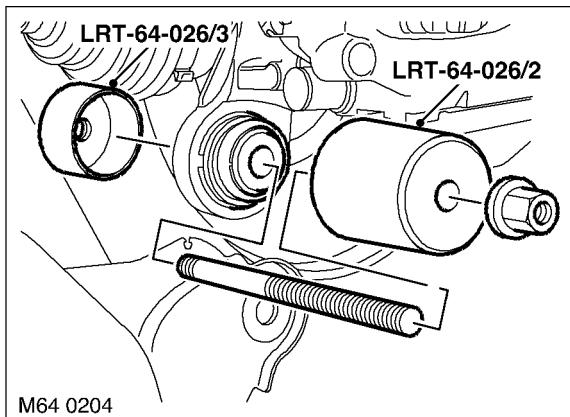
3. Remove and discard nut and bolt securing lower arm to hub.
4. Lower support jack.
5. Release hub from lower arm and support to give access to ball joint.



6. Remove and discard circlip.
7. Remove lower bolt securing brake disc backplate.
8. Remove ball joint using **LRT-64-026/1** with **LRT-64-026/3**, (RH side illustrated).

**Refit**

1. Clean ball joint and location in hub.



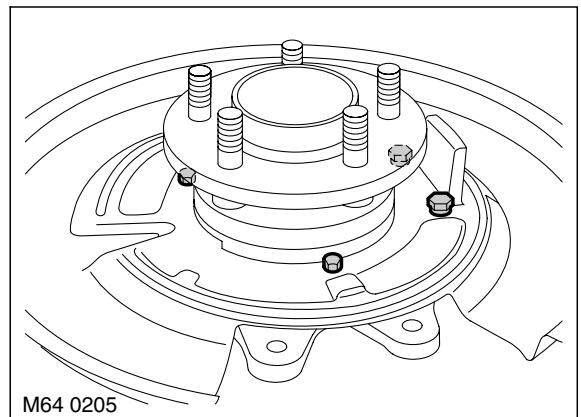
2. Fit ball joint with circlip groove facing towards rear using **LRT-64-026/3** with **LRT-64-026/2**.
3. Fit new circlip.
4. Fit bolt securing brake disc backplate.
5. Clean lower arm and hub mating faces.
6. Align hub to lower arm, fit new nut and bolt and tighten to 250 Nm (184 lbf.ft).
7. Fit tie rod.  
☞ **REAR SUSPENSION, REPAIRS, Tie rod.**
8. Check wheel alignment.

**Bearing(s) - hub**

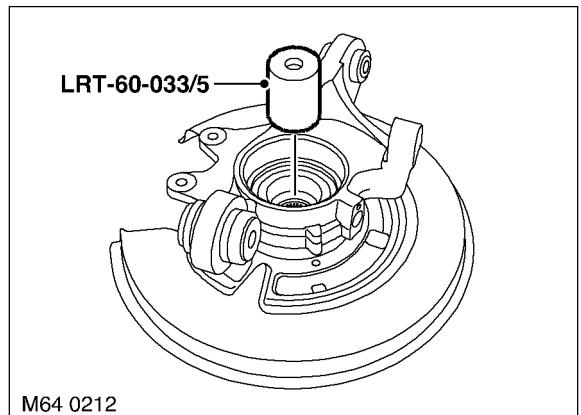
☞ **64.15.14**

**Remove**

1. Remove hub assembly.  
☞ **REAR SUSPENSION, REPAIRS, Hub.**

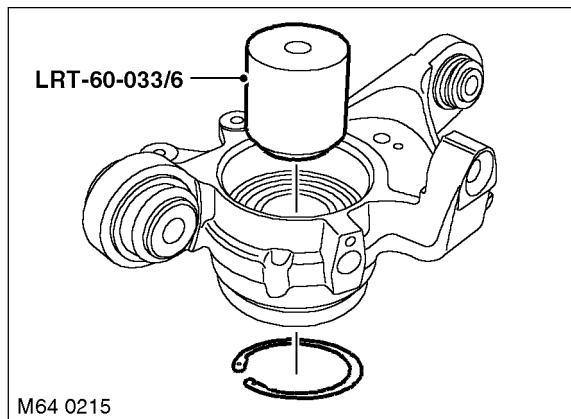
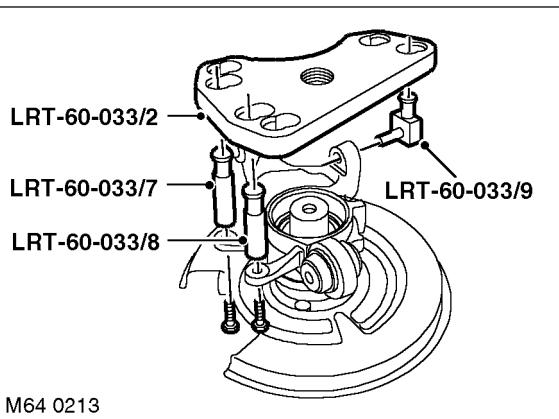


2. Remove 4 bolts securing backplate to hub.



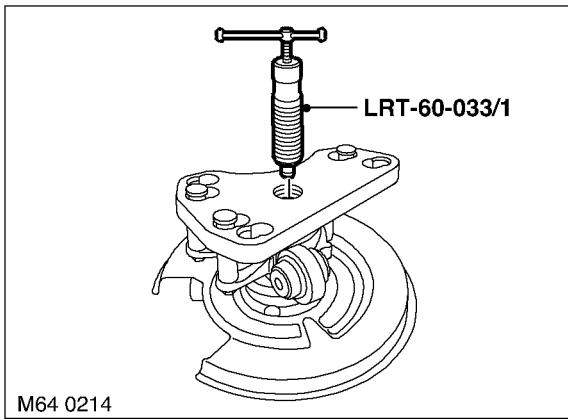
3. Fit adapter, **LRT-60-033/5** to drive flange.

## REAR SUSPENSION



4. Position plate, **LRT-60-033/2**, fit pin **LRT-60-033/9** to tie bar location and secure to plate.
5. Locate pins **LRT-60-033/7** and **LRT-60-033/8** to plate and align to brake caliper mounting bolt locations. Fit bolts to secure pins.

*NOTE: Pins locate in holes marked 'REAR', with longer pin LRT-60-033/7 aligned with caliper top mounting bolt hole.*

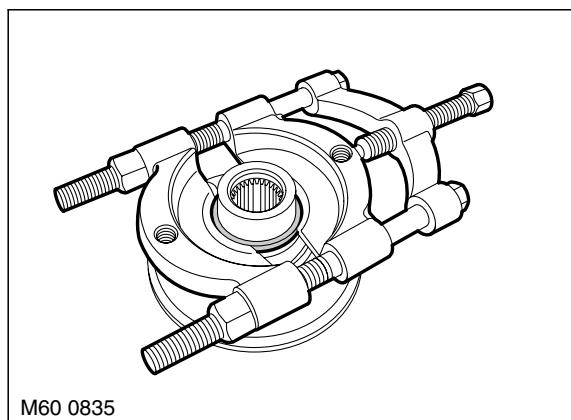


6. Screw hydraulic ram, **LRT-60-033/1** into plate and press drive flange from hub.

*NOTE: Outer bearing track will remain on drive flange.*

7. Remove brake disc shield.
8. Remove plate, **LRT-60-033/2** and pin **LRT-60-033/9**.
9. Remove pins, **LRT-60-033/7** and **LRT-60-033/8**.

10. Remove and discard circlip.
11. Position hub to bed of hydraulic press, fit adapter **LRT-60-033/6** to bearing and press out bearing.



12. Remove bearing track from drive flange using a bearing separator.

### Refit

1. Clean hub and drive flange.

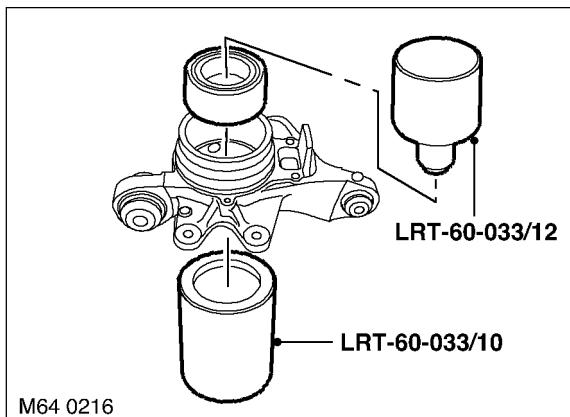


7. Clean backplate and mating face, fit backplate and fit and tighten bolts.
8. Fit bearing support, **LRT-60-033/11** to anvil, and press flange into bearing using adapter **LRT-60-033/12**.
9. Remove tools.
10. Fit hub assembly.

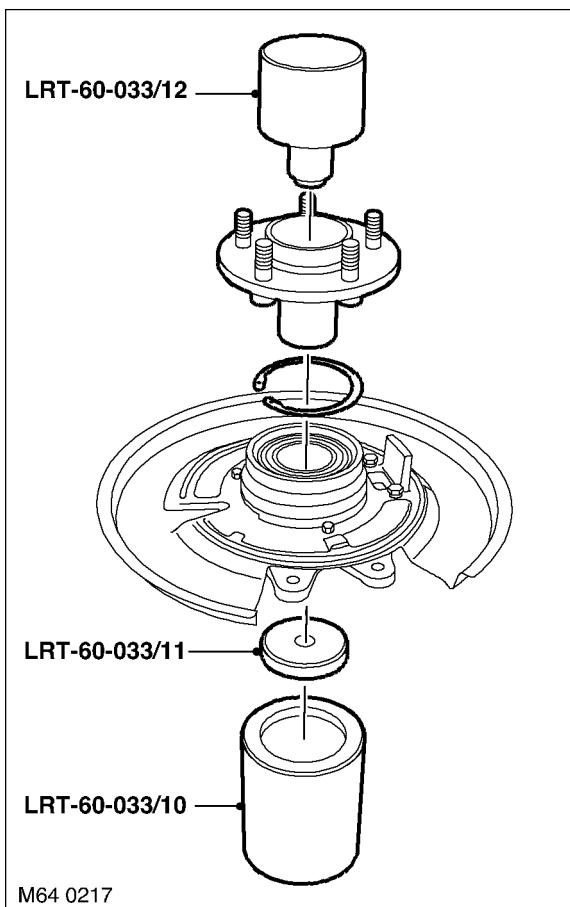


#### **REAR SUSPENSION, REPAIRS,**

**Hub.**



2. Position anvil, **LRT-60-033/10** to bed of hydraulic press and locate hub on anvil.
3. Ensure hub and bearing mating surfaces are clean and dry.
4. Apply stud/bearing fit, STC 50553 to bearing mating surface in hub for half its length.
5. Press bearing into hub using adapter **LRT-60-033/12**.



6. Fit new circlip.

# REAR SUSPENSION

## Air spring

### 64.21.01

It is not necessary to depressurise the whole system, only the side from which the air spring is being replaced.

Do not depressurise air suspension system before raising vehicle

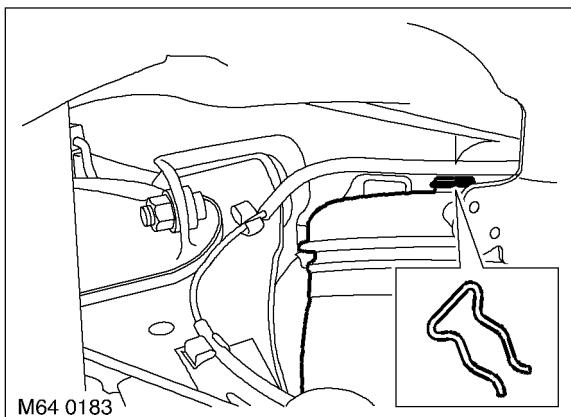
When removing Voss connectors from any air suspension component, the connector must be left attached to the air pipe being removed. Do not remove the connector from the air pipe. Removing the connector from the air pipe could cause the connector to scratch the pipe and increase the likelihood of leaks.

### Remove

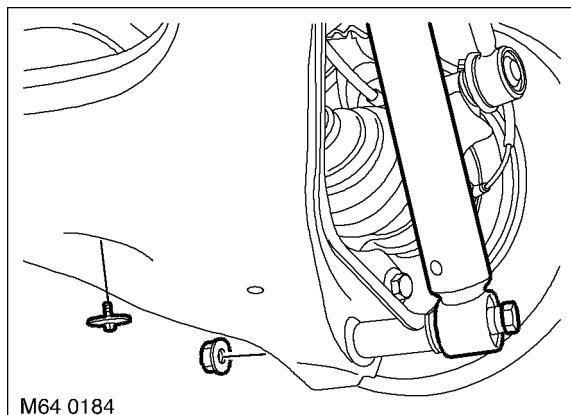
1. Raise rear of vehicle and support under body.

**WARNING:** *Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.*

2. Remove road wheel.



3. Remove clip from upper mounting.

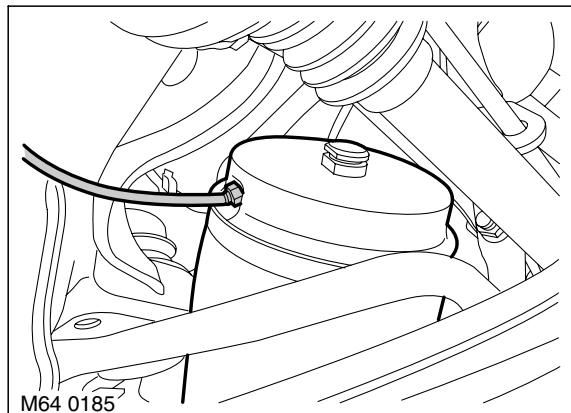


4. Remove screw securing spring to lower arm.
5. Depressurise air spring being replaced.

 **REAR SUSPENSION,  
ADJUSTMENTS, Suspension - depressurise  
and repressurise.**

6. Remove bolt securing damper to lower arm.
7. Release damper from lower arm.
8. With assistance, lower suspension arm and release spring for access to air pipe connection.

**CAUTION:** *Do not extend or compress air spring.*



9. Disconnect air pipe.

**CAUTION:** *Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.*

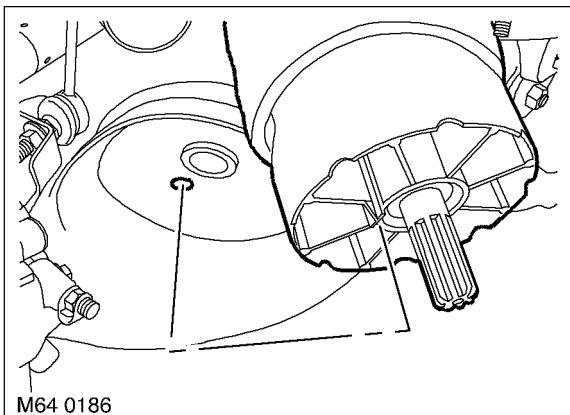
10. Remove air spring assembly.



## REAR SUSPENSION

### Refit

1. If fitting a new spring, remove air connector from new spring.  
**CAUTION:** Check air spring for signs of damage. If air spring is damaged, it must be replaced.
2. Position air spring, connect air pipe but do not tighten union at this stage.  
**CAUTION:** Ensure air pipe connections are clean.



3. With assistance fit air spring in lower arm ensuring rotation lock spigot is correctly located.  
**CAUTION:** Do not extend or compress air spring.
4. Tighten air pipe connection to 3.5 Nm (2.6 lbf.ft).
5. Fit screw securing spring to lower arm and tighten to 7 Nm (5 lbf.ft).
6. Align damper to lower arm, fit through bolt and tighten to 110 Nm (81 lbf.ft).
7. Pressurise system sufficiently to locate spring top mounting and fit clip.
8. Pressurise suspension.  
☞ **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**  
**CAUTION:** The system must be pressurised before putting weight of vehicle on suspension.
9. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
10. Remove stands and lower vehicle.

### Damper

☞ **64.30.02**

Do not depressurise air suspension system before raising vehicle.

It is not necessary to depressurise the whole system, only the side from which the damper is being replaced.

### Remove

1. Remove spare wheel cover.
2. Release rear seat squab and fold seat forward.
3. Release floor carpet for access to damper upper mounting nuts.
4. Raise front and rear of vehicle and support under body.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

5. Remove road wheel.
6. Position jack to support the lower arm.

**CAUTION:** Do not allow suspension arm to hang unsupported on air spring.

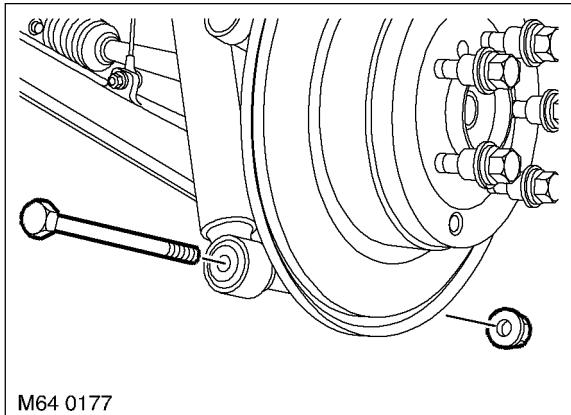
7. Depressurise air spring from side that damper is being replaced from.

☞ **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**



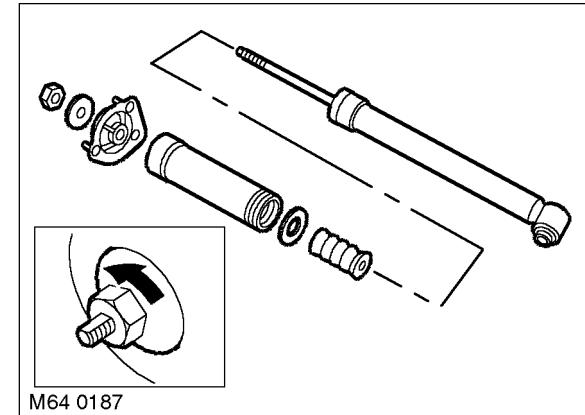
8. Remove 3 nuts securing damper to body.

## REAR SUSPENSION



M64 0177

9. Remove bolt securing damper to lower arm.
10. Remove damper.
11. Remove and discard gasket.



M64 0187

12. Restrain damper spindle and remove nut securing upper mounting.
13. Remove washer, upper mounting, dust cover, support disc and bump stop.

### Refit

1. Fit bump stop, support disc, dust cover, upper mounting and washer to damper.  
**CAUTION: The support disc is hardened and must be fitted in the correct position.**
2. Fit nut, restrain damper spindle and tighten nut to 27 Nm (20 lbf.ft).
3. Clean damper to body mating faces.
4. Fit new gasket.

5. Fit damper, fit upper mounting nuts and lightly tighten.
6. Align damper to lower arm, fit through bolt and tighten to 110 Nm (81 lbf.ft).
7. Tighten damper upper mounting nuts to 56 Nm (40 lbf.ft).
8. Pressurise suspension.  
 **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**  
**CAUTION: The system must be pressurised before putting weight of vehicle on suspension.**

9. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
10. Lower vehicle.
11. Position carpet.
12. Return rear seat(s) to their normal position.
13. Fit spare wheel cover.



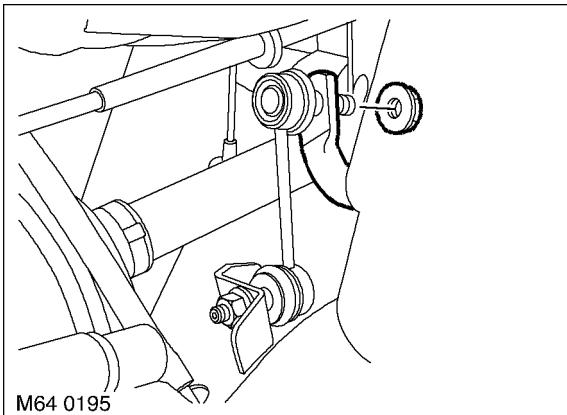
## Anti-roll bar

» 64.35.08

Do not depressurise air suspension system before raising vehicle

### Remove

1. Remove exhaust system.  
☞ **MANIFOLD AND EXHAUST SYSTEM**  
- Td6, REPAIR, Exhaust system and mountings.

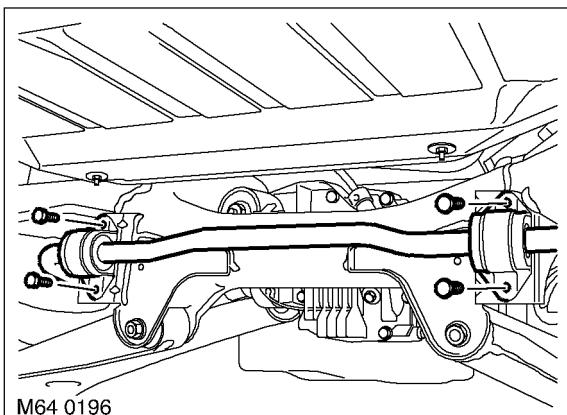


2. Remove nuts securing anti-roll bar links and release both links from anti-roll bar.

**CAUTION: Use an open ended spanner on flats provided to prevent ball joint rotating.**

3. Collect washer from lower fixing.

**CAUTION: Note position of washer for refit.**



4. Remove 4 bolts securing anti-roll bar bush clamps to subframe.

5. Remove LH air spring assembly.  
☞ **REAR SUSPENSION, REPAIRS, Air spring.**
6. Manoeuvre anti-roll bar over subframe and remove from vehicle.

### Refit

1. Position anti-roll bar to subframe and manoeuvre into position.
2. Fit LH air spring.  
☞ **REAR SUSPENSION, REPAIRS, Air spring.**
3. Align anti-roll bar bush clamps, fit bolts and tighten to 38 Nm (28 lbf.ft).
4. Connect anti-roll bar links, fit washer and nuts and tighten to 100 Nm (74 lbf.ft).  
**CAUTION: The washer is hardened and must be fitted in the correct position.**
5. Fit exhaust system.  
☞ **MANIFOLD AND EXHAUST SYSTEM**  
- Td6, REPAIR, Exhaust system and mountings.

## REAR SUSPENSION

### Tie rod

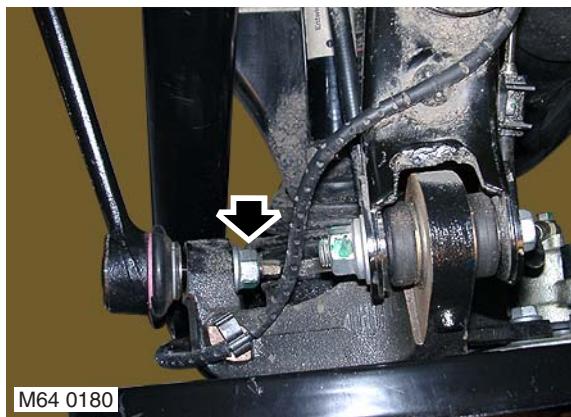
» **64.35.09**

#### Remove

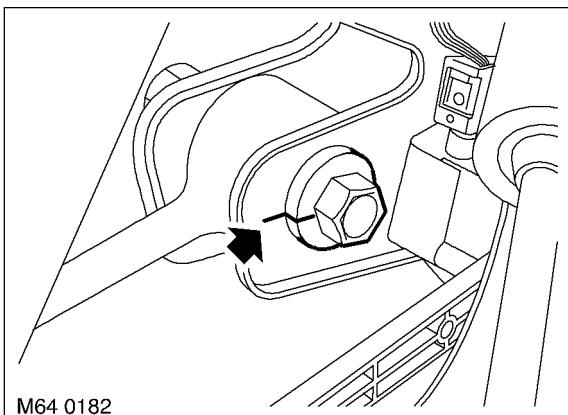
1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



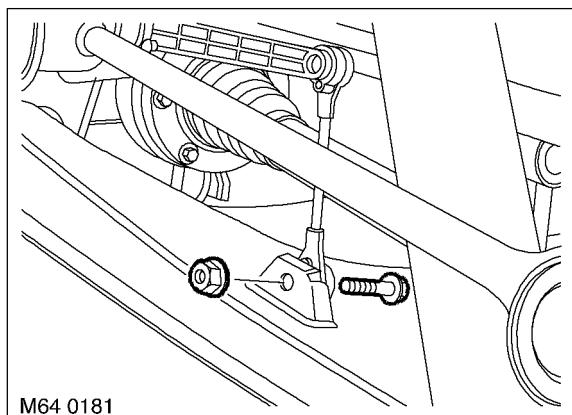
3. Restrain ball pin and remove nut securing tie rod to hub.



5. Reference mark eccentric in relationship to subframe.
6. Remove bolt securing tie rod to subframe. Discard bolt.
7. Collect special washer.
8. Remove tie rod.

#### Refit

1. Clean ball pin and mating face in hub.
2. Fit tie rod, new bolt, special washer and nut. Align reference marks and lightly tighten bolt.
3. Fit nut to tie rod ball joint and tighten to 165 Nm (121 lbf.ft).
4. Align height sensor link to lower arm, fit nut and bolt and tighten to 19 Nm (14 lbf.ft).  
**CAUTION: Ensure height sensor arm is pointing outwards.**
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stands and lower vehicle.
7. Check wheel alignment.
8. Tighten bolt securing tie rod subframe to 165 Nm (121 lbf.ft).



4. Remove nut and bolt securing sensor link to lower arm.



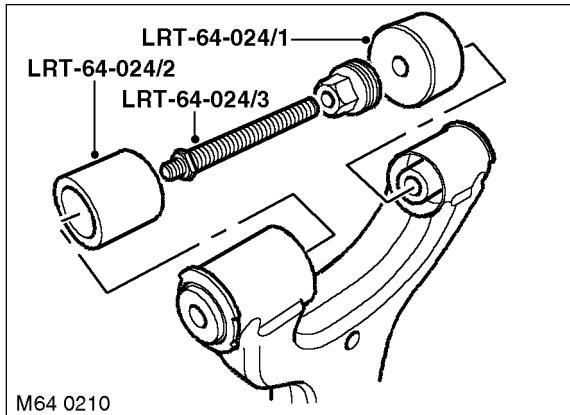
## Refit

**Bushes - upper arm**

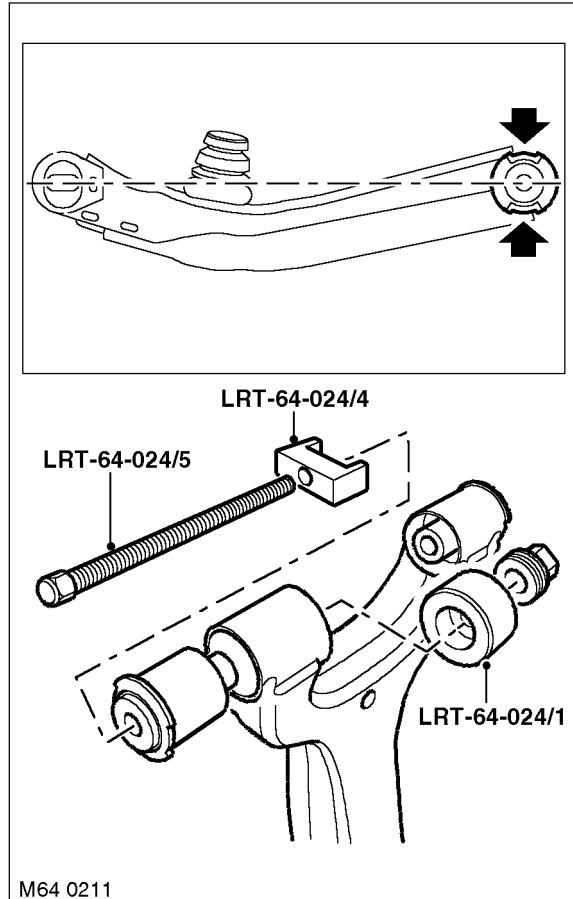
## ☛ 64.35.13

**Remove**

1. Remove upper arm.  
☞ **REAR SUSPENSION, REPAIRS, Arm assembly - upper.**
2. Secure upper arm in a soft jawed vice.



3. Remove bushes using **LRT-64-024/1** with **LRT-64-024/2** and **LRT-64-024/3**.



1. Align bushes as shown and fit using **LRT-64-024/1** with **LRT-64-024/4** and **LRT-64-024/5**.
2. Remove upper arm from vice.
3. Fit upper arm.  
☞ **REAR SUSPENSION, REPAIRS, Arm assembly - upper.**

## REAR SUSPENSION

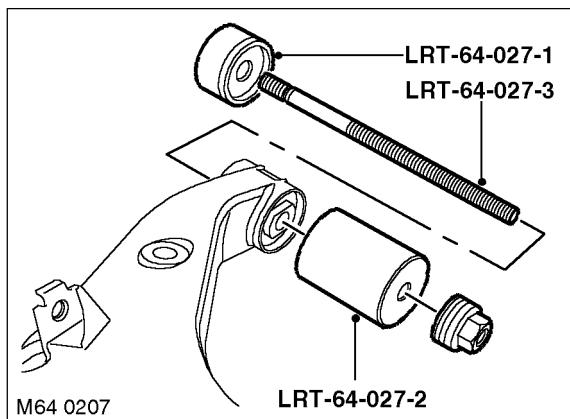
### Bushes - lower arm - front

#### 64.35.16

The bushes must be replaced as a pair, LH and RH sides.

#### Remove

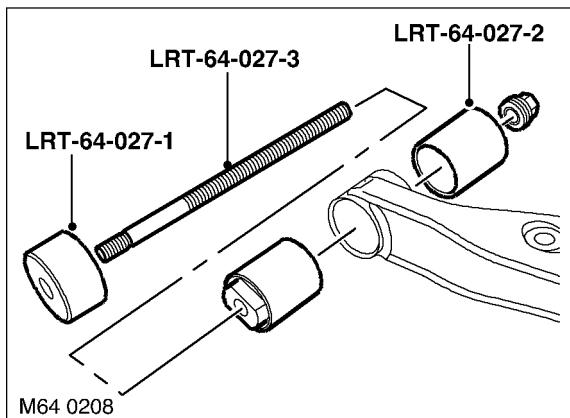
1. Remove lower arms.  
 **REAR SUSPENSION, REPAIRS, Arm assembly - lower.**



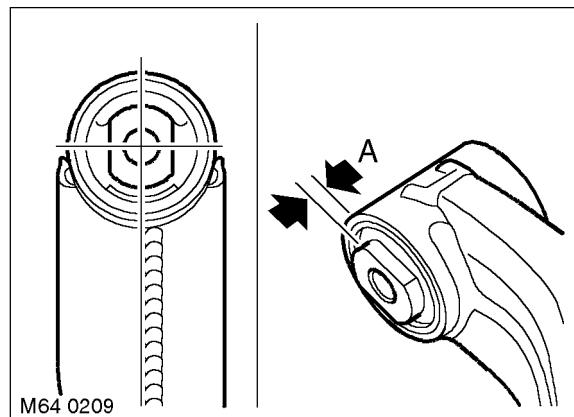
2. Remove bush using **LRT-64-027/1** with **LRT-64-027/2** and **LRT-64-027/3** in direction shown.
3. Repeat procedure for other side.

#### Refit

1. Ensure bush and bush location in lower arm is clean.



2. Fit bush using **LRT-64-027/1** with **LRT-64-027/2** and **LRT-64-027/3** in position and direction shown.



3. Check dimension 'A'. Dimension 'A' = 6.8 mm (0.27 in).
4. Repeat procedure for other side.
5. Fit lower arms.  
 **REAR SUSPENSION, REPAIRS, Arm assembly - lower.**



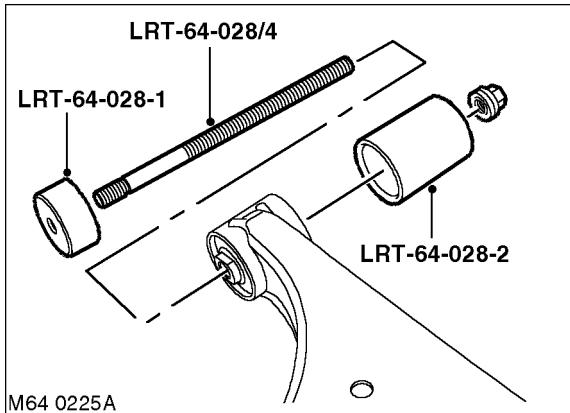
## Bushes - lower arm - rear

### 64.35.17

The bushes must be replaced as a pair, LH and RH sides.

#### Remove

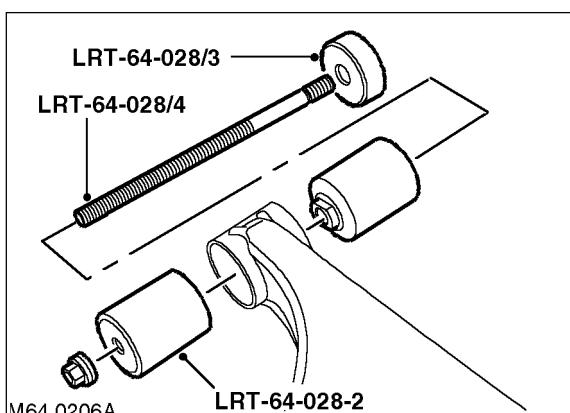
1. Remove lower arms.  
 REAR SUSPENSION, REPAIRS, Arm assembly - lower.



2. Remove bush using **LRT-64-028/1** with **LRT-64-028/2** and **LRT-64-028/3** in direction shown.
3. Repeat procedure for other side.

#### Refit

1. Ensure bush and bush location in lower arm is clean.



2. Fit bush using **LRT-64-028/4** with **LRT-64-028/2** and **LRT-64-028/3** in direction shown.
3. Repeat procedure for other side.

4. Fit lower arms.

REAR SUSPENSION, REPAIRS, Arm assembly - lower.

## Link - anti roll bar

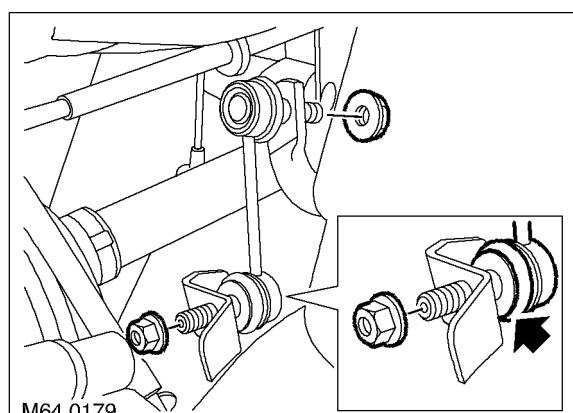
### 64.35.24

#### Remove

1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



3. Remove nut securing anti-roll bar link to anti-roll bar.

**CAUTION:** Use an open ended spanner on flats provided to prevent ball joint rotating.

4. Remove nut securing anti-roll bar link to lower arm.
5. Release link from anti-roll bar.
6. Remove anti-roll bar link and collect washer fitted to lower ball joint.

**CAUTION:** Note position of washer for refit.

#### Refit

1. Fit washer to ball joint, fit anti-roll bar link, fit nuts and tighten to 100 Nm (74 lbf.ft).

**CAUTION:** The washer is hardened and must be fitted in the correct position.

2. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
3. Remove stands and lower vehicle.

2. Fit bush using **LRT-64-028/4** with **LRT-64-028/2** and **LRT-64-028/3** in direction shown.
3. Repeat procedure for other side.
4. Fit lower arms.

REAR SUSPENSION, REPAIRS, Arm assembly - lower.

# REAR SUSPENSION

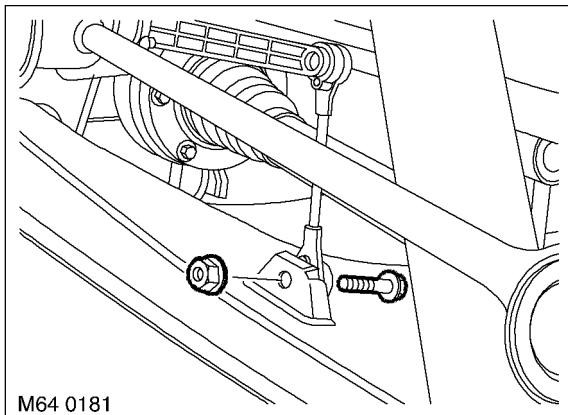
## Arm assembly - lower

### 64.35.54

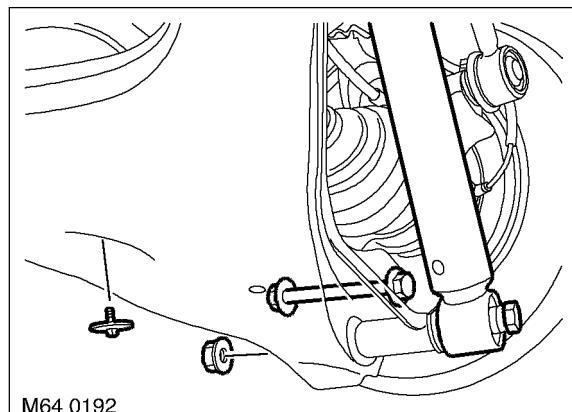
Do not depressurise air suspension system before raising vehicle

#### Remove

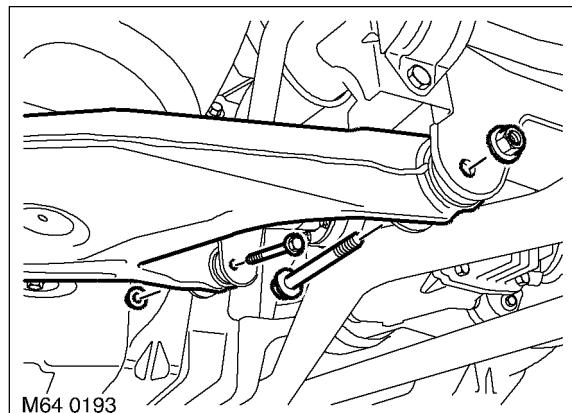
1. Raise rear of vehicle and support under body.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**
2. Remove anti-roll bar link.  
 **REAR SUSPENSION, REPAIRS, Link - anti roll bar.**



3. Remove nut and bolt securing sensor link to lower arm.
4. Position jack to support the lower arm.
5. Depressurise rear suspension.  
 **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**



6. Remove bolt securing damper to lower arm.
7. Release damper from lower arm.
8. Remove screw securing spring to lower arm.
9. Remove and discard nut and bolt securing lower arm to hub.



10. Loosen 2 bolts securing lower arm to subframe.
11. Release air spring spigot from lower arm.  
**CAUTION: Do not extend or compress air spring.**
12. Remove 2 bolts securing lower arm to subframe. Discard bolts.
13. Remove lower arm.

#### Refit

1. Clean lower arm pivot and subframe mating faces.
2. Fit lower arm, fit new bolts but do not tighten at this stage.
3. Raise lower arm and locate air spring spigot.
4. Clean lower arm and hub mating faces.
5. Align hub to lower arm, fit new nut and bolt and tighten to 250 Nm (184 lbf.ft).
6. Fit screw securing spring to lower arm and tighten to 7 Nm (5 lbf.ft).



## REAR SUSPENSION

7. Align damper to lower arm, fit through bolt and tighten to 110 Nm (81 lbf.ft).
  8. Tighten bolts securing lower arm to subframe to 165 Nm (121 lbf.ft).
  9. Pressurise suspension.
- REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**
10. Align height sensor link to lower arm, fit nut and bolt and tighten to 19 Nm (14 lbf.ft).
  11. Fit anti-roll bar link.  
 **REAR SUSPENSION, REPAIRS, Link - anti roll bar.**
  12. Remove stands and lower vehicle.

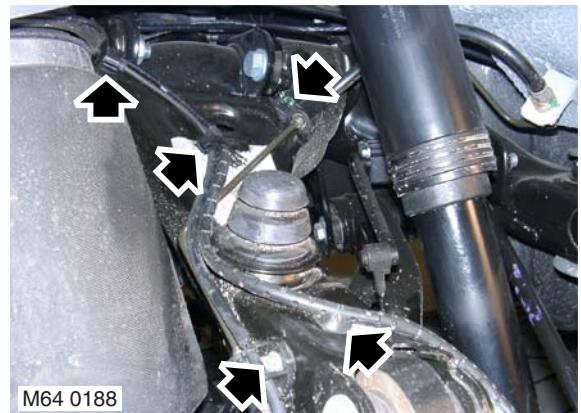
### Arm assembly - upper

**64.35.60**

Do not depressurise air suspension system before raising vehicle

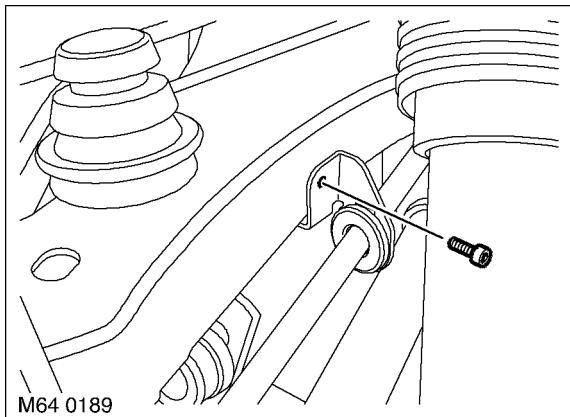
#### Remove

1. Remove exhaust system.  
 **MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
2. Raise rear of vehicle and support under body.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**
3. Remove road wheel.
4. Depressurise rear suspension.  
 **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**

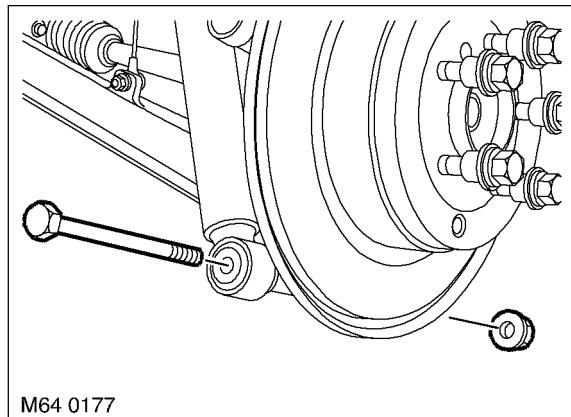


5. Release ABS sensor lead from upper arm.
6. Remove 2 Allen screws securing brake pipe.

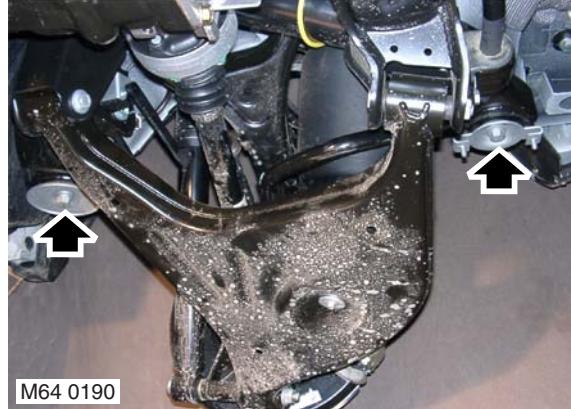
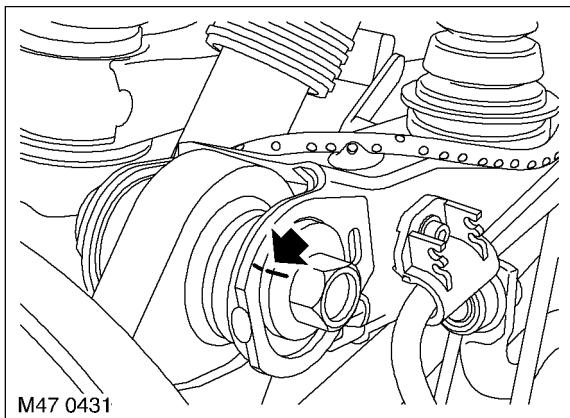
## REAR SUSPENSION



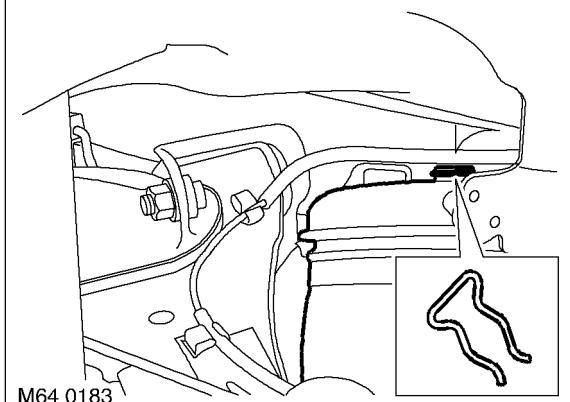
7. Remove Allen screw securing hand brake cable bracket.
8. Position jack to support the lower arm.



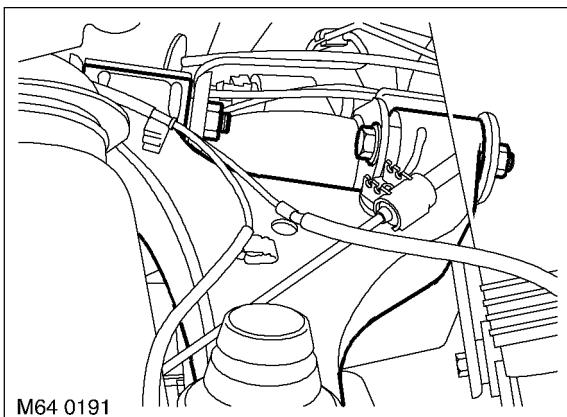
12. Remove bolt securing damper to lower arm.
13. Release damper from lower arm.
14. Support weight of subframe assembly on a jack



9. Reference mark eccentric in relationship to upper arm.
10. Remove and discard nut and bolt securing hub to upper arm. Release hub from arm.
15. Remove 2 bolts securing subframe to body.
16. Lower subframe approximately 75 mm for access to bolts securing upper arm to subframe.
17. Remove washer from top of each subframe bush.



11. Remove clip from air spring upper mounting.



18. Remove 2 bolts securing upper arm.
19. Remove upper arm.

#### Refit

1. Clean upper arm bush locations.
2. Fit upper arm, fit bolts but do not tighten at this stage.
- CAUTION: Nuts and bolts must be tightened with vehicle at normal ride height.**
3. Align damper to lower arm, fit through bolt and tighten to 110 Nm (81 lbf.ft).
4. Tighten bolts securing upper arm to subframe to 165 Nm (121 lbf.ft).
5. Fit washers to subframe bushes.
6. Raise subframe, fit bolts securing subframe to body and tighten to 165 Nm (122 lbf.ft).
7. Pressurise system sufficiently to locate spring top mounting and fit clip.
8. Align hub to upper arm, fit new bolt, align eccentric to reference mark and lightly tighten.
9. Position handbrake cable bracket to upper arm, fit Allen screw and tighten to 5 Nm (3.7 lbf.ft).
10. Fit Allen screws securing brake pipe to upper arm and tighten to 5 Nm (3.7 lbf.ft).
11. Secure ABS sensor lead.
12. Pressurise suspension.
  - ☞ **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**
13. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
14. Lower vehicle.
15. Fit exhaust system.
  - ☞ **MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
16. Check wheel alignment.
17. Tighten bolt securing upper arm to hub to 165 Nm (121 lbf.ft).

## Bushes - rear subframe

### 64.35.86

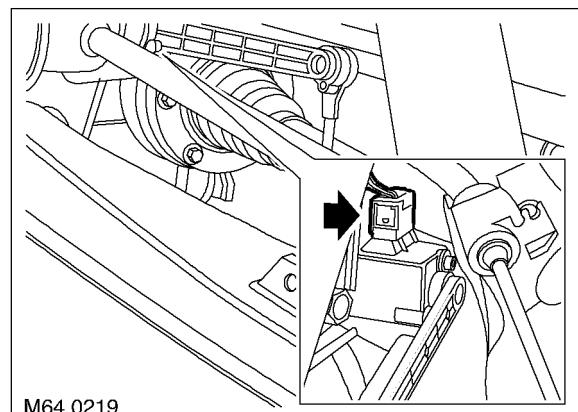
Bushes must be changed in pairs, front LH and RH, or rear LH and RH. Not diagonally or individually.

#### Remove

1. Position vehicle on lift.
2. Raise rear of vehicle.

**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

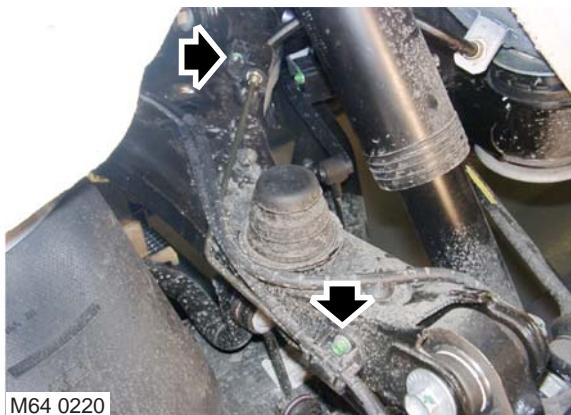
3. Remove rear road wheels.
4. Depressurise suspension.
  - ☞ **REAR SUSPENSION, ADJUSTMENTS, Suspension - depressurise and repressurise.**
5. Remove rear propeller shaft.
  - ☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**



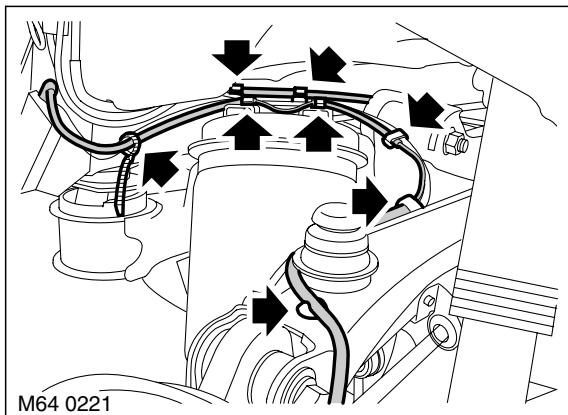
6. Disconnect multiplugs from rear ride height sensors.

## REAR SUSPENSION

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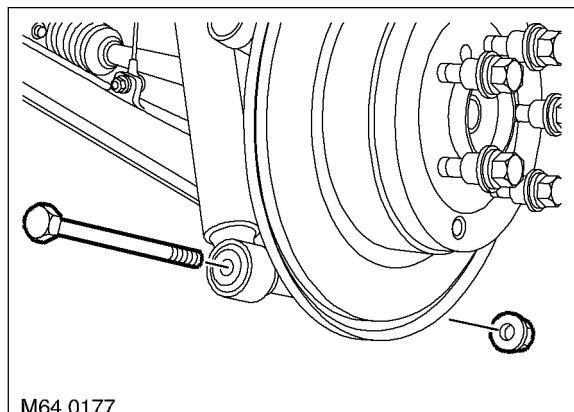


7. Remove Allen screws securing brake pipe clips to upper arms.

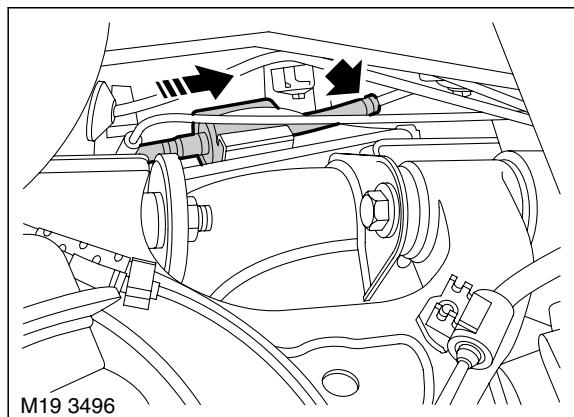


8. Release clips securing ABS and brake pad wear sensor leads to upper arms and body.
9. Release clips securing air suspension pipes to body.
10. Position jacks to support lower arms.

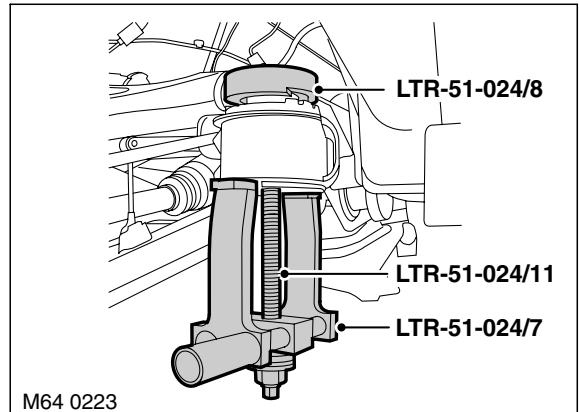
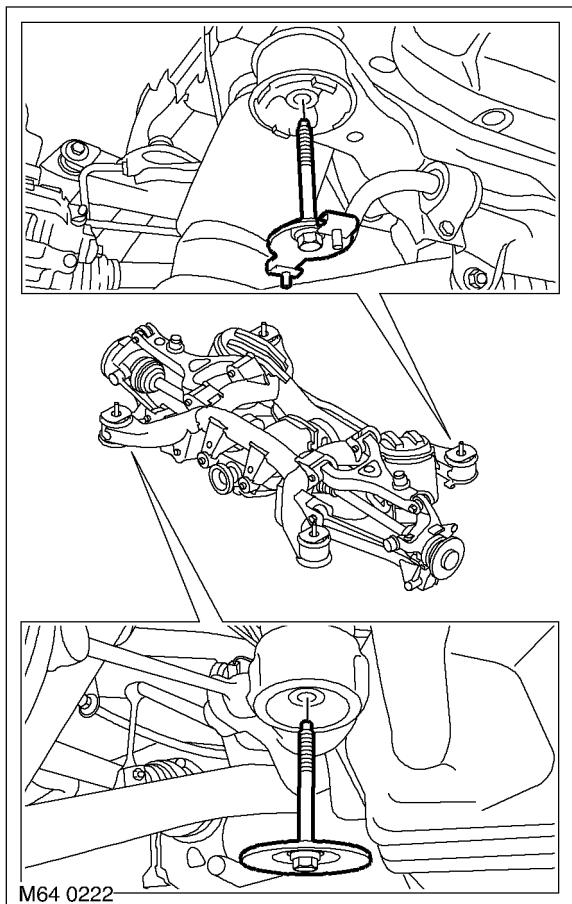
**CAUTION: Do not allow suspension arm to hang unsupported on air spring.**



11. Remove bolts securing dampers to lower arms.



12. Release fuel burning heater (FBH), fuel pump from rubber mounting.
13. Position jack to support rear sub-frame.



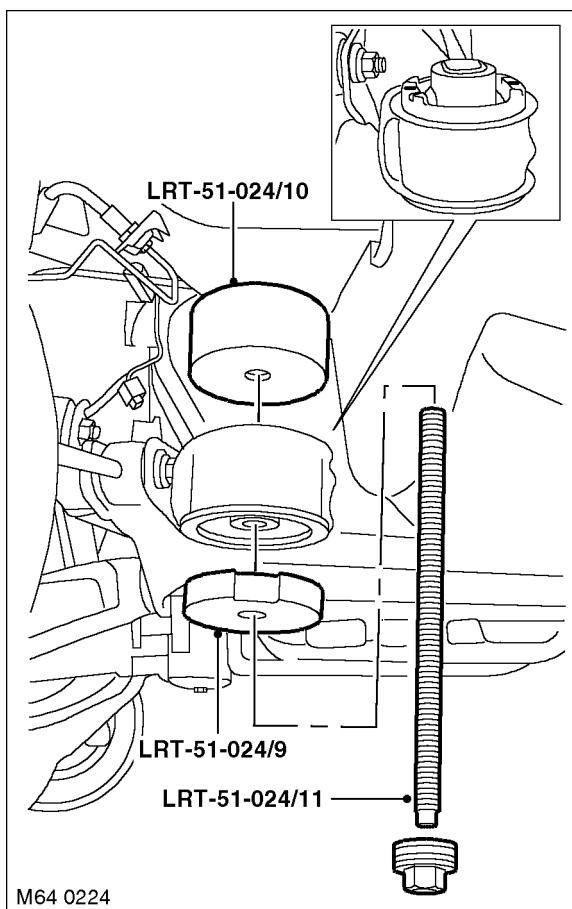
20. Assemble **LRT-51-024/7**.
21. Fit remover **LRT-51-024/8** to bush, position **LRT-51-024/7** to sub-frame. Fit draw bar **LRT-51-024/11** to **LRT-51-024/8**, align tools and remove bush.

#### Refit

1. Clean bush locations and mating faces.
2. Apply rubber lubricant to new bush and bore.

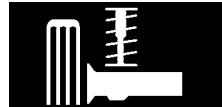
14. Remove 2 diagonally opposite sub-frame mounting bolts, collect cup washer and exhaust mounting bracket. Fit cup washer and mounting bracket to damper mounting bolts. **Use damper bolts as slaves to support sub-frame.**
15. Fit and finger tighten bolts to subframe. **Engage bolts a minimum 16 mm.**
16. Remove the 2 remaining sub-frame bolts.
17. Lower sub-frame for access to bushes.
18. Collect slotted spacers from mountings.
19. Note fitted position of bush and paint mark sub-frame.

## REAR SUSPENSION



17. Tighten sub-frame bolts to 165 Nm (122 lbf.ft).  
**Ensure slotted spacers are correctly located to bushes prior to tightening.**
18. Fit and secure FBH pump to mounting.
19. Fit bolts securing dampers to lower arms, do not tighten at this stage.
20. Fit and secure air suspension pipes to body.  
**CAUTION: Ensure timing marks on the air pipes are fitted to clips.**
21. Fit and secure ABS and brake sensor leads.
22. Position brake pipes and secure clips.
23. Connect ride height sensor multiplugs.
24. Fit rear propeller shaft.  
 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
25. Pressurise suspension.
26. Fit rear road wheels and tighten nuts to 140 Nm (103 lbf.ft).
27. Tighten lower arm damper bolts to 110 Nm (81 lbf.ft).

3. Position bush replacer **LRT-51-024/10** to sub-frame.
4. Fit **LRT-51-024/9** to **LRT-51-024/11**, fit new bush over draw bar.
5. Fit **LRT-51-024/11** to **LRT-51-024/10**.
6. Position bush, align timing mark to paint mark on sub-frame.
7. Fit bush and remove tool assembly.
8. Repeat procedure on bush diagonally opposite.
9. Raise sub-frame to body remove slave damper bolts, fit through opposite bushes and finger tighten.
10. Lower sub-frame.
11. Remove and refit remaining bushes.
12. Fit 2 slotted spacers to available bushes. Raise sub-frame to body leaving sufficient gap to fit remaining spacers.
13. Fit 2 subframe mounting bolts with cup washer and exhaust bracket, do not tighten at this stage.
14. Remove slave bolts from sub-frame and collect cup washer and exhaust bracket.
15. Fit cup washer and exhaust mounting bracket to remaining sub-frame bolts. Locate spacers on bushes and fit bolts to sub-frame.
16. Locate sub-frame on dowels.



## Height sensor

### 64.36.01

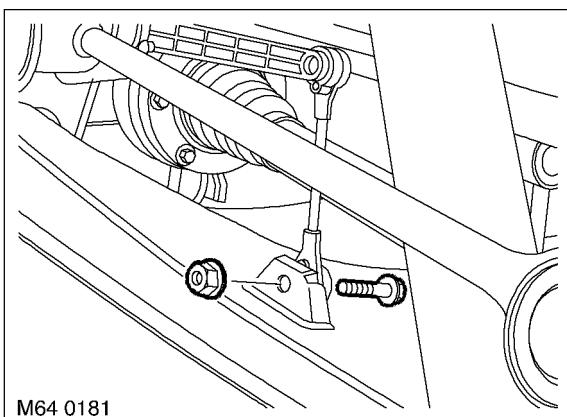
For models fitted with Xenon headlamps the RH front and RH rear height sensors are different to those models with standard headlamps. The Xenon sensors can be identified by a white stripe on the back face of the sensor housing. These sensors can be fitted to models without Xenon headlamps. But the standard sensors cannot be fitted to Xenon models.

#### Remove

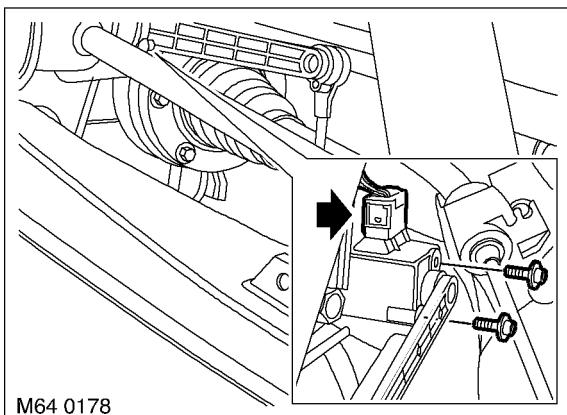
1. Raise rear of vehicle.

**WARNING:** *Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.*

2. Remove road wheel.



3. Remove nut and bolt securing sensor link to lower arm.



4. Disconnect multiplug.

5. Using a 4mm Allen socket, remove 2 Allen screws securing height sensor to mounting bracket and remove height sensor.

#### Refit

1. Ensure sensor and mounting bracket mating surfaces are clean.
2. Position height sensor to mounting bracket, fit Allen screws and tighten to 5 Nm (3.7 lbf.ft).  
**CAUTION:** Ensure height sensor arm is pointing outwards.
3. Align height sensor link to lower arm, fit nut and bolt and tighten to 19 Nm (14 lbf.ft).
4. Connect multiplug to sensor.  
**CAUTION:** Ensure 'O' ring seal is correctly located in multiplug.
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stands and lower vehicle.
7. Use TestBook/T4 to re-calibrate system, if fitting a new sensor.

**FRONT SUSPENSION,  
ADJUSTMENTS, Calibrate - air suspension.**

# REAR SUSPENSION

## Valve assembly - cross link

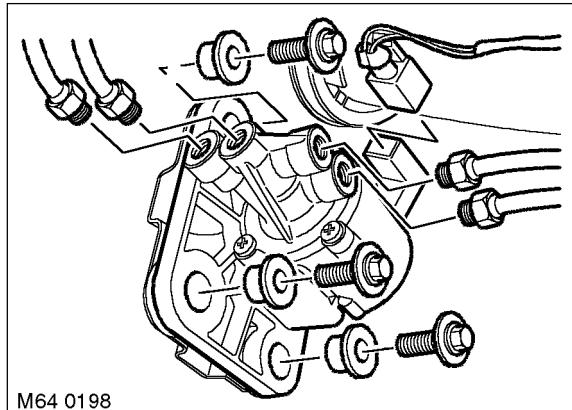
### → 64.50.13

Do not depressurise air suspension system before raising vehicle

When removing Voss connectors from any air suspension component, the connector must be left attached to the air pipe being removed. Do not remove the connector from the air pipe. Removing the connector from the air pipe could cause the connector to scratch the pipe and increase the likelihood of leaks.

### Remove

1. Raise rear of vehicle and support under body.
2. Depressurise rear suspension.  
→ REAR SUSPENSION,  
ADJUSTMENTS, Suspension - depressurise  
and repressurise.
3. Remove RH rear wheel arch liner.  
→ EXTERIOR FITTINGS, REPAIRS,  
Liner - rear wheel arch - single.



4. Noting their fitted positions, disconnect 4 pipes from cross link valve.  
**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.
5. Disconnect multiplug from cross link valve.
6. Remove 3 bolts securing cross link valve to body.
7. Remove cross link valve assembly.

### Refit

1. If fitting a new cross link valve, remove Voss air connectors from new valve.
2. Position cross link valve, fit bolts and tighten to 8 Nm (6 lbf.ft).
3. Connect multiplug to cross link valve.
4. Connect pipes to cross link valve and tighten unions to 3.5 Nm (2.6 lbf.ft).  
**CAUTION:** Ensure air pipe connections are clean.
5. Fit rear wheel arch liner.  
→ EXTERIOR FITTINGS, REPAIRS,  
Liner - rear wheel arch - single.
6. Pressurise suspension.  
→ REAR SUSPENSION,  
ADJUSTMENTS, Suspension - depressurise  
and repressurise.
7. Remove stands and lower vehicle.



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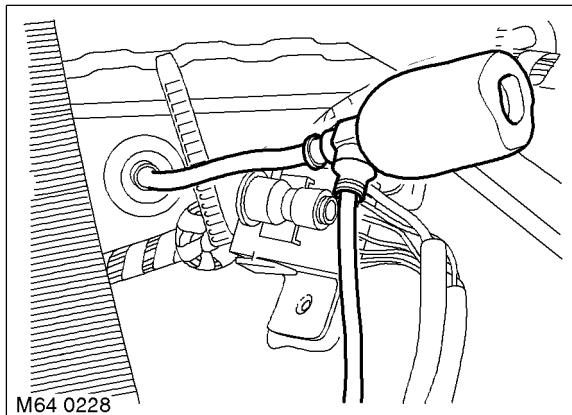
**Valve - safety - air pressure**

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» 64.50.14

**Remove**

1. Open both tailgates, release and fold back parcel shelf.
2. Release spare wheel cover from clips and remove from vehicle.



3. Depress 2 clips and disconnect air pipes from safety valve. Remove safety valve.

**Refit**

1. Connect safety valve to air pipes.
2. Fit spare wheel cover and secure in clips.
3. Close parcel shelf cover.

## **REAR SUSPENSION**

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## Thickness and run out check - brake disc - front

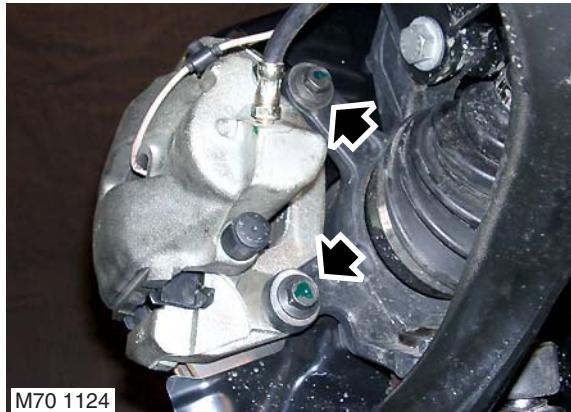
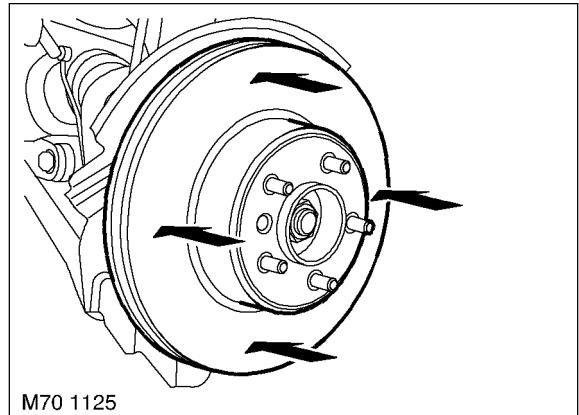
☛ 70.10.15.01

### Check

1. Raise front of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

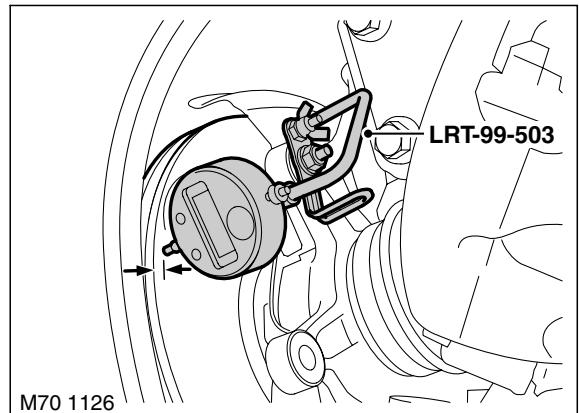
2. Remove road wheel.



3. Remove 2 bolts securing brake caliper to hub. Release caliper from hub and tie aside.

**CAUTION:** Do not allow caliper to hang on brake hose.

4. At 4 points around disc, measure disc thickness using a micrometer; renew disc if less than service limit or if maximum variation is exceeded: Disc thickness, NEW = 30 mm. Service limit = 28.4 mm. Thickness variation, maximum = 0.010 mm.
- CAUTION:** Brake discs must be renewed in pairs, unless one disc requires changing before 1000 miles (1500 kilometres) from new.

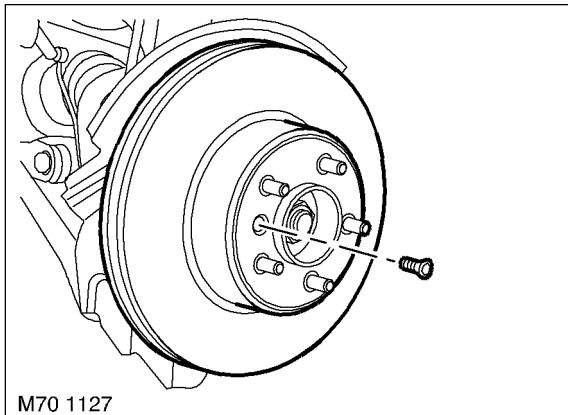


5. Mount a Dial Test Indicator (DTI) to LRT-99-503, and secure to inboard side of hub using caliper assembly upper bolt hole.
6. Position DTI probe 5 mm in from outer edge of disc.
7. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
8. Zero DTI and rotate road wheel one complete revolution to measure disc run out. Disc run out must not exceed 0.073 mm.
9. If disc run out is outside limits, carry out the following procedure.

# BRAKES

## Adjust

1. Remove road wheel.



## Thickness and run out check - brake disc - rear

☞ 70.12.36

### Check

1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

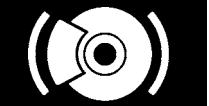
2. Remove road wheel.



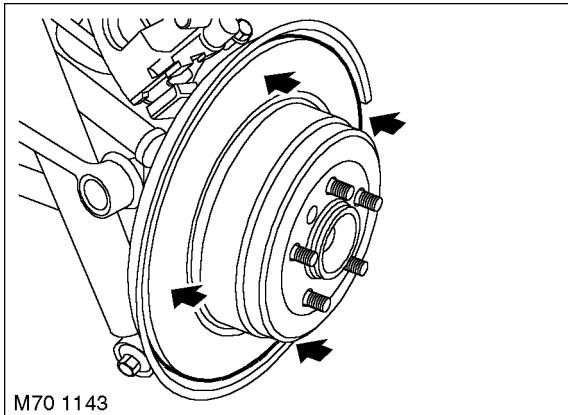
3. Remove 2 bolts securing brake caliper to hub. Release caliper from hub and tie aside.

**CAUTION:** Do not allow caliper to hang on brake hose.

2. Remove Allen screw securing brake disc to drive flange.
3. Remove brake disc.
4. Ensure mating surfaces of disc and drive flange are clean.
5. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft).
6. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
7. Check disc run out as detailed above.
8. If run out is still outside limits, renew disc and/or hub.
9. Remove road wheel.
10. Remove DTI and **LRT-99-503**.
11. Position caliper to hub, fit bolts and tighten to 110 Nm (81 lbf.ft).
12. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
13. Depress brake pedal several times to set brake pads.
14. Remove stands and lower vehicle.

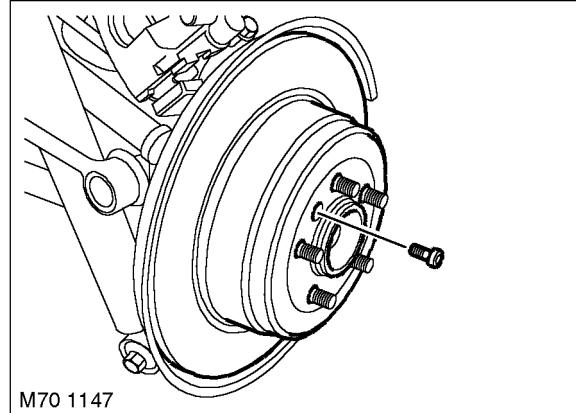
**Adjust**

1. Remove road wheel.

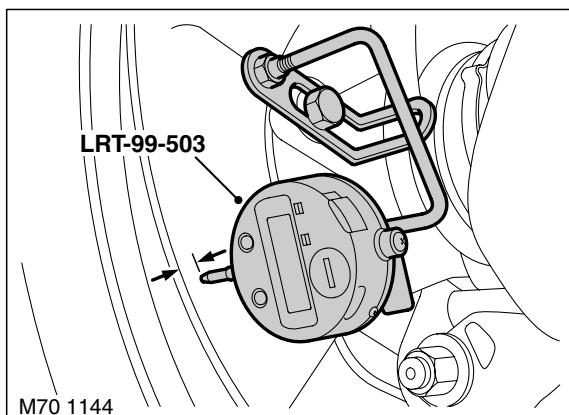


4. At 4 points around disc, measure disc thickness using a micrometer; renew disc if less than service limit or if maximum variation is exceeded: Disc thickness, NEW = 12 mm. Service limit = 10.4 mm. Thickness variation, maximum = 0.010.

**CAUTION: Brake discs must be renewed in pairs, unless one disc requires changing before 1000 miles (1500 kilometres) from new.**



2. Remove Allen screw securing brake disc to drive flange.
3. Remove brake disc.
4. Ensure mating surfaces of disc and drive flange are clean.
5. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft).
6. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
7. Check disc run out as detailed above.
8. If run out is still outside limits, renew disc and/or hub.
9. Remove road wheel.
10. Remove DTI and **LRT-99-503**.
11. Position caliper to rear hub, fit bolts and tighten to 65 Nm (48 lbf.ft).
12. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
13. Depress brake pedal several times to set brake pads.
14. Remove stands and lower vehicle.



5. Mount a Dial Test Indicator (DTI) to **LRT-99-503**, and secure to inboard side of hub using caliper assembly upper bolt hole.
6. Position DTI probe 5 mm in from outer edge of disc.
7. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
8. Zero DTI and rotate wheel one complete revolution to measure disc run out. Disc run out must not exceed 0.075 mm.
9. If disc run out is outside limits, carry out the following procedure.

# BRAKES

## Brake system bleeding

### 70.25.02

Bleeding of the brake system can be carried out using the procedures given on TestBook/T4, or by following the manual procedure given below.

#### Check

1. The following procedure covers bleeding the complete system but where only the primary or secondary circuit have been disturbed in isolation, it should only be necessary to bleed that system. Partial bleeding of the hydraulic system is only permissible if a brake pipe or hose has been disconnected with only minor loss of fluid.

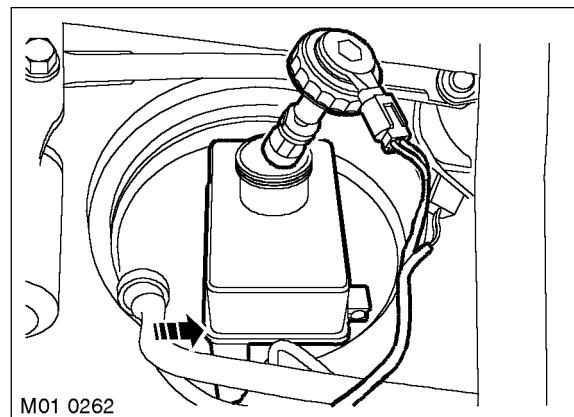
**WARNING:** If any components upstream of brake modulator, including the modulator itself are replaced, the brake system must be bled using the procedure on TestBook/T4, to ensure that all air is expelled from the new component(s).

#### Adjust

1. Raise front and rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

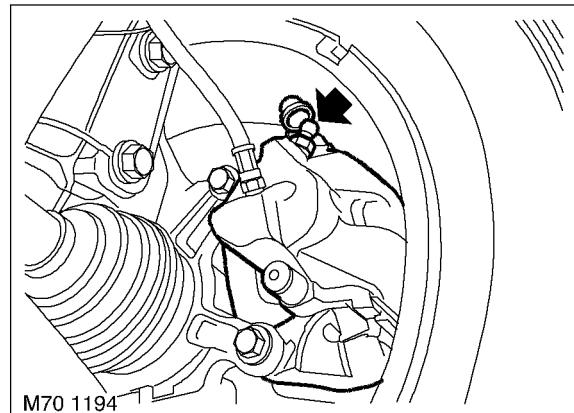
2. Check all pipe and hose connections are tight and there are no signs of leakage.



3. Top-up fluid level in brake reservoir to 'MAX' mark.

 **MAINTENANCE, PROCEDURES, Fluid reservoirs.**

**WARNING:** Do not allow dirt or foreign liquids to enter the reservoir. Use only new Shell DOT 4 ESL brake fluid from airtight containers. Do not mix brands of brake fluid as they may not be compatible.



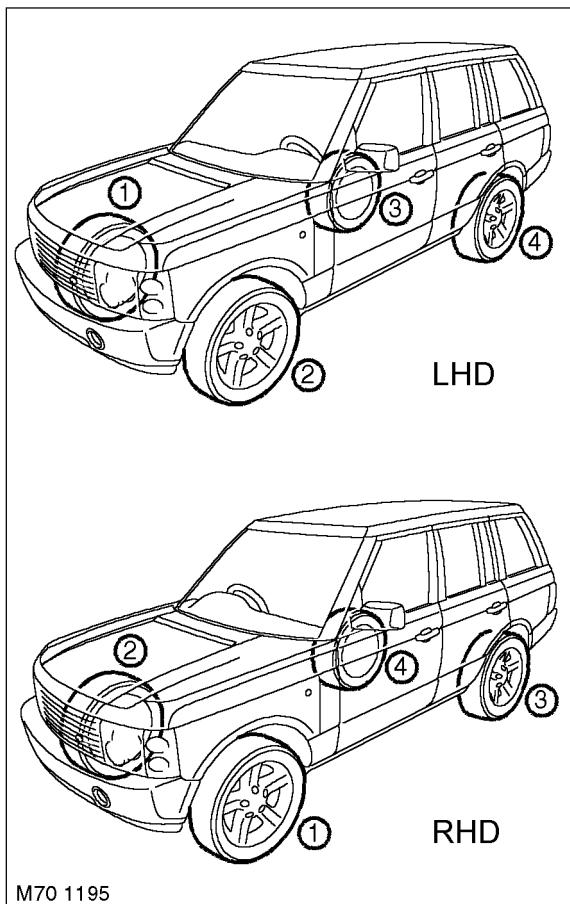
4. Attach bleed tube to front brake caliper bleed screw on passenger side, submerge free end in a clear container containing brake fluid.
5. Apply pressure to brake pedal several times, then apply steady pressure.
6. Loosen bleed screw to release brake fluid and air. Allow pedal to return unassisted.



7. Depress brake pedal steadily through its full stroke and allow to return unassisted. Repeat procedure until a flow of clean, air-free fluid is purged into container, then whilst holding pedal at end of its downward stroke, tighten bleed screw to 14 Nm (10 lbf.ft)

**CAUTION:** Ensure the fluid in the reservoir is maintained between the minimum and maximum levels throughout the bleed procedure using new brake fluid.

8. Top up brake system reservoir.



M70 1195

9. Repeat procedure at each wheel in the sequence shown.  
**WARNING:** Braking efficiency may be seriously impaired if the incorrect bleed sequence is used.
10. Remove tube from bleed screw and fit bleed screw dust cap.
11. Apply brakes and check for leakage.
12. Remove stands and lower vehicle.
13. Road test vehicle. Check brake pedal for short firm travel when brakes are applied.

## Handbrake adjustment

### 70.35.10

#### Check

1. Rear brake shoe bedding-in

**WARNING:** Where possible, a road test should be on well surfaced and dry roads. Always comply with speed limits and local traffic regulations.

2. Ensure handbrake is correctly adjusted as detailed below.
3. On a dynamometer: Apply hand brake for approximately 40 seconds, a braking force reading of 800 Nm must be obtained.
4. On road test: At approximately 24 mph (40 km/h), apply handbrake until braking force can be felt. Apply handbrake one further notch and drive on for 440 yards (400 metres).

#### Adjust

1. Raise rear of vehicle.

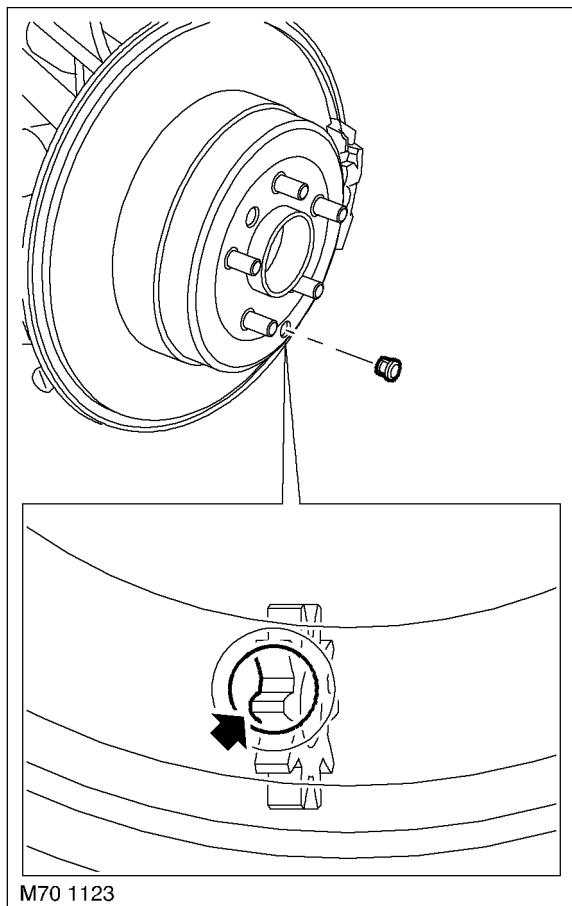
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove rear road wheels.

3. On each rear brake:

## BRAKES

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4. Remove adjuster access plug from brake disc.
5. Rotate brake disc until access hole is in the 6 o'clock position.
6. Using a screwdriver or similar tool, turn brake shoe adjuster until resistance is felt. Apply handbrake several times to centre shoes, re-adjust if required and repeat.
7. Ensure handbrake is released and check disc will not rotate.
8. Back the adjuster off 8 notches, check disc is free to rotate.
9. Fit adjuster access plug.
10. Fit rear road wheels and tighten nuts to 140 Nm (103 lbf.ft).
11. Handbrake lever assembly is self adjusting and will correctly tension cables. However after adjustment apply handbrake several times, release handbrake and ensure road wheels are free to rotate.
12. Lower vehicle.

## Brake disc - front

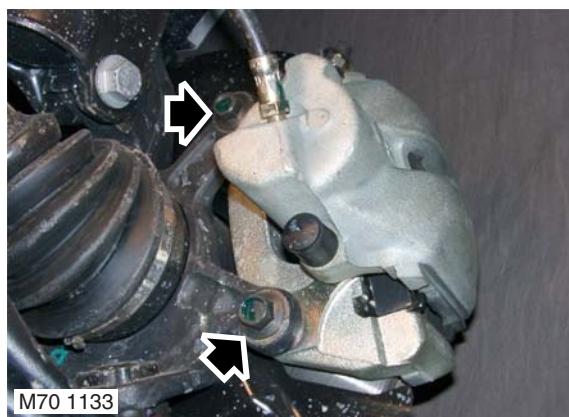
### » 70.12.10

#### Remove

1. Raise front of vehicle.

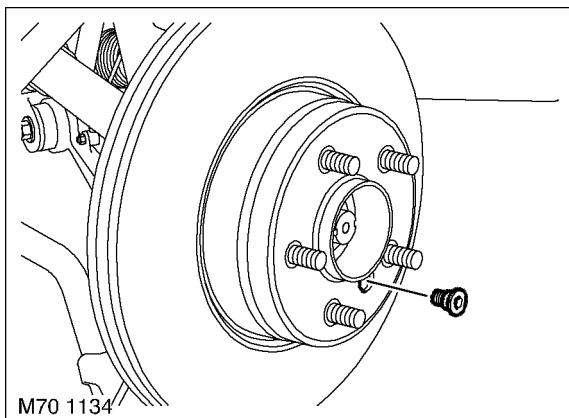
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



3. Remove 2 bolts securing brake caliper to hub.  
Release caliper from hub and tie aside.

**CAUTION:** Do not allow caliper to hang on  
brake hose.



4. Remove Allen screw securing brake disc to drive flange.
5. Remove brake disc.

#### Refit

1. Ensure mating surfaces of disc and drive flange are clean.
2. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft).
3. Position caliper to hub, fit bolts and tighten to 110 Nm (81 lbf.ft).
4. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).

# BRAKES

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## Brake disc - rear

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→ 70.12.33

### Remove

1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.

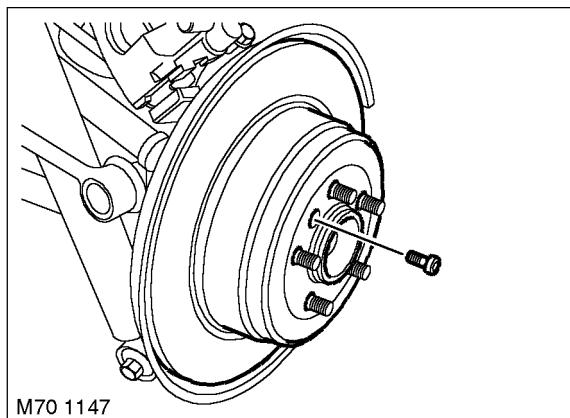


3. Remove 2 bolts securing brake caliper to hub. Release caliper from hub and tie aside.

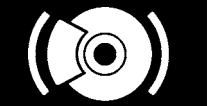
**CAUTION:** Do not allow caliper to hang on brake hose.

### Refit

1. Ensure mating surfaces of disc and drive flange are clean.
2. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft).
3. Position caliper to rear hub, fit bolts and tighten to 65 Nm (48 lbf.ft).
4. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
5. Adjust handbrake.  
→ BRAKES, ADJUSTMENTS, Handbrake adjustment.
6. Remove stands and lower vehicle.



4. Remove Allen screw securing brake disc to drive flange.
5. Remove brake disc.



## Pump - pre-charge

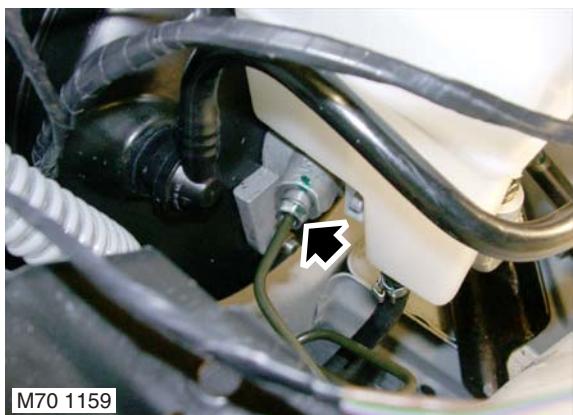
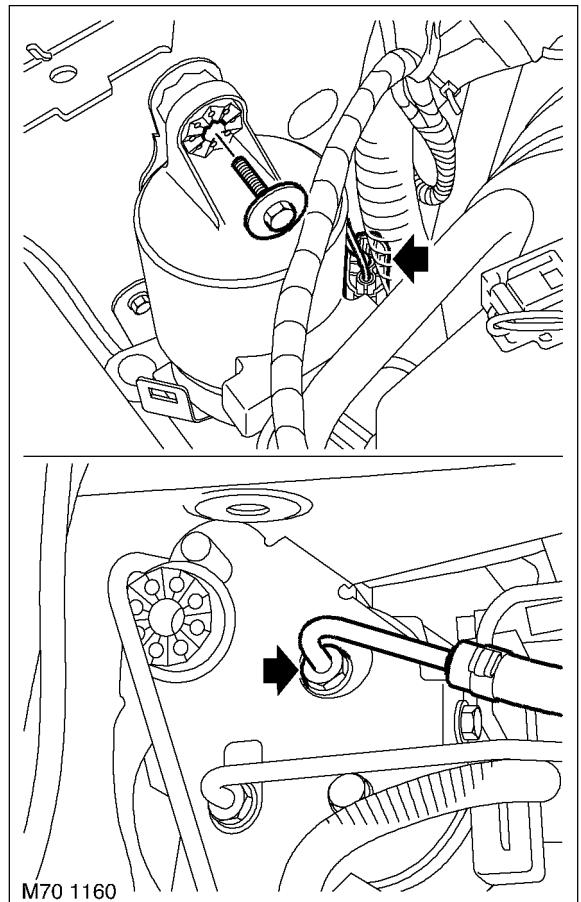
» 70.25.17

### Remove

1. Remove front wheel arch liner.  
☞ EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.



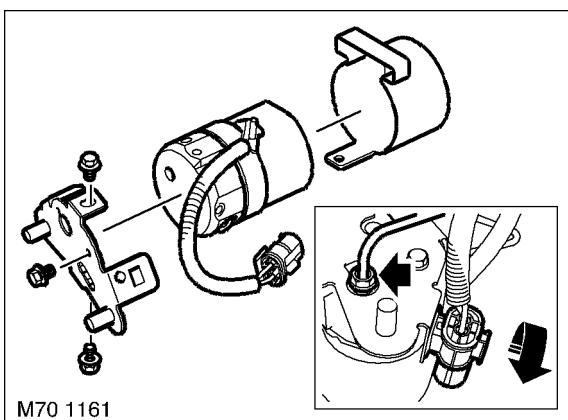
2. Remove nut securing alarm sounder to mounting bracket and move aside.
  3. Position container to collect fluid spillage.
- CAUTION:** Brake fluid will damage paint finished surfaces. If spilled, immediately remove fluid and clean area with water.



4. Disconnect brake pipe from master cylinder.
- CAUTION:** Always fit plugs to open connections to prevent contamination.

5. Disconnect feed hose.
6. Remove bolt securing pre-charge pump bracket to body.
7. Release pump from rubber mounting.
8. Disconnect multiplug.
9. Remove pump.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



10. Noting its fitted position, remove brake pipe.
11. Release multiplug, remove 3 bolts and remove mounting bracket and cover.

## Refit

1. Fit mounting bracket and cover to pre-charge pump, fit bolts and tighten to 8 Nm (6 lbf.ft).
  2. Secure multiplug.
  3. Clean brake pipe unions.
  4. Fit brake pipe to pump and lightly tighten union.
  5. Connect multiplug.
  6. Locate pre-charge pump to mounting rubbers.
  7. Fit bolt securing pre-charge pump and tighten to 8 Nm (6 lbf.ft).
  8. Connect pre-charge pump pipe to master cylinder, tighten both unions to 14 Nm (10 lbf.ft).
  9. Connect master cylinder feed to pre-charge pump and tighten union to 14 Nm (10 lbf.ft).
  10. Position alarm sounder to bracket, fit nut and tighten to 8 Nm (6 lbf.ft).
  11. Fit front wheel arch liner.
- EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.**
12. Bleed brakes using TestBook/T4.

## Reservoir - brake fluid

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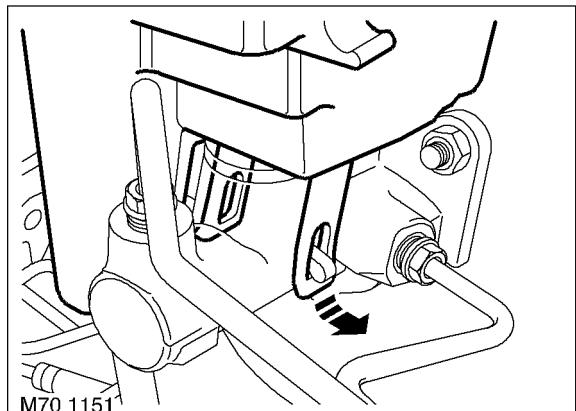
### 70.25.31

#### Remove

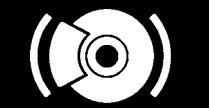
1. Position container to collect fluid spillage.
- CAUTION:** Brake fluid will damage paint finished surfaces. If spilled, immediately remove fluid and clean area with water.



2. Disconnect multiplug from low fluid level sensor.
  3. Release harness from clip.
  4. Release clip and disconnect pre-charge pump feed hose.
- CAUTION:** Plug hose immediately to prevent fluid loss from pre-charge pump.



5. Release 2 clips and remove reservoir.
  6. Remove and discard 2 reservoir seals.
- CAUTION:** Always fit plugs to open connections to prevent contamination.

**Refit**

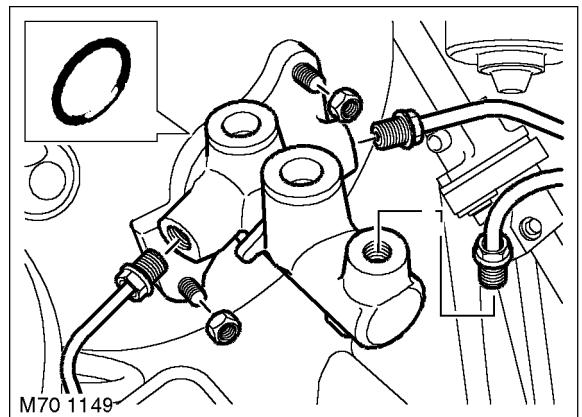
1. Clean reservoir and master cylinder mating faces.
2. Fit seals.
3. Fit brake master cylinder.
4. Connect pre-charge pump feed hose and secure with clip.
5. Secure harness to clip.
6. Connect multiplug to low fluid level sensor.
7. Bleed brakes using TestBook/T4.

**Cylinder - master - tandem**

» **70.30.08**

**Remove**

1. Remove fluid reservoir.  
☞ **BRAKES, REPAIRS, Reservoir - brake fluid.**



2. Disconnect brake pipes.

**CAUTION: Always fit plugs to open connections to prevent contamination.**

3. Remove and discard 2 nuts securing master cylinder to servo, remove master cylinder.
4. Remove and discard sealing ring.

**Refit**

1. Clean master cylinder and servo mating surfaces.
2. Fit new sealing ring to master cylinder.
3. Align push rod and position master cylinder to servo.
4. Fit new nuts securing brake master cylinder and tighten to 26 Nm (19 lbf.ft).
5. Clean brake pipe unions.
6. Connect brake pipes to master cylinder and tighten unions to 14 Nm (10 lbf.ft).
7. Fit fluid reservoir.  
☞ **BRAKES, REPAIRS, Reservoir - brake fluid.**

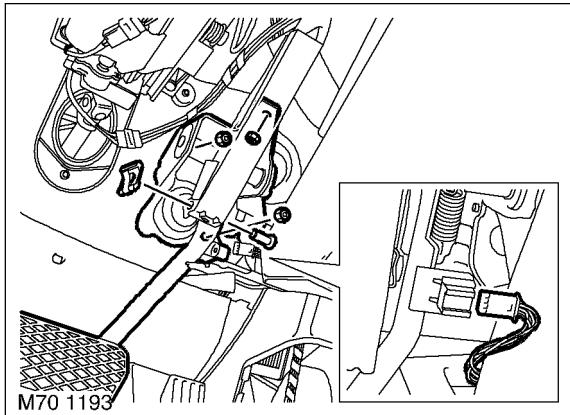
# BRAKES

## Pedal box

☛ 70.35.03

### Remove

1. Remove closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**
2. Remove shroud.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Shroud - lower - fascia.**



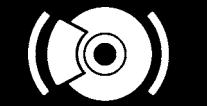
4. Position sensor, connect multiplug and secure to holder.
5. Align push rod, fit clevis pin and secure with clip.
6. With brake pedal released, ensure sensor is in contact with operating tang on brake pedal.
7. Fit shroud.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Shroud - lower - fascia.**
8. Fit closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**

3. Disconnect brake sensor multiplug from pedal box.
4. Remove clip and clevis pin securing brake servo push rod to brake pedal.
5. Remove and discard 3 nuts securing pedal box to bulkhead.
6. Release and withdraw pedal box.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
7. Release and remove brake sensor from holder.
8. Remove holder from pedal bracket.
9. Remove pedal return spring.
10. Remove 2 nuts and bolts securing return spring bracket to pedal box. Remove bracket.

### Refit

1. Position return spring bracket to pedal box, fit nuts, bolts and tighten to 10 Nm (7 lbf.ft).
2. Fit return spring and sensor holder to pedal bracket.
3. Position pedal box to bulkhead, fit new nuts and tighten to 26 Nm (19 lbf.ft).

**CAUTION: Nuts securing brake servo to pedal bracket must be re-torqued after 30 minutes have elapsed.**

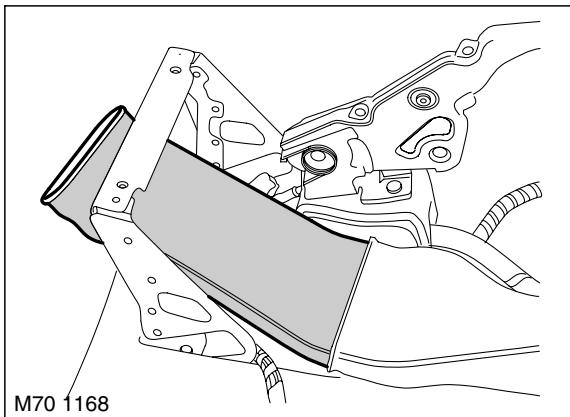


## Lever assembly - handbrake

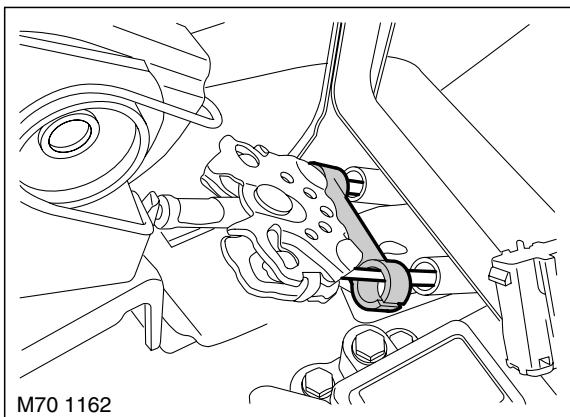
» **70.35.08**

### Remove

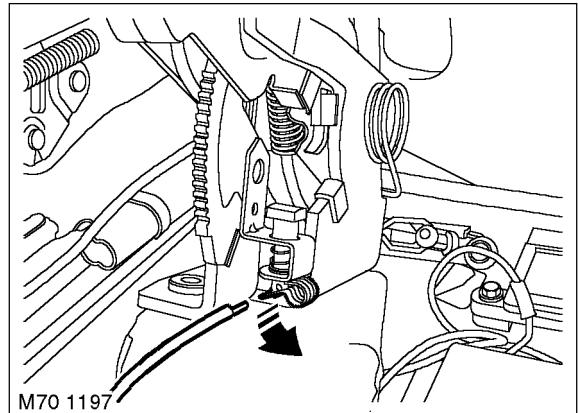
1. Remove centre console.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Centre console.**



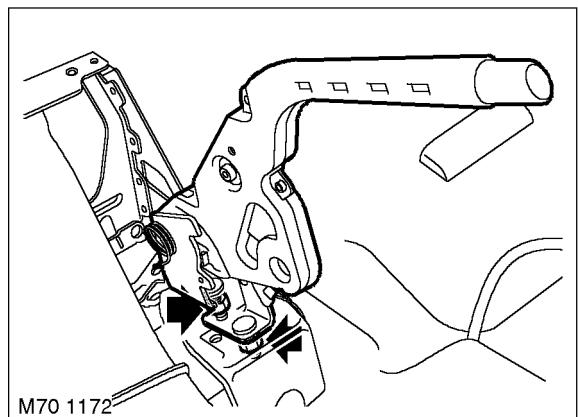
2. Release and remove air duct.



3. Release clip and disconnect handbrake cables from compensator.



4. Release lead from switch.



5. Remove 2 nuts securing handbrake lever.
6. Remove handbrake lever.

### Refit

1. Fit handbrake lever to bracket, fit nuts and tighten to 21 Nm (15 lbf.ft).
2. Connect lead to switch.
3. Connect cables to compensator.
4. Fit air duct.
5. Fit centre console.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Centre console.**
6. Check handbrake operation, adjust if necessary.  
☞ **BRAKES, ADJUSTMENTS,  
Handbrake adjustment.**

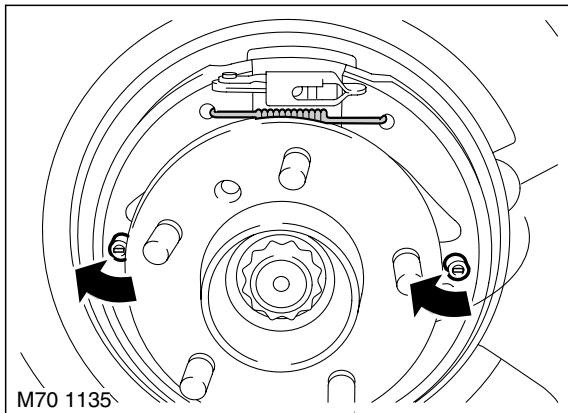
# BRAKES

## Cable - handbrake

→ **70.35.25**

### Remove

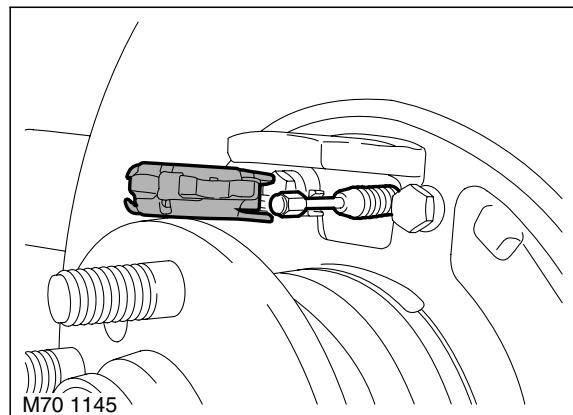
1. Position vehicle on lift.
2. Remove brake disc.  
    👉 **BRAKES, REPAIRS, Brake disc - rear.**



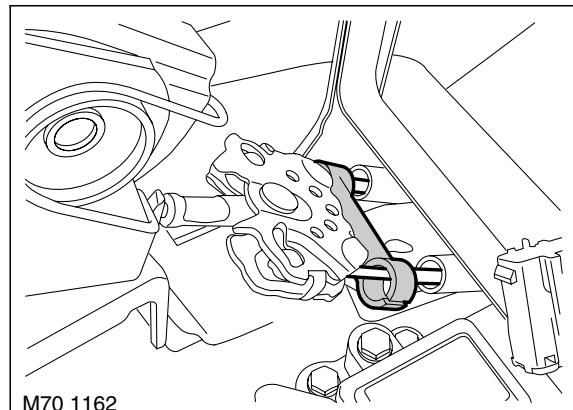
3. Remove brake shoe upper return spring.
4. Rotate brake shoe retainers 90 ° and remove.



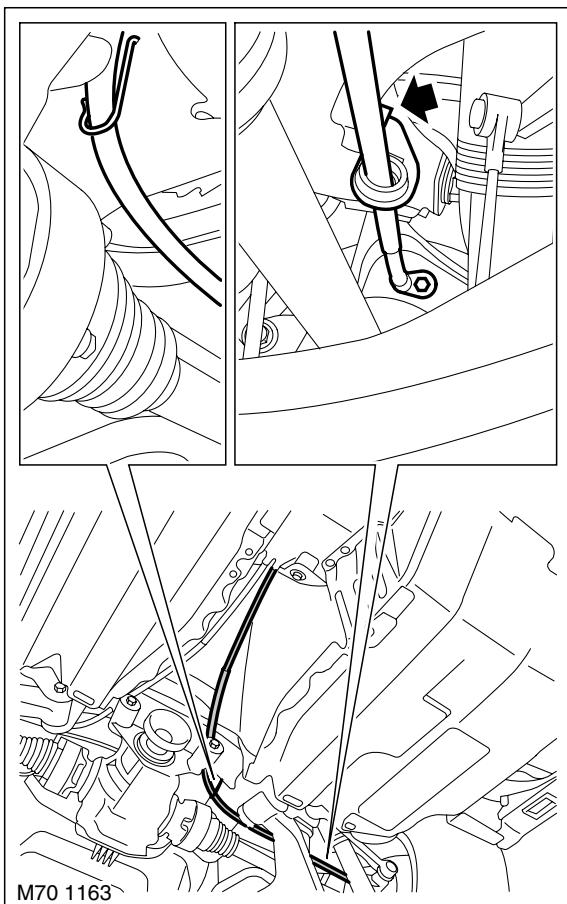
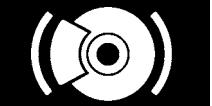
5. Remove lower return spring and adjuster from brake shoes.



6. Remove shoe expander.
7. Remove rear propeller shaft.  
    👉 **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
8. Remove centre console.  
    👉 **INTERIOR FITTINGS, REPAIRS, Centre console.**



9. Remove cable clip and disconnect handbrake lever cable from compensator.
10. Withdraw handbrake cable from body.



10. Fit centre console.  
☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**
11. Fit rear propeller shaft.  
☞ **DRIVESHAFTS, REPAIRS, Propeller shaft - rear.**
12. Clean backplate and brake disc with brake cleaning fluid.
13. Clean brake adjuster, lubricate threads with grease and set to minimum extension.  
☞ **CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
14. Assemble brake shoes with adjuster and lower return spring.
15. Position brake shoe assembly, fit retainers and upper return spring.
16. Fit rear brake disc.  
☞ **BRAKES, REPAIRS, Brake disc - rear.**

11. Remove bolt securing handbrake cable to backplate.
  12. Release cable from chassis clip.
  13. Remove bolt securing cable retaining clip to sub-frame.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
14. Remove cable mounting bracket from handbrake cable.

#### Refit

1. Fit support bracket to cable.
2. Clean expander.
3. Position handbrake cable and secure to expander.
4. Fit and secure handbrake cable to backplate, tighten bolt to 8 Nm (6 lbf.ft).
5. Position cable support clip to sub-frame, tighten bolt to 5 Nm (4 lbf.ft).
6. Secure cable in chassis clip.
7. Feed cable through body to handbrake lever.
8. Connect cable to compensator.
9. Secure cable retaining clip to handbrake assembly.

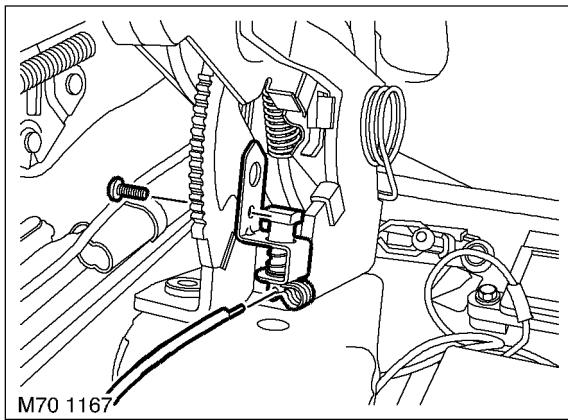
# BRAKES

## Switch - handbrake warning

☛ 70.35.40

### Remove

1. Remove centre console.  
☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**



2. Remove screw securing switch.
3. Release lead from switch.
4. Remove switch.

### Refit

1. Connect lead and position switch to handbrake lever, ensuring lug on handbrake lever locates in hole in switch. Fit and tighten screw.
2. Fit centre console.  
☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**

## Pads - front

☛ 70.40.02

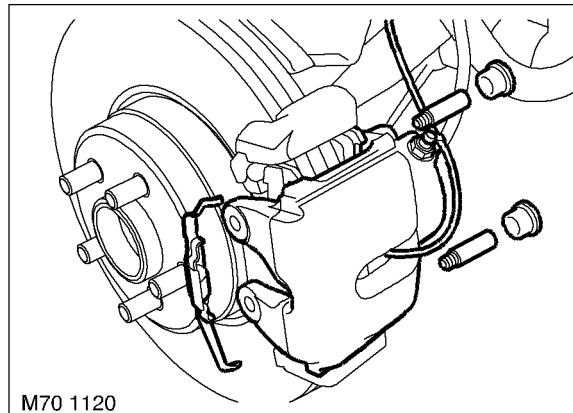
**WARNING:** Brake pads must be renewed in axle sets only, otherwise braking efficiency may be impaired. If pad wear warning light has been activated, pad wear sensor must be renewed.

### Remove

1. Raise front of vehicle.

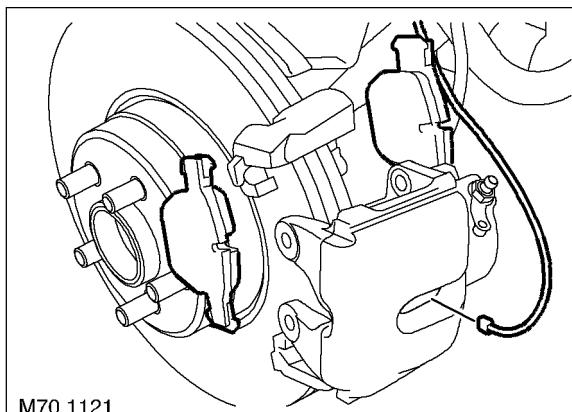
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheels.
3. LH side only: Release pad wear sensor.



4. Remove anti-rattle spring from caliper housing.
5. Remove 2 caps from guide pin dust covers.
6. Remove 2 guide pins from caliper housing.
7. Release caliper housing from caliper carrier and tie aside.

**CAUTION:** Do not allow caliper to hang on brake hose.



10. Fit caps to guide pin dust covers.
11. Fit anti-rattle spring to caliper housing.
12. Repeat procedure for other side.
13. Fit sensor to pad.
14. Depress brake pedal several times to seat pads.
15. Check and top-up fluid level.
16. Fit front road wheels and tighten nuts to 140 Nm (103 lbf.ft).
17. Remove stands and lower vehicle.

8. Remove brake pads from caliper housing, mark their fitted position if they are to be refitted.
9. Repeat procedure for other side.

#### Refit

1. Clean caliper housing and caliper carrier using brake cleaning fluid.  
***WARNING: Do not use compressed air to clean brake components. Dust from friction materials can be harmful if inhaled.***
2. Clean brake pad, caliper housing and carrier contact areas and apply suitable anti-seize compound.
3. Inspect caliper and seals for damage.



4. Position bleed bottle, connect bleed hose to bleed screw and loosen screw.
5. Press piston into caliper housing then tighten bleed screw to 14 Nm (10 lbf.ft)
6. Disconnect bleed hose and remove bottle.
7. Fit brake pads to caliper housing.
8. Clean and inspect guide pins, replace if corroded or damaged. Do not lubricate.
9. Position and align caliper housing to carrier, fit guide pins and tighten to 33 Nm (24 lbf.ft).

# BRAKES

## Pads - rear

### 70.40.03

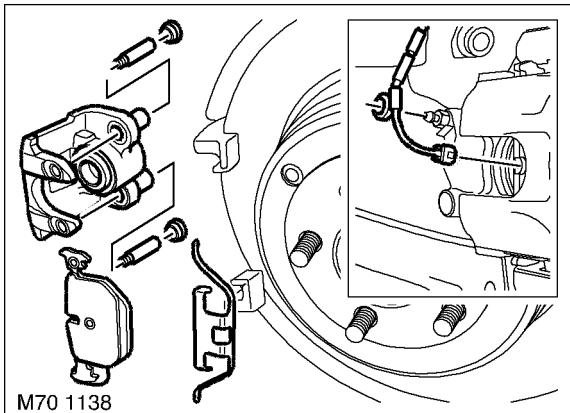
**WARNING:** Brake pads must be renewed in axle sets only, otherwise braking efficiency may be impaired. If pad wear warning light has been activated, pad wear sensor must be renewed.

#### Remove

1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheels.
3. RH side only: Release pad wear sensor.



4. Remove anti-rattle spring from caliper housing.
5. Remove 2 caps from guide pin dust covers.
6. Remove 2 guide pins from caliper housing.
7. Release caliper housing from caliper carrier and tie aside.

**CAUTION:** Do not allow caliper to hang on brake hose.

8. Remove brake pads from caliper housing, mark their fitted position if they are to be refitted.
9. Repeat procedure for other side.

#### Refit

1. Clean caliper housing and caliper carrier using brake cleaning fluid.

**WARNING:** Do not use compressed air to clean brake components. Dust from friction materials can be harmful if inhaled.

2. Clean brake pad, caliper housing and carrier contact areas and apply suitable anti-seize compound.
3. Inspect caliper and seals for damage.



4. Position bleed bottle, connect bleed hose to bleed screw and loosen screw.
5. Press piston into caliper housing then tighten bleed screw to 14 Nm (10 lbf.ft)
6. Disconnect bleed hose and remove bottle.
7. Fit brake pads to caliper housing.
8. Clean and inspect guide pins, replace if corroded or damaged. Do not lubricate.
9. Position and align caliper housing to carrier, fit guide pins and tighten to 33 Nm (24 lbf.ft).
10. Fit caps to guide pin dust covers.
11. Fit anti-rattle spring to caliper housing.
12. Repeat procedure for other side.
13. Fit sensor to pad.
14. Depress brake pedal several times to seat pads.
15. Check and top-up fluid level.
16. Fit road wheel(s) and tighten nuts to 140 Nm (103 lbf.ft).
17. Remove stands and lower vehicle.

## Sensor - pad wear - front

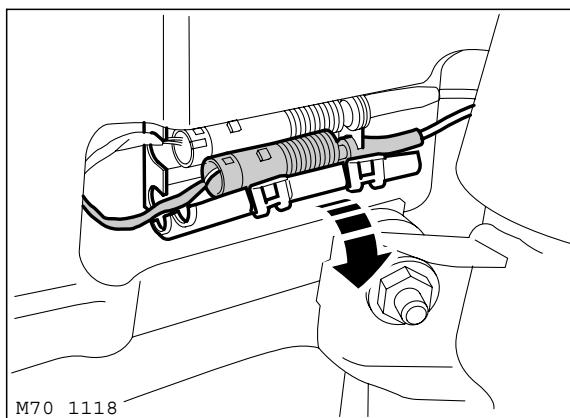
» 70.40.04

### Remove

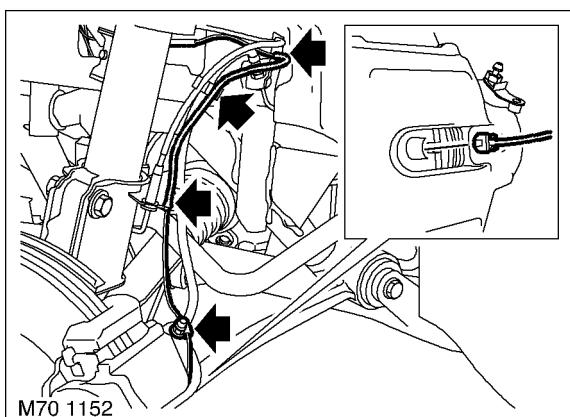
1. Raise front of vehicle, one side.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove LH front road wheel.



3. Open cover on multiplug housing, release and disconnect pad wear sensor multiplug.



4. Release sensor lead from body bracket, clip, brake hose bracket and bleed screw dust cap.
5. Disconnect pad wear sensor from brake pad.
6. Remove sensor.

### Refit

1. Fit sensor to pad.
2. Secure sensor lead to bleed screw dust cap, brake hose bracket, clip and body bracket then connect and secure multiplug. Close cover on multiplug housing.
3. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
4. Remove stand(s) and lower vehicle.

# BRAKES

## Sensor - pad wear - rear

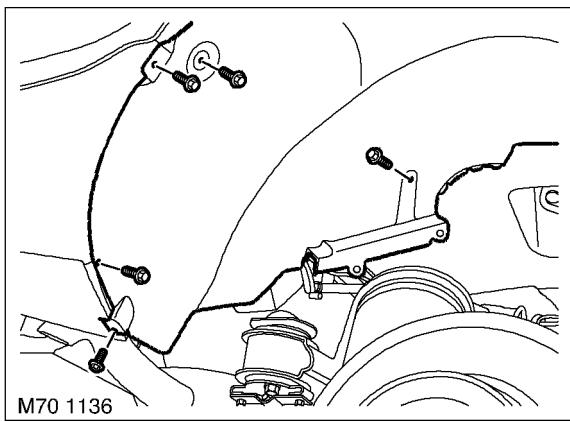
☛ 70.40.05

### Remove

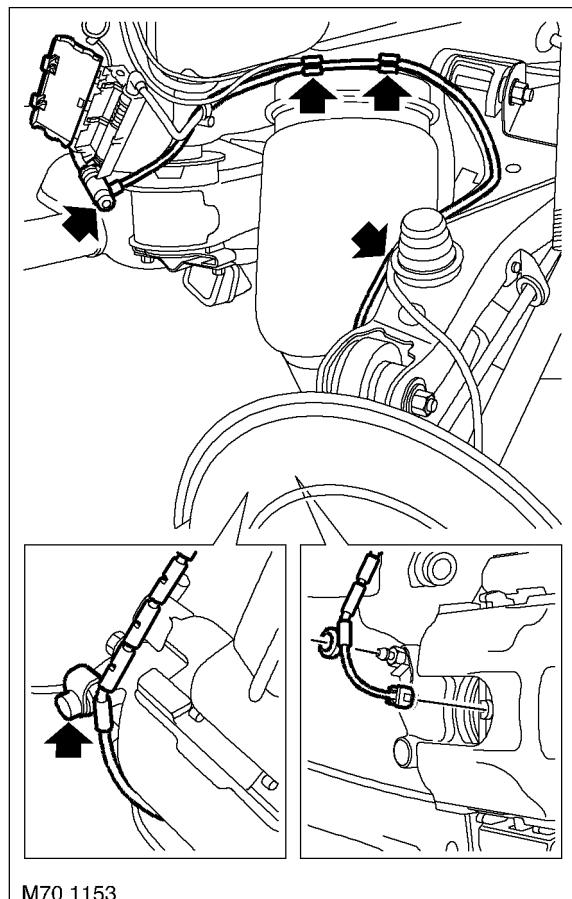
1. Raise rear of vehicle, one side.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove RH road wheel.



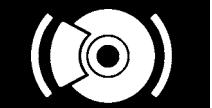
3. Remove 5 screws securing wheel arch liner and release liner for access to multiplug housing.



4. Open cover on multiplug housing, release and disconnect pad wear sensor multiplug then release sensor lead from spring turret, suspension arm and bleed screw dust cap.
5. Disconnect pad wear sensor from brake pad.
6. Remove sensor.

### Refit

1. Fit sensor to pad.
2. Secure sensor lead to bleed screw dust cap, suspension arm and spring turret then connect and secure multiplug. Close multiplug housing cover.
3. Locate wheel arch liner and secure with screws.
4. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
5. Remove stands and lower vehicle.



## Shoes - rear set

### 70.40.09

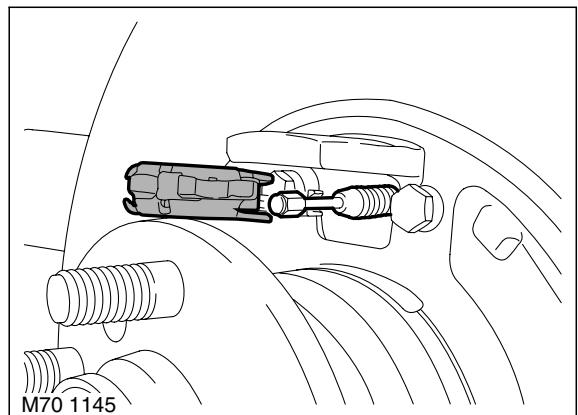
#### Remove

- Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

- Remove road wheels.
- Remove brake disc.

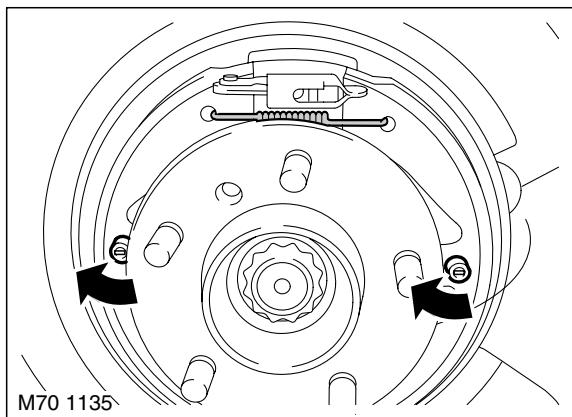
BRAKES, REPAIRS, Brake disc - rear.



- Remove shoe expander.
- Repeat procedure for other side.

#### Refit

- Clean backplate and brake disc with brake cleaning fluid.
- Clean expander.
- Clean brake adjuster, lubricate threads with grease and set to minimum extension.  
 CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.
- Fit expander.
- Assemble brake shoes with adjuster and lower return spring.
- Position brake shoe assembly, fit retainers and upper return spring.
- Fit brake disc.  
 BRAKES, REPAIRS, Brake disc - rear.
- Repeat procedure for other side.
- Fit rear road wheels and tighten nuts to 140 Nm (103 lbf.ft).
- Adjust handbrake.  
 BRAKES, ADJUSTMENTS, Handbrake adjustment.
- Remove stands and lower vehicle.



- Remove brake shoe upper return spring.
- Rotate brake shoe retainers 90° and remove.
- Remove brake shoe assembly complete with lower spring and adjuster.



- Remove lower return spring and adjuster from brake shoes.

# BRAKES

## Servo assembly

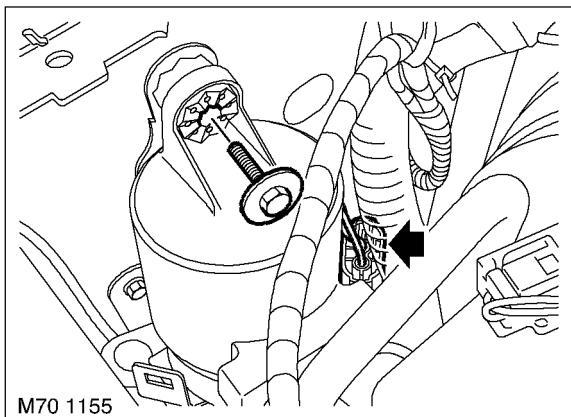
→ 70.50.01

### Remove

1. Remove engine compartment bulkhead closing panel.
2. Remove brake master cylinder.  
☞ BRAKES, REPAIRS, Cylinder - master - tandem.

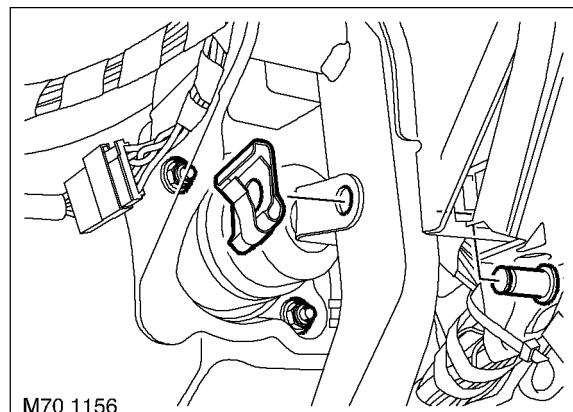


3. Disconnect vacuum pipe from servo.
4. Remove nut securing alarm sounder to mounting bracket and move aside.



5. Remove bolt securing pre-charge pump bracket to body.
6. Release pump from rubber mounting.
7. Disconnect multiplug.
8. Remove pump.
9. Remove shroud.

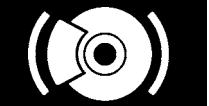
☞ INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.



10. Remove clip and clevis pin securing servo push rod to brake pedal.
11. Remove and discard 2 nuts securing brake servo.
12. Remove brake servo.

### Refit

1. Fit new gasket to brake servo and fit servo.  
**CAUTION: RHD models:** When fitting the servo, ensure air suspension pipe is not trapped behind it.
2. Fit new nuts securing brake servo to pedal bracket and tighten to 26 Nm (19 lbf.ft).  
**CAUTION: Nuts securing brake servo to pedal bracket must be re-torqued after 20 minutes have elapsed.**
3. Clean clevis pin and smear with grease.  
☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.
4. Align push rod, fit clevis pin and secure with clip.
5. Fit shroud.  
☞ INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.
6. Locate pre-charge pump to mounting rubbers.
7. Connect multiplug.
8. Fit bolt securing pre-charge pump and tighten to 8 Nm (6 lbf.ft).
9. Position alarm sounder to bracket, fit nut and tighten to 8 Nm (6 lbf.ft).
10. Connect vacuum pipe.
11. Fit brake master cylinder.  
☞ BRAKES, REPAIRS, Cylinder - master - tandem.
12. Fit bulkhead closing panel.



## Vacuum pump - Td6

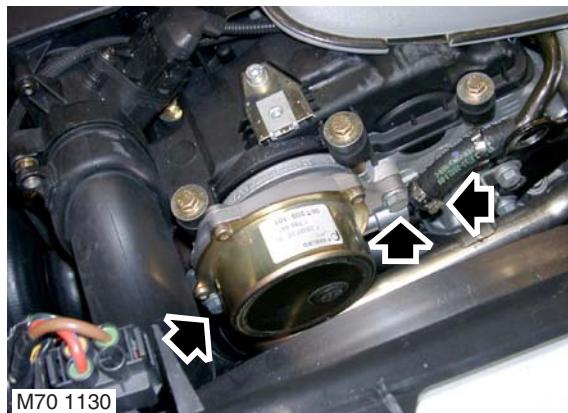
### » 70.50.19

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
  2. Remove engine access cover.
- ENGINE - Td6, REPAIRS, Cover - engine access.**



3. Release clip and disconnect hose from vacuum pump.
4. Remove and discard 2 bolts securing vacuum pump.
5. Remove vacuum pump and discard 'O' ring.

#### Refit

1. Clean vacuum pump and mating face.
  2. Fit new 'O' ring to vacuum pump.
  3. Rotate vacuum pump drive to align with camshaft, fit pump and tighten new bolts to 22 Nm (16 lbf.ft).
  4. Connect hose to vacuum pump and secure with clip.
  5. Fit engine access cover.
- ENGINE - Td6, REPAIRS, Cover - engine access.**
6. Connect battery earth lead.

## ABS Electronic control unit (ECU)

### » 70.65.01

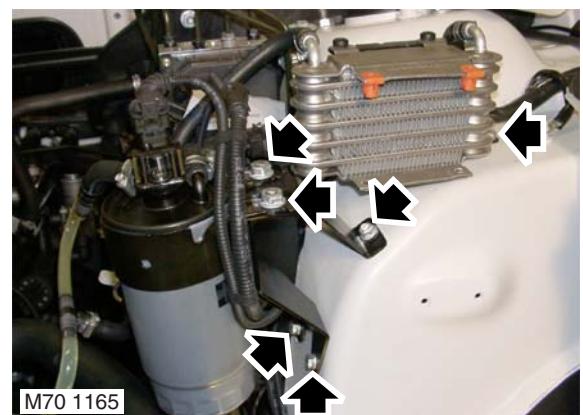
If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

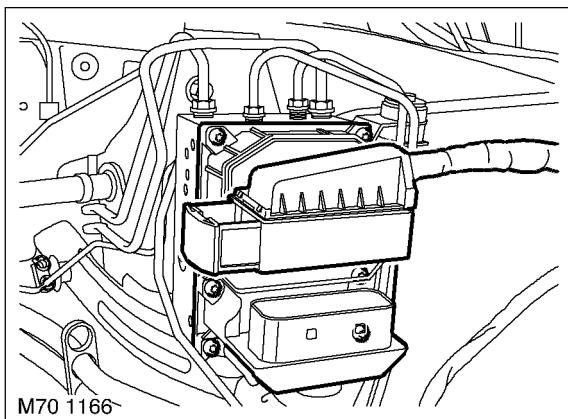
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Remove 2 screws securing fuel cooler intake duct to fuel cooler.
3. Remove 2 bolts securing fuel cooler intake duct to bonnet locking platform.
4. Remove fuel cooler intake duct.



5. Loosen 2 nuts securing fuel filter clamp, release and place fuel filter and clamp assembly aside.
6. Remove nut and 3 bolts securing fuel filter/ cooler bracket assembly and move aside.



7. Release catch and disconnect ABS modulator multiplug.
8. Remove 6 Torx screws securing ABS ECU.  
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**
9. Remove ABS ECU.  
**CAUTION: Do not touch the exposed modulator solenoids as this could lead to solenoid damage.**

## Refit

1. Ensure ABS ECU and modulator mating faces are clean.
2. Fit ABS ECU to modulator, fit Torx screws and tighten to 2.9 Nm (2 lbf.ft).
3. Connect multiplug to ABS modulator.
4. Position fuel cooler/filter bracket assembly, fit bolts and nut and tighten to 8 Nm (6 lbf.ft).
5. Locate fuel filter and clamp assembly and tighten nuts to 25 Nm (18 lbf.ft).
6. Fit intake duct assembly and secure to fuel cooler with screws.
7. Align fuel cooler intake duct to bonnet locking platform, fit bolts and tighten to 3 Nm (2.2 lbf.ft).
8. Connect battery earth lead.

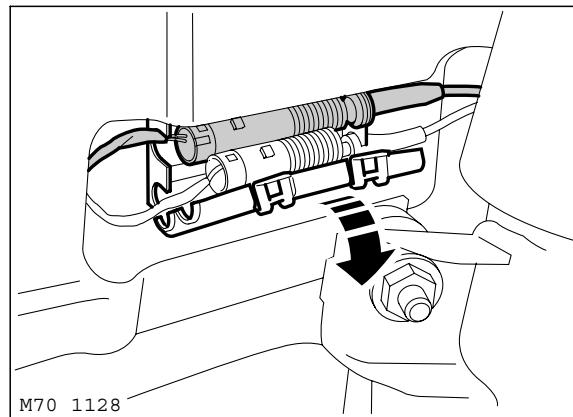
## ABS sensor - front wheel

» 70.65.30

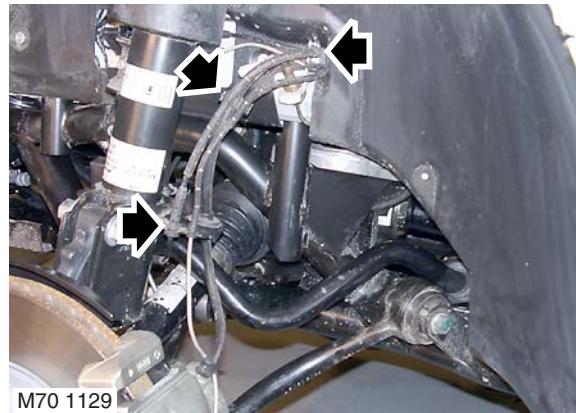
### Remove

1. Raise front of vehicle, one side.  
**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

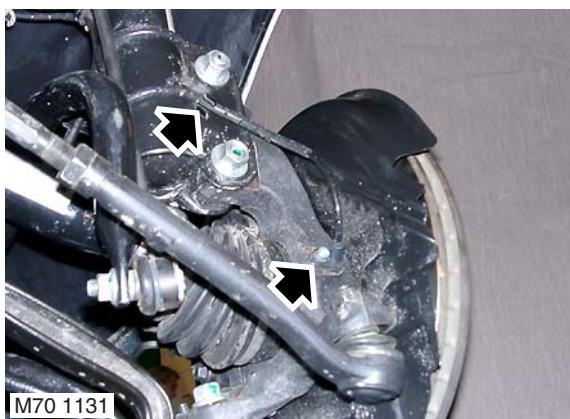
2. Remove road wheel.



3. Open cover on multiplug housing, release and disconnect sensor multiplug.



4. Release sensor lead from body bracket, clip and brake hose bracket.



- Release sensor lead from damper, remove Allen screw and release ABS sensor from hub.

#### Refit

- Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.  
**☞ CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
- Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).
- Secure sensor lead to damper, brake hose bracket, clip and body bracket then connect and secure multiplug. Close cover on multiplug housing.
- Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
- Remove stand and lower vehicle.
- To ensure correct operation, the ABS system MUST be tested using TestBook/T4.

## ABS sensor - rear wheel

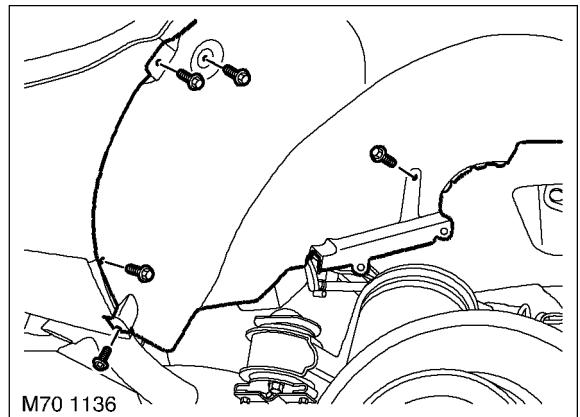
☛ 70.65.31

#### Remove

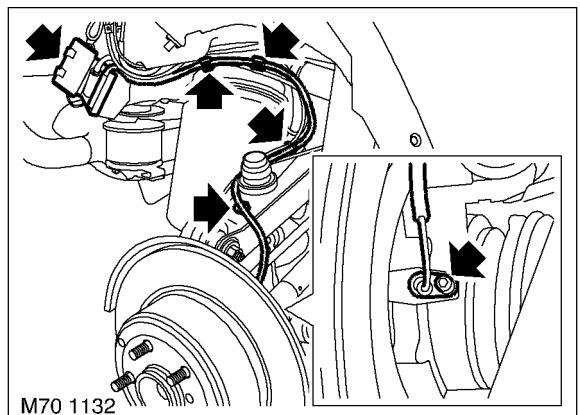
- Raise front of vehicle, one side.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

- Remove road wheel.



- Remove 5 screws securing wheel arch liner and release liner for access to multiplug housing.



- Open cover on multiplug housing, release and disconnect sensor multiplug then release sensor lead from suspension turret and suspension arm.
- Release sensor lead from damper, remove Allen screw and release ABS sensor from hub.

# BRAKES

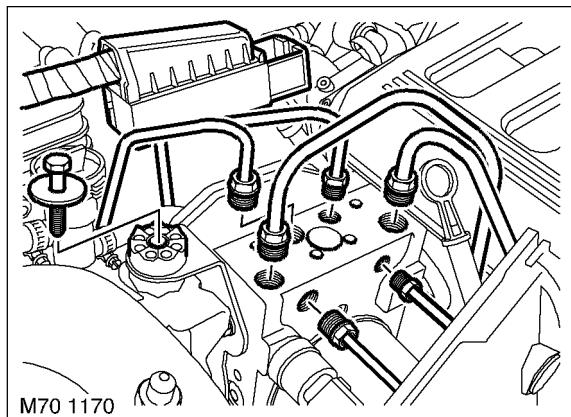
## Refit

1. Clean ABS sensor, smear sensor with an anti-seize grease and fit sensor to hub.
- CAPACITIES, FLUIDS, LUBRICANTS AND SEALANTS, Lubrication.**
2. Fit Allen screw securing ABS sensor and tighten to 8 Nm (6 lbf.ft).
3. Secure sensor lead to suspension arm and suspension turret then connect and secure multiplug. Close cover on multiplug housing.
4. Locate wheel arch liner and secure with screws.
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stand and lower vehicle.
7. To ensure correct operation, the ABS system MUST be tested using TestBook/T4.

## ABS Modulator unit

» 70.65.49

### Remove



1. Release catch and disconnect ABS modulator multiplug.
2. Disconnect multiplug from sensor.
3. Position cloth under modulator to absorb fluid spillage.  
**CAUTION: Brake fluid will damage paint finished surfaces. If spilled, immediately remove fluid and clean area with water. Ensure water does not enter modulator ports.**
4. Noting their fitted positions, disconnect 6 brake pipe unions from modulator.  
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**
5. Remove bolt securing ABS modulator to mounting bracket.
6. Release and remove ABS modulator from mounting bracket.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
7. Remove 2 bolts securing mounting bracket to modulator and remove bracket.

**Refit**

1. Position mounting bracket to modulator, fit bolts and tighten to 8 Nm (6 lbf.ft).
2. Position modulator to mounting bracket, fit bolt and tighten to 8 Nm (6 lbf.ft).
3. Clean brake pipe unions.
4. Connect brake pipe unions to ABS modulator ensuring pipes are connected to their correct ports.
5. Tighten ABS modulator brake pipe unions to 18 Nm (13 lbf.ft).
6. Connect multiplug to sensor.
7. Connect ABS modulator multiplug and secure catch.
8. Bleed brakes.
9. To ensure correct operation, the ABS system MUST be tested using TestBook/T4.

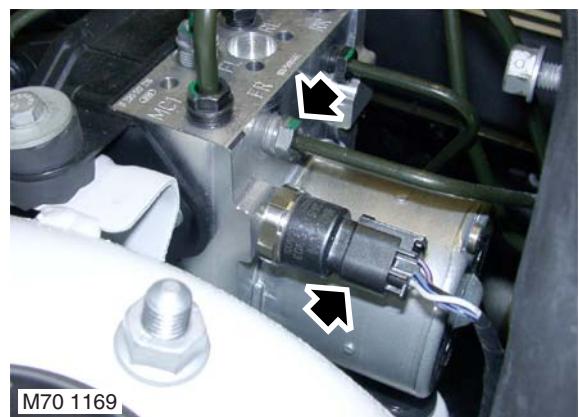
**Sensor - pressure - ABS modulator**

» 70.65.71

**Remove**

1. Position cloth under modulator to absorb fluid spillage.

**CAUTION:** Brake fluid will damage paint finished surfaces. If spilled, immediately remove fluid and clean area with water.



2. Disconnect brake pipe from modulator to access pressure sensor.  
**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.
3. Disconnect multiplug from pressure sensor and remove sensor.

**Refit**

1. Clean pressure sensor threads.
2. Fit pressure sensor to ABS modulator and tighten to 20 Nm (15 lbf.ft).
3. Connect multiplug to pressure sensor.
4. Connect brake pipe to modulator and tighten union to 18 Nm (13 lbf.ft).
5. Bleed brakes.
6. To ensure correct operation, the ABS system MUST be tested using TestBook/T4.

# BRAKES

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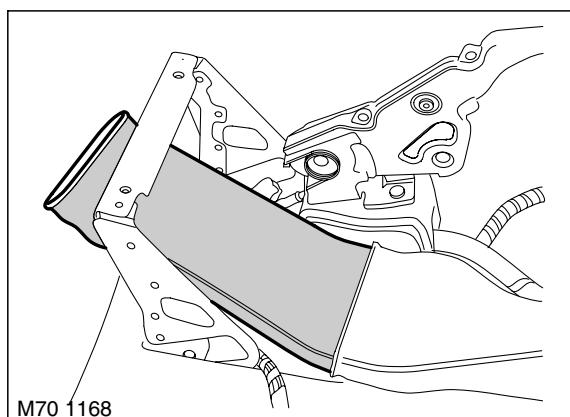
## Sensor - dynamic stability control (DSC)

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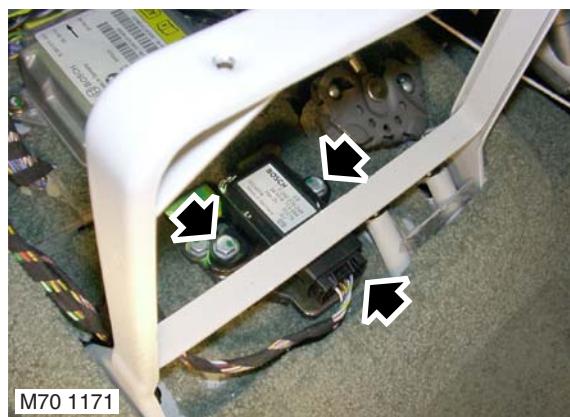
☛ 70.70.35

### Remove

1. Remove centre console finisher.  
☛ INTERIOR FITTINGS, REPAIRS,  
Finisher - console.



2. Release and remove air duct.



3. Remove 2 bolts securing DSC sensor.
4. Release DSC sensor, disconnect multiplug and remove sensor.

### Refit

1. Position DSC sensor and connect multiplug.
2. Locate DSC sensor to mounting bracket, fit bolts and tighten to 8 Nm (6 lbf.ft).
3. Fit air duct.
4. Fit centre console finisher.  
☛ INTERIOR FITTINGS, REPAIRS,  
Finisher - console.
5. To ensure correct operation, the ABS system MUST be tested using TestBook/T4.

**Seat belt - front****76.73.13**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system.  
Disconnect the negative lead first. Never reverse connect the battery.

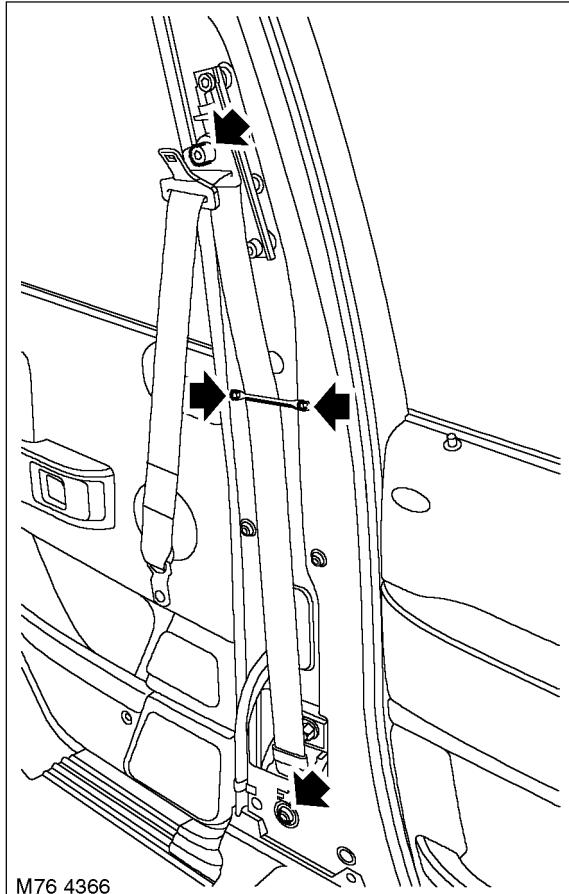
**Remove**

1. Make the SRS system safe.  
 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove 'B' post upper trim.  
 **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'B' post - upper.**

4. Remove Torx nut securing seat belt upper anchor to height adjuster.
5. Remove Torx bolt securing seat belt reel and remove seat belt.

**Refit**

1. Position seat belt, fit reel and tighten Torx bolt securing reel to 31 Nm (23 lbf.ft).  
*NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.*
2. Position belt to height adjuster and tighten Torx nut to 31 Nm (23 lbf.ft).
3. Fit belt guide and tighten bolts to 6 Nm (4.4 lbf.ft).
4. Fit 'B' post upper trim.  
 **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'B' post - upper.**
5. Connect battery leads, earth lead last.



3. Remove 2 bolts securing seat belt guide and remove guide.

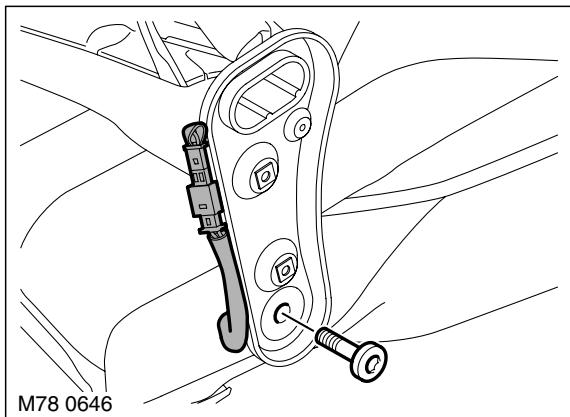
# RESTRAINT SYSTEMS

## Seat belt - centre - rear

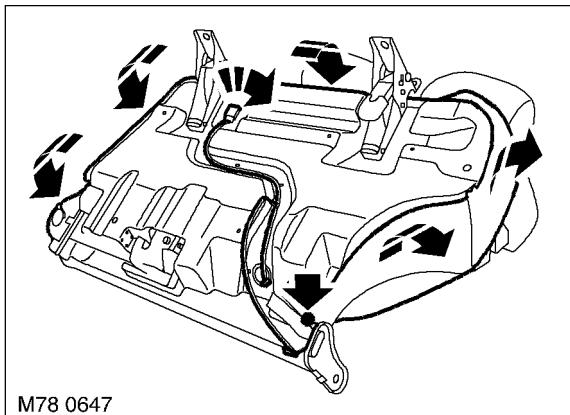
☛ 76.73.20

### Remove

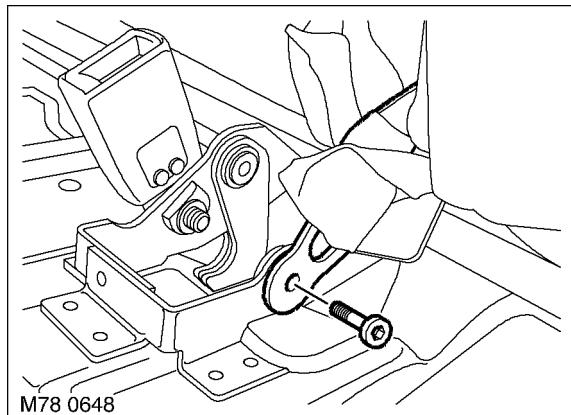
1. Remove seat base finisher.  
☞ **SEATS, REPAIRS, Finisher - seat base rear.**
2. Remove seat fold mechanism.  
☞ **SEATS, REPAIRS, Hinge - rear seat - side.**



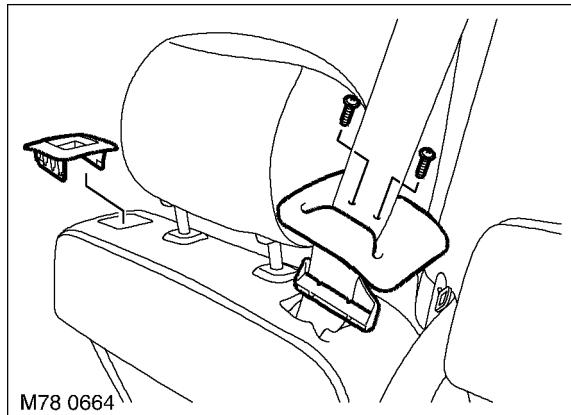
3. Remove Torx bolt securing squab frame to seat frame and separate frames.
4. Disconnect multiplug from heated squab cover.



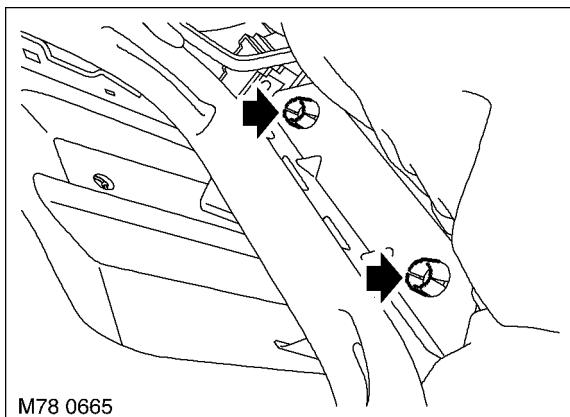
5. Release seat cover beading from sides and front of seat.



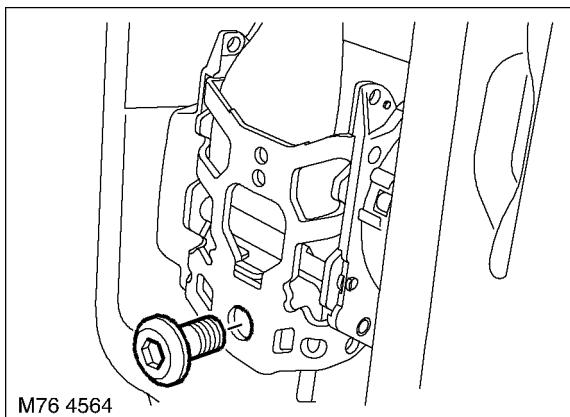
6. Raise seat cover and cushion, remove and discard Torx bolt securing seat belt anchor point to frame.
7. Pull seat belt through cushion and cover, remove seat base.
8. Remove rear squab finisher.  
☞ **SEATS, REPAIRS, Finisher - rear seat squab.**
9. Remove armrest front finisher assembly.  
☞ **SEATS, REPAIRS, Finisher - arm rest - rear seat - front.**



10. Remove 2 screws securing seat belt finisher and remove finisher.
11. Release beading securing squab cover to sides and bottom of frame.
12. Carefully release 4 clips securing seat release button escutcheon, remove escutcheon.



13. Raise squab cover and cushion to gain access to headrest guides.
14. Release 3 clips securing headrest guides to frame, remove guides.
15. Remove cover and cushion assembly from frame and feed seat belt through assembly.



16. Remove and discard Torx bolt securing seat belt reel to squab frame, remove reel.

#### Refit

1. Position seat belt reel and secure with Torx bolt and tighten to 48 Nm (35 lbf.ft).
2. Feed seat belt through cover and cushion assembly and fit assembly to frame.
3. Position and fit headrest guides in squab assembly.
4. Position and fit seat fold release button escutcheon.
5. Secure squab cover beading to sides and bottom of frame.
6. Position seat belt finisher and secure with screws.
7. Fit rear squab finisher.

SEATS, REPAIRS, Finisher - rear seat squab.

8. Fit armrest front finisher assembly.
- SEATS, REPAIRS, Finisher - arm rest - rear seat - front.
9. Fit seat belt through cover and cushion assembly.
10. Position seat belt to frame and fit Torx bolt, tighten to 48 Nm (35 lbf.ft).
11. Fit seat cover beading to sides and front.
12. Position squab frame to seat frame and secure LH side with Torx bolt, tighten to 25 Nm (18 lbf.ft).
13. Connect squab cover heated seat multiplug.
14. Fit seat fold mechanism.
- SEATS, REPAIRS, Hinge - rear seat - side.
15. Fit seat base finisher.
- SEATS, REPAIRS, Finisher - seat base rear.

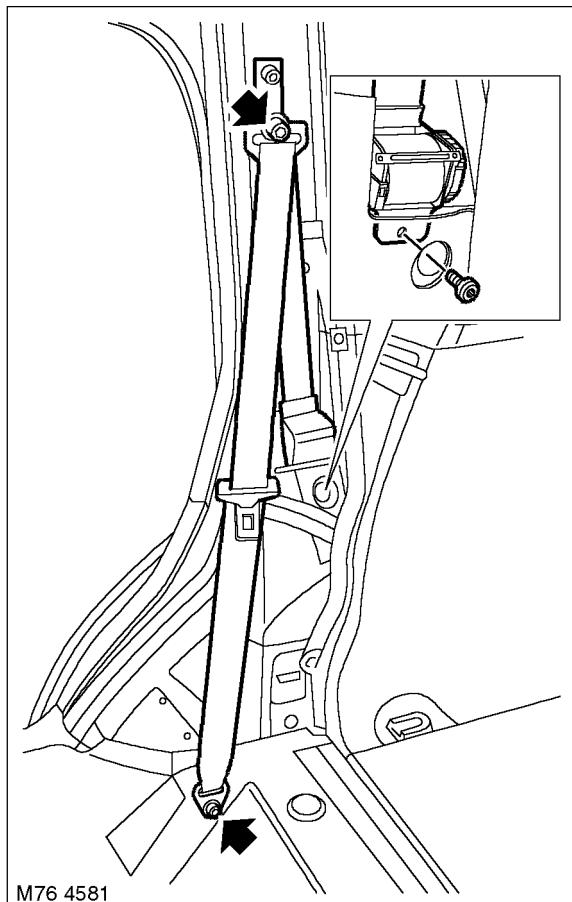
# RESTRAINT SYSTEMS

## Seat belt - rear

☛ 76.73.23

### Remove

1. Remove 'D' post lower trim.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - lower.**



2. Remove Torx bolt securing seat belt floor anchor and remove 'D' post upper trim.
3. Remove Torx nut securing seat belt to upper 'D' post anchor.
4. Remove Torx bolt securing seat belt reel.
5. Release seat belt reel from alignment bracket and remove reel.

### Refit

1. Fit seat belt reel to alignment bracket.
2. Fit Torx bolt securing seat belt reel and tighten to 31 Nm (23 lbf.ft).
3. Position seat belt to upper 'D' post anchor and secure with Torx nut, tighten to 31 Nm (23 lbf.ft).
4. Slide seat belt through 'D' post upper trim.
5. Position seat belt to floor anchor and secure with Torx bolt, tighten to 31 Nm (23 lbf.ft).
6. Fit 'D' post lower trim.

☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - lower.**



## Pre-tensioner - front seat belt

### 76.73.75

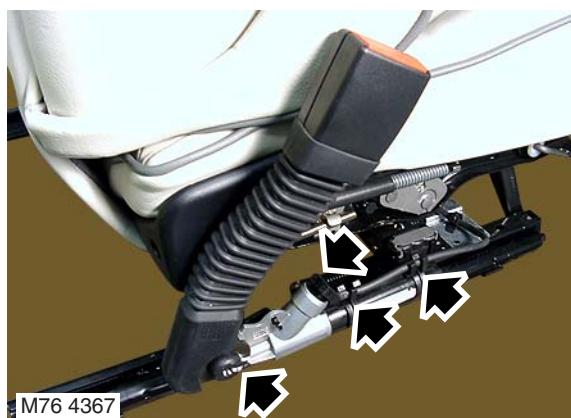
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

#### Remove

1. Make the SRS system safe.  
 GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.
2. Remove front seat.  
 SEATS, REPAIRS, Front seat.



3. Release 2 clips securing harness to pretensioner.
4. Disconnect multiplug from pretensioner.
5. Remove Torx bolt securing pre-tensioner to seat and remove pretensioner.

**WARNING:** Store the airbag module or seat pre-tensioner, with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with enough force to cause serious injury.

**WARNING:** Store the airbag module or seat pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked luggage compartment/loadspace area of the vehicle, and inform the workshop supervisor.

#### Refit

**NOTE:** If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Fit pretensioner and tighten Torx bolt to 48 Nm (35 lbf.ft).
2. Connect pretensioner multiplug and secure harness with clips.
3. Fit front seat.  
 SEATS, REPAIRS, Front seat.
4. Connect battery leads, earth lead last.

# RESTRAINT SYSTEMS

## Airbag module - steering wheel

### 76.74.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

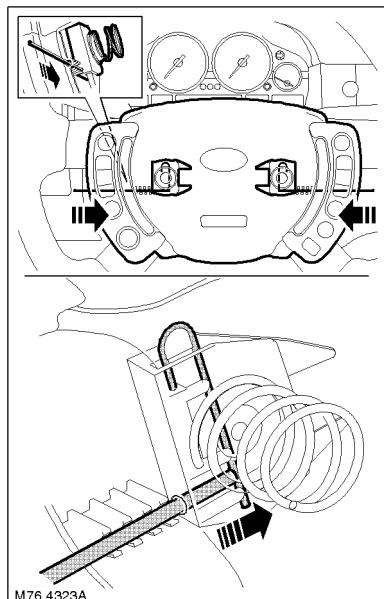
**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

#### Remove

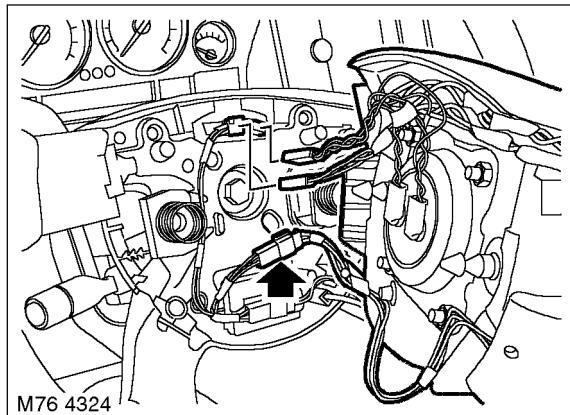
1. Make the SRS system safe.

#### GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.



2. Release 2 airbag retaining clips using a rod at least 50 mm (2 in.) long and not exceeding 3 mm (1/8 in.) diameter. Fit rod through each access hole in steering wheel at right angles to steering column. Locate secondary hole and carefully push on rod until clip is released.

The lower graphic shows the rod pushing on the wire clip.



#### 3. Models with heated steering wheel:

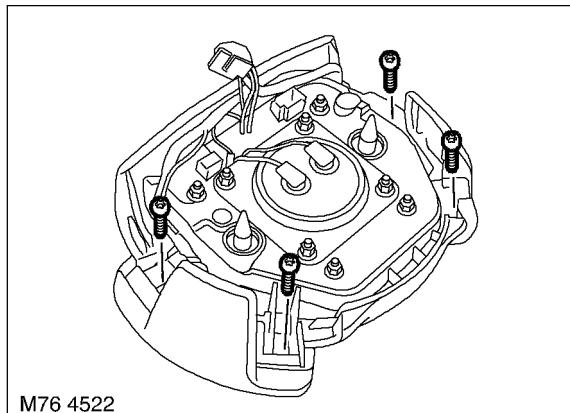
Disconnect multiplug from the heated steering wheel ECU.

4. Disconnect 2 harness multiplugs and remove airbag module.

**CAUTION:** Do not allow the airbag module to hang by the airbag harness.

**WARNING:** Store the airbag module with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with enough force to cause serious injury.

**WARNING:** Store the airbag module or seat pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked luggage compartment/loadspace area of the vehicle, and inform the workshop supervisor.



5. Remove 4 Torx screws and release switch units from airbag module.

6. Disconnect multiplugs from switch units and remove the switch units.

#### Refit

*NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.*

1. Position switch units and connect multiplugs.
2. Fit switch units to airbag module and tighten Torx screws to 2.5 Nm (1.8 lbf.ft).
3. Position airbag module and connect multiplugs.  
*NOTE: If the airbag module is to be replaced, the bar code of the new module must be recorded.*
4. **Models with heated steering wheel:** Connect multiplug to the heated steering wheel ECU.
5. Locate airbag module and carefully push to secure.
6. Connect battery leads, earth lead last.

#### Airbag module - passenger

##### 76.74.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

#### Remove

1. Make the SRS system safe.

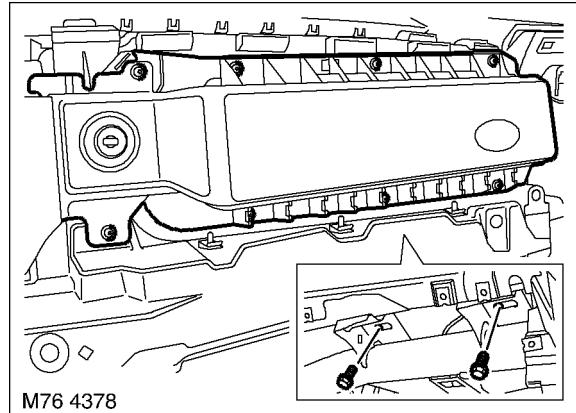
 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

2. Remove top rail finisher.

 **INTERIOR FITTINGS, REPAIRS, Top rail - fascia.**

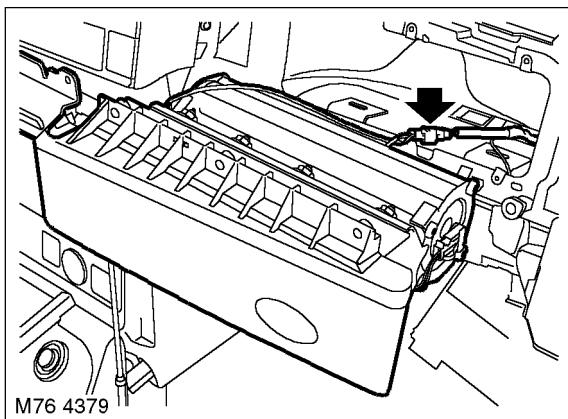
3. Remove shroud.

 **INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.**



4. Remove 8 Torx screws securing airbag to front of fascia.
5. Remove 2 bolts from underside of airbag.
6. Release airbag module from fascia.

**CAUTION: Do not allow the airbag module to hang by the airbag harness.**



7. Disconnect multiplug from airbag module.
8. Remove airbag module.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

**WARNING:** Store the airbag module with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with enough force to cause serious injury.

**WARNING:** Store the airbag module or seat pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked luggage compartment/loadspace area of the vehicle, and inform the workshop supervisor.

9. Remove glove box lock assembly from airbag module.

## Refit

*NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.*

1. Fit glove box lock assembly to airbag module.
2. Position airbag module to fascia and connect multiplug.
3. Fit bolts to airbag module and tighten to 22 Nm (16 lbf.ft).
4. Fit and tighten airbag screws.
5. Fit shroud.  
    *☞ INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.*
6. Fit top rail finisher.  
    *☞ INTERIOR FITTINGS, REPAIRS, Top rail - fascia.*
7. Connect battery leads, earth lead last.

## Airbag module - head - rear

### ☞ 76.74.04

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**☞ GENERAL INFORMATION, Electrical Precautions.**

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

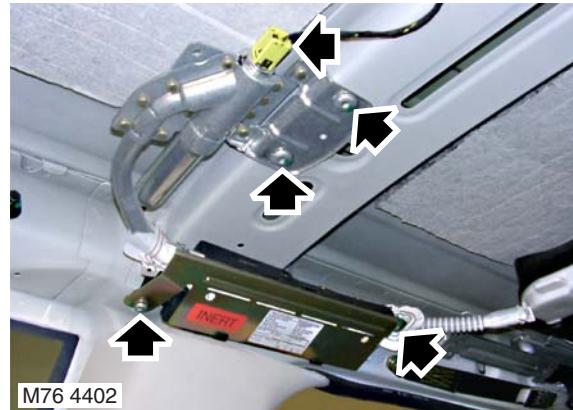
### Remove

1. Make the SRS system safe.

**☞ GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

2. Remove headlining.

**☞ INTERIOR FITTINGS, REPAIRS, Headlining.**



3. Disconnect multiplug from airbag module.



4. Remove 4 Torx screws securing airbag module and remove airbag.

**WARNING:** Store the airbag module with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with enough force to cause serious injury.

**WARNING:** Store the airbag module or seat pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked luggage compartment/loadspace area of the vehicle, and inform the workshop supervisor.

#### Refit

**NOTE:** If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Carefully fit airbag module and tighten screws evenly to 10 Nm (7 lbf.ft).
2. Connect airbag multiplug.
3. Fit headlining.  
    ☞ **INTERIOR FITTINGS, REPAIRS, Headlining.**
4. Connect battery leads, earth lead last.

#### Crash sensor - side

##### ☞ 76.74.11

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

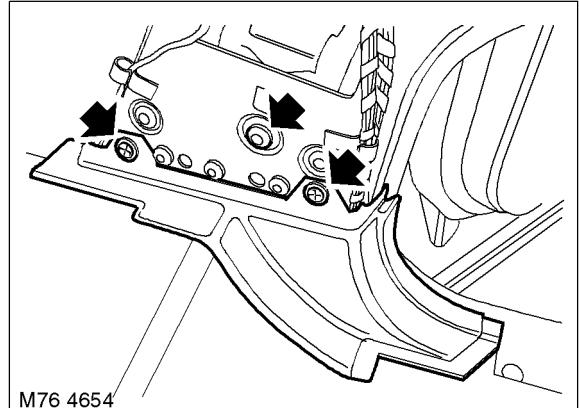
☞ **GENERAL INFORMATION, Electrical Precautions.**

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

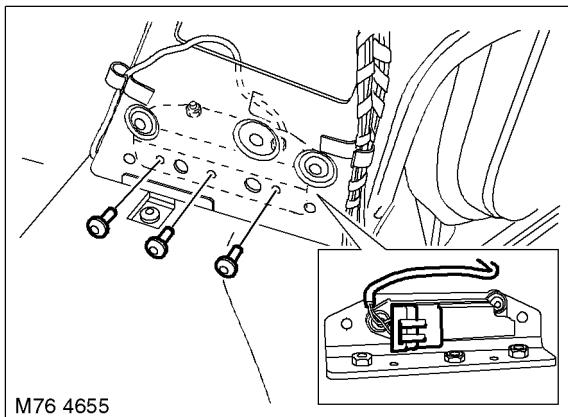
**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

#### Remove

1. Make the SRS system safe.  
    ☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove 'B' post finisher.  
    ☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'B' post - upper.**
3. Remove front and rear carpet retainer.  
    ☞ **INTERIOR FITTINGS, REPAIRS, Retainer - front carpet.**



4. Remove Torx bolt securing seat belt reel to 'B' post and position the seat belt reel aside.
5. Remove 2 scrivets securing centre carpet retainer to 'B' post and remove the carpet retainer.



6. Remove and discard 3 Torx bolts securing side impact crash sensor retaining bracket to 'B' post.
7. Release harness from retaining clips and disconnect multiplug from side impact crash sensor.
8. Remove side impact crash sensor and retaining bracket from 'B' post.

## Refit

*NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.*

1. Position side impact crash sensor and retaining bracket to 'B' post, secure harness and connect multiplug to side impact crash sensor.
2. Fit new bolts to side impact crash sensor retaining bracket and tighten to 8 Nm (6 lbf.ft).
3. Position seat belt reel to 'B' post, fit Torx bolt and tighten to 31 Nm (23 lbf.ft).
4. Fit centre carpet retainer to 'B' post and secure with scrivets.
5. Fit front and rear carpet retainers.

### INTERIOR FITTINGS, REPAIRS,

#### Retainer - front carpet.

6. Fit 'B' post finisher.

### INTERIOR FITTINGS, REPAIRS,

#### Trim finisher - 'B' post - upper.

7. Connect the battery earth lead.
8. New sensors require programming:
  - Turn ignition to position 'II'
  - SRS warning light will flash for a period of approximately 30 seconds
  - Turn ignition off
  - Sensor programming is now complete

## Battery - disconnect unit (SRS)

### 76.74.14

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

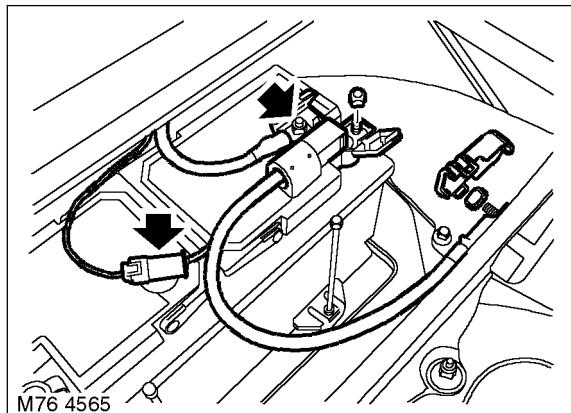
**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

### Remove

1. Make the SRS system safe.

#### GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.



2. Release cover and remove nut securing positive lead to the battery disconnect unit. Position the positive lead aside.
3. Release cover and loosen nut securing battery disconnect unit to the battery terminal.
4. Disconnect multiplug from the battery disconnect unit.
5. Remove cover and nut securing battery disconnect unit to the junction box.
6. Remove the battery disconnect unit.

**Refit**

*NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.*

1. Ensure battery terminals are clean.
2. Position battery disconnect unit to junction box, fit nut and tighten to 25 Nm (18 lbf.ft). Fit cover.
3. Fit battery disconnect unit to the positive battery terminal and tighten nut. Fit cover.
4. Position positive lead to the battery disconnect unit, fit nut and tighten to 25 Nm (18 lbf.ft). Fit cover.
5. Connect multiplug to battery disconnect unit.
6. Connect battery leads, earth lead last.

**Rotary coupler****76.74.20**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system.  
Disconnect the negative lead first. Never reverse connect the battery.

**Remove**

1. Make the SRS system safe.

 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

2. Remove steering wheel

 **STEERING, REPAIRS, Steering wheel.**

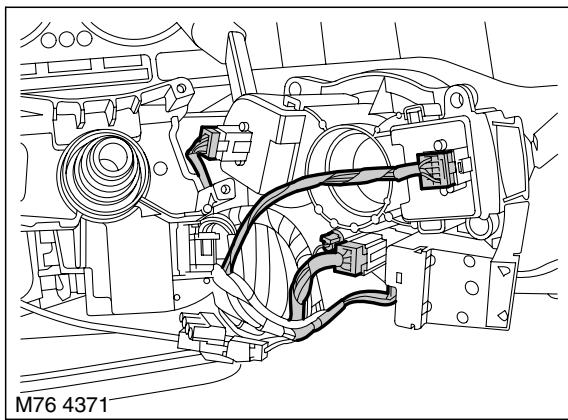
3. Remove steering column nacelle.

 **STEERING, REPAIRS, Nacelle - column - complete.**

**CAUTION:** Centralise the steering wheel with the road wheels in the straight ahead position. This will ensure that the rotary coupler is locked as the steering wheel is removed.



4. Remove 4 Torx screws securing rotary coupler assembly to column. Release coupler assembly.



5. Disconnect 5 multiplugs from rotary coupler.
6. Remove rotary coupler assembly.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
7. Depress clips and remove switches from coupler assembly.

## Refit

1. Fit switches to rotary coupler.
2. Connect multiplugs to rotary coupler.
3. Fit rotary coupler to column, secure with Torx screws.
4. Fit steering column nacelle.  
    ☞ **STEERING, REPAIRS, Nacelle - column - complete.**
5. Fit steering wheel  
    ☞ **STEERING, REPAIRS, Steering wheel.**
6. Connect battery leads, earth lead last.

## Airbag module - side impact - front door

### ☞ 76.74.30

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

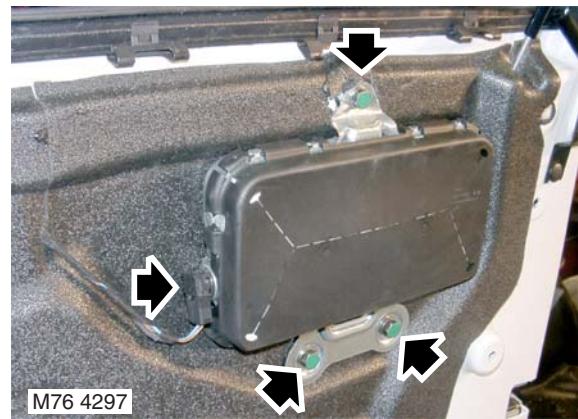
**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

**CAUTION:** The SRS side impact sensor must be replaced after every side deployment has occurred. Only replace the side impact sensor on the deployed side.

## Remove

1. Make the SRS system safe.  
    ☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove door trim casing.  
    ☞ **DOORS, REPAIRS, Trim casing - front door.**



3. Disconnect multiplug from airbag module.
4. Remove and discard 3 bolts securing airbag module.



## 5. Remove airbag module.

**WARNING:** Store the airbag module with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with enough force to cause serious injury.

**WARNING:** Store the airbag module or seat pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked luggage compartment/loadspace area of the vehicle, and inform the workshop supervisor.

## Refit

**NOTE:** If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Position airbag module to door, fit new bolts and tighten to 9 Nm (7 lbf.ft).
2. Connect multiplug to airbag module.
3. Fit door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - front door.**
4. Connect battery leads, earth lead last.

## Airbag module - head - front

### ☞ 76.74.40

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

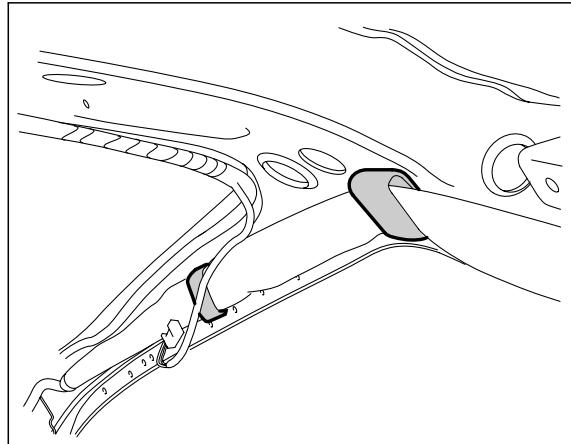
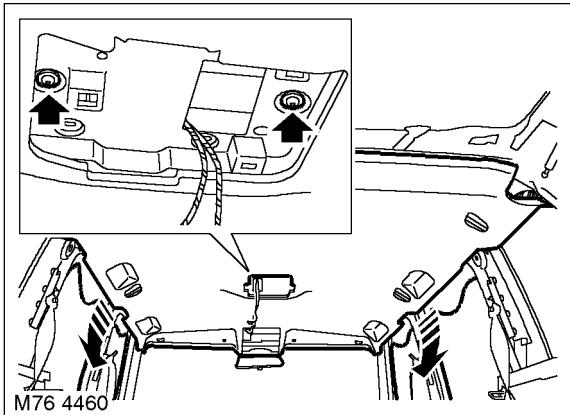
**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

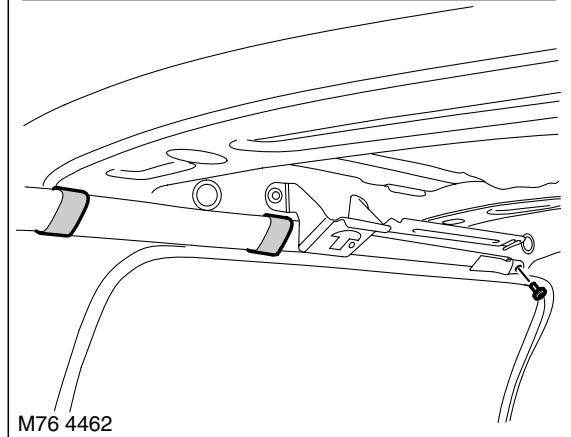
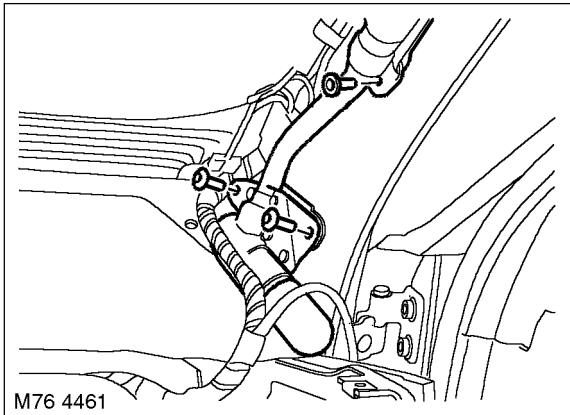
### Remove

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove fascia carrier.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**
3. Remove sun visor.  
☞ **INTERIOR FITTINGS, REPAIRS, Sun visor.**
4. Remove grab handles.  
☞ **INTERIOR FITTINGS, REPAIRS, Handle - grab.**
5. Release door aperture seals to release headlining.
6. Remove 'B' post upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'B' post - upper.**
7. Release 'D' post upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'D' post - upper.**
8. Remove 'E' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'E' post.**
9. Remove rear console from headlining.  
☞ **INTERIOR FITTINGS, REPAIRS, Console - headlining - rear.**

## RESTRAINT SYSTEMS



10. Remove 2 screws securing headlining.
11. Carefully lower edge of headlining for access to airbag fixings.



12. Remove 2 Torx screws securing airbag to 'A' post.
13. Remove Torx screw securing airbag webbing to 'A' post.

14. Remove Torx screw securing airbag webbing to cantrail.
15. Release 4 clips securing airbag module.
16. Remove airbag module.

**WARNING:** Store the airbag module with the deployment side uppermost. If it is stored deployment side down, accidental deployment will propel the airbag module with enough force to cause serious injury.

**WARNING:** Store the airbag module or seat pre-tensioner in a designated storage area. If there is no designated storage area available, store in the locked luggage compartment/loadspace area of the vehicle, and inform the workshop supervisor.

### Refit

**NOTE:** If the SRS component is to be replaced, the bar code of the new unit must be recorded.

1. Carefully fit airbag and secure clips.
2. Fit airbag module to cantrail and 'A' post and tighten Torx screws to 10 Nm (7 lbf.ft).
3. Fit and tighten screws securing headlining.

4. Fit rear console.  
☞ **INTERIOR FITTINGS, REPAIRS, Console - headlining - rear.**
5. Fit 'B' post upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'B' post - upper.**
6. Fit 'D' post upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'D' post - upper.**
7. Fit 'E' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'E' post.**
8. Fit grab handles.  
☞ **INTERIOR FITTINGS, REPAIRS, Handle - grab.**
9. Fit sun visor.  
☞ **INTERIOR FITTINGS, REPAIRS, Sun visor.**
10. Fit fascia carrier.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**
11. Fit door aperture seals.
12. Connect battery leads, earth lead last.

## Diagnostic control unit (DCU)

☞ 76.74.68

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

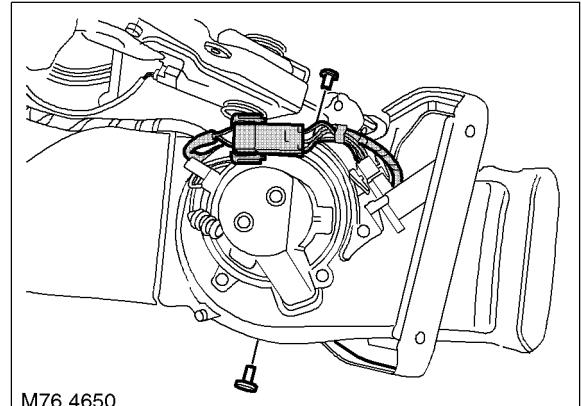
**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

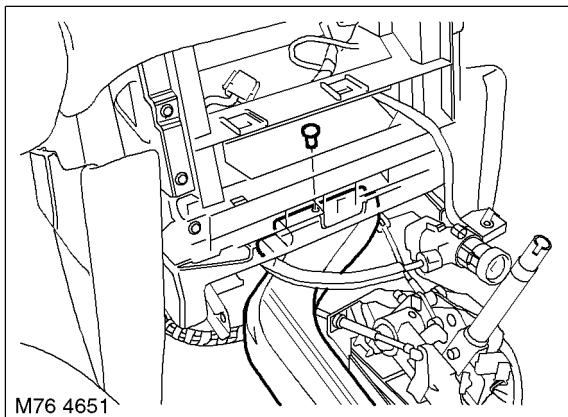
**CAUTION:** The SRS DCU must be replaced after every deployment has occurred.

### Remove

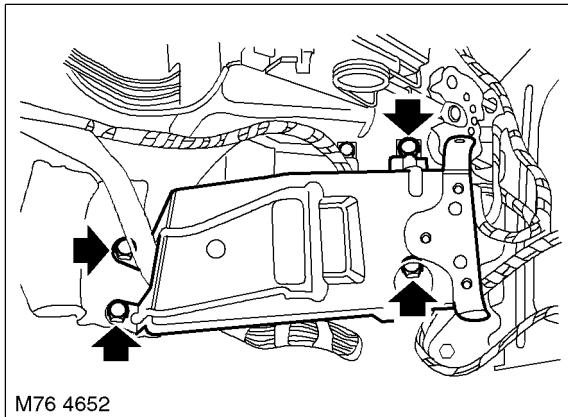
1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove centre console.  
☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**
3. Remove air suspension switch panel.  
☞ **INTERIOR FITTINGS, REPAIRS, Switch panel - air suspension.**



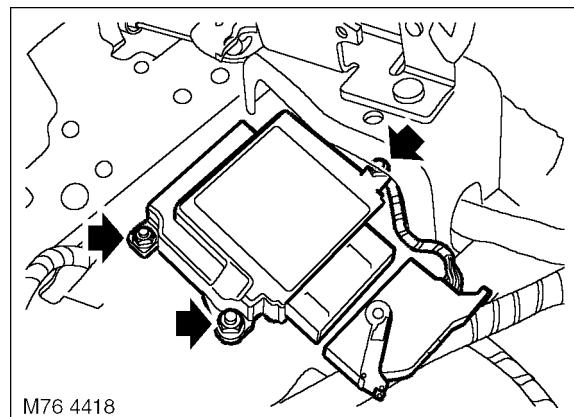
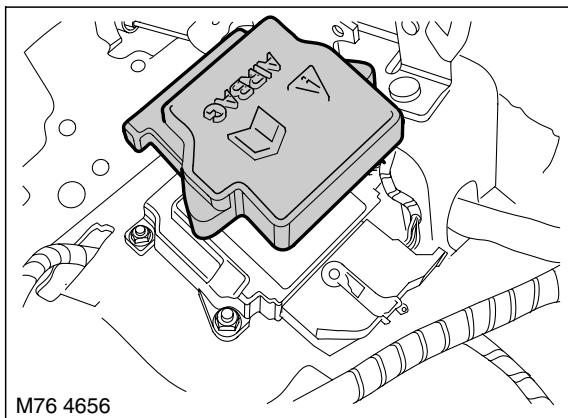
4. Disconnect multiplug from heater motor.
5. Remove 2 screws securing heater motor to mounting bracket.
6. Release and remove heater motor.



7. Remove clip securing centre console heater duct to HEVAC assembly and remove the heater duct.



8. Remove 4 bolts securing centre console heater motor retaining bracket to transmission tunnel.
9. Remove centre console heater motor retaining bracket.



11. Disconnect multiplug from DCU.
  12. Remove nut securing earth lead to DCU. Remove earth lead.
  13. Remove 2 nuts securing DCU to transmission tunnel. Remove DCU.
- CAUTION: The SRS DCU is a shock sensitive device and must be handled with care.**

## Refit

1. Position DCU to transmission tunnel, fit earth lead, fit nuts and tighten to 10 Nm (7 lbf.ft).
- NOTE: If the SRS component is to be replaced, the bar code of the new unit must be recorded.*
2. Connect multiplug to DCU.
3. Fit and secure DCU cover to DCU.
4. Position centre console heater motor retaining bracket to transmission tunnel, fit bolts and tighten to 25 Nm (18 lbf.ft).
5. Fit centre console heater duct to HEVAC assembly and secure with clip.
6. Fit heater motor to mounting bracket and secure with screws.
7. Connect multiplug to heater motor.
8. Fit air suspension switch panel.
  - ☞ **INTERIOR FITTINGS, REPAIRS, Switch panel - air suspension.**
9. Fit centre console.
  - ☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**
10. Connect battery leads, earth lead last.
11. Initiate using TestBook/T4.

10. Release and remove DCU cover from DCU.

## Pre-tensioner - seat belt - front - deployment - in vehicle

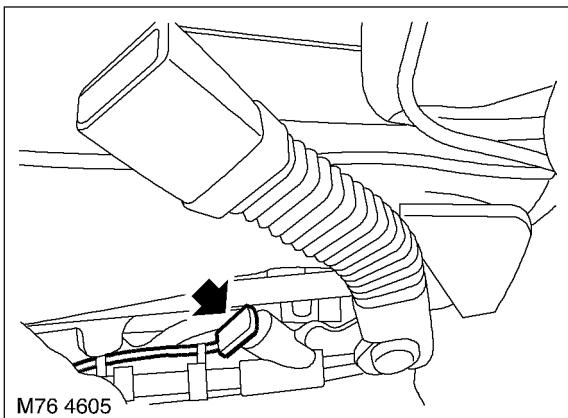
» 76.73.77

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

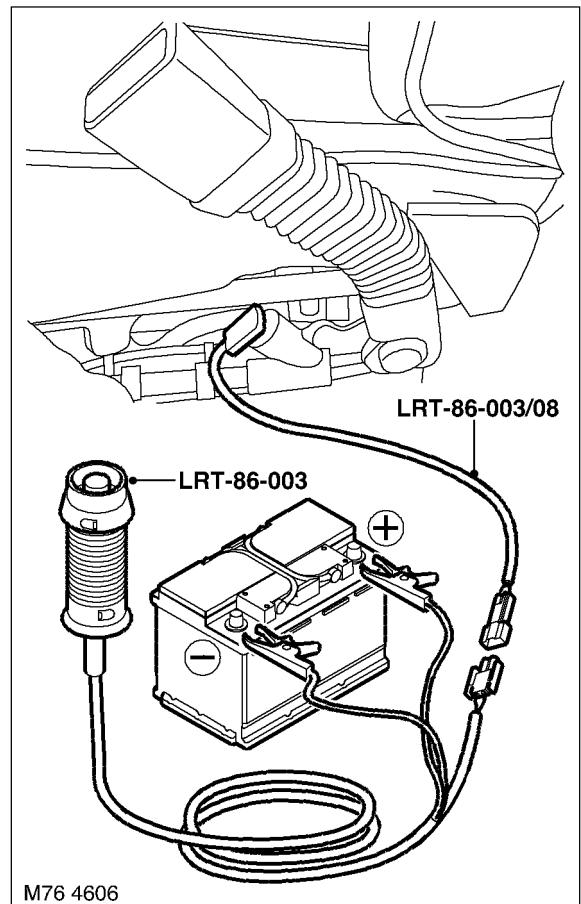
### Deploy

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**



2. Disconnect multiplug from seat belt pre-tensioner.
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.



4. Connect deployment tool fly lead **LRT-86-003/08** to seat belt pre-tensioner.
  5. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.
  6. Connect deployment tool **LRT-86-003** to battery.
- WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.
7. Press deployment tool operating button to deploy seat belt pre-tensioner.
  8. Disconnect deployment tool from battery.
- WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

## RESTRAINT SYSTEMS

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9. Disconnect deployment tool fly lead from seat belt pre-tensioner.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

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### Pre-tensioner - front seat belt - deployment - off vehicle

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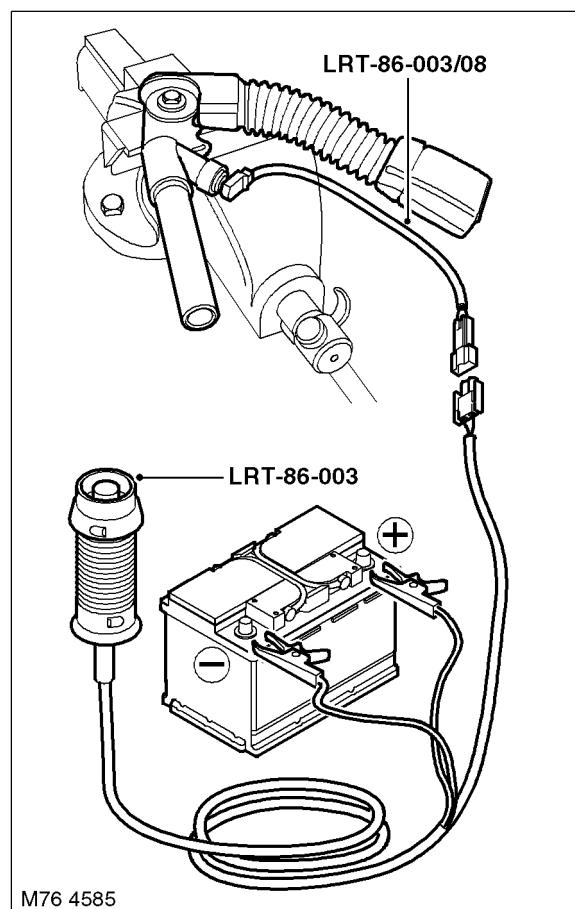
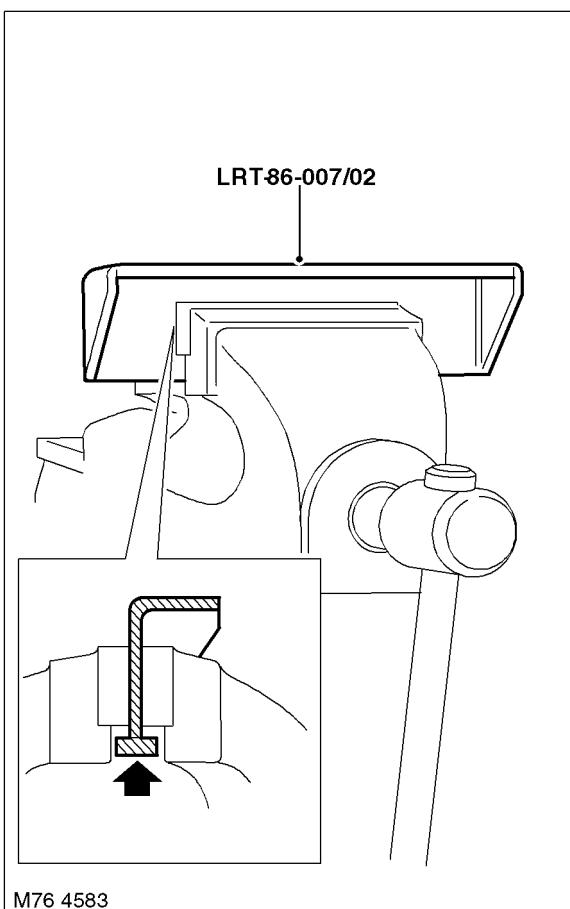
#### » 76.73.78

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

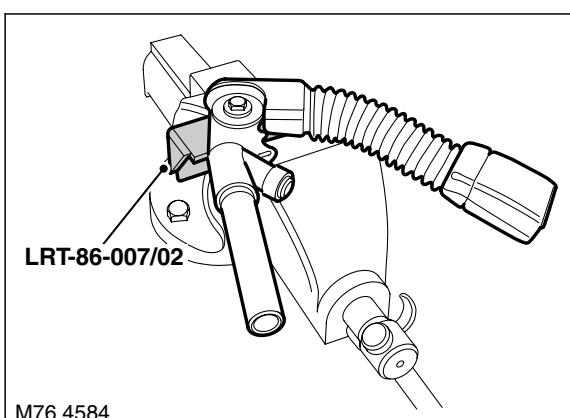
#### Deploy

**WARNING: It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.**

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove front seat belt pre-tensioner from vehicle.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Pre-tensioner - front seat belt.**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.



- Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.



- Fit and secure seat belt pre-tensioner to **LRT-86-007/02**.

- Connect deployment tool fly lead **LRT-86-003/08** to seat belt pre-tensioner.
  - Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.
  - Connect deployment tool **LRT-86-003** to battery.
- WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.
- Press deployment tool operating button to deploy seat belt pre-tensioner.
  - Disconnect deployment tool from battery.
- WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.
- Disconnect deployment tool fly lead from seat belt pre-tensioner.
  - Remove seat belt pre-tensioner from holding tool and place in a sealed bag, ready for disposal.
  - Wipe down holding tools with a damp cloth and remove from vice.

## RESTRAINT SYSTEMS

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14. Transport deployed seat belt pre-tensioner to designated area for incineration.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

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### Airbag module - steering wheel - deployment - off vehicle

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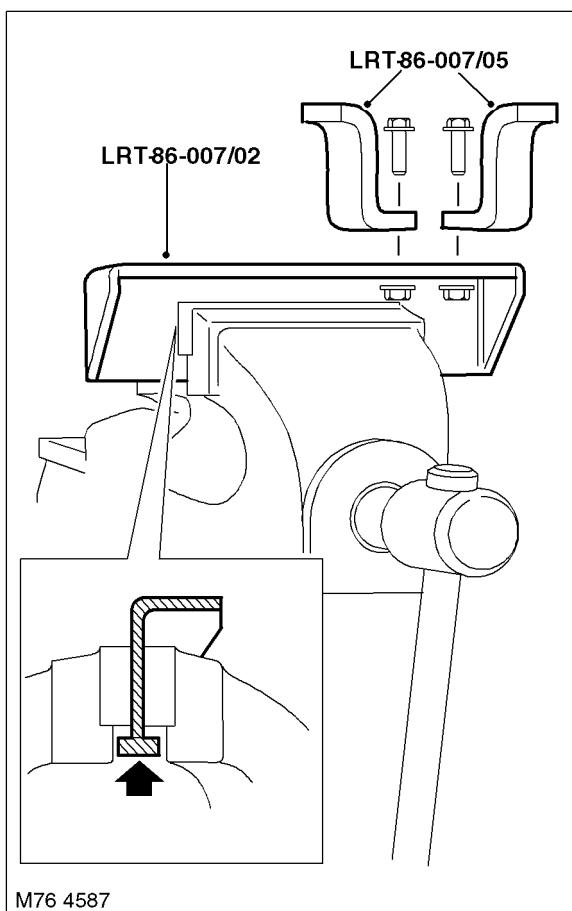
#### » 76.74.16

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

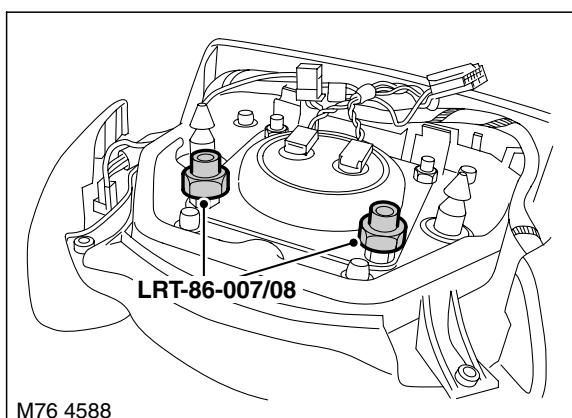
#### Deploy

***WARNING: It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.***

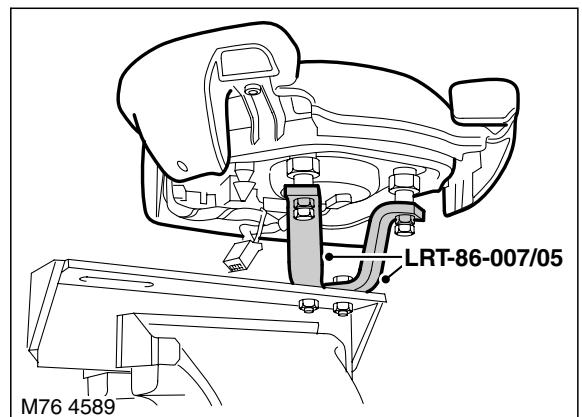
1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove airbag from steering wheel.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Airbag module - steering wheel.**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.



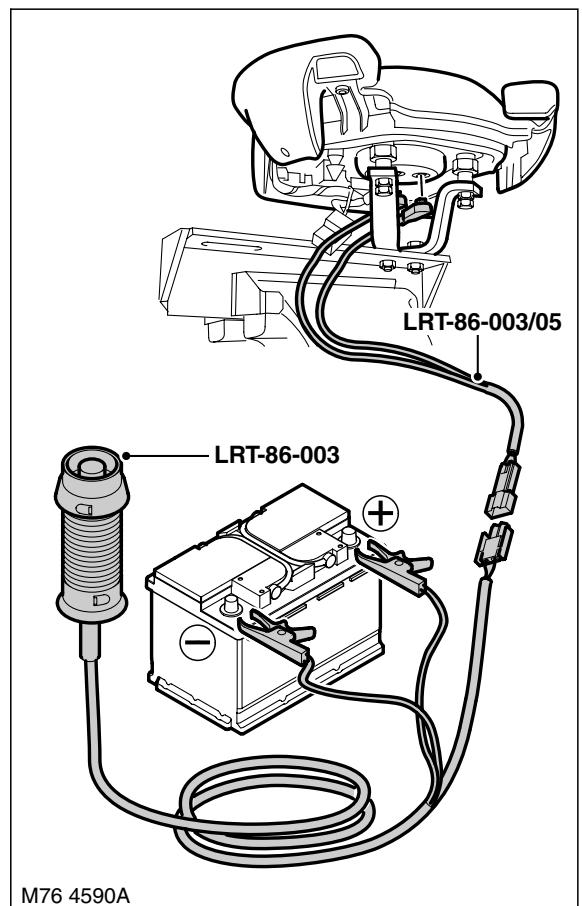
4. Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.
5. Fit and secure 2 off **LRT-86-007/05** to **LRT-86-007/02**.



6. Fit and secure 2 off **LRT-86-007/08** to airbag lower fixing studs.



7. Fit and secure airbag to **LRT-86-007/05**.
8. Connect deployment tool fly lead **LRT-86-003/05** to airbag.



9. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/05**.
  10. Connect deployment tool **LRT-86-003** to battery.
- WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

## RESTRAINT SYSTEMS

11. Press deployment tool operating button to deploy airbag module.
  12. Disconnect deployment tool from battery.  
**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.
  13. Disconnect deployment tool fly lead from airbag.
  14. Remove airbag module from holding tools and place in a sealed bag, ready for disposal.
  15. Wipe down holding tools with a damp cloth and remove from vice.
  16. Transport deployed airbag module to designated area for incineration.
- CAUTION:** Do not re-use or salvage any parts of the SRS system.

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

### Airbag module - passenger - deployment - in vehicle

#### » 76.74.17

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

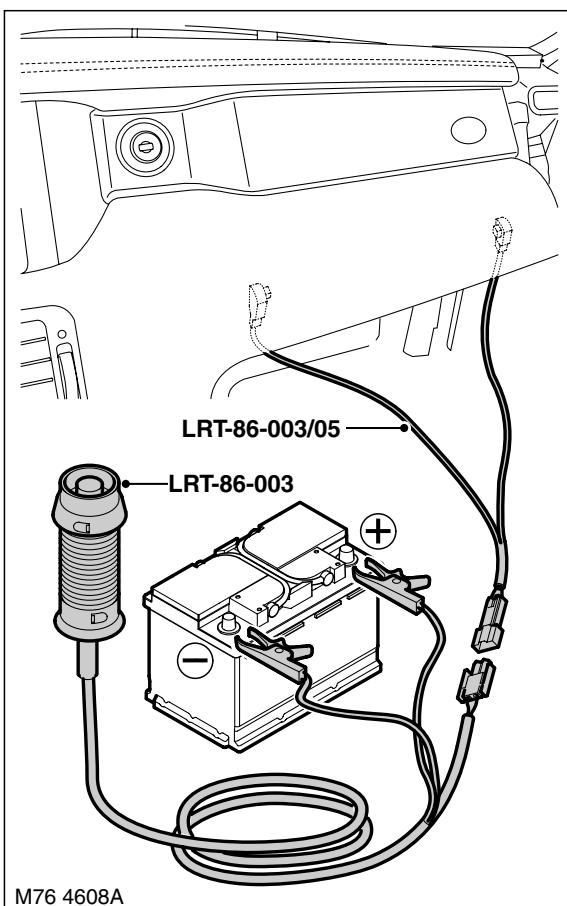
#### Deploy

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove glove box.  
☞ **INTERIOR FITTINGS, REPAIRS, Glove box.**



3. Disconnect multiplugs from airbag module.
4. Check condition of deployment tool **LRT-86-003** and associated fly leads.



5. Connect deployment tool fly lead **LRT-86-003/05** to airbag.

6. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/05**.

7. Connect deployment tool **LRT-86-003** to battery.

**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

8. Press deployment tool operating button to deploy airbag module.

9. Disconnect deployment tool from battery.

**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

10. Disconnect deployment tool fly lead from airbag.

**CAUTION:** Do not re-use or salvage any parts of the SRS system.

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

# RESTRAINT SYSTEMS

## Airbag module - passenger - deployment - off vehicle

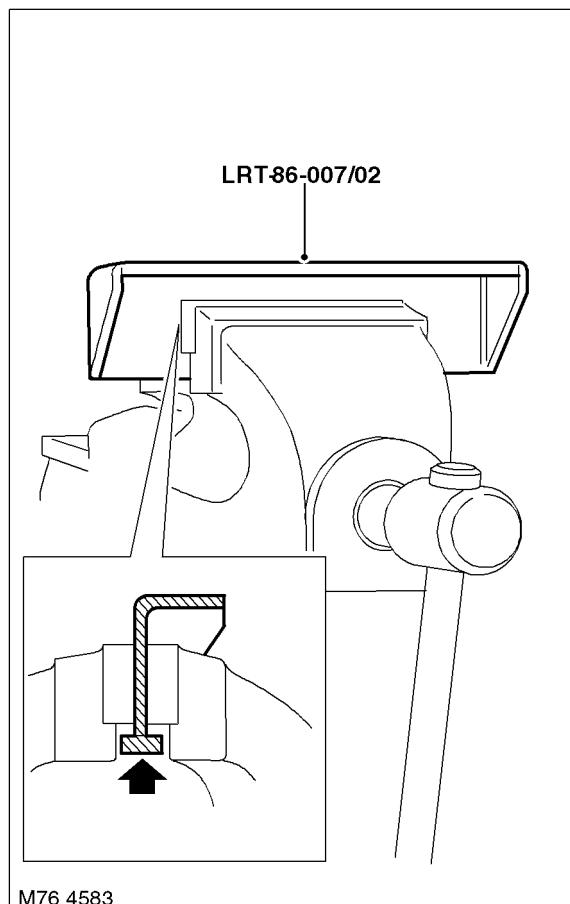
→ 76.74.18

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

### Deploy

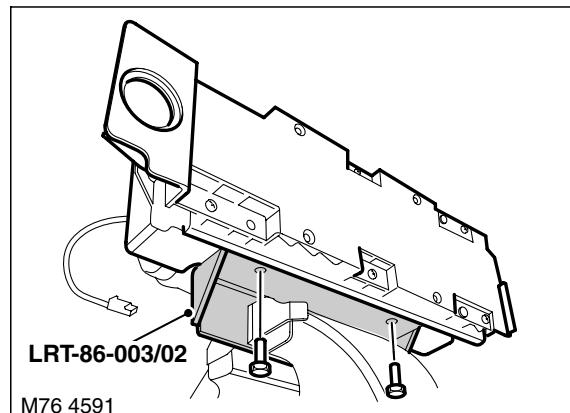
**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

1. Make the SRS system safe.  
→ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove passenger airbag from vehicle.  
→ **RESTRAINT SYSTEMS, REPAIRS, Airbag module - passenger.**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.

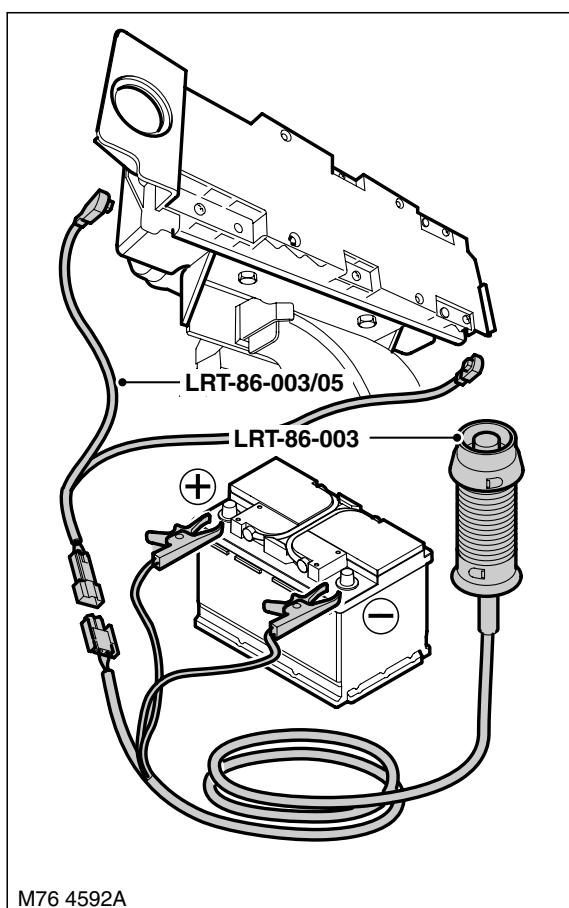


M76 4583

4. Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.



5. Fit and secure airbag to **LRT-86-007/02**.



14. Transport deployed airbag module to designated area for incineration.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

6. Connect deployment tool fly lead **LRT-86-003/05** to airbag.

7. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/05**.

8. Connect deployment tool **LRT-86-003** to battery.

**WARNING: Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.**

9. Press deployment tool operating button to deploy airbag module.

10. Disconnect deployment tool from battery.

**WARNING: During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.**

11. Disconnect deployment tool fly lead from airbag.

12. Remove airbag module from holding tools and place in a sealed bag, ready for disposal.

13. Wipe down holding tools with a damp cloth and remove from vice.

# RESTRAINT SYSTEMS

## Battery - disconnect unit (SRS) - deployment - in vehicle

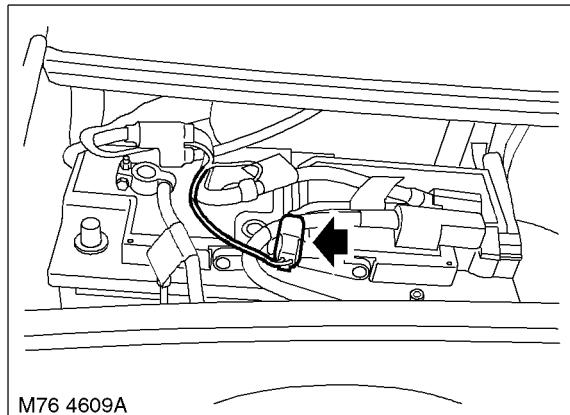
→ 76.74.21

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

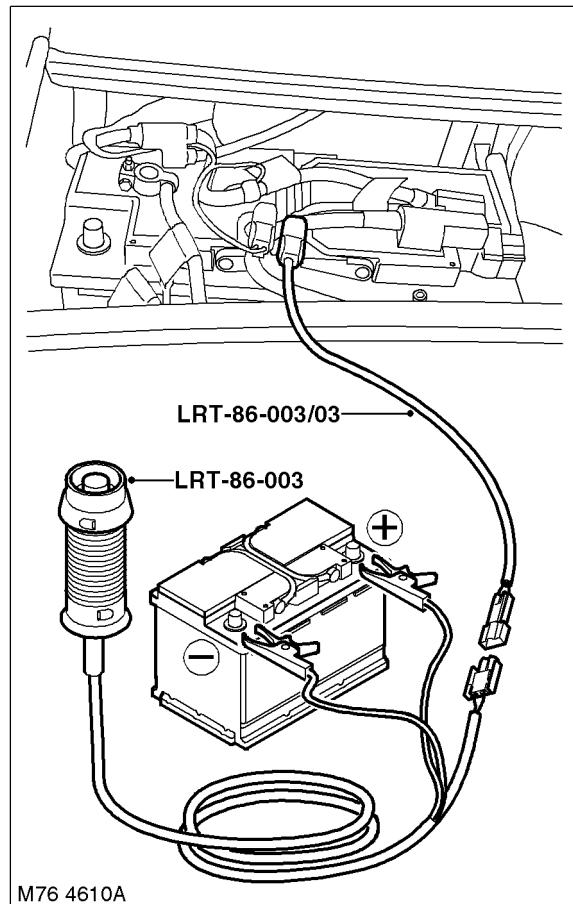
### Deploy

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**



2. Disconnect multiplug from battery disconnect unit.
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.



4. Connect deployment tool fly lead **LRT-86-003/03** to battery disconnect unit.
5. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/03**.
6. Connect deployment tool **LRT-86-003** to battery.  
**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.
7. Press deployment tool operating button to deploy battery disconnect unit.
8. Disconnect deployment tool from battery.  
**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

9. Disconnect deployment tool fly lead from battery disconnect unit.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

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## Battery - disconnect (SRS) - deployment - off vehicle

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### » 76.74.22

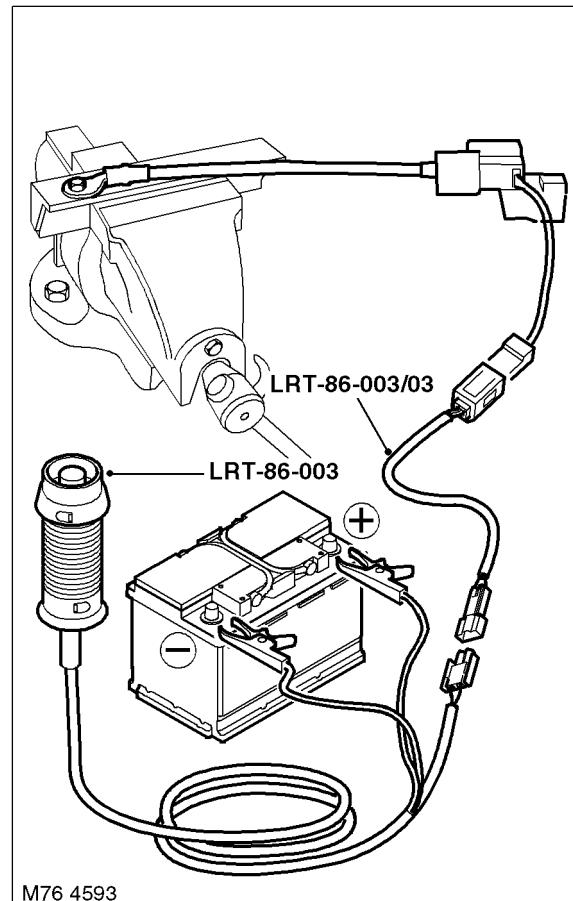
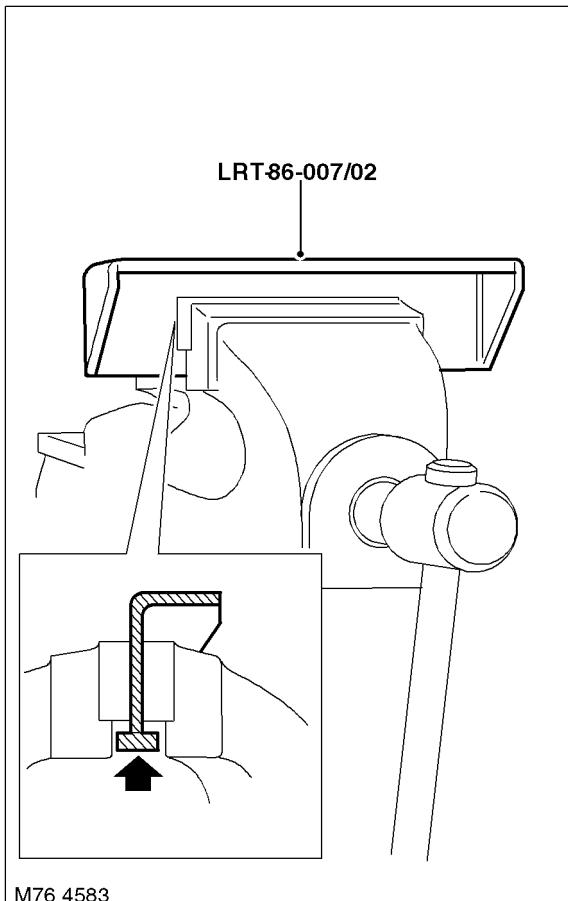
These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

#### Deploy

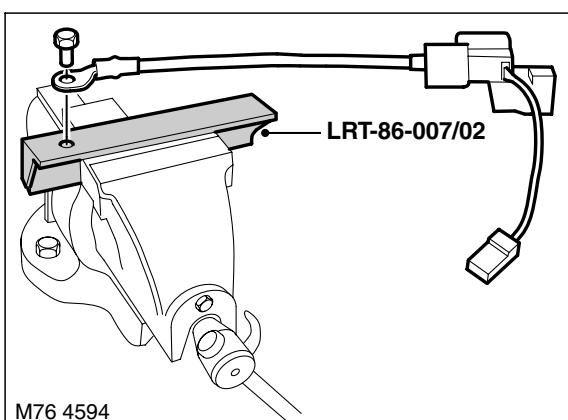
**WARNING: It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.**

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove battery disconnect unit from vehicle.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Battery - disconnect unit (SRS).**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.

## RESTRAINT SYSTEMS



4. Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.



5. Fit and secure battery disconnect unit to **LRT-86-007/02**.

6. Connect deployment tool fly lead **LRT-86-003/03** to battery disconnect unit.

7. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/03**.

8. Connect deployment tool **LRT-86-003** to battery.

**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

9. Press deployment tool operating button to deploy battery disconnect unit.

10. Disconnect deployment tool from battery.

**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

11. Disconnect deployment tool fly lead from battery disconnect unit.

12. Remove battery disconnect unit from holding tool and place in a sealed bag, ready for disposal.

13. Wipe down holding tools with a damp cloth and remove from vice.

14. Transport deployed battery disconnect unit to designated area for incineration.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

## Airbag module - side impact front door - deployment - in vehicle

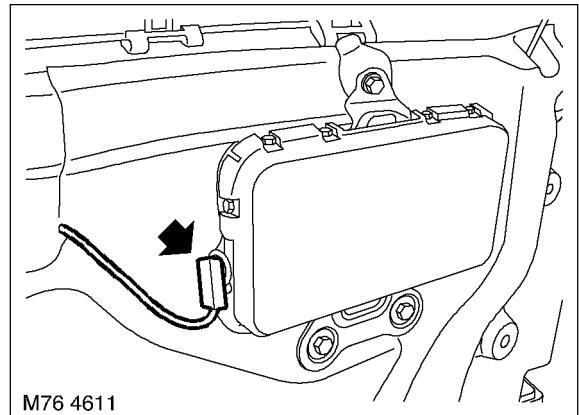
### 76.74.33

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

#### Deploy

**WARNING: It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.**

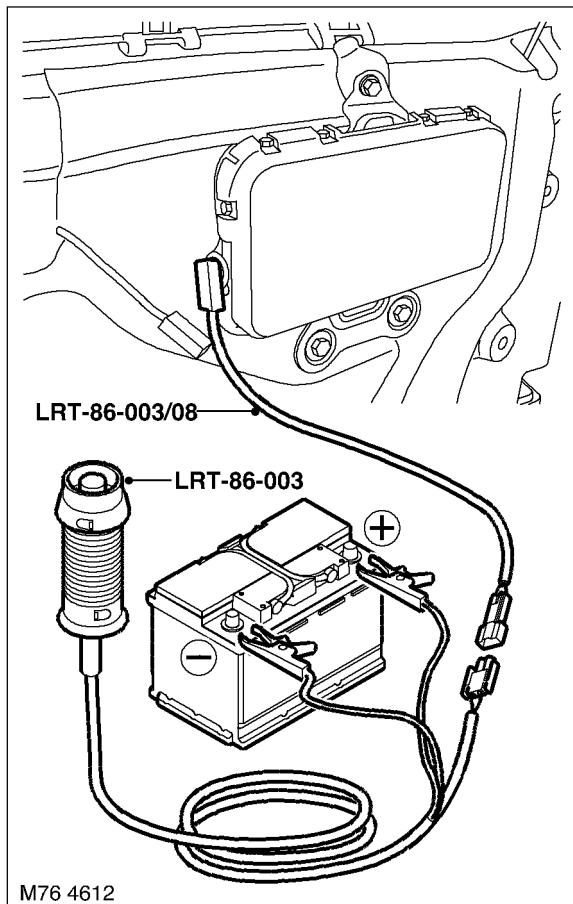
1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove door trim casing  
☞ **DOORS, REPAIRS, Trim casing - front door..**



3. Disconnect multiplug from airbag module.
4. Check condition of deployment tool **LRT-86-003** and associated fly leads.

## RESTRAINT SYSTEMS

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5. Connect deployment tool fly lead **LRT-86-003/08** to airbag.

6. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.

7. Connect deployment tool **LRT-86-003** to battery.

**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

8. Press deployment tool operating button to deploy airbag module.

9. Disconnect deployment tool from battery.

**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

10. Disconnect deployment tool fly lead from airbag.

**CAUTION:** Do not re-use or salvage any parts of the SRS system.

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

## Airbag module - side impact - front door - deployment - off vehicle

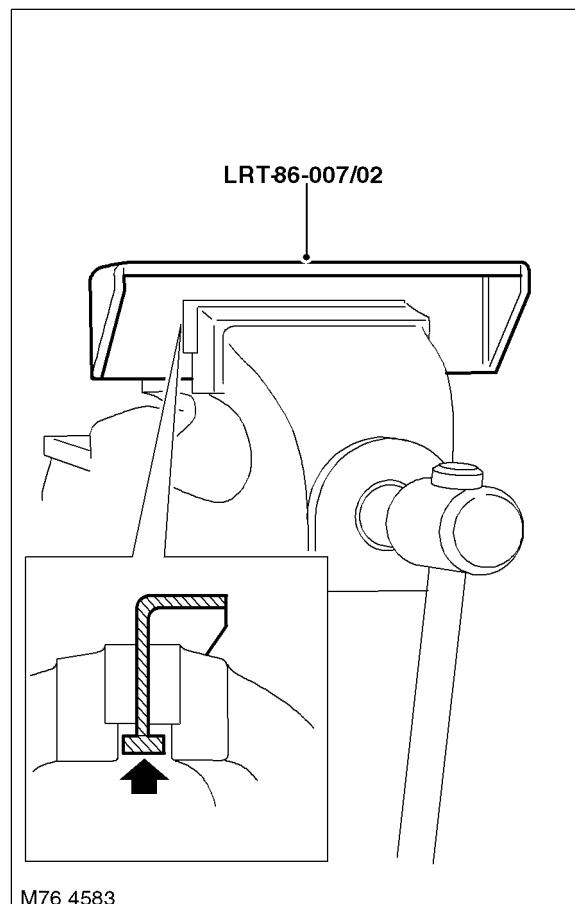
### 76.74.34

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

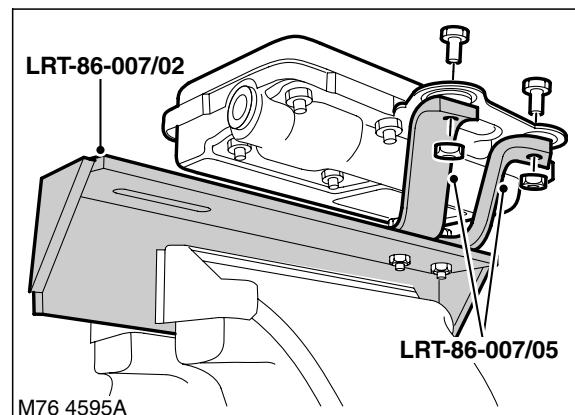
#### Deploy

**WARNING:** *It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.*

1. Make the SRS system safe.  
 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove airbag from vehicle.  
 **RESTRAINT SYSTEMS, REPAIRS, Airbag module - side impact - front door.**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.



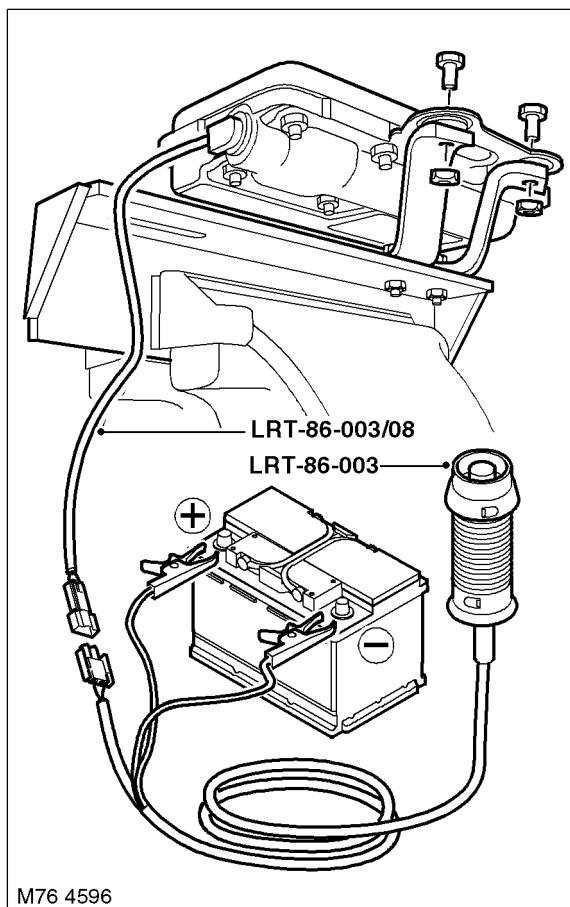
4. Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.



5. Fit and secure 2 off **LRT-86-007/05** to **LRT-86-007/02**.
6. Fit and secure airbag to **LRT-86-007/05**.

## RESTRAINT SYSTEMS

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15. Transport deployed airbag module to designated area for incineration.  
**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

7. Connect deployment tool fly lead **LRT-86-003/08** to airbag.
  8. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.
  9. Connect deployment tool **LRT-86-003** to battery.
- WARNING: Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.**
10. Press deployment tool operating button to deploy airbag module.
  11. Disconnect deployment tool from battery.
- WARNING: During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.**
12. Disconnect deployment tool fly lead from airbag.
  13. Remove airbag module from holding tools and place in a sealed bag, ready for disposal.
  14. Wipe down holding tools with a damp cloth and remove from vice.



## Airbag module - head - front - deployment - in vehicle

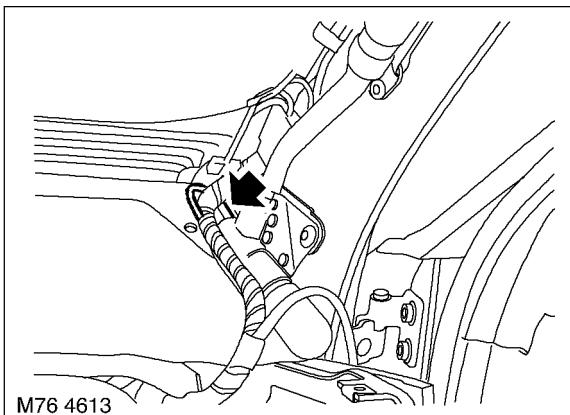
### 76.74.42

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

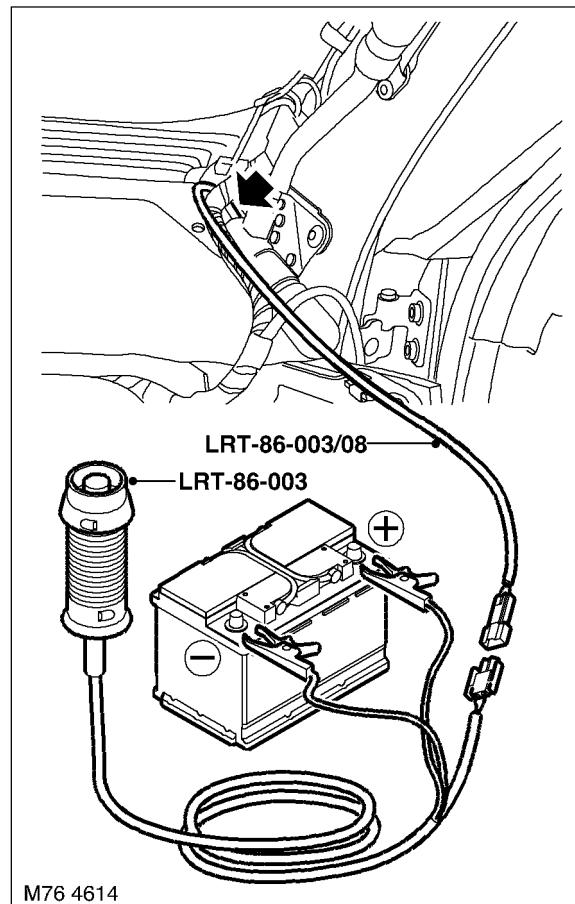
#### Deploy

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove fascia carrier.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**



3. Disconnect multiplug from airbag module.
4. Check condition of deployment tool **LRT-86-003** and associated fly leads.



5. Connect deployment tool fly lead **LRT-86-003/08** to airbag.
6. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.
7. Connect deployment tool **LRT-86-003** to battery.

**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

8. Press deployment tool operating button to deploy airbag module.
  9. Disconnect deployment tool from battery.
- WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

## RESTRAINT SYSTEMS

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10. Disconnect deployment tool fly lead from airbag.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

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### Airbag module - head - front - deployment - off vehicle

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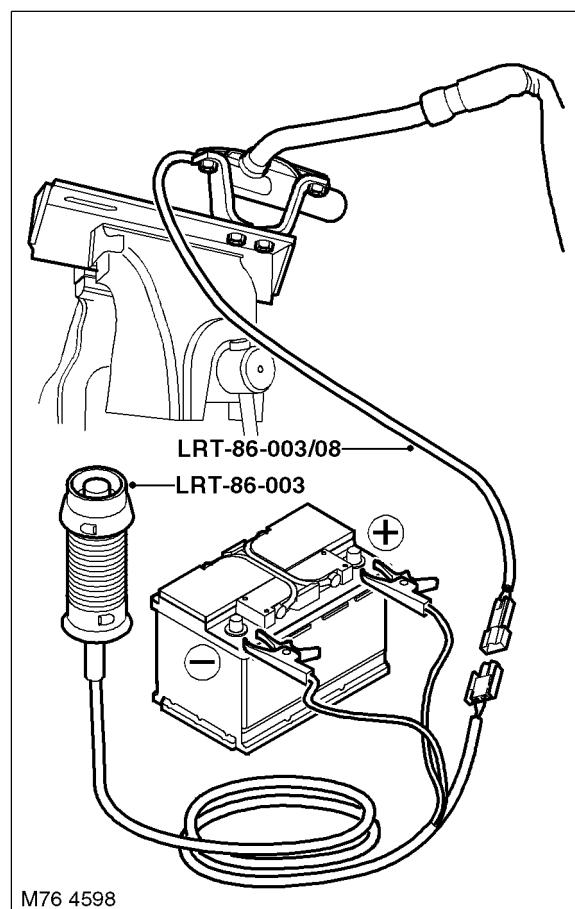
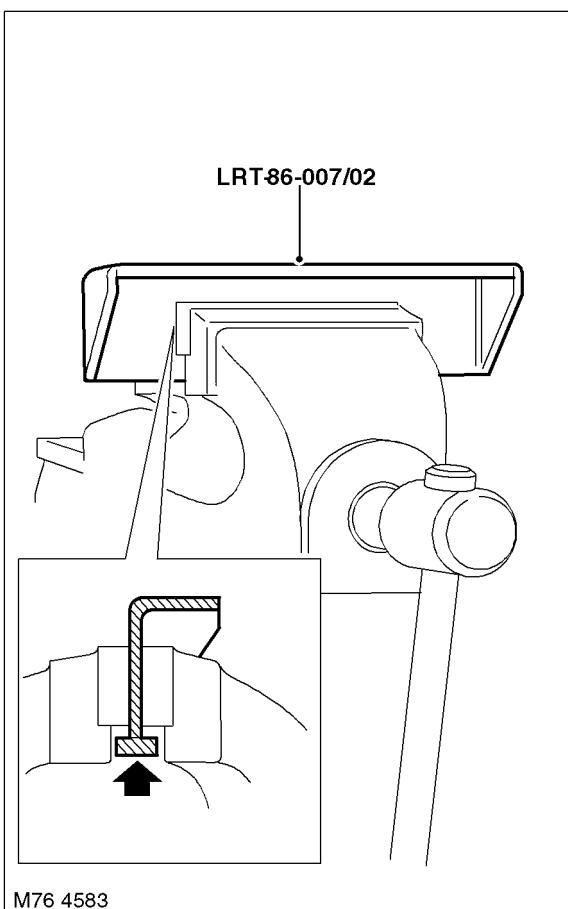
#### » 76.74.43

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

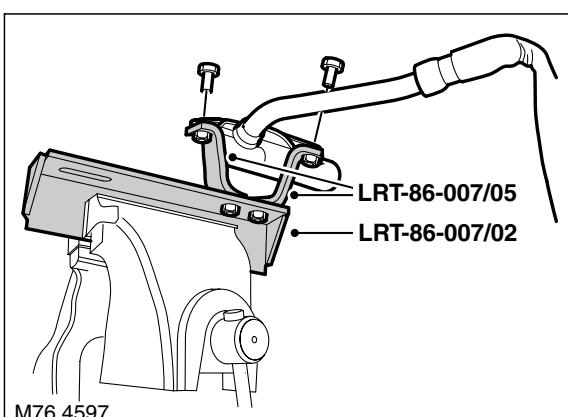
#### Deploy

***WARNING: It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.***

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove airbag module from vehicle.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Airbag module - head - front.**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.



- Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.



- Fit and secure 2 off **LRT-86-007/05** to **LRT-86-007/02**.
- Fit and secure airbag to **LRT-86-007/05**.

- Connect deployment tool fly lead **LRT-86-003/08** to airbag.

- Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.

- Connect deployment tool **LRT-86-003** to battery.

**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

- Press deployment tool operating button to deploy airbag module.

- Disconnect deployment tool from battery.

**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

- Disconnect deployment tool fly lead from airbag.

- Remove airbag module from holding tools and place in a sealed bag, ready for disposal.

- Wipe down holding tools with a damp cloth and remove from vice.

## RESTRAINT SYSTEMS

15. Transport deployed airbag module to designated area for incineration.

**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

### Airbag module - head - rear - deployment - in vehicle

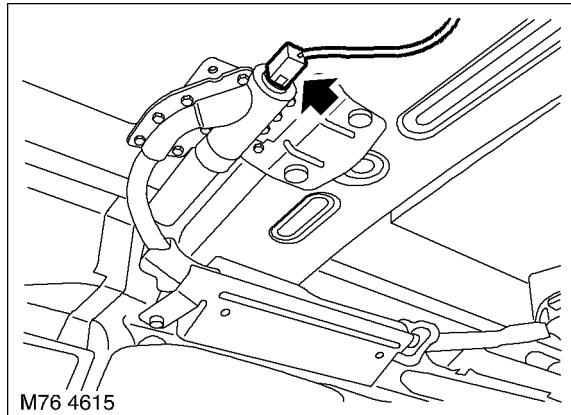
#### » 76.74.44

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

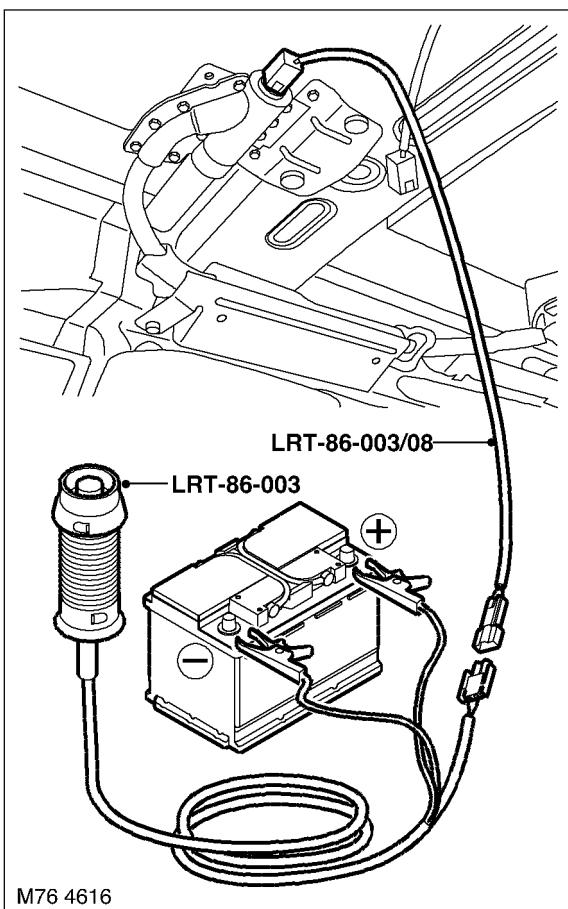
#### Deploy

**WARNING: It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.**

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove headlining.  
☞ **INTERIOR FITTINGS, REPAIRS, Headlining.**
3. Disconnect multiplug from airbag module.
4. Check condition of deployment tool **LRT-86-003** and associated fly leads.



5. Connect deployment tool fly lead **LRT-86-003/08** to airbag.



6. Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.
  7. Connect deployment tool **LRT-86-003** to battery.
- WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.
8. Press deployment tool operating button to deploy airbag module.
  9. Disconnect deployment tool from battery.
- WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.
10. Disconnect deployment tool fly lead from airbag.
- CAUTION:** Do not re-use or salvage any parts of the SRS system.

**NOTE:** Do not transport deployed SRS components in the vehicle passenger compartment.

## Airbag module - head - rear - deployment - off vehicle

— 76.74.45

These guidelines are written to aid authorised personnel to carry out the safe disposal of airbag modules.

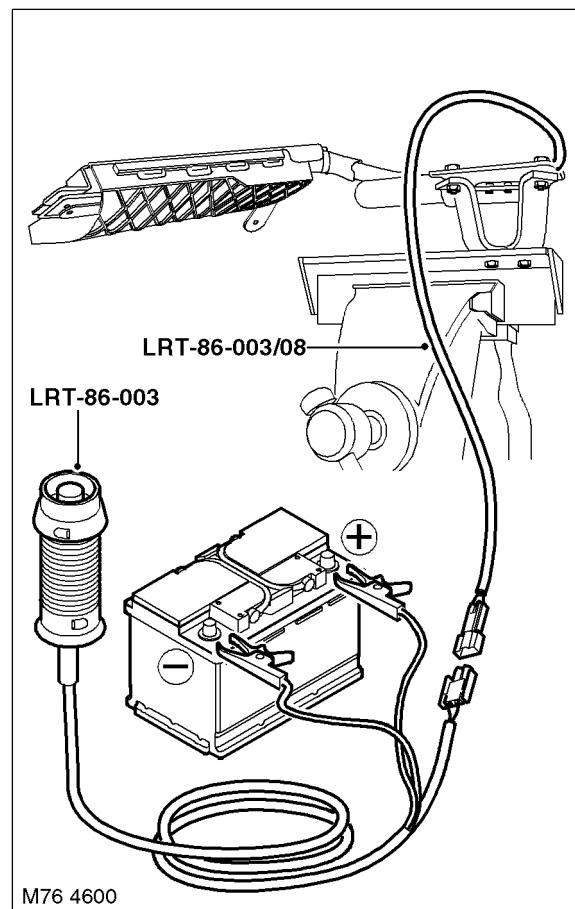
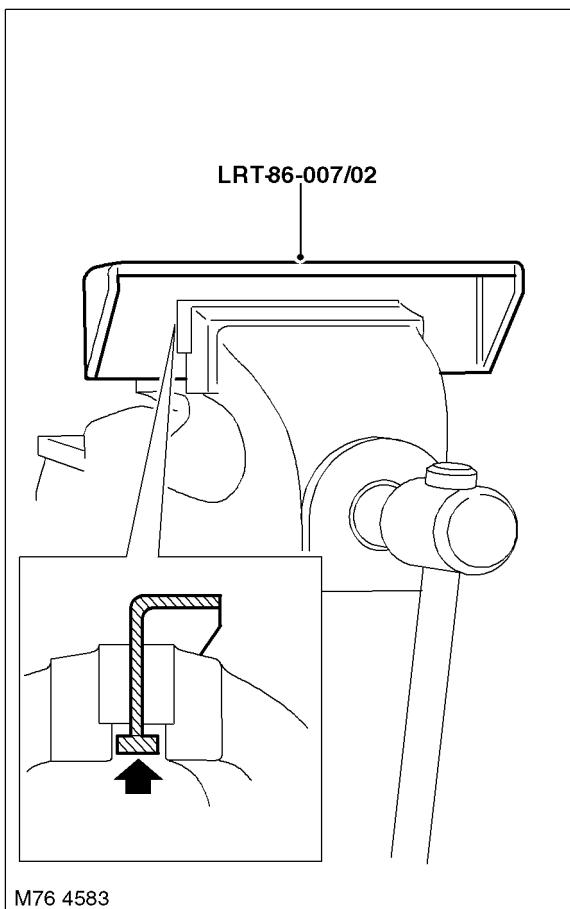
### Deploy

**WARNING:** It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.

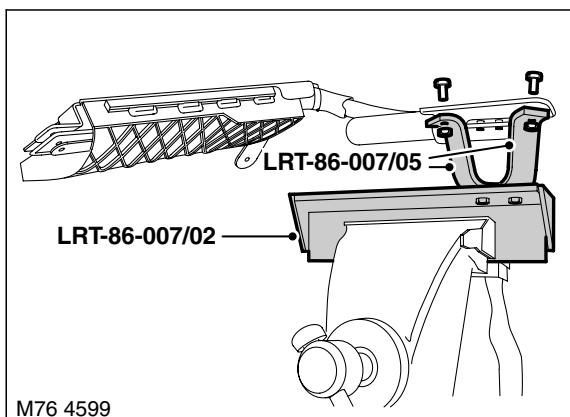
1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove airbag module from vehicle.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Airbag module - head - rear.**
3. Check condition of deployment tool **LRT-86-003** and associated fly leads.

## RESTRAINT SYSTEMS

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- Position **LRT-86-007/02** in vice, ensuring that vice jaws grip tool above the bottom flange to prevent possibility of tool being forced upwards during detonation. Tighten vice.



- Fit and secure 2 off **LRT-86-007/05** to **LRT-86-007/02**.
- Fit and secure airbag to **LRT-86-007/05**.

- Connect deployment tool fly lead **LRT-86-003/08** to airbag.

- Connect deployment tool **LRT-86-003** to deployment tool fly lead **LRT-86-003/08**.

- Connect deployment tool **LRT-86-003** to battery.

**WARNING:** Ensure all personnel are at least 15 metres (50 feet) away from the airbag module.

- Press deployment tool operating button to deploy airbag module.

- Disconnect deployment tool from battery.

**WARNING:** During deployment parts of the airbag module become hot enough to burn you. Wait 30 minutes after deployment before touching the airbag module.

- Disconnect deployment tool fly lead from airbag.

- Remove airbag module from holding tools and place in a sealed bag, ready for disposal.

- Wipe down holding tools with a damp cloth and remove from vice.



## RESTRAINT SYSTEMS

15. Transport deployed airbag module to designated area for incineration.  
**CAUTION: Do not re-use or salvage any parts of the SRS system.**

*NOTE: Do not transport deployed SRS components in the vehicle passenger compartment.*

## **RESTRAINT SYSTEMS**

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## Tailgate lower - adjust on striker

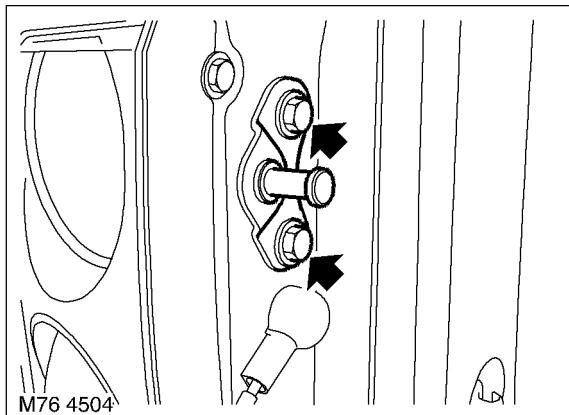
☞ 76.28.03

### Check

1. Check for equal gap and alignment to adjacent panels. If incorrect follow adjust procedure below.

### Adjust

1. Open tailgate.



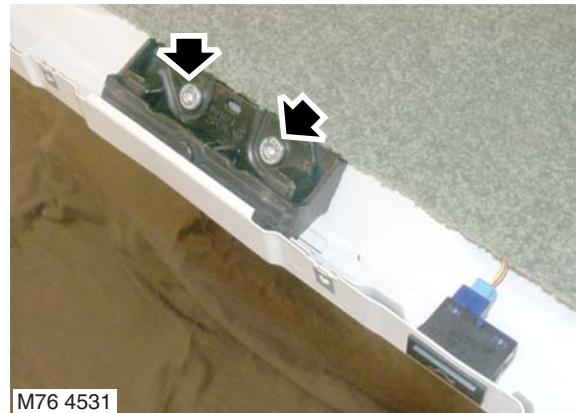
2. Loosen 2 bolts securing lower tailgate striker.
3. Close tailgate, check for equal gap and alignment to adjacent panels.
4. Open lower tailgate and tighten bolts securing striker to 25 Nm (18 lbf.ft).
5. Close tailgate.

## Tailgate upper - adjust on striker(s)

☞ 76.28.28

### Adjust

1. Open tailgate.
2. Remove trim finisher.  
☞ DOORS, REPAIRS, Finisher - upper - tailgate lower.



3. Using a Torx socket, loosen 2 striker screws and adjust striker.
4. Close tailgate, check for equal gap and alignment to adjacent panels.
5. Open tailgate and tighten striker Torx screws to 10 Nm (7 lbf.ft).
6. Adjust other striker if necessary.
7. Fit trim finisher.  
☞ DOORS, REPAIRS, Finisher - upper - tailgate lower.
8. Close tailgate.

## DOORS

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## Glass - front door

☛ 76.31.01

### Remove

1. Lower door glass.
2. Remove plastic sheet.  
 **DOORS, REPAIRS, Plastic sheet - front door.**



3. Loosen two Torx bolts securing glass to regulator.
4. Remove glass.

### Refit

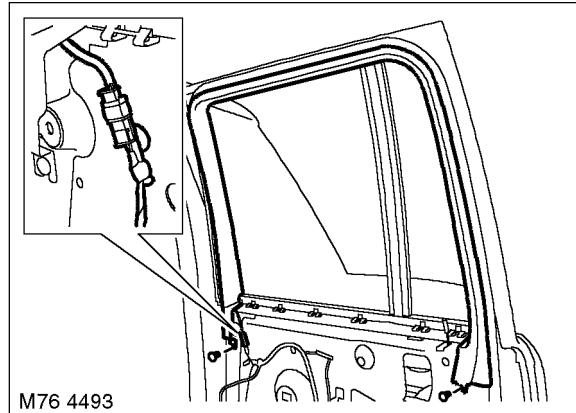
1. Position glass to regulator.
2. Lightly tighten Torx bolts.
3. Raise regulator, check glass alignment, adjust as necessary.
4. Tighten Torx bolts securing front glass to 10 Nm (7 lbf.ft).
5. Fit plastic sheet.  
 **DOORS, REPAIRS, Plastic sheet - front door.**

## Glass - rear door

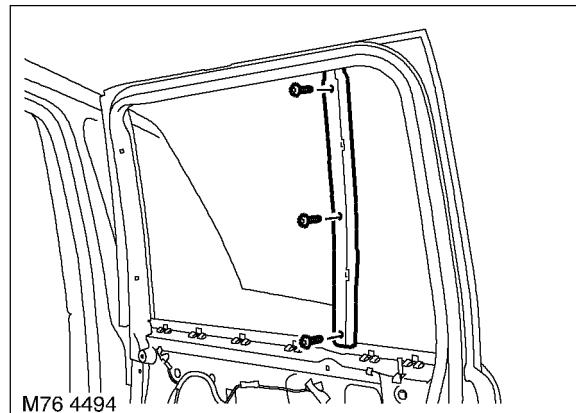
☛ 76.31.02

### Remove

1. Lower door glass.
2. Remove plastic sheet.  
 **DOORS, REPAIRS, Plastic sheet - rear door.**



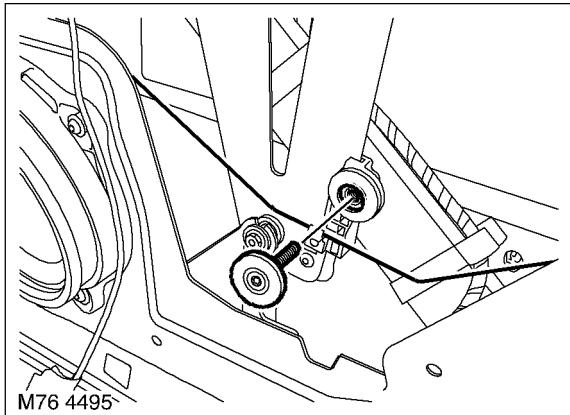
3. Remove 2 clips securing upper door frame finisher, disconnect anti trap multiplug and remove finisher.



4. Remove 3 Torx screws securing rear glass channel to door frame.
5. Withdraw glass channel from frame and position channel seal aside.

# DOORS

---



6. Remove Torx bolt securing glass to regulator.
7. Remove glass.

## Refit

1. Position glass to regulator, fit bolt and tighten to 10 Nm (7 lbf.ft).
2. Fit glass channel to frame and secure with screws.
3. Fit and secure seal.
4. Connect multiplug, fit and secure upper finisher.
5. Fit plastic sheet.  
    ☞ **DOORS, REPAIRS, Plastic sheet - rear door.**
6. Raise and lower glass to check operation.

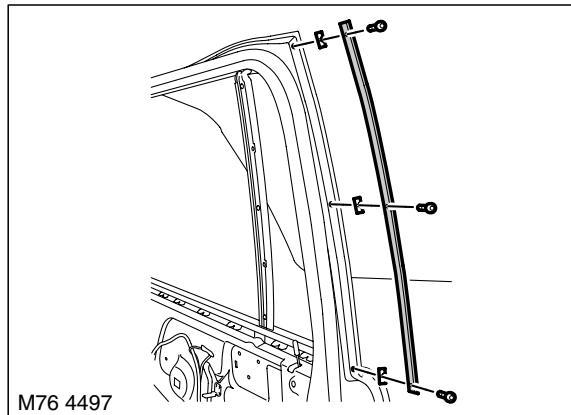
## Quarter light - fixed - rear door

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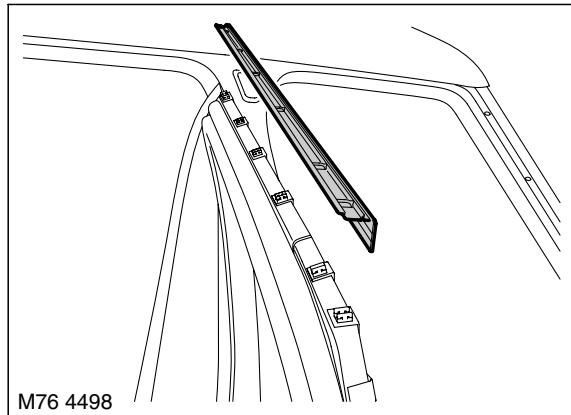
☞ **76.31.31**

### Remove

1. Remove rear door glass.  
    ☞ **DOORS, REPAIRS, Glass - rear door.**

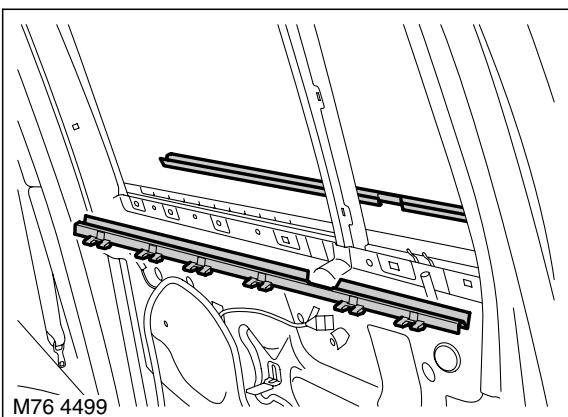


2. Remove 3 screws securing rear finisher to frame and remove finisher.
3. Remove rear finisher retaining clips from door frame.

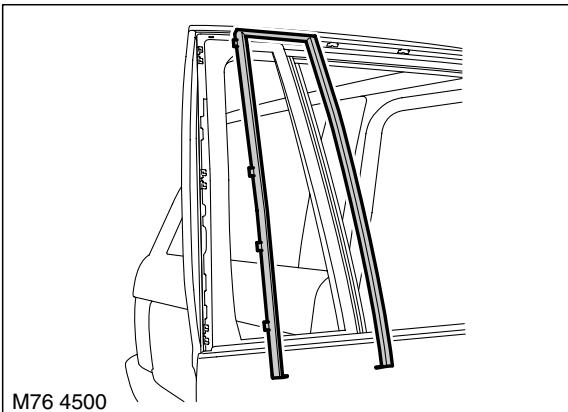


4. Remove top finisher from door.

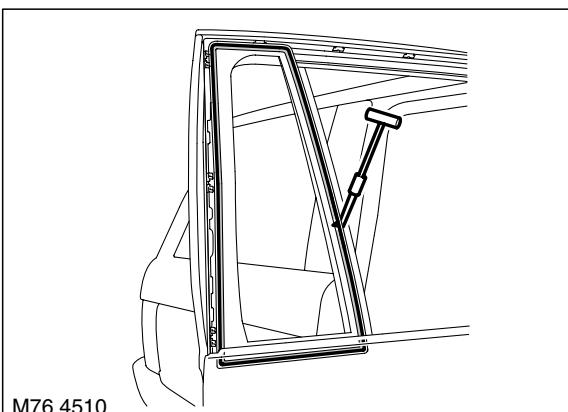
2. **Original quarter light:** Carefully cut back sealant to obtain a smooth surface without damage to obscuration band.
3. Clean sealant face on door frame and quarter light with solvent.
4. Apply etch primer to any bare metal on door frame.
5. Apply primer over etch primer.
6. Fit pre-cut nozzle to sealer cartridge, remove lid, shake out crystals and fit cartridge to applicator gun. If necessary modify the nozzle to achieve required bead section.



5. Remove outer waist seal.
6. Remove inner waist seal.



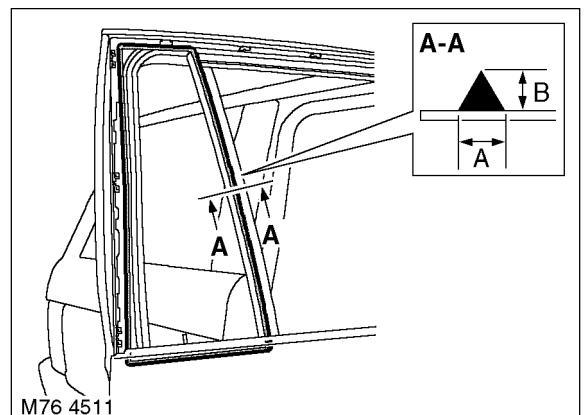
7. Remove quarter light outer trim.



8. Use a Kent knife and carefully cut through sealant securing glass to door frame.
9. Remove quarter light.

#### Refit

1. Carefully remove sealant from door frame to leave a smooth surface.



7. Apply a continuous bead of sealant to door frame. Dimension A = 7 mm (0.28 in). Dimension B = 11 mm (0.44 in).
  8. Fit and centralise quarter light to door frame. Lightly press quarter light to seat sealer.
  9. Fit quarter light trim.
  10. Fit inner waist seal to door.
  11. Fit outer waist seal to door.
  12. Fit door, top finisher.
  13. Fit rear finisher retaining clips to door frame.
  14. Fit and secure rear finisher to frame.
  15. Fit rear door glass.
-  **DOORS, REPAIRS, Glass - rear door.**
16. Test sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around glass and check for leaks. Mark any area that leaks. Dry glass and sealer then apply additional sealer.

# DOORS

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## Glass regulator - front door

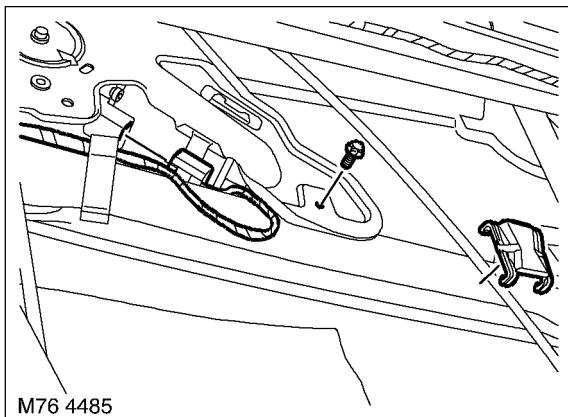
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→ **76.31.45**

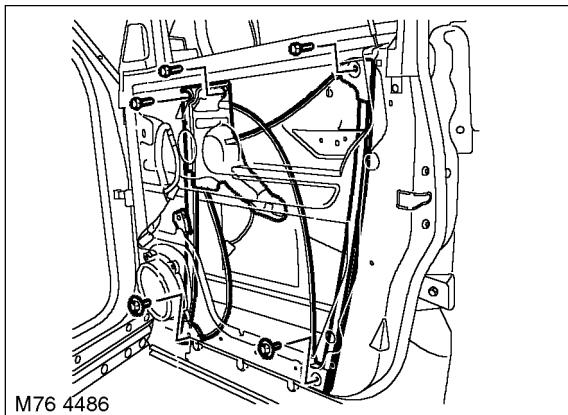
### Remove

1. Remove front door glass.

 **DOORS, REPAIRS, Glass - front door.**



2. Disconnect multiplug from regulator motor.
3. Remove clip securing cable to side impact protection beam.
4. Remove Torx bolt and clamp securing regulator to side impact protection beam.



5. Remove 2 lower bolts securing regulator to door frame and discard.
6. Remove 3 Torx bolts securing regulator to door frame and withdraw regulator through access panel.

### Refit

1. Position regulator to door and unclip motor transit package from rail.
2. Fit upper bolts and clamp, tighten to 10 Nm (7 lbf.ft).
3. Fit new lower bolts and tighten to 10 Nm (7 lbf.ft).
4. Fit cable retaining clip.
5. Connect multiplug to motor.
6. Fit door glass.

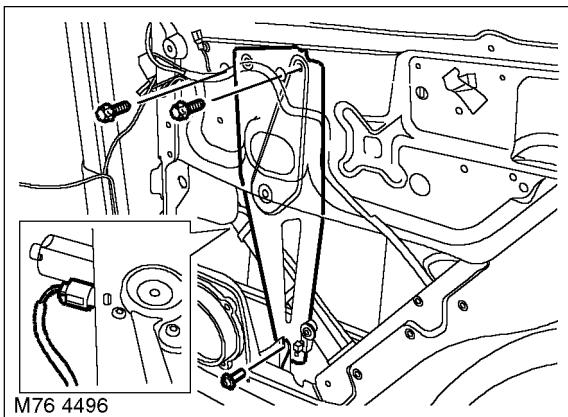
 **DOORS, REPAIRS, Glass - front door.**

## Glass regulator - rear door

» 76.31.46

### Remove

1. Remove rear door glass.
-  **DOORS, REPAIRS, Glass - rear door.**



2. Disconnect multiplug from regulator motor.
3. Remove and discard regulator lower fixing bolt.
4. Remove 2 Torx bolts securing regulator to door frame and withdraw regulator through access panel.

### Refit

1. Position regulator to door and unclip motor transit package from rail.
2. Fit regulator upper bolts and tighten to 10 Nm (7 lbf.ft).
3. Fit new lower bolt and tighten to 10 Nm (7 lbf.ft).
4. Connect multiplug to motor.
5. Fit rear door glass.

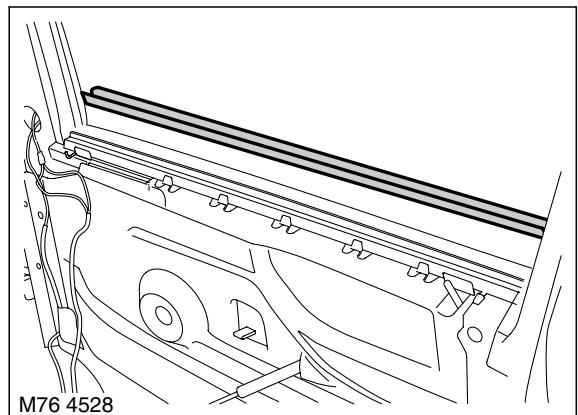
 **DOORS, REPAIRS, Glass - rear door.**

## Seal - waist outer - front door

» 76.31.53

### Remove

1. Remove exterior mirror assembly.
-  **EXTERIOR FITTINGS, REPAIRS, Mirror - exterior.**



2. Carefully prise door seal from outer door flange.

### Refit

1. Carefully fit seal to outer door flange.
  2. Fit exterior mirror assembly.
-  **EXTERIOR FITTINGS, REPAIRS, Mirror - exterior.**

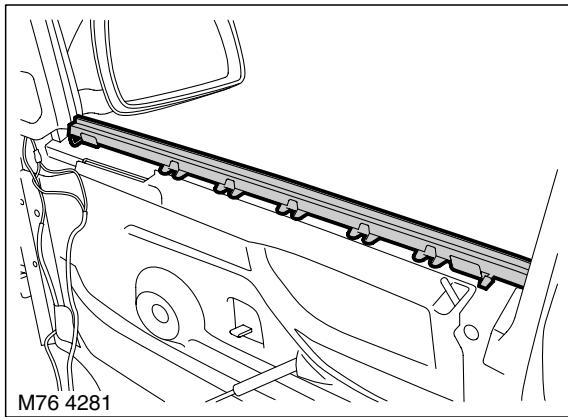
# DOORS

## Seal - waist inner - front door

» 76.31.55

### Remove

1. Remove door trim casing.  
DOORS, REPAIRS, Trim casing - front door.



2. Carefully release waist seal from flange.
3. Remove waist seal.

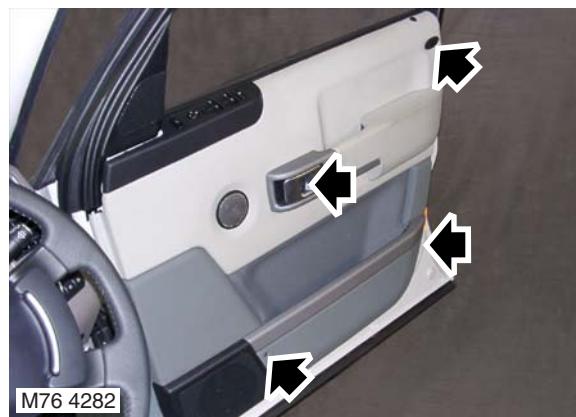
### Refit

1. Fit waist seal.
2. Fit door trim casing.  
DOORS, REPAIRS, Trim casing - front door.

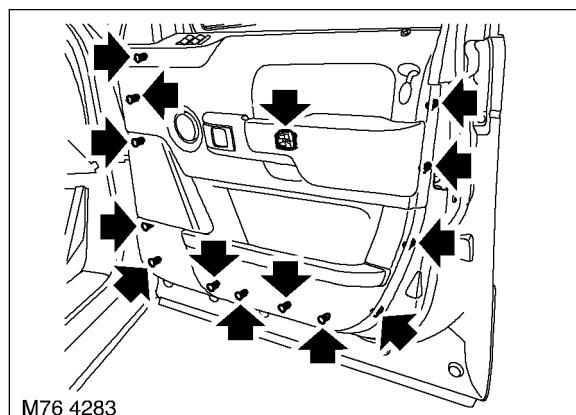
## Trim casing - front door

» 76.34.01

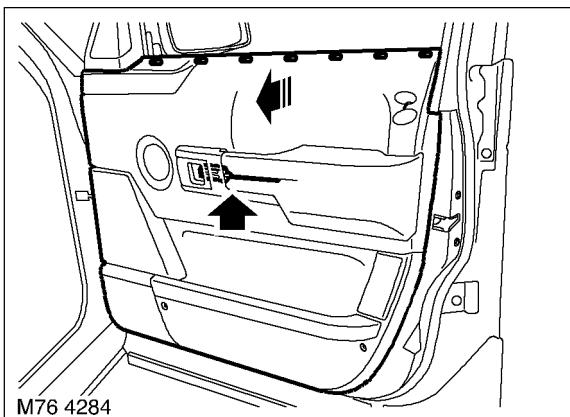
### Remove



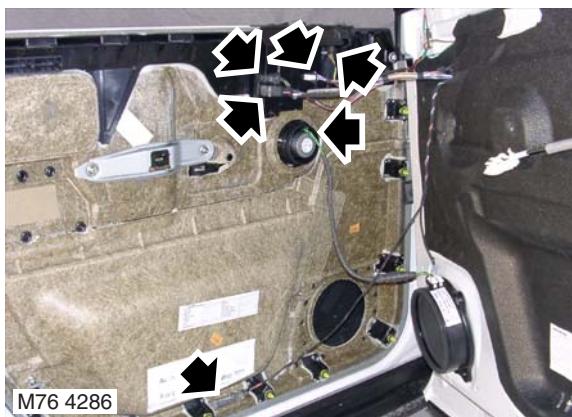
1. Remove 3 screws securing trim casing to door.
2. Release access cover in trim casing and remove screw.



3. Carefully release 13 clips securing trim casing to door.
4. Ensure centre trim casing clip is released.

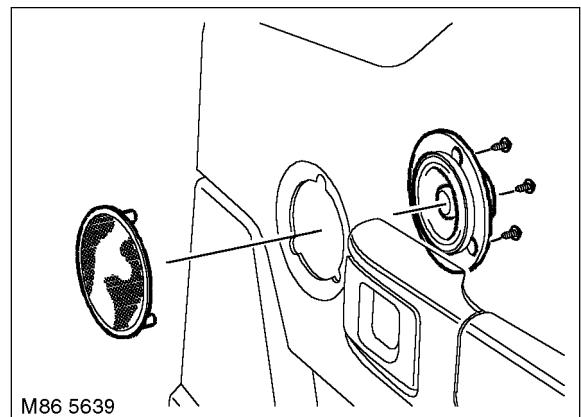


5. Pull trim casing horizontally from 7 clips securing the upper edge to inner glass seal, avoid damage to the locking button on final release.
6. Release door operating cable from door casing and move aside.

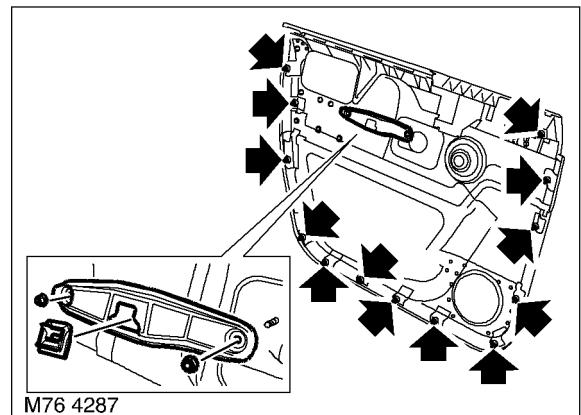


7. Disconnect 6 multiplugs from door harness and remove trim casing.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



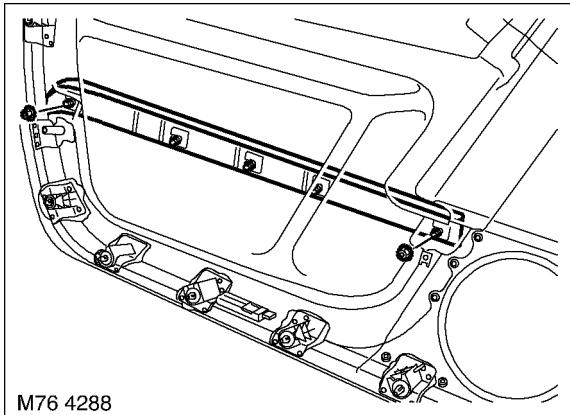
8. Remove 3 Torx screws securing speaker to trim casing and remove speaker



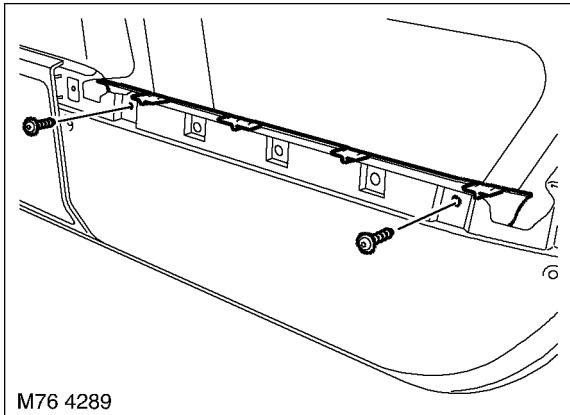
9. Remove 13 clips from door casing.
10. Remove retaining clip from door handle reinforcement bracket.
11. Remove 2 nuts securing door handle reinforcement bracket. Remove bracket.

## DOORS

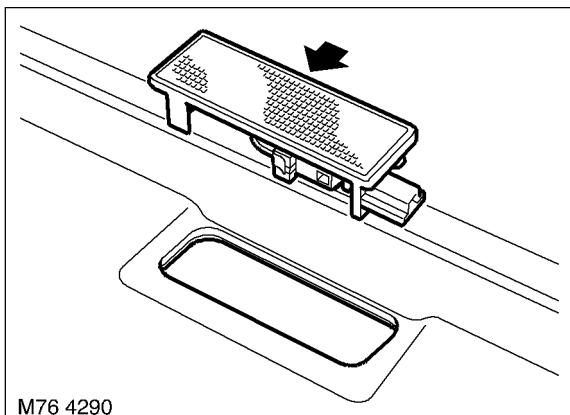
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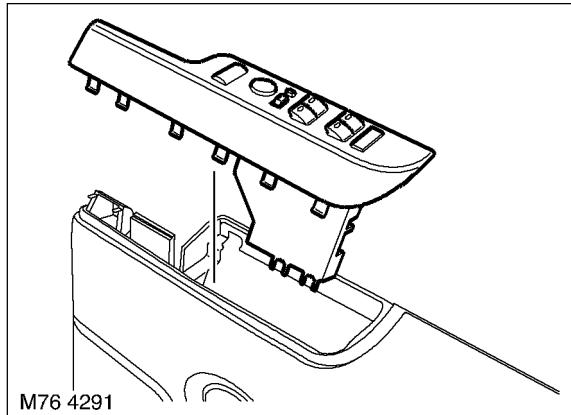
12. Remove 2 nuts securing door pocket finisher, carefully release finisher from 3 clips and remove finisher.



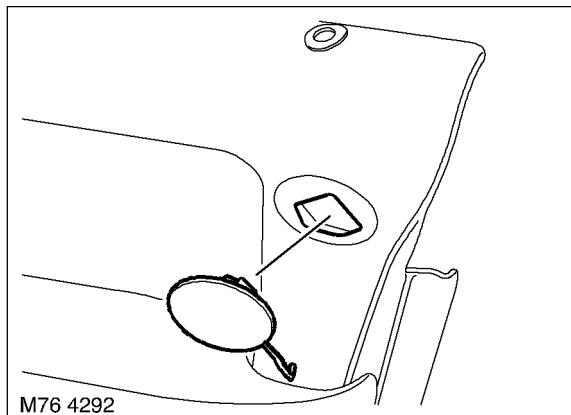
13. Remove 2 Torx screws securing inner door pocket finisher to casing. Remove finisher.



14. Depress clip and remove trim casing light assembly.



15. Carefully release window lift switch pack from door trim casing.



16. Remove access cover from door casing.

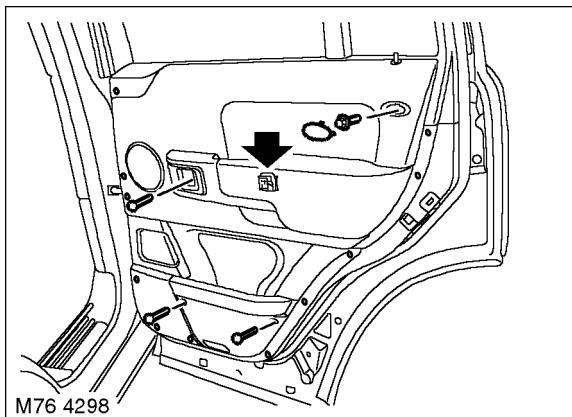
### Refit

1. Fit access cover to door casing.
2. Position switch pack to door casing, align and secure clips.
3. Fit light assembly to door casing.
4. Fit inner door pocket finisher and secure with screws.
5. Position outer door pocket finisher to clips, fit nuts and tighten to 3 Nm (2.2 lbf.ft).
6. Position door handle reinforcement bracket, fit nuts and tighten to 6 Nm (4.4 lbf.ft).
7. Fit and secure clip to reinforcement bracket.
8. Fit door casing retaining clips.
9. Fit speaker to trim casing and secure with Torx screws.
10. Connect multiplugs.
11. Connect cable to interior door release.
12. Fit front door trim casing.
13. Fit screws securing door trim casing.
14. Position and secure screw cover.

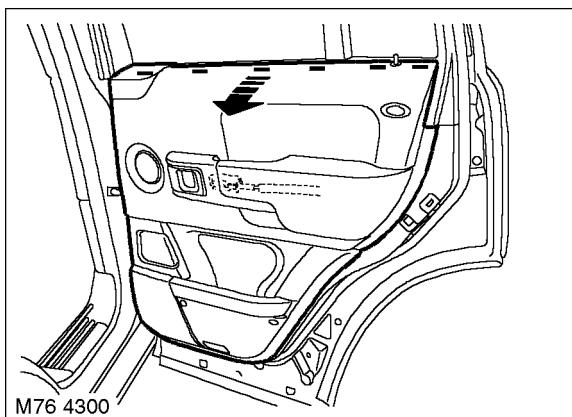
## Trim casing - rear door

» 76.34.04

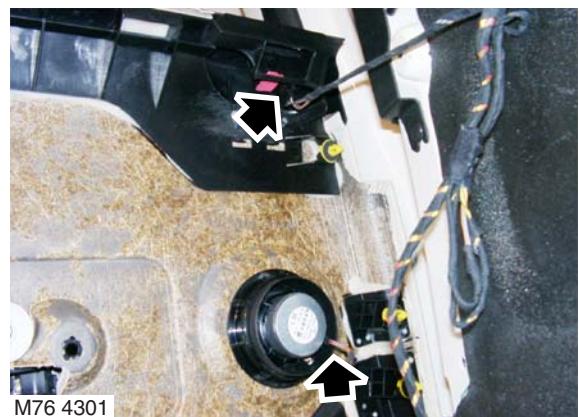
### Remove



1. Remove 3 screws securing trim casing to door.
2. Release access cover in trim casing and remove screw.
3. Carefully release 11 clips securing trim casing to door.
4. Ensure centre trim casing clip is released.

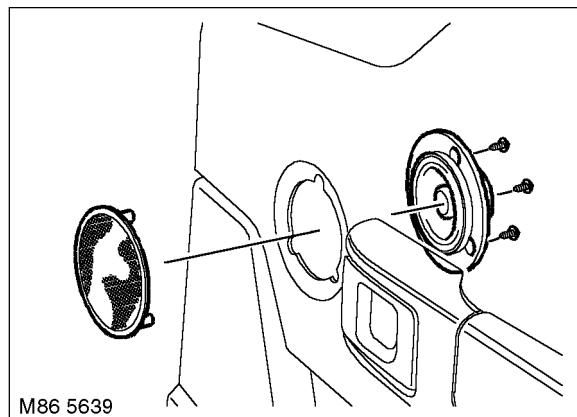


5. Release 6 clips securing door casing to inner glass seal horizontally, avoid damage to locking button on final release.
6. Release door operating cable from door casing and move aside.



7. Disconnect 3 multiplugs from door harness and remove trim casing.

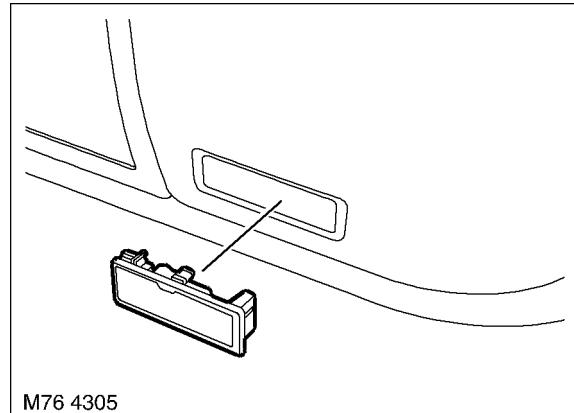
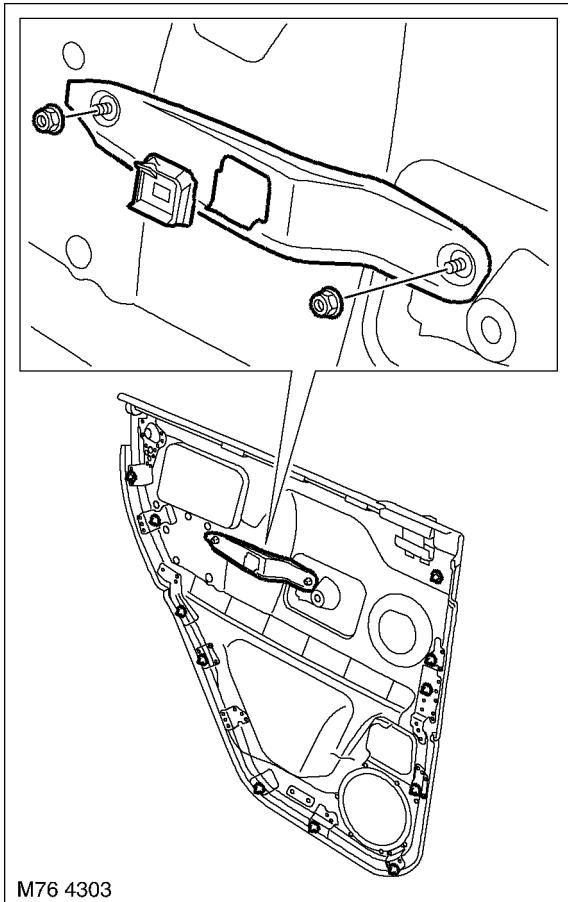
*NOTE: Do not carry out further dismantling if component is removed for access only.*



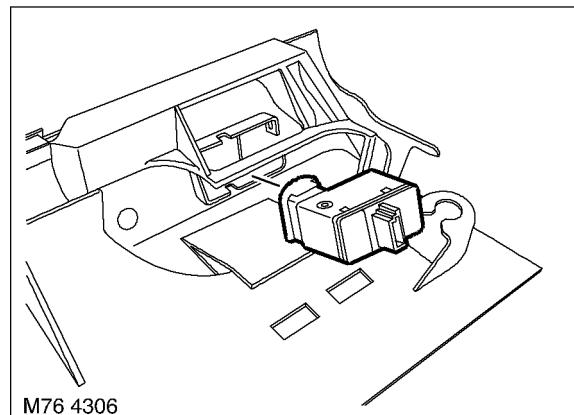
8. Remove 3 Torx screws securing speaker to trim casing and remove speaker

## DOORS

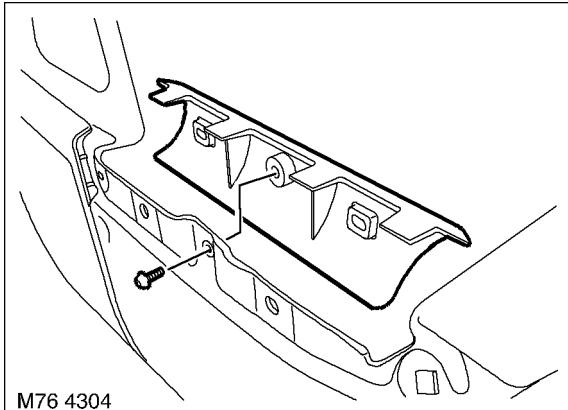
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13. Depress clip and remove trim casing light assembly.



14. Carefully release window lift switch from trim casing.
15. Remove access cover from door casing.



12. Remove Torx screw securing door pocket finisher to casing. Remove finisher.

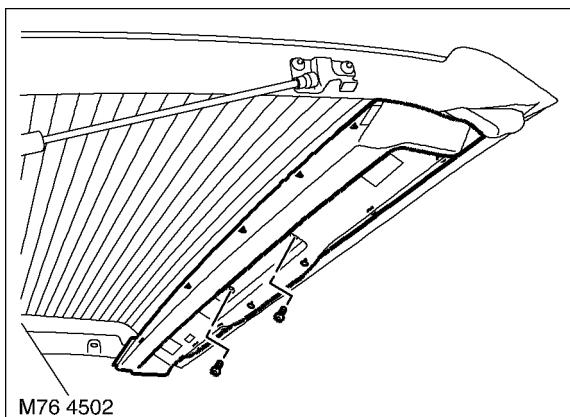
### Refit

1. Fit access cover to door casing.
2. Position switch pack to door casing, align and secure clips.
3. Fit inner door pocket finisher and secure with screw.
4. Position outer door pocket finisher to clips, fit nuts and tighten to 3 Nm (2.2 lbf.ft).
5. Position door handle reinforcement bracket, fit nuts and tighten to 6 Nm (4.4 lbf.ft).
6. Fit and secure clip to reinforcement bracket.
7. Fit door casing retaining clips.
8. Fit speaker to trim casing and secure with Torx screws.
9. Connect multiplugs.
10. Connect cable to interior door release.
11. Fit rear door trim casing.
12. Fit screws securing door trim casing.
13. Position and secure screw cover.

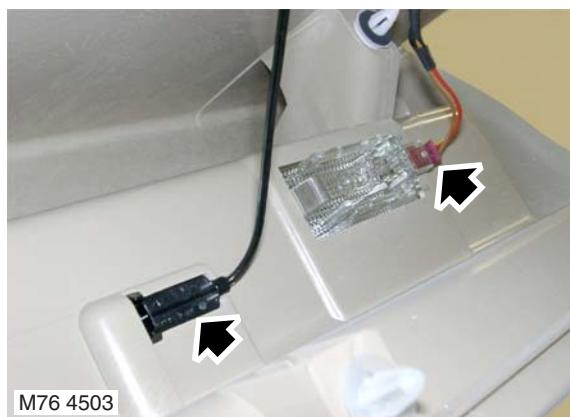
## Trim casing - tailgate upper

» **76.34.11**

### Remove



1. Remove 2 Torx screws securing trim casing to upper tailgate.
2. Carefully release 11 clips securing trim casing to tailgate.



3. Disconnect both tailgate lamp multiplugs.
4. Disconnect tailgate latch manual release cable from trim casing.
5. Remove trim casing.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

6. Remove both lamps and retaining clips from trim casing.

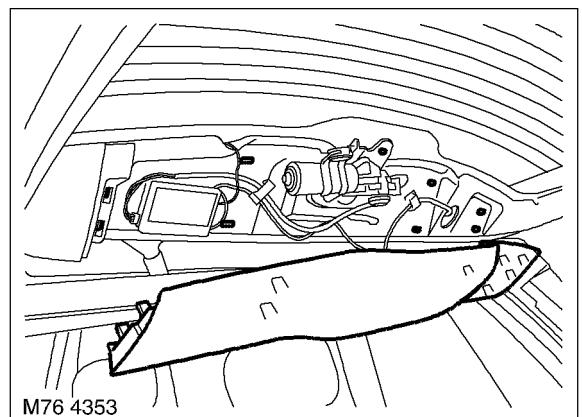
### Refit

1. Fit lamps and clips to trim casing.
2. Connect both tailgate lamp multiplugs.
3. Connect manual release cable.
4. Fit and secure tailgate trim casing.

## Trim finisher - tailgate - upper

» **76.34.13**

### Remove



1. Carefully release 9 clips and remove tailgate upper finisher.

### Refit

1. Position tailgate finisher and secure to clips.

# DOORS

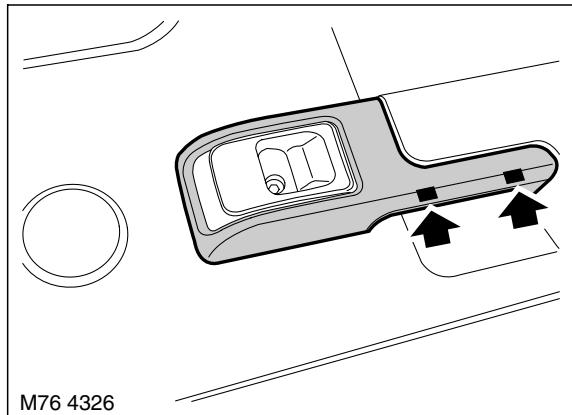
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## Capping - front door arm rest

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» 76.34.15

### Remove



1. Release 2 clips securing door handle capping to arm rest, ease forward and remove.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

2. Remove 2 clips from capping.

### Refit

1. Fit new clips to capping.
2. Align capping to arm rest and secure with clips.

## Plastic sheet - front door

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» 76.34.18

### Remove

1. Remove door airbag.  
 **RESTRAINT SYSTEMS, REPAIRS,  
Airbag module - side impact - front door.**
2. Disconnect speaker multiplug for access.
3. Remove plastic sheet.

### Refit

1. Fit plastic sheet.
2. Connect multiplug to speaker.
3. Fit door airbag.  
 **RESTRAINT SYSTEMS, REPAIRS,  
Airbag module - side impact - front door.**

## Plastic sheet - rear door

☛ **76.34.28**

### Remove

1. Remove rear door trim casing.  
 **DOORS, REPAIRS, Trim casing - rear door.**
2. Disconnect speaker multiplug for access.
3. Remove plastic sheet.

### Refit

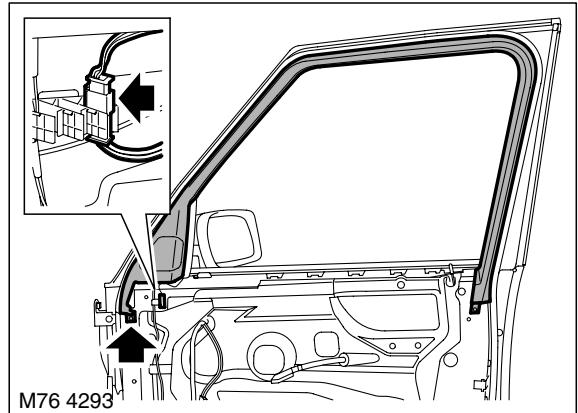
1. Fit plastic sheet.
2. Connect multiplug to speaker.
3. Fit rear door trim casing.  
 **DOORS, REPAIRS, Trim casing - rear door.**

## Finisher - door frame - front

☛ **76.34.42**

### Remove

1. Remove inner waist seal.  
 **DOORS, REPAIRS, Seal - waist inner - front door.**



2. Disconnect anti-trap sensor multiplug, and if fitted, tweeter connector .
3. Remove studs securing finisher.
4. Release and remove finisher.

### Refit

1. Fit finisher ensuring correct location to door seal.
2. Fit studs.
3. Connect anti-trap sensor and tweeter connectors.
4. Fit inner waist seal.  
 **DOORS, REPAIRS, Seal - waist inner - front door.**

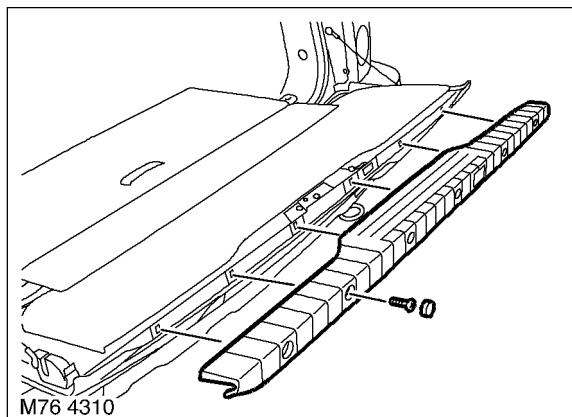
# DOORS

## Finisher - upper - tailgate lower

» **76.34.44**

### Remove

1. Open upper and lower tailgates.



2. Remove 6 screw caps.
3. Remove 6 screws securing trim finisher.
4. Remove trim finisher.

### Refit

1. Fit trim finisher and secure with screws.
2. Fit screw covers.

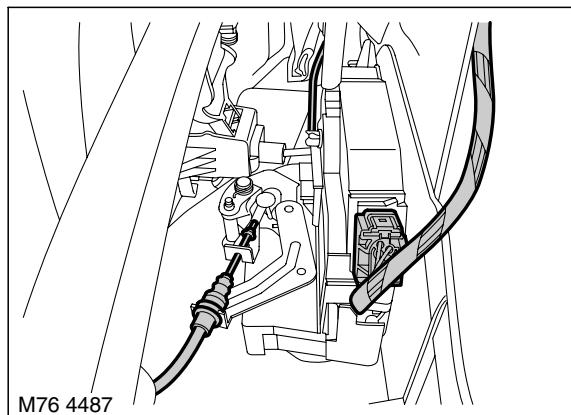
## Latch - front door

» **76.37.12**

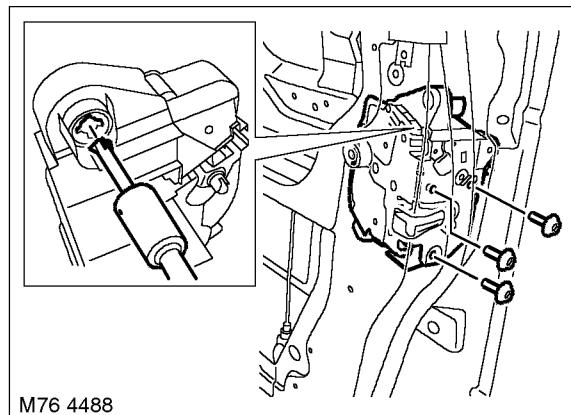
This procedure is also applicable to the rear door latch.

### Remove

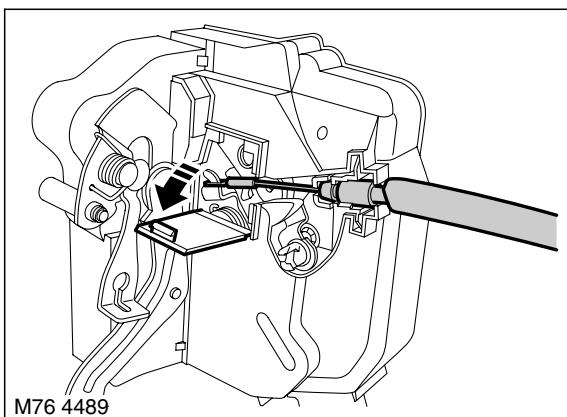
1. Ensure window is fully raised.
2. Remove plastic sheet.
  - ☞ **DOORS, REPAIRS, Plastic sheet - front door.**
  - ☞ **DOORS, REPAIRS, Plastic sheet - rear door.**



3. Release sill button lock rod from door latch.
4. Remove rod.
5. Disconnect multiplug from latch.
6. Disconnect door handle release cable from latch assembly.



7. Remove 3 Torx screws securing latch to door.
8. On drivers door, release door lock barrel paddle from latch.
9. Remove latch from aperture.



10. Remove internal release cable and latch as an assembly.
11. Open security flap on latch.
12. Release interior release cable clamp from latch.
13. Disengage interior release cable from latch.
14. Remove cable.

#### Refit

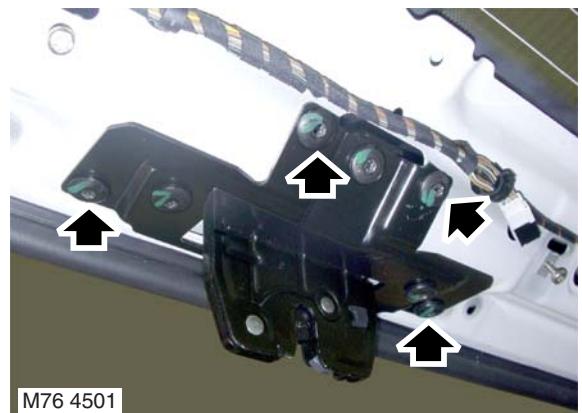
1. Secure interior release cable to latch and close latch security flap.
2. Position latch to door. On drivers door, align lock barrel paddle to latch.
3. Position door latch fit Torx screws and tighten to 10 Nm (7 lbf.ft).
4. Connect outer release cable to latch assembly.
5. Connect multiplug to door latch.
6. Fit sill button lock rod to latch.
7. Check operation of door latch.
8. Fit plastic sheet.
  -  **DOORS, REPAIRS, Plastic sheet - front door.**
  -  **DOORS, REPAIRS, Plastic sheet - rear door.**

## Latch - tailgate

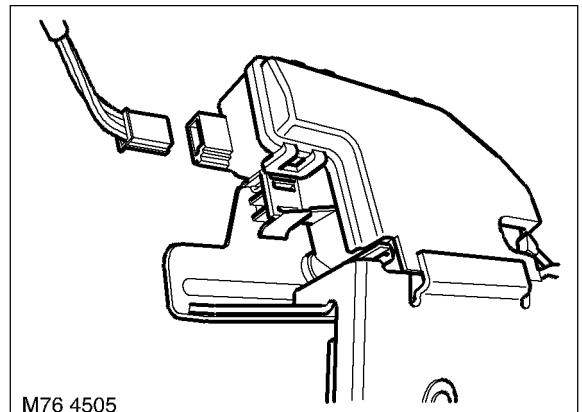
☛ **76.37.17**

#### Remove

1. Remove tailgate trim casing.
  -  **DOORS, REPAIRS, Trim casing - tailgate upper.**



2. Remove 4 Torx bolts securing latch and support bracket to tailgate.



3. Disconnect multiplug from latch.
  4. Remove latch assembly.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
5. Disconnect manual release cable.
  6. Remove 3 Torx bolts securing support bracket to latch. Remove bracket.

# DOORS

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## Refit

1. Position support bracket to latch, fit bolts and tighten to 10 Nm (7 lbf.ft).
2. Connect manual release cable.
3. Position latch assembly to tailgate and connect multiplug.
4. Fit bolts to latch and tighten to 10 Nm (7 lbf.ft).
5. Fit tailgate trim casing.  
 **DOORS, REPAIRS, Trim casing - tailgate upper.**
6. Adjust tailgate striker.  
 **DOORS, ADJUSTMENTS, Tailgate lower - adjust on striker.**

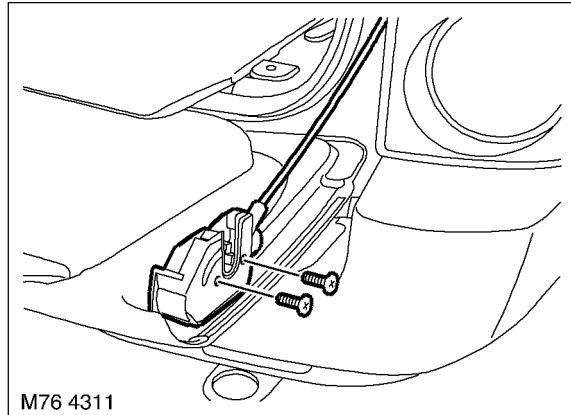
## Latch - outer - tailgate

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☞ **76.37.83**

### Remove

1. Open upper and lower tailgates.



2. Remove 2 Torx screws and latch.

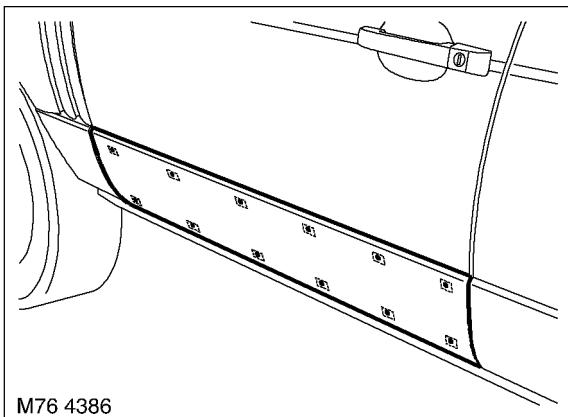
## Refit

1. Align latch assembly, ensure drive is engaged. Fit Torx screws and tighten to 25 Nm (18 lbf.ft).

## Finisher - front door

☛ 76.42.05

### Remove



1. Carefully release 12 clips securing finisher to door.

**CAUTION:** Always protect paintwork when removing or refitting any body trims or bumpers.

2. Remove door finisher.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

3. Remove clips from door finisher.
4. Remove seal from door finisher.

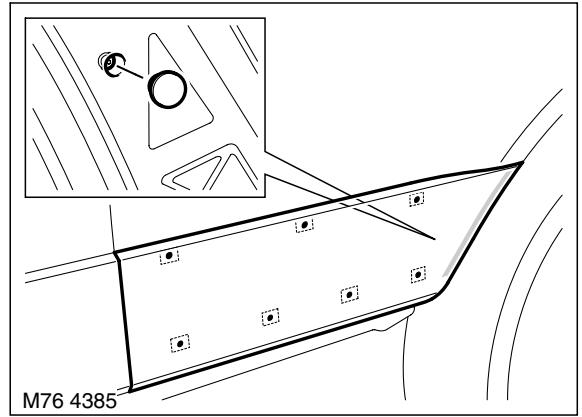
### Refit

1. Fit seal to finisher.
2. Fit clips to door finisher.
3. Fit and secure door finisher.

## Finisher - rear door

☛ 76.42.06

### Remove



1. Open rear door, remove grommet and Torx screw.

**CAUTION:** Always protect paintwork when removing or refitting any body trims or bumpers.

2. Carefully release 7 clips securing door finisher to door, ease and break bonding tape on feather edge.

3. Carefully remove door finisher.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

4. Remove door finisher retaining clips.
5. Remove seal from door finisher.

### Refit

1. Fit seal to finisher.
2. Fit clips to finisher.
3. Clean finisher and door skin, remove all traces of adhesive tape.
4. Position and secure adhesive tape to feather edge of finisher.
5. Remove protective strip from adhesive tape.
6. Fit and secure door finisher.
7. Secure finisher with screw and fit grommet.

# DOORS

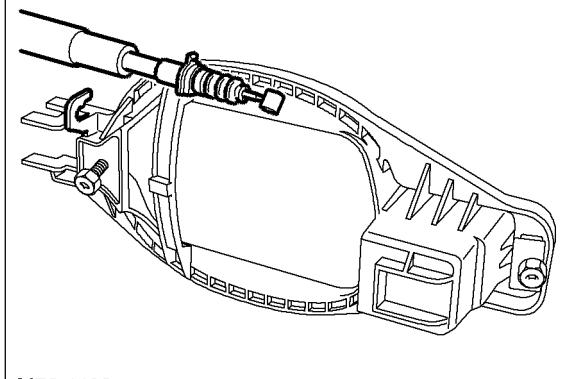
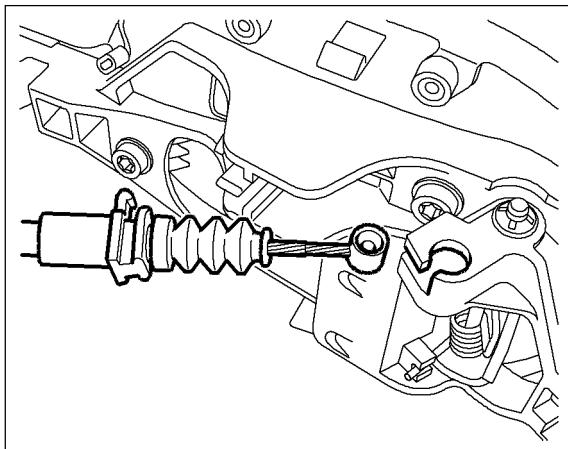
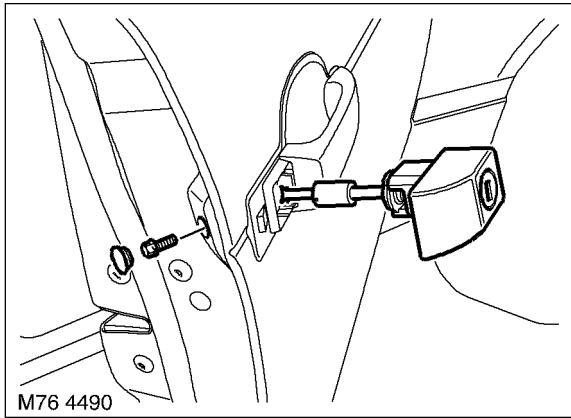
## Handle - outside - front door

→ 76.58.07

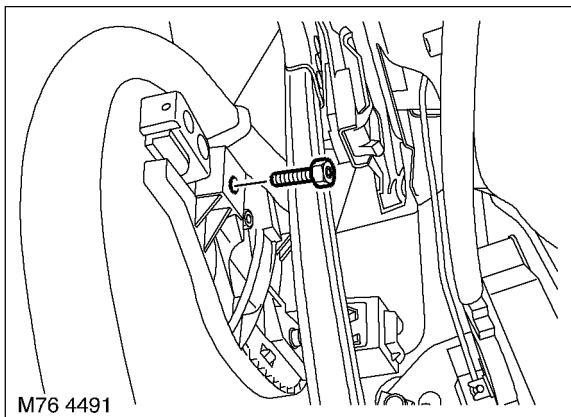
This procedure is also applicable to the rear door handle.

### Remove

1. Remove plastic sheet.  
☞ DOORS, REPAIRS, Plastic sheet - front door.  
☞ DOORS, REPAIRS, Plastic sheet - rear door.



2. Drivers door: Remove grommet for access to lock retaining screw.
3. Drivers door: Remove Torx screw securing lock and remove lock assembly.



4. Remove Torx screw securing door handle assembly.
5. Release handle assembly from door.

6. Disconnect release cable from handle assembly.
7. Remove door handle.
8. Release cable from clip and collect reinforcement.

### Refit

1. Connect latch release cable to door handle.
2. Position inner reinforcement to door.
3. Locate cable to inner reinforcement and secure in clip.
4. Position handle to door align and lightly tighten securing screw.
5. Drivers door: Position door lock, fit and lightly tighten Torx screw.
6. Check alignment and tighten Torx bolts to 10 Nm (7 lbf.ft).
7. Check operation of handle and lock.
8. Fit grommet to door.
9. Fit plastic sheet.

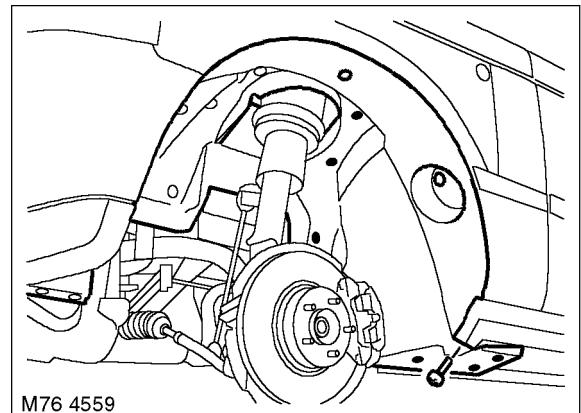
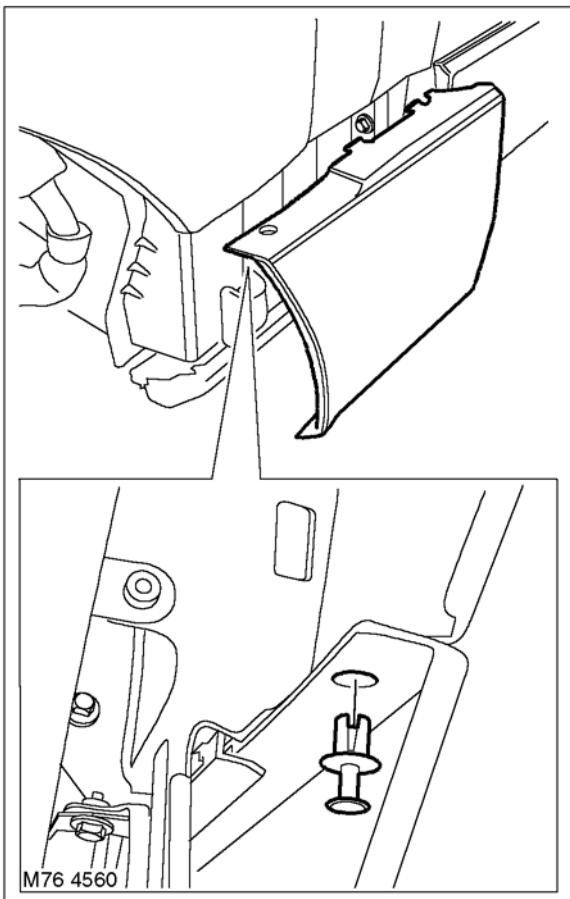
☞ DOORS, REPAIRS, Plastic sheet - front door.

☞ DOORS, REPAIRS, Plastic sheet - rear door.

## Panel - extension - front wing

» **76.10.03**

### Remove



2. Remove screivet securing front wing extension panel to lower wing.
3. Release and remove the lower front wing extension from retaining clips.
4. Release and remove the sill seal from the front wing extension panel.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
5. Remove 2 securing clips from the front wing extension.

### Refit

1. Fit clips to front wing extension.
2. Fit and secure sill seal to front wing extension.
3. Fit front wing extension and secure with clips.
4. Fit and secure screivet to front wing extension.
5. Fit and secure wheelarch liner.

1. Remove 9 screws securing rear of wheelarch liner to inner wing and sill, release liner from wing for access.

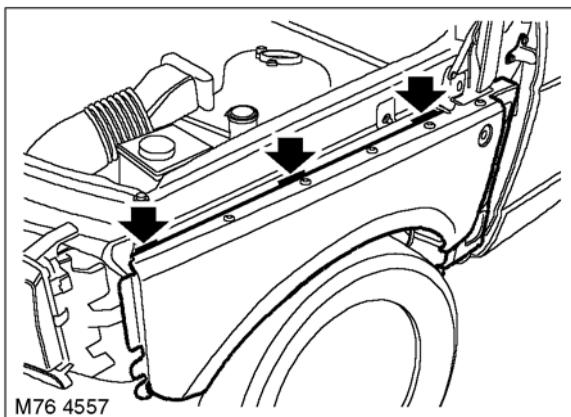
## EXTERIOR FITTINGS

### Wing - front

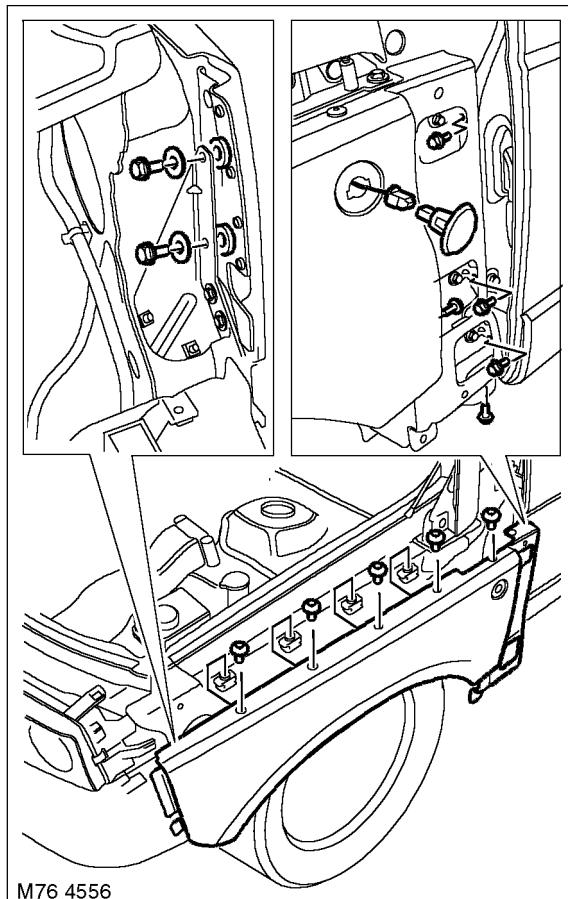
→ 76.10.24

#### Remove

1. Secure bonnet in service position.
2. Remove front wing grille.
3. Remove front indicator lamp assembly.  
☞ **LIGHTING, REPAIRS, Lamp assembly - side & indicator.**



4. Mark fitted position of front wing relative to body.



5. Remove 8 bolts securing front wing panel to inner wing and 'A' post.
6. Collect 2 nylon spacers from the front vertical mountings.
7. Remove side repeater lamp from front wing.  
☞ **LIGHTING, REPAIRS, Lamp assembly - indicator side repeater.**
8. Remove and discard 5 Torx bolts securing front wing panel to inner wing mounting brackets.
9. Remove front wing panel.

#### Refit

1. Clean front wing body mounting brackets.
2. Position front wing to body, fit and finger tighten new Torx bolts.
3. Position front wing nylon spacers to vertical mounting bracket, fit and finger tighten bolts.
4. Fit and lightly tighten remaining bolts.
5. Align front wing to marks and tighten all bolts to 10 Nm (7 lbf.ft).
6. Fit front wing grille.
7. Fit front indicator lamp assembly.  
☞ **LIGHTING, REPAIRS, Lamp assembly - side & indicator.**

8. Fit side repeater lamp to front wing.  
 **LIGHTING, REPAIRS, Lamp assembly - indicator side repeater.**
9. Secure bonnet struts.

## Liner - front wheel arch

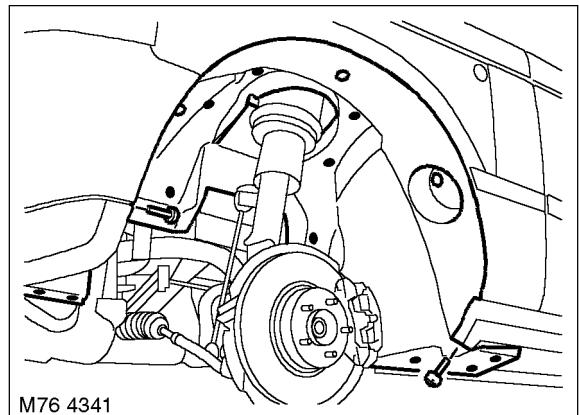
» **76.10.48**

### Remove

1. Raise front of vehicle.

**WARNING:** *Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.*

2. Remove road wheel.



3. Remove 3 plastic nuts securing inner wheel arch liner.
4. Remove 11 hexagonal headed screws securing wheel arch liner.
5. Remove 2 screws securing front and rear edge of wheel arch liner to sill and bumper extension.
6. Release and remove wheel arch liner.

### Refit

1. Fit wheel arch liner.
2. Fit and secure plastic nuts to studs.
3. Fit and tighten screws securing wheel arch liner to wing and bumper.
4. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
5. Remove stand and lower vehicle.

## EXTERIOR FITTINGS

### Liner - rear wheel arch - single

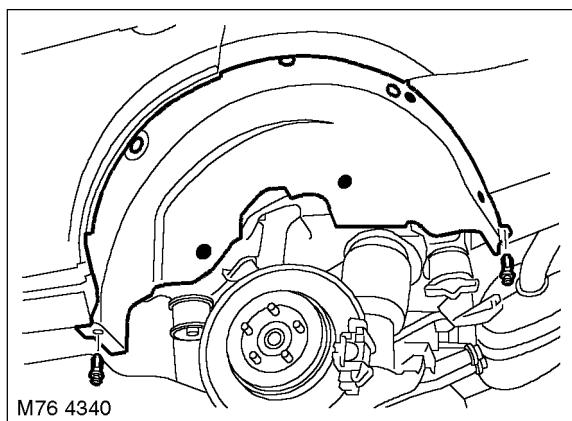
☞ 76.10.49

#### Remove

1. Raise rear of vehicle.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

2. Remove road wheel.



3. Remove 2 scrivets securing wheel arch liner to sill and bumper.
4. Remove 3 plastic nuts securing inner wheel arch liner.
5. Remove 4 hexagonal headed screws securing wheel arch liner.
6. Release and remove wheel arch liner.

#### Refit

1. Position wheel arch liner to inner wing.
2. Fit and secure plastic nuts to studs.
3. Fit and tighten screws securing wheel arch liner to wing and bumper.
4. Fit and secure scrivets.
5. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
6. Remove stands and lower vehicle.

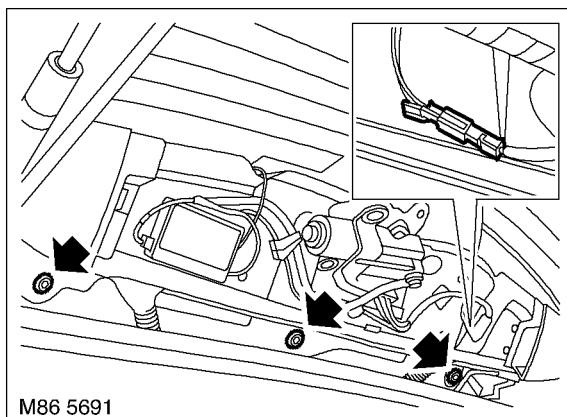
### Spoiler - tailgate

☞ 76.10.91

#### Remove

1. Remove upper tailgate finisher.

DOORS, REPAIRS, Trim finisher - tailgate - upper.



2. Remove 3 bolts securing spoiler to tailgate.
3. Disconnect multiplug from harness.
4. Close upper tailgate.
5. Slide spoiler rearward and release from clips. Release Central High Mounted Stop Light (CHMSL) harness from tailgate and remove spoiler.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
6. Remove 4 screws securing CHMSL to spoiler, release harness from spoiler and remove lamp.

#### Refit

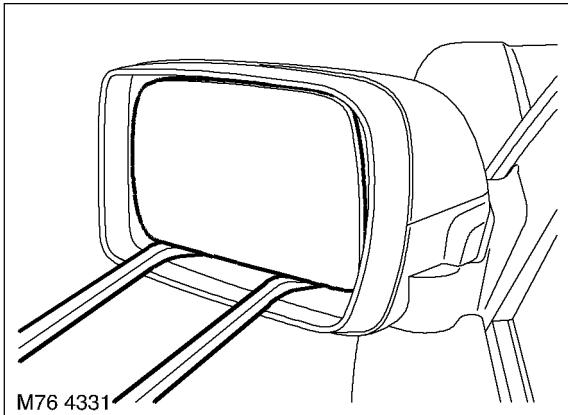
1. Position CHMSL and harness to spoiler, secure with screws.
2. Fit and secure spoiler to tailgate, tighten bolts to 10 Nm (7 lbf.ft).
3. Open upper tailgate.
4. Connect multiplug.
5. Fit upper tailgate finisher.  
 DOORS, REPAIRS, Trim finisher - tailgate - upper.

## Mirror glass - exterior

☛ 76.11.08

### Remove

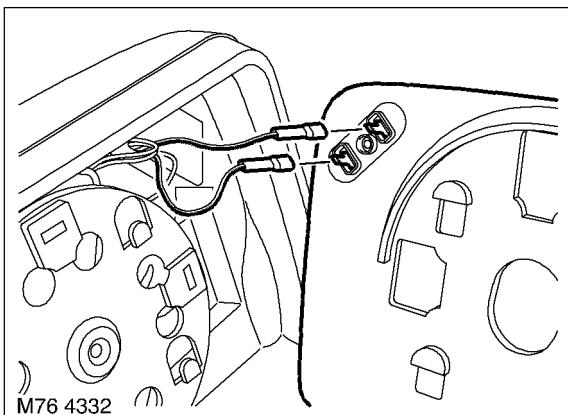
1. Using fingers, gently press lower edge of mirror glass inboard to maximum rotation.



2. Position 2 levers to lower edge of mirror glass surround, apply vertical leverage.

**WARNING:** Wear suitable eye protection when removing and refitting glass.

3. Continue to apply an even but constant pressure, until glass releases from mounting.



4. Disconnect 2 Lucas connections from Mirror glass and remove.

### Refit

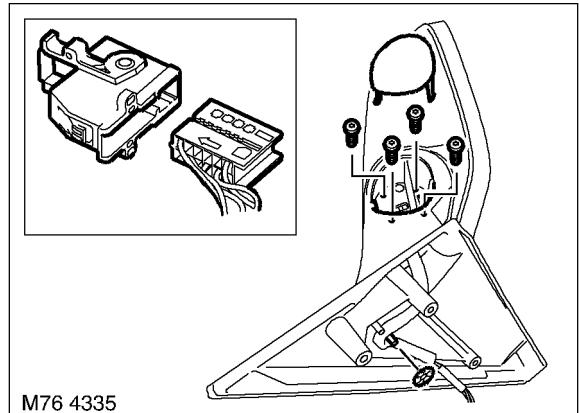
1. Connect Lucars to mirror glass.
2. Position mirror glass to mounting, align 4 location pins to motor and secure clips.
3. Check operation of mirror.

## Motor - exterior mirror

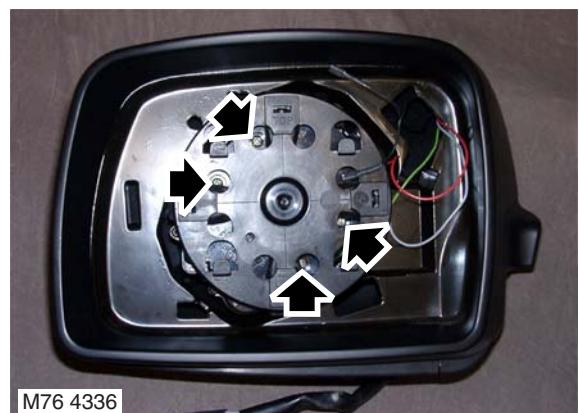
☛ 76.11.09

### Remove

1. Remove exterior mirror glass.  
 **EXTERIOR FITTINGS, REPAIRS, Mirror glass - exterior.**
2. Remove exterior mirror.  
 **EXTERIOR FITTINGS, REPAIRS, Mirror - exterior.**



3. Remove access cover from mirror.
4. Remove 4 Torx screws securing mirror assembly to cheater casting.
5. Remove star washer securing mirror harness to cheater plate.
6. Remove locking body from multiplug.



7. Remove 4 screws securing mirror motor to assembly, withdraw harness and remove motor.

# EXTERIOR FITTINGS

## Refit

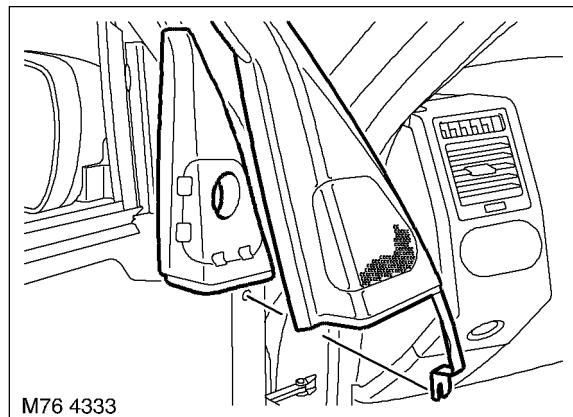
1. Fit harness, position motor and secure with screws.
2. Feed harness through cheater casting, fit Torx screws and tighten to 14 Nm (10 lbf.ft).
3. Fit and secure access cover.
4. Align harness and secure with star washer.
5. Fit locking body to multiplug.
6. Fit exterior mirror.  
 **EXTERIOR FITTINGS, REPAIRS,  
Mirror - exterior.**
7. Fit exterior mirror glass.  
 **EXTERIOR FITTINGS, REPAIRS,  
Mirror - exterior.**

## Mirror - exterior

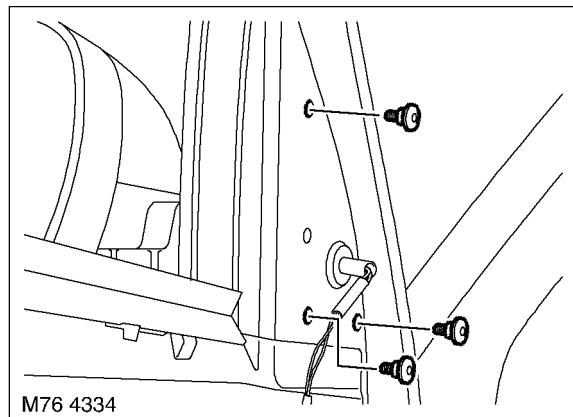
### 76.11.10

#### Remove

1. Remove front door trim casing.  
 **DOORS, REPAIRS, Trim casing -  
front door.**



2. Release lower edge of door trim finisher from clip, move aside. Remove foam moulding and release harness.



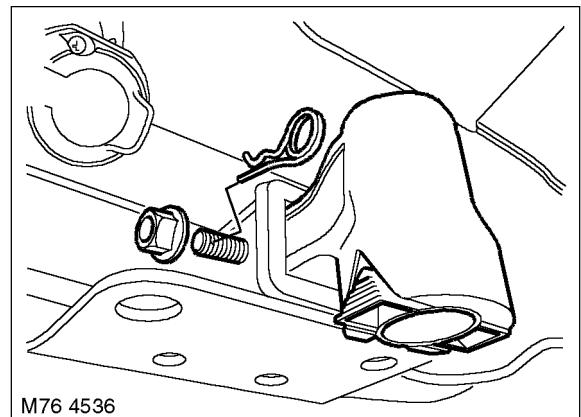
3. Remove 3 Torx screws securing exterior mirror to door, withdraw harness and remove mirror assembly.
4. Remove foam pad from cheater panel.

**Refit**

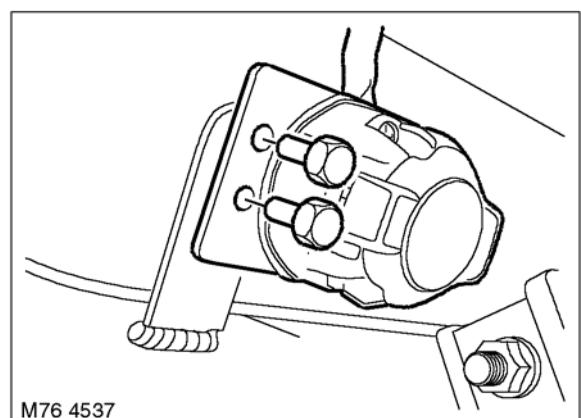
1. Fit foam pad to cheater panel.
2. Feed mirror harness through panel, position mirror, fit and tighten Torx screws to 10 Nm (7 lbf.ft).
3. Fit and secure upper door trim finisher.
4. Fit front door trim casing.  
 **DOORS, REPAIRS, Trim casing - front door.**

**Tow bar** 76.11.41**Remove**

1. Remove bumper armature.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper armature - rear.**

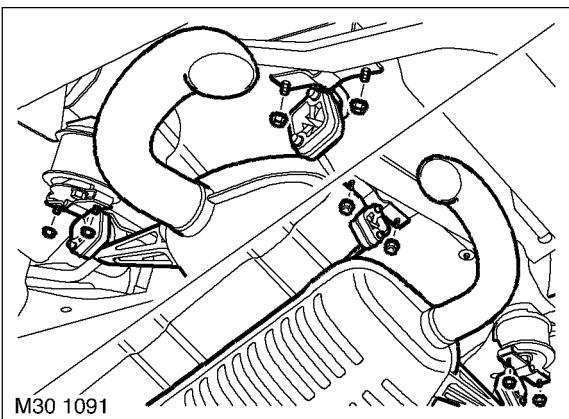


2. Remove tow ball locking pin.
3. Remove nut and bolt securing tow ball to tow bar. Remove the tow ball.

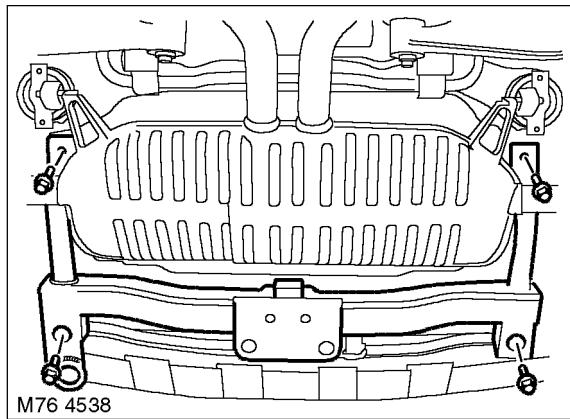


4. Remove 2 bolts securing socket to tow bar and position the socket aside.

## EXTERIOR FITTINGS



5. Remove 4 nuts securing exhaust rubber mountings to the rear subframe.
6. Support exhaust and remove 4 nuts securing exhaust rubber mountings to the tow bar.



7. Lower exhaust sufficiently to allow access to tow bar retaining bolts.
8. Remove 4 bolts securing tow bar to body and with assistance remove the tow bar.

### Refit

1. With assistance position tow bar to body, fit bolts and tighten to 165 Nm ( 122 lbf.ft).
2. Position socket to tow bar, fit bolts and tighten to 25 Nm (18 lbf.ft).
3. Position exhaust to mountings, fit nuts and tighten to 25 Nm ( 18 lbf.ft).
4. Fit tow ball to tow bar. Fit nut and bolt and tighten to 300 Nm (224 lbf.ft).
5. Fit tow ball locking pin.
6. Fit bumper armature.

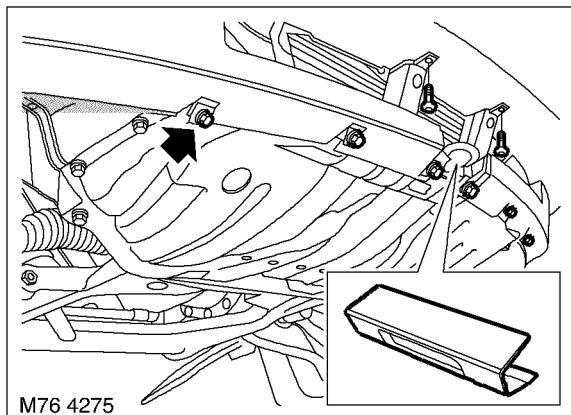
 EXTERIOR FITTINGS, REPAIRS,  
Bumper armature - rear.

### Undertray - front

#### 76.11.81

##### Remove

1. Raise vehicle on lift.



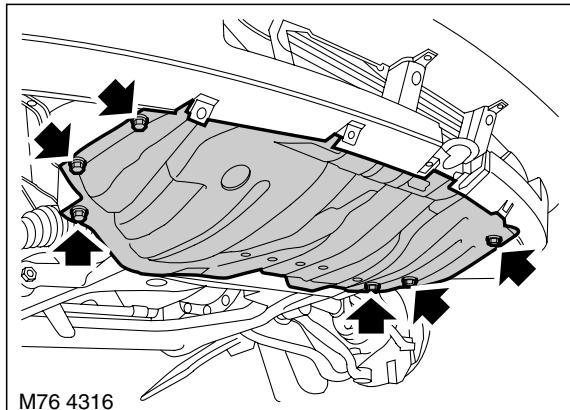
2. Release clips and remove towing eye finisher.
3. Remove 6 screws securing air dam to undertray.
4. Remove 2 screws securing air dam support brackets to bumper.



5. Carefully ease air dam aside for access and remove 4 screws.



- Remove 2 screws securing LH inner edge of wheel arch liner to undertray, repeat on RH side.



- Remove 6 remaining screws securing undertray, release panel and remove.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
- Remove 6 screw retaining clips from undertray.

#### Refit

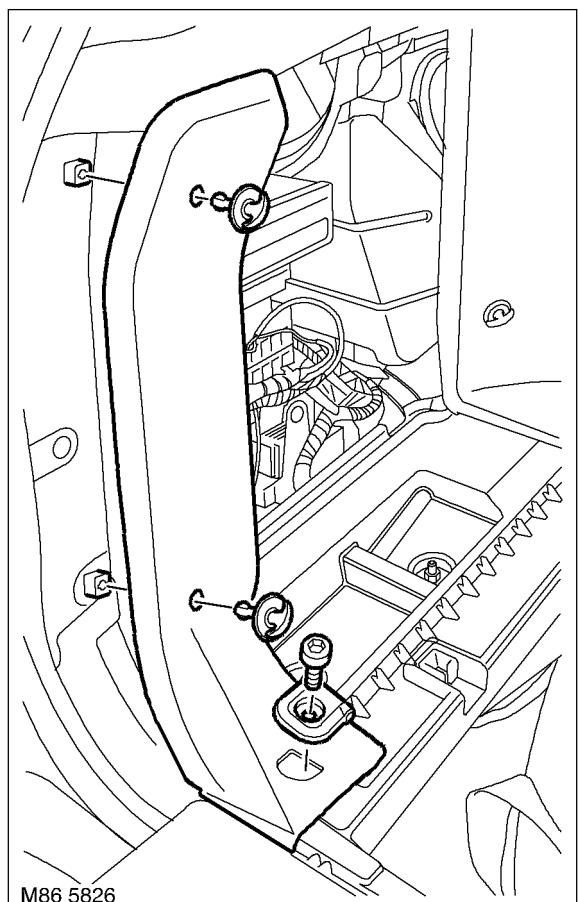
- Fit screw retaining clips to undertray.
- Position undertray and secure with screws.
- Fit screws securing air dam and wheelarch liners.
- Fit and secure towing eye finisher.

## Bumper armature - rear

☛ 76.22.52

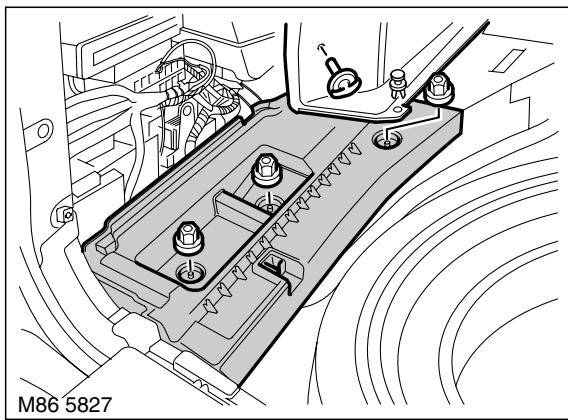
#### Remove

- Open both tailgates, release and fold back parcel shelf.
- Remove rear bumper.  
☛ EXTERIOR FITTINGS, REPAIRS, Bumper - rear.
- Raise spare wheel cover and support on stand.
- Release and remove both LH and RH access panels.

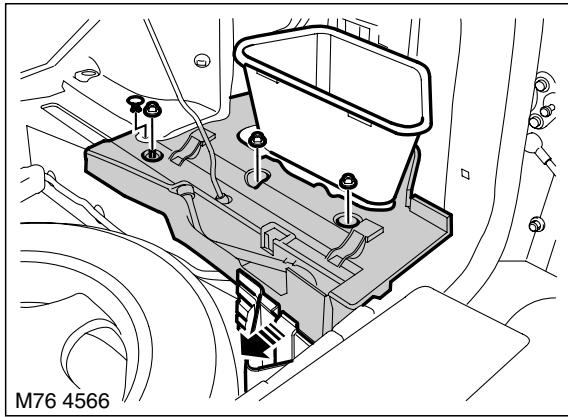


- Remove Allen bolts securing LH and RH luggage securing rings, remove rings.
- Remove 2 turn buckles securing rear quarter trim on LH and RH side of vehicle, remove trim.
- Locate straps and remove both LH and RH loadspace bin covers.

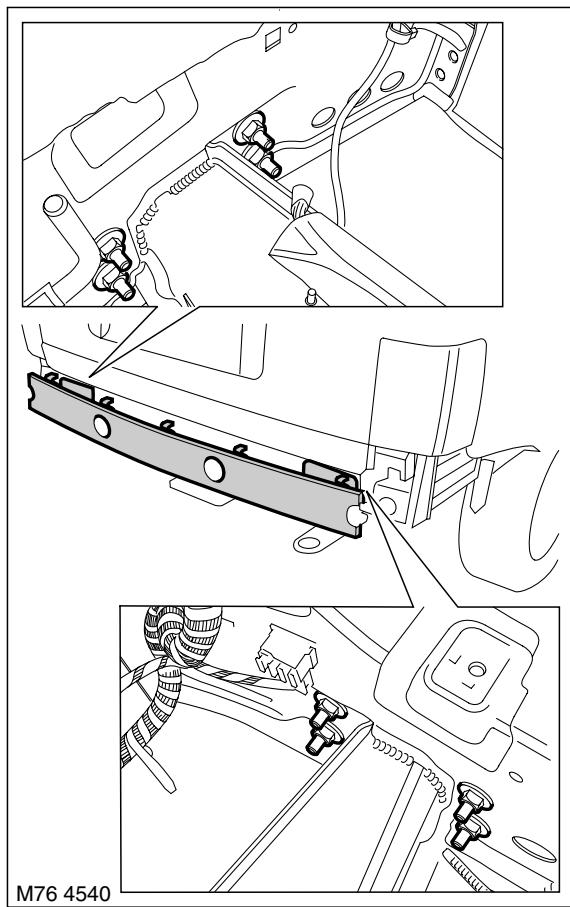
## EXTERIOR FITTINGS



8. Remove stud and turn buckle securing lower rear quarter trim on LH and RH side of vehicle.
9. Remove warning triangle.



10. Release clip and remove wheel chock and tool roll.
11. Remove RH bin from loadspace carrier.
12. Remove 3 plastic nuts and release 2 studs securing RH bin carrier, remove carrier.
13. Remove 3 plastic nuts securing LH carrier and remove carrier.



14. Remove 8 nuts securing rear armature and remove.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

15. Release 8 clips from armature

### Refit

1. Fit 8 clips to armature.
2. Position armature fit and tighten nuts to (45 Nm 33 lbf.ft).
3. Position LH carrier and secure with plastic nuts.
4. Position RH bin carrier and secure 2 studs and 3 plastic nuts.
5. Fit bin to loadspace carrier.
6. Fit wheel chock and tool roll.
7. Fit and secure warning triangle.
8. Fit rear quarter trim to LH and RH side, secure with turn buckles.
9. Position luggage space securing ring to body, locate peg. Fit and tighten bolt to 25 Nm (18 lbf.ft).
10. Position and fit cover.
11. Fit LH and RH rear quarter trim access panels.
12. Close spare wheel access cover and fit parcel shelf.



13. Fit rear bumper.

EXTERIOR FITTINGS, REPAIRS,  
Bumper - rear.

14. Close both tail gates.

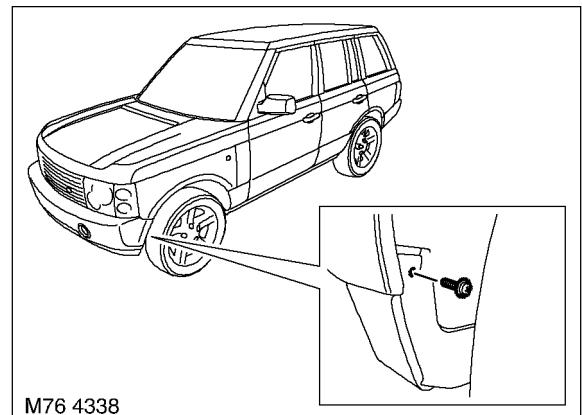
## Bumper - assembly - front

76.22.72

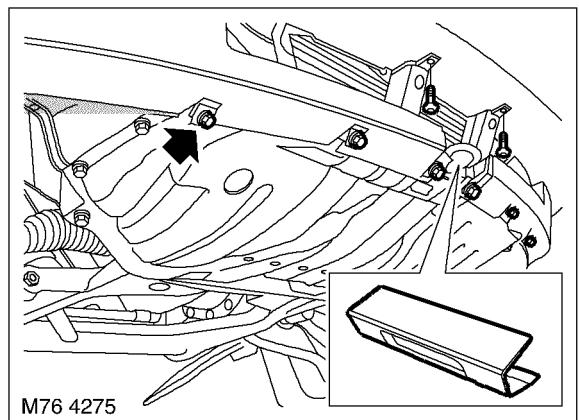
### Remove

1. Remove front grille.

EXTERIOR FITTINGS, REPAIRS,  
Front grille.

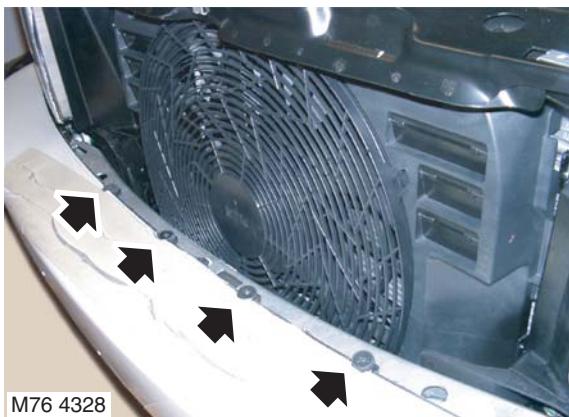


2. Remove screw securing wheel arch liner to bumper, repeat procedure on opposite side.

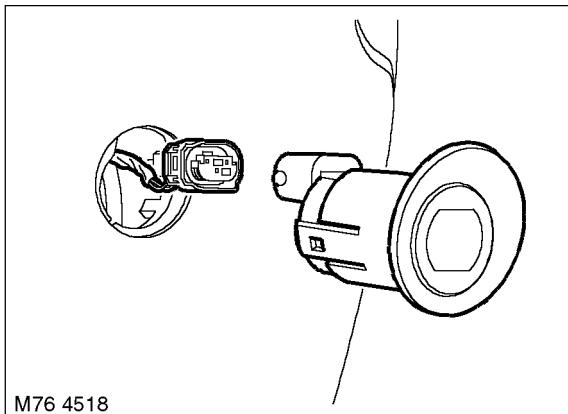


3. Release clips and remove towing eye finisher.
4. Remove 6 screws securing bumper valance to undertray.
5. Remove 2 screws securing bumper to armature.

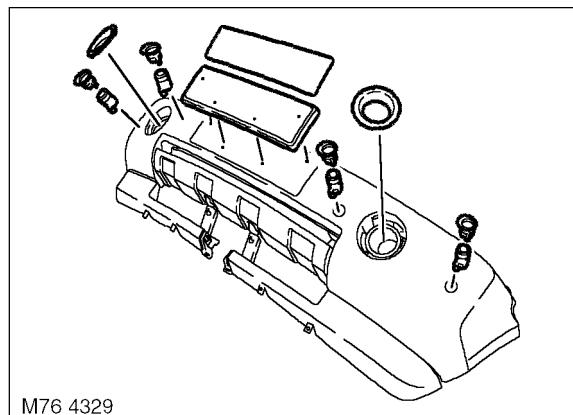
## EXTERIOR FITTINGS



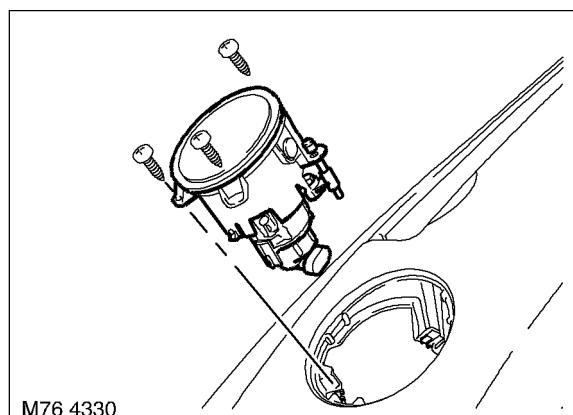
6. Remove 4 screws securing bumper to armature extension.
7. With assistance carefully lift and pull forward each side of bumper to release bumper side mounts and clips.  
**CAUTION: Always protect paintwork when removing or refitting any body trims or bumpers.**
8. Disconnect multiplugs from fog lamps.



9. **Vehicles fitted with parking sensors:**  
Disconnect 4 multiplugs.
10. Remove front bumper.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*



11. Remove front number plate.
12. Remove 4 screws securing number plate mounting to bumper and collect mounting.
13. Remove both spot lamp finishers from bumper.
14. Remove parking sensors from bumper, release clips and remove finishers from sensors.



15. Remove 3 screws securing RH spot lamp to bumper. Repeat operation and remove LH spot lamp.
16. Remove 2 screws securing bumper extensions, release clips and remove extensions.

### Refit

1. Fit parking sensors to finishers, align sensors to bumper and secure clips.
2. Fit bumper extensions and secure with screws.
3. Fit and secure spot lamps and finishers.
4. Fit number plate mounting to bumper and secure with screws.
5. Fit number plate.
6. With assistance position bumper to body.
7. **Vehicles fitted with parking sensors:**  
Connect multiplugs.
8. Connect multiplugs to spotlamps.
9. With assistance, fit bumper assembly to body.



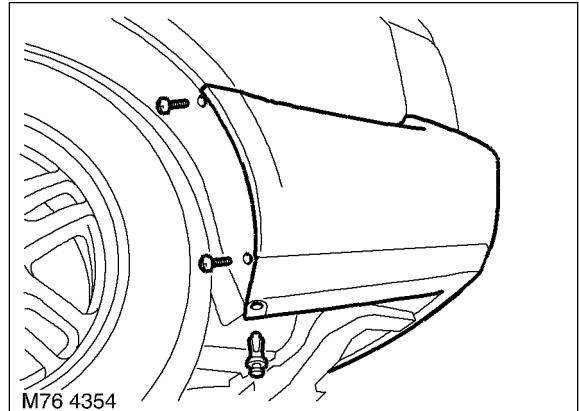
10. Ensure bumper locating pegs are correctly aligned.
11. Fit and tighten screws securing bumper to bumper armature and undertray.
12. Fit and tighten screws securing wheel arch liners to bumper valance and undertray.
13. Fit and secure towing eye finisher.
14. Fit front grille.

EXTERIOR FITTINGS, REPAIRS,  
Front grille.

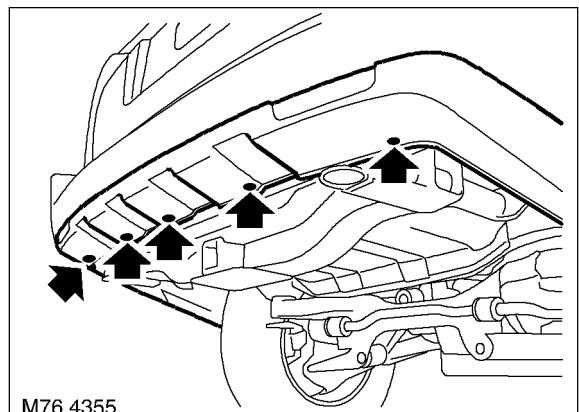
## Bumper - rear

☞ 76.22.74

### Remove

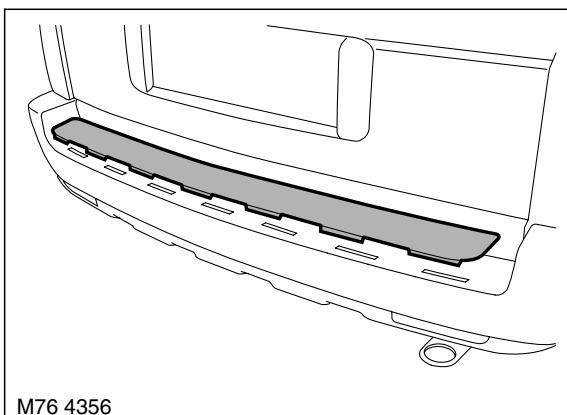


1. Remove 2 scrivets and 4 screws securing wheel arch liner to rear bumper.

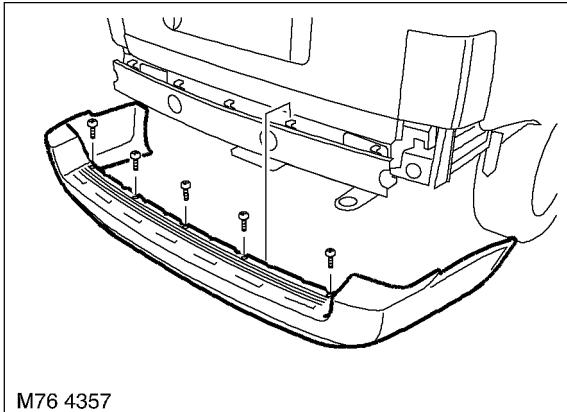


2. Remove 5 screws securing bumper apron to armature.

## EXTERIOR FITTINGS



3. Carefully release 7 clips securing rear bumper finisher, open lower tailgate and remove finisher.



4. Remove 5 screws securing top edge of bumper to armature.
5. Depress 6 clips securing bumper to rear wings and with assistance remove bumper from vehicle.

**CAUTION: Always protect paintwork when removing or refitting any body trims or bumpers.**

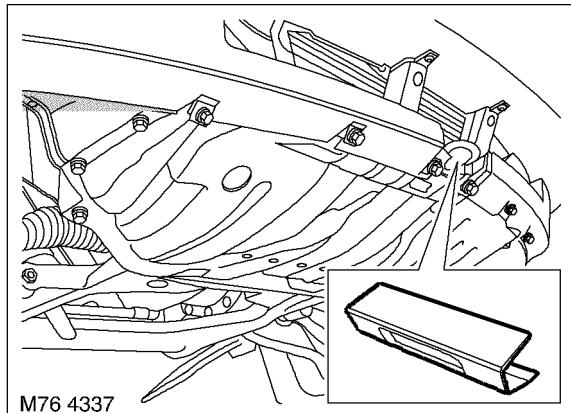
### Refit

1. With assistance position bumper to body.
2. Fit and finger tighten screws securing top edge of bumper to armature.
3. Align bumper sides to rear wings and secure in clips.
4. Fit and tighten bumper apron screws, tighten screws securing top edge of bumper to armature.
5. Position wheel arch liners, secure with screws and scrivets .
6. Fit and secure finisher to bumper.

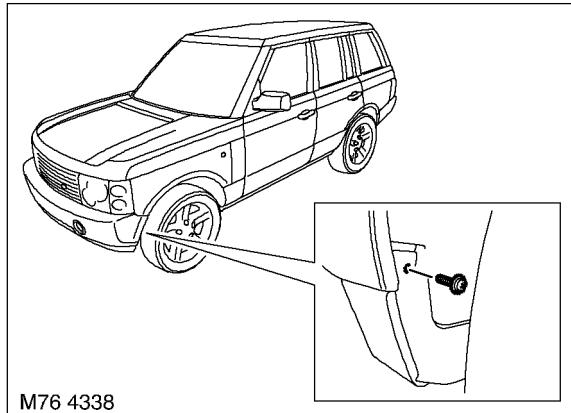
## Extension - spoiler - front bumper

» 76.22.78

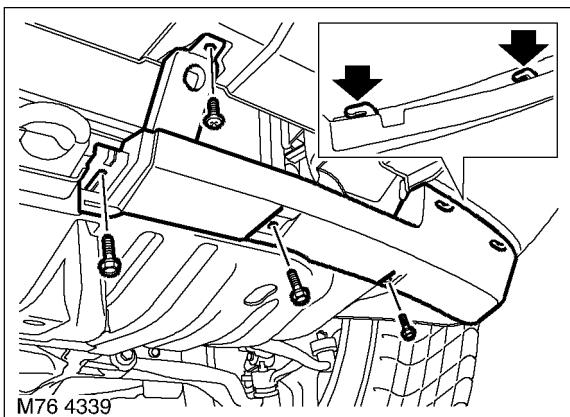
### Remove



1. Release clips and remove towing eye finisher.



2. Remove screw securing bumper extension to wheel arch liner.



3. Remove 3 screws securing bumper extension to undertray.
4. Remove screw securing extension to bumper.
5. Release extension from wheel arch liner, release clips and remove from bumper.

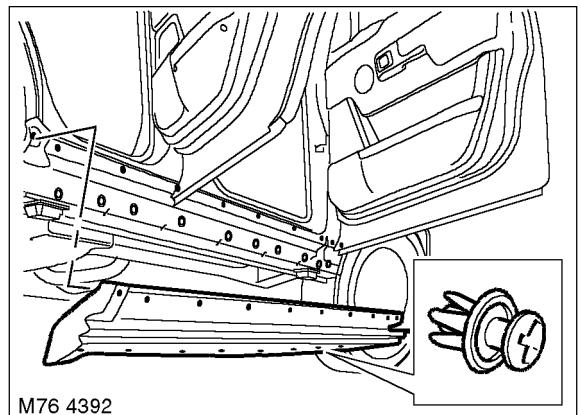
#### Refit

1. Fit screws and secure bumper extension to front bumper.
2. Fit and tighten screw securing bumper extension to wheel arch liner.
3. Fit and secure towing eye finisher.

#### Finisher - sill

☛ 76.43.28

#### Remove



1. Remove 8 scrivets from underside of sill finisher.
2. Carefully release 10 clips securing finisher to sill. Remove sill finisher.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
3. Remove clips from sill finisher.

#### Refit

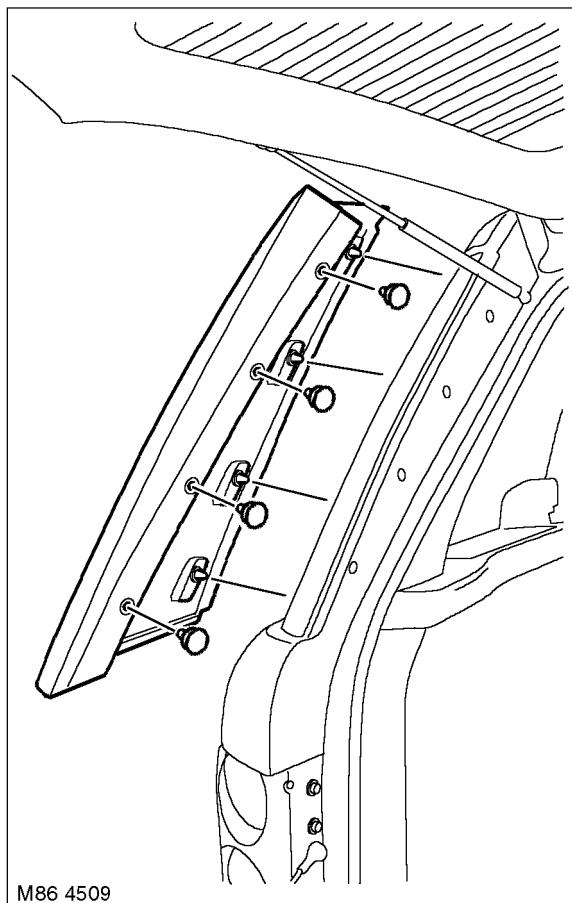
1. Fit clips to sill finisher.
2. Fit and secure finisher to sill clips.
3. Fit scrivets to sill finisher.

## EXTERIOR FITTINGS

### Finisher - 'E' post

☛ 76.43.36

#### Remove



1. Remove 4 studs securing finisher to 'E' post.
2. Release 4 clips and remove finisher.
3. Remove and discard fixings from finisher.
4. Remove and discard fixing retaining sacks from 'E' post.

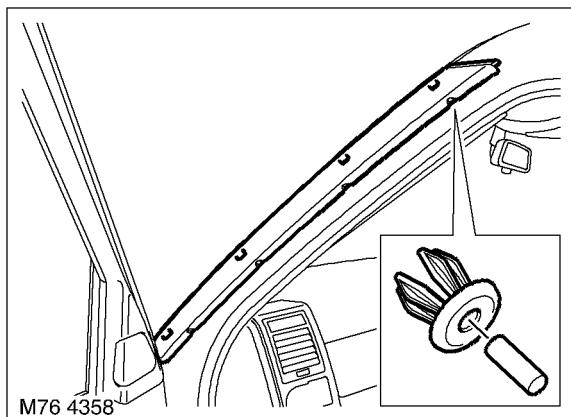
#### Refit

1. Fit new fixing retaining sacks to 'E' post.
2. Fit new fixings to finisher.
3. Fit finisher, secure with clips and studs.

### Side finisher - windscreen

☛ 76.43.39

#### Remove



1. Remove 4 scrivets securing finisher to 'A' post.
2. Release 4 fixings and remove finisher.
3. Remove and discard fixings from finisher.
4. Remove and discard fixing retaining sacks from 'A' post.

#### Refit

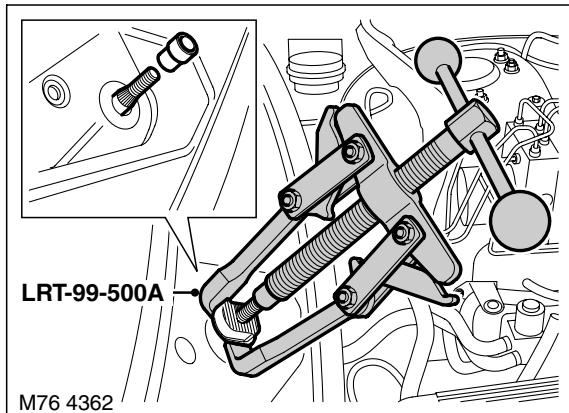
1. Fit new fixing retaining sacks to 'A' post.
2. Fit new fixings to finisher.
3. Fit finisher and secure fixings.
4. Fit and secure scrivets.

## Lower finisher - windscreen

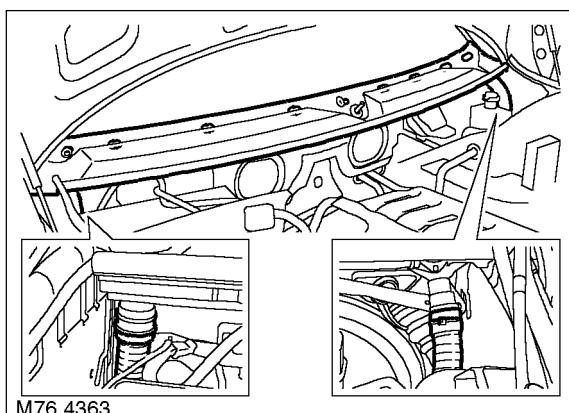
☛ 76.43.41

### Remove

1. Remove RH windscreen side finisher.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Side finisher - windscreen.**
2. Remove both wiper arms.  
☞ **WIPERS AND WASHERS, REPAIRS,  
Arm - wiper - front screen.**



3. Using **LRT-99-500A** remove aluminium boss from both wiper spindles and discard.
4. Remove plastic inserts from both wiper spindles.



5. Release both drain tubes from underside of finisher.
6. Release clips and carefully position finisher away from wiper spindles.
7. Slide lower windscreen finisher away from LH side finisher and remove.

### Refit

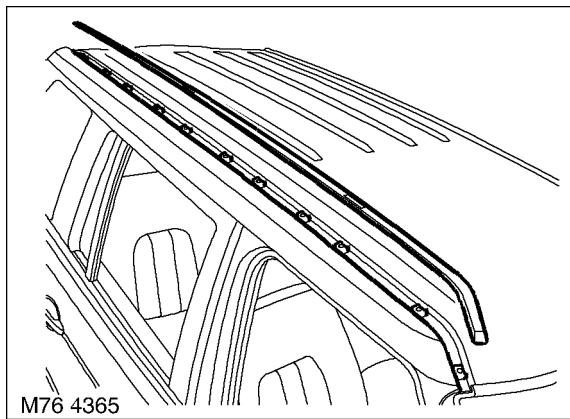
1. Position lower finisher beneath LH side finisher and secure with clips.
2. Fit both drain tubes to finisher.
3. Position plastic inserts to wiper spindles.
4. Fit new aluminium boss to both wiper spindles.
5. Fit wiper arms.  
☞ **WIPERS AND WASHERS, REPAIRS,  
Arm - wiper - front screen.**
6. Fit RH windscreen side finisher.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Side finisher - windscreen.**

## EXTERIOR FITTINGS

### Roof moulding

☛ 76.43.68

#### Remove



1. Carefully raise the front edge of moulding, release from 11 clips and remove moulding.
2. Remove 11 clips from roof panel.

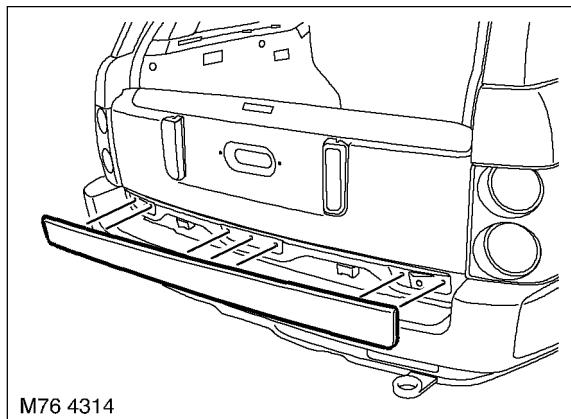
#### Refit

1. Clean roof channel.
2. Fit clips to roof panel.
3. Fit moulding and secure to clips.

### Finisher - tailgate - lower

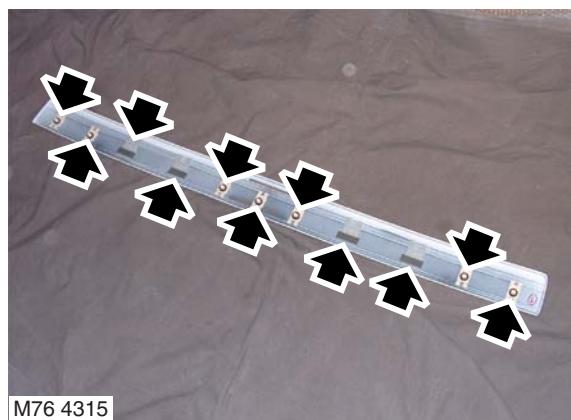
☛ 76.43.99

#### Remove



1. Carefully release 7 clips securing tailgate finisher to body. Remove finisher.  
**CAUTION: Always protect paintwork and glass when removing trim finishers.**

*NOTE: Do not carry out further dismantling if component is removed for access only.*



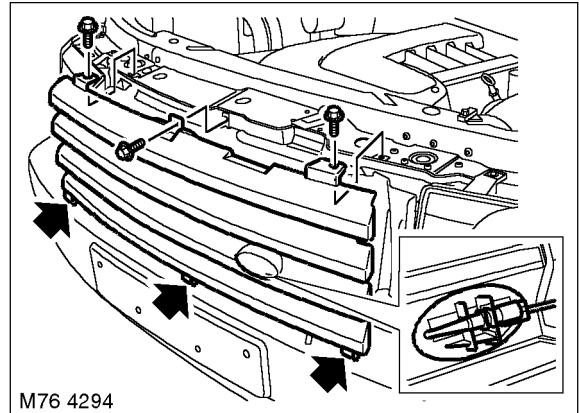
2. Remove 7 clips from tailgate finisher.
3. Noting fitted position remove and discard 4 adhesive backed clips from finisher.

**Refit**

1. Fit adhesive clips to finisher, note fitted position.
2. Fit retaining clips to finisher.
3. Clean tailgate, remove remaining adhesive residue.
4. Remove protective covering from adhesive pads, align finisher to tailgate and secure clips. Ensure adhesive pads are pressed into position.

**Front grille**

☛ **76.55.03**

**Remove**

1. Remove 3 screws securing grille to bonnet locking platform.
  2. Release 3 clips securing grille to armature.
  3. Disconnect multiplug from ambient air temperature (AAT) sensor.
  4. Remove grille.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
5. Release and remove AAT sensor from grille.

**Refit**

1. Fit AAT sensor to grille.
2. Connect multiplug.
3. Fit grille and secure with screws.

## **EXTERIOR FITTINGS**

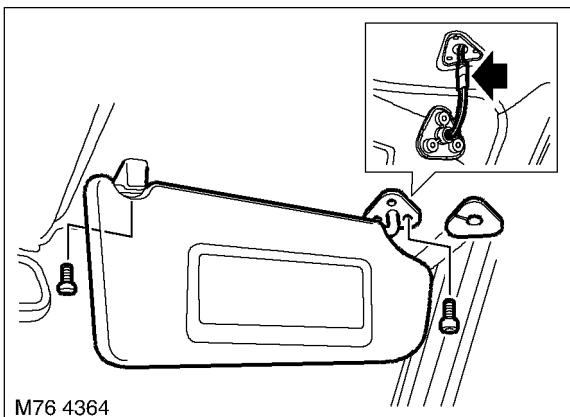
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## Sun visor

☛ 76.10.47

### Remove

- Release sun visor from retaining clip.



- Carefully release and remove trim from mounting.
- Remove 3 Torx screws securing visor.
- Disconnect multiplug and remove visor.
- Remove screw securing sun visor clip to roof and remove clip.

### Refit

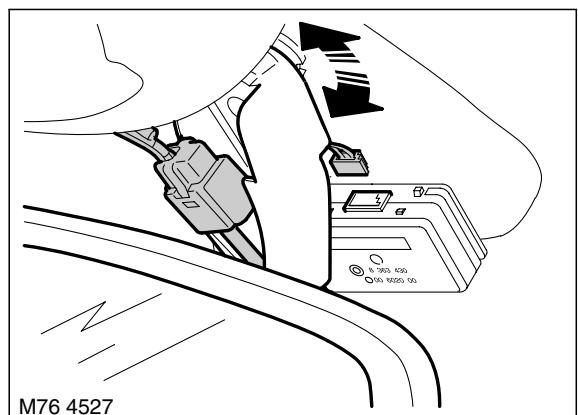
- Fit sun visor clip and secure with screw.
- Position sun visor and connect multiplug.
- Fit sun visor to roof and secure with screws.
- Fit sun visor to clip.
- Fit trim to mounting.

## Mirror - interior

☛ 76.10.51

### Remove

- Release and remove mirror finishers.
- Rotate mirror stem at its base to release from windscreen.



- Models fitted with rain sensor:** Disconnect multiplug from rain sensor.
- Disconnect multiplug from mirror and remove the mirror.

### Refit

- Position mirror and connect multiplug.
- Models fitted with rain sensor:** Connect multiplug to rain sensor.
- Fit mirror to location and rotate to secure.
- Fit and secure mirror finishers.

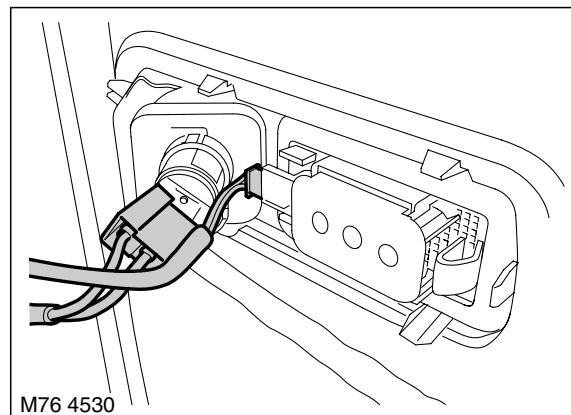
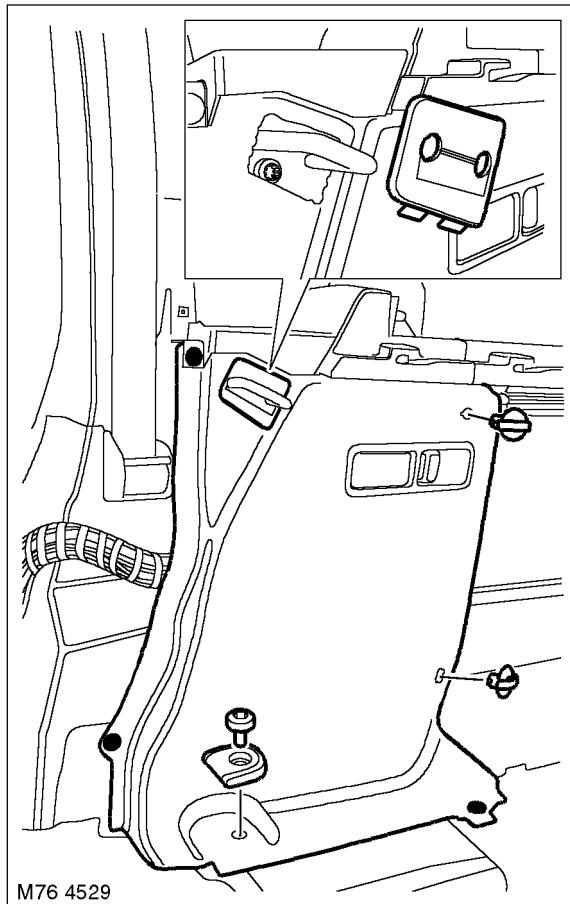
# INTERIOR FITTINGS

## Trim casing - rear quarter - lower

☛ 76.13.12

### Remove

1. Release 'D' post upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - upper.**
2. Remove 'D' post lower trim.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - lower.**



8. Disconnect multiplugs from interior light and accessory power socket.
9. Remove quarter trim.

### Refit

1. Position trim casing and connect multiplugs.
2. Fit scrivets and turn buckles to secure trim.
3. Fit access panel.
4. Fit seat anchor escutcheon.
5. Position luggage space securing ring to body, locate peg. Fit and tighten bolt to 25 Nm (18 lbf.ft).
6. Fit 'D' post lower trim.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - lower.**
7. Fit 'D' post upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - upper.**

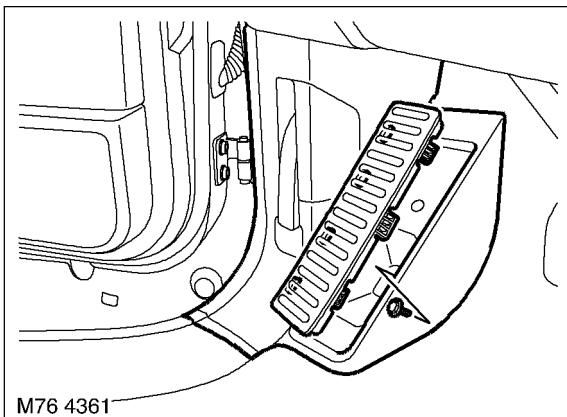
3. Remove Allen screw securing load space securing ring to load space floor, release and remove securing ring assembly.
4. Release and remove seat anchor escutcheon
5. Remove access panel.
6. Release 2 turn buckles.
7. Remove 3 scrivets and release trim casing.

## Foot rest finisher - LHD

☞ 76.13.24

### Remove

1. Remove carpet retainer.
-  **INTERIOR FITTINGS, REPAIRS,  
Retainer - front carpet.**



2. Release 4 clips securing inner edge of footrest pad to finisher, roll pad clockwise and remove.
3. Remove bolt securing footrest finisher to body.
4. Lift bonnet lock release handle and withdraw finisher from clips. Pull horizontal and rearward to remove.

### Refit

1. Fit finisher to 'A' post and secure with clips.
2. Fit bolt securing footrest finisher to body and tighten to 3 Nm (2.2 lbf.ft).
3. Fit footrest pad and secure clips.
4. Fit carpet retainer.

 **INTERIOR FITTINGS, REPAIRS,  
Retainer - front carpet.**

## Trim finisher - 'A' post - upper

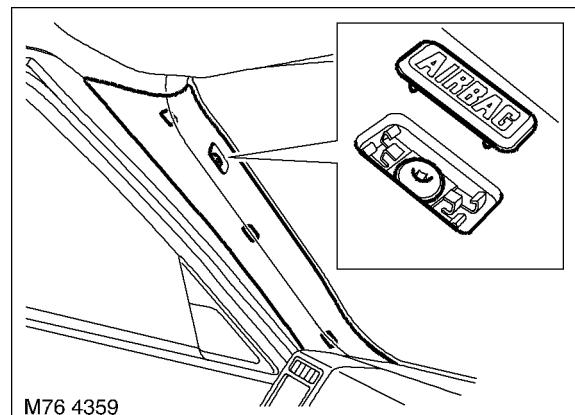
☞ 76.13.26

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical  
Precautions.**

### Remove

1. Make the SRS system safe.
-  **GENERAL INFORMATION,  
Supplementary Restraint System (SRS)  
Precautions.**
2. Release door aperture seal.



3. Remove cover from screw.
  4. Remove Torx screw securing 'A' post trim.
  5. Release 3 clips securing 'A' post trim and remove trim.
- CAUTION: The airbag is mounted directly under this finisher, extreme care is necessary.**
6. Remove retaining clips from trim.

### Refit

1. Fit retaining clips to trim.
2. Fit 'A' post trim and tighten screw to 2 Nm (1.5 lbf.ft).
3. Fit screw cover.
4. Fit seal to door aperture.
5. Connect battery leads, earth lead last.

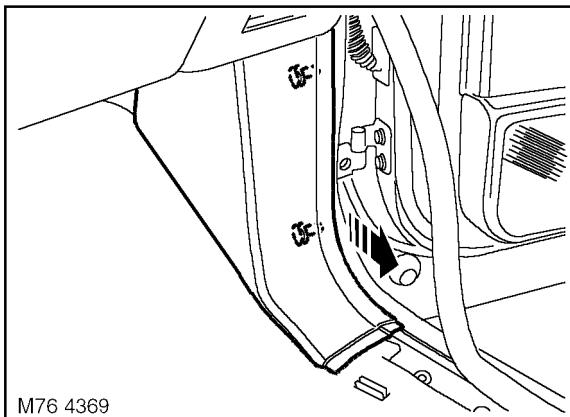
## INTERIOR FITTINGS

### Trim finisher - 'A' post - lower

☛ 76.13.27

#### Remove

1. Remove carpet retainer.  
☞ **INTERIOR FITTINGS, REPAIRS, Retainer - front carpet.**



2. Release sufficient door aperture seal to access lower trim finisher.
3. Release and remove finisher horizontally from 2 retaining clips.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
4. Check condition of finisher retaining clips in body, replace if damaged.

#### Refit

1. Fit retaining clips to body.
2. Fit and secure finisher.
3. Secure door aperture seal.
4. Fit carpet retainer.

☞ **INTERIOR FITTINGS, REPAIRS, Retainer - front carpet.**

### Trim finisher - 'B' post - upper

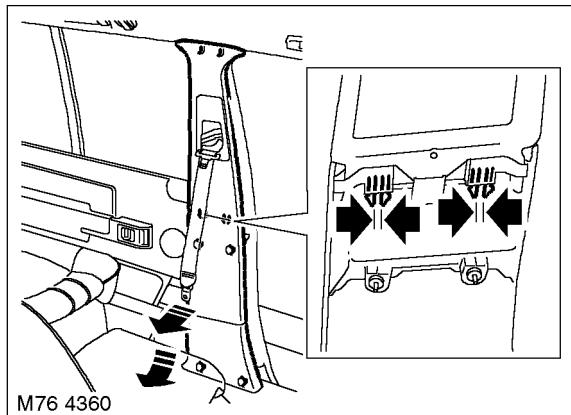
☛ 76.13.28

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove front seat.  
☞ **SEATS, REPAIRS, Front seat.**
3. Release door aperture seal from 'B' and 'C' posts.



4. Release 4 fixings securing 'B' post lower finisher.
5. Release 'B' post upper finisher from fixings and remove finisher assembly.
6. Remove and discard fixings from finisher.
7. Depress clips and remove 'B' post upper finisher from lower finisher.

#### Refit

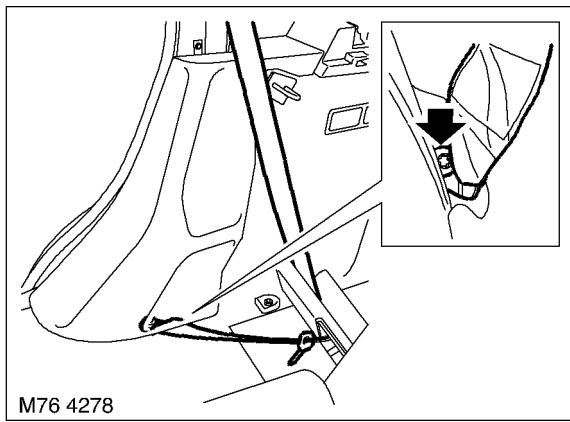
1. Fit upper 'B' post finisher to lower finisher.
2. Fit new fixings to finisher.
3. Fit finisher assembly to upper fixings, position seat belt and secure lower finisher to 'B' post.
4. Fit door aperture seals.
5. Fit front seat.  
☞ **SEATS, REPAIRS, Front seat.**
6. Connect battery leads, earth lead last.

## Trim finisher - 'D' post - upper

☛ 76.13.30

### Remove

1. Remove lower 'D' post finisher.
-  **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - lower.**



2. Remove and discard Torx bolt from lower seat belt anchor.
3. Release upper 'D' post finisher from seat belt webbing and remove finisher.

### Refit

1. Pass seat belt through upper 'D' post finisher, fit belt and tighten Torx bolt to 50 Nm (37 lbf.ft).
2. Fit finisher.

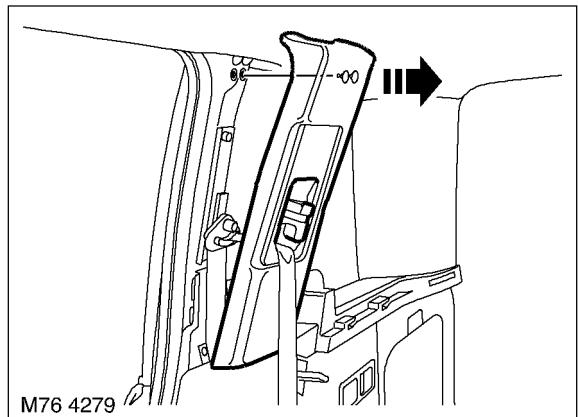
 **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - lower.**

## Trim finisher - 'D' post - lower

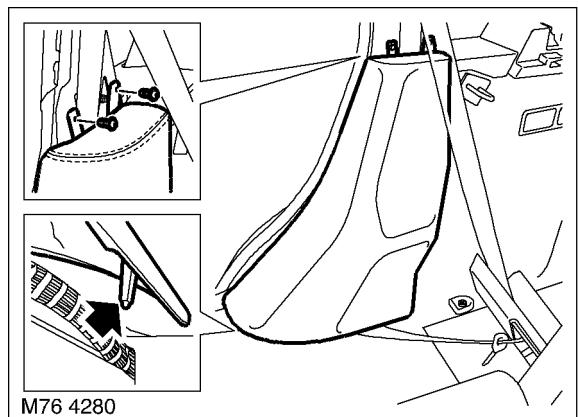
☛ 76.13.31

### Remove

1. Remove parcel tray.
2. Release rear seat squab and fold seat forward.
3. Remove sufficient 'D' post door aperture seal to access upper trim finisher.



4. Release 'D' post upper finisher from upper clips.



5. Remove 2 Torx screws securing top edge of lower trim finisher. Release pegs at lower edge and remove.

### Refit

1. Fit lower trim finisher and secure with Torx screws.
2. Fit 'D' post upper finisher.
3. Check operation of rear seatbelt.
4. Secure seal to door aperture.
5. Position seat in upright position.
6. Fit parcel tray.

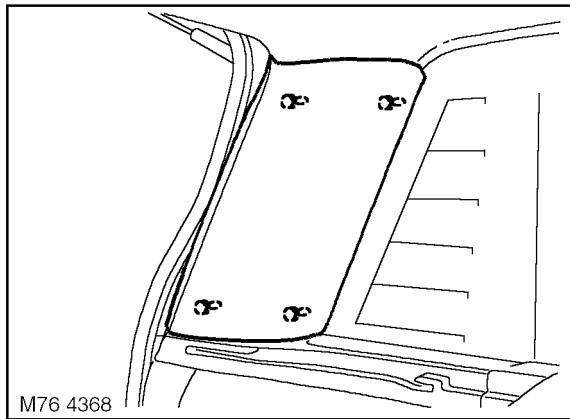
# INTERIOR FITTINGS

## Trim finisher - 'E' post

☛ **76.13.32**

### Remove

1. Open tailgate.
2. Release aperture seal.



3. Release 4 fixings securing 'E' post finisher and carefully remove finisher.
4. Remove fixings from finisher.

### Refit

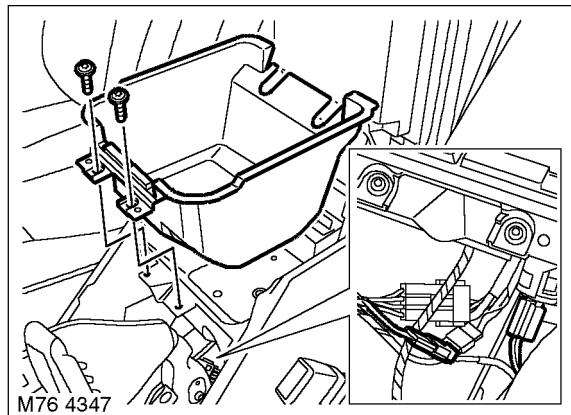
1. Fit new fixings to finisher.
2. Fit finisher and secure fixings.
3. Fit seal to aperture.

## Centre console

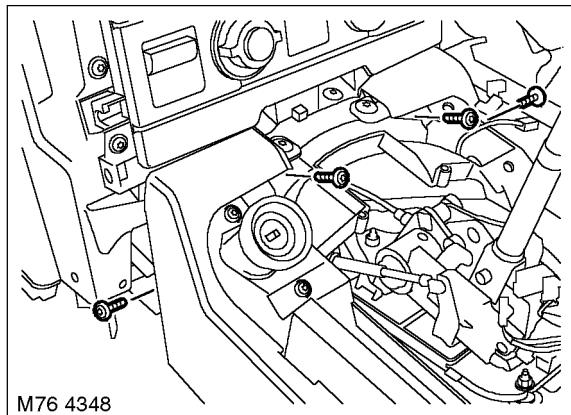
☛ **76.25.01**

### Remove

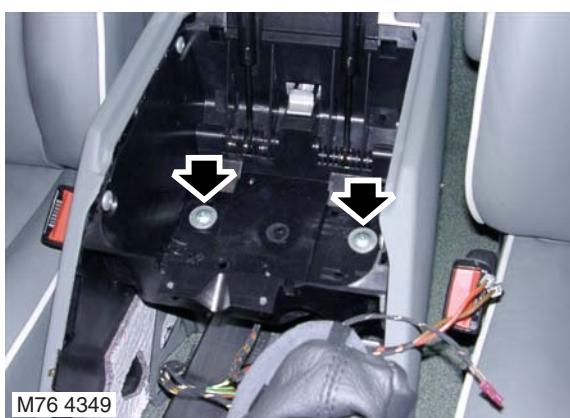
1. Remove centre console finisher.  
☛ **INTERIOR FITTINGS, REPAIRS,  
Finisher - console.**
2. Remove both centre console closing panels.  
☛ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**



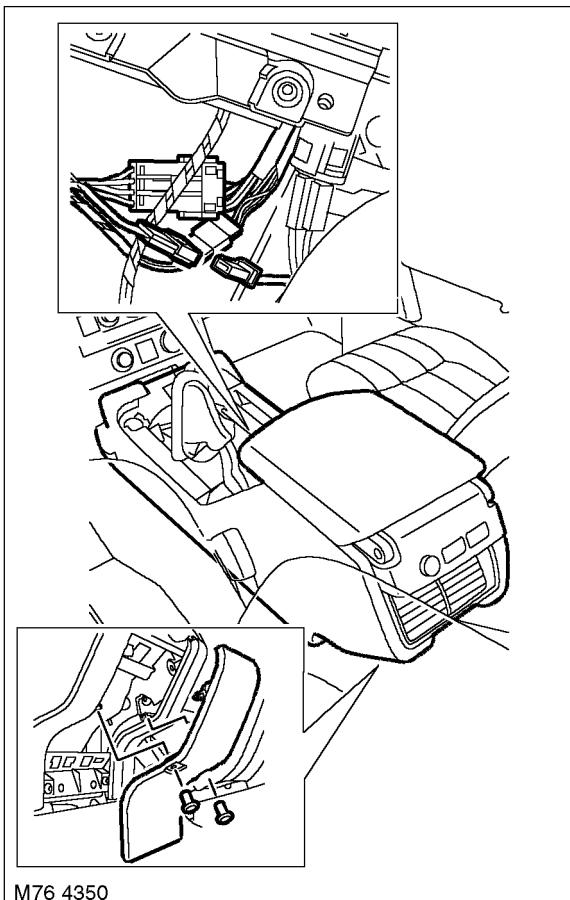
3. Remove 2 Torx screws securing large cubby box liner, remove liner.



4. Remove 2 Torx screws securing ignition switch to centre console.
5. Remove 4 Torx screws securing centre console to fascia.



6. Remove 2 Torx screws and collect washers from base of large cubby box.



7. Remove 2 screws securing centre console rear closing panel. Release clips and remove panel.
8. Raise rear of centre console, disconnect 3 multiplugs from centre console and collect air duct adaptor.
9. Disconnect 3 Lucas connectors from accessory power socket.

10. Carefully remove centre console.

**CAUTION:** Care must be taken to protect painted and veneered surfaces.

#### Refit

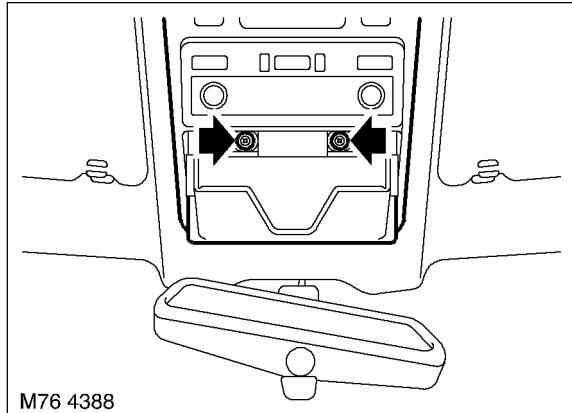
1. Position centre console and connect multiplugs to rear of console. Fit air duct adaptor and align centre console to mountings.
  2. Secure centre console with screws.
  3. Fit rear closing panel and secure with clips and screws.
  4. Position ignition switch and secure with screws.
  5. Fit cubby box and secure with Torx screws.
  6. Fit both centre console closing panels.
-  **INTERIOR FITTINGS, REPAIRS, Closing panel - centre console.**
7. Fit centre console finisher.
-  **INTERIOR FITTINGS, REPAIRS, Finisher - console.**

# INTERIOR FITTINGS

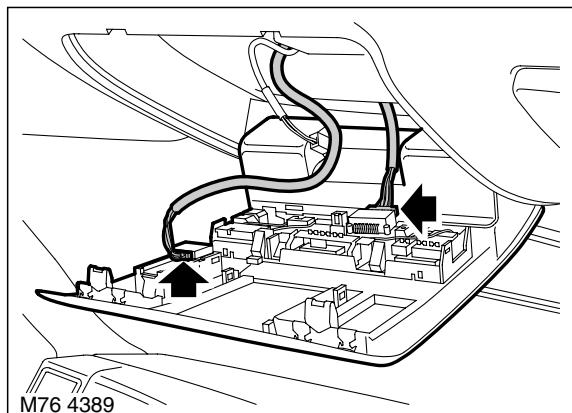
## Console - headlining - front

☛ 76.25.02

### Remove



1. Open spectacle holder, remove 2 screws securing console and release console from headlining.



2. Disconnect multiplugs from switches and lamp. Remove console assembly.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
3. Remove lamp from console.
4. Remove switches from console.
5. Remove 2 retaining clips from console.

### Refit

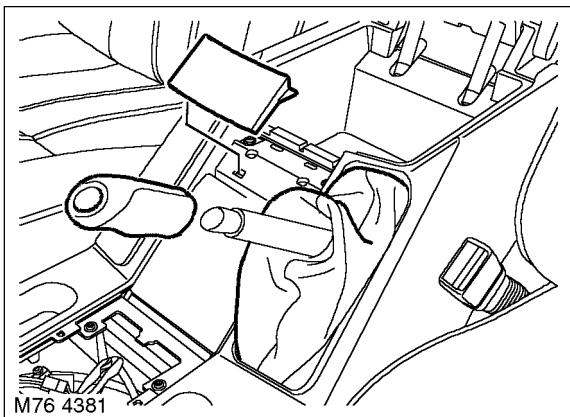
1. Fit retaining clips to console.
2. Fit switches to console.
3. Fit lamp to console.
4. Position front console and connect multiplugs.
5. Fit console to headlining and secure with screws.
6. Close holder.

## Finisher - console

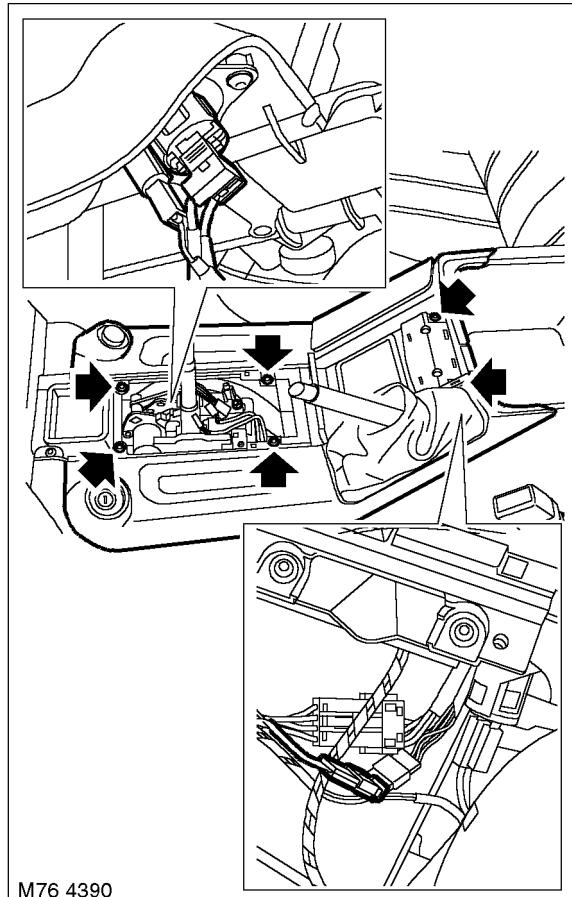
☛ **76.25.07**

### Remove

1. Remove gear selector cover.  
 **INTERIOR FITTINGS, REPAIRS,  
Cover - automatic transmission selector.**



2. Release gaiter from handbrake lever grip.
3. Release and remove handbrake lever grip.
4. Open cubby box lids, carefully release clips and remove finisher.



5. Remove 6 Torx screws securing finisher to centre console, fully apply handbrake.
  6. Release finisher from clips, raise and disconnect 3 Lucas connectors from accessory power socket.
  7. Disconnect multiplug from closing panel lamp assembly.
  8. Remove centre console finisher.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
9. Remove 2 Torx screws securing accessory socket and remove socket.
  10. Remove 4 Torx screws securing cubby box and remove box.
  11. Remove 3 Torx screws securing cup holder and remove cup holder.
  12. Remove handbrake lever gaiter

### Refit

1. Fit cup holder and secure with Torx screws.
2. Fit cubby box and secure with Torx screws.
3. Fit accessory socket and secure with Torx screws.
4. Fit handbrake lever gaiter.

## INTERIOR FITTINGS

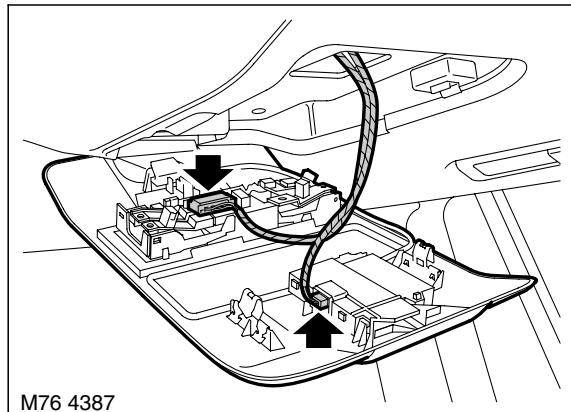
5. Position centre console finisher and connect Lucars.
6. Connect multiplug to closing panel lamp assembly.
7. Fit finisher and secure with Torx screws.
8. Fit handbrake lever grip and secure gaiter.
9. Fit and secure small cubby box finisher.
10. Close cubby box lids.
11. Fit gear selector cover.

 **INTERIOR FITTINGS, REPAIRS,  
Cover - automatic transmission selector.**

### Console - headlining - rear

» **76.25.08**

#### Remove



1. Carefully release rear console from headlining.
2. Disconnect multiplug from interior lamp.
3. Disconnect multiplug from ultrasonic sensor and remove console assembly.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
4. Carefully release and remove ultrasonic sensor and module.
5. Remove lamp from console.

#### Refit

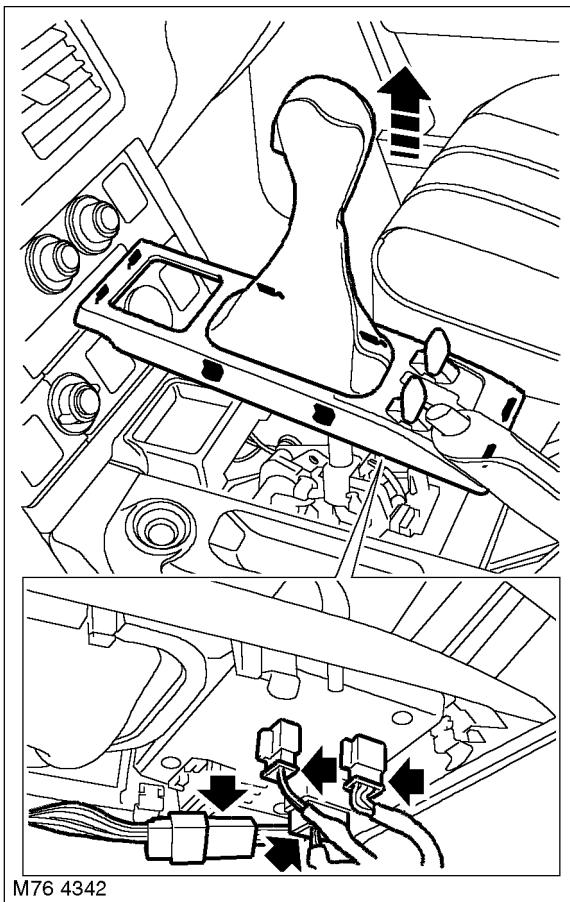
1. Fit lamp to console.
2. Fit module and ultrasonic sensor to console.
3. Position console assembly and connect multiplugs.
4. Fit rear console to headlining.

## Cover - automatic transmission selector

☛ 76.25.09

### Remove

- Turn ignition key to position II, depress brake pedal and move gear lever to 'D' drive, turn ignition off.



- Release clips and gear selector cover from centre console.
- Carefully disconnect 4 multiplugs from gear selector panel.
- Remove gear lever knob and cover by pulling sharply upward.
- Release clips securing gear lever garter to centre console cover, remove knob and garter.

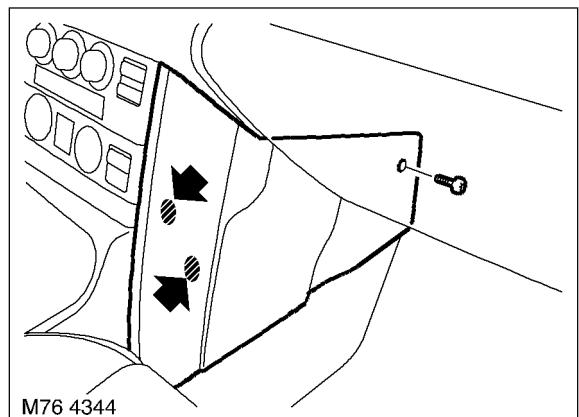
### Refit

- Position cover and connect multiplugs, secure cover to centre console.
- Fit gear lever knob to gear lever.
- Fit garter to centre console and secure with clips.
- Turn ignition key to position II, return gear lever to Park, turn ignition off.

## Closing panel - centre console

☛ 76.25.31

### Remove



- Remove screw securing closing panel to fascia.
- Release 2 clips securing closing panel and remove from lower fascia.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
- Remove 6 screws securing trim finisher to closing panel. Remove finisher.
- Remove damper.
- Remove 2 trim clips.

### Refit

- Fit trim clips to finisher.
- Fit damper.
- Fit trim finisher to closing panel and secure with screws.
- Fit closing panel and tighten screw, secure to clips.

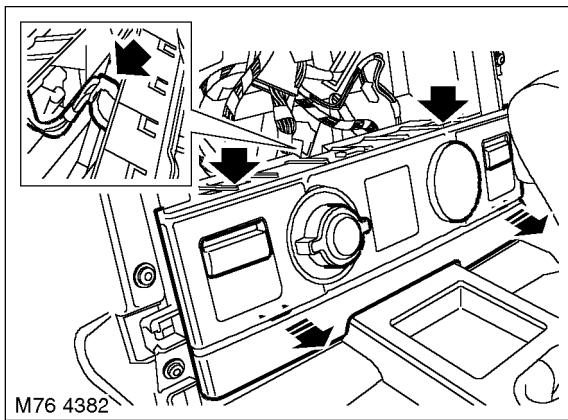
# INTERIOR FITTINGS

## Switch panel - air suspension

» 76.25.41

### Remove

1. Remove heating control assembly.  
☞ **HEATING AND VENTILATION, REPAIRS, Controls - heater (ECU).**



2. Carefully release clips securing air suspension switch panel, disconnect multiplug and remove the panel.

### Refit

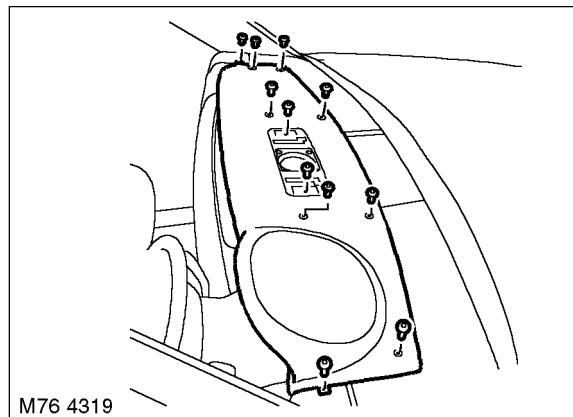
1. Position air suspension switch panel, connect multiplug and secure panel to carrier.
2. Fit heating control assembly.  
☞ **HEATING AND VENTILATION, REPAIRS, Controls - heater (ECU).**

## Top rail - fascia

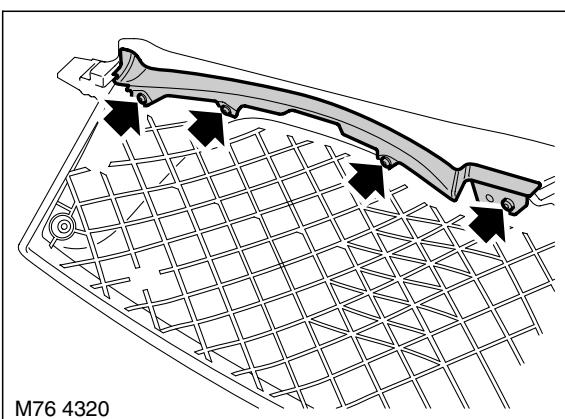
» 76.46.04

### Remove

1. Remove drivers side upper trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - upper - drivers side.**
2. Remove passenger side upper trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - upper - passenger's side.**
3. Carefully release clips securing centre grille to top rail. Remove grille.



4. Remove 11 Torx screws securing top rail to fascia, carefully pull top rail rearward and release.
5. Disconnect speaker multiplug and remove top rail.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
6. Remove 4 Torx screws securing speaker to top rail and remove speaker.



- Remove 4 Torx screws securing instrument pack finisher, remove finisher.

#### Refit

- Fit instrument pack finisher to top rail and secure with Torx screws.
- Fit speaker and secure with screws.
- Position top rail, connect speaker multiplug. Secure rail with Torx screws.
- Position and secure centre grille.
- Fit drivers side upper trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - upper - drivers side.**
- Fit passenger side upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - upper - passenger's side.**

## Shroud - lower - fascia

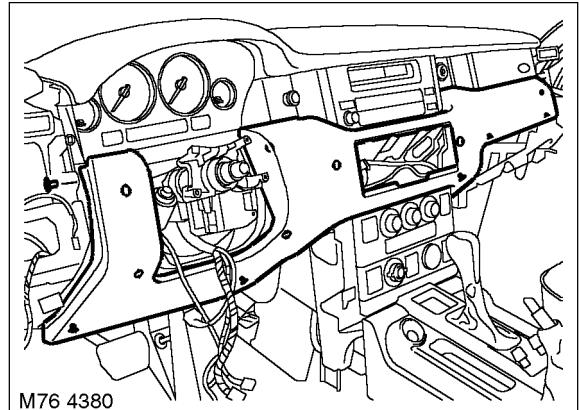
☞ 76.46.05

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

- Remove rotary coupler.  
☞ **RESTRAINT SYSTEMS, REPAIRS, Rotary coupler.**
- Remove glove box.  
☞ **INTERIOR FITTINGS, REPAIRS, Glove box.**
- Remove centre air vent.  
☞ **HEATING AND VENTILATION, REPAIRS, Ventilator(s) - centre.**
- Remove drivers side upper trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - upper - drivers side.**
- Remove drivers side lower trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - lower - drivers side.**



- Remove 6 Torx screws securing lower fascia shroud.
- Carefully release 7 clips securing shroud to carrier assembly. Remove shroud.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
- Remove 7 trim fasteners from shroud.
- Remove 4 retaining clips from shroud.

#### Refit

- Fit clips to shroud.
- Fit fasteners to shroud.

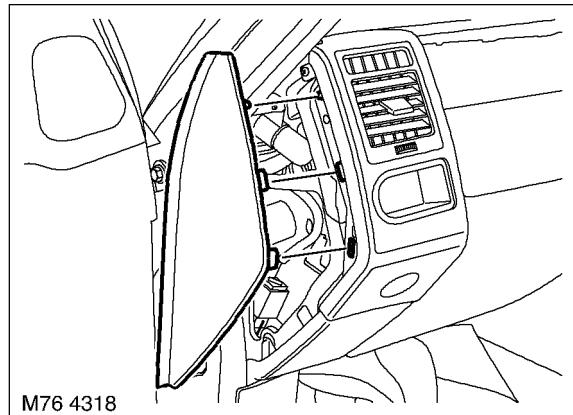
## INTERIOR FITTINGS

3. Position shroud to carrier, fit and secure with clips and screws.
4. Fit drivers side lower trim finisher.  
 **INTERIOR FITTINGS, REPAIRS, Finisher - lower - drivers side.**
5. Fit drivers side upper trim finisher.  
 **INTERIOR FITTINGS, REPAIRS, Finisher - upper - drivers side.**
6. Fit centre air vent.  
 **HEATING AND VENTILATION, REPAIRS, Ventilator(s) - centre.**
7. Fit glove box.  
 **INTERIOR FITTINGS, REPAIRS, Glove box.**
8. Fit rotary coupler.  
 **RESTRAINT SYSTEMS, REPAIRS, Rotary coupler.**

### Closing panel - fascia end

» **76.46.11**

#### Remove



1. Release sufficient door aperture seal to access closing panel.
2. Release 3 clips securing end closing panel to fascia and carefully remove panel.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
3. Remove 3 retaining clips from closing panel.

#### Refit

1. Fit retaining clips to closing panel.
2. Position closing panel to fascia, align and secure clips.
3. Fit seal to door aperture.



## Finisher - upper - drivers side

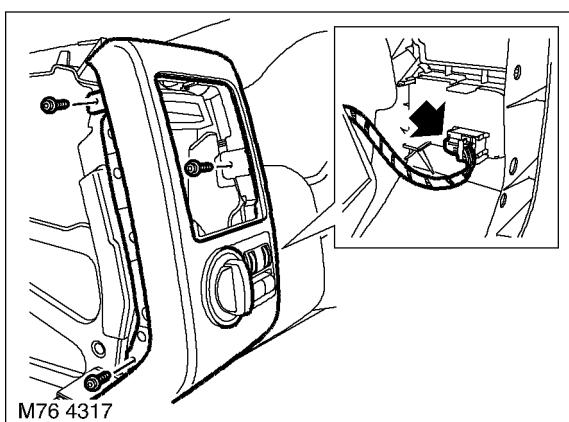
» 76.46.12

### Remove

1. Remove fascia end closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS, Closing panel - fascia end.**
2. Remove face level air vent.  
☞ **HEATING AND VENTILATION, REPAIRS, Fresh air vent - face level.**
3. Remove 'A' post upper trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - upper.**

### Refit

1. Fit footwell lamp assembly to finisher.
2. Fit switch assembly to finisher.
3. Connect multiplugs.
4. Fit finisher to fascia and secure with screws.
5. Fit face level air vents.  
☞ **HEATING AND VENTILATION, REPAIRS, Fresh air vent - face level.**
6. Fit fascia end closing panels.  
☞ **INTERIOR FITTINGS, REPAIRS, Closing panel - fascia end.**
7. Fit 'A' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - upper.**



4. Remove 3 Torx screws securing upper finisher to fascia.
5. Release upper finisher from fascia and disconnect switch multiplug.
6. Disconnect footwell lamp multiplug.
7. Remove upper finisher.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

8. Remove switch assembly from finisher.
9. Depress clips and remove footwell lamp assembly from finisher.

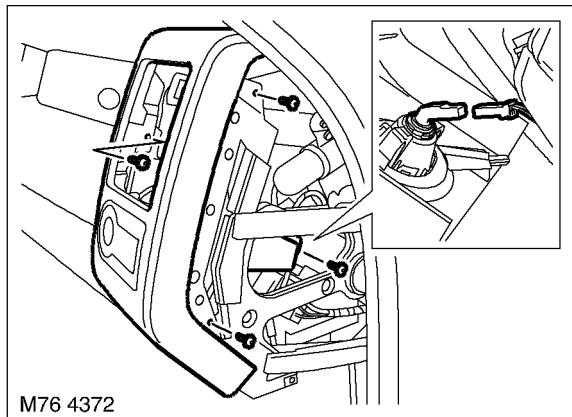
# INTERIOR FITTINGS

## Finisher - upper - passenger's side

☛ 76.46.13

### Remove

1. Remove 'A' post upper trim finisher.  
☛ INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - upper.
2. Remove fascia end closing panel.  
☛ INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.
3. Remove face level air vent.  
☛ HEATING AND VENTILATION,  
REPAIRS, Fresh air vent - face level.



4. Remove 3 Torx screws securing upper finisher to fascia.
5. Remove screw securing rear of cup holder to inner mounting bracket.
6. Release finisher from carrier and disconnect footwell lamp assembly multiplug.
7. Remove upper finisher.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
8. Depress 3 clips and remove passenger cup holder from finisher.
9. Depress clips and remove footwell lamp assembly from finisher.

### Refit

1. Fit footwell lamp assembly to finisher.
2. Fit cup holder to finisher and secure clips.
3. Position finisher and connect lamp multiplug.
4. Fit finisher to fascia and secure with screws.
5. Fit and tighten screw securing cup holder to mounting bracket.
6. Fit face level air vent.  
☛ HEATING AND VENTILATION,  
REPAIRS, Fresh air vent - face level.

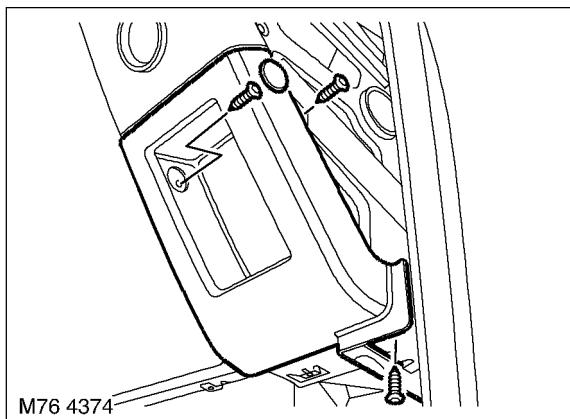
7. Fit fascia end closing panel.  
☛ INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.
8. Fit 'A' post finisher.  
☛ INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - upper.

## Finisher - lower - passengers side

☛ 76.46.14

### Remove

1. Remove fascia end closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**
2. Remove RH lower 'A' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - lower.**
3. Remove passenger side footwell closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**



4. Remove cover from lower finisher for access to Torx screw.
5. Remove 3 Torx screws securing upper finisher to fascia.
6. Remove finisher.
7. Remove clips from finisher.

### Refit

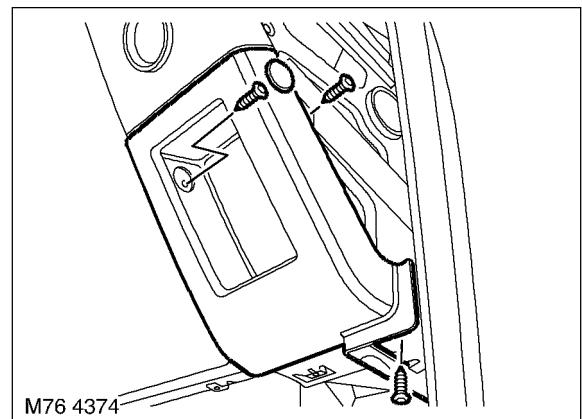
1. Fit clips to finisher.
2. Fit finisher to fascia and secure with screws.
3. Fit blanking plug to finisher.
4. Fit passenger side footwell closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**
5. Fit lower 'A' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - lower.**
6. Fit fascia end closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**

## Finisher - lower - drivers side

☛ 76.46.15

### Remove

1. Remove fascia end closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**
2. Remove closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**
3. Remove LH lower 'A' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Foot rest finisher - LHD.**



4. Remove cover from lower finisher for access to Torx screw.
5. Remove 3 Torx screws securing upper finisher to fascia.
6. Disconnect on board diagnostics port multiplug, if fitted
7. Remove finisher.
8. Remove clips from finisher.

### Refit

1. Fit clips to finisher.
2. Connect on board diagnostics port multiplug.
3. Fit finisher to fascia and secure with screws.
4. Fit blanking plug to finisher.
5. Fit LH lower 'A' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Foot rest finisher - LHD.**
6. Fit closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**
7. Fit fascia end closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**

# INTERIOR FITTINGS

## Fascia - carrier

### 76.46.22

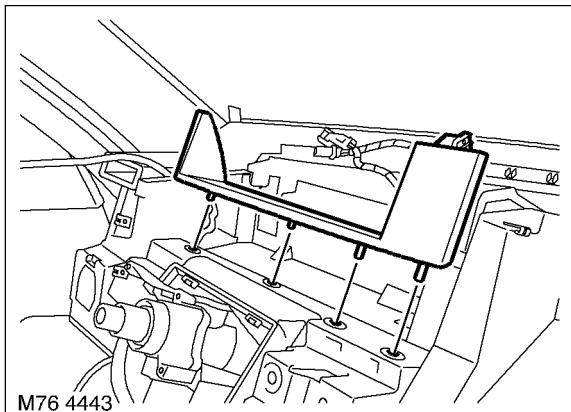
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

#### GENERAL INFORMATION, Electrical Precautions.

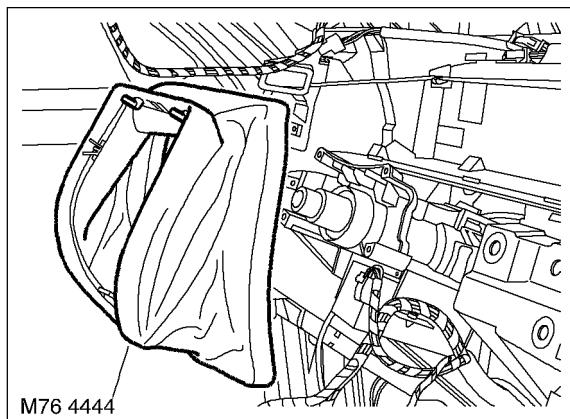
*NOTE: Ensure the harness routing is noted when removing the carrier. This will help to ensure that the harness is correctly fitted/routed when refitting the carrier.*

#### Remove

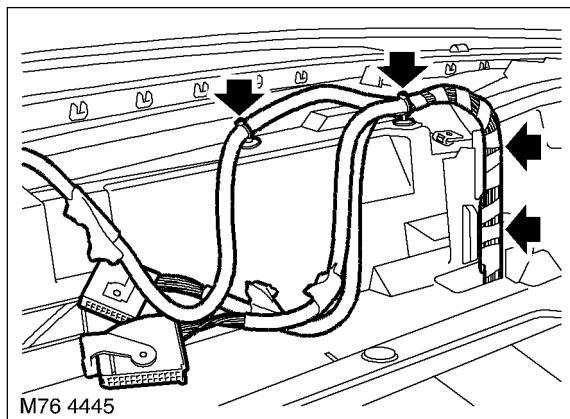
1. Make the SRS system safe.  
 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove centre console.  
 **INTERIOR FITTINGS, REPAIRS, Centre console.**
3. Remove passenger airbag.  
 **RESTRAINT SYSTEMS, REPAIRS, Airbag module - passenger.**
4. Remove air suspension control panel.  
 **INTERIOR FITTINGS, REPAIRS, Switch panel - air suspension.**
5. Remove footwell closing panels.  
 **INTERIOR FITTINGS, REPAIRS, Closing panel - centre console.**
6. Remove cassette/CD unit.  
 **NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Cassette/CD unit.**
7. Remove instrument pack.  
 **INSTRUMENTS, REPAIRS, Instrument pack.**



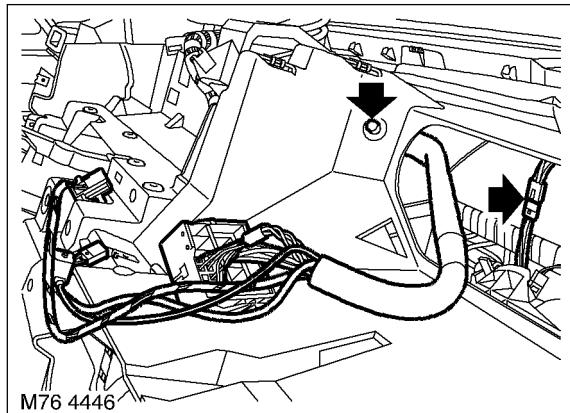
8. Release and remove instrument pack lower finisher.



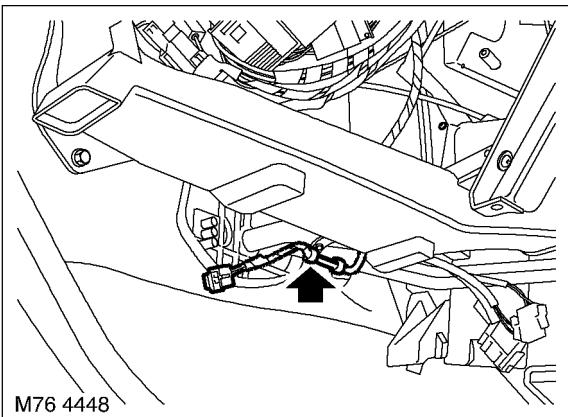
9. Release and remove steering column extension garter.



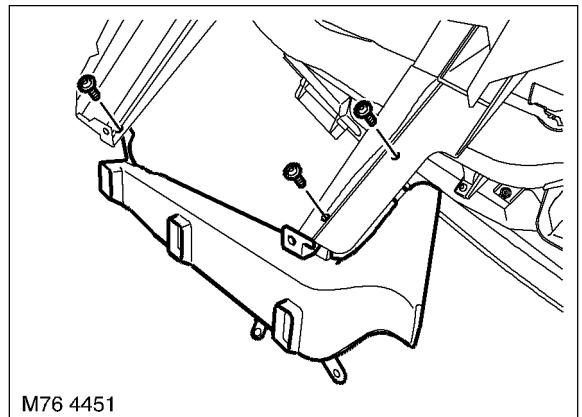
10. Release 4 clips securing instrument pack harness to carrier.



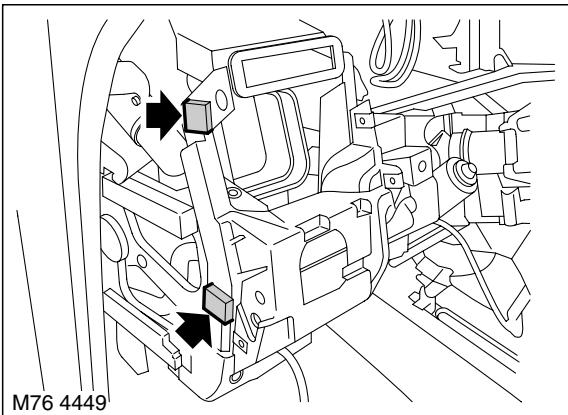
11. Release clip securing cassette/CD unit harness.
12. Disconnect solar sensor multiplug.



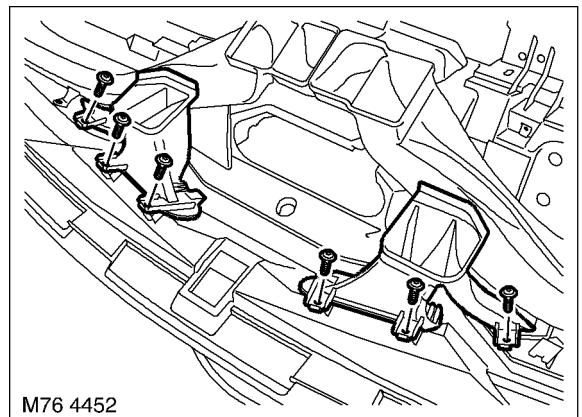
13. Release clip securing harness to drivers side footwell duct.
14. Identify position of harness for reassembly.



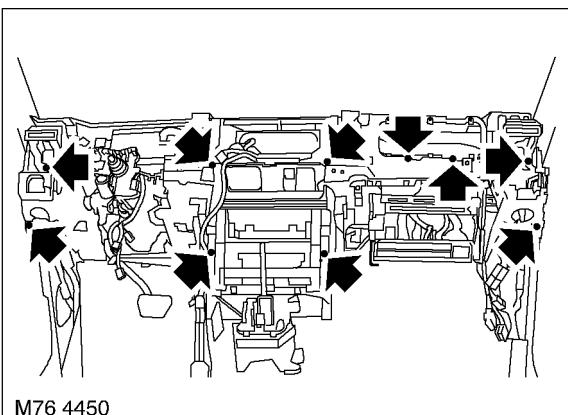
17. Remove 3 Torx screws securing drivers side footwell duct and remove duct.



15. Note position for refit and remove foam strip from ends of carrier.

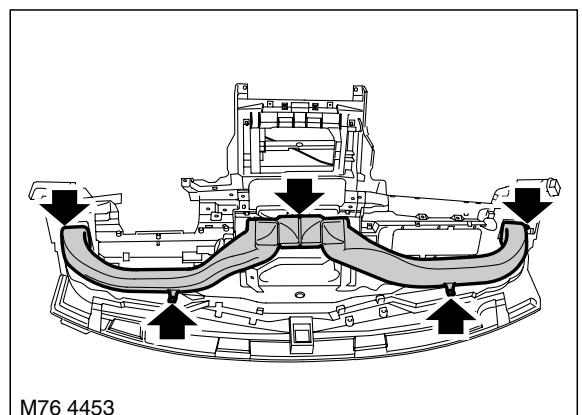


18. Remove 3 Torx screws securing LH demister duct and remove duct.
19. Remove 3 Torx screws securing RH demister duct and remove duct.



16. Remove 10 Torx screws securing fascia carrier and remove carrier.

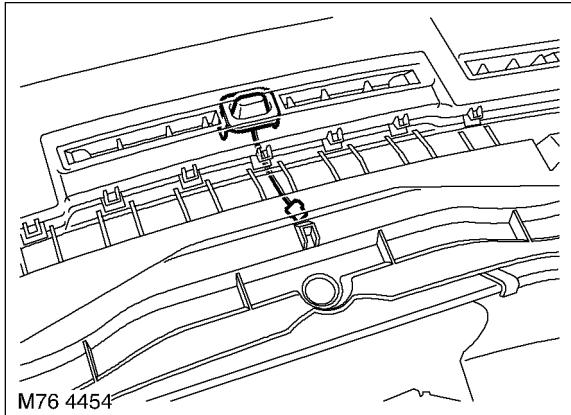
*NOTE: Do not carry out further dismantling if component is removed for access only.*



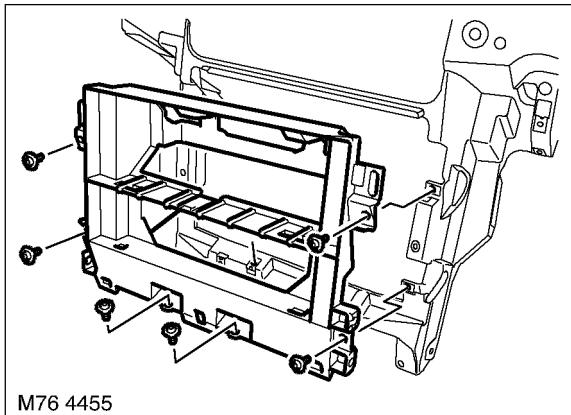
20. Remove 3 Torx screws securing drivers side face level vent duct and remove duct.

## INTERIOR FITTINGS

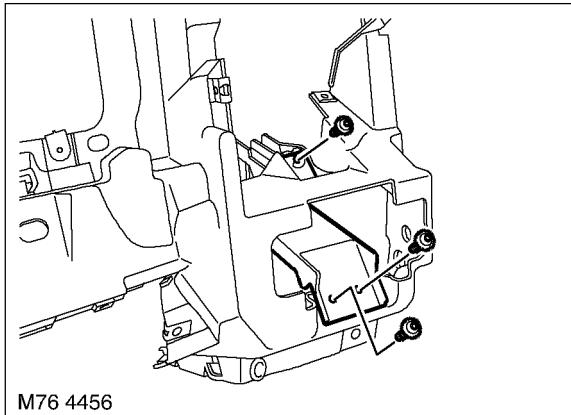
21. Remove 2 remaining Torx screws securing passenger side face level vent duct and remove duct.



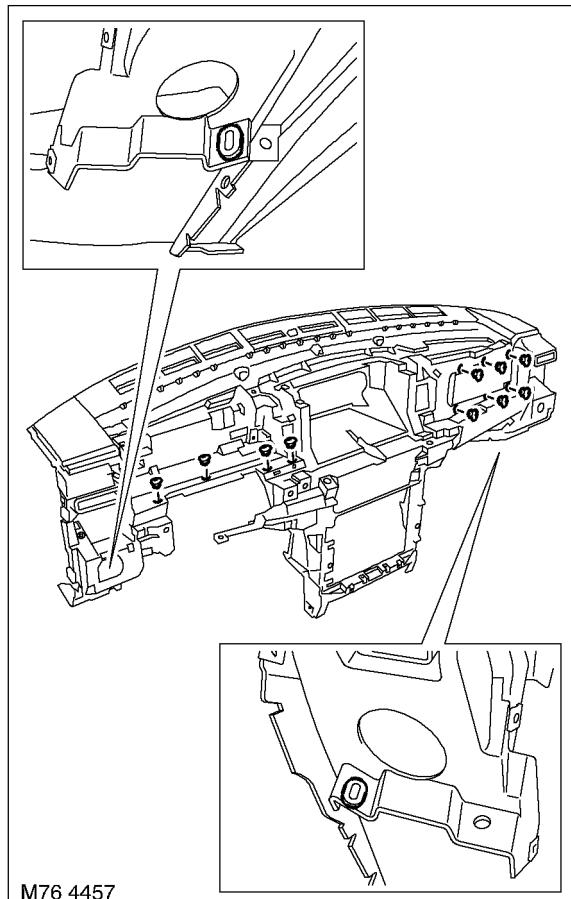
22. Release and remove solar sensor.



23. Remove 6 Torx screws securing heater control mounting and remove mounting.



24. Remove 3 Torx screws securing drink holder bracket and remove bracket.



25. Remove 4 instrument lower finisher securing sacks.
26. Remove 6 passenger airbag cover plastic retaining nuts.
27. Remove 2 side finisher retaining sacks.
28. Remove 64 speed nuts from fascia carrier.

### Refit

1. Fit speed nuts to fascia carrier.
2. Fit side finisher retaining sacks.
3. Fit airbag cover retaining nuts.
4. Fit instrument finisher retaining sacks.
5. Fit drinks holder bracket and secure with screws.
6. Fit heater control mounting and secure with screws.
7. Fit solar sensor.
8. Fit face level vent ducts and secure with screws.
9. Fit demister ducts and secure with screws.
10. Fit footwell duct and secure with screws.
11. With assistance, fit fascia carrier. Ensure harness is routed correctly and carrier has engaged with locations on bulkhead.
12. Fit and tighten screws securing fascia carrier.
13. Fit foam strips to carrier.



14. Fit clip securing harness to footwell duct.
15. Fit clip securing cassette/CD harness.
16. Connect solar sensor multiplug.
17. Fit clip securing instrument pack harness.
18. Fit and secure steering column gaiter.
19. Fit instrument pack lower finisher.
20. Fit instrument pack.

**INSTRUMENTS, REPAIRS,  
Instrument pack.**

21. Fit cassette/CD unit.  
 **NAVIGATION AND IN CAR  
ENTERTAINMENT, REPAIRS, Cassette/CD  
unit.**
22. Fit footwell closing panels.  
 **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**
23. Fit air suspension control panel.  
 **INTERIOR FITTINGS, REPAIRS,  
Switch panel - air suspension.**
24. Fit passenger airbag.  
 **RESTRAINT SYSTEMS, REPAIRS,  
Airbag module - passenger.**
25. Fit centre console.  
 **INTERIOR FITTINGS, REPAIRS,  
Centre console.**

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## Fascia - remove for access & refit

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**76.46.23.99**

This procedure shows how to position the fascia aside for access. The fascia is released from the passenger side and swung aside for access, with the main harness still attached to the fascia.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

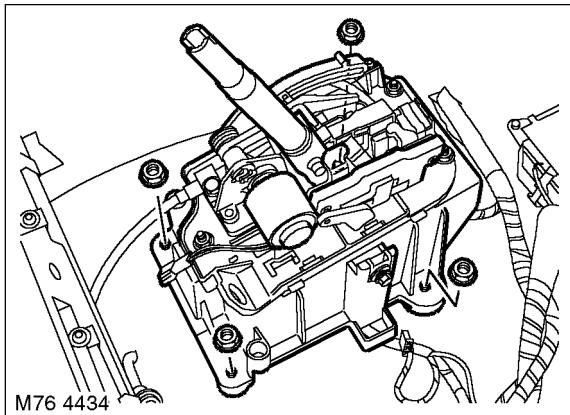
**GENERAL INFORMATION, Electrical  
Precautions.**

### Remove

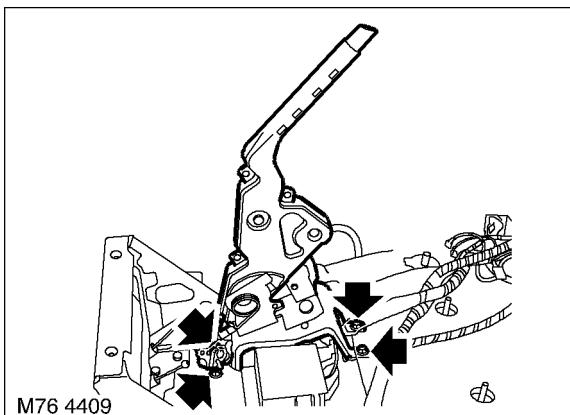
1. Make the SRS system safe.  
 **GENERAL INFORMATION,  
Supplementary Restraint System (SRS)  
Precautions.**
2. Drain coolant.  
 **COOLING SYSTEM - Td6,  
ADJUSTMENT, Coolant - drain and refill.**
3. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT  
RECOVERY, RECYCLING AND  
RECHARGING, Refrigerant recovery -  
recycling and recharge.**
4. Remove air intake plenum.  
 **HEATING AND VENTILATION,  
REPAIRS, Plenum - air intake.**
5. Remove front seats.  
 **SEATS, REPAIRS, Front seat.**
6. Remove heater control panel.  
 **HEATING AND VENTILATION,  
REPAIRS, Controls - heater (ECU).**
7. Remove air suspension control panel.  
 **INTERIOR FITTINGS, REPAIRS,  
Switch panel - air suspension.**
8. Remove handbrake lever assembly.  
 **BRAKES, REPAIRS, Lever assembly  
- handbrake.**
9. Remove footwell closing panels.  
 **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**
10. Release and remove air ducts from HEVAC assembly.
11. **LHD only:** Remove drivers footrest.  
 **INTERIOR FITTINGS, REPAIRS,  
Foot rest finisher - LHD.**
12. Remove 'A' post lower finisher.  
 **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - lower.**
13. Remove 'A' post upper finishers.  
 **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - upper.**

## INTERIOR FITTINGS

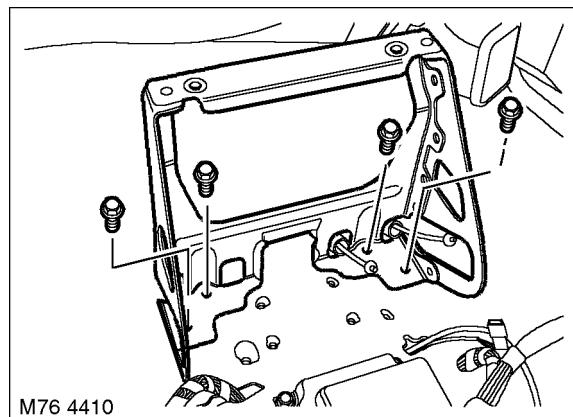
14. Remove drivers side fascia finisher.  
    → **INTERIOR FITTINGS, REPAIRS,  
Finisher - upper - drivers side.**
15. Remove passenger side fascia finisher.  
    → **INTERIOR FITTINGS, REPAIRS,  
Finisher - upper - passenger's side.**
16. Remove gearshift selector assembly.  
    → **AUTOMATIC TRANSMISSION - GM  
5L40-E, REPAIRS, Lever - gearshift selector  
assembly.**



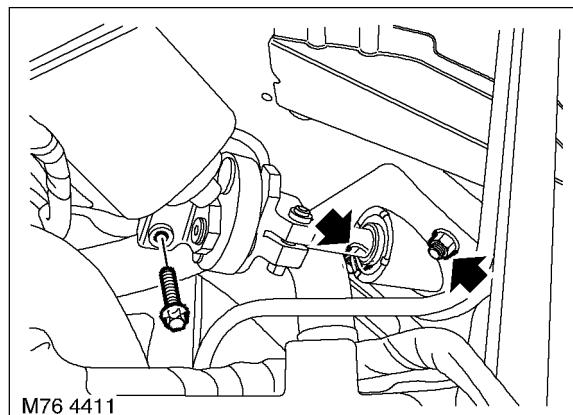
17. Remove 4 nuts securing selector carrier to body and remove.
18. Cover studs to prevent damage to fascia on removal.



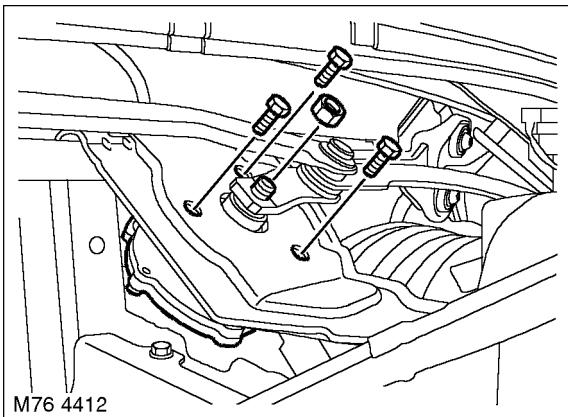
19. Remove 4 bolts securing handbrake mounting bracket to body and remove bracket.



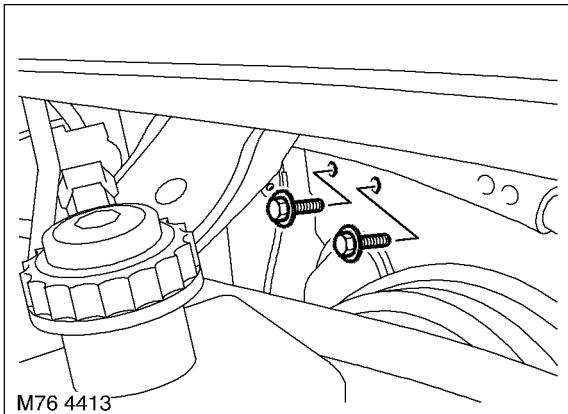
20. Remove 4 bolts securing centre console support bracket to body and remove bracket.



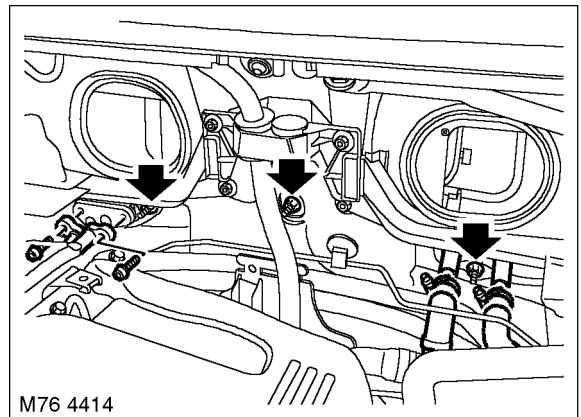
21. Noting fitted position, remove Torx bolt from clamp securing steering column lower shaft to intermediate shaft.
22. Remove 2 nuts securing steering support bearing to body, release bearing and disconnect shaft.



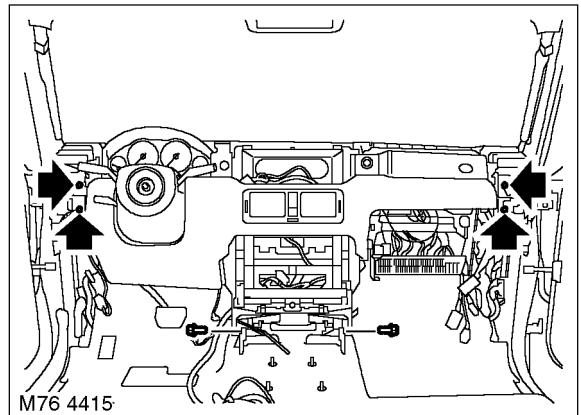
23. Noting fitted position, remove nut and disconnect arm from wiper motor.
24. Remove 3 bolts securing wiper motor to mounting bracket, collect motor and move aside for access.



25. Remove 2 bolts securing fascia to bulkhead.

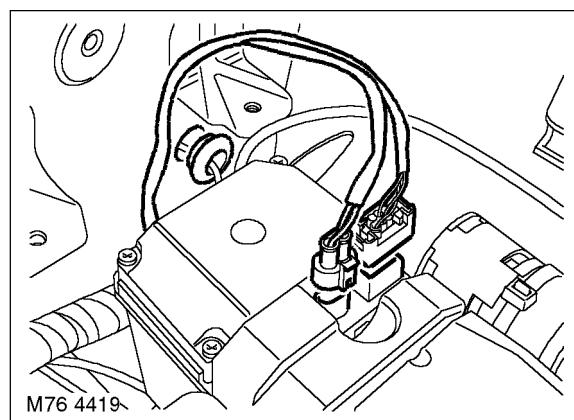
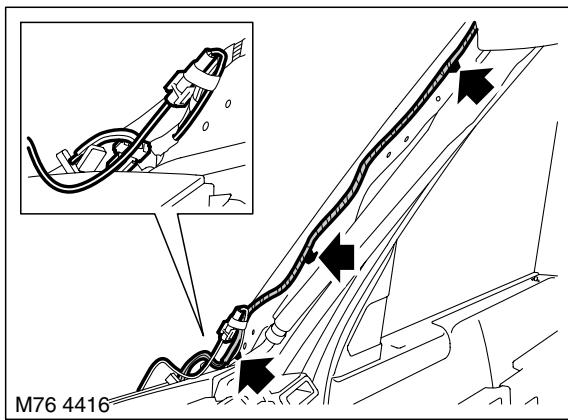


26. Remove 2 Allen bolts securing A/C pipes to bulkhead, disconnect pipes and discard 'O' rings.
- CAUTION: Immediately cap all A/C pipes to prevent ingress of dirt and moisture into the system.**
27. Position container to collect coolant.
28. Release clips and disconnect coolant hoses from heater matrix at bulkhead.
29. Remove 3 nuts securing heater assembly to bulkhead.

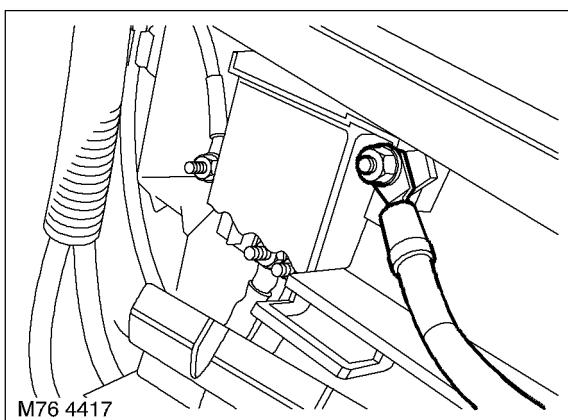


30. Remove 4 nuts and 2 bolts securing fascia assembly to body.
31. Cover fascia lower brackets to protect carpet from damage.

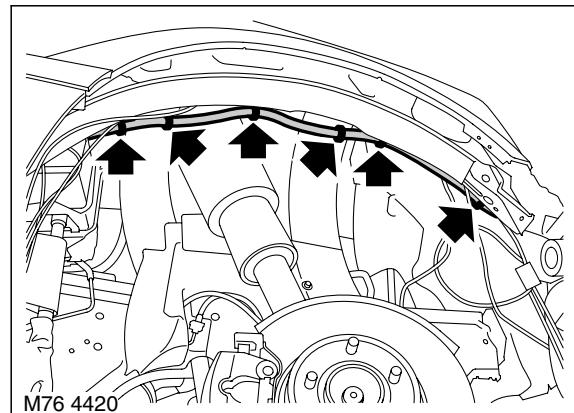
## INTERIOR FITTINGS



32. Disconnect 2 multiplugs and release harness clip from 'A' post, adjacent to top rail. Repeat on opposite side. Tape disconnected leads to windscreen.
33. Withdraw fascia sufficiently to disconnect 'A' post airbag multiplugs.
34. **Passenger side only:** Release 2 additional 'A' post harness clips.
35. Remove transfer box ECU.  
☞ **TRANSFER BOX, REPAIRS,  
Electronic control unit (ECU) - transfer  
gearbox.**



39. Disconnect 2 multiplugs from fuel burning heater, if fitted.
40. Disconnect harness from side repeater lamp, release harness grommet from inner wing and withdraw harness.
41. Remove both front wheelarch liners.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.**

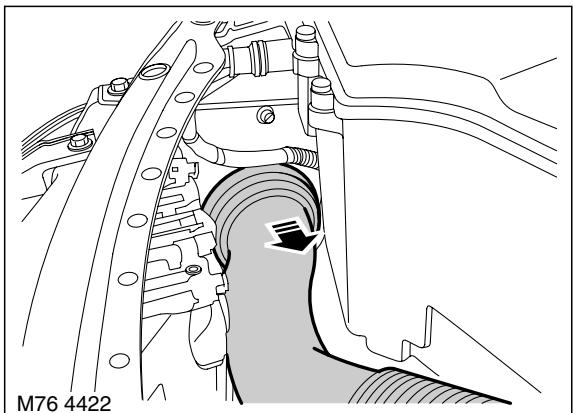


42. Release harness from clips on inner wing.
43. Remove 10 Allen screws securing 'E' box cover and remove cover.

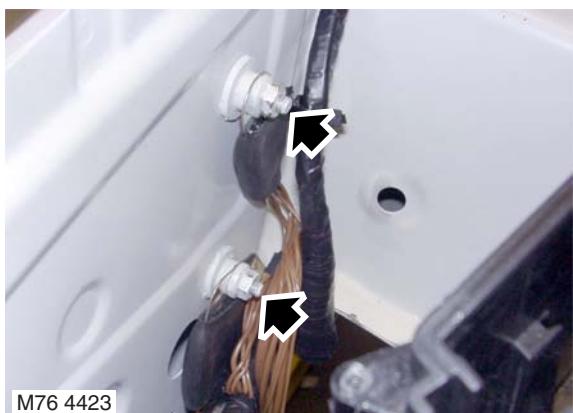
36. Disconnect positive feed from bulkhead fuse box.
37. Disconnect relay and multiplug from bulkhead fuse box.
38. Release harness from bulkhead and position aside.



44. Remove 2 bolts securing 'E' box to suspension turret, move aside for access.



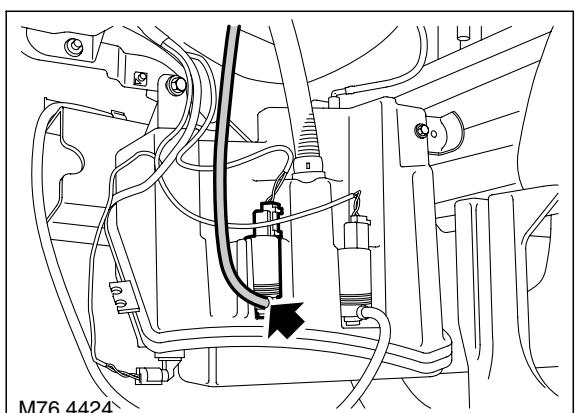
45. Release air intake duct from inner wing and remove.



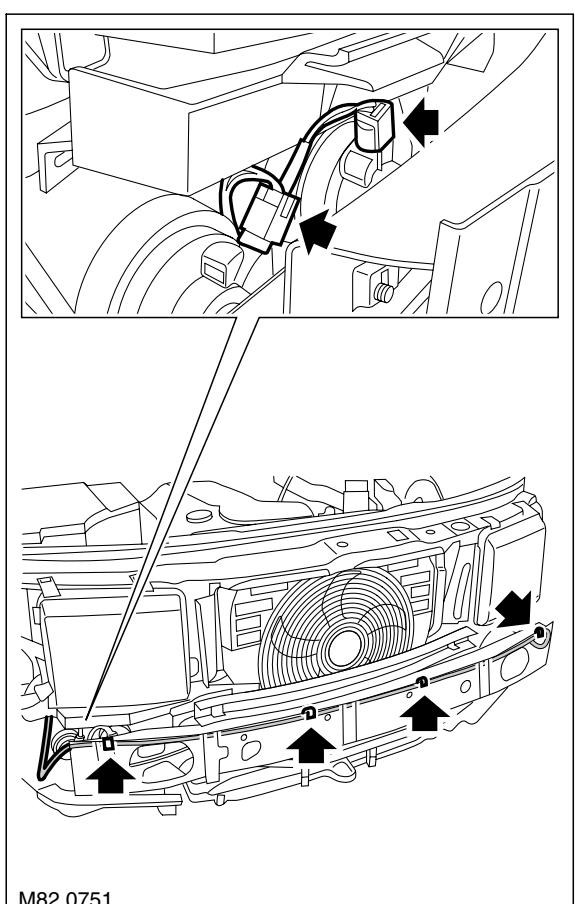
46. Remove nuts and disconnect harness earth headers.

47. Remove front bumper.

 EXTERIOR FITTINGS, REPAIRS,  
Bumper - assembly - front.



48. Disconnect hose from rear washer pump.



49. Release 4 cable ties securing washer hose to armature and move hose aside.

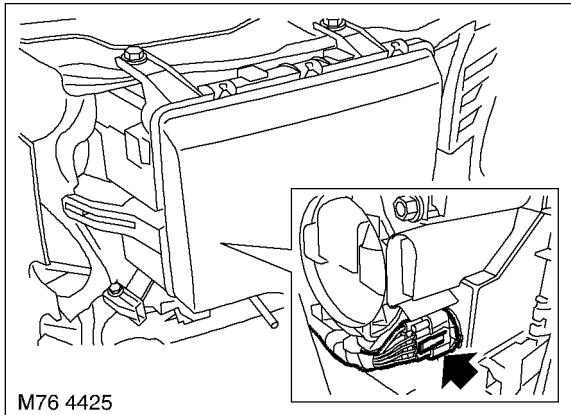
50. Disconnect horn multiplugs.

51. Remove indicator lamp.

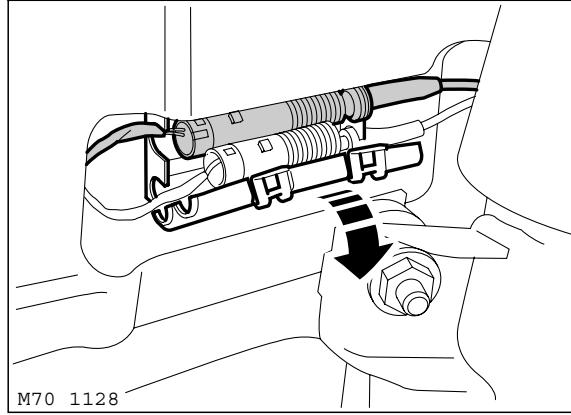
 LIGHTING, REPAIRS, Lamp  
assembly - side & indicator.

## INTERIOR FITTINGS

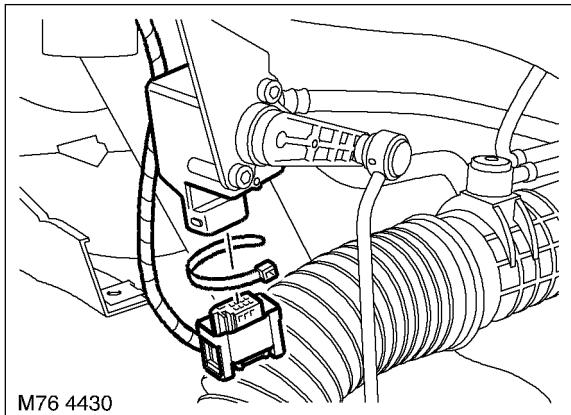
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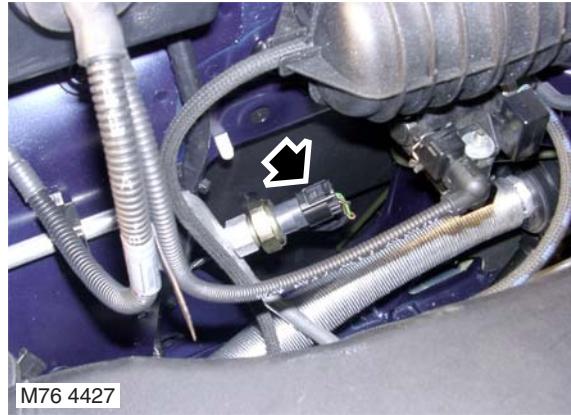
52. Disconnect headlamp multiplug.



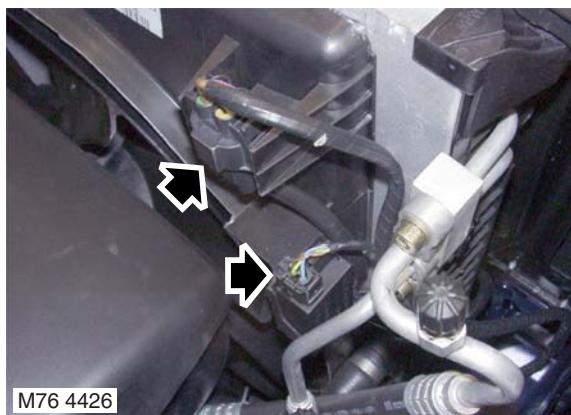
55. Disconnect multiplug from ABS sensor.



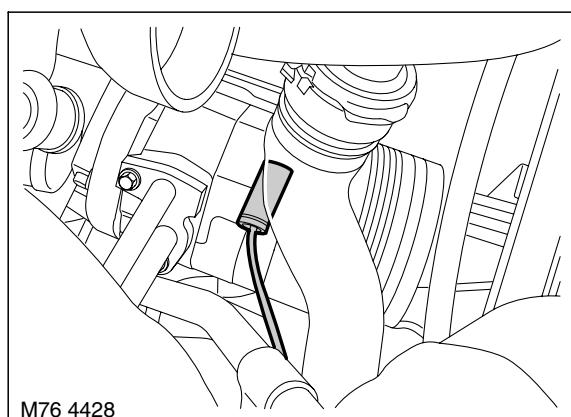
53. Note fitted position of ride height sensor cable ties, remove cable ties and disconnect multiplug.



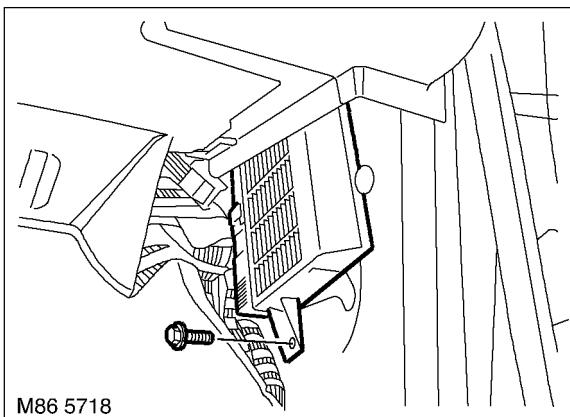
56. Disconnect multiplug from A/C switch.



54. Disconnect multiplugs from radiator pack.



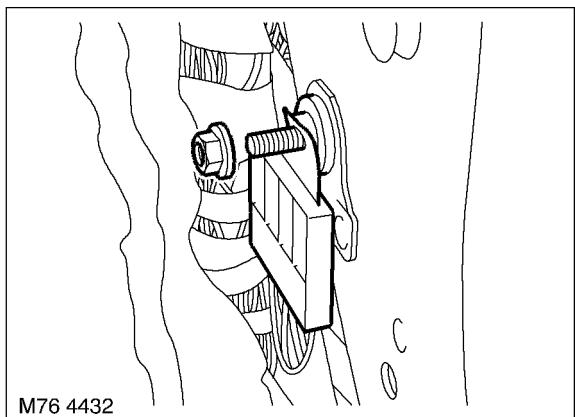
57. Disconnect multiplug from A/C compressor.



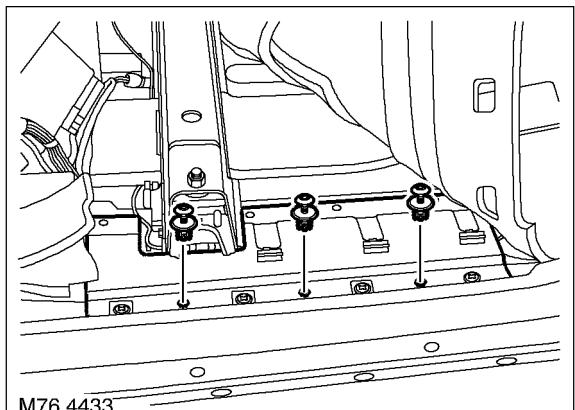
- 58.** Disconnect multiplug from PAS rack pinion sensor.



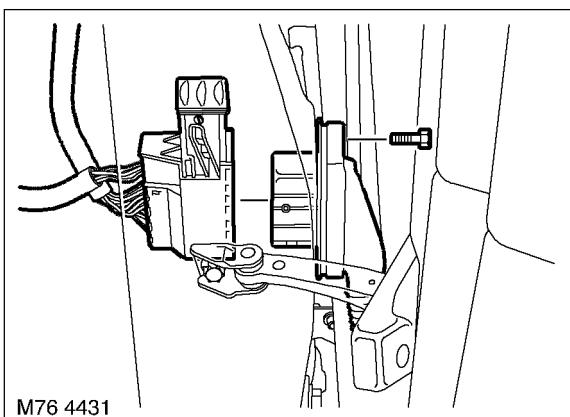
- 59.** Remove screw securing light check control module to 'A' post.  
**60.** Move light check module aside.



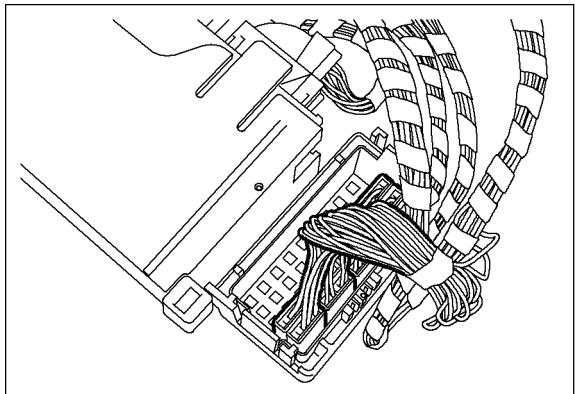
- 62.** Remove nut securing earth header to 'A' post and release header.



- 63.** Raise carpet and remove 3 scrivets securing harness closing panel to body, release and remove panel.

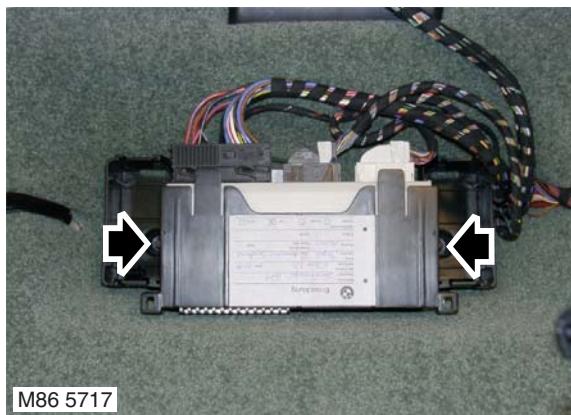


- 61.** Remove bolt securing door harness connector block to 'A' post and disconnect multiplug.



- 64.** Release clips securing harness connector block to BCU carrier.

# INTERIOR FITTINGS



M86 5717

65. Remove 2 nuts and move BCU carrier aside.
66. Release main harness from channel and reposition carpet.
67. With assistance, withdraw harness through bulkhead and rotate fascia assembly for access.  
**CAUTION: Ensure evaporator drain tubes are not damaged when moving fascia.**
68. Support fascia on suitably protected axle stands avoiding damage to carpet and trim.

## Refit

1. With assistance position harness and fascia assembly to bulkhead.
2. Connect airbag and 'A' post multiplugs.
3. Raise carpet, position main harness, fit and secure closing panel with scrivets.
4. Fit carpet.
5. Fit and secure BCU carrier.
6. Fit and secure 'A' post earth header.
7. Connect door harness multiplug and secure with bolt.
8. Fit and secure light check module.
9. Position harness, connect multiplugs to radiator pack, A/C pressure switch, A/C compressor, ABS and ride height sensor.

**Ensure the ride height sensor harness and cable ties are correctly fitted.**

10. Connect multiplug to PAS rack pinion sensor.
11. Connect horn and headlamp multiplugs.
12. Fit side and flasher lamp assembly.  
**LIGHTING, REPAIRS, Lamp assembly - side & indicator.**
13. Connect rear screen washer tube.
14. Fit rear screen washer hose to armature and secure with cable ties.
15. Fit front bumper.

**EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**

16. Fit 'E' box to mounting bracket and tighten bolts to 3 Nm (2.2 lbf.ft).
17. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).

18. Secure harness to inner wing.
19. Fit and secure both front wheelarch liners.

**☞ EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**

20. Position harness, fit and secure side repeater lamp.
21. Position harness, fit and secure FBH multiplugs.
22. Connect relay to bulkhead fuse box mounting.
23. Connect positive feed to bulkhead fuse box.
24. Fit transfer box ECU.

**☞ TRANSFER BOX, REPAIRS, Electronic control unit (ECU) - transfer gearbox.**

25. Secure fascia to bulkhead, fit nuts and bolts, tighten to 25 Nm (18 lbf.ft).
26. Secure 'A' post harness with clips.
27. Fit nuts securing HEVAC to bulkhead, tighten to 10 Nm (7 lbf.ft).
28. Fit coolant hoses and secure with clips.
29. Lubricate new 'O' rings with clean refrigerant oil and fit to pipe/hose assembly.
30. Connect A/C pipes to bulkhead, fit bolts and tighten to 25 Nm (18 lbf.ft).
31. Fit bolts securing fascia to bulkhead and tighten to 25 Nm (18 lbf.ft).
32. Position wiper motor to bracket, fit bolts and tighten to 10 Nm (7 lbf.ft)
33. Position wiper linkage to motor, fit nut and tighten to 25 Nm (18 lbf.ft)
34. Connect steering column assembly, fit nuts to support bearing and tighten to 25 Nm (18 lbf.ft).
35. Fit Torx bolt to steering clamp and tighten to 25 Nm (18 lbf.ft).
36. Fit centre console support bracket and tighten bolts to 10 Nm (7 lbf.ft).
37. Fit handbrake mounting bracket to body, fit bolts and tighten to 25 Nm (18 lbf.ft).
38. Fit selector carrier and tighten nuts to 25 Nm (18 lbf.ft).
39. Fit gearshift selector assembly.

**☞ AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Lever - gearshift selector assembly.**

40. Fit passenger side upper finisher.  
**☞ INTERIOR FITTINGS, REPAIRS, Finisher - upper - passenger's side.**
41. Fit drivers side upper trim finisher.  
**☞ INTERIOR FITTINGS, REPAIRS, Finisher - upper - drivers side.**
42. Fit 'A' post upper finishers.  
**☞ INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - upper.**



43. Fit lower 'A' post finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - lower.**
44. Fit drivers footrest.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Foot rest finisher - LHD.**
45. Fit and secure ducts to heater assembly.
46. Fit centre console closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**
47. Fit handbrake lever assembly.  
☞ **BRAKES, REPAIRS, Lever assembly  
- handbrake.**
48. Fit air suspension switch panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Switch panel - air suspension.**
49. Fit heater control panel.  
☞ **HEATING AND VENTILATION,  
REPAIRS, Controls - heater (ECU).**
50. Fit front seats.  
☞ **SEATS, REPAIRS, Front seat.**
51. Fit air intake plenum.  
☞ **HEATING AND VENTILATION,  
REPAIRS, Plenum - air intake.**
52. Recharge A/C system.  
☞ **AIR CONDITIONING, REFRIGERANT  
RECOVERY, RECYCLING AND  
RECHARGING, Refrigerant recovery -  
recycling and recharge.**
53. Refill cooling system.  
☞ **COOLING SYSTEM - Td6,  
ADJUSTMENT, Coolant - drain and refill.**
54. Connect battery earth lead.

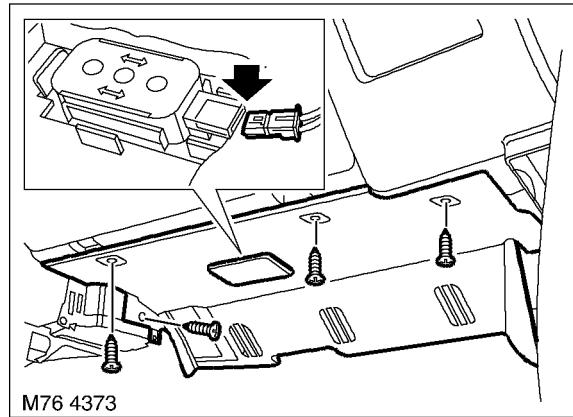
## Closing panel - passenger side

☞ **76.46.27**

### Remove

1. Remove closing panel from passenger side of the centre console.

☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**



2. Remove 4 screws securing closing panel.
3. Disconnect multiplug from closing panel lamp assembly.
4. Remove passenger side footwell closing panel.
5. Release lamp assembly from closing panel.

### Refit

1. Fit lamp assembly to closing panel.
2. Connect multiplug to closing panel lamp assembly.
3. Fit closing panel and secure with screws.
4. Fit centre console closing panel.

☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**

# INTERIOR FITTINGS

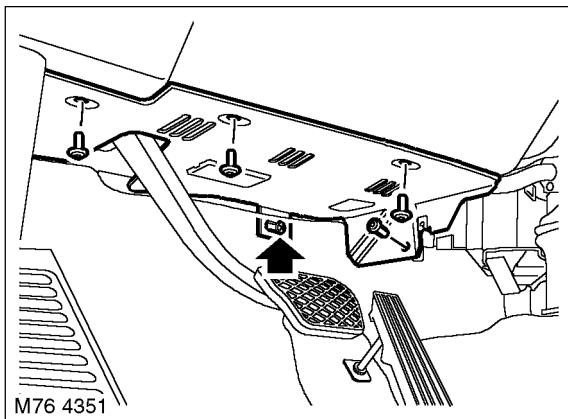
## Closing panel - driver's side

» **76.46.28**

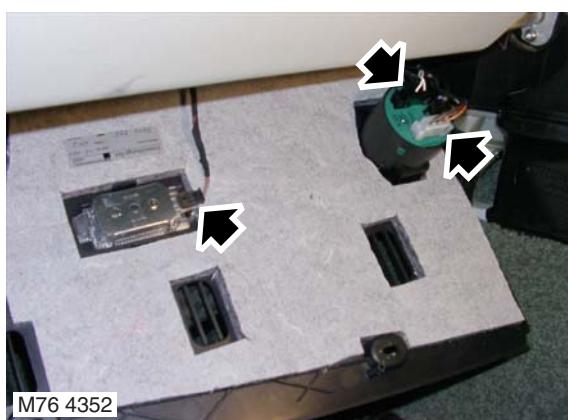
### Remove

1. Remove closing panel from drivers side of the centre console.

☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**



2. Remove 4 screws and 1 trim stud securing closing panel.



3. Release closing panel, disconnect multiplugs from sounder and footwell lamp assembly, remove panel.
4. Remove sounder, lamp and speed nut from panel.

### Refit

1. Fit sounder, lamp and speed nut to panel.
2. Position panel, connect multiplugs, locate and secure with screws and stud.
3. Fit centre console closing panel.

☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**

## Carpet - front

» **76.49.08**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical  
Precautions.**

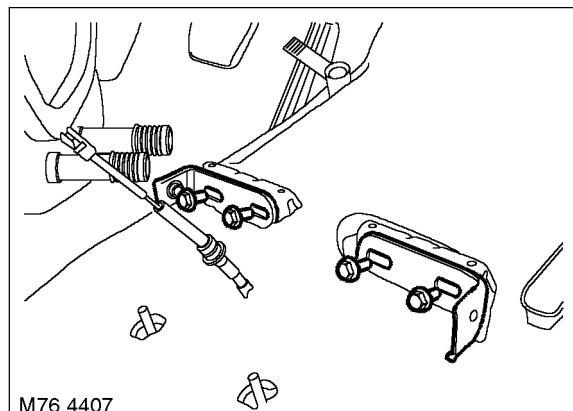
### Remove

1. Remove fascia

☞ **INTERIOR FITTINGS, REPAIRS,  
Fascia - remove for access & refit.**

2. Remove throttle pedal assembly.

☞ **ENGINE MANAGEMENT SYSTEM -  
Td6, REPAIRS, Sensor - accelerator pedal  
position (APP).**



3. Remove 4 bolts securing centre fascia support brackets. Remove brackets.
4. Withdraw throttle pedal harness through carpet.
5. With assistance, support fascia and remove carpet.

### Refit

1. Fit carpet.
2. Feed throttle pedal harness through carpet.
3. Position centre fascia support brackets, fit bolts and tighten to 25 Nm (18 lbf.ft).
4. Fit throttle pedal assembly.

☞ **ENGINE MANAGEMENT SYSTEM -  
Td6, REPAIRS, Sensor - accelerator pedal  
position (APP).**

5. Fit fascia.

☞ **INTERIOR FITTINGS, REPAIRS,  
Fascia - remove for access & refit.**

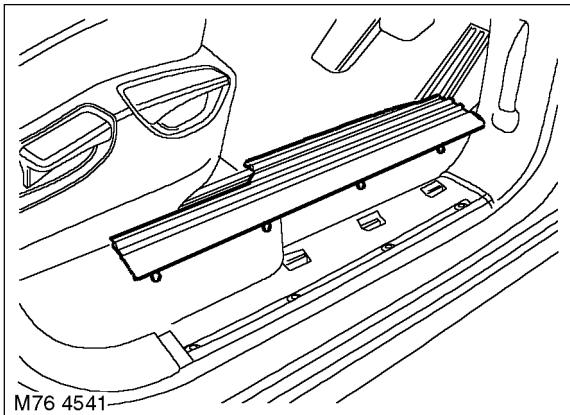


## Retainer - front carpet

☛ 76.49.17

This procedure is also applicable to the rear carpet retainer.

### Remove



1. Using a trim removal tool, release 7 clips securing treadplate carpet retainer to sill.
2. Remove treadplate.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
3. Remove 4 clips from treadplate.

### Refit

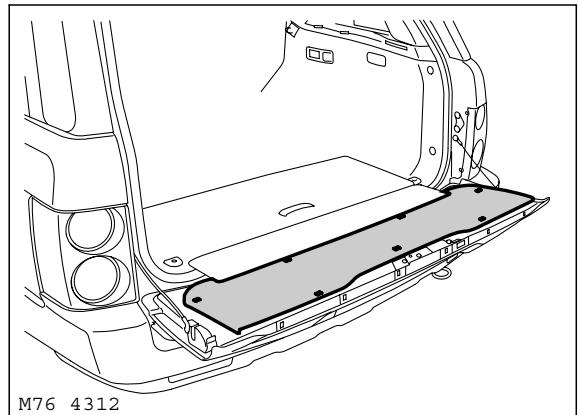
1. Fit clips to treadplate.
2. Position and secure treadplate to sill.

## Finisher - tailgate carpet

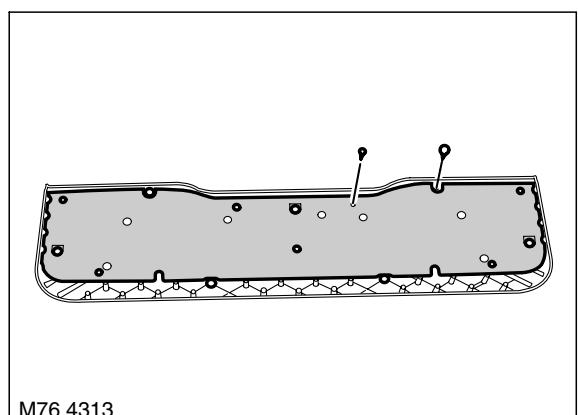
☛ 76.49.23

### Remove

1. Remove lower tailgate finisher.  
☛ DOORS, REPAIRS, Finisher - upper - tailgate lower.



2. Carefully release 7 clips securing tailgate finisher to body. Remove finisher.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*



3. Remove 7 clips from tailgate finisher.
4. Remove 7 clips securing acoustic pad to finisher, remove pad.

### Refit

1. Fit acoustic pad and secure with clips.
2. Fit trim clips to finisher.
3. Align finisher to tailgate and secure clips.
4. Fit tailgate finisher.  
☛ DOORS, REPAIRS, Finisher - upper - tailgate lower.

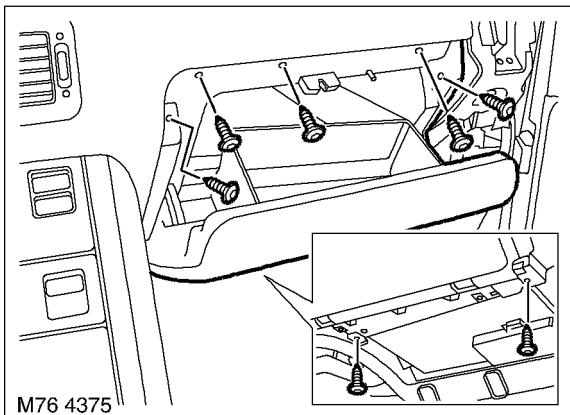
# INTERIOR FITTINGS

## Glove box

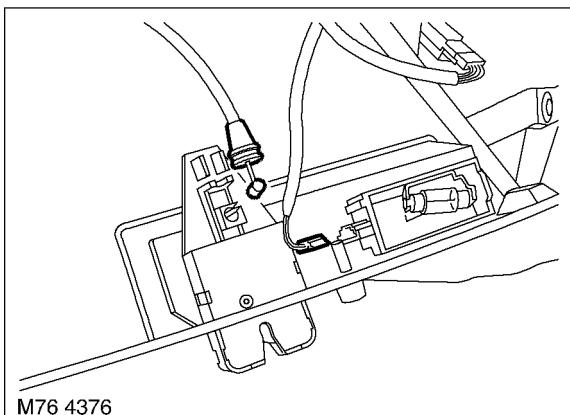
→ 76.52.03

### Remove

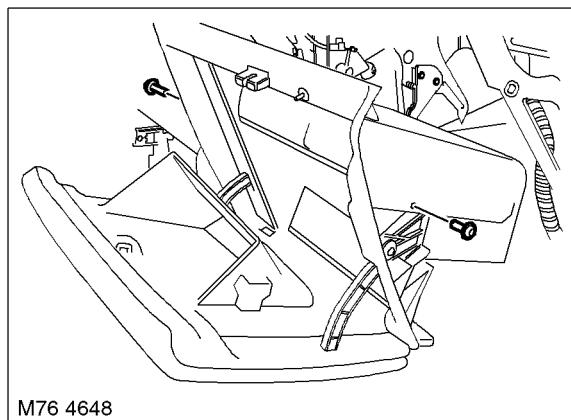
1. Remove upper finisher.  
→ INTERIOR FITTINGS, REPAIRS,  
Finisher - upper - drivers side.
2. Remove lower finisher.  
→ INTERIOR FITTINGS, REPAIRS,  
Finisher - lower - passengers side.



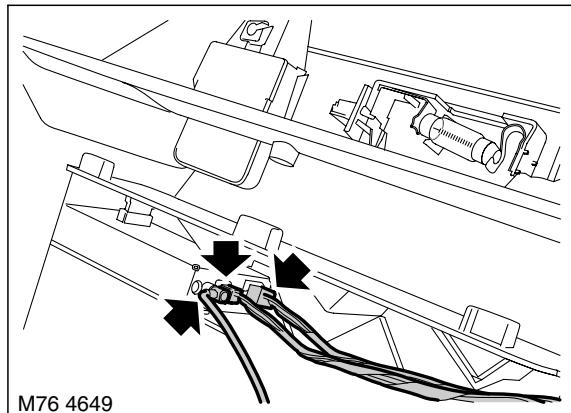
3. Remove 2 Torx screws securing glove box from underside of fascia.
4. Open glove box.
5. Remove 5 Torx screws securing glove box.



6. Disconnect multiplug from lamp.
7. Release cable from glove box latch.



8. If fitted: Remove 2 Torx screws securing CD multi-changer to glove box.



9. If fitted: Withdraw CD multi-changer from glove box and disconnect link lead and both multiplugs. Remove the CD multi-changer.
10. Remove glove box assembly.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

11. Remove fuse puller.
12. Remove clips from glove box.
13. Remove fuse box cover.
14. Remove lamp.
15. Remove 2 Torx screws securing latch to glove box.
16. Remove latch fixing plate and release latch from glove box.

**Refit**

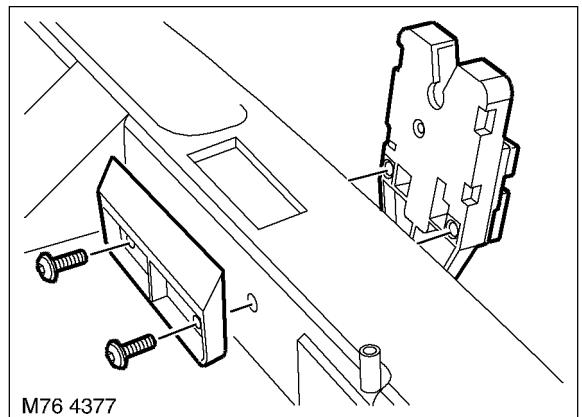
1. Position latch and fixing plate to glove box, secure with screws.
2. Fit lamp assembly to glove box.
3. Fit fuse box cover.
4. Fit clips to glove box.
5. Fit fuse puller.
6. Position glove box to fascia.
7. **If fitted:** Position CD multi-changer to glove box, connect link lead and multiplugs.
8. **If fitted:** Fit CD multi-changer to glove box and secure with Torx screws.
9. Connect cable to glove box latch.
10. Connect multiplug to lamp assembly.
11. Secure glove box with screws.
12. Close glove box.
13. Fit lower trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Finisher - lower - passengers side.**
14. Fit upper finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Finisher - upper - drivers side.**

**Latch - glove box**

☞ **76.52.16**

**Remove**

1. Remove glove box.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Glove box.**



2. Remove 2 Torx screws securing latch to glove box.
3. Remove latch fixing plate and release latch from glove box.

**Refit**

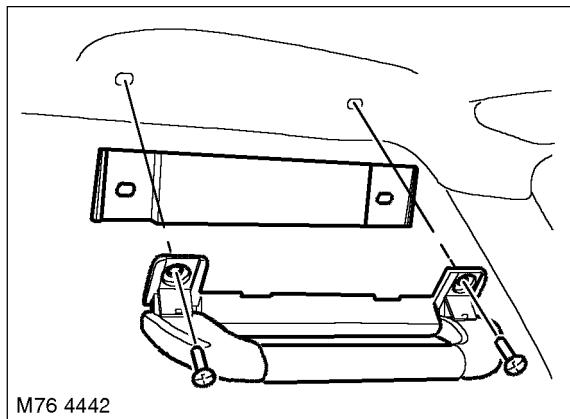
1. Position latch and fixing plate to glove box, secure with screws.
2. Fit glove box.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Glove box.**

# INTERIOR FITTINGS

## Handle - grab

☞ 76.58.30

### Remove



1. Release covers from grab handle retaining screws.
2. Remove 2 screws securing grab handle and remove handle.
3. Remove grab handle support plate.

### Refit

1. Fit grab handle support plate.
2. Fit grab handle and secure with screws.
3. Fit screw covers.

## Headlining

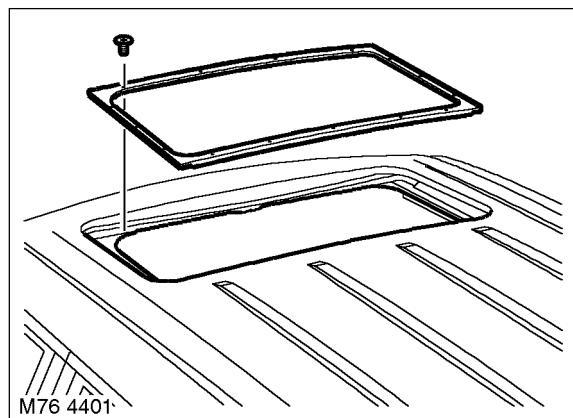
☞ 76.64.15

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

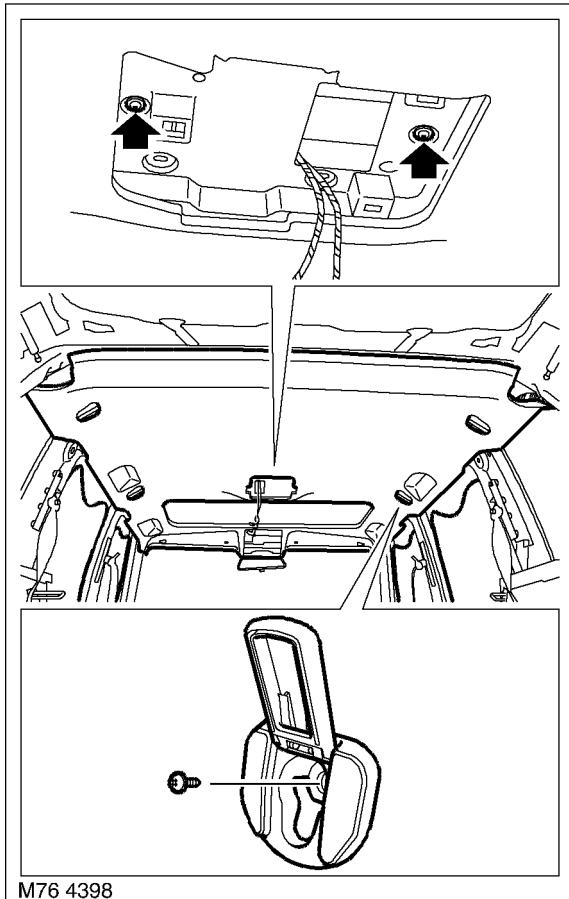
### Remove

1. **Models fitted with sunshine roof:** Open sunshine roof.
2. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
3. Remove RH rear seat.  
☞ **SEATS, REPAIRS, Rear seat.**
4. Remove 'A' post upper finishers.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - upper.**
5. Remove 'B' post upper finishers.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'B' post - upper.**
6. Remove 'D' post upper finishers.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'D' post - upper.**
7. Remove 'E' post finishers.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'E' post.**



8. **Models fitted with sunshine roof:** Remove 15 Torx screws securing headlining to sun roof and remove clamp plate.
9. Remove sun visors.  
☞ **INTERIOR FITTINGS, REPAIRS, Sun visor.**
10. Remove front console from headlining.  
☞ **INTERIOR FITTINGS, REPAIRS, Console - headlining - front.**

11. Remove rear console from headlining.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Console - headlining - rear.**
12. Remove grab handles.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Handle - grab.**

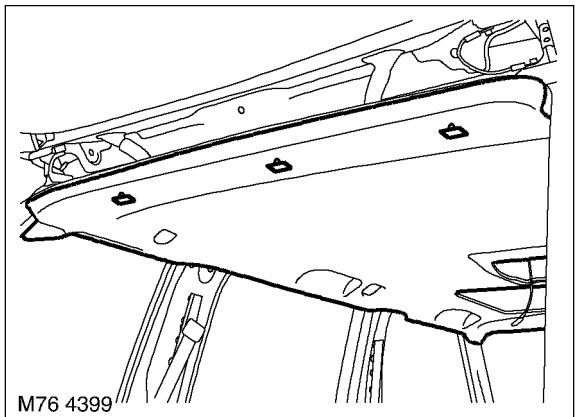


13. Open flap, remove 4 screws securing cargo net upper anchor finishers and remove finishers.
14. Remove seals from door aperture flanges to release headlining.
15. Remove 2 screws securing headlining.
16. **Models fitted with sunshine roof:** Remove 4 screws securing headlining.

17. Carefully release 3 clips securing rear edge of headlining.
18. With assistance, carefully lower and remove headlining from rear of vehicle.

#### Refit

1. Fit headlining and secure with screws.
2. Secure clips at headlining rear edge.
3. Fit luggage net anchor finishers and secure with screws.
4. Fit aperture seals.
5. Fit grab handles.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Handle - grab.**
6. Fit rear console.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Console - headlining - rear.**
7. Fit front console.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Console - headlining - front.**
8. Fit sun visors.  
☞ **INTERIOR FITTINGS, REPAIRS, Sun  
visor.**
9. **Models fitted with sunshine roof:** Fit and align clamping plate and tighten screws securing headlining to sunshine roof to 2.5 Nm (1.9 lbf.ft).
10. Fit 'E' post finishers.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'E' post.**
11. Fit 'D' post upper finishers.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'D' post - upper.**



## INTERIOR FITTINGS

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12. Fit 'B' post upper finishers.  
 **INTERIOR FITTINGS, REPAIRS,**  
**Trim finisher - 'B' post - upper.**
13. Fit 'A' post upper finishers.  
 **INTERIOR FITTINGS, REPAIRS,**  
**Trim finisher - 'A' post - upper.**
14. Fit rear seat.  
 **SEATS, REPAIRS, Rear seat.**
15. **Models fitted with sunshine roof:** Close  
sunshine roof.
16. Connect battery earth lead.

## Glass - tailgate upper

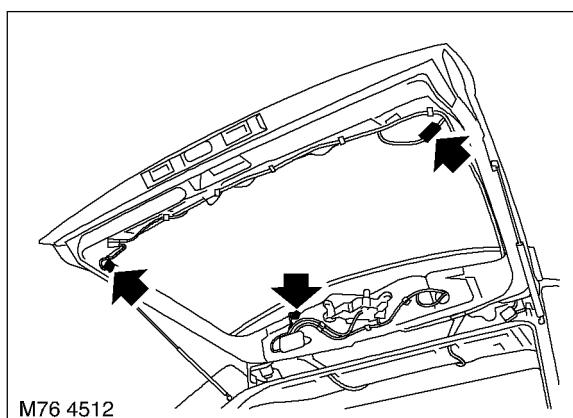
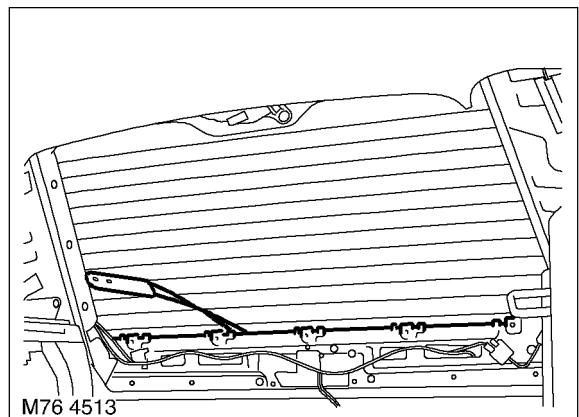
### 76.31.22

The following equipment is required:

- Cutting wire and handles
- Glazing knife
- Glass replacement kit
- Sealant applicator gun
- Suction cups
- A felt covered table or stand to support glass

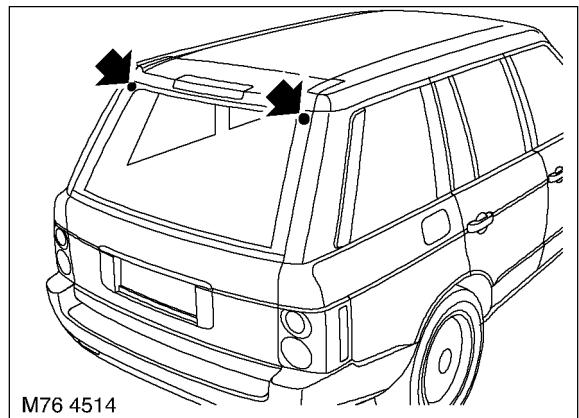
#### Remove

1. Remove rear wiper arm.  
 **WIPERS AND WASHERS, REPAIRS,  
Arm - wiper - tailgate.**
2. Remove tailgate trim casing.  
 **DOORS, REPAIRS, Trim casing -  
tailgate upper.**
3. Remove tailgate inner side finishers.
4. Remove tailgate glass outer finisher.



5. Disconnect 3 multiplugs from tailgate glass.
6. Protect exterior body work adjacent to rear screen.

7. From inside vehicle, carefully cut through sealant securing lower edge of windscreen with a glazing knife. It is not practical to use a Kent knife as the windscreen is very close to body.
  8. If necessary, use cutting wire to cut through any remaining sealant securing top and sides of windscreen.
  9. Attach suction cups and with assistance, remove windscreen and place on stand.
- CAUTION: Lay glass on felt covered supports and be careful not to damage the obscuration band. Do not stand on edge as this can cause chips which subsequently develop into cracks.**

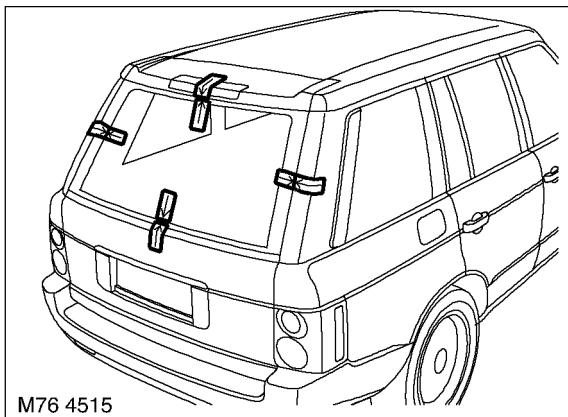


10. Remove 2 windscreen support blocks from body.

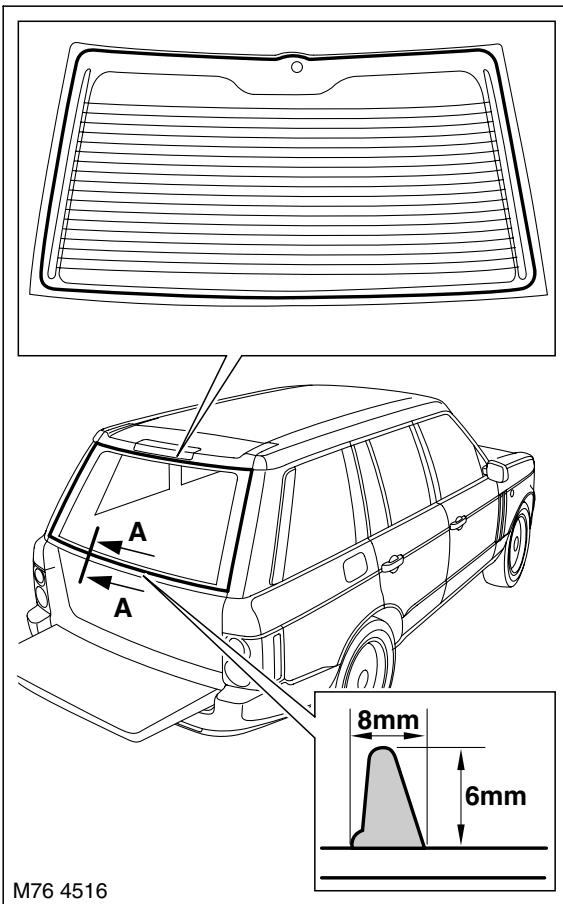
# SCREENS

## Refit

1. Carefully remove sealant from body to leave a smooth surface.
2. **Original screen:** Carefully cut back sealant to obtain a smooth surface without damage to obscuration band
3. Fit finisher to screen.
4. Fit support blocks to body.
5. Fit screen to body and centralise in aperture.



6. Use masking tape to establish reference marks as an alignment aid.
7. Remove windscreen and place on stand.
8. Clean sealant face on body and windscreen with solvent.
9. Apply etch primer to any bare metal on body.
10. Apply primer over etch primer.
11. Apply screen primer to sealant face on windscreen and allow to cure.
12. Apply activator over old sealant on body and allow to cure.
13. Fit pre-cut nozzle to sealer cartridge, remove lid, shake out crystals and fit cartridge to applicator gun. If necessary modify the nozzle to achieve required bead section.



14. Apply a continuous bead of sealant to windscreen as shown,
  - 'A' = 8 mm (0.31 in)
  - 'B' = 11 mm (0.43 in).
15. With assistance, fit and align windscreen. Lightly press windscreen to seat sealer.
16. Remove protective covers and tape.
17. Connect multiplugs to tailgate glass.
18. Test sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around glass and check for leaks. Mark any area that leaks. Dry glass and sealer then apply additional sealer.
19. Fit tailgate inner side finishers.
20. Fit tailgate trim casing.  
☞ **DOORS, REPAIRS, Trim casing - tailgate upper.**
21. Fit rear wiper arm.  
☞ **WIPERS AND WASHERS, REPAIRS, Arm - wiper - tailgate.**

## Windscreen

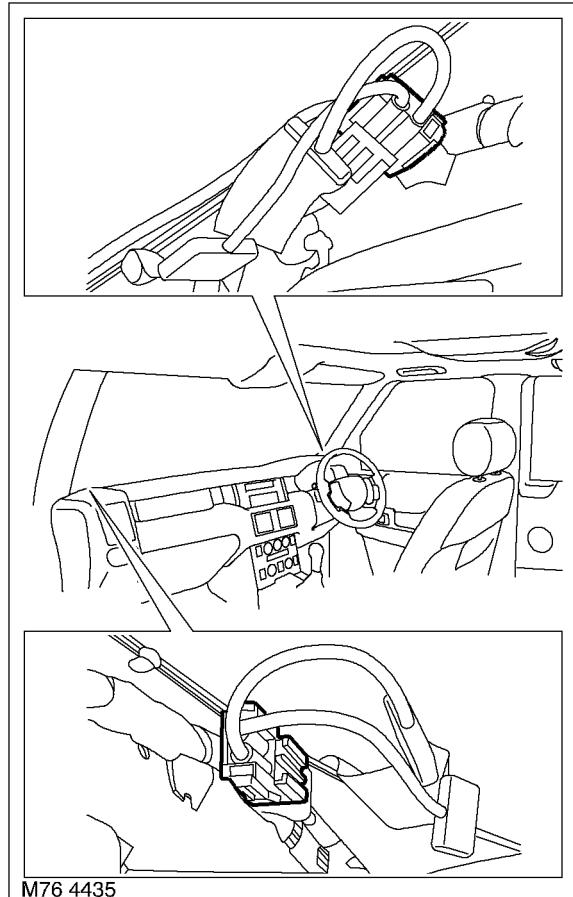
### 76.81.01

The following equipment is required:

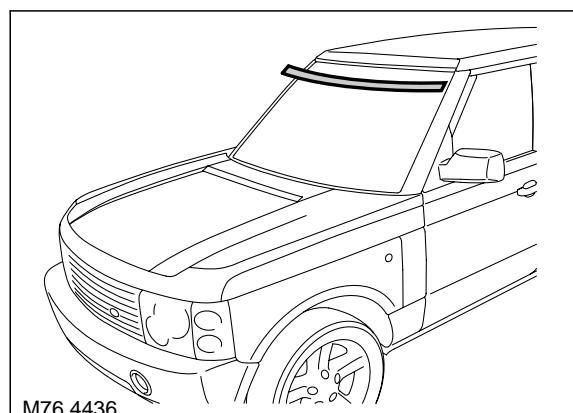
- Cutting wire and handles
- Kent knife
- Glazing knife
- Windscreen replacement kit
- Sealant applicator gun
- Suction cups
- A felt covered table or stand to support glass

#### Remove

1. Remove roof finishers.  
 **EXTERIOR FITTINGS, REPAIRS,  
Roof moulding.**  
**WARNING:** Wear protective gloves when handling glass, solvents and primers.
2. Remove windscreen side finishers.  
 **EXTERIOR FITTINGS, REPAIRS,  
Side finisher - windscreen.**  
**WARNING:** Wear suitable eye protection when removing and refitting glass.
3. Remove windscreen lower finisher.  
 **EXTERIOR FITTINGS, REPAIRS,  
Lower finisher - windscreen.**
4. Remove interior mirror.  
 **INTERIOR FITTINGS, REPAIRS,  
Mirror - interior.**
5. Remove rain sensor, if fitted.  
 **WIPERS AND WASHERS, REPAIRS,  
Sensor - rain.**
6. Remove 'A' post upper finishers.  
 **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - upper.**



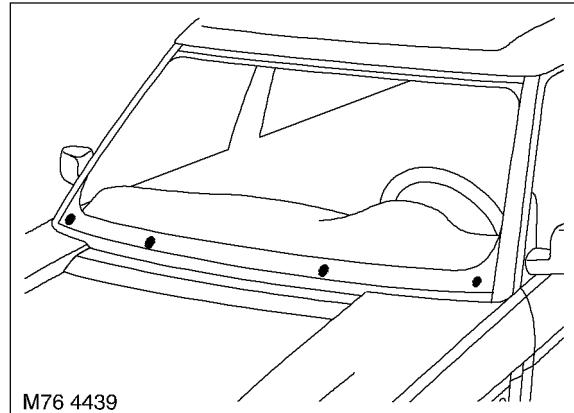
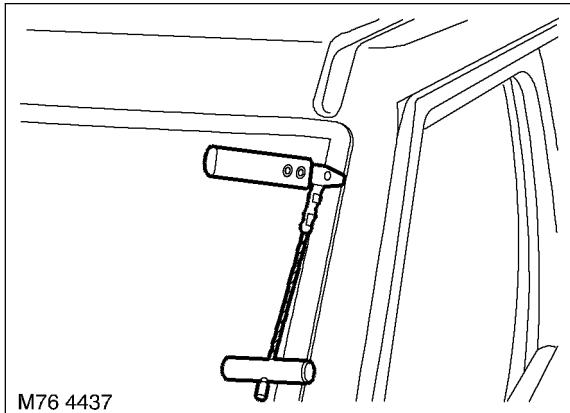
7. Disconnect screen heater multiplugs.
8. Protect exterior body work adjacent to windscreen.
9. Cover heater ducts with masking tape.
10. Protect fascia and interior of vehicle.



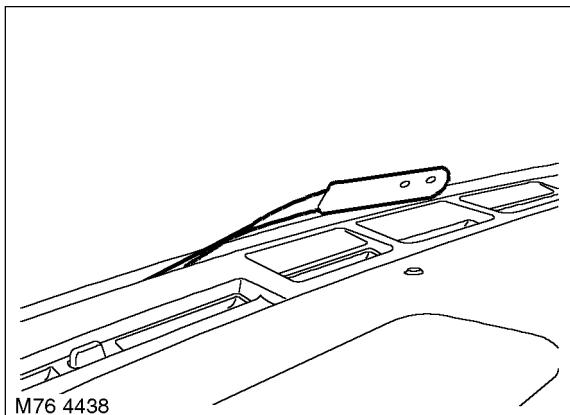
11. Release and remove upper finisher from windscreen.

## SCREENS

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12. From outside of vehicle, use a Kent knife and carefully cut through sealant securing upper and both sides of windscreen to body.
13. If necessary, use cutting wire to cut through any remaining sealant securing top and sides of windscreen.



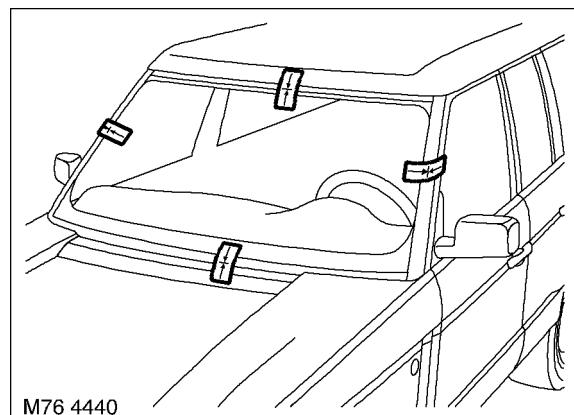
14. From inside vehicle, carefully cut through sealant securing lower edge of windscreen with a glazing knife. It is not practical to use a Kent knife as the windscreen is very close to body.
15. Attach suction cups and with assistance, remove windscreen and place on stand.

**CAUTION: Lay glass on felt covered supports and be careful not to damage the obscuration band. Do not stand on edge as this can cause chips which subsequently develop into cracks.**

16. Remove 4 windscreen support blocks from body.

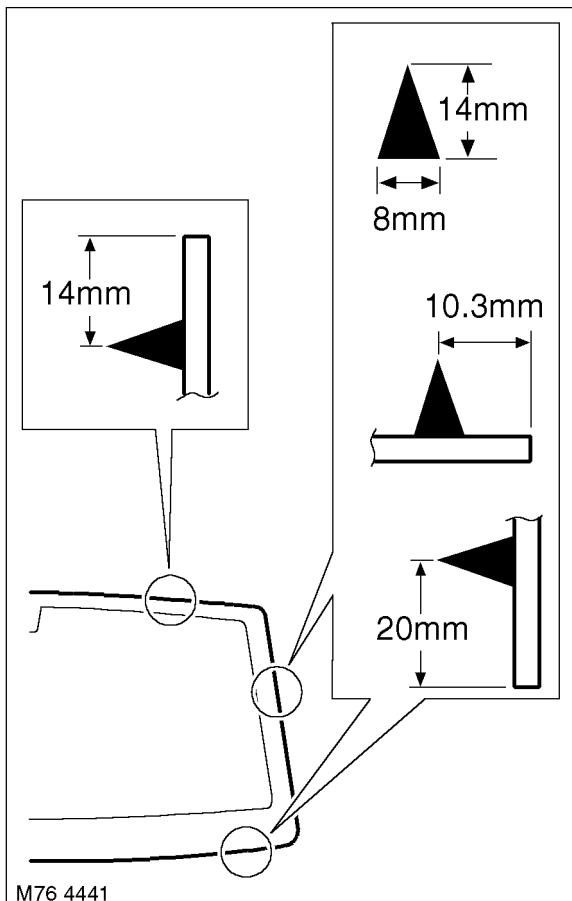
### Refit

1. Carefully remove sealant from body to leave a smooth surface.
2. **Original windscreen:** Carefully cut back sealant to obtain a smooth surface without damage to obscuration band.
3. Fit upper finisher to windscreen.
4. Fit support blocks to body.
5. Fit windscreen to body and centralise in aperture.



6. Use masking tape to establish reference marks as an alignment aid.
7. Remove windscreen and place on stand.
8. Clean sealant face on body and windscreen with solvent.
9. Apply etch primer to any bare metal on body.
10. Apply primer over etch primer.
11. Apply screen primer to sealant face on windscreen and allow to cure.
12. Apply activator over old sealant on body and allow to cure.

13. Fit pre-cut nozzle to sealer cartridge, remove lid, shake out crystals and fit cartridge to applicator gun. If necessary modify the nozzle to achieve required bead section.



22. Fit windscreen lower finisher.  
 ↗ EXTERIOR FITTINGS, REPAIRS,  
 Lower finisher - windscreen.
23. Fit windscreen side finishers.  
 ↗ EXTERIOR FITTINGS, REPAIRS,  
 Side finisher - windscreen.
24. Fit roof finishers.  
 ↗ EXTERIOR FITTINGS, REPAIRS,  
 Roof moulding.

14. Apply a continuous bead of sealant to windscreen as shown.
15. With assistance, fit and align windscreen. Lightly press windscreen to seat sealer.
16. Remove protective covers and tape.
17. Test sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around glass and check for leaks. Mark any area that leaks. Dry glass and sealer then apply additional sealer.
18. Connect screen heater multiplugs and align harness.
19. Fit 'A' post upper finishers.  
 ↗ INTERIOR FITTINGS, REPAIRS,  
 Trim finisher - 'A' post - upper.
20. Fit rain sensor, if fitted.  
 ↗ WIPERS AND WASHERS, REPAIRS,  
 Sensor - rain.
21. Fit interior mirror.  
 ↗ INTERIOR FITTINGS, REPAIRS,  
 Mirror - interior.

# SCREENS

## Glass - quarter light - rear

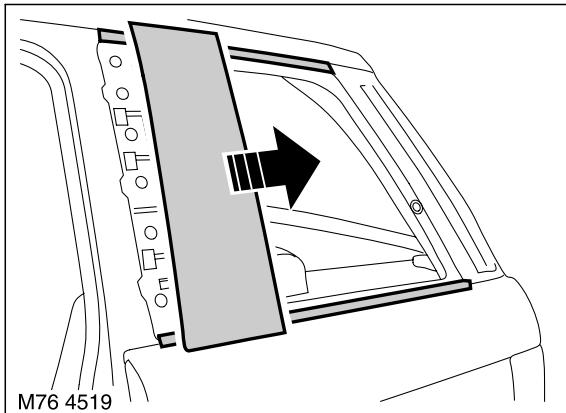
### 76.81.20

The following equipment is required:

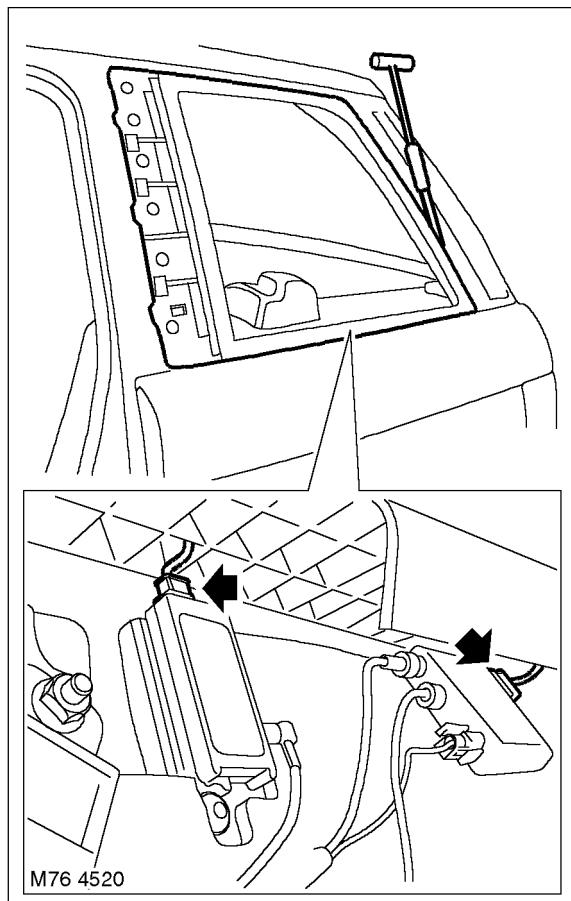
- Cutting wire and handles
- Kent knife
- Glass replacement kit
- Sealant applicator gun
- A felt covered table or stand to support glass

### Remove

1. Remove 'E' post finisher.  
 EXTERIOR FITTINGS, REPAIRS,  
Finisher - 'E' post.



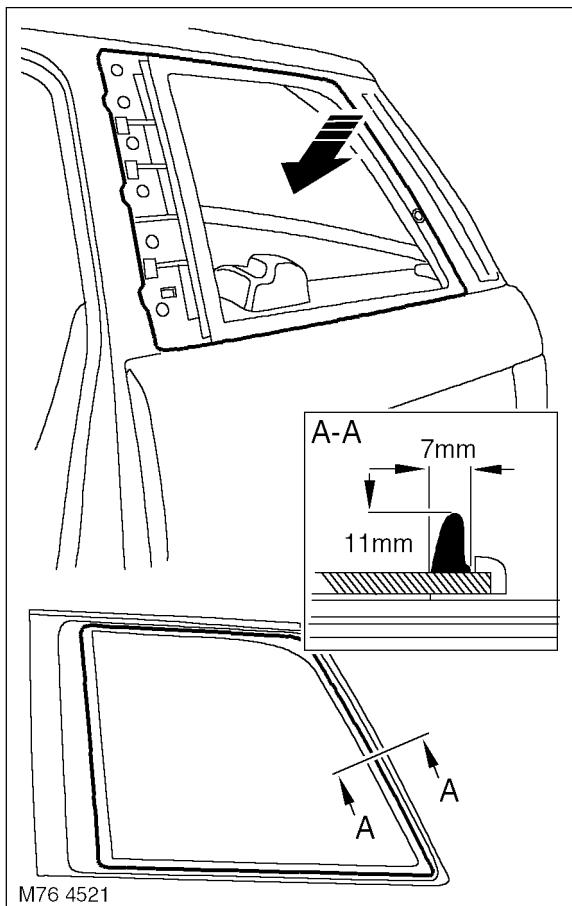
2. Remove quarter light front finisher.
3. Remove rear quarter trim access panel
4. Disconnect receiver multiplug from glass.
5. Protect exterior body work adjacent to quarter light.
6. Protect internal trim adjacent to quarter light.
7. Carefully cut through and remove top and bottom finishers to gain access to glass sealant.



8. From outside of vehicle, use a Kent knife and carefully cut through sealant securing quarter light to body.
9. If necessary, use cutting wire to cut through any remaining sealant.
10. Remove quarter light.

### Refit

1. Carefully remove sealant from body to leave a smooth surface.
2. Clean sealant face on body and quarter light with solvent.
3. Apply etch primer to any bare metal on body.
4. Apply primer over etch primer.
5. Apply screen primer to sealant face on glass and allow to cure.
6. Apply activator over old sealant on body and allow to cure.
7. Fit pre-cut nozzle to sealer cartridge, remove lid, shake out crystals and fit cartridge to applicator gun. If necessary modify the nozzle to achieve required bead section.



8. Apply a continuous bead of sealant to quarter light as shown.
9. Fit and align quarter light to body. Lightly press on glass to seat sealer.
10. Connect receiver multiplug.
11. Fit rear quarter trim access panel
12. Remove protective covers and tape.
13. Test sealer for leaks, apply additional sealer if necessary. If water is used, allow sealer to dry before testing. Spray water around glass and check for leaks. Mark any area that leaks. Dry glass and sealer then apply additional sealer.
14. Fit quarter light front finisher.
15. Fit 'E' post finisher.

 **EXTERIOR FITTINGS, REPAIRS,**  
**Finisher - 'E' post.**

## SCREENS

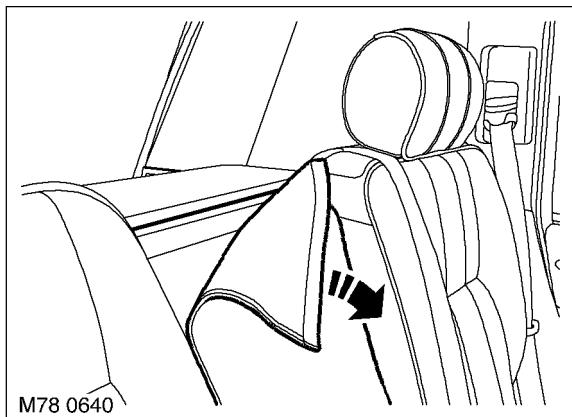
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## Arm rest - rear seat

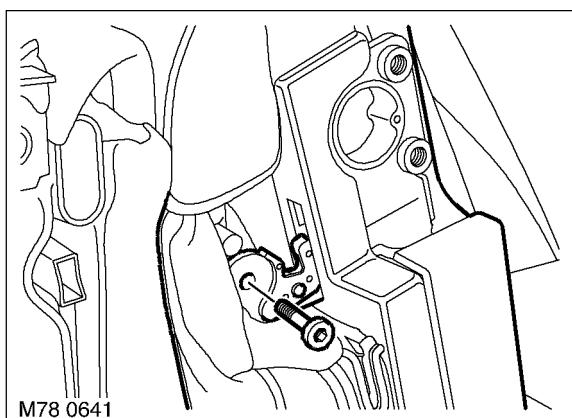
» **78.10.07.99**

### Remove

1. Remove rear seat hinge.
-  **SEATS, REPAIRS, Hinge - rear seat - side.**



2. Release centre catch and fold armrest down.
3. Release velcro strip securing armrest cover to back of squab, fold cover down.



4. Remove Torx bolt from armrest pivot point.
5. Release armrest assembly from LH pivot point boss, remove assembly.

### Refit

1. Position and fit armrest assembly to pivot point boss.
2. Fit and tighten Torx bolt to secure armrest to RH pivot point, tighten to 10 Nm (7 lbf.ft).
3. Position armrest cover and secure velcro strip to back of squab.
4. Reposition armrest and secure in centre catch.
5. Fit rear seat hinge.

 **SEATS, REPAIRS, Hinge - rear seat - side.**

# SEATS

## Front seat

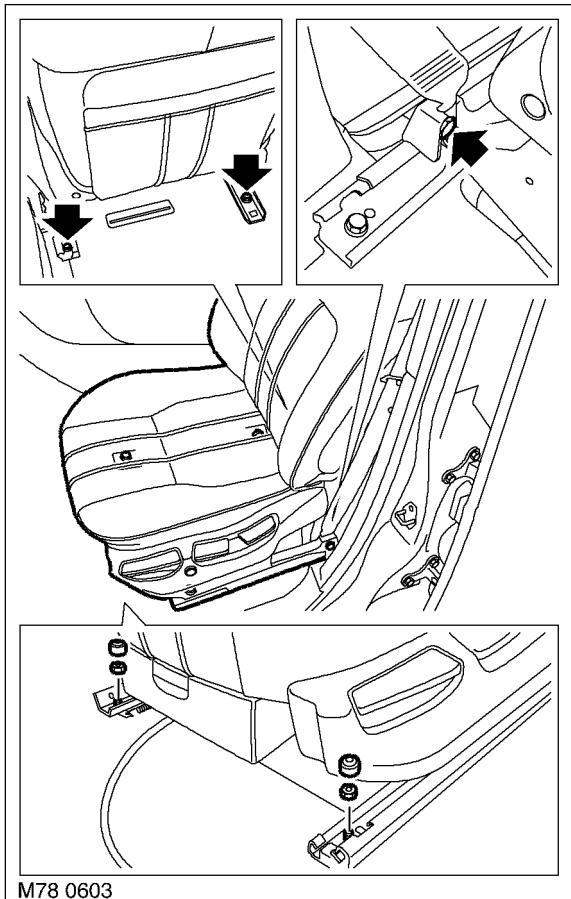
→ 78.10.44.99

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

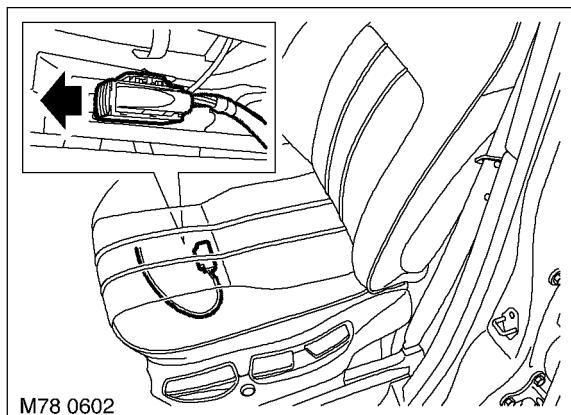
1. Raise seat cushion.



2. Remove bolt securing seat belt to front seat.
3. Remove nut caps and remove 2 nuts securing front of seat.
4. Move the seat forward.
5. Make the SRS system safe.

 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.



6. Release seat harness multiplug from bracket, release and disconnect main harness multiplug.
7. Remove 2 bolts securing rear of seat.
8. Fit protection to sill.
9. With assistance, carefully remove seat.

### Refit

1. Fit front seat.
2. Fit nuts and bolts securing seat and tighten to 45 Nm (33 lbf.ft).
3. Fit caps to nuts.
4. Fit seat belt to seat and tighten bolt to 48 Nm (35 lbf.ft).
5. Connect battery leads, earth lead last.
6. Reposition seat.

## Rear seat

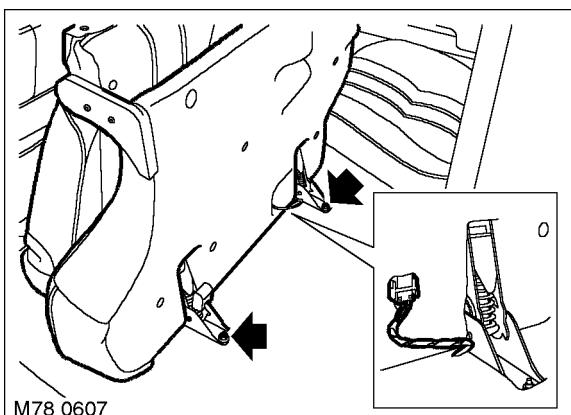
☞ **78.10.48.99**

### Remove

- Fit protection to wheel arch.



- Remove 2 bolts securing rear seat.
- Release rear seat and roll it forwards.



- Disconnect multiplug from seat.
- Remove 2 nuts securing seat and with assistance, carefully remove seat from vehicle.

### Refit

- Fit rear seat in fully folded position and tighten nuts to 25 Nm (18 lbf.ft).
- Connect multiplug to seat.
- Position seat in upright position.
- Fit bolts securing rear seat and tighten to 25 Nm (18 lbf.ft).

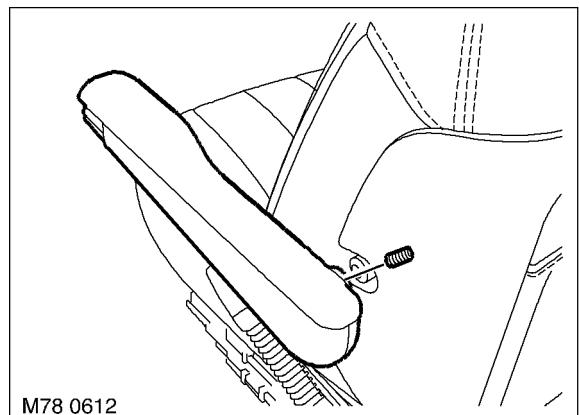
## Cover - one piece - front seat cushion

☞ **78.30.01**

### Remove

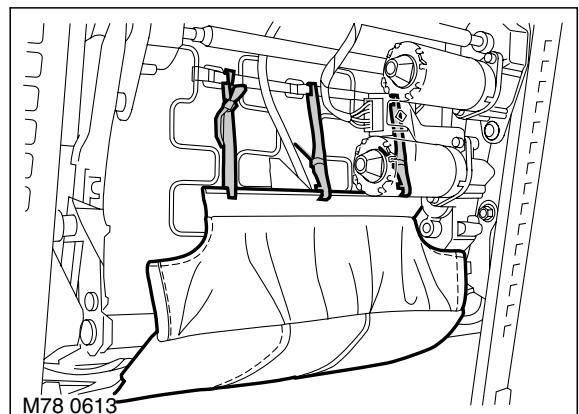
- Remove seat assembly.

 **SEATS, REPAIRS, Front seat.**



- Remove Allen bolt securing arm rest.
- Remove armrest from boss.
- Remove screw securing finisher on inner seat base, remove finisher.
- Remove switch pack assembly.

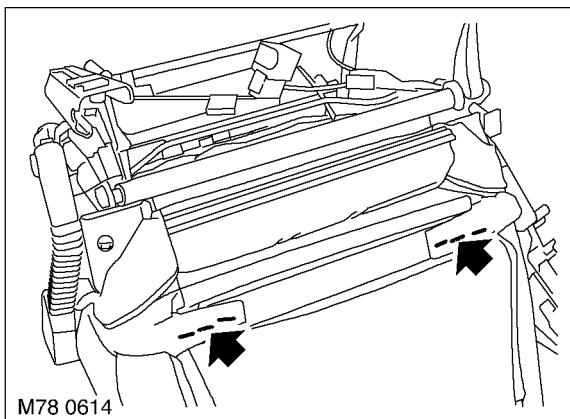
 **SEATS, REPAIRS, Switch pack - seat memory.**



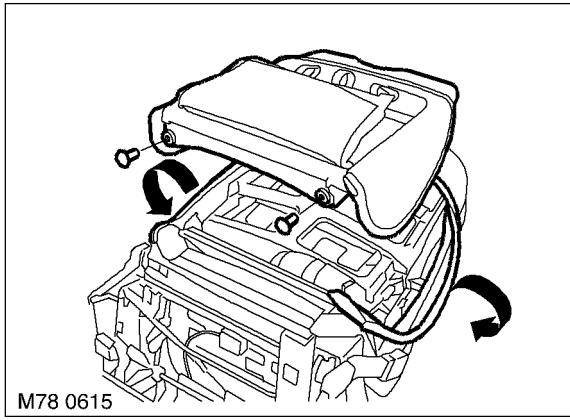
- Release 3 backboard tension straps from under seat.

## SEATS

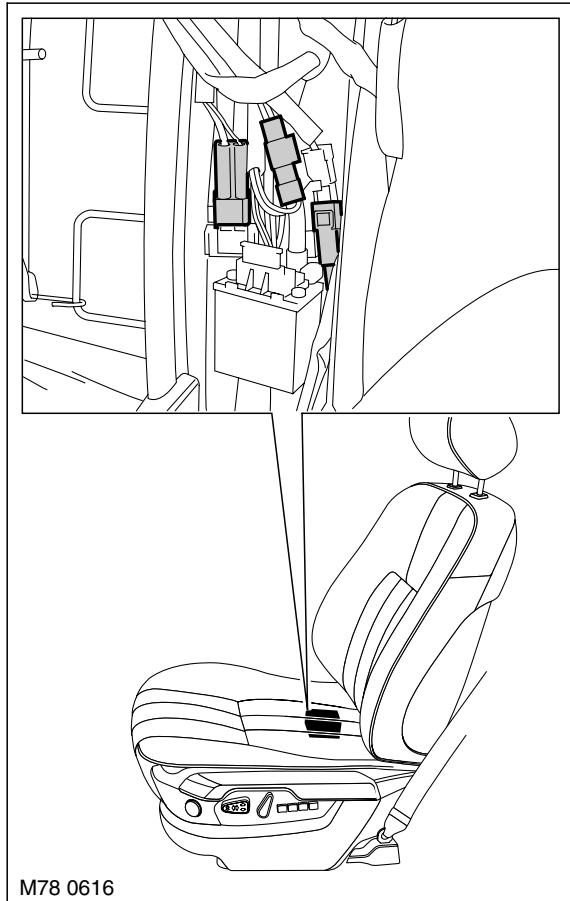
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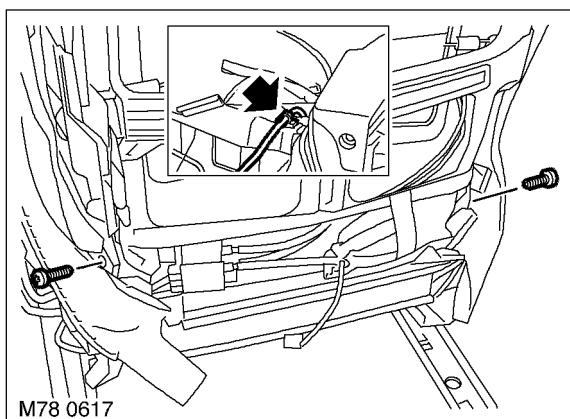
7. Release staples securing squab cover to lower backboard.



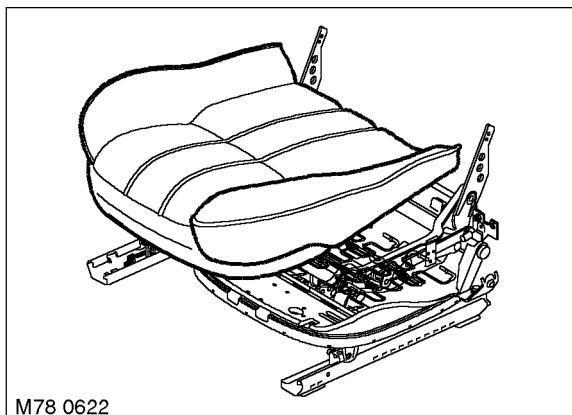
8. Release squab side cover from both sides of backboard.
9. Release 2 studs securing lower half of backboard.
10. Release backboard from seat.



11. Disconnect lumbar harness multiplugs from pump and valve.
12. Disconnect multiplug from heated seat circuit.

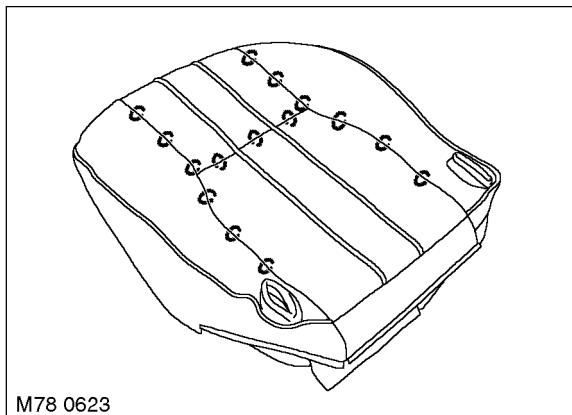


13. Release harness from retaining clip and feed through squab cover.
14. Remove 2 Torx bolts and remove squab frame from seat frame.



10. Fit backboard tension straps to under seat retaining clips.
11. Fit switch pack assembly.  
☞ **SEATS, REPAIRS, Switch pack - seat memory.**
12. Position inner seat base finisher and secure with screw.
13. Fit armrest to boss and secure with Allen bolt, tighten to 25 Nm (18 lbf.ft).
14. Fit seat assembly.  
☞ **SEATS, REPAIRS, Front seat.**

15. Release seat cover beading from rear of frame.
16. Release seat cover beading from sides and front of frame.



17. Remove seat cushion and cover assembly.
18. Remove 15 hog rings securing cover to cushion, remove cover.

#### Refit

1. Position cover to cushion and secure with hog rings.
2. Position and secure cover and cushion assembly to frame.
3. Position squab frame to seat frame, fit Torx bolts tighten to 25 Nm (18 lbf.ft).
4. Route lumbar harness through squab cover and secure to frame.
5. Connect multiplug to heated seat circuit.
6. Connect lumbar harness multiplugs to pump and valve.
7. Position backboard to seat assembly, fit studs securing lower of backboard.
8. Position and fit both sides of squab cover to backboard.
9. Position lower squab cover to backboard and staple.

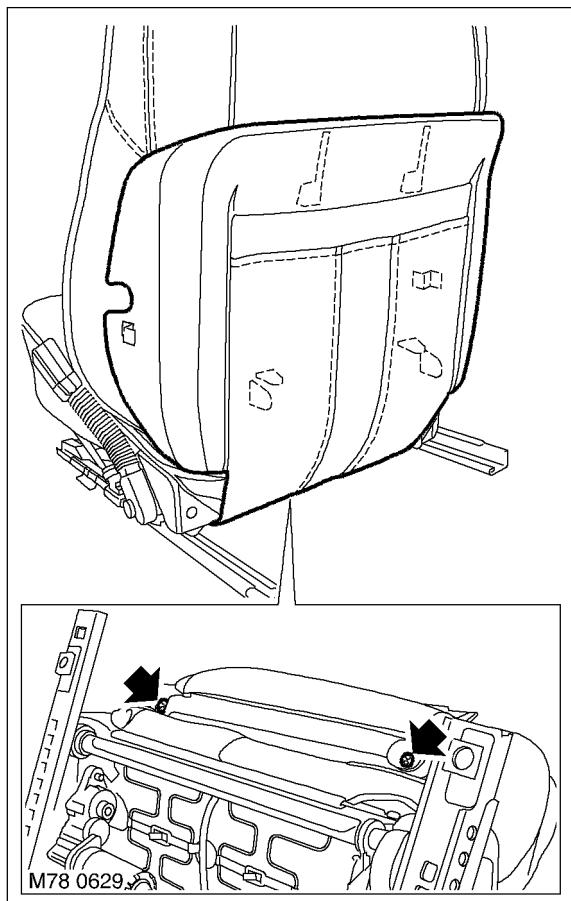
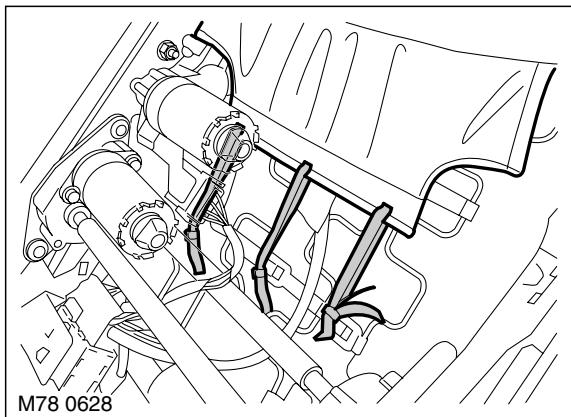
# SEATS

## Cover - one piece - front seat cushion - models with adjustable upper squab

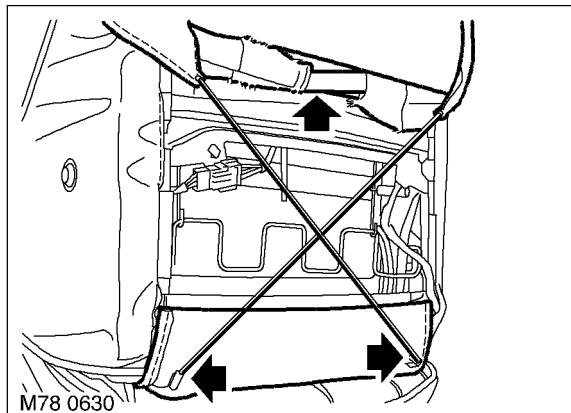
→ 78.30.02

### Remove

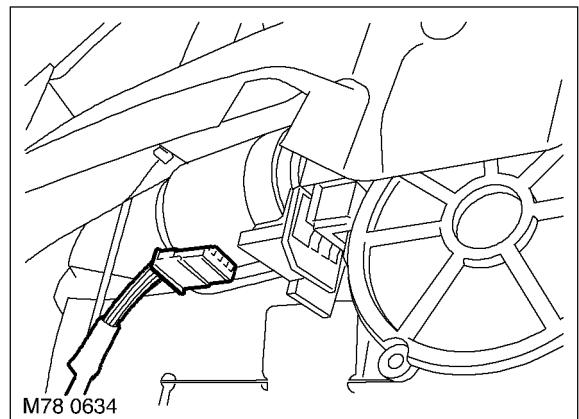
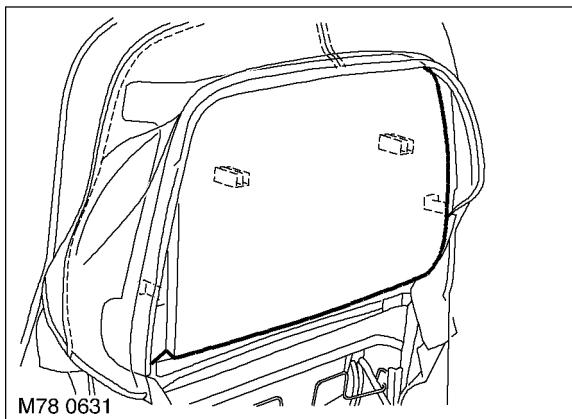
1. Remove seat assembly.  
→ SEATS, REPAIRS, Front seat.
2. Remove switch pack assembly.  
→ SEATS, REPAIRS, Switch pack - seat memory.
3. Remove screw securing finisher on inner seat base, remove finisher.



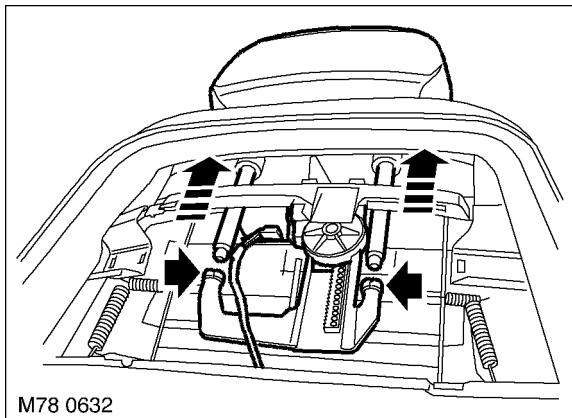
4. Release 3 backboard tension straps from under seat.
5. Remove 2 screws securing lower squab finisher.
6. Release lower finisher from 6 retaining clips and remove.



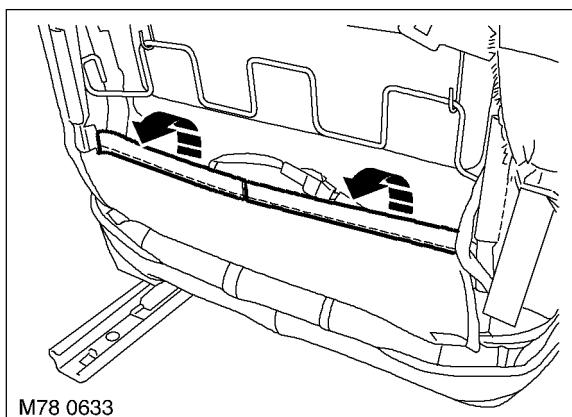
7. Disconnect 2 tension straps securing upper squab cover.
8. Release velcro strip securing squab cover.



9. Release beading from squab cover finisher.
10. Release finisher from 4 retaining clips and remove.

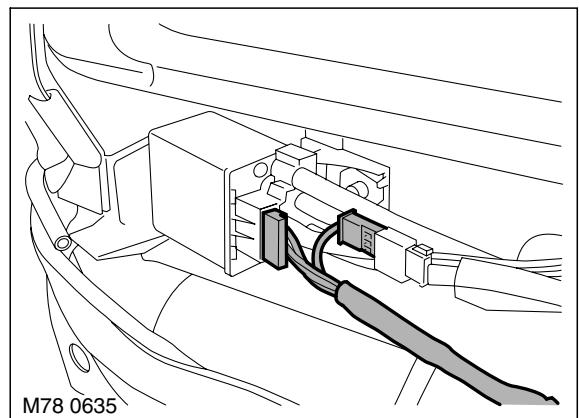


11. Carefully release 2 retaining clips securing headrest to motor housing.
12. Remove headrest.



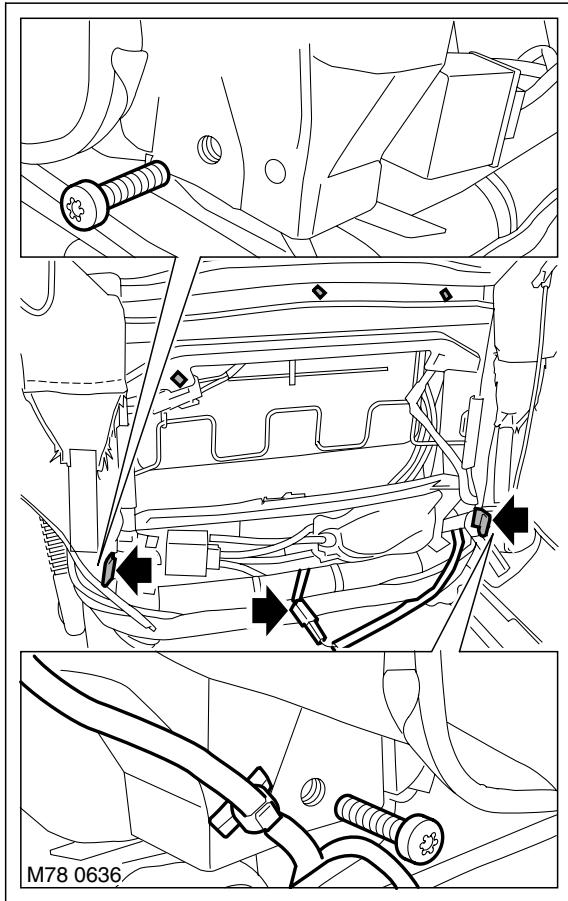
13. Release retaining strip securing squab cover to lower frame.

14. Disconnect multiplugs from headrest and upper squab motors.

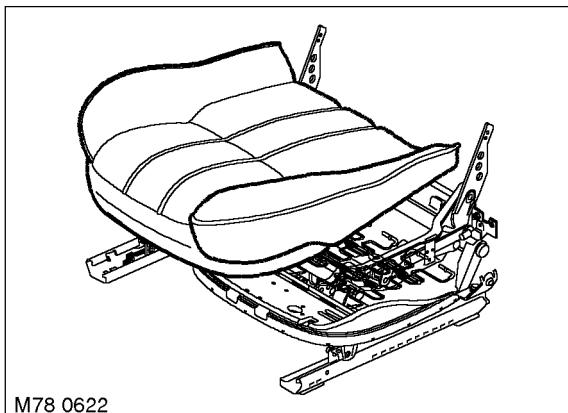


15. Disconnect multiplugs from lumbar pump and valve.

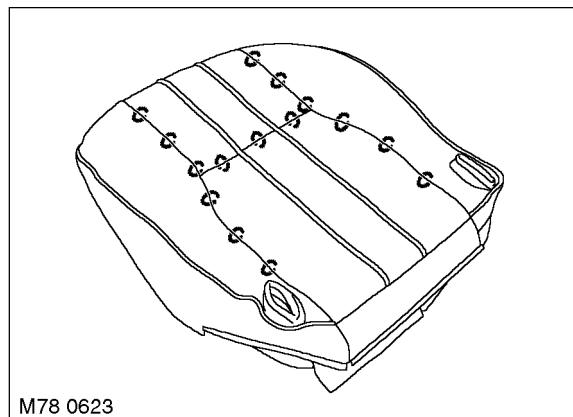
## SEATS



16. Disconnect multiplug from heated seat circuit.
17. Release 2 retaining strips, securing both sides of lower squab cover to frame.
18. Release squab harness from 4 retaining clips.
19. Remove 2 Torx bolts securing squab frame to seat frame.
20. Remove squab assembly from seat assembly.



21. Release seat cover beading from sides and front of frame.
22. Remove seat cover and pad from frame.



23. Remove 15 hog rings securing cover to cushion, remove cover.

### Refit

1. Position cover to cushion and secure with hog rings.
2. Position and secure cover and cushion assembly to frame.
3. Position and fit squab assembly to seat assembly.
4. Fit squab frame to seat frame, secure with Torx bolts tighten to 25 Nm (18 lbf.ft).
5. Fit retaining strips securing both sides of lower squab cover.
6. Connect multiplug to heated seat circuit.
7. Secure squab harness to retaining clips
8. Connect lumbar harness multiplugs to pump and valve.
9. Connect multiplugs to headrest and squab motor.
10. Fit retaining strip securing lower squab cover to frame.
11. Fit headrest and secure to motor housing.
12. Position upper finisher and secure retaining clips.
13. Secure squab cover beading to finisher.
14. Secure squab cover velcro strip
15. Connect tension straps securing upper squab cover.
16. Position lower finisher and secure retaining clips
17. Fit screws securing lower squab finisher.
18. Fit backboard tension straps to under seat retaining clips.
19. Position inner seat base finisher and secure with screw.
20. Fit switch pack assembly.

**SEATS, REPAIRS, Switch pack - seat memory.**

21. Fit seat assembly.

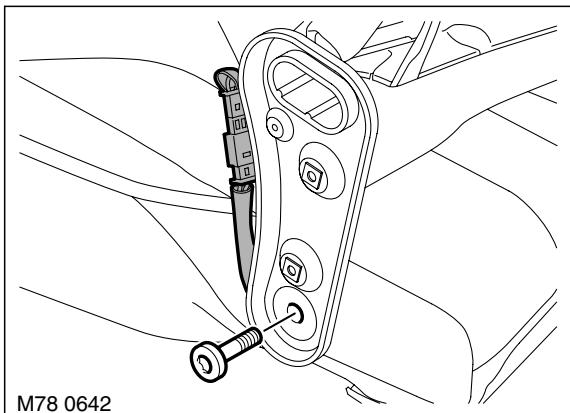
**SEATS, REPAIRS, Front seat.**

## Cover - rear seat cushion - RH

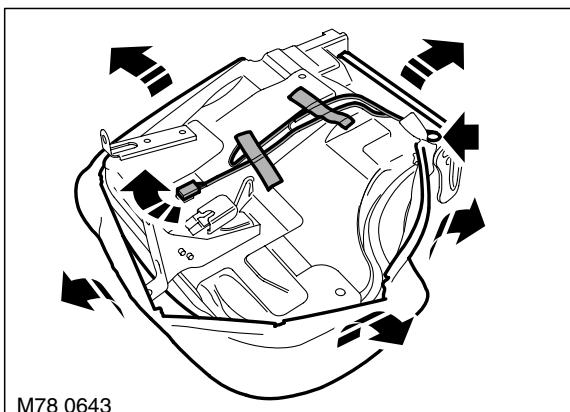
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### Remove

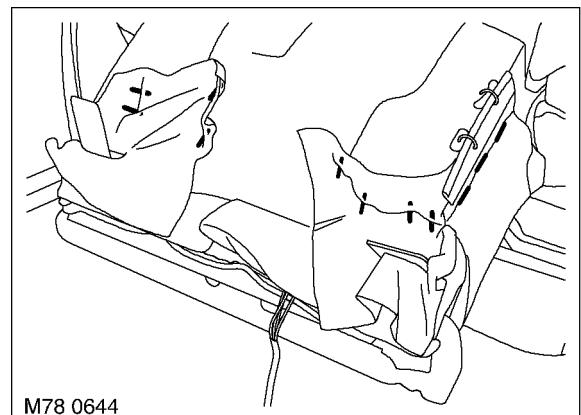
1. Remove seat base finisher.  
 **SEATS, REPAIRS, Finisher - seat base rear.**
2. Remove seat fold mechanism.  
 **SEATS, REPAIRS, Hinge - rear seat - side.**



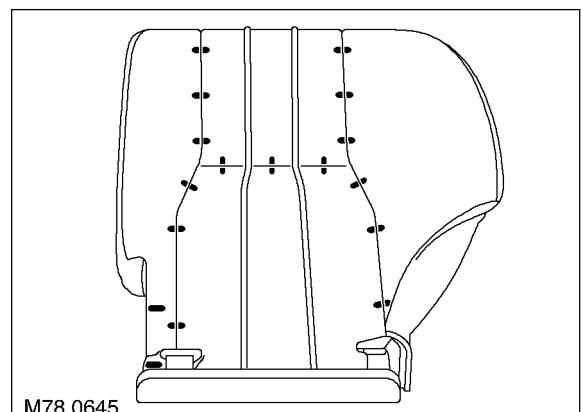
3. Disconnect multiplug from squab harness.
4. Remove Torx bolt securing squab frame to seat frame, separate frames.



5. Release seat cover both sides and front beading, raise cover and cushion.
6. Release heated seat harness multiplug from retaining clip and feed harness through frame.
7. Release 1 stud and rear beading securing seat cover to frame, remove cover and cushion.



8. Release 11 staples securing seat cover to cushion.



9. Remove 16 hog rings securing cover to cushion, remove cover.

### Refit

1. Position seat cover to cushion and secure with hog rings.
2. Fit 11 staples securing cover under cushion.
3. Position cushion to frame and secure rear of cover.
4. Fit stud securing rear cover.
5. Feed heated seat harness through seat frame and secure multiplug to retaining clip.
6. Fit seat cover sides and front beading.
7. Fit Torx bolt securing squab frame to seat frame, tighten to 45 Nm (33 lbf.ft).
8. Connect multiplug to squab harness.
9. Fit seat fold mechanism.  
 **SEATS, REPAIRS, Hinge - rear seat - side.**
10. Fit seat base finisher.  
 **SEATS, REPAIRS, Finisher - seat base rear.**

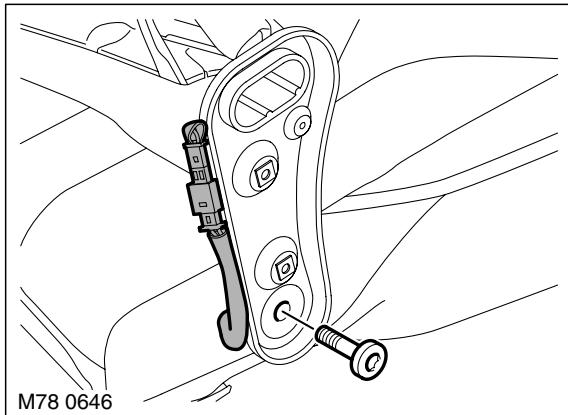
# SEATS

## Cover - rear seat cushion - LH

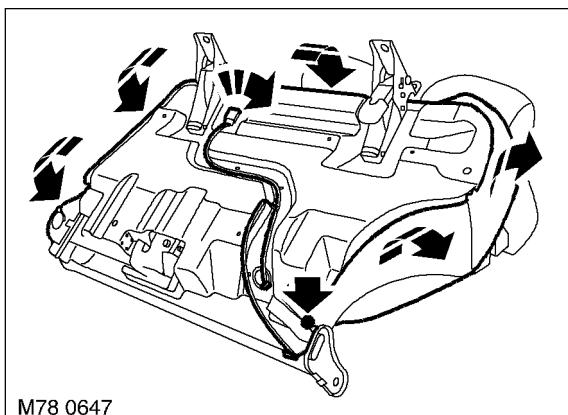
☛ 78.40.05

### Remove

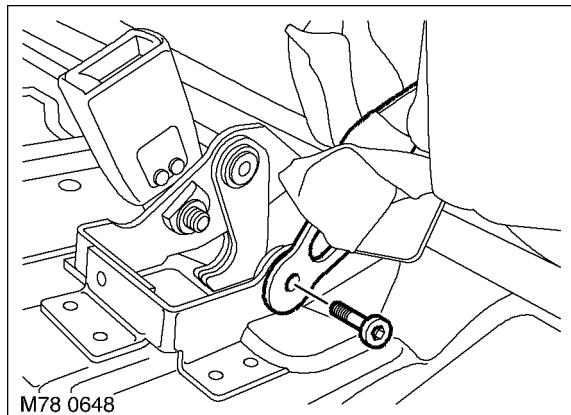
1. Remove LH seat base finisher.  
☞ SEATS, REPAIRS, Finisher - seat base rear.
2. Remove seat fold mechanism.  
☞ SEATS, REPAIRS, Hinge - rear seat - side.



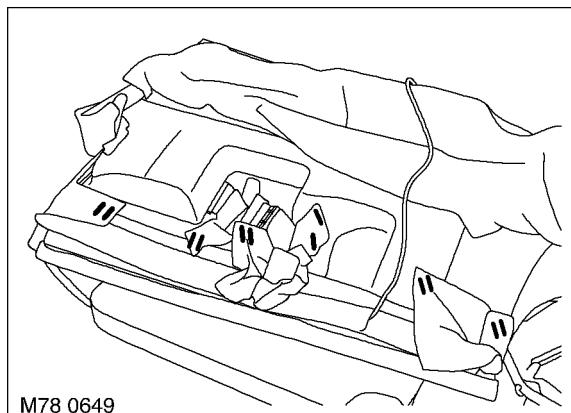
3. Disconnect multiplug from squab harness.
4. Remove Torx bolt securing squab frame to seat frame, separate frames.



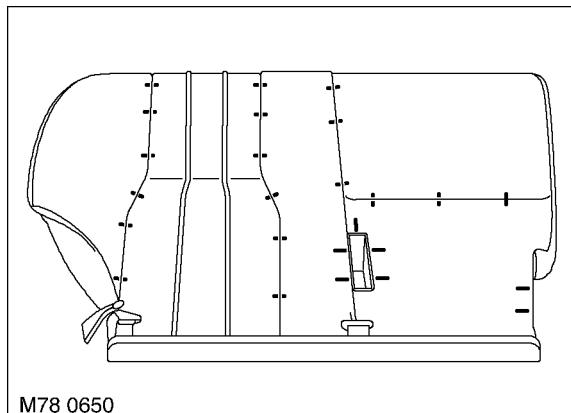
5. Release seat cover both sides and front beading, raise cover and cushion.
6. Release heated seat harness multiplug from retaining clip and feed harness through frame.



7. Remove and discard Torx bolt securing seat belt to seat base frame.
8. Release seat belt from seat cushion and cover.
9. Release stud and rear beading securing seat cover to frame, remove cover and cushion.



10. Release 11 staples securing seat cover to cushion.



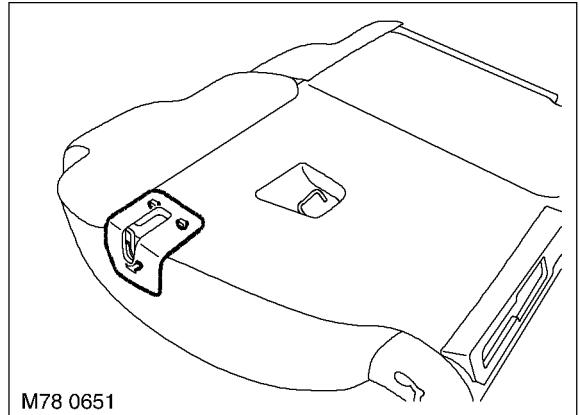
11. Release 25 hog rings securing cover to cushion and remove cover.

**Refit**

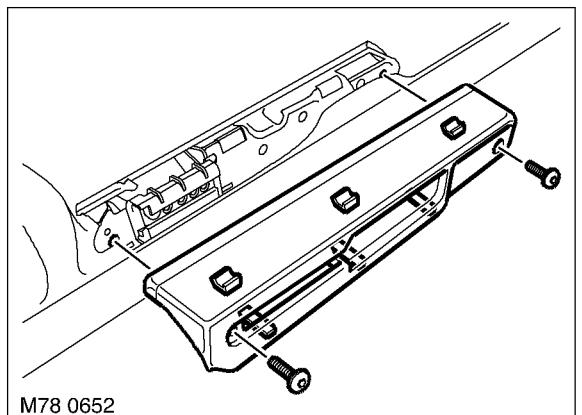
1. Position seat cover to cushion and secure with hog rings.
  2. Fit 14 staples securing cover under cushion.
  3. Position cushion to frame and secure rear of cover.
  4. Fit stud securing rear cover.
  5. Feed heated seat harness through seat frame and secure multiplug to retaining clip.
  6. Position seatbelt lower buckle to frame and secure with Torx bolt tighten to 31 Nm (23 lbf.ft).
  7. Fit seat cover sides and front beading.
  8. Fit Torx bolt securing squab frame to seat frame, tighten to 45 Nm (33 lbf.ft).
  9. Connect multiplug to squab harness.
  10. Fit seat fold mechanism.
-  **SEATS, REPAIRS, Hinge - rear seat - side.**
11. Fit seat base finisher.
-  **SEATS, REPAIRS, Finisher - seat base rear.**

**Finisher - rear seat squab**

 **78.55.03**

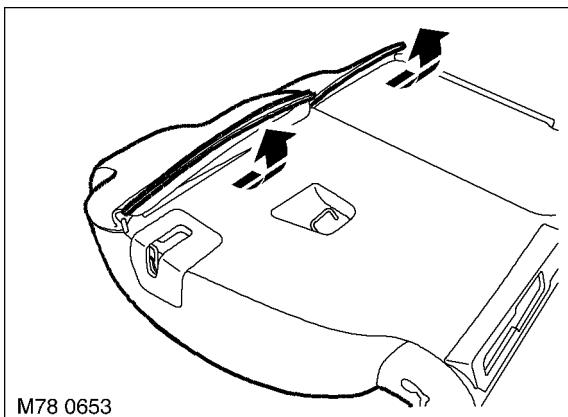
**Remove**

1. Fold rear seat forward.
2. Release 3 clips securing latch finisher, remove finisher.

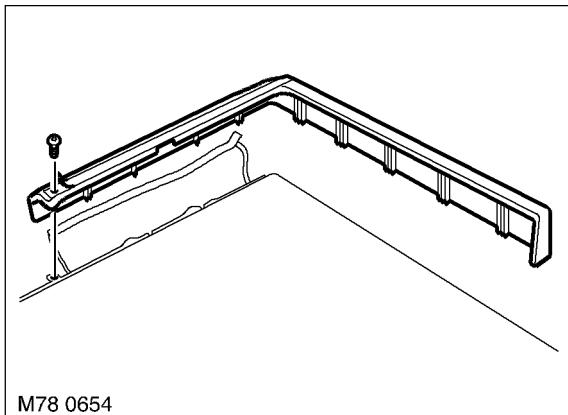


3. Remove 2 screws securing lower squab finisher.
4. Release 3 retaining clips securing finisher and remove finisher.

# SEATS



5. Carefully release squab cover beading from top of rear squab frame.



6. Release velcro to reveal screw securing rear armrest trim to squab finisher, remove screw.
7. Carefully release 11 retaining clips securing armrest rear finisher to front finisher, remove finisher.
8. Carefully prise back finisher, releasing adhesive.
9. Remove finisher from squab.

## Refit

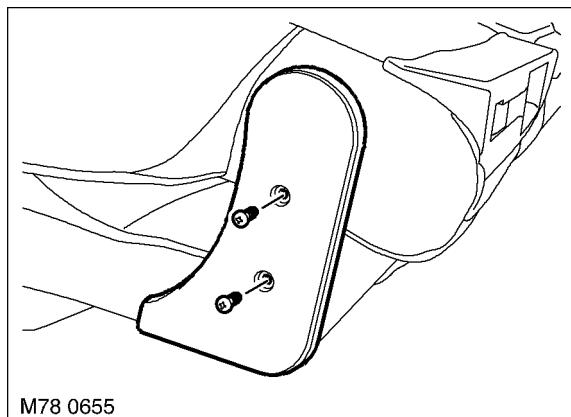
1. Apply suitable adhesive to finisher.
2. Position and fit finisher to squab.
3. Position armrest rear finisher and secure retaining clips.
4. Fit screw securing armrest rear finisher and fit velcro.
5. Position and fit top cover beading to squab frame.
6. Position rear lower squab finisher and secure retaining clips.
7. Fit screws securing lower squab finisher.
8. Position latch finisher and secure clips.
9. Reposition rear seat.

## Finisher - seat base rear

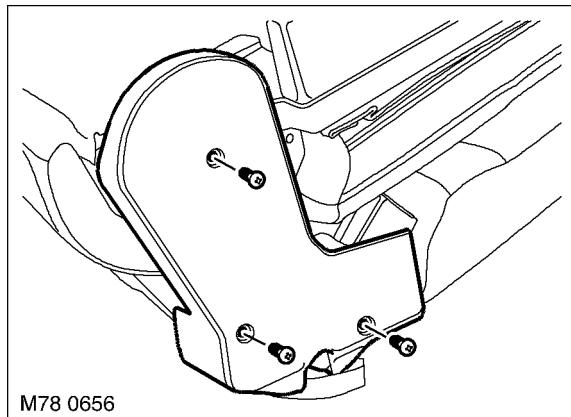
☛ 78.55.08

### Remove

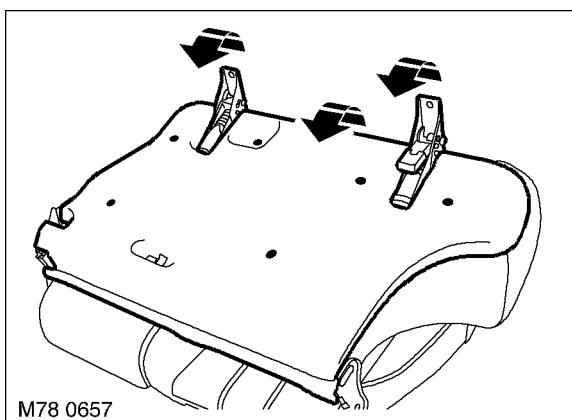
1. Remove LH rear seat.  
☞ SEATS, REPAIRS, Rear seat.



2. Remove 2 screws securing RH seat fold mechanism finisher and remove finisher.



3. Remove 3 screws securing LH seat fold mechanism finisher and remove finisher.



4. Remove 6 scrivets securing finisher.
5. With assistance, push back both spring loaded seat hinges and remove finisher.

#### Refit

1. With assistance, push back on both hinges, position and fit finisher.
2. Fit scrivets to secure finisher.
3. Position LH seat fold mechanism finisher, secure with screws.
4. Position RH seat fold mechanism finisher, secure with screws.
5. Fit LH rear seat.

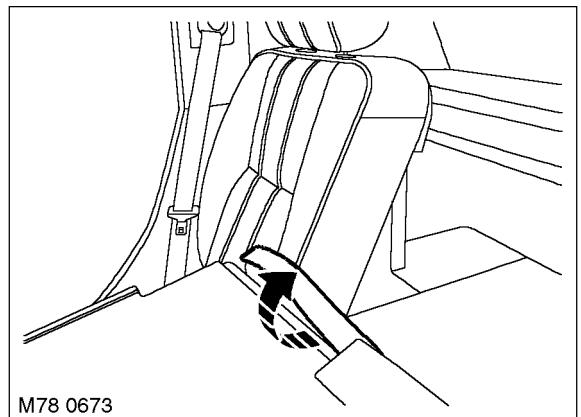
 **SEATS, REPAIRS, Rear seat.**

## Finisher - arm rest - rear seat - front

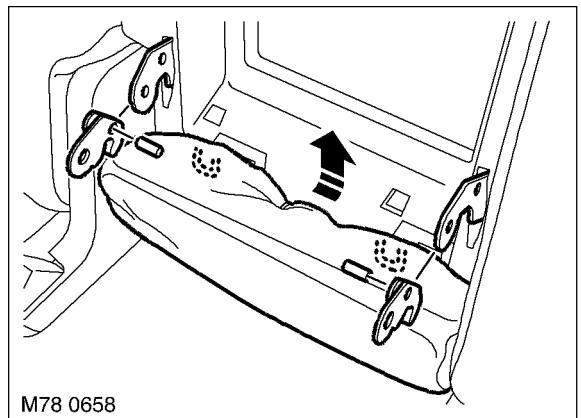
 **78.55.14**

#### Remove

1. Remove armrest assembly.  
 **SEATS, REPAIRS, Arm rest - rear seat.**

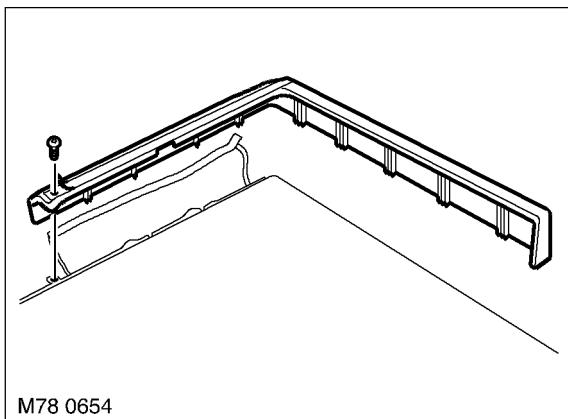


2. Release bolster cover lower beading from squab frame.

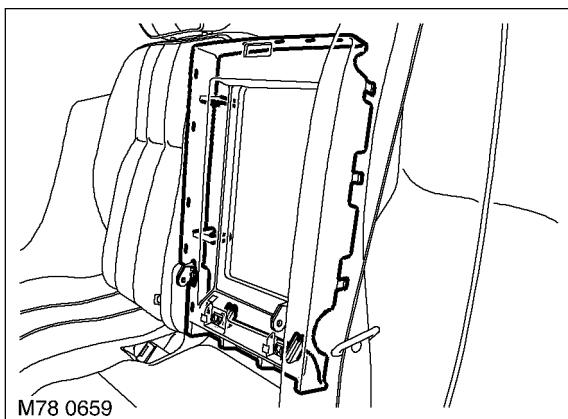


3. Release bolster assembly from 2 retaining clips, remove assembly.
4. Remove both clevis pins securing LH and RH pivot finishers.
5. Release both finishers from pivot points.

## SEATS



6. Release velcro to reveal screw securing rear armrest trim to squab finisher, remove screw.
7. Carefully release 11 retaining clips securing armrest rear finisher to front finisher, remove finisher.



8. Carefully release 7 retaining clips securing armrest finisher, remove finisher.

### Refit

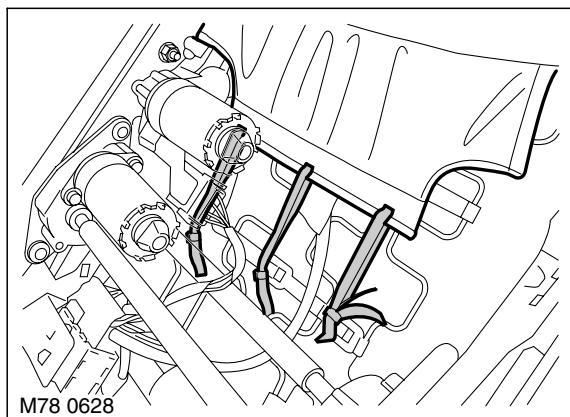
1. Position finisher and secure retaining clips.
2. Position both finishers to pivot points, secure with clevis pins.
3. Position armrest rear finisher and secure retaining clips.
4. Fit screw securing rear armrest finisher and fit velcro.
5. Position and secure bolster assembly to retaining clips.
6. Fit and secure bolster cover lower beading to frame.
7. Fit armrest assembly.  
     **SEATS, REPAIRS, Arm rest - rear seat.**

### Backboard - front seat - models with adjustable upper squab

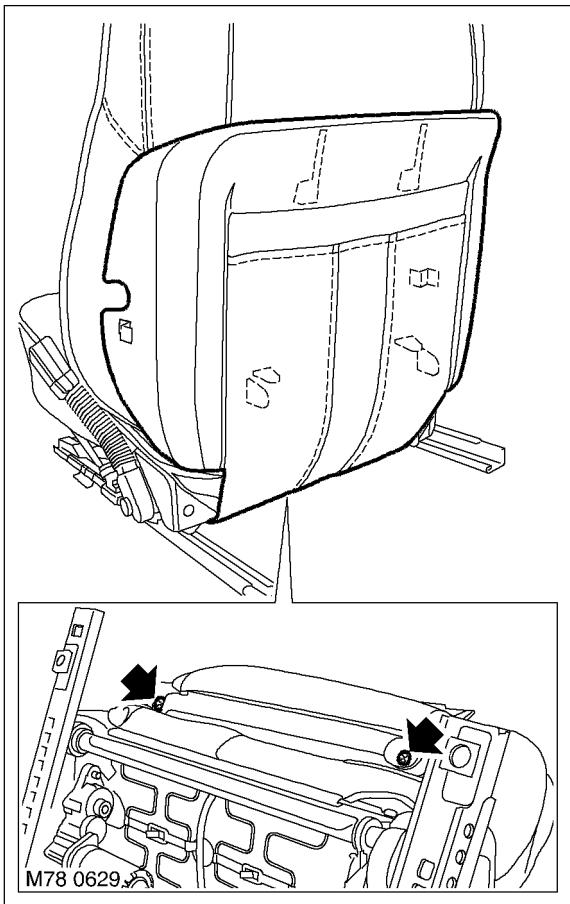
 **78.55.18**

#### Remove

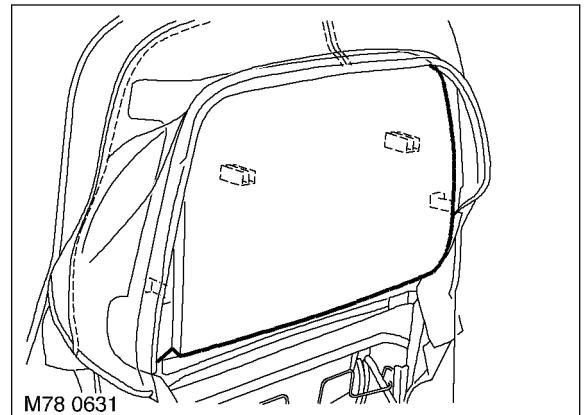
1. Remove seat assembly.  
     **SEATS, REPAIRS, Front seat.**



2. Release 3 backboard tension straps from under seat.



3. Remove 2 screws securing lower squab finisher.
4. Release lower finisher from 6 retaining clips and remove finisher.

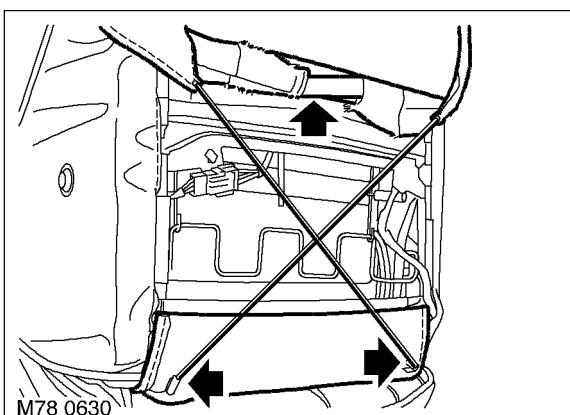


7. Release beading from squab cover finisher.
8. Release finisher from 4 retaining clips and remove backboard.

#### Refit

1. Position upper squab cover finisher and secure retaining clips.
2. Secure squab cover beading to finisher.
3. Secure squab cover velcro strip.
4. Connect tension straps securing squab cover.
5. Position lower finisher and secure retaining clips.
6. Fit screws securing lower finisher.
7. Fit backboard tension straps to under seat retaining clips.
8. Fit seat assembly.

 SEATS, REPAIRS, Front seat.



5. Disconnect 2 tension straps securing upper squab cover.
6. Release velcro strip securing squab cover.

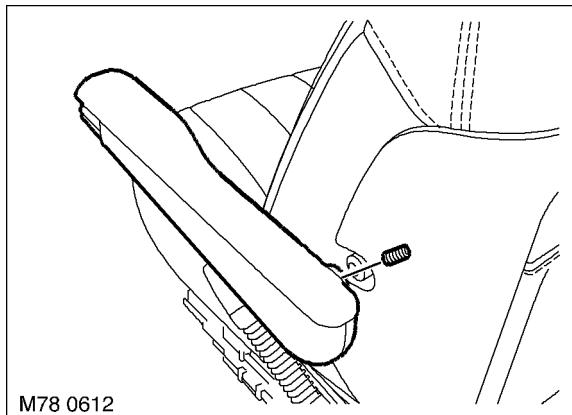
# SEATS

## Bladder - lumbar support - front seat

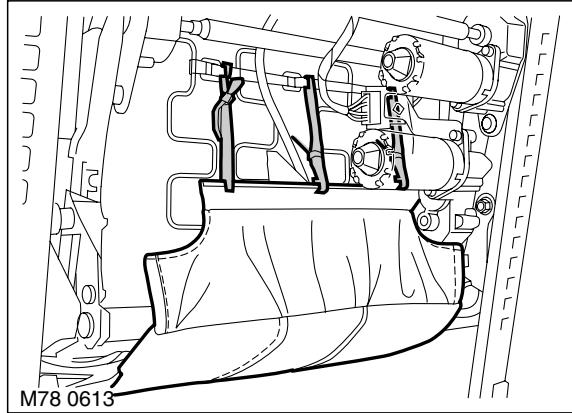
→ 78.60.01

### Remove

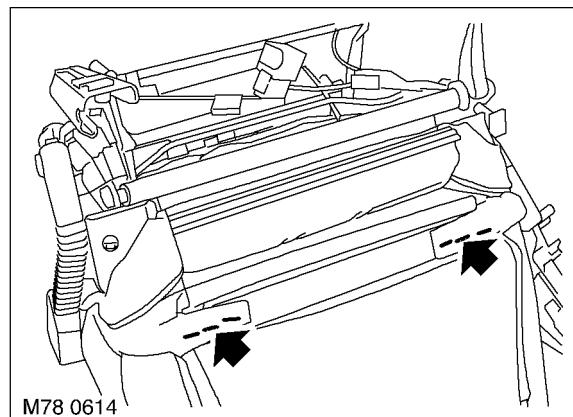
1. Remove seat assembly.  
↙ SEATS, REPAIRS, Front seat.



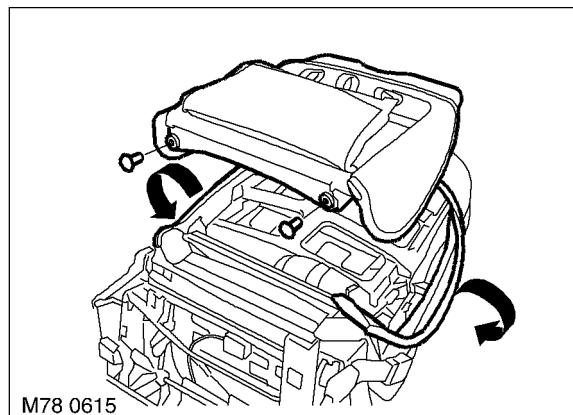
2. Remove Allen bolt securing arm rest.
3. Remove armrest from boss.



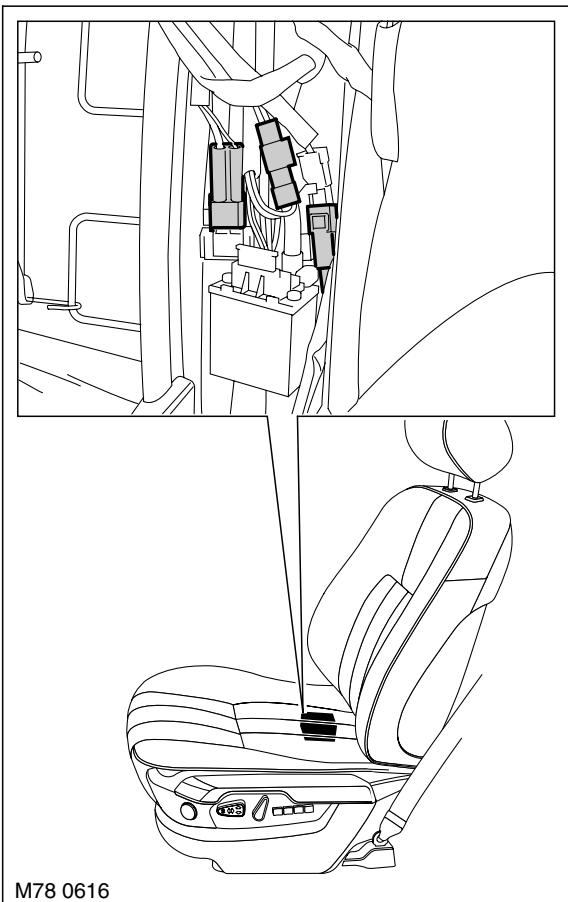
4. Remove headrest.
5. Release 3 backboard tension straps from under seat.



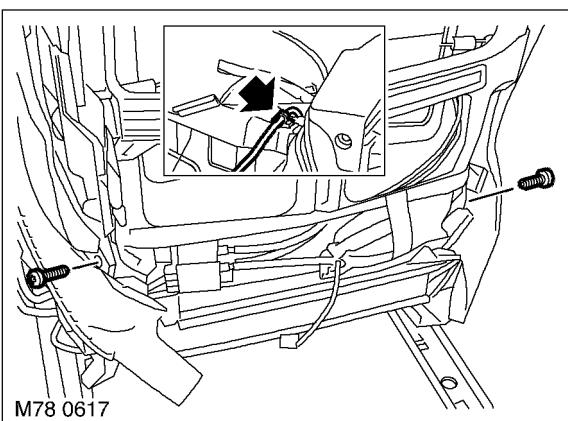
6. Release staples securing squab cover to lower backboard.



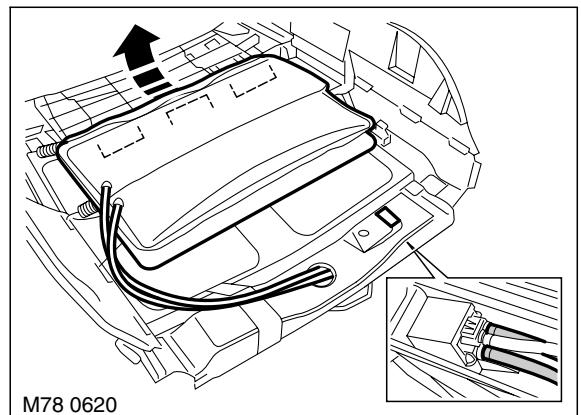
7. Release squab side cover from both sides of backboard.
8. Release 2 studs securing lower half of backboard.
9. Release backboard from seat.



10. Disconnect multiplugs from lumbar pump and valve.
11. Disconnect multiplug from heated seat circuit.



12. Release harness from retaining clip and feed harness through squab cover.
13. Remove 2 Torx bolts and remove squab frame from seat frame.
14. Raise front of squab cover to gain access to lumbar bladder.



15. Disconnect vacuum and pressure pipes from bladder.
16. Release bladder from frame.

#### Refit

1. Fit and secure bladder to frame.
2. Connect vacuum and pressure pipes to bladder.
3. Position squab frame to seat frame, fit Torx bolts tighten to 25 Nm (18 lbf.ft).
4. Route lumbar harness through squab cover and secure to frame.
5. Connect multiplug to heated seat circuit.
6. Connect lumbar harness multiplugs to lumbar pump and valve.
7. Position backboard to seat assembly, fit studs securing lower of backboard.
8. Position and fit both sides of squab cover to backboard.
9. Position lower squab cover to backboard and staple.
10. Fit backboard tension straps to under seat retaining clips.
11. Fit armrest to boss and secure with Allen bolt, tighten to 25 Nm (18 lbf.ft).
12. Fit seat assembly.

 **SEATS, REPAIRS, Front seat.**

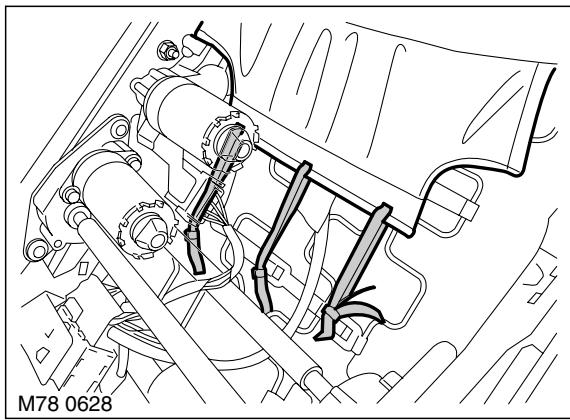
## SEATS

### Bladder - lumbar support - front seat - models with adjustable upper squab

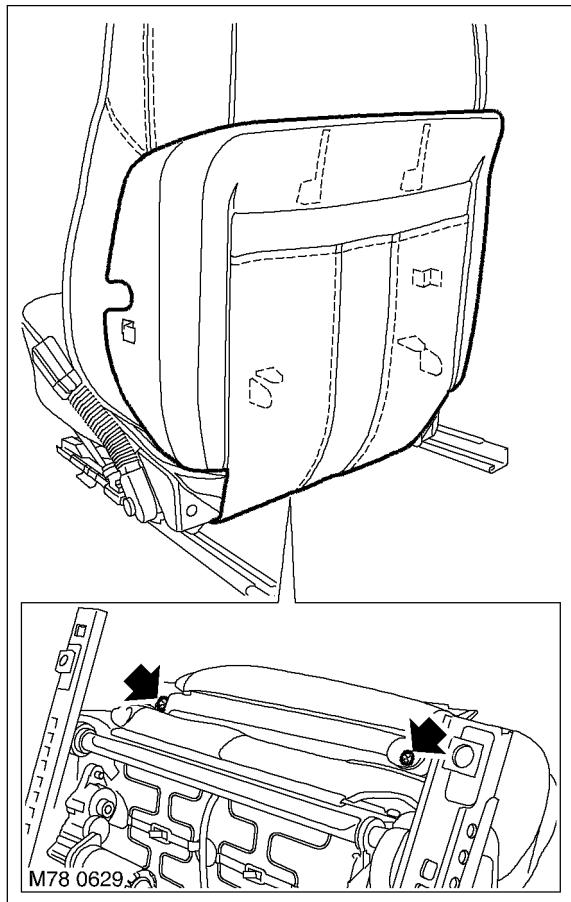
☛ 78.60.02

#### Remove

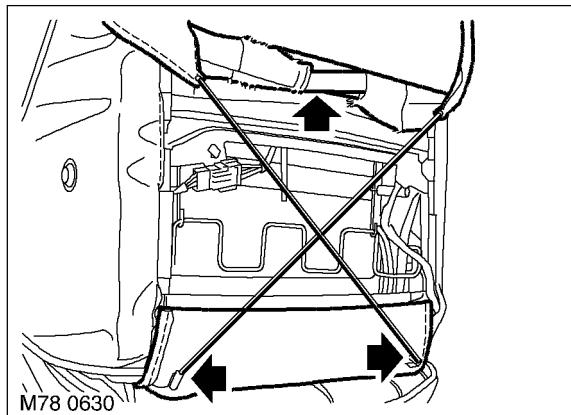
1. Remove seat assembly.  
 SEATS, REPAIRS, Front seat.



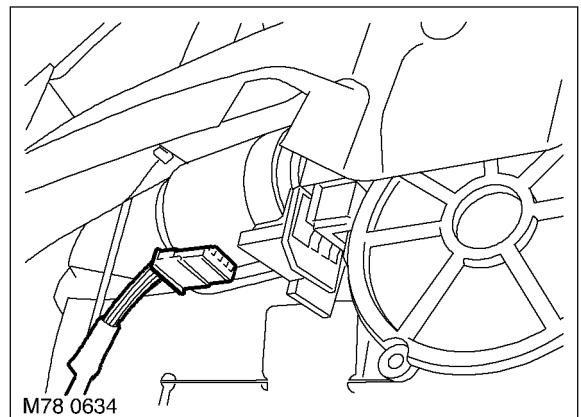
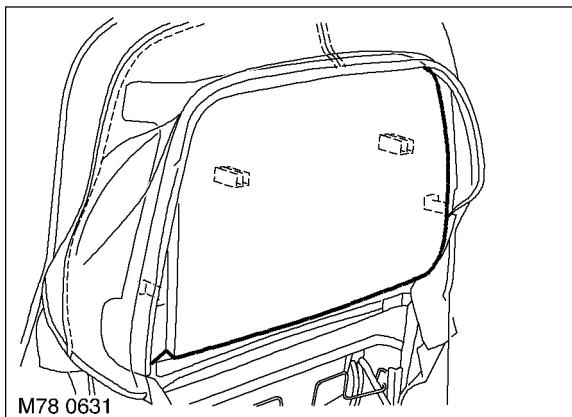
2. Release 3 backboard tension straps from under seat.



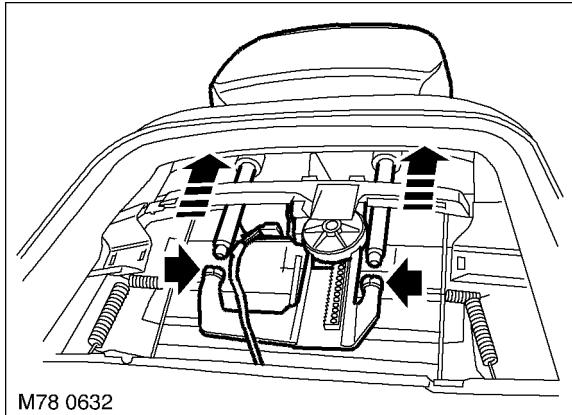
3. Remove 2 screws securing lower squab finisher.
4. Release lower finisher from 6 retaining clips and remove.



5. Disconnect 2 tension straps securing upper squab cover.
6. Release velcro strip securing squab cover.

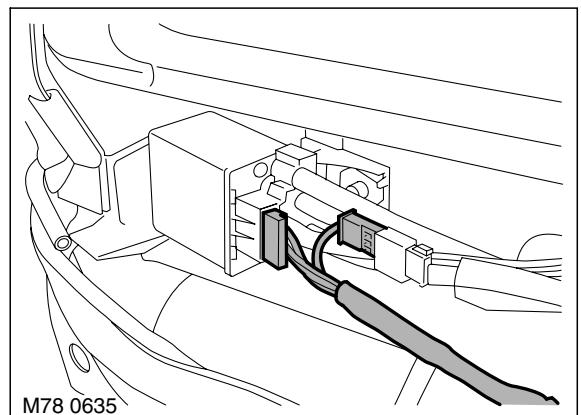


7. Release beading from squab cover finisher.
8. Release finisher from 4 retaining clips and remove.

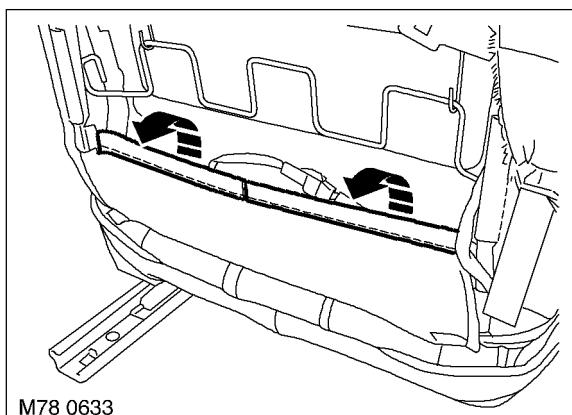


9. Carefully release 2 retaining clips securing headrest to motor housing.
10. Remove headrest.

12. Disconnect multiplugs from headrest and upper squab motors.

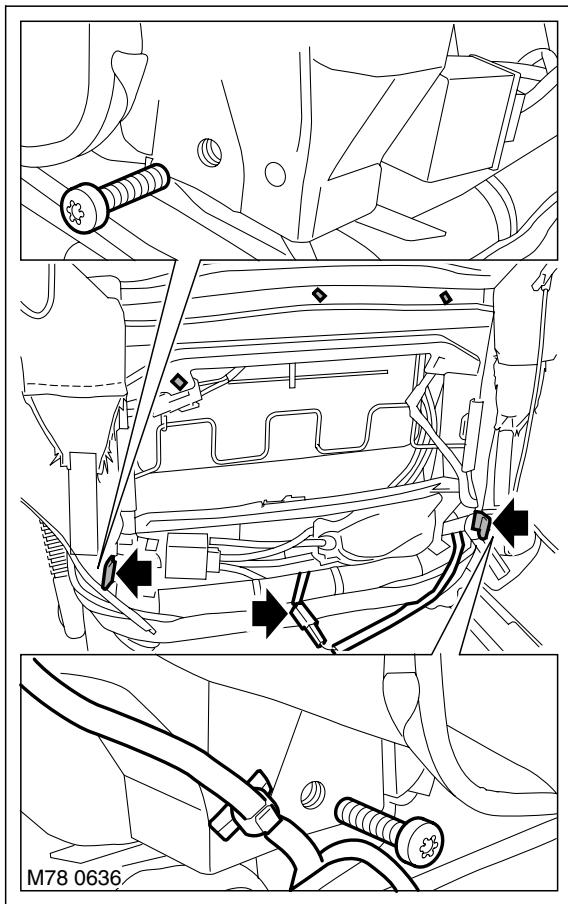


13. Disconnect harness multiplugs from lumbar pump and valve.
14. Release squab harness from 4 retaining clips.

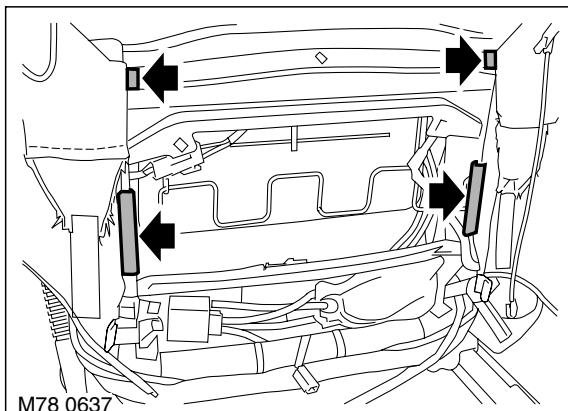


11. Release retaining strip securing squab cover to lower frame.

# SEATS



15. Disconnect multiplug from heated seat circuit.
16. Release 2 retaining strips, securing both sides of lower squab cover to frame.
17. Remove 2 Torx bolts securing squab frame to seat frame.
18. Remove squab assembly from seat assembly.



19. Release 4 retaining strips securing both sides of squab assembly to frame.
20. Disconnect 3 multiplugs from heated seat circuit.

21. Raise front of squab cover to gain access to lumbar bladder.
22. Disconnect vacuum and pressure pipes from bladder.
23. Remove lumbar support bladder.

## Refit

1. Position and fit lumbar support bladder to frame.
2. Connect vacuum and pressure pipes to bladder.
3. Position squab cover over frame.
4. Connect 3 multiplugs to heated seat circuit.
5. Fit 4 retaining strips securing both sides of squab cover to frame.
6. Position and fit squab assembly to seat assembly.
7. Fit squab frame to seat frame, secure with Torx bolts tighten to 25 Nm (18 lbf.ft).
8. Fit retaining strips securing both sides of lower squab cover.
9. Connect multiplug to heated seat circuit.
10. Secure squab harness to retaining clips
11. Connect lumbar harness multiplugs to pump and valve.
12. Connect multiplugs to headrest and squab motor.
13. Fit retaining strip securing lower squab cover to frame.
14. Fit headrest and secure to motor housing.
15. Position upper finisher and secure retaining clips.
16. Secure squab cover beading to finisher.
17. Secure squab cover velcro strip
18. Connect tension straps securing upper squab cover.
19. Position lower finisher and secure retaining clips
20. Fit screws securing lower squab finisher.
21. Fit backboard tension straps to under seat retaining clips.
22. Fit seat assembly.

**SEATS, REPAIRS, Front seat.**

## Switch - lumbar support

### 78.60.15

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Raise seat cushion.
2. Make the SRS system safe.

 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.

4. Release 3 fixings securing outer valance and carefully release valance from seat.

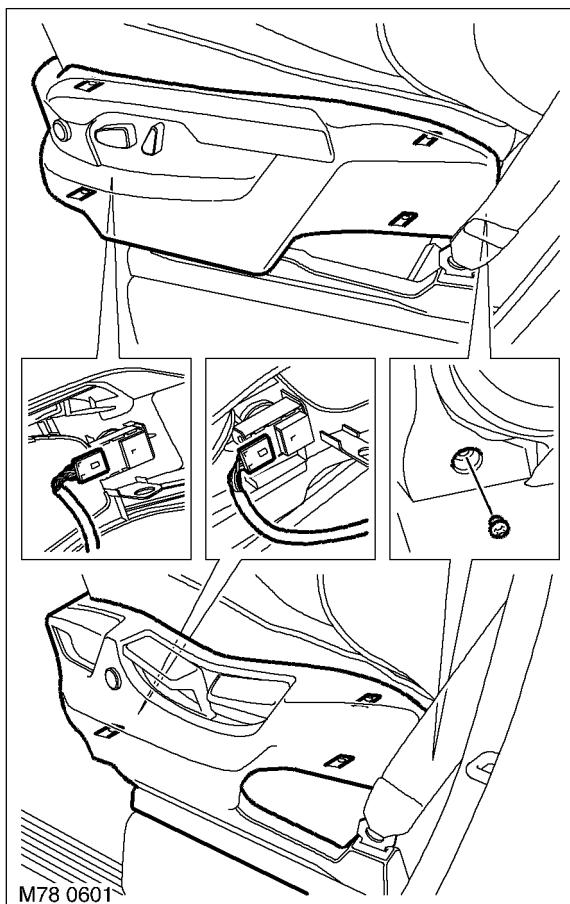
*Models with electric seats have 4 fixings.*

5. Disconnect multiplug from lumbar support switch.

6. Release and remove lumbar support switch.

#### Refit

1. Fit lumbar support switch.
2. Connect multiplug to lumbar support switch.
3. Align fixings, carefully fit valance and secure with screw.
4. Connect battery leads, earth lead last.
5. Reposition seat.



3. Remove screw securing valance.

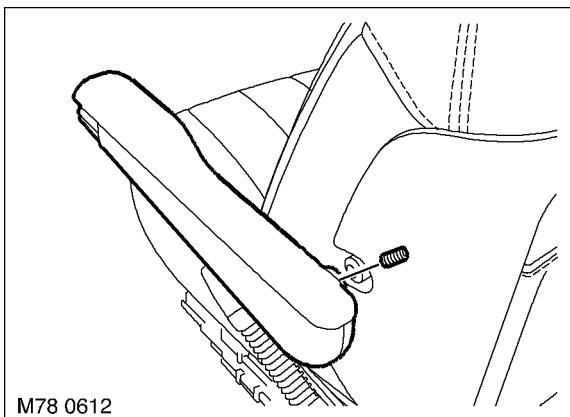
# SEATS

## Motor - squab

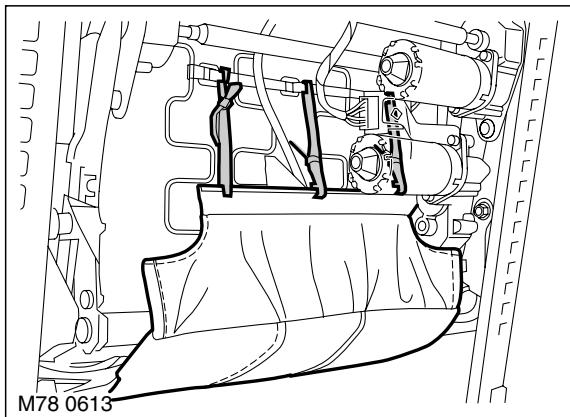
→ 78.70.21

### Remove

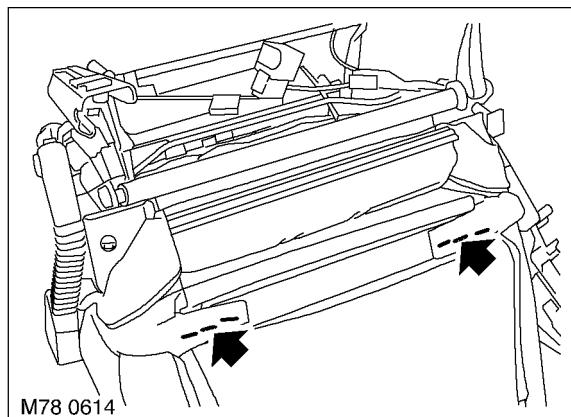
1. Remove seat assembly.  
↙ SEATS, REPAIRS, Front seat.



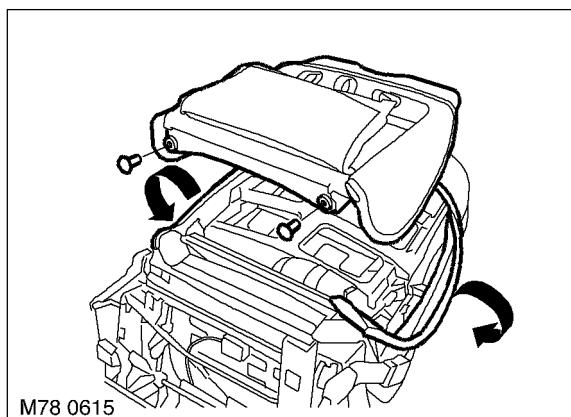
2. Remove Allen bolt securing arm rest.
3. Remove armrest from boss.
4. Remove headrest.



5. Release 3 backboard tension straps from under seat.



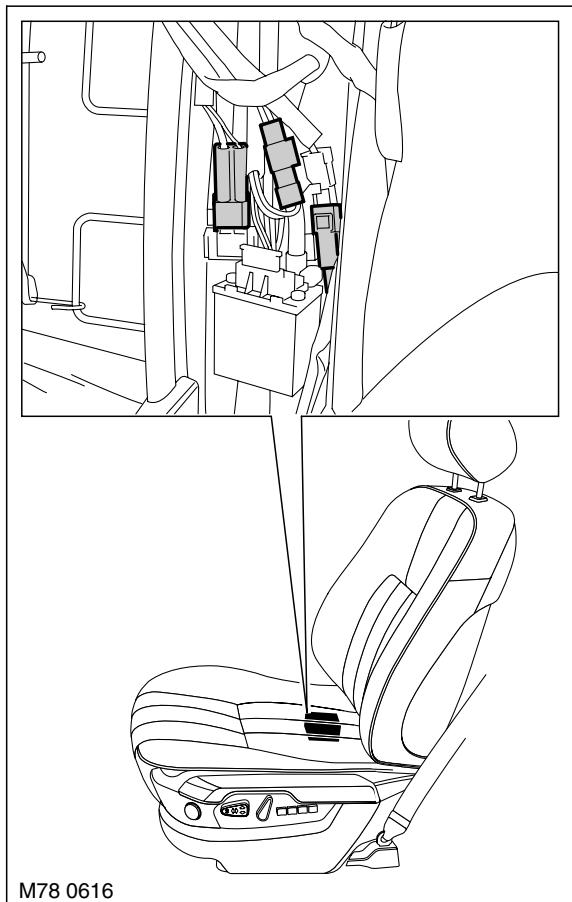
6. Release staples securing squab cover to lower backboard.



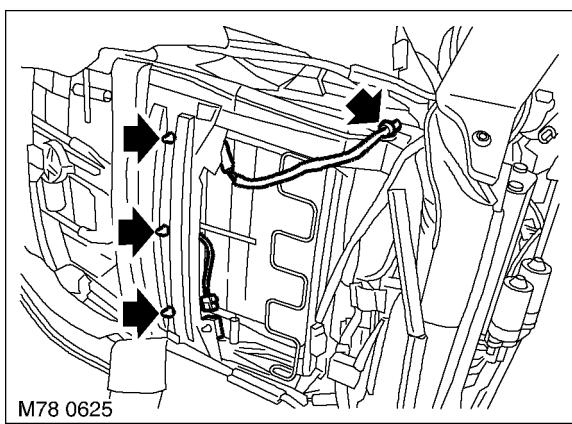
7. Release squab side cover from both sides of backboard.
8. Release 2 studs securing lower half of backboard.
9. Release backboard from seat.



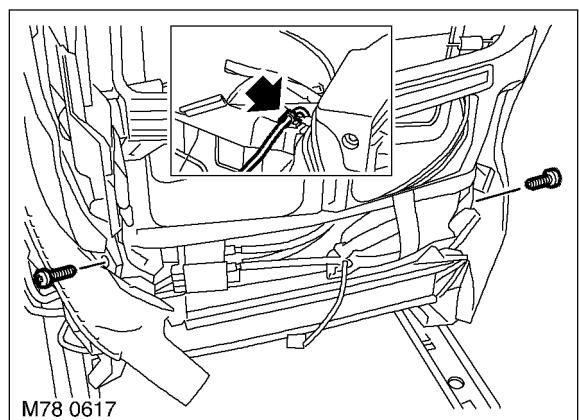
10. Disconnect multiplugs from headrest and upper squab motors.



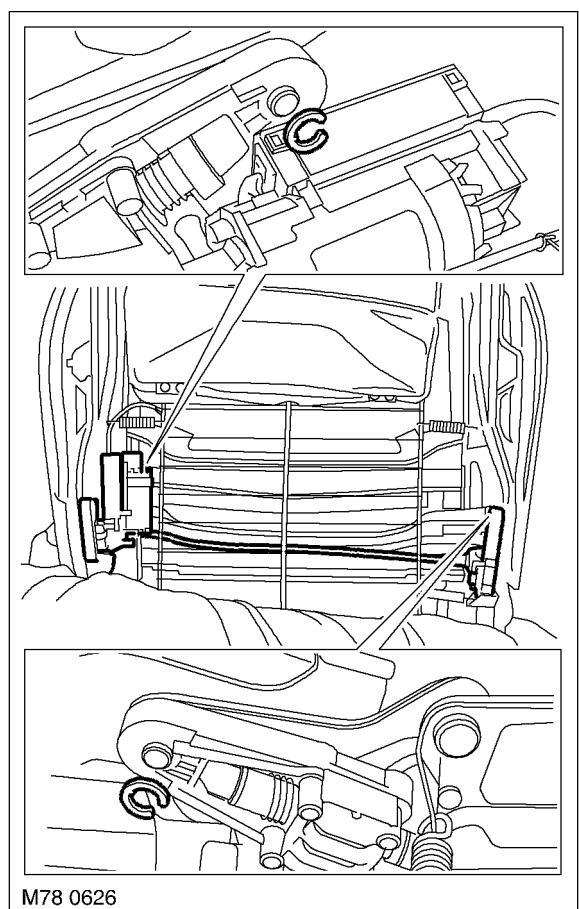
- 11.** Disconnect multiplugs from lumbar pump and valve.
- 12.** Disconnect multiplug to heated seat circuit.



- 13.** Release harness from 4 retaining clips.



- 14.** Remove 2 Torx bolts and remove squab frame from seat frame.



- 15.** Remove 2 'E' clips securing motor assembly.
- 16.** Carefully prise motor assembly from mounting bosses and release drive cable from assembly.

# SEATS

## Refit

1. Position and fit drive cable to motor assembly.
2. Carefully fit motor assembly to mounting bosses.
3. Fit 'E' clips securing motor assembly.
4. Position squab frame to seat frame, fit Torx bolts tighten to 25 Nm (18 lbf.ft).
5. Position harness and secure retaining clips.
6. Connect multiplugs to headrest and squab motor.
7. Connect multiplug to heated seat circuit.
8. Connect lumbar harness multiplugs to lumbar pump and valve.
9. Position backboard to seat assembly, fit studs securing lower of backboard.
10. Position and fit both sides of squab cover to backboard.
11. Position lower squab cover to backboard and staple.
12. Fit backboard tension straps to under seat retaining clips.
13. Fit armrest to boss and secure with Allen bolt, tighten to 25 Nm (18 lbf.ft).
14. Fit seat assembly.

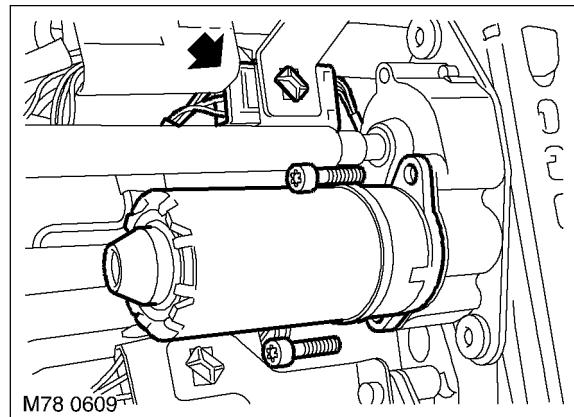
 **SEATS, REPAIRS, Front seat.**

## Motor - fore & aft - front seat

 **78.70.25**

### Remove

1. Remove seat assembly.  
 **SEATS, REPAIRS, Front seat.**



2. Disconnect multiplug from fore and aft motor.
3. Remove 2 Torx bolts from fore and aft motor and remove motor.

## Refit

1. Position fore and aft motor and secure with Torx bolts, tighten to 10 Nm (7 lbf.ft).
2. Connect multiplug to fore and aft motor.
3. Fit seat assembly.

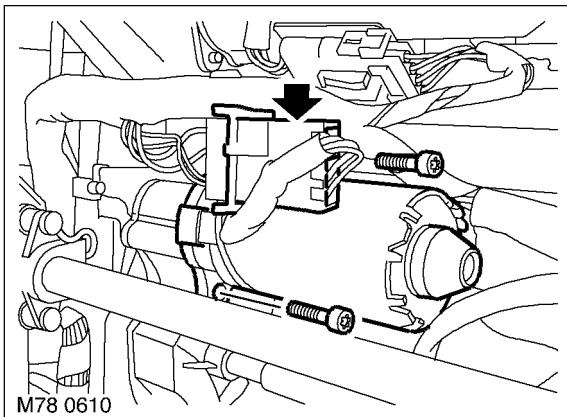
 **SEATS, REPAIRS, Front seat.**

**Motor - rise & fall - front seat**

☛ **78.70.27**

**Remove**

1. Remove seat assembly.  
 **SEATS, REPAIRS, Front seat.**



2. Disconnect multiplug from rise and fall motor.
3. Remove 2 Torx bolts securing rise and fall motor and remove motor.

**Refit**

1. Position rise and fall motor and secure with Torx bolts, tighten to 10 Nm (7 lbf.ft).
2. Connect multiplug to rise and fall motor.
3. Fit seat assembly.

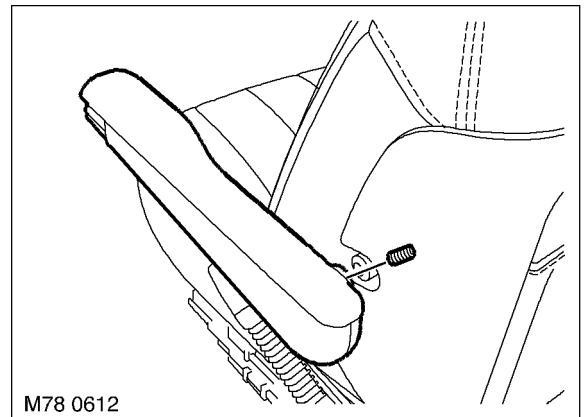
 **SEATS, REPAIRS, Front seat.**

**Motor - rise & fall - head rest - front seat**

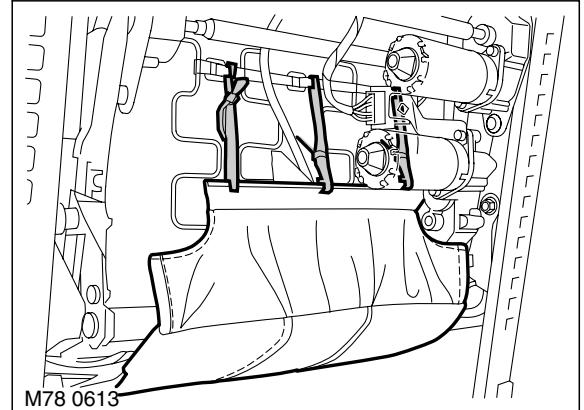
☛ **78.70.31**

**Remove**

1. Remove seat assembly.  
 **SEATS, REPAIRS, Front seat.**



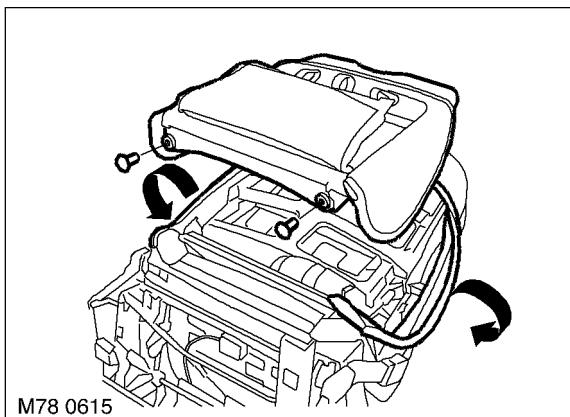
2. Remove Allen bolt securing arm rest.
3. Remove armrest from boss.



4. Release 3 backboard tension straps from under seat.
5. Release staples securing squab cover to lower backboard.

## SEATS

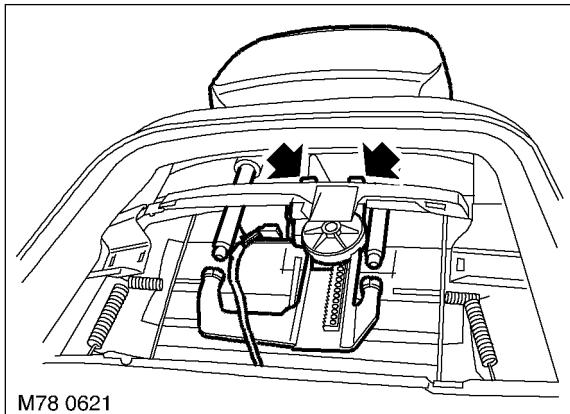
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7. Fit backboard tension straps to under seat retaining clips.
8. Fit armrest to boss and secure with Allen bolt, tighten to 25 Nm (18 lbf.ft).
9. Fit seat assembly.

SEATS, REPAIRS, Front seat.

6. Release 2 studs securing lower half of backboard.
7. Release squab side cover from both sides of backboard.
8. Release backboard from seat.



9. Release headrest from motor assembly and remove from seat.
10. Disconnect multiplug from headrest rise and fall motor.
11. Release motor assembly from retaining clips and remove from frame.

### Refit

1. Position motor assembly to frame and secure in retaining clips.
2. Connect multiplug to headrest rise and fall motor.
3. Fit head rest in seat and secure to motor assembly.
4. Position backboard to seat assembly, fit studs securing lower of backboard.
5. Position and fit both sides of squab cover to backboard.
6. Position lower squab cover to backboard and staple.

## Switch - front seat control

### 78.70.89

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

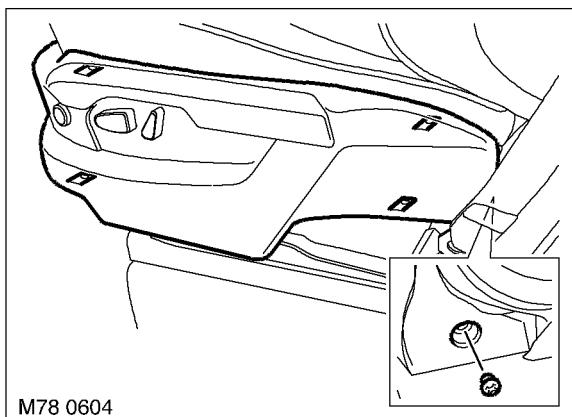
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

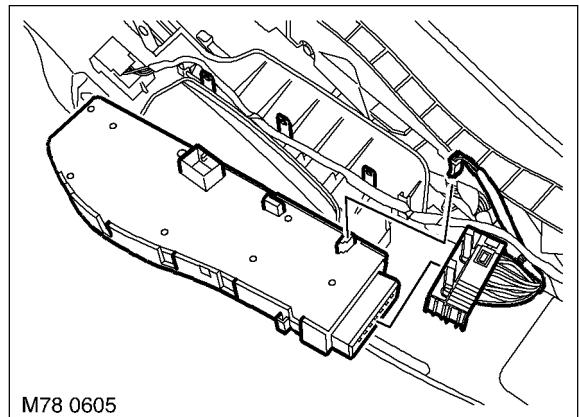
1. Raise seat cushion.
2. Make the SRS system safe.

 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

**WARNING:** Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.



3. Remove screw securing valance.
4. Release 4 fixings securing outer valance and carefully disengage valance from seat.



5. Release fixings, disconnect multiplugs, and remove switch pack.

#### Refit

1. Ensure lumbar switch harness is correctly located.
2. Position switch pack, connect multiplugs and fit switch pack to valance.
3. Align fixings, carefully fit valance and secure with screw.
4. Connect battery leads, earth lead last.
5. Reposition seat.

# SEATS

## Switch pack - seat memory

» 78.70.91

### Remove

1. Raise seat.
2. Remove screw securing rear of outer valance.
3. Carefully release 3 retaining clips securing outer valance.
4. Release switch pack from 3 retaining clips.
5. Disconnect 4 multiplugs and remove switch pack.

### Refit

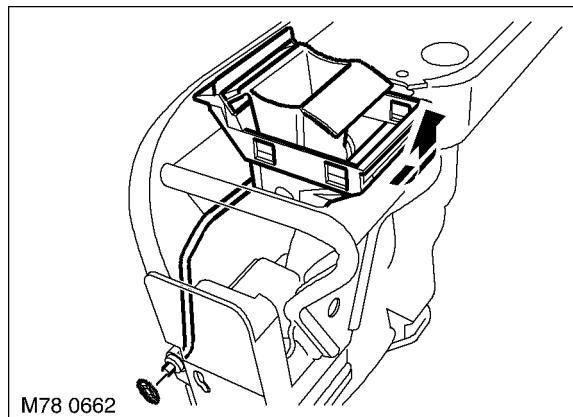
1. Connect 4 multiplugs to switch pack.
2. Fit switch pack to outer valance and secure 3 retaining clips.
3. Position outer valance to seat base and secure 3 retaining clips.
4. Fit screw to secure rear of seat valance.
5. Lower seat to original position.

## Lever assembly - rear squab release

» 78.80.03

### Remove

1. Remove squab cover and pad from frame.  
 SEATS, REPAIRS, Cover - squab - rear seat - side - LH.



2. Remove and discard retaining clip securing operating lever to latch assembly.
3. Release operating lever to latch assembly.
4. Release 3 retaining clips securing lever assembly to frame, remove assembly.

### Refit

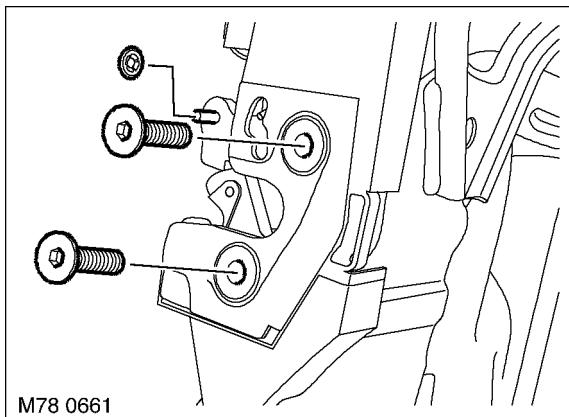
1. Position lever assembly to frame, secure retaining clips.
2. Position and fit operating lever to latch assembly, secure with retaining clip.
3. Fit squab cover and pad to frame.  
 SEATS, REPAIRS, Cover - squab - rear seat - side - LH.

## Latch - rear squab

» **78.80.05**

### Remove

1. Remove squab cover and pad from frame.
-  **SEATS, REPAIRS, Cover - squab - rear seat - RH.**



2. Remove and discard retaining clip securing operating rod to latch assembly.
3. Release operating rod from assembly.
4. Remove 2 Allen bolts securing latch assembly to frame, remove assembly.

### Refit

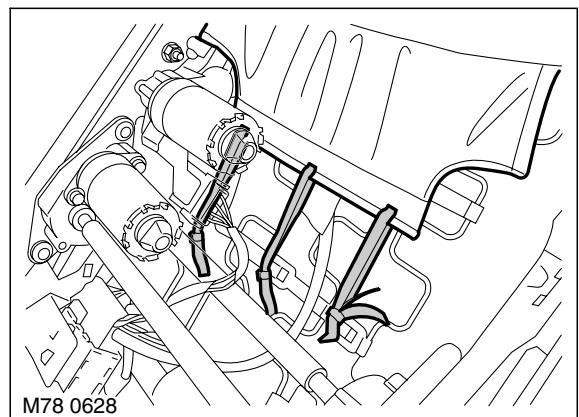
1. Position latch assembly to frame and secure with Allen bolts, tighten to 25 Nm (18 lbf.ft).
  2. Connect operating rod and secure with retaining clip.
  3. Fit squab cover and pad to frame.
-  **SEATS, REPAIRS, Cover - squab - rear seat - RH.**

## Cover - squab - front seat - models with adjustable upper squab

» **78.90.07**

### Remove

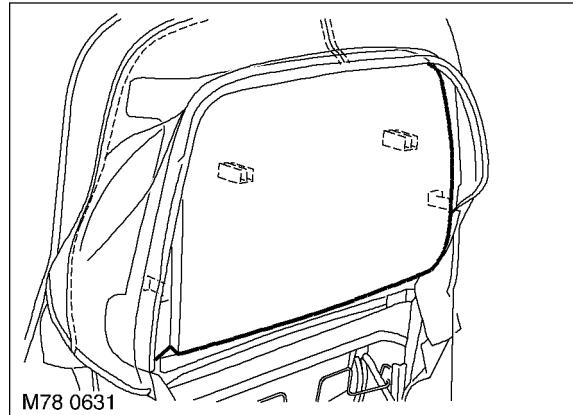
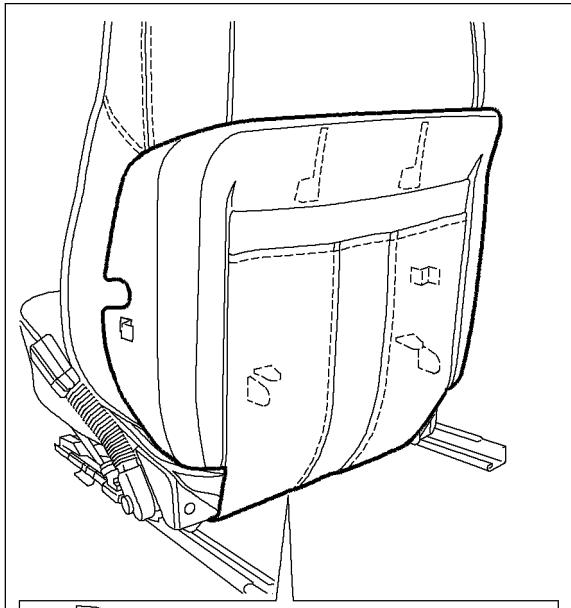
1. Remove seat assembly.
-  **SEATS, REPAIRS, Front seat.**



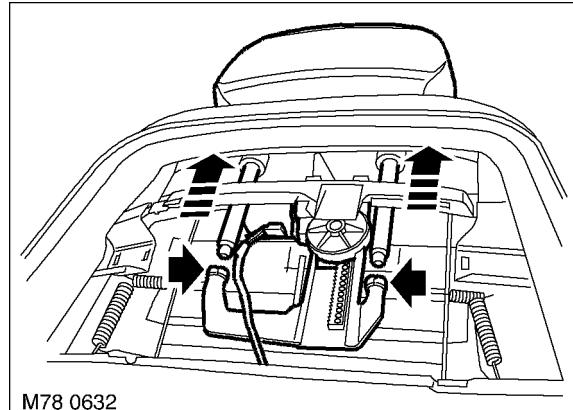
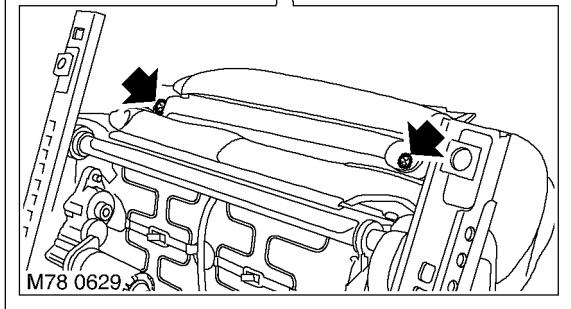
2. Release 3 backboard tension straps from under seat.

## SEATS

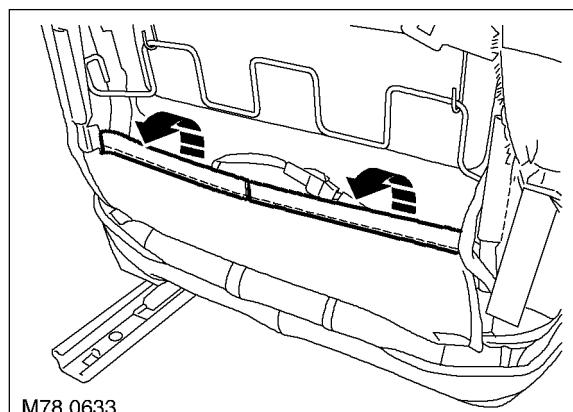
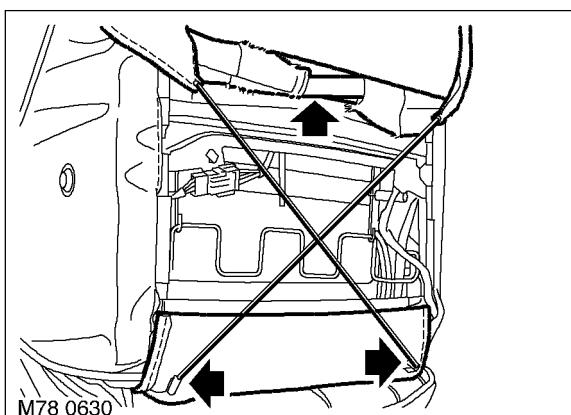
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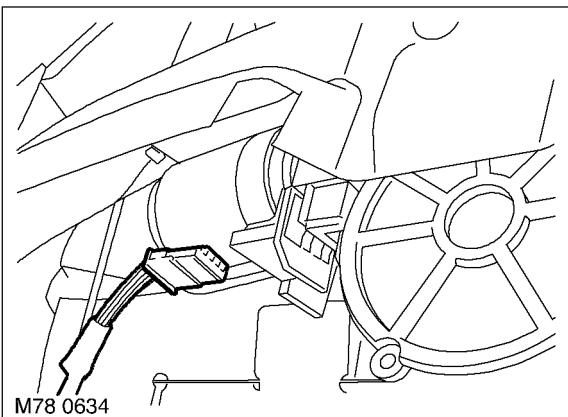
7. Release beading from squab cover finisher.
8. Release finisher from 4 retaining clips and remove.



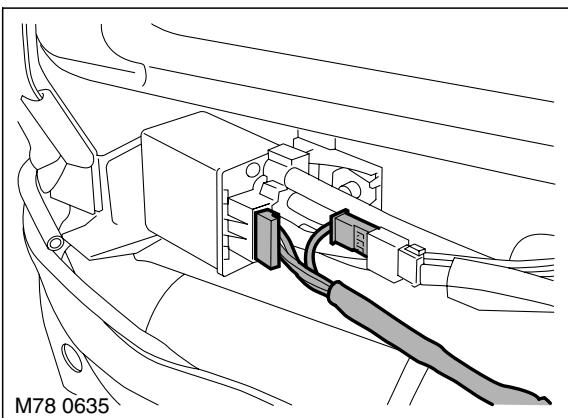
9. Carefully release 2 retaining clips securing headrest to motor housing.
10. Remove headrest.



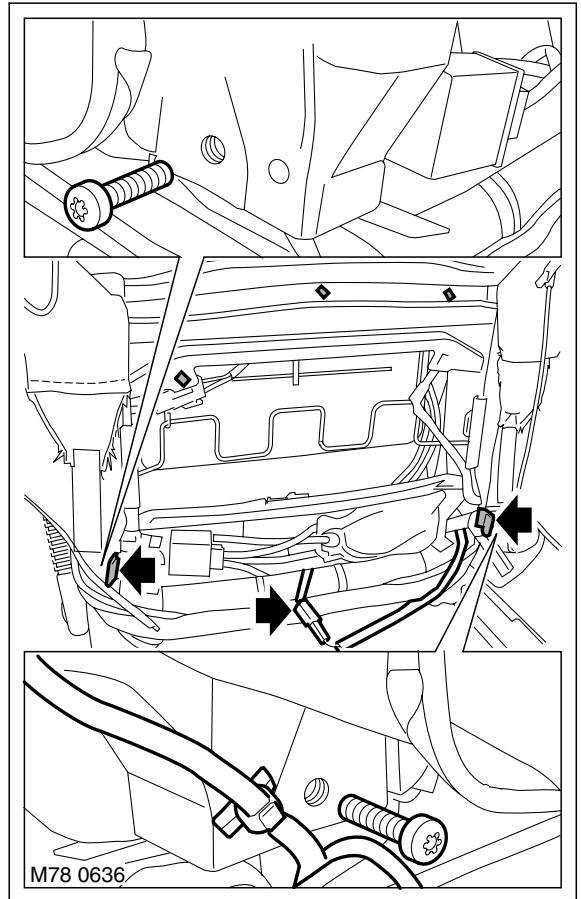
5. Disconnect 2 tension straps securing upper squab cover.
6. Release velcro strip securing squab cover.
11. Release retaining strip securing squab cover to lower frame.



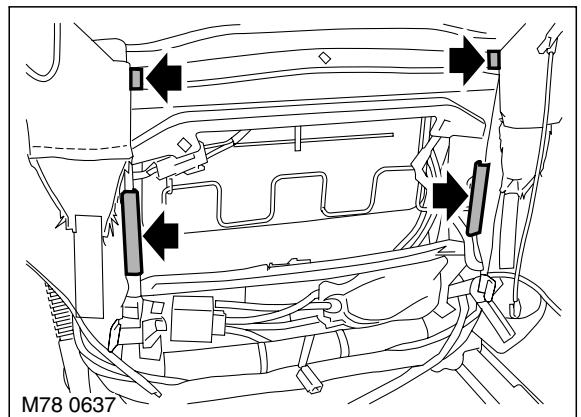
- 12.** Disconnect multiplugs from headrest and upper squab motors.



- 13.** Disconnect harness multiplugs from lumbar pump and valve.



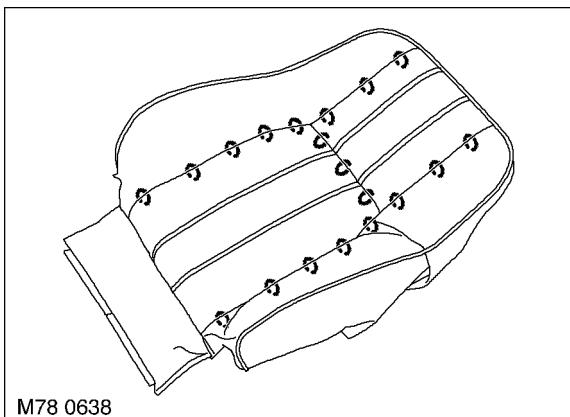
- 14.** Disconnect multiplug from heated seat circuit.  
**15.** Release 2 retaining strips, securing both sides of lower squab cover to frame.  
**16.** Release squab harness from 4 retaining clips.  
**17.** Remove 2 Torx bolts securing squab frame to seat frame.  
**18.** Remove squab assembly from seat assembly.



- 19.** Release 4 retaining strips securing both sides of squab assembly to frame.  
**20.** Remove squab cover and pad from frame.

## SEATS

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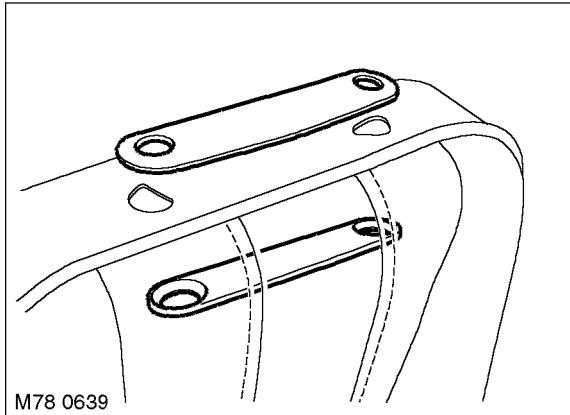


12. Fit retaining strip securing lower squab cover to frame.
13. Fit headrest and secure to motor housing.
14. Position upper finisher and secure retaining clips.
15. Secure squab cover beading to finisher.
16. Secure squab cover velcro strip
17. Connect tension straps securing upper squab cover.
18. Position lower finisher and secure retaining clips
19. Fit screws securing lower squab finisher.
20. Fit backboard tension straps to under seat retaining clips.
21. Fit seat assembly.



**SEATS, REPAIRS, Front seat.**

21. Remove 19 hog rings securing squab cover to pad, remove cover.



22. Release retaining plate securing headrest finisher to squab cover, remove finisher.

### Refit

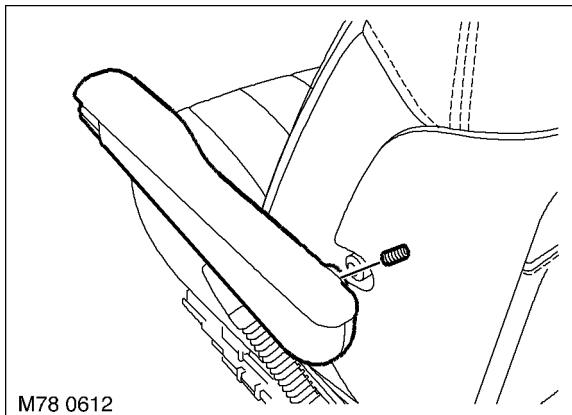
1. Fit headrest finisher to squab cover and secure with retaining plate.
2. Position squab cover to pad and secure with 19 hog rings.
3. Fit squab cover and pad to frame.
4. Fit 4 retaining strips securing both sides of squab cover to frame.
5. Position and fit squab assembly to seat assembly.
6. Fit squab frame to seat frame, secure with Torx bolts tighten to 25 Nm (18 lbf.ft).
7. Secure squab harness to retaining clips
8. Fit retaining strips securing both sides of lower squab cover.
9. Connect multiplug to heated seat circuit.
10. Connect lumbar harness multiplugs to pump and valve.
11. Connect multiplugs to headrest and squab motor.

## Cover - squab - front seat

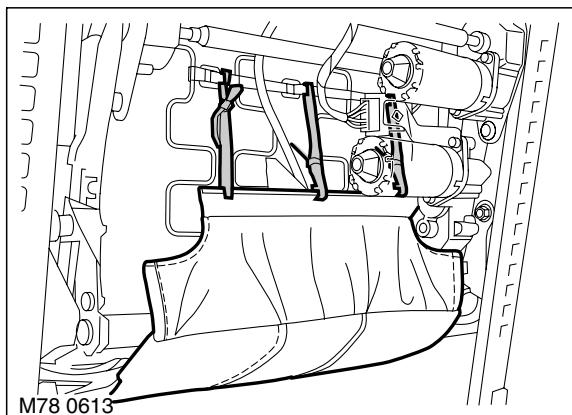
→ 78.90.08

### Remove

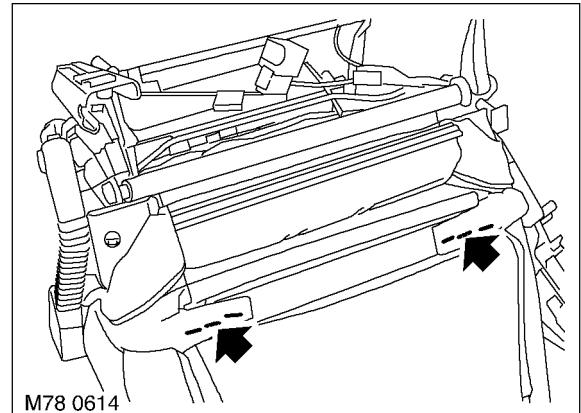
1. Remove seat assembly.  
👉 SEATS, REPAIRS, Front seat.



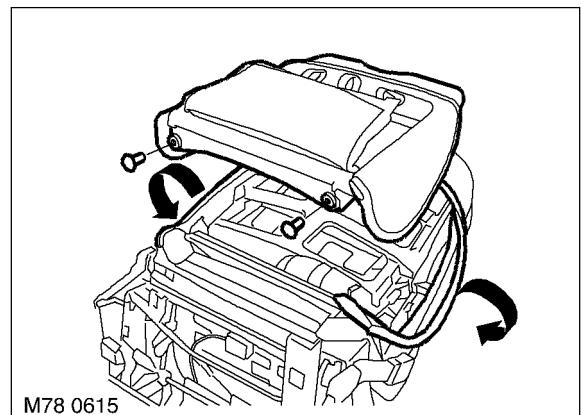
2. Remove Allen bolt securing arm rest.
3. Remove armrest from boss.



4. Remove headrest.
5. Release 3 backboard tension straps from under seat.

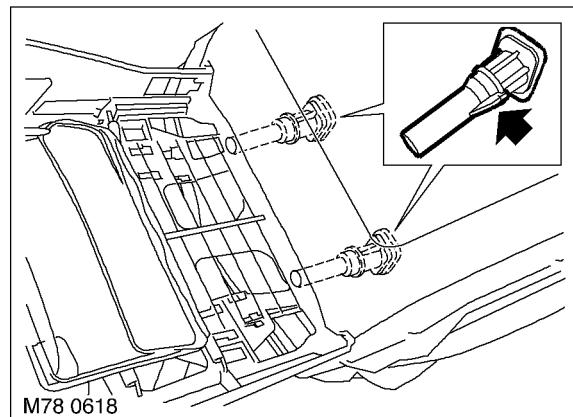
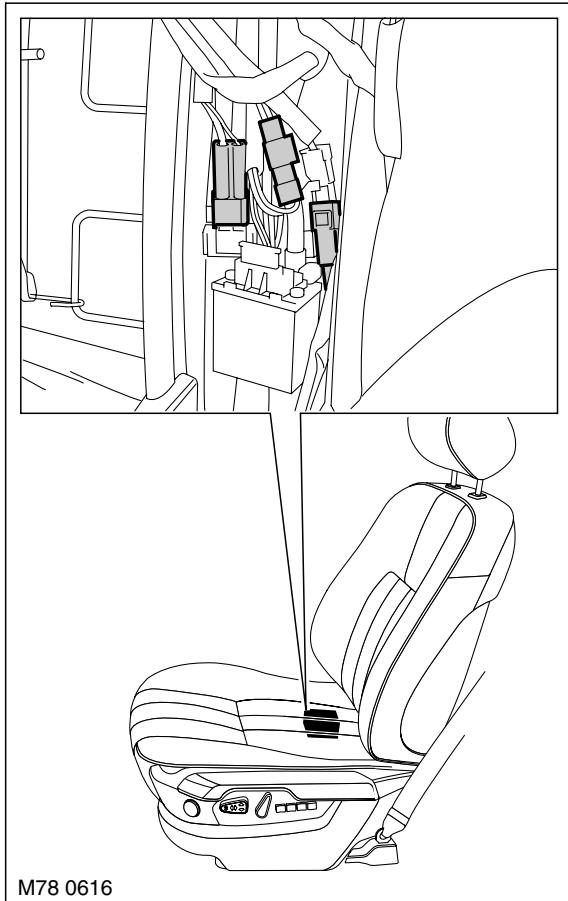


6. Release staples securing squab cover to lower backboard.

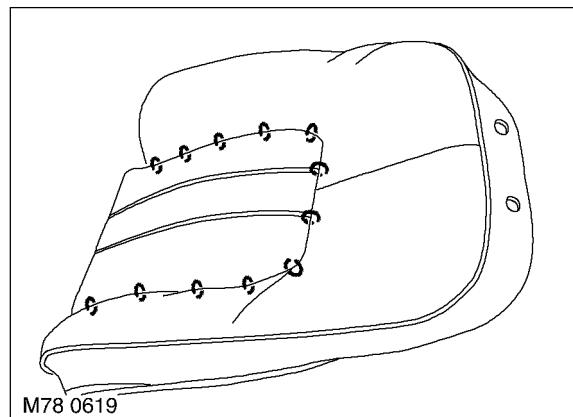


7. Release squab side cover from both sides of backboard.
8. Release 2 studs securing lower half of backboard.
9. Release backboard from seat.

## SEATS



14. Raise front of squab cover to gain access to head rest guides.
15. Release headrest retaining clips, remove headrest guides.

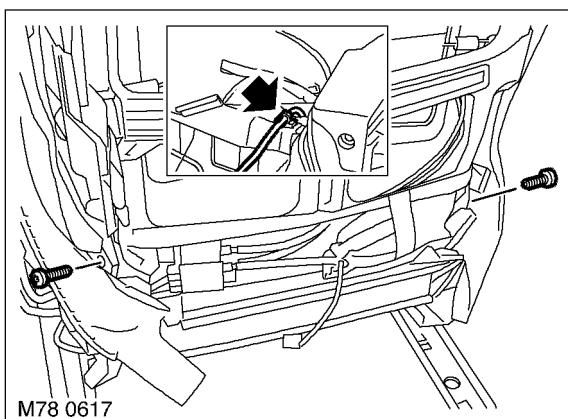


16. Remove squab cover and pad from frame.
17. Remove and discard 12 hog rings and remove cover from pad.

### Refit

1. Position squab cover to pad and secure with hog rings.
2. Position and fit squab cover to frame.
3. Fit and secure headrest guides in squab frame.
4. Position squab frame to seat frame, fit Torx bolts tighten to 25 Nm (18 lbf.ft).
5. Route lumbar harness through squab cover and secure to frame.
6. Connect multiplug to heated seat circuit.
7. Connect lumbar harness multiplugs to pump and valve.
8. Position backboard to seat assembly, fit studs securing lower of backboard.
9. Position and fit both sides of squab cover to backboard.

10. Disconnect harness multiplugs from lumbar pump and valve.
11. Disconnect multiplug from heated seat circuit.



12. Release harness from retaining clip and feed harness through squab cover.
13. Remove 2 Torx bolts and remove squab frame from seat frame.

10. Position lower squab cover to backboard and staple.
11. Fit backboard tension straps to under seat retaining clips.
12. Fit armrest to boss and secure with Allen bolt, tighten to 25 Nm (18 lbf.ft).
13. Fit seat assembly.

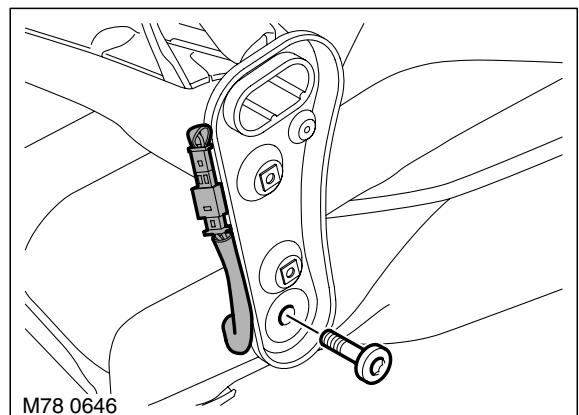
 **SEATS, REPAIRS, Front seat.**

## Cover - squab - rear seat - side - LH

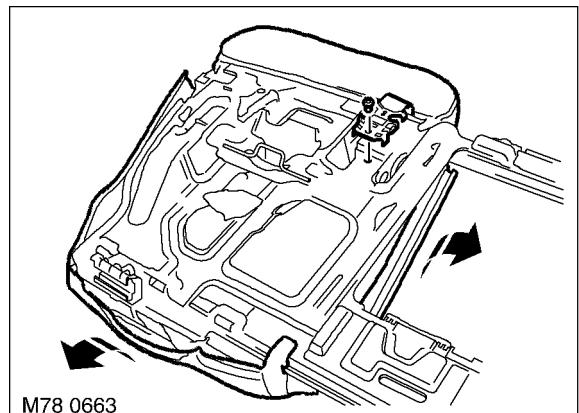
☞ **78.90.12**

### Remove

1. Remove seat base finisher.  
 **SEATS, REPAIRS, Finisher - seat base rear.**
2. Remove seat fold mechanism.  
 **SEATS, REPAIRS, Hinge - rear seat - side.**
3. Remove rear squab finisher.  
 **SEATS, REPAIRS, Finisher - rear seat squab.**



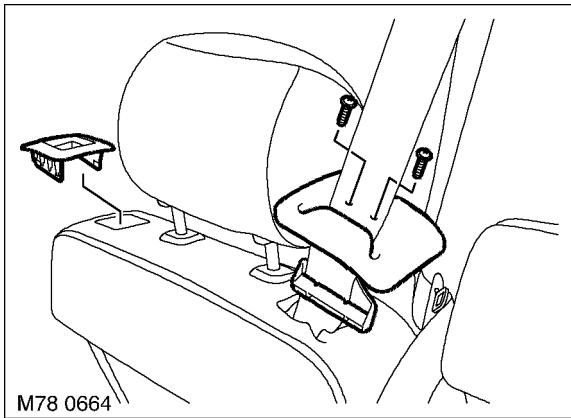
4. Remove Torx bolt securing squab frame to seat frame, separate frames.
5. Remove armrest front finisher assembly.  
 **SEATS, REPAIRS, Finisher - arm rest - rear seat - front.**
6. Disconnect multiplug from heated squab.
7. Release finisher from retaining clips and remove.



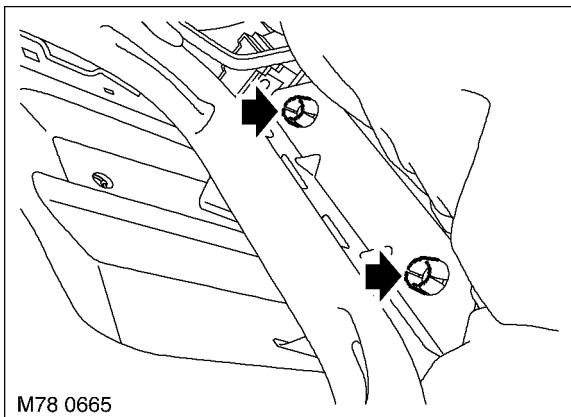
8. Release seat cover beading from sides and front.

## SEATS

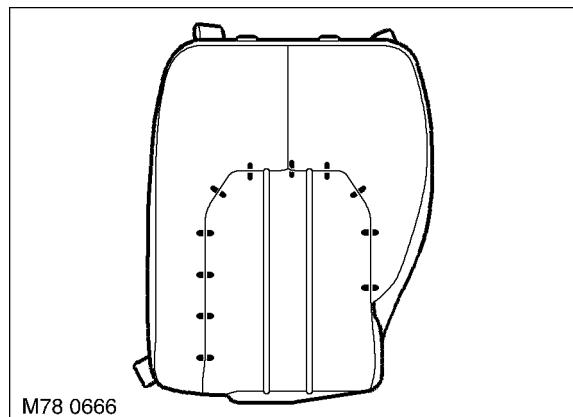
9. Raise seat cover and cushion, remove and discard Torx bolt securing seat belt anchor point to frame.
10. Pull seatbelt through cushion and cover, remove seat base.



11. Remove 2 screws securing seat belt finisher, remove finisher.
12. Release beading securing squab cover to sides and bottom of frame.
13. Carefully release 4 clips securing seat release button escutcheon, remove escutcheon.



14. Raise squab cover and cushion to gain access to headrest guides.
15. Release 3 clips securing headrest guides to frame, remove guides.



16. Remove cover and cushion assembly from frame and feed seat belt through assembly.
17. Remove 16 hog rings securing cover to cushion, remove cover.

### Refit

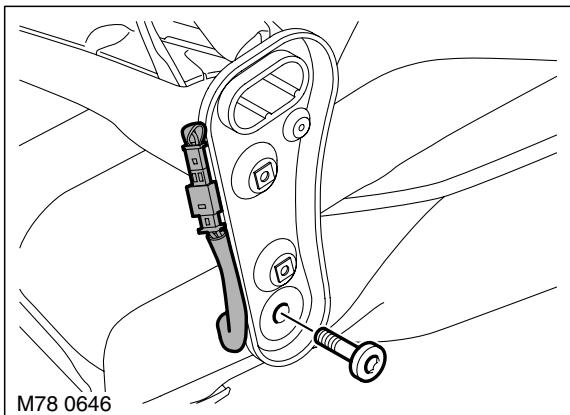
1. Position cover to cushion and secure with hog rings.
2. Feed seat belt through cover and cushion assembly and fit assembly to frame.
3. Position and fit headrest guides in squab assembly.
4. Position and fit seat fold release button escutcheon.
5. Secure squab cover beading to sides and bottom of frame.
6. Position seatbelt finisher and secure with screws.
7. Fit seatbelt through cover and cushion assembly.
8. Position seatbelt to frame and fit Torx bolt, tighten to 48 Nm (35 lbf.ft).
9. Fit seat cover beading to sides and front.
10. Connect squab cover heated seat circuit multiplug.
11. Fit armrest front finisher assembly.  
☞ **SEATS, REPAIRS, Finisher - arm rest - rear seat - front.**
12. Position squab frame to seat frame and secure LH side with Torx bolt, tighten to 25 Nm (18 lbf.ft).
13. Fit rear squab finisher.  
☞ **SEATS, REPAIRS, Finisher - rear seat squab.**
14. Fit seat fold mechanism.  
☞ **SEATS, REPAIRS, Hinge - rear seat - side.**
15. Fit seat base finisher.  
☞ **SEATS, REPAIRS, Finisher - seat base rear.**

## Cover - squab - rear seat - RH

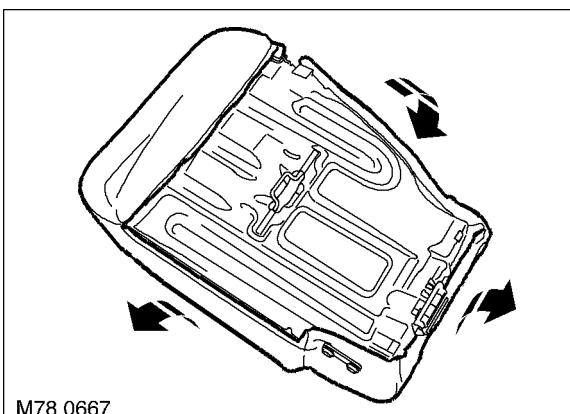
» **78.90.13**

### Remove

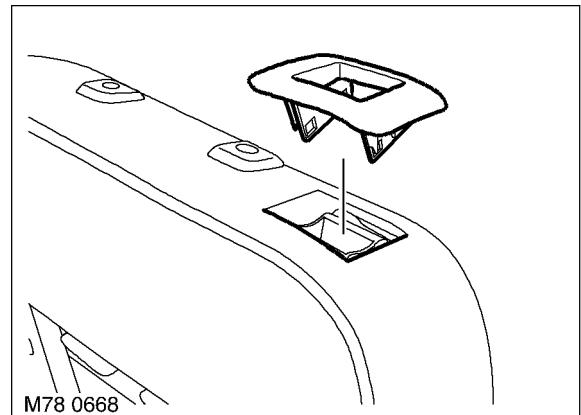
1. Remove seat base finisher.  
 **SEATS, REPAIRS, Finisher - seat base rear.**
2. Remove seat fold mechanism.  
 **SEATS, REPAIRS, Hinge - rear seat - side.**



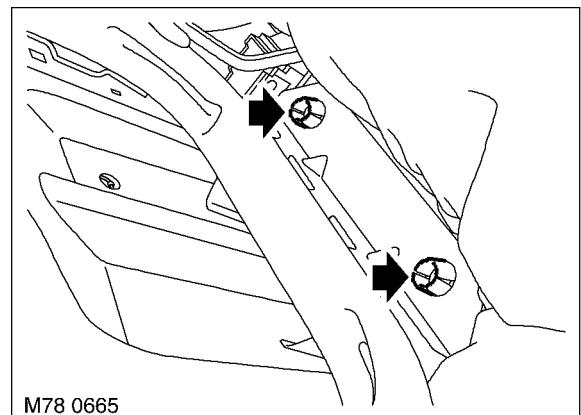
3. Remove Torx bolt securing squab frame to seat frame, separate frames.
4. Disconnect multiplug to heated squab.
5. Remove rear squab finisher.  
 **SEATS, REPAIRS, Finisher - rear seat squab.**



6. Release beading securing squab cover to sides and bottom of frame.

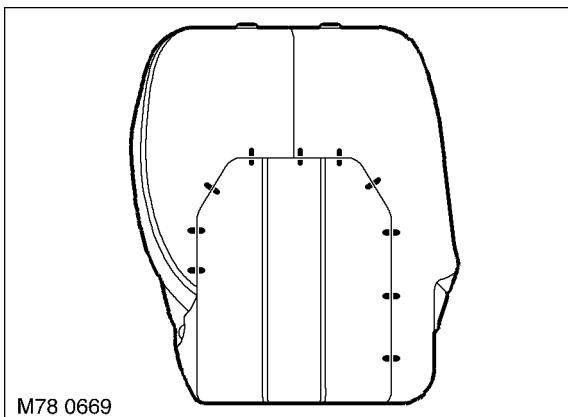


7. Carefully release 4 clips securing seat release button escutcheon, remove escutcheon.



8. Raise squab cover and cushion to gain access to headrest guides.
9. Release 3 clips securing headrest guides to frame, remove guides.
10. Remove cover and cushion assembly from frame.

# SEATS



11. Remove 16 hog rings securing cover to cushion, remove cover.

## Refit

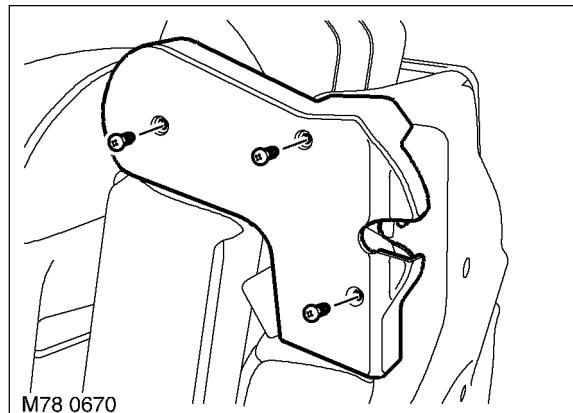
1. Position cover to cushion and secure with hog rings.
2. Position and fit headrest guides in squab assembly.
3. Position and fit seat fold release button escutcheon.
4. Secure squab cover beading to sides and bottom of frame.
5. Fit rear squab finisher.  
     **SEATS, REPAIRS, Finisher - rear seat squab.**
6. Position squab frame to seat frame and secure LH side with Torx bolt, tighten to 25 Nm (18 lbf.ft).
7. Connect squab cover heated seat circuit multiplug.
8. Fit seat fold mechanism.  
     **SEATS, REPAIRS, Hinge - rear seat - side.**
9. Fit seat base finisher.  
     **SEATS, REPAIRS, Finisher - seat base rear.**

## Hinge - rear seat - side

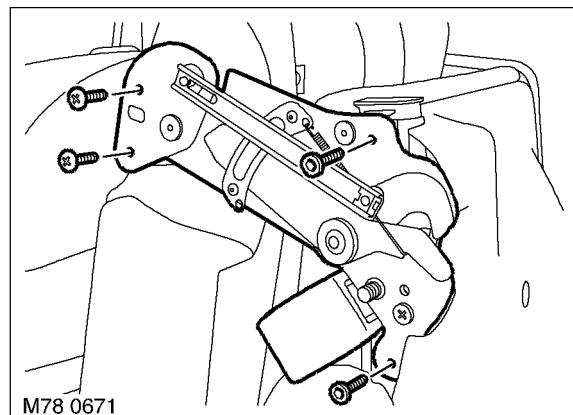
**78.90.43**

### Remove

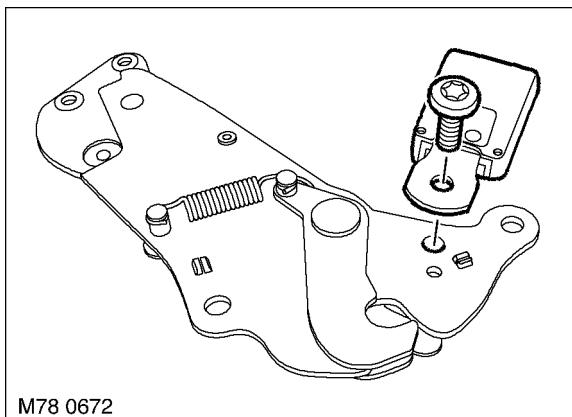
1. Fold rear seat forward.



2. Remove 3 screws securing mechanism finisher, remove finisher.



3. Remove and discard 2 Torx bolts securing mechanism to squab frame.
4. Remove 2 Allen bolts securing mechanism to seat frame, remove mechanism.



5. Remove and discard Torx bolt securing seat belt stalk, remove stalk.

**Refit**

1. Position seat belt stalk and secure with Torx bolt, tighten to 31 Nm (23 lbf.ft).
2. Position mechanism to seat frame and secure with Allen bolts, tighten to 25 Nm (18 lbf.ft).
3. Position squab frame to mechanism and secure with Torx bolts, tighten to 25 Nm (18 lbf.ft).
4. Position mechanism finisher and secure with screws.
5. Reposition rear seat.

## **SEATS**

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10. Close sunroof blind.

## Sun roof - align to roof panel & adjust

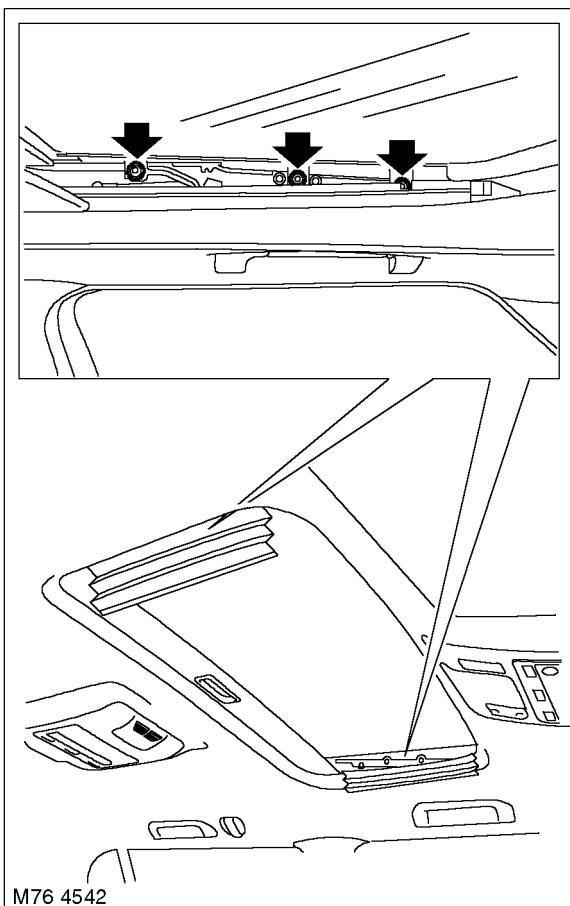
» 76.84.82

### Check

1. With sunroof closed, check alignment of glass to roof panel. The glass should be central in its aperture. Profile of sunroof to body:
  - front edge of sunroof = flush or up to 1.0 mm (0.040 in) lower
  - rear edge of sunroof = flush or up to 1.0 mm (0.040 in) higher

### Adjust

1. Open sunroof blind.
2. Operate switch to raise sunroof fully.



3. Carefully release upper edges of gaiters from sunroof glass.
4. Close sunroof.
5. Loosen 6 Torx screws securing sunroof glass.
6. Align glass to roof and tighten Torx screws to 6 Nm (4.4 lbf.ft).
7. Operate switch to raise sunroof fully.
8. Fit gaiters to sunroof glass.
9. Close sunroof.

## SUNROOF

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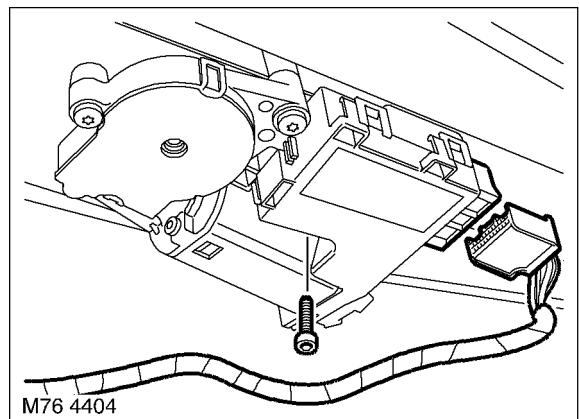
## Sunroof

### 76.84.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

**WARNING:** *It is imperative that before any work is undertaken on the SRS system, the appropriate information is read thoroughly.*



#### Remove

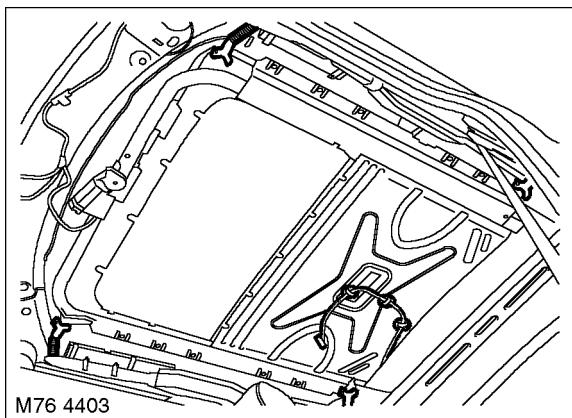
1. Make the SRS system safe.

 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**

**WARNING:** *Always disconnect both battery leads before beginning work on the SRS system. Disconnect the negative lead first. Never reverse connect the battery.*

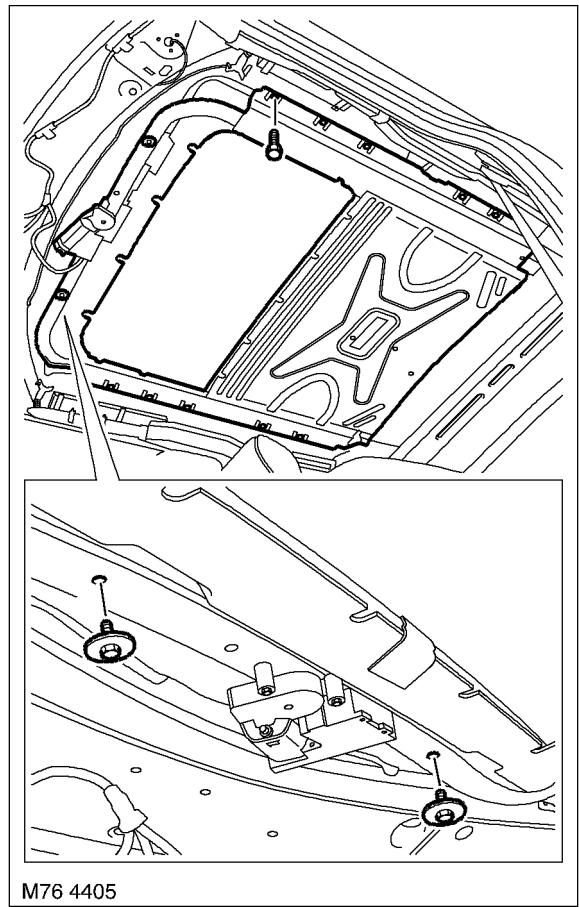
2. Remove headlining.

 **INTERIOR FITTINGS, REPAIRS, Headlining.**



3. Release drain tubes from sun roof.
4. Release rear console harness from sun roof.

5. Disconnect multiplug from sun roof motor.
6. Remove Allen screw securing motor and sun roof.



7. Remove 2 bolts with special washers securing forward edge of sun roof.
8. Remove 10 bolts securing sun roof and with assistance remove sun roof.

# SUNROOF

## Refit

1. Clean sun roof and mating face.
2. With assistance, fit sun roof and tighten bolts evenly to 10 Nm (7 lbf.ft).
3. Tighten Allen screw to 6 Nm (4.4 lbf.ft).
4. Connect multiplug to motor.
5. Position and secure rear console harness.
6. Ensure drain tubes are clear.
7. Connect drain tubes to sun roof.
8. Fit headlining.

### INTERIOR FITTINGS, REPAIRS,

#### Headlining.

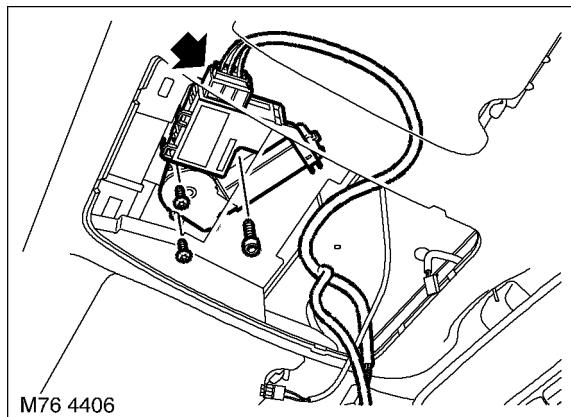
9. Connect battery leads, earth lead last.
10. If fitting a new sunroof, the following initialisation procedure must be carried out
  - Press and hold sunroof tilt switch until sunroof is at tilt position, continue to hold switch, for approximately 20 seconds, until an audible thud is heard from the sunroof motor.
  - Release switch, and immediately depress tilt switch again. The sunroof will close, slide fully open and return to fully closed position to complete the initialisation.

## Motor - sunroof

 76.84.07

### Remove

1. Remove front console from headlining.  
 **INTERIOR FITTINGS, REPAIRS,  
Console - headlining - front.**



2. Remove Allen screw and 2 Torx screws securing motor.
3. Disconnect multiplug and remove motor.

## Refit

1. Position motor, connect multiplug and engage motor drive gear in sun roof cables.
2. Tighten Torx screws securing sun roof motor to 5 Nm (3.7 lbf.ft) and Allen screw to 10 Nm (7 lbf.ft).
3. Fit front console to headlining.  
 **INTERIOR FITTINGS, REPAIRS,  
Console - headlining - front.**
4. If fitting a new sunroof motor, the following initialisation procedure must be carried out
  - Press and hold sunroof tilt switch until sunroof is at tilt position, continue to hold switch, for approximately 20 seconds, until an audible thud is heard from the sunroof motor.
  - Release switch, and immediately depress tilt switch again. The sunroof will close, slide fully open and return to fully closed position to complete the initialisation.



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## Dimensional Information

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### Measurement Types

The following dimensional information is shown so as to assist the technician in the diagnosis and repair of body panels. The information is shown in two different styles. There are X,Y,Z dimensions and actual point to point dimensions.

The X,Y,Z dimensions are the measuring planes used within Land Rover for the measurement of body panels. The whole bodyshell is within a parallel grid system.

The X plane is an imaginary vertical plane starting at the front of the vehicle. It is at right angles to the centre line of the vehicle and measures distances along the length of the vehicle. For Range Rover, the X '0' point is from the large hole in the front suspension turret. Therefore, any dimensions rearward of this point are shown as positive figures and dimensions forward of this point are shown as negative.

The Y plane is an imaginary plane through the centre of the vehicle. All Y dimensions start from this plane. As a rule, body dimensions are symmetrical about the centre line.

The Z plane is set at a fixed distance parallel to the underside of the vehicle. All Z dimensions start from this plane. For Range Rover, the Z '0' point is through the wheel centres.

The point to point measurements are actual distances between two points. These points can be holes or intersection points. Where holes are taken, the point of measurement is always from the hole centre.

Measurements shown are in millimetres and inches. The measurements shown in brackets are in inches.

The **tolerance** for the basic geometry of the vehicle is  $\pm 1.0$  mm (0.040). This includes tooling holes, all fixing holes and apertures.

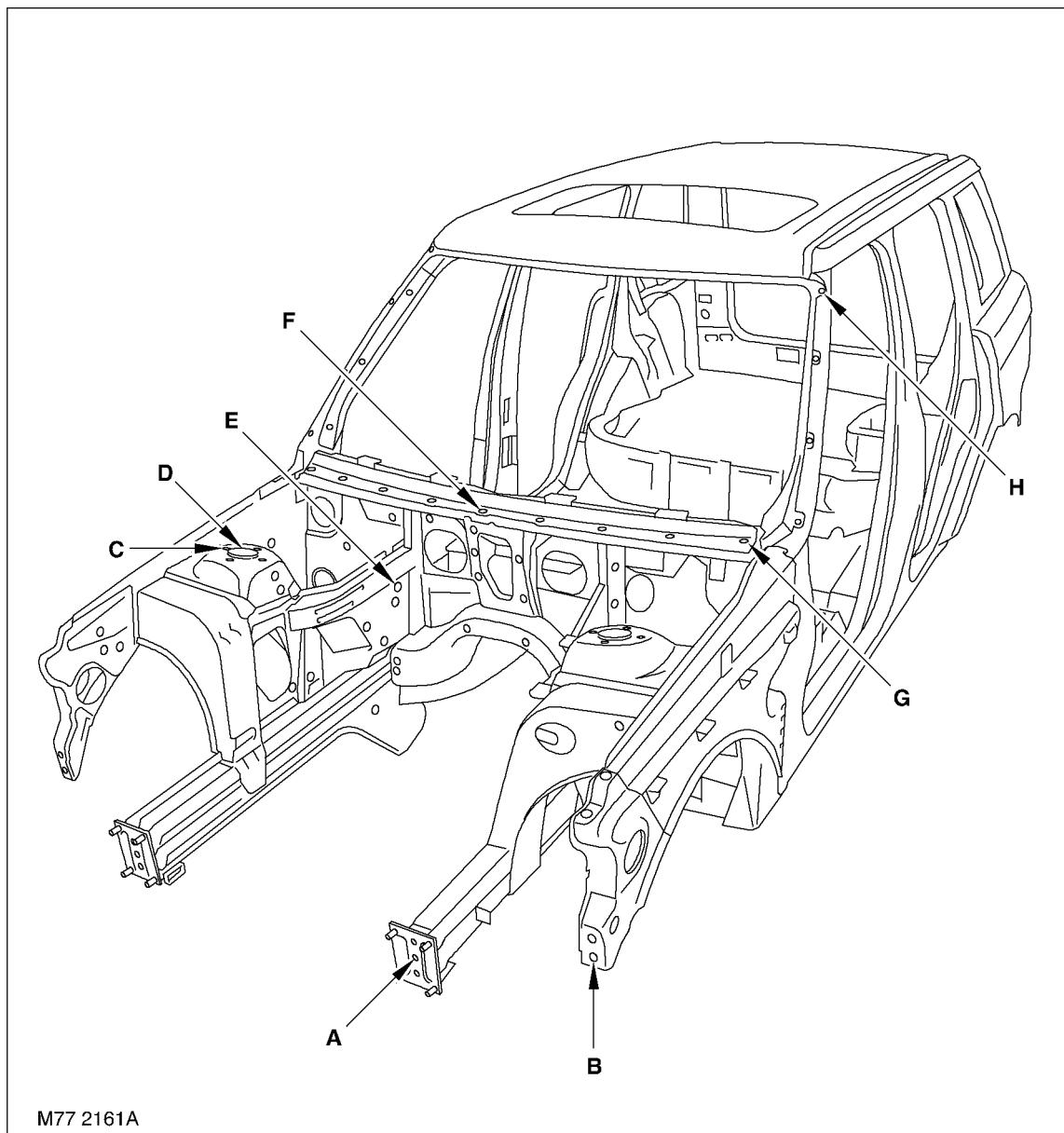
The tolerance for matching panel form and break lines is  $\pm 0.5$  mm (0.020).

# BODY DIMENSIONS

## Dimensional Illustrations

X,Y,Z Dimensional Information

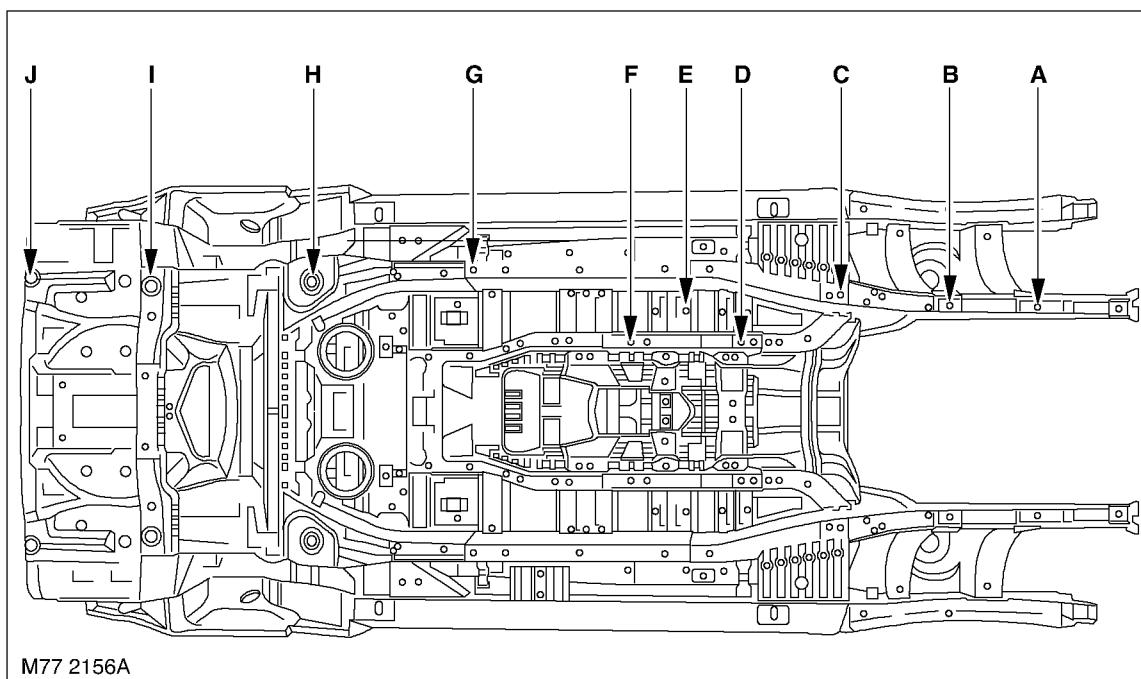
Front end dimensional information



Item	Description	X	Y	Z
A	Tooling hole - front armature mounting bracket	-707.8 (-27.866)	578.5 (22.775)	241 (9.488)
B	Valance outer - headlamp mounting panel lower fixing hole	-580 (-22.834)	817.1 (32.169)	693.7 (11.255)
C	Outboard fixing hole - damper mounting	4.2 (0.165)	649.6 (25.574)	755 (29.724)
D	Large hole - damper mounting	3.2 (0.126)	586.3 (23.082)	750 (29.527)
E	Tooling hole - valance support	400 (15.748)	316.8 (12.472)	616.1 (24.255)
F	Centre fixing hole - plenum	352.2 (13.866)	0	842.1 (33.153)
G	Outboard fixing hole - plenum	488 (19.212)	719.8 (28.338)	827.4 (32.574)
H	Top fixing hole - windscreens finisher	1163.5 (45.807)	681.4 (26.826)	1350.6 (53.173)



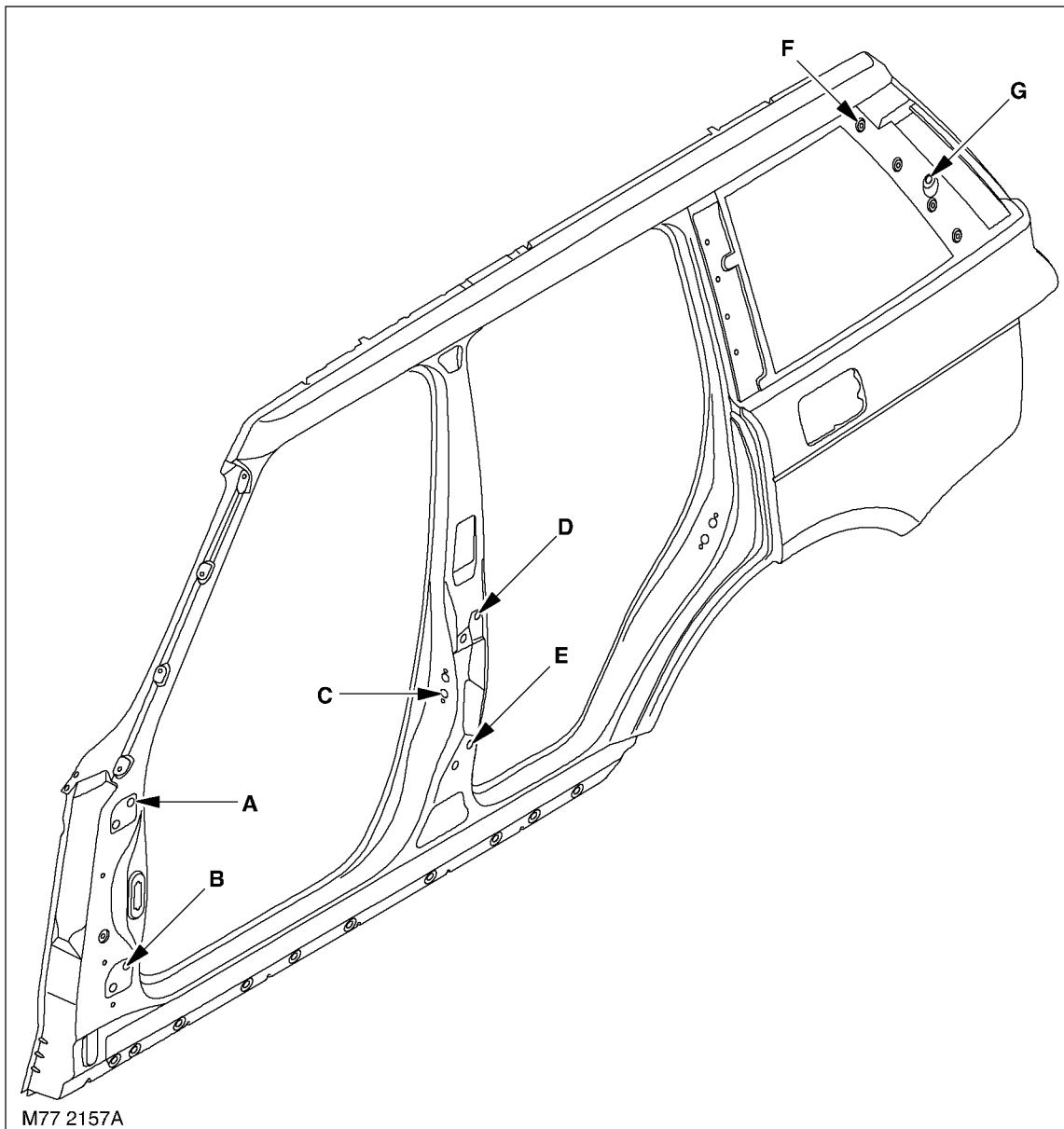
## Underbody dimensional information



Item	Description	X	Y	Z
A	Front sub-frame - front fixing hole	-322 (-12.677)	419 (16.496)	175 (6.889)
B	Front sub-frame - middle fixing hole	20 (0.787)	425 (16.732)	175 (6.889)
C	Front sub-frame - rear fixing hole	434 (17.086)	435.5 (17.145)	-65 (-2.559)
D	Cross member - front fixing hole	774.2 (30.48)	340.4 (13.4) LH, 277.6 (10.929) RH	92.9 (3.657)
E	Main floor - tooling hole	1021.2 (40.204)	337.6 (13.291)	91.7 (3.61)
F	Cross member - rear fixing hole	1268.2 (49.929)	340.4 (13.4) LH, 277.6 (10.929) RH	92.9 (3.657)
G	Fuel tank heat shield - front fixing hole	1766 (69.527)	528.8 (20.818)	-61.6 (-2.425)
H	Rear sub-frame - front fixing hole	2455 (96.653)	510 (20.078)	71.5 (2.814)
I	Rear sub-frame - rear fixing hole	3143 (123.47)	510 (20.078)	101.5 (3.996)
J	Rear tooling hole	3717 (146.33)	546 (21.496)	168.5 (6.633)

## BODY DIMENSIONS

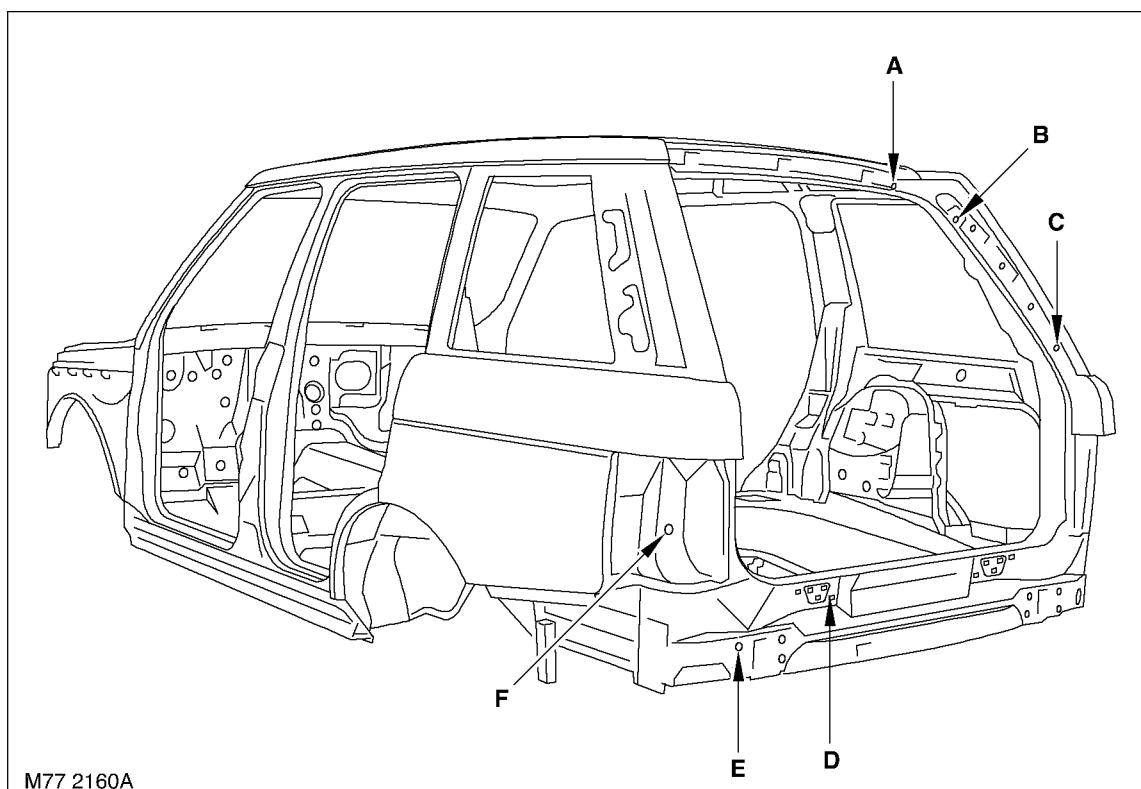
### Side dimensional information



Item	Description	X	Y	Z
A	Front door top hinge - top fixing hole	623.5 (24.547)	841.4 (33.125)	757.7 (29.83)
B	Front door bottom hinge - top fixing hole	602.4 (23.716)	849.5 (33.444)	293.1 (11.539)
C	Front door striker - bottom fixing hole	1669.1 (65.712)	843.3 (33.2)	549.1 (21.618)
D	Rear door top hinge - top fixing hole	1766.2 (69.535)	857.7 (33.767)	731.7 (28.807)
E	Rear door bottom hinge - top fixing hole	1734.6 (68.291)	866.7 (34.122)	383.1 (15.082)
F	'E' - Post finisher top fixing hole	3253.4 (128.086)	667.8 (26.291)	1320.8 (52)
G	'E' - Post tooling hole	3431 (135.078)	719 (28.307)	1100 (43.307)



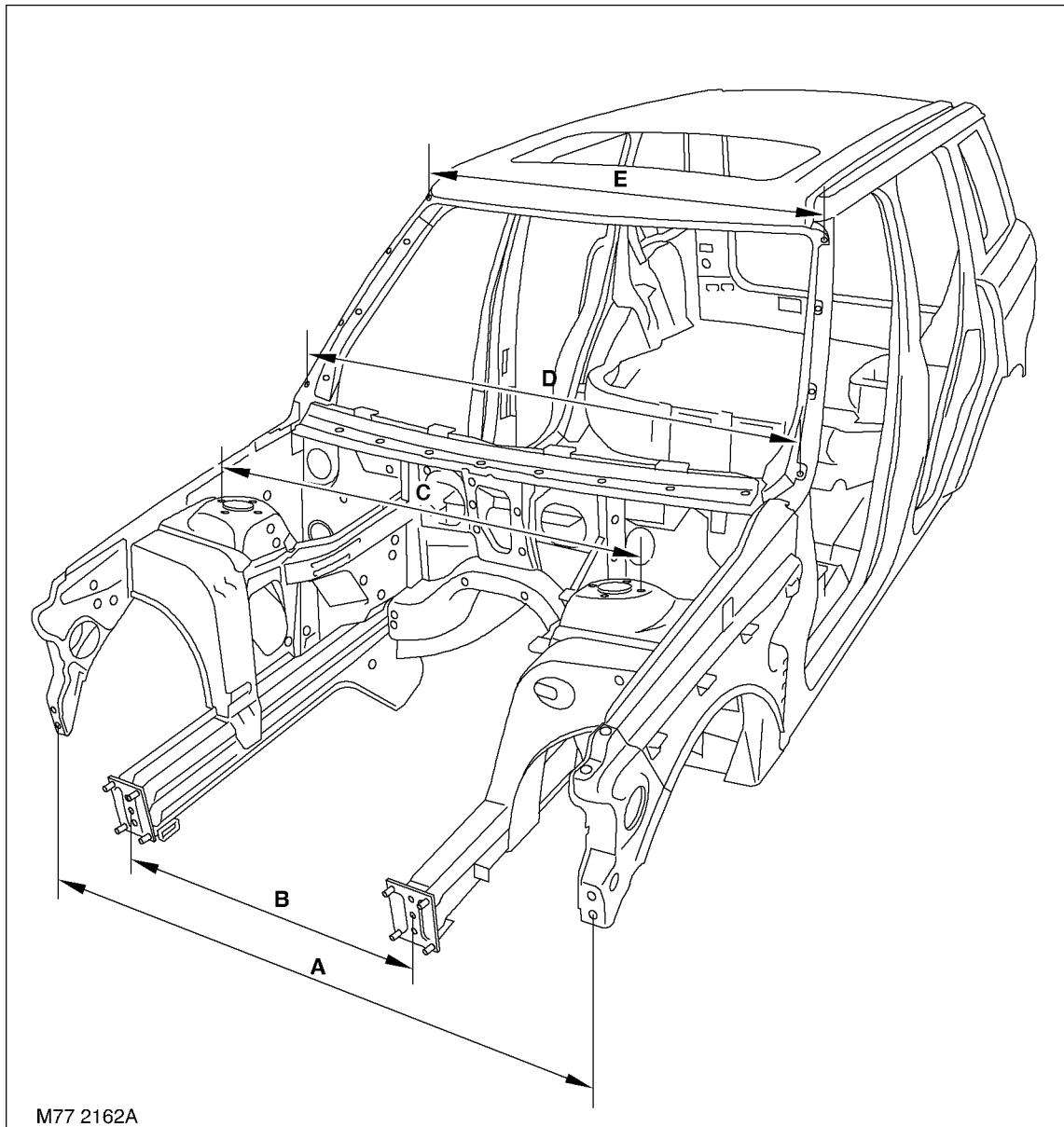
## Rear end dimensional information



Item	Description	X	Y	Z
A	Tail gate upper - inboard hinge fixing hole	3253.1 (128.074)	473.4 (18.637)	1380.2 (54.338)
B	Tailgate upper - gas strut fixing hole	3351.8 (131.96)	570.5 (22.46)	1302.6 (51.283)
C	'E' post drain channel - finisher fixing hole	3661.2 (144.141)	663.3 (26.114)	943.4 (37.141)
D	Tailgate lower, hinge - lower fixing hole	3717.2 (146.346)	283.5 (11.161) LH, 377.5 (14.862) RH	336 (13.228)
E	Rear armature - outboard top fixing hole	3749.5 (147.618)	615.3 (24.224)	267.1 (10.515)
F	Tail lamp mounting panel - tooling hole	3648.9 (143.657)	751.5 (29.586)	532.4 (20.96)

## BODY DIMENSIONS

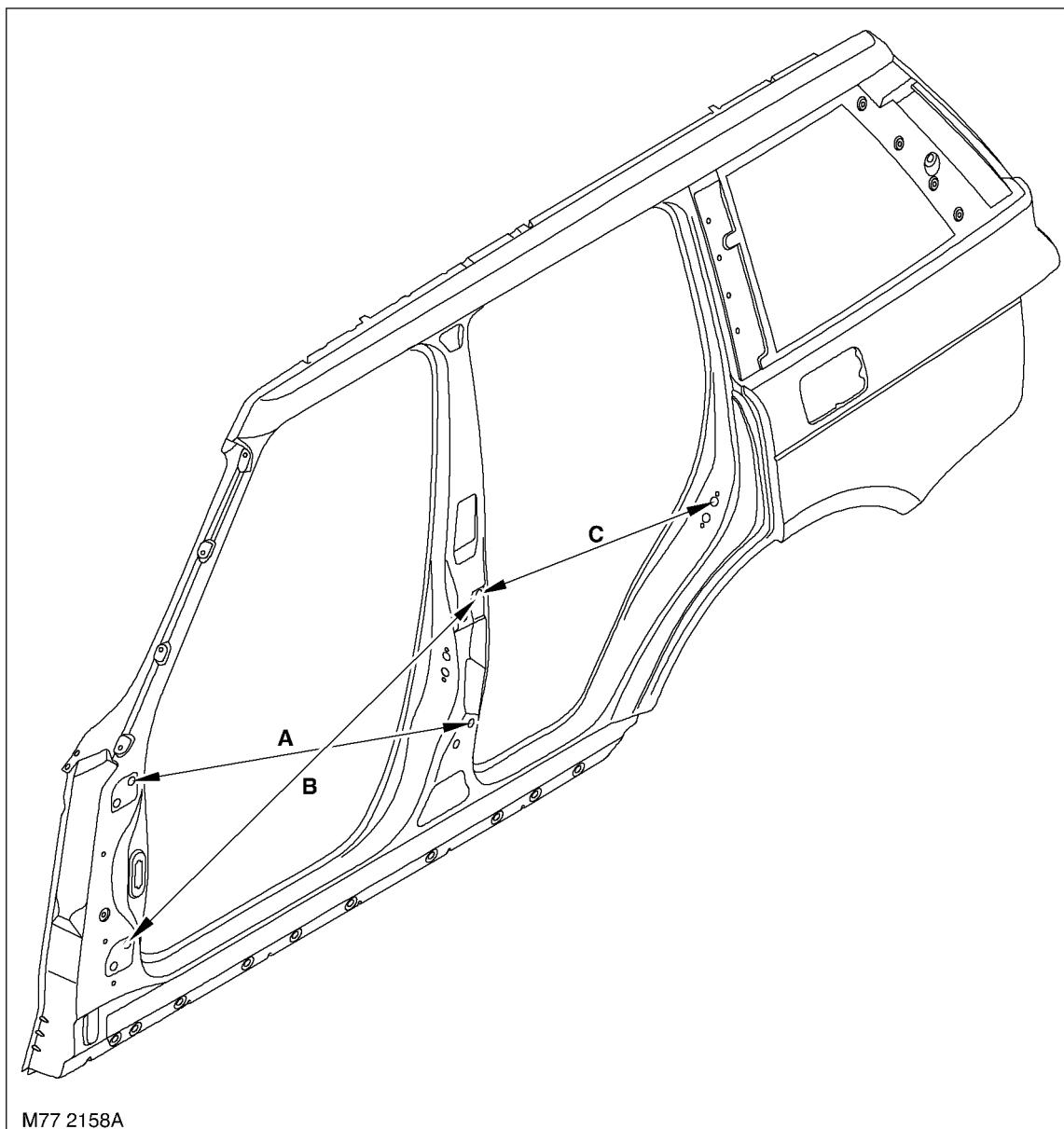
Front end, point to point dimensional information



Item	From	To	Length
A	Valance outer, bulkhead lower fixing hole, LH	Valance outer, bulkhead lower fixing hole, RH	1634.2 (64.338)
B	Front armature mounting plate, tooling hole, LH	Front armature mounting plate, tooling hole, RH	861 (33.897)
C	Damper mounting, outboard fixing, LH	Damper mounting, outboard fixing, RH	1172.6 (46.165)
D	Windscreenside finisher, lower fixing hole, LH	Windscreenside finisher, lower fixing hole, RH	1651.8 (65.031)
E	Windscreenside finisher, top fixing hole, LH	Windscreenside finisher, top fixing hole, RH	1362.8 (53.653)



## Body side, point to point dimensional information

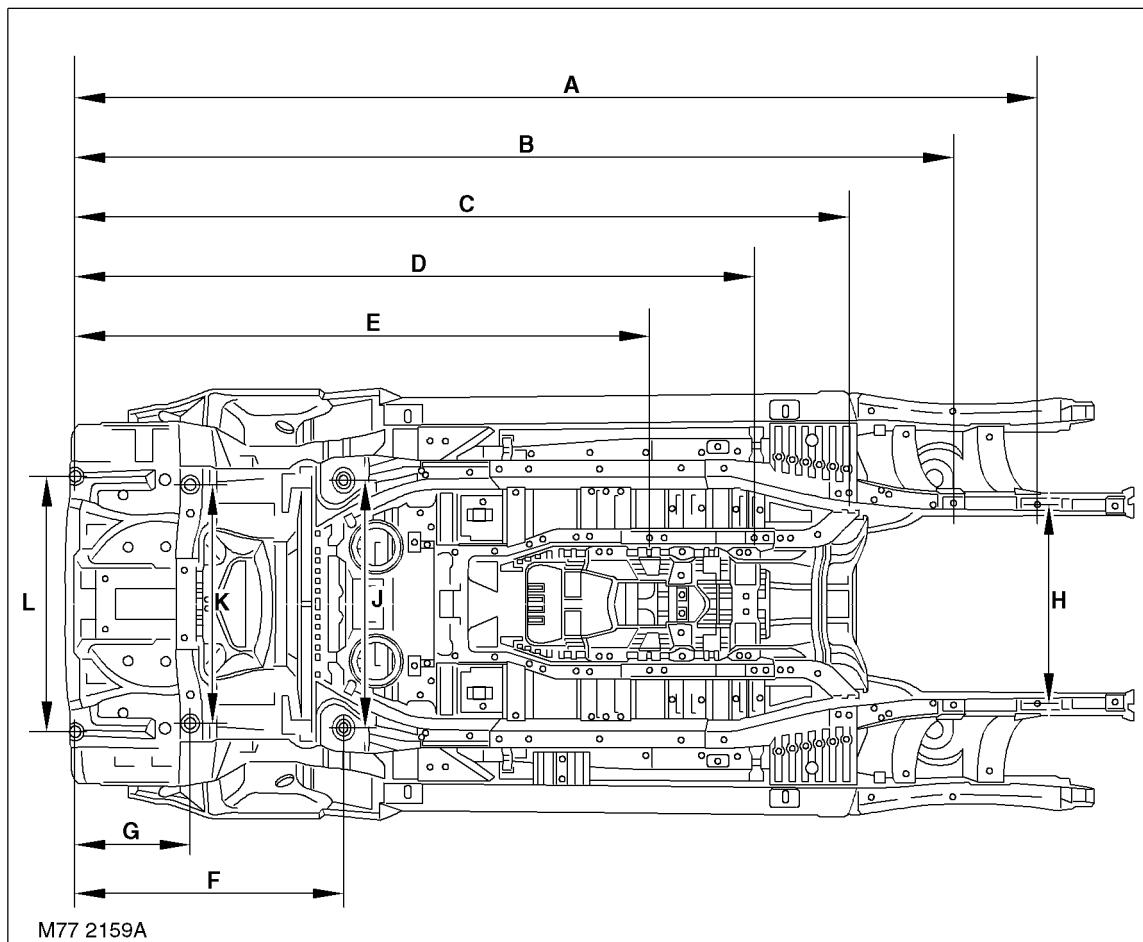


Item	From	To	Length
A	Body side, top hinge fixing hole - front door	Body side, bottom hinge fixing hole - rear door	1172.7 (46.169)
B	Body side, bottom hinge fixing hole - front door	Body side, top hinge fixing hole - rear door	1243.7 (48.964)
C	Body side, top hinge fixing hole - rear door	Body side, top striker fixing hole - rear door	827.4 (32.574)

## BODY DIMENSIONS

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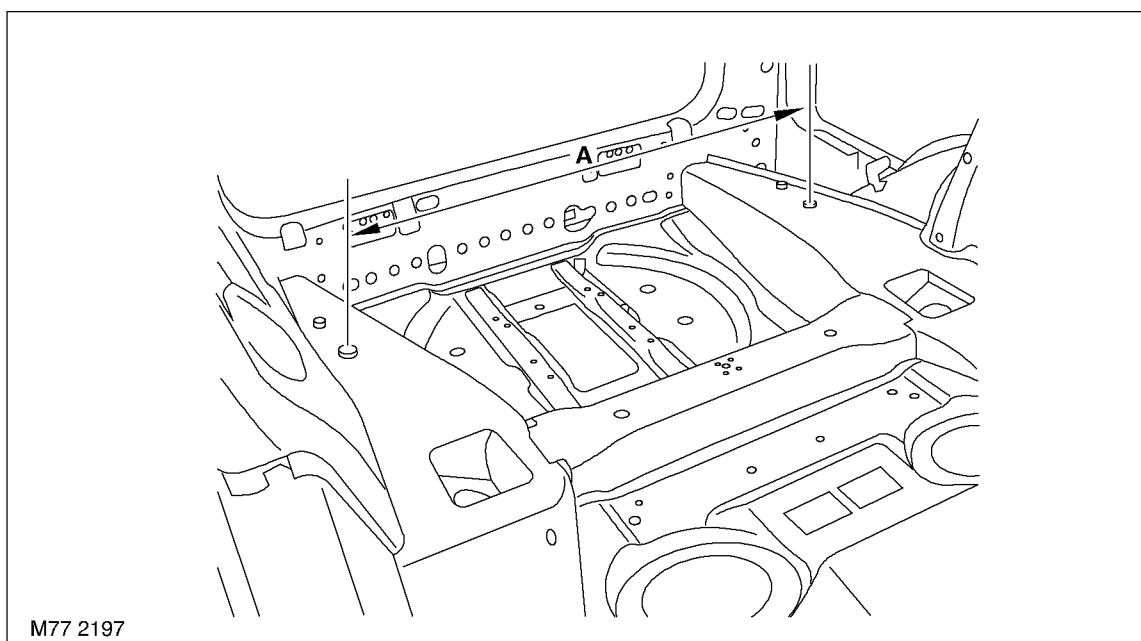
### Under body, point to point dimensional information



Item	From	To	Length
A	Rear tow bar fixing hole	Front sub frame - front fixing hole	4039 (159.015)
B	Rear tow bar fixing hole	Front subframe, middle mounting hole	3737 (147.125)
C	Rear tow bar fixing hole	Front subframe, rear mounting hole	3283 (129.251)
D	Rear tow bar fixing hole	Centre cross member - front fixing hole	2942.8 (115.858)
E	Rear tow bar fixing hole	Centre cross member - rear fixing hole	2448.8 (96.409)
F	Rear tow bar fixing hole	Rear subframe, front mounting hole	1262 (49.685)
G	Rear tow bar fixing hole	Rear subframe, rear mounting hole	574 (22.598)
H	Front sub frame - front fixing hole, LH	Front sub frame - front fixing hole, RH	838 (32.992)
J	Rear subframe, front mounting hole, LH	Rear subframe, front mounting hole, RH	1020 (40.157)
K	Rear subframe, rear mounting hole, LH	Rear subframe, rear mounting hole, RH	1020 (40.157)
L	Rear tow bar fixing hole, LH	Rear tow bar fixing hole, RH	1092 (42.992)

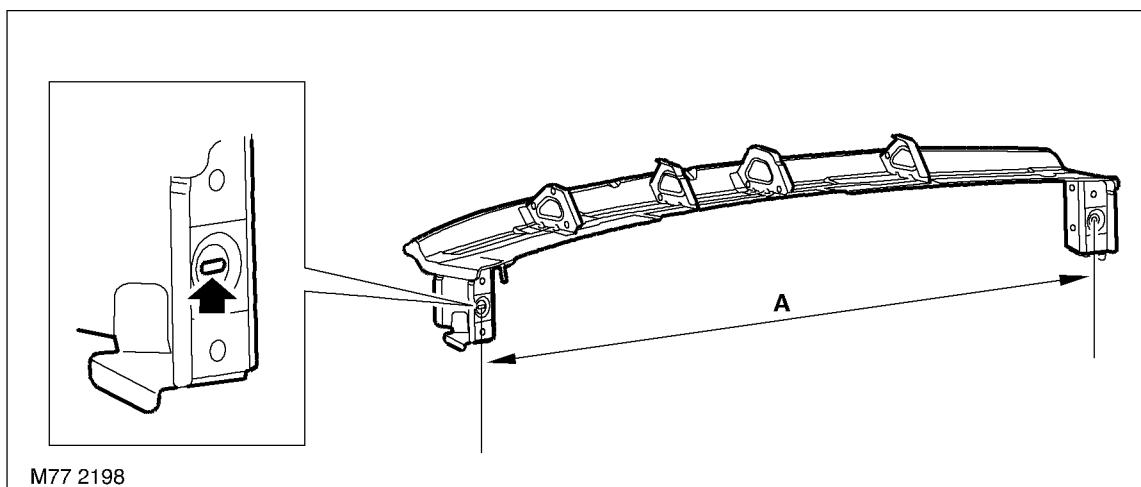


## Internal, point to point dimensional information



Item	From	To	Length
A	Rear subframe, rear mounting hole, LH	Rear subframe, rear mounting hole, RH	1020 (40.157)

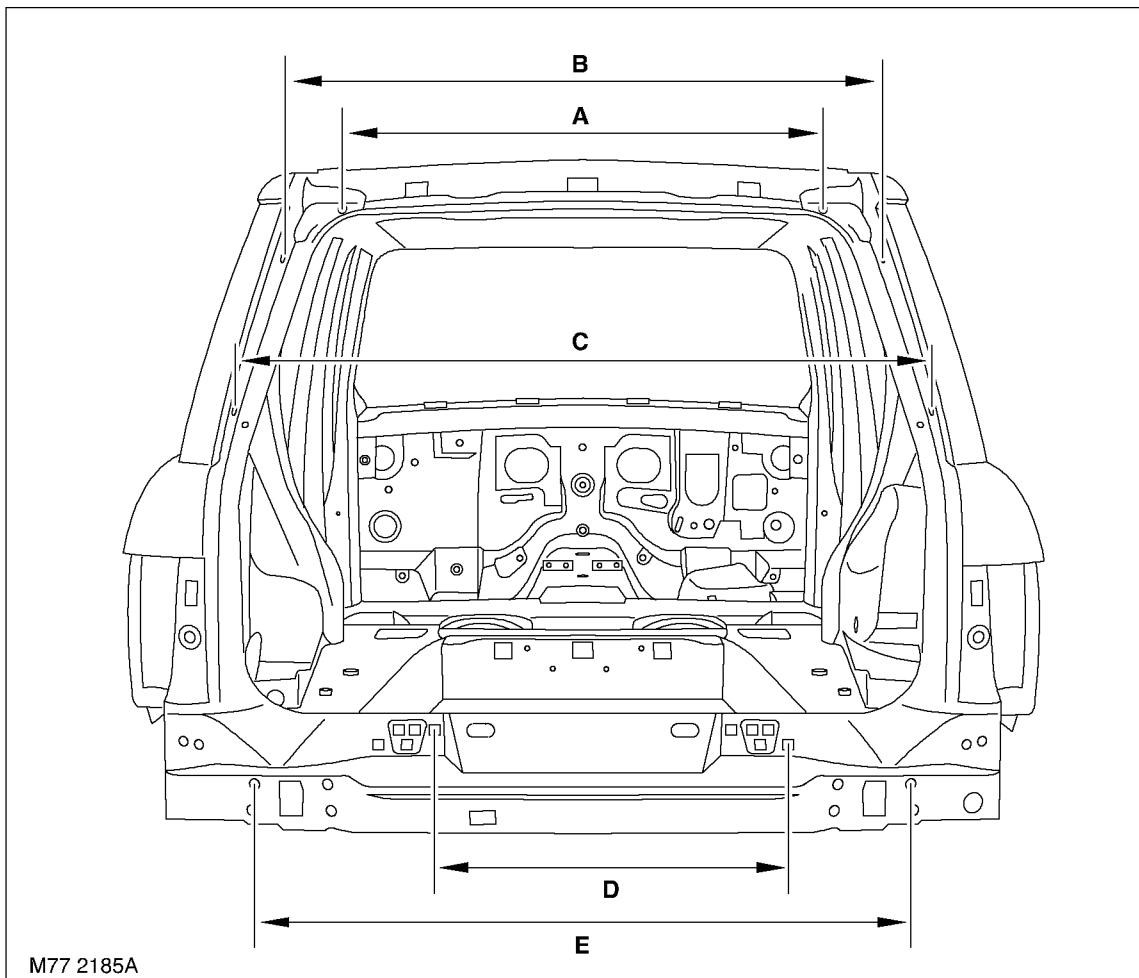
## Fascia carrier mounting points



Item	From	To	Length
A	Fascia carrier mounting hole, RH	Fascia carrier mounting slot, LH	1458 (57.401)

## BODY DIMENSIONS

### Rear end, point to point dimensional information



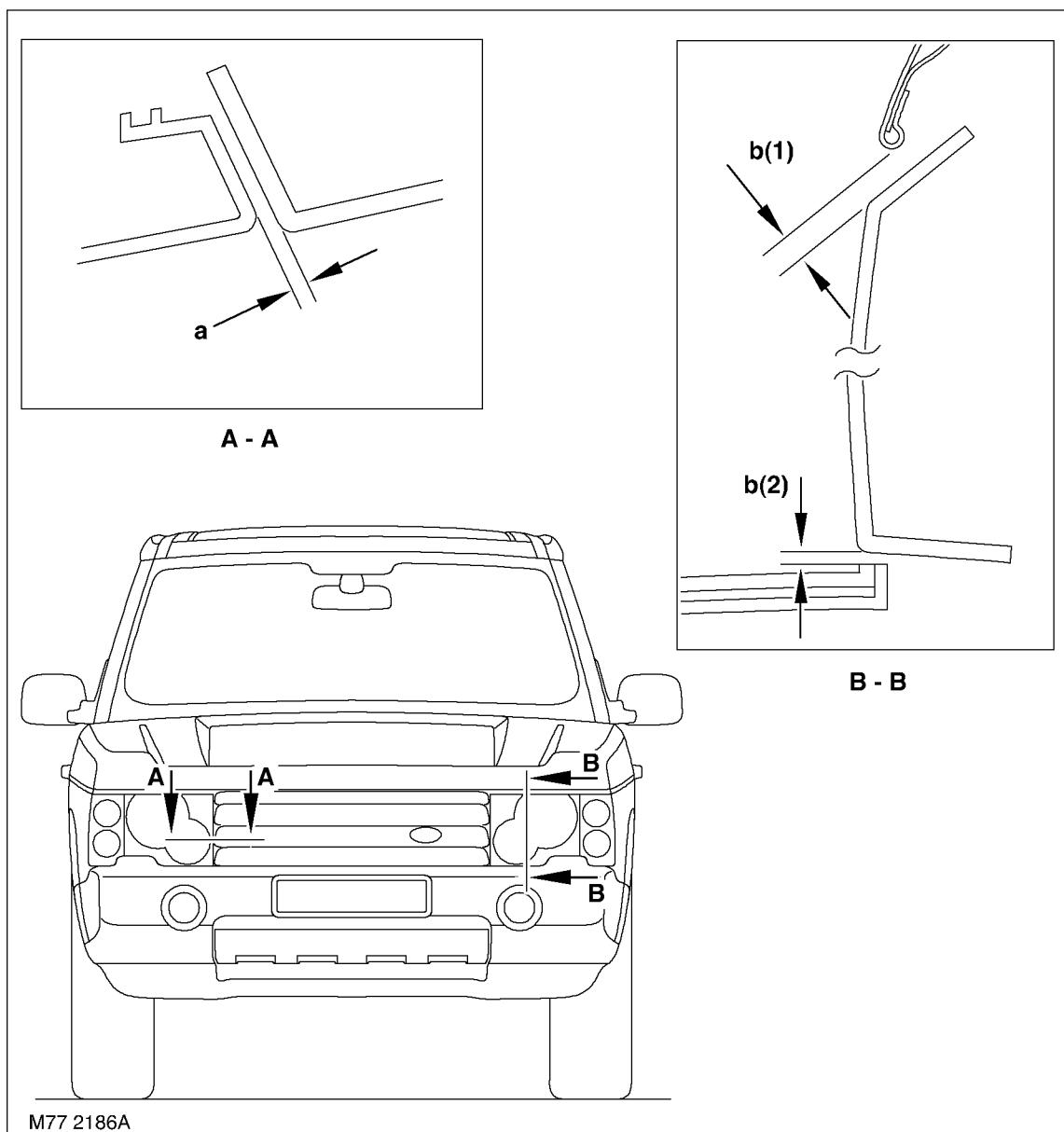
Item	From	To	Length
A	Upper tailgate - inboard hinge fixing hole, LH	Upper tailgate - inboard hinge fixing hole, RH	946.8 (37.275)
B	Upper tailgate - gas strut fixing hole, LH	Upper tailgate - gas strut fixing hole, RH	1141 (44.921)
C	'E' post drain channel - finisher fixing hole, LH	'E' post drain channel - finisher fixing hole, RH	1326.6 (52.228)
D	Lower tailgate hinge fixing - inboard hole, LH	Lower tailgate hinge fixing - inboard hole, RH	661 (26.023)
E	Rear armature - outboard top fixing hole, LH	Rear armature - outboard top fixing hole, RH	1230.6 (48.448)



### Gap and Profile Measurements

The following information is to be used as a guide to assist the technician in refitting exterior body panels and trim items so as to achieve a correctly aligned and cosmetically acceptable vehicle.

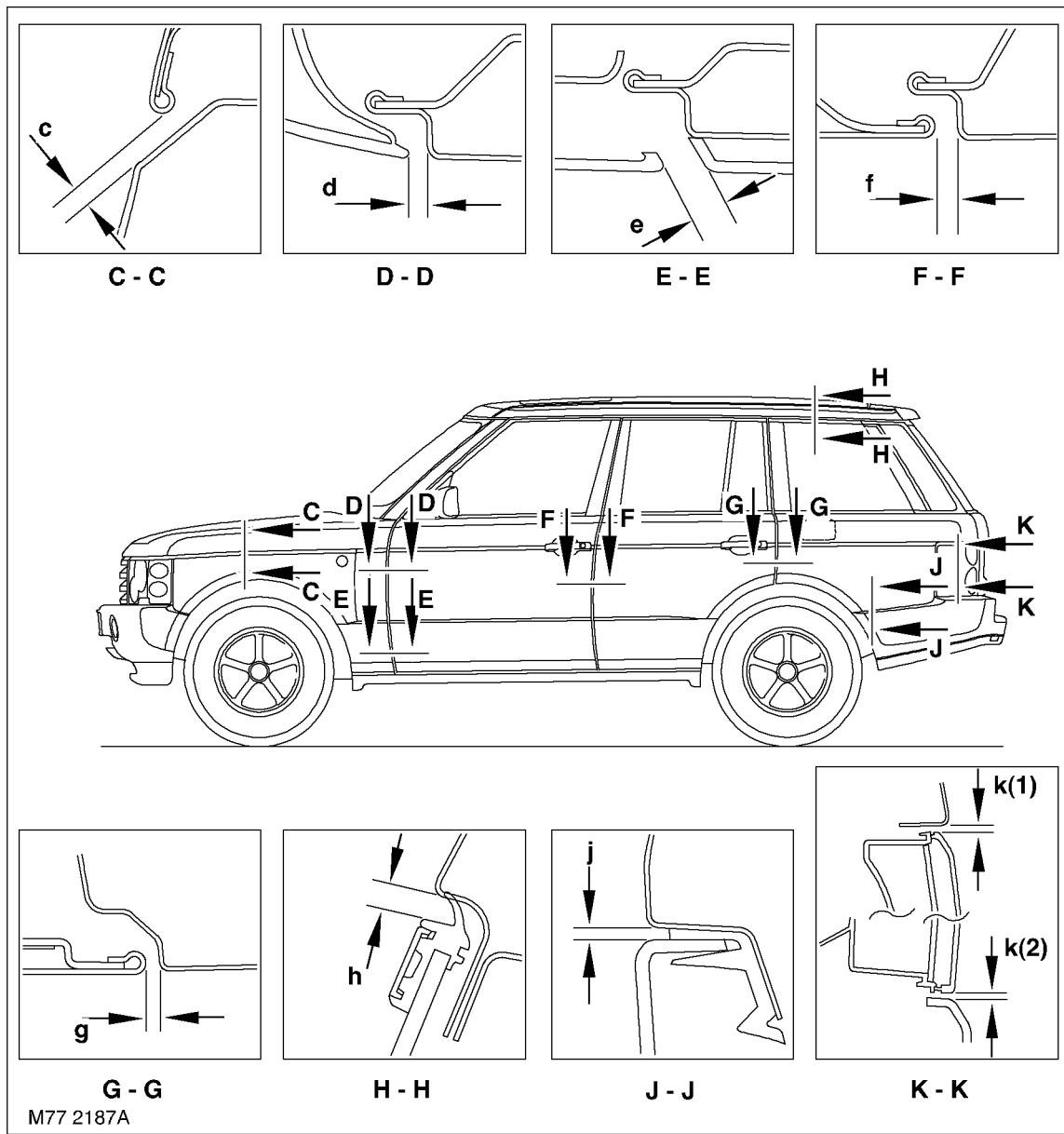
Measurements shown are in millimetres and inches. The measurements shown in brackets are in inches.



Section	Gap	Description	Dimension
A-A	a	Headlamp to grille	4.0 (0.157), $\pm$ 2.0 (0.078)
B-B	b(1)	Headlamp to bonnet	6.0 (0.236), $\pm$ 2.0 (0.078)
B-B	b(2)	Headlamp to bumper	3.0 (0.118), $\pm$ 1.0 (0.0393)

Profile of bonnet to headlamp to be flush. Even gaps side to side, tolerance  $\pm$  1.0 mm (0.040).

## BODY DIMENSIONS



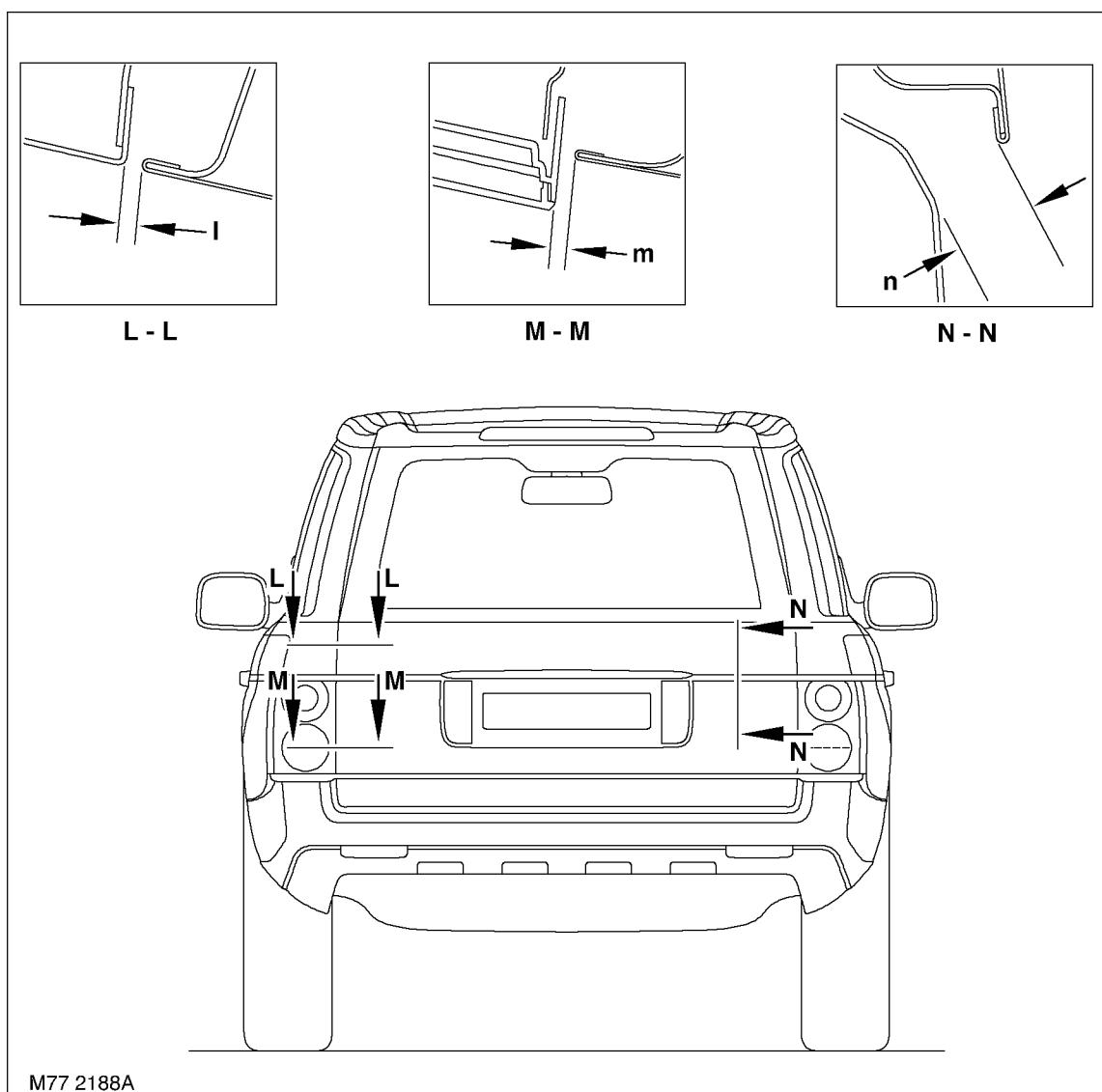
Section	Gap	Description	Dimension
C-C	c	Bonnet to front wing	6.0 (0.236), $\pm 1.5$ (0.059)
D-D	d	Front wing grille finisher to front door	5.0 (0.196), $\pm 1.0$ (0.040)
E-E	e	Front wing lower finisher to front door	7.5 (0.295), $\pm 1.25$ (0.049)
F-F	f	Front door to rear door	5.0 (0.196), $\pm 1.0$ (0.040)
G-G	g	Rear door to bodyside	5.0 (0.196), $\pm 1.0$ (0.040)
H-H	h	Roof to rear quarter trim	6.5 (0.255), $\pm 2$ (0.078)
J-J	j	Body side to rear bumper	3.0 (0.118), $\pm 1.0$ (0.040)
K-K	k(1)	Tail lamp to bodyside	3.0 (0.118), $\pm 1.0$ (0.040)
K-K	k(2)	Tail lamp to bumper	3.0 (0.118), $\pm 1.0$ (0.040)

Section D-D, profile of wing grille to front door is 0.0 nominal, tolerance +1.0 (0.040) / -0.0.

Section F-F, profile of front door to rear door is 0.0 nominal, tolerance +1.0 (0.040) / -0.0.

Section G-G, profile of rear door to body side is 0.0 nominal, tolerance +1.0 (0.040) / -0.0.

Section J-J, profile of rear bumper to body side is 3.5 mm (0.137) nominal, tolerance  $\pm 1.0$  (0.040).



Section	Gap	Description	Dimension
L-L	l	Bodyside to upper tailgate	4.0 (0.157), $\pm 1.0$ (0.040)
M-M	m	Lower tailgate to tail lamp	5.0 (0.196), $\pm 1.5$ (0.059)
N-N	n	Upper tailgate to lower tail gate	20 (0.787), $\pm 2$ (0.078)

## BODY DIMENSIONS

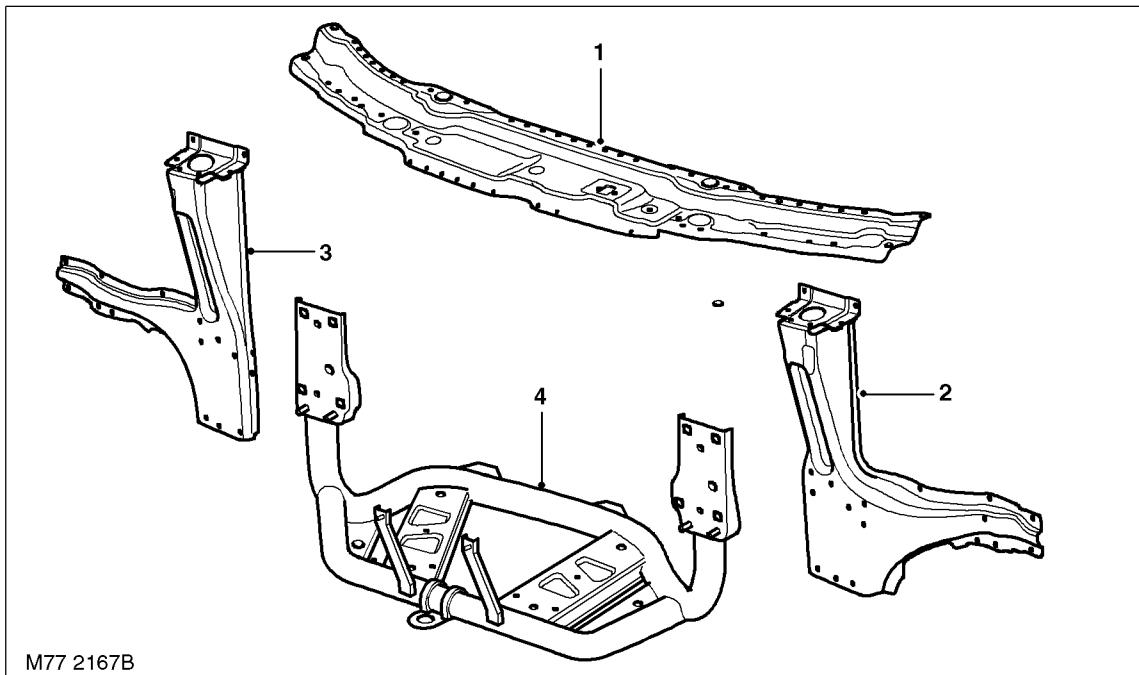
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**Serviceable Panels**

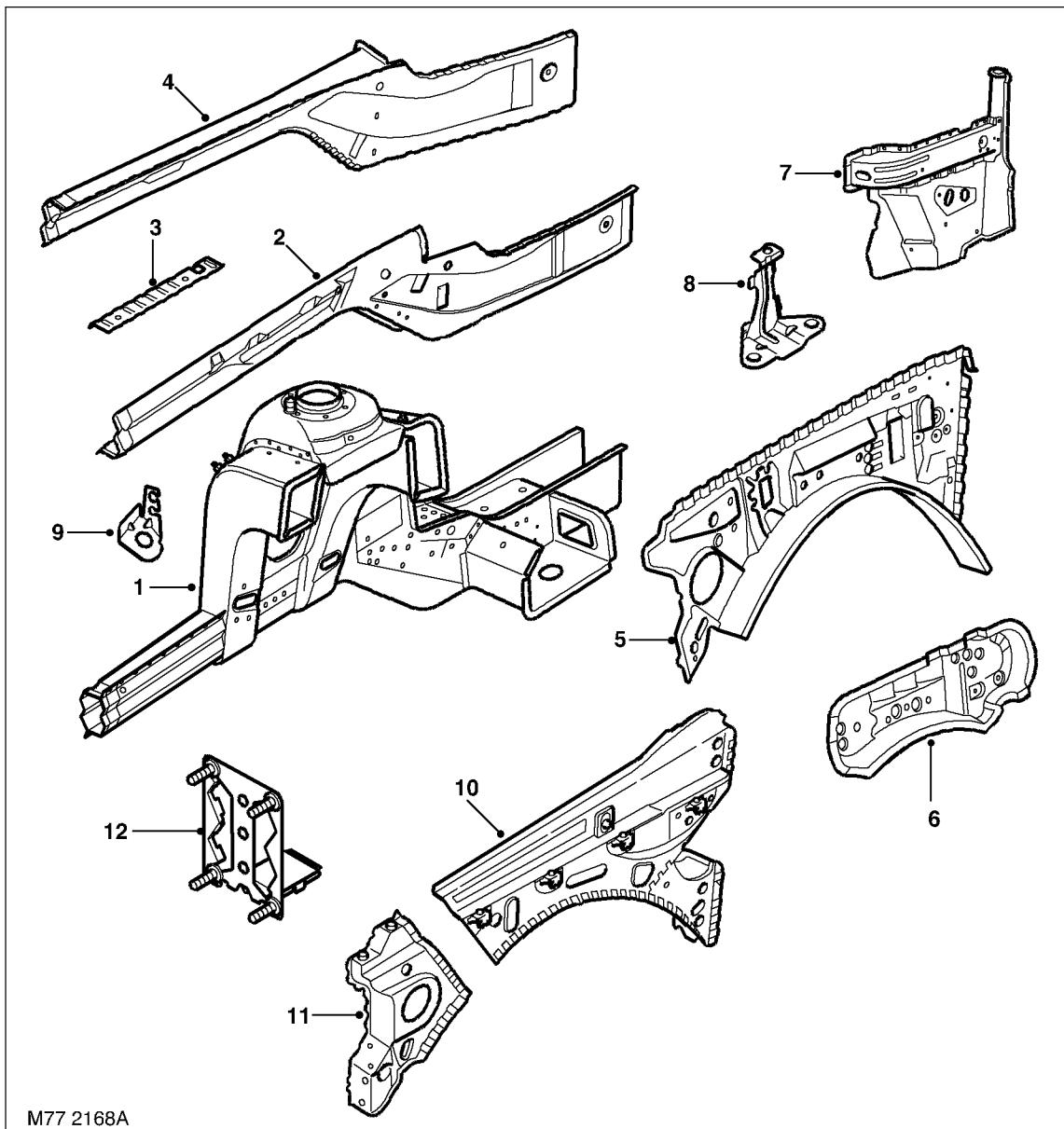
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**Front end panels**

- 1 Bonnet locking platform
- 2 LH headlamp mounting panel
- 3 RH headlamp mounting panel
- 4 Radiator protection bar

## PANEL REPAIRS

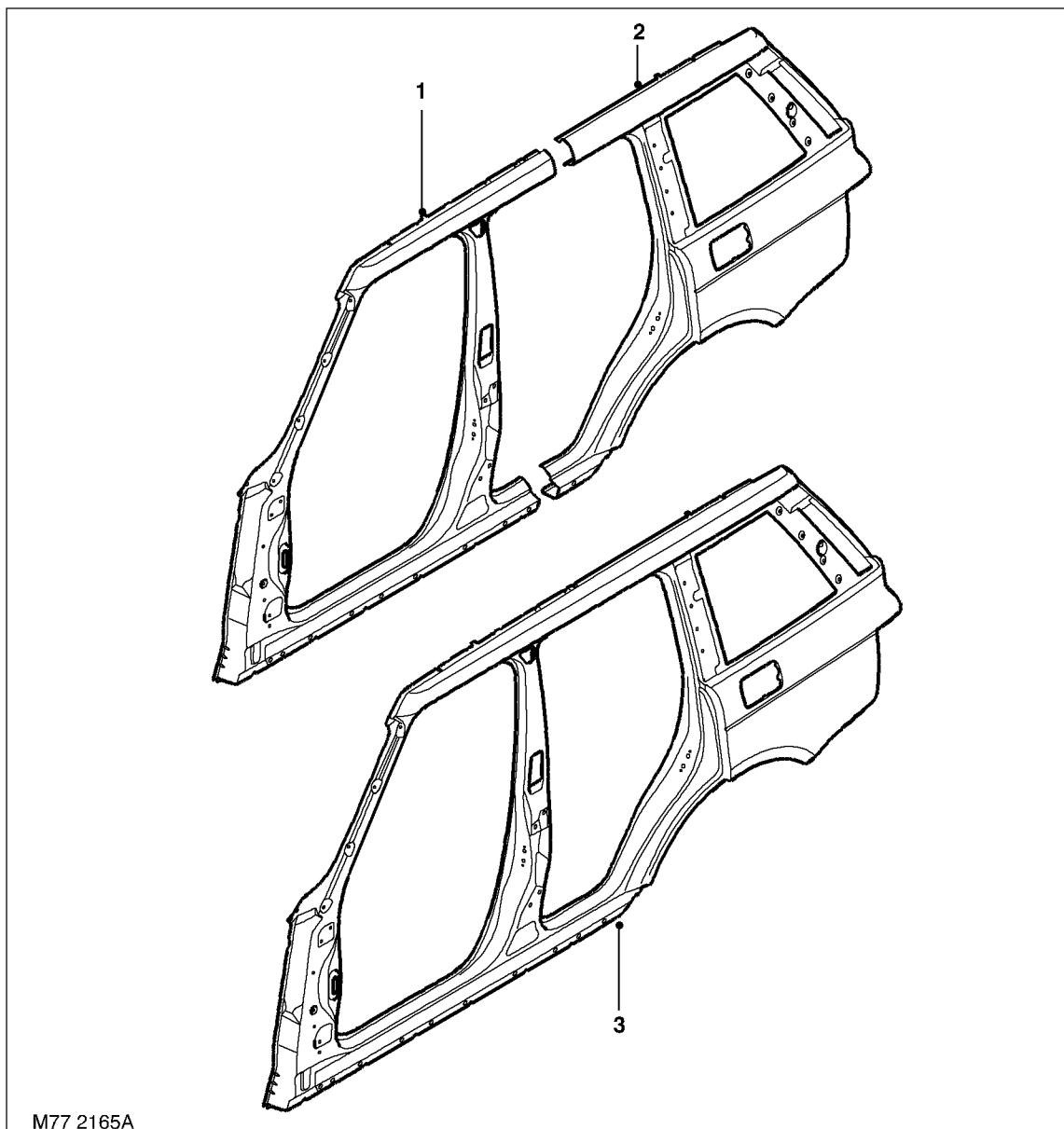
### Inner front end panels



- 1 Front sidemember assembly
- 2 Front sidemember inner panel
- 3 Front sidemember reinforcement panel
- 4 Front sidemember outer panel
- 5 Valance inner assembly
- 6 Valance inner closing panel
- 7 Valance inner reinforcement
- 8 Brake hose bracket
- 9 Brake pipe support bracket
- 10 Valance outer
- 11 Valance outer extension
- 12 Front bumper mounting bracket



Outer body side panels

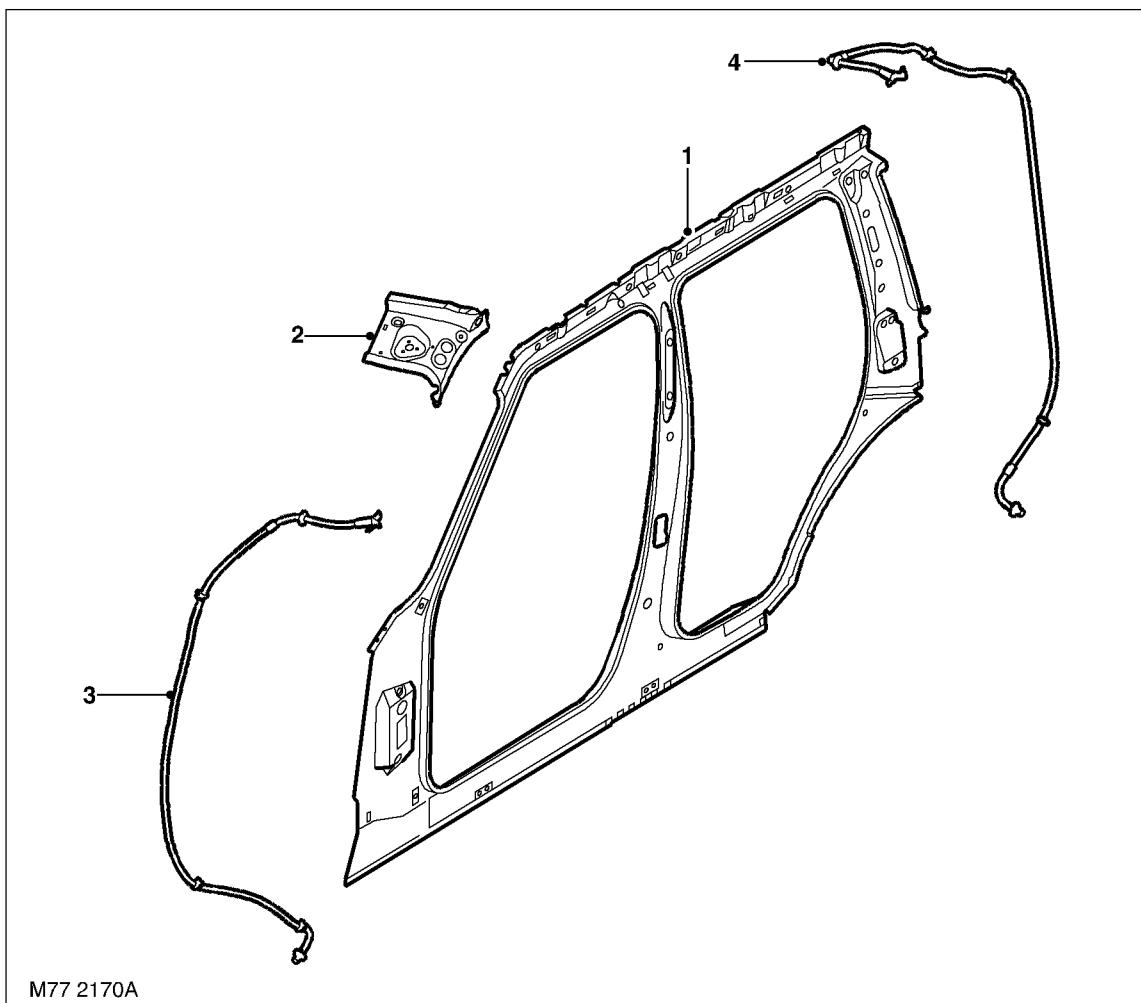


- 1 Front body side assembly
- 2 Rear body side assembly
- 3 Body side assembly

## PANEL REPAIRS

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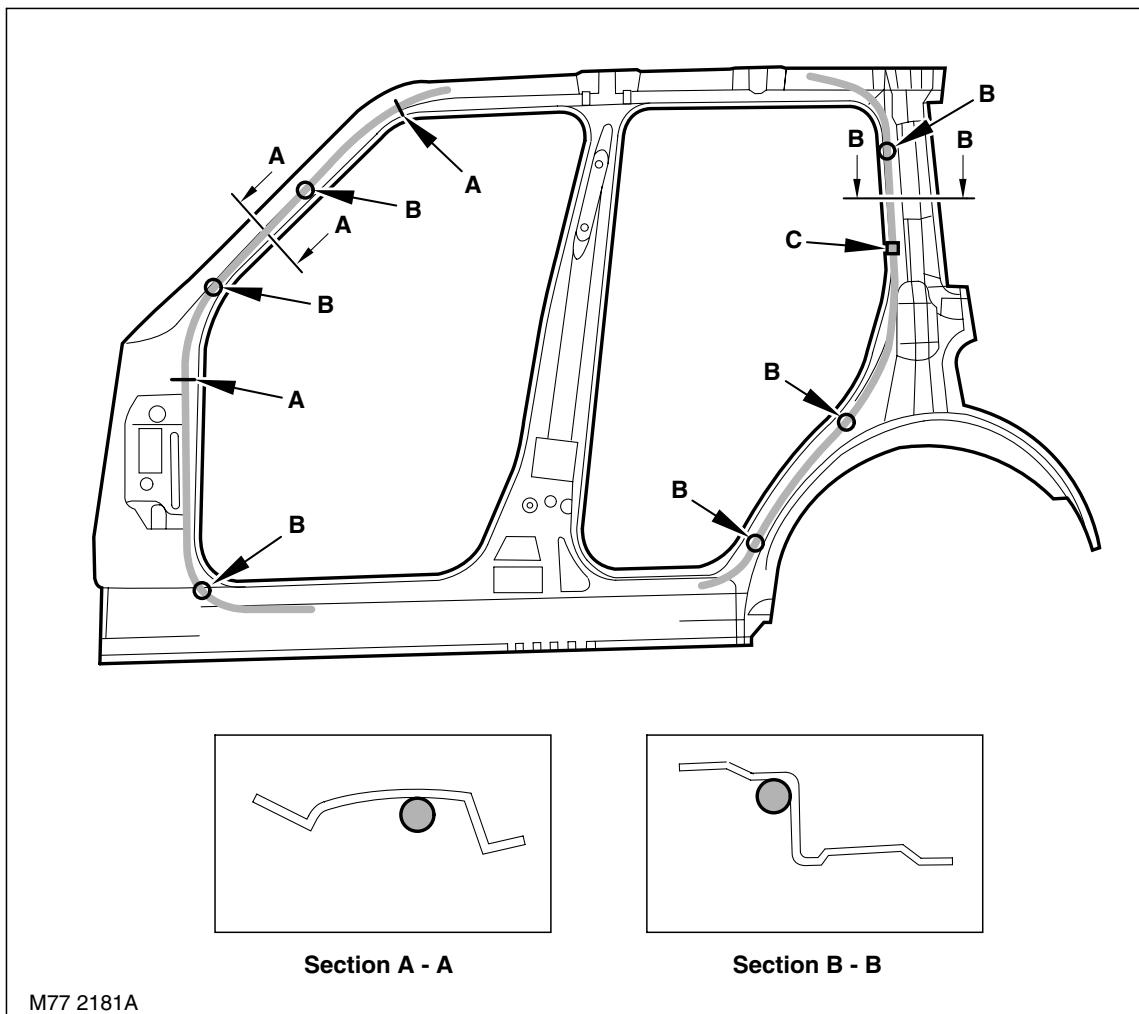
**Body side inner**



- 1** Body side inner assembly
- 2** Front header side extension
- 3** Drain tube - front - sunroof
- 4** Drain tube - rear - sunroof



## Sunroof drain tubes

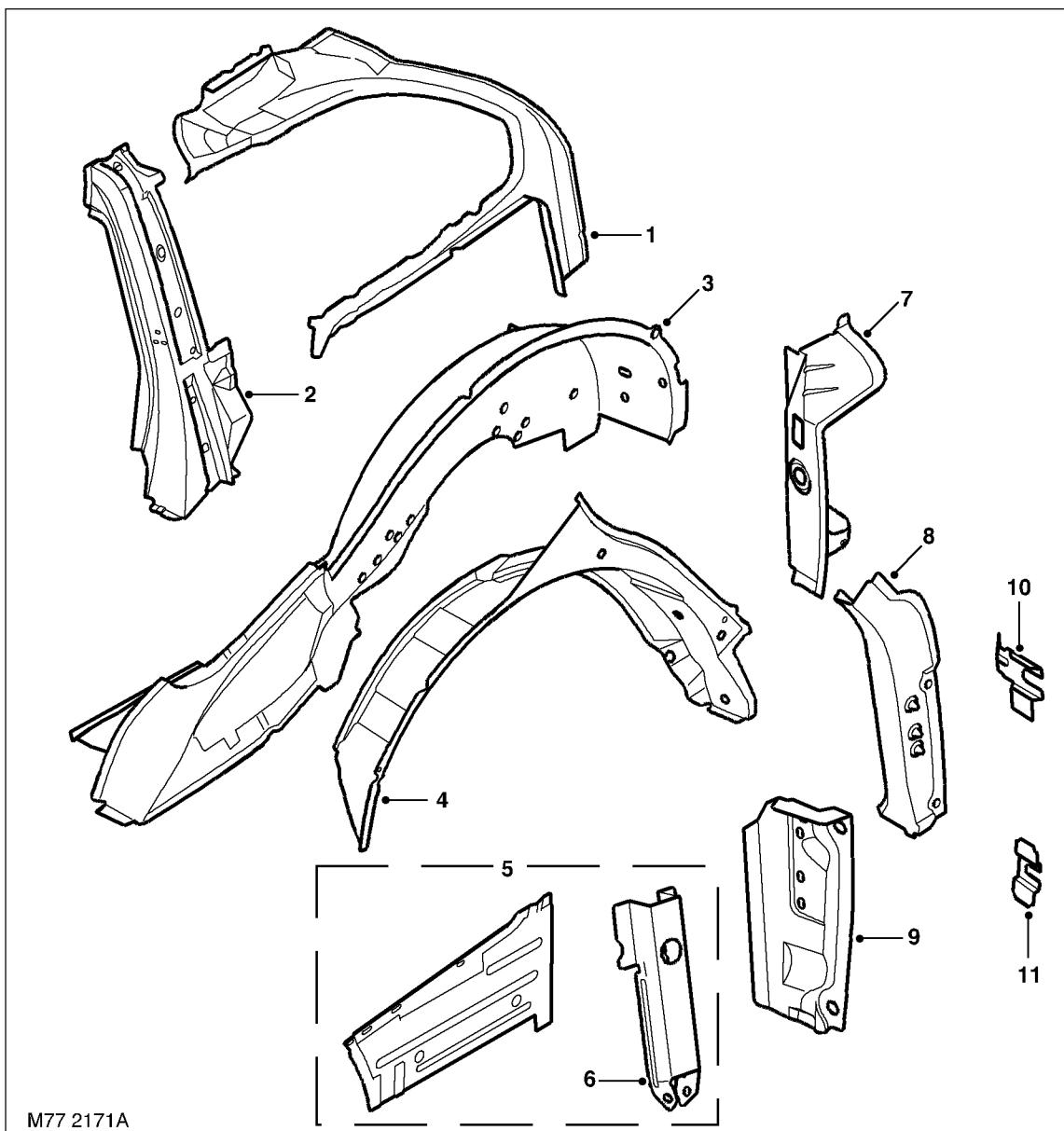


*Section A-A and B-B show the approximate position of each drain tube in the body side closing panel. The letters A, B and C highlight the position, and type of clips used, to hold the drain tubes in place.*

- A = Metal clip, welded to the panel
- B = Plastic clip
- C = Expanding foam block, clipped to the panel

## PANEL REPAIRS

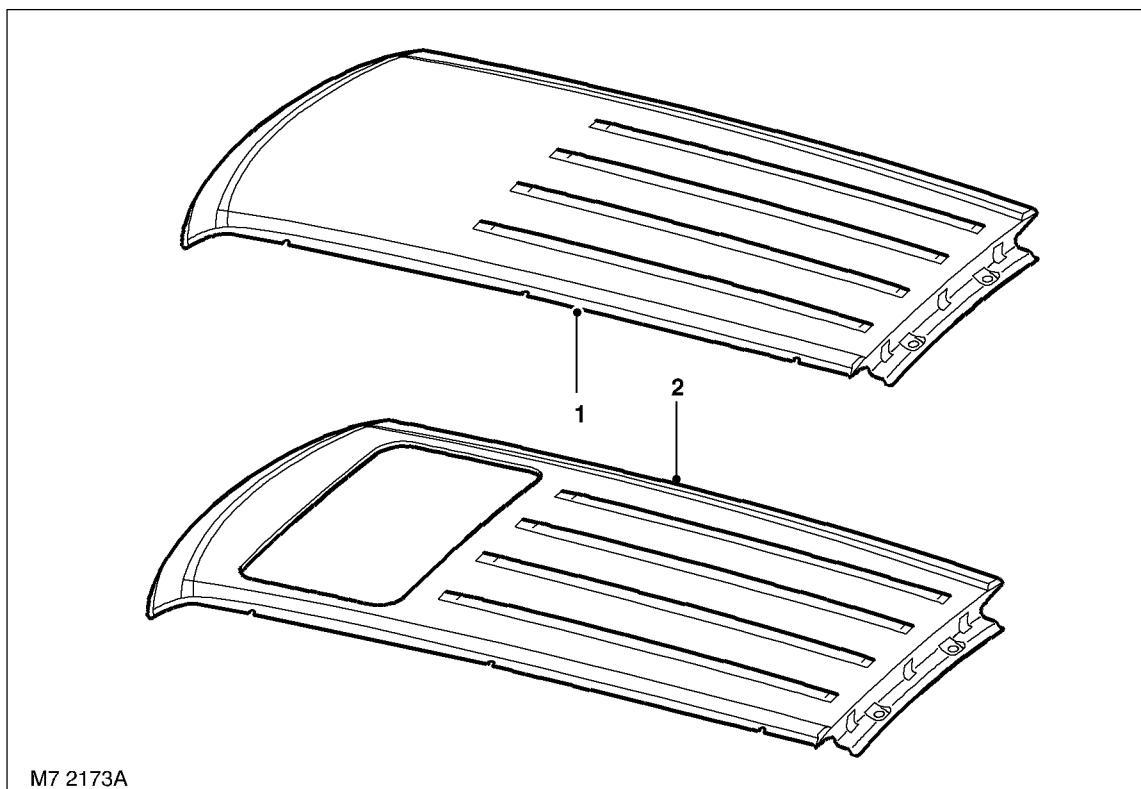
### Rear inner body side panels



- 1 Rear quarter inner - upper
- 2 'D' Post inner
- 3 Wheel arch assembly
- 4 Wheel arch reinforcement assembly
- 5 Outer rear wheelarch assembly
- 6 Rear quarter front lower reinforcement
- 7 Tail lamp mounting panel
- 8 Tail lamp mounting panel
- 9 Tail lamp mounting panel - inner
- 10 Tail lamp mounting bracket - upper
- 11 Tail lamp mounting bracket - lower



Roof assemblies

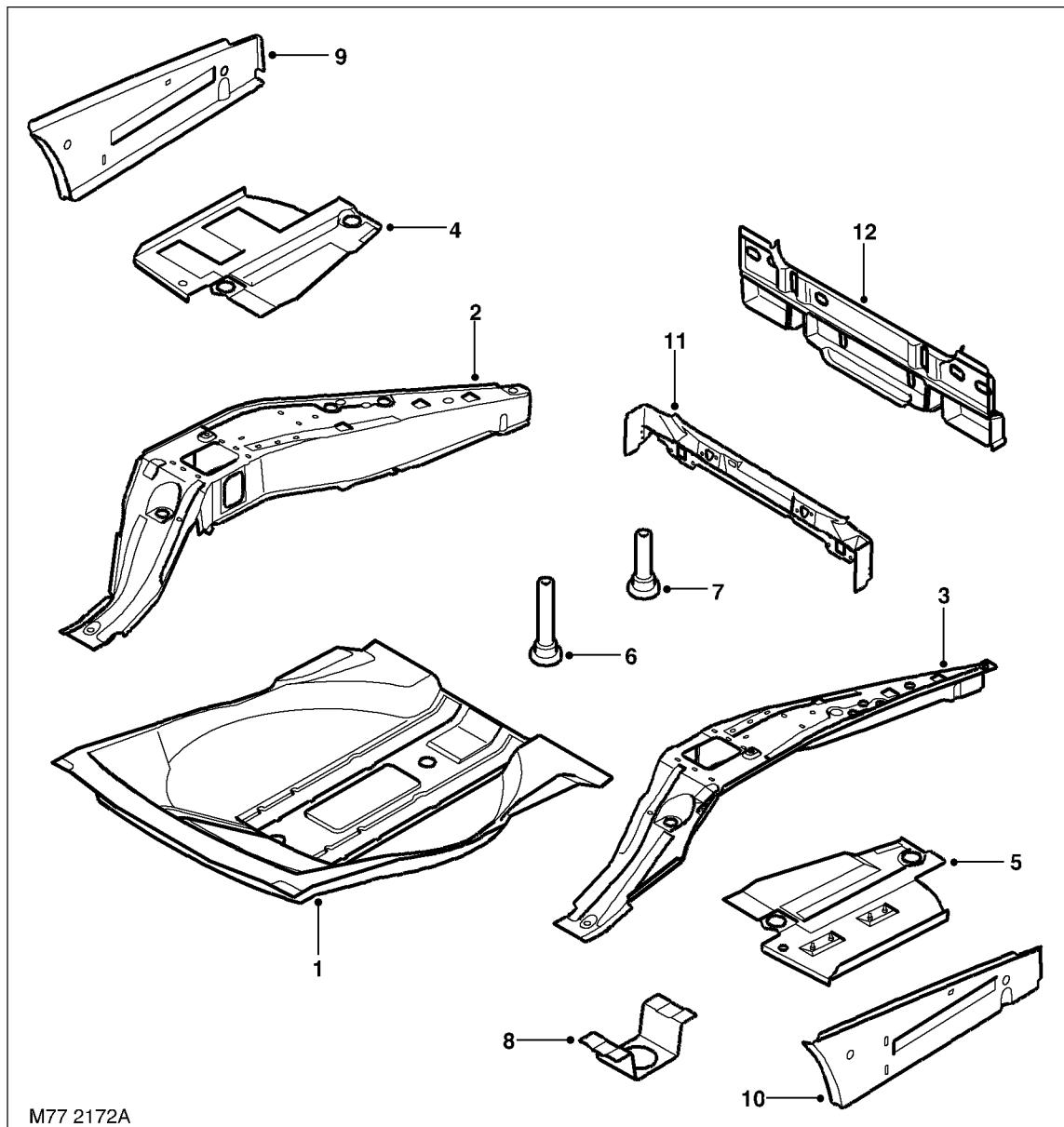


M7 2173A

- 1 Fixed roof assembly
- 2 Sun roof assembly

## PANEL REPAIRS

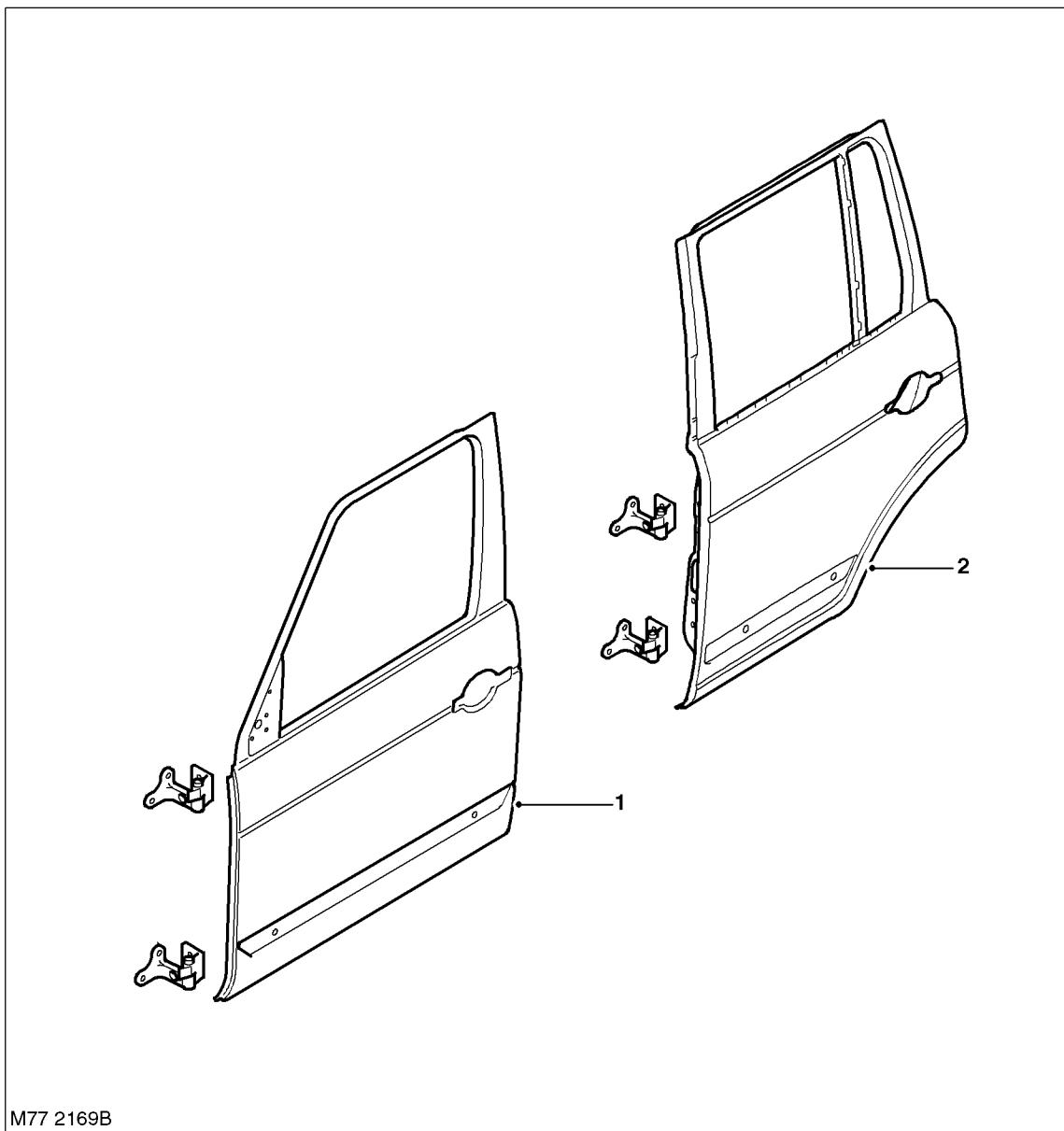
### Rear end panels



- 1 Spare wheel well assembly
- 2 Floor longitudinal - RH
- 3 Floor longitudinal - LH
- 4 Rear floor extension panel - RH
- 5 Rear floor extension panel - LH
- 6 Mounting bush - front - rear sub-frame
- 7 Mounting bush - rear - rear sub-frame
- 8 Spare wheel mounting bracket
- 9 Floor longitudinal closing panel - RH
- 10 Floor longitudinal closing panel - LH
- 11 Body rear outer panel
- 12 Body rear assembly



## Door assemblies



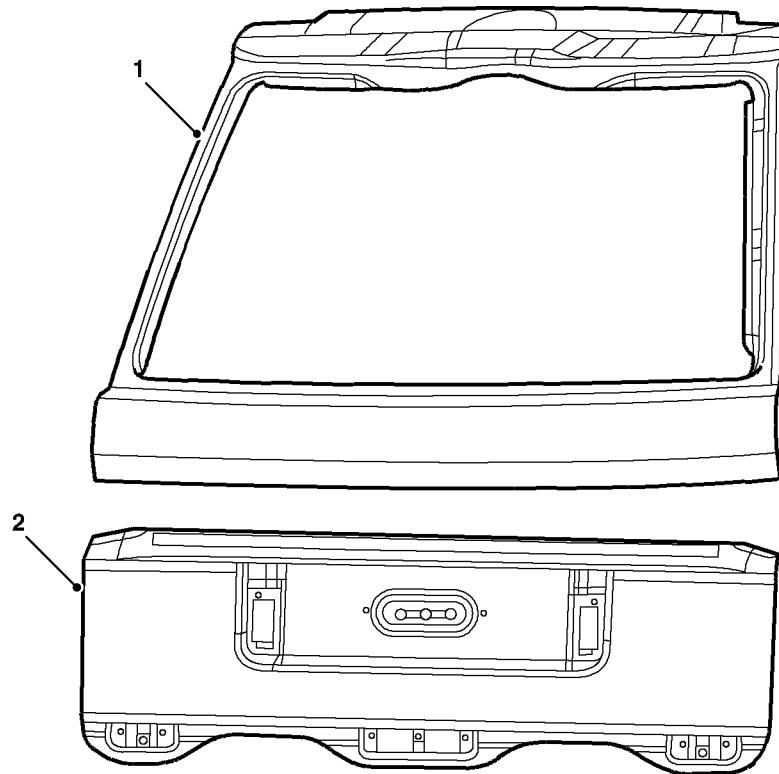
*The doors are serviced as complete assemblies only. The door skins are not available for service.*

- 1 Front door assembly (minus hinges)
- 2 Rear door assembly (minus hinges)

## PANEL REPAIRS

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### Door assemblies



M77 2174A

- 1 Tail gate upper assembly (minus hinges)
- 2 Tail gate lower assembly (minus hinges)



## General Welding Precautions

### General

For ease of reference, the diagrams on the following pages show only the type of weld used in repair where it varies from that used in production.

The replacement welds in the welding diagrams are denoted by the following symbols:



**a** = Single/Multiple thickness plug welds

**b** = MIG seam weld

When carrying out welding operations the following criteria must be observed:

- Where resistance spot welds have been used in production, these must be reproduced with new spot welds in replacement where possible. All such reproduction spot welds must be spaced 30 mm (1.181) apart;
- When spot welding, it is recommended that test coupons of the same metal gauges and materials are produced to carry out peel tests to ensure that welding equipment being used can produce a satisfactory joint. Plug welds must be used if a satisfactory spot weld cannot be produced;
- The electrode arms on hand-held spot welding guns must not exceed 300 mm (11.811) in length;
- Single-side spot welding is not acceptable;
- Brazing and gas welding are not acceptable EXCEPT where they have been specified in production;
- Where 3 metal thicknesses or more are to be welded together it is imperative to use MIG plug welds to ensure joint strength;
- MIG plug welds must be used in repair joints where there is no access for a resistance spot welder. To replace each production spot weld, an 8 mm (0.314) approx. hole must be drilled and/or punched, and a MIG plug weld then made in its place. The number of plug welds must match exactly the number of spot welds which have been removed;
- Where holes are left in an existing panel after removal of the spot welds, a single MIG plug weld will be made in each hole as appropriate.

### Electronic Control Units

The electronic control units (ECU) fitted to vehicles make it advisable to follow suitable precautions prior to carrying out welding repair operations. Harsh conditions of heat and vibration may be generated during these operations which could cause damage to the units.

In particular, it is essential to follow the appropriate precautions when disconnecting or removing the airbag DCU.

### Equipment

Prior to commencing any test procedure on the vehicle, ensure that the relevant test equipment is working correctly and any harness or connectors are in good condition. This particularly applies to electronic control units.

# PANEL REPAIRS

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## **Seat belt anchorages**

Seat belt anchorages are safety critical. When making repairs in these areas, it is essential to follow design specifications. Note that High Strength Low Alloy (HSLA) steel may be used for seat belt anchorages.

Where possible, the original production assembly should be used, complete with its seat belt anchorages, or the cut line should be so arranged that the original seat belt anchorage is not disturbed.

All welds within 250 mm (9.842) of seat belt anchorages must be carefully checked for weld quality, including spacing of spot welds.

***WARNING: Body parts incorporating seat belt anchorages MUST be renewed completely if damaged beyond repair, as the welds in these areas are safety critical and cannot be disturbed.***

## **High Strength Steels**

Body panels are being increasingly manufactured in high strength steels to meet design requirements for safety and weight saving. As panels in high strength steels cannot be visually identified by the repairer, and as they can be more sensitive to excess heat than would be the case with low carbon steels, it is advisable that the following procedure be observed at all times.

While individual repairs will differ in detail, the following Panel Replacement Procedure has been devised placing emphasis on ease of repair and the elimination of unnecessary work. Where replacement of a particular panel involves departure from the Panel Replacement Procedure, a note to that effect is included in the relevant panel replacement operation.

## **Straightening**

Whenever possible, structural members should be cold straightened under tension. Do not attempt to straighten with a single pull but rework the damaged area using a series of pulls, releasing tension between each stage and using the opportunity to check alignment

## **Body jig**

Unless damage is limited to cosmetic panels, all repair work to body members must be carried out on a body jig, to ensure that impact damage has not spread into more remote parts of the structure. Mounting on a jig will also ensure that the straightening and panel replacement procedures do not cause further distortion. If original dimensions cannot be satisfactorily restored by these methods, damaged structural members should be replaced.

***WARNING: Damaged areas should be cut away using a high speed saw, NOT an oxy-acetylene torch.***

As a rule, body dimensions are symmetrical about the centre line. A good initial check for distortion is therefore to measure diagonally and to investigate apparent differences in dimensions.

## **Inspection**

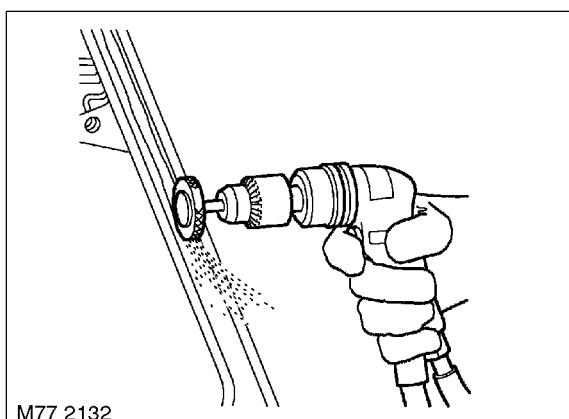
Every accident produces individual variations in damage. Each repair is influenced by the extent of the damage and the facilities and equipment available for its rectification. Most accident damage can be visually inspected and the approximate extent of damage assessed. Sometimes deformation will extend beyond the directly damaged area, and the severity of this must be accurately established so that steps can be taken to restore critical body components to their original dimensions. An initial check can be carried out by means of drop checks or, preferably, trammels. Gauges are available which will accurately check for body twist. Where repairs necessitate renewal of a critical body component it is recommended that a body jig is used.



## Panel replacement procedure

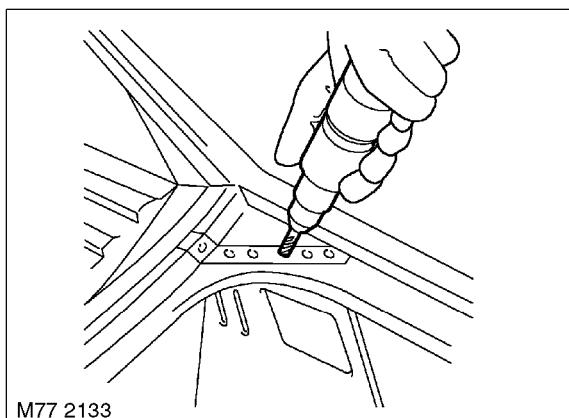
This information is designed to explain the basic panel removal and replacement method. This standard method might vary slightly from one vehicle to another. The main criterion in removable and replacement of body panels is that Land Rover's original standard is maintained as far as possible.

### Remove panel

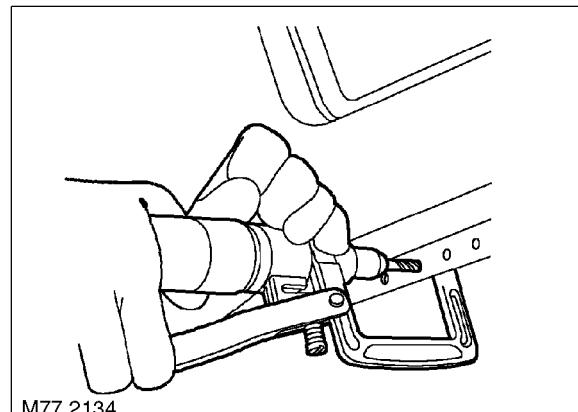


1. Expose resistance spot welds. For those spot welds which are not obviously visible, use a rotary drum sander or wire brush fitted to an air drill, or alternatively a hand held wire brush.

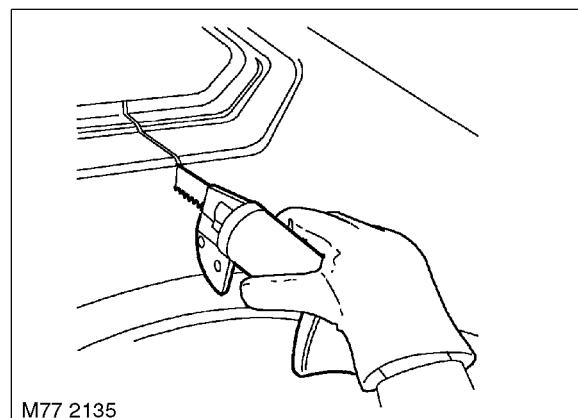
*NOTE: In wheel arch areas it may be necessary to soften underbody coating, using a hot air gun, prior to exposing spot welds.*



2. Cut out welds using a cobalt drill.



3. Alternatively, use a clamp-type spot weld remover.

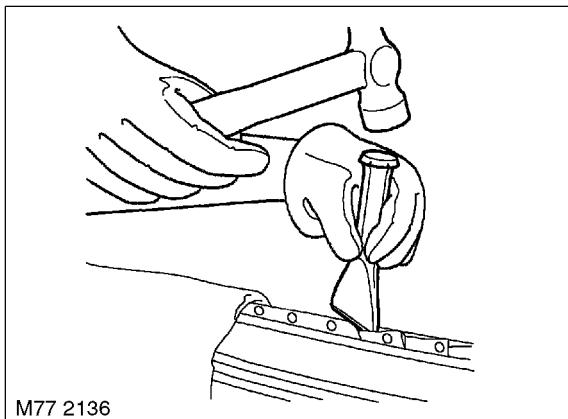


4. Cut away the bulk of the panel as necessary using an air saw.

*NOTE: On certain panel joints MIG welds and braze should be removed using a sander where possible, before cutting out the panel bulk.*

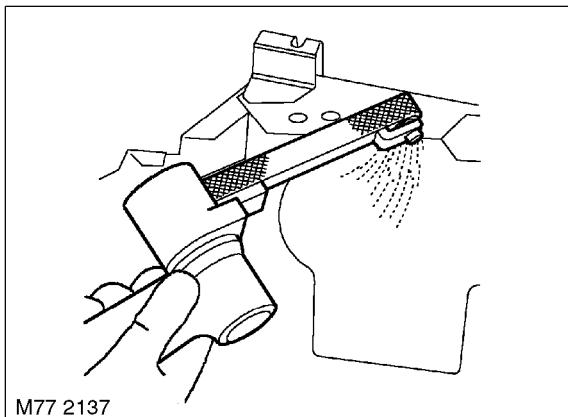
## PANEL REPAIRS

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5. Separate spot welded joints and remove panel remnants using hammer, bolster, chisel and pincers.

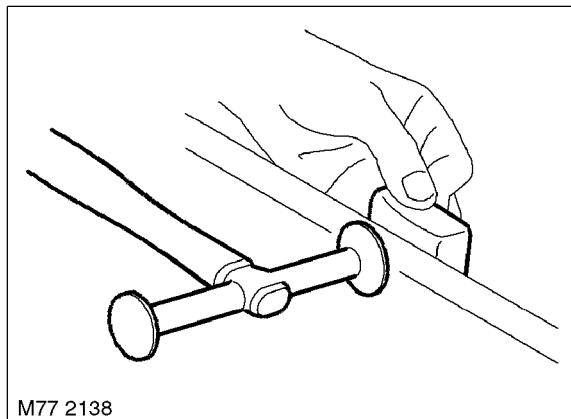
### Prepare old surfaces



1. Clean all panel joint edges to a bright smooth finish, using a belt-type sander.

*NOTE: Prior to sanding, remove remaining sealant using a hot air gun to minimise the risk of toxic fumes caused by generated heat.*

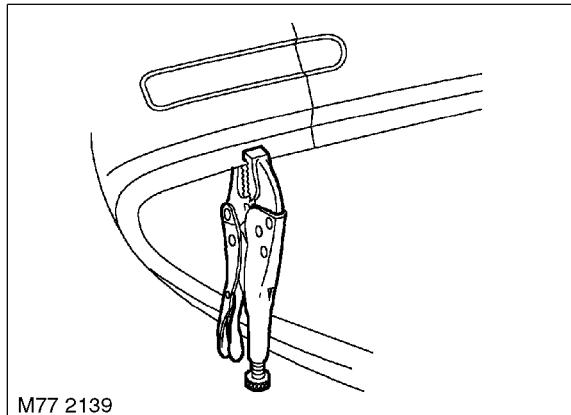
**Caution:** Care must be taken to avoid excessive heat build up when using this equipment.



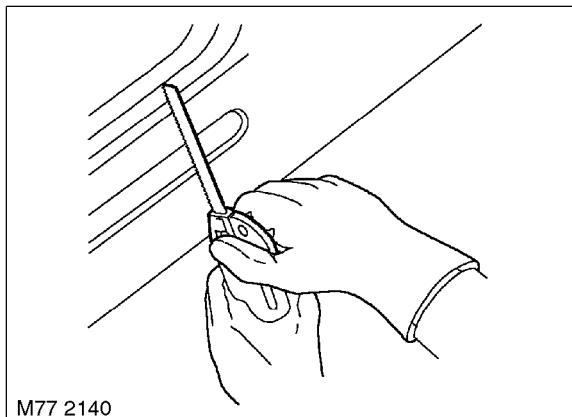
2. Straighten existing panel joint edges using a shaping block and hammer.

**CAUTION:** Never use the same tools for working with steel or aluminium. All tools used for working with steel must be kept separate from those used on aluminium.

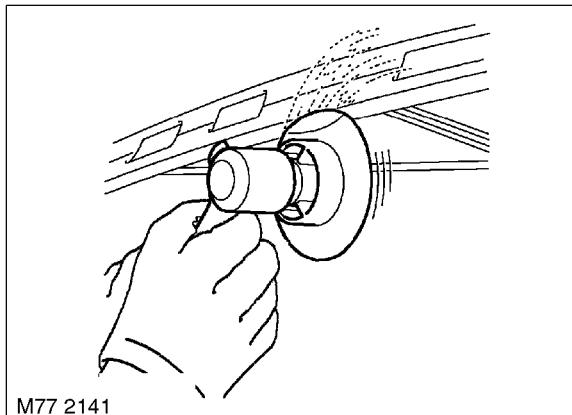
### Prepare new surfaces



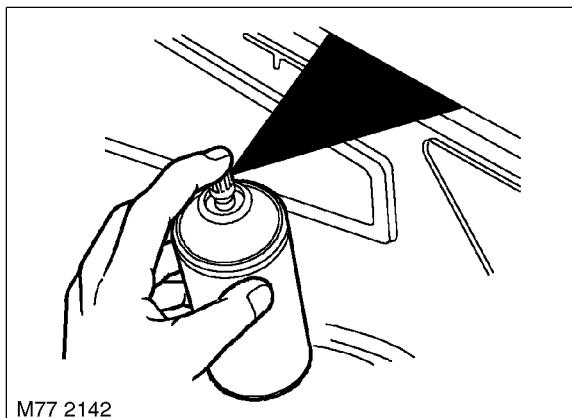
1. Mark out bulk of new panel and trim to size, leaving approximately 50 mm (1.968 ins) overlap with existing panel. Offer up new panel section, align with associated panels (e.g. new body side panel aligned with door and trunklid). Clamp into position.



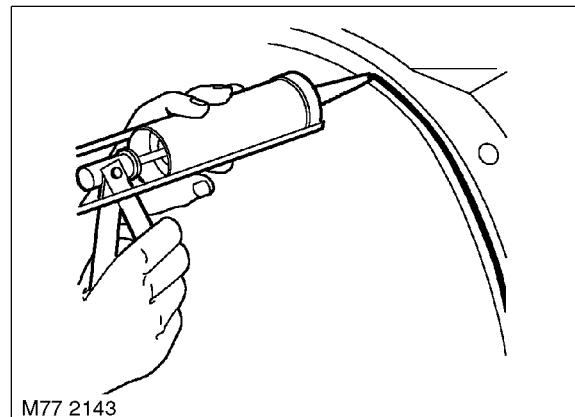
- Cut new and existing panels as necessary to form butt, joggle or brace joint as required. Remove all clamps and metal remnants.



- Prepare new panel joint edges for welding by sanding to a bright finish. This must include inner as well as outer faces.



- Apply suitable weld-through primer, to panel joint surfaces to be welded, using brush or aerosol can.



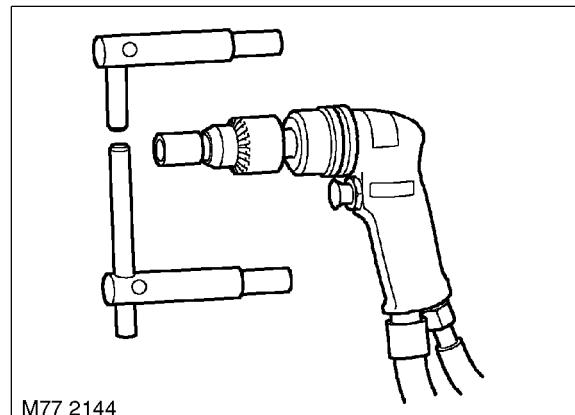
- Apply adhesive sealant to panel joint surfaces.

#### Offer up and align

- Offer up new panel and align with associated panels. Clamp into position using welding clamps or Mole grips. Where a joggle or brace joint is being adopted, make a set in the original panel joint edge or insert a brace behind the joint.

*NOTE: In cases where access for welding clamps is difficult, it may be necessary to use tack welds.*

#### Welding



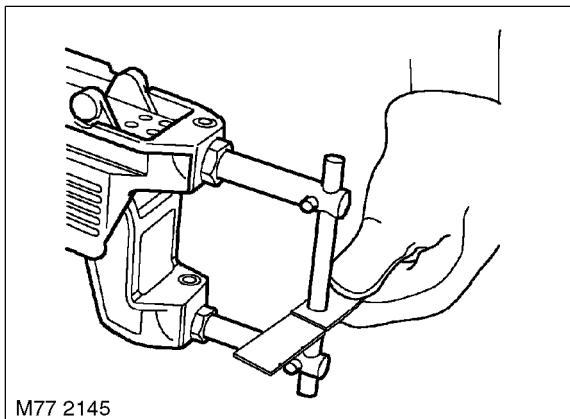
- Select arms for resistance spot welding and shape electrode tips using a tip trimmer. Tips should be dressed so the diameter is equal to twice the thickness of the metal to be welded plus 3.0 mm (0.118 ins).

**CAUTION: Use arms not exceeding 300 mm (11.811ins) in length.**

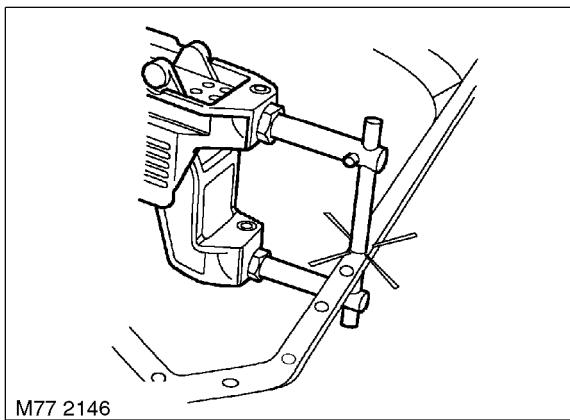
*NOTE: To maintain weld efficiency, the tips will require regular cleaning and dressing.*

## PANEL REPAIRS

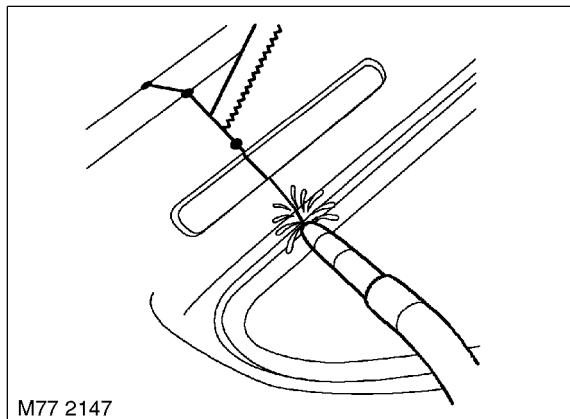
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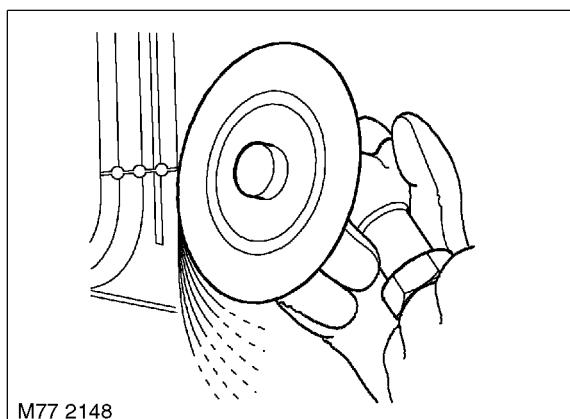
2. Fit resistance spot welding arms and test equipment for satisfactory operation, using test coupons. Where monitoring equipment is not available, verify weld strength by checking that metal around the weld puddle pulls apart under tension during pulling.



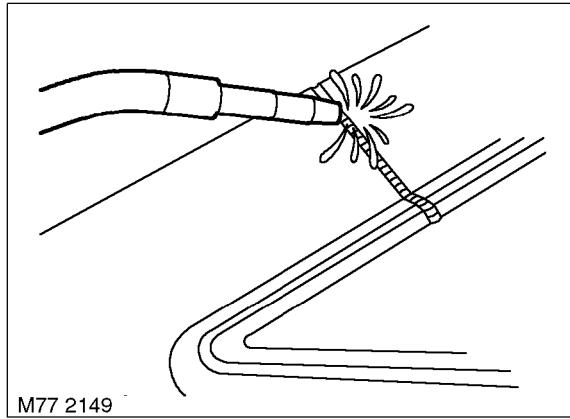
3. Use a resistance spot welder where access permits. Try to ensure weld quality by using a welding monitor where possible.

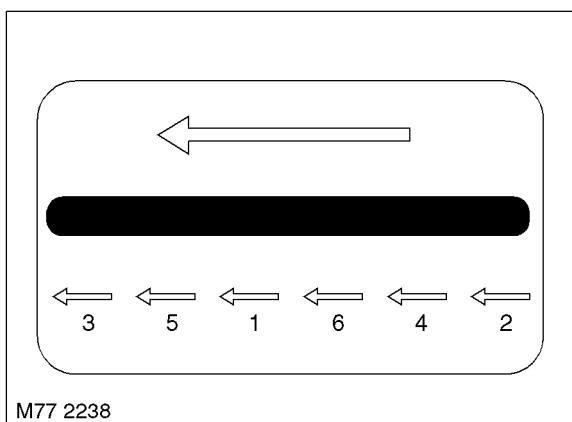


4. MIG tack weld butt joints and re-check alignment and panel contours where necessary. Ensure that a gap is maintained to minimise welding distortion, by inserting a hacksaw blade as an approximate guide.

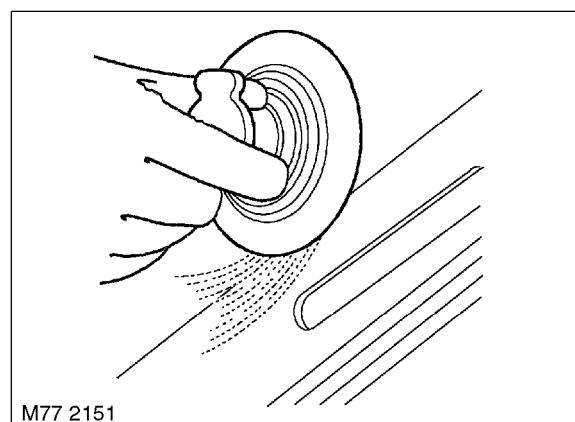


5. Dress MIG tack welds using a sander with 36 grit disc, or a belt-type sander where access is limited.



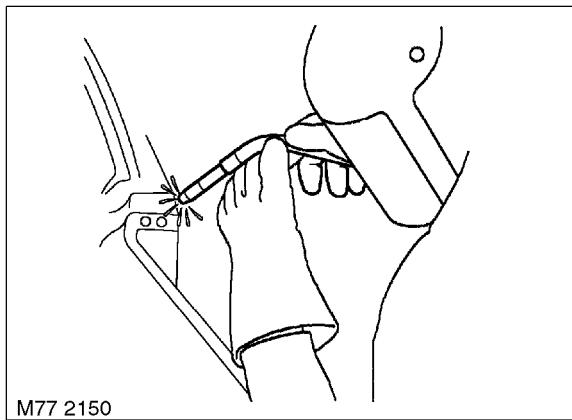


6. MIG seam weld butt joints. When MIG welding long joints, a large amount of heat is generated which can cause the panels to distort. To avoid heat distortion, divide the welds into small sections as shown on the illustration. The large arrows signifies the direction of welding.



8. Dress all welds using either a sander with 36 grit disc, or a belt-type sander and/or wire brush. When dressing welds ensure an area as small as possible is removed to protect the zinc coating.
9. Carry out any further necessary sealing operations.

 , , **Factory treatments.**



7. Always use MIG plug welds where excessive metal thickness or limited access make resistance spot welding impractical. Make plug welds either by using holes left by the spot weld cutter, or through holes punched and drilled for the purpose, approximately 8 mm (0.134 ins) diameter.

## PANEL REPAIRS

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## Front bulkhead assembly

In this procedure, the headlamp mounting panels and the bonnet locking platform are removed.

### Remove

1. Disconnect battery earth lead.

**CAUTION:** After switching off the ignition, wait 2 minutes before disconnecting the battery. Failure to wait two minutes will damage the navigation computer.

2. Remove both headlamp assemblies.  
☞ **LIGHTING, REPAIRS, Headlamp assembly.**
3. Remove front bumper.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
4. Release 4 cable ties securing washer hose to armature and move hose aside.
5. Disconnect the headlamp, headlamp wash/wiper and horn multiplugs from the bonnet locking platform assembly.
6. Remove 2 screws securing armature extension and remove extension from armature.
7. Remove scrivets securing radiator intake ducts to bumper support brackets.
8. Remove 3 bolts securing LH bumper support bracket. Repeat for RH bracket and remove.
9. **Diesel models:** Remove 2 bolts securing fuel cooler intake duct to bonnet locking platform.
10. Move duct aside.
11. Remove radiator assembly retaining bolts from bonnet locking platform.
12. Remove 4 bolts securing bonnet locking platform to inner wings.
13. Cut and discard cable tie securing radiator expansion pipe to bonnet locking platform.
14. **LH side only:** Remove bolt securing washer bottle to headlamp mounting panel.
15. Remove 4 bolts securing lower outer edge of the bonnet locking platform assembly to inner wings.
16. With assistance carefully release and remove the bonnet locking platform assembly.

### Refit

1. With assistance position the bonnet locking platform assembly to body.
2. Fit and finger tighten bolts securing bonnet locking platform assembly to body, align and tighten M8 bolts to 25 Nm (18 lbf.ft), tighten the M6 bolts to 10 Nm (7 lbf.ft).
3. Position radiator assembly to bonnet locking platform and secure with bolts.

4. Position armature to body fit nuts and bolts, tighten bolts to 10 Nm (7 lbf.ft), tighten nuts to 45 Nm (33 lbf.ft).
  5. Fit bolt securing washer bottle to the headlamp mounting bracket and tighten to 3 Nm (2.2 lbf.ft).
  6. Secure harness with cable ties.
  7. Fit and secure bumper support brackets, tighten bolts to 3 Nm (2.2 lbf.ft), fit scrivets.
  8. Connect multiplugs.
  9. Fit armature extension and tighten bolts to 10 Nm (7 lbf.ft).
  10. Position washer hose to armature and secure with new cable ties.
  11. **Diesel models:** Position fuel cooler intake duct to bonnet locking platform, fit and tighten bolts to 3 Nm (2.2 lbf.ft)
  12. Position radiator expansion hose and cable tie to bonnet locking platform.
  13. Fit front bumper.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
  14. Fit both headlamp assemblies.  
☞ **LIGHTING, REPAIRS, Headlamp assembly.**
  15. Connect the battery earth lead.
- CAUTION:** After re-connecting the battery, the steering wheel must be turned to full LH and RH lock (with engine running). This allows the DSC system to re-learn the steering wheel position. Failure to do so will result in a variety of instrument warning lights been illuminated.

# PANEL REPAIRS

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## Bonnet locking platform

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The bonnet locking platform is bolted in position, there are no welds to hold it in place.

### Remove

1. Remove both headlamp assemblies.  
 **LIGHTING, REPAIRS, Headlamp assembly.**
2. Remove LH and RH bonnet locks.
3. **Diesel models:** Remove fuel cooler air duct.
4. Remove 3 screws securing grille to bonnet locking platform.
5. Remove bolts securing bonnet locking platform and remove platform.

### Refit

1. Position bonnet locking platform, align to correct position, fit and tighten bolts.
2. Fit grille and secure with screws.
3. **Diesel models:** Fit fuel cooler air duct.
4. Fit LH and RH bonnet locks.
5. Fit both headlamp assemblies.

 **LIGHTING, REPAIRS, Headlamp assembly.**

## Headlamp mounting panel

---

The headlamp mounting panels are bolted in position, there are no welds to hold them in place.

### Remove

1. Remove both headlamp assemblies.  
 **LIGHTING, REPAIRS, Headlamp assembly.**
2. Remove LH and RH bonnet locks.
3. **Diesel models:** Remove fuel cooler air duct.
4. Remove 3 screws securing grille to bonnet locking platform.
5. Remove bolts securing bonnet locking platform and remove platform.
6. **LH side:** Remove horn.
7. **LH side:** Remove air intake hose.
8. **RH side:** Remove front bumper RH support bracket.
9. **RH side:** Remove windscreen washer reservoir.  
 **WIPERS AND WASHERS, REPAIRS, Reservoir - combined windscreen/headlamp washer.**
10. **RH side:** Remove PAS fluid cooler.  
 **STEERING, REPAIRS, Oil cooler - power steering - Td6.**

### Repair

1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure.

### Refit

1. **RH side:** Fit PAS fluid cooler.  
 **STEERING, REPAIRS, Oil cooler - power steering - Td6.**
2. **RH side:** Fit windscreen washer reservoir.  
 **WIPERS AND WASHERS, REPAIRS, Reservoir - combined windscreen/headlamp washer.**
3. **RH side:** Fit front bumper RH support bracket.
4. **LH side:** Fit horn.
5. **LH side:** Fit air intake hose.
6. Fit and tighten bolts securing bonnet locking platform.
7. Fit 3 screws securing grille to bonnet locking platform.
8. **Diesel models:** Fit fuel cooler air duct.
9. Fit LH and RH bonnet locks.
10. Fit both headlamp assemblies.  
 **LIGHTING, REPAIRS, Headlamp assembly.**

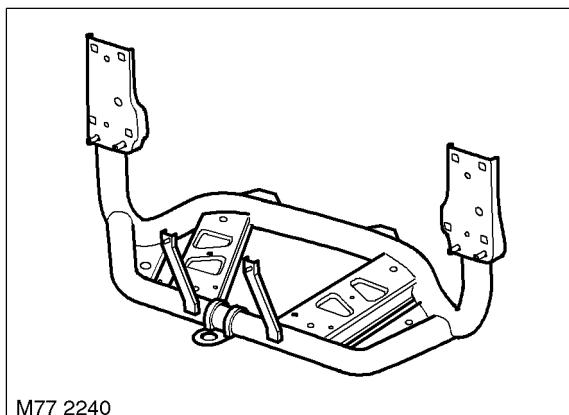


## Radiator protection bar

### Remove

1. Disconnect battery earth lead.
  2. Remove headlamp mounting panel.  
☞ **Headlamp mounting panel.**
  3. Remove RH headlamp mounting panel.
  4. Remove nut securing PAS hose mounting to radiator protection bar and move hose aside.
  5. Remove 2 bolts securing radiator protection bar to front sub-frame and with assistance remove from vehicle.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
6. **V8 models only:** Remove screwt and release clip securing front axle cooling duct to radiator protection bar and remove duct.
  7. Remove 5 scrivets securing intercooler baffle to radiator protection bar. Remove baffle.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit baffle and secure with scrivets.
2. With assistance position radiator protection bar, fit bolts and tighten to 105 Nm (77 lbf.ft).
3. Fit PAS hose mounting and tighten nut to 10 Nm (7 lbf.ft).
4. Fit RH headlamp mounting panel.
5. Fit headlamp mounting panel.  
☞ **Headlamp mounting panel.**
6. Connect the battery earth lead.

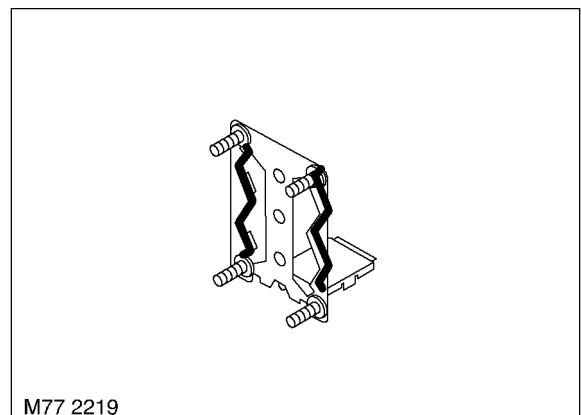
## Front sidemember end panel

*In this procedure, only the sidemember end panel is replaced.*

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove underbelly panel.  
☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
4. Remove front bumper assembly.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
5. Remove front armature.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
6. Remove radiator.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
7. **LH side:** Remove radiator expansion tank.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
8. **RH side:** Remove gearbox fluid cooler.  
☞ **AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Gearbox fluid cooler.**
9. **Diesel models:** Release and remove intercooler pipes.
10. **LH side:** Remove windscreen washer reservoir.  
☞ **WIPERS AND WASHERS, REPAIRS, Reservoir - combined windscreen/ headlamp washer.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

# PANEL REPAIRS

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## Refit

1. **LH side:** Fit windscreen washer reservoir.  
 **WIPERS AND WASHERS, REPAIRS, Reservoir - combined windscreen/ headlamp washer.**
2. **Diesel models:** Fit and connect intercooler pipes.
3. **RH side:** Fit gearbox fluid cooler.  
 **AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Gearbox fluid cooler.**
4. **LH side:** Fit radiator expansion tank.  
 **COOLING SYSTEM - Td6, REPAIR, Radiator.**
5. Fit radiator.  
 **COOLING SYSTEM - Td6, REPAIR, Radiator.**
6. Fit front armature.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
7. Fit front bumper assembly.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
8. Fit underbelly panel.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
9. Connect alternator.
10. Connect battery earth lead.

## Front sidemember (front section)

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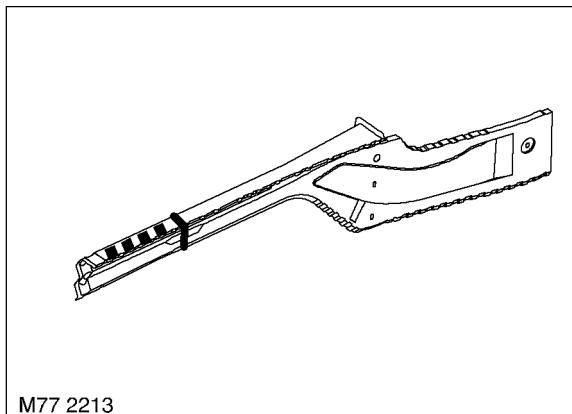
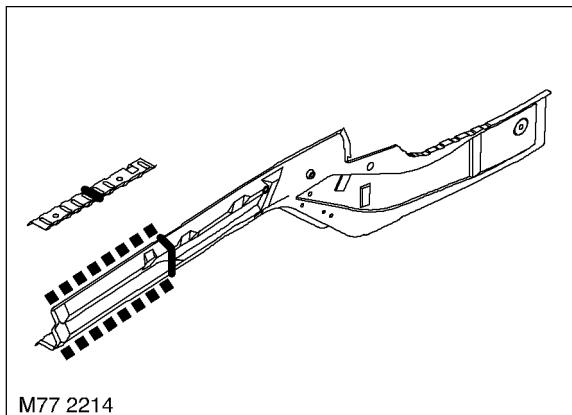
*In this procedure, the front section of the front sidemember inner panel, front sidemember outer panel and the front sidemember reinforcement panel are replaced.*

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove underbelly panel.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
4. Remove front bumper assembly.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
5. Remove front armature.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
6. Remove radiator.  
 **COOLING SYSTEM - Td6, REPAIR, Radiator.**
7. **LH side:** Remove radiator expansion tank.  
 **COOLING SYSTEM - Td6, REPAIR, Radiator.**
8. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**

*NOTE: Receiver drier need only be changed under the following circumstances. There is dirt in the refrigerant circuit ( e.g. compressor seizure ). The system is leaking and refrigerant has been lost to atmosphere. Refrigerant circuit has been open more than 24 hours due to repair.*

9. Remove A/C pipes from sidemember.
10. **RH side:** Remove gearbox fluid cooler.  
 **AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Gearbox fluid cooler.**
11. **Diesel models:** Release and remove intercooler pipes.
12. **LH side:** Remove windscreen washer reservoir.  
 **WIPERS AND WASHERS, REPAIRS, Reservoir - combined windscreen/ headlamp washer.**
13. **LH side:** Remove alternator.  
 **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**
14. Remove front wheel arch liner.  
 **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**
15. Remove PAS pipes to access panel.

**Repair**

8. **LH side:** Fit radiator expansion tank.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
9. Fit radiator.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
10. Fit front armature.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
11. Fit front bumper assembly.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
12. Recharge A/C system.  
☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
13. Bleed PAS system.  
☞ **STEERING, ADJUSTMENTS, Power assisted steering (PAS) system - bleed.**
14. Fit underbelly panel.  
☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
15. Connect alternator.
16. Connect battery earth lead.

1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

**Refit**

1. Fit PAS pipes.
2. Fit front wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**
3. **LH side:** Fit alternator.  
☞ **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**
4. **LH side:** Fit windscreen washer reservoir.  
☞ **WIPERS AND WASHERS, REPAIRS, Reservoir - combined windscreen/headlamp washer.**
5. **Diesel models:** Fit and connect intercooler pipes.
6. Fit A/C pipes to sidemember.
7. **RH side:** Fit gearbox fluid cooler.  
☞ **AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Gearbox fluid cooler.**

# PANEL REPAIRS

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## Front sidemember assembly

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In this procedure, the front sidemember and suspension turret is replaced as an assembly.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove underbelly panel.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
4. Remove front bumper assembly.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
5. Remove front armature.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
6. Remove radiator.  
 **COOLING SYSTEM - Td6, REPAIR, Radiator.**
7. **LH side:** Remove radiator expansion tank.  
 **COOLING SYSTEM - Td6, REPAIR, Radiator.**
8. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**

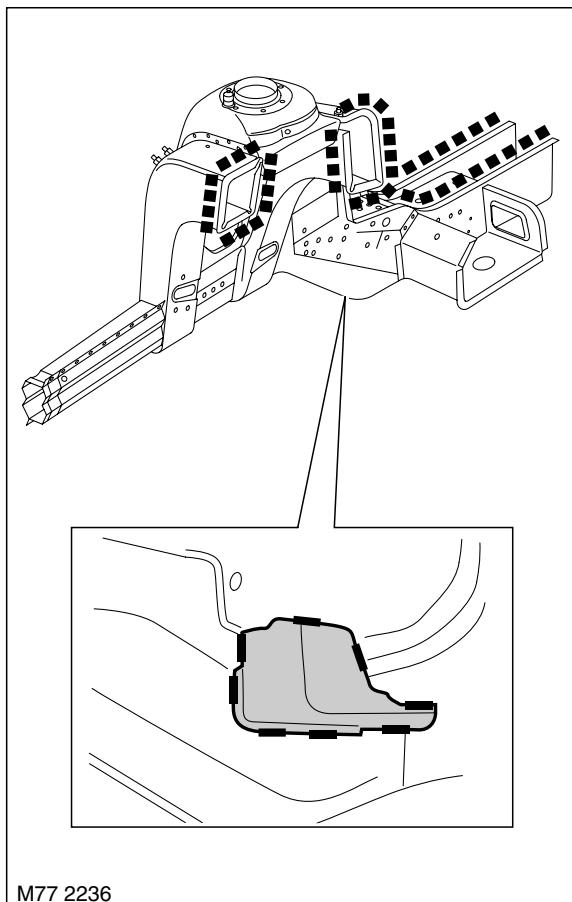
*NOTE: Receiver drier need only be changed under the following circumstances. There is dirt in the refrigerant circuit ( e.g. compressor seizure ). The system is leaking and refrigerant has been lost to atmosphere. Refrigerant circuit has been open more than 24 hours due to repair.*

9. Remove A/C pipes from sidemember.
10. Remove engine.
11. **RH side:** Remove gearbox fluid cooler.  
 **AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Gearbox fluid cooler.**
12. **Diesel models:** Release and remove intercooler pipes.
13. **Diesel models:** Remove FBH.
14. **Diesel models:** Remove FBH fuel pump.
15. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
16. Remove windscreens lower finisher.  
 **EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreens.**
17. Remove plenum chamber drain tube.
18. Remove throttle pedal.
19. Remove front wing.  
 **EXTERIOR FITTINGS, REPAIRS, Wing - front.**

20. Remove front wheel arch liner.  
 **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**
21. Remove PAS pipes to access panel.
22. **LH side:** Remove windscreens washer reservoir.
23. Remove alternator.  
 **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**
24. Remove ABS modulator.  
 **BRAKES, REPAIRS, ABS Modulator unit.**
25. Remove brake servo.  
 **BRAKES, REPAIRS, Servo assembly.**
26. Remove fuel pipes from sidemember.
27. **LH side:** Remove fuel filter.  
 **FUEL DELIVERY SYSTEM - Td6, REPAIRS, Filter.**
28. **LH side:** Remove battery carrier.  
 **CHARGING AND STARTING, REPAIRS, Carrier - battery.**
29. Remove air spring assembly.  
 **FRONT SUSPENSION, REPAIRS, Air spring assembly.**
30. **RH side:** Remove air suspension reservoir.  
 **FRONT SUSPENSION, REPAIRS, Air reservoir.**
31. Remove fuel and brake pipes.
32. Disconnect wiring harnesses and position aside.
33. Remove insulation from dash lower.
34. Remove heatshield from tunnel.
35. Remove fascia carrier.  
 **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**
36. Release front carpet to access welds.



## Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown. The panel shaded in the illustration must also be removed in this procedure.

## Refit

1. Fit insulation pads to dash lower.
2. Position front carpet.
3. Fit fascia carrier.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**
4. Fit heatshield to tunnel.
5. Fit and secure wiring harnesses.
6. Fit fuel and brake pipes.
7. Fit air spring assembly.  
☞ **FRONT SUSPENSION, REPAIRS, Air spring assembly.**
8. **RH side:** Fit air suspension reservoir.  
☞ **FRONT SUSPENSION, REPAIRS, Air reservoir.**
9. **LH side:** Fit fuel filter.  
☞ **FUEL DELIVERY SYSTEM - Td6, REPAIRS, Filter.**

10. **LH side:** Fit battery carrier.  
☞ **CHARGING AND STARTING, REPAIRS, Carrier - battery.**
11. Fit fuel pipes to sidemember.
12. Fit ABS modulator.  
☞ **BRAKES, REPAIRS, ABS Modulator unit.**
13. Fit brake servo.  
☞ **BRAKES, REPAIRS, Servo assembly.**
14. Fit alternator.  
☞ **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**
15. Fit front wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**
16. Fit front wing.  
☞ **EXTERIOR FITTINGS, REPAIRS, Wing - front.**
17. Fit PAS pipes.
18. Fit plenum chamber drain tube.
19. Fit windscreens lower finisher.  
☞ **EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreens.**
20. Fit throttle pedal.
21. Fit engine.
22. **Diesel models:** Fit FBH.
23. **Diesel models:** Fit FBH fuel pump.
24. **Diesel models:** Position and connect intercooler pipes.
25. Fit A/C pipes to sidemember.
26. **RH side:** Fit gearbox fluid cooler.
27. **LH side:** Fit radiator expansion tank.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
28. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
29. **LH side:** Fit windscreens washer reservoir.
30. Fit radiator.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
31. Fit front armature.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
32. Fit front bumper assembly.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
33. Fit underbelly panel.  
☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
34. Recharge A/C system.  
☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
35. Connect alternator.
36. Connect battery earth lead.

# PANEL REPAIRS

## Valance outer

This panel can be changed on its own if necessary.

### Remove

1. Disconnect battery earth lead.

2. Disconnect alternator.

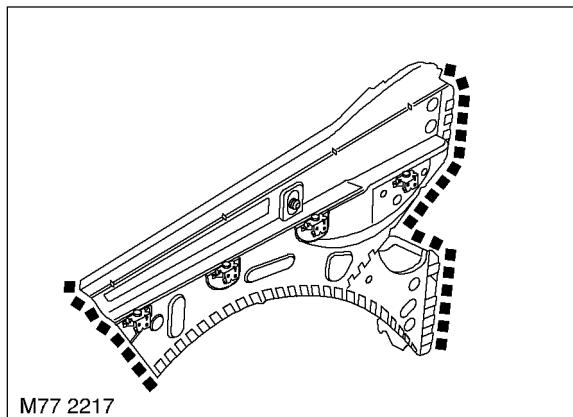
3. Remove front wing.

 EXTERIOR FITTINGS, REPAIRS,  
Wing - front.

4. **RH side:** Remove ECU housing.

5. **LH side:** Remove windscreen washer reservoir.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. **RH side:** Fit ECU housing.

2. **LH side:** Fit windscreen washer reservoir.

3. Fit front wing.

 EXTERIOR FITTINGS, REPAIRS,  
Wing - front.

4. Connect alternator.

5. Connect battery earth lead.

## Valance outer extension

### Remove

1. Disconnect battery earth lead.

2. Disconnect alternator.

3. Remove front wing.

 EXTERIOR FITTINGS, REPAIRS,  
Wing - front.

4. **RH side:** Remove ECU housing.

5. **LH side:** Remove windscreen washer reservoir.

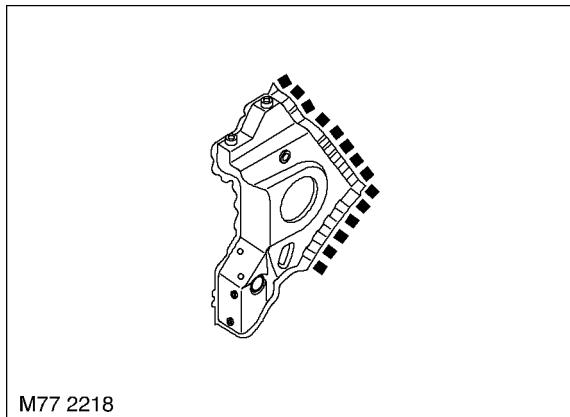
6. Remove harness from valance outer extension panel.

7. Remove bumper fixing.

8. **LH side:** Remove bonnet release cable.

9. **LH side:** Remove radiator expansion tank.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. **LH side:** Fit radiator expansion tank.

2. **LH side:** Fit bonnet release cable.

3. Fit harness to valance outer extension panel.

4. Fit bumper fixing.

5. **LH side:** Fit windscreen washer reservoir.

6. **RH side:** Fit ECU housing.

7. Fit front wing.

 EXTERIOR FITTINGS, REPAIRS,  
Wing - front.

8. Connect alternator.

9. Connect battery earth lead.



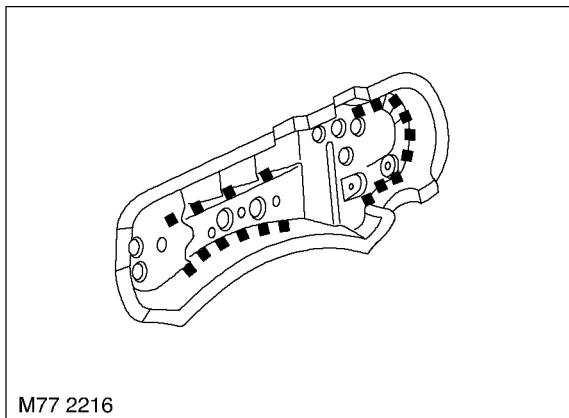
## Valance inner closing panel

This panel is changed in conjunction with the valance outer.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove valance outer.  
☞, Valance outer.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit valance outer.  
☞, Valance outer.
2. Connect alternator.
3. Connect battery earth lead.

## Valance inner assembly

The valance inner assembly is changed in conjunction with the valance outer extension, valance outer and the valance inner closing panel.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove valance outer.  
☞, Valance outer.
4. Remove underbelly panel.  
☞ EXTERIOR FITTINGS, REPAIRS, Undertray - front.
5. Remove front bumper assembly.  
☞ EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.
6. Remove front armature.  
☞ EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.
7. Remove radiator.  
☞ COOLING SYSTEM - Td6, REPAIR, Radiator.
8. **LH side:** Remove radiator expansion tank.  
☞ COOLING SYSTEM - Td6, REPAIR, Radiator.
9. Recover refrigerant from A/C system.  
☞ AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.

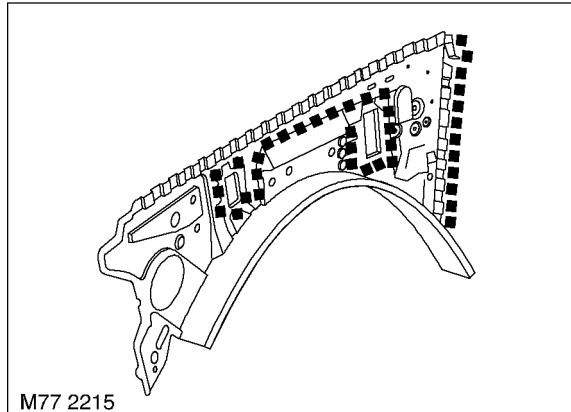
*NOTE: Receiver drier need only be changed under the following circumstances. There is dirt in the refrigerant circuit ( e.g. compressor seizure ). The system is leaking and refrigerant has been lost to atmosphere. Refrigerant circuit has been open more than 24 hours due to repair.*

10. Remove A/C pipes from sidemember.
11. **RH side:** Remove gearbox fluid cooler.  
☞ AUTOMATIC TRANSMISSION - GM 5L40-E, REPAIRS, Gearbox fluid cooler.
12. **Diesel models:** Release and remove intercooler pipes.
13. **Diesel models:** Remove FBH.
14. **Diesel models:** Remove FBH fuel pump.
15. Remove air intake plenum.  
☞ HEATING AND VENTILATION, REPAIRS, Plenum - air intake.
16. Remove windscreen lower finisher.  
☞ EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreens.
17. Remove brake servo.  
☞ BRAKES, REPAIRS, Servo assembly.

# PANEL REPAIRS

18. Remove plenum chamber drain tube.
19. Remove throttle pedal.
20. Remove front wing.  
     **EXTERIOR FITTINGS, REPAIRS, Wing - front.**
21. Remove front wheel arch liner.  
     **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**
22. Remove PAS pipes to access panel.
23. **LH side:** Remove windscreen washer reservoir.
24. Remove alternator.  
     **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**
25. Remove ABS modulator.  
     **BRAKES, REPAIRS, ABS Modulator unit.**
26. Remove fuel pipes from sidemember.
27. **LH side:** Remove fuel filter.  
     **FUEL DELIVERY SYSTEM - Td6, REPAIRS, Filter.**
28. **LH side:** Remove battery carrier.  
     **CHARGING AND STARTING, REPAIRS, Carrier - battery.**
29. Remove air spring assembly.  
     **FRONT SUSPENSION, REPAIRS, Air spring assembly.**
30. **RH side:** Remove air suspension reservoir.  
     **FRONT SUSPENSION, REPAIRS, Air reservoir.**
31. Remove fuel and brake pipes.
32. Disconnect wiring harnesses and position aside.
33. Remove insulation from dash lower.
34. Remove heatshield from tunnel.
35. Remove steering column assembly.  
     **STEERING, REPAIRS, Column assembly - inner & outer.**
36. Remove fascia carrier.  
     **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**
37. Release front carpet to access welds.

## Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

## Refit

1. Fit insulation pads to dash lower.
2. Position front carpet.
3. Fit fascia carrier.  
     **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**
4. Fit steering column assembly.
5. Fit heatshield to tunnel.
6. Fit and secure wiring harnesses and position aside.
7. Fit fuel and brake pipes.
8. Fit air spring assembly.  
     **FRONT SUSPENSION, REPAIRS, Air spring assembly.**
9. **RH side:** Fit air suspension reservoir.  
     **FRONT SUSPENSION, REPAIRS, Air reservoir.**
10. **LH side:** Fit fuel filter.  
     **FUEL DELIVERY SYSTEM - Td6, REPAIRS, Filter.**
11. **LH side:** Fit battery carrier.  
     **CHARGING AND STARTING, REPAIRS, Carrier - battery.**
12. Fit fuel pipes to sidemember.
13. Fit ABS modulator.  
     **BRAKES, REPAIRS, ABS Modulator unit.**
14. Fit brake servo.  
     **BRAKES, REPAIRS, Servo assembly.**
15. Fit alternator.  
     **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**



16. Fit front wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**
17. Fit front wing.  
☞ **EXTERIOR FITTINGS, REPAIRS, Wing - front.**
18. Fit PAS pipes.
19. Fit throttle pedal.
20. Fit plenum chamber drain tube.
21. Fit windscreen lower finisher.  
☞ **EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreen.**
22. Diesel models: Fit FBH.
23. Diesel models: Fit FBH fuel pump.
24. Diesel models: Position and connect intercooler pipes.
25. RH side: Fit gearbox fluid cooler.
26. Fit A/C pipes to sidemember.
27. Recharge A/C system.  
☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
28. LH side: Fit radiator expansion tank.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
29. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
30. LH side: Fit windscreen washer reservoir.
31. Fit radiator.  
☞ **COOLING SYSTEM - Td6, REPAIR, Radiator.**
32. Fit front armature.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
33. Fit front bumper assembly.  
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**
34. Fit underbelly panel.  
☞ **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
35. Connect alternator.
36. Connect battery earth lead.

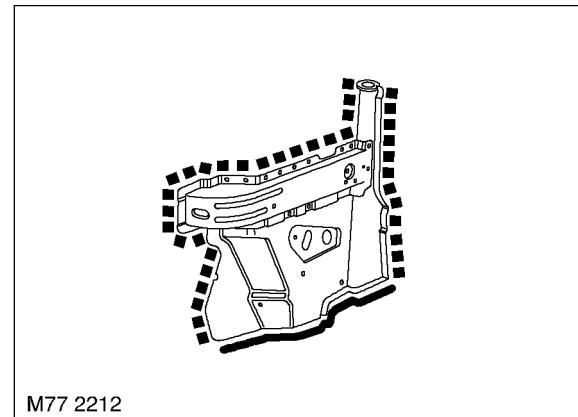
## Valance inner reinforcement

The procedure to remove the valance inner reinforcement is the same as the side member assembly.

### Remove

1. Remove front sidemember assembly.  
☞ **, , Front sidemember assembly.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit front sidemember assembly.  
☞ **, , Front sidemember assembly.**

# PANEL REPAIRS

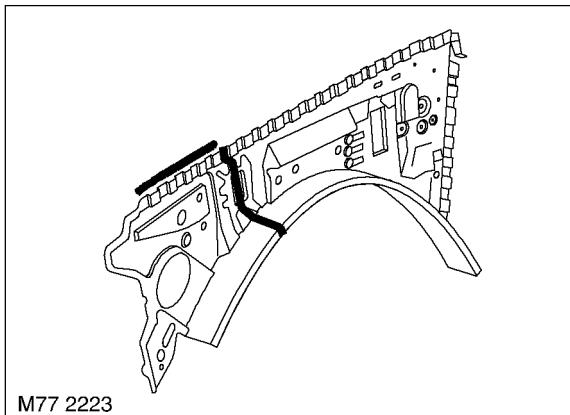
## Valance inner assembly - front section

The valance outer extension is also removed in this procedure.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove valance outer extension.  
 , , Valance outer extension.
4. Remove wiring harness from valance inner panel.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Connect wiring harness to valance inner panel.
2. Fit valance outer extension.  
 , , Valance outer extension.
3. Connect alternator.
4. Connect battery earth lead.

## Body side panel - 'A' post

In this procedure, the 'A' post body side panel is replaced.

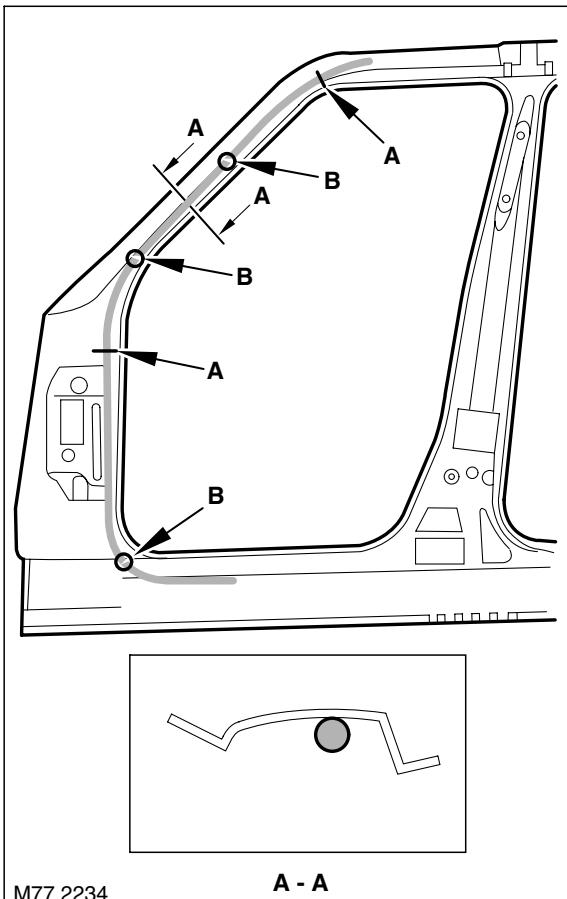
**NOTE:** The 'A' post body side panel is supplied as an assembly and includes the 'A' post reinforcement. Therefore, prior to refitting the 'A' post body side panel, the two panels will have to be separated.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove valance outer.  
 , , Valance outer.
4. Remove battery carrier, if required.  
 CHARGING AND STARTING, REPAIRS, Carrier - battery.
5. Remove brake servo, if required.  
 BRAKES, REPAIRS, Servo assembly.
6. Remove air intake plenum.  
 HEATING AND VENTILATION, REPAIRS, Plenum - air intake.
7. Remove windscreen lower finisher.  
 EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreen.
8. Remove front seat.  
 SEATS, REPAIRS, Front seat.
9. Remove front head airbag.  
 RESTRAINT SYSTEMS, REPAIRS, Airbag module - head - front.
10. Remove front and rear door aperture seals.
11. Remove front door check strap.
12. Remove sill finisher.  
 EXTERIOR FITTINGS, REPAIRS, Extension - spoiler - front bumper.
13. Release front carpet
14. Release wiring harness from 'A' post and position aside.
15. Remove interior lamp.
16. Release and remove dash insulation pads.



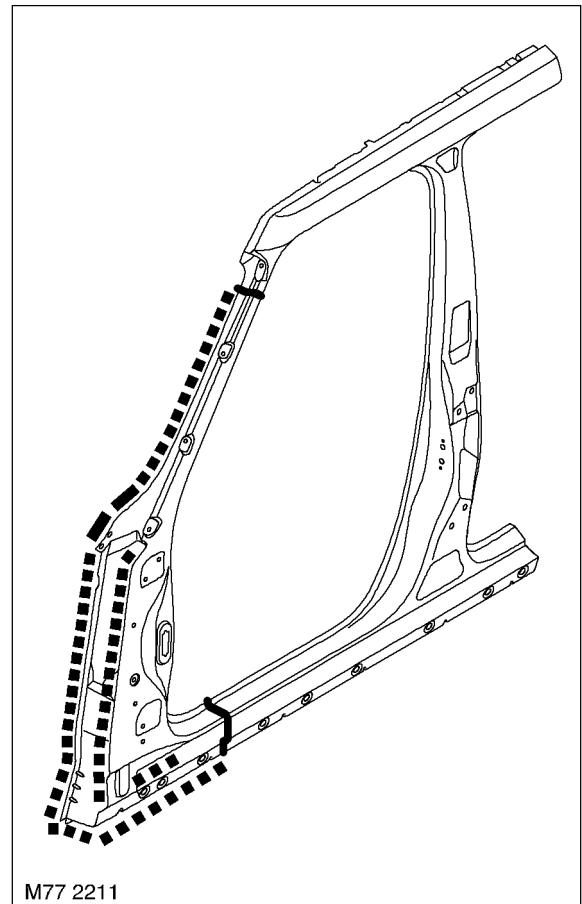
## Repair



1. Before removing the 'A' post panel, observe the following precautions.

**CAUTION: When cutting the 'A' post upper section do not cut through the reinforcement panel as a rubber drain tube is located behind it. The approximate position of the drain tube is shown in the illustration.**

*NOTE: Arrows 'A' and 'B' shown in the illustration, indicate the approximate position of the drain tube fixings.*



2. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

## Refit

1. Refit dash insulation pads.
  2. Secure front carpet.
  3. Fit interior lamp.
  4. Fit and secure wiring harness to 'A' post.
  5. Fit front door check strap.
  6. Fit sill finisher.
- EXTERIOR FITTINGS, REPAIRS, Extension - spoiler - front bumper.**
7. Fit front and rear door aperture seals.
  8. Fit front head airbag.
- RESTRAINT SYSTEMS, REPAIRS, Airbag module - head - front.**
9. Fit front seat.
- SEATS, REPAIRS, Front seat.**
10. Fit battery carrier.
- CHARGING AND STARTING, REPAIRS, Carrier - battery.**

## PANEL REPAIRS

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11. Fit brake servo.  
 **BRAKES, REPAIRS, Servo assembly.**
12. Fit air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
13. Fit windscreen lower finisher.  
 **EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreen.**
14. Fit valance outer.  
 **, , Valance outer.**
15. Connect alternator.
16. Connect battery earth lead.

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### 'A' post reinforcement

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*The procedure to change the 'A' post reinforcement is the same as the 'A' post body side panel.*

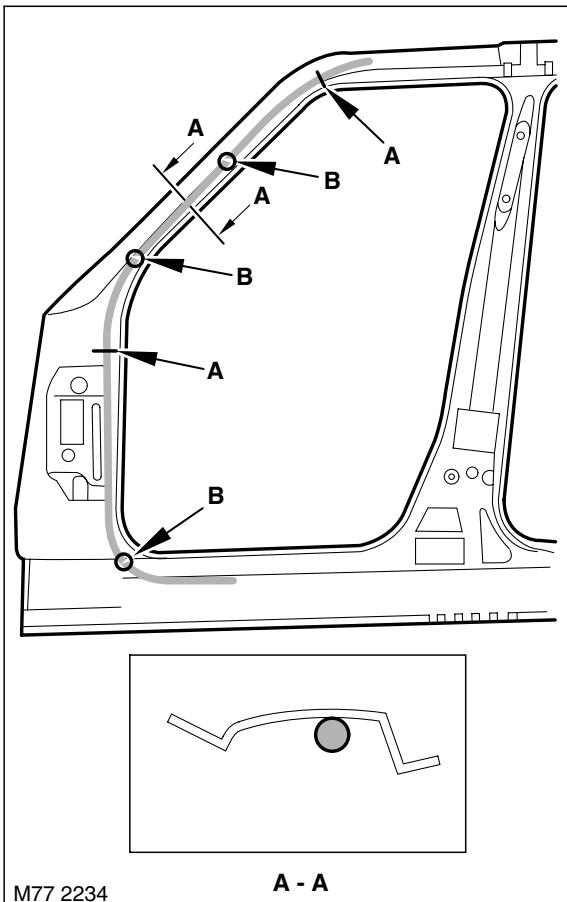
*NOTE: The 'A' post reinforcement is supplied as an assembly and includes the 'A' post body side panel. Prior to refitting the 'A' post reinforcement it is necessary to separate it from the 'A' post body side panel. This allows all welding operations on the 'A' post reinforcement to be carried out.*

#### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove 'A' post body side panel.  
 **, , Body side panel - 'A' post.**

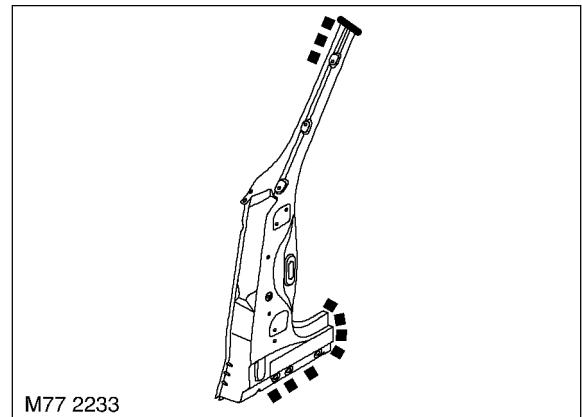


## Repair



1. Before removing the 'A' post reinforcement, observe the following precautions.  
**CAUTION: When cutting the 'A' post upper section, extreme caution must be taken as a rubber drain tube is located behind it. The approximate position of the drain tube is shown in the illustration.**

*NOTE: Arrows 'A' and 'B' shown in the illustration, indicate the approximate position of the drain tube fixings.*



2. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

**CAUTION: Before welding the top of the 'A' post reinforcement, tack weld a small plate over the drain tube to protect it from excessive heat.**

## Refit

1. Fit 'A' post body side panel. , , **Body side panel - 'A' post.**
2. Connect alternator.
3. Connect battery earth lead.

# PANEL REPAIRS

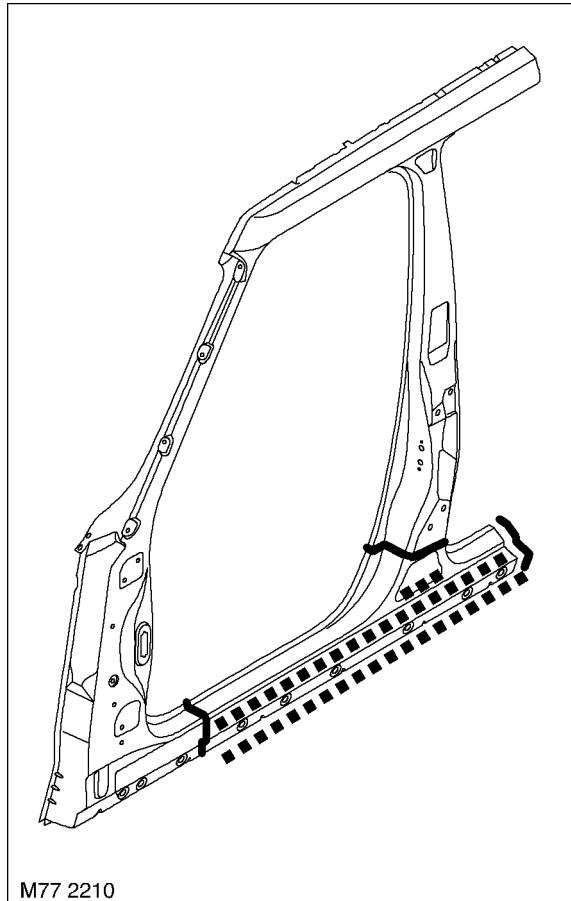
## Body side panel - sill section

In this procedure the sill section of the body side panel is changed.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove rear road wheel.
4. Remove front and rear doors.
5. Remove SRS side crash sensor.  
     **RESTRAINT SYSTEMS, REPAIRS, Crash sensor - side.**
6. Remove front seat belt.
7. Remove front and rear door tread plates.
8. Remove front and rear door aperture seals.
9. Remove sill finisher.  
     **EXTERIOR FITTINGS, REPAIRS, Extension - spoiler - front bumper.**
10. Remove front seat.
11. Remove rear seat cushion.
12. Release carpet from door apertures and position aside.
13. **RH side:** Remove air reservoir.  
     **FRONT SUSPENSION, REPAIRS, Air reservoir.**
14. Remove exhaust assembly.  
     **MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
15. Remove fuel tank shield.
16. Release wiring harnesses from sill area and position aside.

### Repair



M77 2210

1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Secure harness to sill.
2. Position carpet to inner sill.
3. Fit fuel tank shield.
4. Fit exhaust assembly.  
     **MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
5. **RH side:** Fit air reservoir.  
     **FRONT SUSPENSION, REPAIRS, Air reservoir.**
6. Fit front seat.
7. Fit rear seat cushion.
8. Fit front and rear door aperture seals.
9. Fit front and rear door tread plates.
10. Fit sill finisher.  
     **EXTERIOR FITTINGS, REPAIRS, Extension - spoiler - front bumper.**
11. Fit front seat belt.



12. Fit SRS side crash sensor.
-  RESTRAINT SYSTEMS, REPAIRS,  
Crash sensor - side.
13. Fit front and rear doors.
14. Fit rear road wheel.
15. Connect alternator.
16. Connect battery earth lead.

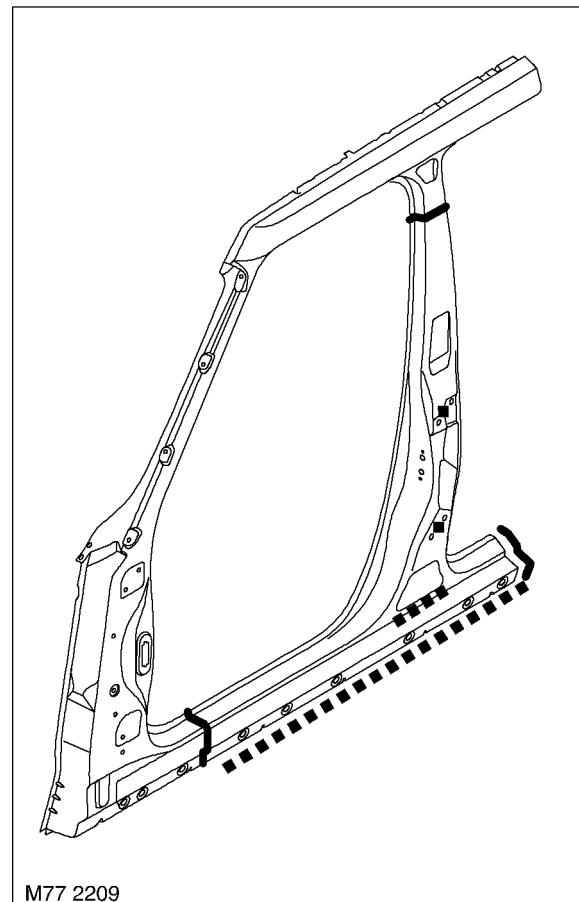
## Body side panel - sill and 'B/C' post section

*In this procedure the sill and 'B/C' post section of the body side panel is changed.*

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove all components that are removed on the sill section of the body side panel.  
 , , Body side panel - sill section.
4. Remove headlining.  
 INTERIOR FITTINGS, REPAIRS,  
Headlining.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

# PANEL REPAIRS

## Refit

1. Fit headlining.  
 **INTERIOR FITTINGS, REPAIRS, Headlining.**
2. Fit all components that are removed on the sill section of the body side panel.  
 **, , Body side panel - sill section.**
3. Connect alternator.
4. Connect battery earth lead.

## 'B/C' post reinforcement

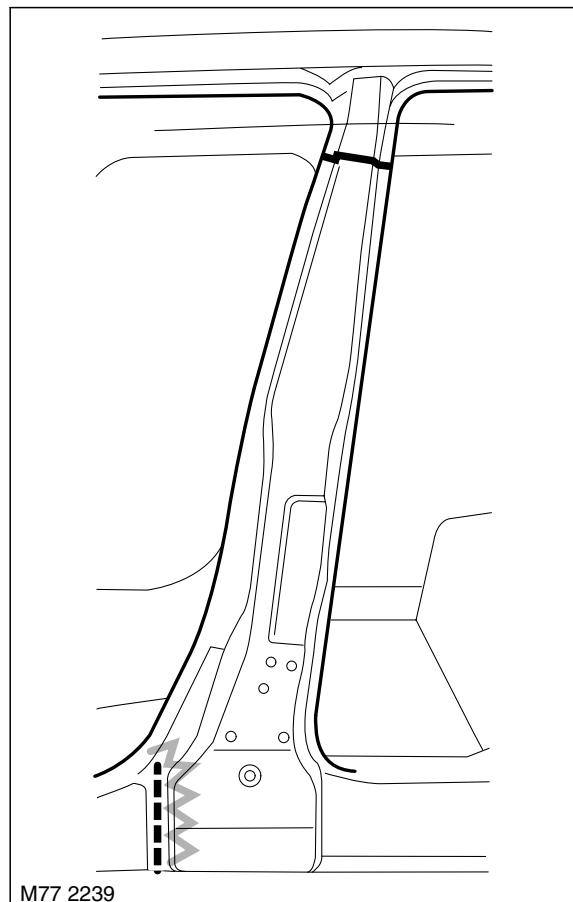
*In this procedure the sill and 'B/C' post section of the body side panel is changed.*

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove all components that are removed on the sill and 'B/C' post section of the body side panel.

 **, , Body side panel - sill and 'B/C' post section.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

*If the front sill reinforcement is not being replaced, then the 'B/C' post reinforcement must be cut in the area identified by the saw tooth line on the above illustration.*

**Refit**

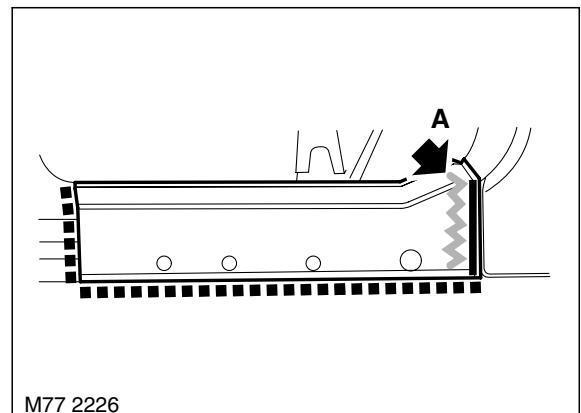
1. Fit all components that are removed on the sill and 'B/C' post section of the body side panel.  
, , **Body side panel - sill section.**
2. Connect alternator.
3. Connect battery earth lead.

**Sill reinforcement**

*In this procedure the sill and 'B/C' post section of the body side panel is changed.*

**Remove**

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove all components that are removed on the sill section of the body side panel.  
, , **Body side panel - sill section.**

**Repair**

M77 2226

1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

*If the 'B/C' post reinforcement is not being replaced then the sill reinforcement must be cut in the area identified by arrow A.*

**Refit**

1. Fit all components that are removed on the sill and 'B/C' post section of the body side panel.  
, , **Body side panel - sill section.**
2. Connect alternator.
3. Connect battery earth lead.

# PANEL REPAIRS

## Body side panel - rear section

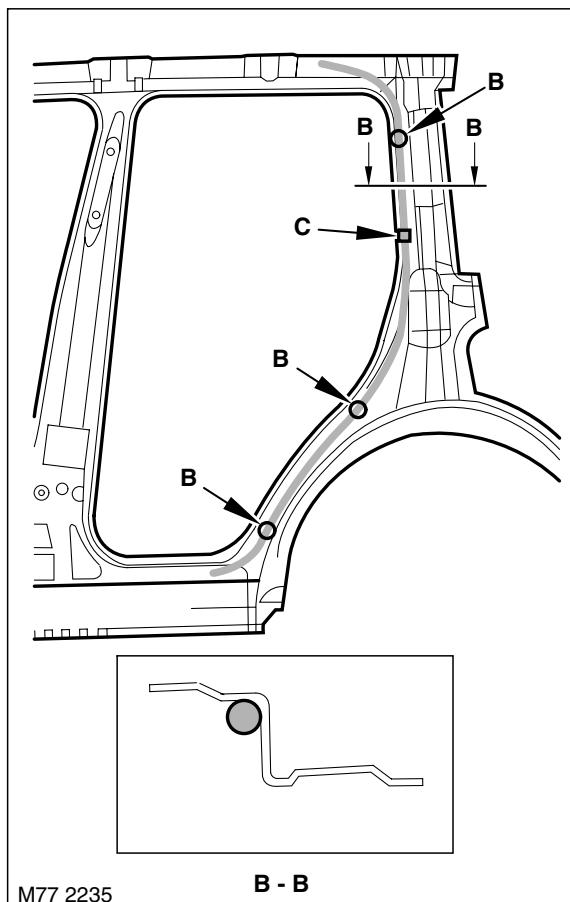
In this procedure, the rear outer body side panel is replaced in conjunction with the complete rear quarter.

### Remove

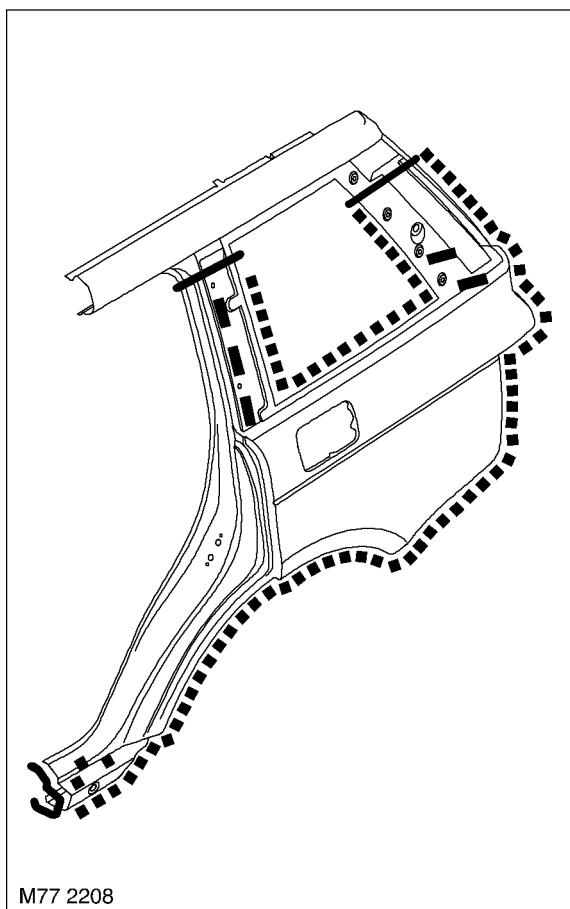
1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove rear road wheel.
4. Remove rear door.
5. Remove rear door and tail door aperture seals.
6. Remove rear door and tail door strikers.
7. Remove sill finisher.  
 **EXTERIOR FITTINGS, REPAIRS, Extension - spoiler - front bumper.**
8. Remove rear bumper armature.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper armature - rear.**
9. Remove rear wheel arch liner.
10. Remove exhaust assembly.  
 **MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
11. Remove 'E' post external finisher.  
 **EXTERIOR FITTINGS, REPAIRS, Finisher - 'E' post.**
12. Remove rear quarter light glass.  
 **SCREENS, REPAIRS, Glass - quarter light - rear.**
13. Remove tail lamp assembly.  
 **LIGHTING, REPAIRS, Lamp assembly - tail.**
14. **RH side:** Drain fuel tank.  
 **FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**
15. **RH side:** Remove fuel filler neck.
16. **RH side:** Remove fuel flap and fuel flap release mechanism.
17. Remove air suspension cross link valve.  
 **REAR SUSPENSION, REPAIRS, Valve assembly - cross link.**
18. Remove rear seat belt.
19. Remove 'E' post internal finisher.  
 **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'E' post.**
20. Remove lower rear quarter trim casing.  
 **INTERIOR FITTINGS, REPAIRS, Trim casing - rear quarter - lower.**
21. Remove all navigation and in car entertainment components from rear quarter area.  
 **NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Power amplifier.**
22. Release rear carpet and position aside.
23. Remove luggage compartment carpet.

24. Remove insulation from rear quarter area.
25. Release vehicle harness from 'D' post and rear quarter area.

### Repair



1. Before removing the 'A' post reinforcement, observe the following caution.  
**CAUTION: When cutting out the body side panel, do not cut through the reinforcement panel as a rubber drain tube is located behind it. The approximate position of the drain tube is shown in the illustration.**



2. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

## Refit

1. Fit insulation to rear quarter area.
2. Position vehicle harness to 'D' post and rear quarter area.
3. Fit luggage compartment carpet.
4. Fit all navigation and in car entertainment components to rear quarter area.
5. Fit lower rear quarter trim casing.  
    **POINTING HAND icon NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Power amplifier.**
6. Fit and secure rear carpet.
7. Fit 'E' post internal finisher.  
    **POINTING HAND icon INTERIOR FITTINGS, REPAIRS, Trim finisher - 'E' post.**
8. Fit air suspension cross link valve.  
    **POINTING HAND icon REAR SUSPENSION, REPAIRS, Valve assembly - cross link.**

9. Fit rear wheel arch liner.
10. Fit rear seat belt.
11. Fit 'E' post external finisher.  
    **POINTING HAND icon EXTERIOR FITTINGS, REPAIRS, Finisher - 'E' post.**
12. Fit rear quarter light glass.  
    **POINTING HAND icon SCREENS, REPAIRS, Glass - quarter light - rear.**
13. Fit tail lamp assembly.  
    **POINTING HAND icon LIGHTING, REPAIRS, Lamp assembly - tail.**
14. **RH side:** Fit fuel filler neck.
15. **RH side:** Fit fuel flap and fuel flap release mechanism.
16. Fit sill finisher.  
    **POINTING HAND icon EXTERIOR FITTINGS, REPAIRS, Extension - spoiler - front bumper.**
17. Fit exhaust assembly.  
    **POINTING HAND icon MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
18. Fit rear bumper armature.  
    **POINTING HAND icon EXTERIOR FITTINGS, REPAIRS, Bumper armature - rear.**
19. Fit rear door and tail door strikers.
20. Fit rear door and tail door aperture seals.
21. Fit rear door.
22. Fit rear road wheel.
23. **RH side:** Refill fuel tank.  
    **POINTING HAND icon FUEL DELIVERY SYSTEM - Td6, ADJUSTMENTS, Tank - drain.**
24. Connect alternator.
25. Connect battery earth lead.

# PANEL REPAIRS

## Rear wheel arch reinforcement - upper

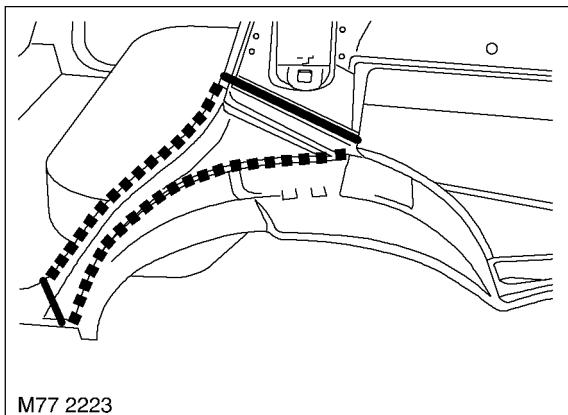
In this procedure, the rear wheel arch upper reinforcement is replaced in conjunction with the rear section of the body side panel.

The upper rear wheel arch reinforcement must be removed before the wheel arch assembly can be removed.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove rear section of the body side panel.  
 , , **Body side panel - rear section.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit rear section of the body side panel.  
 , , **Body side panel - rear section.**
2. Connect alternator.
3. Connect battery earth lead.

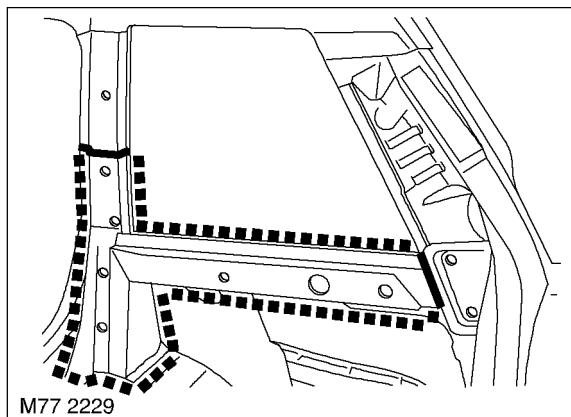
## 'D' post reinforcement

In this procedure, the rear outer body side panel and the rear body side reinforcement assembly is replaced in conjunction with the inner 'E' post assembly.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove rear section of the body side panel.  
 , , **Body side panel - rear section.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit rear section of the body side panel.  
 , , **Body side panel - rear section.**
2. Connect alternator.
3. Connect battery earth lead.



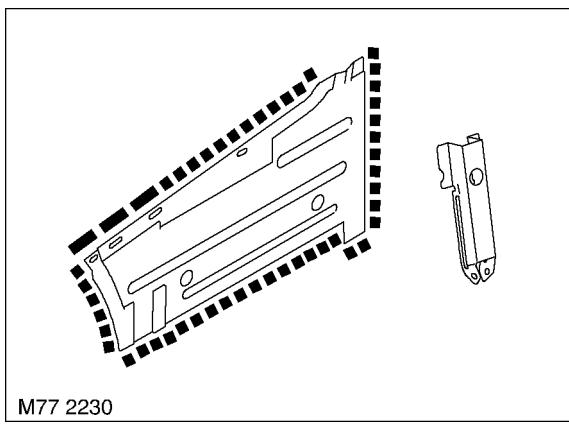
## Body side - rear extension

In this procedure, the body side rear extension in conjunction with the inner body side rear panel.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove rear section of the body side panel.  
☞, **Body side panel - rear section.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit rear section of the body side panel.  
☞, **Body side panel - rear section.**
2. Connect alternator.
3. Connect battery earth lead.

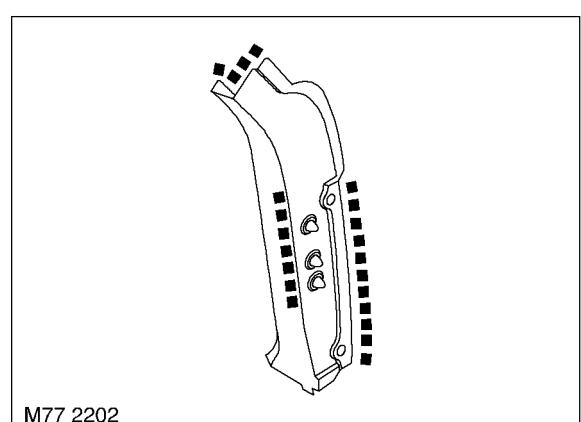
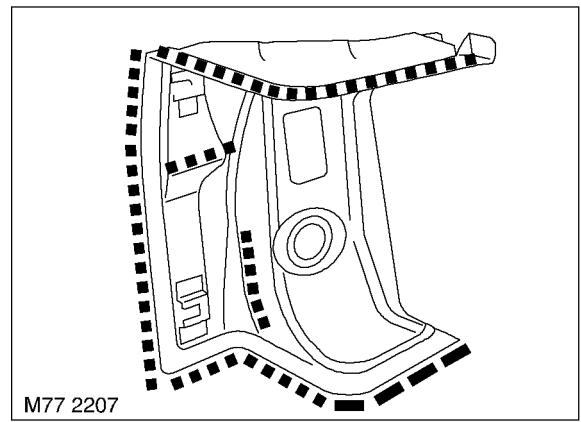
## Tail lamp mounting panel

The tail lamp mounting panel may be changed with the body side rear section or the body rear outer panel. The drain channel may also be changed in this procedure.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove rear section of the body side panel.  
☞, **Body side panel - rear section.**

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

# PANEL REPAIRS

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## Refit

1. Fit rear section of the body side panel.  
 **Body side panel - rear section.**
2. Connect alternator.
3. Connect battery earth lead.

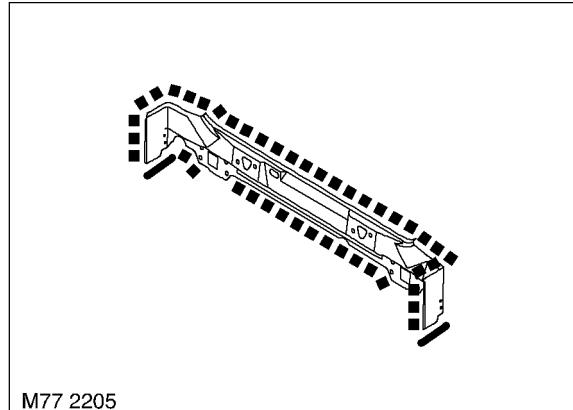
## Body rear - outer panel

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### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove tail door lower.
4. Remove tail door aperture seal.
5. Remove rear bumper armature.  
 **EXTERIOR FITTINGS, REPAIRS, Bumper armature - rear.**
6. Remove tow bar.
7. Remove exhaust assembly.  
 **MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
8. Remove both tail lamp assemblies.  
 **LIGHTING, REPAIRS, Lamp assembly - tail.**
9. Remove air supply unit.  
 **FRONT SUSPENSION, REPAIRS, Air supply unit.**
10. Remove LH and RH rear quarter lower trim casings.
11. Remove luggage space carpet.
12. Release vehicle harness from rear body lower closing and position aside.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

**Refit**

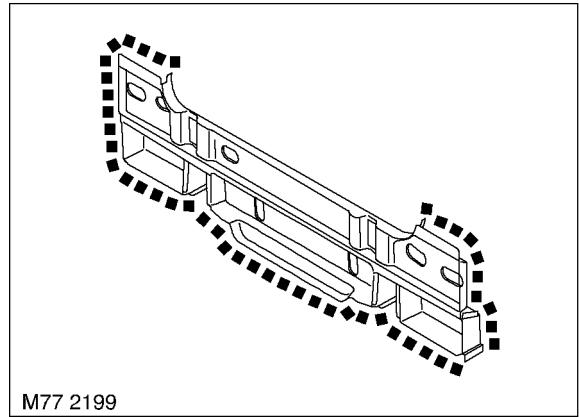
1. Secure vehicle harness to rear body lower closing.
2. Fit luggage space carpet.
3. Fit LH and RH rear quarter lower trim casings.
4. Fit air supply unit.  
    **☞ FRONT SUSPENSION, REPAIRS, Air supply unit.**
5. Fit both tail lamp assemblies.  
    **☞ LIGHTING, REPAIRS, Lamp assembly - tail.**
6. Fit tail door lower.
7. Fit tail door aperture seal.
8. Fit rear bumper armature.  
    **☞ EXTERIOR FITTINGS, REPAIRS, Bumper armature - rear.**
9. Fit tow bar.
10. Fit exhaust assembly.  
    **☞ MANIFOLD AND EXHAUST SYSTEM - Td6, REPAIR, Exhaust system and mountings.**
11. Connect alternator.
12. Connect battery earth lead.

**Body rear assembly**

*The procedure to remove the body rear lower assembly is the same as the body rear outer panel.*

**Remove**

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove body rear outer panel.  
    **☞ , , Body rear - outer panel.**

**Repair**

1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

**Refit**

1. Fit body rear outer panel.  
    **☞ , , Body rear - outer panel.**
2. Connect alternator.
3. Connect battery earth lead.

# PANEL REPAIRS

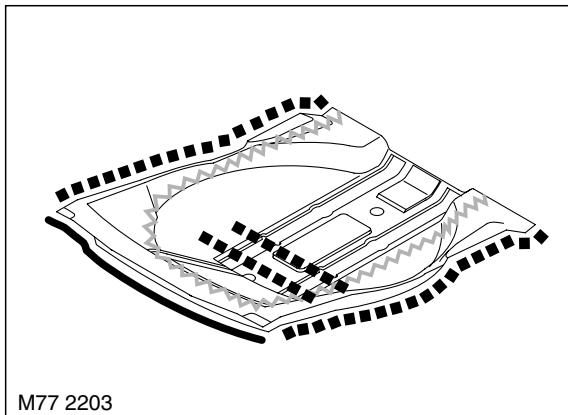
## Spare wheel well

In this procedure, the body rear assembly is also replaced in conjunction with the spare wheel well.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove body rear assembly.  
 , , **Body rear assembly.**
4. Remove heat shield from spare wheel well.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Fit heat shield to spare wheel well.
2. Fit body rear assembly.  
 , , **Body rear assembly.**
3. Connect alternator.
4. Connect battery earth lead.

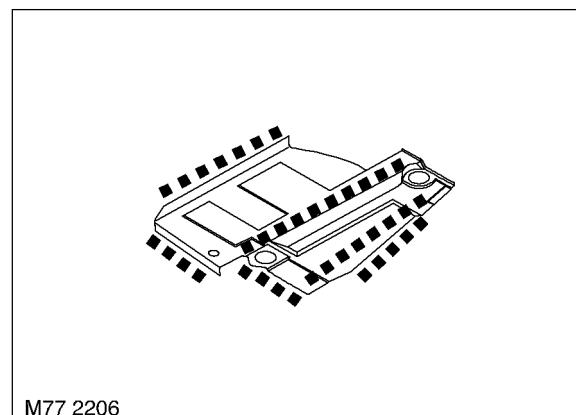
## Rear floor extension

The rear floor extension is replaced with either the body rear assembly or the rear body side panel.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove body rear assembly or the rear body side panel.  
 , , **Body rear assembly.**
4. Remove heat shield from spare wheel well.

### Repair



1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

### Refit

1. Refit is the reversal of the removal.



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## Floor longitudinal

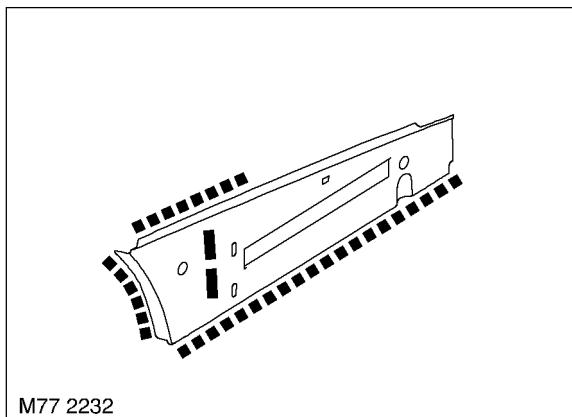
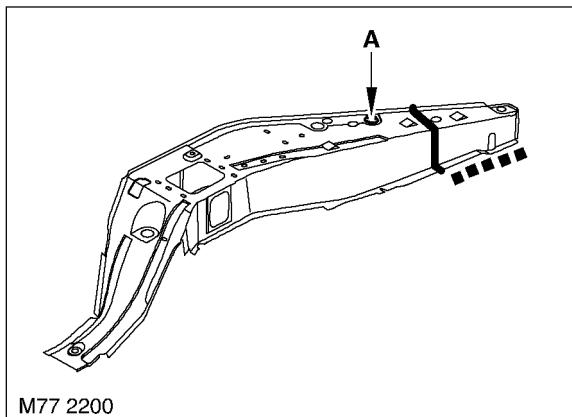
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The floor longitudinal closing panel may also be changed with the floor longitudinal closing panel.

### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove heat shield from spare wheel well.

### Repair



### Refit

1. Fit heat shield to spare wheel well.
2. Connect alternator.
3. Connect battery earth lead.

1. Remove existing panel(s), prepare panel joint faces and install new panel(s) in accordance with Panel Replacement Procedure. Punch or drill holes in new panel for plug welding as shown.

**The panel must be cut rearward of the arrow 'A'. Cutting the panel forward of this mark will structurally weaken the body.**

# PANEL REPAIRS

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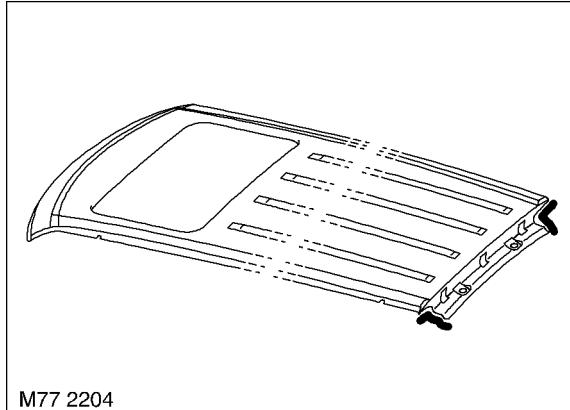
## Roof assembly

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### Remove

1. Disconnect battery earth lead.
2. Disconnect alternator.
3. Remove front screen.  
 **SCREENS, REPAIRS, Windscreen.**
4. Remove tail door upper.
5. Remove tail door aperture seal.
6. Remove both front seats.
7. Remove rear seat cushion.
8. Remove headlining.  
 **INTERIOR FITTINGS, REPAIRS, Headlining.**
9. Remove sunroof.  
 **SUNROOF, REPAIRS, Sunroof.**
10. Remove vehicle harnesses from all roof areas.

### Repair



### Refit

1. Fit vehicle harnesses to all roof areas.
2. Fit sunroof.  
 **SUNROOF, REPAIRS, Sunroof.**
3. Fit front screen.  
 **SCREENS, REPAIRS, Windscreen.**
4. Fit tail door upper.
5. Fit tail door aperture seal.
6. Fit headlining.  
 **INTERIOR FITTINGS, REPAIRS, Headlining.**
7. Fit rear seat cushion.
8. Fit both front seats.
9. Connect alternator.
10. Connect battery earth lead.



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## Doors

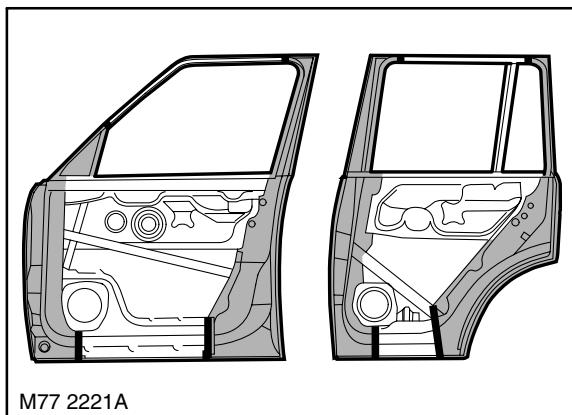
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The doors are serviced as complete assemblies. The door skins cannot be serviced separately.

### Remove

1. Remove door.

### Repair



1. The doors are made from Aluminium. The door inner assemblies are made up of pressed panels and die cast panels, which are joined together using a combination of riveting and bonding.

**CAUTION:** The shaded areas in the above illustration highlight the cast aluminium panels. These panels cannot be repaired, if damage occurs to these panels then the whole door must be replaced.

### Refit

1. Fit door.

## PANEL REPAIRS

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## TIME SCHEDULES

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The following information shows the total time taken to replace single panels and complete assemblies. This time includes removal of Mechanical, Electrical and Trim (MET) items, plus paint times based on Metallic Clear Over Base Paint.

The times shown were generated by Thatcham (the Motor Insurance Repair and Research Centre) and are to be used as a guide only.

**Panel/assembly replacement times**

Panel Description	Total time
Bonnet	7.7
Bonnet locking platform	1.5
Headlamp mounting panel - LH	1.9
Headlamp mounting panel - RH	2.0
Wing	7.0
Front door	8.6
Rear door	8.4
Body side panel - sill section - LH	20.7
Body side panel - sill section - RH	21.3
Body side panel - sill and B/C post section - LH	23.5
Body side panel - sill and B/C post section - RH	24.3
Body side panel - rear section - LH	26.0
Body side panel - rear section - RH	28.0
Tailgate upper	8.6
Tailgate lower	6.9
Body rear outer panel	14.0
Roof panel	21.6

**Combination panel replacement times**

The following panel combination times show the total time to remove/refit body panels, MET items and any paint processes.

# PANEL REPAIRS

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## Front end combination panel times

Panel Description	Total Time
Bonnet locking platform Bumper front Headlamp mounting panel Wing	11.6
Bumper front Bonnet locking platform Headlamp mounting panel - LH and RH	14.4
Bonnet locking platform Bumper front Front armature Front sidemember end panel Front sidemember - front section Front crossmember assembly Headlamp mounting panel - LH and RH Wing Valance outer extension Valance inner assembly	29.9
Bonnet locking platform Bumper front Front armature Front sidemember end panel LH and RH Front sidemember - front section LH and RH Radiator protection bar Headlamp mounting panel - LH and RH Wing LH and RH Valance outer extension LH and RH Valance inner assembly LH and RH	41.3
Bonnet locking platform Bumper front Front armature Front sidemember end panel Front sidemember - front section Radiator protection bar Wing LH and RH Headlamp mounting panel - LH and RH Front wing	19.3 LH 19.2 RH



Bonnet locking platform	
Bumper front	
Armature	
Front sidemember - front section	
Front crossmember lower	
Front sidemember assembly	
Radiator protection bar	
Headlamp panel LH and RH	
Wing	
Valance inner assembly	
Valance outer reinforcement section	
	50.1 LH 49.2 RH

#### Bodyside combination panel times

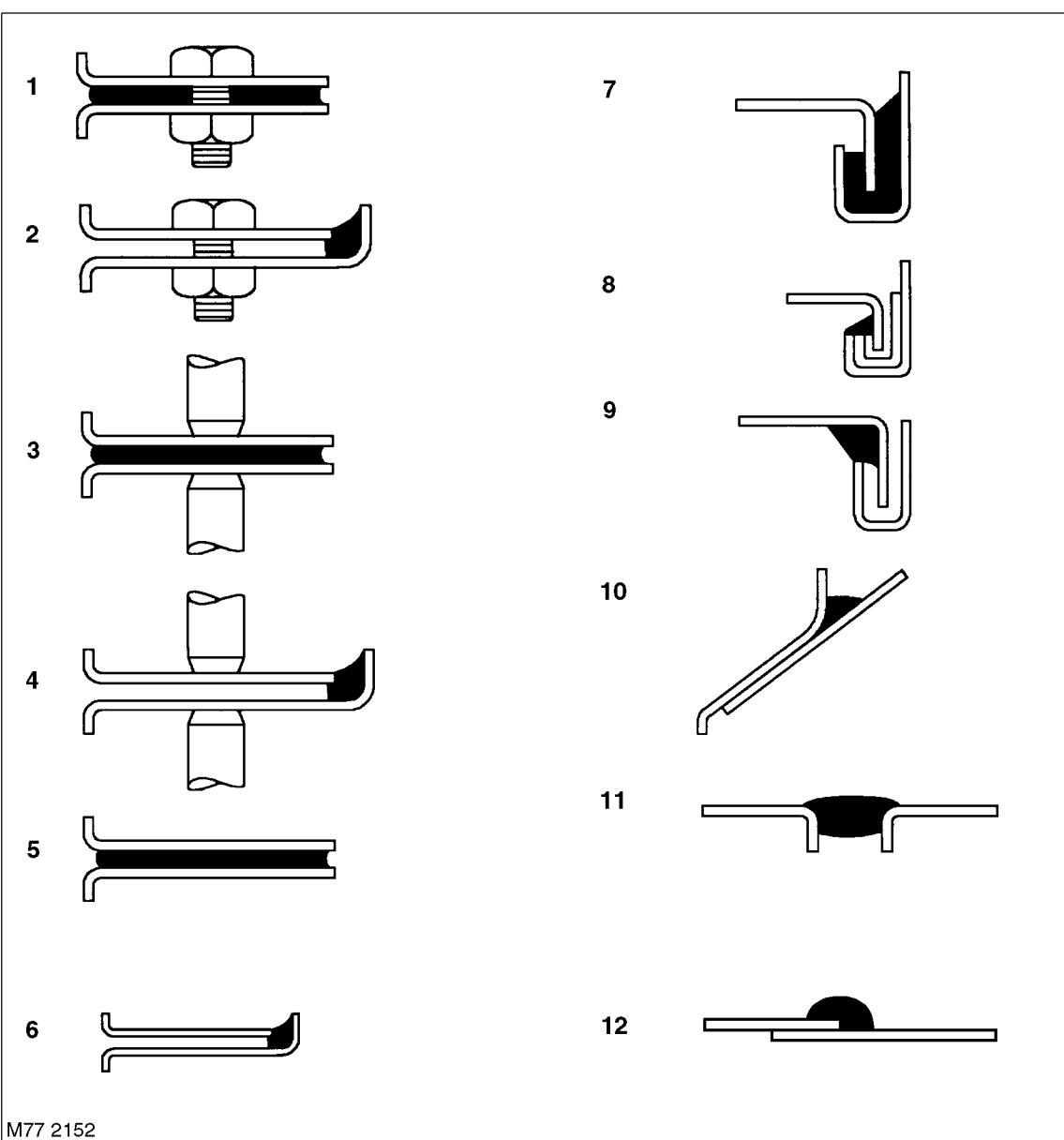
Panel description	Total time
Front door	
Wing	11.7
Rear door	
Bodyside panel - rear section	29.3 LH 31.4 RH
'B/C' post reinforcement	
Front door	
Rear door	
Bodyside side panel - sill and 'B/C' post section	34.5 LH 35.3 RH
Front door	
Rear door	
Bodyside assembly complete	
Wing	51.3 LH 53.0 RH
Front door	
Front body side panel - 'A' post	
A-post reinforcement	
Fascia - remove for access and refit	
Windscreen	
Wing	
Valance outer	40.0 LH 39.6 RH

# PANEL REPAIRS

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## Rear end combination panel times

Panel description	Total time
Rear bumper Body rear - outer panel Body rear assembly Body side panel - rear section	36.7 LH 38.8 RH
Rear bumper Body rear - outer panel Body rear assembly Body side panel - rear section LH and RH	56.3
Rear bumper Body side panel - rear section Spare wheel well Floor longitudinal Body rear assembly Body rear - outer panel Rear floor extension Rear wheel arch reinforcement - upper 'D' post reinforcement	54.1 LH 55.4 RH
Rear bumper Body side panel - rear section LH and RH Spare wheel well Floor longitudinal LH and RH Body rear assembly Body rear - outer panel Rear floor extension LH and RH Rear wheel arch reinforcement - upper LH and RH 'D' post reinforcement LH and RH	81.3



- 1** Between panels - bolted
- 2** Panel edges - bolted
- 3** Between panels - spot welded
- 4** Panel edges - spot welded
- 5** Between panels - bonded
- 6** Panel edges - bonded
- 7** Clinch joints - type (a)
- 8** Clinch joints - type (b)
- 9** Clinch joints - type (c)
- 10** Gaps between panels - type (a)
- 11** Gaps between panels - type (b)
- 12** Lap joint

## BODY SEALING MATERIALS

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Description - Usage	Supplier	Part Number
<b>Cavity waxes</b>		
Inner Cavity Wax (Amber)	3M	08901/11/21
Inner Cavity Wax (Transparent)	3M	08909/19/29
Cavity Wax	Croda	PW57
<b>Engine bay waxes/lacquers</b>		
Astrolan Engine Bay Wax and Cosmetic Wax	Astors	DA3243/1
Engine Bay and Cosmetic Wax/Lacquer	Croda	PW197
Engine Bay Cosmetic Wax/Lacquer	Dinol	4010
<b>Miscellaneous materials</b>		
Aerosol Auto Adhesive (Trim) - impact adhesive for trim parts	3M	08080
Flexible Parts Repair Material - rubber modified polypropylene parts	3M	05900
Sound Dampening Foam	Gurit-Essex	Betacore 7999
Sound Dampening Pillar Foam	Duramix	4330
Flexible Foam (anti-flutter) - used between panels, allows for a degree of movement	Duramix	4320
Water Shedder Repair (Aerosol)	Teroson	-
<b>Seam sealers</b>		
Body Caulking - type (b) gaps between panels	3M	08568
Drip Chek Clear - bolted, spot welded and bonded panel edges; type(a) and (b) gaps between panels; type (c) clinch joints	3M	08401
Drip Chek Heavy - type (b) gaps between panels; type (c) clinch joints	3M	08531
Polyurethane Seam Sealer - bolted, spot welded and bonded panel edges; type (a) and (b) gaps between panels; type (b) clinch joints	3M	08684/89/94
Polyurethane Sealer (Sachet) - bolted panel edges; type (b) clinch joints	3M	08703/83/88
Sprayable Sealer - lap joints	3M	08800/23
Super Seam Sealer - lap joints; type (b) clinch joints	3M	08537
Weld Thru' Sealer - between spot welded panels	3M	08626
Betafill Clinch and Brushable Sealer - type (b) clinch joints	Gurit-Essex	10211/15/20
Clinch, Joint and Underbody Coating - lap joints	Gurit-Essex	10101/10707
Leak Chek Clear - between bolted panels; spot welded and bonded panel edges; type (c) clinch joints; type (a) gaps between panels	Kent Industries	10075
Putty - type (b) gaps between panels	Kent Industries	-
Polyurethane Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (a) and (b) gaps between panels	PPG	6500
Polyurethane Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (b) gaps between panels	Teroson	92
Terolan Light Seam Sealer - bolted, spot welded and bonded panel edges; type (a) and (b) gaps between panels; between bonded panels; type (c) clinch joints	Teroson	-
Terolan Special Brushable Seam Sealer - lap joints	Teroson	-

## BODY SEALING MATERIALS

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Description - Usage	Supplier	Part Number
Terostat Sprayable Seam Sealer - bolted, spot welded and bonded panel edges; between bonded panels; type (b) gaps between panels	Teroson	9320
Terostat 1K PU Seam Sealer (SE 20) - type (a) and (b) gaps between panels; spot welded and bonded panel edges	Teroson	-
Sealing Compound - bolted, spot welded and bonded panel edges; between bonded panels; type (b) gaps between panels	Wurths	8901001/-/6
<b>Structural adhesives</b>		
Automotive Structural Adhesive - between bonded panels; type (a) clinch joints	3M	08122
Two Part Structural Epoxy - between bonded and spot welded panels; type (a) clinch joints	Ciba-Geigy	XB5106/7
<b>Underbody sealers</b>		
Body Schutz	3M	08861
Spray Schutz	3M	08877
Crodapol Brushable Underbody Sealer	Croda	PV75
Terotex Underseal (CP 02)	Teroson	9320
<b>Underbody waxes</b>		
Stone-chip coating (smooth)	3M	08158/9
Underbody Wax	Croda	PW61
Underbody Wax	Dinol	Tectacote 205
<b>Weld-through primers</b>		
Weld Thru' Coating	3M	05913
Zinc Spray	3M	09113
Zinc Rich Primer	ICI	P-565 634



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## Application Equipment

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Suitable application equipment is available from the following manufacturers and suppliers:

### **3M**

Automotive Trades Group  
3M UK Plc  
3M House  
PO Box 1  
Market Place  
Bracknell  
Berks.  
RG12 1JU  
 (01344) 858611

### **Cooper Pegler**

Burgess Hill  
Sussex  
RH15 9LA  
 (014 446) 42526

### **SATA Spray Equipment**

Minden Industrial Ltd.  
16 Greyfriars Road  
Moreton Hall  
Bury St. Edmunds  
Suffolk  
IP32 7DX  
 (01284) 760791

### **3M Body Schutz Pistol Spraygun 08996**

A pistol type spraygun constructed from case and machined light alloy and designed for use with 3M screw fit Body Schutz containers.

### **3M Pneumatic Cartridge Gun 08012**

Air line-fed gun for applying 3M cartridge products. Excellent for ease of application to obtain a smooth bead. Regulator valve for additional control.

### **3M Pneumatic Applicator Guns 08006/7**

Air line-fed gun for application of 3M sachet sealers (Part Number 08006 for 200ml and 310ml sachet applications, and Part Number 08007 for all size sachets including 600ml).

Also available: **Heavy Duty Manual Gun 08013.**

### **3M Applicator Gun 08190.**

For the application of 3M Structural Adhesive 08120.

### **3M Inner Cavity Wax Applicator Gun 08997**

This equipment accepts 1-litre canisters and has a 750mm flexible tube.

The approved system is available from all 3M refinishing factors.

### **Cooper Pegler Falcon Junior Pneumatic Gun (Airless)**

Intended primarily for applying transit wax, this pneumatic sprayer has a 5-litre container with integral hand pump and provides an effective means of wax spraying without the need for compressed air or additional services.

## BODY SEALING MATERIALS

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A selection of nozzles, lances, hose lengths and a trigger valve assembly with integral filter allows flexibility in use. Additional applications include general maintenance, wax injection and paint application. Heavy-bodied materials may also be applied. All parts are fully replaceable and a wide range of nozzle configurations is available.

### **SATA Schutz Gun Model UBE**

The SATA Schutz Gun is approved for the re-treatment of vehicle underbody areas with protective coatings as supplied in 1 litre, purpose-designed 'one-way' containers. The screw thread fitting (female on the gun) is standard to most Schutz-type packs.

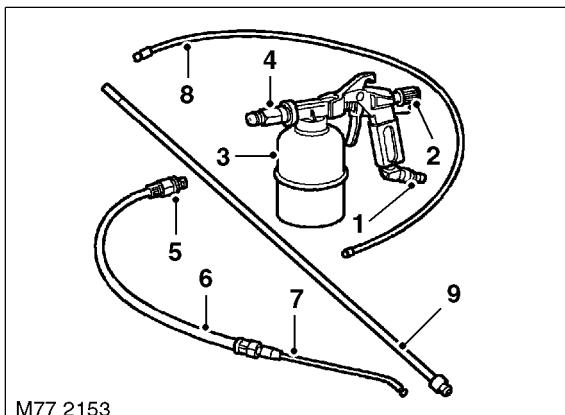
Full operating details are supplied with the equipment.

### **SATA HKD1 Wax Injection Equipment**

This equipment is approved for carrying out cavity wax re-treatment. The SATA HKD1 set comprises a high quality forged gun with 1-litre pressure feed container, a flexible nylon lance, a straight 1100mm steel lance and hooked-wand lance. A quick-change coupling is provided as a standard fitting to allow lances to be easily interchanged. Each lance has an integral, machined nozzle with specialised spray characteristics to suit the type of box section to be treated.



## Cavity wax application equipment and techniques



- 1 Air inlet
- 2 Flow control (spray pattern adjustment)
- 3 Pressure cup (1 litre capacity). Maximum pressure 140PSI (9.7 bar, 9.84kg/cm<sup>3</sup>)
- 4 Gun connector
- 5 Lance nipple connection
- 6 Flexible lance
- 7 Rigid directional hook wand (forward cone spray pattern)
- 8 Flexible nylon lance (1100mm) with 360° spray pattern
- 9 Rigid lance (1100mm) with 360° spray pattern

When re-treating wax-injected areas which have been disturbed during repairs, it is necessary to use a compressed air spray gun with integral pressure cup and a selection of interchangeable lances.

The following points must be observed during use, according to the attachments fitted:

- Use the rigid or flexible lance attachments with 360° spray dispersal when treating enclosed areas, to ensure maximum coverage.
- Where openings are restricted, use the hook nozzle to provide a more directional spray (e.g. inside narrow or short box sections).
- Spray exposed underbody surfaces directly from the gun less lance attachment and without disconnecting the fluid coupling.

### **1100mm flexible nylon lance**

This lance is similar in pattern to the rigid version, but provides the additional penetration required for curved sections or in places where access is difficult. Its main limitation is a lack of positional accuracy inside box sections.

Carry out all spraying on the outward stroke of the lance. Withdraw the lance slowly to ensure sufficient coverage. Do not withdraw the lance too quickly.

Ensure that the nylon tube of the lance is kept away from the edges of the access hole to eliminate abrasion and extend the life of the tube. Take care to ensure that spraying ceases just before the nozzle emerges from the access hole. To assist in this process paint the final 30mm of the nozzle with RED paint.

### **Hook nozzle on flexible lance**

The rigid hook produces a highly atomised, forward-directed, fully conical spray pattern having long range and good dispersion characteristics. This combination has good directional capabilities for treating short, narrow sections, and may also be used for direct spraying of inner wheel arches etc.

In use, position the flat area at the end of the lance at 180° to the nozzle spray direction. This will help to guide the spray more accurately when it is concealed in a box section or access hole.

## BODY SEALING MATERIALS

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For general spraying, move the nozzle in an arc from side to side as required, to ensure full coverage.

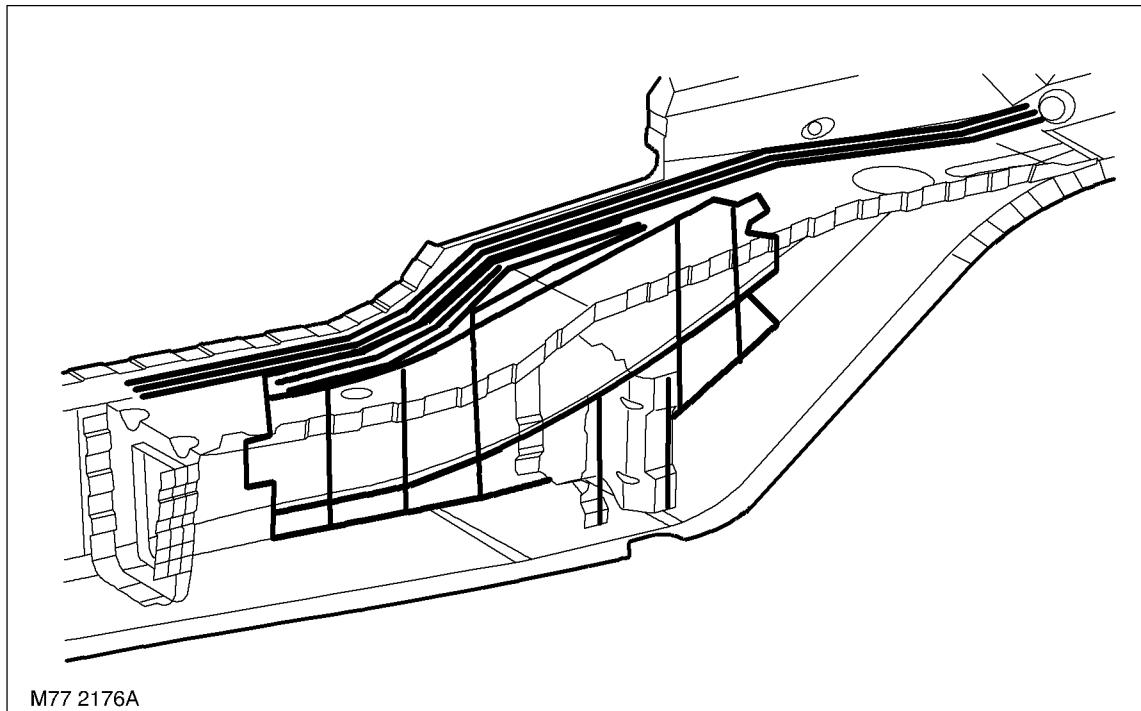
Ensure that all wax injection/application equipment is kept clean. Use white spirit for this purpose immediately after wax injection operations.



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**Structural adhesive on front  
sidemembers**

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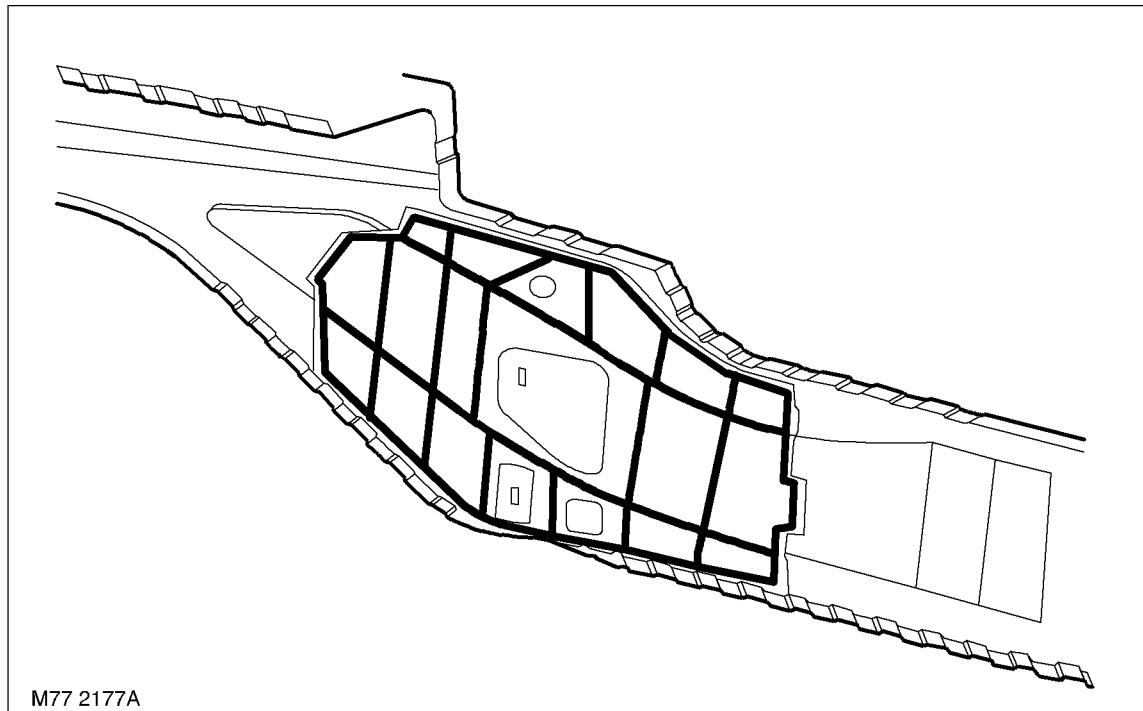
*Joints symmetrically opposite to those shown are also treated*

## CORROSION PREVENTION AND SEALING

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### Structural adhesive on front sidemembers

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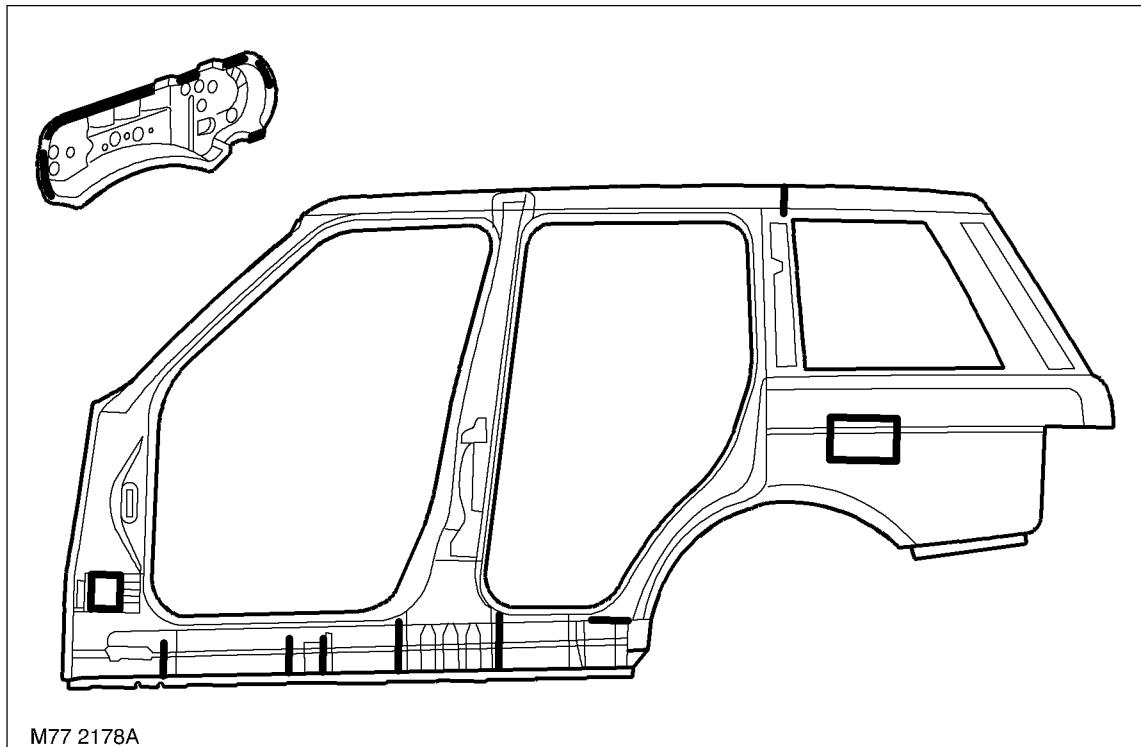


M77 2177A

*Joints symmetrically opposite to those shown are also treated*



**Structural adhesive on valance outer and body side panel**



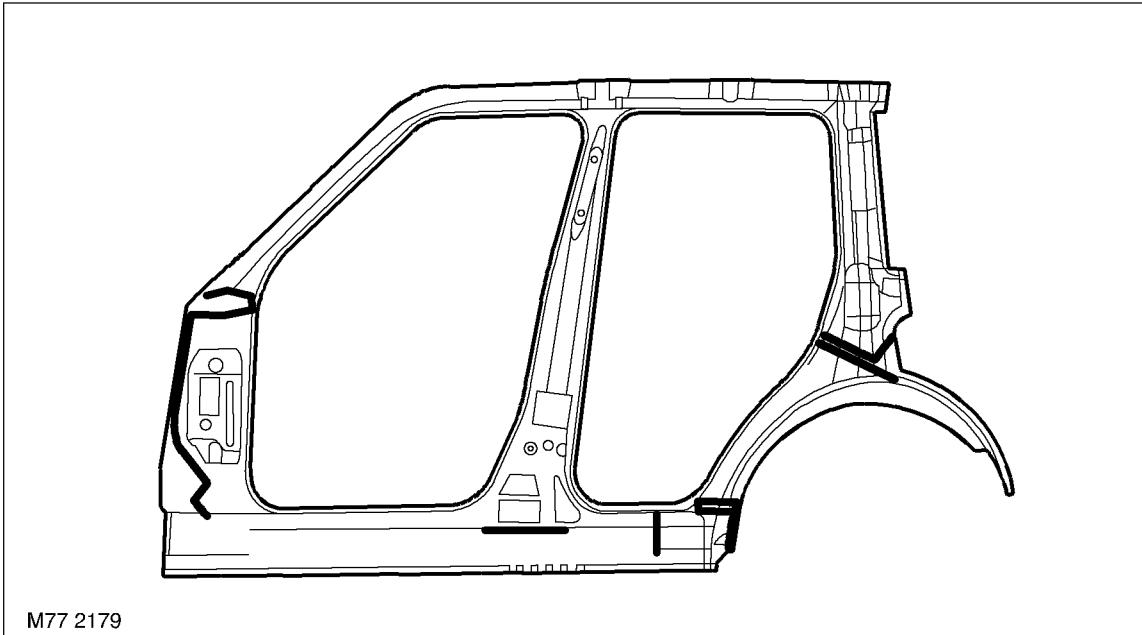
*Joints symmetrically opposite to those shown are also treated. Apply 3 mm diameter beads to all joints shown. Leave sill drain points free of adhesive.*

# CORROSION PREVENTION AND SEALING

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## Structural adhesive on body side frame - inner

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*Joints symmetrically opposite to those shown are also treated. Apply 3 mm diameter beads to all joints shown. Leave sill drain points free of adhesive.*

### Structural adhesive

Metal-to-metal adhesive is applied to critical joint areas during factory assembly. The material used is a high-temperature, heat cured, nitrile phenolic which serves to bond two metal surfaces and also to seal the joint against ingress of dust, moisture and fumes. This material is not suitable for service use and, during repair, should be substituted by an approved Structural Adhesive.

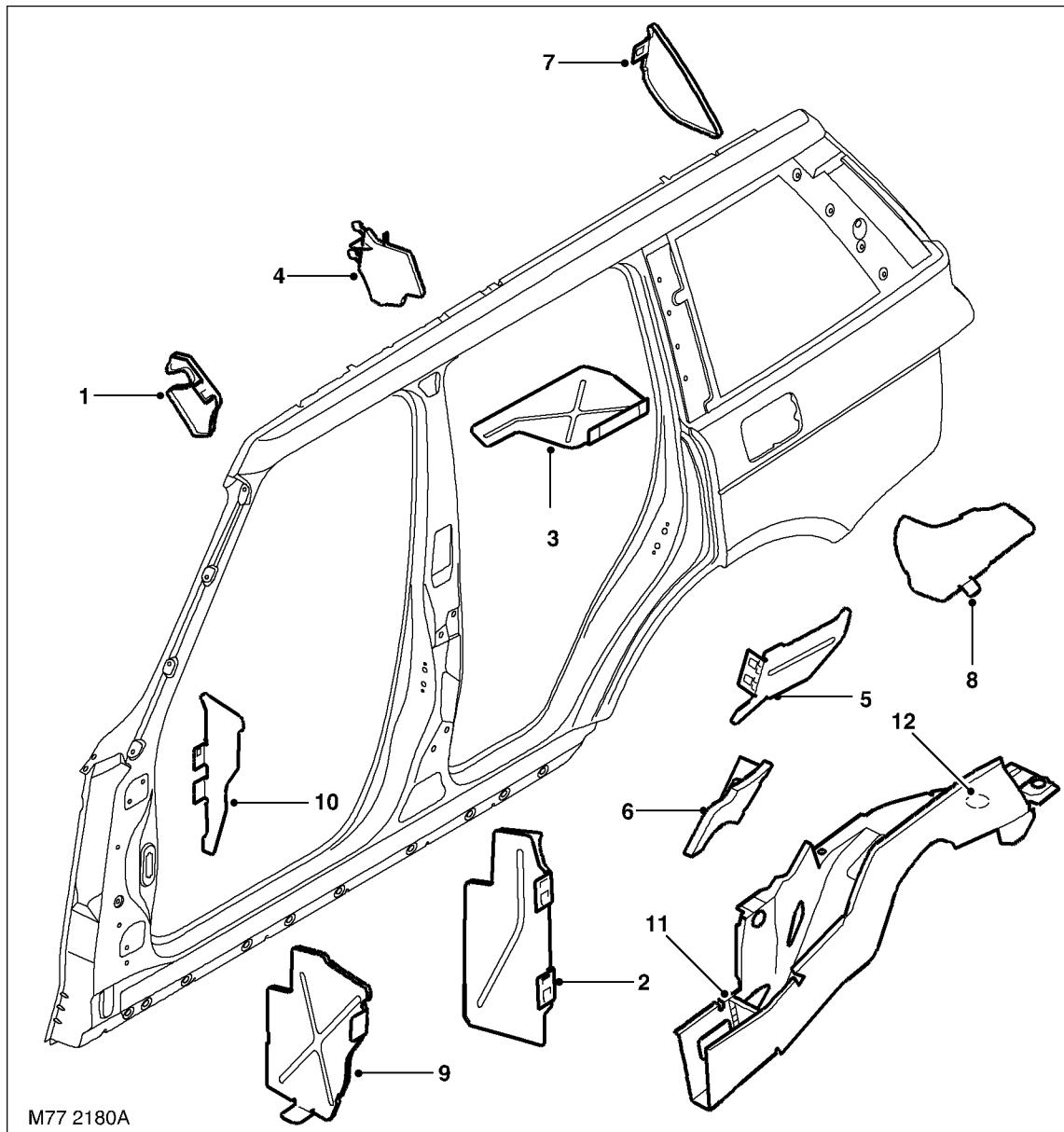
Those joints which require the application of structural adhesive are detailed in the previous illustrations. Only joints applicable to service panels are included. Apply structural adhesive where indicated or to the mating panel surface.

**CAUTION: When separating a joint treated with metal-to-metal adhesive, it is important to avoid distortion. Heat the joint gradually until the bond weakens sufficiently to permit panel separation.**

*NOTE: When spot welding through metal-to-metal adhesive, take particular care to adjust the transformer setting to ensure a reliable weld.*



## Expanding foam acoustic seals



*Expanding foam seals numbers 1 to 10 are fitted to various sections of the body side panel, bodyside closing and bodyside inner panel. Seal numbers 11 and 12 are fitted inside the rear longitudinals.*

Expanding foam acoustic seals are used in various closed sections of the body to improve vehicle refinement. The seals expand during the factory paint process, thus locking them into position. The seals are used in various locations throughout the vehicle.

The main function of the seals is to insulate the cabin from noise and vibrations, particularly road noise. They are located such that they prevent noise accentuation along a section and also reflect air borne noise away from the cabin.

A secondary function of the seals is that the internal sections are sealed from the infiltration of water, air, dust and gases.

Another advantage of the seals is that they marginally increase the overall stiffness of the body and its structural performance in case of a crash.

The seals are manufactured from an expandible synthetic rubber, 'Betacore 4300'.

## CORROSION PREVENTION AND SEALING

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All the seals are fitted in the body-in-white areas, and after going through the paint baking process expand up to eight times original size.

### ***Replacing seals***

As paint oven temperatures used in a repair workshop are significantly lower than those that are used during manufacture of the vehicle, a different process is required to replace the seals in service.

After a repair that involves replacement of a section containing expanded foam, the new section must be injected with an approved sound dampening foam. The sound dampening foam should be injected after paint refinishing and application of cavity wax. When injecting the foam, ensure the foam fills a complete cross section of the cavity.



## Factory treatments

All steel panels are double sided zinc coated.

During production, vehicle bodies are treated with the following anti-corrosion materials:

- A heat cured, PVC based sealant is applied to specific joint seams during factory assembly.
- A PVC-based underbody sealer which is sprayed onto the underside of the main floor and sills, the exterior of the safe well and the forward face of the lower dash crossmember.
- An application of cavity wax which is sprayed into various body sections.

Whenever body repairs are carried out, ensure the anti-corrosion materials in the affected area are repaired or renewed as necessary using the approved materials.

## Seam Sealers

A heat cured, PVC based sealant is applied to specific joint seams during factory assembly. This material is not suitable for service use and, during repair, should be substituted by an approved Seam Sealer.

Seams to which seam sealer is applied during factory assembly are detailed in the following illustrations.

Apply seam sealers after the application of primer and before the application of surfacer and top coat. The seam sealer must form a continuous bead, with the profile of the bead dependant on the type of seam. If seam sealer is applied with a brush, take particular care to maintain the required coverage of the seam. Where shaping of the seam sealer is required, use a cloth soaked with solvent such as white spirit or Shell SBP3 to achieve the required finish.

Ensure that ALL accessible repair seams are sealed following a repair. Damage to a vehicle often flexes areas of the body remote from the impact. As a result, the seam sealer in these areas may be disturbed by subsequent straightening and repair operations. Check all seams in the vicinity of the area undergoing repair for evidence of cracked seam sealer, then clean out as required and apply fresh seam sealer using the following procedure:

- Clean the affected seam and re-treat any exposed metal areas with a suitable etch phosphate primer.
- Treat affected area with an etch-acid primer.
- Apply appropriate seam sealer as necessary.
- Apply appropriate colour coat (and underbody sealer as applicable).

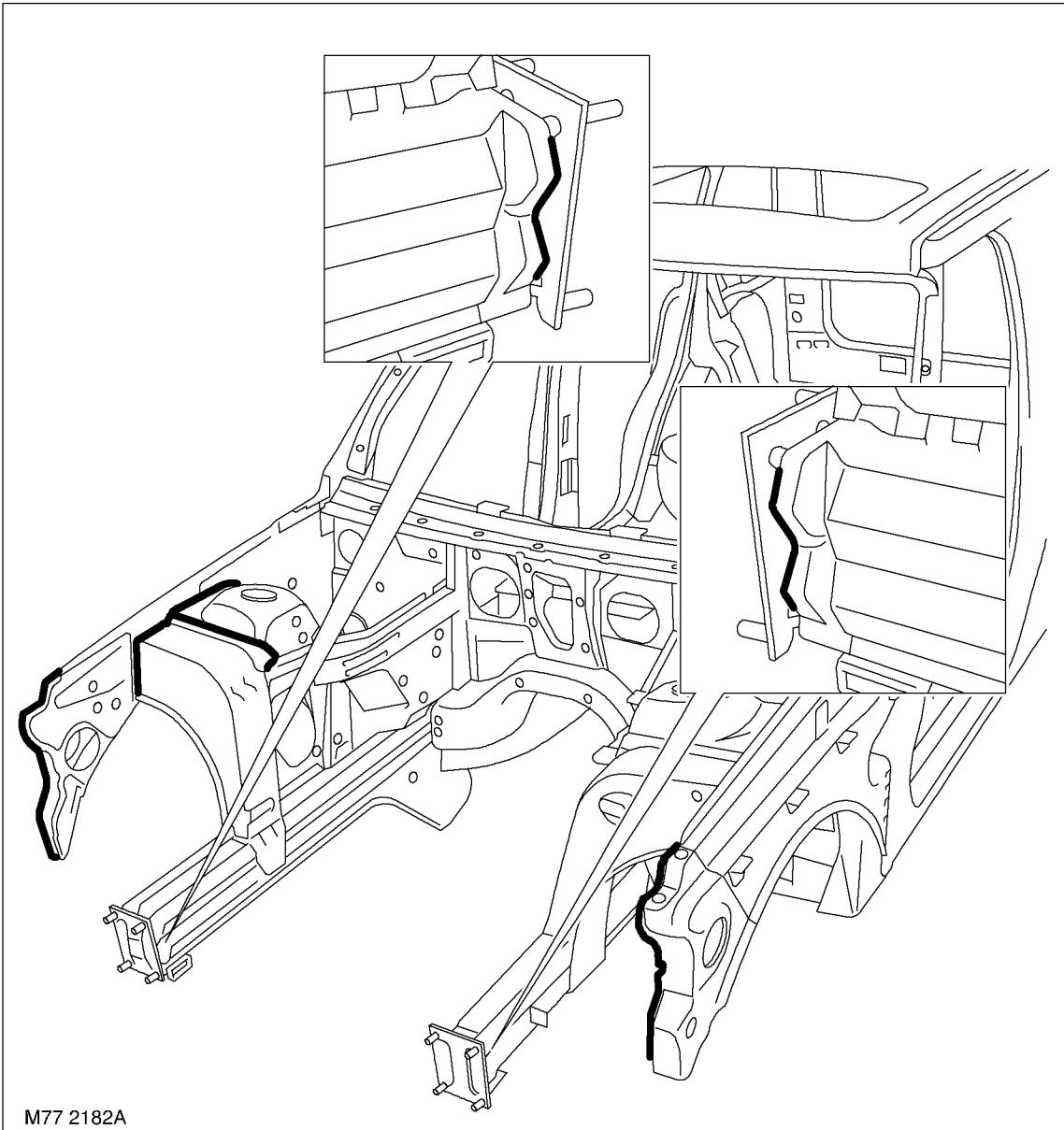
Where seams are inaccessible following the reassembly or fitting of components, ensure that a paste-type seam sealer is applied to such seams. Certain seams also become inaccessible after the completion of panel repairs. In such instances apply seam sealer and paint before final assembly.

Provided access is adequate, apply seam sealer to both sides of a repair joint. Where access is limited to one side only (e.g. box sections), treat the affected box member with cavity wax.

## CORROSION PREVENTION AND SEALING

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### ***Seam sealer on front end***

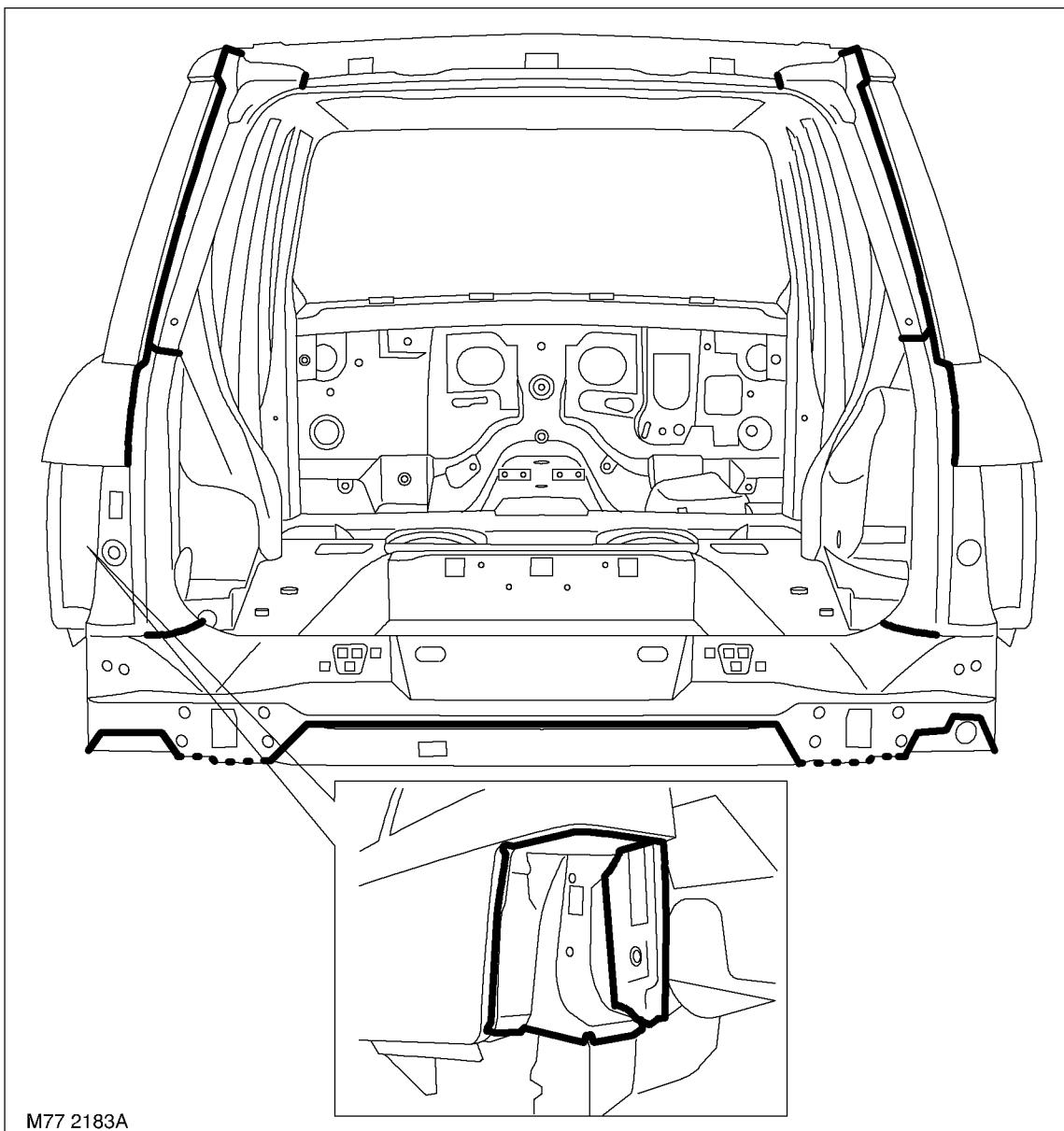


Seams symmetrically opposite to those shown are also treated. On front suspension turrets, ensure damper mounting holes are kept free of sealant.



## CORROSION PREVENTION AND SEALING

**Seam sealer on rear end**

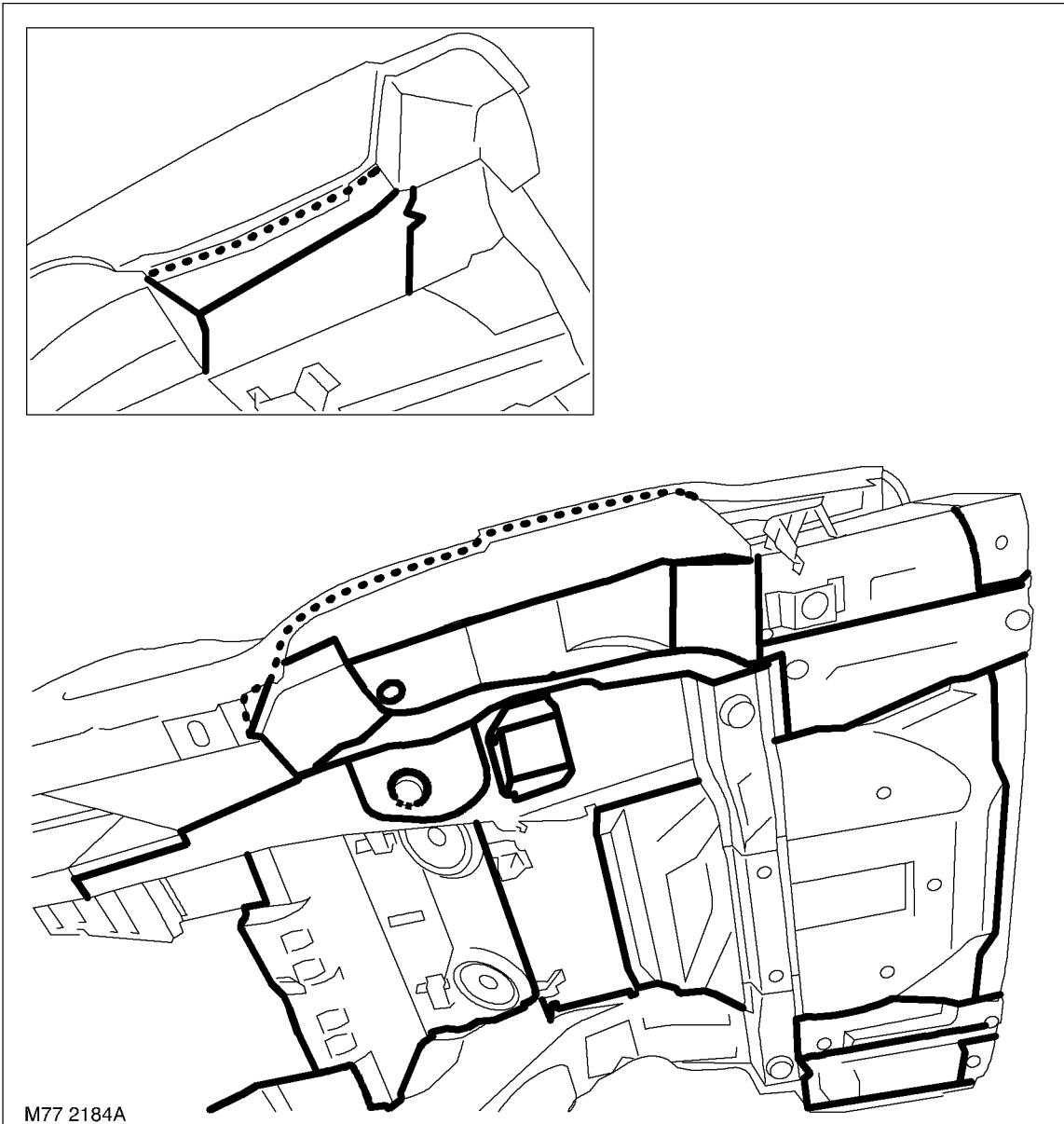


Seams symmetrically opposite to those shown are also treated.

## CORROSION PREVENTION AND SEALING

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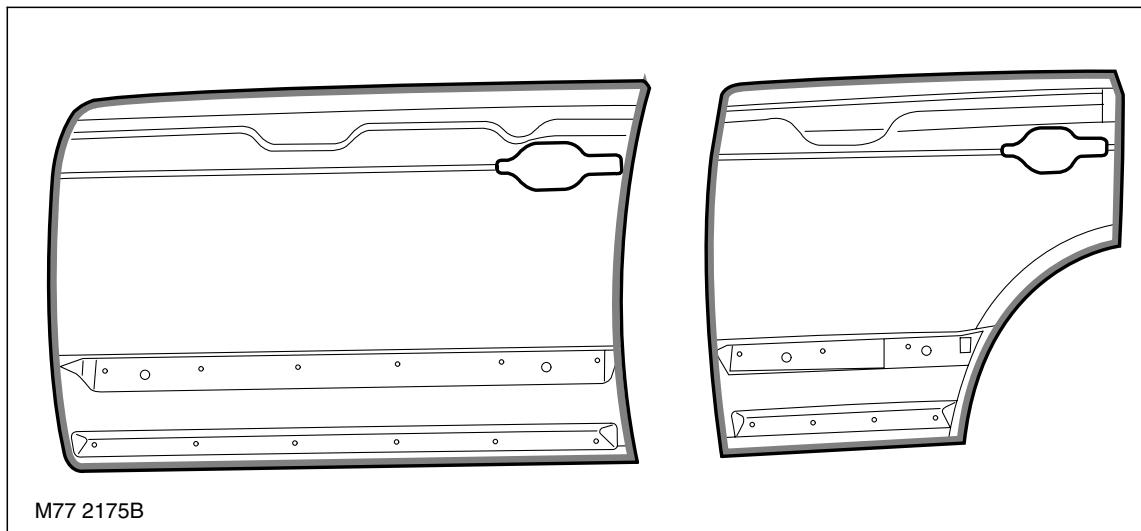
### ***Seam sealer on underside***



Seams symmetrically opposite to those shown are also treated. Ensure drain holes in doors are not blocked by sealant.



### Seam sealer on doors



Seams symmetrically opposite to those shown are also treated.

### Underbody sealer

Underfloor areas and sill outer panels are treated with a Plastisol PVC underbody sealer. This material is not suitable for re-treatment. When repairing areas of underbody sealer, strip the factory-applied underbody sealer back to a suitable break point. Ensure that a clean metal surface is exposed and that the edge of the existing sealer adheres soundly to the panel.

Apply new underbody sealer between primer and surfacer paint operations. Apply seam sealer as necessary before application of underbody sealer. Ensure that blanking plugs and grommets in the floor pan (except those used for wax injection) are fitted before underbody sealer application. Refit any heat-fusible plugs which have been disturbed in repair with the aid of a hot air blower, or replace with rubber grommets.

**CAUTION:** Ensure that suspension units, wheels, tyres, power unit, driveshafts, exhaust and brakes (including all mounting points) are shielded prior to application of fresh underbody sealer.

### Precautions during body repairs and handling

Take care when handling the vehicle in the workshop. Underbody sealers, seam sealers, underbody wax and body panels may be damaged if the vehicle is carelessly lifted.

### Proprietary anti-corrosion treatments

The application of proprietary anti-corrosion treatments in addition to the factory-applied treatment could invalidate the Corrosion Warranty and should be discouraged. This does not apply to approved, compatible, preservative waxes which may be applied on top of existing coatings.

### Fitting approved accessories

When fitting accessories ensure that the vehicle's corrosion protection is not affected, either by breaking the protective coating or by introducing a moisture trap.

Do not screw self-tapping screws directly into body panels. Fit suitable plastic inserts to the panel beforehand. Always ensure that the edges of holes drilled into panels, chassis members and other body parts are protected with a suitable zinc rich or acid etch primer, and follow with a protective wax coating brushed onto the surrounding area.

Do not attach painted metal surfaces of any accessory directly to the vehicle's bodywork unless suitably protected. Where metal faces are bolted together always interpose a suitable interface material such as weldable zinc rich primer, extruded strip, or zinc tape.

# CORROSION PREVENTION AND SEALING

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## Steam cleaning and dewaxing

Due to the high temperatures generated by steam cleaning equipment, there is a risk that certain trim components could be damaged and some adhesives and corrosion prevention materials softened or liquified.

Adjust the equipment so that the nozzle temperature does not exceed 90°C (194°F). Take care not to allow the steam jet to dwell on one area, and keep the nozzle at least 300mm from panel surfaces.

DO NOT remove wax or lacquer from underbody or underbonnet areas during repairs. Should it be necessary to steam clean these areas, apply a new coating of wax or underbody protection as soon as possible.

## Inspections during maintenance servicing

It is a requirement of the Corrosion Warranty that the vehicle body is checked for corrosion by an authorised Land Rover Dealer at least once a year, to ensure that the factory-applied protection remains effective.

Service Job Sheets include the following operations to check bodywork for corrosion:

- With the vehicle on a lift, carry out visual check of underbody sealer for damage.
- With the vehicle lowered, inspect exterior paintwork for damage and body panels for corrosion.

The vehicle must be washed and free from deposits prior to inspection. It is part of the owner's responsibility to ensure that the vehicle is kept free of accumulations of mud which could accelerate the onset of corrosion. It will be necessary for the vehicle to be washed by the Dealer prior to inspection of bodywork if the customer has offered the vehicle in a dirty condition. Particular attention should be paid to areas where access is difficult.

The checks described above are intended to be visual only. It is not intended that the operator should remove trim panels, finishers, rubbing strips or sound-deadening materials when checking the vehicle for corrosion and paint damage.

With the vehicle on a lift, and using an inspection or spot lamp, visually check for the following:

- Corrosion damage and damaged paintwork, condition of underbody sealer on front and rear lower panels, sills and wheel arches.
- Damage to underbody sealer. Corrosion in areas adjacent to suspension mountings and fuel tank fixings.

The presence of small blisters in underbody sealer is acceptable, providing they do not expose bare metal.

Pay special attention to signs of damage caused to panels or corrosion protection material by incorrect jack positioning.

**CAUTION:** It is essential to follow the correct jacking and lifting procedures.

With the vehicle lowered, visually check for evidence of damage and corrosion on all visible painted areas, in particular the following:

- Front edge of bonnet.
- Visible flanges in engine compartment.
- Lower body and door panels.

Rectify any bodywork damage or evidence of corrosion found during inspection as soon as is practicable, both to minimise the extent of the damage and to ensure the long term effectiveness of the factory-applied corrosion prevention treatment. Where the cost of rectification work is the owner's responsibility, the Dealer must advise the owner and endorse the relevant documentation accordingly.

Where corrosion has become evident and is emanating from beneath a removable component (e.g. trim panel, window glass, seat etc.), remove the component as required to permit effective rectification.

## Underbody protection repairs

Whenever body repairs are carried out, ensure that full sealing and corrosion protection treatments are reinstated. This applies both to the damaged areas and also to areas where protection has been indirectly impaired, as a result either of accident damage or repair operations.

Remove corrosion protection from the damaged area before straightening or panel beating. This applies in particular to panels coated with wax, PVC underbody sealer, sound deadening pads etc.

**warn :** DO NOT use oxy-acetylene gas equipment to remove corrosion prevention materials. Large volumes of fumes and gases are liberated by these materials when they burn.



## CORROSION PREVENTION AND SEALING

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Equipment for the removal of tough anti-corrosion sealers offers varying degrees of speed and effectiveness. The compressed air-operated scraper (NOT an air chisel) offers a relatively quiet mechanical method using an extremely rapid reciprocating action. Move the operating end of the tool along the work surface to remove the material.

The most common method of removal is by means of a hot air blower with integral scraper.

High temperatures can be generated with this equipment which may cause fumes. Take care during its use.

Another tool, and one of the most efficient methods, is the rapid-cutting 'hot knife'. This tool uses a wide blade and is quick and versatile, able to be used easily in profiled sections where access is otherwise difficult.

Use the following procedure when repairing underbody coatings:

- 1 Remove existing underbody coatings.
- 2 After panel repair, clean the affected area with a solvent wipe, and treat bare metal with an etch phosphate material.
- 3 Re-prime the affected area.

**CAUTION:** DO NOT, under any circumstances, apply underbody sealer directly to bare metal surfaces.

- Replace all heat-fusible plugs which have been disturbed. Where such plugs are not available use rubber grommets of equivalent size, ensuring that they are embedded in sealer.
- Mask off all mounting faces from which mechanical components, hoses and pipe clips, have been removed. Underbody sealer must be applied **before** such components are refitted.
- Brush sealer into all exposed seams.
- Spray the affected area with an approved service underbody sealer.
- Remove masking from component mounting faces, and touch-in where necessary. Allow adequate drying time before applying underbody wax.

After refitting mechanical components, including hoses and pipes and other fixtures, mask off the brake discs and apply a coat of approved underbody wax.

*NOTE: Where repairs include the application of finish paint coats in the areas requiring underbody wax, carry out paint operations before applying wax.*

## CORROSION PREVENTION AND SEALING

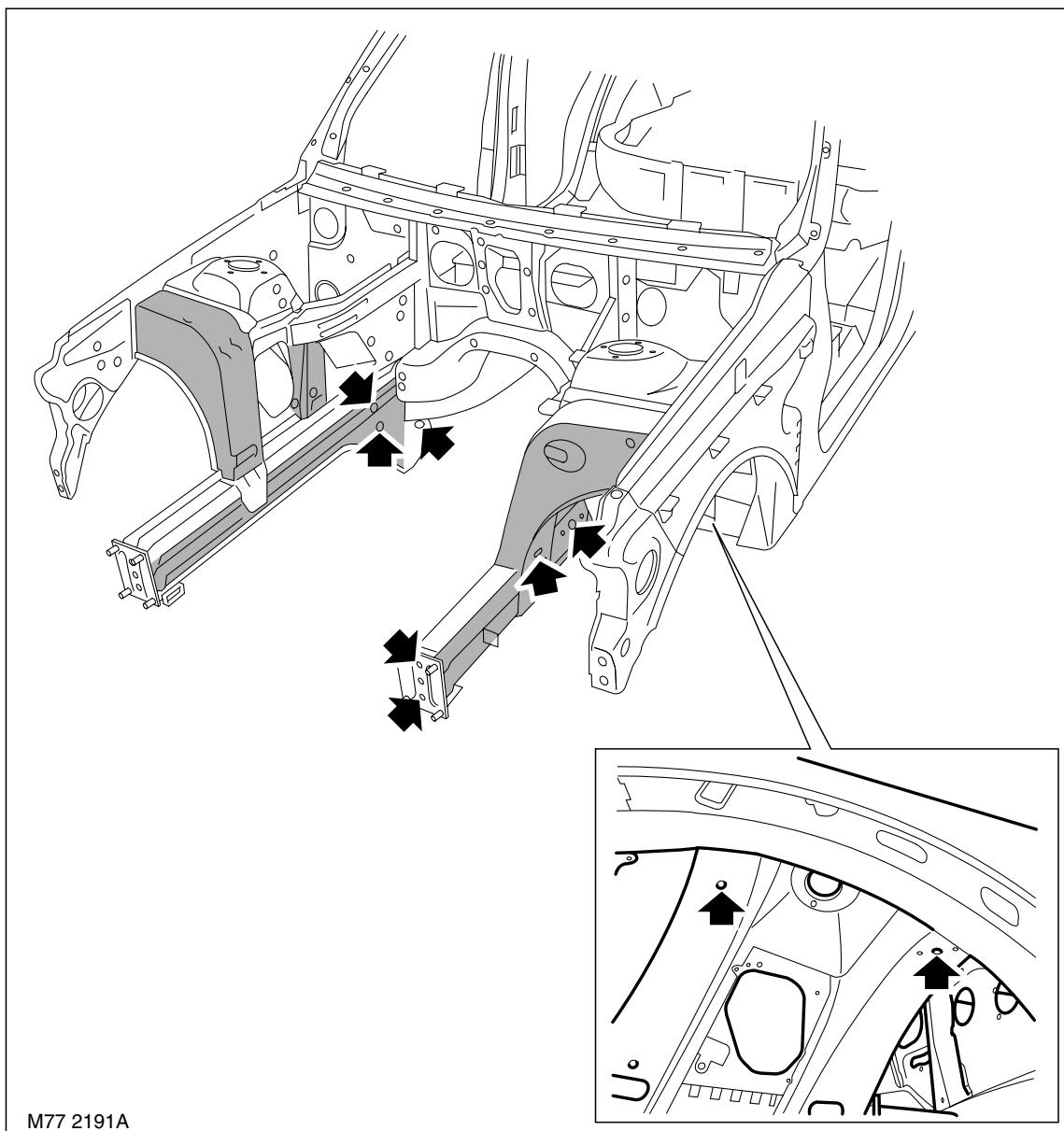
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## CORROSION PREVENTION AND SEALING

### Cavity wax application areas and injection holes

Front end

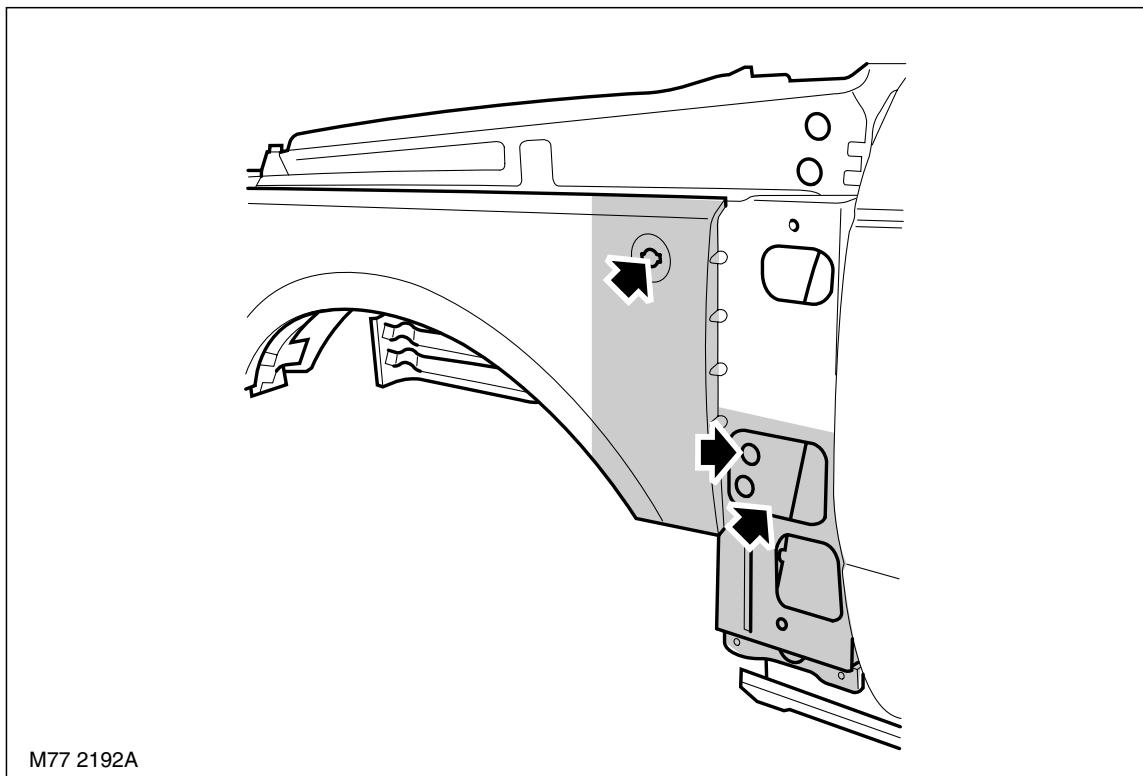


Arrows indicate injection points. All areas symmetrically opposite to those shown are also treated.

## CORROSION PREVENTION AND SEALING

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### Front wing

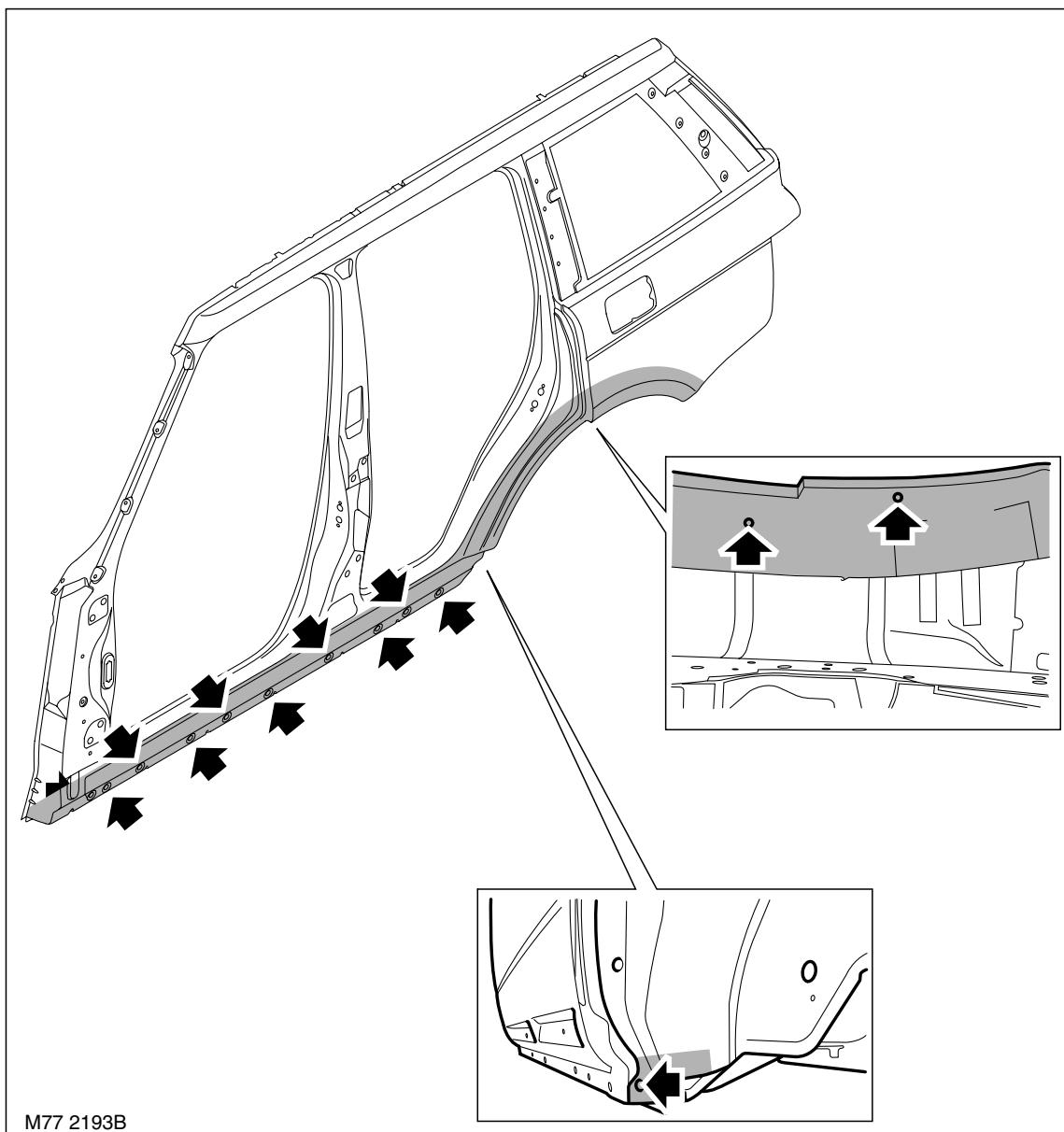


*Arrows indicate injection points. All areas symmetrically opposite to those shown are also treated.*



## CORROSION PREVENTION AND SEALING

### Body side

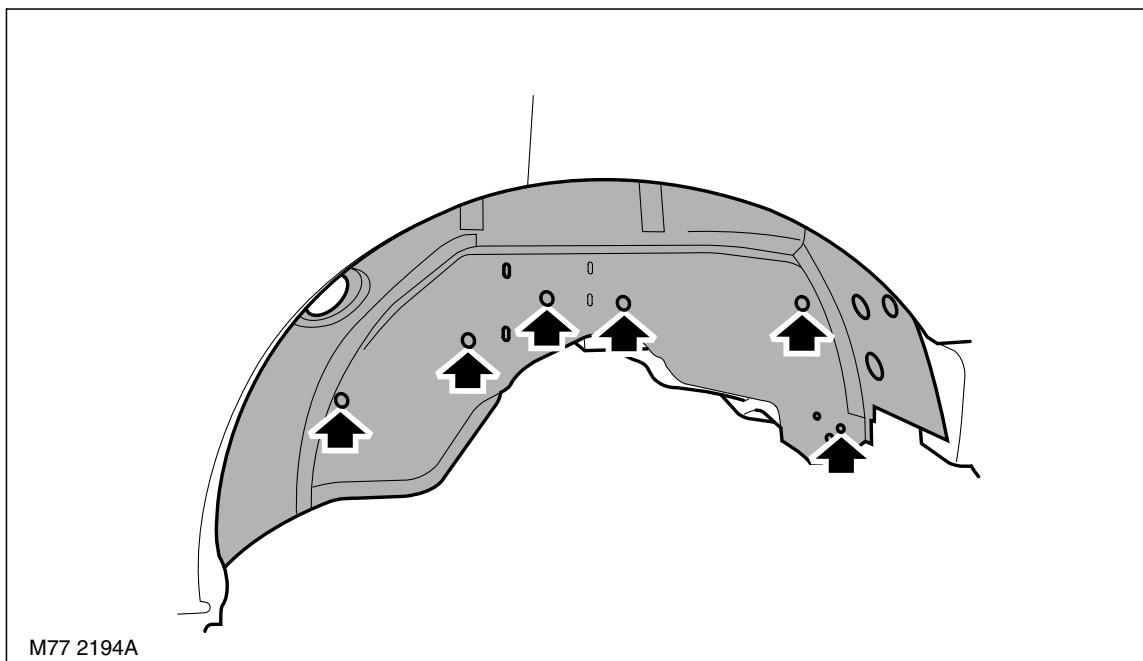


Arrows indicate injection points. All areas symmetrically opposite to those shown are also treated.

## CORROSION PREVENTION AND SEALING

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Rear wheel arch

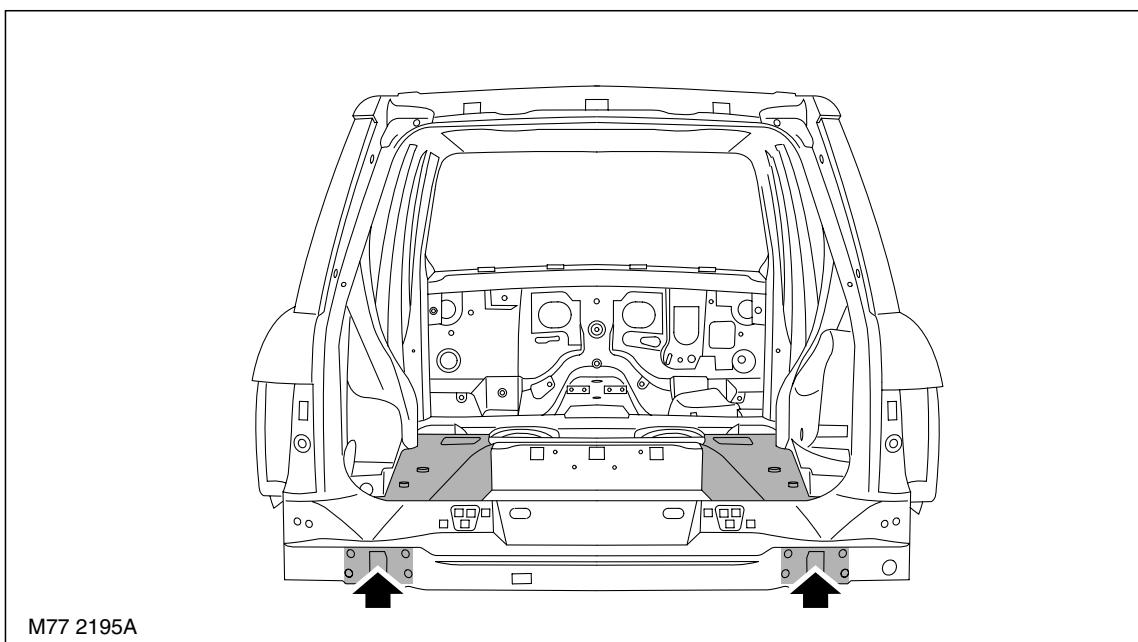


*Arrows indicate injection points. All areas symmetrically opposite to those shown are also treated.*



## CORROSION PREVENTION AND SEALING

### Rear end



M77 2195A

*Arrows indicate injection points. All areas symmetrically opposite to those shown are also treated.*

# CORROSION PREVENTION AND SEALING

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## Cavity wax

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After repairs, always re-treat these areas with an approved cavity wax. In addition, treat all interior surfaces which have been disturbed during repairs whether they have been treated in production or not. This includes all box members, cavities and door interiors. It is permissible to drill extra holes for access where necessary, provided these are not positioned in load-bearing members. Ensure that such holes are treated with a suitable zinc rich primer, brushed with wax and then sealed with a rubber grommet.

Before wax injection, ensure that the cavity to be treated is free from any contamination or foreign matter. Where necessary, clear out any debris using compressed air.

Ensure that cavity wax is applied AFTER the final paint process and BEFORE refitting any trim components.

During application, ensure that the wax covers all flange and seam areas and that it is adequately applied to all repaired areas of both new and existing panels.

It should be noted that new panel assemblies and complete body shells are supplied without wax injection treatment. Ensure that such treatment is carried out after repairs.

Effective cavity wax protection is vital. Always observe the following points:

- Complete all paint refinish operations before wax application.
- Clean body panel areas and blow-clean cavities if necessary, before treatment.
- Maintain a temperature of 18°C during application and drying.
- Check the spray pattern of injection equipment.
- Mask off all areas not to be wax coated and which could be contaminated by wax overspray.
- Remove body fixings, such as seat belt retractors, if contamination is at all likely.
- Move door glasses to fully closed position before treating door interiors.
- Treat body areas normally covered by trim before refitting items.
- Check that body and door drain holes are clear after the protective wax has dried.
- Keep all equipment clean, especially wax injection nozzles.



## Water Leaks

Where water leakage is involved, always adopt a logical approach to the problem using a combination of skill, experience and intuition. Do not reach a conclusion based only on visual evidence, such as assuming that a wet footwell is caused by a leak emanating from the windscreen. It will often be found that the source of the leak is elsewhere. Use of the correct procedure will increase the chance of locating a leak, however obscure it may seem.

### **Tools and equipment**

The following tools and equipment are recommended for the purpose of detection and rectification of water leaks:

- 1 Garden sprayer (hand-operated).
- 2 Wet/dry vacuum cleaner.
- 3 Dry, absorbent cloths.
- 4 Battery torch.
- 5 Small mirror.
- 6 Weatherstrip locating tool.
- 7 Trim panel remover.
- 8 Small wooden or plastic wedges.
- 9 Dry compressed air supply.
- 10 Hot air blower.
- 11 Sealer applicators.
- 12 Ultrasonic leak detector.

During leak detection, the vehicle should be considered in three basic sections:

- The front interior space.
- The rear passenger space.
- The loadspace or boot.

### **Testing**

From the information supplied by the customer it should be possible for the bodyshop operator to locate the starting point from which the leak may be detected. After the area of the leak has been identified, find the actual point of entry into the vehicle.

A simple and effective means in the first instance is an ordinary garden spray with provision for pressure and jet adjustment, which will allow water to be directed in a jet or turned into a fine spray. Use a mirror and a battery-powered torch (NOT a mains voltage inspection lamp) to see into dark corners.

The sequence of testing is particularly important. Start at the lowest point and work slowly upwards, to avoid testing in one area while masking the leak in another. For example, if testing started at the level of the windscreen, any water cascading into the plenum chamber could leak through a bulkhead grommet and into the footwells. Even at this point it could still be wrongly assumed that the windscreen seal was at fault.

Another important part of identifying a water leak is by visual examination of door aperture seals, grommets and weatherstrips for damage, deterioration or misalignment, together with the fit of the door itself against the seals.

### **Sealing**

When the point of the leak has been detected, it will then be necessary to rectify it using the following procedure:

- 1 Renew all door aperture seals and weatherstrips which have suffered damage, misalignment or deterioration.
- 2 Check all body seals to ensure that they are correctly located on their mounting flanges/faces using a lipper tool if necessary.
- 3 Dry out body seams to be treated using compressed air and/or a hot air blower as necessary.
- 4 Apply sealant on the outside of the joint wherever possible to ensure the exclusion of water.
- 5 When rectifying leaks between a screen glass and its weatherstrip (or in the case of direct glazing, between the glass and bodywork), avoid removing the glass if possible. Apply the approved material at the appropriate location (i.e. glass to weatherstrip or glass to body).

## CORROSION PREVENTION AND SEALING

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## Panel Preparation

### General

Replacement panels are supplied with a cathodic primer coating as part of the panel protection and in compliance with the vehicle's Corrosion Warranty, where applicable. **DO NOT remove the primer before paint refinishing. In the event of localized surface damage or imperfections, ensure that only the minimum of primer is removed during rectification work for effective repair.**

Rectify damage as far as possible by panel beating or straightening. To remove corrosion or paint runs on outer surfaces, abrade the primer coat in the affected area as necessary using the following procedure:

- 1 Clean the panel using a solvent wipe.
- 2 Treat exposed areas of metal with an etch phosphate process.
- 3 Re-treat the affected area using either a separate acid-etch primer and two-pack surfacer, or an integrated etch primer/filler.

### Panel Preparation

The following procedures should be applied when repairing panels.

#### *Welded panels*

- 1 Remove primer from the immediate vicinity of new and existing panel flanges, cleaning to bright metal finish.
- 2 On joints to be spot welded, apply weld-through zinc rich primer to joint faces of both flanges. Make spot welds while primer is still wet or according to the manufacturer's instructions.
- 3 Dress accessible weld joints.
- 4 Clean panel using solvent wipe.
- 5 Treat bare metal with an etch phosphate process.
- 6 Re-treat repaired areas.

#### *Sectioned panels*

When replacing part or sectioned panels, the basic procedure is the same as for welded panels described above, with the following variations:

- 1 Remove primer from both new and existing joint faces, cleaning to a bright metal finish.
- 2 Where an overlap joint with the existing panel is to be spot welded, apply weld-through, zinc rich primer to both joint faces and spot weld while the primer is still wet, or according to the manufacturer's instructions.
- 3 MIG weld butt joints where applicable.
- 4 Clean the panel with a solvent wipe.
- 5 Treat bare metal areas using an etch phosphate process.
- 6 Re-prime affected areas as necessary as for rectifying transit damage.
- 7 Treat the inner faces of lap or butt joints with a suitable cavity wax.

#### *Clinched panels*

- 1 Abrade primer on new and existing panel joint faces, and clean using a solvent wipe.
- 2 Apply metal-to-metal adhesive where applicable.
- 3 Where joints are to be spot welded, apply suitable weld-through, zinc rich primer to weld areas.
- 4 Where joints are to be MIG, arc or gas welded, apply zinc rich primer in adjacent areas **but leave the welded area untreated.**
- 5 To retain the panel while clinching the flanges, tack spot weld or plug weld as appropriate.
- 6 Clean the panel with a solvent wipe.
- 7 Treat bare metal areas with a suitable etch phosphate process.
- 8 Re-prime affected areas as necessary as for rectifying transit damage.

# PAINTING

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## Paint preparation

### Paint refinishing

The following process must be adhered to for paint refinishing operations.

- 1 Seal required exterior and interior seams with an approved seam sealer  
 , , .
- 2 Repair any damage to underbody sealers  
 , , **Structural adhesive.**
- 3 Apply a two-pack paint refinishing system
- 4 Apply cavity wax to all interior surfaces which have not received refinish paint

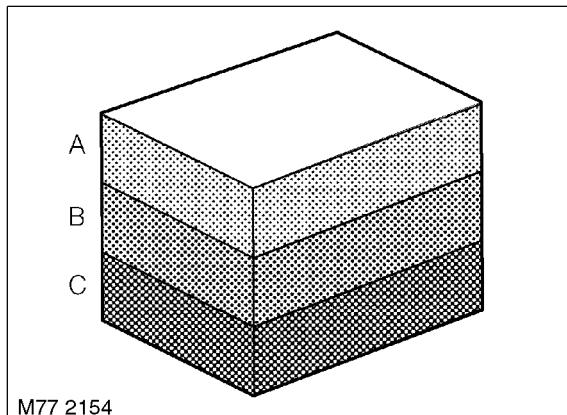
### Paint repairs

Before carrying out paintwork repairs, clean the vehicle thoroughly using either a steam cleaner or high-pressure washer.

Wash locally repaired areas using a mild water-mixable detergent and wipe them clean with solvent, immediately before paint application.

Ensure that damaged paintwork which has led to exposed metal is abraded until the metal is clean, extending beyond the area of the original damage. Treat the bare metal with an etch phosphate to remove all traces of rust and to provide a key for new paint coats. Re-treat the affected area using either a separate acid-etch primer and two-pack surfacer or an integrated etch primer/filler, and follow with a two-pack paint system. Treat those surfaces not receiving paint using an approved cavity wax, following paint operations.

***WARNING: When preparing bumpers for painting, ensure the PDC sensors are not damaged. Only remove the clear coat if possible. When painting the PDC sensors, do not apply excessive layers of paint as this can hinder the performance of the sensors.***



- a Two-pack top coat
- b Two-pack primer filler and etch primer
- c Etch phosphate

**CAUTION: When heat curing paint repairs, the temperature must not exceed 65°C (149°F). Temperatures above this figure will cause the reflective elements within the headlamps and tail lamps to distort and may damage other components.**

# PAINTING

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**Controls - heater (ECU)**

» **80.10.02**

On high line models the automatic temperature control (ATC) ECU is an integral part of the heater controls.

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

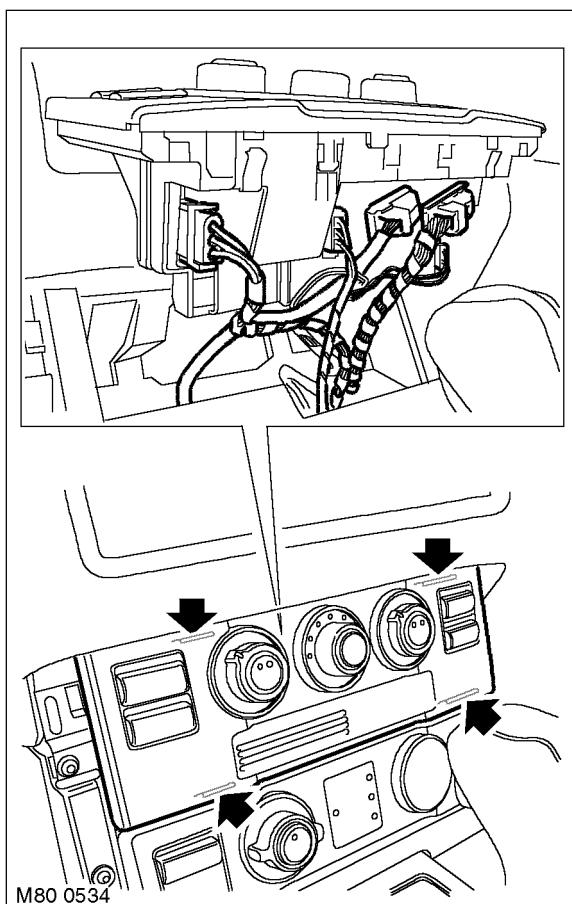
**Remove**

1. Remove LH centre console footwell closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**
2. Remove RH centre console footwell closing panel.

**Refit**

1. Position heater controls to carrier and connect multiplugs.
2. Fit and secure heater controls to carrier.
3. Fit centre console footwell closing panels.

☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**



3. Carefully release 4 clips securing heater controls to carrier, disconnect 5 multiplugs and remove.

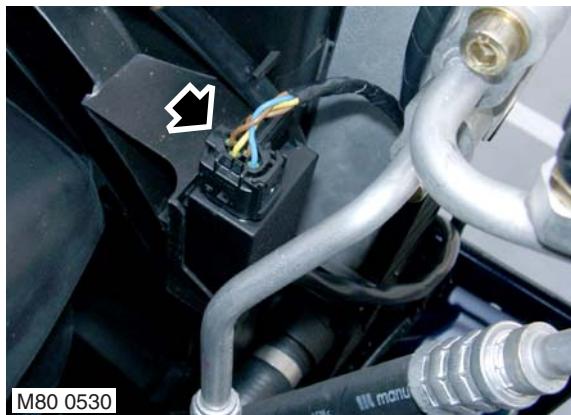
# HEATING AND VENTILATION

## Sensor - pollution detection

» 80.10.09

### Remove

1. Disconnect battery earth lead.
2. Remove engine cover.  
 **ENGINE - Td6, REPAIRS, Cover - engine access.**



3. Disconnect multiplug from sensor.
4. Release and remove pollution sensor.

### Refit

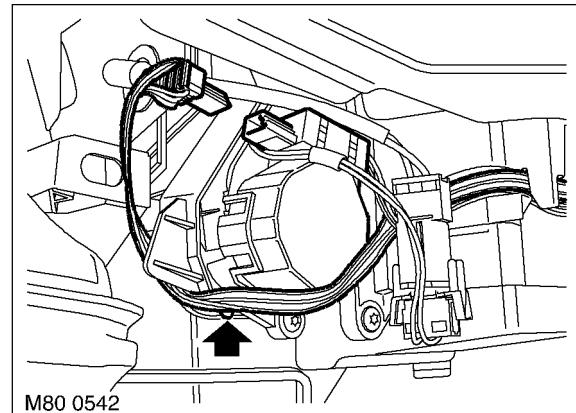
1. Fit pollution sensor and connect multiplug.
2. Fit engine cover.  
 **ENGINE - Td6, REPAIRS, Cover - engine access.**
3. Connect battery earth lead.

## Motor - windscreen air vent

» 80.10.36

### Remove

1. **LHD models:** Remove glove box.  
 **INTERIOR FITTINGS, REPAIRS, Glove box.**
2. **RHD models:** Remove RH footwell closing panel.  
 **INTERIOR FITTINGS, REPAIRS, Closing panel - passenger side.**



3. Disconnect multiplug from motor, remove motor from heating assembly.

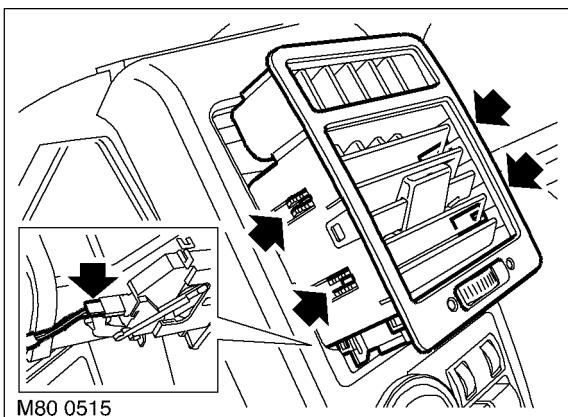
### Refit

1. Fit motor to heating assembly, connect multiplug.
2. **LHD models:** Fit glove box.  
 **INTERIOR FITTINGS, REPAIRS, Glove box.**
3. **RHD models:** Fit RH footwell closing panel.  
 **INTERIOR FITTINGS, REPAIRS, Closing panel - passenger side.**

**Fresh air vent - face level**

» **80.15.04**

**Remove**



1. Individually release 4 internal clips securing air vent to finisher, apply an even outward pressure until the last clip is released. Remove air vent from finisher.
2. Disconnect air vent multiplug and remove vent from vehicle.

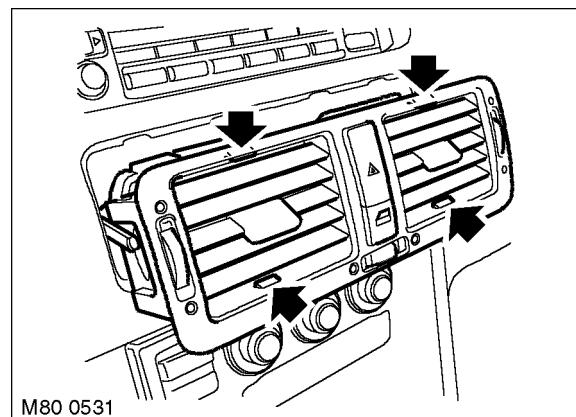
**Refit**

1. Connect multiplug.
2. Position air vent to finisher, align, enter and secure clips.

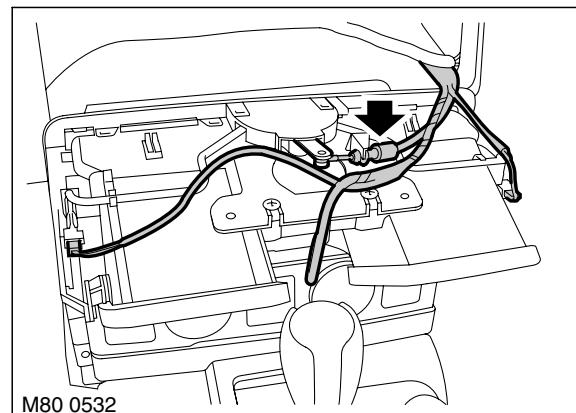
**Ventilator(s) - centre**

» **80.15.24**

**Remove**



1. Individually release 4 internal clips securing air vent to finisher, apply an even outward pressure until the last clip is released.



2. Disconnect multiplugs and release harness from vent.
3. Release air distribution cable from ratchet assembly and remove vent.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
4. Remove hazard warning switch.

**Refit**

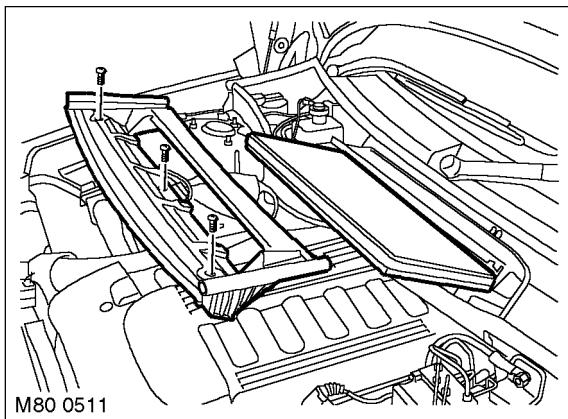
1. Fit hazard warning switch.
2. Position vent to fascia and secure cable.
3. Connect multiplugs and secure harness to vent.
4. Fit and secure air vent to fascia.

# HEATING AND VENTILATION

## Filter - fresh air intake

» **80.15.42**

### Remove



1. Remove 3 screws and remove plenum intake cover.
2. Lift flap and remove filter.

### Refit

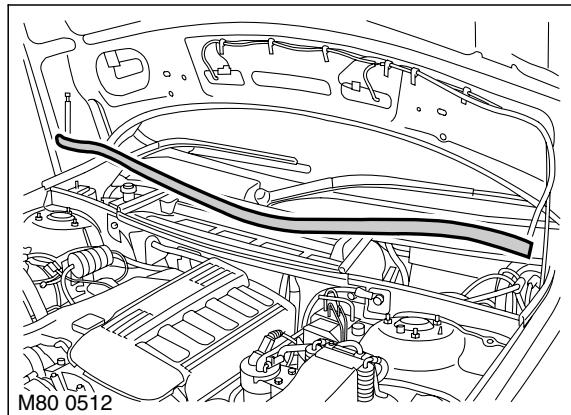
1. Clean plenum intake.
2. Fit new filter.
3. Fit cover and secure with screws.

## Plenum - air intake

» **80.15.62**

### Remove

1. Release bonnet support stays, raise and secure bonnet in upright position.
2. Disconnect battery earth lead.

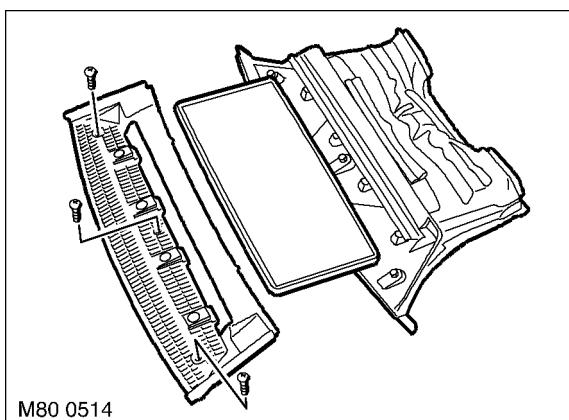


3. Remove bonnet sealing rubber from air intake moulding.



4. Release cover from positive cable.
5. Remove nut and disconnect positive cable from stud.
6. Remove 2 nuts securing plenum and remove air intake plenum assembly.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



7. Remove 3 screws securing air intake cover and remove cover.
8. Remove air filter.

#### Refit

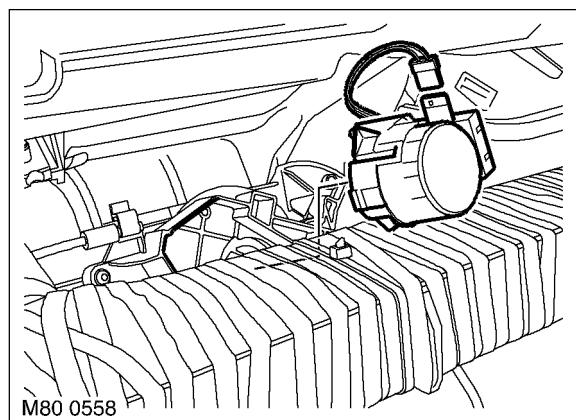
1. Fit air filter.
2. Fit plenum cover and secure with screws.
3. Fit plenum assembly and tighten nuts to 10 Nm (7 lbf.ft).
4. Fit positive cable to stud and tighten nut to 20 Nm (15 lbf.ft)
5. Fit cover.
6. Fit bonnet sealing rubber to air intake moulding.
7. Connect battery earth lead.
8. Reconnect support stays and close bonnet.

## Heater unit/HEVAC - remove for access & refit

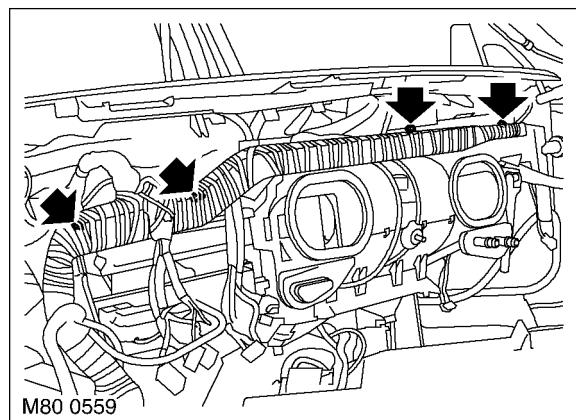
→ 80.20.01.99

#### Remove

1. Remove glove box assembly.  
 **INTERIOR FITTINGS, REPAIRS, Glove box.**  
*Glove box assembly removal is necessary to access fascia harness retaining screws.*
2. Remove fascia.  
 **INTERIOR FITTINGS, REPAIRS, Fascia - remove for access & refit.**

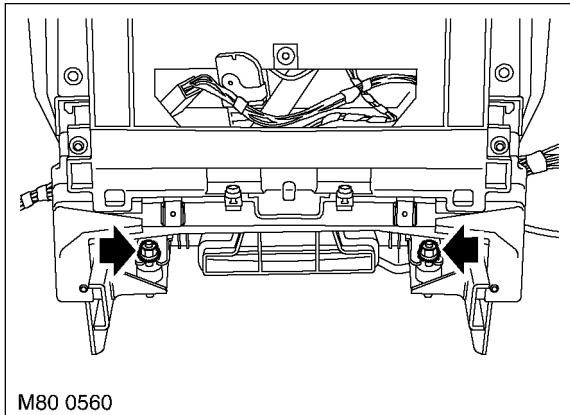


3. Disconnect multiplug and remove air blend motor.



4. Remove Torx screws and nuts from rear of fascia harness tray. Release clips to allow movement of harness for access. **Do not cut harness tray cable ties.**

## HEATING AND VENTILATION



5. Remove 2 nuts securing HEVAC assembly to fascia carrier.
6. Note HEVAC harness route prior to removal.
7. With assistance, withdraw HEVAC assembly from fascia.

### Refit

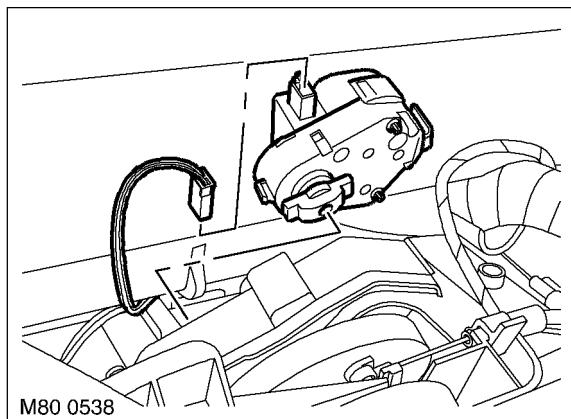
1. Position HEVAC assembly to fascia.
2. Check for possible foul conditions on HEVAC harness, cables and rods.
3. Fit and tighten nuts securing HEVAC assembly to fascia.
4. Position and secure harness tray to fascia.
5. Fit motor to heating assembly, connect multiplug.
6. Fit fascia.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - remove for access & refit.**
7. Fit glove box assembly.  
☞ **INTERIOR FITTINGS, REPAIRS, Glove box.**

### Motor assembly - select (air blend) control

☞ **80.20.04**

#### Remove

1. Remove cassette/CD unit.  
☞ **NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Cassette/CD unit.**



2. Disconnect multiplug from motor, remove motor from heating assembly.

#### Refit

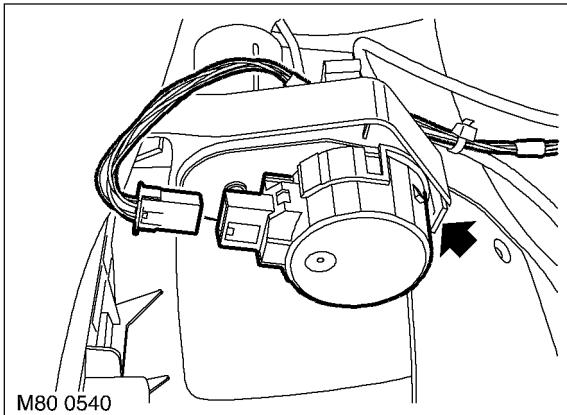
1. Fit motor to heating assembly, connect multiplug.
2. Fit cassette/CD unit.  
☞ **NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Cassette/CD unit.**

## Motor assembly - fresh & recirculated air control - LH

» 80.20.10

### Remove

1. **RHD models:** Remove glove box.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Glove box.**
2. **LHD models:** Remove closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**



3. From underside of fascia, disconnect multiplug from motor, remove motor from heating assembly.

### Refit

1. Fit motor to heating assembly, connect multiplug.
2. **RHD models:** Fit glove box.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Glove box.**
3. **LHD models:** Fit closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**

## Motor assembly - fresh & recirculated air control - RH

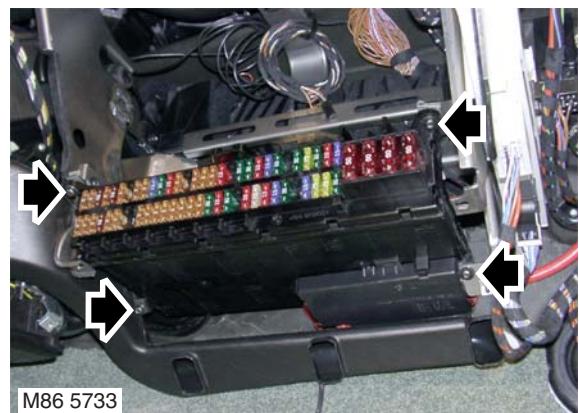
» 80.20.11

### Remove

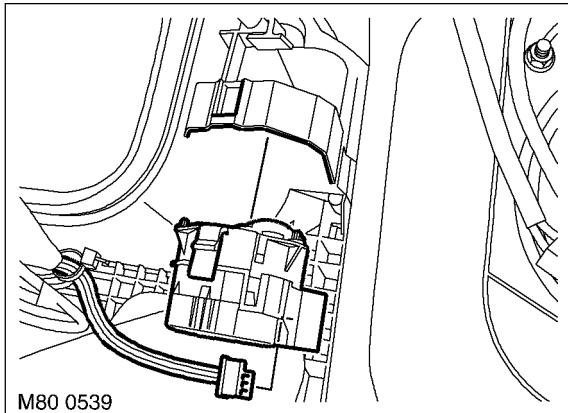
1. **LHD models:** Remove glove box.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Glove box.**
2. **RHD models:** Remove closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**



3. Noting fitted position, disconnect 8 multiplugs from fuse box.



4. Remove 4 Torx screws securing the fuse box, position the fuse box aside.



5. Disconnect multiplug from motor, remove motor from heating assembly.

## Refit

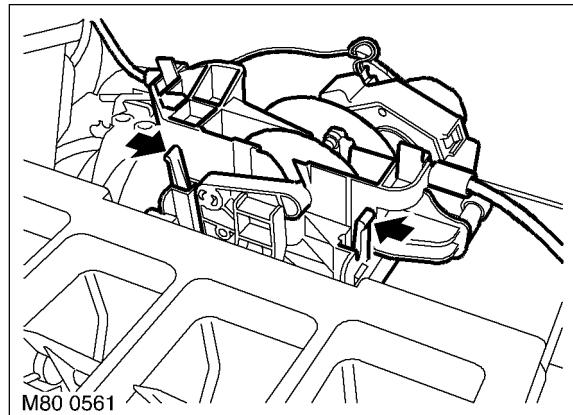
1. Fit motor to heating assembly, connect multiplug.
2. Position fuse box, secure with screws.
3. Connect multiplugs to fuse box.
4. **LHD models:** Fit glove box.  
    ☞ **INTERIOR FITTINGS, REPAIRS,  
Glove box.**
5. **RHD models:** Fit closing panel.  
    ☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**

## Motor - fan

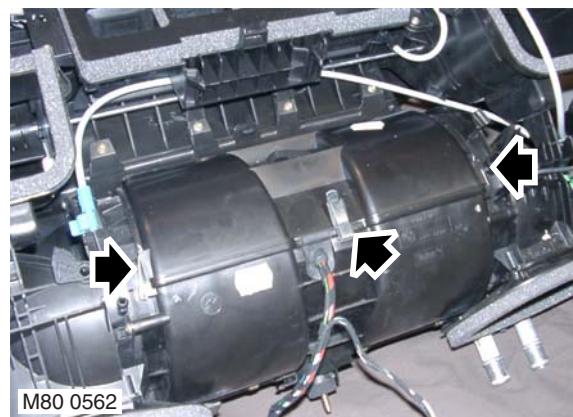
☞ **80.20.15**

### Remove

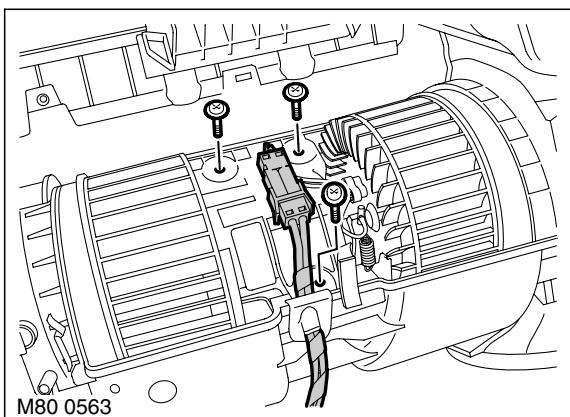
1. Remove HEVAC assembly.  
    ☞ **HEATING AND VENTILATION,  
REPAIRS, Heater unit/HEVAC - remove for  
access & refit.**



2. Release air blend assembly and position aside.



3. Release 3 clips and remove heater fan cover.



4. Remove 3 Torx screws securing fan assembly to heater.
5. Disconnect multiplug and remove fan assembly.

#### Refit

1. Position fan assembly to heater and connect multiplug.
2. Fit and tighten fan assembly Torx screws.
3. Fit and secure fan cover.
4. Fit and secure air blend assembly.
5. Fit HEVAC assembly to fascia.

 **HEATING AND VENTILATION,**

**REPAIRS, Heater unit/HEVAC - remove for access & refit.**

## Resistor unit - fan motor - LHD

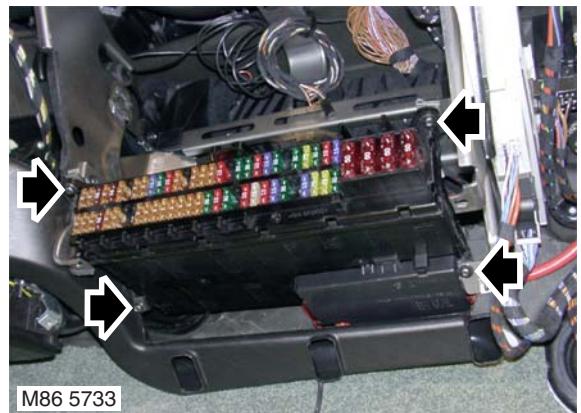
### 80.20.17

#### Remove

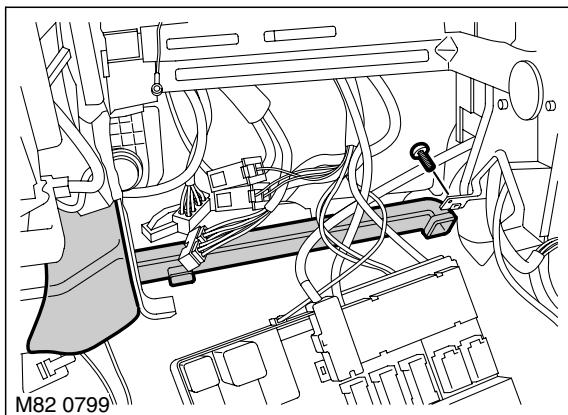
1. Disconnect battery earth lead.
  2. Remove glove box.
-  **INTERIOR FITTINGS, REPAIRS, Glove box.**



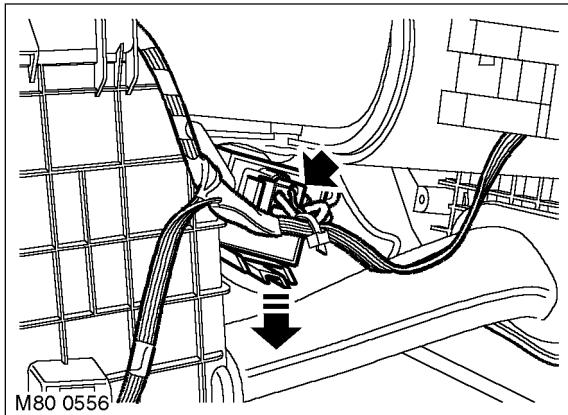
3. Noting fitted position, disconnect 8 multiplugs from fuse box.



4. Remove 4 Torx screws securing the fuse box, position the fuse box aside.



5. Remove screw securing footwell heating duct to carrier. Remove duct.



6. Disconnect multiplug from resistor.
7. Release clip securing resistor to heater assembly, remove resistor.

## Refit

1. Position resistor to heater assembly, locate on dowels and secure.
2. Connect multiplug to resistor.
3. Position and secure footwell heating duct.
4. Position fuse box, secure with screws.
5. Connect multiplugs to fuse box.
6. Fit glove box.

**INTERIOR FITTINGS, REPAIRS,  
Glove box.**

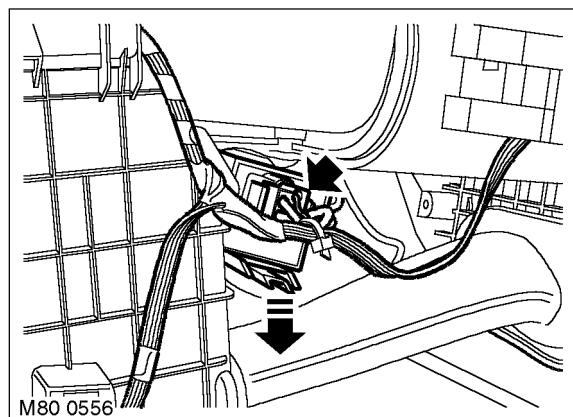
7. Connect battery earth lead.

## Resistor unit - fan motor - RHD

### 80.20.17

#### Remove

1. Remove closing panel.  
 **INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**
2. Remove screw securing footwell heating duct, remove duct.



3. Disconnect multiplug from resistor.
4. Release clip securing resistor to heater assembly, remove resistor.

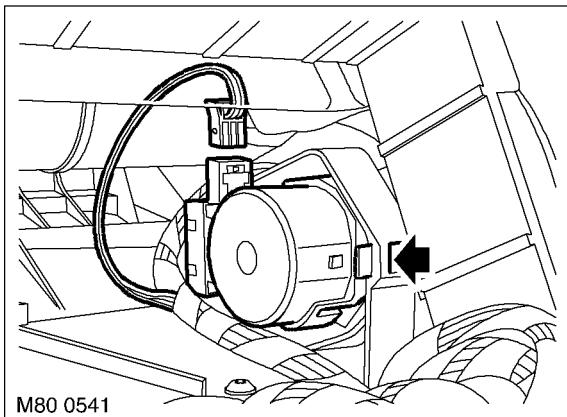
#### Refit

1. Position resistor to heater assembly, locate on dowels and secure.
2. Connect multiplug to resistor.
3. Position and secure footwell heating duct.
4. Fit closing panel.

**INTERIOR FITTINGS, REPAIRS,  
Closing panel - passenger side.**

**Motor - footwell air vent****» 80.20.20****Remove**

1. Remove heating control assembly.  
 **HEATING AND VENTILATION, REPAIRS, Controls - heater (ECU).**



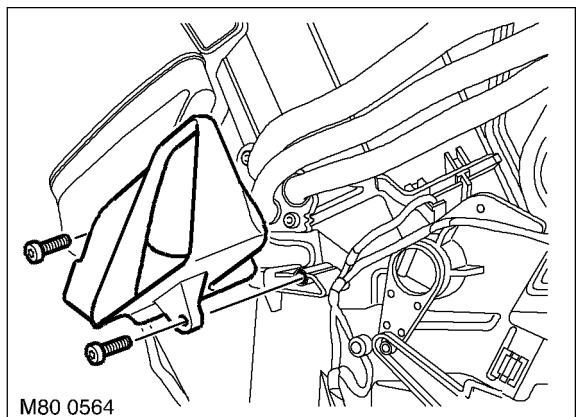
2. Disconnect multiplug from motor, remove motor from heating assembly.

**Refit**

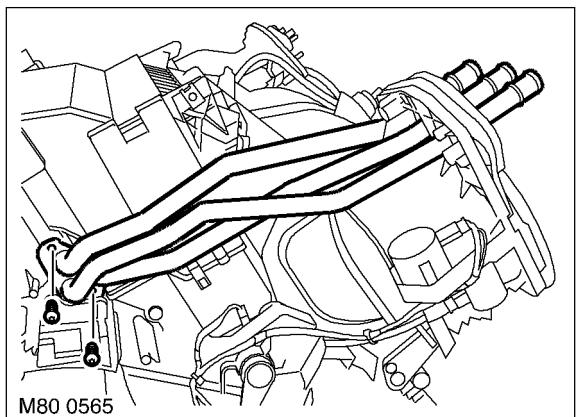
1. Fit motor to heating assembly, connect multiplug.
2. Fit heating control assembly.  
 **HEATING AND VENTILATION, REPAIRS, Controls - heater (ECU).**

**Heater matrix****» 80.20.29****Remove**

1. Remove HEVAC assembly.  
 **HEATING AND VENTILATION, REPAIRS, Heater unit/HEVAC - remove for access & refit.**
2. Invert HEVAC assembly.

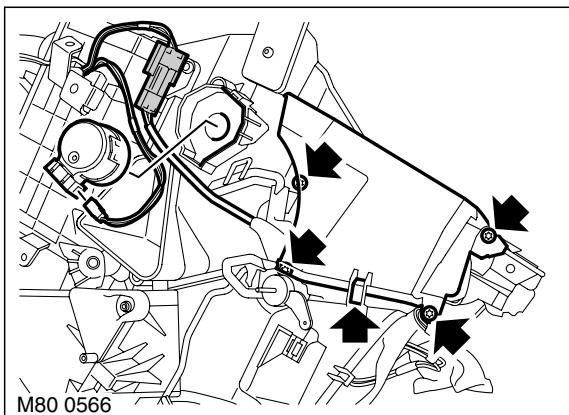


3. Remove 2 Torx screws securing LH heating duct elbow to HEVAC assembly. Remove elbow.

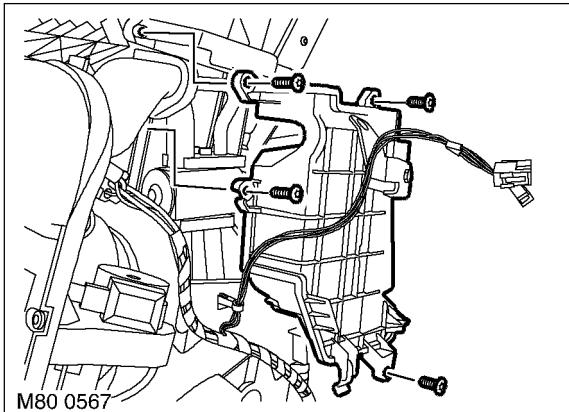


4. Remove 2 Torx screws securing heating pipes to matrix, release and remove pipes. Discard 'O' rings.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**

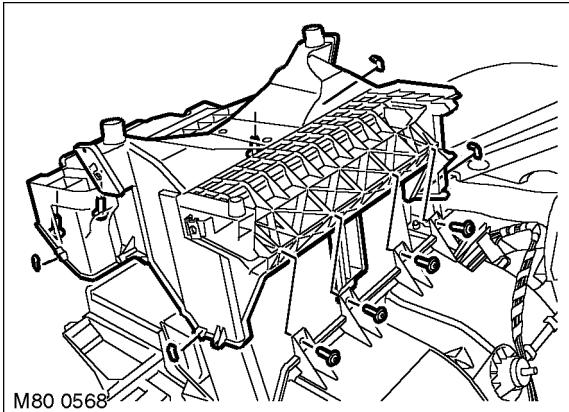
## HEATING AND VENTILATION



5. Remove 4 Torx screws and spring clip from RH heating duct elbow. Remove elbow.
6. Disconnect multiplug from evaporator sensor.
7. Disconnect multiplug and remove rear air vent motor.



8. Remove 4 Torx screws securing TXV cover and position aside.



9. Remove 7 Torx screws and 3 spring clips from lower HEVAC access panel.

10. Release 2 clips and remove access panel.
11. Remove matrix.

### Refit

1. Fit matrix to HEVAC assembly, position access panel, secure with clips and screws.
2. Fit and secure TXV cover.
3. Fit motor to heating assembly, connect multiplug.
4. Connect multiplug to evaporator sensor.
5. Position RH heating duct elbow to HEVAC assembly, secure with clip and screws.
6. Clean heating pipes and matrix mating faces.
7. Fit new 'O' rings to heating pipes, position pipes to matrix, fit bolts and tighten to 10 Nm (7 lbf.ft).
8. Position LH heating duct elbow to HEVAC assembly, secure with screws.
9. Fit HEVAC assembly to fascia.

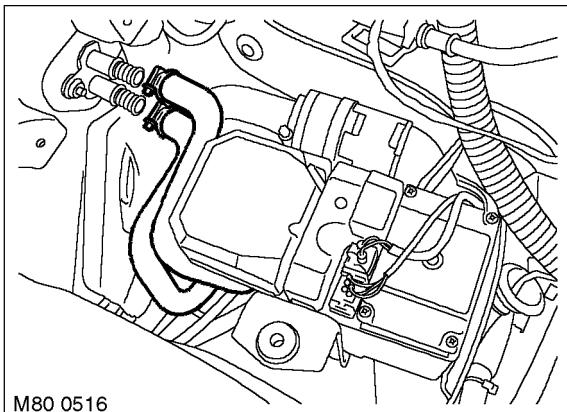
**HEATING AND VENTILATION, REPAIRS, Heater unit/HEVAC - remove for access & refit.**

## Fuel Burning Heater (FBH) - Td6

### 80.40.01

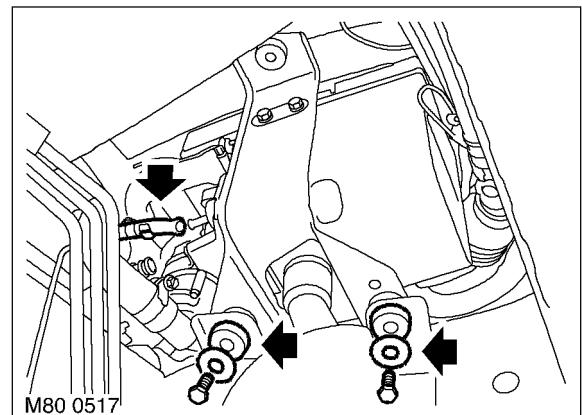
#### Remove

1. Remove battery carrier.  
 **CHARGING AND STARTING,  
REPAIRS, Carrier - battery.**
2. Remove front wheel arch liner.  
 **EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.**
3. Drain coolant.  
 **COOLING SYSTEM - Td6,  
ADJUSTMENT, Coolant - drain and refill.**
4. Position container to collect coolant spillage.

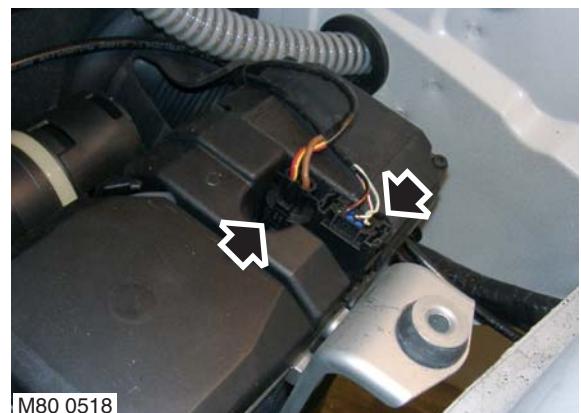


5. Release clips, disconnect coolant feed and return hoses from FBH.

**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**



6. Position an absorbent cloth, release clip and remove fuel feed hose from FBH. Plug connections and move aside.
7. Remove 2 bolts securing FBH to mounting bracket



8. Release FBH from mounting, disconnect multiplugs and move assembly aside.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
9. Remove 3 bolts securing FBH to mounting bracket.
10. Remove bracket.
11. Cut and discard cable tie securing intake filter to FBH. Release clip and remove intake assembly.

#### Refit

1. Fit intake assembly and secure clips.
2. Fit FBH mounting bracket and tighten bolts to 10 Nm (7 lbf.ft).
3. Connect multiplugs to FBH.
4. Align FBH exhaust to silencer, fit to mounting and tighten bolts to 10 Nm (7 lbf.ft).
5. Fit coolant hoses to FBH and secure with clips.
6. Fit fuel feed hose to FBH and secure with clip.

## HEATING AND VENTILATION

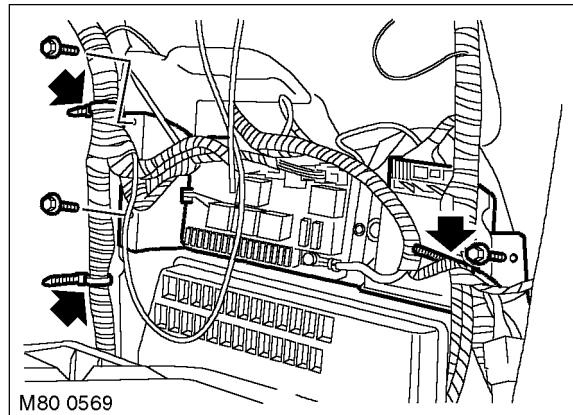
7. Refill cooling system.  
    ☞ **COOLING SYSTEM - Td6,  
ADJUSTMENT, Coolant - drain and refill.**
8. Fit front wheel arch liner.  
    ☞ **EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.**
9. Fit battery carrier.  
    ☞ **CHARGING AND STARTING,  
REPAIRS, Carrier - battery.**

### Receiver - fuel burning heater (FBH)

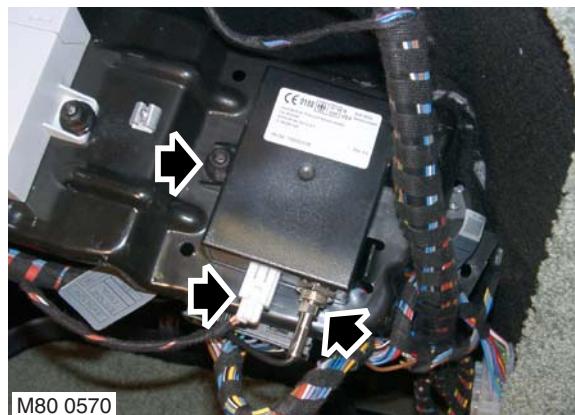
☞ **80.40.02**

#### Remove

1. Disconnect battery earth lead.
2. Remove access panel from load space RH trim casing.
3. Remove warning triangle.



4. Remove cable tie securing harness.
5. Release 2 straps securing harness.
6. Remove 3 bolts securing fuse box to body.



7. Loosen nut and disconnect coaxial cable.
8. Disconnect multiplug from receiver.
9. Remove nut securing receiver and remove receiver.

#### Refit

1. Fit receiver and secure with nut.
2. Connect multiplug to receiver.
3. Fit coaxial and tighten nut to 2 Nm (1.5 lbf.ft).
4. Align fuse box and tighten bolts to 6 Nm (4.4 lbf.ft).
5. Align and secure harness.

6. Fit and secure warning triangle.
7. Fit access panel.
8. Connect battery earth lead.

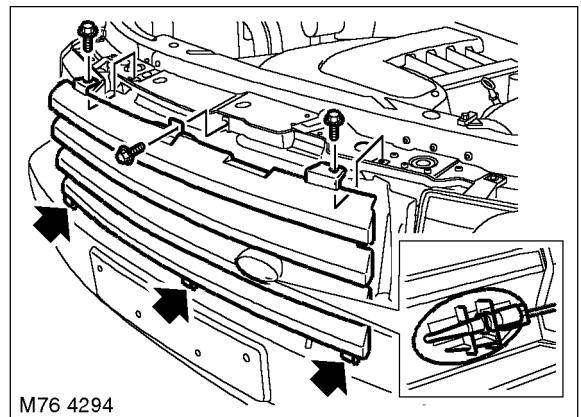
## Sensor - ambient temperature

» 80.40.31

### Remove

1. Remove front grille.

 EXTERIOR FITTINGS, REPAIRS,  
Front grille.



2. Release and remove temperature sensor.

### Refit

1. Fit and secure temperature sensor.

2. Fit front grille.

 EXTERIOR FITTINGS, REPAIRS,  
Front grille.

# HEATING AND VENTILATION

## Fuel pump - Fuel Burning Heater (FBH) Td6

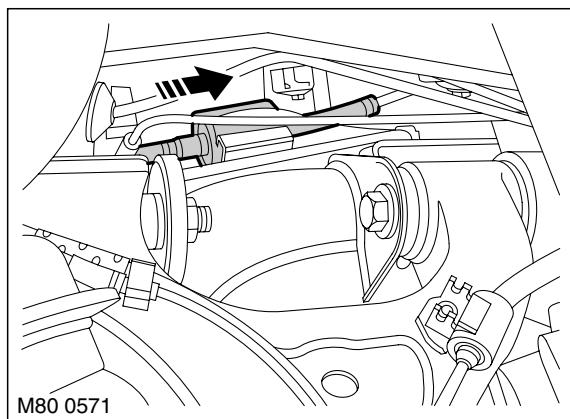
→ 80.40.40

### Remove

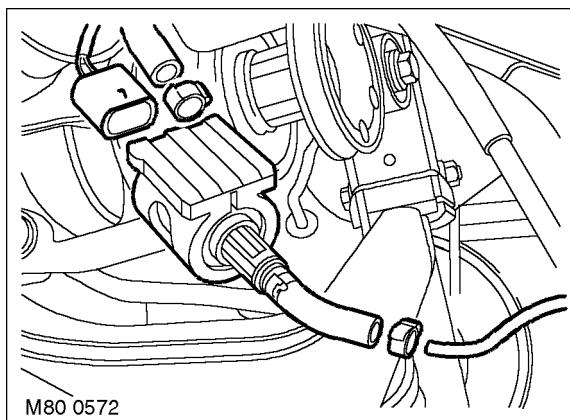
1. Disconnect battery earth lead.
2. Raise rear of vehicle, one side.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

3. Remove RH rear road wheel.



4. Release pump from rubber mounting.
5. Disconnect multiplug from fuel pump.



6. Release clips and remove fuel pipes from fuel pump.

**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.

7. Recover pump from vehicle and remove rubber mounting.

### Refit

1. Clean fuel hose connections.
2. Fit rubber mounting to pump.
3. Position fuel pipes to pump and secure with clips.
4. Connect multiplug to fuel pump.
5. Fit pump assembly to mounting bracket.
6. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
7. Lower vehicle.
8. Connect battery earth lead.

## Refrigerant recovery - recycling and recharge

» 82.30.02

### Refrigerant recovery

1. Recover refrigerant.

**WARNING:** Servicing must only be carried out by personnel familiar with both the vehicle system and the charging and testing equipment. All operations must be carried out in a well ventilated area away from open flame and heat sources.

**NOTE:** Receiver drier need only be changed under the following circumstances. There is dirt in the refrigerant circuit ( e.g. compressor seizure ). The system is leaking and refrigerant has been lost to atmosphere. Refrigerant circuit has been open more than 24 hours due to repair.



2. Remove dust caps from high and low pressure connectors.
3. Connect high and low pressure hoses to appropriate connections.
4. Open valves on connectors.
5. Turn valves on refrigerant station to correct positions.
6. Turn process switch to correct position.
7. Turn Main switch to 'ON'.

8. Allow station to recover refrigerant from system.

**WARNING:** Refrigerant must always be recycled before re-use to ensure that the purity of the refrigerant is high enough for safe use in the air conditioning system. Recycling should always be carried out with equipment which is design certified by Underwriter Laboratory Inc. for compliance with SAE J1991. Other equipment may not recycle refrigerant to the required level of purity. A R134a Refrigerant Recovery Recycling Recharging Station must not be used with any other type of refrigerant. Refrigerant R134a from domestic and commercial sources must not be used in motor vehicle air conditioning systems.

9. Close valves on refrigerant station.
10. Turn Main switch to 'OFF'.
11. Close valves on connectors.
12. Disconnect high and low pressure connectors.
13. Fit dust caps to connectors.
14. Open tap at rear of station to drain refrigerant oil.
15. Measure and record quantity of refrigerant oil recovered from system.
16. Close tap at rear of station.

### Evacuation

1. Remove dust caps from high and low pressure connectors.
2. Connect high and low pressure hoses to appropriate connections.
3. Open valves on connectors.
4. Turn valves on refrigerant station to correct positions.
5. Turn Process switch to correct position.
6. Turn Main switch to 'ON'.
7. Allow station to evacuate system.

### Recharging

1. Recharge A/C system.

**CAUTION:** The system must be evacuated immediately before recharging commences. Delay between evacuation and recharging is not permitted.

2. Close valves on refrigerant station.
3. Close valve on oil charger.
4. Disconnect yellow hose from refrigerant station.
5. Remove lid from oil charger.

## AIR CONDITIONING

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6. Pour same quantity of refrigerant oil into oil charger as collected during recovery. If the following components have been removed, add the following additional quantity of lubricating oil:
  - Condenser = 30 cm<sup>3</sup>
  - Desiccant bag = 30 cm<sup>3</sup>
  - Evaporator = 20 cm<sup>3</sup>
  - Pipe/hose = 10 cm<sup>3</sup>
7. Fit lid to oil charger.
8. Connect yellow hose to refrigerant station.
9. Open valve on oil charger.
10. Move pointer on refrigerant gauge to mark position of refrigerant drop.
11. Slowly open correct valve on refrigerant station and allow vacuum to pull refrigerant into system.
12. Close valve on refrigerant station when correct amount of refrigerant has been drawn into air conditioning system.
13. Turn Main switch to 'OFF'.
14. Close valves on connectors.
15. Disconnect high and low pressure connectors.

## Drive belt - compressor - Td6

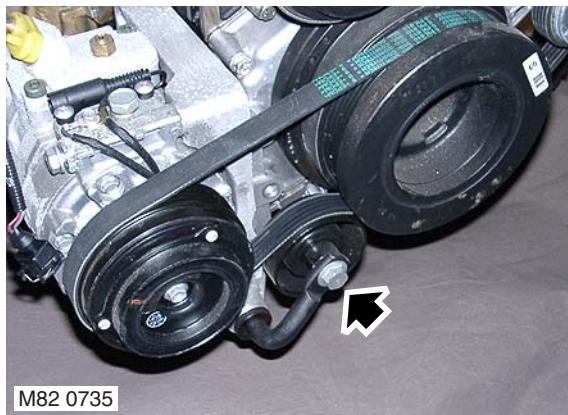
### » 82.10.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Remove undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**



3. Using a 16 mm spanner, rotate tensioner clockwise and remove drive belt from compressor.
4. Remove compressor drive belt.

#### Refit

1. Ensure pulleys are clean and damage free.
2. Fit compressor drive belt to crankshaft pulley, hold back tensioner and fit belt to compressor. Release tensioner and ensure belt is correctly aligned.
3. Fit undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
4. Connect battery earth lead.

## Drive belt - compressor - V8

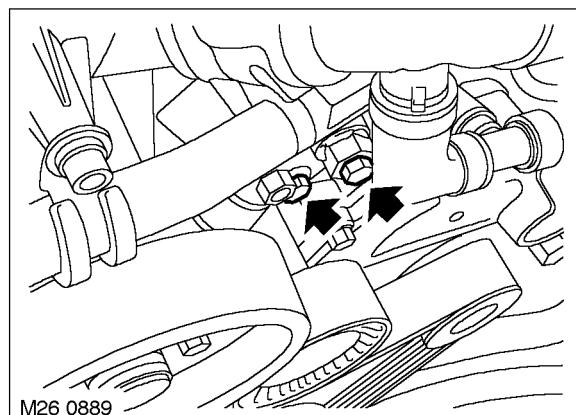
### » 82.10.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

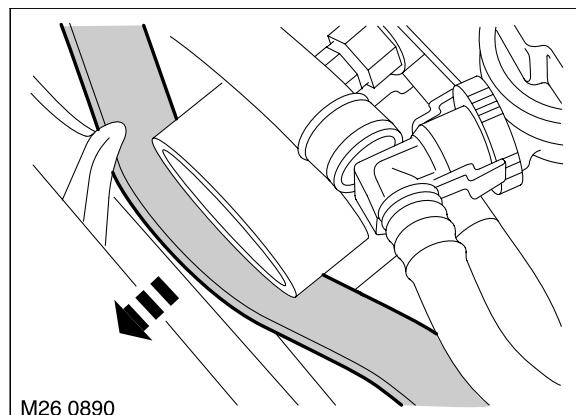
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Raise vehicle on lift.
2. Disconnect battery earth lead.
3. Remove undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**

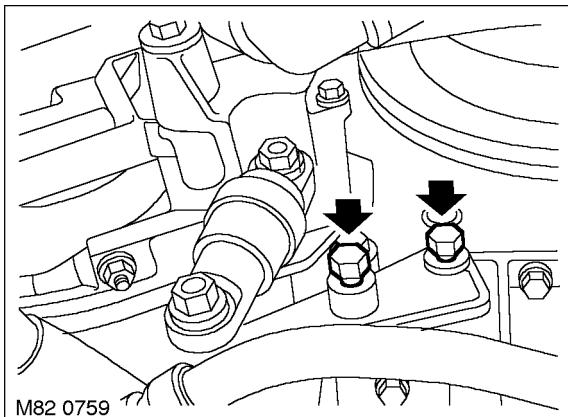


4. Loosen 2 ancillary drive belt tensioner bolts.
5. Rotate tensioner to release tension from drive belt.

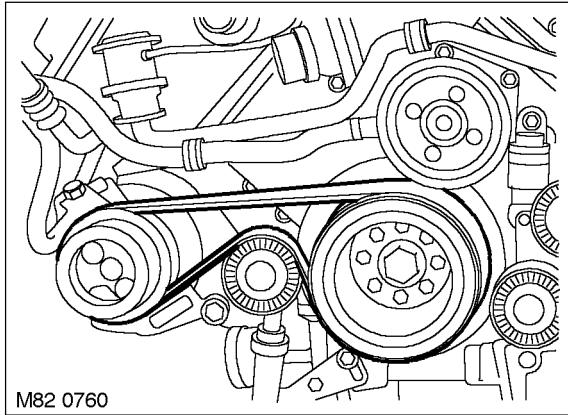


6. Release ancillary drive belt from tensioner pulley.
7. Release ancillary drive belt from crankshaft pulley.

## AIR CONDITIONING



8. Loosen 2 bolts securing compressor drive belt tensioner.



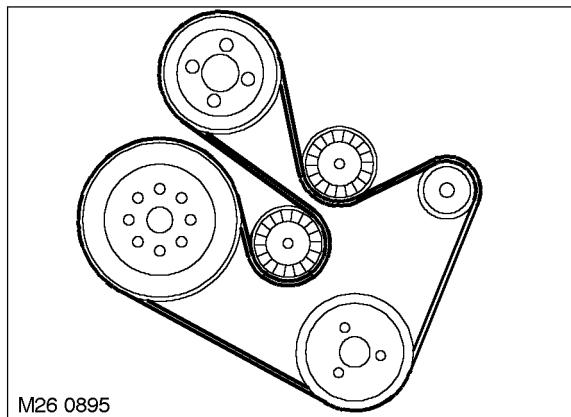
9. Release compressor drive belt from tensioner pulley.
10. Remove compressor drive belt from crankshaft pulley and compressor pulley.

### Refit

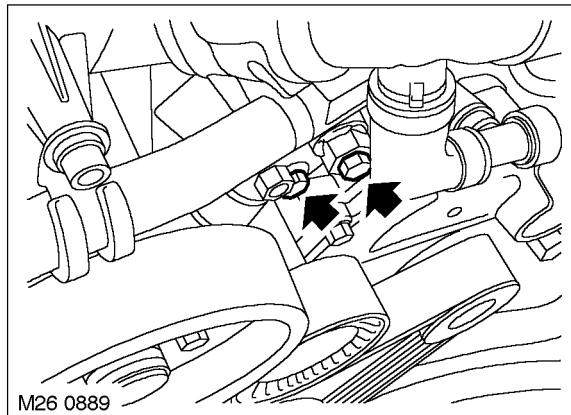
1. Ensure drive belt pulleys are clean and damage free.
2. Fit compressor drive belt to compressor pulley and crankshaft pulley.

*NOTE: Make sure compressor drive belt is fully seated in pulley grooves.*

3. Fit compressor drive belt to tensioner.
4. Rotate tensioner to fully tension compressor drive belt.
5. Tighten 2 bolts securing compressor drive belt tensioner to 25 Nm (18 lbf.ft).
6. Fit ancillary drive belt to all pulleys except tensioner pulley.



7. Fit ancillary drive belt to tensioner pulley. Ensure ancillary drive belt is aligned to all pulleys.
8. Rotate tensioner to fully tension ancillary drive belt.



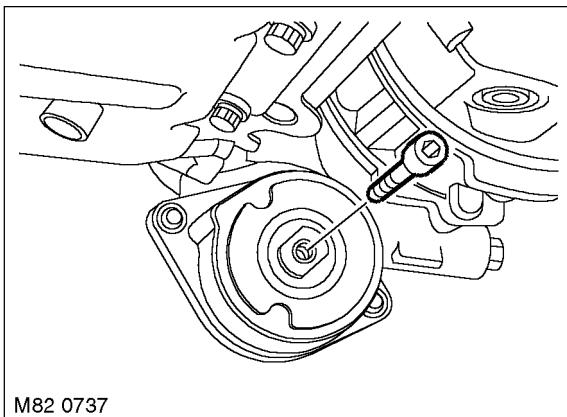
9. Tighten tensioner bolts to 30 Nm (22 lbf.ft).
10. Fit undertray.  
 **EXTERIOR FITTINGS, REPAIRS, Undertray - front.**
11. Connect battery earth lead.

## Tensioner - compressor drive belt - Td6

» **82.10.05**

### Remove

1. Remove compressor drive belt.
-  **AIR CONDITIONING, REPAIRS,  
Drive belt - compressor - Td6.**



2. Remove Allen bolt securing pulley arm to spring tensioner, withdraw arm assembly.



3. Remove 2 bolts securing tensioner to mounting, noting fitted position remove tensioner.

### Refit

1. Position tensioner, fit bolts and tighten to 25 Nm (18 lbf.ft).
  2. Fit tensioner arm assembly and tighten Allen bolt to 10 Nm (7 lbf.ft).
  3. Fit compressor drive belt.
-  **AIR CONDITIONING, REPAIRS,  
Drive belt - compressor - Td6.**

## Tensioner - compressor drive belt - V8

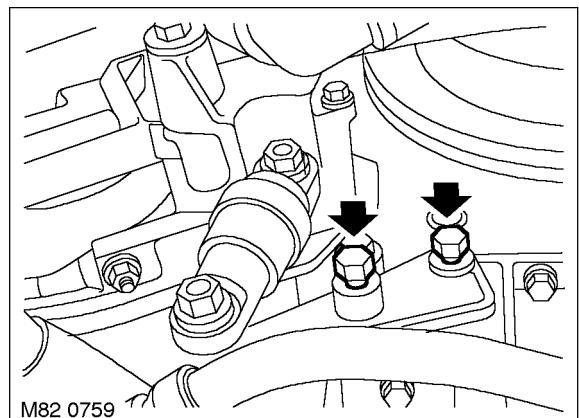
» **82.10.05**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

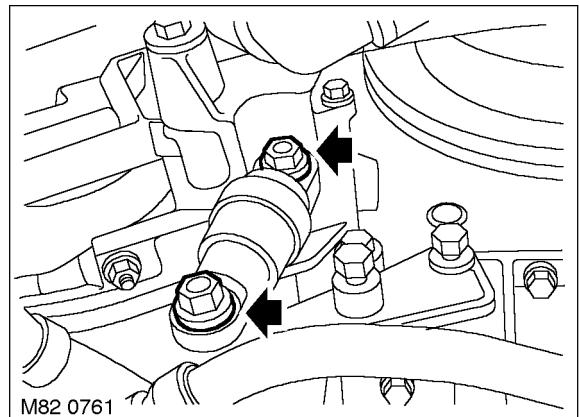
 **GENERAL INFORMATION, Electrical  
Precautions.**

### Remove

1. Position vehicle on lift.
  2. Disconnect battery earth lead.
  3. Remove undertray.
-  **EXTERIOR FITTINGS, REPAIRS,  
Undertray - front.**



4. Loosen 2 compressor drive belt tensioner securing bolts.



5. Remove 2 bolts securing compressor drive belt tensioner and remove tensioner.

### Refit

1. Position compressor drive belt tensioner, fit 2 bolts and tighten to 25 Nm (18 lbf.ft).

# AIR CONDITIONING

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2. Rotate tensioner to fully tension compressor drive belt.

*NOTE: Make sure compressor drive belt is fully seated in pulley grooves.*

3. Tighten 2 bolts securing compressor drive belt tensioner to 25 Nm (18 lbf.ft).

4. Fit undertray.

 **EXTERIOR FITTINGS, REPAIRS,  
Undertray - front.**

5. Connect battery earth lead.

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## Compressor - Td6

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### 82.10.20

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical  
Precautions.**

### Remove

1. Raise front of vehicle.

**WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

2. Disconnect battery earth lead.

3. Recover refrigerant from A/C system.

 **AIR CONDITIONING, REFRIGERANT  
RECOVERY, RECYCLING AND  
RECHARGING, Refrigerant recovery -  
recycling and recharge.**

*NOTE: Receiver drier need only be changed under the following circumstances. There is dirt in the refrigerant circuit ( e.g. compressor seizure ). The system is leaking and refrigerant has been lost to atmosphere. Refrigerant circuit has been open more than 24 hours due to repair.*

4. Remove turbocharger intake duct.

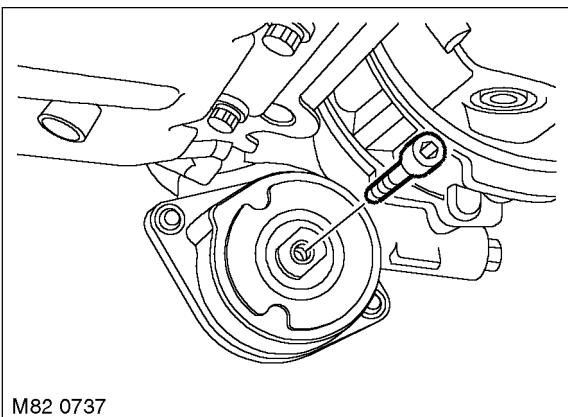
 **ENGINE MANAGEMENT SYSTEM -  
Td6, REPAIRS, Duct- intake - turbocharger.**

5. Remove viscous coupling.

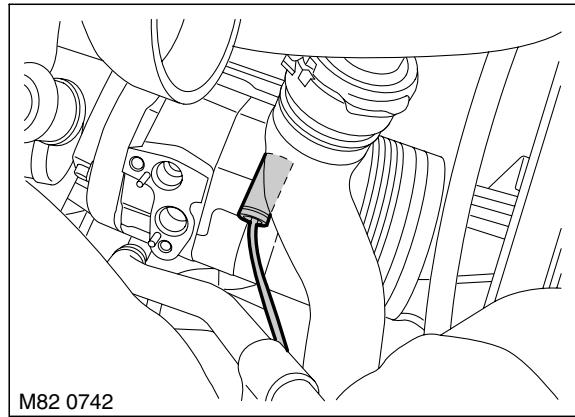
 **COOLING SYSTEM - Td6, REPAIR,  
Coupling unit - viscous fan.**

6. Remove compressor drive belt.

 **AIR CONDITIONING, REPAIRS,  
Drive belt - compressor - Td6.**



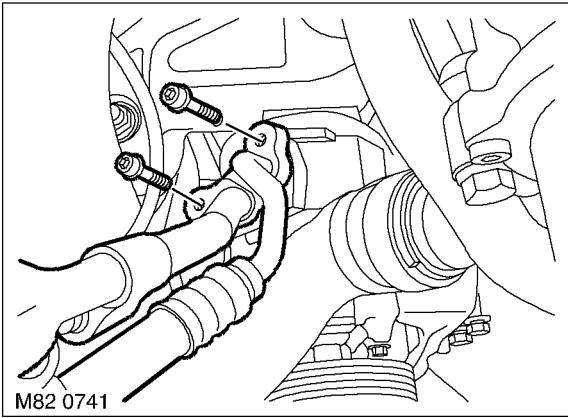
M82 0737



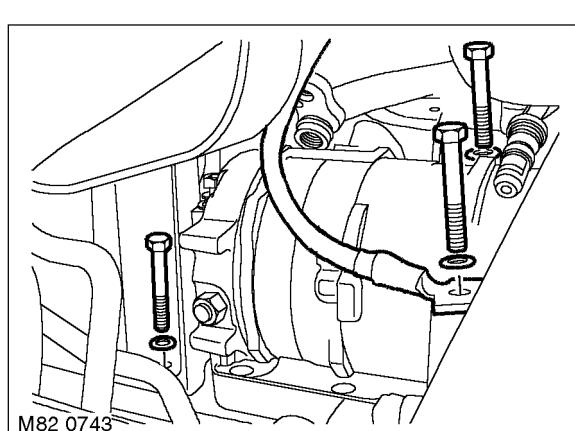
M82 0742

7. Remove Allen bolt securing pulley arm to spring tensioner, withdraw arm assembly.

10. Remove bolt securing intercooler hose support bracket to compressor and move aside.
11. Disconnect multiplug from compressor.



8. Remove 2 bolts securing A/C pipes to compressor. Release pipes from compressor.  
**CAUTION: Always fit plugs to open connections to prevent contamination.**
9. Remove and discard 'O' rings from A/C pipes.



12. Remove bolt securing compressor earth lead, move lead aside.
13. Remove bolt securing rear of compressor to mounting, release compressor from dowels and remove from vehicle.

#### Refit

1. If a new compressor is being installed, drain the required amount of refrigerant oil from the new compressor.

 **GENERAL INFORMATION, Air Conditioning System Precautions.**

2. Ensure mating faces of A/C pipes and compressor are clean.
3. Clean compressor and mounting bracket mating faces.
4. Ensure rear bolt is fitted to compressor, locate compressor onto dowels and finger tighten bolt.
5. Fit bolt and intercooler support bracket to compressor.
6. Fit bolt and secure compressor earth lead.

# AIR CONDITIONING

7. Evenly and progressively tighten compressor mounting bolts to 25 Nm (18 lbf.ft).
8. Lubricate new 'O' rings with clean refrigerant oil and fit to evaporator pipes
9. Position A/C pipes to compressor, fit bolts and tighten to 22 Nm (16 lbf.ft).
10. Connect multiplug to compressor.
11. Fit tensioner arm assembly and tighten Allen bolt to 10 Nm (7 lbf.ft).
12. Fit compressor drive belt.  
 **AIR CONDITIONING, REPAIRS, Drive belt - compressor - Td6.**
13. Fit viscous coupling.  
 **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
14. Fit turbocharger intake duct.  
 **ENGINE MANAGEMENT SYSTEM - Td6, REPAIRS, Duct- intake - turbocharger.**
15. Recharge A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
16. Connect battery earth lead.
17. Remove stands and lower vehicle.

## Compressor - V8

### 82.10.20

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

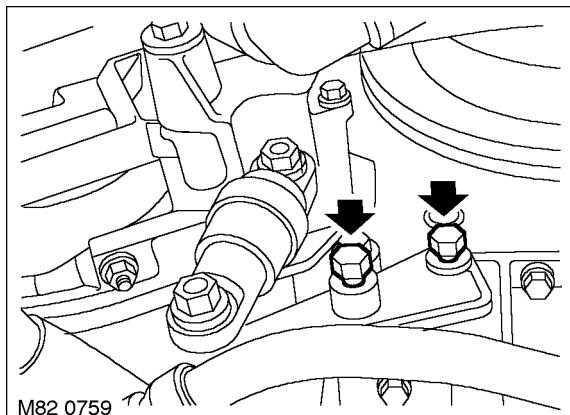
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

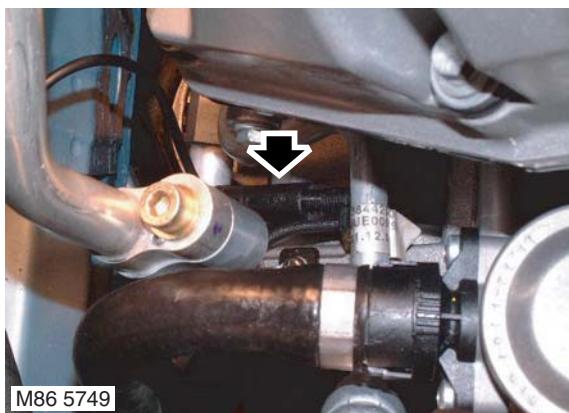
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**

*Receiver drier need only be changed under the following circumstances. There is dirt in the refrigerant circuit ( e.g. compressor seizure ). The system is leaking and refrigerant has been lost to atmosphere. Refrigerant circuit has been open more than 24 hours due to repair.*

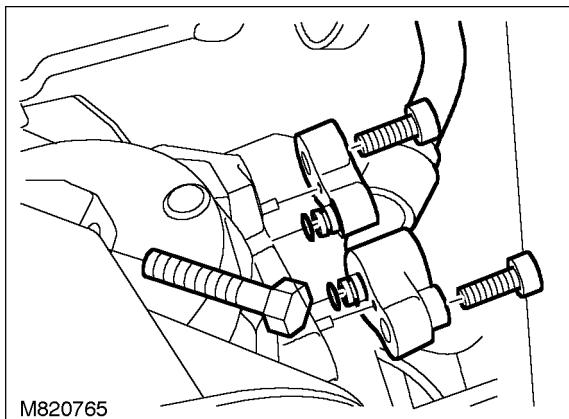
4. Remove air intake pipe.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**



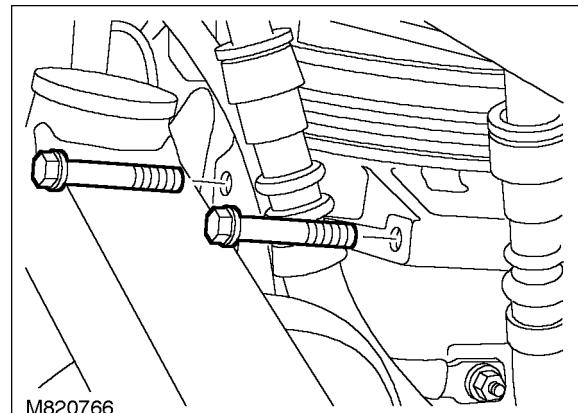
5. Remove A/C compressor drive belt.  
 **AIR CONDITIONING, REPAIRS, Drive belt - compressor - V8.**
6. Remove 2 bolts securing A/C compressor drive belt adjusting plate to sump.
7. Position A/C tensioner toward crankshaft pulley to aid removal of A/C compressor.



8. Disconnect multiplug from A/C compressor.



9. Remove bolt securing rear of A/C compressor to mounting.
  10. Remove 2 Allen bolts securing A/C pipes to A/C compressor. Release pipes from A/C compressor.
- CAUTION: Always fit plugs to open connections to prevent contamination.**
11. Remove and discard 'O' rings from A/C pipes.



12. Remove 2 bolts securing A/C compressor to mounting.

*NOTE: Top securing bolt needs to stay located into compressor on removal and installation.*

13. Remove A/C compressor.

#### Refit

1. If a new compressor is being installed, drain the required amount of refrigerant oil from the new compressor.  
**☞ GENERAL INFORMATION, Air Conditioning System Precautions.**
2. Ensure mating faces of A/C pipes and A/C compressor are clean.
3. Clean A/C compressor and mounting bracket mating faces.
4. Fit A/C compressor to mounting bracket. Fit 3 securing bolts.  
*NOTE: Top securing bolt needs to stay located into compressor on removal and installation.*
5. Evenly and progressively tighten A/C compressor mounting bolts to 25 Nm (18 lbf.ft).
6. Lubricate new 'O' rings with clean refrigerant oil and fit to evaporator pipes
7. Position A/C pipes to A/C compressor, fit bolts and tighten to 22 Nm (16 lbf.ft).
8. Connect multiplug to A/C compressor.
9. Tighten 2 bolts securing compressor drive belt tensioner to 25 Nm (18 lbf.ft).
10. Fit A/C compressor drive belt.  
**☞ AIR CONDITIONING, REPAIRS, Drive belt - compressor - V8.**
11. Fit air intake pipe.  
**☞ ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**

## AIR CONDITIONING

12. Recharge A/C system.  
☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
13. Connect battery earth lead.

### Motor - condenser fan

☞ **82.15.01**

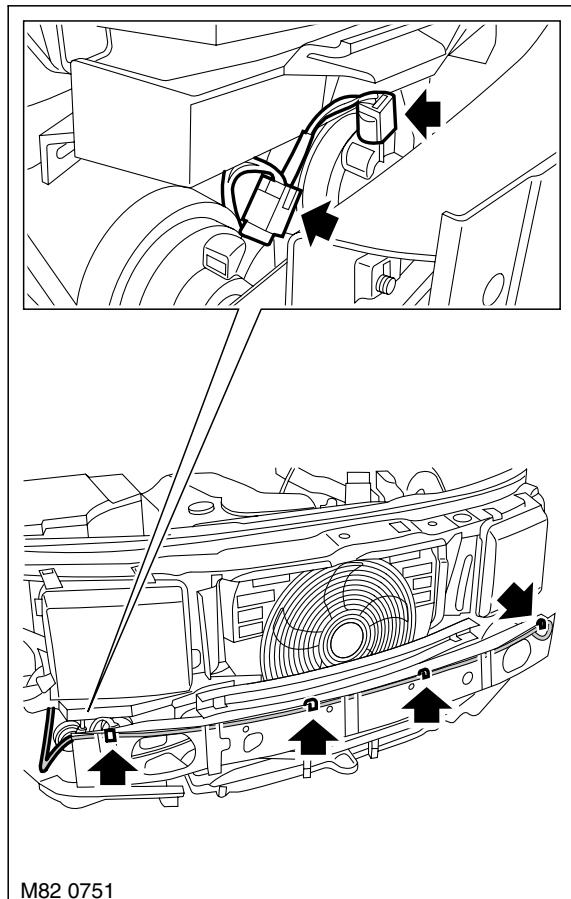
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

☞ **GENERAL INFORMATION, Electrical Precautions.**

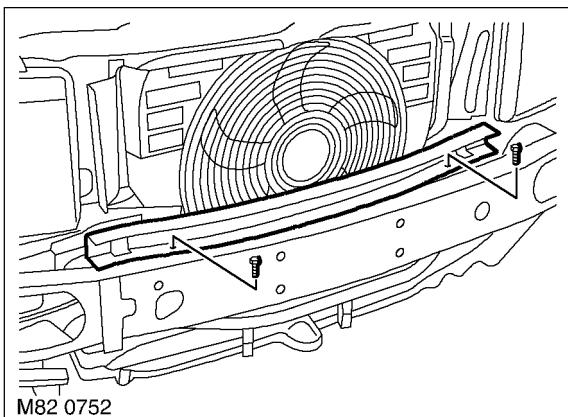
#### Remove

1. Disconnect battery earth lead.
2. Remove front bumper.

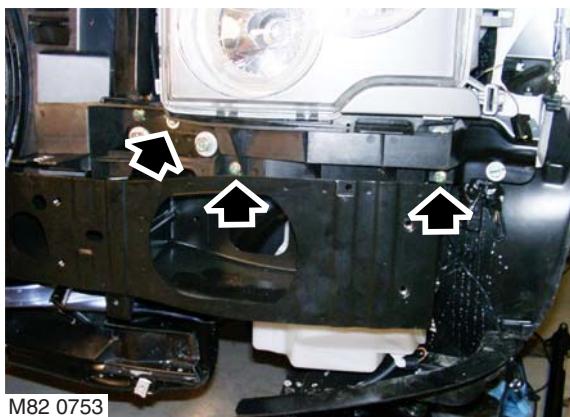
☞ **EXTERIOR FITTINGS, REPAIRS, Bumper - assembly - front.**



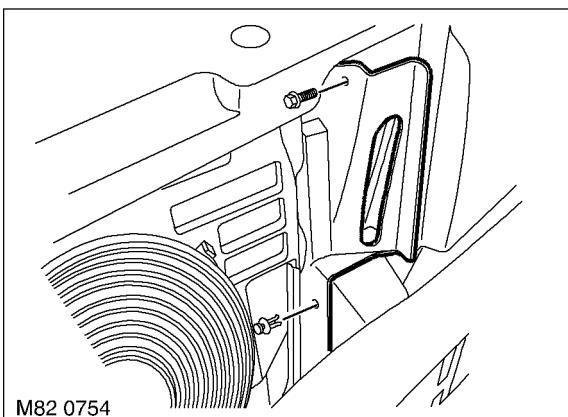
3. Release 4 cable ties securing washer hose to armature and move hose aside.
4. Disconnect horn multiplugs.



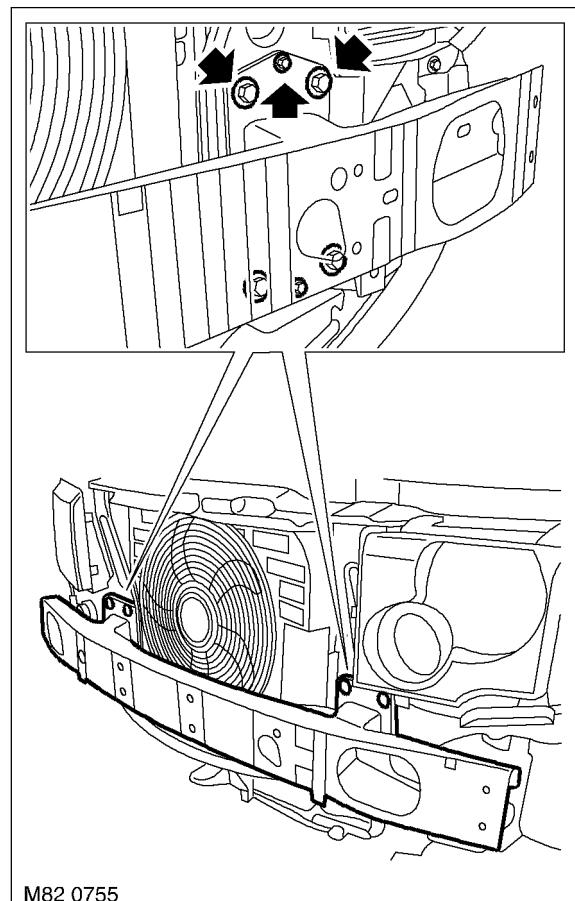
- Remove 2 screws securing armature extension and remove extension from armature.



- Remove 3 bolts securing LH bumper support bracket. Repeat for RH bracket and remove.



- Remove screw and rivet securing LH air intake deflector, repeat operation on RH. Remove deflectors.



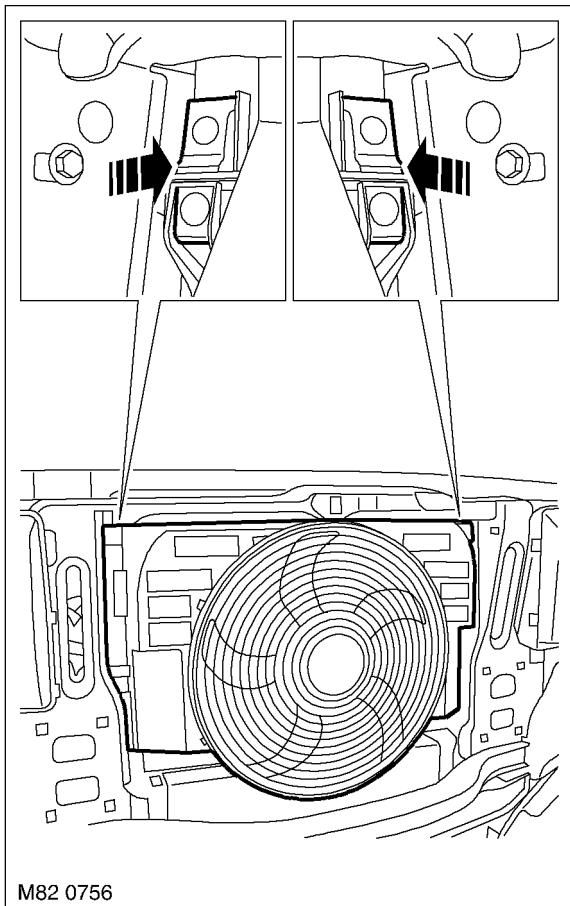
- Remove 8 nuts and 4 bolts securing armature. Cut 2 cable ties and release harness, remove armature.

*NOTE: Do not carry out further dismantling if component is removed for access only.*

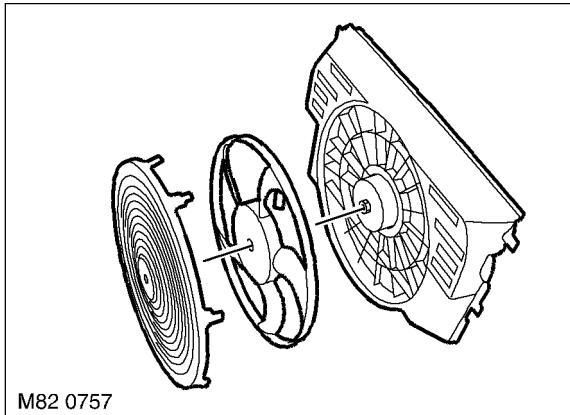


- Disconnect multiplug from condenser cooling fan motor.

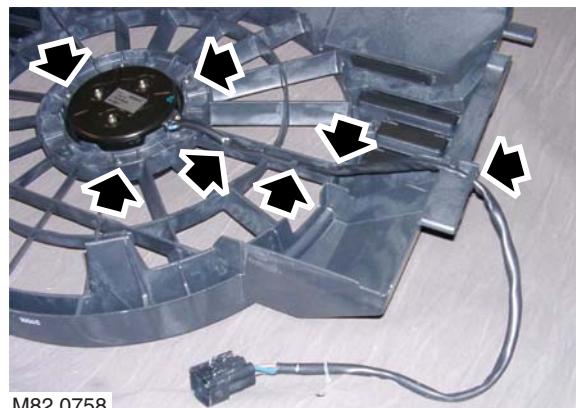
## AIR CONDITIONING



10. Depress clips and remove condenser fan cowl.



11. Depress 7 clips securing fan guard and remove from cowl.
12. Hold fan assembly, rotate nut anti clockwise and remove fan from motor.
13. Release fan motor harness from cowl.



14. Remove 3 Torx screws securing fan motor to condenser cowl, remove motor.

### Refit

1. Position fan and motor assembly to fan cowl, fit and tighten bolts to 5 Nm (3.7 lbf.ft).
2. Secure cooling fan harness in clips on fan cowl.
3. Position fan to motor and align lugs. Hold fan, rotate centre nut clockwise to secure.
4. Position fan guard and secure clips.
5. Position condenser fan cowl to mounting and secure clips.
6. Connect fan motor multiplug.
7. Position armature to body fit nuts and bolts, tighten bolts to 10 Nm (7 lbf.ft), tighten nuts to 45 Nm (33 lbf.ft).
8. Secure harness with cable ties.
9. Fit and secure bumper support brackets, tighten bolts to 3 Nm (2.2 lbf.ft), fit scrivets.
10. Fit and secure air deflectors.
11. Fit and secure armature extension.
12. Connect horn multiplugs.
13. Position hose to armature and secure with new cable ties.
14. Fit front bumper.  
 **EXTERIOR FITTINGS, REPAIRS,  
Bumper - assembly - front.**
15. Connect battery earth lead.

## Condenser

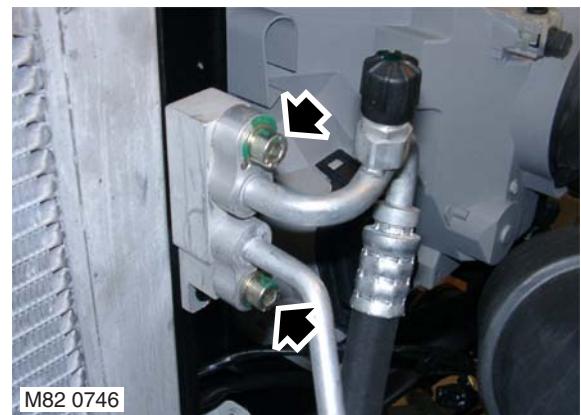
### 82.15.07

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

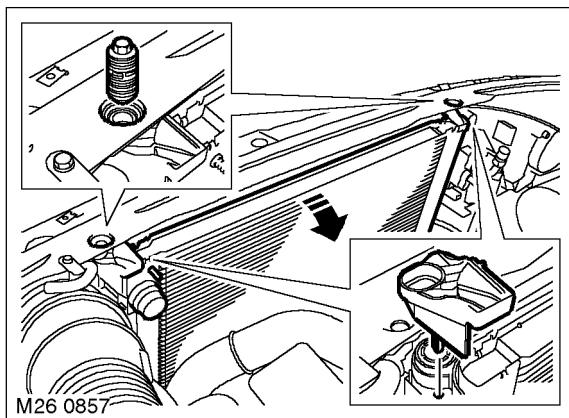
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

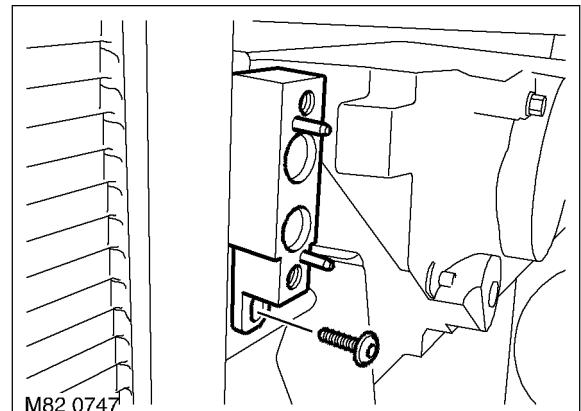
1. Disconnect battery earth lead.
2. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
3. Remove viscous coupling.  
 **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**



6. Remove 2 Allen screws securing A/C pipes to condenser, disconnect pipes and discard 'O' rings.  
**CAUTION: Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.**



4. Remove radiator assembly retaining bolts from bonnet locking platform.
5. Ease radiator assembly rearward, release and remove radiator retaining clips.



7. Remove Torx screw securing condenser to mounting.
8. Carefully remove condenser.

#### Refit

1. Fit and secure condenser with Torx screw.
2. Position radiator to mounting, fit and secure retaining clips.
3. Position and secure radiator assembly to bonnet locking platform.
4. Lubricate new 'O' rings with clean refrigerant oil, fit one seal to each condenser pipe.
5. Fit A/C pipes to condenser, fit bolts and tighten to 9 Nm (7 lbf.ft).

# AIR CONDITIONING

6. Fit viscous coupling.  
    ☞ **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**  
    ☞ **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
7. Recharge A/C system.  
    ☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
8. Connect battery earth lead.

## Drier desiccant bag

☞ **82.17.05**

*NOTE: The desiccant bag/receiver drier need only be changed under the following circumstances:*

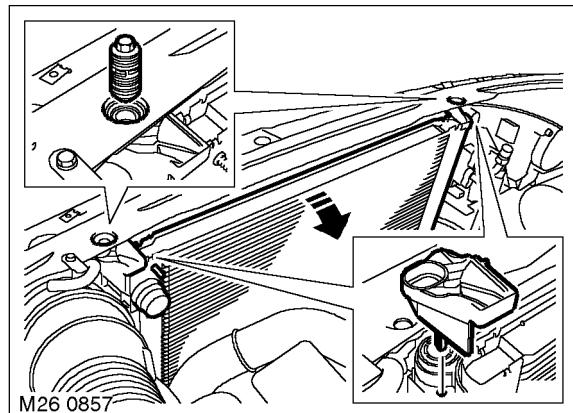
- *There is dirt in the refrigerant circuit ( e.g. compressor seizure ).*
- *The system is leaking and refrigerant has been lost to atmosphere.*
- *Refrigerant circuit has been open more than 24 hours due to repair.*

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

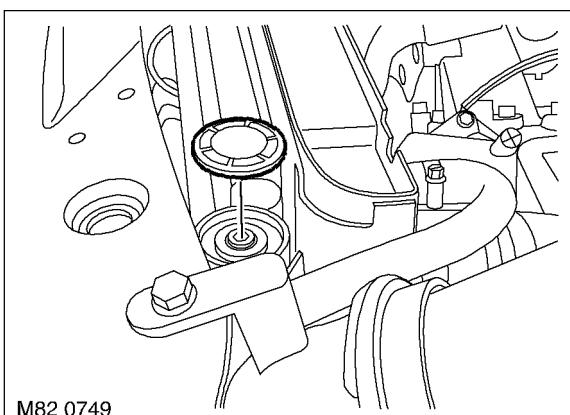
☞ **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.
2. Recover refrigerant from A/C system.  
    ☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
3. Remove viscous coupling.  
    ☞ **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**  
    ☞ **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**

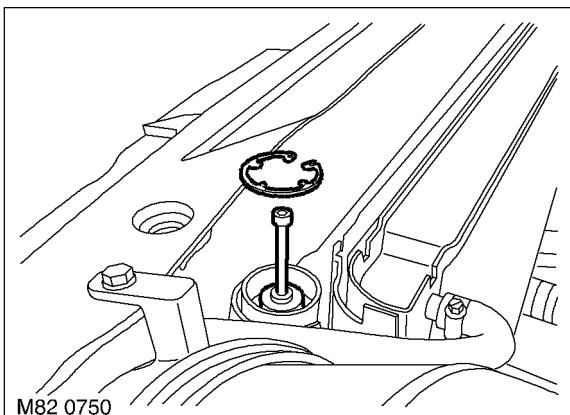


4. Remove radiator assembly retaining bolts from bonnet locking platform.
5. Ease radiator assembly rearward, release and remove radiator retaining clips.



- Remove desiccant bag cover from condenser.

**CAUTION:** Before disconnecting or removing components, ensure the immediate area around joint faces and connections are clean. Plug open connections to prevent contamination.



- Fit a 5 mm bolt to desiccant bag plug, depress plug and remove circlip.
- Withdraw plug, carefully remove and discard desiccant bag from condenser.
- Remove and discard 'O' rings.

#### Refit

- Clean condenser opening and plug.
- Fit desiccant bag.
- Lubricate new 'O' rings with clean refrigerant oil, fit and secure plug with circlip. Remove bolt from plug.
- Fit desiccant bag cover.
- Position radiator to mounting, fit and secure retaining clips.
- Position and secure radiator assembly to bonnet locking platform.

- Fit viscous coupling.  
☞ COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.
- Fit viscous coupling.  
☞ COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.
- Recharge A/C system.  
☞ AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.
- Connect battery earth lead.

# AIR CONDITIONING

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## Sensor - refrigerant pressure

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→ 82.20.38

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.
2. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**



3. Release multiplug from refrigerant pressure sensor.  
**WARNING:** Under no circumstances should refrigerant hoses be disconnected without first discharging the system.
4. Remove refrigerant pressure sensor from air conditioning (A/C) pipe mounting. Use two spanners to avoid straining A/C pipe mounting.  
**CAUTION:** Immediately cap all A/C pipes to prevent ingress of dirt and moisture into the system.
5. Discard 'O' ring.

### Refit

1. Clean refrigerant pressure switch and surrounding area.
2. Fit new 'O' ring to sensor and tighten to 10 Nm (7 lbf.ft).
3. Fit multiplug to sensor.

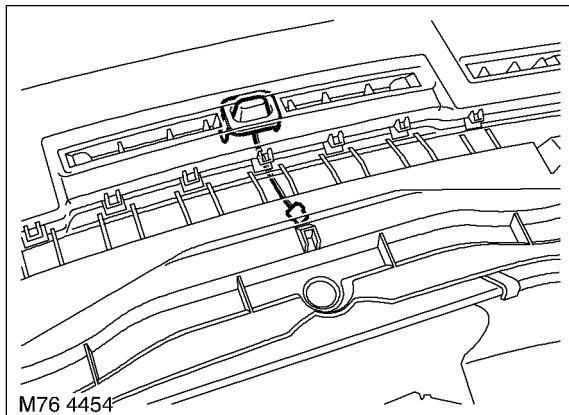
4. Recharge air conditioning system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
5. Connect battery earth lead.

## Sensor - solar light - automatic temperature control

» 82.20.92

### Remove

1. Make the SRS system safe.  
☞ **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove fascia carrier.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**



3. Release and remove solar sensor.

### Refit

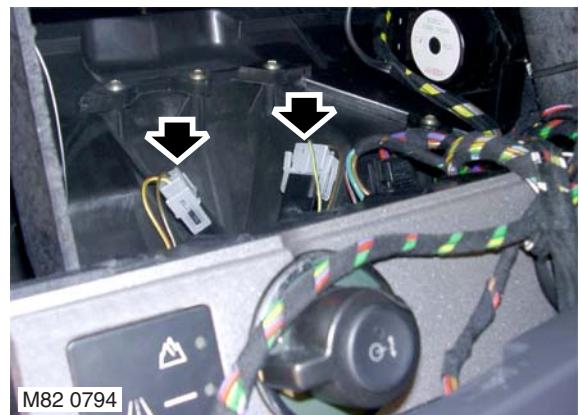
1. Fit solar sensor.
2. Fit fascia carrier.  
☞ **INTERIOR FITTINGS, REPAIRS, Fascia - carrier.**

## Sensor - air temperature - automatic temperature control

» 82.20.93

### Remove

1. Remove heating control assembly.  
☞ **HEATING AND VENTILATION, REPAIRS, Controls - heater (ECU).**



2. Disconnect multiplug from air temperature sensor.
3. Remove sensor from heating assembly.

### Refit

1. Fit sensor to heater assembly and connect multiplug.
2. Fit heating control assembly.  
☞ **HEATING AND VENTILATION, REPAIRS, Controls - heater (ECU).**

# AIR CONDITIONING

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## Sensor - evaporator temperature - LHD

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### » 82.20.95

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Set heater control to de-mist.

**Failure to comply will result in damage to footwell vent flap.**

2. Disconnect battery earth lead.

3. Remove glove box.

 **INTERIOR FITTINGS, REPAIRS, Glove box.**

4. Noting fitted position, disconnect 8 multiplugs from fuse box.

5. Remove 4 Torx screws securing the fuse box, position the fuse box aside.

6. Remove screw securing footwell heating duct to fuse box mounting bracket. Remove duct.

7. Remove 4 Torx screws and spring clip from RH heating duct elbow. Remove elbow.

**CAUTION: Contain spring clip prior to release.**

8. Disconnect multiplug from evaporator sensor, release harness and remove sensor.

### Refit

1. Carefully fit sensor and secure grommet.

2. Connect multiplug and secure harness.

3. Position and secure heating duct elbow.

4. Position and secure footwell heating duct.

5. Position fuse box and secure with screws.

6. Connect multiplugs to fuse box.

7. Fit glove box.

 **INTERIOR FITTINGS, REPAIRS, Glove box.**

8. Connect battery earth lead.

## Sensor - evaporator temperature - RHD

---

### » 82.20.95

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Set heater control to de-mist.

**CAUTION: Failure to comply will result in damage to footwell vent flap.**

2. Disconnect battery earth lead.

3. Remove closing panel.

 **INTERIOR FITTINGS, REPAIRS, Closing panel - passenger side.**

4. Remove shroud.

 **INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.**

5. Remove screw securing footwell heating duct to carrier. Remove duct.

6. Remove 4 Torx screws and spring clip from RH heating duct elbow. Remove elbow.

**CAUTION: Contain spring clip prior to release.**

7. Disconnect multiplug from evaporator sensor, release harness and remove sensor.

### Refit

1. Carefully fit sensor and secure grommet.

2. Connect multiplug to sensor and secure harness.

3. Position and secure heating duct elbow.

4. Position and secure footwell heating duct.

5. Fit shroud.

 **INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.**

6. Fit closing panel.

 **INTERIOR FITTINGS, REPAIRS, Closing panel - passenger side.**

## Valve - thermostatic expansion (TXV) - LHD

### 82.25.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

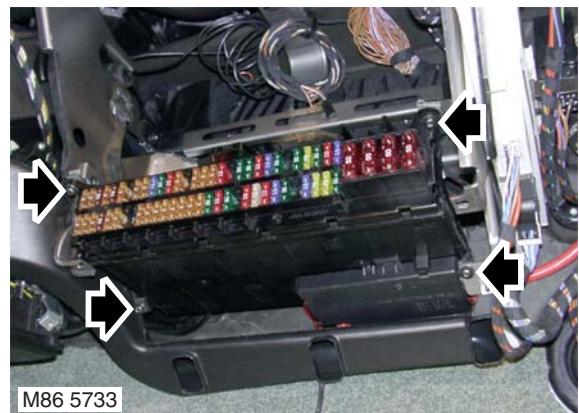
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

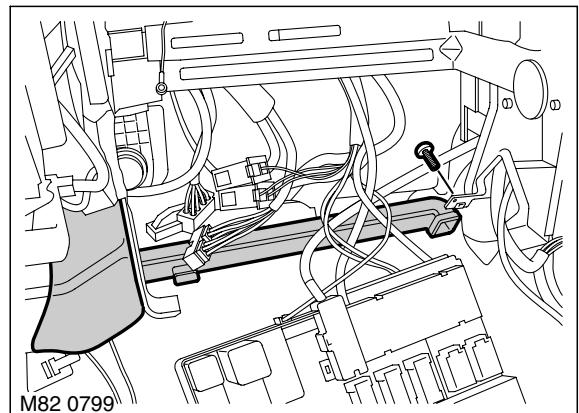
1. Disconnect battery earth lead.
2. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
3. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
4. Remove glove box.  
 **INTERIOR FITTINGS, REPAIRS, Glove box.**



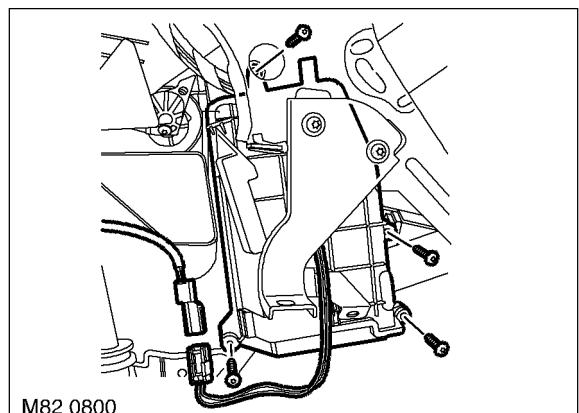
5. Noting fitted position, disconnect 8 multiplugs from fuse box.



6. Remove 4 Torx screws securing the fuse box, position the fuse box aside.



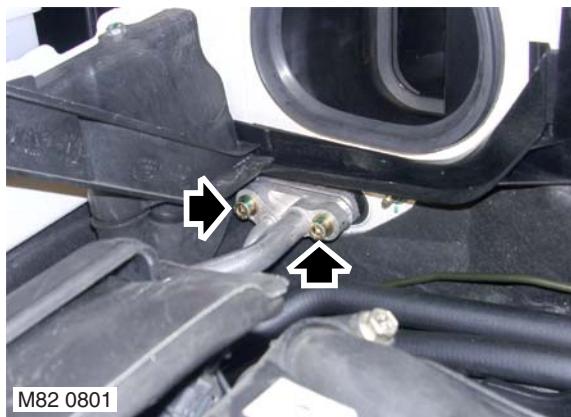
7. Remove screw securing footwell heating duct to carrier. Remove duct.



8. Release evaporator sensor harness from TXV cover.
9. Remove 4 Torx screws securing TXV cover and position aside.

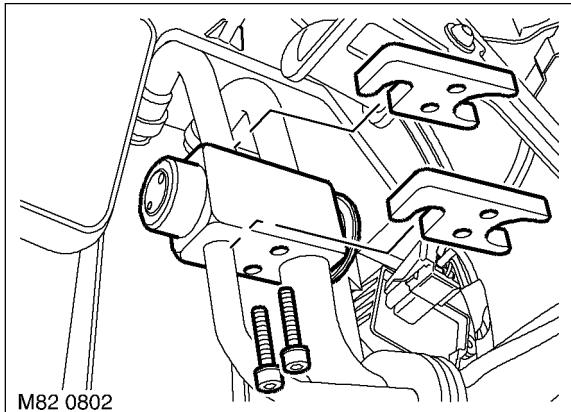
## AIR CONDITIONING

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11. Recharge A/C system.  
☞ **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
12. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
13. Connect battery earth lead.

10. Remove 2 Allen bolts securing A/C pipes to bulkhead, release pipes and discard 'O' rings.



11. Remove 2 Allen bolts securing A/C pipes to TXV, remove clamps, release pipes and discard 'O' rings.
12. Remove TXV.
13. Plug all connections.

### Refit

1. Clean mating faces and seal recesses on evaporator, TXV and A/C pipes.
2. Lubricate new 'O' rings with clean refrigerant oil and fit to A/C pipes.
3. Position TXV to A/C pipes, fit clamps, fit bolts and tighten to 6 Nm (4.4 lbf.ft).
4. Position A/C pipes to bulkhead, fit bolts and tighten to 6 Nm (4.4 lbf.ft).
5. Fit and secure TXV cover.
6. Position and secure footwell heating duct.
7. Secure evaporator sensor harness.
8. Position fuse box and secure with screws.
9. Connect multiplugs to fuse box.
10. Fit glove box.

☞ **INTERIOR FITTINGS, REPAIRS, Glove box.**

## Valve - thermostatic expansion (TXV) - RHD

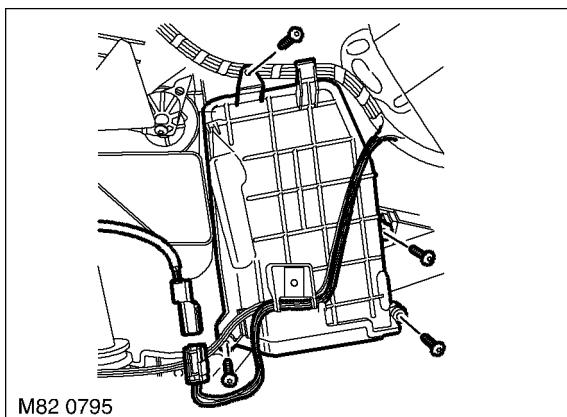
### 82.25.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

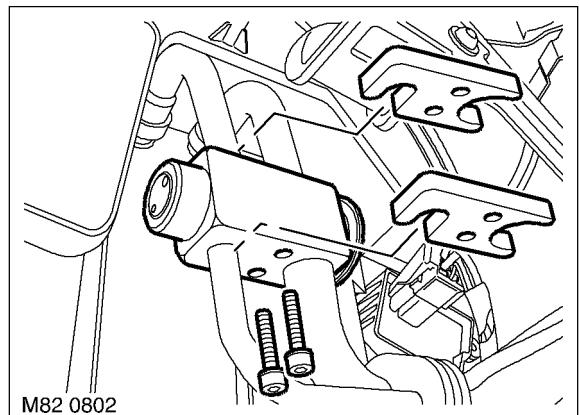
1. Disconnect battery earth lead.
2. Remove air intake plenum.  
 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
3. Recover refrigerant from A/C system.  
 **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
4. Remove drivers side footwell closing panel.
5. Remove shroud.  
 **INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.**
6. Remove screw securing footwell heating duct, remove duct.



7. Release evaporator sensor harness from TXV cover.
8. Remove 4 Torx screws securing TXV cover and position aside.



9. Remove 2 Allen bolts securing A/C pipes to bulkhead, release pipes and discard 'O' rings.



10. Remove 2 Allen bolts securing A/C pipes to TXV, remove clamps, release pipes and discard 'O' rings.
11. Remove TXV.
12. Plug all connections.

#### Refit

1. Clean mating faces and seal recesses on TXV and A/C pipes.
2. Lubricate new 'O' rings with clean refrigerant oil and fit to A/C pipes.
3. Position TXV to A/C pipes, fit clamps, fit bolts and tighten to 6 Nm (4.4 lbf.ft).
4. Position A/C pipes to bulkhead, fit bolts and tighten to 6 Nm (4.4 lbf.ft).
5. Fit and secure TXV cover.
6. Secure evaporator sensor harness.
7. Position and secure footwell heating duct.
8. Fit shroud.  
 **INTERIOR FITTINGS, REPAIRS, Shroud - lower - fascia.**
9. Fit footwell closing panel.

## AIR CONDITIONING

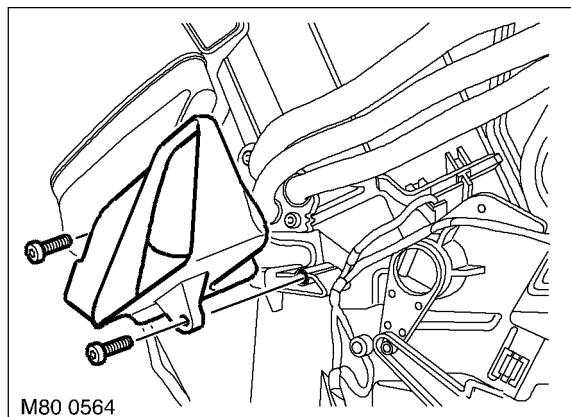
10. Recharge A/C system.  
    → **AIR CONDITIONING, REFRIGERANT RECOVERY, RECYCLING AND RECHARGING, Refrigerant recovery - recycling and recharge.**
11. Fit air intake plenum.  
    → **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
12. Connect battery earth lead.

### Evaporator

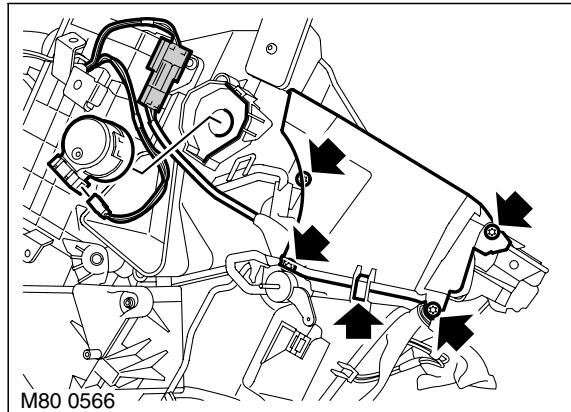
→ 82.25.20

#### Remove

1. Remove HEVAC assembly.  
    → **HEATING AND VENTILATION, REPAIRS, Heater unit/HEVAC - remove for access & refit.**
2. Position HEVAC assembly upside down.



3. Remove 2 Torx screws securing LH heating duct elbow to HEVAC assembly. Remove elbow.



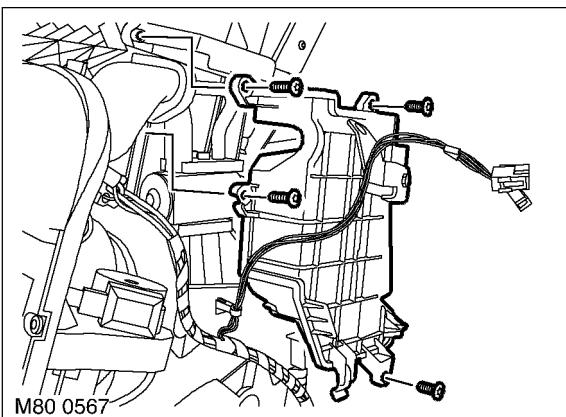
4. Remove 4 Torx screws and spring clip from RH heating duct elbow. Remove elbow.
5. Disconnect multiplug from evaporator sensor, release harness and remove sensor.
6. Disconnect multiplug and remove rear air vent motor.

- 12.** Remove evaporator assembly.

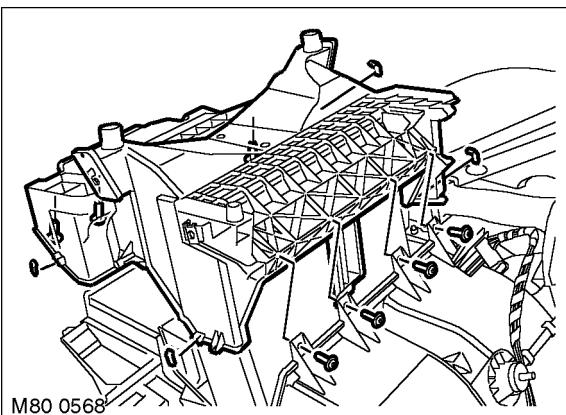
**Refit**

1. Clean mating faces and seal recesses on evaporator, TXV and A/C pipes.
2. Lubricate new 'O' rings with clean refrigerant oil and fit to A/C pipes.
3. Fit evaporator assembly.
4. Position TXV to A/C pipes, fit clamps, fit bolts and tighten to 6 Nm (4.4 lbf.ft).
5. Fit and secure access panel.
6. Fit and secure TXV cover.
7. Fit motor to heating assembly and connect multiplug.
8. Carefully fit sensor and secure grommet.
9. Connect multiplug to sensor and secure harness.
10. Position RH heating duct elbow to HEVAC assembly, secure with clip and screws.
11. Position LH heating duct elbow to HEVAC assembly and secure with screws.
12. Fit HEVAC assembly to fascia.

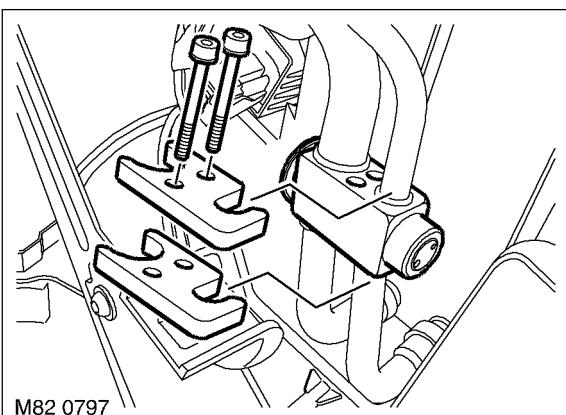
 **HEATING AND VENTILATION,  
REPAIRS, Heater unit/HEVAC - remove for  
access & refit.**



- 7.** Remove 4 Torx screws securing TXV cover and position aside.



- 8.** Remove 7 Torx screws and 3 spring clips from lower HEVAC access panel.  
**9.** Release 2 clips and remove access panel.



- 10.** Remove 2 Allen bolts securing A/C pipes to TXV, remove clamps, release pipes and discard 'O' rings.  
**11.** Remove TXV.

## AIR CONDITIONING

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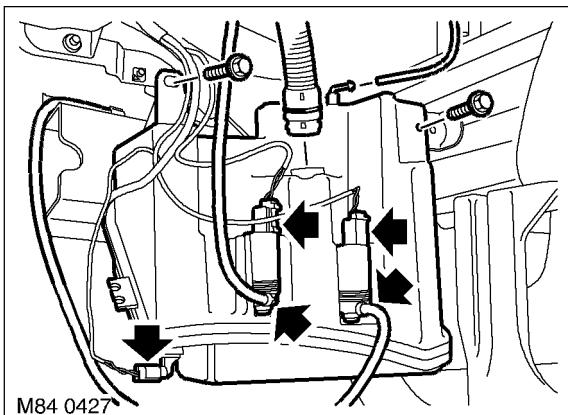


## Reservoir - combined windscreen/ headlamp washer

» **84.10.03**

### Remove

1. Remove LH front wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.**
2. Position container to catch windscreen washer fluid.



3. Release filler neck from washer bottle and discard seal.
4. Noting fitted position, disconnect multiplugs and hoses from washer pumps.
5. Disconnect multiplug from washer reservoir low level sensor.
6. Release vent pipe from reservoir.
7. Remove 2 bolts securing reservoir to body and release reservoir from front mounting.
8. Remove washer pumps from reservoir and discard seals.

### Refit

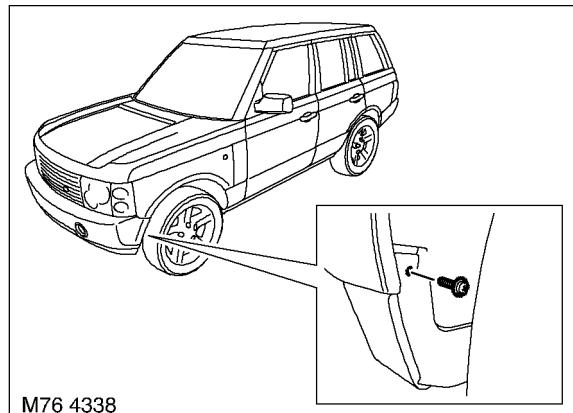
1. Clean washer pumps and reservoir recesses.
2. Fit new seals to pumps and fit to reservoir.
3. Position reservoir to body, fit bolts and tighten to 3 Nm (2.2 lbf.ft).
4. Connect vent pipe.
5. Connect multiplug to low level sensor.
6. Connect multiplugs and hoses to pumps.
7. Clean filler neck and reservoir recess.
8. Fit new seal to filler neck and connect to reservoir.
9. Refill reservoir.
10. Fit wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.**

## Sensor - washer reservoir level

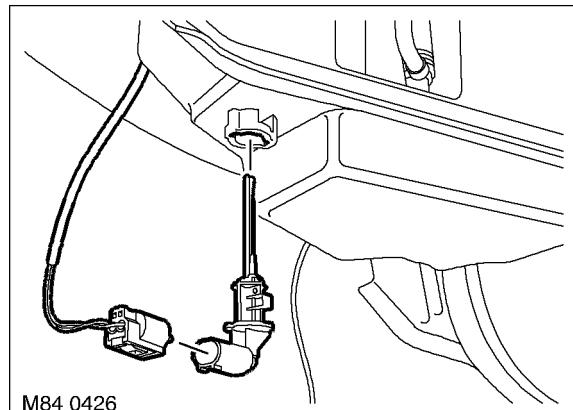
» **84.10.17**

### Remove

1. Turn steering wheel to full lock.
2. Raise vehicle on lift.



3. Remove screw securing bumper extension to wheel arch liner.



4. Ease lower edge of wheel arch liner aside for access, from rear of bumper release level sensor from washer reservoir.
5. Disconnect multiplug from level sensor and remove sensor.

# WIPERS AND WASHERS

## Refit

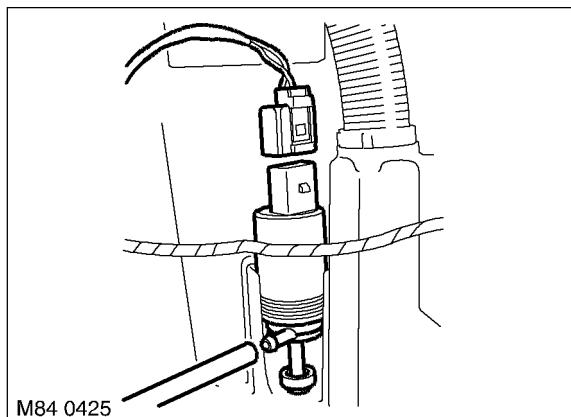
1. Connect low level sensor to multiplug and fit to reservoir.
2. Position wheel arch liner and secure with screw.
3. Lower vehicle ramp.
4. Position steering wheel straight ahead.

## Pump - washer

» 84.10.21

### Remove

1. Remove LH front wheel arch liner.  
 EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.
2. Position container to catch windscreen washer fluid.



3. Disconnect multiplug and hose from windscreen washer pump.
4. Remove washer pump from reservoir and remove and discard pump seal.

### Refit

1. Clean washer pump and reservoir recess.
2. Fit new seal to pump and fit to reservoir.
3. Connect hose and multiplug to pump.
4. Refill reservoir.
5. Fit wheel arch liner.

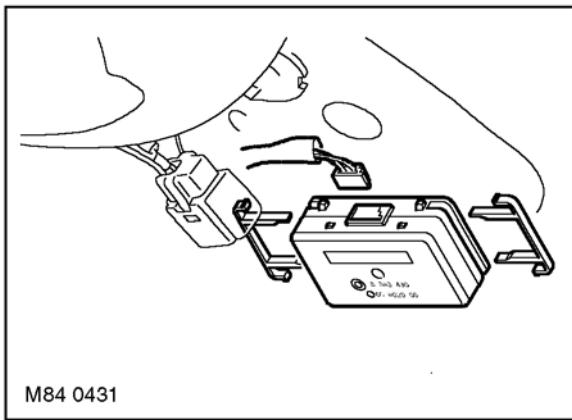
 EXTERIOR FITTINGS, REPAIRS,  
Liner - front wheel arch.

**Sensor - rain**

» **84.12.10**

**Remove**

1. Remove interior mirror.
- INTERIOR FITTINGS, REPAIRS,  
Mirror - interior.**



2. Remove 2 clips securing rain sensor and remove sensor from windscreen.

**Refit**

1. Fit rain sensor to windscreen and secure with clips.
  2. Fit interior mirror.
- INTERIOR FITTINGS, REPAIRS,  
Mirror - interior.**

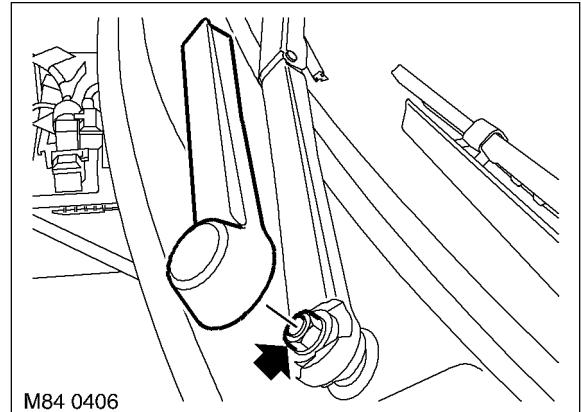
3. Configure a new sensor using TestBook/T4.

**Arm - wiper - front screen**

» **84.15.02**

**Remove**

1. Open bonnet for access.

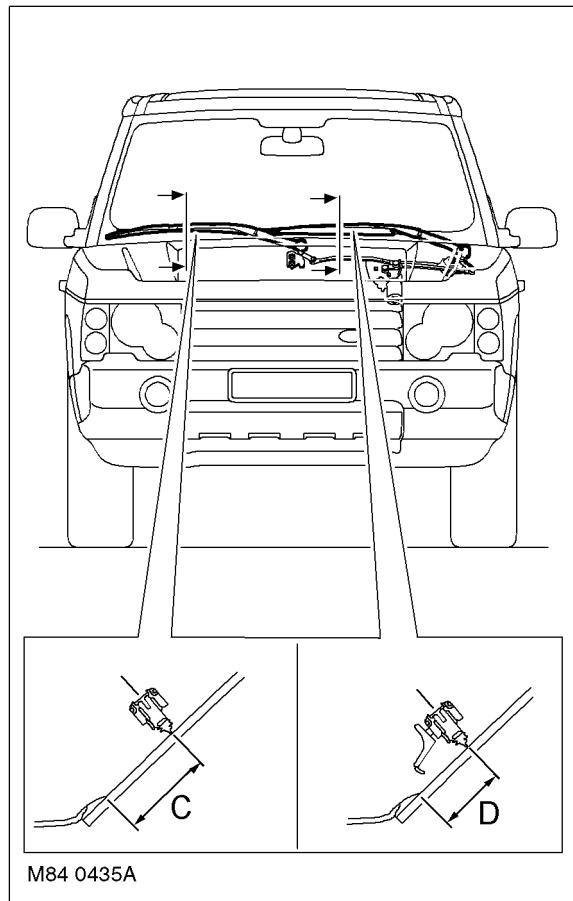
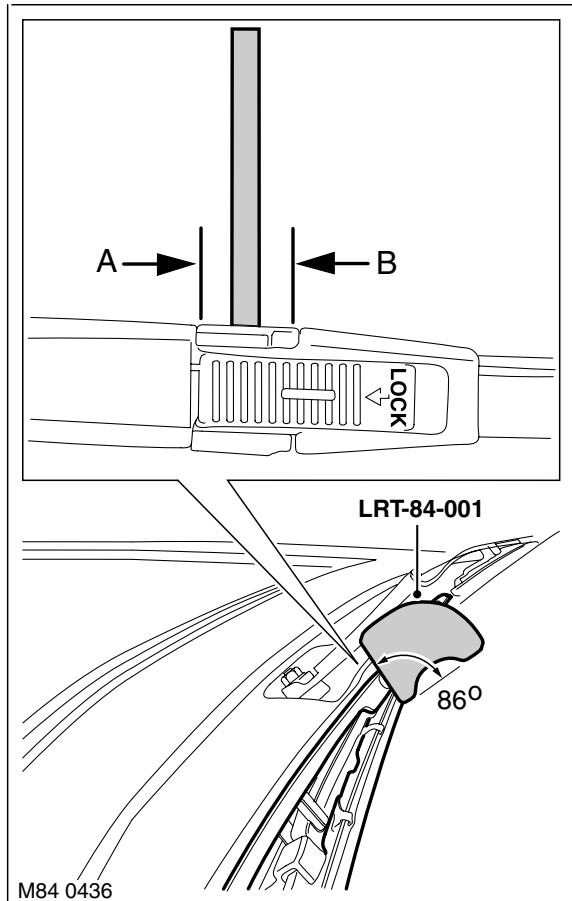


2. Remove nut cover on wiper arm and remove nut.
  3. Remove wiper arm from spindle.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
  4. Remove wiper blade.
- WIPERS AND WASHERS, REPAIRS,  
Blade - wiper - front screen.**

**Refit**

1. Fit wiper blade.
- WIPERS AND WASHERS, REPAIRS,  
Blade - wiper - front screen.**

## WIPERS AND WASHERS

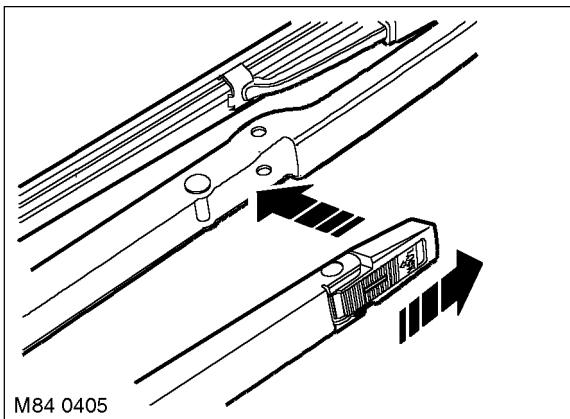


2. Fit wiper arm assembly to spindle, fit and finger tighten nut. Position **LRT-84-001** to windscreens between points 'A' and 'B' on wiper arm, align face of wiper arm to 86°.

3. While maintaining the 86° angle, set the respective wiper arms to the dimensions shown. Passenger side 'C' = 58 mm (2.283). Drivers side 'D' = 40.5 mm (1.594).
4. Measurement must be taken from lip of the plenum glass seal to the lip of the wiper blade adjacent to wiper arm/blade pivot.
5. Tighten wiper arm nut to 34 Nm (25 lbf.ft).
6. Fit nut cover.
7. Close bonnet.

**Blade - wiper - front screen**

» **84.15.06**

**Remove**

1. Lift wiper arm from screen.
2. Release wiper arm lock.
3. Release wiper blade from arm.

**Refit**

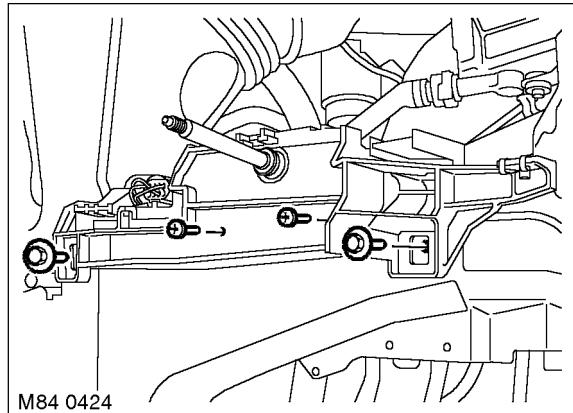
1. Position new blade to wiper arm.
2. Push blade into engagement with arm, and check blade is retained.
3. Lower arm onto screen.

**Motor & linkage - wiper**

» **84.15.11**

**Remove**

1. Remove windscreen lower finisher.  
☞ **EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreen.**
2. Remove air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**



3. Disconnect multiplug from wiper motor.
4. Remove 5 Torx bolts securing wiper linkage and remove assembly.

**Refit**

1. Position wiper motor assembly, fit bolts and tighten to 10 Nm (7 lbf.ft).
2. Connect multiplug to wiper motor.
3. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
4. Fit windscreen finisher.  
☞ **EXTERIOR FITTINGS, REPAIRS, Lower finisher - windscreen.**

# WIPERS AND WASHERS

## Motor - wiper

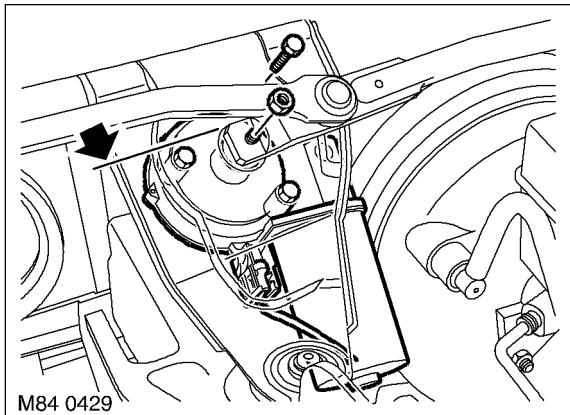
### 84.15.12

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Disconnect battery earth lead.



2. Noting fitted position, remove nut securing windscreen wiper linkage and release linkage from motor.
3. Remove 3 bolts securing mounting plate to wiper motor.
4. Disconnect multiplug from motor.
5. Remove motor.

### Refit

1. Position wiper motor to bracket, fit bolts and tighten to 10 Nm (7 lbf.ft)
2. Connect multiplug to motor.
3. Connect battery earth lead.
4. Turn ignition key to position II, ensure wiper motor is in park, turn ignition off.
5. Disconnect battery earth lead.
6. Position wiper linkage to motor, fit nut and tighten to 25 Nm (7 lbf.ft)

**CAUTION: Ensure wiper motor is timed with wiper linkage.**

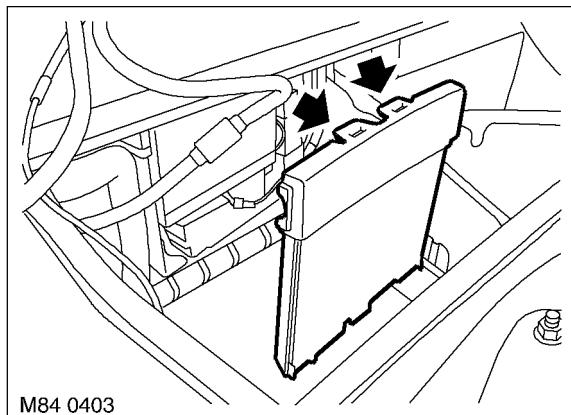
7. Connect battery earth lead.

## Relay - wiper delay

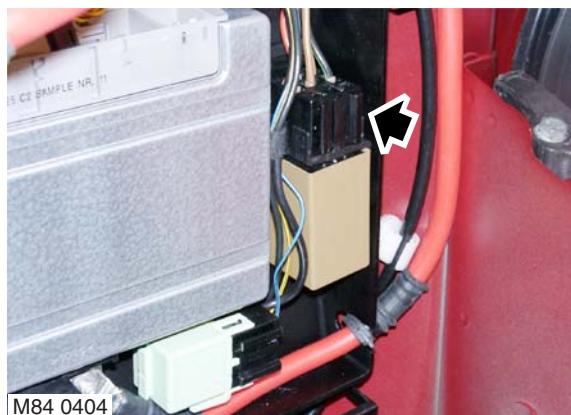
### 84.15.37

### Remove

1. Remove battery.  
 **CHARGING AND STARTING, REPAIRS, Battery.**



2. Release clips securing ECU cover to bulkhead. Remove cover.



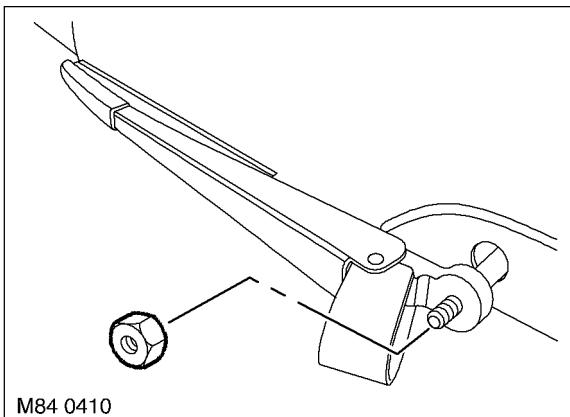
3. Disconnect relay and multiplug from bulkhead fuse box.

### Refit

1. Connect relay to bulkhead fuse box mounting.
2. Fit and secure ECU cover.
3. Fit battery.  
 **CHARGING AND STARTING, REPAIRS, Battery.**

**Arm - wiper - headlamp**

» **84.25.02**

**Remove**

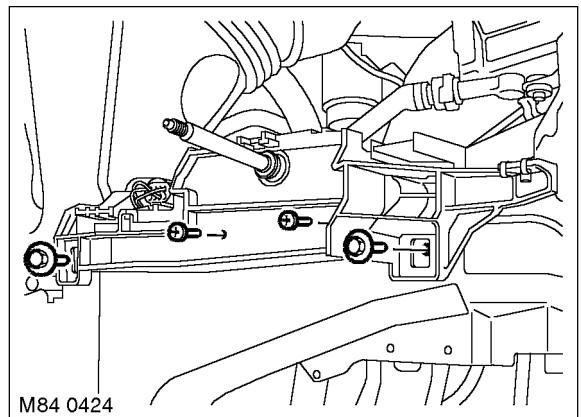
1. Raise nut cover, remove nut and release wiper arm.

**Refit**

1. Fit wiper arm to spindle, align blade to glass and tighten nut to 6 Nm (4.4 lbf.ft).
2. Fit wiper arm fixing cover.

**Blade - wiper - headlamp**

» **84.25.06**

**Remove**

1. Remove pin securing headlamp wiper blade and release blade from wiper arm.

**Refit**

1. Fit wiper blade to wiper arm and secure with pin.

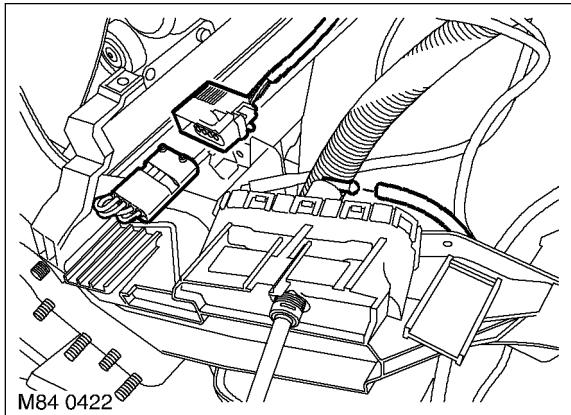
# WIPERS AND WASHERS

## Motor - wiper - headlamp

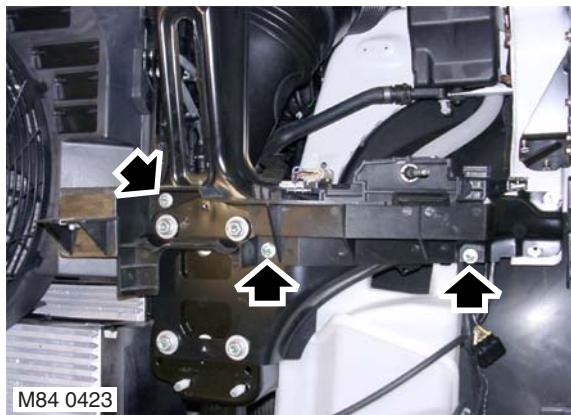
→ 84.25.12

### Remove

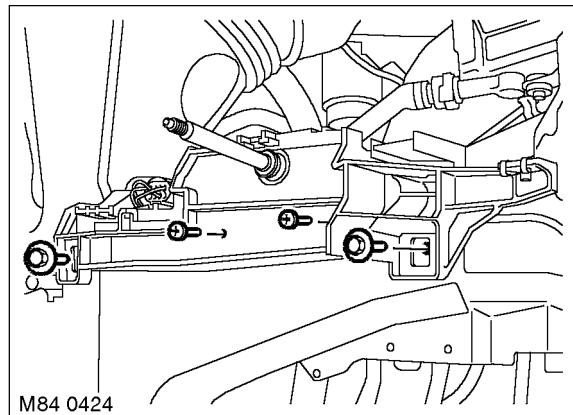
1. Remove front bumper assembly.  
☞ EXTERIOR FITTINGS, REPAIRS,  
Bumper - assembly - front.
2. Remove headlamp assembly.  
☞ LIGHTING, REPAIRS, Headlamp  
assembly.



3. Disconnect multiplug and hose from headlamp wiper motor.
4. Release harness from front panel.



5. Remove 3 bolts securing bumper support bracket and remove bracket.



6. Remove 2 bolts securing wiper motor retaining bracket, remove bracket and motor assembly.
7. Remove 2 screws and release wiper motor from bracket.

### Refit

1. Position wiper motor to bracket and secure with screws.
2. Fit motor assembly, fit and tighten bolts to 10 Nm (7 lbf.ft).
3. Fit bumper support bracket, fit and tighten bolts to 10 Nm (7 lbf.ft).
4. Secure harness to front panel, connect multiplug and hose to motor.
5. Fit headlamp assembly.  
☞ LIGHTING, REPAIRS, Headlamp  
assembly.
6. Fit front bumper assembly.  
☞ EXTERIOR FITTINGS, REPAIRS,  
Bumper - assembly - front.

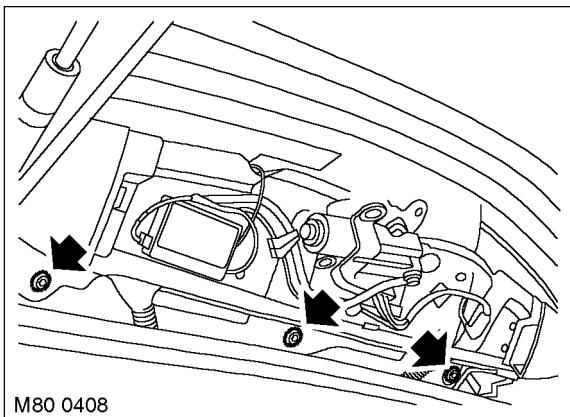


## Arm - wiper - tailgate

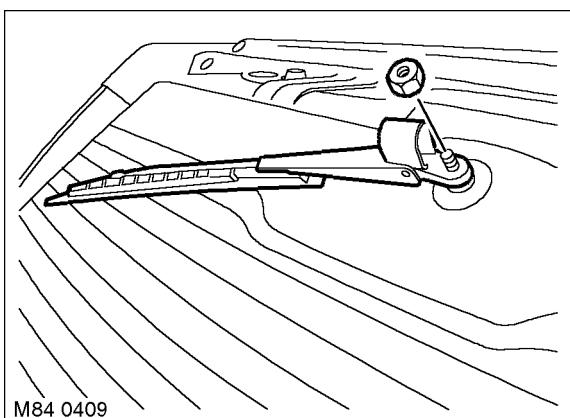
» **84.35.01**

### Remove

1. Remove upper tailgate finisher.  
☞ **DOORS, REPAIRS, Trim finisher - tailgate - upper.**



2. Remove 3 bolts securing spoiler to tailgate.
3. Close tailgate.
4. Move spoiler aside for access.



5. Raise nut cover on wiper arm and remove nut.
6. Remove rear wiper arm.

### Refit

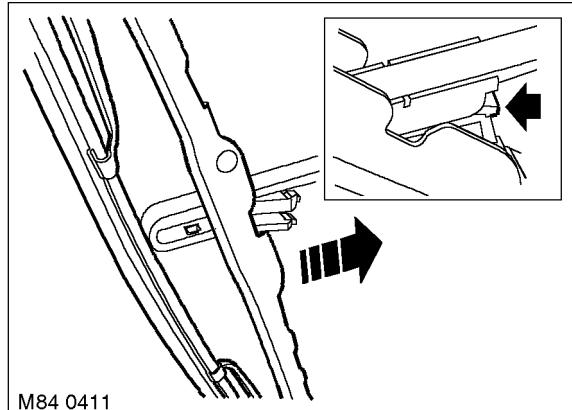
1. Fit wiper arm to spindle, align blade to glass and tighten nut to 13 Nm (10 lbf.ft).
2. Close nut cover.
3. Fit and secure spoiler to tailgate, tighten bolts to 10 Nm (7 lbf.ft).
4. Fit upper tailgate finisher.  
☞ **DOORS, REPAIRS, Trim finisher - tailgate - upper.**

## Blade - wiper - tailgate

» **84.35.02**

### Remove

1. Position rear wiper arm for access.



2. Lift wiper arm from screen.
3. Release wiper arm lock.
4. Release wiper blade from arm.

### Refit

1. Position new blade to wiper arm.
2. Push blade into engagement with arm, and check blade is retained.
3. Lower arm onto screen.
4. Return wiper to park position.

# WIPERS AND WASHERS

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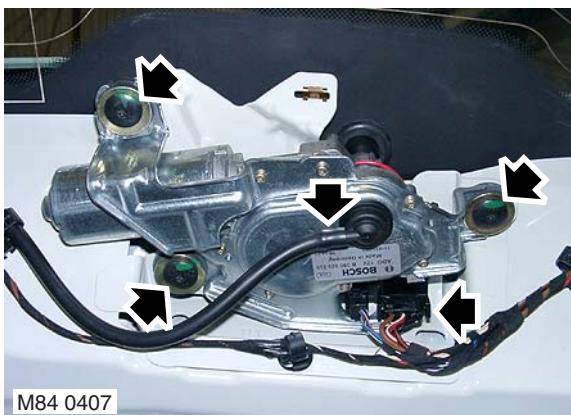
## Motor - wiper - tailgate

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→ 84.35.12

### Remove

1. Remove rear wiper arm.  
☞ **WIPERS AND WASHERS, REPAIRS,  
Arm - wiper - tailgate.**



2. Disconnect washer hose from wiper motor.
3. Disconnect multiplugs from wiper motor.
4. Remove 3 Torx screws securing rear wiper motor to tailgate.
5. Release motor from glass seal, remove motor assembly.
6. Remove seal from glass.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
7. Remove compression limiters from wiper motor rubber mountings, release and collect mounting rubbers.

### Refit

1. Fit mounting rubbers and insert compression limiters.
2. Fit new glass seal.
3. Position wiper motor assembly to tailgate, fit and tighten Torx screws to 10 Nm (7 lbf.ft).
4. Connect multiplugs.
5. Connect washer hose to wiper motor.
6. Fit wiper arm.

☞ **WIPERS AND WASHERS, REPAIRS,  
Arm - wiper - tailgate.**



## Alternator - Td6

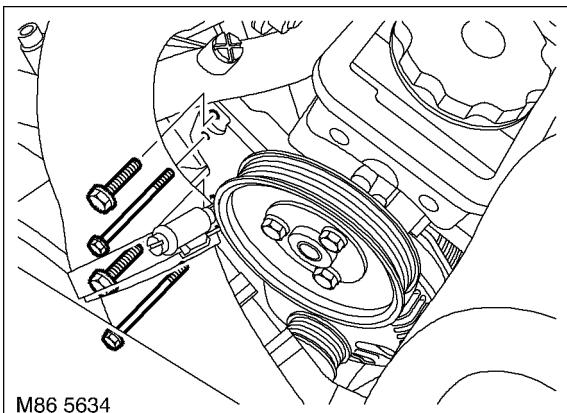
### » 86.10.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

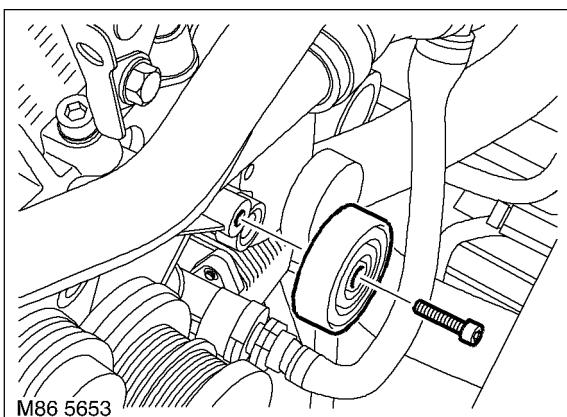
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

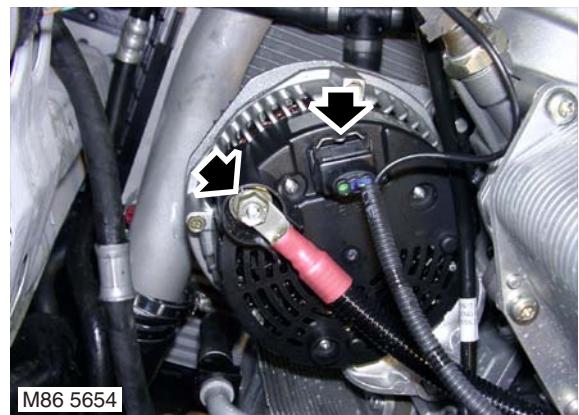
1. Disconnect battery earth lead.
  2. Remove ancillary drive belt.
- CHARGING AND STARTING, REPAIRS, Ancillary drive belt - Td6.**



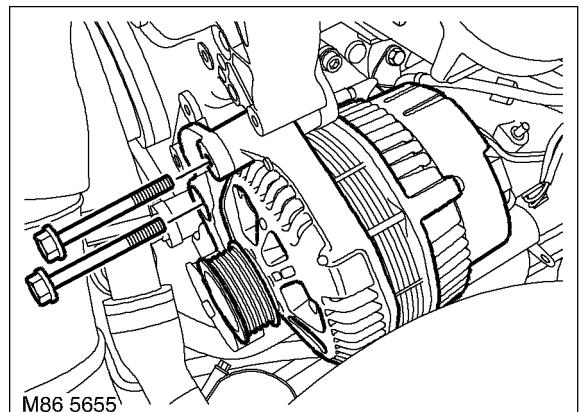
3. Remove 4 bolts securing PAS pump to mounting, release pump and tie aside.



4. Remove Allen bolt securing ancillary drive belt upper idler pulley and remove pulley.



5. Remove nut securing battery cable to alternator, release cable and position aside.
6. Disconnect alternator multiplug.



7. Remove 2 bolts securing alternator to mounting, collect idler pulley bracket and remove alternator.

#### Refit

1. Position alternator to mounting bracket.
  2. Fit jockey pulley carrier bracket and bolts to alternator. Tighten bolts to 45 Nm (33 lbf.ft).
  3. Connect alternator multiplug.
  4. Connect battery cable to alternator, fit nut and tighten to 13 Nm (10 lbf.ft).
  5. Position upper ancillary drive belt jockey pulley, fit and tighten bolt to 25 Nm (18 lbf.ft).
  6. Position PAS pump to mounting and fit bolts. Tighten M8 bolts to 25 Nm (18 lbf.ft) and M6 bolts to 10 Nm (7 lbf.ft).
  7. Fit ancillary drive belt.
- CHARGING AND STARTING, REPAIRS, Ancillary drive belt - Td6.**
8. Connect battery earth lead.

# CHARGING AND STARTING

## Alternator - V8

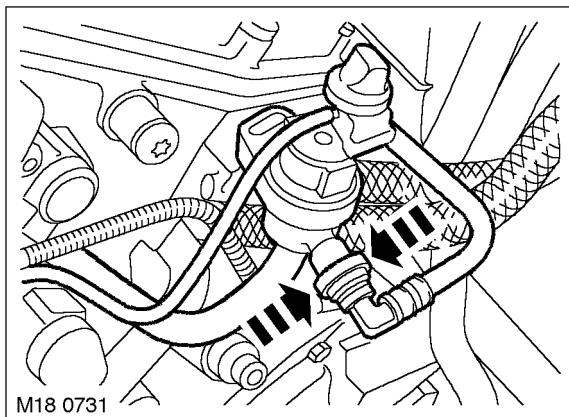
### » 86.10.02

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

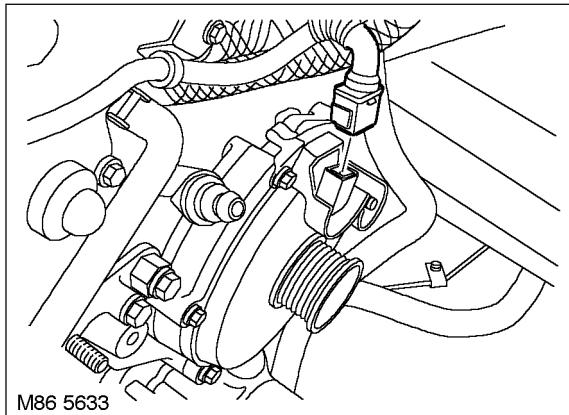
 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

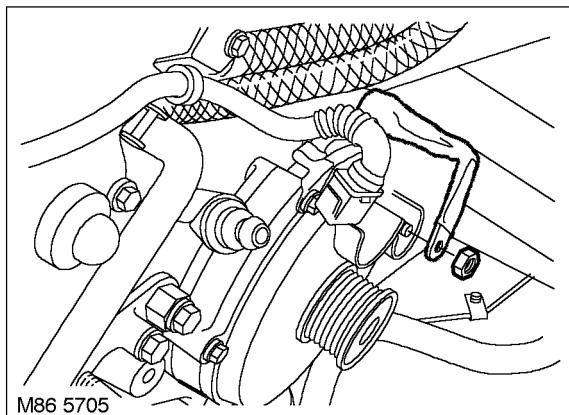
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Drain cooling system  
 **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**
4. Remove viscous coupling.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
5. Remove ancillary drive belt tensioner.  
 **CHARGING AND STARTING, REPAIRS, Tensioner - ancillary drive belt - V8.**



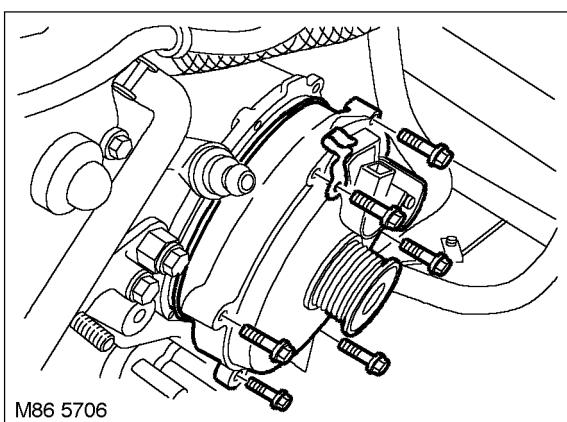
9. Disconnect pipe from charcoal canister purge control valve, release valve from bracket and position valve aside.
10. Release battery lead from securing clip on engine timing cover.



11. Disconnect multiplug from alternator.



12. Remove nut and disconnect battery cable from alternator.
13. Release alternator harness from securing clip on alternator.



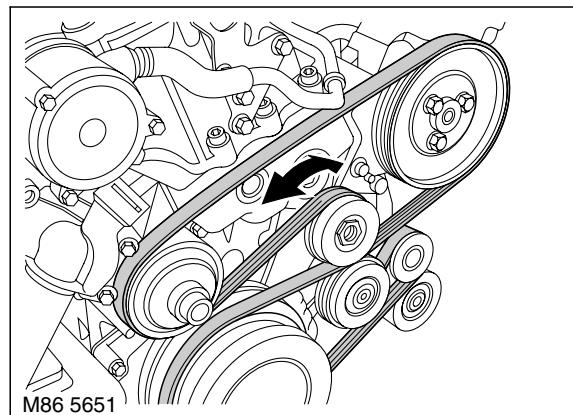
- 14.** Remove 6 bolts securing alternator, remove harness securing clip and remove alternator. Discard alternator 'O' ring.

**Refit**

1. Clean alternator and engine timing gear cover mating face.
2. Lubricate and fit new 'O' ring to alternator.
3. Position alternator to casing, fit bolts securing alternator and tighten to 13 Nm (10 lbf.ft).
4. Connect battery lead to alternator and tighten nut securing battery lead to alternator to 13 Nm (10 lbf.ft).
5. Secure battery lead into securing clip on engine timing cover.
6. Connect multiplug to alternator.
7. Secure alternator harness into securing clip on alternator.
8. Fit charcoal canister purge control valve and connect pipe.
9. Connect radiator top hose to coolant pump and alternator and secure clips.
10. Connect top hose to radiator and secure with clip.
11. Fit ancillary drive belt tensioner.  
☞ **CHARGING AND STARTING, REPAIRS, Tensioner - ancillary drive belt - V8.**
12. Fit viscous coupling.  
☞ **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**
13. Connect battery earth lead.
14. Fill cooling system.  
☞ **COOLING SYSTEM - V8, ADJUSTMENTS, Coolant - drain, flush & refill.**

**Ancillary drive belt - Td6****☞ 86.10.03****Remove**

1. Remove compressor drive belt.  
☞ **AIR CONDITIONING, REPAIRS, Drive belt - compressor - Td6.**
2. Remove viscous coupling.  
☞ **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**



3. Using a 24 mm socket, rotate tensioner anticlockwise and remove belt from coolant pump pulley, relax tensioner.
4. Release and remove ancillary drive belt from remaining pulleys.

**Refit**

1. Check drive belt pulleys are damage free.
2. Ensure compressor pulleys and drive belt are clean.
3. Position ancillary drive belt to pulleys.
4. Rotate tensioner anticlockwise, fit belt and release tension. Ensure drive belt is correctly aligned to pulleys.
5. Fit viscous coupling.  
☞ **COOLING SYSTEM - Td6, REPAIR, Coupling unit - viscous fan.**
6. Fit compressor drive belt.  
☞ **AIR CONDITIONING, REPAIRS, Drive belt - compressor - Td6.**

# CHARGING AND STARTING

## Ancillary drive belt - V8

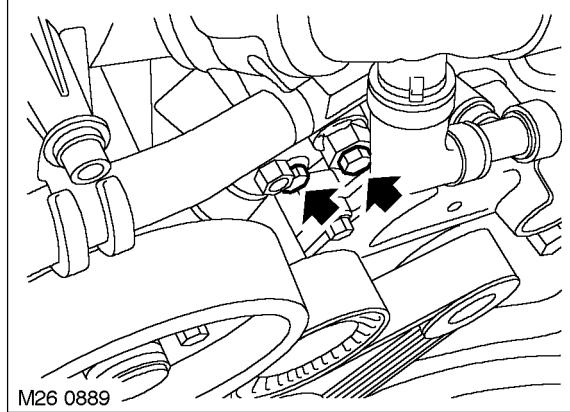
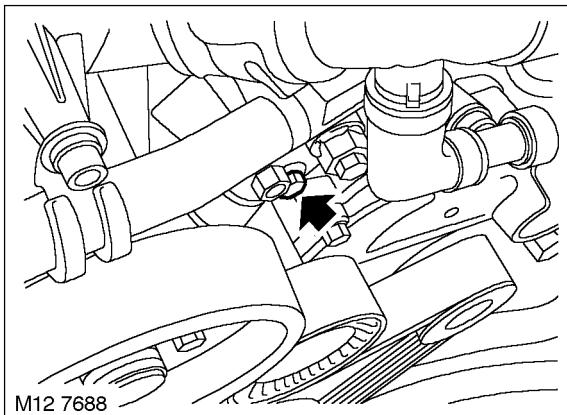
### » 86.10.03

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

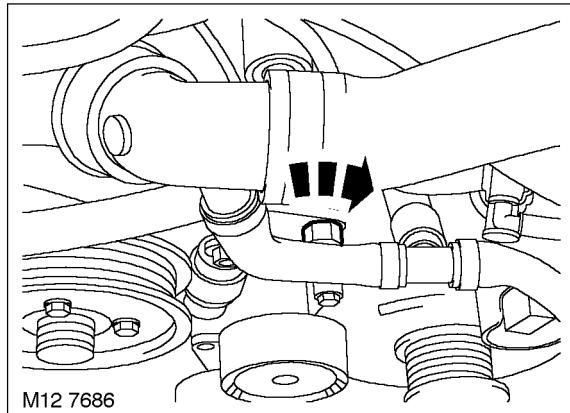
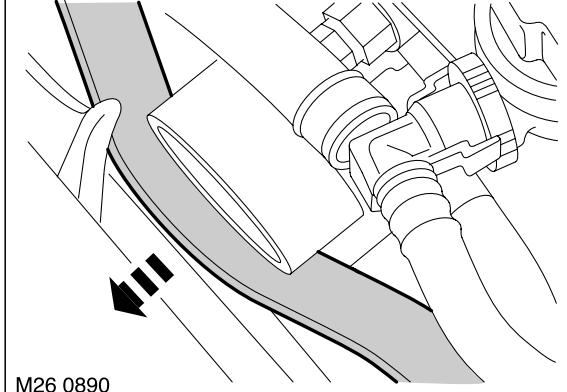
### Remove

1. Disconnect battery earth lead.



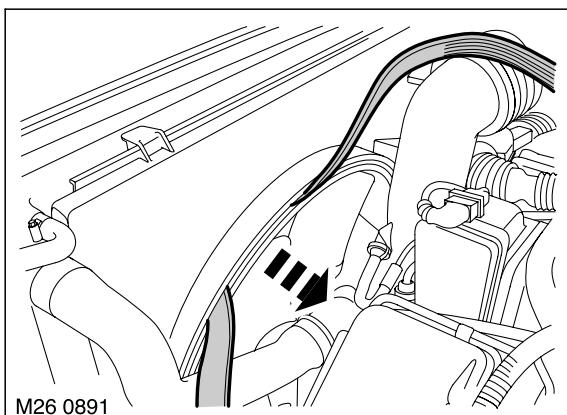
2. Loosen 2 ancillary drive belt tensioner bolts.

4. Hold tensioner in retracted position and tighten tensioner clamping bolt.



3. Using a 17 mm (11/16 in') spanner, rotate belt tensioner fully clockwise to release tension on ancillary drive belt.

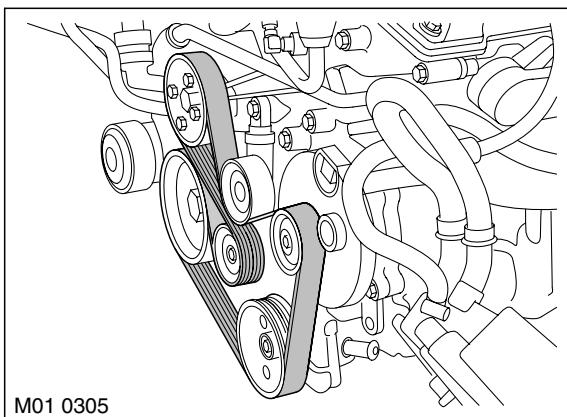
5. Release ancillary drive belt from tensioner pulley.
6. Release and remove ancillary drive belt from remaining pulleys.



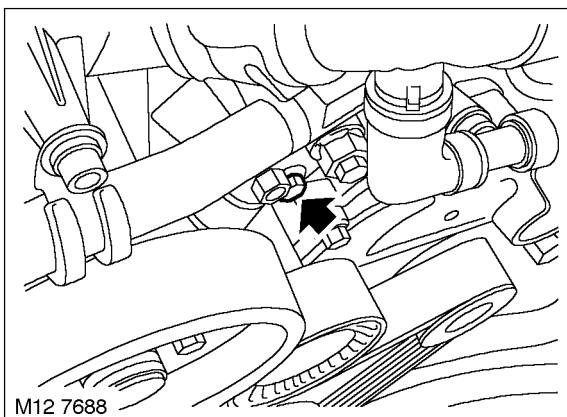
7. Slowly rotate fan by hand while positioning ancillary drive belt over fan blades between fan and fan cowl to remove belt.

**Refit**

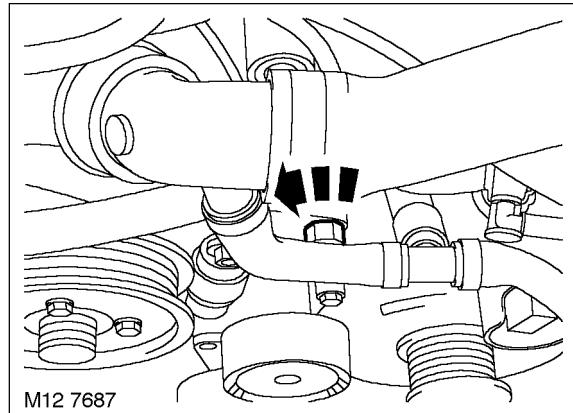
1. Check drive belt pulleys are damage free.
2. Fit ancillary drive belt over cooling fan assembly.
3. Fit ancillary drive belt to all pulleys except tensioner pulley.



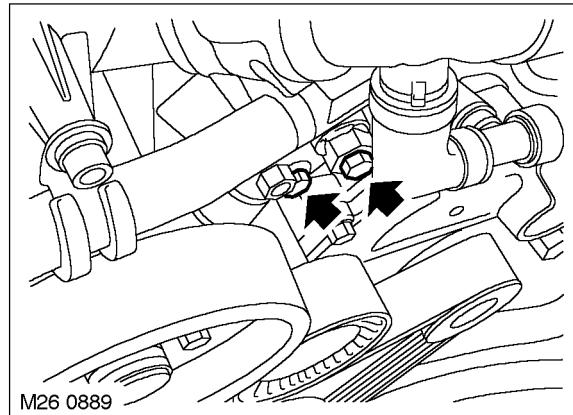
4. Fit ancillary drive belt to tensioner pulley. Ensure ancillary drive belt is aligned to all pulleys.



5. Undo tensioner clamping bolt to release tensioner



6. Using a 17 mm (11/16 in) spanner, rotate belt tensioner fully anticlockwise to tension ancillary drive belt.



7. Hold tensioner in the tensioned position and tighten tensioner bolts to 30 Nm (22 lbf.ft).
8. Connect battery earth lead.

# CHARGING AND STARTING

## Tensioner - ancillary drive belt - Td6

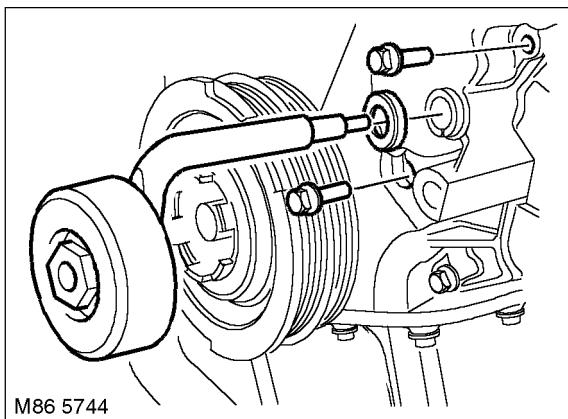
### → 86.10.06

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

### Remove

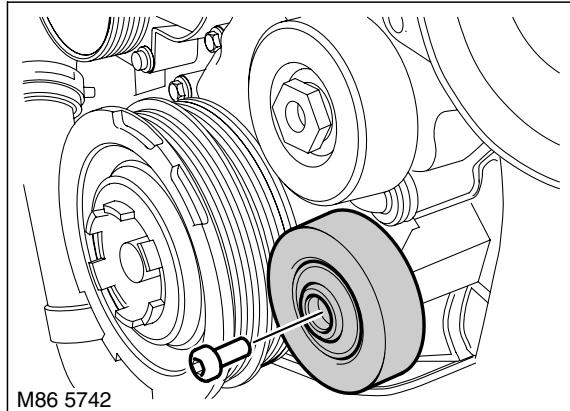
1. Disconnect battery earth lead.
2. Remove ancillary drive belt.  
 **CHARGING AND STARTING, REPAIRS, Ancillary drive belt - Td6.**
3. Remove alternator.  
 **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**



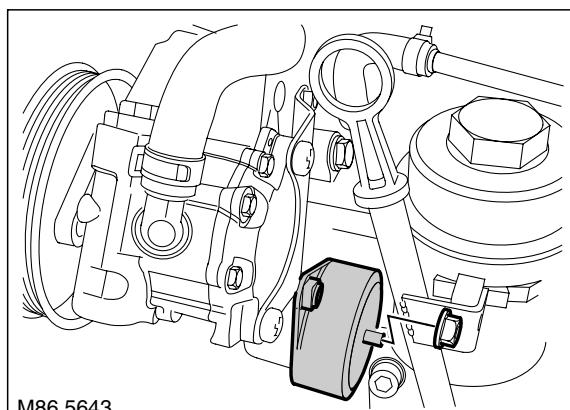
7. Remove and discard tensioner arm seal.
8. Remove 2 bolts securing ancillary drive belt tensioner to lower timing gear cover.
9. Remove tensioner.

### Refit

1. Clean tensioner block and mounting.
2. Position tensioner block, temporarily fit tensioner arm to align spring block with timing cover. Fit bolts and tighten to 25 Nm (18 lbf.ft). Remove tensioner arm.
3. Clean seal mounting for tensioner arm on timing cover, fit new seal.
4. Fit ancillary drive belt tensioner to timing cover, push fully home. Fit new nut and tighten to 10 Nm (7 lbf.ft).
5. Fit alternator.  
 **CHARGING AND STARTING, REPAIRS, Alternator - Td6.**
6. Fit idler pulley to mounting and tighten Allen bolt to 25 Nm (18 lbf.ft).
7. Fit ancillary drive belt.  
 **CHARGING AND STARTING, REPAIRS, Ancillary drive belt - Td6.**
8. Connect battery earth lead.



4. Remove Allen bolt, securing ancillary belt idler and remove idler from vehicle.



5. Remove nut, securing ancillary drive belt tensioner arm to rear of spring housing.
6. Remove tensioner arm from mounting.



## Tensioner - ancillary drive belt - V8

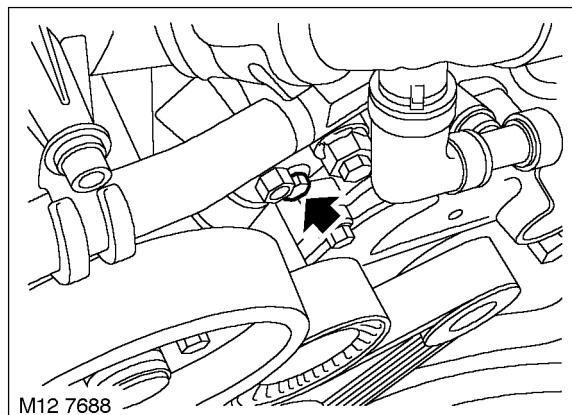
### » 86.10.06

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

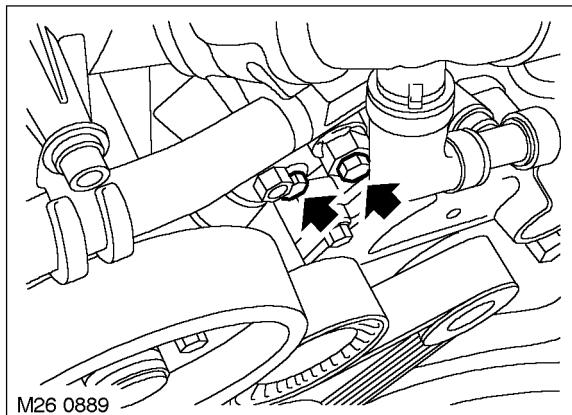
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

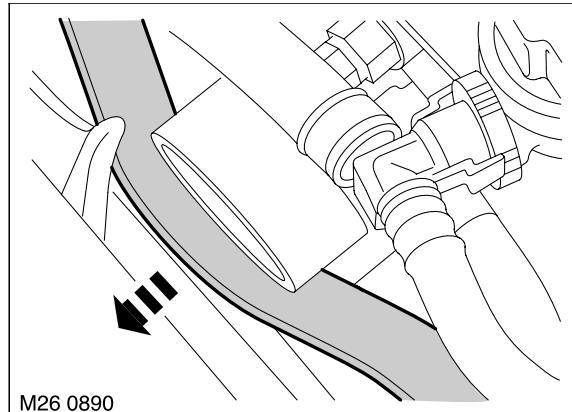
1. Disconnect battery earth lead.
2. Remove fan cowl.  
 **COOLING SYSTEM - V8, REPAIRS, Coupling unit - viscous fan.**



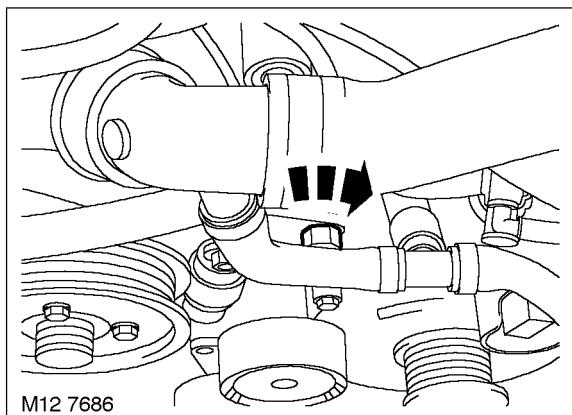
5. Hold tensioner in retracted position and tighten tensioner clamping bolt.



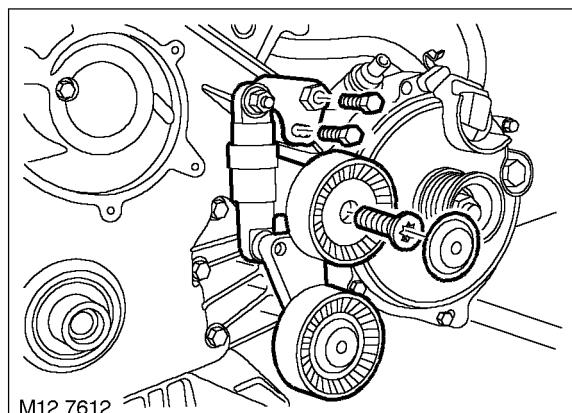
3. Loosen 2 ancillary drive belt tensioner bolts.



6. Release ancillary drive belt from tensioner pulley.



4. Using a 17 mm (11/16 in) spanner, rotate belt tensioner fully clockwise to release tension on ancillary drive belt.



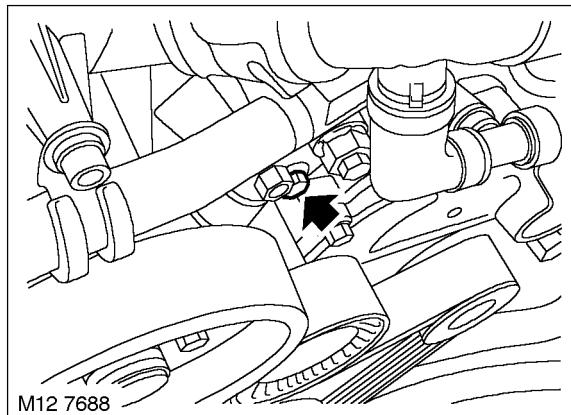
7. Remove nut securing tensioner to tensioner adjusting bracket.
8. Remove 2 bolts securing ancillary drive belt tensioner to lower timing gear cover.

## CHARGING AND STARTING

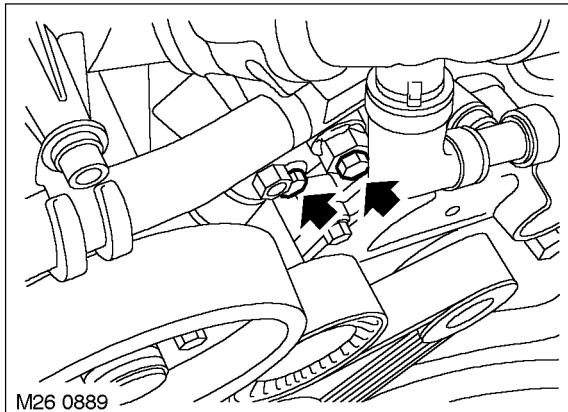
9. Remove dust cap from ancillary drive belt tensioner idler pulley and remove Torx bolt securing ancillary drive belt tensioner idler pulley.
10. Remove ancillary drive belt tensioner assembly.
11. Remove bolt and tensioner from pulley mounting.
12. Remove tensioner from tensioner adjusting bracket.

### Refit

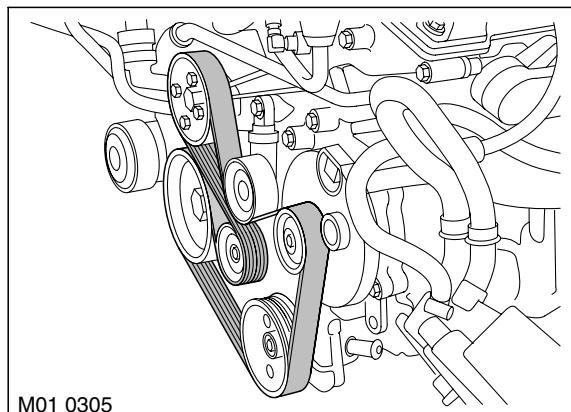
1. Fit tensioner to tensioner adjusting bracket, fit securing nut but do not fully tighten at this stage.
2. Fit tensioner to pulley mounting and tighten securing bolt.
3. Fit pulley and tensioner mounting to timing gear cover and tighten securing bolt.
4. Fit dust cap to tensioner pulley.



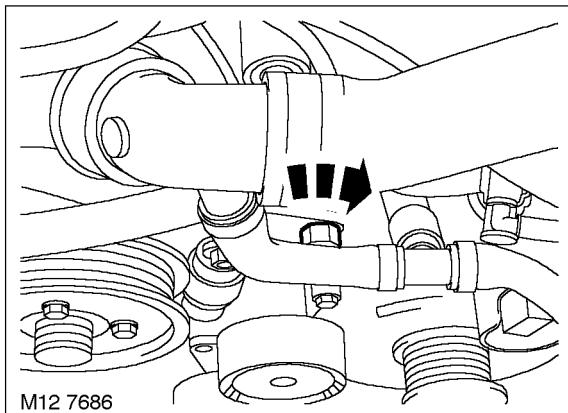
7. Hold tensioner in retracted position and tighten tensioner clamping bolt.
8. Fit ancillary drive belt to all pulleys except tensioner pulley.



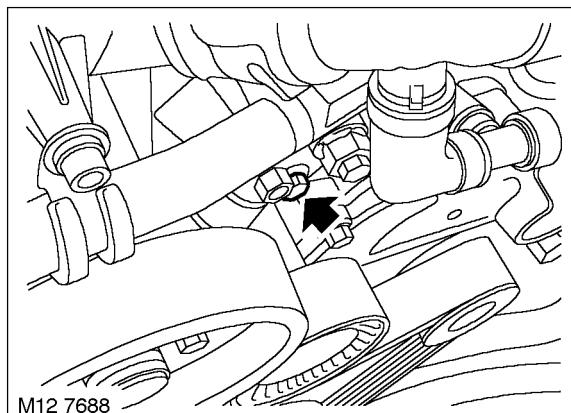
5. Fit tensioner to upper timing gear cover, fit 2 securing bolts but do not tighten at this stage.



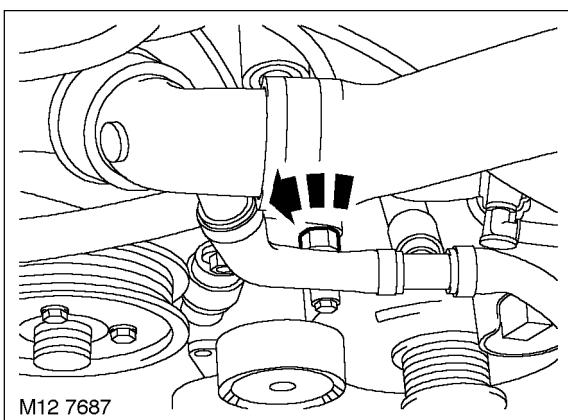
9. Fit ancillary drive belt to tensioner pulley. Ensure ancillary drive belt is aligned to all pulleys.



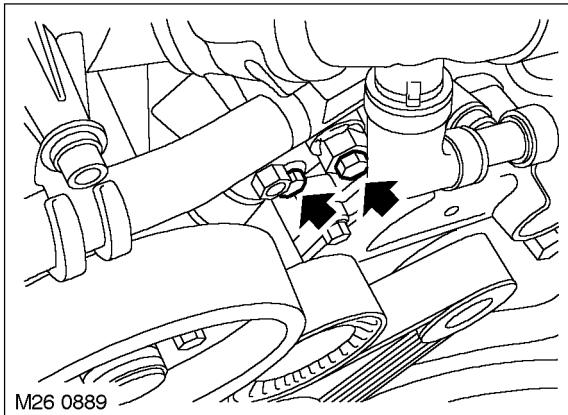
6. Using a 17 mm (11/16 in) spanner, rotate belt tensioner fully clockwise.



10. Undo tensioner clamping bolt to release tensioner



11. Using a 17 mm (11/16 in) spanner, rotate belt tensioner fully anticlockwise to tension ancillary drive belt.



12. Hold tensioner in the tensioned position and tighten tensioner bolts to 30 Nm (22 lbf.ft).
13. Tighten tensioner to tensioner adjusting bracket securing nut.
14. Fit fan cowl.  
 **COOLING SYSTEM - V8, REPAIRS,  
Coupling unit - viscous fan.**
15. Connect battery earth lead.

## Battery

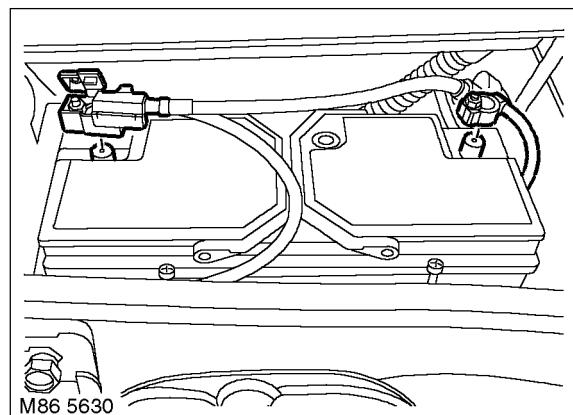
### 86.15.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

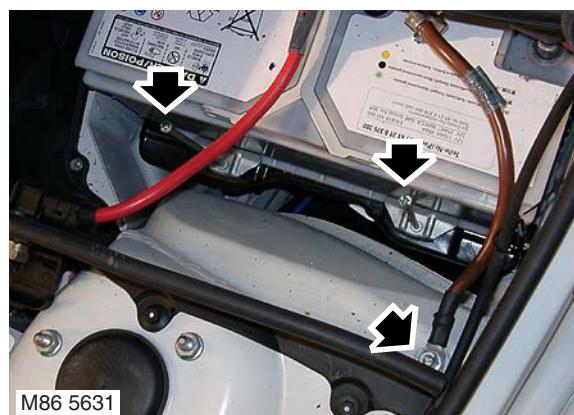
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Open bonnet.
2. **V8 models only:** Disconnect bonnet earth lead.
3. Release screen washer tube and heated washer jet harness from bonnet clip.
4. Secure bonnet in service position.



5. Disconnect both battery terminals, earth lead first.



6. Remove battery clamps.
7. Remove nut securing earth lead to body, release lead from stud.
8. Remove battery.

# CHARGING AND STARTING

## Refit

1. Clean battery tray.
2. Fit battery, align battery clamps fit and tighten bolts to 10 Nm (7 lbf.ft).
3. Connect body earth lead to stud, fit nut and tighten to 25 Nm (18 lbf.ft).
4. Connect gas struts to body.
5. **V8 models only:** Connect bonnet earth lead and tighten nut to 6 Nm (4.4 lbf.ft).
6. Position washer harness and tube to bonnet, secure clip.
7. Apply petroleum jelly to both terminals, fit and tighten terminal bolts, negative lead last.

**CAUTION:** After re-connecting the battery, the steering wheel must be turned to full LH and RH lock (with engine running). This allows the DSC system to relearn the steering wheel position. Failure to do so will result in a variety of instrument warning lights being illuminated.

## Carrier - battery

### » 86.15.11

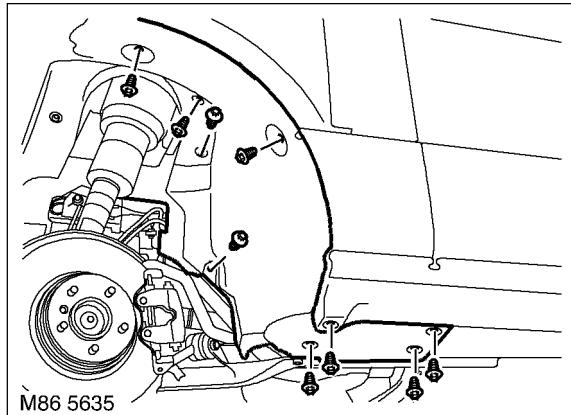
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

 **GENERAL INFORMATION, Electrical Precautions.**

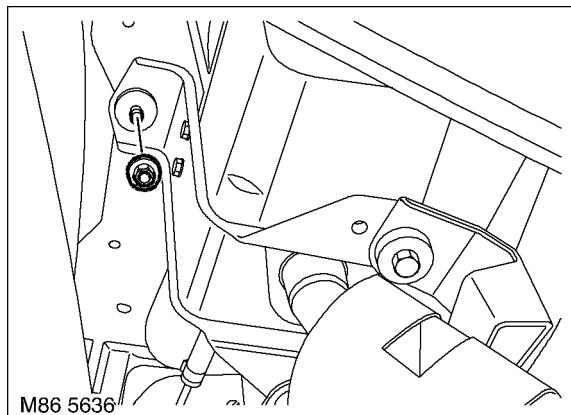
### Remove

1. Remove battery.

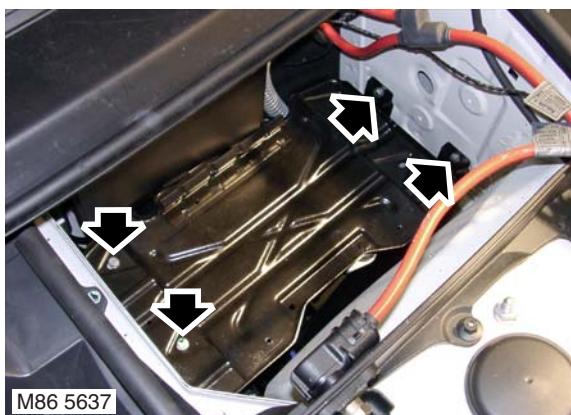
 **CHARGING AND STARTING, REPAIRS, Battery.**



2. Remove 9 screws securing rear of wheelarch liner to inner wing and sill, release liner from wing for access.



3. Remove nut securing fuel burning heater (FBH) to underside of battery tray.



4. Remove 4 bolts and battery carrier.

#### Refit

1. Fit battery carrier, ensure stud aligns with FBH mounting bracket.
2. Fit bolts to carrier and nut to FBH mounting bracket, tighten to 10 Nm (7 lbf.ft).
3. Fit and secure wheelarch liner.
4. Fit battery.  
 **CHARGING AND STARTING, REPAIRS, Battery.**

#### Starter motor - Td6

 **86.60.01**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

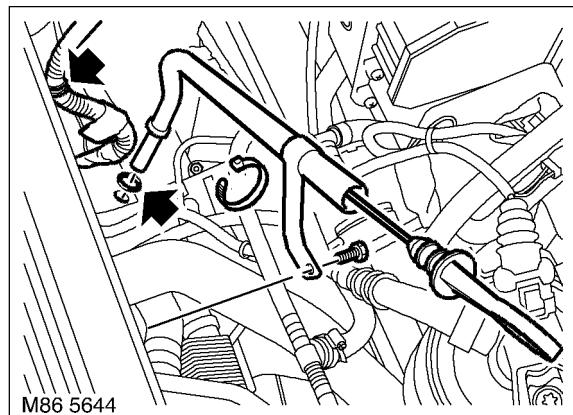
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.

2. Remove air intake plenum.

 **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**

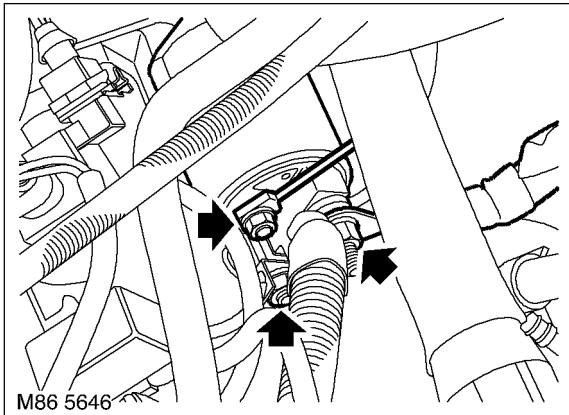


3. Remove cable tie securing harness to dipstick tube.
4. Release fuel hose clip from dipstick tube.
5. Remove dipstick.
6. Remove bolt securing dipstick tube.
7. Remove dipstick tube and discard 'O' ring.
8. Release positive cable clip from inlet manifold.



9. Remove 2 Torx bolts and release starter motor for access to electrical connections.

## CHARGING AND STARTING



10. Remove nut and disconnect battery cable from starter motor.
11. Remove 2 nuts and disconnect remaining leads from starter motor.
12. Remove starter motor.

### Refit

1. Clean starter motor and mating face. Clean dowel and dowel hole.
2. Position starter motor, connect leads and tighten nuts to 6 Nm (4.4 lbf.ft).
3. Fit battery cable to starter motor and tighten nut to 15 Nm (11 lbf.ft).
4. Fit starter motor and tighten Torx bolts to 47 Nm (35 lbf.ft).
5. Fit positive cable clip to inlet manifold.
6. Clean dipstick tube and location in oil sump.
7. Fit 'O' ring to dipstick tube, fit tube and tighten bolt to 6 Nm (4.4 lbf.ft).
8. Fit dipstick.
9. Fit fuel hose clip to dipstick tube.
10. Secure harness to dipstick tube.
11. Fit air intake plenum.

**HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**

12. Connect battery earth lead.

## Starter motor - V8

### 86.60.01

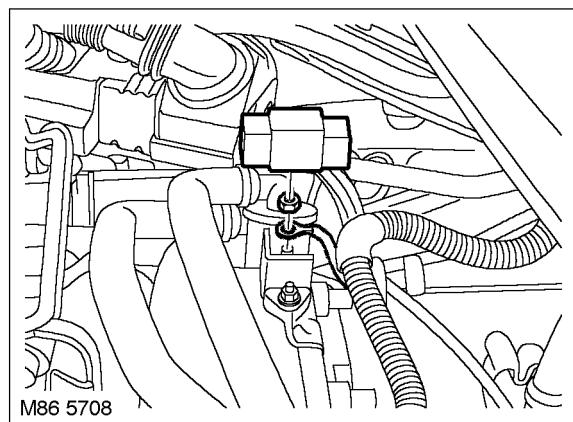
Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

### Remove

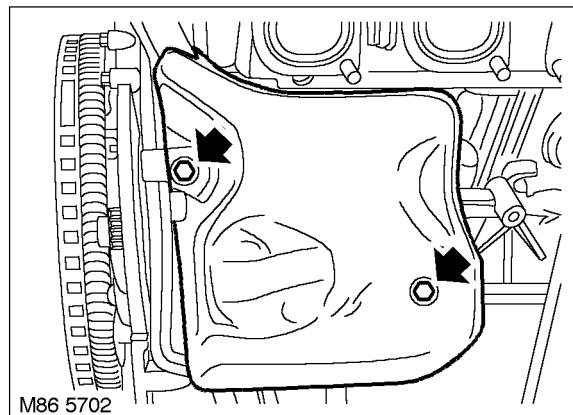
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove air intake plenum.

**HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**



4. Release terminal cover, remove nut and disconnect 2 cables from terminal post.
5. Remove RH exhaust manifold.

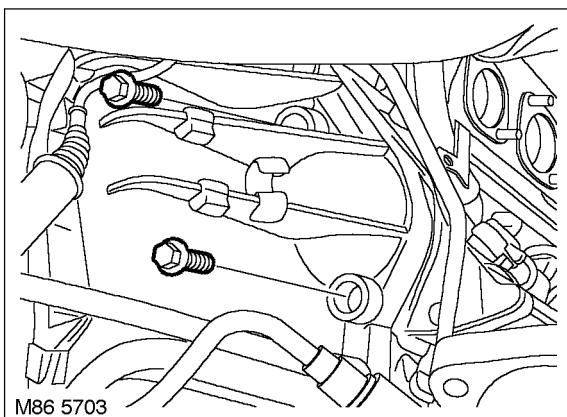
**MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - exhaust manifold - RH.**



6. Remove 2 bolts and remove heat shield.

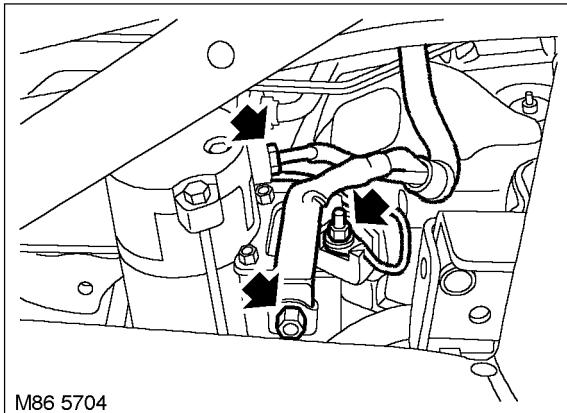


## CHARGING AND STARTING



7. Fit RH exhaust manifold.  
☞ **MANIFOLD AND EXHAUST SYSTEM - V8, REPAIRS, Gasket(s) - exhaust manifold - RH.**
8. Connect 2 cables to terminal post secure with nut and fit terminal cover.
9. Fit air intake plenum.  
☞ **HEATING AND VENTILATION, REPAIRS, Plenum - air intake.**
10. Connect battery earth lead.

7. Remove 2 bolts and release starter motor.
8. Reposition starter motor to allow access to electrical connectors.



9. Remove nut and disconnect battery lead from starter motor.
10. Remove 2 nuts and disconnect remaining leads from starter motor.
11. Disconnect starter motor breather pipe.
12. Remove starter motor.

### Refit

1. Clean starter motor and mating face. Clean dowel and dowel hole.
2. Connect starter motor breather pipe.
3. Position starter motor, connect starter motor leads and tighten nuts securing starter motor leads to 6 Nm (4.4 lbf.ft)
4. Connect battery lead to starter motor and tighten nut securing battery lead to starter motor to 15 Nm (11 lbf.ft).
5. Fit starter motor, fit 2 bolts and tighten bolts securing starter motor to 47 Nm (35 lbf.ft).
6. Fit heat shield, fit 2 bolts and tighten bolts securing heat shield to starter motor to 10 Nm (7 lbf.ft).

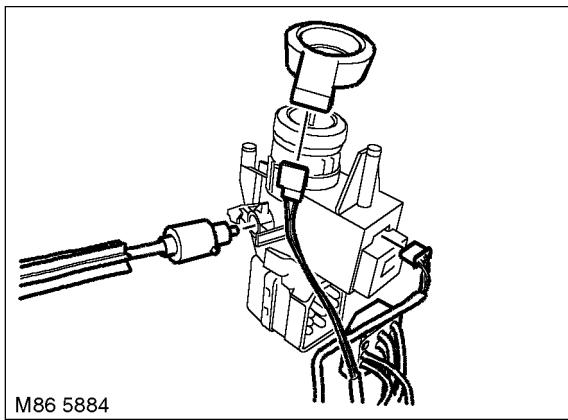
# CHARGING AND STARTING

## Switch - ignition/starter

» 86.65.02

### Remove

1. Remove centre console.  
☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**



2. Disconnect shift interlock cable from ignition barrel.
3. Disconnect 3 multiplugs from ignition switch and passive coil. Remove ignition switch.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
4. Release and remove passive coil from ignition switch.

### Refit

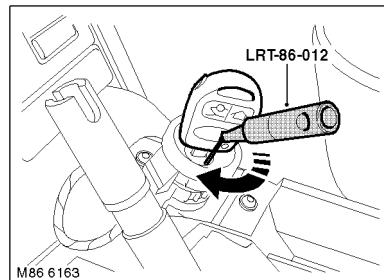
1. Fit and secure passive coil to ignition switch.
2. Connect multiplugs to passive coil and ignition switch.
3. Connect shift interlock cable to ignition barrel.
4. Fit centre console.  
☞ **INTERIOR FITTINGS, REPAIRS, Centre console.**

## Barrel - lock- ignition switch

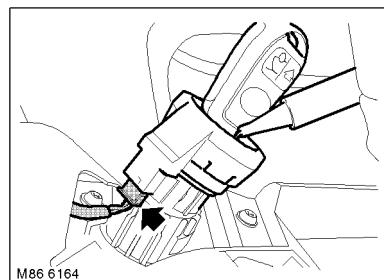
» 86.65.14

### Remove

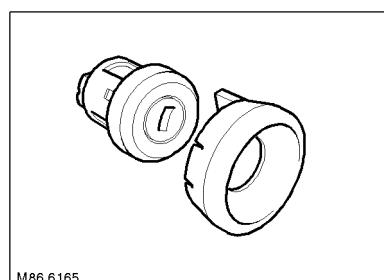
1. Remove centre console finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - console.**
2. Turn key in ignition switch to position 1.



3. Insert **LRT-86-012** into ignition barrel access hole. Carefully turn **LRT-86-012** clockwise to release ignition barrel from ignition switch.



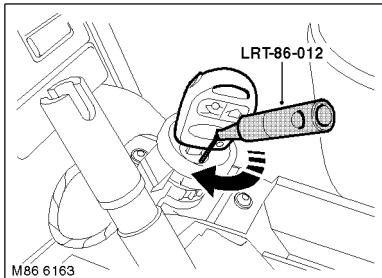
4. Disconnect multiplug from passive coil.
5. Remove ignition barrel from ignition switch.
6. Remove ignition key.



7. Release and remove passive coil from ignition switch.

**Refit**

1. Fit and secure passive coil to ignition switch.
2. Turn key in ignition switch to position 1.



3. Insert **LRT-86-012** into ignition barrel access hole. Carefully turn **LRT-86-012** clockwise and fit ignition barrel into ignition switch.
4. Remove ignition key.
5. Connect multiplug to passive coil.
6. Fit centre console finisher.

 **INTERIOR FITTINGS, REPAIRS,**  
**Finisher - console.**

## **CHARGING AND STARTING**

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## Headlamps - align beam

### » 86.40.17

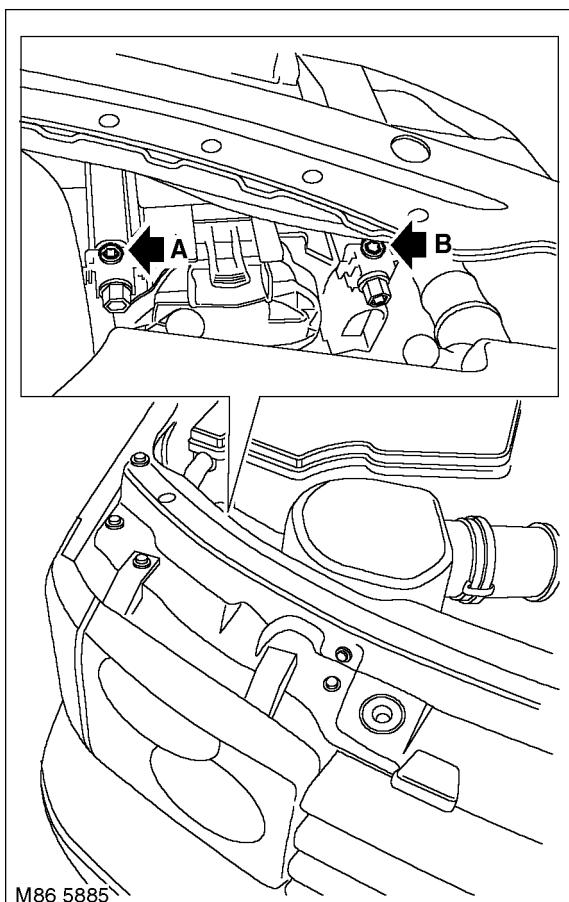
Between VINs 2A100042 and 3A117361, models with Xenon headlamps were fitted with a headlamp levelling ECU. All vehicles in this VIN range must have TestBook/T4 connected to align the headlamps.

#### Check

1. Ensure vehicle is parked on level ground and is at standard ride height
2. **Models with headlamp levelling ECU:**  
Connect TestBook/T4 to align headlamps.
3. Position and align beam setting equipment to headlamp.
4. Switch on headlamps. Headlamp setting 1.4% below horizontal and parallel.

#### Adjust

1. Adjust headlamp using a 6 mm Allen key.



2. Turn Allen screw 'A' for vertical alignment.

3. Turn Allen screw 'B' for horizontal alignment.  
**When adjusting horizontal alignment ensure the vertical alignment remains within specification.**

4. Align beam setting equipment to 2nd headlamp.
5. Adjust 2nd headlamp as detailed above.
6. Switch off headlamps and remove beam setting equipment.

## LIGHTING

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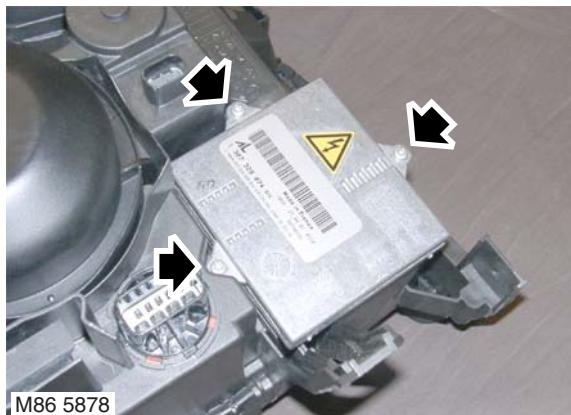


## Control unit - gas discharge - Xenon headlamps

» 86.40.03

### Remove

1. Remove headlamp assembly.  
☞ **LIGHTING, REPAIRS, Headlamp assembly.**



2. Remove 3 Torx screws securing the gas discharge control unit to head lamp assembly.
3. Disconnect multiplug from headlamp and remove gas discharge control unit.

### Refit

1. Clean headlamp area around the gas discharge control unit multiplug.
2. Fit the gas discharge control unit to headlamp and secure with Torx screws.
3. Fit headlamp assembly.  
☞ **LIGHTING, REPAIRS, Headlamp assembly.**

## Electronic control unit (ECU) headlamp levelling - Xenon headlamps only

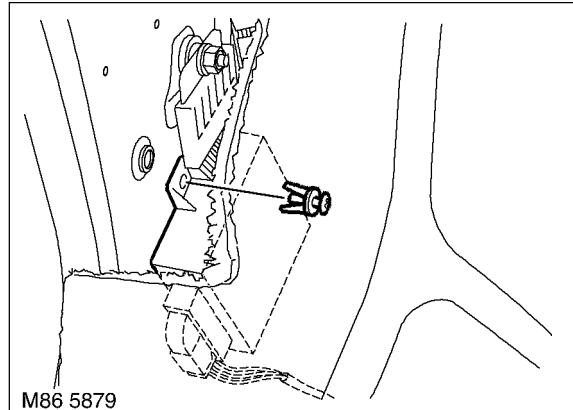
» 86.40.06

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

The headlamp levelling ECU is only fitted to models between the following VINs; 2A100042 and 3A117361.

### Remove

1. Disconnect battery earth lead.
2. Remove lower finisher from LH 'A' post.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - lower.**



3. Pull carpet edge back for access.
4. Remove upper scritet securing ECU and carefully release ECU from lower scritet.
5. Release and disconnect multiplug from ECU and remove the ECU.

### Refit

1. Position ECU and connect multiplug.
2. Fit ECU to lower scritet and secure with upper scritet.
3. Fit 'A' post lower finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - lower.**
4. Connect the battery earth lead.
5. Configure new ECU using TestBook/T4.
6. Adjust headlamps.  
☞ **LIGHTING, ADJUSTMENTS, Headlamps - align beam.**

# LIGHTING

## Bulb - headlamp

→ 86.40.09

**WARNING:** For vehicles fitted with Xenon headlamps, the following precautions must be observed. Failure to comply may result in exposure to ultra violet rays, severe electric shock, burns or risk of explosion.

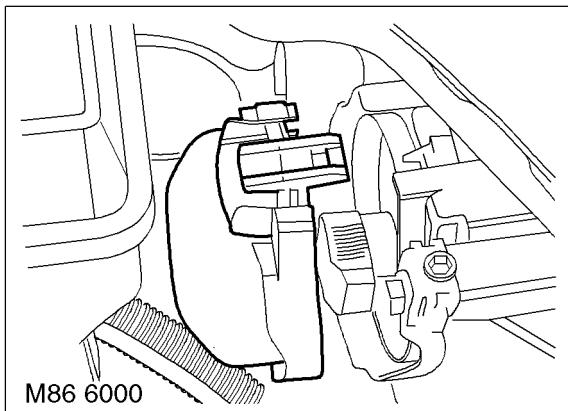
- Ensure headlamps are switched off at all times
- Eye and hand protection must be worn
- Never switch on lamps or test bulbs with the lamp holder detached from headlamp

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

→ **GENERAL INFORMATION, Electrical Precautions.**

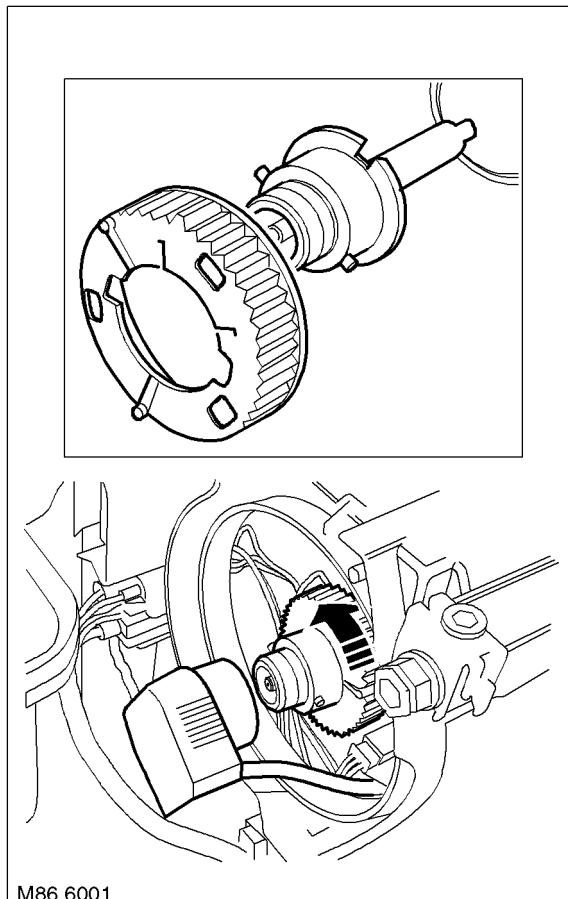
### Remove

1. Open bonnet for access.
2. Disconnect battery earth lead.
3. **RH Headlamp on V8 models:** Remove air cleaner assembly.  
→ **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Housing - air cleaner.**



4. Remove headlamp bulb dust cover.

*NOTE: Xenon headlamp illustrated.*



5. Disconnect the headlamp bulb bayonet connection.

→ **GENERAL INFORMATION, Electrical Precautions.**

*NOTE: Xenon headlamp illustrated.*

6. Remove collar securing bulb to lampholder, release and remove bulb.

### Refit

1. Position the bulb to the lampholder, fit and secure the collar.
2. Connect headlamp bulb bayonet connection.
3. Fit and secure headlamp bulb dust cover.
4. **RH Headlamp on V8 models:** Fit air cleaner assembly.

→ **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Housing - air cleaner.**

5. Connect the battery earth lead.
6. Close bonnet.



## Lamp assembly - side & indicator

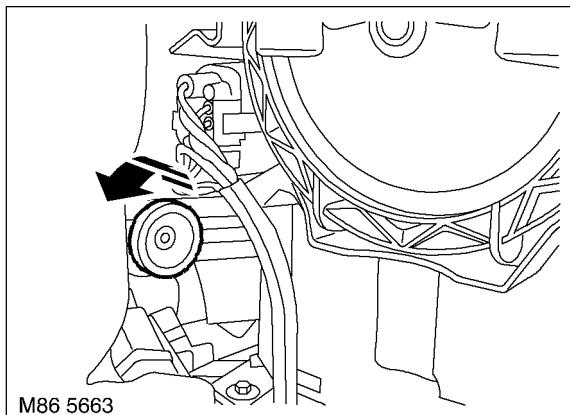
### » 86.40.29

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

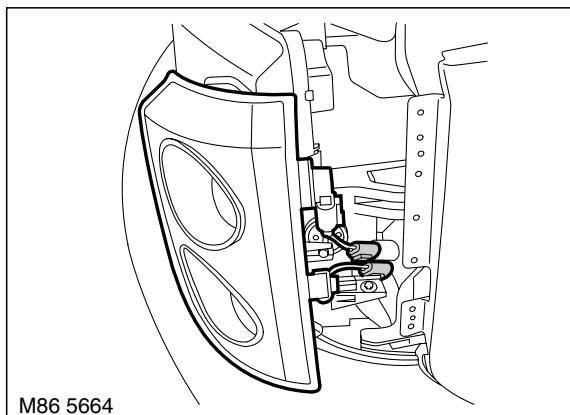
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.

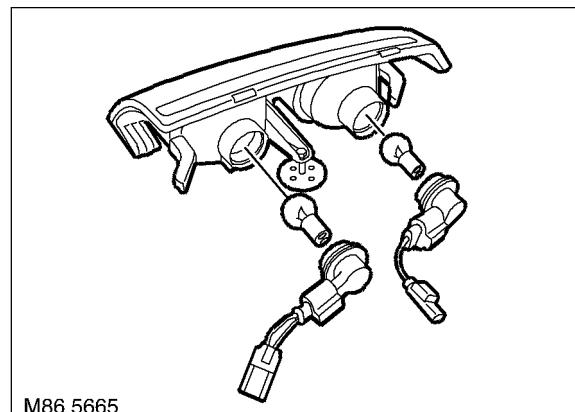


2. Remove thumbscrew nut securing lamp assembly to headlamp mounting bracket.



3. Slide lamp assembly forward, disconnect multiplugs and remove lamp assembly.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



4. Remove bulb holders from lamp assembly, remove bulbs from holders.

#### Refit

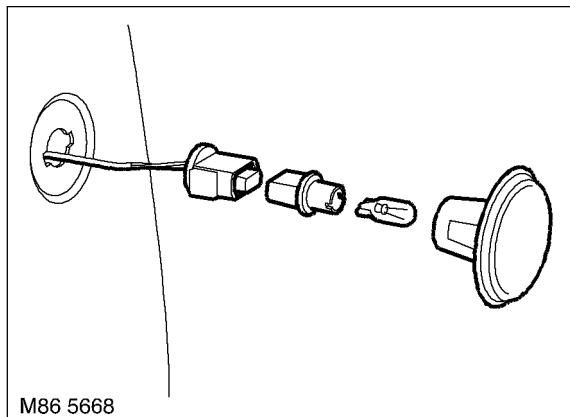
1. Fit bulbs to holders.
2. Fit bulb holders to lamp assembly.
3. Connect multiplugs.
4. Fit and secure lamp assembly.
5. Connect battery earth lead.

# LIGHTING

## Lamp assembly - indicator side repeater

☞ 86.40.53

### Remove



1. Push side repeater lamp towards front of vehicle. Release clip and ease lamp from wing.
2. Disconnect multiplug.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
3. Release bulb holder from lamp.
4. Release bulb from holder.

### Refit

1. Fit bulb and secure bulb holder to lamp.
2. Connect multiplug.
3. Fit and secure lamp assembly.

## Headlamp assembly

☞ 86.40.55

**WARNING:** For vehicles fitted with Xenon headlamps, the following precautions must be observed. Failure to comply may result in exposure to ultra violet rays, severe electric shock, burns or risk of explosion.

- Ensure headlamps are switched off at all times
- Eye and hand protection must be worn
- Never switch on lamps or test bulbs with the lamp holder detached from headlamp

### Remove

1. **RH Headlamp on V8 models:** Remove air cleaner assembly.

**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Housing - air cleaner.**

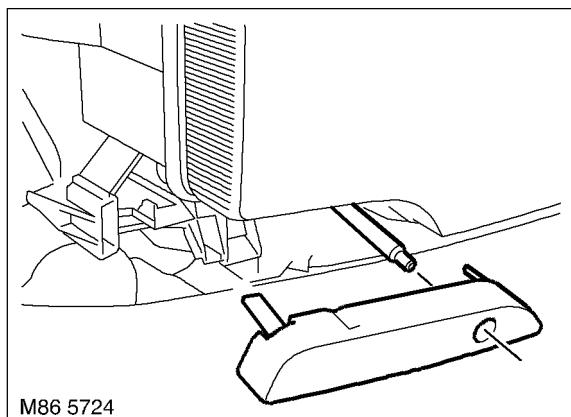
2. Remove side and indicator lamp  
 **LIGHTING, REPAIRS, Lamp assembly - side & indicator.**

3. Protect bumper from damage.

**CAUTION:** Always protect paintwork when removing or refitting any body trims or bumpers.

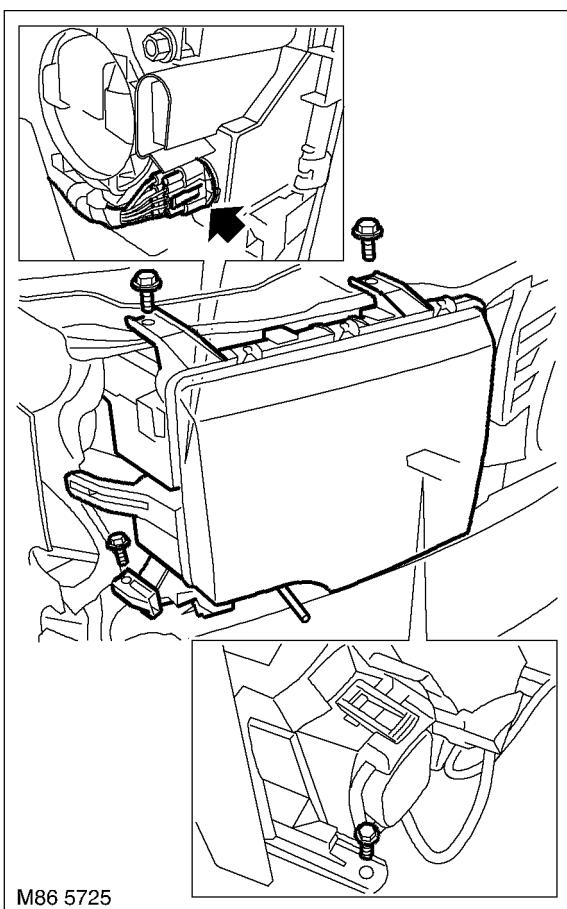
4. Remove headlight wiper arm.

**WIPERS AND WASHERS, REPAIRS, Arm - wiper - headlamp.**



5. Remove headlight wiper spindle escutcheon.
6. Remove front grille.

**EXTERIOR FITTINGS, REPAIRS, Front grille.**



7. Remove 4 bolts securing headlamp.
8. Slide headlamp forward, disconnect multiplug and remove headlamp.

#### Refit

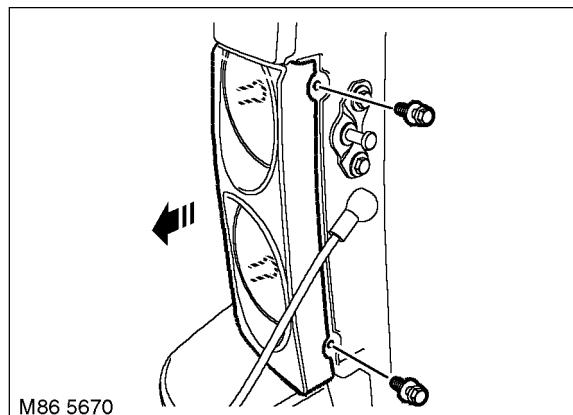
1. Position headlamp and connect multiplug.
2. Fit headlamp onto lower mountings, fit and tighten bolts to 6 Nm (4.4 lbf.ft).
3. Fit front grille.
  -  **EXTERIOR FITTINGS, REPAIRS, Front grille.**
4. Fit headlight wiper spindle escutcheon.
5. Fit headlight wiper arm.
  -  **WIPERS AND WASHERS, REPAIRS, Arm - wiper - headlamp.**
6. Fit side and indicator lamp.
  -  **LIGHTING, REPAIRS, Lamp assembly - side & indicator.**
7. Check headlamp alignment - adjust if necessary.
  -  **LIGHTING, ADJUSTMENTS, Headlamps - align beam.**
8. **RH Headlamp on V8 models:** Fit air cleaner assembly.
  -  **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Housing - air cleaner.**

#### Lamp assembly - tail

» **86.40.70**

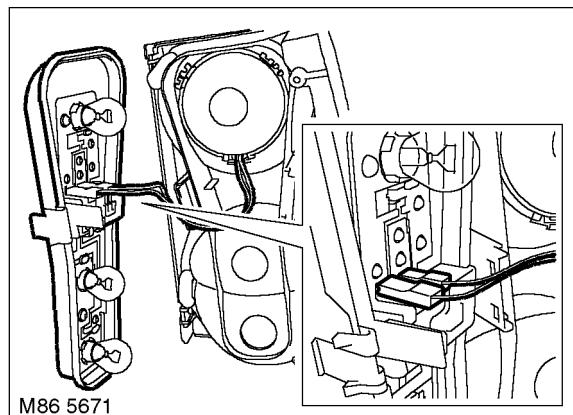
##### Remove

1. Open upper and lower tailgates.



2. Remove 2 screws securing lamp to body.
3. Release lamp from mountings and withdraw horizontally. Disconnect multiplug and remove lamp.

**CAUTION: Always protect paintwork and glass when removing trim finishers.**



4. Depress clips and remove bulb holder from lamp assembly.
5. Remove bulb from bulb holder.
 

*NOTE: Do not carry out further dismantling if component is removed for access only.*
6. Remove remaining bulbs from holder.
7. Disconnect LED Lucas connections from bulb holder assembly.

## LIGHTING

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### Refit

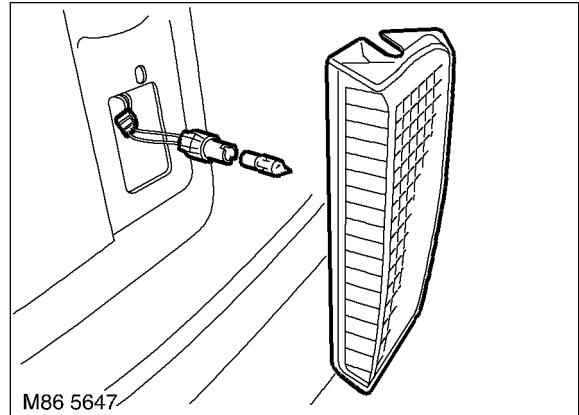
1. Connect Lucars to bulb holder.
2. Fit bulbs to holders.
3. Fit bulb and secure bulb holder to lamp.
4. Connect multiplug to lamp.
5. Fit and secure lamp assembly.

### Bulb - reverse lamp

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☞ 86.40.90

#### Remove



1. Remove screw securing reversing lamp to lower tailgate, release lamp and disconnect bulb holder.
2. Release bulb from holder.

### Refit

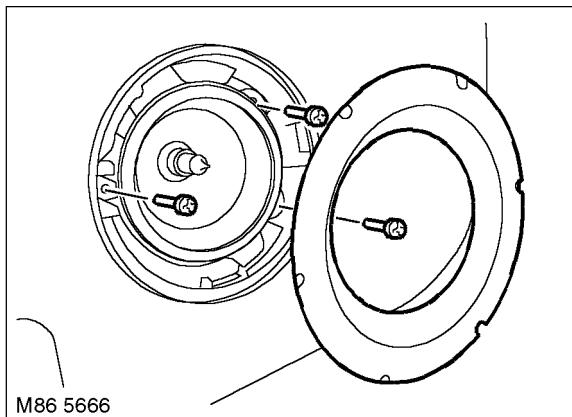
1. Fit new bulb to holder.
2. Fit bulb holder to lamp.
3. Fit lamp to tailgate and secure with screw.



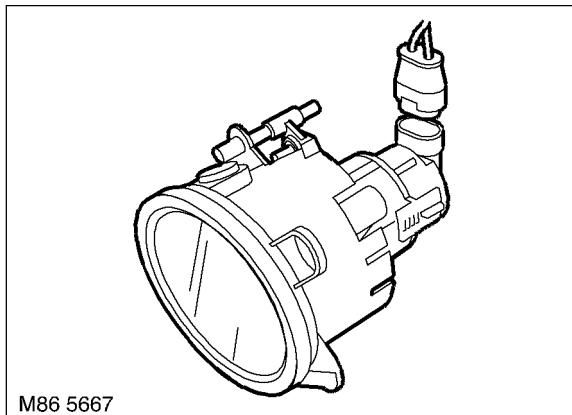
## Lamp - driving

» **86.40.96**

### Remove



1. Release clips securing driving lamp finisher to bumper, collect the finisher.
2. Remove 3 screws securing lamp assembly to bumper.



3. Release lamp assembly from bumper and disconnect multiplug.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
4. Remove bulb holder from lamp.
5. Remove bulb from bulb holder.

### Refit

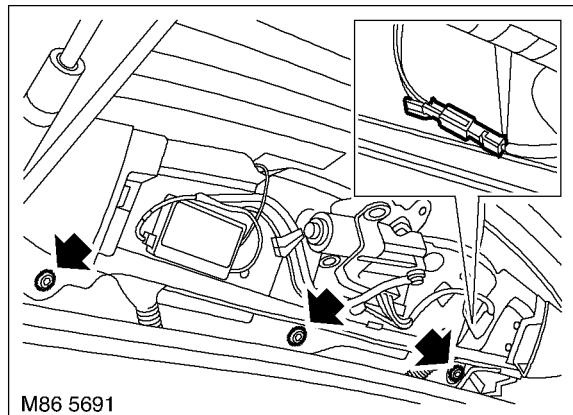
1. Fit bulb and secure bulb holder to lamp.
2. Connect multiplug.
3. Fit new lamp to bumper and secure with screws.
4. Fit and secure finisher to bumper.

## Lamp assembly - stop - centre high mounted

» **86.41.32**

### Remove

1. Remove upper tailgate finisher.  
☞ DOORS, REPAIRS, Trim finisher - tailgate - upper.



2. Remove 3 bolts securing spoiler to tailgate.
3. Disconnect multiplug from harness.
4. Close upper tailgate.
5. Slide spoiler rearward and release from clips. Release Central High Mounted Stop Lamp (CHMSL) harness from tailgate and remove spoiler.
- NOTE: Do not carry out further dismantling if component is removed for access only.*
6. Remove 4 screws securing CHMSL to spoiler, release harness from spoiler and remove lamp.

### Refit

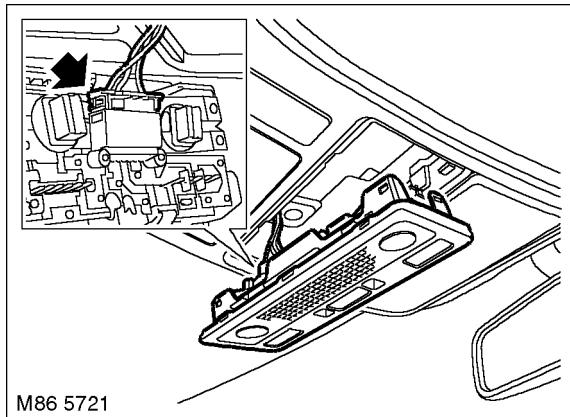
1. Position CHMSL and harness to spoiler, secure with screws.
2. Fit and secure spoiler to tailgate, tighten bolts to 10 Nm (7 lbf.ft).
3. Open upper tailgate.
4. Connect multiplug.
5. Fit upper tailgate finisher.  
☞ DOORS, REPAIRS, Trim finisher - tailgate - upper.

# LIGHTING

## Lamp assembly - interior - front and rear

» 86.45.09

### Remove



1. Release lamp from console, rear edge first.
2. Disconnect multiplug and remove lamp.

### Refit

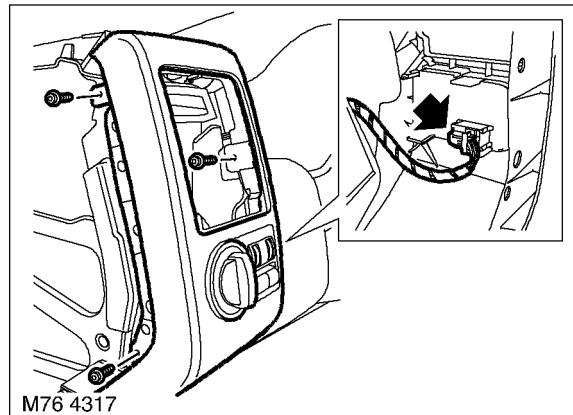
1. Position lamp and connect multiplug.
2. Fit lamp to console.

## Switch - master - lighting

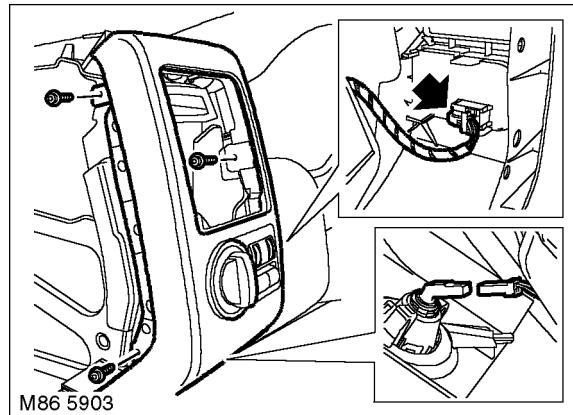
» 86.65.09

### Remove

1. Remove fascia end closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**
2. Remove face level air vent.  
☞ **HEATING AND VENTILATION,  
REPAIRS, Fresh air vent - face level.**
3. Remove 'A' post upper trim finisher.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - upper.**



4. Remove 3 Torx screws securing upper finisher to fascia.



5. Release upper finisher from fascia and disconnect switch multiplug.
6. Disconnect footwell lamp multiplug.
7. Remove upper finisher.

*NOTE: Do not carry out further dismantling if component is removed for access only.*



8. Remove switch assembly from finisher.

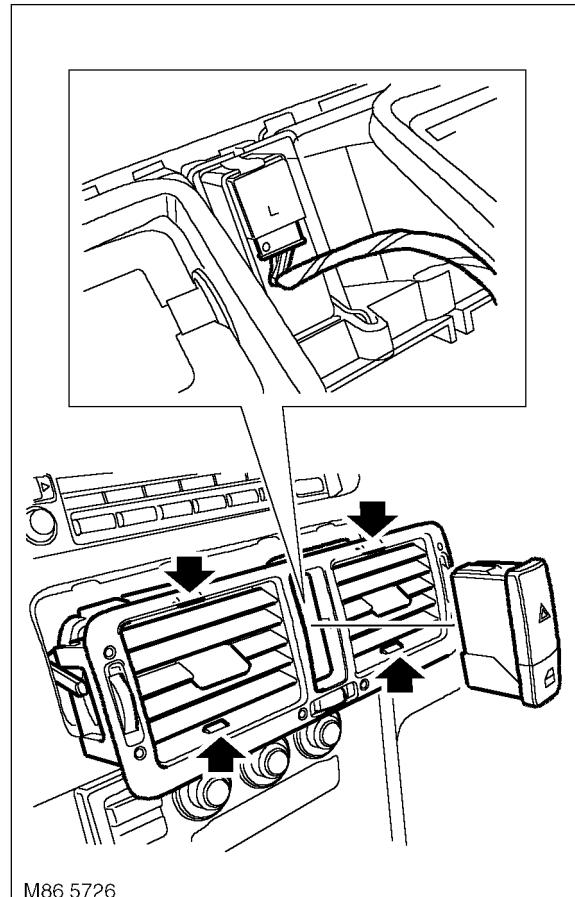
#### Refit

1. Fit switch assembly to finisher.
  2. Connect multiplugs.
  3. Fit finisher to fascia and secure with screws.
  4. Fit face level air vents.
- HEATING AND VENTILATION, REPAIRS, Fresh air vent - face level.**
5. Fit fascia end closing panels.
- INTERIOR FITTINGS, REPAIRS, Closing panel - fascia end.**
6. Fit 'A' post finisher.
- INTERIOR FITTINGS, REPAIRS, Trim finisher - 'A' post - upper.**

#### Switch - hazard warning

**86.65.50**

#### Remove



1. Release 4 internal clips securing air vent to finisher, apply an even outward pressure until the last clip is released.
2. Disconnect multiplug and remove hazard warning switch.

#### Refit

1. Position hazard warning switch and connect multiplug.
2. Fit and secure air vent.

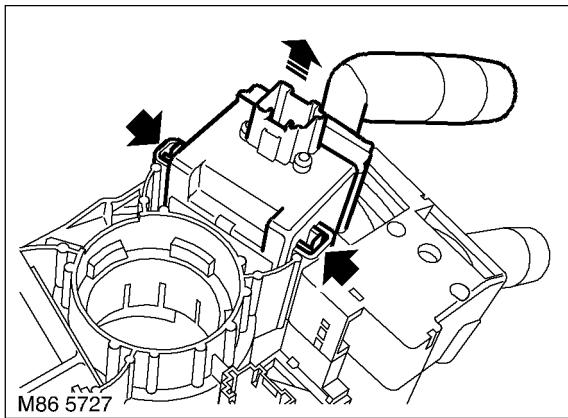
# LIGHTING

## Switch - combined direction indicator/headlight

» 86.65.55

### Remove

1. Remove rotary coupler.  
☞ RESTRAINT SYSTEMS, REPAIRS,  
Rotary coupler.



2. Depress 2 clips and remove switch from rotary coupler assembly.

### Refit

1. Fit switch to rotary coupler, ensure engagement of clips.
2. Fit rotary coupler.  
☞ RESTRAINT SYSTEMS, REPAIRS,  
Rotary coupler.

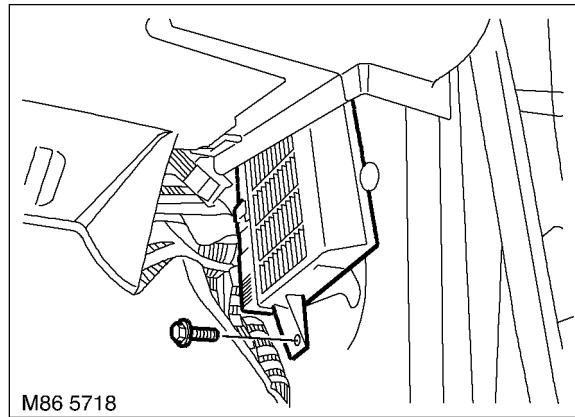
## Light check module (LCM)

» 86.77.02

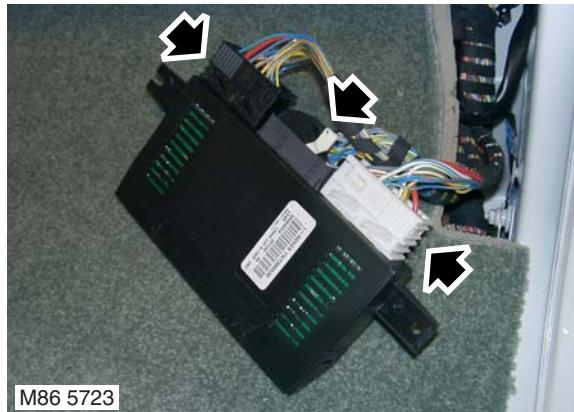
If the LCM is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

### Remove

1. Remove RH lower 'A' post finisher.  
☞ INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - lower.



2. Remove screw securing LCM to 'A' post.



3. Release LCM from mounting and disconnect multiplugs.
4. Remove LCM.

### Refit

1. Position LCM and connect multiplugs.
2. Fit LCM and secure with screw.
3. Fit RH lower 'A' post finisher.  
☞ INTERIOR FITTINGS, REPAIRS,  
Trim finisher - 'A' post - lower.
4. Configure new LCM using TestBook/T4.



## Electronic control unit (ECU) - trailer

### » 86.55.07

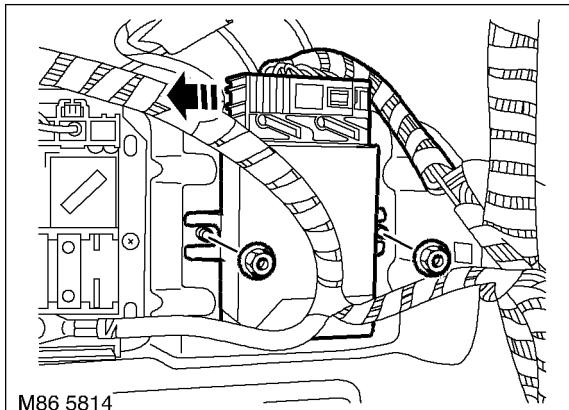
If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.
2. Remove access panel from load space RH trim casing.



3. Remove 2 nuts securing trailer ECU.
4. Release and disconnect multiplug.
5. Remove trailer ECU.

#### Refit

1. Position trailer ECU and connect multiplug.
2. Fit trailer ECU and secure with nuts.
3. Fit access panel.
4. Connect the battery earth lead.
5. Configure new ECU using TestBook/T4.

## Relay - horn

### » 86.55.09

#### Remove

1. Remove glove box.



**INTERIOR FITTINGS, REPAIRS,**

**Glove box.**



2. Remove horn relay.

#### Refit

1. Fit horn relay.
2. Fit glove box.



**INTERIOR FITTINGS, REPAIRS,**

**Glove box.**

## CONTROL UNITS AND RELAYS

### Relay - heated front screen

» 86.55.18

#### Remove

1. Remove passenger side end closing panel from fascia.  
 **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**



2. Rotate relay holder anti-clockwise to release for access.
3. Remove heated front screen relay from holder.

#### Refit

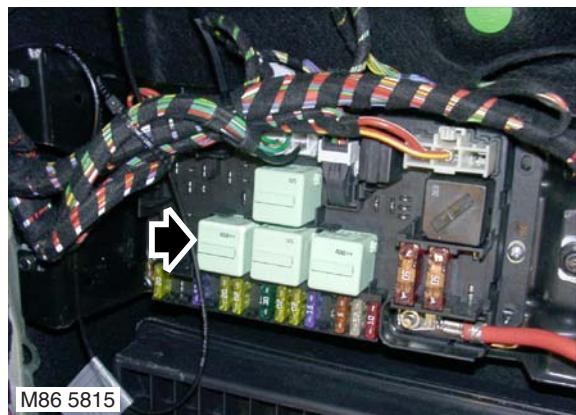
1. Fit and secure heated front screen relay to holder.
2. Fit closing panel.  
 **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**
3. Fit end closing panel to fascia.  
 **INTERIOR FITTINGS, REPAIRS,  
Closing panel - fascia end.**

### Relay - heated rear screen

» 86.55.19

#### Remove

1. Remove access panel from load space RH trim casing.



2. Identify and remove relay.

#### Refit

1. Fit relay.
2. Fit access panel.



## Body Control Unit (BCU)

### » 86.55.75

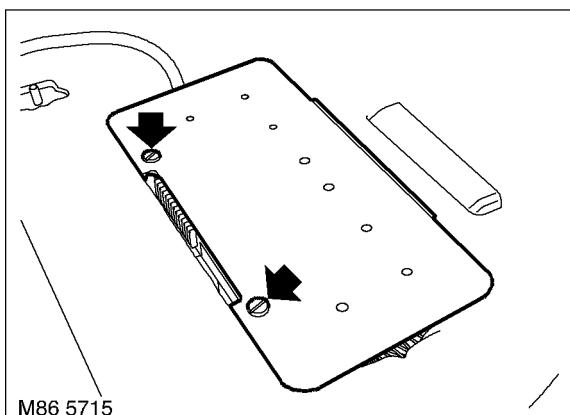
If the BCU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

### Remove

1. Make the SRS system safe.  
 **GENERAL INFORMATION, Supplementary Restraint System (SRS) Precautions.**
2. Remove front passenger seat.  
 **SEATS, REPAIRS, Front seat.**



3. Release 2 turnbuckles securing cover and remove cover.



4. Release and disconnect 3 multiplugs from BCU.

5. Remove BCU.

### Refit

1. Fit BCU and connect multiplugs.
2. Fit cover and secure with turnbuckles.
3. Fit front seat.  
 **SEATS, REPAIRS, Front seat.**
4. Configure new BCU using TestBook/T4.

## **CONTROL UNITS AND RELAYS**

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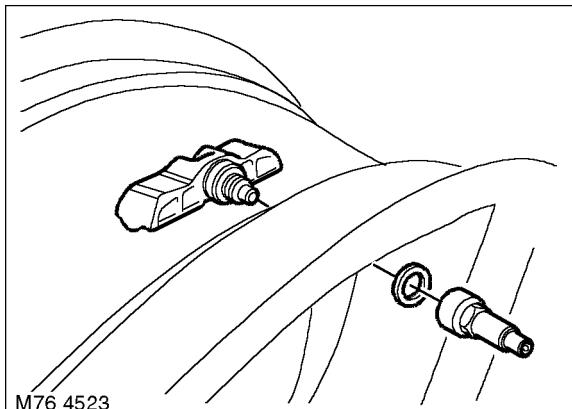


## Sensor - tyre pressure monitoring (TPM) system

☛ 74.10.05

### Remove

1. Using a jack, raise vehicle and support with stands.  
**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.
2. Remove 5 nuts securing road wheel, remove wheel.  
**CAUTION:** Never use high pressure cleaning equipment on a wheel with a TPM sensor fitted.
3. Remove tyre from rim.  
**CAUTION:** To avoid damage to TPM sensor, break tyre bead from rim 180 degrees from valve stem.



4. Remove valve from wheel and collect washer.
5. Carefully remove TPM sensor from rim.

**CAUTION:** If a tyre sealing fluid has been used the TPM sensor must be replaced.

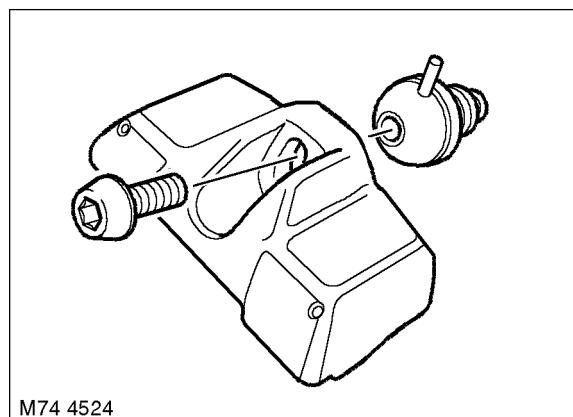
**CAUTION:** If sensor has been removed, the complete valve must be replaced.

### Refit

1. Clean TPM sensor filter surface (on underside of sensor).

**CAUTION:** If the TPM sensor filter is dirty the sensor must be replaced.

**CAUTION:** Do not use compressed air to clean TPM sensors. Do not clean sensors with solvents or any cleaning agent of any source, use a clean dry cloth only.



2. Fit Torx bolt and adapter to TPM sensor, finger tighten bolt.
3. Carefully fit TPM sensor to rim, fit washer and valve, tighten valve to 3.5 Nm (2.6 lbf.ft).  
**CAUTION:** Do not exceed these torque figures as damage to sensor will occur if overtightened.
4. Insert brace supplied with valve into adapter.
5. Ensure sensor is pushed fully home to the rim and tighten Torx bolt to 3.5 Nm (2.6 lbf.ft).  
**CAUTION:** Do not exceed these torque figures as damage to sensor will occur if overtightened.
6. Remove brace from adapter.
7. Fit tyre and balance wheel.
8. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
9. Remove stands and lower jack.
10. An initialisation process must be carried out after the following:
  - A tyre pressure has been adjusted
  - A TPM sensor has been replaced
  - A wheel has changed position, e.g. swapped axles or the spare fitted as a road wheel

## DRIVING AIDS

11. To initialise the TPM system, turn ignition key to position 'II', depress and hold TPM button, until SET TYRE PRESSURE message appears on the instrument pack message centre (approximately 4 seconds). The system is now initialised.

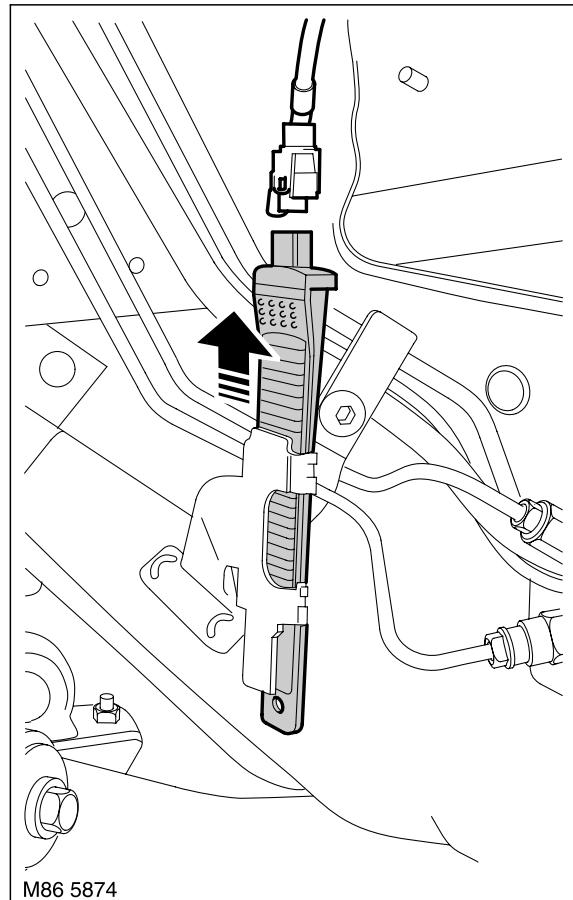
*NOTE: Some vehicles may display a rearranged message TYRE PRESSURE SET, this also acknowledges that the system is initialised.*

### Antenna - front wheel - tyre pressure monitoring (TPM) system

» **86.53.16**

#### Remove

1. Remove front wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**



2. Disconnect multiplug and release antenna from securing bracket.

#### Refit

1. Fit antenna in securing bracket and connect multiplug.
2. Fit wheel arch liner.  
☞ **EXTERIOR FITTINGS, REPAIRS, Liner - front wheel arch.**



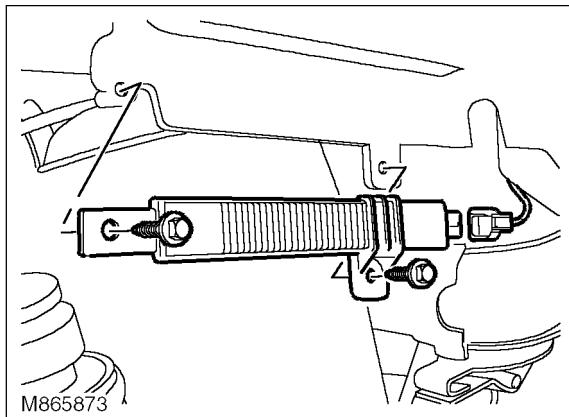
## Antenna - rear wheel - tyre pressure monitoring (TPM) system

» **86.53.17**

### Remove

1. Using jack Raise vehicle and support with stands.

**WARNING:** *Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.*



2. Remove 5 nuts securing road wheel, remove wheel.
3. Remove 2 bolts securing antenna, disconnect multiplug and remove antenna.

### Refit

1. Position and fit bolts to secure antenna.
2. Connect multiplug to antenna.
3. Fit road wheel and tighten nuts to 140 Nm (103 lbf.ft).
4. Remove stands and lower jack.

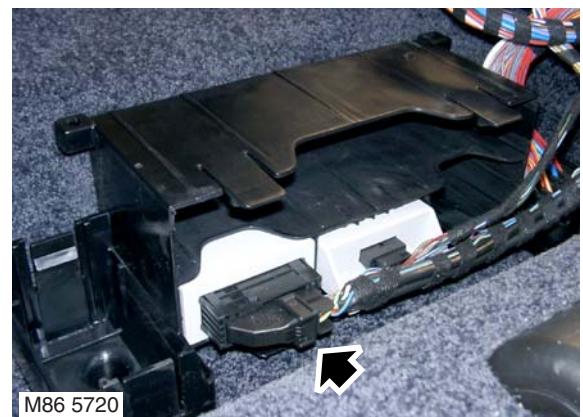
## Electronic control unit (ECU) - tyre pressure monitoring (TPM)

» **86.54.05**

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

### Remove

1. Remove the Body Control Unit (BCU).  
☞ **CONTROL UNITS AND RELAYS, REPAIRS, Body Control Unit (BCU).**



2. Release tyre pressure monitoring ECU from holder, disconnect multiplug and remove ECU.

### Refit

1. Position ECU, connect multiplug and fit ECU to holder.
2. Fit BCU.  
☞ **CONTROL UNITS AND RELAYS, REPAIRS, Body Control Unit (BCU).**
3. Configure new ECU using TestBook/T4.

# DRIVING AIDS

## Electronic control unit (ECU) - parking aid

### → 86.54.10

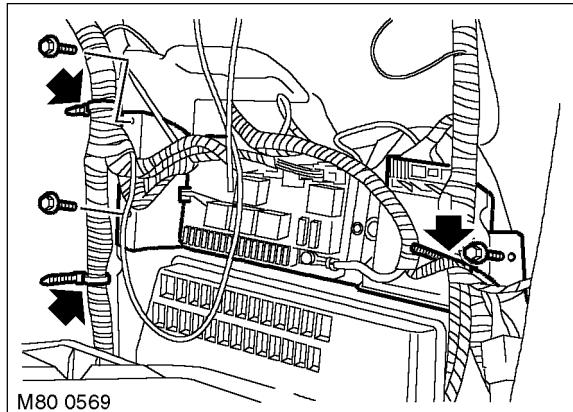
If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

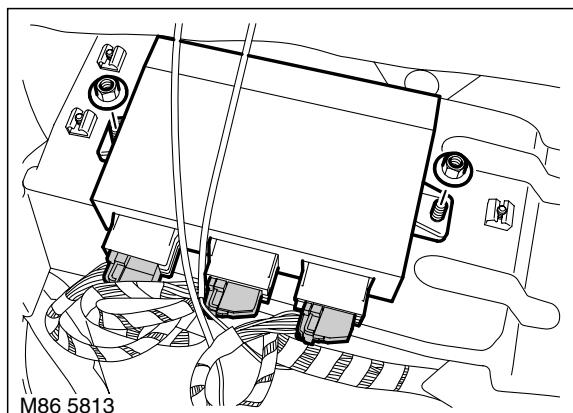
### ☞ GENERAL INFORMATION, Electrical Precautions.

#### Remove

1. Disconnect battery earth lead.
2. Remove access panel from load space RH trim casing.
3. Remove warning triangle.



4. Remove cable tie securing harness.
5. Release 2 straps securing harness.
6. Remove 3 bolts securing fuse box to body.



7. Disconnect 3 multiplugs from parking aid ECU.

8. Remove 2 nuts securing parking aid ECU and remove ECU.

#### Refit

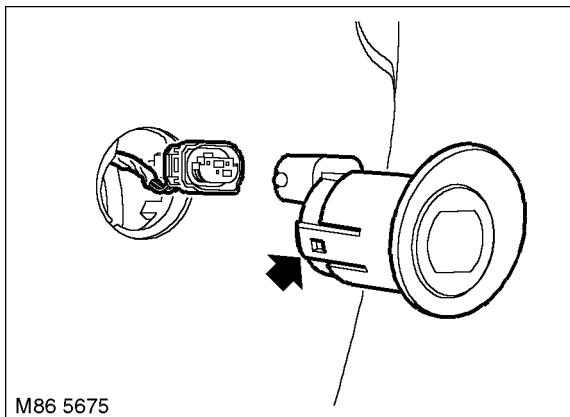
1. Fit parking aid ECU and secure with nuts.
2. Connect multiplugs to parking aid ECU.
3. Align fuse box and tighten bolts to 6 Nm (4.4 lbf.ft).
4. Align and secure harness.
5. Fit and secure warning triangle.
6. Fit access panel.
7. Connect battery earth lead.
8. Configure new ECU using TestBook/T4.



## Sensor - parking aid - rear - each

» **86.54.14**

### Remove



1. Release park distance control sensor from rear bumper and disconnect multiplug. Remove sensor assembly.
2. Remove and collect finisher from the rear parking distance sensor.

### Refit

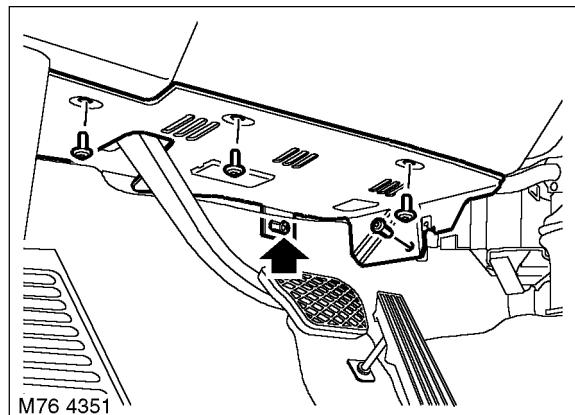
1. Fit finisher to rear parking distance sensor.
2. Position rear parking sensor to the rear bumper and connect multiplug.
3. Fit and secure rear parking distance sensor to bumper.

## Sounder - parking aid - front

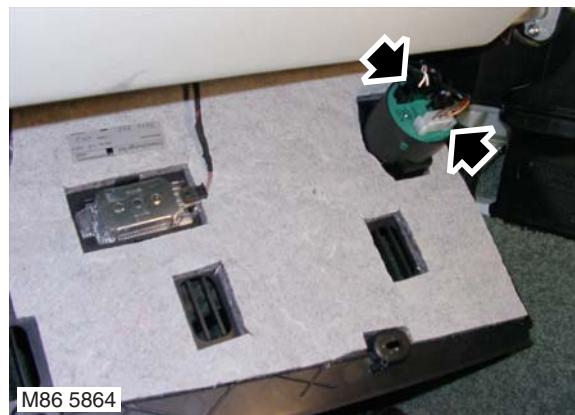
» **86.54.18**

### Remove

1. Remove centre console closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**



2. Remove 4 screws and 1 trim stud securing closing panel.



3. Release closing panel and disconnect multiplugs from sounder.
4. Remove sounder.

### Refit

1. Fit sounder.
2. Position panel, connect multiplugs, locate and secure with screws and stud.
3. Fit centre console closing panel.  
☞ **INTERIOR FITTINGS, REPAIRS,  
Closing panel - centre console.**

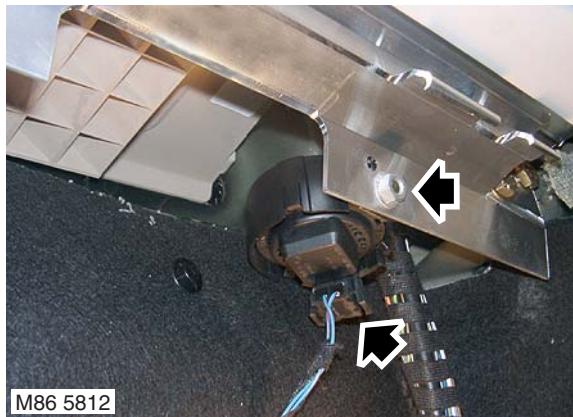
# DRIVING AIDS

## Sounder - parking aid - rear

» **86.54.19**

### Remove

1. Remove access panel from load space RH trim casing.



2. Disconnect multiplug from instrument pack sounder.
3. Remove nut securing sounder and remove sounder.

### Refit

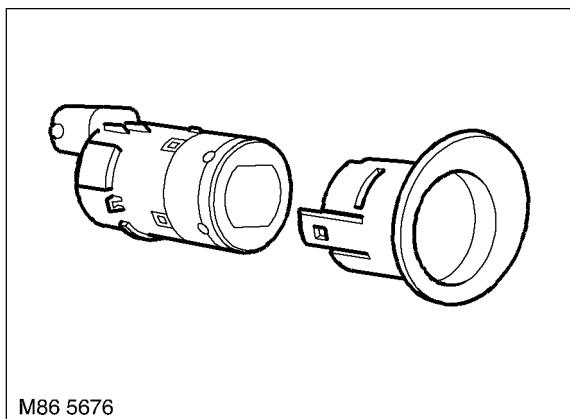
1. Fit sounder and tighten nut to 10 Nm (7 lbf.ft).
2. Connect multiplug to instrument pack sounder.
3. Fit access panel.

## Sensor - parking aid - front - inner

» **86.54.21**

### Remove

1. Remove front bumper.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Bumper - assembly - front.**



2. Remove parking sensor from bumper, release clips and remove sensor from finisher.

### Refit

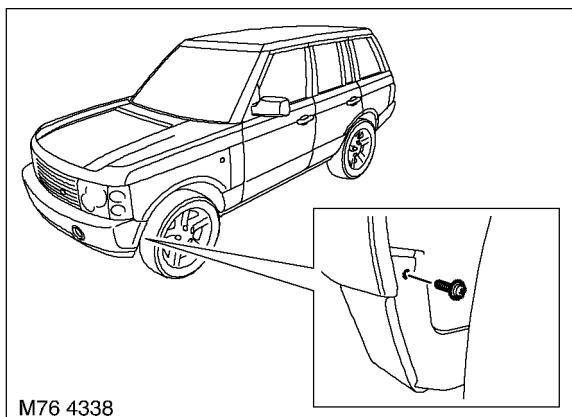
1. Fit sensor to finisher, align sensor to bumper and secure clips.
2. Fit front bumper.  
☞ **EXTERIOR FITTINGS, REPAIRS,  
Bumper - assembly - front.**



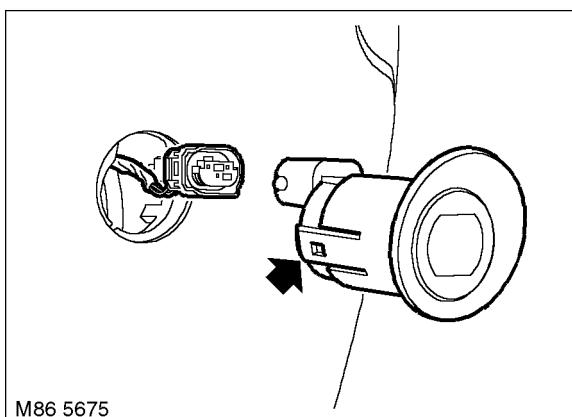
## Sensor - parking aid - front - outer

» **86.54.22**

### Remove



1. Remove screw securing bumper extension to wheel arch liner.
2. Ease lower edge of wheel arch liner aside for access, from rear of bumper release parking sensor.



3. Disconnect multiplug.
4. Release clips and remove finisher from sensor.

### Refit

1. Fit sensor to finisher, connect harness multiplug.
2. Fit sensor to bumper and secure clips.
3. Fit wheel arch liner and secure with screw.

## DRIVING AIDS

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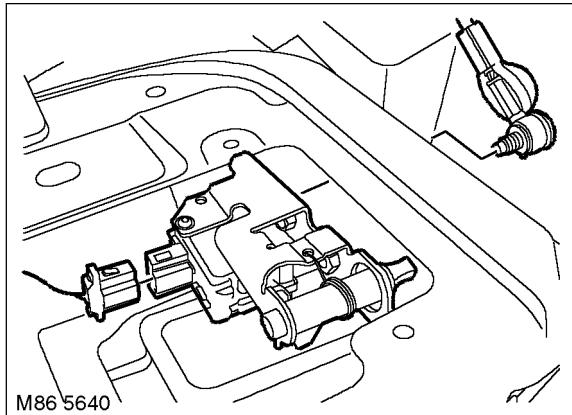


## Solenoid - motor - tailgate

» 86.26.02

### Remove

1. Remove tailgate lower trim casing.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - tailgate carpet.**
2. Remove tailgate latch assembly.  
☞ **DOORS, REPAIRS, Latch - outer - tailgate.**



3. Disconnect multiplug from solenoid motor.
4. Release cover from tailgate support cable, remove Torx bolt, move cable aside and collect solenoid motor.

### Refit

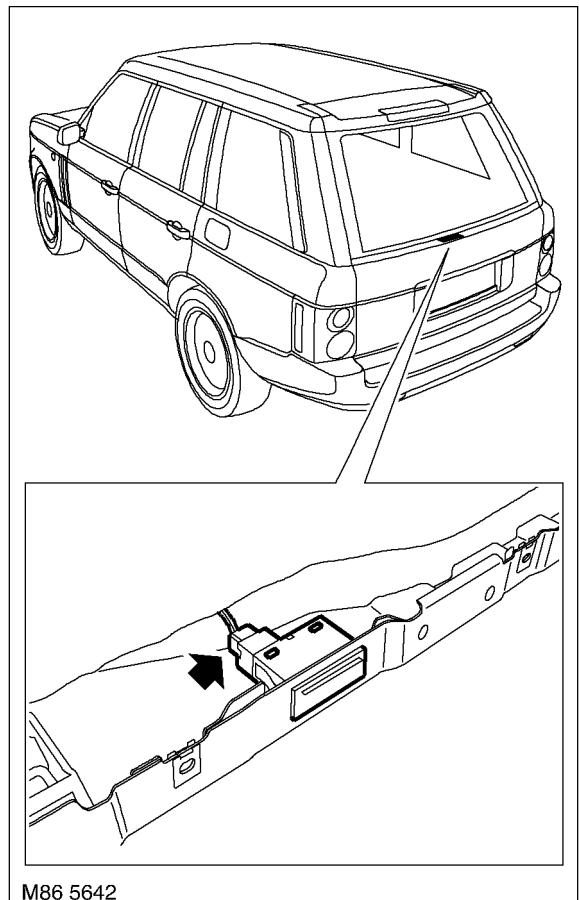
1. Position solenoid motor to tailgate, ensure latch drive spindle is central to hole. Fit bolt to cable, secure motor and tighten to 25 Nm (18 lbf.ft).
2. Connect multiplug.
3. Fit tailgate latch assembly.  
☞ **DOORS, REPAIRS, Latch - outer - tailgate.**
4. Fit lower trim casing to tailgate.  
☞ **INTERIOR FITTINGS, REPAIRS, Finisher - tailgate carpet.**

## Switch - tailgate release - lower

» 86.26.26

### Remove

1. Remove lower tailgate finisher.  
☞ **DOORS, REPAIRS, Finisher - upper - tailgate lower.**



2. Disconnect multiplug from tailgate release switch.
3. Release clips and remove switch from tailgate.

### Refit

1. Fit switch and connect multiplug.
2. Fit tailgate finisher.  
☞ **DOORS, REPAIRS, Finisher - upper - tailgate lower.**

# ALARM SYSTEM AND HORN

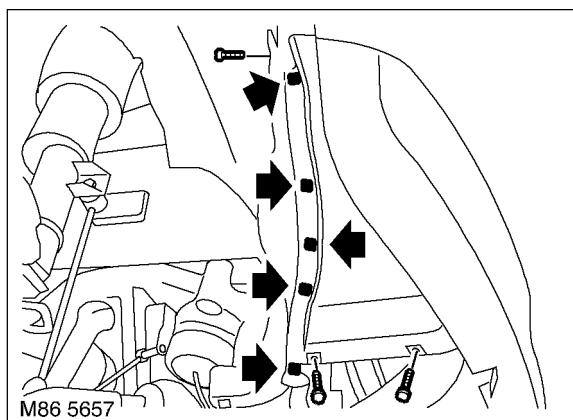
## Horn

→ 86.30.10

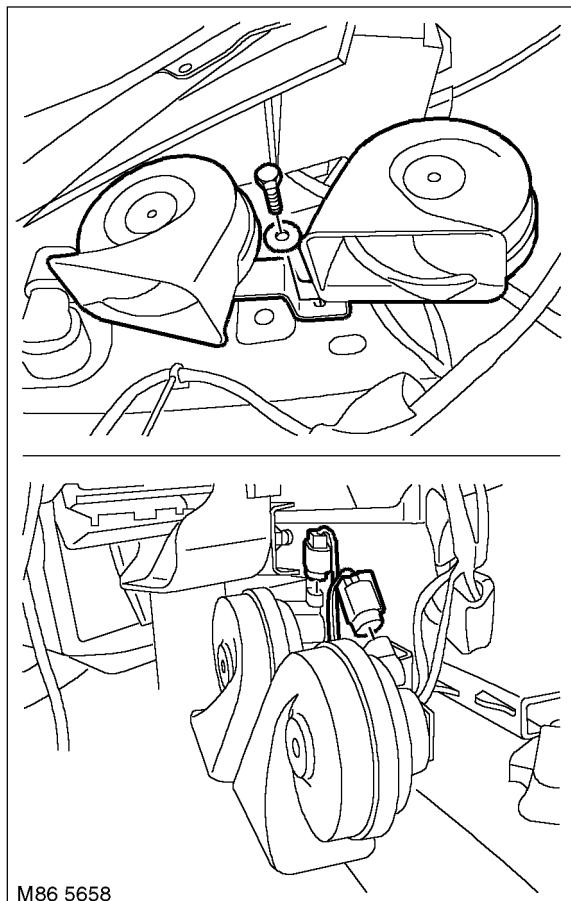
### Remove

1. Raise RH front of vehicle and support on stand.

**WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.



2. Remove 5 rivets and 3 screws securing RH wheel arch extension to splash shield and bumper.
3. Remove front wheel arch extension.



4. Remove bolt securing horn assembly to armature. Remove horns.
5. Disconnect horn multiplugs.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*
6. Remove nuts securing horns to mounting brackets. Collect horns.

### Refit

1. Position horns to mounting bracket, fit nuts and tighten to 10 Nm (7 lbf.ft).
2. Connect multiplugs.
3. Position horn assembly to armature, fit and tighten bolt to 10 Nm (7 lbf.ft).
4. Fit and secure wheel arch extension.
5. Lower vehicle.

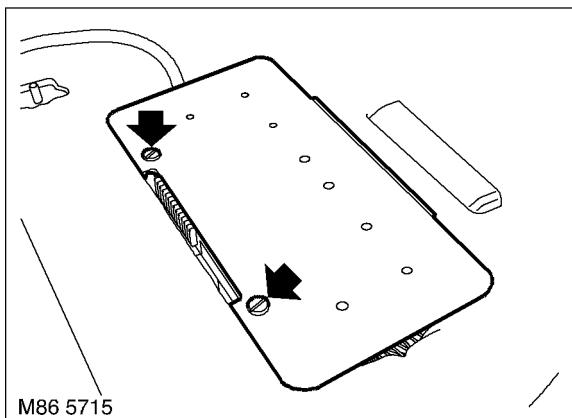


## Sensor - alarm - tilt

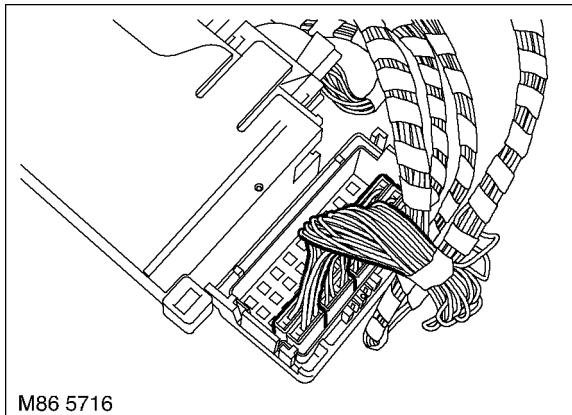
» 86.77.06

### Remove

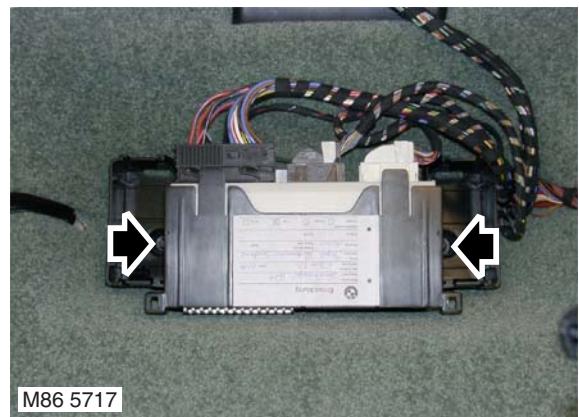
1. Make the SRS system safe.  
☞ **GENERAL INFORMATION,  
Supplementary Restraint System (SRS)  
Precautions.**
2. Remove front passenger seat.  
☞ **SEATS, REPAIRS, Front seat.**



3. Release 2 turnbuckles securing cover and remove cover.



4. Release harness junction box and lay aside.



5. Remove 2 nuts securing holder.
6. Release tilt sensor from holder, disconnect multiplug and remove sensor.

### Refit

1. Position sensor, connect multiplug and secure to holder.
2. Fit holder to studs and tighten nuts to 3 Nm (2.2 lbf.ft).
3. Fit junction box to holder.
4. Fit cover and secure with turnbuckles.
5. Fit front seat.  
☞ **SEATS, REPAIRS, Front seat.**
6. Initiate using TestBook/T4.

# ALARM SYSTEM AND HORN

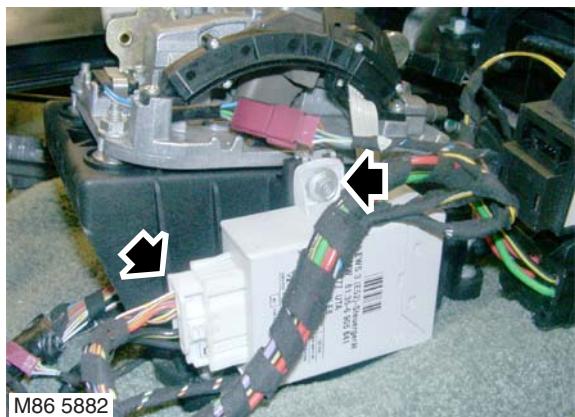
## Electronic control unit (ECU) - immobilisation

### 86.77.07

If the ECU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

#### Remove

1. Remove centre console.  
 **INTERIOR FITTINGS, REPAIRS, Centre console.**



2. Remove bolt securing immobilisation ECU to gear selector carrier.
3. Release immobilisation ECU from the mounting and disconnect multiplug.
4. Remove ECU.

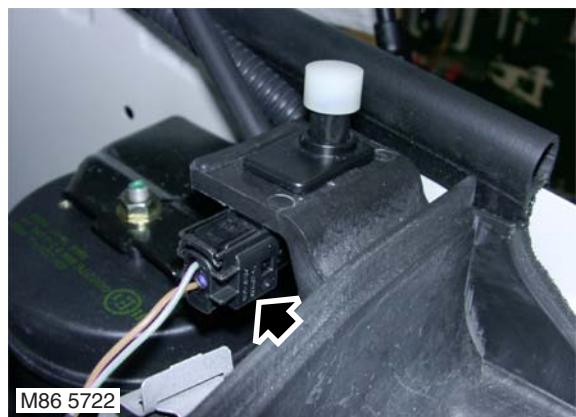
#### Refit

1. Fit and secure immobilisation ECU to carrier, tighten bolt to 3 Nm (2.2 lbf.ft).
2. Connect multiplug to immobilisation ECU.
3. Fit centre console.  
 **INTERIOR FITTINGS, REPAIRS, Centre console.**
4. Configure new ECU using TestBook/T4.

## Switch - bonnet

### 86.77.20

#### Remove



1. Disconnect multiplug from bonnet alarm switch.
2. Release and remove switch from bulkhead closing panel.

#### Refit

1. Fit bonnet switch to closing panel.
2. Connect multiplug to bonnet switch.



## Receiver - alarm

» 86.77.31

### Remove

1. Remove upper tailgate finisher.  
☞ **DOORS, REPAIRS, Trim finisher - tailgate - upper.**



2. Remove Torx bolt securing receiver to tailgate.
3. Disconnect 2 multiplugs and aerial lead from receiver, remove receiver.

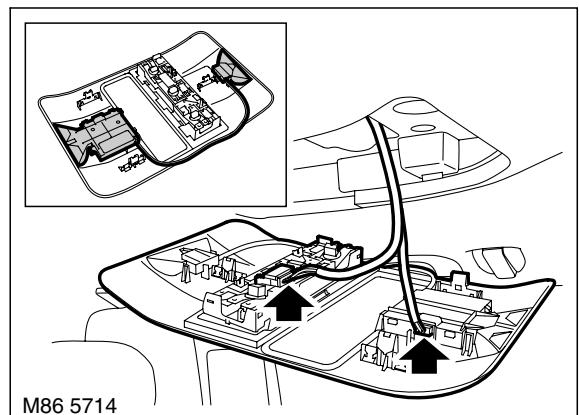
### Refit

1. Connect multiplugs and aerial lead to receiver.
2. Position receiver to tailgate mounting, fit and tighten bolt to 6 Nm (4.4 lbf.ft).
3. Fit upper tailgate finisher.  
☞ **DOORS, REPAIRS, Trim finisher - tailgate - upper.**

## Sensor - ultrasonic

» 86.77.32

### Remove



1. Carefully release rear console from headlining.
2. Disconnect multiplug from interior lamp.
3. Disconnect multiplug from ultrasonic module and remove console assembly.
4. Carefully release and remove ultrasonic sensor and module.

### Refit

1. Fit ultrasonic module and sensor to console.
2. Position console assembly and connect multiplugs.
3. Fit rear console to headlining.

## **ALARM SYSTEM AND HORN**

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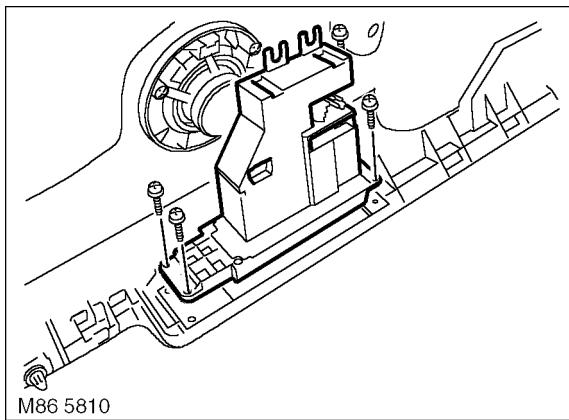


## Switch - window - master

» **86.25.08**

### Remove

1. Remove drivers door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - front door.**



2. Remove 4 Torx screws securing switch pack to door casing.
3. Remove switch pack assembly.

### Refit

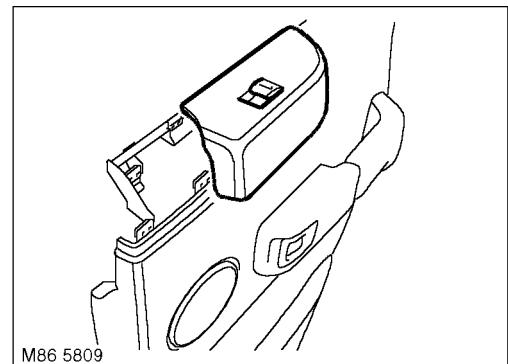
1. Fit switch pack and secure with screws.
2. Fit drivers door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - front door.**

## Switch pack - rear door

» **86.25.10**

### Remove

1. Remove rear door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - rear door.**



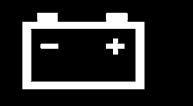
2. Release 4 clips securing switch pack to rear door casing.
3. Remove switch pack assembly.

### Refit

1. Fit switch pack and secure with clips.
2. Fit rear door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - rear door.**

## WINDOWS

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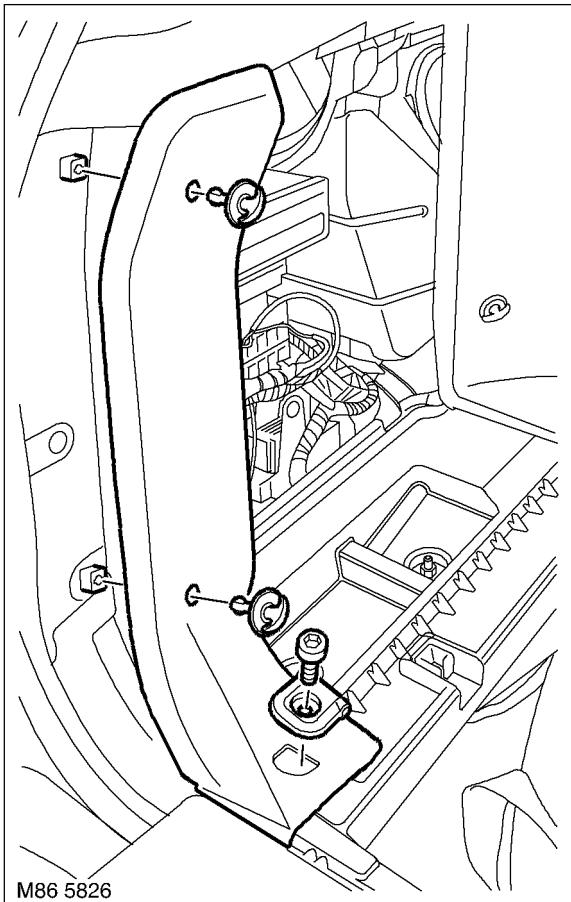


## Radio

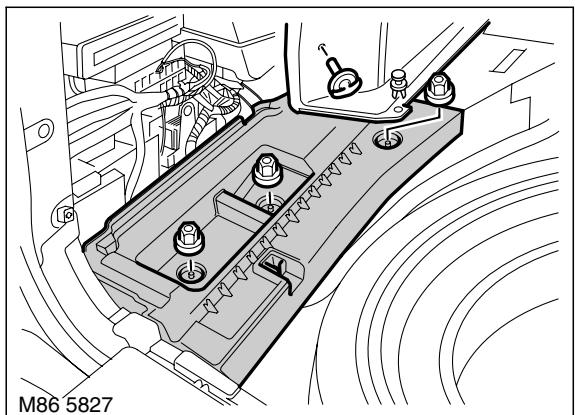
### 86.50.03

#### Remove

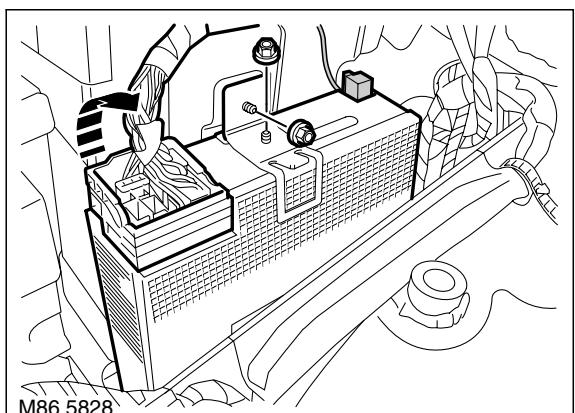
1. Remove access panel from load space LH trim casing.
2. Remove load space LH stowage bin cover.
3. Raise and support spare wheel cover.



4. Remove Allen bolt securing lashing ring and remove ring.
5. Remove 2 turnbuckles securing load space LH rear trim casing.
6. Carefully release and remove trim casing.



7. Remove lower turnbuckle securing load space LH front trim casing.
8. Remove trim stud securing load space LH front trim casing to stowage bin.
9. Remove 3 nuts securing stowage bin, carefully release and remove bin.



10. Release and disconnect multiplug from radio.
11. Release and disconnect coaxial cable.
12. Remove 2 nuts securing radio clamp and remove clamp.
13. Remove radio.

#### Refit

1. Fit radio, fit clamp and tighten nuts to 6 Nm (4.4 lbf.ft).
2. Connect coaxial cable.
3. Connect multiplug.
4. Fit stowage bin and secure with nuts.
5. Fit trim stud.
6. Fit turnbuckle.

## NAVIGATION AND IN CAR ENTERTAINMENT

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7. Fit LH rear trim casing, align to tailgate seal and fit turnbuckles.
8. Fit lashing eye and tighten Allen bolt to 25 Nm (18 lbf.ft).
9. Lower and secure spare wheel cover.
10. Fit stowage bin cover.
11. Fit access panel.

---

### Grille - front door speaker

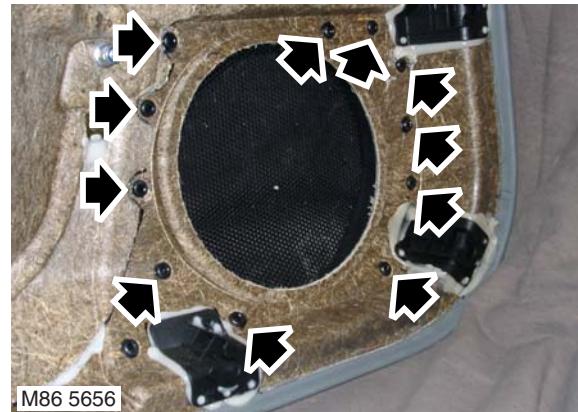
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» **86.50.09**

#### Remove

1. Remove front door trim casing.

 **DOORS, REPAIRS, Trim casing - front door.**



2. Remove heads of 11 plastic weld studs.
3. Using a drift, remove and discard speaker grille.
4. Remove flash from inner face of trim casing.

#### Refit

1. Fit speaker grille to trim casing and secure with clips.

2. Fit front door trim casing.

 **DOORS, REPAIRS, Trim casing - front door.**

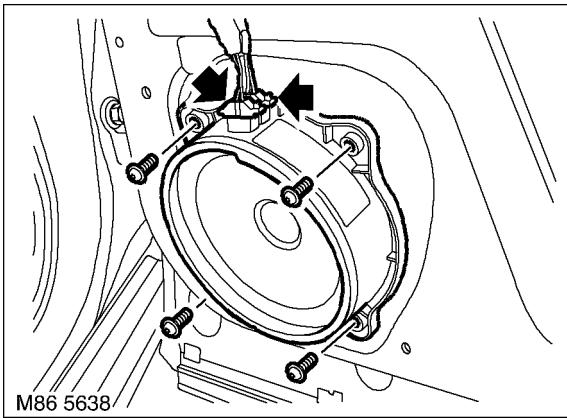


## Speaker - front door

» **86.50.10**

### Remove

1. Remove front door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - front door.**



2. Remove front speaker harness.
3. Disconnect multiplug from speaker.
4. Remove 4 screws securing speaker to door.
5. Remove speaker.

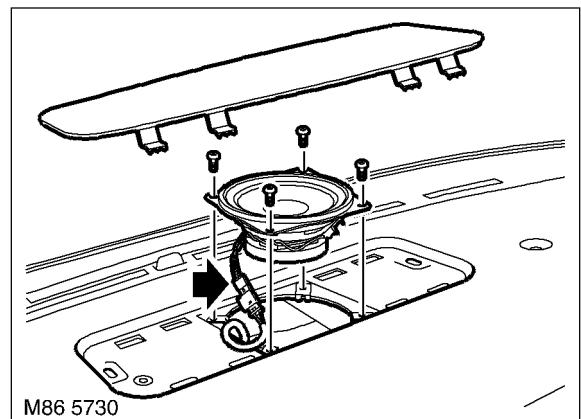
### Refit

1. Fit speaker to door and secure with screws.
2. Connect multiplug to speaker.
3. Fit front speaker harness.
4. Fit front door trim casing.  
☞ **DOORS, REPAIRS, Trim casing - front door.**

## Speaker - top rail

» **86.50.11**

### Remove



1. Carefully release speaker grille from top rail finisher.
2. Remove 4 Torx screws securing speaker to finisher.
3. Release speaker from mounting and disconnect multiplug.

### Refit

1. Connect multiplug, position speaker to mounting and secure with screws.
2. Fit and secure grille to top rail finisher.

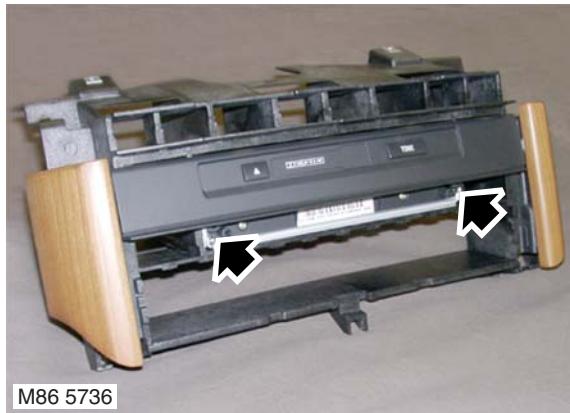
# NAVIGATION AND IN CAR ENTERTAINMENT

## Cassette/CD unit

» 86.50.21

### Remove

1. Remove display unit.  
    ☞ **NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Head unit - multi-information display.**



2. Remove 2 screws securing cassette/CD unit to housing and remove unit.

### Refit

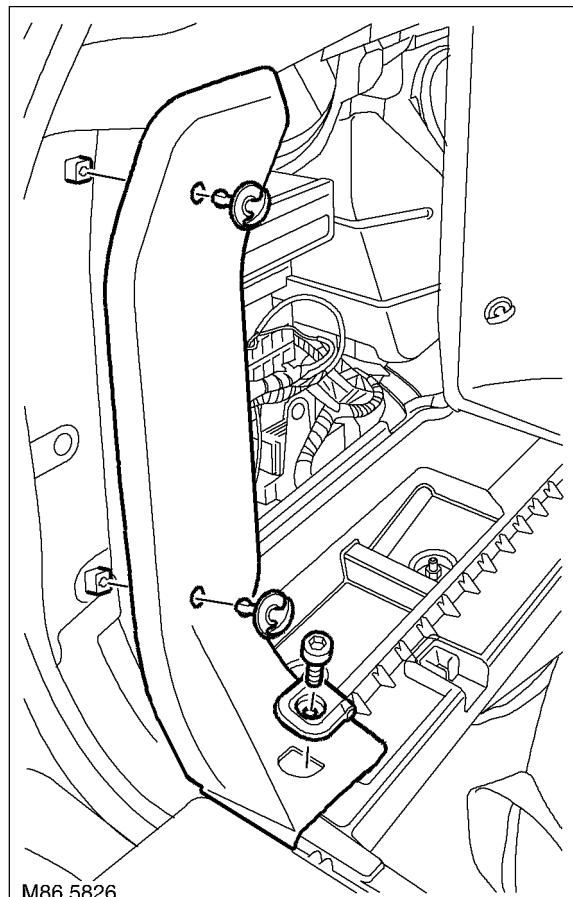
1. Fit cassette/CD unit to housing and secure with screws.
2. Fit display unit.  
    ☞ **NAVIGATION AND IN CAR ENTERTAINMENT, REPAIRS, Head unit - multi-information display.**

## Power amplifier

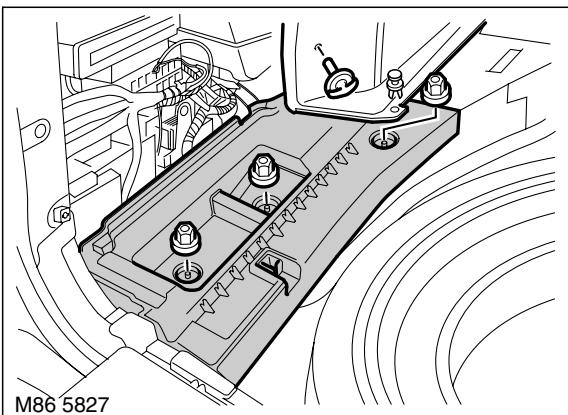
» 86.50.36

### Remove

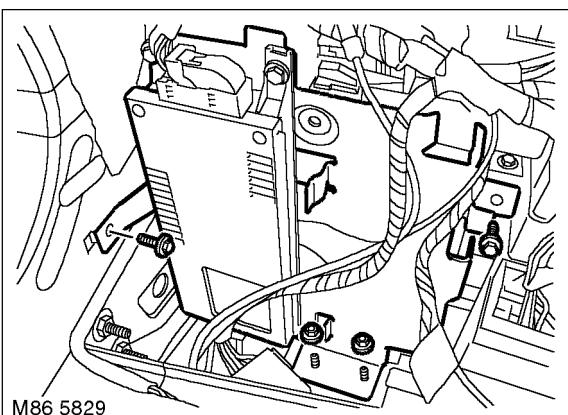
1. Remove access panel from load space LH trim casing.
2. Remove load space LH stowage bin cover.
3. Raise and support spare wheel cover.



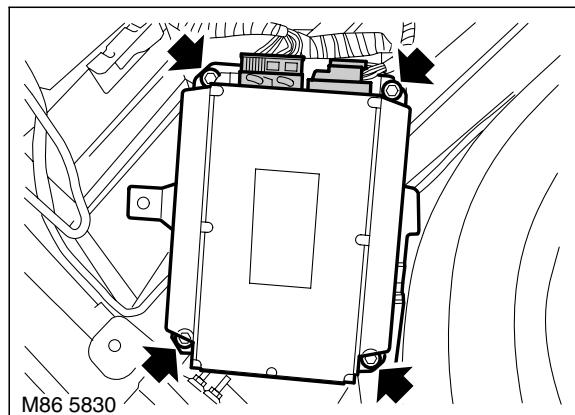
4. Remove Allen bolt securing lashing ring and remove ring.
5. Remove 2 turnbuckles securing load space LH rear trim casing.
6. Carefully release and remove trim casing.



7. Remove lower turnbuckle securing load space LH front trim casing.
8. Remove trim stud securing load space LH front trim casing to stowage bin.
9. Remove 3 nuts securing stowage bin, carefully release and remove bin.



10. Remove 2 nuts and 2 bolts securing mounting bracket.



11. Raise mounting bracket assembly for access and disconnect 3 multiplugs from amplifier.
12. Remove 4 bolts securing amplifier and remove amplifier.

#### Refit

1. Fit amplifier and tighten bolts to 6 Nm (4.4 lbf.ft).
2. Connect multiplugs to amplifier.
3. Align amplifier mounting bracket, ensure harness route is clear and tighten bolts and nuts to 6 Nm (4.4 lbf.ft).
4. Fit stowage bin and secure with nuts.
5. Fit trim stud securing load space LH front trim casing to stowage bin.
6. Fit turnbuckle securing load space LH front trim casing.
7. Fit LH rear trim casing, align to tailgate seal and fit turnbuckles.
8. Fit lashing eye and tighten Allen bolt to 25 Nm (18 lbf.ft).
9. Lower and secure spare wheel cover.
10. Fit stowage bin cover.
11. Fit access panel.

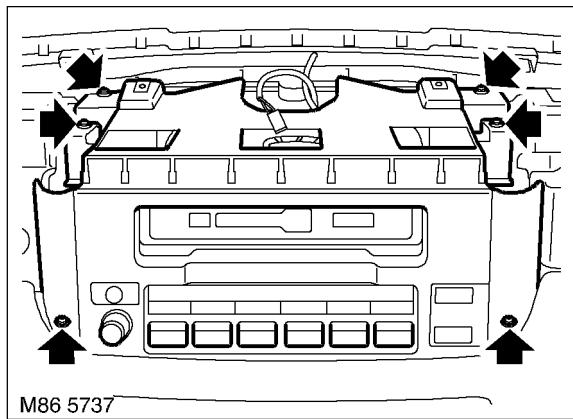
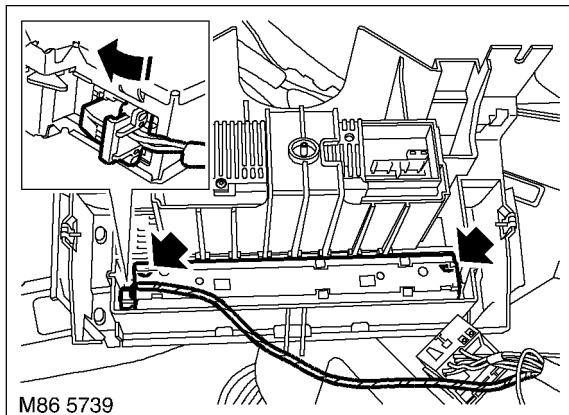
## Head unit - multi-information display

### → 86.50.81

If the head unit is to be replaced, then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

#### Remove

1. Remove top rail finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Top rail - fascia.**

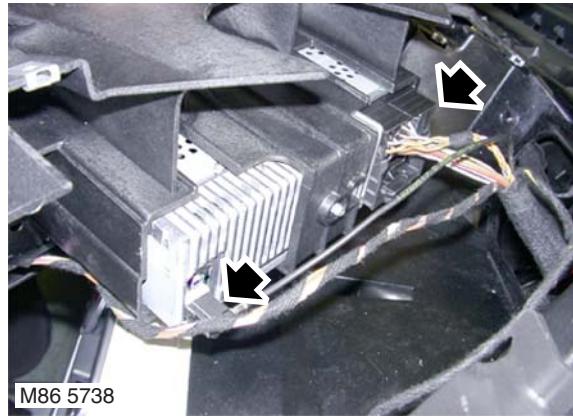


2. Remove 6 Torx screws securing display housing to carrier.

4. From rear of housing, release clips securing display unit.
5. Disconnect multiplug from display unit and remove unit.

#### Refit

1. Connect multiplug and fit display unit to housing.
2. Position housing to carrier, connect multiplug, aerial and secure harness.
3. Fit and tighten screws securing housing to carrier.
4. Fit top rail finisher.  
☞ **INTERIOR FITTINGS, REPAIRS, Top rail - fascia.**
5. Configure new head unit using TestBook/T4.



3. Release housing and harness from carrier, disconnect multiplug and aerial.



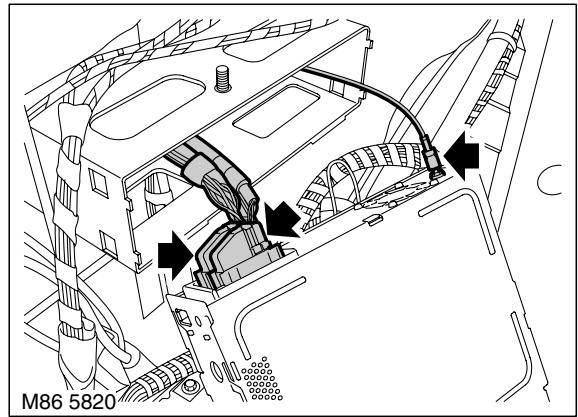
## Computer - navigation

### » 86.53.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

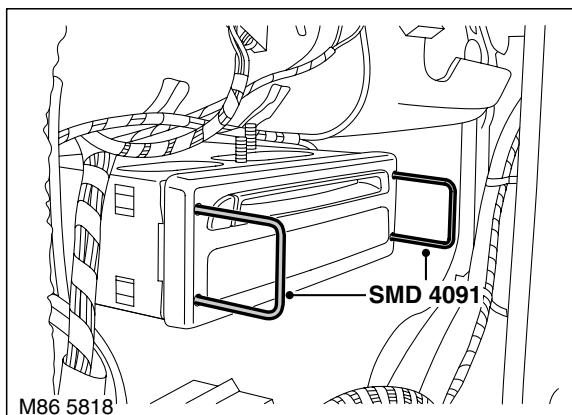
#### GENERAL INFORMATION, Electrical Precautions.

If the navigation computer/unit is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.



#### Remove

1. Disconnect battery earth lead.
- CAUTION: After switching off the ignition, wait 2 minutes before disconnecting the battery. Failure to wait two minutes will damage the navigation computer.**
2. Remove access panel from load space LH trim casing.



3. Use **SMD 4091** and release navigation unit.

4. Disconnect coaxial cable.
5. Release and disconnect 2 multiplugs from navigation unit.
6. Remove navigation unit.

#### Refit

1. Position navigation unit and connect multiplugs.
2. Connect coaxial cable.
3. Fit navigation unit into bracket.
4. Fit access panel.
5. Connect battery earth lead.
6. Configure new naivation unit using TestBook/ T4.

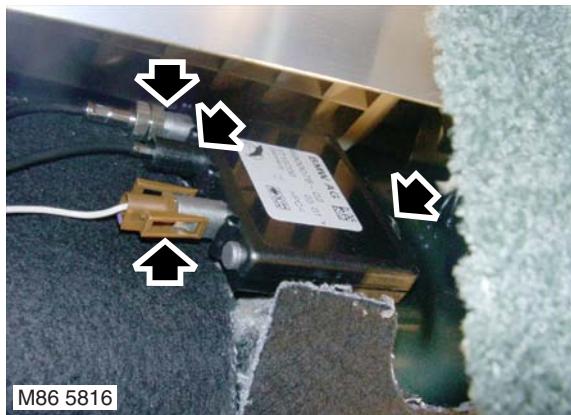
## NAVIGATION AND IN CAR ENTERTAINMENT

### Amplifier - aerial - diversity

» **86.53.08**

#### Remove

1. Remove access panel from load space LH trim casing.



2. Disconnect multiplug from amplifier
3. Disconnect coaxial cable.
4. Loosen nut and disconnect coaxial cable.
5. Remove Torx screw securing amplifier.
6. Disconnect multiplug and remove amplifier.

#### Refit

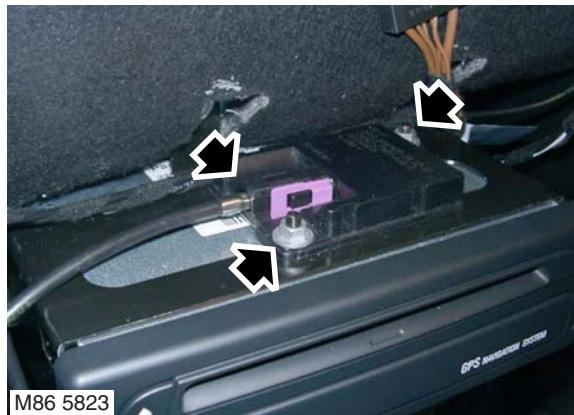
1. Position amplifier and connect multiplug.
2. Fit amplifier and tighten Torx screw to 6 Nm (4.4 lbf.ft)
3. Connect coaxial cables.
4. Connect multiplug.
5. Fit access panel.

### Antenna - telephone

» **86.53.11**

#### Remove

1. Remove access panel from load space LH trim casing.



2. Remove 2 nuts securing antenna and release antenna.
3. Disconnect multiplug and remove antenna

#### Refit

1. Position antenna and connect multiplug.
2. Fit antenna and tighten nuts to 6 Nm (4.4 lbf.ft).
3. Fit access panel.



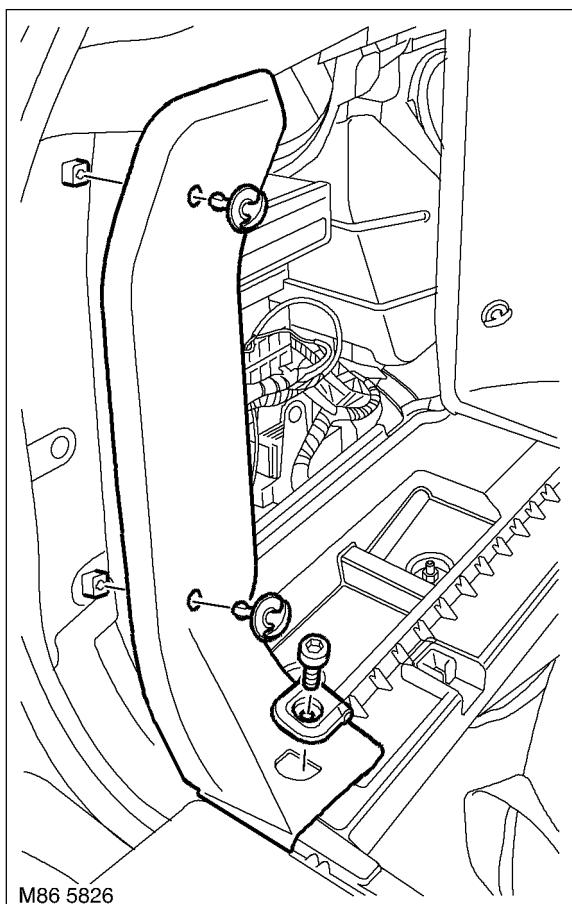
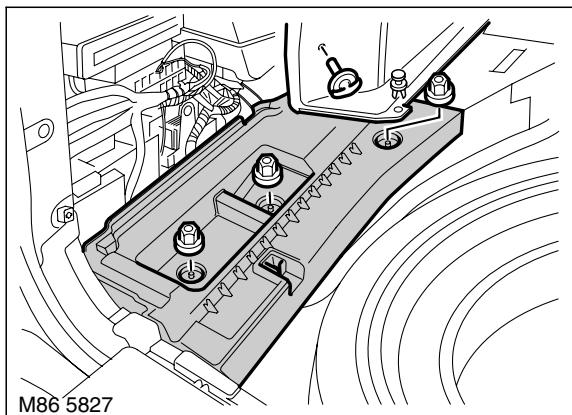
## Control unit - telephone (TCU)

### » 86.53.12

If the TCU is to be replaced then Testbook/T4 must be connected and correct procedures adhered to, prior to battery disconnection.

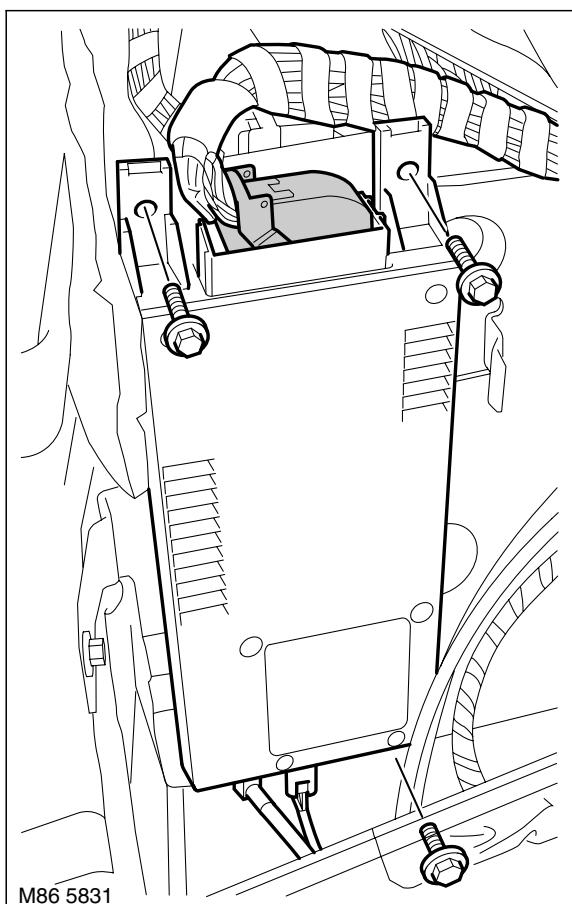
#### Remove

1. Remove access panel from load space LH trim casing.
2. Remove load space LH stowage bin cover.
3. Raise and support spare wheel cover.

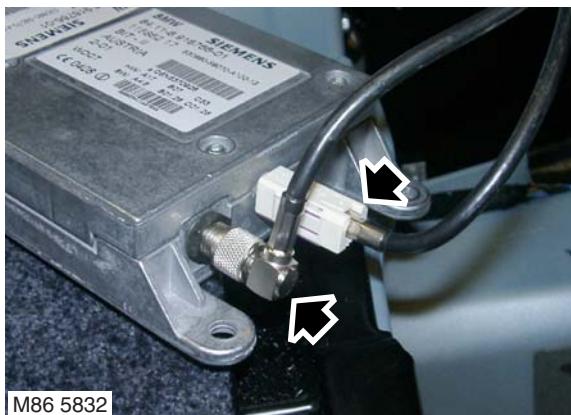


4. Remove Allen bolt securing lashing ring and remove ring.
5. Remove 2 turnbuckles securing load space LH rear trim casing.
6. Carefully release and remove trim casing.

7. Remove lower turnbuckle securing load space LH front trim casing.
8. Remove trim stud securing load space LH front trim casing to stowage bin.
9. Remove 3 nuts securing stowage bin, carefully release and remove bin.



10. Disconnect multiplug from TCU.
11. Remove 3 bolts securing TCU and release TCU.



12. Loosen nut and disconnect coaxial cable.
13. Disconnect multiplug and remove TCU.

#### Refit

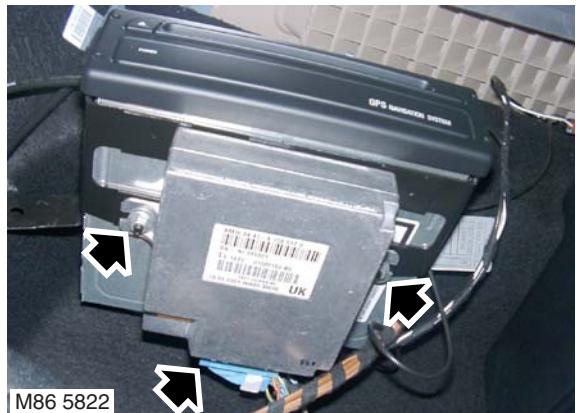
1. Position TCU and connect multiplug.
2. Connect coaxial cable and secure with nut.
3. Fit TCU and tighten bolts to 10 Nm (7 lbf.ft).
4. Connect multiplug to TCU.
5. Fit stowage bin and secure with nuts.
6. Fit trim stud securing LH front trim casing.
7. Fit turnbuckle securing LH front trim casing.
8. Fit LH rear trim casing, align to tailgate seal and fit turnbuckles.
9. Fit lashing eye and tighten Allen bolt to 25 Nm (18 lbf.ft).
10. Lower and secure spare wheel cover.
11. Fit stowage bin cover.
12. Fit access panel.
13. Configure new TCU using TestBook/T4.

## Voice recognition module

### 86.53.13

#### Remove

1. Remove access panel from load space LH trim casing.



2. Remove 2 nuts securing voice recognition module and release module.
3. Disconnect multiplug and remove voice recognition module.

#### Refit

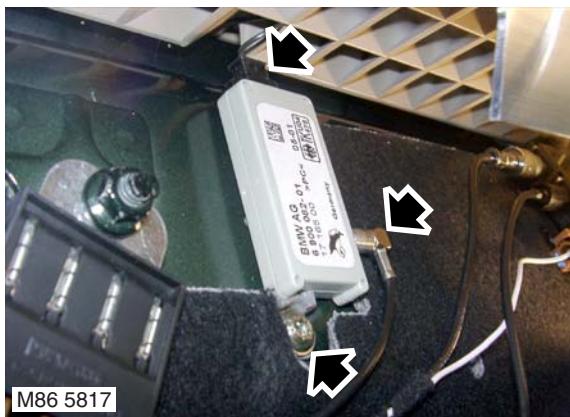
1. Position voice recognition module and connect multiplug.
2. Fit voice recognition module and tighten nuts to 6 Nm (4.4 lbf.ft).
3. Fit access panel.

**Amplifier - television (TV) - LH**

» **86.53.18**

**Remove**

1. Remove access panel from load space LH trim casing.



2. Disconnect coaxial cable.
3. Remove Torx screw securing amplifier.
4. Disconnect multiplug and remove amplifier.

**Refit**

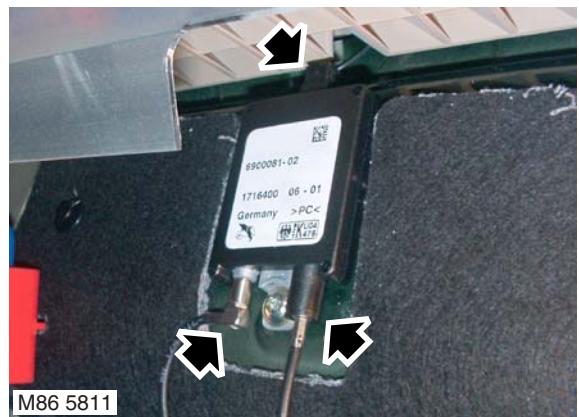
1. Position amplifier and connect multiplug.
2. Fit amplifier and tighten Torx screw to 6 Nm (4.4 lbf.ft)
3. Connect coaxial cable.
4. Fit access panel.

**Amplifier - television (TV) - RH**

» **86.53.19**

**Remove**

1. Remove RH access panel from load space trim casing.



2. Disconnect coaxial cable.
3. Remove Torx screw securing aerial amplifier.
4. Disconnect multiplug and remove amplifier.

**Refit**

1. Position amplifier and connect multiplug.
2. Fit amplifier and tighten Torx screw to 6 Nm (4.4 lbf.ft)
3. Connect coaxial cable.
4. Fit access panel to load space trim casing.

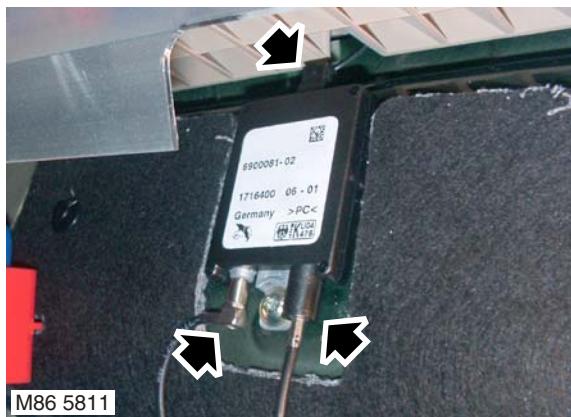
## NAVIGATION AND IN CAR ENTERTAINMENT

### Amplifier - aerial - TV and FBH

» 86.53.21

#### Remove

1. Remove RH access panel from load space trim casing.



2. Disconnect coaxial cable.
3. **Models with fuel burning heater:** Disconnect FBH receiver coaxial cable.
4. Remove Torx screw securing aerial amplifier.
5. Disconnect multiplug and remove amplifier.

#### Refit

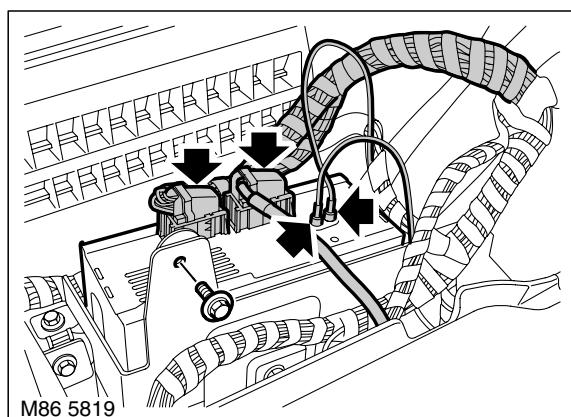
1. Position amplifier and connect multiplug.
2. Fit amplifier and tighten Torx screw to 6 Nm (4.4 lbf.ft)
3. Connect coaxial cable.
4. **Models with fuel burning heater:** Connect FBH receiver coaxial cable.
5. Fit access panel.

### Video unit

» 86.53.70

#### Remove

1. Remove access panel from load space LH trim casing.



2. Disconnect 2 multiplugs from video module.
3. Identify and disconnect 2 coaxial cables.
4. Remove bolt securing video module and remove module.

#### Refit

1. Fit video module and tighten bolt to 10 Nm (7 lbf.ft).
2. Connect coaxial cables.
3. Connect multiplugs.
4. Fit access panel.



## Fuse box - passenger compartment

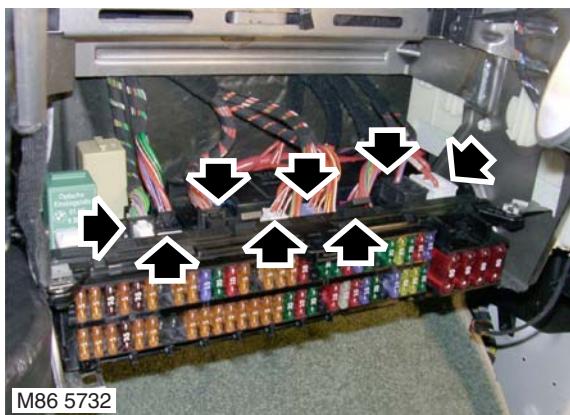
### 86.70.01

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

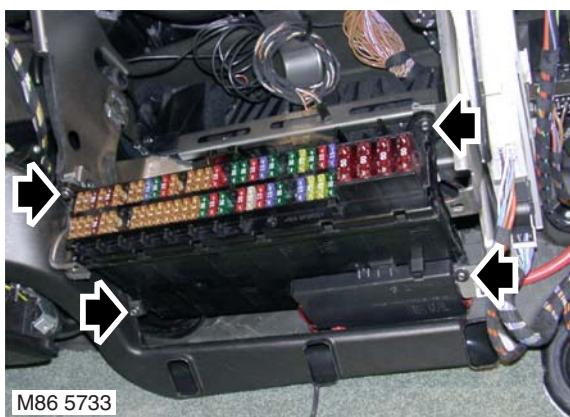
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

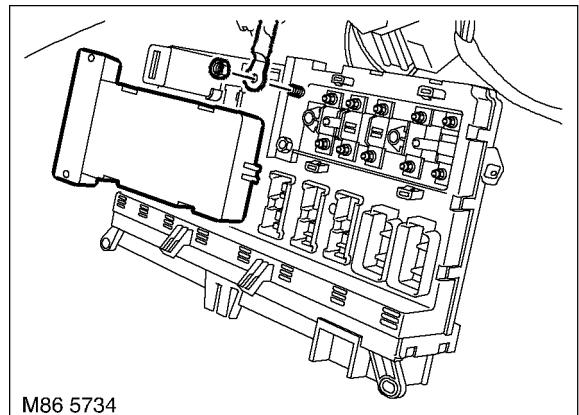
1. Disconnect battery earth lead.
2. Remove glove box.  
 **INTERIOR FITTINGS, REPAIRS, Glove box.**



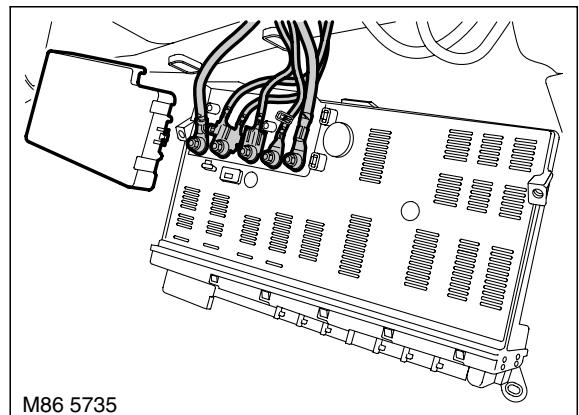
3. Noting fitted position, disconnect 8 multiplugs from fuse box.



4. Remove 4 Torx screws securing fuse box and position fuse box aside.



5. Remove upper fusible link cover.
6. Remove nut securing positive cable to fuse box, position cable aside.



7. Invert fuse box and remove lower fusible link cover.
8. Noting fitted position remove nuts securing fusible link cables, position cables aside.
9. Remove fusebox.  
*NOTE: Do not carry out further dismantling if component is removed for access only.*

10. Remove fuses and relays from fuse box.

#### Refit

1. Fit fuses and relays to fuse box.
2. Position fuse box, connect fusible link cables, fit nuts and tighten to 8 Nm (6 lbf.ft).
3. Fit lower fusible link cover.
4. Position positive cable to fuse box, fit nut and tighten to 15 Nm (11 lbf.ft).
5. Fit upper fusible link cover.
6. Position fuse box and secure with screws.
7. Connect multiplugs to fusebox.

## HARNESES

8. Fit glove box.  
    → **INTERIOR FITTINGS, REPAIRS,**  
    **Glove box.**
9. Connect battery earth lead.

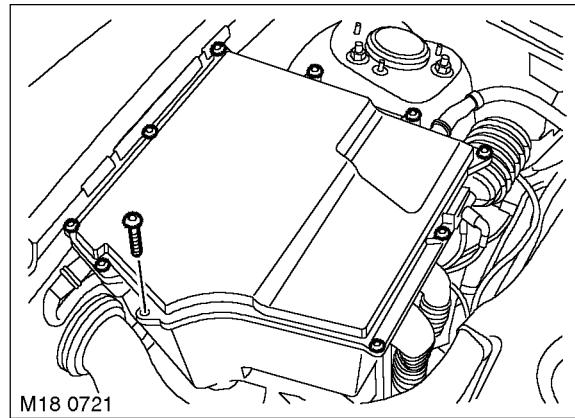
### **Harness - engine - Td6**

→ **86.70.17**

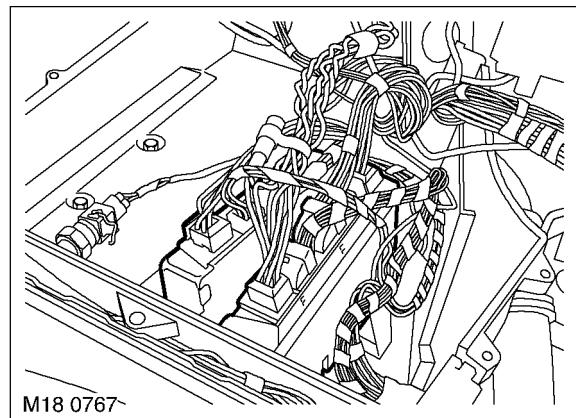
#### **Remove**

1. Remove inlet manifold gasket.

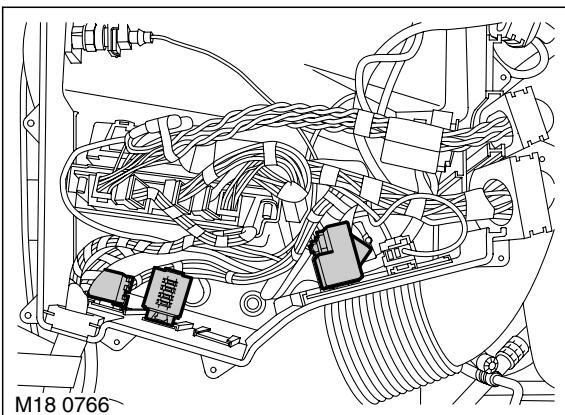
    → **MANIFOLD AND EXHAUST SYSTEM**  
    - **Td6, REPAIR, Gaskets - inlet manifold.**



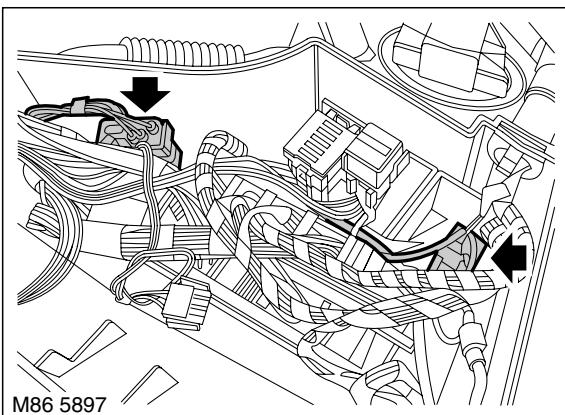
2. Remove 10 Allen screws securing 'E' box cover, remove cover.



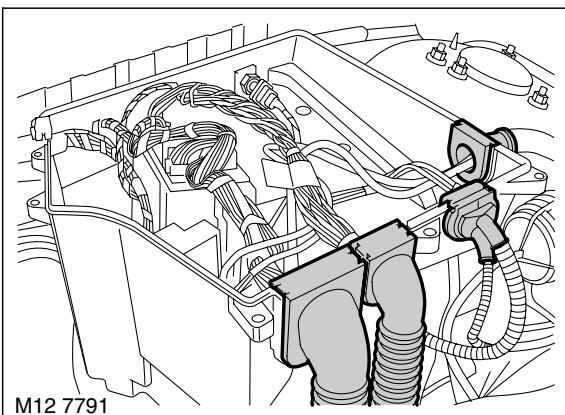
3. Release 3 multiplugs from ECM.
4. Release 2 multiplugs from EAT ECU.



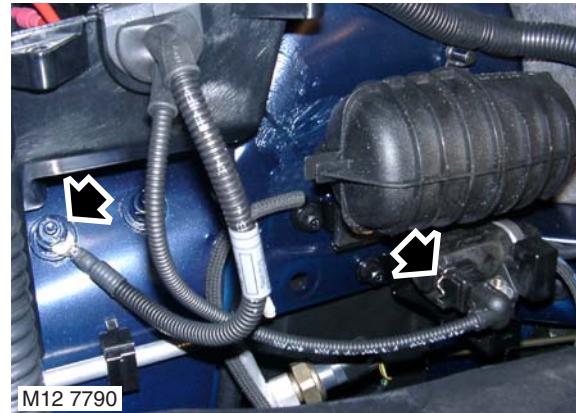
5. Disconnect multiplug from glowplug ECU.
6. Release fuse holder and relay from 'E' box.



7. Release and disconnect multiplug from engine harness to RH body harness.
8. Release multiplug from engine relay.



9. Release harness grommets from 'E' box.



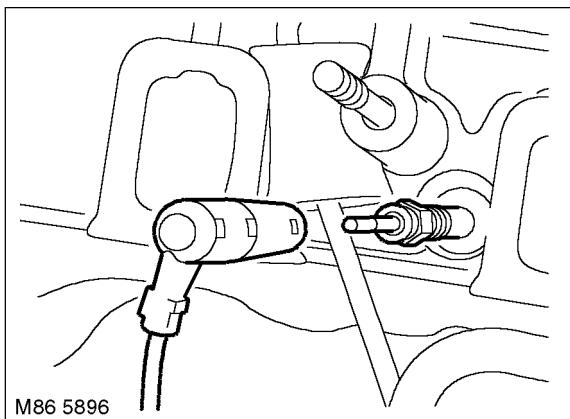
10. Disconnect earth lead from RH suspension turret.
11. Disconnect multiplug from boost control modulator.



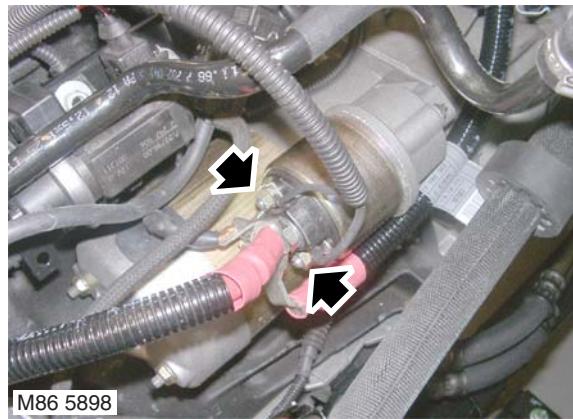
12. Disconnect multiplug from mass airflow meter.
13. Disconnect multiplug from CMP sensor.
14. Release mass airflow meter harness from retaining clip and cable tie.
15. Feed mass airflow meter harness through vacuum pump pipe.

## HARNESSES

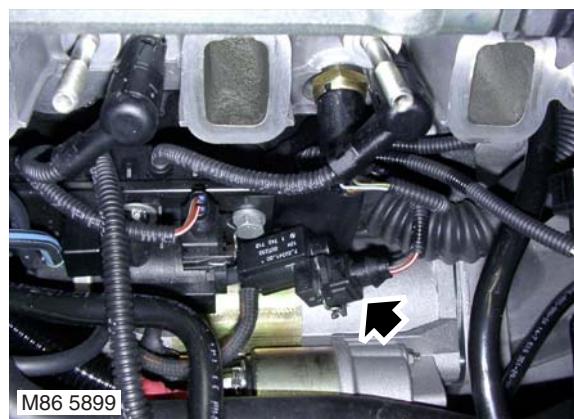
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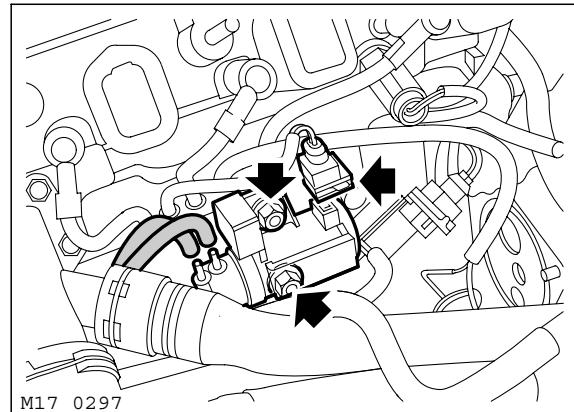
16. Disconnect 6 multiplugs from glow plugs.



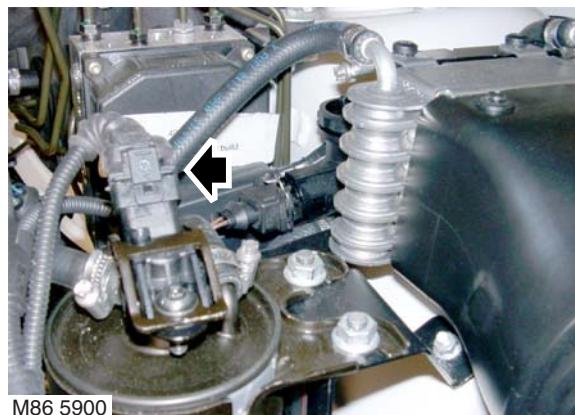
17. Remove 2 nuts securing engine harness to starter motor.



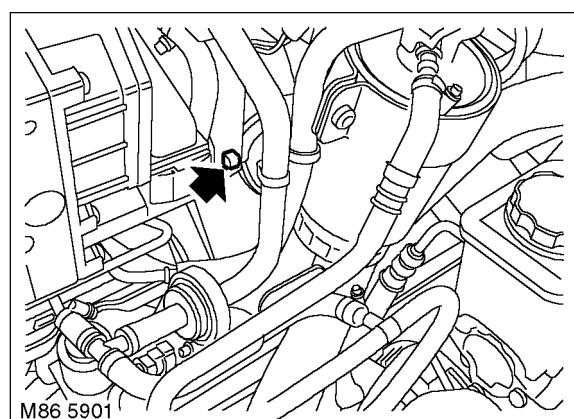
18. Disconnect multiplug from damping control actuator.



19. Disconnect multiplug from EGR modulator, remove 2 nuts and place modulator aside.



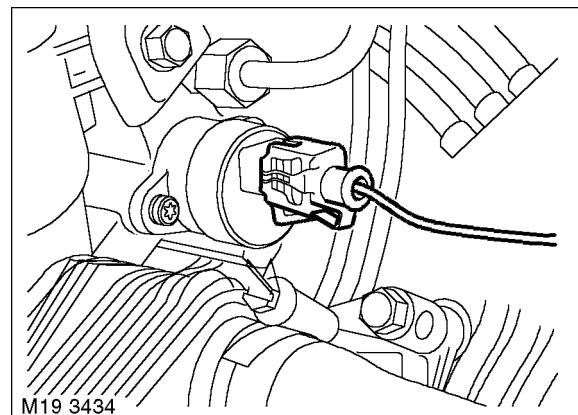
20. Disconnect multiplug from low pressure sensor, positioned on fuel filter.



21. Disconnect multiplugs from fan assisted fuel cooler and thermostatic switch.  
22. Release fuel cooler harness from retaining clip.



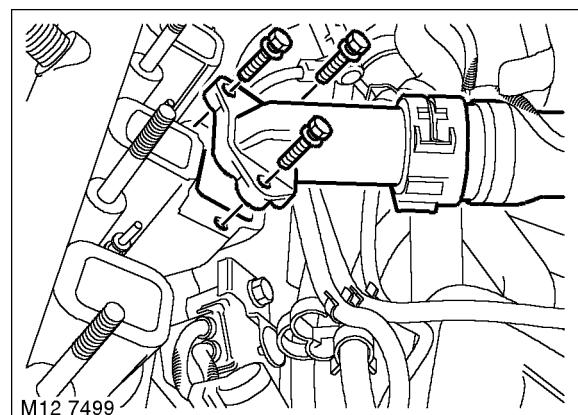
- 23.** Disconnect multiplug from engine oil temperature sensor.



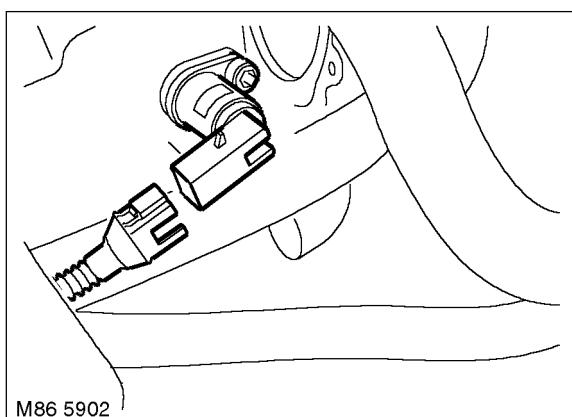
- 26.** Disconnect multiplug from back of injector pump.



- 24.** Disconnect multiplug from ECT sensor.



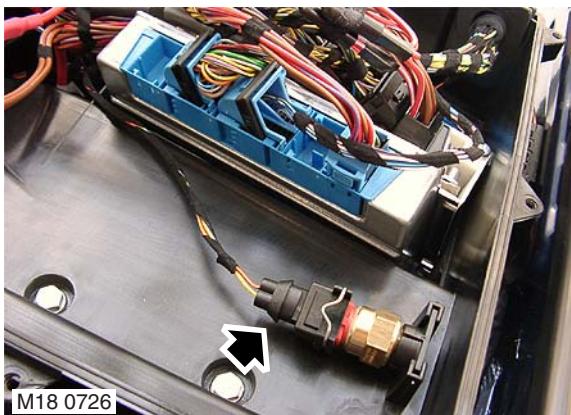
- 27.** Remove 3 bolts and move coolant hose adaptor from cylinder head. Discard seal.  
**28.** Remove 2 bolts securing harness.  
**29.** Raise vehicle on lift.  
**30.** Disconnect gearbox multiplug and release harness from 3 retaining clips.  
**31.** Remove bolt and spacer from 'P' clip securing harness at rear of engine.  
**32.** Release harness from 3 retaining clips on RH side of engine.



- 25.** Disconnect multiplug from CKP sensor.

# HARNESSES

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33. Disconnect multiplug from 'E' box temperature sensor and remove harness.

## Refit

1. Fit harness to clips on RH side of engine.
2. Position harness to rear of engine, fit and secure 'P' clip with bolt, tighten to 10 Nm (7 lbf.ft).
3. Raise vehicle on lift.
4. Position and secure harness to gearbox clips, connect multiplug.
5. Position harness to LH side of engine and secure with bolt, tighten to 10 Nm (7 lbf.ft).
6. Clean mating surfaces of coolant hose adaptor and fit seal.
7. Position adaptor to engine and secure with bolts, tighten to 10 Nm (7 lbf.ft).
8. Route injector pump harness to rear of pump and connect multiplug.
9. Route CKP sensor harness and connect multiplug.
10. Connect ECT sensor multiplug.
11. Route harness and connect multiplug to engine oil temperature sensor.
12. Position fuel cooler harness and secure in retaining clip.
13. Connect multiplugs to fan assisted fuel cooler and thermostatic switch.
14. Connect multiplug to low fuel pressure sensor.
15. Position and fit EGR modulator, secure with nuts tighten to 10 Nm (7 lbf.ft).
16. Secure damping control actuator to retaining bracket.
17. Connect multiplugs to actuator and modulator.
18. Route harness to starter motor.
19. Fit harness connection to RH side of starter motor and secure with nut, tighten to 6 Nm (4.4 lbf.ft).
20. Fit harness connection to LH side of starter motor and secure with nut, tighten to 10 Nm (7 lbf.ft).
21. Connect multiplugs to glow plugs.

22. Route mass airflow meter harness and connect multiplug.
23. Place engine harness across engine, fit grommet to 'E' box.
24. Using cable tie, secure mass airflow meter harness to vacuum pipes and secure to retaining clip.
25. Connect multiplug to camshaft sensor.
26. Route harness and connect multiplug to boost control modulator.
27. Connect multiplug to engine relay in 'E' box.
28. Fit harness connection to RH side of starter motor and secure with nut, tighten to 6 Nm (4.4 lbf.ft).
29. Position and secure, fuse holder and relay to 'E' box bracket.
30. Connect earth lead to LH suspension turret
31. Connect multiplug to glowplug ECU.
32. Connect multiplugs to EAT ECU.
33. Connect multiplug from engine harness to RH body harness.
34. Connect ECM multiplugs.
35. Connect 'E' box temperature sensor multiplug.
36. Fit 'E' box cover and secure with Allen key screws.
37. Fit inlet manifold gasket.

 **MANIFOLD AND EXHAUST SYSTEM**  
- Td6, REPAIR, Gaskets - inlet manifold.



## Harness - engine - V8

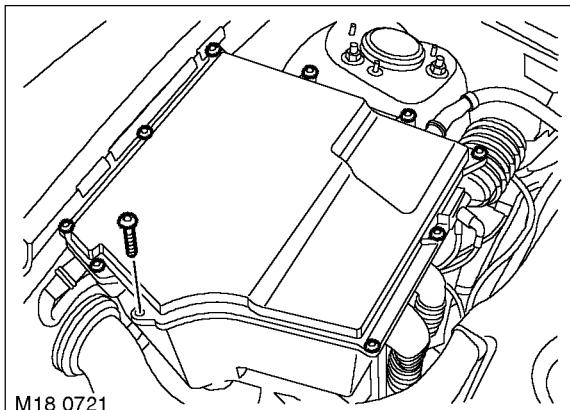
### » 86.70.17

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

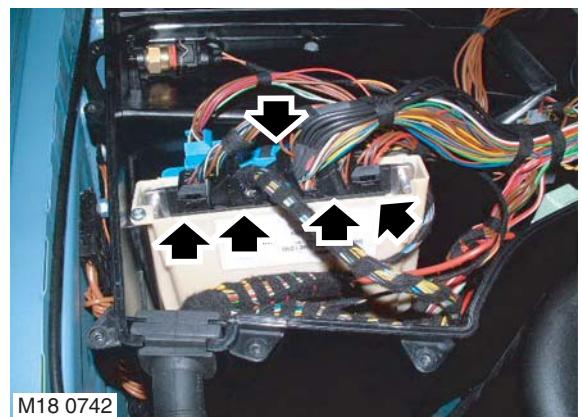
**GENERAL INFORMATION, Electrical Precautions.**

#### Remove

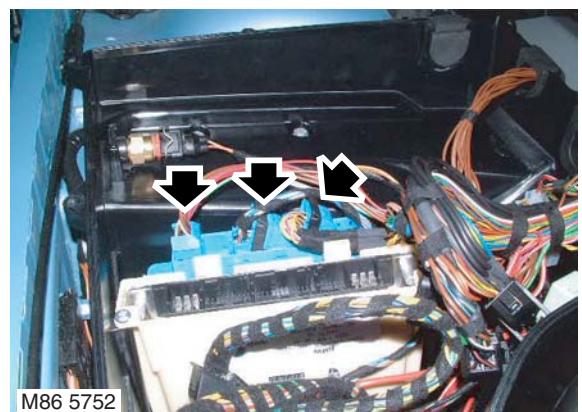
1. Position vehicle on lift.
2. Disconnect battery earth lead.
3. Remove air intake hose.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
4. Remove LH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
5. Remove RH ignition coil cover.  
 **ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**



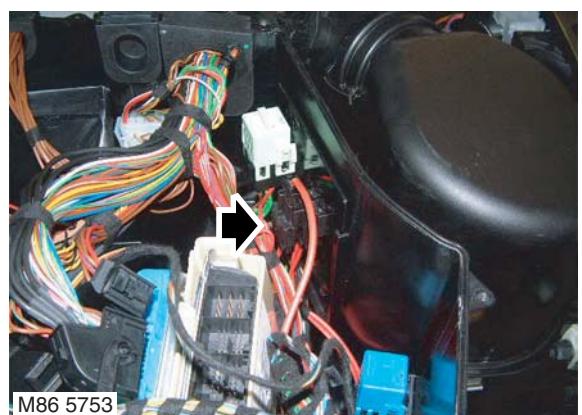
6. Remove 10 Allen screws securing 'E' box cover and remove cover.



7. Disconnect 5 multiplugs from engine ECM.



8. Disconnect 3 multiplugs from gearbox ECU.

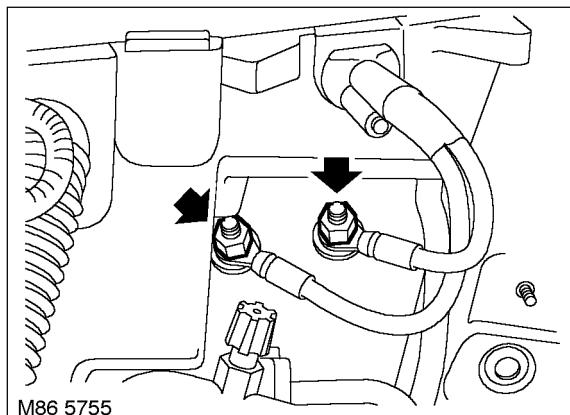


9. Disconnect engine harness multiplug and 3 relays from inside 'E' box

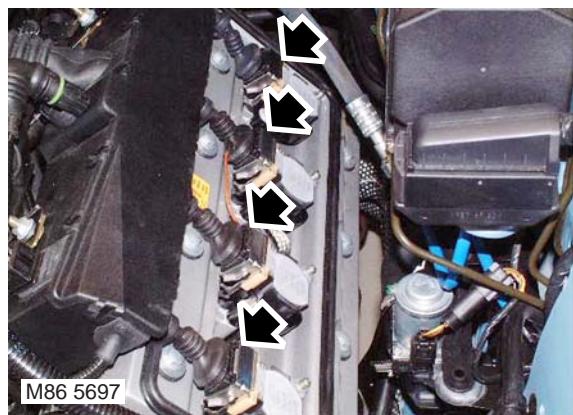
## HARNESSES



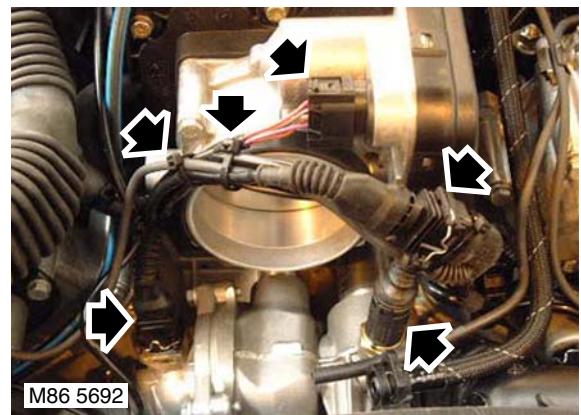
10. Disconnect engine harness multiplug from 'E' box.



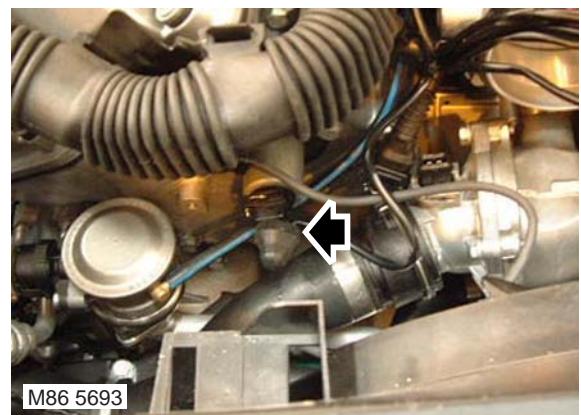
11. Remove 2 nuts securing 2 engine harness earth leads.
12. Release 2 engine harness grommets from 'E' box.



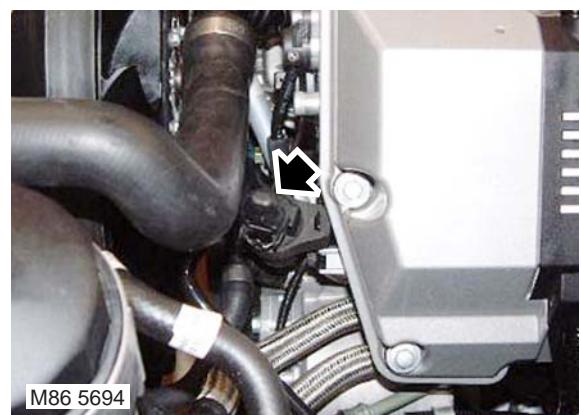
13. Disconnect multiplugs from ignition coils.



14. Disconnect multiplugs from throttle body, thermostat heater, CMP sensor and ECT sensor.
15. Cut 2 cable ties and release engine harness.



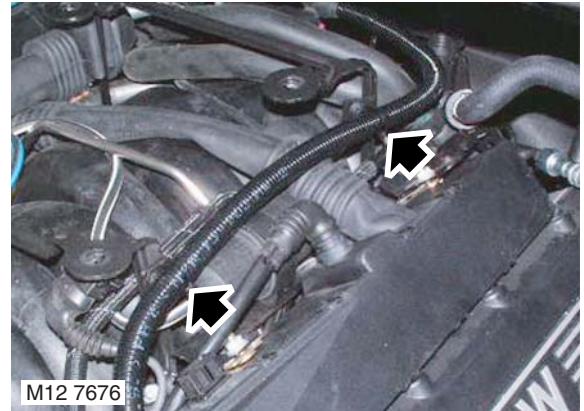
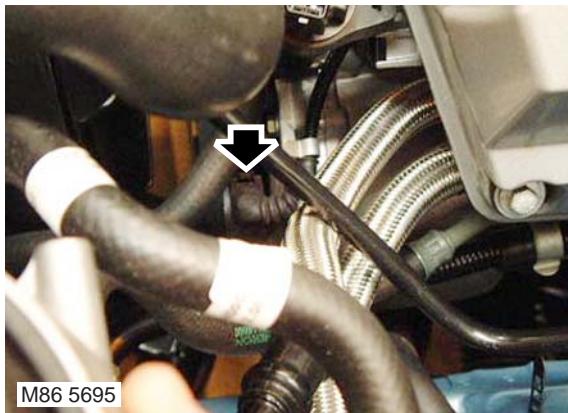
16. Disconnect multiplugs from VCC solenoids.
17. Release VCC multiplug harness from clip.



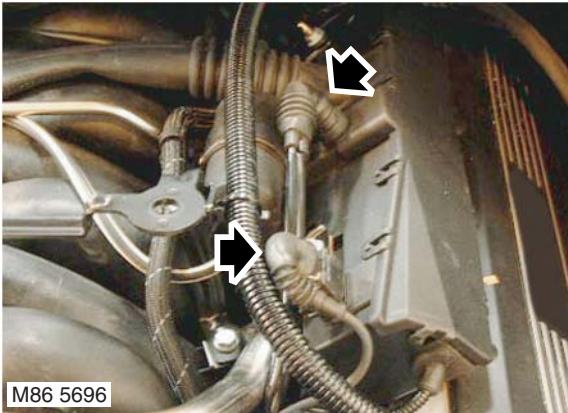
18. Disconnect multiplug from charcoal canister purge solenoid valve.



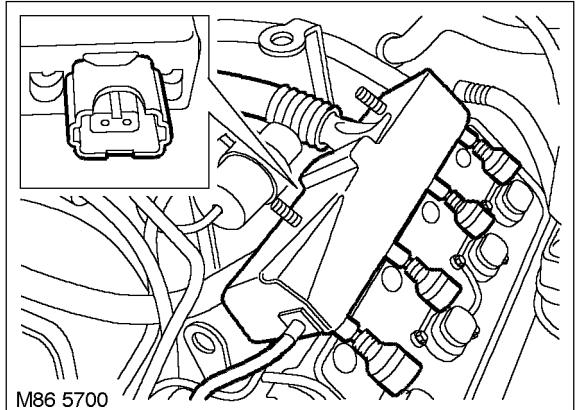
- 24.** Remove fuel hose and mounting bracket from LH fuel injector harness securing stud.



- 19.** Disconnect multiplug from alternator.  
**20.** Release alternator harness from 4 clips.

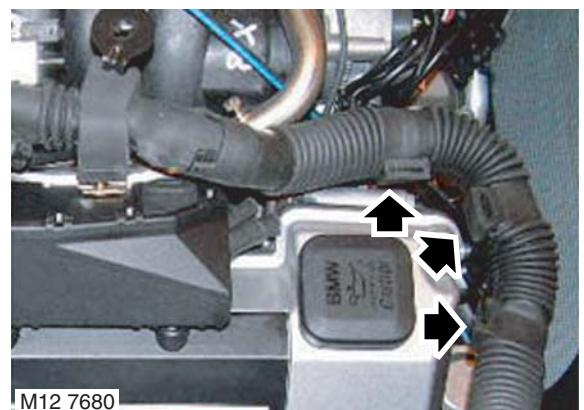
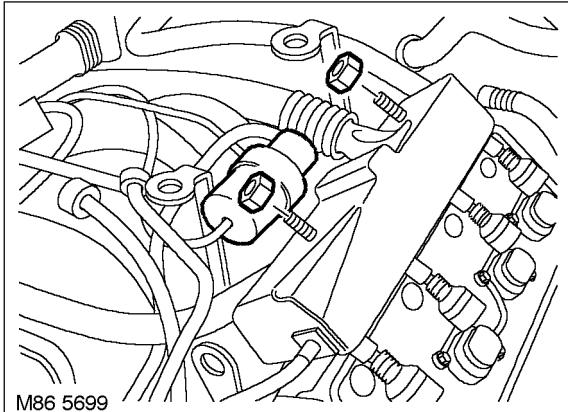


- 25.** Release alternator harness from 2 clips on engine cover mounting brackets.



- 21.** Disconnect multiplugs from KS and CMP sensor.

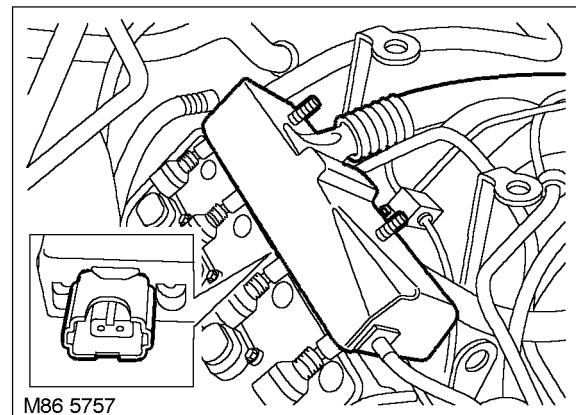
- 26.** Disconnect multiplugs from fuel injectors.



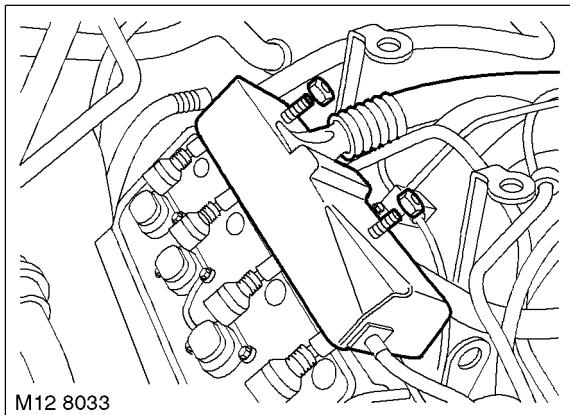
- 22.** Remove 2 nuts securing fuel injector harness to fuel rail.  
**23.** Release vacuum reservoir and mounting bracket from LH fuel injector harness securing stud.

- 27.** Release engine harness from clips and move clear of camshaft cover.

## HARNESSES



28. Disconnect multiplug from charcoal canister purge solenoid valve.

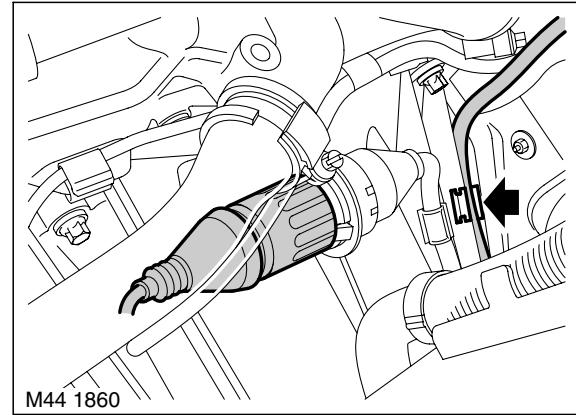


29. Remove 2 nuts securing engine harness to induction manifold
30. Remove secondary air vacuum switching valve from RH fuel injector harness securing stud.
31. Remove washer from fuel injector harness securing stud.



32. Disconnect multiplug from RH KS.

33. Disconnect multiplugs from fuel injectors.
34. Reposition injector harness.



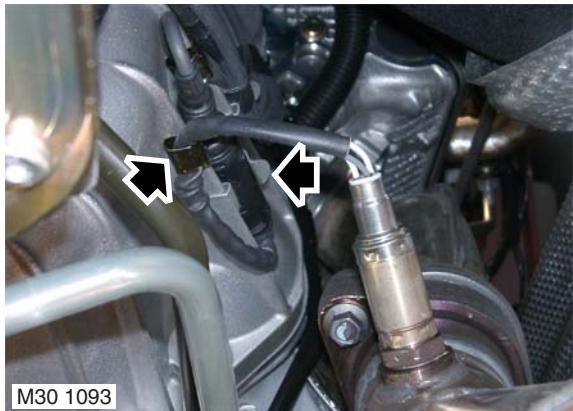
35. Disconnect multiplug from inhibitor switch harness.
36. Release clips securing LH oxygen sensor lead from gearbox bell housing.



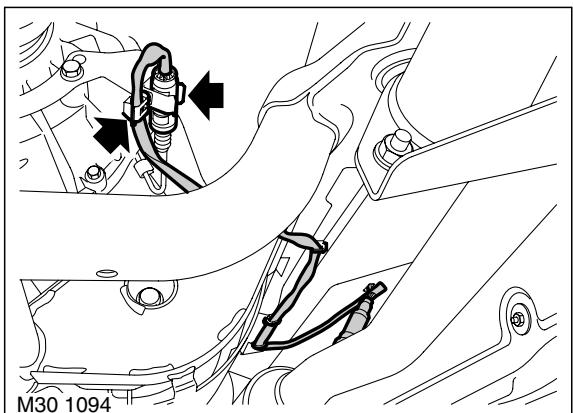
37. Disconnect multiplug from engine wiring harness.
38. Disconnect multiplug from CKP sensor.



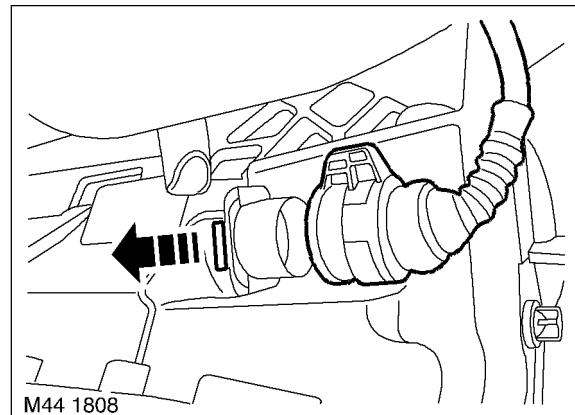
- 39.** Release CKP sensor lead from clip on RH side of gearbox.



- 40.** Release pre-catalyst harness leads from clips, remove multiplugs from retaining clips and disconnect.  
**41.** Release gearbox breather pipe from clip on top of gearbox.



- 42.** Release post catalyst HO2S harnesses from clips, remove multiplugs from clips and disconnect.



- 43.** Disconnect multiplug from gearbox housing.  
**44.** Note engine harness route on engine and remove harness.

#### Refit

1. Position and correctly route engine harness to engine.
2. Connect multiplug to gearbox housing.
3. Connect multiplugs to post catalyst HO2S sensors and secure with clips.
4. Secure gearbox breather pipe to clip on top of gearbox.
5. Connect multiplugs to pre-catalyst HO2S sensors and secure with clips.
6. Secure CKP sensor lead to clip on RH side of gearbox.
7. Connect multiplug to CKP sensor.
8. Connect multiplug to engine wiring harness.
9. Fit and secure LH oxygen sensor lead to gearbox bell housing.
10. Fit and secure inhibitor switch harness and connect multiplug.
11. Reposition injector harness.
12. Connect fuel injector harness multiplugs.
13. Fit washer to fuel injector harness securing stud.
14. Fit secondary air vacuum switching valve to RH fuel injector securing stud.
15. Fit 2 nuts securing fuel injector harness to induction manifold and tighten.
16. Connect multiplug to charcoal canister purge solenoid valve.
17. Position and secure engine harness to brackets with clips.
18. Connect fuel injector harness multiplugs.
19. Connect alternator harness to 2 clips on engine cover mounting brackets.
20. Fit fuel hose and mounting bracket to LH fuel injector harness securing stud.
21. Fit vacuum reservoir and mounting bracket to LH fuel injector harness securing stud.

## HARNESSES

22. Fit 2 nuts securing fuel injector harness to induction manifold and tighten.
23. Connect multiplugs to knock sensors.
24. Connect multiplug to CMP sensor.
25. Connect alternator harness to 4 clips.
26. Connect multiplug to alternator.
27. Connect multiplug to charcoal canister purge solenoid valve.
28. Connect VCC multiplug harness to clip.
29. Connect multiplugs to valve body solenoids.
30. Fit new cable ties, align and secure harness.
31. Connect multiplug to CMP sensor.
32. Connect multiplug to throttle body.
33. Connect multiplug to alternator.
34. Connect multiplugs to ECT sensors.
35. Secure 2 engine harness grommets to 'E' box.
36. Position 2 engine harness earth leads, fit nuts and tighten.
37. Connect engine harness multiplug in 'E' box.
38. Secure 3 relays to brackets in 'E' box.
39. Connect engine harness multiplug in 'E' box.
40. Connect 3 multiplugs to gearbox ECU.
41. Connect 5 multiplugs to engine ECM.
42. Fit 'E' box cover and tighten 10 securing Allen screws.
43. Fit LH ignition coil cover.  
**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - RH.**
44. Fit RH ignition coil cover.  
**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Cover - Ignition coils - LH.**
45. Connect air intake hose.  
**ENGINE MANAGEMENT SYSTEM - V8, REPAIRS, Hose - air flow meter to throttle body.**
46. Connect battery earth lead.

## Environmental box ('E' box)

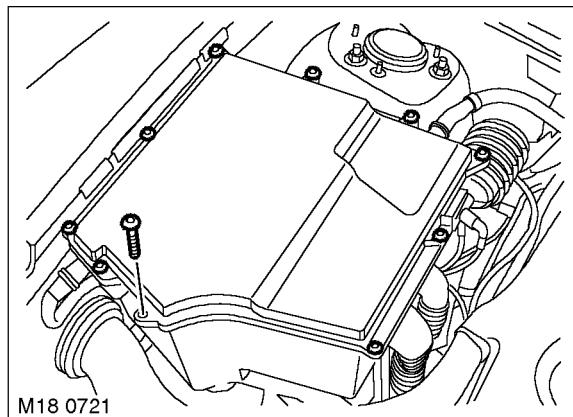
### 86.70.18

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

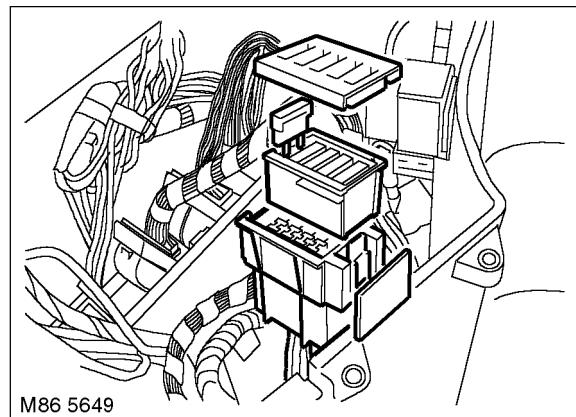
 **GENERAL INFORMATION, Electrical Precautions.**

#### Remove

1. Disconnect battery earth lead.



2. Remove 10 Allen screws securing 'E' box cover and remove cover.



3. Depress clip and release fuse block from mounting.
4. Disconnect fuse block assembly from multiplug.
5. Depress clips and remove fuse block cover.
6. Remove fuse.

**Refit**

1. Fit fuse and secure fuse block cover.
2. Connect multiplug to harness.
3. Fit and secure fuse block to mounting.
4. Fit 'E' box cover and tighten Allen screws to 2 Nm (1.5 lbf.ft).
5. Connect battery earth lead.

**Harness - tailgate - lower**

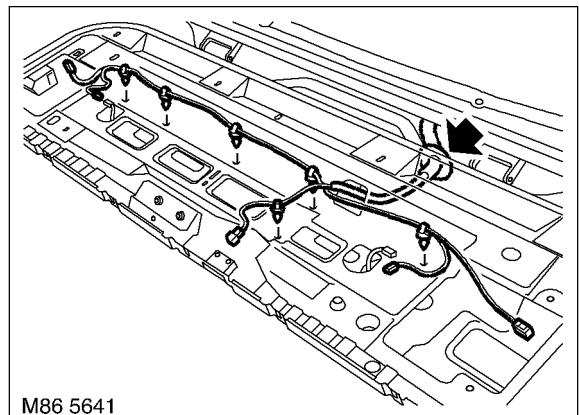
☞ **86.70.85**

Before disconnecting the battery, ensure all text and cautions in the battery disconnection section are observed.

**GENERAL INFORMATION, Electrical Precautions.**

**Remove**

1. Disconnect battery earth lead.
2. Remove lower tailgate finisher.  
 **INTERIOR FITTINGS, REPAIRS, Finisher - tailgate carpet.**



3. Disconnect 5 harness multiplugs.
4. Release 6 clips securing harness to tailgate.
5. Release harness gaiter from lower tailgate and withdraw harness.
6. Raise and support spare wheel cover.



7. Disconnect lower tailgate harness multiplug from body harness.
8. Release harness gaiter from body and remove harness from vehicle.

## HARNESSES

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### Refit

1. Position harness and secure harness clips.
2. Secure harness gaiter grommets to tailgate and body.
3. Connect multiplugs.
4. Fit tailgate lower trim casing.  
 **INTERIOR FITTINGS, REPAIRS,**  
**Finisher - tailgate carpet.**
5. Fit spare wheel cover.
6. Connect battery earth lead.

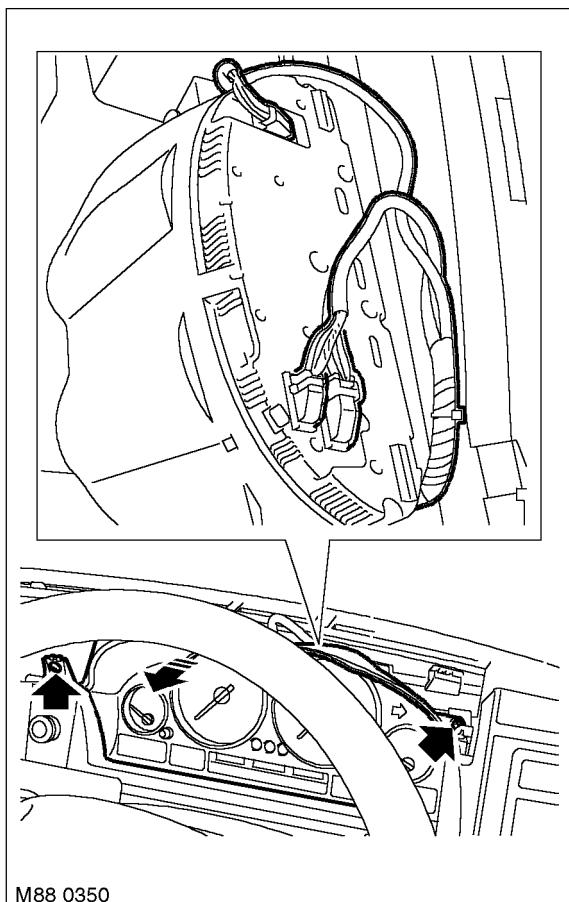


## Instrument pack

» 88.20.01.99

### Remove

1. Remove fascia top rail.  
 **INTERIOR FITTINGS, REPAIRS, Top rail - fascia.**



2. Remove 2 screws securing instrument pack to fascia, release pack from lower mounting lugs and move aside.
3. Disconnect 3 multiplugs from instrument pack.
4. Remove instrument pack.

### Refit

1. Connect multiplugs to instrument pack.
2. Fit instrument pack to fascia and secure with screws.
3. Fit fascia top rail.  
 **INTERIOR FITTINGS, REPAIRS, Top rail - fascia.**