

DB9

Workshop Manual

Issue 2

ASTON MARTIN

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Aston Martin 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.

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DB9 Workshop Manual

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Introduction

Welcome

This Workshop Manual is part of a suite of technical manuals provided for DB9. Other technical manuals include:

- Parts manual
- OBDII Diagnostic manual
- Man hour schedules

Chapters

The DB9 suite of manuals incorporate a new chapter structure.

Each chapter in this workshop manual is associated with a 4 digit number, i.e. Transmission (07.00). Each chapter is then further broken into sections, i.e. Automatic Transmission (07.01).

Chapter Navigation

Example 1:

Previous workshop manuals would have Steering and Suspension together in one chapter. The new structure now places Steering and Suspension into their own chapters. Road wheels are also now included in Suspension.

Example 2:

Fuel, emissions and exhaust is now in three different chapters. Fuel has its own chapter and includes all fuel aspects up to the fuel rails (Fuel rails and fuel injection now come under Engine System). Exhaust, not including manifolds, has its own chapter and Emissions now come under the Engine system.

When required references are made out to other chapters.

Numbering

	03.	02.
System, i.e. Engine system		
Subsystem, i.e. Engine lubrication system		

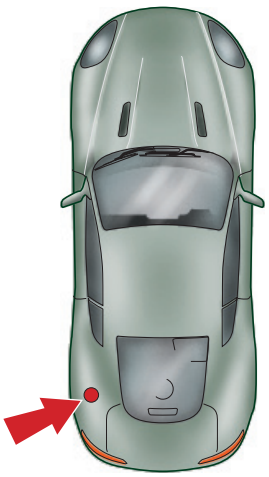
Chapters and sections within chapters are numbered using the system detailed above. All technical manuals for this vehicle use the same numbering system. When carrying out a procedure, the relevant parts illustration and spare parts list can be found using the same numbering system.

To avoid excessive repetition, each procedure is fully detailed once in its appropriate chapter. In any other location where this procedure is required, it is referenced by its title and chapter / page number.

Special Tools

Where special service tools are required to perform an operation, the tool number is recorded at the point of use within the procedure. Where the operation of a special service tool is complicated or not obvious, refer to the Appendix and Glossary for detailed operation procedures. A pictorial list of special service tools available for this vehicle can also be found in the Appendix and Glossary.

Location References



References to left, right, front or rear of the vehicle or of a component are referenced from sitting in the drivers seat facing forward. Any such references to assemblies removed from the vehicle are to the normal orientation of the assembly when installed in the vehicle.

Warnings, Cautions and Notes

The following Warnings, Cautions and Notes are used within this workshop manual to call your attention to specific types of information.

Warnings

⚠ *Warning* ⚠
Identifies procedures which must be followed precisely to help avoid the risk of personal injury.

Cautions

Caution
Provided to indicate procedures which must be followed precisely to reduce the possibility of damage to the vehicle.

Notes

Provided to indicate procedures which will help to avoid difficulties in the operation of the vehicle.

Repairs and Replacements

Where replacement parts are required, it is essential that only genuine Aston Martin parts are used. Your attention is drawn to the following points concerning repairs and the fitting of genuine Aston Martin parts and accessories:

- Safety features embodied in the vehicle may be impaired if other than genuine Aston Martin parts are installed. In certain territories, legislation prohibits the installation of parts which are not produced to the manufacturers specification
- Adhere to torque wrench settings given in this manual
- Locking devices, where specified, must be installed. If the efficiency of a locking device is impaired during removal, it must be renewed
- The vehicle warranty may be invalidated by the installation of other than genuine Aston Martin parts

Safety Precautions

All service workshops are a source of potential danger and repair work should only be performed by technically trained staff following procedures detailed in this manual. A safety conscious approach to the performance of all service procedures must be observed at all times. Statutory requirements governing all aspects of health and safety at work including directives for the proper use of materials and equipment must be implemented.

The following headings highlight particular safety precautions which should be observed (The list is not intended to be exhaustive).

Battery Disconnection

Where a procedure requires the vehicle battery to be physically disconnected (disconnect the vehicle battery earth (Negative) lead), the following items will have to be reset or re-learnt on connection:

- Seats memory
- Radio pre-sets
- DTCs will be lost

Air Conditioning (A/C) System

Do not break into the A/C refrigeration system until the refrigerant has been evacuated using the procedure detailed in this manual. Do not disconnect any A/C refrigerant system pipes unless trained and instructed to do so. The refrigerant used can cause blindness if allowed to contact your eyes.

Chemical Handling and Storage

⚠ Warning ⚠
Strictly adhere to handling and safety information found on containers and labels.

⚠ Warning ⚠
Do not store chemicals in unlabelled or incorrectly labelled containers.

⚠ Warning ⚠
Containers used for storing chemicals should not be left open; there is a risk of spilling, or evaporation of fumes which may be inflammable or toxic.

⚠ Warning ⚠
Do not mix chemicals unless instructed to do so, following manufacturers guidelines.

⚠ Warning ⚠
Do not inhale chemical materials to determine identity, they may be toxic.

⚠ Warning ⚠
Do not use petrol, kerosene, diesel fuel, gas oil, thinners or solvents for washing skin.

⚠ Warning ⚠
Chemicals based on solvents such as paint should not be sprayed in a confined space; work areas used for such operations should be well ventilated and fume extraction equipment should be utilised.

⚠ Warning ⚠
Containers whose capacity is over 25 litres (5 gallons) require a bund wall in order to contain spillages.

⚠ Warning ⚠
Avoid splashing the skin, eyes and clothing.

⚠ Warning ⚠
Ensure that adequate ventilation is provided when volatile de-greasing agents are being used.

⚠ Warning ⚠
Clean chemicals from the skin and clothing as soon as possible after soiling.

⚠ Warning ⚠
Wear protective clothing such as goggles, non porous gloves and apron when handling battery acid and other corrosive and toxic substances.

⚠ Warning ⚠
Do not smoke in the vicinity of volatile de-greasing agents.

⚠ Warning ⚠
Fume extraction equipment must be in operation when solvents are used e.g. trichloroethane, white spirit, SBP3, methylene chloride, perchloroethylene.

Chemicals used in the servicing of motor vehicles include acids, adhesives, antifreeze, brake fluids, coolants, grease, oil, paint, resin and solvents. Exposure to certain chemicals through direct contact or inhalation can be fatal.

Potential hazards may also be present through the incorrect use, storage and handling of chemicals causing a fire risk.

Electrical Equipment

⚠ Warning ⚠
Ensure that electrical equipment is in safe working order before use.

⚠ Warning ⚠
Inspect power leads of all mains electrical equipment for damage and security, and check that it is properly earthed.

⚠ Warning ⚠
Ensure that electrical equipment is protected by a fuse of the correct current rating.

⚠ Warning ⚠
Disconnect the battery before commencing repair operations to the electrical system, fuel system and engine or when working beneath the vehicle.

Exhaust Fumes

⚠ Warning ⚠
Do not breathe exhaust fumes. Exhaust fumes contain carbon monoxide. Carbon monoxide is a dangerous gas, which is colourless and odourless and can cause unconsciousness and may be fatal. Never start or leave the engine running in an enclosed, unventilated area.

⚠ Warning ⚠
Avoid skin contact with all exhaust system and engine components, engine fluids and escaping steam. They may be hot and will burn you.

Engines must only be run where there is fume extraction equipment in operation or where there is adequate ventilation.

Fire Precautions

⚠ Warning ⚠
Ensure that a suitable form of fire extinguisher is conveniently located near the work area.

⚠ Warning ⚠
Keep oils, solvents and combustible materials away from naked flames and other sources of ignition.

⚠ Warning ⚠
Ensure that NO SMOKING signs are posted around areas where combustible materials and vapour may be present and ensure that the warnings are strictly observed.

⚠ Warning ⚠
Ensure that dry sand is available to soak up any spillage of fuel or other flammable solutions.

⚠ Warning ⚠
Fume extraction equipment must be available and in full working order to remove combustible and toxic vapours.

⚠ Warning ⚠
All personnel should be aware of the fire drill procedures and precautions.

Tools and Equipment

⚠ Warning ⚠
Do not leave tools, equipment, spilt oil, etc. around or on the work area.

⚠ Warning ⚠
Ensure that tools and equipment used are in good condition; do not use damaged or defective tools or equipment.

Caution
Do not apply heat in an attempt to free stiff nuts or fittings; as well as causing damage to protective coatings, the stray heat may damage electronic equipment, harnesses and brake lines.

Use the recommended service tool where instructed to do so.

Used Engine Oil

⚠ Warning ⚠
Prolonged and repeated contact with used engine oils can cause serious skin disorders, including dermatitis and cancer. Avoid excessive contact, wash thoroughly after contact.
In addition, observe all laws regarding the disposal of waste oil and toxic fluids.

Adequate means of skin protection and washing facilities should be provided.

Health Protection Precautions

⚠ Warning ⚠
Prolonged and repeated contact with used engine oils can cause serious skin disorders, including dermatitis and cancer. Avoid excessive contact, wash thoroughly after contact.

- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets.
- Avoid contaminating clothes with oil.
- Overalls must be cleaned regularly. Discard un-washable clothes and oil impregnated footwear.
- First aid treatment should be obtained immediately for open cuts or wounds.
- Use barrier creams, apply before each work period to help the removal of oil from the skin.
- Wash with soap and water to ensure all oil is removed. Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use petrol, kerosene, diesel fuel, gas oil, thinners or solvents for washing skin.
- If skin disorders develop, obtain medical advice.
- Where practicable, degrease components prior to handling.
- Where there is a risk of eye contact, eye protection should be worn. In addition, an eye wash facility should be provided.

Environmental Protection

It is illegal to pour used oil on the ground, down sewers or drains, or into water courses. The burning of used engine oil in small space heaters or boilers is not recommended unless emission control equipment is installed; in case of doubt, contact the Local Authority for advice on disposal facilities.

Lifting and Jacking

Safety

> ⚠ *Warning* ⚠
> ***Recommended procedures for lifting, jacking and towing must be strictly observed to ensure personal safety.***

> ⚠ *Warning* ⚠
> ***Always use a vehicle hoist, ramp or pit for working beneath the vehicle in preference to jacking.***

> ⚠ *Warning* ⚠
> ***Never rely on a jack to support a car independently, use axle stands or blocks carefully placed at jacking points to provide rigid support.***

> ⚠ *Warning* ⚠
> ***When working beneath a vehicle, chock wheels as well as applying handbrake.***

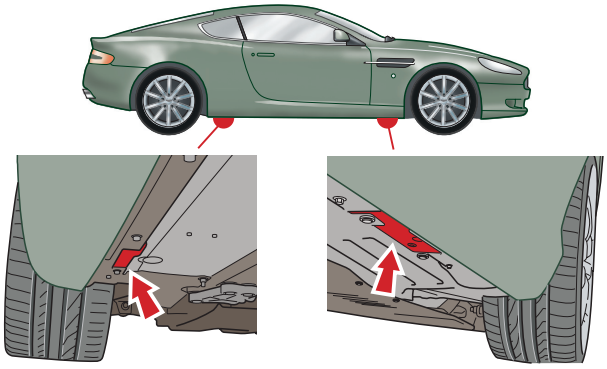
> ⚠ *Warning* ⚠
> ***Ensure vehicle is standing on firm, level ground before jacking or lifting.***

> ⚠ *Warning* ⚠
> ***Check lifting equipment has adequate capacity for load being lifted and is in full working order.***

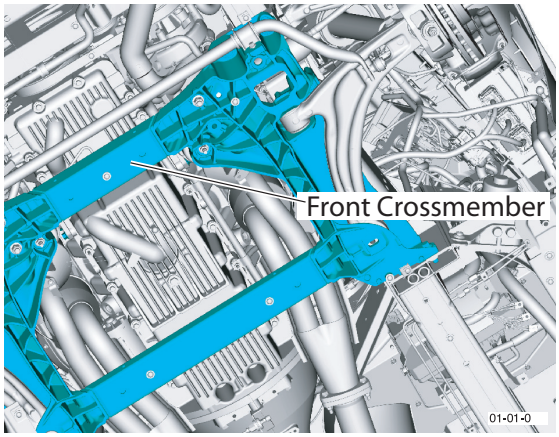
Jacking Points

> **Caution**
> **Do not jack the vehicle on the lower suspension arms (front or rear).**

This vehicle jacking points are at positions shown.



The vehicle may also be jacked with the jack placed on the front subframe, front crossmember.



Always use a jack with a rubber contact pad. Avoid the use of jacks with sharp contact pads which could damage the vehicle floor pan Always chock the opposite road wheels as well as applying the handbrake when using a hydraulic jack.

To prevent body distortion, avoid single point or one side jacking with the tunnel shear panel removed.

To avoid any danger of bodywork damage when using a hydraulic jack, the vehicle must only be lifted at the jacking points.

Stands

When carrying out work (other than a wheel change) which requires a wheel to be raised, a stand must be used, located at the jacking point, to provide a secure support for the vehicle.

Workshop Hoist

Use of a workshop hoist is recommended for all operations where vehicles must be raised. Follow manufacturers instructions. If using an adjustable arm type, ensure lifting pads are correctly positioned at the four jacking points before lifting.

Vehicle Recovery

General

The preferred method of vehicle recovery is by a flat bed, covered, transporter.

The towing eye is primarily for emergency use when towing for short distances, e.g. removing vehicle if it is causing an obstruction or winching vehicle onto a flatbed transporter.

If moving this vehicle in such a situation, install the towing eye to the bracket, which is located behind the registration number plate.

Caution

Take care to protect the paint work when installing the towing eye. Ensure the towing eye is tight.

Transporting

If vehicle is to be transported on a trailer or flat bed transporter the handbrake must be applied and the road wheels must be chocked.

Suspended Towing

Caution

Do not tow with 'sling' type equipment, damage to bodywork will result.

Take care when using 'spectacle frame' type towing equipment that the towing device is well clear of front or rear apron. Body damage may occur if vehicle passes over uneven road surfaces.

Ensure the recovery team follow the following towing instructions:

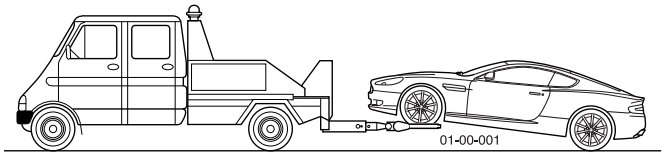
Front Suspended Tow

Automatic Transmission Only

1. Switch the ignition 'On'.
2. Pull back twice on both paddles, simultaneously, to force the gearbox into 'Neutral'.
   Switch the ignition 'Off' within three seconds.

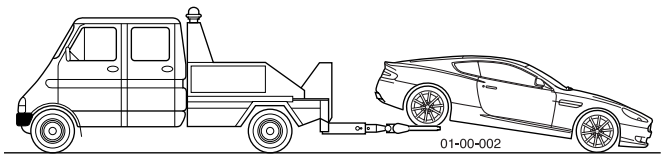
Manual and Automatic Transmissions

3. Remove the ignition key from the ignition.
4. Raise the vehicle using a 'spectacle frame' type lifting device with a cradle positioned under each front wheel as indicated below.



Rear Suspended Tow

1. Set the steering in the 'straight ahead' position.
2. Remove the ignition key from the ignition. Ensure the steering is locked in the straight ahead position.
3. Raise the vehicle using a 'spectacle frame' style lifting device where a cradle is positioned under each rear wheel as indicated below.



Towing an Automatic Vehicle

Caution

This vehicle installed with an automatic transmission can be towed on its driven wheels at not more than 70 km/h road speed and for a maximum distance of 500 km.

The selector lever must be in Neutral (N).

If the above speed and distance limits are exceeded, the automatic transmission will be severely damaged.

Towing Regulations

In certain countries the registration number plate of the towing vehicle and an 'ON TOW' sign or warning triangle must be displayed in a prominent position at the rear of vehicle being towed.

Towing by Another Vehicle

⚠ Ward the brake booster will become ineffective after a few applications of the brakes. Be prepared for relatively heavy steering and the need for greatly increased brake pedal pressure.

This vehicle may be towed short distances by another vehicle provided that a speed of 48 km/h (30 mph) is not exceeded. Ensure that the towed vehicle gear selection is in 'Neutral' (manual) or position 'N' (automatic), the ignition key turned to position 'II' (to release steering lock and to render the horn, indicators and brake lights operational).

Push-start

Vehicle's installed with automatic transmissions cannot be started by push-starting.

Identification Numbers

Vehicle Identification Number (VIN)

The Vehicle Identification Number (VIN) is a 17 character number which uniquely identifies the vehicle and gives fundamental data on the build site, date and initial configuration of the vehicle.

S	C	F	A	C	1	3	A	4	1	G	A	0	0	0	0	1

- Code for AML
- Restraint System
- Transmission and Steering
- Body Type
- Engine Type
- Calculated Check Digit
- Model Year
- Manufacturing Plant
- Series Identifier
- Sequential Chassis Number

VIN Number Location

The VIN number is stamped / plated in the following locations:

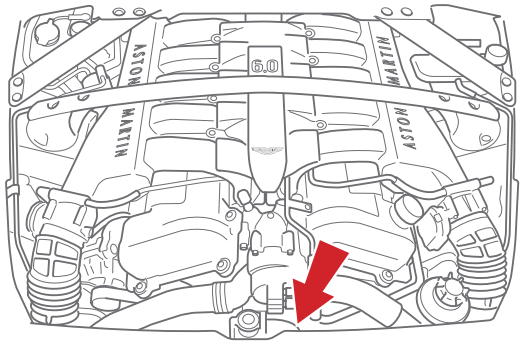
Under the lower edge of the windscreen.



Stamped on the floorpan in the RH front footwell.

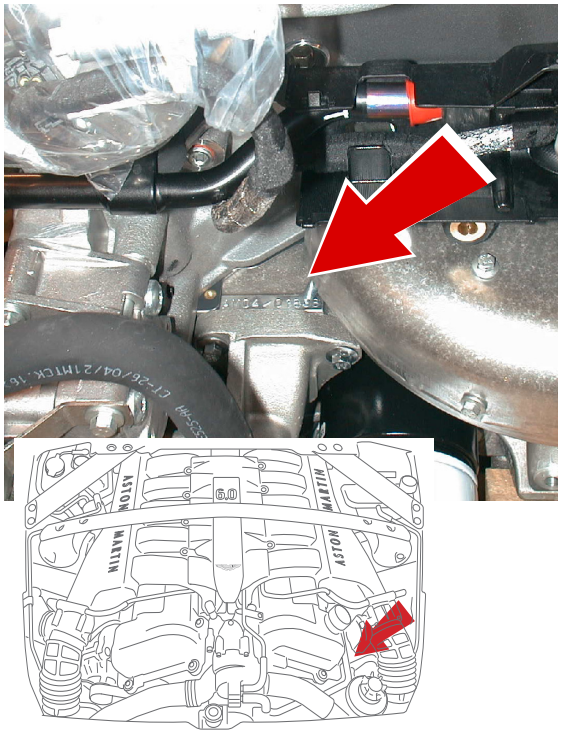


Front of the engine bay.



Engine Number

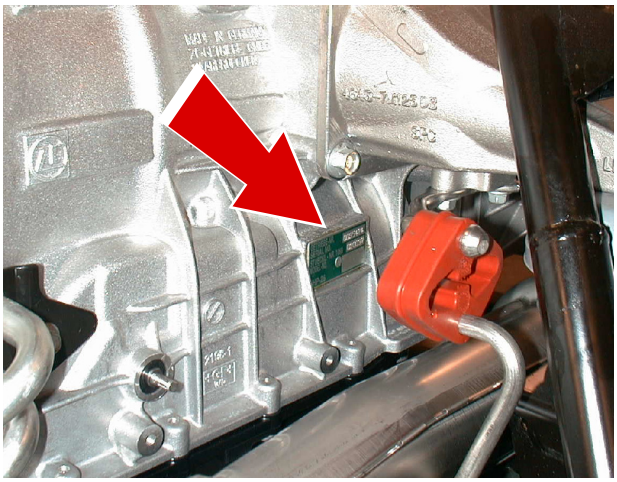
The engine number is stamped on the LH side of the engine block.



Gearbox Number

Automatic Gearbox

The automatic gearbox number plate is located on the LH side of the gearbox.



Manual Gearbox

To follow.

Image to Follow

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Body System (01.00)

Body Structure (01.01)

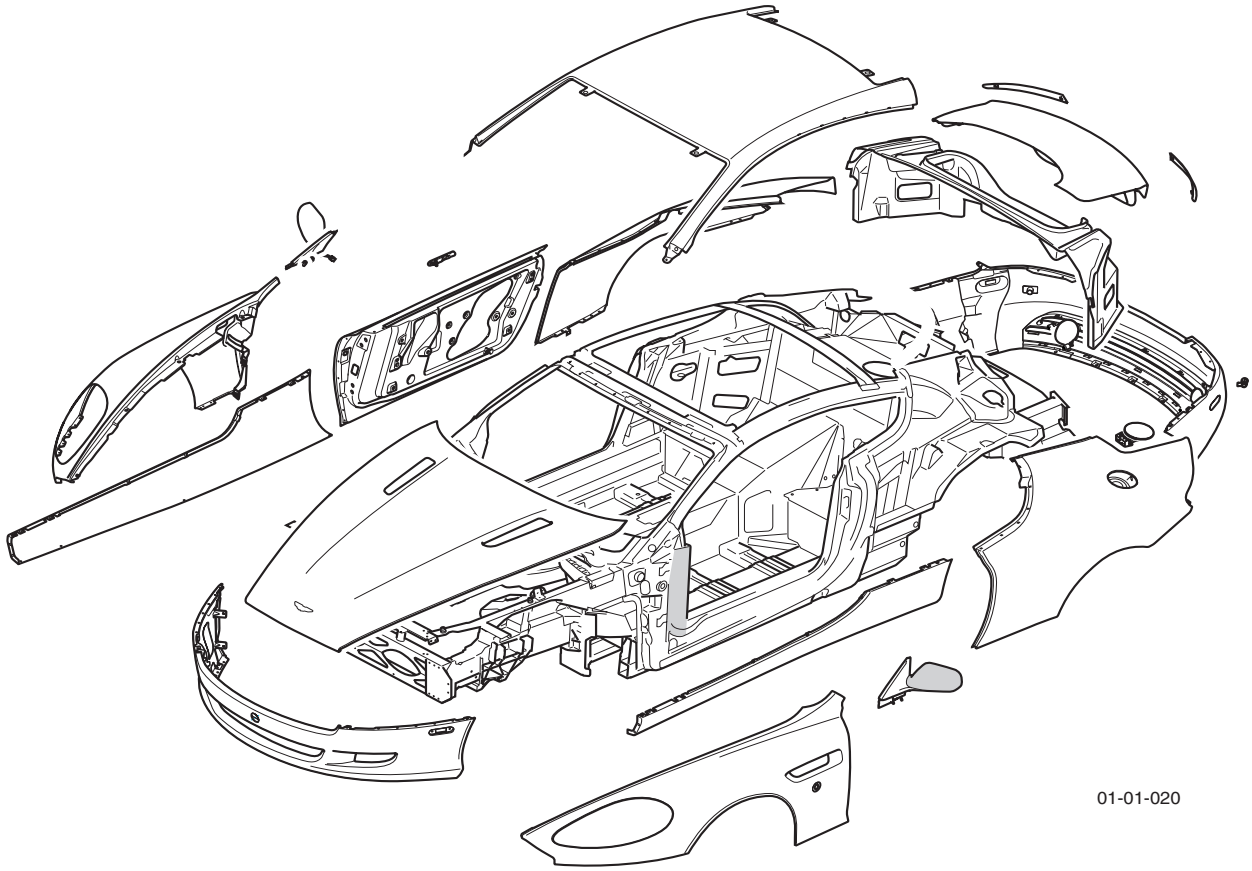
Overview

The all aluminium body underframe is bonded using an immensely strong hot-cured XD4600 red adhesive.

The rear quarter panels, roof and side mouldings are bonded to the structure using cold-cured 2810 MV adhesive. The curing cycle is improved by using a hot air impingement system. In addition, the roof panel is connected to the rear quarter panels through ultrasonic welds.

The composite front wings are bolted to the structure.

At no time should the body structure be subjected to temperatures in excess of 120°C (248°F).



01-01-020

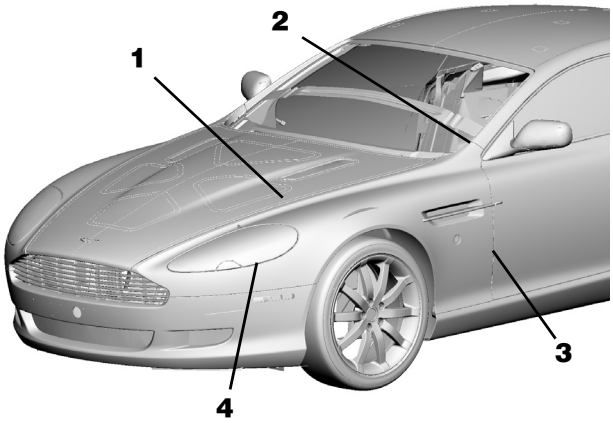
ASTON MARTIN
ASTON MARTIN

Body System (01.00)

Front End (01.02)

Front Wings

Specifications



Wing Standard (mm)				
Item	1	2	3	4
Nominal gap	3.5	2.0	3.75	3.0
Tolerance	±0.75	+0.5 / -0.0	± 0.75	±0.5
Flush	-0.0	0.0	0.0	-0.5
Tolerance	±1.5	+0.0 / -0.5	±1.5	±0.5
Taper	N/A			
Symmetry	N/A			

Torque Figures		
Description	Nm.	lbs / ft.
Wing Top	8	6
Wing Top Single nut	Tight with 'Threadlock'	
Lower Rear	8	6
Slam panel	8	6
PCM Bracket	10	7
Bonnet Damper	25	18

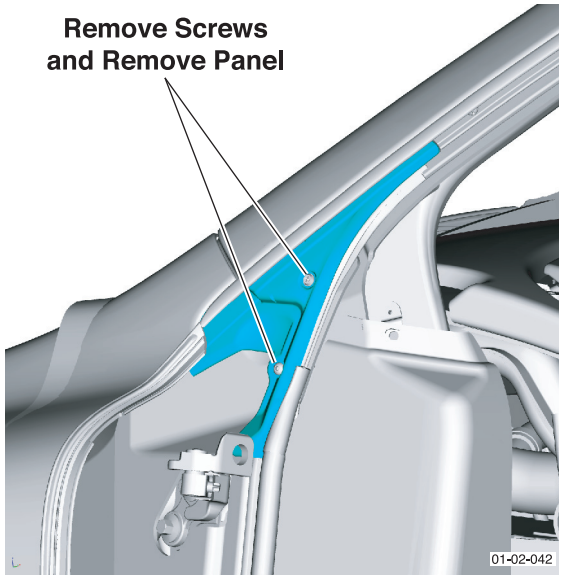
Maintenance

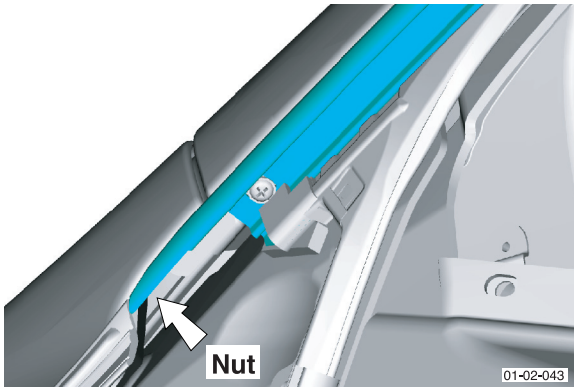
Front Wing

Repair Operation Time (ROT)		
Item		**Code**
Front Wing Renew	(LH)	**01.02.KB**
	(RH)	**01.02.LB**

Removal

1. Disconnect the vehicle battery.
2. Remove the wing top nut.

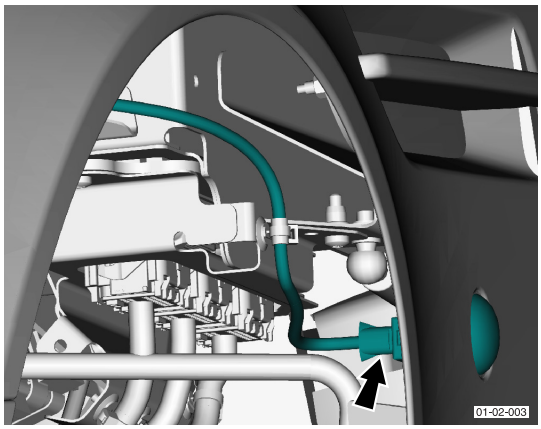




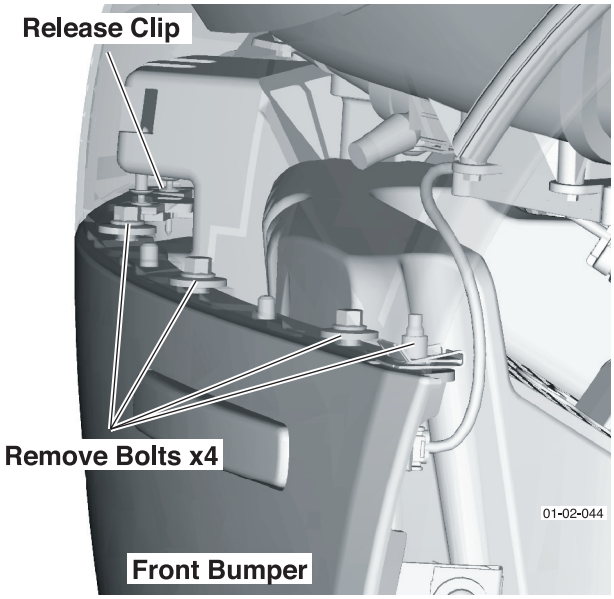
If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

3. Remove the front road wheel and road wheel arch liner.

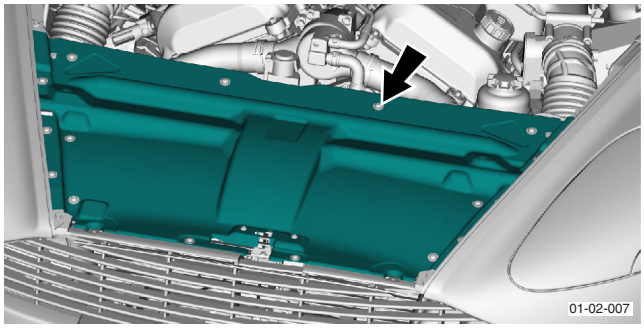
4. Disconnect the side repeater lamp wiring harness plug.



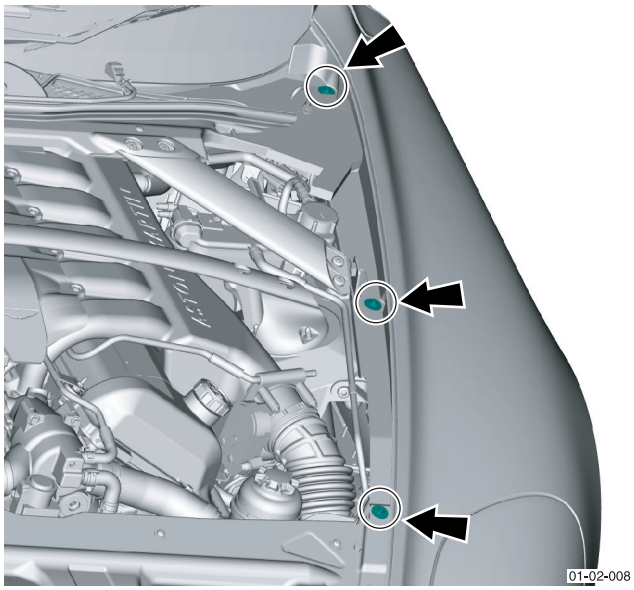
5. Disconnect the wing from the bumper (Refer to 'Front Bumper', page 1-13-1).



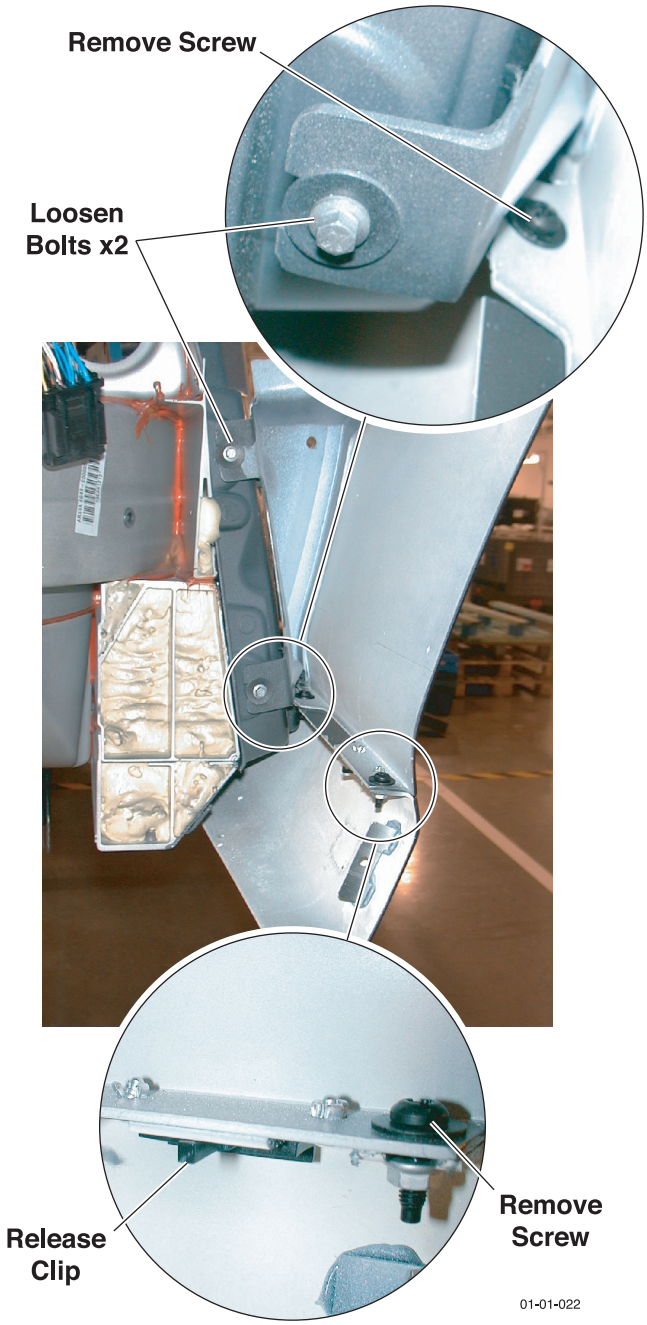
6. Remove the slam panel (bolts x12). Remove the front grill bolt (x2).



7. Remove bolts (x3).



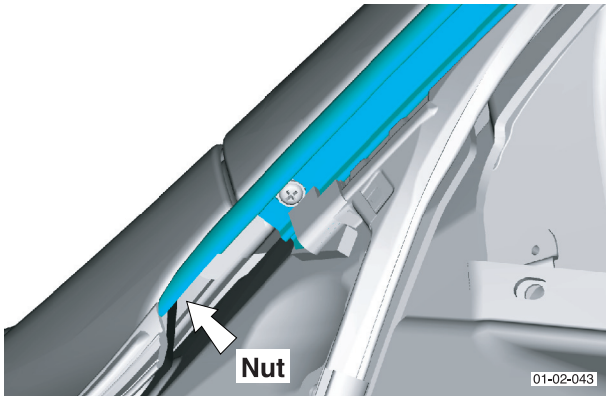
8. Loosen bolts (x2).



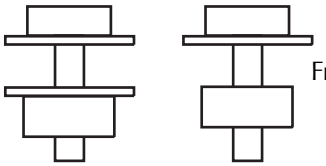
9. Lift from the rear lower edge to disengage the wing from the two loosened bolts. Pull the wing from the body.

Installation

1. Place the wing to the body.
2. Locate:
   - The wing top stud

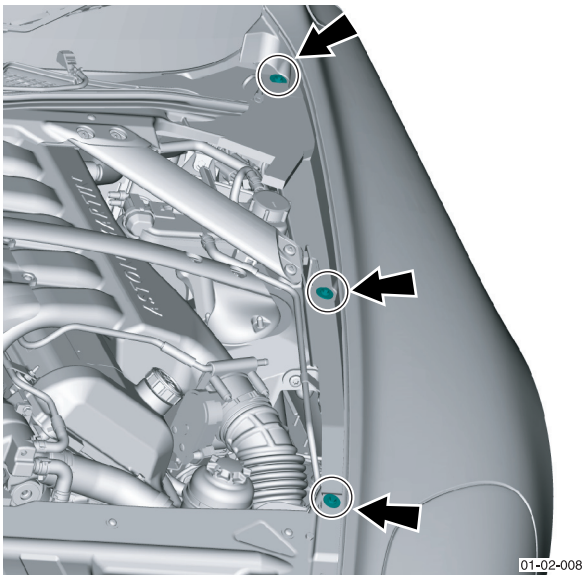


   - The rear lower wing to the loosened bolts
3. Install the wing lower edge clips and bolt.
4. Connect the wing to the bumper.
5. Install bolts to the wing top edge. Do not tighten.

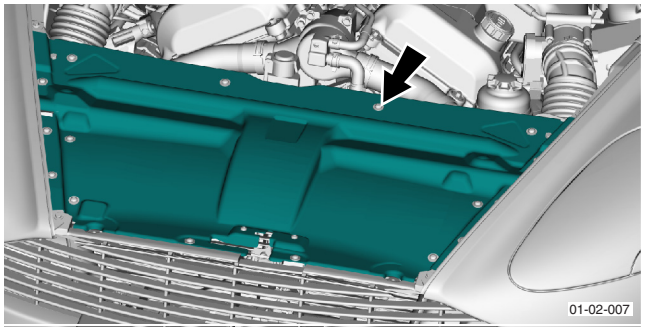


Front bolt on each wing

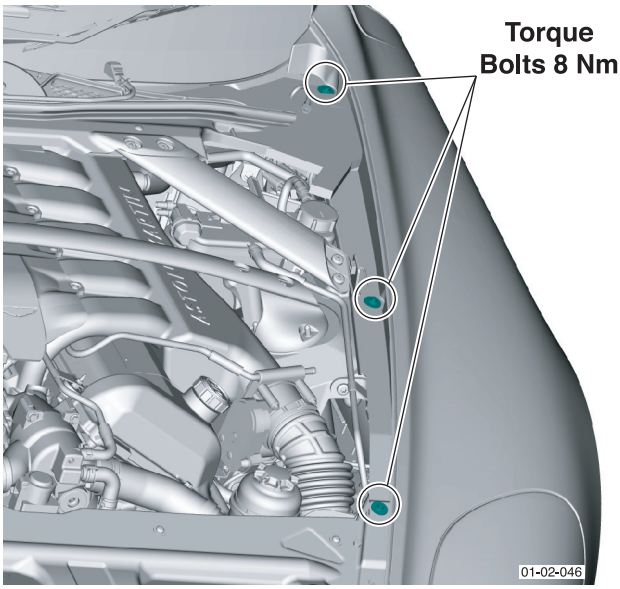
The two lower rear wing bolts have the same bolt / washer arrangement.

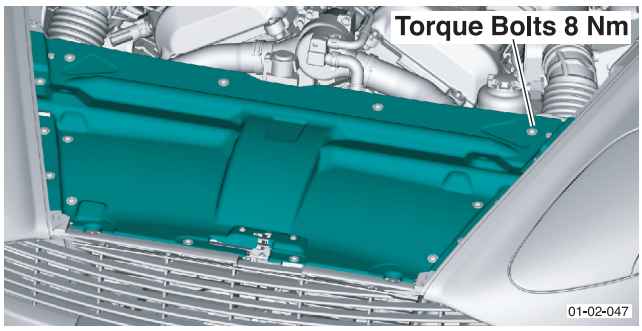


6. Install the slam panel.



7. Check wing alignment. Refer to specifications. Adjust if required.
8. Torque all wing fixings.





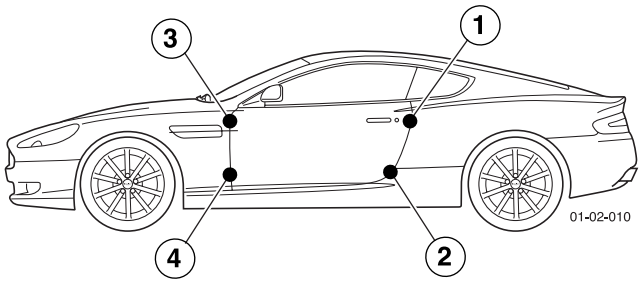
9. Connect the side repeater lamp wiring harness plug.
10. Install the road wheel and road wheel arch liner (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
11. Connect the vehicle battery.

Body System (01.00)

Body Closures (01.03)

Specifications

Doors

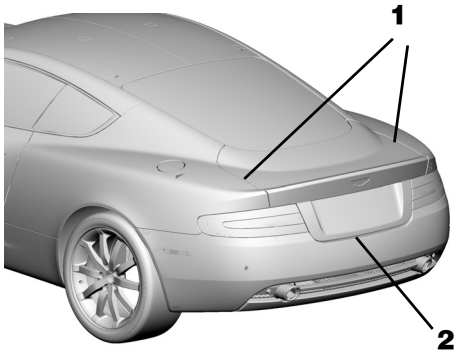


Door Standard (mm)				
Item	1	*2	3	4
Nominal gap	3.5	3.00	3.00	3.75
Tolerance	±0.75	±1.0	±1.0	± 0.75
Flush	0.0	-1.0	-1.0	0.0
Tolerance	±1.5 / 0.0	+0.0 / -1.0	±1.0	±1.5
Taper	N/A			
Symmetry	N/A			

* Flushness blends to 0.0 at the rear quarter
* Gap blends to 3.5 at rear quarter

Torque Figures		
Description	Nm.	lb. / ft.
Hinge to Door	47.5	33.5
Hinge to Body	36	26.5
Door Striker plate		

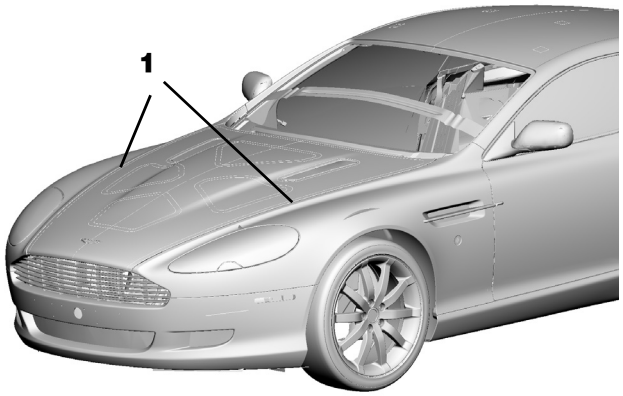
Boot Lid



Boot Standard (mm)		
Item	1	2
Nominal gap	3.5	3.5
Tolerance	±0.75	±1.0
Flush	-0.5	N/A
Tolerance	+0.5 / -1.0	N/A
Taper	1 mm Max. across the length	
Symmetry	1 mm Max. difference LH to RH	

Torque Figures		
Description	Nm	lb. / ft.
Hinge to Body	25	18

Bonnet



Bonnet Standard (mm)	
Item	1
Nominal gap	3.5
Tolerance	±0.75
Flush	-0.0
Tolerance	±1.5
Taper	N/A
Symmetry	N/A

Torque Figures		
Description	Nm	lb. / ft.
Hinge to Body	25	18

Maintenance

Doors

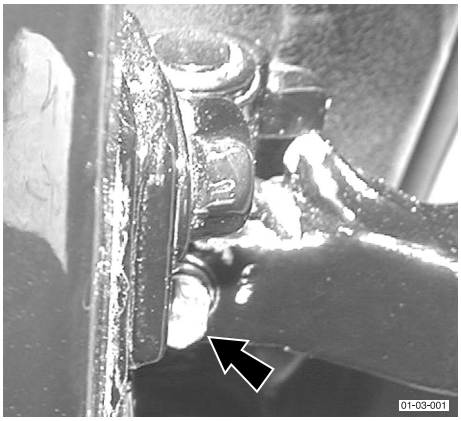
Repair Operation Time (ROT)		
Item		**Code**
Remove and reinstall	LH	**01.03.EA**
	RH	**01.03.FA**

Removal

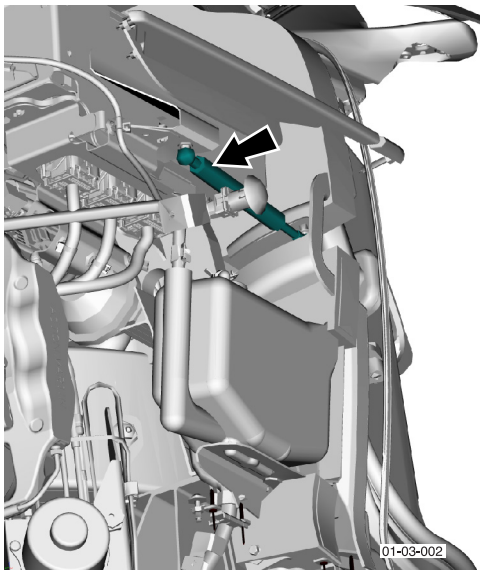
⚠ Warning ⚠
The doors are heavy. Removal is a two person operation.

Caution
Before removing the door ensure that the vehicle body work is sufficiently protected from possible damage.

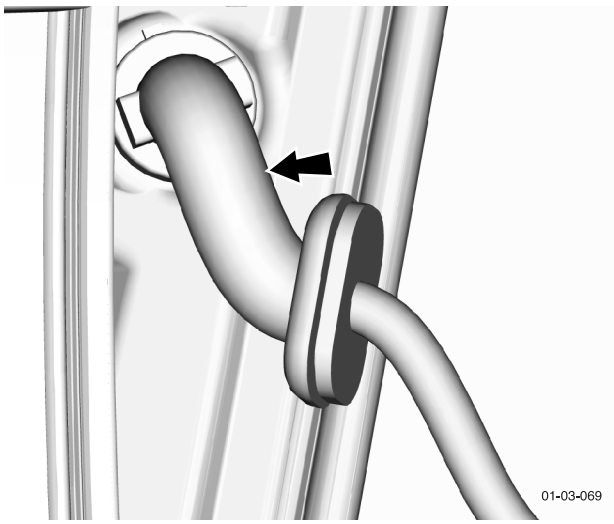
1. Disconnect the vehicle battery.
2. Open the vehicle door.
3. Slightly loosen the door hinge lock screws (x2).



4. Remove part of the roadwheel arch liner to gain access to the door check rod. Disconnect the door check rod.



5. Lift the door off the support studs and withdraw the door enough to gain access to the door wiring harness plug. Disconnect the wiring harness plug.



6. Withdraw the door from the vehicle and install on service tool (Refer to '501-F111 (Door Service Trolley)', page 20-1-8).

Installation

⚠ Warning ⚠
The doors are heavy. Replacement is a two person operation.

Caution
Before installing the door ensure that the vehicle body work is sufficiently protected from possible damage.

1. Place the door to the vehicle. Connect the door wiring harness plug.
2. Align the door to the upper and lower hinges. Install the door onto the hinges.

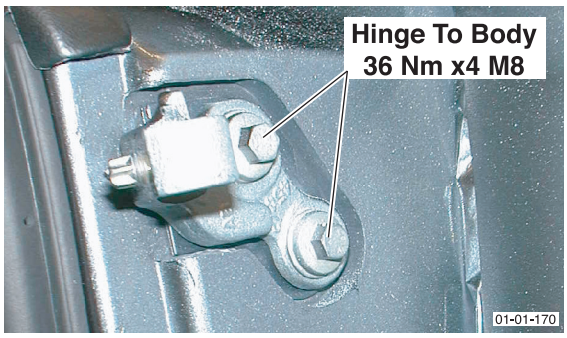


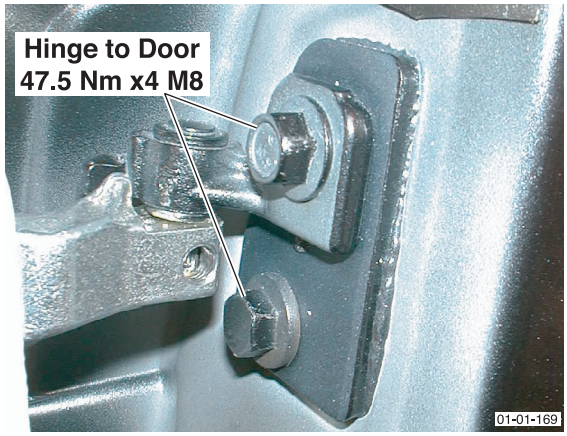
3. Connect the door check rod. Install the roadwheel arch liner.
4. Align the door. Manoeuvre the door to achieve correct gaps and flush (add / remove shims as required). Tighten the bolts. Do not torque.

5. Connect the vehicle battery.

> ⚠ ***Warning*** ⚠
> ***Never touch the door lock linkage with electrical power available to the door. The window mechanism can move and trap hands, arms, etc. in door frame.***

6. Check door alignment and closure of the door catch. Adjust striker plate if required.
7. When satisfied with the door install - torque the hinge bolts.
   - Hinge to Body - **36 Nm**.
   - Hinge to Door - **47.5 Nm**.



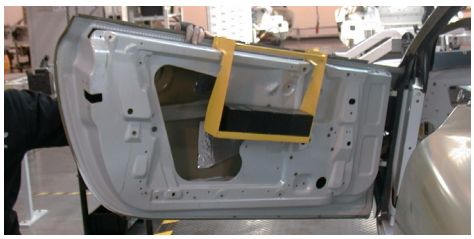


8. Check for:
   - Correct operation of all door lock functions.
   - Correct operation and sealing of the door window.

New Door Assembly

Repair Operation Time (ROT)		
Item		**Code**
Remove and install	LH	**01.03.CB**
	RH	**01.03.DB**

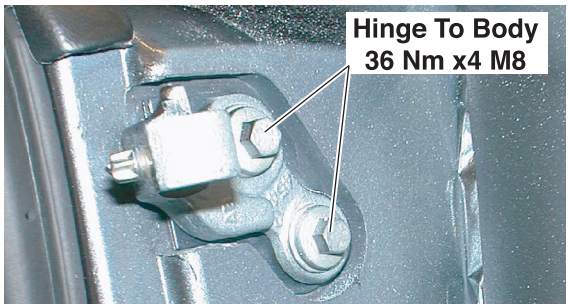
Preliminary Hinge Setup

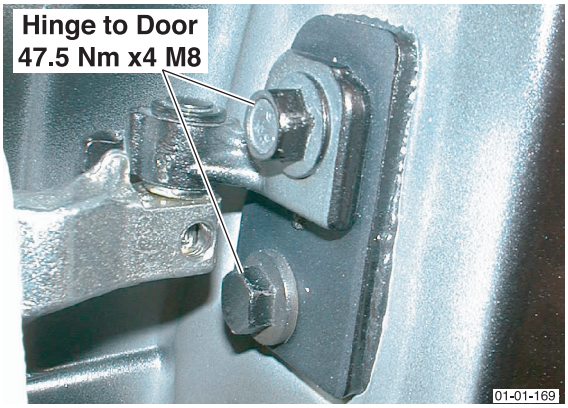


1. Install the door onto the hinges.
2. Place a weight of 16 kg (to compensate for weight of door windows, locks etc.) hanging from inner door skin as shown.

> *Weight and position are critical to accurately simulate weight and distribution of door furniture. Adjustment is difficult on a fully installed door.*

3. If removed, install the front wing (Refer to 'Front Wing', page 1-2-1).
4. Gently close the door. Check for an acceptable initial install.
5. Align the door. Manoeuvre the door to achieve correct gaps and flush (add / remove shims as required). Tighten the bolts. Do not torque.
6. Open the door and torque all hinge bolts. Remove the door weight.
   - Hinge to Body - **36 Nm**.
   - Hinge to Door - **47.5 Nm**.





7. Release the hinge locking screws and remove the door for installation of window, locks etc.

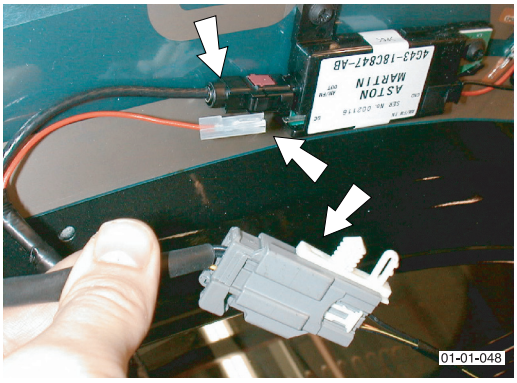
Boot Lid

Repair Operation Time (ROT)	
Item	**Code**
Remove and reinstall	**01.03.BB**

Removal

> ⚠ ***Warning*** ⚠
> ***The boot lid is heavy. Removal / replacement is a two person operation.***

1. Open the boot lid.
2. Remove the boot lid trim panel (Fir trees).
3. Disconnect the boot lid harness.



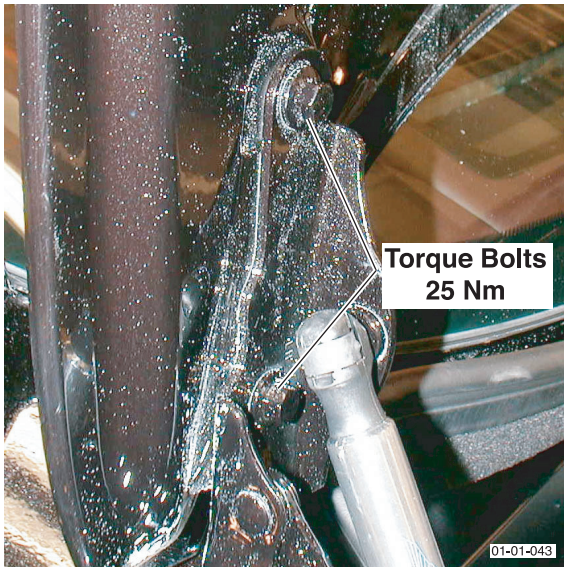
4. Slightly loosen the bolts (x4) that secure the boot lid to the boot lid hinges.
5. Support the boot lid. Remove the hinge bolts.
6. Withdraw the boot lid from the vehicle.

Installation

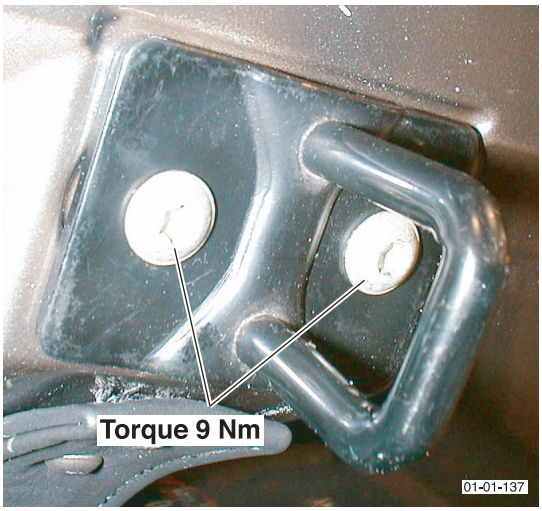
1. Align the boot lid to it's hinges. Install bolts (x4) sufficiently to manoeuvre the boot lid on it's hinges. Gently lower the boot lid rear edge, ensure the front corners do not touch the rear wings.
2. Align the boot lid front edge centrally in the boot aperture. Manoeuvre as required to achieve correct gaps.
3. Partially raise the boot lid and 'nip' up the hinge bolts.



4. Lower the boot lid. Check for correct alignment and readjust if required.
5. Fully raise the boot lid. Torque the hinge bolts to 2**5 Nm**.



6. Gently close the boot lid. Check for correct engagement of the boot latch.
   Adjust the boot latch if required. Torque the boot latch bolts, to **9 Nm**.



7. Connect the boot lid wiring harness plugs.
8. Fully close the boot lid.
   Check for correct operation of the boot release switch and remote transmitter boot lid enable.
9. Install the boot lid trim.

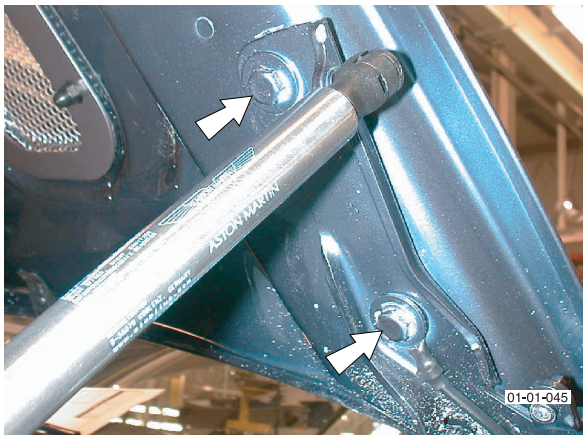
Bonnet

Repair Operation Time (ROT)	
Item	**Code**
Remove and reinstall	**01.03.AB**

Removal

⚠ Warning ⚠
The bonnet is heavy. Removal is a two person operation.

1. Open the bonnet.
2. Disconnect the windscreen wash pipe.
3. Slightly loosen the bolts (x4) that secure the bonnet to the hinge.
4. With the bonnet supported, disconnect the gas struts and remove the hinge bolts (x4).

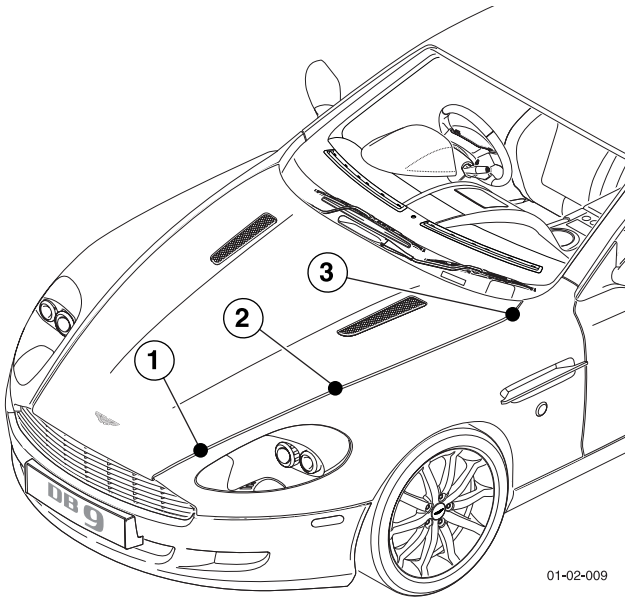


5. Withdraw the bonnet from the vehicle.

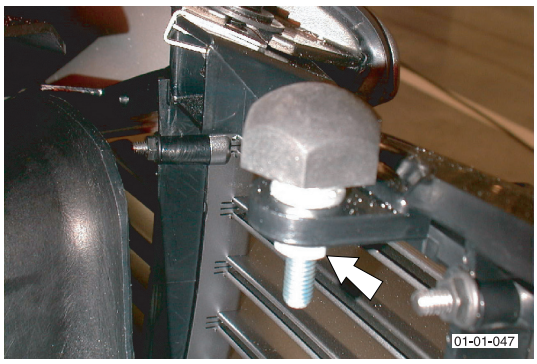
Installation / Realignment

⚠ Warning ⚠
The bonnet is heavy. Replacement is a two person operation.

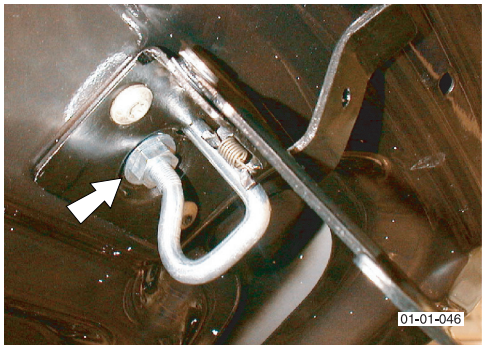
1. Align the bonnet to it's hinges. Install bolts (x4) sufficiently to manoeuvre the bonnet on it's hinges. Gently lower the bonnet. Adjust so that the corners do not touch the wings at the front and rear. Align the bonnet front edge centrally in the aperture.



2. Partially raise the bonnet. 'Nip' up one hinge bolt either side.
3. Lower the bonnet. Check for correct alignment. Readjust if required.



4. Fully raise the bonnet. Torque all hinge bolts to **25 Nm**.
5. Install the bonnet gas struts.
6. Gently close the bonnet. Check for correct engagement of the bonnet latch. Adjust if required to achieve the flush specification.
   - Turn the nut anti-clockwise to raise or clockwise to lower the bonnet catch until the bonnet is flush with the wings when closed.



7. Fully close the bonnet. Check for correct operation of the bonnet release lever.

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Body System (01.00)

Interior Trim (01.05)

This section covers removal and installation of the interior mouldings and trim panels. In many instances, one component overlaps another component. If this condition is found, it will be necessary to loosen or remove the overlapping component before removal, to prevent damage to either component.

Specifications

Torque Figures

Description	Nm	lb. / ft.
Door Handle	9	6.5
Seat Belt Mounts	35	26

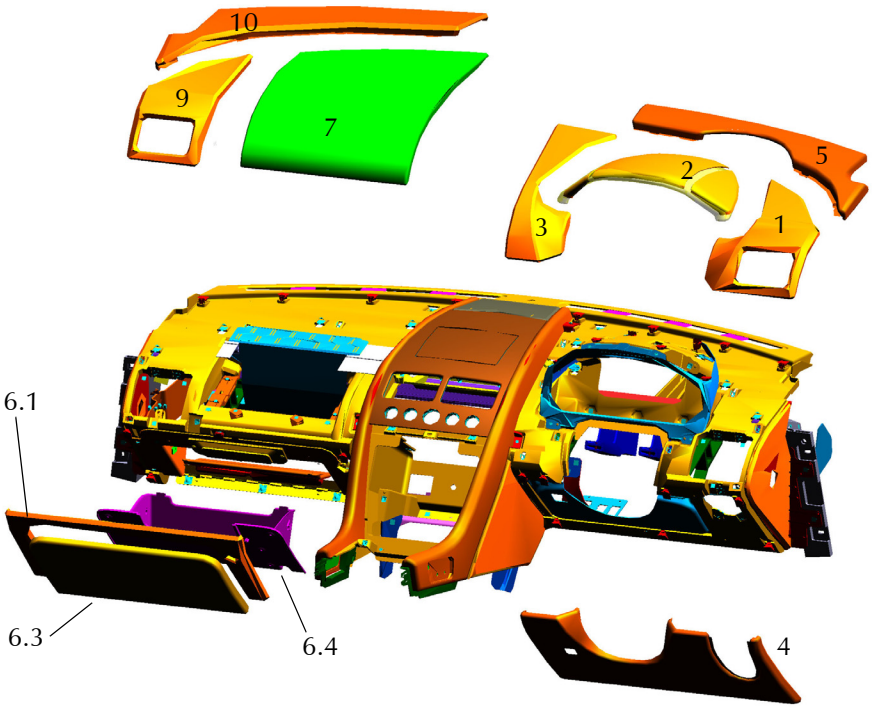
Maintenance

IP Trim

If required, removal of the IP trim can be achieved while the IP is in the vehicle.

Remove

1. Panel (1)- Pull off.
2. Hood (2) - Pull off.
3. Panel (3) - Pull off.
4. Panel (4) - Pull off. Disconnect the air temperature pipe.
5. Panel (5) - Front, screws (x3)
6. Glove box.
   - 6.1 Pull of the outer trim panel. Disconnect the glovebox release switch wiring harness plug.
   - 6.2 Release the damper cord.
   - 6.3 Remove screws (x3) from the glovebox door hinge. Remove door.
   - 6.4 Remove screws (x4) from the sight shield. Remove the sight shield and glovebox.



7. Panel, Airbag (7).

Caution
Withdraw the airbag panel carefully. The airbag panel can crease if forced out.

   - 7.1 Remove screws (x3).
   - 7.2 Lift from the front edge. Withdraw out of clips (x3).
8. Remove the airbag.

⚠ Warning ⚠
When removed, place the airbag in a sercure container to prevent personal injuries if the airbag activates.

   - 8.1 Disconnect the wiring harness plugs (x2).
   - 8.2 Remove bolts (x4). Withdraw the airbag.
9. Panel (9) - Screws (x2), then pull off.
10. Panel (10) - Screws (x4).
11. If required, remove the center stack.
    - 11.1 Pull off the veneer panel (Service tool No. TBA). Disconnect the wiring harness plugs.
    - 11.2 Remove the speaker grill - Screws (x2).
    - 11.3 Remove the center panel (Radio etc.) - Screws (x4)
    - 11.4 Remove the center stack - Screws (x6).
    - 11.5 Remove the media player - Screws (x2). Disconnect the wiring harness plugs.

Installation Notes

The panels, etc., are best replaced in the order they were removed. Note the following:

1. When installing the glovebox shield ensure that the tab in the top centre locates into the slot in the substrate.

Roof Trim

Removal

1. Remove (pull away) the cant rail.

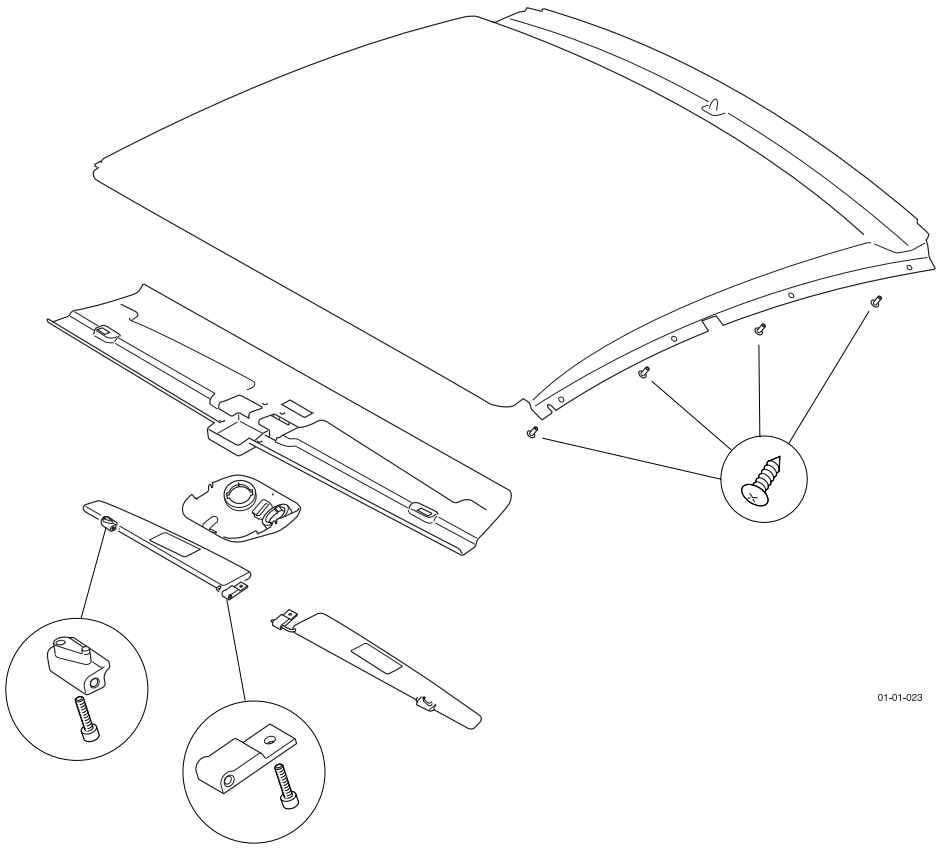
The cant rail is held in by 'FirTrees'.
The front of the cant rail is held in place by the 'IP'. Pull the cant rail away from the back first then pull the front out from the 'IP'.

2. Remove the interior mirror (screw x1).
3. Remove the reading lamp pod (clips x2, screw x1, wiring harness plugs x2)
4. Remove the sun visors (screws x2 (x2).

The front headlining will fall away.

5. Remove the headlining.

Held in place with 'FirTrees' and two velcro panels at the rear.



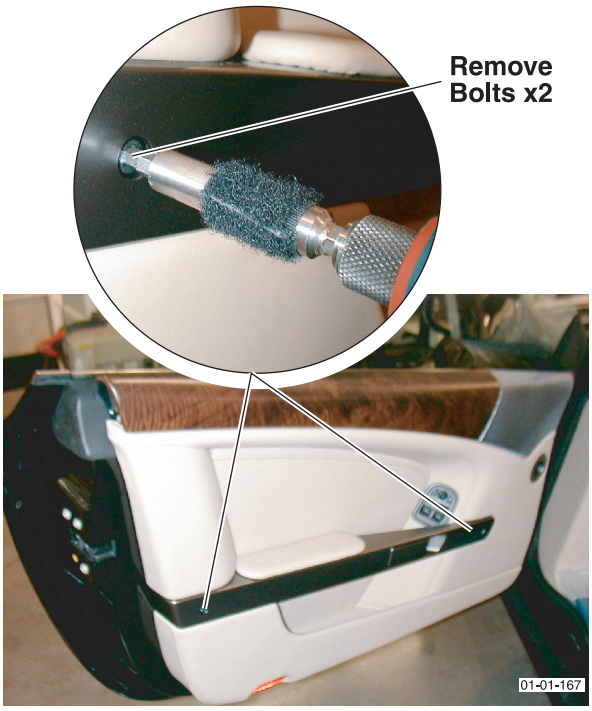
Installation

1. Install the roof lining.
2. Install the front headling.
   While holding the front headling in place install the sun visors.
3. Install the interior mirror.
4. Install the cant rails.
   Place the front of the cant rail into location at the IP, and work towards the rear, locating the 'FirTrees'.

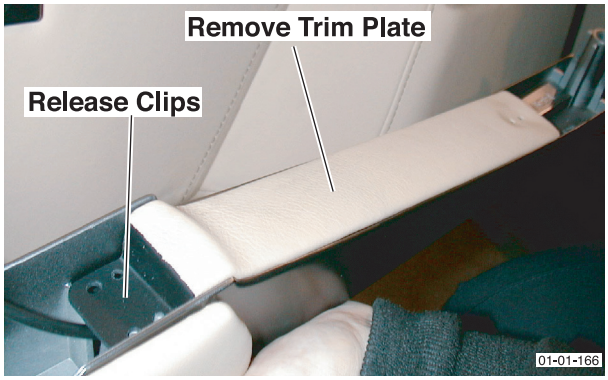
Door Trim

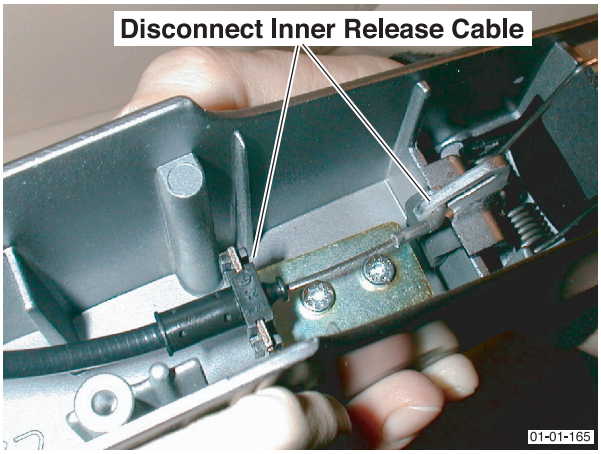
Removal

1. Lower the door glass fully.
2. Disconnect vehicle battery.
3. Release the door handle (Bolts x2).

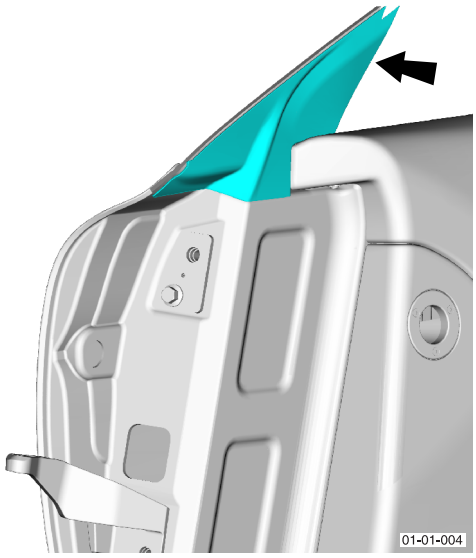


4. Remove the door handle trim plate and disconnect the release cable.

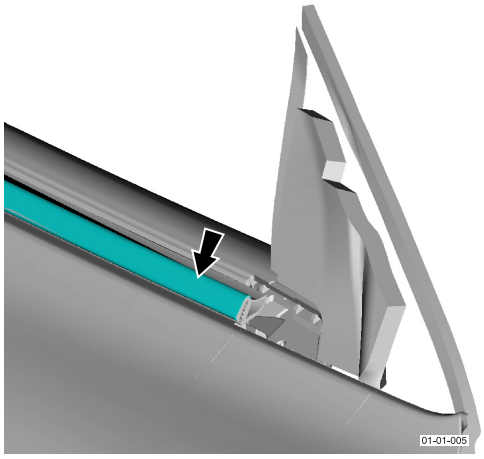




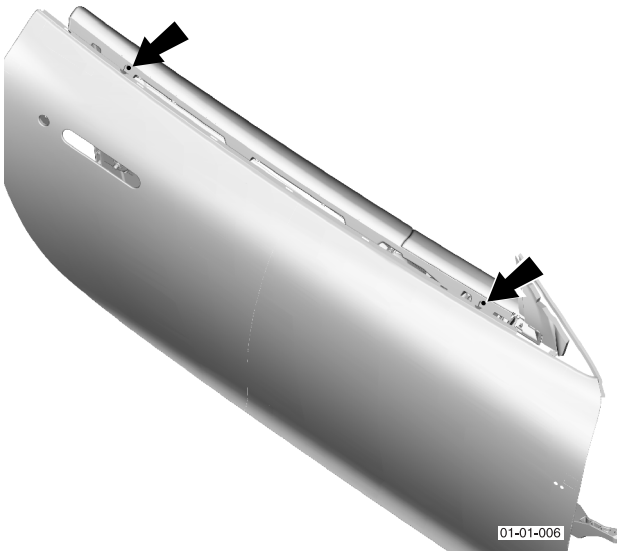
5. Remove the door mirror cheater panel.



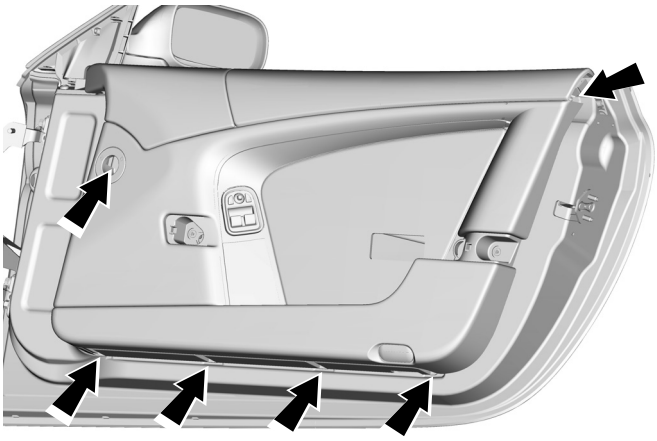
6. Remove outer chrome waist rail trim.



7. From the outside remove screws (x2).



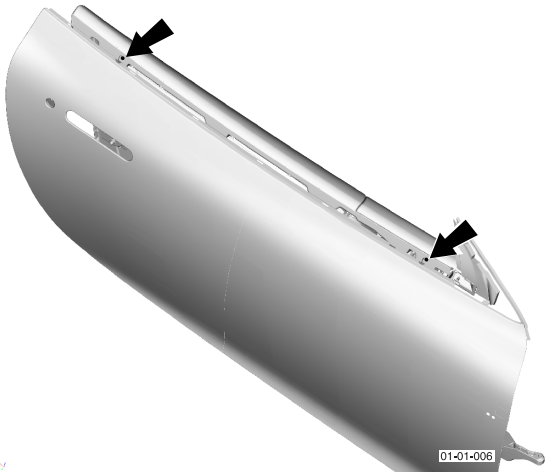
8. Remove the door trim panel screws (x6). Withdraw the door trim panel to gain access to the window and mirror switches. Disconnect the switches.



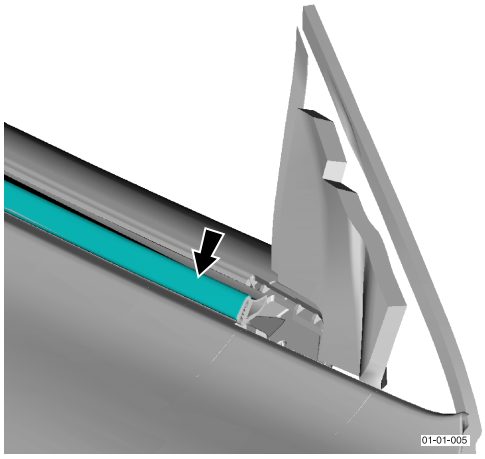


Installation

1. Place the door trim panel to the door and connect the wiring harness plugs.
2. Install the door trim panel screws (x6).
3. Install screws (x2).



4. Install the outer weather seal strip.

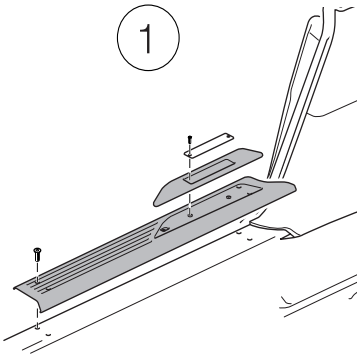


5. Install the door mirror cheater panel.
6. Install the door pull
   - 6.1 Connect the door inner release cable.
   - 6.2 Install the door pull trim plate.
   - 6.3 Install the door handle. Torque to **9 Nm**.
7. Connect the vehicle battery.

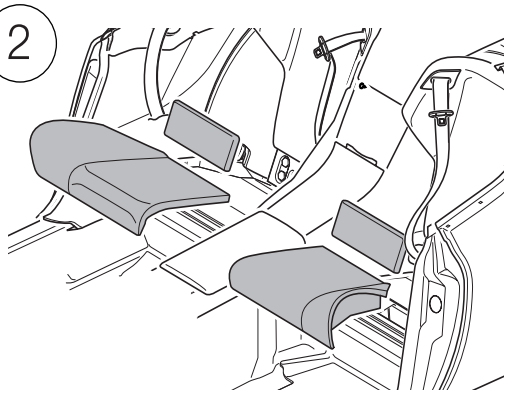
Rear Trim

Removal (Coupe)

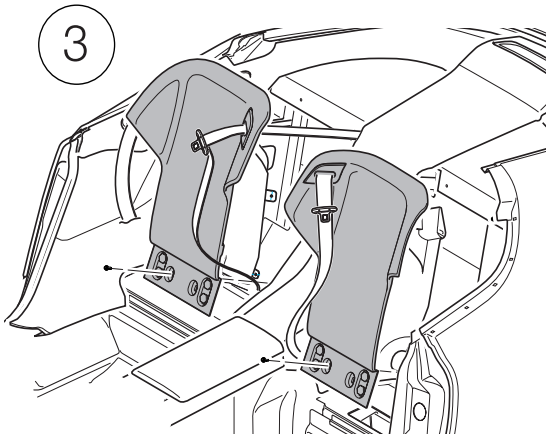
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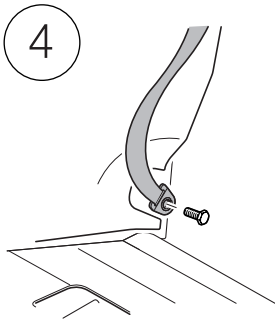
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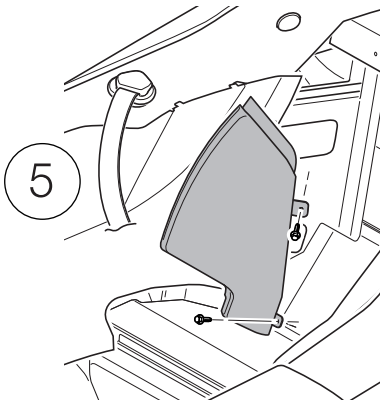
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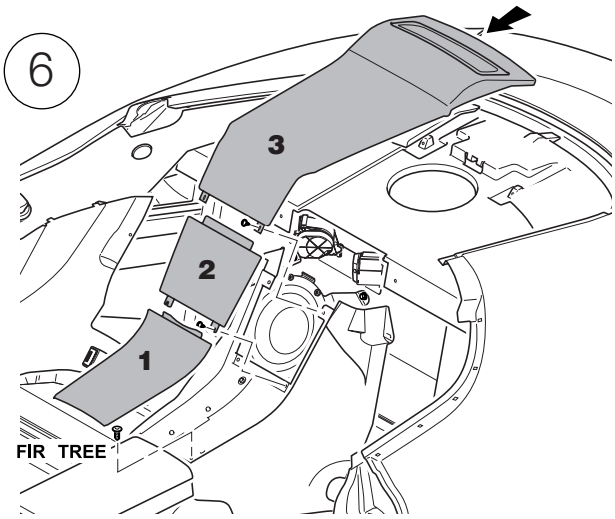
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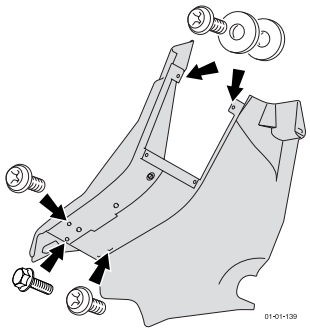


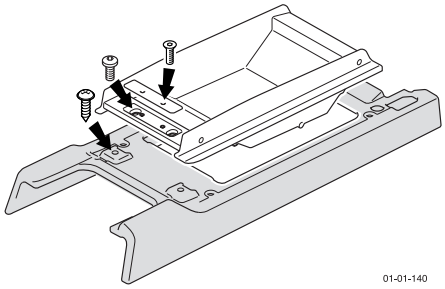
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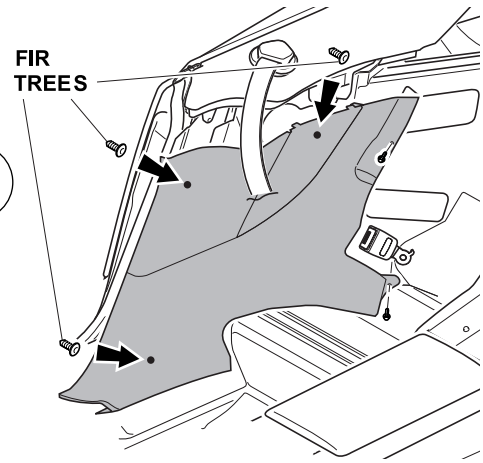
6

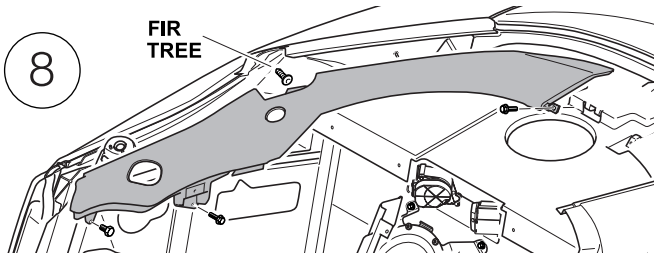


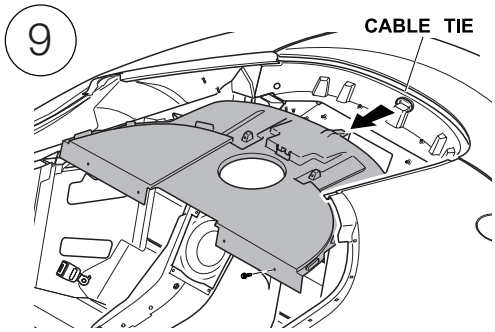




7







Install (Coupe)

Install the trim in reverse order to remove.

Torque seat belt mounts to **35 Nm**.

Removal (Volante)

1. Remove the seat bases.
2. Remove the seat backs.
   - 2.1 Pull off and up to remove the head support.
   - 2.2 Remove screws (x2 (Bottom) and x2 (top)).
3. Remove the door 'kick' plates.
   - 3.1 Remove screws x2.
   - 3.2 Remove screws x4. Withdraw the 'kick' plate.
   - 3.3 Repeat for the second 'kick' plate.
4. Remove the rear seat belt top mounts.
5. Remove the rear quarter panels.

   Screws (x2 (lower)), screw (x1 (upper)) and pull the front away (firtrees). Repeat for the second quarter panel.
6. Remove the 1st trim panel of the rear console.

   Pull up at the front and lift off.
7. Remove the 2nd trim (speaker) panel of the rear console.

   Remove the screws (x2).
8. Remove the 3rd trim panel of the rear console.

   Remove the screws (x2) from the bottom and screws (x2) from the rear of the ROPS closure panel.
9. Remove the rear center console.

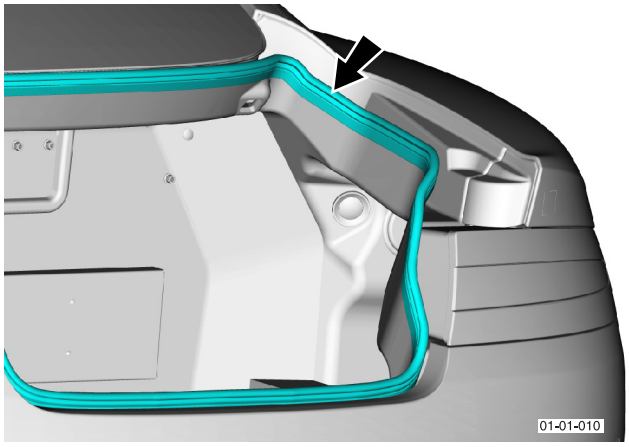
Install (Volante)

1. Install the rear center console.
2. Install the center console trim panels.
3. Install the rear quarter panels.
4. Install the door 'kick' plates.
5. Install the seat belt top mounts. Torque to **35 Nm**.
6. Install the seat backs and bases.

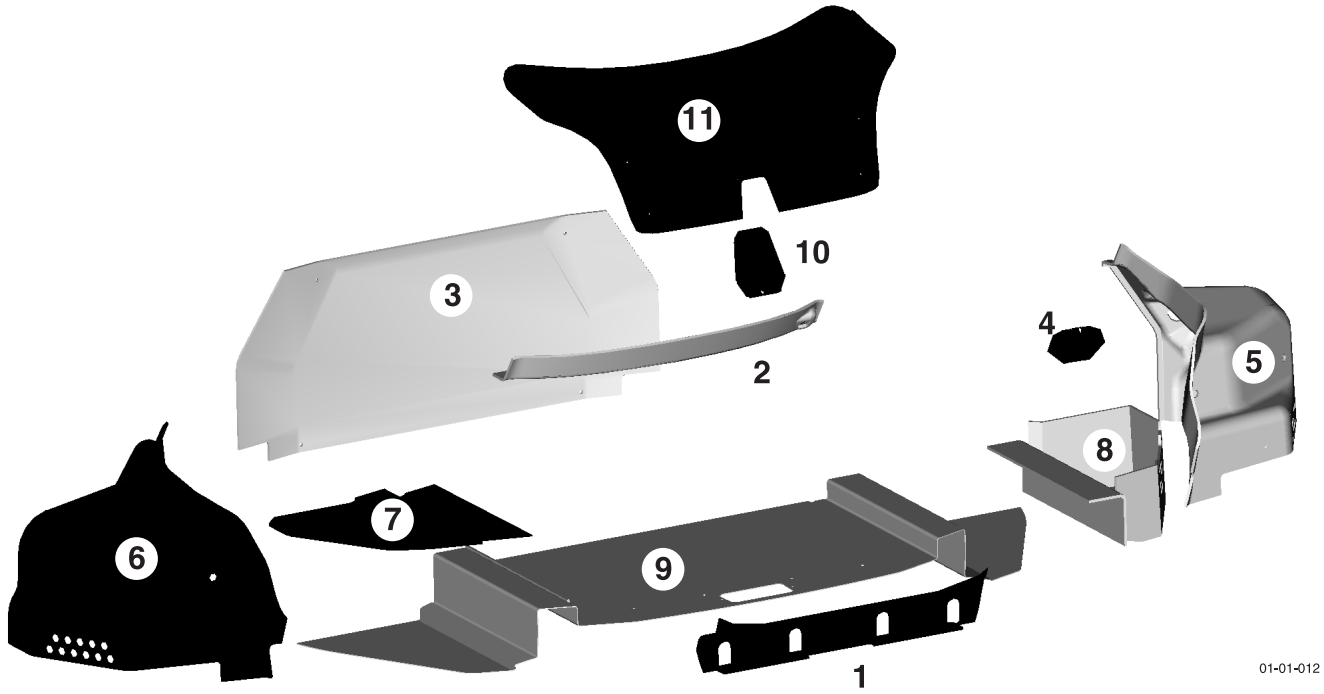
Boot Trim

Removal

1. Remove the boot weather seal.



2. Remove the boot trim in the following order detailed above.



Item	Fixings	Item	Fixings
1.	Fir trees	6.	Fir trees
2.	Fir trees	7.	Fir trees
3.	Fir trees	8.	Fir trees
4.	Fir trees	9.	Fir trees
5.	Fir trees	10.	Fir trees
		11.	Fir trees

Installation

The rear trim is best installed in reverse order of the removal procedure.

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Body System (01.00)

Exterior Trim (01.08)

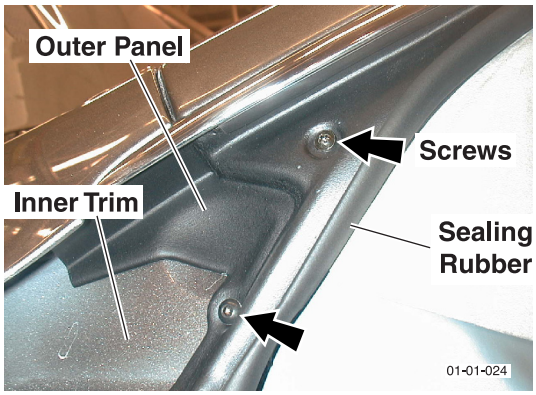
Maintenance

Side Trim

Removal

1. Remove the trim panel.
   1.1 Remove the top / bottom screws (x2). Remove the outer panel.

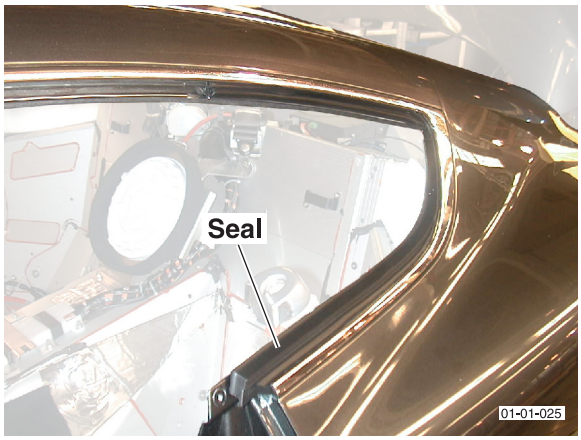
Pull the top of the outer panel away from the vehicle and slide it forward.



2. Pull the inner trim panel away from the vehicle.

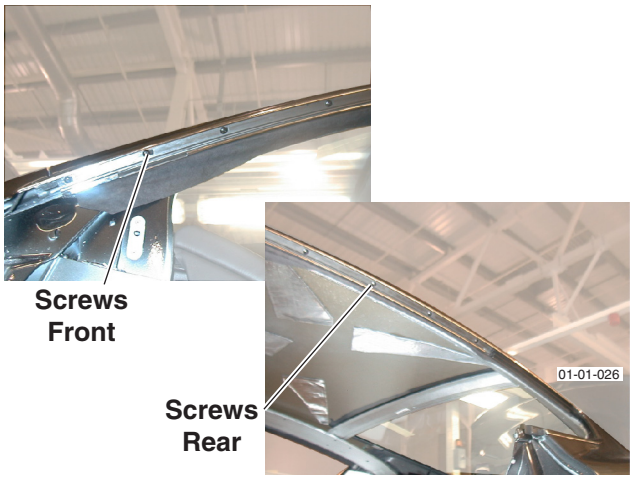
Pull the inner trim panel downwards.

3. Remove the door sealing rubber.
4. Remove the rear ¼ glass and seal.



5. Remove the chrome trim screws (x18). Remove the chrome trim.

Support the trim as it is removed.



Installation

1. Install the chrome trim.
2. Rear ¼ glass seal and glass.
3. Install the mirror trim panels. Insert the section of door sealing rubber as the inner and outer trim panels are installed.

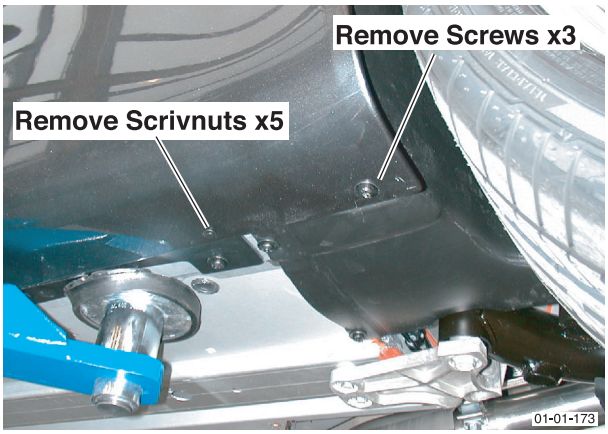
The lower screw, screws into fibre glass. Ensure that the lower screw is screwed into the original threads.

4. Install the door sealing rubber.

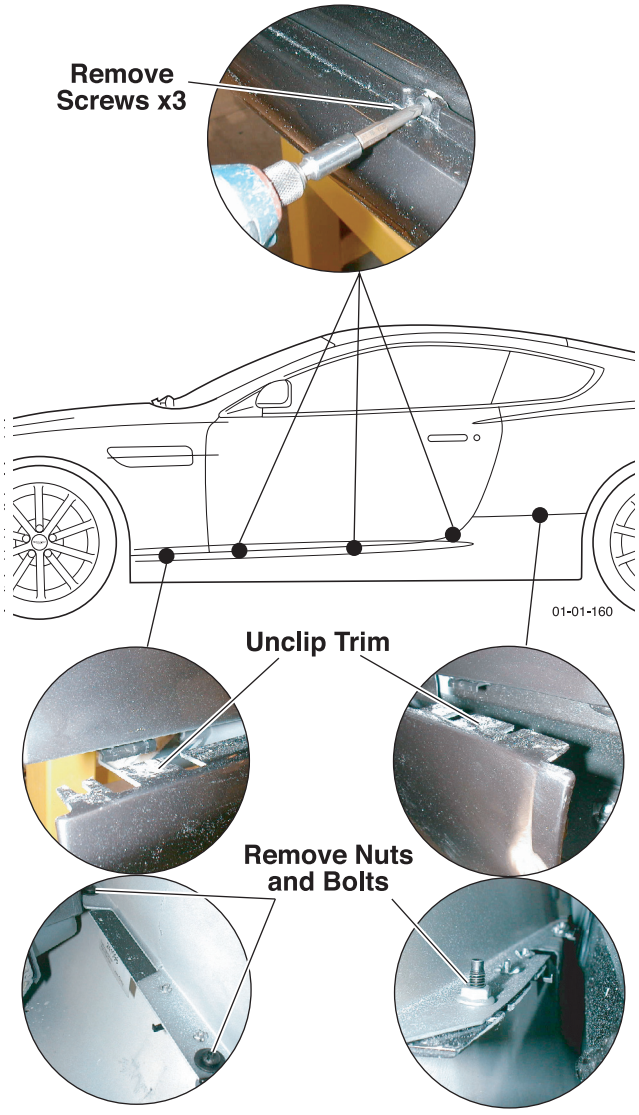
Sill Trim

Remove

1. Remove the front and rear road wheel arch liners sufficiently to gain access.
2. Remove (x3) screws and (x2) scrivnuts.



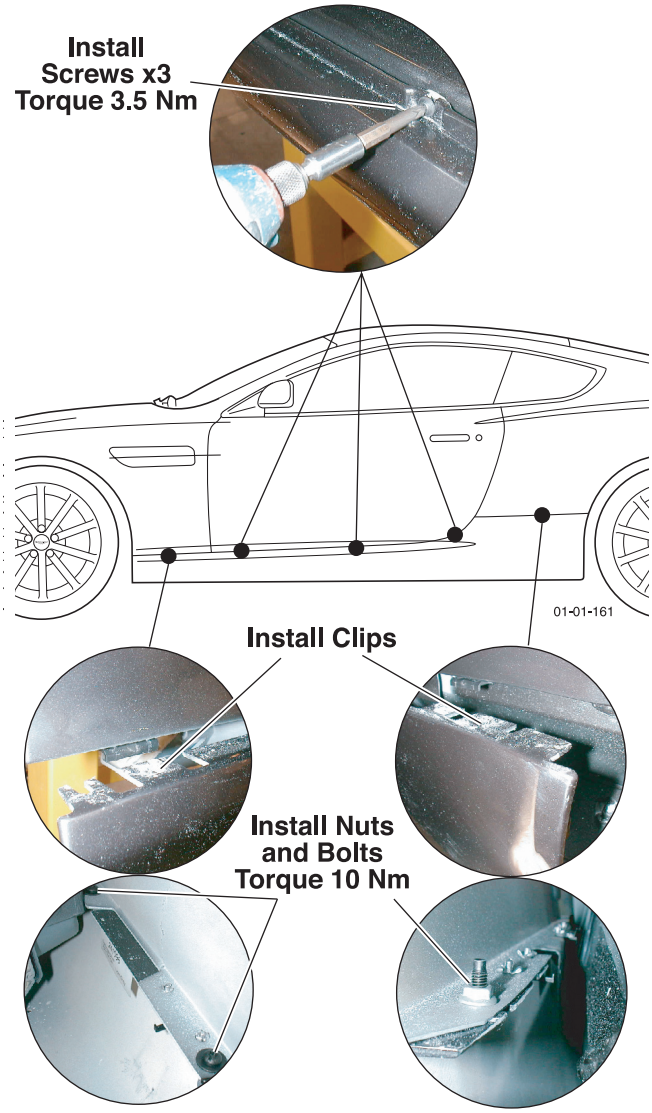
3. Remove (x3) nut and bolt (front x2, rear x1).
4. Remove the door aperture screws (x3).



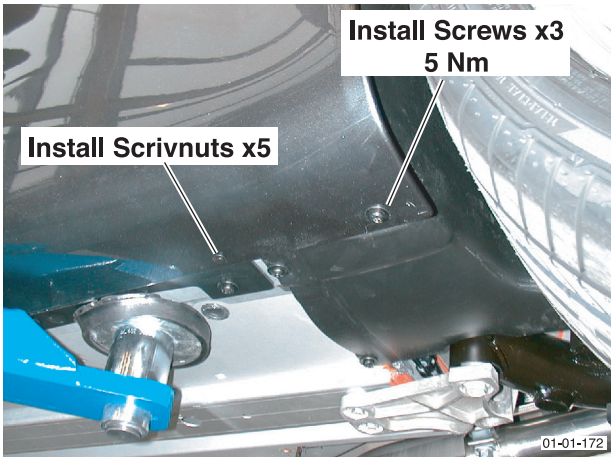
5. Unclip the sill trim from the vehicle body. Withdraw the sill trim.

Installation

1. Offer the sill trim to the vehicle.
2. Install the sill trim using 3 clips (front x1, rear x2).
3. Install the door aperture screws (x3).
4. Install (x3) nut and bolt (front x2, rear x1). Torque to **6 Nm**.



5. Install (x3) screws and (x2) scrivnuts.



6. Install the front and rear road wheel arch liners.

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Body System (01.00)

Mirrors (01.09)

Specifications

Torque Figures		
Description	Nm	lb. / ft.
Mirror Mounting	20-25	15-18.5

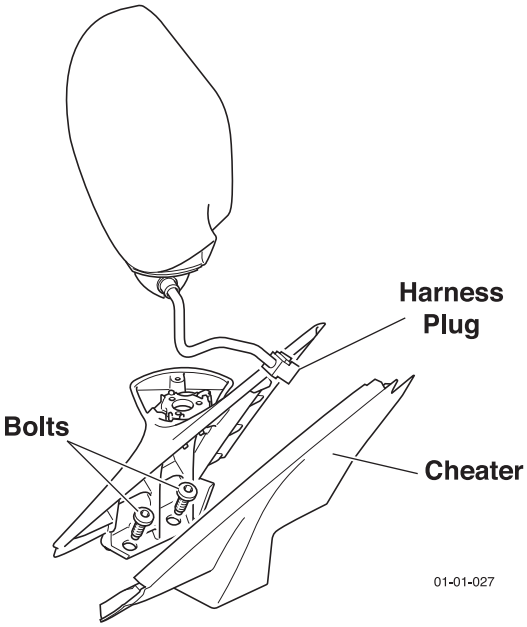
Maintenance

Repair Operation Time (ROT)		
Item		**Code**
Remove and install	LH	**01.09.AB**
	RH	**01.09.BB**

Door Mirrors

Removal

1. Remove the door trim panel (Refer to 'Door Trim', page 1-4-3).
2. Remove the door mirror 'cheater' panel (pull off).



3. Disconnect the wiring harness plug.
4. Remove bolts (x2) and withdraw mirror.

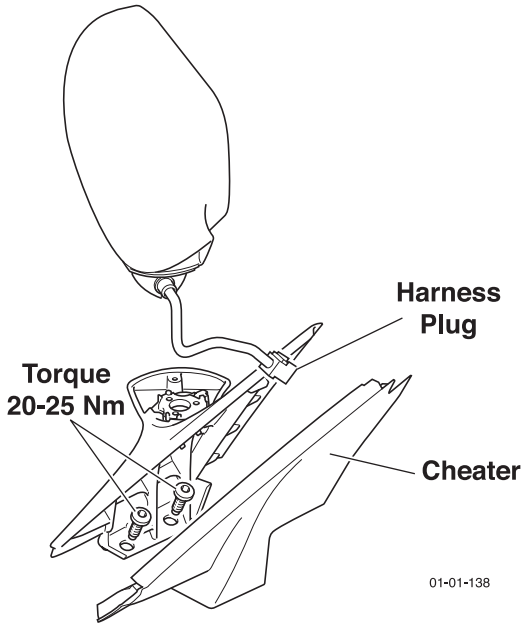
Installation

1. Place the mirror into position. Install bolts (x2).

The spring washer goes between the mirror bracket and the door. On the front bolt of each mirror, ensure that the plain washer goes between the bolt head and the mirror bracket.

Torque to **20-25 Nm**. As the front bolt is tightened ensure a flush install with the door.

The front bolt hole on each mirror has an enlarged hole, to allow a small amount of adjustment.



2. Connect the wiring harness plug.
3. Install the door mirror 'cheater' panel.
4. Install the door trim panel (Refer to 'Door Trim', page 1-4-3).

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Body System (01.00)

Seating (01.10)

Description

The front seats are installed with the following features:

- Integral side airbags
- Head restraints
- Safety belt buckle / pretensioner
- Electrically adjustable seat positioning and lumbar support
- Heated seat (optional)

Heated Seats

The heated seat system comprises:

- Heated seat switches
- Backrest heater element
- Cushion heater element and thermostat

The heated seat function permits the electrical heating of the seat back and cushion on the driver and front passenger seats. The heating system of each seat is selected by separate switches located on the inside of each seat base.

Once the heated seat function has been activated, it will operate until one of the following conditions have been satisfied:

- A fixed period of time has expired (10 minutes)
- If the engine is not running and the ignition key is removed
- A malfunction is detected by the heated seat module

Confirmation that the heated seat function is active is indicated by the illumination of an amber light in the instrument cluster.

Seat Module

The seat module is located under the front edge of the seat.

Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Seat mountings	20-25	15-18.5
Seat Belt Mounts	35	26

Maintenance

Repair Operation Time (ROT)		
Item		**Code**
Remove and install	LH	**01.10.AA**
	RH	**01.10.BA**

Front Seat

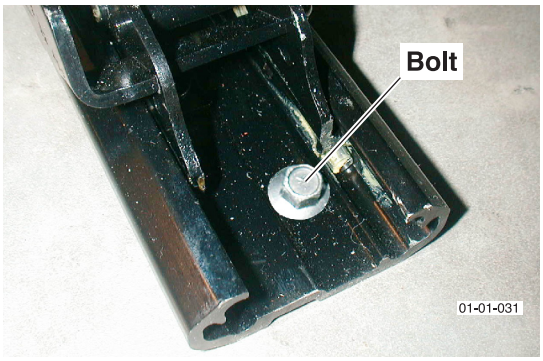
Removal

The front and rear seat rail mountings are positioned on four washers. Ensure the washers are collected during seat removal.

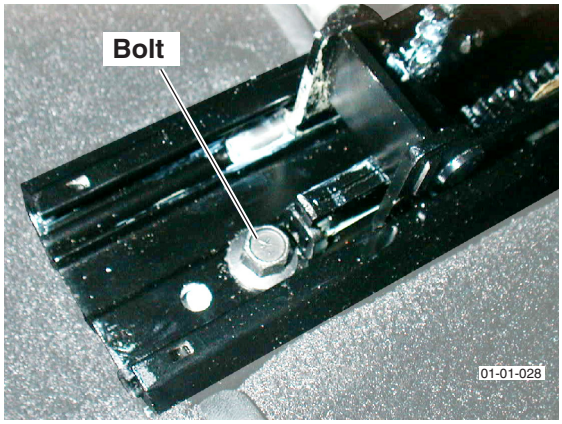
1. Motor the seat forward.

To power the drivers seat the ignition switch must be in the 'II' position

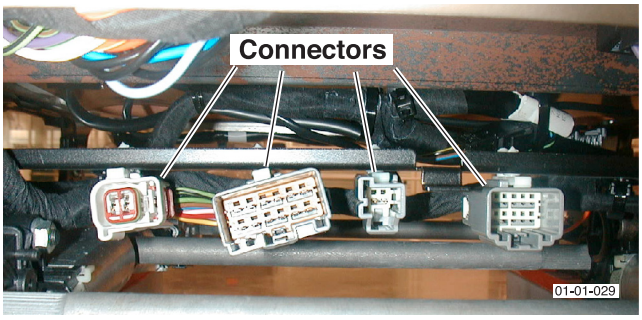
2. Remove bolts (x2) that secure the rear of the seat rails.



3. Motor the seat to the rear. Remove bolts (x2) that secure the front of the seat rails.



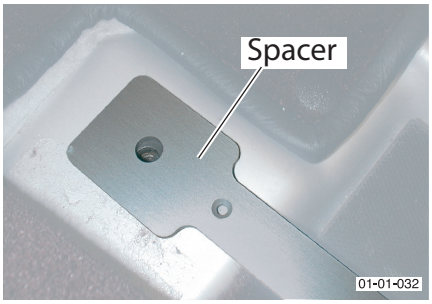
4. Tip the seat rearwards and disconnect the wiring harness plugs (x4).



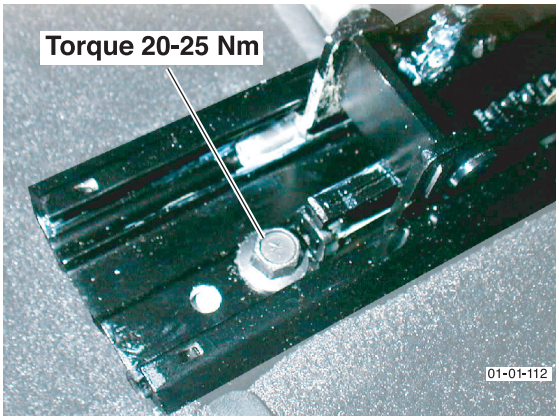
5. Remove the seat assembly.

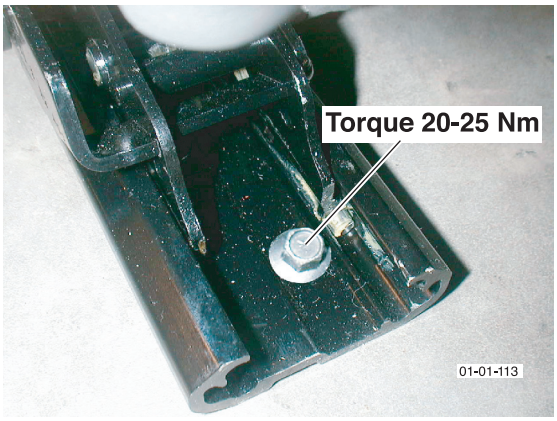
Installation

1. Place the seat in the vehicle.
2. Connect the wiring harness plugs (x4).
3. Place the two spacers in position. Locate the seat over the seat mountings.



4. Install the front bolts, power the seat forwards and install the rear bolts. Torque bolts (x4) to **20-25 Nm**.





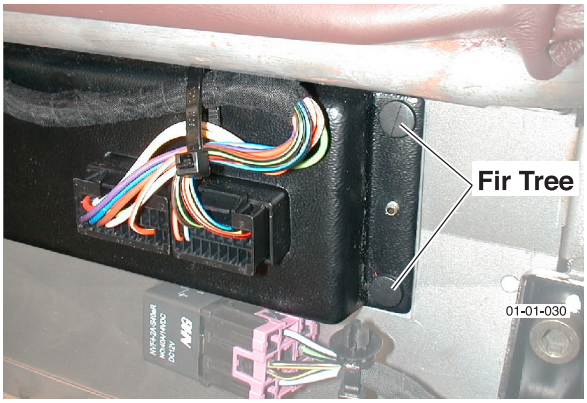
Seat Base Control Motors

The seat base control motors are an integral part of the seat base.

Seat Module

Removal

1. Remove seat from vehicle.
2. Remove the seat module. The seat module is held in by fir trees (x4).



Installation

1. Remove seat from vehicle.
2. Remove the seat module. The seat module is held in by fir trees (x4).

Seat Module Calibration

This mode allows the seat module to learn its position. The seat needs to know exactly where it is to electronically prevent seat movement into certain areas within the mechanical seat movement envelope.

Once the seat has been put in to calibration mode it will remain in this mode until it as been re-taught its position. There is no physical indication that the seat is in calibration mode, the seat could be left in this mode for some time before a user notices.

There is nothing wrong with the seat being in calibration mode for extended periods of time, it will only be apparent to the user when a rearward / downward seat movement is required.

The seat must be calibrated before rearward / downward movement is allowed.

Calibration mode is activated by a diagnostic command or by switching on the BDS while holding up the seat height switches.

1. With the Interior light relay 'On', i.e. door open, move the seat forwards or backwards, then disconnect the vehicle battery (either physically or via the BDS) before the interior light relay switches 'Off' (five minutes unlocked, 30 second locked).

   The seat module is now in calibration mode.

The seat will not go into calibration mode if the interior light relay has been allowed to switch off since the last seat movement.

2. Drive the seat fully forward, allow the motors to stall against the seats mechanical end stops.
3. Drive the seat fully upwards, allow the motors to stall against the seats mechanical end stops.

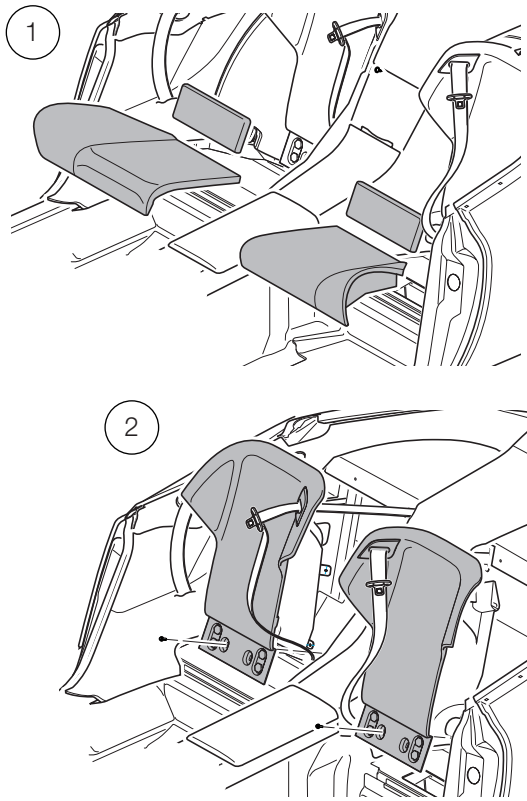
The seat up switch needs to be operated front up then back up.

When each end stop is reached the motor will know where it is on that particular axis, the seat will only allow forward of upward movement until each axis position has been learnt

4. The seat module is now out of calibration mode.

Rear Seats

Removal (Coupe)



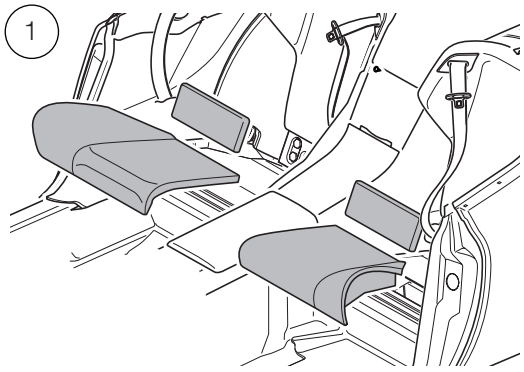
Installation (Coupe)

Install the rear seat in reverse order.

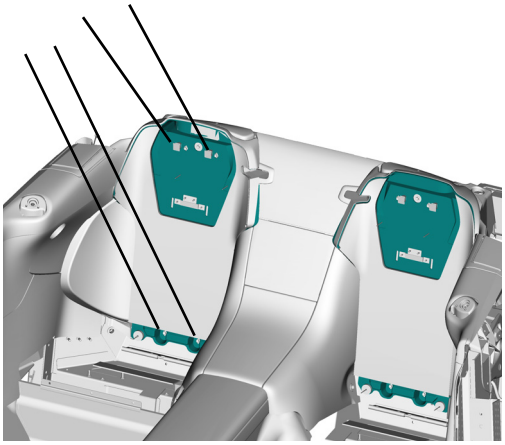
Torque seat belt mounts to **35 Nm**.

Removal (Volante)

1. Remove the seat bases. Pull off.



2. Remove the headrest panel. Pull off at the top and pull up to remove.
3. Remove screws (x4) that secure the seat back. Withdraw the seat back.



Installation (Volante)

Install the rear seat in reverse order.

Torque seat belt mounts to **35 Nm**.

Body System (01.00)

Glass, Frame and Mechanism (01.11)

Description

Power to the door window regulator motor is available when the ignition switch is at position '0' and is supplied, through a thermal cut-out, to the left and right window switches. The switches are double pole earth so that the current through a window regulator motor may be switched in either direction to raise or lower the glass.

Frameless doors

To avoid damaging the body seals during door opening, the door glass must be lowered before the door can be opened. This function is controlled by the door modules.

The door module senses the rotation of the latch claw as the door opens, the door module then drives the door window regulator motor briefly to lower the door glass until it clears the glass seals. After closing a door, the window regulator motor operates to raise the door glass to seat against the body seals.

Specifications

Torque Figures			
Description		Nm	lb. / ft.
Door regulator	M6	9	7
	M10	10-15	7.5-11.5
Glass grip screws		5-6	4-4.5
Door Handle		9	7
Rear quarter regulator	M6	9	7
	M10	10-15	7.5-11.5
Seat belt and speaker plate		8-10	6-7.5

Maintenance

Glass Regulator

Repair Operation Time (ROT)		
Item		**Code**
Door Glass Motor	LH	**01.11.LH**
	RH	**01.11.RH**
Door Glass Regulator	LH	**01.11.FB**
	RH	**01.11.GB**

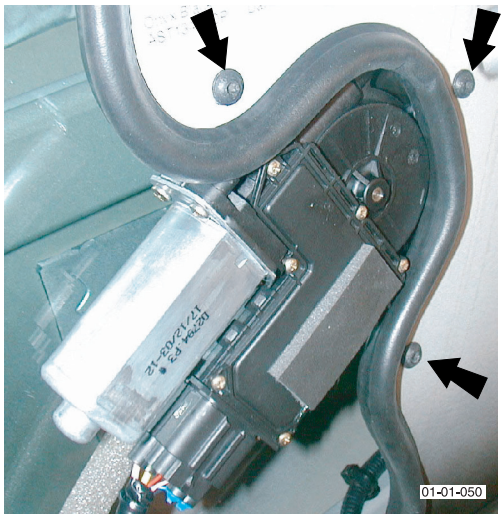
Removal

1. Remove the door trim panel (Refer to 'Door Trim', page 1-4-3).
2. Power the door glass to a 'half open' position.

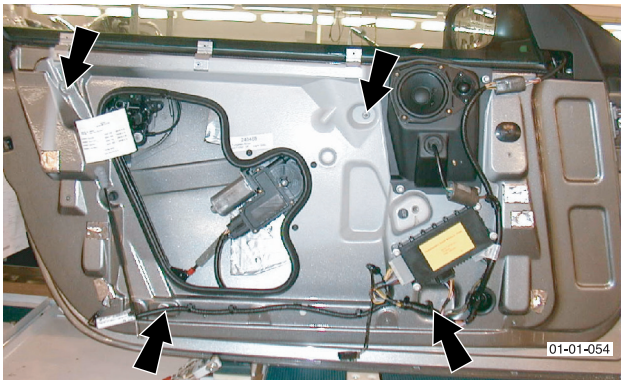
To enable access to the screws which secure the door glass.



3. Disconnect the vehicle battery.
4. Remove the door glass grip screws. Withdraw the door glass from the door.
5. Release the window regulator motor from the door.



6. Release nuts (x4). Withdraw the window regulator from the door.

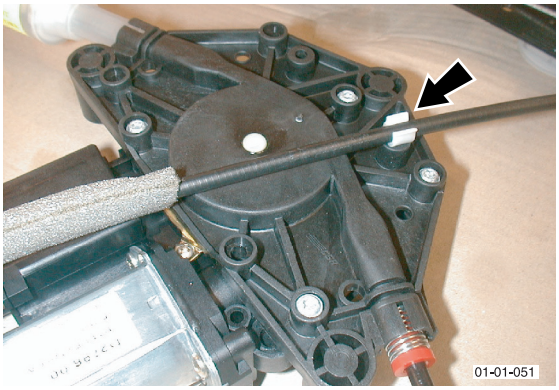


Installation

1. Install the window regulator assembly.



Ensure the window regulator cable remains in place during installation.



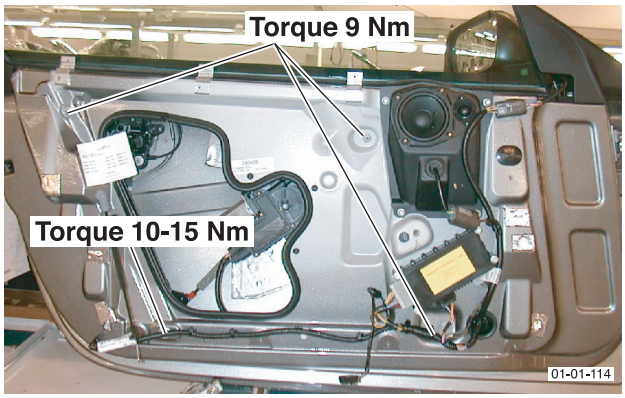
Ensure that the wiring harness running by the adjuster bolt locates above the adjuster bolt.

Ensure the wiring harness does not get 'trapped'.

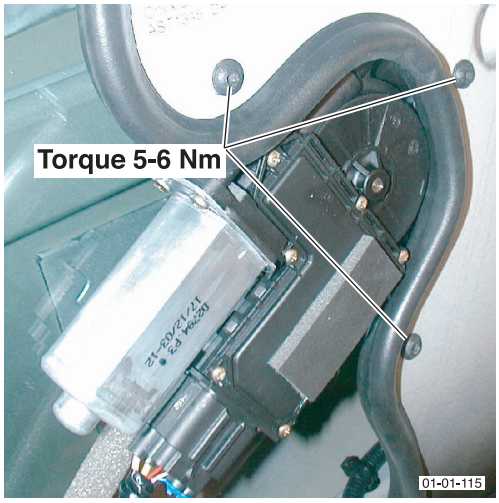
Window regulators are 'Handed' (L/H and R/H). The adjuster is always located at the bottom rear of the door.

Place the window regulator unit into position and locate the four mountings through the door inner skin.

2. Install nuts. Torque nuts (x3) M6 to **9 Nm**. and (x1) M10 **10-15 Nm**.



3. Install the window regulator motor (screws x3). Torque to **5-6 Nm**.



Ensure the window regulator motor wiring harness clips to the window regulator motor.

4. Install the weather strips (x2). If removed.
5. Lower the door glass into the door.

Insert the front end of the door glass first then lower the door glass and insert the rear end.

5.1 Locate the rear end of the door glass into it's grip.

5.2 Locate the front end of the door glass into it's grip.

The front grip has to be located by feel alone.

5.3 Line up the holes in door glass with the openings in the grips (x2).

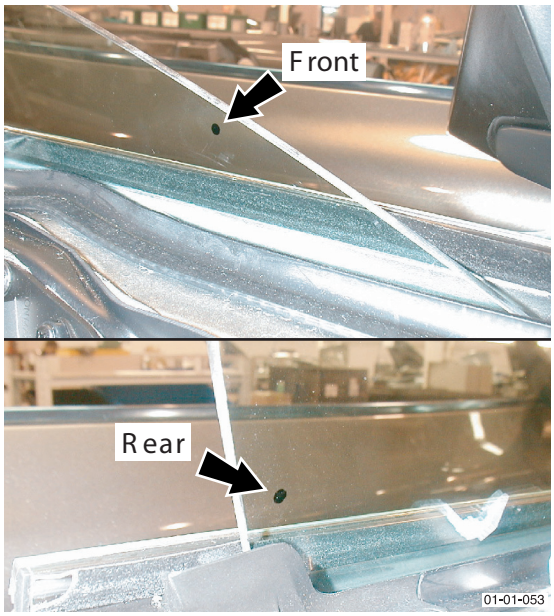
6. Install the grip screws (x2). Do not tighten.

The grip screws are, apart from length, the same as the latch unit screws (x3). Do not install the, shorter, latch unit screws to the grips.

7. Align the door glass. Ensure the following when installing a new door glass.
   - The glass is flush with the mirror trim edge



   - The two dots on the door glass are equal distance from the door edge.



8. Install the door module (if removed).

> ⚠ ***Warning*** ⚠
>
> ***Danger of hands being trapped in the window regulator mechanism. Do not put your hands through the door glass aperture with the door harness connected.***

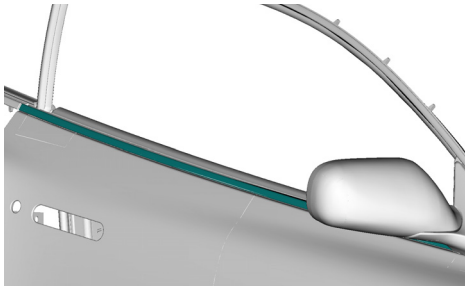
9. Connect the vehicle battery.
10. Check alignment of the door glass to the door seals.
    If required, disconnect the power to the door and realign the door glass.
    Once satisfactory alignment is achieved, torque both grip screws to **5-6 Nm**.
11. Install the door mirror. If removed.
12. Install the outer weather strip. If removed.
13. Install the door trim.

Door Glass

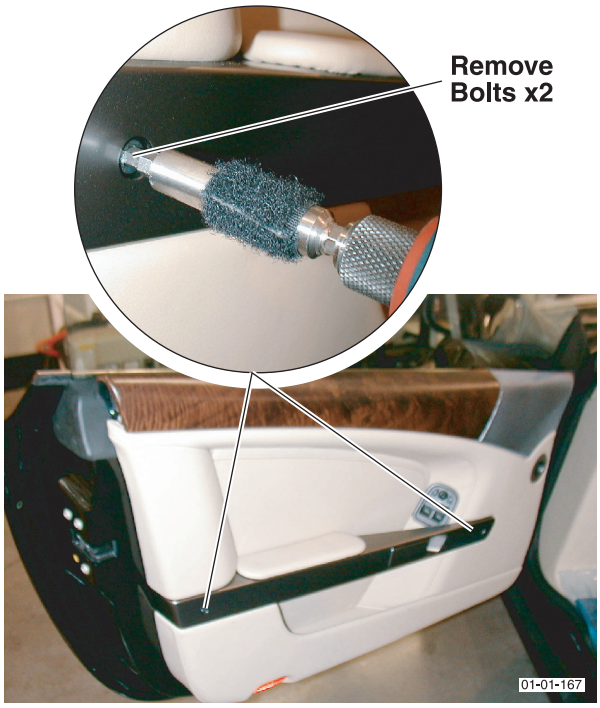
Repair Operation Time (ROT)		
Item		**Code**
Door Glass Renew	LH	**01.11.BB**
	RH	**01.11.HB**
Door Glass Adjust	LH	**01.11.CD**
	RH	**01.11.JD**

Removal

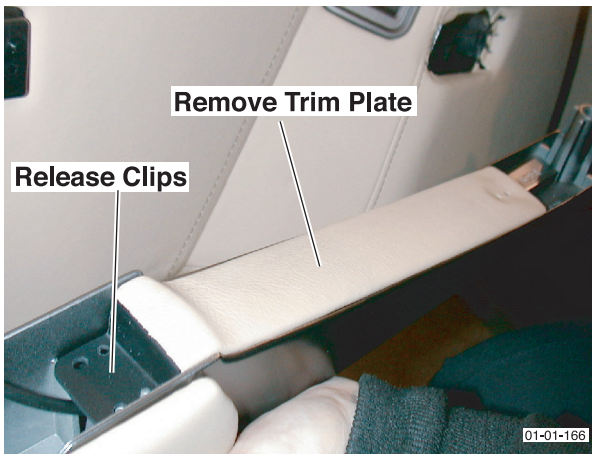
1. Remove the door outer weather strip.

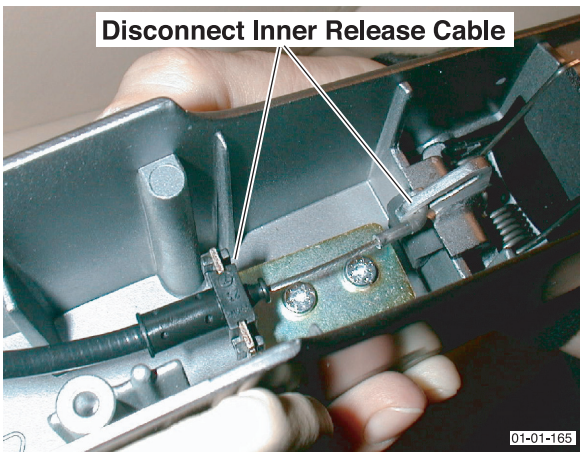


2. Release the door handle (Bolts x2).

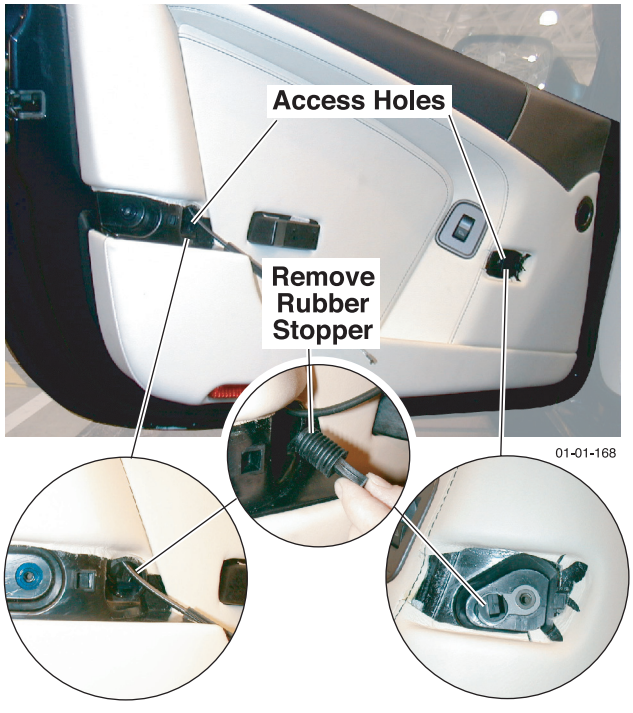


3. Remove the door handle trim plate and disconnect the release cable.





4. While looking through the access holes provided by removing the door handle, power the door glass to show the glass grip screws.



5. Disconnect the vehicle battery.
6. Remove the door glass grip screws. Withdraw the door glass from the door.

Installation

1. Lower the door glass into the door.

Insert the front end of the door glass first then lower the door glass and insert the rear end.

1.1 Locate the rear end of the door glass into it's grip.

1.2 Locate the front end of the door glass into it's grip.

The front grip has to be located by feel alone.

1.3 Line up the holes in door glass with the openings in the grips (x2).

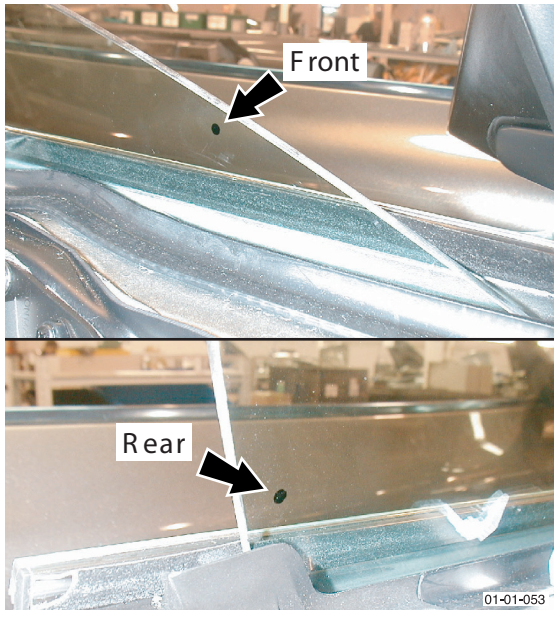
2. Install the grip screws (x2). Do not tighten.

The grip screws are, apart from length, the same as the latch unit screws (x3). Do not install the, shorter, latch unit screws to the grips.

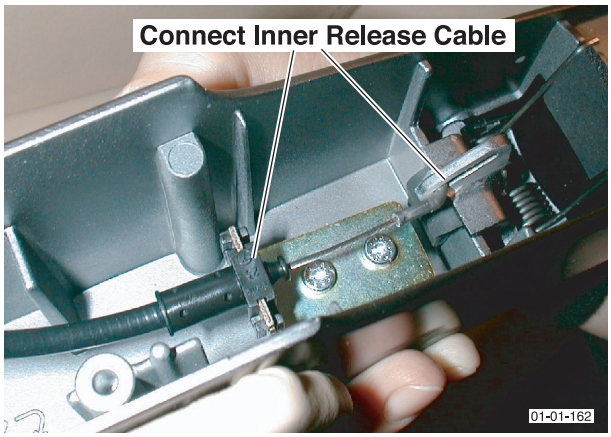
3. Align the door glass. Ensure the following when installing a new door glass.
   - The glass is flush with the mirror trim edge

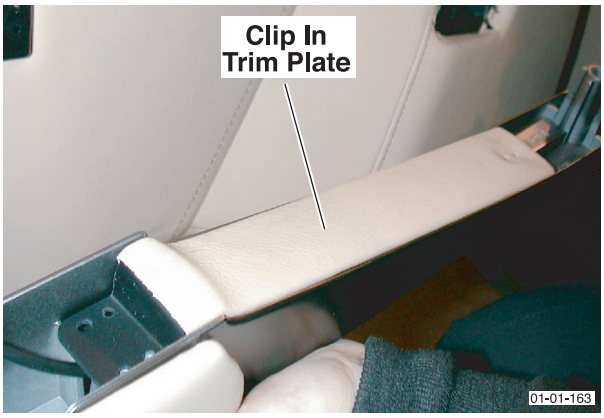


   - The two dots on the door glass are equal distance from the door edge.

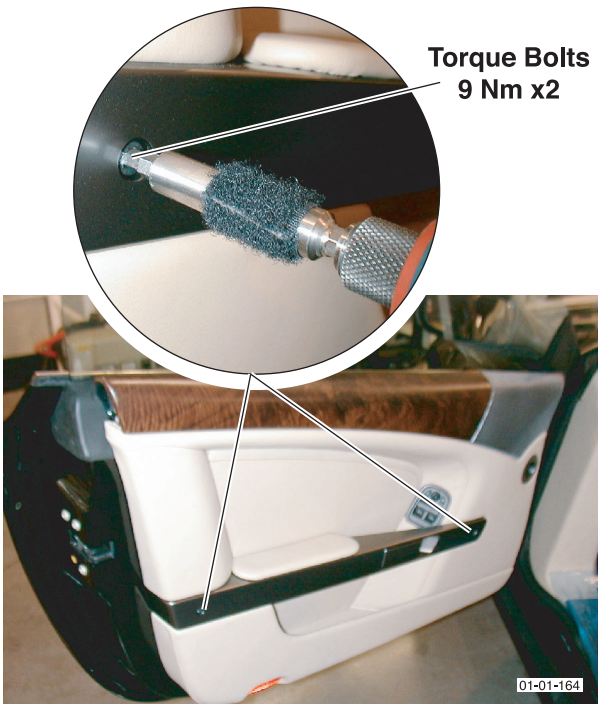


4. Connect the inner release cable and install the door handle trim plate.



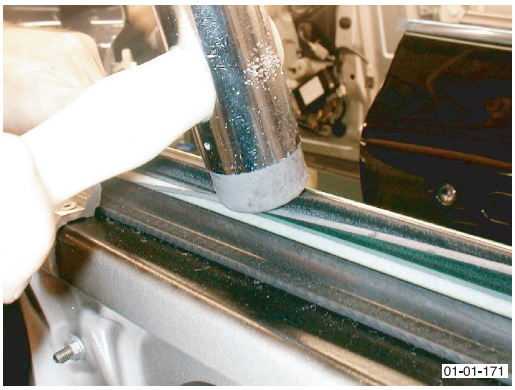


5. Install the door handle Torque bolts (x2) to **9 Nm**.



6. Install the door outer weather strip.





7. Connect the vehicle battery.
8. Check that the door glass operates correctly. Perform the 'Door glass Setup' procedure.

Door Glass Setup

1. Sit in the driver's seat.
2. Ensure both doors are closed and switch the ignition to '0'.
3. Press firmly and hold the window switch until the window is at the maximum down position. Continue to hold the button for 5 seconds then release.
4. Pull back and hold the window switch until the window is in the maximum up position. Continue to hold the switch for a further 5 seconds, then release.
5. The window is now reset. Repeat for the second window.

Rear Quarter Glass (Coupe)

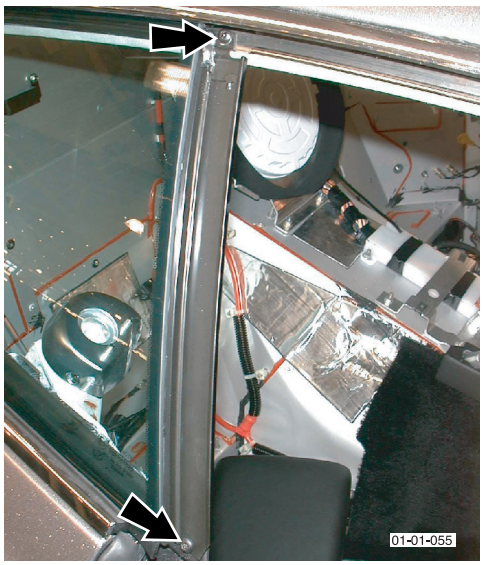
Repair Operation Time (ROT)		
Item		**Code**
Rear Quater Glass Renew	LH	**01.11.LB**
	RH	**01.11.MB**

Remove

1. Pull the door sealing rubber away from the rear quarter glass.
2. Remove screws (x2).
3. Pull the rear quarter glass away from the body.

Installation

1. Install the rear quarter glass.
2. Install screws (x2).



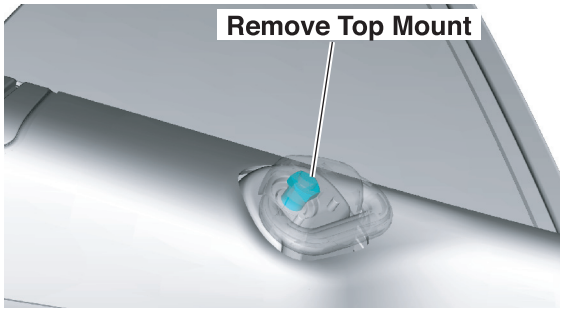
3. Install the door sealing rubber.

Rear Quarter Glass (Volante)

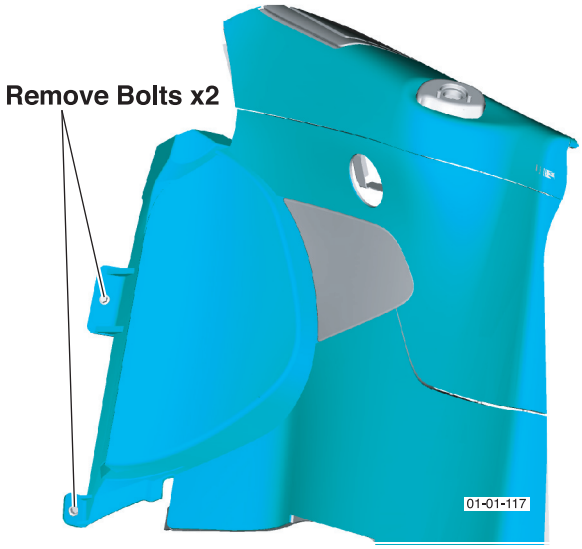
Repair Operation Time (ROT)		
Item		**Code**
Rear Quater Glass Renew	LH	
	RH	

Remove

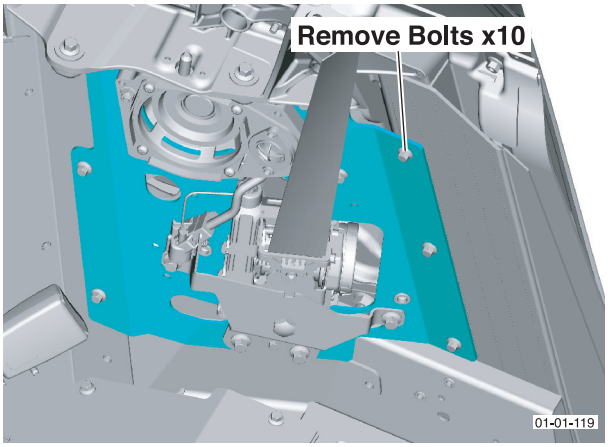
1. Power the front seat forward.
2. Lower the convertible roof.
3. Remove the rear seat back and seat base.
4. Disconnect the vehicle battery.
5. Remove the seat belt top mount.



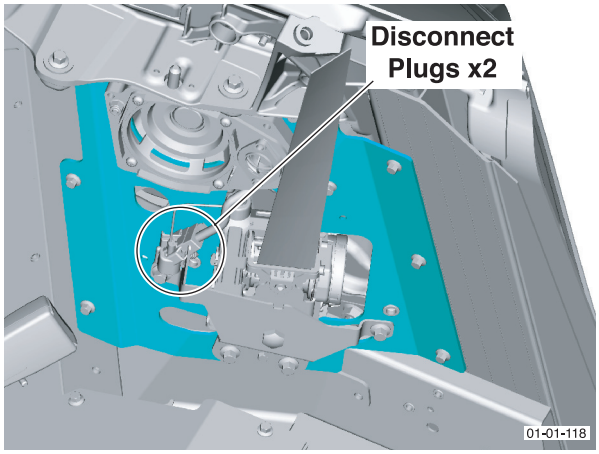
6. Remove the rear 1/4 panel.
   6.1 bolts x2
   6.2 fir trees x3



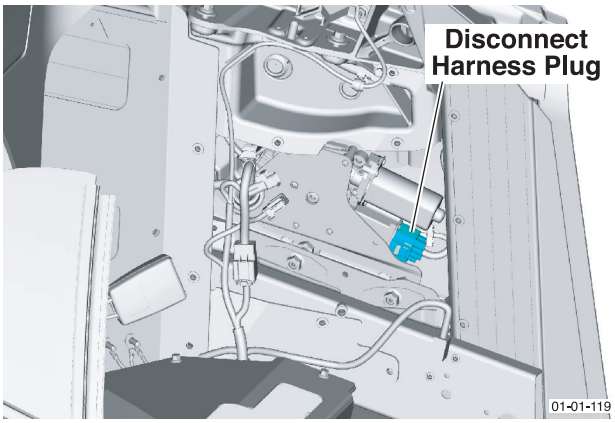
7. Remove bolts (x10) that secure the seat belt and speaker plate. Withdraw the plate.



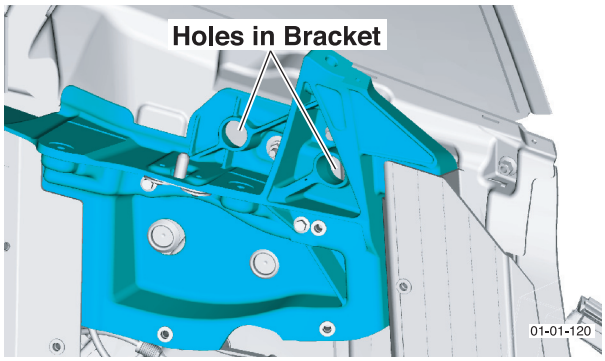
8. Disconnect the wiring harness plugs (x2).



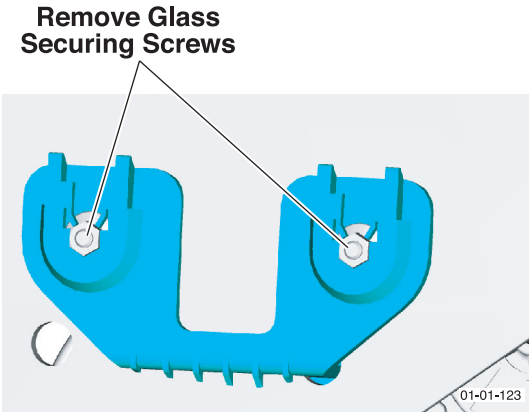
9. Disconnect the glass regulator wiring harness plug.



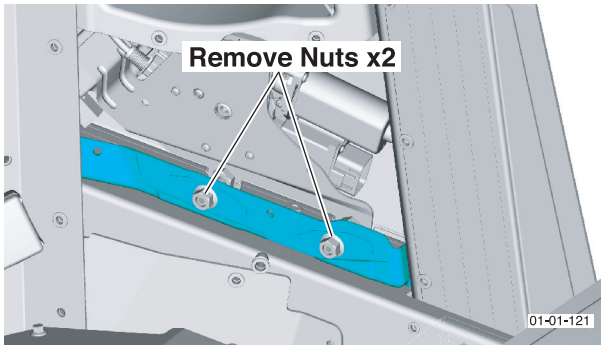
10. Power up the glass regulator to line up the two glass securing screws through the two holes in the top bracket.

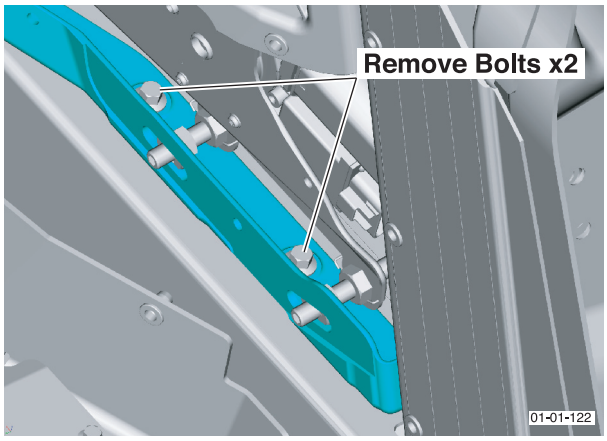


11. Remove the two glass securing screws and withdraw the glass.



12. Power the glass regulator down.
13. Remove the nuts (x2) that secure the bottom of the glass regulator. Pull the bottom of the glass regulator to reveal bolts (x2). Remove the bolts (x2).

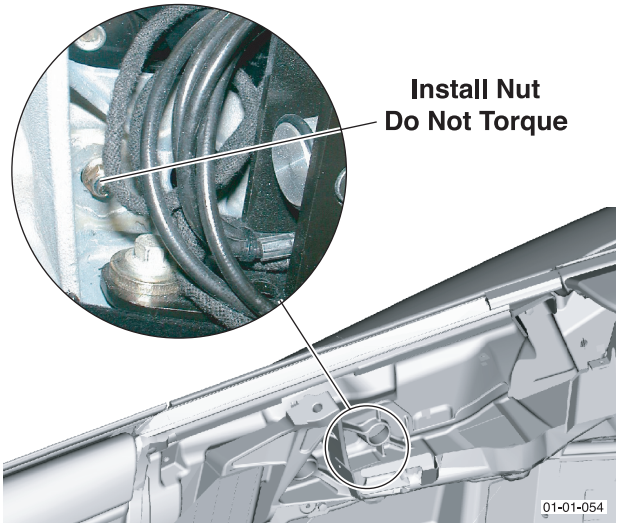




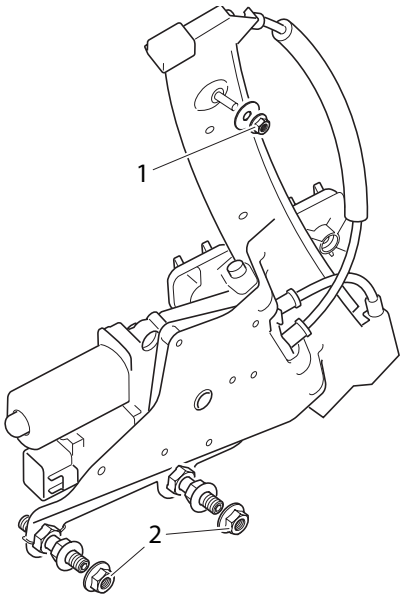
14. Remove the nut from the top of the glass regulator and withdraw the glass regulator.

Installation

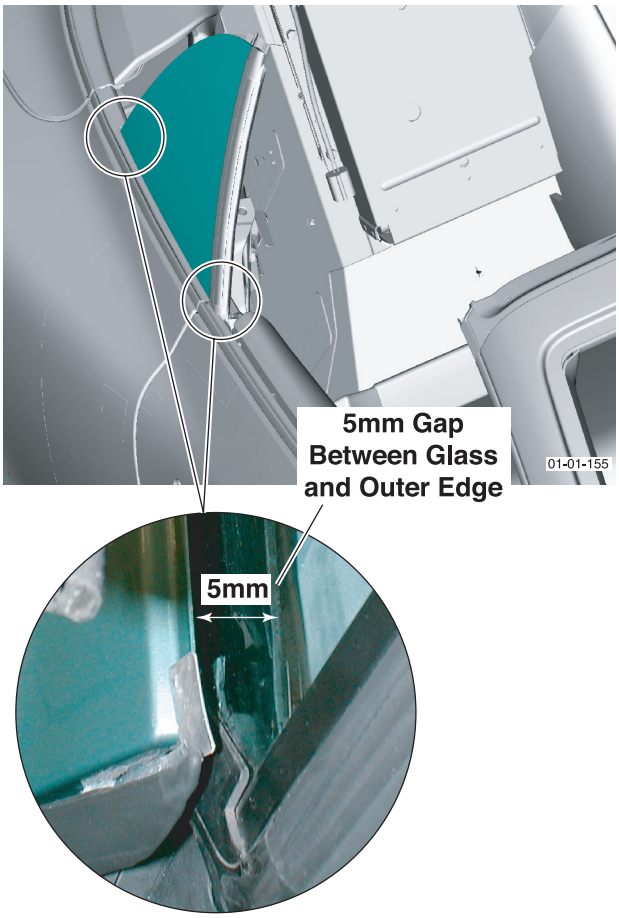
1. Install the glass regulator. Install the nut to the top of the glass regulator. Do not torque.

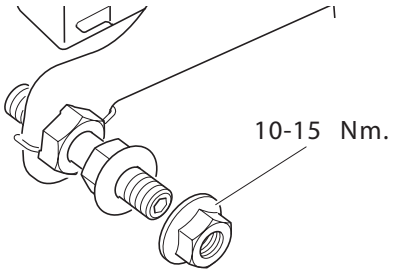


2. Install the lower bolts (x2). Push the bottom of the glass regulator into place and install nuts (x2).
3. Power up the glass regulator to line up the two glass securing screw holes through the two holes in the top bracket.
4. Install the glass. Secure with screws (x2). Do not torque
5. Remove the outer chrome trim.
6. Torque the upper nut (1) of the glass regulator to **9 Nm**.



7. Adjust the lower mountings (2) to achieve the 5 mm gap between the glass and the edge of the vehicle body.





When adjusted, torque the outer nuts to **10-15 Nm**.

8. Secure the qurater glass. Torque the screws to **5-6 Nm**.
9. Connect the glass regulator wiring harness plug.
10. Check glass alignment.
    10.1 Raise the convertible roof.
    Check the alignment of the glass to the door glass.
    Check the alignment of the glass with the convertible roof seals.
11. Install the seat belt and speaker plate. Torque bolts to **8-10 Nm**.
12. Connect the wiring harness plugs (x2).
13. Install the rear 1/4 panel.
14. Install the seat belt top mount. Torque bolt to **35 Nm**.
15. Install the rear seat back and seat base.
16. Power the front seat forward.

Body System (01.00)

Instrument Panel (IP) (01.12)



Specifications

Torque Figures		
Description	Nm	lb. / ft.
IP Mountings	22.5	17
Glue pot bolts	8	6
Blower motor to bulkhead	10-14	7.5-10.5

Maintenance

IP

Repair Operation Time (ROT)	
Item	**Code**
IP Renew	**01.12.AA**

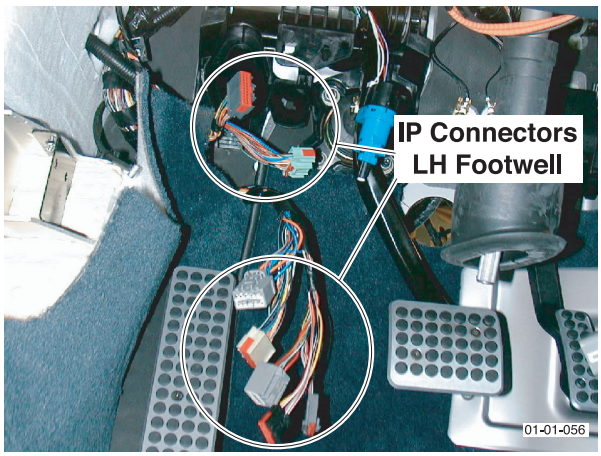
Removal

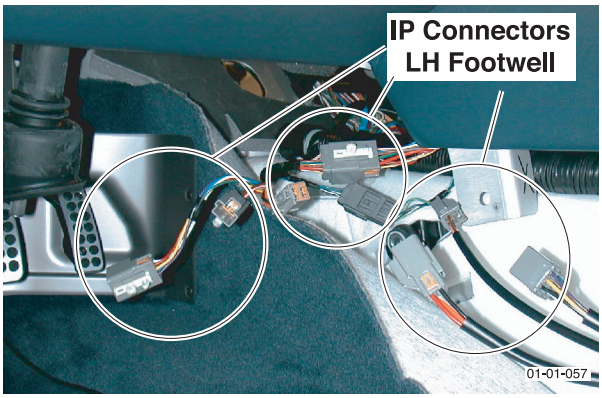
1. Evacuate the A/C system (Refer to 'Air Conditioning (A/C) System (12.03)', page 12-3-1).
2. Remove both doors (Refer to 'Body Closures (01.03)', page 1-3-1).
3. Remove both seats (Refer to 'Seating (01.10)', page 1-7-1).
4. Disconnect the vehicle battery.
5. Remove the passenger side road wheel and arch liner.
6. Remove the cant rails (pull off) (Refer to 'Roof Trim', page 1-4-2).
7. Remove the steering column (Refer to 'Steering Wheel', page 11-5-1).
8. Remove the rear trim panels (Refer to 'Rear Trim', page 1-4-5). Including the centre arm rest and surround.
9. Remove / Pull back the front carpet (allowing access to the IP mounts and wiring harness plugs).
10. Remove the engine bay fusebox and fusebox mounting bracket.
11. Remove the A/C evaporator pipes.
    Cap the open ends of all pipes.

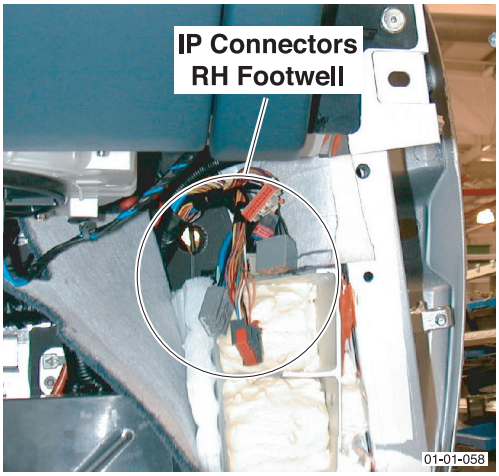


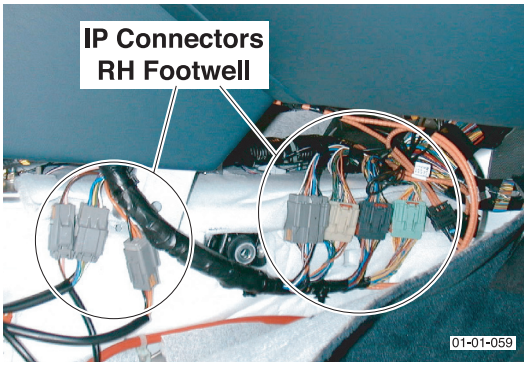
12. Disconnect the wiring harness plugs.

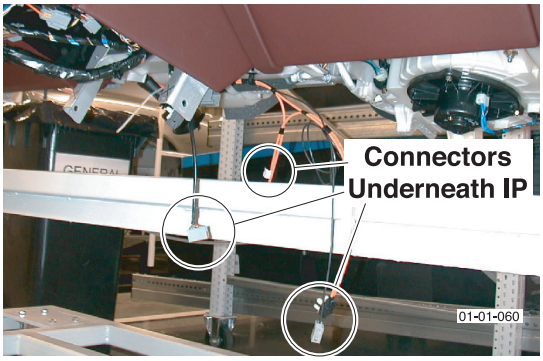
Remove the bonnet pull lever to gain access to L/H harness plugs.









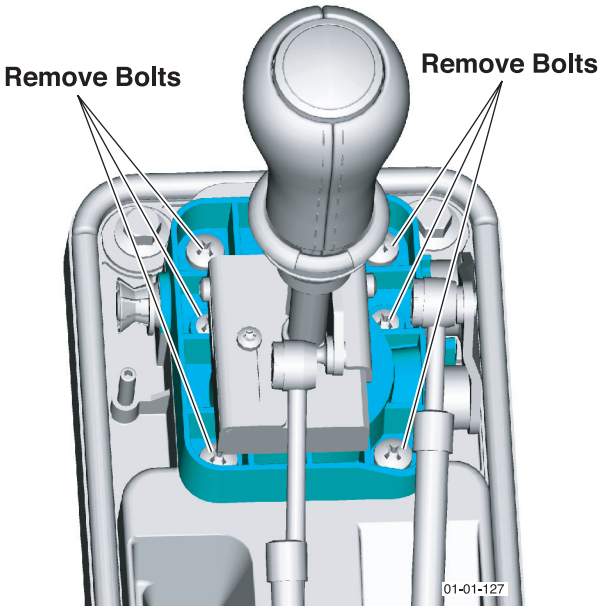


13. Manual Gearbox Only.

Remove the gear-lever.

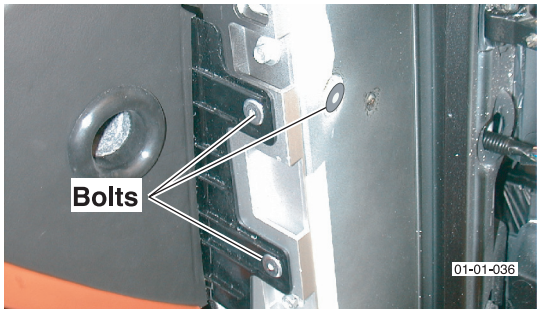
13.1 Disengage the manual shift control cables (x2).

13.2 Remove screws (x6) that secure the gear lever pivot block. Withdraw the gear lever.

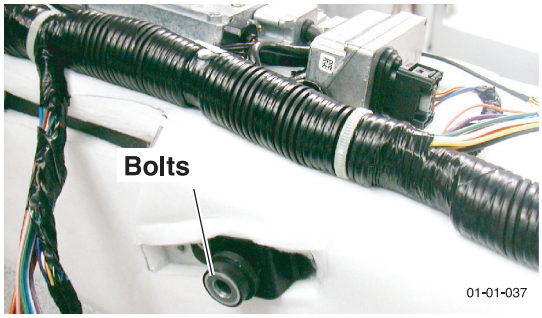


14. Remove, L/H and R/H, bolts securing the IP to vehicle.

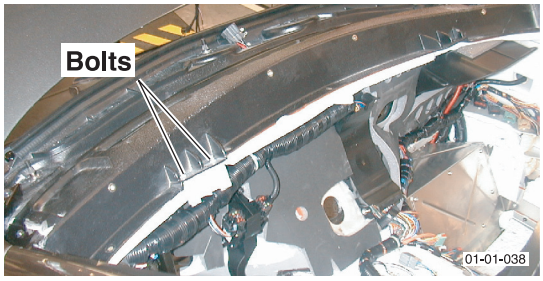
14.1 Bolts (x6 L/H and R/H).



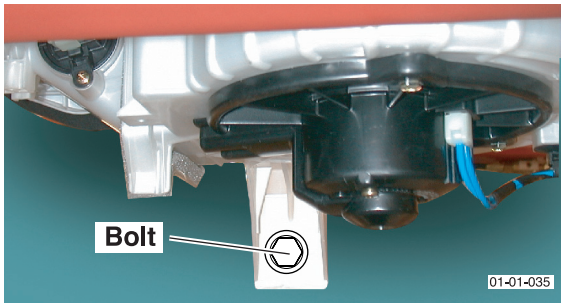
14.2 Bolts (x2).



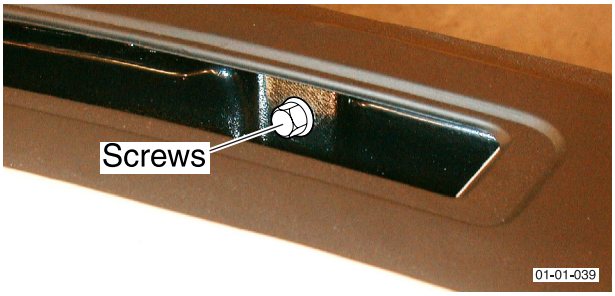
14.3 Glue pot bolts (x2).



14.4 Bolt (x1) from heater blower.



15. Remove the window defrost air duct screws (x3 each side).

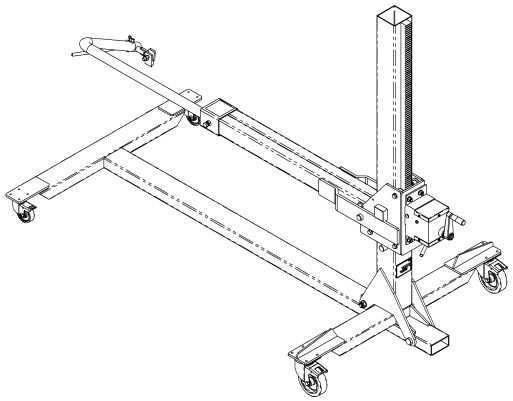


To prevent the screws falling down the air ducts - place a rag / cloth into the air ducts.

15.1 Disengage clips (x3) from each window defrost air duct) to release the window defrost air ducts from the IP.

15.2 Remove screws (x3 for each duct).

16. Manoeuvre the service tool (Refer to '501-F116 (IP Removal)', page 20-1-8) into position, through the passenger side opening, and attach to the IP.



17. Move the IP rearwards sufficient to gain access to the heater pipes. Disconnect the heater pipes.

One person to open the spring clip from inside the vehicle and one person to pull the pipes off from inside the engine bay.

Caution
Take care not to let coolant drip onto the vehicle carpet.



18. Withdraw the IP from the vehicle.

As the IP is withdrawn from the vehicle the evaporator drain pipe will come with it.

Take care not to break the blower motor bracket when manoeuvring over the vehicle tunnel.

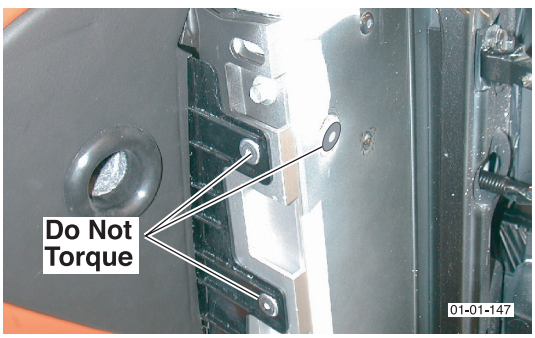
Installation

1. Manoeuvre the IP, attached to service tool, through the passenger side opening.
2. Place the A/C Evaporator drain pipe through the opening provided.

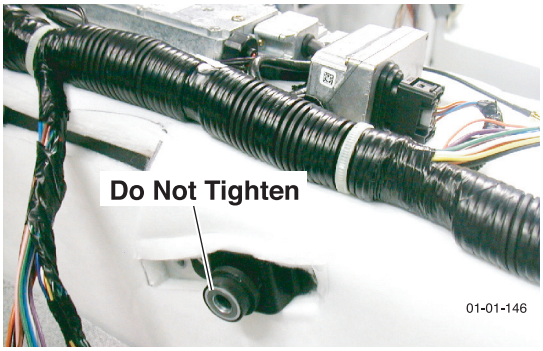
Ensure A/C breather pipe is secure and correctly located. It is not accessible once the IP is installed.

3. Install the heater pipes.
4. Raise the IP and locate into position.
5. Install the following bolts

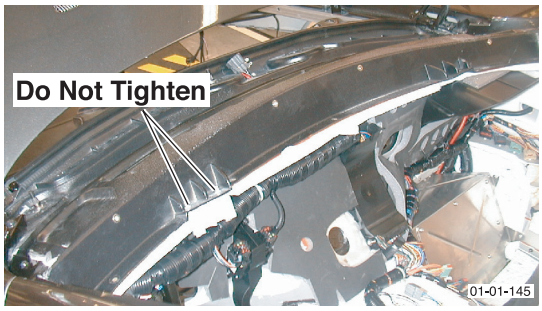
5.1 Bolts (x6 (L and R/H)). Do not torque.



5.2 Install bolts (x2 L and R/H). Do not tighten.



5.3 Install the glue pot bolts (x2). Do not tighten.

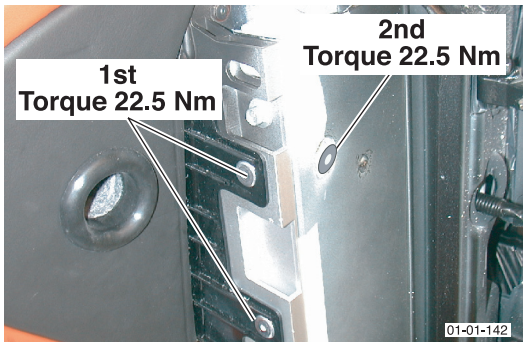


6. Torque the bolts in the following order.

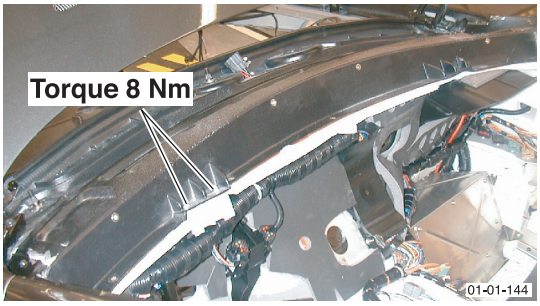
6.1 Bolts (x6 (L and R/H)).

Torque bolts (1) to **22.5 Nm**

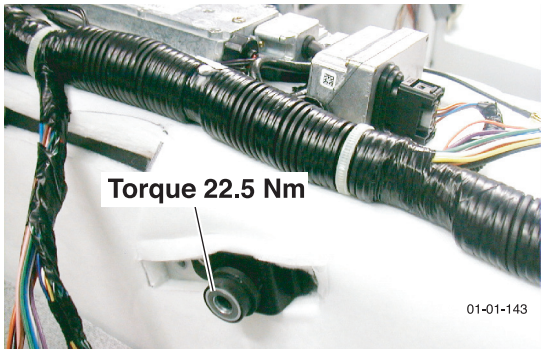
Torque bolts (2) to **22.5 Nm**.



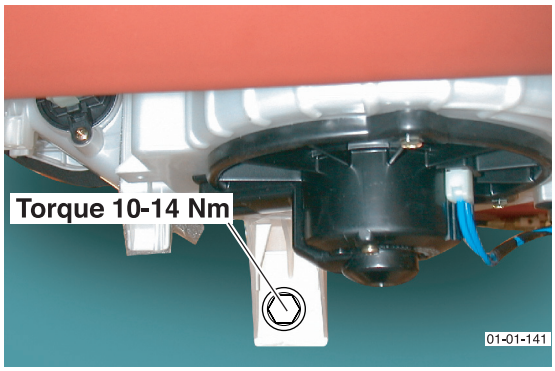
6.2 The glue pot bolts (x2). Torque bolts to **8 Nm**.



6.3 Bolts (x2 L and R/H). Torque bolts to **22.5 Nm.**



7. Install the heater blower to the bulkhead bolt. Torque to **10-14 Nm.**



8. Connect the wiring harness plugs.

If removed, install the bonnet pull lever.

9. Install screws (x3 each) that secure the window defrost air ducts.
10. Engage clips (x3) for each window defrost air duct vent panel.
11. Install the steering column (Refer to 'Steering Column', page 11-3-1).

Note the steering rack to steering column position from removal.

12. Install the cant rail (Refer to 'Roof Trim', page 1-4-2).
13. Connect the A/C pipes.
14. Install the fusebox mounting bracket, fusebox and fusebox wiring harness blocks.
15. Install the rear trim (Refer to 'Rear Trim', page 1-4-5), front carpets and centre arm rest.
16. **Manual Gearbox Only.**

    Install the gear-lever.
17. Install the road wheel arch liner.
18. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
19. Install the seats (Refer to 'Seating (01.10)', page 1-7-1).
20. Install the doors (Refer to 'Body Closures (01.03)', page 1-3-1).
21. Connect the vehicle battery.
22. Charge the A/C system (Refer to 'Air Conditioning (A/C) System (12.03)', page 12-3-1).

Body System (01.00)

Handles and Lock Mechanisms (01.14)

Description

Vehicle Key / Remote Transmitter

The vehicle key operates the ignition and the door lock, the remote transmitter operates the central locking and alarm systems.



Do not leave them in the vehicle.

Central Locking System

The Central Locking system consists of lock actuators in both doors, the boot and the fuel flap. Central locking control is through the door modules.

Each lock actuator incorporates a microswitch which signals a change of state when any motor runs to drive the actuator. The microswitches are of the change over type and provide an earth for lock / unlock signals to the door module.

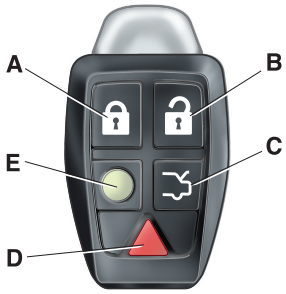
The boot will remain locked or will be unlocked simultaneously with the doors dependant on the boot lock position. The boot lock can be enabled at any time using the remote transmitter irrespective of the Central Locking status.

Remote Transmitter

The remote control system consists of a transmitter and an antenna (radio frequency system). The remote control transmitter for the radio frequency system will operate without the transmitter being directed at the vehicle. The normal range between the transmitter and the antenna is up to 5 meters. Before the remote control system can be used, each transmitter must be initialized to the vehicle. A maximum number of four transmitters can be initialized to any vehicle. All remote transmitters must be initialized at the same time.The keyless entry / remote operated locks will not operate when the ignition key is in the ignition switch.

(A) Lock - One step vehicle locking and alarm enable.

The vehicle will deadlock after 25 seconds.



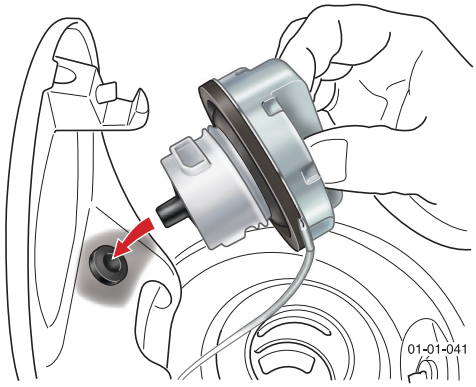
(B) Un-lock - One step vehicle unlocking or two step vehicle unlocking and alarm disable.

(C) Boot Open - Press to enable the boot catch.

(D) Panic Alarm - Activates / deactivates the panic alarm.

(E) Approach Light - Activates the front and rear side lights.

Fuel Filler Assembly



Manual Boot Release

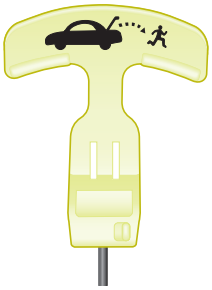
In the event of a total loss of vehicle power the boot can be opened by pulling the manual boot release handle.

Remove the LH rear seat base and undo the two knurled bolts that secure the cover. Remove the cover and pull the boot release.

Boot release assembly
Image to follow

Boot Emergency Release

The boot can be opened from inside the boot by pulling the luminous emergency release handle.



Specifications

Torque Figures		
Description	Nm	lb. / ft.
Door handle	5	4
Latch	9	7

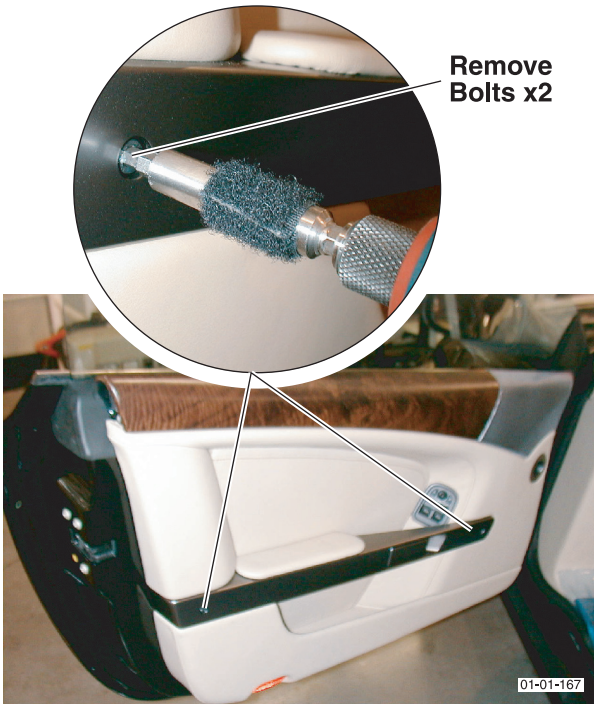
Maintenance

Door Handle / Latch Unit

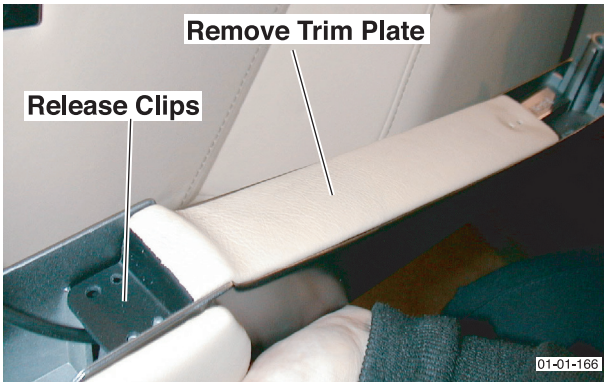
Repair Operation Time (ROT)		
Item		**Code**
Door Catch and Outer Lock	LH	**01.14.MB**
	RH	**01.14.NB**

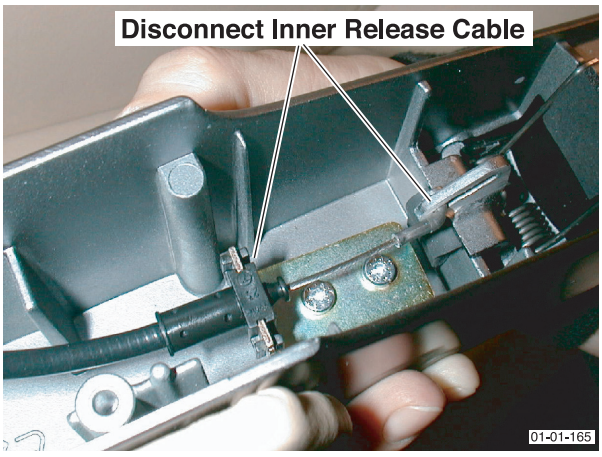
Removal

1. Disconnect the vehicle battery.
2. Remove the door handle (Bolts x2).

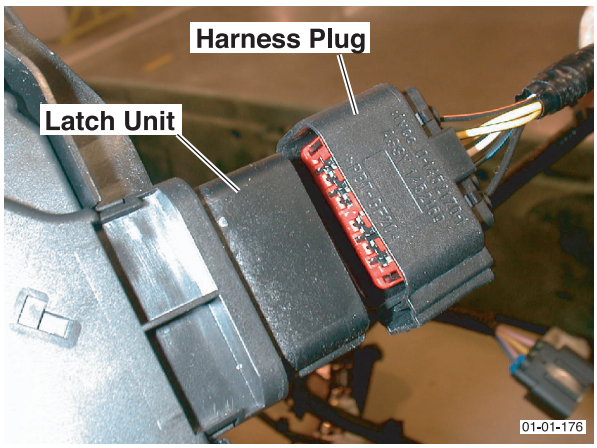


3. Remove the door handle trim plate and disconnect the inner release cable.



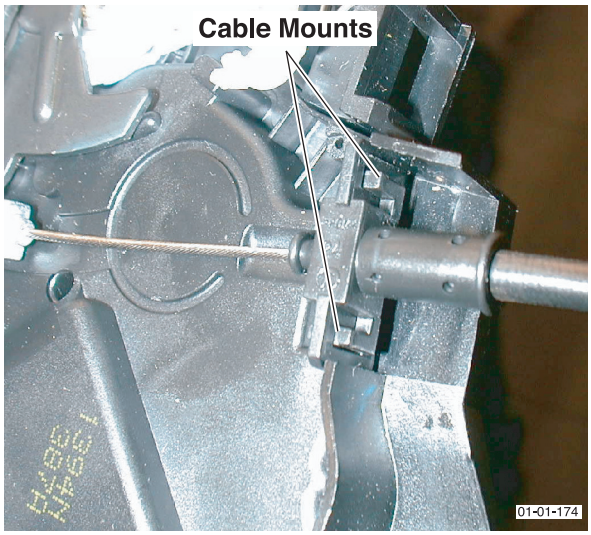


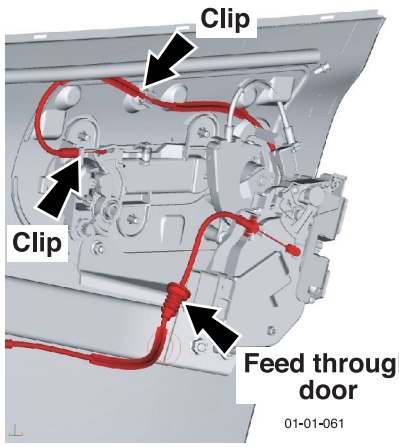
4. Remove the door trim (Refer to 'Door Trim', page 1-4-3).
5. Remove the door glass and regulator (Refer to 'Glass Regulator', page 1-8-1).
6. Disconnect the wiring harness plug.



7. Disconnect the outer release cable from the outer handle and feed the inner release cable back through the door.

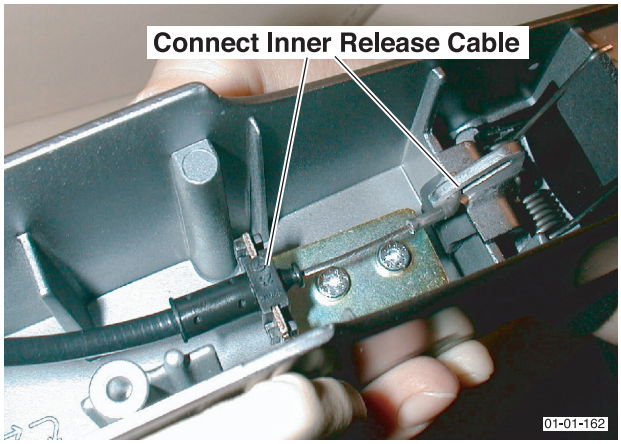
Take care not to break the cable mounts.



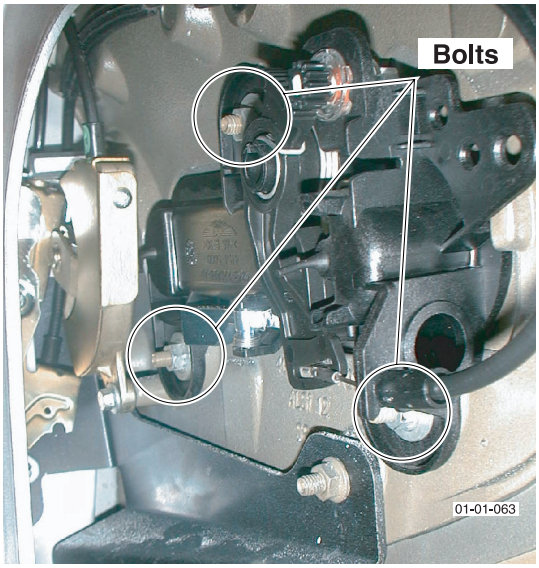


Ensure that the fir tree on the release cable is removed.

8. Remove the lock and latch assembly.
   8.1 Remove the latch screws (x3).



   8.2 Remove the lock lower bolt and loosen the top nut.
   8.3 Rotate and withdraw the lock along with latch assembly.
9. Remove the nuts (x3) from the outer handle. Withdraw the outer handle from the door.

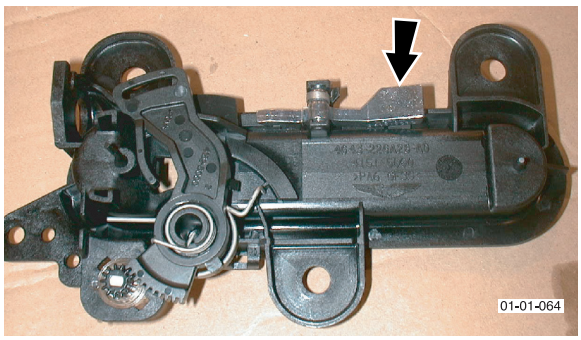


Installation

1. Install the outer door handle.

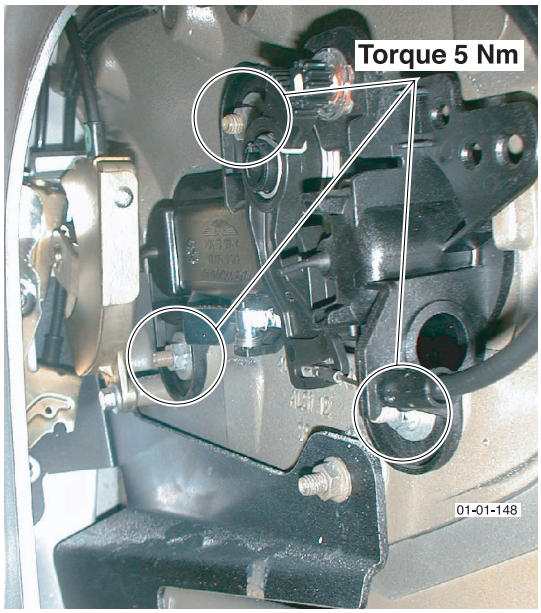
The outer door handle is reversible (installs to L/H and R/H).

Caution
Ensure the Inertia block is in the 'Floating' position.



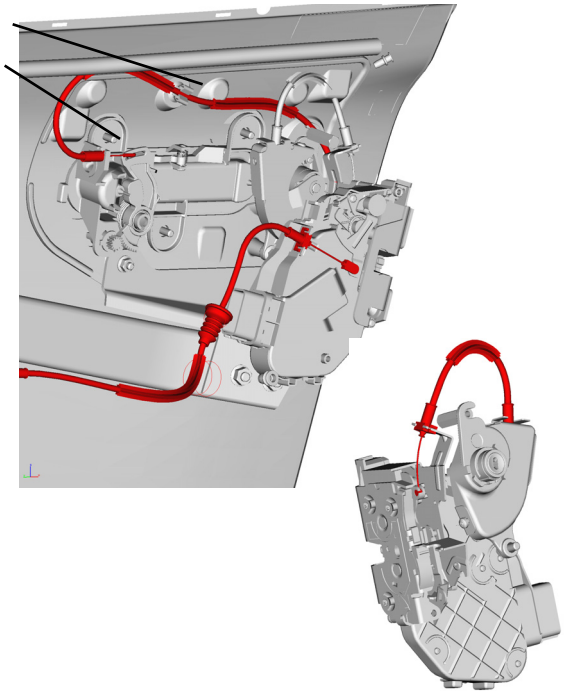
Secure with nuts (x3). Torque to **5 Nm**.

Do not over tighten. If over tightened the studs may pull from their mounts.



2. Connect the outer, inner and lock cables to the latch. Insert the lock and latch assembly into position. Feed the inner cable through the hole provided in the door.

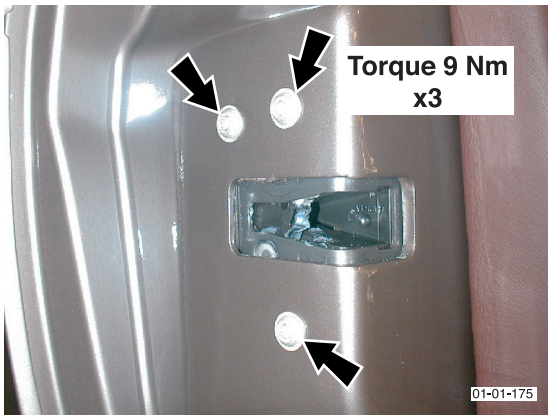
Do not push the inner cable when it is hanging from the door. This may disconnect the link at the latch end.



3. Install the lock.
   3.1 Locate the barrel through the door and rotate the lock into position.
   3.2 Install nut on lower mount.
   3.3 Tighten both nuts.



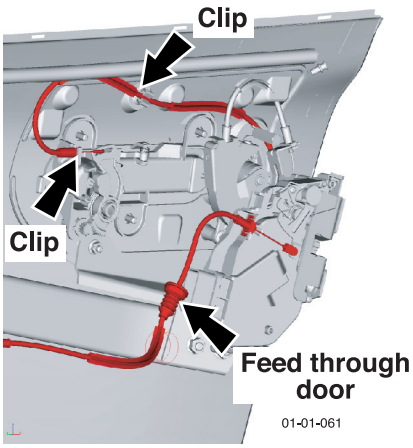
4. Install the latch (screws x3). Torque to **9 Nm**.



5. Install the outer release cable to the outer release handle.

Ensure that both the release and lock cables locate behind the lock and barrel unit top nut (rear of door).

Ensure that the fir tree on the release cable is installed.



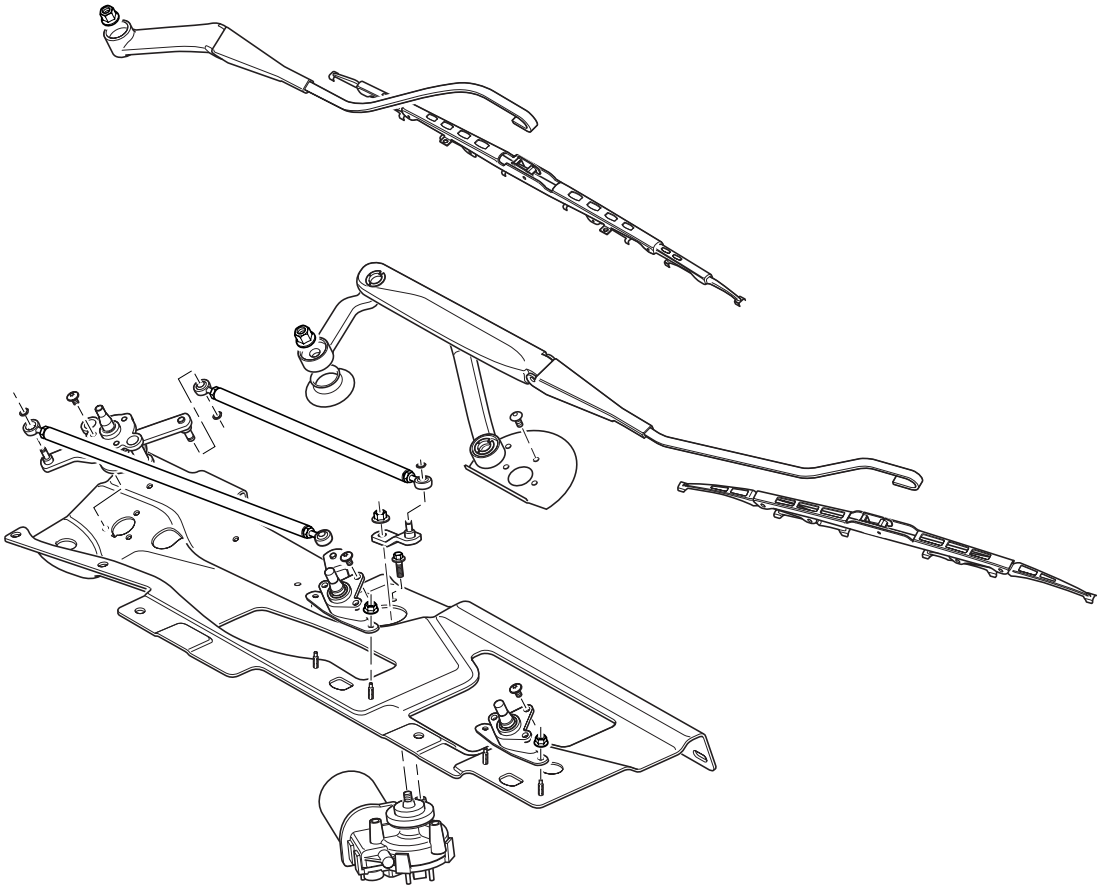
6. Connect the wiring harness plug.
7. Install the door glass and regulator (Refer to 'Glass Regulator', page 1-8-1).
8. Install the door trim and the inner release handle (Refer to 'Door Trim', page 1-4-3).
9. Connect the vehicle battery. Check operation of the door latches.

Body System (01.00)

Wipers and Washer System (01.16)

The wipers and washer system consists of the following components:

- Wipers and washers
- Mounting arm and pivot shaft
- Wiper motor
- Reservoir and washer pump
- Headlamp washing system



The wipers have a two speed control (low and high) and an intermittent wipe mode. The wipers will park automatically irrespective of their position when the 'Off' position of the ignition or control switch is selected or the bonnet is opened.

Within the wiper and washer system the following features can be attained:

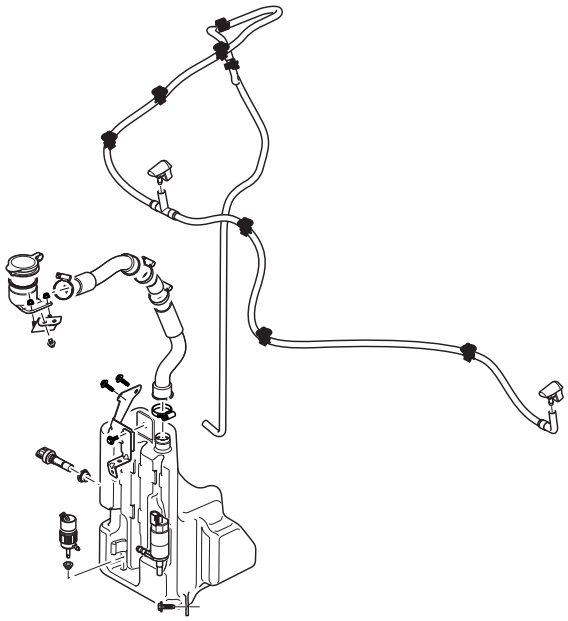
- Adjustable interval intermittent wiping

  The intermittent wiping has six speed settings, 3, 6, 9, 12, 15, 18 seconds.

- Programmable wash and wipe sequences

  The programmable wash and wipe sequence is driver controlled. With a depression of the wash / wipe switch between 40 milliseconds and 1.2 seconds the wash pump will be activated for a duration of 1.2 seconds. When the wash/wipe switch is depressed for longer than 1.2 seconds the wash pump will be activated for the duration of switch depression, a 10 second duration is the maximum available.

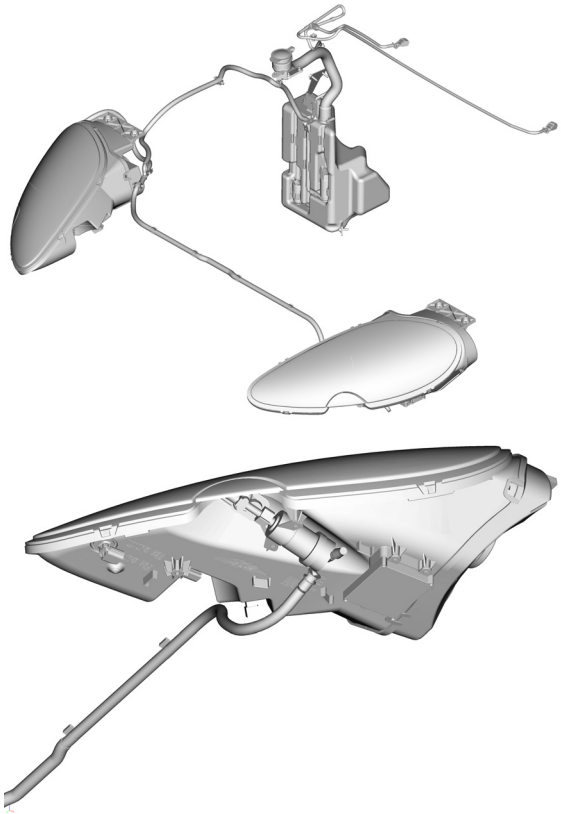
The wiping system is automatically activated with a depression of the wash switch of **more** than 0.5 seconds. If the wash switch is only pressed for 0.5 seconds **or less** then only the water pump will operate.



Headlamp Washing

The headlamp washers operate once per ignition cycle and are activated the first time the window washers are operated.

Headlamp washing is only available when the headlamps are switched on.



Specifications

Torque Figures

Description		Nm	lb. / ft.
Wiper link to wiper motor		35-42	26-31
Wiper motor mounting bolts		7-10	5.5-7.5
Wiper assembly plate	M6 Torx	6	4.5
	M6 bolt	8	6
Brake servo nuts		21-24	15.5-18
Brake master cylinder nuts		25	18.5
Wiper arm (Driver)		17	13
Wiper arm (Passenger)	M10	24	18
	M6	6	4.5

Maintenance

Windscreen Wiper Motor

Repair Operation Time (ROT)	
Item	**Code**
Wiper Motor Renew	**01.16.HB**

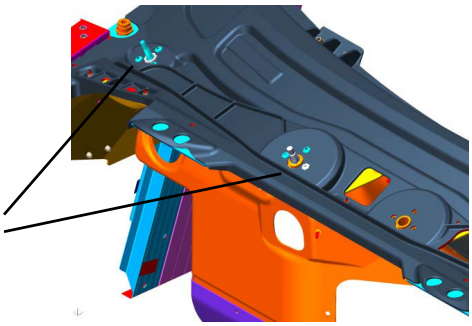
Removal

1. Disconnect the vehicle battery.
2. Remove the inlet manifolds (Refer to 'Inlet Manifold', page 3-2-7).
3. Remove the wiper arms. Note the position of the wiper arms on the glass for installation.

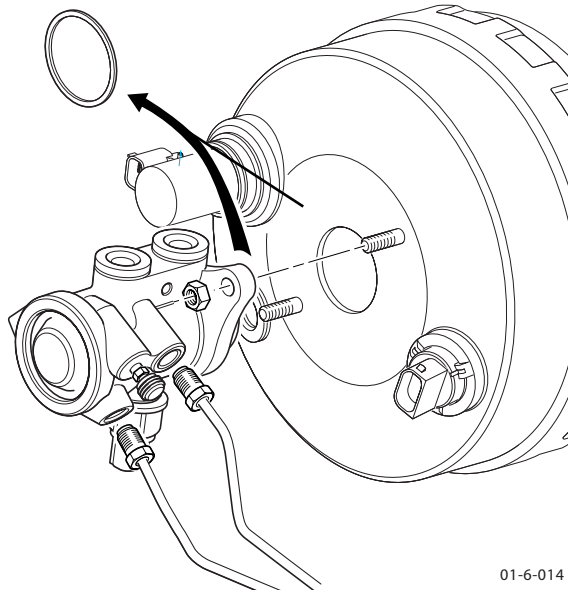
Do not remove the nut that secures the idle arm to the wiper spindle. Remove the 4 bolts securing the idle arm mounting plate.

Image to follow

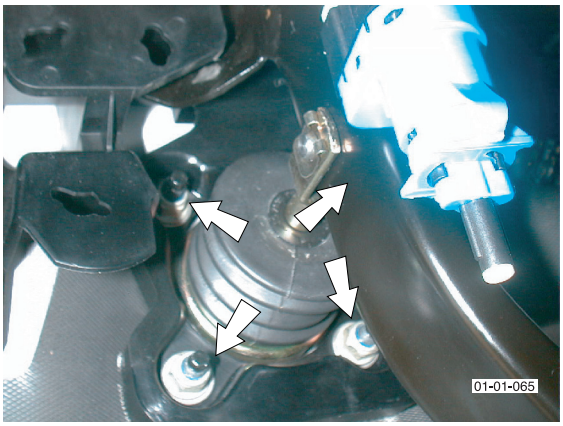
4. Remove the wiper box to scuttle panel bolts (x6).



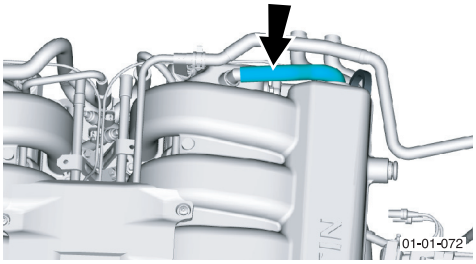
5. Remove the brake master cylinder. Lay the master cylinder to one side.



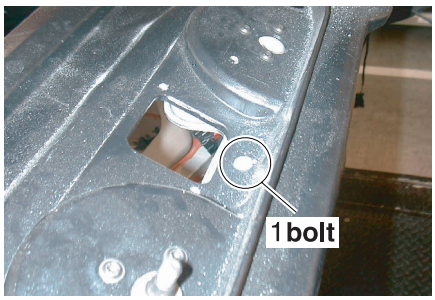
6. From inside remove the brake booster fixings. Allow the brake booster to drop slightly.

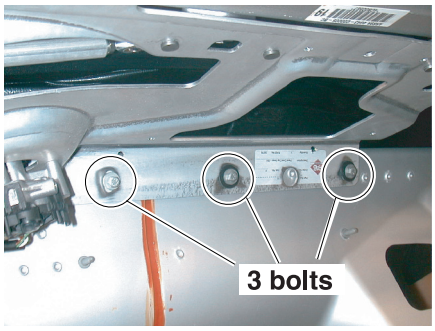


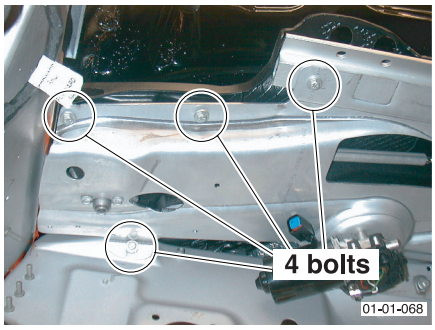
7. Disconnect the engine breather hose from the rear of the camshaft cover.



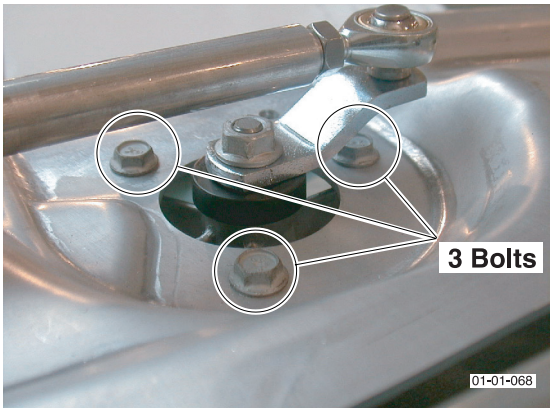
8. Remove the wiper assembly mounting bolts and allow the wiper assembly drop sufficiently to access the wiper motor bolts.



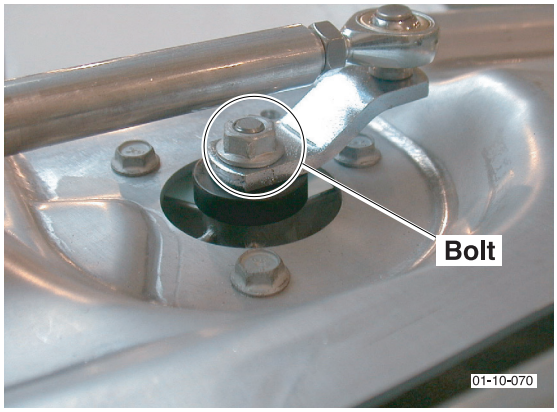




9. Remove the wiper motor bolts (x3).

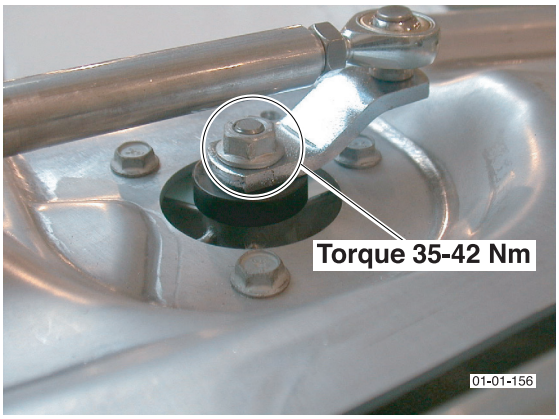


10. Disconnect the wiper linkage from the wiper motor (bolt x1). Withdraw the wiper motor.

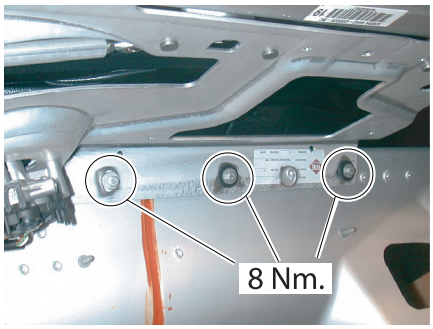


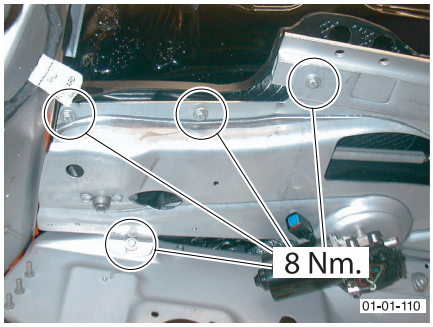
Installation

1. Connect the wiper linkage to the wiper motor (bolt x1) using service tool (Refer to '501-112 (Wiper Linkage to Wiper Motor)', page 20-1-8). Torque nut to **35-42 Nm**.

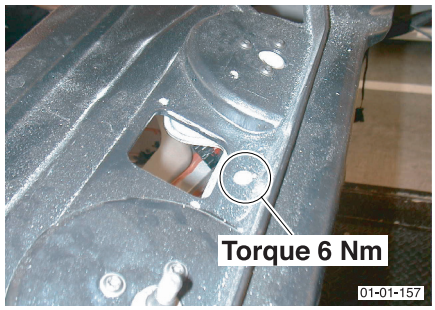


2. Install the wiper motor bolts (x3). Torque bolts to **7-10 Nm**.
3. Install the wiper assembly plate
   3.1 Torque bolts to **8 Nm**.



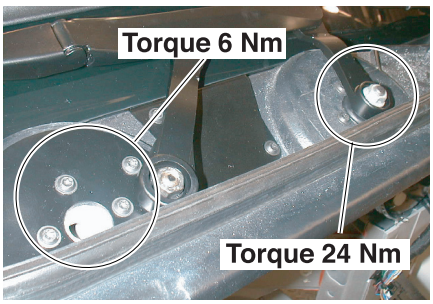


   3.2 Torque bolt to **6 Nm**.



4. Connect the engine breather hose to the rear of the camshaft cover.
5. From inside the vehicle install the brake servo fixings. Torque to **21-24 Nm**.
6. Install the brake master cylinder. Torque to **25 Nm**.
7. Install the wiper box. Torque bolts to **7-10 Nm**.

8. Install the wiper arms. Position the wiper arms as per their position on removal.
   Passenger Arm
   Torque M10 nut to **24 Nm.**
   Torque M6 (x4) nuts to **6 Nm.**
   Driver Arm
   Torque M8 nut to **17 Nm**.





9. Install the inlet manifolds (Refer to 'Inlet Manifold', page 3-2-7).
10. Connect the vehicle battery.

Wiper Arms

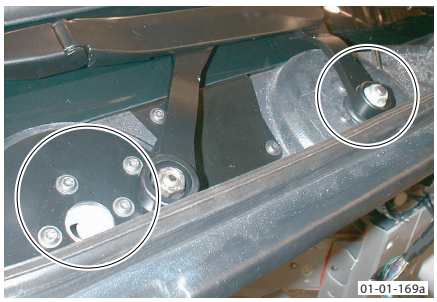
Repair Operation Time (ROT)		
Item		**Code**
Wiper Arm Renew	LHF	**01.16.KG**
	RHF	**01.16.LB**

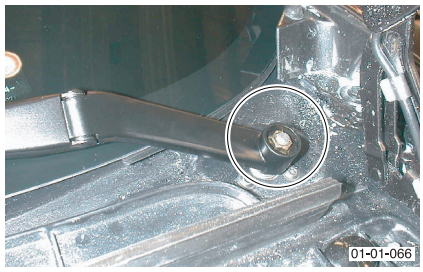
Removal

Note the position of the wiper arms on the glass for installation.

Do not remove the nut that secures the idle arm to the wiper spindle. Remove the 3 bolts securing the idle arm mounting plate.

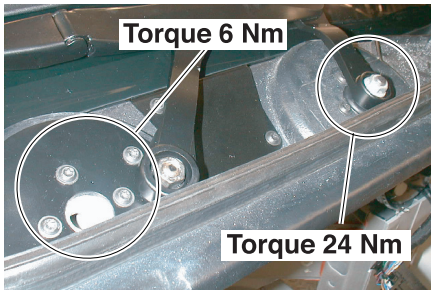
1. Remove the following screws and nuts.





Installation

1. Install the wiper arms. Position the wiper arms as per their position on removal.
   Passenger Arm
   Torque M10 nut to **24 Nm.**
   Torque M6 (x4) nuts to **6 Nm.**
   Driver Arm
   Torque M8 nut to **17 Nm**.





ASTON MARTIN
ASTON MARTIN

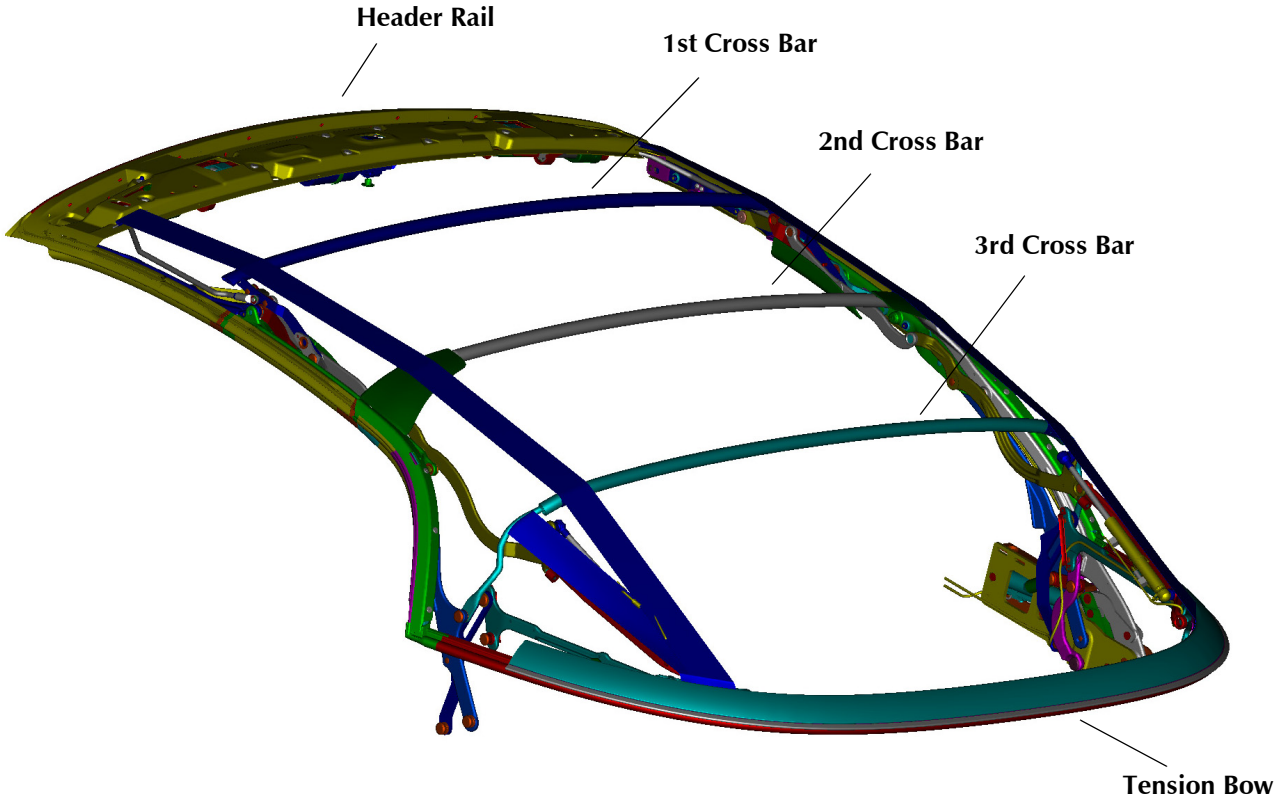
Body System (01.00)

Convertible Roof (01.17)

Description

The convertible roof system comprises an electrically driven hydraulic pump and six hydraulic rams, four for raising and lowering the roof and two for raising and lowering the tonneau cover. The pump is powered via either the 'Roof Up' or Roof Down' relay. Two further pairs of change-over relays power the rear quarter windows (one pair for each window). The roof hydraulic pump is protected by a 30A fuse.

The Roof control module is actuated by the roof switch on the centre console and controls the operation of both the roof and rear quarter window circuits. They can only be operated in a pre-programmed manner.



Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Pump plate	7-10	5.5-7.5
Module plate	7-10	5.5-7.5
Roof Mountings		

Maintenance

Roof

Removal

> ⚠ ***Warning*** ⚠
> ***Do not place any objects on the top of the deployable rollbar covers behind the rear seat backs.***

> ⚠ ***Warning*** ⚠
> ***Do not allow any person to sit on the deployable rollbar covers at any time.***

> ⚠ ***Warning*** ⚠
> ***If the roof is not stowed and the deployable rollbars deploy they will break through the rear glass.***

1. Raise the roof. Do not lock in position.
2. Remove the ignition key and wait for a minimum of five seconds. The roof can now be moved in any direction.

> ⚠ ***Warning*** ⚠
> ***Keep fingers clear of the roof linkage when moving the roof manually.***

> *During this time the roof hydraulics will relax allowing manual movement of the roof. Some hydraulic fluid resistance will still be present in the operating rams. It may take considerable effort to fully raise the roof manually.*

3. Disconnect the vehicle battery at the negative terminal and ensure the ignition key is removed.

> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the deployable rollbar system.***

> ⚠ ***Warning*** ⚠
> ***Do not lean over the rollbars. If the rollbars deploy while someone is leaning over them, they will cause severe injury.***

4. Remove the rear seats and trim panels (Refer to 'Rear Trim', page 1-4-5).
5. Raise the tonneau cover and secure in the fully open position.
6. Manually raise the tension bow to 90°.

> *For access to the hydraulic pipes and wiring harness plugs.*

> *With the roof in the raised position and the tension bow in the 90° position the hydraulic rams have the minimum amount of hydraulic oil in them.*



7. Disconnect the hydraulic pipes (x2) for each hydraulic ram.

> *Hydraulic pipes are self sealing.*

tonneau cover pipes image to Follow

8. Disconnect the wiring harness plug from the LH hydraulic ram unit.

Image to Follow

9. Disconnect the two wiring harness plugs from inside the boot RH area. Route the cables into the roof storage area.

Image to Follow

10. Remove bolts (x6 (3 each side)). Withdraw the roof mechanism.

Installation

1. Place the roof mechanism into position. Locate on the dowels provided and secure using bolts x6 (3 each side). Torque the bolts to **TBA Nm**.

The locating dowels are adjustable. In normal circumstances the dowels will not require to be adjusted.

2. Connect the hydraulic pipes.
3. Connect the LH hydraulic ram unit wiring harness plug.
4. Route the RH cable into the boot area. Connect the wiring harness plugs (x3) in the boot RH area.
5. Install the rear trim panels (Refer to 'Rear Trim', page 1-4-5).
6. Install the rear seat belt top mount. Torque to **35 Nm**.
7. Install the rear seat bases and backs.
8. Connect the vehicle battery.
9. Reset both door windows (Refer to 'Door Glass Setup', page 1-8-5).
10. Operate the roof and check for correct installation.

Roof Material

⚠ Warning ⚠
Do not place any objects on the top of the deployable rollbar covers behind the rear seat backs.

⚠ Warning ⚠
Do not allow any person to sit on the deployable rollbar covers at any time.

⚠ Warning ⚠
If the roof is not stowed and the deployable rollbars deploy they will break through the rear glass.

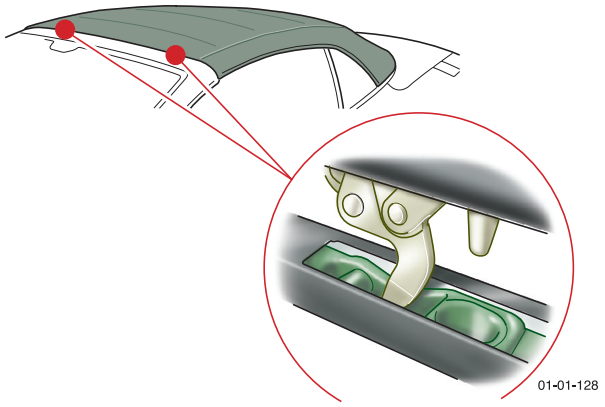
Removal

1. Disconnect the vehicle battery at the negative terminal and ensure the ignition key is removed.

⚠ Warning ⚠
Allow a two minute power down period before proceeding. This will ensure that there is no power to the deployable rollbar system.

⚠ Warning ⚠
Do not lean over the rollbars. If the rollbars deploy while someone is leaning over them, they will cause severe injury.

2. If the roof is raised and locked, unlock and open, slightly.



3. Remove the ignition key and wait for a minimum of five seconds. The roof can now be moved in any direction.

⚠ Warning ⚠
Keep fingers clear of the roof linkage when moving the roof manually.

During this time the roof hydraulics will relax allowing manual movement of the roof. Some hydraulic fluid resistance will still be present in the operating rams. It may take considerable effort to fully raise the roof manually.

4. Disconnect the vehicle battery.
5. Raise the roof lid and secure in the fully raised position.
6. Raise the tension bow to 90° to the vehicle.

7. Remove the rear roof seal.



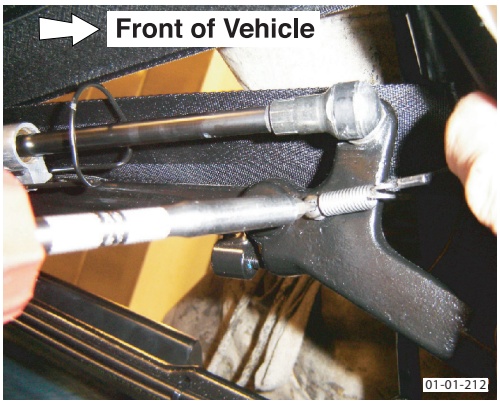
8. Remove the screws retaining the trim strip.
9. Remove the roof material from the roof frame (rear).



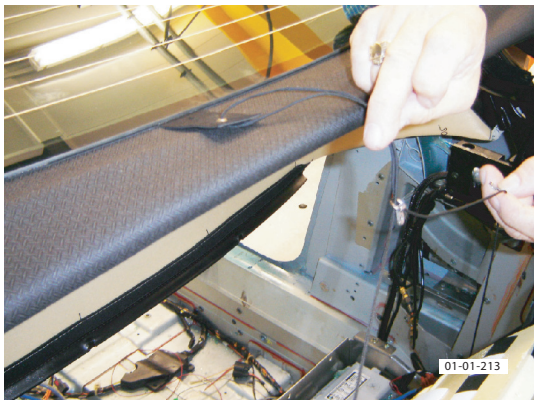
10. Lift the roof material from the rear of the tension bow.



11. Disconnect the window tension cord.
    11.1 Remove the window tension cord springs.



11.2 Remove the three tension cord mounts.

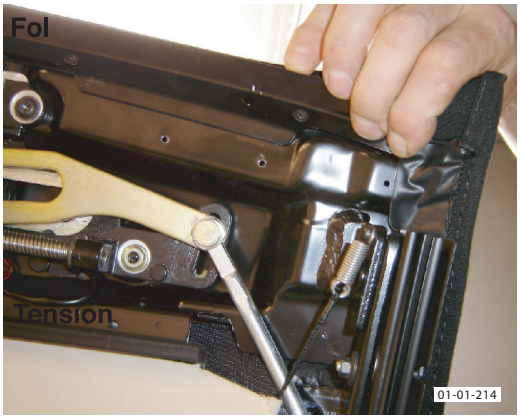


12. Roll the roof material back to the 3rd cross bar.
    Remove the screws that secure the roof lining to the cross bar.
    Pull the roof material from the cross bar.
13. Roll the roof material back to the 2rd cross bar.
    Remove the screws that secure the roof lining to the cross bar.
    Pull the roof material from the cross bar.
14. Remove the front of the roof material from the header rail.



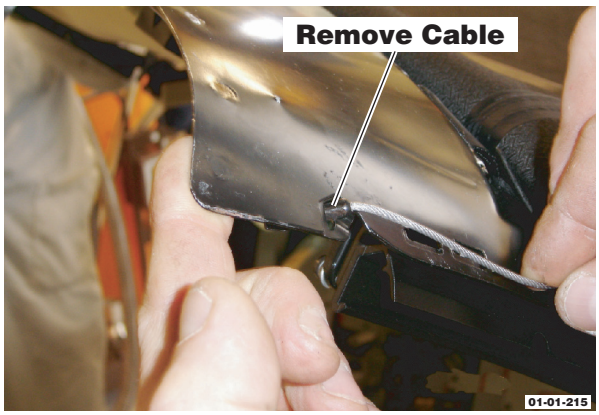
15. Remove the corners of the front of the roof material from the header plate.

The outer screws on both sides of the header plate are not currently used.



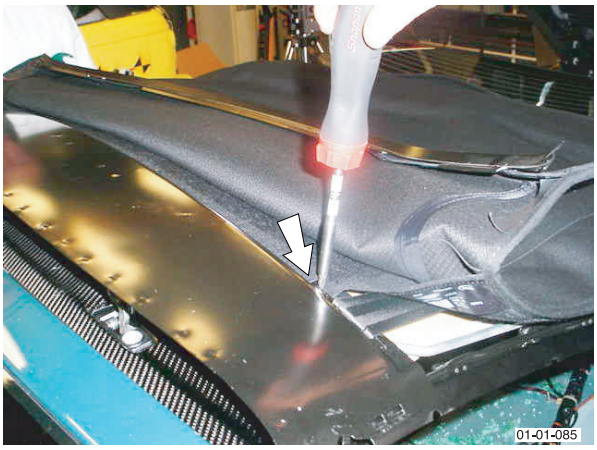
16. Pull the roof material from the roof header rail.

17. Remove the two side cable securing clips (two each side) and withdraw the side tension cables through the roof lining.



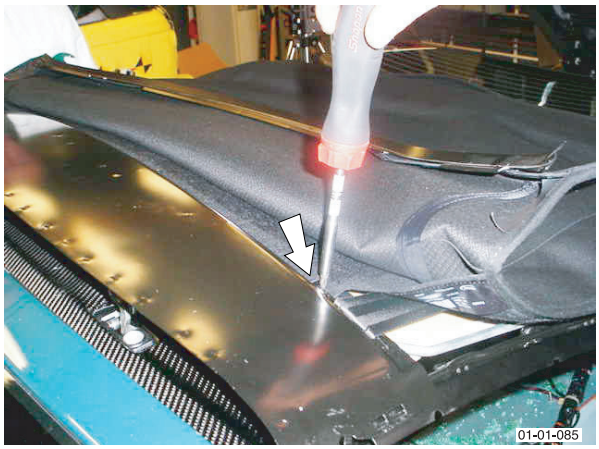
Ensure that the two cable securing clips (each side) are retained for installation.

18. Roll the roof material back to the 1st cross bar.
    Remove the screws that secure the roof lining to the cross bar.
    Pull the roof material from the cross bar.
19. Remove the strip in the roof material from the front of the header rail.



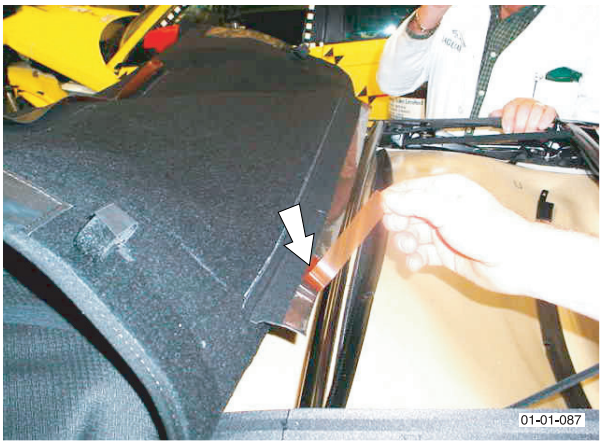
Installation

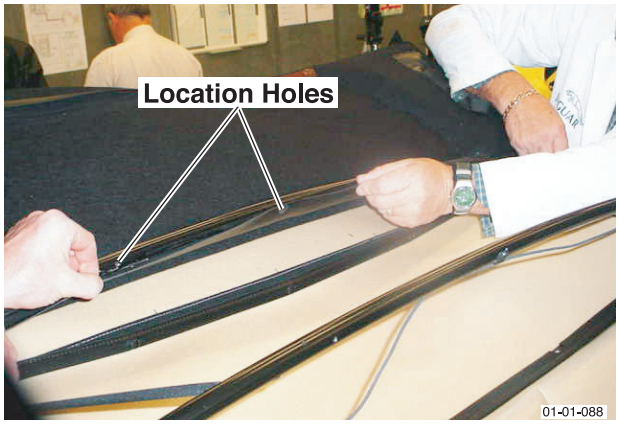
1. Manually raise the roof to the raised position.
2. Lay the roof material on the roof frame.
   2.1 Locate the strip in the roof material to the header rail. Secure with screws x4.



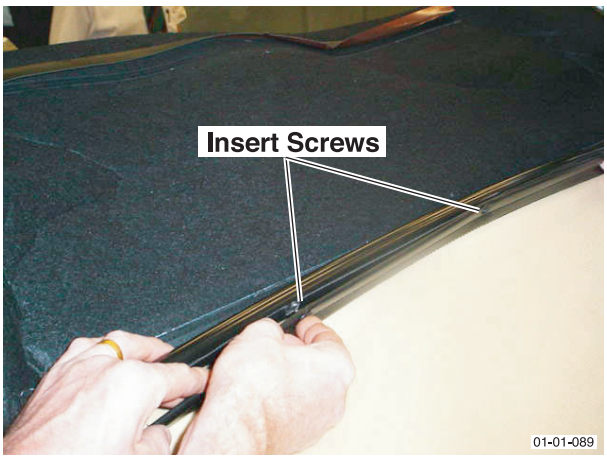
3. Roll the roof material to the 1st cross bar.
4. Remove the sticky strip protection and locate to the first cross bar.
   Ensuring that the material is central, stick to the frame cross bar. Affix from centre out, ensuring the holes in the material locate over the holes in the cross bar.

The material with the sticky surface goes under and up around the cross bar.





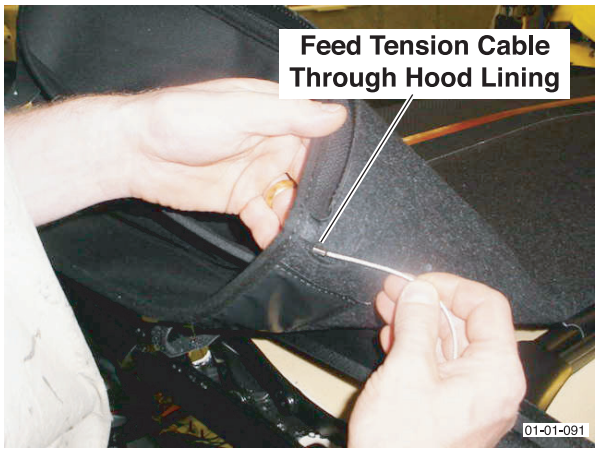
5. Locate the roof lining strip to the cross bar and secure with screws x5.

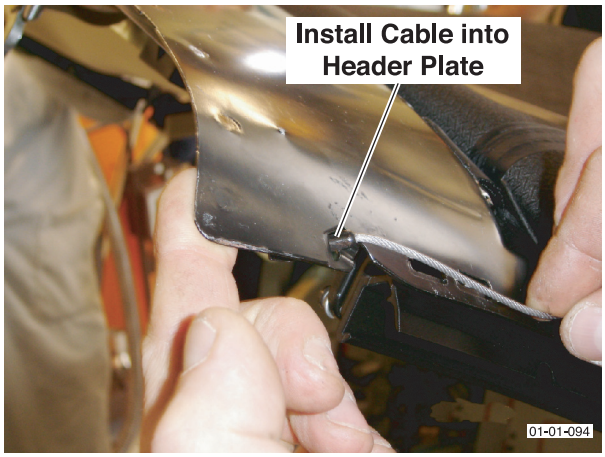


6. Roll the roof material to the 2nd frame cross bar.
7. Repeat step 6 and 7.

The material with the sticky surface goes over and down around the cross bar

8. Feed the side tension cables through the roof lining and install the end of the cables to the header rail. Ensure that the two cable securing clips are installed.





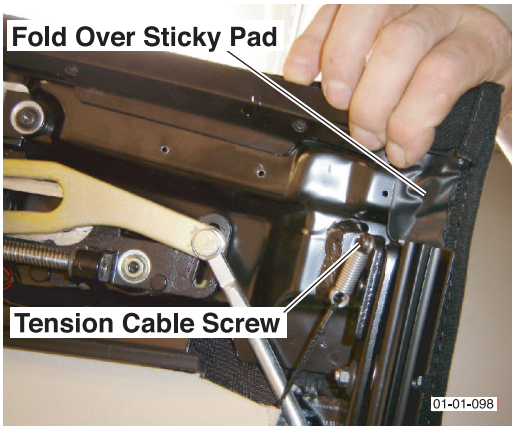
9. Install the front of the roof material to the header rail. Secure with screws.

The outer screws on both sides of the header plate are not currently used.



10. Place the material with the sticky pads into position. Remove the sticky pads protection and affix to the header rail.





11. Roll the roof material to the 3rd cross bar.
    Repeat steps 6 and 7.

The material with the sticky surface goes over and down around the cross bar

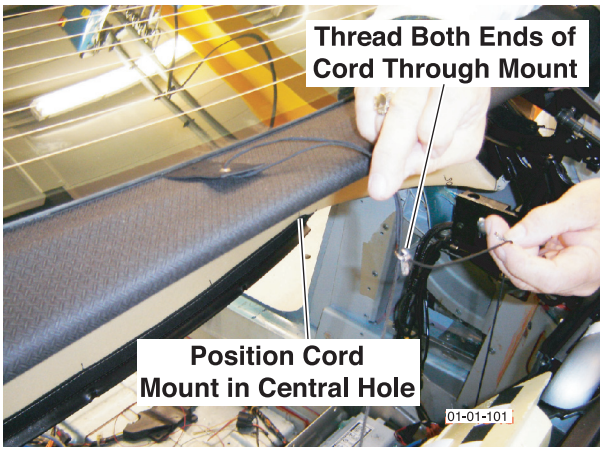
Ensure that the heated window cable goes under the adhesive strip.



12. Install the window tension cord (if not install).
    12.1 Thread the tension cord through the center hole.

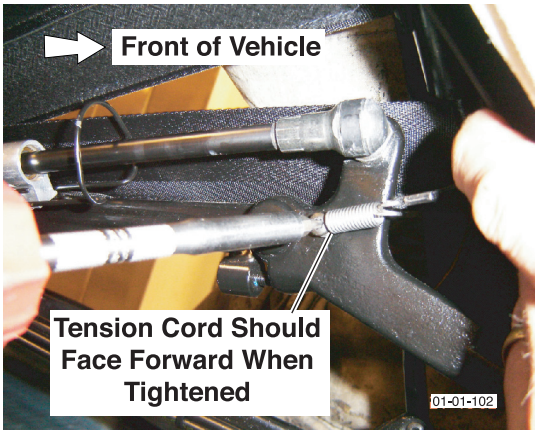


    12.2 Install the three tension cord mounts.

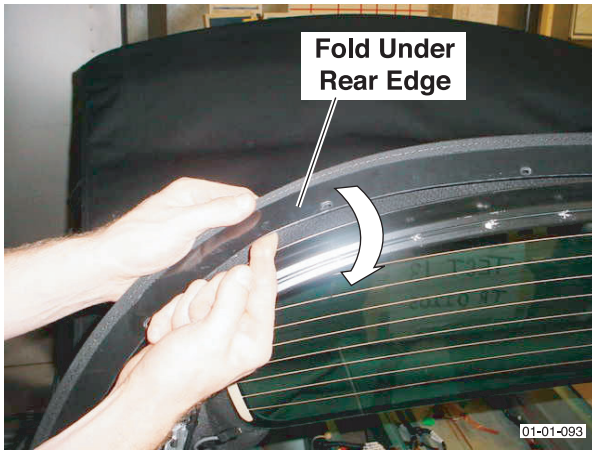


13. Install the ends of the tension cord.

Install the spring, on the end of the tension cord, facing forward.



14. Raise the tension bow to 90°.
15. Slide the roof material over the rear of the tension bow.

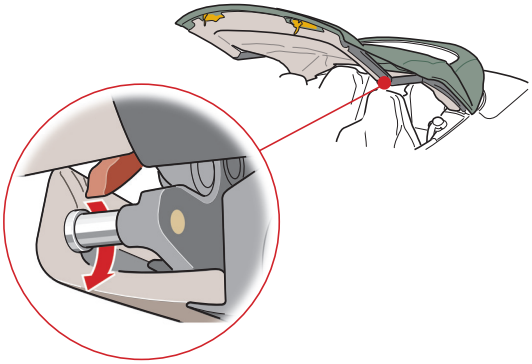


16. Install the trim strip. Do not tighten the screws.



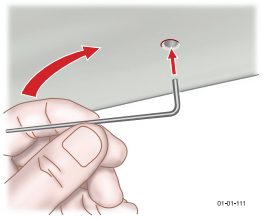
17. Raise the roof to the open position and lock into place.

Ensure the two lock arms are located in their catches.



Using the allen key provided in the vehicle tool kit, lock the roof in position.

Continue to turn the allen key until no more movement is possible.



Locking the roof manually may require the assistance of a second person to push down so the catches engage while the allen key is turned.

18. Check that the roof material is correctly installed.



19. Tighten 4 or 5, evenly, trim strip screws while the roof is in the open position.



20. Unlock the roof and lower to enable access to the trim strip. Tighten the remaining screws.



21. Install the roof material over the roof side frame.



The screw holes in the roof material are used when the sealing strip is installed.



Weather Seals

Removal

1.

Installation

1.

Roof Pump

> ⚠ ***Warning*** ⚠
> ***Do not place any objects on the top of the deployable rollbar covers behind the rear seat backs.***

> ⚠ ***Warning*** ⚠
> ***Do not allow any person to sit on the deployable rollbar covers at any time.***

> ⚠ ***Warning*** ⚠
> ***If the roof is not stowed and the deployable rollbars deploy they will break through the rear glass.***

Removal

1. Disconnect the vehicle battery at the negative terminal and ensure the ignition key is removed.

> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the deployable rollbar system.***

> ⚠ ***Warning*** ⚠
> ***Do not lean over the rollbars. If the rollbars deploy while someone is leaning over them, they will cause severe injury.***

2. Remove the ignition key and wait for a minimum of five seconds. The roof can now be moved in any direction.

> ⚠ ***Warning*** ⚠
> ***Keep fingers clear of the roof linkage when moving the roof manually.***

> *During this time the roof hydraulics will relax allowing manual movement of the roof. Some hydraulic fluid resistance will still be present in the operating rams. It may take considerable effort to fully raise the roof manually.*

3. Disconnect the vehicle battery.
4. Remove the LH road wheel and arch liner.

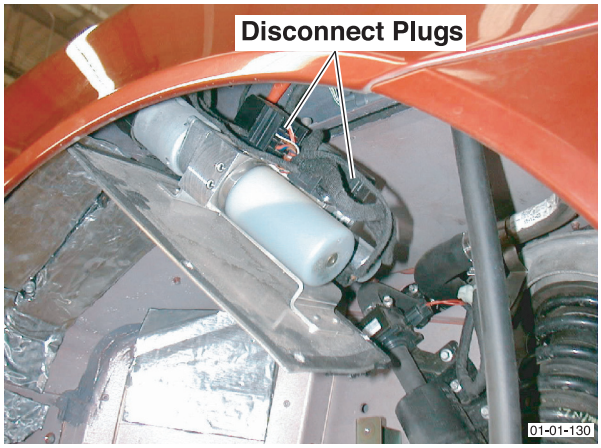
> *The fuel filler drain off pipe is attached to the arch liner. Ensure that the fuel filler drain off pipe does not disconnect from it's stub pipe.*

5. Remove bolts (x6). Support the pump plate as the screws are removed.

> *The pump is attached to the pump plate.*



6. Disconnect two wiring harness plugs.



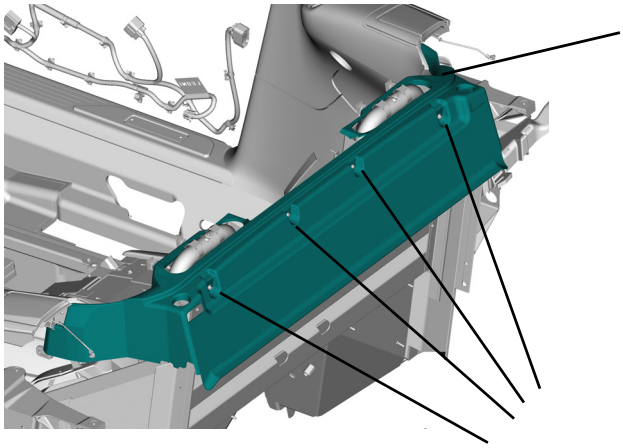
7. Manually raise the tension bow to 90°.

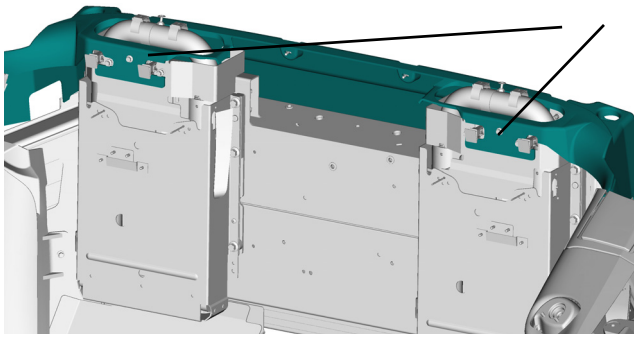
For access to the hydraulic pipes and wiring harness plugs.



8. Remove the rollbar trim cover.

9. Remove the rear closing panel.

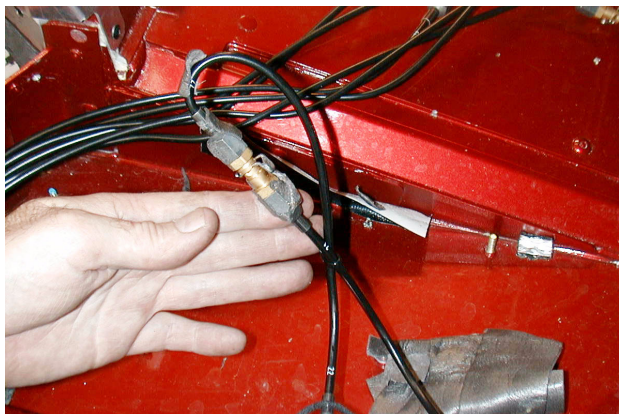




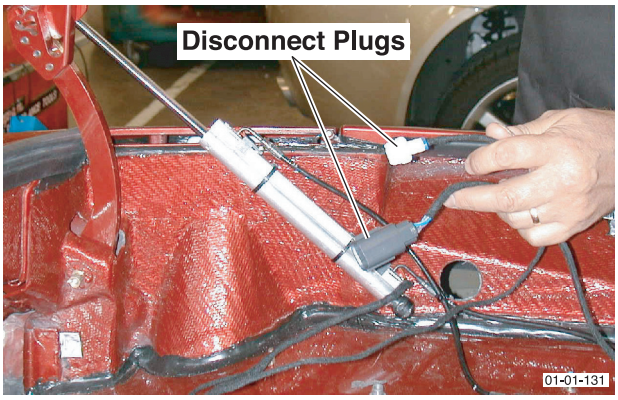
10. Disconnect the hydraulic pipes.
    Connect feed and return hydraulic pipes to create an hydraulic loop.

Creating hydraulic loops will enable the hydraulic rams to continue to operate.

Connect the hydraulic pipes, feed to return.



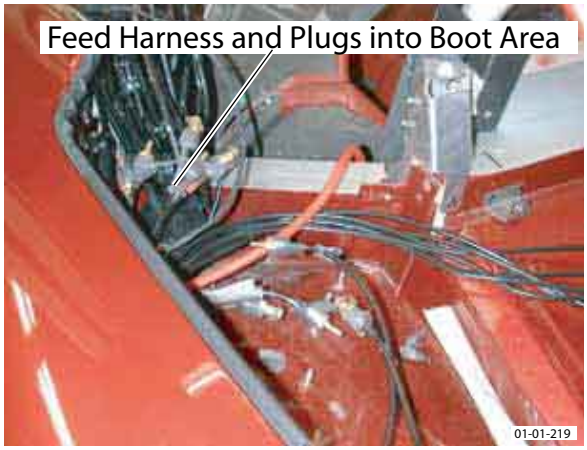
11. Disconnect the two wiring harness plugs from inside the boot area.



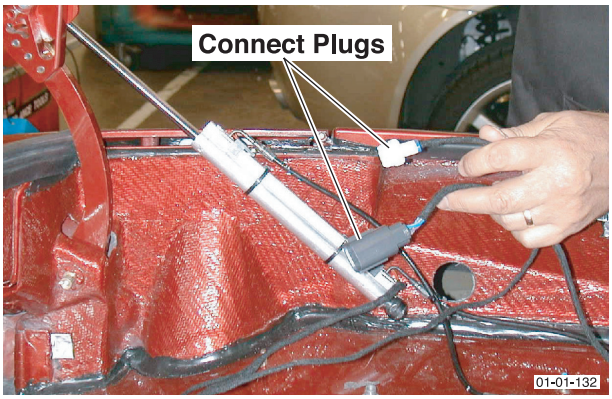
12. Withdraw the hydraulic pipes and the wiring harness cables through the vehicle body, while lowering the pump.

Installation

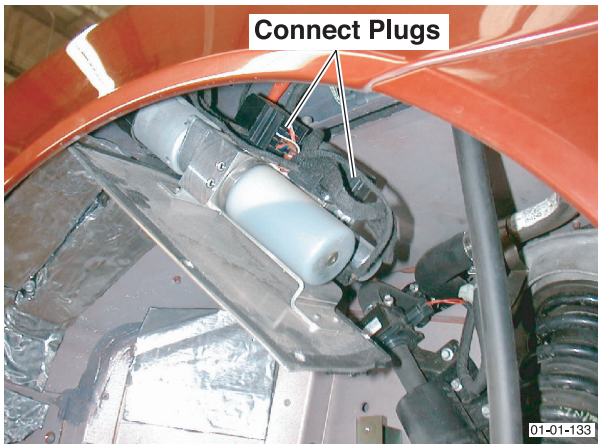
1. Feed the hydraulic pipes through the vehicle body. Feed the wiring harness plugs into the boot area.



2. Connect the two boot wiring harness plugs.



3. Connect the two pump wiring harness plugs.



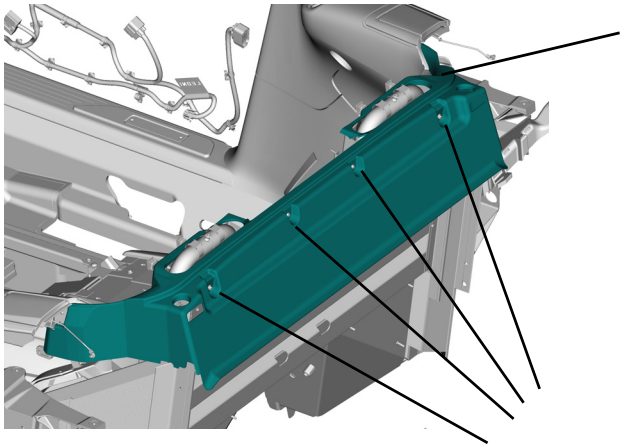
4. Raise the pump and pump plate assembly into position and secure. Torque bolts to **7-10 Nm.**

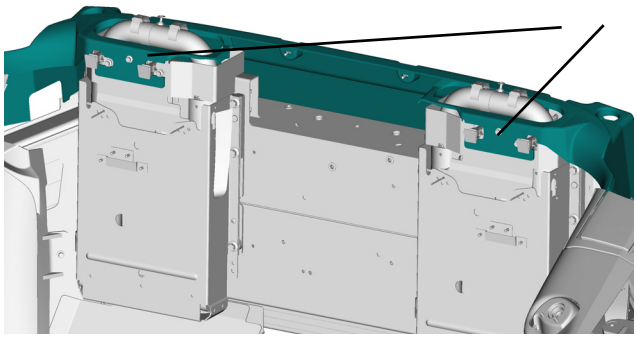
Take care not to trap hydraulic pipes and wiring harness cables.

5. Connect the hydraulic pipes.

The hydraulic pipes are numbered, i.e. connect pipes numbered 32 together, etc.

6. Install the rear closing panel.





7. Install the rollbar trim cover.
8. Install the road wheel arch liner and road wheel. (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Roof Module

Removal

1. Remove the ignition key and wait for a minimum of five seconds. The roof can now be moved in any direction.

> ⚠ ***Warning*** ⚠
> ***Keep fingers clear of the roof linkage when moving the roof manually.***

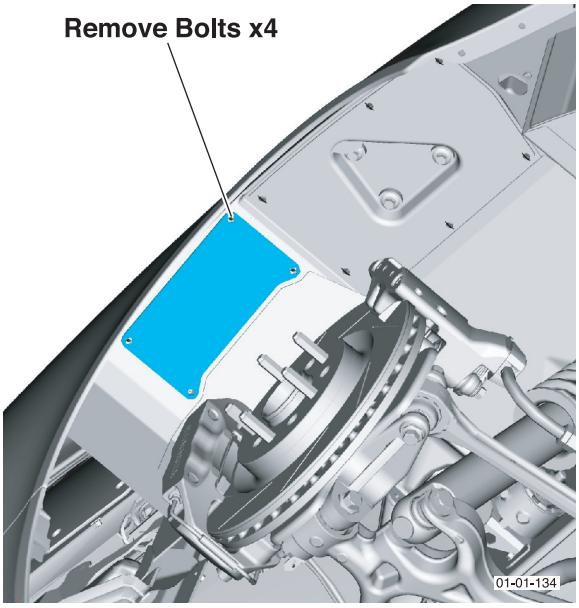
> *During this time the roof hydraulics will relax allowing manual movement of the roof. Some hydraulic fluid resistance will still be present in the operating rams. It may take considerable effort to fully raise the roof manually.*

2. Disconnect the vehicle battery.
3. Remove the LH road wheel and arch liner.

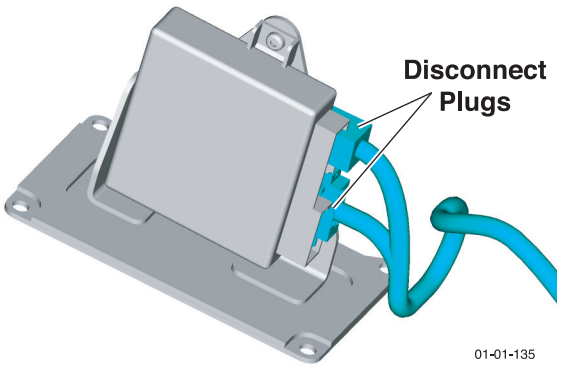
> *The fuel filler drain off pipe is attached to the arch liner. Ensure that the fuel filler drain off pipe does not disconnect from it's stub pipe.*

4. Remove bolts (x4). Support the module plate as the screws are removed.

> *The roof module is attached to the plate.*



5. Lower the module plate to access the two wiring harness plugs. Disconnect the two wiring harness plugs and withdraw the roof module.



Installation

1. Raise the roof module into position and connect the two wiring harness plugs.
2. Install the roof module and plate assembly. Torque bolts to **7-10 Nm**.

Roof Lid Hydraulic Rams

Removal

1. Remove the ignition key and wait for a minimum of five seconds. The roof can now be moved in any direction.

> ⚠ ***Warning*** ⚠
> ***Keep fingers clear of the roof linkage when moving the roof manually.***

> *During this time the roof hydraulics will relax allowing manual movement of the roof. Some hydraulic fluid resistance will still be present in the operating rams. It may take considerable effort to fully raise the roof manually.*

2. Disconnect the vehicle battery.
3. Raise the tension bow to 90° to the vehicle.
4. Raise the roof lid and support.
5. **LH ram only**.
   - 5.1 Withdraw the pump and pump plate unit.
   - 5.2 Connect the vehicle battery. Open the boot lid.
   - 5.3 Disconnect the wiring harness plug. Feed the wiring harness cable through into the pump area.

> ⚠ ***Warning*** ⚠
> ***Take care to avoid sharp edges.***

Disconnect plug from the Boot image

   - 5.4 Close the boot lid. Disconnect the vehicle battery.
   - 5.5 Disconnect the wiring harness plugs.

Disconnect plug from the front of the mech image

6. Disconnect the hydraulic pipes.
   Connect feed and return hydraulic pipes to create an hydraulic loop.

Creating hydraulic loops will enable the hydraulic rams to continue to operate.

The hydraulic pipes are numbered, i.e. connect pipes, feed to return, numbered 32 together, etc.

Disconnect hydraulic Pipes

7. Disconnect both ends of the hydraulic ram and withdraw the ram.

Installation

1. Connect the ram to it's mounts.
2. Connect the hydraulic pipes.

The hydraulic pipes are numbered, i.e. connect pipes, feed to return, numbered 32 together, etc.

Connect hydraulic Pipes

3. **LH ram only**.
   3.1 Connect the wiring harness plug (x1).

Disconnect plug from the front of the mech

   3.2 Feed the wiring harness cable (x1) through into the boot area.

⚠ Warning ⚠
Take care to avoid sharp edges.

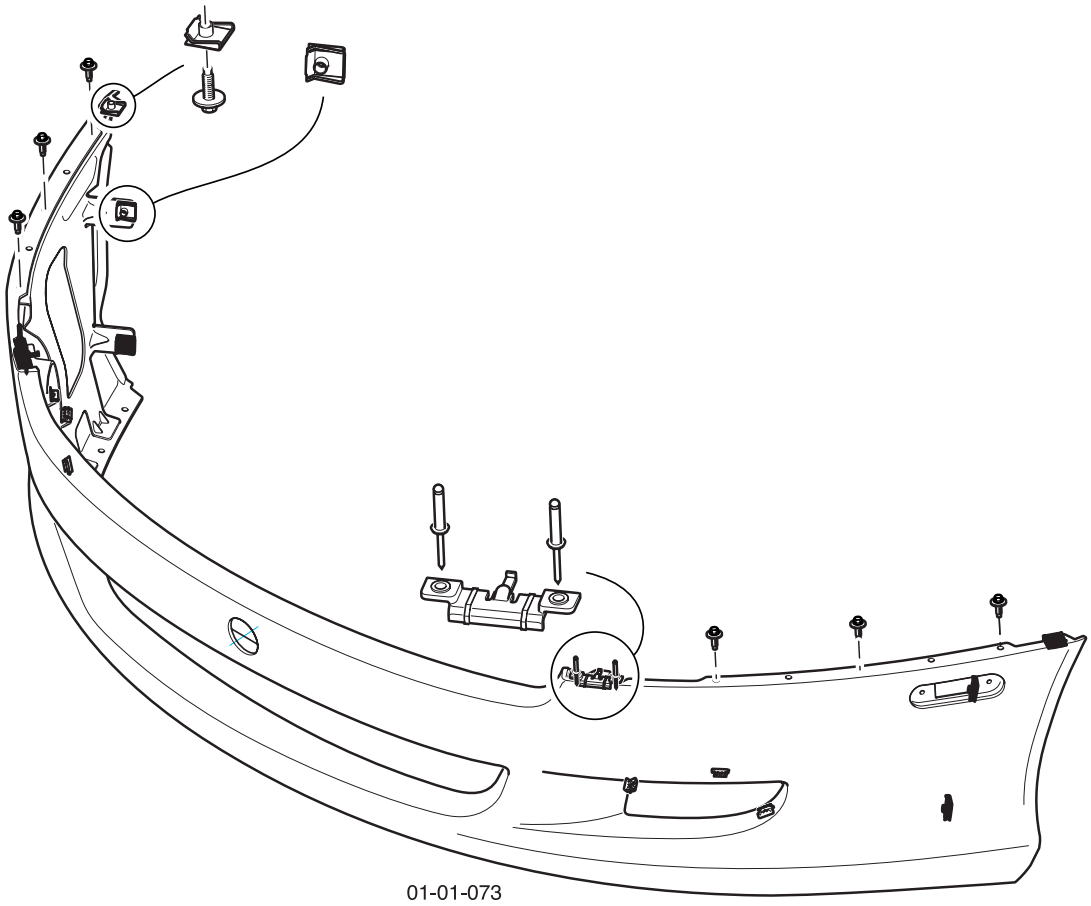
   3.3 Install the pump and pump plate unit.
4. Remove the roof lid support.
5. Connect the vehicle battery. Open the boot lid.
6. Connect the boot area wiring harness plug.

ASTON MARTIN
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Body System (01.00)

Bumpers (01.19)

Front Bumper



Specifications

Torque Figures		
Description	Nm	lb. / ft.
Bumper to bumper bracket	4-5	3-4

Maintenance

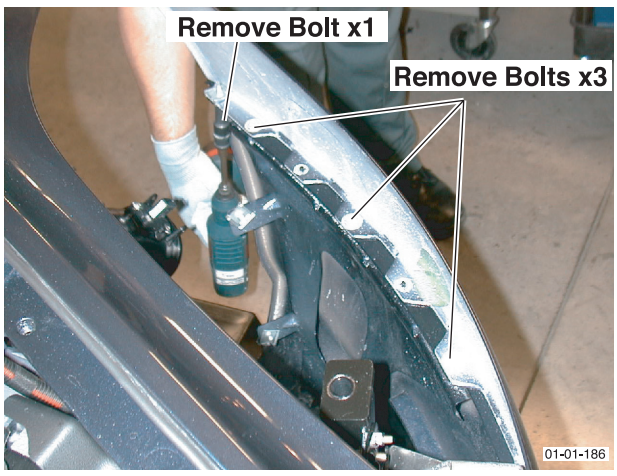
Repair Operation Time (ROT)	
Item	**Code**
Bumper Remove / Install	**01.19.AB**

Removal

1. Remove the road wheel and arch liner.
2. Remove the bolts (x6) that secure the under tray to the bumper.

The air intake for the alternator is located in the front under tray.

3. Remove the LH and RH air boxes (Refer to 'Air Filter Box', page 3-13-3).
4. Remove bolts (x8 (x4 each side)) that secure the bumper.



5. Disconnect the retaining clips (x2).

Use a tool, i.e. a long screwdriver, to unclip the bumper from the vehicle body.

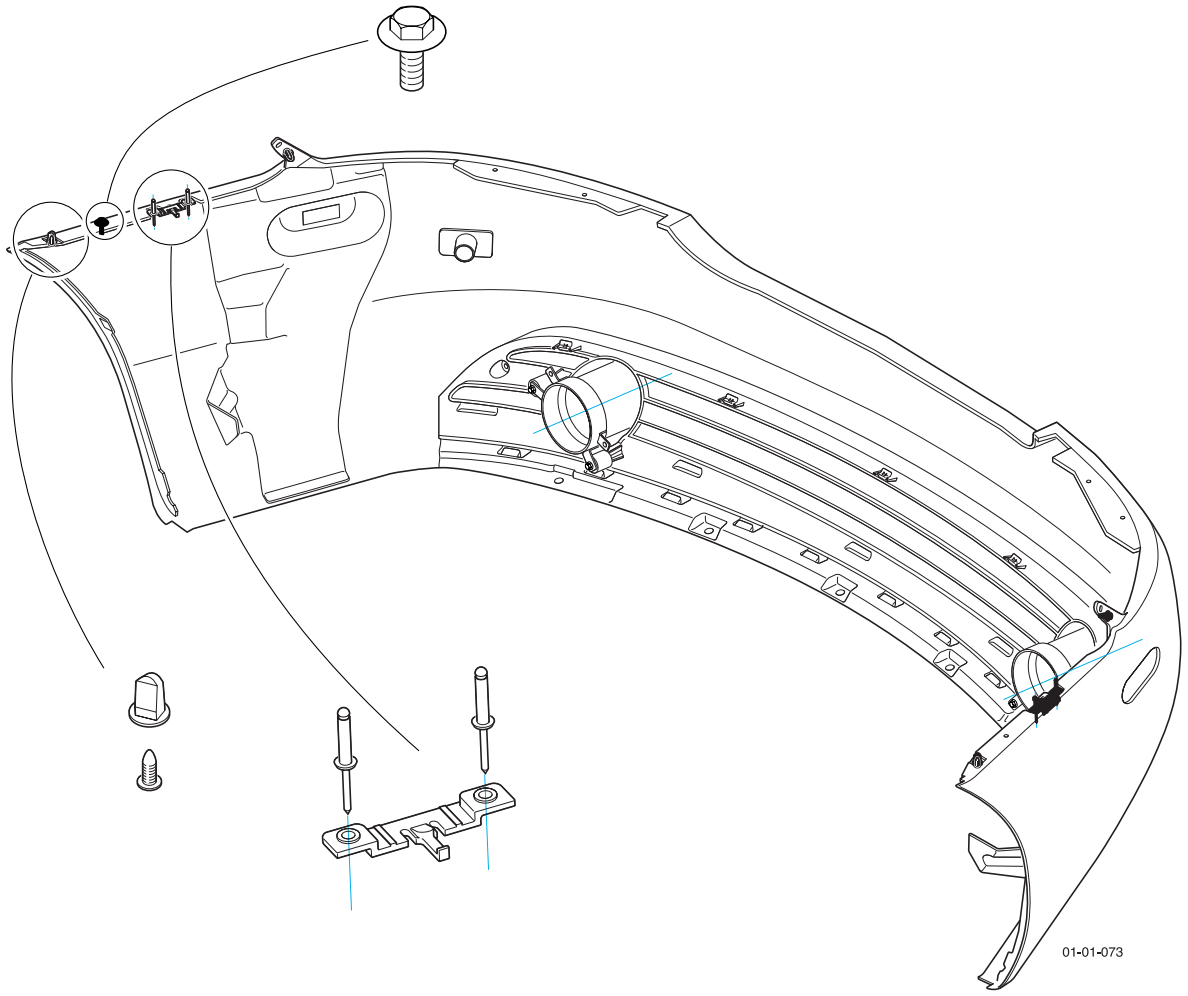
Image to follow

6. Pull the bumper from the clips located in the front grill. Withdraw the bumper from the vehicle.

Installation

1. Place the bumper in position. Push install onto the clips located in t he front grill.
2. Locate on the retaining clips (x2).
3. Install bolts (x8 (x4 each side)) to the bumper. Torque to **4-5 Nm**.
4. Install the LH and RH air boxes (Refer to 'Air Filter Box', page 3-13-3).
5. Install the undertray.
6. Install the road wheel arch liner and wheel.

Rear Bumper



Specifications

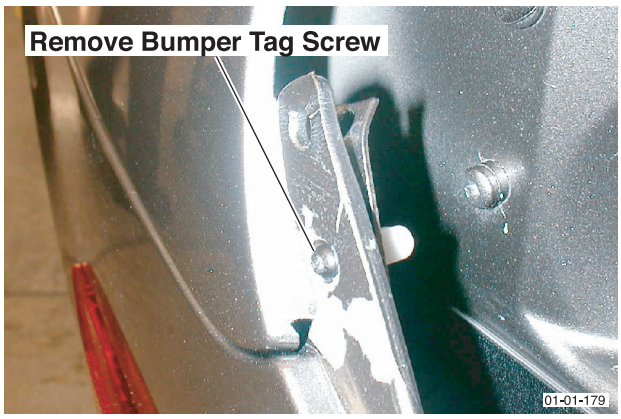
Torque Figures		
Description	Nm	lb. / ft.
Bumper to bumper bracket	2-3	1.5-2.5

Maintenance

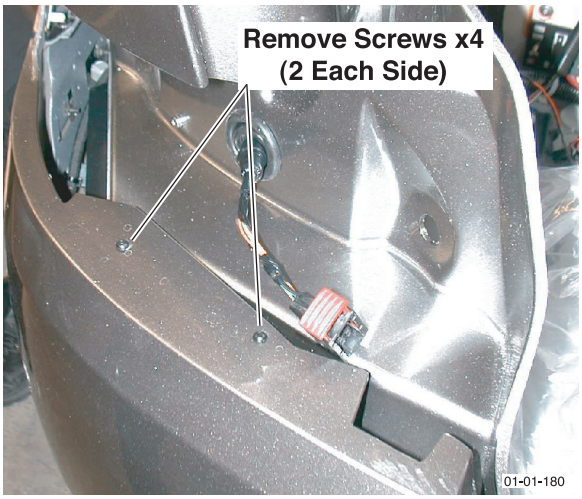
Repair Operation Time (ROT)	
Item	**Code**
Bumper Remove / Install	**01.19.BB**

Removal

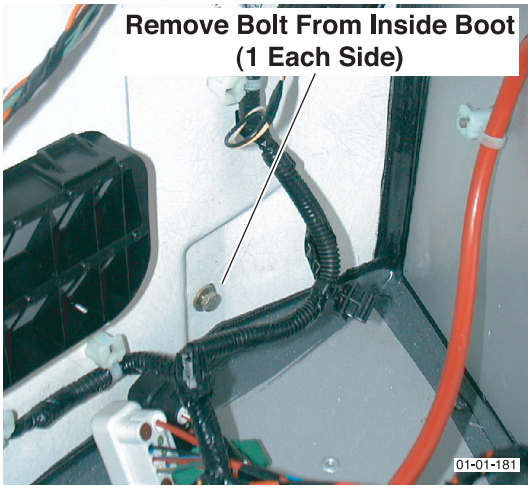
1. Remove the light clusters.
   - 1.1 Open the boot and remove the trim from around the light cluster mounts.
   - 1.2 Release and remove nuts (x3).
   - 1.3 Withdraw the rear light cluster unit. Disconnect the wiring harness plug.
2. Remove the bumper tag screw.



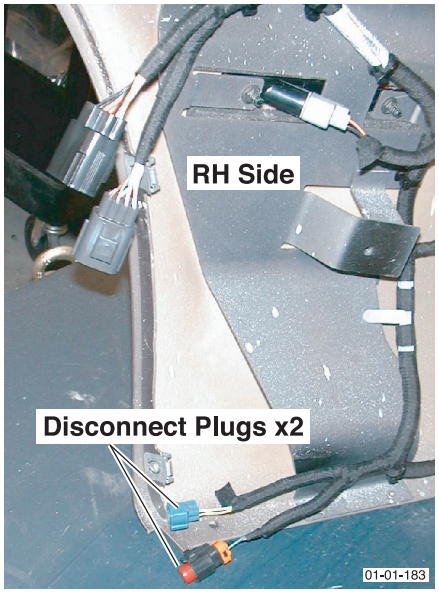
3. Remove screws x4 (2 each side).



4. Remove bolt from inside the boot (1 each side).

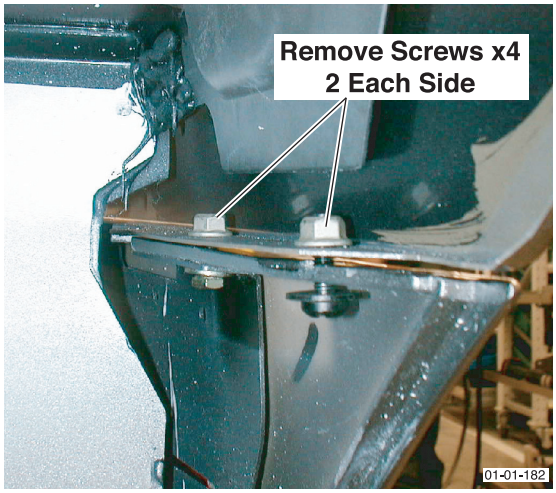


5. Remove the roadwheel and disconnect the rear section of the roadwheel arch liner.
6. Disconnect the wiring harness plugs (x2 (RH side)) and (x2 (LH side)).

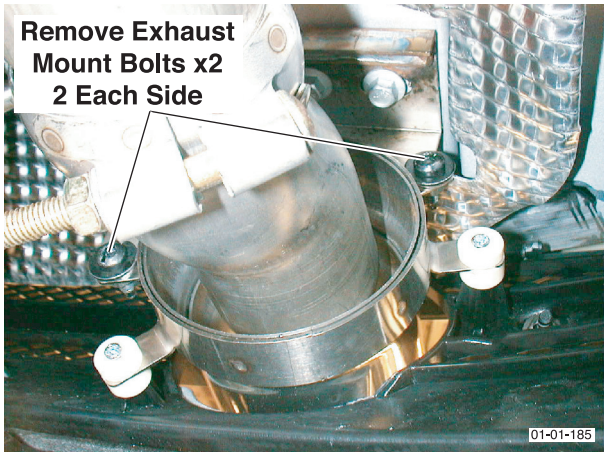




7. Remove screws (x4 (x2 each side)) from the bumper.



8. Remove bolts (x4 (x2 each) that secure the exhaust mount to the end pipe trim.



9. Disconnect the retaining clips (x2).

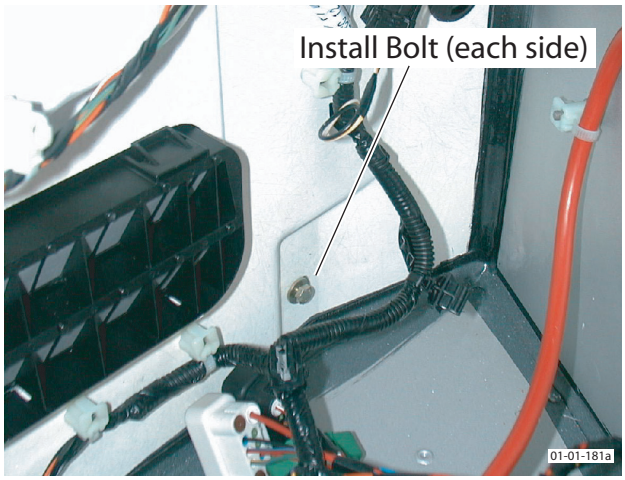
Use a tool, i.e. a long screwdriver, to unclip the bumper from the vehicle body.

Image to follow

10. Disconnect the two clips in the top centre of the bumper. Withdraw the bumper from the vehicle.

Installation

1. Place the bumper to the vehicle. Locate the two clips in the center top of the bumper.
2. Locate the retaining clips (x2).
3. Install the bumper 'Tag' screw.
4. Install screws (x4 (x2 each side)). Torque to **2-3 Nm**.
5. Install the screws (x4) in the light cluster opening.
6. Install the light clusters.
   - 6.1 Place a light cluster unit to vehicle and connect the wiring harness plug.
   - 6.2 Insert the light cluster unit into position.
   - 6.3 Ensure the rubber seal is in position. Tighten nuts (x3).
   - 6.4 Repeat for the second light cluster.
7. Install the bolts (x2) to the bumper boot mount.



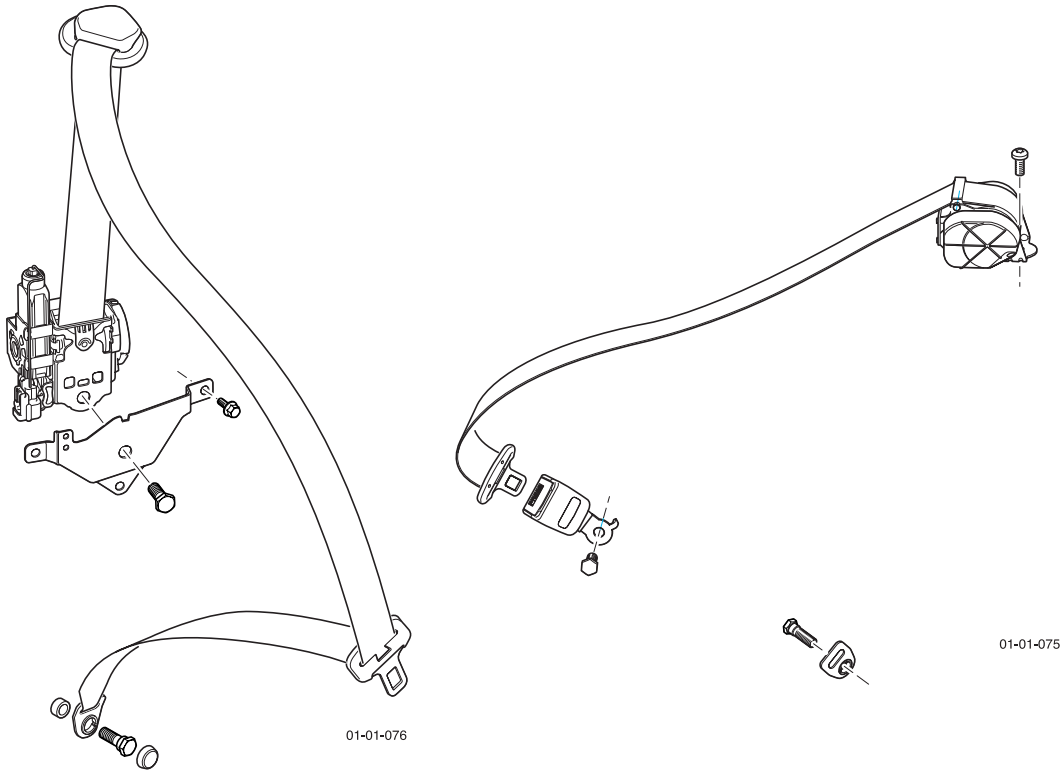
8. Install the exhaust mounts.
9. Connect the wiring harness plugs.
10. Install the road wheel arch liner and wheel.

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Body System (01.00)

Restraining Devices (01.20)

Seat Belts



This vehicle is installed with four inertia reel safety belts. The inertia belt reels automatically tension the belts to provide security with comfort. In the event of a collision or during severe braking, the belt reels will lock.

The driver and front passenger safety belt buckles are installed with a switch, which is connected to a warning indicator housed within the DIM. When the ignition is first turned on the warning indicator will illuminate only if the seat belt is not fastened. If the safety belt is fastened before the ignition is turned on the circuit is broken and the indicator will remain off.

Pre-tensioner and Load Limiting Systems

The driver and front passenger seat belts are equipped with pre-tensioner and load limiting systems.

When required, the front airbag and pre-tensioner systems will deploy simultaneously.

In some moderate frontal or near frontal accidents, only the pre-tensioner system will deploy.

The pre-tensioners take up slack in the front seat belts as the airbags are expanding. The load limiting system releases belt webbing in a controlled manner to reduce belt force on the occupant's chest.

The Restraints Control Module (RCM) receives information on the status of the safety belt buckles from a switch contained in the buckle. Only fastened safety belts will activate.

The safety belt retractors, which are mounted within the base of the B pillars, incorporate a torsion bar load limiting device. This device consists of a retractor reel which is mounted onto a spindle (torsion bar) which once the sensor has locked the retractor reel and a predetermined load is applied, twists and allows additional webbing into the system. The deceleration force required to initiate this sequence is approximately the same as that required to initiate airbag deployment. The torsion bar load limiting device will only react if the safety belt is in use at the time of the impact.

Caution

It should be considered that during any event that utilizes the full capability of the safety belts, the webbing may have been elongated and the torsion bar may have twisted. For this reason, if a vehicle is involved in an accident which results in the deployment of the airbag(s), all the safety belts that were in use at the time of the accident MUST be renewed.

Emergency Locking Retractor (ELR)

The retractors in all seat positions feature ELR. During any period of sudden deceleration, or under lateral load when cornering at speed, a sensor weight within the safety belt retractor moves a locking pawl against the teeth on the retractor reel, which then locks the retractor preventing any further release of webbing. As soon as the load applied onto the retractor through the safety belt webbing is removed the locking pawl releases the retractor reel and normal movement is returned to the retractor.

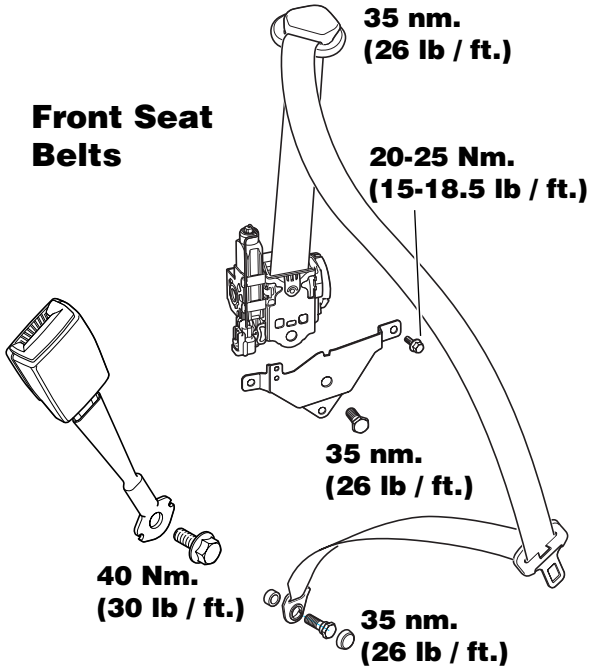
Automatic Locking Retractor (ALR)

Automatic locking retractors (ALR) are installed to all passenger seat positions.

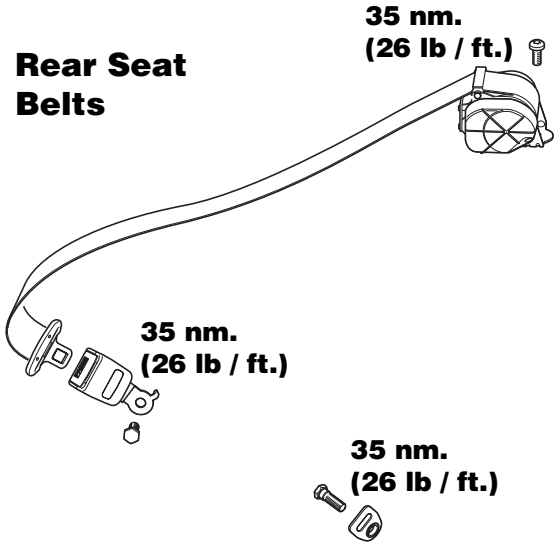
The safety belt webbing on these are clearly marked to show their operating feature. To initiate the ALR system, fasten the safety belt into it's buckle and pull all of the webbing from the retractor, as the safety belt is released the retractor locks allowing travel in only one direction thus producing a fixed length restraint and preventing the safety belt from introducing slack, making any child seat it may be restraining secure. The ALR system of the retractor is disengaged by unfastening the safety belt and allowing the safety belt to fully retract onto the reel.

Specifications

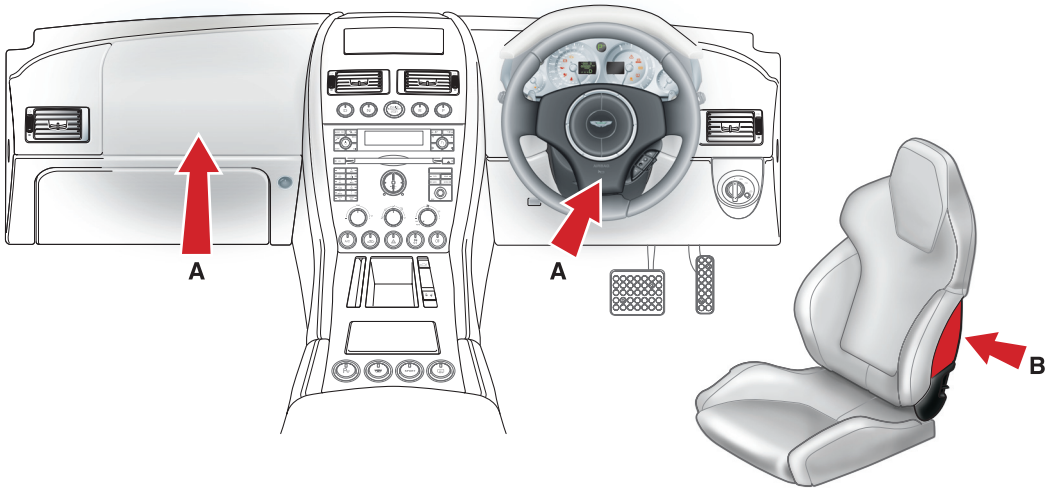
Torque Figures
Description



Torque Figures
Description



Airbag System



The airbag system is designed to provide increased collision protection for front seat occupants in addition to that provided by the safety belt system. Safety belt use is necessary to obtain the best occupant protection and to receive the full advantages of the airbag system.

This vehicle is equipped with driver, passenger, side impact airbags and seat belt pretensioners, which are electrically controlled by a Restraints Control Module (RCM).

The purpose of the driver, passenger and side airbags is to provide **additional** protection for the front seat occupants in the event of a serious impact (front or side impacts). The airbags are supplementary to the seat belts.

Airbag Deployment

⚠ Warning ⚠

Airbags inflate rapidly and with considerable force, there is therefore a risk of death or serious injury such as fractures, facial and eye injuries or internal injuries, particularly to occupants who are not properly restrained by seat belts or are not sitting correctly when the airbags deploy. The risk of injury from a deploying airbag is greatest close to the trim covering the airbag.

⚠ Warning ⚠

The whole sequence of airbag deployment, from sensing the impact to full inflation of the airbag takes place in a fraction of a second.

Dual Inflation Technology

When activated, the airbags will deploy at either a normal or reduced level of inflation, depending on crash severity. Various sensors determine the direction and severity of an impact. The system analyses this information then deploys the appropriate airbags.

Driver airbag Module

The driver airbag module is installed in the steering wheel, the cover forming the outer surface of the steering wheel boss. The cover has a split line moulded into its surface allowing the airbag to exit through the cover when the system deploys.

No routine maintenance is required and there are no serviceable parts. The driver airbag module is replaced as an assembly.

Passenger Airbag Module

The passenger airbag module is located above the glove compartment behind a deployment panel.

The passenger airbag deployment panel hinges up out of the way during airbag deployment.

The passenger airbag module is replaced as an assembly. There is no routine maintenance required and there are no serviceable parts.

Side Airbag Module

A side impact airbag module is mounted in the outboard bolster of each front seat. In a side airbag module deployment situation, the airbag module deploys from behind a hard trim panel.

Clockspring

The airbag clockspring continuously transfers electrical signals from the driver airbag module to the airbag sensor.

The airbag clockspring is mounted on the steering column, behind the steering wheel and does not contain any serviceable components. Ensure that the steering wheel is locked in the central position before commencing any work on the steering column, wheel or airbag.

Restrains Control Module (RCM)

The primary purpose of the RCM is to discriminate between an event that warrants an airbag system deployment and an event that does not. The RCM governs the operation of the whole system and performs continual system diagnostics. Information on the severity of an impact is received from the impact sensors.

Variations in the deployment of the front airbag modules are dependent on the status of the front safety belt buckles.

Impact Sensors

Side Impact - Side impact sensors are mounted to the base of each B-pillar. In the event of a side impact, the RCM processes the impact data sent by the side impact sensor against stored data. The RCM will deploy both side impact airbags dependant on seat belt buckle status.

Front Impact

Front impact sensors (x2) are located under the grill opening panel.

The SRS module processes the impact data sent by the front impact sensor against stored data, and deploys the front airbags, and the seat belt pre-tensioners.

Specifications

Torque Figures		
Description	Nm	lb. / ft.
Drive Airbag	8-10	6-7.5
Passenger Airbag	11.5	8.5
Side Airbag	10	7.5

Maintenance

Driver Airbag

Repair Operation Time (ROT)	
Item	**Code**
Drivers Airbag Renew	**01.20.AB**

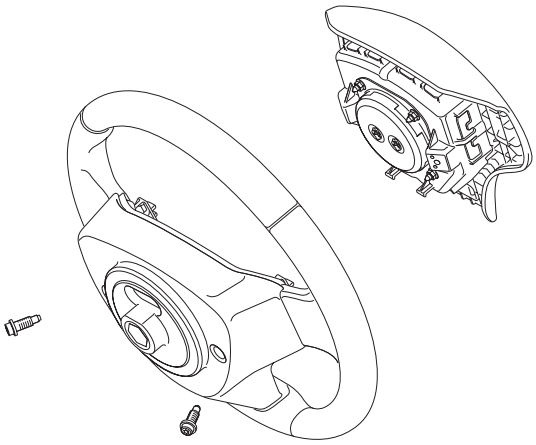
Removal

1. Remove the earth ('-ve') terminal from the vehicle battery and ensure the ignition key is removed.

> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.***

2. Remove bolts (x2) that secure the driver airbag.

Rotate the steering wheel to gain access to the two bolts.



3. Withdraw the driver airbag to gain access to the wiring harness plug. Disconnect the plug.
4. Withdraw the driver airbag.

Installation

1. Place the airbag module to the steering wheel. Connect the wiring harness plug.
2. Install the bolts (x2). Torque to **8-10 Nm**.
3. Connect the vehicle battery with the ignition in the 'Off' position.

Passenger Airbag

Repair Operation Time (ROT)	
Item	**Code**
Passenger Airbag Renew	**01.20.BB**

Removal

1. Remove the earth ('-ve') terminal from the vehicle battery and ensure the ignition key is removed.

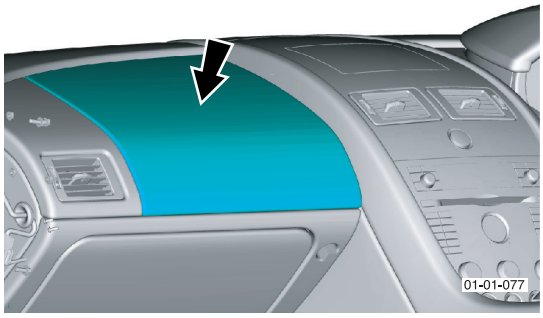
> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.***

2. Remove the glove box.
   - 2.1 Pull of the outer trim panel. Disconnect the glovebox release switch wiring harness plug.
   - 2.2 Release the damper cord.
   - 2.3 Remove screws (x3) from the glovebox door hinge. Remove door.
   - 2.4 Remove screws (x4) from the sight shield. Remove the sight shield and glovebox.

3. Remove the airbag trim panel.

Caution
Withdraw the airbag panel carefully. The airbag panel can crease if forced out.

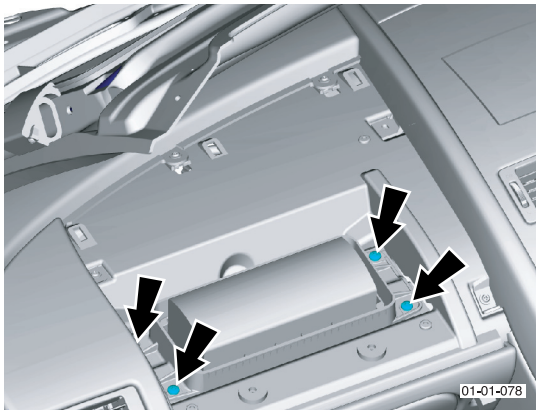
3.1 Remove screws (x3).
3.2 Lift from the front edge. Withdraw out of clips (x3).



4. Disconnect the wiring harness plugs (x2).



5. Remove bolts (x4) and withdraw the airbag.



Installation

1. Install the airbag. Torque bolts to **11.5 Nm**.
2. Connect the wiring harness plugs.
3. Install the airbag trim panel. Torque bolts to **11.5 Nm**.
4. Install the glovebox.
5. Connect the vehicle battery with the ignition in the 'Off' position.

Side Impact Airbag

Removal

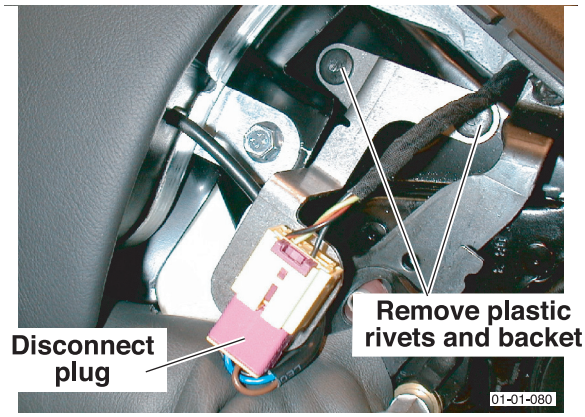
1. Remove the earth ('-ve') terminal from the vehicle battery and ensure the ignition key is removed.

⚠ Warning ⚠
Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.

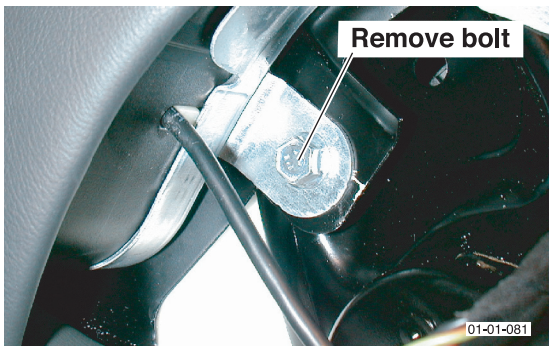
2. Remove the seat lower side trim.



3. Disconnect the wiring harness plug.



4. Remove bolt (x1) that secures the airbag module to the seat.



Installation

1. Place the airbag to the seat. Torque bolt to **10 Nm**.
2. Connect the wiring harness plug.
3. Install the seat lower trim panel.
4. Connect the vehicle battery with the ignition in the 'Off' position.

Deployable Rollbars

> ⚠ ***Warning*** ⚠
> ***Do not place any objects on the top of the deployable rollbar covers behind the rear seat backs.***

> ⚠ ***Warning*** ⚠
> ***Do not allow any person to sit on the deployable rollbar covers at any time.***

> ⚠ ***Warning*** ⚠
> ***If the roof is not stowed and the deployable rollbars deploy they will break through the rear glass.***

Specifications

Torque Figures

Description	Nm	lb. / ft.
Deployable Rollbar Unit	20-30	15-22.5
Deployable Rollbar Sensor Unit	TBA	

Maintenance

Rollbar Unit

Remove

1. Disconnect the vehicle battery at the negative terminal and ensure the ignition key is removed.

> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the deployable rollbar system.***

> ⚠ ***Warning*** ⚠
> ***Do not lean over the rollbars. If the rollbars deploy while someone is leaning over them, they will cause severe injury.***

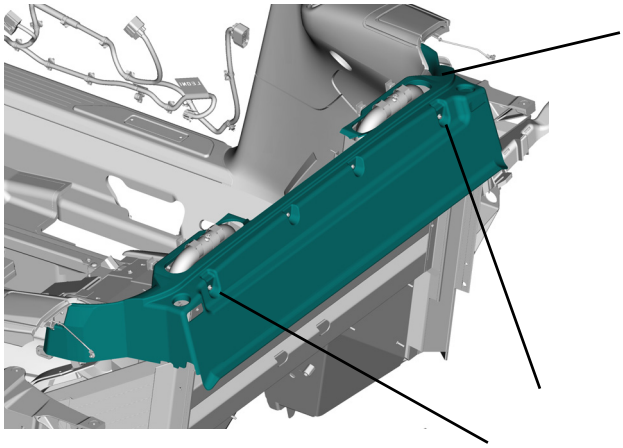
2. Remove the rear seat bases and backs (Refer to 'Rear Seats', page 1-7-3).
3. Remove the rollbar trim cover.
4. **LH Rollbar unit only**.
   Remove the rear centre console (Refer to 'Rear Trim', page 1-4-5).

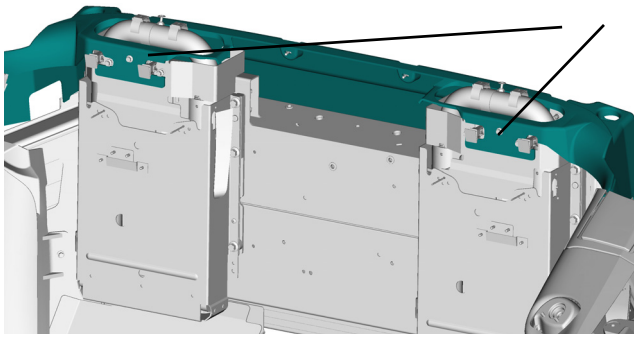
To gain access to the LH ROPS unit wiring harness plug.

5. Disconnect the wiring harness plug.

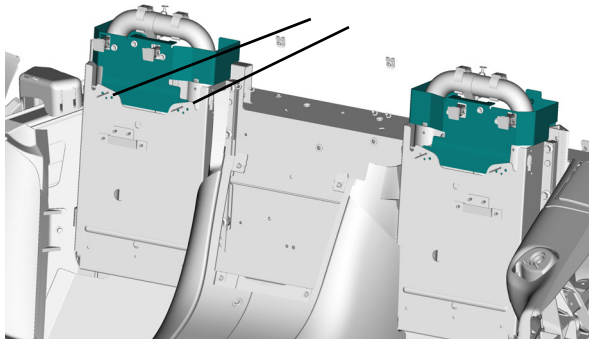
Image to follow

6. Remove the rear closing panel.

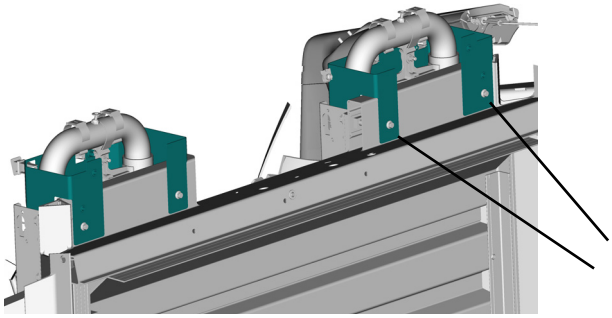




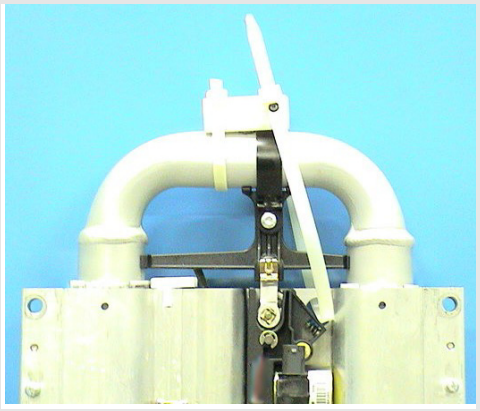
7. Drill out the pop rivits (x2) that secure the seat back bracket to the ROPS unit.



8. Remove bolts (x2 on each) that secure the seat back bracket.



> ⚠ ***Warning*** ⚠
> ***Ensure that the deployable rollbars are secured in the lowered position.***

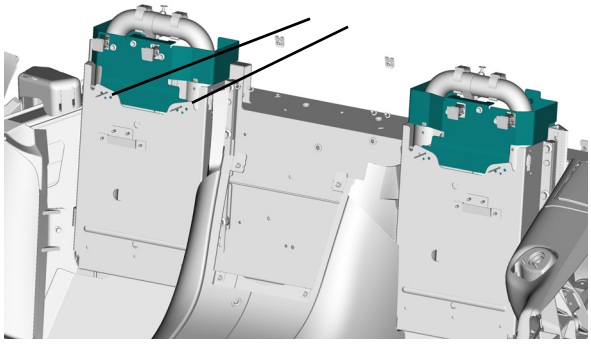


9. Remove bolts x6 that secure the deployable rollbar unit. Withdraw the ROPS unit.

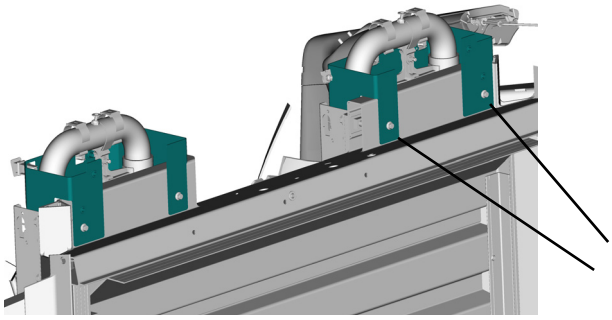
Install

> ⚠ ***Warning*** ⚠
> ***Do not connect the vehicle battery unitll the ROPS unit is fully installed.***

1. Install the deployable rollbar unit. Torque bolts (x6) to **20-30 Nm**.
2. Pop rivit (x2) the seat back bracket to the ROPS unit.

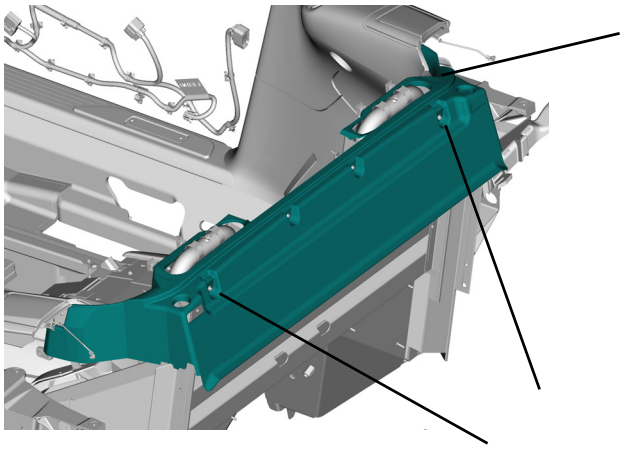


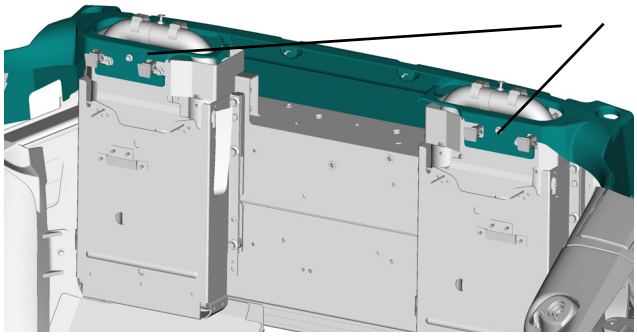
3. Install the bolts (x2) that secure the seat back bracket.



4. Install the rear closing panel.

> *The two center screws are installed when the 3rd center console trim panel is installed.*





5. Connect the wiring harness plug.
6. **LH Rollbar Unit Only**.
   Install the rear centre console (Refer to 'Rear Trim', page 1-4-5).
7. Install the rear seat bases and backs (Refer to 'Rear Seats', page 1-7-3).

Rollbar Sensor

Remove

1. Disconnect the vehicle battery at the negative terminal and ensure the ignition key is removed.

> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the deployable rollbar system.***

2. Remove the boot trim to gain access to the rollbar sensor unit.
3. Remove the bolts (x4) that secure the rollbar sensor and bracket assembly.
4. Withdraw the rollbar sensor and bracket assembly to access the wirining harness plug. Disconnect the wiring harness plug.
5. Remove the rollbar sensor unit from its bracket (screws x3).

Install

> ⚠ ***Warning*** ⚠
> ***Do not connect the vehicle battery unitll the rollbar sensor is fully installed.***

> ⚠ ***Warning*** ⚠
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the deployable rollbar system.***

1. Install the deployable rollbar sensor unit to it's bracket. Torque bolts (x3) to **TBA Nm**.
2. Connect the wiring harness plug.
3. Install the bolts (x4) that secure the rollbar sensor and bracket assembly. Torque to **TBA Nm**.
4. Install the boot trim.
5. Connect the vehicle battery at the negative terminal.

Engine System (03.00)

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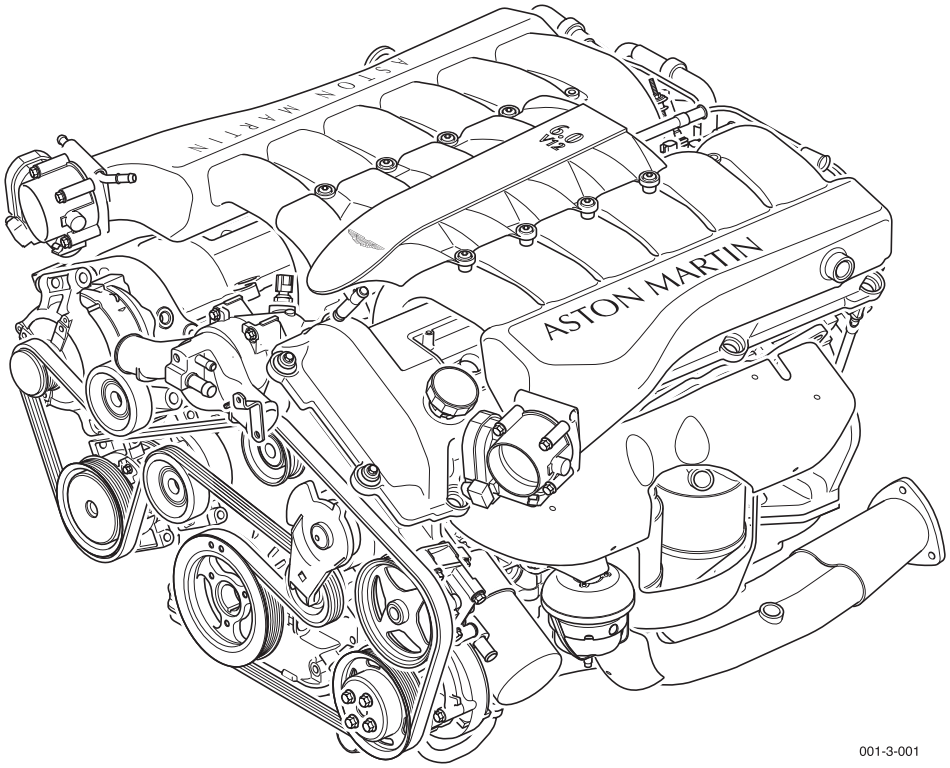
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Engine (03.00)

Engine Assembly (03.00)

Description



001-3-001

The engine is an all aluminium 6.0 litre 60° V12 configuration. The cylinder heads have dual overhead camshafts and four valves per cylinder. An electronic engine management system controls the sequential multi-port fuel injection and distributor-less ignition systems.

The engine uses the latest 'fast-burn' combustion technology. Heated oxygen sensors monitor the oxygen content of exhaust gasses. The engine management system uses the oxygen sensor signals together with other engine information to 'fine tune' fuelling levels and ignition timing. This helps to achieve the best possible fuel burn with minimum exhaust emissions. The exhaust system incorporates six catalytic convertors to minimise the levels of harmful gasses passing into the atmosphere. Additional oxygen sensors are placed after the catalysts so that long term catalyst efficiency can be monitored.

The engine runs on unleaded fuel only.

Maintenance

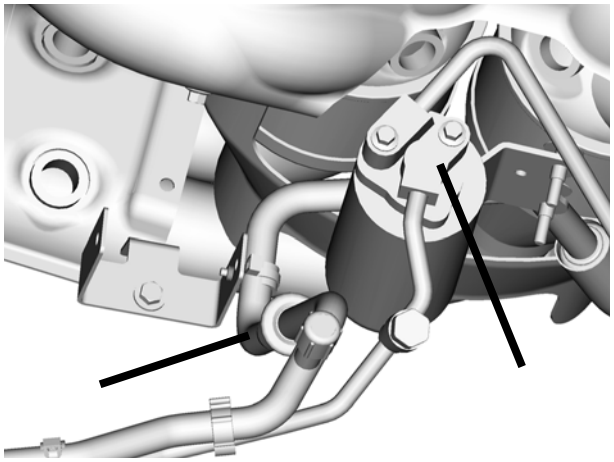
Engine

Repair Operation Time (ROT)	
Item	**Code**
Engine Remove and Install Including engine removal from the frame	**03.00.AA**

Removal

To remove the engine from the vehicle the complete power train will be removed.

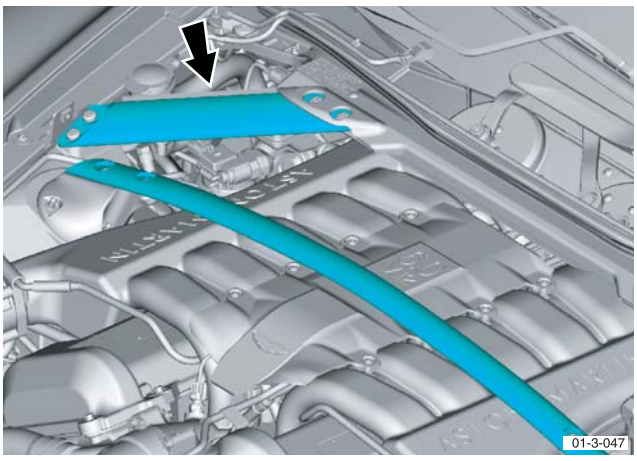
1. Disconnect the earth ('- ve) terminal from the vehicle battery.
2. Evacuate the A/C unit (Refer to 'Air Conditioning (A/C) System (12.03)', page 12-3-1).
3. Disconnect the A/C pipes.



4. Drain the coolant (Refer to 'Coolant Drain / Fill', page 3-4-3).

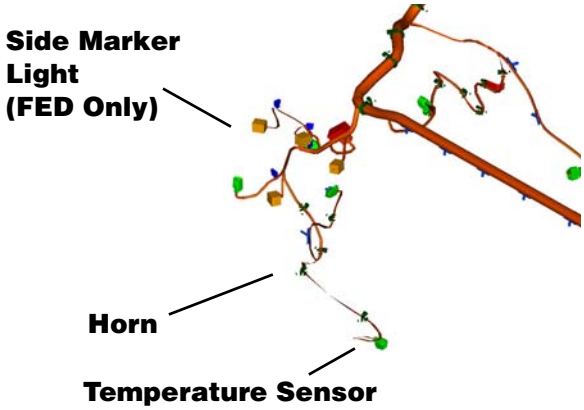
Caution
Before removing the engine bay corner cross-braces ensure that the at the vehicle is resting on it's roadwheels.

5. Remove the engine bay **corner** cross-braces. Do not remove the engine bay cross brace.

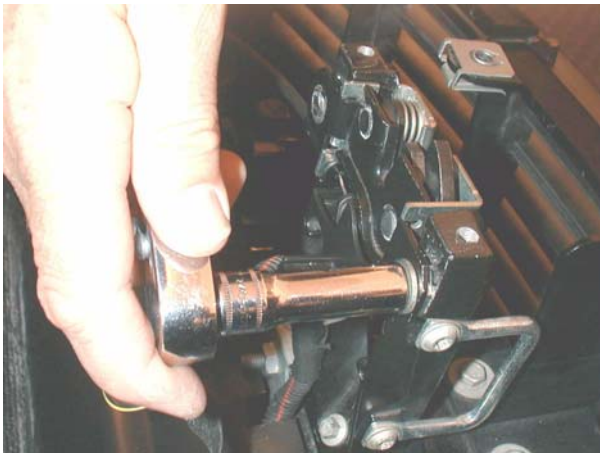


6. Remove the washer bottle neck bracket.
7. Remove the 'slam' panel.
8. Withdraw the plastic cover and disconnect the forward wiring harness plugs.





9. Remove the bonnet release cable.



10. Disconnect the following from the forward cross member.
    - The reinforcement struts



    - The 'Jump start' plug



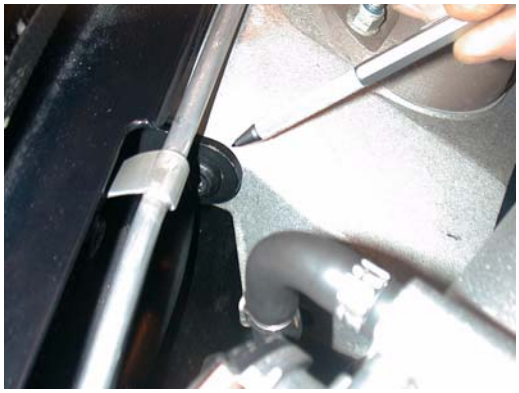
    - The power steering reservoir



11. **Manual Gearbox Only.**
    Disconnect the clutch pipe.

12. Remove the bolts and the reinforcement brackets from the inner wing.

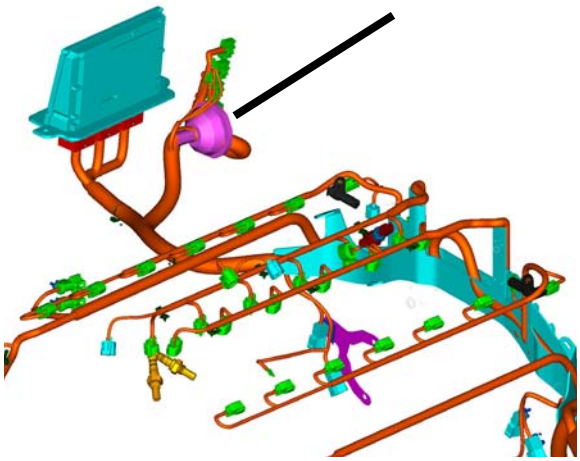
Remove the header tank to gain access. Be aware that there is a wiring harness plug connected to the header tank on the under side.



13. Centre the steering wheel. Remove the ignition key and engage the steering lock with the wheel as accurately centred as possible.

Failure to centre the steering wheel may cause damage to the restraint bag clock-spring and also may cause difficulties in attaining correct alignment of the steering wheel in the straight ahead position.

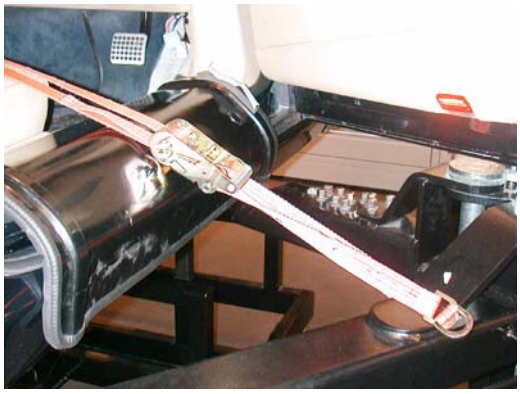
14. From inside the cabin, pull back the steering colum bulkhead seal. Remove the pinch bolt that secures the upper column to the intermediate shaft.
15. Disconnect the engine harness from inside the vehicle cabin.



16. Raise the vehicle and make safe.

Remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly.
(Refer to 'Jacking Points', page I-I-IX).

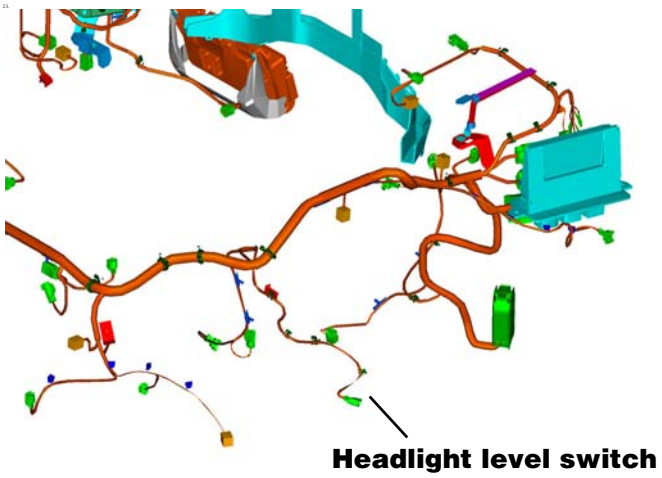
Caution
Ensure the vehicle is 'strapped' to the lift.



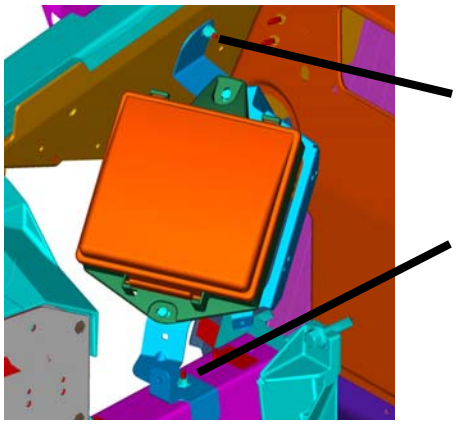
17. Remove the undertrays and shear plates.

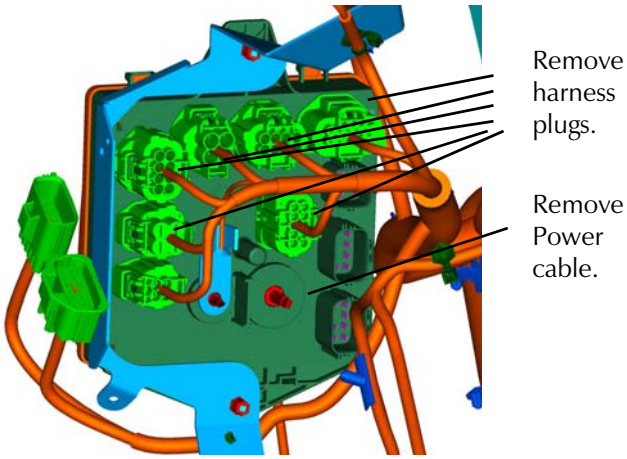
Note the positions of the (x4) spacers when removing the front shear plate.

18. Remove all road wheels and arches.
19. Remove the air filter boxes.
20. Remove the front bumper.
21. Disconnect the headlight units lower mount.
22. Disconnect the following forward wiring harness plugs.
    - Fan pack
    - Headlight levelling sensor
    - MAF sensor
    - ABS speed sensor
    - Header tank level sensor



24. Remove the engine bay fusebox and bracket.





25. Disconnect the earth points from the bulkhead. Mark the leads at the clean earth studs.

These are 'Clean Earths' labelled 'Bank A' and 'Bank B'. Reconnect to correct stud.

- Right Hand side



- Left Hand Side

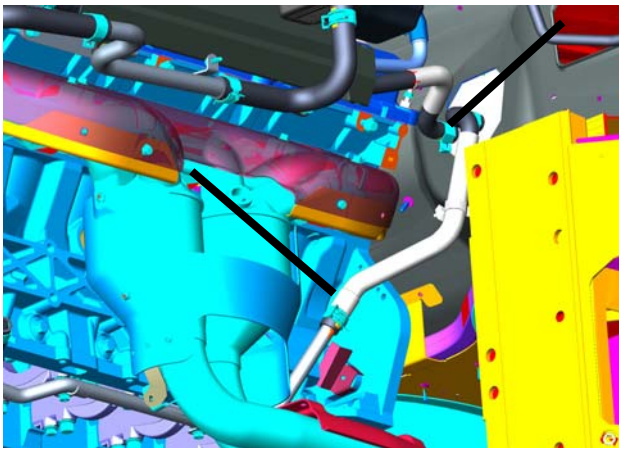


26. Remove the PCMs. Disconnect the engine wiring harness plugs and remove the three screws that secure the PCM (each side).
27. Move the removed engine wiring harness plugs into the engine bay and secure to the engine cross brace.



28. Remove the brake booster vacuum pipe
29. Disconnect the heater coolant pipes.

On LH drive vehicles the heater coolant pipes enter the bulkhead on the RH side.

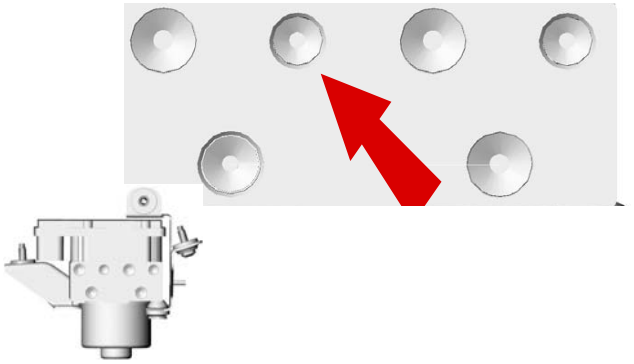


30. Disconnect the front brake pipes:

Caution

Brake fluid must not be allowed to contact vehicle paint work. Remove spilt brake fluid from paint work by rinsing away with running water.

30.1 Disconnect the brake pipe from the brake modulator to the L/H front brake caliper.



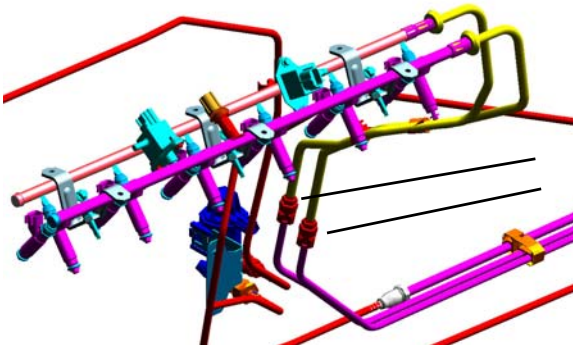
30.2 Disconnect the brake pipe in the RH wing.



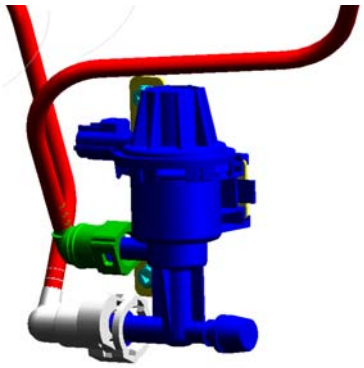
31. Remove the intermediate steering shaft.
    31.1 Remove the lower pinch bolt. Open the lower mount.
    31.2 Pull the intermediate steering shaft downwards and remove.



32. Disconnect the fuel lines.



33. Remove the VMV to inlet manifold pipe from the VMV.



34. Disconnect the torque tube to body (engine) earth lead.
35. Disconnect the Starter / Alternator / Jump terminal cable from the chassis.



36. Disconnect the silencer from the two rear exhaust pipes.

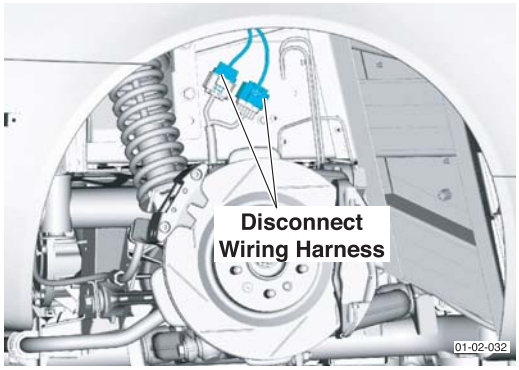


37. Disconnect the handbrake cable from the rear subframe (Refer to 'Hand Brake (06.05)', page 6-3-1).

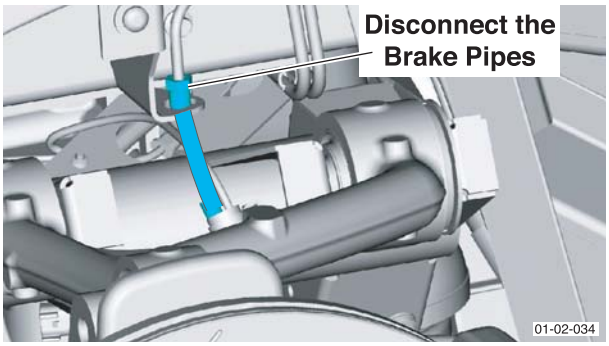
Use the brake cable release tool (Refer to '206-103 (Handbrake Cable Removal)', page 20-1-4).



38. Disconnect the subframe wiring harness.

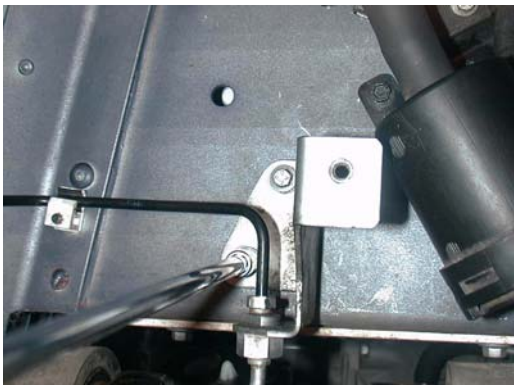


39. Disconnect the rear brake pipes.



Caution
Brake fluid must not be allowed to contact vehicle paint work. Remove spilt brake fluid from paint work by rinsing away with running water.

40. Remove the rear brake pipe brackets.

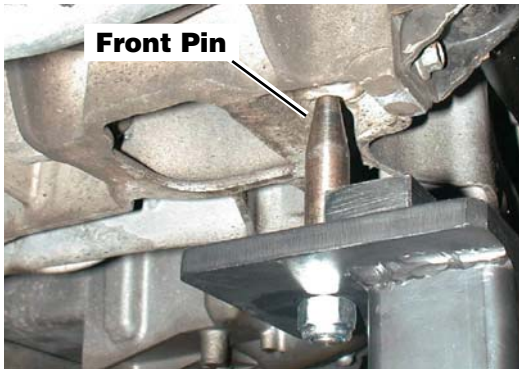


41. Automatic Gearbox Only.
Disconnect the manual override cable.



42. Position the subframe trolleys, front and rear (Refer to '303-F715 (Multi-purpose Trolley) x2', page 20-1-5) under the subframes. Lower the vehicle until the front and rear subframes rests on the subframe trolleys.

Connect the two trolleys together (Refer to '303-F715-06 (Trolley Brace Bars)', page 20-1-5).

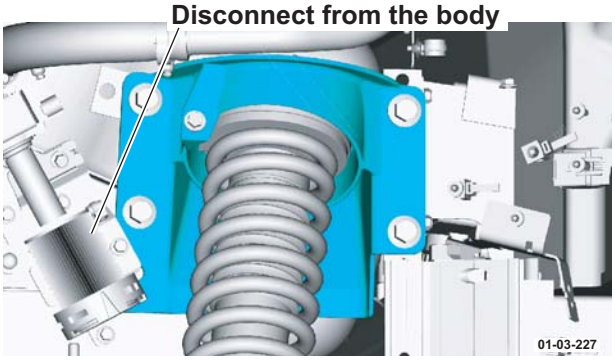


Rear Pin Image to Follow

43. Ensure that the relation of the front subframe / front structure to the vehicle body is marked (scribed), for accurate installation.
44. Remove bolts (x12) that secure the front subframe / front structure to the body.

Image to Follow

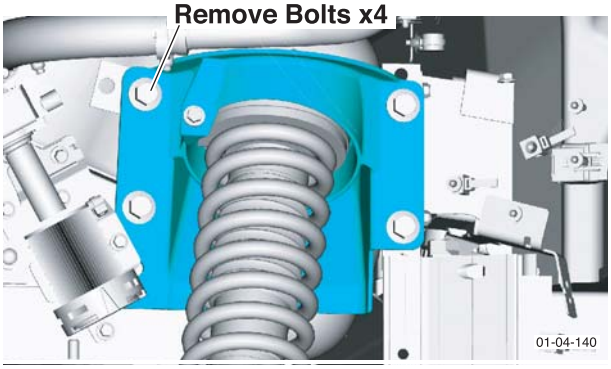
45. Remove the bolts (x3) that secure the emmisions filter unit. This allows access to the spring and damper unit top mount.



46. Remove bolts (x4) that secure the rear spring and damper units.

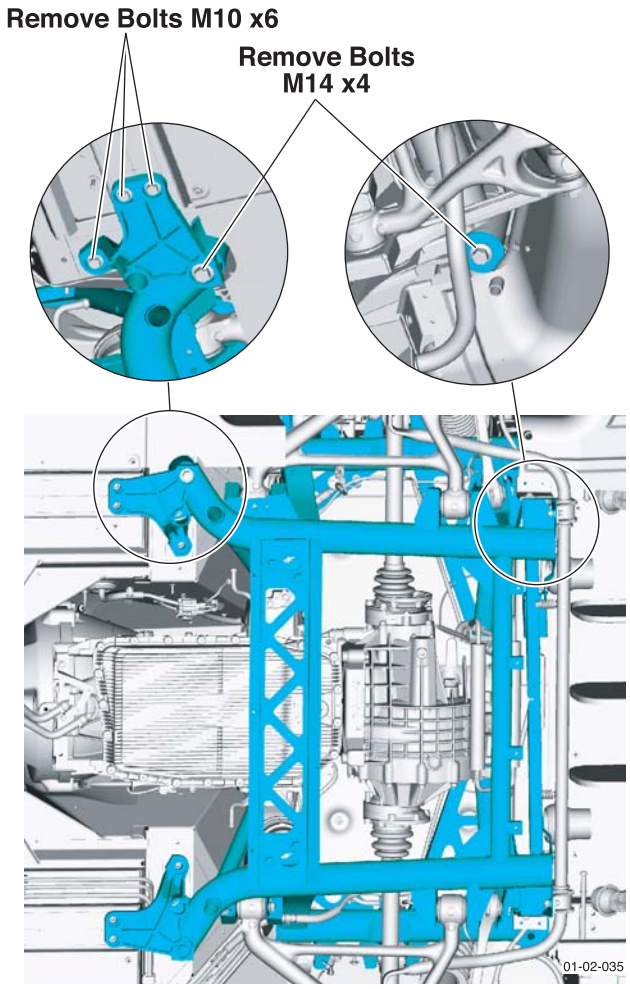
Ensure the rear spring and damper assemblies are fully extended to release spring tension. A small amount of tension will remain.

Lever the rear spring and damper mounting turret against spring tension to allow removal of bolts.



47. Remove the rear subframe securing bolts.

The anti-roll bar must be removed before the two rear bolts can be completely removed.



48. **Manual Transaxle only**.

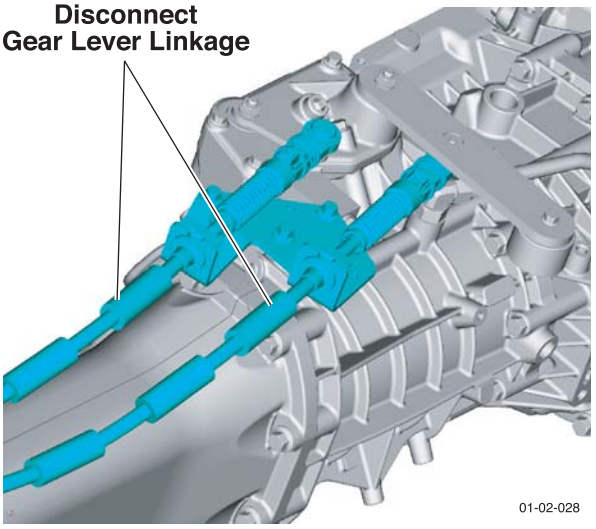
Raise the vehicle to allow access to disconnect the gear selector cables.

Use the service tool (Refer to '501-F116 (IP Removal)', page 20-1-8) to remove the horseshoe clips (x2) and lever the cables from the ball joints.

Caution

There is a risk of bending the end of the cable. Lever cable from ball joint at a point closest to the ball joint.

Ensure the vehicle raises without catching pipes, cables, etc.



49. Slowly raise the vehicle.

As the vehicle raises disconnect the wings from front grill.



Ensure all pipes, cables, etc., are clear as the vehicle raises.

LH drive vehicles - ensure that the coolant pipe is in front of the brake booster.

50. Retain the spacers from each rear subframe mounting pad. These should be installed in the same positions when the subframe is installed.

Installation

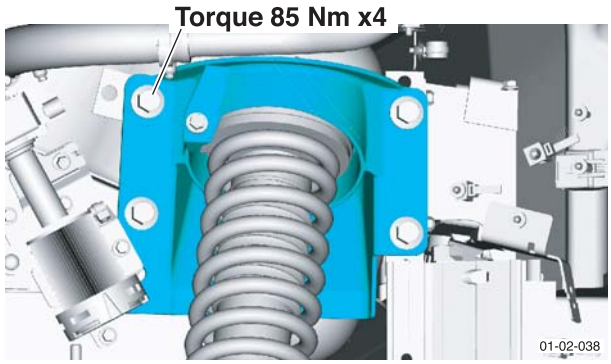
1. Lower the vehicle to the powertrain assembly.
   Ensure all pipes, cables, etc., are clear as the vehicle lowers.
   As the vehicle lowers pull the wings from front grill.



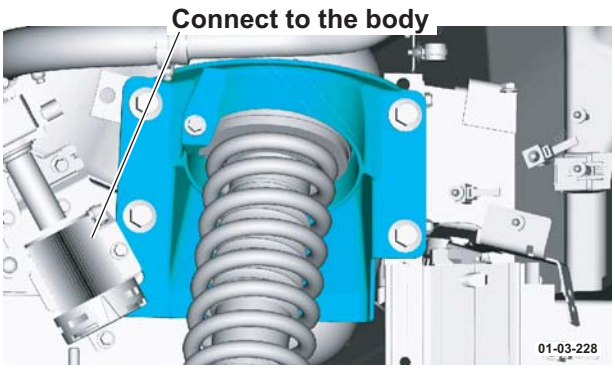
2. Install the rear spring and damper assemblies. Do not tighten the bolts.
3. Install the front subframe and front structure mounting bolts (x12). Do not tighten.
4. Install the rear subframe mounting bolts (x4). Do not tighten.

Spacers from rear subframe mounting pads should be installed in the same positions as removed.

5. Install the rear subframe reinforcement plates.
6. Torque the rear spring and damper assemblies - **85.5 Nm**.



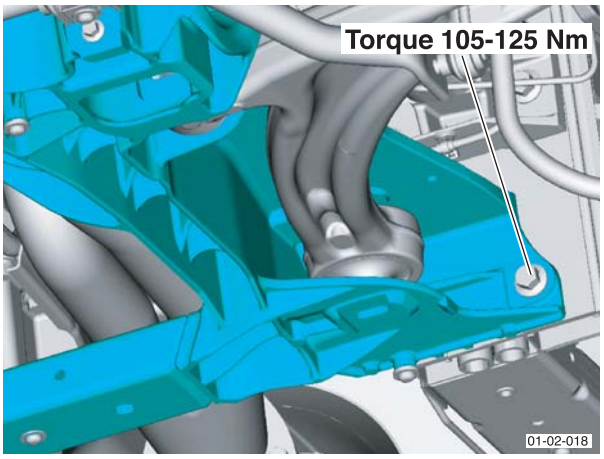
7. Install the emmisions filter unit.



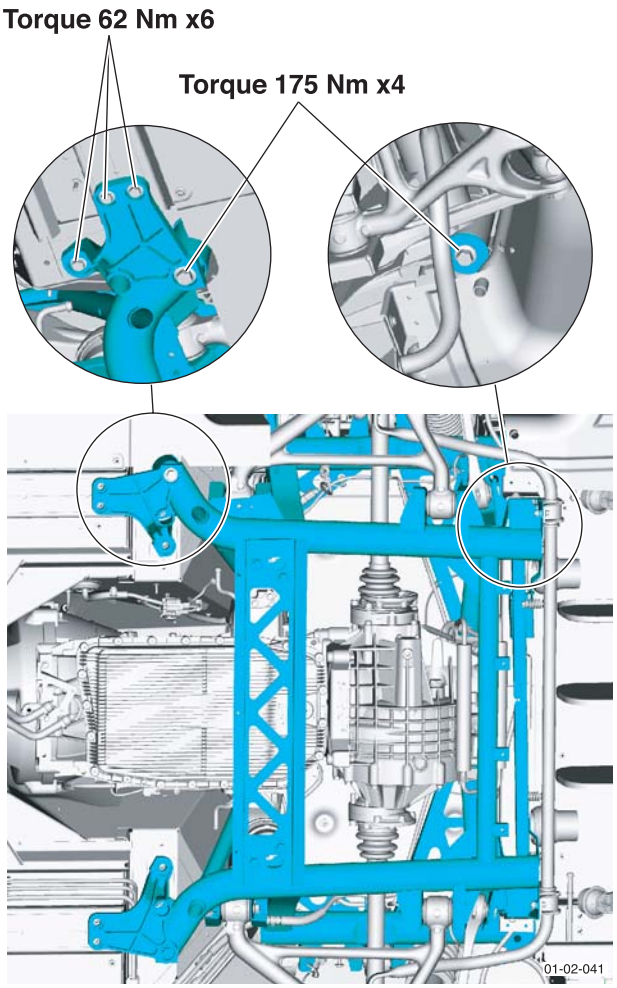
8. Torque the front subframe and front structure bolts.

Ensure that the front subframe / front structure to body alignment marks are lined up.

Torque bolts (x12) to **105-125 Nm**.



9. Torque the rear subframe mounting bolts.
   1 Torque the bolts that secure the subframe to the body to **175 Nm**.
   2 Torque the bolts that secure the subframe reinforcement plates to **62 Nm**.



10. Connect the rear subframe wiring harness.

11. Automatic Gearbox Only.

Install the manual override cable.

12. Manual Gearbox Only.

- Install the gear change linkage
- Install the wiring harness plugs

13. Manual Gearbox Only.

Caution

Clutch fluid must not be allowed to contact the vehicle paint work. Remove spilt clutch fluid from the paint work by rinsing away with running water.

Install the clutch pipe.

14. Install the brake pipes:

Caution

Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

- Install the LH front brake caliper pipe to the modulator
- Install the rear brake pipe brackets.
- Install the brake pipes to all remaining brake calipers.

15. Install the handbrake cable to the handbrake lever
16. Connect the torque tube to body (engine) earth lead.
17. Connect the Starter / Alternator / Jump terminal cable to the body.



18. Install the heater coolant pipes.
19. Connect the VMV.
20. Connect the fuel lines.
21. Install the headlight units (L/H and R/H).
22. Install both air filter boxes.
23. Install the PCMs. Connect the engine wiring harness plugs.
24. Connect the following forward wiring harness plugs.
    - Fan pack
    - Headlight levelling sensor
    - MAF sensor
    - ABS speed sensor
    - Header tank level sensor
25. Connect the earth points to the bulkhead.
    - RH side



    - LH Side



26. Install the steering intermediate shaft.
27. Install the fusebox.
    - 27.1 Connect the wiring harness plugs
    - 27.2 Connect the main power feed
    - 27.3 Install the fusebox bracket and fusebox
28. Install the power steering reservoir.
29. Install the jump start cable.
30. Install the A/C pipes.
31. Install the bolts and reinforcement struts along the inner wings.
32. Install the header tank.

Caution

Before installing the engine bay cross-braces ensure that the at the vehicle is resting on it's roadwheels.

33. Install the engine bay corner cross braces. **Do not tighten**.
34. Install the front bumper.
35. Install the road wheel arch liners.
36. Install:
    - Front and rear undertrays
    - Shear plates

Note the positions of the (x4) spacers from removal on the front shear plate.

37. Bleed the brakes (Refer to 'Brake Bleeding - WDS', page 6-4-4).
38. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
39. Torque the engine bay cross-braces to **49 Nm.**
40. Fill the coolant (Refer to 'Coolant Drain / Fill', page 3-4-3)

41. Charge the A/C unit (Refer to 'Air Conditioning (A/C) System (12.03)', page 12-3-1).
42. Check the road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

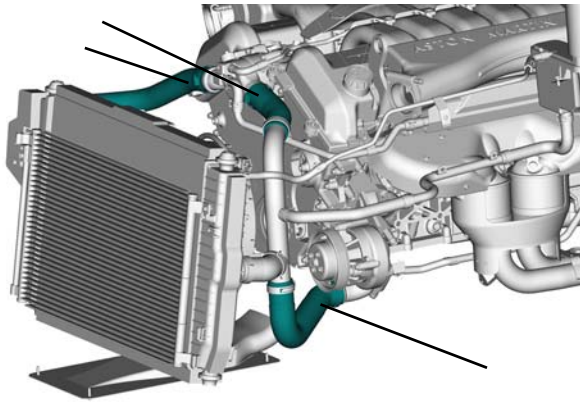
Always check the steering angle sensor (viaWDS) after any work carried out on the steering or the suspension systems or the yaw rate sensor.

43. Connect the vehicle battery.

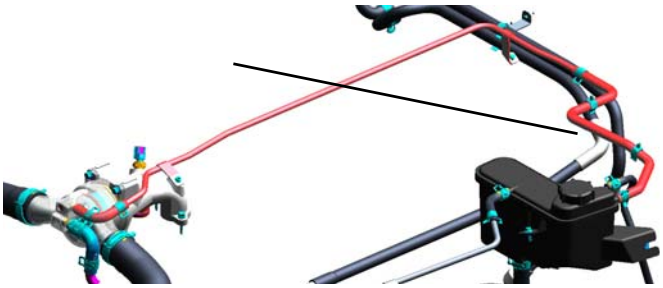
Engine Removal from the Frame

Removal

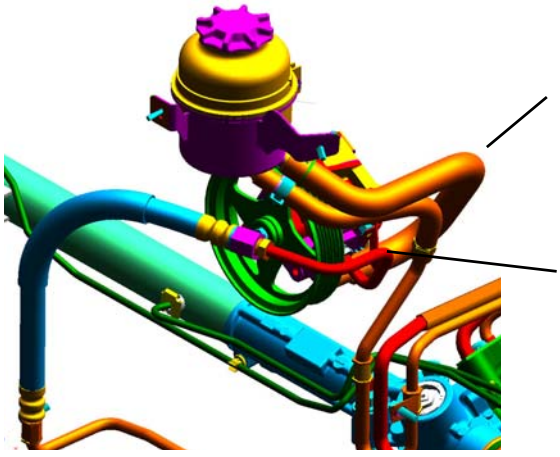
1. Release the exhaust manifolds from the catalysts.
2. Remove the following hoses:



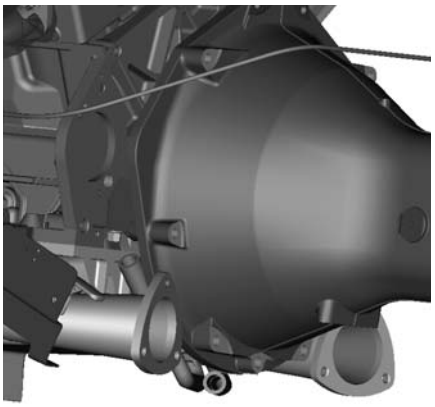
3. Disconnect the AC pipe from the condensor.
4. Remove the hose from the header tank.



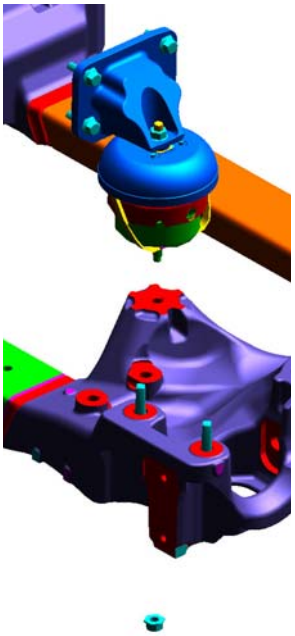
5. Disconnect the cables from the starter motor and the alternator.
6. Remove the power steering pump hoses.



7. Attach the lifting eyes (x4) to the cylinder heads.
8. Install the engine lifting gear to a suitable hoist.
9. Raise the hoist to take up 'slack' in lifting gear.
10. Remove the torque tube.
    10.1 Ensure the torque tube is supported.
    10.2 Remove bolts (x) that secure the torque tube to the engine block.
    10.3 Ensuring the torque tube and engine are adequately supported, move the engine frame and hoist forward until there is room to manoeuvre the torque tube away from the engine block and exhaust manifolds.



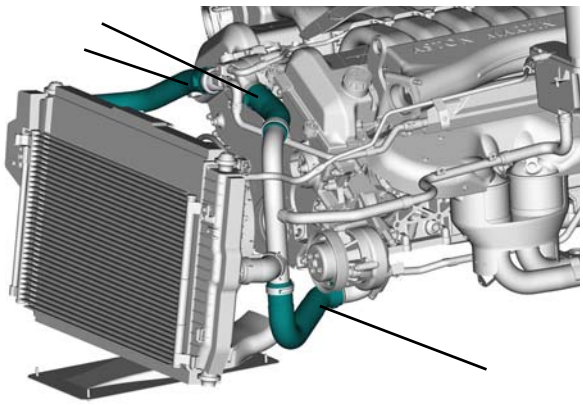
11. Remove the engine mount nuts (x2).



12. Lift the engine clear of the frame assembly. Secure the engine to an appropriate stand.
    Detach the lifting gear.

Installation

1. Install the engine lifting gear to a suitable hoist.
2. Raise and manoeuvre the engine to the frame.
3. Ensuring the torque tube is adequately supported, manoeuvre the engine to torque tube.
4. Locate the propshaft splines and ‘face up’ the engine block to the torque tube.
5. Install the bolts that secure the torque tube to the engine block. Torque the bolts to:
   - M8 - **25 Nm**.
   - M10 - **50 Nm**.
6. Install the engine mounts. Torque the nuts (x2) to **47 Nm**.
7. Remove the lifting equipment and lifting eyes.
8. Install the hose to the header tank.
9. Connect the AC pipe to the condensor.
10. Install the following hoses:



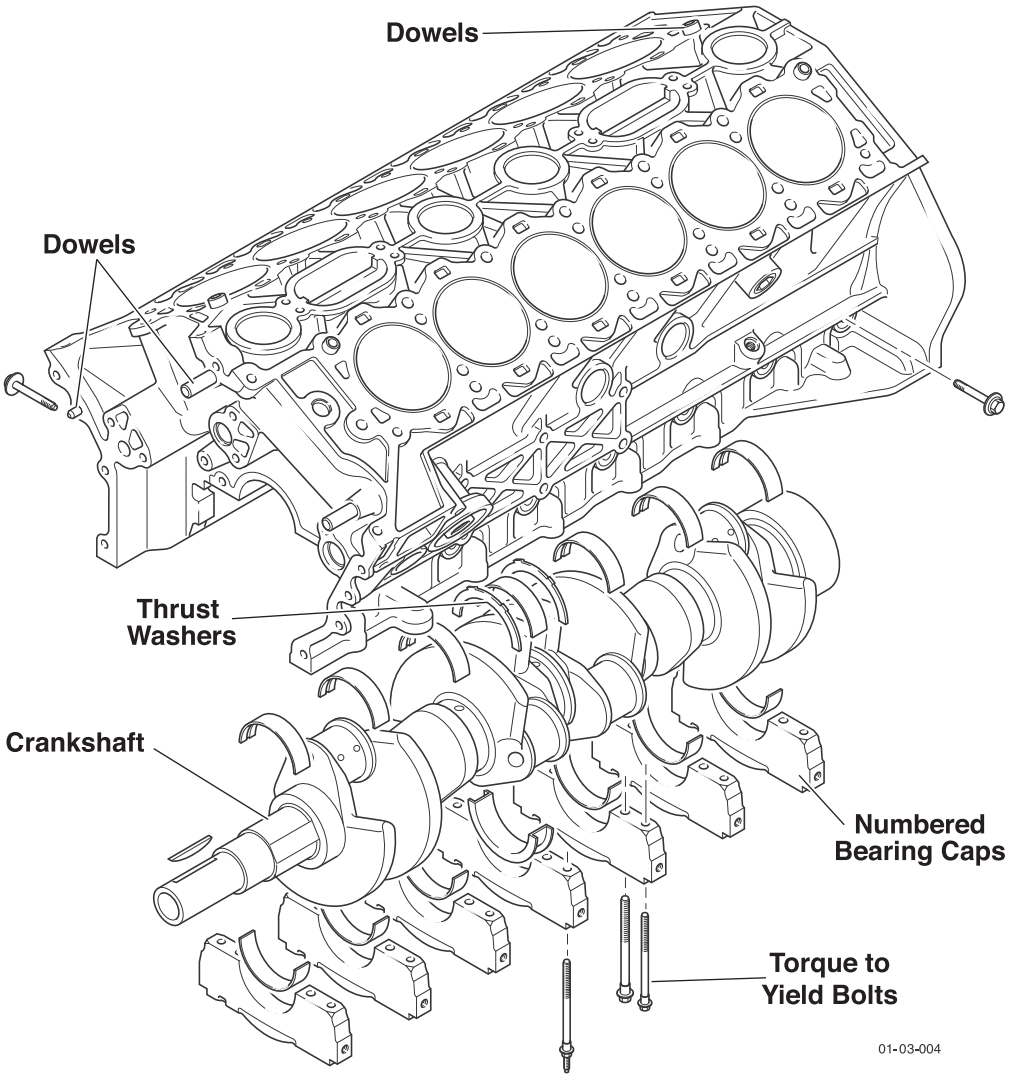
11. Install the power steering pump hoses.
12. Install the cables to the starter motor and the alternator.
13. Install the exhaust manifolds to the catalysts. Torque the nuts and bolts to **25.5 Nm**.

Engine (03.00)

Engine Structure (03.01)

Description

Engine Block



Dowels are installed to the principal mating faces of the block to ensure accurate alignment of cylinder heads, front timing cover, auxiliaries, etc.

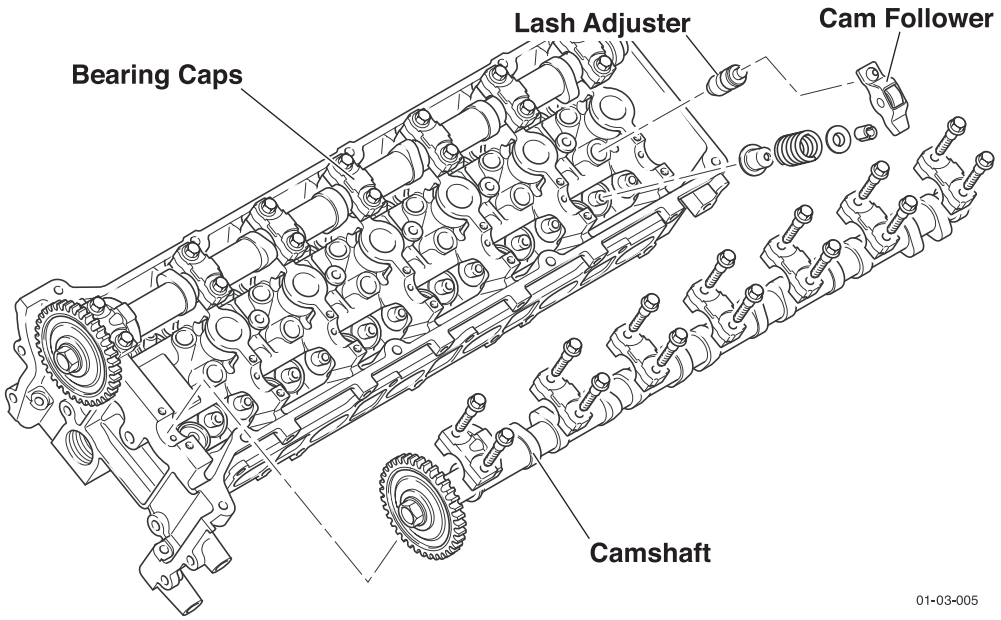
The 60° V12 aluminium engine block incorporates paths for water cooling, oil distribution and positive crankcase ventilation. The seven main bearing caps supporting the crankshaft are bolted laterally as well as vertically to provide additional crankcase stiffening whilst keeping engine weight to a minimum. Each bearing cap is numbered to identify its position in the engine block The 12 cast iron cylinder liners are inserted and machined during block production and require specialist equipment for replacement.

The crankshaft is mounted in 7 main bearings with end loads absorbed by thrust washers at number 4 main bearing. Main bearing bolts are of the 'torque to yield' type and must be renewed if removed.

A twin sprocket installed to the front end of the crankshaft drives the camshaft chains. A damper pulley installed on the crankshaft nose drives the engine auxiliaries via a polyvee drive belt. Also at the front of the engine a timing disc is installed together with two crankshaft sensors. The sensors provide engine position signals to the two Engine control modules.

Cylinder Heads

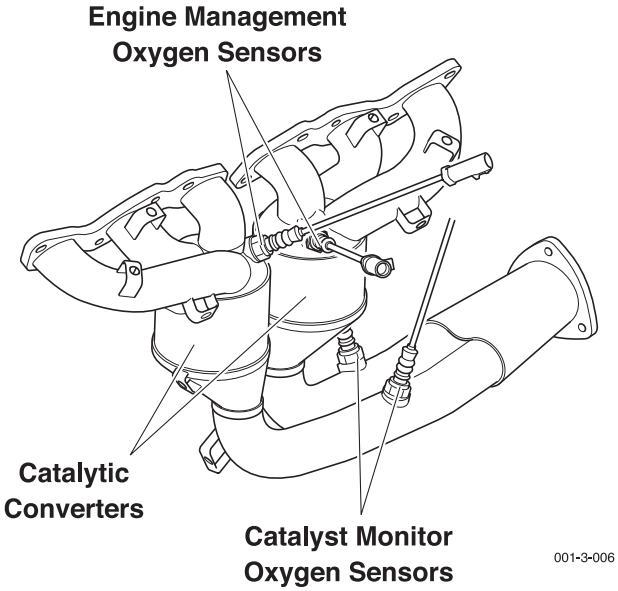
Each cylinder is provided with two inlet and two exhaust valves. The valves are operated by cam followers beneath each camshaft. Valve clearances are maintained at zero by a hydraulic tappet system (lash adjuster) pressurised from the main engine lubrication system.



Inlet / Exhaust Manifolds

Two six-branch exhaust manifolds, locate four primary catalytic converters and eight oxygen sensors.

Four engine management oxygen sensors are mounted before the primary catalysts. Four catalyst monitor oxygen sensors are mounted after the primary catalysts.



Intake air is filtered and passed through mass air flow meters (MAF). The air then passes through the throttle bodies into the six branch inlet manifolds.

Specifications

Block	**MM**
Cylinder Bore Grade 2	89.010 - 89.020
Main Bearing Bore (without shells)	72.400 - 72.424

Cylinder Heads	**MM**
Head Face-Roof Button	14.75 - 15.25
Valve Seat Width - Inlet	1.10 - 1.40
Valve Seat Width - Exhaust	1.40 - 1.70
Camshaft Bore	26.987 - 27.012
Camshaft Journals	26.936 - 26. 962
Head Volume	46.70 - 49.70 ml.

Camshaft End Play

0.025 - 0.165 mm (using a force of 30-50 lbs - do not exceed 50 lb. as damage may occur to the thrust washer).

Camshaft Sensors	**MM**
Air Gap	1 (±0.5)

Torque Figures

Description		Nm.	lb./ft.
Cylinder head	1. Bolts 1 to 14	37-43	27.5-32
	2. Bolts 15-16	15-20	11.5-15
	3. Bolts 1-14	85°-95°	
	4. Release bolts 1-14	Min. 360°	
	5. Bolts 1 to 14	37-43	27.5-32
	6. Bolts 15-16	23-27	17-20
	7. Bolts 1 to 14	85°-95°	
	8. Bolts 1 to 14	85°-95°	
Camshaft bearing caps		8-12	6-9

Maintenance

Cylinder Head

Removal

1. Remove the engine from vehicle (Refer to 'Engine', page 3-1-4)
2. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
3. Remove the exhaust manifold (Refer to 'Exhaust Manifold', page 3-2-10).
4. Drain the engine coolant (Refer to 'Coolant Drain / Fill', page 3-4-3).
5. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
6. Remove the thermostat housing (Refer to 'Thermostat', page 3-4-5).
7. Remove the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
8. Remove the timing cover (Refer to 'Timing Cover', page 3-11-3).
9. Remove the timing chains (Refer to 'Valve Timing Chains', page 3-10-1)
10. Remove both camshafts.



10.1 Progressively release all bolts that secure each bearing cap.

The thrust camshaft bearing cap, of each camshaft (No.1 and No. 8 cap), must be removed first and installed last.

10.2 Withdraw the bearing caps. Ensure they are retained in the sequence withdrawn.

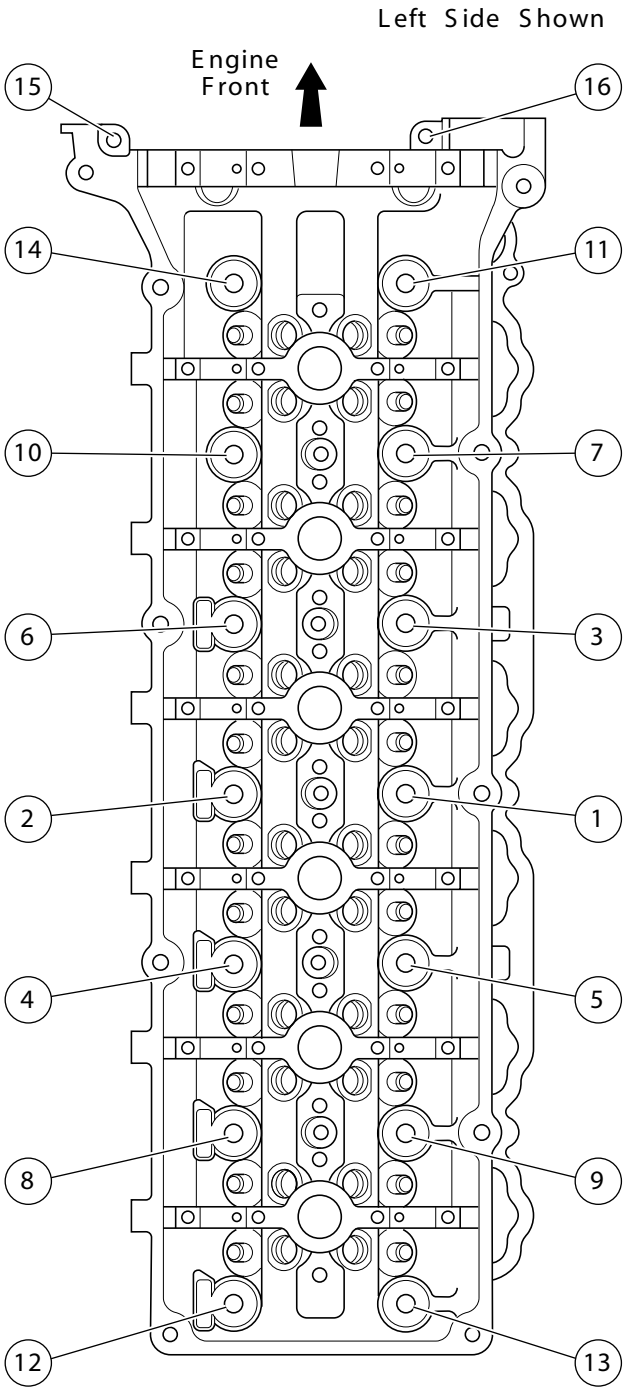
10.3 Withdraw the camshafts.

11. Remove the camshaft followers and lash adjusters. Ensure they are retained in the sequence removed.





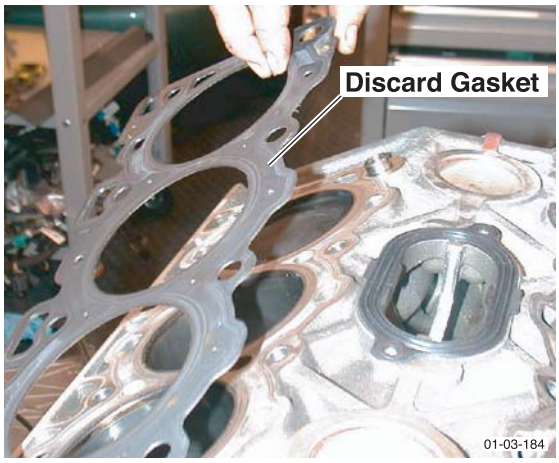
12. Remove bolts (x2 (M8) and (x14 (M10)) from the cylinder head in order as shown below.



13. Withdraw the cylinder head. Discard the cylinder head gasket.

    Cover the engine block to prevent ingress of foreign material.





14. Remove the second cylinder head if required.
15. Overhaul the cylinder head(s) as required (Refer to 'Cylinder Head', page 3-2-3).

Installation

Ensure all mating surfaces are clean, smooth and free of any contamination.

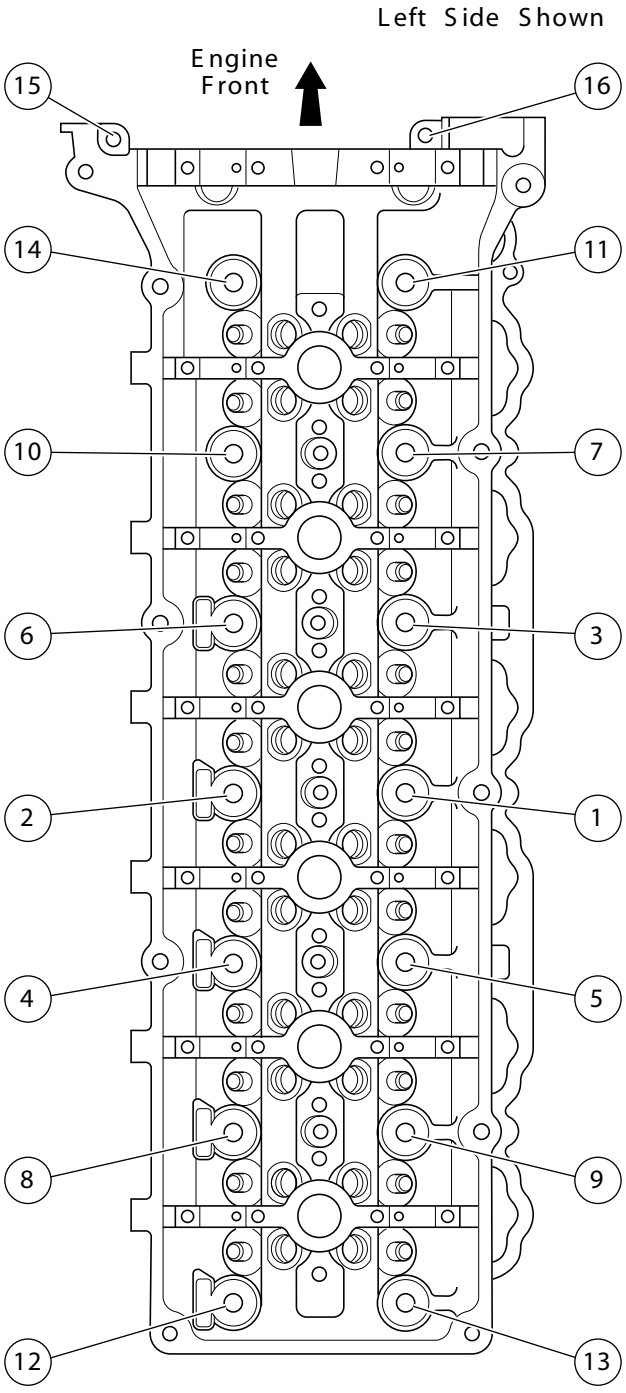
1. Place a new cylinder head gasket over the locating dowels.
2. Lubricate beneath the head of all the cylinder head bolts (x14 (M10) and x2 (M8) with engine oil. **Do not lubricate the threads.**

   Place the bolts to the cylinder head.

Caution

The following 'Torque - Release - Torque' sequence must be performed exactly as specified to ensure correct cylinder head to engine block sealing.

3. Torque the cylinder head in stages using the following procedure:



3.1 Initial Torque

1 Torque bolts 1 -14 (M10) to **37-43 Nm**. in the sequence shown.

2 Torque bolts 15-16 (M8) to **15-20 Nm**.

3 Torque bolts 1-14 (M10) a further **85-95°** in the sequence shown.

3.2 Release

1 Loosen bolts 1-14 (M10) a minimum of **one full turn** (360°).

3.3 Final Torque

1 Torque bolts 1-14 (M10) to **37-43 Nm.** in the sequence shown.

2 Torque bolts 15-16 (M8) to **23-27 Nm**.

3 Torque bolts 1-14 (M10) a further **85-95°** in the sequence shown.

4 Torque bolts 1-14 (M10) an additional **85-95°** in the sequence shown.

4. Repeat for the second cylinder head.
5. Install all lash adjusters.

Soak the lash adjusters in engine oil.

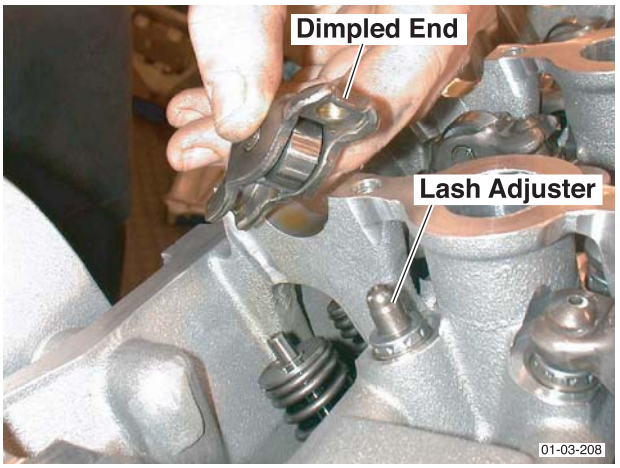
Insert each lash adjuster into its correct recess in the cylinder head.

6. Install the camshaft followers to their valves.

Caution

Ensure that the dimpled end of the camshaft followers are installed to the lash adjusters.

Soak the cam followers in engine oil.



7. Lubricate the camshaft journals, camshaft bearing caps with engine oil.
8. Ensure the crankshaft key is vertical.

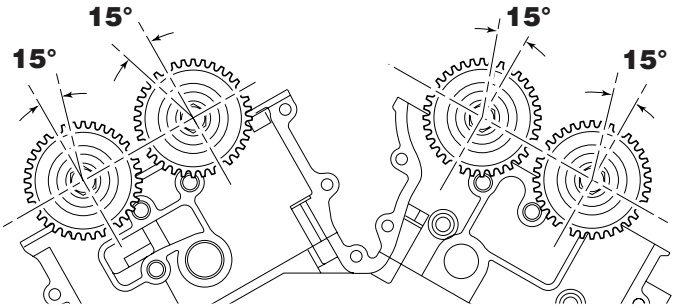
Caution

The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.

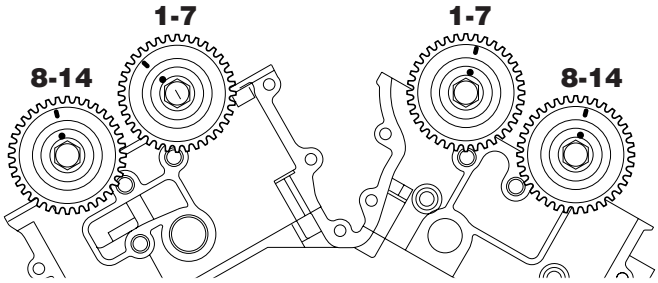
9. Place the camshafts in position, with the timing marks in the positions shown.

The positions shown allow the camshafts to lay at their lowest in the journals.



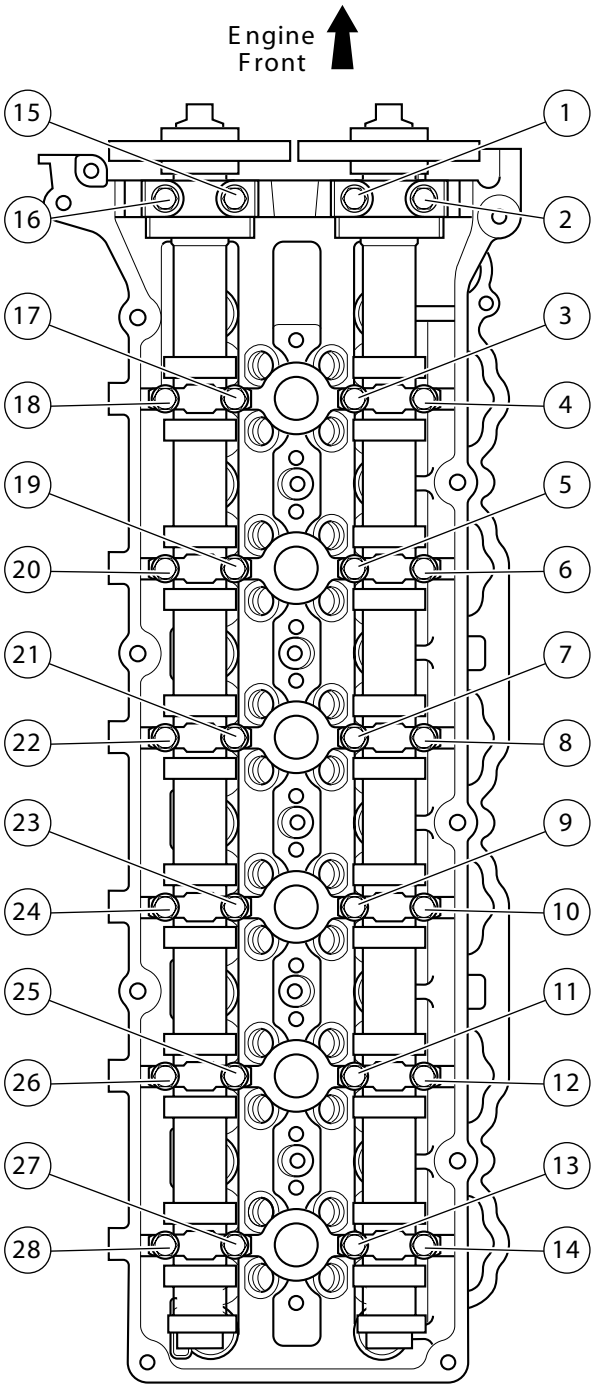
10. Work on one cylinder head at a time.
11. Install all camshaft bearing caps, except the two thrust camshaft bearing caps (No.1 and No. 8 cap) at the front of each camshaft. Loosely secure each cam cap.

Bearing Caps



The bearing caps are numbered and correspond with numbers stamped on the cylinder head adjacent to the journal.

12. Test install No.1 and No. 8 bearing caps over their thrust flanges. If the bolt holes do not perfectly align, move the camshafts forward or rearward as required until the bearing caps locate correctly. Loosely secure the bearing caps.
13. Torque down the camshafts.
    13.1 Progressively 'nip' down all bolts in the sequence shown. Ensure the camshaft bearing caps pull down evenly into contact with the cylinder head.
    13.2 In the sequence shown, torque the camshaft bearing caps to **8-12 Nm**.



14. Repeat from step 10. for the second cylinder head.
15. Install the timing chains. Perform the camshaft timing procedure
16. (Refer to 'Valve Train (03.09)', page 3-10-1).
17. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).

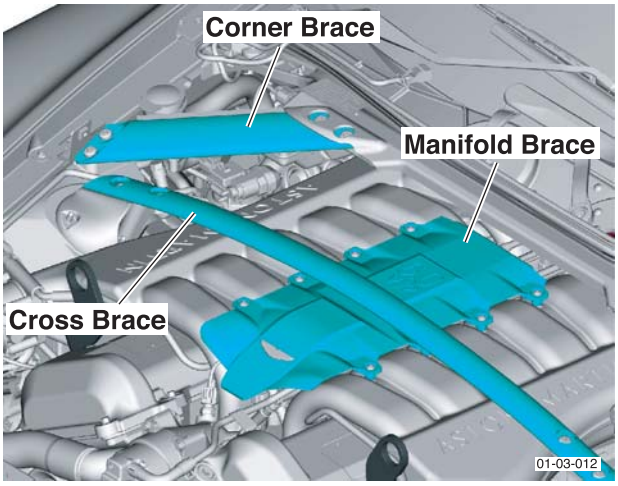
18. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1)
19. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
20. Install the thermostat housing (Refer to 'Thermostat', page 3-4-5).
21. Fill the engine coolant system (Refer to 'Coolant Drain / Fill', page 3-4-3).
22. Install the exhaust manifold (Refer to 'Exhaust Manifold', page 3-2-10).
23. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
24. Install the engine to vehicle (Refer to 'Engine', page 3-1-4).

Inlet Manifold

Repair Operation Time (ROT)		
Item		**Code**
Inlet Manifold Renew	LH	**03.01.BB**
	RH	**03.01.DB**

Removal

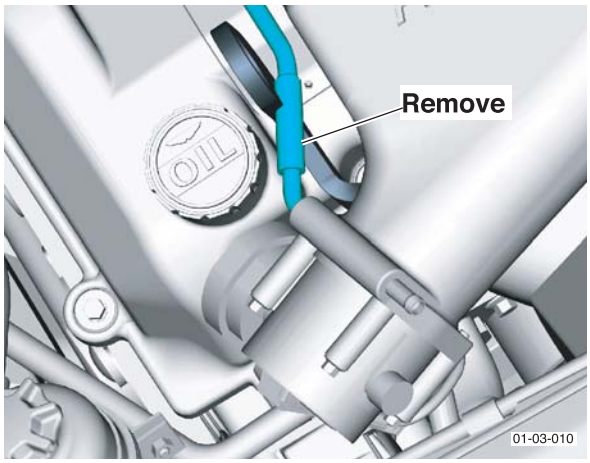
1. Depressurise the fuel system (Refer to 'Depressurising', page 10-1-8).
2. Disconnect the vehicle battery.
3. Remove the engine bay corner braces (x2), engine bay cross brace and manifold brace.

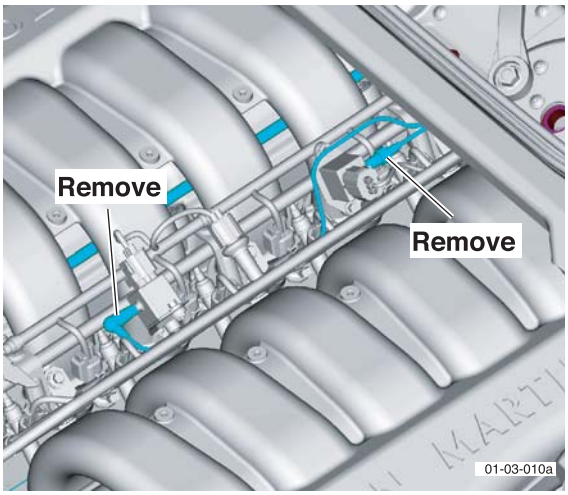


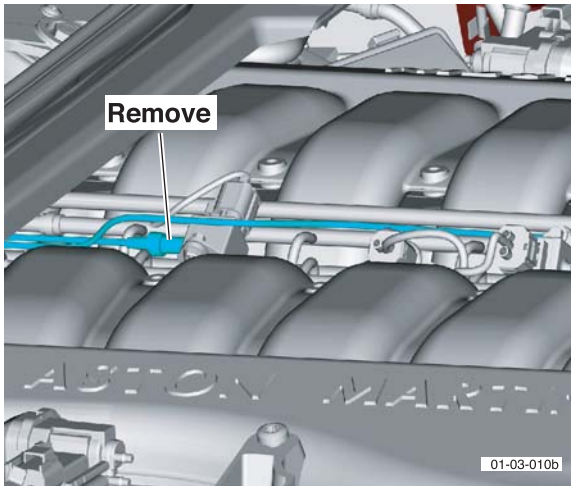
4. Remove the air intake pipe.

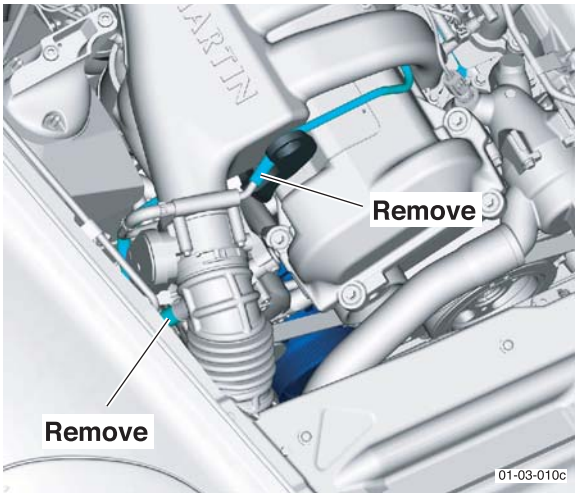


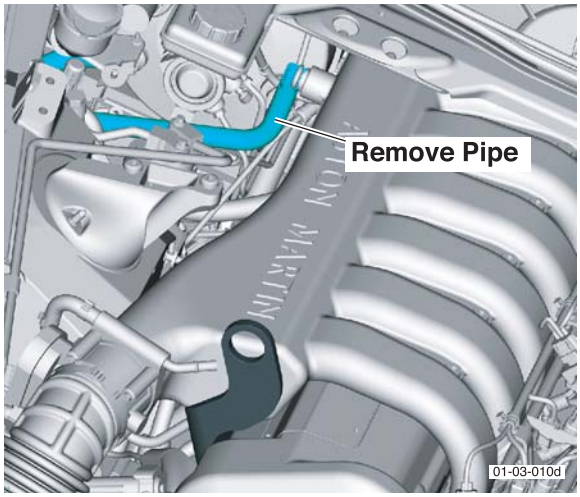
5. Remove the following from the inlet manifold.



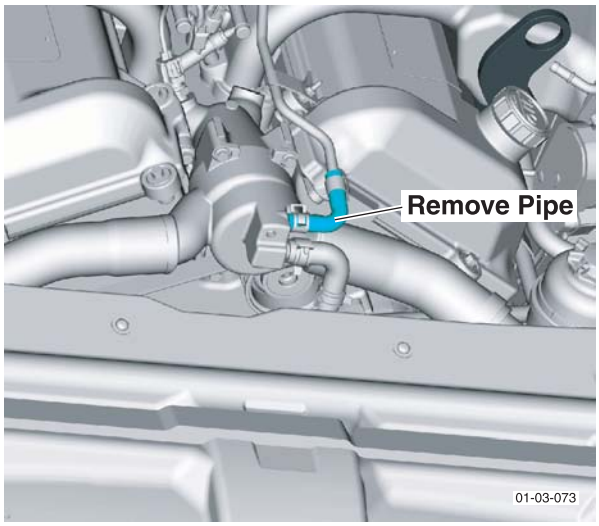




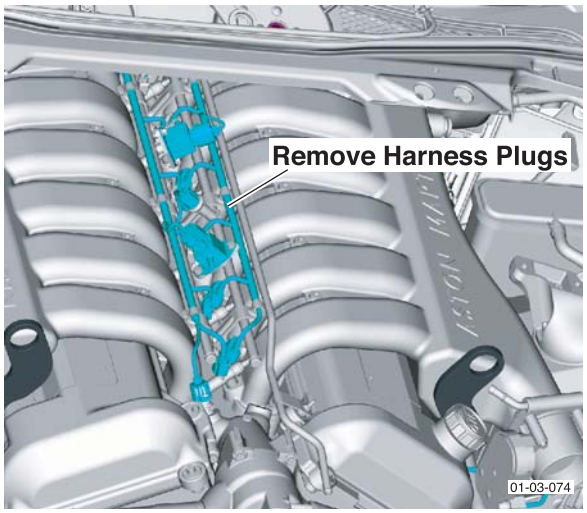




6. Remove the thermostat housing by-pass hose. Plug the open ends.

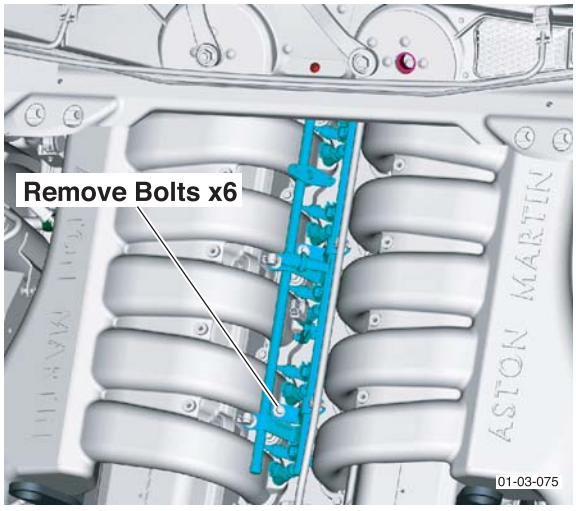


7. Remove the following:
   - Fuel rail temperature sender wiring harness plug
   - Fuel rail pressure sensor wiring harness plug
   - Injector wiring harness plugs



> ⚠ ***Warning*** ⚠
> ***If the fuel system is pressurised, fuel will be released and may contaminate eyes and / or skin.***

8. Remove the fuel rails and injectors.
   8.1 Remove bolts (x6) that secure the fuel rails.
   8.2 Withdraw the fuel rails sufficiently to remove the injectors.
   8.3 Discard the injector 'O' rings.



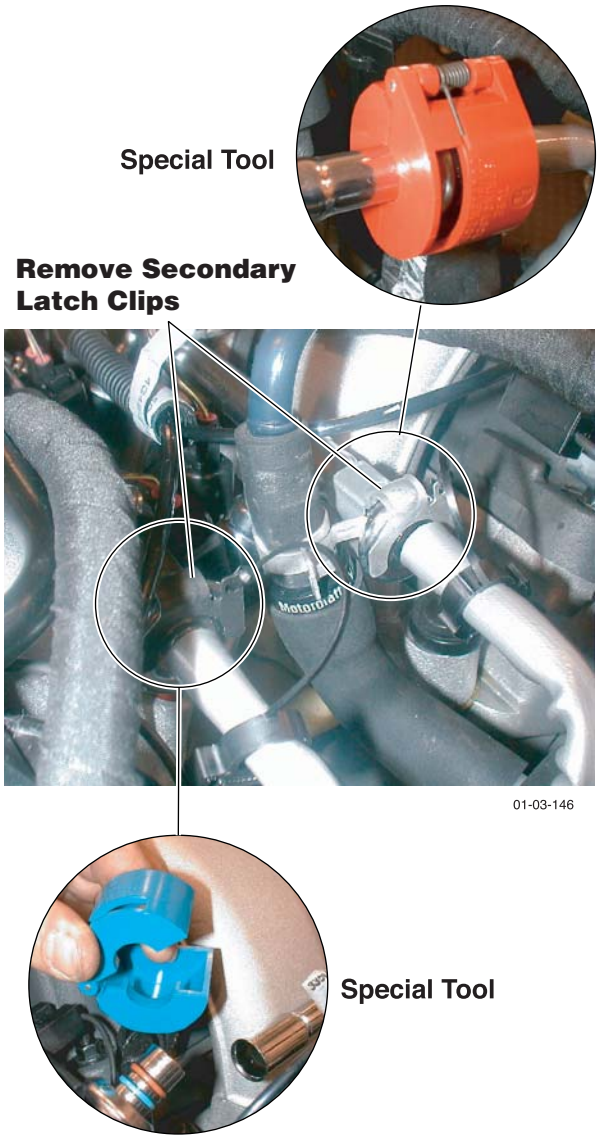
9. Disconnect the fuel rails from the fuel supply hoses.

Left and right hand fuel rails to the fuel supply hose unions are different sizes.

9.1 Remove the secondary latch clip from each fuel line.

9.2 Locate correct size of service tool around the union.
- (Refer to '412-038 (Quick Disconnect Tool)', page 20-1-7)
- (Refer to '412-040 (Quick Disconnect Tool)', page 20-1-7)

9.3 Push back on the tool. While pushed back withdraw the fuel rail.



10. Remove the inlet manifold.

10.1 Remove bolts (x7) that secure the inlet manifold to the cylinder head.

10.2 Withdraw the inlet manifold sufficiently to gain access to it's rear and disconnect the vacuum harness.

10.3 Withdraw the inlet manifold. Discard the gaskets.

11. Cover the inlets to the cylinder head to prevent contamination of the cylinders.

Installation

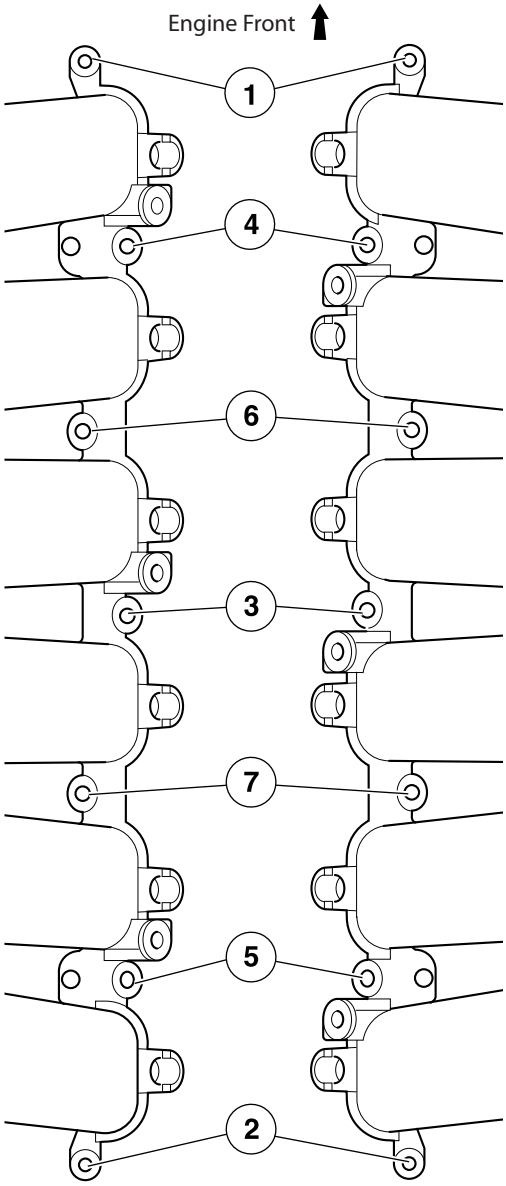
Ensure all faces are clean and free of damage / contamination.

1. Place a new inlet manifold gasket to the inlet manifold. Locate the two 'lipped' holes in the gasket through the two corresponding bolt inserts in the inlet manifold.
2. Install the inlet manifold.

2.1 Place the inlet manifold to the cylinder head and install the vacuum harness to the rear of the inlet manifold.

2.2 Locate the inlet manifold to the cylinder head. Ensure the gasket remains in position.

2.3 Secure the inlet manifold to the cylinder head. Torque bolts (x7), in the order detailed below, to **8 - 12 Nm**.



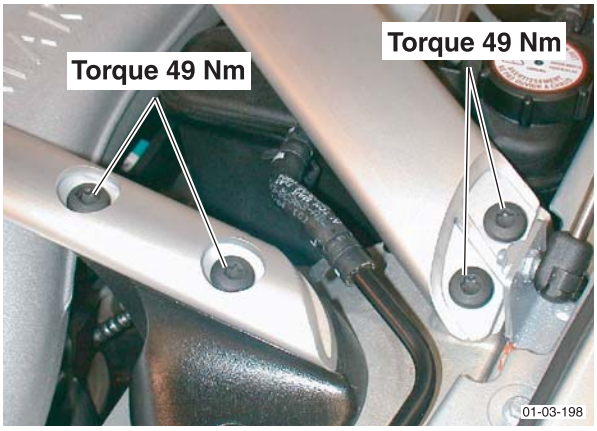
3. Install the injectors to the inlet manifold, complete with new 'O' rings.

Note position of 'O' rings
- *Blue (top)*
- *Green (bottom)*

4. Install the fuel rails.
   4.1 Locate fuel rails over injectors.
   4.2 Pull down' fuel rail onto injectors by tightening bolts (x3). Torque bolts to **8-12 Nm**.
5. Connect fuel rails to fuel supply lines.

Ensure each fuel rail and fuel supply line are 'in-line' before connection.

6. Install the secondary latch clips to the fuel lines.
7. Connect the following wiring harness plugs:
   - Temperature sender to fuel rail
   - Pressure sensor to fuel rail
   - To the injectors
8. Connect thermostat housing by-pass pipe.
9. Install the air intake hose.
10. Install the engine bay corner braces (x2), engine bay cross brace and manifold brace. Torque bolts to:
    - Engine cross brace - **49 Nm.**
    - Manifold brace - **8-12 Nm**.
    - Corner braces - **49 Nm.**

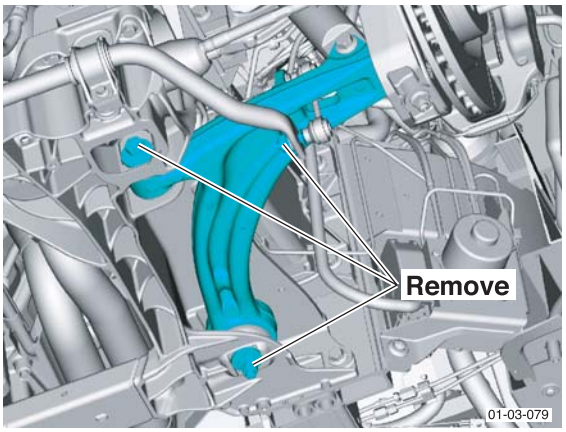


Exhaust Manifold

Repair Operation Time (ROT)		
Item		**Code**
Exhaust Manifold Renew	LH	**09.03.DB**
	RH	**09.03.EB**

Removal

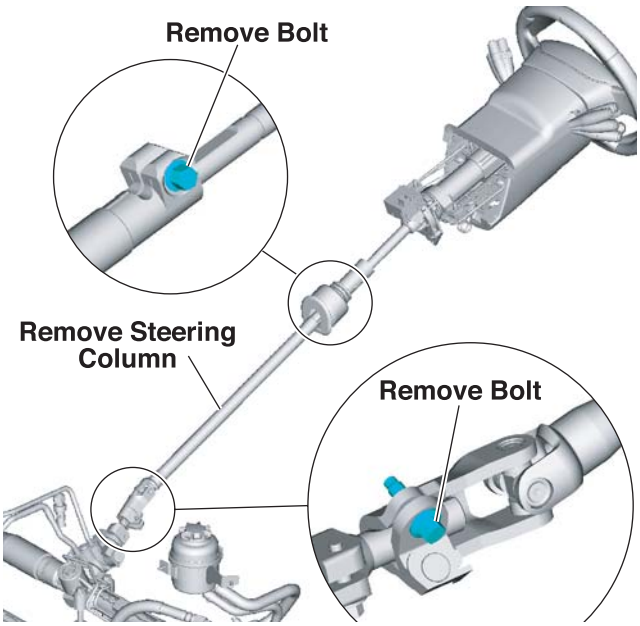
1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the front roadwheels and wheel arch liners.
4. Remove the undertray.
5. Remove the lower suspension arms.



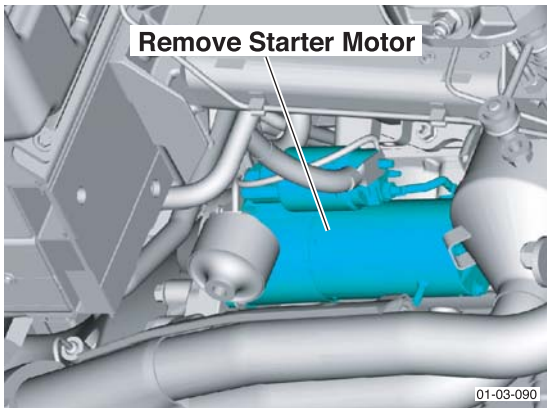
6. Disconnect the anti-roll bar links.
7. Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).

RH manifold

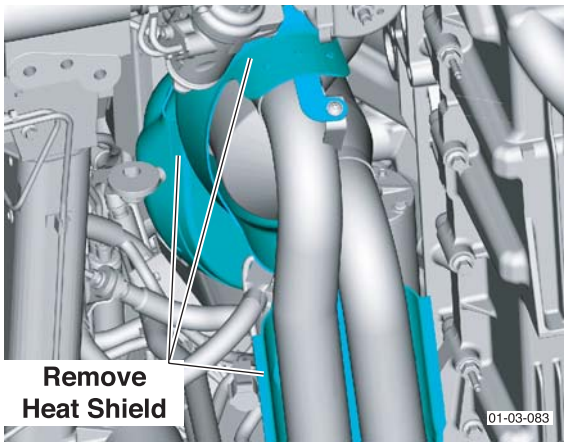
1. Remove the steering column (RH drive only).



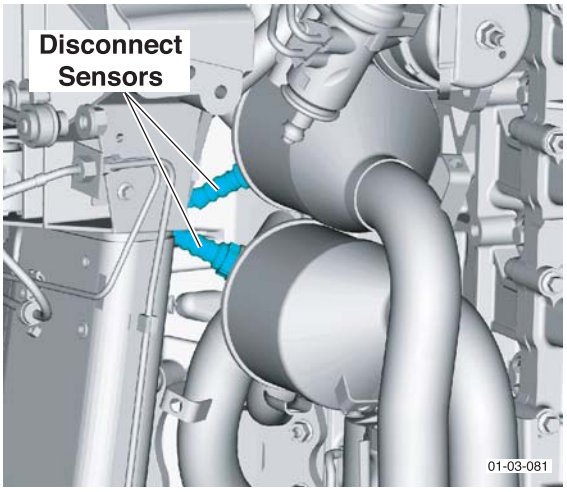
2. Remove the starter motor.



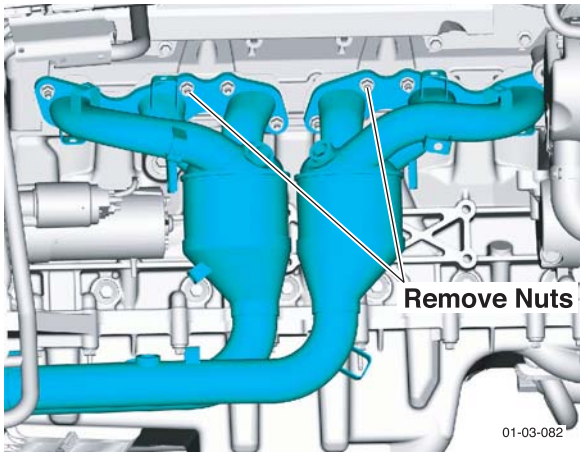
3. Disconnect the heated oxygen sensors (x2) and the Catalyst Monitor sensors (x2).
4. Remove the exhaust heat shields.



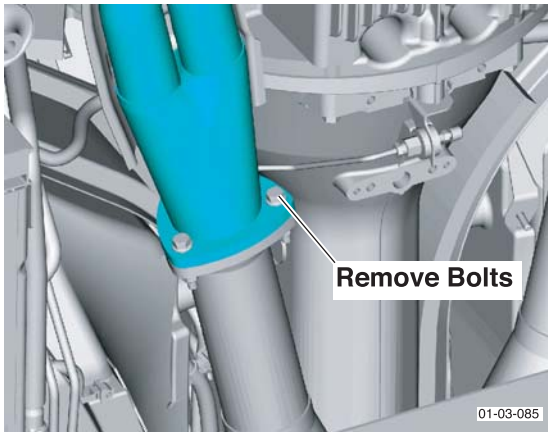
5. Disconnect the heated oxygen sensors (x2) and the Catalyst Monitor sensors (x2).



6. Remove exhaust manifold.
   6.1 Remove manifold nuts (x12).



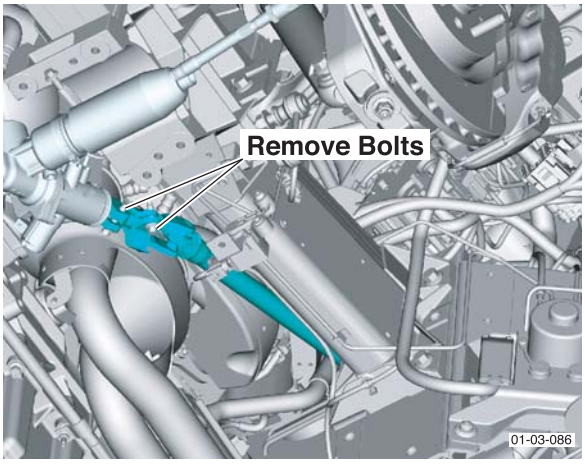
   6.2 Remove nut and bolt (x3).



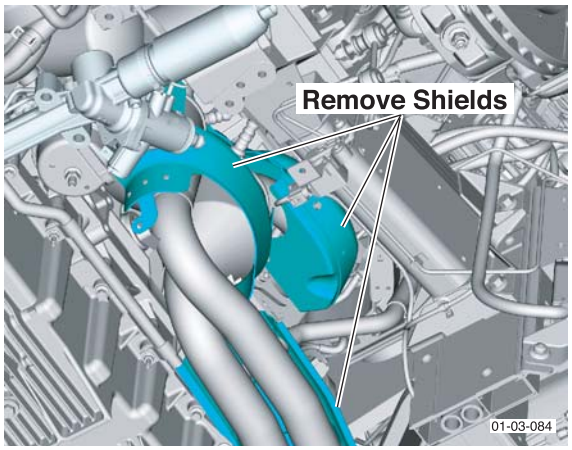
   6.3 Withdraw the manifold.
   Discard the manifold gasket.

LH Manifold

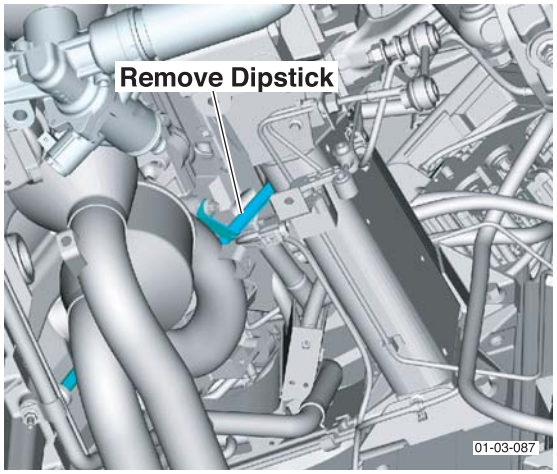
1. Remove the lower steering column (LH drive only).



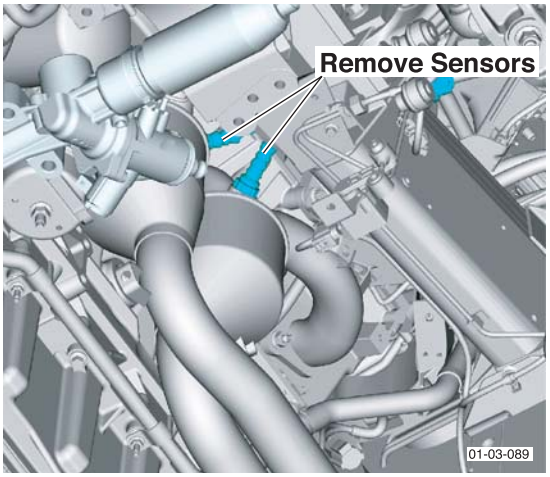
2. Remove the exhaust heat shields.



3. Remove the dip stick.

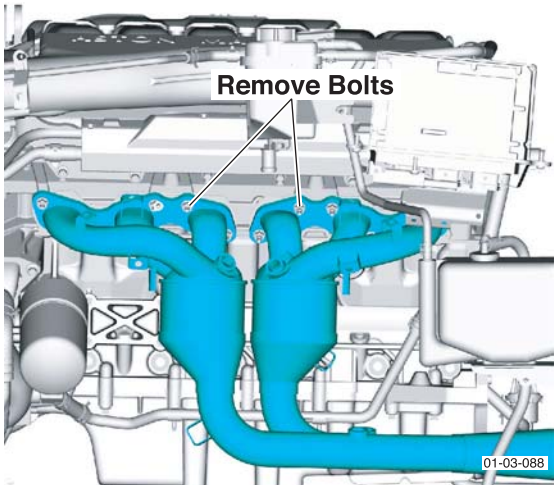


4. Disconnect the heated oxygen sensors (x2) and the Catalyst Monitor sensors (x2).

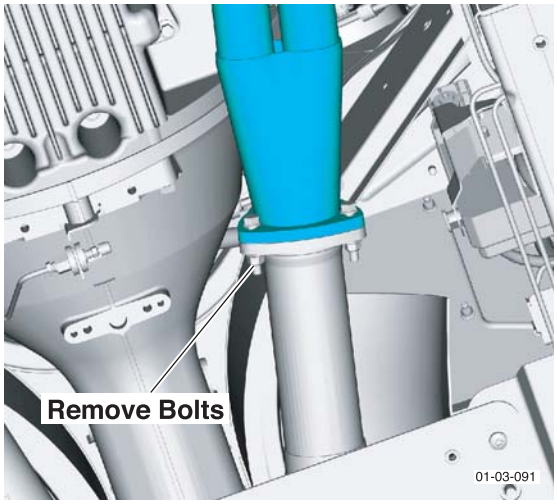


5. Remove the exhaust manifold.

5.1 Remove manifold nuts (x12).



5.2 Remove nut and bolt (x3).

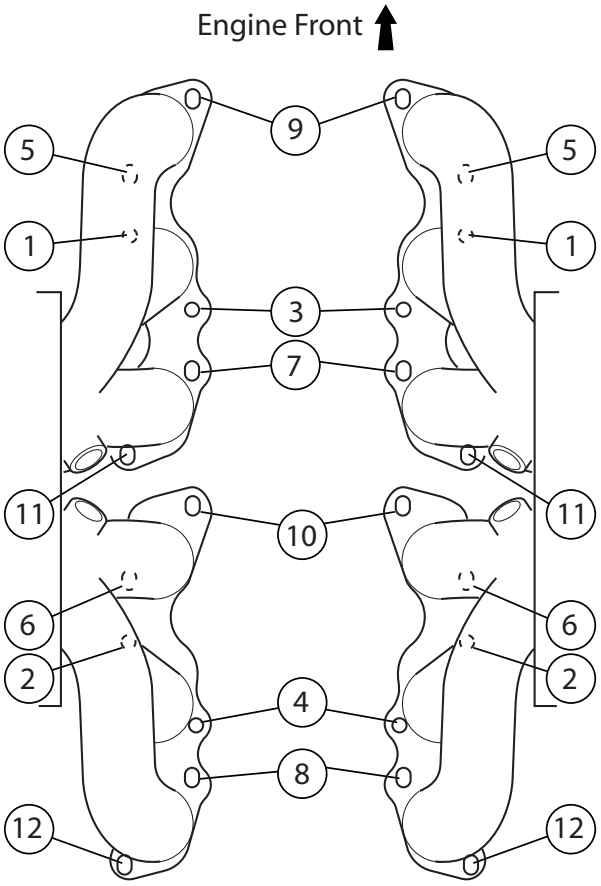


5.3 Withdraw the manifold.
Discard the manifold gasket.

Installation

Use new gaskets.

1. Place a new gasket and the exhaust manifold to the cylinder head.
2. Install nuts (x12). Torque nuts, in sequence shown, to **18-22 Nm**.



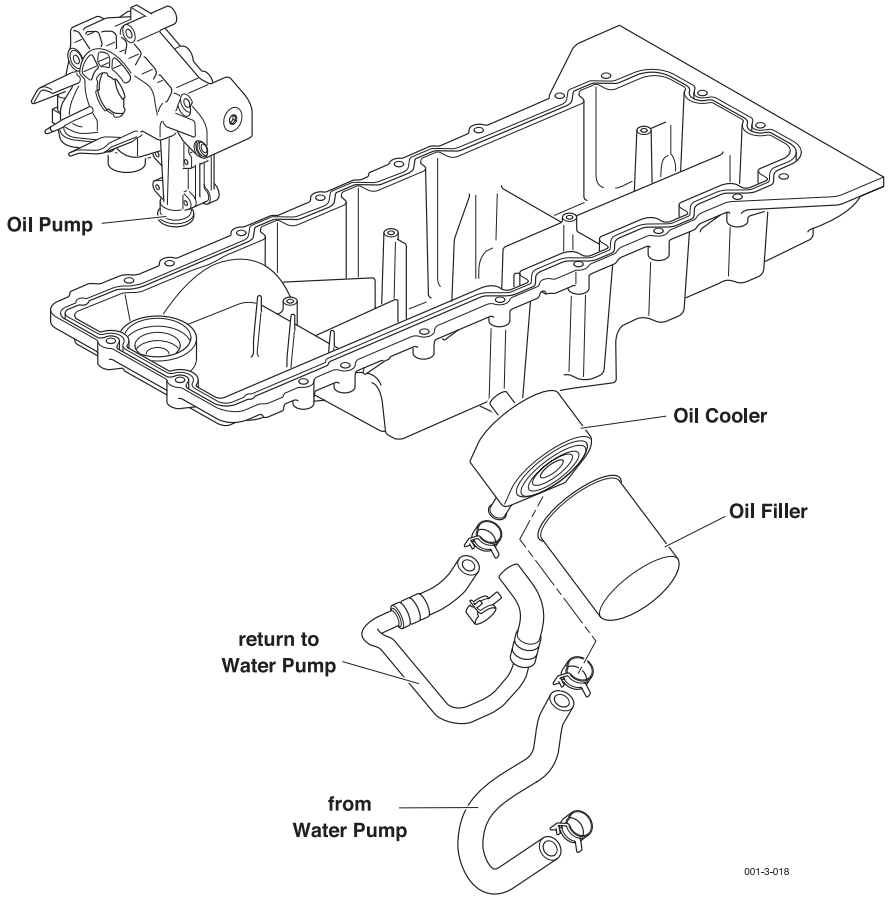
3. Install the Heated Oxygen sensors (x2) and the Catalyst Monitor sensors (x2).
4. Install the exhaust heat shields.
5. Install:
   - 5.1 **LH Manifold**.
     - The Dip stick
     - The Lower steering column (LH drive only)
   - 5.2 **RH Manifold**.
     - The Alternator
     - The Starter motor
     - The Lower steering column (RH drive only)
6. Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
7. Install the lower suspension arms and anti-roll bar links (Refer to 'Front Suspension (04.01)', page 4-2-1).
8. Install the undertray.
9. Install the road wheels.(Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

ASTON MARTIN
ASTON MARTIN

Engine (03.00)

Lubrication System (03.02)

Description

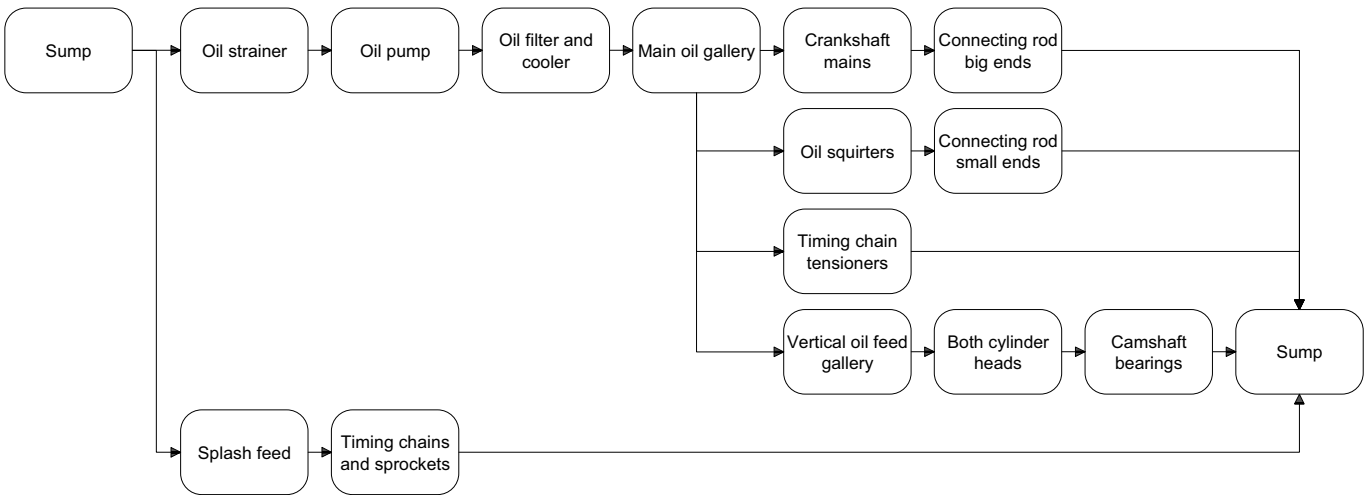


The engine uses a wet sump lubrication system.

Oil is drawn from the sump via an oil strainer and pick-up tube to the crankshaft driven oil pump. Pressure from the oil pump is limited by a built in oil pressure relief valve. Pressurised oil then flows from the left side of the engine through a filter and cooler then back into the engine main oil gallery.

Oil pressure at the re-entry point is approximately 60 psi with the engine hot and should reach at least 100 psi when cold.

Oil flow



Specifications

Engine oil		Mobil 1
	Europe / Aus	0W-40
	USA	0W-30 or 0W-40

To achieve the required high performance of synthetic lubricants, do not mix with mineral oils.

Capacity	**Europe (Litres)**	**UK (Pints)**	**USA (Qts.)**
Engine sump (incl. filter)	10.0	17.6	10.6

Torque Figures

Description		Nm.	lb. / ft.
Sump plug		23-27	17-20
Sump bolts (two stage)	1.	15	11.5
		(in sequence)	
	2.	A further 90° (same sequence)	
Oil pump bolts	M8	23-27	17-20
	M6	8-12	6-9

Engine Oil Specification

An oil of 0W-30 viscosity meeting Aston Martin specification WSS M2C913-A/B or 0W-40 viscosity meeting Aston Martin specification WSS-M2C937-A is preferred. Where this is not possible, oil meeting the following standards may be used.

0W-30	
Authority	Standard
API	SL / SJ / EC / CF
ACEA	A1 / A5 / B1 / B5
ILSAC	GF3

0W-40	
Authority	Standard
API	SL / SJ / EC / CF
ACEA	A3 / B3 / B4
ILSAC	GF3

Maintenance

Oil Drain

1. Remove the front undertray.
2. Remove the sump plug. Drain the oil into a suitable receptacle.
3. Install a new sump plug. Torque to **23-27 Nm**.

Caution
Always install a new oil drain bolt.

4. Wipe the area clean before installing the front undertray. Install the front undertray.

Oil Filter

Repair Operation Time (ROT)		
Item		**Code**
Oil Filter Renew	LHD	**TBA**
	RHD	**03.02.AB**

Removal

RH Drive.

1. Remove the front undertray.
2. Remove the oil filter.



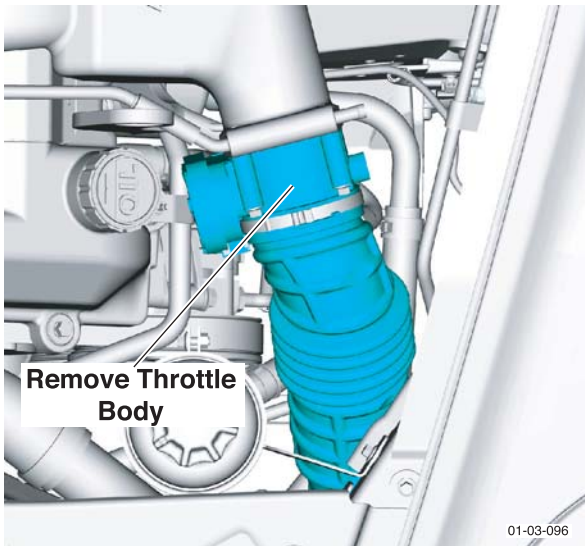
To lessen the amount of engine oil spillage, cover the oil filter with a plastic bag.

3. Clean any excess oil from around and below the oil filter.

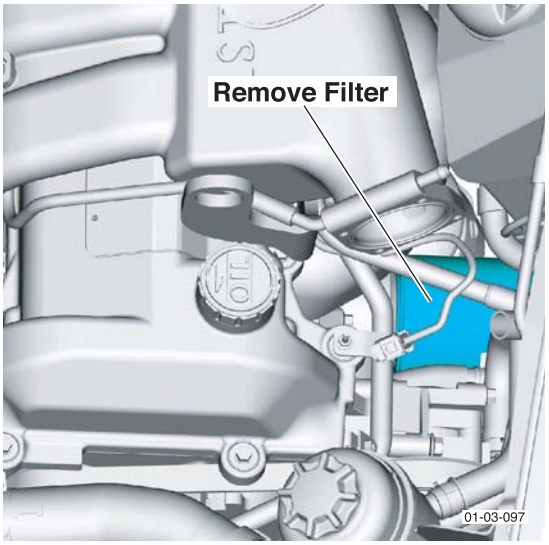
Caution
Engine oil may drain onto the steering rack and rubber hoses. Ensure excess engine oil is removed before installing the undertray.
Engine oil which remains may drip, in time, onto the undertray and indicate a false engine oil leak.

LH Drive.

1. Remove the front undertray.
2. Remove the air intake from the throttle body. Remove the throttle body.



3. Remove the oil filter.



To lessen the amount of engine oil spillage, cover the oil filter with a plastic bag.

4. Clean any excess oil from around and below the oil filter.

Caution

Engine oil may drain onto the steering rack and rubber hoses. Ensure excess engine oil is removed before installing the undertray.

Engine oil which remains may drip, in time, onto the undertray and indicate a false engine oil leak.

Installation

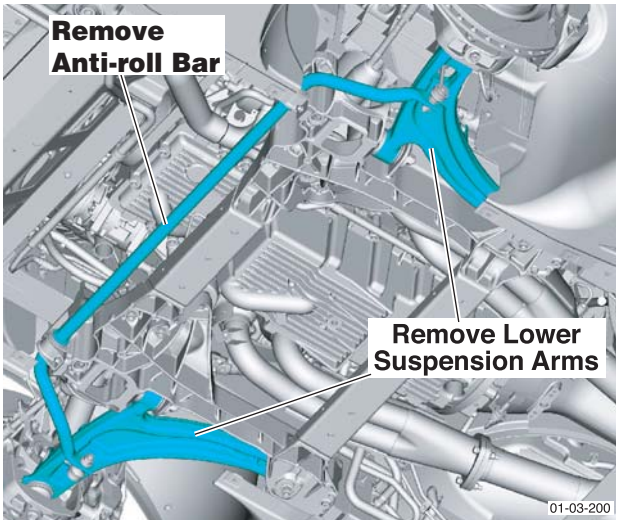
1. Smear the lip of the oil filter with clean engine oil.
2. Install the oil filter to the engine block. Tighten the oil filter hand tight.
3. **L/H drive only**.
   Install the throttle body and air intake pipe.
4. Install the front undertray.

Sump

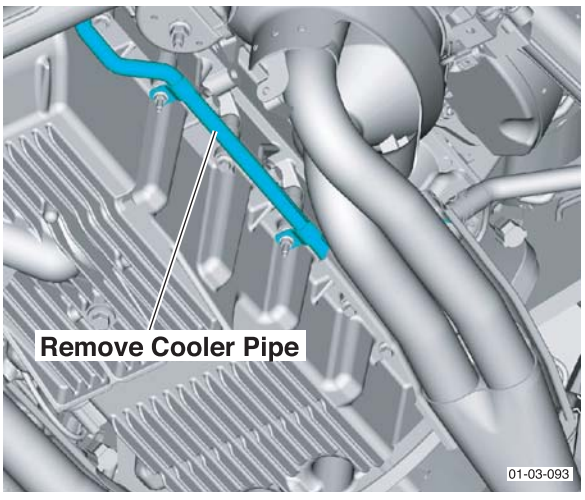
Repair Operation Time (ROT)		
Item		**Code**
Sump Remove / Install	LH	**03.02.BN**

Removal

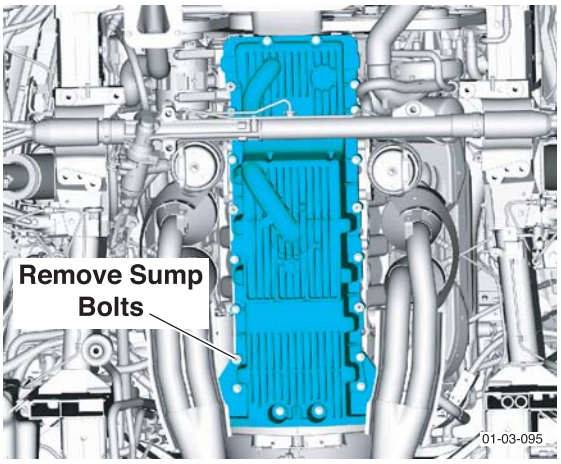
1. Drain the engine oil.
2. Remove the lower suspension arms (from the front subframe) and the anti-roll bar (Refer to 'Front Suspension (04.01)', page 4-2-1).



3. Support the engine from above (Refer to '303-1080 (Engine Support Adaptor)', page 20-1-6).
4. Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).
5. Withdraw the coolant pipe from the sump.



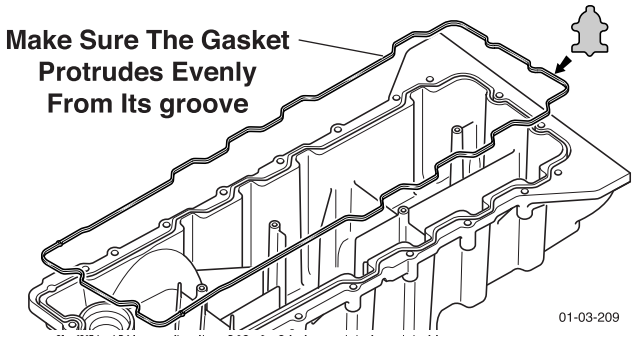
6. Remove bolts (x15 M8) and (x5 M6) that secure the sump. Withdraw the sump. Discard the sump gasket and oil seal (oil pump).



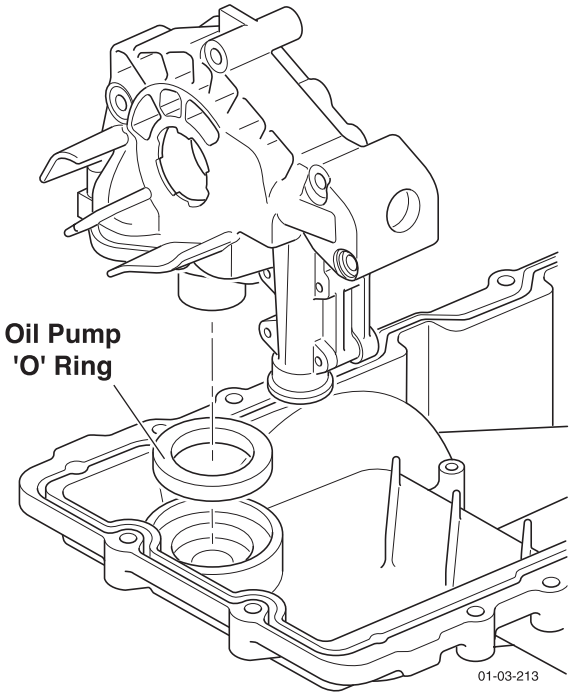
7. Clean the sump and engine block mating surfaces.

Installation

1. Ensure the sump is clean.
2. Install a new sump gasket. Ensure that the gasket protrudes evenly from its groove all around the sump.

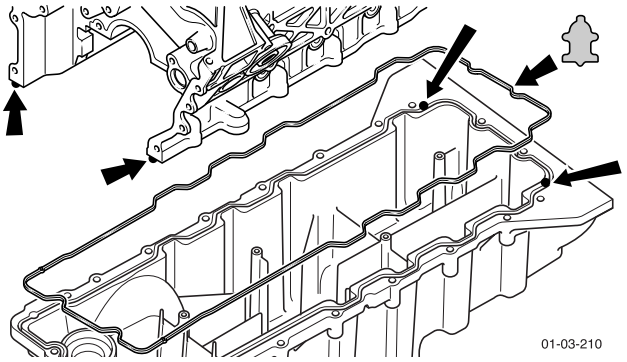


3. Install a new oil seal to the sump (oil pump to sump).



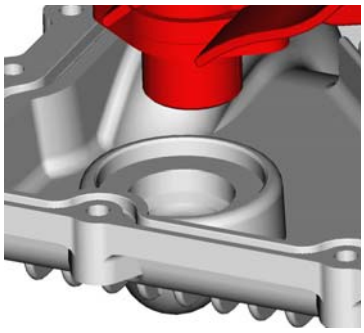
4. Apply dots (10 mm Dia approx.) of sealant to the sump sealing surface in the positions indicated.

The sump must be installed and secured within 6 minutes of applying beads of sealant.



5. Install the sump.

Ensure that the sump oil outlet seal locates to the oil pump inlet before the sump is faced up to the engine block.
Do not use a mallet etc. to face up the sump to engine block.



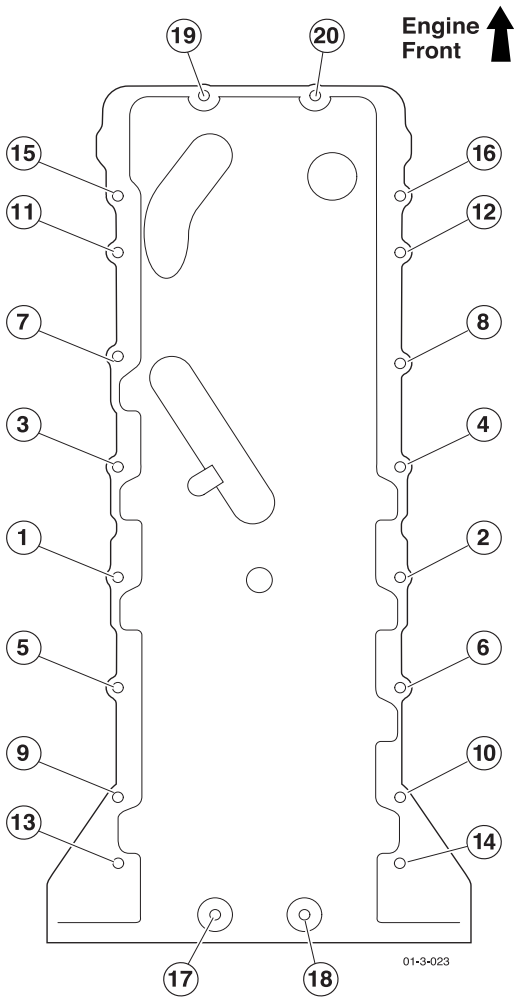
Ensure the sump is flush to 0.25mm underflush to the rear face of the cylinder block.

Secure the sump using bolts (x15 M8) and (x5 M6).

Tighten the bolts using a two stage procedure:

1 Tighten all bolts to **15 Nm.** in the sequence shown.

2 Tighten all bolts through a further **90°** following the same sequence.



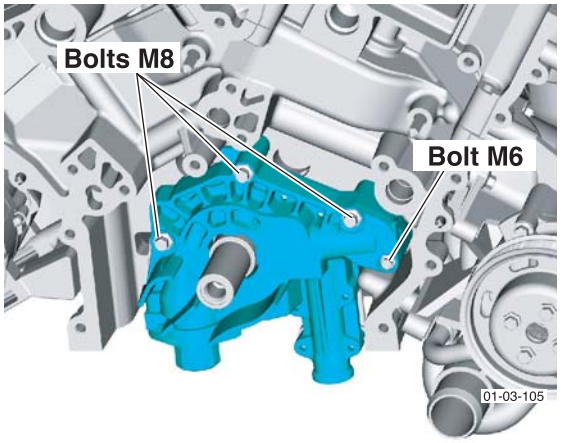
6. Install the coolant pipe.
7. Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
8. Install the lower suspension arms (Do not torque bolts)
9. Install the anti-roll bar. Torque the stabiliser nut to **110 Nm**.
10. Remove the engine support.
11. Fill the engine with the recommended quantity and grade of engine oil (Refer to 'Specifications', page 3-3-2).
12. Torque the suspension fixings with the vehicle at normal ride height (Refer to 'Front Suspension (04.01)', page 4-2-1):
    - Lower suspension arms to the subframe - **115 Nm**.
13. Check and adjust the front wheel alignment (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
14. Raise the vehicle and install the front undertray.

Oil Pump

Repair Operation Time (ROT)	
Item	**Code**
Oil Pump Renew	**TBA**

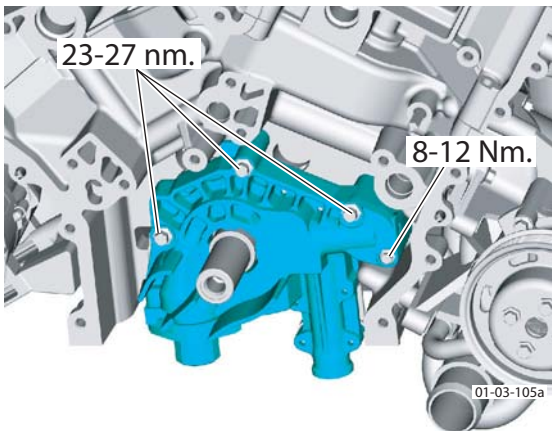
Removal

1. Drain the engine oil.
2. Remove the engine from the vehicle (Refer to 'Removal', page 3-1-4).
3. Remove the sump (Refer to 'Sump', page 3-3-3).
   Discard the sump gasket and oil seal.
4. Remove the timing chains (Refer to 'Valve Timing Chains', page 3-10-1).
5. Remove bolts (x1 M6) and (x3 M8) that secure the oil pump. Withdraw the oil pump.



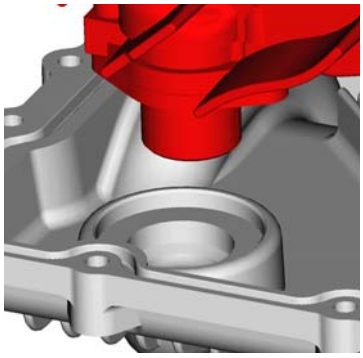
Installation

1. Locate the oil pump onto the crankshaft.
   Install the oil pump.
   - Torque bolts (M8 x3) to **23-27 Nm.**
   - Torque bolts (M6 x1) to **8-12 Nm.**



2. Install the timing chains (Refer to 'Valve Timing Chains', page 3-10-1).
3. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
4. Install the sump (Refer to 'Sump', page 3-3-3) complete with new gasket and oil seal.

Ensure that the sump oil outlet seal locates to the oil pump inlet before the sump is faced up to the engine block.
Do not use a mallet etc. to face up the sump to engine block.



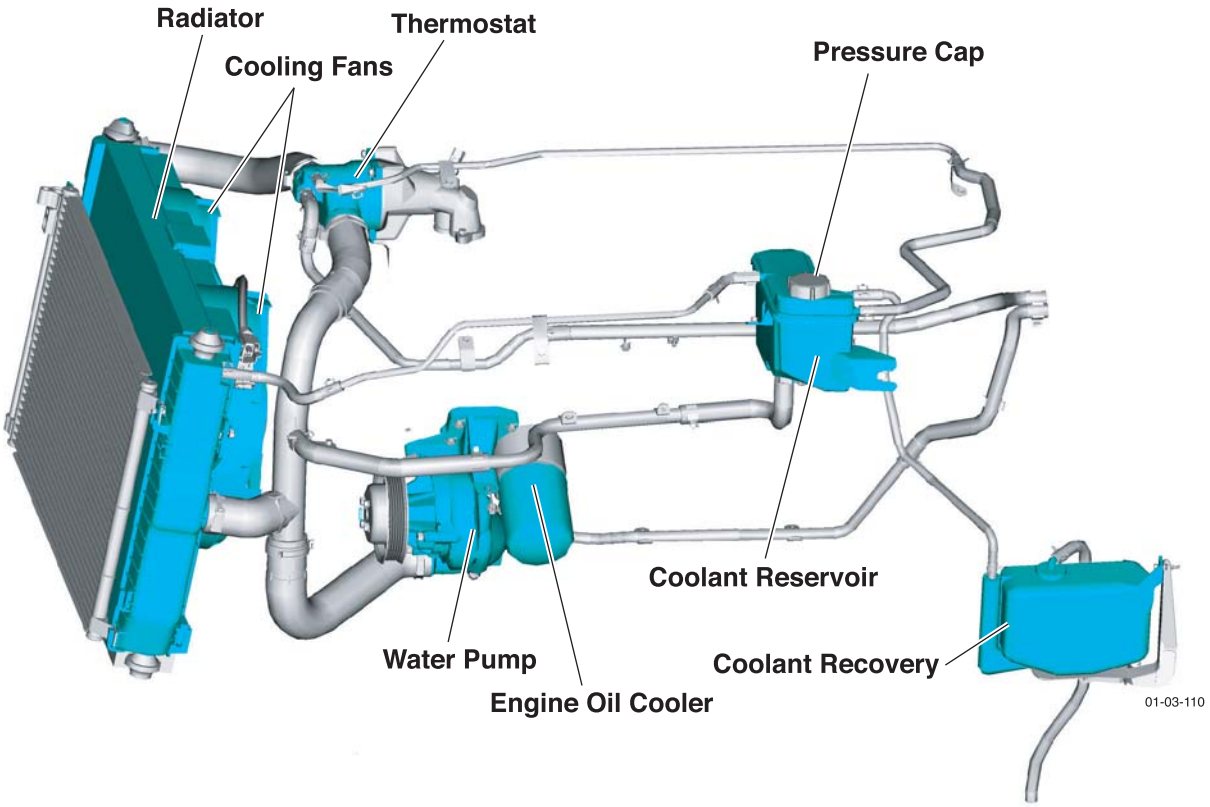
Ensure the sump is flush to 0.25mm underflush to the rear face of the cylinder block.

5. Install the engine to vehicle (Refer to 'Engine', page 3-1-4).
6. Fill the engine with the recommended quantity and grade of engine oil (Refer to 'Specifications', page 3-3-2).
7. Check and adjust the front wheel alignment (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Engine (03.00)

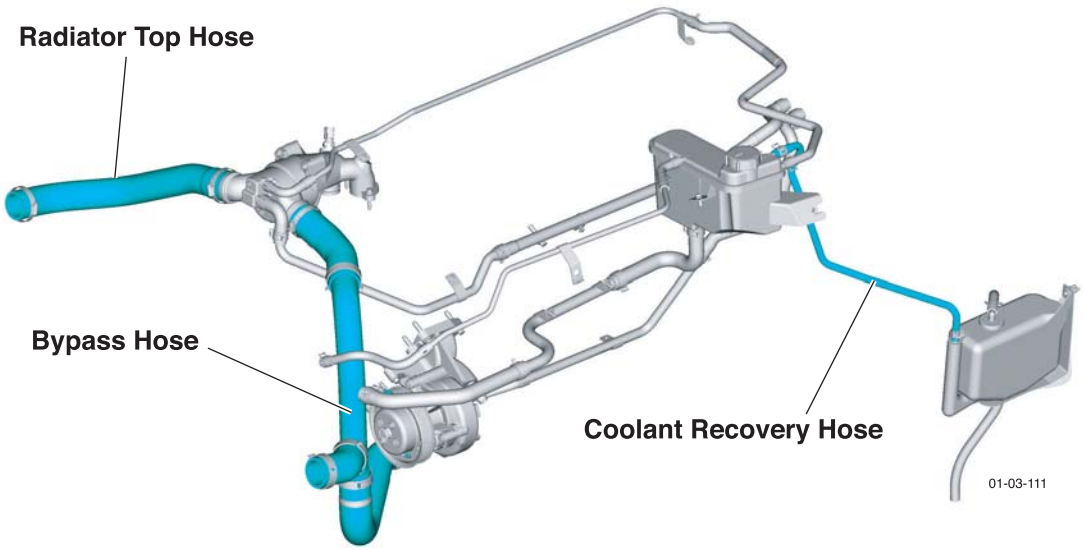
Cooling System (03.03)

Description



- Water pump
- Radiator
- Coolant Reservoir
- Cooling fan motor control module
- Thermostat
- Pressure cap
- Electric cooling fans (x2)
- Engine oil cooler

Coolant Circuit



Water Pump

The water pump is of a conventional design and is located at the front of the engine. It is driven by the accessory drive belt.

Thermostat

The thermostat allows rapid engine warm-up by redirecting coolant flow through the engine below 88.3°C (190.9°F). The thermostat also assists in keeping the engine operating temperature within predetermined limits. The thermostat starts to open between 88.3 - 92.2°C (190.9 - 198°F) and is fully open at 103.9°C (219°F).

Cold Engine (By-pass Circuit) - When the engine is cold and the thermostat is closed, coolant flows from the water pump through the engine, then returns directly to the water pump.

Warm Engine - When the engine is warm and the thermostat is open, coolant flows from the water pump, through the engine, through the thermostat, into the radiator upper coolant hose, through the radiator and then returns to the water pump via the radiator lower coolant hose.

The heater core is on a parallel circuit and is unaffected by the position of the thermostat.

Radiator

The radiator is of aluminium construction with plastic end tanks. Foam seals are installed to the radiator to prevent the cooling air from by passing the radiator core. The radiator is located by four isolator mountings and supported by the radiator support beam. A coolant drain plug is provided in the lower RH side for the draining of the coolant. The Cooling fan shroud is attached to the radiator.

Cooling Fans

Two variable speed electric cooling fans are housed in the cooling fan pack for the cooling of the radiator. The speed of the electric cooling fans is adjusted by the Powertrain Control Module (PCM).

Coolant Reservoir

A pressurized Coolant Reservoir system is used which continuously removes any air from the cooling system. A continuous vent from the engine and radiator to the coolant expansion tank prevents air locks from forming in the cooling system. No manual bleed points are provided on the system.

The Coolant Reservoir should be full when the coolant system is cold.

In-Vehicle Heating

A hose from the front of the thermostat housing directs coolant to the heater water valve which remains closed below 30°C ± 10°C (86°F ± 50°F). Above this temperature, the heater water valve will open and warm water will be available to the heater water pump. This pump will only run when the temperature is > 10°C (50°F) and will supply warm water to the air conditioning heater matrix. The A/C heater matrix outlet is connected through the return side of the water valve, back to the rear of the engine water pump.

Specifications

Antifreeze Mix	50% OAT coolant / 50% water.
Pressure Cap	150 kpa.
Thermostat	Starts to opens between 88.3 - 92.2°C (190.9 - 198°F).
	Fully open at 103.9°C (219°F).
Leakage Rates	30 cm / Min. 150 - 180 kpa.
	60 cm / Min. 10 kpa Man.
	Up to 75 kpa @ 150 c m / h.

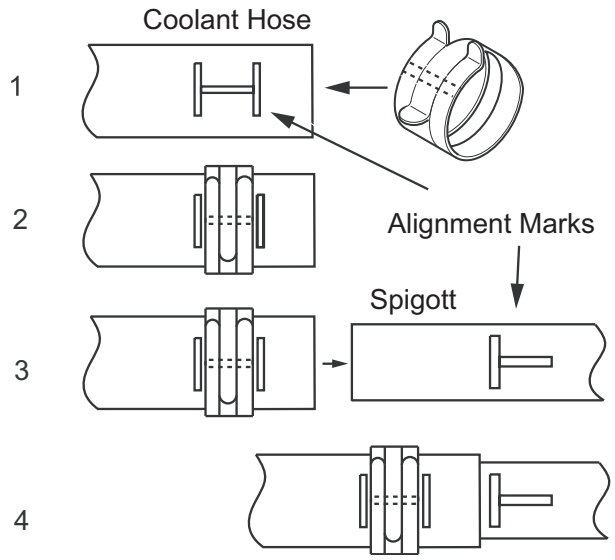
The anti-freeze is unique and cannot be mixed with other anti-freeze solutions. The OAT coolant/water mixture has a life of 150,000 miles or 5 years (which ever comes first).

Torque Figures

Description	Nm.	lb./ft.
Condenser A/C pipes	8-10	6-7.5
Thermostat housing	8-12	6-9
Thermostat housing support bracket	23-27	17-20
Water pump	23-27	17-20
Water pump pulley	23-27	17-20

Maintenance

Caution
'Spring band' clips
'Spring band' clips must be installed as detailed below:



All coolant hoses and spigots must be de-greased before assembly.

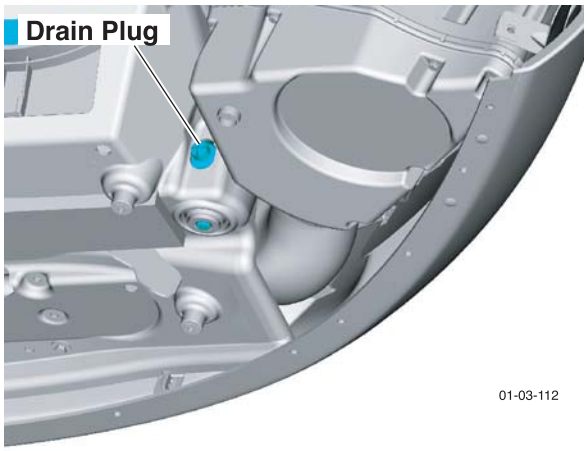
Coolant Drain / Fill

Repair Operation Time (ROT)	
Item	**Code**
Drain / Fill	**03.03.BE**

1. Remove the front undertray.

⚠ Warning ⚠
Do not remove the pressure cap when the coolant is hot. Allow time for the coolant / engine to cool. Take particular care to avoid burns from the cooling system.

2. Remove the pressure cap from the Coolant Reservoir.
3. Loosen the drain plug. Drain the coolant into a suitable container.



4. Install the drain plug. Ensure the drain plug is secure.
5. Fill the cooling system with the specified coolant to maximum level in the Coolant Reservoir. Install the pressure cap.

⚠ Warning ⚠
Do not remove the pressure cap when the coolant is hot. Allow time for the coolant / engine to cool. Take particular care to avoid burns from the cooling system.

6. Run the engine until fully warm. Stop the engine and allow to cool down. Any coolant displaced due to expansion will be drawn back into the Coolant Reservoir as the system cools.
7. Re check the level at the Coolant Reservoir. Top-up as necessary to the maximum level.
8. Ensure the filler cap is secure after topping up.

Caution
Do not over tighten.

9. Install the front undertray.

Pressure Tests

Cooling System

1. Select the correct pressure tester adaptors and install the pressure tester to the Coolant Reservoir.
2. Bring the engine up to it's correct working temperature.
3. Test the cooling system following the pressure tester manufacture instructions.
   Pressure leakage (Refer to 'Specifications', page 3-4-2).

Pressure Cap

1. Select the correct pressure tester adaptors and install the pressure tester to the pressure cap.

Rinse the pressure cap in water to remove any sediment

2. Test the pressure cap following the pressure tester manufacture instructions.
3. Pressure leakage (Refer to 'Specifications', page 3-4-2).
   If replacing a pressure cap, always install one of identical pressure specification to original equipment.

Radiator

Repair Operation Time (ROT)	
Item	**Code**
Radiator Renew	**03.03.EB**

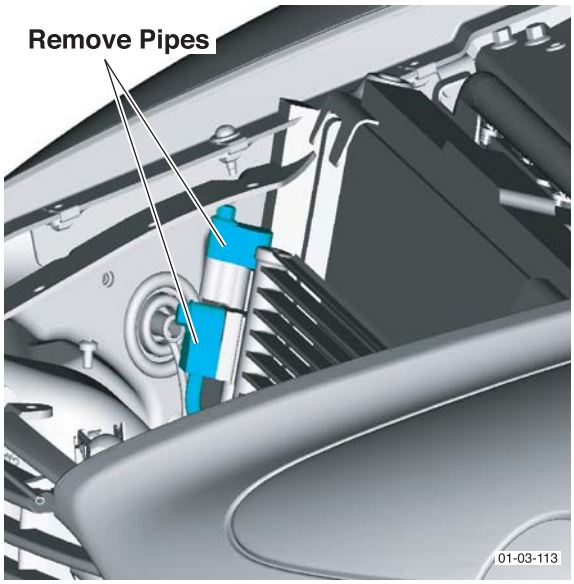
Removal

1. Discharge the A/C system.
2. Drain the engine coolant.
3. Remove the airfilter boxes (Refer to 'Air Charging (03.12)', page 3-13-1).
4. Remove the headlight units (Refer to 'Front Lights (17.01)', page 17-1-2).
5. Remove the 'Slam' panel.
6. Remove the A/C pipes from the condenser.

Caution

Ensure open ends are plugged immediately after disconnecting refrigeration parts.

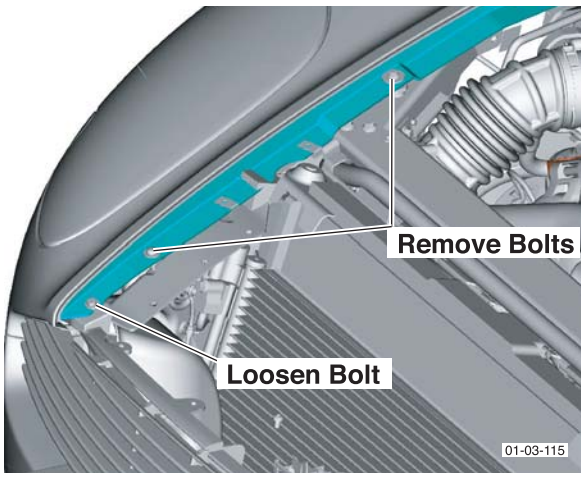
If moist air or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other faults may occur.



7. Remove the front crossmember.

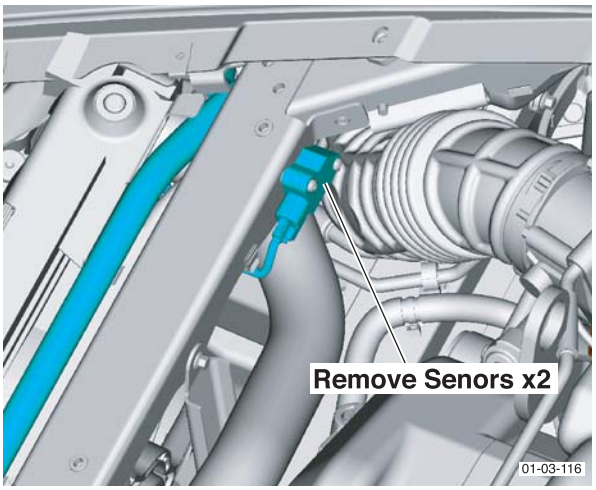
The vehicle wings have to be manoeuvred to remove the crossmember.

Remove bolts (x4) and loosen bolts (x2) from the wings. When the crossmember is ready to be removed the wings then need to be gently pulled to allow crossmember removal.

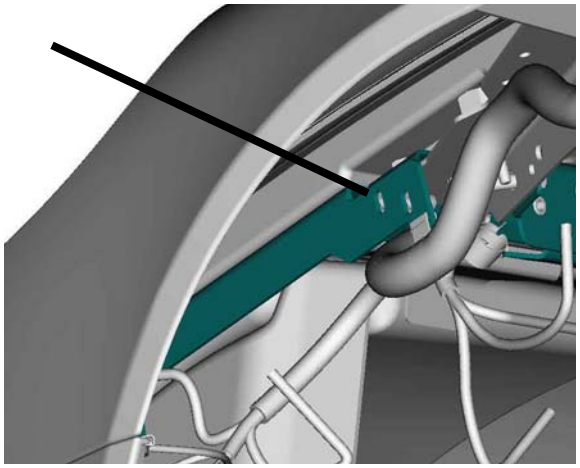


7.1 Disconnect the wiring harness plug from the crash sensors (x2).

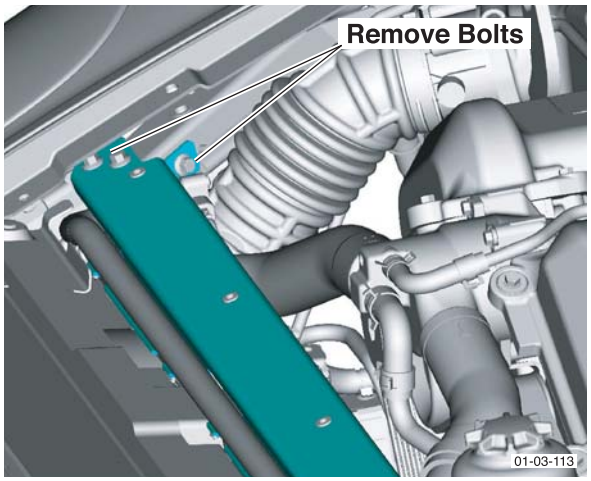
7.2 Remove wiring harness locaters (x2).



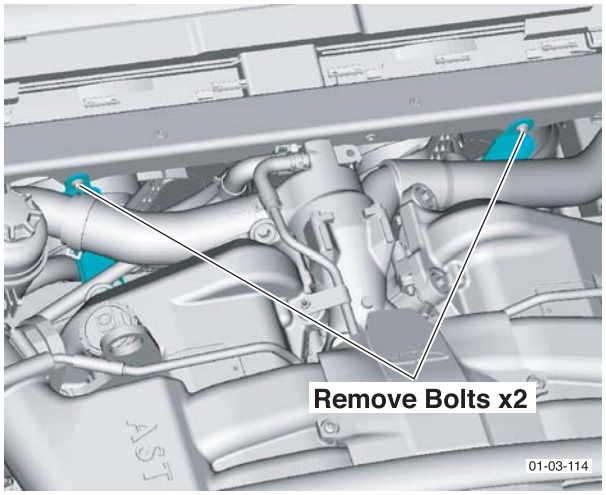
7.3 Remove bolts (x2 each side (inside the wings)).



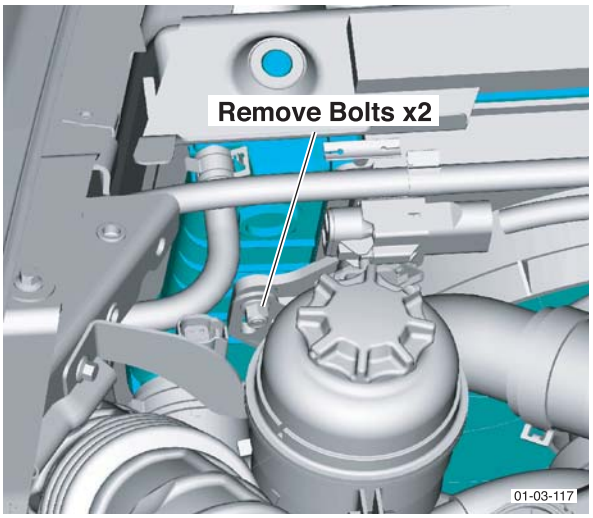
7.4 Remove bolts (x3 each side).



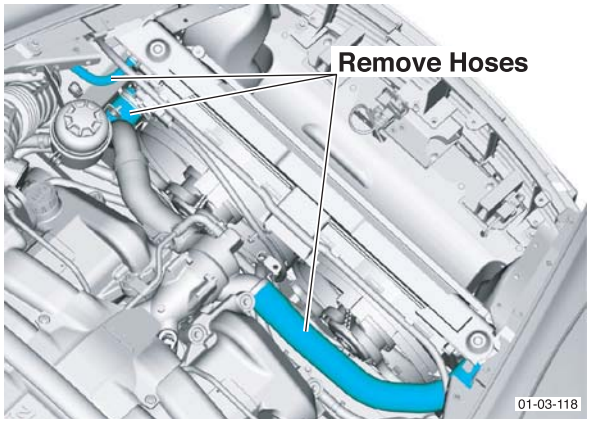
7.5 Remove bolts (x2).
Withdraw the front crossmember.



8. Remove the fan pack from the radiator.
   8.1 Remove bolts (x2) that secure the fan pack to the radiator.
   8.2 Withdraw the fan pack from the radiator.



9. Remove hoses from the radiator.



10. Withdraw the radiator complete with the condenser.

Installation

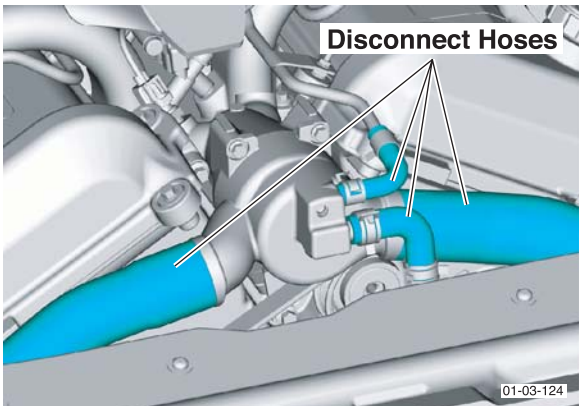
1. Install the radiator, complete with the condenser. Connect the radiator hoses.
2. Install the fan pack.
3. Install the front crossmember. Install the wings.
4. Install the condenser A/C pipes. Torque bolts to **8-10 Nm**.
5. Install the 'Slam' panel.
6. Install the headlight units (Refer to 'Front Lights (17.01)', page 17-1-2).
7. Install the air filter boxes (Refer to 'Air Charging (03.12)', page 3-13-1).
8. Fill the coolant system.
9. Charge the A/C system.

Thermostat

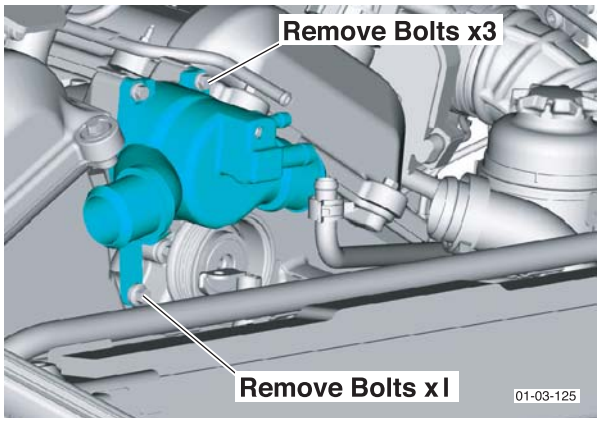
Repair Operation Time (ROT)	
Item	**Code**
Thermostat Renew	**03.03.GB**

Removal

1. Drain the engine coolant.
2. Disconnect the hoses.



3. Remove bolt (x1) from the timing cover (thermostat housing support bracket).
4. Remove the bolts (x3) that secure the thermostat.



5. Remove the thermostat housing. Discard the thermostat housing gasket.
6. Withdraw the thermostat from the thermostat housing.

Installation

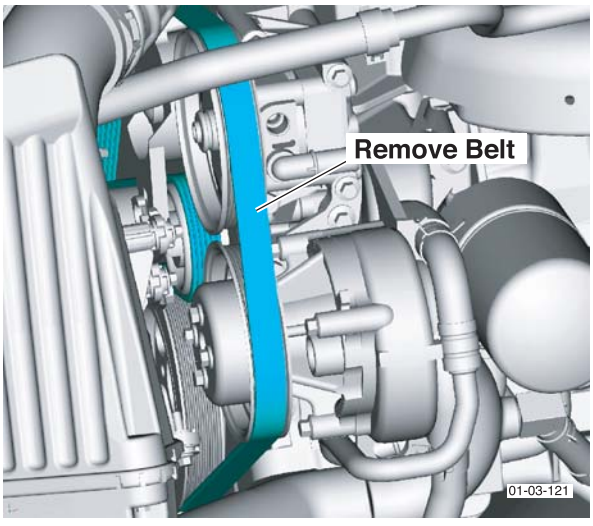
1. Clean all the mating surfaces and install a new thermostat housing gasket.
2. Install the thermostat into the thermostat housing.
3. Install the thermostat housing support bracket, do not tighten.
4. Install the thermostat housing. Torque bolts (x3) to **8-12 Nm**. Torque the thermostat housing support bracket bolt (x1) to **23-27 Nm.**
5. Fill the cooling system.

Water Pump

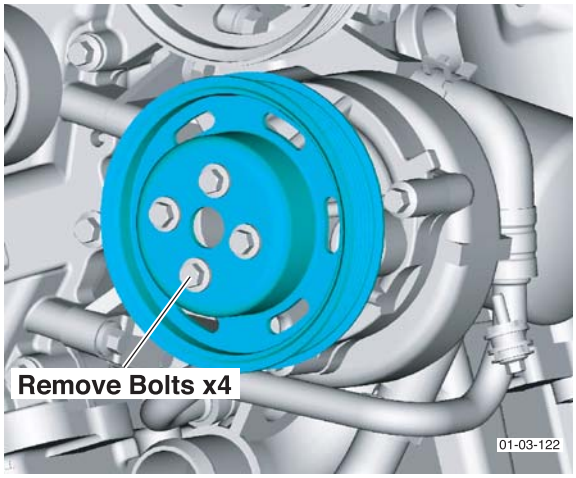
Repair Operation Time (ROT)	
Item	**Code**
Water Pump Renew	**03.03.LB**

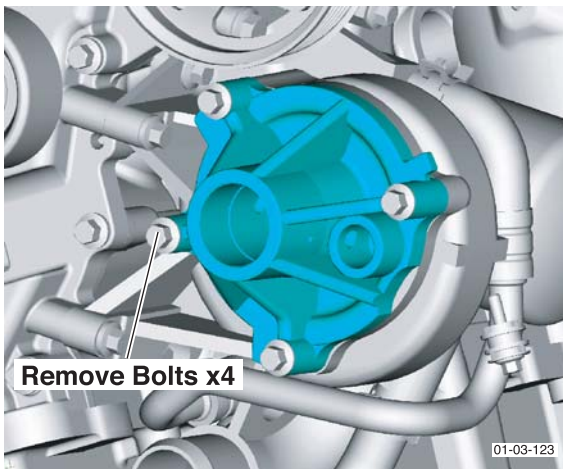
Removal

1. Drain the cooling system.
2. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).



3. Remove the water pump.





4. Remove and discard the water pump 'O'-ring.

Installation

1. Clean the mating surface of the water pump and install a new 'O' ring.
2. Place the water pump to the water pump body. Secure the water pump. Torque bolts (x4) to **23-27 Nm**.
3. Secure the water pump pulley to the water pump. Torque bolts (x4) to **23-27 Nm**.
4. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
5. Fill the cooling system.

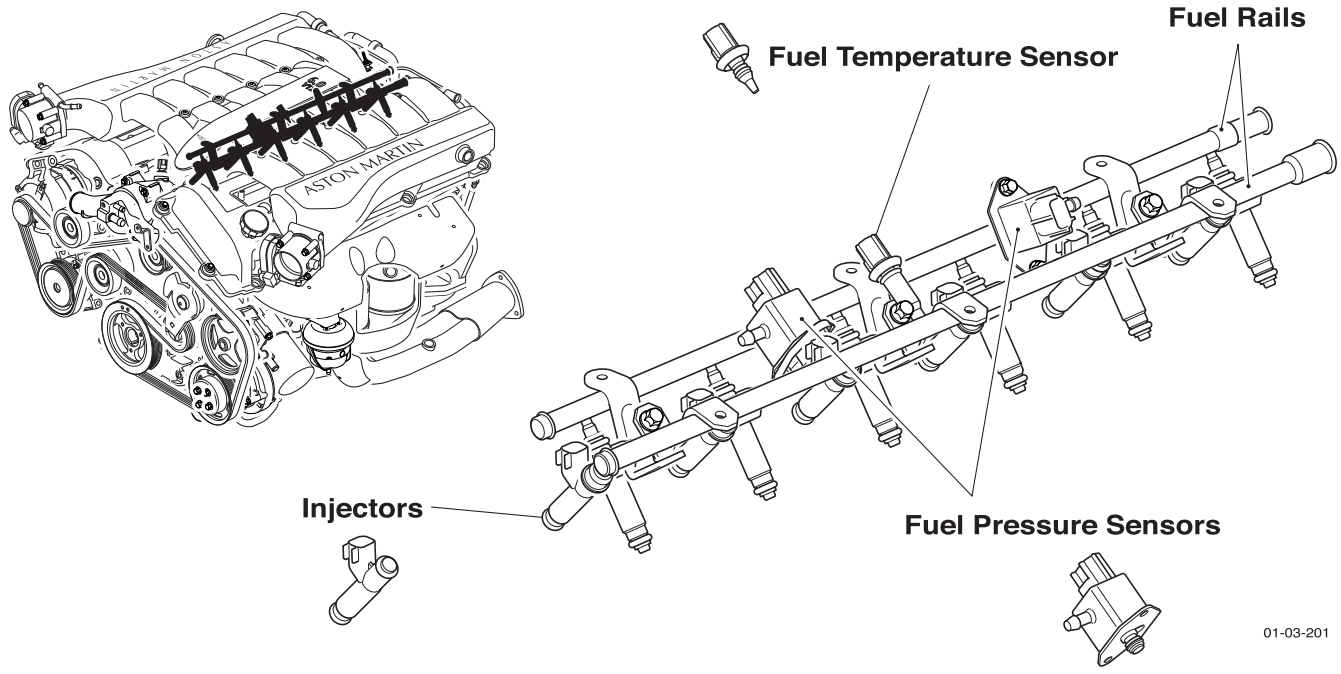
Engine (03.00)

Fuel Charging System (03.04)

Description

The electronic return-less fuel system utilized has the advantages of reduced fuel tank vapor, requires less electrical power and does not require a fuel return line. Fuel is supplied at high pressure to the injectors via two fuel rails (primary and secondary). Each fuel rail incorporates six fuel injectors, and a fuel pressure regulator. A fuel temperature sensor is installed in the primary fuel rail. Powertrain Control Modules (PCMs) maintain 280 kPa across the injectors, by increasing the pulse width modulation signal to the fuel pump controller. This in turn controls the voltage output to the fuel pump.

Fuel rails and injectors are detailed in this chapter. For fuel delivery to the fuel rails and injectors refer to Chapter 10 (Fuel System).



Safety Precautions

Operations on fuel system will result in fuel liquid and vapour being present in the working environment. This presents a very serious risk and the following precautions must be strictly observed:

⚠ Warning ⚠
Operations on refuelling and the fuel system must only be performed by personnel who have completed training on fuel handling.

⚠ Warning ⚠
Smoking must not be allowed near the working area. "NO SMOKING" signs must be posted around the working area.

⚠ Warning ⚠
Any operation which could involve sparks or naked lights (e.g. battery testing, welding, metal grinding, etc.) must not be allowed near the working area.

⚠ Warning ⚠
A CO2 fire extinguisher must be available close at hand.

⚠ Warning ⚠
Dry sand must be available close at hand to soak up any accidental fuel spillage.

⚠ Warning ⚠
If necessary, empty the fuel into an explosion proof container using suitable fireproof fuel handling equipment.

⚠ Warning ⚠
The working area must be well ventilated.

⚠ Warning ⚠
Disconnect the battery before commencing work on the fuel system.

⚠ Warning ⚠
Depressurise the fuel system before disconnecting any fuel lines.

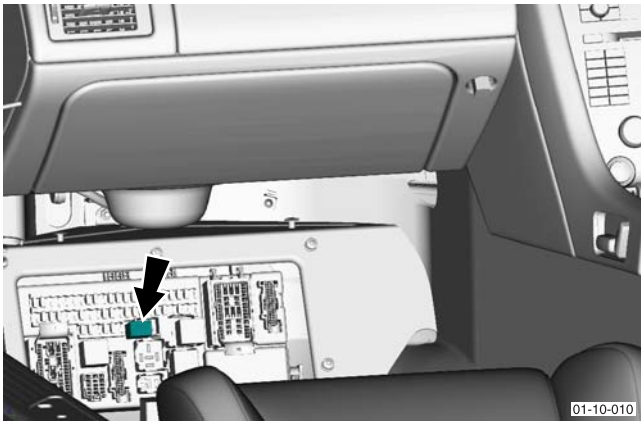
⚠ Warning ⚠
The engine must be cool before working on the fuel charging system.

Maintenance

Depressurising

Repair Operation Time (ROT)	
Item	**Code**
Fuel System Depressurising	**10.01.EK**

1. Read and observe fuel system safety precautions (Refer to 'Safety Precautions', page 3-5-1).
2. Remove the fuel pump relay from the CEM.



3. Attempt to start the engine.
   The engine will run for approx. 11 seconds then stall. With the fuel pumps disabled the fuel lines will depressurise.

Two fault codes will show on each bank.
- *P0087 'fuel pressure too low'*
- *P1233 'fuel pump driver module disabled or off line'*

Both of these codes can be erased from each bank after the repairs to the fuel system

⚠ Warning ⚠
Fire Risk. Before starting work on the fuel system disconnect the earth lead from the vehicle battery.

4. Switch off the ignition and install the fuel pump relay.

Fuel Rails

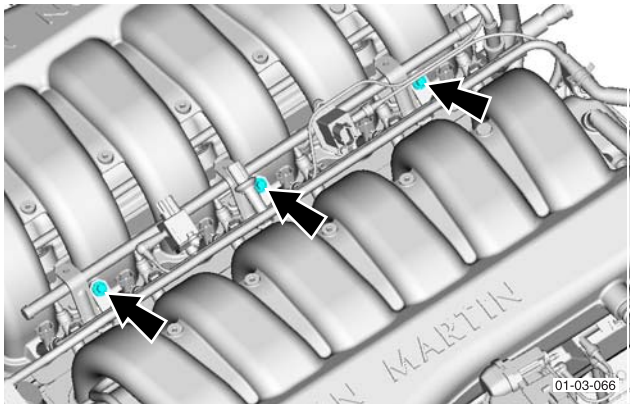
Repair Operation Time (ROT)		
Item		**Code**
Fuel Rail Renew	x1	**03.04.AB**
	x2	**03.04.BB**

Removal

1. Depressurise the fuel lines.
2. Disconnect the earth (- ve) lead from the vehicle battery.
3. Remove the engine bay cross brace and the inlet manifold brace.

To aid injector and fuel rail removal it may be required to disconnect the coolant pipe, from the thermostat housing, running between the two inlet manifolds.

4. Remove the following wiring harness plugs:
   - Temperature sender plugs
   - Pressure sensor plugs
   - Injector harness plugs
5. Remove bolts (x3) securing the fuel rail to the inlet manifold.



6. Remove the secondary latch clip from each fuel line.
7. Disconnect the fuel rails from their supply pipes.

Use a rag / cloth to collect any residual fuel from the opened fuel pipe.

Left and right hand fuel rails to fuel supply hose unions are different sizes.

Locate correct size of service tool around the union.

(Refer to '412-038 (Quick Disconnect Tool)', page 20-1-7)

(Refer to '412-040 (Quick Disconnect Tool)', page 20-1-7)

Push back on the tool. While pushing back on the tool withdraw the fuel rail. Note left and right hand fuel rail for installation.

Installation

1. Locate the fuel rails over the injectors.
2. 'Pull down' the fuel rails onto the injectors by tightening bolts (x3). Tighten bolts to **8-12 Nm**.
3. Connect the fuel rails to their supply pipes.

Ensure the fuel rail and fuel supply line are in-line before connection.

4. Install the secondary latch clip to each fuel line.
5. Connect the wiring harness plugs:
   - Temperature sender plugs
   - Pressure sensor plugs
   - Injector harness plugs
6. If removed, connect the coolant pipe to thermostat housing.
7. Install the inlet manifold brace and the engine bay cross brace.

Injectors

Repair Operation Time (ROT)		
Item		**Code**
Fuel Injectors	x1	**03.04.GB**
	x12	**03.04.FB**

Removal

1. Remove the fuel rails.
2. Remove the injectors. Discard the 'O' rings.

Installation

1. Install the injectors, complete with new 'O' rings.

Position of 'O' rings.
Blue (top)
Green (bottom)

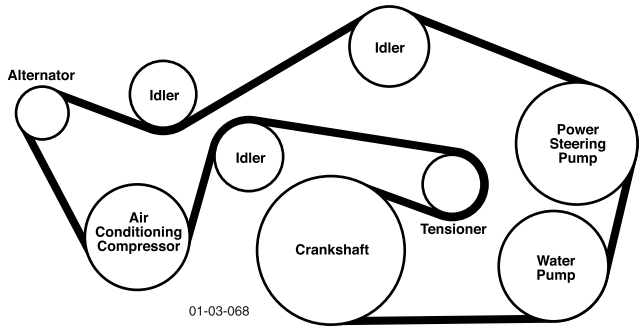
2. Install the fuel rails.

ASTON MARTIN
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Engine (03.00)

Accessory Drive System (03.05)

Description



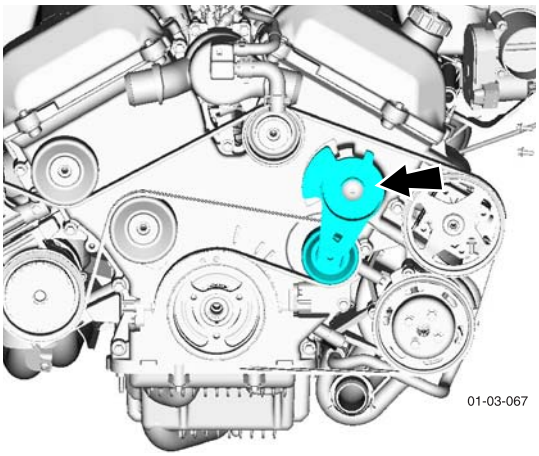
Auxiliary Drives

A damper pulley installed to the front of the crankshaft drives a ‘polyvee’ drive belt to power all of the engine auxiliaries.

- Air Conditioning Compressor
- Alternator
- Power Steering Pump
- Water Pump

Automatic Belt Tensioner

The automatic belt tensioner consists of an idler pulley which is free to rotate on a bearing, located at the end of a spring-loaded pivot arm.The pivot arm can be turned clockwise (viewed from the front of the engine) for belt removal and installation.



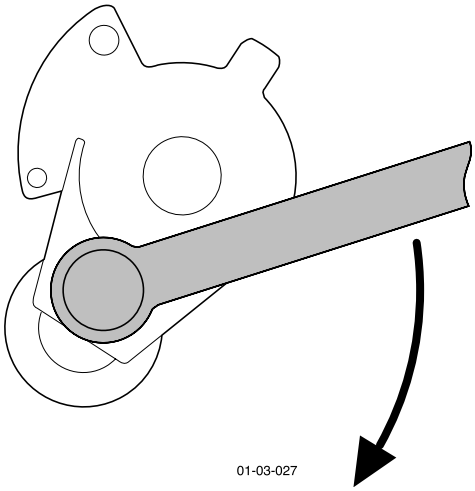
Maintenance

Drive Belt

Repair Operation Time (ROT)	
Item	**Code**
Drive Belt Renew	**03.05.AB**

Removal

1. Remove the undertray.
2. Using a 3/8 inch ratchet handle 'T' bar, rotate the drive belt tensioner clockwise and slip the drive belt off the idler pulley indicated (A).
   Slip the drive belt off the remaining drive pulleys.
3. Check condition of the drive belt. Replace if required.



Installation

1. Install the drive belt around all drive pulleys except the idler pulley.
2. Rotate the tensioner assembly clockwise. Install the drive belt to the idler pulley and release the tensioner.
3. Check all pulleys to ensure correct belt location.

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Engine (03.00)

Engine Cranking System (03.06) Maintenance

Starting System

The starting system consists of a pre-engaged type starter motor, battery, remote control switch (ignition switch) and relay. The operation of the starter relay is controlled by the Powertrain Control Module (PCM).

To protect the starter motor from damage, the PCM prevents the starter from being engaged when the engine is running. This is done by the PCM inhibiting the starter relay operation. The PCM will only operate the starter relay providing the following conditions are met:

- The ignition switch has been in the start position for a predetermined time
- The security response between the PCM and the Driver Information Module (DIM) has passed
- The engine is not running
- The transmission range switch is in the Neutral or Park position (vehicles installed with automatic transmission)
- The clutch pedal is operated (USA vehicles installed with manual transmission)

The starter relay remains energized until one of the following occur:

- The PCM detects an engine running signal
- The starter button is on longer pressed
- The transmission range switch is no longer in the Neutral or Park position (vehicles installed with automatic transmission)
- The clutch pedal is released (USA vehicles installed with manual transmission)

With the ignition switch in the start position, providing the PCM start conditions are met, the starter relay is energized and the engagement lever moves the pinion into mesh with the flywheel ring gear teeth. The electrical contacts within the solenoid complete the high power circuit and the starter motor operates to turn the engine.

Specifications

Torque Figures		
Description	Nm.	lb./ft.
Starter motor	50	37

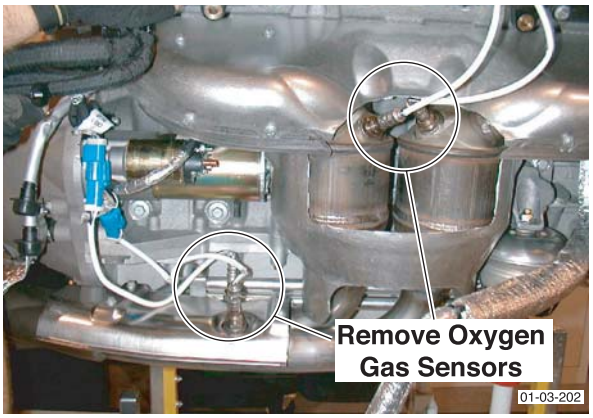
Starter Motor

Repair Operation Time (ROT)	
Item	**Code**
Starter motor Renew	**03.06.AB**

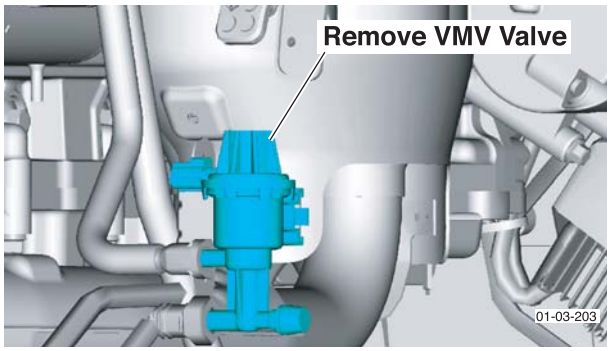
Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the R/H road wheel, road wheel arch liner and the front undertray.
4. Remove the oxygen gas sensors. Disconnect the oxygen gas sensors electrics.

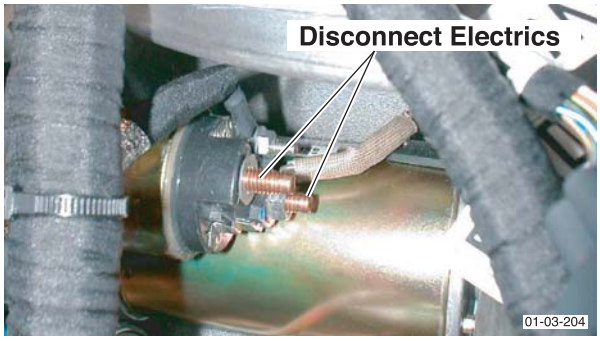
This may provide better access to remove the starter motor.



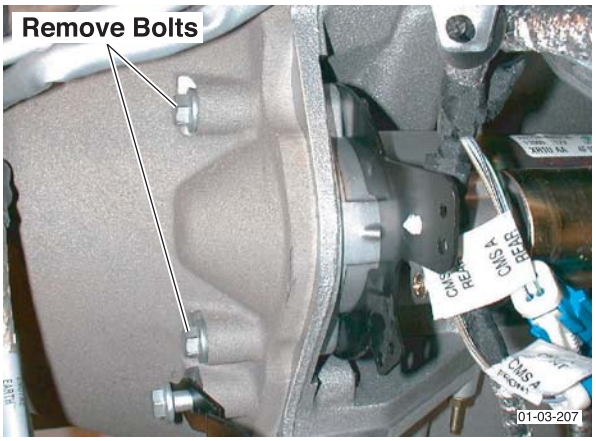
5. Remove the VMV valve.



6. Remove the heat shield.
7. Disconnect the starter motor electrics.



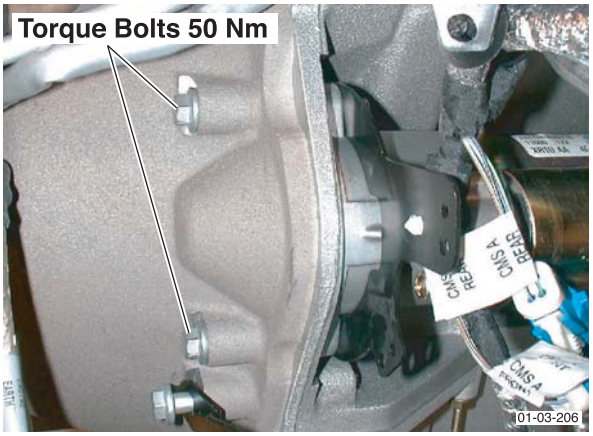
8. Remove bolts (x2) that secure the starter motor.



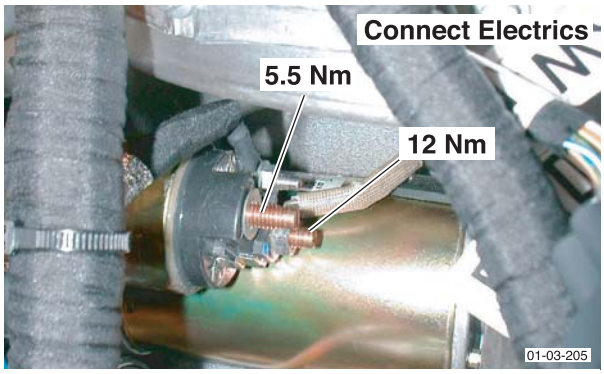
9. Withdraw the starter motor and oxygen gas sensors bracket.

Installation

1. Place the starter motor and the oxygen gas sensors bracket to the bell housing. Torque bolts to **50 Nm**.



2. Connect the starter motor electrics.



3. Install the heat shield.
4. Install the oxygen gas sensors (if removed).
5. Install the front under tray and road wheel arch liner.
6. Install the road wheels and 'nip-up' road wheel nuts.
7. Lower the vehicle. Tighten the road wheel nuts (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Engine (03.00)

Ignition System (03.07)

Description

The ignition system consists of an ignition coil for each individual cylinder located on each individual spark plug.

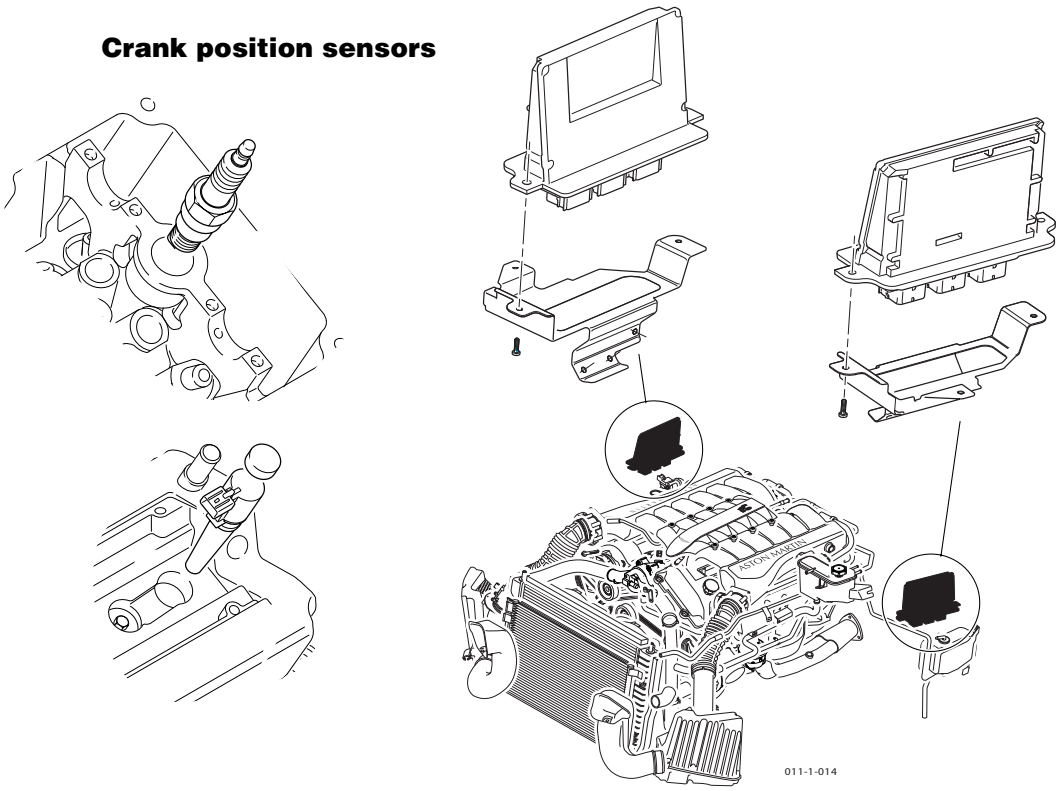
There are two crankshaft sensors located on the front of the engine - only the RH sensor is used. The second crankshaft sensor is located on the flywheel housing (LH side).

An alternating voltage signal from two Crankshaft Position Sensors (CPS) is converted by the Powertrain Control modules (PCMs). This digital signal is then used to position the 'On' and 'Off' time of the primary circuit of the ignition coil. The effective range for ignition timing control is increased by the fact that there are no rotating parts. On the basis of engine speed and load inputs, the PCMs determine the ignition timing. This function also takes other inputs into consideration such as engine temperature, throttle position and transmission control module (TCM) inputs.

- In the event of a short circuit to ground between the fusebox and the coil or the coil and the PCM the fuse would blow and all ignition coils on that bank would cease to function.
- If an ignition coil 'short circuits' internally the ignition coil will fail instead of its fuse. This allows the remaining ignition coils to continue functioning.
- In the event of a wiring harness failure between the PCM an7d the ignition coil, the ignition coil will fail instead of its fuse. This allows the remaining ignition coils to continue functioning.

The twelve spark plugs are fired in sequence by the two PCMs. Ignition timing can vary from 55° before TDC to 10° after TDC.

Crank position sensors



Specifications

Spark Plugs	
Firing order	1 - 7 - 5 - 11 - 3 - 9 - 6 - 12 - 2 - 8 - 4 - 10.
Type	Dual Platinum Fine Wire
Gap	1.2 - 1.3 mm
Torque	16-20 Nm

Camshaft Sensors	
Air Gap	1 ±0.5 mm

Torque Figures

Description	Nm	lb./ft.
Spark plugs	16-20	12-15
Ignition coils	5-7	4-5.5
Spark plug cover	2.5-3.5	2-3

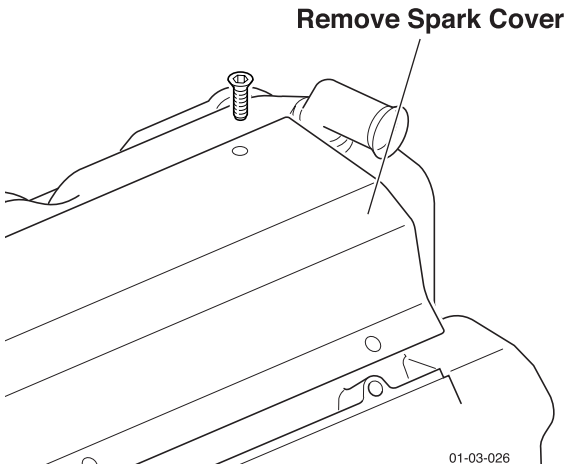
Maintenance

Spark Plugs

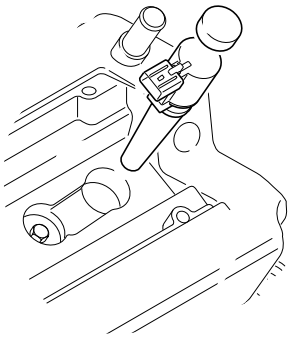
Repair Operation Time (ROT)		
Item		**Code**
Spark Plug Renew	All	**03.07.DB**
	LH Bank	**03.07.EB**
	RH Bank	**03.07.FB**

Removal

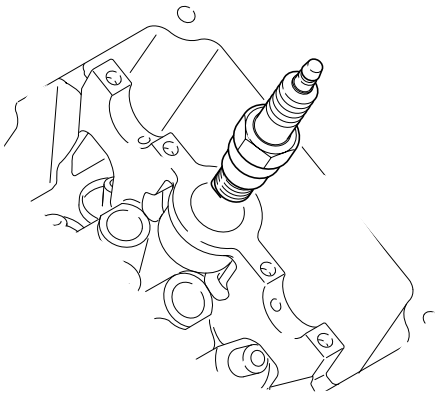
1. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
2. Remove the spark plug cover.



3. Disconnect the ignition coils. Remove the ignition coils.



4. Remove the spark plugs.



Installation

1. Install the spark plugs. Torque to **16-20 Nm**.
2. Install the ignition coils. Torque bolts to **5-7 Nm**. Connect the ignition coils wiring harness plugs.
3. Install the spark plug cover. Torque bolts to **2.5-3.5 Nm**.
4. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).

Engine (03.00)

Emission Control (03.08)

System Description

To avoid environmental pollution from the crankcase gases (blow-by), the crankcase (engine) is ventilated into the intake system. Any noxious fumes in the crankcase gases are then burned in the normal combustion process.

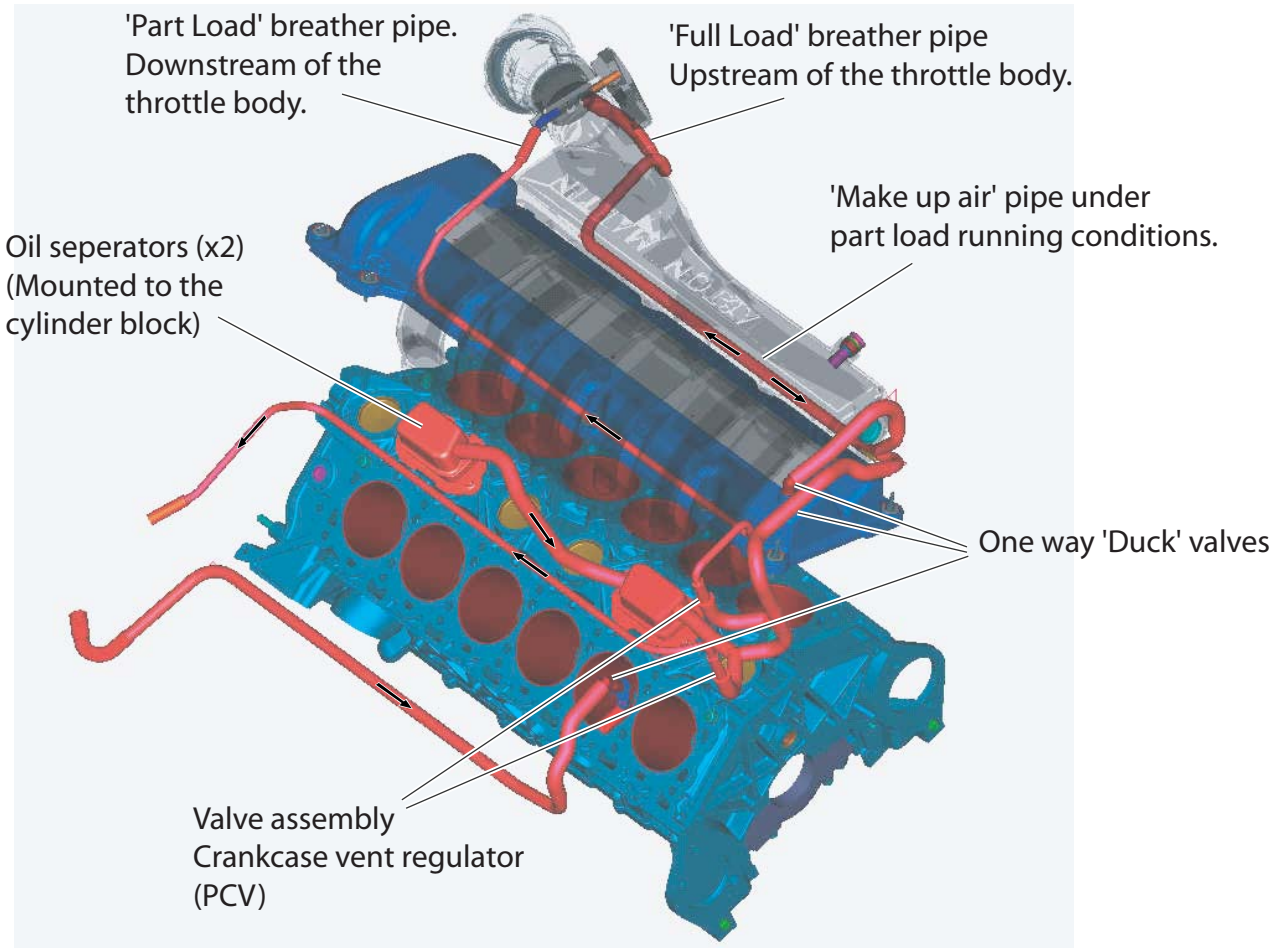
The system consists of a part load and full load breather system which ensures sufficient engine venting under all running conditions.

Crankcase gases escape through channels in the block walls where they are fed into oil separators to minimise the oil pullover. From the separators, pipe work channels the vent gases to the intake manifold at part load or intake system at full load.

Under part load conditions the system is controlled by the PCV valve which regulates a constant flow of vent gases (engine blowby varies across the range of part load sites). The PCV valve flow is balanced by the 'make up air' pipes to the cam covers. The pressure difference across the ends of these pipes (i.e. across the throttle valve) activates the PCV valve.

At full load, the system vents through a 1-way valve to the RH inlet system (pre-throttle) only.

The diameter of the pipes in the system is critical in the control of the Full and Part load operating conditions.Vacuum Pipework Layout



ASTON MARTIN
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Engine (03.00)

Valve Train (03.09)

Description

Camshafts

Inlet and exhaust camshafts in each head are chain driven directly from the crankshaft.

The twin crankshaft sprocket has 18 teeth and each camshaft sprocket has 36 teeth, the timing chains have 61 links. Three chain links are marked and are aligned with timing marks on the crankshaft and camshaft sprockets during valve timing. Because of the odd number of links in the timing chains, the timing marks and marked links will only align once every 122 engine revolutions.

Specifications

Valves, Guides & Springs	Nm.
Spring Force at 40mm Spring Height	290
	MM
Installed Spring Height (Exhaust / Inlet)	39.69-40.29
Valve Guide Internal Diameter	6.015 - 6.044
Valve Guide Maximum Runout	0.030
Valve Stem Diameter - Inlet	5.975 - 5.995
Valve Stem Diameter - Exhaust	5.950 - 5.970
Valve Stem Clearance - Inlet	0.020-0.069
Valve Stem Clearance - Exhaust	0.046-0.095
Valve Face Maximum Runout	0.050
Valve Lash Adjusters	
Bore	16.018 - 16.057
Outside Diameter	15.988 - 16.000
Clearance	0.018 - 0.069

Torque Figures

Description	Nm	lb. / ft.
Timing chain guide	20-30	15-22.5
Tensioners	20-30	15-22.5
Timing cover bolts	23-27	17-20

Maintenance

Valve Timing Chains

Repair Operation Time (ROT)	
Item	**Code**
Timing Chain Renew	**TBA**

Removal

1. Remove the engine from the vehicle (Refer to 'Engine', page 3-1-4).
2. Remove the camshaft covers (Refer to 'Camshaft Cover', page 3-11-1)
3. Remove the timing cover (Refer to 'Timing Cover', page 3-11-3).
4. Remove the crankshaft timing disc.

Note the orientation of the disc for installation.

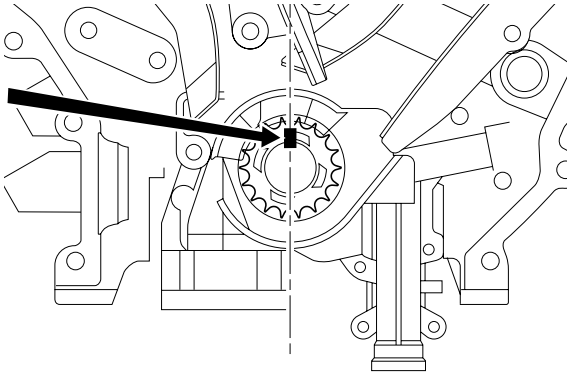
Image to Follow

5. Turn the crankshaft to place the crankshaft key in the vertical position.

Caution

The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.



6. Insert the camshaft set tool (Refer to '303-713 (Camshaft Set)', page 20-1-5).

With the crankshaft Key in the vertical position the camshaft flats will accept the camshaft set tool.

7. Remove the RH or LH timing chain tensioner, tensioner arm and timing chain guides.

   Do not remove the timing chain.

   7.1 Compress the timing chain tensioner and insert the locking pin (Refer to '303-1072 (Timing Chain Tensioner Pins)', page 20-1-6). Remove bolts (x2) that secure the timing chain tensioner and withdraw.

   7.2 Remove the floating tensioner arm.

   7.3 Remove the fixed timing chain guide (bolts x2).

   Repeat for the second timing chain tensioner and timing chain guides.

8. Remove both timing chains and the crankshaft twin sprocket from the crankshaft.

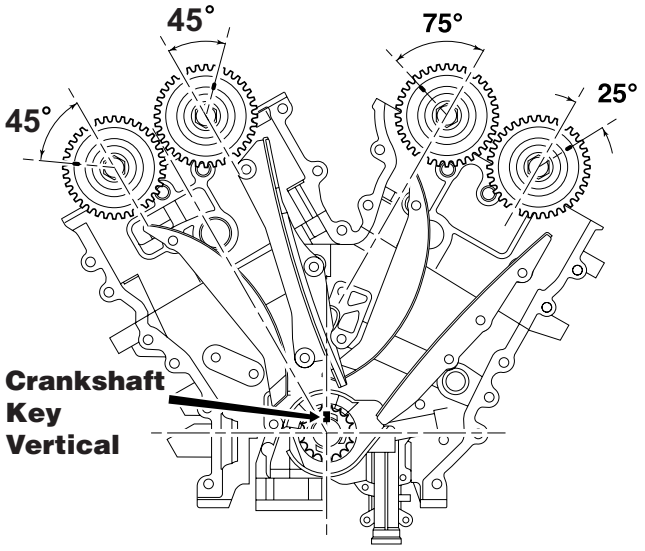
Installation

Caution

The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

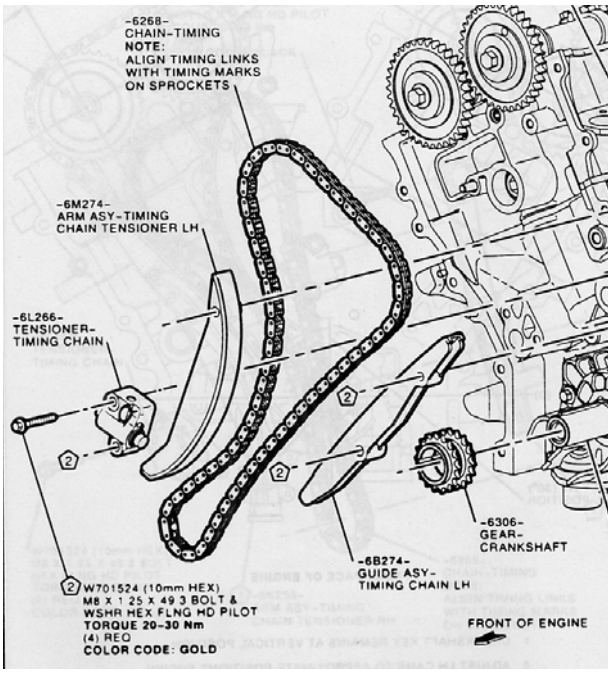
1. Ensure the crankshaft key is vertical and all camshafts are in the initial positions shown.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.

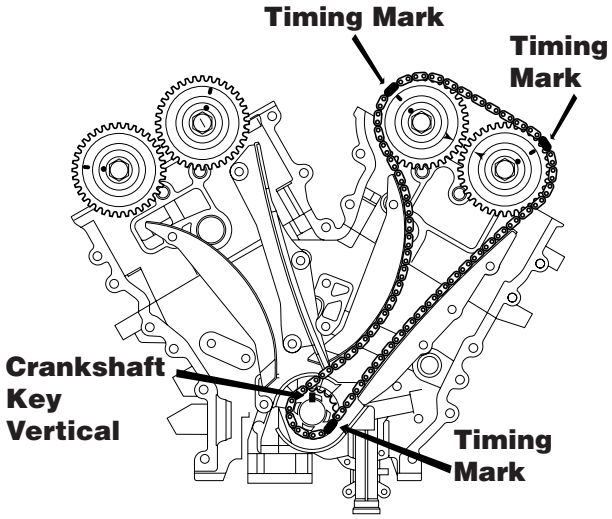


LH Cylinder Head (Cylinders 7-12)

2. Engage the camshaft timing service tool (Refer to '303-713 (Camshaft Set)', page 20-1-5) to flats on the camshafts.
3. Install the fixed timing chain guide.



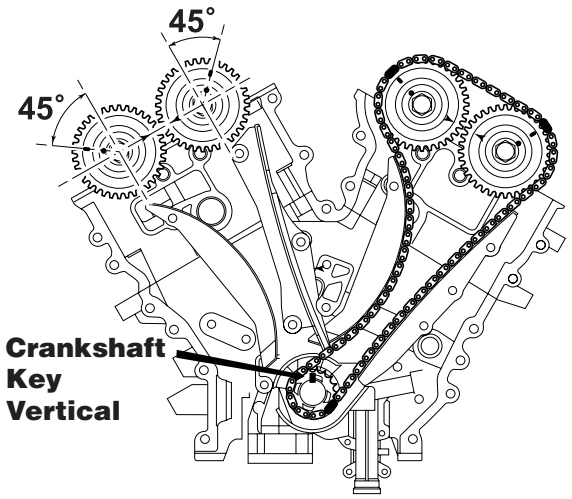
4. Install the timing chain with the marked links (x3) matching the marks on the crankshaft and camshaft sprockets.



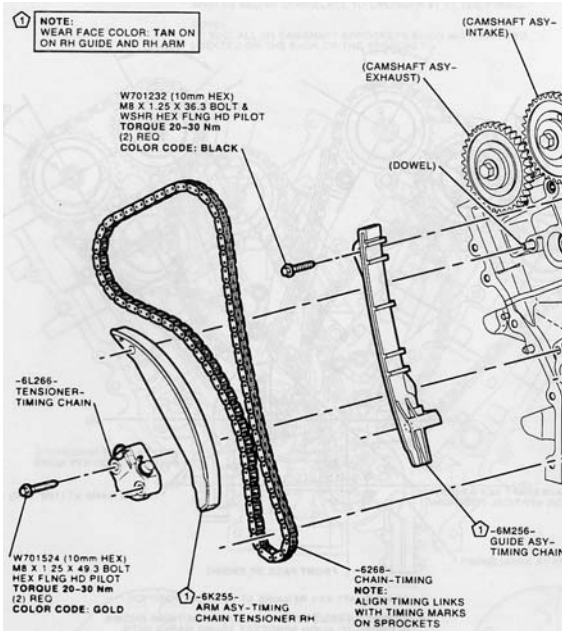
5. Install and tension the timing chain arm and tensioner. Withdraw the timing chain tensioner lock pin.
6. Ensure that all three marked timing chain links align with the timing marks on the camshaft and crankshaft sprockets.

RH Cylinder Head (Cylinders 1-6)

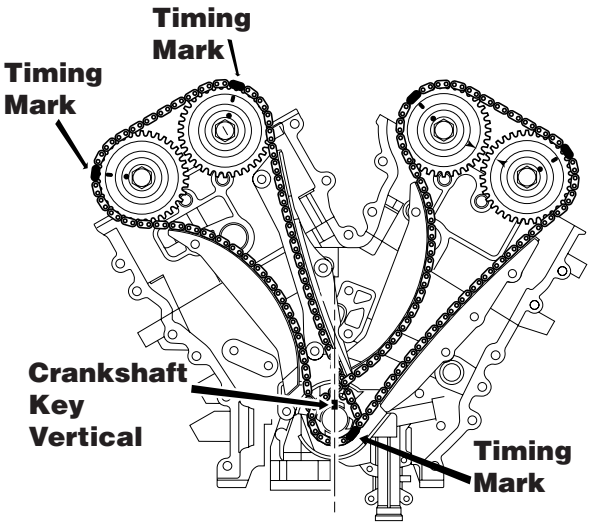
7. Ensure the crankshaft key is in the vertical position (No.1 cylinder at 30° ATDC). Ensure that the camshafts are in the initial positions shown.



8. Engage the camshaft timing service tool (Refer to '303-713 (Camshaft Set)', page 20-1-5) to flats on the camshafts.
9. Install the fixed timing chain guide.



10. Install the timing chain with the marked links (x3) matching timing marks on the camshaft and crankshaft sprockets.



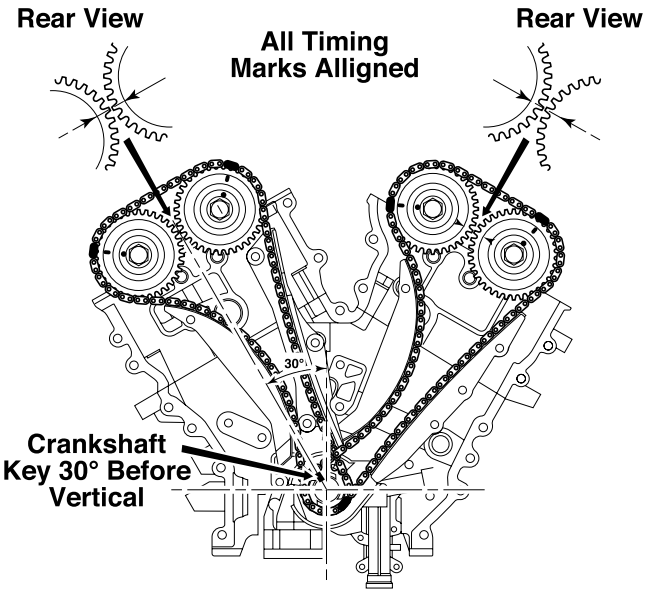
11. Install the timing chain tensioner arm.
12. Install the timing chain tensioner. Remove it's lock pin.
13. Ensure all three marked links on the timing chain align with the timing marks on the camshaft and crankshaft sprockets.
14. Remove the camshaft timing service tool.
15. Install the crankshaft timing disc, noting orientation from removal.

Image to Follow

16. Check the valve timing (Refer to 'Valve Timing Check', page 3-10-4).
17. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
18. Install the engine to the vehicle (Refer to 'Engine', page 3-1-4).

Valve Timing Check

1. Rotate the crankshaft anti-clockwise at least 60°, then rotate clockwise to TDC No. 1 (crankshaft key 30° before vertical).
2. At TDC No.1, the timing marks on the REAR of the camshaft sprockets should be precisely aligned as shown.



On a correctly timed engine, when No. 1 cylinder is at TDC compression the timing marks on the rear of the camshaft sprockets will always align.

Timing marks on the timing chains, camshaft and crankshaft sprockets will only aligned once every 122 crankshaft revolutions on a correctly timed engine.

Be aware - engine oil will bleed from timing chain tensioner.

Camshafts / Camshaft Followers / Lash Adjusters

Repair Operation Time (ROT)	
Item	**Code**
Camshafts / Camshaft Followers / Lash Adjusters	**TBA**

Removal

1. Remove the engine from vehicle (Refer to 'Engine', page 3-1-4)
2. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
3. Drain the engine coolant (Refer to 'Coolant Drain / Fill', page 3-4-3).
4. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
5. Remove the thermostat housing (Refer to 'Thermostat', page 3-4-5).
6. Remove the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
7. Remove the timing cover (Refer to 'Timing Cover', page 3-11-3).
8. Remove the timing chains (Refer to 'Valve Timing Chains', page 3-10-1)
9. Progressively release all bolts that secure each bearing cap.

The thrust camshaft bearing cap, of each camshaft (No.1 and No. 8 cap), must be removed first and installed last.



10. Withdraw the bearing caps. Ensure they are retained in the sequence withdrawn.
11. Withdraw the camshafts.
12. Remove the camshaft followers and lash adjusters. Ensure they are retained in the sequence removed.





13. Cover the engine block to prevent ingress of foreign material.

Installation

Ensure all mating surfaces are clean, smooth and free of any contamination.

1. Install all lash adjusters.

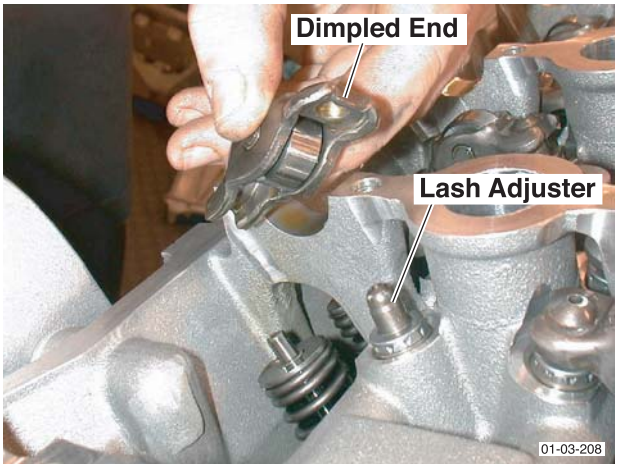
Soak the lash adjusters in engine oil and ensure that they are 'pumped up' with engine oil.

Insert each lash adjuster into its correct recess in the cylinder head.

2. Install the camshaft followers to their valves.

Caution
Ensure that the dimpled end of the camshaft followers are installed to the lash adjusters.

Soak the cam followers in engine oil.



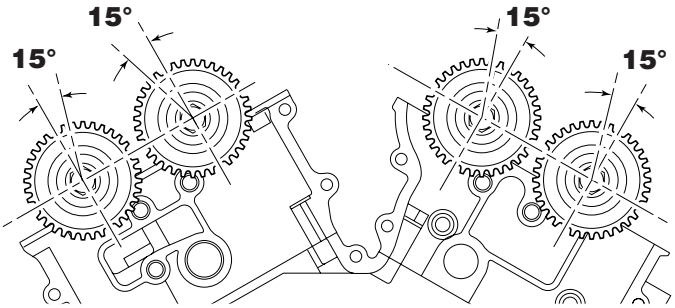
3. Lubricate the camshaft journals, camshaft bearing caps with engine oil.
4. Ensure the crankshaft key is vertical.

Caution
The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.

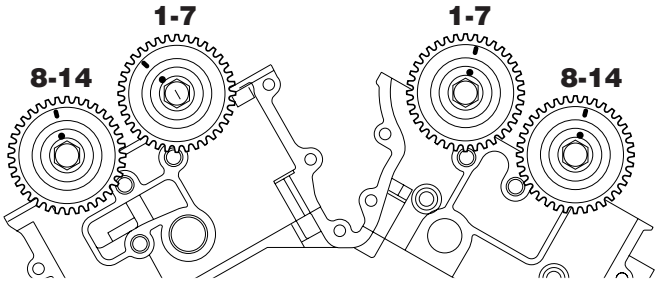
5. Place the camshafts in position, with the timing marks in the positions shown.

The positions shown allow the camshafts to lay at their lowest in the journals.



6. Work on one cylinder head at a time.
7. Install all camshaft bearing caps, except the two thrust camshaft bearing caps (No.1 and No. 8 cap) at the front of each camshaft. Loosely secure each cam cap.

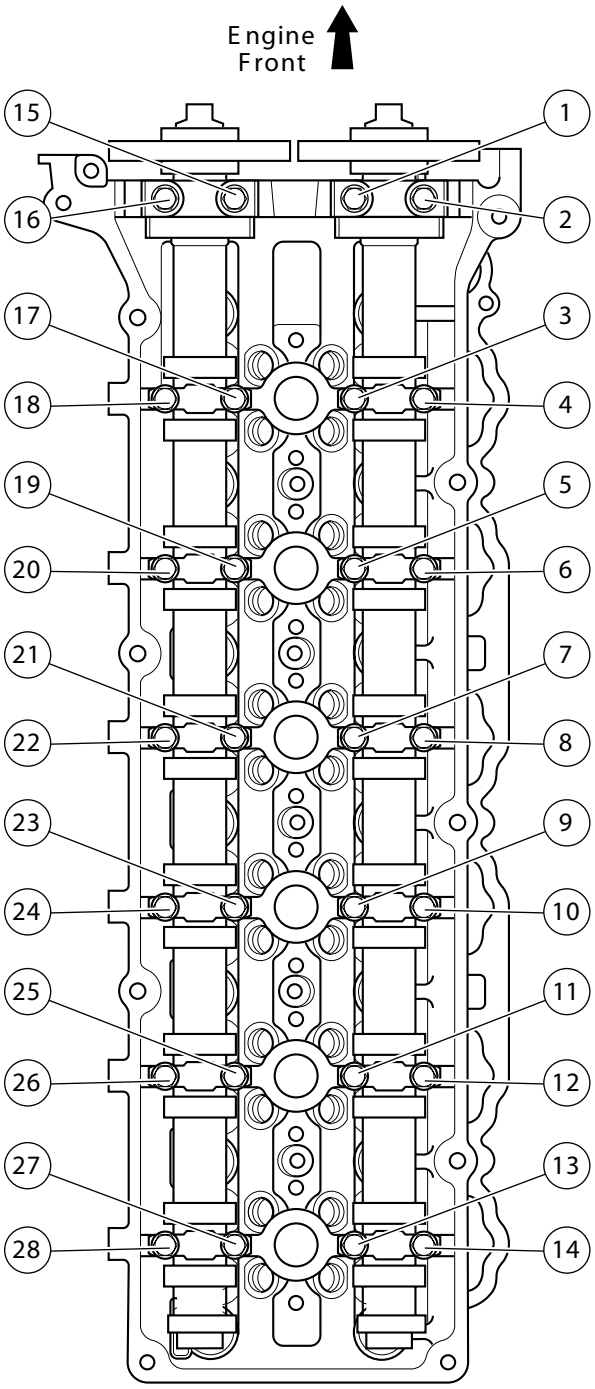
Bearing Caps



The bearing caps are numbered and correspond with numbers stamped on the cylinder head adjacent to the journal.

8. Test install No.1 and No. 8 bearing caps over their thrust flanges. If the bolt holes do not perfectly align, move the camshafts forward or rearward as required until the bearing caps locate correctly. Loosely secure the bearing caps.

9. Torque down the camshafts.
   9.1 Progressively 'nip' down all bolts in the sequence shown. Ensure the camshaft bearing caps pull down evenly into contact with the cylinder head.
   9.2 In the sequence shown, torque the camshaft bearing caps to **8-12 Nm**.



10. Repeat from step 6. for the second cylinder head.
11. Install the timing chains. Perform the camshaft timing procedure (Refer to 'Valve Train (03.09)', page 3-10-1).
12. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
13. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1)
14. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
15. Install the thermostat housing (Refer to 'Thermostat', page 3-4-5).
16. Fill the engine coolant system (Refer to 'Coolant Drain / Fill', page 3-4-3).
17. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
18. Install the engine to vehicle (Refer to 'Engine', page 3-1-4).

Engine (03.00)

Engine Sealing (03.10)

Specifications

Torque Figures			
Description		Nm.	lb. / ft.
Camshaft cover		8-12	6-9
Timing cover		23-27	17-18.5
Idler pulley		25-27	18.5-20
Sump bolts	1.	15	11.5
	2.	90°	
Crankshaft damper	1.	120	89
	2.	Back out a minimum of 360°	
	3.	47-53	35-39.5
	4.	85°-95°	
Camshaft sensor		8-12	6-9
Ignition coils		5-7	4-5.5
Spark plug cover		2.5-3.5	2-3

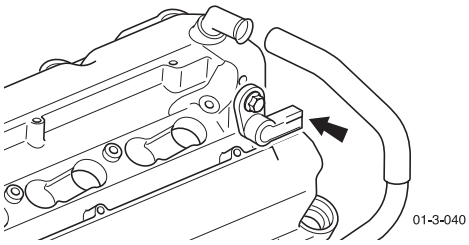
Maintenance

Camshaft Cover

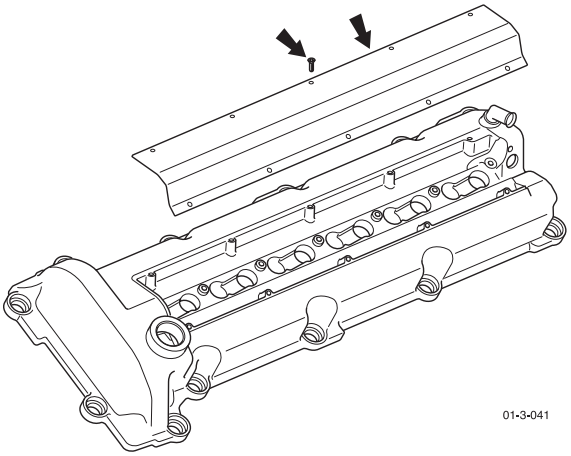
Repair Operation Time (ROT)	
Item	**Code**
Camshaft Covers	**TBA**

Removal

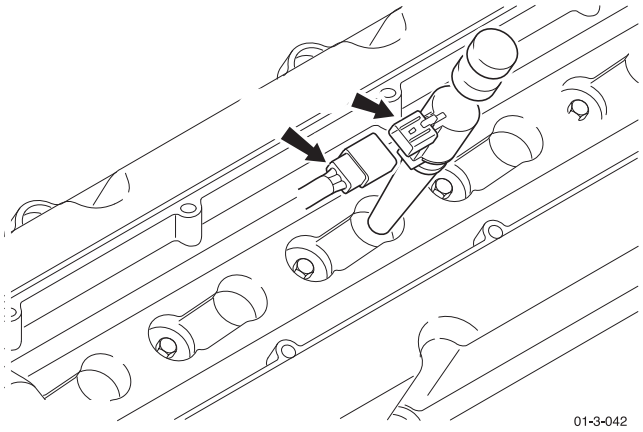
1. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
2. Disconnect the camshaft cover ventilation pipe and the camshaft sensor wiring harness plug.



3. Remove the spark plug cover.



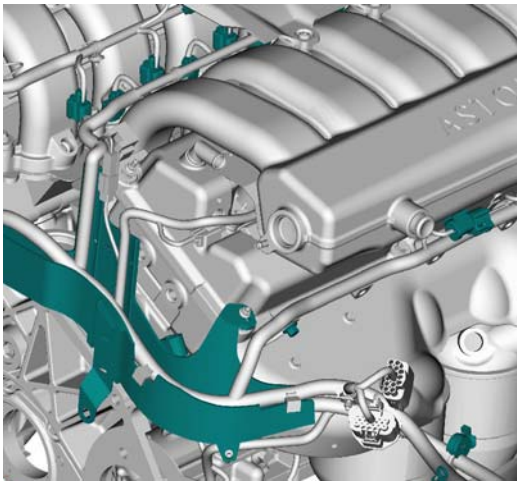
4. Disconnect the ignition coil connectors. Remove the ignition coils.



5. Lower the rear suspension (Refer to 'Rear Suspension (04.02)', page 4-3-1).

To gain access to the bolts (x2) that secure the wiring harness carrier to the camshaft covers.

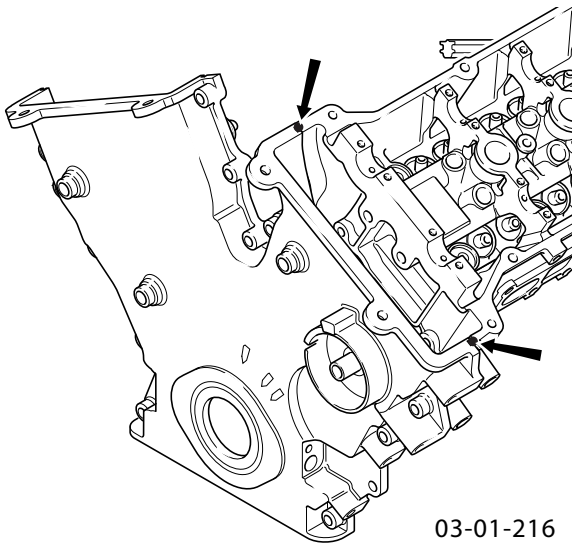
6. Remove bolts (x2) that secure the wiring harness carrier and the electrical device. Lift the wiring harness carrier off the camshaft studs.



7. Remove bolts (x15) that secure the camshaft cover. Withdraw the camshaft cover.
   Discard all camshaft cover seals.
8. Repeat from Step 1. for second camshaft cover.

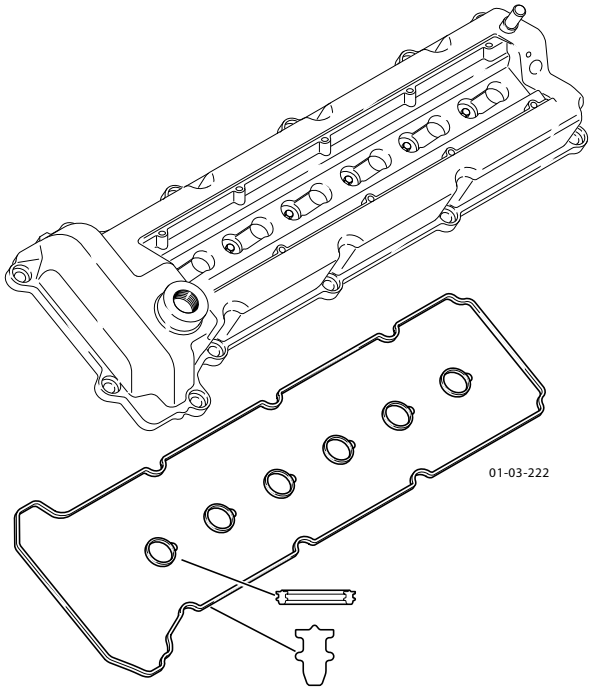
Installation

1. Apply a bead of sealant where indicated.

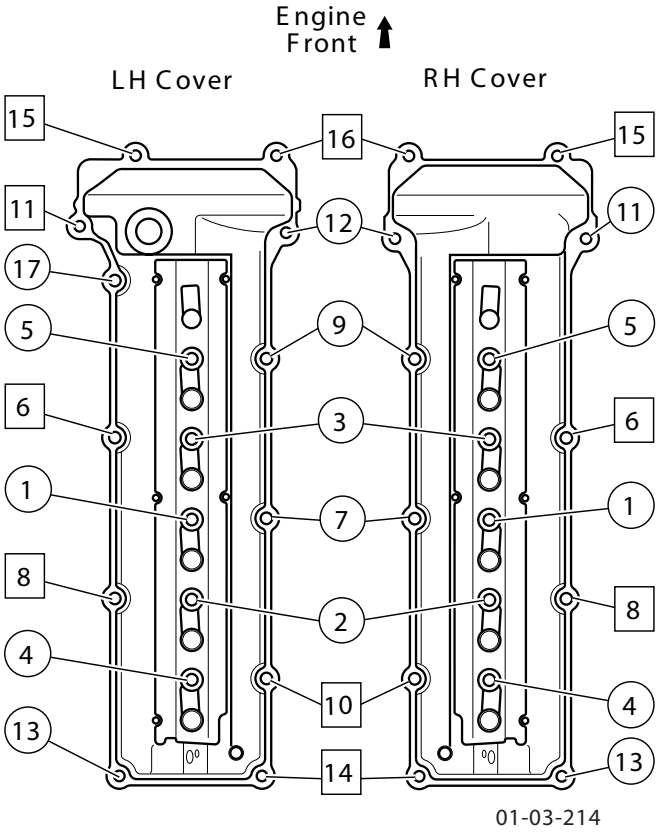


RTV Sealant	●

2. Install new camshaft cover gaskets.



3. Install the camshaft cover. Torque bolts (x15) to **8-12 Nm**. in the sequence shown below.



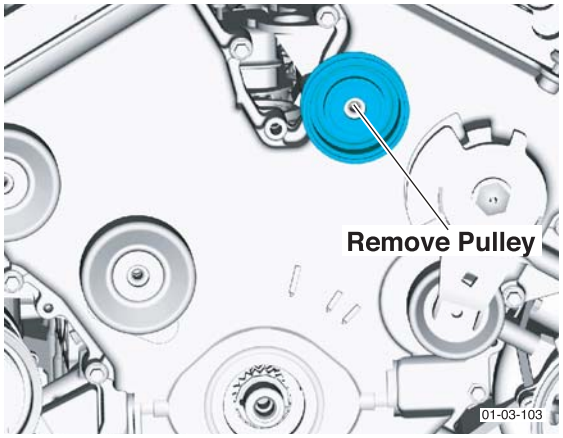
4. Place the wiring harness carrier and the electrical device over the camshaft studs. Torque bolts (x2) to **8-12 Nm**.
5. Install the rear suspension (Refer to 'Rear Suspension (04.02)', page 4-3-1).
6. Install the ignition coils. Torque bolts to **5-7 Nm**. Connect the ignition coils wiring harness plugs.
7. Install the spark plug cover. Torque bolts to **2.5-3.5 Nm**.
8. Connect the camshaft cover ventilation pipe and camshaft sensor wiring harness plug.
9. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).

Timing Cover

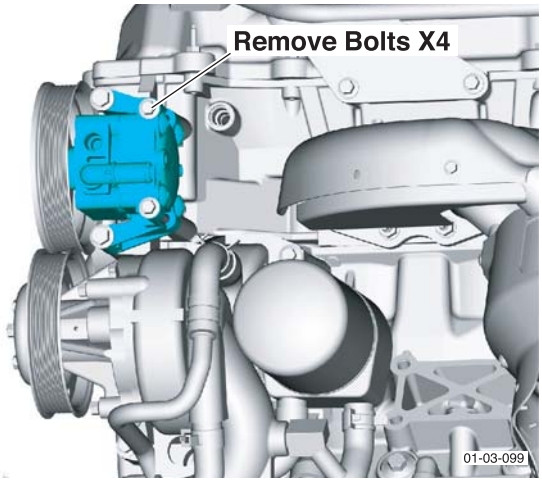
Repair Operation Time (ROT)	
Item	Code
Timing Chain Cover	TBA

Removal

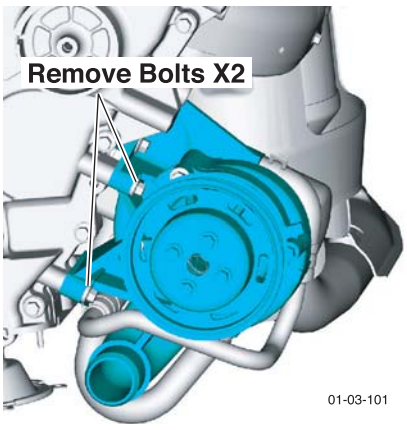
1. Drain the engine oil.
2. Remove the engine from vehicle (Refer to 'Removal', page 3-1-4).
3. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
4. Remove the top idler pulley and the accessory drive belt from timing cover.



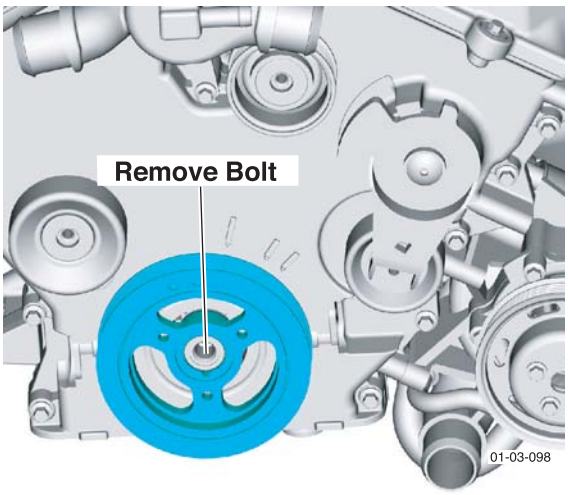
5. Remove bolts (x4) and withdraw the power steering pump.



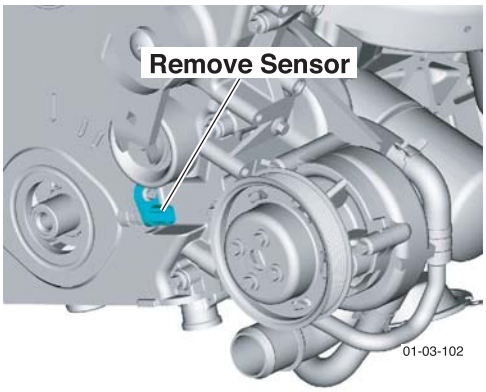
6. Remove bolts (x2) securing water pump to the timing cover.



7. Prevent crankshaft from turning (Refer to '303-1047 (Crankshaft Holding)', page 20-1-6) and remove the bolt / washer that secures the crankshaft damper.

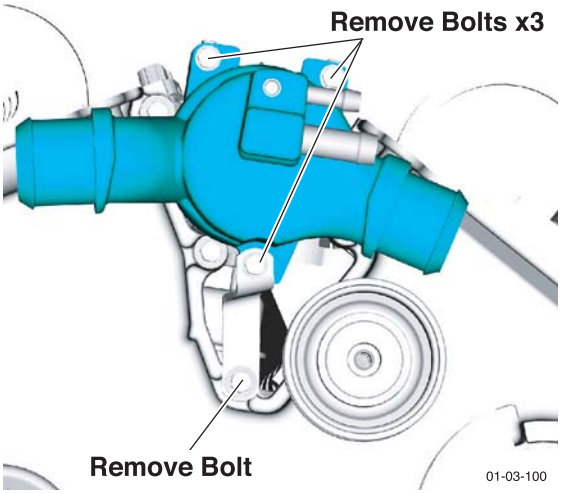


8. Using a universal puller, remove the crankshaft damper.
9. Remove the crankshaft position sensors (x2).

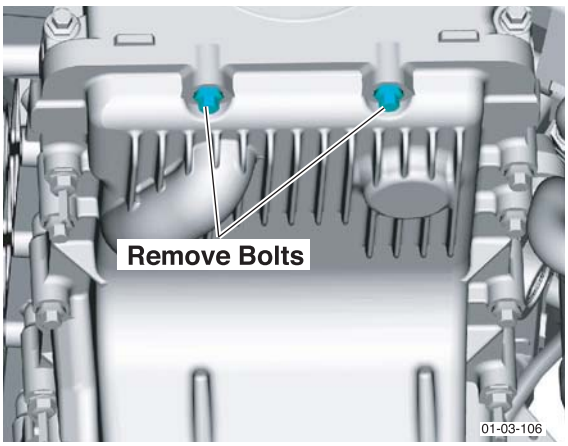


10. Remove the camshaft covers (Refer to 'Camshaft Cover', page 3-11-1).

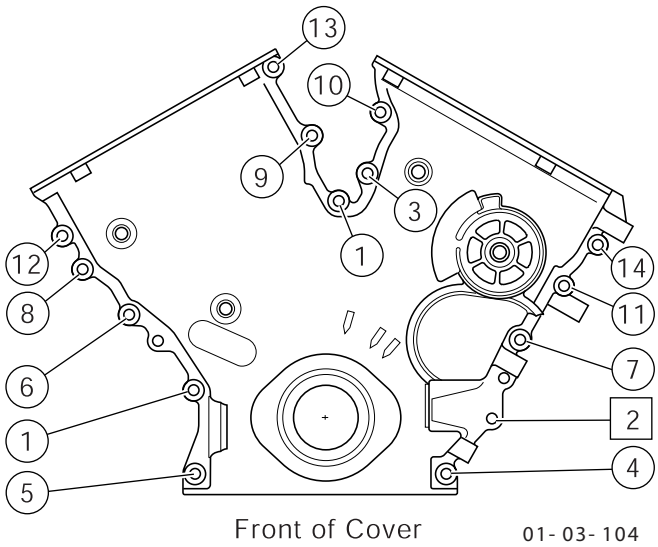
11. Remove the thermostat housing.
    11.1 Remove hoses (x4).
    11.2 Remove bolts (x3).
    11.3 Remove bolt (x1) from the timing cover.



12. Remove bolts (x2) securing the sump to the timing cover.

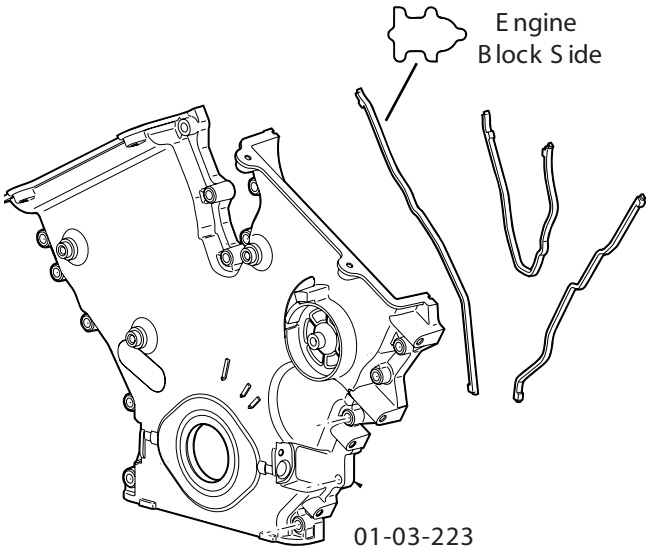


13. Remove the remaining bolts (x14) that secure the timing cover. Withdraw the timing cover. Discard the timing cover gaskets.



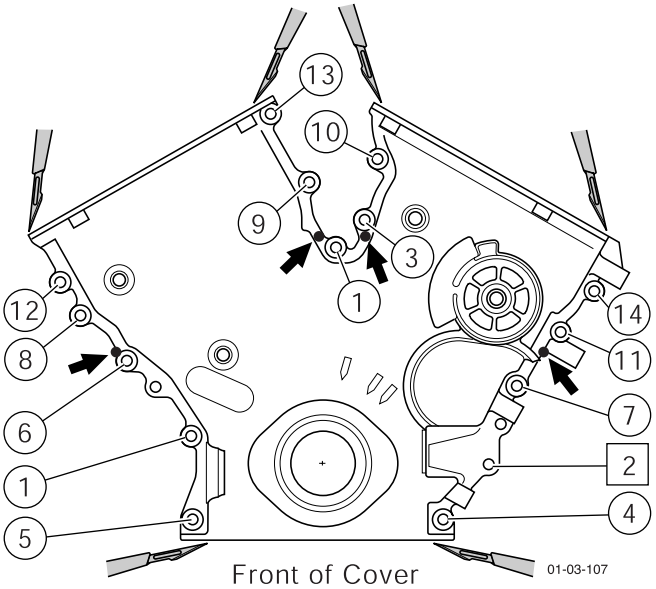
Installation

1. Ensure mating surfaces are clean and smooth. Install new timing cover seals.



2. Apply RTV sealant at the cylinder head joints as shown.

The timing cover must be installed and secured within 6 minutes of applying beads of sealant.



RTV Sealant	●
Gasket Trimming	

3. Secure with bolts (x14).

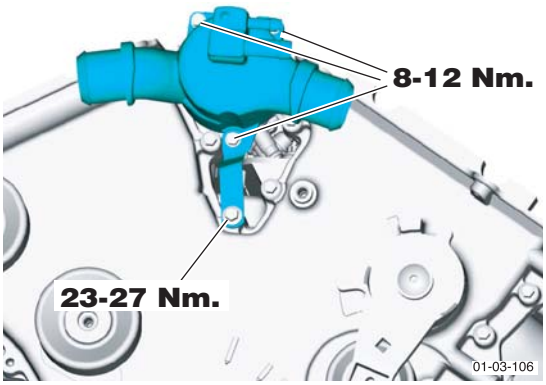
The shorter bolt locates in position 2.

Do not install the thermostat bracket bolt.

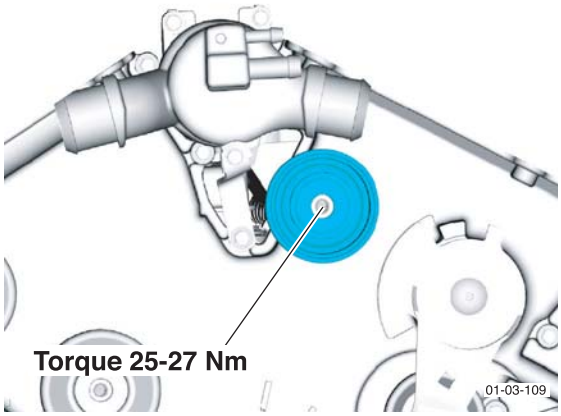
Torque the bolts, in sequence, to **23-27 Nm**.

When the timing cover bolts are torqued, the ends of the timing cover seals may protrude from the joints. Trim flush with a sharp knife.

4. Install the thermostat housing complete with the thermostat and a new 'O'-ring (Refer to 'Thermostat', page 3-4-5). Torque bolts (x3) to **8-12 Nm**. Torque the thermostat housing support bracket bolt (x1) to **23-27 Nm.**

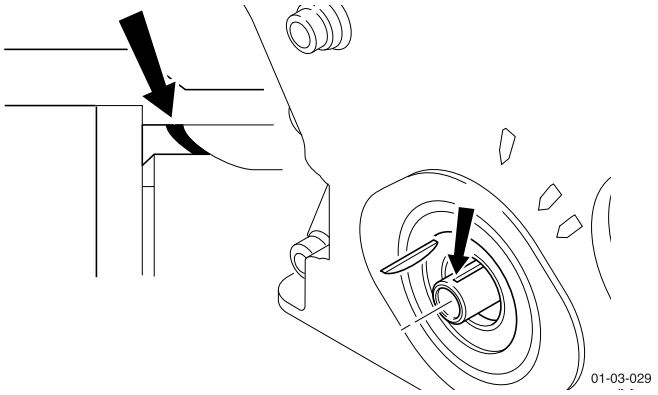


5. Install the upper idler pulley. Torque bolt to **25-27 Nm**.
6. Install the accessory drive belt tensioner. Torque bolt to **25-27 Nm**.

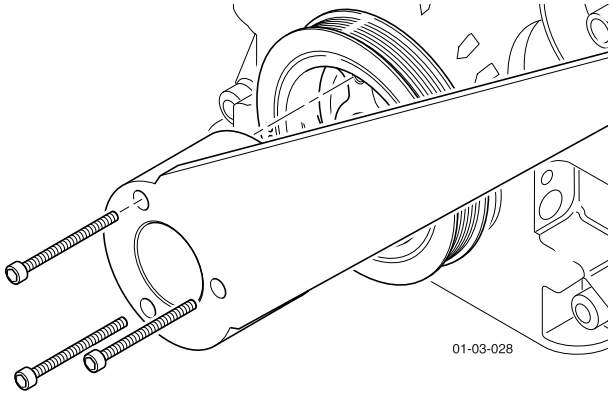


7. Install the sump bolts (x2). Torque to **15 Nm. + 90°**.
8. Install the crankshaft damper.
   8.1 Clean all sealant from the crankshaft key-way and oil the crankshaft damper seal surface.

   Apply silicone sealant to seal the key-way end.



   8.2 Prevent crankshaft from turning (Refer to '303-1047 (Crankshaft Holding)', page 20-1-6) and torque the crankshaft damper bolt in four stages:
   1 Tighten to **120 Nm**.
   2 Back out a minimum of **360°**.
   3 Tighten to **47-53 Nm**.
   4 Tighten a further **85°-95°**.



9. Install the crankshaft sensors (x2). Torque bolts to **8-12 Nm**. Connect the wiring harness plugs.
10. Secure the power steering pump and the water pump to the timing cover. Torque bolts to **23-27 Nm**.
11. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
12. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
13. Fill the coolant system (Refer to 'Cooling System (03.03)', page 3-4-1).
14. Fill the engine with the recommended quantity and grade of engine oil (Refer to 'Specifications', page 3-3-2).

Crankshaft Rear Oil Seal

Repair Operation Time (ROT)	
Item	**Code**
Crankshafts Rear Oil Seal	**TBA**

Removal

1. **Automatic Gearbox Only**
   Remove the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).
2. **Manual Gearbox Only**
   Remove the transaxle (Refer to 'Manual Transmission (07.03)', page 7-3-1)
3. Remove the torque tube (Refer to 'Torque Tube', page 5-1-2).
4. Remove the flywheel (Refer to 'Flywheel', page 3-12-9).
5. Using the service tools (Refer to 'TBA (Crankshaft Rear Oil Seal and Slinger Removal)', page 20-1-4) extract the oil seal slinger and oil seal from the oil seal retainer.

Details on removal procedure (Refer to 'Crankshaft Rear Oil Seal Remove (TBA)', page 20-1-11)

6. Clean the oil seal recess and mating surface of the oil seal retainer. Clean the mating surfaces on the engine block and sump. Ensure all mating surfaces are oil free.

Installation

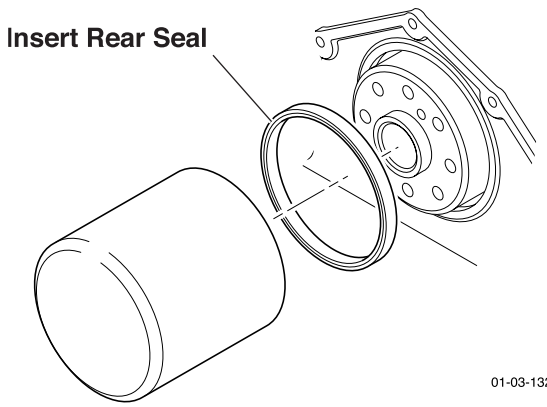
Caution
Throughout this procedure it is essential that all parts remain clean, free of dirt, grease and debris.

1. Lubricate the seal recess and seal surface with engine oil.
2. Install the rear crankshaft oil seal (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5).

Spring side towards the engine

When the oil seal install tool has bottomed out on the oil seal housing the new oil seal has been installed to the correct depth.

Insert the seal ensuring it sits squarely into the retainer recess.

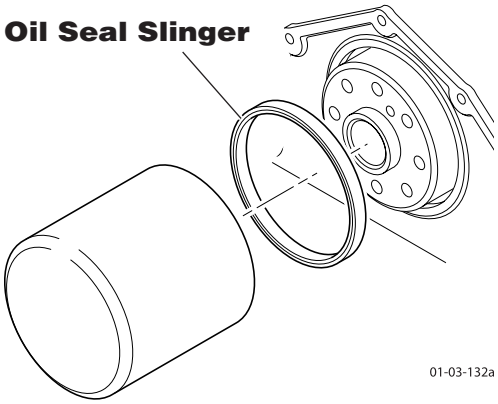


3. Install the oil seal slinger (Refer to 'TBA (Crankshaft Rear Oil Seal Slinger Install)', page 20-1-4).

The oil seal slinger installs one way only on the oil seal slinger install tool.

When the oil seal install tool has bottomed out on the oil seal housing the new oil seal has been installed to the correct depth.

Insert the seal ensuring it sits squarely into the retainer recess.



4. Install the flywheel (Refer to 'Flywheel', page 3-12-9).
5. Install the torque tube (Refer to 'Torque Tube', page 5-1-2).
6. **Manual Gearbox Only**
   Install the transaxle (Refer to 'Manual Transmission (07.03)', page 7-3-1)
7. **Automatic Gearbox Only**
   Install the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).

Crankshaft Front Oil Seal

Repair Operation Time (ROT)	
Item	**Code**
Crankshafts Front Oil Seal	**TBA**

Removal

1. Remove the timing cover (Refer to 'Camshaft Cover', page 3-11-3).
2. Remove the oil seal from the timing cover.

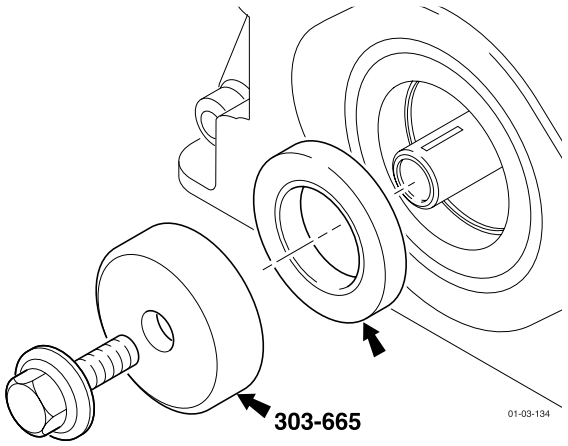
Installation

1. Clean the seal recess in the timing cover.

   Lubricate the outside of the new seal and seal recess with engine oil.
2. Install the timing cover (Refer to 'Camshaft Cover', page 3-11-3).
3. Position a new seal on the seal recess.

Spring side towards the engine

   Install the seal (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5).



Lubricate the seal surface with engine oil before installing the crankshaft damper.

ASTON MARTIN
ASTON MARTIN

Engine (03.00)

Power Conversion (03.11)

Description

Crankshaft

The crankshaft is mounted in 7 main bearings with end loads absorbed by thrust washers at number 4 main bearing. Main bearing bolts are of the 'torque to yield' type and must be renewed if removed.

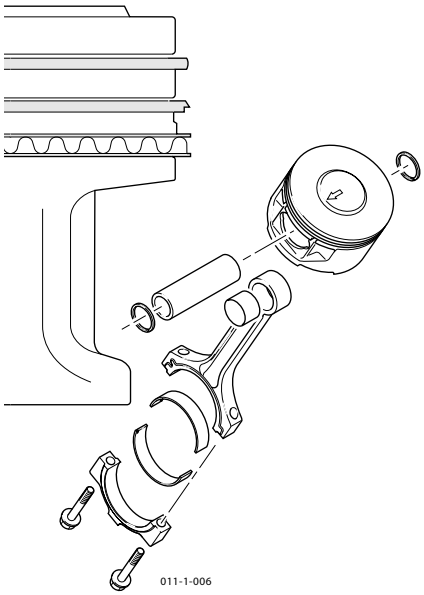
A twin sprocket, installed to the front end of the crankshaft, drives the camshaft timing chains. A damper pulley on the crankshaft drives the engine auxiliaries via the accessory drive belt.

Also at the front of the engine a timing disc is installed together with a crankshaft sensor (RH side). The sensor provides engine position signals to PCMs.

A second crankshaft sensor (LH side) is installed at the front of the engine - but is not used.

Pistons and Connecting Rods

Six crankshaft big end journals each carry a pair of connecting rods. The connecting rods are secured to the crankshaft by individual connecting rod caps enclosing the connecting rod bearing shells. Connecting rod bolts are of the 'torque to yield' type and must be renewed if removed.



Each piston carries two compression rings and one oil control ring. The arrow on each piston crown must point to the front of the engine during installation.

Connecting rods are manufactured as a single piece with fracture lines at the connecting rod bearing. Each connecting rod cap is cracked from the connecting rod after machining and drilling. Thus each connecting rod cap will only install to, in correct orientation, its matching connecting rod.

Specifications

Crankshaft	**MM**
Main Bearing Diameter	67.480 - 67.504
Main Bearing Clearance	0.025 - 0.050
Refer to the Main Bearing Grade Chart for bearing shell selection.	
Connecting Rod Bearing Diameter	49.97 - 49.99
Connecting Rod Bearing Clearance	0.028 - 0.066
Crankshaft End Float	0.130 - 0.301

Turning Torque	**Nm.**
Guideline figures only	
Crankshaft and rear seal only	6
Crank, rear seal + pistons & rods	16 - 20
Crank, rear seal, pistons & rods + camshafts & tensioned chains	36 - 44

Crankshaft Sensors	**MM**
Air Gap	1 (±0.5)

Piston Ring Gaps at 89.000 Cylinder Bore Diameter	**MM**
Upper compression ring	0.100 - 0.250
Lower compression ring	0.270 - 0.420
Oil control rings	0.150 - 0.650

Compression Ring Vertical Clearance	**MM**
Upper compression ring	0.040 - 0.075
Lower compression ring	0.040 - 0.885

Piston Pin	**MM**
Piston pin to rod clearance	
Interference	0.005
Clearance at 20°C (68°F)	0.001

Connecting Rods	**MM**
Piston pin to connecting rod clearance	0.004 - 0.020
Piston pin to piston interference	-0.005 - 0.001
Big End Side Clearance (2 rods)	0.225 - 0.625

Piston Height Above the Block Face at TDC	**MM**
Average of two readings taken along the crankshaft axis. A straight line must pass between the two readings and the center of the pistion.	0.415 (Below) 0.115 (Above)

Torque Figures			
Description		Nm.	lb./ft.
Engine block spread tool		25	18.5
Main bearings	1. Bolts 1 to 14.	37-43	27.5-32
	2. Bolts 15 to 28.	22-28	16.5-21
	3. Bolts 1 to 28.	85°-95°	
Main cap side bolts	1. Bolts 29 to 42.	22-28	16.5-21
	2. Bolts 29 to 42.	85°-95°	
Connecting rods	1.	20-25	15-18.5
	2.	40-45	30-33.5
	3.	105°-120°	
Windage tray	1.	5-7	4-5.5
	2.	45°	
Sump	1.	15	11.5
	2.	90°	
Flywheel		75-81	55.5-60
Damper plate (Auto only)		30	22.5

Piston Skirt Grading Chart

Grade	Piston Diameter 'A1'Prior to Skirt Coating	Cylinder Bore Diameter
1	88.970 / 88.980	89.000 / 89.010
2	88.978 / 88.992	89.008 / 89.022
3	88.990 / 89.000	89.020 / 89.030

Skirt Coating adds 0.020 - 0.030 to the diameter as follows:

Grade	Piston Diameter (Coated)	Clearance with Coating
1	88.990 / 89.010	New Build -0.014 (interference)
2	88.998 / 89.022	New Build + 0.024 (clearance)
3	89.010 / 89.030	Service Limit + 0.050 (clearance)

Main Bearing Grade Chart

The finished diameter of the crankshaft main bearing bores is indicated by letters stamped on the cylinder block face. The first letter, e.g. 'D', refers to No.1 journal, the second letter element refers to No.2 journal and so on.

The finished diameter of the seven crankshaft main bearing journals are indicated by seven letters stamped in bearing number sequence on No.1 counterweight.

The first letter in the sequence refers to No.1 journal, the second letter refers to No.2 journal and so on.

1. Read the first letter on the cylinder block face and note it.
2. Read the first letter on No. 1 crankshaft counterweight and note it.
3. Using the letters, select the correct bearing grade for No. 1 journal.
4. Repeat steps 1-3 to obtain the correct bearing grades for journals 2-7.

Max Crankshaft Diameter		Minimum Block Diameter																						
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
	72.400	.401	.402	.403	.404	.405	.406	.407	.408	.409	.410	.411	.412	.413	.414	.415	.416	.417	.418	.419	.420	.421	.422	.423	.424
X	67.504	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
W	67.503	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
V	67.502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
U	67.501	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
T	67.500	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
S	67.499	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
R	67.498	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Q	67.497	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3
P	67.496	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
O	67.495	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
N	67.494	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
M	67.493	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
L	67.492	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
K	67.491	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
J	67.490	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
I	67.489	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
H	67.488	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
G	67.487	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
F	67.486	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
E	67.485	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
D	67.484	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C	67.483	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
B	67.482	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
A	67.481	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Bearing Grade 1 = Orange
Bearing Grade 2 = Blue
Bearing Grade 3 = Green

The bearing grade is stamped, in ink, on the inside of the bearing.

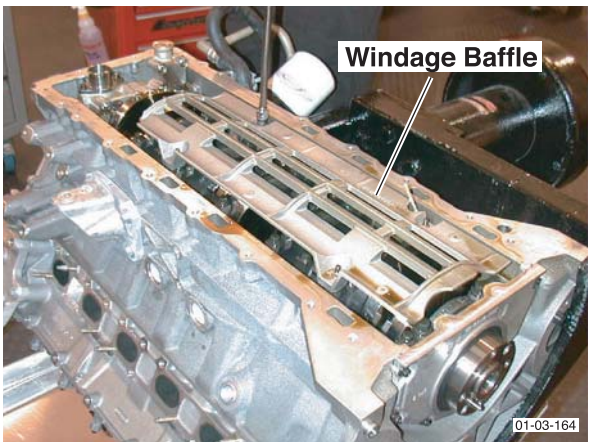
Maintenance

Crankshaft

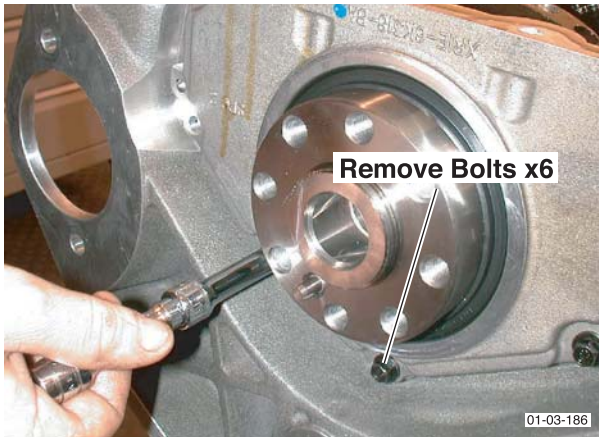
Repair Operation Time (ROT)	
Item	**Code**
Crankshaft Renew	**TBA**

Removal

1. Remove the engine from the vehicle (Refer to 'Engine', page 3-1-4).
2. Remove the cylinder heads (Refer to 'Cylinder Heads', page 3-2-2).
3. Remove the sump (Refer to 'Sump', page 3-3-3).
4. Remove the windage baffle.

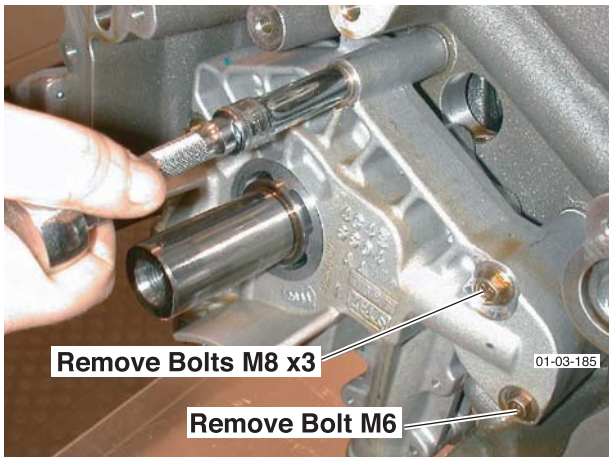


5. Remove bolts (x6) that secure the rear oil seal retainer and withdraw the seal retainer and oil seal.



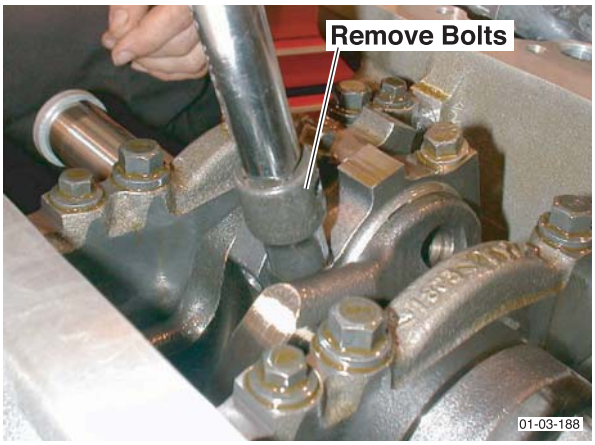


6. Remove the oil pump.



7. Remove the piston and connecting rod assemblies.

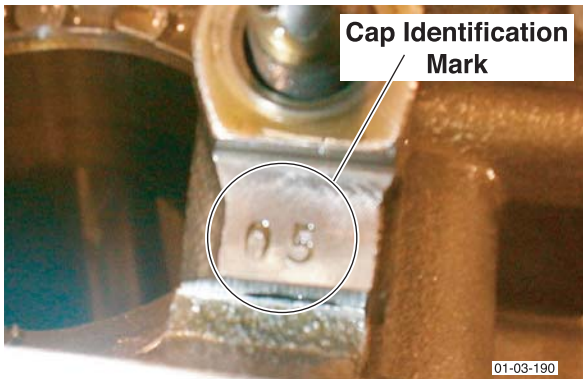
7.1 Remove the connecting rod bolts and withdraw the connecting rod caps, complete with bearings.



7.2 Withdraw the piston and connecting rod assemblies, complete with bearings, from the top of the bore.

Ensure each piston / connecting rod / connecting rod cap set remain together in order for installation to their original locations.

Connecting rods and caps have identification marks which must match and align upon reassembly.



An arrow stamped on the piston upper face must point towards the front of the engine when reassembled.

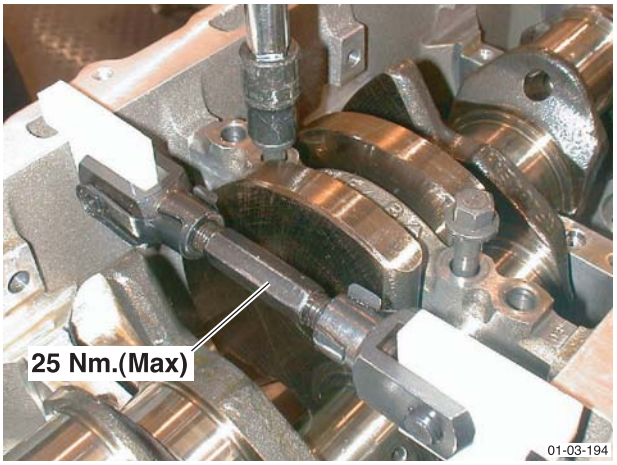
Connecting rods are symmetrical and do not require front to rear orientation.

Connecting rod bolts have ferrules pressed into the caps for new build bolt retention / ease of assembly. Replacement bolts do not have the captive ferrule. Original bolts can be removed by tapping the bolt out of the cap with a rubber mallet.

8. Remove the main bearing caps and bearing shells.

To withdraw the bearing caps, spread the engine block side walls using the engine block spreading tool (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5), tensioned to **25 Nm**.

To avoid overstriking engine block walls, ***do not*** *exceed* **25 Nm**. *on engine block spreader bolt.*

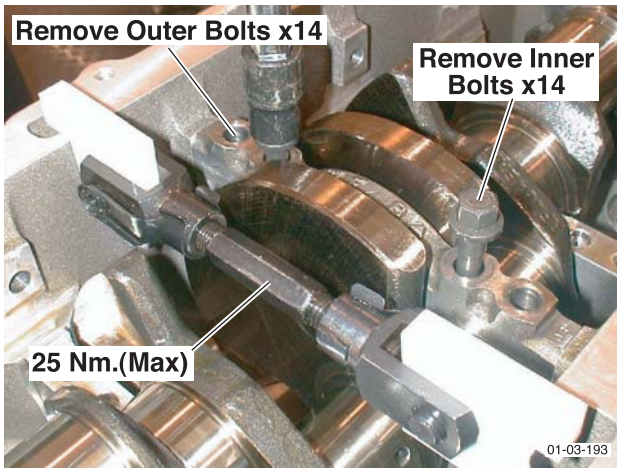


8.1 Remove the side bolts (x14).

8.2 Remove the outer bolts (x14) from the main bearing caps.

Record positions of the stud bolts at No. 3 and 6 main bearing caps.

8.3 Remove the inner bolts (x14) from the main bearing caps.



Retain all components in order for installation to their original locations, if serviceable.

9. Remove the crankshaft from the engine.
10. Remove the thrust washers from No. 4 main bearing.
11. Remove the upper bearing shells from all the main bearings.

If serviceable, retain all bearings, in order, for refitting to their original locations.

Component Checks

1. Examine the crankshaft journals for wear, scuffing or other defects. Replace the crankshaft if un-serviceable.
2. Examine all bearing shells and thrust washers for wear, scuffing or other defects. Replace if un-serviceable.
3. If required, measure the diameter of the crankshaft main and big end bearings.

   Compare results with data in engine specifications.
   - The finished diameter of crankshaft main bearing bores is indicated by numbers stamped on engine block face
   - The finished diameter of crankshaft main bearing journals are indicated by seven letters, stamped in bearing number sequence, on No.1 counter weight
4. Refer to Main Bearing Grade Chart in Engine Specifications if the main bearings are to be replaced.

Installation

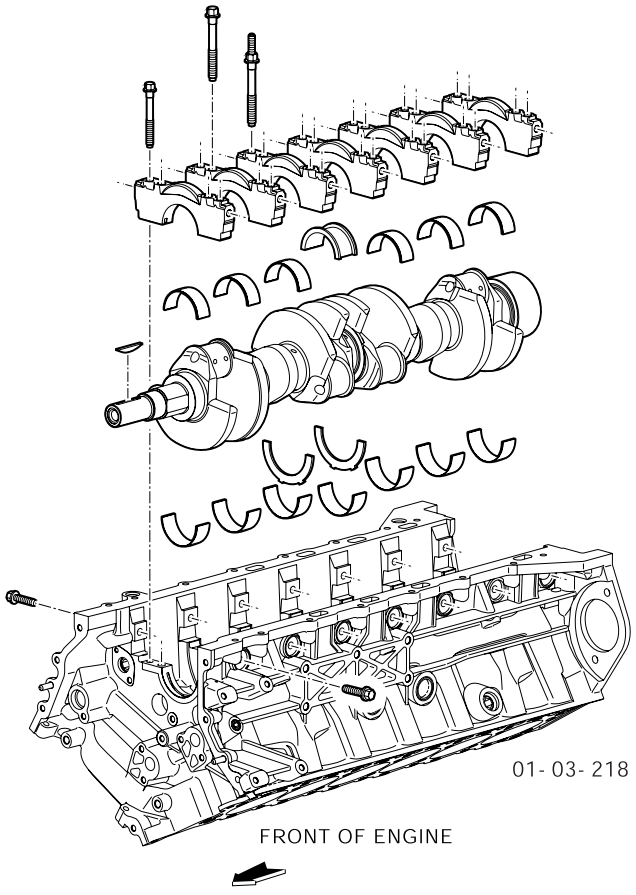
Caution
Lubricate all bearing surfaces with SAE 50 Assembly Oil.

Ensure all components are clean and free of damage prior to reassembly.

1. Install the upper bearing shells and thrust washers (No 4 bearing). Check the oil feed hole alignment.

The thrust washers are installed with the groove facing the crankshaft.

2. Install the crankshaft into the upper main bearings.



3. Install and 'seat' the main bearings and caps.

Caution
Oil beneath the head of all the main bearing bolts. Do not oil threads. 'Hand start' them into their holes.

Note the positions of the stud bolts at No. 3 and 6 main bearing caps from removal.

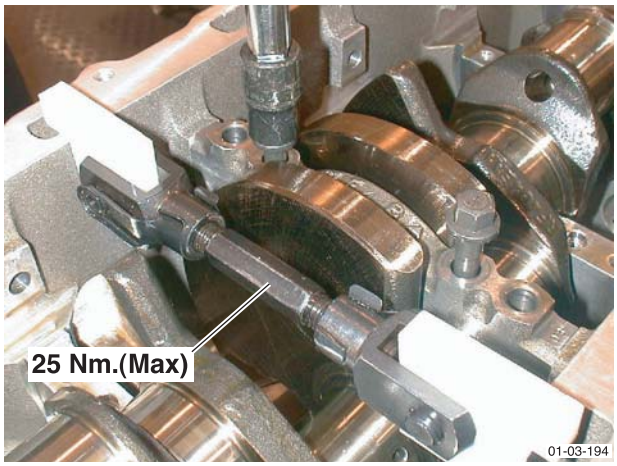
3.1 Insert the inner and outer bolts to all main bearing caps.

3.2 Lightly 'run down' the bolts to seat the main bearing caps.

3.3 Release all bolts approx. one turn.

To install the bearing caps spread the engine block side walls using the engine block spreading tool (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5), tensioned to **25 Nm**.

To avoid overstriking engine block walls, ***do not*** *exceed* **25 Nm.** *on engine block spreader bolt.*



4. Set No. 4 main bearing so the end loads are taken on both the upper and lower bearing thrust faces.

4.1 Bias the crankshaft maximum rearward against the upper thrust bearing.

4.2 With the crankshaft fully rearward, bias No. 4 bearing cap maximum rearward against the crankshaft thrust face.

4.3 Bias the crankshaft forward.

5. Torque the main bearing cap bolts, in the sequence detailed, to:

1 Bolts 1 to 14 - **37-43 Nm**.

2 Bolts 15 to 28 - **22-28 Nm**.

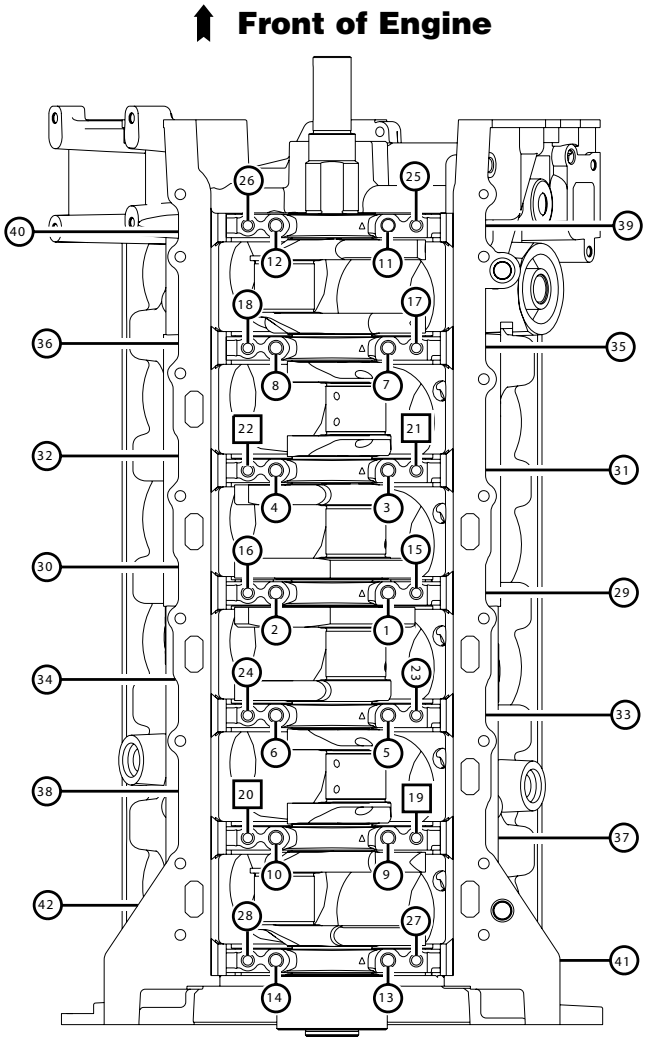
3 Bolts 1 to 28 - rotate **85°-95°**

Check and, if required, adjust No. 1 main bearing cap so that the front face does not protrude forward of the oil pump mounting face.

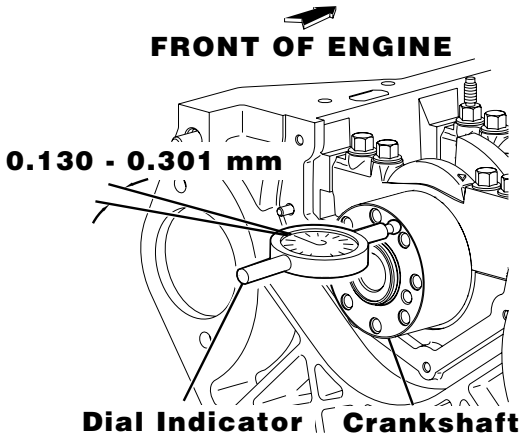
Main bearing bolts are torqued to yield. They must be tightened precisely as specified.

6. Insert the main caps side bolts. Torque the main cap side bolts, in sequence detailed, to:

1 Bolts 29 to 42 - **22-28 Nm. + 40°-50°**



7. Check the crank shaft end play.



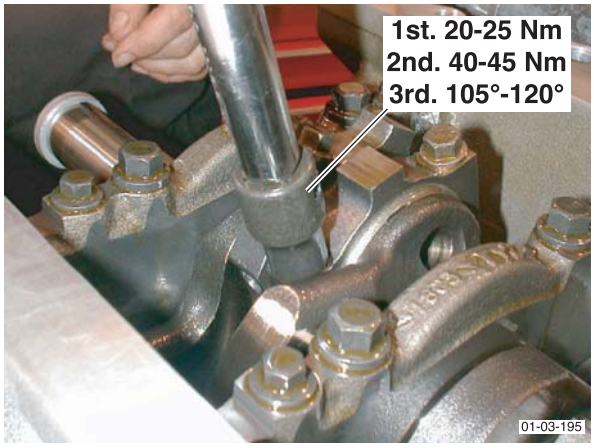
8. Check the crankshaft turning torque.
   The turing torque must not exceed **6 Nm**.
9. Complete with their upper big end bearing shell, install the pistons and connecting rods in their numbered positions. If new pistons or connecting rods are being installed, check the piston height (Refer to 'Specifications', page 3-12-1).

Ensure that the piston rings are installed and located correctly (Refer to 'Pistons and Connecting Rods', page 3-12-1).

Arrows stamped on the piston upper surface must point towards the front of the engine during reassembly.

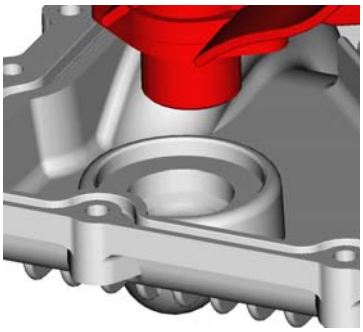
Use cylinder protectors during piston and connecting rod installation (Refer to '303-535 (Cylinder Bore Protectors)', page 20-1-4).

10. Install the connecting rod bearing caps and shells, noting correct orientation of each cap.
    Check that connecting rod and cap identification marks match and align.
    Secure caps using two new bolts to each cap.
    Torque all connecting rod bolts in three stages:
    1 To **20-25 Nm**.
    2 To **40-45 Nm**.
    3 Rotate a further **105°-120°**.



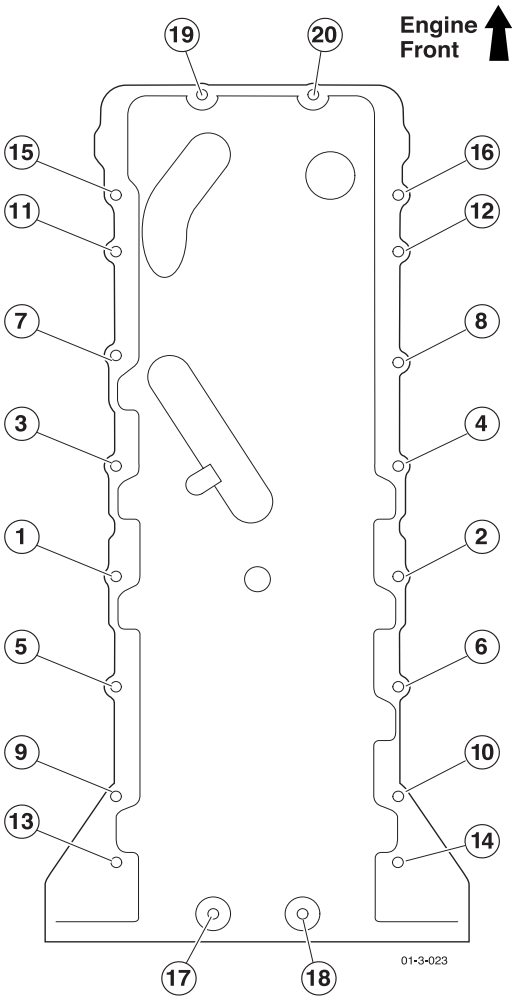
11. Install the windage tray.
    Torque nuts (x4) to **5-7 Nm + 45°**.
12. Install new a 'O'-ring to the oil pick-up pipe.
13. Install the sump.

Ensure that the sump oil outlet locates to the oil pump inlet before the sump is faced up to the engine block.
Do not use a mallet etc. to face up the sump to engine block.



Ensure the sump is flush to 0.25mm underflush to the rear face of the cylinder block.

Secure the sump using bolts (x15 M8) and (x5 M6).
Tighten the bolts using a two stage procedure:
1 Tighten all bolts to **15 Nm.** in the sequence shown.
2 Tighten all bolts through a further **90°** following the same sequence.



Caution
Ensure that the crankshaft key is in the vertical position.

14. Install the cylinder heads and camshafts (Refer to 'Cylinder Heads', page 3-2-2).
15. Install the timing chains. Check and ensure that the valve timing is correct (Refer to 'Valve Timing Check', page 3-10-4).
16. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
17. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
18. Install the engine auxiliaries.
19. Install and tension the accessory drive belt.
20. Complete engine reassembly and prepare to install to vehicle.

Pistons and Connecting Rods

Repair Operation Time (ROT)	
Item	**Code**
Pisteo and Connecting Rods Renew	**TBA**

Overhaul

Keep all components in sets for installing in their original locations, if serviceable.

1. Remove the piston pin circlips. Discard the circlips.

⚠ Warning ⚠
Pistons are heated to approx. 70°C. Wear protective clothing, e.g. gloves, to avoid burns.

2. Heat the piston to approx. 70°C and push out the piston pin. Allow the components to cool.
3. Using a ring spreader, remove the piston rings from the piston.
4. Wash all components. Replace any with obvious wear or other signs of deterioration.

   Check that components meet dimensional specifications (Refer to 'Specifications', page 3-12-1).
5. Repeat for all pistons.

Reassembly

Pistons are graded for each cylinder bore. If the pistons and / or connecting rods are to be reinstalled, they must be in their original sets and in their original positions.

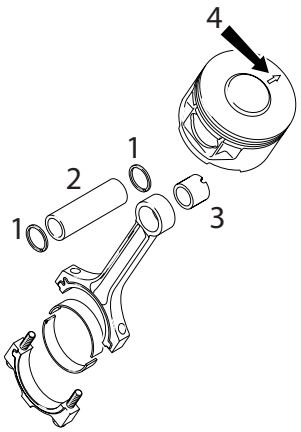
The grade of a cylinder bore (1, 2 or 3) is marked on outside of engine block, adjacent to the bore. Pistons are similarly graded (1,2 or 3) on their upper surface. Make sure the correct piston grade is chosen when installing a new piston.

Ensure that the connecting rods and caps are a matched set.

1. Heat the piston to approximately 70°C and install the connecting rod and piston pin.

⚠ Warning ⚠
Pistons are heated to approx. 70°C. Wear protective clothing, e.g. gloves, to avoid burns.

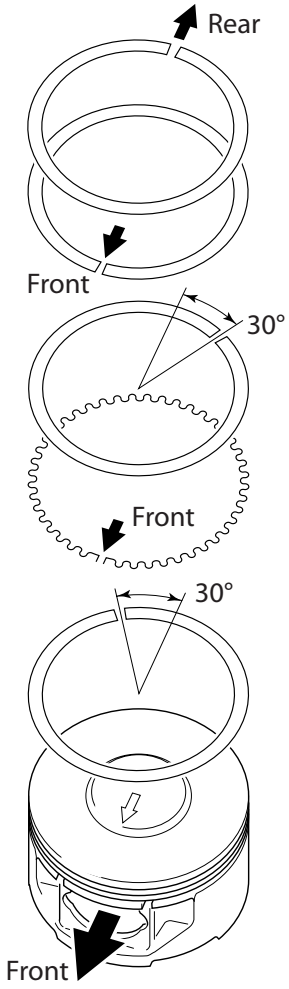
Install the connecting rod to the piston with the 'notch' in the little end bearing (3) facing the same direction as the arrow stamped on the piston head (4).



Secure the piston pin (2) with new circlips (1).

Allow the pistons cool.

2. Before installing to the engine, rotate the piston rings as necessary to the positions shown on the following diagram.



Flywheel

Repair Operation Time (ROT)	
Item	**Code**
Flywheel Renew	TBA

Removal

1. Disconnect the vehicle battery.

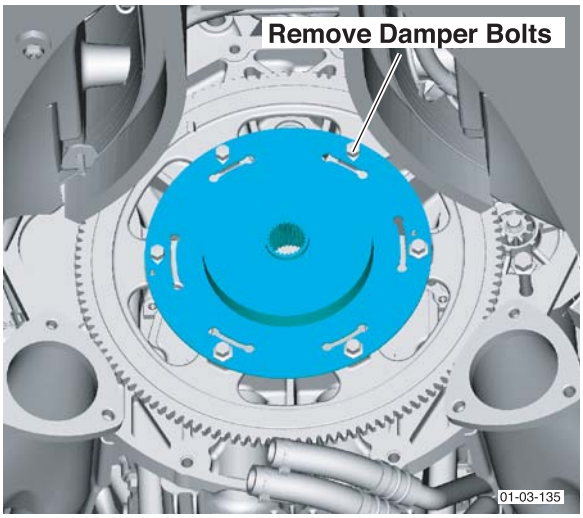
> ⚠ ***Warning*** ⚠
> ***If rasing vehicle on a 'two post' ramp (vehicle supported by underbody), Ensure that the rear end of the vehicle is securely strapped to the ramp. Failure to strap the rear of vehicle down may lead to the vehicle falling off the ramp.***

If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly (Refer to 'Jacking Points', page I-I-IX).

2. Raise the vehicle and make safe.
3. Remove the rear road wheel(s) and road wheel arch liners.
4. Remove the front and rear undertrays and the shear plate.

Lower the front undertray to reveal the air intake for the alternator. Release the spring clip and part the flex pipe from the undertray.

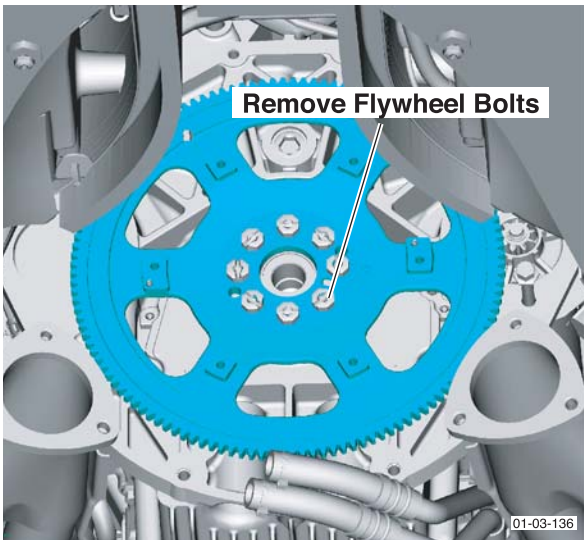
5. Remove the rear subframe and torque tube.
   - (Refer to 'Rear Subframe', page 2-1-4)
   - (Refer to 'Torque Tube', page 5-1-2)
6. **Manual Gearbox Only.**
   Remove the clutch assembly (Refer to 'Clutch (08.00)', page 8-1-1).
7. **Automatic Gearbox Only.**
   Remove the drive damper plate (bolts x8).Retain for installation.



> **Caution**
> **The flywheel assembly, including the mounting bolts, is a balanced assembly. Use the same bolts when reassembling to retain balance.**

8. Place a support surface under the flywheel. Insert flywheel bolts (x2) into the threaded 'jacking' holes in the flywheel.

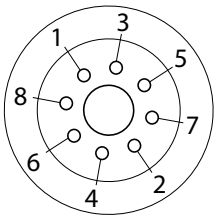
> ⚠ ***Warning*** ⚠
> ***The flywheel is heavy. Take care to provide adequate support when removing or replacing it.***



9. Tighten the bolts in stages to ease the flywheel from its location on the crankshaft.

Installation

1. Using a suitable support surface under the flywheel, offer the flywheel to the crankshaft and align the attachment holes.
2. Loosely install the flywheel mounting bolts (x8) and hand tighten.
3. Tighten the bolts in half turn stages in sequence shown. Continue until the flywheel face is in full contact with the crankshaft flange.



4. Loosen the bolts. Then torque to **75-81 Nm** in the same sequence.
5. **Manual Gearbox Only.**
   Install the clutch assembly (Refer to 'Clutch (08.00)', page 8-1-1).
6. **Automatic Gearbox Only.**
7. Install the drive damper plate. Torque bolts (x8) to **30 Nm**.

The damper plate will only install one way, locating on dowels provided.

8. Install the torque tube and the rear subframe.
   - (Refer to 'Torque Tube', page 5-1-2)
   - (Refer to 'Rear Subframe', page 2-1-4)
9. Install the front and rear undertrays.
10. Install the road wheel arch liners.
11. Bleed the brakes. (Refer to 'Brake Bleeding - WDS', page 6-4-4).
12. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
13. Remove the vehicle securing strap, if installed.
14. Connect the vehicle battery.

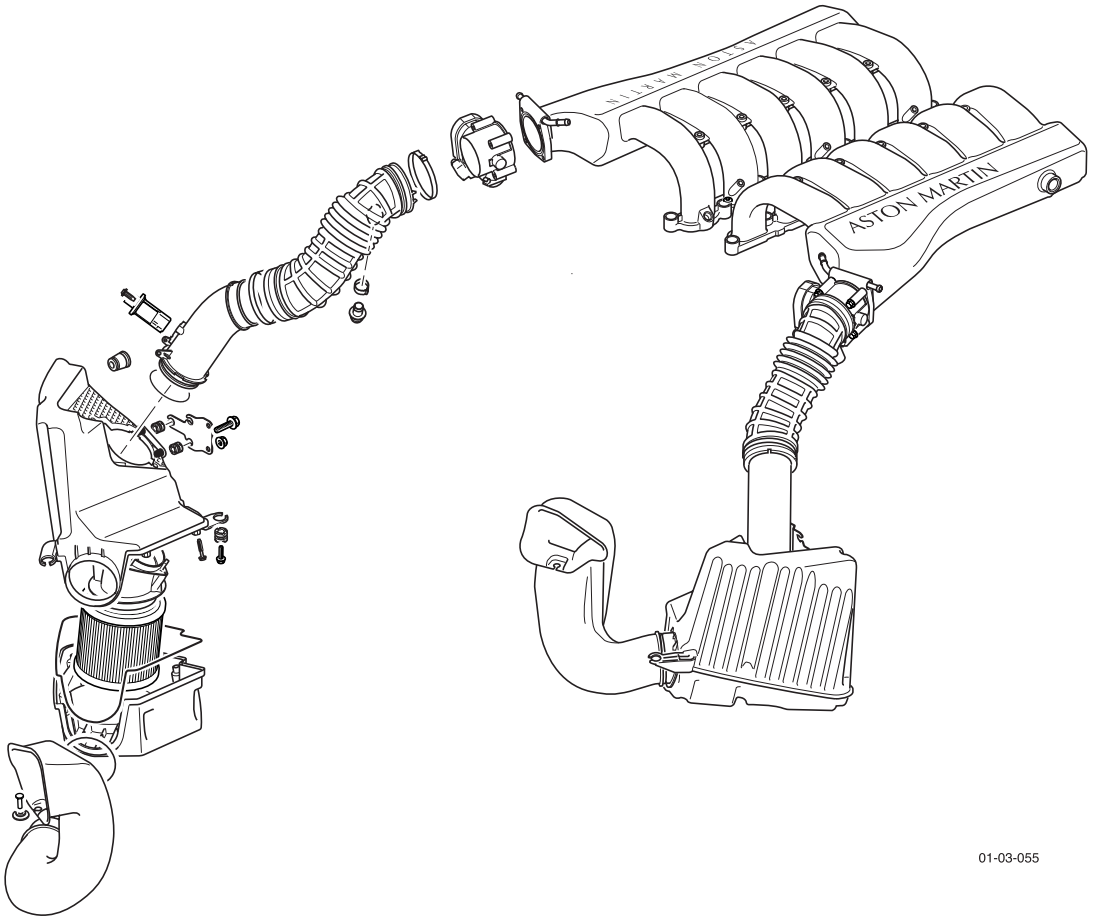
Engine (03.00)

Air Charging (03.12)

Description

Air Induction System

Intake air is filtered and then passed through mass air flow (MAF) meters. Signals from the MAF meters are fed to the PCMs and are used together with other signals in calculating the required amount of fuel (Air fuel ratio approx. 14.3 parts air to 1.0 part fuel by weight). The air then passes through the throttle bodies into the six branch inlet manifolds.



Specifications

Torque Figures		
Description	Nm	(lb. / ft.)
Air box cover	1.5-2.0	1.5
Outlet pipe	1.5-2.0	1.5
Air box mountings	2.5-3.5	2-2.5

Maintenance

Air Filter

Repair Operation Time (ROT)		
Item		**Code**
Air Filter Renew	LH	**03.12.CB**
	RH	**03.12.DB**

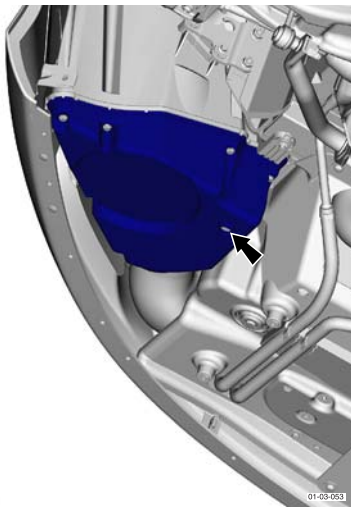
Removal

If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

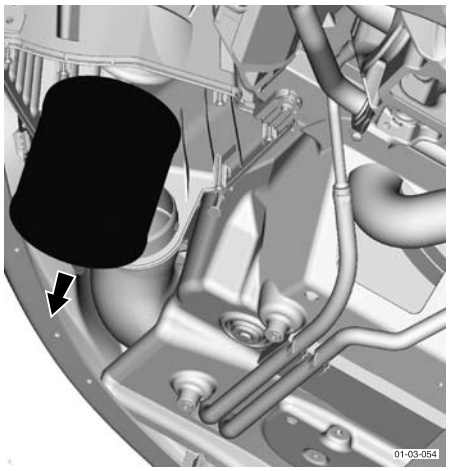
15. Raise the vehicle and make safe.
16. Remove the road wheel(s).
17. Remove the front undertray.
18. Remove the screws (x3). Pull the front section of the wheel arch down to gain access the air filter box.



19. Remove bolts (x7) and remove filter box cover.



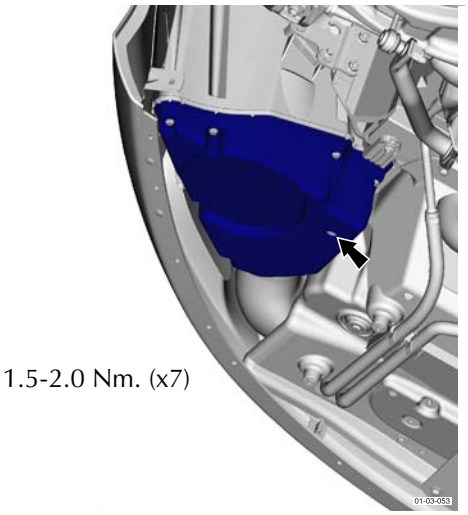
20. Remove air filter.



21. Repeat for second air filter.

Installation

1. Push the air filter onto the filter adaptor. Install the box cover. Torque bolts to **1.5-2.0 Nm**.



2. Install the front section of the road wheel arch liner.
3. Install the front undertray.
4. Install the road wheel(s) (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

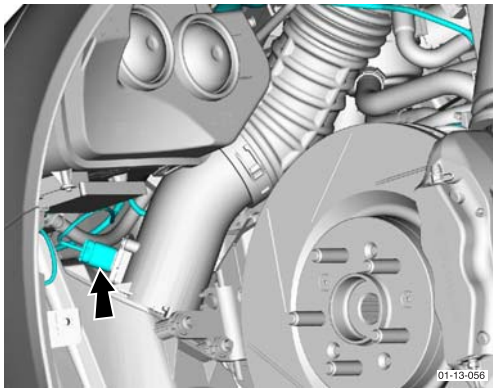
Air Filter Box

Repair Operation Time (ROT)		
Item		**Code**
Air Box Renew	LH	**03.12.AB**
	RH	**03.12.BB**

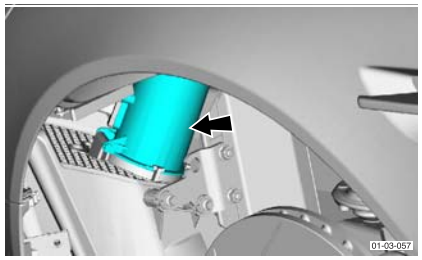
Removal

If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

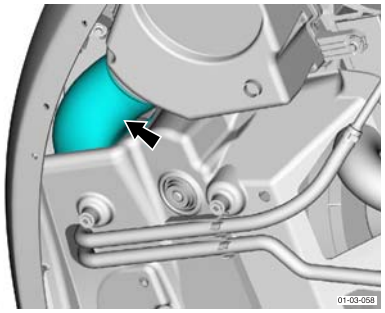
1. Raise the vehicle and make safe.
2. Remove the front undertray.
3. Remove the road wheel(s) and arch liner.
4. Disconnect the wiring harness plug.



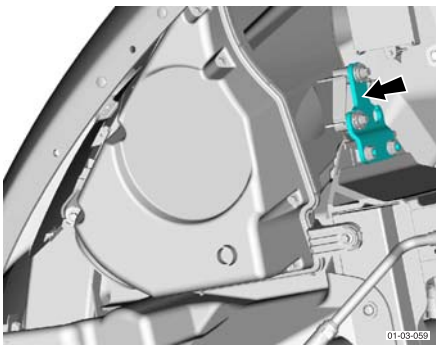
5. Disconnect the air outlet and inlet pipes.

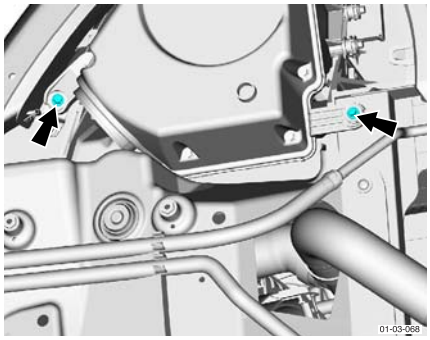


Outlet pipe - Remove fixing screw. Twist the outlet pipe and pull away.



6. Remove the air filter box mounting bracket (x1) and mounting bolts (x2). Withdraw the air filter box.

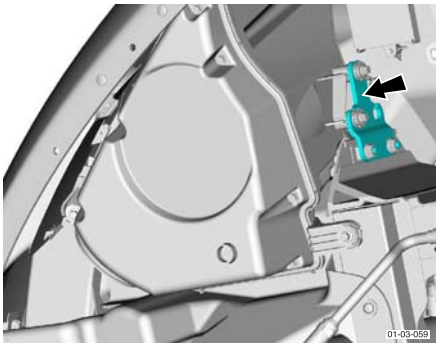


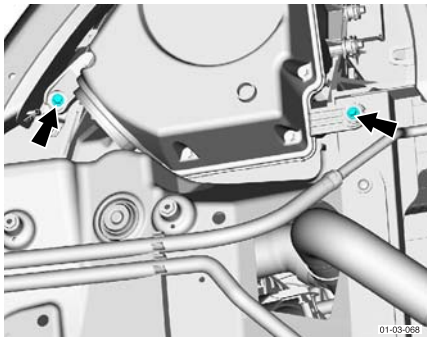


7. Repeat for second air filter.

Installation

1. Place the air filter box into position and secure.





2. Connect the outlet and inlet pipes.

Outlet pipe - Insert and twist, install fixing screw.

3. Connect the wiring harness plug.
4. Install the road wheel arch liner and front undertray.
5. Install the road wheel(s) (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

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Engine (03.00)

Engine Management System (03.14)

The electronic engine control system consists of two Powertrain Control Modules (PCM's) and a number of sensing and actuating devices. The sensors supply the PCM's with input signals which relate to the engine operating conditions and driver requirements. The sensor information is evaluated by the PCM's using the results to activate the appropriate response from the actuating devices.

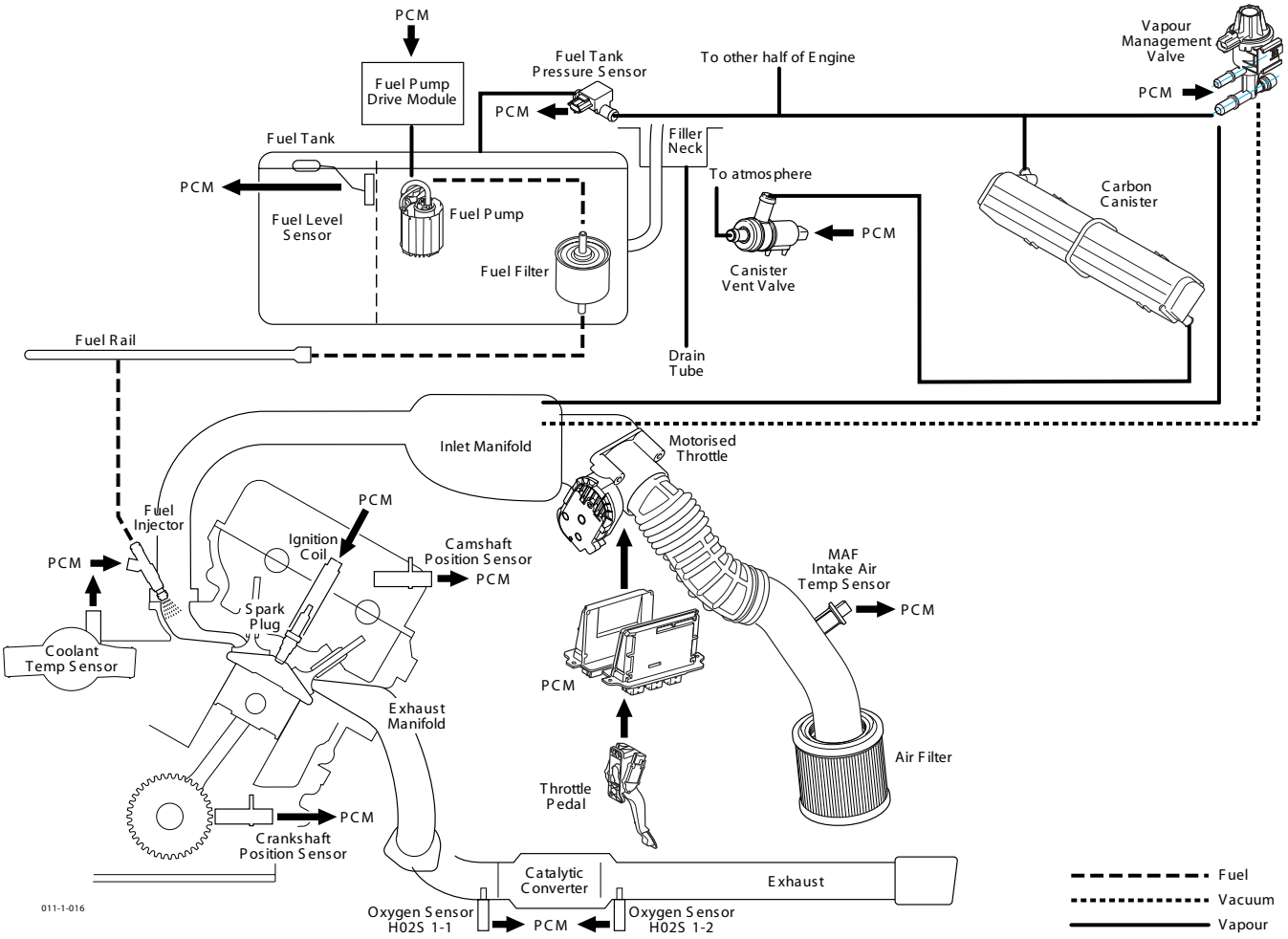
The system provides the necessary engine control accuracy and adaptability to:

- Minimize exhaust emissions and fuel consumption
- Provide optimum driver control under all conditions
- Minimize evaporative emissions
- Provide system diagnostics

In addition to these functions the PCM's also interface with other vehicle systems through the controller area network (CAN).

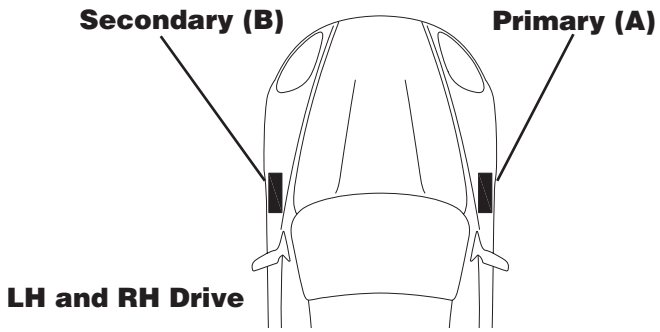
Refer to the Vehicle OBDII manual for inputs / outputs and diagnostic information

Schematic Diagram



Specifications

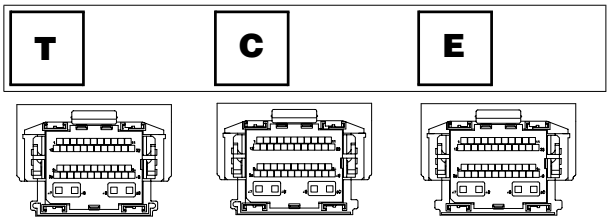
Powertrain Control Modules (PCMs)



PCM A

View looking into the PCM connectors.

Caution
Check plugs to ensure correct connector



(Refer to 'Circuit Diagrams', page 18-1-17)

T - Transmission

C0634-	Description	I / 0	Circuit Page
4	PRND	I	8
9	MAF+	I	67
10	MAF-	I	67
14	CB2+		13
17	Drive TT	0	9
18	Sport TT	0	8
19	Tip up	I	9
20	Tip down	I	9
21	MIL	0	30
24	HEGO 12	I	43
25	HEGO 22	I	43
26	CB2-		13
28	Rev TT	0	8
29	PRND 2	I	8
30	CB 3+		16
31	CB 3-		16
32	Neutral TT	0	9
33	Sport SW	I	8
36	Bap	I	68
38	Engine off	I	9
40	Ref. voltage C		9, 68
41	Signal return C		43, 68
43	Park ST	I	9
45	Park TT	0	8

T - Transmission

C0634-	Description	I / 0	Circuit Page
47	HTR 12	0	43
48	HTR 22	0	43
50	CNVNT	0	68

C - Cowl

C0635-	Description	I / 0	Circuit Page
2	Start enable	0	70
3	ISO-K		9
4	App1 Ref. voltage		72
5	App 1	I	72
6	App 1 Return		72
7	Brake pedal switch	I	39
8	Brake On / Off switch	I	39
9	Fuel tank pressure	I	68
10	Case ground		56
11	CB 1+		16
12	Motor fuel pump	0	41
14	Power steering pressure	I	65
15	Accs (Aircon demand)	I	6
16	App 2 Ref. voltage		72
17	App 2	I	72
18	App 2Return		72
19	Sccs (Speed Con Demand)	I	71
20	Restraint deploy Ind	I	2
21	Fuel pump monitor	I	41
22	Oil Pressure	I	65
23	CB 1-		16
24	Power hold	0	50, 56, 63
25	Aircon clutch relay	0	6
26	Aircon pressure	I	6
29	Clutch (Top of travel)	I	70
30	Sccs (Speed Con Return		71
31	TX out (PATS Comms)	0	63
32	Vehicle speed sensor+	I	68
33	Vehicle speed sensor-	I	68
34	EVMV	0	65
35	Power		56
36	Power		56
37	PATIL (PATS LED)	0	30
38	PBI (Start button ILL)	0	70
39	Clutch (Bottom of travel)	I	70
40	Ref. voltage B		6, 65, 68
41	Signal return B		6, 65, 68, 70
42	RXIN (PATS Comms)	I	63
43	EBV	0	68
44	FEPS		16
45	Keep alive power		56
47	Power ground		56

C - Cowl

C0635-	Description	I / 0	Circuit Page
48	Power ground		56
49	Power ground		56
50	IGNSNS	I	56

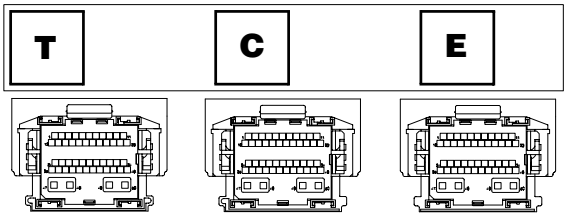
E - Engine

C0636-	Description	I / 0	Circuit Page
1	(CD1) Clyinder 1	0	47
2	Injector 1	0	48
3	Injector 6	0	48
4	Injector 4	0	48
5	Injector 3	0	48
7	Throttle pot return		72
8	Injector 5	0	48
9	Injector 2	0	48
10	Injector 7	0	48
11	Injector 8	0	48
12	(CD5) Cylinder 5	0	47
13	Inlet air temperature	I	67
14	Fan Control	0	21
15	Camshaft / Crankshaft Return		65
18	Throttle Pot Reference Volume		72
19	TP1-NS	I	72
24	(CD3) Cylinder 3	0	47
25	CID 1	I	65
29	TP2-PS	I	72
30	HEGO 11	I	43
31	Hego21	I	43
33	Engine Coolant Temperature	I	65
34	Crankshaft Position	I	65
35	(CD6) Cylinder 6	0	47
36	Fuel Rail Temperature	I	65
37	Fuel Rail Pressure Tran	I	65
38	(CD2) Cylinder 2	0	47
39	(CD4) Cylinder 4	0	47
40	Ref. Voltage A		65
41	Signal Return		43, 65, 67
45	Crankshaft Positive	I	65
47	Throttle Mtr +	0	72
48	Throttle Mtr -	0	72
49	HTR11	0	43
50	HTR21	0	43

PCM B

View looking into the PCM connectors.

Caution
Check plugs to ensure correct connector



(Refer to 'Circuit Diagrams', page 18-1-17)

E - Engine

C2464-	Description	I / 0	Circuit Page
1	(CD7) Cylinder 1	0	47
2	Injector 1	0	48
3	Injector 6	0	48
4	Injector 4	0	48
5	Injector 3	0	48
7	Throttle pot return		72
8	Injector 5	0	48
9	Injector 2	0	48
10	Injector 7	0	48
11	Injector 8	0	48
12	(CD11) Cylinder 5	0	47
13	Inlet air temperature	I	67
15	Camshaft / Crankshaft Return		66
18	Throttle Pot Reference Volume		72
19	TP1-NS	I	72
24	(CD9) Cylinder 3	0	47
25	CID 1	I	66
29	TP2-PS	I	72
30	HEGO 11	I	44
31	HEGO 21	I	44
34	Crankshaft Position+	I	66
35	(CD12) Cylinder 6	0	47
37	Fuel tank pressure tran	I	66
38	(CD8) Cylinder 2	0	47
39	(CD10) Cylinder 4	0	47
40	Ref. Voltage A		66
41	Signal Return		44, 66, 67
45	Crankshaft Positive -	I	72
47	Throttle Mtr +	0	72
48	Throttle Mtr -	0	72
49	HTR11	0	44
50	HTR21	0	44

T - Transmission			
C0637-	**Description**	**I / 0**	**Circuit Page**
4	Engine coolant level	I	66
6	PRI / Sec switch	I	44
9	MAF +	I	67
10	MAF -	I	67
14	CB 2 +		13
24	HEGO 12	I	44
25	HEGO 22	I	44
26	CB 2 -	I	13
30	CB 3 +		16
31	CB 3 -		16
38	Altmon	I	69
41	Signal return C		44
47	HTR 12	0	44
48	HTR 22	0	44

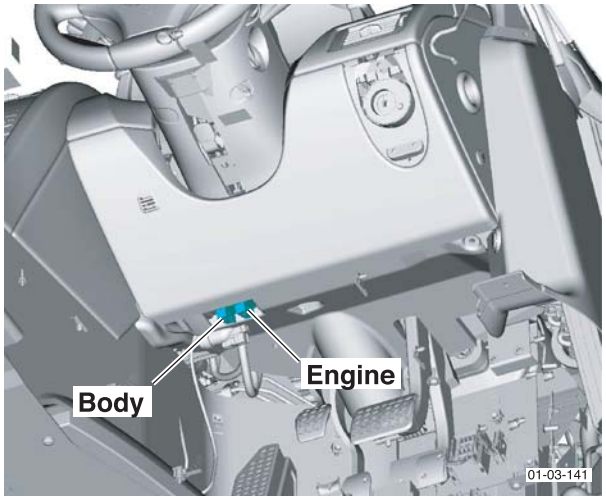
C -Cowl			
C0638-	**Description**	**I / 0**	**Circuit Page**
4	App 1 Ref. voltage		72
5	App 1	I	72
6	App 1 return		72
7	Brake pedal switch	I	39
8	Brake On / Off switch	I	39
10	Case ground		56
11	CB 1+		16
12	Motor fuel pump	0	41
16	App 2 Ref. voltage		72
17	App 2	I	72
18	App 2 Return		72
20	Restraint deploy Ind	I	2
21	Fuel pump monitor	I	41
23	CB 1-		16
24	Power hold	0	56
32	Vehicle speed sensor+	I	68
33	Vehicle speed sensor-	I	68
34	EVMV	0	66
35	Power		56
36	Power		56
44	FEPS		16
45	Keep alive power		56
47	Power ground		56
48	Power ground		56
49	Power ground		56
50	IGNSNS	I	56

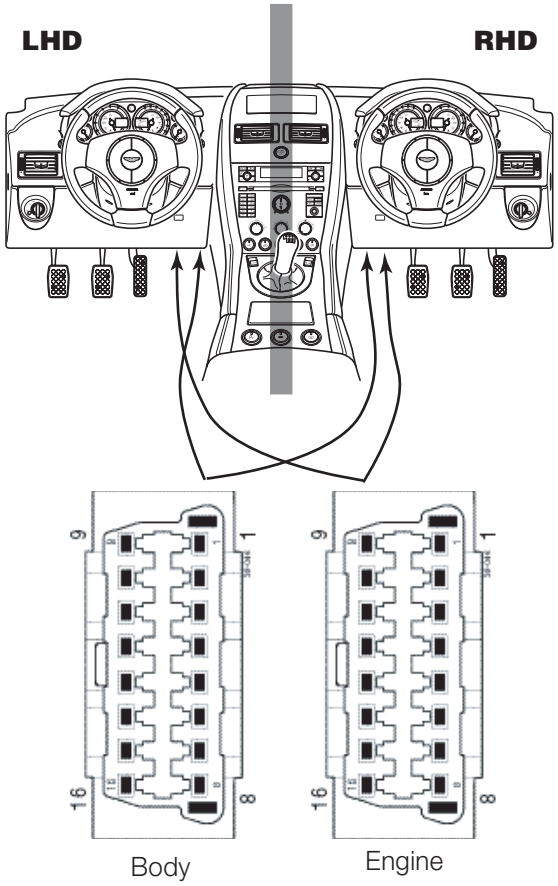
Torque Figures		
Description	Nm.	lb./ft.
PCM mount	8-10	6-7.5

Maintenance

WDS Connection

The port for WDS connection is located in the drivers side footwell on the transmission tunnel.



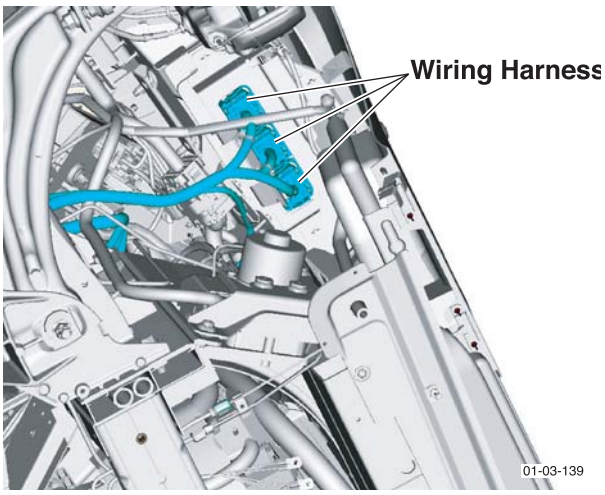


PCM

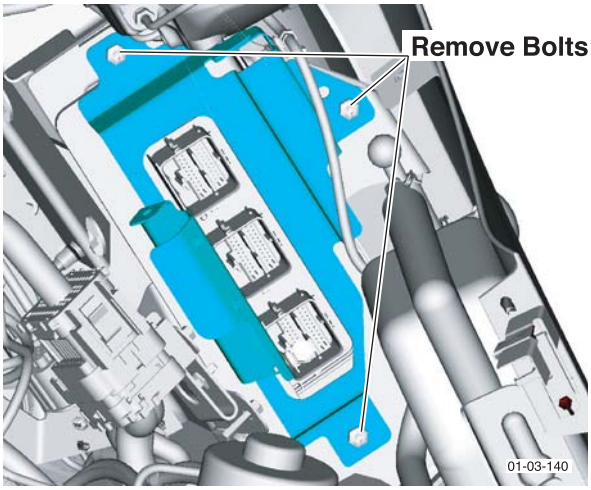
Repair Operation Time (ROT)		
Item		**Code**
PCM Renew	LH	**03.14.AB**
	RH	**03.14.BB**

Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the road wheel and road wheel arch liner.
4. Disconnect the wiring harness plugs (x3).



5. Disconnect the door check rod.
6. Remove bolts (x3) and withdraw the bracket and the PCM.



Installation

1. Install the PCM and the bracket. Torque bolts (x3) to **8-10 Nm**.
2. Connect the wiring harness plugs (x3).
3. Install the door check rod.
4. Install the road wheel arch liner.
5. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
6. Connect the vehicle battery.

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Engine (03.00)

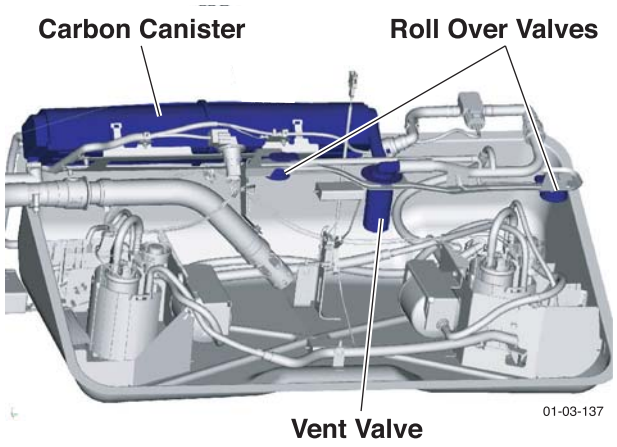
Evaporative Emissions (03.13)

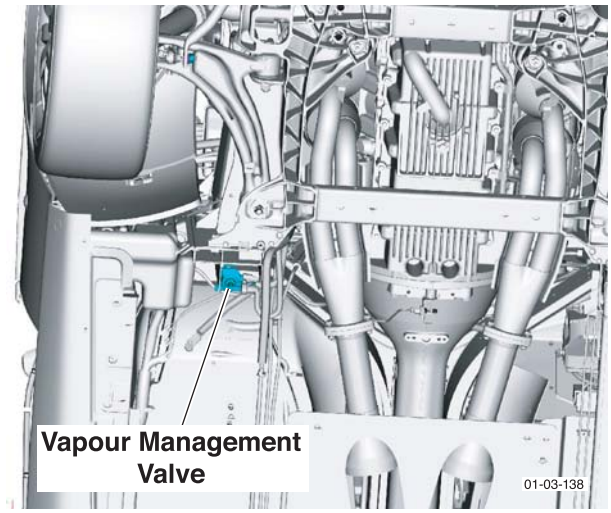
Description

The evaporative loss system prevents escape of fuel vapours into the atmosphere.

Fuel vapour is displaced from the fuel tank during filling. Vapour is also displaced due to fuel evaporation in higher temperatures. Displaced fuel vapour is absorbed in the carbon canister filter located on top of the fuel tank.

During normal engine running, absorbed fuel vapour is purged from the carbon canisters and mixed with the normal fuel/air charge in the inlet manifold.





System Operation

Displaced fuel vapour leaves the fuel tank via the normally open fill level vent valve and the roll over valves. It passes through the carbon canister where fuel hydrocarbons are absorbed. Clean air leaves the system via the normally open canister vent valve. This valve is only closed during diagnostic pressure testing of the fuel system.

During normal engine running, the single vapour management valve in the engine bay is periodically opened allowing fresh air flow into the open canister vent valve, through the carbon canister, through the vapour management valve and into the primary inlet manifold. This fresh air flow progressively purges any absorbed fuel vapour from the carbon canister.

ASTON MARTIN
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Engine (03.00)

Throttle Control (03.16)

Description

Motorised Throttles

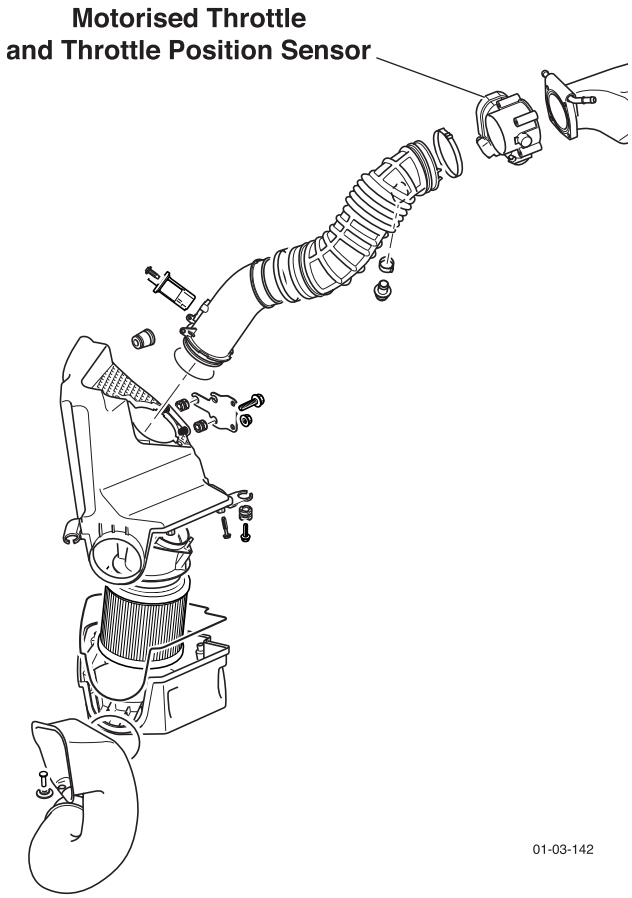
The motorised throttles (x2, one to each inlet manifold) allow accurate control of the inlet air.

A throttle position sensor (TPS) is incorporated into each motorised throttle unit. During normal engine run, TPS signals are used by the PCMs to indicate power demand from the engine. If not already at the desired position, the PCMs will drive the throttle motors to open or close the throttles by the required amount.

At idle, the throttle butterflies are almost closed and idle speed is controlled by small throttle movements.

The throttle butterflies are spring loaded to fail in the idle position. In the event of the throttle butterflies springs failing, air flow will allow the throttle butterflies to fail in the idle position.

No set-up procedure is required.



Specifications

Torque Figures		
Description	Nm.	lb./ft.
Throttle body	**8-12**	6-9

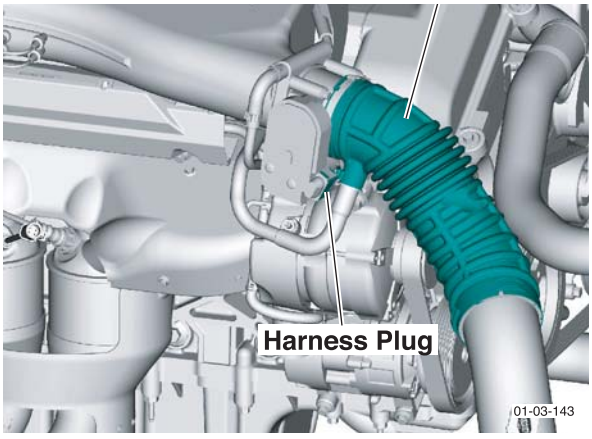
Maintenance

Throttle Body

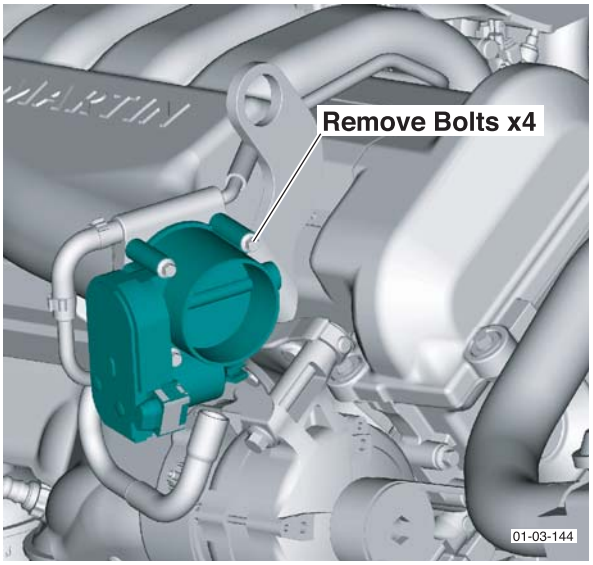
Repair Operation Time (ROT)		
Item		**Code**
Throttle Body Renew	LH	**03.04.HB**
	RH	**03.04.JB**

Removal

1. Disconnect the air intake pipe.



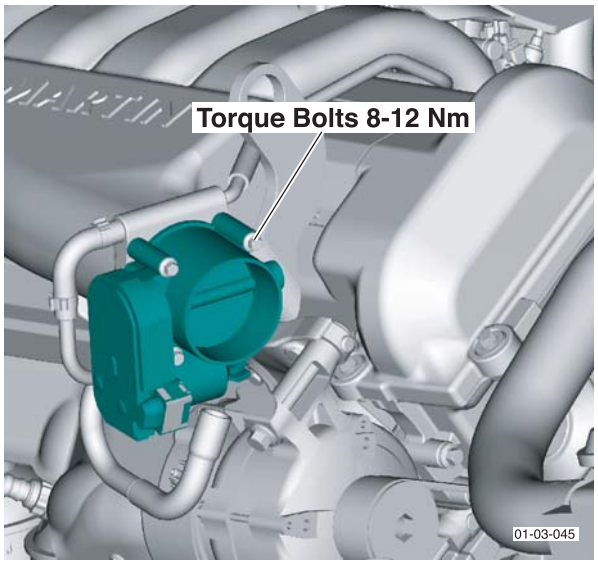
2. Disconnect the wiring harness plug.
3. Remove bolts (x4).



4. Withdraw throttle body complete with gasket. Discard the 'O' ring.

Installation

1. Install the throttle body complete with a new 'O' ring. Torque bolts (x4) to **8-12 Nm**.



2. Install the air intake pipe and wiring harness plug.

Frame and Mounting (02.00)

Contents

Subframes (02.03) 2-1-2
Specifications 1-2
Maintenance 1-2
Front Subframe 1-2
Removal 1-2
Installation 1-3
Rear Subframe 1-4
Removal 1-4
Installation 1-8

Frame and Mounting (02.00)

Subframes (02.03)

Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Subframe to Front Structure	105-125	77.5-92.5
Subframe to Body	105-125	77.5-92.5
Engine Mounts	47	35
Steering Rack	115	85
Torque tube (rear)	43-57	32-42.5
Drive Plate (auto only)	72	53.5
Spring and Damper top mounting (rear)	85	63
Rear subframe to Body	175	129.5
Rear subframe reinforcement plates	62	46

Maintenance

Front Subframe

Repair Operation Time (ROT)	
Item	**Code**
Front Subframe	**02.01.AB**

Removal

1. Disconnect the vehicle battery.
2. Support the engine from above (Refer to '303-1080 (Engine Support Adaptor)', page 20-1-6).

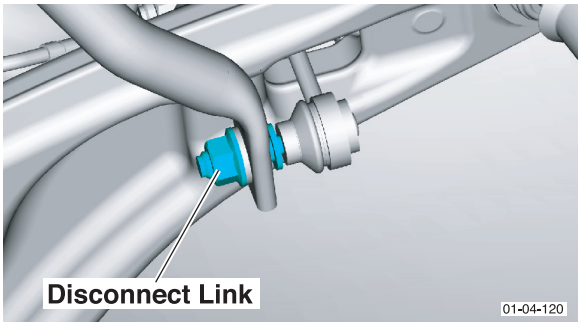
If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

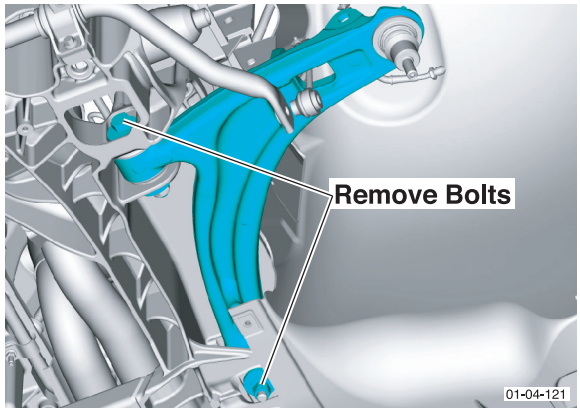
3. Raise the vehicle and make safe.
4. Remove the front road wheels and road wheel arch liners.
5. Remove the undertray.

Lower the undertray to reveal the air intake for the alternator. Release the jubilee clip and part flex pipe from the undertray. Remove the front undertray.

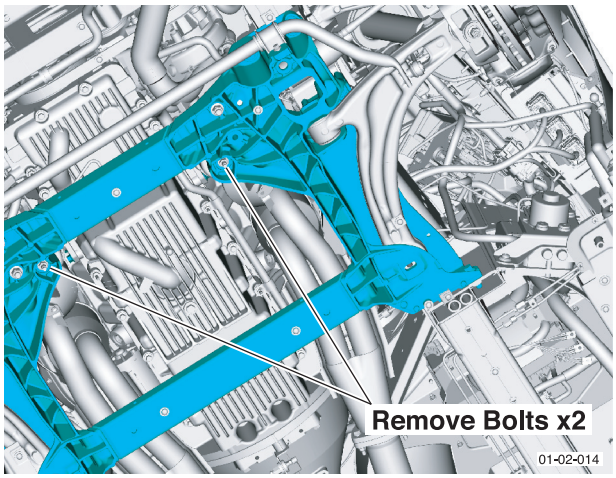
6. Disconnect the lower suspension arms (Refer to 'Front Suspension (04.01)', page 4-2-1).

Disconnect the anti-roll bar from the lower arms. Leave the anti-roll bar attached to the subframe.



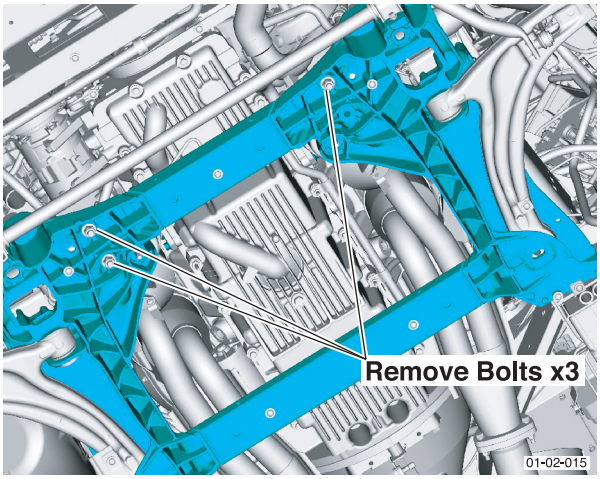


7. Remove bolts (x2) that secure the engine mounts to the subframe.



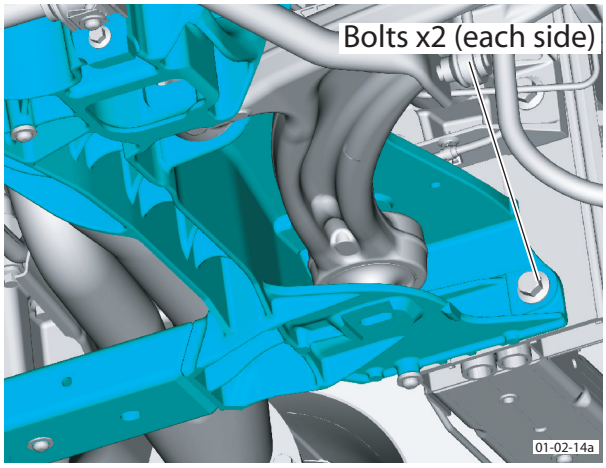
8. Remove bolts (x3) that secure the steering rack to the subframe.

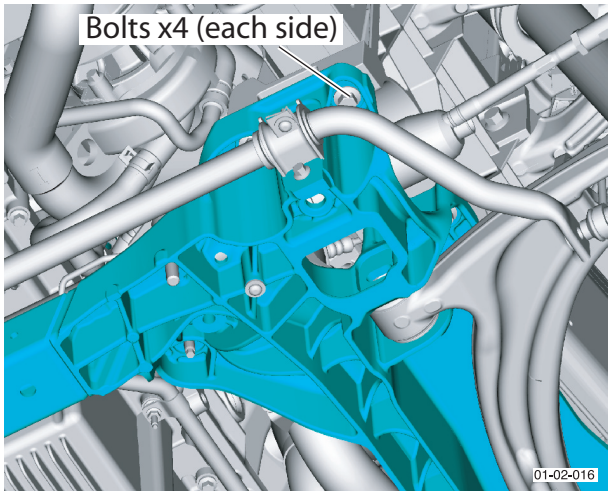
'Ty-wrap' the steering rack in position.



9. Support the subframe.
10. Ensure that the relation of the subframe to the front structure and the vehicle body is marked (scribed), for accurate installation.

11. Remove bolts (x12) that secure the subframe to the body and the front structure.
    Withdraw the subframe.





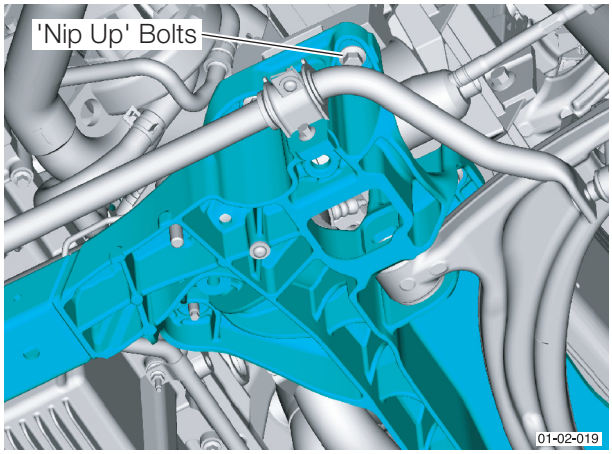
Installation

1. Raise the subframe to the front structure. Install the subframe mounting bolts (x12).

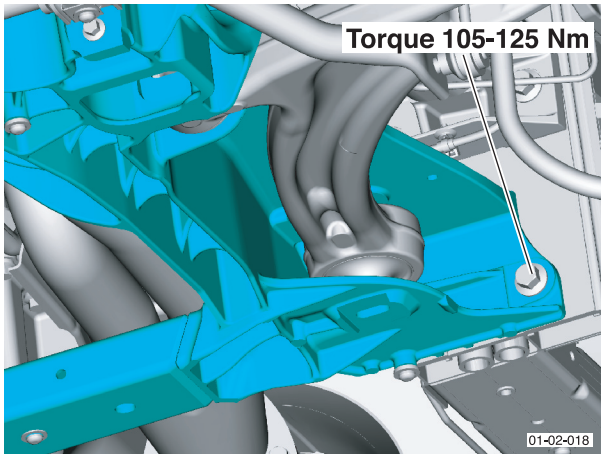
Ensure that the subframe to the front structure and the vehicle body alignment marks are lined up.

Tighten the bolts in three stages:

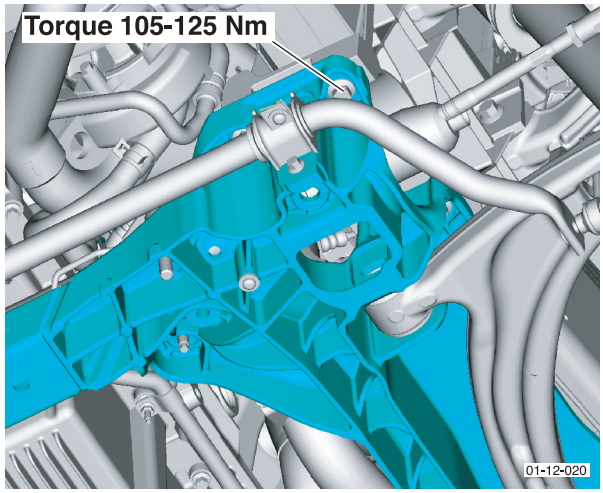
1 'Nip-up' the bolts that secure the subframe to the front structure.



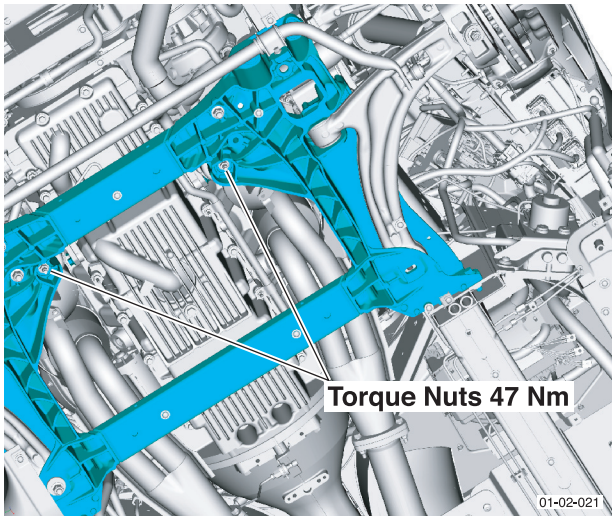
2 Torque the bolts that secure the subframe to the body to **105-125 Nm**.



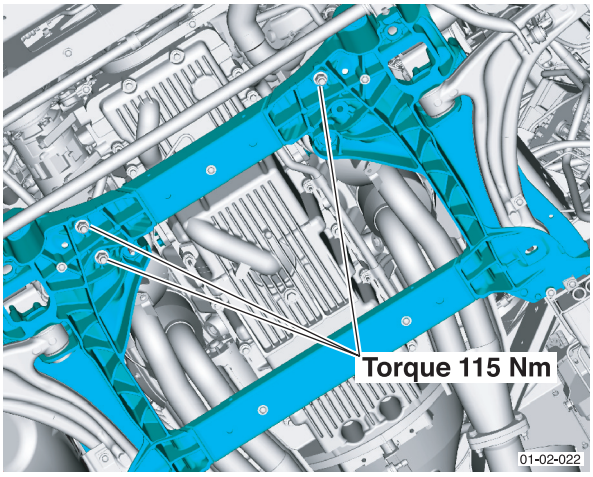
3 Torque the bolts that secure the subframe to the front structure to **105-125 Nm**.



2. Install the engine mount nuts (x2). Torque nuts to **47 Nm**.



3. Install the steering rack bolts (x3). Torque bolts to **115 Nm**.
   Release the 'Ty-wraps' on the steering rack.



4. Install the lower suspension arms (Refer to 'Front Suspension (04.01)', page 4-2-1).

The bolts that secure the lower suspension arm must be torqued only when the vehicle is at normal ride height (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

5. Remove the engine support service tool.
6. Install the undertray.
7. Install the road wheel arch liners and road wheels. (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
8. Connect the vehicle battery.
9. Check / Adjust the camber, Toe and Castor settings (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

Rear Subframe

Repair Operation Time (ROT)	
Item	**Code**
Rear Subframe	**02.01.CA**

Removal

1. Disconnect the vehicle battery.

⚠ Warning ⚠
If rasing vehicle on a 'two post' ramp (vehicle supported by underbody), ensure that the rear end of the vehicle is securely strapped to the ramp. Failure to strap the rear of vehicle down may lead to the vehicle falling off the ramp.

Caution
If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly (Refer to 'Jacking Points', page I-I-IX).

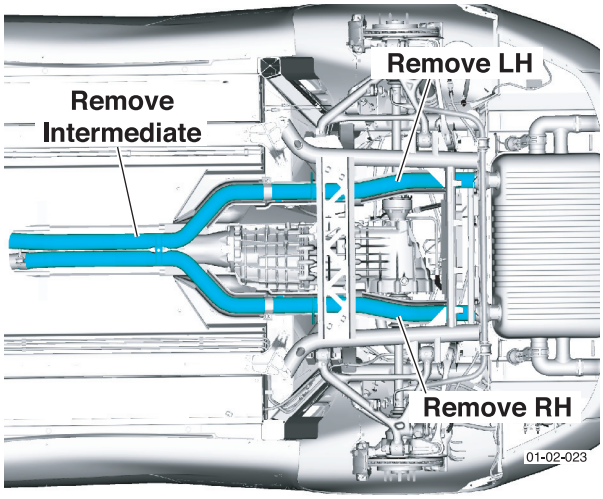
2. Raise the vehicle and make safe.
3. Remove the rear road wheels and road wheel arch liners.

The fuel filler drain off pipe is attached to the arch liner. Ensure that the fuel filler drain off pipe does not disconnect from it's stub pipe.

4. Remove the following:
   - Front and rear undertrays

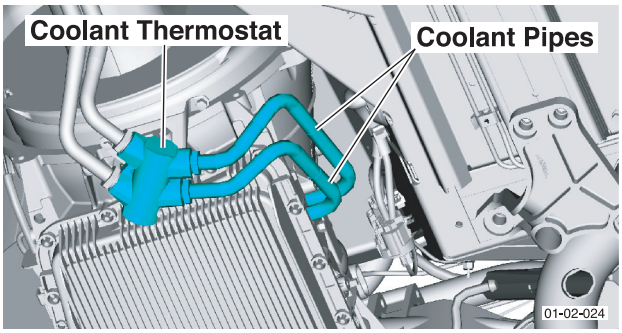
Lower the undertray to reveal the air intake for the alternator. Release the spring clip and part the flex pipe from the undertray.

   - Shear plate
5. Remove the intermediate exhaust pipe and the rear LH and RH exhaust pipes (Refer to 'Pipes and Supports (09.03)', page 9-2-1).

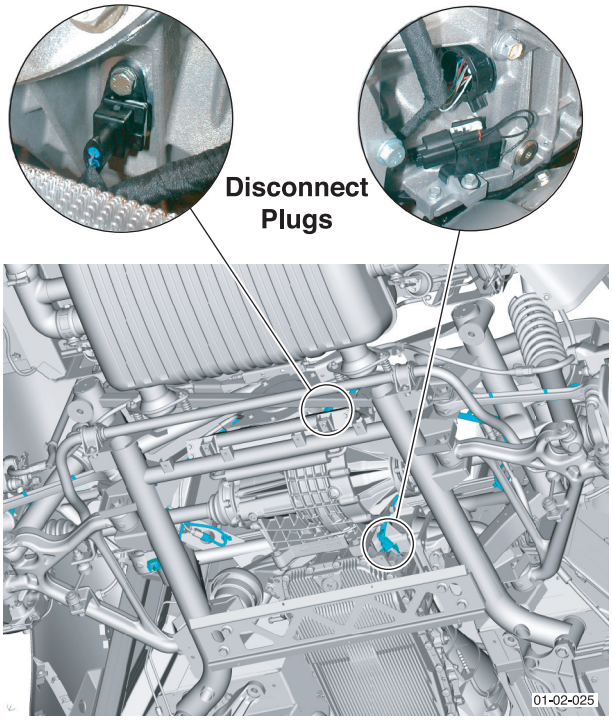


6. Remove the silencer assembly.
7. **Automatic Gearbox Only.**
   Remove the gearbox coolant pipes.
   7.1 Remove the coolant thermostat from it's mounting bracket.
   7.2 Disconnect the coolant pipes from the gearbox.
   7.3 Cap the pipes open ends.

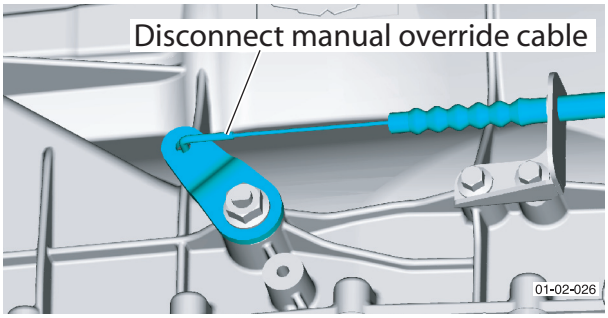
Gearbox ends are self sealing.



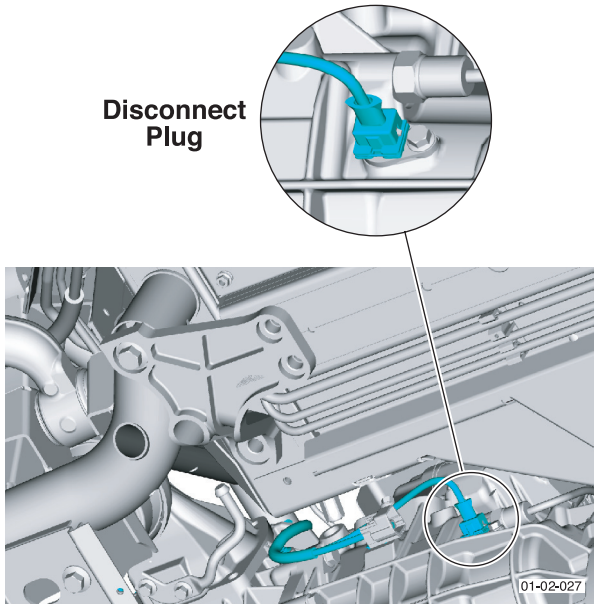
8. **Automatic Transaxle Only.**
   Disconnect the following from the transaxle:
   • Wiring harness plugs



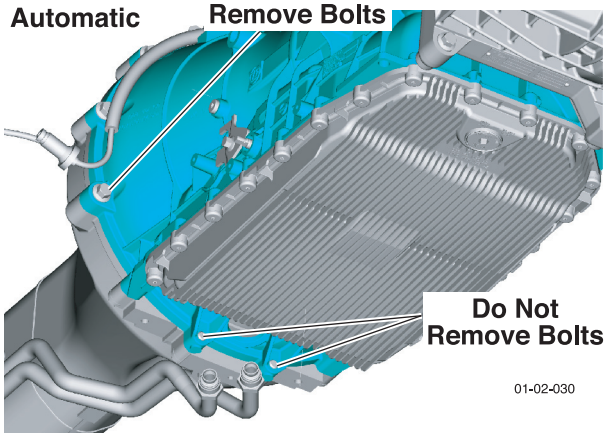
   • Manual override cable

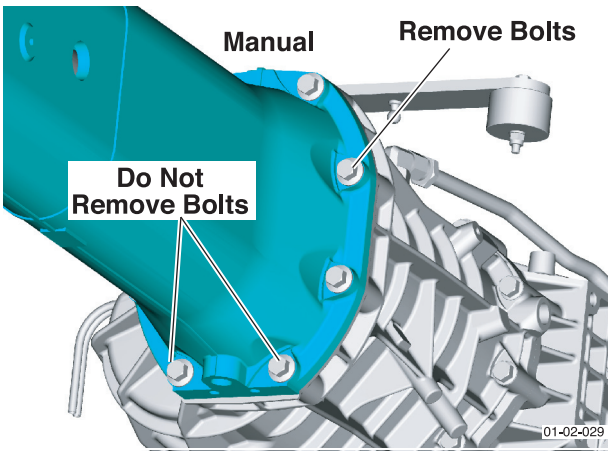


9. **Manual Transaxle Only.**
   Disconnect the wiring harness plug.



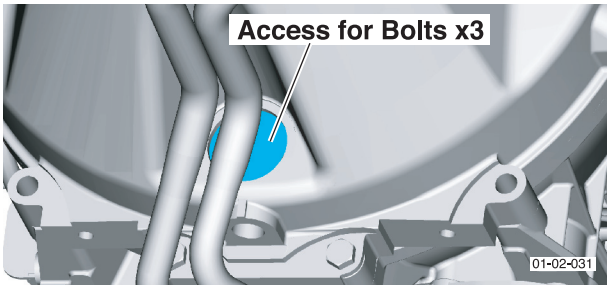
10. Remove accessible bolts from around the torque tube.
    Do not remove the lower bolts (x2) facing towards the gearbox.



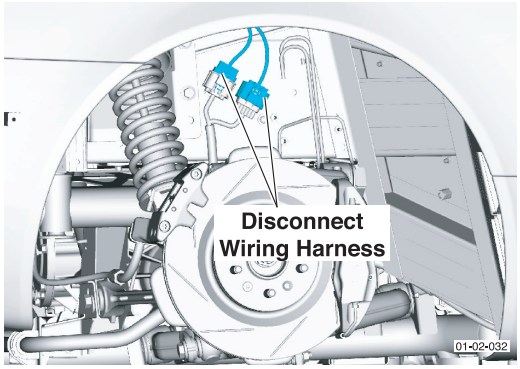


11. Automatic Transaxle Only.

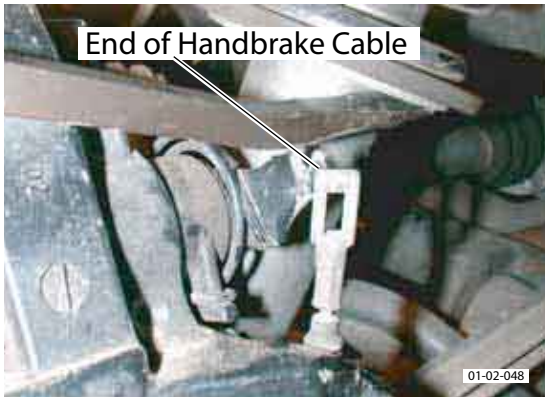
Remove the bolts (x3) that secure the torque tube drive plate to the torque converter.



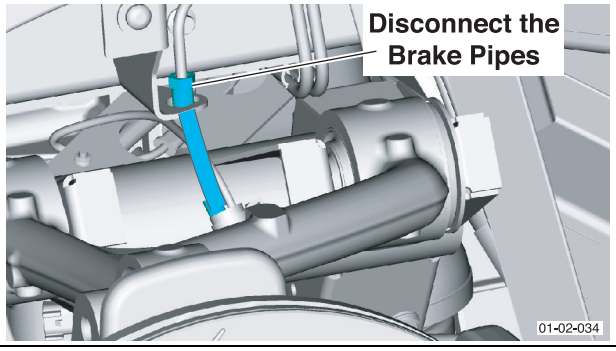
12. Disconnect the subframe wiring harness.



13. Disconnect the handbrake cable from the calipers and subframe (Refer to '206-103 (Handbrake Cable Removal)', page 20-1-4).



14. Disconnect the brake pipes.



Caution
Brake fluid must not be allowed to contact vehicle paint work. Remove spilt brake fluid from paint work by rinsing away with running water.

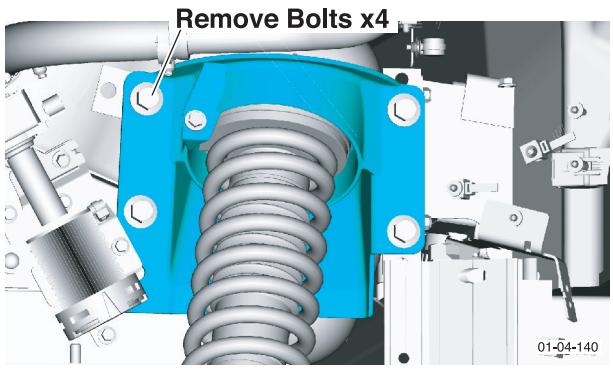
15. Position the subframe trolley (Refer to '303-F715 (Multi-purpose Trolley) x2', page 20-1-5) under the subframe. Lower the vehicle until the subframe rests on the subframe support.



16. Remove bolts (x4) that secure the spring and damper units.

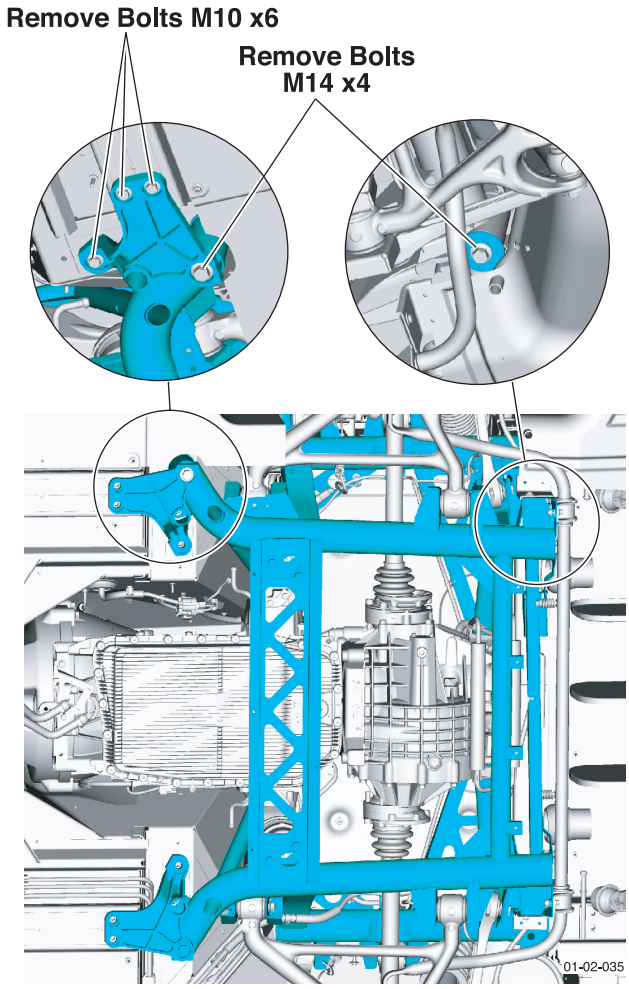
Ensure the spring and damper assemblies are fully extended to release spring tension. A small amount of tension will remain.

Lever spring and damper mounting turret against spring tension to allow removal of bolts.



17. Remove the subframe securing bolts.

The anti-roll bar must be removed before the two rear bolts can be completely removed.



18. **Manual Transaxle only**.

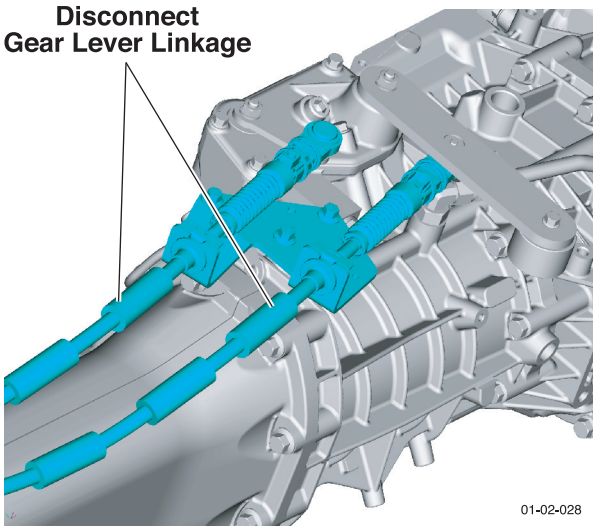
Raise the vehicle to allow access to disconnect the gear selector cables.

Use the service tool (Refer to '501-F116 (IP Removal)', page 20-1-8) to remove the horseshoe clips (x2) and lever the cables from the ball joints.

Caution

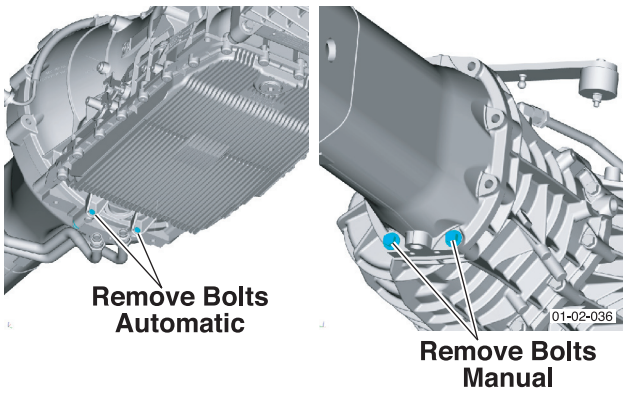
There is a risk of bending the end of the cable. Lever cable from ball joint at a point closest to the ball joint.

Ensure the vehicle raises without catching pipes, cables, etc.



19. Raise the vehicle for access and remove the bolts that secure the torque tube to the gearbox.

Ensure the vehicle raises without catching pipes, cables, etc.



20. Move the subframe rearwards on its support to give a clearance between the torque tube and the gearbox.

Slowly raise the vehicle from the subframe.

Ensure the vehicle raises without catching pipes, cables, etc.

21. **Automatic Gearbox Only.**
    Install a torque converter transit bracket.

Transit Bracket image

22. Retain the spacers from each rear subframe mounting pad. These should be installed in the same positions when the subframe is installed.
23. If required, remove the transaxle from the subframe (Refer to 'Transmission (07.00)', page 7-1-1)

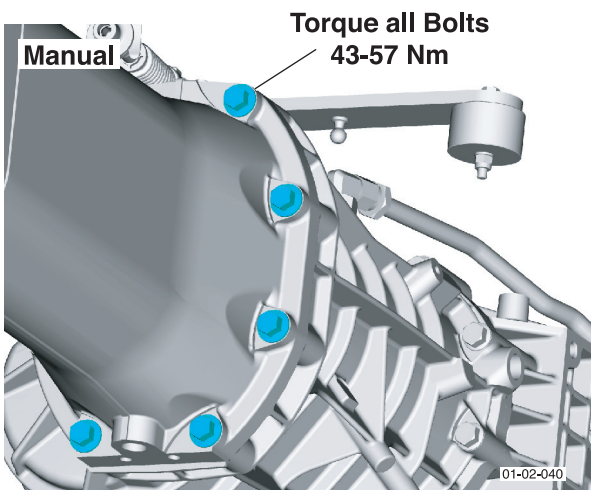
Installation

1. If removed, install the transaxle.
    - Automatic (Refer to 'Automatic Transaxle (07.01)', page 7-1-2)
    - Manual (Refer to 'Manual Transmission (07.03)', page 7-3-1).
2. Ensure the spacers from each rear subframe mounting pad are located correctly.
3. Lower the vehicle to the subframe.

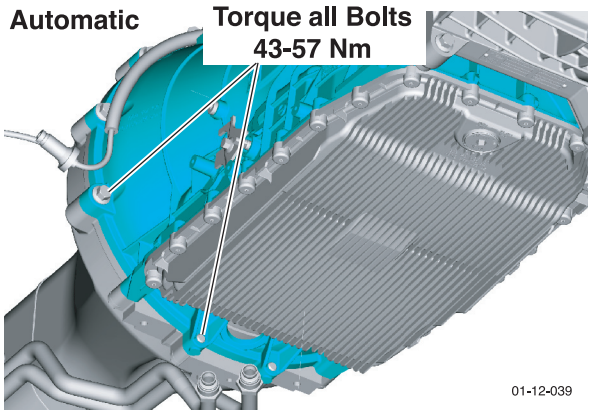
Ensure the vehicle lowers without catching pipes, cables, etc.

Ensure the suspension assembly is placed slightly to the rear of the final position. This will enable installation to the torque tube.

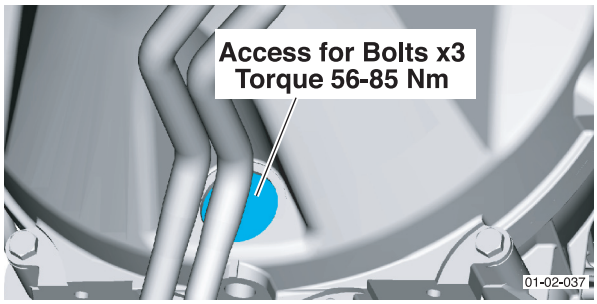
4. **Manual Gearbox Only.**
    Install the gearbox to the torque tube.
    4.1 Lower the vehicle to enable the gearbox to line up with the propshaft splines.
    4.2 Move the subframe forward. Engage the gearbox to the propshaft splines.
    4.3 Install the bolts around the torque tube. Torque to **43-57 Nm**.



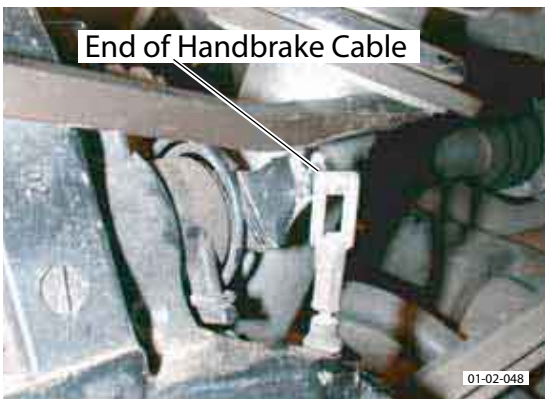
5. **Manual Gearbox Only.**
    Install the gear selector cables.
6. **Automatic Gearbox Only.**
    Install the gearbox to the torque tube.
    6.1 Remove the torque converter transit bracket.
    6.2 Move the subframe forward. Place the torque converter to the torque tube drive plate.
    6.3 Install the bolts around the torque tube. Torque to **43-57 Nm**.



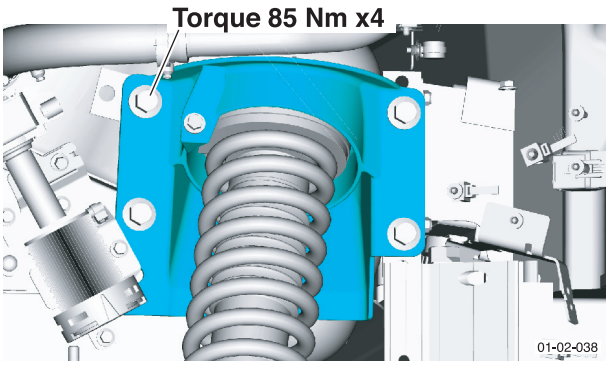
7. **Automatic Gearbox Only.**
    Connect the drive plate.
    7.1 Install bolts (x3). Torque bolts to **60-85 Nm**.



8. Install the handbrake cable to the subframe and the calipers.

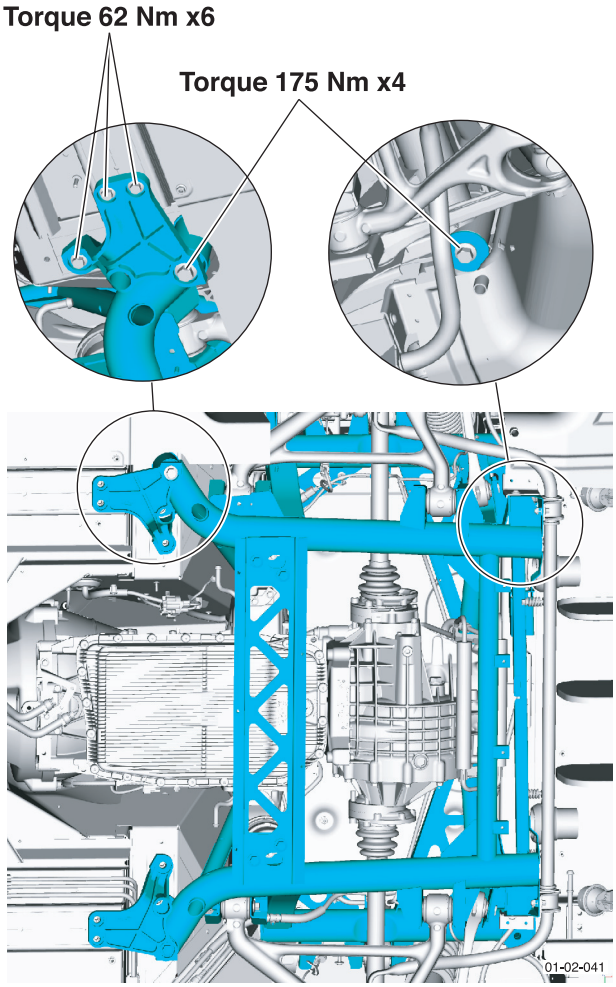


9. Install the spring and damper units.
   9.1 Lower the vehicle to line up the spring and damper mounts to the body.
   9.2 Install bolts (x4) to each mount. Torque to **85 Nm**.



10. Lower the vehicle to meet the subframe mounts.
    Install bolts (x4) that secure the subframe to the body. Torque bolts to **175 Nm**.

If the anti-roll bar was removed ensure the two rear bolts are installed.



11. Install the subframe reinforcement plates. Torque bolts to **62 Nm**.
12. Connect the subframe wiring harness plugs.
13. **Automatic Gearbox Only.**
    Install to the gearbox:
    - Manual override cable
    - Coolant pipes
    - Wiring harness plugs
    - Breather pipe
14. **Manual Gearbox Only.**
    Install the wiring harness plugs.

Caution
Brake fluid must not be allowed to contact vehicle paint work. Remove spilt brake fluid from paint work by rinsing away with running water.

15. Connect the brakes pipes.
16. Install the exhaust system.
17. Install the front and rear undertrays and the shear plate.
18. Bleed the brakes. (Refer to 'Brake Bleeding - WDS', page 6-4-4).
19. Install the road wheel arch liners.

The fuel filler drain off pipe is attaches to the arch liner.

20. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
21. Remove the vehicle securing strap, if installed.
22. Connect vehicle battery.

ASTON MARTIN
ASTON MARTIN

Engine System (03.00)

Contents

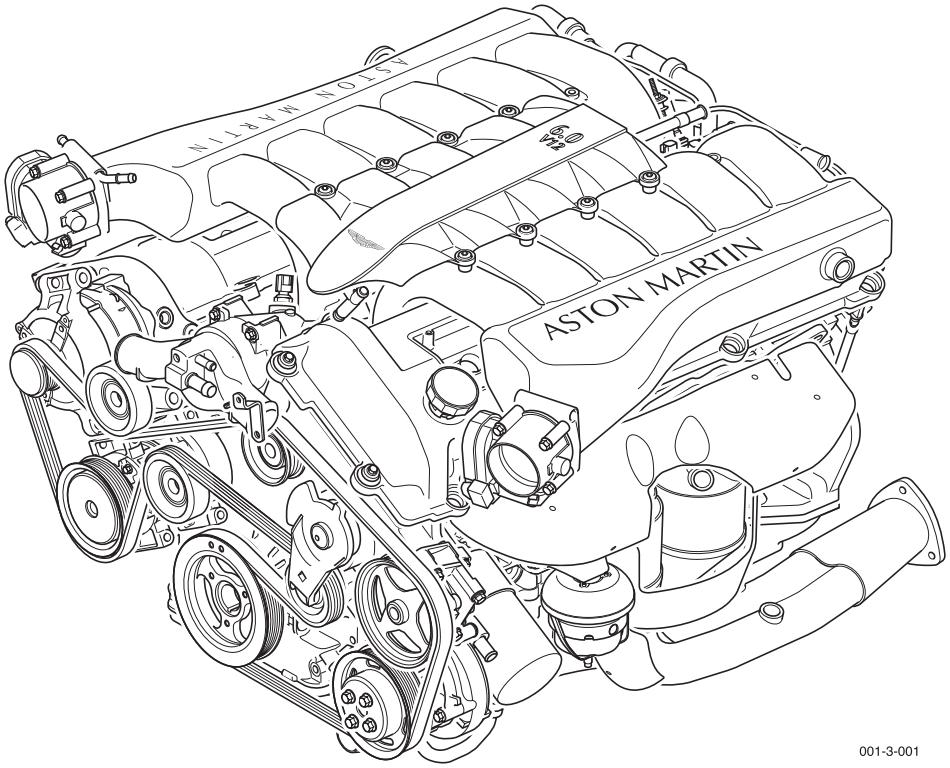
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Engine (03.00)

Engine Assembly (03.00)

Description



001-3-001

The engine is an all aluminium 6.0 litre 60° V12 configuration. The cylinder heads have dual overhead camshafts and four valves per cylinder. An electronic engine management system controls the sequential multi-port fuel injection and distributor-less ignition systems.

The engine uses the latest 'fast-burn' combustion technology. Heated oxygen sensors monitor the oxygen content of exhaust gasses. The engine management system uses the oxygen sensor signals together with other engine information to 'fine tune' fuelling levels and ignition timing. This helps to achieve the best possible fuel burn with minimum exhaust emissions. The exhaust system incorporates six catalytic convertors to minimise the levels of harmful gasses passing into the atmosphere. Additional oxygen sensors are placed after the catalysts so that long term catalyst efficiency can be monitored.

The engine runs on unleaded fuel only.

Maintenance

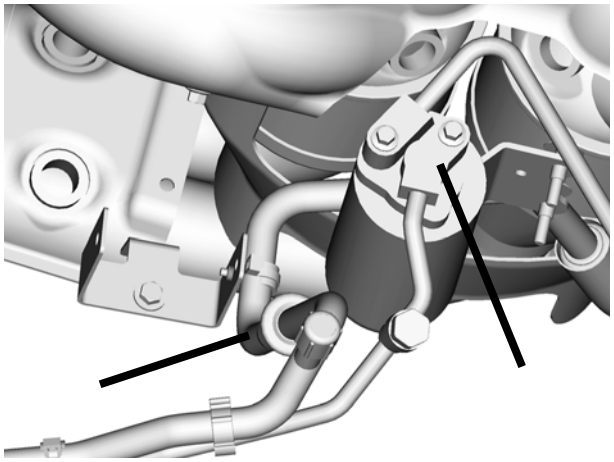
Engine

Repair Operation Time (ROT)	
Item	**Code**
Engine Remove and Install Including engine removal from the frame	**03.00.AA**

Removal

To remove the engine from the vehicle the complete power train will be removed.

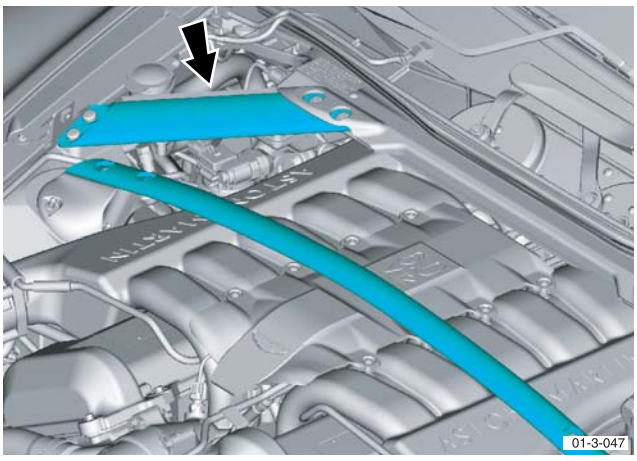
1. Disconnect the earth ('- ve) terminal from the vehicle battery.
2. Evacuate the A/C unit (Refer to 'Air Conditioning (A/C) System (12.03)', page 12-3-1).
3. Disconnect the A/C pipes.



4. Drain the coolant (Refer to 'Coolant Drain / Fill', page 3-4-3).

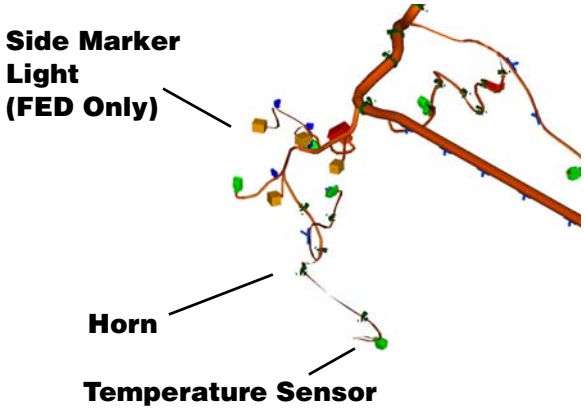
Caution
Before removing the engine bay corner cross-braces ensure that the at the vehicle is resting on it's roadwheels.

5. Remove the engine bay **corner** cross-braces. Do not remove the engine bay cross brace.

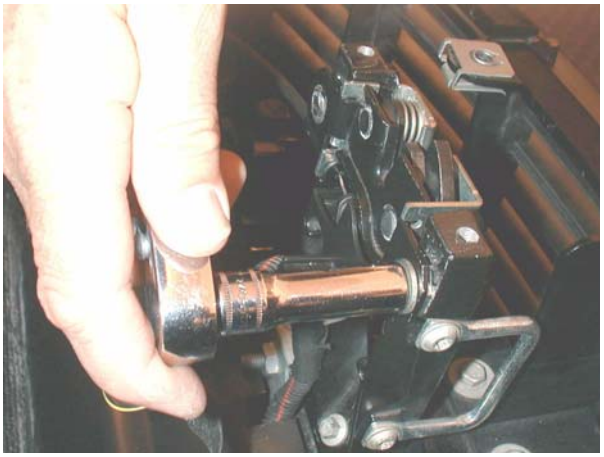


6. Remove the washer bottle neck bracket.
7. Remove the 'slam' panel.
8. Withdraw the plastic cover and disconnect the forward wiring harness plugs.





9. Remove the bonnet release cable.



10. Disconnect the following from the forward cross member.
    - The reinforcement struts



    - The 'Jump start' plug



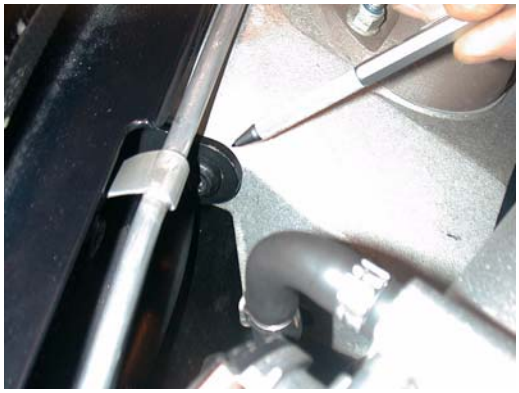
    - The power steering reservoir



11. **Manual Gearbox Only.**
    Disconnect the clutch pipe.

12. Remove the bolts and the reinforcement brackets from the inner wing.

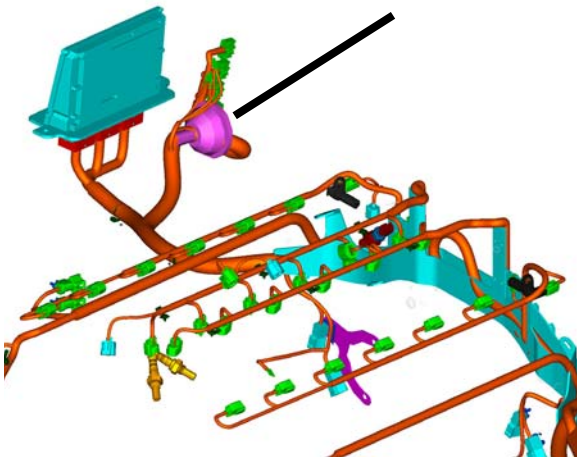
Remove the header tank to gain access. Be aware that there is a wiring harness plug connected to the header tank on the under side.



13. Centre the steering wheel. Remove the ignition key and engage the steering lock with the wheel as accurately centred as possible.

Failure to centre the steering wheel may cause damage to the restraint bag clock-spring and also may cause difficulties in attaining correct alignment of the steering wheel in the straight ahead position.

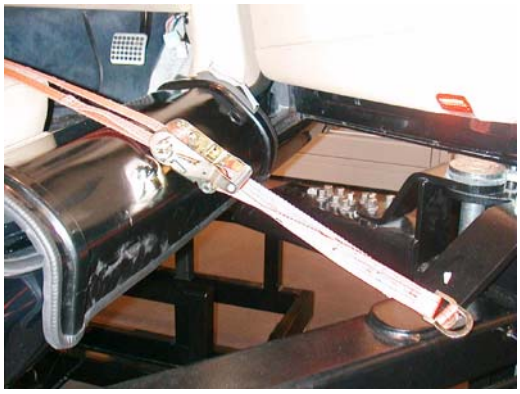
14. From inside the cabin, pull back the steering colum bulkhead seal. Remove the pinch bolt that secures the upper column to the intermediate shaft.
15. Disconnect the engine harness from inside the vehicle cabin.



16. Raise the vehicle and make safe.

Remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly.
(Refer to 'Jacking Points', page I-I-IX).

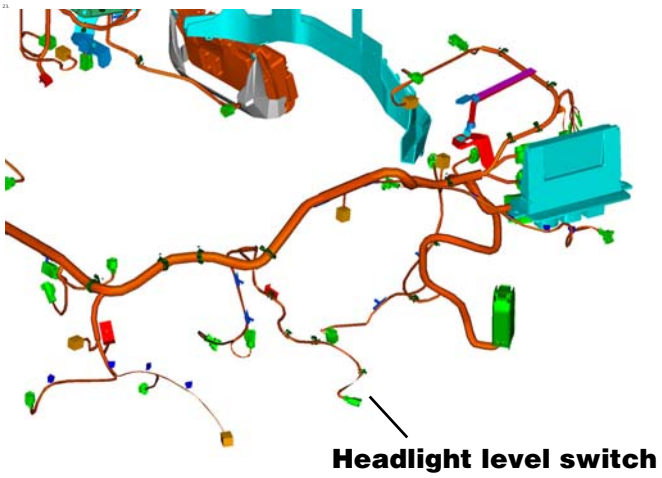
Caution
Ensure the vehicle is 'strapped' to the lift.



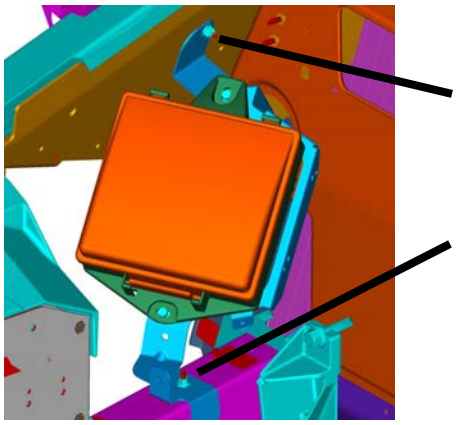
17. Remove the undertrays and shear plates.

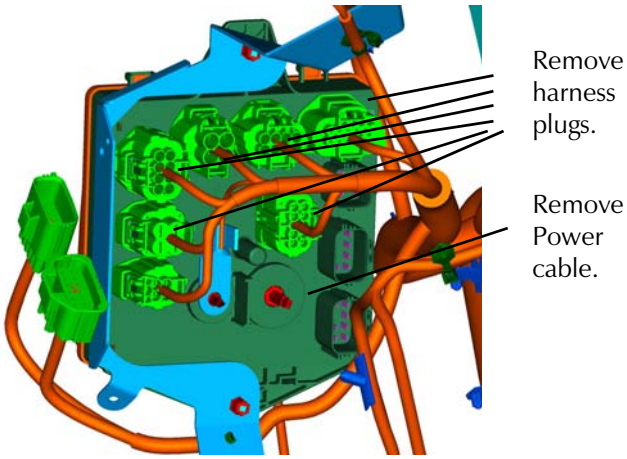
Note the positions of the (x4) spacers when removing the front shear plate.

18. Remove all road wheels and arches.
19. Remove the air filter boxes.
20. Remove the front bumper.
21. Disconnect the headlight units lower mount.
22. Disconnect the following forward wiring harness plugs.
    - Fan pack
    - Headlight levelling sensor
    - MAF sensor
    - ABS speed sensor
    - Header tank level sensor



24. Remove the engine bay fusebox and bracket.





25. Disconnect the earth points from the bulkhead. Mark the leads at the clean earth studs.

These are 'Clean Earths' labelled 'Bank A' and 'Bank B'. Reconnect to correct stud.

- Right Hand side



- Left Hand Side

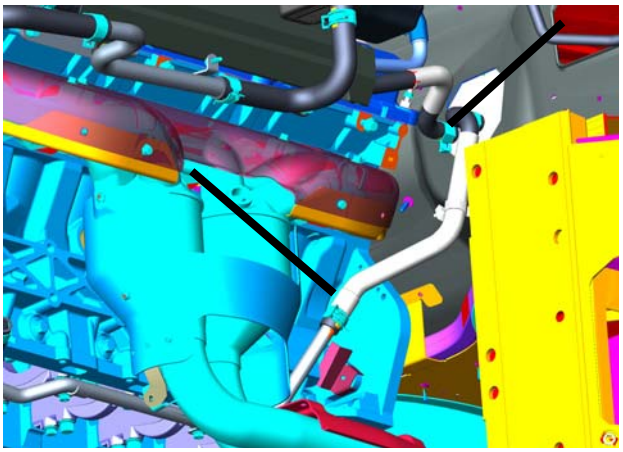


26. Remove the PCMs. Disconnect the engine wiring harness plugs and remove the three screws that secure the PCM (each side).
27. Move the removed engine wiring harness plugs into the engine bay and secure to the engine cross brace.



28. Remove the brake booster vacuum pipe
29. Disconnect the heater coolant pipes.

On LH drive vehicles the heater coolant pipes enter the bulkhead on the RH side.

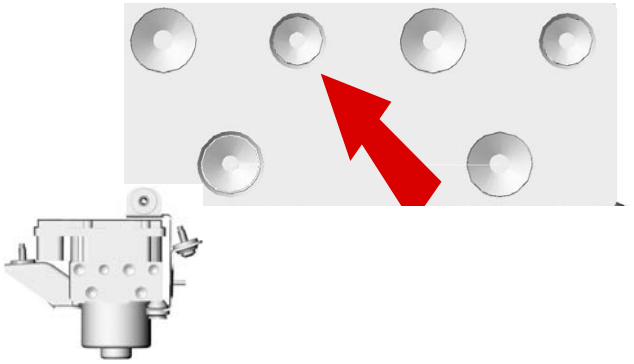


30. Disconnect the front brake pipes:

Caution

Brake fluid must not be allowed to contact vehicle paint work. Remove spilt brake fluid from paint work by rinsing away with running water.

30.1 Disconnect the brake pipe from the brake modulator to the L/H front brake caliper.



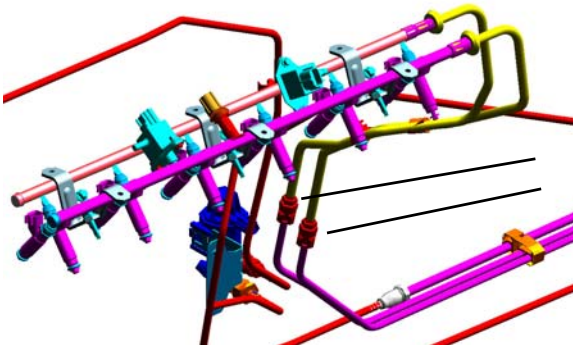
30.2 Disconnect the brake pipe in the RH wing.



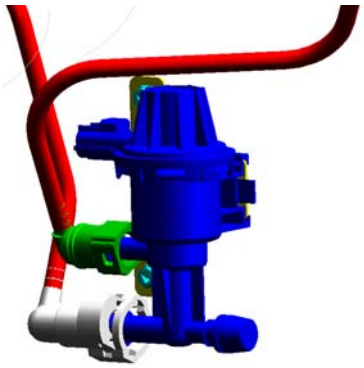
31. Remove the intermediate steering shaft.
    31.1 Remove the lower pinch bolt. Open the lower mount.
    31.2 Pull the intermediate steering shaft downwards and remove.



32. Disconnect the fuel lines.



33. Remove the VMV to inlet manifold pipe from the VMV.



34. Disconnect the torque tube to body (engine) earth lead.
35. Disconnect the Starter / Alternator / Jump terminal cable from the chassis.



36. Disconnect the silencer from the two rear exhaust pipes.

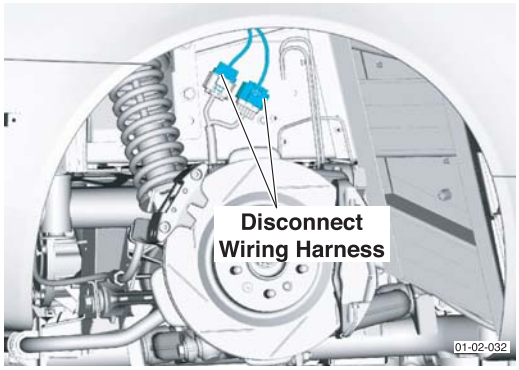


37. Disconnect the handbrake cable from the rear subframe (Refer to 'Hand Brake (06.05)', page 6-3-1).

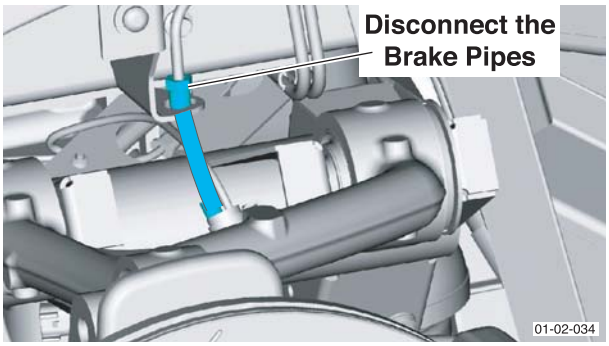
Use the brake cable release tool (Refer to '206-103 (Handbrake Cable Removal)', page 20-1-4).



38. Disconnect the subframe wiring harness.

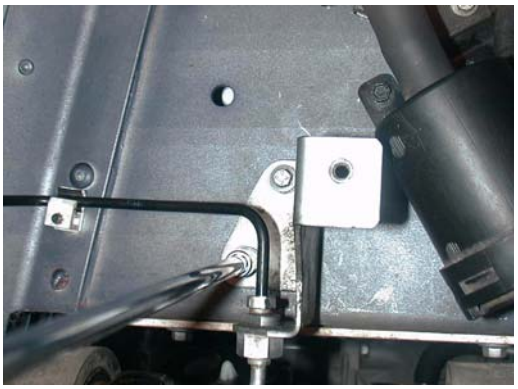


39. Disconnect the rear brake pipes.



Caution
Brake fluid must not be allowed to contact vehicle paint work. Remove spilt brake fluid from paint work by rinsing away with running water.

40. Remove the rear brake pipe brackets.

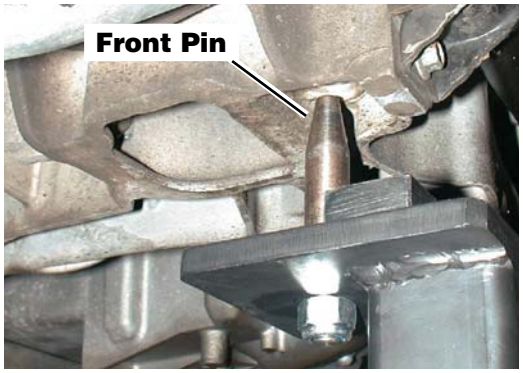


41. Automatic Gearbox Only.
Disconnect the manual override cable.



42. Position the subframe trolleys, front and rear (Refer to '303-F715 (Multi-purpose Trolley) x2', page 20-1-5) under the subframes. Lower the vehicle until the front and rear subframes rests on the subframe trolleys.

Connect the two trolleys together (Refer to '303-F715-06 (Trolley Brace Bars)', page 20-1-5).

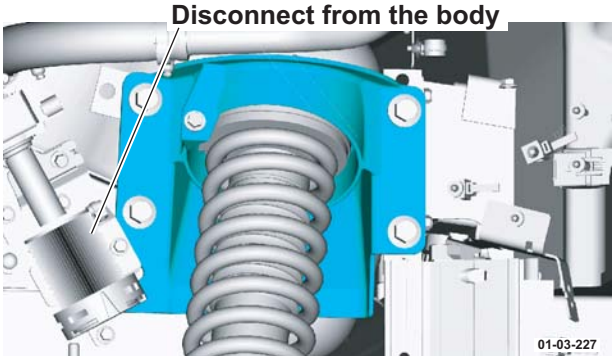


Rear Pin Image to Follow

43. Ensure that the relation of the front subframe / front structure to the vehicle body is marked (scribed), for accurate installation.
44. Remove bolts (x12) that secure the front subframe / front structure to the body.

Image to Follow

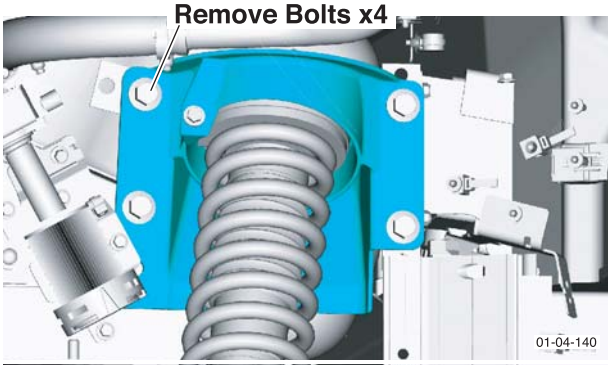
45. Remove the bolts (x3) that secure the emmisions filter unit. This allows access to the spring and damper unit top mount.



46. Remove bolts (x4) that secure the rear spring and damper units.

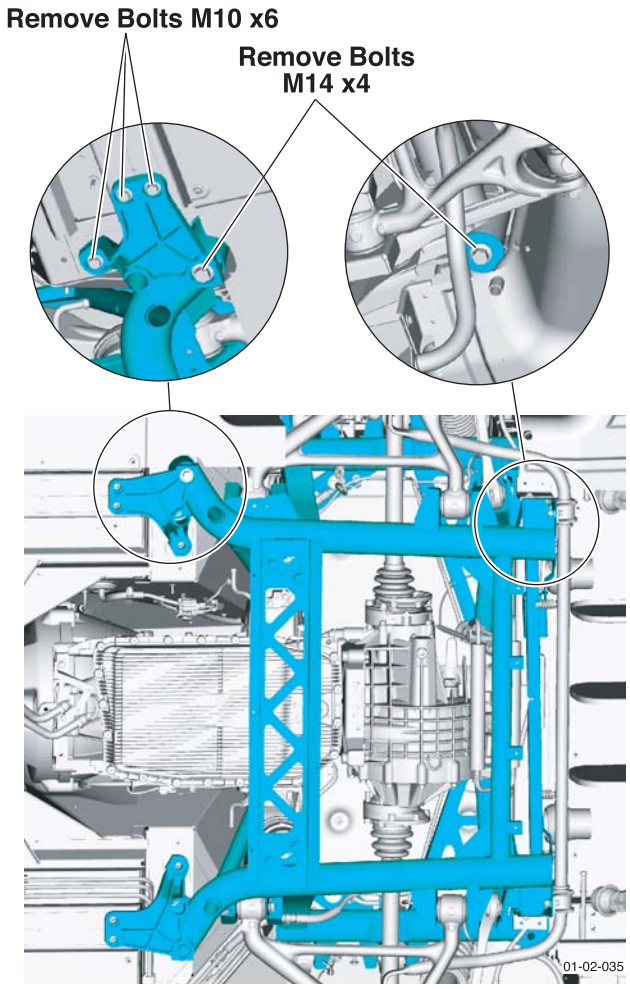
Ensure the rear spring and damper assemblies are fully extended to release spring tension. A small amount of tension will remain.

Lever the rear spring and damper mounting turret against spring tension to allow removal of bolts.



47. Remove the rear subframe securing bolts.

The anti-roll bar must be removed before the two rear bolts can be completely removed.



48. **Manual Transaxle only**.

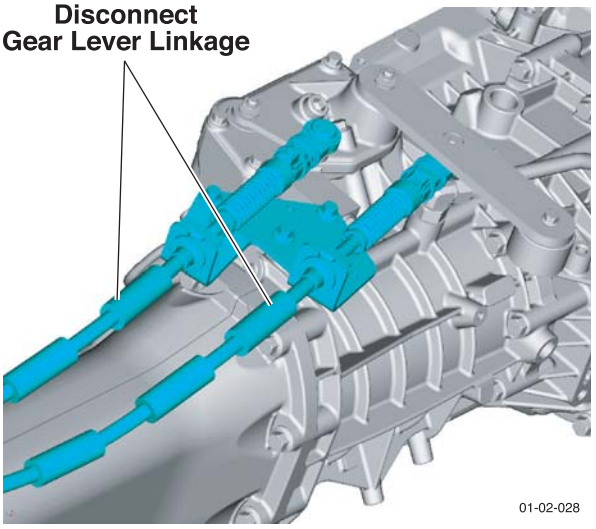
Raise the vehicle to allow access to disconnect the gear selector cables.

Use the service tool (Refer to '501-F116 (IP Removal)', page 20-1-8) to remove the horseshoe clips (x2) and lever the cables from the ball joints.

Caution

There is a risk of bending the end of the cable. Lever cable from ball joint at a point closest to the ball joint.

Ensure the vehicle raises without catching pipes, cables, etc.



49. Slowly raise the vehicle.

As the vehicle raises disconnect the wings from front grill.



Ensure all pipes, cables, etc., are clear as the vehicle raises.

LH drive vehicles - ensure that the coolant pipe is in front of the brake booster.

50. Retain the spacers from each rear subframe mounting pad. These should be installed in the same positions when the subframe is installed.

Installation

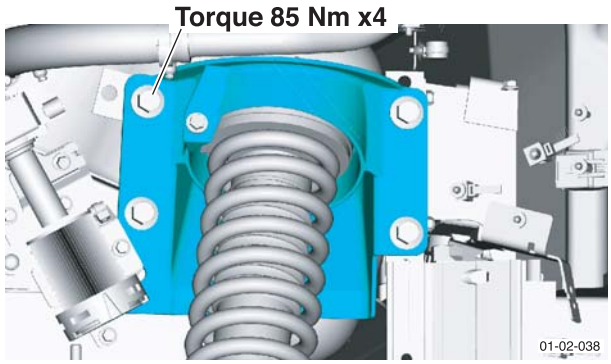
1. Lower the vehicle to the powertrain assembly.
   Ensure all pipes, cables, etc., are clear as the vehicle lowers.
   As the vehicle lowers pull the wings from front grill.



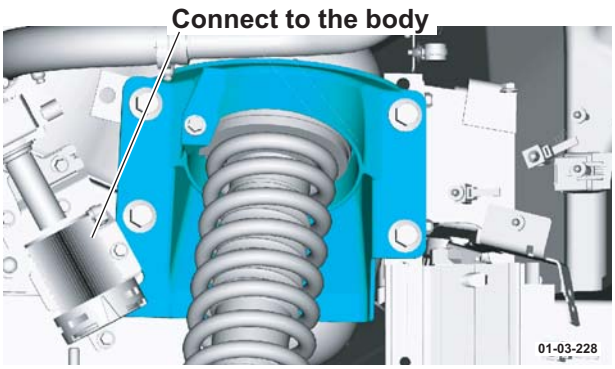
2. Install the rear spring and damper assemblies. Do not tighten the bolts.
3. Install the front subframe and front structure mounting bolts (x12). Do not tighten.
4. Install the rear subframe mounting bolts (x4). Do not tighten.

Spacers from rear subframe mounting pads should be installed in the same positions as removed.

5. Install the rear subframe reinforcement plates.
6. Torque the rear spring and damper assemblies - **85.5 Nm**.



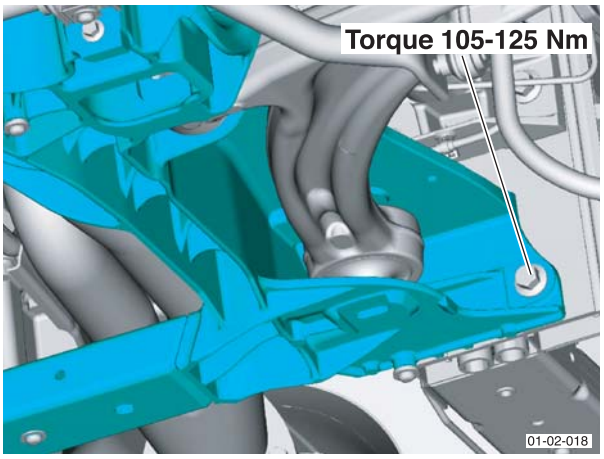
7. Install the emmisions filter unit.



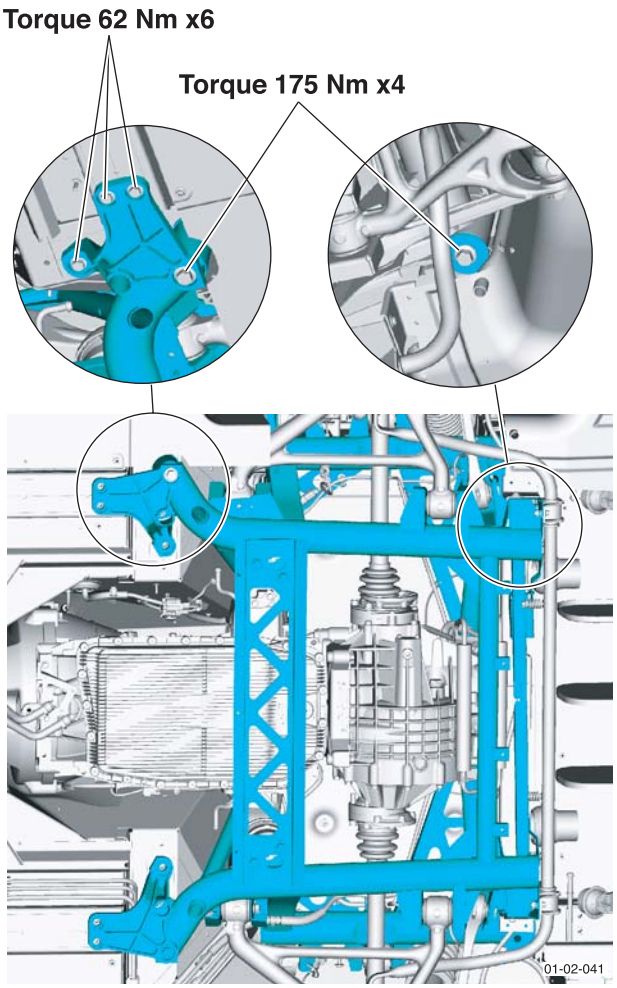
8. Torque the front subframe and front structure bolts.

Ensure that the front subframe / front structure to body alignment marks are lined up.

Torque bolts (x12) to **105-125 Nm**.



9. Torque the rear subframe mounting bolts.
   1 Torque the bolts that secure the subframe to the body to **175 Nm**.
   2 Torque the bolts that secure the subframe reinforcement plates to **62 Nm**.



10. Connect the rear subframe wiring harness.

11. Automatic Gearbox Only.

Install the manual override cable.

12. Manual Gearbox Only.

- Install the gear change linkage
- Install the wiring harness plugs

13. Manual Gearbox Only.

Caution

Clutch fluid must not be allowed to contact the vehicle paint work. Remove spilt clutch fluid from the paint work by rinsing away with running water.

Install the clutch pipe.

14. Install the brake pipes:

Caution

Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

- Install the LH front brake caliper pipe to the modulator
- Install the rear brake pipe brackets.
- Install the brake pipes to all remaining brake calipers.

15. Install the handbrake cable to the handbrake lever
16. Connect the torque tube to body (engine) earth lead.
17. Connect the Starter / Alternator / Jump terminal cable to the body.



18. Install the heater coolant pipes.
19. Connect the VMV.
20. Connect the fuel lines.
21. Install the headlight units (L/H and R/H).
22. Install both air filter boxes.
23. Install the PCMs. Connect the engine wiring harness plugs.
24. Connect the following forward wiring harness plugs.
    - Fan pack
    - Headlight levelling sensor
    - MAF sensor
    - ABS speed sensor
    - Header tank level sensor
25. Connect the earth points to the bulkhead.
    - RH side



    - LH Side



26. Install the steering intermediate shaft.
27. Install the fusebox.
    - 27.1 Connect the wiring harness plugs
    - 27.2 Connect the main power feed
    - 27.3 Install the fusebox bracket and fusebox
28. Install the power steering reservoir.
29. Install the jump start cable.
30. Install the A/C pipes.
31. Install the bolts and reinforcement struts along the inner wings.
32. Install the header tank.

Caution

Before installing the engine bay cross-braces ensure that the at the vehicle is resting on it's roadwheels.

33. Install the engine bay corner cross braces. **Do not tighten**.
34. Install the front bumper.
35. Install the road wheel arch liners.
36. Install:
    - Front and rear undertrays
    - Shear plates

Note the positions of the (x4) spacers from removal on the front shear plate.

37. Bleed the brakes (Refer to 'Brake Bleeding - WDS', page 6-4-4).
38. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
39. Torque the engine bay cross-braces to **49 Nm.**
40. Fill the coolant (Refer to 'Coolant Drain / Fill', page 3-4-3)

41. Charge the A/C unit (Refer to 'Air Conditioning (A/C) System (12.03)', page 12-3-1).
42. Check the road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

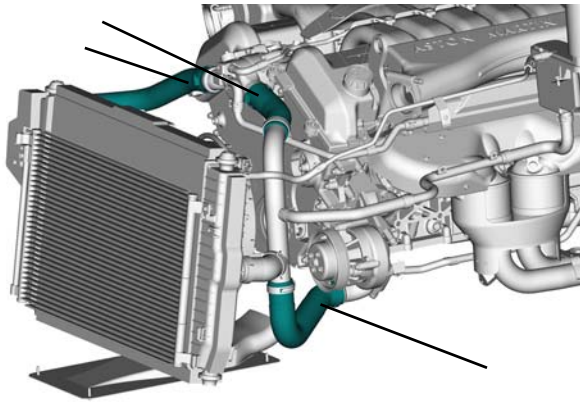
Always check the steering angle sensor (viaWDS) after any work carried out on the steering or the suspension systems or the yaw rate sensor.

43. Connect the vehicle battery.

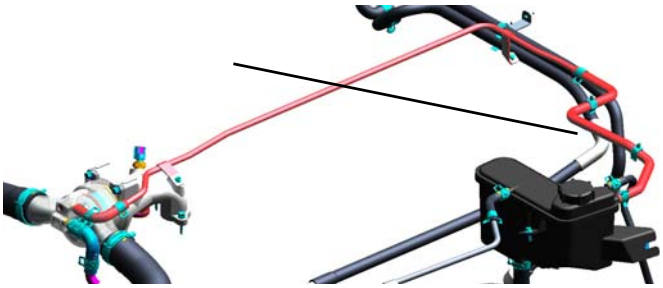
Engine Removal from the Frame

Removal

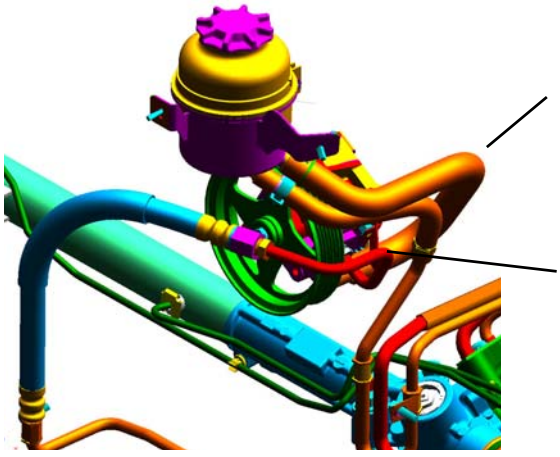
1. Release the exhaust manifolds from the catalysts.
2. Remove the following hoses:



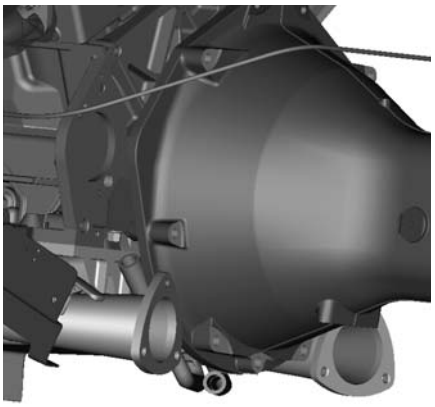
3. Disconnect the AC pipe from the condensor.
4. Remove the hose from the header tank.



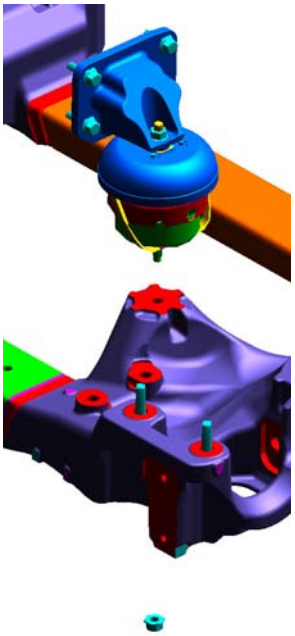
5. Disconnect the cables from the starter motor and the alternator.
6. Remove the power steering pump hoses.



7. Attach the lifting eyes (x4) to the cylinder heads.
8. Install the engine lifting gear to a suitable hoist.
9. Raise the hoist to take up 'slack' in lifting gear.
10. Remove the torque tube.
    10.1 Ensure the torque tube is supported.
    10.2 Remove bolts (x) that secure the torque tube to the engine block.
    10.3 Ensuring the torque tube and engine are adequately supported, move the engine frame and hoist forward until there is room to manoeuvre the torque tube away from the engine block and exhaust manifolds.



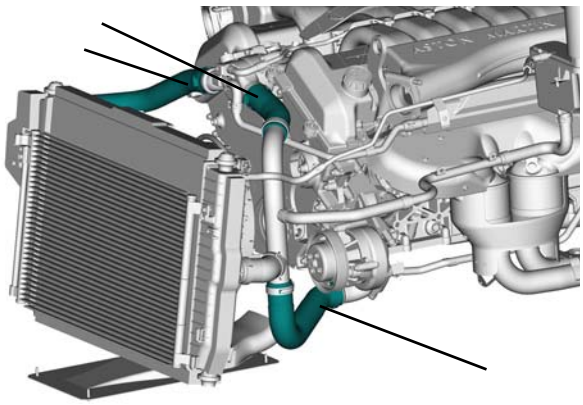
11. Remove the engine mount nuts (x2).



12. Lift the engine clear of the frame assembly. Secure the engine to an appropriate stand.
    Detach the lifting gear.

Installation

1. Install the engine lifting gear to a suitable hoist.
2. Raise and manoeuvre the engine to the frame.
3. Ensuring the torque tube is adequately supported, manoeuvre the engine to torque tube.
4. Locate the propshaft splines and ‘face up’ the engine block to the torque tube.
5. Install the bolts that secure the torque tube to the engine block. Torque the bolts to:
   - M8 - **25 Nm**.
   - M10 - **50 Nm**.
6. Install the engine mounts. Torque the nuts (x2) to **47 Nm**.
7. Remove the lifting equipment and lifting eyes.
8. Install the hose to the header tank.
9. Connect the AC pipe to the condensor.
10. Install the following hoses:



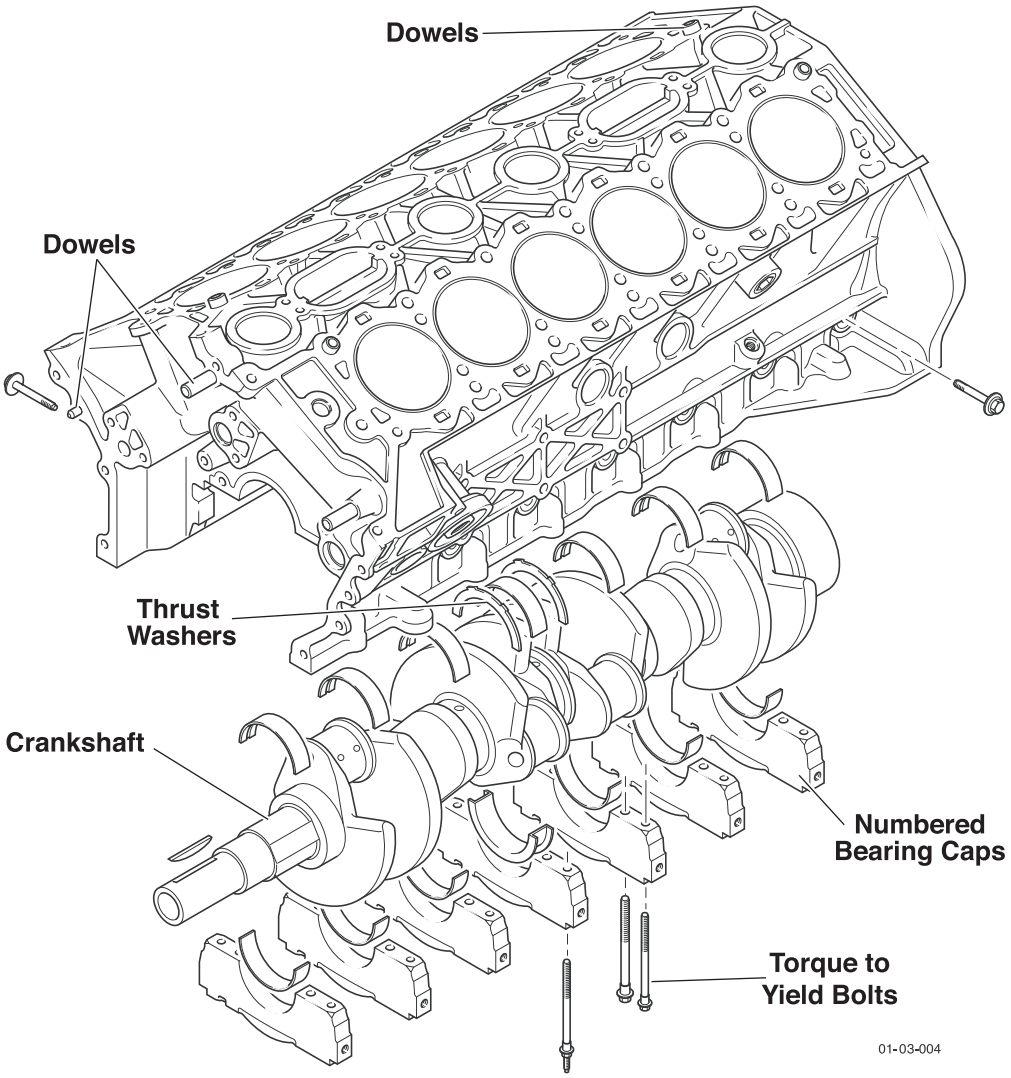
11. Install the power steering pump hoses.
12. Install the cables to the starter motor and the alternator.
13. Install the exhaust manifolds to the catalysts. Torque the nuts and bolts to **25.5 Nm**.

Engine (03.00)

Engine Structure (03.01)

Description

Engine Block



Dowels are installed to the principal mating faces of the block to ensure accurate alignment of cylinder heads, front timing cover, auxiliaries, etc.

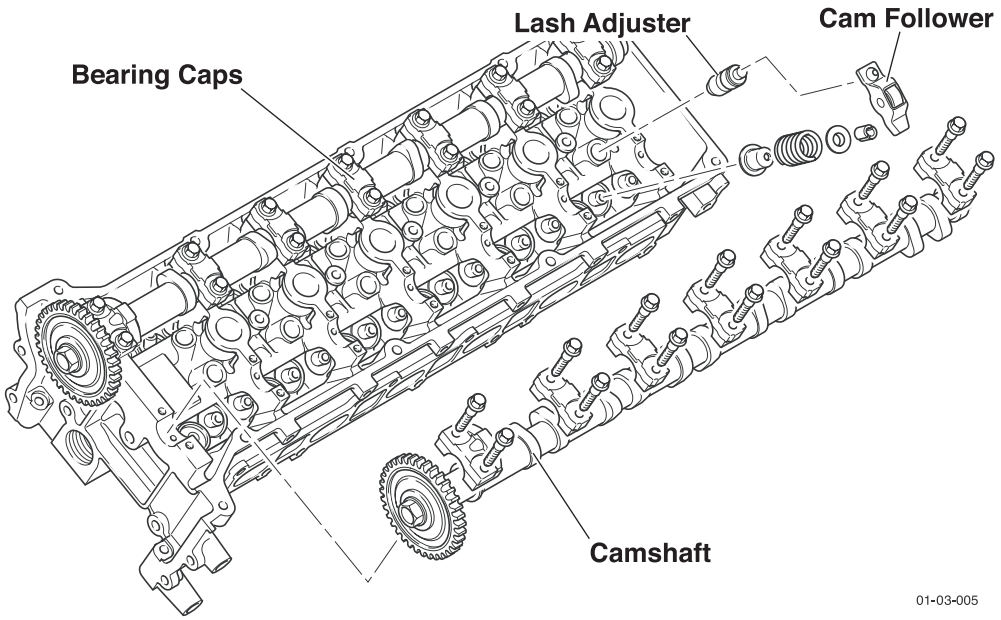
The 60° V12 aluminium engine block incorporates paths for water cooling, oil distribution and positive crankcase ventilation. The seven main bearing caps supporting the crankshaft are bolted laterally as well as vertically to provide additional crankcase stiffening whilst keeping engine weight to a minimum. Each bearing cap is numbered to identify its position in the engine block The 12 cast iron cylinder liners are inserted and machined during block production and require specialist equipment for replacement.

The crankshaft is mounted in 7 main bearings with end loads absorbed by thrust washers at number 4 main bearing. Main bearing bolts are of the 'torque to yield' type and must be renewed if removed.

A twin sprocket installed to the front end of the crankshaft drives the camshaft chains. A damper pulley installed on the crankshaft nose drives the engine auxiliaries via a polyvee drive belt. Also at the front of the engine a timing disc is installed together with two crankshaft sensors. The sensors provide engine position signals to the two Engine control modules.

Cylinder Heads

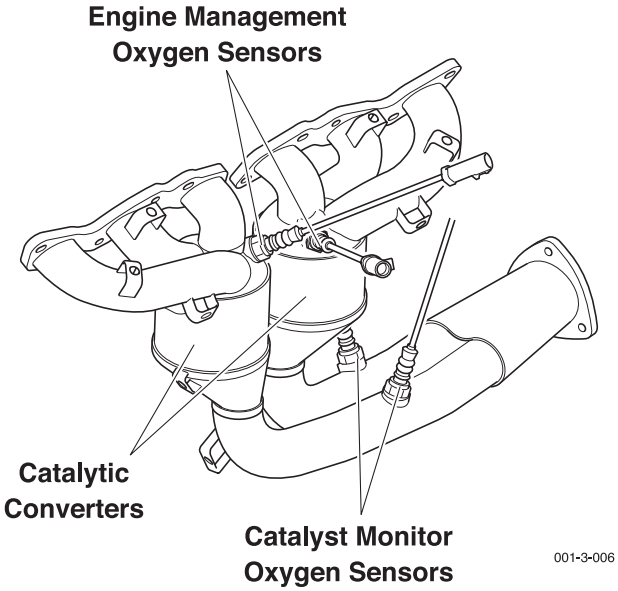
Each cylinder is provided with two inlet and two exhaust valves. The valves are operated by cam followers beneath each camshaft. Valve clearances are maintained at zero by a hydraulic tappet system (lash adjuster) pressurised from the main engine lubrication system.



Inlet / Exhaust Manifolds

Two six-branch exhaust manifolds, locate four primary catalytic converters and eight oxygen sensors.

Four engine management oxygen sensors are mounted before the primary catalysts. Four catalyst monitor oxygen sensors are mounted after the primary catalysts.



Intake air is filtered and passed through mass air flow meters (MAF). The air then passes through the throttle bodies into the six branch inlet manifolds.

Specifications

Block	**MM**
Cylinder Bore Grade 2	89.010 - 89.020
Main Bearing Bore (without shells)	72.400 - 72.424

Cylinder Heads	**MM**
Head Face-Roof Button	14.75 - 15.25
Valve Seat Width - Inlet	1.10 - 1.40
Valve Seat Width - Exhaust	1.40 - 1.70
Camshaft Bore	26.987 - 27.012
Camshaft Journals	26.936 - 26. 962
Head Volume	46.70 - 49.70 ml.

Camshaft End Play

0.025 - 0.165 mm (using a force of 30-50 lbs - do not exceed 50 lb. as damage may occur to the thrust washer).

Camshaft Sensors	**MM**
Air Gap	1 (±0.5)

Torque Figures

Description		Nm.	lb./ft.
Cylinder head	1. Bolts 1 to 14	37-43	27.5-32
	2. Bolts 15-16	15-20	11.5-15
	3. Bolts 1-14	85°-95°	
	4. Release bolts 1-14	Min. 360°	
	5. Bolts 1 to 14	37-43	27.5-32
	6. Bolts 15-16	23-27	17-20
	7. Bolts 1 to 14	85°-95°	
	8. Bolts 1 to 14	85°-95°	
Camshaft bearing caps		8-12	6-9

Maintenance

Cylinder Head

Removal

1. Remove the engine from vehicle (Refer to 'Engine', page 3-1-4)
2. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
3. Remove the exhaust manifold (Refer to 'Exhaust Manifold', page 3-2-10).
4. Drain the engine coolant (Refer to 'Coolant Drain / Fill', page 3-4-3).
5. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
6. Remove the thermostat housing (Refer to 'Thermostat', page 3-4-5).
7. Remove the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
8. Remove the timing cover (Refer to 'Timing Cover', page 3-11-3).
9. Remove the timing chains (Refer to 'Valve Timing Chains', page 3-10-1)
10. Remove both camshafts.



10.1 Progressively release all bolts that secure each bearing cap.

The thrust camshaft bearing cap, of each camshaft (No.1 and No. 8 cap), must be removed first and installed last.

10.2 Withdraw the bearing caps. Ensure they are retained in the sequence withdrawn.

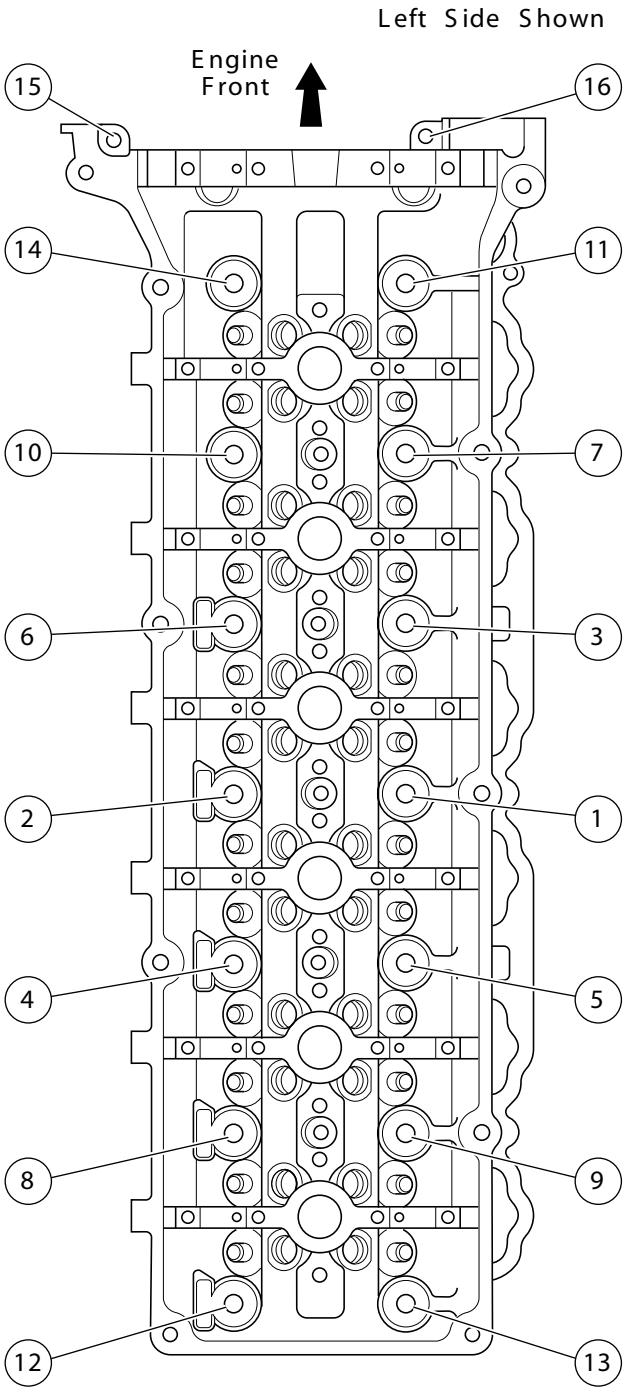
10.3 Withdraw the camshafts.

11. Remove the camshaft followers and lash adjusters. Ensure they are retained in the sequence removed.





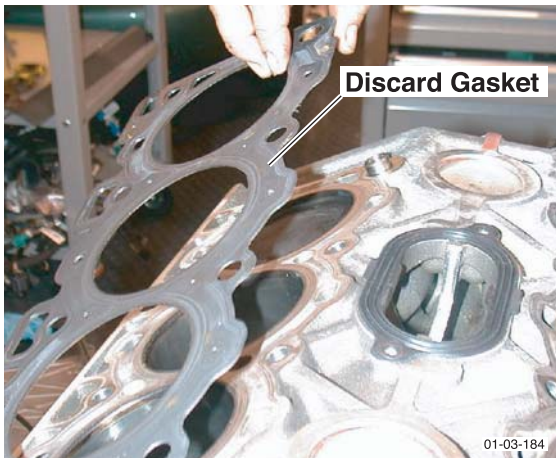
12. Remove bolts (x2 (M8) and (x14 (M10)) from the cylinder head in order as shown below.



13. Withdraw the cylinder head. Discard the cylinder head gasket.

    Cover the engine block to prevent ingress of foreign material.





14. Remove the second cylinder head if required.
15. Overhaul the cylinder head(s) as required (Refer to 'Cylinder Head', page 3-2-3).

Installation

Ensure all mating surfaces are clean, smooth and free of any contamination.

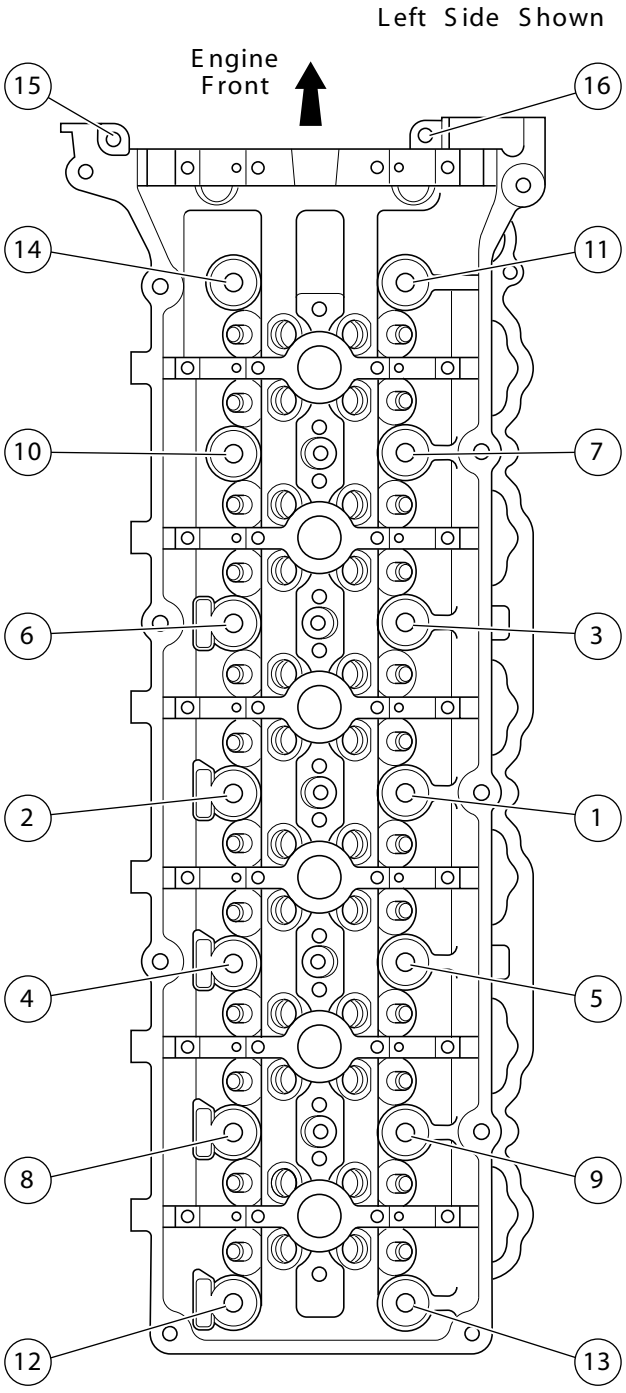
1. Place a new cylinder head gasket over the locating dowels.
2. Lubricate beneath the head of all the cylinder head bolts (x14 (M10) and x2 (M8) with engine oil. **Do not lubricate the threads.**

   Place the bolts to the cylinder head.

Caution

The following 'Torque - Release - Torque' sequence must be performed exactly as specified to ensure correct cylinder head to engine block sealing.

3. Torque the cylinder head in stages using the following procedure:



3.1 Initial Torque

1 Torque bolts 1 -14 (M10) to **37-43 Nm**. in the sequence shown.

2 Torque bolts 15-16 (M8) to **15-20 Nm**.

3 Torque bolts 1-14 (M10) a further **85-95°** in the sequence shown.

3.2 Release

1 Loosen bolts 1-14 (M10) a minimum of **one full turn** (360°).

3.3 Final Torque

1 Torque bolts 1-14 (M10) to **37-43 Nm.** in the sequence shown.

2 Torque bolts 15-16 (M8) to **23-27 Nm**.

3 Torque bolts 1-14 (M10) a further **85-95°** in the sequence shown.

4 Torque bolts 1-14 (M10) an additional **85-95°** in the sequence shown.

4. Repeat for the second cylinder head.
5. Install all lash adjusters.

Soak the lash adjusters in engine oil.

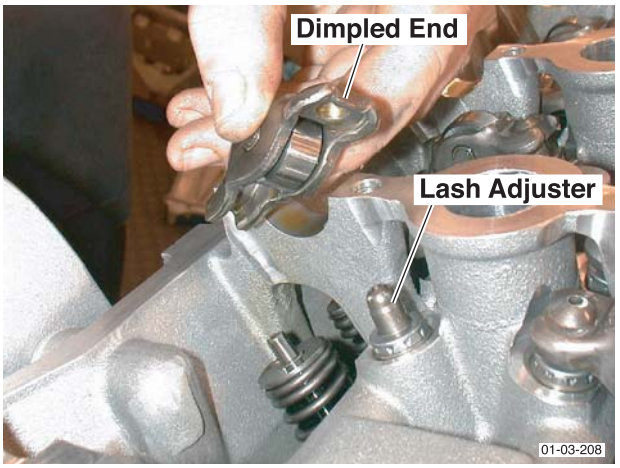
Insert each lash adjuster into its correct recess in the cylinder head.

6. Install the camshaft followers to their valves.

Caution

Ensure that the dimpled end of the camshaft followers are installed to the lash adjusters.

Soak the cam followers in engine oil.



7. Lubricate the camshaft journals, camshaft bearing caps with engine oil.
8. Ensure the crankshaft key is vertical.

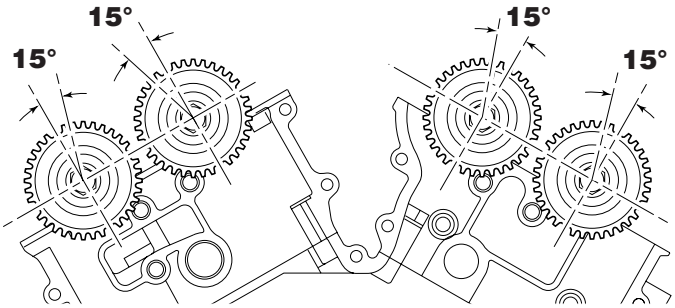
Caution

The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.

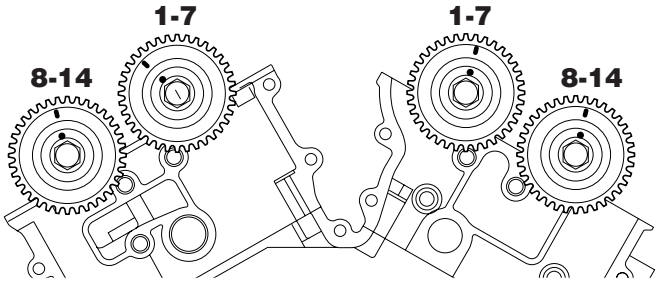
9. Place the camshafts in position, with the timing marks in the positions shown.

The positions shown allow the camshafts to lay at their lowest in the journals.



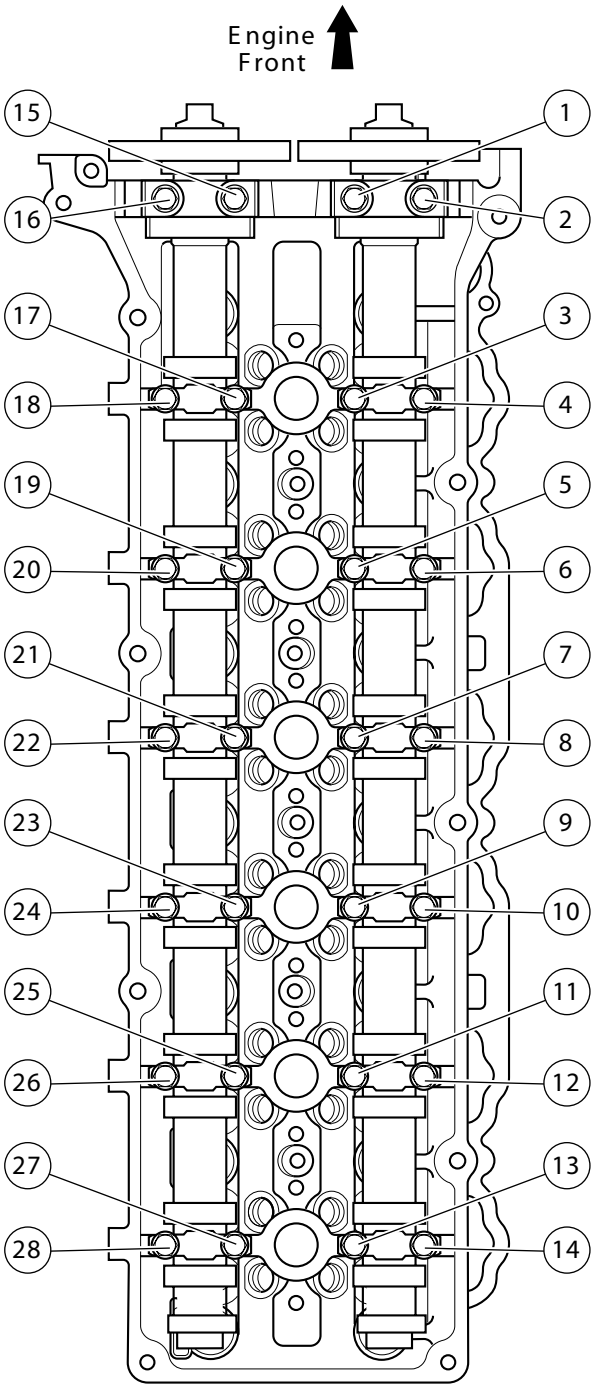
10. Work on one cylinder head at a time.
11. Install all camshaft bearing caps, except the two thrust camshaft bearing caps (No.1 and No. 8 cap) at the front of each camshaft. Loosely secure each cam cap.

Bearing Caps



The bearing caps are numbered and correspond with numbers stamped on the cylinder head adjacent to the journal.

12. Test install No.1 and No. 8 bearing caps over their thrust flanges. If the bolt holes do not perfectly align, move the camshafts forward or rearward as required until the bearing caps locate correctly. Loosely secure the bearing caps.
13. Torque down the camshafts.
    13.1 Progressively 'nip' down all bolts in the sequence shown. Ensure the camshaft bearing caps pull down evenly into contact with the cylinder head.
    13.2 In the sequence shown, torque the camshaft bearing caps to **8-12 Nm**.



14. Repeat from step 10. for the second cylinder head.
15. Install the timing chains. Perform the camshaft timing procedure
16. (Refer to 'Valve Train (03.09)', page 3-10-1).
17. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).

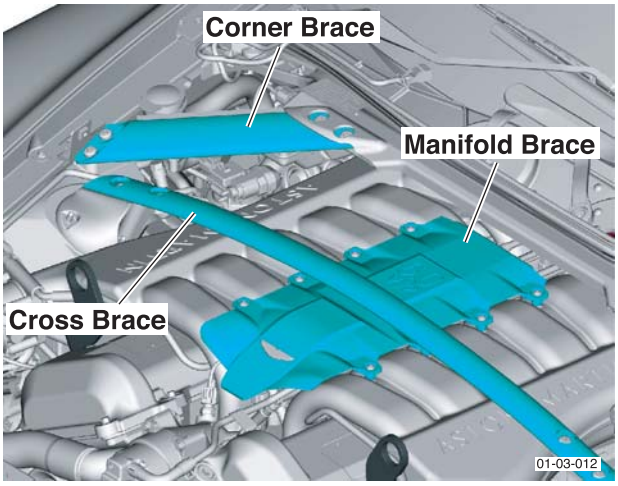
18. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1)
19. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
20. Install the thermostat housing (Refer to 'Thermostat', page 3-4-5).
21. Fill the engine coolant system (Refer to 'Coolant Drain / Fill', page 3-4-3).
22. Install the exhaust manifold (Refer to 'Exhaust Manifold', page 3-2-10).
23. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
24. Install the engine to vehicle (Refer to 'Engine', page 3-1-4).

Inlet Manifold

Repair Operation Time (ROT)		
Item		**Code**
Inlet Manifold Renew	LH	**03.01.BB**
	RH	**03.01.DB**

Removal

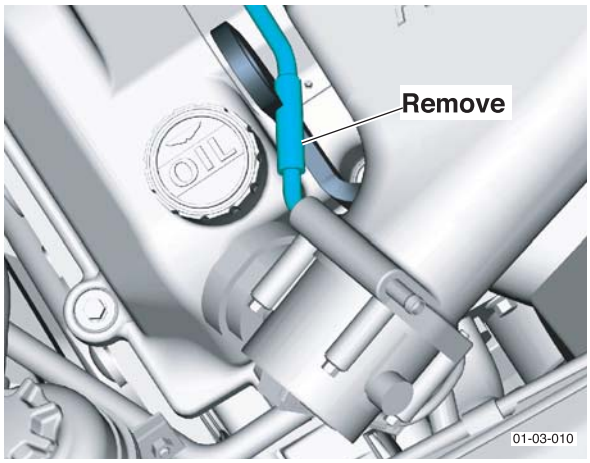
1. Depressurise the fuel system (Refer to 'Depressurising', page 10-1-8).
2. Disconnect the vehicle battery.
3. Remove the engine bay corner braces (x2), engine bay cross brace and manifold brace.

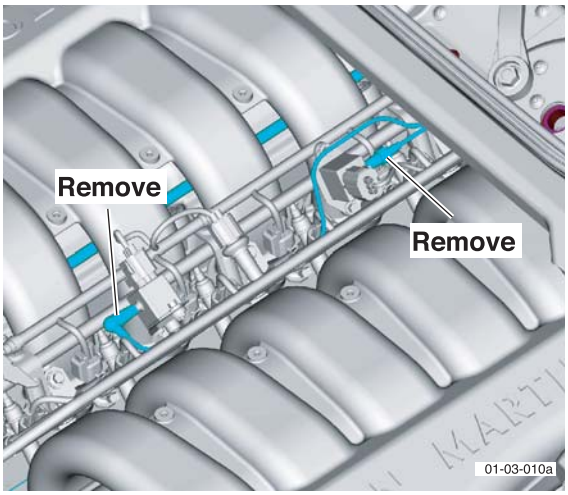


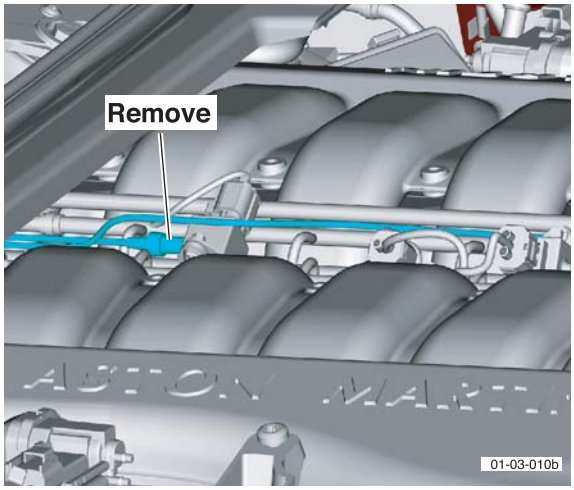
4. Remove the air intake pipe.

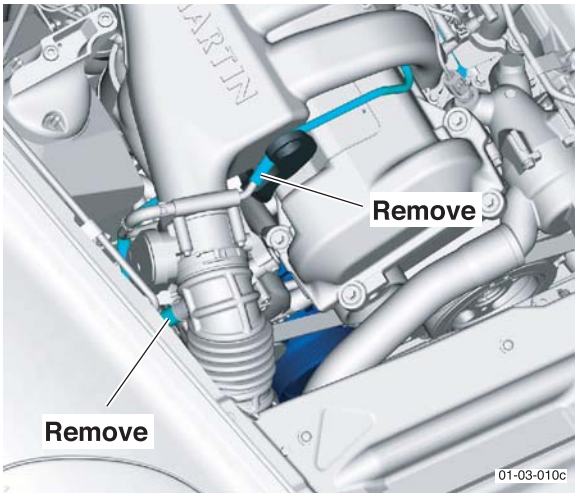


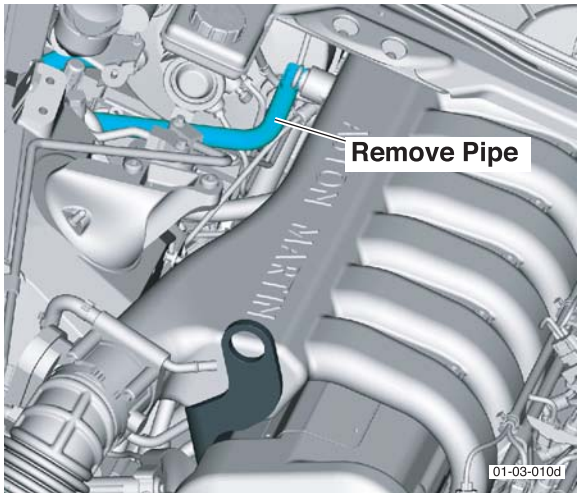
5. Remove the following from the inlet manifold.



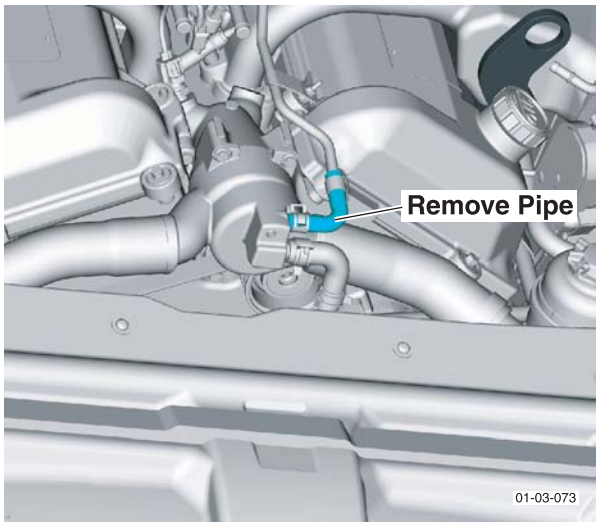




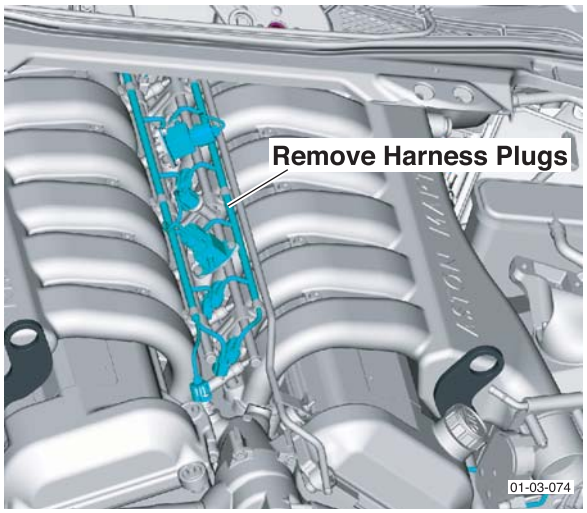




6. Remove the thermostat housing by-pass hose. Plug the open ends.

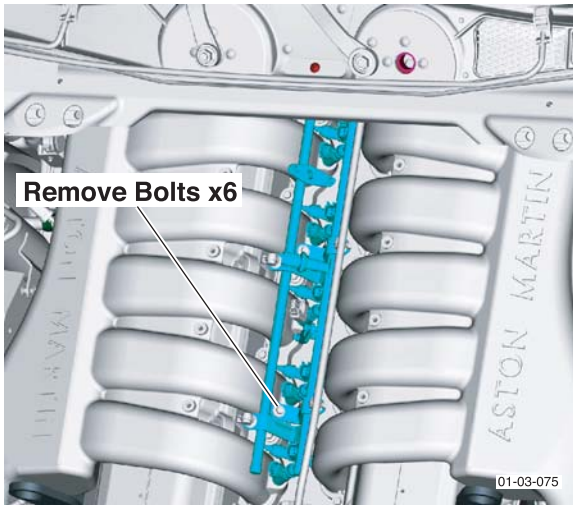


7. Remove the following:
   - Fuel rail temperature sender wiring harness plug
   - Fuel rail pressure sensor wiring harness plug
   - Injector wiring harness plugs



> ⚠ ***Warning*** ⚠
> ***If the fuel system is pressurised, fuel will be released and may contaminate eyes and / or skin.***

8. Remove the fuel rails and injectors.
   8.1 Remove bolts (x6) that secure the fuel rails.
   8.2 Withdraw the fuel rails sufficiently to remove the injectors.
   8.3 Discard the injector 'O' rings.



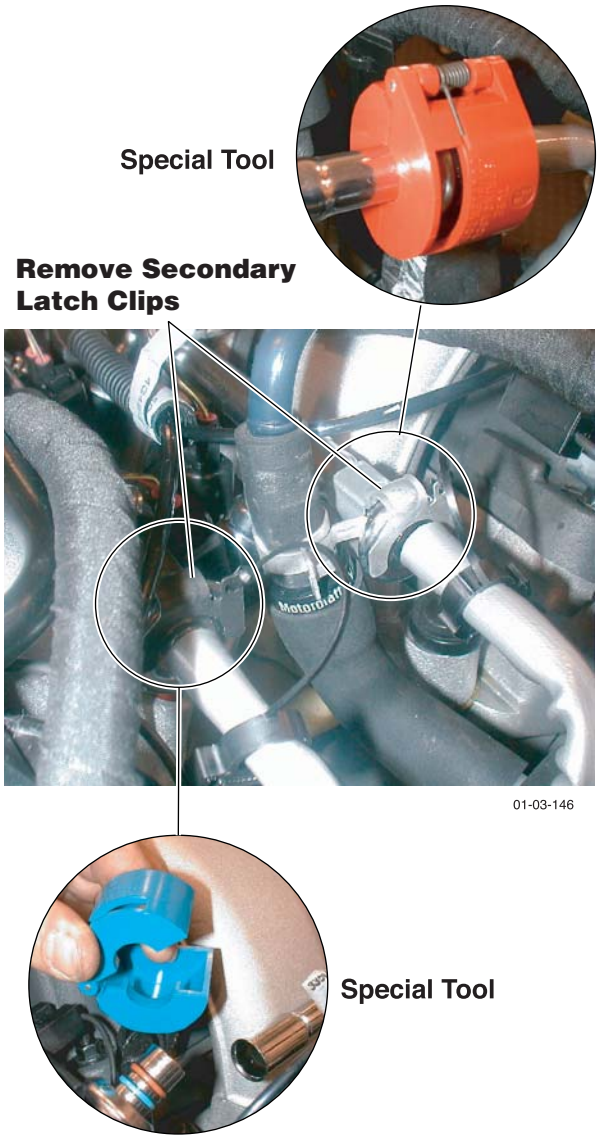
9. Disconnect the fuel rails from the fuel supply hoses.

Left and right hand fuel rails to the fuel supply hose unions are different sizes.

9.1 Remove the secondary latch clip from each fuel line.

9.2 Locate correct size of service tool around the union.
- (Refer to '412-038 (Quick Disconnect Tool)', page 20-1-7)
- (Refer to '412-040 (Quick Disconnect Tool)', page 20-1-7)

9.3 Push back on the tool. While pushed back withdraw the fuel rail.



10. Remove the inlet manifold.

10.1 Remove bolts (x7) that secure the inlet manifold to the cylinder head.

10.2 Withdraw the inlet manifold sufficiently to gain access to it's rear and disconnect the vacuum harness.

10.3 Withdraw the inlet manifold. Discard the gaskets.

11. Cover the inlets to the cylinder head to prevent contamination of the cylinders.

Installation

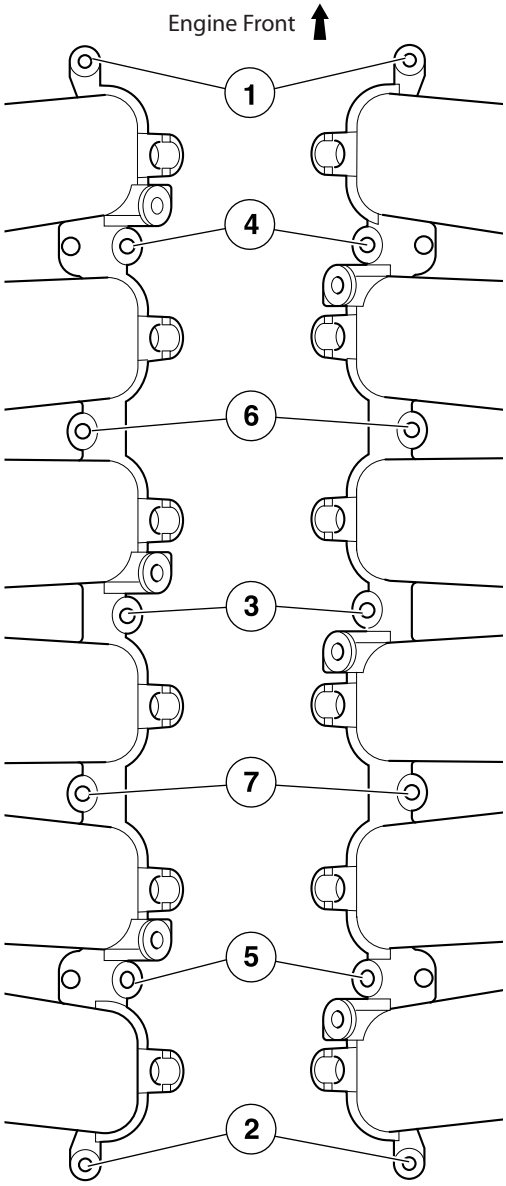
Ensure all faces are clean and free of damage / contamination.

1. Place a new inlet manifold gasket to the inlet manifold. Locate the two 'lipped' holes in the gasket through the two corresponding bolt inserts in the inlet manifold.
2. Install the inlet manifold.

2.1 Place the inlet manifold to the cylinder head and install the vacuum harness to the rear of the inlet manifold.

2.2 Locate the inlet manifold to the cylinder head. Ensure the gasket remains in position.

2.3 Secure the inlet manifold to the cylinder head. Torque bolts (x7), in the order detailed below, to **8 - 12 Nm**.



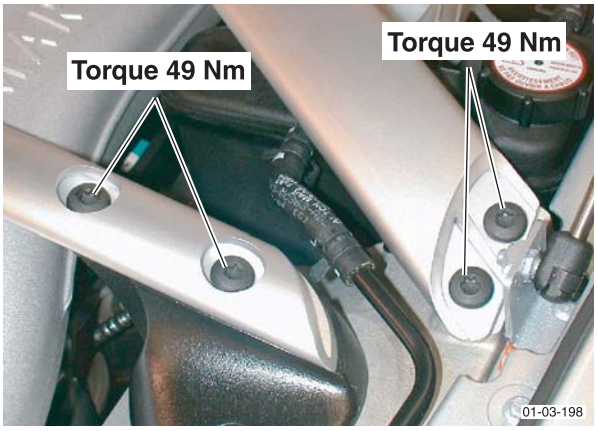
3. Install the injectors to the inlet manifold, complete with new 'O' rings.

Note position of 'O' rings
- *Blue (top)*
- *Green (bottom)*

4. Install the fuel rails.
   4.1 Locate fuel rails over injectors.
   4.2 Pull down' fuel rail onto injectors by tightening bolts (x3). Torque bolts to **8-12 Nm**.
5. Connect fuel rails to fuel supply lines.

Ensure each fuel rail and fuel supply line are 'in-line' before connection.

6. Install the secondary latch clips to the fuel lines.
7. Connect the following wiring harness plugs:
   - Temperature sender to fuel rail
   - Pressure sensor to fuel rail
   - To the injectors
8. Connect thermostat housing by-pass pipe.
9. Install the air intake hose.
10. Install the engine bay corner braces (x2), engine bay cross brace and manifold brace. Torque bolts to:
    - Engine cross brace - **49 Nm.**
    - Manifold brace - **8-12 Nm**.
    - Corner braces - **49 Nm.**

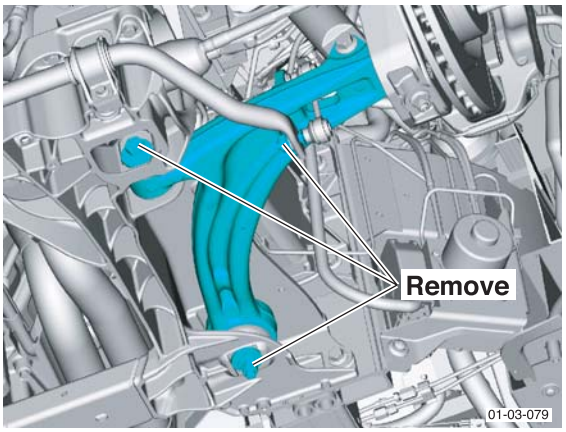


Exhaust Manifold

Repair Operation Time (ROT)		
Item		**Code**
Exhaust Manifold Renew	LH	**09.03.DB**
	RH	**09.03.EB**

Removal

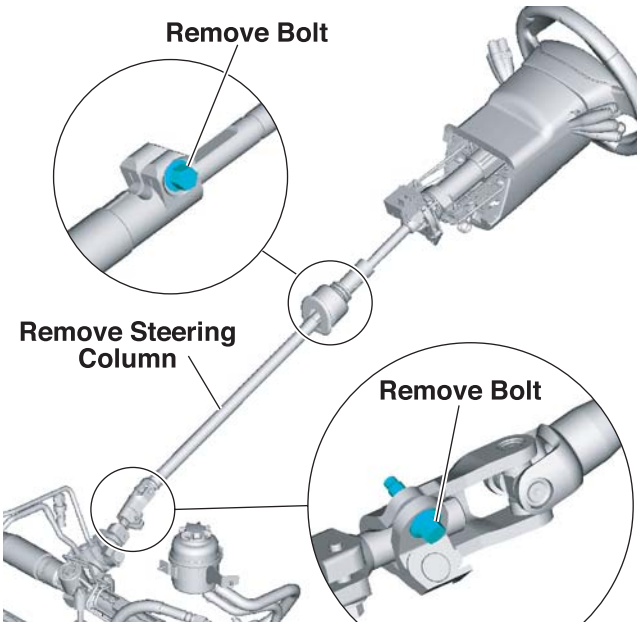
1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the front roadwheels and wheel arch liners.
4. Remove the undertray.
5. Remove the lower suspension arms.



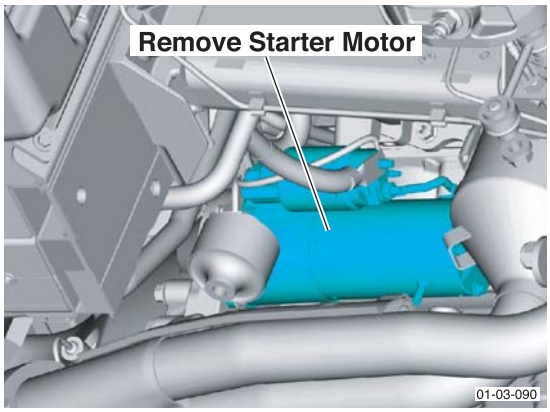
6. Disconnect the anti-roll bar links.
7. Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).

RH manifold

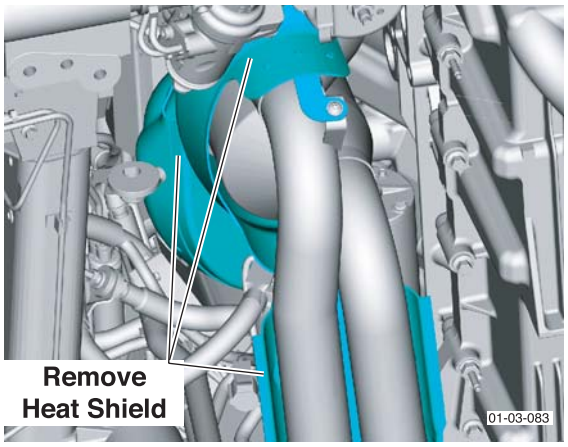
1. Remove the steering column (RH drive only).



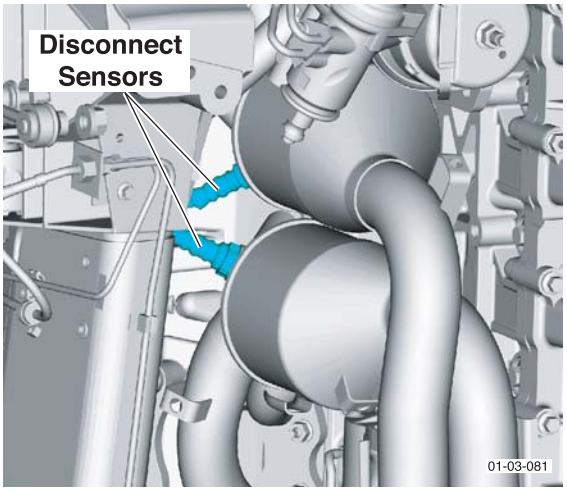
2. Remove the starter motor.



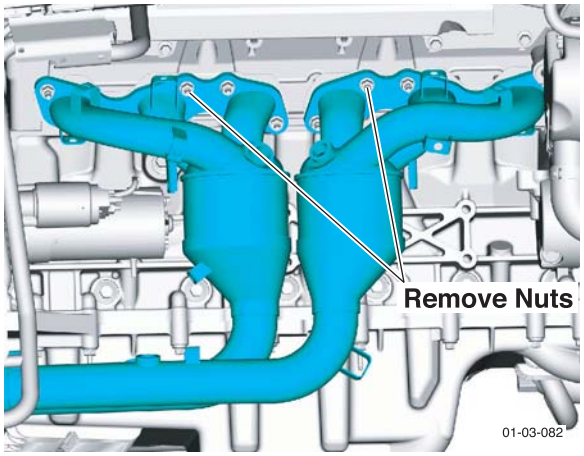
3. Disconnect the heated oxygen sensors (x2) and the Catalyst Monitor sensors (x2).
4. Remove the exhaust heat shields.



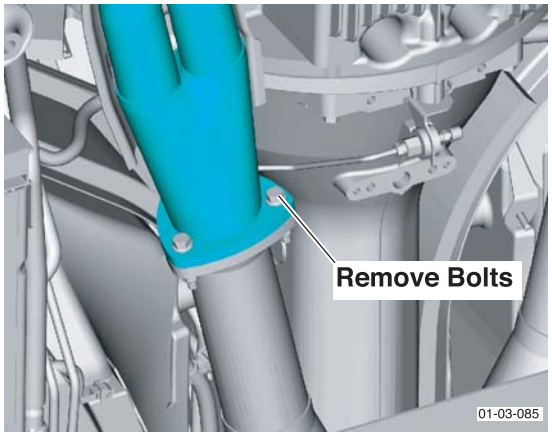
5. Disconnect the heated oxygen sensors (x2) and the Catalyst Monitor sensors (x2).



6. Remove exhaust manifold.
   6.1 Remove manifold nuts (x12).



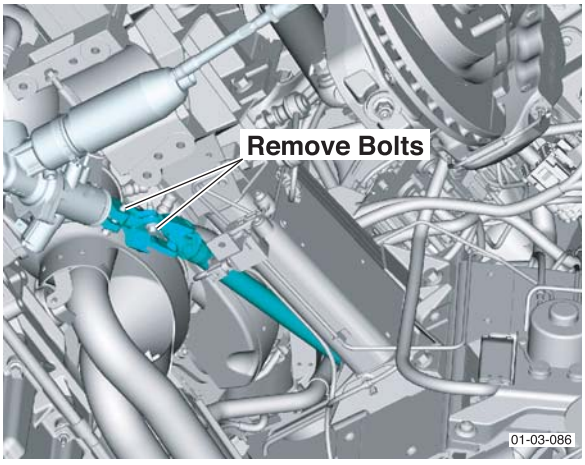
   6.2 Remove nut and bolt (x3).



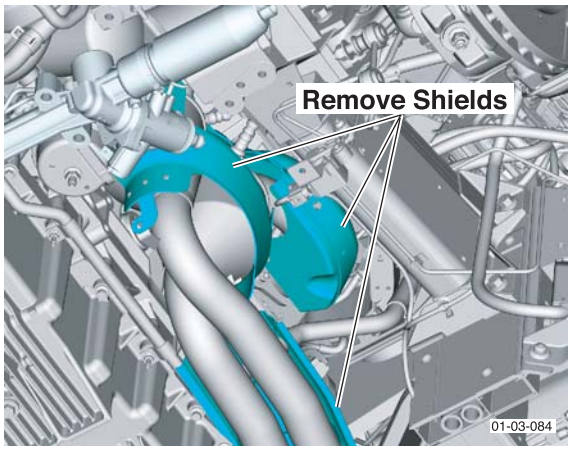
   6.3 Withdraw the manifold.
   Discard the manifold gasket.

LH Manifold

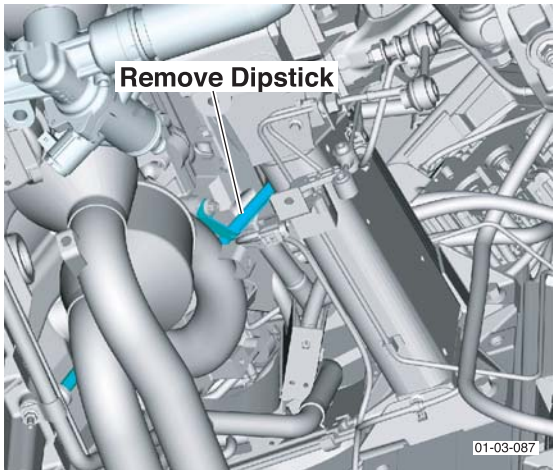
1. Remove the lower steering column (LH drive only).



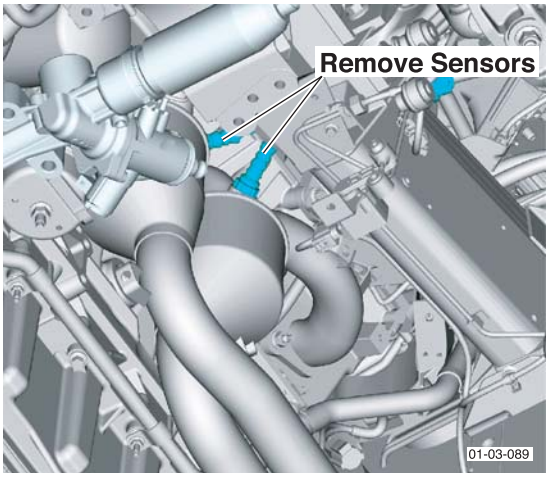
2. Remove the exhaust heat shields.



3. Remove the dip stick.

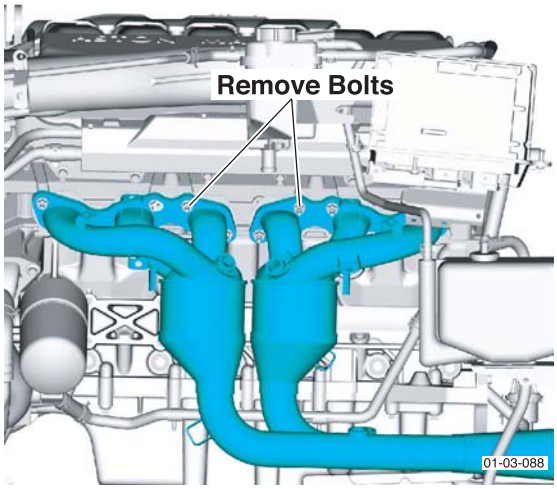


4. Disconnect the heated oxygen sensors (x2) and the Catalyst Monitor sensors (x2).

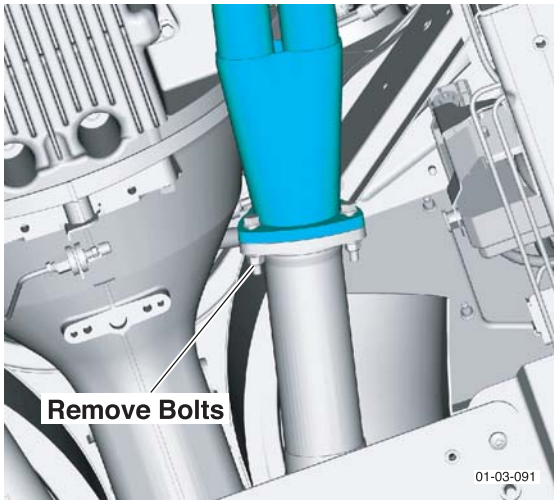


5. Remove the exhaust manifold.

5.1 Remove manifold nuts (x12).



5.2 Remove nut and bolt (x3).

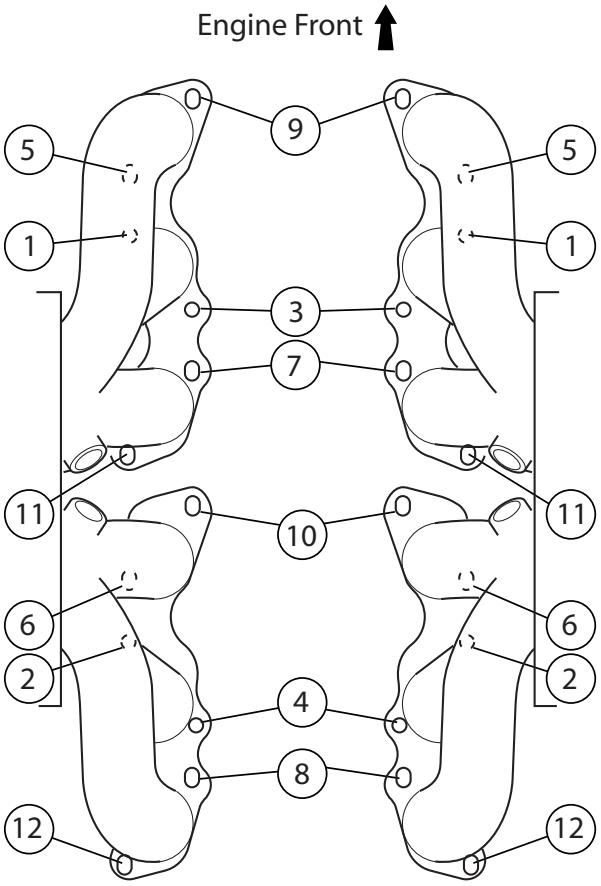


5.3 Withdraw the manifold.
Discard the manifold gasket.

Installation

Use new gaskets.

1. Place a new gasket and the exhaust manifold to the cylinder head.
2. Install nuts (x12). Torque nuts, in sequence shown, to **18-22 Nm**.



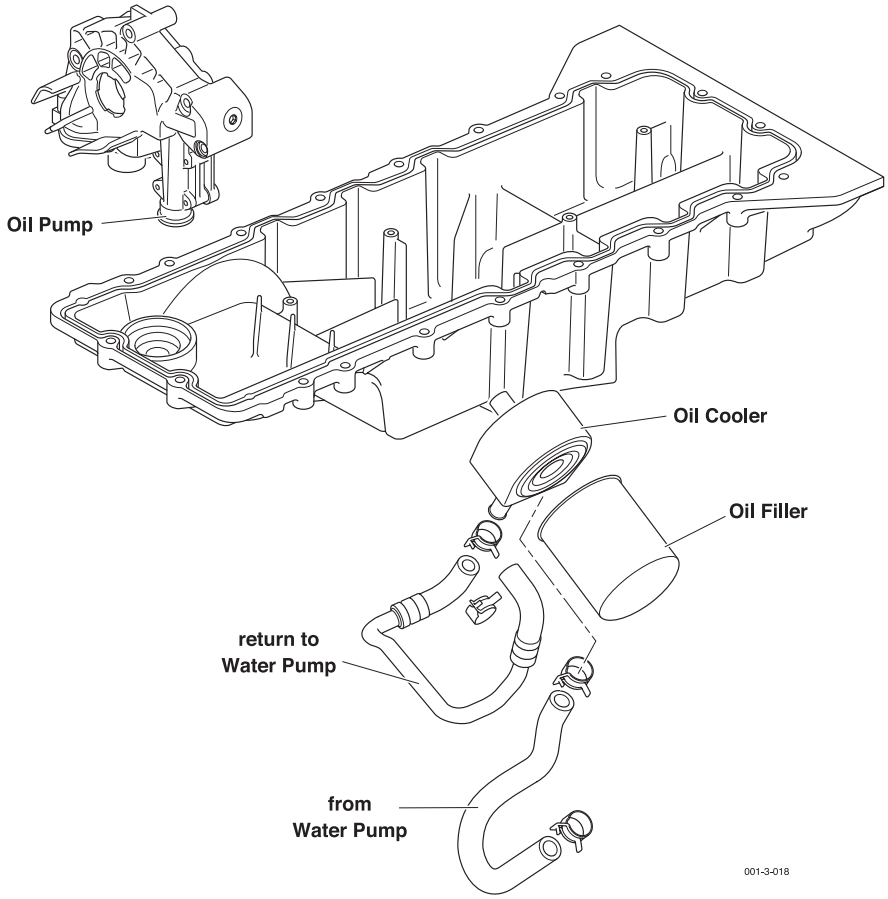
3. Install the Heated Oxygen sensors (x2) and the Catalyst Monitor sensors (x2).
4. Install the exhaust heat shields.
5. Install:
   - 5.1 **LH Manifold**.
     - The Dip stick
     - The Lower steering column (LH drive only)
   - 5.2 **RH Manifold**.
     - The Alternator
     - The Starter motor
     - The Lower steering column (RH drive only)
6. Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
7. Install the lower suspension arms and anti-roll bar links (Refer to 'Front Suspension (04.01)', page 4-2-1).
8. Install the undertray.
9. Install the road wheels.(Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

ASTON MARTIN
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Engine (03.00)

Lubrication System (03.02)

Description

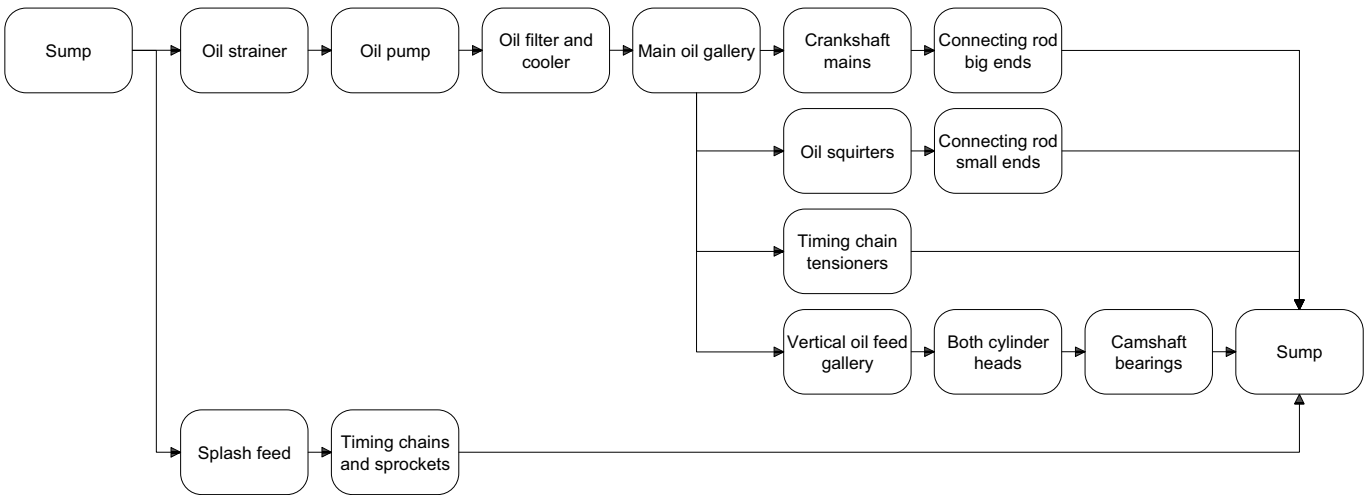


The engine uses a wet sump lubrication system.

Oil is drawn from the sump via an oil strainer and pick-up tube to the crankshaft driven oil pump. Pressure from the oil pump is limited by a built in oil pressure relief valve. Pressurised oil then flows from the left side of the engine through a filter and cooler then back into the engine main oil gallery.

Oil pressure at the re-entry point is approximately 60 psi with the engine hot and should reach at least 100 psi when cold.

Oil flow



Specifications

Engine oil		Mobil 1
	Europe / Aus	0W-40
	USA	0W-30 or 0W-40

To achieve the required high performance of synthetic lubricants, do not mix with mineral oils.

Capacity	**Europe (Litres)**	**UK (Pints)**	**USA (Qts.)**
Engine sump (incl. filter)	10.0	17.6	10.6

Torque Figures

Description		Nm.	lb. / ft.
Sump plug		23-27	17-20
Sump bolts (two stage)	1.	15	11.5
		(in sequence)	
	2.	A further 90° (same sequence)	
Oil pump bolts	M8	23-27	17-20
	M6	8-12	6-9

Engine Oil Specification

An oil of 0W-30 viscosity meeting Aston Martin specification WSS M2C913-A/B or 0W-40 viscosity meeting Aston Martin specification WSS-M2C937-A is preferred. Where this is not possible, oil meeting the following standards may be used.

0W-30	
Authority	Standard
API	SL / SJ / EC / CF
ACEA	A1 / A5 / B1 / B5
ILSAC	GF3

0W-40	
Authority	Standard
API	SL / SJ / EC / CF
ACEA	A3 / B3 / B4
ILSAC	GF3

Maintenance

Oil Drain

1. Remove the front undertray.
2. Remove the sump plug. Drain the oil into a suitable receptacle.
3. Install a new sump plug. Torque to **23-27 Nm**.

Caution
Always install a new oil drain bolt.

4. Wipe the area clean before installing the front undertray. Install the front undertray.

Oil Filter

Repair Operation Time (ROT)		
Item		**Code**
Oil Filter Renew	LHD	**TBA**
	RHD	**03.02.AB**

Removal

RH Drive.

1. Remove the front undertray.
2. Remove the oil filter.



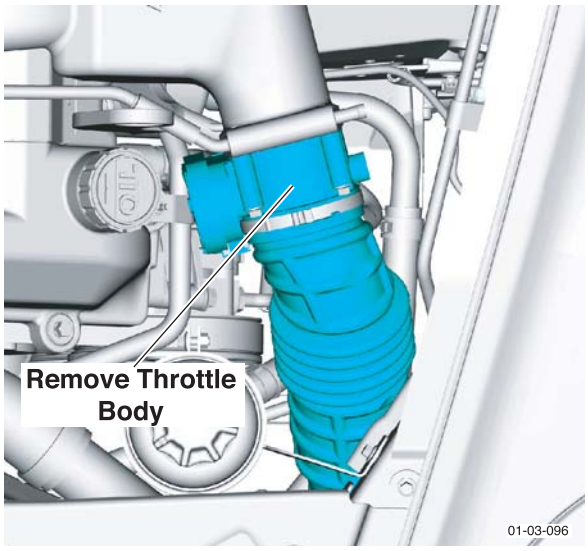
To lessen the amount of engine oil spillage, cover the oil filter with a plastic bag.

3. Clean any excess oil from around and below the oil filter.

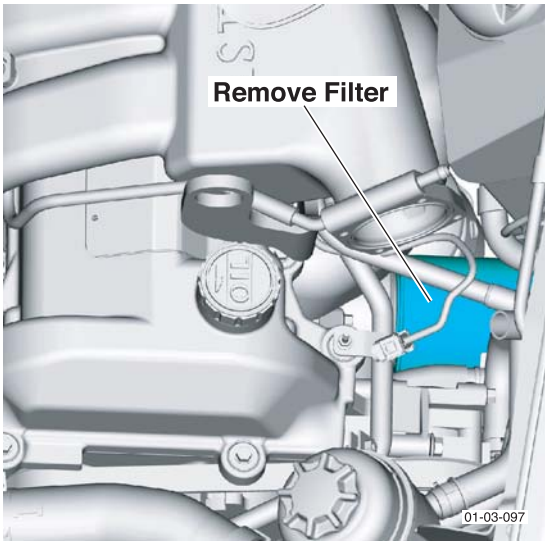
Caution
Engine oil may drain onto the steering rack and rubber hoses. Ensure excess engine oil is removed before installing the undertray.
Engine oil which remains may drip, in time, onto the undertray and indicate a false engine oil leak.

LH Drive.

1. Remove the front undertray.
2. Remove the air intake from the throttle body. Remove the throttle body.



3. Remove the oil filter.



To lessen the amount of engine oil spillage, cover the oil filter with a plastic bag.

4. Clean any excess oil from around and below the oil filter.

Caution

Engine oil may drain onto the steering rack and rubber hoses. Ensure excess engine oil is removed before installing the undertray.

Engine oil which remains may drip, in time, onto the undertray and indicate a false engine oil leak.

Installation

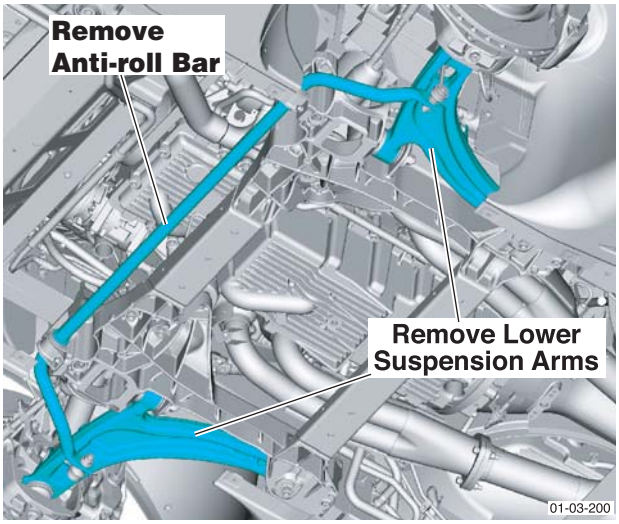
1. Smear the lip of the oil filter with clean engine oil.
2. Install the oil filter to the engine block. Tighten the oil filter hand tight.
3. **L/H drive only**.
   Install the throttle body and air intake pipe.
4. Install the front undertray.

Sump

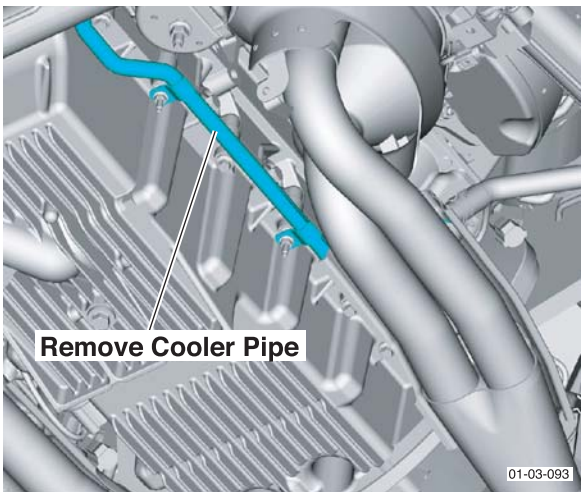
Repair Operation Time (ROT)		
Item		**Code**
Sump Remove / Install	LH	**03.02.BN**

Removal

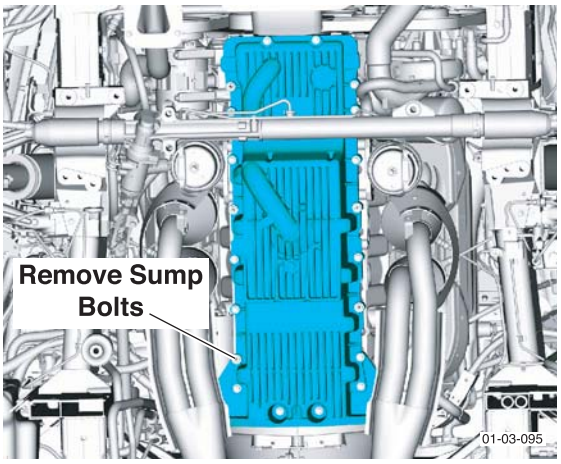
1. Drain the engine oil.
2. Remove the lower suspension arms (from the front subframe) and the anti-roll bar (Refer to 'Front Suspension (04.01)', page 4-2-1).



3. Support the engine from above (Refer to '303-1080 (Engine Support Adaptor)', page 20-1-6).
4. Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).
5. Withdraw the coolant pipe from the sump.



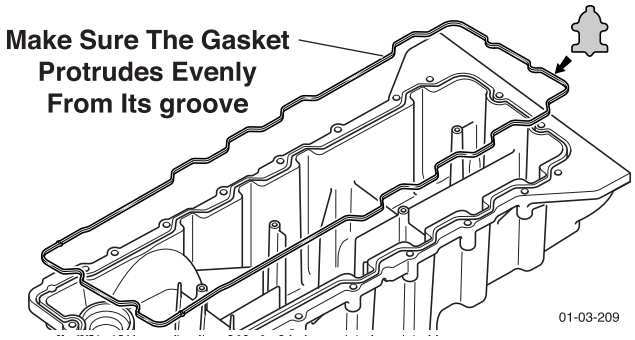
6. Remove bolts (x15 M8) and (x5 M6) that secure the sump. Withdraw the sump. Discard the sump gasket and oil seal (oil pump).



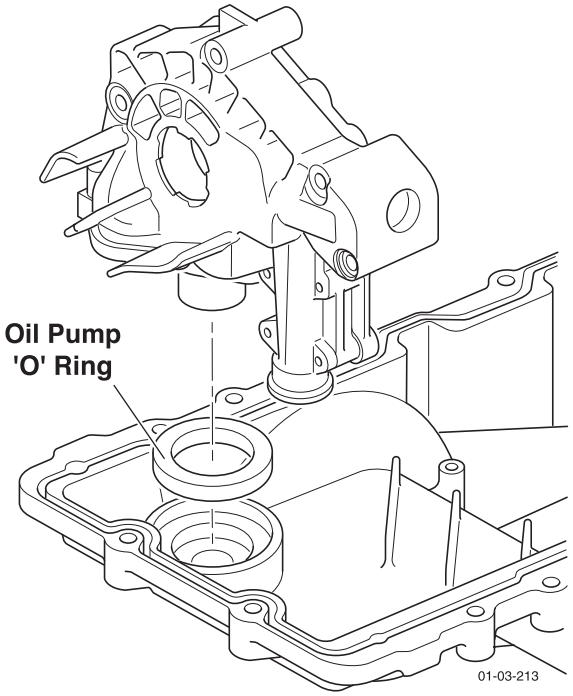
7. Clean the sump and engine block mating surfaces.

Installation

1. Ensure the sump is clean.
2. Install a new sump gasket. Ensure that the gasket protrudes evenly from its groove all around the sump.

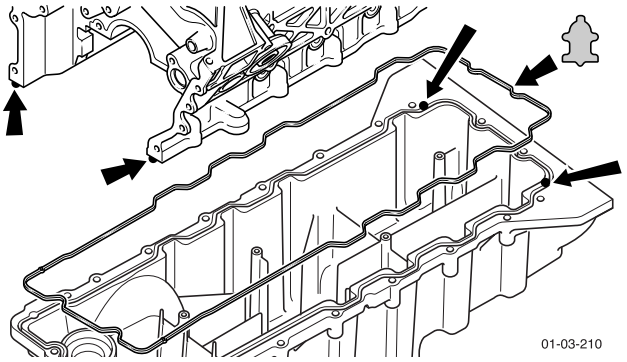


3. Install a new oil seal to the sump (oil pump to sump).



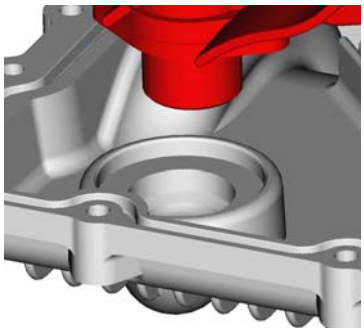
4. Apply dots (10 mm Dia approx.) of sealant to the sump sealing surface in the positions indicated.

The sump must be installed and secured within 6 minutes of applying beads of sealant.



5. Install the sump.

Ensure that the sump oil outlet seal locates to the oil pump inlet before the sump is faced up to the engine block.
Do not use a mallet etc. to face up the sump to engine block.



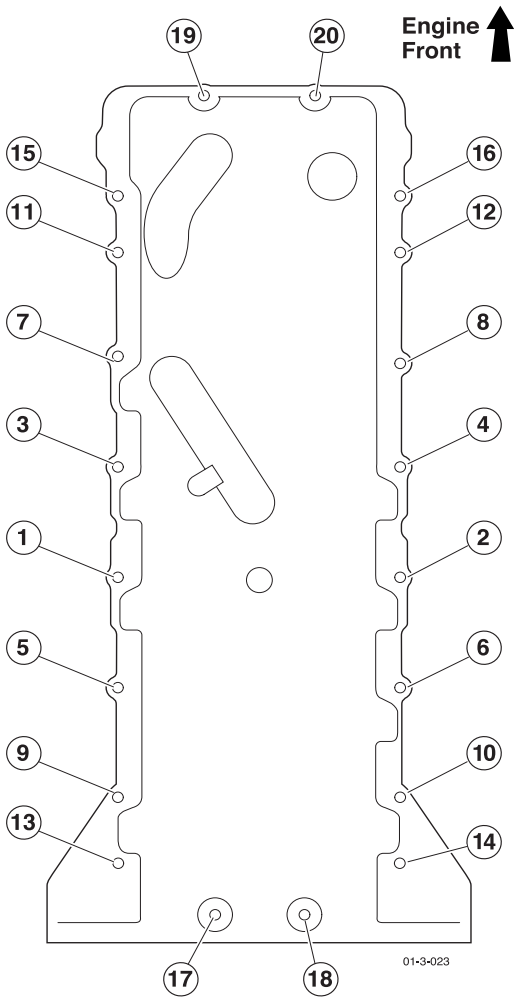
Ensure the sump is flush to 0.25mm underflush to the rear face of the cylinder block.

Secure the sump using bolts (x15 M8) and (x5 M6).

Tighten the bolts using a two stage procedure:

1 Tighten all bolts to **15 Nm.** in the sequence shown.

2 Tighten all bolts through a further **90°** following the same sequence.



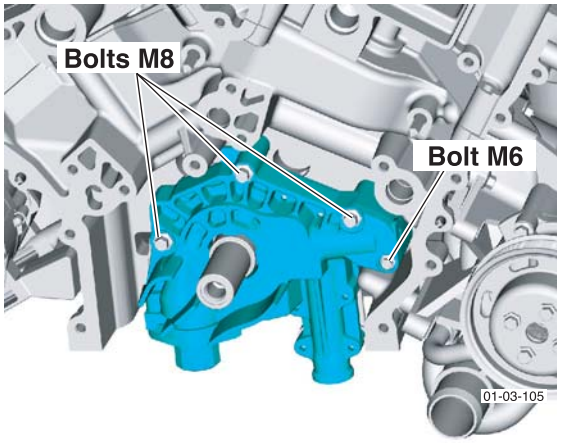
6. Install the coolant pipe.
7. Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
8. Install the lower suspension arms (Do not torque bolts)
9. Install the anti-roll bar. Torque the stabiliser nut to **110 Nm**.
10. Remove the engine support.
11. Fill the engine with the recommended quantity and grade of engine oil (Refer to 'Specifications', page 3-3-2).
12. Torque the suspension fixings with the vehicle at normal ride height (Refer to 'Front Suspension (04.01)', page 4-2-1):
    - Lower suspension arms to the subframe - **115 Nm**.
13. Check and adjust the front wheel alignment (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
14. Raise the vehicle and install the front undertray.

Oil Pump

Repair Operation Time (ROT)	
Item	**Code**
Oil Pump Renew	**TBA**

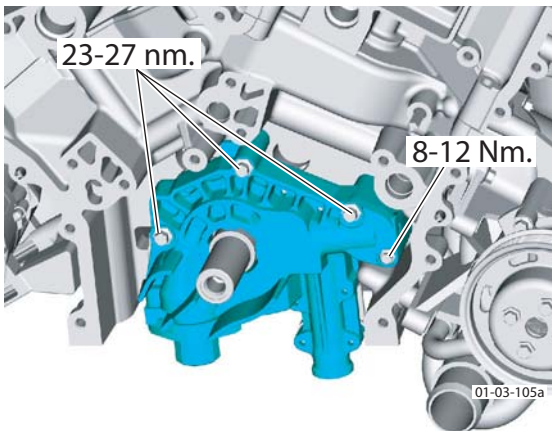
Removal

1. Drain the engine oil.
2. Remove the engine from the vehicle (Refer to 'Removal', page 3-1-4).
3. Remove the sump (Refer to 'Sump', page 3-3-3).
   Discard the sump gasket and oil seal.
4. Remove the timing chains (Refer to 'Valve Timing Chains', page 3-10-1).
5. Remove bolts (x1 M6) and (x3 M8) that secure the oil pump. Withdraw the oil pump.



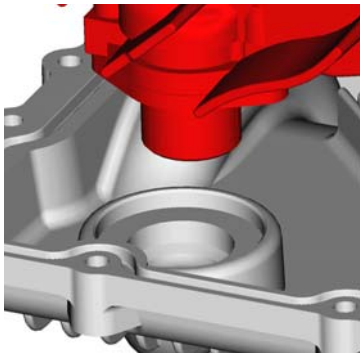
Installation

1. Locate the oil pump onto the crankshaft.
   Install the oil pump.
   - Torque bolts (M8 x3) to **23-27 Nm.**
   - Torque bolts (M6 x1) to **8-12 Nm.**



2. Install the timing chains (Refer to 'Valve Timing Chains', page 3-10-1).
3. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
4. Install the sump (Refer to 'Sump', page 3-3-3) complete with new gasket and oil seal.

Ensure that the sump oil outlet seal locates to the oil pump inlet before the sump is faced up to the engine block.
Do not use a mallet etc. to face up the sump to engine block.



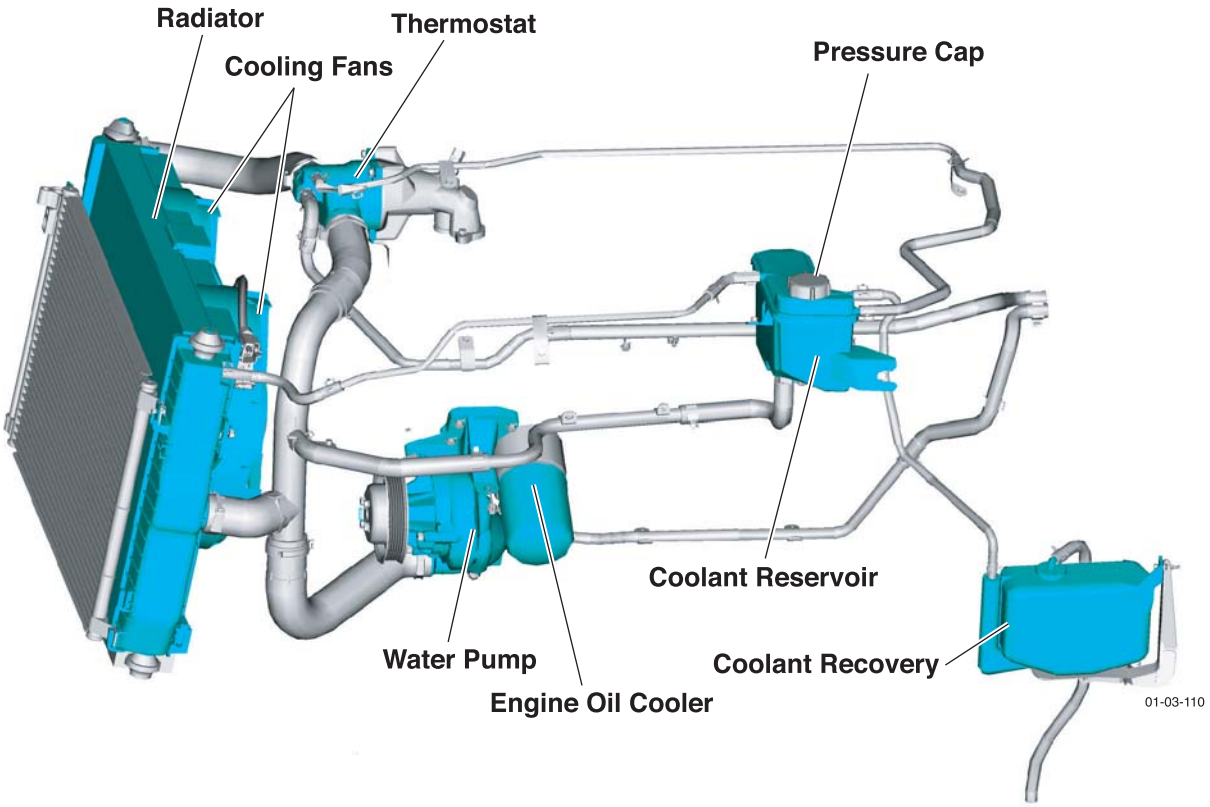
Ensure the sump is flush to 0.25mm underflush to the rear face of the cylinder block.

5. Install the engine to vehicle (Refer to 'Engine', page 3-1-4).
6. Fill the engine with the recommended quantity and grade of engine oil (Refer to 'Specifications', page 3-3-2).
7. Check and adjust the front wheel alignment (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Engine (03.00)

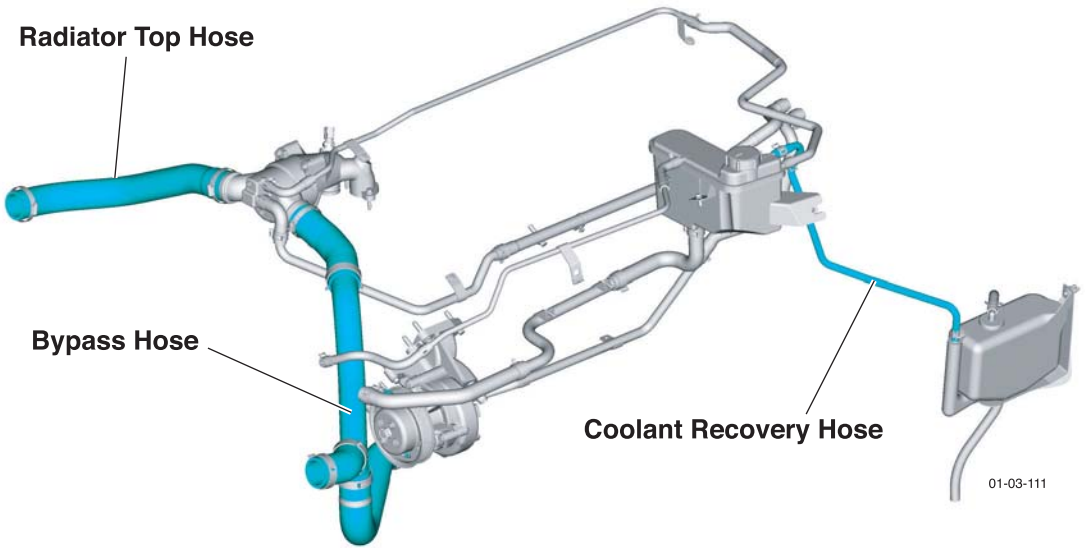
Cooling System (03.03)

Description



- Water pump
- Radiator
- Coolant Reservoir
- Cooling fan motor control module
- Thermostat
- Pressure cap
- Electric cooling fans (x2)
- Engine oil cooler

Coolant Circuit



Water Pump

The water pump is of a conventional design and is located at the front of the engine. It is driven by the accessory drive belt.

Thermostat

The thermostat allows rapid engine warm-up by redirecting coolant flow through the engine below 88.3°C (190.9°F). The thermostat also assists in keeping the engine operating temperature within predetermined limits. The thermostat starts to open between 88.3 - 92.2°C (190.9 - 198°F) and is fully open at 103.9°C (219°F).

Cold Engine (By-pass Circuit) - When the engine is cold and the thermostat is closed, coolant flows from the water pump through the engine, then returns directly to the water pump.

Warm Engine - When the engine is warm and the thermostat is open, coolant flows from the water pump, through the engine, through the thermostat, into the radiator upper coolant hose, through the radiator and then returns to the water pump via the radiator lower coolant hose.

The heater core is on a parallel circuit and is unaffected by the position of the thermostat.

Radiator

The radiator is of aluminium construction with plastic end tanks. Foam seals are installed to the radiator to prevent the cooling air from by passing the radiator core. The radiator is located by four isolator mountings and supported by the radiator support beam. A coolant drain plug is provided in the lower RH side for the draining of the coolant. The Cooling fan shroud is attached to the radiator.

Cooling Fans

Two variable speed electric cooling fans are housed in the cooling fan pack for the cooling of the radiator. The speed of the electric cooling fans is adjusted by the Powertrain Control Module (PCM).

Coolant Reservoir

A pressurized Coolant Reservoir system is used which continuously removes any air from the cooling system. A continuous vent from the engine and radiator to the coolant expansion tank prevents air locks from forming in the cooling system. No manual bleed points are provided on the system.

The Coolant Reservoir should be full when the coolant system is cold.

In-Vehicle Heating

A hose from the front of the thermostat housing directs coolant to the heater water valve which remains closed below 30°C ± 10°C (86°F ± 50°F). Above this temperature, the heater water valve will open and warm water will be available to the heater water pump. This pump will only run when the temperature is > 10°C (50°F) and will supply warm water to the air conditioning heater matrix. The A/C heater matrix outlet is connected through the return side of the water valve, back to the rear of the engine water pump.

Specifications

Antifreeze Mix	50% OAT coolant / 50% water.
Pressure Cap	150 kpa.
Thermostat	Starts to opens between 88.3 - 92.2°C (190.9 - 198°F).
	Fully open at 103.9°C (219°F).
Leakage Rates	30 cm / Min. 150 - 180 kpa.
	60 cm / Min. 10 kpa Man.
	Up to 75 kpa @ 150 c m / h.

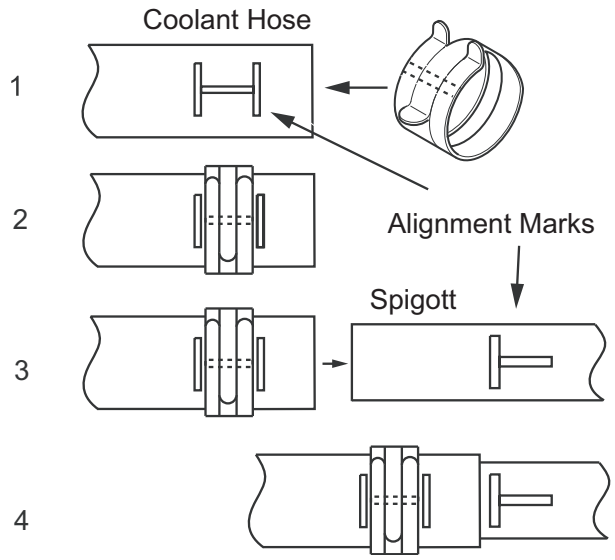
The anti-freeze is unique and cannot be mixed with other anti-freeze solutions. The OAT coolant/water mixture has a life of 150,000 miles or 5 years (which ever comes first).

Torque Figures

Description	Nm.	lb./ft.
Condenser A/C pipes	8-10	6-7.5
Thermostat housing	8-12	6-9
Thermostat housing support bracket	23-27	17-20
Water pump	23-27	17-20
Water pump pulley	23-27	17-20

Maintenance

Caution
'Spring band' clips
'Spring band' clips must be installed as detailed below:



All coolant hoses and spigots must be de-greased before assembly.

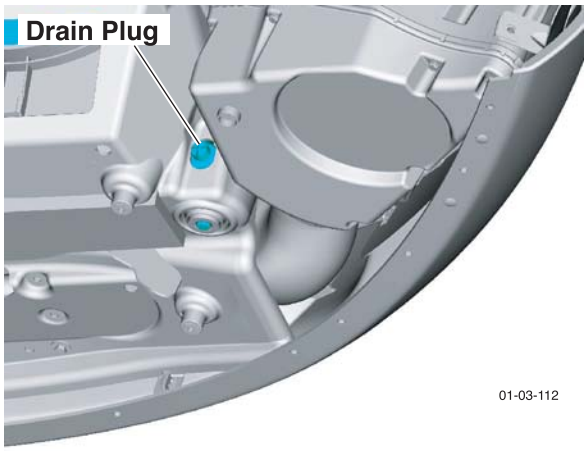
Coolant Drain / Fill

Repair Operation Time (ROT)	
Item	**Code**
Drain / Fill	**03.03.BE**

1. Remove the front undertray.

⚠ Warning ⚠
Do not remove the pressure cap when the coolant is hot. Allow time for the coolant / engine to cool. Take particular care to avoid burns from the cooling system.

2. Remove the pressure cap from the Coolant Reservoir.
3. Loosen the drain plug. Drain the coolant into a suitable container.



4. Install the drain plug. Ensure the drain plug is secure.
5. Fill the cooling system with the specified coolant to maximum level in the Coolant Reservoir. Install the pressure cap.

⚠ Warning ⚠
Do not remove the pressure cap when the coolant is hot. Allow time for the coolant / engine to cool. Take particular care to avoid burns from the cooling system.

6. Run the engine until fully warm. Stop the engine and allow to cool down. Any coolant displaced due to expansion will be drawn back into the Coolant Reservoir as the system cools.
7. Re check the level at the Coolant Reservoir. Top-up as necessary to the maximum level.
8. Ensure the filler cap is secure after topping up.

Caution
Do not over tighten.

9. Install the front undertray.

Pressure Tests

Cooling System

1. Select the correct pressure tester adaptors and install the pressure tester to the Coolant Reservoir.
2. Bring the engine up to it's correct working temperature.
3. Test the cooling system following the pressure tester manufacture instructions.
   Pressure leakage (Refer to 'Specifications', page 3-4-2).

Pressure Cap

1. Select the correct pressure tester adaptors and install the pressure tester to the pressure cap.

Rinse the pressure cap in water to remove any sediment

2. Test the pressure cap following the pressure tester manufacture instructions.
3. Pressure leakage (Refer to 'Specifications', page 3-4-2).
   If replacing a pressure cap, always install one of identical pressure specification to original equipment.

Radiator

Repair Operation Time (ROT)	
Item	**Code**
Radiator Renew	**03.03.EB**

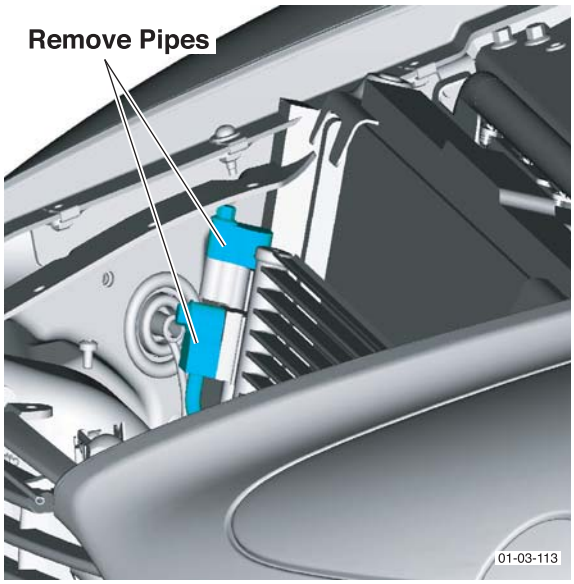
Removal

1. Discharge the A/C system.
2. Drain the engine coolant.
3. Remove the airfilter boxes (Refer to 'Air Charging (03.12)', page 3-13-1).
4. Remove the headlight units (Refer to 'Front Lights (17.01)', page 17-1-2).
5. Remove the 'Slam' panel.
6. Remove the A/C pipes from the condenser.

Caution

Ensure open ends are plugged immediately after disconnecting refrigeration parts.

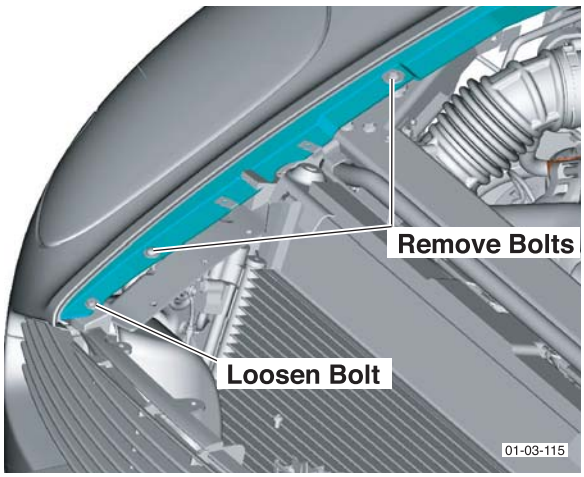
If moist air or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other faults may occur.



7. Remove the front crossmember.

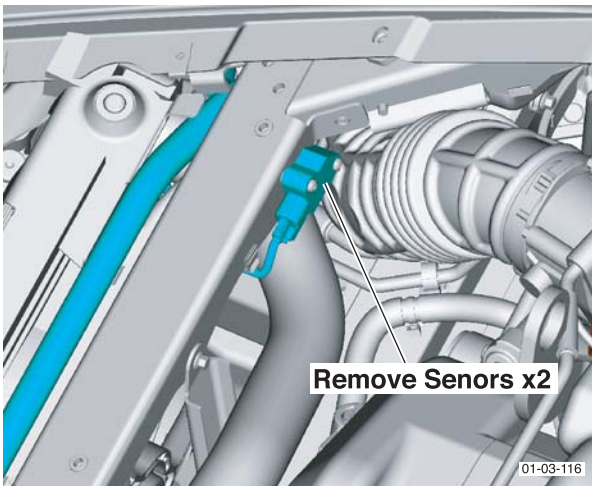
The vehicle wings have to be manoeuvred to remove the crossmember.

Remove bolts (x4) and loosen bolts (x2) from the wings. When the crossmember is ready to be removed the wings then need to be gently pulled to allow crossmember removal.

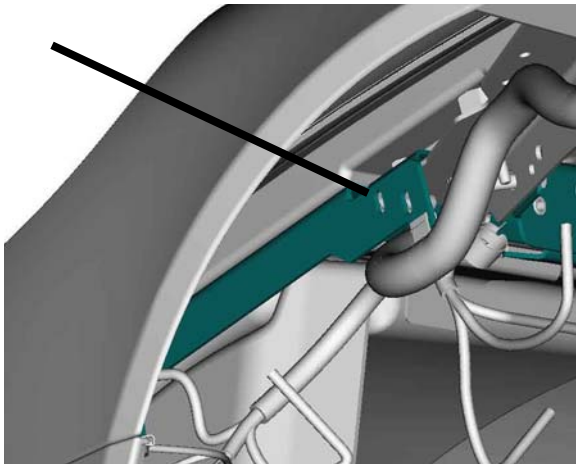


7.1 Disconnect the wiring harness plug from the crash sensors (x2).

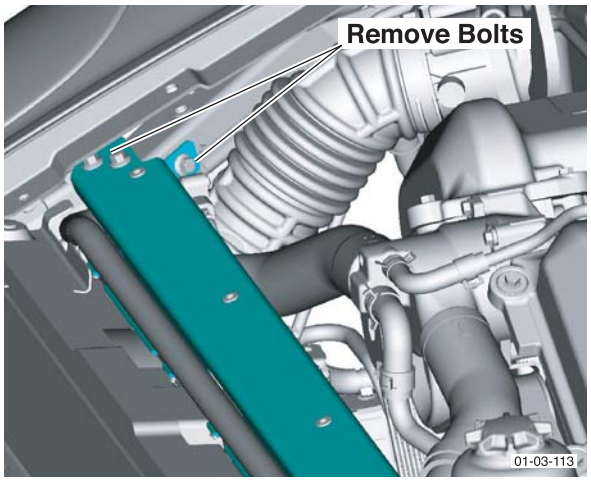
7.2 Remove wiring harness locaters (x2).



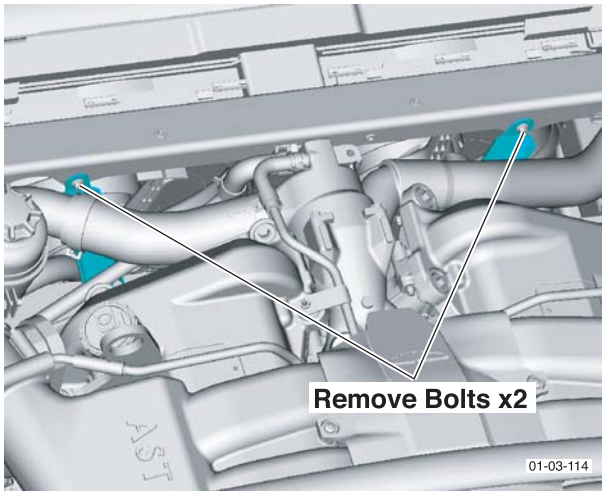
7.3 Remove bolts (x2 each side (inside the wings)).



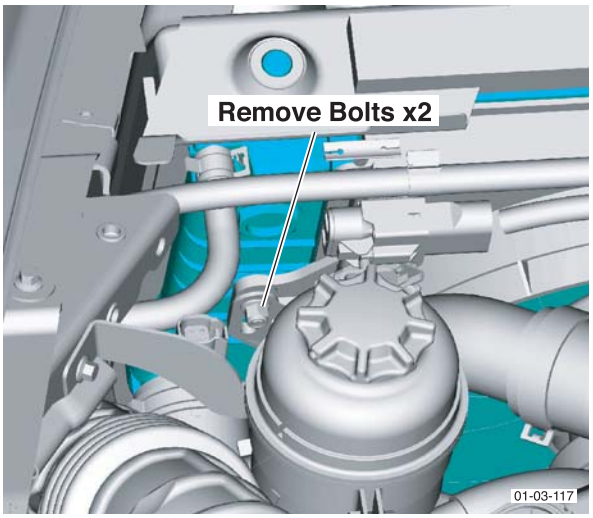
7.4 Remove bolts (x3 each side).



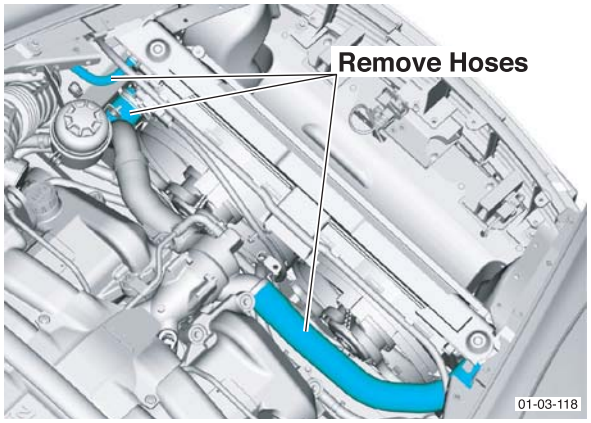
7.5 Remove bolts (x2).
Withdraw the front crossmember.



8. Remove the fan pack from the radiator.
   8.1 Remove bolts (x2) that secure the fan pack to the radiator.
   8.2 Withdraw the fan pack from the radiator.



9. Remove hoses from the radiator.



10. Withdraw the radiator complete with the condenser.

Installation

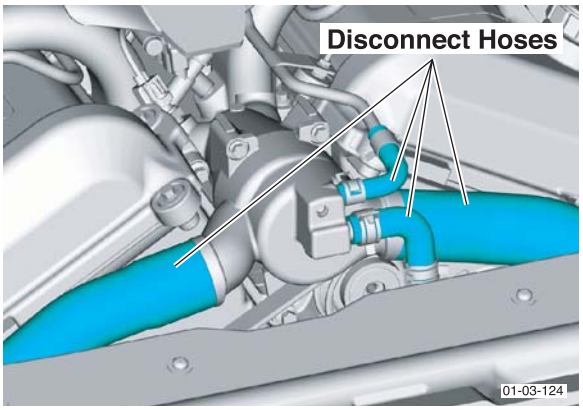
1. Install the radiator, complete with the condenser. Connect the radiator hoses.
2. Install the fan pack.
3. Install the front crossmember. Install the wings.
4. Install the condenser A/C pipes. Torque bolts to **8-10 Nm**.
5. Install the 'Slam' panel.
6. Install the headlight units (Refer to 'Front Lights (17.01)', page 17-1-2).
7. Install the air filter boxes (Refer to 'Air Charging (03.12)', page 3-13-1).
8. Fill the coolant system.
9. Charge the A/C system.

Thermostat

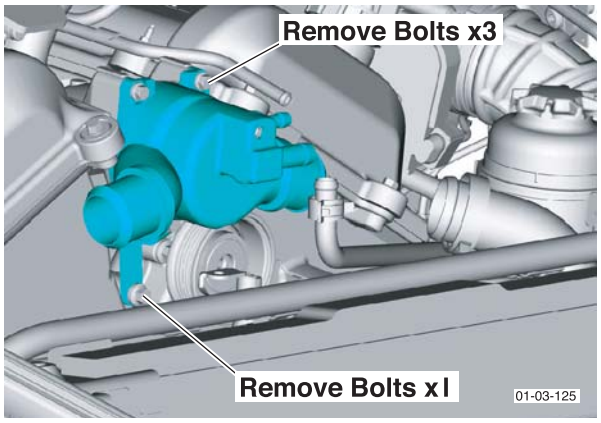
Repair Operation Time (ROT)	
Item	**Code**
Thermostat Renew	**03.03.GB**

Removal

1. Drain the engine coolant.
2. Disconnect the hoses.



3. Remove bolt (x1) from the timing cover (thermostat housing support bracket).
4. Remove the bolts (x3) that secure the thermostat.



5. Remove the thermostat housing. Discard the thermostat housing gasket.
6. Withdraw the thermostat from the thermostat housing.

Installation

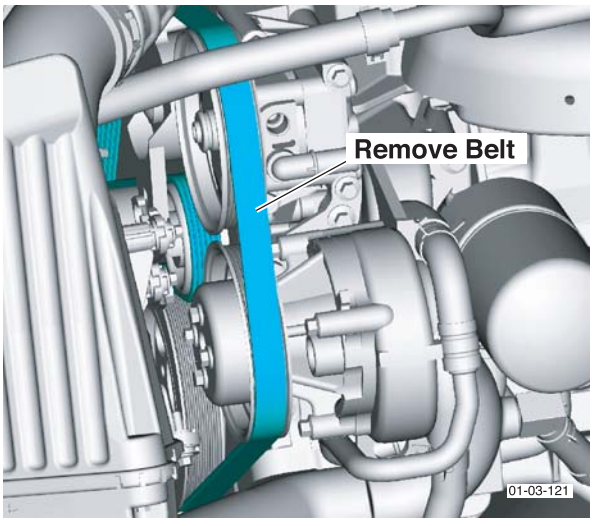
1. Clean all the mating surfaces and install a new thermostat housing gasket.
2. Install the thermostat into the thermostat housing.
3. Install the thermostat housing support bracket, do not tighten.
4. Install the thermostat housing. Torque bolts (x3) to **8-12 Nm**. Torque the thermostat housing support bracket bolt (x1) to **23-27 Nm.**
5. Fill the cooling system.

Water Pump

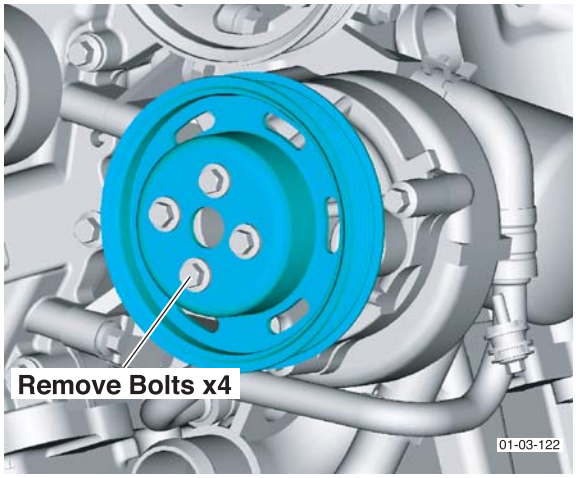
Repair Operation Time (ROT)	
Item	**Code**
Water Pump Renew	**03.03.LB**

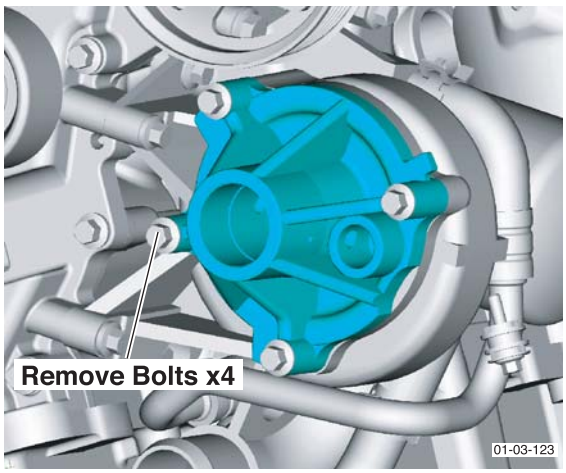
Removal

1. Drain the cooling system.
2. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).



3. Remove the water pump.





4. Remove and discard the water pump 'O'-ring.

Installation

1. Clean the mating surface of the water pump and install a new 'O' ring.
2. Place the water pump to the water pump body. Secure the water pump. Torque bolts (x4) to **23-27 Nm**.
3. Secure the water pump pulley to the water pump. Torque bolts (x4) to **23-27 Nm**.
4. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
5. Fill the cooling system.

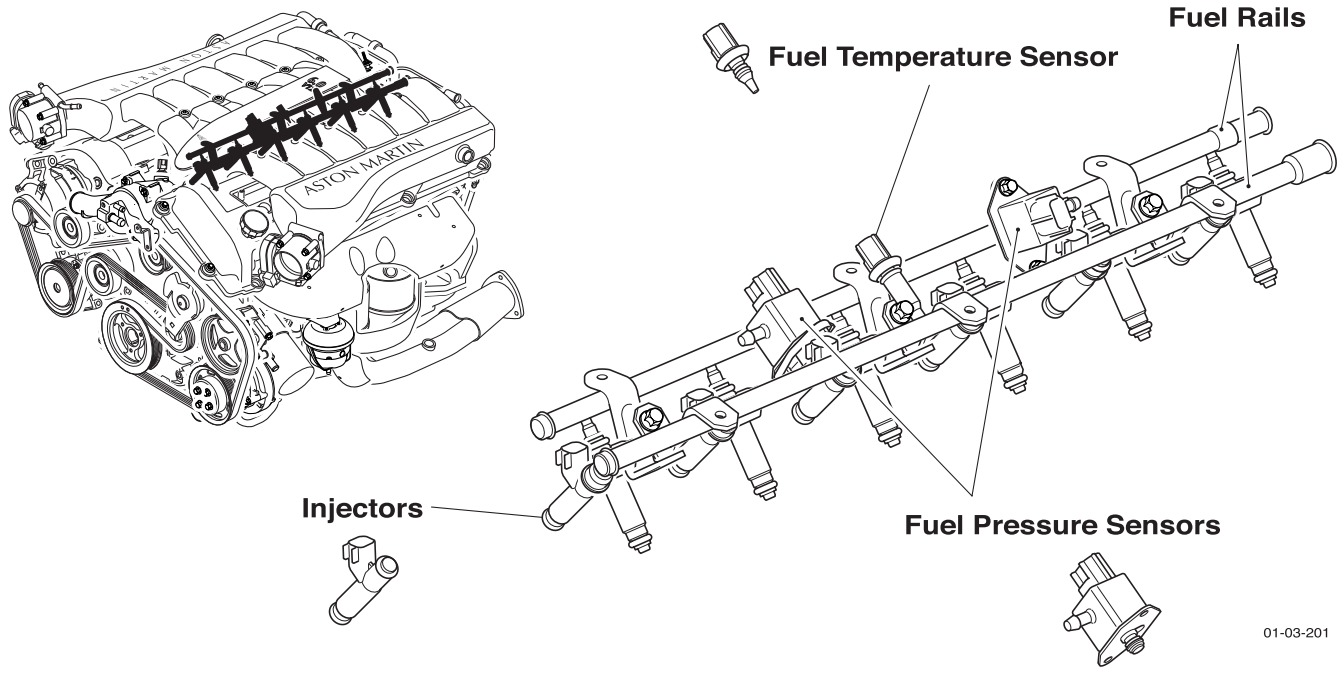
Engine (03.00)

Fuel Charging System (03.04)

Description

The electronic return-less fuel system utilized has the advantages of reduced fuel tank vapor, requires less electrical power and does not require a fuel return line. Fuel is supplied at high pressure to the injectors via two fuel rails (primary and secondary). Each fuel rail incorporates six fuel injectors, and a fuel pressure regulator. A fuel temperature sensor is installed in the primary fuel rail. Powertrain Control Modules (PCMs) maintain 280 kPa across the injectors, by increasing the pulse width modulation signal to the fuel pump controller. This in turn controls the voltage output to the fuel pump.

Fuel rails and injectors are detailed in this chapter. For fuel delivery to the fuel rails and injectors refer to Chapter 10 (Fuel System).



Safety Precautions

Operations on fuel system will result in fuel liquid and vapour being present in the working environment. This presents a very serious risk and the following precautions must be strictly observed:

⚠ Warning ⚠
Operations on refuelling and the fuel system must only be performed by personnel who have completed training on fuel handling.

⚠ Warning ⚠
Smoking must not be allowed near the working area. "NO SMOKING" signs must be posted around the working area.

⚠ Warning ⚠
Any operation which could involve sparks or naked lights (e.g. battery testing, welding, metal grinding, etc.) must not be allowed near the working area.

⚠ Warning ⚠
A CO2 fire extinguisher must be available close at hand.

⚠ Warning ⚠
Dry sand must be available close at hand to soak up any accidental fuel spillage.

⚠ Warning ⚠
If necessary, empty the fuel into an explosion proof container using suitable fireproof fuel handling equipment.

⚠ Warning ⚠
The working area must be well ventilated.

⚠ Warning ⚠
Disconnect the battery before commencing work on the fuel system.

⚠ Warning ⚠
Depressurise the fuel system before disconnecting any fuel lines.

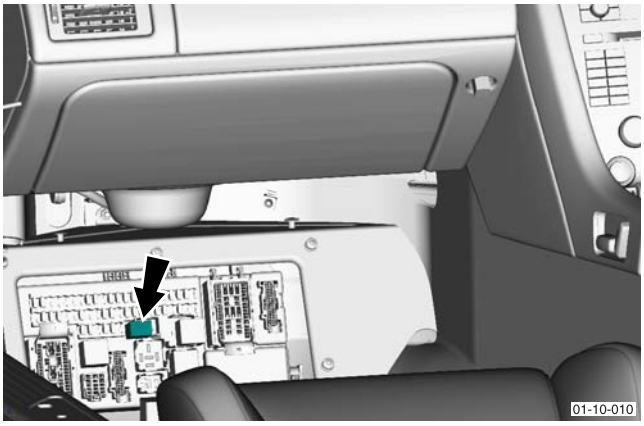
⚠ Warning ⚠
The engine must be cool before working on the fuel charging system.

Maintenance

Depressurising

Repair Operation Time (ROT)	
Item	**Code**
Fuel System Depressurising	**10.01.EK**

1. Read and observe fuel system safety precautions (Refer to 'Safety Precautions', page 3-5-1).
2. Remove the fuel pump relay from the CEM.



3. Attempt to start the engine.
   The engine will run for approx. 11 seconds then stall. With the fuel pumps disabled the fuel lines will depressurise.

Two fault codes will show on each bank.
- *P0087 'fuel pressure too low'*
- *P1233 'fuel pump driver module disabled or off line'*

Both of these codes can be erased from each bank after the repairs to the fuel system

⚠ Warning ⚠
Fire Risk. Before starting work on the fuel system disconnect the earth lead from the vehicle battery.

4. Switch off the ignition and install the fuel pump relay.

Fuel Rails

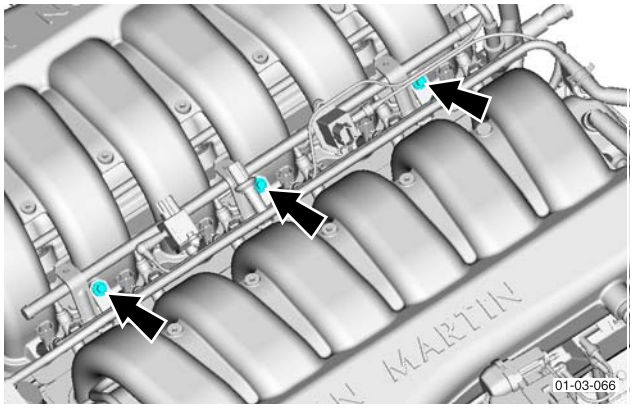
Repair Operation Time (ROT)		
Item		**Code**
Fuel Rail Renew	x1	**03.04.AB**
	x2	**03.04.BB**

Removal

1. Depressurise the fuel lines.
2. Disconnect the earth (- ve) lead from the vehicle battery.
3. Remove the engine bay cross brace and the inlet manifold brace.

To aid injector and fuel rail removal it may be required to disconnect the coolant pipe, from the thermostat housing, running between the two inlet manifolds.

4. Remove the following wiring harness plugs:
   - Temperature sender plugs
   - Pressure sensor plugs
   - Injector harness plugs
5. Remove bolts (x3) securing the fuel rail to the inlet manifold.



6. Remove the secondary latch clip from each fuel line.
7. Disconnect the fuel rails from their supply pipes.

Use a rag / cloth to collect any residual fuel from the opened fuel pipe.

Left and right hand fuel rails to fuel supply hose unions are different sizes.

Locate correct size of service tool around the union.

(Refer to '412-038 (Quick Disconnect Tool)', page 20-1-7)

(Refer to '412-040 (Quick Disconnect Tool)', page 20-1-7)

Push back on the tool. While pushing back on the tool withdraw the fuel rail. Note left and right hand fuel rail for installation.

Installation

1. Locate the fuel rails over the injectors.
2. 'Pull down' the fuel rails onto the injectors by tightening bolts (x3). Tighten bolts to **8-12 Nm**.
3. Connect the fuel rails to their supply pipes.

Ensure the fuel rail and fuel supply line are in-line before connection.

4. Install the secondary latch clip to each fuel line.
5. Connect the wiring harness plugs:
   - Temperature sender plugs
   - Pressure sensor plugs
   - Injector harness plugs
6. If removed, connect the coolant pipe to thermostat housing.
7. Install the inlet manifold brace and the engine bay cross brace.

Injectors

Repair Operation Time (ROT)		
Item		**Code**
Fuel Injectors	x1	**03.04.GB**
	x12	**03.04.FB**

Removal

1. Remove the fuel rails.
2. Remove the injectors. Discard the 'O' rings.

Installation

1. Install the injectors, complete with new 'O' rings.

Position of 'O' rings.
Blue (top)
Green (bottom)

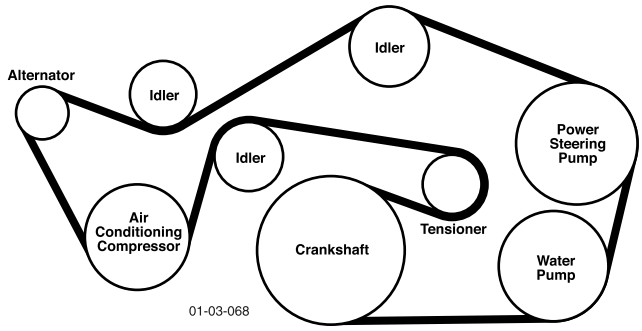
2. Install the fuel rails.

ASTON MARTIN
ASTON MARTIN

Engine (03.00)

Accessory Drive System (03.05)

Description



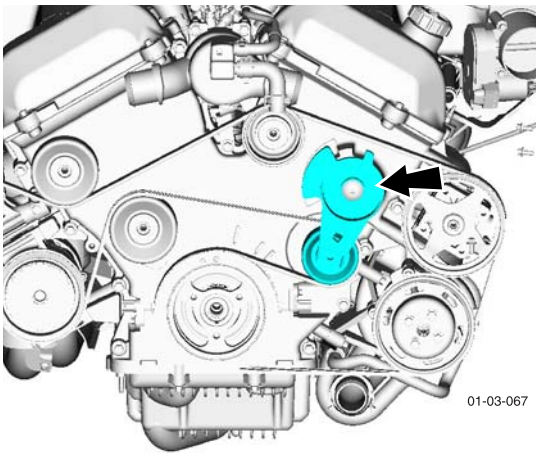
Auxiliary Drives

A damper pulley installed to the front of the crankshaft drives a ‘polyvee’ drive belt to power all of the engine auxiliaries.

- Air Conditioning Compressor
- Alternator
- Power Steering Pump
- Water Pump

Automatic Belt Tensioner

The automatic belt tensioner consists of an idler pulley which is free to rotate on a bearing, located at the end of a spring-loaded pivot arm.The pivot arm can be turned clockwise (viewed from the front of the engine) for belt removal and installation.



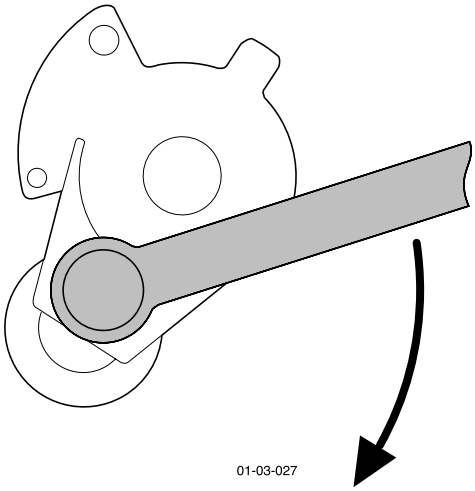
Maintenance

Drive Belt

Repair Operation Time (ROT)	
Item	**Code**
Drive Belt Renew	**03.05.AB**

Removal

1. Remove the undertray.
2. Using a 3/8 inch ratchet handle 'T' bar, rotate the drive belt tensioner clockwise and slip the drive belt off the idler pulley indicated (A).
   Slip the drive belt off the remaining drive pulleys.
3. Check condition of the drive belt. Replace if required.



Installation

1. Install the drive belt around all drive pulleys except the idler pulley.
2. Rotate the tensioner assembly clockwise. Install the drive belt to the idler pulley and release the tensioner.
3. Check all pulleys to ensure correct belt location.

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Engine (03.00)

Engine Cranking System (03.06) Maintenance

Starting System

The starting system consists of a pre-engaged type starter motor, battery, remote control switch (ignition switch) and relay. The operation of the starter relay is controlled by the Powertrain Control Module (PCM).

To protect the starter motor from damage, the PCM prevents the starter from being engaged when the engine is running. This is done by the PCM inhibiting the starter relay operation. The PCM will only operate the starter relay providing the following conditions are met:

- The ignition switch has been in the start position for a predetermined time
- The security response between the PCM and the Driver Information Module (DIM) has passed
- The engine is not running
- The transmission range switch is in the Neutral or Park position (vehicles installed with automatic transmission)
- The clutch pedal is operated (USA vehicles installed with manual transmission)

The starter relay remains energized until one of the following occur:

- The PCM detects an engine running signal
- The starter button is on longer pressed
- The transmission range switch is no longer in the Neutral or Park position (vehicles installed with automatic transmission)
- The clutch pedal is released (USA vehicles installed with manual transmission)

With the ignition switch in the start position, providing the PCM start conditions are met, the starter relay is energized and the engagement lever moves the pinion into mesh with the flywheel ring gear teeth. The electrical contacts within the solenoid complete the high power circuit and the starter motor operates to turn the engine.

Specifications

Torque Figures		
Description	Nm.	lb./ft.
Starter motor	50	37

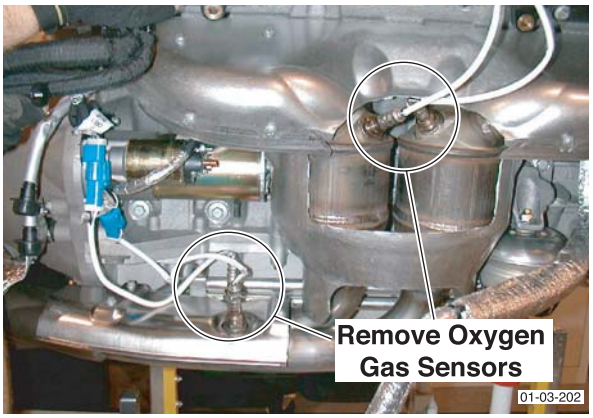
Starter Motor

Repair Operation Time (ROT)	
Item	**Code**
Starter motor Renew	**03.06.AB**

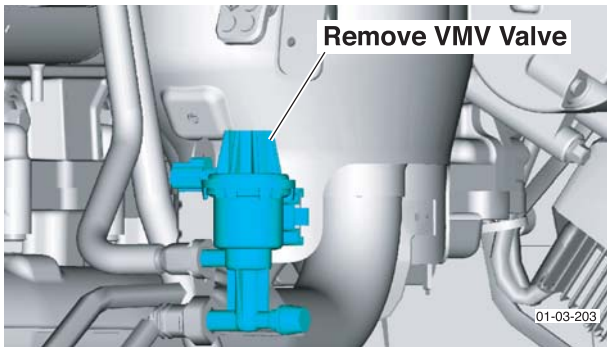
Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the R/H road wheel, road wheel arch liner and the front undertray.
4. Remove the oxygen gas sensors. Disconnect the oxygen gas sensors electrics.

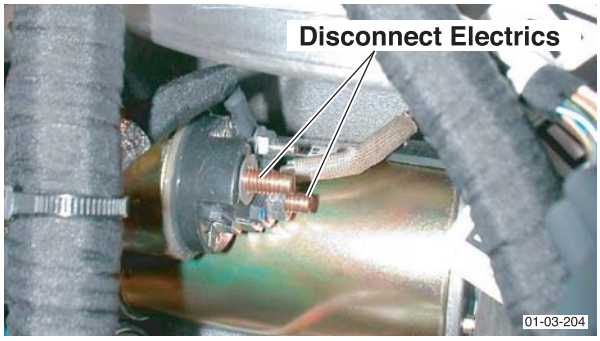
This may provide better access to remove the starter motor.



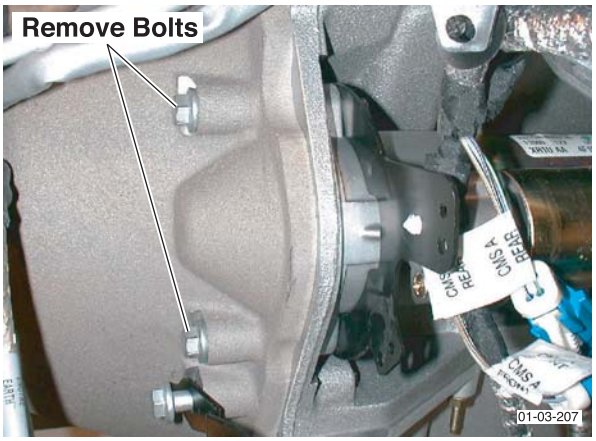
5. Remove the VMV valve.



6. Remove the heat shield.
7. Disconnect the starter motor electrics.



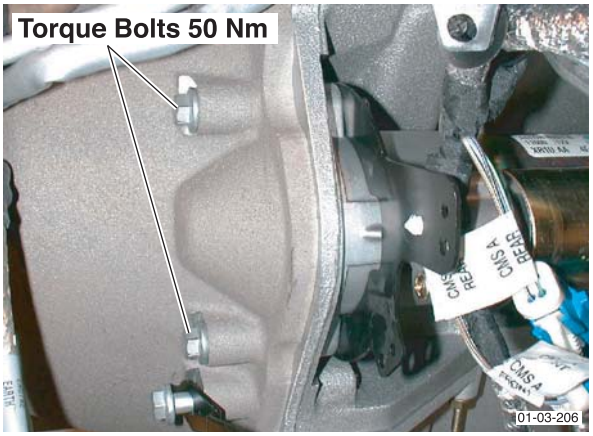
8. Remove bolts (x2) that secure the starter motor.



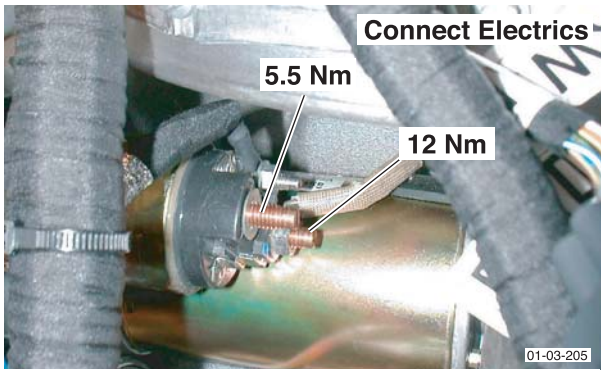
9. Withdraw the starter motor and oxygen gas sensors bracket.

Installation

1. Place the starter motor and the oxygen gas sensors bracket to the bell housing. Torque bolts to **50 Nm**.



2. Connect the starter motor electrics.



3. Install the heat shield.
4. Install the oxygen gas sensors (if removed).
5. Install the front under tray and road wheel arch liner.
6. Install the road wheels and 'nip-up' road wheel nuts.
7. Lower the vehicle. Tighten the road wheel nuts (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Engine (03.00)

Ignition System (03.07)

Description

The ignition system consists of an ignition coil for each individual cylinder located on each individual spark plug.

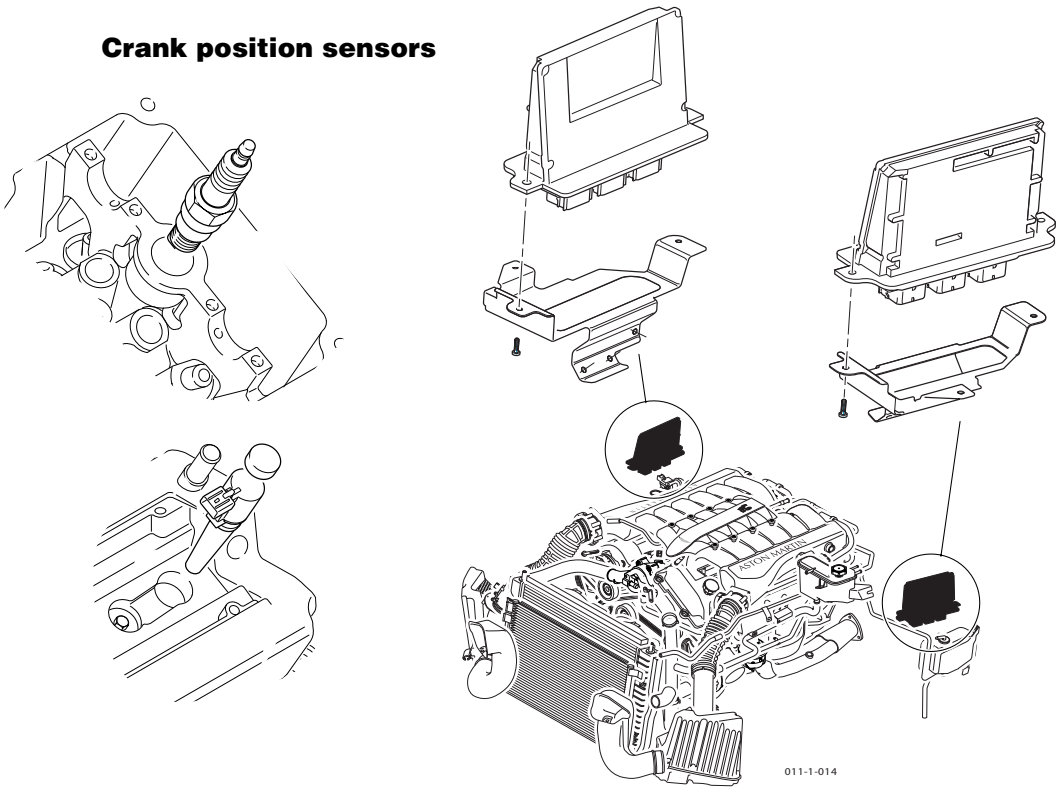
There are two crankshaft sensors located on the front of the engine - only the RH sensor is used. The second crankshaft sensor is located on the flywheel housing (LH side).

An alternating voltage signal from two Crankshaft Position Sensors (CPS) is converted by the Powertrain Control modules (PCMs). This digital signal is then used to position the 'On' and 'Off' time of the primary circuit of the ignition coil. The effective range for ignition timing control is increased by the fact that there are no rotating parts. On the basis of engine speed and load inputs, the PCMs determine the ignition timing. This function also takes other inputs into consideration such as engine temperature, throttle position and transmission control module (TCM) inputs.

- In the event of a short circuit to ground between the fusebox and the coil or the coil and the PCM the fuse would blow and all ignition coils on that bank would cease to function.
- If an ignition coil 'short circuits' internally the ignition coil will fail instead of its fuse. This allows the remaining ignition coils to continue functioning.
- In the event of a wiring harness failure between the PCM an7d the ignition coil, the ignition coil will fail instead of its fuse. This allows the remaining ignition coils to continue functioning.

The twelve spark plugs are fired in sequence by the two PCMs. Ignition timing can vary from 55° before TDC to 10° after TDC.

Crank position sensors



Specifications

Spark Plugs	
Firing order	1 - 7 - 5 - 11 - 3 - 9 - 6 - 12 - 2 - 8 - 4 - 10.
Type	Dual Platinum Fine Wire
Gap	1.2 - 1.3 mm
Torque	16-20 Nm

Camshaft Sensors	
Air Gap	1 ±0.5 mm

Torque Figures

Description	Nm	lb./ft.
Spark plugs	16-20	12-15
Ignition coils	5-7	4-5.5
Spark plug cover	2.5-3.5	2-3

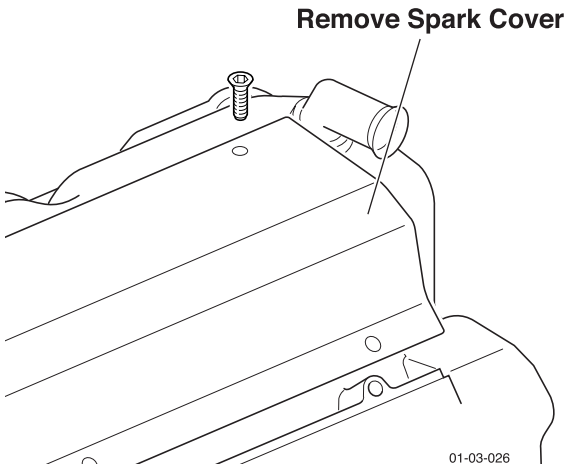
Maintenance

Spark Plugs

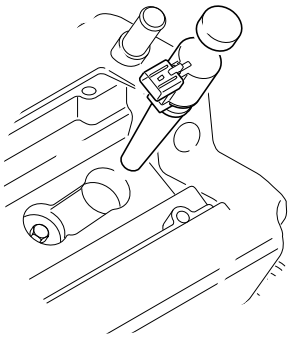
Repair Operation Time (ROT)		
Item		**Code**
Spark Plug Renew	All	**03.07.DB**
	LH Bank	**03.07.EB**
	RH Bank	**03.07.FB**

Removal

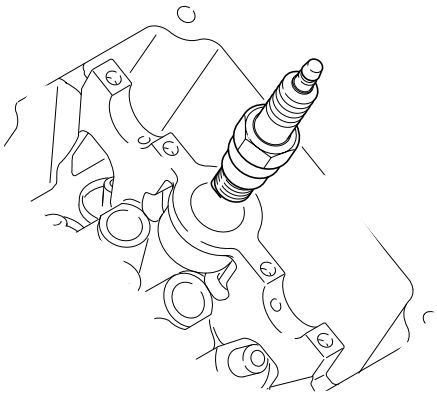
1. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
2. Remove the spark plug cover.



3. Disconnect the ignition coils. Remove the ignition coils.



4. Remove the spark plugs.



Installation

1. Install the spark plugs. Torque to **16-20 Nm**.
2. Install the ignition coils. Torque bolts to **5-7 Nm**. Connect the ignition coils wiring harness plugs.
3. Install the spark plug cover. Torque bolts to **2.5-3.5 Nm**.
4. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).

Engine (03.00)

Emission Control (03.08)

System Description

To avoid environmental pollution from the crankcase gases (blow-by), the crankcase (engine) is ventilated into the intake system. Any noxious fumes in the crankcase gases are then burned in the normal combustion process.

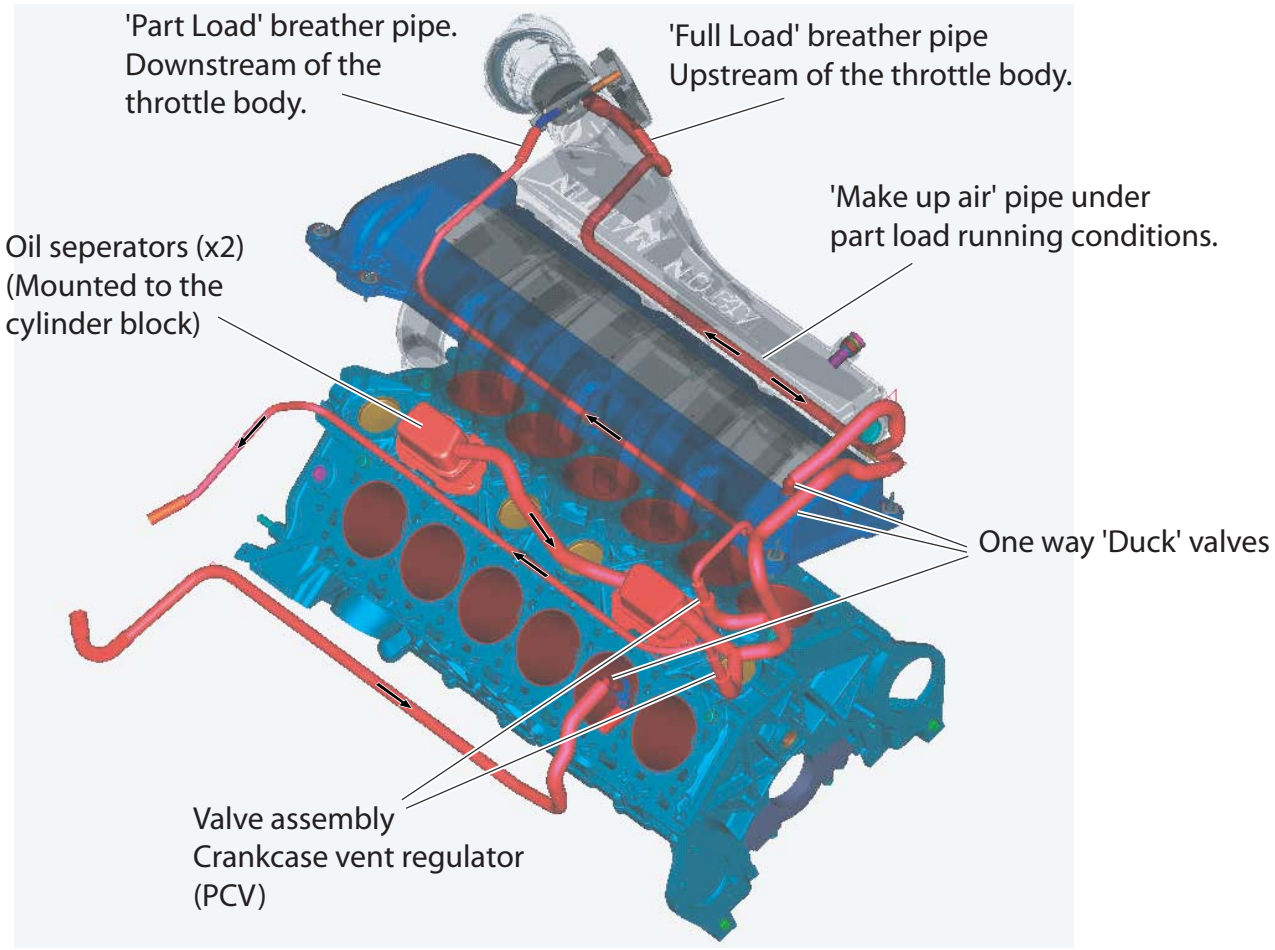
The system consists of a part load and full load breather system which ensures sufficient engine venting under all running conditions.

Crankcase gases escape through channels in the block walls where they are fed into oil separators to minimise the oil pullover. From the separators, pipe work channels the vent gases to the intake manifold at part load or intake system at full load.

Under part load conditions the system is controlled by the PCV valve which regulates a constant flow of vent gases (engine blowby varies across the range of part load sites). The PCV valve flow is balanced by the 'make up air' pipes to the cam covers. The pressure difference across the ends of these pipes (i.e. across the throttle valve) activates the PCV valve.

At full load, the system vents through a 1-way valve to the RH inlet system (pre-throttle) only.

The diameter of the pipes in the system is critical in the control of the Full and Part load operating conditions.Vacuum Pipework Layout



ASTON MARTIN
ASTON MARTIN

Engine (03.00)

Valve Train (03.09)

Description

Camshafts

Inlet and exhaust camshafts in each head are chain driven directly from the crankshaft.

The twin crankshaft sprocket has 18 teeth and each camshaft sprocket has 36 teeth, the timing chains have 61 links. Three chain links are marked and are aligned with timing marks on the crankshaft and camshaft sprockets during valve timing. Because of the odd number of links in the timing chains, the timing marks and marked links will only align once every 122 engine revolutions.

Specifications

Valves, Guides & Springs	Nm.
Spring Force at 40mm Spring Height	290
	MM
Installed Spring Height (Exhaust / Inlet)	39.69-40.29
Valve Guide Internal Diameter	6.015 - 6.044
Valve Guide Maximum Runout	0.030
Valve Stem Diameter - Inlet	5.975 - 5.995
Valve Stem Diameter - Exhaust	5.950 - 5.970
Valve Stem Clearance - Inlet	0.020-0.069
Valve Stem Clearance - Exhaust	0.046-0.095
Valve Face Maximum Runout	0.050
Valve Lash Adjusters	
Bore	16.018 - 16.057
Outside Diameter	15.988 - 16.000
Clearance	0.018 - 0.069

Torque Figures

Description	Nm	lb. / ft.
Timing chain guide	20-30	15-22.5
Tensioners	20-30	15-22.5
Timing cover bolts	23-27	17-20

Maintenance

Valve Timing Chains

Repair Operation Time (ROT)	
Item	**Code**
Timing Chain Renew	**TBA**

Removal

1. Remove the engine from the vehicle (Refer to 'Engine', page 3-1-4).
2. Remove the camshaft covers (Refer to 'Camshaft Cover', page 3-11-1)
3. Remove the timing cover (Refer to 'Timing Cover', page 3-11-3).
4. Remove the crankshaft timing disc.

Note the orientation of the disc for installation.

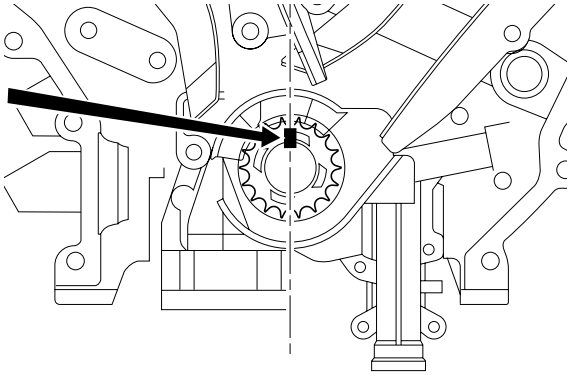
Image to Follow

5. Turn the crankshaft to place the crankshaft key in the vertical position.

Caution

The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.



6. Insert the camshaft set tool (Refer to '303-713 (Camshaft Set)', page 20-1-5).

With the crankshaft Key in the vertical position the camshaft flats will accept the camshaft set tool.

7. Remove the RH or LH timing chain tensioner, tensioner arm and timing chain guides.

   Do not remove the timing chain.

   7.1 Compress the timing chain tensioner and insert the locking pin (Refer to '303-1072 (Timing Chain Tensioner Pins)', page 20-1-6). Remove bolts (x2) that secure the timing chain tensioner and withdraw.

   7.2 Remove the floating tensioner arm.

   7.3 Remove the fixed timing chain guide (bolts x2).

   Repeat for the second timing chain tensioner and timing chain guides.

8. Remove both timing chains and the crankshaft twin sprocket from the crankshaft.

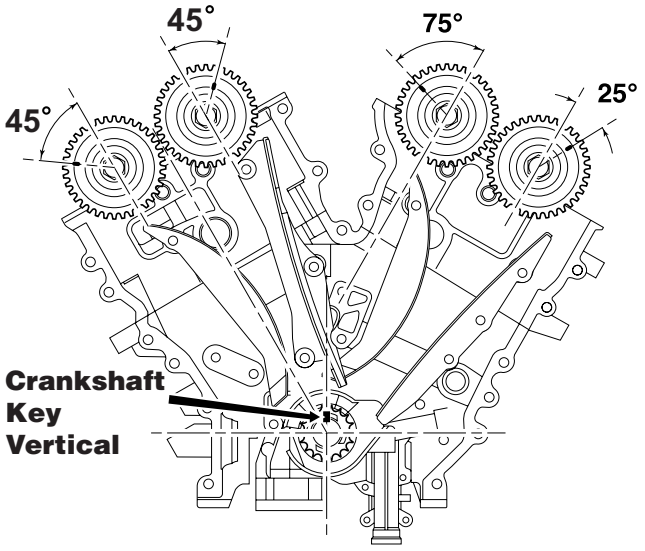
Installation

Caution

The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

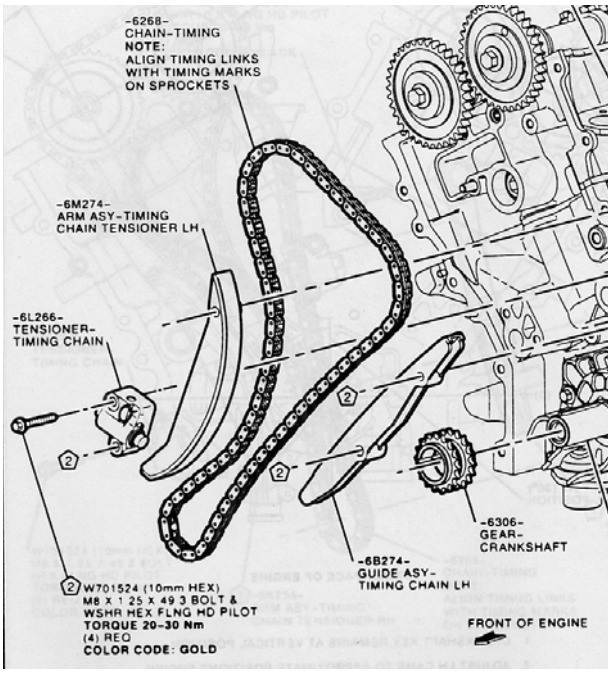
1. Ensure the crankshaft key is vertical and all camshafts are in the initial positions shown.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.

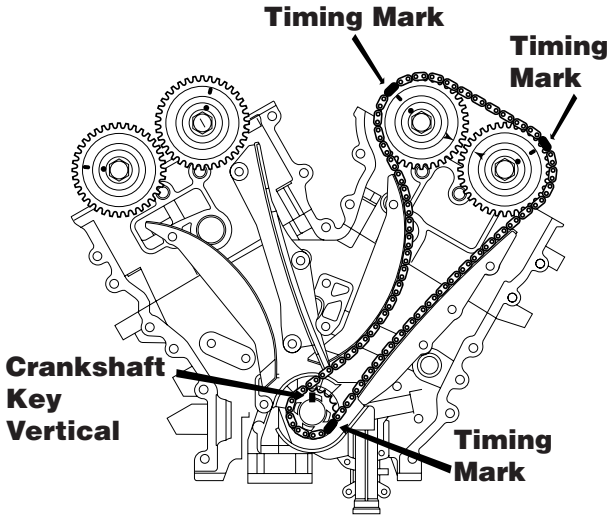


LH Cylinder Head (Cylinders 7-12)

2. Engage the camshaft timing service tool (Refer to '303-713 (Camshaft Set)', page 20-1-5) to flats on the camshafts.
3. Install the fixed timing chain guide.



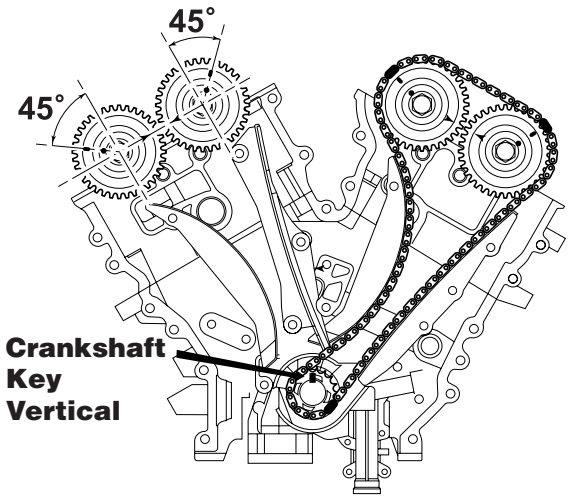
4. Install the timing chain with the marked links (x3) matching the marks on the crankshaft and camshaft sprockets.



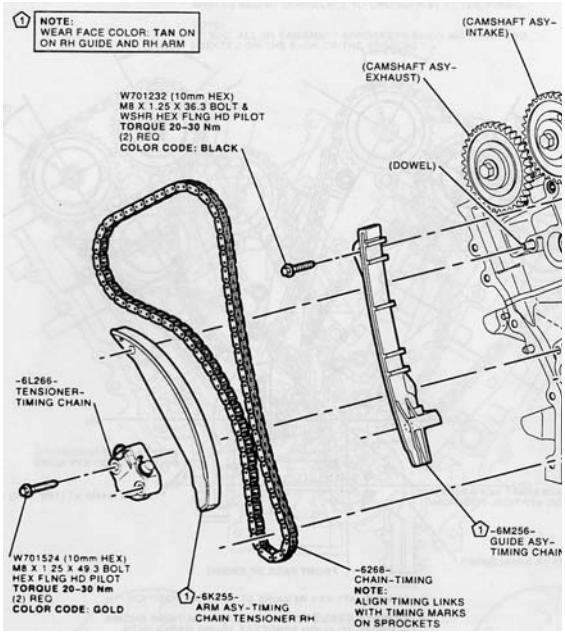
5. Install and tension the timing chain arm and tensioner. Withdraw the timing chain tensioner lock pin.
6. Ensure that all three marked timing chain links align with the timing marks on the camshaft and crankshaft sprockets.

RH Cylinder Head (Cylinders 1-6)

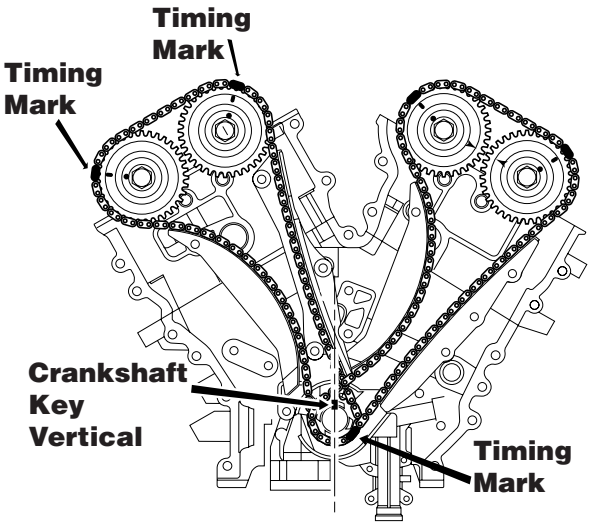
7. Ensure the crankshaft key is in the vertical position (No.1 cylinder at 30° ATDC). Ensure that the camshafts are in the initial positions shown.



8. Engage the camshaft timing service tool (Refer to '303-713 (Camshaft Set)', page 20-1-5) to flats on the camshafts.
9. Install the fixed timing chain guide.



10. Install the timing chain with the marked links (x3) matching timing marks on the camshaft and crankshaft sprockets.



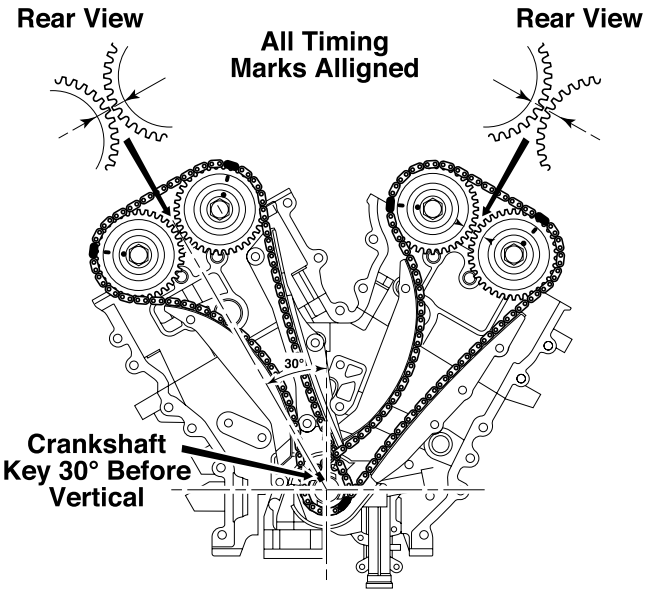
11. Install the timing chain tensioner arm.
12. Install the timing chain tensioner. Remove it's lock pin.
13. Ensure all three marked links on the timing chain align with the timing marks on the camshaft and crankshaft sprockets.
14. Remove the camshaft timing service tool.
15. Install the crankshaft timing disc, noting orientation from removal.

Image to Follow

16. Check the valve timing (Refer to 'Valve Timing Check', page 3-10-4).
17. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
18. Install the engine to the vehicle (Refer to 'Engine', page 3-1-4).

Valve Timing Check

1. Rotate the crankshaft anti-clockwise at least 60°, then rotate clockwise to TDC No. 1 (crankshaft key 30° before vertical).
2. At TDC No.1, the timing marks on the REAR of the camshaft sprockets should be precisely aligned as shown.



On a correctly timed engine, when No. 1 cylinder is at TDC compression the timing marks on the rear of the camshaft sprockets will always align.

Timing marks on the timing chains, camshaft and crankshaft sprockets will only aligned once every 122 crankshaft revolutions on a correctly timed engine.

Be aware - engine oil will bleed from timing chain tensioner.

Camshafts / Camshaft Followers / Lash Adjusters

Repair Operation Time (ROT)	
Item	**Code**
Camshafts / Camshaft Followers / Lash Adjusters	**TBA**

Removal

1. Remove the engine from vehicle (Refer to 'Engine', page 3-1-4)
2. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
3. Drain the engine coolant (Refer to 'Coolant Drain / Fill', page 3-4-3).
4. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
5. Remove the thermostat housing (Refer to 'Thermostat', page 3-4-5).
6. Remove the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
7. Remove the timing cover (Refer to 'Timing Cover', page 3-11-3).
8. Remove the timing chains (Refer to 'Valve Timing Chains', page 3-10-1)
9. Progressively release all bolts that secure each bearing cap.

The thrust camshaft bearing cap, of each camshaft (No.1 and No. 8 cap), must be removed first and installed last.



10. Withdraw the bearing caps. Ensure they are retained in the sequence withdrawn.
11. Withdraw the camshafts.
12. Remove the camshaft followers and lash adjusters. Ensure they are retained in the sequence removed.





13. Cover the engine block to prevent ingress of foreign material.

Installation

Ensure all mating surfaces are clean, smooth and free of any contamination.

1. Install all lash adjusters.

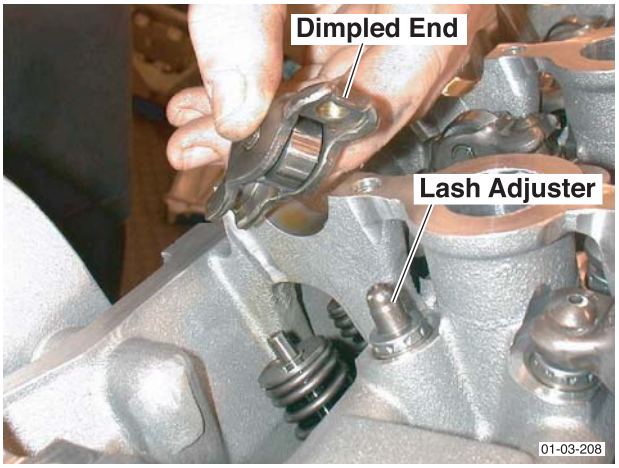
Soak the lash adjusters in engine oil and ensure that they are 'pumped up' with engine oil.

Insert each lash adjuster into its correct recess in the cylinder head.

2. Install the camshaft followers to their valves.

Caution
Ensure that the dimpled end of the camshaft followers are installed to the lash adjusters.

Soak the cam followers in engine oil.



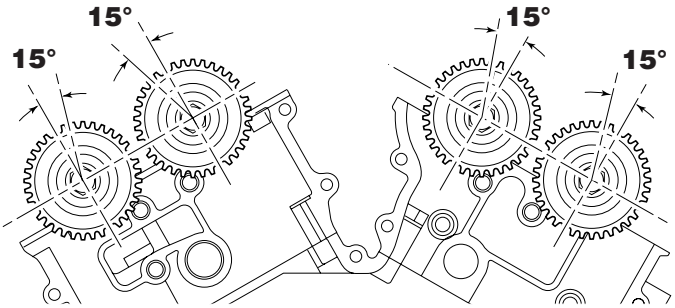
3. Lubricate the camshaft journals, camshaft bearing caps with engine oil.
4. Ensure the crankshaft key is vertical.

Caution
The crankshaft key must remain in the vertical position until the camshaft chains are correctly installed and tensioned. Movement of the crankshaft before completion of valve timing may cause contact between a piston and a valve, resulting in valve and / or piston damage.

The crankshaft key is exactly in line with No.1 crankshaft throw. With the crankshaft key vertical, No.1 piston is 30° ATDC and all pistons are below engine block surface.

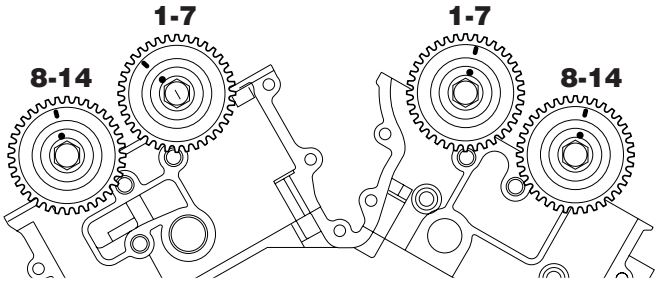
5. Place the camshafts in position, with the timing marks in the positions shown.

The positions shown allow the camshafts to lay at their lowest in the journals.



6. Work on one cylinder head at a time.
7. Install all camshaft bearing caps, except the two thrust camshaft bearing caps (No.1 and No. 8 cap) at the front of each camshaft. Loosely secure each cam cap.

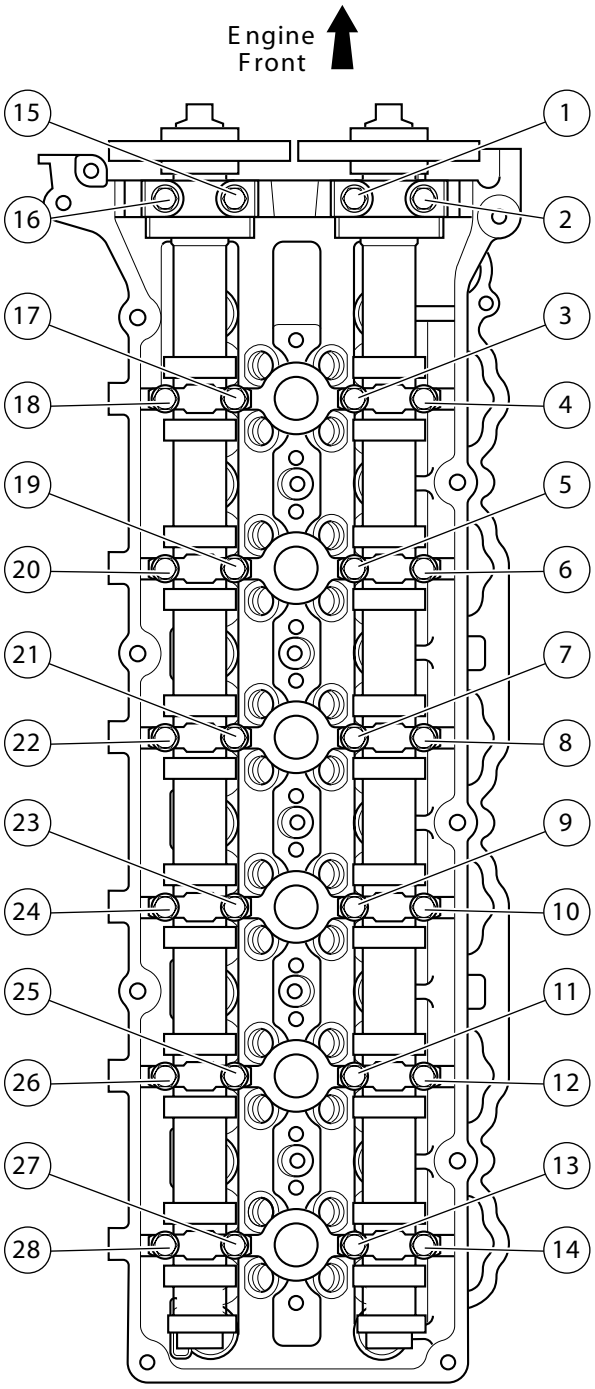
Bearing Caps



The bearing caps are numbered and correspond with numbers stamped on the cylinder head adjacent to the journal.

8. Test install No.1 and No. 8 bearing caps over their thrust flanges. If the bolt holes do not perfectly align, move the camshafts forward or rearward as required until the bearing caps locate correctly. Loosely secure the bearing caps.

9. Torque down the camshafts.
   9.1 Progressively 'nip' down all bolts in the sequence shown. Ensure the camshaft bearing caps pull down evenly into contact with the cylinder head.
   9.2 In the sequence shown, torque the camshaft bearing caps to **8-12 Nm**.



10. Repeat from step 6. for the second cylinder head.
11. Install the timing chains. Perform the camshaft timing procedure (Refer to 'Valve Train (03.09)', page 3-10-1).
12. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
13. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1)
14. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
15. Install the thermostat housing (Refer to 'Thermostat', page 3-4-5).
16. Fill the engine coolant system (Refer to 'Coolant Drain / Fill', page 3-4-3).
17. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
18. Install the engine to vehicle (Refer to 'Engine', page 3-1-4).

Engine (03.00)

Engine Sealing (03.10)

Specifications

Torque Figures			
Description		Nm.	lb. / ft.
Camshaft cover		8-12	6-9
Timing cover		23-27	17-18.5
Idler pulley		25-27	18.5-20
Sump bolts	1.	15	11.5
	2.	90°	
Crankshaft damper	1.	120	89
	2.	Back out a minimum of 360°	
	3.	47-53	35-39.5
	4.	85°-95°	
Camshaft sensor		8-12	6-9
Ignition coils		5-7	4-5.5
Spark plug cover		2.5-3.5	2-3

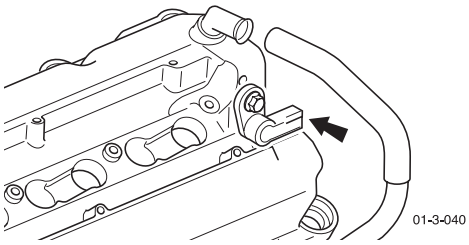
Maintenance

Camshaft Cover

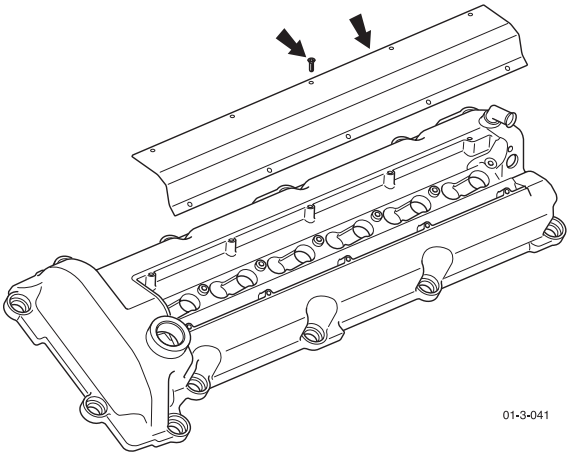
Repair Operation Time (ROT)	
Item	**Code**
Camshaft Covers	**TBA**

Removal

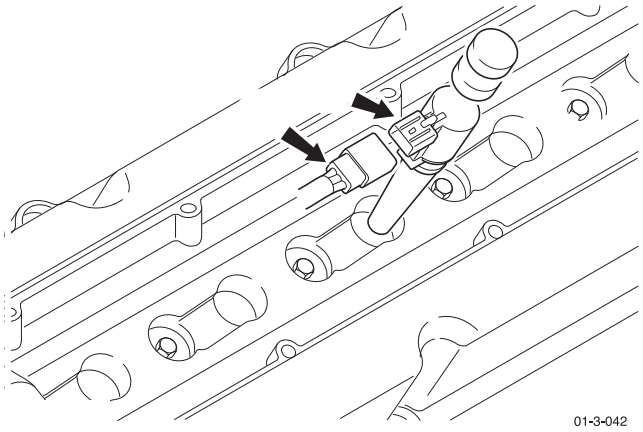
1. Remove the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).
2. Disconnect the camshaft cover ventilation pipe and the camshaft sensor wiring harness plug.



3. Remove the spark plug cover.



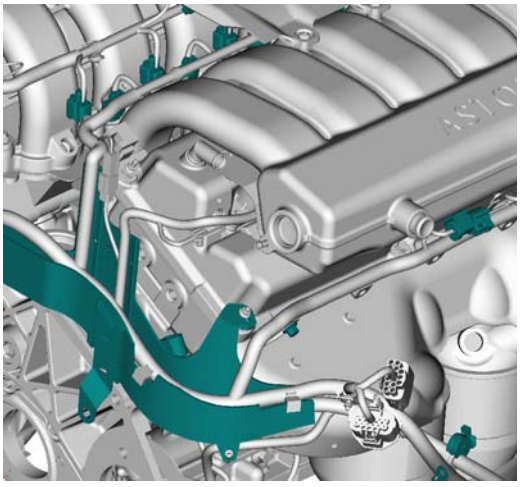
4. Disconnect the ignition coil connectors. Remove the ignition coils.



5. Lower the rear suspension (Refer to 'Rear Suspension (04.02)', page 4-3-1).

To gain access to the bolts (x2) that secure the wiring harness carrier to the camshaft covers.

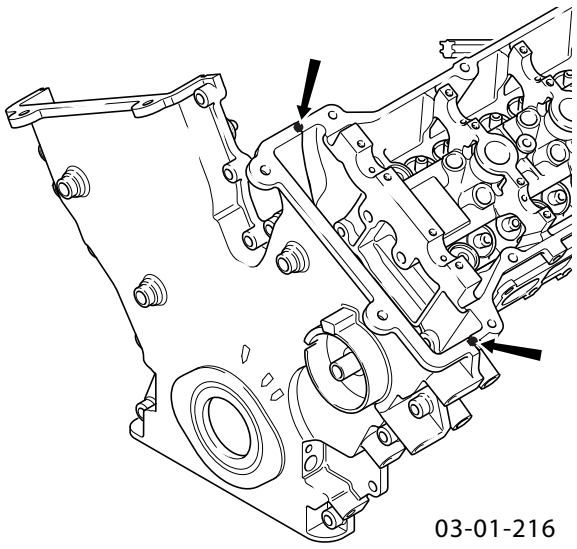
6. Remove bolts (x2) that secure the wiring harness carrier and the electrical device. Lift the wiring harness carrier off the camshaft studs.



7. Remove bolts (x15) that secure the camshaft cover. Withdraw the camshaft cover.
   Discard all camshaft cover seals.
8. Repeat from Step 1. for second camshaft cover.

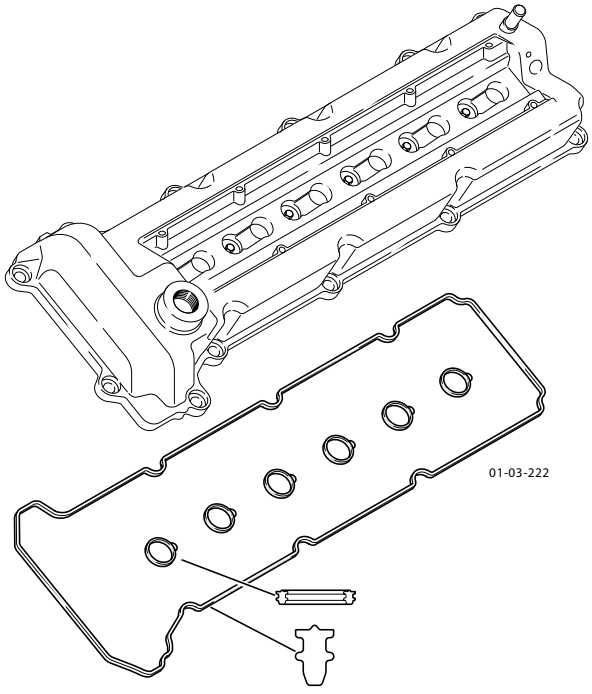
Installation

1. Apply a bead of sealant where indicated.

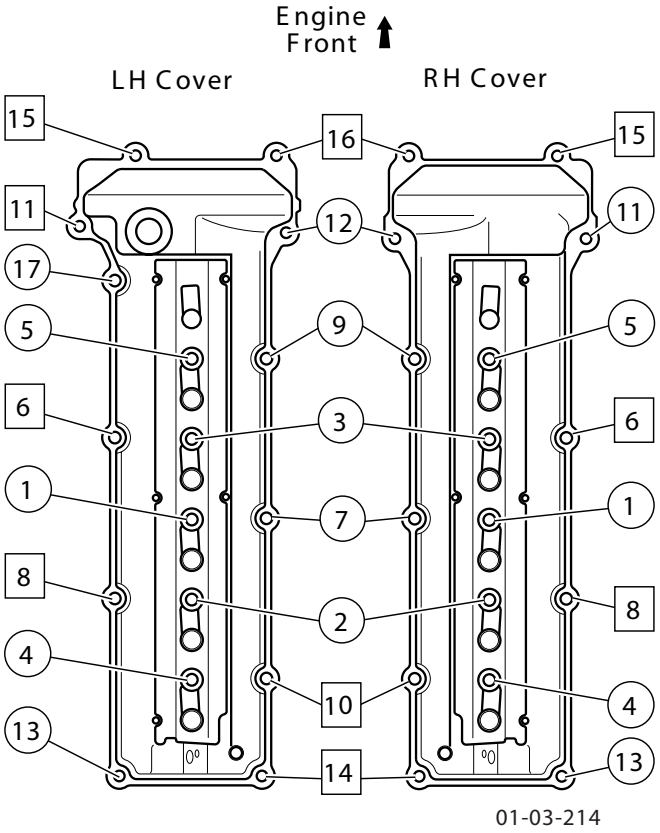


RTV Sealant	●

2. Install new camshaft cover gaskets.



3. Install the camshaft cover. Torque bolts (x15) to **8-12 Nm**. in the sequence shown below.



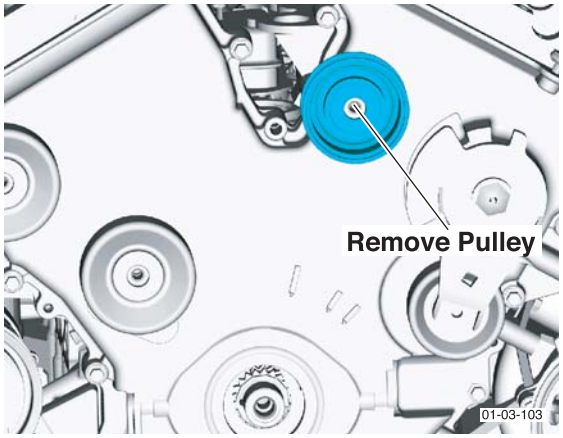
4. Place the wiring harness carrier and the electrical device over the camshaft studs. Torque bolts (x2) to **8-12 Nm**.
5. Install the rear suspension (Refer to 'Rear Suspension (04.02)', page 4-3-1).
6. Install the ignition coils. Torque bolts to **5-7 Nm**. Connect the ignition coils wiring harness plugs.
7. Install the spark plug cover. Torque bolts to **2.5-3.5 Nm**.
8. Connect the camshaft cover ventilation pipe and camshaft sensor wiring harness plug.
9. Install the inlet manifold (Refer to 'Inlet Manifold', page 3-2-7).

Timing Cover

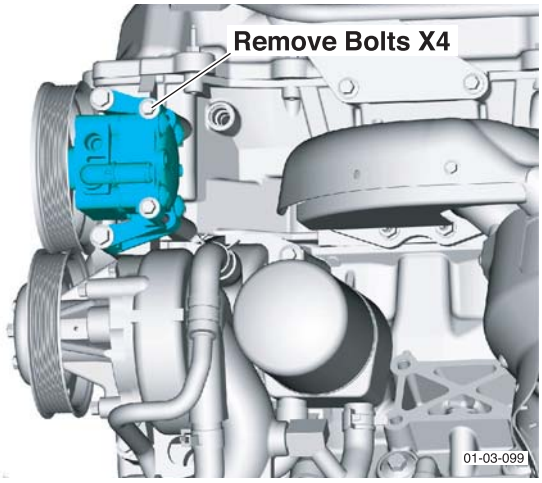
Repair Operation Time (ROT)	
Item	Code
Timing Chain Cover	TBA

Removal

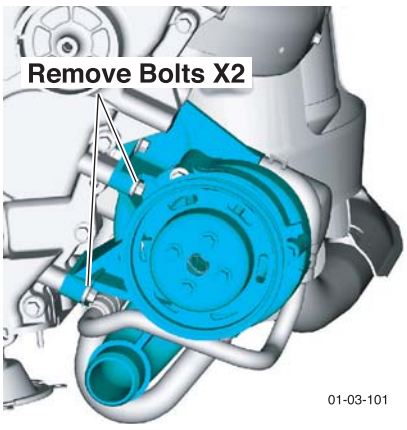
1. Drain the engine oil.
2. Remove the engine from vehicle (Refer to 'Removal', page 3-1-4).
3. Remove the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
4. Remove the top idler pulley and the accessory drive belt from timing cover.



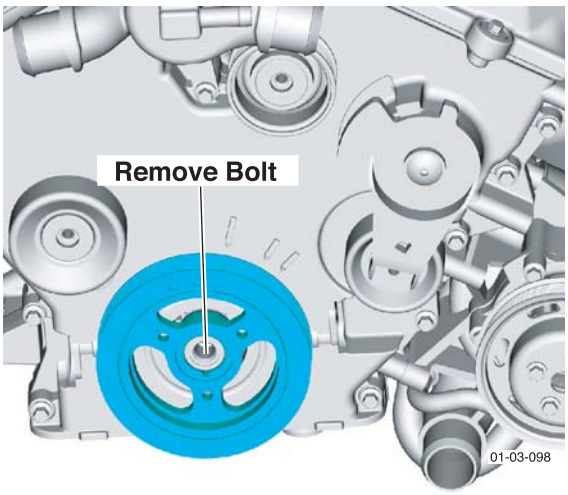
5. Remove bolts (x4) and withdraw the power steering pump.



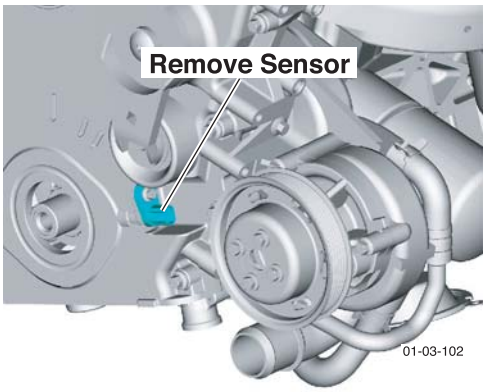
6. Remove bolts (x2) securing water pump to the timing cover.



7. Prevent crankshaft from turning (Refer to '303-1047 (Crankshaft Holding)', page 20-1-6) and remove the bolt / washer that secures the crankshaft damper.

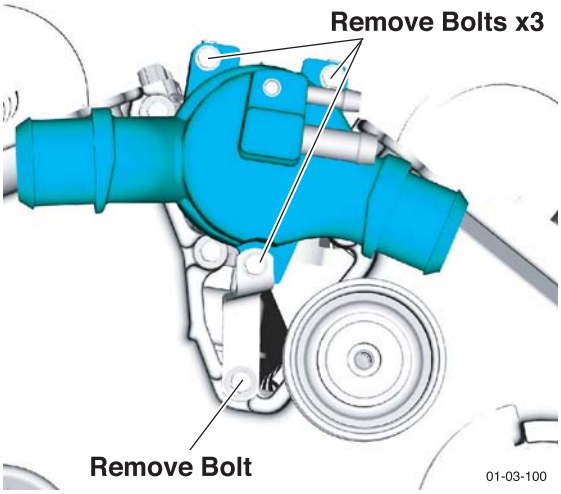


8. Using a universal puller, remove the crankshaft damper.
9. Remove the crankshaft position sensors (x2).

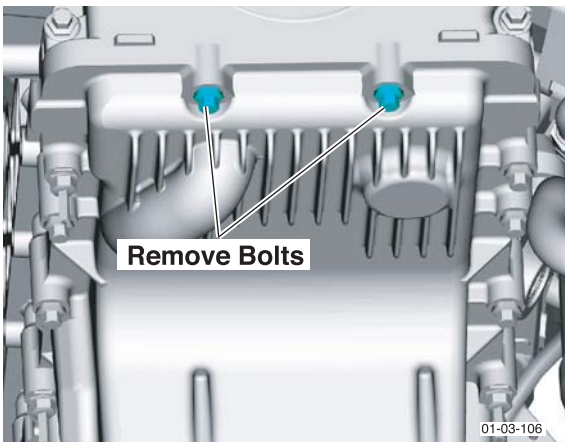


10. Remove the camshaft covers (Refer to 'Camshaft Cover', page 3-11-1).

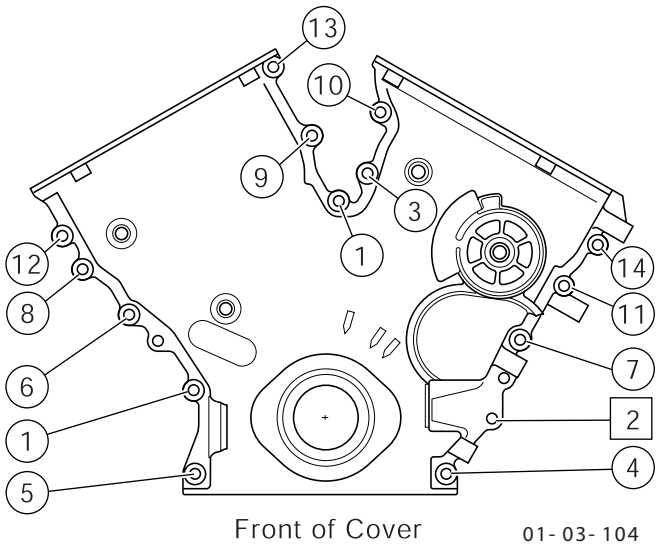
11. Remove the thermostat housing.
    11.1 Remove hoses (x4).
    11.2 Remove bolts (x3).
    11.3 Remove bolt (x1) from the timing cover.



12. Remove bolts (x2) securing the sump to the timing cover.

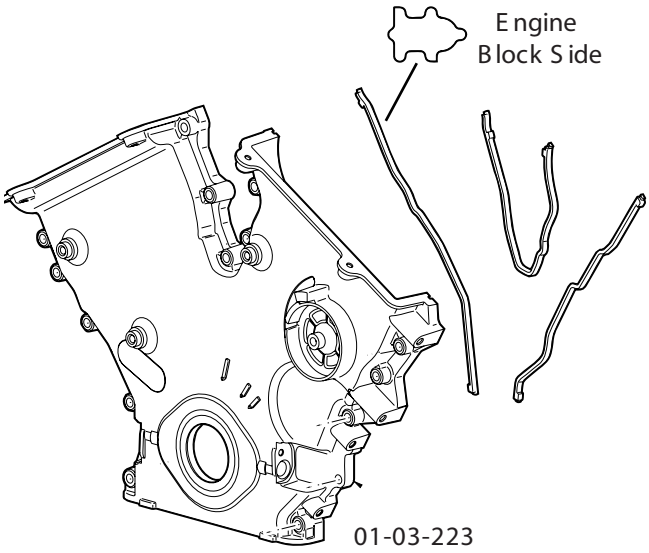


13. Remove the remaining bolts (x14) that secure the timing cover. Withdraw the timing cover. Discard the timing cover gaskets.



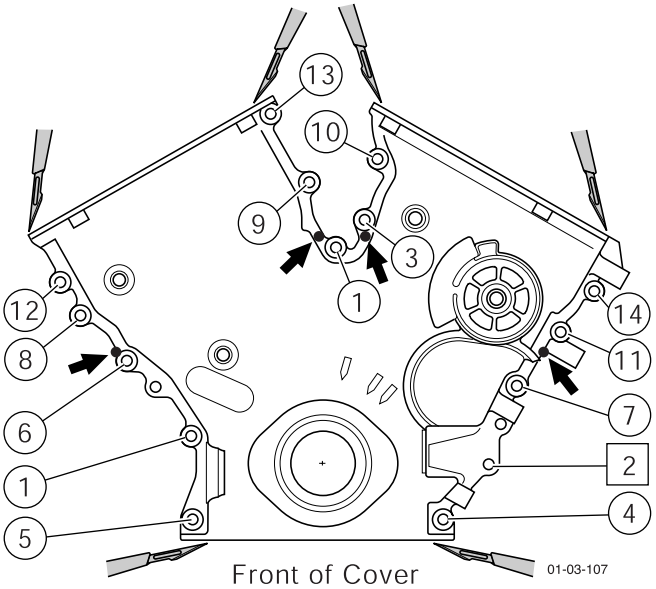
Installation

1. Ensure mating surfaces are clean and smooth. Install new timing cover seals.



2. Apply RTV sealant at the cylinder head joints as shown.

The timing cover must be installed and secured within 6 minutes of applying beads of sealant.



RTV Sealant	●
Gasket Trimming	

3. Secure with bolts (x14).

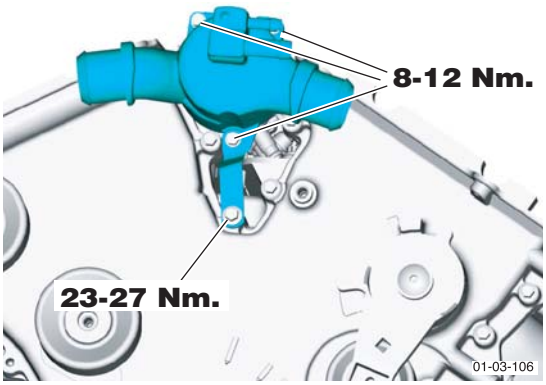
The shorter bolt locates in position 2.

Do not install the thermostat bracket bolt.

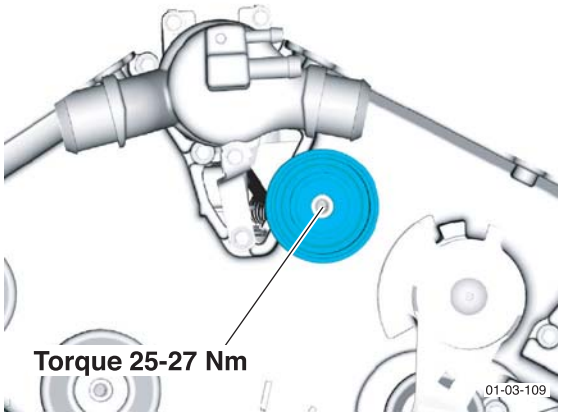
Torque the bolts, in sequence, to **23-27 Nm**.

When the timing cover bolts are torqued, the ends of the timing cover seals may protrude from the joints. Trim flush with a sharp knife.

4. Install the thermostat housing complete with the thermostat and a new 'O'-ring (Refer to 'Thermostat', page 3-4-5). Torque bolts (x3) to **8-12 Nm**. Torque the thermostat housing support bracket bolt (x1) to **23-27 Nm.**

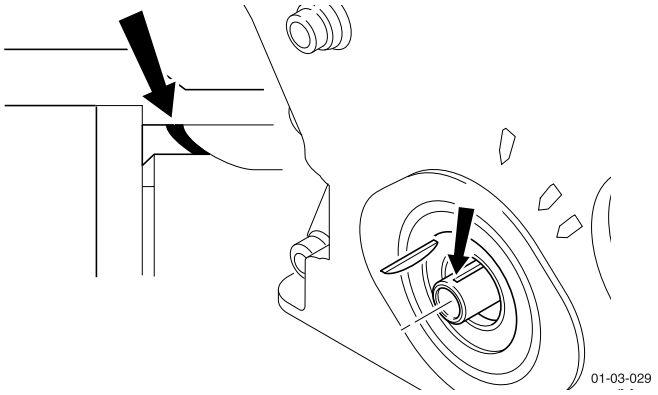


5. Install the upper idler pulley. Torque bolt to **25-27 Nm**.
6. Install the accessory drive belt tensioner. Torque bolt to **25-27 Nm**.

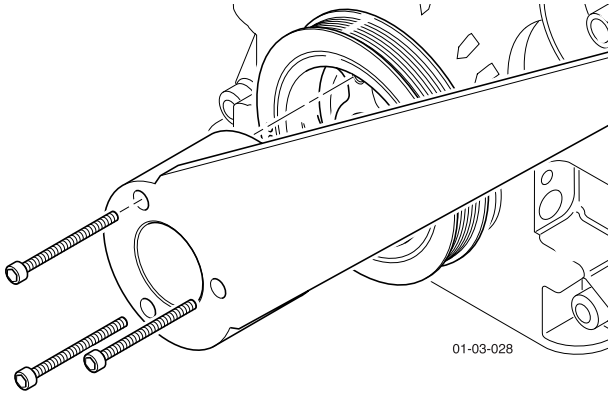


7. Install the sump bolts (x2). Torque to **15 Nm. + 90°**.
8. Install the crankshaft damper.
   8.1 Clean all sealant from the crankshaft key-way and oil the crankshaft damper seal surface.

   Apply silicone sealant to seal the key-way end.



   8.2 Prevent crankshaft from turning (Refer to '303-1047 (Crankshaft Holding)', page 20-1-6) and torque the crankshaft damper bolt in four stages:
   1 Tighten to **120 Nm**.
   2 Back out a minimum of **360°**.
   3 Tighten to **47-53 Nm**.
   4 Tighten a further **85°-95°**.



9. Install the crankshaft sensors (x2). Torque bolts to **8-12 Nm**. Connect the wiring harness plugs.
10. Secure the power steering pump and the water pump to the timing cover. Torque bolts to **23-27 Nm**.
11. Install the accessory drive belt (Refer to 'Drive Belt', page 3-6-1).
12. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
13. Fill the coolant system (Refer to 'Cooling System (03.03)', page 3-4-1).
14. Fill the engine with the recommended quantity and grade of engine oil (Refer to 'Specifications', page 3-3-2).

Crankshaft Rear Oil Seal

Repair Operation Time (ROT)	
Item	**Code**
Crankshafts Rear Oil Seal	**TBA**

Removal

1. **Automatic Gearbox Only**
   Remove the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).
2. **Manual Gearbox Only**
   Remove the transaxle (Refer to 'Manual Transmission (07.03)', page 7-3-1)
3. Remove the torque tube (Refer to 'Torque Tube', page 5-1-2).
4. Remove the flywheel (Refer to 'Flywheel', page 3-12-9).
5. Using the service tools (Refer to 'TBA (Crankshaft Rear Oil Seal and Slinger Removal)', page 20-1-4) extract the oil seal slinger and oil seal from the oil seal retainer.

Details on removal procedure (Refer to 'Crankshaft Rear Oil Seal Remove (TBA)', page 20-1-11)

6. Clean the oil seal recess and mating surface of the oil seal retainer. Clean the mating surfaces on the engine block and sump. Ensure all mating surfaces are oil free.

Installation

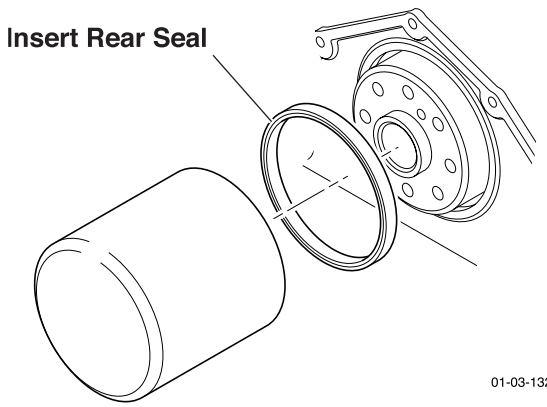
Caution
Throughout this procedure it is essential that all parts remain clean, free of dirt, grease and debris.

1. Lubricate the seal recess and seal surface with engine oil.
2. Install the rear crankshaft oil seal (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5).

Spring side towards the engine

When the oil seal install tool has bottomed out on the oil seal housing the new oil seal has been installed to the correct depth.

Insert the seal ensuring it sits squarely into the retainer recess.

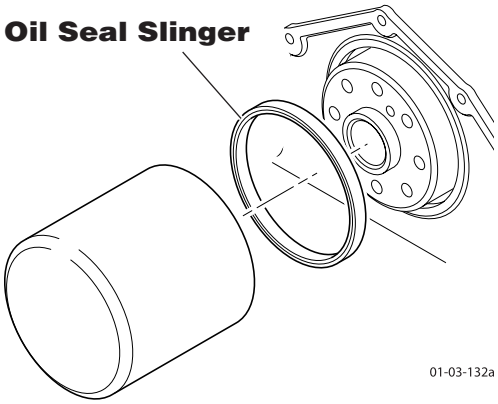


3. Install the oil seal slinger (Refer to 'TBA (Crankshaft Rear Oil Seal Slinger Install)', page 20-1-4).

The oil seal slinger installs one way only on the oil seal slinger install tool.

When the oil seal install tool has bottomed out on the oil seal housing the new oil seal has been installed to the correct depth.

Insert the seal ensuring it sits squarely into the retainer recess.



4. Install the flywheel (Refer to 'Flywheel', page 3-12-9).
5. Install the torque tube (Refer to 'Torque Tube', page 5-1-2).
6. **Manual Gearbox Only**
   Install the transaxle (Refer to 'Manual Transmission (07.03)', page 7-3-1)
7. **Automatic Gearbox Only**
   Install the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).

Crankshaft Front Oil Seal

Repair Operation Time (ROT)	
Item	**Code**
Crankshafts Front Oil Seal	**TBA**

Removal

1. Remove the timing cover (Refer to 'Camshaft Cover', page 3-11-3).
2. Remove the oil seal from the timing cover.

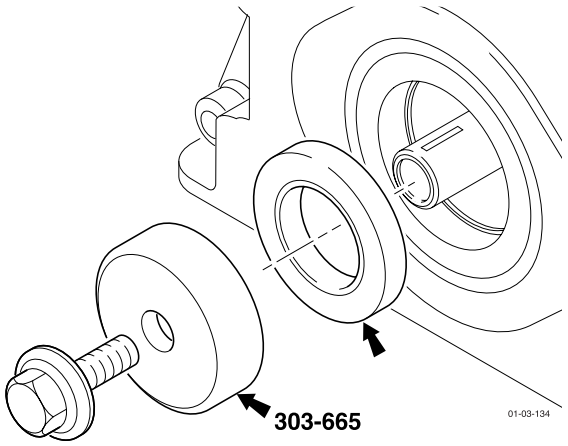
Installation

1. Clean the seal recess in the timing cover.

   Lubricate the outside of the new seal and seal recess with engine oil.
2. Install the timing cover (Refer to 'Camshaft Cover', page 3-11-3).
3. Position a new seal on the seal recess.

Spring side towards the engine

   Install the seal (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5).



Lubricate the seal surface with engine oil before installing the crankshaft damper.

ASTON MARTIN
ASTON MARTIN

Engine (03.00)

Power Conversion (03.11)

Description

Crankshaft

The crankshaft is mounted in 7 main bearings with end loads absorbed by thrust washers at number 4 main bearing. Main bearing bolts are of the 'torque to yield' type and must be renewed if removed.

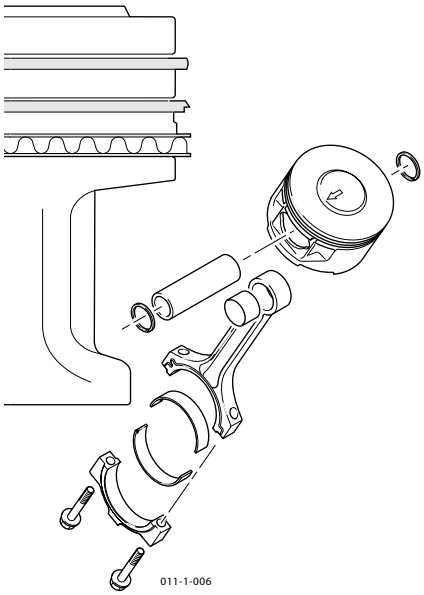
A twin sprocket, installed to the front end of the crankshaft, drives the camshaft timing chains. A damper pulley on the crankshaft drives the engine auxiliaries via the accessory drive belt.

Also at the front of the engine a timing disc is installed together with a crankshaft sensor (RH side). The sensor provides engine position signals to PCMs.

A second crankshaft sensor (LH side) is installed at the front of the engine - but is not used.

Pistons and Connecting Rods

Six crankshaft big end journals each carry a pair of connecting rods. The connecting rods are secured to the crankshaft by individual connecting rod caps enclosing the connecting rod bearing shells. Connecting rod bolts are of the 'torque to yield' type and must be renewed if removed.



Each piston carries two compression rings and one oil control ring. The arrow on each piston crown must point to the front of the engine during installation.

Connecting rods are manufactured as a single piece with fracture lines at the connecting rod bearing. Each connecting rod cap is cracked from the connecting rod after machining and drilling. Thus each connecting rod cap will only install to, in correct orientation, its matching connecting rod.

Specifications

Crankshaft	**MM**
Main Bearing Diameter	67.480 - 67.504
Main Bearing Clearance	0.025 - 0.050
Refer to the Main Bearing Grade Chart for bearing shell selection.	
Connecting Rod Bearing Diameter	49.97 - 49.99
Connecting Rod Bearing Clearance	0.028 - 0.066
Crankshaft End Float	0.130 - 0.301

Turning Torque	**Nm.**
Guideline figures only	
Crankshaft and rear seal only	6
Crank, rear seal + pistons & rods	16 - 20
Crank, rear seal, pistons & rods + camshafts & tensioned chains	36 - 44

Crankshaft Sensors	**MM**
Air Gap	1 (±0.5)

Piston Ring Gaps at 89.000 Cylinder Bore Diameter	**MM**
Upper compression ring	0.100 - 0.250
Lower compression ring	0.270 - 0.420
Oil control rings	0.150 - 0.650

Compression Ring Vertical Clearance	**MM**
Upper compression ring	0.040 - 0.075
Lower compression ring	0.040 - 0.885

Piston Pin	**MM**
Piston pin to rod clearance	
Interference	0.005
Clearance at 20°C (68°F)	0.001

Connecting Rods	**MM**
Piston pin to connecting rod clearance	0.004 - 0.020
Piston pin to piston interference	-0.005 - 0.001
Big End Side Clearance (2 rods)	0.225 - 0.625

Piston Height Above the Block Face at TDC	**MM**
Average of two readings taken along the crankshaft axis. A straight line must pass between the two readings and the center of the pistion.	0.415 (Below) 0.115 (Above)

Torque Figures			
Description		Nm.	lb./ft.
Engine block spread tool		25	18.5
Main bearings	1. Bolts 1 to 14.	37-43	27.5-32
	2. Bolts 15 to 28.	22-28	16.5-21
	3. Bolts 1 to 28.	85°-95°	
Main cap side bolts	1. Bolts 29 to 42.	22-28	16.5-21
	2. Bolts 29 to 42.	85°-95°	
Connecting rods	1.	20-25	15-18.5
	2.	40-45	30-33.5
	3.	105°-120°	
Windage tray	1.	5-7	4-5.5
	2.	45°	
Sump	1.	15	11.5
	2.	90°	
Flywheel		75-81	55.5-60
Damper plate (Auto only)		30	22.5

Piston Skirt Grading Chart

Grade	Piston Diameter 'A1'Prior to Skirt Coating	Cylinder Bore Diameter
1	88.970 / 88.980	89.000 / 89.010
2	88.978 / 88.992	89.008 / 89.022
3	88.990 / 89.000	89.020 / 89.030

Skirt Coating adds 0.020 - 0.030 to the diameter as follows:

Grade	Piston Diameter (Coated)	Clearance with Coating
1	88.990 / 89.010	New Build -0.014 (interference)
2	88.998 / 89.022	New Build + 0.024 (clearance)
3	89.010 / 89.030	Service Limit + 0.050 (clearance)

Main Bearing Grade Chart

The finished diameter of the crankshaft main bearing bores is indicated by letters stamped on the cylinder block face. The first letter, e.g. 'D', refers to No.1 journal, the second letter element refers to No.2 journal and so on.

The finished diameter of the seven crankshaft main bearing journals are indicated by seven letters stamped in bearing number sequence on No.1 counterweight.

The first letter in the sequence refers to No.1 journal, the second letter refers to No.2 journal and so on.

1. Read the first letter on the cylinder block face and note it.
2. Read the first letter on No. 1 crankshaft counterweight and note it.
3. Using the letters, select the correct bearing grade for No. 1 journal.
4. Repeat steps 1-3 to obtain the correct bearing grades for journals 2-7.

Max Crankshaft Diameter		Minimum Block Diameter																						
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
	72.400	.401	.402	.403	.404	.405	.406	.407	.408	.409	.410	.411	.412	.413	.414	.415	.416	.417	.418	.419	.420	.421	.422	.423	.424
X	67.504	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
W	67.503	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
V	67.502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
U	67.501	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
T	67.500	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
S	67.499	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
R	67.498	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Q	67.497	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3
P	67.496	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
O	67.495	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
N	67.494	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
M	67.493	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
L	67.492	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
K	67.491	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
J	67.490	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
I	67.489	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
H	67.488	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
G	67.487	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
F	67.486	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
E	67.485	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
D	67.484	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C	67.483	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
B	67.482	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
A	67.481	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Bearing Grade 1 = Orange
Bearing Grade 2 = Blue
Bearing Grade 3 = Green

The bearing grade is stamped, in ink, on the inside of the bearing.

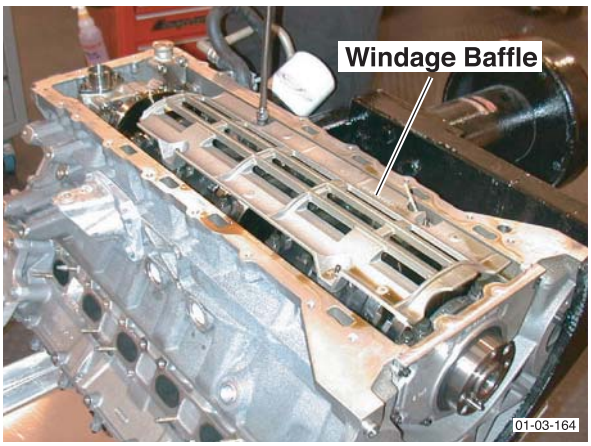
Maintenance

Crankshaft

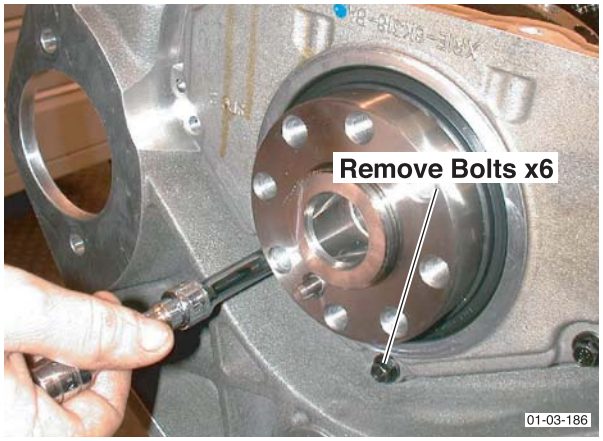
Repair Operation Time (ROT)	
Item	**Code**
Crankshaft Renew	**TBA**

Removal

1. Remove the engine from the vehicle (Refer to 'Engine', page 3-1-4).
2. Remove the cylinder heads (Refer to 'Cylinder Heads', page 3-2-2).
3. Remove the sump (Refer to 'Sump', page 3-3-3).
4. Remove the windage baffle.

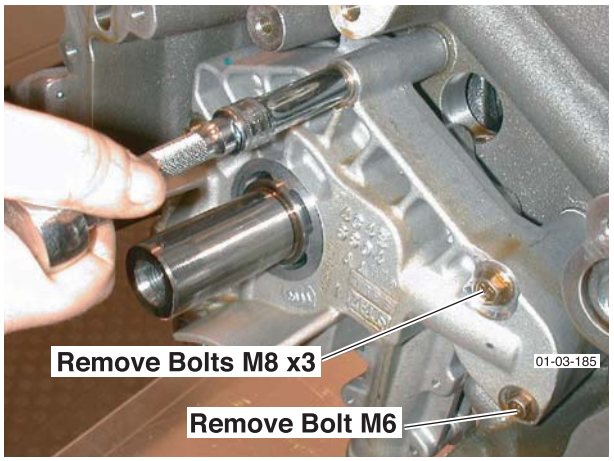


5. Remove bolts (x6) that secure the rear oil seal retainer and withdraw the seal retainer and oil seal.



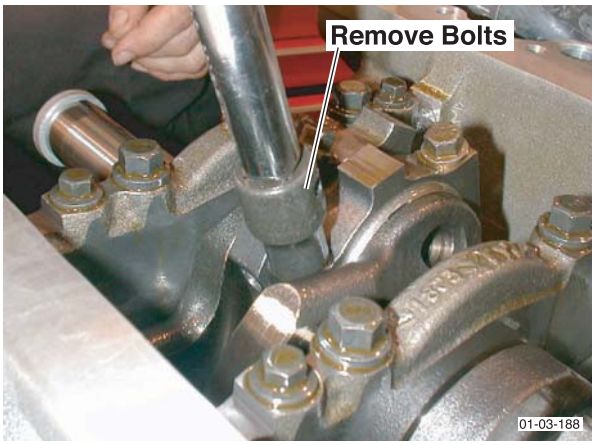


6. Remove the oil pump.



7. Remove the piston and connecting rod assemblies.

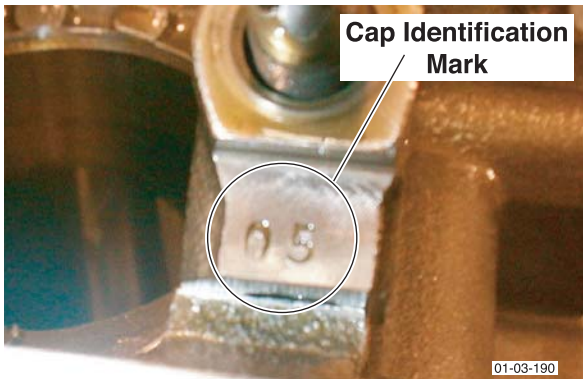
7.1 Remove the connecting rod bolts and withdraw the connecting rod caps, complete with bearings.



7.2 Withdraw the piston and connecting rod assemblies, complete with bearings, from the top of the bore.

Ensure each piston / connecting rod / connecting rod cap set remain together in order for installation to their original locations.

Connecting rods and caps have identification marks which must match and align upon reassembly.



An arrow stamped on the piston upper face must point towards the front of the engine when reassembled.

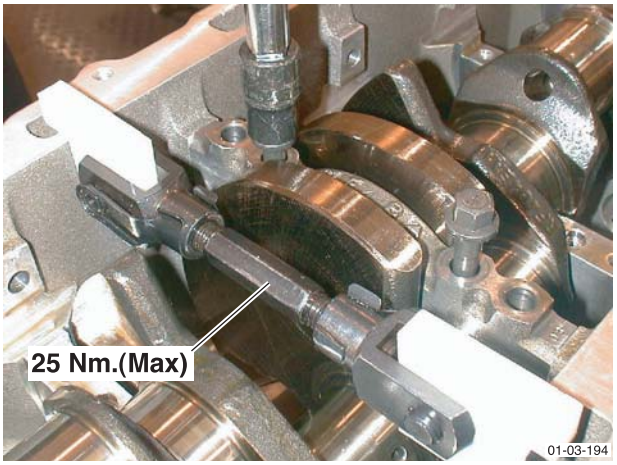
Connecting rods are symmetrical and do not require front to rear orientation.

Connecting rod bolts have ferrules pressed into the caps for new build bolt retention / ease of assembly. Replacement bolts do not have the captive ferrule. Original bolts can be removed by tapping the bolt out of the cap with a rubber mallet.

8. Remove the main bearing caps and bearing shells.

To withdraw the bearing caps, spread the engine block side walls using the engine block spreading tool (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5), tensioned to **25 Nm**.

To avoid overstriking engine block walls, ***do not*** *exceed* **25 Nm**. *on engine block spreader bolt.*

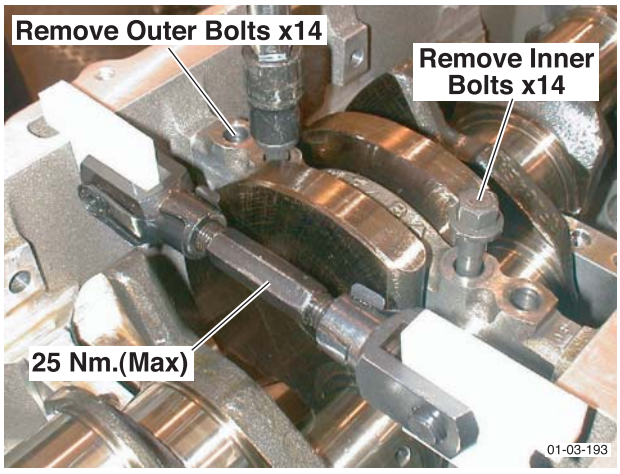


8.1 Remove the side bolts (x14).

8.2 Remove the outer bolts (x14) from the main bearing caps.

Record positions of the stud bolts at No. 3 and 6 main bearing caps.

8.3 Remove the inner bolts (x14) from the main bearing caps.



Retain all components in order for installation to their original locations, if serviceable.

9. Remove the crankshaft from the engine.
10. Remove the thrust washers from No. 4 main bearing.
11. Remove the upper bearing shells from all the main bearings.

If serviceable, retain all bearings, in order, for refitting to their original locations.

Component Checks

1. Examine the crankshaft journals for wear, scuffing or other defects. Replace the crankshaft if un-serviceable.
2. Examine all bearing shells and thrust washers for wear, scuffing or other defects. Replace if un-serviceable.
3. If required, measure the diameter of the crankshaft main and big end bearings.

   Compare results with data in engine specifications.
   - The finished diameter of crankshaft main bearing bores is indicated by numbers stamped on engine block face
   - The finished diameter of crankshaft main bearing journals are indicated by seven letters, stamped in bearing number sequence, on No.1 counter weight
4. Refer to Main Bearing Grade Chart in Engine Specifications if the main bearings are to be replaced.

Installation

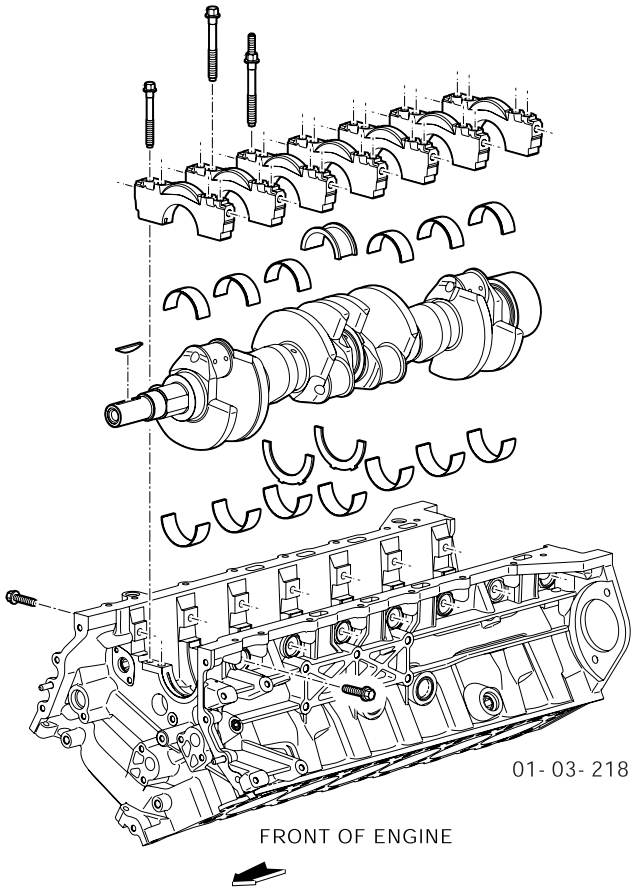
Caution
Lubricate all bearing surfaces with SAE 50 Assembly Oil.

Ensure all components are clean and free of damage prior to reassembly.

1. Install the upper bearing shells and thrust washers (No 4 bearing). Check the oil feed hole alignment.

The thrust washers are installed with the groove facing the crankshaft.

2. Install the crankshaft into the upper main bearings.



3. Install and 'seat' the main bearings and caps.

Caution
Oil beneath the head of all the main bearing bolts. Do not oil threads. 'Hand start' them into their holes.

Note the positions of the stud bolts at No. 3 and 6 main bearing caps from removal.

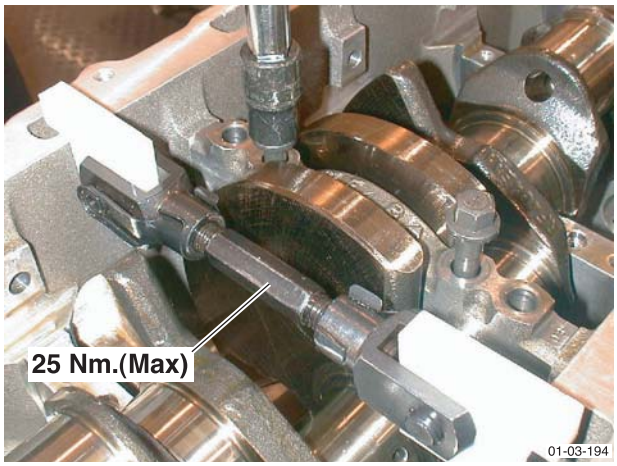
3.1 Insert the inner and outer bolts to all main bearing caps.

3.2 Lightly 'run down' the bolts to seat the main bearing caps.

3.3 Release all bolts approx. one turn.

To install the bearing caps spread the engine block side walls using the engine block spreading tool (Refer to '303-664 (Crankshaft Rear Oil Seal Install)', page 20-1-5), tensioned to **25 Nm**.

To avoid overstriking engine block walls, ***do not*** *exceed* **25 Nm.** *on engine block spreader bolt.*



4. Set No. 4 main bearing so the end loads are taken on both the upper and lower bearing thrust faces.

4.1 Bias the crankshaft maximum rearward against the upper thrust bearing.

4.2 With the crankshaft fully rearward, bias No. 4 bearing cap maximum rearward against the crankshaft thrust face.

4.3 Bias the crankshaft forward.

5. Torque the main bearing cap bolts, in the sequence detailed, to:

1 Bolts 1 to 14 - **37-43 Nm**.

2 Bolts 15 to 28 - **22-28 Nm**.

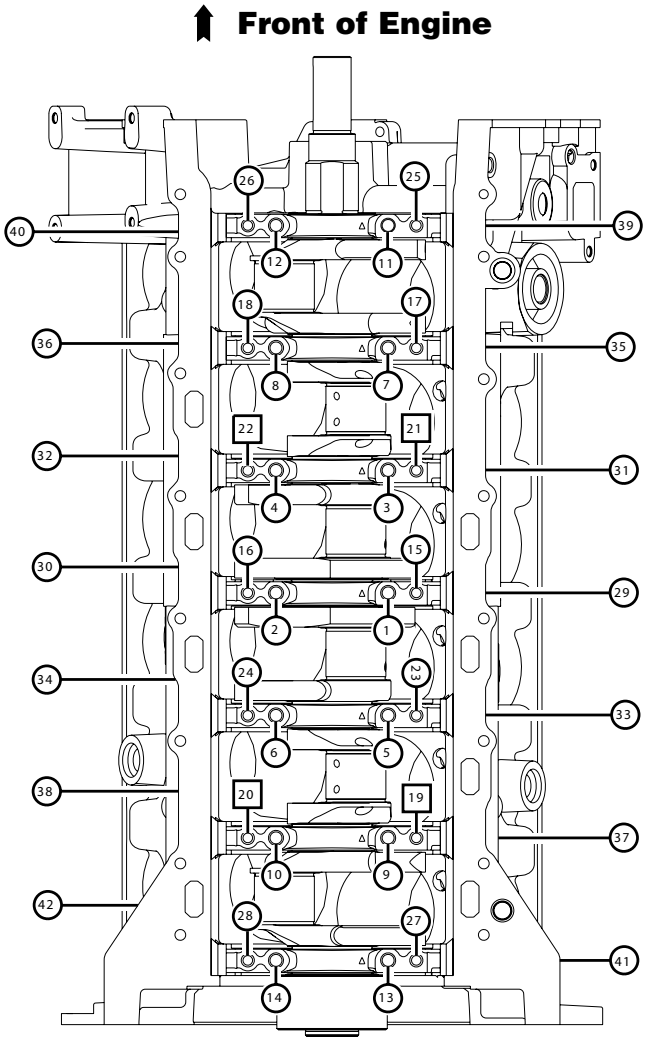
3 Bolts 1 to 28 - rotate **85°-95°**

Check and, if required, adjust No. 1 main bearing cap so that the front face does not protrude forward of the oil pump mounting face.

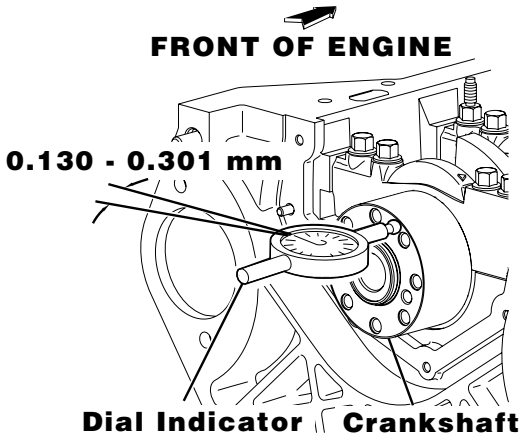
Main bearing bolts are torqued to yield. They must be tightened precisely as specified.

6. Insert the main caps side bolts. Torque the main cap side bolts, in sequence detailed, to:

1 Bolts 29 to 42 - **22-28 Nm. + 40°-50°**



7. Check the crank shaft end play.



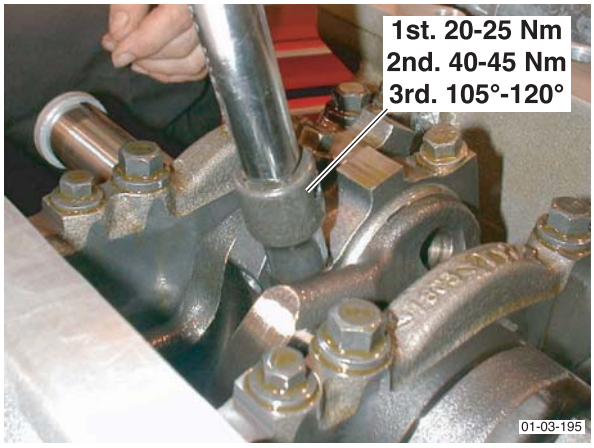
8. Check the crankshaft turning torque.
   The turing torque must not exceed **6 Nm**.
9. Complete with their upper big end bearing shell, install the pistons and connecting rods in their numbered positions. If new pistons or connecting rods are being installed, check the piston height (Refer to 'Specifications', page 3-12-1).

Ensure that the piston rings are installed and located correctly (Refer to 'Pistons and Connecting Rods', page 3-12-1).

Arrows stamped on the piston upper surface must point towards the front of the engine during reassembly.

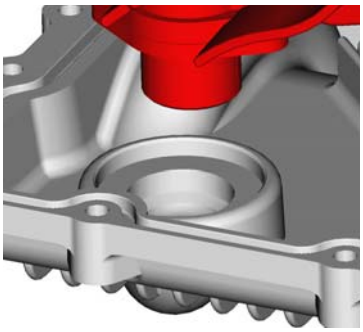
Use cylinder protectors during piston and connecting rod installation (Refer to '303-535 (Cylinder Bore Protectors)', page 20-1-4).

10. Install the connecting rod bearing caps and shells, noting correct orientation of each cap.
    Check that connecting rod and cap identification marks match and align.
    Secure caps using two new bolts to each cap.
    Torque all connecting rod bolts in three stages:
    1 To **20-25 Nm**.
    2 To **40-45 Nm**.
    3 Rotate a further **105°-120°**.



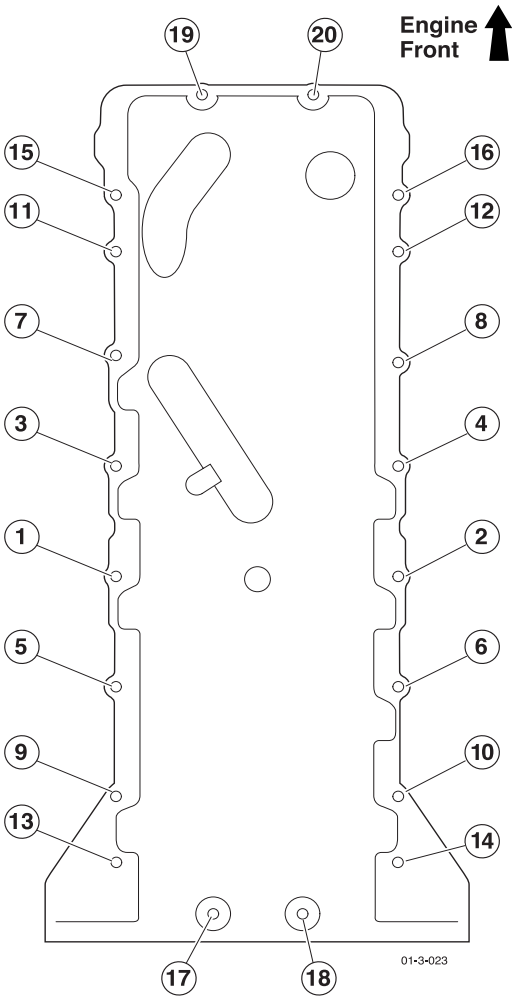
11. Install the windage tray.
    Torque nuts (x4) to **5-7 Nm + 45°**.
12. Install new a 'O'-ring to the oil pick-up pipe.
13. Install the sump.

Ensure that the sump oil outlet locates to the oil pump inlet before the sump is faced up to the engine block.
Do not use a mallet etc. to face up the sump to engine block.



Ensure the sump is flush to 0.25mm underflush to the rear face of the cylinder block.

Secure the sump using bolts (x15 M8) and (x5 M6).
Tighten the bolts using a two stage procedure:
1 Tighten all bolts to **15 Nm.** in the sequence shown.
2 Tighten all bolts through a further **90°** following the same sequence.



Caution
Ensure that the crankshaft key is in the vertical position.

14. Install the cylinder heads and camshafts (Refer to 'Cylinder Heads', page 3-2-2).
15. Install the timing chains. Check and ensure that the valve timing is correct (Refer to 'Valve Timing Check', page 3-10-4).
16. Install the timing cover (Refer to 'Timing Cover', page 3-11-3).
17. Install the camshaft cover (Refer to 'Camshaft Cover', page 3-11-1).
18. Install the engine auxiliaries.
19. Install and tension the accessory drive belt.
20. Complete engine reassembly and prepare to install to vehicle.

Pistons and Connecting Rods

Repair Operation Time (ROT)	
Item	**Code**
Pisteo and Connecting Rods Renew	**TBA**

Overhaul

Keep all components in sets for installing in their original locations, if serviceable.

1. Remove the piston pin circlips. Discard the circlips.

⚠ Warning ⚠
Pistons are heated to approx. 70°C. Wear protective clothing, e.g. gloves, to avoid burns.

2. Heat the piston to approx. 70°C and push out the piston pin. Allow the components to cool.
3. Using a ring spreader, remove the piston rings from the piston.
4. Wash all components. Replace any with obvious wear or other signs of deterioration.

   Check that components meet dimensional specifications (Refer to 'Specifications', page 3-12-1).
5. Repeat for all pistons.

Reassembly

Pistons are graded for each cylinder bore. If the pistons and / or connecting rods are to be reinstalled, they must be in their original sets and in their original positions.

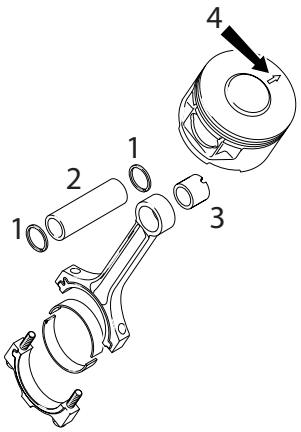
The grade of a cylinder bore (1, 2 or 3) is marked on outside of engine block, adjacent to the bore. Pistons are similarly graded (1,2 or 3) on their upper surface. Make sure the correct piston grade is chosen when installing a new piston.

Ensure that the connecting rods and caps are a matched set.

1. Heat the piston to approximately 70°C and install the connecting rod and piston pin.

⚠ Warning ⚠
Pistons are heated to approx. 70°C. Wear protective clothing, e.g. gloves, to avoid burns.

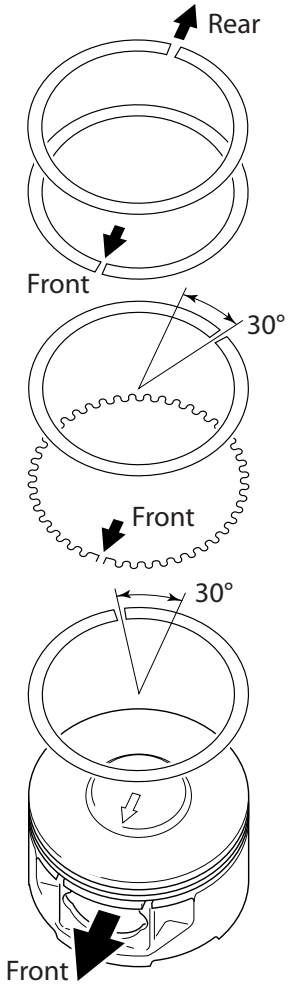
Install the connecting rod to the piston with the 'notch' in the little end bearing (3) facing the same direction as the arrow stamped on the piston head (4).



Secure the piston pin (2) with new circlips (1).

Allow the pistons cool.

2. Before installing to the engine, rotate the piston rings as necessary to the positions shown on the following diagram.



Flywheel

Repair Operation Time (ROT)	
Item	**Code**
Flywheel Renew	TBA

Removal

1. Disconnect the vehicle battery.

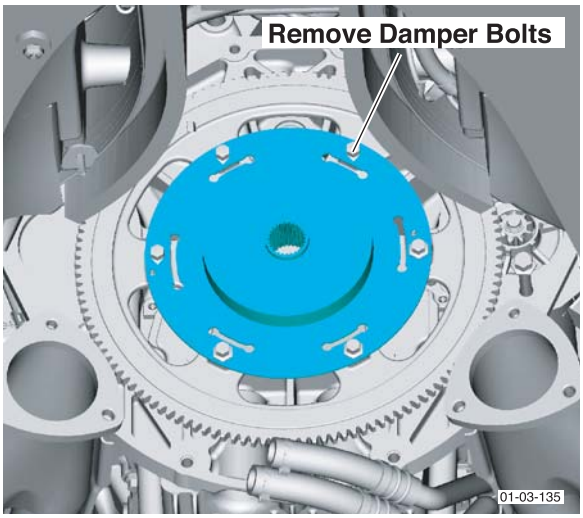
> ⚠ ***Warning*** ⚠
> ***If rasing vehicle on a 'two post' ramp (vehicle supported by underbody), Ensure that the rear end of the vehicle is securely strapped to the ramp. Failure to strap the rear of vehicle down may lead to the vehicle falling off the ramp.***

If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly (Refer to 'Jacking Points', page I-I-IX).

2. Raise the vehicle and make safe.
3. Remove the rear road wheel(s) and road wheel arch liners.
4. Remove the front and rear undertrays and the shear plate.

Lower the front undertray to reveal the air intake for the alternator. Release the spring clip and part the flex pipe from the undertray.

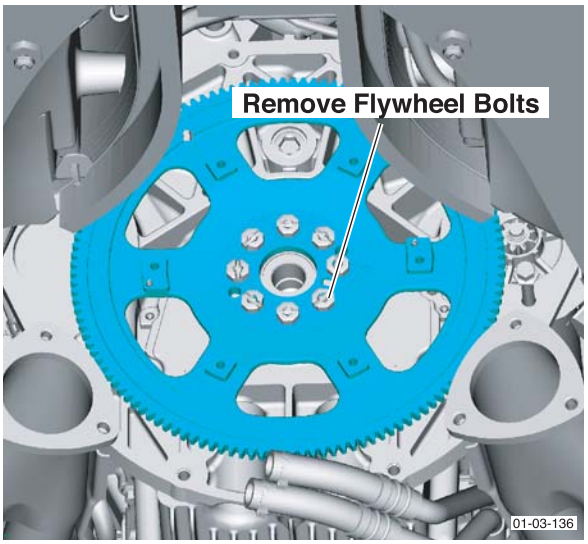
5. Remove the rear subframe and torque tube.
   - (Refer to 'Rear Subframe', page 2-1-4)
   - (Refer to 'Torque Tube', page 5-1-2)
6. **Manual Gearbox Only.**
   Remove the clutch assembly (Refer to 'Clutch (08.00)', page 8-1-1).
7. **Automatic Gearbox Only.**
   Remove the drive damper plate (bolts x8).Retain for installation.



> **Caution**
> **The flywheel assembly, including the mounting bolts, is a balanced assembly. Use the same bolts when reassembling to retain balance.**

8. Place a support surface under the flywheel. Insert flywheel bolts (x2) into the threaded 'jacking' holes in the flywheel.

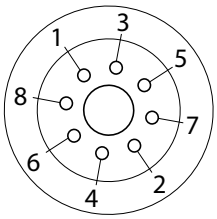
> ⚠ ***Warning*** ⚠
> ***The flywheel is heavy. Take care to provide adequate support when removing or replacing it.***



9. Tighten the bolts in stages to ease the flywheel from its location on the crankshaft.

Installation

1. Using a suitable support surface under the flywheel, offer the flywheel to the crankshaft and align the attachment holes.
2. Loosely install the flywheel mounting bolts (x8) and hand tighten.
3. Tighten the bolts in half turn stages in sequence shown. Continue until the flywheel face is in full contact with the crankshaft flange.



4. Loosen the bolts. Then torque to **75-81 Nm** in the same sequence.
5. **Manual Gearbox Only.**
   Install the clutch assembly (Refer to 'Clutch (08.00)', page 8-1-1).
6. **Automatic Gearbox Only.**
7. Install the drive damper plate. Torque bolts (x8) to **30 Nm**.

The damper plate will only install one way, locating on dowels provided.

8. Install the torque tube and the rear subframe.
   - (Refer to 'Torque Tube', page 5-1-2)
   - (Refer to 'Rear Subframe', page 2-1-4)
9. Install the front and rear undertrays.
10. Install the road wheel arch liners.
11. Bleed the brakes. (Refer to 'Brake Bleeding - WDS', page 6-4-4).
12. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
13. Remove the vehicle securing strap, if installed.
14. Connect the vehicle battery.

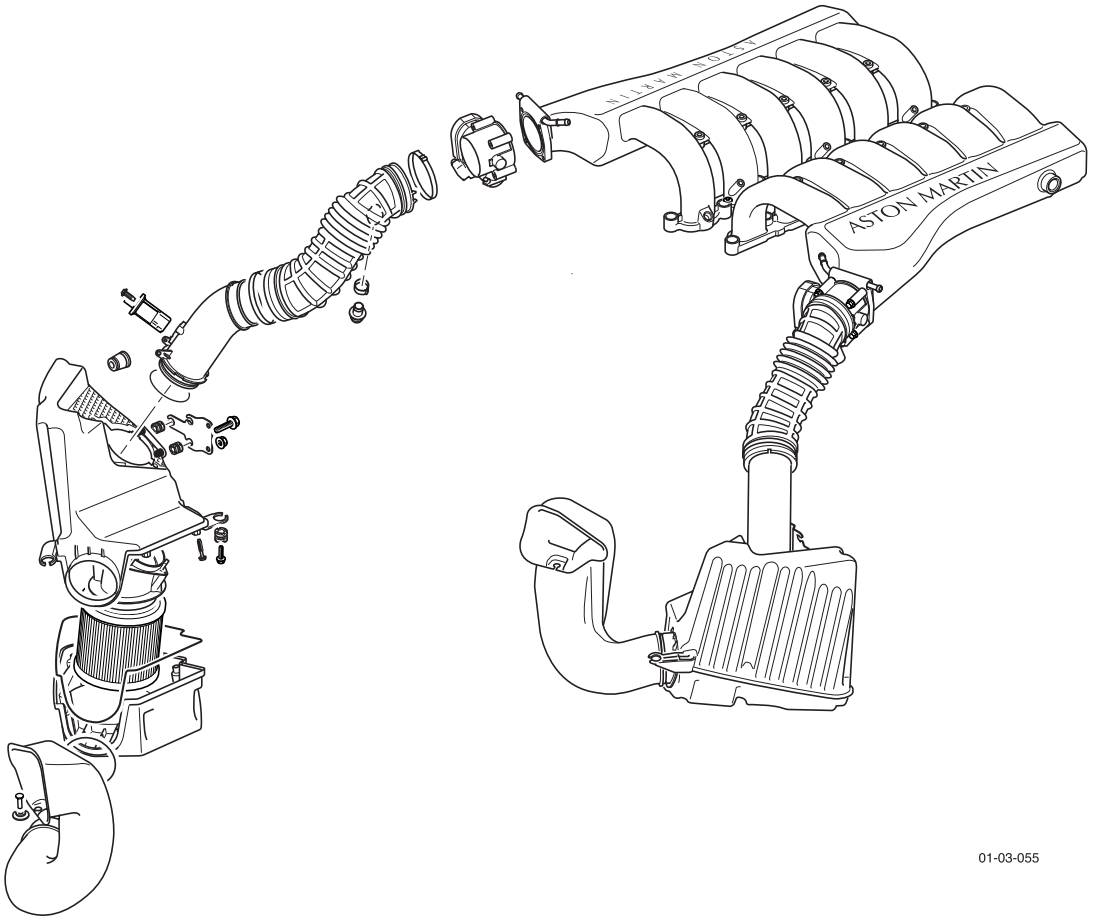
Engine (03.00)

Air Charging (03.12)

Description

Air Induction System

Intake air is filtered and then passed through mass air flow (MAF) meters. Signals from the MAF meters are fed to the PCMs and are used together with other signals in calculating the required amount of fuel (Air fuel ratio approx. 14.3 parts air to 1.0 part fuel by weight). The air then passes through the throttle bodies into the six branch inlet manifolds.



Specifications

Torque Figures		
Description	Nm	(lb. / ft.)
Air box cover	1.5-2.0	1.5
Outlet pipe	1.5-2.0	1.5
Air box mountings	2.5-3.5	2-2.5

Maintenance

Air Filter

Repair Operation Time (ROT)		
Item		**Code**
Air Filter Renew	LH	**03.12.CB**
	RH	**03.12.DB**

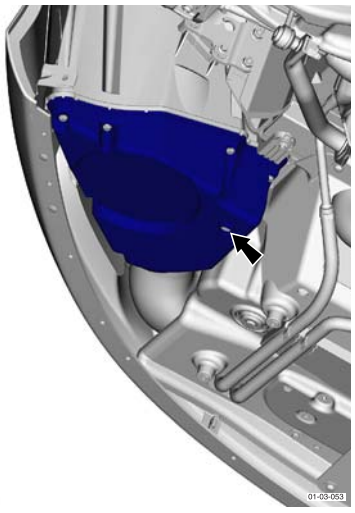
Removal

If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

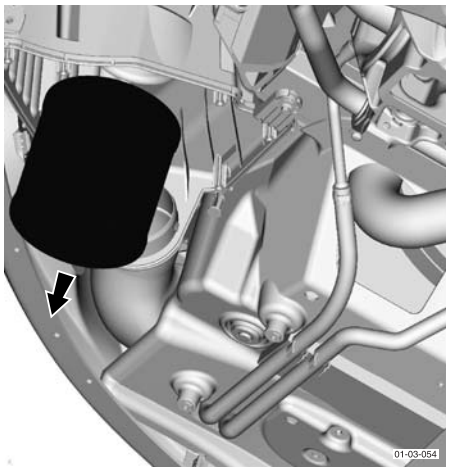
15. Raise the vehicle and make safe.
16. Remove the road wheel(s).
17. Remove the front undertray.
18. Remove the screws (x3). Pull the front section of the wheel arch down to gain access the air filter box.



19. Remove bolts (x7) and remove filter box cover.



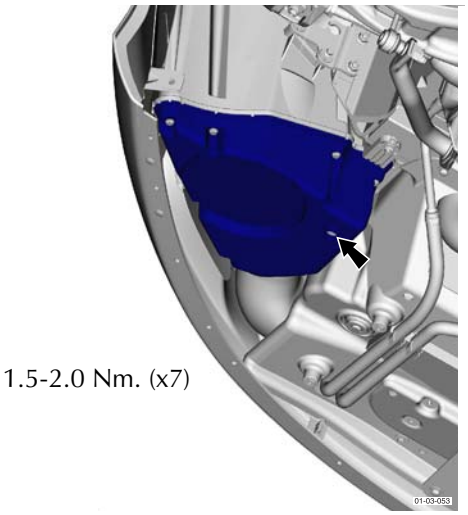
20. Remove air filter.



21. Repeat for second air filter.

Installation

1. Push the air filter onto the filter adaptor. Install the box cover. Torque bolts to **1.5-2.0 Nm**.



2. Install the front section of the road wheel arch liner.
3. Install the front undertray.
4. Install the road wheel(s) (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

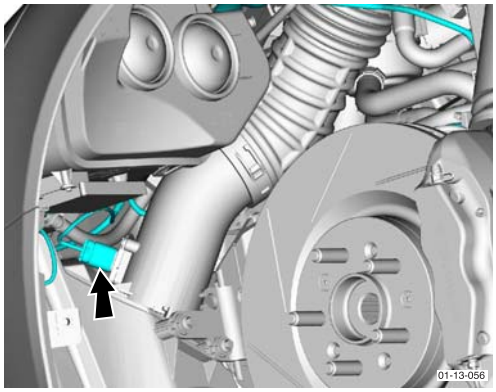
Air Filter Box

Repair Operation Time (ROT)		
Item		**Code**
Air Box Renew	LH	**03.12.AB**
	RH	**03.12.BB**

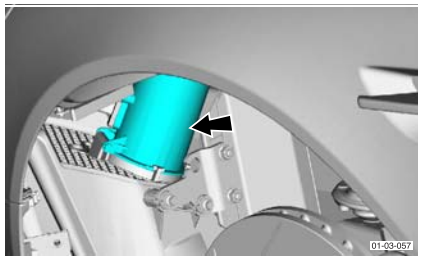
Removal

If using a two post vehicle lift, remove the screws that secure the rear section of the road wheel arch liner. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

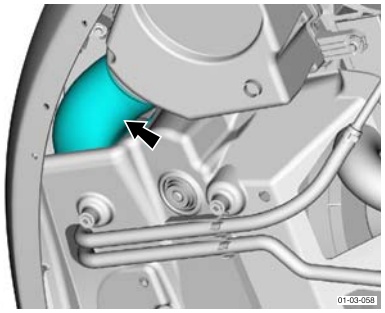
1. Raise the vehicle and make safe.
2. Remove the front undertray.
3. Remove the road wheel(s) and arch liner.
4. Disconnect the wiring harness plug.



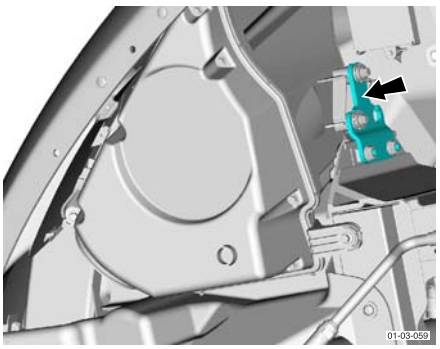
5. Disconnect the air outlet and inlet pipes.

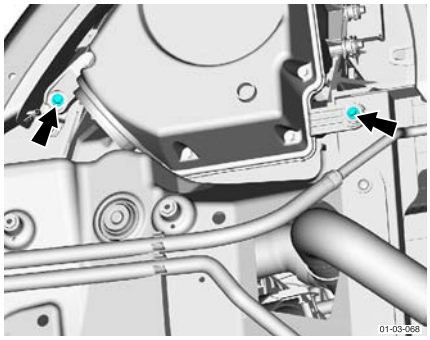


Outlet pipe - Remove fixing screw. Twist the outlet pipe and pull away.



6. Remove the air filter box mounting bracket (x1) and mounting bolts (x2). Withdraw the air filter box.

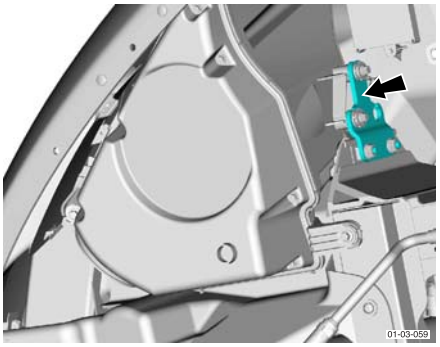


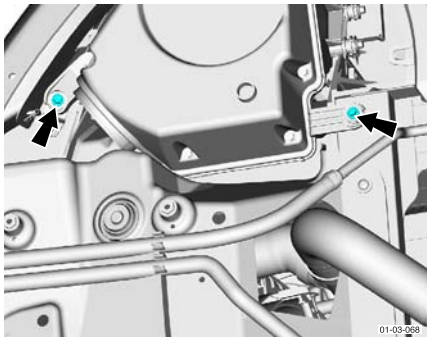


7. Repeat for second air filter.

Installation

1. Place the air filter box into position and secure.





2. Connect the outlet and inlet pipes.

Outlet pipe - Insert and twist, install fixing screw.

3. Connect the wiring harness plug.
4. Install the road wheel arch liner and front undertray.
5. Install the road wheel(s) (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

ASTON MARTIN
ASTON MARTIN

Engine (03.00)

Engine Management System (03.14)

The electronic engine control system consists of two Powertrain Control Modules (PCM's) and a number of sensing and actuating devices. The sensors supply the PCM's with input signals which relate to the engine operating conditions and driver requirements. The sensor information is evaluated by the PCM's using the results to activate the appropriate response from the actuating devices.

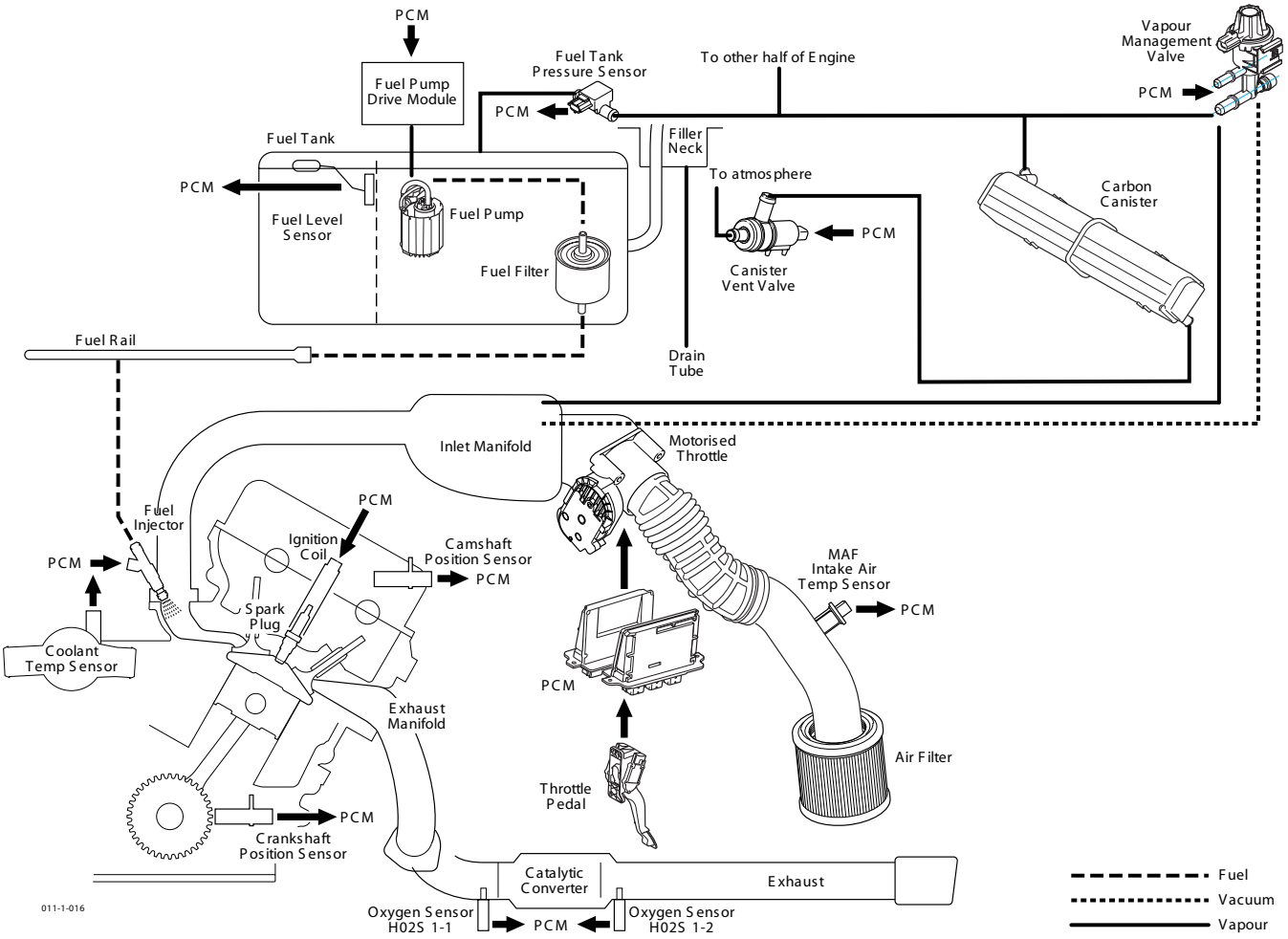
The system provides the necessary engine control accuracy and adaptability to:

- Minimize exhaust emissions and fuel consumption
- Provide optimum driver control under all conditions
- Minimize evaporative emissions
- Provide system diagnostics

In addition to these functions the PCM's also interface with other vehicle systems through the controller area network (CAN).

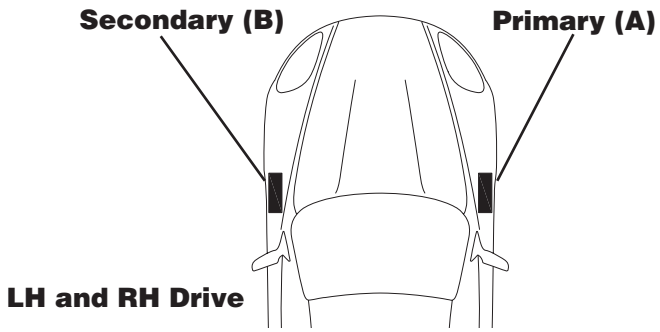
Refer to the Vehicle OBDII manual for inputs / outputs and diagnostic information

Schematic Diagram



Specifications

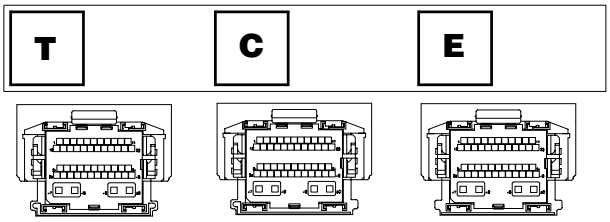
Powertrain Control Modules (PCMs)



PCM A

View looking into the PCM connectors.

Caution
Check plugs to ensure correct connector



(Refer to 'Circuit Diagrams', page 18-1-17)

T - Transmission

C0634-	Description	I / 0	Circuit Page
4	PRND	I	8
9	MAF+	I	67
10	MAF-	I	67
14	CB2+		13
17	Drive TT	0	9
18	Sport TT	0	8
19	Tip up	I	9
20	Tip down	I	9
21	MIL	0	30
24	HEGO 12	I	43
25	HEGO 22	I	43
26	CB2-		13
28	Rev TT	0	8
29	PRND 2	I	8
30	CB 3+		16
31	CB 3-		16
32	Neutral TT	0	9
33	Sport SW	I	8
36	Bap	I	68
38	Engine off	I	9
40	Ref. voltage C		9, 68
41	Signal return C		43, 68
43	Park ST	I	9
45	Park TT	0	8

T - Transmission

C0634-	Description	I / 0	Circuit Page
47	HTR 12	0	43
48	HTR 22	0	43
50	CNVNT	0	68

C - Cowl

C0635-	Description	I / 0	Circuit Page
2	Start enable	0	70
3	ISO-K		9
4	App1 Ref. voltage		72
5	App 1	I	72
6	App 1 Return		72
7	Brake pedal switch	I	39
8	Brake On / Off switch	I	39
9	Fuel tank pressure	I	68
10	Case ground		56
11	CB 1+		16
12	Motor fuel pump	0	41
14	Power steering pressure	I	65
15	Accs (Aircon demand)	I	6
16	App 2 Ref. voltage		72
17	App 2	I	72
18	App 2Return		72
19	Sccs (Speed Con Demand)	I	71
20	Restraint deploy Ind	I	2
21	Fuel pump monitor	I	41
22	Oil Pressure	I	65
23	CB 1-		16
24	Power hold	0	50, 56, 63
25	Aircon clutch relay	0	6
26	Aircon pressure	I	6
29	Clutch (Top of travel)	I	70
30	Sccs (Speed Con Return		71
31	TX out (PATS Comms)	0	63
32	Vehicle speed sensor+	I	68
33	Vehicle speed sensor-	I	68
34	EVMV	0	65
35	Power		56
36	Power		56
37	PATIL (PATS LED)	0	30
38	PBI (Start button ILL)	0	70
39	Clutch (Bottom of travel)	I	70
40	Ref. voltage B		6, 65, 68
41	Signal return B		6, 65, 68, 70
42	RXIN (PATS Comms)	I	63
43	EBV	0	68
44	FEPS		16
45	Keep alive power		56
47	Power ground		56

C - Cowl

C0635-	Description	I / 0	Circuit Page
48	Power ground		56
49	Power ground		56
50	IGNSNS	I	56

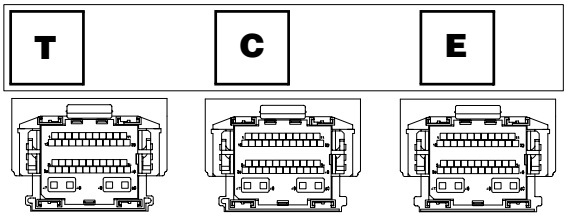
E - Engine

C0636-	Description	I / 0	Circuit Page
1	(CD1) Clyinder 1	0	47
2	Injector 1	0	48
3	Injector 6	0	48
4	Injector 4	0	48
5	Injector 3	0	48
7	Throttle pot return		72
8	Injector 5	0	48
9	Injector 2	0	48
10	Injector 7	0	48
11	Injector 8	0	48
12	(CD5) Cylinder 5	0	47
13	Inlet air temperature	I	67
14	Fan Control	0	21
15	Camshaft / Crankshaft Return		65
18	Throttle Pot Reference Volume		72
19	TP1-NS	I	72
24	(CD3) Cylinder 3	0	47
25	CID 1	I	65
29	TP2-PS	I	72
30	HEGO 11	I	43
31	Hego21	I	43
33	Engine Coolant Temperature	I	65
34	Crankshaft Position	I	65
35	(CD6) Cylinder 6	0	47
36	Fuel Rail Temperature	I	65
37	Fuel Rail Pressure Tran	I	65
38	(CD2) Cylinder 2	0	47
39	(CD4) Cylinder 4	0	47
40	Ref. Voltage A		65
41	Signal Return		43, 65, 67
45	Crankshaft Positive	I	65
47	Throttle Mtr +	0	72
48	Throttle Mtr -	0	72
49	HTR11	0	43
50	HTR21	0	43

PCM B

View looking into the PCM connectors.

Caution
Check plugs to ensure correct connector



(Refer to 'Circuit Diagrams', page 18-1-17)

E - Engine

C2464-	Description	I / 0	Circuit Page
1	(CD7) Cylinder 1	0	47
2	Injector 1	0	48
3	Injector 6	0	48
4	Injector 4	0	48
5	Injector 3	0	48
7	Throttle pot return		72
8	Injector 5	0	48
9	Injector 2	0	48
10	Injector 7	0	48
11	Injector 8	0	48
12	(CD11) Cylinder 5	0	47
13	Inlet air temperature	I	67
15	Camshaft / Crankshaft Return		66
18	Throttle Pot Reference Volume		72
19	TP1-NS	I	72
24	(CD9) Cylinder 3	0	47
25	CID 1	I	66
29	TP2-PS	I	72
30	HEGO 11	I	44
31	HEGO 21	I	44
34	Crankshaft Position+	I	66
35	(CD12) Cylinder 6	0	47
37	Fuel tank pressure tran	I	66
38	(CD8) Cylinder 2	0	47
39	(CD10) Cylinder 4	0	47
40	Ref. Voltage A		66
41	Signal Return		44, 66, 67
45	Crankshaft Positive -	I	72
47	Throttle Mtr +	0	72
48	Throttle Mtr -	0	72
49	HTR11	0	44
50	HTR21	0	44

T - Transmission			
C0637-	**Description**	**I / 0**	**Circuit Page**
4	Engine coolant level	I	66
6	PRI / Sec switch	I	44
9	MAF +	I	67
10	MAF -	I	67
14	CB 2 +		13
24	HEGO 12	I	44
25	HEGO 22	I	44
26	CB 2 -	I	13
30	CB 3 +		16
31	CB 3 -		16
38	Altmon	I	69
41	Signal return C		44
47	HTR 12	0	44
48	HTR 22	0	44

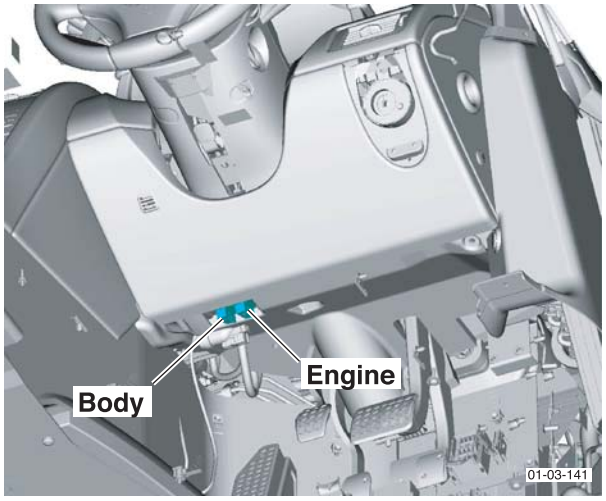
C -Cowl			
C0638-	**Description**	**I / 0**	**Circuit Page**
4	App 1 Ref. voltage		72
5	App 1	I	72
6	App 1 return		72
7	Brake pedal switch	I	39
8	Brake On / Off switch	I	39
10	Case ground		56
11	CB 1+		16
12	Motor fuel pump	0	41
16	App 2 Ref. voltage		72
17	App 2	I	72
18	App 2 Return		72
20	Restraint deploy Ind	I	2
21	Fuel pump monitor	I	41
23	CB 1-		16
24	Power hold	0	56
32	Vehicle speed sensor+	I	68
33	Vehicle speed sensor-	I	68
34	EVMV	0	66
35	Power		56
36	Power		56
44	FEPS		16
45	Keep alive power		56
47	Power ground		56
48	Power ground		56
49	Power ground		56
50	IGNSNS	I	56

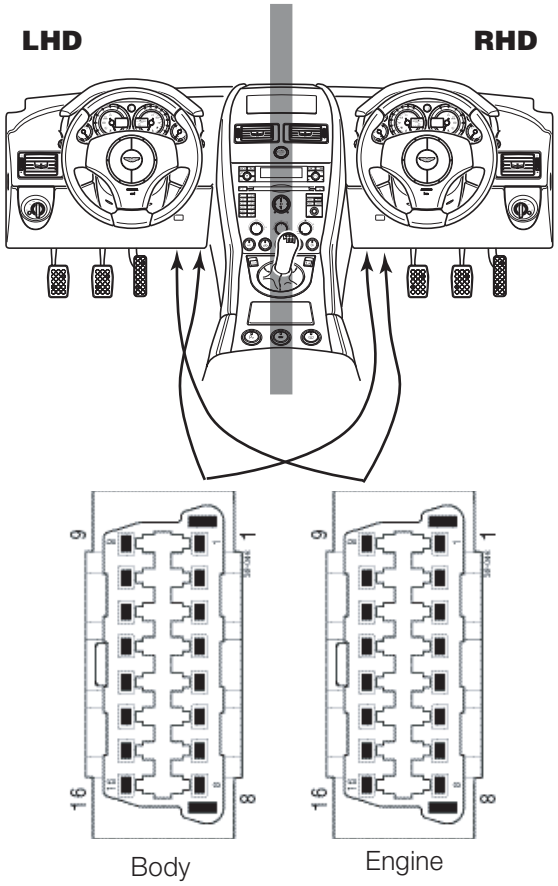
Torque Figures		
Description	Nm.	lb./ft.
PCM mount	8-10	6-7.5

Maintenance

WDS Connection

The port for WDS connection is located in the drivers side footwell on the transmission tunnel.



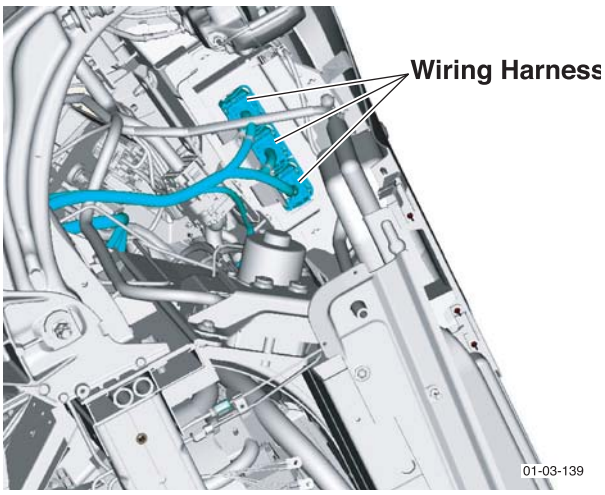


PCM

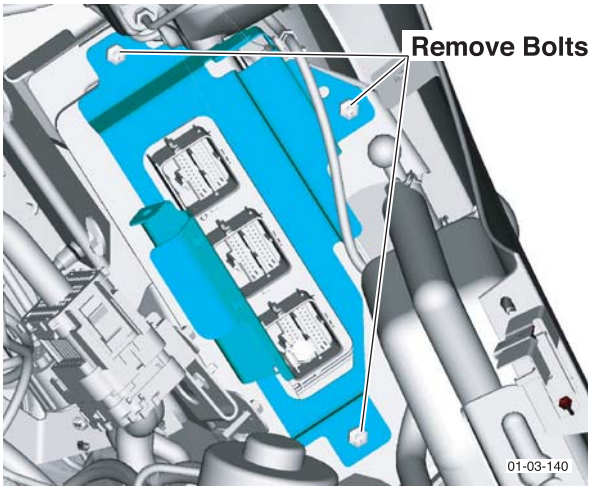
Repair Operation Time (ROT)		
Item		**Code**
PCM Renew	LH	**03.14.AB**
	RH	**03.14.BB**

Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the road wheel and road wheel arch liner.
4. Disconnect the wiring harness plugs (x3).



5. Disconnect the door check rod.
6. Remove bolts (x3) and withdraw the bracket and the PCM.



Installation

1. Install the PCM and the bracket. Torque bolts (x3) to **8-10 Nm**.
2. Connect the wiring harness plugs (x3).
3. Install the door check rod.
4. Install the road wheel arch liner.
5. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
6. Connect the vehicle battery.

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Engine (03.00)

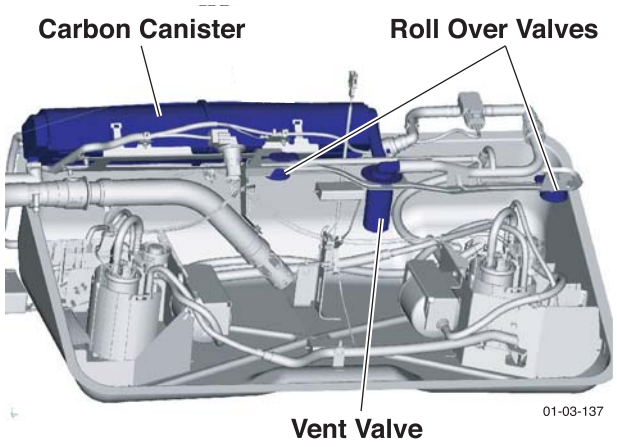
Evaporative Emissions (03.13)

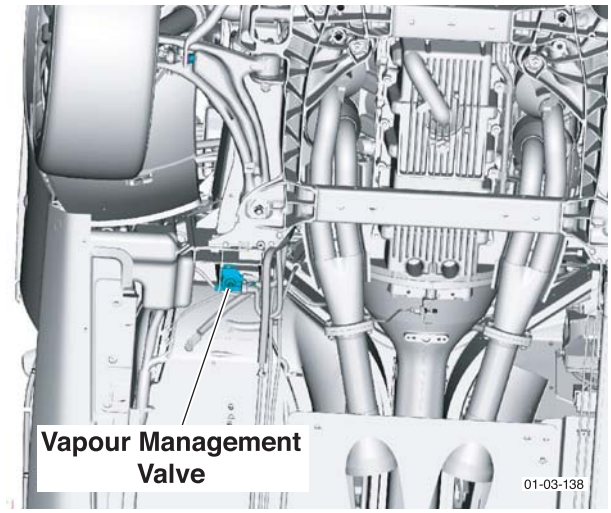
Description

The evaporative loss system prevents escape of fuel vapours into the atmosphere.

Fuel vapour is displaced from the fuel tank during filling. Vapour is also displaced due to fuel evaporation in higher temperatures. Displaced fuel vapour is absorbed in the carbon canister filter located on top of the fuel tank.

During normal engine running, absorbed fuel vapour is purged from the carbon canisters and mixed with the normal fuel/air charge in the inlet manifold.





System Operation

Displaced fuel vapour leaves the fuel tank via the normally open fill level vent valve and the roll over valves. It passes through the carbon canister where fuel hydrocarbons are absorbed. Clean air leaves the system via the normally open canister vent valve. This valve is only closed during diagnostic pressure testing of the fuel system.

During normal engine running, the single vapour management valve in the engine bay is periodically opened allowing fresh air flow into the open canister vent valve, through the carbon canister, through the vapour management valve and into the primary inlet manifold. This fresh air flow progressively purges any absorbed fuel vapour from the carbon canister.

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Engine (03.00)

Throttle Control (03.16)

Description

Motorised Throttles

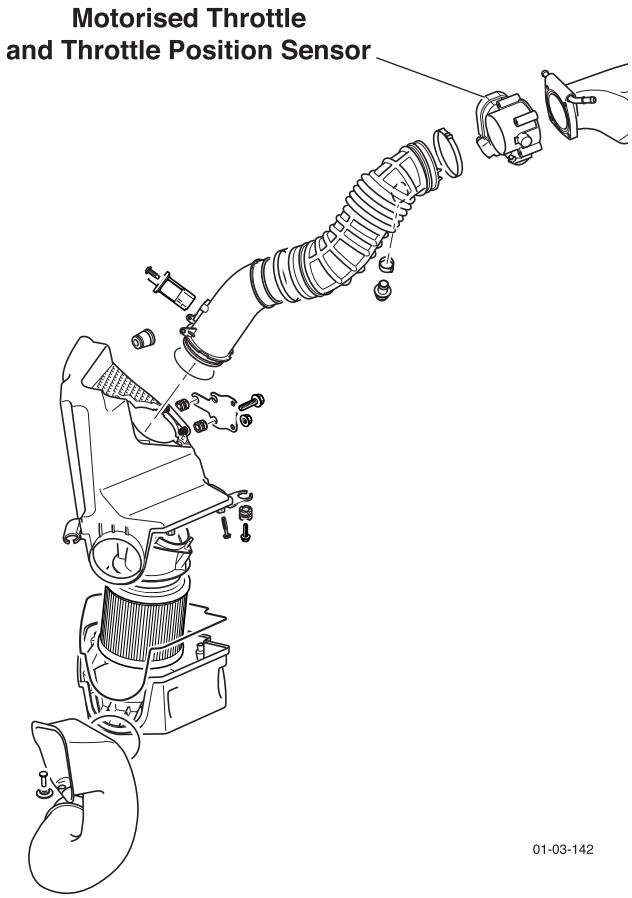
The motorised throttles (x2, one to each inlet manifold) allow accurate control of the inlet air.

A throttle position sensor (TPS) is incorporated into each motorised throttle unit. During normal engine run, TPS signals are used by the PCMs to indicate power demand from the engine. If not already at the desired position, the PCMs will drive the throttle motors to open or close the throttles by the required amount.

At idle, the throttle butterflies are almost closed and idle speed is controlled by small throttle movements.

The throttle butterflies are spring loaded to fail in the idle position. In the event of the throttle butterflies springs failing, air flow will allow the throttle butterflies to fail in the idle position.

No set-up procedure is required.



Specifications

Torque Figures		
Description	Nm.	lb./ft.
Throttle body	**8-12**	6-9

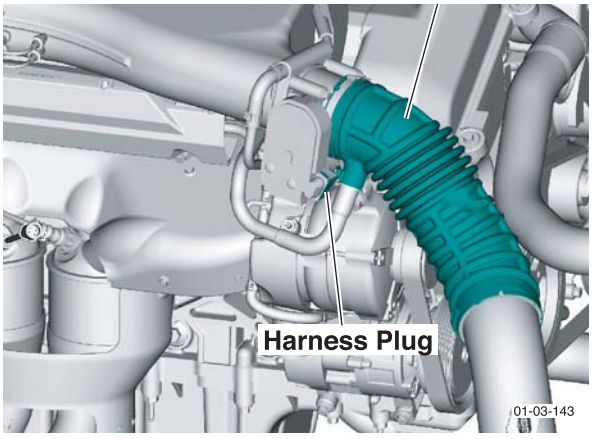
Maintenance

Throttle Body

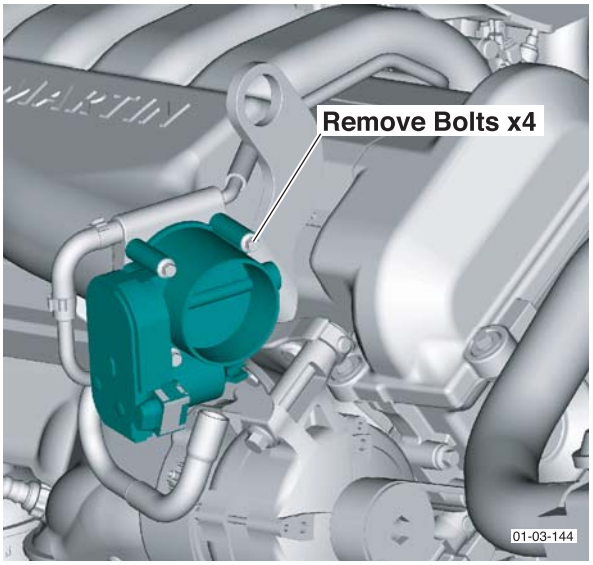
Repair Operation Time (ROT)		
Item		**Code**
Throttle Body Renew	LH	**03.04.HB**
	RH	**03.04.JB**

Removal

1. Disconnect the air intake pipe.



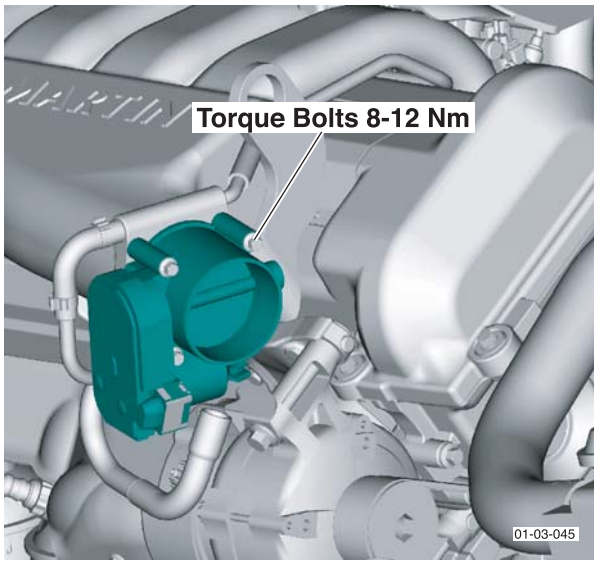
2. Disconnect the wiring harness plug.
3. Remove bolts (x4).



4. Withdraw throttle body complete with gasket. Discard the 'O' ring.

Installation

1. Install the throttle body complete with a new 'O' ring. Torque bolts (x4) to **8-12 Nm**.



2. Install the air intake pipe and wiring harness plug.

Suspension (04.00)

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Suspension (04.00)

Road Wheel Alignment (04.00)

Specifications

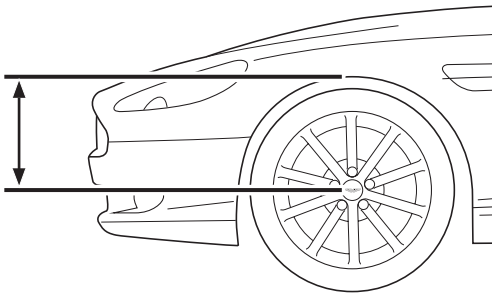
	Front	Rear
Toe	2.5′ (±2′)	10′ (+5′ / -0′)
Total Toe	5′ (±4′)	20′ (+10′ / -0′)
Camber	-15′ (±5′)	-1° 30′ (±5′)
Cross Camber	0′ (±10′)	0′ (±10′)
Caster	5° (+30′ / -15′)	N/A
Cross Castor	0° (±15′)	N/A
KPI	10° 51′	N/A
Bumpstop free travel	12.0 mm	14.5 mm
Normal Ride Height	2 x 68 kg (driver and passenger seat) + 14 kg in the boot + full fuel tank.	

Ride height is measured from the centre of the road wheel, vertically, up to the road wheel arch.

Check tyre pressures before checking road wheel alignment.

	Front	Rear
Ride Height	378.5mm (±15mm)	376.5mm (±15mm)

Wheel centre to wheel arch (front and rear)



Over time this vehicle's ride height will settle (up to 20mm). Therefore, as this vehicle ages it's ride height will tend to sit towards the lower end of the ride height tolerance band. This needs to be taken into account when checking vehicle ride height.

Maintenance

Repair Operation Time (ROT)	
Item	**Code**
All Wheel Alignment	**04.00.AD**

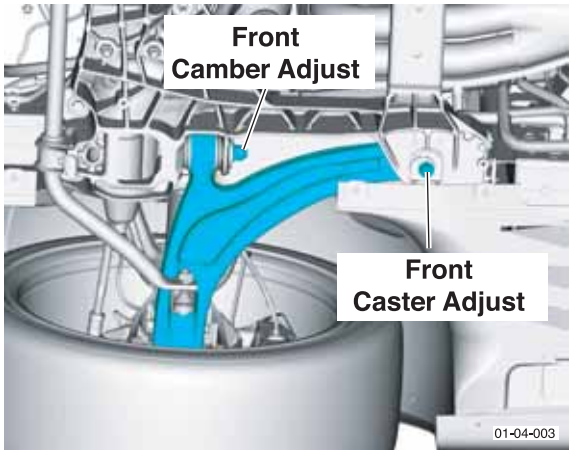
Refer to the geometry setup tool manufacture operating instructions.

Check vehicle geometry in the following order:

1 Caster Angle
2 Camber Angle
3 Toe

Adjustments to caster, camber and toe settings may impact each other. After checking / adjusting each setting, minor adjustments to caster, camber and toe may have to be made to reach the correct set up for the vehicle.

Both LH and RH Toe need to be adjusted when adjusting caster and camber.



Caster Angle

Adjustment (Front)

Check and if required adjust the camber angle. If the camber angle is correct but the caster angle is still incorrect, suspect damage to the suspension components.

Ensure that the vehicle is at normal ride height. Check tyre pressures.

1. Check the caster settings. Follow the equipment manufacturer's instructions.
2. Release the cam bolt lock nuts.
3. Rotate the lower arm caster adjustment cam bolts.
4. When the caster angle is correct, tighten the cam bolt lock nuts.
5. Re-check alignment settings. Adjust if required.

Camber Angle

Adjustment

Ensure that the vehicle is at normal ride height. Check tyre pressures.

1. Check the camber settings. Follow the equipment manufacturer's instructions.
2. Release the cam bolt lock nuts.
3. Rotate the lower arm camber adjustment cam bolt to adjust the camber angle.
4. Tighten the cam bolt lock nuts.
5. Re-check alignment settings. Adjust if required.

Toe

Adjustment (Front)

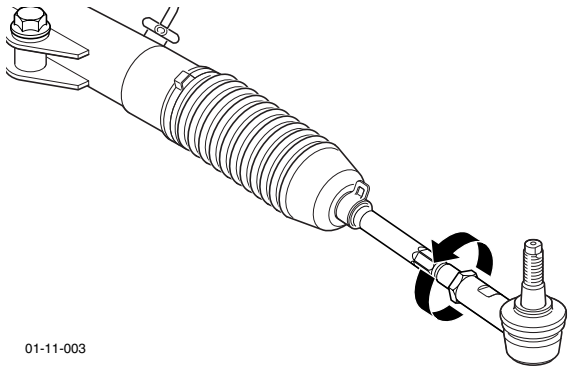
Ensure that the vehicle is at normal ride height. Check tyre pressures.

1. Start the engine and centre the steering rack.
2. Turn the engine off. Lock the steering position.
3. Check the Toe settings. Follow the equipment manufacturer's instructions.

If Adjustment is Required.

4. Clean the lock nuts and the threads of the track-rod ends.

Do not allow the steering gear boot to twist when the track-rod ends are rotated. If required release the steering gear boot clamps.



5. Loosen the lock nuts and rotate the track-rod ends (in equal amounts) to adjust the Toe.
6. Tighten the lock nuts to **70 Nm.**, and re-check the Toe. Adjust if required.

   When correct, secure the steering gear boot clamps (if released).

Adjustment (Rear)

Ensure that the vehicle is at normal ride height. Check tyre pressures.

1. Check the toe settings. Follow the equipment manufacturer's instructions
2. Release the cam bolt lock nuts.
3. Rotate the toe control rod adjustment cam bolt to adjust the rear toe.
4. Tighten the lock nut.
5. Re check the Toe settings. Adjust if required.

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Suspension (04.00)

Front Suspension (04.01)

Description

Suspension Arms

The upper suspension arm is attached to the body structure. The lower suspension arm is attached to the front subframe.

Each upper suspension arm has a press-fit ball joint, and two interleaved rubber bushes. Two bolts attach the upper suspension arm to the body structure.

Each lower suspension arm has a press fit ball joint and metal-to-rubber bonded bushes which are attached to the front subframe by two eccentric cam bolts (Camber and castor settings).

Anti-roll Bar

The anti-roll bar, is attached to the subframe in two positions by rubber bushes and clamps. The outer ends of the anti-roll bar are attached to the lower suspension arms by drop links. The anti-roll bar provides the required stiffness to control body roll.

Vertical link

The Vertical link (Knuckle Joint) swivels on the upper and lower suspension arms via ball joints, and carries the hub, a unit 3 wheel bearing (including the ABS encoder ring), the wheel speed sensor, the brake caliper, and the brake disc and shield. The position of the Vertical link is determined by the movement of the steering rack, which is connected to the Vertical link by the steering track rod.

Specifications

Torque Figures

Description		Nm	lb. / ft.
Brake dust shield.		9	7
Bearing Assembly to the Vertical link.		55	41
Vertical Link to the Lower Suspension Arm.		90	66.5
Vertical Link to the Upper Suspension Arm.		90	66.5
Track-rod End Lock Nut.		70	52
Vehicle Ride Height Sensor.	M8	22.5	17
	M5	9	7
Anti-roll Bar Link Nuts		110	81.5
Anti-roll Bar Mounting Bolts		22.5	17
Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)			
Torque the following suspension fixings with the vehicle at normal ride height			
Lower Suspension Arm front bush to the Subframe		115	85
Lower Suspension Arm rear bush to the Subframe.		185	137
Upper Suspension Arm to the Front Structure		115	85
Spring and Damper Bolts	Top	22.5	17
	Lower	175	129.5

Normal ride height 2 x 68 kg + 14kg in the boot +full fuel tank.

Symptoms

Symptom	Possible Cause	Action
Crabbing	Front or rear suspension components / road wheel alignment	Inspect front and rear suspension systems.
		Check / adjust road wheel alignment
	Drive axle damaged	New drive axle.
Front 'Bottoming' or Riding Low	Spring(s)	Check ride height.
	Dampers	Check dampers.
Drift / Pull	Unequal tyre pressure	Check / adjust tyre pressures.
		Inspect tyre for excessive wear.
	Incorrect road wheel alignment	Check / adjust road wheel alignment.
	Tyres	Check / adjust tyre pressures. Inspect tyre for excessive wear.
	Unevenly loaded or overloaded vehicle	Notify customer of incorrect vehicle loading.
	Damaged steering components	Check steering system for mechanical or hydraulic bias.
	Brake drag	Check brakes.
		Check steering system for mechanical or hydraulic bias.
Rough Ride	Spring(s)	Check springs.
	Shock absorber(s)	Check shock absorbers.
Incorrect Tyre Wear	Incorrect tyre pressure	Check and adjust tyre pressure. Inspect tyre for excessive wear.
	Excessive front or rear Toe (rapid inner or outer edge wear)	Check and adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
	Excessive negative or positive camber (rapid or outer edge wear)	Check and adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
	Tyres out of balance (tyres cupped or dished)	Balance tyres.
'Shimmy' or 'Road Wheel Tramp'	Loose road wheel nut(s)	Check and tighten road wheel nuts to specification.
	Loose front suspension	Check and tighten suspension fixings to specification.
	Front road wheel bearing(s)	Check road wheel bearings.
	Road wheel / tyres	Check road wheels / tyres.
	Shock absorber(s)	Check shock absorbers.
	Spring(s)	Check springs.
	Loose, worn or damaged ball joint(s)	Check ball joint(s) (Refer to 'Ball Joints', page 4-2-4).
	Loose, worn or damaged steering components	Check components.
	Front road wheel alignment	Check and adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
	Worn or damaged suspension bushes	Check suspension bushes
Poor 'Return ability' of Steering	Ball joints	Check ball joint(s).
	Steering components	Check for excessive friction in steering system.
		Check tyre pressures
Steering Wheel Off-Centre	Unequal front or rear Toe settings	Check and adjust road wheel alignment.
	Steering components	Check and install new components as required.
Sway or Roll	Overloaded, unevenly or incorrectly loaded vehicle	Notify customer of incorrect vehicle loading
	Loose road wheel nut(s)	Check. Tighten road wheel nut(s) to specification
	Spring(s)	Check. Install new springs as required.
	Shock absorber(s)	Check. Install new shock absorbers as required.
	Loose front stabilizer bar or rear stabilizer bar	Check. Tighten anti-roll bar to specification.

Symptom	Possible Cause	Action
Vibration / Noise	Tyres / road wheel	Check. Install new components as required.
	Road wheel bearing assemblies	
	Brake components	
	Suspension components	
	Spring and damper units	
	Steering components	
Vehicle Leans to One Side	Unevenly loaded or overloaded vehicle	Notify customer of incorrect vehicle loading.
	Front or rear suspension components	Inspect front and rear suspension systems.
	Spring and damper assemblies	Check spring and damper assemblies.
	Incorrect ride height. Lateral tilt out of specification	Check ride height.
	Suspension bushes not torqued at ride height	Check / adjust suspension bushes torque.
Wander	Unevenly loaded or overloaded vehicle	Notify customer of incorrect vehicle loading.
	Ball joint(s)	Check ball joint(s) (Refer to 'Ball Joints', page 4-2-4).
	Front road wheel bearing(s)	Check road wheel bearings.
	Loose, worn or damaged suspension components	Check suspension components.
	Loose suspension fasteners	Check and tighten suspension fasteners to specification.
	Steering components	Check steering components for wear and / or free play.
	Road wheel alignment (excessive total front Toe-out)	Check / adjust road wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

Maintenance

Caution

Treat the suspension components with care. The suspension components are libel to damage if struck with, e.g. a metal faced hammer.

Road Wheel Bearing

Inspection

1. Raise and support the vehicle.
2. Make sure the road wheel rotates freely and that the brake pads are sufficiently retracted, allowing free movement of the road wheel.
3. Firmly grasp the road wheel at the top and bottom. Attempt to move the road wheel inward / outward while lifting the weight of the road wheel off the road wheel bearing.

   Observe upper and lower ball joints for movement.
4. If there is any excess movement in the road wheel bearing, replace the bearing assembly.



Ball Joints

Inspection

1. Raise and support the vehicle.

Prior to carrying out any inspection of the ball joints, inspect the road wheel bearings.

2. Pull and push the bottom of the road wheel. Check for any relative movement between the ball joint and the lower suspension arm.
   Install new components if required.



3. Pull and push the top of road wheel. Check the relative movement between the ball joint and the upper suspension arm.
   Install new components as required.
4. Lower the vehicle.

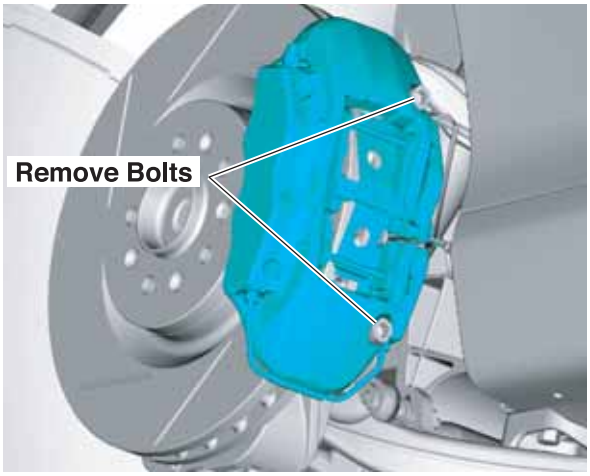
Front Suspension

Repair Operation Time (ROT)		
Item		**Code**
Upper Suspension Arm	(LH)	**04.01.NB**
	(RH)	**04.01.PB**
Lower Suspension Arm	(LH)	**04.01.LB**
	(RH)	**04.01.MB**
Vertical link	(LH)	**04.01.GB**
	(RH)	**04.01.HB**
Spring and Damper Unit	(LH)	**04.03.AB**
	(RH)	**04.03.BB**
Anti-roll Bar		**04.01.AB**

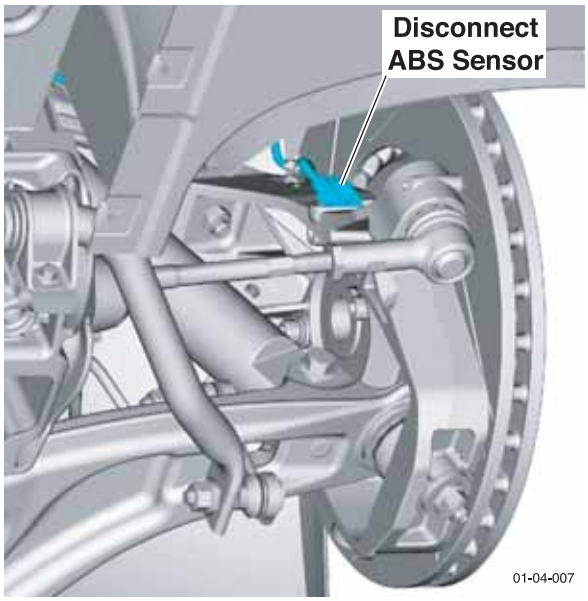
Caution
Treat the suspension components with care. The suspension components are libel to damage if struck with, e.g. a metal faced hammer.

Removal

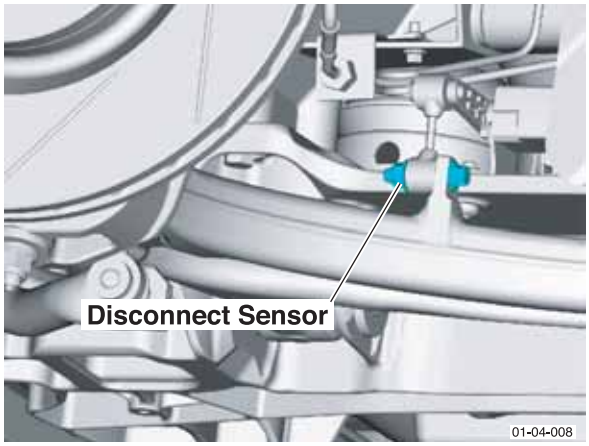
1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the brake caliper (bolts x2). Move the brake caliper to one side and secure.



4. Disconnect the ABS sensor wiring harness plug.



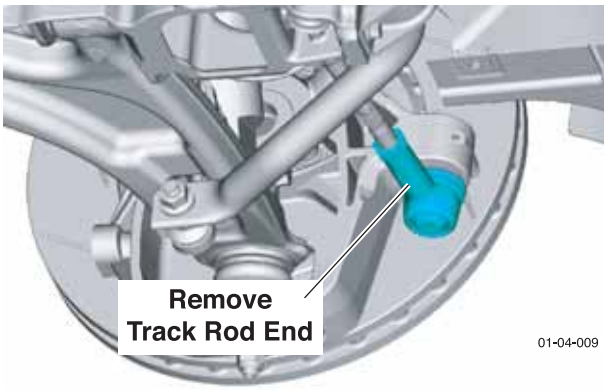
5. Disconnect the vehicle ride height sensor.



6. Using service tool (Refer to '204-523 (Ball Joint Splitter)', page 20-1-3), remove the track rod-end.

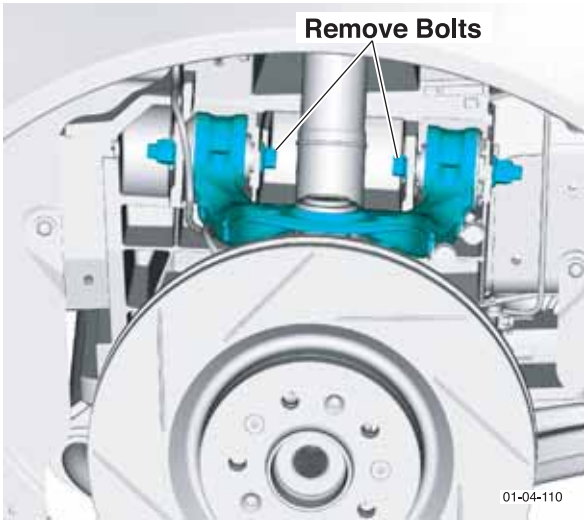
Caution
Do not use a hammer, etc., to 'shock' the track rod-end.

Take care not to damage the ball joint boot.

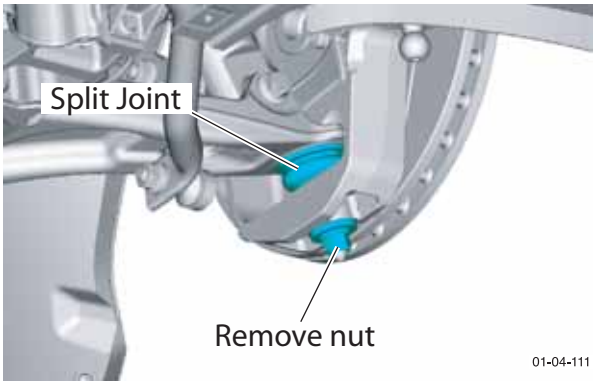


7. Remove the upper suspension arm and vertical link as a unit.

7.1 Remove bolts (x2) that secure the upper suspension arm to the body structure.



7.2 Using service tool (Refer to '204-523 (Ball Joint Splitter)', page 20-1-3), remove the vertical link from the lower suspension arm.



7.3 If required separate the upper suspension arm from the vertical link.

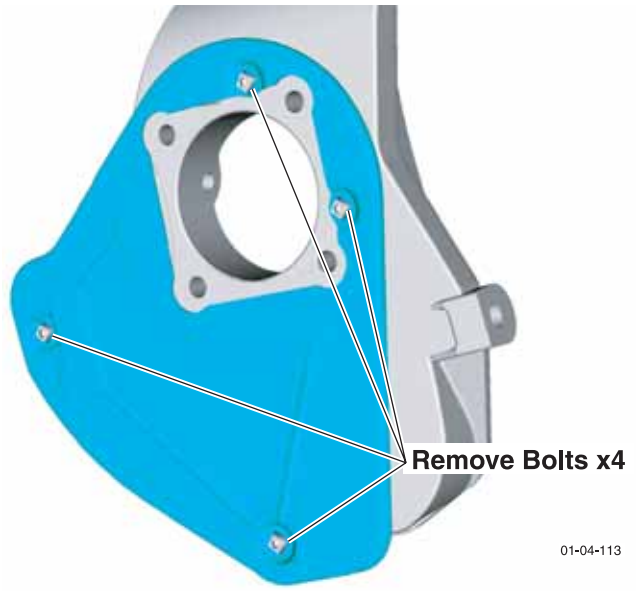
8. If required, remove the hub from the vertical link.

8.1 Remove bolts (x4).



8.2 Press the hub from the vertical link.

8.3 Remove the brake dust shield (bolts x4).

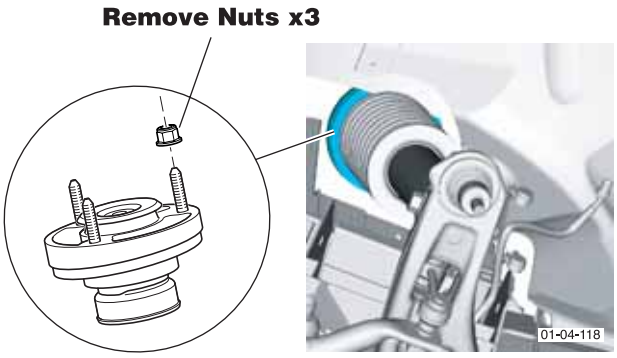


9. Remove the spring and damper assembly.

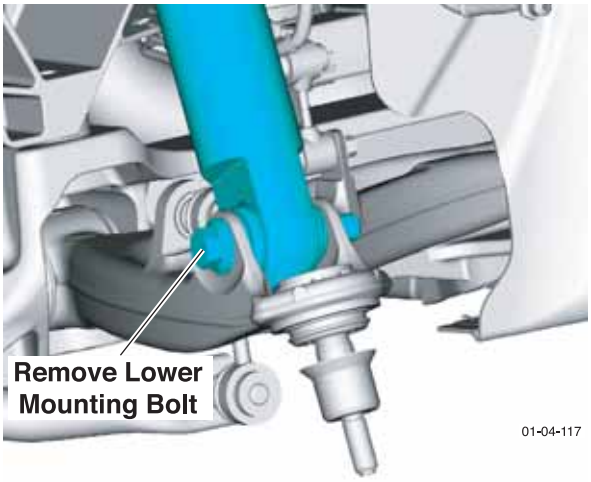
Caution
Ensure the damper is fully extended.

If removing both spring and damper units - the engine bay cross brace will be released.

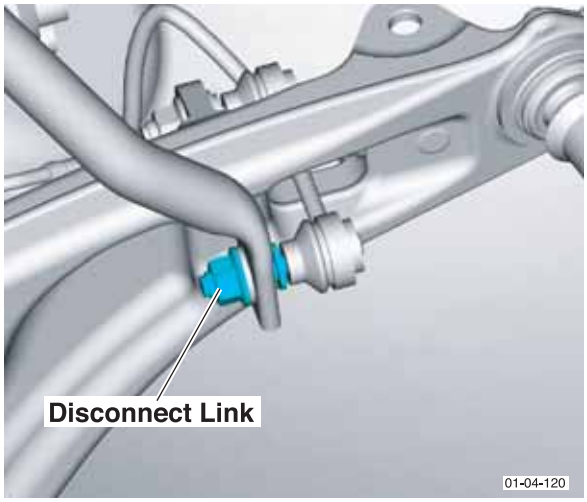
9.1 Remove nuts (x3) from the top of the spring and damper assembly.



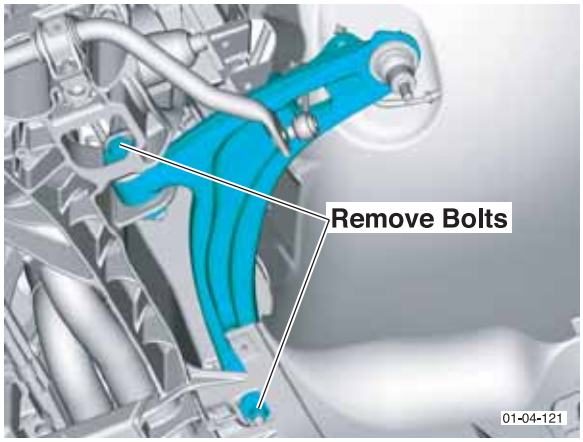
9.2 Remove the spring and damper assembly lower mounting bolt.



10. Disconnect the anti-roll bar link assembly.



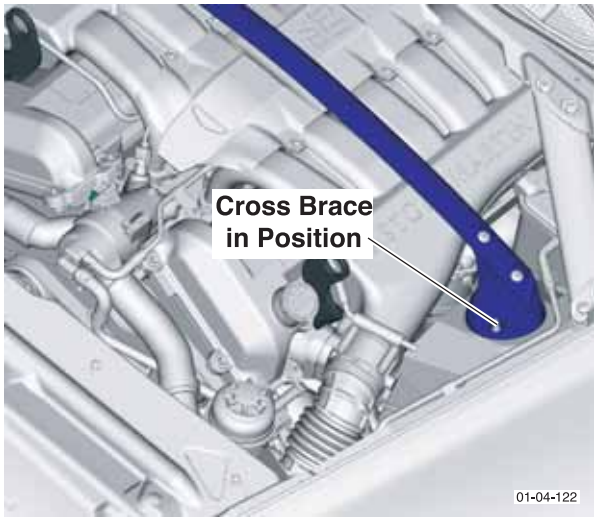
11. Remove bolts (x2) that secure the lower suspension arm to the subframe. Withdraw the lower suspension arm.



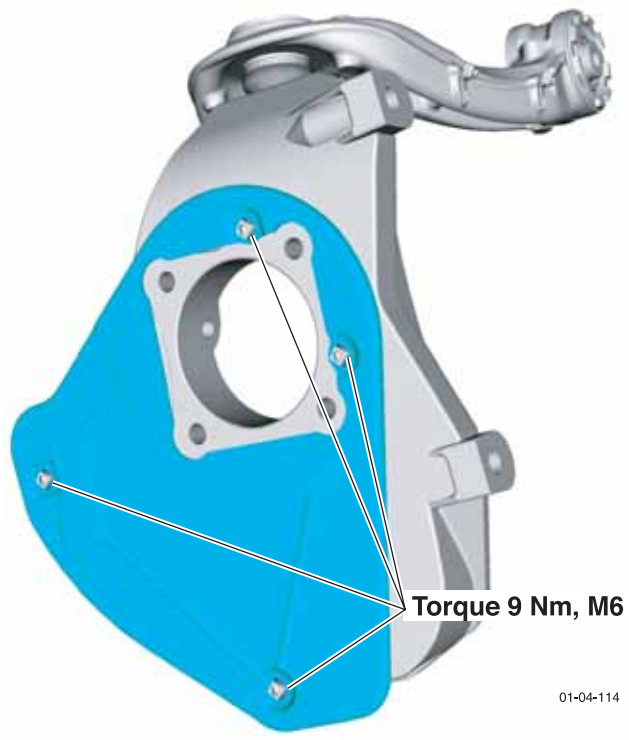
Installation

Caution
Final tightening of the suspension components must be carried out with the suspension arms at normal ride height. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

1. Install the lower suspension arm to the subframe. Do not torque.
2. Place the engine bay cross brace, complete with mounts, in position. Install the spring and damper assembly. Do not torque bolts.



3. Install the bearing assembly to the vertical link (if removed).
   3.1 Install the brake dust shield. Torque bolts (x3) to **9 Nm**.

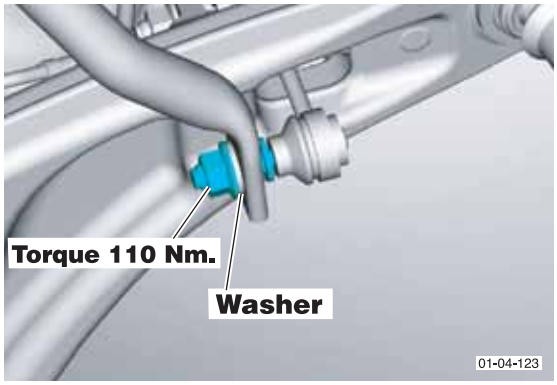


   3.2 Install the bearing assembly. Torque bolts to **55 Nm**.



4. Install the anti-roll bar link assembly to the lower arm. Torque to **110 Nm**.

Ensure that the washer installs as shown below.



5. Install the upper suspension arm to the vertical link, if removed. Torque nut to **90 Nm**.
6. Install the vertical link to the lower suspension arm. Torque nut to **90 Nm**.
7. Install the upper suspension arm to the body structure. Do not torque.
8. Install the track-rod end. Torque nut to **70 Nm**.



9. Install the vehicle ride height sensor (LH side). Torque nut to **22.5 Nm**.
10. Install the ABS sensor wiring harness plug.
11. Install the brake caliper (Refer to 'Brake Caliper (Front and Rear)', page 6-1-3).
    Torque bolts to **20 Nm + 66°-70°**

12. Torque the suspension fixings with the vehicle at normal ride height (Refer to 'Specifications', page 4-2-1):
    - Lower suspension arm to the subframe (rear bush) - **185 Nm**.
    - Lower suspension arm to the subframe (front bush) - **115 Nm**.
    - Upper suspension arm to the front structure - **115 Nm**.
    - Spring and damper bolts to (top) **25.5 Nm**. (bottom) **175 Nm**.

The engine bay cross brace must be torqued with the weight of the vehicle on the roadwheels.

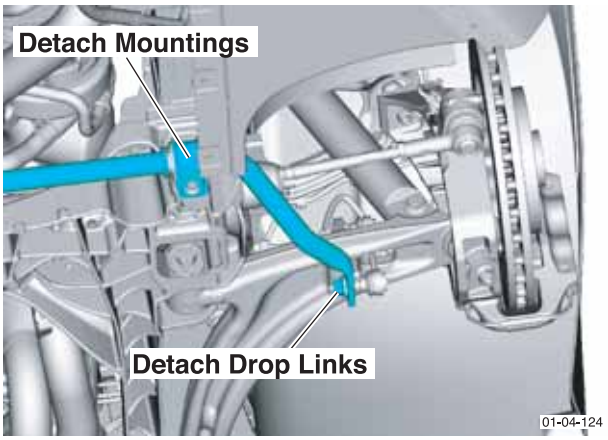
13. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
14. Check / adjust the Camber, Castor and Toe settings.

Anti-roll Bar

Repair Operation Time (ROT)	
Item	**Code**
Anti-roll Bar Renew	**04.01.AB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the front undertray.
4. Remove the anti-roll bar from the anti-roll bar drop links.

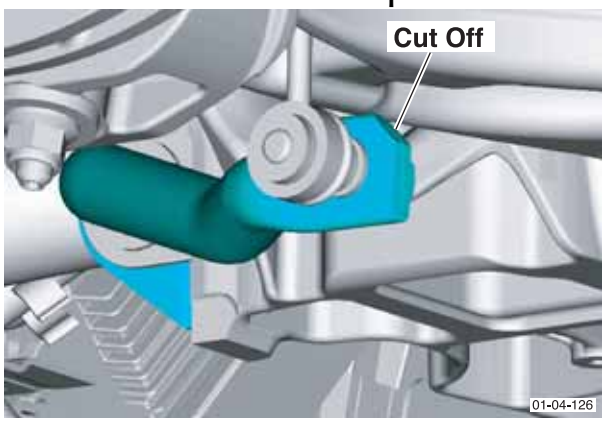


5. Remove the anti-roll bar mountings (strap and bush) from the subframe and withdraw the anti-roll bar.

Installation

1. Place the anti-roll bar in position and install the stabiliser mountings.

Caution
The anti-roll bar must be installed with the cut off section at the top.

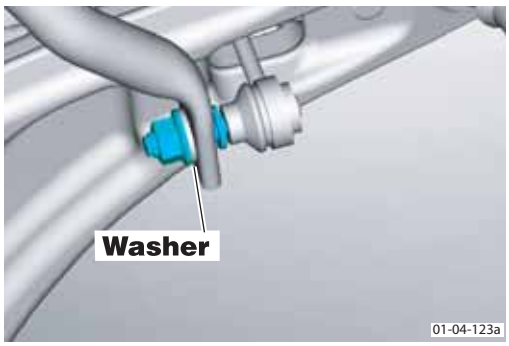


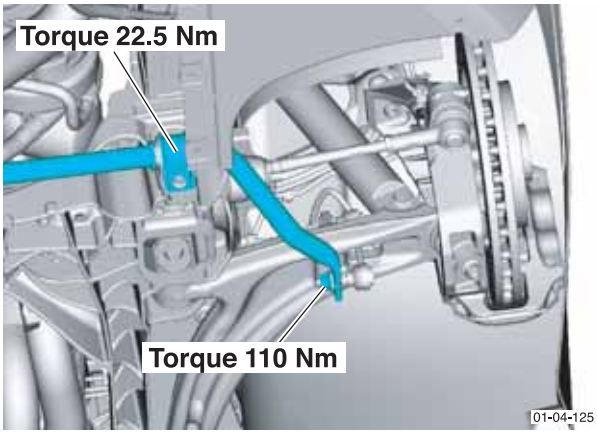
2. Connect the anti-roll bar to the anti-roll bar drop links. Torque the fixings.
    - Anti-roll bar mounting bolts to **22.5 Nm**.

Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)

    - Anti-roll bar link nuts to **110 Nm**.

Ensure that the washer installs as shown below.





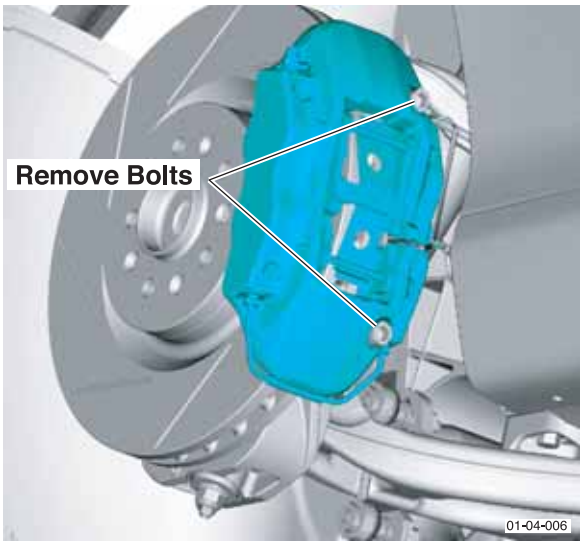
3. Install the front undertray.
4. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Vertical Link

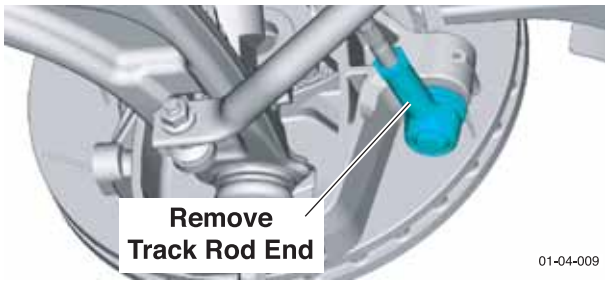
Repair Operation Time (ROT)		
Item		**Code**
Vertical link Renew	(LH)	**04.01.GB**
	(RH)	**04.01.HB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the brake caliper bolts (x2). Move the brake caliper to one side and secure.



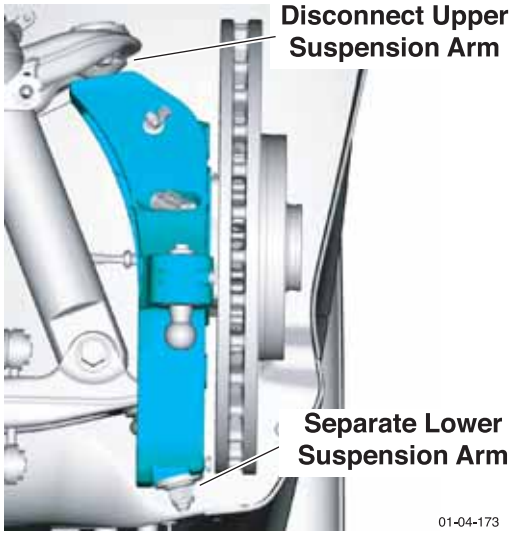
4. Disconnect the ABS sensor wiring harness plug.
5. Remove the track-rod end.



6. Separate the lower suspension arm from the vertical link
   - 6.1 Install service tool (Refer to '204-524 (Front Suspension Support)', page 20-1-4). Lower the vehicle until the lower suspension arm is horizontal.
   - 6.2 Using a service tool(Refer to '204-523 (Ball Joint Splitter)', page 20-1-3) part the lower suspension arm from the Vertical link.

Caution
Do not use a hammer, etc., to 'shock' the track rod-end.
Take care not to damage the ball joint boot.

   - 6.3 Raise the vehicle and remove the service tool (Refer to '204-524 (Front Suspension Support)', page 20-1-4).
7. Disconnect the upper suspension arm from the vertical link.



Installation

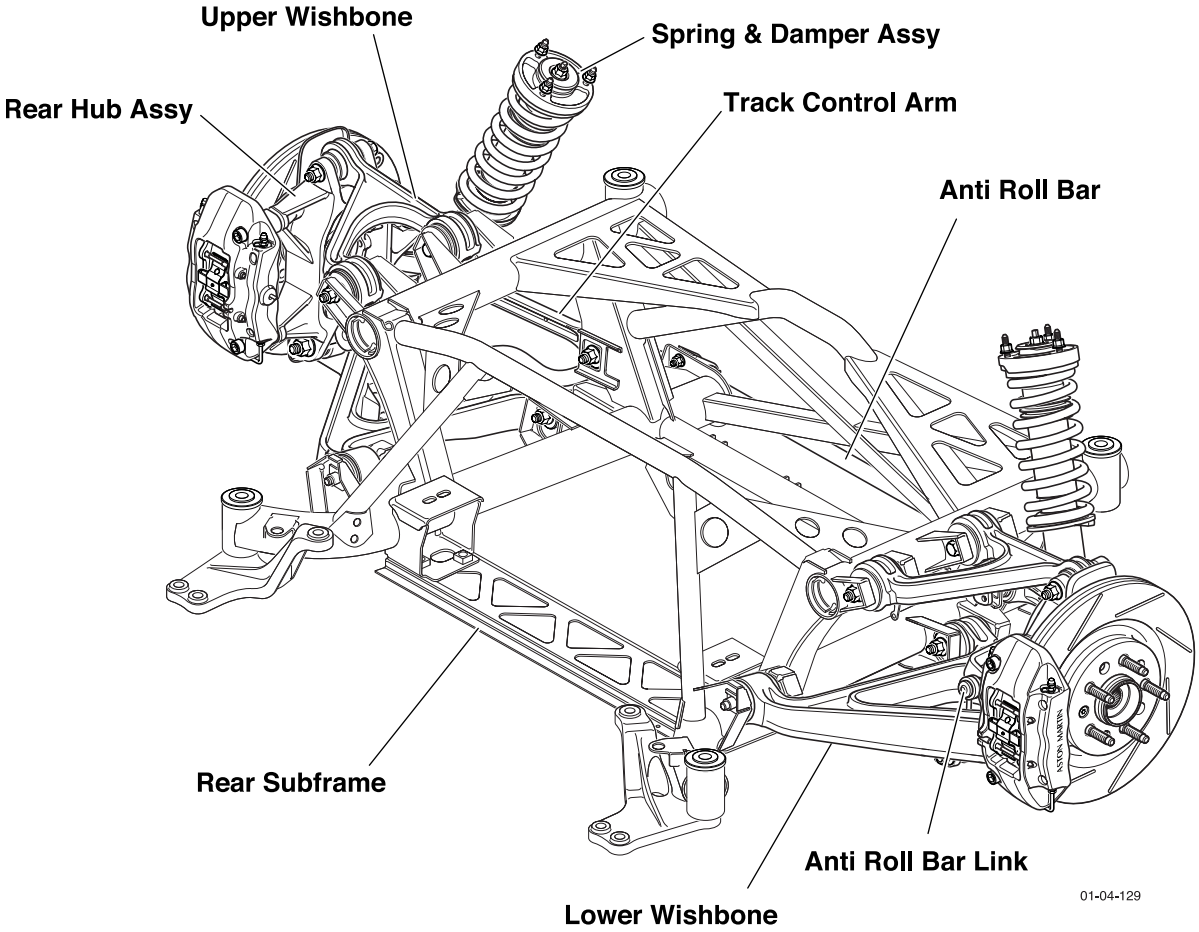
1. Install the vertical link to the lower suspension arm. Torque bolt to **90 Nm**.
2. Install the vertical link to the upper suspension arm. Torque bolt to **90 Nm**.
3. Install the track-rod end. Torque nut to **70 Nm**.
4. Connect the ABS sensor wiring harness plug.
5. Install the brake caliper (Refer to 'Brake Caliper (Front and Rear)', page 6-1-3). Torque bolts to **20 Nm + 66°-70°.**
6. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
7. Check / adjust the Camber, Caster and Toe settings.

ASTON MARTIN
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Suspension (04.00)

Rear Suspension (04.02)

Description



Suspension Arms

The upper suspension arms are each installed with a press-fit ball joint, and two interleaved rubber bushes. Two bolts attach each upper suspension arm to the rear subframe.

The lower suspension arms each have press fit ball joints installed and metal-to-rubber bonded bushes which are attach to the rear subframe by two eccentric cam bolts.

The camber setting is adjusted by rotating the lower suspension arm rear eccentric cam bolt.

Anti-roll Bar

An anti-roll bar, mounted on the rear subframe connects to the LH and RH lower suspension arms via drop links. The drop links, with a ball joint at either end, transmit vertical movement of the rear suspension to the anti-roll bar, minimising body roll.

Vertical Link

The vertical link carries the hub, the cartridge wheel bearing, the ABS rotor, the wheel speed sensor, the brake caliper, the hand brake caliper and the brake disc and shield.

A toe control (track-rod) arm secures the rear of the vertical link to the subframe. The toe control arm is adjustable, on an eccentric cam, to alter the rear road wheel toe alignment.

Specifications

Torque Figures			
Description		Nm	lb. / ft.
Brake Dust Shield.		9	7
Bearing Assembly to the Vertical link.		50	37
Halfshaft Nut		300	221.5
Spring and Damper Bracket Mounting		75-80	55.5-59.5
Spring and Damper Top Mounting to Bracket		22.5	17
Spring and Damper Lower Mounting		175	129.5
Track rod Arm to Vertical Link		115	85
Anti-roll Bar Link		110	81.5
Anti-roll Bar Mounting Bolts		30	22.5
Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)			
Ride Height Sensor	M8	22.5	
Torque the following suspension fixings with the vehicle at normal ride height			
Vertical Link to the Lower Suspension Arm.		175	129.5
Vertical Link to the Upper Suspension Arm.		90	66.5
Lower Suspension Arm to the Subframe.		115	85
Upper Suspension Arm to the Subframe		115	85
Track-Rod Arm to Subframe		115	85

Normal ride height: 2 x 68 kg + 14kg in the boot +full fuel tank.

Maintenance

For details on:

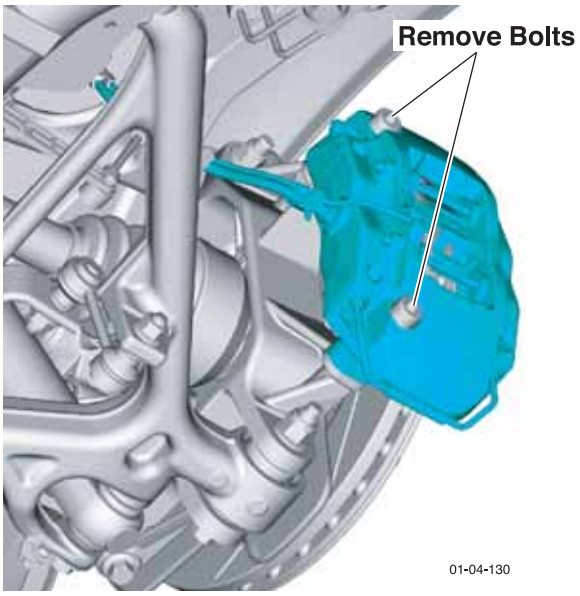
• Alignment	(Refer to 'Road Wheel Alignment (04.00)', page 4-1-2)
• Inspections • Symptoms • Road Wheel Bearing Procedures • Ball Joints Procedures	(Refer to 'Suspension (04.00)', page 4-2-1)

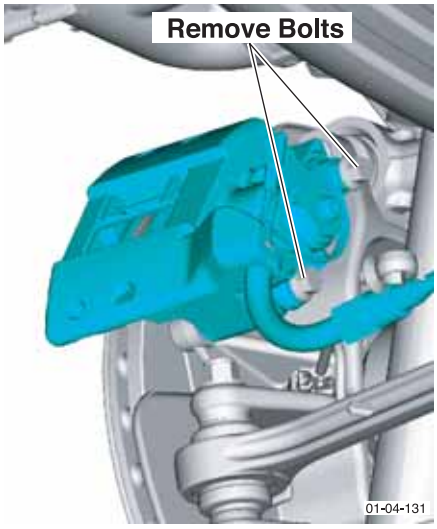
Rear Suspension

Repair Operation Time (ROT)		
Item		**Code**
Upper Suspension Arm Renew	(LH)	**04.02.RB**
	(RH)	**04.02.SB**
Lower Suspension Arm Renew	(LH)	**04.02.NB**
	(RH)	**04.02.PB**
Vertical link Renew	(LH)	**04.02.GB**
	(RH)	**04.02.HB**
Spring and Damper Unit Renew	(LH)	**04.03.CB**
	(RH)	**04.03.DB**
Anti-roll Bar Renew		**04.02.AB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the bolts securing the service brake and handbrake calipers to the vertical link. Move the calipers to one side and secure.

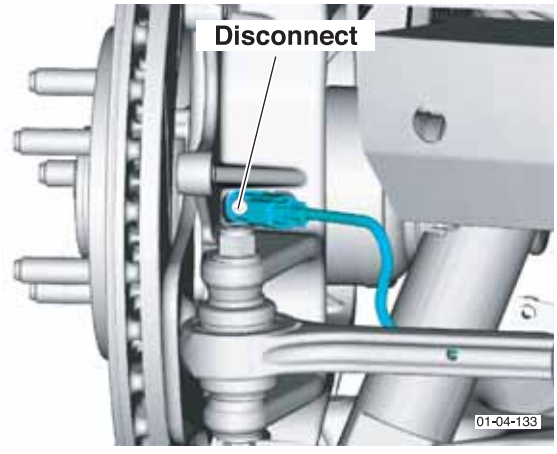




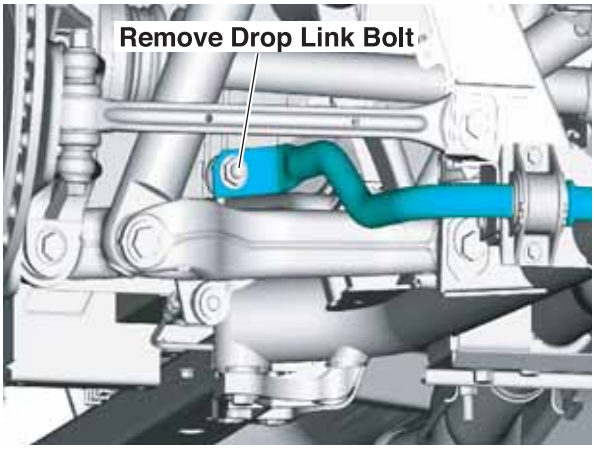
4. Remove the halfshaft nut.



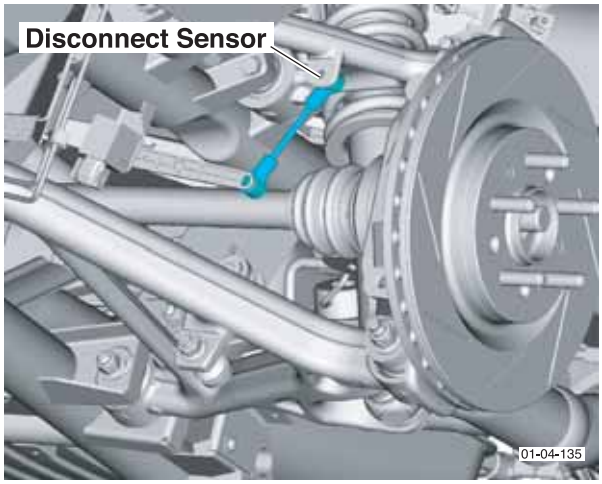
5. Disconnect the ABS sensor wiring harness plug.



6. Remove the anti-roll bar drop links.



7. Disconnect the vehicle height sensor (LH side).



8. Remove the bolt that secures the track-rod arm to the vertical link.
9. Remove the bolt that secures the upper suspension arm to the vertical link.
10. Press the halfshaft from the vertical link.
11. Remove the bolt that secures the vertical link to the lower suspension arm.

12.If required, remove the bearing assembly from the vertical link.

12.1 Remove bolts (x4) that secure the bearing assembly to the vertical link.

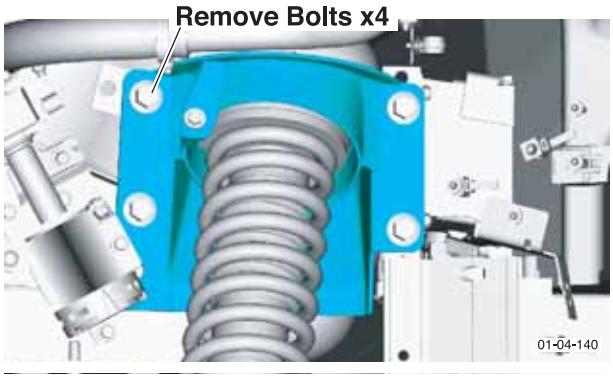
12.2 Press the bearing assembly from the vertical link.



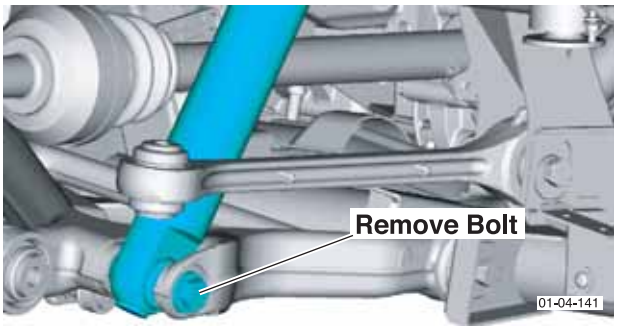
13. Remove the spring and damper assembly.

Ensure the damper is fully extended.

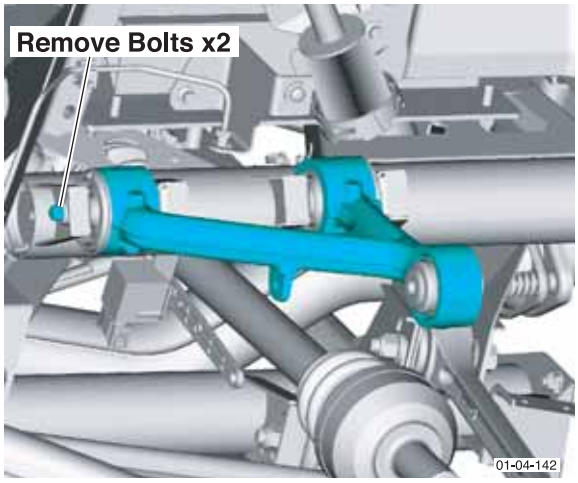
13.1 Remove the bolts (x4) from the spring and damper assembly upper mounting bracket.



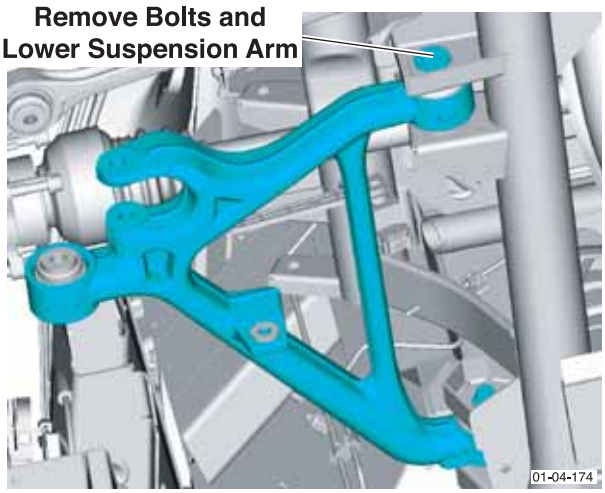
13.2 Remove the bolt from the lower spring and damper mounting. Withdraw the spring and damper assembly.



14.Remove the upper suspension arm.



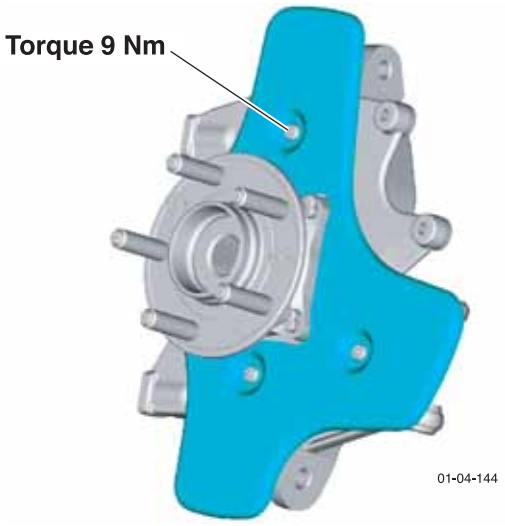
15. Remove the lower suspension arm.

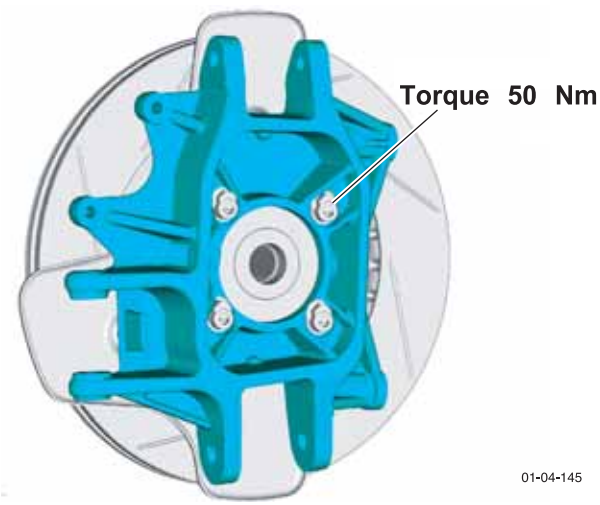


Installation

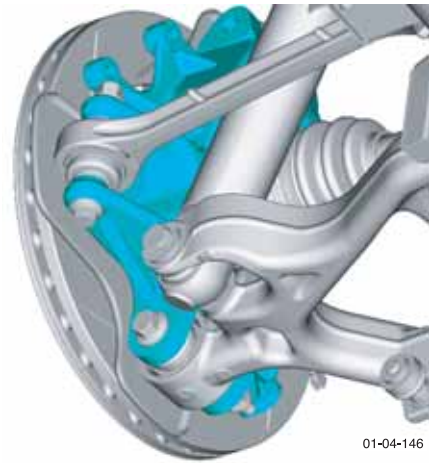
1. Install the lower suspension arm to the rear subframe. Do not torque.
2. Install the spring and damper assemblies. Torque to:
   - Top mounting bracket bolts (x4) - **75-80 Nm**.
   - Bottom mounting bolt - **175 Nm**.
3. Install the upper suspension arm to the subframe. Do not torque.

4. Install the bearing assembly (if removed).
   - Bearing bolts to **50 Nm**.
   - Dust shield bolts to **9 Nm**.

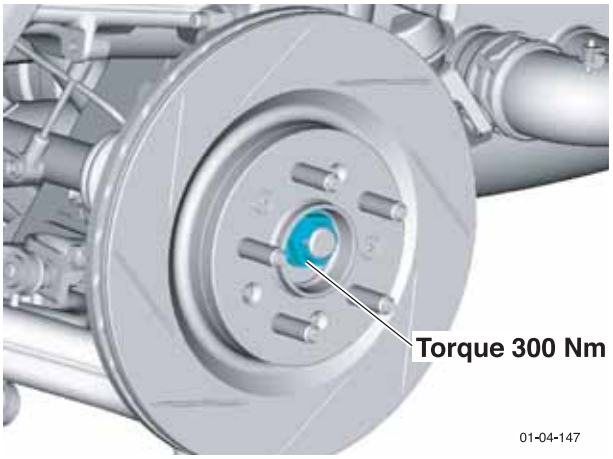




5. Install the vertical link. Do not torque bolts.

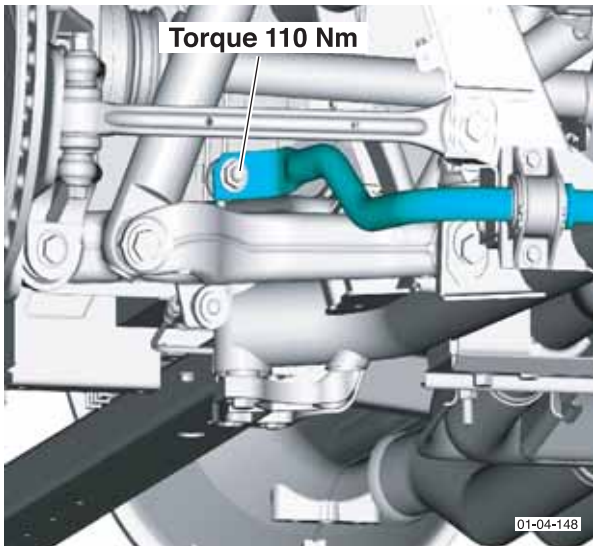


6. Install the track-rod end. Do not torque.
7. Connect the ABS sensor wiring harness plug.
8. Install the halfshaft nut. Torque to **300 Nm**.



9. Install the service brake and the handbrake calipers. Torque bolts to:
   - Service brake caliper to **20 Nm. + 66°-70°**
   - Handbrake caliper to **15 Nm. + 90°-94°**
10. Install the anti-roll bar drop link. Torque to **110 Nm**.

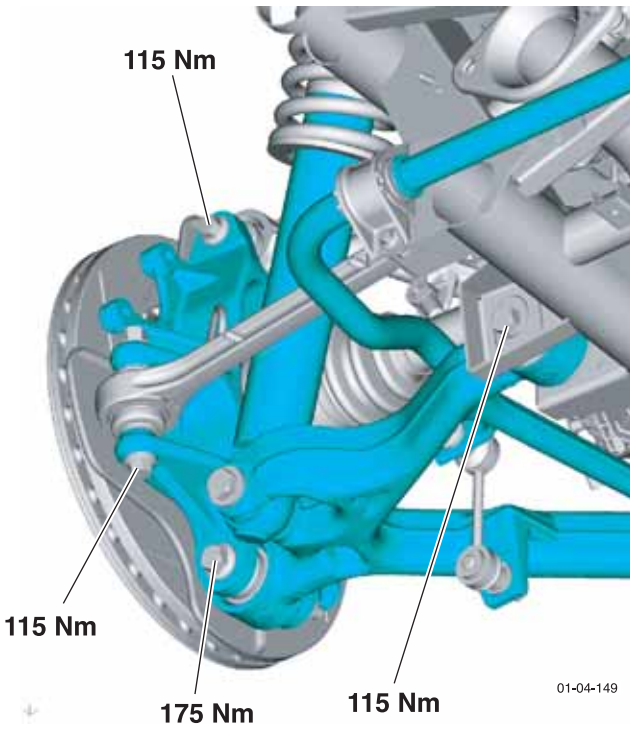
Ensure that the washer is installed between the nut and the anti-roll bar.

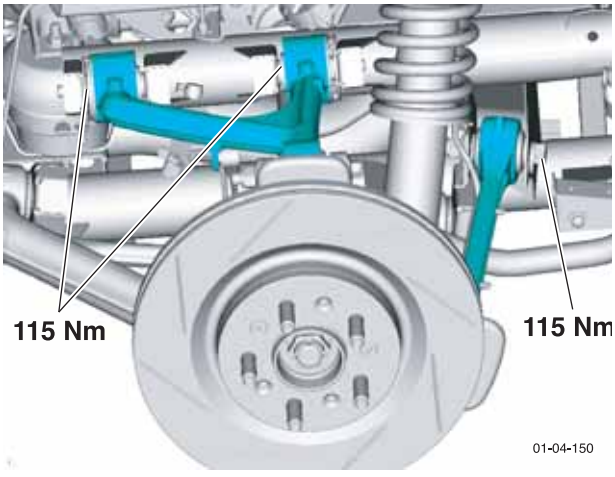


11. Install the vehicle ride height sensor (LH side). Torque nut to - **22.5 Nm**.
12. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Caution
Final tightening of the suspension components must be carried out with the suspension arms at normal ride height. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

13. Torque the suspension fixings with the vehicle at normal ride height (Refer to 'Specifications', page 4-1-2).
    - Lower suspension arm to the subframe - **115 Nm**.
    - Vertical link to the lower suspension arm - **175 Nm**.
    - Upper suspension arm to the vertical link - **115 Nm**.
    - Upper suspension arm to the subframe - **115 Nm**.
    - Track-rod end to vertical link - **115 Nm**.
    - Track-rod arm to subframe - **115 Nm**.





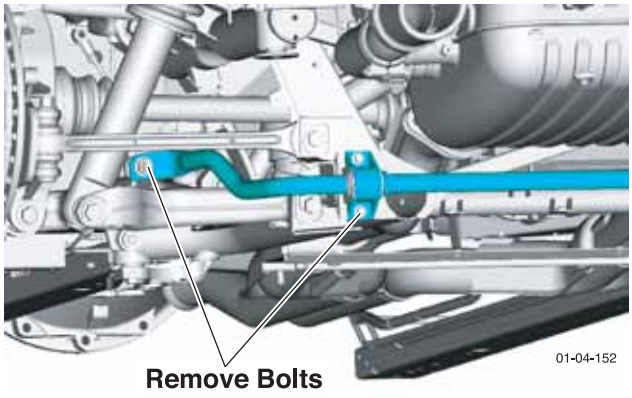
14. Check / adjust the Camber and Toe settings.

Anti-roll Bar

Repair Operation Time (ROT)	
Item	**Code**
Anti-roll Bar Renew	04.02.AB

Removal

1. Remove the rear under tray.
2. Disconnect the anti-roll bar link assembly from the lower arm (x2).



3. Remove the bolts (x2) from the bush strap (x2).
4. Withdraw the anti-roll bar.

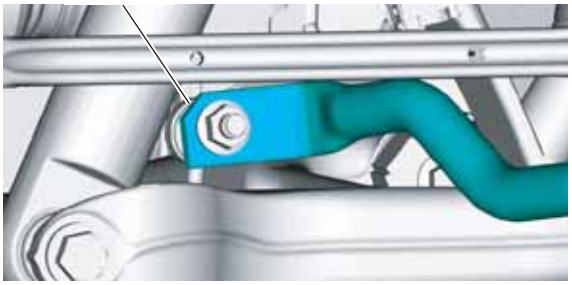
Installation

Caution
Final tightening of the suspension components must be carried out with the suspension arms at normal ride height. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

1. Place the anti-roll bar in position.

1.1 Install both bush straps (bolts x4). Do not torque.

Caution
The anti-roll bar must be installed with the cut off section at the top.



1.2 Secure both ends of the anti-roll bar link assembly to the lower arm (bolts x2).

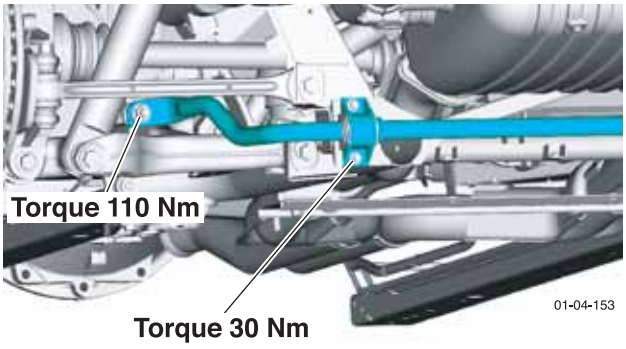
Torque the fixings.

- Anti-roll bar mounting bolts to **30 Nm**.

Torque bolt 1, then bolt 2, then bolt 1 again (to allow for rubber compression)

• Anti-roll bar link nuts to **110 Nm**.

Ensure that the washer installs between the stud and the suspension arm.



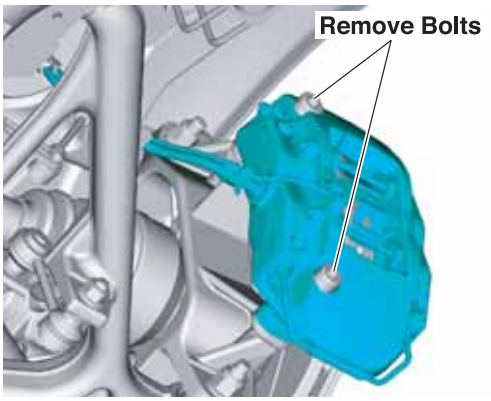
2. Install the rear undertray.

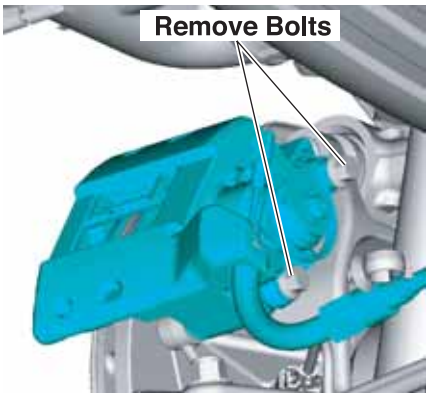
Vertical link

Repair Operation Time (ROT)		
Item		**Code**
Vertical link Renew	(LH)	**04.02.GB**
	(RH)	**04.02.HB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the service brake and handbrake calipers. Move the calipers to one side and secure.

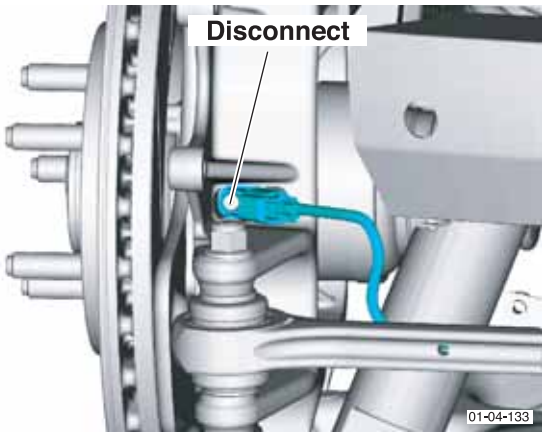




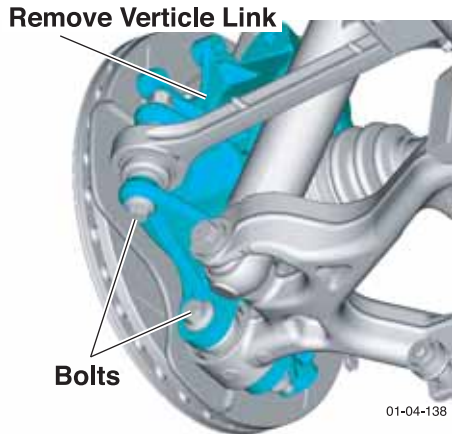
4. Remove the halfshaft nut.



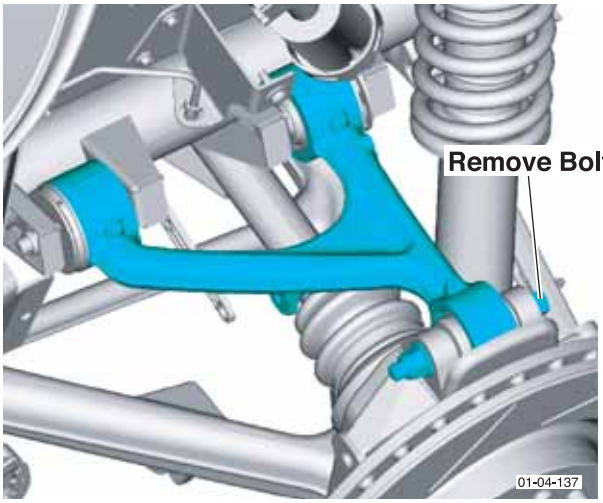
5. Disconnect the ABS sensor wiring harness plug.



6. Disconnect the track-rod arm.



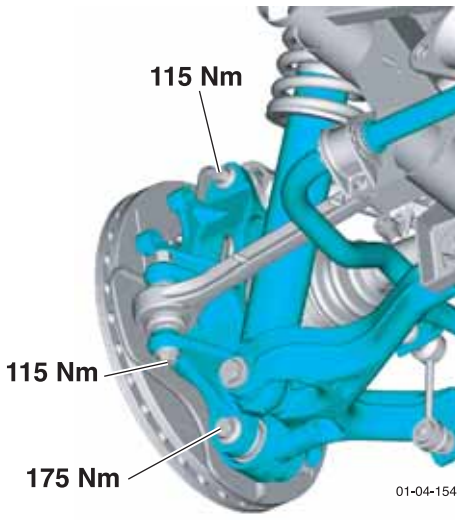
7. Disconnect the upper suspension arm.



8. Press the halfshaft from the vertical link.
9. Remove the Vertical link from the lower suspension arm.

Installation

1. Install the vertical link to the lower suspension arm.
2. Install the halfshaft through the vertical link.
3. Install the vertical link to the upper suspension arm.
4. Torque the following:
   - Vertical link to the **lower** suspension arm - **175 Nm**.
   - Vertical link to the **upper** suspension arm - **115 Nm**.
5. Install the track-rod arm. Torque to - **115 Nm**.



6. Connect the ABS sensor wiring harness plug.
7. Install the halfshaft nut. Torque to **300 Nm**.



8. Install the service brake and the handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1). Torque bolts to:
   - Service brake caliper to **20 Nm. + 66°-70°**
   - Handbrake caliper to **15 Nm. +90°- 94°**
9. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
10. Check / adjust the Camber and Toe settings.

Suspension (04.00)

Shock Absorber System (04.03)

Description

Movement of each road spring is independently damped by a telescopic, hydraulically-controlled shock absorber. Each shock absorber is installed coaxially within the road spring. Front spring and damper assemblies are located between the upper suspension arm and attach to the lower suspension arm and the body structure.

Rear spring and damper assemblies attach to the lower suspension arm and the rear subframe, via a mounting bracket, laying to the rear of the upper suspension arm.

Specifications

Torque Figures		
Description	Nm	lb. / ft.
Front		
Spring and Damper Top Mounts	22.5	17
Spring and Damper Bottom Mount	175	129.5
Upper Suspension Arm	115	85
Rear		
Spring and Damper Bracket Mounting	75-80	55.5-59.5
Spring and Damper Top Mounting to Bracket	22.5	17
Spring and Damper Lower Mounting	175	129.5
Vertical Link to Lower Suspension Arm	175	129.5
Track-rod Arm to Lower Suspension Arm	115	85

Maintenance (Front)

Spring and Damper Assembly

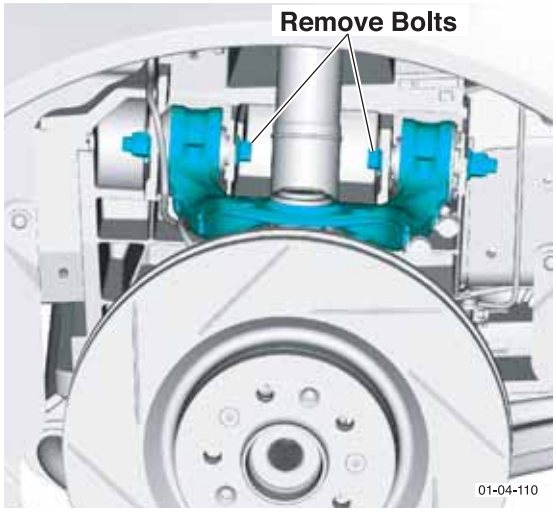
Repair Operation Time (ROT)		
Item		**Code**
Spring and Damper Unit Renew	(LH)	**04.03.AB**
	(RH)	**04.03.BB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Disconnect the ABS sensor wiring harness plug.
4. Remove the upper suspension arm from the body structure.

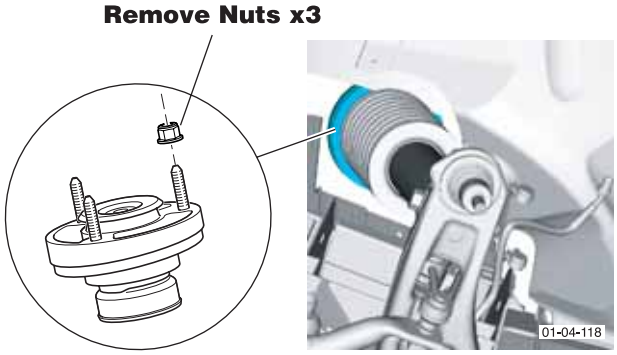
Allow the upper suspension arm and the Vertical link to fall back, giving access to the spring and damper assembly.

Caution
Ensure the brake flex hose is not over stretched.



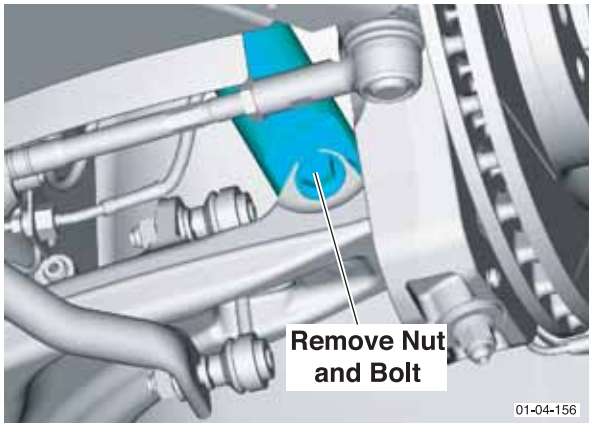
Ensure the spring and damper assembly is fully extended.

5. Remove the spring and damper top mount nuts (x3).



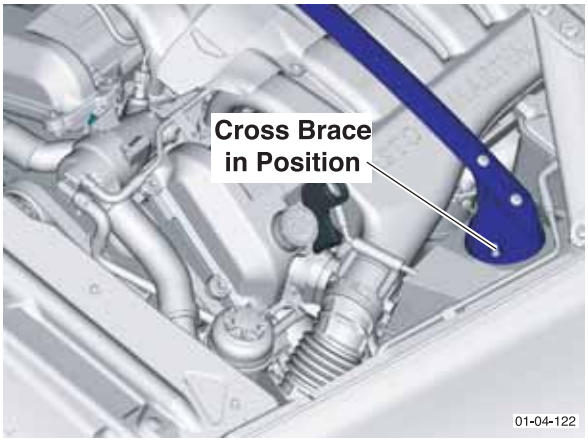
If removing both spring and damper units - the engine bay cross brace will be released.

6. Remove the lower mounting nut and bolt. Withdraw the spring and damper assembly.



Installation

If removed, place the engine bay cross brace, complete with mounts, in position.



Caution
Ensure the brake flex hose is not over stretched.

1. Install the spring and damper unit. Do not torque bolts.

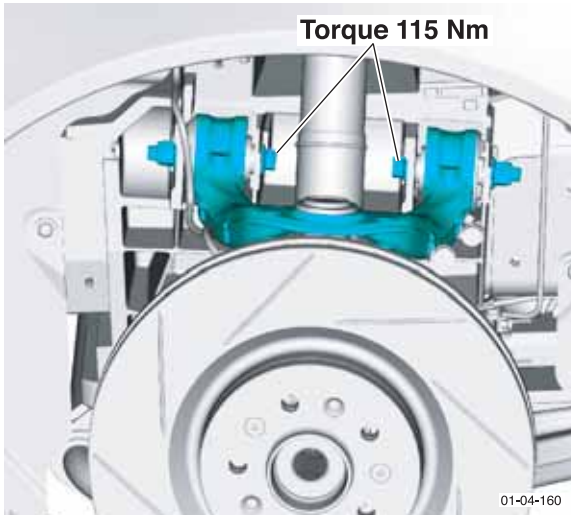
The engine bay cross brace mount must be torqued with the weight of the vehicle on the roadwheels.

2. Install the upper suspension arm. Do not torque.
3. Connect the ABS sensor wiring harness plug.
4. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

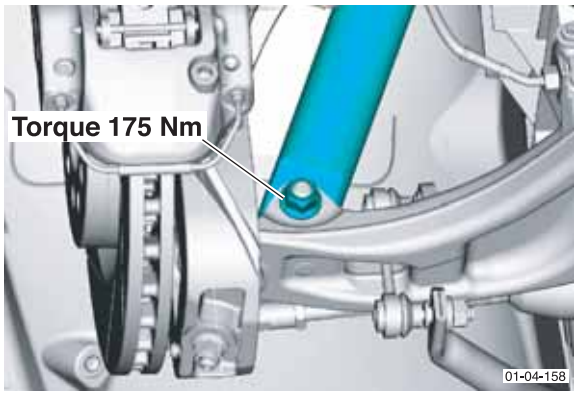
Caution
Final tightening of the suspension components must be carried out with the full weight of the vehicle on its road wheels. Failure to do this will over stress the suspension bushes when the suspension is deflected to max. upward travel.

5. Torque the suspension fixings with the vehicle at normal ride height:
   - Upper suspension arm to the front structure - **115 Nm**.
   - Spring and damper bolts to (top) **22.5 Nm**. (bottom) **175 Nm**.

The engine bay cross brace must be torqued with the weight of the vehicle on the roadwheels.







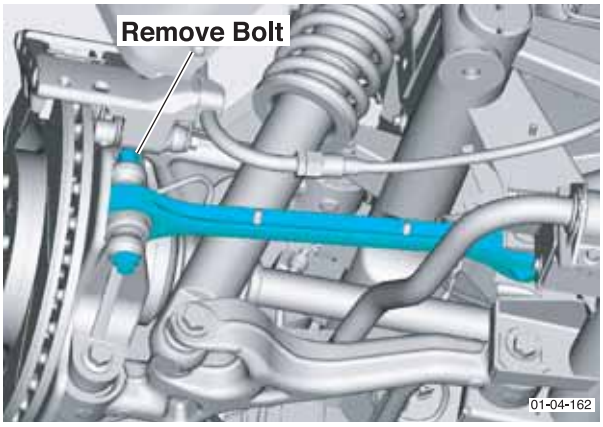
Maintenance (Rear)

Spring and Damper Assembly

Repair Operation Time (ROT)		
Item		**Code**
Spring and Damper Unit Renew	(LH)	**04.03.CB**
	(RH)	**04.03.DB**

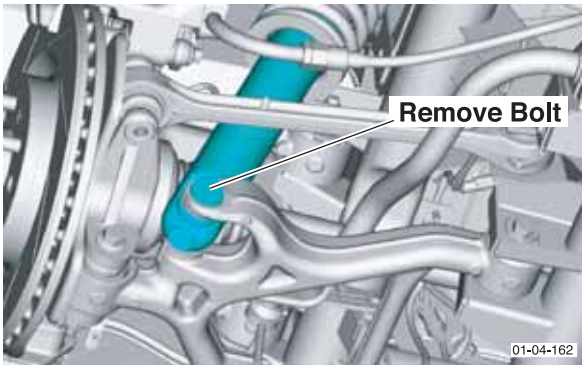
Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the track-rod arm bolt.

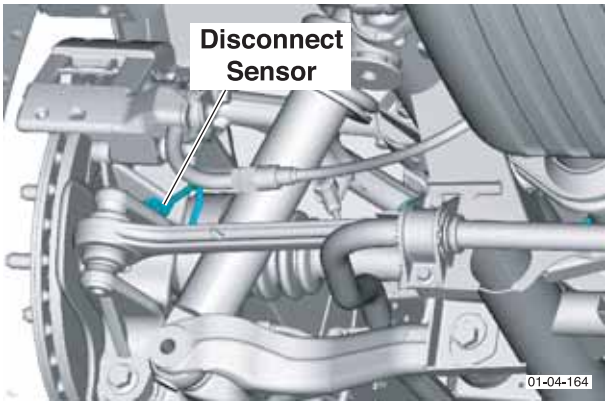


Ensure the spring and damper assembly is fully extended.

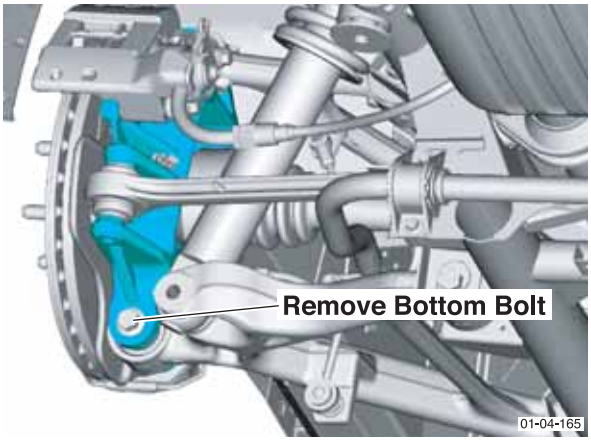
4. Remove the bolt from the lower spring and damper mounting.



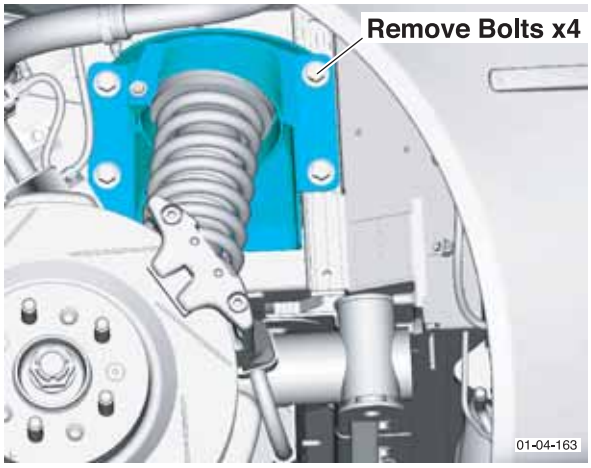
5. Disconnect the ABS sensor wiring harness plug.



6. Remove the vertical link lower bolt.



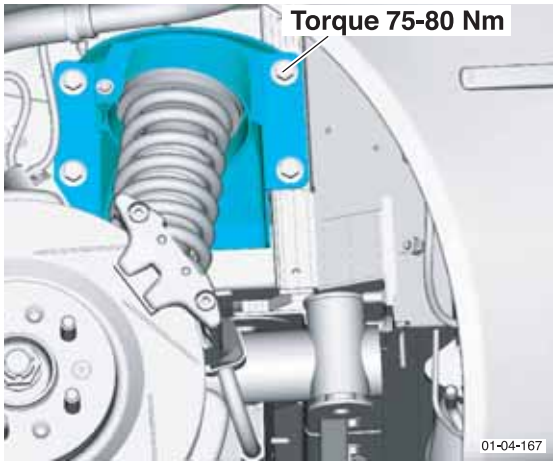
7. Remove the bolts (x4) from the spring and damper assembly upper mounting.



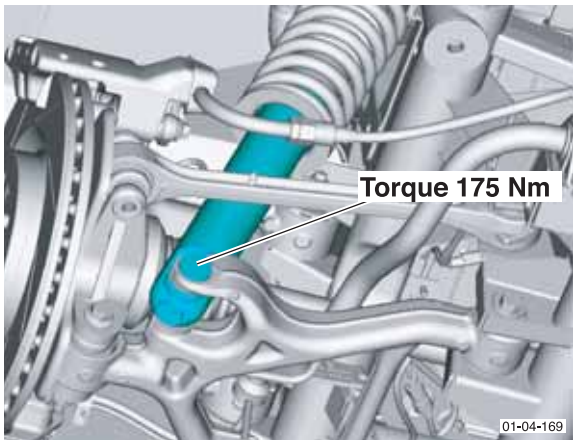
8. Withdraw the spring and damper assembly.

Installation

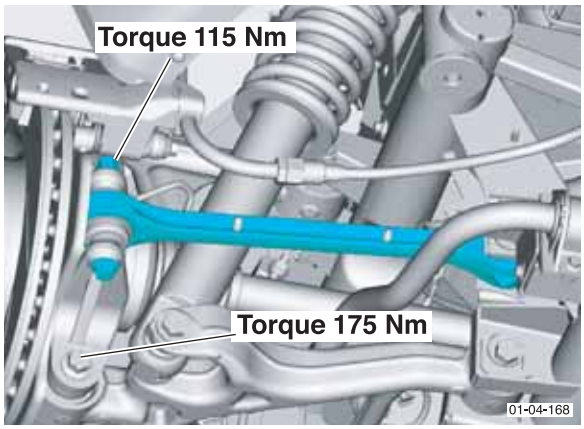
1. Install the spring and damper assembly upper mounting bracket. Torque bolts (x4) to **75-80 Nm**.



2. Install the spring and damper assembly to the lower suspension arm. Torque bolt to **175 Nm**.



3. Install the vertical link to the lower suspension arm. Torque to **175 Nm.**
4. Install the track-rod arm. Torque to **115 Nm**.



5. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
6. Check / adjust the Camber and Toe settings.

Suspension (04.00)

Road Wheels and Tyres (04.04)

⚠ *Warning* ⚠
Do not mix different types of tyres on the same vehicle such as radial, bias or bias belted tyres except in emergencies (temporary spare usage).

⚠ *Warning* ⚠
Never run the engine with one wheel off the ground, for example when changing a wheel. The wheel resting on the ground may cause the vehicle to move.

⚠ *Warning* ⚠
After market aerosol tyre sealants are extremely flammable. Always question the customer to make sure these products have not been used.

⚠ *Warning* ⚠
Always wear safety goggles or a face shield when performing any work with wheel and tyre assemblies.

⚠ *Warning* ⚠
Check road wheel nuts torque at 32 km (20 miles) after any wheel change or any time the wheel nuts are loosened.

⚠ *Warning* ⚠
When changing a wheel, make sure that the vehicle cannot move. Always apply the parking brake and select the transmission park position (Automatic transmission only).

⚠ *Warning* ⚠
Reduce air pressure as much as possible by pushing the valve core plunger in before removing the valve core.

⚠ *Warning* ⚠
Each individual axle, road wheel and tyre has its own maximum weight or tyre inflation rating. Do not overload or over-inflate beyond the capacity of the lowest rated components of the system.

Caution
Do not clean the aluminium alloy wheels with steel wool, abrasive type cleaners or detergents. Failure to follow these instructions may result in damage to the vehicle.

Caution
Paraffin (kerosene) must not be used as a cleansing agent on tyres.

Specifications

Tyres

The tyres recommended by Aston Martin meet the high speed performance of this vehicle. Only tyres of identical specification may be installed as replacements. Under no circumstances must cross-ply tyres be installed.

⚠ *Warning* ⚠
Correct tyre installation is critical to personal and vehicle safety. The recommended tyres for this vehicle are asymmetrical and must be installed to the wheel with the tyre mark 'Outside' on the outside of the wheel rim.

Unique Aston Martin lightweight aluminium alloy road wheels.

- Front - 8.5j x 19
- Rear - 9.5J x 19

The tyres are made exclusively for Aston Martin.

- Front - Bridgestone 235/40 ZR 19
- Rear - Bridgestone 275/35 ZR 19

Tyre Pressures

Tyre pressures must be checked with the tyres cold.

⚠ *Warning* ⚠
PDI Inspection.
Tyre pressures must be reduced to normal level during PDI. The vehicle must never be run on road with elevated tyre pressures, driveability may be seriously compromised.

Caution
In order to protect tyres against flat spots during storage and transportation, tyre pressures should be increased to 65 - 70 psi (450 - 500 kPa). Ensure that the tyre pressure are set to the recommended tyre pressures before driving.

- Front - 2.5 bar (250 kpa / 36 psi)
- Rear - 2.6 bar (260 kpa / 38 psi)

Torque Figures

Description	Nm	lb. / ft.
Road wheel nuts	135	100
	In two stages. (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7)	

USA Tyre Gradings

The following information relates to the tyre grading system developed by the National Highway Traffic Safety Administration which grades tyres by tread wear, traction and temperature performance.

Tread Wear

Tread wear grade is a comparative rating based on the wear rate of the tyre when tested under controlled conditions (specified government test course). For example, a tyre graded 150 would wear one and a half times less on the government course than a tyre graded 100. Relative performance of the tyres depends upon actual conditions of use and may depart significantly from normal due to variations in driving habits, service practices and differences in road characteristics and climate.

Traction

Traction grades, A (highest), B and C represent a tyre's ability to stop in wet conditions measured on specified government test surfaces of asphalt and concrete.

⚠ Warning ⚠
PDI Inspection.
Traction grade is based on braking (straight ahead) traction tests and does not include cornering (turning) traction.

Temperature

Temperature grades, A (highest), B and C, represent a tyre's resistance to the generation of wear and its ability to dissipate heat when tested under controlled conditions (specified indoor laboratory test road wheel). Sustained high temperature can cause the material of a tyre to degenerate and reduce tyre life; excessive temperatures can lead to sudden tyre failure. Grade 'C' corresponds to a level of performance which all passenger vehicle tyres must meet under Federal Motor Vehicle Safety Standard No. 109. Grades 'B' and 'A' represent higher levels of performance than the minimum required by law.

⚠ Warning ⚠
Temperature grade is established for a tyre that is properly inflated and not overloaded. Excessive speed, under inflation or excessive loading, whether separately or in combination, can cause heat build-up and possible tyre failure.

Maintenance

Factory installed tyres and road wheels are designed to operate satisfactory when inflated to the recommended inflation pressures (Refer to 'Inspection and Verification', page 4-5-3). The recommended pressures apply to vehicle loads up to and including the full-rated load capacity.

Correct tyre pressures and driving technique have an important influence on tyre life. Heavy cornering, excessively rapid acceleration and unnecessary sharp braking increase tyre wear.

Replacement tyres should follow the recommended:

- Size
- Speed rating
- Load range
- Radial construction type

The use of any other size or type may seriously affect:

- Safety
- Ride
- Handling
- Speedometer and Odometer calibration
- Vehicle ground clearance
- Tyre clearance between body and chassis
- Wheel bearing life
- Brake cooling

Wheels need to be renewed when:

- Impact damaged
- Heavily corroded
- Porous
- Wheel stud holes or seats become damaged
- They have excessive radial or lateral runout.

Safety

⚠ Warning ⚠
Do not mix different types of tyres on the same vehicle. Handling may be seriously affected resulting in loss of control.

⚠ Warning ⚠
Ensure that tyres are mounted with the sidewall marking 'Outside' showing on the outer sidewall face. Correct tyre rotational direction is critical.

⚠ Warning ⚠
A tyre and wheel must always be correctly matched. Wider or narrower tyres than recommended could cause danger through sudden deflation.

⚠ Warning ⚠
When changing a wheel, make sure that the vehicle cannot move. Always apply the parking brake and select the transmission park position (Automatic transmission only).

⚠ Warning ⚠
Never run the engine with one wheel off the ground, for example, when changing the wheel. The wheel resting on the ground may cause the vehicle to move.

⚠ Warning ⚠
Always tighten the wheel nuts to specification. Too tight may cause damage, too loose may allow the wheel to become detached.

⚠ Warning ⚠

Use only wheels and wheel nuts supplied by Aston Martin. After market wheels or wheel nuts may not install or function correctly and could cause injury or damage.

Tyre Replacement and Wheel Interchanging

Caution

When a new tyre is installed, always renew the tyre valve.

When replacement of tyres is required it is preferable to install a complete vehicle set. Should either the front or rear tyres only show excessive wear, new tyres must be installed to replace worn ones. Under no circumstances interchange tyres from side to side, front to rear or vice versa as individual tyre wear produces unique characteristics depending upon their position. If the position is changed after wear has occurred, the performance of the tyre will be adversely affected.

New tyres must be balanced before installing to the vehicle.

Winter (Snow) tyres

Winter tyres must only be installed in complete four-wheel sets of the same type. The maximum speed with winter tyres installed (without snow chains) is 210 km/h (131 mile/h) for H rated tyres or 240 km/h (149 mile/h) for V rated tyres.

When using snow chains, note that:

- Snow chains must only be installed to the rear wheels
- Only Aston Martin snow chains should be used
- Snow chains must not be used on roads which are clear of snow
- The maximum speed with winter tyres and snow chains fitted is 48 km/h (30 mile/h)
- Traction control must be switched Off when using snow chains

Inspection and Verification

Verify the customer's concern by driving the vehicle.

Visually inspect for obvious signs of damage:

Visual Inspection Chart

- Incorrect tyre pressure
- Wheel imbalance
- Bulges (blister)
- Cuts
- Abrasions
- Tyres worn beyond tread wear indicators
- Ply separation
- Embedded objects
- Impact damage
- Incorrect speed rating
- Incorrect load rating
- Tyres installed with the 'Outside' marking not shown

1. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
2. If the concern is not visually evident, verify the symptom and refer to Symptom Chart.

Tyre Wear

Tread wear indicators (A) are moulded into the bottom of the tread grooves across the width of the tyre. When the tread wear indicators become visible at the surface of the tread, in two or more adjacent tread grooves, only 1.6 mm of tread remains.



Tyre tread depth and condition must comply with prevailing local legislation.

To maximize tyre performance, inspect the tyres for signs of incorrect inflation and uneven wear which may indicate a need for balancing, rotation or front suspension alignment. tyres should also be checked frequently for cuts, stone bruises, abrasions, blisters, and for objects that may have become embedded in the tread. More frequent inspections are recommended when rapid or extreme temperature changes occur or when road surfaces are rough or occasionally littered with debris.

Tyre Wear Diagnosis

New tyres should be installed if the wear indictors are exposed or if there is severe shoulder wear. Shoulder wear is usually caused by either excessive camber or excessive toe on radial tyres.

Sometimes incorrect rear toe settings or damaged struts will cause severe cupping' or scalloped' tyre wear on non-drive wheels.

Incorrect rear toe alignment will also cause other unusual wear patterns.

Road Test

A tyre vibration diagnostic procedure always begins with a road test. The road test and customer interview (if available) will provide much of the information needed to find the source of a vibration.

During the road test, drive the vehicle on a road that is smooth and free of undulations. If vibration is apparent, note and record the following:

- The speed at which the vibration occurs
- What type of vibration occurs in each speed range
- How the vibration is affected by changes in the following types of vibration-sensitivity:

Torque Sensitive **-** This means that the condition may be improved or made worse by accelerating, decelerating, coasting, maintaining a steady vehicle speed or applying engine torque.

Vehicle Speed Sensitive **-** This means that the vibration always occurs at the same vehicle speed and is not affected by engine torque, engine speed or the transmission gear selected.

Engine Speed Sensitive **-** This means that the vibration occurs at varying vehicle speeds when a different transmission gear is selected. It may sometimes be isolated by increasing or decreasing engine speed with the transmission in NEUTRAL or by stall testing with the transmission in gear. If the condition is engine speed sensitive, the cause is probably not related to the tyres.

If the road test indicates that there is tyre whine, but no shake or vibration, the noise originates with the contact between the tyre and the road surface.

A thumping noise usually means that the tyre has a flat or soft spot making a noise as they slap the roadway. Tyre whine may be distinguished from axle noise. Tyre whine remains the same over a range of speeds.

Symptoms

Symptom	Possible Source(s):	Action(s)
Tyres show excess wear on edge of treads	Tyres under-inflated	Correct pressure to specification.
	Vehicle overloaded	Correct as required.
Tyres show excess wear on edge of treads (having the correct tyre pressures)	Incorrect toe setting	Set to specification.
Tyres show excess wear in center of tread	Tyres over-inflated	Correct pressure to specification.
Other excessive tyre wear problems	Incorrect tyre pressure	Correct pressure to specification.
	Incorrect tyre and wheel usage	Install correct tyre and wheel combination.
	Geometry out of alignment	Check and adjust.
	Loose, worn or damaged suspension components	Inspect, repair or install new suspension components as necessary.
	Wheel and tyre assembly out of balance	Balance wheel and tyre assembly.
	Excessive lateral or radial runout of wheel or tyre	Check, repair or install a new wheel or tyre as necessary.
Wheel mounting is difficult	Incorrect application or mismatched parts, including wheel studs and wheel nuts. Corroded, worn or damaged parts	Clean or install new parts.
Wobble or shimmy affecting wheel runout	Damaged wheel (eventually damaging wheel bearings and causing uneven tyre wear)	Inspect wheel rims for damage and runout. Install a new wheel rim as necessary.
Excessive vibration, rough steering or severe tyre wear	Loose or incorrect attaching parts	Tighten or install new parts.

Symptom	Possible Source(s):	Action(s)
Vehicle vibrations	Tyres and wheels mismatched	Install correct tyre and wheel combination.
	Inflation pressure too high or too low	Correct pressure to specification
	Uneven tyre wear	Refer to Diagnosis and Testing.
	Out-of-balance wheel, tyre, wheel hub or disc assembly	Determine the out-of-balance component and balance or install a new part.
	Damaged or distorted wheel from road impact hazard or incorrect handling	Install a new wheel.
	Excessive radial runout	Install a new wheel or tyre. Check for incorrect wheel and tyre specifications.
	Excessive lateral runout	Install a new wheel or tyre.
	Incorrectly seated tyre	Remount the tyre.
	Loose wheel mountings - damaged wheel studs, wheel nuts, worn or broken wheel hub face or foreign material on mounting faces	Tighten or install new parts. Clean mounting surfaces.
	Defective wheel bearings	Install a new bearing set.
	Brake disc imbalance	
	Water in tyres	Remove water.
	Loose engine or transmission mounts	Install new mount nuts / install new mounts.
	Incorrect front end alignment	Align front end.
	Loose or worn driveline or suspension parts	Repair or install new parts.
	Excessive driveshaft runout or imbalance	Install a new driveshaft.
	Worn or damaged flexible drive joint	Install a new driveshaft.
Damaged wheel hub stud threads	Sliding wheel across the wheel studs during installation. Loose wheel nuts	Install new wheel studs.
Broken wheel studs	Loose or over tightened wheel nuts	Install new wheel studs.
Corrosion and contamination streaks from the wheel hub wheel stud holes	Loose wheel nuts	Check complete assembly. Install new parts.
Damaged wheel nuts	Loose wheel assembly	Install new wheel nuts.
	Over-tightened wheel nuts	Install new wheel nuts.
Frozen wheel nuts	Corrosion or galling	If corrosion is light, wire brush away corrosion. If corrosion is excessive install new wheel studs and wheel nuts.

Tyre Damage

Symptom	Description
Age Deterioration	Cracking and crazing of the tread and sidewall rubber, sometimes accompanied by carcass deformation. An indication that the tyres have been in service for a very long time.
Neglected Cut	Damage through accidental cuts or penetrations will extend in use due to continued flexing and / or ingress of moisture and road matter.
Impact Fracture	Resultant damage from impact fractures is not always visible externally and, therefore, as a safety precaution the tyre should be removed and examined. Casing fracture caused by severe localized impact through driving over kerbs, hitting potholes and / or objects in the road. A double fracture caused by crushing the side wall of the tyre between an object and the rim flange. In both instances, such damage can lead to sudden and dangerous tyre deflation some time after the impact occurred.

Repairs

In view of the high performance capability of the vehicle, damaged tyres should be renewed and not repaired.

Caution
When a new tyre is installed, always renew the tyre valve.

Care of Alloy Road Wheels

Aluminium alloy road wheels are covered with a protective coating. To prevent corrosion it is essential that this coating is not damaged. When removing or installing tyres only equipment utilizing spigot or stud hole clamping must be used. The equipment must not have any moving parts which contact the road wheel, and tyre levers must not be used.

To clean road wheels use warm soapy water; stubborn stains can be removed using a soft brush or by using a proprietary alloy road wheel cleaner.

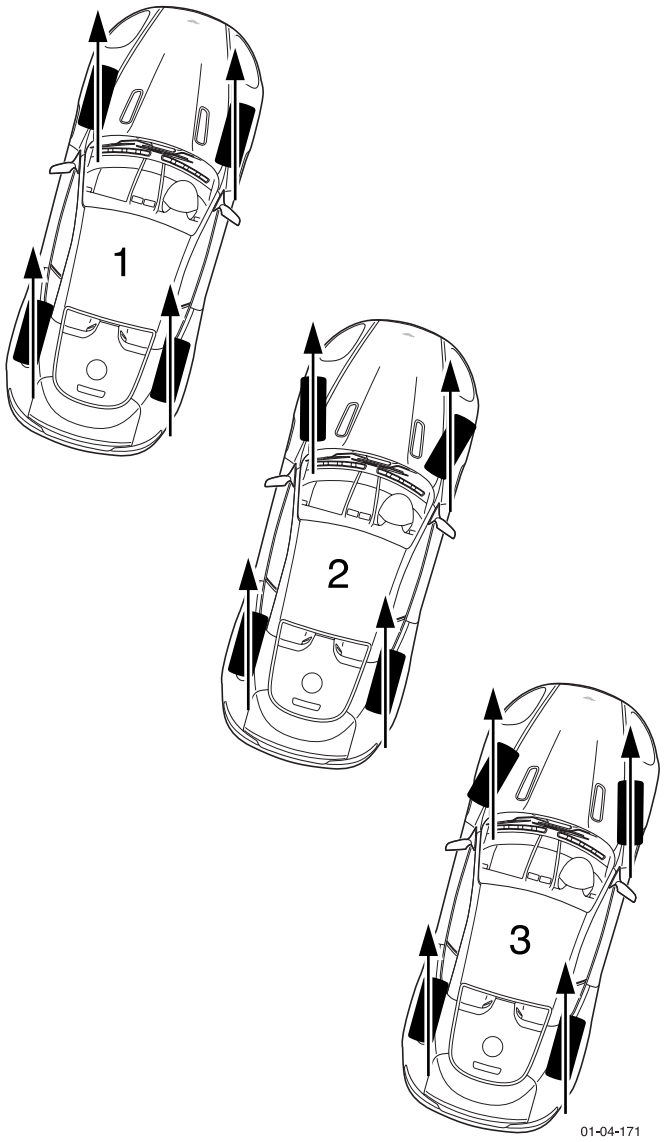
Road Wheel Alignment

It is important that correct road wheel alignment be maintained. Misalignment causes tyre tread to be scrubbed off laterally because the natural direction of the road wheel differs from that of the vehicle.

A sharp 'fin' protrusion on the edge of each pattern rib is a sure sign of misalignment.

- 'Fins' on the inside edges of the pattern ribs, particularly on the nearside tyre, indicate Toe-in.
- 'Fins' on the outside edges, particularly on the offside tyre, indicate Toe-out.

With minor misalignment, the evidence is less noticeable and sharp pattern edges may be caused by road camber even when the road wheel alignment is correct. In such cases it is better to make sure by checking with an alignment gauge. Road camber affects the direction of the vehicle by imposing a side thrust and, if left to follow its natural course, the vehicle will drift towards its nearside. This is instinctively corrected by steering towards the road centre and, as a result, the vehicle runs crabwise. The diagram shows why nearside tyres are very sensitive to too much Toe-in and offside tyres to Toe-out.



It also shows why sharp 'fins' appear on one tyre but not on the other, and why the direction of misalignment can be determined by noting the position of the 'fins'. Severe misalignment produces clear evidence on both tyres.

Front road wheels on a moving vehicle should be parallel. Tyre wear can be affected noticeably by quite small variations from this condition. It will be noted from the diagram that even with parallel road wheels, the vehicle is still out of line with its direction of movement, but there is less tendency for the wear to be concentrated on one tyre.

The near front tyre sometimes persists in wearing faster and more unevenly than the other tyres, even when the mechanical condition of the vehicle and tyre maintenance are satisfactory. The more severe the average road camber, the more marked this tendency will be.

Misalignment Effects

Misalignment	Effect
Road wheels are correctly aligned but crabbing due to road camber	All tyres will wear equally.
Shows road wheels 'Toed-out' in motion	RH front tyre will wear faster.
Shows road wheels 'Toed-in' in motion	LH front tyre will wear faster.

Alignment Precautions

The following alignment precautions should be observed:

1. The vehicle should have come to rest from a forward movement. This ensures, as far as possible, that the road wheels are in natural running positions.
2. It is preferable for alignment to be checked with the vehicle laden (Refer to 'Specifications', page 4-1-2).

Road Wheel and Tyre Balance

Static Balance

For smooth riding, precise steering and the avoidance of high speed 'tramp' or 'road wheel hop', all tyres are balance checked to predetermined limits. To ensure the best degree of tyre balance, the covers are marked with yellow spots on the outer sidewall and these indicate the lightest balance point of the cover.

The original degree of balance is not necessarily maintained. It can be affected by uneven tread wear, tyre removal or refitting, by road wheel damage or eccentricity. The vehicle may also become sensitive to imbalance due to normal wear of moving parts. If roughness or high speed steering troubles develop and mechanical investigation fails to disclose a possible cause, road wheel and tyre balance should be suspected.

⚠ Warning ⚠

If balancing equipment is used to dynamically balance road wheels, always jack both rear road wheels off the ground when rear road wheel balancing, otherwise damage may be caused to differential. This is doubly important in case of vehicles installed with a limited slip differential, as in addition to possible damage to the differential, the vehicle may drive itself off the jack or stand.

Dynamic Balance

Static imbalance can be measured when the tyre and road wheel assembly is stationary. There is another form known as dynamic imbalance which can be detected only when the assembly is revolving.

There may be no heavy spot, i.e. there is no natural tendency for the tyre and road wheel assembly to rotate about its centre due to gravity, but the weight may be unevenly distributed each side of the tyre centre line. Laterally, the eccentric road wheels give the same effect. During rotation, the offset weight distribution sets up a situation which tends to steer the road wheel to the right and left alternately.

Dynamic imbalance of the tyre and road wheel assemblies can be measured on suitable tyre balancing equipment, and corrections implemented. Where it is clear that a damaged road wheel is the primary cause of severe imbalance, it is advisable for the road wheel to be renewed.

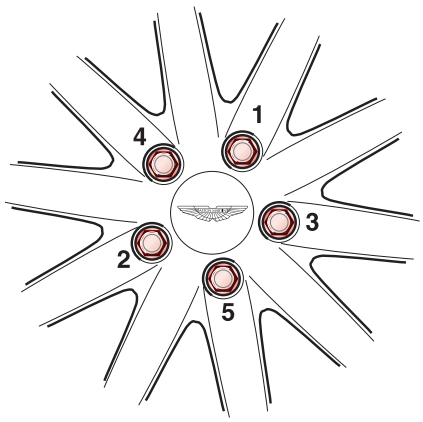
Road Wheel Nut Torque Tightening

Repair Operation Time (ROT)		
Item		**Code**
Road Wheel	(LHF)	**04.04.AB**
	(RHF)	**04.04.CB**
	(LHR)	**04.04.BB**
	(RHR)	**04.04.DB**

Order - Tighten every second nut until all five nuts are tightened.

Tighten all road wheel nuts in two stages.

1. To 80 Nm (60 lb. / ft) in one continuous movement.
2. To 135 Nm (100 lb. / ft.) in one continuous movement.



Inform the customer that the wheel nuts are to be torque checked after 32 km (20 mile).

Tyre Pressure Sensing (Option)

> ⚠ ***Warning*** ⚠
> ***Tyre pressure sensing is not intended to replace driver awareness of tyre performance or the need for recommended weekly checks on tyre condition and pressure.***

Tyre pressure sensing monitors the vehicle tyre pressures and feeds-back this information to the driver.

Each road wheel is installed with a tyre pressure sensing device which sends tyre pressure information to a control unit mounted in the centre, rear wall of the boot.

Each pressure sensing device has a colour coded collar. Ensure the coloured collars are always installed in their original positions, i.e. after new tyres are installed.

Road wheel	Colour
Front right	Green
Front Left	Red
Rear Right	Blue
Rear Left	Yellow

The control unit provides a visual warning by illuminating the tyre pressure warning lamp (A) on the instrument panel if any tyre pressure falls below specification.



Pressure Sensing with Winter Wheels and Tyres

If the tyre pressure sensing option is installed on the vehicle, the winter road wheel and tyre option with the tyre pressure sensing system should be installed. The tyre pressure sensing system will need to be programmed to recognize additional tyres.

Warnings

Instrument Cluster	Lamp constant / Message 'Check Tyres'.
Control module	Tyre LED constant **red**.
Fault	Tyre pressure below specification.

Action

Reduce speed to 48 km/h (30 mph). Stop in safe place as soon as possible.

One of the coloured LEDs on the control module will illuminate to indicate which tyre requires inflating. The LED colour corresponds to the colour of the band below each tyre valve cap. Inspect affected tyre. Re-inflate if necessary. If on inspection the tyre is found to be OK, continue at 48 km/h (30 mph) maximum.

Ensure that the coloured band remains in position.

Instrument Cluster	Lamp constant / Message 'Check Tyres'.
Control module	Tyre LED constant **amber**.
Fault	Tyre transmitter fault.

Action

Reduce speed to 48 km/h (30 mph). Stop in safe place as soon as possible.

Inspect affected tyre. Re-inflate if necessary.

If on inspection the tyre is found to be OK, continue at 48 km/h (30 mph) maximum.

Instrument Cluster	Lamp constant / Message 'Tyre system Fault'
Control module	Module LED constant **amber**.
Fault	Control module fault.

Action

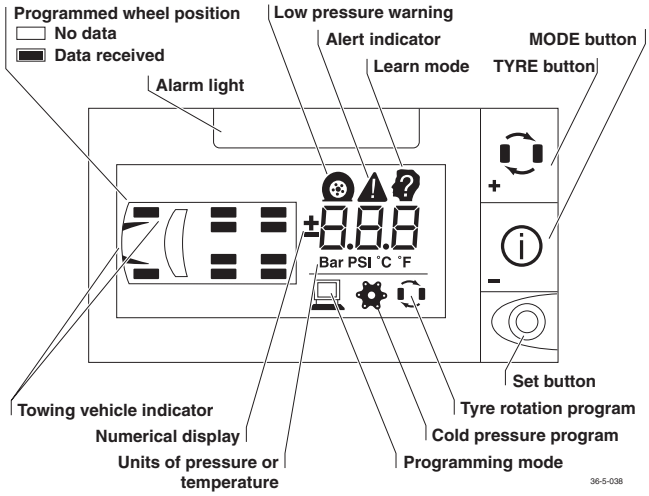
Stop in safe place as soon as possible.

Check all tyres for flats. If OK, continue at 48 km/h (30 mph) maximum.

Display Unit

The display unit provides additional features when correctly connected to a previously installed 'Smartyre' system. The display unit connects directly to the front of the basic 'Smartyre' receiver and is powered from the vehicle circuits. The display will be fully illuminated during use but will go into 'Energy Saver' mode when no activity is detected.

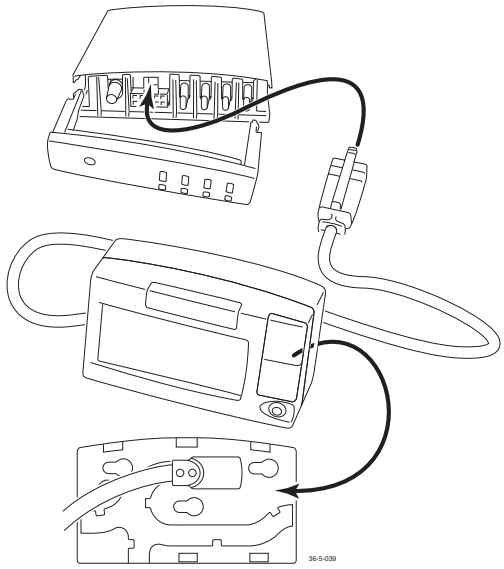
Display Panel



Connection and Normal Operation

1. Remove the front bezel of the Pressure Sensor Receiver. Install the extension lead to the display unit and to the receiver module. Turn on the ignition.

   All icons will illuminate briefly and then extinguish leaving only the vehicle outline.



2. When tyre pressure data is received, (drive the vehicle or spin the road wheels), all the road wheel icons will appear. Press the Tyre icon to access the recorded data for each of the four road wheels.
3. Press the Mode button to scroll through the pressure, temperature and pressure deviation readings for the selected tyre.
4. If any tyre pressure sensor is defective, the display will show three dashes to indicate the absence of data for that tyre.
5. To return to normal mode, press the SET button.

System Programming

The system may be programmed by the user on three different levels. Enter Programming Mode by pressing the 'Set' button:

- 2 seconds to enter level 1
- 5 seconds to enter level 2
- 10 seconds to enter level 3

The following parameters may be set in each level:

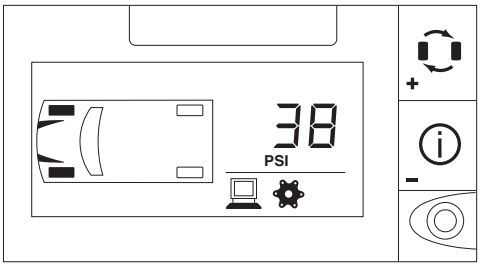
Level 1
- Cold Pressure
- Tyre Rotation
- Low Pressure Warning
- Pressure Deviation
- High Temperature Alert
- Units Selection

Level 2
- Slope
- Learn Transmitter ID

Level 3
- Low Pressure Alert

Level 1 Programming

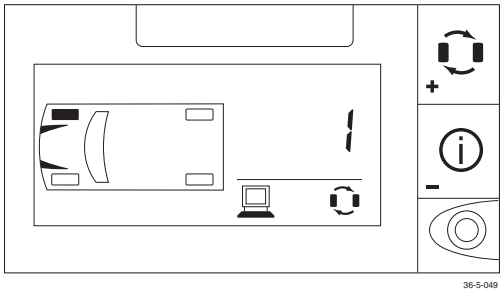
Cold inflation pressure



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Tyre' to select the front or rear axle. Front or rear tyres will be highlighted.
3. Press 'Mode' to show the current value. Press 'Tyre' to increase or 'Mode' to decrease the current value.
4. Press 'Set' to save the new values.
5. Repeat steps 2 - 4 to set the cold inflation pressure for other the axle.

Tyre Rotation

> ***⚠ Warning ⚠***
> ***The road wheels and tyres are asymmetrical and different sizes front and rear. They must not be rotated front to rear. This function should be used only to verify correct tyre position. Do not change the programmed data.***



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' repeatedly until 'Tyre Rotation' icon is displayed.
3. Press 'Tyre' to scroll to a tyre position. Press 'Mode' to display the current sensor identity.

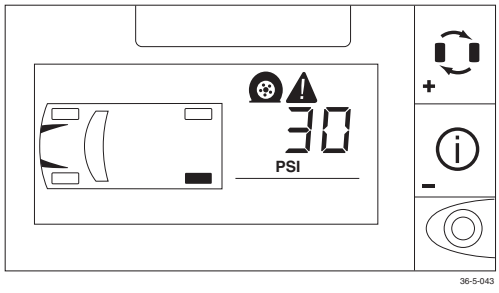
Each sensor is identified by the colour of a washer on the tyre valve. Tyres are always installed in fixed positions and must remain as follows:

- *Right Front - Green (Code 1)*
- *Left Front - Red (Code 2)*
- *Right Rear - Blue (Code 3)*
- *Left Rear - Yellow (Code 4)*

If the current data is incorrect, revise as follows:

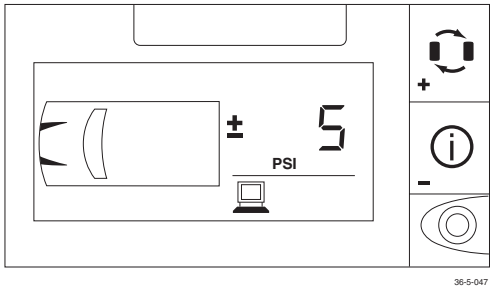
4. Ensure that the road wheels and tyres are installed in the correct locations (see the colour code list above). Note the correct code number for each road wheel.
5. Use 'Tyre' or 'Mode' to correct the sensor identity code if required.
6. Repeat for the remaining tyres.
7. Press 'Set' twice to exit the programme.

Low Pressure Warning



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' repeatedly until 'Flat Tyre' icon is displayed.
3. Press 'Tyre' to scroll to the desired axle. Press 'Mode' to display the current low pressure warning value.
4. Press 'Tyre' to increase or 'Mode' to decrease current value.
5. Press 'Set' to enter the new value into memory.

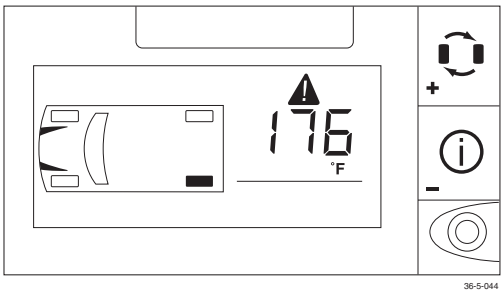
Pressure Deviation Alert



This function sets the threshold for warning of a deviation from normal tyre pressures.

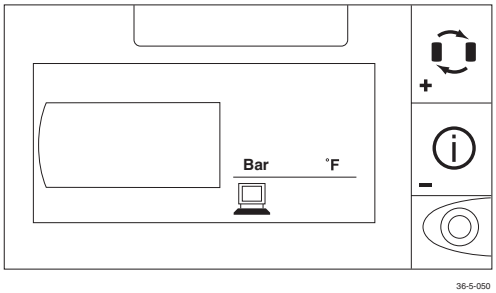
1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' repeatedly until the '+-' icon is displayed.
3. Press 'Tyre' to display the current value.
4. Press 'Tyre' to increase or 'Mode' to decrease the current value
5. Press 'Set' to save the amended value.
6. Press 'Set' again to revert to normal operation.

High Temperature Alert



1. Press 'Set' for 2 seconds to enter level 1 programming.
2. Press 'Mode' until 'alert' icon is displayed.
3. Press 'Tyre' to display the current value of the high temperature alert.
4. Press 'Tyre' to increase or 'Mode' to decrease current value
5. Press 'Set' to save the amended value.
6. Press 'Set' again to return to normal mode.

Units Selection



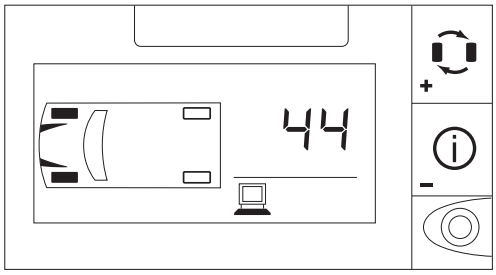
Use this function to select the combination of units for pressure and temperature.

1. Press 'Set' for 2 seconds to enter level 1 programming.

2. Press 'Mode' until pressure / temperature units are displayed.
3. Press 'Tyre' to enter 'Units Selection' mode.
4. Use 'Tyre' or 'Mode' to scroll through four combinations of pressure / temperature units.
5. Press 'Set' to save the selected combination of units.
6. Press the 'Set' button again to revert to normal mode.

Level 2 Programming

Slope



Sets rate of pressure change for tyres in use. This parameter is set at manufacture and is specific only to the recommended tyres for DB9.

1. Press 'Set' for 5 seconds to enter level 2 programming.
2. Press 'Tyre' until the desired vehicle axle is displayed.
3. Press 'Mode' to display the current SLOPE entry (DB9 is set at?)
4. If required, use 'Tyre' to increase or 'Mode' to decrease current value.
5. Press 'Set' to save the final value.
6. Press 'Set' again to return to normal mode.

Transmitter Learn Mode

This mode is used to add or delete transmitters from the system memory. It is vital that transmitter signals are correctly recognised to avoid system reaction to other transmitters (e.g. from passing vehicles with similar sensors).

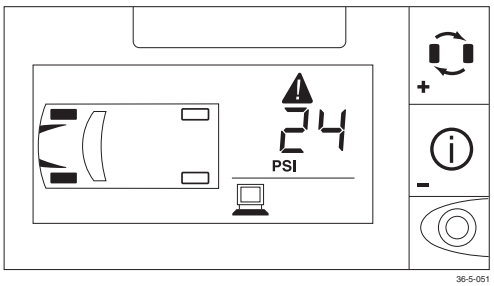
1. Remove a Redundant Transmitter
   1.1 Press 'Set' for 5 seconds to enter level 2 programming.
   1.2 Press 'Mode' to select 'Transmitter Learn' mode.
   1.3 Press 'Tyre' to display possible tyre positions (filled rectangles represent currently programmed transmitters).
   1.4 Press 'Tyre' to scroll to the desired position.
   1.5 To delete a transmitter, press the 'Mode' once.
   1.6 If required, scroll to other positions using 'Tyre' and, if required, delete any other transmitters using 'Mode' button.
2. Add new Transmitters.
   2.1 Press 'Set' for 5 seconds to enter level 2 programming.
   2.2 Press 'Mode' to select 'Transmitter Learn' mode.
   2.3 Press 'Tyre' to display possible tyre positions (filled rectangles represent currently programmed transmitters).
   2.4 Press 'Tyre' to scroll to the desired position. The chosen road wheel icon will flash.
   2.5 Program a new transmitter by either:
   2.6 Vigorously shaking the transmitter (bounce the road wheel on the ground) to promote a transmission.
   2.7 Inflate or deflate the tyre by more than 3 psi (0.2 bar).

The unit will 'beep' when new transmitter is recognised.

   2.8 Press 'Tyre' to scroll to the next position. Repeat steps 4 and 5 as required to programme additional transmitters.
   2.9 Press 'Set' to save the new transmitter data and to exit 'learn' mode. If no error is found, the system will return to 'normal' mode.

Level 3 Programming

Low Pressure Alert



1. Press 'Set' for 10 seconds to enter level 3 programming.
2. Press 'Tyre' button to scroll to the desired axle.
3. Press 'Mode' to view the current low pressure alert value.
4. Press 'Tyre' to increase the current value or press 'Mode' to the decrease current value.
5. Press 'Set' to save when the desired value is reached.
6. Repeat steps 2 to 5 until the Low Pressure Alert Level has been set for all road wheels.
7. Press 'Set' button to exit this mode.
8. Press the 'Set' button again to return to normal mode.

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Driveline (05.00)

Contents

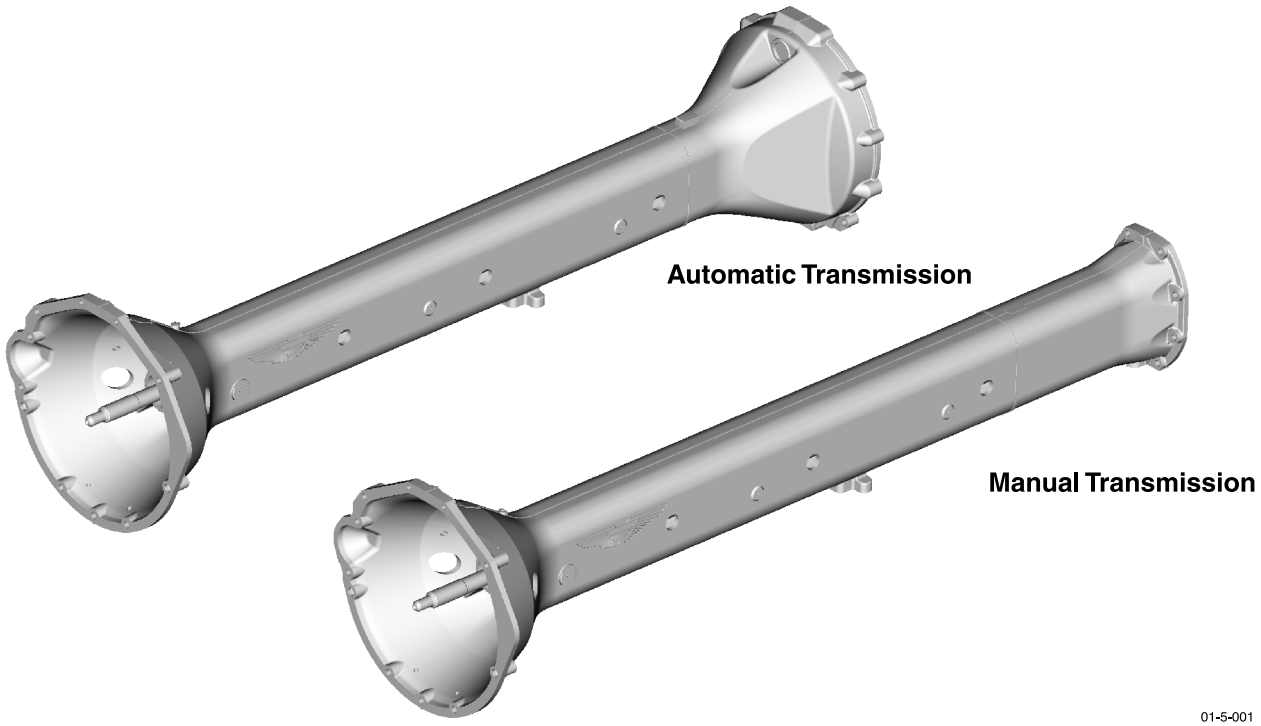
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Driveline (05.00)

Driveshaft (05.01)

Description

The driveshaft consists of a torque tube assembly, incorporating the propshaft, transferring drive from the power unit to the gearbox.



Engine power is transmitted to the rear wheels via a carbon fibre prop shaft. To prevent any shunting of the engine under high acceleration, the engine and transaxle are connected with an aluminium torque tube which surrounds the prop shaft. This arrangement is used on both the automatic and manual transmission cars.

Specifications

Torque Figures

Description		Nm.	lb. / ft.
Torque Tube (front)	M8	25	18.5
	M10	50	37
Torque Tube (rear)		43-57	32-42.5
Exhaust Manifold		18-22	13.5-16.5
Starter Motor		50	37
Drive Plate (Auto only) - Torque converter to prop shaft		72	53.5

Maintenance

Torque Tube

Repair Operation Time (ROT)	
Item	**Code**
Torque Tube Renew	**05.01.AB**

Remove

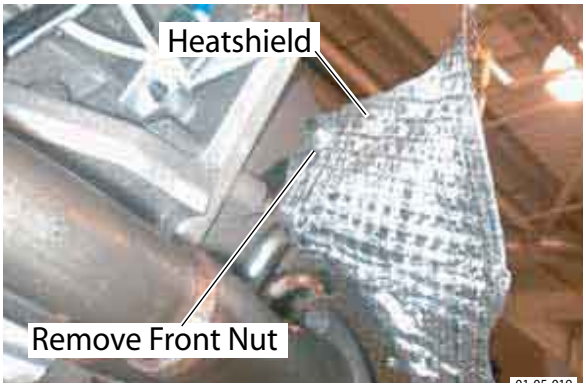
1. Disconnect the vehicle battery. Raise the vehicle and make safe.

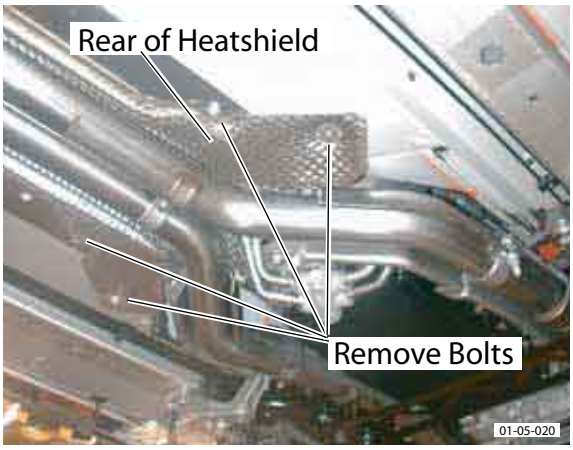
Caution
On a two post ramp ensure vehicle is 'strapped' to the lift.

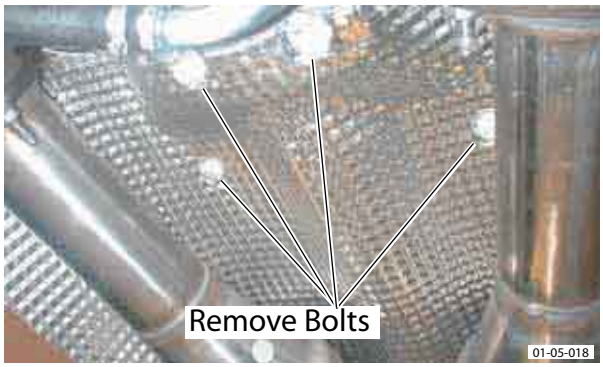
If using a two post vehicle lift, remove the screws that secure the rear section of the front road wheel arch liners. Hold back the rear section of the road wheel arch liner to allow the foot of the vehicle lift to be positioned correctly. (Refer to 'Jacking Points', page I-I-IX)

2. Remove the front road wheels and road wheel arch liners.
3. Remove the shear panel and both undertrays.
4. Remove the exhaust system (Refer to 'Exhaust System', page 9-2-1).

5. Remove the heat shields.



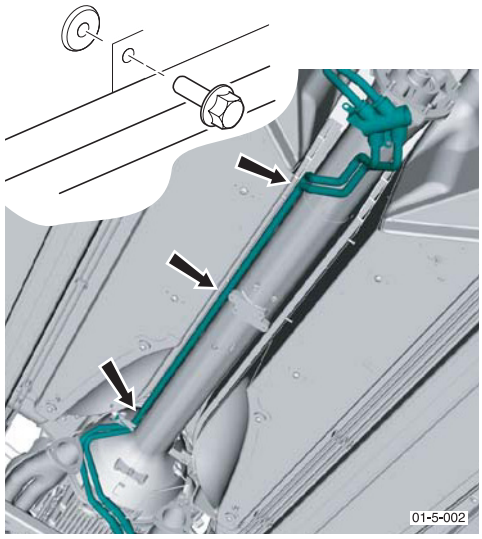




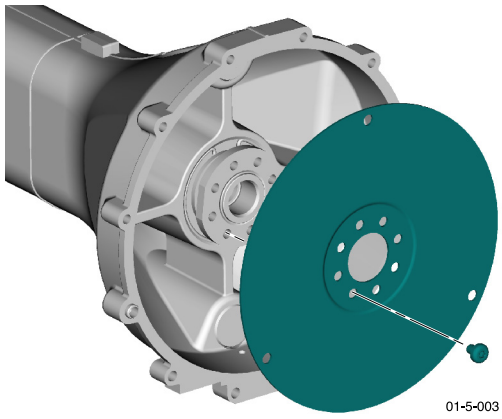
6. Remove the lower steering column (LH drive only).
7. Remove the dip stick tube.
8. Remove the LH exhaust heat shields and manifold.

Remove the manifold and lay to one side.

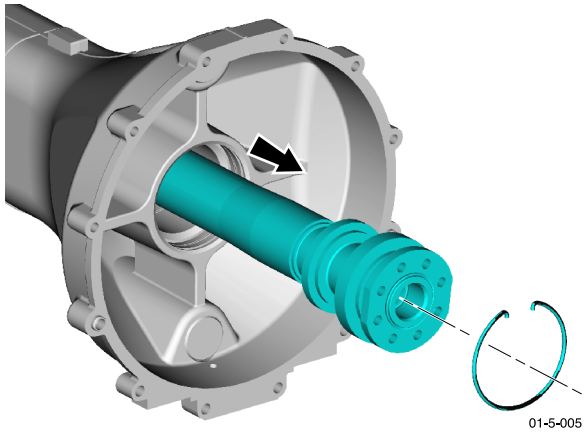
9. **Automatic Gearbox Only.**
   Remove the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).
10. **Manual Gearbox Only.**
    Remove the transaxle (Refer to 'Manual Transmission (07.03)', page 7-3-1).
11. Allow the torque tube to lower until the engine is resting on the front subframe rear crossmember.
12. **Automatic Gearbox Only.**
    Remove the transmission oil coolant pipes from the torque tube.



13. **Automatic Gearbox Only.**
    Remove the drive plate.



14. **Automatic Gearbox Only.**
    Remove the propshaft.
    Remove the wire clip and pull the propshaft from the torque tube.

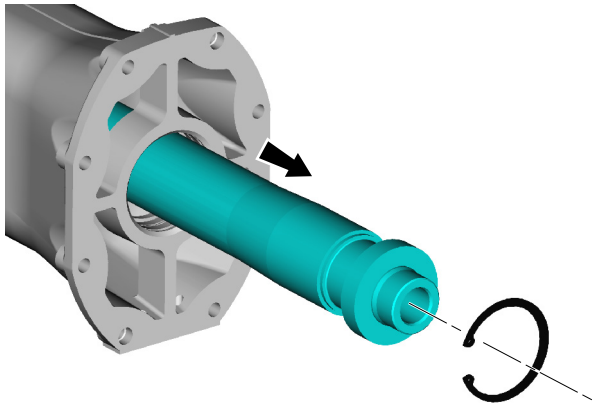


15. Manual Gearbox Only.

Remove the propshaft.

Remove the horseshoe clip and pull the propshaft from the torque tube.

Suggestion: To pull the prop shaft from the torque tube install a jubilee clip around the end of the prop shaft and use this to lever against.



01-5-005

16. **Manual gearbox Only.**

⚠ Warning ⚠

Avoid skin / eye contact or ingestion of clutch fluid. If skin or eyes are splashed with clutch fluid, rinse the affected area immediately with plenty of water and obtain medical attention. If clutch fluid is ingested, obtain immediate medical attention.

Caution

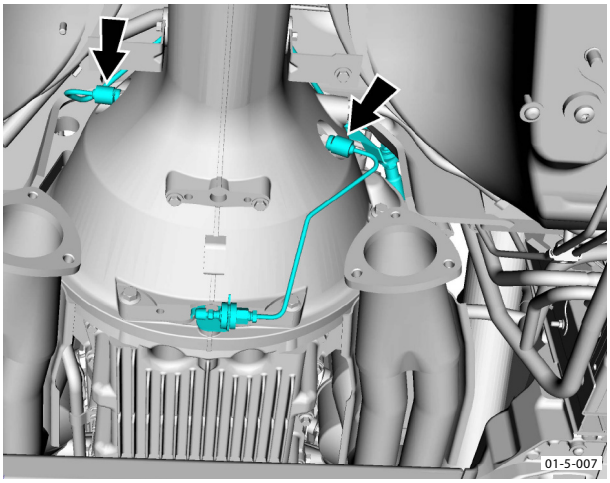
Clutch fluid must not be allowed to contact the vehicle paint work. Remove spilt clutch fluid from the paint work by rinsing away with running water.

Place suitable absorbent material around the affected area to absorb any possible clutch fluid spillage.

Disconnect the clutch salve cylinder bleed and supply pipes. Pull the wire clips back to release the unions.

Caution

Ensure that the seal on the 'male' end remains connected to the 'male' end when disconnecting.

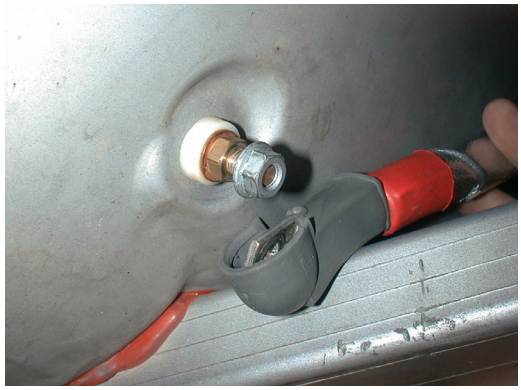


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⚠ Warning ⚠

The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal is at least a two person operation.

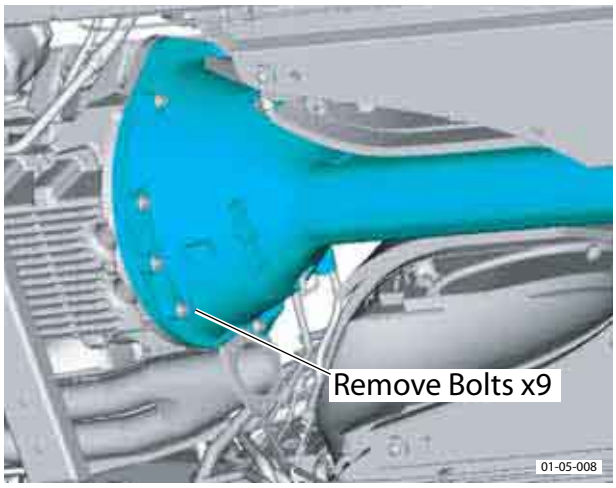
17. Remove the bolts (x2) that secure the starter motor. Withdraw the starter motor and place to one side.
18. Disconnect the earth cable.



19. Loosen and undo the engine mount nuts sufficently to allow the front of the engine to be raised.

Do not remove the nuts - leave them in place, one or two threads only.

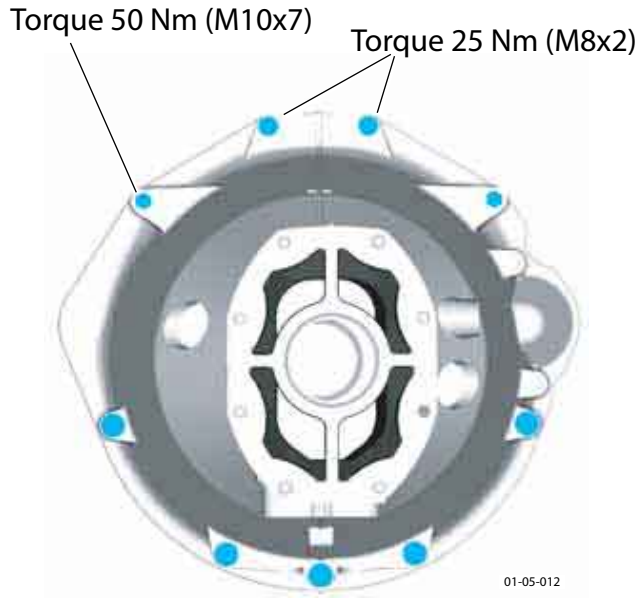
20. Raise the front of the engine. This then provides access to the two top bolts of the torque tube and enables move movement of the torque tube.
21. Ensure the torque tube is supported. Remove the bolts (x9) that secure the torque tube to the engine block. Withdraw the torque tube.



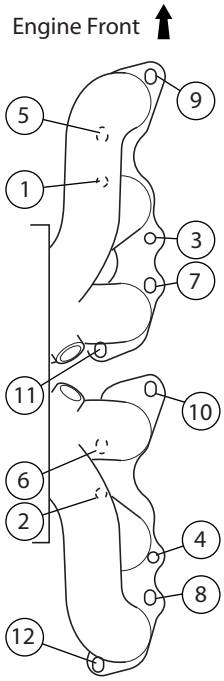
Installation

> ⚠ ***Warning*** ⚠
> ***The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal is at least a two person operation.***

1. Feed the torque tube into position against the engine block.
2. Secure the torque tube to the engine block.
   - M8 **25 Nm.**
   - M10 **50 Nm.**



3. Lower the engine onto its mounts. Torque the two engine mount nuts to **47 Nm**.
4. Install the exhaust manifold. Torque the nuts, in sequence shown, to **18-22 Nm**.

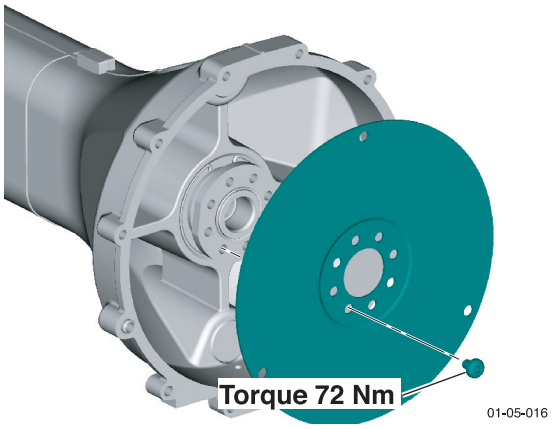


5. Install the exhaust heat shields.
6. Install the lower steering column (LH drive only) and the dip stick tube.
7. Install the earth cable.
8. Install the starter motor. Torque bolts to **50 Nm.**
9. **Automatic Gearbox Only.**
   Install the propshaft to the torque tube. Install the wire clip.

When installing the propshaft use a lever through the opening in the bell housing to manoeuvre the splines of the propshaft to the crankshaft.
Use a soft face hammer to fully locate the propshaft

10. Automatic Gearbox Only.

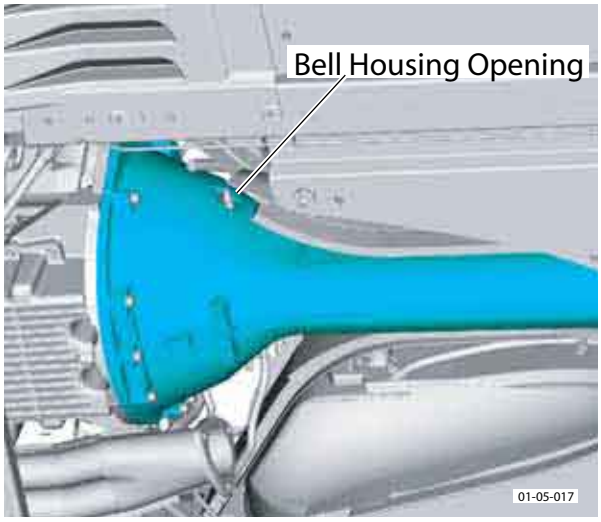
Install the drive plate. Torque bolts to **72 Nm.**



11. Manual Gearbox Only.

Install the propshaft to the torque tube. Install the horseshoe clip.

When installing the propshaft use a lever through the opening in the bell housing to manoeuvre the splines of the propshaft to the crankshaft.
Use a soft face hammer to fully locate the propshaft.



12. Manual gearbox Only.

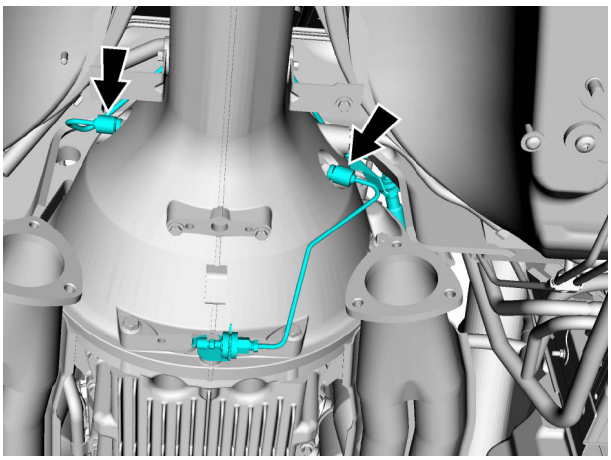
⚠ Warning ⚠
Avoid skin / eye contact or ingestion of clutch fluid.
If skin or eyes are splashed with clutch fluid, rinse affected area immediately with plenty of water and obtain medical attention.
If clutch fluid is ingested, obtain immediate medical attention.

Caution
Clutch fluid must not be allowed to contact the vehicle paint work. Remove spilt clutch fluid from the paint work by rinsing away with running water.

Place suitable absorbent material around the affected area to absorb any possible clutch fluid spillage.

Install the clutch salve cylinder bleed and supply pipes.

Push the wire clip back into position on the female end, then connect the male to the female.



13. Automatic Gearbox Only.

Install the transmission oil coolant pipes to the torque tube.

14. Install the heat shield brackets to the torque tube.

15. Automatic Gearbox Only.

Install the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).

16. Manual gearbox Only.

Install the transaxle (Refer to 'Manual Transmission (07.03)', page 7-3-1).

17. Manual gearbox Only.

Bleed the clutch.

18. Install the heat shields.
19. Install the exhaust system (Refer to 'Exhaust System', page 9-2-1).
20. Install the shear panel and both undertrays.
21. Install the road wheel arch liners and road wheels. (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
22. Connect the vehicle battery.

Driveline (05.00)

Halfshafts (05.05)

Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Halfshaft nut	300	221.5
Halfshaft to differential	70	52

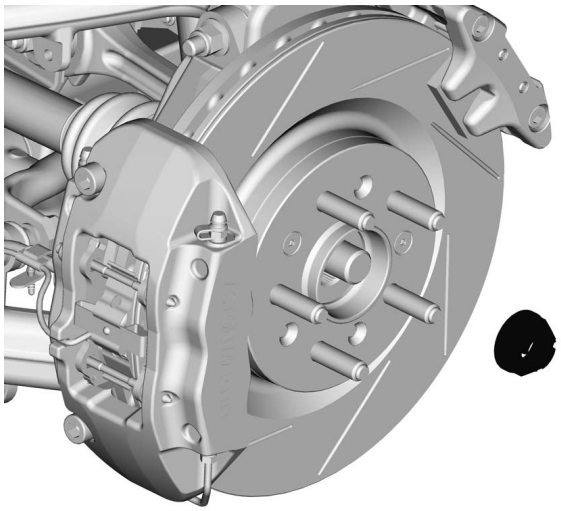
Maintenance

Halfshaft

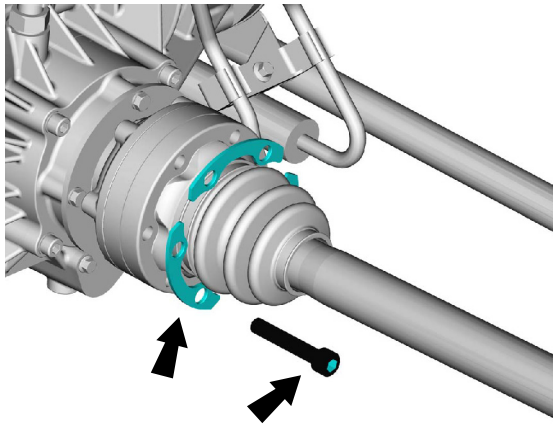
Repair Operation Time (ROT)		
Item		**Code**
Halfshaft Renew	(LH)	**05.05.AB**
	(RH)	**05.05.BB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the halfshaft nut.



4. Remove bolts (x6) and washer tabs (x3). Discard bolts.



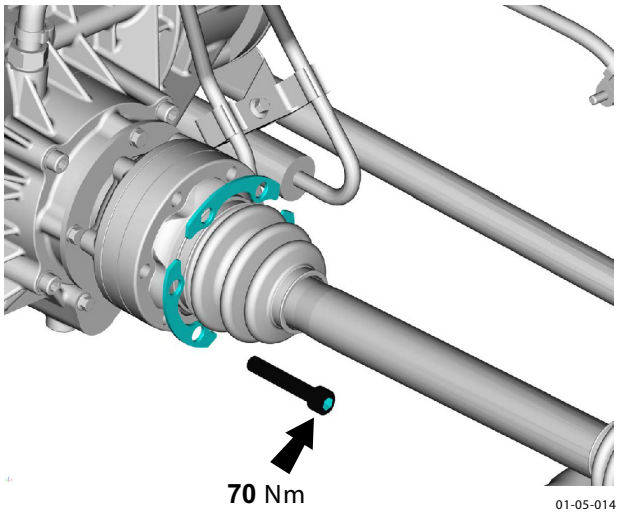
5. Withdraw the halfshaft.

Installation

1. Position the halfshaft through the vertical link.



2. Place the halfshaft up to the differential output.



3. Install the washer tabs (x3) and **new** bolts (x6). Torque bolts to **70 Nm**.

New bolts should have a thread lock coating.

4. Install the halfshaft nut. Torque nut to **300 Nm**.
5. Install the road wheel(s) (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

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Brake System (06.00)

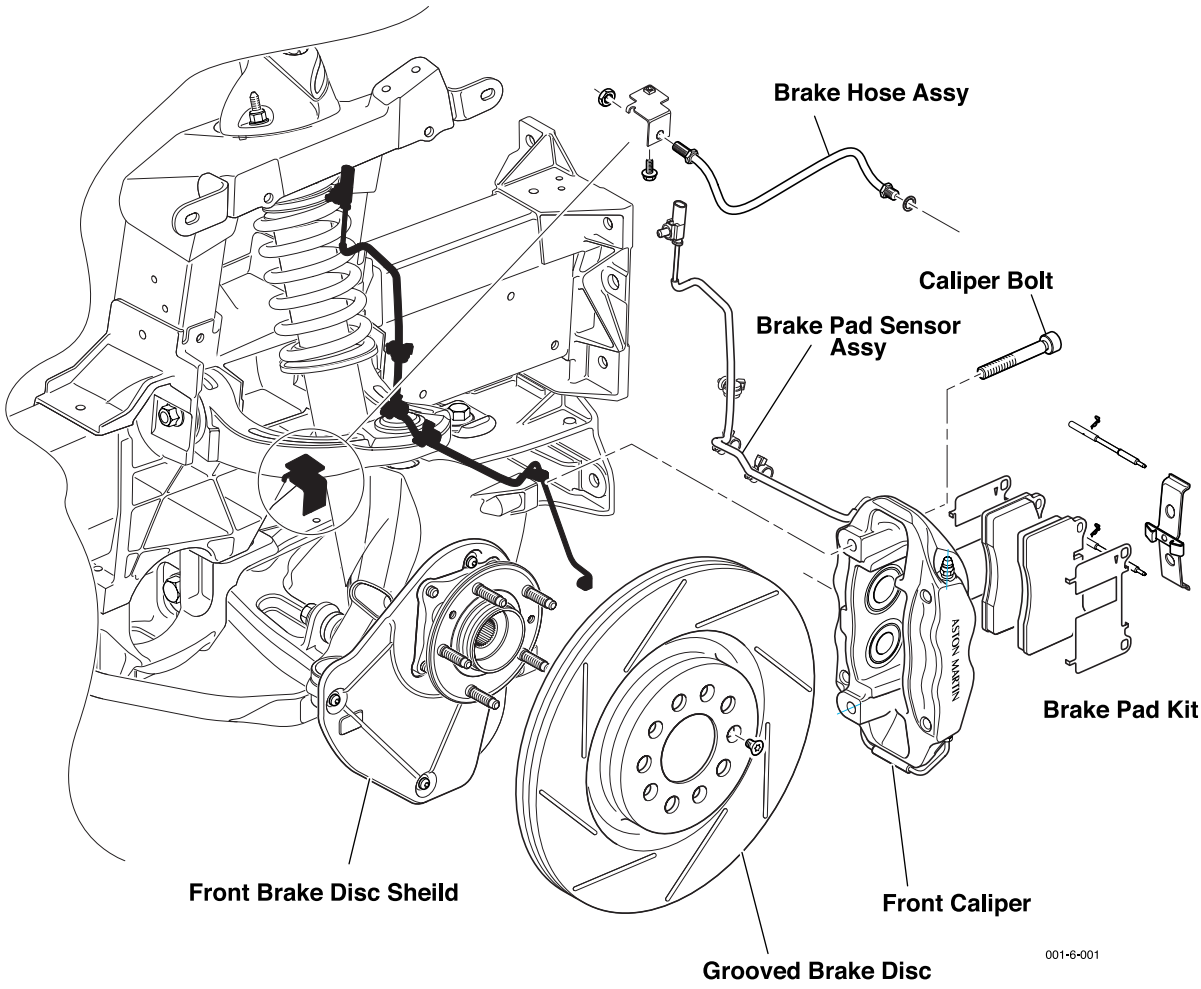
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Brake Systems (06.00)

Front Disc Brake (06.03)

Description



The front, four piston, brake caliper is bolted directly to the vertical link by two bolts. The caliper is a monobloc assembly. The steel brake discs are ventilated and grooved. They are secured to the hub by two retaining bolts.

The two-pairs of opposed pistons act directly on the brake pads mounted one each side of the disc.

Specifications

Oils/Greases	
Brake Fluid	Castrol Super Response DOT 4 (Not silicon based brake fluid).
Qty.	2.5 ltrs

Brake discs	Front
Initial thickness	32 mm
Min. thickness	30 mm
Brake Disc 'Runout'	<70 μm measured @ 2 mm in from the brake disc edge.

Brake pads	
New pad thickness	9.4 mm
Minimum lining thickness	2.5 mm

Torque Figures

Description	Nm.	lb. / ft.
Brake hose unions	22	16.5
Brake Caliper to Vertical Link	20 + 66°-70°	15 + 66°-70°
Handbrake Caliper to Vertical Link	15 +90°-94°	11.5 + 90°-94°
Brake Disc Screws	10.5	8

Maintenance

Brake Caliper (Front and Rear)

Repair Operation Time (ROT)		
Item		**Code**
Brake Caliper Renew	(LH)	**TBA**
	(RH)	**TBA**
	(LH)	**TBA**
	(RH)	**TBA**

Removal

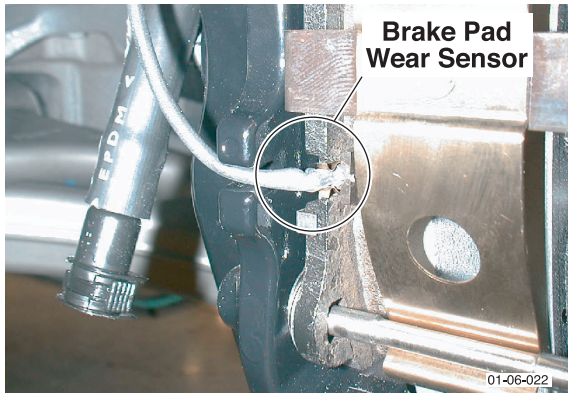
Front calipers shown.

Place a cloth around the brake reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).

Retract the caliper pistons (allowing easier removal of caliper). Retracting the caliper pistons may cause the brake fluid reservoir to overflow.

3. Disconnect the brake pad wear sensor.



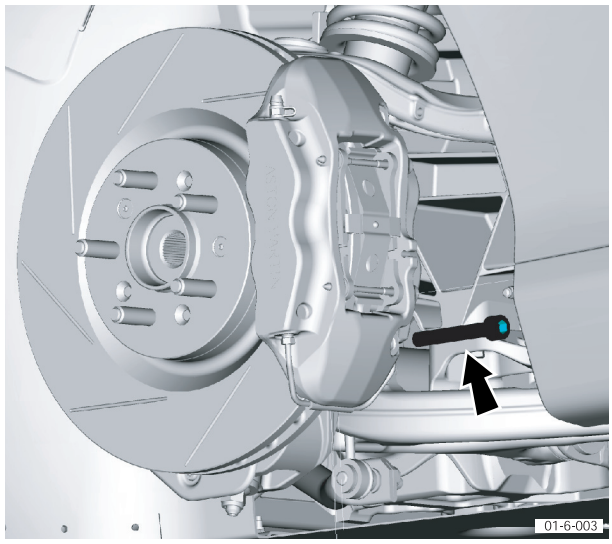
Consider renewing the brake pads when less than $^{1}/_{3}$ of the friction material remains, especially if the vehicle is regularly used and some time remains before next service.

⚠ Warning ⚠
Always use a vacuum brush or aqueous brake cleaner to remove brake lining dust. Never use compressed air.

⚠ Warning ⚠
Avoid skin / eye contact or ingestion of brake fluid. If skin or eyes are splashed with brake fluid, rinse the affected area immediately with plenty of water and obtain medical attention. If brake fluid is ingested, obtain immediate medical attention.

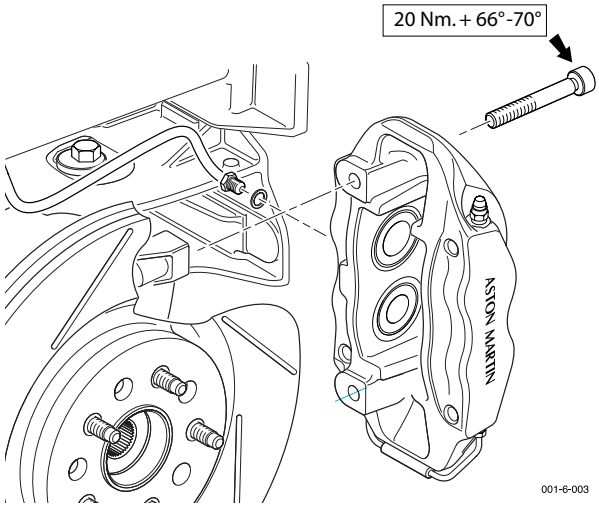
Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

4. Disconnect the brake hose union. 'Cap' the union bolt and plug the hose aperture in the caliper.
5. Remove bolts (x2) that secure the caliper to the vertical link. Withdraw the caliper.



Installation

1. Install the caliper to the vertical link. Torque bolts (x2) to **20 Nm. + 66°-70°**.



2. **Front Caliper Brake pipes.**

Caution
Ensure that the alignment line on the flexible brake pipe remains in a straight line.

Caution
On LH and RH calipers the brake pipe must route towards the front of the car.

2.1 Insert the brake pipe union to the caliper.
- Ensure that the flex hose alignment line is straight
- Ensure that the brake pipe faces forward and locates correctly in the alignment tool

Torque to **22 Nm**.

2.2 Install the brake pipe alignment tool. Check that the brake pipe orientation is correct:
- The flex hose alignment line is straight
- The brake pipe faces forward and locates correctly in the alignment tool



2.3 If the alignment is **not** correct, carefully back off the pipe union at the brake calliper until the pipe can be rotated backwards to allow forward movement when being re-torqued. Re torque the brake pipe union to **22 Nm** then re check alignment as detailed above.

3. Rear Caliper brake pipes.

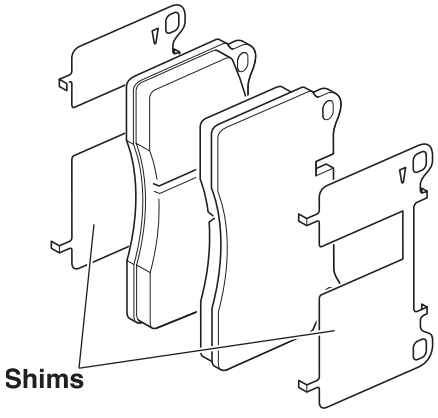
3.1 Insert the brake pipe union to the caliper. Torque to **22 Nm**.

3.2 Check that the brake pipe orientation is correct.
- Flex hose alignment line is straight

3.3 If the alignment is **not** correct, carefully back off the pipe union at the brake calliper until the pipe can be rotated backwards to allow forward movement when being re-torqued. Re torque the brake pipe union to **22 Nm** then re check alignment as listed above.

4. Install the brake pads and brake pad wear sensor. Note LH and RH shims from removal.

When installing new brake pads, install a new brake pad wear sensor.



5. Bleed the brakes (Refer to 'Brake Bleed - Manual', page 6-4-4).
6. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
7. 'Bed-In' the brakes (Refer to 'Brake Pad 'Bedding-in'', page 6-1-6).

Brake Discs (Front and rear)

Repair Operation Time (ROT)		
Item		**Code**
Brake Disc Renew	(Front)	**06.03.CB**
	(Rear)	**06.04.CB**

Removal

Place a cloth around the brake reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).

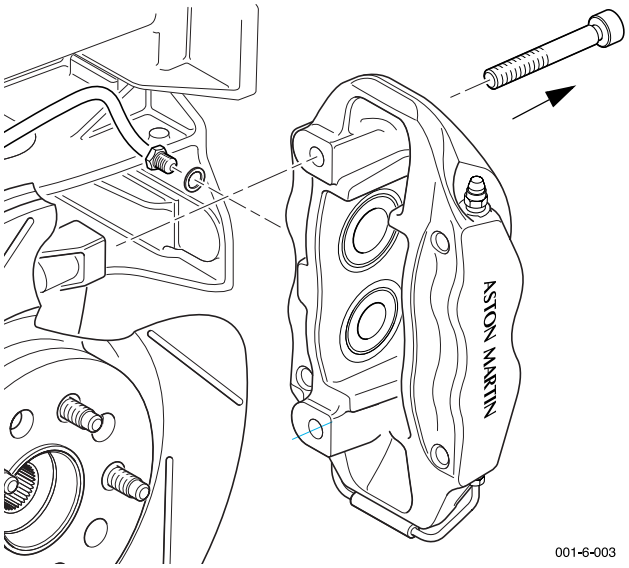
Retract the caliper pistons (allowing easier removal of caliper). Retracting the caliper pistons may cause the brake fluid reservoir to overflow.

3. Rear Road Wheels Only.

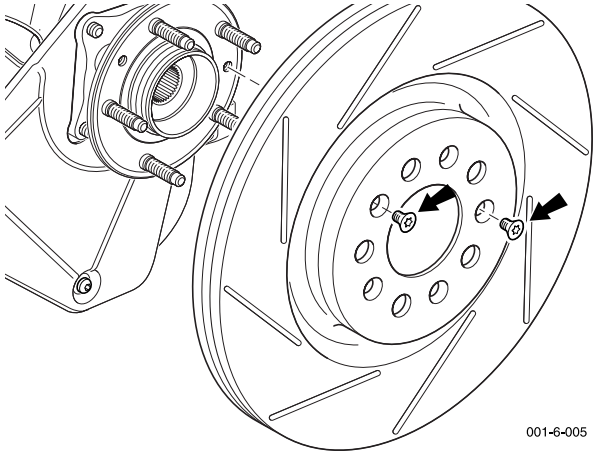
Remove the parking brake caliper (Refer to 'Brake Caliper', page 6-3-2).

4. Remove bolts (x2) and withdraw the caliper.

Support the caliper to prevent excessive strain on flexible hose.



5. Remove retaining screws. Withdraw the brake disc.



Installation

1. Install the brake disc to the road wheel hub. Ensure that the surfaces of the disc and hub are clean and free from debris.

   Torque screws (x2) to **10.5 Nm**.
2. Check brake disc 'runout' (Refer to 'Specifications', page 6-1-2).
3. Install the caliper. Torque bolts (x2) to **20 Nm. + 66°-70° Nm**.
4. **Rear Road Wheels Only.**
5. Install the handbrake caliper. Torque bolts (x2) to **15 Nm. + 90°-94°**.
6. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

> ⚠ ***Warning*** ⚠
> ***Before moving off, pump the foot brake pedal 2 or 3 times to ensure the foot brake works correctly. Brake caliper pistons may require travel to contact the brake pads and disc.***

7. 'Bed-in' the brake pads (Refer to 'Brake Pad 'Bedding-in'', page 6-1-6).

Brake Pads (Front and rear)

Repair Operation Time (ROT)		
Item		**Code**
Brake Pads Renew	(Front)	**06.03.DB**
	(Rear)	**06.04.DB**

Removal

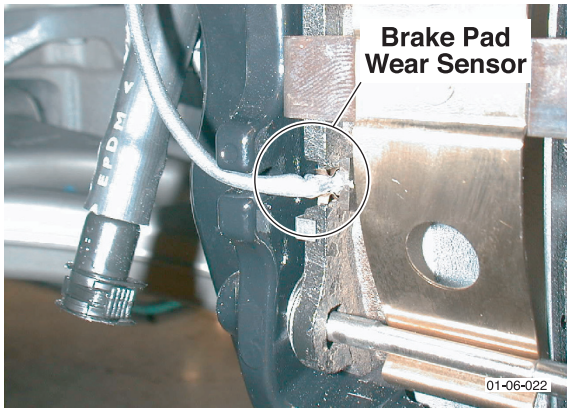
Front calipers shown.

Place a cloth around the brake reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).

Retract the caliper pistons (allowing easier removal of caliper). Retracting the caliper pistons may cause the brake fluid reservoir to overflow.

3. Disconnect the brake pad wear sensor.



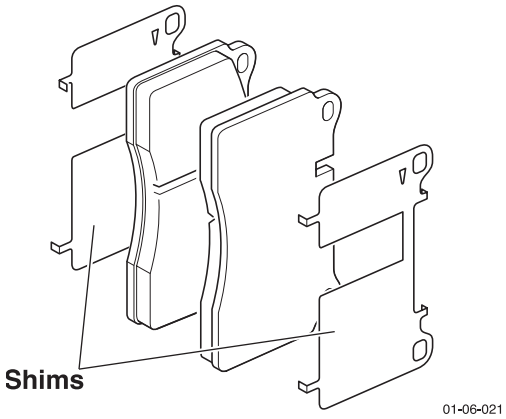
4. Remove the brake pads. Note LH and RH shims for installation.

> ⚠ ***Warning*** ⚠
> ***Always use a vacuum brush or aqueous brake cleaner to remove the brake lining dust. Never use an air line.***

5. Clean the caliper area using approved brake cleaning equipment.

Installation

1. Install the brake pads. Note LH and RH shims from removal. Install the pad locating pins.



When installing new brake pads, install a new brake pad wear sensor.

2. Connect the brake pad wear sensor to the brake pads.
3. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

> ⚠ ***Warning*** ⚠
> ***Before moving off, pump the foot brake pedal 2 or 3 times to ensure the foot brake works correctly. Brake caliper pistons may require travel to contact the brake pads and disc.***

4. 'Bed-in' the brake pads (Refer to 'Brake Pad 'Bedding-in'', page 6-1-6).

Brake Pad 'Bedding-in'

Repair Operation Time (ROT)	
Item	**Code**
Bedding-in	**TBA**

Caution
Failure to 'bed-in' new brake pads will result in reduced brake performance and possible brake judder or squeal.

After the installation of new brake pads, brake performance will be limited, as the brake discs and pads need to be 'Bedded-in'.

Procedure

This procedure, in a controlled environment, requires approximately 17 minutes to complete. It is recommended that an analogue decelerometer be used for this procedure.

Ensure the brakes are cold (Less than 80° C) before starting this procedure.

Use light brake applications only, if possible, when the vehicle is driven to a suitable location to carry out this procedure.

Use light brake applications only, if possible, during all cooling down periods.

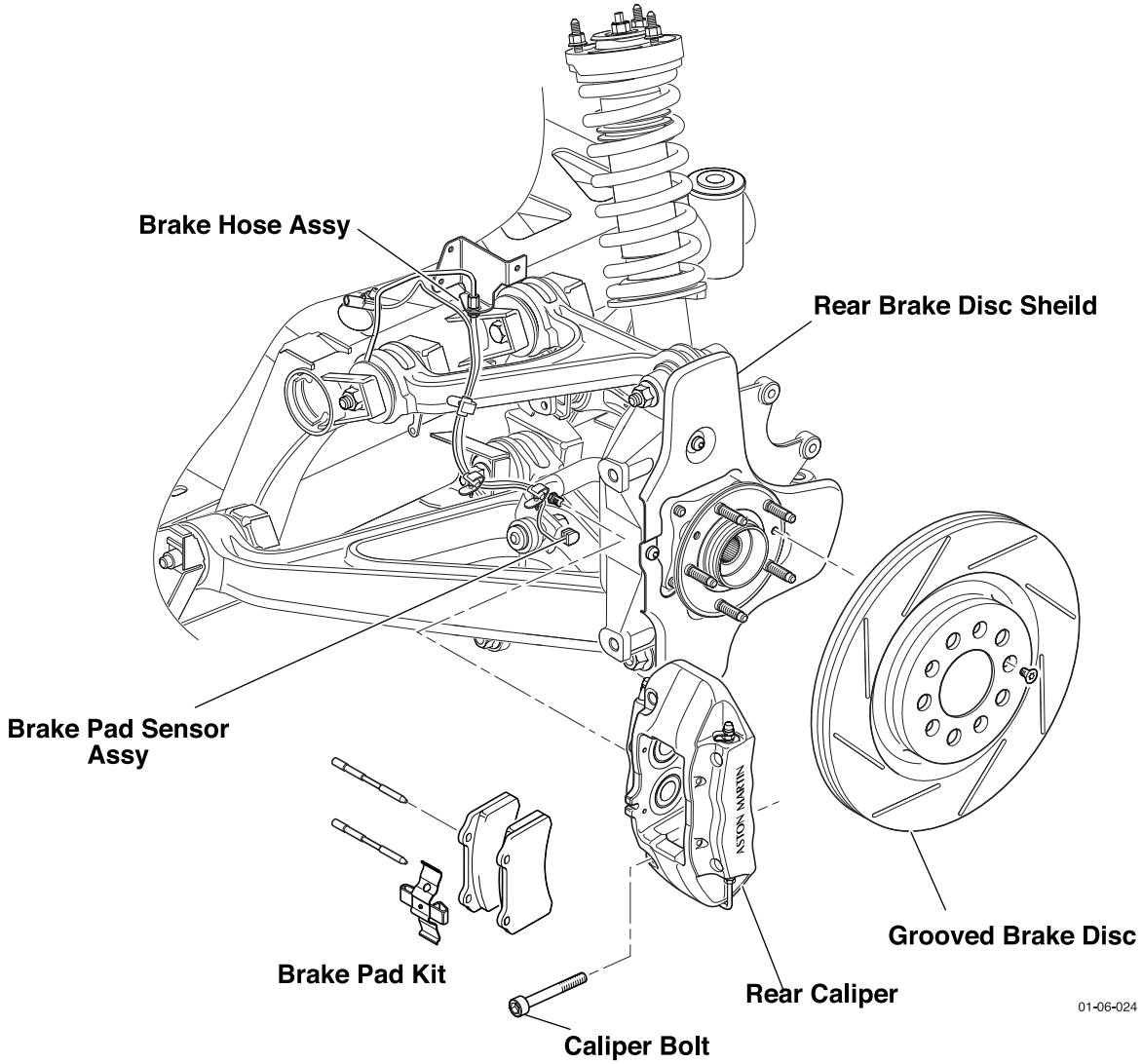
The cool down periods are the minimum required and can be extended.

1. Decelerate the vehicle three times from 100 km/h to 32 km/h at 0.3g accelerating normally in between each deceleration.
2. Drive 3 km (allowing the brakes to cool).
3. Decelerate the vehicle three times from 100 km/h to 32 km/h @ 0.5g accelerating normally in between each deceleration.
4. Drive 4 km (allowing the brakes to cool).
5. Decelerate the vehicle three times from 100 km/h to 0 km/h using the ABS, accelerating normally in between each deceleration.
6. Drive 8 km (allowing the brakes to cool).

Brake system (06.00)

Rear Disc Brakes (06.04)

Description



The rear, four piston, brake caliper is bolted directly to the vertical link by two bolts. The caliper is a monobloc assembly. The steel brake discs are ventilated and grooved. They are secured to the hub by two retaining bolts.

Specifications

Oils/Greases	
Brake Fluid	Castrol Super Response DOT 4 (Not silicon based brake fluid)

Brake discs	
Brake disc initial thickness	28.0 mm
Brake disc Min. thickness	26.0 mm
Brake Disc 'Runout'	<70 μm measured @ 2 mm in from the brake disc edge.

Brake pads	
Minimum lining thickness	2.5

Torque Figures		
Description	Nm.	lb. / ft.
Brake hose unions	22	16.5
Service brake Caliper to Vertical Link	20 + 66°-70°	15 + 66°-70°
Handbrake Caliper to Vertical Link	15 + 90°-94°	11.5 + 90°-94°

Maintenance

For symptoms and maintenance of the rear brake system (Brake Discs, Pads and Calipers) follow the same procedures as detailed for the front brake system.

Brake Calipers (Refer to 'Brake Caliper (Front and Rear)', page 6-1-3)

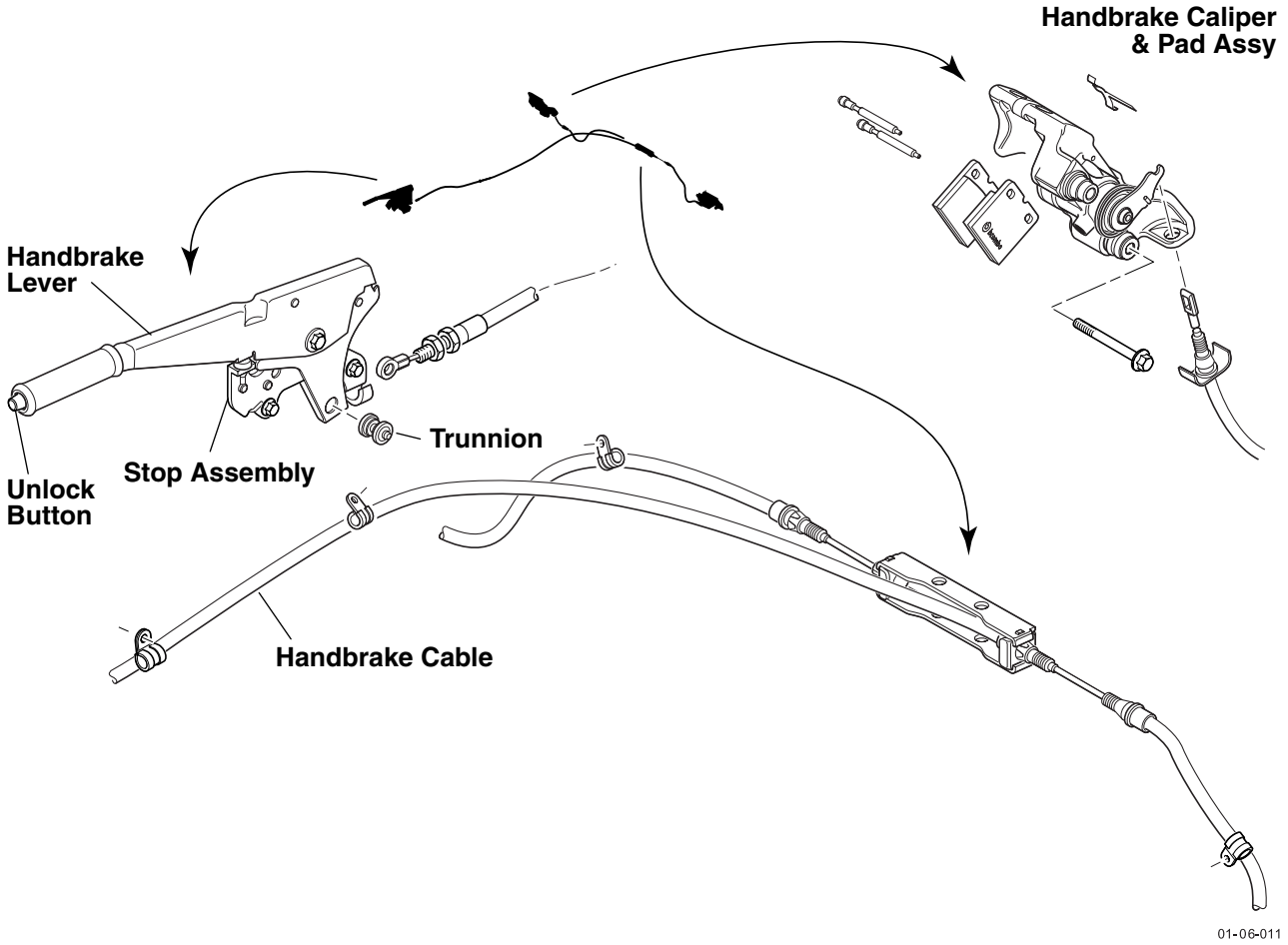
Brake Discs (Refer to 'Brake Discs (Front and rear)', page 6-1-4)

Brake pads (Refer to 'Brake Pads (Front and rear)', page 6-1-5)

Brake Systems (06.00)

Hand Brake (06.05)

Description



The hand brake control lever is located on the outside of the drivers seat and brakes the rear road wheels through a cable system and two mechanical handbrake calipers. Hand brake pads are applied by the mechanical brake calipers (x2), one acting on each rear road wheel brake disc. The calipers are bolted to the vertical links. Return springs on each caliper retract the pads when the parking brake is released.

Wear in the parking brake pads is compensated for automatically by a mechanism within the calipers. Cable stretch is compensated by cable adjusters.

A hand brake switch is wired normally closed. The switch is held open whilst the hand brake is 'off' and closes when the hand brake is applied. The hand brake warning lamp on the instrument panel is illuminated when the hand brake is applied.

Specifications

Brake pads		
Minimum lining thickness	6 mm	
Torque Figures		
Description	Nm.	lb. / ft.
Brake Caliper to Vertical Link	15 + 92°	11.5 + 92°

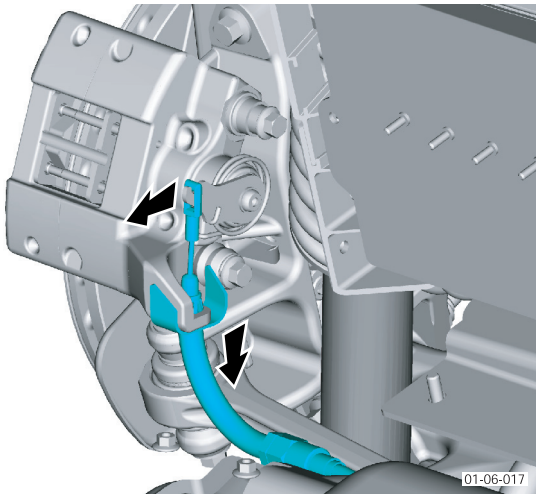
Maintenance

Brake Caliper

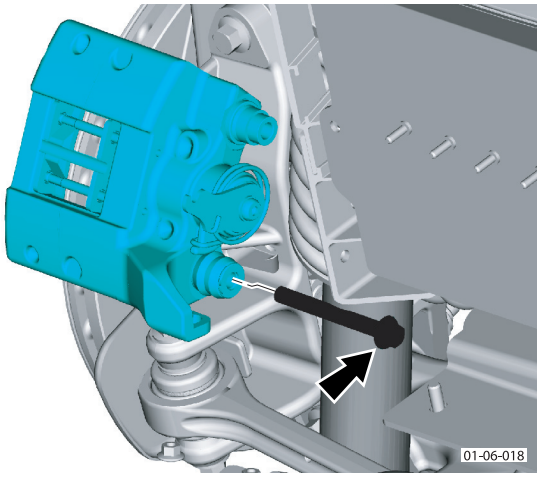
Repair Operation Time (ROT)		
Item		**Code**
Handbrake Caliper Renew	LH	**06.05.AB**
	RH	**06.05.BB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the handbrake cable from the caliper.
   3.1 Screw in the cable adjustment on both handbrake calipers.
   3.2 Remove the handbrake cable 'eyelet' from the caliper actuator arm.
   3.3 Withdraw the handbrake cable.



4. Remove the caliper from the vertical link. Discard the mounting bolts (x2).



> ⚠ ***Warning*** ⚠
> ***Always use a vacuum brush or aqueous brake cleaner to remove brake pad dust. Never use compressed air.***

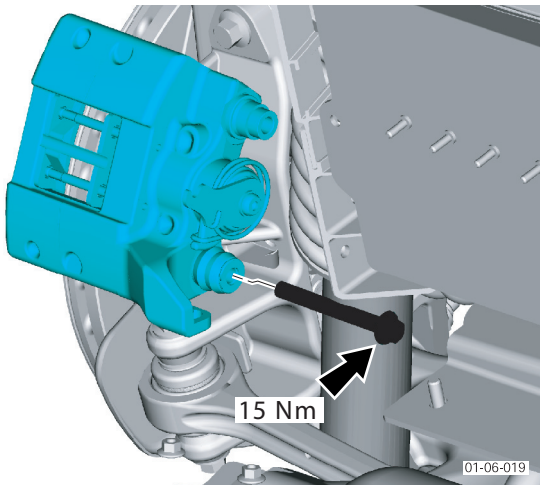
5. Carefully remove brake dust or dirt from the parking brake system components.
6. If required, remove the handbrake pads (Refer to 'Brake Pads', page 6-3-3)
7. Check the caliper is free on its mounting pins. Service as required.

Installation

1. If removed, install the handbrake pads (Refer to 'Brake Pads', page 6-3-3).

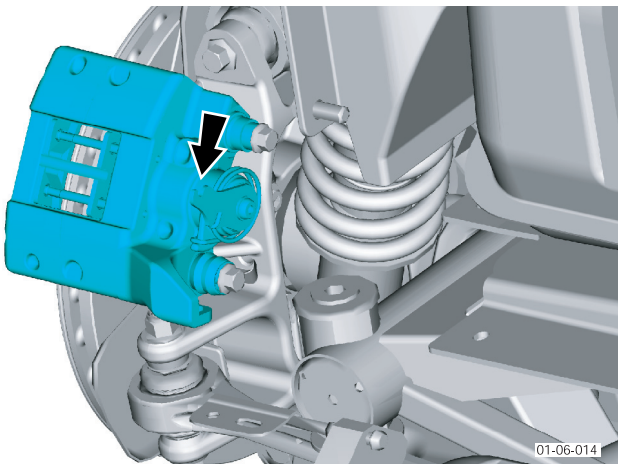
> *Always replace handbrake pads in axle sets.*

2. Using new bolts, install the caliper to the vertical link. Torque bolts (x2) to **15 Nm + 92°**.



3. Operate the caliper lever several times by hand.

> *This will take up the free play between the piston / pads and the brake disc.*



4. Install the handbrake cable to the caliper.
   4.1 Install the handbrake cable through the mount on the caliper.
   4.2 Locate the handbrake cable 'eyelet' over the caliper actuator arm.

5. Adjust the handbrake cable (Refer to 'Adjustment', page 6-3-5).

⚠ Warning ⚠
Before moving off, operate the handbrake 2 or 3 times to ensure the handbrake works correctly. Handbrake caliper pistons may require travel to contact the brake pads and disc.

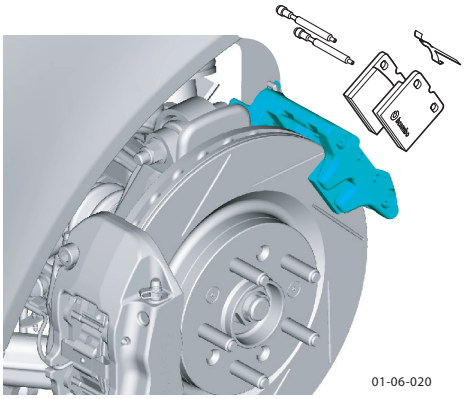
6. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Brake Pads

Repair Operation Time (ROT)	
Item	**Code**
Handbrake Pads Renew	**06.05.DB**

Removal

1. Raise the vehicle and make safe.
2. For each affected wheel station remove the road wheel(s).
3. Remove the handbrake brake pads.



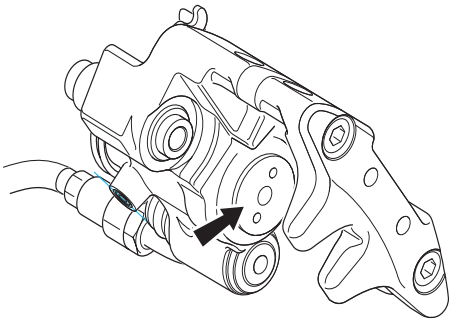
⚠ Warning ⚠
Always use a vacuum brush or aqueous brake cleaner to remove brake pad dust. Never use compressed air.

4. Carefully remove brake dust or dirt from the handbrake system components.

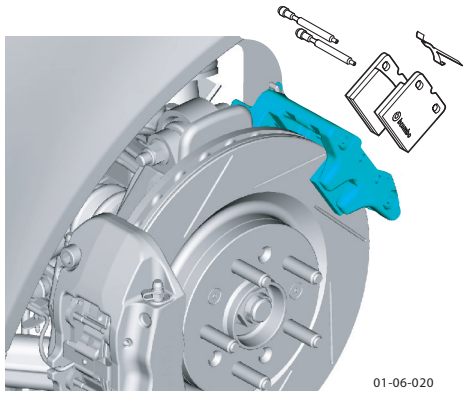
Installation

1. Screw back the caliper pistons.

Use a proprietary service tool to screw back the piston.

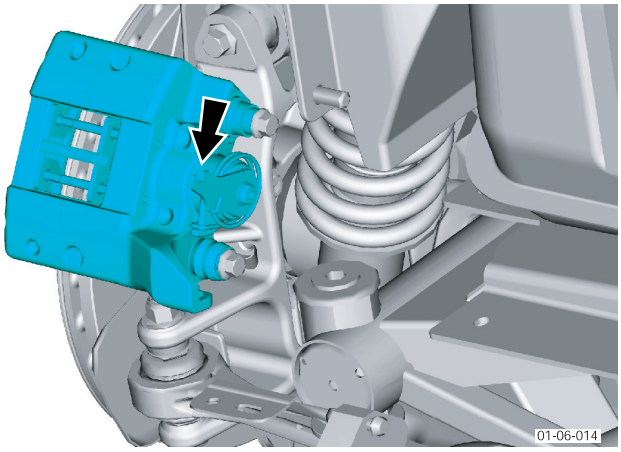


2. Install the brake pads.



3. Operate the caliper lever several times by hand.

This will take up the free play between the piston / pads and the brake disc.



4. Adjust the handbrake cable (Refer to 'Adjustment', page 6-3-5).

⚠ Warning ⚠
Before moving off, operate handbrake 2 or 3 times to ensure the handbrake works correctly. Handbrake caliper pistons may require travel to contact the brake pads and disc.

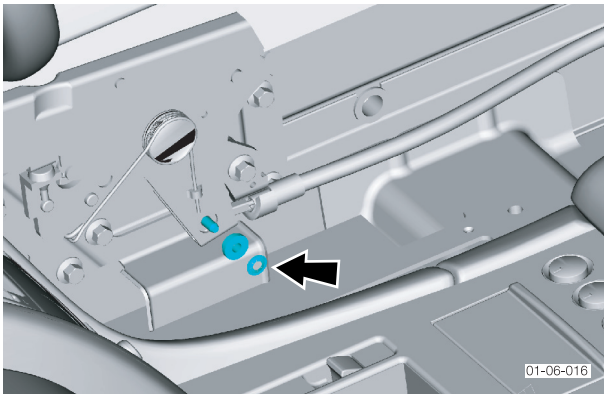
5. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

Handbrake Cable

Repair Operation Time (ROT)	
Item	Code
Handbrake Cable Renew	06.05.DB

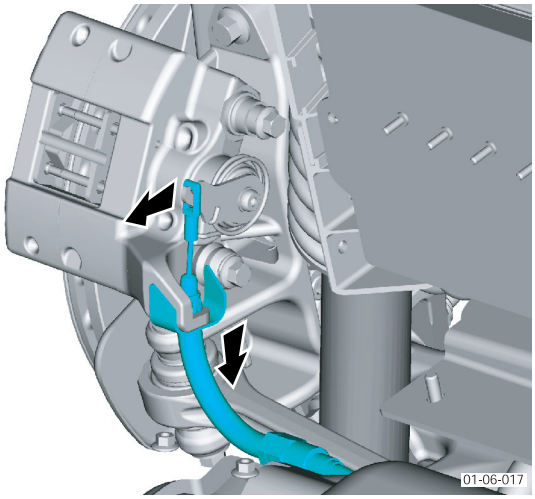
Removal

1. Back off the cable adjustment from each caliper.
2. Remove the drivers seat (Refer to 'Seating (01.10)', page 1-7-1).
3. Remove the clevis pin and washers. Withdraw the handbrake cable from the vehicle body. Discard the clevis pin and spring clip.



4. Remove the handbrake cable from the calipers.

Use service tool 206-103 (Refer to '206-103 (Handbrake Cable Removal)', page 20-1-4) to disconnect the handbrake cable outer from the caliper mount.



5. Disconnect the cable from the subframe.

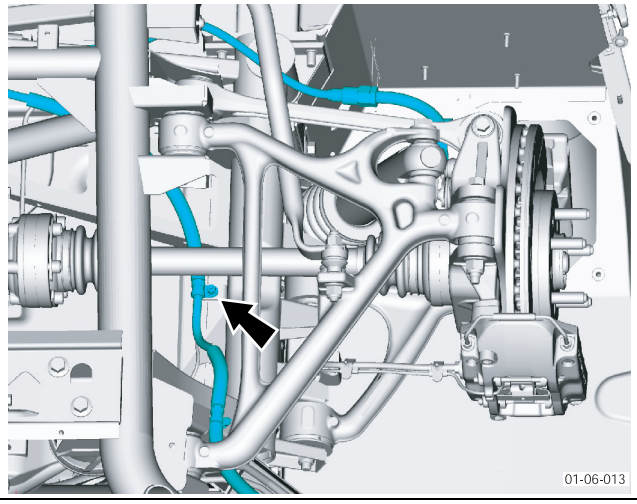
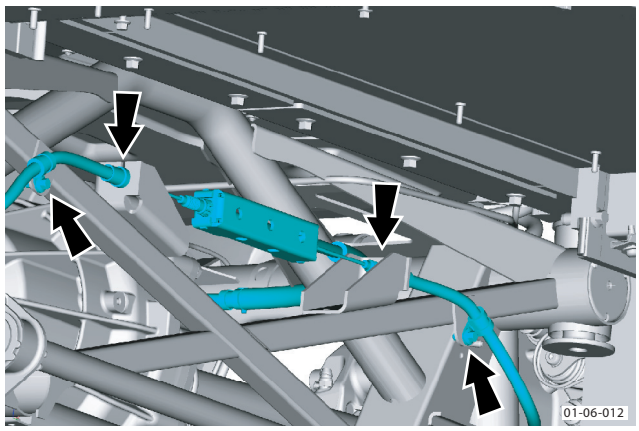


Image - RH drive vehicle

Caution
Do not attempt to disconnect the handbrake cables from the equaliser unit.

Use service tool 206-103 (Refer to '206-103 (Handbrake Cable Removal)', page 20-1-4) to disconnect the handbrake cable outer from the subframe mounts.



6. Withdraw the cable through the vehicle body and the subframe.

Installation

1. Feed the handbrake cable through the vehicle body and the subframe.

Ensure that all snap install clips are correctly located.

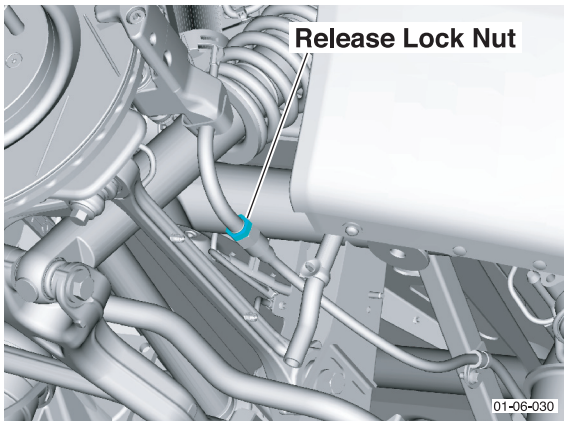
2. Engage the operator cable 'eyelets' to the calipers.

Ensure that the handbrake lever is fully released.

3. Using a new clevis pin, washers and spring clip, connect to the handbrake lever.
4. Adjust the handbrake cable.

Adjustment

1. Ensure the handbrake lever is fully released.
2. Release the handbrake cable lock nuts and screw the adjustment fully in.



3. Screw the adjustment 'out' or 'in' on each caliper, in equal amounts, to obtain a rise 4 clicks on the handbrake lever.

> ⚠ ***Warning*** ⚠
> ***Before moving off, operate parking brake 2 or 3 times to ensure the parking brake works correctly. Parking brake caliper pistons may require travel to contact the brake pads and disc.***

4. Check the functionality of the handbrake system:

4.1 When handbrake lever is in the fully down position (handbrake released), the brake warning light should be extinguished.

If the brake warning light does not extinguish, adjust the handbrake cable until correct function of brake warning light occurs.

4.2 Check the handbrake pads for binding by driving the vehicle.

If the pads are binding a squeal will be emitted from the rear brakes)

If the pads are binding the handbrake cable adjusters are over adjusted. Slacken the adjusters as necessary, then check brake warning light functionality.

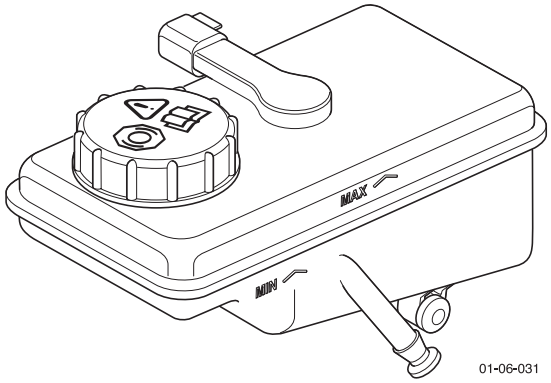
ASTON MARTIN
ASTON MARTIN

Brake System (06.00)

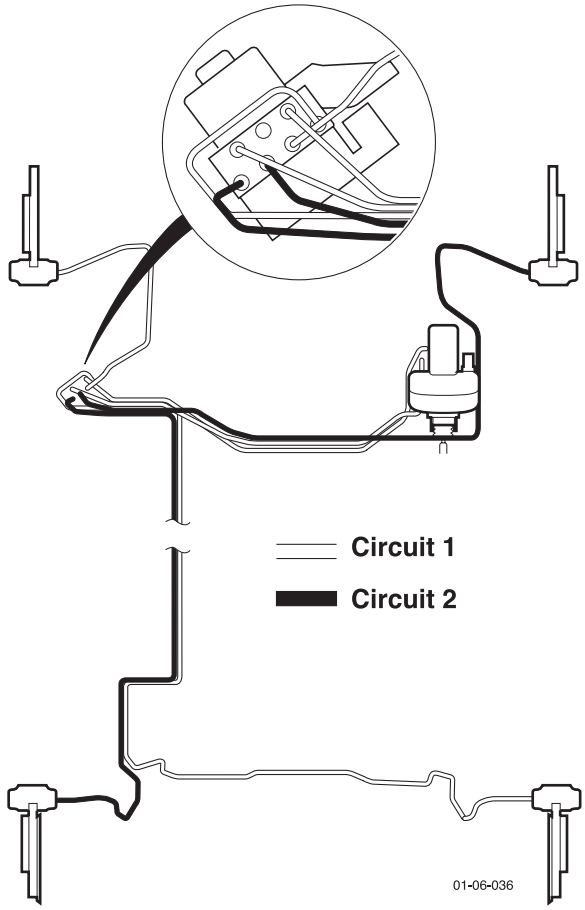
Brake Actuation System (06.06)

Description

Tandem Master Cylinder



The short-stroke tandem master-cylinder controls two separate brake circuits which are jointly activated by the brake pedal. In the event of a major leak in one system, the other will still function. The two systems are supplied by a common brake fluid reservoir.

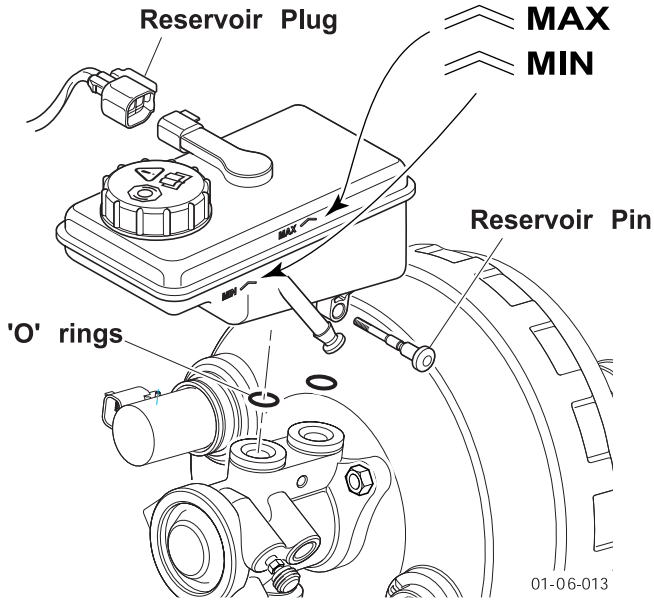


A pressure sensor attached to the master-cylinder provides the ABS / DSC module with brake pressure information. This information informs the system how hard the driver is braking and is used as an aid for the ABS / DSC to achieve accurate brake pressure control.

Brake Fluid Reservoir

The brake fluid reservoir is mounted directly on the tandem master cylinder and secured with a pin. Two stub pipes, on the base of the reservoir, locate into the primary and secondary chambers of the tandem master cylinder.

An integral fluid-level switch is incorporated in the reservoir. If the brake fluid level is low, the brake warning lamp in the Driver Information Module (DIM) will illuminate and 'LOW BRAKE FLUID' will be displayed in the message center right.



Specifications

Oils/Greases	
Brake Fluid	Castrol Super Response Dot 4

Torque Figures		
Description	Nm.	lb. / ft.
Master Cylinder Mount	25 (+/- 4)	18.5 (+/- 3)
Brake Pipe Unions	17	13
Brake fluid reservoir securing pin	4	3
Pressure Sensor	35 (+/- 2)	26 (+/- 1.5)

Maintenance

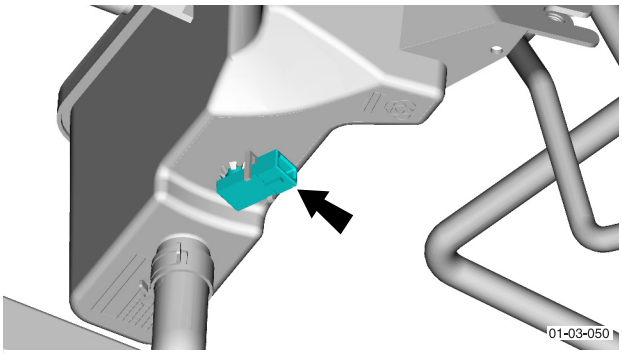
Master Cylinder

Repair Operation Time (ROT)	
Item	**Code**
Master Cylinder Renew	**06.06.EB**

Removal

1. Remove the coolant reservoir (LH drive only).

To give better access. Be aware that there is a wiring harness plug connected to the header tank on the under side.



⚠ *Warning* ⚠

Avoid skin / eye contact or ingestion of brake fluid. If skin or eyes are splashed with brake fluid, rinse the affected area immediately with plenty of water and obtain medical attention. If brake fluid is ingested, obtain immediate medical attention.

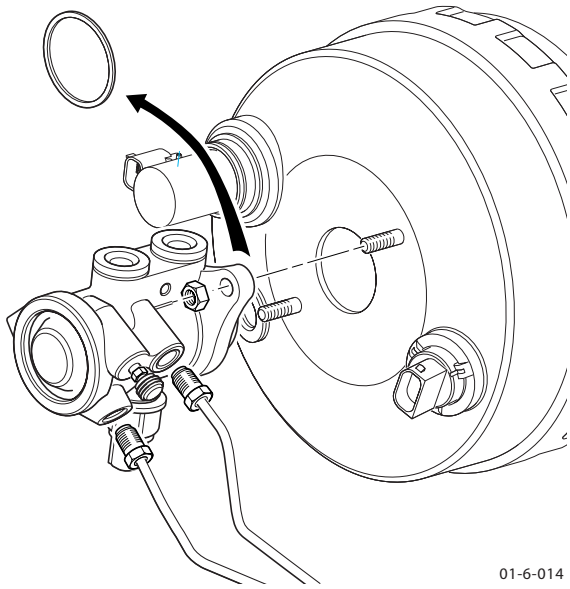
Caution

Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

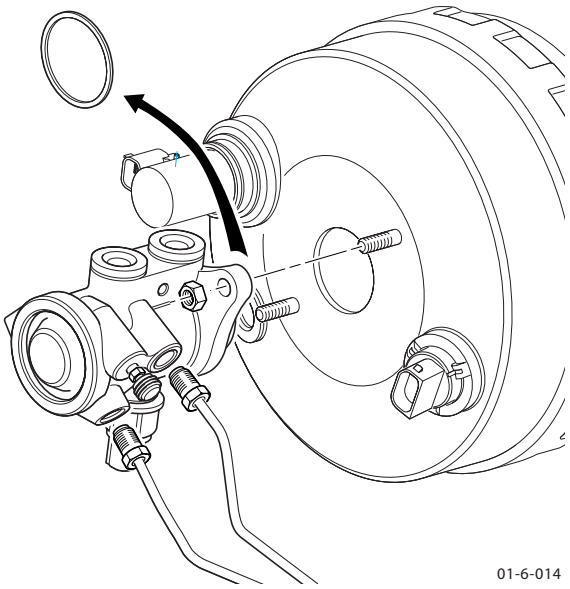
Place suitable absorbent material around the brake fluid reservoir area to catch any spilt brake fluid.

2. Disconnect the two outlet pipes. Install blanking plugs to all ports and pipe ends to prevent brake fluid leakage.

Mark each pipe - for correct installation.

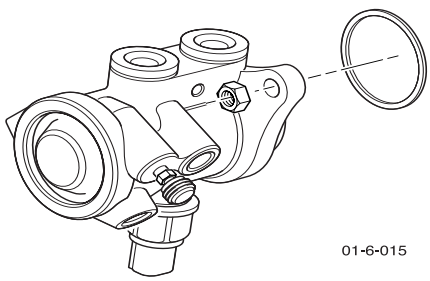


3. Disconnect the pressure sensor wiring harness plug.
4. Remove the two nyloc nuts that secure the master cylinder to the brake booster. Withdraw the master cylinder. Discard the 'O' ring and nyloc nuts.

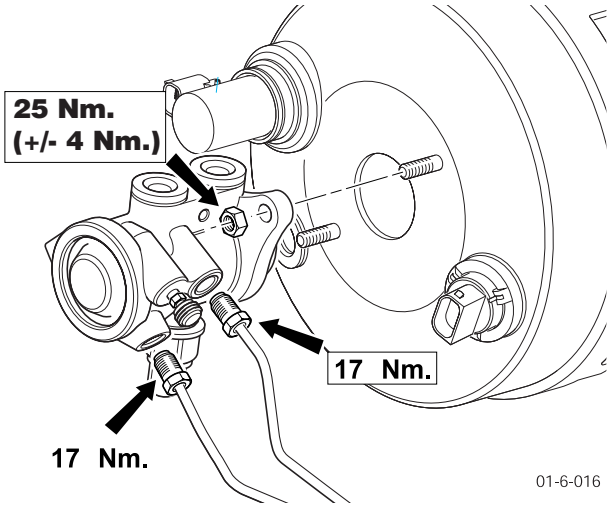


Installation

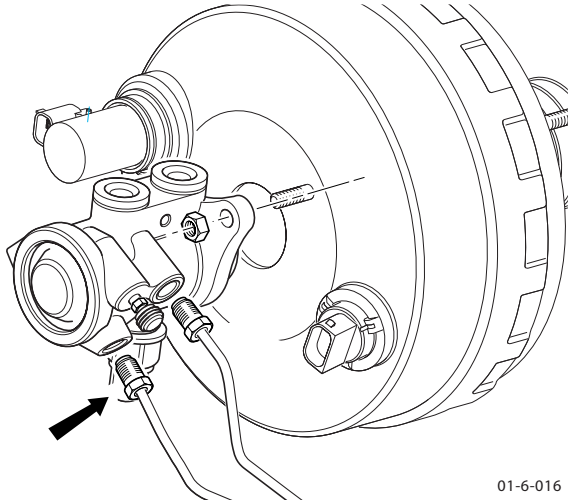
1. Install a new 'O' ring.



2. Secure the master cylinder with new nyloc nuts (x2). Torque to **25 Nm (+/- 4 Nm.)**.



3. Install the two outlet pipe unions to their original positions on the tandem master cylinder.
4. Connect the pressure sensor wiring harness plug.



5. Install the coolant reservoir (LH drive only). Top up the coolant system if required.
6. Bleed the brake system (Refer to 'Brake Bleeding - WDS', page 6-4-4).

Caution

Do not bleed the brake system at the brake master cylinder.

Brake Fluid Reservoir

Repair Operation Time (ROT)	
Item	**Code**
Brake Fluid Reservoir Renew	06.06.AB

Removal

⚠ Warning ⚠

Avoid skin / eye contact or ingestion of brake fluid.

If skin or eyes are splashed with brake fluid, rinse the affected area immediately with plenty of water and obtain medical attention.

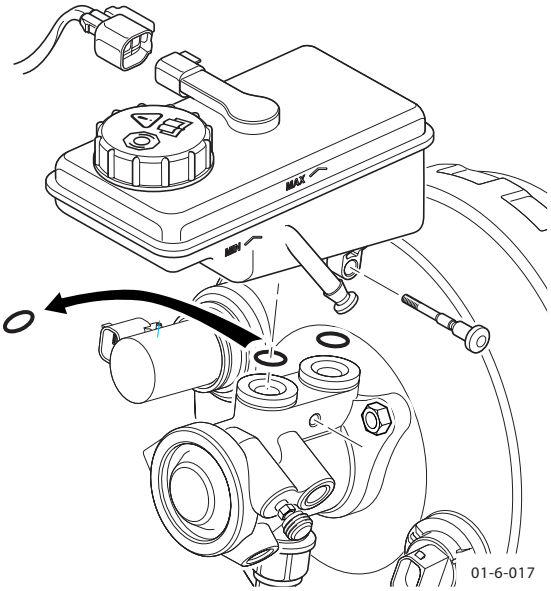
If brake fluid is ingested, obtain immediate medical attention.

Caution

Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Place suitable absorbent material around the brake fluid reservoir area to catch any spilt brake fluid.

1. Remove the master cylinder (Refer to 'Master Cylinder', page 6-4-2).
2. Drain as much brake fluid as possible from the brake fluid reservoir.
3. Remove the brake fluid reservoir securing pin.
4. Withdraw the brake fluid reservoir. Take care to minimise brake fluid spill. Clear any spilt brake fluid immediately.
5. Discard the brake fluid reservoir 'O' rings.



Installation

1. Install new 'O' rings to the brake fluid reservoir.

Lightly lubricate 'O' rings with brake fluid.

2. Install the brake fluid reservoir to the master cylinder. Ensure correct location of the 'O' rings.
3. Install the brake fluid reservoir securing pin. Torque to **4 Nm. (+/- 0.5 Nm.)**.

⚠ Warning ⚠
Brake fluid is hygroscopic. If kept in opened containers, it will absorb water vapour. Use only brake fluid from freshly opened containers when topping up the brake fluid reservoir.

4. Fill the brake fluid reservoir with the specified brake fluid from a new, unopened container (Refer to 'Specifications', page 6-1-2).
5. Bleed the brake system (Refer to 'Brake Bleeding - WDS', page 6-4-4).

Brake Bleeding - WDS

⚠ Warning ⚠
Avoid skin / eye contact or ingestion of brake fluid. If skin / eyes are splashed with brake fluid, rinse the affected area immediately with plenty of water and obtain medical attention. If brake fluid is ingested, obtain immediate medical attention.

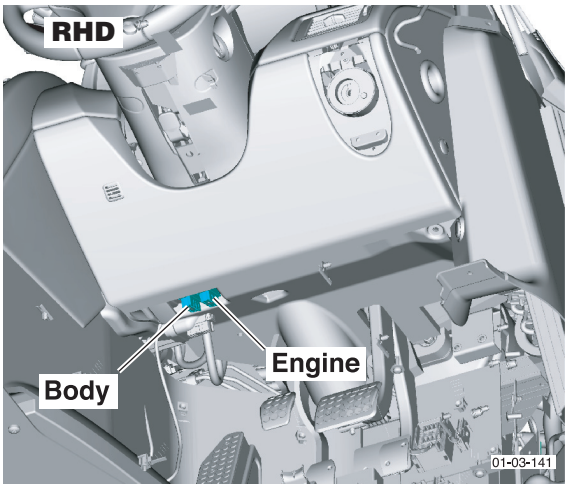
Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Use the WDS to bleed the brakes if bleeding the brake system after installing a major component, i.e. a modulator or master cylinder or when filling from empty.

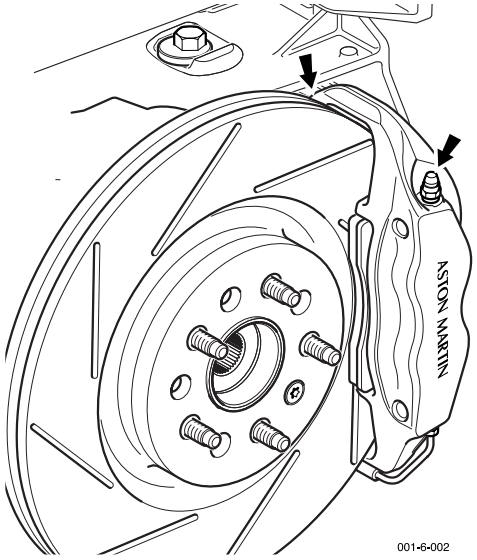
If bleeding a caliper a manual brake bleed procedure can be used.

1. Connect the WDS.

The diagnostic sockets, Body and Engine, differ for LHD and RHD vehicles (Refer to 'Diagnostic Ports', page 20-1-2).



2. Clean each caliper in the area of the bleed screws. Remove the dust caps.



⚠ Warning ⚠
Brake fluid is hygroscopic. If kept in opened containers, it will absorb water vapour. Use only brake fluid from freshly opened containers when topping up brake fluid reservoir.

3. Prepare a bleed tube and a bottle containing a small quantity of clean brake fluid.
4. If necessary, top up the brake fluid reservoir with brake fluid from a freshly opened container.
5. Switch on the WDS and load the 'Anti-lock braking diagnostics' software.

When bleeding a brake caliper always bleed the inner bleed screw first, followed by the outer bleed screw, then bleed the inner bleed screw once again.

6. Select 'Brake Bleed' and follow the WDS instructions.

Brake Bleed - Manual

After a Caliper Replacement

Preparation

1. Connect the bleed bottle tube to the bleed screws of front LH and rear LH calipers. Open the front LH and rear LH calipers bleed screws.
2. Actuate the brake pedal (>60mm) and secure it by using a pedal support.

This closes the TMC central valves and prevents fluid flowing out of the opened brake system.

3. Close the front LH and rear LH calipers bleed screws and remove the bleed bottle tubes.
4. Remove the caliper. Install the new caliper.
5. Remove the pedal support.
6. Remove the brake fluid reservoir cap and fill the reservoir to 'MAX' with **new** DOT 4 brake fluid.

7. Bleed the brake system.

Only the new caliper has to be bled.Ensure that there is always sufficient brake fluid in the reservoir.

Procedure

8. Connect a bleed bottle tube to the caliper inner bleed screw.
9. Actuate the brake pedal firmly to the floor and hold down. Open the inner bleed screw until pressure is released. Close the inner bleed screw, then release the brake pedal.

Wait 2 seconds between brake pedal actuations for the brake fluid level to settle.

Repeat this procedure till clear, air free brake fluid streams out of the inner bleed screw (10 to 20 times).

Watch the brake fluid level of the reservoir and refill if necessary.

10. Once satisfied that no air is in the brake fluid, push down on the brake pedal, hold down and tighten the inner bleed screw. Remove the bleed bottle tube.
11. Complete the same procedure on the outer bleed screw.
12. Once satisfied that no air is in the brake fluid from the outer bleed screw, check, once more, the inner bleed screw for air.

Disconnection

13. Fill the reservoir to the 'MAX' level and install the reservoir cap.

Take note of brake pad wear.

14. Start the engine to generate a vacuum in the booster.
15. Check brake pedal travel and pedal 'feel'.

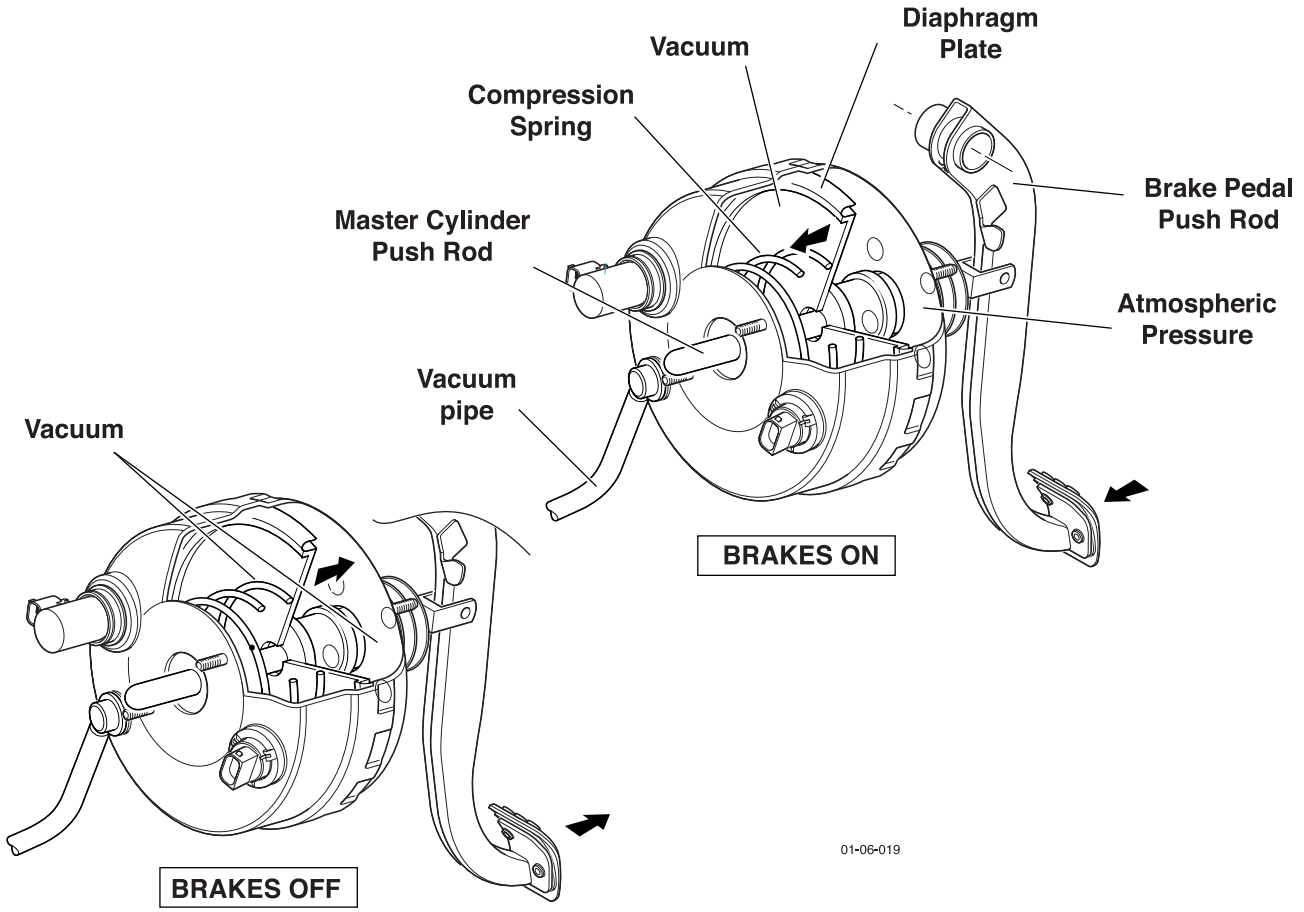
If the pedal travel is too long after bleeding, check the brake system for leaks If no leaks, repeat the brake bleed procedure.

ASTON MARTIN
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Brake System (06.00)

Power Brake System (06.09)

Brake Booster



The brake booster comprises a chamber divided by a diaphragm plate and is secured to the brake pedal housing.

As the brake pedal is pressed, a poppet valve opens allowing atmospheric pressure into the drivers side of the diaphragm. Atmospheric pressure builds up on the drivers side of the diaphragm and pushes against the partial vacuum on the other side. This additional force boosts the applied brake pedal force up to 6.5 times.

When the brake pedal is released, the poppet valve closes. The pressure on the diaphragm reduces and the compression spring returns the diaphragm to the release position.

Panic Brake Assist

In an emergency braking situation, a driver presses down on the brake pedal much faster than in normal braking conditions, but often without sufficient force. The initial application of the brake pedal is a reflex reaction. After the initial application, many drivers do not brake hard enough because of concerns that they might cause the vehicle to skid. To aid the driver, the panic brake assist (PBA) intervenes in bringing the vehicle to a halt, sooner and in a controlled manner, in emergency braking situation. The PBA system monitors the speed of brake pedal activation, and at a calibrated pedal activation speed, the PBA provides maximum brake force and makes full use of the ABS.

PBA is controlled by the ABS / DSC module, which monitors a travel sensor attached to the internal vacuum diaphragm of the brake booster. The sensor determines the position of the diaphragm and the speed of the diaphragm movement. If the sensor's signal indicates an emergency braking situation, the

ABS / DSC module will open an electric solenoid on the brake booster. The solenoid directs atmospheric pressure into the rear of the brake booster, causing the booster diaphragm to move forward to fully apply the brakes. PBA takes full benefit of ABS to stop the vehicle in a controlled manner and in the shortest distance possible. When the brake pedal is released the ABS / DSC module instantly releases the brakes.

Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Brake Booster Mount	21-24	15.5-18

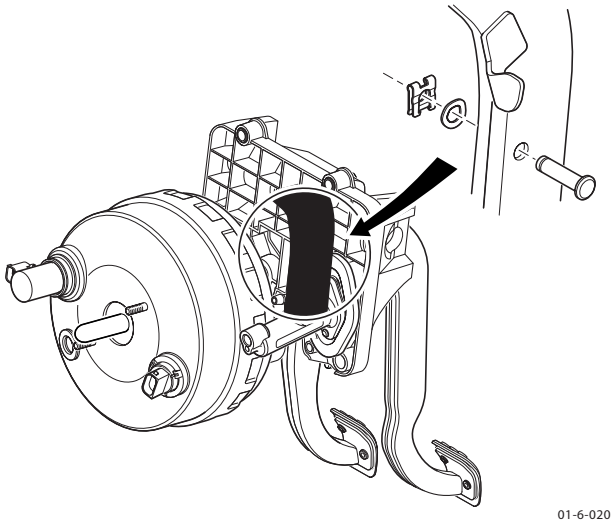
Maintenance

Brake Booster

Repair Operation Time (ROT)		
Item		**Code**
Brake Booster Renew	RHD	**06.07.AB**

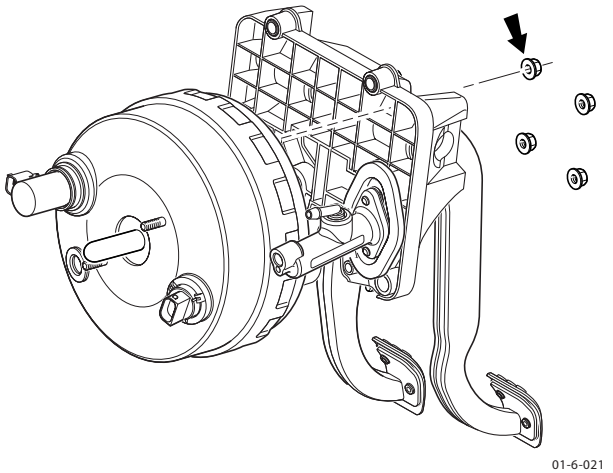
Removal

1. Remove the master cylinder (Refer to 'Master Cylinder', page 6-4-2).
2. Remove the oil dip sick.
3. Remove the clevis pin.



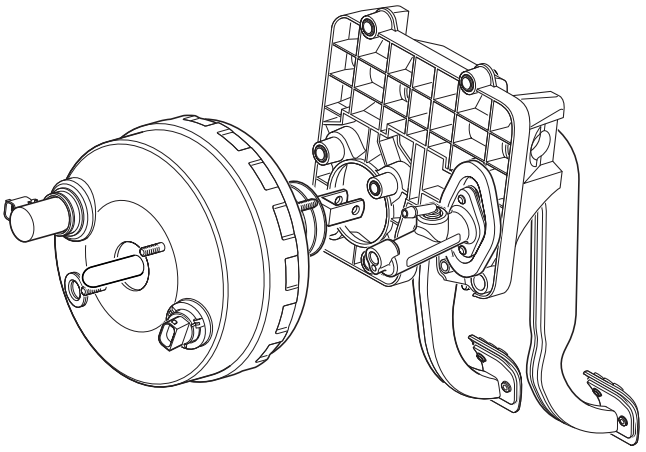
01-6-020

4. Remove nuts (x4).



01-6-021

5. Disconnect the wiring harness plugs (x2).
6. Withdraw the brake booster.



01-6-022

7. Remove and discard the brake light switch (mounted on the brake pedal block).

Installation

1. Install a new brake light switch.

After installing a new brake booster a new brake light switch, mounted on the brake pedal block, must be installed.

2. Place the brake booster through the bulkhead.
3. Secure using bolts (x4). Torque to **21-24 Nm**.
4. Install the clevis pin.
5. Connect the wiring harness plugs (x2).
6. Install the master cylinder (Refer to 'Master Cylinder', page 6-4-2).
7. Bleed the brake system (Refer to 'Brake Bleeding - WDS', page 6-4-4).

Brake system (06.00)

Anti-lock Braking System (ABS) (06.09)

The anti-lock braking system (ABS) is a four-channel system having independent inputs from all four-wheel speed sensors.

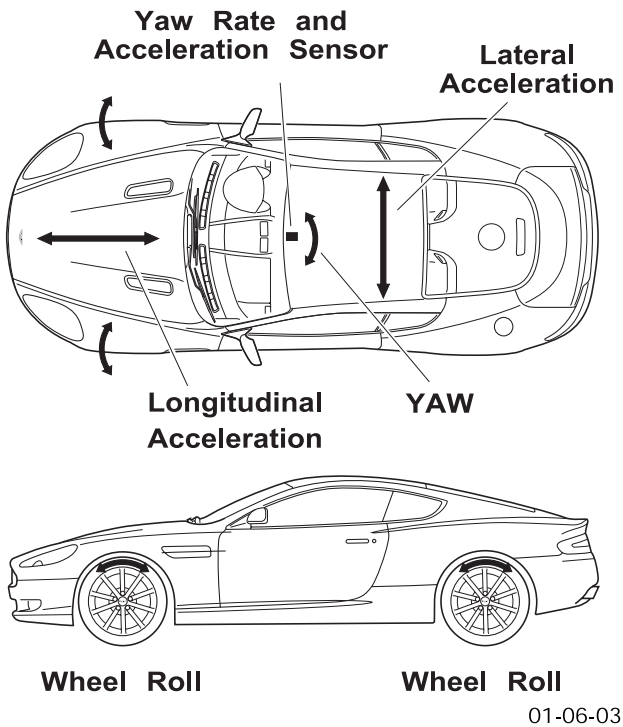
The ABS module, monitors signals from the sensors to calculate, brake slip and the acceleration / deceleration of individual wheels. When the brake pedal is depressed, and the ABS module detects incipient wheel lock-up from the incoming signals, it triggers the re-circulation pump inside the module's hydraulic modulator, and the solenoid valves for the wheel(s) concerned. Brake pressure, is then modulated to increase / decrease or remain constant at the wheel(s) concerned until wheel lock-up is eliminated. The ABS provides self-diagnosis and any malfunction within the system will be indicated to the driver by the illumination of the brake warning light and 'ABS FAULT' displayed in the message centre right. Should a fault develop within the ABS, the brake system will operate conventionally and with the same standard of performance as a vehicle not equipped with ABS.

Dynamic Stability Control

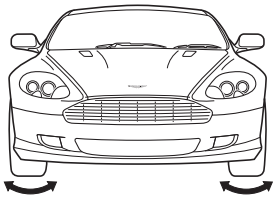
Dynamic Stability Control (DSC) is a closed-loop system designed to enhance driving safety by improving vehicle handling when the tyres are at the limits of their grip capabilities. This is achieved through instantaneous, electronically controlled, reduction of engine torque and strategic application of the brakes at individual wheels.

By using the principle that by controlling the brakes individually it is possible, to an extent, to steer the vehicle.

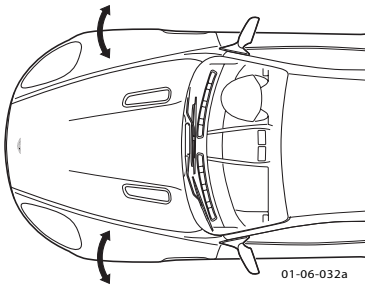
This principle can be used to enhance driving safety by correcting the vehicle's yaw moment (turning force), when the vehicle fails to follow the driver's steering inputs.



01-06-032



Steering Motion



01-06-032a

Concept

Satisfactory handling is determined according to whether a vehicle maintains a path, which accurately reflects the driver's input (steering wheel angle) while at the same time remaining stable.

The ABS / DSC module measures the vehicle's motion using the sensors below and processes the information to maintain vehicle control and stability within its ultimate control limits, which are determined by the physical limits set by the tyre's grip.

Wheel speed sensors - Longitudinal acceleration.

lateral acceleration sensor - Lateral acceleration.

Yaw rate sensor - Yaw rate, defined as the rotation around the vertical axis.

When there is insufficient tyre grip for the driving situation (for example, the driver has entered a corner too fast) the DSC will maintain stability and optimise the cornering and stopping performance, but cannot always prevent the vehicle from running wide.

Driver demand is measured by using the steering wheel angle sensor and vehicle speed to calculate the optimum yaw rate. This is compared to the actual measured yaw-rate and a yaw-rate calculated from the lateral acceleration and the vehicle speed. If the deviation between these measurements is too great, an understeer or oversteer correction is made.

The first step in this process is to determine how the vehicle should respond to driver demand (ideal response) and how it actually does respond (actual response). Hydraulic control valves can then be activated to generate brake pressure and / or engine torque reduction can be used to maintain the difference between the ideal and actual response within a tolerance band. This directly influences the forces on the tires to generate a corrective yaw moment to reduce the side forces of the tires where appropriate

System Overview

The DSC system embraces capabilities far beyond that of ABS, or ABS and traction control combined, while relying on the components of these systems. It also incorporates these additional sensors for measuring the vehicle's motion and brake system pressure:

Yaw rate sensor - located centrally on the transmission tunnel.

Lateral acceleration sensor - integrated with the yaw rate sensor.

Steering angle sensor - located on the upper steering column.

Pressure transducer - located on master cylinder.

The ABS / DSC module supports data exchange with other vehicle electronic systems via the CAN network; the module also enables diagnostic interrogation using WDS.

The following components register driver demand and the ABS / DSC module processes their signals as a basis for defining an ideal response:

PCM - position of accelerator pedal.

Brake master cylinder pressure transducer - driver's braking effort.

Steering angle sensor - position of steering wheel.

There are many supplementary parameters also included in the processing calculations these include the coefficient of friction and vehicle speed. The ABS / DSC module monitors these factors based on signals transmitted by the sensors for:

- Wheel speed
- Lateral acceleration
- Brake pressure
- Yaw rate

Using these parameters, the function of the ABS / DSC module is to determine the current vehicle status based on the yaw-rate signal and the slip as estimated by the ABS / DSC module. It then maintains the vehicle response within a tolerance of the 'normal' behaviour, which is easily controlled by the driver.

In order to generate the desired yaw behaviour the ABS / DSC module controls the selected wheels using the ABS hydraulic system and engine control system. In the event of engine intervention, the ABS / DSC module calculates the torque which should be supplied by the engine to the wheels, and relays this request signal to the PCM which implements the torque request.

The PCM receives signals from the DSC system via the CAN bus and reduces engine torque as follows:

- The throttle is positioned to provide the requested engine target torque.
- During the transient phase of torque reduction caused by mechanical and combustion delays, other alternative torque reduction methods are used to provide a quicker response.
- The ignition is retarded and / or the fuel is cut-off at the injectors at selected cylinders.
- Ignition and fuelling are reinstated when the engine torque reaches the requested value

Operation Summary

- DSC is switched 'On' when the engine is started
- When the system is operating, the DSC light in the instrument cluster will flash, at the rate of twice a second
- DSC can be switched 'Off / On' by pressing the DSC switch
- The DSC light in the instrument cluster will illuminate continuously when the system is switched 'Off'.
- 'DSC OFF' will be displayed in the message centre right to indicate the system has been switched 'Off'
- A malfunction in the traction control system will be indicated to the driver by the following:
  - The DSC light in the instrument cluster will illuminate continuously
  - The message 'DSC NOT AVAILABLE' will be displayed in the message centre right
- If vehicle speed control is engaged it will automatically disengage when traction control is operating.

Traction Control

Traction control is a function of DSC, and is operated in association with DSC. Traction control prevents excessive wheel-spin at standing starts, or during acceleration. Wheel-spin is usually caused by excessive use of the accelerator pedal, or slippery, loose or bumpy road surfaces. To prevent excessive wheel-spin and maintain vehicle stability such situations are overcome by the intervention of the traction control system by:

- Braking the driven-wheel when it starts to slip
- And / or adapting the engine torque to a level corresponding to the traction available on the road surface.

Functional Description

Traction control uses the ABS electronic and mechanical / hydraulic hardware with additional valves to control the braking pressure at the calipers. An engine interface also enables the engine to respond to torque reduction requests from the traction control. As with ABS, the signals from the wheel-speed sensors are supplied to the ABS module, where they are used to calculate the wheel-slip of the individual wheels. Traction control intervention is initiated if the slip at one of the wheels is excessive.

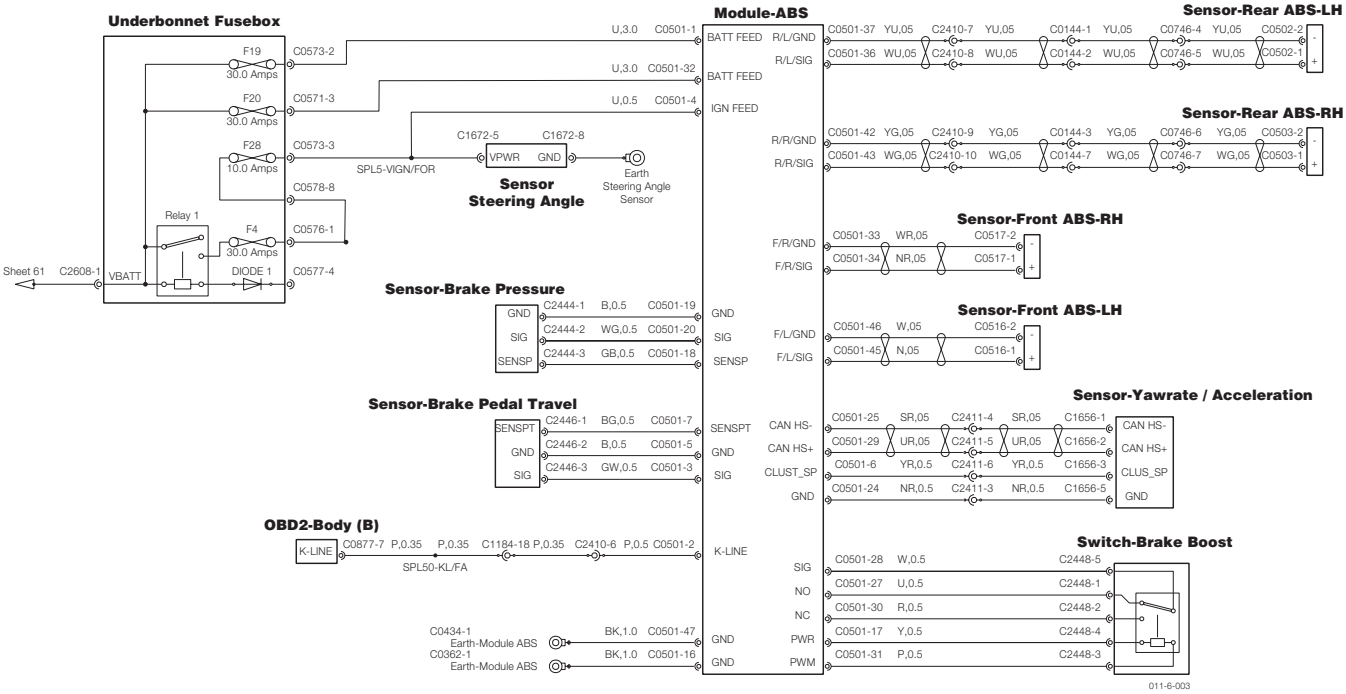
Engine Intervention

In the event of wheel-slip the ABS / DSC module calculates the torque, which should be applied by the engine to reduce the wheel-slip (this torque does not exceed driver demand). Engine torque reduction is then requested from the PCM via the CAN bus. The PCM, in response to these signals, reduces engine torque by controlling the ignition and fuelling. A traction control gearshift pattern is automatically selected within the automatic transmission software whenever traction control is active.

Brake Intervention

This function operates by increasing the pressure in the brake caliper of the slipping wheel, by closing the separation valve and the inlet valve of the non-slipping wheel and running the modulator pump. This takes fluid from the fluid reservoir via the non-actuated master cylinder and pressurizes the brake caliper. The pressure is modulated at the caliper via the inlet and outlet valves to achieve the desired wheel-slip target to maximize traction.

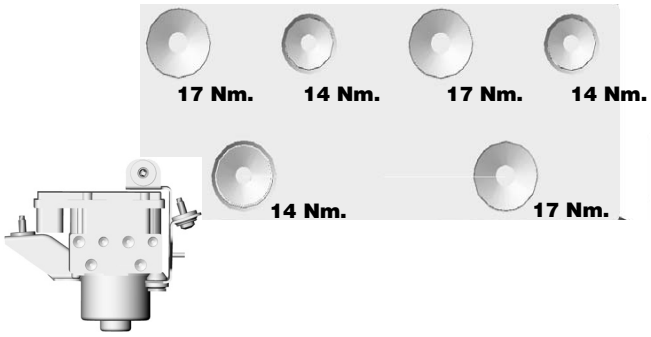
ABS / DSC Circuit



Specifications

Oils/Greases	
Brake Fluid	Castrol Response Super Dot 4

Torque Figures		
Description	Nm.	lb. / ft.
Modulator to Bracket	5	4
Modulator / Bracket to body	9	7
Brake hose unions	17	13
	14	10.5



Maintenance

ABS Modulator

Repair Operation Time (ROT)	
Item	**Code**
ABS Modulator Renew	RHD **06.06.CB**

Removal

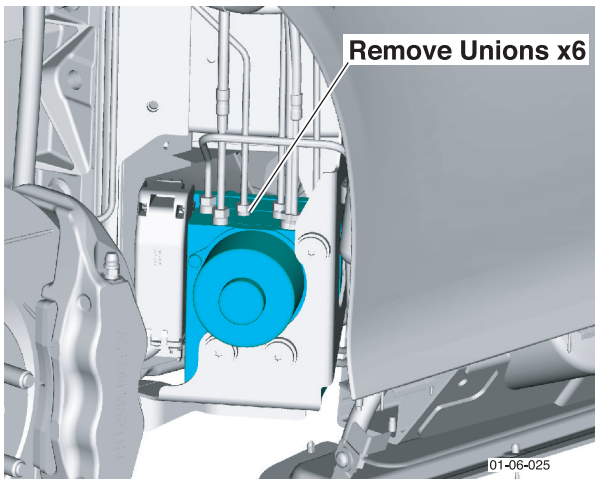
⚠ Warning ⚠
Avoid skin / eye contact or ingestion of brake fluid.
If skin or eyes are splashed with brake fluid, rinse the affected area immediately with plenty of water and obtain medical attention.
If brake fluid is ingested, obtain immediate medical attention.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

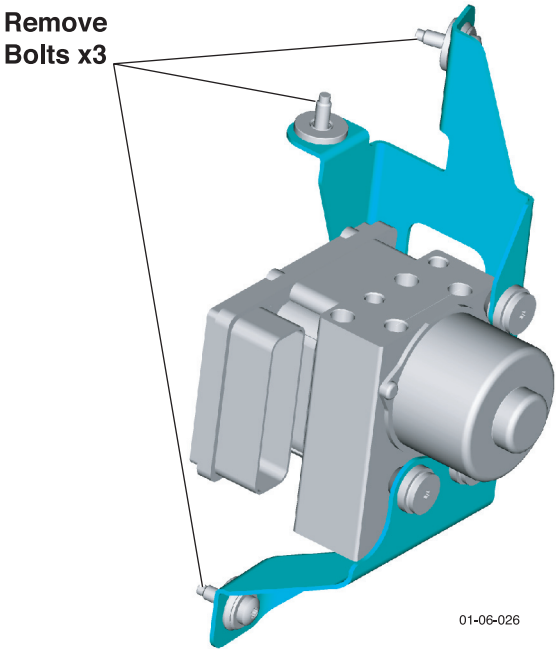
1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the passenger side road wheel and road wheel arch liner.

Place suitable absorbent material around the modulator valve block area to catch any spilt brake fluid.

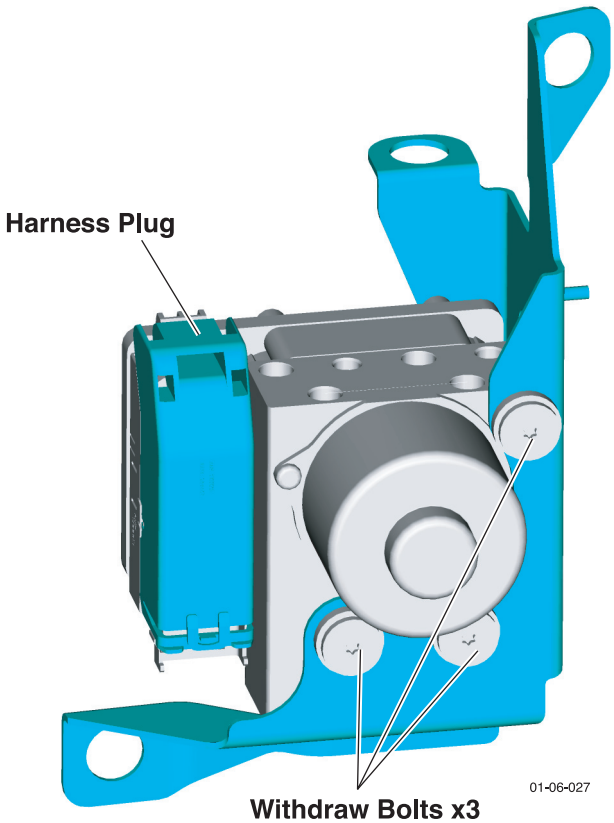
4. Remove the brake pipe unions (x6) from the top of the modulator valve block. Cap each pipe and plug each valve block outlet to prevent leakage.
   Note pipe locations for installation.



5. Release bolts (x3) that secure the modulator mounting.



6. Disconnect the modulator wiring harness plug.

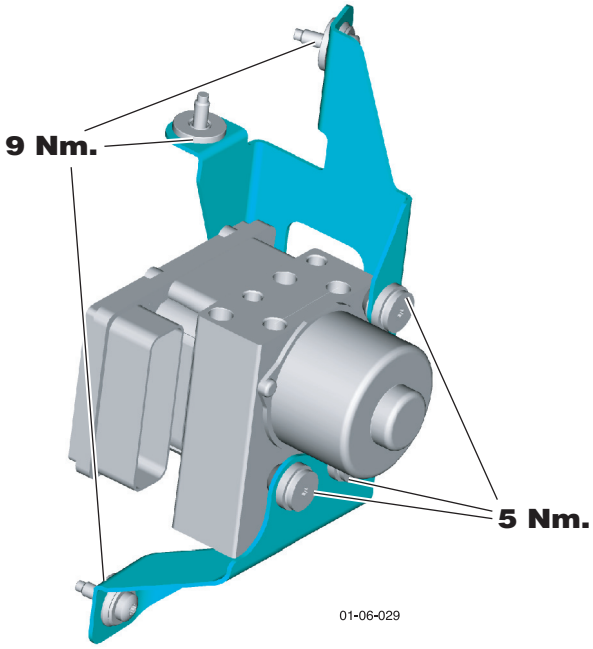


7. Remove bolts (x3) that secure the modulator to its bracket.

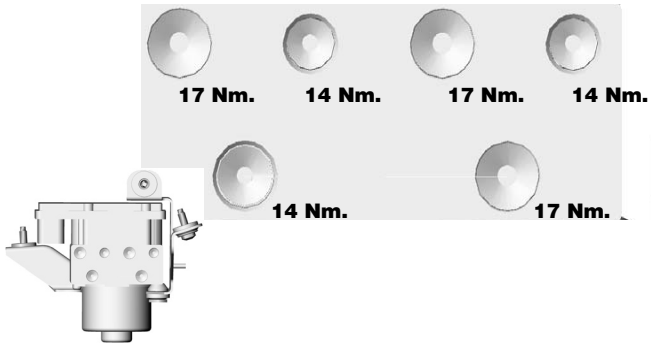
The ABS / DSC control module can be renewed separately from the modulator and can be removed from the vehicle without disturbing the hydraulic circuit.

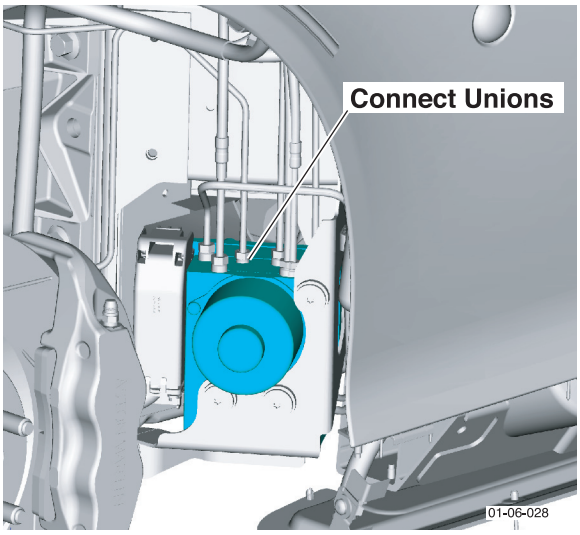
Installation

1. Install the modulator to its mounting bracket. Secure with bolts (x3). Torque to **5 Nm**.



2. Connect the wiring harness plug.
3. Install the modulator and bracket assembly. Secure using bolts (x3). Torque to **9 Nm**.
4. Remove the sealing caps and plugs from the brake pipes and the valve block. Install the brake pipes (x6) to their matching outlets on the valve block.
5. Torque the unions to:





6. Remove any traces of brake fluid from the modulator and surrounding area.
7. Install the road wheel arch liner and road wheel.
8. Bleed the brake system (Refer to 'Brake Bleeding - WDS', page 6-4-4).
9. Install the road wheel arches and road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
10. Connect the vehicle battery.

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Transmission (07.00)

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Transmission (07.00)

Automatic Transaxle (07.01)

Description

The ZF 6HP26 automatic gearbox has the following features:

- Six forward speeds / One reverse
- A torque converter with an integral converter lock-up clutch
- Electronic shift and pressure controls
- A single planetary gear set
- A double planetary gear set
- Two fixed multi-disc brakes
- Three multi-plate clutches

All hydraulic functions are directed by electronic solenoids to control:

- Engagement feel
- Shift feel
- Shift scheduling
- Modulated torque converter clutch (TCC) applications
- Engine braking utilizing the coast clutch

The ZF 6HP26 Automatic Transmission is a six speed electronically controlled transmission comprising the basic elements of:

- A Mechatronik module (Transmission Control Module (TCM) and main control valve body assembly)
- A torque converter
- One solenoid valve and six pressure regulators

Gear selection is achieved by the control of the transmission oil flow to operate various internal clutches. The TCM operates the electrical components and provides for the control of gear selection shift pressure which increases refinement and torque converter slip control.

In the event of a system fault the TCM also provides for Failure Mode Effect Management (FMEM) to maintain maximum functional operation of the transmission with a minimum reduction in driver, passenger or vehicle safety. In the event of a total loss of control or electrical power the basic transmission functions Park, Reverse, Neutral and Drive are retained. Also 3rd or 5th gear is retained by the hydraulic system, the gear retained is dependant upon the gear selected at time of the failure.

The transmission also contains turbine and output shaft speed sensors, an internal P, R, N, D selector position sensor, and a transmission oil temperature sensor. The TCM also requires information from the shift selector module to determine when the driver has initiated manual gear selection. The TCM communicates with other electronic control modules by the controller area network (CAN).

The TCM also provides for legislated transmission diagnostics, which meet the requirements of CARB OBDII legislation, monitoring all components, which may effect vehicle emissions. Additional diagnostic functions are also supported to ensure fast repairs of all failures in the service environment.

Engine power transfers to the transmission by a torque converter with integral converter lock-up clutch. Six forward gears and one reverse gear are obtained from a single planetary set followed by a double planetary set also known as lepelletier-type gear sets, these gear sets make it possible to obtain the six forward gears.

Cooling

The Auto transmission has an external cooling circuit which prevents overheating of the transmission oil. A pump mounted in the gearbox, working on engine speed variation, pumps the transmission oil around the radiator and back to the transmission.

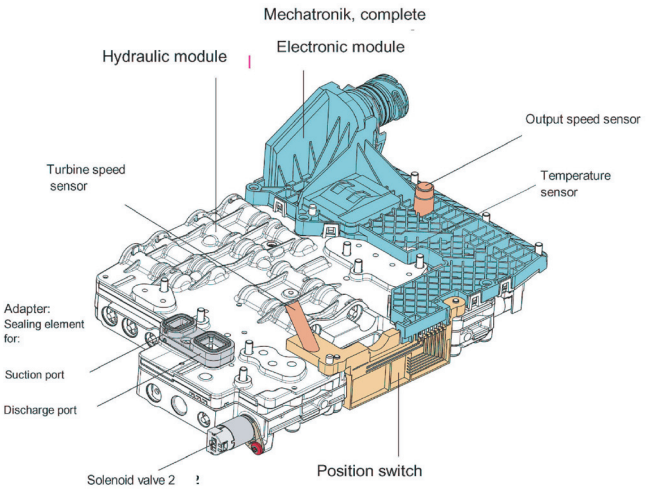
A thermostat (Wax / Poppet type), close to the gearbox inlet / outlet, controls the oil temperature, operating at a range of 74°C - 88°C.

Mechatronik module

The Mechatronik module is located in the sump of the automatic gearbox. It contains electrical actuators and sensors as well as hydraulic valves which, acting in conjunction with the TCM, perform gear changes.

The electromechanical components are arranged in such a way that they may be replaced while the automatic gearbox is installed in the vehicle.

(Refer to 'Automatic Control System (07.05)', page 7-4-1)



Specifications

Gearbox

Type

6 speed ZF 6HP26 automatic transmission and torque converter

Weight

Complete with transmission oil - 89 kg (196.25 lbs) approx.

Control System

Electrohydraulic (Mechatronik)

Controlled on-load shifts

Various shift programs available

Torque Converter

Controlled-slip lock-up clutch in gears 1 - 6 and reverse.

Transmission oil

ATF Shell M1375.4

Transmission Qty. 10 Ltr (17.06 pt. / 10.57 US qts.)

Coolant system Qty. 1.6 Ltr (2.8 pt. / 1.7 US qts.)

The ZF 6HP26 automatic transmission is 'filled for life' at manufacturer and will not normally require any servicing.

Gear Ratios

1st	2nd	3rd	4th	5th	6th
4.17:1	2.34:1	1.52:1	1.14:1	0.87:1	0.69:1

Reverse

3.40:1

Maximum Towing Distance

150 km (93 miles) at a maximum speed of 70 km/h (43 mph)

Torque Figures

Description	Nm.	lb. / ft.
Transaxle to Mounting Brackets	20-30	15-22.5
Mechatronics Unit	8	6
Sump	7-9	5.5-7
Gearbox to Differential Adaptor Plate	52-75	38.5-55.5
Subframe cross-member	85	63

Differential

Type

Graziano AM803D

Weight

Complete with differential oil - 47.25 kg (104 lbs) approx

Differential oil

Shell 'Transaxle' oil 75W/90

Gearbox Qty. 1.7 Ltr (3 pt. / 1.8 US qts.)

Coolant system Qty. 0.7 Ltr (1.2 pt. / 0.7 US qts.)

The automatic transaxle differential is 'filled for life' at manufacturer and will not normally require any servicing.

Torque Figures

Description	Nm.	lb. / ft.
Differential Housing Cover (bolts smeared with Loctite 242)	35	26
Output Shaft Cover	10	7.5
Sump Plug	49	36.5
Fill Plug	49	36.5
End Cover	30	22.5

Maintenance

Transmission Oil Check / Top Up

The ZF 6 HP26 automatic transmission is 'filled for life' at manufacturer and will not normally require any servicing.

In the event of a oil leak from the transmission cooling system, the leak must be repaired and then the transmission oil may be replenished as follows:

> ⚠ ***Warning*** ⚠
> ***Observe all transmission oil manufacturers safety instructions when draining and refilling the automatic transmission.***

Before doing any work to the transmission oil level setting make sure that:

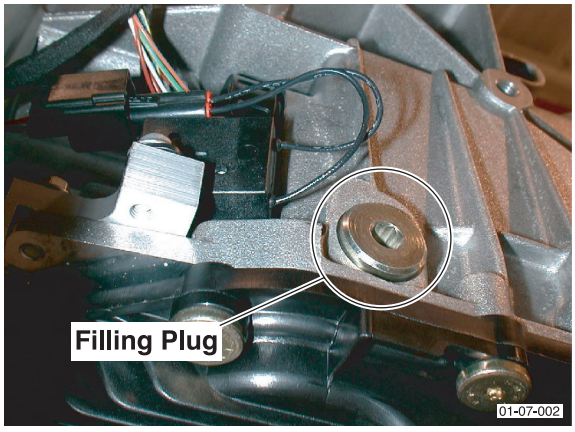
- The car is on a horizontal ramp
- The rear wheels are standing still for a minimum of 2 minutes before starting the oil level check and during the process, e.g. by applying the hand brake
- The transmission sump temperature is between 30°C-50°C (86°F-122°F) when opening the filling plug and whilst checking oil level
- Positions Reverse and Drive have been engaged for a minimum of 3 seconds with **rear wheels braked** before a setting is carried out
- The TCM is not in limp home mode

1. Remove the rear under tray.

> ⚠ ***Warning*** ⚠
> ***While the engine is running ensure that an exhaust extractor system is attached to the exhaust system.***

> ⚠ ***Warning*** ⚠
> ***Do not breathe exhaust fumes. Exhaust fumes contain carbon monoxide. Carbon monoxide is a dangerous gas, which is colourless and odourless and can cause unconsciousness and may be fatal.***

2. Remove the RH exhaust pipe.
3. Run the engine between 600 and 750 rpm.
4. Place a suitable container to hold any oil that may come from the opening.
5. Remove the fill plug (rear RH side of the transmission) immediately after starting up the engine.



6. Top up oil level with transmission oil (Refer to 'Specifications', page 7-1-3), until transmission oil drains out of the bore. Stop topping up.
7. Wait until the out coming transmission oil starts dribbling, but at least 1(one) minute or the oil reached 50°C (122°F).
8. Install the fill plug and make sure that the sump temperature has not exceeded 50°C (122°F).
9. Install the RH exhaust pipe. Install the rear under tray.
10. **To ensure that the gearbox and coolant system has been fully charged**, complete a test drive. Ensure that the transmission cooling thermostat fully opens (75°C (167°F)).
11. Check the transmission oil level.

Differential Oil Check / Top Up

The Graziano differential is 'filled for life' at manufacturer and will not normally require any servicing.

In the event of a oil leak from the differential cooling system, the leak must be repaired and then the differential oil may be replenished as follows:

> ⚠ ***Warning*** ⚠
> ***Observe all differential oil manufacturers safety instructions when draining and refilling the differential.***

Before doing any work to the differential oil level setting make sure that:

- The car is on a horizontal ramp
- The rear wheels are standing still for a minimum of 2 minutes before starting the oil level check and during the process, e.g. **by applying the hand brake**
- Ensure the vehicle has run a short distance to ensure that the differential cooling system has been completely filled

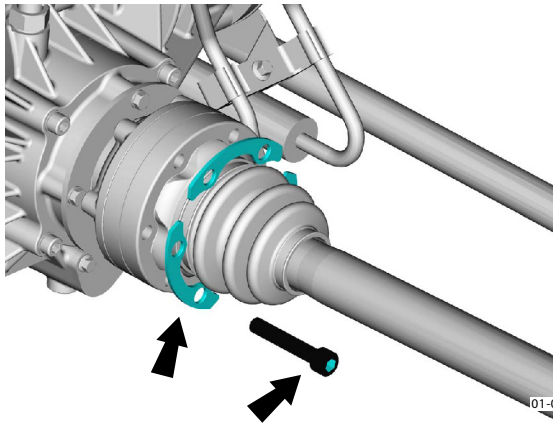
1. Remove the rear under tray.
2. Place a suitable container to hold any differential oil that may come from the opening.
3. Remove the fill plug.
   With the fill plug removed the differential oil should just 'dribble' from the opening in the side of the differential.
4. If required fill the differential with the specified oil until oil 'dribbles from the hole (Refer to 'Specifications', page 7-1-3).
5. Install the rear under tray.

Automatic Transaxle

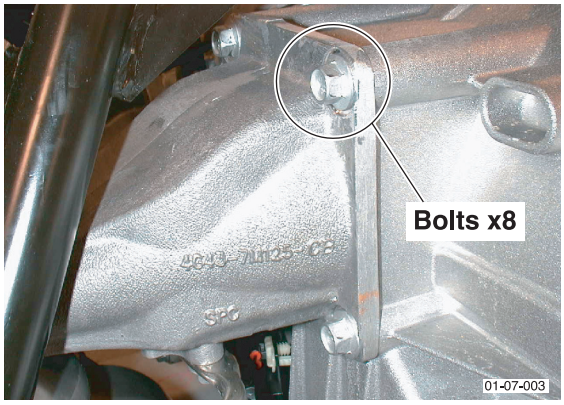
Repair Operation Time (ROT)	
Item	**Code**
Automatic Transaxle Renew	**07.01.AB**

Removal

1. Remove the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).
2. Remove bolts (x6) and washer tabs (x3) from each halfshaft. Discard bolts.
   Withdraw the halfshafts.



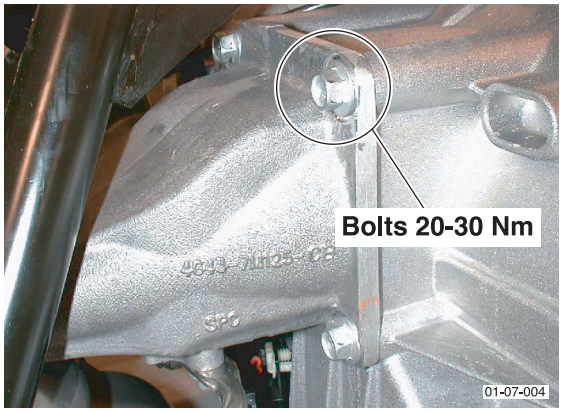
3. Using suitable lifting equipment, i.e. hydraulic ramp and sling, support the transaxle from above.
4. Remove the transaxle from it's mounts.



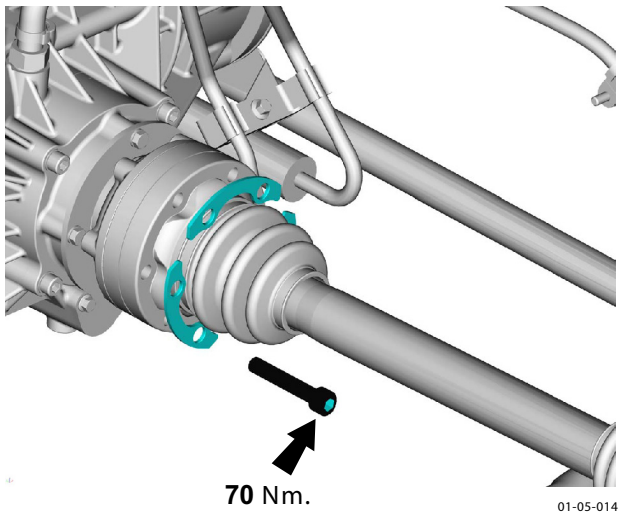
5. Withdraw the transaxle from the subframe.

Installation

1. Using suitable lifting equipment, i.e. hydraulic ramp and sling, place the transaxle to the subframe.
2. Install the transaxle to it's mounting brackets.
   Torque bolts (x4) on each mount to **20-30 Nm**.



3. Place the halfshafts up to the differential outputs.



4. Install the washer tabs (x3) and **new** bolts (x6) to each halfshaft. Torque bolts to **70 Nm**.

New bolts should have a thread lock coating.

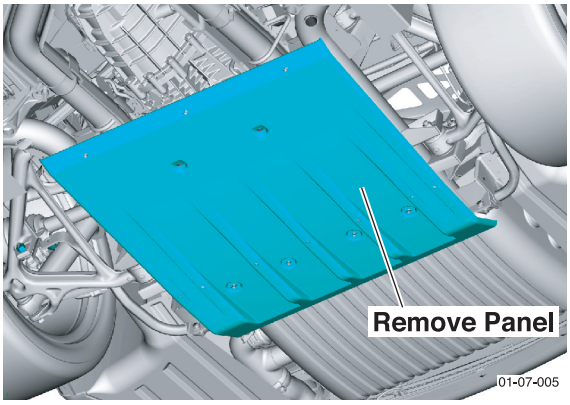
5. If removed. Install the torque converter.
6. Install the rear subframe complete with transaxle to the vehicle (Refer to 'Rear Subframe', page 2-1-4).
7. Top-up the transmission oil (Refer to 'Transmission Oil Check / Top Up', page 7-1-4).
8. Run the engine and place gear selector lever in each position for at least 10 seconds. Stop the engine.
9. Check and, if required, top-up the transmission oil.

Mechatronik Unit

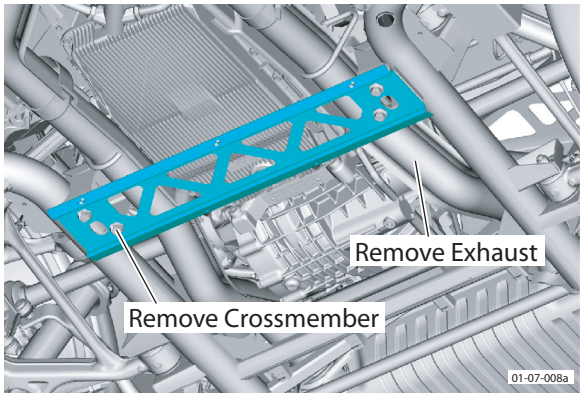
Repair Operation Time (ROT)	
Item	Code
Mechatronik Unit Renew	TBA

Removal

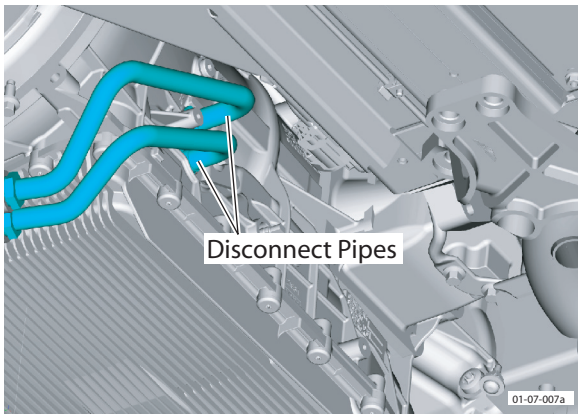
1. Remove the rear undertray.



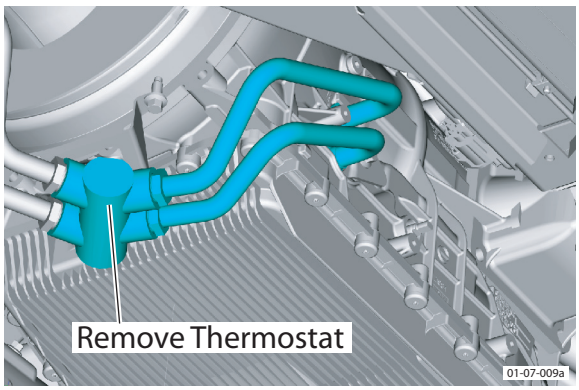
2. Remove the subframe crossmember.



3. Drain the gearbox oil.
4. Remove LH rear exhaust pipe.
5. Disconnect the coolant pipes from the gearbox.



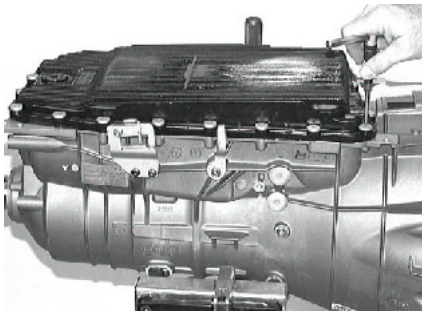
6. Remove the oil thermostat complete with gearbox side coolant pipes (Refer to 'Thermostat (Automatic Gearbox)', page 7-2-2).



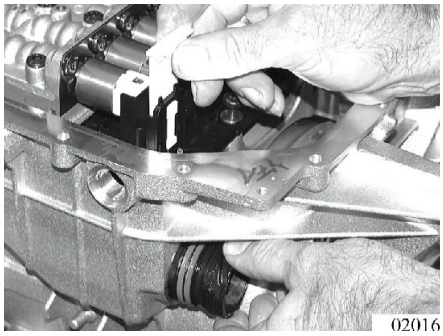
7. Remove the gearbox Capacitor.

The following images are taken from the ZF repair manual.

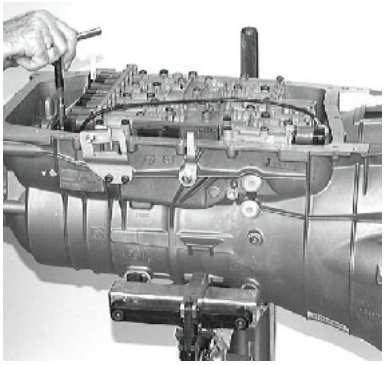
8. Remove screws (x21) that secure the sump. Withdraw the sump. Discard the 'O'-ring seal and the gasket.



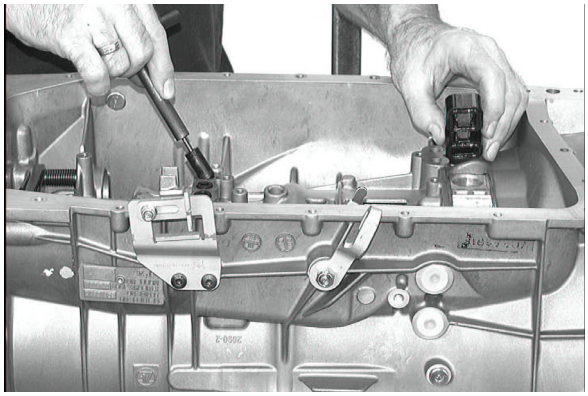
9. Remove the electric socket.



10. Remove screws (x10 large head M6) and lift off the Mechatronik unit.

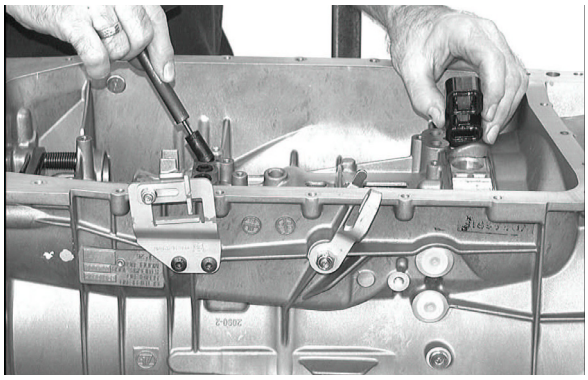


11. Remove the Mechatronik unit seals.

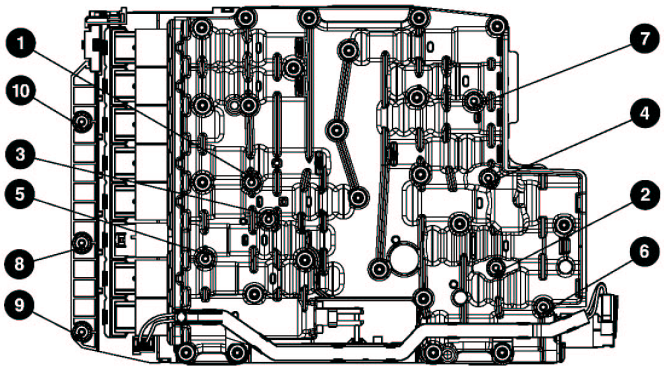


Installation

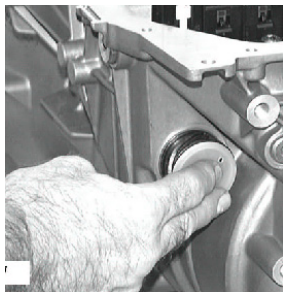
1. Install new Mechatronik unit seals.



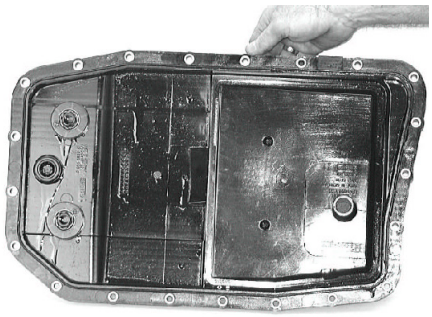
2. Install the Mechatronik unit, press on by hand. Torque bolts, in sequence (detailed below), to **8 Nm.**



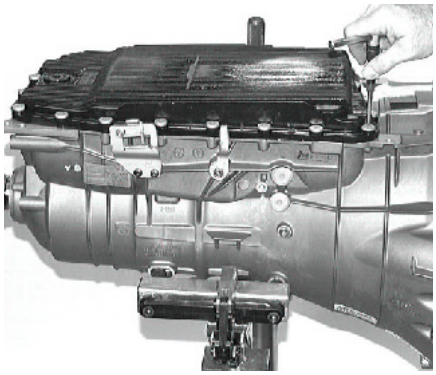
3. Press in the new electric socket with the Mechatronik unit screw plug attached. Secure with the retaining clip.



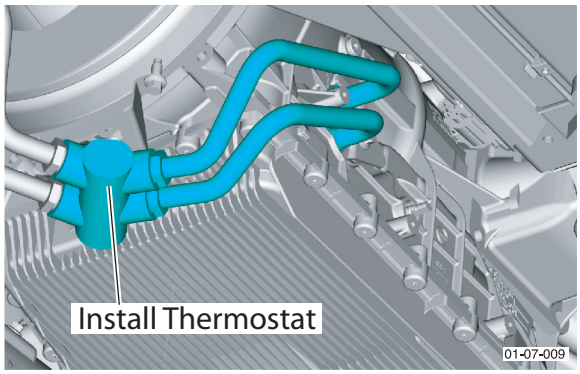
4. Install a new 'O'-ring seal onto stub pipe of the transmission oil filter. Press the new seal into the sump.



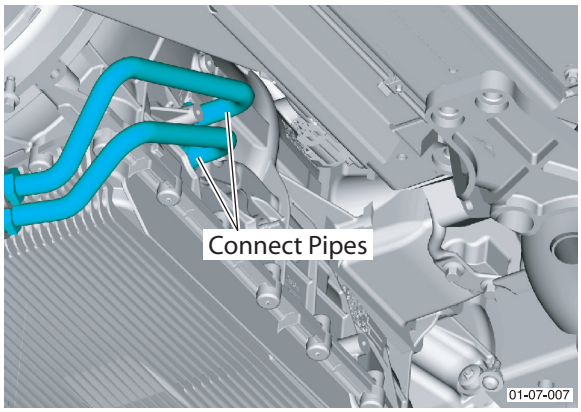
5. Install the gearbox capacitor.
6. Install the sump (screws x21). Torque to **7-9 Nm**.



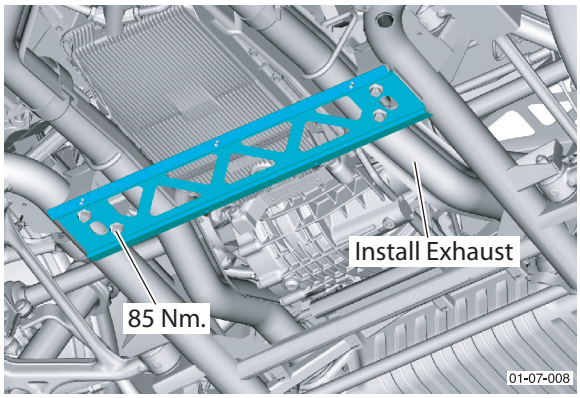
7. Insert a new drain plug. Torque plug to **9 Nm**.
8. Install the oil thermostat complete with gearbox side coolant pipes.



9. Connect the coolant pipes to the gearbox. Torque bolt to **20-25 Nm**.



10. Install the LH rear exhaust pipe.
11. Install the subframe crossmember. Torque bolts to **85 Nm**.



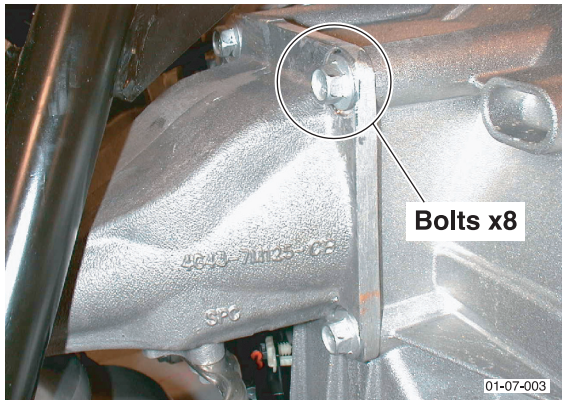
12. Top-up the gearbox oil (Refer to 'Transmission Oil Check / Top Up', page 7-1-4).
13. Run the engine and place gear selector lever in each position for at least 10 seconds. Stop the engine.
14. Check and, if required, top-up the gearbox oil.
15. Install the rear undertray.

Differential

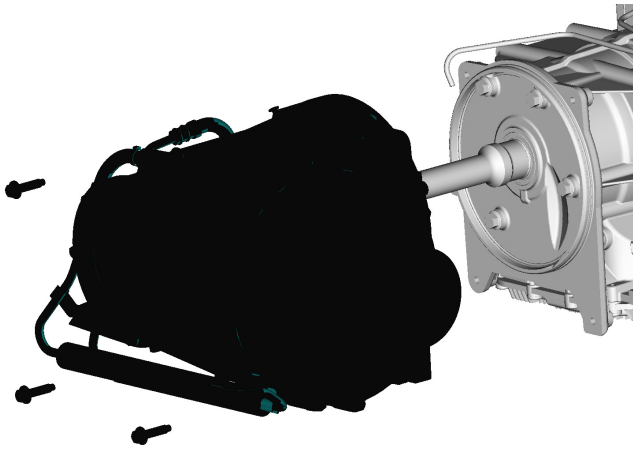
Repair Operation Time (ROT)	
Item	**Code**
Differential Renew	**05.02.AB**

Removal

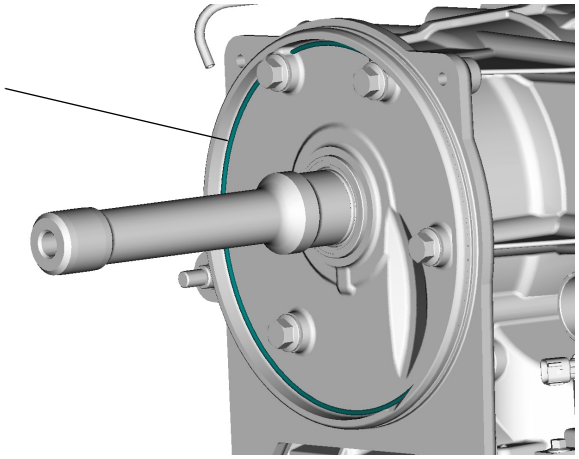
1. Remove the rear subframe complete with the transaxle (Refer to 'Rear Subframe', page 2-1-4).
2. Using suitable lifting equipment, i.e. hydraulic ramp and sling, support the transaxle from above.
3. Remove the transaxle from it's mounts. Withdraw the transaxle from the subframe.



4. Remove the bolts (x4) that secure the differential to the gearbox. Withdraw the differential.



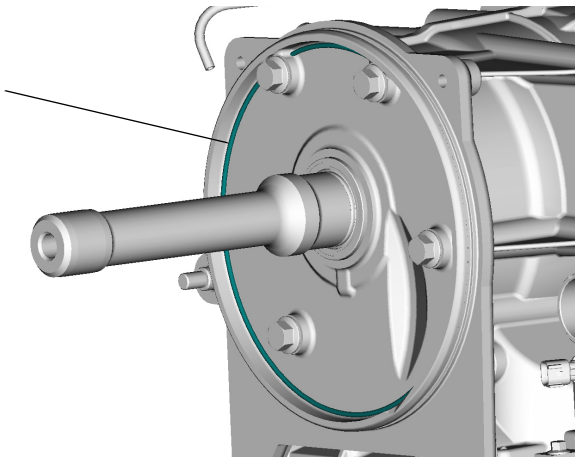
5. Remove the 'O' ring.



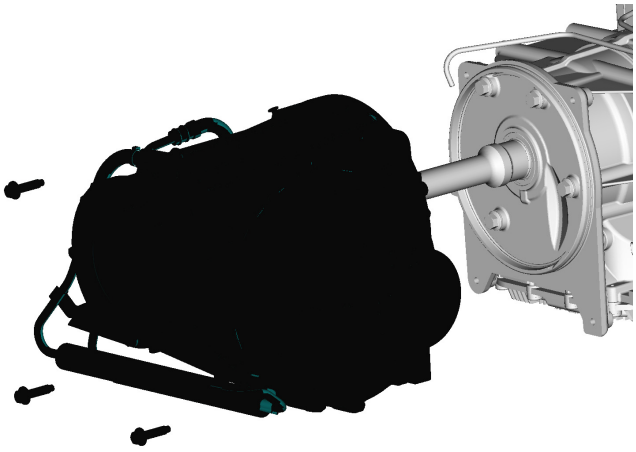
Installation

1. Install a new 'O' ring.

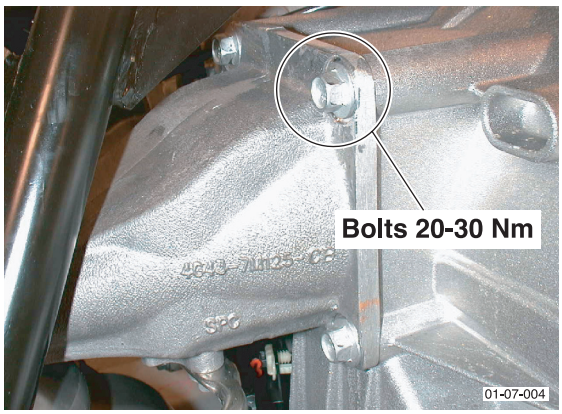
Ensure that the 'O' ring is not twisted when installed. Look for the line running along the 'O' ring for guidance.



2. Install the differential. Torque the bolts to **52-75 Nm**.



3. Using suitable lifting equipment, i.e. hydraulic ramp and sling, place the transaxle to the subframe.
4. Install the transaxle to it's mounting brackets. Torque bolts (x4) on each mount to **20-30 Nm**.



5. If removed. Install the torque converter.
6. Install the rear subframe complete with transaxle to the vehicle (Refer to 'Rear Subframe', page 2-1-4).
7. Check / Top-up the differential oil (Refer to 'Differential Oil Check / Top Up', page 7-1-4).
8. Check and, if required, top-up the transmission oil.

Differential Output Seal (LH)

Repair Operation Time (ROT)	
Item	**Code**
Differential Output Seal (LH) Renew	**TBA**

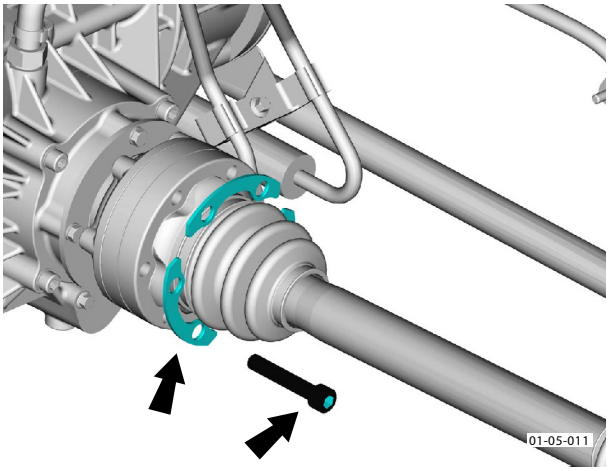
If replacing both LH and RH seals at the same time, change the LH seal first.

When replacing the RH seal the LH output shaft will hold the differential unit in place.

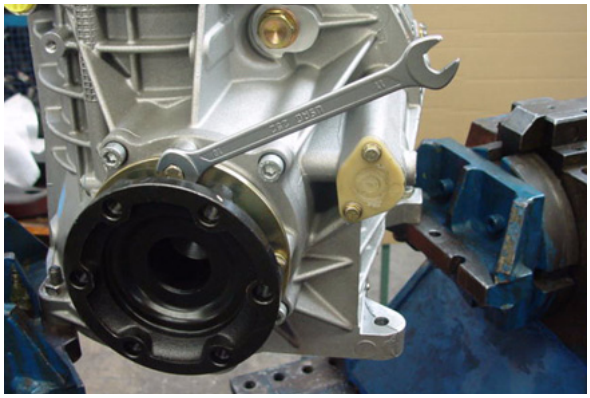
Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the LH road wheel and road wheel arch liner.
4. Remove the rear undertray.
5. Remove the service brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).
6. Remove the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
7. Drain the differential oil.

8. Remove the halfshaft bolts (x6) and washers (x3). Withdraw the halfshaft.



9. Remove bolts (x4).



10. Attach a slide hammer and withdraw the output shaft cover complete with output shaft and bearing. Discard the 'O' ring.

The oil pump impeller ring may come out with the output shaft. Ensure that the oil pump impeller ring is correctly locate on install.

11. Remove the circlip and withdraw the bearing.





12. Remove the seal.

Installation

1. Install a new seal. Push the seal in until it seats against the lip in the casing. Smear the lip with a small amount of grease.
2. Place the output shaft through the seal casing. Install the bearing and circlip.

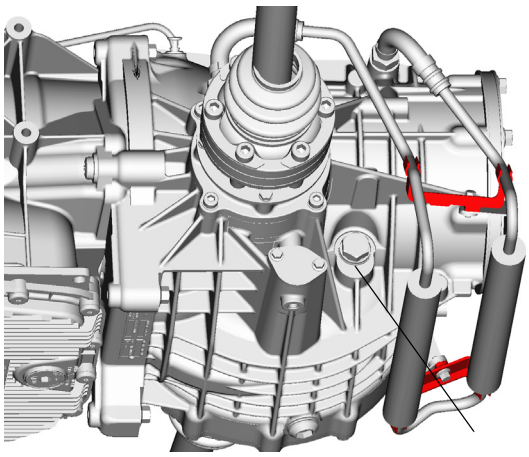


3. Install a new 'O' ring to the seal casting.
4. Install the output shaft cover complete with output shaft and bearing. Install bolts (x4), torque to **10 Nm**.

Insert the output shaft through the inner oil pump ring. Take care to locate the splines of the output shaft through the oil pump inner ring.

5. Install the halfshaft. Torque bolts (x6) to **70.5 Nm**.
6. Install the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
7. Install the service brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).

8. Ensure the drain plug is installed (Torque **49 Nm**.). Fill the differential with the specified oil (Refer to 'Specifications', page 7-1-3).



9. Install the road wheel arch and road wheel (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
10. Run the vehicle a short distance to ensure that the differential cooling system has been completely filled. Check / Top if required.
11. Install the undertray.

Differential Output Seal (RH)

Repair Operation Time (ROT)	
Item	**Code**
Differential Output Seal (RH) Renew	**TBA**

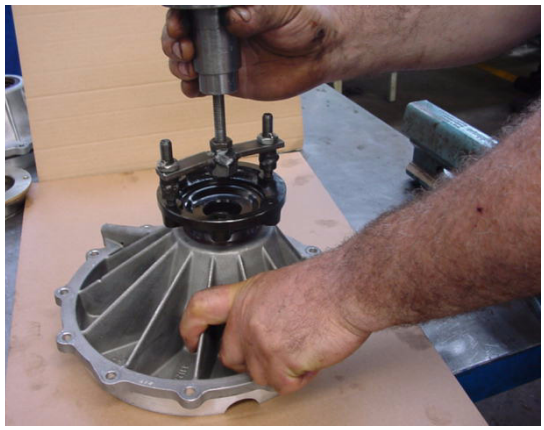
Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the RH road wheel and road wheel arch liner.
4. Remove the rear undertray.
5. Remove the brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).
6. Remove the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
7. Drain the differential oil.
8. Remove the halfshaft bolts (x6) and washers (x3). Withdraw the halfshaft.
9. Remove bolts (x12), attach a slide hammer and withdraw the differential housing cover complete with output shaft. Discard the 'O' ring.



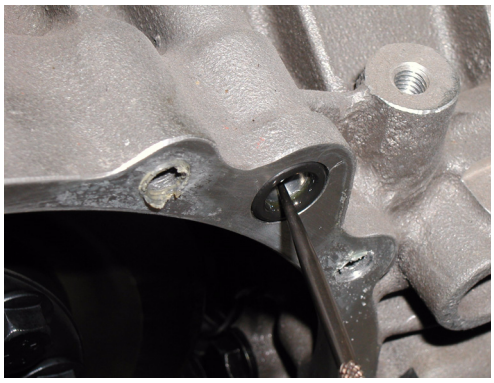
10. Remove the circlip. Remove the output shaft complete with bearing.





11. Remove the 'O' rings (x2).





12. Remove the seal.



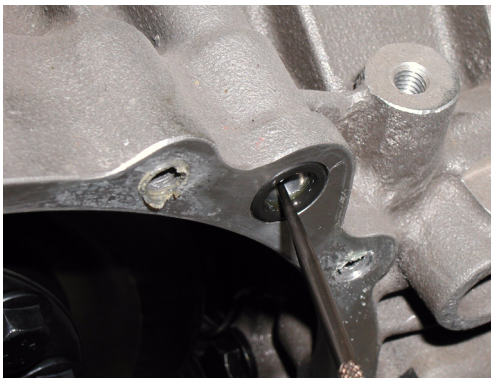
Installation

1. Install a new seal. Push the seal in until it seats against the lip in the casting. Smear the lip with a small amount of grease.
2. Place the output shaft through the differential housing cover. Install the bearing circlip.

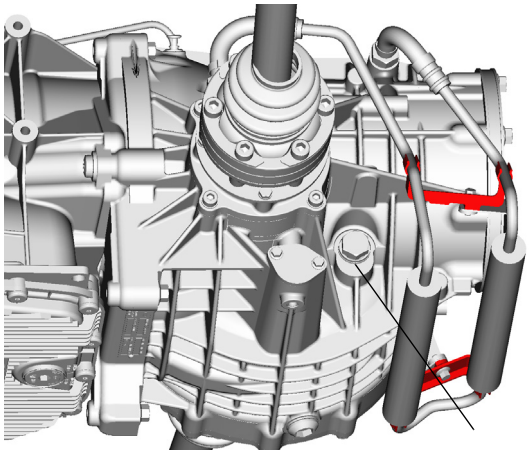
Place a support under the casting bearing race and press the output shaft to its seat. Ensure that the bearing race does not move - shims may be disturbed.

3. Install new 'O' rings (x2)





4. Install the differential housing cover. Install bolts, smeared with Loctite 242 (x12). Torque bolts to **35 Nm**.
5. Ensure the drain plug is installed (Torque **49 Nm**.). Fill the differential with the specified oil (Refer to 'Specifications', page 7-1-3).



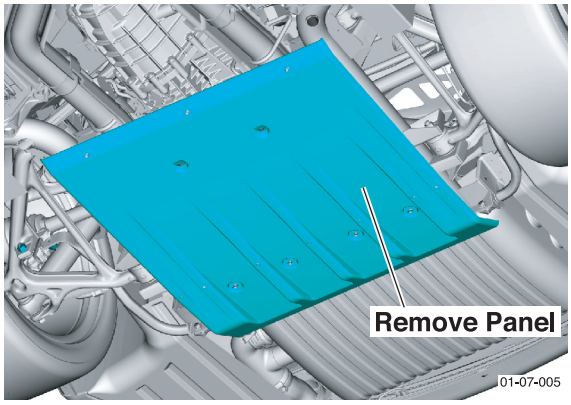
6. Install the halfshaft. Torque bolts (x6) to **70.5 Nm**.
7. Install the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
8. Install the service brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).
9. Install the road wheel arches and road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
10. Run the vehicle a short distance to ensure that the differential cooling system has been completely filled. Check / Top if required.
11. Install the undertray.

Differential Oil Filter

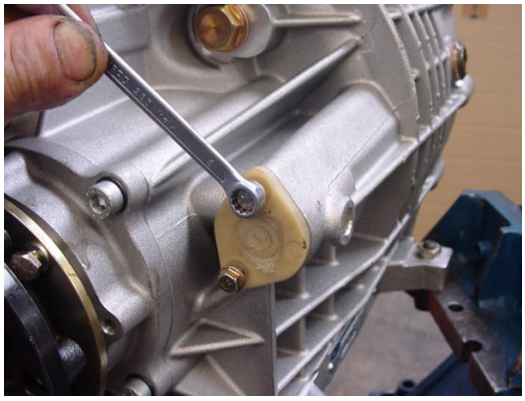
Repair Operation Time (ROT)	
Item	Code
Differential Oil Filter Renew	TBA

Removal

1. Remove the rear undertray.



2. Drain the differential oil.
3. Remove bolts (x2). Withdraw the gauze filter.



Installation

1. Install the oil filter complete with a new 'O' ring. Torque bolts to **5 Nm**.
2. Ensure the drain plug is installed (Torque **49 Nm**.). Fill the differential with the specified oil (Refer to 'Specifications', page 7-1-3).

Run the vehicle a short distance to ensure that the differential cooling system has been completely filled. Check / Top if required.

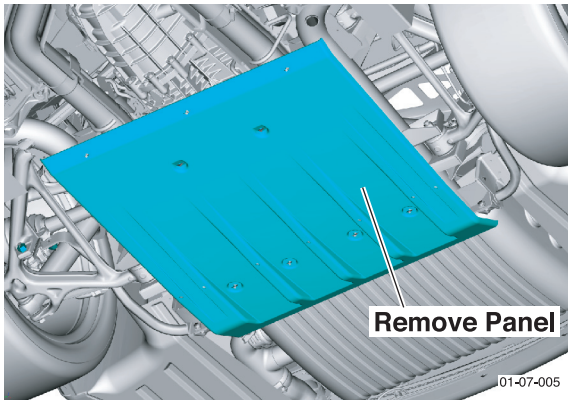
3. Install the undertray.

Differential Speed Sensor

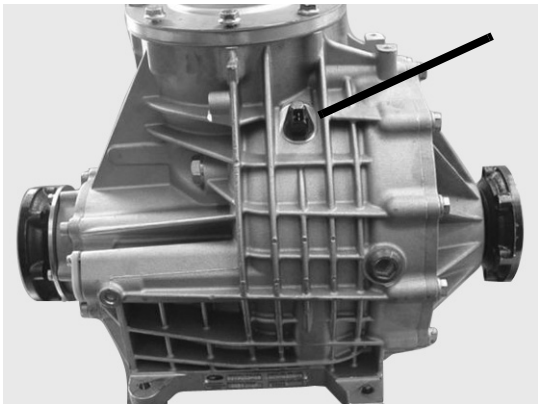
Repair Operation Time (ROT)	
Item	Code
Differential Speed Sensor Renew	TBA

Removal

1. Remove the rear undertray.



2. Place a suitable container to hold any differential oil that may come from the opening.
3. Disconnect the speed sensor. Remove the speed sensor.



Installation

1. Install the speed sensor. Torque bolt to **10 Nm**.
2. Connect the wiring harness plug.
3. Check / Top-up the differential oil (Refer to 'Differential Oil Check / Top Up', page 7-1-4).
4. Install the undertray.

ASTON MARTIN
ASTON MARTIN

Transmission (07.00)

Transmission Cooling (07.02)

Specifications

Thermostat	°C	°F
Oil cooler thermostat range (Auto only)	74°- 88°	165° - 190°

Torque Figures

Description	Nm.	lb. / ft.
Cooler Matrix (auto)	8-10	6-7.5
Cooler to subframe (manual)	8-10	6-7.5

Maintenance

Oil Cooler (Automatic Gearbox)

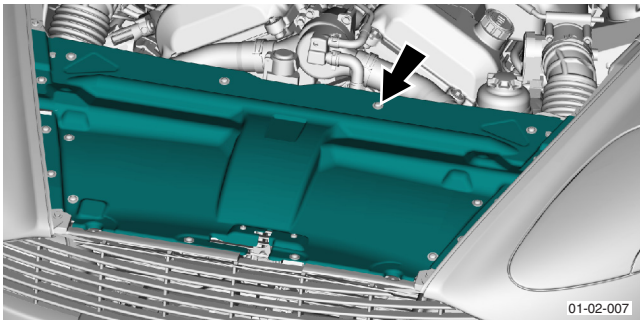
Repair Operation Time (ROT)	
Item	**Code**
Oil Cooler (Automatic Gearbox) Renew	**07.02.AB**

Removal

1. Remove the front undertray.

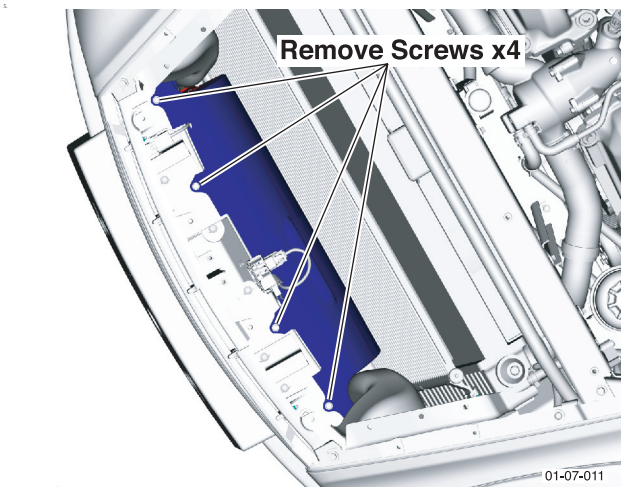
The air intake for the alternator is located in the front under tray.

2. Remove the front bumper (Refer to 'Front Bumper', page 1-13-1).
3. Remove the 'Slam' panel.

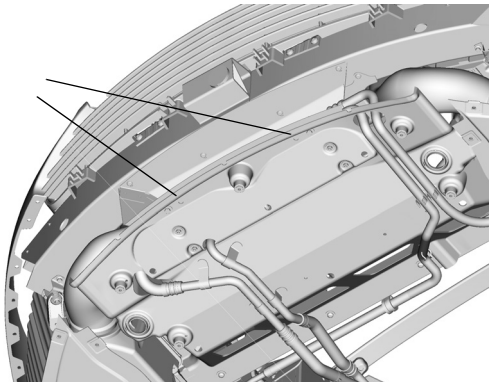


4. Remove screws (x4) that secure the top of the grill divider.

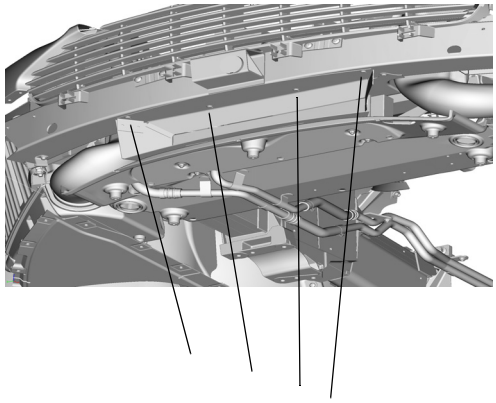
To gain access to the cooler top hose.



6. Remove the PAS cooler securing bolts. Move the PAS cooler to one side.



7. Remove the cooler matrix air duct.



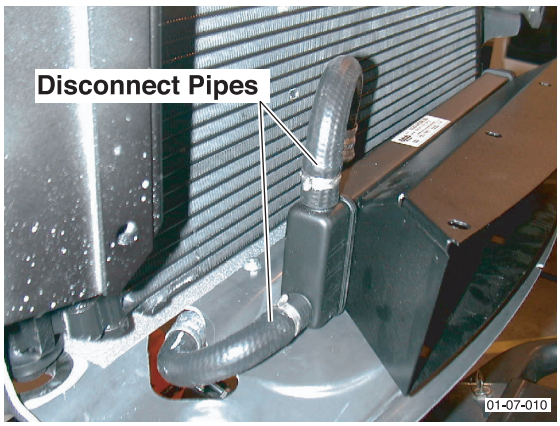
⚠ Warning ⚠

Ensure that the transmission oil has cooled before removing the cooler matrix pipes. The transmission oil operates at very high temperatures.

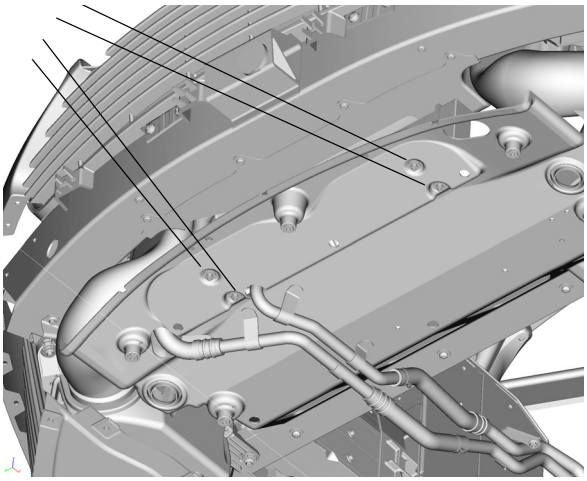
8. Disconnect the cooler matrix pipes (x2). Cap the open ends.

Some transmission oil will drain as the pipes are removed.

The air intake pipe will restrict access to the cooler matrix pipes.



9. Remove bolts (x4) that secure the cooler matrix. Withdraw the cooler matrix.



Installation

1. Install the cooler matrix. Torque bolts (x4) to **8-10 Nm**.
2. Connect the cooler matrix pipes (x2).

The air intake pipe will restrict access to the cooler matrix pipes.

Access the top cooler matrix pipe through the grill divider.

   Use new 'Oetiker' hose clips when reconnecting hoses.
3. Install screws (x4) that secure the top of the grill divider.
4. Install the cooler air duct.
5. Install the PAS cooler.
6. Install the bumper (Refer to 'Front Bumper', page 1-13-1).
7. Install the undertray.
8. Run the engine to prime the cooling circuit.
9. Check / Top up the transmission oil with the specified transmission oil (Refer to 'Transmission Oil Check / Top Up', page 7-1-4).

Thermostat (Automatic Gearbox)

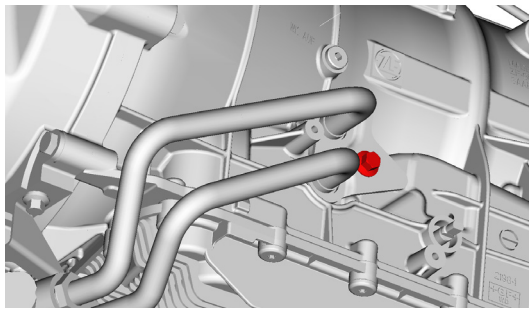
Repair Operation Time (ROT)	
Item	**Code**
Thermostat (Automatic Gearbox) Renew	TBA

Remove

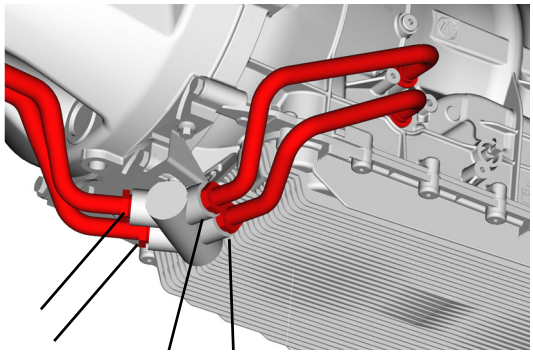
⚠ Warning ⚠
Ensure that the transmission oil has cooled before removing the cooler matrix pipes. The transmission oil operates a very high temperatures.

1. Remove the cooling pipes clamp.

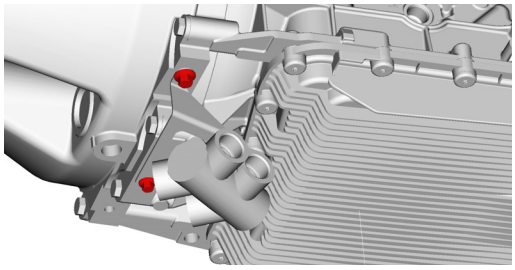
Some transmission oil will start to drip.



2. Remove the gearbox cooling pipes. Plug the open ends.

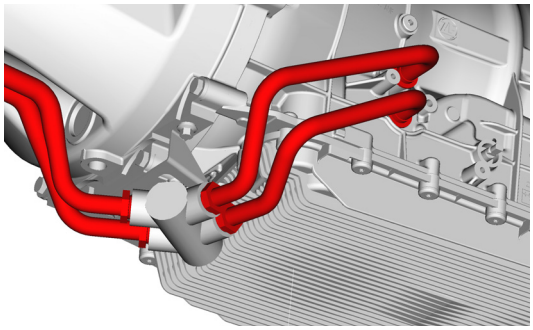


3. Remove the thermostat and bracket assembly from the gearbox.

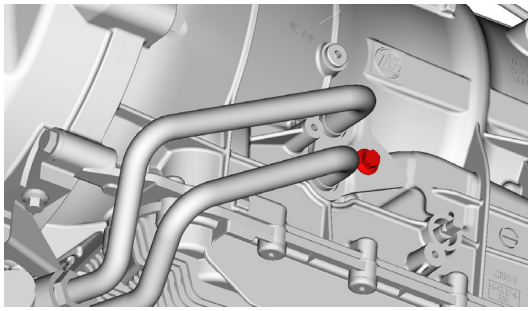


Installation

1. Install the thermostat and thermostat bracket assembly to the gearbox.
2. Connect the cooling pipes. Ensure that the 'O' ring is correctly located in each pipe union.
   Torque each union to **20 Nm**.



3. Install the pipe clamp. Torque bolt to **20-25 Nm**.



4. Run the engine to prime the cooling circuit.
5. Check / Top up the transmission oil with the specified transmission oil (Refer to 'Transmission Oil Check / Top Up', page 7-1-4).

Oil Cooler (Automatic Transaxle Differential)

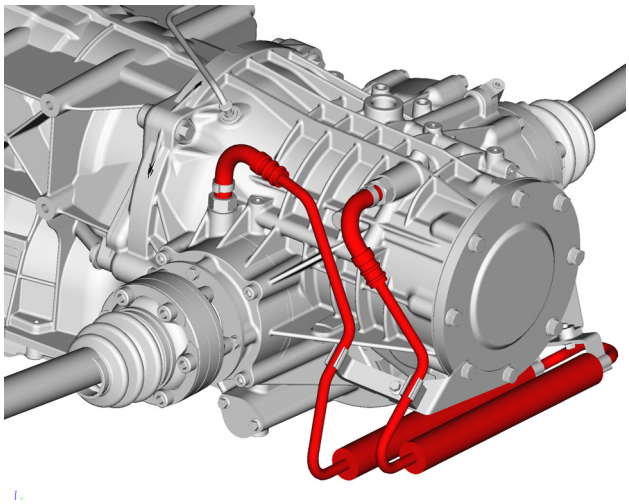
Repair Operation Time (ROT)	
Item	**Code**
Oil Cooler (Automatic Transaxle Differential) Renew	**TBA**

Removal

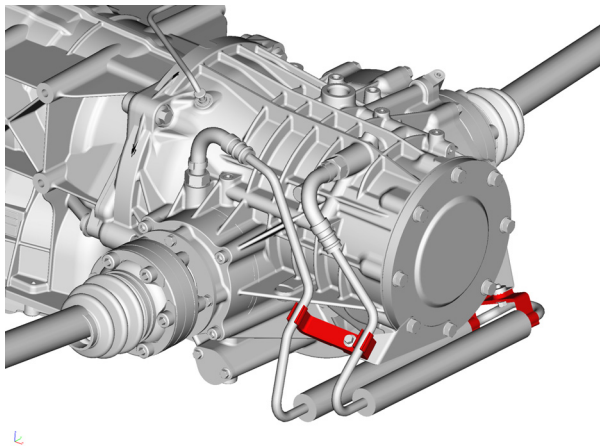
1. Disconnect (quick release) the coolant pipes.

Some transmission oil will start to drip.

   Cap the open ends.



2. Remove the bolts (x2) securing the coolant pipes brackets. Withdraw the oil cooler.



Installation

1. With the coolant pipes clipped into their brackets, secure the coolant pipe brackets.
2. Connect the coolant pipes.
3. Run the engine to prime the cooling circuit.
4. Check / Top up the differential with the specified differential oil (Refer to 'Specifications', page 7-1-3).

Oil Cooler (Manual Transaxle)

Repair Operation Time (ROT)	
Item	**Code**
Oil Cooler (Manual Transaxle Renew	**TBA**

Removal

1. Disconnect the coolant pipes.

Some transmission oil will start to drip.

   Cap the open ends.

Image to Follow

2. Remove bolts (x2) securing the oil cooler to the subframe. Withdraw the oil cooler.

Image to Follow

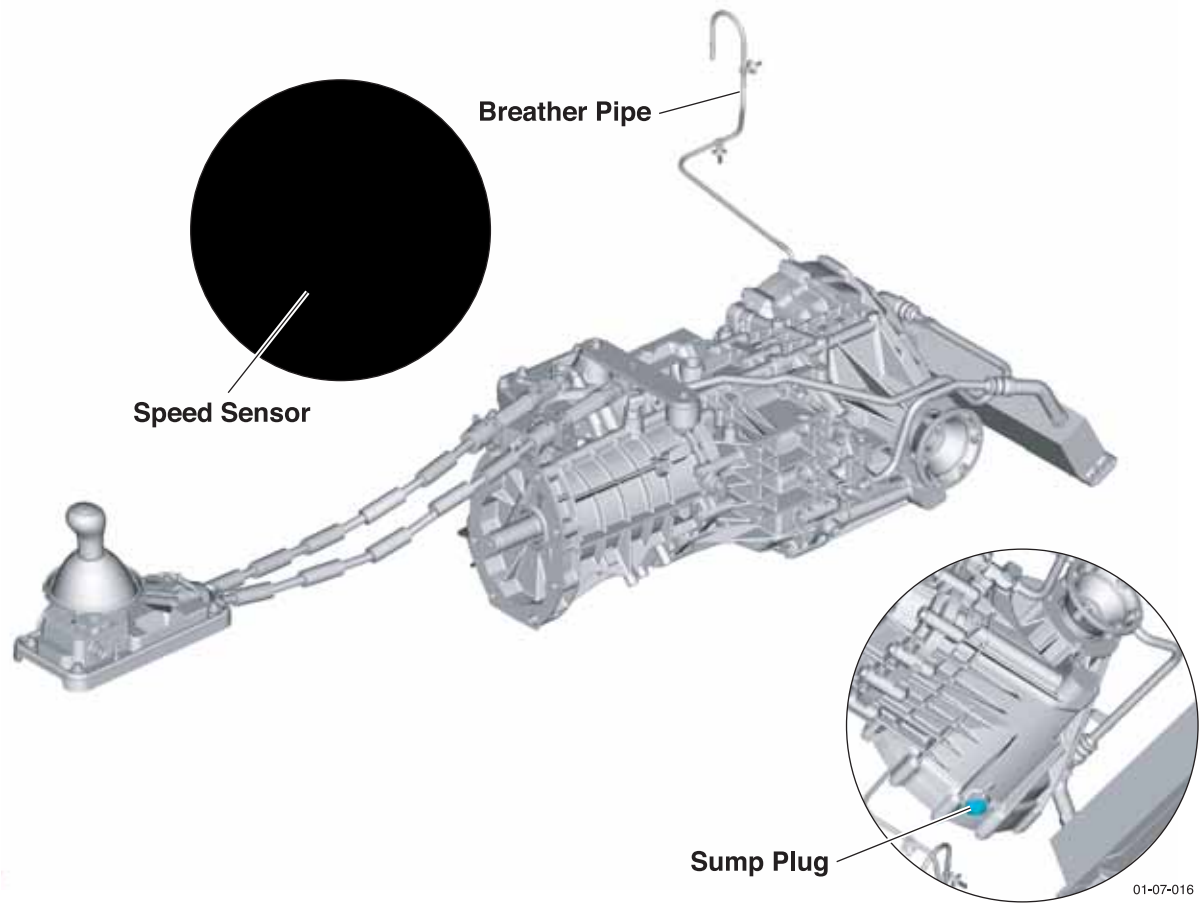
Installation

1. Install the oil cooler to the subframe. Torque bolts to **8-10 Nm**.
2. Connect the coolant pipes.
3. Run the engine to prime the cooling circuit.
4. Check / Top up the transmission oil with the specified transmission oil (Refer to 'Manual Transmission (07.03)', page 7-3-1).

Transmission (07.00)

Manual Transmission (07.03)

Description



The Graziano AM803T transaxle installed to this vehicle incorporates a six speed transmission, with synchromesh on all gears. Gear selection is by a twin cable system (shift and select) operating an integrated bellcrank and H gate.

Cooling

The manual transaxle has an external cooling circuit which operates continuously by a fixed displacement pump driven by the input shaft.

The cooler is mounted at the rear attached to the subframe.

Specifications

Type

Graziano AM803T transaxle with:

- Integrated Bellcrank Assembly
- Integrated Reverse Switch
- Plate Type Limited Slip Differential

Synchronisers

Triple Cone Syncros on 1st and 2nd, double cone on all other gears incl. reverse.

Lubrication

Forced Lubrication system with integral pump and filter (filter is serviceable item)

Transaxle Oil

Shell Transaxle Oil, Fully Synthetic 75W 90

Transaxle Qty.	4 ltr. (7 pt. / 4.2 US qts.)
Coolant System Qty.	0.5 ltr (0.9 pt. / 0.53 US qts.)
Transaxle + Coolant Qty.	4.5 ltr (7.9 pt. / 4.6 US qts.)

Gear Ratios

1st	2nd	3rd	4th	5th	6th
3.154:1	1.947:1	1.435:1	1.148:1	0.935:1	0.758:1

Reverse
2.385:1

Differential Locking Ratio

20% Drive, 60% Coast

Torque Figures

Description	Nm.	lb. / ft.
Speedo sensor to cover plate	7	5.5
Sump plug	49	36.5
LH Output shaft housing	10	7.5
Halfshaft	70	52
Differential Cover	35	26

Maintenance

Oil Check and Top-up

The transaxle is filled for life and would only require checking and topping-up in the event of a oil leak or strip down of the transaxle cooling system.

In the event of a oil leak from the transaxle cooling system, the leak must be repaired and then the transaxle oil may be replenished as follows:

> ⚠ ***Warning*** ⚠
> ***Observe all transaxle oil manufacturers safety instructions when draining and refilling the manual transaxle.***

Before doing any work to the transaxle oil level setting make sure that:

- The car is on a horizontal ramp
- The engine is not running
- The rear wheels are standing still for a minimum of 2 minutes before starting the oil level check and during the process, e.g. **by applying the hand brake**

1. Place a suitable container to hold any transaxle oil that may come from the opening.
2. Remove the fill plug.
   With the fill plug removed transaxle oil should just 'dribble' from the opening.
3. If required fill the transaxle with the specified oil until oil 'dribbles from the hole (Refer to 'Specifications', page 7-3-2).

Drain / Fill

1. Place a suitable container to hold the transaxle oil.
2. Remove the drain plug. Allow the oil to drain.
3. Disconnect the oil cooling pipes and allow the oil in the cooling system to drain in to the container.
4. Complete with a new sealing washer, install the drain plug. Torque plug to **49 Nm**.
5. Connect the oil cooling system pipes.
6. Fill the transaxle with the correct oil.
7. Run the vehicle a short distance to ensure that the transaxle cooling system has been completely filled. Check / Top-up.

Transaxle

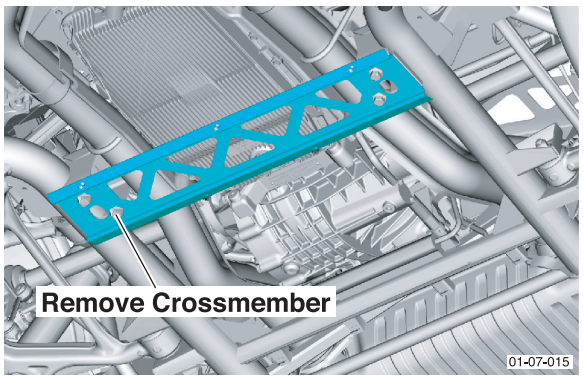
Repair Operation Time (ROT)	
Item	Code
Manual Transaxle Renew	TBA

Removal

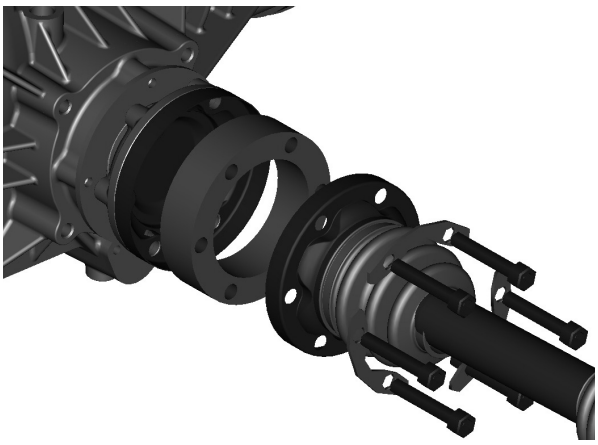
1. Raise vehicle and make safe.

Caution
On a two post ramp ensure vehicle is 'strapped' to the lift.

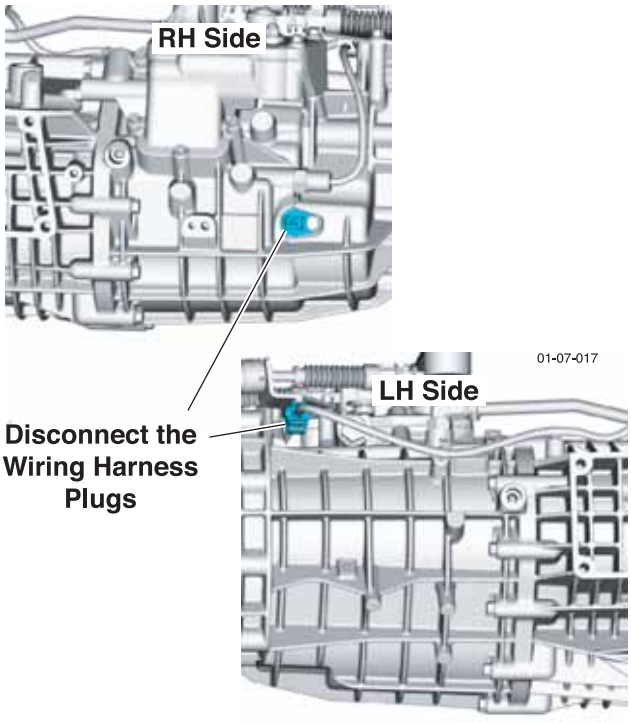
2. Remove both rear road wheels.
3. Remove the silencer and rear LH and RH exhaust pipes.
4. Remove the subframe brace.



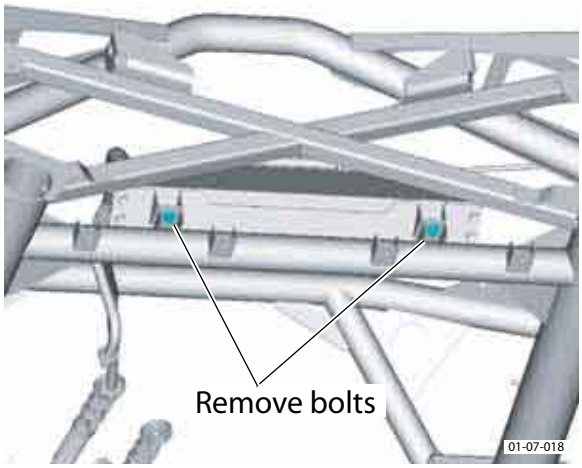
5. Remove the halfshafts from the differential.
   5.1 Remove bolts (x6) and washer tabs (x3). Discard the bolts.
   5.2 Withdraw the halfshafts from final drive.



6. Disconnect the wiring harness plugs.



7. Remove the bolts that secure the oil cooler to the subframe. Withdraw oil cooler.



8. Disconnect the breather pipe from the transaxle.

The breather pipe should remain in position on the vehicle to avoid being incorrectly route on install.

Image to Follow

9. Using suitable lifting equipment, i.e. hydraulic jack and sling, support the transaxle and remove the bolts (x8 (4 each side)) that secure the transaxle to the mounts (x2). Discard the bolts.

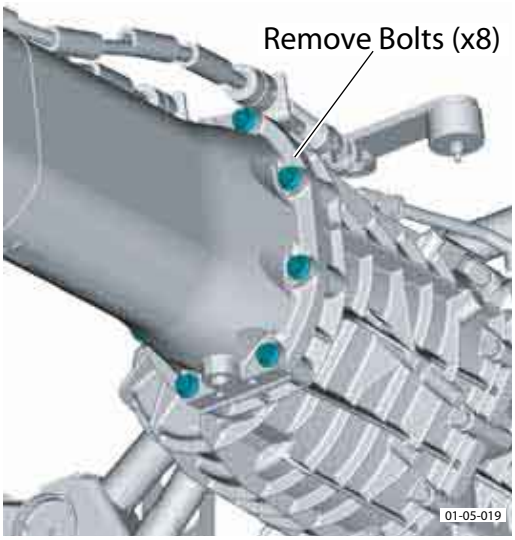
Image to Follow

10. Lower the transaxle, using the lifting equipment, and disconnect the gear selector cables.
    Use the service tool (Refer to '501-F116 (IP Removal)', page 20-1-8) to remove the horseshoe clips (x2) and lever the cables from the ball joints.

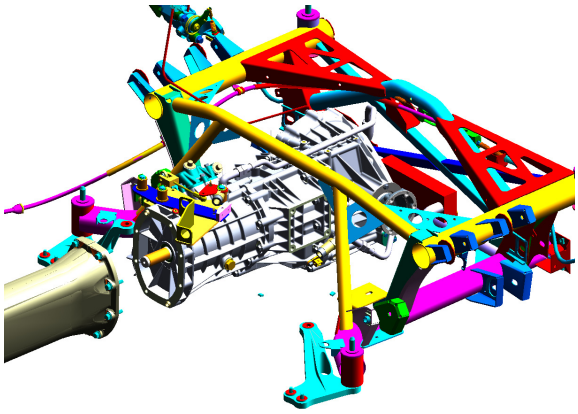
Caution
Ensure that the service tool No. TBA is used. There is a risk of bending the end of the cable. Lever cable from ball joint at a point closest to the ball joint.

Image to Follow

11. Disconnect the torque tube from the gearbox.
    11.1 Ensure the torque tube is supported.
    11.2 Remove bolts (x8).

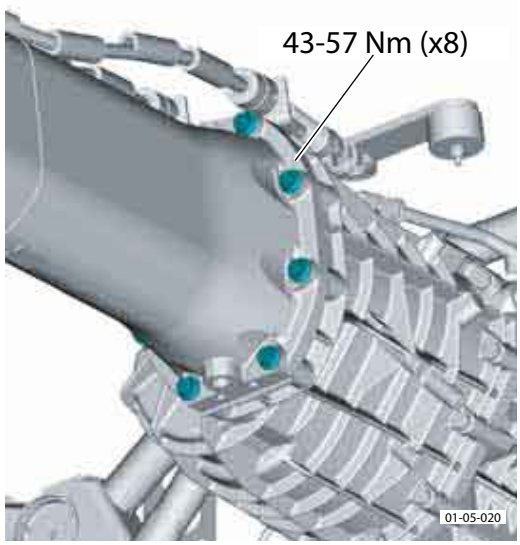


12. Withdraw the transaxle rearwards and manoeuvre transaxle out from rear subframe.



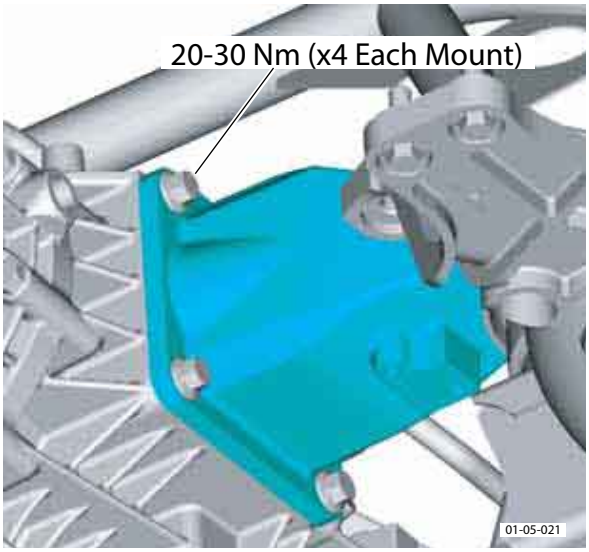
Installation

1. Using suitable lifting equipment, i.e. hydraulic jack and sling, place the transaxle up in the subframe.
2. Manoeuvre the transaxle to up to the torque tube. Install bolts (x8). Torque to **43-57 Nm**.

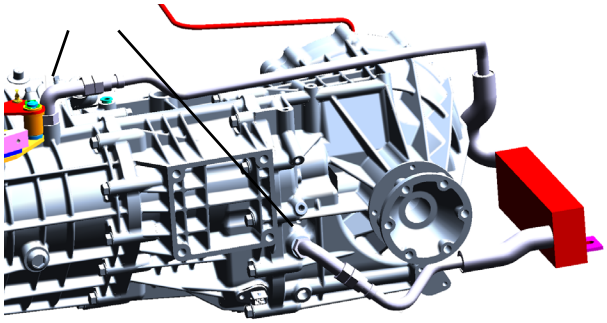


3. Connect the gear selector cables.

4. Install the transaxle to it's mountings. Use **new** bolts. Torque bolts (x4 on each mount) to **20-30 Nm**. Remove the support.



5. Install the breather pipe.
6. Install the oil cooler.



7. Install the halfshafts. Torque bolts to **70.5 Nm**.
8. Install the subframe brace. Torque bolts to **85 Nm**.
9. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7)).
10. Complete a test drive to ensure correct operation.
11. Check gearbox oil level.

Differential Output Seal (LH)

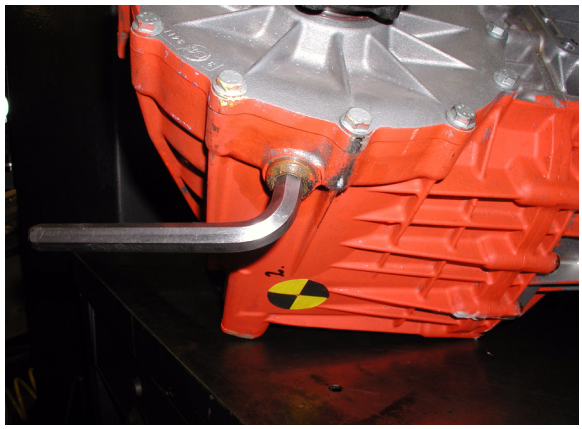
Repair Operation Time (ROT)	
Item	**Code**
Differential Output Seal (LH) Renew	**TBA**

If replacing both LH and RH seals at the same time, change the LH seal first.

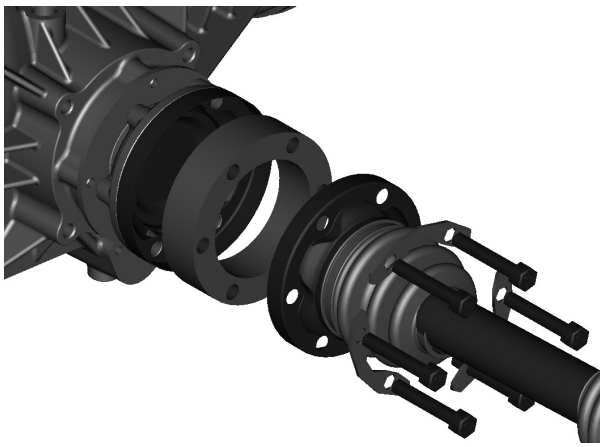
When replacing the RH seal the LH output shaft will hold the differential unit in place.

Removal

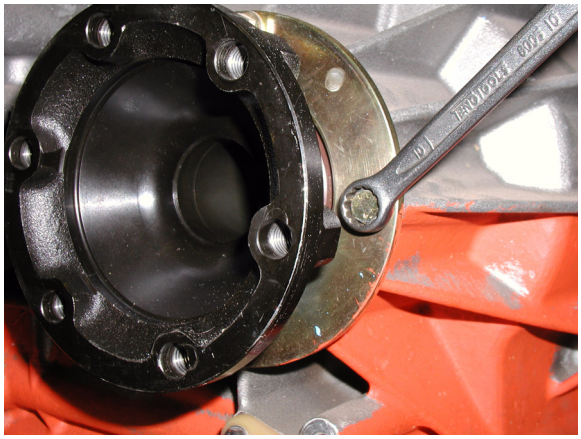
1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the LH road wheel and road wheel arch liner.
4. Remove the rear undertray.
5. Remove the service brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).
6. Remove the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
7. Drain the differential oil.



8. Remove the halfshaft bolts (x6) and washers (x3). Withdraw the halfshaft.

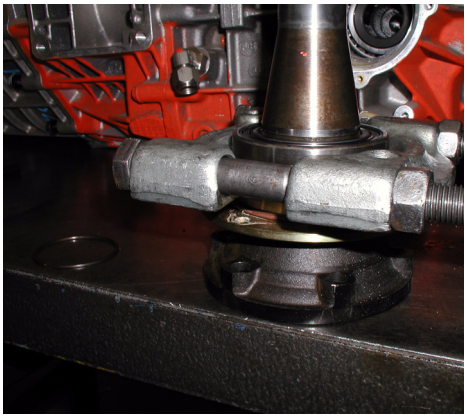


9. Remove bolts (x4).



10. Attach a slide hammer and withdraw the output shaft cover complete with output shaft and bearing. Discard the 'O' ring.
11. Remove the circlip and withdraw the bearing.





12. Remove the seal.

Installation

1. Install a new seal. Push the seal in until it seats against the lip in the casing. Smear the lip with a small amount of grease.
2. Place the output shaft through the seal casing. Install the bearing and circlip.



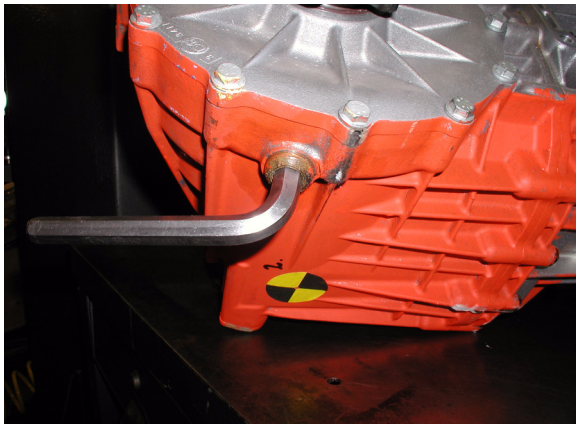
3. Install a new 'O' ring to the seal casting.
4. Install the output shaft cover complete with output shaft and bearing. Install bolts (x4), torque to **10 Nm**.
5. Install the halfshaft. Torque bolts (x6) to **70.5 Nm**.
6. Install the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
7. Install the service brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).
8. Ensure the drain plug is installed (Torque **49 Nm**.). Fill the differential with the specified oil (Refer to 'Specifications', page 7-3-2).
9. Install the undertray.
10. Install the road wheel arch and road wheel (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
11. Connect the vehicle battery.

Differential Output Seal (RH)

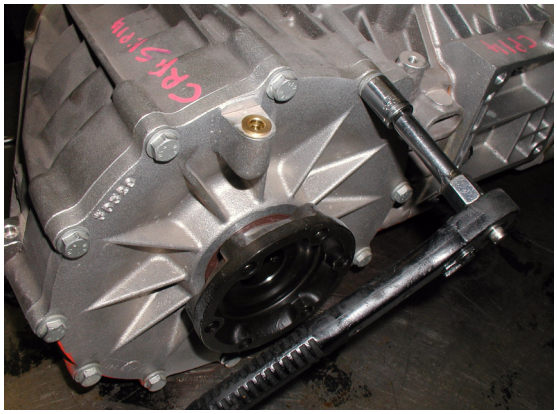
Repair Operation Time (ROT)	
Item	Code
Differential Output Seal (RH) Renew	TBA

Removal

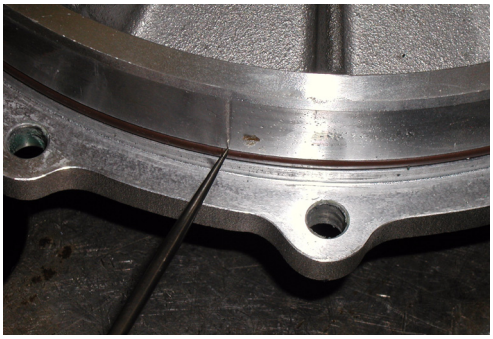
1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the RH road wheel and road wheel arch liner.
4. Remove the rear undertray.
5. Drain the differential oil.

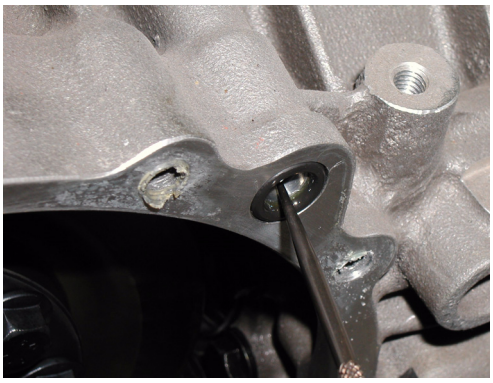


6. Remove the halfshaft bolts (x6) and washers (x3). Withdraw the halfshaft.
7. Remove bolts (x12), attach a slide hammer and withdraw the differential housing cover complete with output shaft.

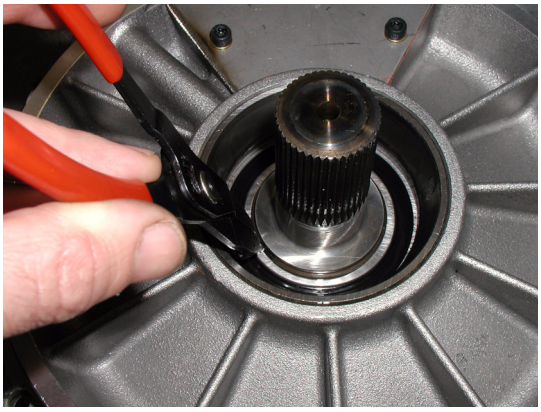


8. Remove the 'O' rings (x2).





9. Remove the circlip. Remove the output shaft complete with bearing.



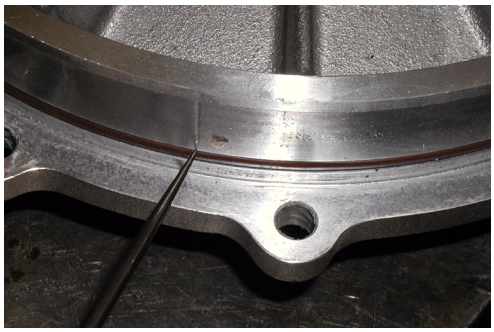
10. Remove the seal.

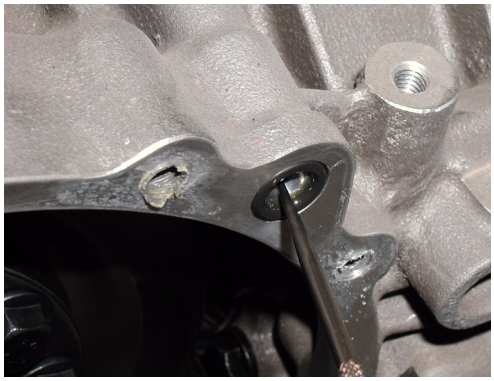
Installation

1. Install a new seal. Push the seal in until it seats against the lip in the casting. Smear the lip with a small amount of grease.
2. Place the output shaft through the differential housing cover. Install the bearing circlip.

Place a support under the casting bearing race and press the output shaft to its seat. Ensure that the bearing race does not move - shims may be disturbed.

3. Install new 'O' rings (x2)





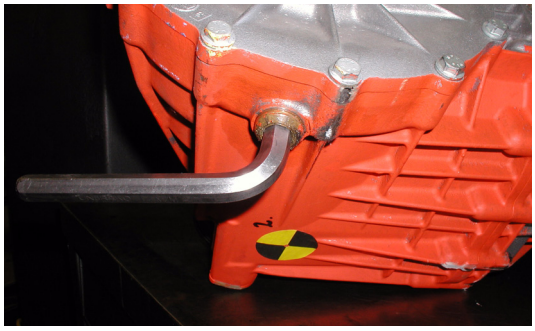
4. Install the differential housing cover. Install bolts, smeared with Loctite 242 (x12). Torque bolts to **35 Nm**.
5. Ensure the drain plug is installed (Torque **49 Nm**.). Fill the differential with the specified oil (Refer to 'Specifications', page 7-3-2).
6. Install the halfshaft. Torque bolts (x6) to **70 Nm**.
7. Install the vertical link (Refer to 'Rear Suspension (04.02)', page 4-3-1).
8. Install the service brake and handbrake calipers (Refer to 'Brake System (06.00)', page 6-1-1).
9. Install the undertray.
10. Install the road wheel arches and road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
11. Connect the vehicle battery.

Differential (Limited Slip)

Repair Operation Time (ROT)	
Item	**Code**
Differential (Limited Slip) Renew	**TBA**

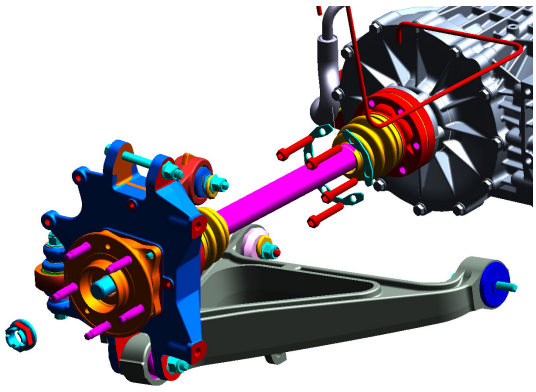
Removal

1. Disconnect the vehicle battery.
2. Raise the vehicle and make safe.
3. Remove the RH road wheel and road wheel arch liner.
4. Remove the shear plate and rear undertray
5. Drain the gearbox oil.



6. Remove the RH rear exhaust pipe (Refer to 'Pipes and Supports (09.03)', page 9-2-1).
7. Remove the RH halfshaft.

7.1 Remove the halfshaft nut.

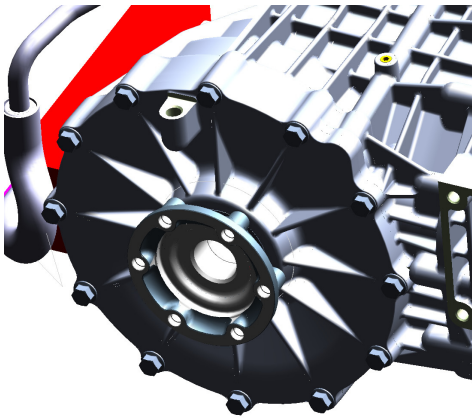


7.2 Remove bolts (x6) and washers (x3).

7.3 Withdraw the halfshaft.



8. Remove the differential cover.
   8.1 Install service tool (No.) to differential output shaft.
   8.2 Remove bolts (x12).



   8.3 Withdraw the differential cover.
   8.4 Discard the 'O' rings (x2).
9. Remove the differential.

The differential may come out with the differential cover or it may remain in the differential housing located on the L/H output shaft.

Installation

1. Insert the differential into the differential housing.
2. Complete with new 'O' rings (x2), install the differential cover. Secure with bolts (x12). Torque bolts to **35 Nm**.
3. Install the halfshaft. Torque bolts (x6) to **70.5 Nm**.
4. Install the exhaust pipe (Refer to 'Pipes and Supports (09.03)', page 9-2-1).
5. Install the undertray and shear panel.
6. Install the road wheel arches and road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).

ASTON MARTIN
ASTON MARTIN

Transmission (07.00)

Automatic Control System (07.05)

Transmission controls

Push buttons, mounted on the centre console, are used to select P, R, N and D electrically. The link with the transmission shift console is electric and electronic, via the engine electronics. In addition, gear shifts can be made by using the shift paddles behind the steering wheel ('TouchTronic'). The left paddle is for down-shifts, the right paddle for up-shifts.

Gearbox Modes

Automatic - Button 'D' pressed. Standard drive program (with automatic shifts). Economical use of engine power.

Automatic-Sport - Sport button pressed. Makes full use of the engine power. Moves shifts up to higher engine speeds.

Does not use 6th rear.

TouchTronic - Paddles behind the steering wheel. Manual shifts between all gears (6, 5, 4, 3, 2 and 1). Will auto shift up when engine revs. reach maximum.

TouchTronic-Sport - Manual shifts between all gears with Sport button pressed (6, 5, 4, 3, 2 and 1). Does not auto shift up when engine revs. reach maximum.

Overview of Gearshift Procedures

Park (P)

Select 'P' only with vehicle standing still or moving very slowly (less than 2 km/h). If 'P' is selected without applying the foot brake, the DIM display will read 'PRESS BRAKE PEDAL!'

The 'shift by wire' (SBW) system also includes a mechanical emergency release (Park override) so that the vehicle can be towed away in certain circumstances.

If 'P' is selected from drive position D > 2 km/h, the transmission will read 'CANNOT SELECT PARK AT SPEED'.

Reverse (R)

Select 'R' only when the vehicle is stationary and the engine idling. 'R' can only be engaged if the foot brake has been applied. If 'R' is selected without applying the foot brake, the DIM display will read 'PRESS BRAKE PEDAL!'.

*If the vehicle speed is less than approx. 5 km/h (3 mph), '**R**' may be selected from '**D**', without pressing the brake pedal, to enable a vehicle 'rocking' i.e. to enable vehicle movement out of mud, snow, etc. If 5 km/h (3 mph) is exceeded then the transmission will automatically select '**N**'.*

Neutral (N)

In neutral, there is no power flow between the engine and the automatic transmission. Apply the handbrake to prevent the vehicle from rolling away when neutral has been selected.

To select 'N' from 'P', the brake pedal must be pressed down, otherwise the DIM display will show 'PRESS BRAKE PEDAL!'. Neutral can be selected from any drive position.

Drive (D)

'D' can only be selected after pressing down the brake pedal. If position 'D' is selected without applying the foot brake, the DIM display will read 'PRESS BRAKE PEDAL!'. From 'D', D-Touch can be selected directly by moving one of the paddles behind the steering wheel.

The standard drive program is in use, with automatic shifts from 1 to 6 and 6 to 1.

The actual gear is added to the 'D' display, for example 'D1' (position D, 1st gear).

*If the vehicle speed is less than approx. 5 km/h (3 mph), '**D**' may be selected from '**R**', without pressing the brake pedal. This enables a vehicle 'rocking' motion, i.e. to enable vehicle movement out of mud, snow, etc.*

Drive (D) - Sport

The Sport program is selected at a separate push button on the centre console and must be re-activated each time the engine is started. This is a program that makes full use of the available engine power and moves the shift points farther up the engine-speed scale.

Drive (D) - TouchTronic

Gears are selected by pulling one of the two paddles behind the steering wheel.

Left paddle (-)	Right paddle (+)
Down-shift	Up-shift

The up and down shift points are protected so that the engine cannot over speed. If the '+' paddle is not operated in time, however, the transmission shifts up to the next higher gear when maximum engine speed is reached.

Pull back simultaneously on both paddles to select Neutral.

Drive (D) - TouchTronic-Sport

In contrast to 'D-TouchTronic', no up-shift takes place in 'D-TouchTronic-Sport' when the maximum engine speed is reached. In this mode (manual program / Sport button operated) no up-shift takes place if the '+' paddle is not operated. Engine over speeding will be prevented only by the governed maximum speed limit.

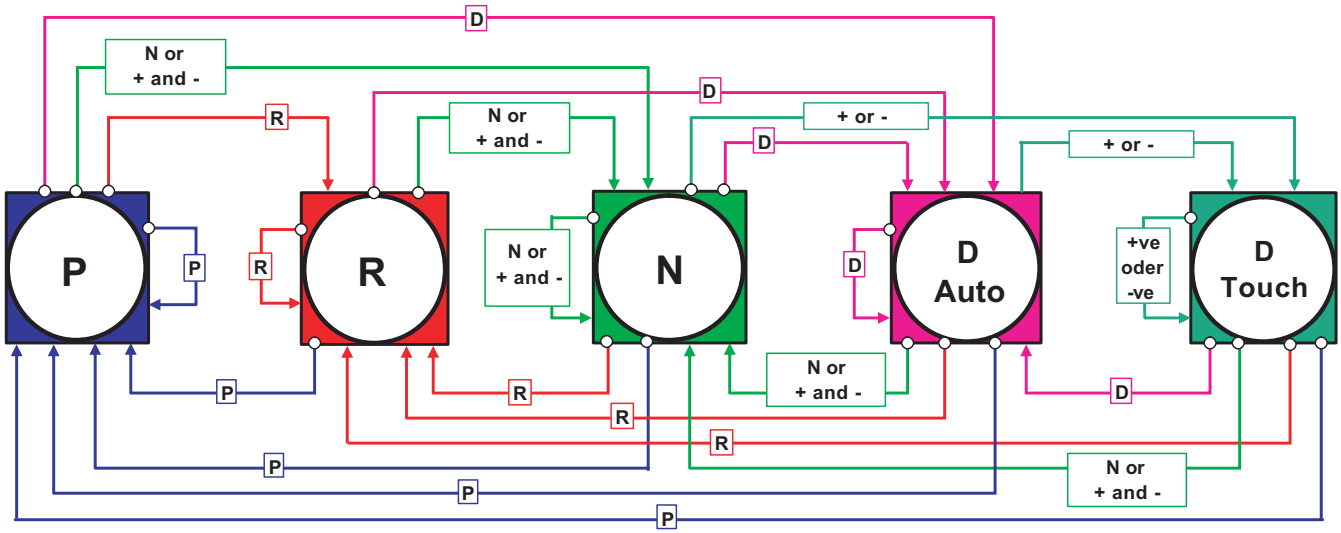
Auto-Park / Auto-Neutral

As safety features, the automatic transmission has 'Auto-Park' and 'Auto-Neutral' strategies. When certain driving situations are encountered, the automatic transmission shifts to the 'P' or 'N' positions.

Driving situations:

- If the engine stops while 'D' or 'R' is selected, but the ignition is on and the vehicle is moving, 'N' will be selected.
- If the engine is stopped and the ignition turned off while in 'D' or 'R', but the vehicle continues to roll, 'P' will be selected if the vehicle's speed is below approx. 10 km/h.
- If the engine is stopped and the ignition turned off in position 'D' or 'R', but the vehicle continues to roll, 'N' is selected above approx. 10 km/h.

This assumes that the vehicle's speed does not rise too high. These functions are performed automatically to ensure that no power can pass through the automatic transmission when the engine is restarted.



Parking Lock

The parking lock is a device that prevents the vehicle from rolling away out of control. It is engaged when 'P' is selected.

The parking lock acts by inserting a pawl into the teeth of the parking lock gearwheel on the transmission output shaft; this prevents the rear road wheels from turning by way of the propeller shaft and final drive.

The parking lock is engaged by a mechanical spring system in the transmission and secured electrically. All drive positions are also selected electrically. The detent disc in the transmission is omitted, and replaced by a parking disc and lock cylinder with solenoid valve (MV3).

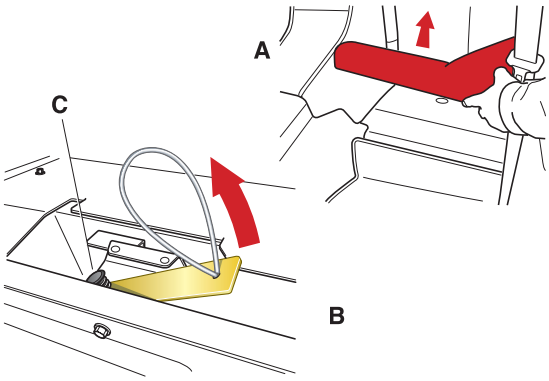
Apply the handbrake before operating the park override. There is the danger that the vehicle will roll, depending on the incline of the road.

After stopping the vehicle apply the handbrake and push back the park override lever.

Overriding the Park Lock

Apply the handbrake. Remove the LH rear seat base (A) and unscrew the two screws that secure the park override lever cover. Remove the cover.

Pull the manual park override lever (B) fully up on the ratchet, fully releasing the parking lock.



After towing or moving the vehicle apply the handbrake. Lift the manual park override lever slightly, press the ratchet release (C) and lower the manual park override lever back to the stop. The parking lock is now engaged. Install the cover and the rear seat base.

The message in the instrument pack must disappear and the position display must change from 'N' to 'P'. Otherwise there is the danger that the vehicle will roll away.

Hydraulic Shift Control Unit

The Hydraulic Shift Control Unit (Mechatronik unit) is a combination of hydraulic and electronic control (TCM) modules, which is located in the transmission, in the oil sump.

This technical principle has the following advantages:

- Minimum tolerances
- Better coordination of gear shifts
- Increased refinement
- Optimised shift quality
- Good reliability, since the number of plug connections and interfaces is reduced

Electrostatic Discharge (ESD)

Caution

When working with the transmission control module (TCM) and main control valve body, all suitable safety precautions must be taken to protect the component against electrostatic discharge (ESD). Failure to follow these instructions may result in component damage.

Make sure all possible safety precautions are taken to protect the TCM and main control valve body unit against ESD.

Personal Wrist-Band Earthing

Earthing (grounding) by means of a wrist band or strap is the most reliable method of diverting electrostatic charges away from working personnel, and should therefore be used wherever possible, particularly if the person concerned is working while seated. The wrist band earthing (grounding) device consists of a bracelet closely attached to the wrist and a spiral earthing (grounding) cable connecting it to the earthing (grounding) contact point. This system must include a quick-release device so that the wrist can be released in the event of danger.

Shoes and Foot Earthing Straps

Electrically conductive shoes should be worn by persons who mainly work standing up or either standing or sitting in ESD protection zones, particularly if wrist band earthing (grounding) is impracticable. The standard calls for ESD shoes to record values between 0 and 35 Megga-ohms (MOhm) resistance. However, for antistatic working shoes resistance values between 0.1 and 1000 MOhm are called for, and a through-conducting resistance for protective shoes of 0.1 to 100 MOhm. A lower limit value of not less than 0.1 MOhm must be maintained on account of the contact voltage risk. For this reason the minimum value has been set contrary to the standard at the higher figure of 0.75 MOhm.

Transmission Control Module (TCM)

The transmission control module (TCM) and its input / output network control the following transmission operations:

- Shift timing
- Line pressure (shift feel)
- Torque converter clutch

The TCM processes signals from the transmission, the engine and the vehicle.

From the signal inputs and the memorised data the control program computes the correct gear and converter lock-up clutch setting and the optimum pressure settings for gear shift and lock-up clutch control.

By means of special output-side modules (power output stages, current regulator circuits), the TCM controls the solenoid valves and pressure regulators and thus influences the hydraulics of the automatic transmission. In addition, the amount and duration of engine interventions are supplied to the engine management by way of the CAN bus.

Caution

Disconnection of other control modules and / or the vehicle battery, may introduce fault codes (DTCs).

Following rectification and reconnection, ensure that no induced codes exist in the TCM memory.

Caution

Disconnection of other control modules and / or the vehicle battery, will cause shift adaptations to be lost; this may be apparent by slight shift quality degradation. Shift quality adaptations are made to compensate for changing transmission characteristics over time.

Following reconnection, a period of adaptation will be required as the TCM re-learns the transmissions operating characteristics.

Controller Area Network (CAN) Interface

For the TCM to be able to perform shift point and shift quality management a number of external signals are required. For shift point management alone the TCM requires output speed sensor, throttle pedal position, brake pedal status and virtual gear selector position. The controller area network (CAN) bus is used to share information between control modules. The TCM obtains most of its required data over the CAN bus from the electronic engine controls, EMS, Driver inputs and ABS, Instruments pack and diagnostic tools.

TCM Inputs

Input Speed Sensor (ISS)

The input speed sensor provides transmission input shaft speed information. This signal is produced from an inductive pick-up, generating 36 pulses per revolution.

Output Speed Sensor (OSS)

The output speed sensor provides transmission output shaft speed information. This signal is produced from an inductive pick-up, generating 36 pulses per revolution.

Accelerator Pedal Position (APP) Sensor

The accelerator pedal position (APP) sensor is a potentiometer mounted on the accelerator pedal. The APP sensor detects the position of the accelerator pedal and sends this information to the TCM. The APP sensor is used for shift scheduling and TCC lock-up.

Engine Coolant Temperature (ECT) Sensor

The engine coolant temperature (ECT) sensor detects engine coolant temperature and supplies the information to the TCM. The ECT sensor is used to control the torque converter clutch (TCC) operation.

Transmission oil Temperature (TFT) Sensor

A thermistor provides an electrical indication of the oil temperature. The signal is measured as a voltage with reference to analogue ground in the TCM.

Virtual Kickdown Switch

Kickdown is intended to provide maximum vehicle acceleration, via the appropriate downshift(s), when the operator uses full throttle. The kickdown switch provides an electrical signal when the accelerator pedal is fully pressed down. The TCM detects kickdown using the accelerator pedal position.

Position sensor

The TCM uses the position of this switch, housed on the TCM and main control valve body, to determine the selected gear range. Gear selections are sent by CAN to the TCM, which operates the transmission selector shaft between positions Park, Reverse, Neutral and Drive. The TCM detects the driver´s choice of manual range selection.

Transmission Range Switch (TRS)

The transmission range switch detects the position of the transmission selector shaft. The switch is supplied as part of a new transmission assembly, mounted on the transmission body. The switch is used to indicate positions of the shaft: Park, Reverse, Neutral, Drive, Fourth, Third and Second.

TCM Monitoring Functions

The TCM monitors all input and outputs to identify possible failures. If a fault is detected the TCM takes the appropriate action to ensure the transmission enters a safe mode of operation, without sacrificing transmission durability or driver safety.

Supply Monitoring

If the battery voltage is either too great or too low, the TCM will detect a fault condition. For the TCM to be able to identify this fault, the engine must be running and the transmission oil temperature sensor must be functioning correctly.

Solenoid Supply Monitoring

While the solenoid operating transistors are being activated, checks are run for open circuits, shorts circuits to ground and short circuits to supply. The monitoring function evaluates the voltage characteristics during the switch on process checking for the above faults. All solenoid outputs are fully protected. The processor and the appropriate fail-safe action taken can quickly identify open and short circuit faults.

Sensor Supply Monitoring

The sensor supply voltage is a stabilized supply. This supply is monitored by the TCM by an Analogue to Digital Converter (ADC). If the voltage is out of the valid tolerance a diagnostic trouble code (DTC) is set and the appropriate fail-safe action is performed.

Electronically Erasable Programable Read Only Memory (EEPROM) Monitoring

To diagnose errors with the Electronically Erasable Programable Read Only Memory (EEPROM) the TCM calculates four checksums continuously: If the processor identifies discrepancies in any of the four checksums the TCM will engage ‘mechanical’ limp-home mode. Diagnosis is only performed during TCM initialization. There is no fail-safe mechanism associated with this function as the EEPROM is mainly used for the storage of fault codes and transmission calibration adoptions. If a fault occurs the TCM is able to perform default action and inform the driver of the problem, this is by the DIM message centre right.

Watchdog Monitoring

Watchdog monitoring has two functions. Firstly, it checks that it is possible to inhibit output control by the activation of the solenoid supply transistor. Secondly, it checks that the safety circuit is functioning correctly. During initialization the watchdog checks that it is possible to inhibit control of the pressure regulator and solenoid valves by switching the solenoid supply transistor. There is a fault if activation of the solenoids cannot be inhibited by the watchdog.

The supply to the solenoids can still be inhibited by the high side switch responsible for control of each solenoid i.e. One safety path is lost.

Temperature Sensor Monitoring

If the temperature of the Mechatronik unit rises above a pre-determined level the TCM will be shut down. Prior to the TCM shutting down the TCM will log a fault code, during shutdown the transmission will enter 'mechanical' limp-home mode. Temperature monitoring is performed by a temperature dependent resistor mounted on the in the TCM.

Transmission oil Temperature Sensor Monitoring

The TCM monitors for faults associated with the transmission oil temperature sensor via open and short circuit fault detection.

The temperature cannot alter by more than a pre-defined differential between any two consecutive measurements. The transmission oil temperature must rise after the engine has been started provided that the oil temperature was low enough to begin with (The vehicle must be driven and the diagnostic test condition met).

Gear Ratio Monitoring

Gear ratio diagnostic checks that each gear ratio is correctly engaged. Also, following a gear shift the diagnostic checks that the transmission has engaged the target gear within the allowed time.

Torque Converter Monitoring

The TCM checks that the torque converter can be locked correctly. If torque converter lock-up does not occur correctly the TCM performs the appropriate fail-safe action of opening the Torque converter clutch.

Plausibility Checking

The TCM detects a fault if an excessive voltage jump is identified between any two consecutive measurements. Also, with the engine started from cold the transmission oil temperature will start to rise. Therefore the Mechatronik unit or transmission oil temperature will also start to rise because the TCM is surrounded by transmission oil. If the engine and output shaft speed is higher than a set threshold for a predetermined length of time without the substrate temperature rising above a set threshold a fault will be detected.

Pressure Regulator/Solenoid Monitoring

Each pressure regulator and solenoid is monitored for open circuits and short circuits. The TCM also checks that the current being delivered to each solenoid valve or pressure regulator is within valid limits. When each solenoid is being driven with minimum current the TCM checks that the current is not above a threshold value. If a solenoid is being driven with maximum current, it checks that the current is not below a valid threshold. If either of these two errors occur a plausibility error is logged and the appropriate fail-safe action is performed.

Output Speed Monitor

It is possible for the TCM to diagnose electrical errors associated with the output speed sensor while the vehicle is stationary as well as moving. Plausibility monitoring is performed on the sensor output when the vehicle is moving.

Input Speed Monitor

It is possible for the TCM to diagnose electrical errors associated with the input shaft speed sensor while the vehicle is stationary as well as moving. Plausibility monitoring is performed on the sensor output when the vehicle is moving.

Position Sensor Monitoring

The TCM can identify position errors with a position switch located within the transmission. If an unrecognized position code is read by the TCM a plausibility fault will be logged.

Torque Converter Lock-up Control

The TCM controls how the torque converter clutch is engaged as a function of the accelerator pedal position, output speed, transmission oil temperature, gear selected and shift program. Lock-up is possible in all forward gears, but usually it is restricted to fourth, fifth and sixth gears. To make use of the comfort enhancing effect of the torque converter, the converter clutch can be disengaged prior to a downshift or up-shift. The torque converter lock up clutch is always modulated to allow for controlled slip, to further improve the shift quality.

Safety Functions

Safety functions are designed to safeguard against inappropriate actions by the operator as well as against system malfunctions. The system prevents reverse gear from being engaged at high forward speeds and prevents manual down shifting at excessive engine speeds.

The functions are not operational in mechanical 'limp-home' mode.

The TCM constantly monitors the transmission for faults. In the event of a problem the TCM will adopt a 'limp-home' mode. If a transmission fault is detected, the PCM generates a DIM warning message.

Safety concept is based on the following:

1. The hydraulic system has 'fail-safe' characteristics regarding its electrical operation, such that should the power supply be lost to the electro-hydraulic actuators, the transmission will initiate a 'limp-home' mode.
2. Recognition of critical shift operation by monitoring the last element in the signal path, i.e. the solenoid valve, and checking by means of redundant measured variables, i.e. engine speed, input speed and output speed.
3. Each time the vehicle is started there is a check on the entire safety hardware and the associated program parts and signal paths. A malfunction in this part of the system, or triggering of the safety circuit, is communicated to the operator through the DIM message centre right.

Limp-home Modes

If a fault is detected in the 'Shift by Wire' system the vehicle will go into 'Limp Home' mode. There are three types of 'Limp Home'.

Electrical - '**Gearbox Fault Reduced Function**' will be displayed in the message centre right. Touchtronic and Sport modes will be disabled. Gearshifts will still be possible but shift quality will be degraded.

*In certain circumstances '**D**' will be restricted to 3rd gear. If travelling at speed 3rd gear will engage when an appropriate speed has been reached.*

Reduced Engine Performance - '**Reduced Engine Perform**' will display in the message centre right. Engine performance will be restricted.

Mechanical - '**Limphome No Gear Change Possible**' will display in the message centre right and a audible warning will sound. If travelling forwards in '**D**' or '**D Touch**' the vehicle will go into a locked gear (3rd or 5th depending on vehicle speed). If entering mechanical limp home mode in any position other than '**D**' or '**D Touch**' (forward gears) the park lock will engage.

Do not attempt to change position while in mechanical limp home mode, i.e. pressing either P, R, N, D or pulling back on both gear shift paddles simultaneously. If this request is detected at a speed below approx. 20 km (12.5 mph) the engine will stop and the parking lock will engage.

At a speed above approx. 20 km (12.5 mph) the request and any other transmission request will be rejected and the vehicle will continue in 3rd or 5th.

Torque Converter Operation

The TCM continually monitors the state of the torque converter.

There are three operating modes for the converter:

Fully open	Torque converter 'disengaged'.
Fully closed	Torque converter 'engaged'.
Slip control	The TCM monitors slip and may apply sufficient pressure to allow a small degree of slip. This mode maximises economy by reducing slip to a minimum whilst providing isolation from drive-line shunt and vibration.

Torque Converter Clutch

Hydraulic Pressure Regulation

The TCM supplies an internally switched +12V supply to No.4 pressure regulator. The regulator is operated by switching the other side of the operating winding to ground. Hydraulic pressure is controlled by 'pulse width modulation' (PWM) of the ground switching signal i.e. the duty cycle: the time that the pressure regulator is switched on.

TCM Supply Voltage

The TCM monitors battery and ignition switched supply voltages.

A permanent supply is used to maintain a battery backed 'memory'. Should this supply be cut, due to battery disconnection or power interruption, the shift quality adaptations (made due to the transmission's changing characteristics over time) will be lost. This will result in a small reduction in shift quality for a period until the shift adaptations are re-learned.

The TCM will adopt 'limp-home' mode as a result of the supply voltage being greater than 16 V or below 7 V with an engine speed of greater than 1600 rpm.

Should the ignition supply be between 7 and 9 volts, the TCM will hold the gear that it has currently selected. If after 2.5 seconds, with the engine speed more than 1600 rpm, the voltage remains at this level, 'limp-home' mode will be adopted. The 2.5 second delay is built in to prevent reaction to a momentary voltage fluctuation.

Shift by Wire

In the shift by wire (SBW) system driver intention is transmitted by electrical signals.

The driver request is transmitted over the CAN and the 'Backup Line PSU'. In general the TCM uses the signal over the CAN, in case of a CAN failure the signal over the backup line is used. The serial backup line is unidirectional.

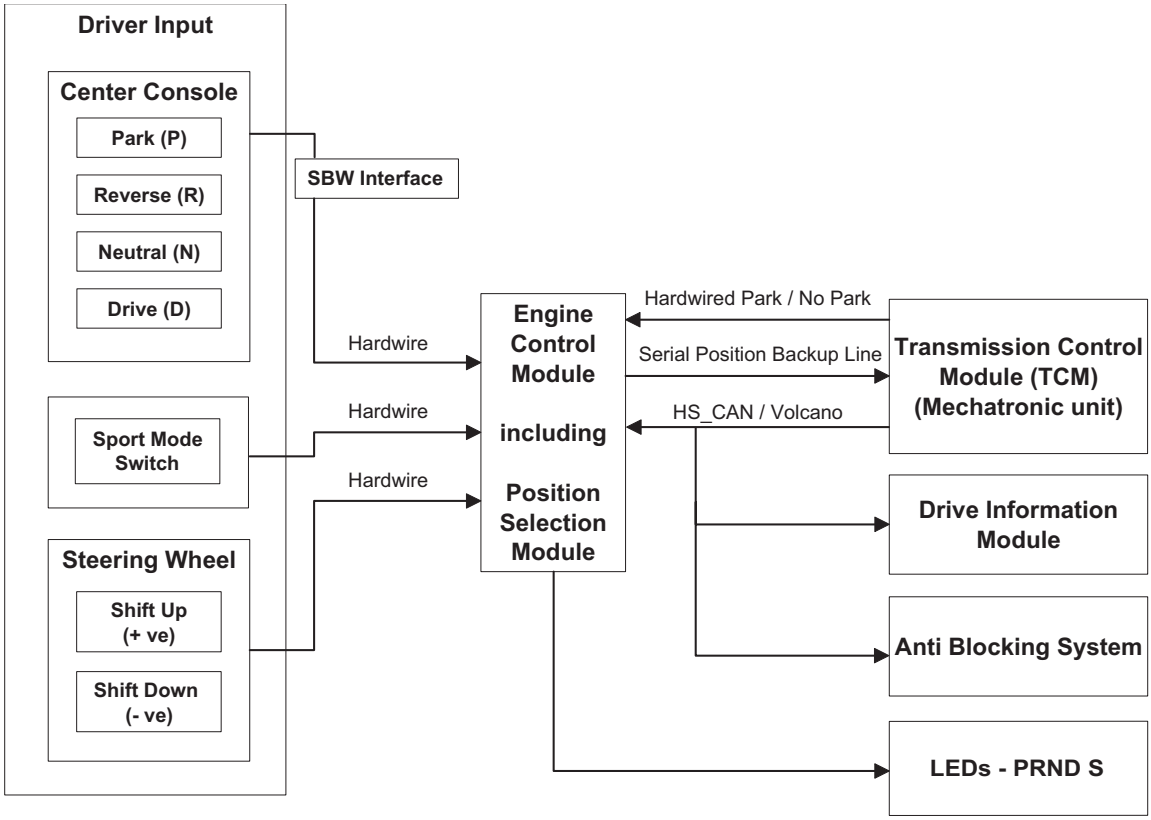
The EMS converts the driver input into an electrical signal which is transmitted to the TCM. The TCM then makes a plausibility check of the driver request. If the conditions (ignition, engine speed, vehicle speed etc.) are fulfilled, the target position is transmitted to the DIM over the CAN.

If required by the TCM the DIM also displays messages to warn the driver and messages to recommend driver actions.

The SBW system provides an emergency disengagement mechanism for the park lock system to enable towing the vehicle (Disengagement of Park in case the engine is not running).

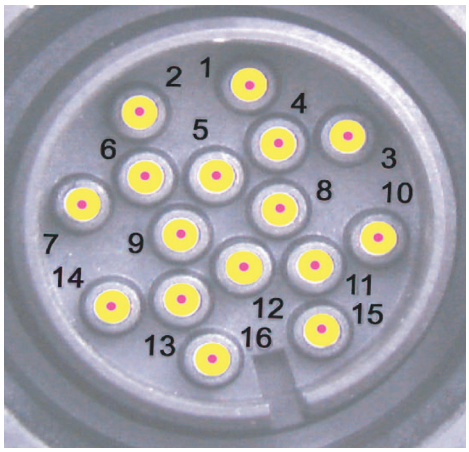
Signal Chain-Basic Example for D-Button operation

1. Driver input - via the SBW interface.
2. The PCM receives the input signal.
3. The PSU performs a diagnostic on the input signal. It then buffers the raw signal from the buttons / paddles and distributes the pressed / no pressed, pulled / no pulled information on CAN.
4. The TCM receives the signal and checks, depending on the current conditions (Transmission state, Engine speed, Vehicle speed etc.), if a change of position is allowed. If yes, the TCM initiates a position change in the gearbox. At the same time the TCM distributes updated position information on CAN.
5. This position information is received by the DIM and the PCM. The DIM illuminates the actual position distributed from the TCM and the PCM illuminates e. g. in addition the drive button light when Drive is distributed from the TCM.



Transmission Plug Pin Assignment

Pin	Assigned to	Notes
1	Series line	Serial Backup Line EMS
2	CAN L	CAN low
3	ISO K	K line (for example application)
4	Not in use	Digital input
5	Not in use	Digital input
6	CAN H	CAN high
7	S4	Heartbeat Supply
8	Not in use	optional input
9	Terminal 15	Wake-up signal, terminal 15 VIGN
10	P signal	P line for starter inhibit
11	S4	Heartbeat
12	not in use	
13	Terminal 31-1	Earth (ground)
14	Terminal 30	Permanent positive (EGS supply voltage)
15	Not in use	
16	Terminal 31-2	Earth (ground) 2



Clutch (08.00)

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Clutch (08.00)

Clutch Assembly (08.01)

Description

The clutch assembly is a balanced unit consisting of a flywheel, clutch friction plates and clutch cover.

The clutch is a twin plate, diaphragm spring type assembly.

A concentric clutch slave cylinder is mounted around the first motion shaft in the torque tube bell housing.

The clutch master cylinder is mounted on the engine bulkhead and is operated directly by the clutch pedal.

A hydraulic connection from the master cylinder feeds pressurised fluid to the slave cylinder. The slave cylinder has an extension tube and bleed nipple extending from the left side of the bell housing for bleeding the system after any major work.

Specifications

Clutch Fluid		
Castrol/Girling Universal Brake and Clutch fluid.		
Clutch Assembly		
Balanced assembly with alignment marks		
Clutch Plate		
Twin friction plates		
Torque Figures		
Description	Nm	lb / ft.
Flywheel Bolts	75-81	55.5-60
Tighten the bolts in sequence. Loosen the bolts and then torque, in even stages, in the same sequence.		
Clutch Bolts	29-35	21.5-26
Tighten x3 equally-spaced bolts, in-turn, to pull-down the clutch evenly. Then torque all bolts in sequence.		
Starter Motor Bolts.	30-35	22.5-26

Maintenance

Clutch Assembly

Repair Operation Time (ROT)	
Item	**Code**
Clutch Renew	**TBA**

Remove

Note alignment marks on clutch cover.

1. Disconnect the vehicle battery.

⚠ *Warning* ⚠

If rasing vehicle on a 'two post' ramp (vehicle supported by underbody), ensurethat the rear end of the vehicle is securly strapped to the ramp. Faliure to strap the rear of vehicle down may lead to the vehicle falling off the ramp.

2. Raise the vehicle and make safe.
3. Remove the rear road wheel(s) and road wheel arch liners.
4. Remove the front and rear undertrays and the shear plate.

Lower the front undertray to reveal the air intake for the alternator. Release the spring clip and part the flex pipe from the undertray.

5. Remove the transaxle and the torque tube.
   - (Refer to 'Manual Transmission (07.03)', page 7-3-1)
   - (Refer to 'Torque Tube', page 5-1-2).

⚠ *Warning* ⚠

The clutch assembly is heavy. Ensure the clutch assembly is supported before removing final bolts.

6. Install the crankshaft holding tool (Refer to '303-1047 (Crankshaft Holding)', page 20-1-6) to prevent crankshaft turning.



7. Remove bolts (x6) and lock washers. Withdraw the clutch cover and plates.

Caution

The clutch is replaced as a complete assembly (flywheel, clutch plate and clutch cover).

Replacing only the clutch plates will result in clutch non-release.

Image to Follow

8. Remove the flywheel.

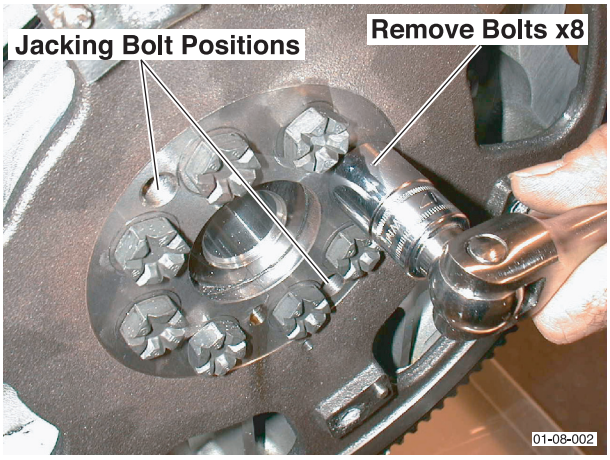
> ⚠ ***Warning*** ⚠
> ***The flywheel is heavy. Ensure flywheel is supported before removing.***

8.1 Insert bolts into the bolt holes (x2) provided.

8.2 Remove bolts (x6).

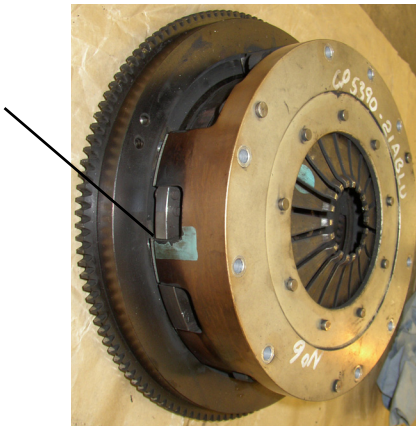
8.3 Using the inserted bolts 'Jack' the flywheel off the crankshaft.

8.4 Discard the bolts.

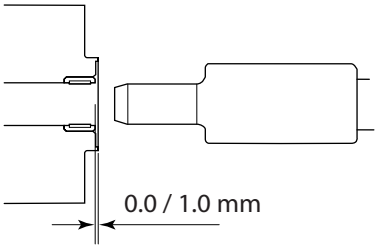


Installation

- If the new clutch assembly is bolted to the flywheel, remove the new clutch assembly from flywheel. Note position of clutch assembly to flywheel.
- If the new clutch assembly is not assembled - assemble with paint marks in alignment:

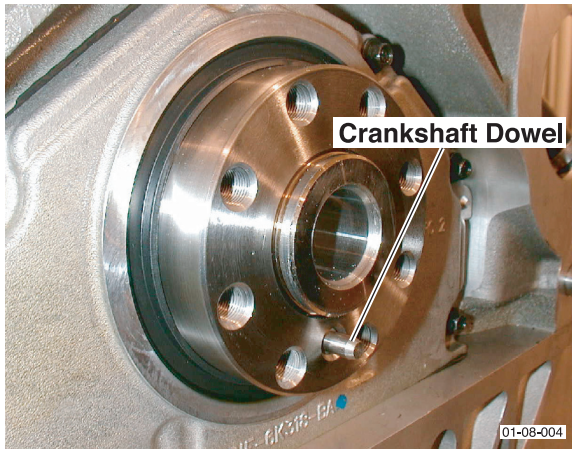


1. Check that pilot bearing in the rear end of the crankshaft is 0.0-1.0 mm below the crankshaft end face.



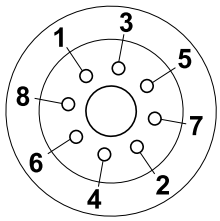
2. Install the crankshaft holding tool (Refer to '303-1047 (Crankshaft Holding)', page 20-1-6) to prevent crankshaft turning.
3. Install the flywheel.

3.1 Using a suitable support surface under the flywheel, offer the flywheel to the crankshaft. Locate the flywheel onto the crankshaft dowel.

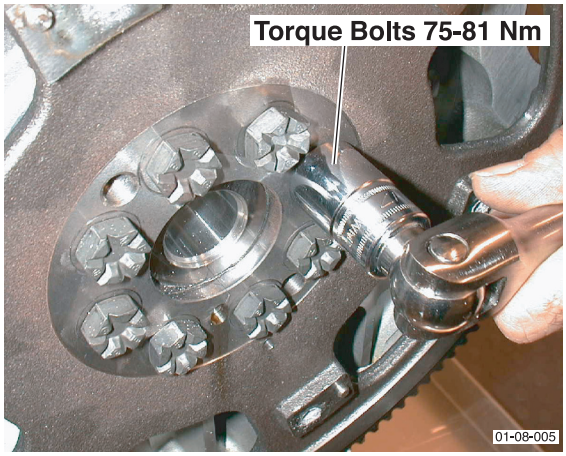


3.2 Loosely install new flywheel mounting bolts (x8) and hand tighten.

3.3 Tighten the bolts in the sequence illustrated. Continue until the flywheel face is in full contact with the crankshaft flange.

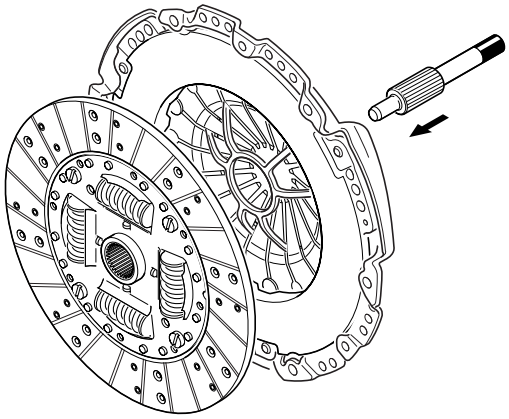


3.4 Loosen the bolts and then torque, in even stages, to **75-81 Nm** in the same sequence.

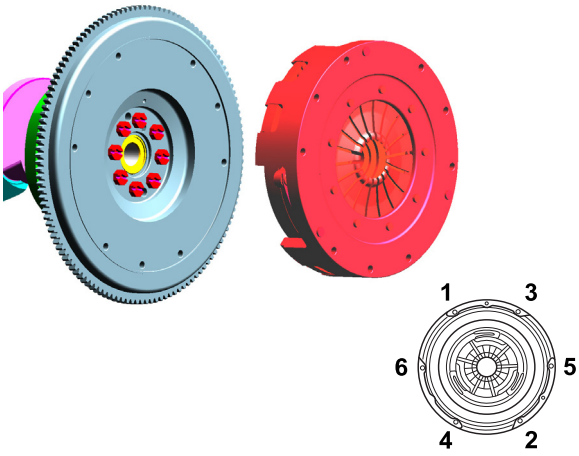


4. Insert the clutch alignment tool (Refer to '303-667 (Clutch Alignment)', page 20-1-5) through the clutch assembly. Offer this assembly to the flywheel and insert the alignment tool into the crankshaft pilot bearing.

Caution
The flywheel and pressure plate are a balanced assembly. Ensure alignment marks are aligned.



5. Insert new bolts (x9). Tighten x3 equally-spaced bolts in-turn to pull-down the clutch evenly.
   Torque all bolts, in sequence, to **29-35 Nm**.



6. Visually check that marks between the clutch and the flywheel are correctly aligned. If not, the clutch must be removed and installed correctly.
7. Remove the alignment tool.
8. Remove the crankshaft holding tool.
9. Install the torque tube and the transaxle.
   - (Refer to 'Torque Tube', page 5-1-2)
   - (Refer to 'Manual Transmission (07.03)', page 7-3-1)
10. Install the starter motor. Torque the starter motor bolts to **30-35 Nm**.
11. Install the front and rear undertrays.
12. Install the road wheel arch liners.
13. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
14. Remove the vehicle securing strap, if installed.
15. Connect vehicle battery.

Exhaust (09.00)

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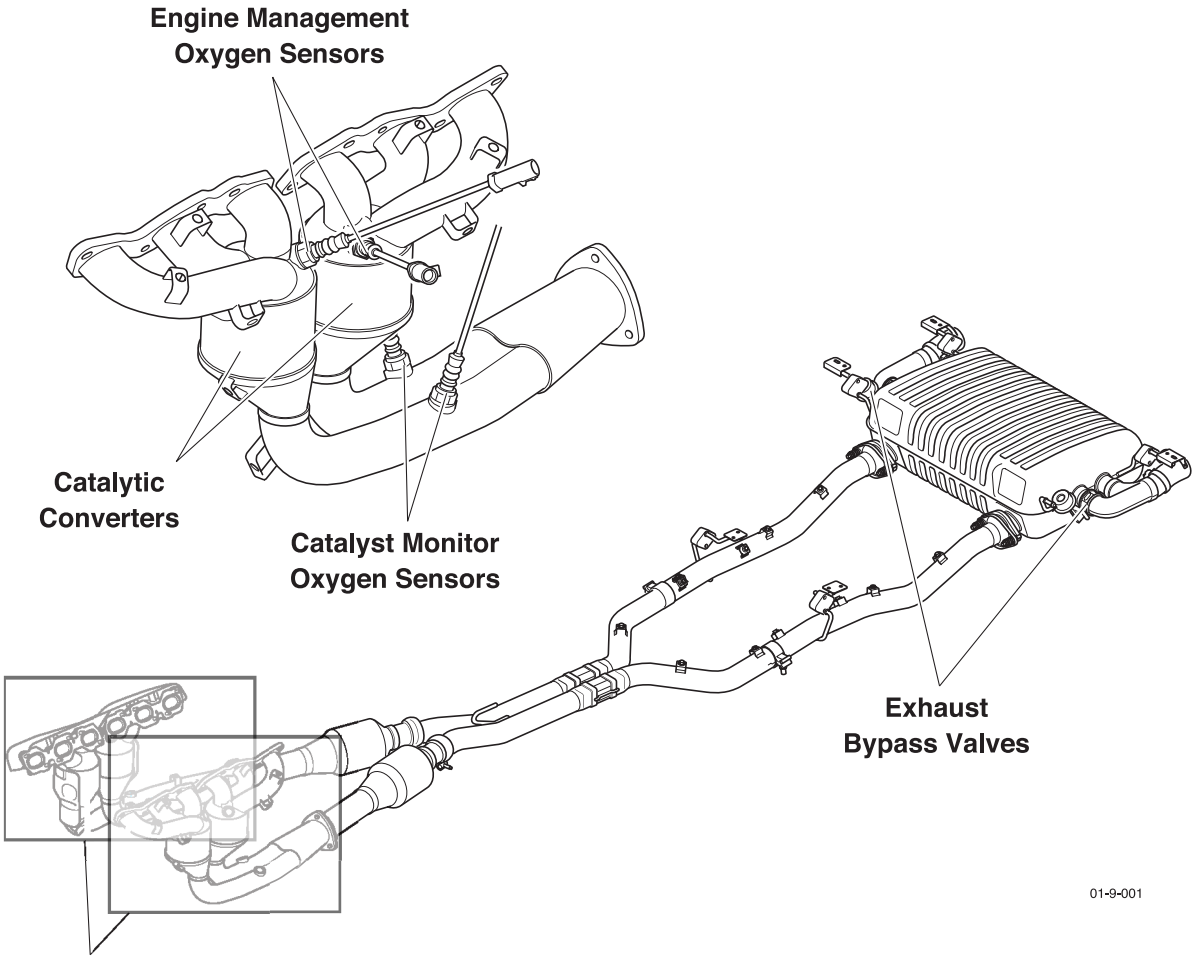
Exhaust System (09.00)

Exhaust Overview

The exhaust system consists of two six-branch manifolds, four primary catalytic converters, eight oxygen sensors, two secondary catalytic converters and a single variable flow silencer assembly.

Exhaust gasses flow from the exhaust manifolds, through the primary catalysts, through the secondary catalysts and on to the rear silencer assembly.

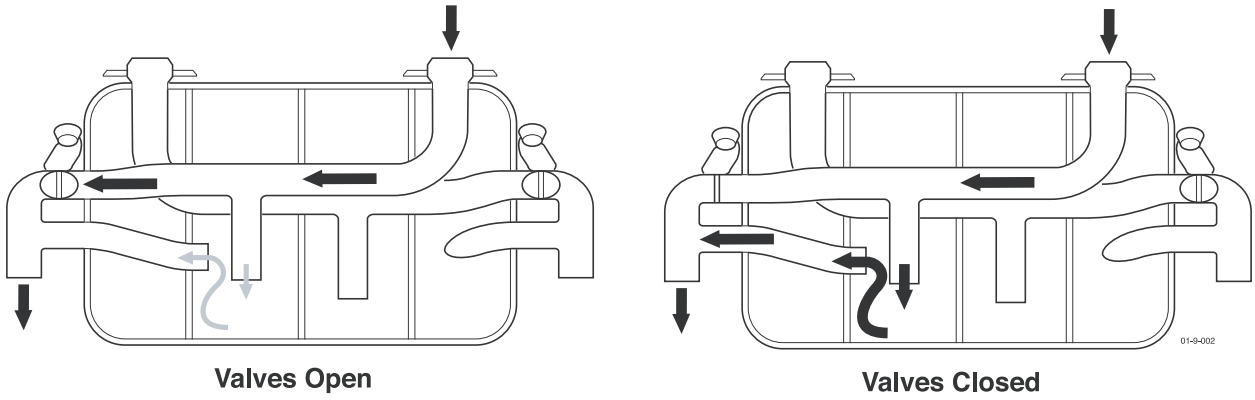
Eight oxygen sensors are installed in the exhaust system. The four engine management oxygen sensors are mounted before the primary catalysts. The four catalyst monitor oxygen sensors are mounted between the primary and secondary catalysts.



Exhaust Manifolds (Refer to Engine Structure (Page 3-2-1)

Exhaust (09.00)

Silencer Assembly (09.01)



Valves Open

Valves Closed

Variable Flow Silencer Assembly

The rear silencer assembly has a variable flow path controlled by two bypass valves.

The system is intended to enhance top end performance in motor sport applications and will not operate in most normal driving conditions.

By directing exhaust gasses through a modified path at high vehicle speeds, exhaust back pressure is reduced and top end performance is enhanced.

As engine speed increase from idle, the bypass valve is open until the engine speed is 1500 rpm.

From 1500 rpm to 3000 rpm, the valve is closed

Above 3000 rpm the bypass valves state is load dependent (fully open at higher loads).

ASTON MARTIN

ASTON MARTIN

Exhaust System (09.00)

Pipes and Supports (09.03)

Specifications

Torque Figures		
Description	Nm	lb. / ft.
Catalyst (nuts / bolts)	25.5-34.5	19-25.5
Catalyst (clamps)	19-22	14.5-16.5
Centre pipe to rear pipe (clamp)	39-51	29-38
Rear Pipe to Silencer (bolt)	28-33	21-24.5

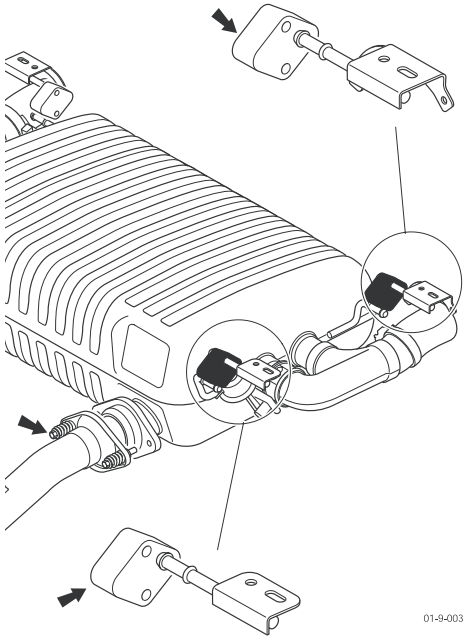
Maintenance

Exhaust System

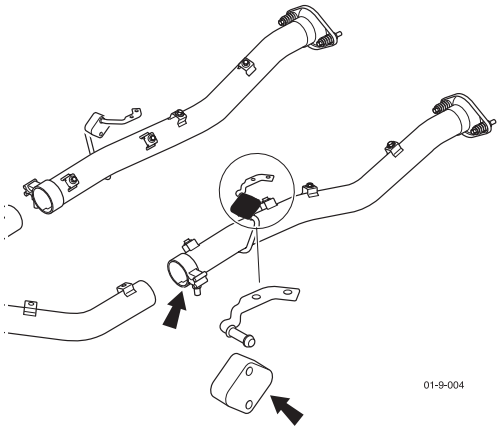
Repair Operation Time (ROT)	
Item	**Code**
Exhaust System Renew	**09.03.NB**

Removal

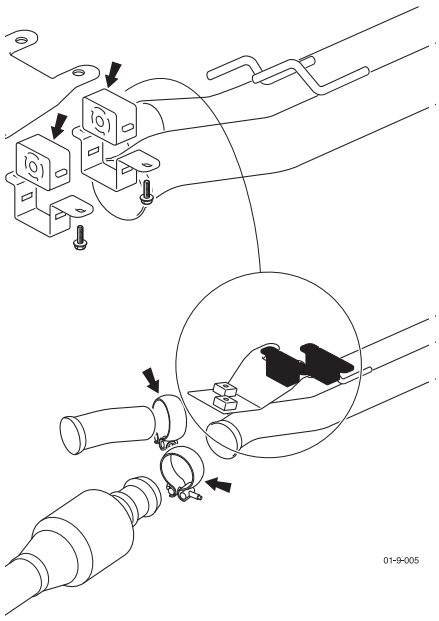
1. Raise the vehicle and make safe.
2. Remove the shear panel and both undertrays.
3. Disconnect the vacuum lines from the bypass valves.
4. Remove the silencer assembly.
   - 4.1 Release bolts (x4) from LH and RH rear pipes.
   - 4.2 Support the silencer and release the front and rear hangers.
   - 4.3 Withdraw the silencer assembly.



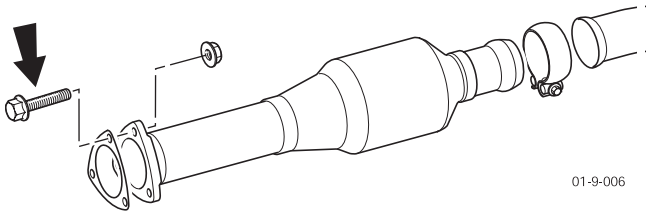
5. Remove LH and RH rear pipes.
   - 5.1 Remove subframe cross brace.
   - 5.2 Release clamps (2)
   - 5.3 Release LH and RH pipe hangers from body.
   - 5.4 Withdraw LH and RH rear pipes through the subframe.



6. Remove the center pipes.
   - 6.1 Release clamps (2).
   - 6.2 Push center pipe rearwards to release from rubber mount.



7. Remove the catalysts.
   7.1 Release bolts (x3).
   7.2 Withdraw catalyst. Repeat for second catalyst.



Installation

Use a proprietary exhaust sealant around all clamp joints prior to securing loosely. Use new manifold flange gaskets.

1. Install, loosely, the LH and RH catalysts.
2. Install, loosely, the center pipes.
3. Install, loosely, LH and RH rear pipes.
4. Install the silencer and the vacuum lines to the bypass valves.
5. Work from the front and set all bodywork clearances.
6. Tighten all the exhaust fixings.
7. Install the subframe cross brace.

Fuel (10.00)

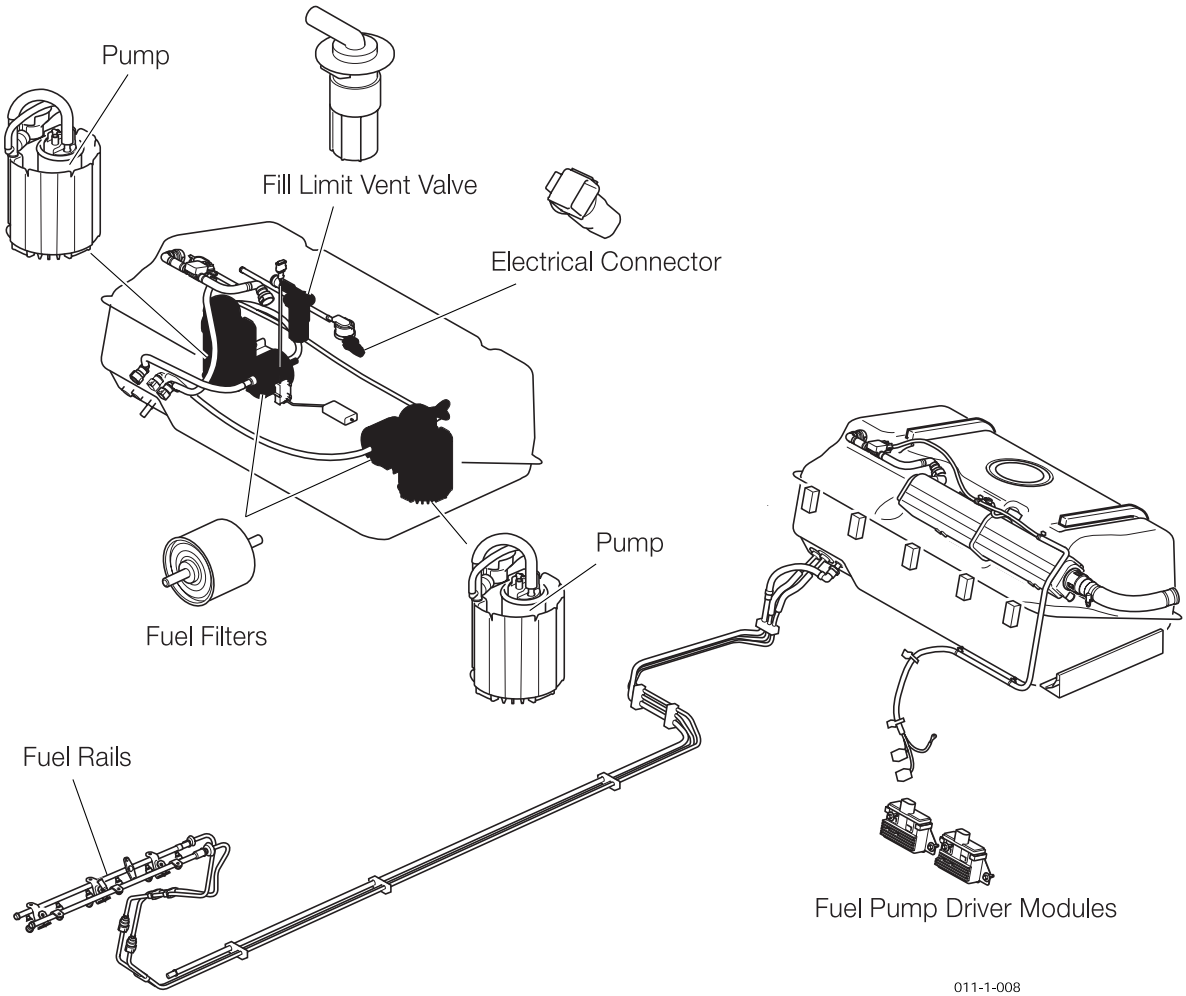
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Fuel (10.00)

Fuel Tank and Lines (10.01)

Description



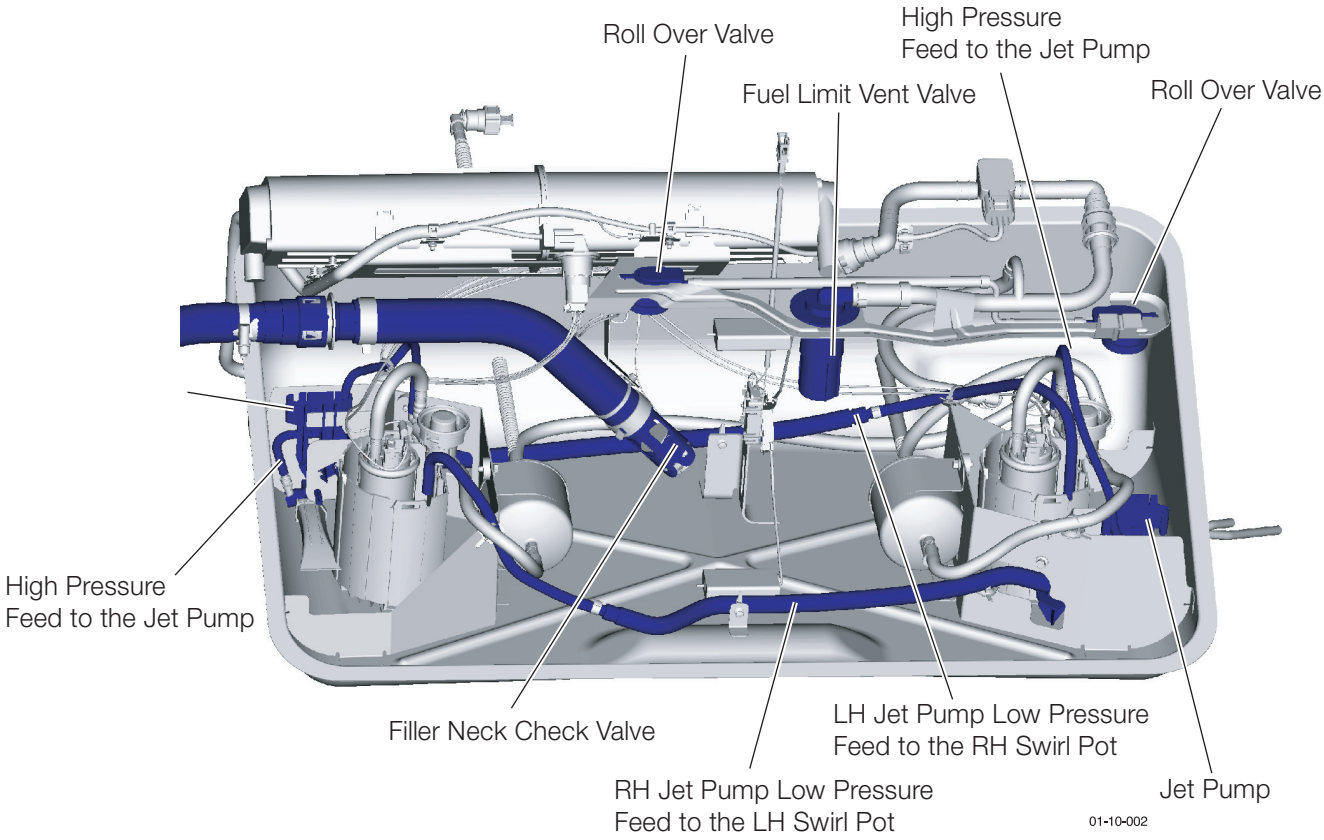
This vehicle uses a return less fuel system in which two fuel pumps, controlled by the fuel pump driver modules, are run to supply fuel through two in-tank filters to the two fuel rails (Refer to 'Fuel Charging System (03.04)', page 3-5-1). Each fuel rail is installed with six fuel injectors. A pressure sensor and a temperature sensor are fitted on the primary fuel rail. The secondary fuel rail is installed only with a pressure sensor. The fuel pump speeds are varied as required to regulate the fuel pressure in the fuel rails.

The RH fuel pump feeds the engine LH bank fuel rail.

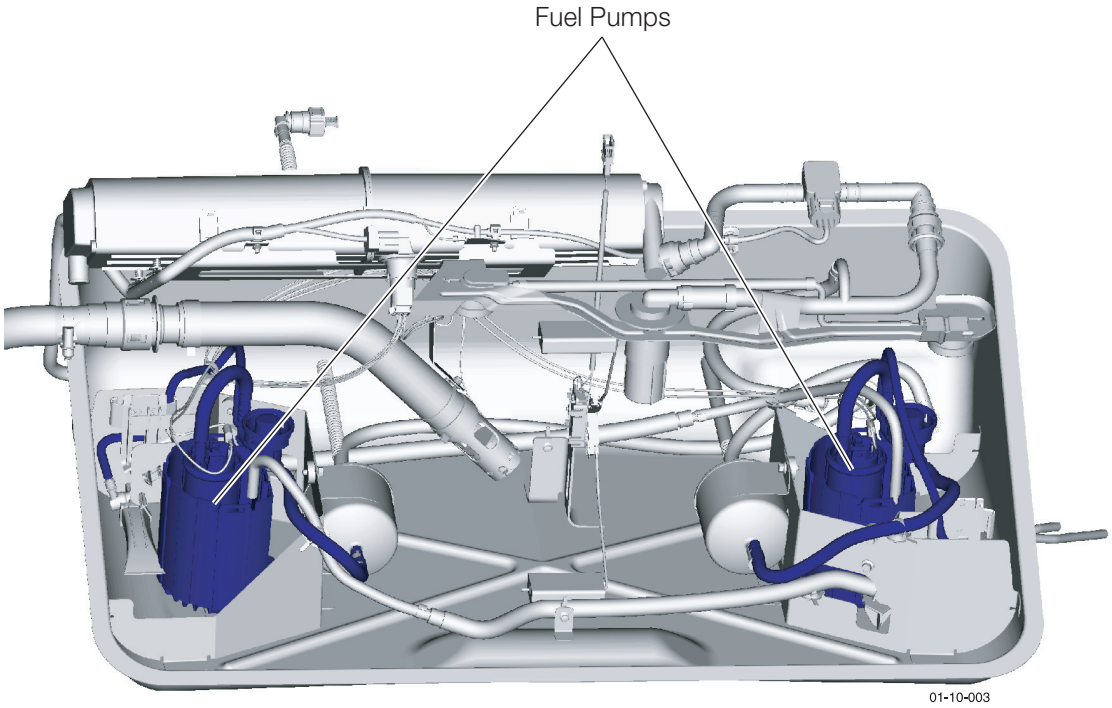
The LH fuel pump feeds the engine RH bank fuel rail.

Fuel Tank

The fuel tank incorporates a single filler neck and check valve, internal fuel pumps, internal fuel filters, a sender unit and an 'on board refuelling vapour recovery' system.



Fuel Pumps



The two modular fuel pumps are immersed in the base of the fuel tank. The pumps can deliver up to 150 litres / hour. The in-tank fuel lines connect to the external lines using two quick-fit connectors in the base of the fuel tank.

During normal running, pressurised fuel from each fuel pump passes from the tank, through an 3 micron in-tank fuel filter to one of the two fuel rails on the engine.

Fuel temperature is measured on the primary fuel rail. If fuel temperature becomes excessive, the fuel pressure is increased to prevent fuel vaporisation (boiling).

Fuel pressure is measured by sensors on each fuel rail. The fuel pressure to each rail is regulated as required by continuously changing the run speed of the associated fuel pump. Maximum pressure in the system is limited to 5.3 bar by in-tank pressure regulators.

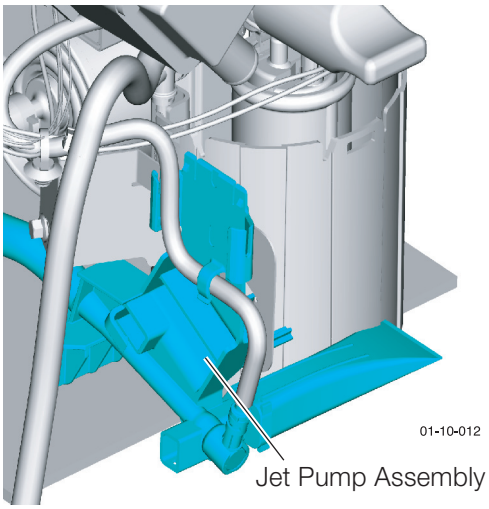
A constant head of fuel is maintained in the fuel pump modules to ensure that the pumps cannot run dry in a 'low fuel' situation.

Jet Pumps

Fuel feed from the fuel pumps is split three ways:

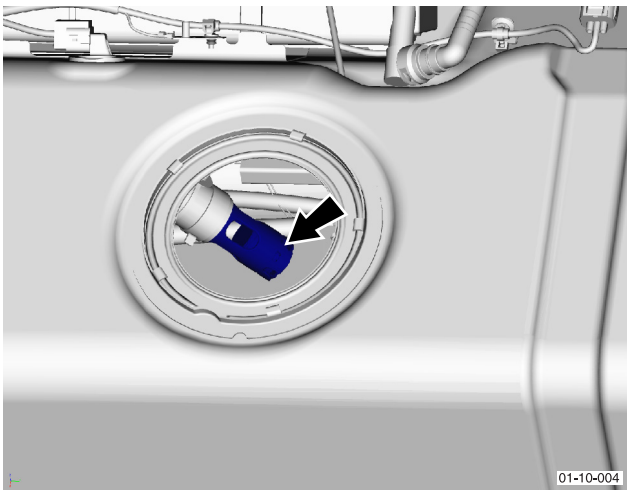
1. Feed to the fuel rails.
2. Feed to the swirl pot jet pumps (integral to the FDM).
3. Feed to the externally mounted jet pumps.

   These pumps ensure that the appropriate pump swirl pot is maintained with fuel under severe dynamic conditions.



Filler Neck and Check Valve

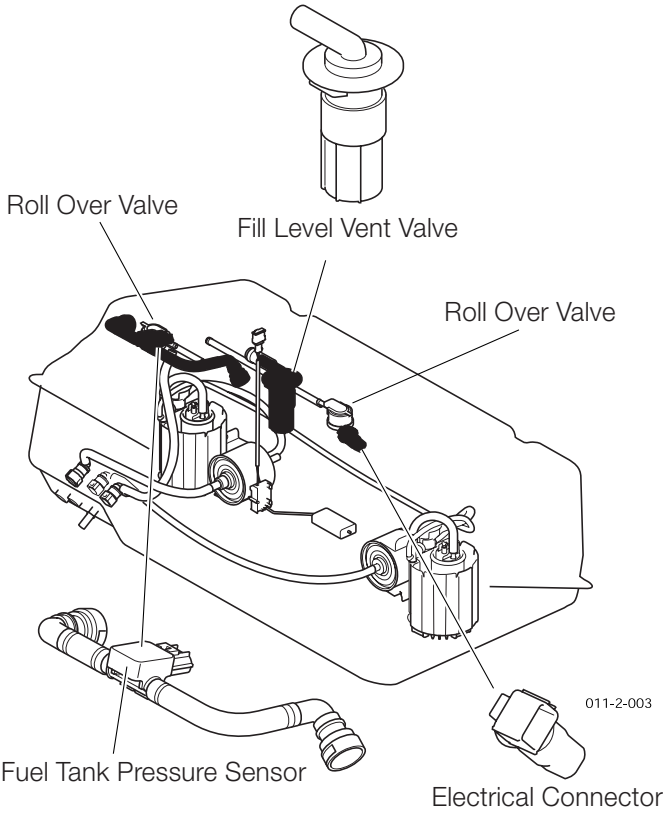
Incoming fuel passes through a check valve at the base of the filler neck. This valve is normally held closed by light spring pressure. The valve opens under the pressure of incoming fuel and closes again when fuel flow ceases. The check valve prevents surging of fuel in the filler neck.



The filler neck also forms part of the on-board refuelling vapour recovery system. Incoming fuel forms a liquid seal in the filler neck. Thus any air displaced during fuel tank filling cannot escape via the filler neck.



Valves and Sensors



Fuel Limit Vent Valve (FLVV)

This valve contains a float which rises to cut off the path for displaced air when the fuel level rises towards maximum during fuel filling. This causes a rapid pressure build up in the tank which triggers the cut-off valve in the fuel delivery nozzle. This discourages overfilling of the fuel tank.

The FLVV also includes an over pressure relief valve set at about 2 psi to vent the tank if all other vents fail.

Roll Over Valves

The roll over valves purpose is to vent the highest point of the tank. If the tank is grossly overfilled (e.g. many clicks over the normal filler nozzle cut-off), the FLVV will suffer a hydraulic lock. The roll over vent valve allows venting of the tank at the highest possible level in this situation.

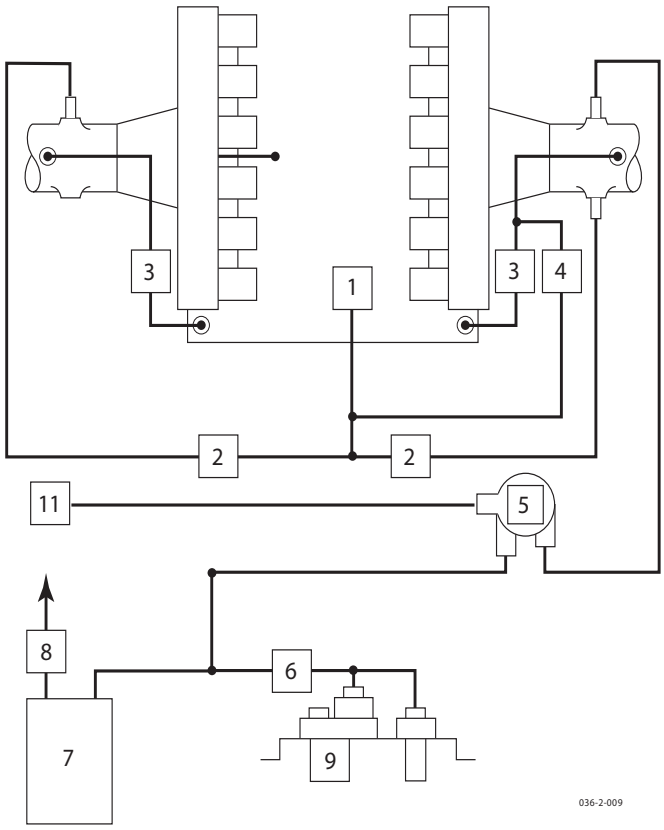
All three valves allow the tank to breath until it is inverted when they will close to prevent fuel spill. The fuel level vent valve controls the fuel height of the tank by creating a pressure spike inside the tank which shuts of the fill nozzle.

If the vehicle is inverted in an accident, this valve will close to prevent leakage of liquid fuel.

Fuel System Schematic

It includes the positive crankcase ventilation and vapour recovery systems.

1. Oil separator
2. PCV valve
3. Check valve
4. Relief valve
5. Vapour management valve
6. Fuel tank pressure transducer
7. Carbon canister
8. Canister vent valve
9. Fuel limit vent valve
10. Test port



Evaporative Loss System

Fuel vapour is displaced from the fuel tank during filling. Vapour is also displaced due to fuel evaporation in higher temperatures. Displaced fuel vapour is absorbed in the carbon canister filter located on top of the fuel tank.

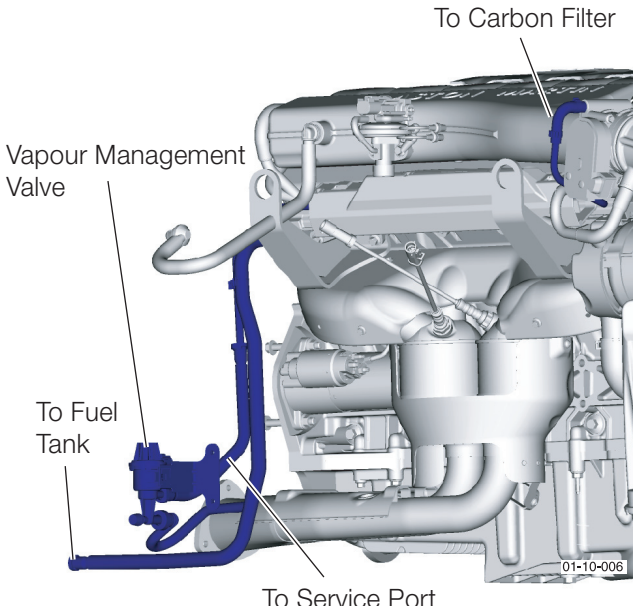
During normal engine running, absorbed fuel vapour is purged from the carbon canisters and mixed with the normal fuel/air charge in the inlet manifold.

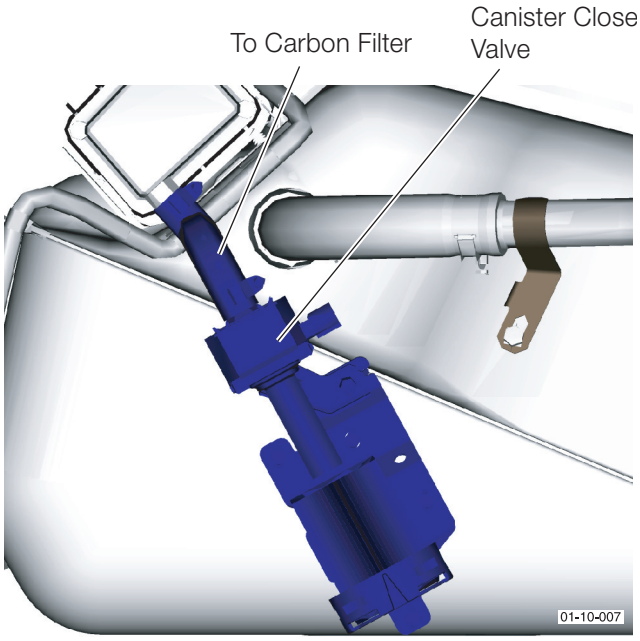
System Operation

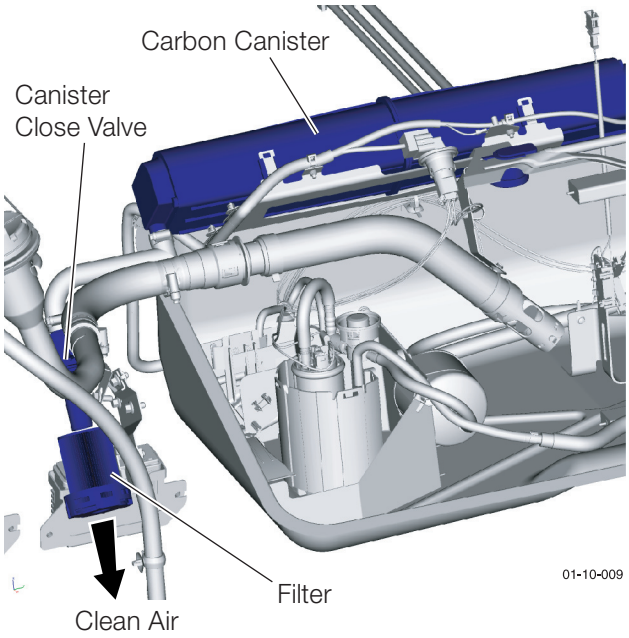
Displaced fuel vapour leaves the fuel tank via the normally open fuel level vent valve and the roll over valves. It passes through the carbon canister where fuel hydrocarbons are absorbed. Clean air leaves the system via the normally open canister vent valve. This valve is only closed during diagnostic pressure testing of the fuel system.

During normal engine running, the single vapour management valve in the engine bay is periodically opened, when negative pressure exists in the intake manifold, allowing fresh air flow into the open canister vent valve, through the carbon canister, through the vapour management valve and into the primary inlet manifold. This fresh air flow progressively purges any absorbed fuel vapour from the carbon canister.

Fuel Tank Vents and Control Valves

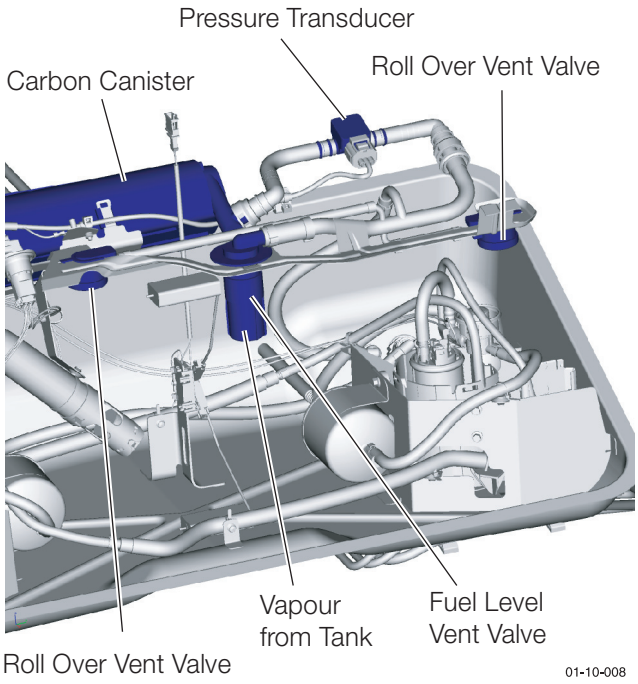






On-Board Refuelling Vapour Recovery

All of the vapour displaced from the tank by refuelling passes through a series of valves and through a carbon canister. This filters out and stores all the fuel vapour and clean air exits the carbon canister port.



Normal Fuel Fill - Air displaced from the fuel tank during filling can only exit via the fuel level vent valve and be forced through the carbon canister. Any fuel vapour in the displaced air is absorbed in the carbon filter material. No fuel vapour can escape to the atmosphere. Clean air then exits the carbon canister, via and additional filter, to atmosphere.

Excessive Fuel Fill - In the event of overfilling of the fuel tank, the fuel level vent valve will close at normal maximum fuel level. Finally the roll over vent valve will close, completely sealing the tank. Any excess pressure in the fuel tank will 'blow off' via the Over-pressure vent valve (part of the roll over vent valves) in the Fuel Level vent valve assembly.

Safety Precautions

Operations on fuel system result in fuel liquid and vapour being present in the working environment. This presents a very serious risk and the following precautions must be strictly observed:

⚠ Warning ⚠
Operations on refuelling and the fuel system must only be performed by personnel who have completed training on fuel handling.

⚠ Warning ⚠
Smoking must not be allowed near the working area. "NO SMOKING" signs must be posted around the working area.

⚠ Warning ⚠
Any operation which could involve sparks or naked lights (e.g. battery testing, welding, metal grinding, etc.) must not be allowed near the working area.

⚠ Warning ⚠
A CO2 fire extinguisher must be available close at hand.

⚠ Warning ⚠
Dry sand must be available close at hand to soak up any accidental fuel spillage.

⚠ Warning ⚠
If necessary, empty the fuel into an explosion proof container using suitable fireproof fuel handling equipment.

⚠ Warning ⚠
The working area must be well ventilated.

⚠ Warning ⚠
Disconnect the battery before commencing work on the fuel system.

⚠ Warning ⚠
Depressurise the fuel system before disconnecting any fuel lines.

Specifications

Pump Pressure

Nominal pump pressure 40 psi (2.7 bar) above inlet manifold pressure.

Torque Figures

Description	Nm	lb. / ft.
Tank retaining plate bolts	20-25	15-18.5

Maintenance

Fuel System

⚠ Warning ⚠
Never break into the fuel system of a hot engine.
Catalysts and exhaust systems run at high temperatures and present a serious fire risk if fuel is spilled onto them when hot.

⚠ Warning ⚠
The fuel system is pressurised when the engine is running. Residual pressure will remain in the fuel system as the ignition is switched off.
Opening a pressurised fuel line will cause a fuel leak and a fire risk.

The fuel system must only be serviced by staff trained in fuel handling.

Depressurising

Repair Operation Time (ROT)	
Item	**Code**
Fuel System Depressurising	**10.01.EK**

1. Read and observe fuel system safety precautions (Refer to 'Safety Precautions', page 10-1-8).
2. Remove the fuel pump relay from the CEM.



3. Attempt to start the engine.
   The engine will run for approx. 11 seconds then stall. With the fuel pumps disabled the fuel lines will depressurise.

Two fault codes will show on each bank.
- *P0087 'fuel pressure too low'*
- *P1233 'fuel pump driver module disabled or off line'*

Both of these codes can be erased from each bank after the repairs to the fuel system

⚠ Warning ⚠
Fire Risk. Before starting work on the fuel system disconnect the earth lead from the vehicle battery.

4. Switch off the ignition and install the fuel pump relay.

Priming

⚠ Warning ⚠
Fire Risk. Do not switch on the ignition until all work on the fuel system is completed and area is cleared of fuel and fuel vapour contamination.

The fuel system is self priming.

There must be a minimum of 5 litres of fuel in the tank.

Pressure Test

⚠ Warning ⚠
Fire Risk. Depressurise the fuel system before disconnecting pipe work. Use a pan or absorbent cloth to catch fuel spills which may occur due to residual pressure. Clean up spillages immediately and dispose of fuel contaminated materials safely.

1. Set the WDS system to monitor the pressure in each fuel rail.
2. Start the engine and monitor the fuel pressure readings.
   - Both fuel rails must show a pressure of more than 40 psi for the engine to function satisfactorily.
   - If either fuel rail is lower than 40 psi, check for blocked or restricted fuel filter or fuel lines on the side showing low pressure.
3. If the filter and fuel lines are serviceable, suspect a defective fuel pump.

Fuel Tank

Repair Operation Time (ROT)	
Item	**Code**
Fuel Tank Renew	**10.01.FB**

Draining

⚠ Warning ⚠
Fire Risk. Before starting work on the fuel system disconnect the earth lead from the vehicle battery.

⚠ Warning ⚠
Read and follow all fuel handling instructions given at the start of this chapter and in the bowser manufacturers fuel handling documentation before commencing work on fuel system.
This procedure must only be performed by staff who are fully trained in fuel handling.

1. Remove the following:

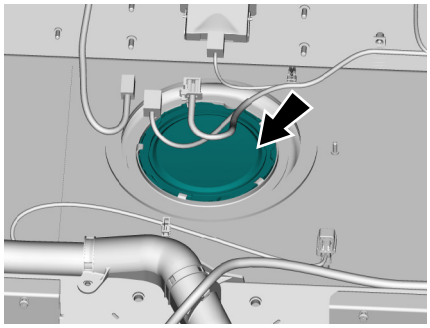
For trim, seat belt and seat removal refer to the following:
(Refer to 'Interior Trim (01.05)', page 1-4-1)
(Refer to 'Seating (01.10)', page 1-7-1)
(Refer to 'Restraining Devices (01.20)', page 1-14-1)

   - Passenger front seat
   - Both rear seats

2. Disconnect the seat belts lower mounts.
3. Remove the following:
   - Passenger rear ¼ panel
   - Rear top panel
   - Both seat belts
   - Satellite Navigation (if installed)
4. Remove the access cover over the fuel tank flange.

⚠ Warning ⚠
Ensure there is adequate ventilation inside the vehicle (i.e. place the vehicle in a well ventilated area, with the windows open).

5. Remove the tank service cover plate (Refer to '310-136 (Fuel Tank Drainage Adaptor)', page 20-1-7).



6. Install the fuel drain cover plate (Refer to '310-136 (Fuel Tank Drainage Adaptor)', page 20-1-7).
7. Connect the external pipe to a fuel recovery unit. Recover the fuel according to the recovery unit instructions.

Several litres of fuel will remain in the tank sump after draining.

8. After fuel recovery, remove the service tool from the fuel tank. Carry out the intended repair or service procedure.

When installing the service cover plate always use a new seal.

Removal

⚠ Warning ⚠
Fire Risk. Before starting braking in to the fuel system disconnect the earth (- ve) lead from the vehicle battery.

⚠ Warning ⚠
Fuel vapour is explosive. During the following procedure, fuel tank and fuel lines will be open. Ensure good ventilation and take all necessary precautions to eliminate fire risks.

⚠ Warning ⚠
Read and follow the fuel handling instructions given in Safety Precautions at the start of this section.

Take all necessary precautions to prevent sparks from electrical / electrostatic discharge or from friction.

1. Depressurise the fuel system (Refer to 'Depressurising', page 10-1-8).
2. Disconnect the earth lead from the vehicle battery.

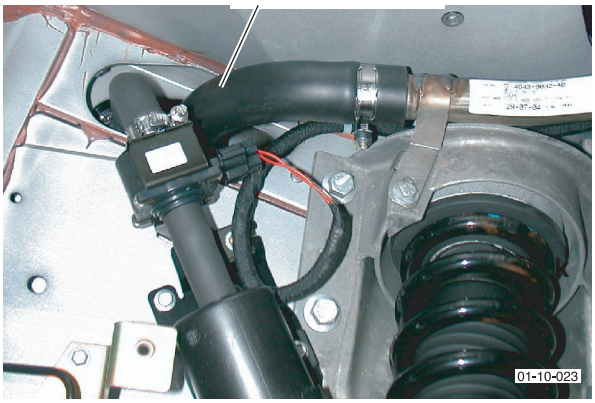
3. Drain the tank.

Several litres of fuel will remain in the tank sump after draining.

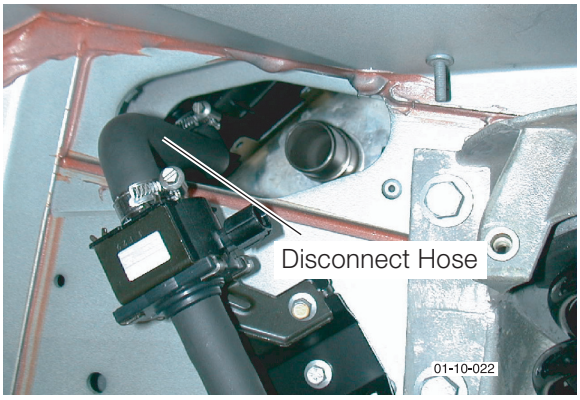
4. Remove the rear subframe (Refer to 'Rear Subframe', page 2-1-4).
5. Disconnect the tank wiring harness plugs and earth cable.
6. Disconnect the wiring harness earths and plugs



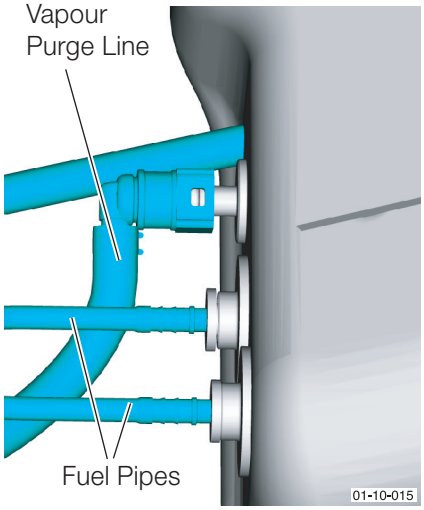
7. Remove the filler neck from the tank (Refer to '310-134 (Filler Neck Disconnect Tool)', page 20-1-6)
   Cap the filler neck on the tank.



8. Disconnect the On-Board Refuelling Vapour Recovery hose to the filter.



9. Disconnect the vapour purge and fuel pipes from the tank (Refer to '310-040 (Fuel Pipe Disconnect Tool)', page 20-1-6). Cap the open ends on the tank and on the pipes.

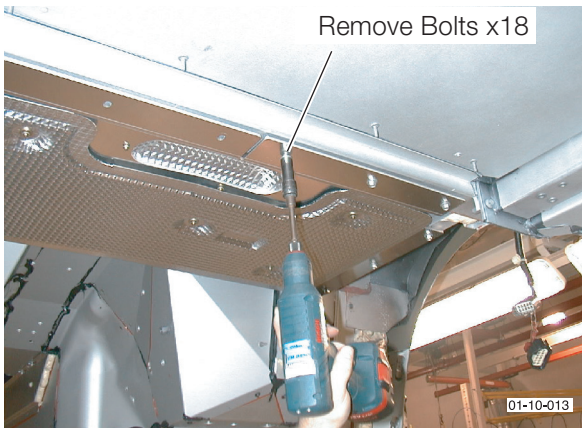


10. Place a suitable adjustable support, i.e. a transmission jack, under the fuel tank retaining plate.

⚠ Warning ⚠
This is a two person operation. The fuel tank is heavy. Withdraw fuel tank with care.

11. Remove bolts (x18) that secure the fuel tank retaining plate. Allow the fuel tank retaining plate and fuel tank to lower on the adjustable support.

The tank may remain in position after retaining plate is removed. Manoeuvre the tank out from the vehicle body.



Installation

⚠ Warning ⚠
Fire Risk. Before starting braking in to the fuel system disconnect the earth lead from the vehicle battery.

⚠ Warning ⚠
Read and follow the fuel handling instructions given in Safety Precautions at the start of this section.

1. Place the fuel tank on to it's retaining plate. Using a suitable adjustable support, raise the fuel tank and retaining plate into position. Secure the tank with the tank retaining plate. Torque bolts (x18) to **20-25 Nm**.
2. Connect the fuel lines.

When reconnecting the fuel lines at the tank, check for complete engagement of locking clips. Test the fuel system integrity before refitting the shear plate and rear undertray.

3. Remove the cap from the filler neck on the tank. Install the filler neck to the tank.
4. Connect the On-Board Refuelling Vapour Recovery hose to the filter.
5. Connect the tank wiring harness plugs and earth cable.
6. Install the rear subframe (Refer to 'Rear Subframe', page 2-1-4).
7. Fill the tank.
8. Check and ensure integrity of the fuel system.

⚠ Warning ⚠
Fire Risk. Do not connect the battery and switch on the ignition until all work on the fuel system is completed and the area is cleared of fuel contamination.
Remove contaminated material, open fuel containers, waste fuel. Fully ventilate vehicle and work area to remove all fuel fumes.

9. Connect the earth lead to the vehicle battery.

⚠ Warning ⚠
Fire Risk. Do not start the engine until the fuel system integrity is confirmed.

10. Switch on the ignition. Confirm there are no fuel leaks.
11. Start the engine and check for correct fuel system operation (i.e. correct engine running).

Fuel Filters

Repair Operation Time (ROT)		
Item		**Code**
Fuel Filter Renew	(x1)	**10.01.AB**
	(x2)	**10.01.BB**

Caution
The following procedure is completed inside the vehicle cabin area. Extra care must be taken to ensure no fuel or fuel vapours come into contact with the vehicle interior.

Removal

1. Depressurise the fuel system (Refer to 'Depressurising', page 10-1-8).
2. Drain the fuel tank (Refer to 'Draining', page 10-1-9).

⚠ Warning ⚠
Several litres of fuel remain in the tank sump after draining.

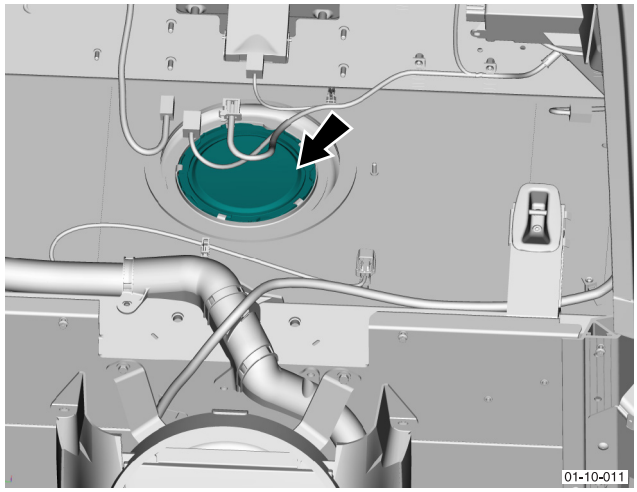
3. Disconnect the earth lead from vehicle battery.
4. Remove the passenger front seat.
5. Remove both rear seat backs and bases.
6. Remove the rear trim.
   - Rear ¼ panels
   - Rear top panel
   - Both seat belts

For trim, seat belt and seat removal refer to the following: (Refer to 'Interior Trim (01.05)', page 1-4-1)

7. Remove the access cover over the fuel tank flange.

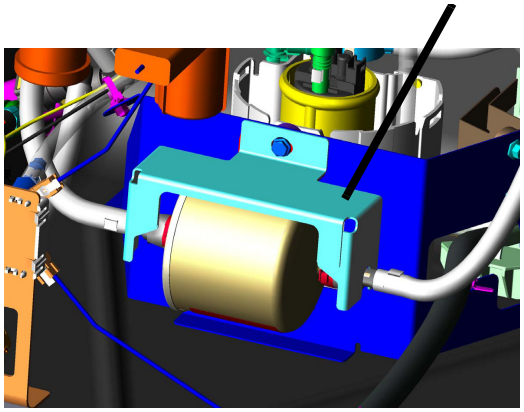
⚠ Warning ⚠
Ensure there is adequate ventilation inside the vehicle (i.e. place the vehicle in a well ventilated area, with the windows open).

8. Remove the tank service cover plate (Refer to '310-136 (Fuel Tank Drainage Adaptor)', page 20-1-7).

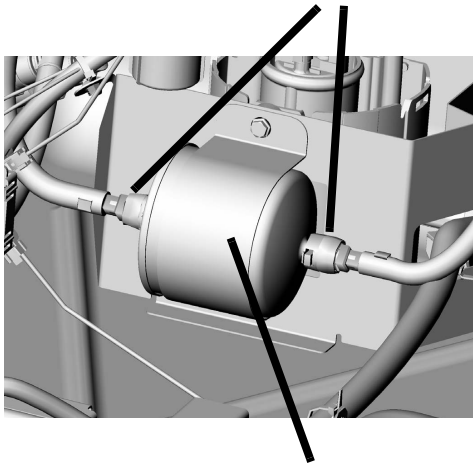


The following operation is completed using one hand and without sight of the fuel filter.

9. Remove the fuel filter.
   9.1 Release the fuel filter pipe clamp.



   9.2 Release the two fuel filter pipes (quick release unions).



   9.3 Remove the fuel filter clamp.
   9.4 Withdraw the fuel filter.
10. Repeat for the second fuel filter.

Installation

The following operation is completed using one hand and without sight of the fuel filter.

1. Insert a fuel filter through the fuel tank opening. Secure in position using the fuel filter clamp.
2. Connect the fuel pipes (x2).
   Repeat for the second fuel filter.
3. Install the tank service cover plate (Refer to '310-136 (Fuel Tank Drainage Adaptor)', page 20-1-7).

When installing the service cover plate always use a new seal.

4. Connect the earth lead to the vehicle battery.

⚠ *Warning* ⚠
Fire Risk. Do not start engine until fuel system integrity is confirmed.

5. Switch on the ignition. Confirm there are no fuel leaks.
6. Start the engine and check for correct fuel system operation (i.e. correct engine running).
7. Install the vehicle seat belts and trim.

For trim, seat belt and seat installation refer to the following:
(Refer to 'Interior Trim (01.05)', page 1-4-1)
(Refer to 'Seating (01.10)', page 1-7-1)
(Refer to 'Restraining Devices (01.20)', page 1-14-1)

Fuel Pumps

Repair Operation Time (ROT)		
Item		**Code**
Fuel Pump Renew	(x1)	**10.01.CB**
	(x2)	**10.01.DB**

Caution
The following procedure is completed inside the vehicle cabin area. Extra care must be taken to ensure no fuel or fuel vapours come into contact with the vehicle interior.

Removal

1. Depressurise the fuel system (Refer to 'Depressurising', page 10-1-8).
2. Drain the fuel tank (Refer to 'Draining', page 10-1-9).

⚠ *Warning* ⚠
Several litres of fuel remain in the tank sump after draining.

3. Disconnect the earth lead from the vehicle battery.
4. Remove the following:

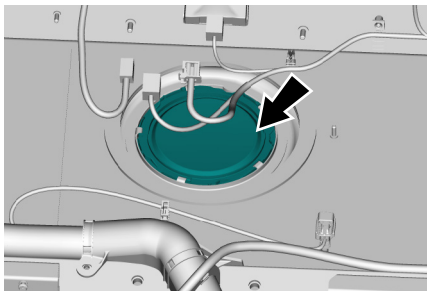
For trim, seat belt and seat removal refer to the following:
(Refer to 'Interior Trim (01.05)', page 1-4-1)
(Refer to 'Seating (01.10)', page 1-7-1)
(Refer to 'Restraining Devices (01.20)', page 1-14-1)

- Passenger front seat
- Both rear seats

5. Disconnect the seat belts lower mounts.
6. Remove the following:
   - Passenger rear ¼ panel
   - Rear top panel
   - Both seat belts
7. Remove the access cover over the tank flange.

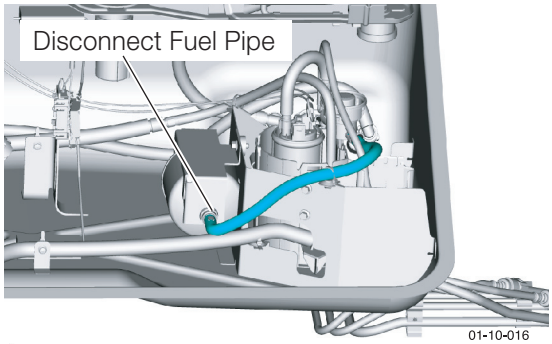
⚠ *Warning* ⚠
Ensure there is adequate ventilation inside vehicle (i.e. vehicle in a well ventilated area, windows open).

8. Remove the tank service cover plate (Refer to '310-136 (Fuel Tank Drainage Adaptor)', page 20-1-7).

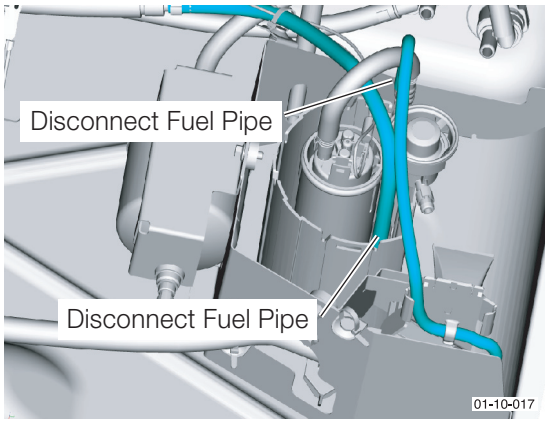


The following operation is completed using one hand and without sight of the fuel pump.

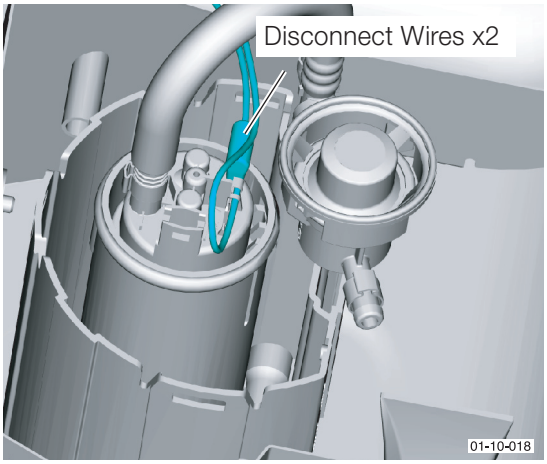
9. Disconnect the main fuel pipe from the fuel filter (2).



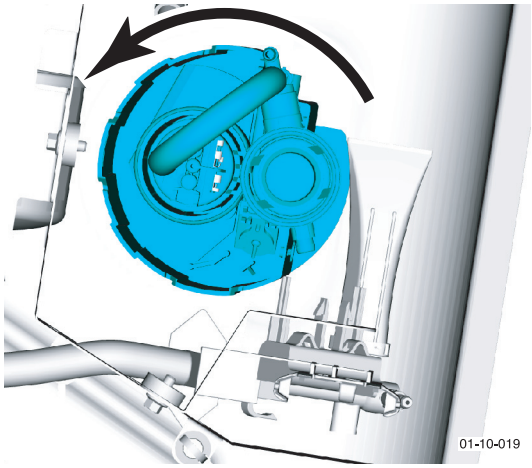
10. Disconnect the cross feed fuel pipes.



11. Disconnect the wiring harness plug.



12. Using the service tool (Refer to '310-140 (Fuel Pump Install / Remove)', page 20-1-7), twist the fuel pump anti-clockwise to release it from the mounting bracket. Withdraw the fuel pump.



Installation

1. Place the fuel pump to it's mounting. Using the service tool twist clockwise to secure (Refer to '310-140 (Fuel Pump Install / Remove)', page 20-1-7).

The fuel pump should 'click' into place.

2. Install the main fuel pipe, the cross feed pipes and the wiring harness plug.
3. Install the tank service cover plate (Refer to '310-136 (Fuel Tank Drainage Adaptor)', page 20-1-7).

When installing the service cover plate always use a new seal.

4. Connect the earth lead to the vehicle battery.

⚠ Warning ⚠
Fire Risk. Do not start engine until fuel system integrity is confirmed.

5. Switch on the ignition. Confirm there are no fuel leaks.
6. Start the engine and check for correct fuel system operation (i.e. correct engine running).
7. Install both seat belts.
8. Install the rear top panel.
9. Install the passenger rear ¼ panel.
10. Connect the seat belts lower mounts.
11. Install the rear seats.

Install the seat backs then the seat bases.

12. Install the passenger front seat.

ASTON MARTIN
ASTON MARTIN

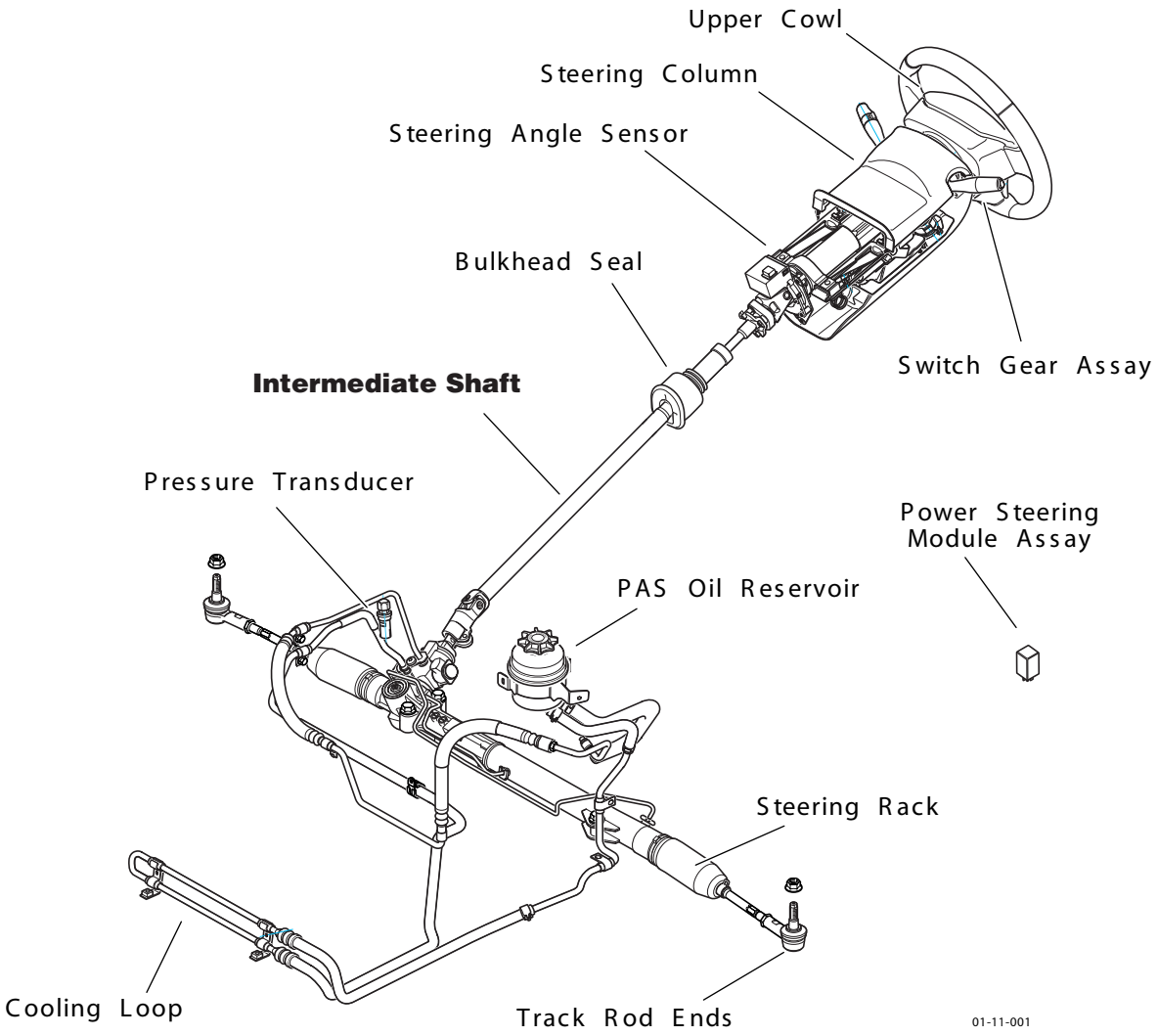
Steering (11.00)

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Steering (11.00)

Steering Gear (11.01)



Diagnostics

Symptom Chart

Symptom	Possible Cause	Action
Vehicle wanders from side to side on the road when driven straight ahead with the steering wheel held firmly.	Incorrect tyre size or pressure.	Check for correct tyre size. Adjust tyre pressures.
	Vehicle unevenly loaded or overloaded.	Adjust load.
	Loose or worn tie-rods or tie-rod ends.	New tie-rod end or steering gear.
	Steering gear bolts loose or damaged.	Tighten. New bolts.
	Loose or worn suspension ball joint(s).	New suspension ball joint assembly.
	Steering column universal joint pinch bolt loose.	Tighten pinch bolt.
	Incorrect toe adjustment.	Adjust as required.
	Loose or worn rear suspension.	Tighten if loose. New rear suspension components.
	Steering gear bushes worn or damaged.	New steering gear.

Symptom	Possible Cause	Action
Vehicle tends to pull to one side when driven on a level surface.	Incorrect tyre pressure.	Adjust tyre pressure.
	Incorrect tyre size.	New tyre as required.
	Different tyre or tread type.	
	Vehicle is unevenly or excessively loaded.	Adjust load evenly.
	Incorrect toe adjustment.	Adjust as required.
	Damaged front or rear suspension components.	New suspension components.
	Steering gear valve effort out of balance.	Shift transmission into neutral while driving at no more than 30 miles/hour (50 km/h) and turn the ignition to position I (engine 'Off'-coasting). a. If the vehicle does not pull to one side with the engine off, install a new steering gear. b. If the vehicle drifts with the engine off, 'cross switch' the front wheel assemblies. Test at low speed due to directional tyres. a. If the vehicle pulls to the opposite side, switch the wheels that were on the rear to the same side on the front. b. If the vehicle pull direction is not changed, check the front suspension components and toe adjustments.
	Check front and rear brakes for correct operation.	Adjust as required.
	Check for bent rear suspension components and for damaged coil springs in the front suspension.	New rear suspension components.
	Check the rear suspension for loose or worn suspension components.	Tighten. New components.
	Incorrect underbody alignment.	Check underbody alignment.
Feedback (whining or knocking noises in the steering gear) Condition where roughness is felt in the steering wheel by the driver when the vehicle is driven over rough surfaces.	Loose or worn tie-rods.	New steering gear.
	Steering gear bolts loose or damaged.	Tighten. New bolts.
	Loose suspension bushing, bolts or ball joints.	Tighten. New components.
	Damaged steering column.	New steering column.
Power steering pump or reservoir leaks	Overfilled system.	Correct fluid level.
	Damaged fluid cap.	New fluid cap.
	Loose or damaged hose fittings.	Tighten. New hose.
	Leakage at power steering pump.	New power steering pump.
Poor returnability of the steering	Incorrect tyre pressure.	Check and adjust tyre pressure.
	Incorrect tyre size or type.	New tyre as required.
	Steering column universal joints binding.	New steering column.
	Steering column shaft floor seal may be torn	New floor seal as required.
	Binding or damaged tie-rods.	New steering gear.
	Damaged or worn front suspension components.	New front suspension components as required.
	Incorrect toe adjustment.	Adjust as required.

Symptom	Possible Cause	Action
Excessive steering efforts required to turn corners and during parking manoeuvres	Low power steering pump fluid.	Fill as required. Check for system leaks.
	Damaged accessory drive belt tensioner.	New accessory drive belt tensioner.
	Hose or oil cooler external leak.	New hose or oil cooler as required.
	Hose or cooler line restriction.	New hose as required.
	Fluid aeration.	Bleed system.
Fluid leakage	Overfilled system.	Correct fluid level.
	Component leak.	Locate suspect component and repair as required.
Accessory drive belt squeal	Check accessory drive belt for correct tension or glazing.	New accessory drive belt.
'Chirp' noise in steering pump	Loose or worn accessory drive belt.	New accessory drive belt.
Power steering pump noisy	Low fluid level.	Top up and check for system leaks.
	Power steering pump.	Check for leaks. Repair as required.
		New power steering pump.
'Swish' noise	Fluid flow into bypass valve of the power steering pump valve housing with fluid temperature below 54°C (130°F).	Normal noise.
'Whine' noise	Aerated fluid.	Bleed system.

Specifications

Torque Figures

Description	Nm.	lb / ft.
Ball Joint (nut)	70	52
Track-Rod (lock nut)	70	52
Steering Rack to Subframe	115	85
Steering Rack Pipe Latch Plate	9-12	7-9
Intermediate Shaft Pinch Bolt	21-29	15.5-21.5

Maintenance

The specifications and adjustments for front and rear road wheel alignment are located in Suspension (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).

Wheel Bearing Inspection

1. Raise, support and make the vehicle safe.
2. Ensure the road wheel rotates freely and that the brake pads are sufficiently retracted, allowing free movement of the road wheel.

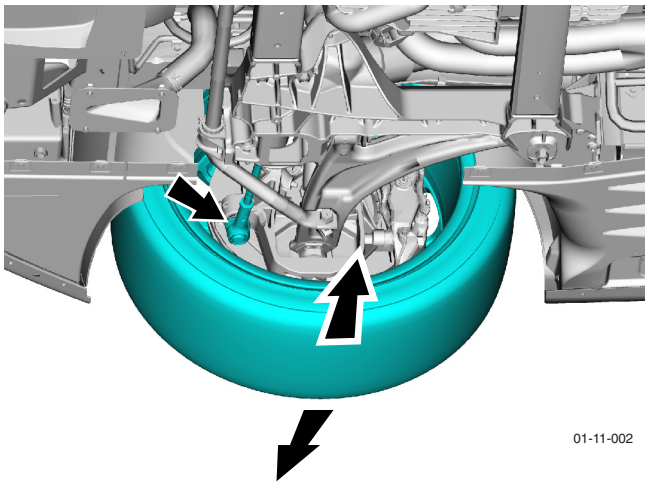
Have a colleague observe upper and lower ball joints for movement during the following check. This will ensure that the cause of any free play is correctly identified.

3. Firmly grasp the road wheel at top and bottom. Attempt to move the road wheel inward and outward while lifting the weight of the road wheel off the road wheel bearings.
4. If there is any excess movement in the wheel bearing, replace the bearing assembly.
5. Remove the safety stand and lower the vehicle.

Ball Joint Inspection

Prior to carrying out any inspection of ball joints, inspect the front wheel bearings.

1. Raise, support and make the vehicle safe.
2. Position a safety stand to support the suspension lower arm.
3. While an assistant pulls and pushes the bottom of the road wheel, check for any relative movement between the ball joint and the suspension lower arm. Any lateral movement indicates a worn or damaged lower ball joint. Install new components if required.



4. While an assistant pulls and pushes the top of the road wheel, observe the relative movement between the ball joint and the suspension upper arm. Any lateral movement indicates a worn or damaged upper ball joint. Install new components as required.
5. Remove the safety stand and lower the vehicle.

Track-Rod Ends

Repair Operation Time (ROT)	
Item	**Code**
Track-Rod Ends Renew	**TBA**

Removal

1. Raise, support and make the vehicle safe.
2. Remove the front road wheels.
3. Remove the front undertray.
4. Using service tool (Refer to '204-523 (Ball Joint Splitter)', page 20-1-3), remove the track rod-end from the vertical link.

Take care not to cut / damage the track rod end boot when using the ball joint splitter.

Remove image

5. Loosen the track-rod end lock nut and remove the track-rod end.

Note the number of complete turns to remove the rod end from the track rod.

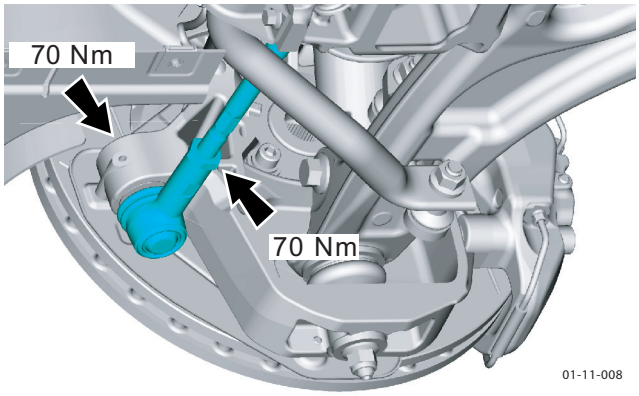
Installation

1. Install the track-rod end.

Install the rod end the same number of turns it took to remove.

Install image

2. Install the track-rod end to the vertical link. Torque nut to **70 Nm**.



3. Install the road wheel.
4. Lower the vehicle.
5. Check the vehicle Toe (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
   - If the vehicle Toe is within specifications - Tighten the track-rod end lock nut(s) (**70 Nm.**)
   - If the vehicle Toe is not within specifications - Raise the vehicle and adjust the vehicle Toe

Steering Rack

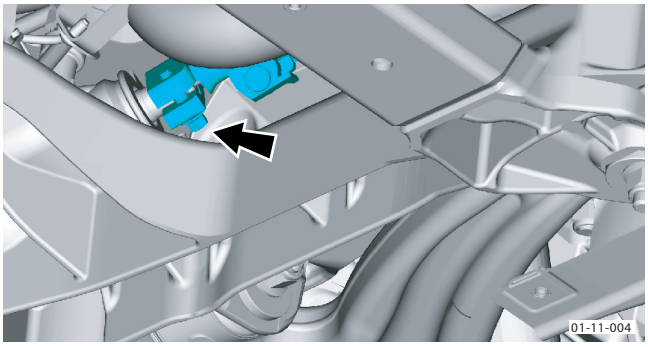
Repair Operation Time (ROT)		
Item		**Code**
Steering Rack Renew	RHD	**11.02.DB**
	LHD	**TBA**

Removal

1. Disconnect the vehicle battery.

Caution
Failure to centre the steering wheel and rack during reassembly may cause damage to the restraint bag clock-spring and also may cause difficulties in attaining correct alignment of the steering wheel in the straight ahead position.

2. Secure the steering wheel in the centred position. Remove the ignition key and engage the steering lock with the road wheel as accurately centred as possible.
3. Support the enginre from above (Refer to '303-1080 (Engine Support Adaptor)', page 20-1-6).
4. Raise, support and make the vehicle safe.
5. Remove the front road wheels.
6. Remove the front undertray.
7. Disconnect the steering rack from the steering intermediate shaft (RH drive shown).

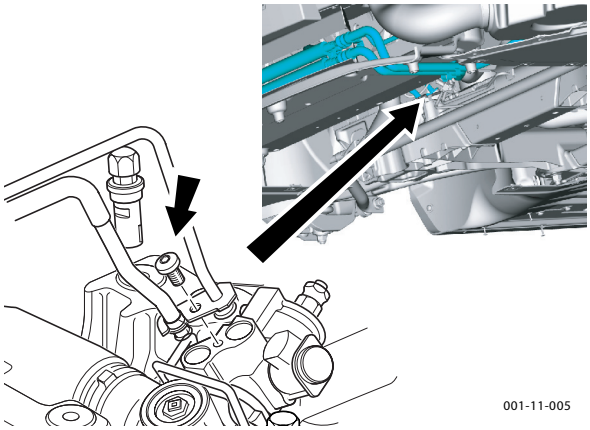


8. Disconnect the L/H and R/H rod ends from the vertical link.

9. RH Drive Only.

9.1 Disconnect the power steering fluid pipes.

Caution
Whenever the steering gear unions are disconnected the steering gear valve body ports should be capped to prevent ingress of foreign objects.



9.2 Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).

9.3 Remove bolts (x3) that secure the steering rack to the subframe. Withdraw the steering rack.

10. LH Drive Only.

10.1 'Ty-wrap' the steering rack in position. Remove bolts (x3) that secure the steering rack to the subframe.

10.2 Remove the front subframe (Refer to 'Front Subframe', page 2-1-2).

10.3 Disconnect the power steering fluid pipes.

Caution
Whenever the steering gear unions are disconnected the steering gear valve body ports should be capped to prevent ingress of foreign objects.

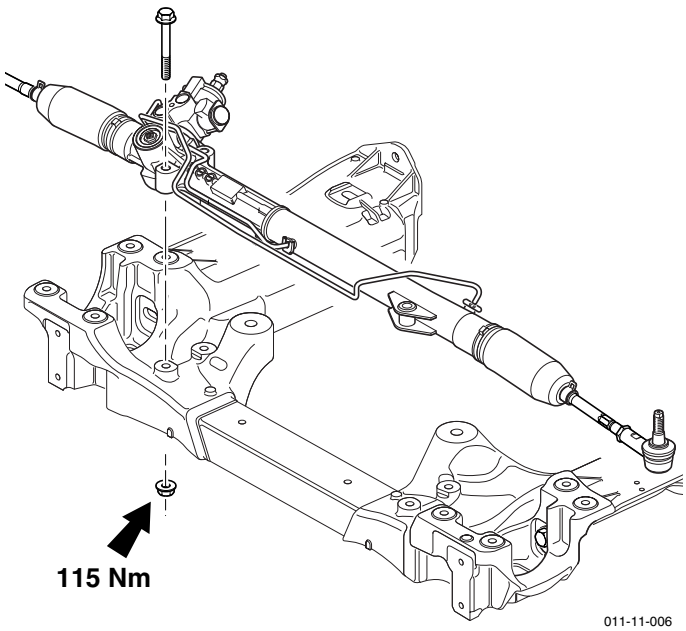
10.4 Remove 'Ty-wraps' and withdraw the steering rack.

Installation

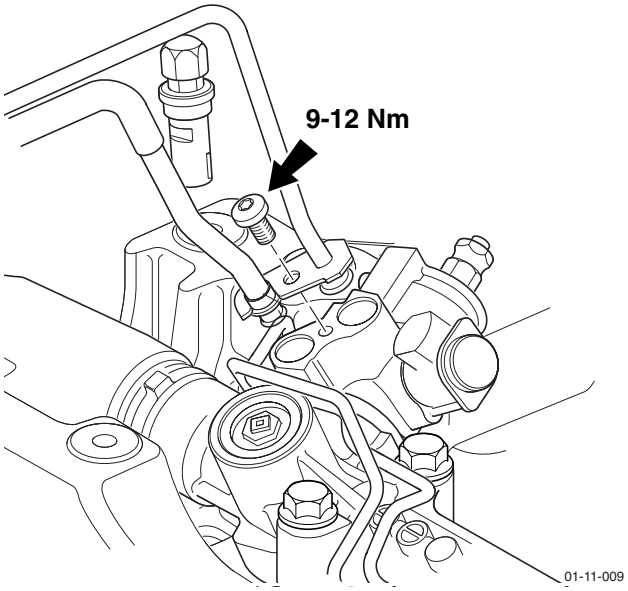
Always use new washer seals.

1. RH Drive Only.

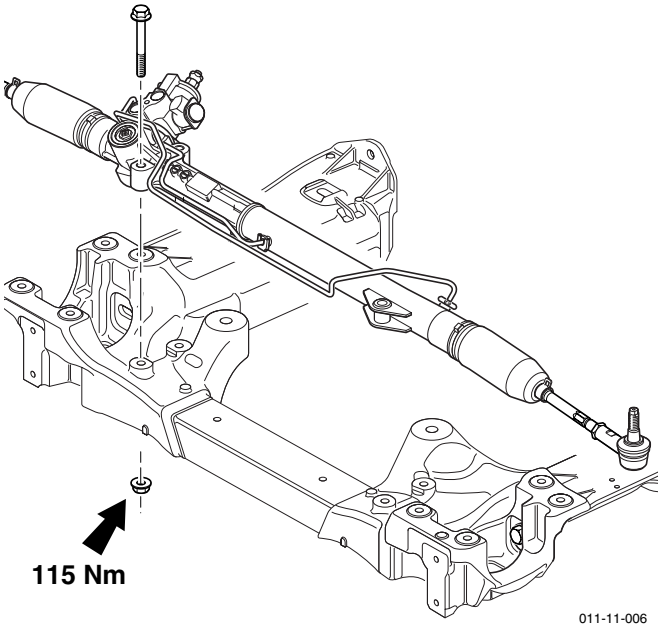
1.1 Install the steering rack to the subframe (new nyloc bolts x3). Tighten bolts to **115 Nm**.



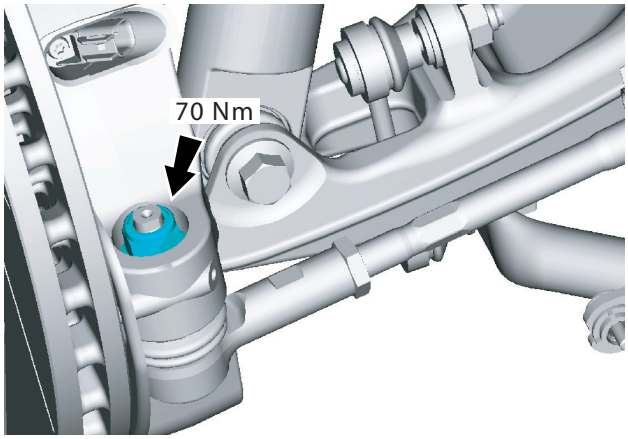
1.2 Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
1.3 Connect the steering rack pipe work.



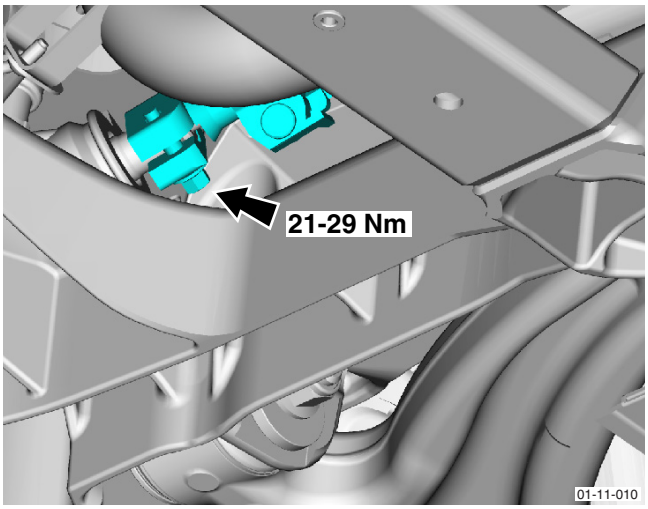
2. **LH Drive Only.**
2.1 'Ty-wrap the steering rack in position.
2.2 Connect the power steering fluid pipes.
2.3 Install the front subframe (Refer to 'Front Subframe', page 2-1-2).
2.4 Install the steering rack to the subframe (new nyloc bolts x3). Tighten bolts to **115 Nm**.



3. Install L/H and R/H rod ends to the vertical link.



4. Recheck both the steering wheel and rack are accurately centred.
5. Install the steering rack to the steering intermediate shaft.



6. Connect the vehicle battery.
7. Fill and bleed the power steering system (Refer to 'System Bleeding', page 11-2-2).

⚠ Warning ⚠
Do not drive the vehicle until the steering geometry has been set and all fixings have been secured.

8. Install the road wheels (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
9. Check and adjust front wheel alignment (Refer to 'Road Wheel Alignment (04.00)', page 4-1-2).
10. Raise the vehicle and install the front undertray.

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Steering (11.00)

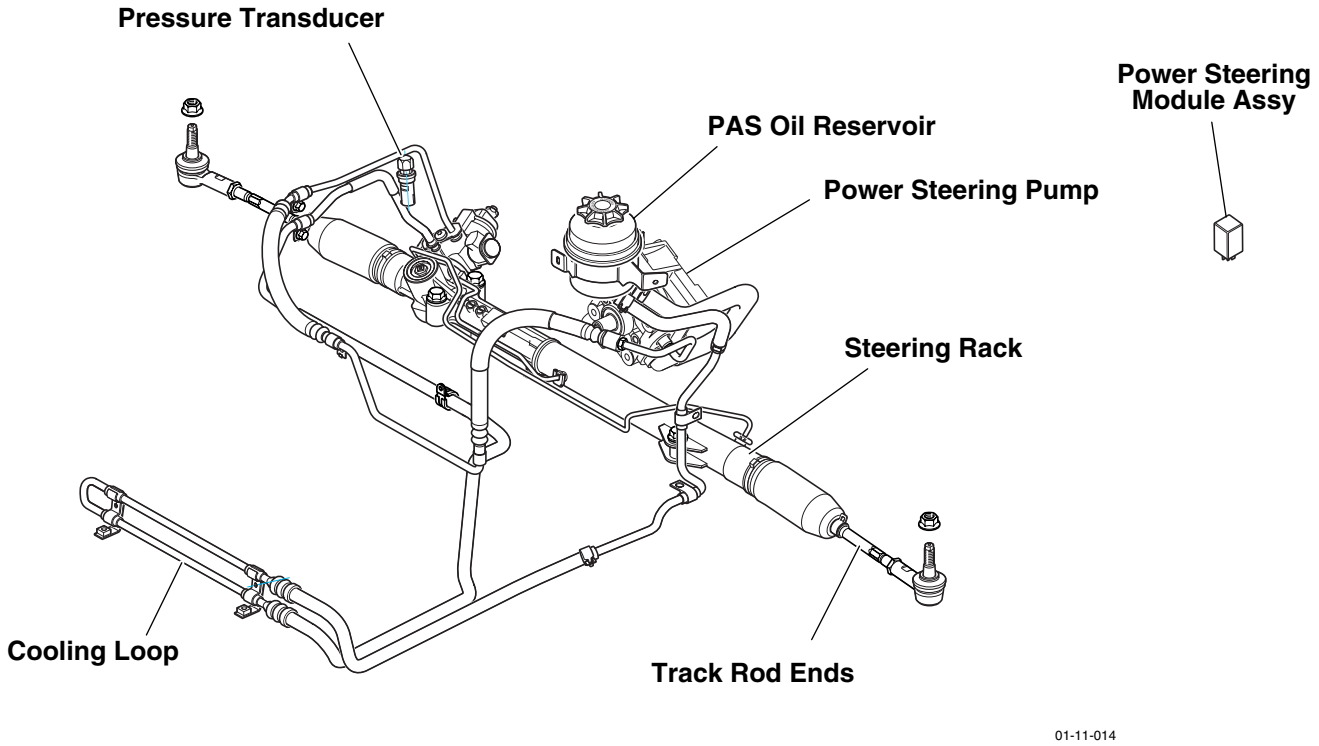
Power Steering (11.02)

The power steering system is hydraulically driven and contains a speed sensitive rack and pinion steering gear (ZF Servotronic II ®). Power assistance is generated by an engine driven vane pump, operating at a constant flow rate.

The level of assistance is controlled electronically via an ECU, which receives a vehicle speed signal from the speedometer. The signal is then converted to a controlled electric current, which is then transmitted to an electro-hydraulic transducer (attached directly to the valve housing). This allows steering efforts to remain lighter at lower speeds to aid parking manoeuvres, whilst at higher speeds, efforts are increased, providing greater directional stability.

Hoses / pipes are used to transmit hydraulic fluid throughout the system. The high-pressure line contains a pressure transducer, which sends an electronic signal to the engine management system. This ensures engine rpm is maintained when the steering system draws higher loads from the engine (i.e. during parking manoeuvres). In order to regulate system temperatures, a wire-wound cooler is incorporated into the return line.

Description



The power steering system uses a rack and pinion type steering gear with servotronic steering assistance. The power steering pump is belt driven and the power steering oil cooler is of a wire bound tube type and is mounted in front of the radiator.

The steering assistance decreases smoothly at a calibrated rate to increase the steering efforts required as vehicle speed increases.

The steering efforts are controlled by the servotronic valve (actuator) position, which in turn is controlled electronically by the servotronic ECU housed in the instrument cluster.

Absolute cleanliness must be observed when replenishing the fluid or dismantling any part of the system. A new power steering reservoir must be installed if the steering gear, pump or fluid cooler is to be replaced. New fluid from a sealed container must be used.

Specifications

Item	Data
Pump Pressure (max)	116 +/-4 bar
Turns lock-to-lock	3
Overall steering ratio	17:1
Turning Circle (Kerb To Kerb)	11.5m
Fluids	33270 Texaco Cold Climate Power Steering Fluid 14315G
Capacity	1.3 ltr.
Toe Settings	(Refer to 'Road Wheel Alignment (04.00)', page 4-1-2)

Maintenance

System Bleeding

When filling the reservoir, make sure that the fluid is clean and not agitated prior to use. Pour the fluid slowly to minimize aeration.

1. Check that the reservoir level is well above the Min. mark. Add fluid if required and install the reservoir cap loosely to avoid fluid splashes during system bleeding.
2. Start the engine and run for several minutes. Check the returning fluid in reservoir. When the air bubbles cease to flow, top up the reservoir. Move to step 3.
3. Turn the steering hard over on one lock. Run the engine for several minutes. Check the returning fluid in reservoir. When the air bubbles cease to flow, top up the reservoir. Move to step 4.
4. Turn the steering hard over on opposite lock. Run the engine for several minutes. Check the returning fluid in the reservoir. When the air bubbles cease to flow, top up reservoir. Move to step 5.
5. Allow the engine to idle for 5 minutes with the road wheels in the straight ahead position.
6. Briefly turn the steering to one lock and then to the opposite lock. If no air sounds are heard, bleeding was successful.

   If air noises are present, repeat the bleeding procedure.
7. Top-up the reservoir to the max. level and secure the reservoir cap.

Steering (11.00)

Steering Column (11.04)

Description

The steering column lock is secured to the upper casting of the steering column and consists of a locking pin. The steering column is locked and unlocked by inserting and removing the ignition key respectively.

The steering column has rake and reach functions. These allow the driver to manually set the steering column position by using the rake / reach lever, located on the underside of the steering column, regardless of the ignition switch position.

The steering intermediate shaft consists of two parts. The lower shaft is attached to both the steering gear and the upper shaft.

Specifications

Torque Figures

Description	Nm.	lb / ft.
Steering Column to mounting	21-27	15.5-20
U/J securing bolt	20-25	15-18.5

Maintenance

Steering Column

Repair Operation Time (ROT)	
Item	**Code**
Steering Column (Upper) Renew	**11.04.CB**

Removal

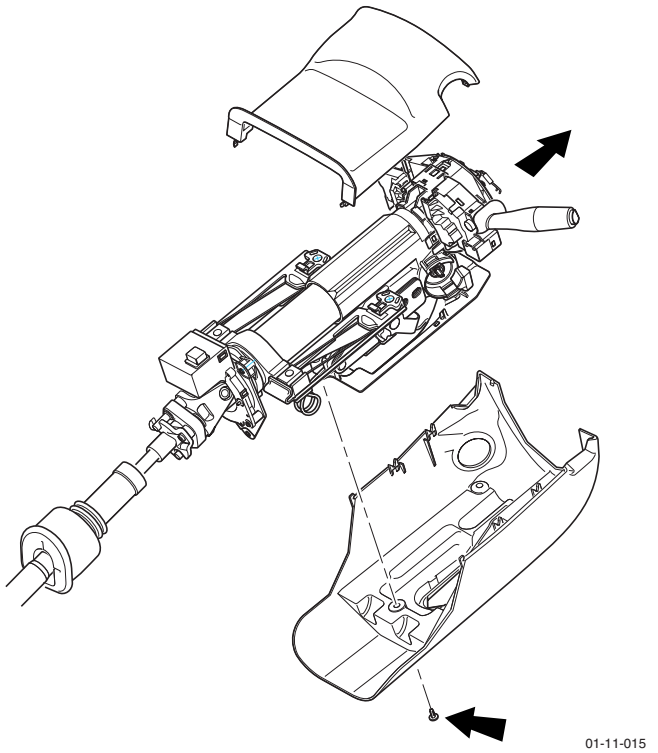
1. Power the driver's seat to it's lowest and most rearward position.
2. Disconnect the vehicle battery at the negative terminal. Ensure the ignition key is removed.

⚠ Warning ⚠

The restraint bag is equipped with a back-up power supply and may be inadvertently deployed. To avoid accidental restraint bag deployment, wait at least one minute before starting work so that any residual power is dissipated.

3. Remove the drivers side underscuttle panel.
4. Remove the steering column cowls.

To remove the rear lower screw unlatch the reach / rake lever and pull the steering column forward.



Caution

Failure to centre steering wheel and rack may cause damage to restraint bag clock-spring and also may cause difficulties in attaining correct alignment of steering wheel in the straight ahead position.

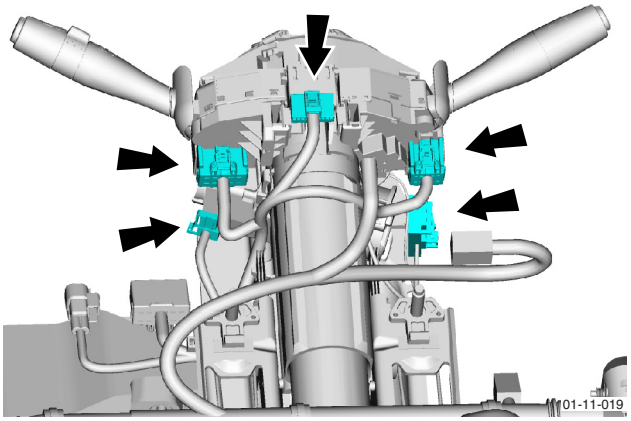
5. Centre the steering and engage the steering column lock.
6. Pull back the bulkhead seal. Remove the pinch bolt that secures the upper column to the intermediate shaft.

Image to follow

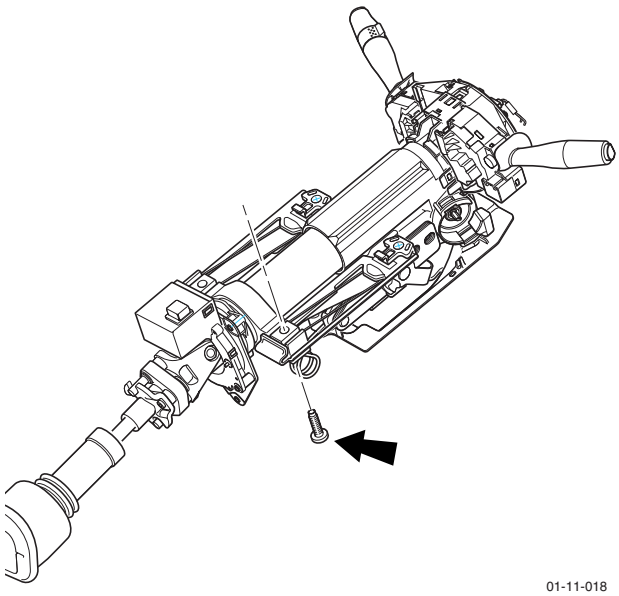
7. Ensure that the vehicle battery is disconnected at the negative terminal and that the ignition key is removed.

> ***⚠ Warning ⚠***
> ***Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.***

8. Disarm and remove the air bag module (Refer to 'Driver Airbag', page 1-14-4).
9. Remove the steering wheel (Refer to 'Steering Wheel', page 11-5-1).
10. Retain the clockspring rotor in position, i.e. masking tape.
11. **Automatic Vehicles Only.**
    Remove the paddle shift assembly.
12. Disconnect the wiring harness plugs (x5).



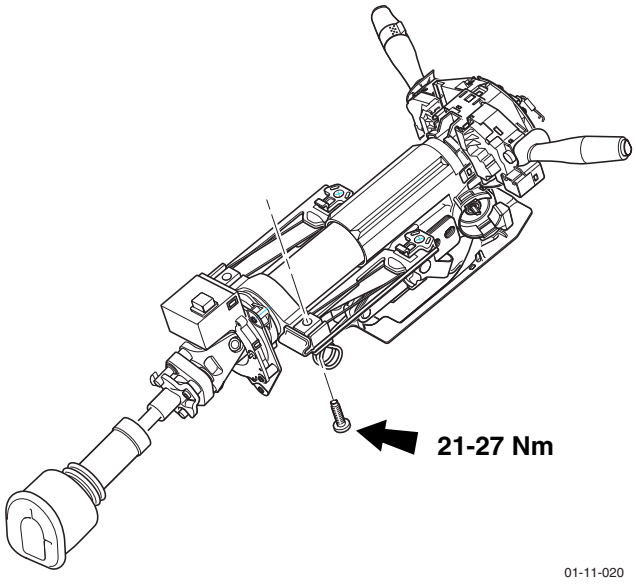
13. Remove the mounting securing bolts (x4).



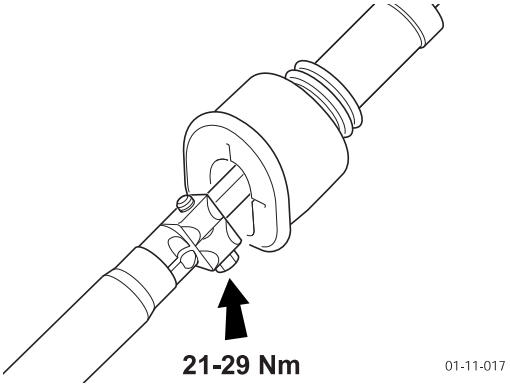
14. Withdraw the upper column from the intermediate shaft.

Installation

1. Install the upper column.
   1.1 Connect the intermediate shaft to the upper column.
   1.2 Locate the steering column to it's mount. Install the mounting bracket bolts. Tighten bolts (x4) to **21 -27 Nm**.



2. Install the U/J securing bolt. Torque to **20-25 Nm**. Install the bulkhead seal.



3. Install the steering column switch block (Refer to 'Column Controls', page 11-4-1).
4. Connect the wiring harness plugs.
5. Remove the material holding the clockspring rotor in position.
6. **Automatic Vehicles Only.**
   Install the paddle shift assembly. Connect the wiring harness plug.
7. Install the steering wheel (Refer to 'Steering Wheel', page 11-5-1).
8. Install the air bag module (Refer to 'Driver Airbag', page 1-14-4).
9. Install the steering column cowls.
10. Install the underscuttle.
11. Connect the vehicle battery.

Steering (11.00)

Steering Column Switches (11.05)

Maintenance

Column Controls

Repair Operation Time (ROT)	
Item	**Code**
Steering Column Controls Renew	TBA

Removal

⚠ Warning ⚠

DO NOT remove the restraint bag without first reading and fully understanding the warnings related to restraint bag removal. Follow step by step the procedure for disarming and removing the restraint bag.

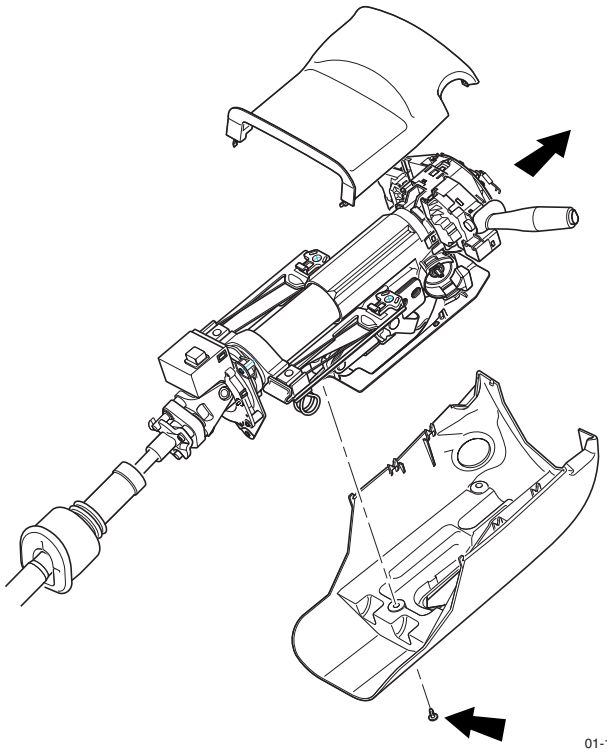
1. Disconnect the vehicle battery at the earth (-ve) terminal and ensure the ignition key is removed.

⚠ Warning ⚠

Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.

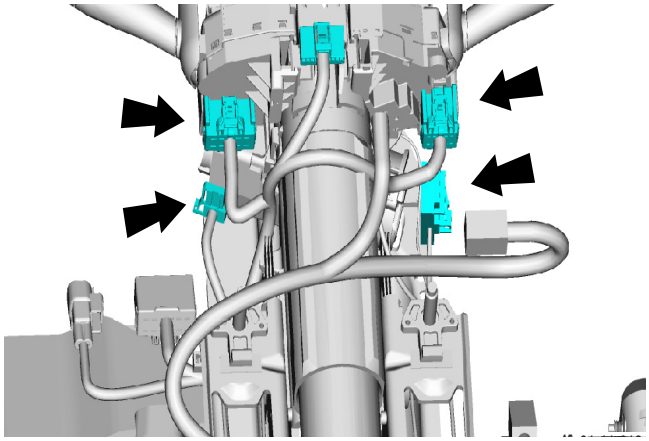
2. Remove the restraint bag module (Refer to 'Driver Airbag', page 1-14-4).
3. Remove the steering wheel (Refer to 'Steering Wheel', page 11-5-1).
4. Remove the steering column cowls.

To remove the rear lower screw unlatch the reach / rake lever and pull the steering column forward.



01-11-015

5. **Automatic Gearbox Only.**
   5.1 Remove screws (x4) and release the paddle shift.
   5.2 Disconnect the wiring harness plug and remove paddle shift.
6. Disconnect the column switch wiring harness plugs.



7. Unclip the column controls from the steering column and remove.

Installation

1. Install the column controls.
   1.1 Clip the column controls to the steering column.
   1.2 Connect the wiring harness plugs.
2. **Automatic Gearbox Only.**
   Connect the wiring harness plug and install the paddle shift.
3. Install the restraint bag module (Refer to 'Driver Airbag', page 1-14-4).
4. Install the steering column cowls.

⚠ Warning ⚠

DO NOT install the restraint bag without first reading and fully understanding the warnings related to restraint bag removal. Follow the step by step procedure for refitting the restraint bag.

5. Install and re-arm the restraint bag (Refer to 'Driver Airbag', page 1-14-4).
6. Install the steering wheel (Refer to 'Steering Wheel', page 11-5-1).

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Steering (11.00)

Steering Wheel (11.06)

Specifications

Torque Figures		
Description	Nm.	lb / ft.
Steering Wheel	40	30

Maintenance

Steering Wheel

Repair Operation Time (ROT)	
Item	**Code**
Steering Wheel Renew	**11.06.AB**

Removal

⚠ Warning ⚠
DO NOT remove the restraint bag without first reading and fully understanding the warnings related to restraint bag removal. Follow step by step the procedure for disarming and removing the restraint bag.

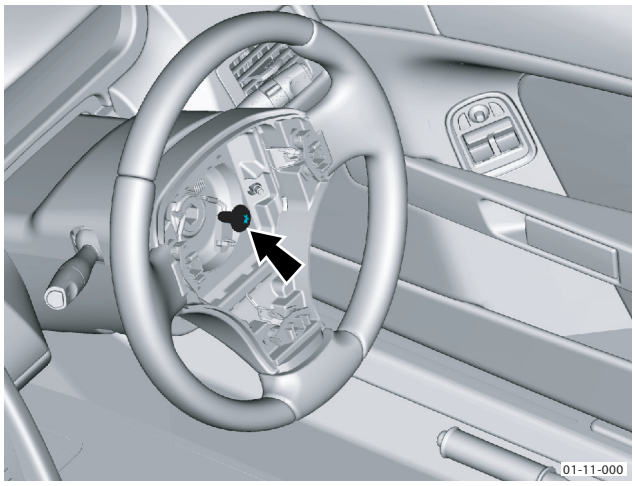
1. Disconnect the vehicle battery at the earth (-ve) terminal and ensure the ignition key is removed.

⚠ Warning ⚠
Allow a two minute power down period before proceeding. This will ensure that there is no power to the airbag system.

2. Remove the restraint bag module (Refer to 'Driver Airbag', page 1-14-4).
3. Place the steering in the straight ahead position.

Caution
Do not use steering lock to hold wheel whilst releasing securing nut. Steering lock may be irreparably damaged.

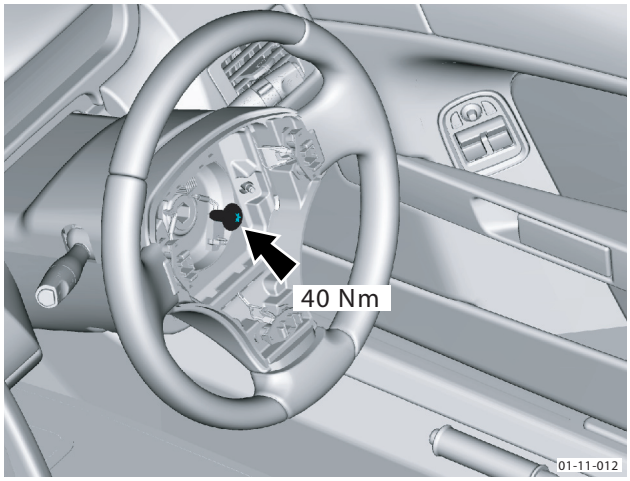
4. Undo and remove the steering wheel securing nut.



5. Place marks on the steering wheel and column to indicate the correct spline alignment. Pull the steering wheel from the steering column splines.

Installation

1. Install steering wheel.
   1.1 Ensure that the steering is in the straight ahead position.
   1.2 Align the steering wheel spokes in the straight ahead position.
   1.3 Align the steering wheel and column marks correctly and install the steering wheel to the steering column
   1.4 Check that the steering wheel rotation is accurately centred when the road wheels are in the straight ahead position.
   1.5 Install and tighten the securing bolt. Torque bolt to **40 Nm**.



2. Install the restraint bag (Refer to 'Driver Airbag', page 1-14-4).

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Climate Control (12.00)

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Climate Control (12.00)

Body Ventilation (12.01)

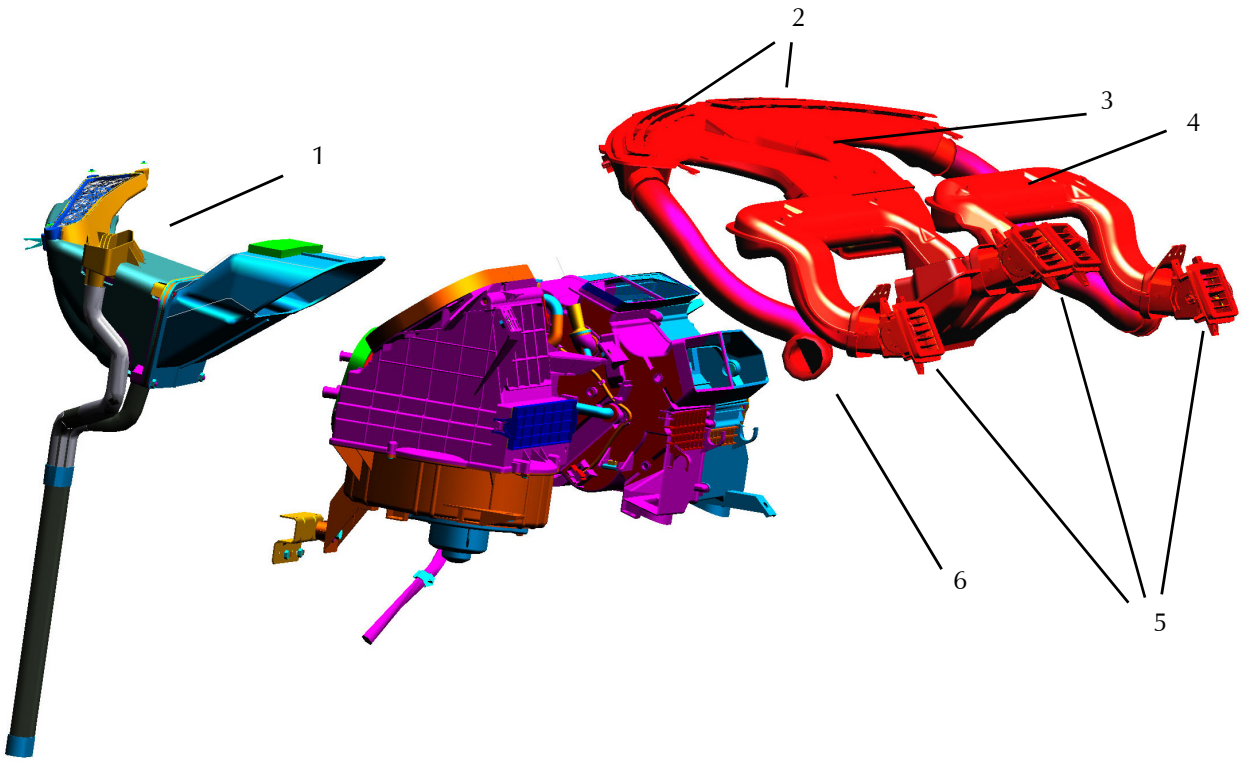
Air Intake & Distribution System

Outside air enters the plenum via inlets at the base of the windscreen.

Fresh mode - Air is drawn in through the plenum and into the blower unit. From the blower unit air enters the A/C unit where it is cooled and dehumidified as it passes through the evaporator. It is then 'reheated' to the selected temperature as it passes through the heater matrix,.

Air flows from the cabin into the boot via air vent grilles and through apertures in the rear parcel shelf. The air is exhausted from the vehicle through extraction vent assemblies (incorporating one way flaps) in the lower part of the rear bumpers, concealed by the bumper trim.

Recirculation mode - The air in the passenger compartment is drawn into the A/C system via the recirculation air inlets on the blower unit.



Item	Description	Item	Description
1.	Air Intake	4.	Cabin Distribution Box
2.	Windscreen air outlets	5.	Cabin air vents
3.	Defrost/Demist Ducting	6.	Side window air outlets

The A/C unit is linked and sealed to the defrost / demisting and cabin air ducting assemblies. The A/C unit incorporates two actuator operated flaps which regulate airflow to the selected air flow mode and temperature blend.

The centre vent duct incorporates a baffle plate which balances the volume of airflow of the centre and end of dash vents.

Maintenance

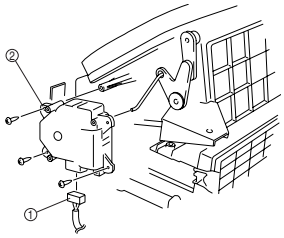
Actuators

Repair Operation Time (ROT)	
Item	**Code**
Actuators Renew	**TBA**

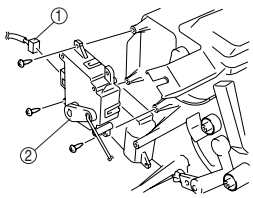
The A/C and blower unit assembly uses three actuators

- Blower unit
  1 Air intake actuator
- A/C unit
  2 Air mode actuator
  3 Air mix actuator

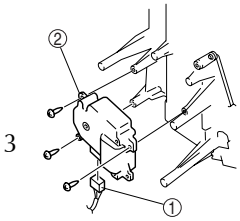
1



2



3



The removal procedure is the same for all three actuators.

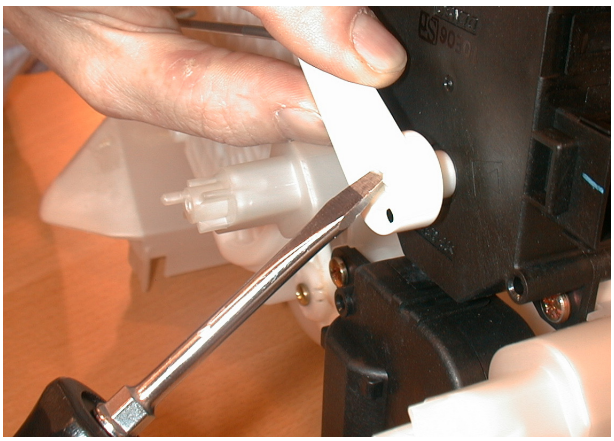
To remove the blower unit actuator remove the A/C unit from the IP (Refer to 'A/C Unit', page 12-3-11).

Removal

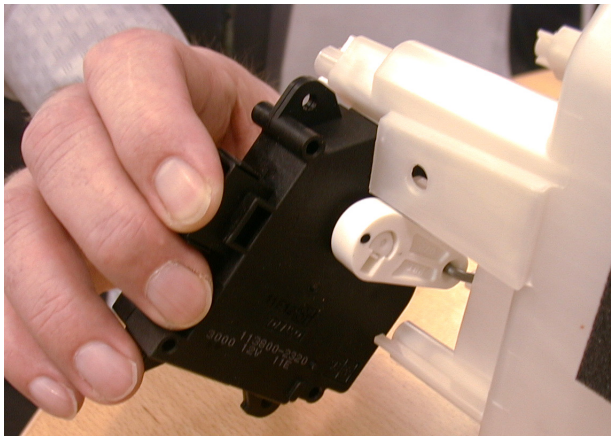
1. Remove the IP from the vehicle (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).

To gain access to the Air mode and Air mix actuators remove the A/C control module (screws x3).

2. Disconnect the actuator control rod.



The lower actuator on the A/C unit requires to be firstly removed from the A/C unit.



3. Remove the wiring harness plugs and the screws (x3). Withdraw the actuator.

Install

1. Install the actuator (screws x3). Connect the wiring harness plug.
2. Connect the actuator control rod.
3. Install the A/C control module. Conect the wiring harness plug.
4. If removed, install the A/C unit to the IP (Refer to '', page 12-3-10).
5. Install the IP to the vehicle (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).

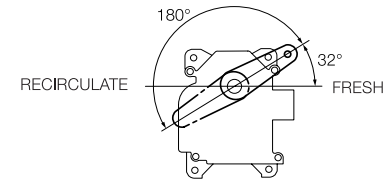
Air Intake Actuator

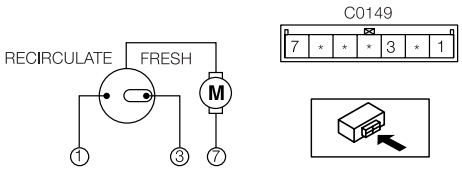
Inspection

1. Connect the battery positive voltage to Intake Actuator terminal 1 (or 3), and ground to terminal 3 (or 1).
2. Verify that the Air Intake Actuator operates as shown.

If the operation condition is not normal, replace the Air Intake Actuator.

Terminal (C0149)		Air Intake Actuator Operation
1	**3**	
Ground	B+	Fresh > Recirculate
B+	Ground	Recirculate > Fresh





Air Mix Actuator

Inspection

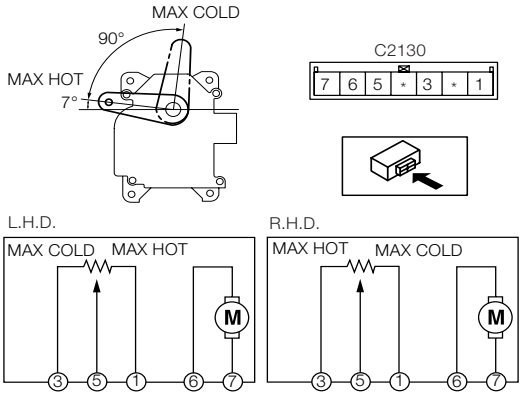
1. Connect the battery positive voltage to Air Mix Actuator terminal 6 (or 7), and ground to terminal 7 (or 6). Verify that the Air Mix Actuator operates as shown.

If the operation condition is not normal, replace the Air Mix Actuator.

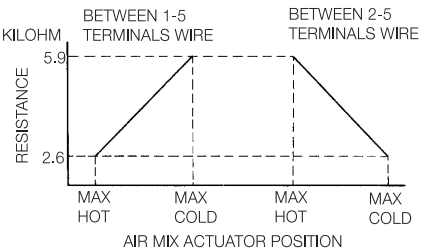
Terminal (C2130)		Air Intake Actuator Operation
1	**3**	
B+	Ground	Cold - Hot (LHD) Hot - Cold (RHD)
Ground	B+	Hot - Cold (LHD) Cold - Hot (RHD)

2. Check that the resistance between terminals 3 and 5, and 1 and 5 matches the Air Mix Actuator operation as shown in the graph below.

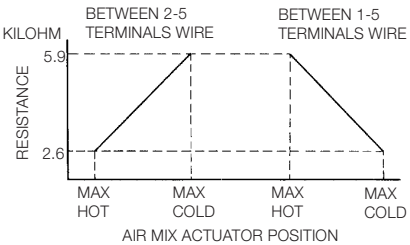
If the operation condition and resistance are not normal, replace the Air Mix Actuator.



LHD



RHD



Airflow Mode Actuator

Inspection

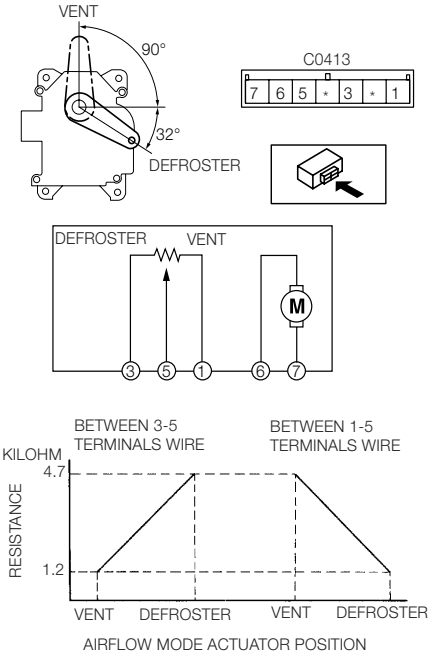
1. Connect the battery positive voltage to the Airflow Mode Actuator terminal 6 (or 7), and ground to terminal 7 (or 6). Verify that the Airflow Mode Actuator operates as shown.

If the operation condition is not normal, replace the Airflow Mode Actuator.

Terminal		Airflow Mode Actuator operation
6	**7**	
B+	Ground	Defroster - Vent
Ground	B+	Vent - Defroster

2. Verify that the resistance between terminals 1 and 5, and 3 and 5 matches the Airflow Mode Actuator operation as shown in the graph below.

If the operation condition and resistance are not normal, replace the Airflow Mode Actuator.



Climate Control (12.00)

Heater System (12.02)

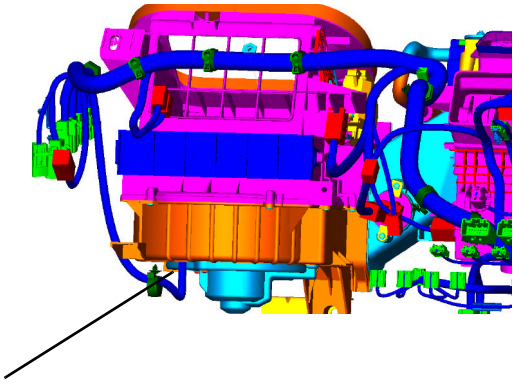
Maintenance

Blower Motor

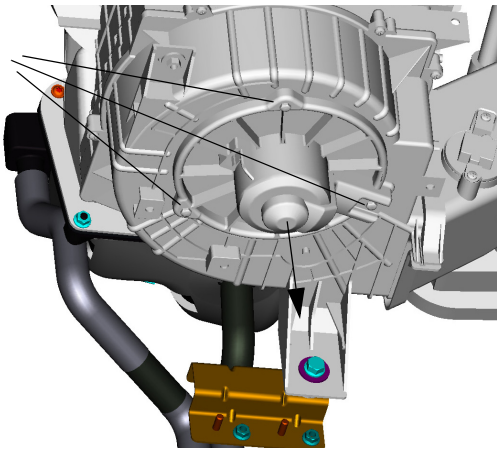
Repair Operation Time (ROT)	
Item	**Code**
Blower Motor Renew	**12.02.BB**

Removal

1. Disconnect the vehicle battery.
2. Disconnect the wiring harness plug.



3. Remove screws (x3). Withdraw the blower motor.

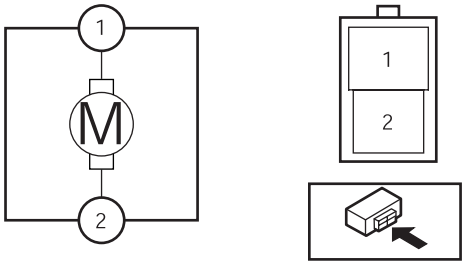


Installation

1. Install the blower motor to the blower unit body.
2. Install bolts (x3). Connect the wiring harness plugs.

Inspection

1. Connect the battery positive voltage to blower motor terminal 1, ground to terminal 2, and then verify that the blower motor operates smoothly.

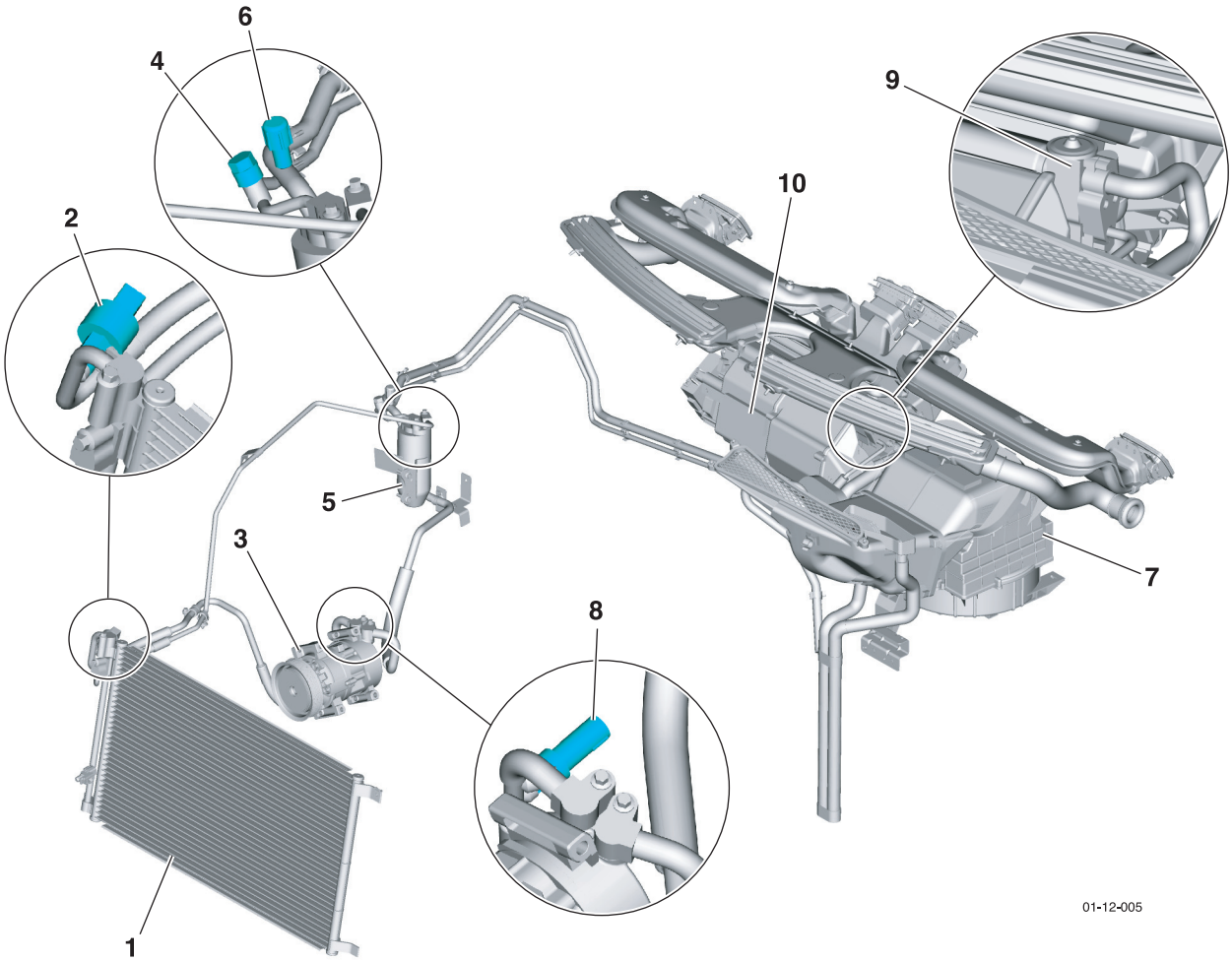


2. If the operation condition is not normal, replace the blower motor.

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Climate Control (12.00)

Air Conditioning (A/C) System (12.03)



Item	Description	Item	Description
1.	Condenser	6.	Low-side charge.
2.	Trinary switch	7.	Blower Unit.
3.	Compressor assembly	8.	Switch, A/C Cut-Off.
4.	High-side charge port	9.	Expansion valve.
5.	Receiver drier.	10.	A/C Unit.

Major Components

Compressor

- Engine mounted, driven by the accessory drive belt
- Variable displacement type
- High-pressure relief valve, to avoid system over-pressure
- ECU controlled clutch energised via a relay

Receiver drier

- Vertically mounted on the right-hand side of the engine bay
- The high-side charge port is installed to the high side entry pipe to the receiver drier

Condenser

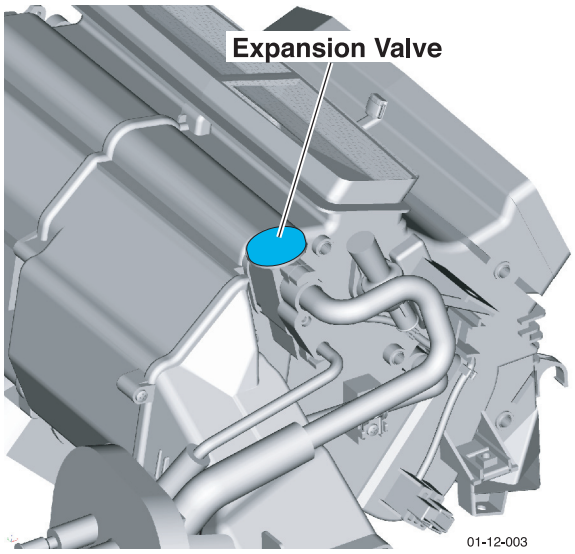
- Multi-pass fin-over-tube type, mounted in front of the engine cooling pack and directly to the radiator

Trinary switch

Located in the compressor discharge pipe

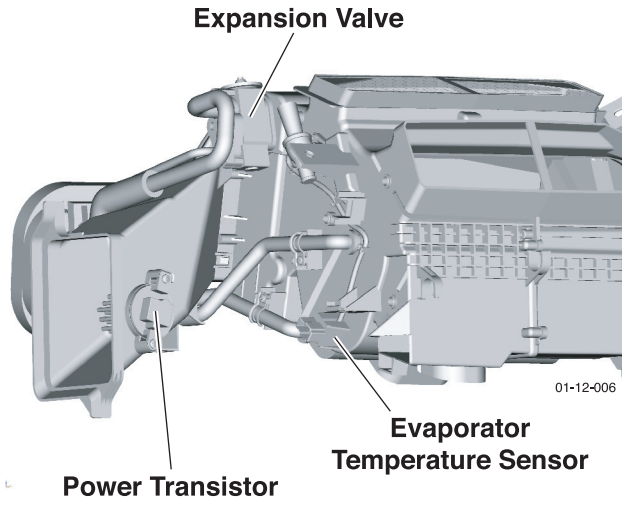
- Provides a signal, via the A/C module, to the PCM, to disengage the compressor clutch should the refrigerant pressure be less than 2 bar or greater than 30 bar
- Provides a hard-wired signal to the PCM, to switch the cooling fans to HIGH speed at 22 bar rising pressure and to LOW speed at 17,5 bar falling pressure
- Provides a hard-wired signal to the PCM, to switch the radiator cooling fans to LOW speed at 12 bar rising pressure and to switch the fans OFF at 8 bar falling pressure

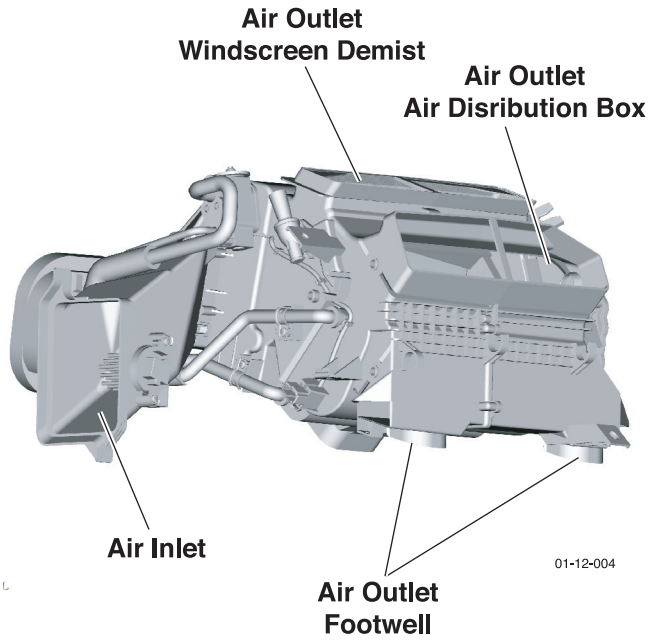
Expansion Valve

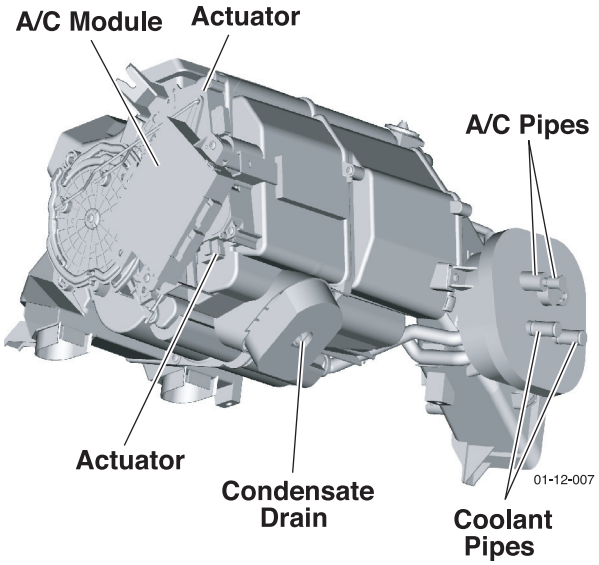


The expansion valve is located on the outside of the A/C unit and comprises of a diaphragm, connected by a capillary tube to a temperature sensing bulb, which regulates the valve according to temperature variations at the evaporator outlet pipe. This component is **not** serviceable.

A/C Unit







The A/C unit houses the evaporator, heater matrix and air flow flaps.

The unit also incorporates two servo motor operated air distribution flaps.

1. Regulates airflow to the cabin vents.
2. Regulates airflow to the defrost / demist air ducting.

When the cabin air flap is open, air is ducted to the cabin via face and foot level air vents.

Condensate (water) which forms on the evaporator fins is drained out of the unit case through a drain hose, located at underneath / rear of the evaporator.

Refrigerant System

Handling Refrigerant

⚠ *Warning* ⚠

Avoid breathing A/C refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, Aston Martin recommend the use of a recovery / recycling / recharging unit when draining R-134a from the A/C system.

If accidental A/C system discharge occurs, ventilate work area before resuming service.

⚠ *Warning* ⚠

Do not perform a pressure test or leak test for R-134a service equipment and or vehicle A/C using compressed air. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.

⚠ *Warning* ⚠

Do not allow refrigerant to leak near a fire or any kind of heat. A poisonous gas may be generated if refrigerant gas contacts fire or heat such as from cigarettes and heaters. When carrying out any operation that can cause refrigerant leakage, extinguish or remove the above mentioned heat sources and maintain adequate ventilation.

⚠ *Warning* ⚠

Handling liquid refrigerant is dangerous. A drop of refrigerant on the skin can result in localized frostbite. When handling refrigerant, wear gloves and safety goggles. If refrigerant splashes into the eyes, immediately wash them with clean water and consult a doctor.

Storing Refrigerant

⚠ *Warning* ⚠

The refrigerant container is highly pressurized. If it is subjected to high heat, it could explode, scattering metal fragments and liquid refrigerant that can seriously injure personnel. Store refrigerant at temperatures below 40 °C (104 °F).

Handling Insufficient Refrigerant Level

Caution

If an insufficient refrigerant level is detected while troubleshooting, do not charge (add) the refrigerant. Because an accurate amount of refrigerant cannot be determined from the pressure indicated on the recovery / recycling / recharging unit, never charge the refrigerant.

Caution

If there is too much or too little refrigerant from the refilling, there may be secondary problems such as damage to the refrigerant cycle parts, or a decrease of cooling performance. Therefore, if it is determined that the refrigerant level is insufficient, completely remove refrigerant from the refrigerant cycle and refill with refrigerant to the specified amount.

Handling Compressor Oil

Caution

Use only ND8 compressor oil for this vehicle. Using a PAG oil other than DENSO OIL8 compressor oil can damage the A/C compressor.

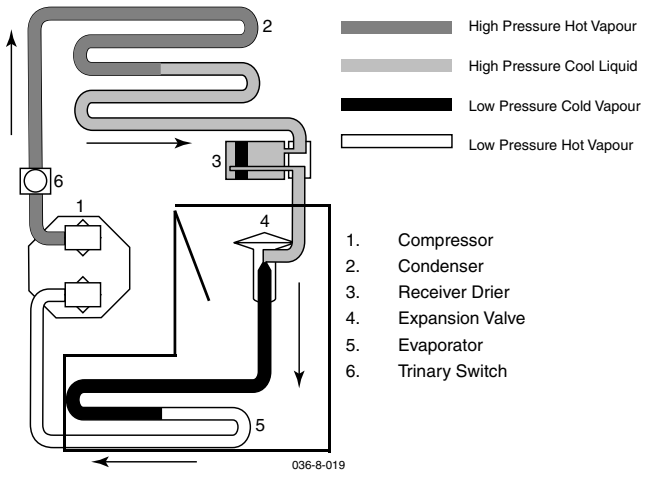
Caution

Do not spill the ND8 compressor oil on the vehicle. A drop of compressor oil on the vehicle surface can damage the paint work. If oil gets on the vehicle, wipe it off immediately.

Caution

ND8 compressor oil has a high moisture absorption efficiency. If moisture mixes with the compressor oil, the refrigerant system could be damaged. Ensure caps are installed immediately after using the compressor oil or removing refrigerant system parts to prevent moisture absorption.

Refrigeration Cycle



Operation

1. The Compressor (1) draws low pressure, low temperature, refrigerant vapour from the evaporator (5) and compresses it, raising the refrigerant pressure and temperature.
2. This high pressure, hot, refrigerant vapour enters the condenser (2), where it is cooled by the flow of ambient air and changes state into a cooler, high pressure liquid.
3. From the condenser, the liquid passes into the receiver drier (3) which has three functions:
   - Removes moisture from the refrigerant using a desiccant
   - Filters the refrigerant to remove system contaminants
   - Stores the refrigerant to cope with varying system refrigerant demands
4. The filtered liquid refrigerant, still at high pressure, then enters the expansion valve (4). Here it passes through a controlled orifice and emerges as an atomised liquid spray. This has the effect of reducing the refrigerant pressure and temperature. The cold refrigerant spray now flows into the evaporator (5).
5. As refrigerant passes through the evaporator core, it cools the incoming airflow. Heat is absorbed by the refrigerant, during this process and it once again changes state, from an atomised cool liquid into a vapour. The refrigerant vapour then returns to the compressor for the cycle to be repeated.

An automatic safety valve is incorporated in the compressor, which will open if the system pressure rises above 41 bar. The valve will reseat when the pressure drops below 27,6 bar. When the safety valve is open, the compressor will 'free wheel' and the excess pressure will be dissipated through the expansion valve. When the pressure drops below 27.6 bar, the safety valve will close again and the compressor will be operative.

The terms ‘high’ and ‘low’ pressure (or side) refer to the pressure differential between the compressor and expansion valve ports. This differential is critical to system fault diagnosis and efficiency checks.

The high side starts at the compressor and includes the trinary switch, condenser, receiver drier and expansion valve.

The low side starts at the expansion valve outlet and includes the evaporator and all connections back to the compressor.

The trinary switch (6) monitors system pressure between the compressor and condenser. If the pressure rises above 30 bar or falls below 2 bar the compressor clutch is de-energised to prevent damage to system components.

Specifications

Refrigerant and Lubricant

Refrigerant	R-134a
Compressor Lubricant	ND8 (DENSO)

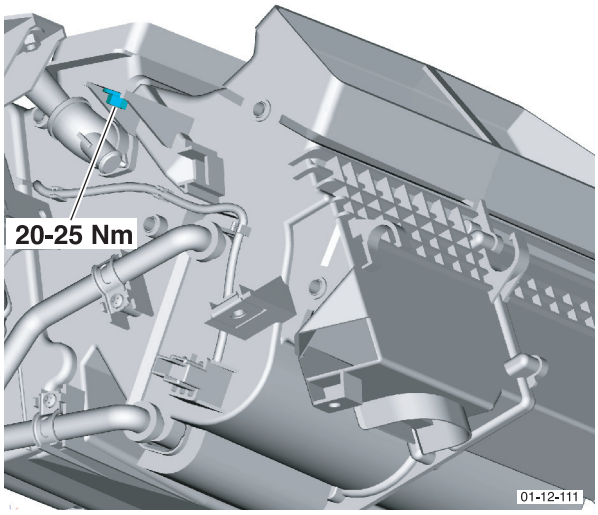
Capacities

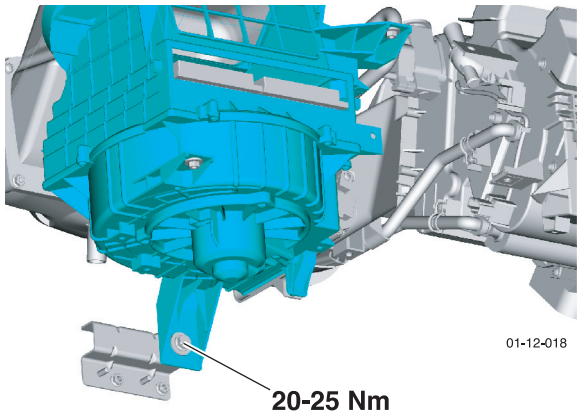
Refrigerant charge	Weight 850g (30 oz.)
Compressor Lubricant	Sealed volume (approx. quantity) 150 cc (pre-charged)

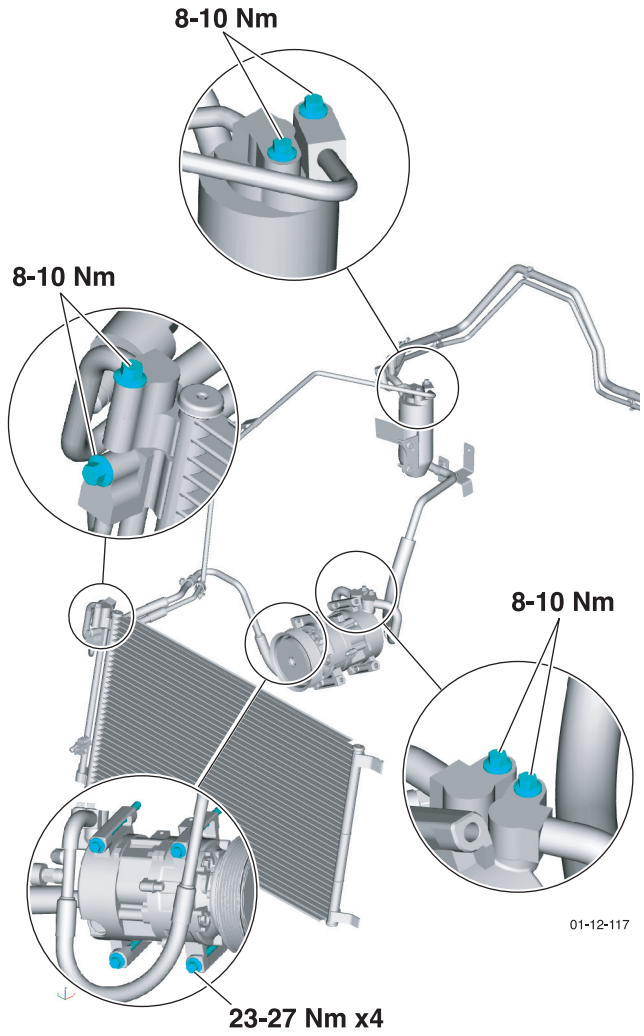
Torque Figures

Torque Figures

Description	Nm.	lb. / ft.
AC unit Mounitng	20-25	15-18.5
Compressor Mounting	23-27	17-20
Trinary switch		
A/C pipes to condenser	8-10	6-7.5

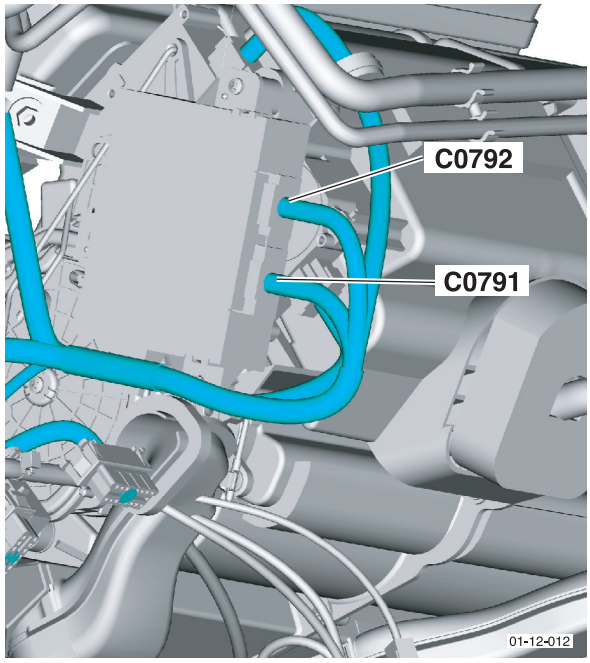




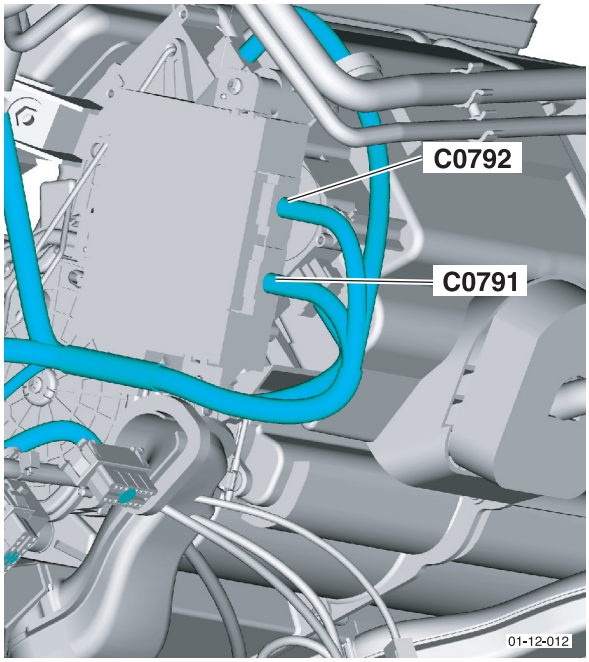


Diagnostics

Electrical Connectors



A/C Module (C0792)	
Pin	**Specification**
1	V Battery (from CCM)
2	V Ignition (from comfort relay) Recirculation acutuator
3	Blank
4	Air flow mode actuator (input)
5	Solar sensor (input)
6	Ambient Temperature sensor
7	Engine coolant temperature (input)
8	Ref. voltage - Solar sensor (output) Ref. voltage - Temperature actuator (output) Ref. voltage - Air flow mode actuator (output)
9	Blank
10	Blank
11	Blank
12	Temperature actuator (input)
13	Evaporation sensor (input)
14	In-vehicle temperature sensor (input)
15	Ground
16	Sensor ground (In-vehicle, Evaporator, Air flow mode actuator, Temperature mode actuator)



A/C Module (C0791)	
Pin	**Specification**
1	Air flow mode actuator (output)
2	Temperature actuator (output)
3	Blank
4	Blank
5	Blank
6	A/C On (A/C pressure sensor)
7	Blank
8	Recirculation actuator (output)
9	Blank
10	Blank
11	Temperature level (RHD)
12	Blower speed regulator (Output)
13	Air flow mode actuator (output)
14	Temperature actuator (output)
15	Blank
16	Output
17	HAVAC ECU (input)
18	Blank
19	Blower relay (engine bay fusebox)
20	Recirculation actuator (output)
21	Blank
22	blank
23	Temperature level (LHD)
24	Blower speed regulator input)

DTC Inspection

Using WDS

1. Connect the WDS to the **body** diagnostic socket (Refer to 'Appendix & Glossary', page 20-1-2).
2. Select 'Air-Con' from the menu.
3. Read the fault codes from the WDS screen.

DTC Fault Codes

DTC	Fault Code Definition
10	Switchpack 1 disconnected.
20	Switchpack 2 disconnected.
30	Analogue digital converter 100us timeout.
40	Serial transmit 10ms timeout.
111	Temperature control - short circuit to ground on A.
122	Temperature control - short circuit to 5 volts on A.
133	Temperature control - short circuit to ground on B.
144	Temperature control - short circuit to 5 volts on B.
250	Temperature – bad pair.
260	Mode control - short circuit to ground.
270	Mode control - short circuit to 5 volts.
280	Fan control - short circuit to ground.
355	Fan control – short circuit to 5 volts.
366	Bad response data - temperature.
377	Bad response data - mode.

DTC	Fault Code Definition
388	Bad response data - fan speed.
412	Bad response data - recirculation.
423	Serial communications error – header.
434	Serial communications error – checksum.
445	Serial communications error – overrun.
556	Serial communications error – framing.
567	Serial communications error – parity.
578	Electrically erasable programmable read only memory - command 120ms timeout.
589	Electrically erasable programmable read only memory - access error.
613	Electrically erasable programmable read only memory - protection error.
624	Electrically erasable programmable read only memory - not blank on verification.
635	Dynamic stability control 10 second timeout.
646	Temperature forced to default.
790	Blower speed forced to default.
791	Mode forced to default.
792	Power switch output - short circuit.
793	Electrically erasable programmable read only memory - command not ready.
794	Heating ventilating air conditioning control module – in car sensor - current fault.
795	Heating ventilating air conditioning control module – in car sensor - past fault.
796	Heating ventilating air conditioning control module – external air sensor - current fault.
797	Heating ventilating air conditioning control module – external air sensor - past fault.
798	Heating ventilating air conditioning control module – post evaporator sensor - current fault.
799	Heating ventilating air conditioning control module – post evaporator sensor - past fault.
880	Heating ventilating air conditioning control module – coolant temperature sensor - current fault.
881	Heating ventilating air conditioning control module – coolant temperature sensor - past fault.
882	Heating ventilating air conditioning control module – solar radiation sensor - current fault.
883	Heating ventilating air conditioning control module – air mix actuator cool/hot - current fault.
884	Heating ventilating air conditioning control module – air mix actuator cool/hot - past fault.
885	Heating ventilating air conditioning control module – mode actuator face/defrost - current fault.
886	Heating ventilating air conditioning control module – mode actuator face/defrost - past fault.
887	Heating ventilating air conditioning control module – air mix actuator fail.
888	Heating ventilating air conditioning control module – mode actuator fail.
889	Electrically erasable programmable read only memory - data checksum error.

Maintenance

Assessment of the A/C system operating efficiency and fault classification may be achieved by using the facilities on a Recovery / Recycling / Recharging unit.

Follow the manufacturer's instructions implicitly and observe all safety considerations.

Connections

Only use hoses with connectors which are dedicated to HFC 134a charge ports.

⚠ Warning ⚠

Under no circumstances should connections be made with the A/C system in operation or valves open. Should valves be open and a vacuum pump or refrigerant container attached, an explosion could occur as a result of high pressure refrigerant being forced back into the vacuum pump or container.

Recovery

⚠ Warning ⚠

Handling liquid refrigerant is dangerous. A drop of refrigerant on the skin can result in localized frostbite. When handling refrigerant, wear gloves and safety goggles. If refrigerant splashes into the eyes, immediately wash them with clean water and consult a doctor.

Caution

Do not attempt to adapt this unit for R-12 as an A/C system failure will result. Recovery / Recycle / Recharging equipment has special connections to avoid cross contamination with R-12 systems.

The A/C unit's overfill limitation mechanism has been calibrated specifically for use with the 50 lb. (23 Kg) refillable refrigerant tank.

Run the A/C system for a few minutes before starting the recovery procedure as this will enable more refrigerant to be recovered. Turn the A/C system off before starting the procedure.

Ensure the A/C system has pressure in it before beginning the recovery process; if there is no system pressure there is no refrigerant to recover.

Ensure that the oil drain valve is closed.

Read manufacture's instructions and warnings before completing any recovery / evacuating and charging operations.

Caution

The Recovery / Recycling / Recharging unit relies on a weighing mechanism to weight the quantity of oil removed. Ensure that the Recovery / Recycle / Recharging unit is not disturbed during the recovery procedure.

1. Connect an R-134a Recovery / Recycling / Recharging unit to the vehicle A/C system.
2. Follow the Recovery / Recycling / Recharging unit manufacturer's instructions to evacuate the A/C system.

Compressor oil may be drawn out during this process, take note of the quantity recovered so that it may be replaced.

Evacuation

The removal of unwanted air and moisture, is critical to the correct operation of the A/C system. Moisture in the system can be highly destructive and may cause internal blockages due to freezing; water suspended in the lubricating oil will damage the compressor. Once the A/C system has been dismantled, or the refrigerant charge recovered, all traces of moisture must be removed before charging.

It is recommended that initially only the high-side valve be opened at the start of the procedure. After a short time a small depression should be seen on the low-side, at which point the low-side valve may be opened and the evacuation process completed. If a vacuum is not registered on the low-side, it may indicate that the expansion valve is permanently closed or that the system is blocked. This simple check may save time and effort when the system is recharged.

Read manufacture's instructions and warnings before completing any Recovery / Recycling / Recharging operation.

1. Connect an R-134a Recovery / Recycling / Recharging unit to the vehicle A/C system.
2. Follow the Recovery / Recycling / Recharging unit manufacturer's instructions to evacuate the A/C system.

Charging

Caution

Do not exceed the specification when charging the A/C system with refrigerant. Doing so will decrease the efficiency of the A/C unit or damage the refrigeration cycle parts.

Caution

Always start the charging of refrigerant from the high-pressure side. If charging starts from the low-pressure side, vanes of the A/C compressor will not be released and abnormal noise may result.

Read manufacture's instructions and warnings before completing any Recovery / Recycling / Recharging operation.

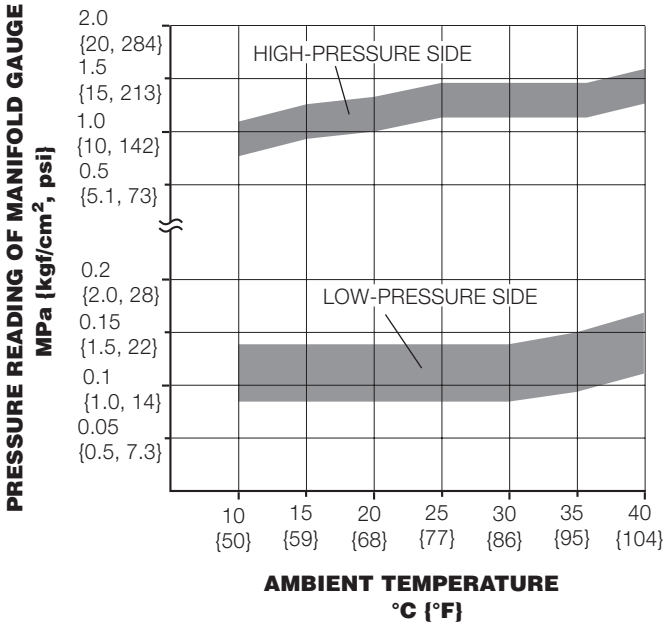
1. Connect an R-134a Recovery / Recycling / Recharging unit to the vehicle A/C system.
2. Follow the Recovery / Recycling / Recharging unit manufacturer's instructions to charge the A/C system.

A/C System Testing

It is recommended that a free standing air mover is placed in front of the condenser / cooling system.

Pressure Check

1. Connect the Recovery / Recycling / Recharging unit.
2. Start the engine. Allow to warm up then run at a constant 1,500 rpm.
3. Set the following A/C controls:
   - Air Circulation to 'Recirculate'
   - Temperature to 'Max' Cold
   - Air Flow to 'Vent'
4. Close all the vehicle doors and windows.
5. Measure the ambient temperature and high / low pressure side reading of Recovery / Recycling / Recharging unit gauges.
6. Verify that the intersection of the pressure reading of the Recovery / Recycling / Recharging unit gauges and the ambient temperature is in the shaded zone.



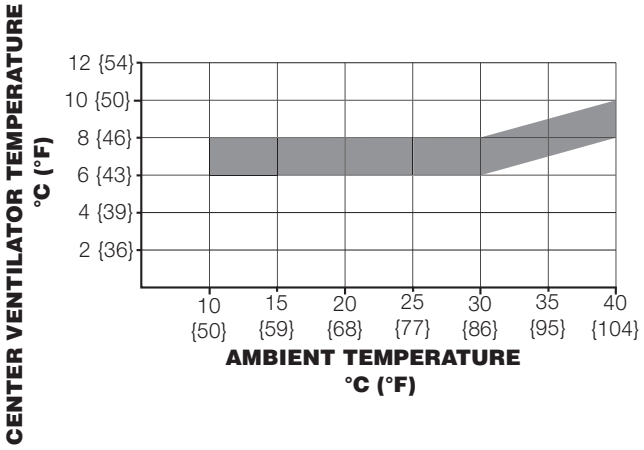
If there is any fault, inspect the refrigerant system according to the troubleshooting chart.

Performance Test

1. Check the refrigerant pressure.
2. Place a dry-bulb thermometer in the driver-side center ventilator outlet.
3. Start the engine. Allow to warm up then run at a constant 1,500 rpm.
4. Set the A/C unit fan speed to 'Max Hi'.
5. Turn the A/C system on.
6. Set the following A/C controls:
   - Air Circulation to 'Recirculate'
   - Temperature to 'Max' Cold
   - Air Flow to 'Vent'
7. Close all the doors and windows.
8. Wait until the A/C output temperature stabilizes.

Stabilized condition.
The A/C compressor repeatedly turns on and off at regular intervals.

9. After the blower air is stabilized, read the dry-bulb thermometer.
10. Verify the ambient temperature.
11. Verify the temperature is in the shaded zone.



If there is any fault, inspect the refrigerant system according to the troubleshooting chart.

Vacuum Check

1. Stop the vacuum pump, note the high and low pressure side readings of the Recovery / Recycling / Recharging unit gauges and wait for 5 min.
2. Check the high and low pressure side readings of the Recovery / Recycling / Recharging unit gauges.
   1 If the readings have changed, inspect for leaks and go to Evacuation (Refer to 'Evacuation', page 12-3-8).
   2 If the readings have not changed, go to Charging (Refer to 'Charging', page 12-3-8).

Leaks

Faults associated with low refrigerant charge weight and low pressure may be caused by leakage. Leaks traced to mechanical connections may be caused by torque relaxation or joint face contamination. Evidence of oil around such areas is an indicator of leakage.

Leak Detection

Fluorescent Tracer Dye - A fluorescent tracer dye is incorporated into the refrigeration system and can be checked for non-apparent leaks by scanning with a high intensity ultraviolet lamp. The location of leaks can be pinpointed by the bright yellow glow of the tracer dye.

Caution
Observe ALL safety precautions associated with ultraviolet equipment.

Automatic Refrigerant Leak Detector - (various manufacturers) Hand-held, portable, battery operated leak detector. Place in and around A/C system to detect refrigerant leaks.

System Pressure Fault Classification

If erratic or unusual gauge movements occur, check the equipment against known Recovery / Recycling / Recharging unit gauges.

This table should be used in conjunction with the graphical representations of 'High side' pressure / ambient temperature and 'Low side' pressure / evaporator temperature.

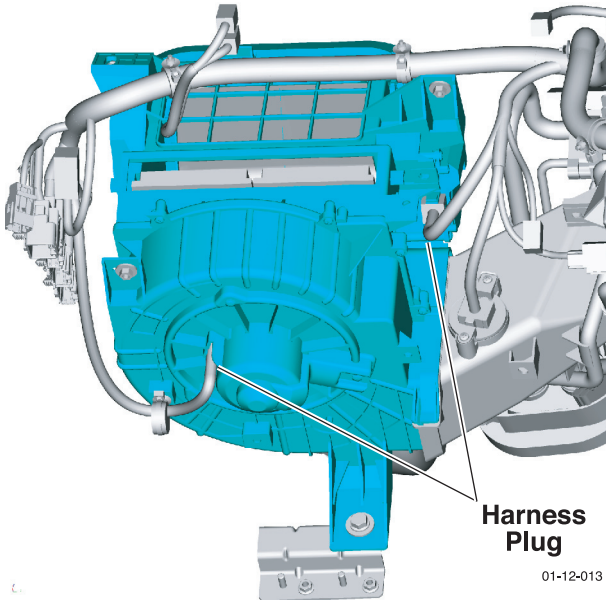
Low side gauge reading	High side gauge reading	Fault	Cause
Normal	Normal	Discharge air initially cool then warms up	Moisture in system
Normal to low	Normal	As above	As above
Low	Low	Discharge air slightly cool	Refrigerant charge low
Low	Low	Discharge air warm	Refrigerant charge very low
Low	Low	Discharge air slightly cool or frost build up at expansion valve	Expansion valve stuck closed
Low	Low	Discharge air slightly cool, sweating or frost after point of restriction	Restriction in High side of system
High	Low	Compressor noisy	Defective compressor reed valve
High	High	Discharge air warm and high side pipes hot	Refrigerant charge high or inefficient condenser cooling due to air flow blockage or engine cooling fans not working
High	High	Discharge air warm Sweating or frost at evaporator	Expansion valve stuck open

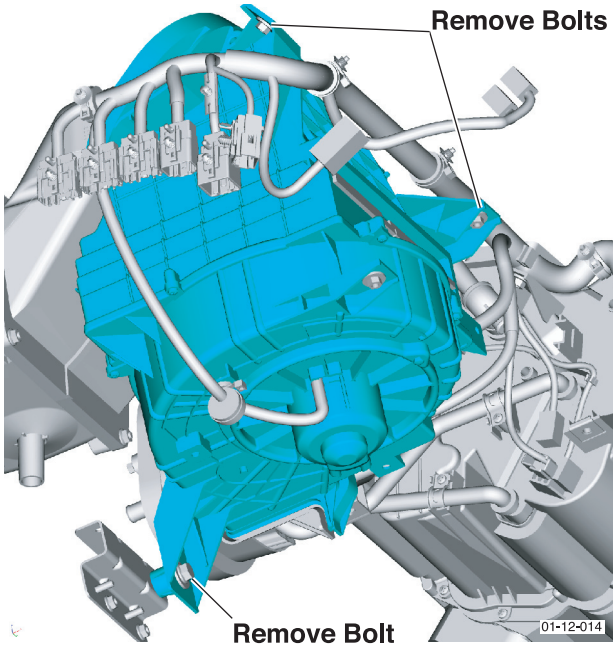
A/C Unit

Repair Operation Time (ROT)	
Item	**Code**
A/C Unit Renew	12.03.EB

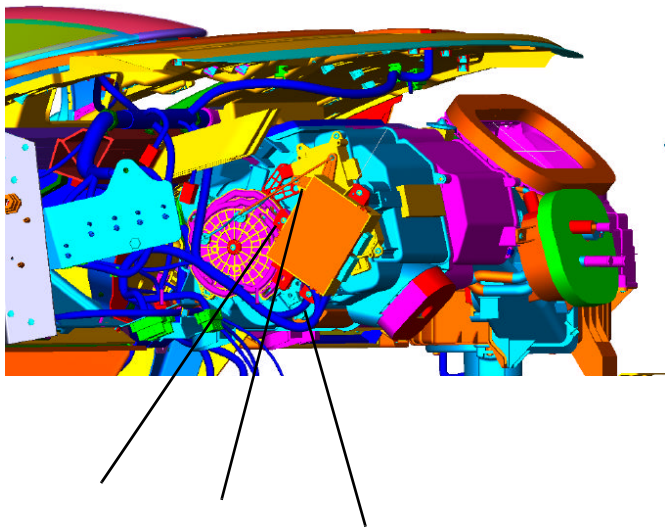
Removal

1. Connect the WDS and record any logged fault codes in the A/C system.
2. Disconnect the vehicle battery.
3. Recover the refrigerant from the A/C system (Refer to 'Recovery', page 12-3-8).
4. Drain the engine coolant.
5. Remove the IP (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).
6. Remove the blower unit.
   - 6.1 Disconnect the wiring harness plugs (x2).
   - 6.2 Remove bolts (x3). Withdraw the blower unit.





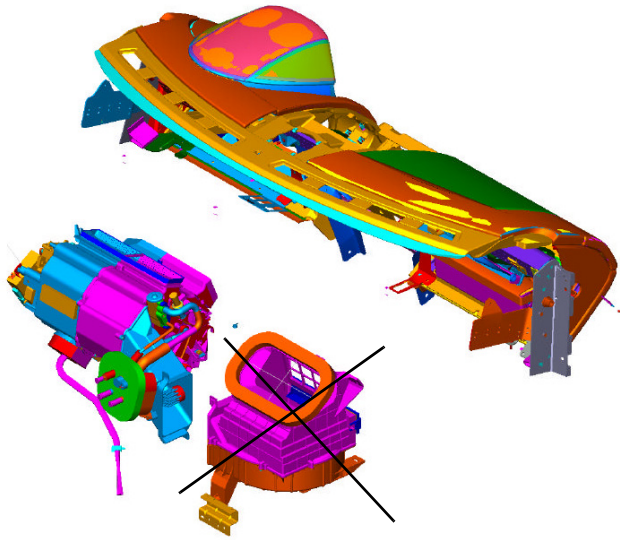
7. Disconnect the wiring harness plugs (x3).



8. Remove bolt (x1) and nuts (x2). Withdraw the A/C unit.

Image to Follow

9. Unlatch the A/C unit from the defrost air duct (Push the A/C unit up into the IP). Withdraw the A/C unit.



Installation

1. Install the A/C unit to the IP. Torque bolts to **5.5 Nm**.

Ensure the A/C unit interlocks with the defrost duct.

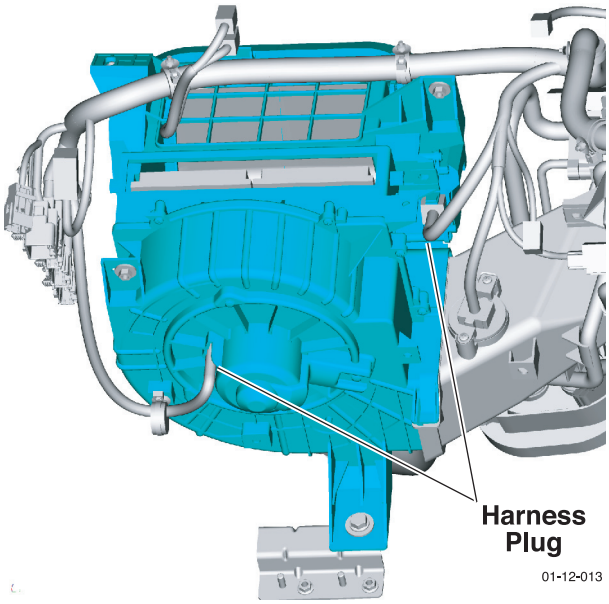
2. Install the blower unit to the IP. Torque bolts to **5.5 Nm**.
3. Connect the wiring harness plugs.
   - (x3) to the A/C unit
   - (x2) to the blower unit
4. Install the IP (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).
5. Recharge the A/C system (Refer to 'Charging', page 12-3-8).
6. Fill the engine coolant system (Refer to 'Cooling System (03.03)', page 3-4-1).
7. Connect the vehicle battery.
8. Start the engine. Allow the cooling system to come to normal operating temperature.
9. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

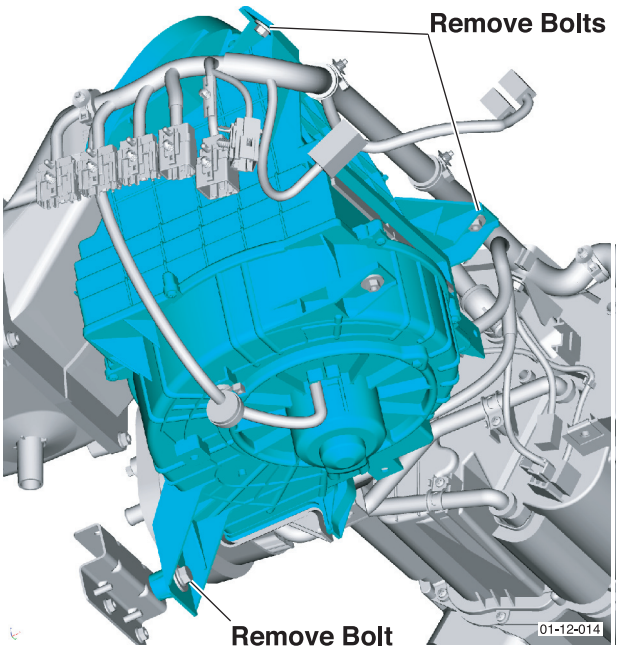
Heater Matrix

Repair Operation Time (ROT)	
Item	**Code**
Heater Matrix Renew	**12.02.CB**

Remove

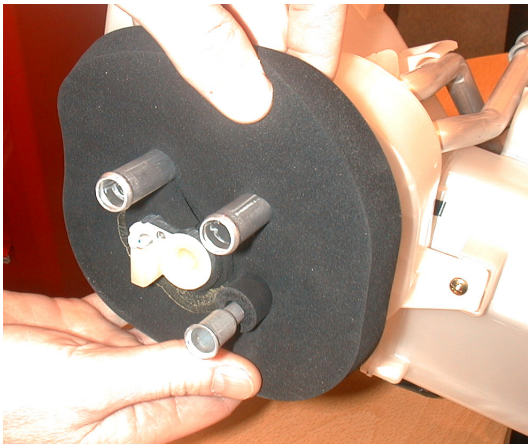
1. Connect the WDS and record any logged fault codes in the A/C system (Refer to 'Appendix & Glossary', page 20-1-2).
2. Disconnect the vehicle battery.
3. Recover the refrigerant from the A/C system (Refer to 'Recovery', page 12-3-8).
4. Drain the engine coolant (Refer to 'Cooling System (03.03)', page 3-4-1).
5. Remove the IP (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).
6. Remove the blower unit assembly.
   6.1 Disconnect the wiring harness plug (x1).
   6.2 Remove bolts (x3). Withdraw the blower unit.



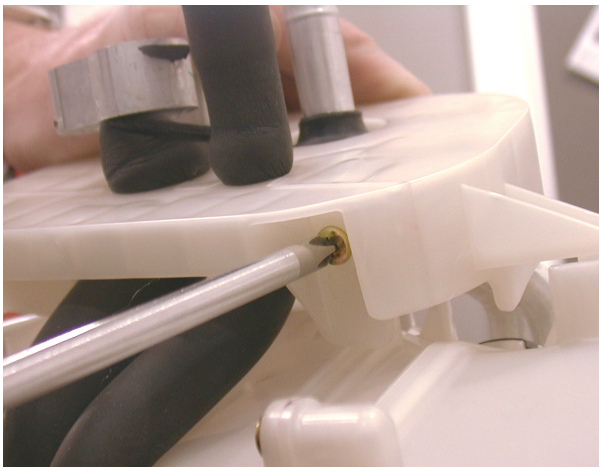


7. Remove the blower unit to A/C unit adaptor and pipe locator.

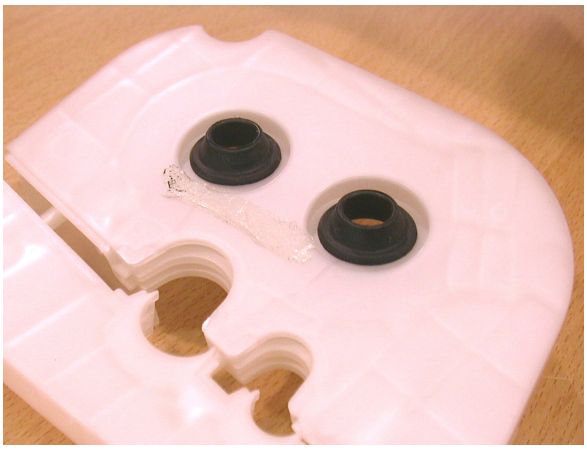
7.1 Remove the foam.



7.2 Remove the pipe location plate (screws x4). Part the pipe location plate and withdraw.

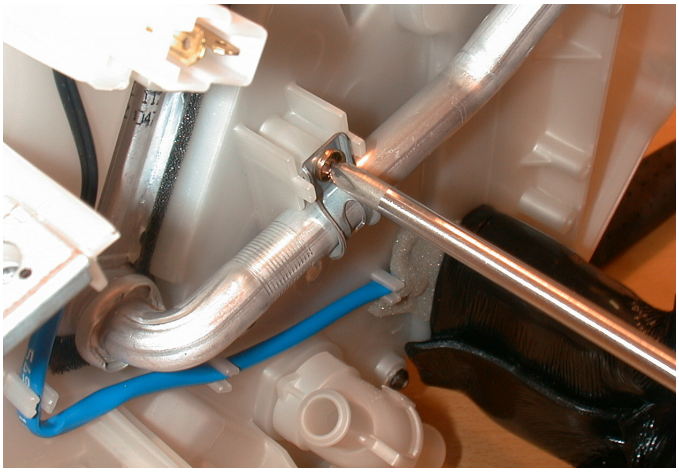


Note the orientation of the two rubber grommets.

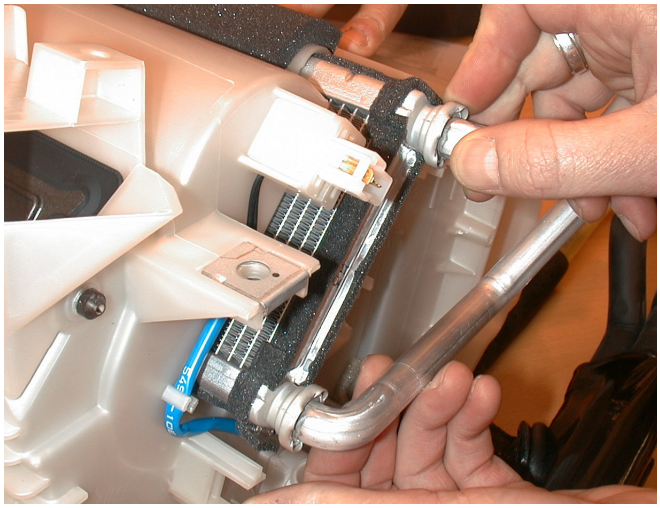


7.3 Remove the adaptor (screws x2), clip (x1) and disconnect one plastic locator.

8. Remove the pipe clips (x2) that secure the heater pipes.



9. Withdraw the heater matrix.

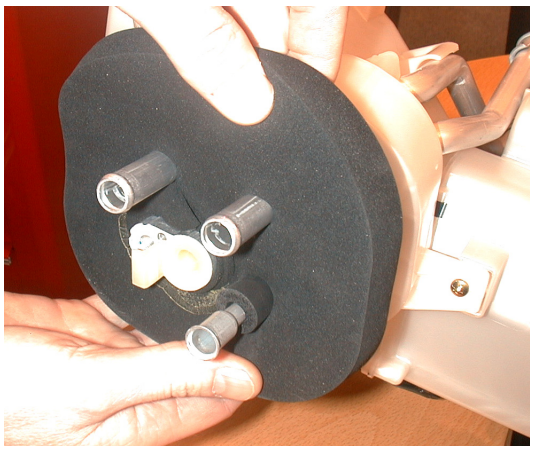


Installation

1. Install the heater matrix into the A/C unit. Ensure the heater matrix is pushed fully in.
2. Install the pipe clips.
3. Install the blower unit to A/C unit adaptor and pipe locator.

Ensure that the two rubber grommets are located correctly.

4. Install the foam aorund the pipes



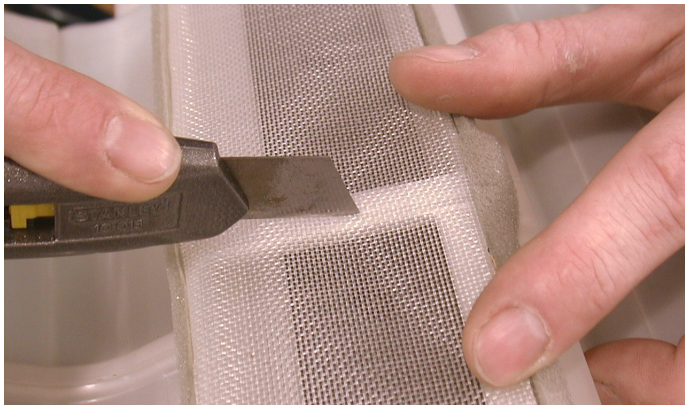
5. Install the blower unit. Torque bolts to **10-13 Nm**.
6. Install the IP (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).
7. Recharge the A/C system (Refer to 'Charging', page 12-3-8).
8. Fill the engine coolant system (Refer to 'Cooling System (03.03)', page 3-4-1).
9. Connect the vehicle battery.
10. Start the engine. Allow the cooling system to come to normal operating temperature.
11. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

Evaporator

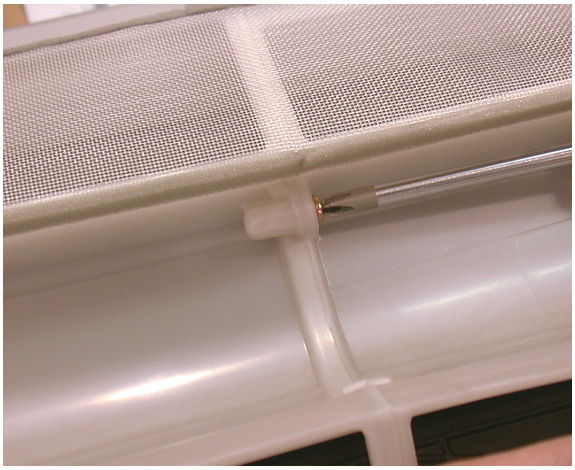
Repair Operation Time (ROT)	
Item	**Code**
Evaporator Renew	**12.03.CB**

Removal

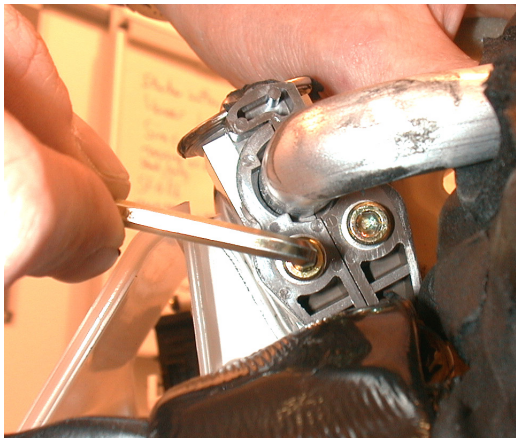
1. Remove the A/C unit (Refer to 'A/C Unit', page 12-3-11).
2. Move the in-vehicle temperature pipe to one side.
3. With a sharp knife cut the filter gauze and foam where the two halves of the A/C unit meet.



4. Remove clip (x1) and screws (x9) that secure the two halves of the A/C unit. Part the two halves of the A/C unit.



5. Remove the expansion valve
   5.1 Remove protective material from around the expansion valve.
   5.2 Remove screws (x2). Remove the A/C pipes clamp.



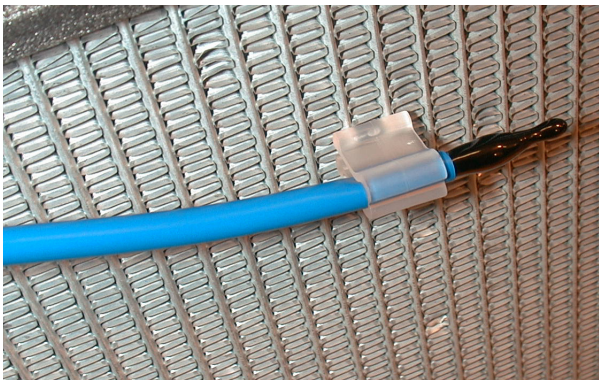
   5.3 Withdraw the A/C pipes.



   5.4 Withdraw the expansion valve. Discard 'O' rings.



6. Remove the clips (x2) that secure the evaporator temperature sensor element to the evaporator.



7. Withdraw the evaporator.



Installation

1. Insert the evaporator (inlet / outlet first) into the half of the A/C unit which houses the expansion valve.
2. Complete with new 'O' rings, install the expansion valve.
3. Complete with new 'O' rings, install the A/C pipes clamp (screws x2).
4. Install the clips (x2) that secure the evaporator temperature sensor element to the evaporator.
5. Place the two halves of the A/C unit together.

Take care to correctly locate the vent flaps.

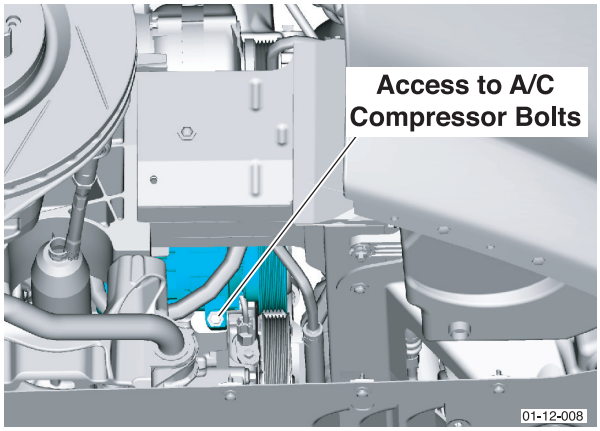
6. Install clip (x1) and screws (x9) that secure the two halves of the A/C unit.
7. Connect (glue) the filter gauze and foam where the two halves of the A/C unit meet.
8. Install the in-vehicle temperature pipe to the A/C unit clips.
9. Install the A/C unit to the IP (Refer to 'A/C Unit', page 12-3-11).
10. Install the IP (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).
11. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

A/C Compressor

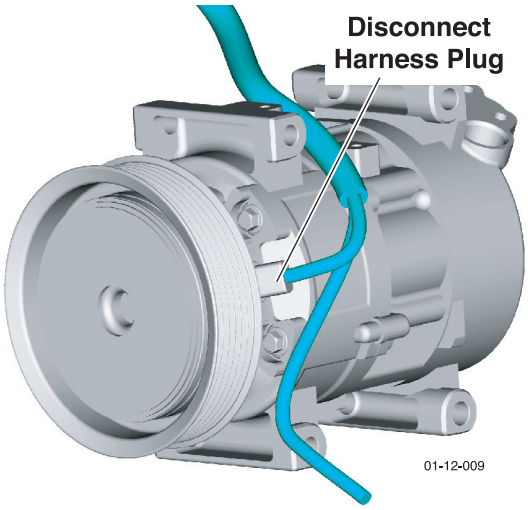
Repair Operation Time (ROT)	
Item	**Code**
A/C Compressor Renew	12.03.AB

Removal

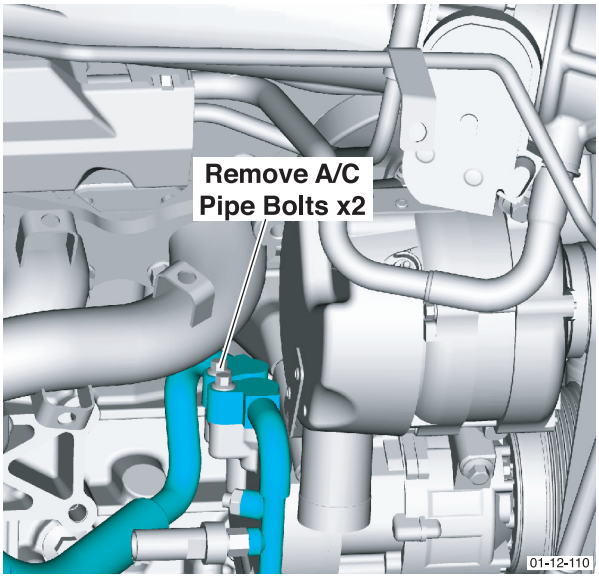
1. Disconnect the vehicle battery.
2. Recover the refrigerant from the A/C system (Refer to 'Recovery', page 12-3-8).
3. Remove the road wheel and road wheel arch liner (for access to the A/C compressor securing bolts).



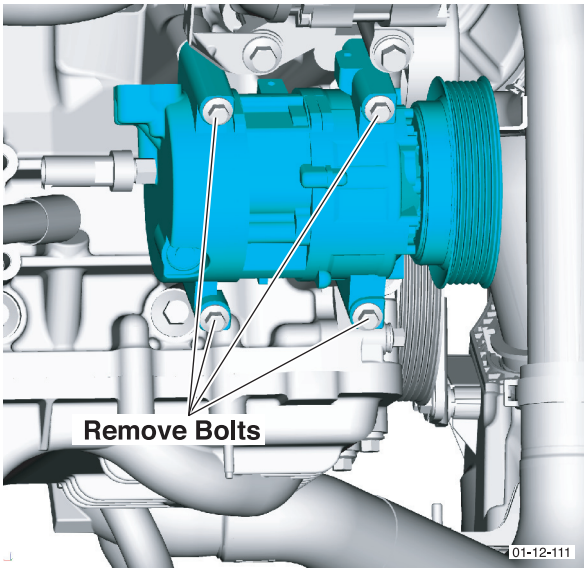
4. Remove the accessory drive belt (Refer to 'Accessory Drive System (03.05)', page 3-6-1).
5. Disconnect the wiring harness plug.



6. Remove the A/C pipes. Discard the O-rings. Install suitable blanking plugs.



7. Remove bolts (x3) and withdraw the A/C compressor.



8. Measure the amount of oil held in the A/C compressor.

This step is not necessary in the case of refrigerant loss.

8.1 Pour oil from the old A/C compressor into a suitable measuring container. Note the amount and discard oil.

8.2 Install blanking plugs to the old A/C compressor.

8.3 Note the volume of oil recovered with the refrigerant.

Installation

If replacing a faulty A/C compressor with internal mechanical damage, also replace the receiver drier which could also be contaminated with mechanical debris.

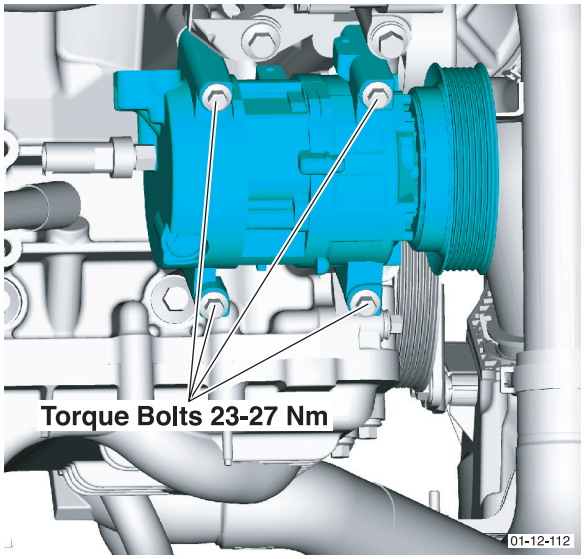
1. Fill the new A/C compressor with the correct amount of oil.

1.1 Remove the blanking plugs from the A/C compressor.

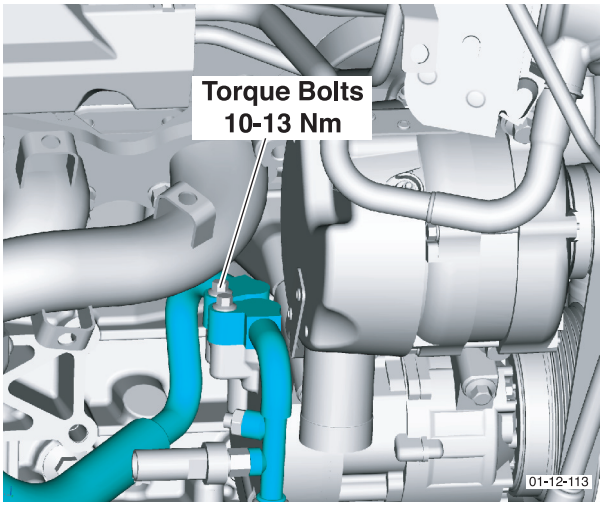
1.2 Fill the A/C compressor with same amount of oil that was recovered from the original A/C compressor, plus the amount recovered from the recovery equipment.

1.3 Install the blanking plugs to the A/C compressor.

2. Install the A/C compressor. Torque bolts (x4) to **23-27 Nm**.

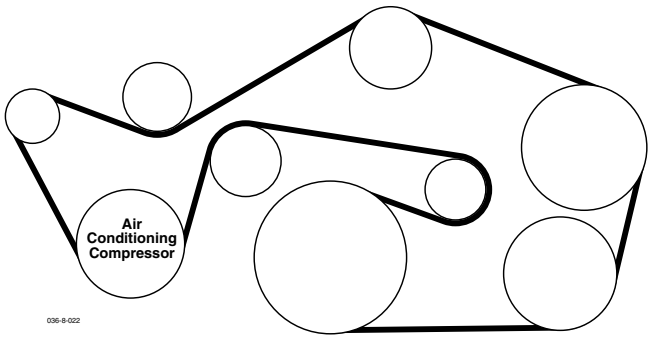


3. Install both A/C pipes. Use new O-rings. Torque bolts (x2) to **10-13 Nm**.



4. Connect the wiring harness plug.

5. Install the accessory drive belt (Refer to 'Accessory Drive System (03.05)', page 3-6-1).



6. Connect the vehicle battery.
7. Install the road wheel arch liner and road wheel (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
8. Recharge the A/C system.
9. Start the engine. Allow the engine cooling system to rise to normal running temperature.
10. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

Condenser

Repair Operation Time (ROT)	
Item	**Code**
A/C Condenser Renew	**12.03.BB**

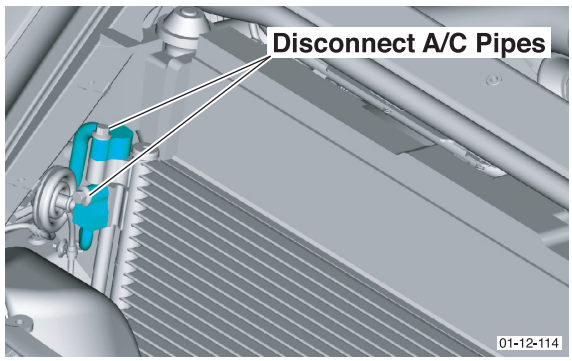
Removal

1. Disconnect the vehicle battery.
2. Recover the A/C refrigerant (Refer to 'Recovery', page 12-3-8).
3. Drain the engine coolant system (Refer to 'Cooling System (03.03)', page 3-4-1).

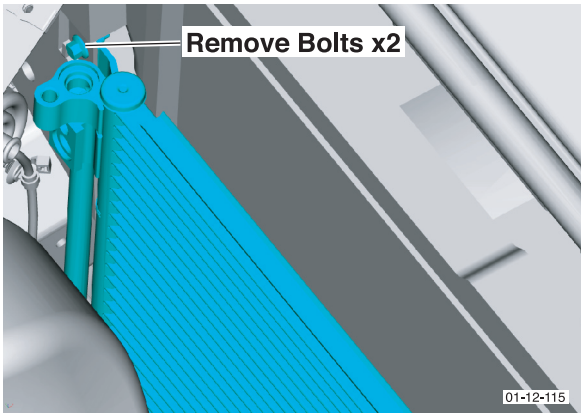
Caution

Ensure open ends are plugged immediately after disconnecting refrigeration parts. If moist air or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other faults may occur.

4. Remove the 'slam' panel.
5. Disconnect the A/C pipes. Discard the O-rings. Install suitable blanking plugs.



6. Remove bolts (x2).

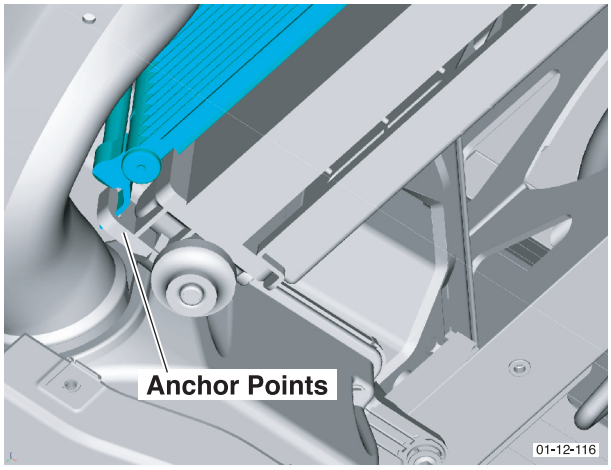


7. Withdraw the condenser upwards.

Installation

If a new condenser is to be installed ensure the correct amount of A/C system oil is added.

1. Insert the condenser, locate the bottom of the condenser into the anchor points (x2). Install bolts (x2).



2. Install both A/C pipes. Use new O-rings. Torque bolts (x2) to **10-13 Nm**.
3. Install the 'slam' panel.
4. Fill the coolant system (Refer to 'Cooling System (03.03)', page 3-4-1) and charge the A/C system (Refer to 'Charging', page 12-3-8).

Receiver Drier Assembly

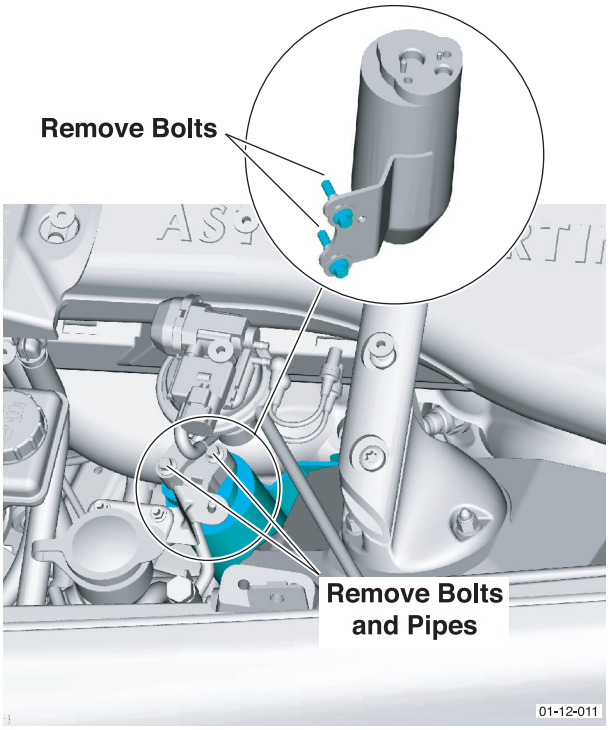
Repair Operation Time (ROT)	
Item	**Code**
A/C Receiver Drier Renew	12.03.DB

Removal

1. Disconnect the vehicle battery.
2. Recover the refrigerant (Refer to 'Recovery', page 12-3-8).
3. Disconnect the A/C pipes from the receiver drier assembly. Remove and discard the 'O' rings. Install suitable blanking plugs.

Caution

Ensure open ends are plugged immediately after disconnecting refrigeration parts. If moist air or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other faults may occur.



4. Remove bolts (x2) and withdraw the receiver drier assembly.
5. Recover the spacers and ferrules for reuse.

Installation

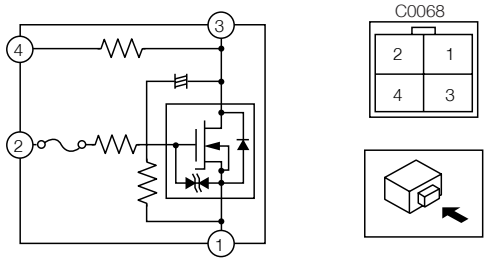
1. Install receiver drier assembly.Torque bolts to **2-3 Nm**.
2. Connect the refrigerant lines. Torque to **2-3 Nm**.

Install new 'O' rings to the A/C system connectors.

3. Charge the A/C system (Refer to 'Charging', page 12-3-8).
4. Connect the vehicle battery. Start the engine. Allow the engine cooling system to rise to normal running temperature.
5. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

Power Transistor

Inspection



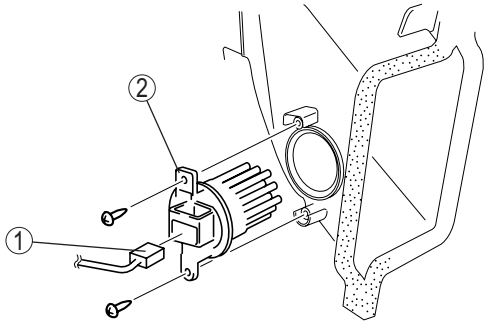
1. Verify that the continuity between the power transistor terminals is as indicated in the table below.
   If there is any fault, replace the power transistor.

If the blower motor operation is not normal even though no fault can be verified, inspect the A/C module.

Tester lead		Resistance (kilo hm)
+	-	
1	3	Infinity
1	2	11.0
1	4	Infinity
3	1	Continuity detected
3	2	Continuity detected
3	4	1.5
2	1	11.0
2	3	Infinity
2	4	Infinity
4	1	Continuity detected
4	3	1.5
4	2	Continuity detected

Removal

1. Disconnect the vehicle battery.
2. Remove the glove box.
3. Disconnect the wiring harness plug.
4. Remove the power transistor.



Installation

1. Install the power transistor and connect the wiring harness plug.
2. Install the glove box.
3. Connect the vehicle battery.

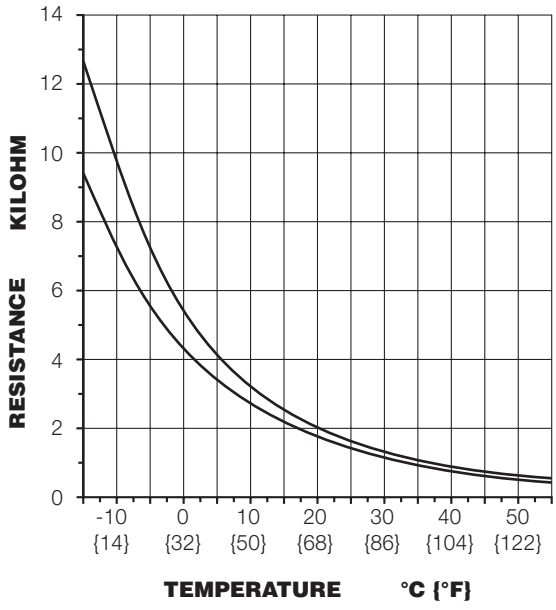
Evaporator Temperature Sensor

Inspection

Inspect the Evaporator Temperature Sensor when it is installed in the A/C unit.

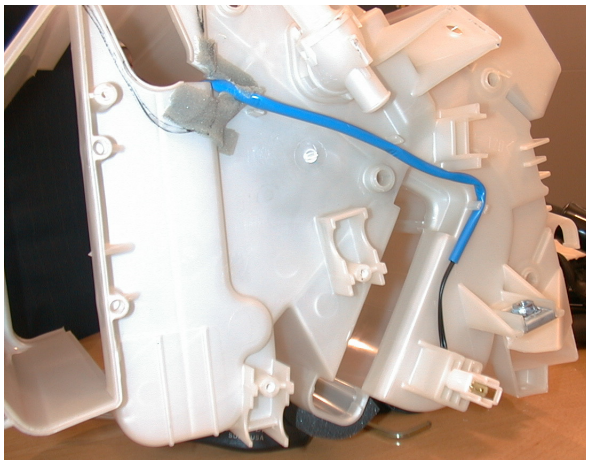
1. Set the fan speed Max. Hi.
2. Set the temperature control to Max. Cold.
3. Set the air intake mode to Recirculate.
4. Turn the A/C switch off.
5. Close all the doors and windows. Wait for 5 minutes.
6. Disconnect the Evaporator Temperature Sensor connector.
7. Measure the temperature at the air intake.
8. Measure the resistance between the Evaporator Temperature Sensor terminals.

If the characteristics of the Evaporator Temperature Sensor are not as shown in the graph, replace the Evaporator Temperature Sensor.



Removal

1. Disconnect the vehicle battery.
2. Remove the A/C unit (Refer to 'A/C Unit', page 12-3-11).
3. Remove the evaporator (Refer to 'Evaporator', page 12-3-14).
4. Remove the wiring harness plug from the A/C unit.
5. Remove the evaporator temperature sensor.



Installation

1. Install the evaporator temperature sensor.
2. Insert the evaporator (inlet / outlet first) into the half of the A/C unit which houses the expansion valve.
3. Complete with new 'O' rings, install the expansion valve and the A/C pipes clamp (screws x2).
4. Install the clips (x2) that secure the evaporator temperature sensor element to the evaporator.
5. Secure the two halves of the A/C unit together.

Take care to correctly locate the two vent flaps.

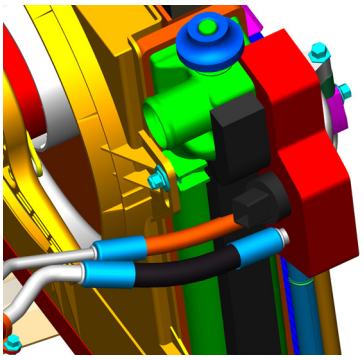
6. Connect (glue) the filter gauze and foam where the two halves of the A/C unit meet.
7. Install the in-vehicle temperature pipe to the A/C unit clips.
8. Install the A/C unit to the IP (Refer to 'A/C Unit', page 12-3-11).
9. Install the IP (Refer to 'Instrument Panel (IP) (01.12)', page 1-9-1).
10. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

Trinary Switch

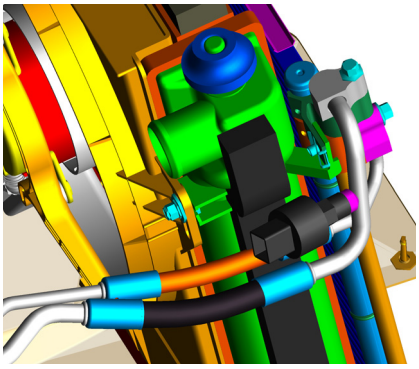
Repair Operation Time (ROT)	
Item	Code
A/C Trinary Switch Renew	TBA

Removal

1. Disconnect the vehicle battery.
2. Recover the refrigerant from the A/C system.
3. Remove the foam surround.



4. Disconnect the wiring harness plug.
5. Hold the piping block with pliers or a similar tool and loosen the trinary switch using a wrench. Withdraw the trinary switch.



Installation

1. Install the trinary switch. Torque to **TBA Nm**.

Apply compressor oil to the O-ring joint.

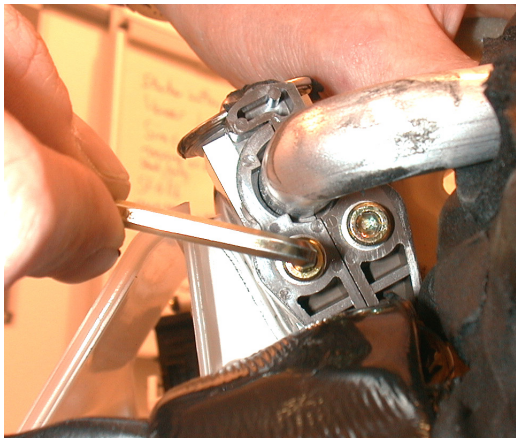
2. Connect the wiring harness plug.
3. Install the foam surround.
4. Charge the A/C system (Refer to 'Charging', page 12-3-8).
5. Connect the vehicle battery. Start the engine. Allow the engine cooling system to rise to normal running temperature.
6. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

Expansion Valve

Repair Operation Time (ROT)	
Item	Code
A/C Expansion Valve Renew	TBA

Removal

1. Disconnect the vehicle battery.
2. Recover the refrigerant from the A/C system.
3. Remove protective material from around the expansion valve.
4. Remove screws (x2). Remove the A/C pipes clamp.



5. Withdraw the A/C pipes. Discard 'O' rings.



6. Withdraw the expansion valve. Discard 'O' rings.



Installation

Install new 'O' rings.

Apply compressor oil to the 'O'-ring joints.

1. Install the expansion valve to the A/C unit body.
2. Install the A/C pipes to the expansion valve.
3. Install the A/C pipes clamp.
4. Install sealant around the evaporator pipes.
5. Install the in-vehicle temperature pipe to the A/C unit clips.
6. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9)
7. Connect the vehicle battery. Start the engine. Allow the engine cooling system to rise to normal running temperature.
8. Carry out A/C system actuator check and functional check to ensure correct operation (Refer to 'A/C System Testing', page 12-3-9).

Troubleshooting

The areas for inspection (steps) are given according to various circuit malfunctions. Use the following chart to verify the symptoms of the trouble in order to diagnose the appropriate area.

Symptom(1)	Description	Possible Cause
Insufficient air (or no air) blown from vents.	Problem with each vent / duct or both. Airflow mode does not change.	• Fault in Airflow Mode Actuator • Fault in 'Vent' mode system • Fault in 'Heat' mode system • Fault in 'Defroster' mode system

Symptom(2)	Description	Possible Cause
Amount of air blown from vents does not change.	Fault in blower system.	• Blower motor fault • Blower unit fault • Power transistor system fault • Climate control unit fault
Shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions. If there is a problem, check to make sure connectors, terminals and wiring harnesses are connected correctly and undamaged.		

Symptom(3)	Description	Possible Cause
Air intake mode does not change.	Air intake mode does not change when switching REC FRESH mode.	• Air Intake Actuator fault • Air intake door fault
Shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions. If there is a problem, check to make sure connectors, terminals and wiring harnesses are connected correctly and undamaged.		

Symptom(4)	Description	Possible Cause
No temperature control with A/C Module.	Temperature does not change with operating temperature control dial	• Air Mix Actuator (5 V signal) system fault • A/C Module (potentiometer GND signal) system fault • Air Mix Actuator (potentiometer input signal) system fault • Air Mix Actuator (potentiometer GND signal, motor drive signal) system fault • Air Mix Actuator system fault • A/C unit air mix door fault
Shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions. If there is a problem, check to make sure connectors, terminals and wiring harnesses are connected correctly and undamaged.		

Symptom(5)	Description	Possible Cause
Windshield fogged.	• A/C compressor does not operate while airflow mode is in DEFROSTER or HEAT DEF modes • Air intake mode does not change to FRESH while airflow mode is in DEFROSTER or HEAT DEF modes	• A/C Module (B+ signal) system fault • Air intake actuator fault • A/C Module (RECIRCULATE, FRESH signal) system fault • Fault in blower unit air intake doors
Shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions. If there is a problem, check to make sure connectors, terminals and wiring harnesses are connected correctly and undamaged.		

Symptom(6)	Description	Possible Cause
Air from vents not cold enough.	Magnetic clutch operates but A/C system malfunctions.	• Drive belt fault • Fault in blower unit or condenser • Fault in Receiver / Drier or expansion valve (valve closes too much) • Fault in refrigerant lines • A/C compressor system fault, insufficient compressor oil • Over filling of compressor oil, fault in expansion valve or A/C unit air mix link system
Shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions. If there is a problem, check to make sure connectors, terminals and wiring harnesses are connected correctly and undamaged.		

Symptom(7)	Description	Possible Cause
No cool air.	Magnetic clutch does not operate.	• Fault in PCM A/C cut control system • Fault in A/C Module • Fault in refrigerant pressure switch • Fault in PCM (A/C signal) • Fault in PCM (IG1 signal) • Fault in A/C compressor • Fault in A/C relay • Fault in Evaporator Temperature Sensor
Shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions. If there is a problem, check to make sure connectors, terminals and wiring harnesses are connected correctly and undamaged.		

Symptom(8)	Description	Possible Cause
Noise while operating A/C system.	Noise from magnetic clutch, A/C compressor, hose or refrigerant line.	• Magnetic clutch operation noise • A/C compressor slippage noise • Hose or refrigerant line interference noise

ASTON MARTIN
ASTON MARTIN

Information, Gauge and Warning (13.00)

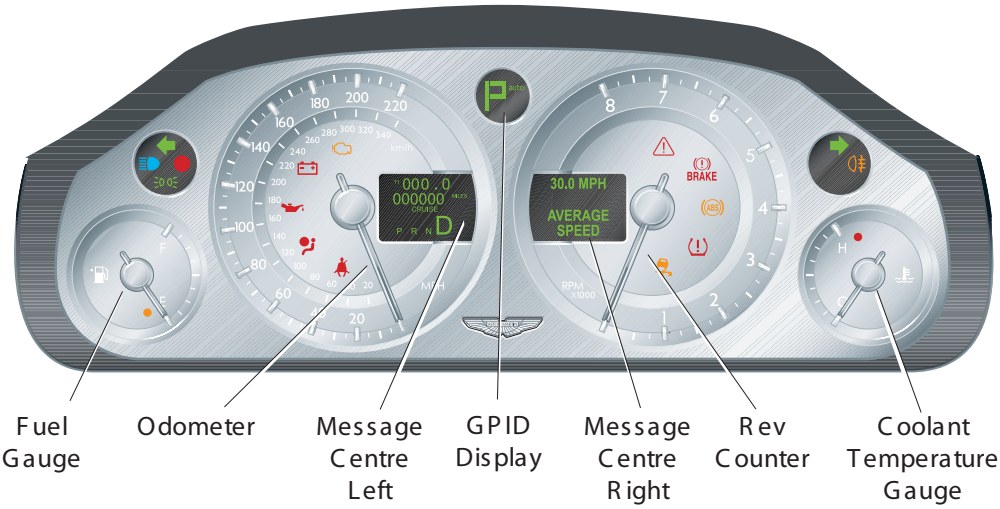
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Information, Gauge and Warning (13.00)

Driver Information Module (DIM) (13.01)

Description



The Driver Information module contains the necessary electronic control units and memories to control, process and present all necessary vehicle information to the driver.

1. Information on vehicle performance is presented in visible form using the instruments and gauges. These devices present such information as Vehicle Speed, Engine Speed, Fuel Level and Coolant Temperature.
2. Information on vehicle status is presented by an array of warning lights.
   - Red - indicate immediate danger warnings
   - Amber - indicate conditions which are serious but not immediately dangerous
   - Green and Blue - indicate normal actuation of items such as turn signals or fog lamps

   The message centres and the gear position indicator display (GPID) are used to present information on the distance recorders (trip meters), current gear mode and current gear engaged.
3. The right message centre is used to display any warning / information message text. These text messages may be reinforced in some cases by illumination of the appropriate warning lamps.

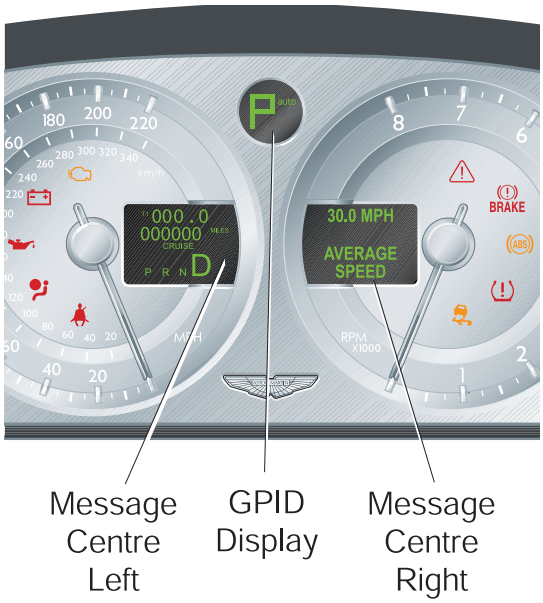
The following table defines all information and warning lamps and their significance:

Information and Warning Lamps

Name / Function	Description	Symbol	Input Signal	Power On Check
General Warning – Amber / Red	Controlled internally by the DIM. It is used in conjunction with several text messages to indicate information to the driver.		Internal	
SRS (Airbag)	Controlled externally by the SRS module and indicates a fault in the SRS module.		CAN	Yes (5 Seconds)
High Engine Coolant Temp	This tell tale is controlled internally by the DIM. Activated when the engine coolant temperature signal from the CAN bus reaches a pre defined value. (The actual symbol is not lit, only the red LED.)		CAN	
DSC	Controlled externally by the ABS / DSC module. Indicates when the system is in operation or when it is turned off. The tell tale is triggered by a CAN signal.		CAN	Yes (5 Seconds)
ABS	Controlled externally by the ABS / DSC module. Indicates a fault in the ABS system. The tell tale is triggered by a CAN signal.		CAN	Yes (5 Seconds)
Rear Fog Lights	Controlled externally by the SRS module. Indicates that the rear fog lights are turned on. The tell tale is triggered by a CAN signal.		CAN	Yes (5 Seconds)
Seat Belts	Controlled externally by the CEM. Indicates that the seat belts are not fastened properly. The tell tale is triggered by a CAN signal.		CAN	Yes (5 Seconds)
Brake (General)	Controlled externally by either the CEM or the ABS / DSC module. It indicates low brake fluid level, brake fault and park brake. The tell tale is triggered by two low side inputs or a CAN signal.		Low side x 2 **and** CAN	Yes (5 Seconds)
Side Lights	Controlled externally by the CEM. Indicates that the side lights are on.		High side	
Oil Pressure	Controlled externally by the PCM. Indicates low oil pressure. The tell tale is triggered by a CAN signal.		CAN	Yes (5 Seconds)
Battery Charge	Controlled externally by the CEM. Indicates that the alternator is no longer charging the battery properly. The tell tale is triggered by a CAN signal.		CAN	Yes (5 Seconds)
Fuel Level Low	Controlled internally by the DIM. Activated when the fuel level drops below a pre defined value. The fuel information is provided from the CAN bus. The symbol is not lit, only the amber LED.		CAN	
Turn Left / Right	Controlled externally by the CEM. The tell tale is triggered by a CAN signal.		CAN	
High Beam	Controlled externally by the CEM. Indicates that the high beam is switched on. The tell tale is triggered by a CAN signal.		CAN	
Check Engine	Controlled externally by the PCM. Indicates a fault in the engine management system. The tell tale is not connected to the microprocessor.		Low side	
Tyre Pressure	Controlled by the DIM. Indicates a low or rapid change in the tyre pressure or a tyre pressure monitoring system fault.		Low side	Yes (5 Seconds)
Not Used				
PATS	Controlled externally by the PCM. Indicates key acceptance status.		Low side	

DIM Display layout

The DIM contains two displays, which are used to inform the driver about the vehicles status.



Message Centre Left

The Message Centre left is used to display the odometer (A), the Cruise control status (B), the Gear range (C) and the T1 or T2 trip distance (D).



Gear Position Indicator Display (GPID)

Automatic Transmission

On an automatic transmisssion vehicle the GPID display contains the two gearbox mode 'tags' (Auto and Touch), and a segmented character area. This segmented display can show P, R, N, D, 1, 2, 3, 4, 5, 6 depending on the current gear engaged. The display is dual colour.

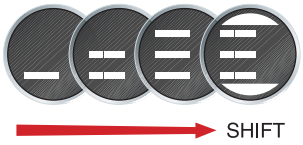


Green - normal operation

Red - defined situations.

Manual Transmission

On a manual transmisssion vehicle the GPID display informs the driver when the current gear has reached it's upper rev. limit the GPID will indicate revs increasing. The optimum time to shift gear is when the GPID shows three bars and is red at the top and bottom.



For the first 2000 km (1243 mile) and when ever the engine temperature is below 40°C (104°F) the shift control will indicate early shift changes to protect the engine.

A red 'R' will show when the transmission is in reverse.



Message Centre Right

The Message Centre Right is used to display the trip function information and warning / information messages.



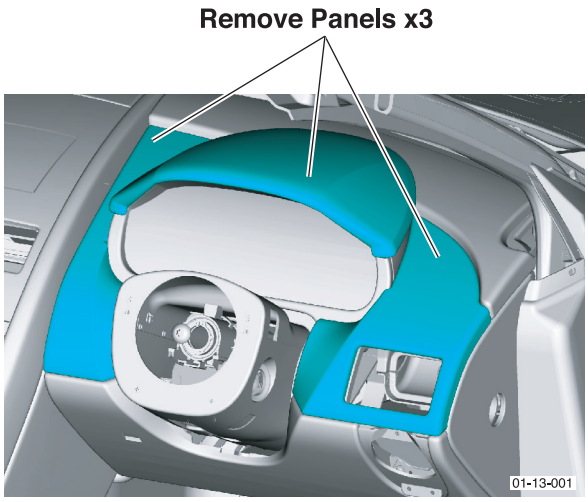
Maintenance

Driver Information Module (DIM)

Repair Operation Time (ROT)	
Item	**Code**
Driver Information Module (DIM) Renew	**TBA**

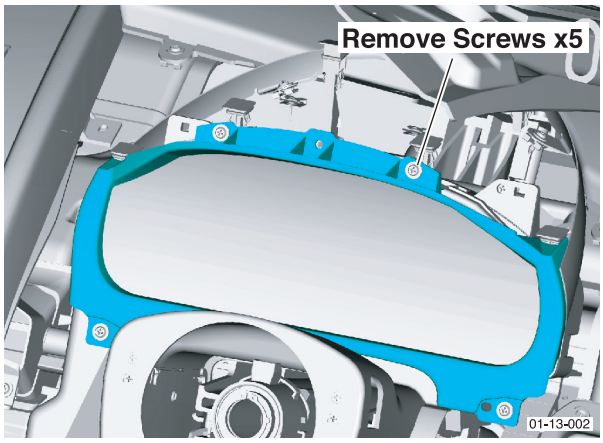
Removal

1. Disconnect the vehicle battery.
2. Remove the following items of trim.
   - 2.1 Remove panel (pull off).
   - 2.2 Remove panel (pull off).
   - 2.3 Remove panel (pull off).



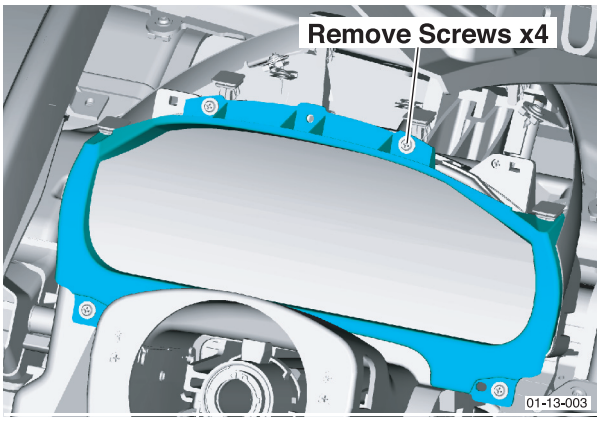
3. Remove the screws that secure the DIM bezel (x5). Withdraw the bezel and lay it on the steering column.

The DIM bezel is attached to the leather trim.



4. Remove the screws (x4) that secure the DIM. Withdraw the DIM to the extent of the wiring harness.

Ensure the spacers are retained.

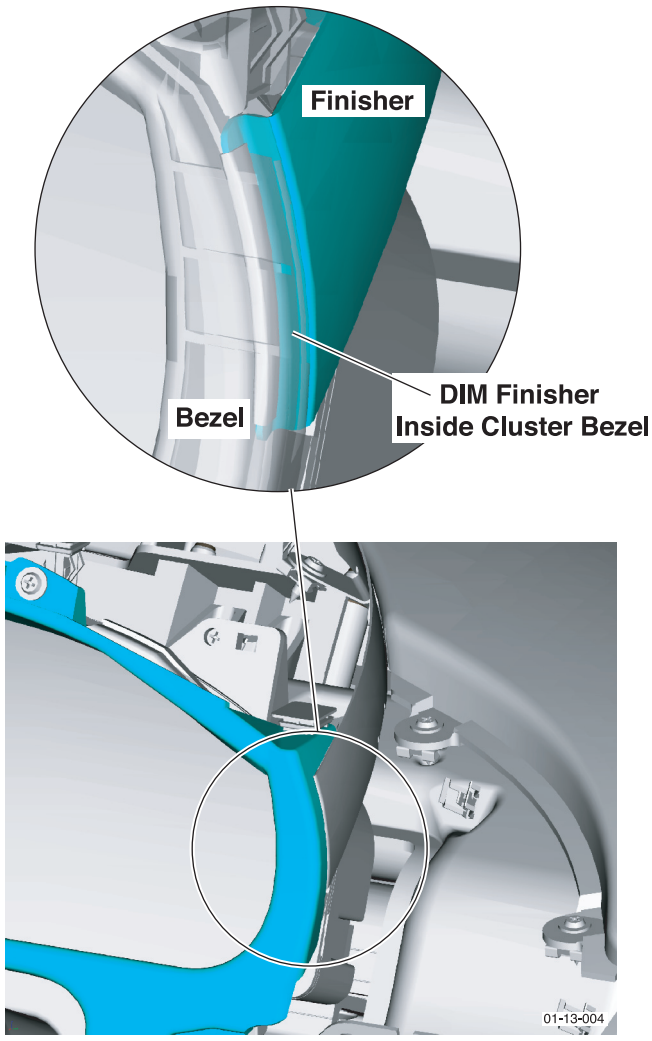


5. Disconnect the wiring harness plug. Withdraw the DIM.

Installation

1. Place the DIM to it's mounting point. Connect the wiring harness plug.
2. Install the DIM (screws x4).
3. Install the DIM bezel (screws x5).

Ensure that the DIM finishers install on the inside of the cluster bezel.



4. Install the trim panels.
5. Connect the vehicle battery.

Power Supply (14.00)

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Installation.....2-2

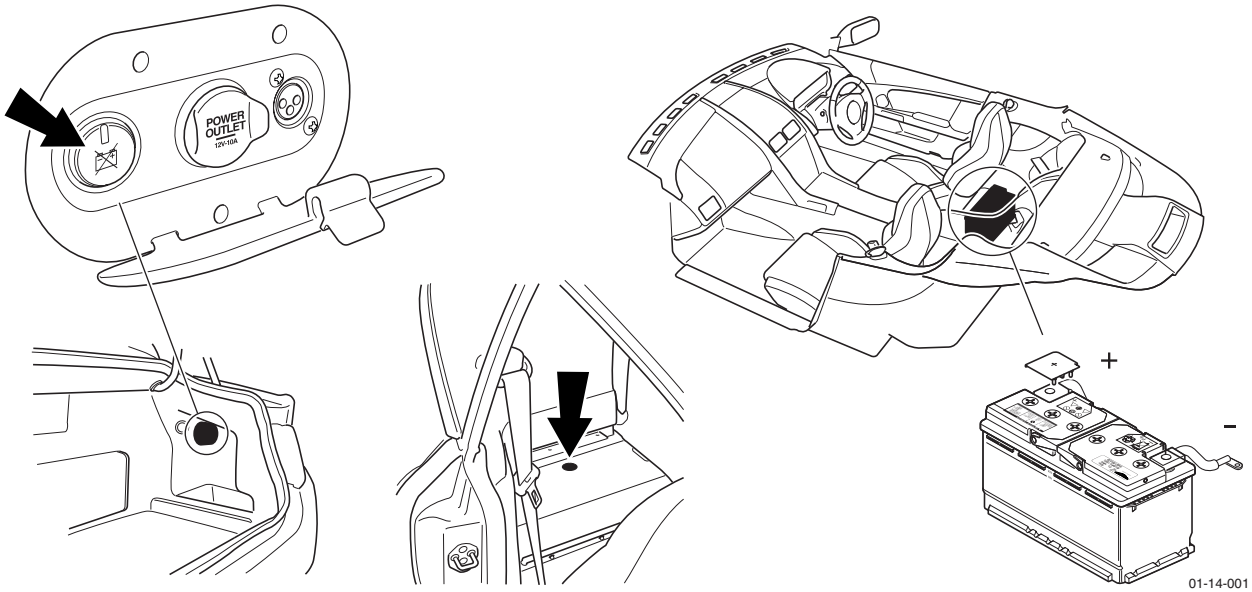
Power Supply (14.00)

Battery System (14.01)

Description

The 12 volt negative earth ('-' ve) battery is located under the drivers side rear seat and is grounded to the vehicle body.

The battery positive ('+' ve) terminal is connected to a battery connect switch. The connect switch may be accessed by raising the rear seat cushion.



Battery Connect Switch

When the battery connect switch is in an 'open' state it isolates electrical power from all systems except the 'keep alive memory' functions in the PCMs, TCU, radio, navigation system and door modules.

This function isolates electrical power from vehicle circuits under all normal service conditions with the following exceptions:

- Before any welding or other work which may induce high voltages into the electronic control modules
- Before disconnecting any of the control modules with 'keep alive memory'
- Before any major service task (e.g. engine removal)
- Before installing any accessory which involves modification of vehicle wiring

In the above four exceptions the battery earth ('-' ve) lead should be disconnected.

When the battery earth ('-' ve) terminal is disconnected, data held in keep alive memories will be lost.

After connecting the battery, the radio preset stations and the door window controllers will require to be reset (Adaptive learning data in the PCMs and TCU (Auto transmission) modules will require to be re-learned by driving the vehicle for some miles in a range of driving conditions), **driveability may be slightly compromised until the vehicle systems have completed their adaptive learning routines again.**

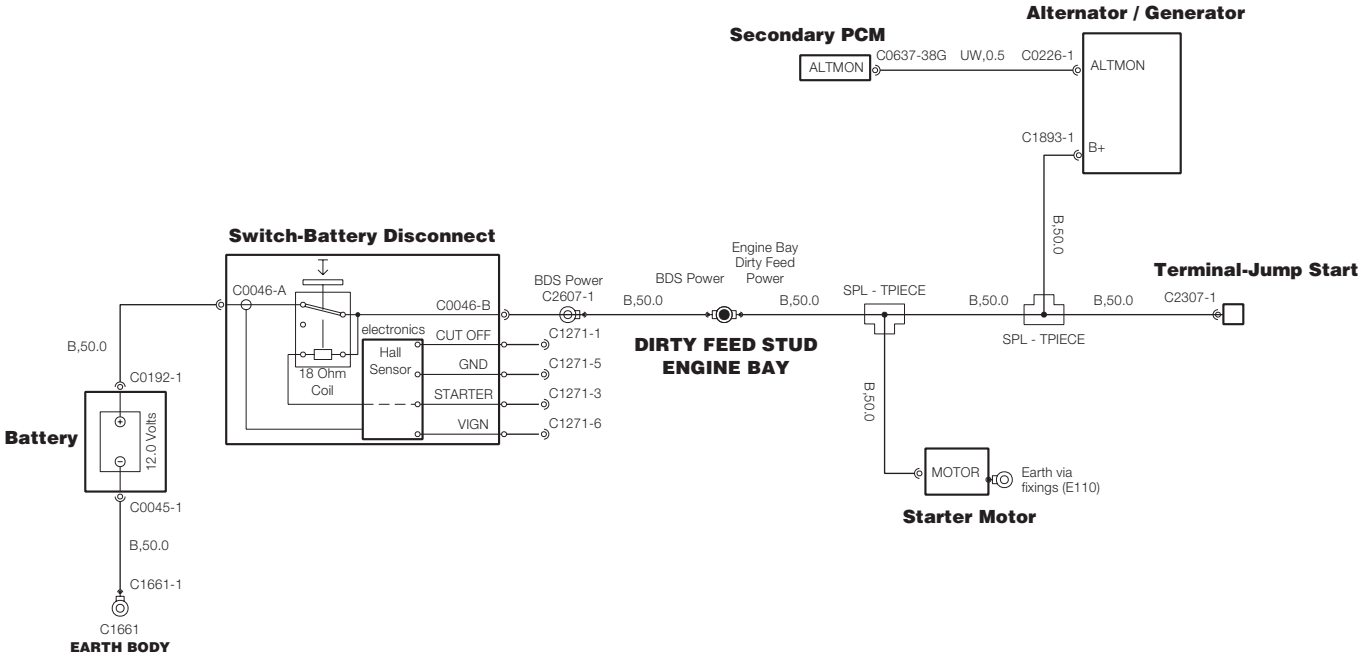
Battery Disconnection and Alarm Activation

The vehicle is installed with an alarm which will be activated if the battery is disconnected. This alarm is driven by a back up battery within the alarm sounder unit.

To prevent the alarm from sounding when the battery is disconnected (for workshop procedures), disconnect the battery within 10 seconds of switching off the ignition. Always carry out the following procedures upon connection of the battery.

- Reset the clock
- Reset the radio preset programmes.
- Reset the window maximum up and maximum down settings.

Charging Circuit



Electrical power generated at the alternator flows via two 'T Piece' connectors to the engine bay 'Dirty Feed' stud. It then flows via the Battery Disconnect Switch (BDS) to the battery positive terminal. Both the alternator and the battery are earthed via the vehicle body to complete the charging circuit.

The starter motor and the 'jump start terminal' are also fed directly from the charging circuit.

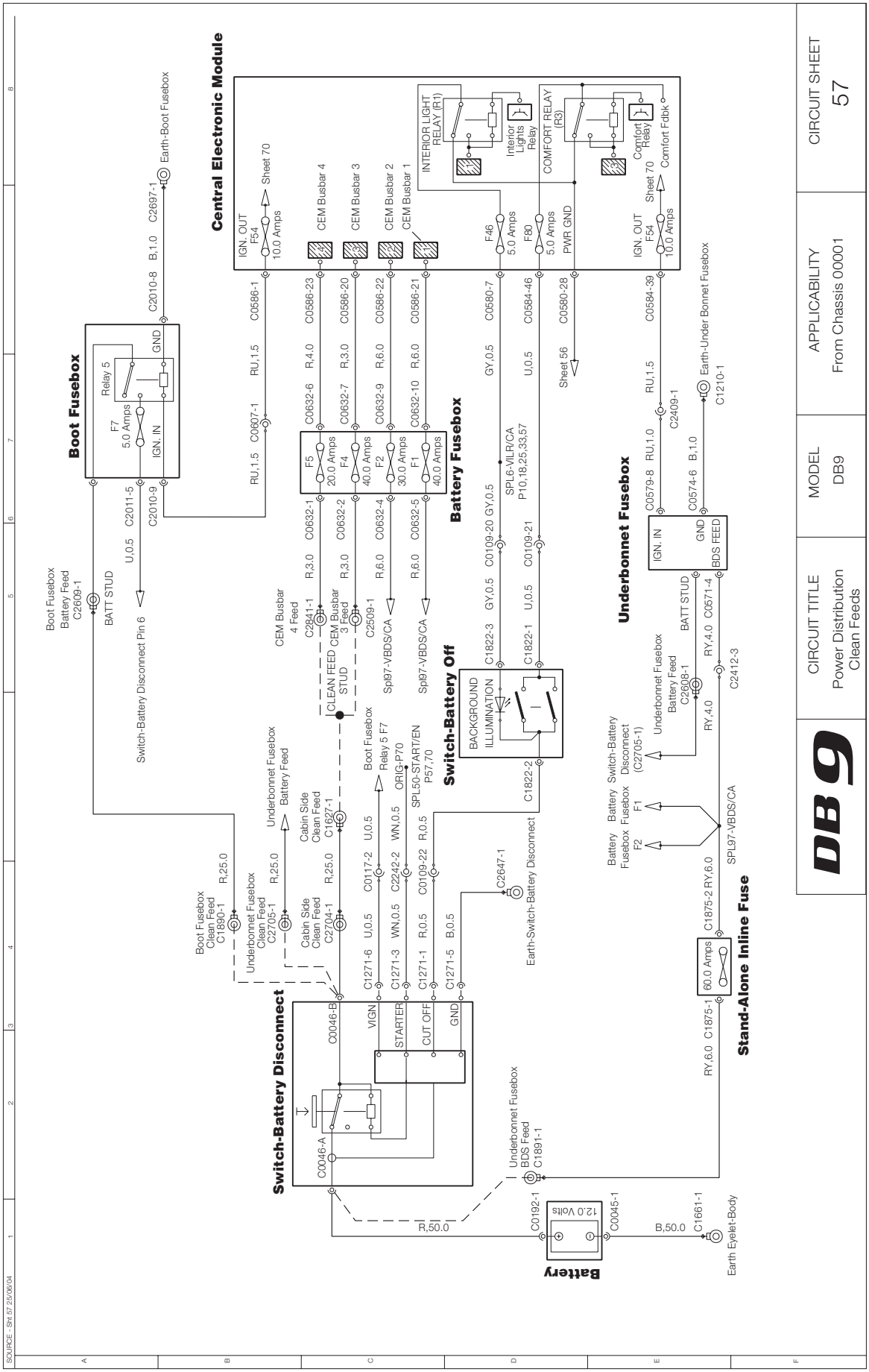
+12 Volt Distribution

The +12 volt supply comes from the battery to the battery disconnect switch (BDS). Assuming that this switch is not activated, 12 volt power is then available from C0046-8 on the BDS to all of the clean feed battery studs.

The following clean feeds are then live:

- Boot fuse box clean feed
- Under bonnet fuse box clean feed
- CEM busbars 1, 2, 3, 4 and 5 clean feeds

12V power to all systems and components is then controlled by the CEM and the under bonnet / boot fuse boxes.


Central Electronic Module
Boot Fusebox
Battery Fusebox
Underbonnet Fusebox
Switch-Battery Off
Switch-Battery Disconnect
Stand-Alone Inline Fuse
Battery
CIRCUIT TITLE
Power Distribution
Clean Feeds
MODEL
DB9
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
57

Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Battery Compartment Cover	9	7
Battery clamp	9	7
Battery Terminals	9	7

Maintenance

Battery

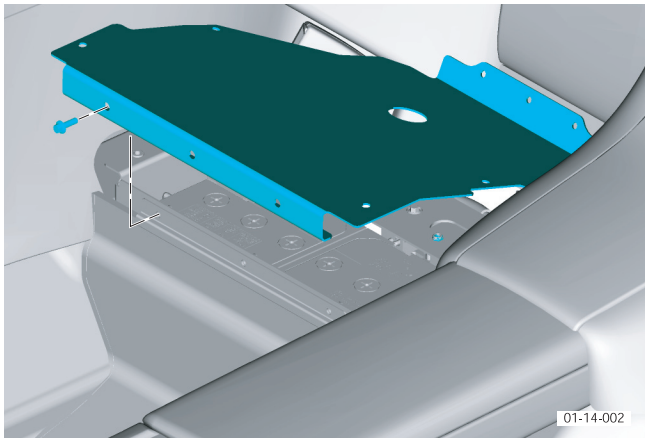
Repair Operation Time (ROT)	
Item	**Code**
Battery Renew	**14.01.AB**

Removal

1. Power the drivers seat forward.
2. Remove the RH rear seat to reveal the battery compartment.

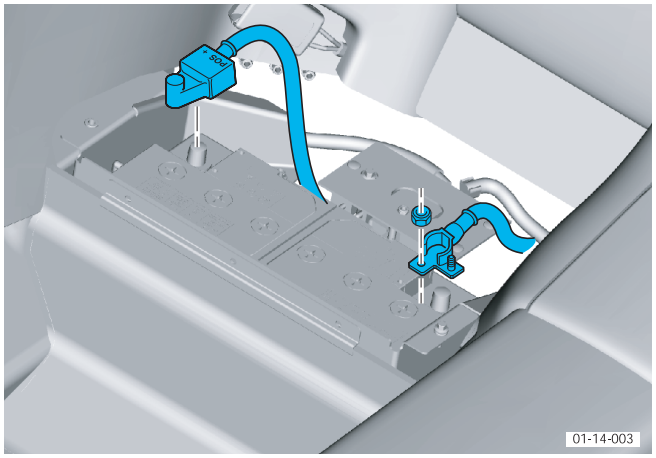
The rear trim ¼ panel may need to be removed to gain access to the battery compartment lid bolts.

3. Remove bolts (x10). Remove the battery compartment cover.



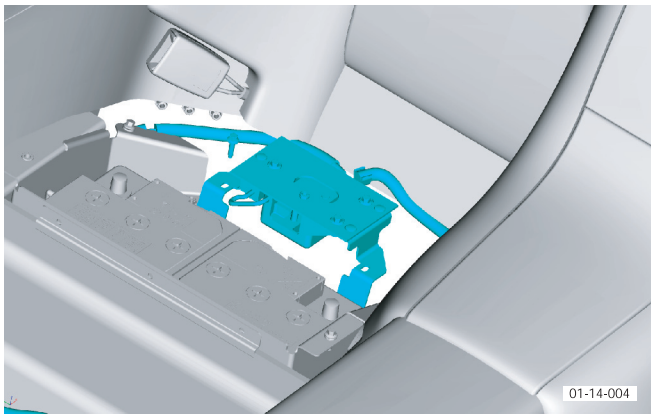
4. Disconnect the battery terminals.

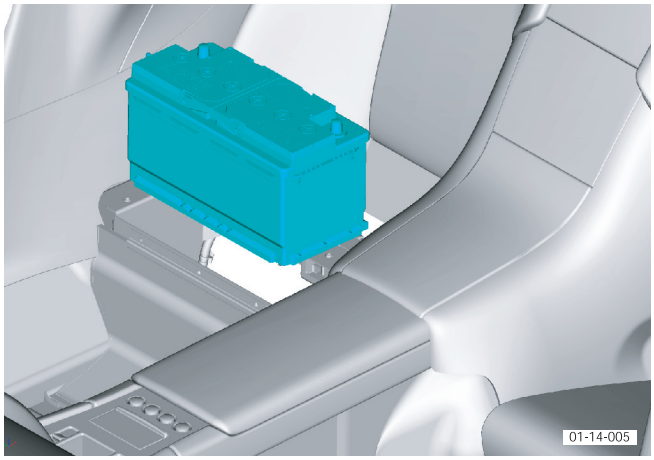
⚠ Warning ⚠
Always disconnect the earth (- ve) terminal first.



5. Remove the battery clamp. Disconnect battery vent tube and pull the battery from the compartment.

⚠ Warning ⚠
The vehicle battery is heavy and access to the battery is restricted. Take care when lifting the vehicle battery.





Installation

⚠ Warning ⚠
The vehicle battery is heavy and access to the battery is restricted. Take care when lifting the vehicle battery.

1. Lower the battery into it's compartment.

Ensure that the battery vent tube is attached to the battery and that it located into the opening provided in the body.

2. Clamp the battery. Torque bolts to **9 Nm**.

Ensure that the battery vent tube is not distorted by the battery.

⚠ Warning ⚠
Always connect the earth (- ve) terminal last.

3. Install the battery terminals. Torque to **9 Nm**.
4. Install the battery compartment cover. Torque bolts to **9 Nm**.
5. Install the rear seat base.
6. Reposition the drivers seat.

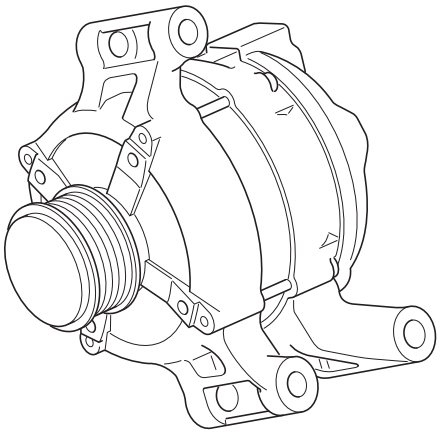
ASTON MARTIN
ASTON MARTIN

Power Supply (14.00)

Alternator and Regulator System (14.02)

Description

The alternator installed to this vehicle is a Denso, SC2, 150 amp rating, with a 14.4 volt regulator.



The Alternator has an 'Altmon' signal that goes to and from the secondary PCM via a wire in the 3 way connector.

The 'Altmon' signal is monitored by the secondary PCM which adjusts ignition timing and fuelling if necessary to maintain idle speed when the alternator is charging.

The alternator pulley has an in-built mechanical clutch which will slip if there is a rapid change in drive belt speed. This reduces the 'snatch' in the auxiliary drive system during gear changes.

Specifications

Torque Figures

Description	Nm.	lb. / ft.
Alternator mounts	43-52	32-38.5

Maintenance

Alternator

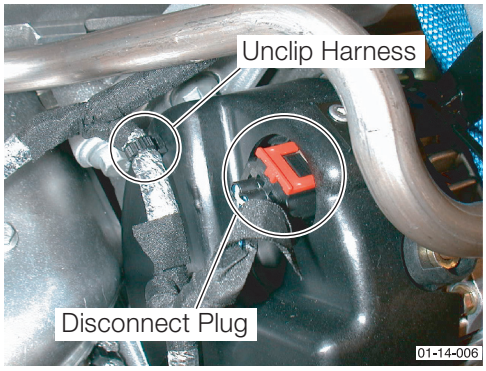
Repair Operation Time (ROT)	
Item	**Code**
Alternator Renew	**14.02.AB**

Removal

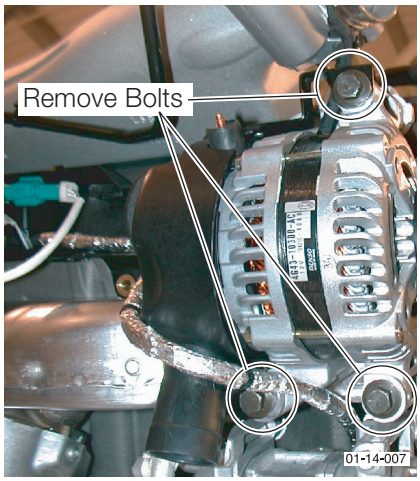
1. Disconnect the vehicle battery.
2. Disconnect the wiring harness plug on rear of alternator.



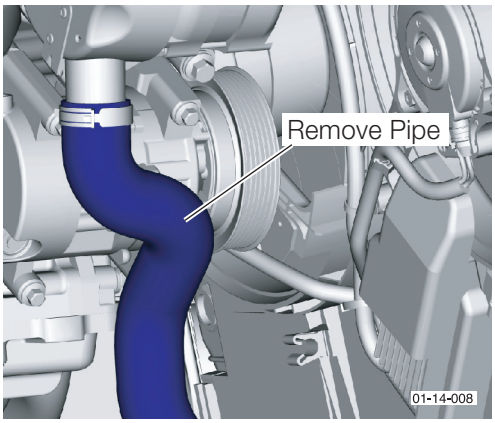
3. Raise the vehicle and make safe. Remove the road wheel and road wheel arch liner.
4. Remove the undertray.
5. Release the polyvee drive belt (Refer to 'Accessory Drive System (03.05)', page 3-6-1).
6. Unclip the wiring harness from the cooling cover.



7. Remove bolts / washers (x3). Withdraw the alternator complete with the cooling shield.



For easier access to bolt, remove air ducting from underside of cooling shield.

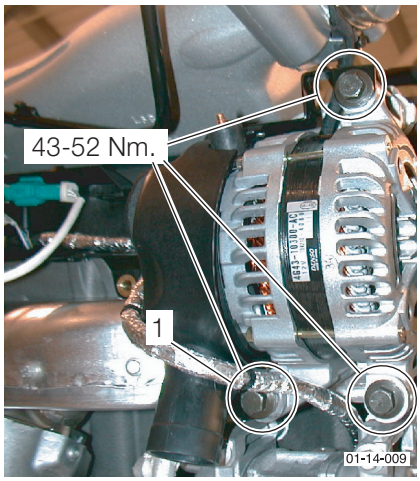


Installation

1. Place the alternator complete with the cooling shield to mountings.

Insert bolt (1) as cooling shield is placed to alternator.

2. Secure the alternator and cooling shield assembly to engine block. Tighten bolts (x3) to **43-52 Nm**.



3. Install the air ducting to the cooling shield, if removed.
4. Clip the wiring harness to the cooling shield.
5. Connect the wiring harness plug to the alternator.
6. Install the drive belt (Refer to 'Accessory Drive System (03.05)', page 3-6-1).
7. Install the road wheel arch liners.
8. Install the road wheels (Two stages (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7)).

Vehicle Entertainment (15.00)

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Vehicle Entertainment (15.00)

Audio System (15.01)

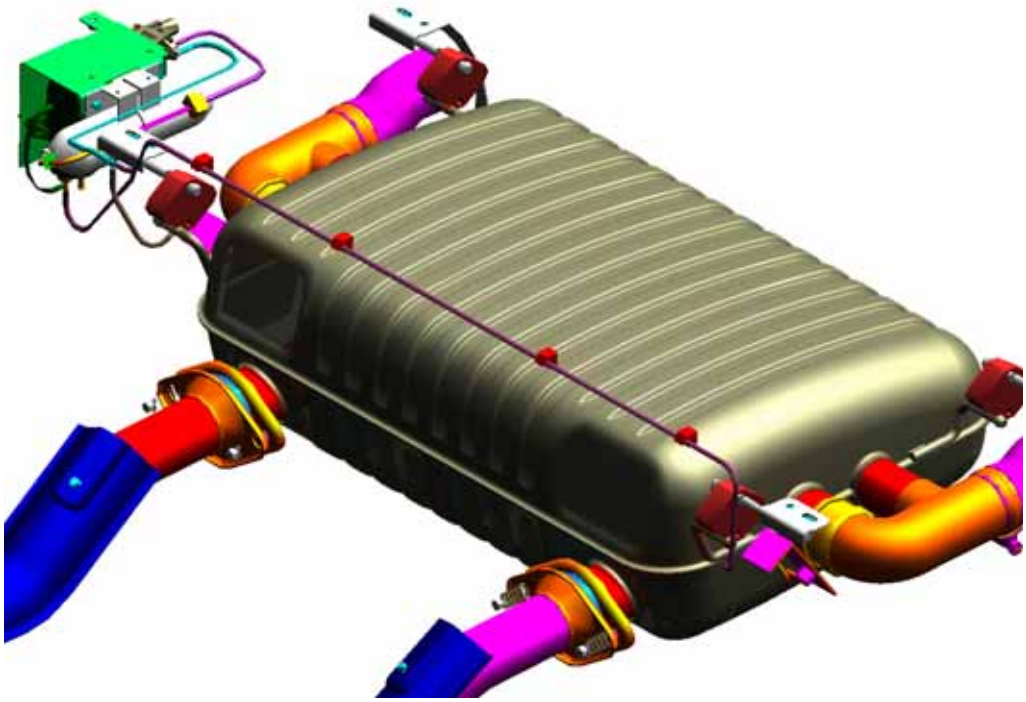
Refer to manufactures literature

Vacuum Distribution (16.00)

Details to follow

Body Vacuum System (16.01)

Description



Vacuum System (16.00)

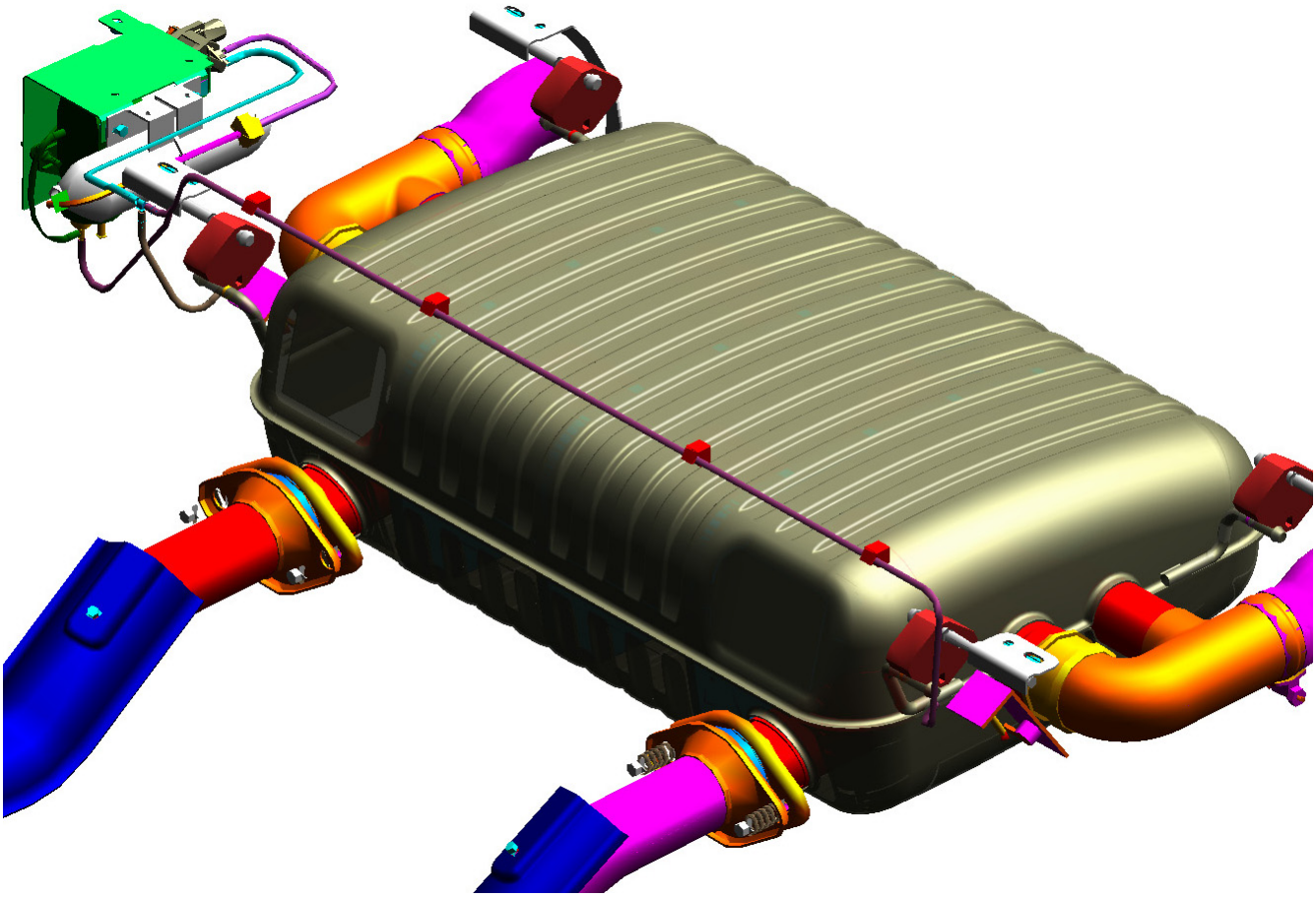
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Vacuum System (16.00)

Vacuum Distribution (16.01)

Description



Lighting (17.00)

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Lighting (17.00)

Front Lights (17.01)

Specifications

Bulbs			
	Rating	Type (European)	Type (Federal)
Headlight dipped beam	35W	D1S	D1S
Headlight main beam	65W	H9	H9
Front Indicators	27W / 29W	PY27W	3457 AK
Front Position Lamp	5W	W5W (Blue)	W5W (Blue)
Side Repeater	5W	WY5W	WY5W
Side marker (front and rear)	5W	N/A	W5W

Headlamp Alignment	European	Federal
Main Beam Alignment	1.5% Down	0.7% Down Vol.
Dipped Beam Alignment	1.5% Down	0.7% Down Vol.

Main beam is fixed to the Dipped beam.

Maintenance

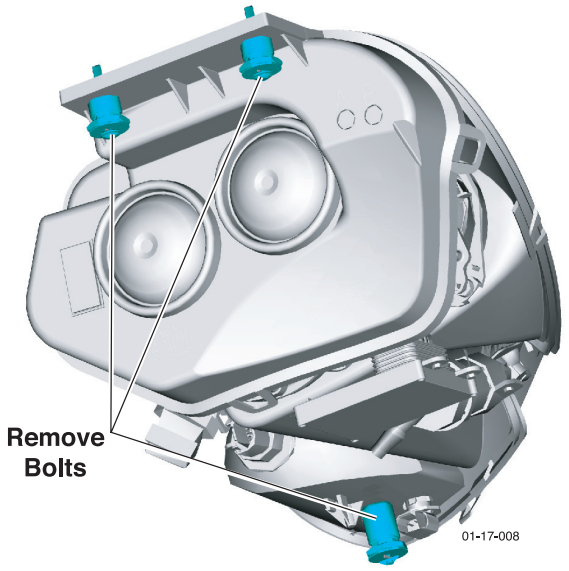
Headlamp Unit

Repair Operation Time (ROT)		
Item		Code
Headlamp Unit Renew	LH	17.01.AB
	RH	17.01.BB

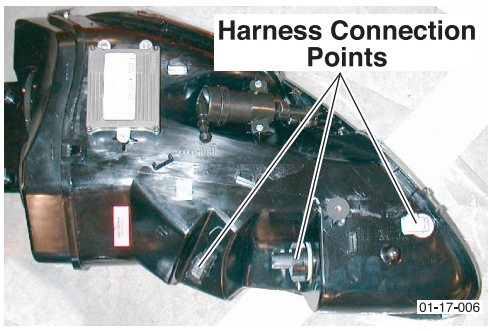
(Including side light and indicator)

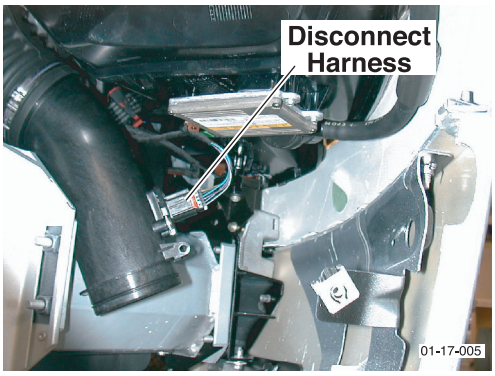
Removal

1. Raise the vehicle and make safe.
2. Remove the road wheel and road wheel arch liner.
3. Remove the air box (Refer to 'Air Charging (03.12)', page 3-13-1).
4. Remove bolts (x3) securing the headlamp unit bracket.



5. Disconnect the headlamp unit wiring harness plugs (x3)





6. Withdraw the headlamp unit.

Installation

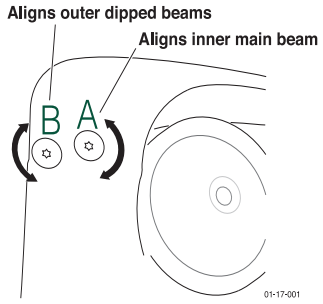
7. Install the headlamp unit.
8. Install the air box (Refer to 'Air Charging (03.12)', page 3-13-1).
9. Install the road wheel arch liner.
10. Install the road wheel (Refer to 'Road Wheel Nut Torque Tightening', page 4-5-7).
11. Carry out headlamp unit alignment procedure.

Headlight Alignment

Headlight alignment should be carried out with vehicle at design weight, i.e.,

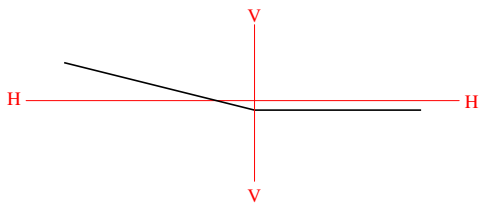
- Vehicle at kerb weight, plus
- All fluids at normal full level, plus
- A 75 kg weight in each front seat

1. Remove the access panel from the road wheel arch liner.
2. Switch the ignition to position 'II' then back to position '0'.
   This will motor the headlight units to their 'set' position.



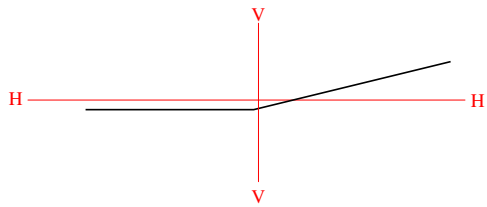
3. **ROW Only.**
   Align the headlamps so that the cut off of the dipped beam is 1.5% below the horizontal.

LHD Headlamps



1.5% (0.86° below the horizontal)

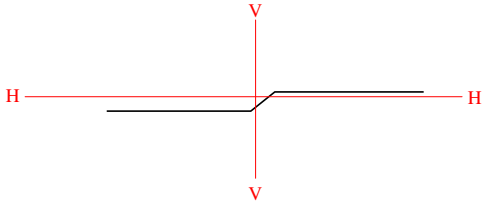
RHD Headlamps



1.5% (0.86° below the horizontal)

4. **Federal Only**.
   Align the headlamps so that the LH cut off of the dipped beam is 0.7% below the horizontal.

Federal Headlamps



0.7% (0.4° below the horizontal)

5. Switch the ignition to position 'II' then back to position '0' to ensure that the headlight units are at their set position.
6. Check the headlight unit alignment again to confirm correct alignment.

Continental Conversion

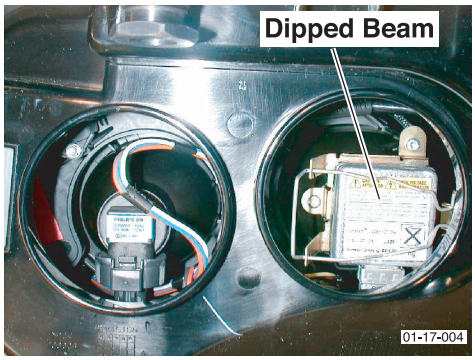
(UK Spec only)

1. Disconnect the vehicle battery.
2. Gain access to the headlight unit by removing the access panel in the road wheel arch liner.
3. Remove both rubber covers.

> ⚠ ***Warning*** ⚠
> ***HID bulbs start-up voltage can be as much as 1000v.***
> ***Ensure power to HID bulbs has been disconnected before attempting to service them. Failure to do this may result in a severe injury or death.***

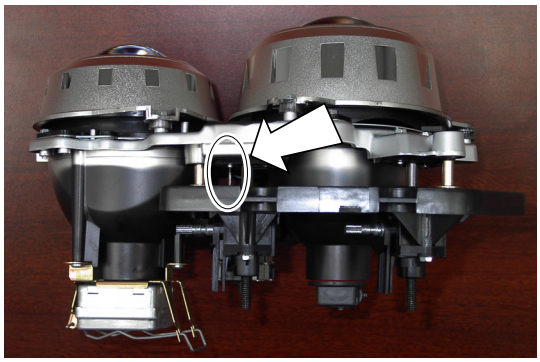
> ⚠ ***Warning*** ⚠
> ***HID bulbs get hot during operation.***
> ***Allow at least 15 minutes for headlamp assemblies to cool before attempting to service them. Failure to do this may result in burns to skin or clothing.***

4. Disconnect the dipped beam bulb unit wiring harness plug. Remove the spring clip and withdraw the bulb unit.

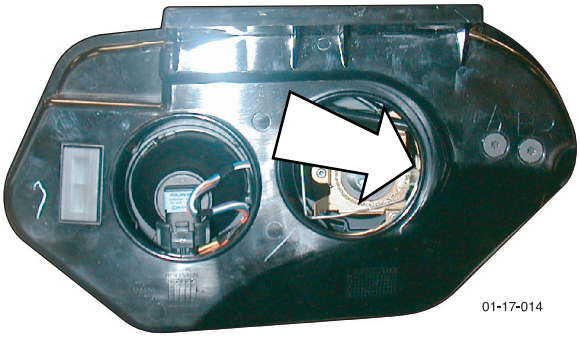


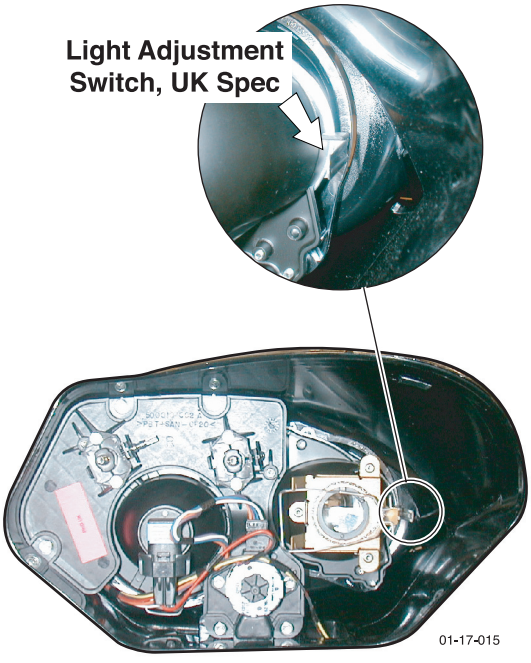
5. Locate the conversion switch and move up / down until a positive 'click' is heard.

LH Headlamp Unit



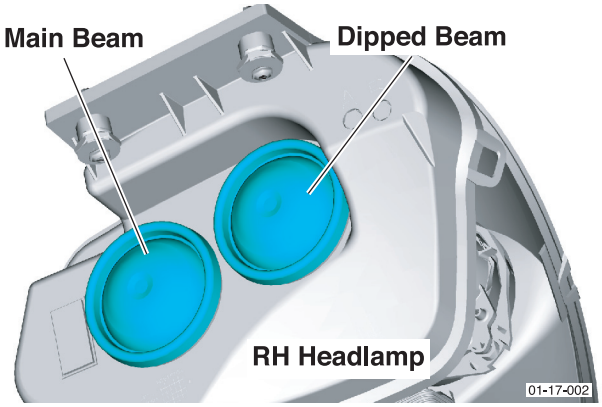
RH Headlamp Unit





6. Install the dipped beam bulb unit. Connect wiring harness plug.
7. Install both rubber covers.
8. Install the access panel in the road wheel arch liner.
9. Connect the vehicle battery.

Bulb Renewal



Gain access to the headlight unit by first removing the access panel in the road wheel arch liner.

Dipped Beam

Repair Operation Time (ROT)		
Item		**Code**
Dipped Beam Renew	LH	**17.01.CB**
	RH	**17.01.DB**

HID Bulb Disposal

Always dispose of HID bulbs in a responsible manner.

Follow your local authorised standards for disposal.

The following precautions must be observed when handling HID bulbs. Failure to comply may result in exposure to ultra violet rays, severe electric shock, burns or risk of explosion.

⚠ Warning ⚠

HID bulbs start-up voltage can be as much as 1000v. Ensure power to HID bulbs has been disconnected before attempting to service them. Failure to do this may result in a severe injury or death.

⚠ Warning ⚠

HID bulbs get hot during operation. Allow at least 15 minutes for headlamp assemblies to cool before attempting to service them. Failure to do this may result in burns to skin or clothing.

⚠ Warning ⚠

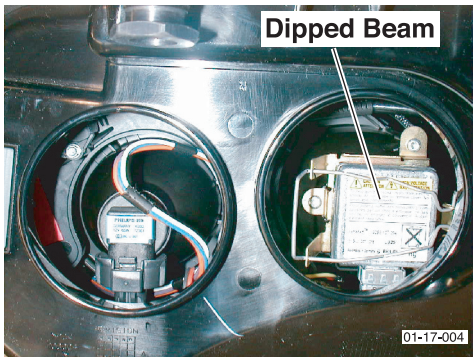
Never switch on lamps or test bulbs with the lamp holder detached from headlamp.

⚠ Warning ⚠

Eye and hand protection must be worn.

1. Disconnect the vehicle battery.
2. Remove the rubber cover.

3. Disconnect wiring harness plug. Remove the spring clip and withdraw the bulb unit.



4. Insert a new bulb unit. Secure with the spring clip and connect the wiring harness plug.
5. Connect the vehicle battery.

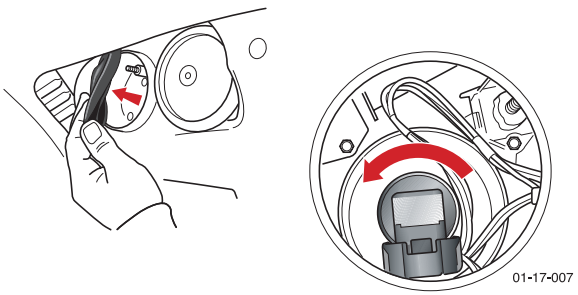
Main Beam

Repair Operation Time (ROT)		
Item		**Code**
Main Beam Renew	LH	**17.01.GB**
	RH	**17.01.HB**

⚠ Warning ⚠
HID bulbs start-up voltage can be as much as 1000v. Ensure power to HID bulbs has been disconnected before attempting to service them. Failure to do this may result in a severe injury or death.

⚠ Warning ⚠
HID bulbs get hot during operation. Allow at least 15 minutes for headlamp assemblies to cool before attempting to service them. Failure to do this may result in burns to skin or clothing.

1. Disconnect the vehicle battery.
2. Twist the bulb holder anti-clockwise and pull out from it's retainer. Disconnect the wiring harness plug.
3. Connect the wiring harness plug to the new the bulb and insert the bulb unit into it's retainer. Twist clockwise to secure.



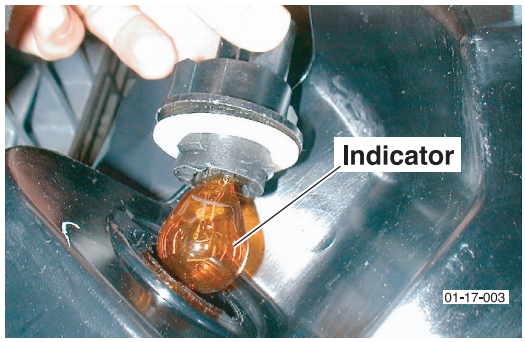
4. Connect the vehicle battery.

Indicator and Side Light

Repair Operation Time (ROT)		
Item		**Code**
Indicator Bulb Renew	LHF	**17.01.EB**
	RHF	**17.01.FB**
Side Bulb Renew	LHF	**17.01.JB**
	RHF	**17.01.KB**

1. Rotate the bulb holder a quarter turn anti-clockwise and withdraw.





2. Pull the bulb from it's holder and withdraw the bulb.
3. Install a new bulb and turn push to lock.
4. Install the bulb holder to the headlamp light cluster and install the rear lamp access panel.

Side Repeater Unit

Repair Operation Time (ROT)		
Item		**Code**
Side Repeater Unit Renew	LH	**TBA**
	RH	**TBA**

Renewal

1. Protect surrounding paint work and rotate the repeater unit clockwise approx. 30°. Withdraw the repeater unit from the vehicle and disconnect the wiring harness plug.



2. To change the bulb. Hold the side repeater unit and turn the bulb holder 90° anti-clockwise. Withdraw the bulb and install a new one.
3. To change the side repeater unit. Connect the wiring harness plug to a new side repeater unit and install.

Side Marker Unit Bulb

Repair Operation Time (ROT)		
Item		**Code**
Side Marker Unit Bulb Renew	LH	**TBA**
	RH	**TBA**

Federal Markets Only

Renewal (Front and Rear)

1. **Front Side Marker Unit Only**.
   Remove part of the road wheel arch liner to gain access to the bulb holder.
2. **Rear Side Marker Unit Only**.
   Remove the rear light cluster to gain access to the bulb holder (Refer to 'Light Cluster', page 17-3-1).
3. Twist the side marker unit bulb holder 90° anti-clockwise and pull from the side marker unit.
4. Install a new bulb to the bulb holder. Insert the bulb holder to the side marker unit. Twist 90° clockwise to lock in place.
5. **Front Side Marker Unit Only**.
   Install the road wheel arch liner.
6. **Rear Side Marker Unit Only**.
   Install the rear light cluster (Refer to 'Light Cluster', page 17-3-1).

Side Marker Unit

Repair Operation Time (ROT)		
Item		**Code**
Side Marker Unit Renew	LH	**TBA**
	RH	**TBA**

Federal Markets Only

Renewal (Front and Rear)

1. **Front Side Marker Unit Only**.
   Remove part of the road wheel arch liner to gain access to the rear of the side marker unit.
2. **Rear Side Marker Unit Only**.
   Remove the rear bumper to gain access to the rear of the side marker unit (Refer to 'Rear Bumper', page 1-13-3).
3. Remove speed nuts (x2) that secure the side marker unit to the bumper. Withdraw the side marker unit.



4. Disconnect the wiring harness plug at the rear of the side marker unit and remove the assembly.
5. Connect the wiring harness plug to a new side marker unit and install.
6. **Front Side Marker Unit Only**.
   Install the road wheel arch liner.
7. **Rear Side Marker Unit Only**.
   Install the rear bumper (Refer to 'Rear Bumper', page 1-13-3).

Lighting (17.00)

Interior Lighting (17.02)

Specifications

Bulbs

	Rating	Type
Reading lamp	3W	W3W
Rear occupant lamp	3W	W3W
Boot lamp	3W	W3W

Maintenance

Interior Light Bulb

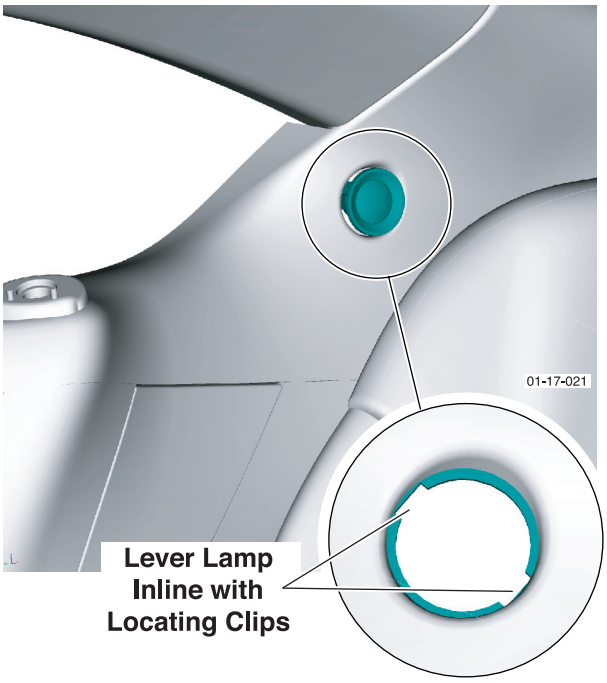
Renew

Repair Operation Time (ROT)	
Item	**Code**
Interior Bulb Renew	**17.02.AB**

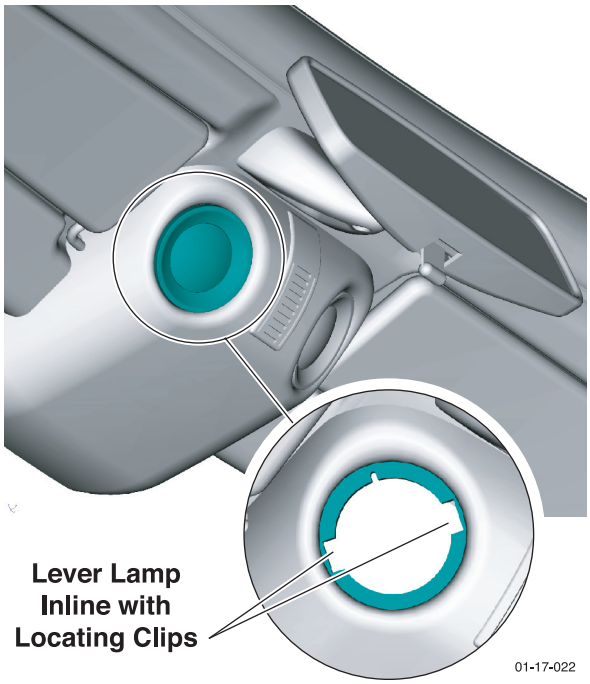
1. Taking care to protect the trim panel, lever the lamp unit from the trim panel.

Lever the lamp unit from the trim panels inline with the locating clips.

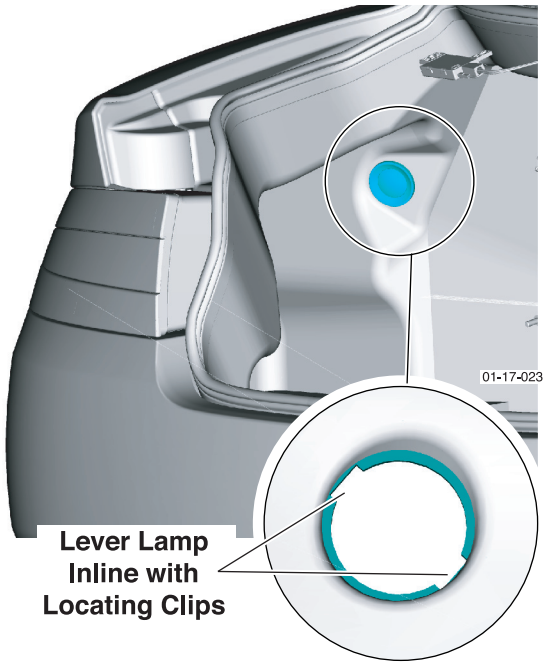
Reading Lamp



Rear Quarter Lamp



Boot Lamp



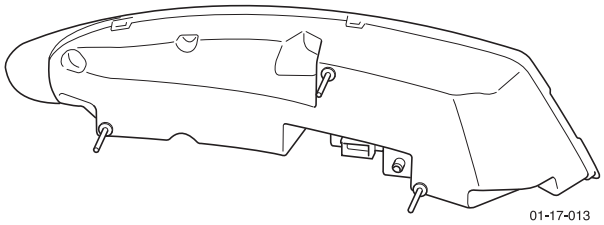
2. Twist the bulb holder approx. 20° anti-clockwise and withdraw the bulb holder. Pull the from the bulb holder and install a new bulb.
3. Push the lamp unit back into the recess in the trim panel.

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Lighting (17.00)

Rear Lights (17.03)

The rear light cluster is a sealed unit. If any light which fails to illuminate is traced back to the rear light cluster, replace the whole unit.



Specifications

Bulbs		
	Rating	**Type**
Rear light cluster		LED
Rear side marker	3W	W3W
Number plate	5W	C5W
High Mounted Stop Lamp		LED

Maintenance

Light Cluster

Repair Operation Time (ROT)		
Item		**Code**
Rear Light Cluster Renew	LH	**17.03.AB**
	RH	**17.03.BB**

Remove

1. Open the boot and remove the trim from around the light cluster mounts.
2. Release and remove nuts (x3).
3. Withdraw the rear light cluster unit.
4. Disconnect the wiring harness plug.

Installation

1. Place the rear light cluster unit to vehicle and connect the wiring harness plug.
2. Insert the rear light cluster unit into position.
   Ensure the rubber seal is in position. Tighten nuts (x3).

Ensure that the light cluster profile matches the surrounding panels.

Side Marker Units

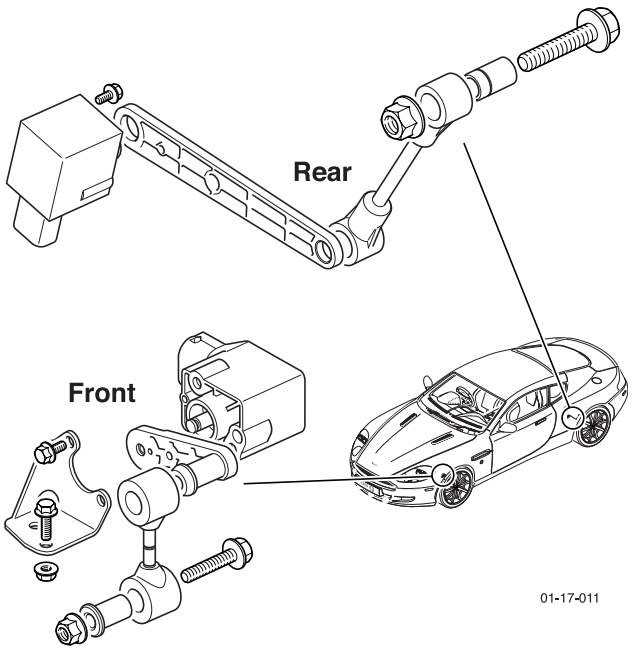
Refer to 'Front Lights (17.01)' for all information on the rear side marker lights.

ASTON MARTIN
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Lighting (17.00)

Lighting Mechanisms (17.04)

Headlamp Levelling



The 'Automatic Dynamic Headlamp Levelling System' consists of:

- An Automatic Dynamic Headlamp Levelling System ECU
- A level sensor for the front suspension
- A level sensor for the rear suspension
- A bi-polar stepper motor mounted in the housing of each headlamp

The Automatic Dynamic Headlamp Levelling System prevents the dipped beam dazzling oncoming road traffic by varying the angular position of the dipped (and main beam) headlamp units relative to the position of the vehicles suspension.

Static condition **-** Compensates for boot or occupant load condition.

Dynamic condition **-** Compensates for suspension movements due to acceleration and deceleration. The sensitivity of the system is dependent on vehicle speed and the rate of change of the vehicle speed.

High amplitude low frequency inputs such as those caused by potholes are filtered out to desensitise the system in constant speed situations.

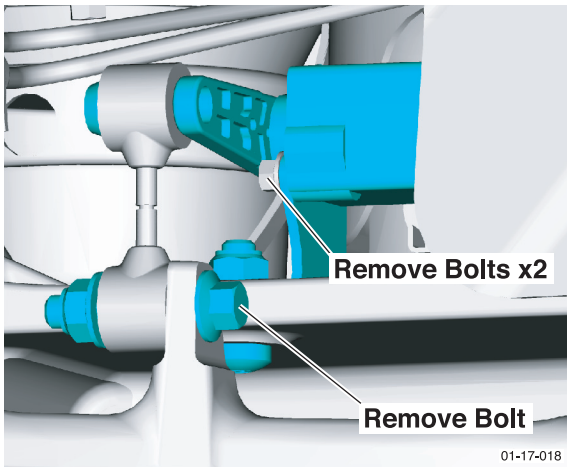
Maintenance

Front Level Sensor

Repair Operation Time (ROT)	
Item	**Code**
Front Level Sensor Renew	17.04.BB

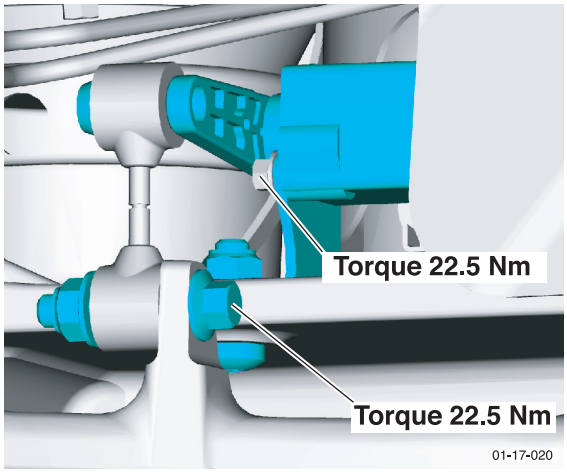
Removal

1. Disconnect the vehicle ride height sensor from the lower suspension arm.
2. Remove the ride height sensor from the subframe.



Installation

1. Install the vehicle ride height sensor (LH side).
   Torque to:
   - (M8 (subframe)) **22.5 Nm**.
   - (M8 (lower arm)) **22.5 Nm**.

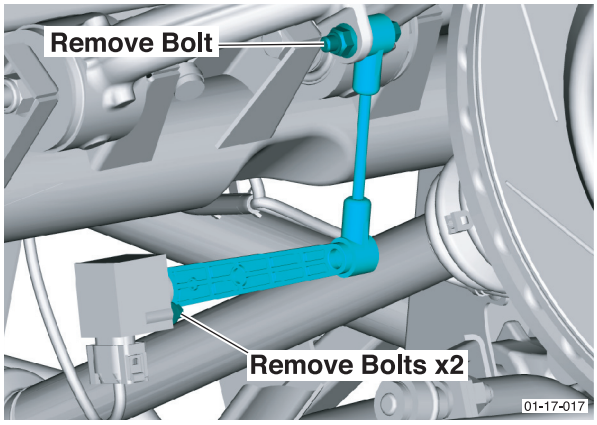


Rear Level Sensor

Repair Operation Time (ROT)	
Item	**Code**
Rear Level Sensor Renew	**17.04.CB**

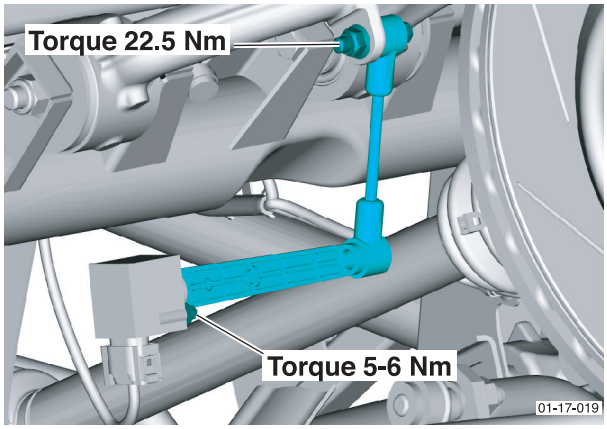
Removal

1. Disconnect the vehicle ride height sensor from the upper suspension arm.
2. Remove the ride height sensor from the subframe.



Installation

1. Install the vehicle ride height sensor (LH side).
   Torque to:
   - (M5 (subframe)) **5-6 Nm**.
   - (M8 (upper arm)) **22.5 Nm**.



Electric Distribution/Electronic Control (18.00)

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Electric Distribution/Electronic Control (18.00)

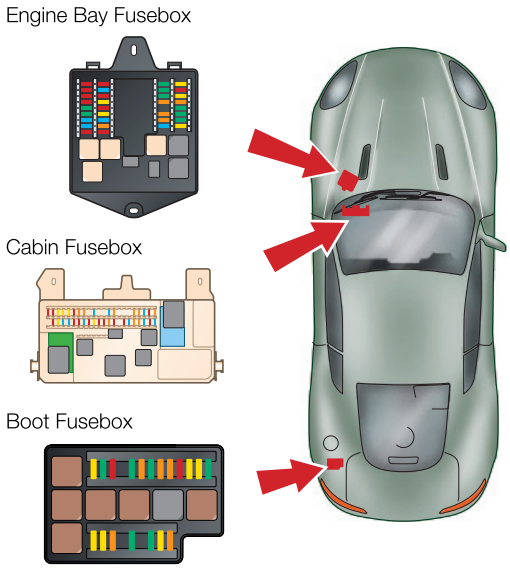
Wiring and Circuit Protection (18.01)

Fuse Boxes

From the clean 12V output terminal of the battery disconnect switch, electrical power is distributed to three fuse boxes:

***RH drive shown**. On LH drive vehicles the engine bay fuse box is located on the RH side.*

The central electronic module (CEM) fuse box is always located on the passenger side.

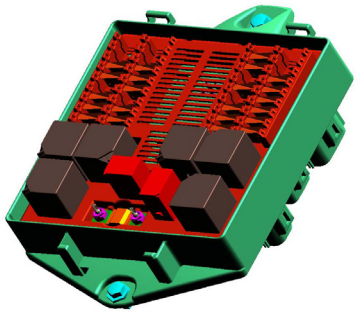


Always ensure that the fusebox covers are located correctly to prevent ingress of water / foreign materials

The fuse boxes also contain the switching relays.

Fuse Listings

Engine Bay Fuse / Relay Box

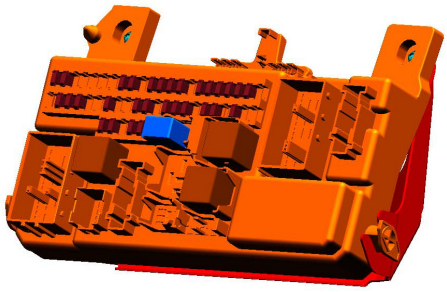


Fuse	Rating	Function
F1	10A	Keep alive power PCM (Bank B)
F2	10A	Tracker (option) / Clock
F3	10A	Cooling fan module
F4	20A	Engine management (Bank A) / Module - ABS, Key Reader and Steering angle sensors
F5	20A	Engine management (Bank B)
F6	15A	Exhaust Gas Oxygen (HEGO) sensors / Catalyst monitor sensor (CMS) (Bank B)
F7	15A	Coils 7-12 / Suppressor solenoid (Bank B)
F8	10A	Engine coolant level sensor (Bank B)
F9	20A	Injectors 7-12 / Mass air flow sensor (MAF) (Bank B)
F10	10A	A/C clutch
F11	15A	Horn
F12	10A	Keep alive power PCM (Bank A)
F13	20A	Injectors 1-6 / Mass air flow sensor (MAF) (Bank A)
F14	10A	Vapour Management valve (VMV) (Bank A)
F15	25A	Starter motor
F16	15A	Coils 1-6 / Suppressor solenoids (Bank A)
F17	5A	Glove box release solenoid
F18	15A	Exhaust Gas Oxygen (HEGO) sensors / Catalyst monitor sensor (CMS) (Bank A)
F19	30A	ABS module / Battery feed
F20	30A	ABS module / Battery feed
F21	30A	Heated front screen
F22	5A	Spare
F23		Blank
F24	5A	Alternator warning lamp
F25	5A	Spare
F26	20A	Headlamp wash pump
F27	25A	Spare

Fuse	Rating	Function
F28	10A	Module - ABS, Key Reader and Steering angle sensors
F29	25A	Spare
F30	5A	Alternator battery sensing
F31	30A	Heated front screen
F32	30A	Wiper (slow)
F33	30A	Wiper (fast)
F34	20A	Heater Blower motor
F35	60A	Cooling fan module

Relay	Rating	Function
R1		PCM A
		Coolant fan pack
R2		PCM B
R3		Injectors (1-6 (Bank A))
		MAF Sensor (1-6 (Bank A))
		Ignition coils (1-6 (Bank A))
		Front and rear HEGOs and CMS (1-6 (Bank A))
		VMV
R4		Wiper motor
R5		Injectors (7-12 (Bank B))
		Ignition coils (7-12 (Bank B))
		MAF Sensor (7-12 (Bank B))
		Engine coolant level and VMV
R6		Heater blower moter
R7		Glovebox
R8		Wiper motor

Central Electronics Module Fusebox

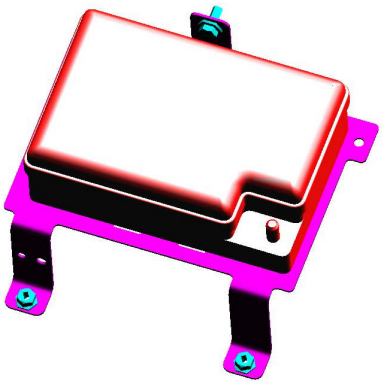


Fuse	Rating	Function
F43	10A	Multi media module display / Phone (option) / GPS tuner (option (not Middle East)) / Media player
F44	10A	Airbag module
F45	15A	Accessory socket and illumination
F46	5A	ROPS / Convertible roof switch / Driver Information / Master light switch / Glove box relay / Master lock switch / Battery Off switch
F47	5A	Interior lamps (front / footwell / rear) / Boot lamps relay

Fuse	Rating	Function
F48	15A	Front windscreen relay and wash pump
F49	10A	Airbag module
F50	5A	Spare
F51	10A	Diagnostic connectors / Centre stack switches
F52	5A	Start button
F53	10A	Headlamp levelling module / Power steering module
F54	10A	Engine fuse box, Boot fuse box
F55	20A	Spare
F56	10A	Centre console module / Sounder module / Hazard switch
F57	15A	Diagnostic connectors / Brake pedal switch
F58	10A	High beam (RH)
F59	10A	High beam (LH)
F60	15A	Drivers seat heating
F61	15A	Passenger seat heating
F62	20A	A/C module
F63	20A	Spare
F64	5A	AM / FM receiver module / Traffic Monitoring Control module (TMC)
F65	5A	Media player / Multi media module and display / Antenna amplifiers / Audio amplifier
F66	10A	Centre console module / Infotainment control module
F67	15A	Spare
F68	5A	Spare
F69	5A	Convertible roof module (Volante)
F70	15a	Spare
F71		Spare
F72		Spare
F73	5A	Spare
F74	15A	Fuel pump
F75		Spare
F76		Spare
F77	15A	Boot power socket
F78		Blank
F79	5A	Reversing lamps / Module - Parking aid (option)
F80	5A	Battery ‘Off’ switch
F81	20A	Ignition switch
F82	25A	Passenger door module
F83	25A	Driver door module
F84	25A	Passenger seat power and switch pack
F85	30A	Driver seat power and switch pack
F86	5A	Start button, Driver and passenger seats

Stand Alone Fuses		
Fuse	**Rating**	**Function**
F1	40A	Cabin Fuse box supply
F2	30A	Cabin Fuse box supply
F3		Blank
F4	40A	Cabin Fuse box supply
F5	20A	Cabin Fuse box supply

Boot Fusebox



Fuse	Rating	Function
F1	5A	Convertible deck lid lock motors
F2	20A	Spare
F3	30A	Heated rear window
F4	20A	Rear quarter glass motor (LH) (Volante) Spare (Coupe)
F5	30A	Spare
F6	20A	Rear quarter glass motor (RH) (Volante) Spare (Coupe)
F7	5A	Battery disconnect switch (BDS) power
F8	30A	Fuel pump module (Bank B) / Tracker
F9	20A	Fuel pump module (Bank A)
F10	30A	Convertible roof module
F11	20A	Spare
F12	20A	Transmission control module (Automatic)
F13	10A	Tyre pressure monitoring
F14	5A	Rear parking assistance module (optional)
F15	5A	Transmission control module (Automatic)
F16	30A	Convertible roof hydraulic pump
F17	5A	Boot lamps / Rear power socket illumination
F18	30A	Audio amplifier
F19	5A	Spare
F20	10A	Canister vent
F21	30A	Convertible roof lid lock motors relay
F22	20A	Exhaust by-pass and vacuum pump

Relay	Rating	Function
R1		Fuel pump driver module (7-12 (Bank B)) Tracker (If installed)
R2		Fuel pump driver module (1-6 (Bank A))
R3		Cansiter vent valve Exhaust bypass valve and vacum pump
R4		TCM (auto only) Spare Tyre pressure monitor Parking aid (if installed)
R5		Rear quarter glass motor (Volante) Spare (Coupe) BDS Rear quarter glass motor (Volante) Spare (Coupe)
R6		Boot lamps
R7		Heated rear window

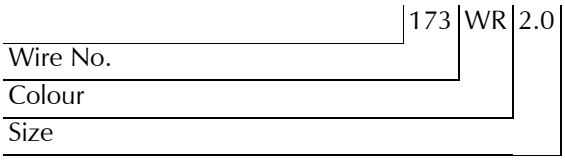
How to Read the Circuits

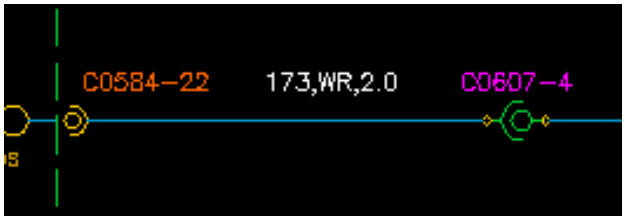
Below is a simple guide to what symbols mean on the circuit diagrams. For some of the symbols there are descriptions as to how they function.

Wires

Wire numbers have been deleted from the original engineering circuits. This allows the type size to be increased for improved legibility of the service circuits.

Wires vary in size to allow different current to be carried. For example a wire with a diameter of 0.50mm (This is the diameter of all the internal copper strands together) will carry 11A (dependant on ambient temperature) whilst a wire with a diameter of 2.00mm will carry 25A.





Twisted Wires

The 'figure of 8' shown on circuits as below denotes a twisted wire and shows the wires that are twisted together. A wire generates a certain amount of 'electrical noise' when a current is passed through it. By twisting the 2 wires together the 'electrical noise' is cancelled out on each wire by the opposing wire. This is used more on sensors and audio speakers.

908 | GU | MAPM | 05

- Wire No.
- Colour
- **MAP** (Defines twisted pair)
- Size



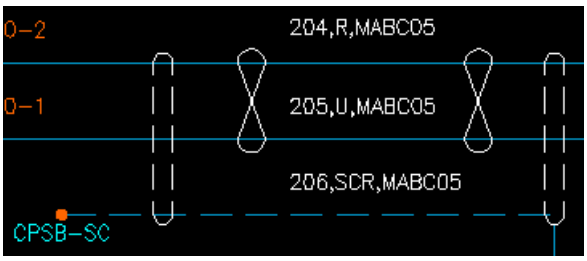
Screened and Twisted Screen Wires

The signals through a wire can be affected by externally generated electrical noise. To reduce the external interference the wires are placed inside a conductive sleeve. One end of the conductive sleeve is always open whilst the other end can be terminated to a ground, to a component, or left open.

The symbol for the screen is an oval with the wires that are to be screened inside it. The letters 'SCR' define the screen.

205 | U | MABC | 05

- Wire No.
- Colour
- **MAB** (Defines Screened)
- Size



Controller Area Network (CAN)

Controller Area Network (CAN) is the wiring between intelligent modules of the vehicle. This wiring carries the electronic data around the vehicle allowing the various modules and components to interrogate the network and read their specific data signals.

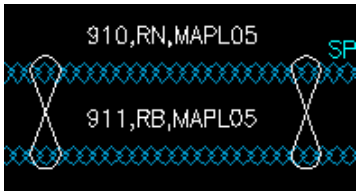
There are 2 different speeds of network.

Low speed - Transmits at 125,000 bits per second. Mainly for body controller systems such as seats and doors

High speed - Transmits at 500,000 bits per second. Mainly for engine management and powertrain associated systems such as ABS.

All wiring in the CAN is twisted. The twisted wires always consist of one wire with a black trace in it for the negative side and one with a brown trace in it for the positive.

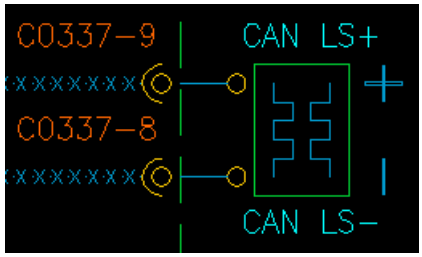
High Speed CAN wire



Low Speed CAN wire



The symbol below shows a module or a component connector with the pin numbers that have CAN wires coming from them.



'CAN LS+' **-** Low speed CAN positive side

'CAN LS-' **-** Low speed CAN Negative Side

This naming convention also applies to the High Speed CAN network.

To aid identification of the different speed CAN's in the vehicle different colours of wire have been used, e.g. the Low Speed Volcano is GB twisted with GN, the High Speed Volcano is RB twisted with RN.

There is attached on a separate page a list for wire colour abbreviations and what colour they refer to.

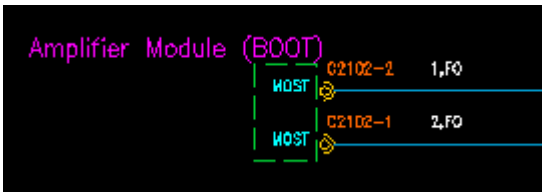
Media Oriented System Transport (MOST)

A fibre optic carries out a similar function to that of a wire in that it transmits data signals. The differences being that where a wire is made up of copper strands in an insulated sleeve a fibre optic is a plastic tube with a highly polished reflective inside surface.

The fibre optic carries the data in the form of a pulse of light, which is sent via an infrared transmitter and picked up at the next component in the loop via an infrared receiver. The light pulse is then converted to an electrical signal that is used by that module or component.

The CAN sends signals around the vehicle where the modules or components remove their specific signals. The fibre optic is in a loop with the module components in that loop, one fibre goes in and one fibre goes out. This is shown below.

1 FO
Fibre optic in harness
Fibre Optic

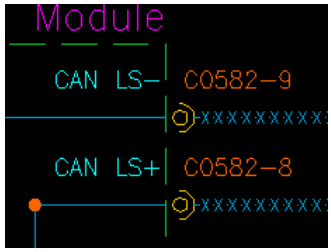


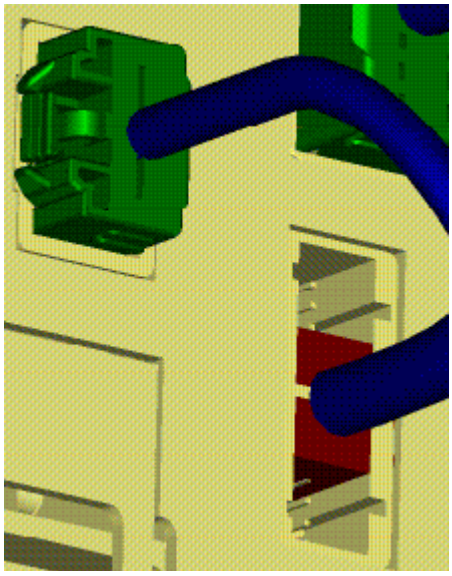
Connectors

There are 2 types of interconnect shown on the circuits. Each connector is given a dedicated 'C' number. The number after the dash is the pin number, also known as the cavity number. The example below is C0582 that when checked on the attached list refers to the CEM Connector Cockpit 2 (C3).

The 1st type is shown for a **connector** that is on a module or component with a mating harness connector attached to it.

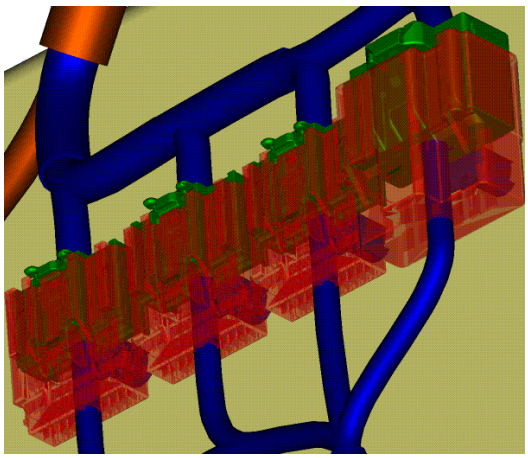
C0582 9
Connector C number
Connector pin / cavity number





The 2nd type is shown for a connector on a harness with the mating connector on another harness. This is known as an **Inline**. Again the above naming convention applies.





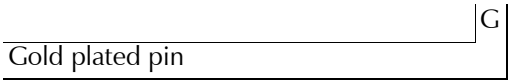
The terminals in a connector housing can have a special coating on them. This coating if required is selected using the following criteria.

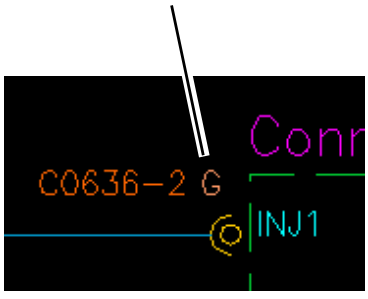
- A specific coating requested by component / system owner.

Or

- The current passing through the terminal.
- The environment the connector is to be situated with respect to temperature.
- The open circuit voltage passing through the terminal at a given.

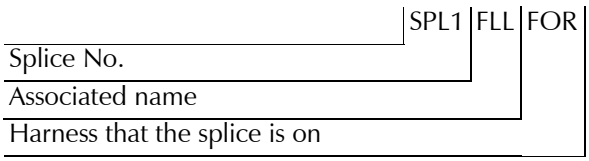
Depending on the above criteria the coating, if required, can either be gold, silver, phosphor bronze. Generally tin is the common plating on the terminals but there are some that are gold. These are identified in the circuits with the letter '**G**' which stands for gold after the connector number. An example of this is shown below.

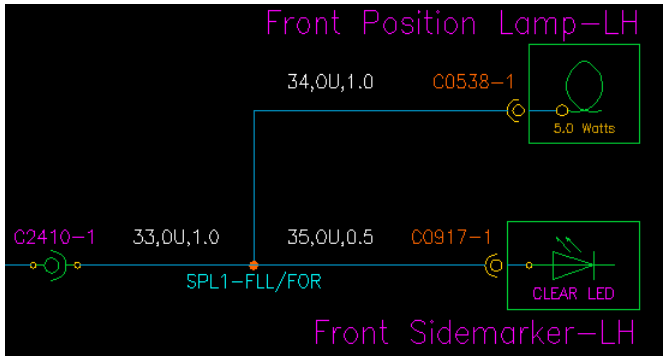




Splices

A splice is used where more than 2 wires that have the same requirement i.e. they need the same signal and meet in the same harness. In the example below the Front Position Lamp-LH and Front Side marker-LH require the same output signal from the CEM. Therefore the 2 wires for the lamps are spliced into the output wire from the CEM on the Forward Harness.





Tracing Spliced Wires

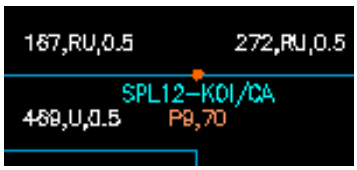
Some splices appear on pages as a wire that goes to one spot and seems to terminate in space. An example of this is shown below.

Splice Origin Page

(e.g.P9)



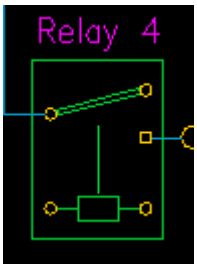
Other Page(s) on which the splice occurs**.**



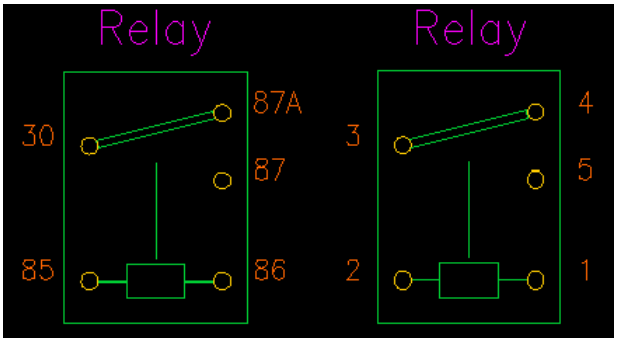
A separate page is attached containing a list of splice abbreviations and the harness to which they refer.

Relays

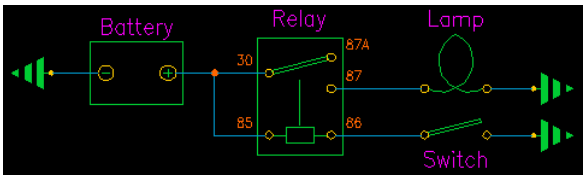
Another significant component in the circuits is a relay, this is in simple terms a switch that operates on the principal of electromagnetism. Below is the circuit symbol for a typical relay. The relay shown below is a normally open relay in its inoperative state i.e The arm is in the open position.



Relays can have either 4 or 5 terminals on the base. The circuit of the relay is shown on the base or the side of the housing. There are 2 types of numbering convention for the relay terminals, both of which are shown below.



Below is a circuit diagram to show the function and operation of a relay in a simple circuit.

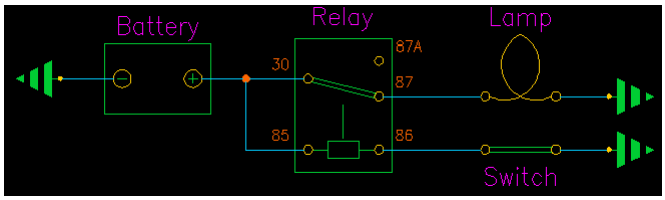


The current from a battery for example flows through the wires to the high power normally open switch (The arm between pins 30 & 87A) and the low power coil (The box between pins 85 & 86). As you can see in the example above the lamp is in not illuminated, because the switch is open.

For the relay to operate there needs to be current flow through the low power coil i.e Current in to the coil then through to an earth. The current passes through the relay coil and creates a magnetic field, this magnetic field is strong enough to 'grab' the high power normally open switch.

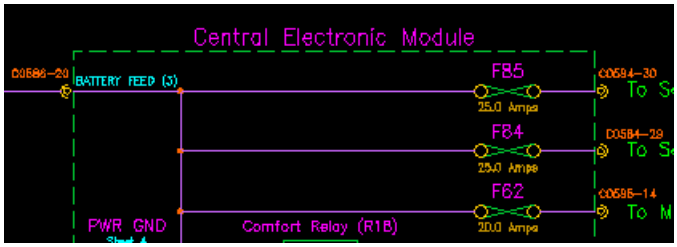
The magnetic field pulls the switch from it's normally open contact to a normally closed contact. The normally closed contact has a path to an earth, in this case it goes through a lamp.

The high power current then flows through the high power normally open switch through the lamp and then to an earth. This can be seen more clearly in the diagram below.Lamp Illuminates

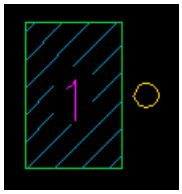


Busbars

A busbar is where a electrical supply is fed into a conductive bar, wire or pcb track and various modules or components 'tap' into this busbar to draw their required power. The Central Electronic Module has 4 of these busbars internally, each of which is supplied from an external power supply, that supply can be a battery feed, ignition feed or a switched supply.



The symbol shown below is the symbol used on the circuits for a busbar, the number inside the box refers to the busbar number in the Central Electronic Module.

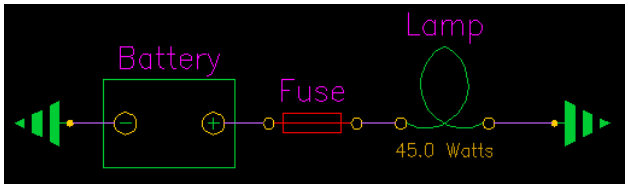


Fuses

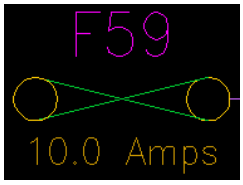
A fuse is a device used to protect a module or component from excessive electrical current which can cause damage or destroy that module or component. In practice the fuse is placed in between the power source and the module or component that is being protected.

The size or 'Rating' of the fuse in amps is calculated according to the power requirements of the module or component it is protecting with other factors being taken into consideration. If the rating has been calculated correctly then the fuse will 'blow' when excessive current passes through it before any harm or permanent damage occurs to the module or component it is protecting.

In a correctly protected circuit, the fuse is placed '**Inline**' between the power source in this case the battery and the lamp. If the lamp goes 'short circuit', a massive current will begin to flow and the fuse will fail causing an open circuit. The battery and wiring are protected from over current damage.



Below is the fuse symbol as shown on the circuit diagrams. The number above the fuse symbol is the fuse number; allocated to this fuse. The number below the fuse symbol is the rating.



Resistors

A resistor is an electronic component that by way of its construction reduces the current flowing through it. A resistors unit of measure is the Ohm.

The diagrams below show a resistor and a variable resistor.



Variable Resistors

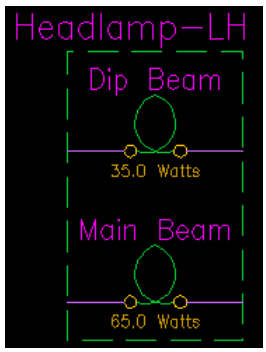
A variable resistor works in the same manner as a normal resistor but the resistance values can fluctuate. The construction of a variable resistor depends upon its use and environment.

One example is for the fuel tank level sensor. The tank full level is 10 ohms and the tank empty level is 204 ohms, the resistance will vary between 10 and 204 ohms depending on how much fuel is in the tank.



Lamps

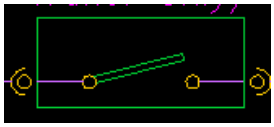
Below is the symbol for a light bulb, shown below the symbol is the power of the bulb in watts.



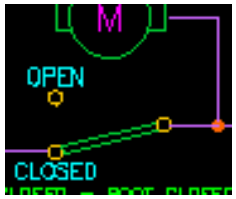
Switches

There are numerous of types of switch, several of examples are shown below.

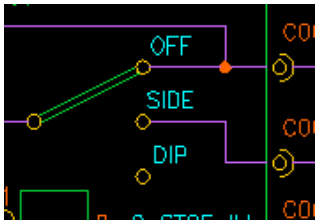
Normally Open Switch



2 Position Switch



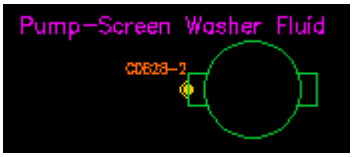
3 Position Switch



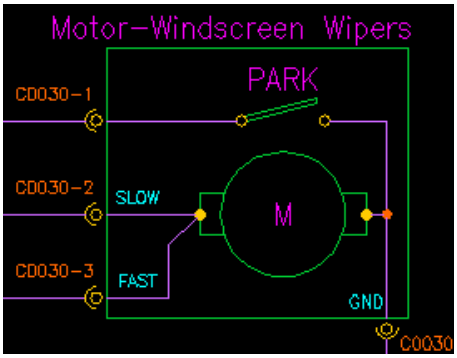
Motors and Pumps

The same symbol is used for a pump or a motor, the description differentiates between them.

Pump

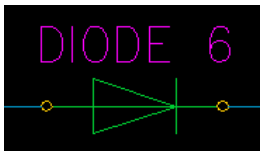


Motor



Diodes

The simplest way of describing a diode is 'a non return valve'. The current will flow through the diode from the anode to the cathode, due to the construction of it though current cannot come back. Diodes are used to reduce the possibilities of 'back feed'. This is where current comes through the circuit the wrong way for one reason or another. Below is the circuit symbol for a diode.

Anode  **Cathode**

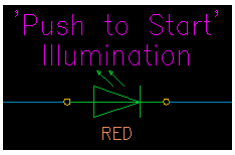
Light Emitting Diode (LED)

The light emitting diode (LED) works on the same principal as the diode. The main difference is that in the manufacturing process one of the materials is replaced by another. This replacement material has certain properties that when a certain voltage passes through it glows.

Arrow Symbol indicating light emission

Anode

LED Colour



Cathode

Transistor

A transistor in simplistic terms is a switch with no moving parts. The 'switching' is controlled by electronics and currents etc. rather than a physical switch being operated. Below is the circuit symbol for it. The example shown below is one of the most common basic type used called a 'Bipolar'.



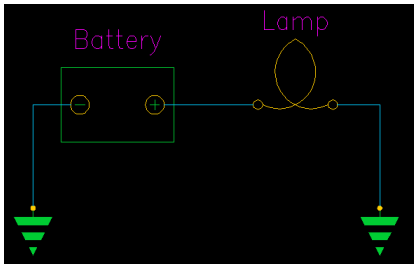
Field Effect Transistor (FET)



A field effect transistor (FET) is, in simplistic terms, a switch with no moving parts. The 'switching' is controlled by electronics and currents etc. rather than a physical switch being operated. The main difference between this and the type of transistor shown above is this one operates using a magnetic field.

Earth / Ground

For an electrical current to 'flow' around a circuit it has to start from a power source and go to an earth / ground. If there are any breaks in this circuit then current will not flow, this is called an 'Open circuit'



There are 2 types of earth, Signal Earth and Chassis Earth, these are referred to sometimes as a Quiet Earth and Noisy Earth respectively.

Some sensors for example specify a Signal / Quiet Earth. While components such as pumps and motors can have a Chassis / Noisy Earth. The reason behind this is that pumps, motors and the like can generate 'electrical noise' by the way of their operation. Some of this 'electrical noise can be transferred through wires, it is this 'electrical noise' that can have an adverse effect on sensor signals and affect the control readings.



Keeping Signal / Quiet and Chassis / Noisy earths separate reduces the effect of 'electrical noise' being transferred from component to component.

This symbol is a standard symbol for earths.

On the circuit diagrams some earths are shown as eyelets with the description of Earth-**** next to it, the earths also comply with the 4 digit C number. An example of this is shown below.



Component Identification

Component	Connector	Circuit Page
Airbag-Driver	C0257	3
Airbag-Passenger1	C0251	3
Airbag-Passenger2	C0261	3
Airbag-Side-Left	C0948	3
Airbag-Side-Right	C0949	3
Alternator/Generator	C0226	60, 69
Alternator/Generator Battery Terminal	C1893	58
AM/FM Receiver Module	C2538	7
AM/FM Receiver Module	C2219	7
AM/FM Receiver Module (MOST)	C0102	74, 75
Amplifier-(Aud Power)	C2588	46
Antenna Amplifer1	C2510	7
Antenna Amplifer1	C0491	7
Antenna Amplifer2	C2511	7
Antenna Amplifer2	C0492	7
Antenna-GPS	C1598	17
Antenna-Phone	C2233	17
Bar-ROPS-LH	C2672	60
Bar-ROPS-RH	C2673	60
Battery Fusebox	C0632	57
Battery Negative Terminal	C0045	57, 58
Battery Positive Terminal	C0192	57, 58
Battery-Backup-Tracker	C0800	64
Boot Fusebox - Conn A	C2010	
Boot Fusebox - Conn B	C2011	
Boot Fusebox - Conn C	C2012	
Boot Fusebox - Conn D	C2013	
Boot Lamp1	C0119	36
Boot Lamp2	C0120	36
Boot-Boot Lid Harness	C0384	
Boot-Convertible Roof Inline 1	C0349	
Boot-Convertible Roof Inline 2	C0084	
Boot-Transmission Inline 1	C0746	
Boot-Transmission Inline 2	C0747	
C1 Engine Bay Fusebox	C0570	
C10 Engine Bay Fusebox	C0579	
C2 Engine Bay Fusebox	C0571	
C3 Engine Bay Fusebox	C0572	
C4 Engine Bay Fusebox	C0573	
C5 Engine Bay Fusebox	C0574	
C6 Engine Bay Fusebox	C0575	
C7 Engine Bay Fusebox	C0576	
C8 Engine Bay Fusebox	C0577	
C9 Engine Bay Fusebox	C0578	
Cabin-Boot Inline 2	C0144	
Cabin-Boot Inline 3	C0117	
Cabin-Boot Inline 4	C0109	
Cabin-Boot Inline 7	C0607	
Cabin-Boot Inline 8	C0608	
Cabin-Boot MOST Connector	C0420	
Cabin-Centre Stack Inline 1	C0083	
Cabin-Centre Stack Inline 2	C1165	
Cabin-Centre Stack Inline 3	C1185	
Cabin-Centre Stack Inline 4	C1322	
Cabin-Centre Stack MOST Connection	C1898	
Cabin-Driver Airbag Inline	C0273	
Cabin-Engine Inline 1	C2242	
Cabin-Engine Inline 2	C2243	
Cabin-Engine Inline 3	C2244	
Cabin-Engine Inline 4	C2245	
Cabin-Fuel Tank Inline 1	C1187	
Cabin-Fuel Tank Inline 2	C0113	
Cabin-Passenger Airbag Inline	C0305	
Capacitor	C1323	9
CEM Busbar 3 Feed	C2509	57
CEM Busbar 4 Feed	C2841	57
CEM Busbar 5 Feed	C2842	
CEM Connector Cockpit 1 (C1)	C0580	
CEM Connector Cockpit 2 (C3)	C0582	
CEM Connector Floor 1 (C5)	C0584	
CEM Connector Floor 2 (C8)	C0587	
CEM Connector Front End 1 (C7)	C0586	
CEM Connector Front End 2 (C9)	C0588	
CEM Connector Roof 1 (C6)	C0585	
CEM Connector Roof 2 (C10)	C0589	
Clock-Analogue	C0232	31
Clutch-Compressor-Air Conditioning (A/C)	C0127	6
Coil Suppressor-Bank A	C0997	47
Coil Suppressor-Bank B	C2455	47
Connector-Fuel Tank	C0114	41
Convertible Roof Conn4 (HRW)	C2808	42
Convertible Roof1	C2805	19
Convertible Roof2	C2806	19
Convertible Roof3	C2807	19
Convertible Roof5	C2809	20
Convertible Roof6 (Hydraulic Pump)	C2810	18
Diagnostic Connector A - Powertrain	C0549	16, 54
Diagnostic Connector B - Body	C0877	14, 53
Direction Mode Actuator	C0413	5, 6
Door Lock-Drivers Door	C1449	22
Door Lock-Passenger Door	C1451	22
Driver Seat-Conn1	C2378	61, 61A

Component	Connector	Circuit Page
Driver Seat-Conn3	C0751	2, 61A
Driver Seat-Conn4	C0255	15, 61
Drivers Door Module Conn 1	C0336	22, 23, 26, 28, 35, 49
Drivers Door Module Conn 2	C0337	15, 23, 25, 26, 28
Drivers Door Module Conn 3	C0338	23
Drivers Door-Cabin Inline	C0744	49
Drivers Door-Puddle Lamp	C0978	18
Dual Relay Base-Tonneau Lid Lock	C0063	6
Earth Eyelet-Aircon Clutch	C0560	46
Earth Eyelet-Amplifier	C0808	22, 23, 26, 28, 35, 49
Earth Eyelet-Antenna Amplifiers	C2713A/B	7
Earth Eyelet-Auto Int, Start, Glove Rel, Red Grd	C2716	32, 63
Earth Eyelet-Bank A Cam/Crank Screen	C0563	65
Earth Eyelet-Bank B Cam/Crank Screen	C0561	66
Earth Eyelet-Blower Motor	C0564	5
Earth Eyelet-Body	C2934	41
Earth Eyelet-Body to Battery Negative	C1661	57, 58
Earth Eyelet-Bonnet Switch	C1972	63
Earth Eyelet-Boot Fusebox	C2697	57
Earth Eyelet-Boot Release Sw, Batt Condition	C2694	36, 69
Earth Eyelet-Brake Fluid Level Switch	C2562	50
Earth Eyelet-CCM (Noisy)	C1169	17
Earth Eyelet-CCM (Quiet)	C1170	17
Earth Eyelet-CCMTrip Switches	C1355	30
Earth Eyelet-CEM (Quiet)	C2648	56
Earth Eyelet-CEM Chassis	C2570	56
Earth Eyelet-CHMSL	C2626	39
Earth Eyelet-Convert Roof Sw	C2566	18
Earth Eyelet-Convertible Roof Module	C0810	18
Earth Eyelet-Convertible Roof Module	C2635	18
Earth Eyelet-Cooling Fan Module	C0562	21
Earth Eyelet-Drivers Door	C2600	22, 23, 26, 28
Earth Eyelet-Drivers Seat	C2567	61
Earth Eyelet-Drivers Seat	C2568	61
Earth Eyelet-ECU A Caseground	C2651	56
Earth Eyelet-ECU A Powerground	C0556	56
Earth Eyelet-ECU A Powerground	C0557	56
Earth Eyelet-ECU B Caseground	C2650	56
Earth Eyelet-ECU B Powerground	C0558	56
Earth Eyelet-ECU B Powerground	C0559	56
Earth Eyelet-FPDMs	C2727	41
Earth Eyelet-Front Brake Pad Wear Sensors	C2564	30
Earth Eyelet-Fuel Flap Release Switch	C2920	32
Earth Eyelet-Fuel Flap Release Switch	C2921	32
Earth Eyelet-Fuel Flap Sol, Bt Lmps, Mtr-Boot	C2692	1, 32, 36
Earth Eyelet-Fuel Tank	C2899	41
Earth Eyelet-Glovebox Release Motor	C2929	32
Earth Eyelet-Headlamp Wash Pump	C2603	73
Earth Eyelet-Heated Rear Window (Con)	C2693	42
Earth Eyelet-Heated Rear Window (Coupe)	C1679	42
Earth Eyelet-HFS LH	C2597	42
Earth Eyelet-HFS RH	C2598	42
Earth Eyelet-HID Module & DIM	C0709	31, 34
Earth Eyelet-Horn	C0018	71
Earth Eyelet-Hydraulic Roof Pump	C2710	18
“Earth Eyelet-ICM,MP & Switches”	C0555	10, 11, 12, 17, 31
Earth Eyelet-Key Read & Ind Switch	C0706	33, 35, 63
Earth Eyelet-LH Front Lights	C1626	33
Earth Eyelet-LH Headlamp DI	C1964	35
Earth Eyelet-LH Rear Lamp	C2605	35, 37, 38, 39, 40
Earth Eyelet-LH Side Repeater	C1968	35
Earth Eyelet-Mass Air Flow Sensor A	C0551	67
Earth Eyelet-Mass Air Flow Sensor B	C0552	67
Earth Eyelet-Master Lock & Int Boot Rel Sw	C2646	25
Earth Eyelet-MMM,GPS,Tyre Press	C2634	17, 31, 52
Earth Eyelet-Module ABS	C0434	51
Earth Eyelet-Module ABS	C0362	51
Earth Eyelet-Module-Auto Transmission	C2696	6
Earth Eyelet-OBD Chassis Gnd	C2629	53, 54
Earth Eyelet-OBD Signal Gnd	C2628	53, 54

Component	Connector	Circuit Page
Earth Eyelet-Passenger Door	C2601	22, 24, 27, 29
Earth Eyelet-Passenger Seat	C0811	62
Earth Eyelet-Passenger Seat	C2569	62
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Earth Eyelet-Rear Doors Ajar	C2712	22
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Facia-Cabin Inline 1	C0047	
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Facia-Cabin Inline 13	C1168	
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Facia-Cabin Inline 4	C0223	
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Ignition Coil 4	C1770	47
Ignition Coil 5	C1771	47
Ignition Coil 6	C1772	47
Ignition Coil 7	C2087	47
Ignition Coil 8	C2088	47
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Illumination-Rear Power Outlet	C0351	1
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Injector 10	C2457	48
Injector 11	C2458	48
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Injector 2	C0523	48
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Injector 4	C0525	48
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Module-Aircon-Conn B	C0792	6
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Module-Centre Console (Trip Switches)	C2522	30
Module-Centre Console-Conn1 (Key A)	C0428	
Module-Centre Console-Conn2 (Midd)	C0429	
Module-Centre Console-Conn3 (Key B)	C0430	
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Motor-Rear Quarter light-LH	C2592	20
Motor-Rear Quarter light-RH	C2593	20
Motor-Tonneau Lid Lock-LH	C2594	18
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Passenger Seat-Conn3	C0752	2
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Sensor-Ambient Temp	C0884	6
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Sensor-Mass Movement	C0359	63
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Sensor-Vehicle Speed (Automatic)	C0195	68
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Speaker-Dual-Front Left	C0340	45
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Speaker-Rear Left	C0310	46
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Switch-Brake Fluid Level	C0026	50
Switch-Brake Pedal	C0075	39
Switch-Buckle-Passenger	C0262	2
Switch-Clutch Bottom Of Travel	C0667	70
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Switch-Cruise Control	C0749	71
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Switch-Steering Column-Wiper	C0278	73
Switch-Tonneau Lid Closed1	C2573	20
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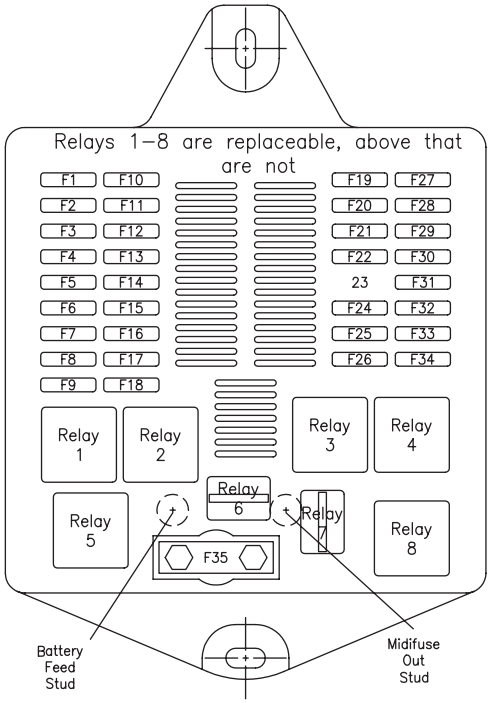
Wire Colours

B	Black
G	Green
K	Pink
N	Brown
O	Orange
P	Purple
R	Red
S	Slate (Grey)
U	Blue
W	White
Y	Yellow
SCR	Screen
FO	Fibre Optic
MAP	Twisted Wire
MAB	Screened Wire

Splice Descriptions

AU	Auto Transmission
BT	Boot
BTLID	Boot Lid
BUMP	Bumper
CA	Cabin
CENST	Centre Stack
CON	Convertible Roof
DRDR	Drivers Door
EN	Engine
FA	Facia
FOR	Forward
PADR	Passenger Door

DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Circuit Index	Coupe	From Chassis 00001	00

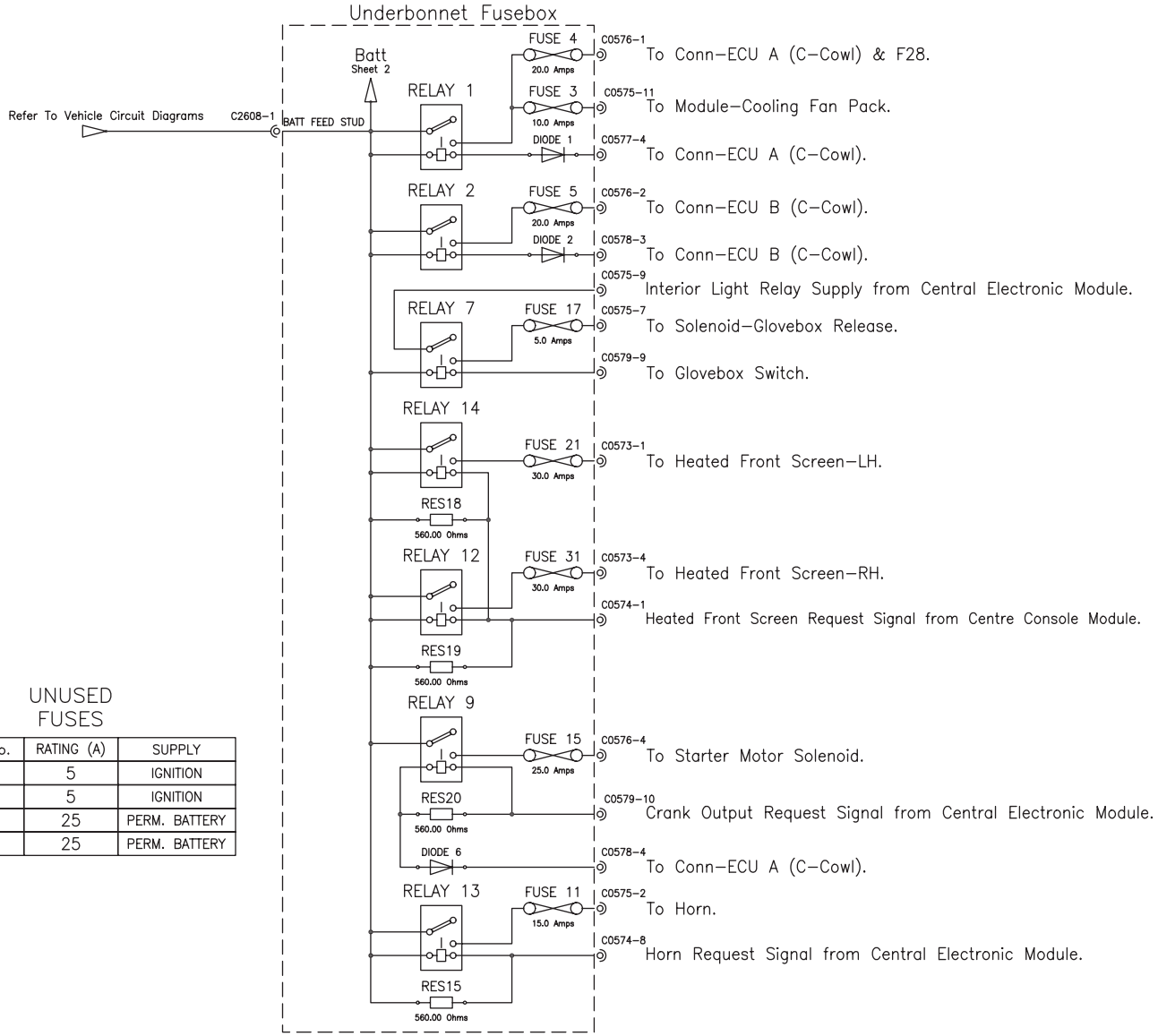


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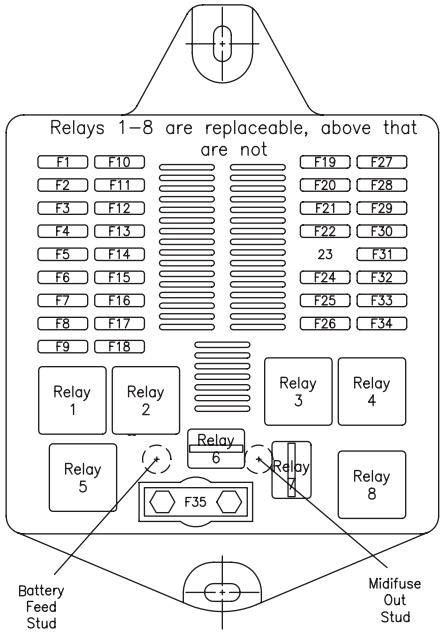
FUSEBOX CONNECTOR	CIRCUIT C NUMBER	HARNESS
1	C0570	Forward
2	C0571	Forward
3	C0572	Forward
4	C0573	Forward
5	C0574	Forward
6	C0575	Forward
7	C0576	Engine
8	C0577	Engine
9	C0578	Engine
10	C0579	Forward

UNUSED FUSES

FUSE No.	RATING (A)	SUPPLY
22	5	IGNITION
25	5	IGNITION
27	25	PERM. BATTERY
29	25	PERM. BATTERY



DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Underbonnet Fusebox 1 of 3	Coupe	From Chassis 00001	UB 1

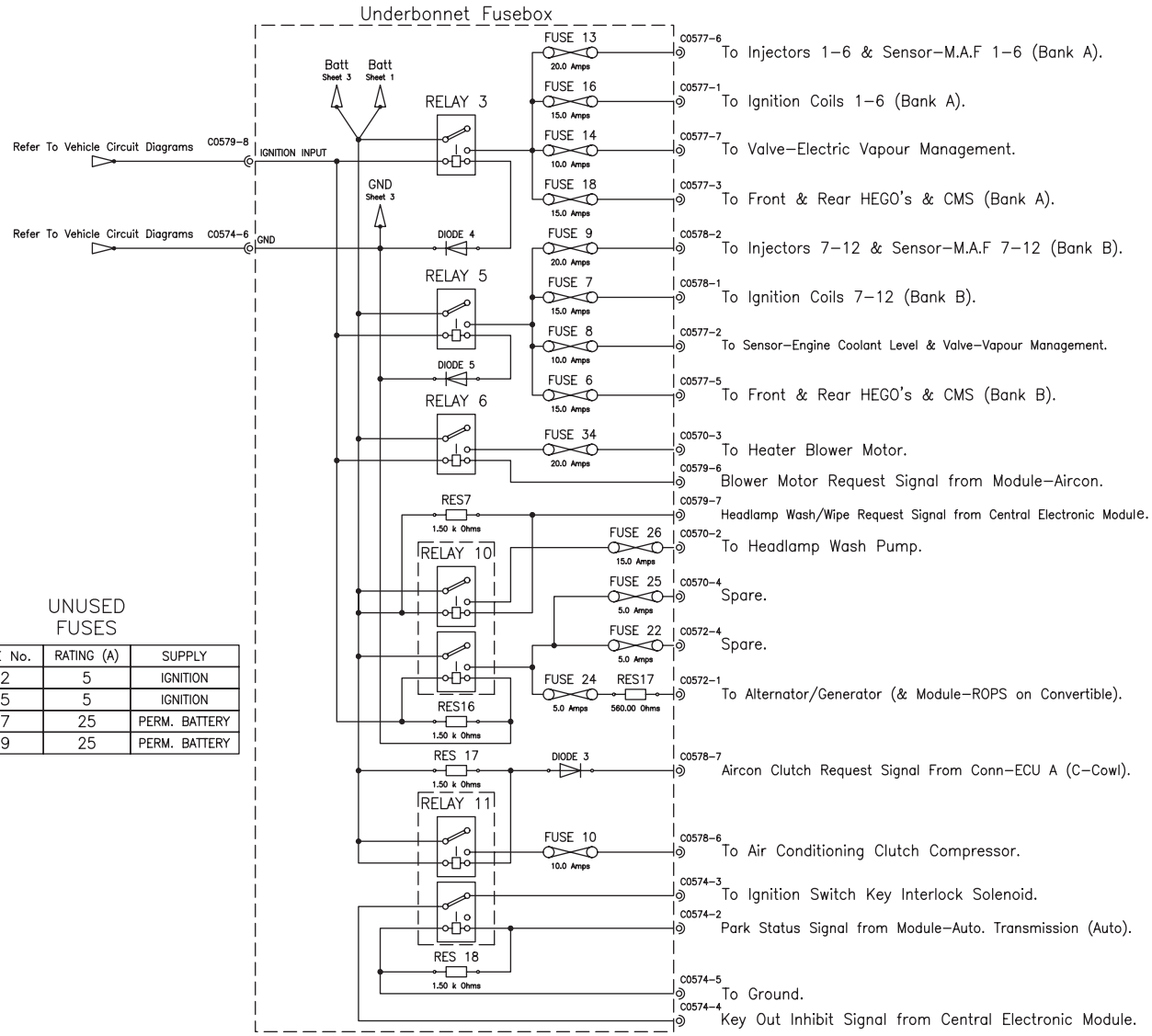


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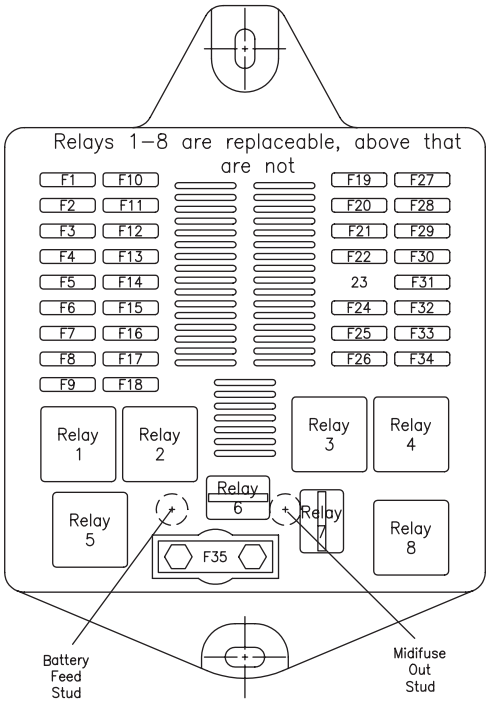
FUSEBOX CONNECTOR	CIRCUIT C NUMBER	HARNESS
1	C0570	Forward
2	C0571	Forward
3	C0572	Forward
4	C0573	Forward
5	C0574	Forward
6	C0575	Forward
7	C0576	Engine
8	C0577	Engine
9	C0578	Engine
10	C0579	Forward

UNUSED FUSES

FUSE No.	RATING (A)	SUPPLY
22	5	IGNITION
25	5	IGNITION
27	25	PERM. BATTERY
29	25	PERM. BATTERY



DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Underbonnet Fusebox 2 of 3	Coupe	From Chassis 00001	UB 2

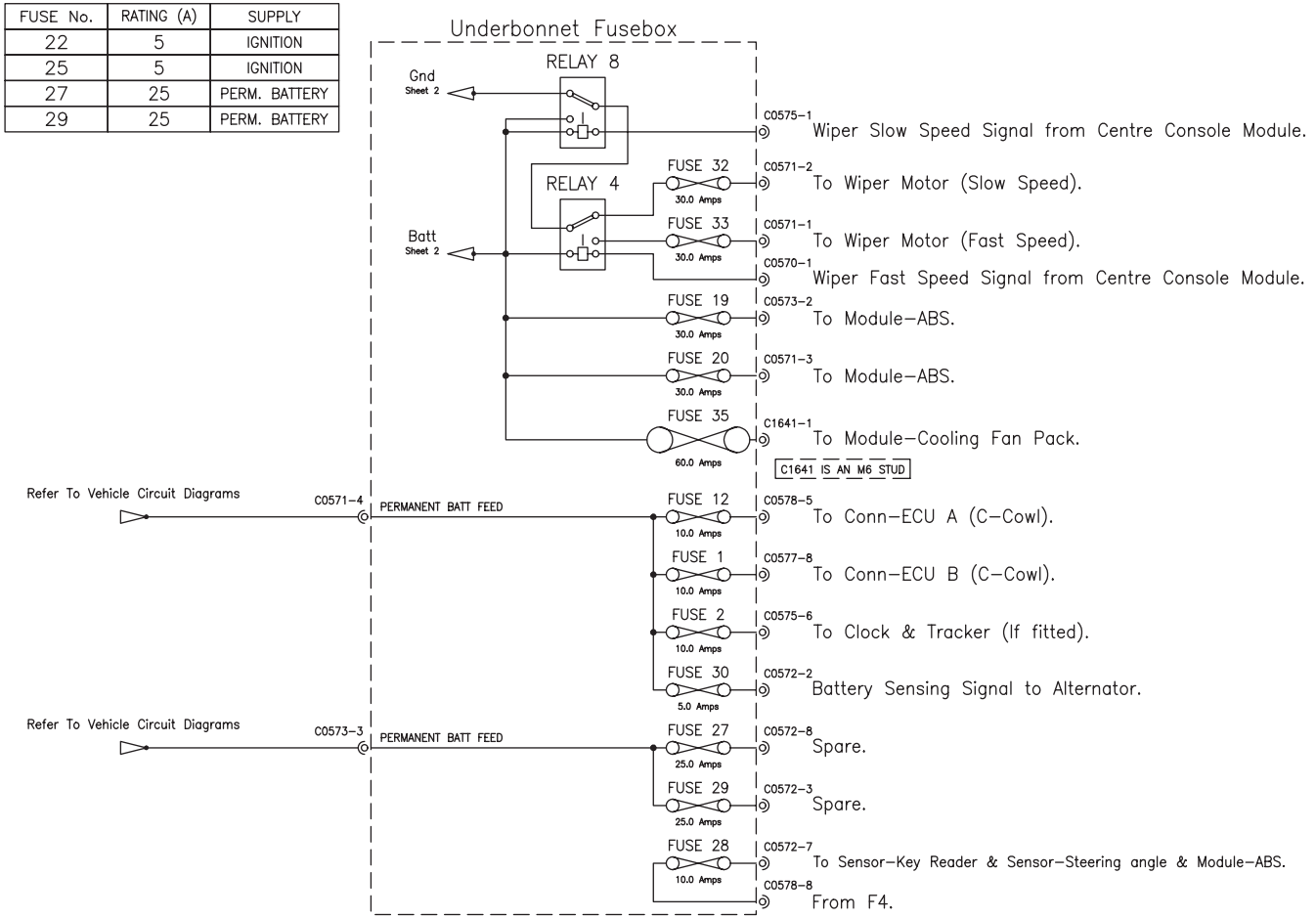


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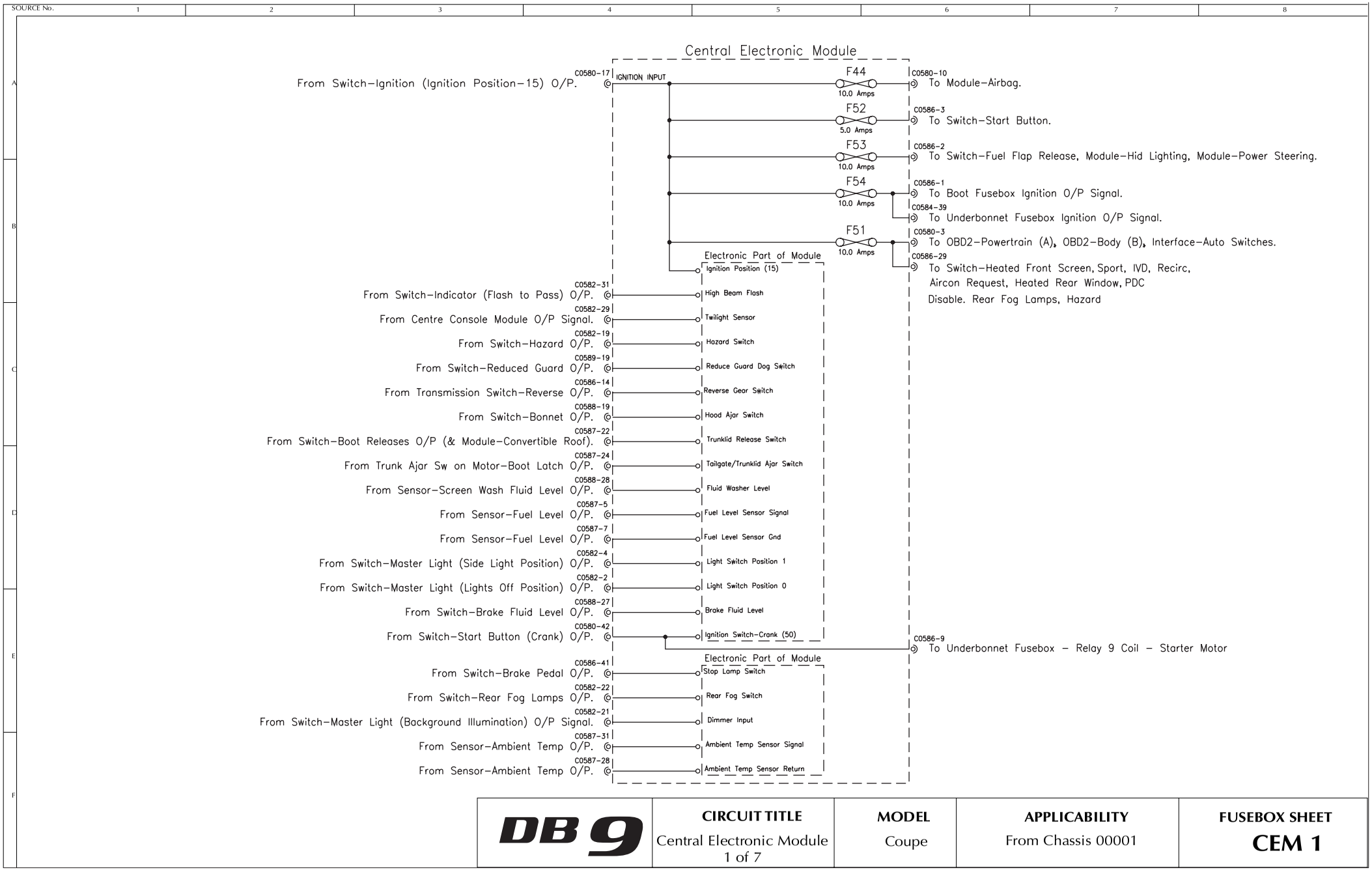
FUSEBOX CONNECTOR	CIRCUIT C NUMBER	HARNESS
1	C0570	Forward
2	C0571	Forward
3	C0572	Forward
4	C0573	Forward
5	C0574	Forward
6	C0575	Forward
7	C0576	Engine
8	C0577	Engine
9	C0578	Engine
10	C0579	Forward

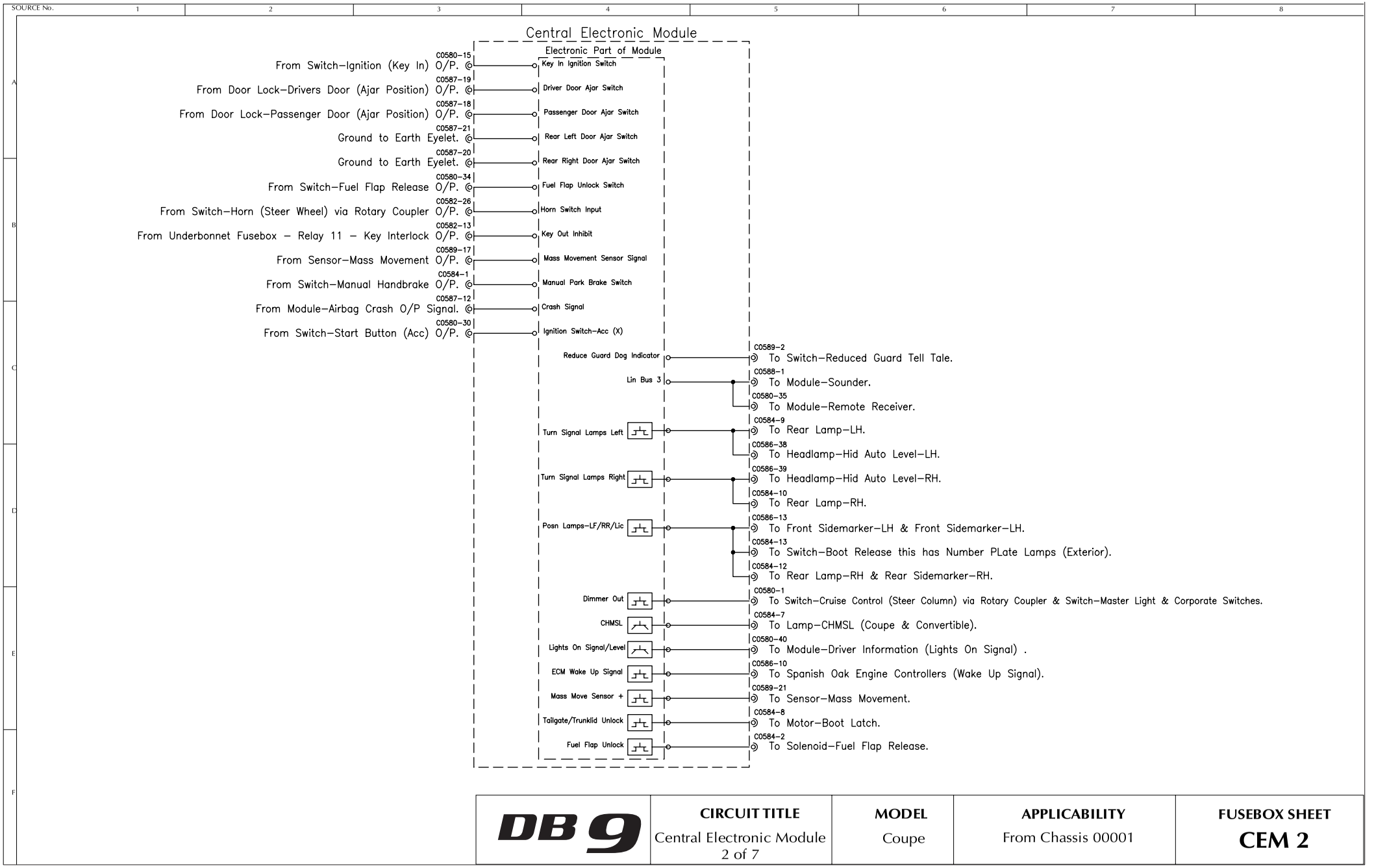
UNUSED FUSES

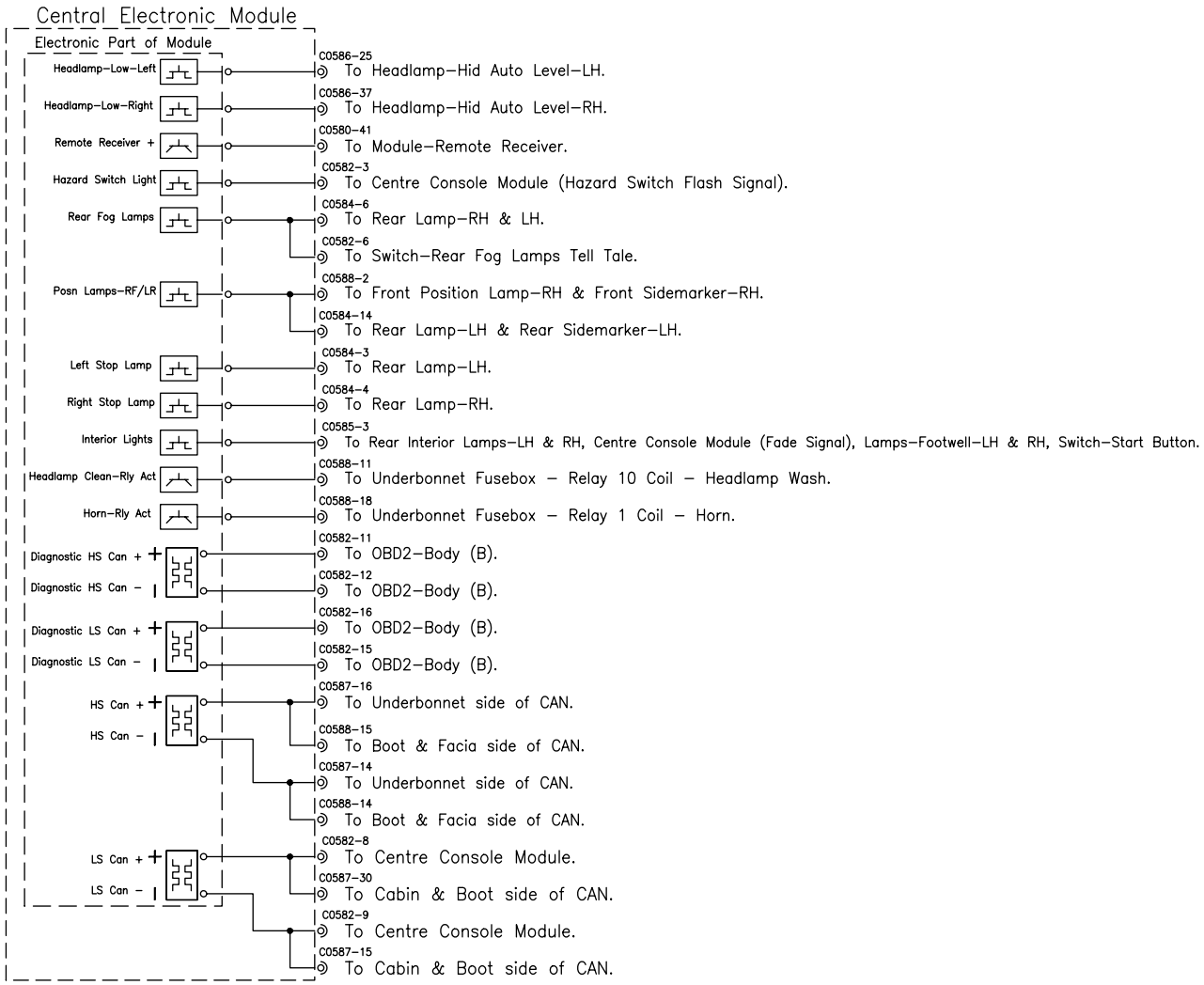
FUSE No.	RATING (A)	SUPPLY
22	5	IGNITION
25	5	IGNITION
27	25	PERM. BATTERY
29	25	PERM. BATTERY



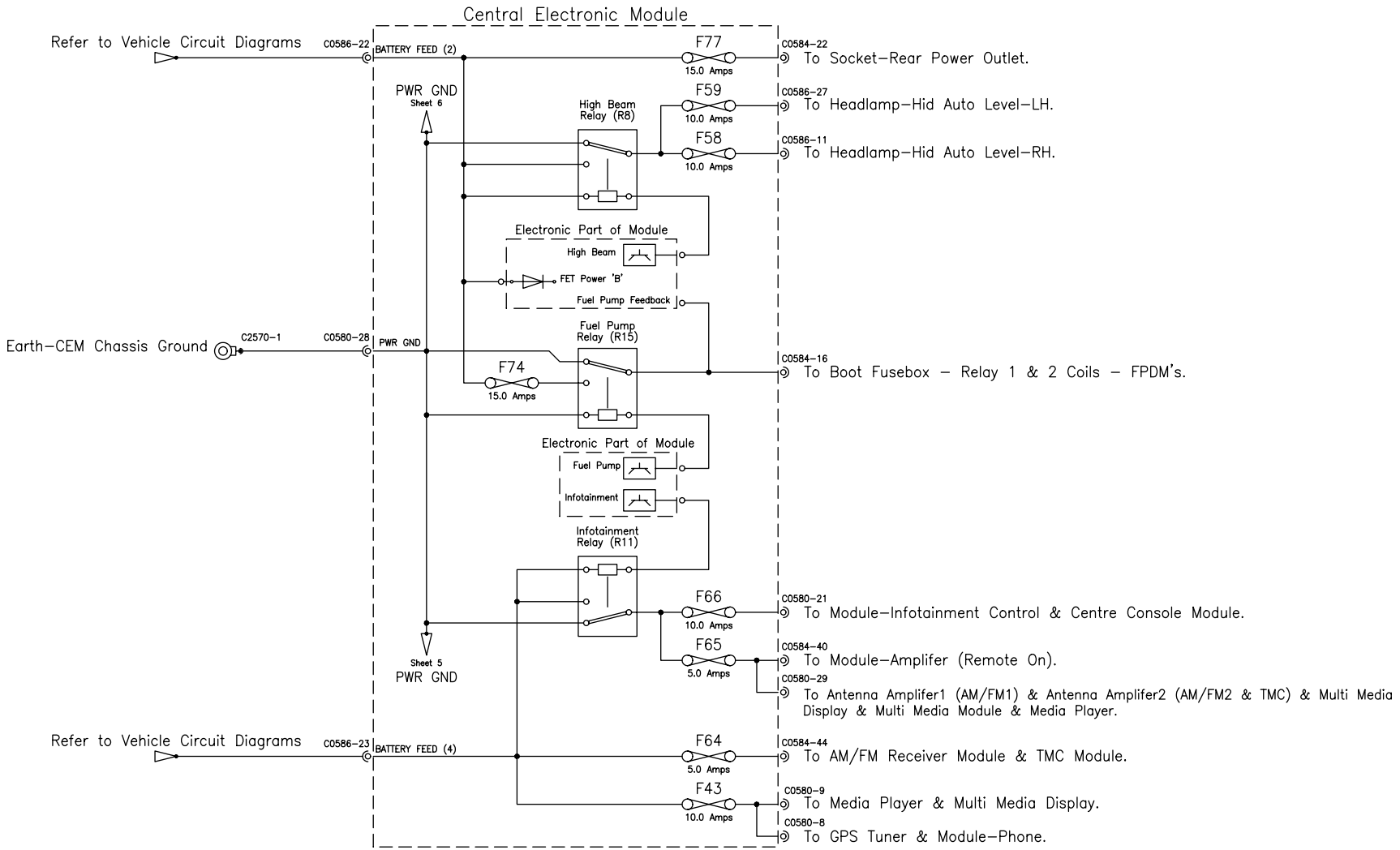
DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Underbonnet Fusebox 3 of 3	Coupe	From Chassis 00001	UB 3


SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
Central Electronic Module
From Switch-Ignition (Ignition Position-15) O/P.
C0580-17
IGNITION INPUT
F44
10.0 Amps
C0580-10
To Module-Airbag.
F52
5.0 Amps
C0586-3
To Switch-Start Button.
F53
10.0 Amps
C0586-2
To Switch-Fuel Flap Release, Module-Hid Lighting, Module-Power Steering.
F54
10.0 Amps
C0586-1
To Boot Fusebox Ignition O/P Signal.
C0584-39
To Underbonnet Fusebox Ignition O/P Signal.
F51
10.0 Amps
C0580-3
To OBD2-Powertrain (A), OBD2-Body (B), Interface-Auto Switches.
C0586-29
To Switch-Heated Front Screen, Sport, IVD, Recirc, Aircon Request, Heated Rear Window, PDC Disable. Rear Fog Lamps, Hazard
Electronic Part of Module
Ignition Position (15)
From Switch-Indicator (Flash to Pass) O/P.
C0582-31
High Beam Flash
From Centre Console Module O/P Signal.
C0582-29
Twilight Sensor
From Switch-Hazard O/P.
C0582-19
Hazard Switch
From Switch-Reduced Guard O/P.
C0589-19
Reduce Guard Dog Switch
From Transmission Switch-Reverse O/P.
C0586-14
Reverse Gear Switch
From Switch-Bonnet O/P.
C0588-19
Hood Ajar Switch
From Switch-Boot Releases O/P (& Module-Convertible Roof).
C0587-22
Trunklid Release Switch
From Trunk Ajar Sw on Motor-Boot Latch O/P.
C0587-24
Tailgate/Trunklid Ajar Switch
From Sensor-Screen Wash Fluid Level O/P.
C0588-28
Fluid Washer Level
From Sensor-Fuel Level O/P.
C0587-5
Fuel Level Sensor Signal
From Sensor-Fuel Level O/P.
C0587-7
Fuel Level Sensor Gnd
From Switch-Master Light (Side Light Position) O/P.
C0582-4
Light Switch Position 1
From Switch-Master Light (Lights Off Position) O/P.
C0582-2
Light Switch Position 0
From Switch-Brake Fluid Level O/P.
C0588-27
Brake Fluid Level
From Switch-Start Button (Crank) O/P.
C0580-42
Ignition Switch-Crank (50)
C0586-9
To Underbonnet Fusebox - Relay 9 Coil - Starter Motor
Electronic Part of Module
From Switch-Brake Pedal O/P.
C0586-41
Stop Lamp Switch
From Switch-Rear Fog Lamps O/P.
C0582-22
Rear Fog Switch
From Switch-Master Light (Background Illumination) O/P Signal.
C0582-21
Dimmer Input
From Sensor-Ambient Temp O/P.
C0587-31
Ambient Temp Sensor Signal
From Sensor-Ambient Temp O/P.
C0587-28
Ambient Temp Sensor Return
DB 9
CIRCUIT TITLE
Central Electronic Module
1 of 7
MODEL
Coupe
APPLICABILITY
From Chassis 00001
FUSEBOX SHEET
CEM 1

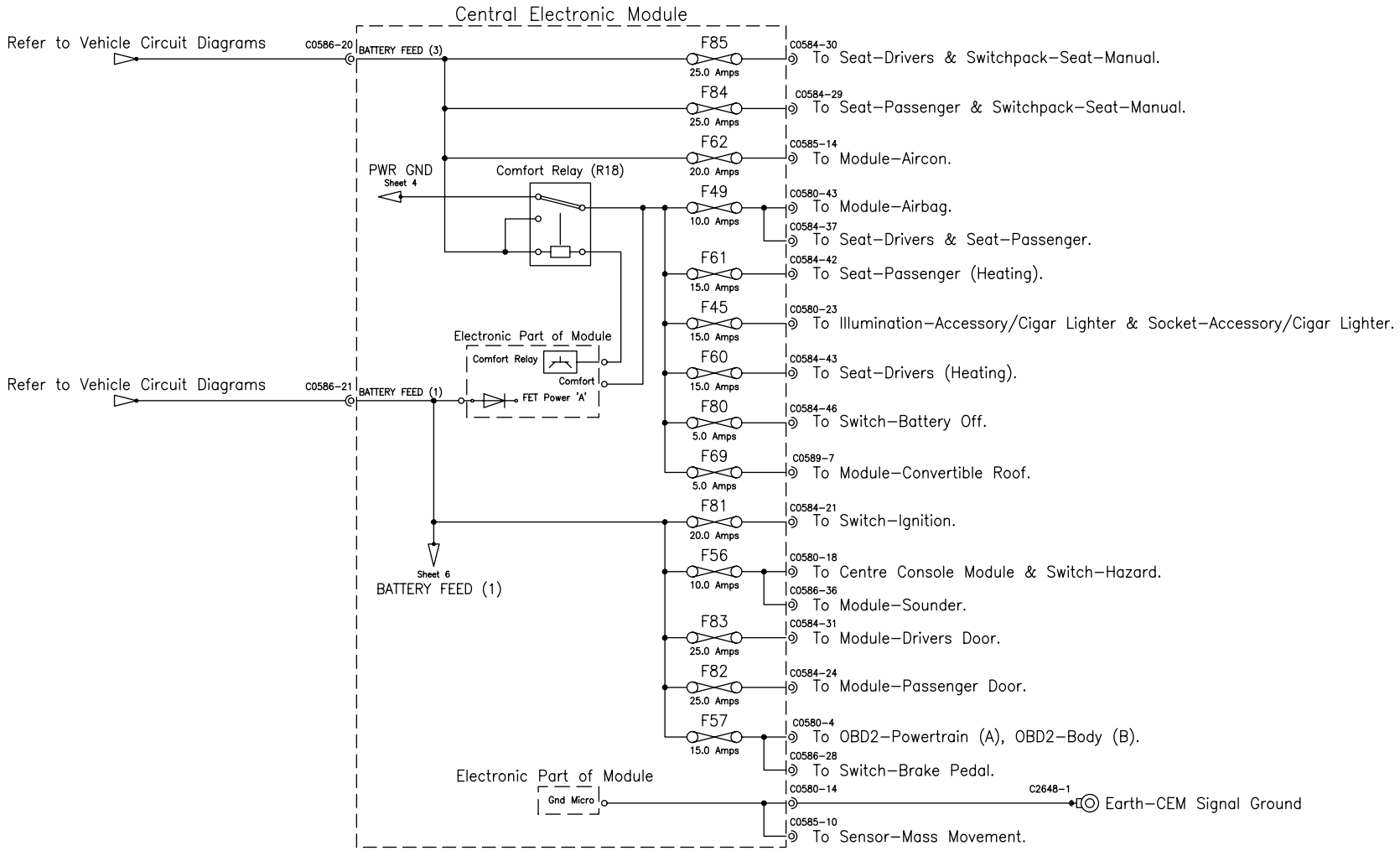

SOURCE No.
1
2
3
4
5
6
7
8
Central Electronic Module
Electronic Part of Module
C0580-15
From Switch-Ignition (Key In) O/P.
Key In Ignition Switch
C0587-19
From Door Lock-Drivers Door (Ajar Position) O/P.
Driver Door Ajar Switch
C0587-18
From Door Lock-Passenger Door (Ajar Position) O/P.
Passenger Door Ajar Switch
C0587-21
Ground to Earth Eyelet.
Rear Left Door Ajar Switch
C0587-20
Ground to Earth Eyelet.
Rear Right Door Ajar Switch
C0580-34
From Switch-Fuel Flap Release O/P.
Fuel Flap Unlock Switch
C0582-26
From Switch-Horn (Steer Wheel) via Rotary Coupler O/P.
Horn Switch Input
C0582-13
From Underbonnet Fusebox - Relay 11 - Key Interlock O/P.
Key Out Inhibit
C0589-17
From Sensor-Mass Movement O/P.
Mass Movement Sensor Signal
C0584-1
From Switch-Manual Handbrake O/P.
Manual Park Brake Switch
C0587-12
From Module-Airbag Crash O/P Signal.
Crash Signal
C0580-30
From Switch-Start Button (Acc) O/P.
Ignition Switch-Acc (X)
Reduce Guard Dog Indicator
C0589-2
To Switch-Reduced Guard Tell Tale.
Lin Bus 3
C0588-1
To Module-Sounder.
C0580-35
To Module-Remote Receiver.
Turn Signal Lamps Left
C0584-9
To Rear Lamp-LH.
C0586-38
To Headlamp-Hid Auto Level-LH.
Turn Signal Lamps Right
C0586-39
To Headlamp-Hid Auto Level-RH.
C0584-10
To Rear Lamp-RH.
Posn Lamps-LF/RR/Lic
C0586-13
To Front Sidemarker-LH & Front Sidemarker-LH.
C0584-13
To Switch-Boot Release this has Number PLate Lamps (Exterior).
C0584-12
To Rear Lamp-RH & Rear Sidemarker-RH.
Dimmer Out
C0580-1
To Switch-Cruise Control (Steer Column) via Rotary Coupler & Switch-Master Light & Corporate Switches.
CHMSL
C0584-7
To Lamp-CHMSL (Coupe & Convertible).
Lights On Signal/Level
C0580-40
To Module-Driver Information (Lights On Signal) .
ECM Wake Up Signal
C0586-10
To Spanish Oak Engine Controllers (Wake Up Signal).
Mass Move Sensor +
C0589-21
To Sensor-Mass Movement.
Tailgate/Trunklid Unlock
C0584-8
To Motor-Boot Latch.
Fuel Flap Unlock
C0584-2
To Solenoid-Fuel Flap Release.
DB 9
CIRCUIT TITLE
Central Electronic Module
2 of 7
MODEL
Coupe
APPLICABILITY
From Chassis 00001
FUSEBOX SHEET
CEM 2



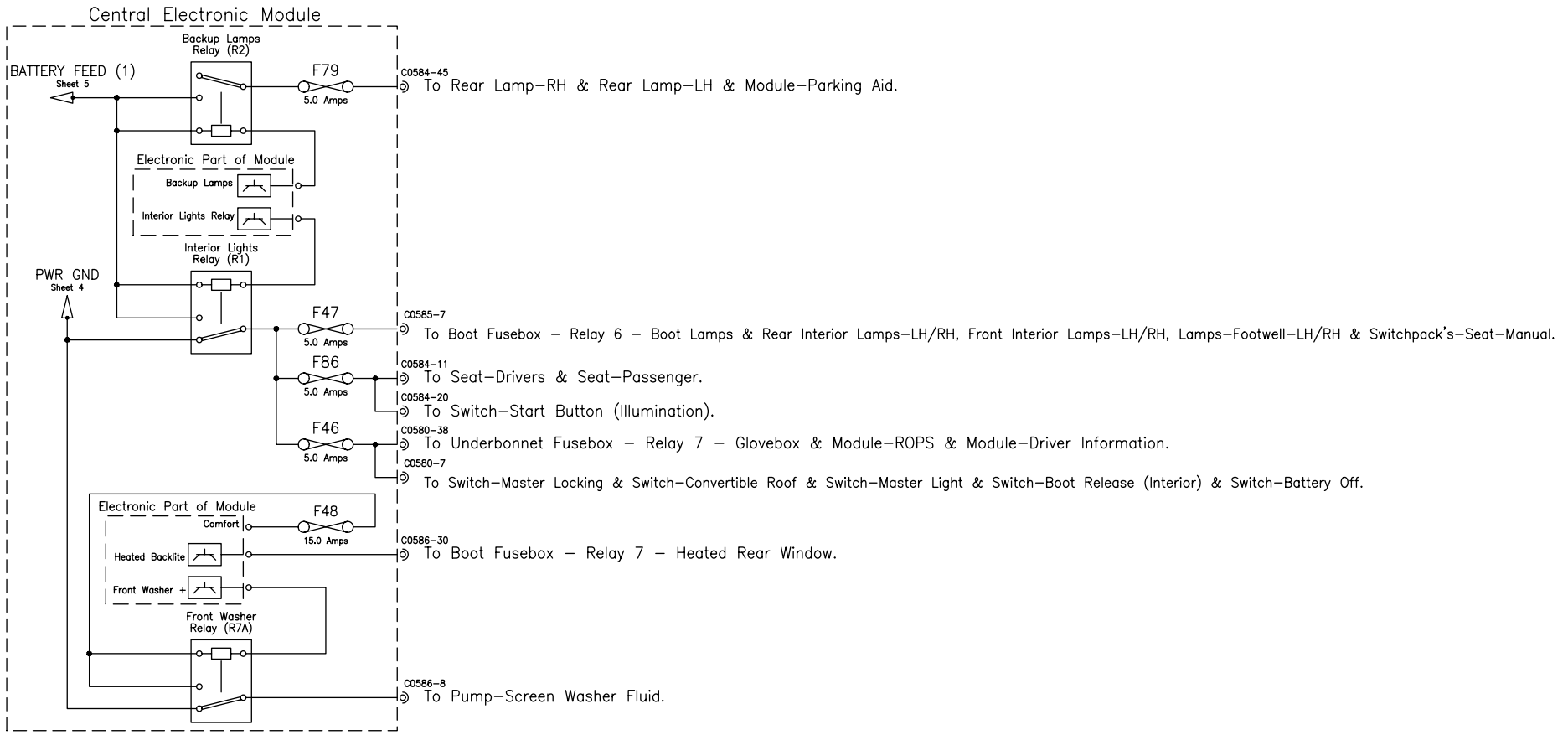
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Central Electronic Module 3 of 7	Coupe	From Chassis 00001	CEM 3



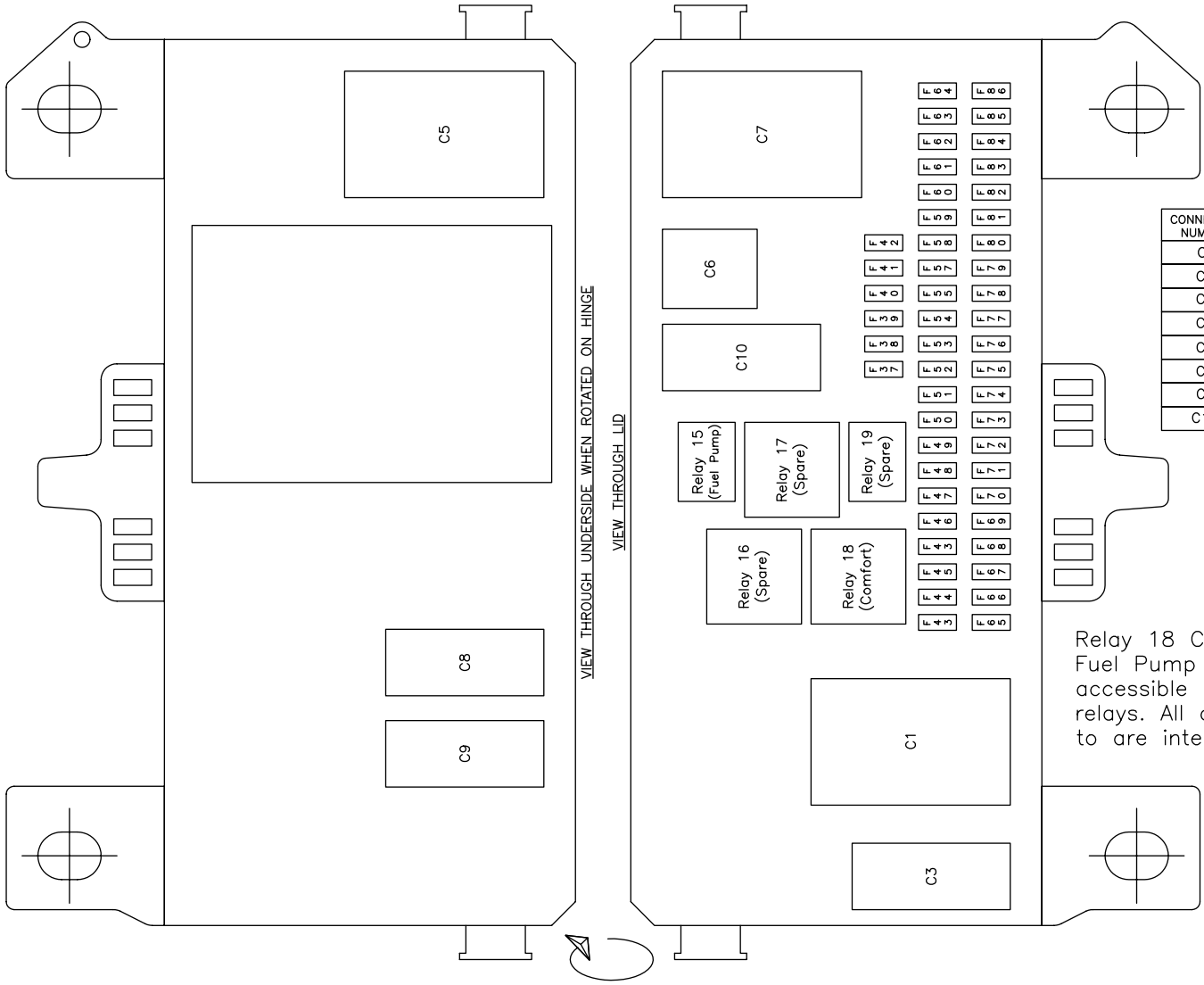
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Central Electronic Module 4 of 7	Coupe	From Chassis 00001	CEM 4



DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Central Electronic Module 5 of 7	Coupe	From Chassis 00001	CEM 5



DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Central Electronic Module 6 of 7	Coupe	From Chassis 00001	CEM 6

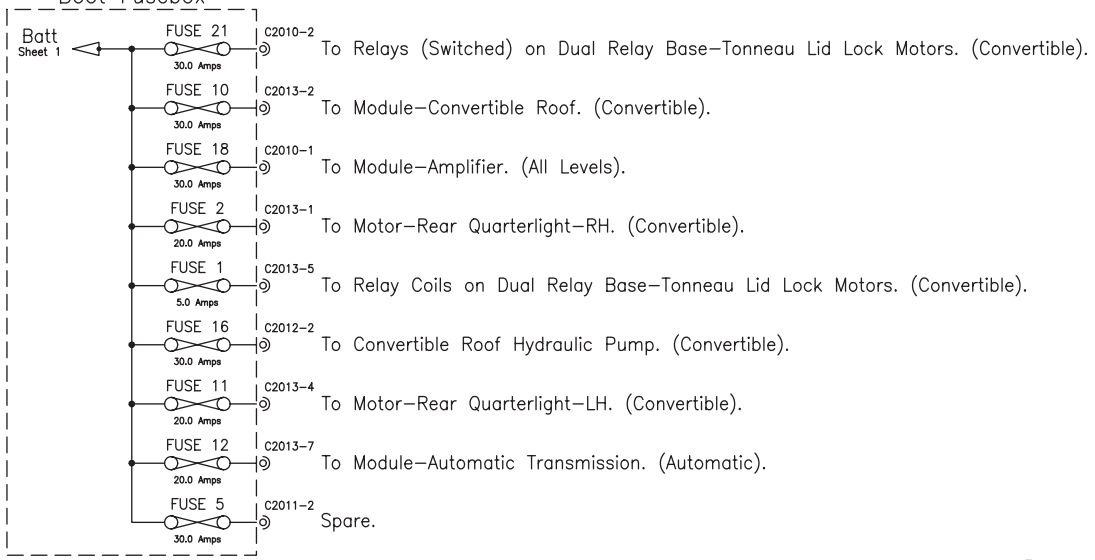


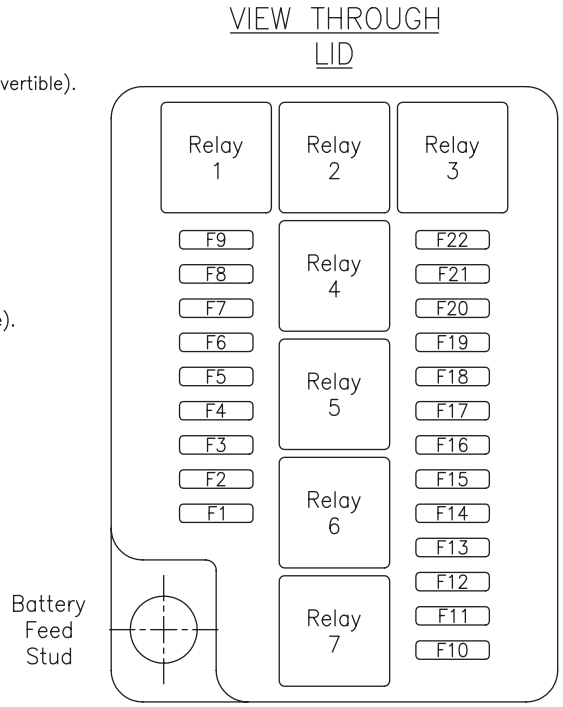
CONNECTOR NUMBER	FUSEBOX CONNECTOR	CIRCUIT C NUMBER	CONNECTOR COLOUR
C1	COCKPIT 1	C0580	BLUE
C3	COCKPIT 2	C0582	BLUE
C5	FLOOR 1	C0584	BROWN
C6	ROOF 1	C0585	BLACK
C7	FRONT 1	C0586	GREEN
C8	FLOOR 2	C0587	BROWN
C9	FRONT 2	C0588	GREEN
C10	ROOF 2	C0589	GREY

NOTE

Relay 18 Comfort and Relay 15 Fuel Pump are the only accessible interchangeable relays. All other relays referred to are internal to the CEM.

DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Central Electronic Module 7 of 7	Coupe	From Chassis 00001	CEM 7



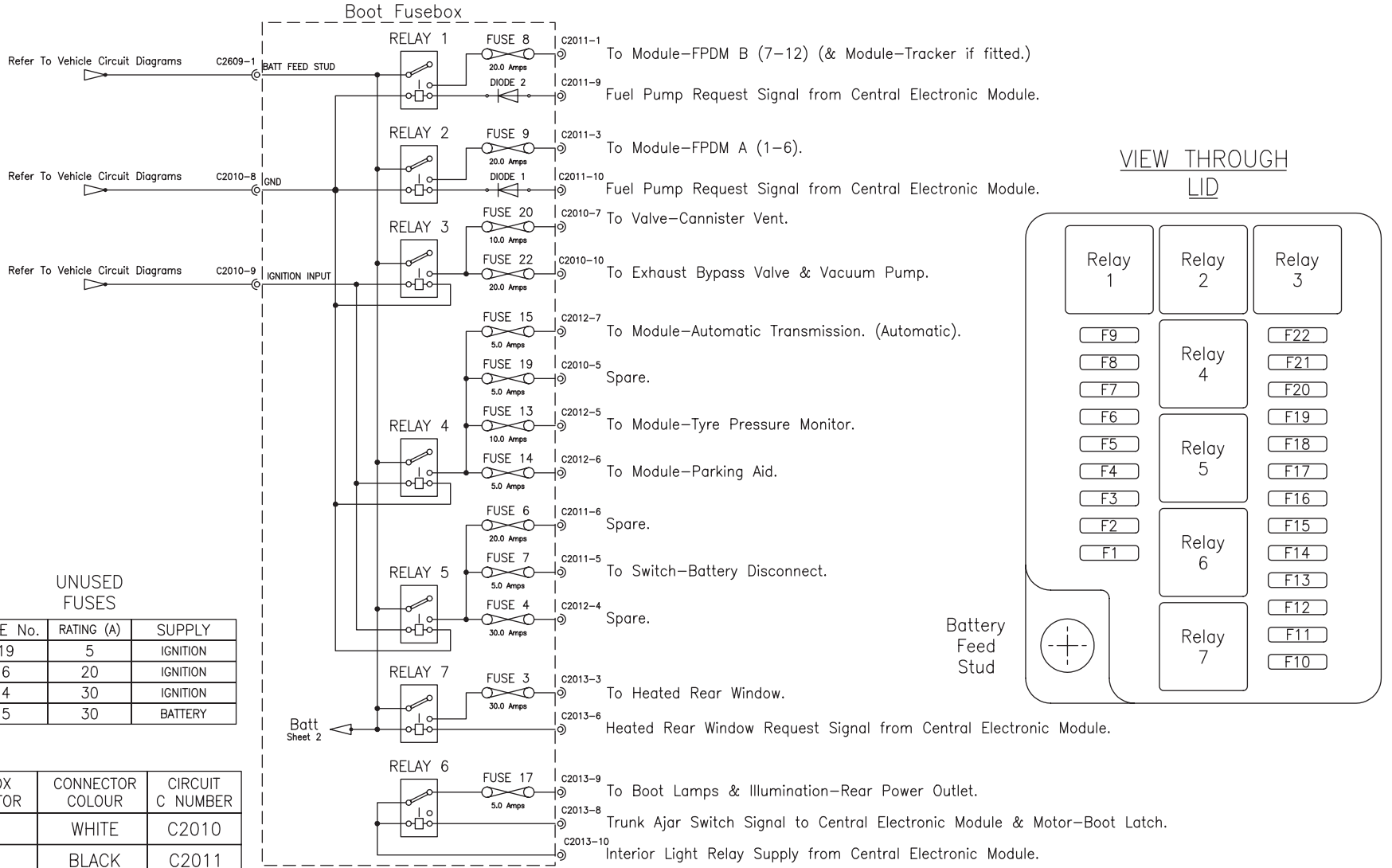


UNUSED FUSES

FUSE No.	RATING (A)	SUPPLY
19	5	IGNITION
6	20	IGNITION
4	30	IGNITION
5	30	BATTERY

FUSEBOX CONNECTOR	CONNECTOR COLOUR	CIRCUIT C NUMBER
A	WHITE	C2010
B	BLACK	C2011
C	GREEN	C2012
D	BLUE	C2013

DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Boot Fusebox 1 of 2	Coupe	From Chassis 00001	**Boot 1**

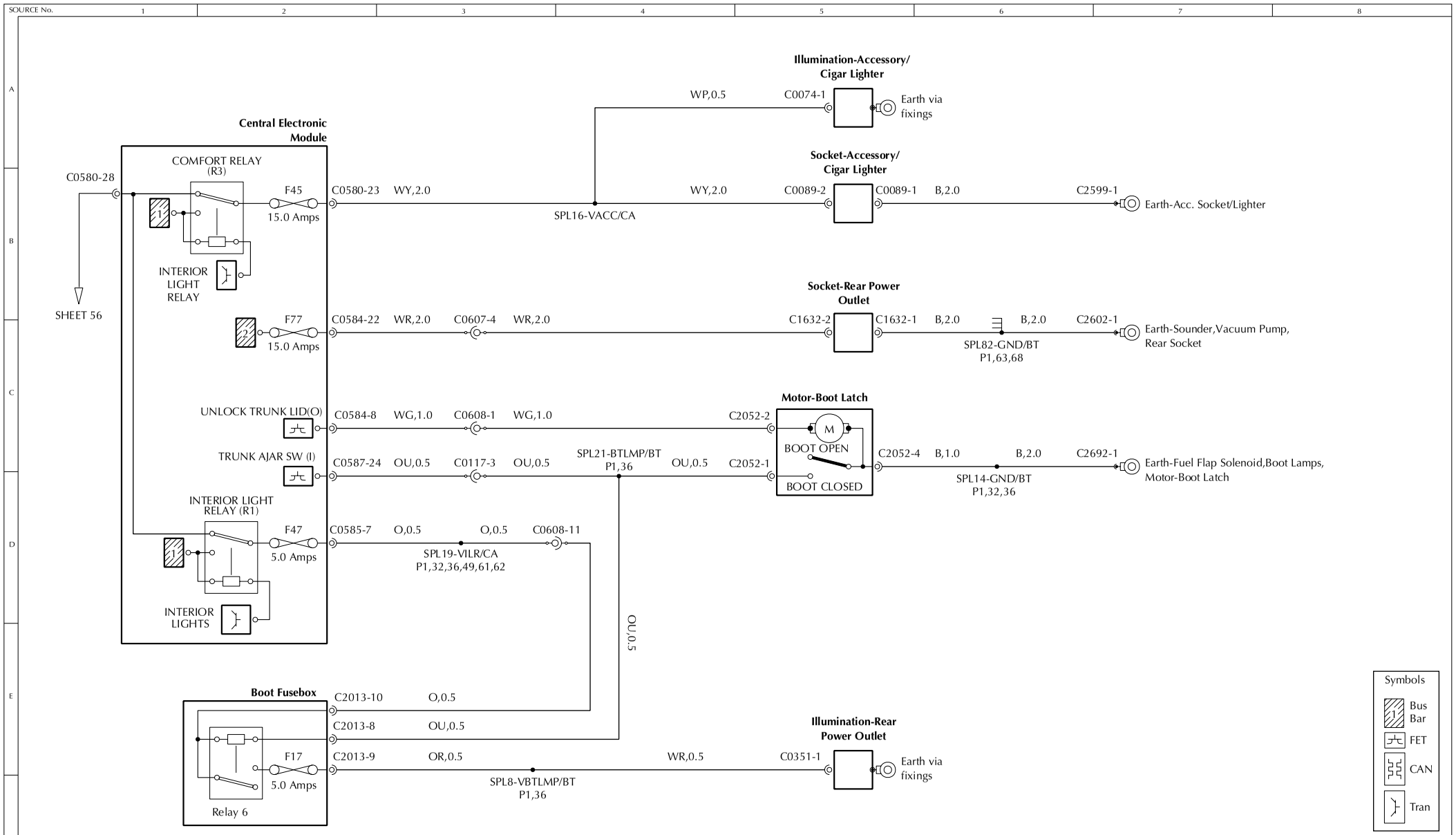


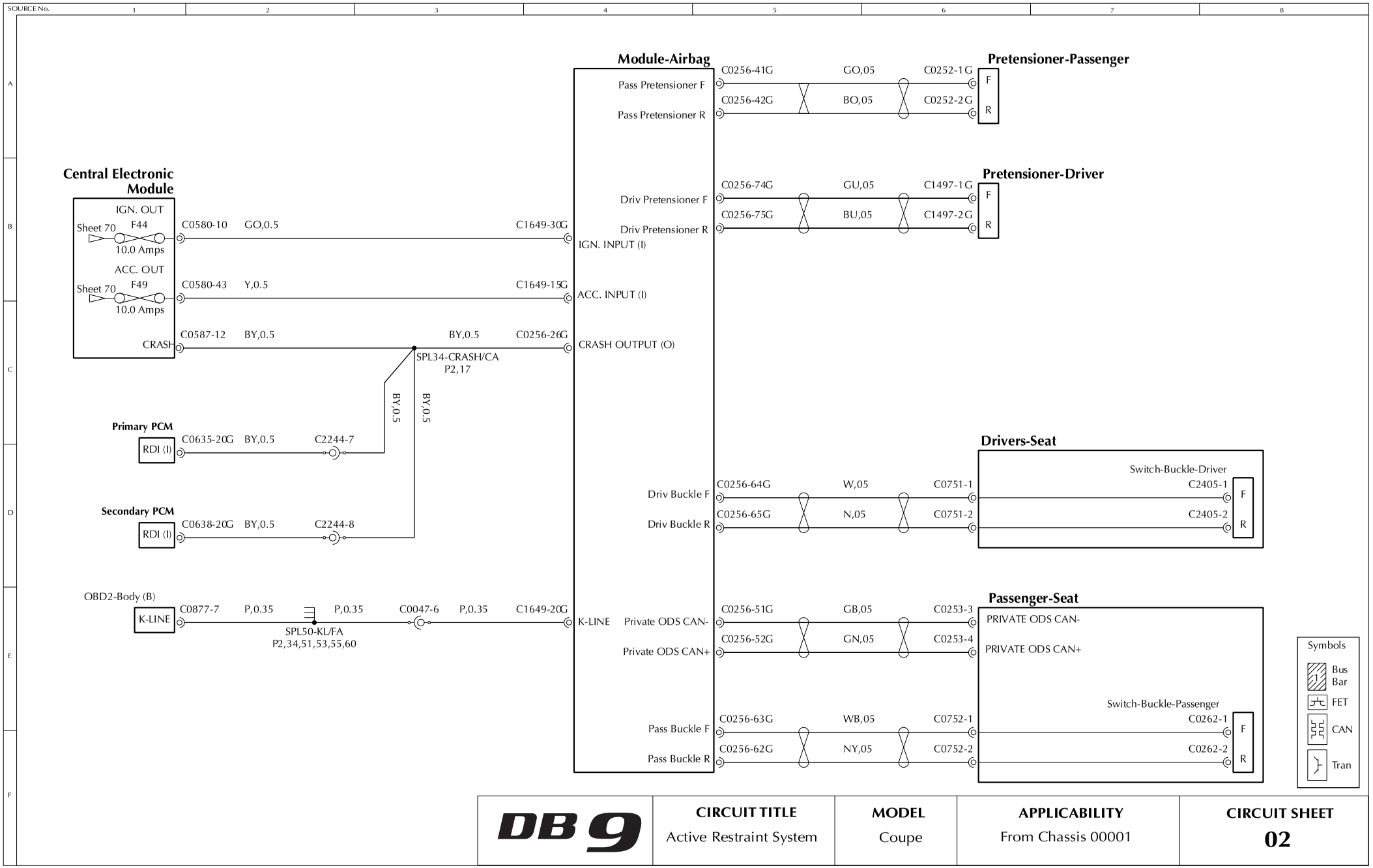
UNUSED FUSES

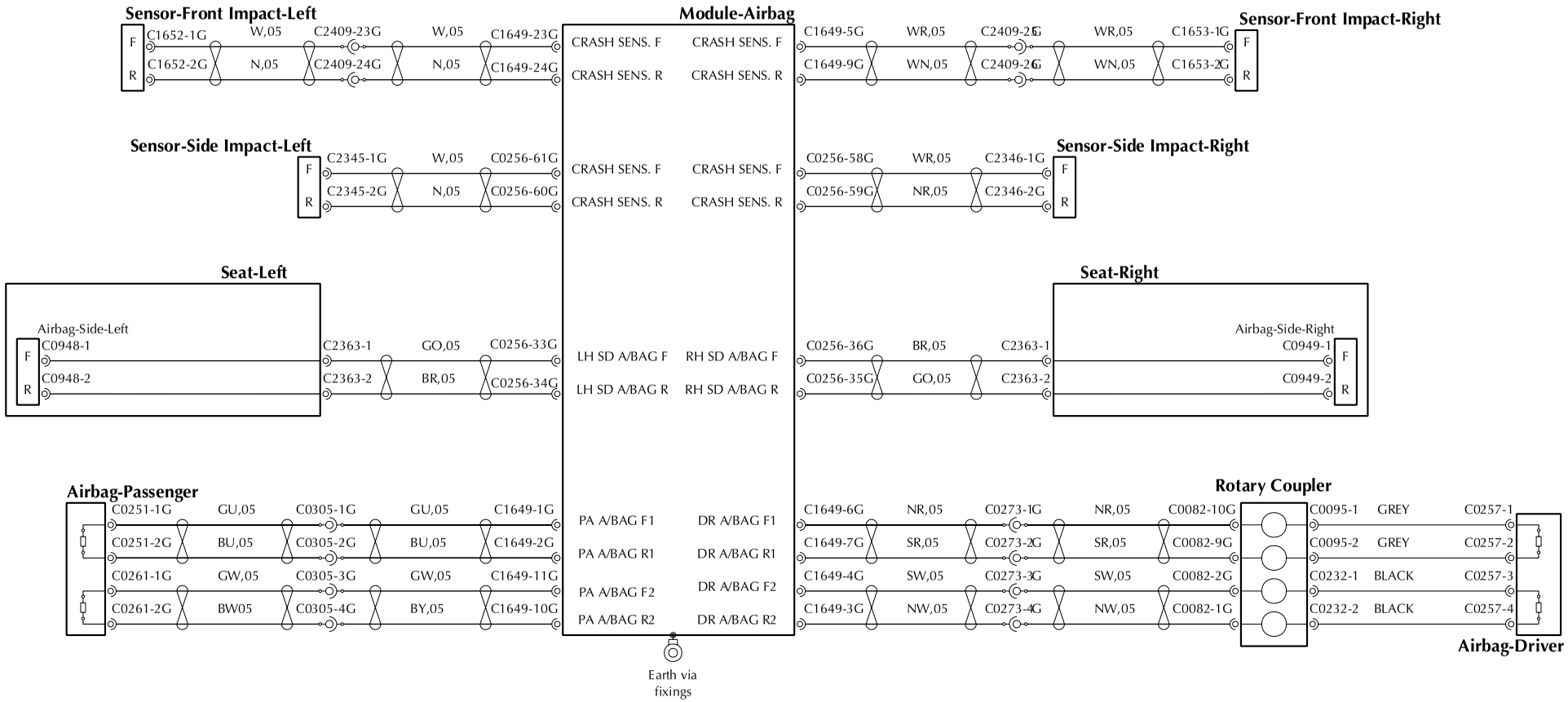
FUSE No.	RATING (A)	SUPPLY
19	5	IGNITION
6	20	IGNITION
4	30	IGNITION
5	30	BATTERY

FUSEBOX CONNECTOR	CONNECTOR COLOUR	CIRCUIT C NUMBER
A	WHITE	C2010
B	BLACK	C2011
C	GREEN	C2012
D	BLUE	C2013

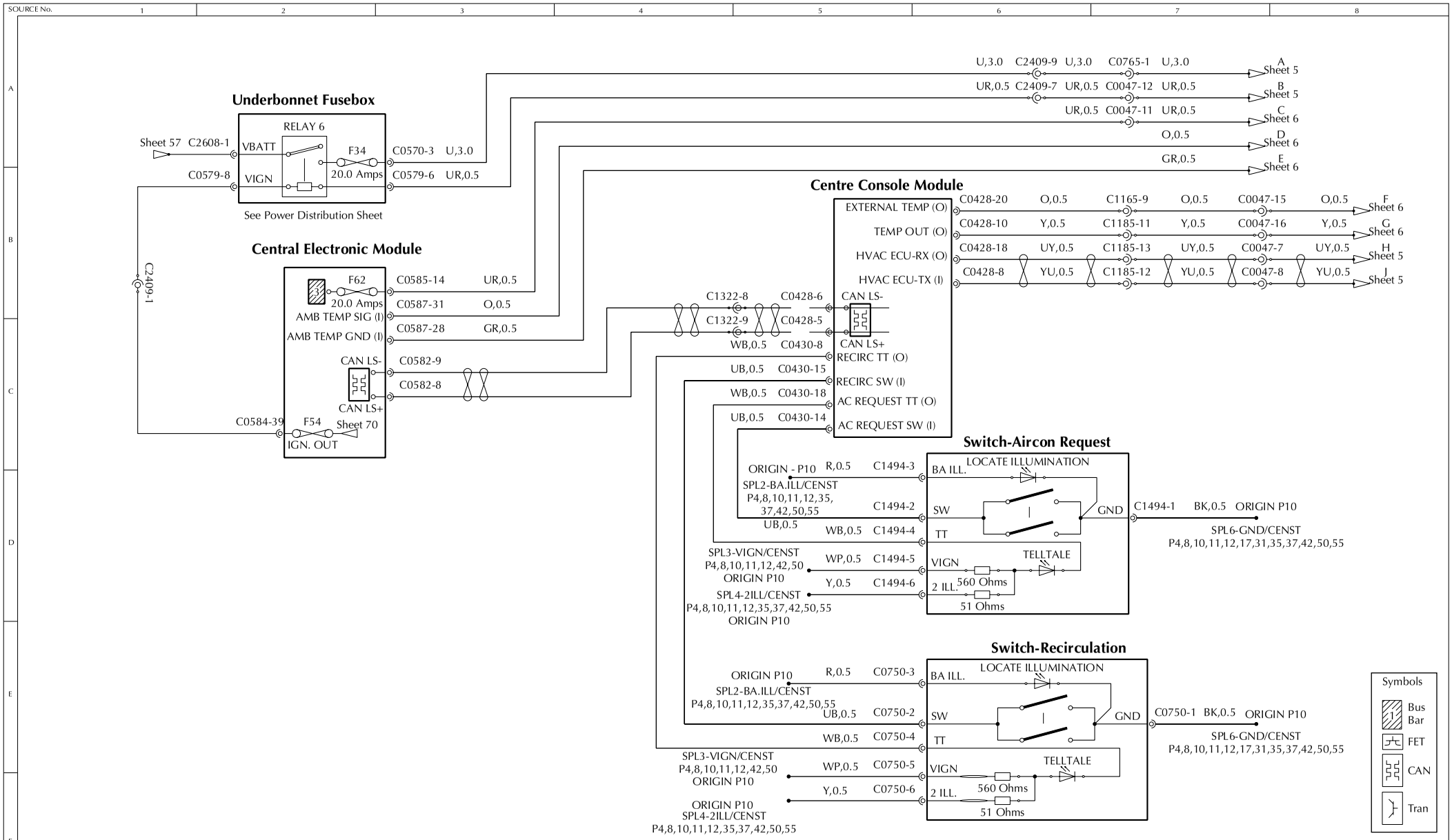
DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	FUSEBOX SHEET
	Boot Fusebox 2 of 2	Coupe	From Chassis 00001	**Boot 2**


SOURCE No.
Illumination-Accessory/
Cigar Lighter
WP,0.5
C0074-1
Earth via
fixings
Central Electronic
Module
COMFORT RELAY
(R3)
C0580-28
F45
15.0 Amps
C0580-23
WY,2.0
WY,2.0
C0089-2
Socket-Accessory/
Cigar Lighter
C0089-1
B,2.0
C2599-1
Earth-Acc. Socket/Lighter
SPL16-VACC/CA
INTERIOR
LIGHT
RELAY
SHEET 56
Socket-Rear Power
Outlet
F77
15.0 Amps
C0584-22
WR,2.0
C0607-4
WR,2.0
C1632-2
C1632-1
B,2.0
B,2.0
C2602-1
Earth-Sounder,Vacuum Pump,
Rear Socket
SPL82-GND/BT
P1,63,68
Motor-Boot Latch
UNLOCK TRUNK LID(O)
C0584-8
WG,1.0
C0608-1
WG,1.0
C2052-2
M
BOOT OPEN
TRUNK AJAR SW (I)
C0587-24
OU,0.5
C0117-3
OU,0.5
SPL21-BTLMP/BT
P1,36
OU,0.5
C2052-1
BOOT CLOSED
C2052-4
B,1.0
B,2.0
C2692-1
Earth-Fuel Flap Solenoid,Boot Lamps,
Motor-Boot Latch
SPL14-GND/BT
P1,32,36
INTERIOR LIGHT
RELAY (R1)
F47
5.0 Amps
C0585-7
O,0.5
O,0.5
C0608-11
SPL19-VILR/CA
P1,32,36,49,61,62
INTERIOR
LIGHTS
OU,0.5
Boot Fusebox
C2013-10
O,0.5
C2013-8
OU,0.5
Illumination-Rear
Power Outlet
F17
5.0 Amps
C2013-9
OR,0.5
WR,0.5
C0351-1
Earth via
fixings
SPL8-VBTLMP/BT
P1,36
Relay 6
Symbols
Bus
Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Accessory Sockets,
Cigar Lighter, Boot Latch
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
01

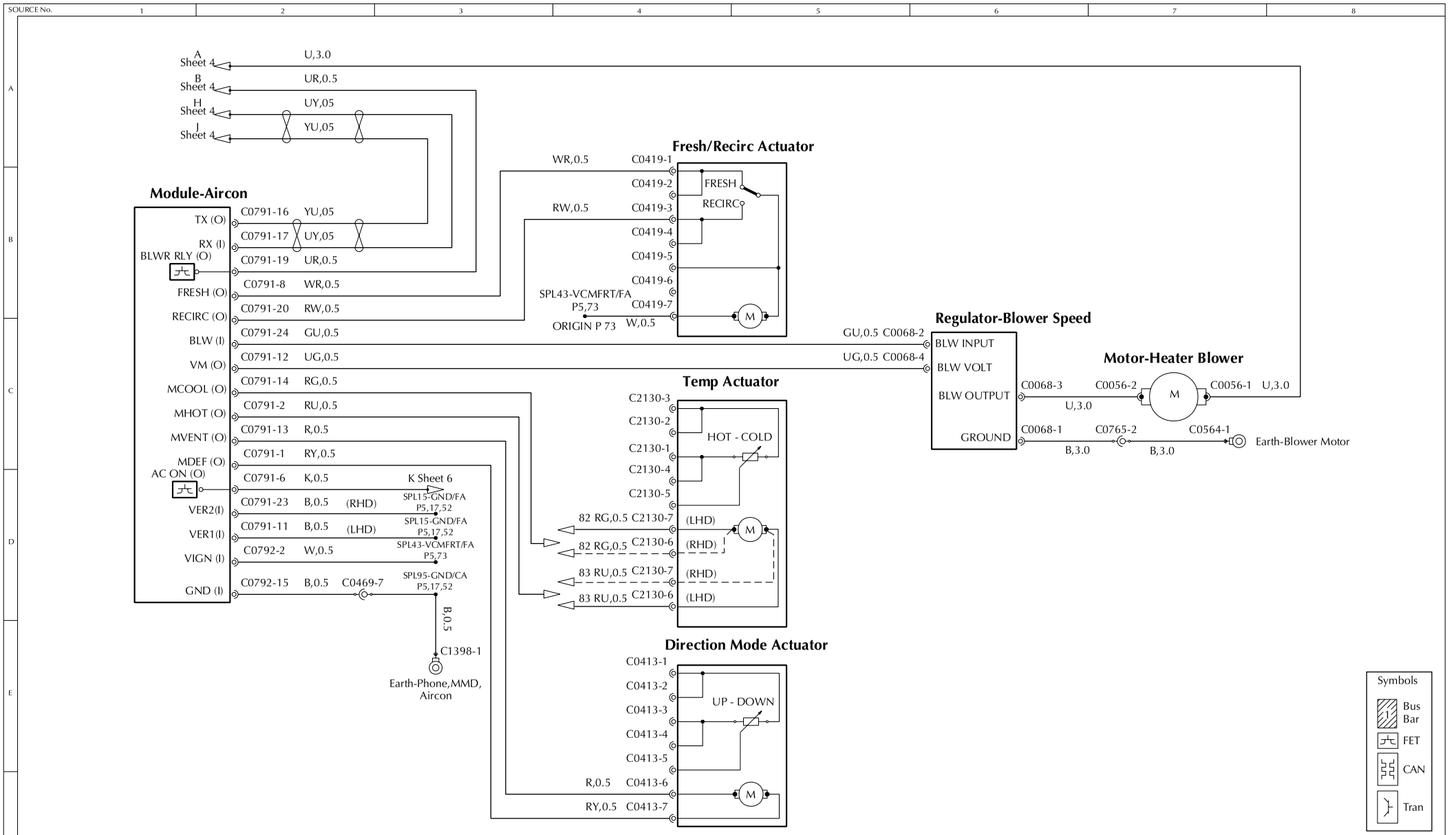

SOURCE No.
Module-Airbag
Pretensioner-Passenger
Pass Pretensioner F
Pass Pretensioner R
C0256-41G
GO,05
C0252-1G
C0256-42G
BO,05
C0252-2G
Central Electronic Module
Pretensioner-Driver
Driv Pretensioner F
Driv Pretensioner R
C0256-74G
GU,05
C1497-1G
C0256-75G
BU,05
C1497-2G
IGN. OUT
Sheet 70 F44
10.0 Amps
C0580-10 GO,0.5
C1649-30G
IGN. INPUT (I)
ACC. OUT
Sheet 70 F49
10.0 Amps
C0580-43 Y,0.5
C1649-15G
ACC. INPUT (I)
CRASH
C0587-12 BY,0.5
BY,0.5 C0256-26G
CRASH OUTPUT (O)
SPL34-CRASH/CA
P2,17
BY,0.5
BY,0.5
Primary PCM
RDI (I)
C0635-20G BY,0.5 C2244-7
Drivers-Seat
Switch-Buckle-Driver
Driv Buckle F
Driv Buckle R
C0256-64G
W,05
C0751-1
C2405-1
C0256-65G
N,05
C0751-2
C2405-2
Secondary PCM
RDI (I)
C0638-20G BY,0.5 C2244-8
OBD2-Body (B)
K-LINE
C0877-7 P,0.35
P,0.35 C0047-6 P,0.35 C1649-20G
K-LINE
SPL50-KL/FA
P2,34,51,53,55,60
Passenger-Seat
PRIVATE ODS CAN-
PRIVATE ODS CAN+
Private ODS CAN-
Private ODS CAN+
C0256-51G
GB,05
C0253-3
C0256-52G
GN,05
C0253-4
Switch-Buckle-Passenger
Pass Buckle F
Pass Buckle R
C0256-63G
WB,05
C0752-1
C0262-1
C0256-62G
NY,05
C0752-2
C0262-2
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Active Restraint System
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
02



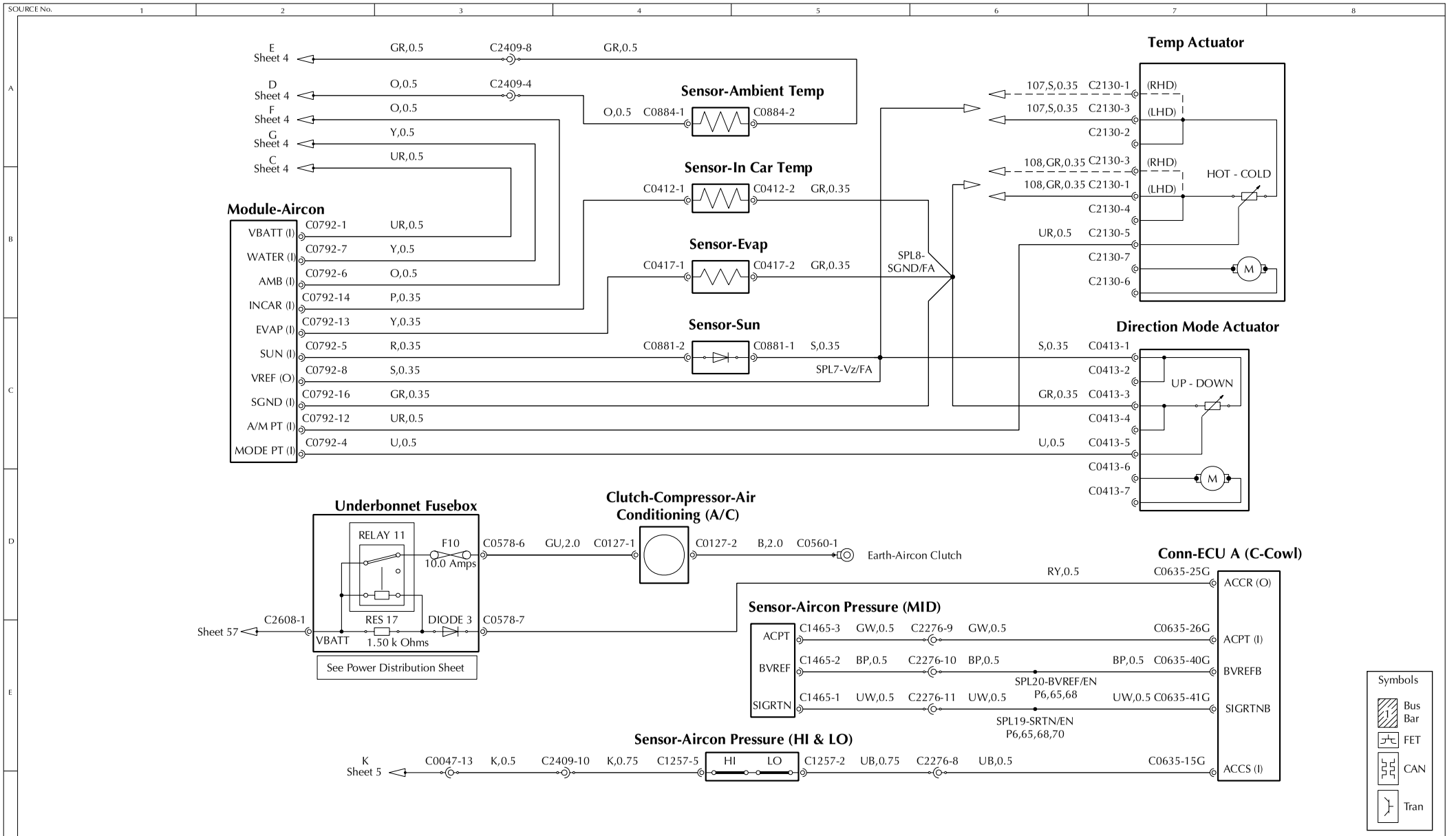
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Active Restraint System	Coupe	From Chassis 00001	03



DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Air Conditioning	Coupe	From Chassis 00001	04

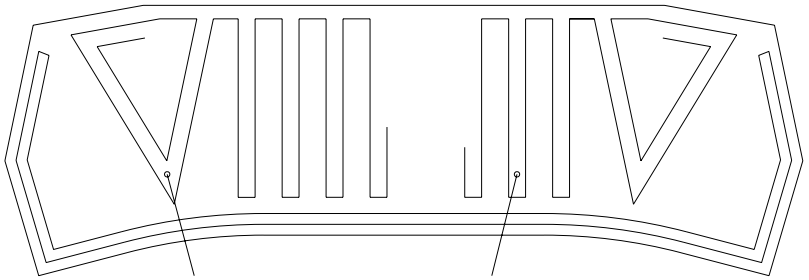


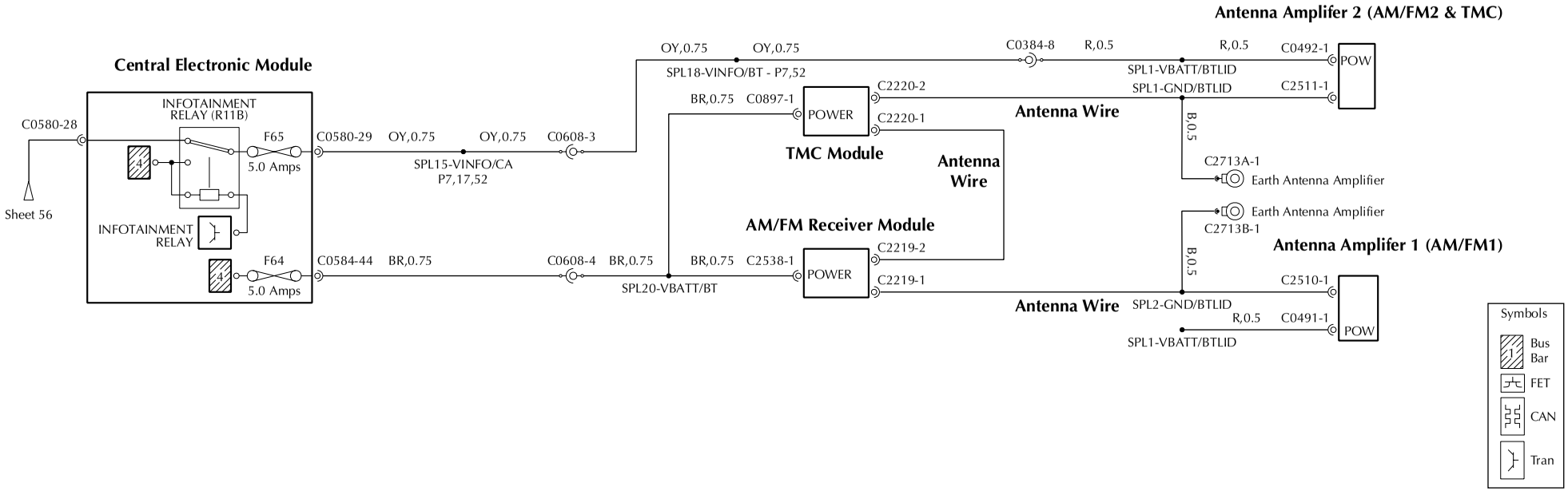
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Air Conditioning	Coupe	From Chassis 00001	05



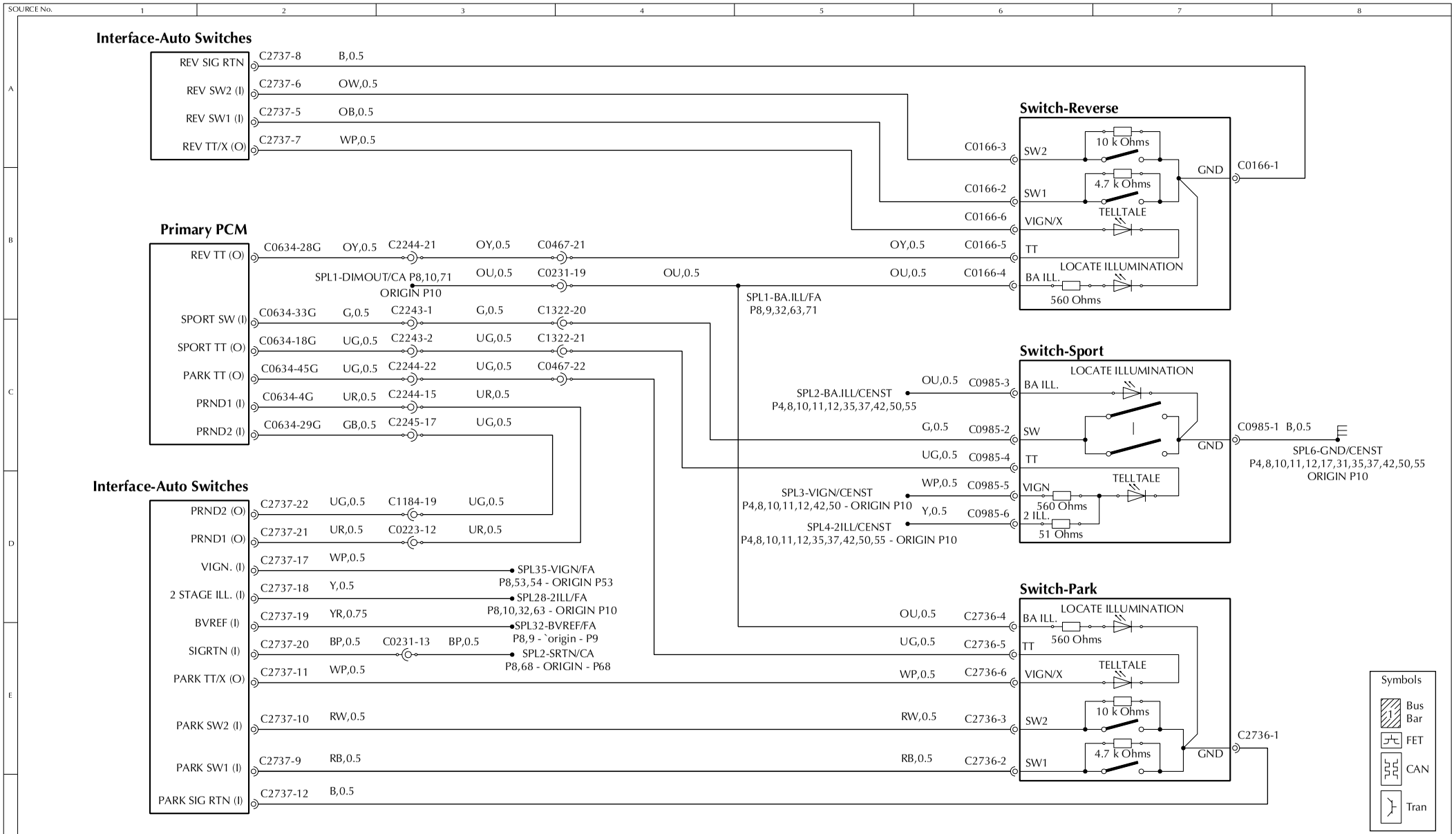
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Air Conditioning	Coupe	From Chassis 00001	06

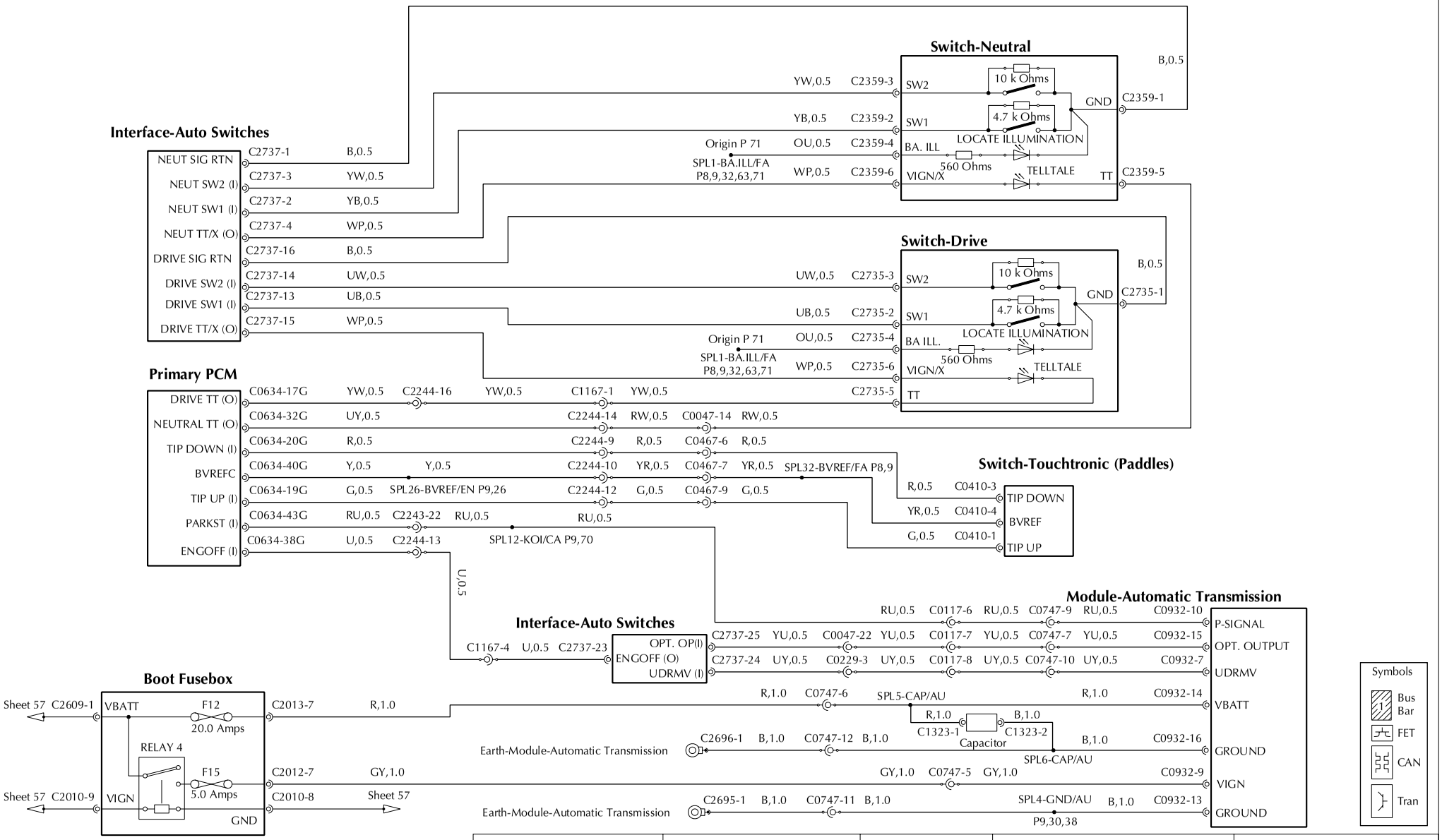
View of Bootlid Antenna

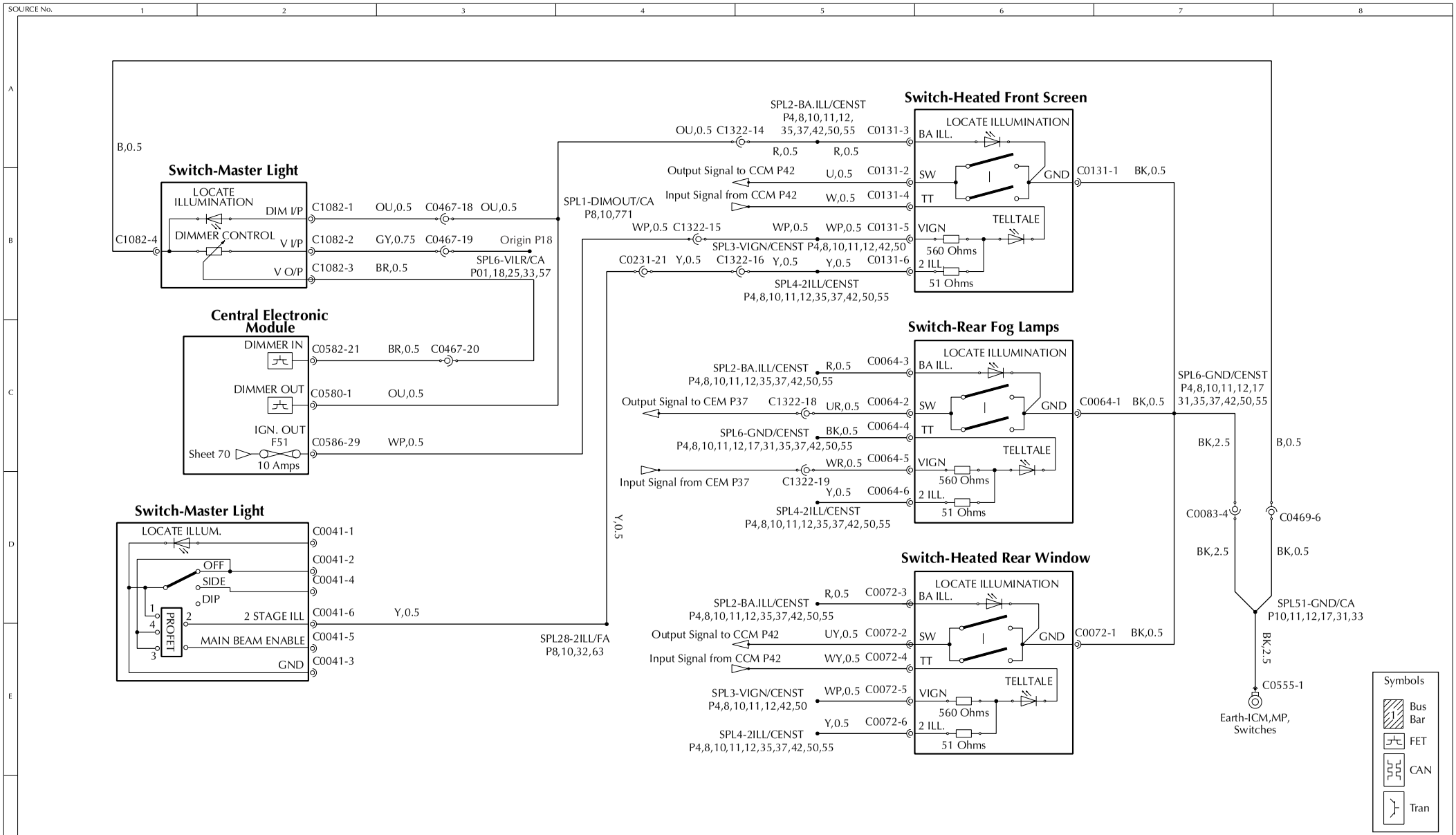


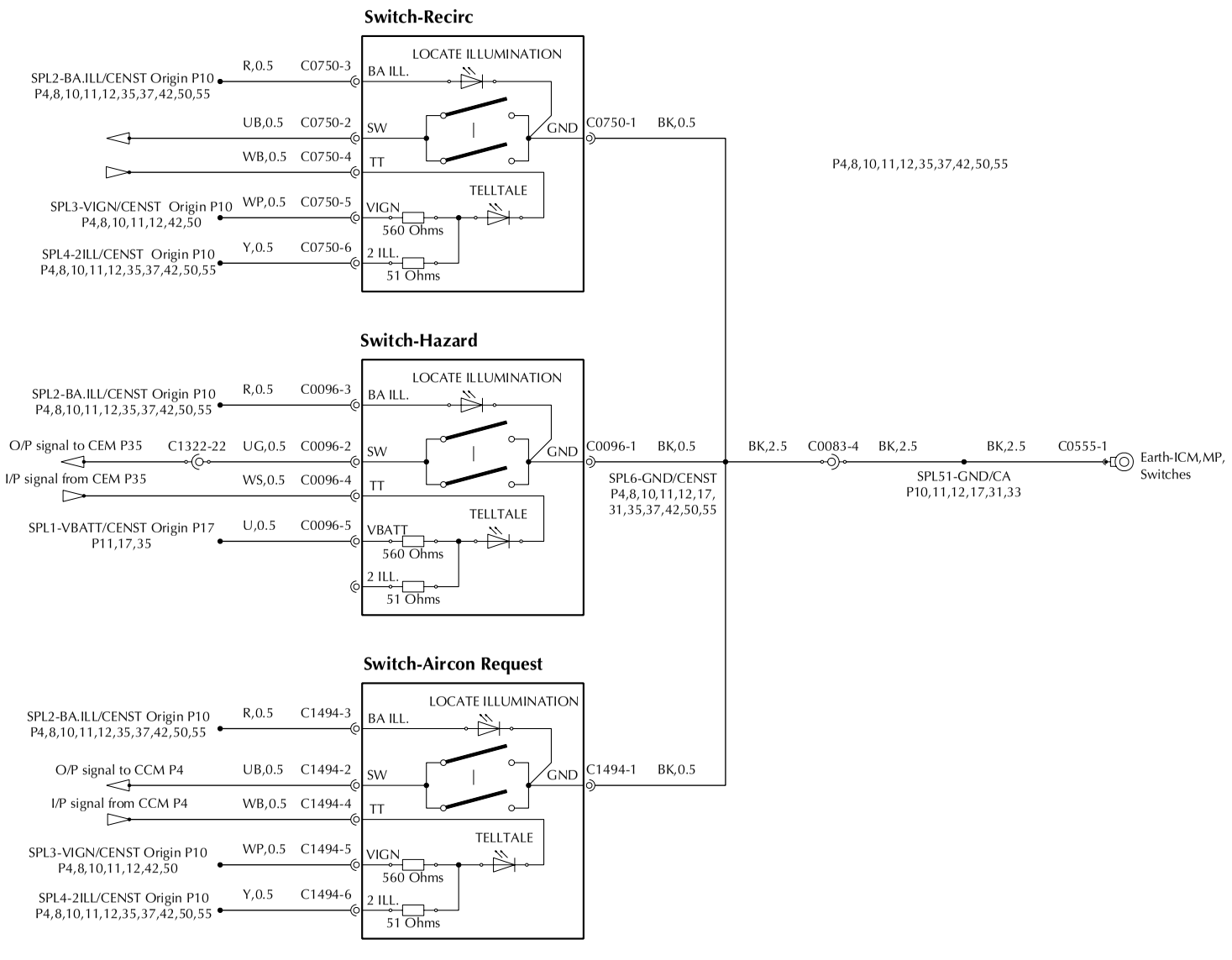


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	AM_FM Receiver Module and Antenna Amplifier	Coupe	From Chassis 00001	07

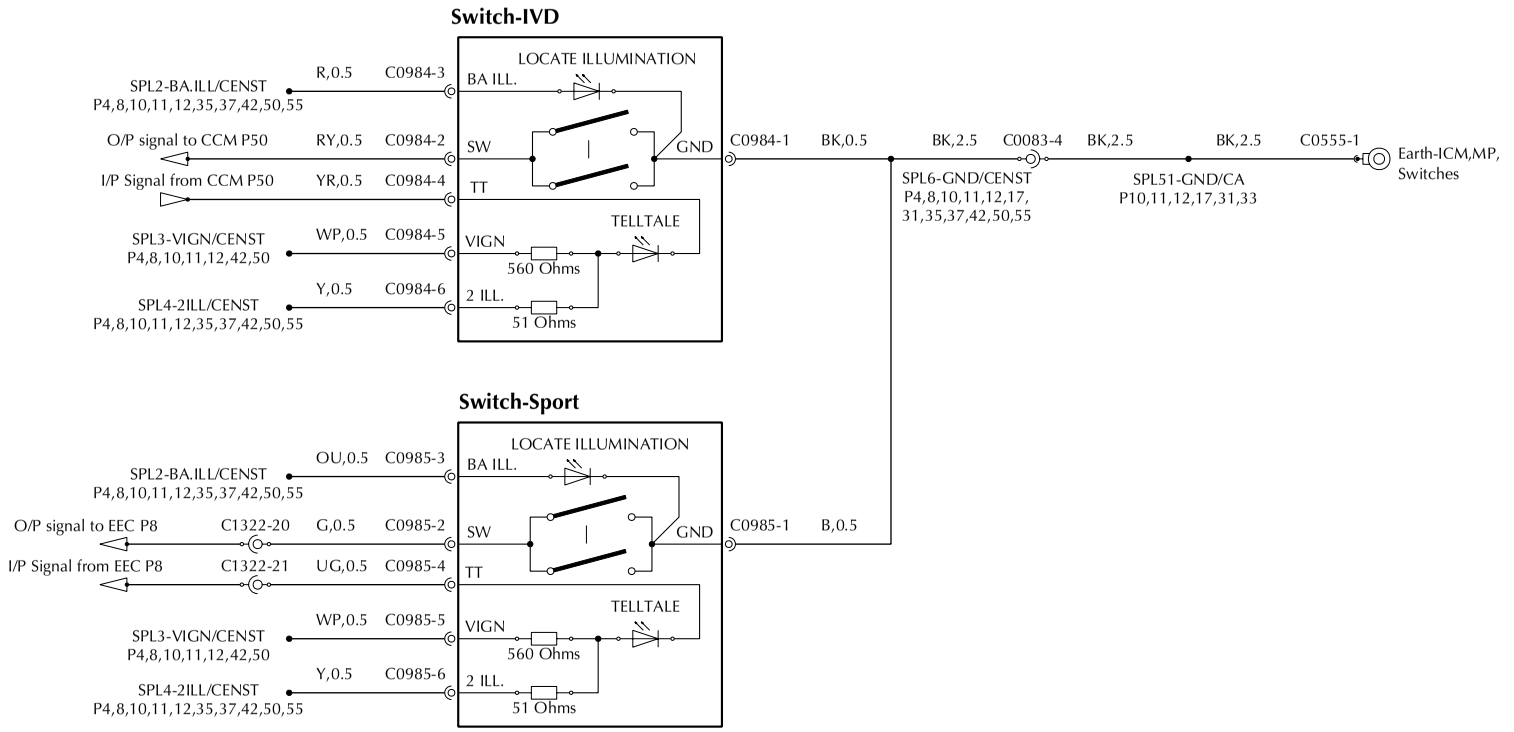

SOURCE No.
Interface-Auto Switches
REV SIG RTN
REV SW2 (I)
REV SW1 (I)
REV TT/X (O)
C2737-8 B,0.5
C2737-6 OW,0.5
C2737-5 OB,0.5
C2737-7 WP,0.5
Switch-Reverse
C0166-3
C0166-2
C0166-6
SW2
SW1
VIGN/X
10 k Ohms
4.7 k Ohms
TELLTALE
GND
C0166-1
TT
BA ILL
LOCATE ILLUMINATION
560 Ohms
Primary PCM
REV TT (O)
SPORT SW (I)
SPORT TT (O)
PARK TT (O)
PRND1 (I)
PRND2 (I)
C0634-28G OY,0.5 C2244-21 OY,0.5 C0467-21
SPL1-DIMOUT/CA P8,10,71
ORIGIN P10
OU,0.5 C0231-19
OY,0.5 C0166-5
OU,0.5 C0166-4
OU,0.5
SPL1-BA.ILL/FA
P8,9,32,63,71
C0634-33G G,0.5 C2243-1 G,0.5 C1322-20
C0634-18G UG,0.5 C2243-2 UG,0.5 C1322-21
C0634-45G UG,0.5 C2244-22 UG,0.5 C0467-22
C0634-4G UR,0.5 C2244-15 UR,0.5
C0634-29G GB,0.5 C2245-17 UG,0.5
Switch-Sport
LOCATE ILLUMINATION
BA ILL.
SW
TT
VIGN
2 ILL.
560 Ohms
51 Ohms
TELLTALE
OU,0.5 C0985-3
G,0.5 C0985-2
UG,0.5 C0985-4
WP,0.5 C0985-5
Y,0.5 C0985-6
SPL2-BA.ILL/CENST
P4,8,10,11,12,35,37,42,50,55
SPL3-VIGN/CENST
P4,8,10,11,12,42,50 - ORIGIN P10
SPL4-2ILL/CENST
P4,8,10,11,12,35,37,42,50,55 - ORIGIN P10
C0985-1 B,0.5
GND
SPL6-GND/CENST
P4,8,10,11,12,17,31,35,37,42,50,55
ORIGIN P10
Interface-Auto Switches
PRND2 (O)
PRND1 (O)
VIGN. (I)
2 STAGE ILL. (I)
BVREF (I)
SIGRTN (I)
PARK TT/X (O)
PARK SW2 (I)
PARK SW1 (I)
PARK SIG RTN (I)
C2737-22 UG,0.5 C1184-19 UG,0.5
C2737-21 UR,0.5 C0223-12 UR,0.5
C2737-17 WP,0.5
C2737-18 Y,0.5
C2737-19 YR,0.75
C2737-20 BP,0.5 C0231-13 BP,0.5
C2737-11 WP,0.5
C2737-10 RW,0.5
C2737-9 RB,0.5
C2737-12 B,0.5
SPL35-VIGN/FA
P8,53,54 - ORIGIN P53
SPL28-2ILL/FA
P8,10,32,63 - ORIGIN P10
SPL32-BVREF/FA
P8,9 - `origin - P9
SPL2-SRTN/CA
P8,68 - ORIGIN - P68
Switch-Park
OU,0.5 C2736-4
UG,0.5 C2736-5
WP,0.5 C2736-6
RW,0.5 C2736-3
RB,0.5 C2736-2
C2736-1
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Automatic Transmission
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
08


SOURCE No.
Switch-Neutral
Interface-Auto Switches
NEUT SIG RTN
NEUT SW2 (I)
NEUT SW1 (I)
NEUT TT/X (O)
DRIVE SIG RTN
DRIVE SW2 (I)
DRIVE SW1 (I)
DRIVE TT/X (O)
C2737-1 B,0.5
C2737-3 YW,0.5
C2737-2 YB,0.5
C2737-4 WP,0.5
C2737-16 B,0.5
C2737-14 UW,0.5
C2737-13 UB,0.5
C2737-15 WP,0.5
YW,0.5 C2359-3
YB,0.5 C2359-2
Origin P 71 OU,0.5 C2359-4
SPL1-BA.ILL/FA P8,9,32,63,71 WP,0.5 C2359-6
SW2
SW1
BA. ILL
VIGN/X
10 k Ohms
4.7 k Ohms
560 Ohms
LOCATE ILLUMINATION
TELLTALE
GND
TT
B,0.5
C2359-1
C2359-5
Switch-Drive
UW,0.5 C2735-3
UB,0.5 C2735-2
Origin P 71 OU,0.5 C2735-4
SPL1-BA.ILL/FA P8,9,32,63,71 WP,0.5 C2735-6
C2735-5
C2735-1
Primary PCM
DRIVE TT (O)
NEUTRAL TT (O)
TIP DOWN (I)
BVREFC
TIP UP (I)
PARKST (I)
ENGOFF (I)
C0634-17G YW,0.5 C2244-16 YW,0.5 C1167-1 YW,0.5
C0634-32G UY,0.5 C2244-14 RW,0.5 C0047-14 RW,0.5
C0634-20G R,0.5 C2244-9 R,0.5 C0467-6 R,0.5
C0634-40G Y,0.5 Y,0.5 C2244-10 YR,0.5 C0467-7 YR,0.5
C0634-19G G,0.5 SPL26-BVREF/EN P9,26 C2244-12 G,0.5 C0467-9 G,0.5
C0634-43G RU,0.5 C2243-22 RU,0.5
C0634-38G U,0.5 C2244-13
RU,0.5
SPL12-KOI/CA P9,70
SPL32-BVREF/FA P8,9
Switch-Touchtronic (Paddles)
R,0.5 C0410-3
YR,0.5 C0410-4
G,0.5 C0410-1
TIP DOWN
BVREF
TIP UP
U,0.5
Interface-Auto Switches
C1167-4 U,0.5 C2737-23
OPT. OP(I)
ENGOFF (O)
UDRMV (I)
Module-Automatic Transmission
RU,0.5 C0117-6 RU,0.5 C0747-9 RU,0.5 C0932-10 P-SIGNAL
C2737-25 YU,0.5 C0047-22 YU,0.5 C0117-7 YU,0.5 C0747-7 YU,0.5 C0932-15 OPT. OUTPUT
C2737-24 UY,0.5 C0229-3 UY,0.5 C0117-8 UY,0.5 C0747-10 UY,0.5 C0932-7 UDRMV
Boot Fusebox
Sheet 57 C2609-1
VBATT
F12
20.0 Amps
C2013-7 R,1.0
RELAY 4
F15
5.0 Amps
C2012-7 GY,1.0
Sheet 57 C2010-9
VIGN
C2010-8 Sheet 57
GND
R,1.0 C0747-6
SPL5-CAP/AU
R,1.0 C0932-14 VBATT
R,1.0 C1323-1
C1323-2 B,1.0
Capacitor
Earth-Module-Automatic Transmission
C2696-1 B,1.0 C0747-12 B,1.0
B,1.0 C0932-16 GROUND
SPL6-CAP/AU
GY,1.0 C0747-5 GY,1.0
C0932-9 VIGN
C2695-1 B,1.0 C0747-11 B,1.0
SPL4-GND/AU B,1.0 C0932-13 GROUND
P9,30,38
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Automatic Transmission
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
09

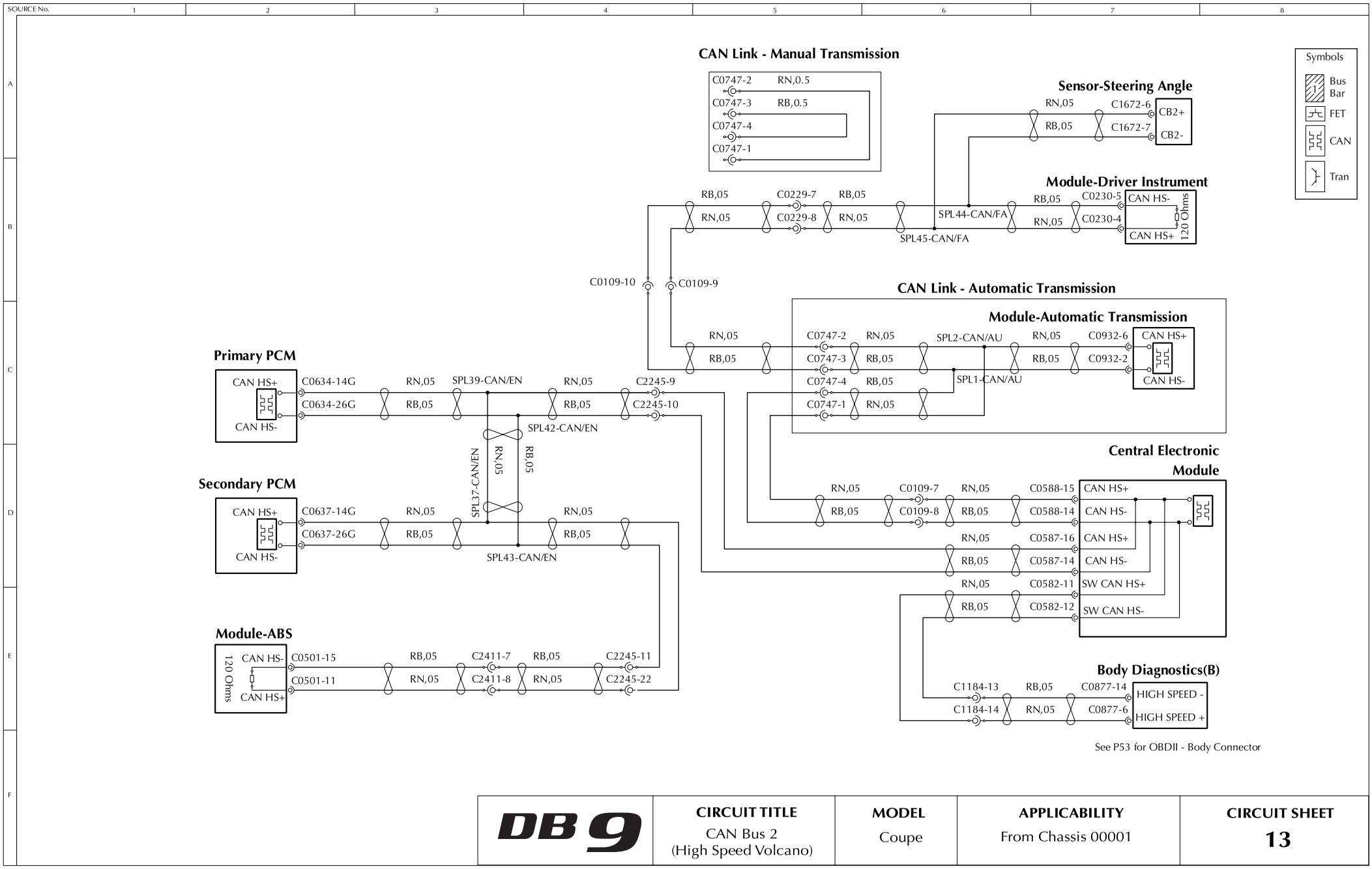

SOURCE No.
Switch-Master Light
LOCATE ILLUMINATION
DIM I/P
DIMMER CONTROL
V I/P
V O/P
C1082-4
C1082-1
C1082-2
C1082-3
OU,0.5
C0467-18
OU,0.5
GY,0.75
C0467-19
Origin P18
BR,0.5
SPL6-VILR/CA
P01,18,25,33,57
B,0.5
SPL1-DIMOUT/CA
P8,10,771
Central Electronic Module
DIMMER IN
C0582-21
BR,0.5
C0467-20
DIMMER OUT
C0580-1
OU,0.5
IGN. OUT
F51
Sheet 70
10 Amps
C0586-29
WP,0.5
Switch-Master Light
LOCATE ILLUM.
OFF
SIDE
DIP
2 STAGE ILL
MAIN BEAM ENABLE
GND
PROFET
C0041-1
C0041-2
C0041-4
C0041-6
C0041-5
C0041-3
Y,0.5
SPL28-2ILL/FA
P8,10,32,63
Y,0.5
Switch-Heated Front Screen
SPL2-BA.ILL/CENST
P4,8,10,11,12,
35,37,42,50,55
OU,0.5 C1322-14
C0131-3
R,0.5
R,0.5
LOCATE ILLUMINATION
BA ILL.
Output Signal to CCM P42
U,0.5
C0131-2
SW
GND
C0131-1
BK,0.5
Input Signal from CCM P42
W,0.5
C0131-4
TT
WP,0.5 C1322-15
WP,0.5
WP,0.5
C0131-5
VIGN
TELLTALE
SPL3-VIGN/CENST P4,8,10,11,12,42,50
560 Ohms
C0231-21
Y,0.5
C1322-16
Y,0.5
Y,0.5
C0131-6
2 ILL.
51 Ohms
SPL4-2ILL/CENST
P4,8,10,11,12,35,37,42,50,55
Switch-Rear Fog Lamps
LOCATE ILLUMINATION
SPL2-BA.ILL/CENST
P4,8,10,11,12,35,37,42,50,55
R,0.5
C0064-3
BA ILL.
Output Signal to CEM P37
C1322-18
UR,0.5
C0064-2
SW
GND
C0064-1
BK,0.5
SPL6-GND/CENST
P4,8,10,11,12,17
31,35,37,42,50,55
SPL6-GND/CENST
P4,8,10,11,12,17,31,35,37,42,50,55
BK,0.5
C0064-4
TT
BK,2.5
B,0.5
WR,0.5
C0064-5
VIGN
TELLTALE
Input Signal from CEM P37
C1322-19
560 Ohms
Y,0.5
C0064-6
2 ILL.
51 Ohms
SPL4-2ILL/CENST
P4,8,10,11,12,35,37,42,50,55
C0083-4
C0469-6
BK,2.5
BK,0.5
Switch-Heated Rear Window
LOCATE ILLUMINATION
SPL2-BA.ILL/CENST
P4,8,10,11,12,35,37,42,50,55
R,0.5
C0072-3
BA ILL.
SPL51-GND/CA
P10,11,12,17,31,33
Output Signal to CCM P42
UY,0.5
C0072-2
SW
GND
C0072-1
BK,0.5
Input Signal from CCM P42
WY,0.5
C0072-4
TT
BK,2.5
C0555-1
SPL3-VIGN/CENST
P4,8,10,11,12,42,50
WP,0.5
C0072-5
VIGN
TELLTALE
560 Ohms
Y,0.5
C0072-6
2 ILL.
SPL4-2ILL/CENST
P4,8,10,11,12,35,37,42,50,55
51 Ohms
Earth-ICM,MP,
Switches
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Background Illumination
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
10

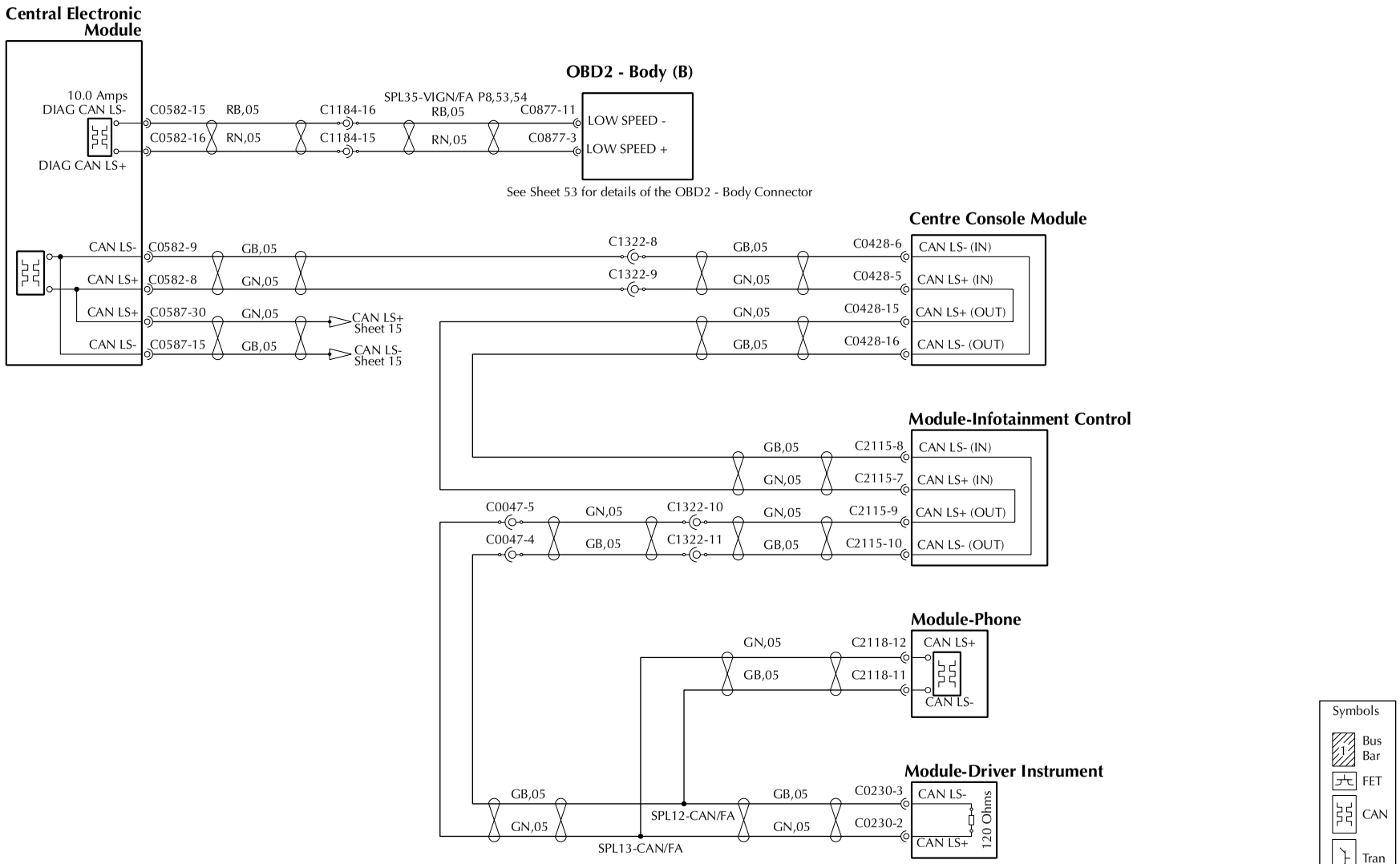


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Background Illumination	Coupe	From Chassis 00001	11

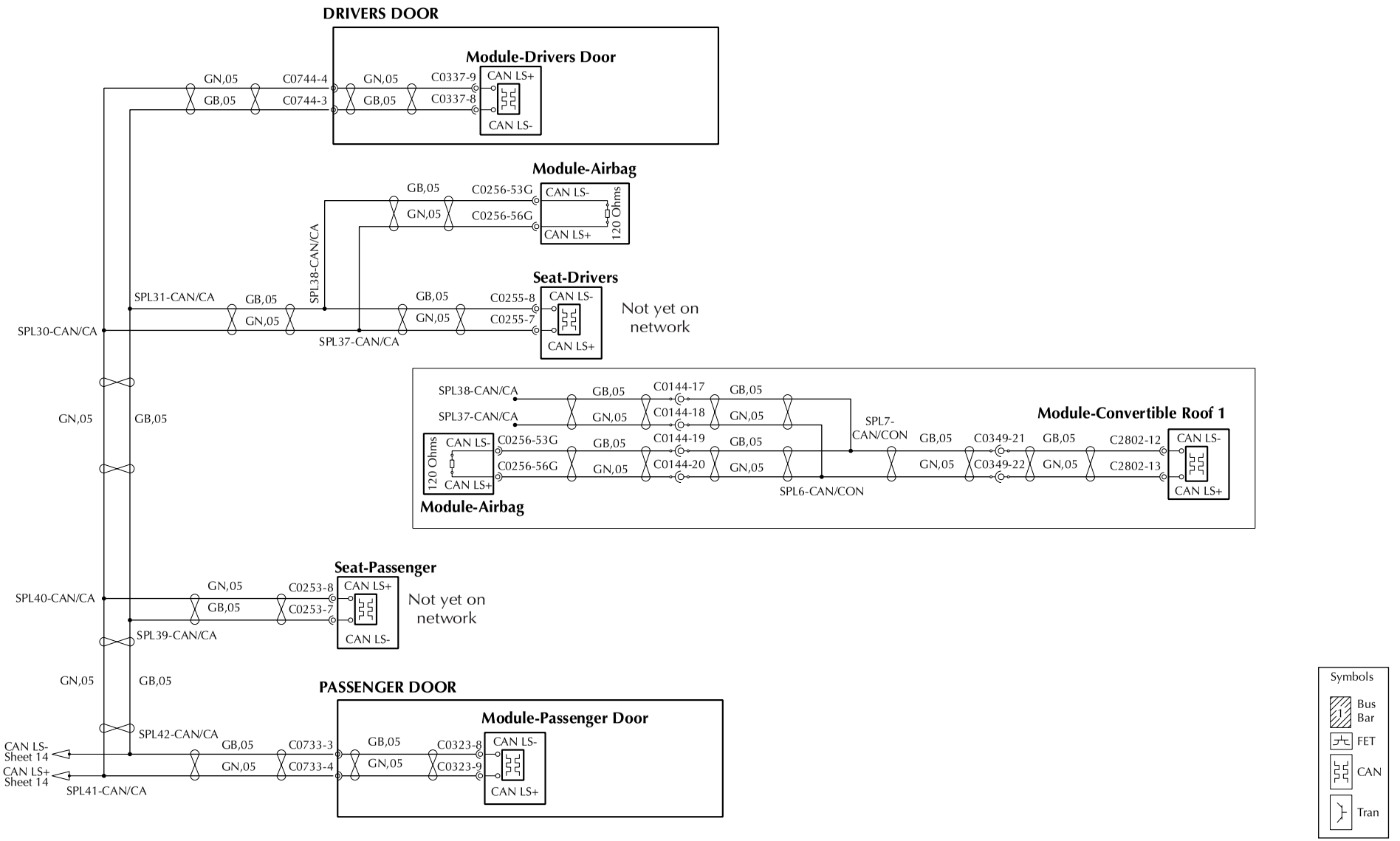


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Background Illumination	Coupe	From Chassis 00001	12


SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
CAN Link - Manual Transmission
C0747-2
RN,0.5
C0747-3
RB,0.5
C0747-4
C0747-1
Sensor-Steering Angle
RN,05
C1672-6
CB2+
RB,05
C1672-7
CB2-
Module-Driver Instrument
RB,05
C0229-7
RB,05
RN,05
C0229-8
RN,05
SPL44-CAN/FA
SPL45-CAN/FA
RB,05
C0230-5
CAN HS-
RN,05
C0230-4
CAN HS+
120 Ohms
C0109-10
C0109-9
CAN Link - Automatic Transmission
Module-Automatic Transmission
RN,05
RB,05
C0747-2
RN,05
C0747-3
RB,05
C0747-4
RB,05
C0747-1
RN,05
SPL2-CAN/AU
SPL1-CAN/AU
RN,05
C0932-6
CAN HS+
RB,05
C0932-2
CAN HS-
Primary PCM
CAN HS+
CAN HS-
C0634-14G
C0634-26G
RN,05
RB,05
SPL39-CAN/EN
RN,05
RB,05
C2245-9
C2245-10
SPL42-CAN/EN
SPL37-CAN/EN
RN,05
RB,05
Secondary PCM
CAN HS+
CAN HS-
C0637-14G
C0637-26G
RN,05
RB,05
RN,05
RB,05
SPL43-CAN/EN
Central Electronic Module
RN,05
RB,05
C0109-7
C0109-8
RN,05
RB,05
C0588-15
CAN HS+
C0588-14
CAN HS-
RN,05
RB,05
C0587-16
CAN HS+
C0587-14
CAN HS-
RN,05
RB,05
C0582-11
SW CAN HS+
C0582-12
SW CAN HS-
Module-ABS
120 Ohms
CAN HS-
CAN HS+
C0501-15
C0501-11
RB,05
RN,05
C2411-7
C2411-8
RB,05
RN,05
C2245-11
C2245-22
Body Diagnostics(B)
C1184-13
C1184-14
RB,05
RN,05
C0877-14
C0877-6
HIGH SPEED -
HIGH SPEED +
See P53 for OBDII - Body Connector
Symbols
Bus Bar
FET
CAN
Tran
DB9
CIRCUIT TITLE
CAN Bus 2
(High Speed Volcano)
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
13

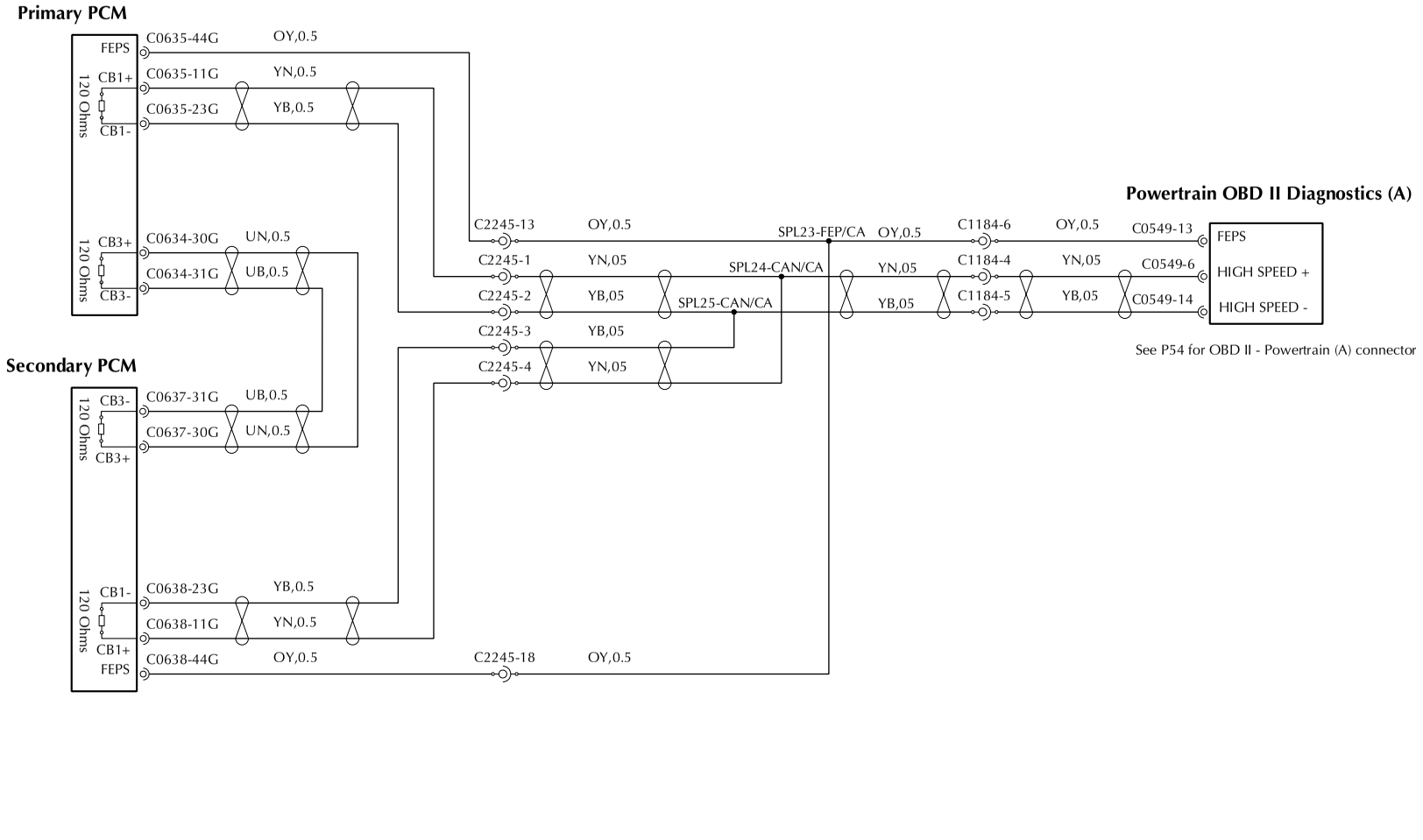


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	CAN Bus (Low Speed Volcano 1)	Coupe	From Chassis 00001	14

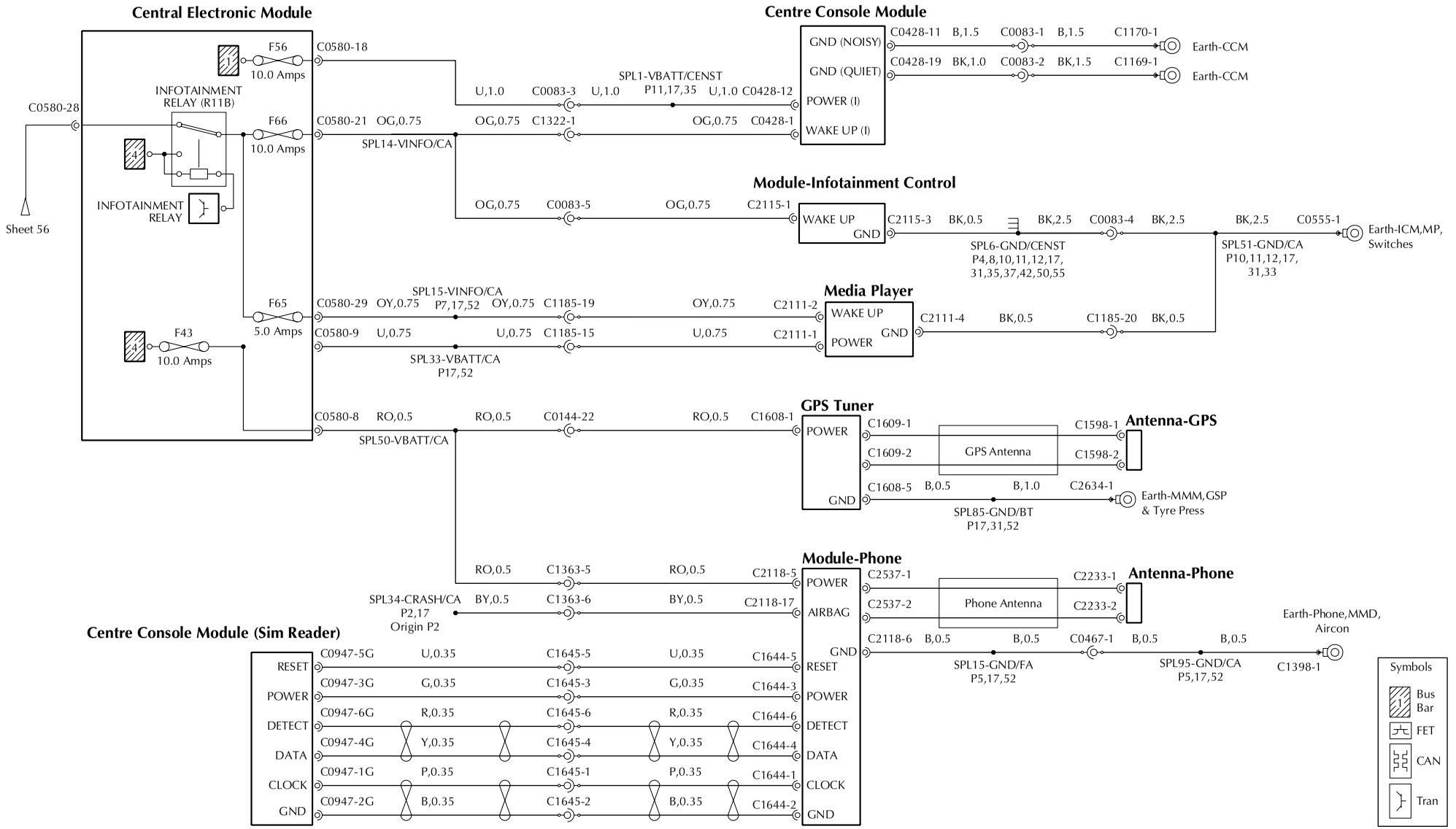


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	CAN Bus (Low Speed Volcano)	Coupe	From Chassis 00001	15

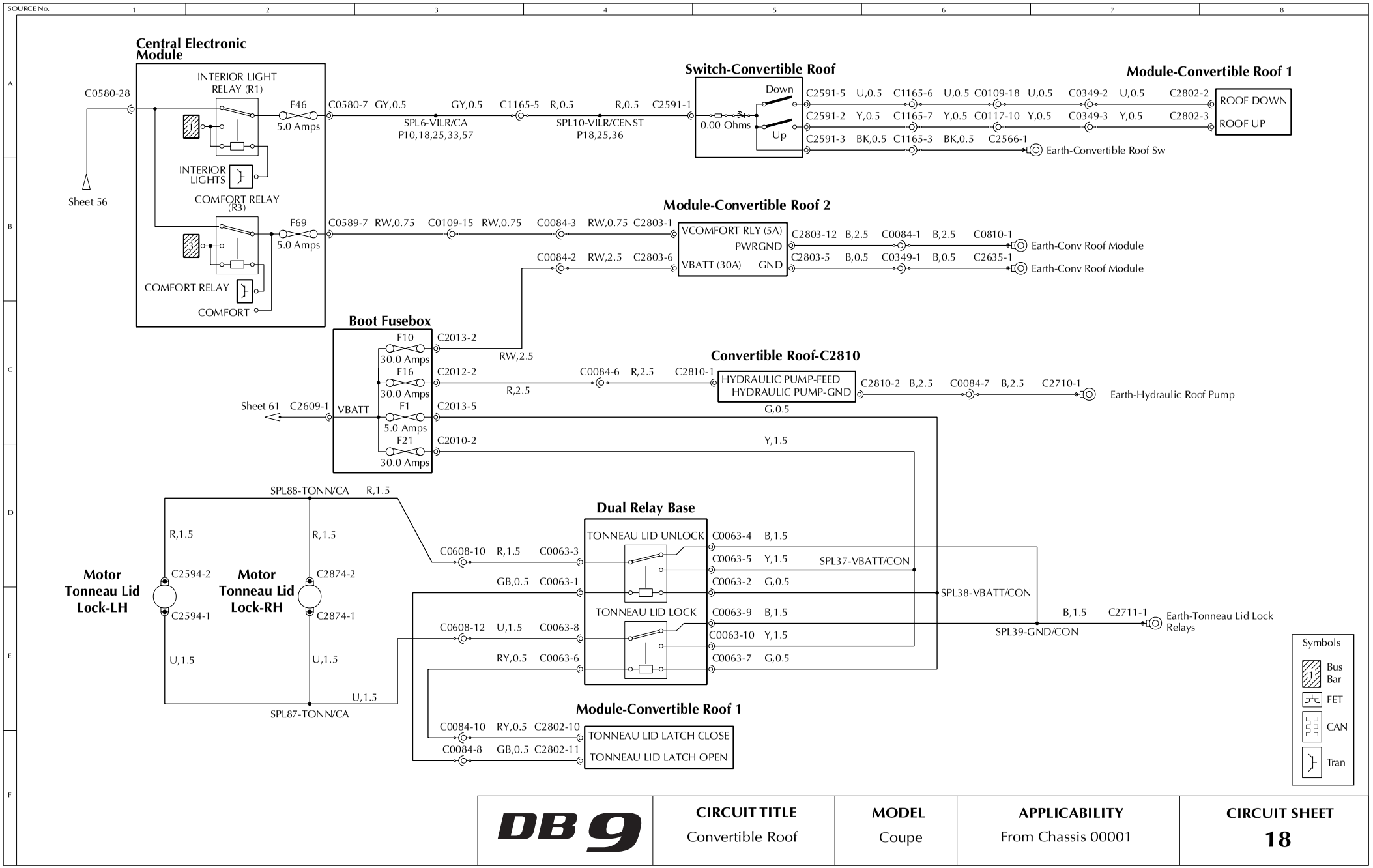
Note:
CAN Bus 1 is used exclusively for diagnostics.
CAN Bus 3 is used for inter-module comminications.

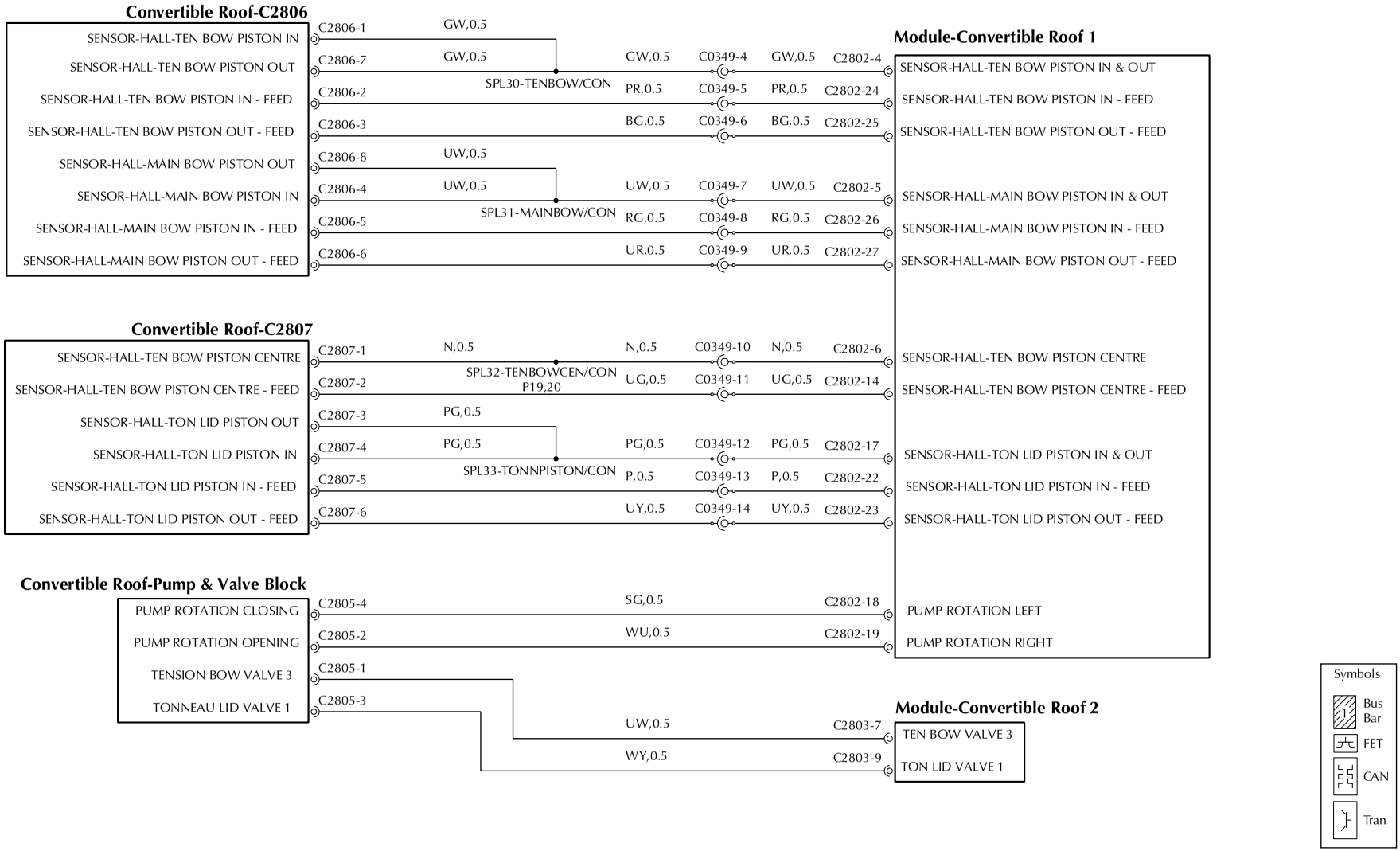


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	CAN Bus 1 & 3 (Powertrain)	Coupe	From Chassis 00001	16

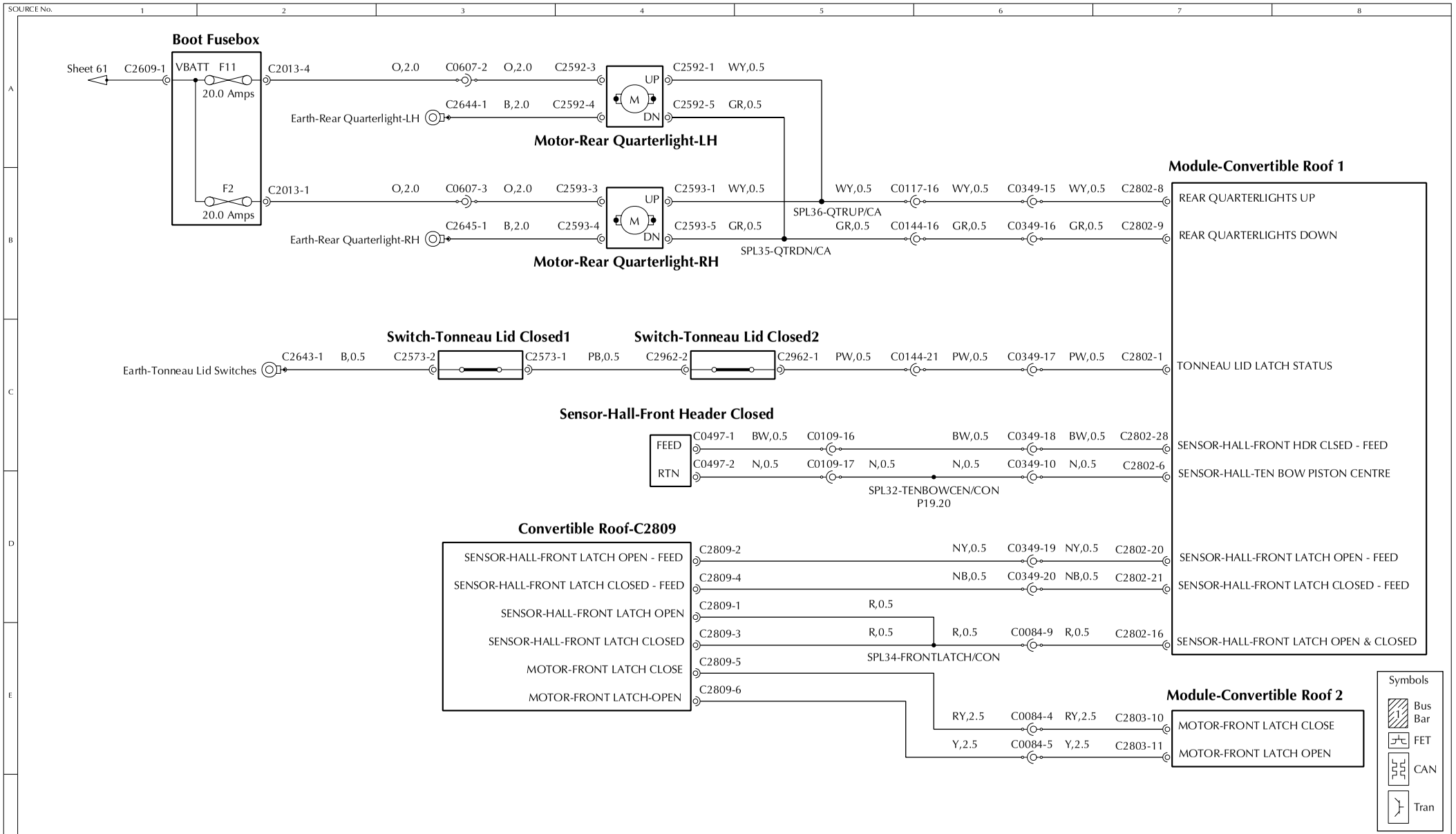


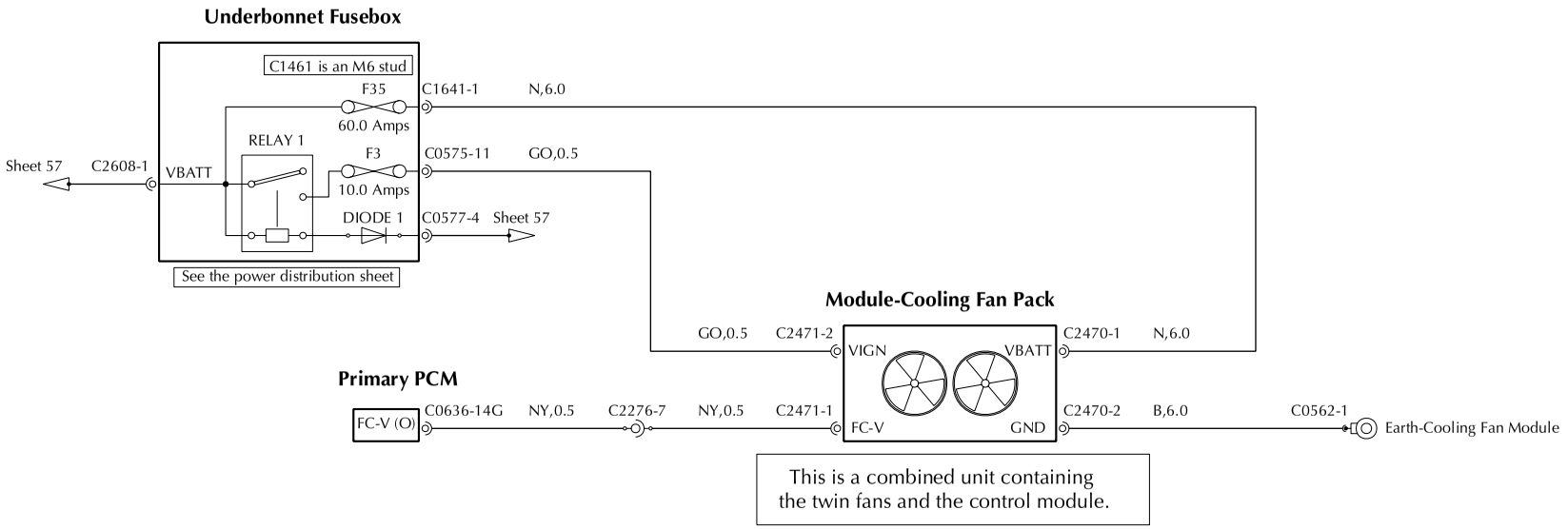
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	CCM, ICM, MP, GPS and PHONE	Coupe	From Chassis 00001	17

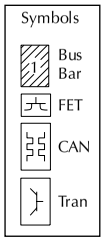

SOURCE No.
Central Electronic Module
INTERIOR LIGHT RELAY (R1)
INTERIOR LIGHTS
COMFORT RELAY (R3)
COMFORT RELAY
COMFORT
C0580-28
Sheet 56
F46
5.0 Amps
F69
5.0 Amps
C0580-7 GY,0.5
GY,0.5 C1165-5 R,0.5
R,0.5 C2591-1
SPL6-VILR/CA
P10,18,25,33,57
SPL10-VILR/CENST
P18,25,36
Switch-Convertible Roof
Down
Up
0.00 Ohms
Module-Convertible Roof 1
C2591-5 U,0.5 C1165-6 U,0.5 C0109-18 U,0.5 C0349-2 U,0.5 C2802-2
ROOF DOWN
C2591-2 Y,0.5 C1165-7 Y,0.5 C0117-10 Y,0.5 C0349-3 Y,0.5 C2802-3
ROOF UP
C2591-3 BK,0.5 C1165-3 BK,0.5 C2566-1
Earth-Convertible Roof Sw
Module-Convertible Roof 2
C0589-7 RW,0.75 C0109-15 RW,0.75 C0084-3 RW,0.75 C2803-1
VCOMFORT RLY (5A)
PWRGND
VBATT (30A)
GND
C2803-12 B,2.5 C0084-1 B,2.5 C0810-1
Earth-Conv Roof Module
C0084-2 RW,2.5 C2803-6
C2803-5 B,0.5 C0349-1 B,0.5 C2635-1
Earth-Conv Roof Module
Boot Fusebox
F10
30.0 Amps
F16
30.0 Amps
F1
5.0 Amps
F21
30.0 Amps
C2013-2
RW,2.5
C2012-2
R,2.5
C0084-6 R,2.5 C2810-1
Convertible Roof-C2810
HYDRAULIC PUMP-FEED
HYDRAULIC PUMP-GND
C2810-2 B,2.5 C0084-7 B,2.5 C2710-1
Earth-Hydraulic Roof Pump
Sheet 61 C2609-1
VBATT
C2013-5
G,0.5
C2010-2
Y,1.5
SPL88-TONN/CA R,1.5
Dual Relay Base
TONNEAU LID UNLOCK
TONNEAU LID LOCK
C0608-10 R,1.5 C0063-3
C0063-4 B,1.5
C0063-5 Y,1.5
SPL37-VBATT/CON
GB,0.5 C0063-1
C0063-2 G,0.5
SPL38-VBATT/CON
C0608-12 U,1.5 C0063-8
C0063-9 B,1.5
B,1.5 C2711-1
Earth-Tonneau Lid Lock Relays
SPL39-GND/CON
C0063-10 Y,1.5
RY,0.5 C0063-6
C0063-7 G,0.5
Motor Tonneau Lid Lock-LH
Motor Tonneau Lid Lock-RH
C2594-2
C2594-1
C2874-2
C2874-1
R,1.5
U,1.5
SPL87-TONN/CA
Module-Convertible Roof 1
C0084-10 RY,0.5 C2802-10
TONNEAU LID LATCH CLOSE
C0084-8 GB,0.5 C2802-11
TONNEAU LID LATCH OPEN
Symbols
Bus Bar
FET
CAN
Tran
DB9
CIRCUIT TITLE
Convertible Roof
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
18



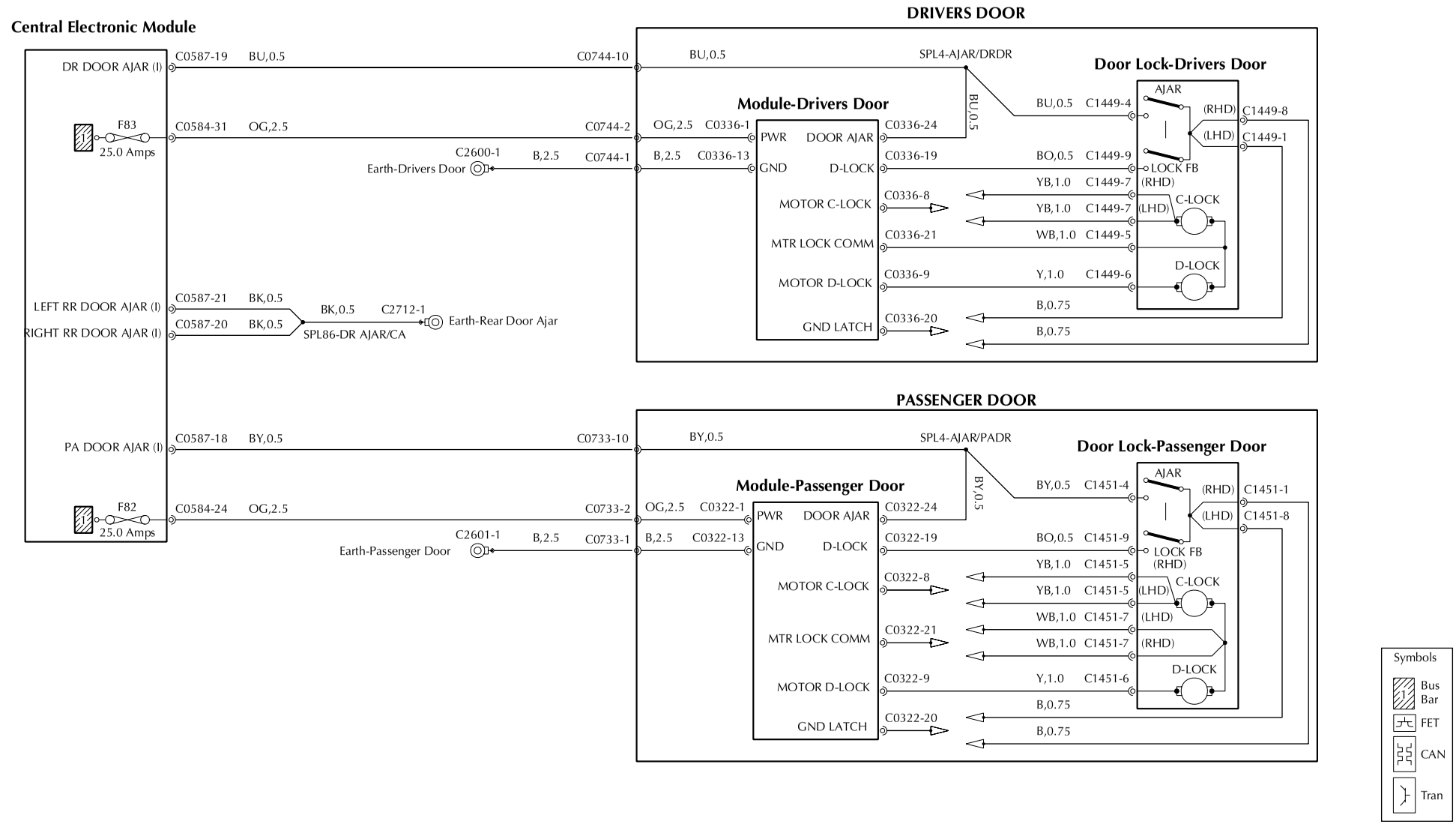
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Convertible Roof	Coupe	From Chassis 00001	19


SOURCE No.
Boot Fusebox
Sheet 61
C2609-1
VBATT
F11
20.0 Amps
C2013-4
O,2.0
C0607-2
O,2.0
C2592-3
UP
M
DN
C2592-1
WY,0.5
C2644-1
B,2.0
C2592-4
C2592-5
GR,0.5
Earth-Rear Quarterlight-LH
Motor-Rear Quarterlight-LH
F2
20.0 Amps
C2013-1
O,2.0
C0607-3
O,2.0
C2593-3
C2593-1
WY,0.5
C2645-1
B,2.0
C2593-4
C2593-5
GR,0.5
Earth-Rear Quarterlight-RH
Motor-Rear Quarterlight-RH
SPL36-QTRUP/CA
SPL35-QTRDN/CA
WY,0.5
C0117-16
WY,0.5
C0349-15
WY,0.5
C2802-8
GR,0.5
C0144-16
GR,0.5
C0349-16
GR,0.5
C2802-9
Module-Convertible Roof 1
REAR QUARTERLIGHTS UP
REAR QUARTERLIGHTS DOWN
Switch-Tonneau Lid Closed1
Switch-Tonneau Lid Closed2
Earth-Tonneau Lid Switches
C2643-1
B,0.5
C2573-2
C2573-1
PB,0.5
C2962-2
C2962-1
PW,0.5
C0144-21
PW,0.5
C0349-17
PW,0.5
C2802-1
TONNEAU LID LATCH STATUS
Sensor-Hall-Front Header Closed
FEED
RTN
C0497-1
BW,0.5
C0109-16
BW,0.5
C0349-18
BW,0.5
C2802-28
SENSOR-HALL-FRONT HDR CLSED - FEED
C0497-2
N,0.5
C0109-17
N,0.5
N,0.5
C0349-10
N,0.5
C2802-6
SENSOR-HALL-TEN BOW PISTON CENTRE
SPL32-TENBOWCEN/CON
P19.20
Convertible Roof-C2809
SENSOR-HALL-FRONT LATCH OPEN - FEED
SENSOR-HALL-FRONT LATCH CLOSED - FEED
SENSOR-HALL-FRONT LATCH OPEN
SENSOR-HALL-FRONT LATCH CLOSED
MOTOR-FRONT LATCH CLOSE
MOTOR-FRONT LATCH-OPEN
C2809-2
NY,0.5
C0349-19
NY,0.5
C2802-20
SENSOR-HALL-FRONT LATCH OPEN - FEED
C2809-4
NB,0.5
C0349-20
NB,0.5
C2802-21
SENSOR-HALL-FRONT LATCH CLOSED - FEED
C2809-1
R,0.5
C2809-3
R,0.5
R,0.5
C0084-9
R,0.5
C2802-16
SENSOR-HALL-FRONT LATCH OPEN & CLOSED
SPL34-FRONTLATCH/CON
C2809-5
C2809-6
Module-Convertible Roof 2
RY,2.5
C0084-4
RY,2.5
C2803-10
MOTOR-FRONT LATCH CLOSE
Y,2.5
C0084-5
Y,2.5
C2803-11
MOTOR-FRONT LATCH OPEN
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Convertible Roof
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
20



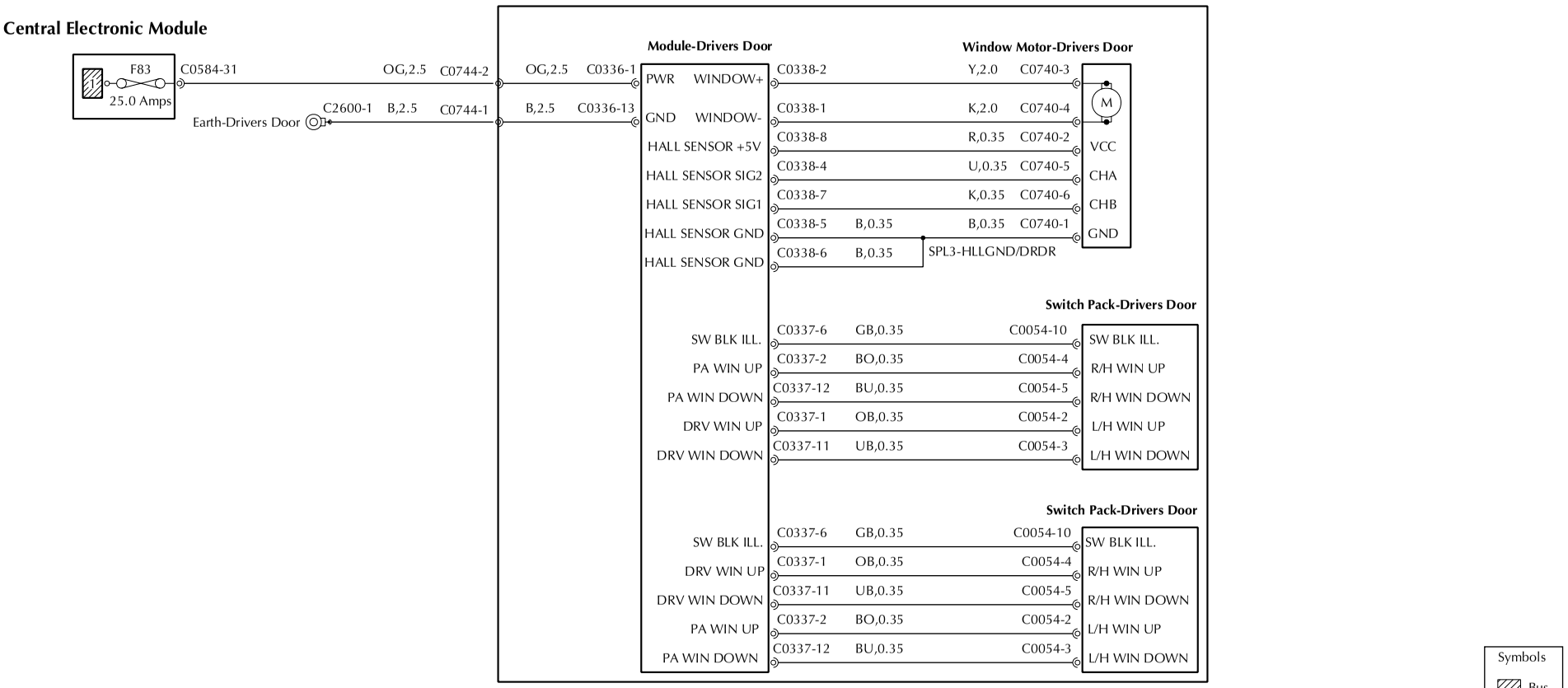


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Convertible Roof	Coupe	From Chassis 00001	21

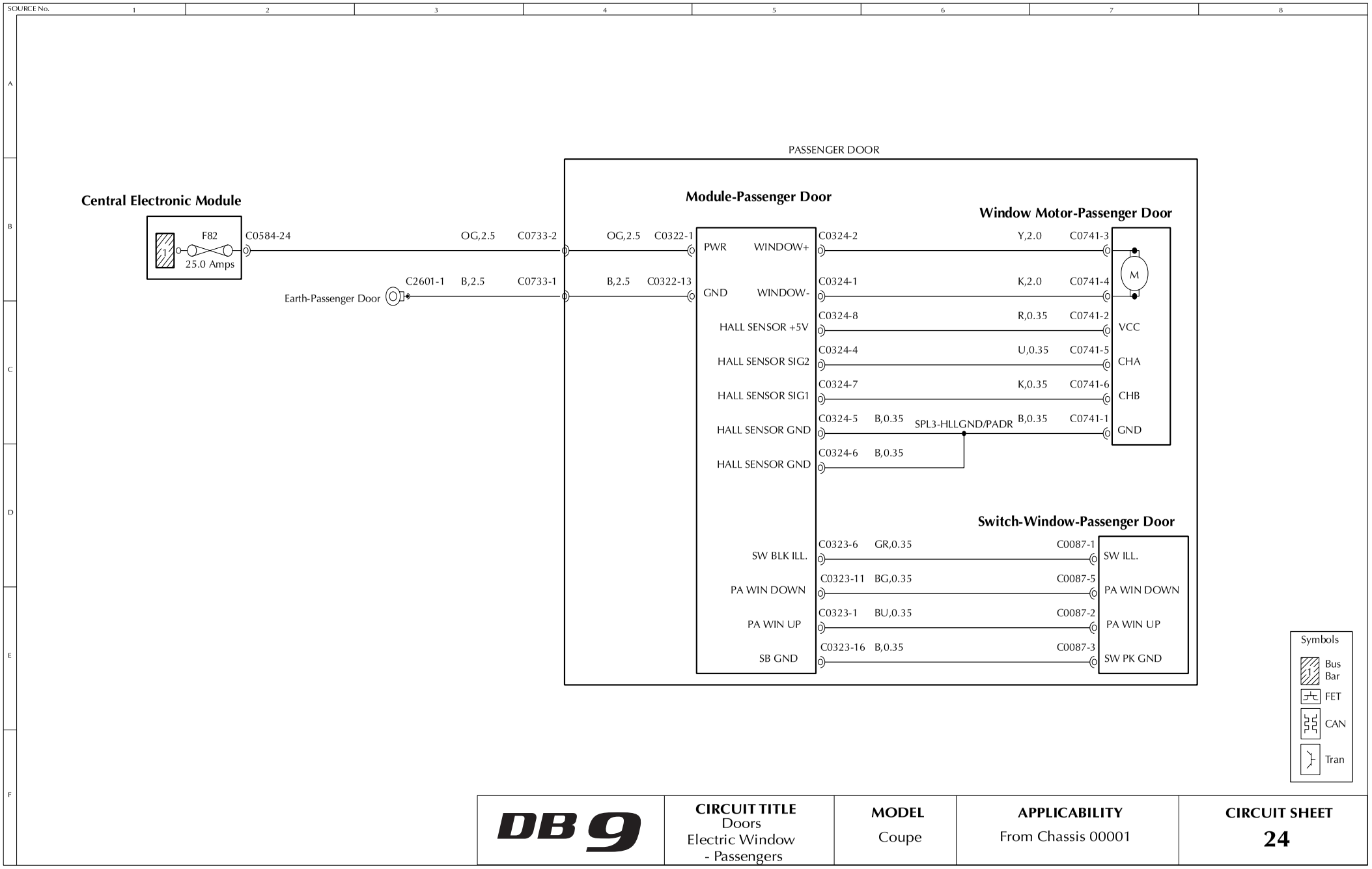


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Door Driver and Passenger Locks	Coupe	From Chassis 00001	22

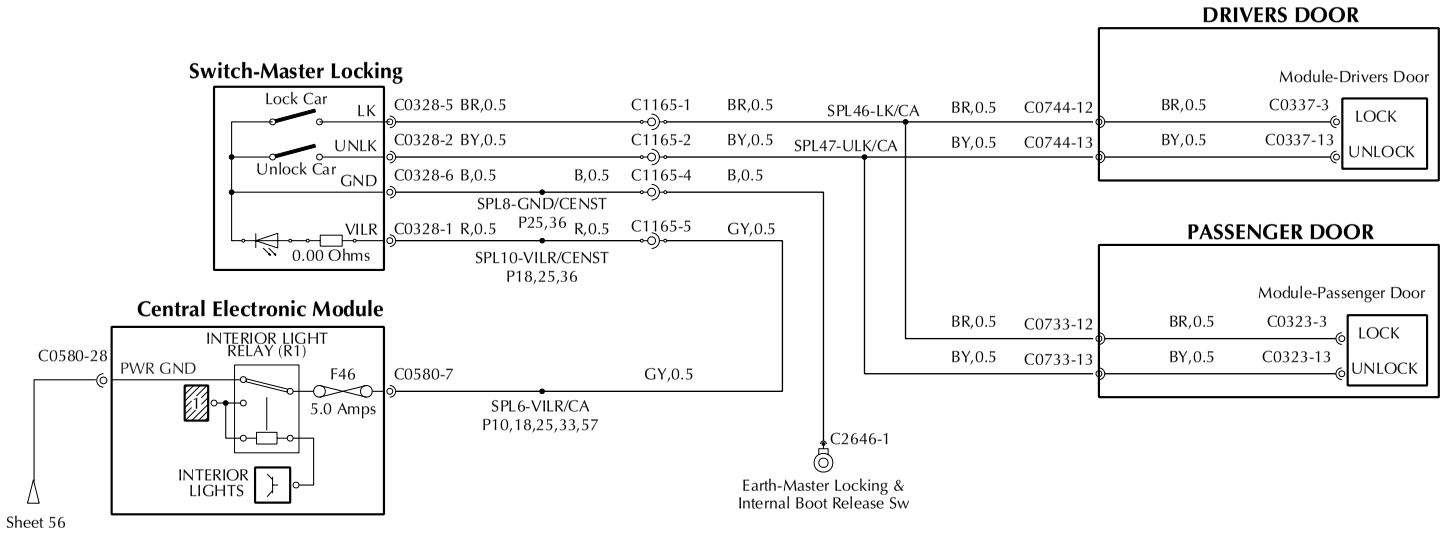
DRIVERS DOOR

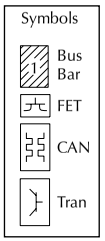


DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Door Electric Window - Drivers	Coupe	From Chassis 00001	23

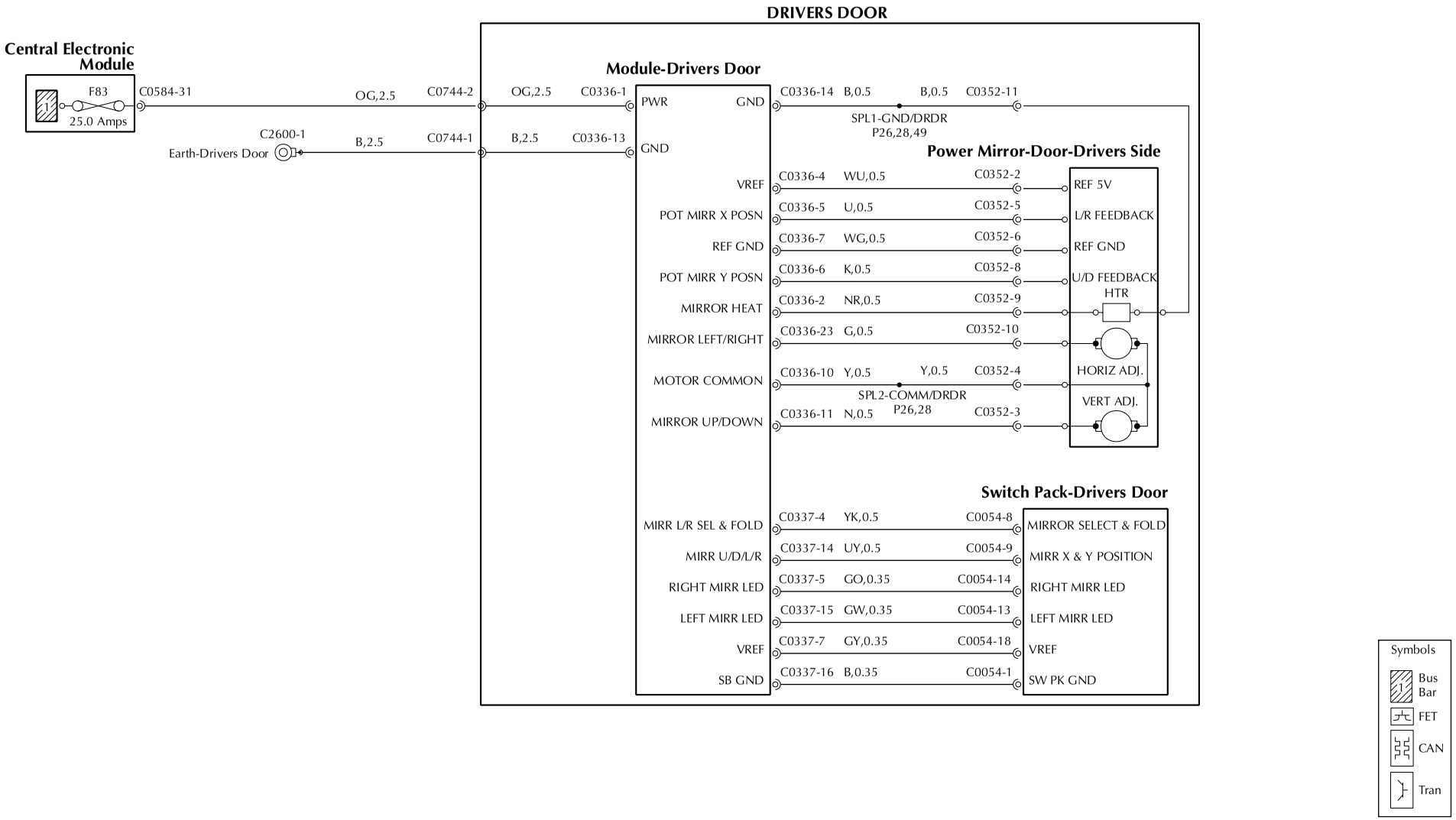


DB 9	CIRCUIT TITLE Doors Electric Window - Passengers	MODEL Coupe	APPLICABILITY From Chassis 00001	CIRCUIT SHEET 24

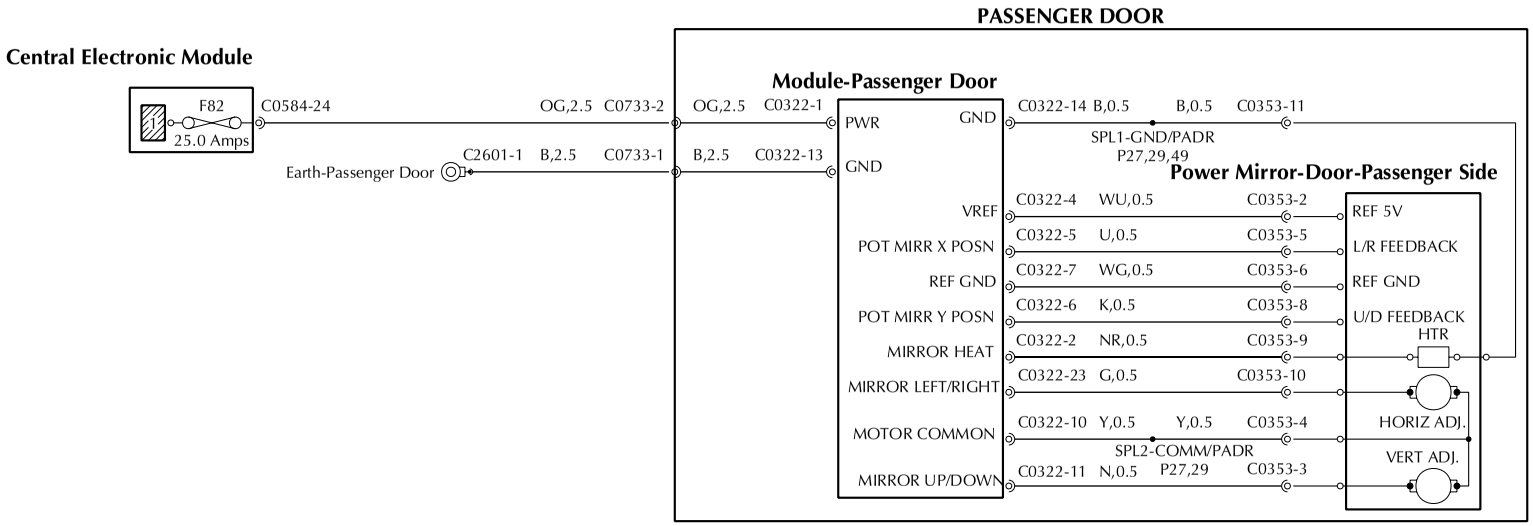




DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Doors Master Locking	Coupe	From Chassis 00001	25



DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Drivers Door Power Mirror	Coupe	From Chassis 00001	26



Symbols

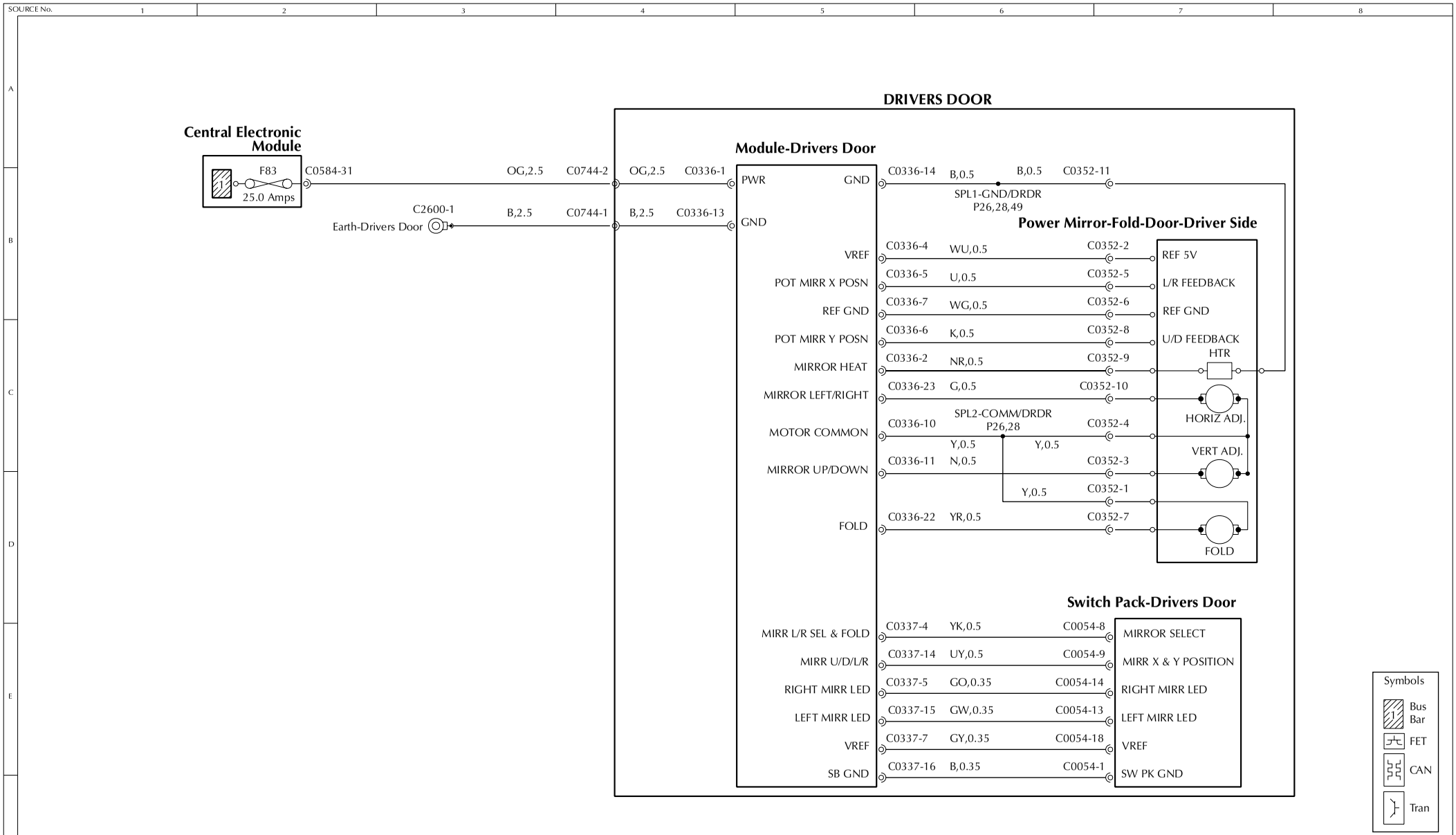
Bus Bar

FET

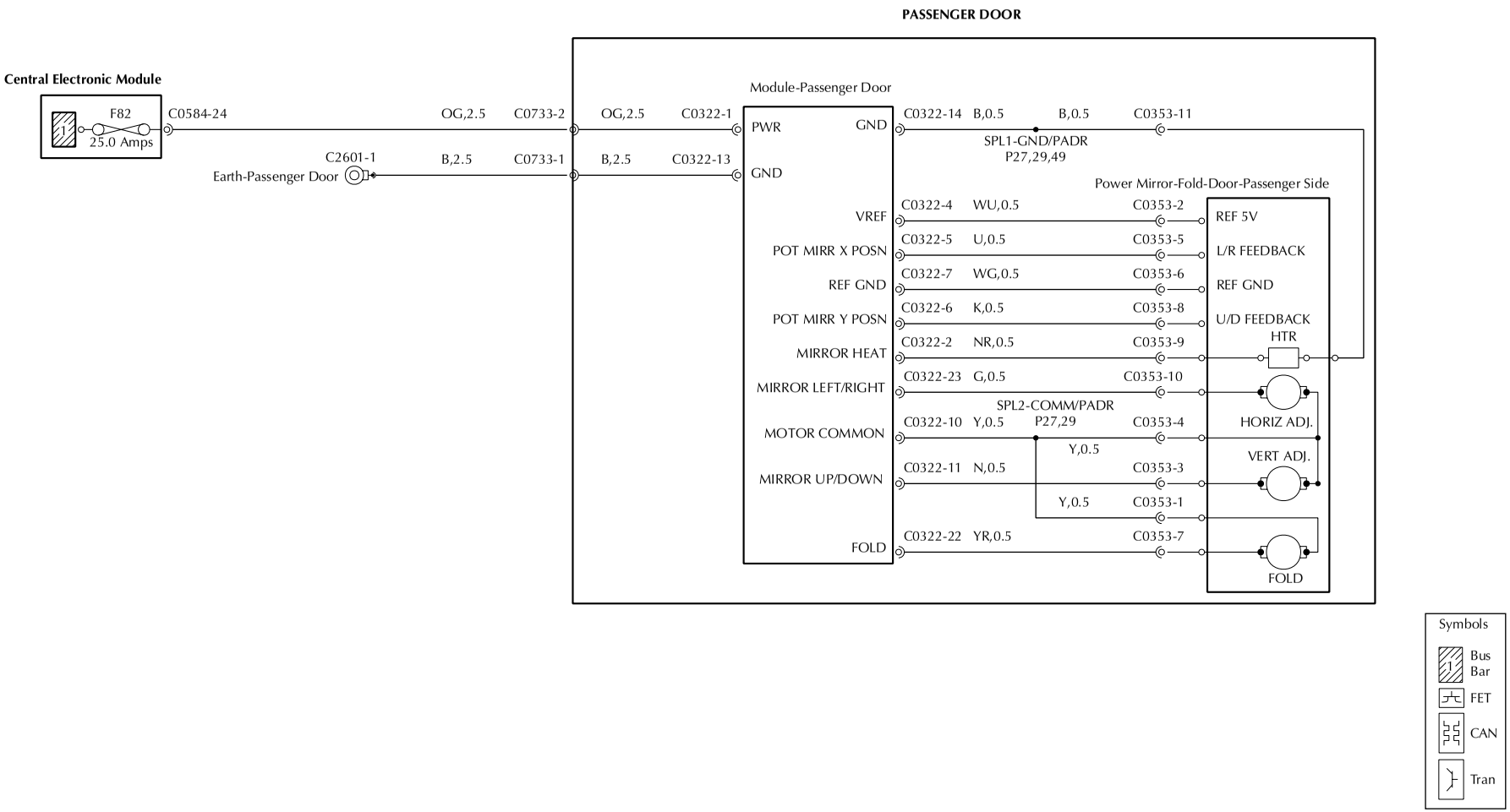
CAN

Tran

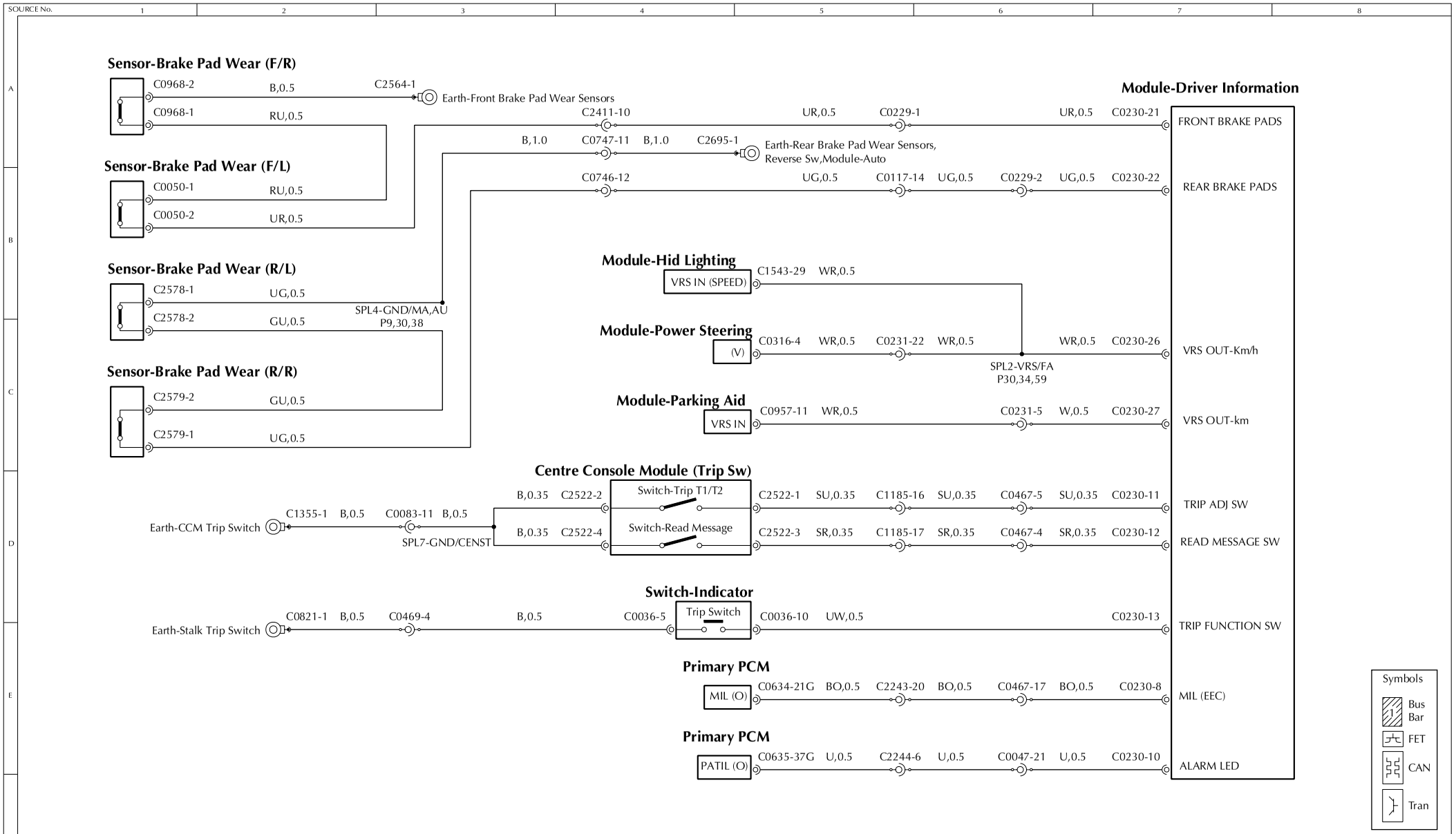
DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Passenger Door Electric Mirror	Coupe	From Chassis 00001	27

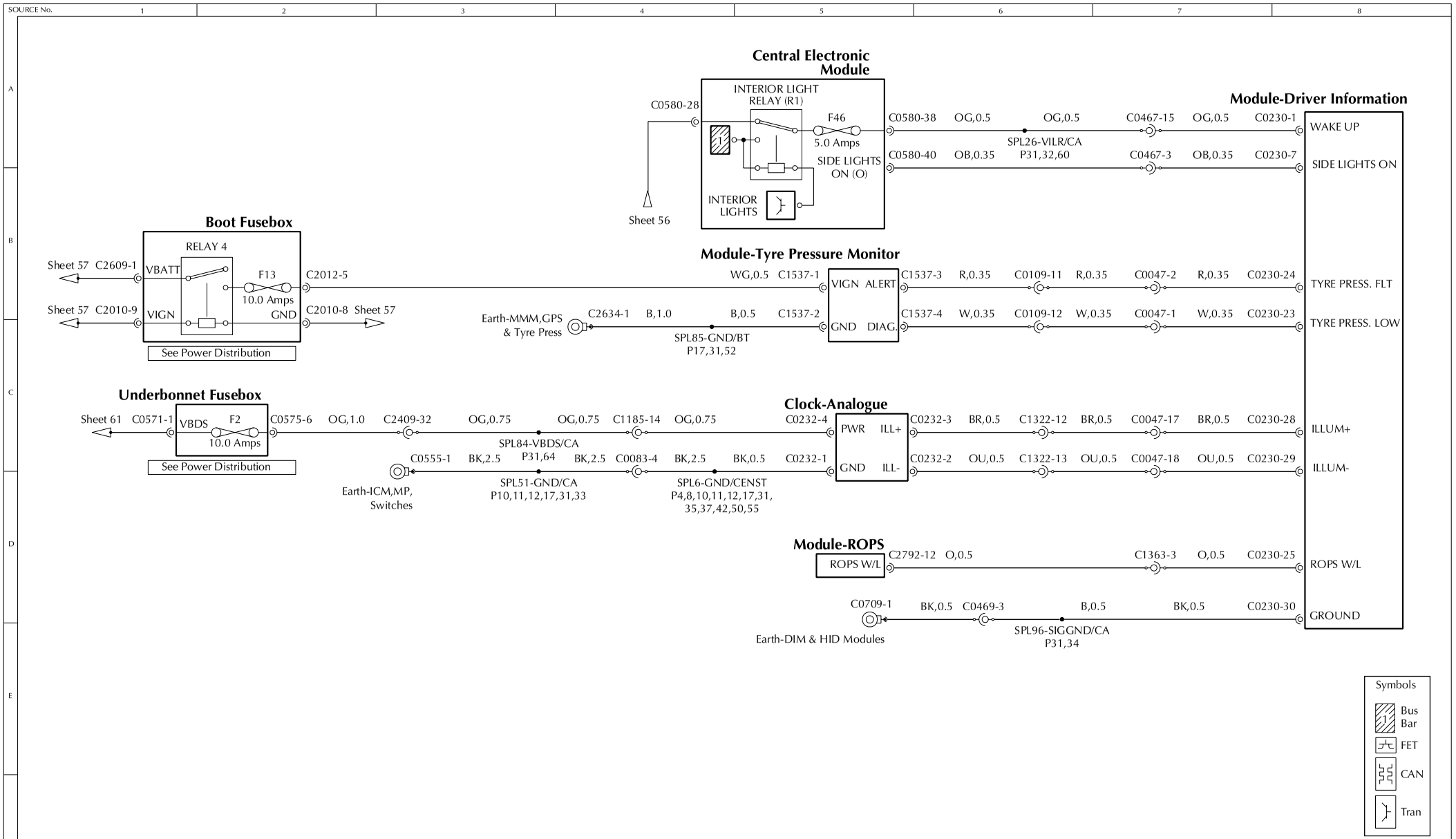


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Drivers Door Power Fold Mirror	Coupe	From Chassis 00001	28

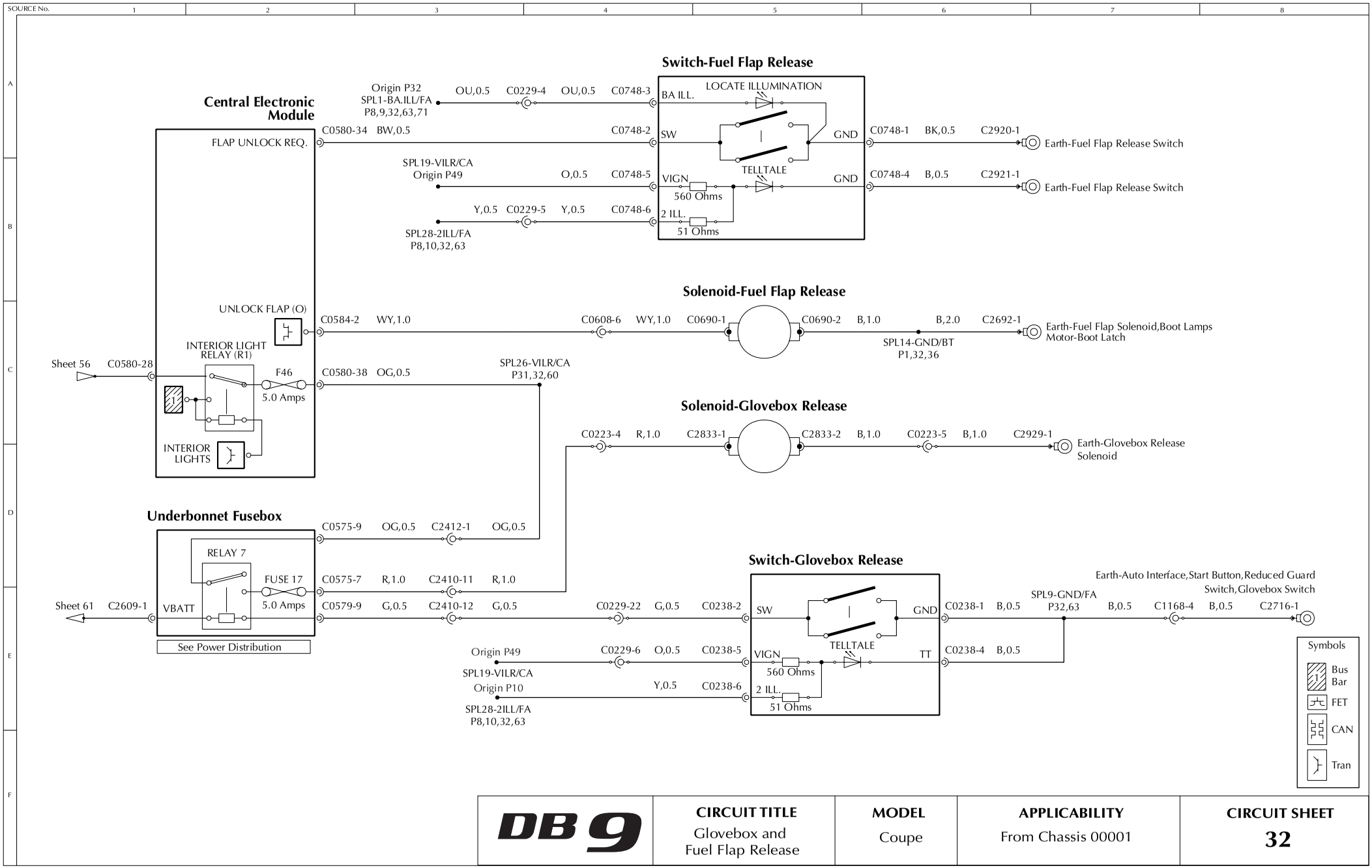


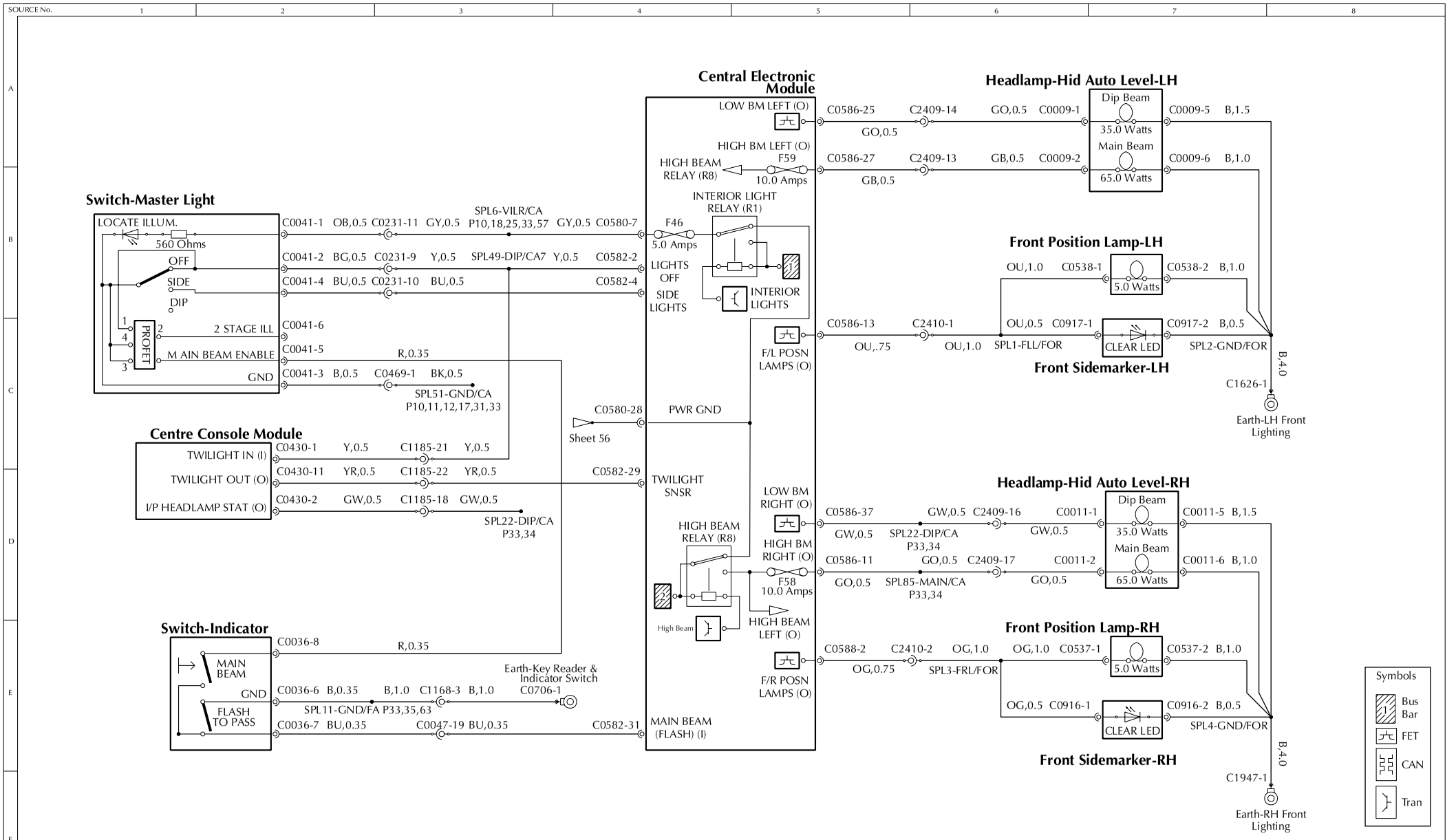
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Passenger Door Power Fold Mirror	Coupe	From Chassis 00001	29


SOURCE No.
Sensor-Brake Pad Wear (F/R)
C0968-2
B,0.5
C2564-1
Earth-Front Brake Pad Wear Sensors
C0968-1
RU,0.5
Sensor-Brake Pad Wear (F/L)
C0050-1
RU,0.5
C0050-2
UR,0.5
Sensor-Brake Pad Wear (R/L)
C2578-1
UG,0.5
C2578-2
GU,0.5
SPL4-GND/MA,AU
P9,30,38
Sensor-Brake Pad Wear (R/R)
C2579-2
GU,0.5
C2579-1
UG,0.5
Module-Driver Information
C2411-10
UR,0.5
C0229-1
UR,0.5
C0230-21
FRONT BRAKE PADS
B,1.0
C0747-11
B,1.0
C2695-1
Earth-Rear Brake Pad Wear Sensors,
Reverse Sw,Module-Auto
C0746-12
UG,0.5
C0117-14
UG,0.5
C0229-2
UG,0.5
C0230-22
REAR BRAKE PADS
Module-Hid Lighting
VRS IN (SPEED)
C1543-29
WR,0.5
Module-Power Steering
(V)
C0316-4
WR,0.5
C0231-22
WR,0.5
WR,0.5
C0230-26
VRS OUT-Km/h
SPL2-VRS/FA
P30,34,59
Module-Parking Aid
VRS IN
C0957-11
WR,0.5
C0231-5
W,0.5
C0230-27
VRS OUT-km
Centre Console Module (Trip Sw)
Earth-CCM Trip Switch
C1355-1
B,0.5
C0083-11
B,0.5
SPL7-GND/CENST
B,0.35
C2522-2
Switch-Trip T1/T2
C2522-1
SU,0.35
C1185-16
SU,0.35
C0467-5
SU,0.35
C0230-11
TRIP ADJ SW
B,0.35
C2522-4
Switch-Read Message
C2522-3
SR,0.35
C1185-17
SR,0.35
C0467-4
SR,0.35
C0230-12
READ MESSAGE SW
Switch-Indicator
Earth-Stalk Trip Switch
C0821-1
B,0.5
C0469-4
B,0.5
C0036-5
Trip Switch
C0036-10
UW,0.5
C0230-13
TRIP FUNCTION SW
Primary PCM
MIL (O)
C0634-21G
BO,0.5
C2243-20
BO,0.5
C0467-17
BO,0.5
C0230-8
MIL (EEC)
Primary PCM
PATIL (O)
C0635-37G
U,0.5
C2244-6
U,0.5
C0047-21
U,0.5
C0230-10
ALARM LED
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Driver Information Module
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
30

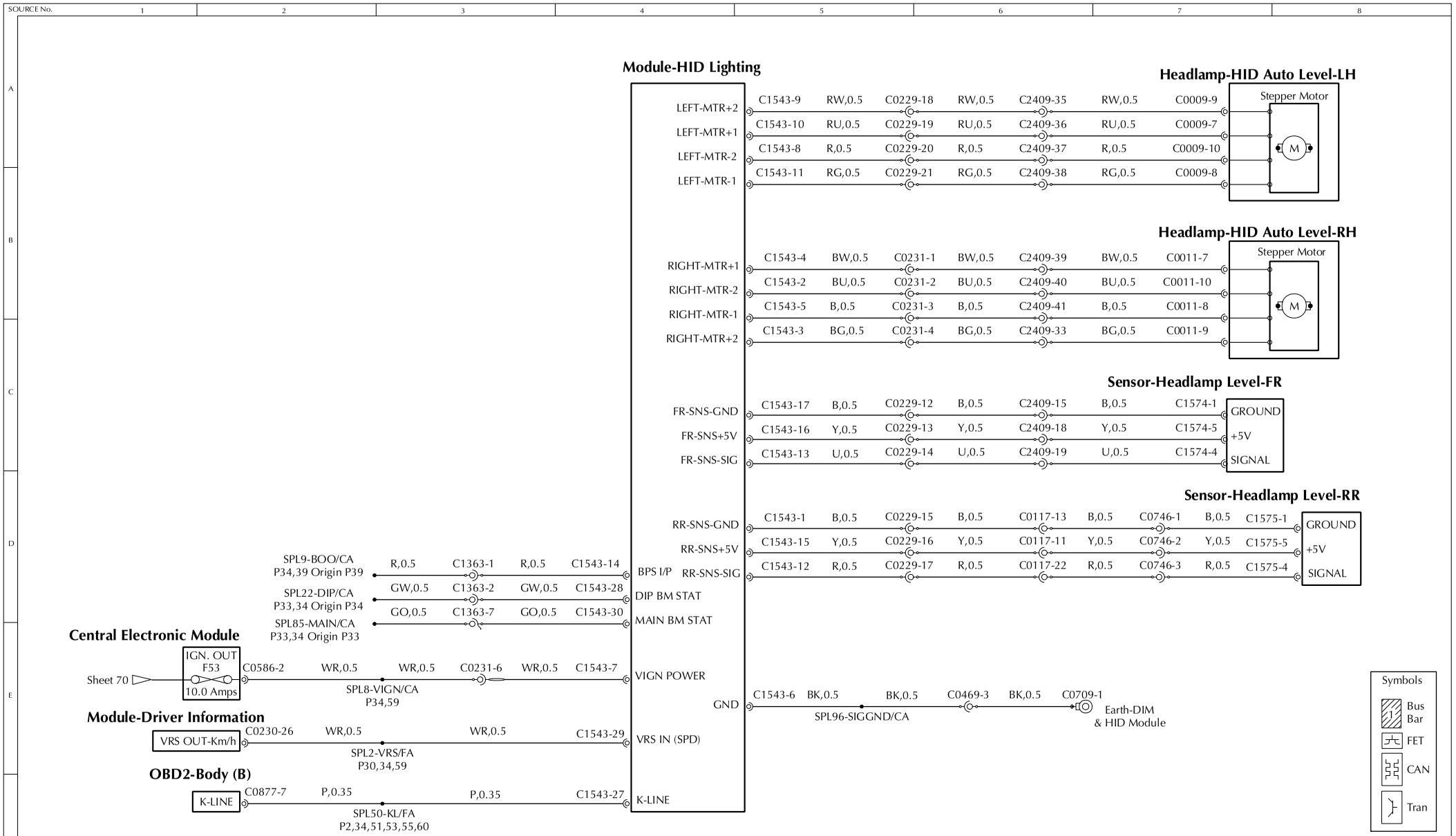


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Driver Information Module	Coupe	From Chassis 00001	31

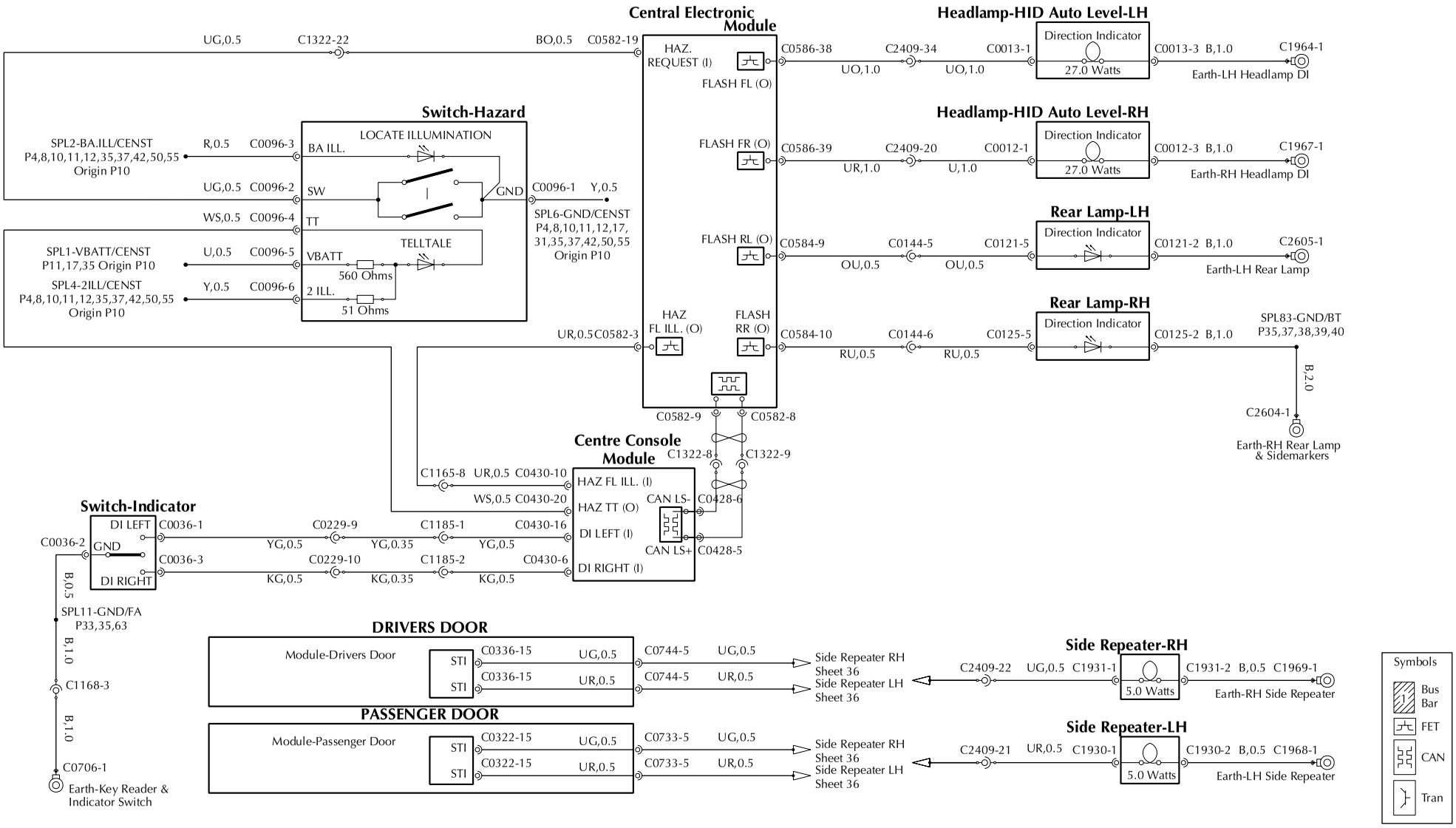

SOURCE No.
Switch-Fuel Flap Release
Central Electronic Module
Origin P32
SPL1-BA.ILL/FA
P8,9,32,63,71
OU,0.5
C0229-4
OU,0.5
C0748-3
BA ILL.
LOCATE ILLUMINATION
C0580-34 BW,0.5
C0748-2
SW
GND
C0748-1 BK,0.5 C2920-1
Earth-Fuel Flap Release Switch
FLAP UNLOCK REQ.
SPL19-VILR/CA
Origin P49
O,0.5
C0748-5
VIGN
TELLTALE
GND
C0748-4 B,0.5 C2921-1
Earth-Fuel Flap Release Switch
560 Ohms
Y,0.5 C0229-5 Y,0.5 C0748-6
2 ILL.
51 Ohms
SPL28-2ILL/FA
P8,10,32,63
Solenoid-Fuel Flap Release
UNLOCK FLAP (O)
C0584-2 WY,1.0
C0608-6 WY,1.0 C0690-1
C0690-2 B,1.0
B,2.0 C2692-1
Earth-Fuel Flap Solenoid,Boot Lamps Motor-Boot Latch
SPL14-GND/BT
P1,32,36
INTERIOR LIGHT RELAY (R1)
Sheet 56 C0580-28
F46
5.0 Amps
C0580-38 OG,0.5
SPL26-VILR/CA
P31,32,60
Solenoid-Glovebox Release
C0223-4 R,1.0 C2833-1
C2833-2 B,1.0
C0223-5 B,1.0 C2929-1
Earth-Glovebox Release Solenoid
INTERIOR LIGHTS
Underbonnet Fusebox
C0575-9 OG,0.5 C2412-1 OG,0.5
RELAY 7
FUSE 17
5.0 Amps
C0575-7 R,1.0 C2410-11 R,1.0
Switch-Glovebox Release
Earth-Auto Interface,Start Button,Reduced Guard Switch,Glovebox Switch
Sheet 61 C2609-1
VBATT
C0579-9 G,0.5 C2410-12 G,0.5
C0229-22 G,0.5 C0238-2
SW
GND
C0238-1 B,0.5
SPL9-GND/FA
P32,63
B,0.5 C1168-4 B,0.5 C2716-1
See Power Distribution
Origin P49
C0229-6 O,0.5 C0238-5
VIGN
TELLTALE
TT
C0238-4 B,0.5
SPL19-VILR/CA
560 Ohms
Origin P10
Y,0.5 C0238-6
2 ILL.
51 Ohms
SPL28-2ILL/FA
P8,10,32,63
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Glovebox and Fuel Flap Release
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
32



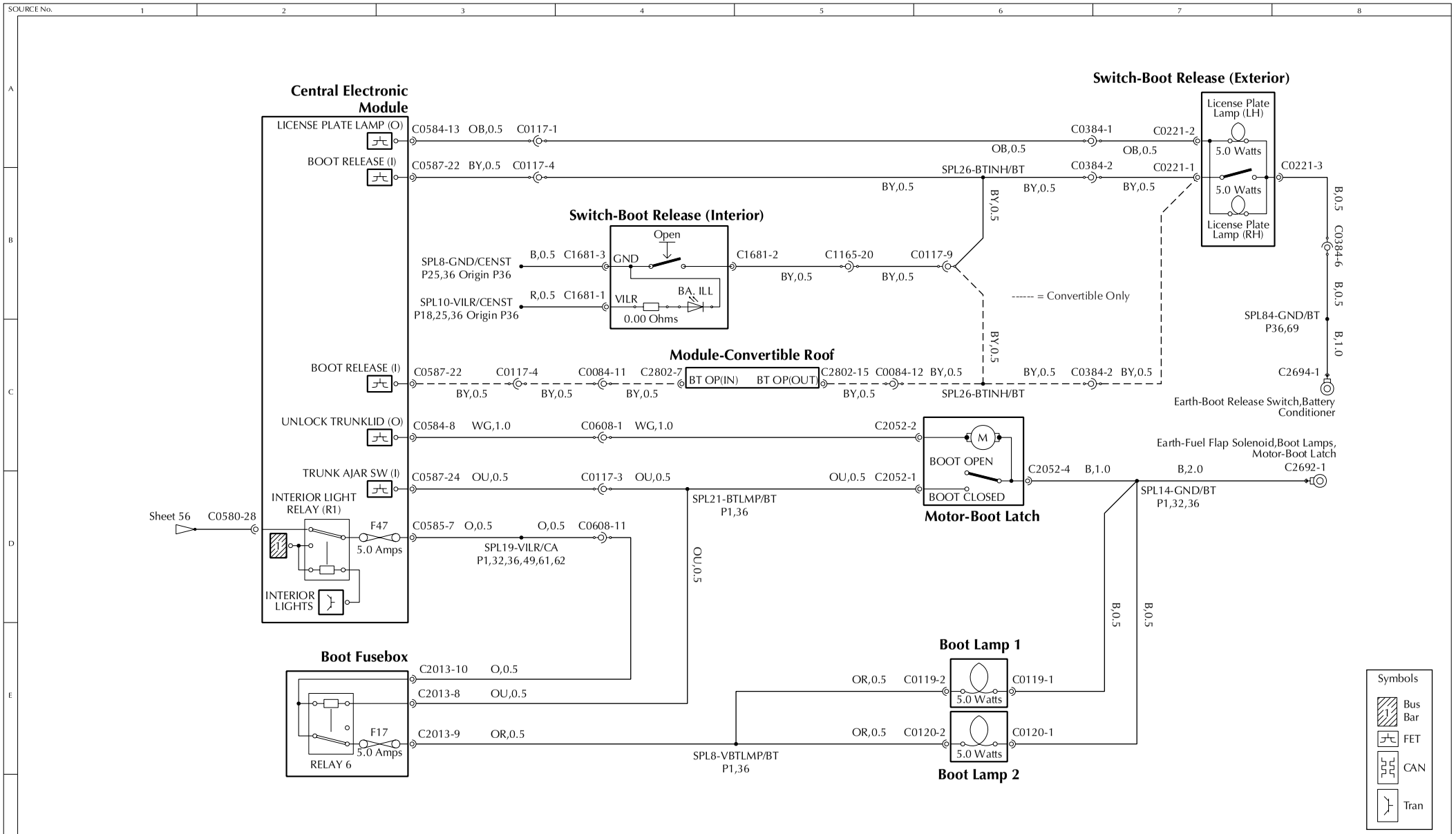
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting - Front Headlamps and Markers	Coupe	From Chassis 00001	33



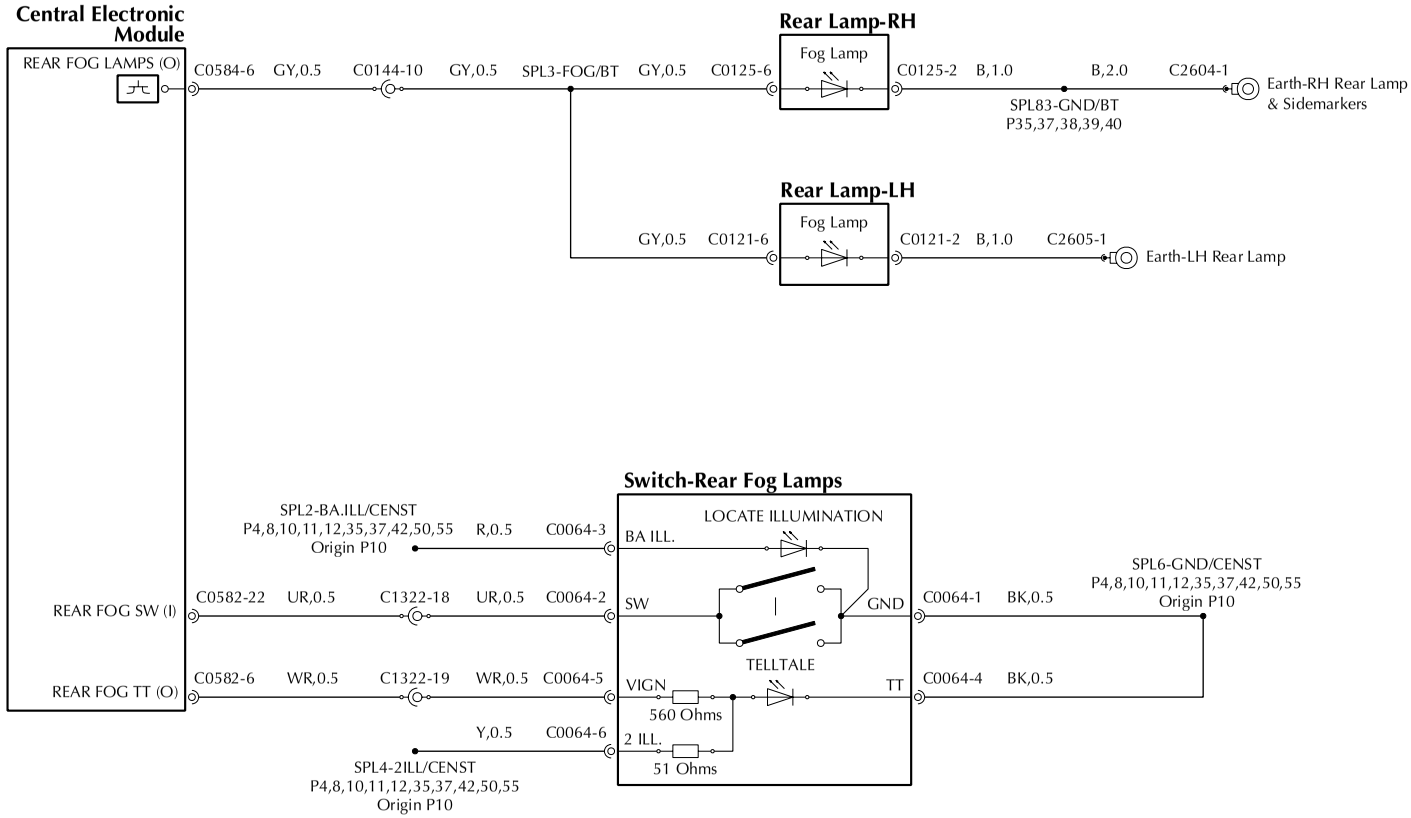
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting - Front Headlamp Levelling	Coupe	From Chassis 00001	34



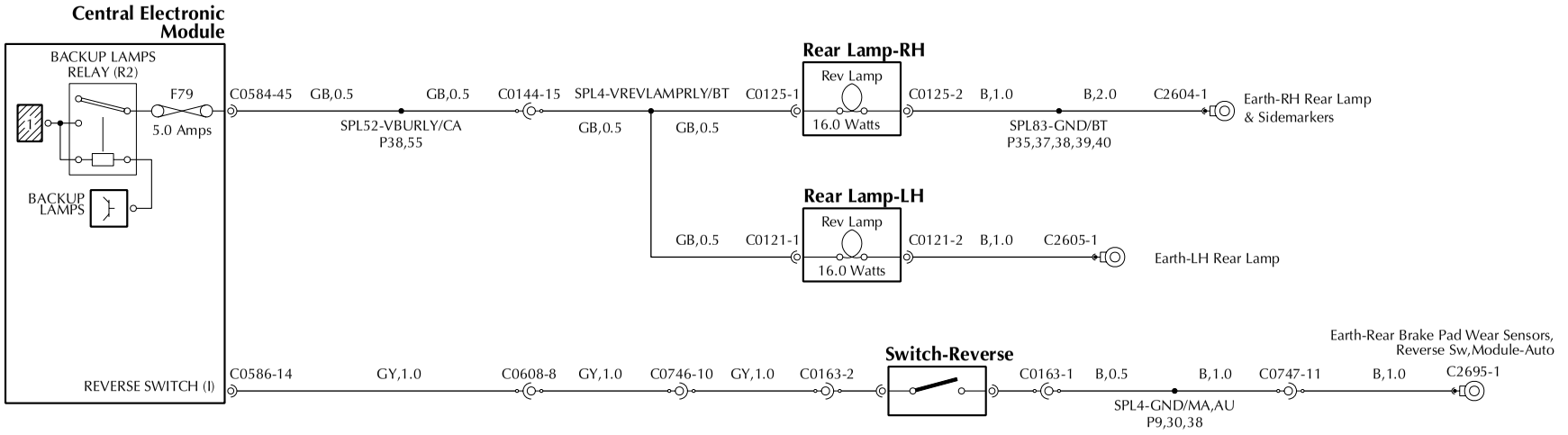
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting Direction Indicators	Coupe	From Chassis 00001	35

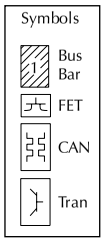


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Boot Components	Coupe	From Chassis 00001	36

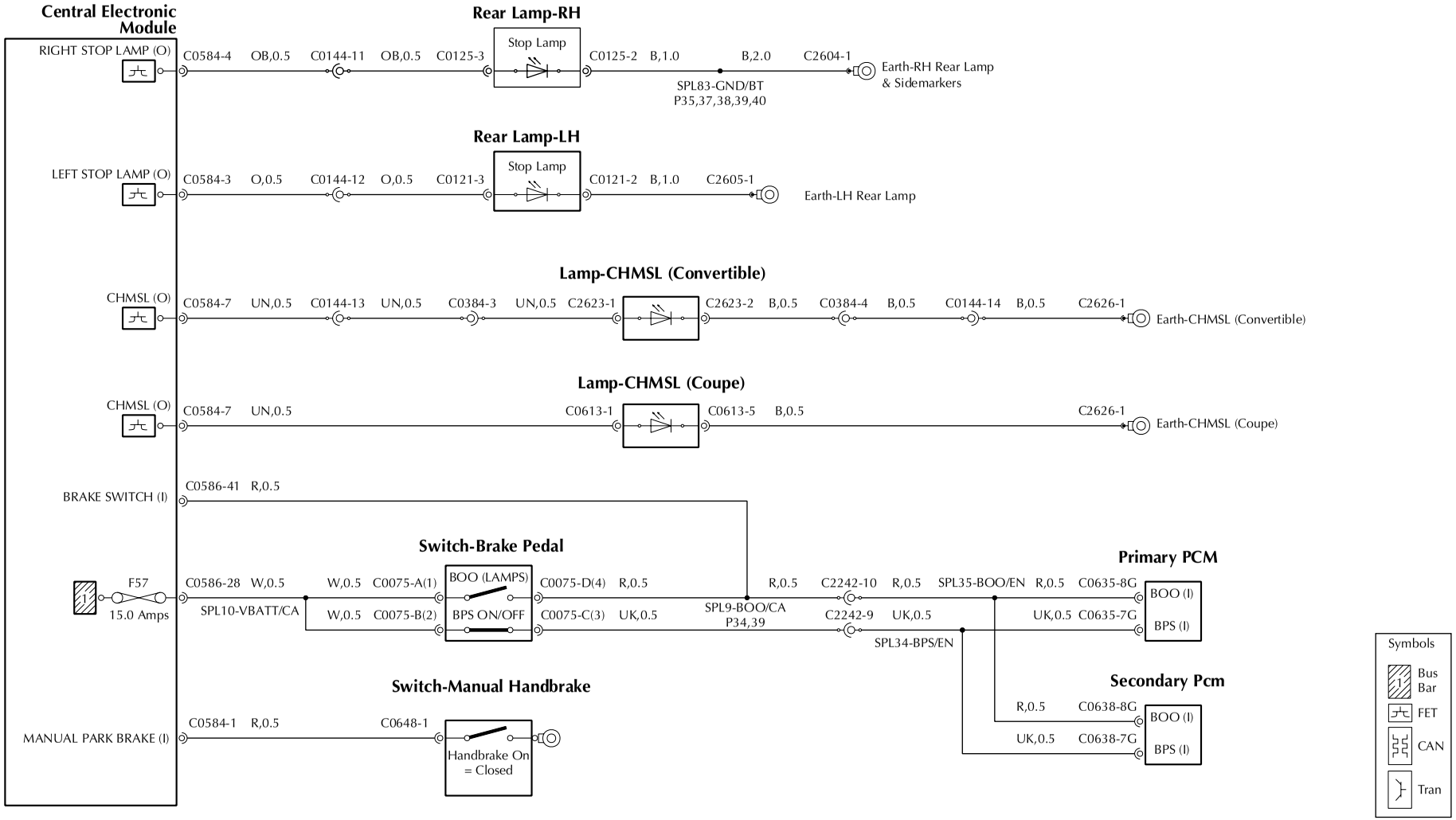


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting Rear Fog Lights	Coupe	From Chassis 00001	37

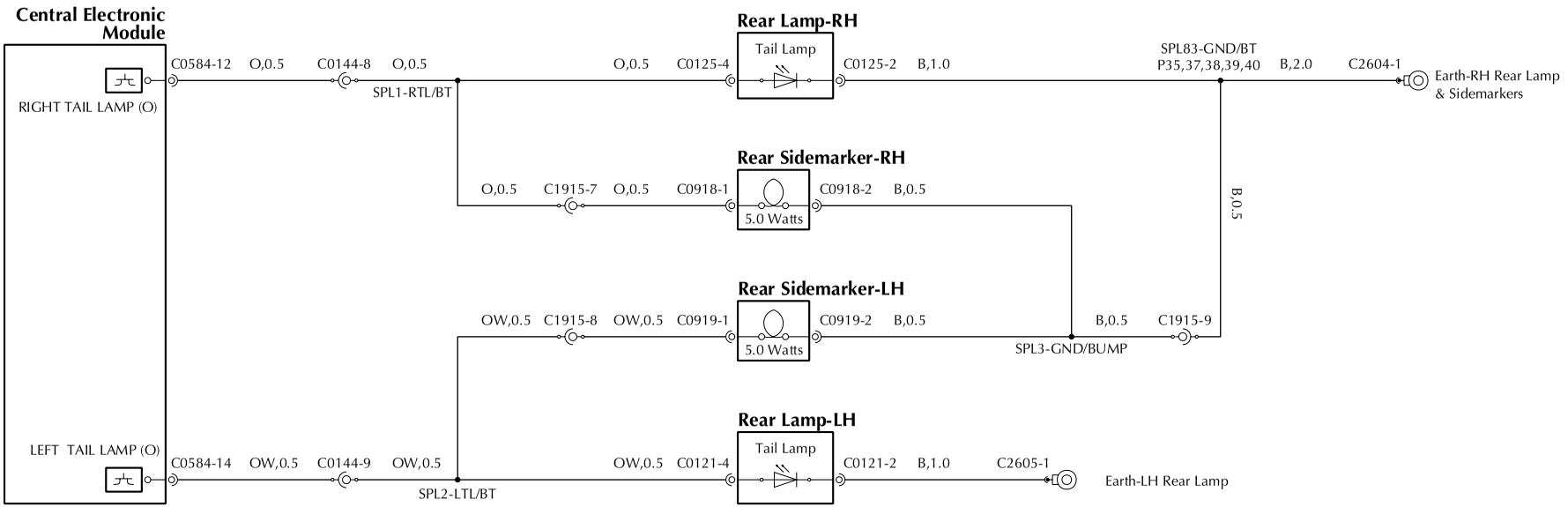




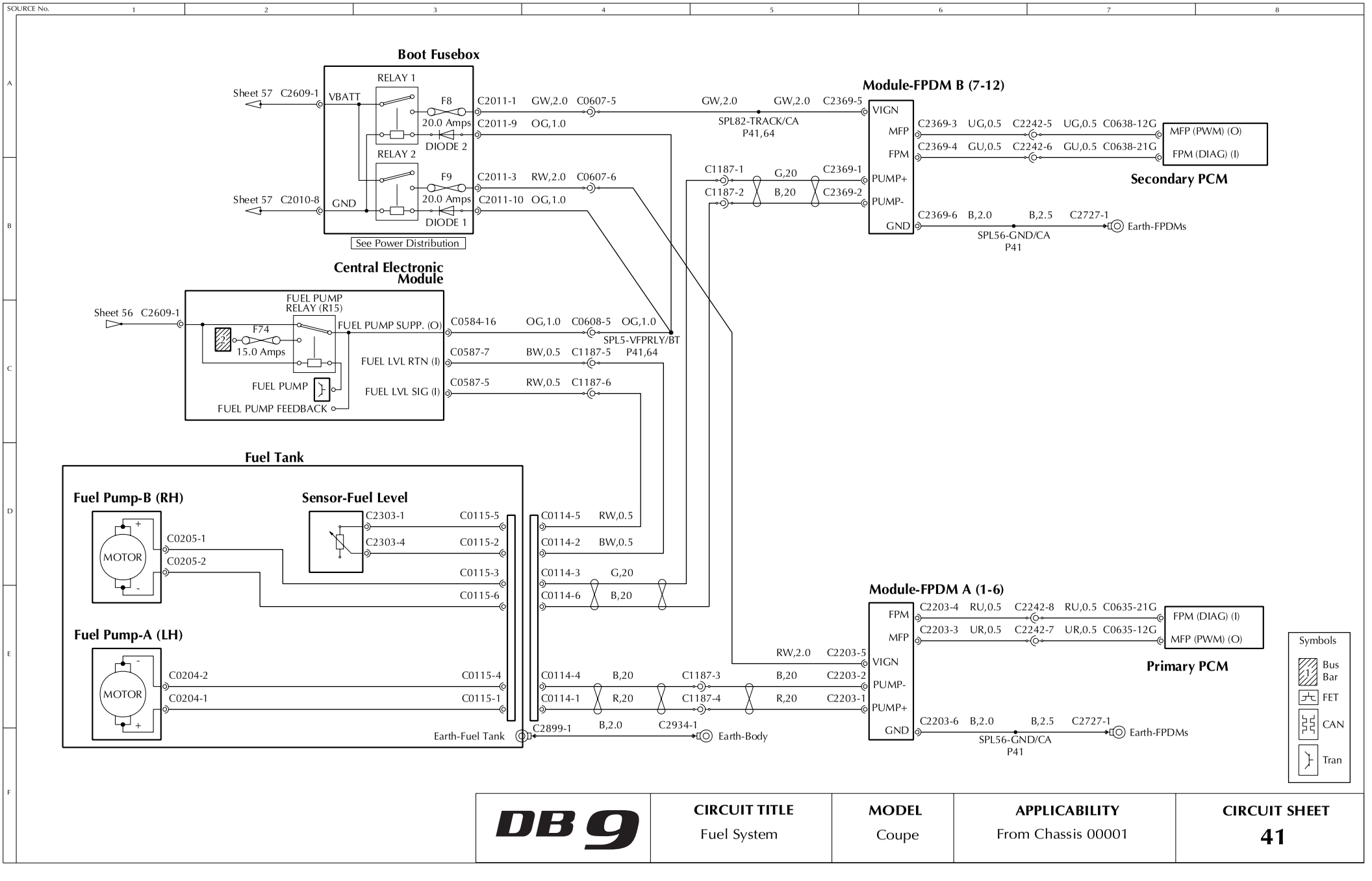
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting Reversing Lamps	Coupe	From Chassis 00001	38

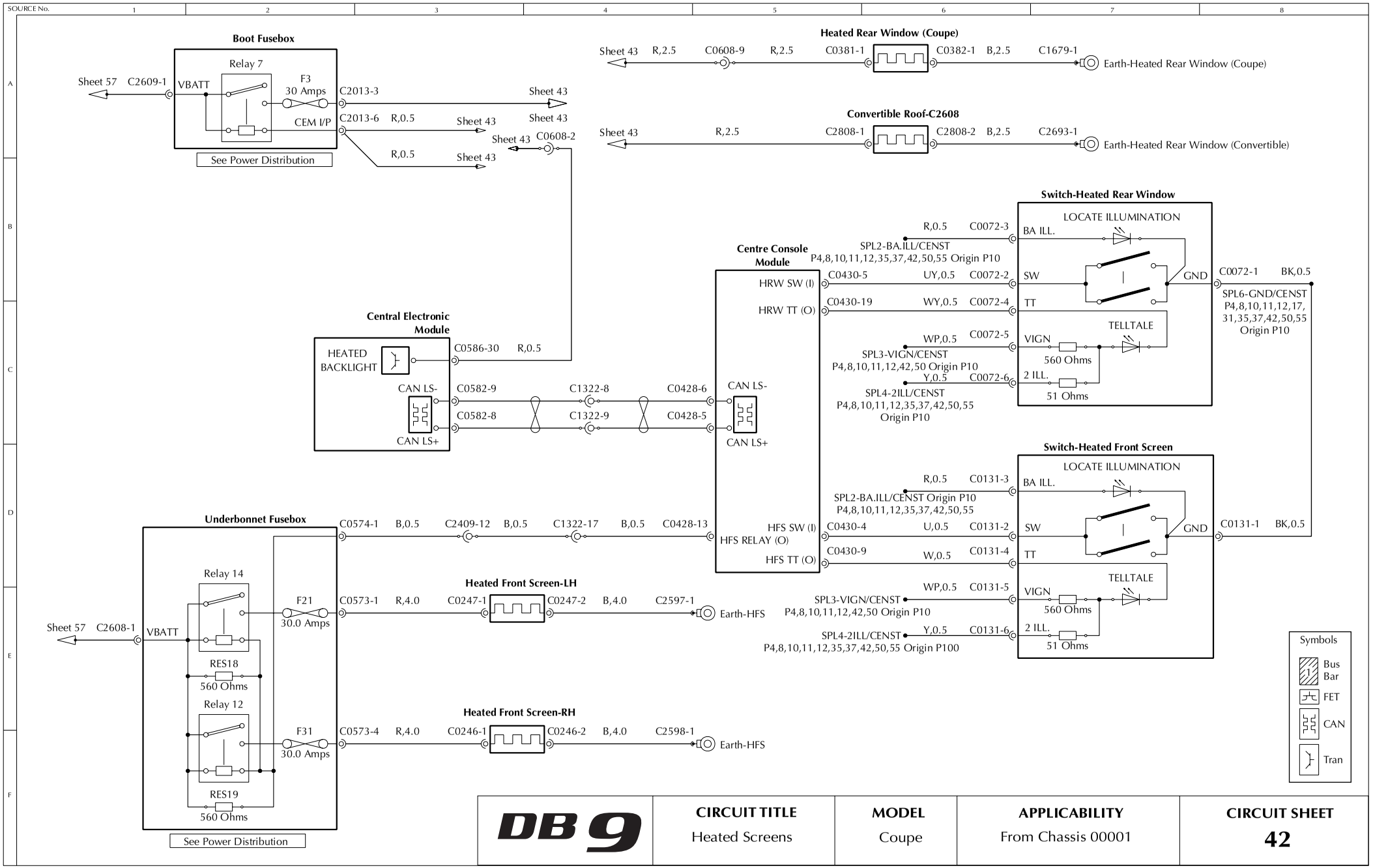


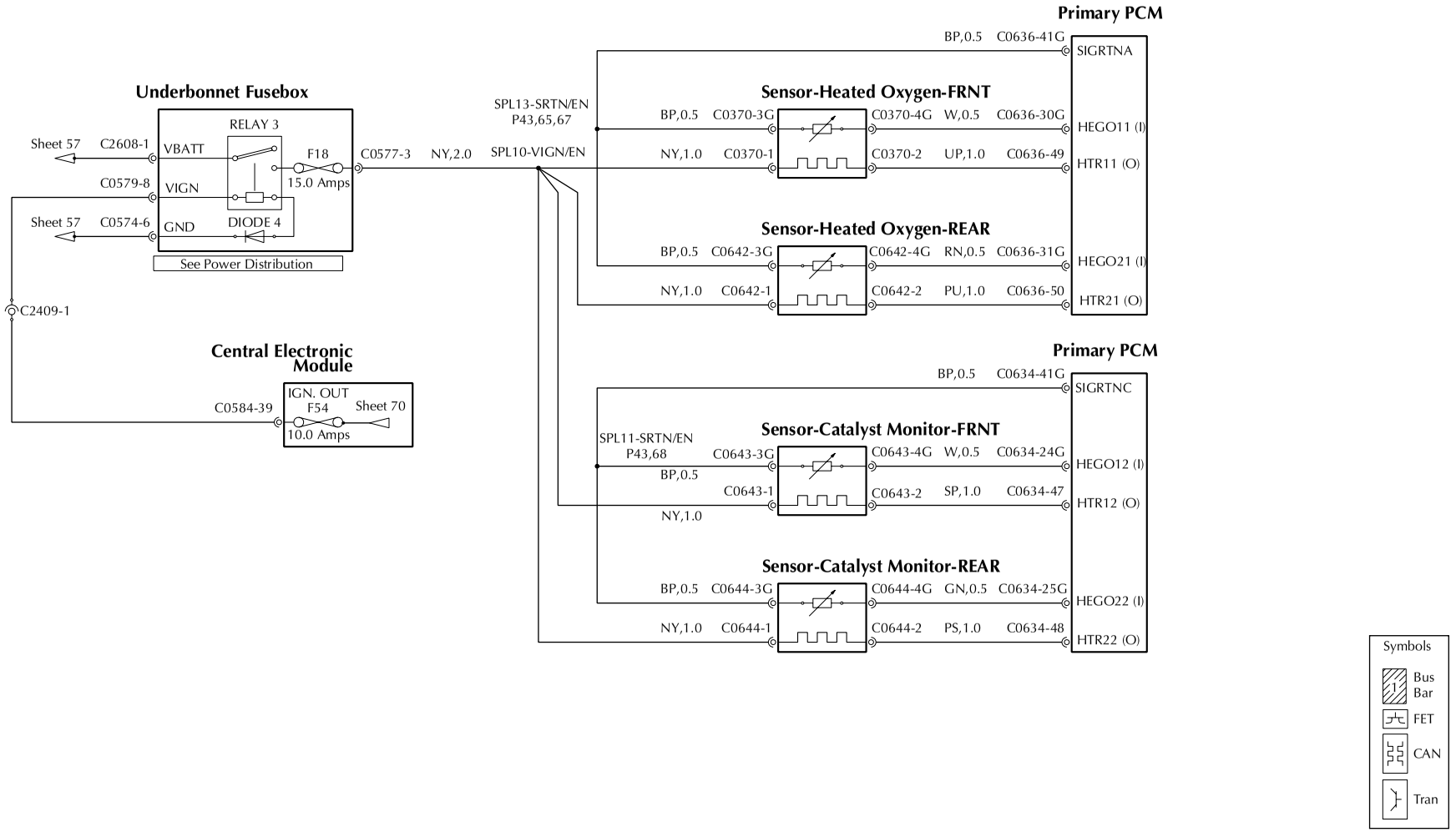
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting Brake Lights	Coupe	From Chassis 00001	39



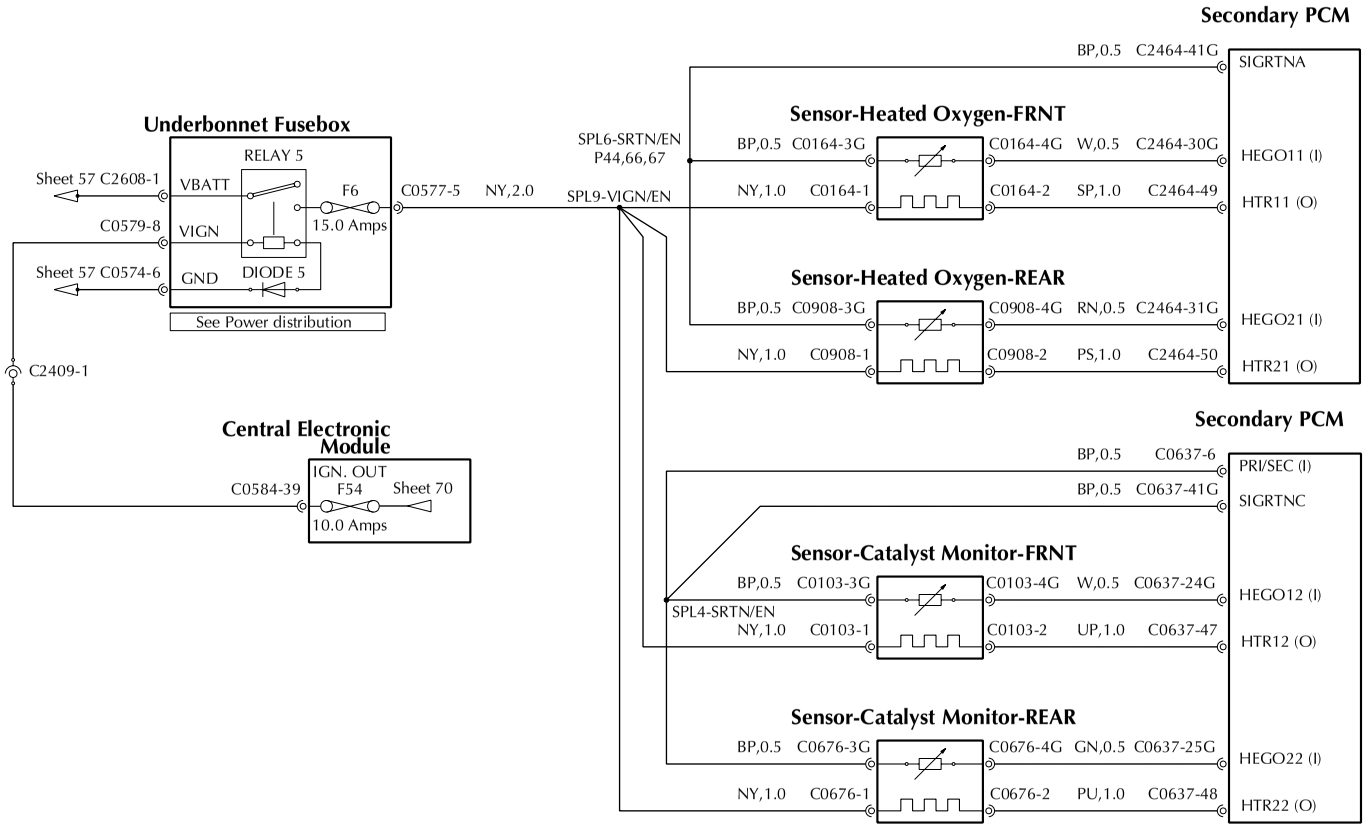
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Exterior Lighting Tail Lamps	Coupe	From Chassis 00001	40


SOURCE No.
Boot Fusebox
RELAY 1
RELAY 2
Sheet 57 C2609-1
VBATT
F8
20.0 Amps
DIODE 2
F9
20.0 Amps
DIODE 1
Sheet 57 C2010-8
GND
See Power Distribution
C2011-1 GW,2.0 C0607-5
C2011-9 OG,1.0
C2011-3 RW,2.0 C0607-6
C2011-10 OG,1.0
Module-FPDM B (7-12)
GW,2.0 GW,2.0 C2369-5
SPL82-TRACK/CA
P41,64
VIGN
MFP
FPM
PUMP+
PUMP-
GND
C2369-3 UG,0.5 C2242-5 UG,0.5 C0638-12G
C2369-4 GU,0.5 C2242-6 GU,0.5 C0638-21G
MFP (PWM) (O)
FPM (DIAG) (I)
Secondary PCM
C1187-1 G,20 C2369-1
C1187-2 B,20 C2369-2
C2369-6 B,2.0 B,2.5 C2727-1
SPL56-GND/CA
P41
Earth-FPDMs
Central Electronic Module
FUEL PUMP RELAY (R15)
Sheet 56 C2609-1
F74
15.0 Amps
FUEL PUMP SUPP. (O)
FUEL PUMP
FUEL PUMP FEEDBACK
FUEL LVL RTN (I)
FUEL LVL SIG (I)
C0584-16 OG,1.0 C0608-5 OG,1.0
SPL5-VFPRLY/BT
C0587-7 BW,0.5 C1187-5 P41,64
C0587-5 RW,0.5 C1187-6
Fuel Tank
Fuel Pump-B (RH)
Sensor-Fuel Level
MOTOR
C0205-1
C0205-2
C2303-1 C0115-5
C2303-4 C0115-2
C0115-3
C0115-6
C0114-5 RW,0.5
C0114-2 BW,0.5
C0114-3 G,20
C0114-6 B,20
Fuel Pump-A (LH)
C0204-2 C0115-4
C0204-1 C0115-1
C0114-4 B,20 C1187-3 B,20 C2203-2
C0114-1 R,20 C1187-4 R,20 C2203-1
Module-FPDM A (1-6)
RW,2.0 C2203-5
C2203-4 RU,0.5 C2242-8 RU,0.5 C0635-21G
C2203-3 UR,0.5 C2242-7 UR,0.5 C0635-12G
FPM (DIAG) (I)
MFP (PWM) (O)
Primary PCM
C2203-6 B,2.0 B,2.5 C2727-1
SPL56-GND/CA
P41
Earth-FPDMs
Earth-Fuel Tank
C2899-1 B,2.0 C2934-1
Earth-Body
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Fuel System
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
41

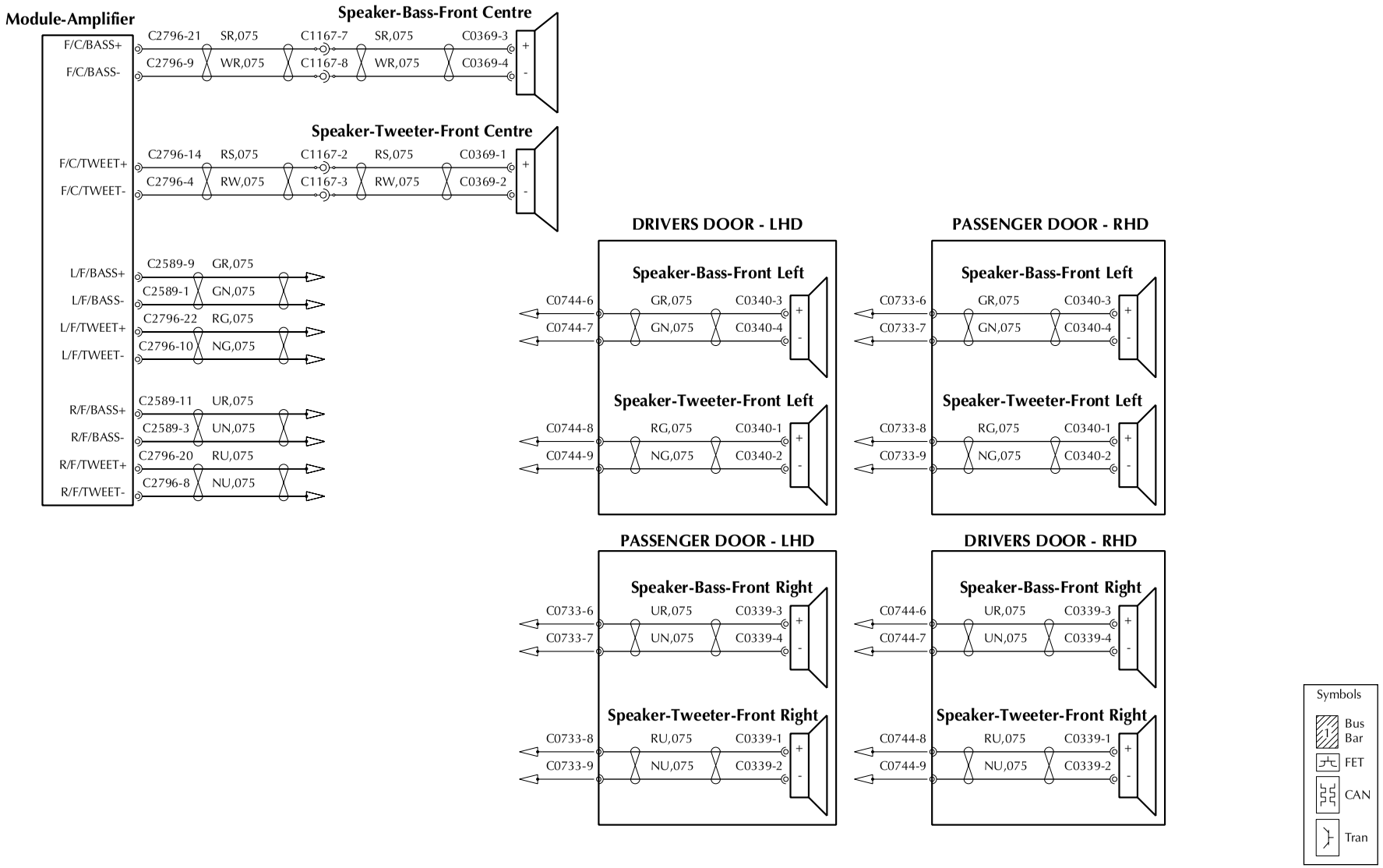

SOURCE No.
Boot Fusebox
Relay 7
F3
30 Amps
VBATT
CEM I/P
Sheet 57 C2609-1
C2013-3
C2013-6 R,0.5
R,0.5
Sheet 43
See Power Distribution
Heated Rear Window (Coupe)
Sheet 43 R,2.5 C0608-9 R,2.5 C0381-1 C0382-1 B,2.5 C1679-1
Earth-Heated Rear Window (Coupe)
Convertible Roof-C2608
Sheet 43 R,2.5 C2808-1 C2808-2 B,2.5 C2693-1
Earth-Heated Rear Window (Convertible)
C0608-2
Central Electronic Module
HEATED BACKLIGHT
C0586-30 R,0.5
CAN LS-
CAN LS+
C0582-9 C1322-8 C0428-6
C0582-8 C1322-9 C0428-5
Centre Console Module
HRW SW (I)
HRW TT (O)
HFS SW (I)
HFS RELAY (O)
HFS TT (O)
Switch-Heated Rear Window
LOCATE ILLUMINATION
BA ILL.
SW
TT
GND
TELLTALE
VIGN
560 Ohms
2 ILL.
51 Ohms
R,0.5 C0072-3
SPL2-BA.ILL/CENST
P4,8,10,11,12,35,37,42,50,55 Origin P10
C0430-5 UY,0.5 C0072-2
C0430-19 WY,0.5 C0072-4
WP,0.5 C0072-5
SPL3-VIGN/CENST
P4,8,10,11,12,42,50 Origin P10
Y,0.5 C0072-6
SPL4-2ILL/CENST
P4,8,10,11,12,35,37,42,50,55
Origin P10
C0072-1 BK,0.5
SPL6-GND/CENST
P4,8,10,11,12,17,
31,35,37,42,50,55
Origin P10
Switch-Heated Front Screen
C0131-3
C0131-4
C0131-5
C0131-6
C0430-4 U,0.5 C0131-2
C0430-9 W,0.5
C0131-1 BK,0.5
Underbonnet Fusebox
Relay 14
Relay 12
F21
F31
30.0 Amps
RES18
RES19
560 Ohms
Sheet 57 C2608-1
C0574-1 B,0.5 C2409-12 B,0.5 C1322-17 B,0.5 C0428-13
Heated Front Screen-LH
C0573-1 R,4.0 C0247-1 C0247-2 B,4.0 C2597-1
Earth-HFS
Heated Front Screen-RH
C0573-4 R,4.0 C0246-1 C0246-2 B,4.0 C2598-1
Symbols
Bus Bar
FET
CAN
Tran
DB9
CIRCUIT TITLE
Heated Screens
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
42



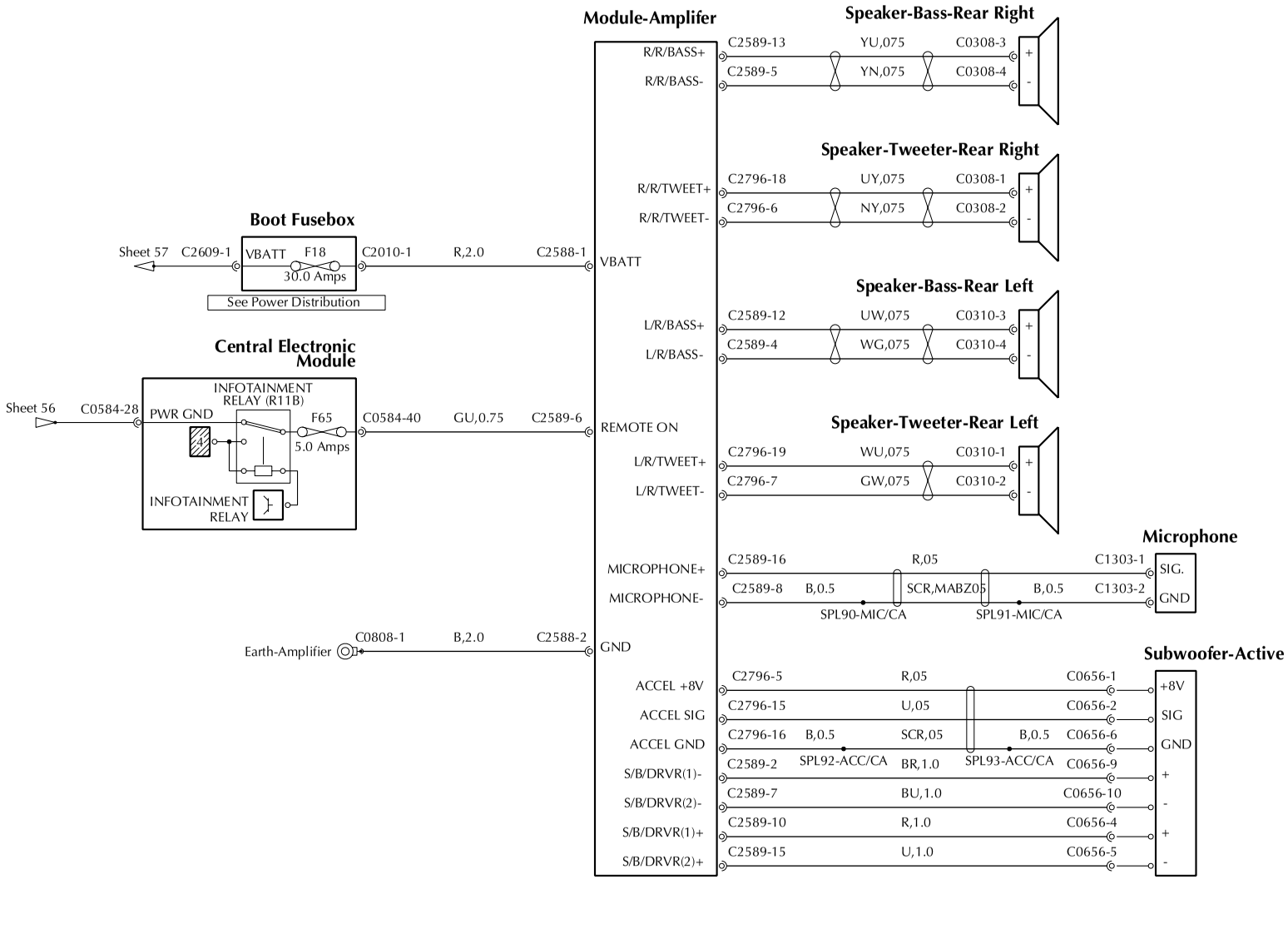
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Primary PCM Heated Oxygen Sensors, Catalyst Monitor Sensors	Coupe	From Chassis 00001	43



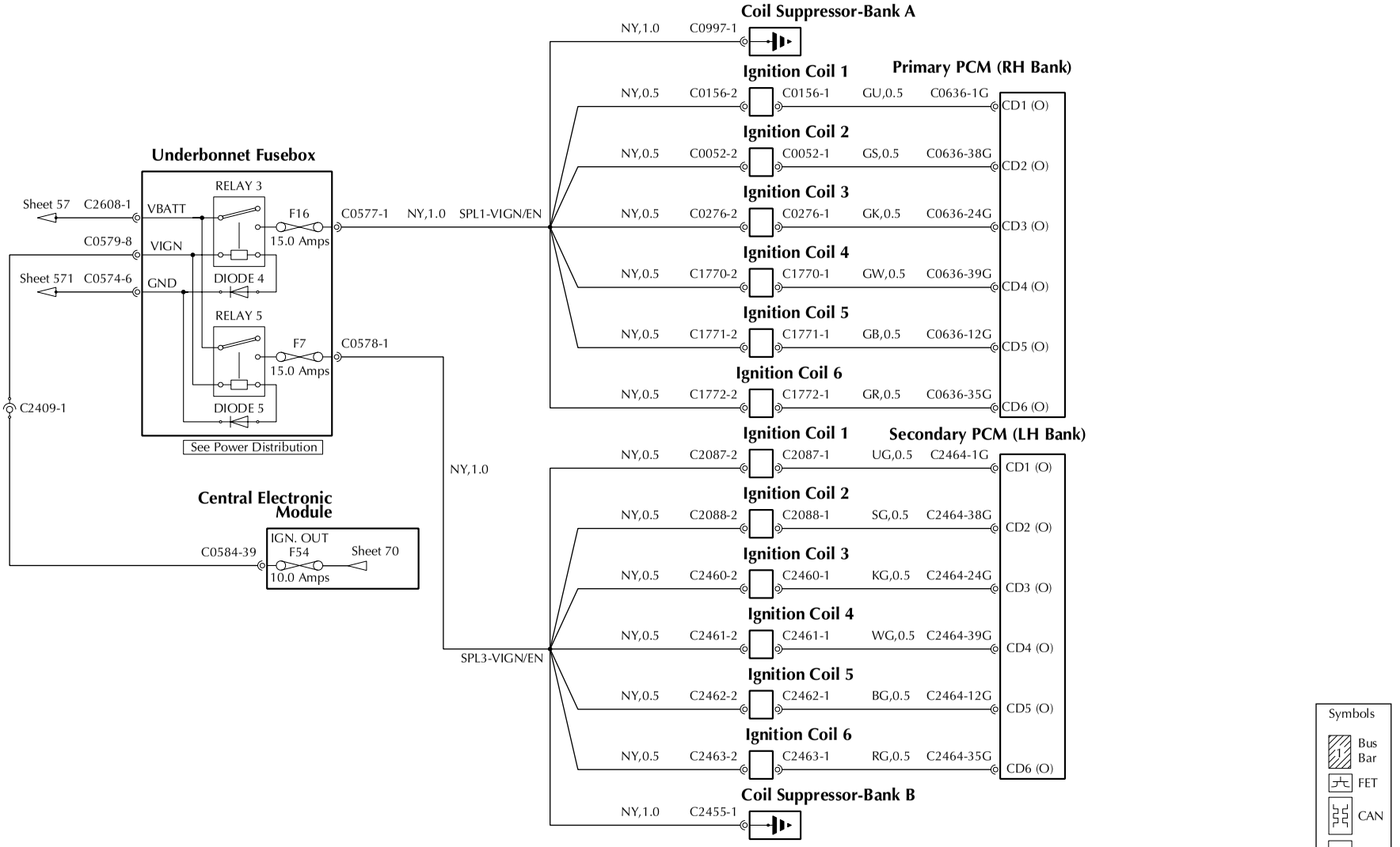
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Secondary PCM Heated Oxygen Sensors, Catalyst Monitor Sensors	Coupe	From Chassis 00001	44



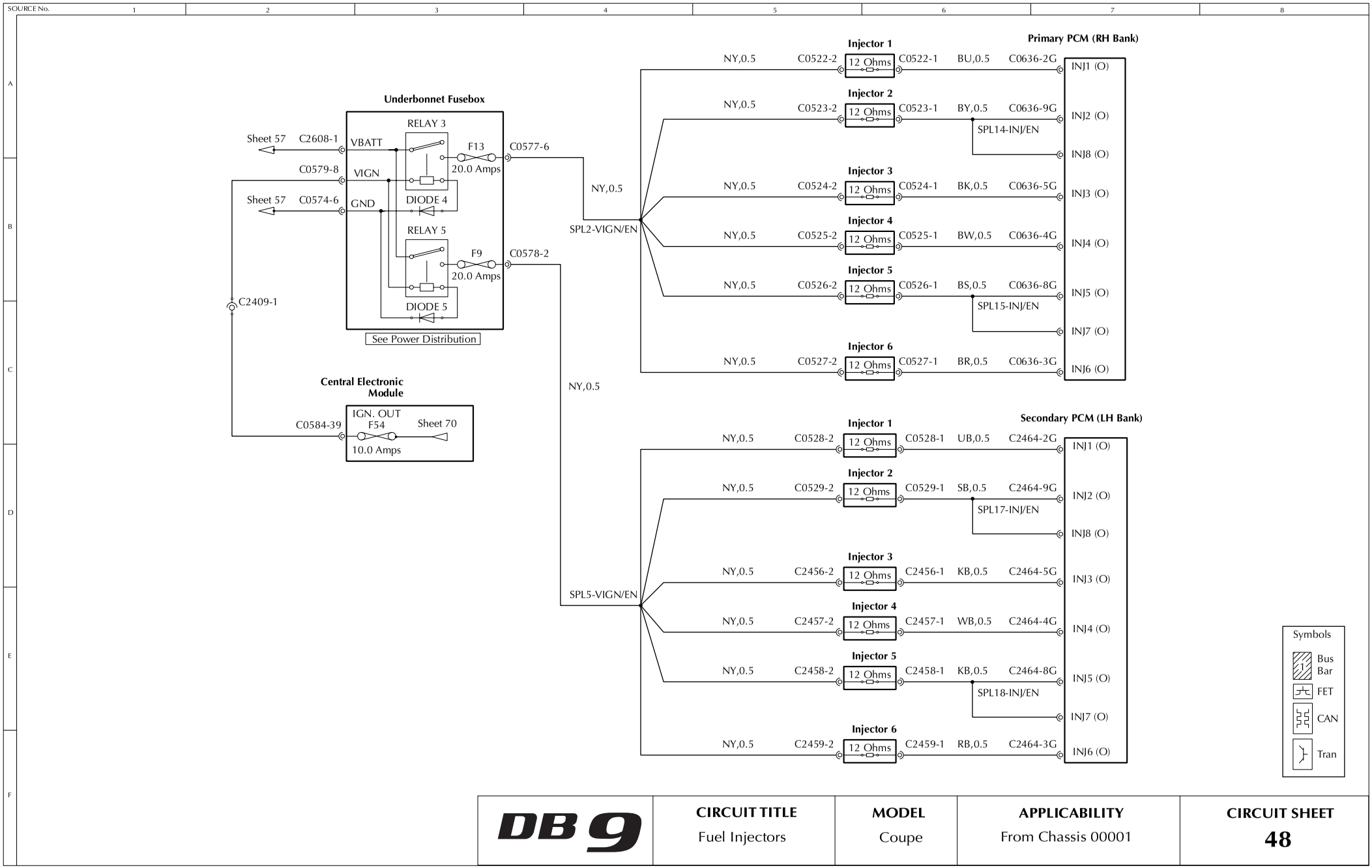
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	In-Car Entertainment Linn Amplifier	Coupe	From Chassis 00001	45

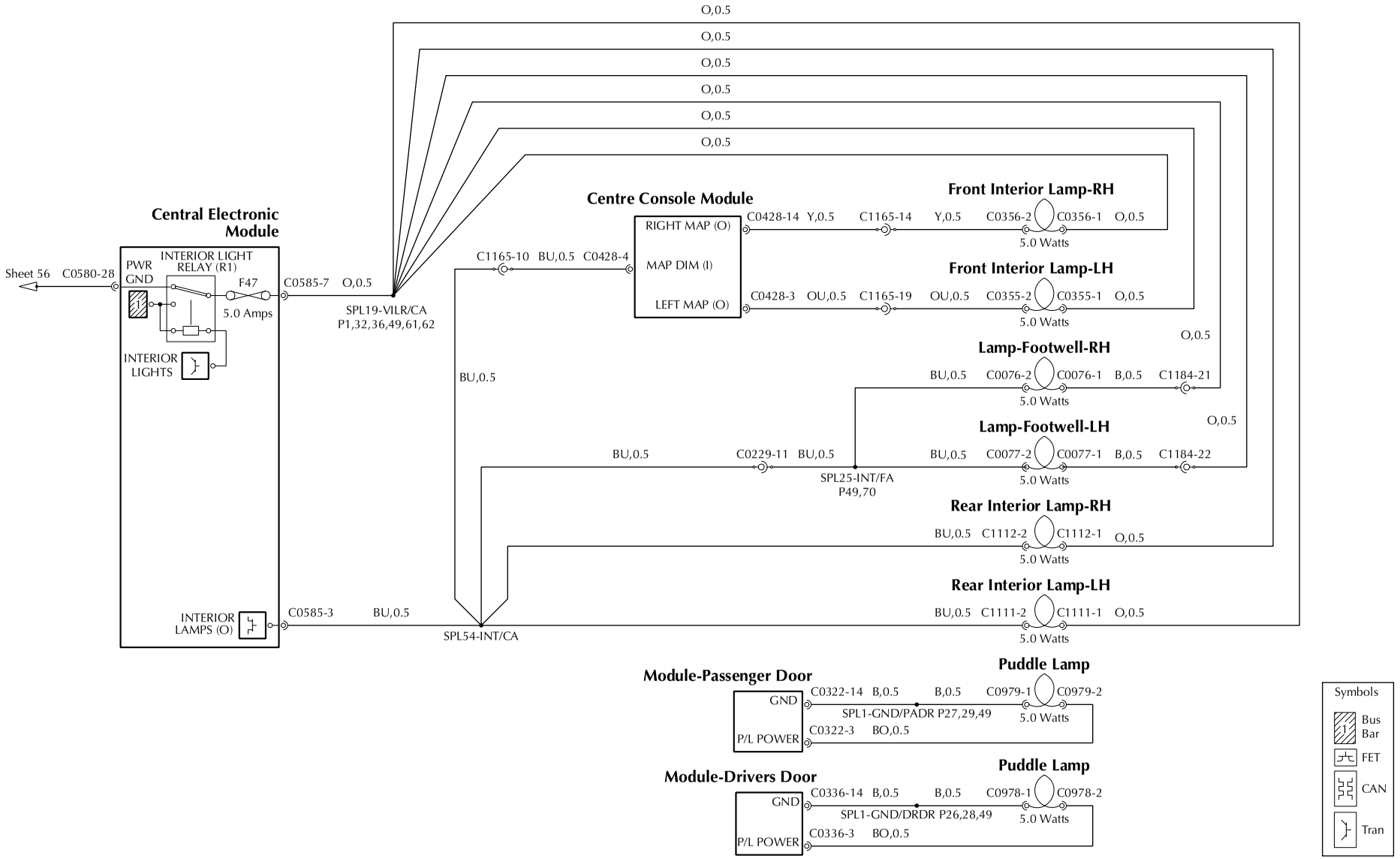


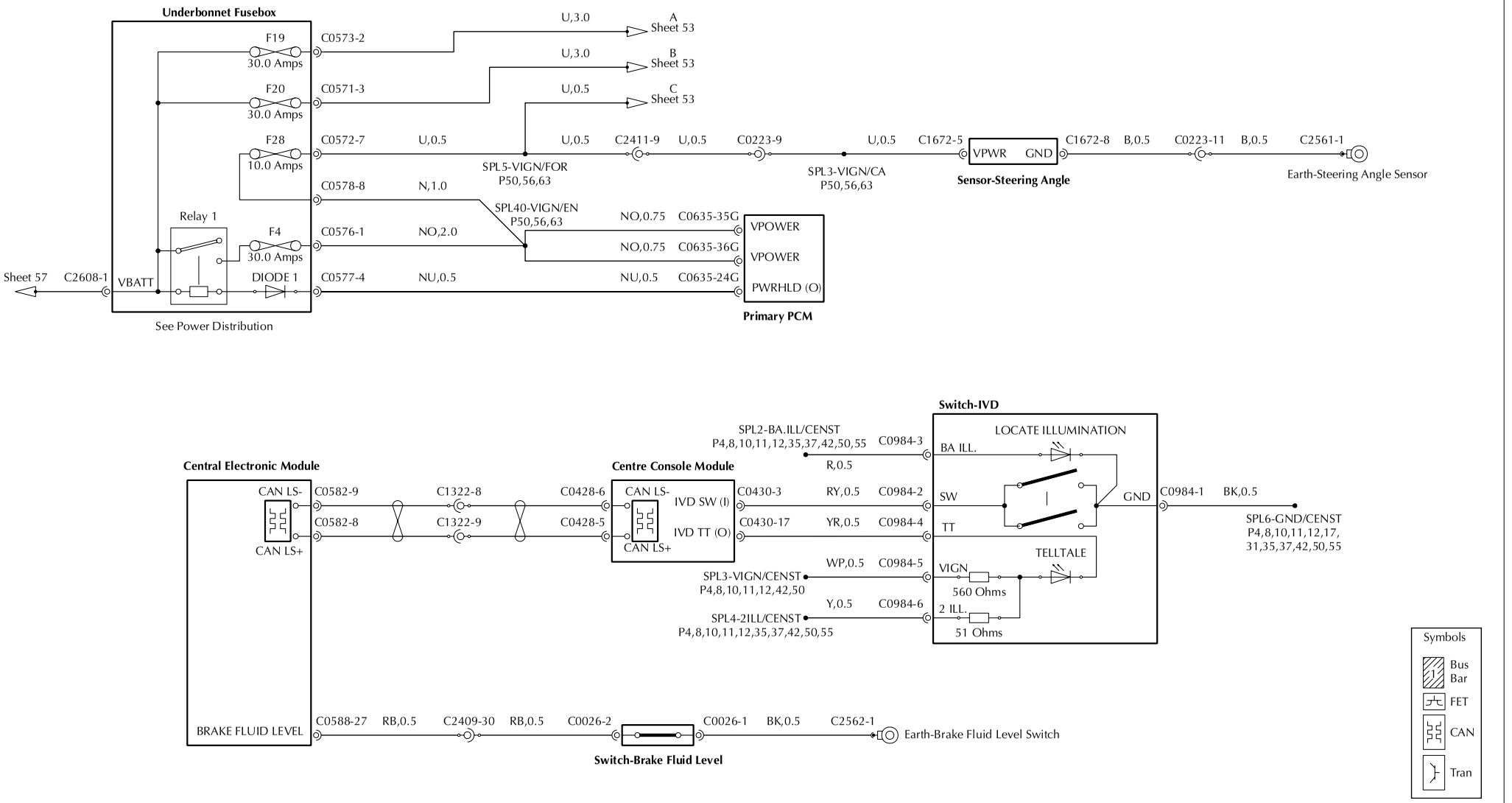
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	In-Car Entertainment	Coupe	From Chassis 00001	46



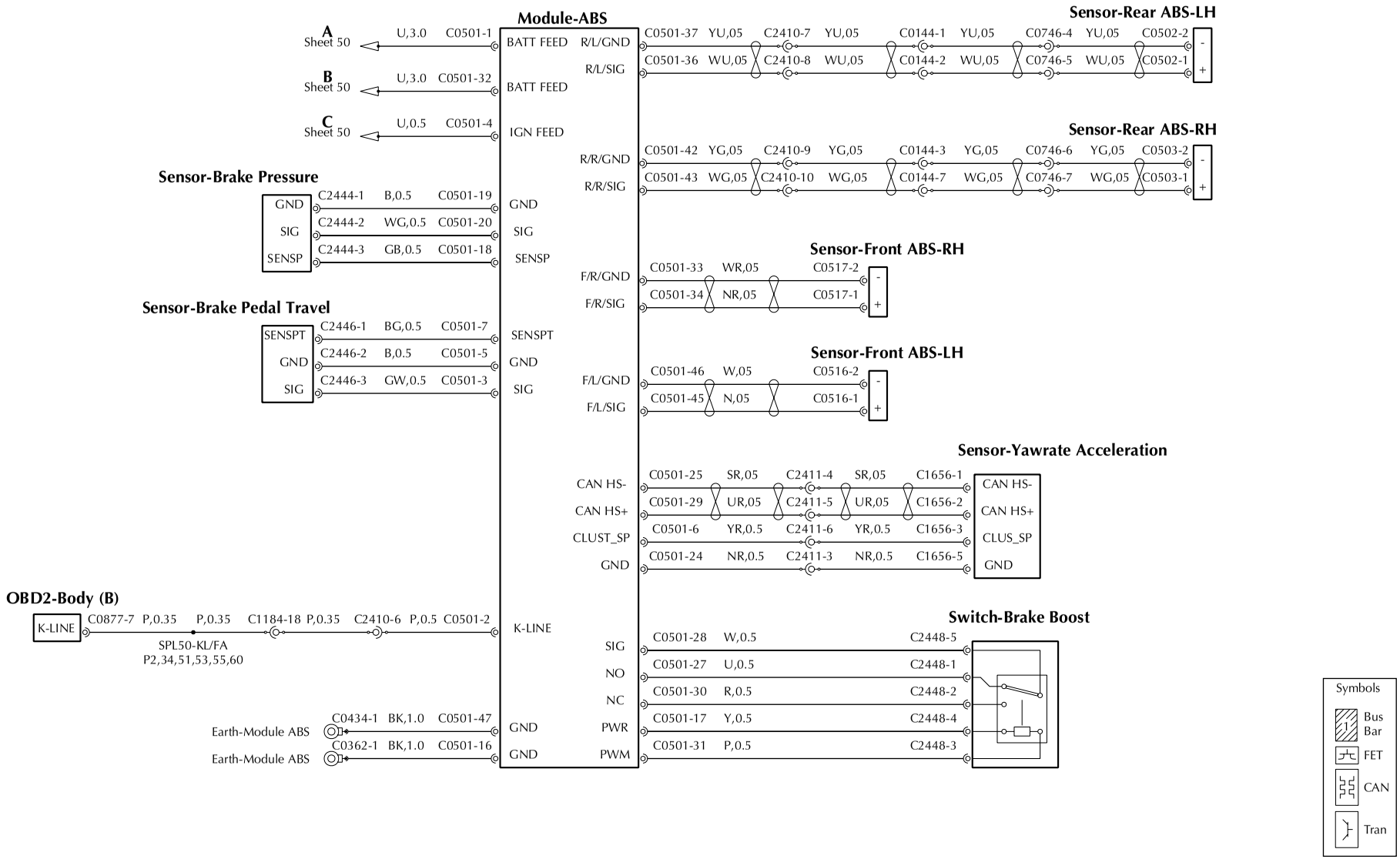
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Ignition Coils	Coupe	From Chassis 00001	47

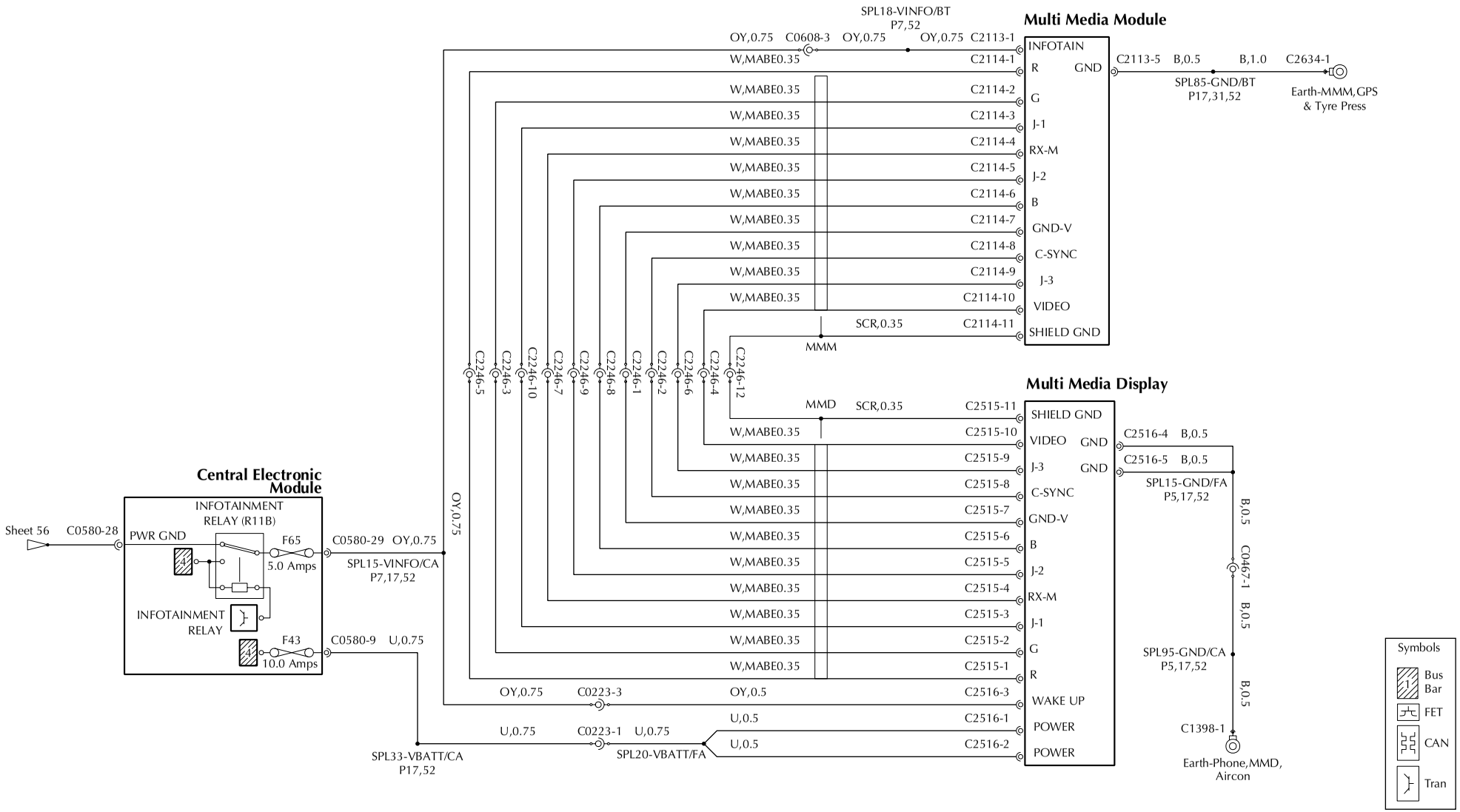

SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
Underbonnet Fusebox
RELAY 3
Sheet 57
C2608-1
VBATT
F13
20.0 Amps
C0577-6
C0579-8
VIGN
Sheet 57
C0574-6
GND
DIODE 4
RELAY 5
F9
20.0 Amps
C0578-2
C2409-1
DIODE 5
See Power Distribution
Central Electronic Module
IGN. OUT
C0584-39
F54
Sheet 70
10.0 Amps
NY,0.5
SPL2-VIGN/EN
NY,0.5
SPL5-VIGN/EN
Primary PCM (RH Bank)
Injector 1
NY,0.5
C0522-2
12 Ohms
C0522-1
BU,0.5
C0636-2G
INJ1 (O)
Injector 2
NY,0.5
C0523-2
12 Ohms
C0523-1
BY,0.5
C0636-9G
INJ2 (O)
SPL14-INJ/EN
INJ8 (O)
Injector 3
NY,0.5
C0524-2
12 Ohms
C0524-1
BK,0.5
C0636-5G
INJ3 (O)
Injector 4
NY,0.5
C0525-2
12 Ohms
C0525-1
BW,0.5
C0636-4G
INJ4 (O)
Injector 5
NY,0.5
C0526-2
12 Ohms
C0526-1
BS,0.5
C0636-8G
INJ5 (O)
SPL15-INJ/EN
INJ7 (O)
Injector 6
NY,0.5
C0527-2
12 Ohms
C0527-1
BR,0.5
C0636-3G
INJ6 (O)
Secondary PCM (LH Bank)
Injector 1
NY,0.5
C0528-2
12 Ohms
C0528-1
UB,0.5
C2464-2G
INJ1 (O)
Injector 2
NY,0.5
C0529-2
12 Ohms
C0529-1
SB,0.5
C2464-9G
INJ2 (O)
SPL17-INJ/EN
INJ8 (O)
Injector 3
NY,0.5
C2456-2
12 Ohms
C2456-1
KB,0.5
C2464-5G
INJ3 (O)
Injector 4
NY,0.5
C2457-2
12 Ohms
C2457-1
WB,0.5
C2464-4G
INJ4 (O)
Injector 5
NY,0.5
C2458-2
12 Ohms
C2458-1
KB,0.5
C2464-8G
INJ5 (O)
SPL18-INJ/EN
INJ7 (O)
Injector 6
NY,0.5
C2459-2
12 Ohms
C2459-1
RB,0.5
C2464-3G
INJ6 (O)
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Fuel Injectors
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
48


SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
O,0.5
O,0.5
O,0.5
O,0.5
O,0.5
O,0.5
Central Electronic Module
INTERIOR LIGHT RELAY (R1)
PWR GND
F47
5.0 Amps
INTERIOR LIGHTS
INTERIOR LAMPS (O)
Sheet 56 C0580-28
C0585-7 O,0.5
C0585-3 BU,0.5
SPL19-VILR/CA
P1,32,36,49,61,62
SPL54-INT/CA
Centre Console Module
RIGHT MAP (O)
MAP DIM (I)
LEFT MAP (O)
C1165-10 BU,0.5 C0428-4
Front Interior Lamp-RH
C0428-14 Y,0.5 C1165-14 Y,0.5 C0356-2 C0356-1 O,0.5
5.0 Watts
Front Interior Lamp-LH
C0428-3 OU,0.5 C1165-19 OU,0.5 C0355-2 C0355-1 O,0.5
5.0 Watts
Lamp-Footwell-RH
BU,0.5 C0076-2 C0076-1 B,0.5 C1184-21
5.0 Watts
Lamp-Footwell-LH
BU,0.5 C0229-11 BU,0.5
SPL25-INT/FA
P49,70
BU,0.5 C0077-2 C0077-1 B,0.5 C1184-22
5.0 Watts
Rear Interior Lamp-RH
BU,0.5 C1112-2 C1112-1 O,0.5
5.0 Watts
Rear Interior Lamp-LH
BU,0.5 C1111-2 C1111-1 O,0.5
5.0 Watts
Module-Passenger Door
GND
P/L POWER
C0322-14 B,0.5 B,0.5 C0979-1 C0979-2
SPL1-GND/PADR P27,29,49
5.0 Watts
C0322-3 BO,0.5
Puddle Lamp
Module-Drivers Door
GND
P/L POWER
C0336-14 B,0.5 B,0.5 C0978-1 C0978-2
SPL1-GND/DRDR P26,28,49
5.0 Watts
C0336-3 BO,0.5
Puddle Lamp
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Interior Illumination
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
49

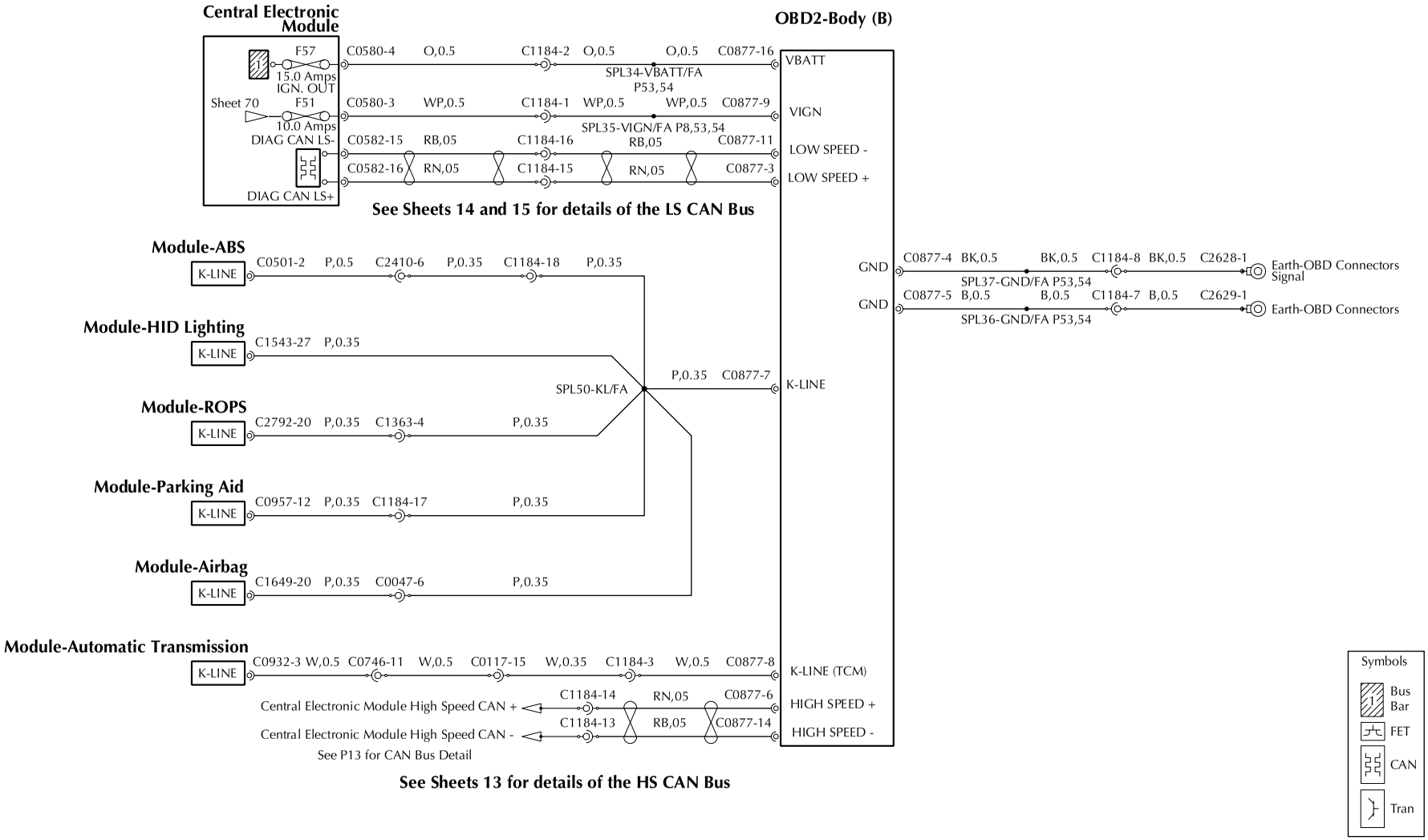


DB 9	CIRCUIT TITLE Interactive Vehicle Dynamics	MODEL Coupe	APPLICABILITY From Chassis 00001	CIRCUIT SHEET 50

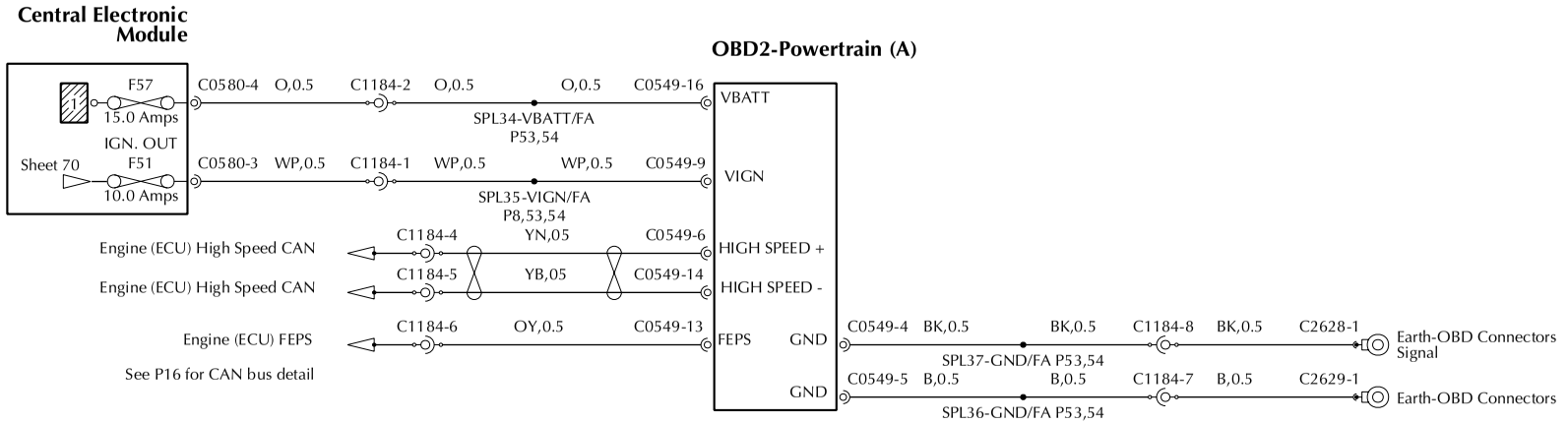

SOURCE No.
Module-ABS
A
Sheet 50
U,3.0 C0501-1
BATT FEED
B
Sheet 50
U,3.0 C0501-32
BATT FEED
C
Sheet 50
U,0.5 C0501-4
IGN FEED
Sensor-Brake Pressure
GND
SIG
SENSP
C2444-1 B,0.5 C0501-19
C2444-2 WG,0.5 C0501-20
C2444-3 GB,0.5 C0501-18
GND
SIG
SENSP
Sensor-Brake Pedal Travel
SENSPT
GND
SIG
C2446-1 BG,0.5 C0501-7
C2446-2 B,0.5 C0501-5
C2446-3 GW,0.5 C0501-3
SENSPT
GND
SIG
OBD2-Body (B)
K-LINE
C0877-7 P,0.35 P,0.35 C1184-18 P,0.35 C2410-6 P,0.5 C0501-2
SPL50-KL/FA
P2,34,51,53,55,60
K-LINE
Earth-Module ABS
C0434-1 BK,1.0 C0501-47
GND
Earth-Module ABS
C0362-1 BK,1.0 C0501-16
GND
R/L/GND
R/L/SIG
R/R/GND
R/R/SIG
F/R/GND
F/R/SIG
F/L/GND
F/L/SIG
CAN HS-
CAN HS+
CLUST_SP
GND
SIG
NO
NC
PWR
PWM
Sensor-Rear ABS-LH
C0501-37 YU,05 C2410-7 YU,05 C0144-1 YU,05 C0746-4 YU,05 C0502-2
C0501-36 WU,05 C2410-8 WU,05 C0144-2 WU,05 C0746-5 WU,05 C0502-1
Sensor-Rear ABS-RH
C0501-42 YG,05 C2410-9 YG,05 C0144-3 YG,05 C0746-6 YG,05 C0503-2
C0501-43 WG,05 C2410-10 WG,05 C0144-7 WG,05 C0746-7 WG,05 C0503-1
Sensor-Front ABS-RH
C0501-33 WR,05 C0517-2
C0501-34 NR,05 C0517-1
Sensor-Front ABS-LH
C0501-46 W,05 C0516-2
C0501-45 N,05 C0516-1
Sensor-Yawrate Acceleration
C0501-25 SR,05 C2411-4 SR,05 C1656-1
C0501-29 UR,05 C2411-5 UR,05 C1656-2
C0501-6 YR,0.5 C2411-6 YR,0.5 C1656-3
C0501-24 NR,0.5 C2411-3 NR,0.5 C1656-5
CAN HS-
CAN HS+
CLUS_SP
GND
Switch-Brake Boost
C0501-28 W,0.5 C2448-5
C0501-27 U,0.5 C2448-1
C0501-30 R,0.5 C2448-2
C0501-17 Y,0.5 C2448-4
C0501-31 P,0.5 C2448-3
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Interactive Vehicle Dynamics
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
51



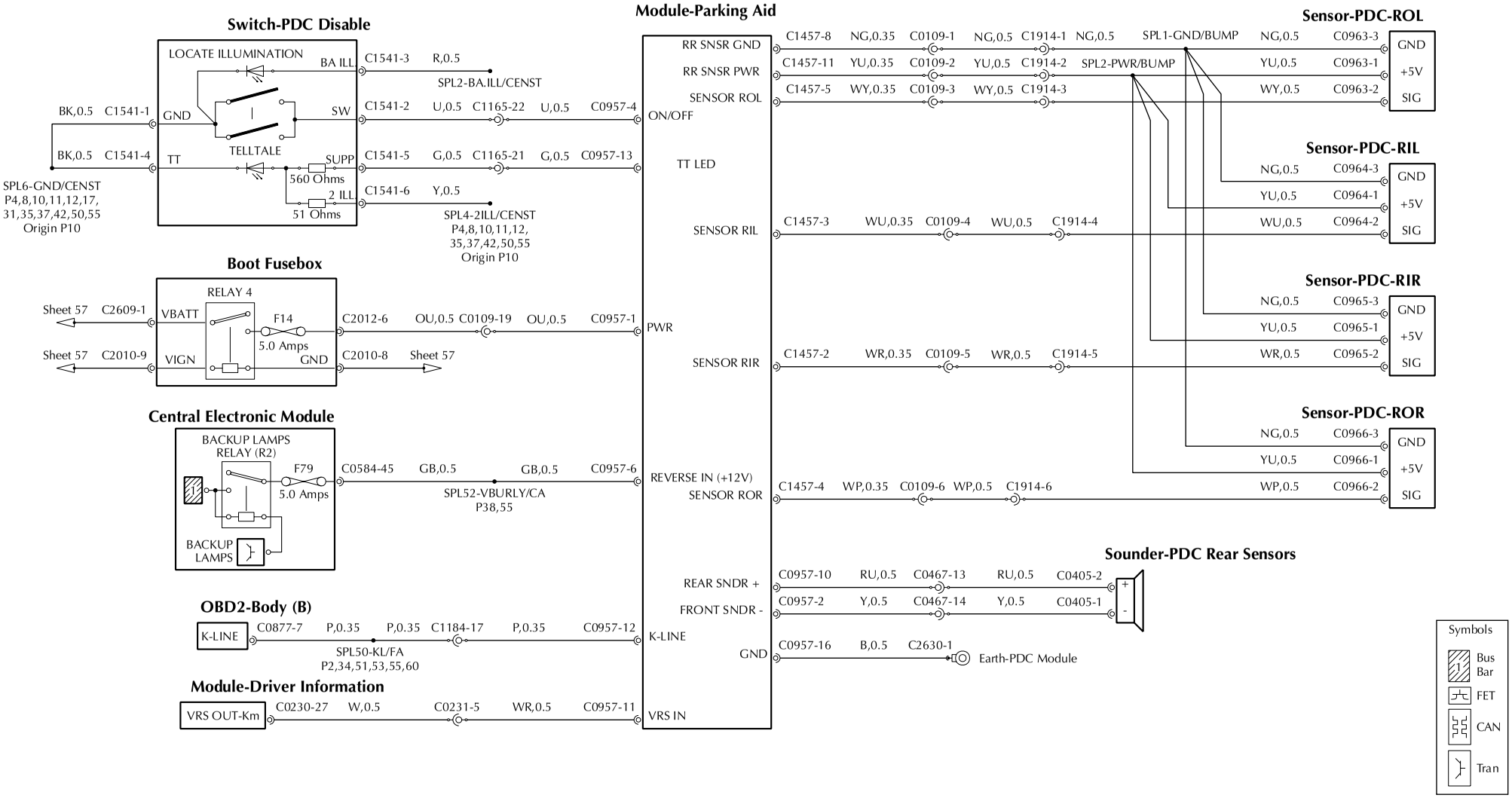
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Multi-Media Module	Coupe	From Chassis 00001	52



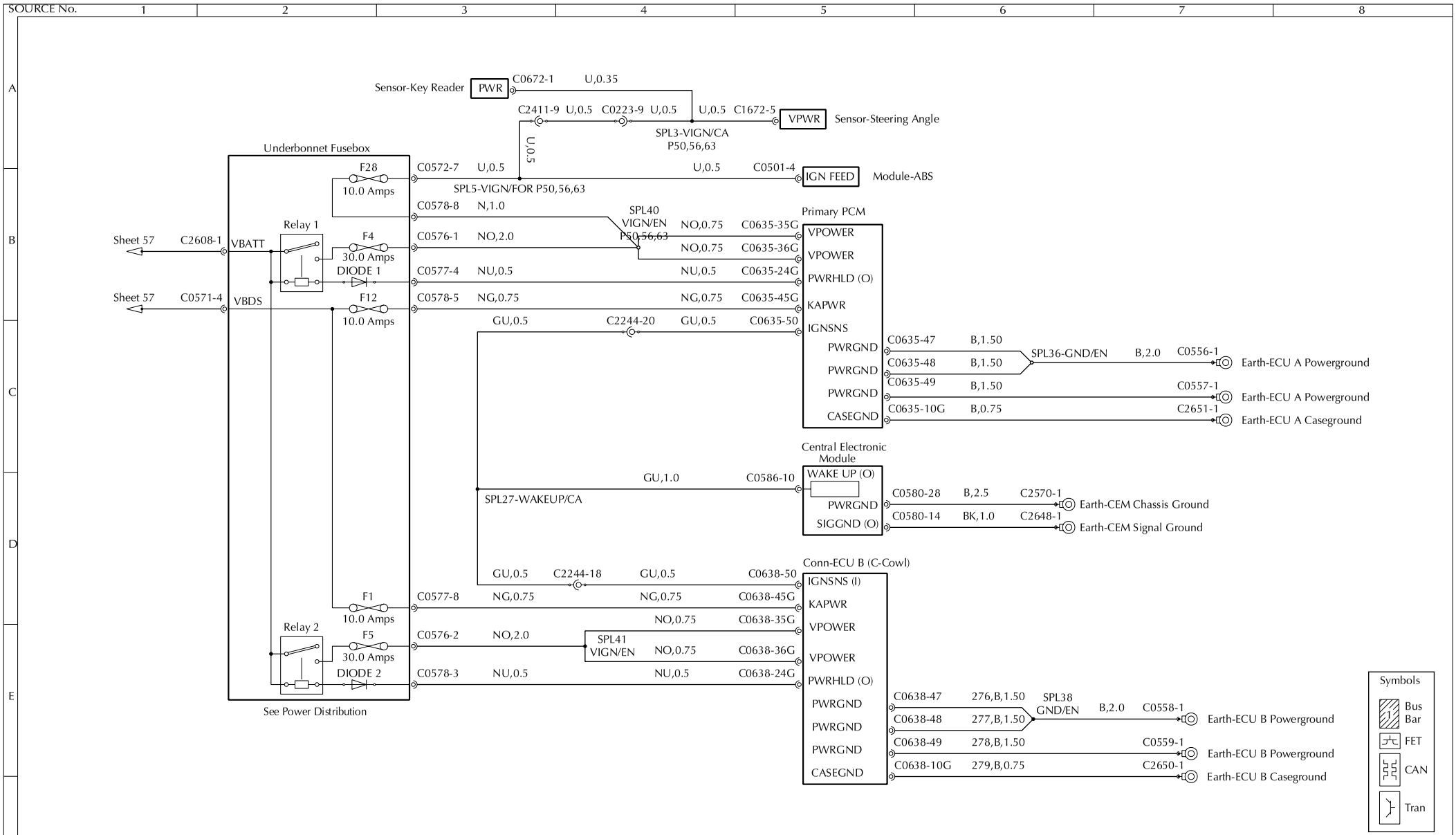
DB9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	OBD II Body Connector	Coupe	From Chassis 00001	53

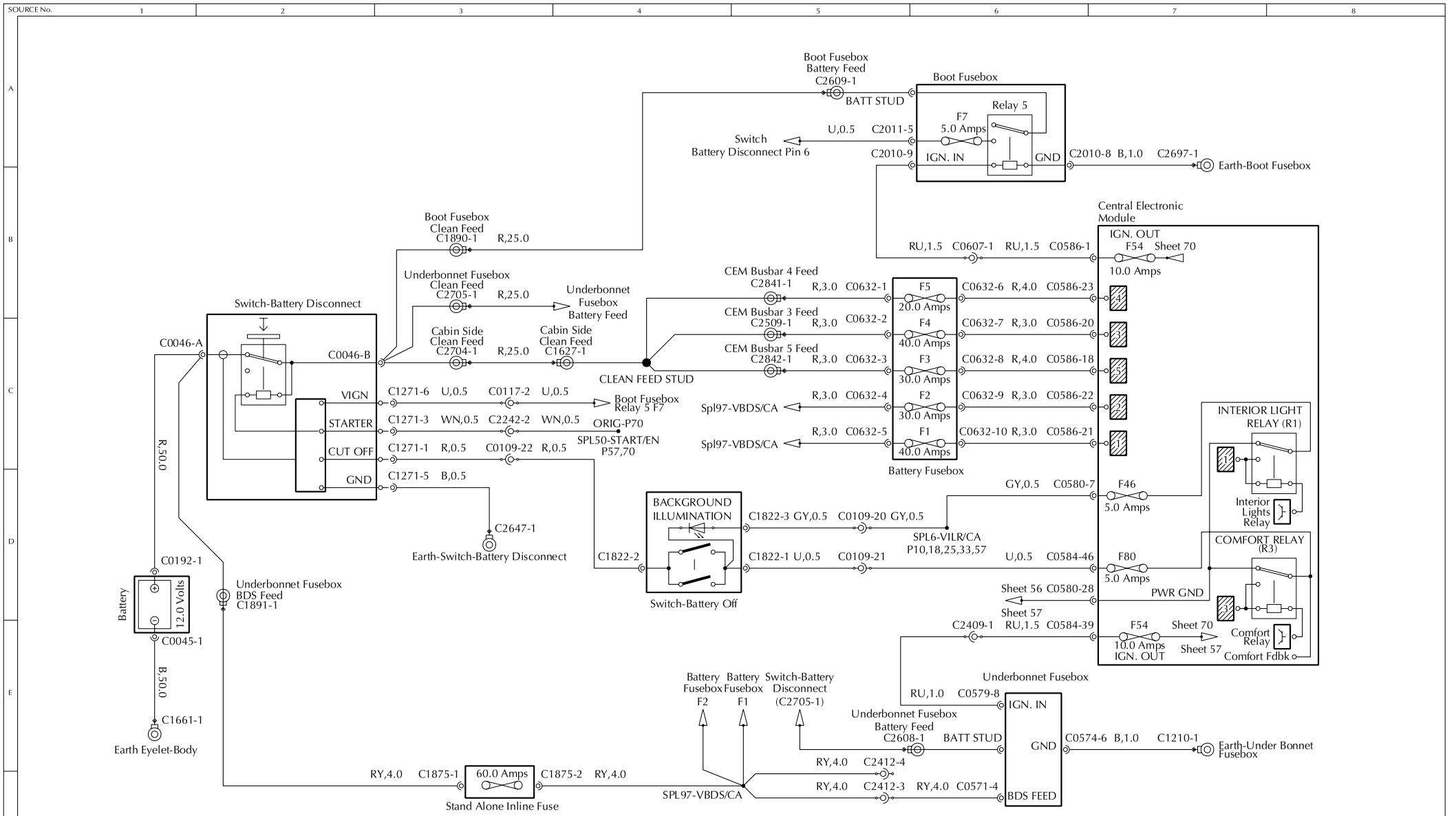


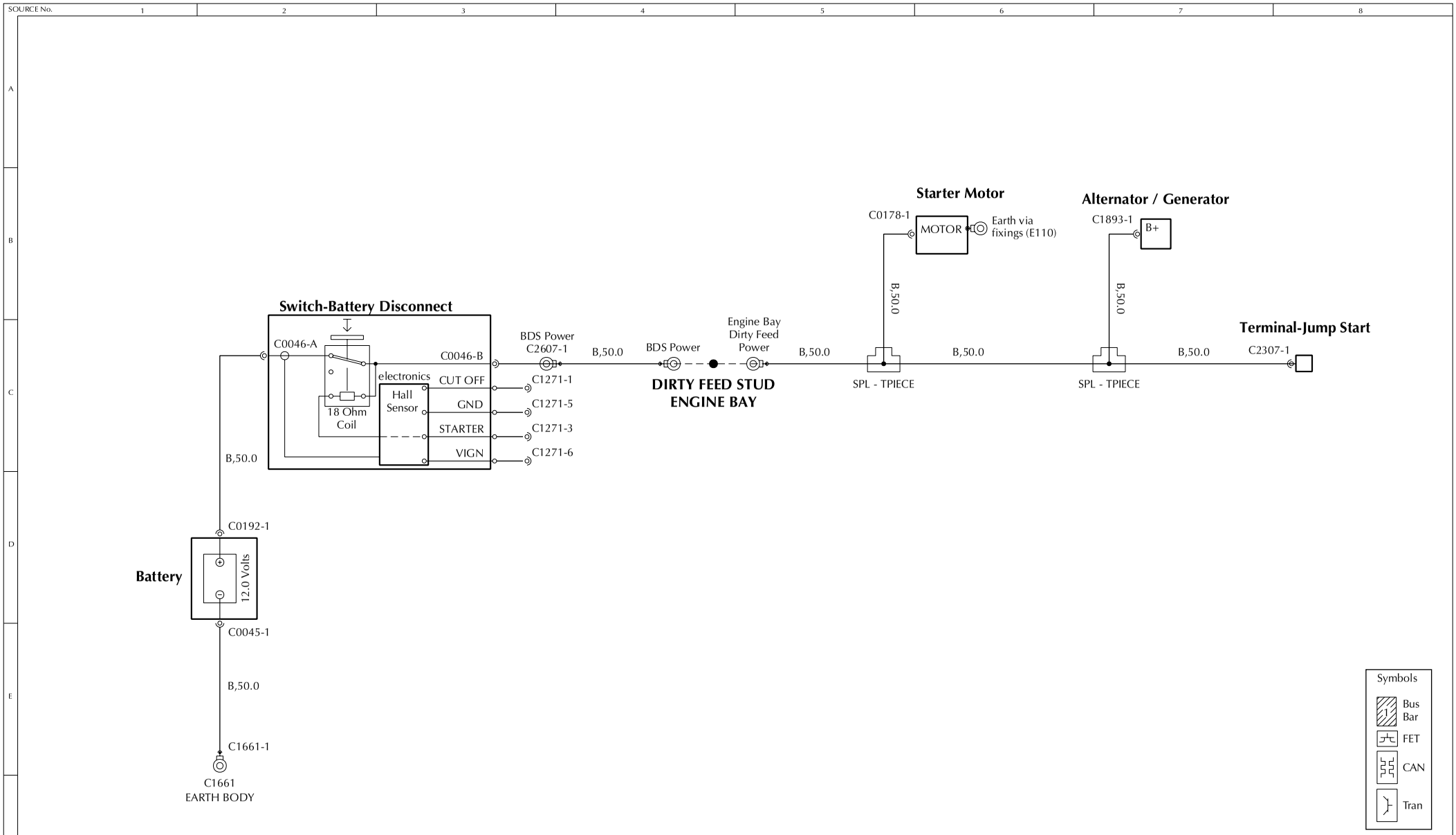
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	OBD II Powertrain Connector	Coupe	From Chassis 00001	54



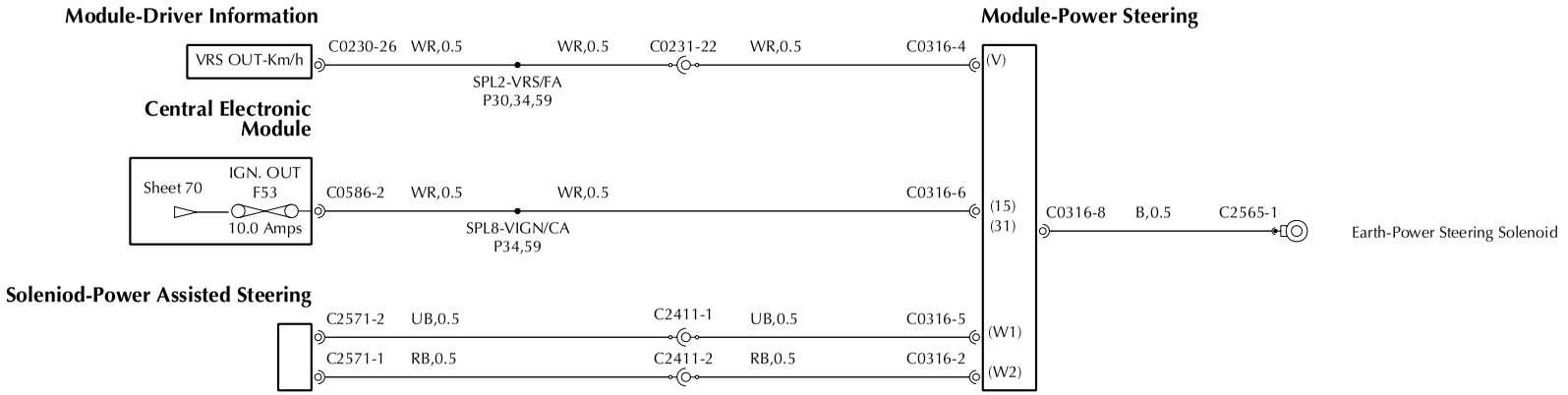
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Parking Distance Aid	Coupe	From Chassis 00001	55

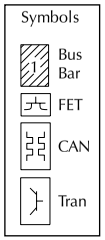

SOURCE No. 1 2 3 4 5 6 7 8
A B C D E F
Sensor-Key Reader
PWR
C0672-1 U,0.35
C2411-9 U,0.5 C0223-9 U,0.5 U,0.5 C1672-5
VPWR
Sensor-Steering Angle
SPL3-VIGN/CA P50,56,63
U,0.5
Underbonnet Fusebox
F28
10.0 Amps
C0572-7 U,0.5
U,0.5 C0501-4
IGN FEED
Module-ABS
SPL5-VIGN/FOR P50,56,63
C0578-8 N,1.0
SPL40 VIGN/EN P50,56,63
Primary PCM
Relay 1
Sheet 57 C2608-1 VBATT
F4
30.0 Amps
C0576-1 NO,2.0
NO,0.75 C0635-35G
VPOWER
NO,0.75 C0635-36G
VPOWER
DIODE 1
C0577-4 NU,0.5
NU,0.5 C0635-24G
PWRHLD (O)
Sheet 57 C0571-4 VBDS
F12
10.0 Amps
C0578-5 NG,0.75
NG,0.75 C0635-45G
KAPWR
GU,0.5 C2244-20 GU,0.5 C0635-50
IGNSNS
C0635-47 B,1.50
PWRGND
C0635-48 B,1.50
PWRGND
C0635-49 B,1.50
PWRGND
C0635-10G B,0.75
CASEGND
SPL36-GND/EN B,2.0 C0556-1
Earth-ECU A Powerground
C0557-1
Earth-ECU A Powerground
C2651-1
Earth-ECU A Caseground
Central Electronic Module
GU,1.0 C0586-10
WAKE UP (O)
SPL27-WAKEUP/CA
C0580-28 B,2.5 C2570-1
PWRGND
Earth-CEM Chassis Ground
C0580-14 BK,1.0 C2648-1
SIGGND (O)
Earth-CEM Signal Ground
Conn-ECU B (C-Cowl)
GU,0.5 C2244-18 GU,0.5 C0638-50
IGNSNS (I)
F1
10.0 Amps
C0577-8 NG,0.75
NG,0.75 C0638-45G
KAPWR
NO,0.75 C0638-35G
VPOWER
Relay 2
F5
30.0 Amps
C0576-2 NO,2.0
SPL41 VIGN/EN
NO,0.75 C0638-36G
VPOWER
DIODE 2
C0578-3 NU,0.5
NU,0.5 C0638-24G
PWRHLD (O)
C0638-47 276,B,1.50
PWRGND
C0638-48 277,B,1.50
PWRGND
C0638-49 278,B,1.50
PWRGND
C0638-10G 279,B,0.75
CASEGND
SPL38 GND/EN B,2.0 C0558-1
Earth-ECU B Powerground
C0559-1
Earth-ECU B Powerground
C2650-1
Earth-ECU B Caseground
See Power Distribution
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Power & Grounds CEM
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
56


SOURCE No.
Boot Fusebox Battery Feed C2609-1
BATT STUD
Boot Fusebox
Relay 5
F7 5.0 Amps
U,0.5 C2011-5
Switch Battery Disconnect Pin 6
C2010-9
IGN. IN
GND
C2010-8 B,1.0 C2697-1
Earth-Boot Fusebox
Central Electronic Module
IGN. OUT F54 Sheet 70
10.0 Amps
RU,1.5 C0607-1 RU,1.5 C0586-1
Boot Fusebox Clean Feed C1890-1 R,25.0
Underbonnet Fusebox Clean Feed C2705-1 R,25.0
Underbonnet Fusebox Battery Feed
Switch-Battery Disconnect
C0046-A
C0046-B
Cabin Side Clean Feed C2704-1 R,25.0
Cabin Side Clean Feed C1627-1
CLEAN FEED STUD
CEM Busbar 4 Feed C2841-1 R,3.0 C0632-1
CEM Busbar 3 Feed C2509-1 R,3.0 C0632-2
CEM Busbar 5 Feed C2842-1 R,3.0 C0632-3
R,3.0 C0632-4
R,3.0 C0632-5
F5 20.0 Amps
F4 40.0 Amps
F3 30.0 Amps
F2 30.0 Amps
F1 40.0 Amps
Battery Fusebox
C0632-6 R,4.0 C0586-23
C0632-7 R,3.0 C0586-20
C0632-8 R,4.0 C0586-18
C0632-9 R,3.0 C0586-22
C0632-10 R,3.0 C0586-21
Spl97-VBDS/CA
Spl97-VBDS/CA
VIGN
STARTER
CUT OFF
GND
C1271-6 U,0.5 C0117-2 U,0.5
C1271-3 WN,0.5 C2242-2 WN,0.5
C1271-1 R,0.5 C0109-22 R,0.5
C1271-5 B,0.5
Boot Fusebox Relay 5 F7
ORIG-P70
SPL50-START/EN P57,70
R,50.0
C2647-1
Earth-Switch-Battery Disconnect
BACKGROUND ILLUMINATION
C1822-2
C1822-3 GY,0.5 C0109-20 GY,0.5
C1822-1 U,0.5 C0109-21
SPL6-VILR/CA P10,18,25,33,57
Switch-Battery Off
GY,0.5 C0580-7
F46 5.0 Amps
INTERIOR LIGHT RELAY (R1)
Interior Lights Relay
COMFORT RELAY (R3)
F80 5.0 Amps
U,0.5 C0584-46
PWR GND
Sheet 56 C0580-28
Sheet 57
C2409-1 RU,1.5 C0584-39
F54 10.0 Amps IGN. OUT
Sheet 70
Sheet 57
Comfort Relay
Comfort Fdbk
C0192-1
Battery
12.0 Volts
C0045-1
B,50.0
C1661-1
Earth Eyelet-Body
Underbonnet Fusebox BDS Feed C1891-1
Battery Fusebox F2
Battery Fusebox F1
Switch-Battery Disconnect (C2705-1)
Underbonnet Fusebox
RU,1.0 C0579-8
IGN. IN
Underbonnet Fusebox Battery Feed C2608-1
BATT STUD
GND
C0574-6 B,1.0 C1210-1
Earth-Under Bonnet Fusebox
RY,4.0 C2412-4
RY,4.0 C2412-3
RY,4.0 C0571-4
BDS FEED
SPL97-VBDS/CA
RY,4.0 C1875-1
60.0 Amps
C1875-2 RY,4.0
Stand Alone Inline Fuse
DB 9
CIRCUIT TITLE
Power Distribution Clean Feeds
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
57

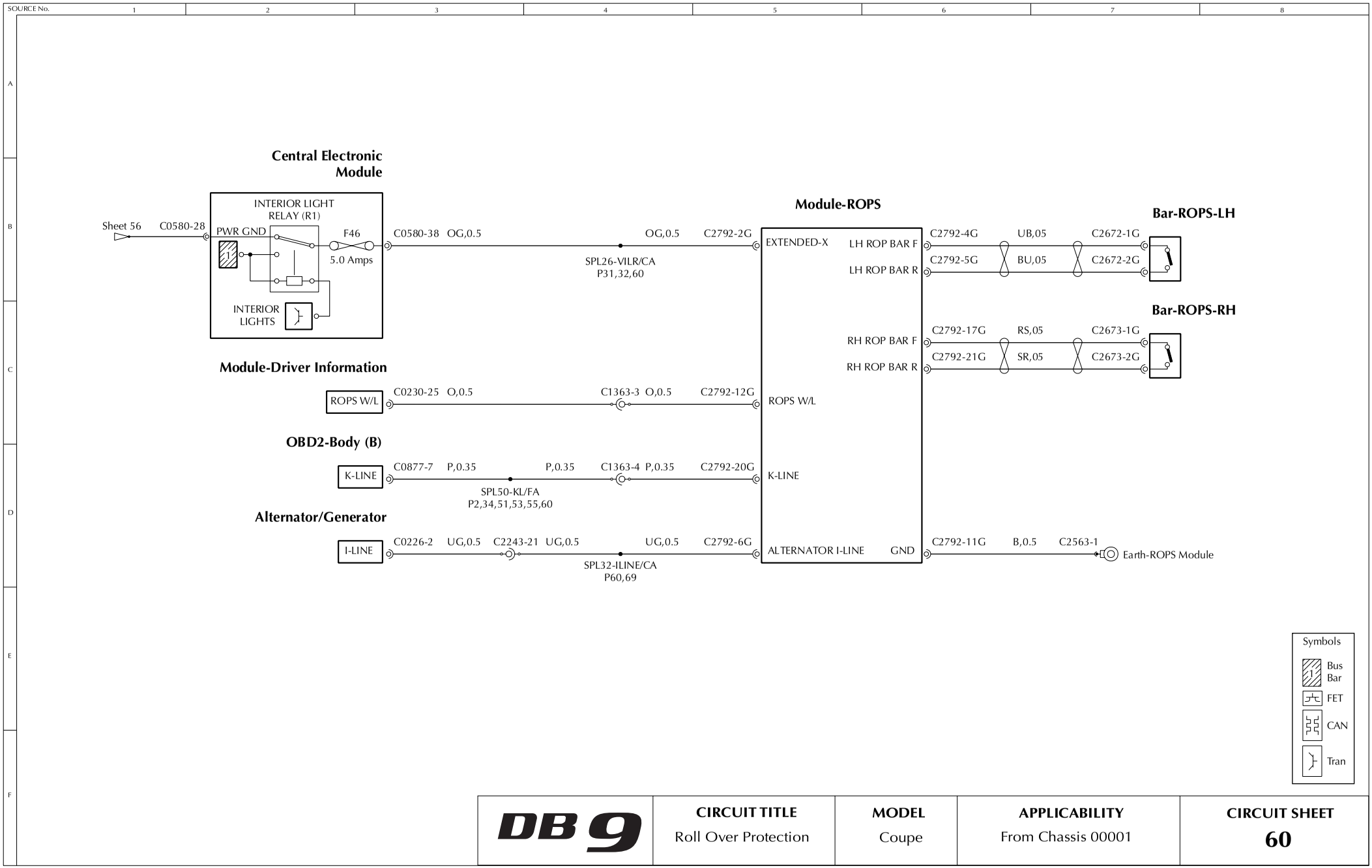


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Power Distribution (Dirty Feeds)	Coupe	From Chassis 00001	58

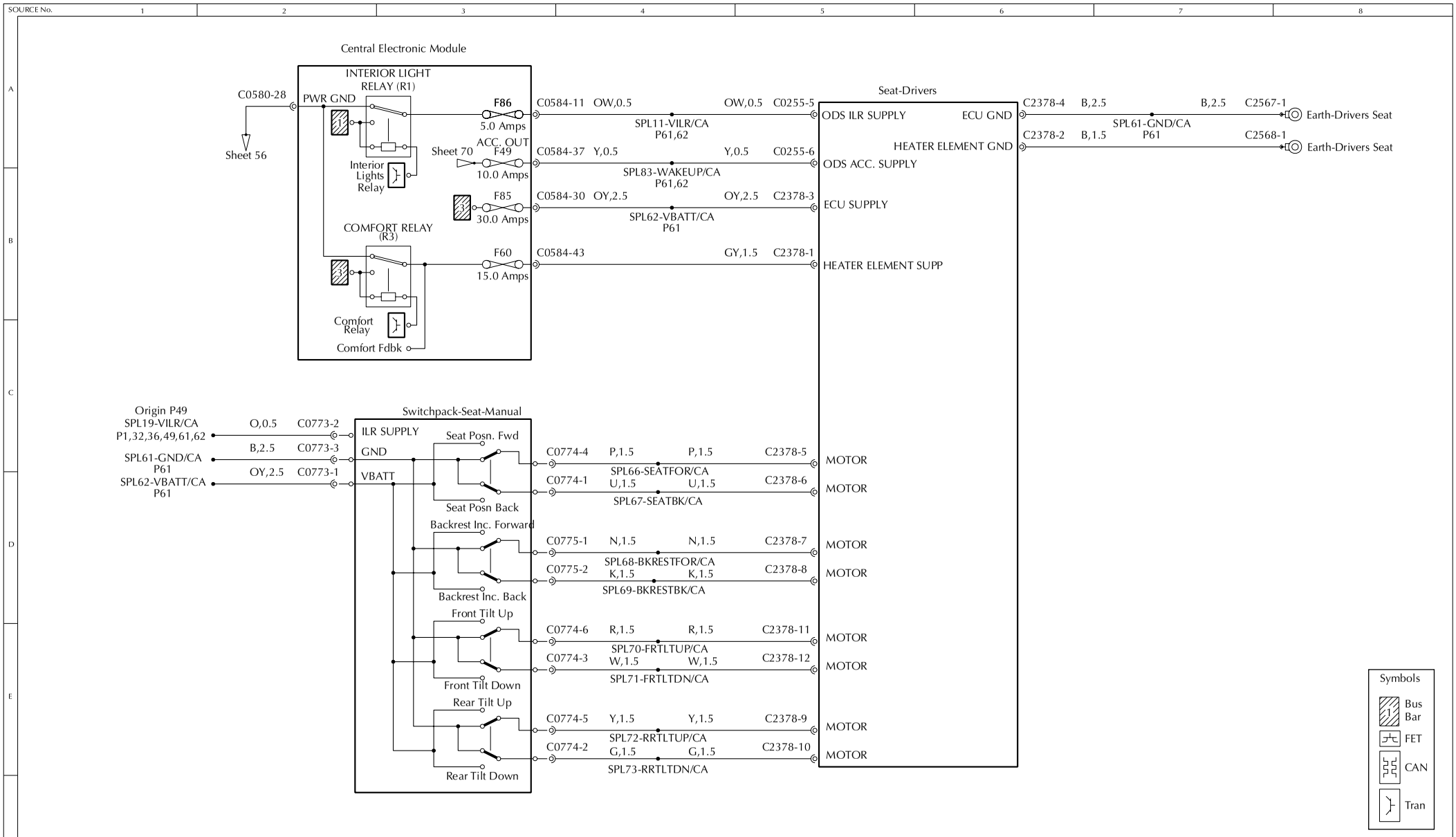




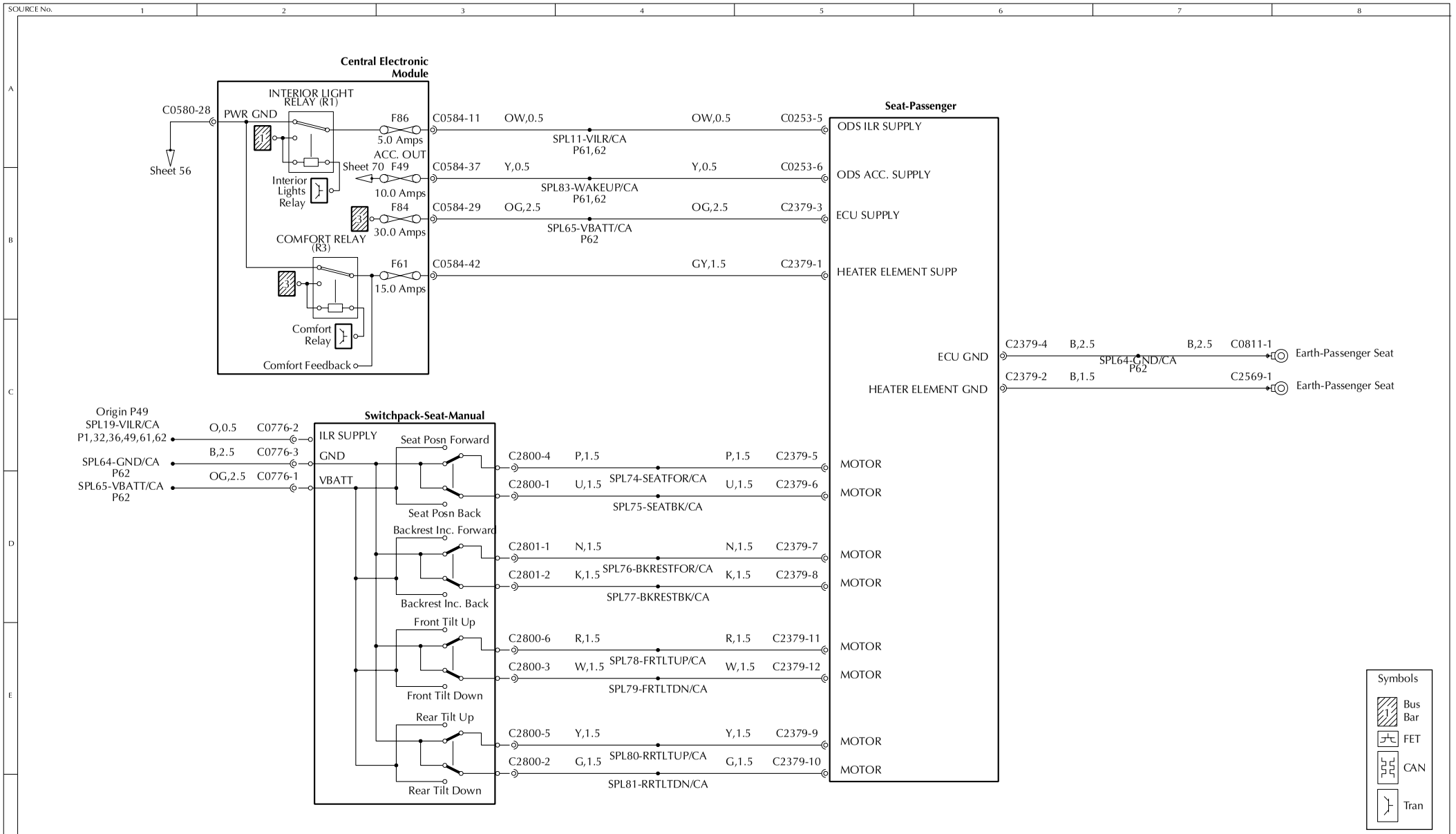
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Power Steering	Coupe	From Chassis 00001	59



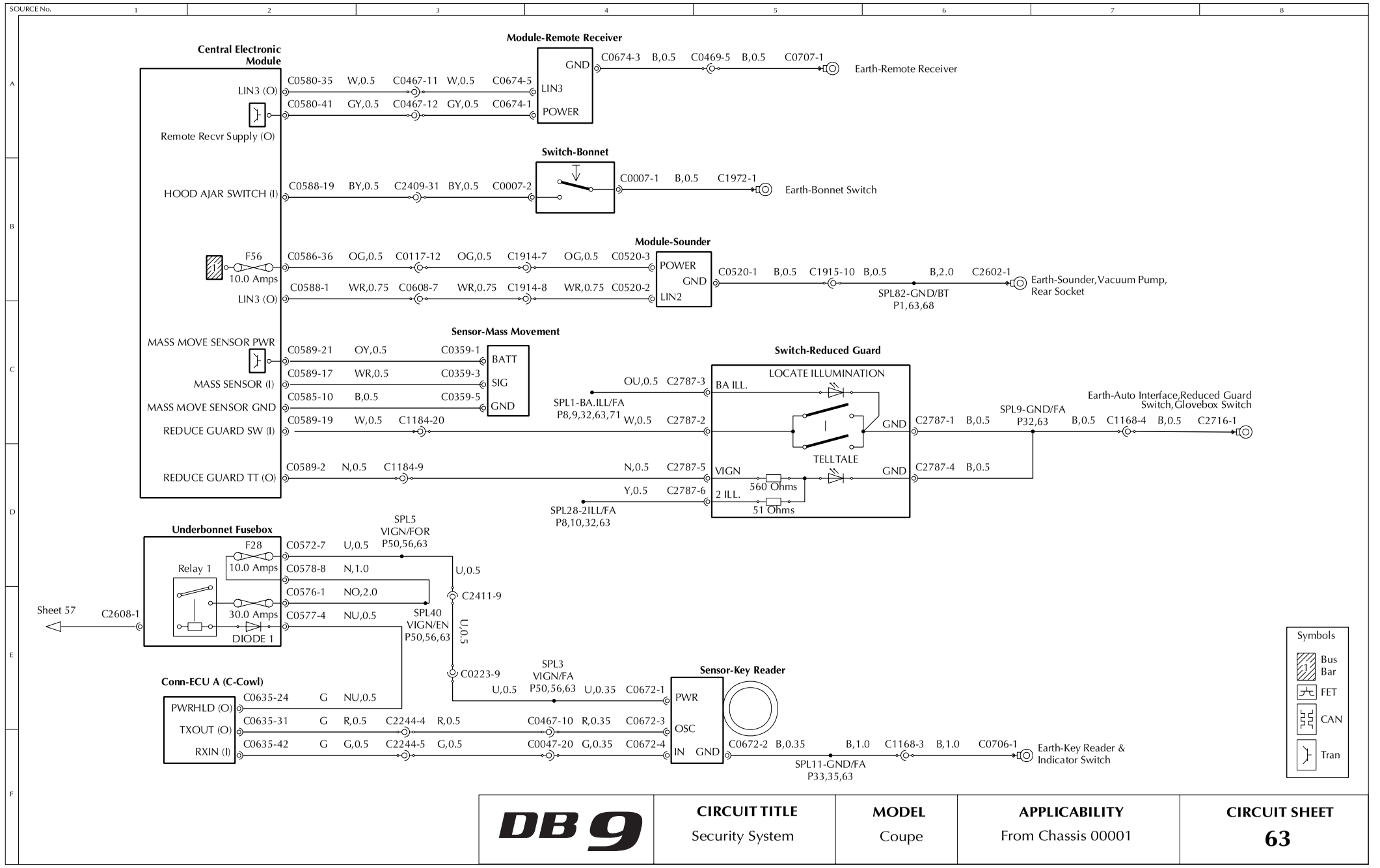
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Roll Over Protection	Coupe	From Chassis 00001	60

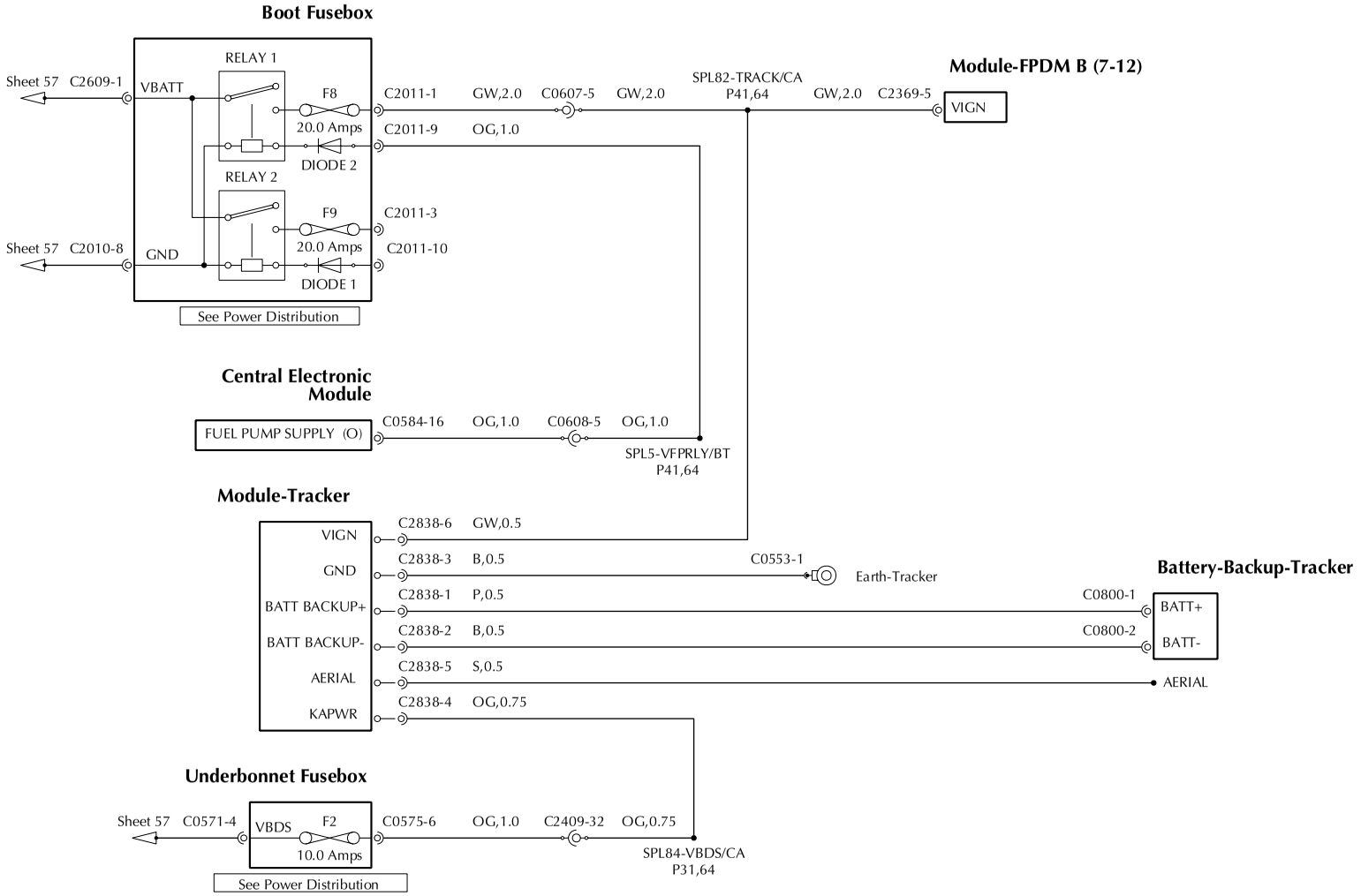


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Seat (Driver's Manual)	Coupe	From Chassis 00001	61

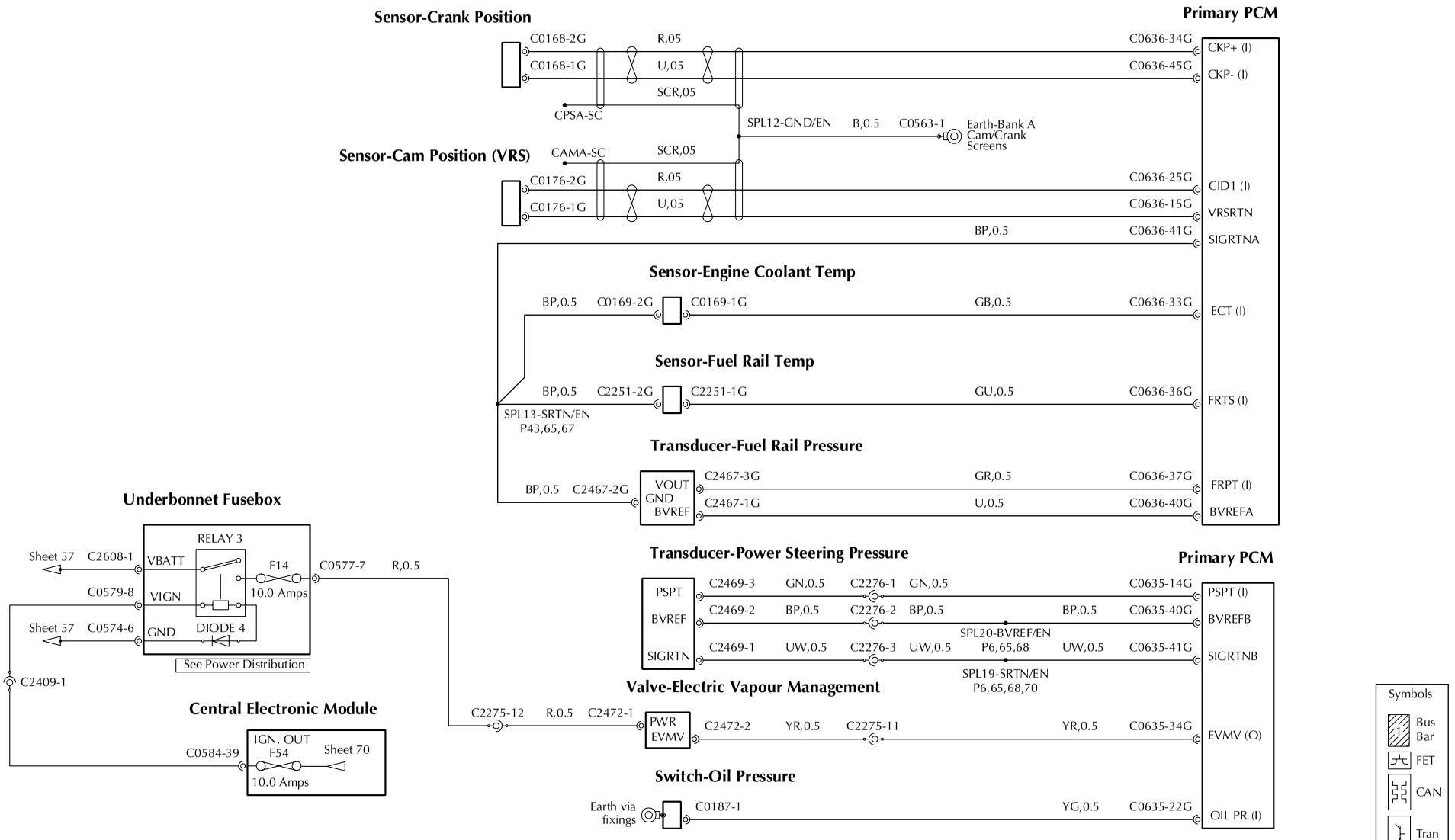


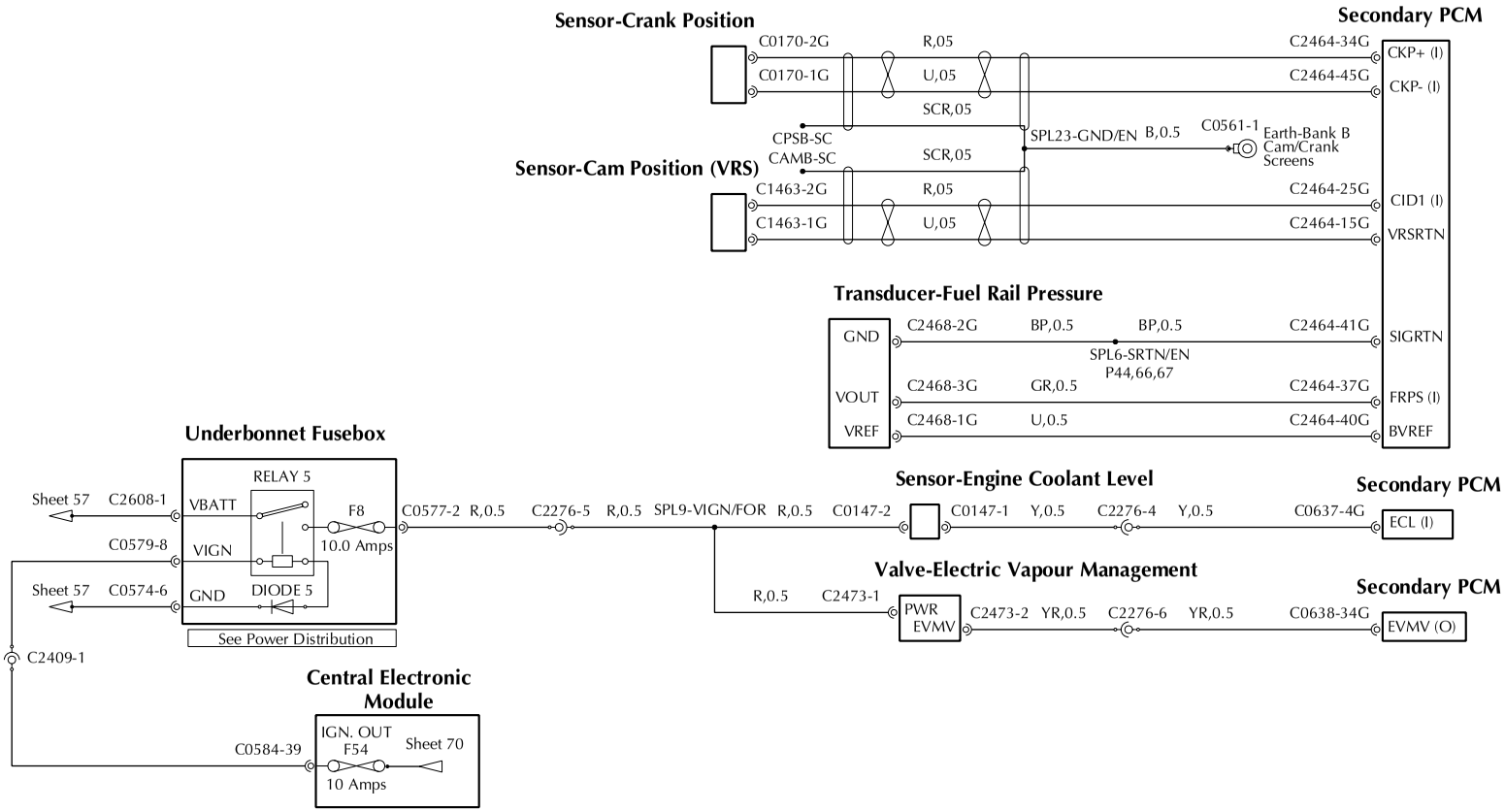
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Seat (Passenger's Manual)	Coupe	From Chassis 00001	62


SOURCE No.
Central Electronic Module
Module-Remote Receiver
GND
LIN3
POWER
C0674-3 B,0.5 C0469-5 B,0.5 C0707-1
Earth-Remote Receiver
LIN3 (O)
C0580-35 W,0.5 C0467-11 W,0.5 C0674-5
C0580-41 GY,0.5 C0467-12 GY,0.5 C0674-1
Remote Recvr Supply (O)
Switch-Bonnet
HOOD AJAR SWITCH (I)
C0588-19 BY,0.5 C2409-31 BY,0.5 C0007-2
C0007-1 B,0.5 C1972-1
Earth-Bonnet Switch
Module-Sounder
F56
10.0 Amps
LIN3 (O)
C0586-36 OG,0.5 C0117-12 OG,0.5 C1914-7 OG,0.5 C0520-3
C0588-1 WR,0.75 C0608-7 WR,0.75 C1914-8 WR,0.75 C0520-2
POWER
GND
LIN2
C0520-1 B,0.5 C1915-10 B,0.5 B,2.0 C2602-1
SPL82-GND/BT
P1,63,68
Earth-Sounder,Vacuum Pump, Rear Socket
Sensor-Mass Movement
MASS MOVE SENSOR PWR
MASS SENSOR (I)
MASS MOVE SENSOR GND
REDUCE GUARD SW (I)
REDUCE GUARD TT (O)
C0589-21 OY,0.5 C0359-1
C0589-17 WR,0.5 C0359-3
C0585-10 B,0.5 C0359-5
C0589-19 W,0.5 C1184-20
C0589-2 N,0.5 C1184-9
BATT
SIG
GND
Switch-Reduced Guard
LOCATE ILLUMINATION
BA ILL.
SPL1-BA.ILL/FA
P8,9,32,63,71
OU,0.5 C2787-3
W,0.5 C2787-2
N,0.5 C2787-5
Y,0.5 C2787-6
GND
VIGN
2 ILL.
TELLTALE
560 Ohms
51 Ohms
SPL28-2ILL/FA
P8,10,32,63
C2787-1 B,0.5
C2787-4 B,0.5
SPL9-GND/FA
P32,63
B,0.5 C1168-4 B,0.5 C2716-1
Earth-Auto Interface,Reduced Guard Switch,Glovebox Switch
Underbonnet Fusebox
F28
10.0 Amps
Relay 1
30.0 Amps
DIODE 1
C0572-7 U,0.5
C0578-8 N,1.0
C0576-1 NO,2.0
C0577-4 NU,0.5
SPL5
VIGN/FOR
P50,56,63
U,0.5
C2411-9
SPL40
VIGN/EN
P50,56,63
U,0.5
Sheet 57
C2608-1
C0223-9
SPL3
VIGN/FA
P50,56,63
U,0.5
U,0.35 C0672-1
Sensor-Key Reader
PWR
OSC
IN
GND
Conn-ECU A (C-Cowl)
PWRHLD (O)
TXOUT (O)
RXIN (I)
C0635-24 G NU,0.5
C0635-31 G R,0.5 C2244-4 R,0.5 C0467-10 R,0.35 C0672-3
C0635-42 G G,0.5 C2244-5 G,0.5 C0047-20 G,0.35 C0672-4
C0672-2 B,0.35
B,1.0 C1168-3 B,1.0 C0706-1
SPL11-GND/FA
P33,35,63
Earth-Key Reader & Indicator Switch
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Security System
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
63

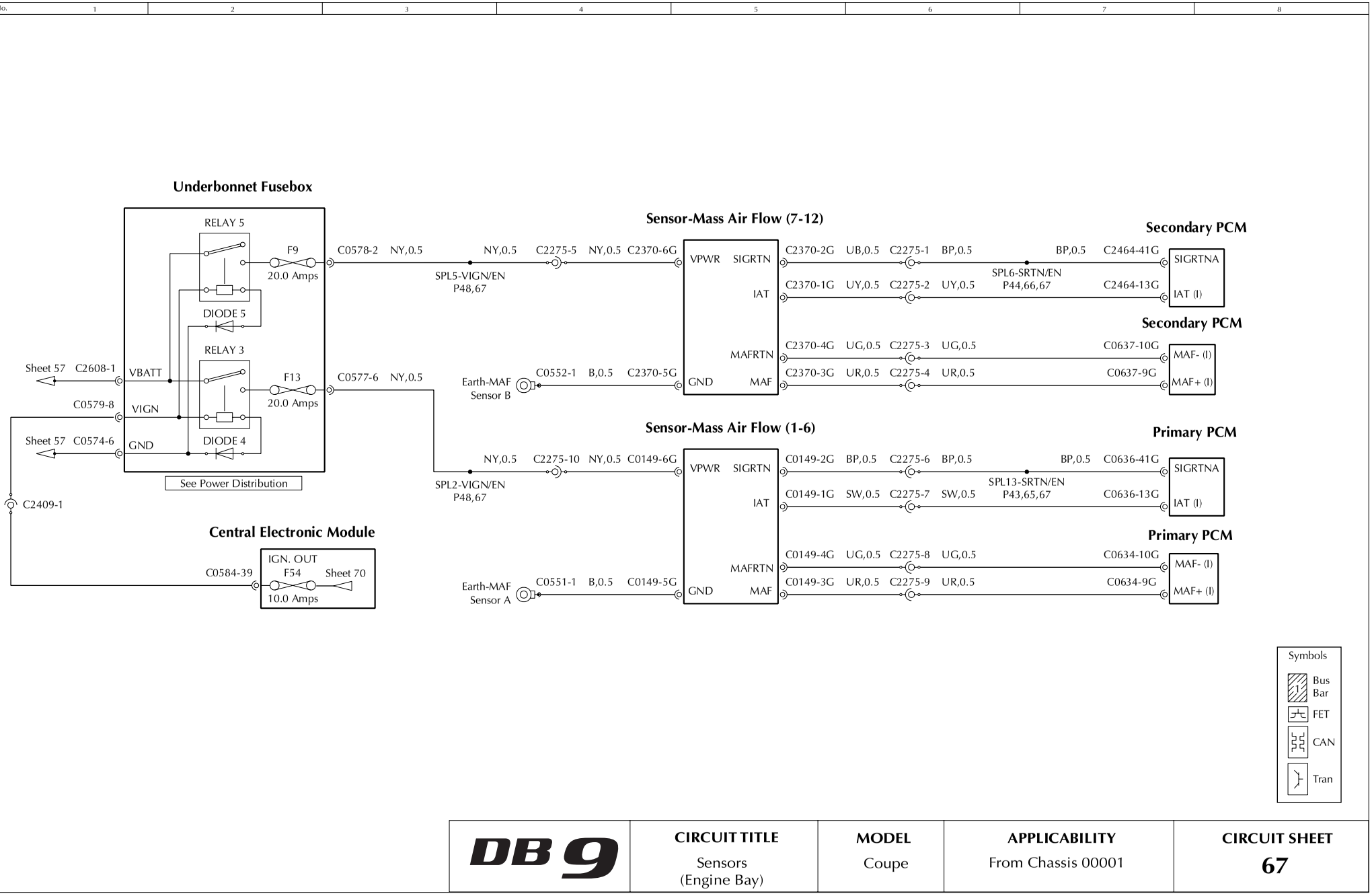


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Security System	Coupe	From Chassis 00001	64

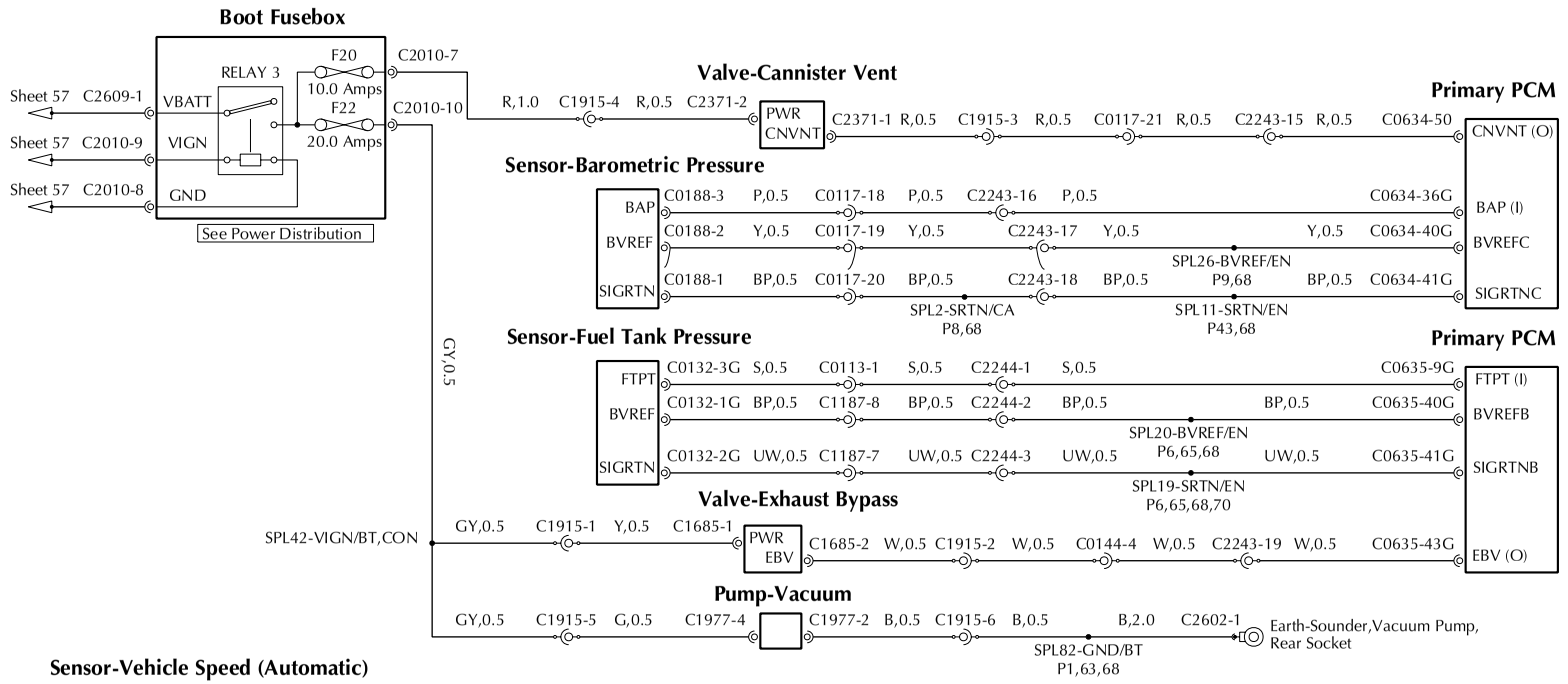

SOURCE No.
Sensor-Crank Position
Primary PCM
C0168-2G
C0168-1G
R,05
U,05
SCR,05
C0636-34G
C0636-45G
CKP+ (I)
CKP- (I)
CPSA-SC
SPL12-GND/EN
B,0.5
C0563-1
Earth-Bank A Cam/Crank Screens
Sensor-Cam Position (VRS)
CAMA-SC
SCR,05
C0176-2G
C0176-1G
R,05
U,05
C0636-25G
C0636-15G
CID1 (I)
VRSRTN
BP,0.5
C0636-41G
SIGRTNA
Sensor-Engine Coolant Temp
BP,0.5
C0169-2G
C0169-1G
GB,0.5
C0636-33G
ECT (I)
Sensor-Fuel Rail Temp
BP,0.5
C2251-2G
C2251-1G
GU,0.5
C0636-36G
FRTS (I)
SPL13-SRTN/EN
P43,65,67
Transducer-Fuel Rail Pressure
BP,0.5
C2467-2G
VOUT
GND
BVREF
C2467-3G
C2467-1G
GR,0.5
U,0.5
C0636-37G
C0636-40G
FRPT (I)
BVREFA
Underbonnet Fusebox
RELAY 3
Sheet 57
C2608-1
VBATT
F14
10.0 Amps
C0577-7
R,0.5
C0579-8
VIGN
Sheet 57
C0574-6
GND
DIODE 4
See Power Distribution
C2409-1
Central Electronic Module
C0584-39
IGN. OUT
F54
10.0 Amps
Sheet 70
Transducer-Power Steering Pressure
Primary PCM
PSPT
BVREF
SIGRTN
C2469-3
C2469-2
C2469-1
GN,0.5
BP,0.5
UW,0.5
C2276-1
C2276-2
C2276-3
C0635-14G
C0635-40G
C0635-41G
PSPT (I)
BVREFB
SIGRTNB
SPL20-BVREF/EN
P6,65,68
SPL19-SRTN/EN
P6,65,68,70
Valve-Electric Vapour Management
C2275-12
R,0.5
C2472-1
PWR
EVMV
C2472-2
YR,0.5
C2275-11
C0635-34G
EVMV (O)
Switch-Oil Pressure
Earth via fixings
C0187-1
YG,0.5
C0635-22G
OIL PR (I)
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Sensors (Engine Bay)
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
65



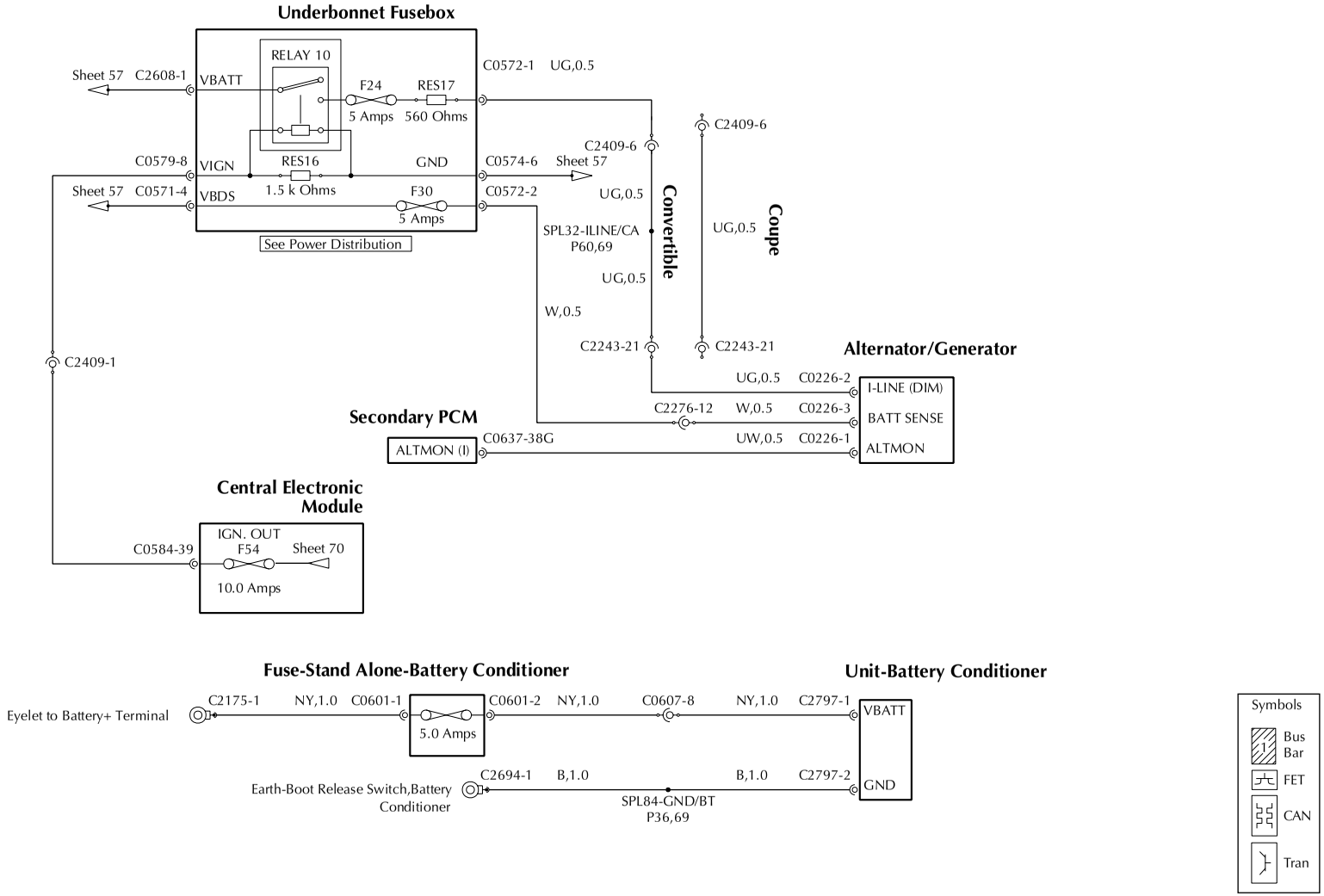
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Sensors (Engine Bay)	Coupe	From Chassis 00001	66



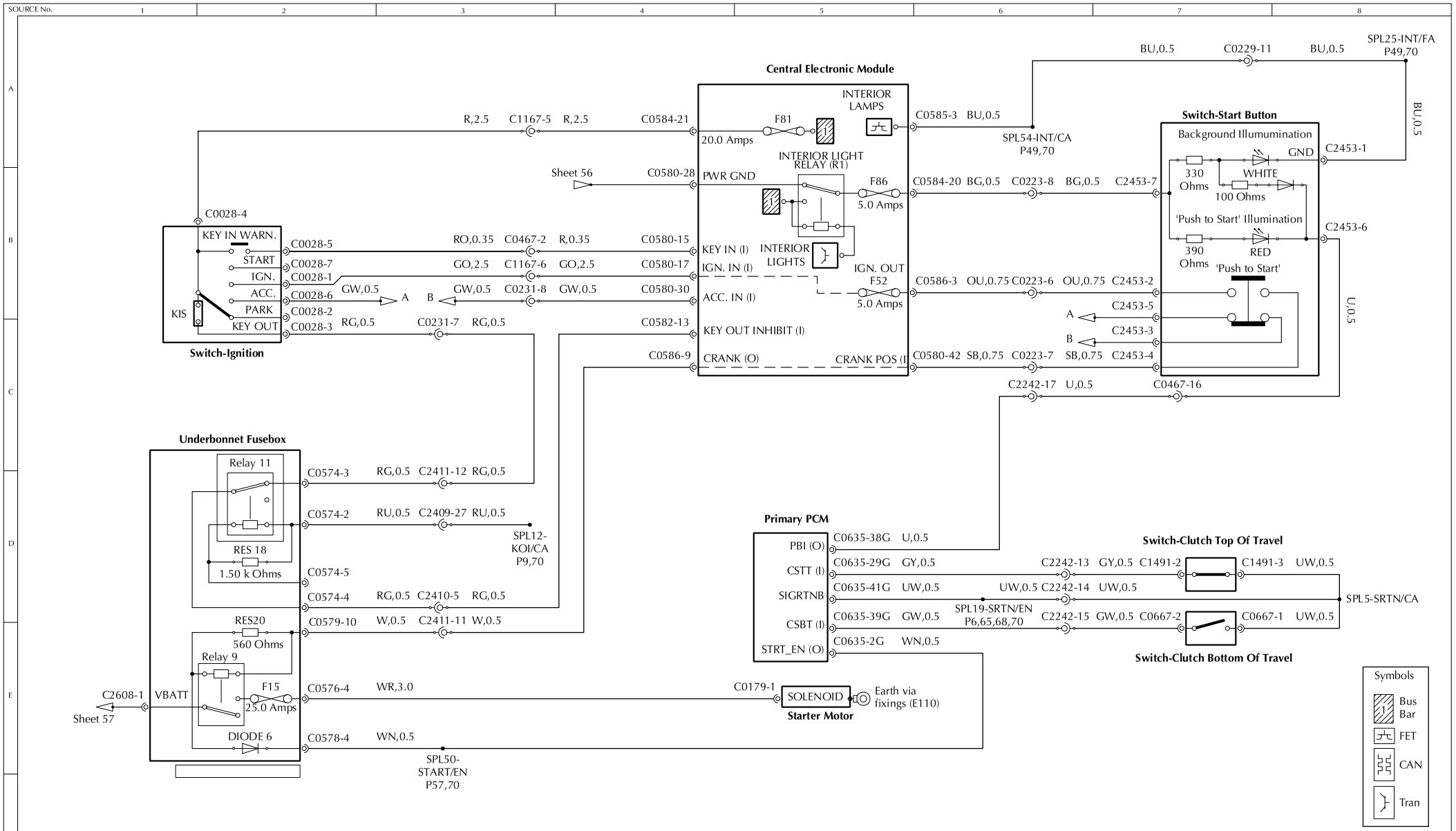
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Sensors (Engine Bay)	Coupe	From Chassis 00001	67

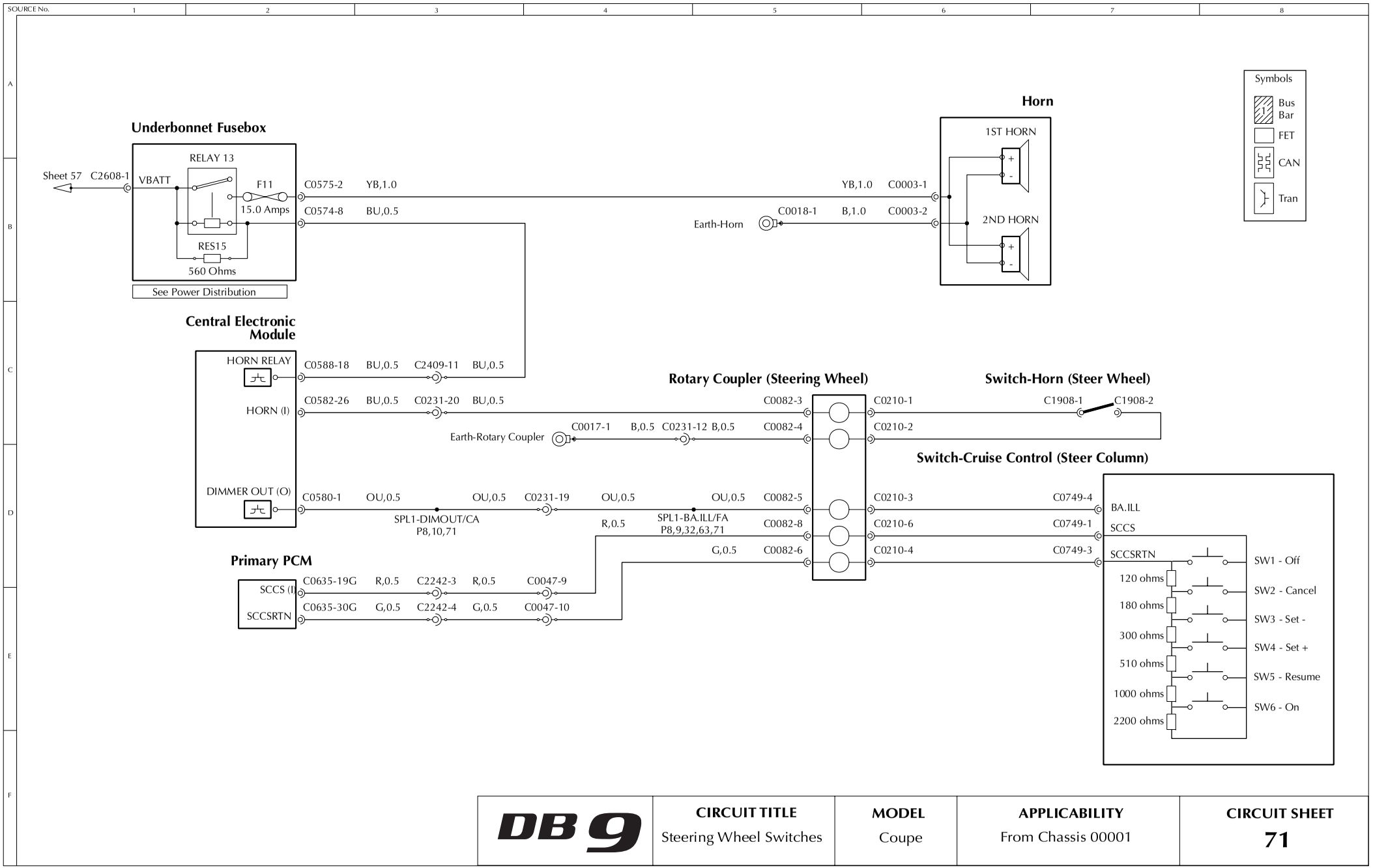


DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Sensors (Rear)	Coupe	From Chassis 00001	68

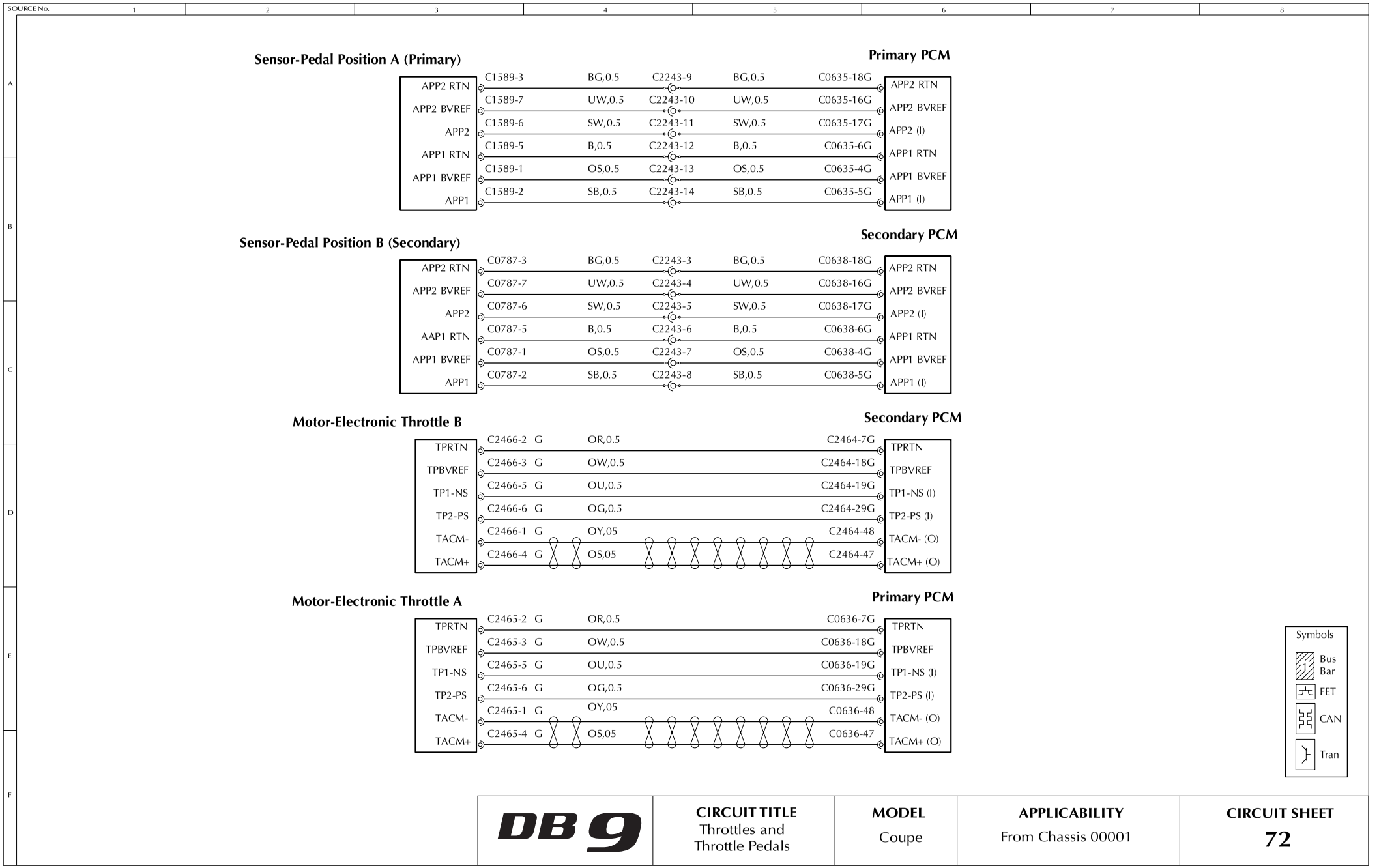


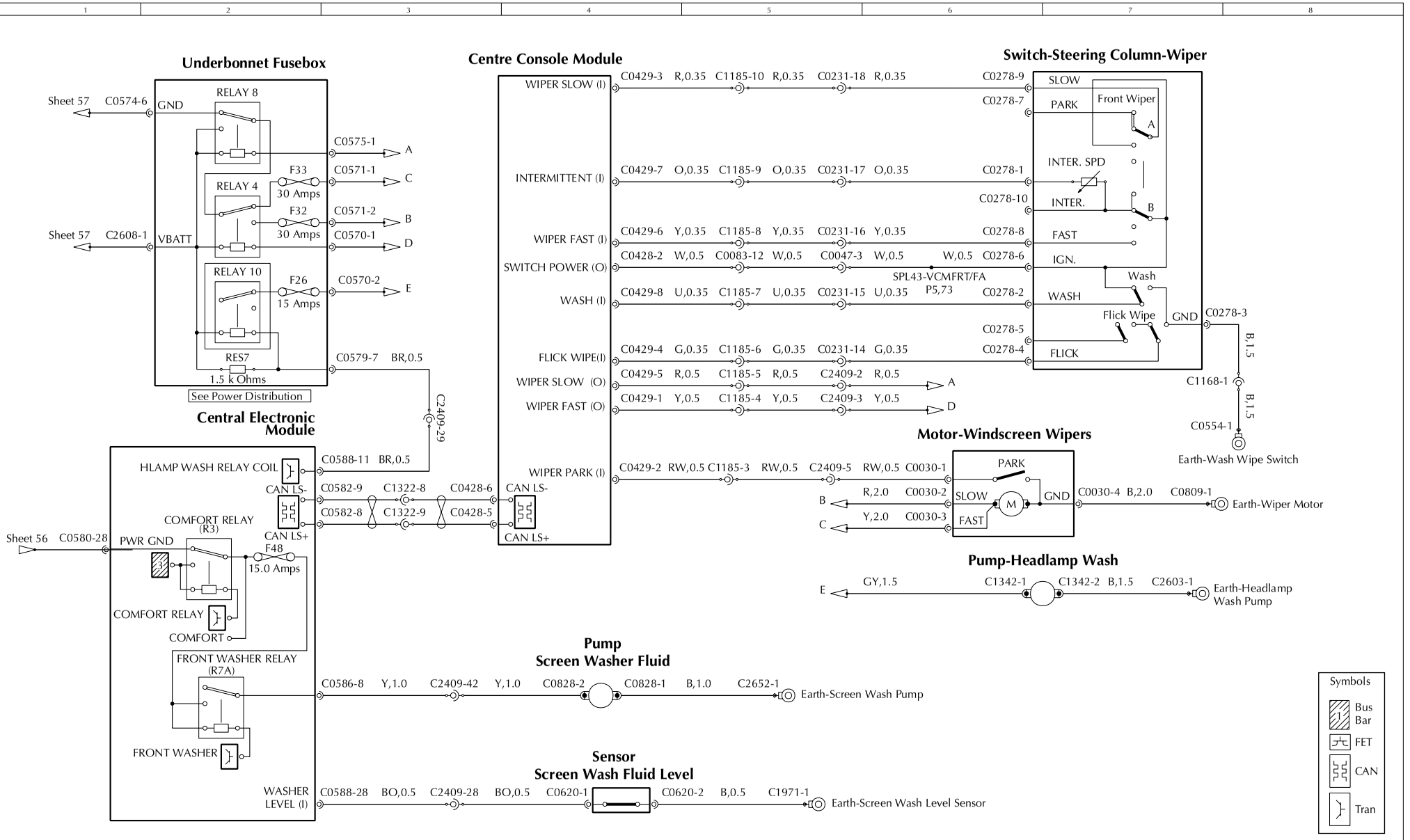
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Starting and Charging	Coupe	From Chassis 00001	69


SOURCE No.
Central Electronic Module
INTERIOR LAMPS
F81
20.0 Amps
INTERIOR LIGHT RELAY (R1)
F86
5.0 Amps
F52
5.0 Amps
PWR GND
KEY IN (I)
IGN. IN (I)
ACC. IN (I)
KEY OUT INHIBIT (I)
CRANK (O)
CRANK POS (I)
INTERIOR LIGHTS
IGN. OUT
Switch-Ignition
KEY IN WARN.
START
IGN.
ACC.
PARK
KEY OUT
KIS
Switch-Start Button
Background Illumumination
'Push to Start' Illumination
'Push to Start'
330 Ohms
100 Ohms
390 Ohms
WHITE
RED
GND
Underbonnet Fusebox
Relay 11
RES 18
1.50 k Ohms
RES20
560 Ohms
Relay 9
DIODE 6
F15
25.0 Amps
VBATT
Primary PCM
PBI (O)
CSTT (I)
SIGRTNB
CSBT (I)
STRT_EN (O)
Switch-Clutch Top Of Travel
Switch-Clutch Bottom Of Travel
SOLENOID
Starter Motor
Earth via fixings (E110)
Symbols
Bus Bar
FET
CAN
Tran
C0028-4
C0028-5
C0028-7
C0028-1
C0028-6
C0028-2
C0028-3
C0584-21
C0580-28
C0580-15
C0580-17
C0580-30
C0582-13
C0586-9
C0585-3 BU,0.5
C0584-20 BG,0.5
C0586-3 OU,0.75
C0580-42 SB,0.75
C0574-3
C0574-2
C0574-5
C0574-4
C0579-10
C0576-4 WR,3.0
C0578-4 WN,0.5
C0179-1
C0635-38G U,0.5
C0635-29G GY,0.5
C0635-41G UW,0.5
C0635-39G GW,0.5
C0635-2G WN,0.5
C2242-17 U,0.5
C2242-13 GY,0.5
C2242-14 UW,0.5
C2242-15 GW,0.5
C0467-16
C1491-2
C1491-3 UW,0.5
C0667-2
C0667-1 UW,0.5
C2453-1
C2453-6
C2453-7
C2453-2
C2453-5
C2453-3
C2453-4
C0229-11
SPL25-INT/FA P49,70
SPL54-INT/CA P49,70
SPL12-KOI/CA P9,70
SPL19-SRTN/EN P6,65,68,70
SPL5-SRTN/CA
SPL50-START/EN P57,70
C2608-1
Sheet 57
Sheet 56
R,2.5 C1167-5 R,2.5
RO,0.35 C0467-2 R,0.35
GO,2.5 C1167-6 GO,2.5
GW,0.5 C0231-8 GW,0.5
RG,0.5 C0231-7 RG,0.5
RG,0.5 C2411-12 RG,0.5
RU,0.5 C2409-27 RU,0.5
RG,0.5 C2410-5 RG,0.5
W,0.5 C2411-11 W,0.5
BU,0.5
U,0.5
DB 9
CIRCUIT TITLE
Starting and Charging
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
70

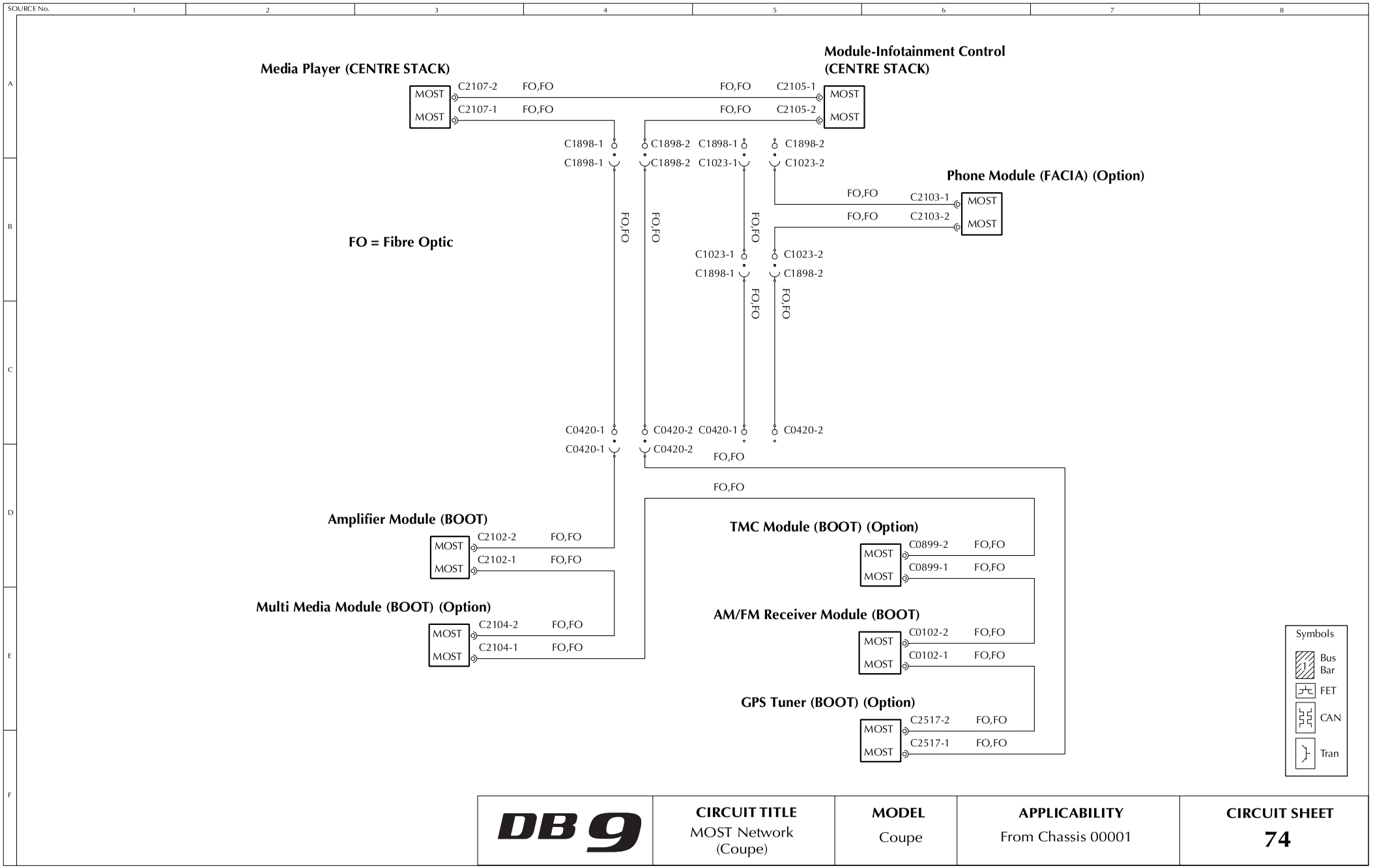


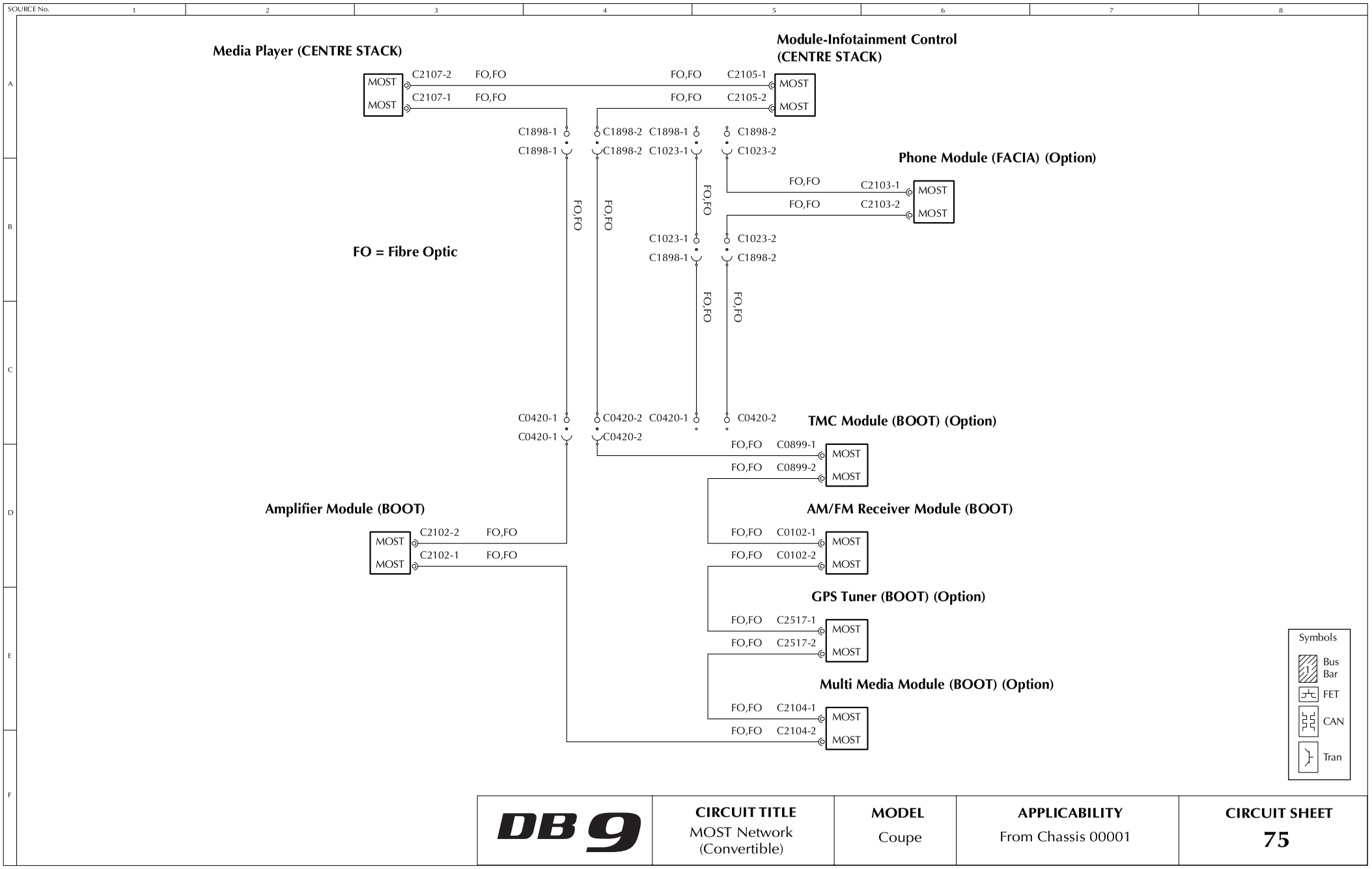
DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Steering Wheel Switches	Coupe	From Chassis 00001	71


SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
Sensor-Pedal Position A (Primary)
Primary PCM
APP2 RTN
APP2 BVREF
APP2
APP1 RTN
APP1 BVREF
APP1
C1589-3 BG,0.5 C2243-9 BG,0.5 C0635-18G
C1589-7 UW,0.5 C2243-10 UW,0.5 C0635-16G
C1589-6 SW,0.5 C2243-11 SW,0.5 C0635-17G
C1589-5 B,0.5 C2243-12 B,0.5 C0635-6G
C1589-1 OS,0.5 C2243-13 OS,0.5 C0635-4G
C1589-2 SB,0.5 C2243-14 SB,0.5 C0635-5G
APP2 RTN
APP2 BVREF
APP2 (I)
APP1 RTN
APP1 BVREF
APP1 (I)
Sensor-Pedal Position B (Secondary)
Secondary PCM
APP2 RTN
APP2 BVREF
APP2
AAP1 RTN
APP1 BVREF
APP1
C0787-3 BG,0.5 C2243-3 BG,0.5 C0638-18G
C0787-7 UW,0.5 C2243-4 UW,0.5 C0638-16G
C0787-6 SW,0.5 C2243-5 SW,0.5 C0638-17G
C0787-5 B,0.5 C2243-6 B,0.5 C0638-6G
C0787-1 OS,0.5 C2243-7 OS,0.5 C0638-4G
C0787-2 SB,0.5 C2243-8 SB,0.5 C0638-5G
APP2 RTN
APP2 BVREF
APP2 (I)
APP1 RTN
APP1 BVREF
APP1 (I)
Motor-Electronic Throttle B
Secondary PCM
TPRTN
TPBVREF
TP1-NS
TP2-PS
TACM-
TACM+
C2466-2 G OR,0.5 C2464-7G
C2466-3 G OW,0.5 C2464-18G
C2466-5 G OU,0.5 C2464-19G
C2466-6 G OG,0.5 C2464-29G
C2466-1 G OY,05 C2464-48
C2466-4 G OS,05 C2464-47
TPRTN
TPBVREF
TP1-NS (I)
TP2-PS (I)
TACM- (O)
TACM+ (O)
Motor-Electronic Throttle A
Primary PCM
TPRTN
TPBVREF
TP1-NS
TP2-PS
TACM-
TACM+
C2465-2 G OR,0.5 C0636-7G
C2465-3 G OW,0.5 C0636-18G
C2465-5 G OU,0.5 C0636-19G
C2465-6 G OG,0.5 C0636-29G
C2465-1 G OY,05 C0636-48
C2465-4 G OS,05 C0636-47
TPRTN
TPBVREF
TP1-NS (I)
TP2-PS (I)
TACM- (O)
TACM+ (O)
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
Throttles and Throttle Pedals
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
72



DB 9	CIRCUIT TITLE	MODEL	APPLICABILITY	CIRCUIT SHEET
	Wash Wipe System	Coupe	From Chassis 00001	73


SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
Media Player (CENTRE STACK)
Module-Infotainment Control (CENTRE STACK)
MOST
MOST
C2107-2
C2107-1
FO,FO
C2105-1
C2105-2
C1898-1
C1898-2
C1023-1
C1023-2
Phone Module (FACIA) (Option)
C2103-1
C2103-2
FO = Fibre Optic
C0420-1
C0420-2
Amplifier Module (BOOT)
C2102-2
C2102-1
Multi Media Module (BOOT) (Option)
C2104-2
C2104-1
TMC Module (BOOT) (Option)
C0899-2
C0899-1
AM/FM Receiver Module (BOOT)
C0102-2
C0102-1
GPS Tuner (BOOT) (Option)
C2517-2
C2517-1
Symbols
Bus Bar
FET
CAN
Tran
DB 9
CIRCUIT TITLE
MOST Network (Coupe)
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
74


SOURCE No.
1
2
3
4
5
6
7
8
A
B
C
D
E
F
Media Player (CENTRE STACK)
Module-Infotainment Control (CENTRE STACK)
MOST
MOST
C2107-2
FO,FO
C2107-1
FO,FO
FO,FO
C2105-1
FO,FO
C2105-2
C1898-1
C1898-1
C1898-2
C1898-2
C1898-1
C1023-1
C1898-2
C1023-2
Phone Module (FACIA) (Option)
FO,FO
C2103-1
FO,FO
C2103-2
FO,FO
FO,FO
FO,FO
FO,FO
FO = Fibre Optic
C1023-1
C1898-1
C1023-2
C1898-2
FO,FO
FO,FO
C0420-1
C0420-1
C0420-2
C0420-2
C0420-1
C0420-2
TMC Module (BOOT) (Option)
FO,FO
C0899-1
FO,FO
C0899-2
Amplifier Module (BOOT)
AM/FM Receiver Module (BOOT)
C2102-2
FO,FO
C2102-1
FO,FO
FO,FO
C0102-1
FO,FO
C0102-2
GPS Tuner (BOOT) (Option)
FO,FO
C2517-1
FO,FO
C2517-2
Multi Media Module (BOOT) (Option)
FO,FO
C2104-1
FO,FO
C2104-2
Symbols
Bus Bar
FET
CAN
Tran
DB9
CIRCUIT TITLE
MOST Network (Convertible)
MODEL
Coupe
APPLICABILITY
From Chassis 00001
CIRCUIT SHEET
75

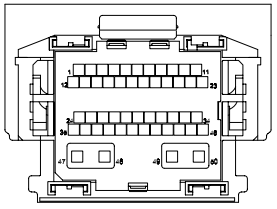
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ASTON MARTIN CIRCUIT DIAGRAM

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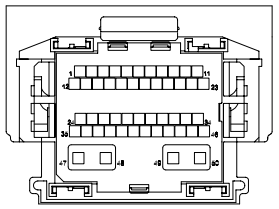
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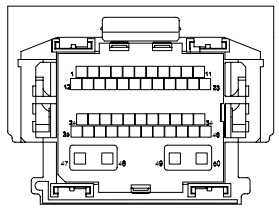
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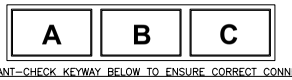
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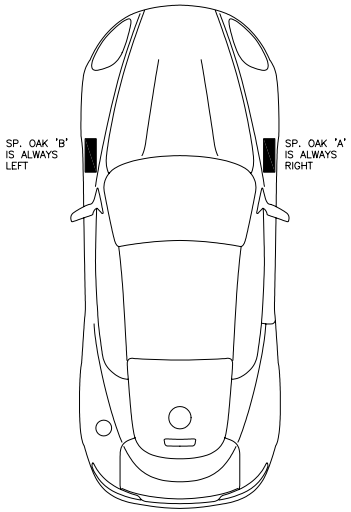


VIEWED THROUGH WIRE INSERTION SIDE OF CONNECTORS

VIEW LOOKING INTO MODULE CONNECTORS



IMPORTANT-CHECK KEYWAY BELOW TO ENSURE CORRECT CONNECTOR



HS CAN

LS CAN

BUSBAR

FET

CAN

TRAN

DRAWN BY A.PEARSON	SIGNATURE A.PEARSON	DATE 29-03-04	SYSTEM SPANISH OAK SECONDARY		PROJECT AM803	BUILD JOB1	CPSC CODE XX.XX.XX
CHECKED BY	SIGNATURE	DATE	SUB SYSTEM ECU B		DRAWING No. V1.05		ISSUE LEVEL A
APPROVED BY	SIGNATURE	DATE	VARIANT RHD/LHD	SYSTEM OWNER STEVE ARMITSTEAD	SHEET No. 1	No OF SHEETS 2	DATE 04-Feb-04

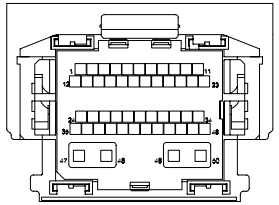
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ASTON MARTIN CIRCUIT DIAGRAM

C

ECU A (E-Engine)

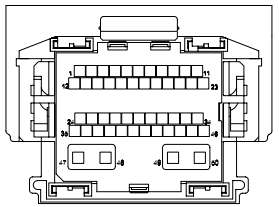
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ECU A (T-Trans)

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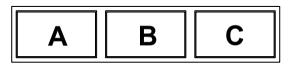
VIEWED THROUGH WIRE INSERTION SIDE OF CONNECTORS

B

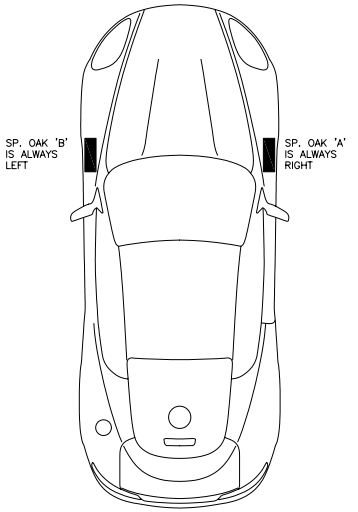
ECU A (C-Cowl)

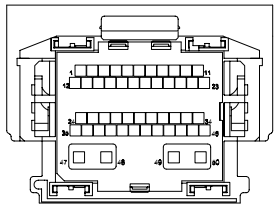
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VIEW LOOKING INTO MODULE CONNECTORS



IMPORTANT-CHECK KEYWAY BELOW TO ENSURE CORRECT CONNECTOR





HS CAN

LS CAN

BUSBAR

FET

CAN

TRAN

DRAWN BY A.PEARSON	SIGNATURE A.PEARSON	DATE 29-03-04	SYSTEM SPANISH OAK PRIMARY	PROJECT AM803 / BUILD JOB1 / CPSC CODE XX.XX.XX	PAGE 2
CHECKED BY	SIGNATURE	DATE	SUB SYSTEM ECU A	DRAWING No. V1.05 / ISSUE LEVEL A	
APPROVED BY	SIGNATURE	DATE	VARIANT RHD/LHD / SYSTEM OWNER STEVE ARMITSTEAD	SHEET No. 2 / No OF SHEETS 2 / DATE 04-Feb-04	

Electric Distribution/Electronic Control (18.00)

Vehicle Control System (18.08)

Module Configuration

Principles of Operation

All configurable modules are packaged in a kit which contains a warning label and a multi-language sheet re-emphasizing the requirements to configure replacement modules.

Replacement configurable modules must be configured using WDS.

Market Configuration

This data is required so that modules can interact with the vehicle correctly. By using WDS this data will be retrieved in the following ways:

- Indirectly from a mirrored image of the old modules data stored in an 'As is' database on DCS
- Indirectly from information stored in WDS

Configuration

The complexity of the electronics involved with module configuration and the multiplex communication network which they are connected to preclude the use of general workshop electrical test equipment.

WDS contains detailed instructions on module configuration.

Install the new module(s) and download the 'As is' data using the vehicle configuration software on WDS.

WDS will permanently retain the configuration information

Customer Configuration

There are certain modules / functions that the customer may or may not want reconfigured or enabled. Some of these preferences are accessed through the 'in-car' menus, available on the infotainment centre. Others are set in the vehicle configuration or specific software files, these items can be toggled or configured by WDS.

The 'As is' database (AML) holds customer original preferences. When a new module is installed to a previously upgraded or reconfigured vehicle these preferences can retrieved and re-applied as required through WDS

Data Buses

The primary data required for control and operation is carried on CAN data buses.

Two Can buses are used:

- High Speed CAN bus operates at 500 k bits / sec and is primarily used to transmit powertrain data
- The Powertrain (high speed) CAN bus operates at 500 k bits / sec and is only used to link the two PCMs
- Low Speed CAN bus operates at 125 k bits / sec and is used to transmit data relevant to the body system.

For data bus circuits - (Refer to 'Circuit Diagrams', page 18-1-17).

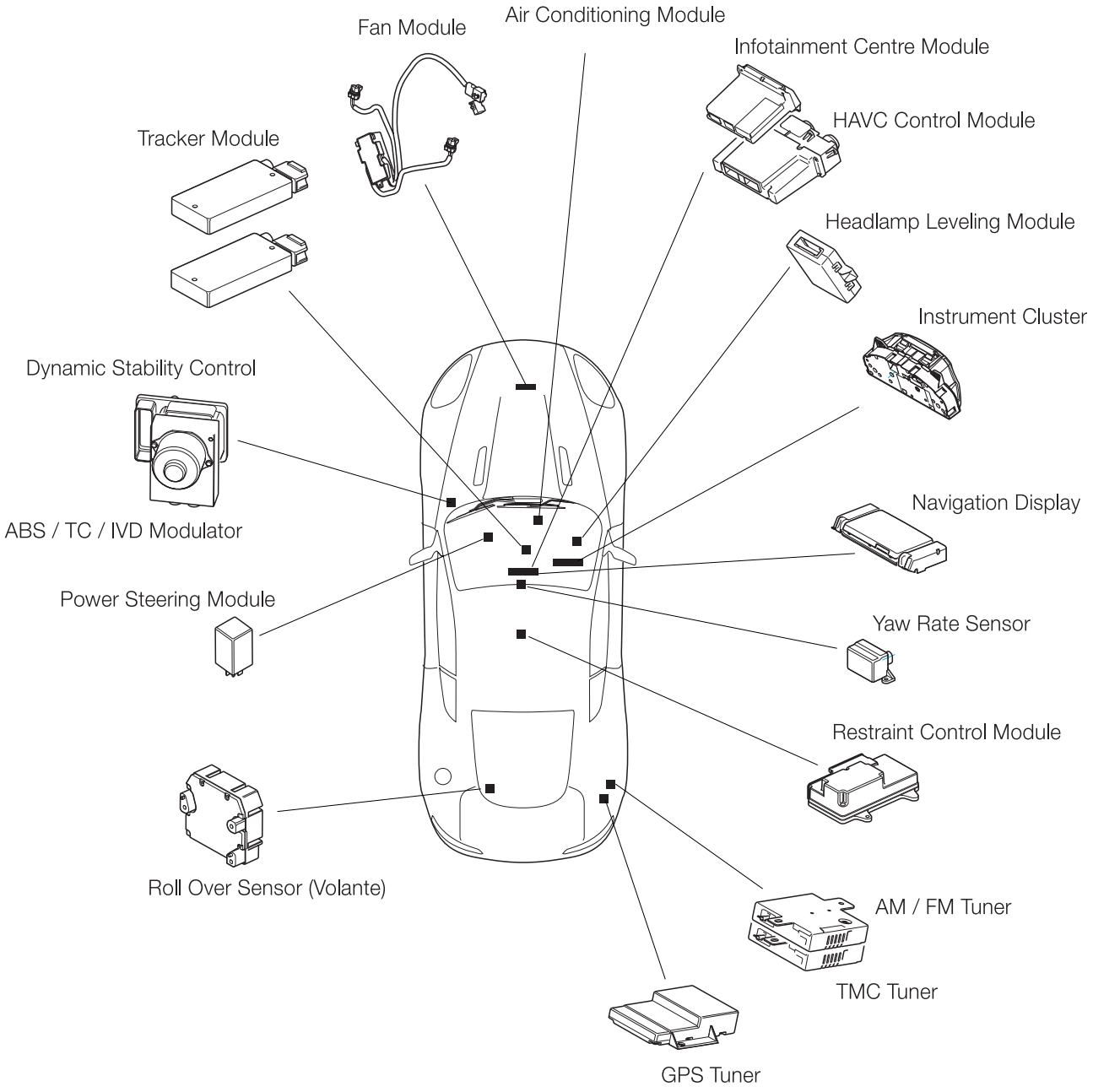
Network Bus

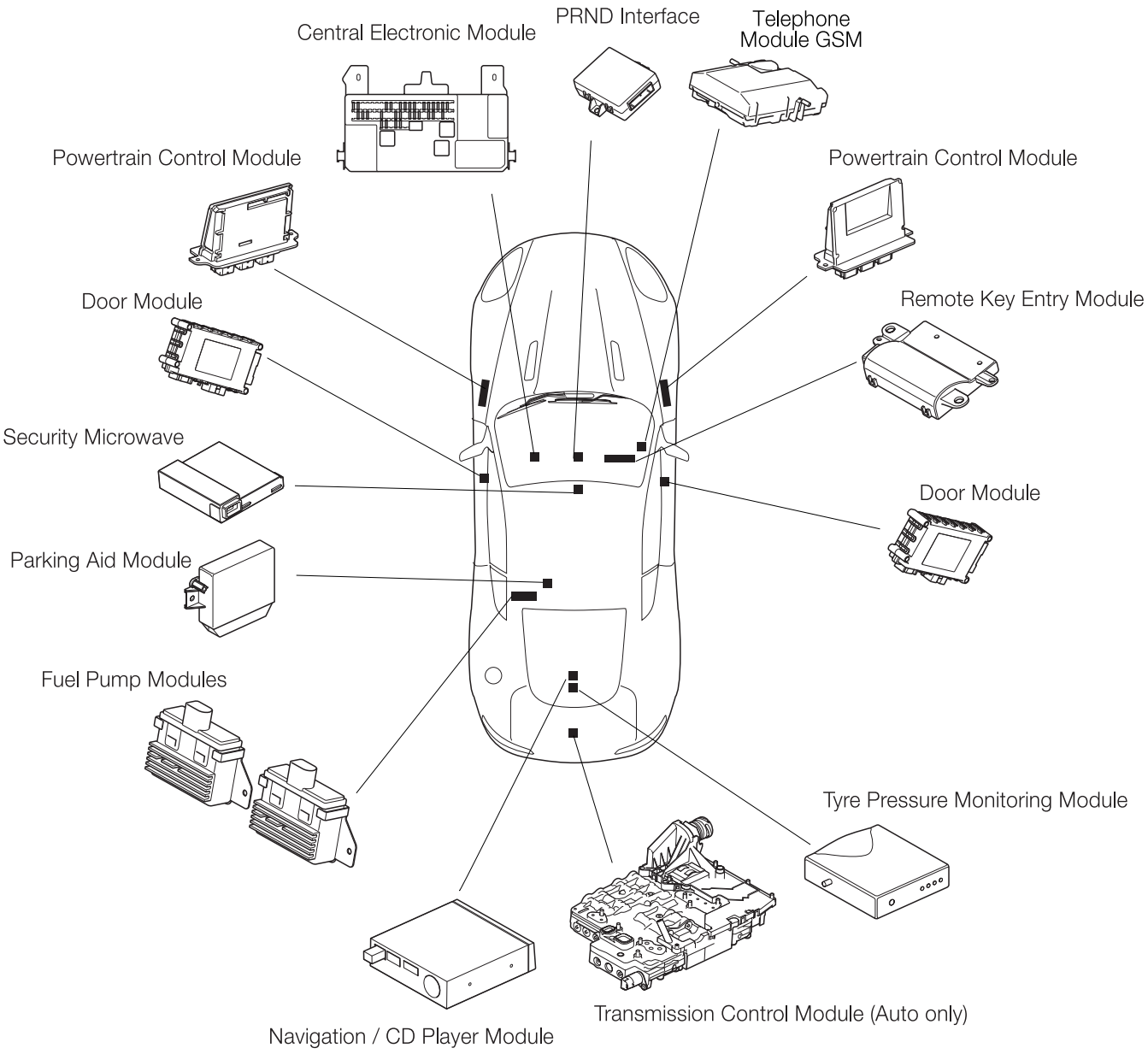
MOST

The MOST network bus is a fibre optical network used only for the Infotainment System

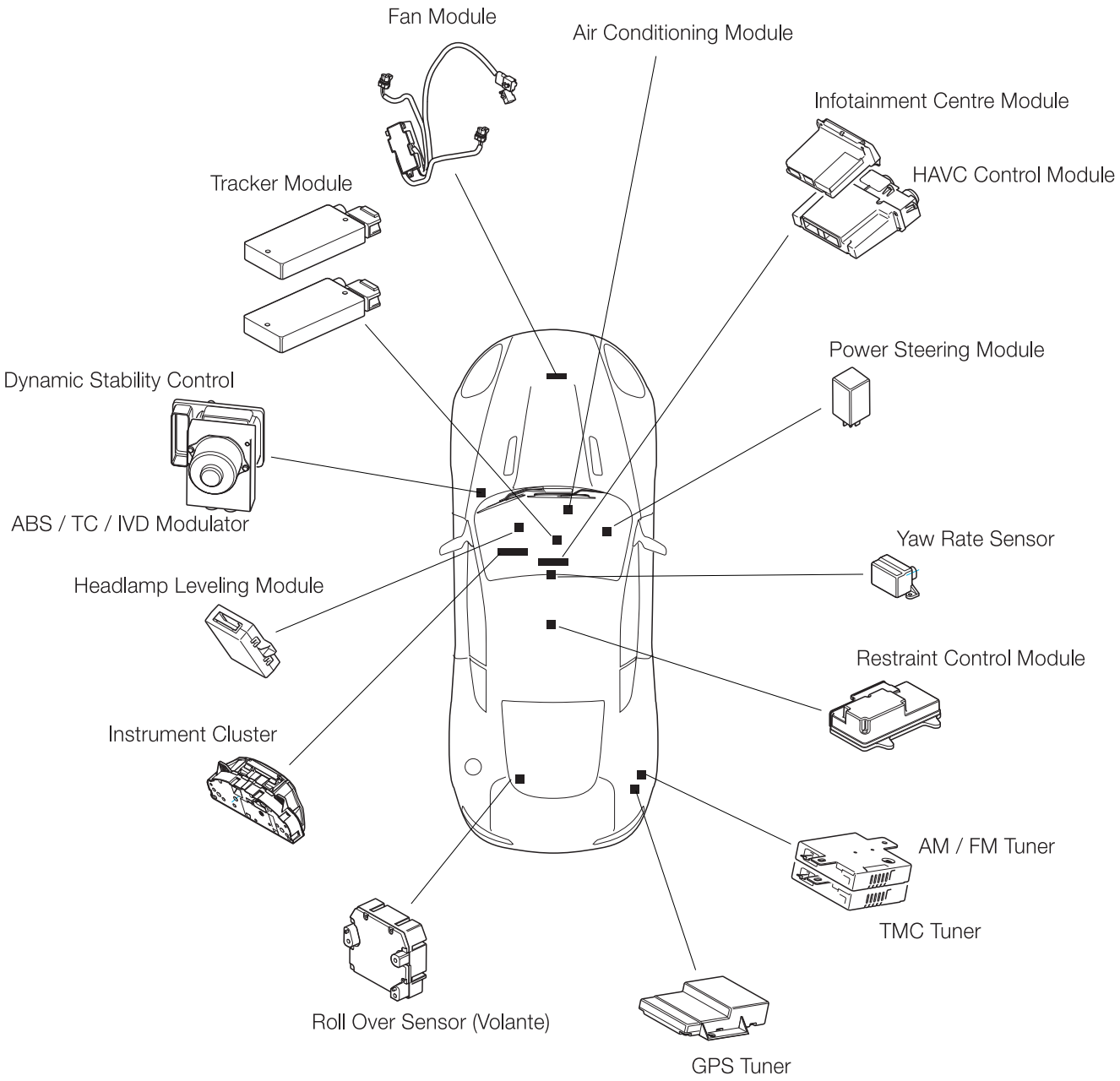
For the MOST network circuits - (Refer to 'Circuit Diagrams', page 18-1-17).

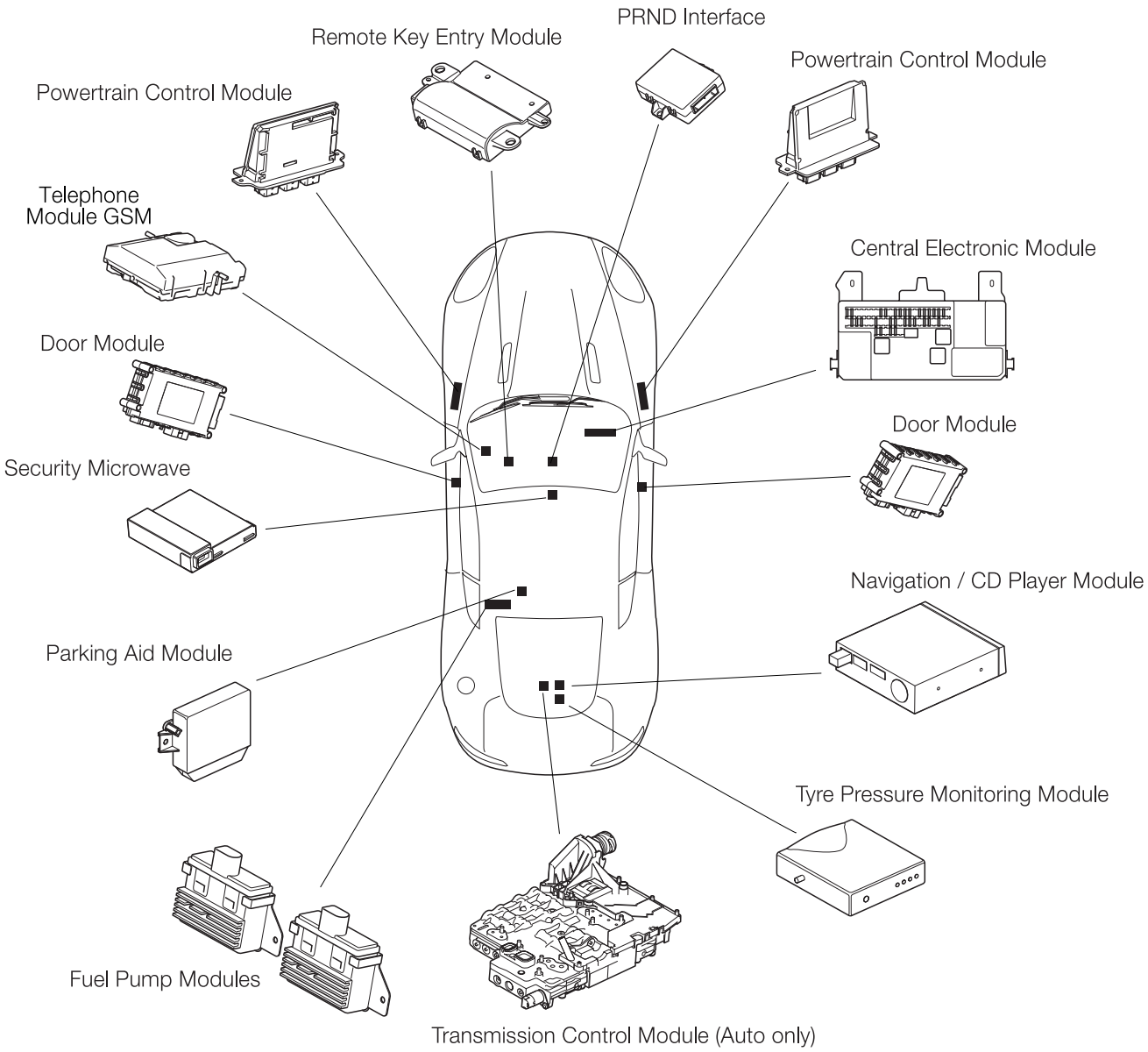
Module Locations (RHD)




Central Electronic Module
PRND Interface
Telephone Module GSM
Powertrain Control Module
Powertrain Control Module
Door Module
Remote Key Entry Module
Security Microwave
Door Module
Parking Aid Module
Fuel Pump Modules
Tyre Pressure Monitoring Module
Navigation / CD Player Module
Transmission Control Module (Auto only)

Module Locations (LHD)




PRND Interface
Remote Key Entry Module
Powertrain Control Module
Powertrain Control Module
Telephone
Module GSM
Central Electronic Module
Door Module
Door Module
Security Microwave
Navigation / CD Player Module
Parking Aid Module
Tyre Pressure Monitoring Module
Fuel Pump Modules
Transmission Control Module (Auto only)

ASTON MARTIN
ASTON MARTIN

Electronic Features (19.00)

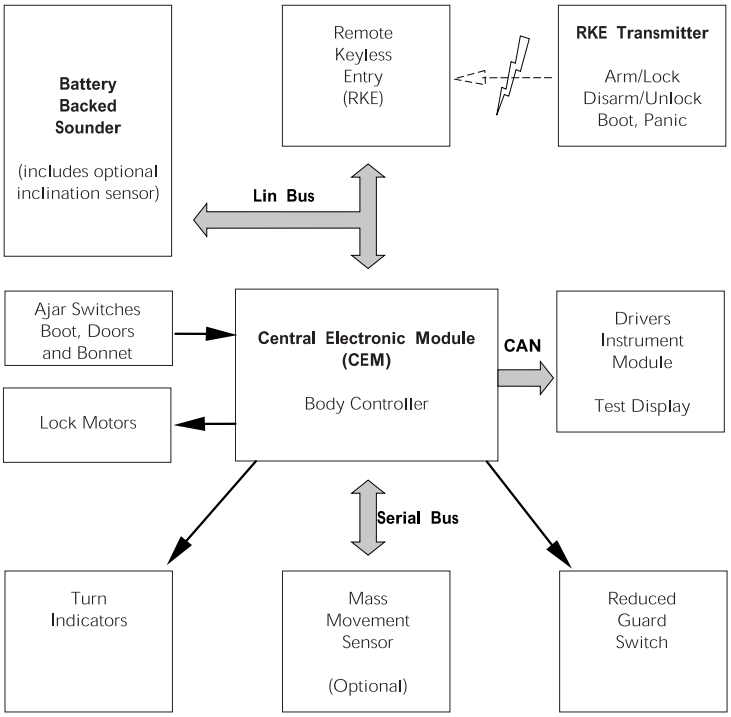
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Electronic Features (19.00)

Active Anti-Theft System (19.01)

Alarm System Overview



All alarm and central locking operations are controlled from within the Central Electronic Module (CEM).

Communications with the Mass Movement Sensor, the Instrument Module, the Remote Key Less Entry Function and the Battery Backed Sounder are via data buses.

Component Descriptions

Battery Backed Sounder

This device produces the audible out-put from the alarm system. The sounder can also house a tilt sensor to detect unauthorised vehicle movement.

Guard Reduction Switch

Used to disable the mass movement sensor, double locking and tilt sensor, so that people or animals can be left in the vehicle.

Mass Movement Sensor (optional)

Detects movement within the cabin of the car using microwaves. It is specifically designed to protect the ignition barrel and lock.

Central Electronics Module (CEM)

This module controls the vehicle alarm system. The CEM controls all alarm system inputs and outputs.

Driver Information Module (DIM)

Instrument Cluster

The message centre right provides text messages displaying alarm information to the user.

Ajar switches (perimeter sensors)

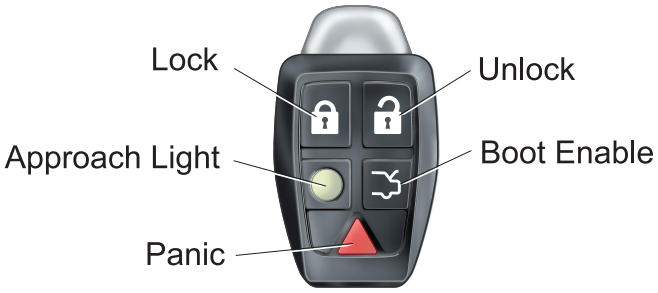
The car is equipped with ajar switches to sense unauthorised access to the following areas:

- Doors (Cabin area)
- Boot (Luggage compartment)
- Bonnet (Engine bay)

Remote Transmitter

Remote Key less Entry (RKE)

Controls the vehicle locking functionality (Refer to the vehicles Owner's Guide for operation).



Functional Description

Overview – Alarm

The Vehicle Alarm System (VAS) will generate an audible and visual warning if the vehicle doors, bonnet or boot are opened without first disarming the system using an authorised remote transmitter key.

There are two types of alarm system:

- Standard
- High Specification (optional). Includes an interior movement sensor and tilt sensor

The interior movement sensor offers further protection of the ignition barrel and steering wheel lock, the tilt sensor will detect unauthorised angular movement of the vehicle.

A Battery Backup sounder (BBS) is used to protect the sounder from disconnection. The BBS will sound if any attempt is made to disconnect it from the rest of the alarm system when the vehicle is armed.

General setting

The system will be armed on the first press of the remote transmitter 'Lock' button. The alarm system will arm and deadlock 25 seconds after receiving the arm request.

Door open

If the alarm system is set when any door, bonnet or boot are left open, then the alarm will be armed on all closed doors only, 25 seconds after the alarm set command has been requested. The open door, bonnet or boot will not be armed. 5 seconds after the open door, bonnet or boot have been closed, the alarm will Arm on that door, bonnet or boot.

Disable the Alarm

The alarm will be disabled following the unlock or boot open commands from the remote transmitter key or by turning the ignition key in the ignition barrel.

Reduced guard mode

When the vehicle is in reduced guard mode the mass movement and tilt sensors are disabled. This allows people or animals to be left in the vehicle.

With doors, boot and bonnet closed, ignition key in position '0' or 'I' or within 60 sec after removing the keys the reduced guard button can be activated.

The ignition key must have been in position 'II' first.

When the alarm is set, the vehicle will enter reduced guard mode. To deactivate reduced guard mode simply insert and turn the ignition key to position 'II'.

If the alarm is deactivated and then activated without turning the ignition key to position 'II' first, then the reduced guard mode will remain active.

Alarm Cycle

When the alarm has been activated there will be two outputs, these are listed below:

Audible output device (Siren)

The audible alarm signal is generated by the battery backed sounder. Duration of one alarm cycle is 25 seconds. The maximum number of cycles is ten.

Visible output device DI's

The turn indicators are activated during and alarm cycle. The alarm signal is given by flashing all direction indicators for 5 minutes. Following an alarm cycle the vehicle alarm will remain set.

Panic Alarm

The Panic Alarm is to be used in emergency situations for attracting attention while in or outside the vehicle.

Activate Panic Alarm

The Panic Alarm can be activated using the Panic Alarm button on the remote transmitter, there are two ways to initiate the feature:

- Press the Panic Alarm button for a minimum time of 3 seconds.
- Press the Panic Alarm button twice, the second press must be made within 3 seconds from the first press.

Deactivate Panic Alarm

The panic alarm cannot be deactivated for the first 5 seconds of operation following its activation. Following the first 5 seconds of the panic alarm cycle, it can then be deactivated in following ways:

- Pressing the panic button on the remote transmitter.
- The activation time has exceeded (25 seconds).

Panic alarm cycle

When active, the DI's will flash and the vehicle horn will sound for 25 seconds.

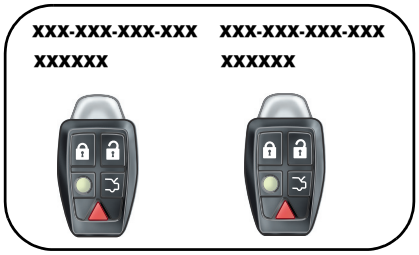
Remote Transmitter

The security system allows up to eight remote transmitters to be used for controlling the system functions.

The remote transmitter come in packs of two. Each transmitter is associated with a series of numbers, which are shown on a label located on the transmitter packaging. These numbers are required to program the transmitter to a vehicle.

Caution

Do not lose the transmitter packaging, with the number label attached, before programming to the vehicle. The remote transmitters can not be programmed without the Seed and Key ID numbers.



Key Learning Operations

Using WDS.

1. Select 'Set up and Configuration'.
2. Select either:
   - Transmitter add
   - Transmitter Delete
3. Follow the on screen instructions. Type in the Key ID and the Seed numbers when prompted.
4. If adding a transmitter.

   After programming, point a transmitter at the vehicle and attempt to lock / unlock the vehicle. If the vehicle does not lock / unlock, attempt to lock / unlock using the second transmitter from the pack.

   After a successful 'Transmitter add' operation delete the Key ID and Seed numbers taken from the packaging label.

   The remaining Key ID and Seed numbers are for the remaining remote transmitter. **Ensure that they remain together**.

If the CEM is required to be renewed then all remote transmitter must be renewed as well.

Integrated Passive Anti-Theft System (IPATS)

Description

IPATS (immobilisation system) is responsible for enabling / disabling engine functionality. The system is totally passive and requires no extra intervention from the user.

To prevent the engine from starting the IPATS disables the fuel pumps, injectors, and the crank circuit.

Disarming IPATS

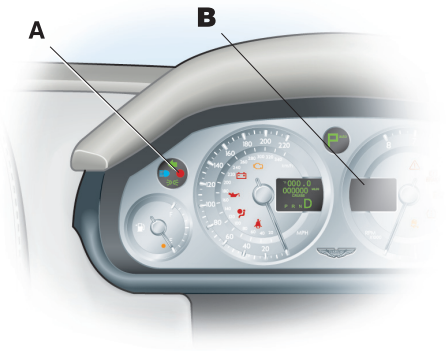
When the ignition key is located in the ignition barrel and turned to position 'II', the key is validated. If successful, subsequent requests for crank and engine start will be allowed. If the key validation fails, then engine starting will be prevented.

Arming IPATS

To arm the system the user simply removes the ignition key.

IPATS LED

An IPATS LED is located in the DIM to display the immobilisation status and DTC's using flash codes.



Normal behaviour following a successful key read is for the LED to illuminate for three seconds and then to extinguish.

If the self-test detects any problem with IPATS when the ignition is turned on, the IPATS LED will flash at 4Hz for 1 minute. The IPATS LED will then flash one of the following codes:

DTC	Flash Code	Description
B1681	11	Transceiver not connected
B2103	12	Transceiver antenna coil malfunction
B1600	13	No key-code from the key
B1602	14	Invalid/Partial key code from transceiver
B1601	15	Keycode not recognised (but correct format)
B1213	21	Less than two keys stored
B1342		EEPROM fault (failed store operation)
B2431		Key would not store, (key fault)

Key Programming

Internet access required

All vehicle keys are required to perform key programming.

Using WDS.

1. Insert the first key to the ignition.
2. Select 'Set up and Configuration' on WDS.
3. Select either:
   - Key Learn
   - Key Delete
4. Follow the on screen instructions. You will be prompted to program successive keys as required.

Count Keys

Using WDS.

Select Count keys to check how many keys are programmed into the vehicle security.

ASTON MARTIN
ASTON MARTIN

Appendix & Glossary

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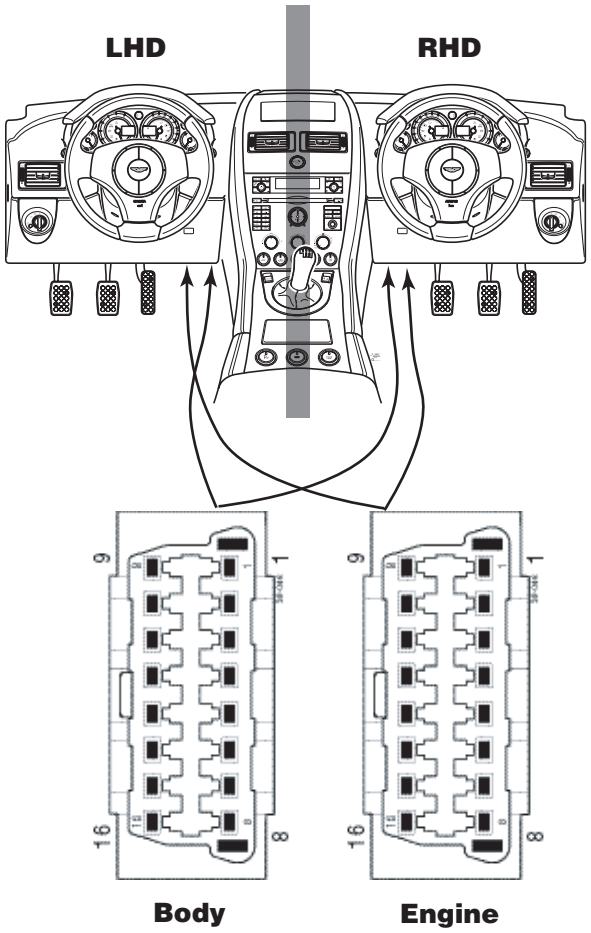
Diagnostic Ports 20-1-2
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Appendix & Glossary

Diagnostic Ports

Diagnostic ports are provided for:

- OBD II
- Body - including



Fluids / Capacities

Capacities

	Europe	USA
Engine sump (incl. filter)	10.4 ltr	11.0 qts
Engine sump (excl. filter)	9.5 ltr	10.0 qts
Engine cooling system	15 ltr	15.5 qts
Screen washer reservoir	6.9 ltr	7.3 qts
Gearbox		
Manual (including final drive and cooler)	4 ltr	4.2 qts
Automatic (including cooler)	9.7 ltr	10.2 qts
Final drive (Automatic) including cooler	1.6 ltr	1.7 qts
Transmission Cooler		
Manual Gearbox	TBA	TBA
Automatic Gearbox	1.6 ltr	1.7 qts
Automatic Final Drive	0.7	0.7
Fuel tank	80 ltr	21.0 galls

Approx. 78 litres (17.2 UK Gallons) usable.

Recommended Fluids

Engine oil	EU / Aus	Mobil 1 (0W-40)
	USA	Mobil 1 (0W-40) and (0W-30)

Do not mix Mobil 1 oil with any mineral oils.

Engine coolant		60% water, 40% Havoline OAT

Do not mix OAT coolant with any glycol based anti-freeze.

Automatic transmission fluid		Shell ATFM 1375-4
Automatic transmission final drive oil		Shell 'Transaxle' oil 75W/90
Manual gearbox oil / Final drive		Shell 'Transaxle' oil 75W/90
Brake / Clutch fluid		Castrol Super Response Dot 4
Power steering fluid		Texaco Cold Climate
A/C refrigerant		HFC134A.
Fuel	**EU**	95 RON Unleaded (Min.) or 98 RON Super Unleaded
	Aus	Premium Unleaded (95 RON Min.)
	USA	Premium Unleaded (95 RON), AKI 91 (Premium)

Abbreviations

To follow

Terms

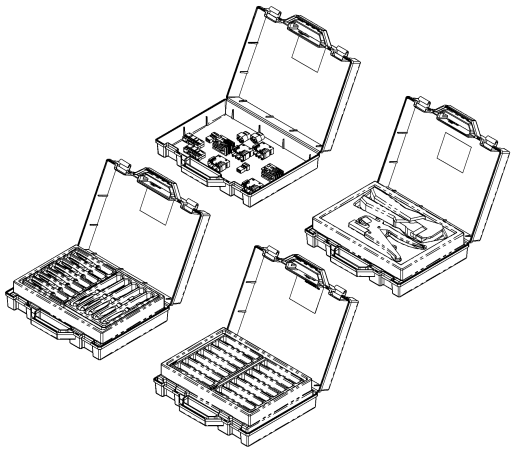
Frequently used alternative names or spellings for vehicle components mentioned in this Workshop Manual.

UK English	US English
Bonnet	Hood
Boot	Trunk
Brake Disc	Rotor
Handbrake	Parking Brake
Petrol	Gasoline
Tyre	Tire
Wing	Fender
Windscreen	Windshield
Sill	Rocker Panel
Nip	

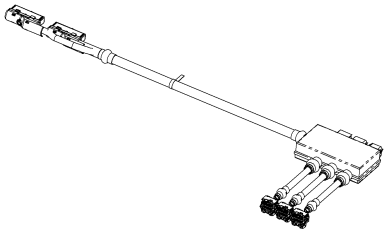
Special Tools - Pictorial Index

Part No. / Description

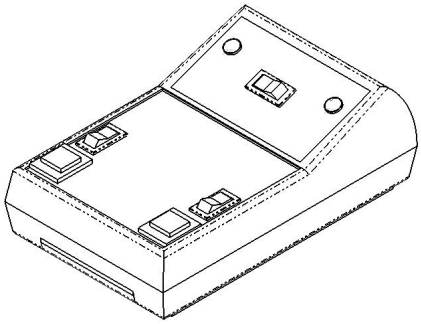
43-10047 (Wiring Harness Repair Kit)



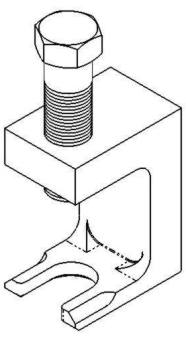
43-10048 (PCM II Test Lead)



43-27750 (MOST Tester)

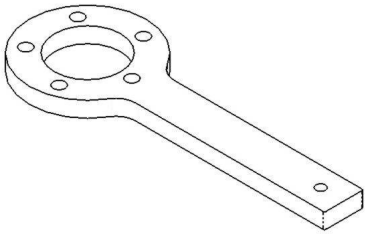


204-523 (Ball Joint Splitter)

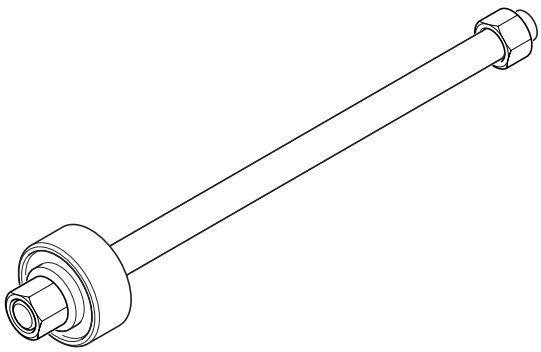


Part No. / Description

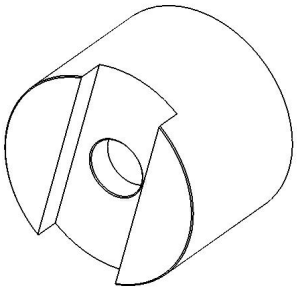
204-524 (Front Suspension Support)



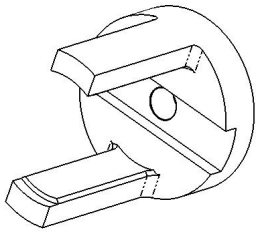
205-521 (Rear Subframe Bush Removal)



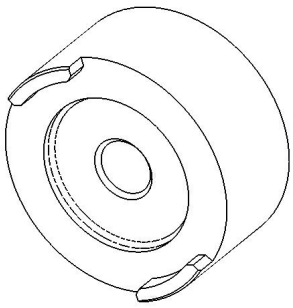
205-791 (Rear Subframe Bush Removal (use with 205-521))



205-792 (Rear Subframe Receiver Cup)

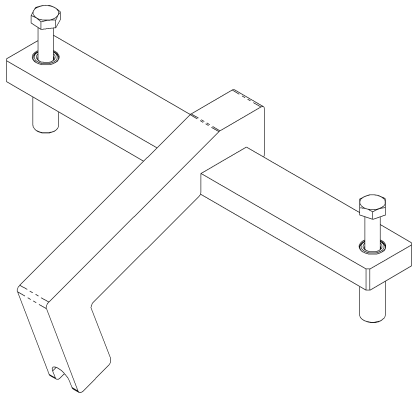


205-793 (Rear Subframe Bush Installer)



Part No. / Description

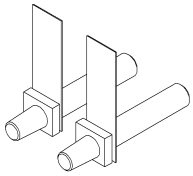
206-100 (Brake Hose Install)



206-103 (Handbrake Cable Removal)



303-535 (Cylinder Bore Protectors)



TBA (Crankshaft Rear Oil Seal and Slinger Removal)

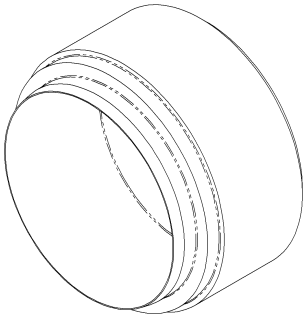
Image to Follow

TBA (Crankshaft Rear Oil Seal Slinger Install)

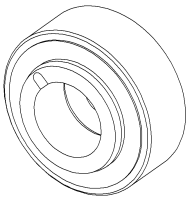
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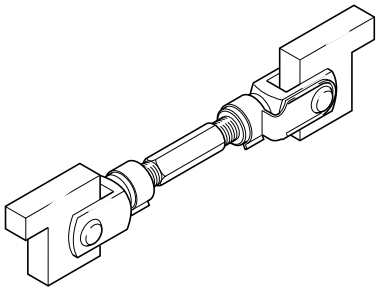
303-664 (Crankshaft Rear Oil Seal Install)



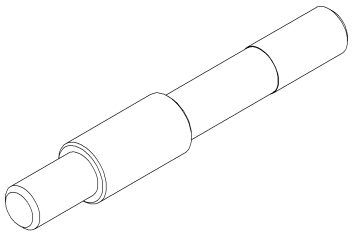
303-665 (Crankshaft Front Oil Seal Install)



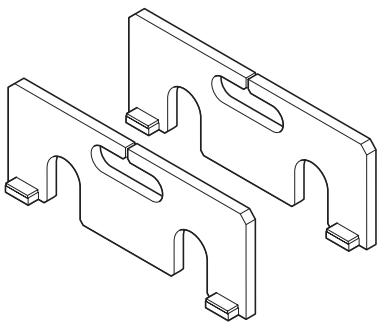
303-666 (Cylinder Block Spreader)



303-667 (Clutch Alignment)

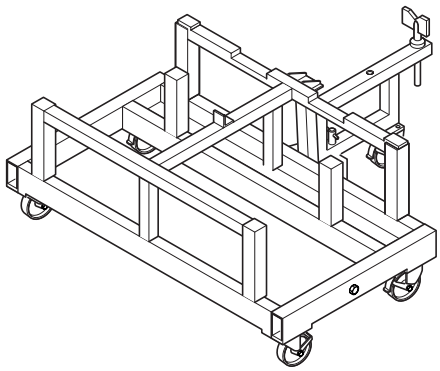


303-713 (Camshaft Set)

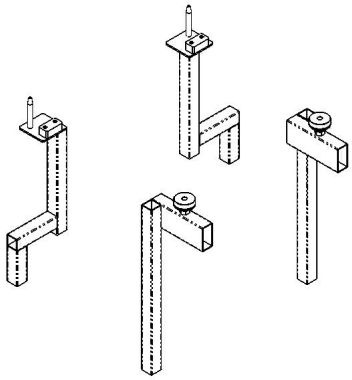


Part No. / Description

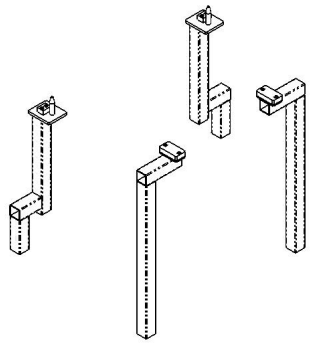
303-F715 (Multi-purpose Trolley) x2



303-F715-04 (Rear Subframe Trolley Adaptors)



303-F715-05 (Engine/Subframe Trolley Adaptors)

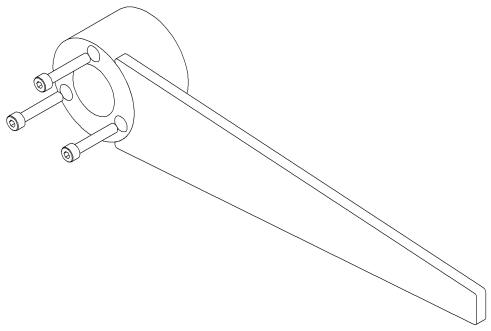


303-F715-06 (Trolley Brace Bars)

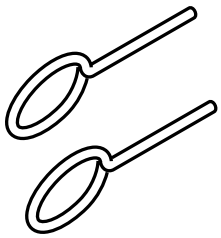


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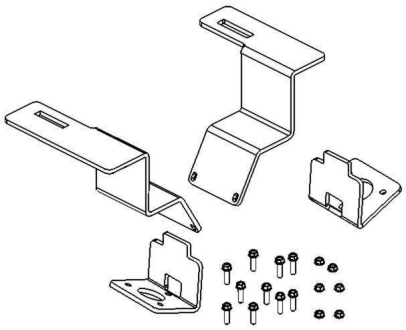
303-1047 (Crankshaft Holding)



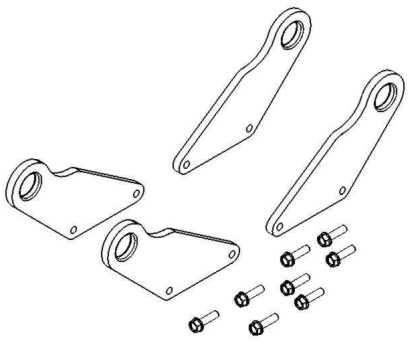
303-1072 (Timing Chain Tensioner Pins)



303-1080 (Engine Support Adaptor)

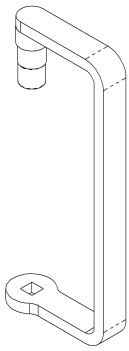


303-1098 (Engine Lifting Brackets)

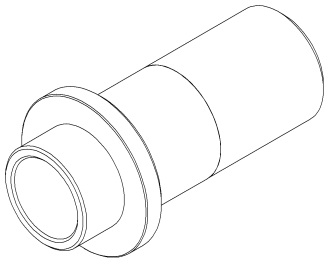


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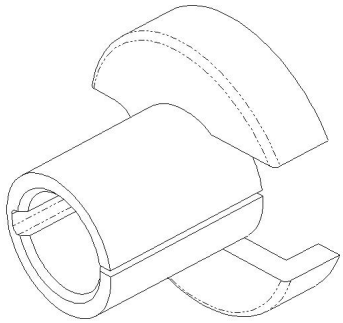
303-1133 (Engine Mount Top Nut Adaptor)



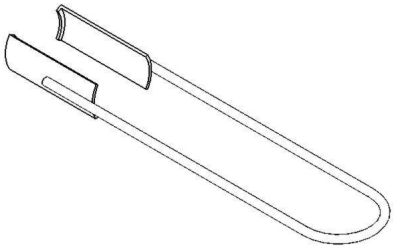
307-521 (Transaxle Seal Instal)



310-040 (Fuel Pipe Disconnect Tool)

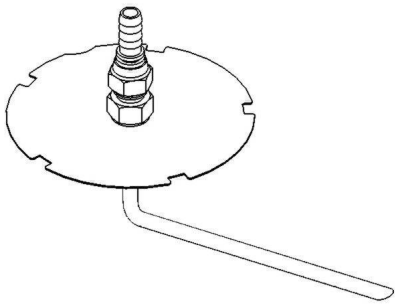


310-134 (Filler Neck Disconnect Tool)



Part No. / Description

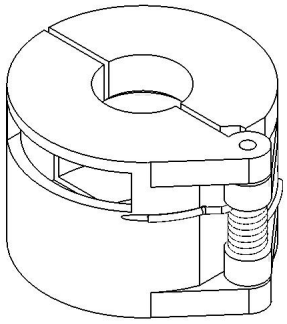
310-136 (Fuel Tank Drainage Adaptor)



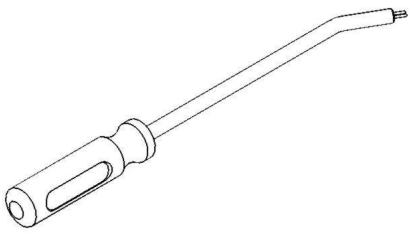
310-140 (Fuel Pump Install / Remove)

Image to Follow

412-026 (Quick Disconnect Tool)
412-038 (Quick Disconnect Tool)
412-040 (Quick Disconnect Tool)

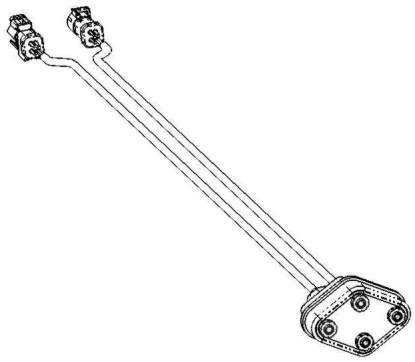


412-132 (Quick Disconnect Tool)

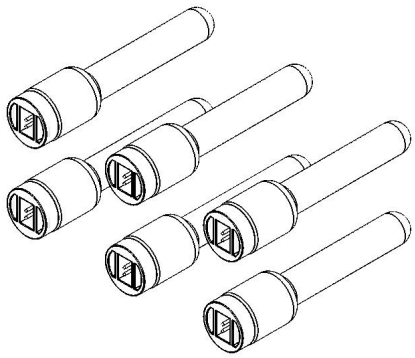


Part No. / Description

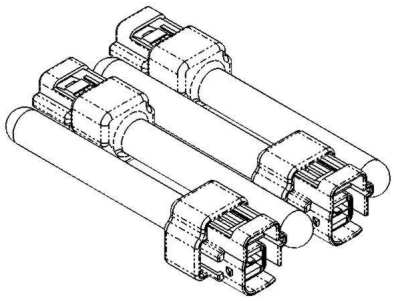
418-583 (Oxygen Sensor Diagnostic Lead)



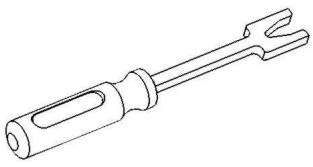
501-073A (Airbag Simulators)



501-103 (Side Airbag and Pretensioner simulators)



501-104 (Trim Removal)



Part No. / Description	Part No. / Description
501-108 (IP Alignment Pins)	501-112 (Wiper Linkage to Wiper Motor)

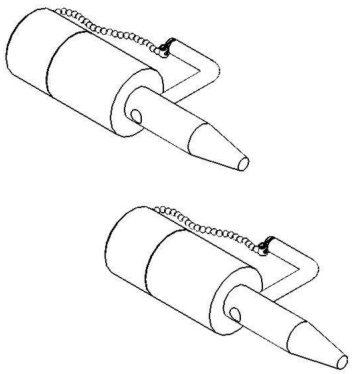


Image to follow

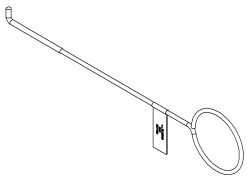
TBA (Gear Selector Cable Remove)

501-F111 (Door Service Trolley)

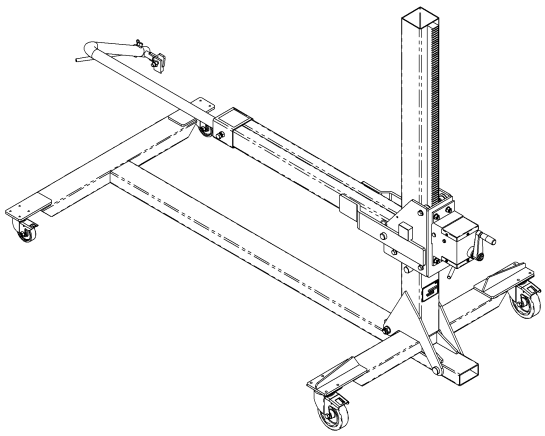


Image to follow

501-115 (Front Veneer Removal)



501-F116 (IP Removal)



Specialist Tool Operation

To assist the technician in the operation of some of the specialist tools available for this vehicle, listed here are specialist tool operating procedures.

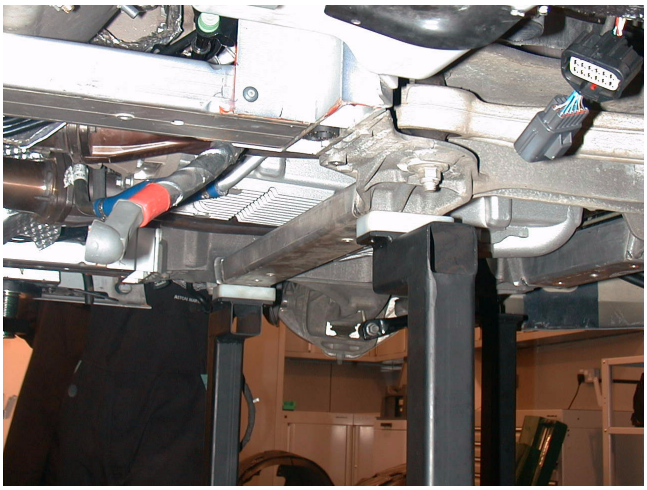
PowerTrain Trolleys (303-F715)

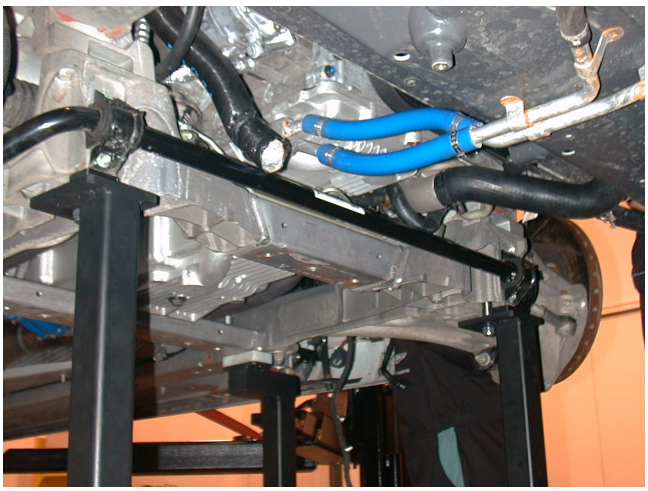
Images of where to locate the powertrain trolleys to the rear and front subframes to come

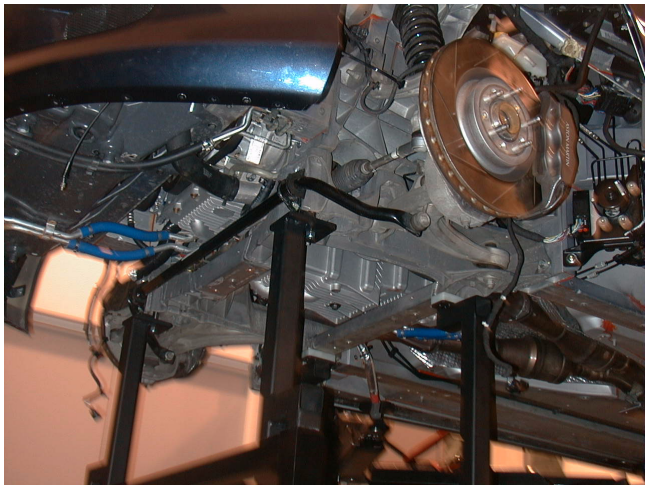
When removing the powertrain in total use both powertrain trolleys joined together using service tool (Refer to '303-F715-06 (Trolley Brace Bars)', page 20-1-5).

The link bars install as shown. They are not handed.

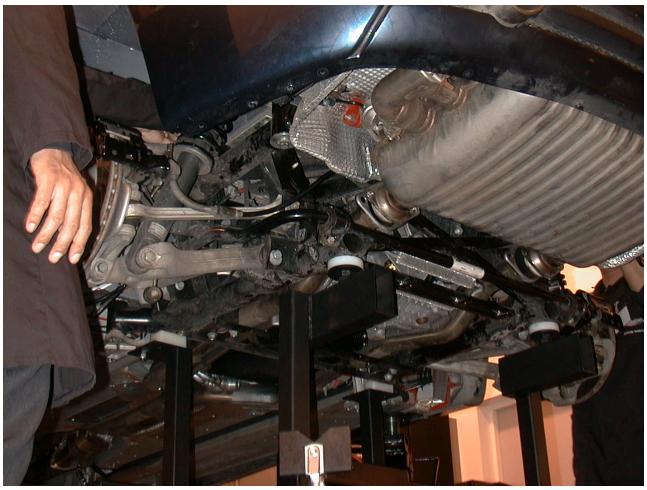
Front Mounts

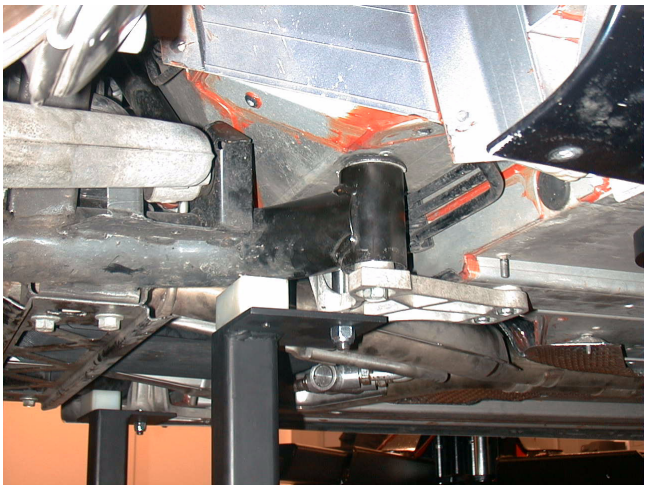


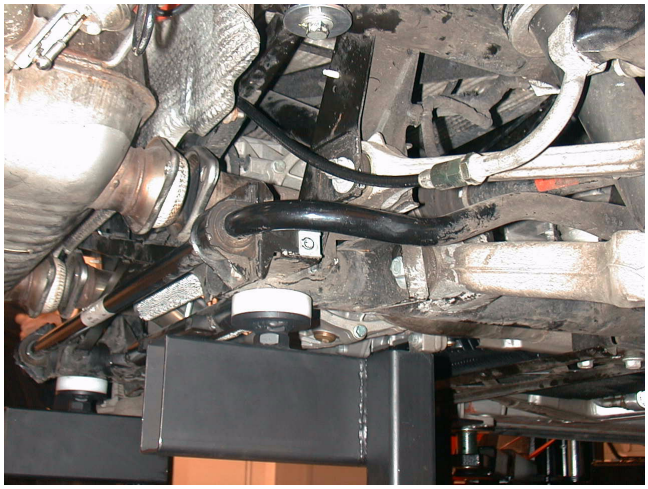




Rear Mounts







Ball Joint Splitter (204-523)

Track Rod Ends

To access the vertical link lower ball joint.

1. For each affected wheel station, slacken road wheel nuts ¼ turn each. Raise vehicle and make safe.
2. Remove road wheel(s).
3. Install service tool No. 204-524 to the front hub.

   Place a support under service tool No. 204-524. Lower vehicle enough to raise the suspension to ride height.

PowerTrain Trolleys Brace Bars (303-F715-06)

Image to follow



4. Insert service tool No. 204-523.

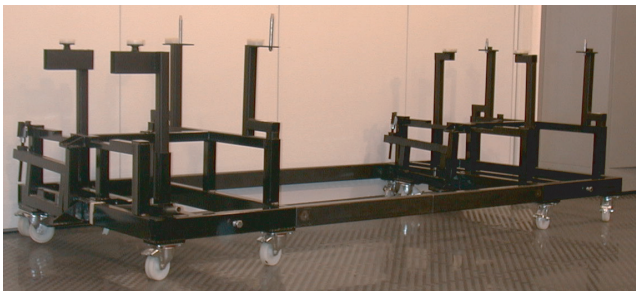


Image to follow

Vertical Link

To access upper and lower ball joints on the vertical link:

Note steering geometry settings before removing upper control arm.

1. Remove upper control arm from body. Allow the vertical link and lower arm to fall forward.
2. Top and bottom ball joints can then be accessed.

Brake Hose Check (206-100)

Front Brake Caliper

Caution
Ensure that the alignment line on the flexible brake pipe remains in a straight line.

Caution
On LH and RH calipers the brake pipe must route towards the front of the car.

1. Insert the brake pipe union to the caliper.
   - Ensure that the flex hose alignment line is straight
   - Ensure that the brake pipe elbow faces forward.

   Torque to **22 Nm**.
2. Install the brake pipe alignment tool. Check that the brake pipe orientation is correct:
   - The flex hose alignment line is straight
   - The brake pipe faces forward and locates correctly in the alignment tool





3. If the alignment is **not** correct, carefully back off the pipe union at the brake calliper until the pipe can be rotated backwards to allow forward movement when being re-torqued. Re torque the brake pipe union to **22 Nm** then re check alignment as detailed above.

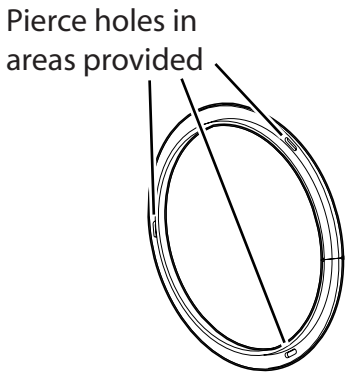
Crankshaft Rear Oil Seal Remove (TBA)

Caution
Throughout this procedure it is essential that all parts remain clean, free of dirt, grease and debris.

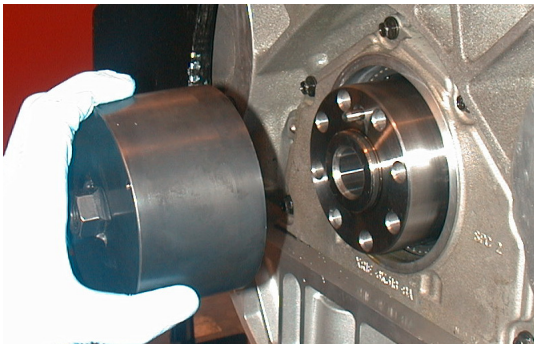
1. Using the sleeved punch (supplied with the new oil seal kit), pierce three equally spaced holes in the oil seal slinger.

There are three weak areas on the slinger, indicated in the image below.



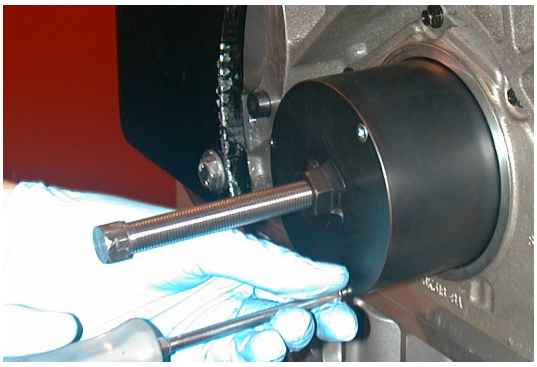


2. Place the oil seal removal tool into position.



3. Line up the three holes in the oil seal removal tool with the three pierced holes in the oil seal slinger.

4. Insert three screws (supplied with the new oil seal kit) into the three holes provided in the oil seal removal tool.



Screw the three screws in enough to attach to the oil seal slinger. Insert the oil seal removal tool bolt.

5. Turn the bolt of the oil seal removal tool clockwise to withdraw the oil seal slinger.
6. Remove the oil seal slinger, the three screws and the bolt from the oil seal removal tool.

Caution
Ensure that the oil seal removal tool is clean, free of dirt, grease and debris.

7. Using the oil seal removal tool, carefully knock the crankshaft oil seal through the oil seal housing.

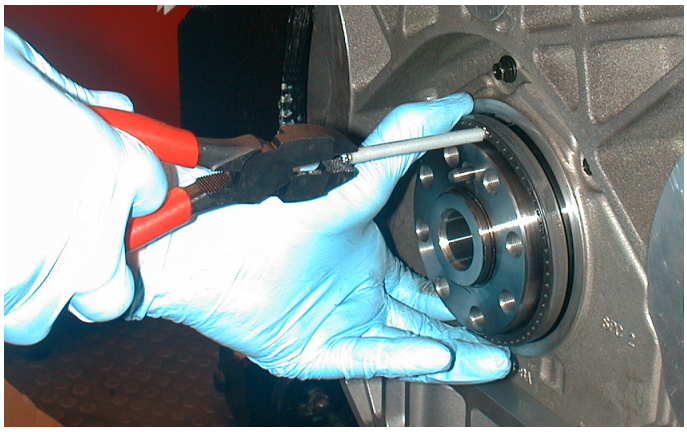
The oil seal will stop against the crankshaft / engine block web.



8. Using the sleeved punch (supplied with the new oil seal kit), pierce a hole in the crankshaft oil seal at the top (12 o'clock) only.



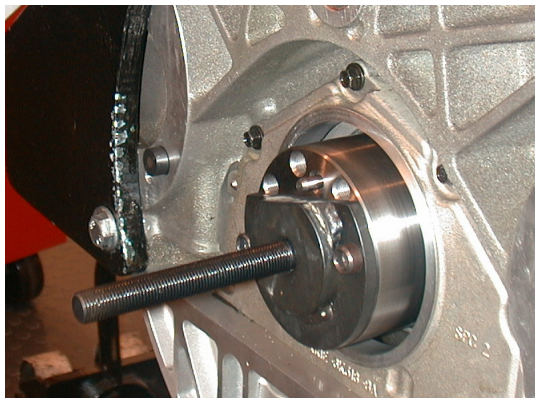
9. Screw the sleeved screw (supplied with the new oil seal kit) into the pierced hole enough to attach to the crankshaft oil seal.
10. Pull the crankshaft oil seal from the seal housing and the crankshaft.



Crankshaft Rear Oil Seal Install (No. TBA)

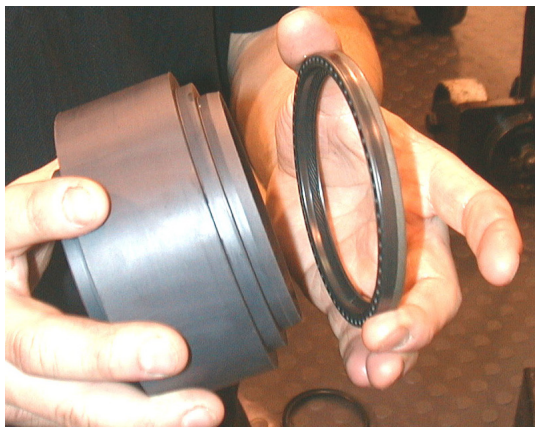
Caution
Throughout this procedure it is essential that all parts remain clean, free of dirt, grease and debris.

1. Install the bolt assembly of the oil seal install tool.

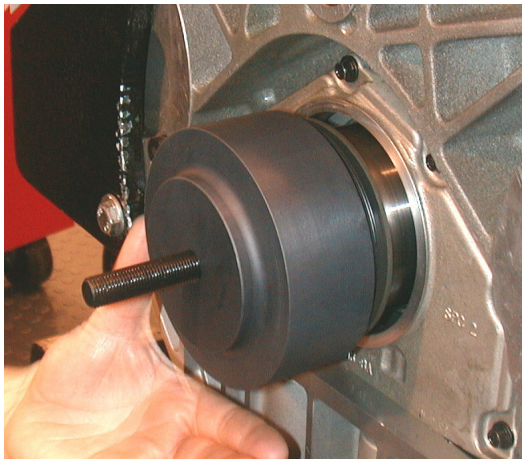


2. Place the oil seal to the oil seal installation tool.

The holes on the oil seal facing outward (away from the engine block).

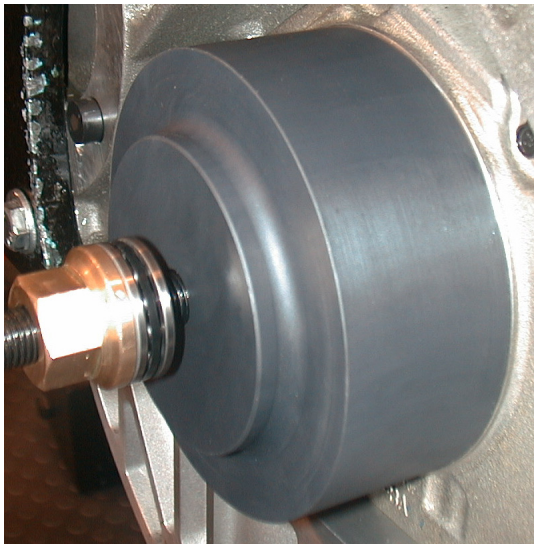


3. Wipe the lip of the new oil seal with clean engine oil.
4. Place the seal install tool, complete with the new oil seal, into position and install the nut and bearing assembly.



5. Wind the nut and bearing assembly in until the oil seal install tool bottoms out on the oil seal housing.

When the oil seal install tool has bottomed out on the oil seal housing the new oil seal has been installed to the correct depth.



6. Remove the oil seal install tool. Do not remove the bolt assembly.
7. Using the oil seal slinger install tool repeat from step two to install the oil seal slinger.

The oil seal slinger installs one way only on the oil seal slinger install tool.



Maintenance Schedules

1000mls	10000mls	20000mls	
1500km	**16000km**	**32000km**	
3 months	**12 months**	**24 months**	
Road Test Evaluation			
x	x	x	Pre-Maintenance Road Test Evaluation
Fluids, Filters and Leaks Checks			
x	x	x	Renew engine oil
x	x	x	Renew engine oil filter
x	x	x	Check for engine oil leaks
-	x	x	Renew air cleaner elements
x	x	x	Check manual transaxle for leaks
48,000 km (30,000 mile)			Renew manual transaxle oil and filter
x	x	x	Check auto gearbox for leaks / top up if required
x	x	-	Check differential for leaks, top up if required (automatic)
-	-	x	Renew differential oil (automatic)
5 Years			Renew engine coolant - check S.Gravity
x	x	x	Check / top-up engine coolant
x	x	x	Check cooling and heating systems for leaks
x	x	x	Check for fuel leaks
2 years			Renew brake / clutch fluid
x	x	x	Check / top-up brake / clutch fluid reservoir
x	x	x	Check / top-up power steering reservoir
x	x	x	Check power steering system for leaks
x	x	x	Check brake hoses, pipes and unions for leaks
x	x	x	Check suspension dampers for leaks
x	x	x	Top-up windscreen washer reservoir
x	x	x	Check exhaust system for leaks
x	x	x	Check operation of exhaust by-pass valves
x	x	x	Check A/C system for leaks
-	-	x	Renew pollen filter

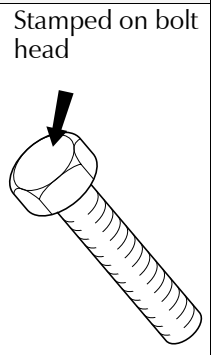
1000mls	10000mls	20000mls	
1500km	16000km	32000km	
3 months	12 months	24 months	
Mechanical Function Checks			
-	x	x	Lubricate all door locks and hinges
x	x	x	Check / adjust all drive belt tensions, renew if necessary
x	x	x	Lubricate handbrake links and cables
x	x	x	Check handbrake security
48,000 km (30,000 mile)			Check condition of handbrake pads
-	x	x	Inspect brake pad and warning leads for wear. Replace if 60% worn
-	x	x	Inspect condition of discs
-	x	x	Check wiper blade inserts. Renew if necessary
48,000 km (30,000 mile)			Renew wiper blades
48,000 km (30,000 mile)			Clean out coolant radiator and A/C condenser
x	x	x	Check condition and operation of all seat belts
x	x	x	Check security of exhaust system mountings and heatsheilds
x	x	x	Check brake hoses, pipes and unions
x	x	x	Check power steering pipes and unions for corrosion and mechanical defects
x	x	x	Check security and condition of fuel hoses
x	x	x	Check cooling system hoses security and condition
x	x	x	Check A/C hoses security and condition
x	x	x	Check condition and security of steering unit joints and gaiters
x	x	x	Check security and condition of suspension fixings
x	x	x	Check security and condition of suspension ball joints, gaiters and bushes
-	-	x	Check tightness of driveshaft bolts
x	x	x	Check interior rear view mirror for security and function
-	-	x	Check the condition of wheel arch liners
Electrical Function Checks			
112,000 km (70,000 mile)			Renew spark plugs
x	x	x	Check / record battery voltage
x	x	x	Clean and grease battery connections
x	-	x	Check and if necessary adjust headlight alignment
x	x	x	Check operation of all lights
x	x	x	Check operation of ABS warning lamp
x	x	x	Check operation of all warning indicators
x	x	x	Check audible warnings including security system
x	x	x	Check operation of the horns
x	x	x	Check operation of the windscreen wipers
x	x	x	Check exterior rear view mirrors for security and function
x	x	x	Interrogate DTC P codes / Rectify if required
x	x	x	Check service interval indicator. Reset
x	x	x	Check / operate battery disconnect switch
x	x	x	Check / operate battery connect switch
x	x	x	Check / operate electric windows
x	x	x	Check / operate powerfold mirrors (option)
x	x	x	Check windscreen washers and jets

1000mls	10000mls	20000mls	
1500km	16000km	32000km	
3 months	12 months	24 months	
Wheels and Tyre Checks			
x	x	x	Check for correct tyre size, type and rotation
x	x	x	Check colour coded valve collars for correct location (Tyre pressure monitoring)
x	x	x	Check and report tyre tread depth
x	x	x	Check tyres for uneven / excessive wear or damage
x	x	x	Check / adjust tyre pressures
x	x	x	Check torque of road wheel nuts
x	x	x	Check road wheel rims for inner and outer damage.
x	x	x	Check operation of tyre pressure sensors
x	x	x	Check 'use by' date of tyre repair kit
Anti Corrosion Check			
	x		Check body panels and underbody for corrosion starting from the inside - out (excluding stone chips).
Gear Change Modes			
x	x	x	Auto
x	x	x	Sport
x	x	x	Touchtronic
x	x	x	Reverse
Final Checks			
x	x	x	Degrease windscreen
x	x	x	Carry out road test - including operation of all auto gearbox modes
x	x	x	Check ABS and Traction Control operation
x	x	x	Check operation of all seat belts and buckles
x	x	x	Check that fuel filler bowl rain drain is clear

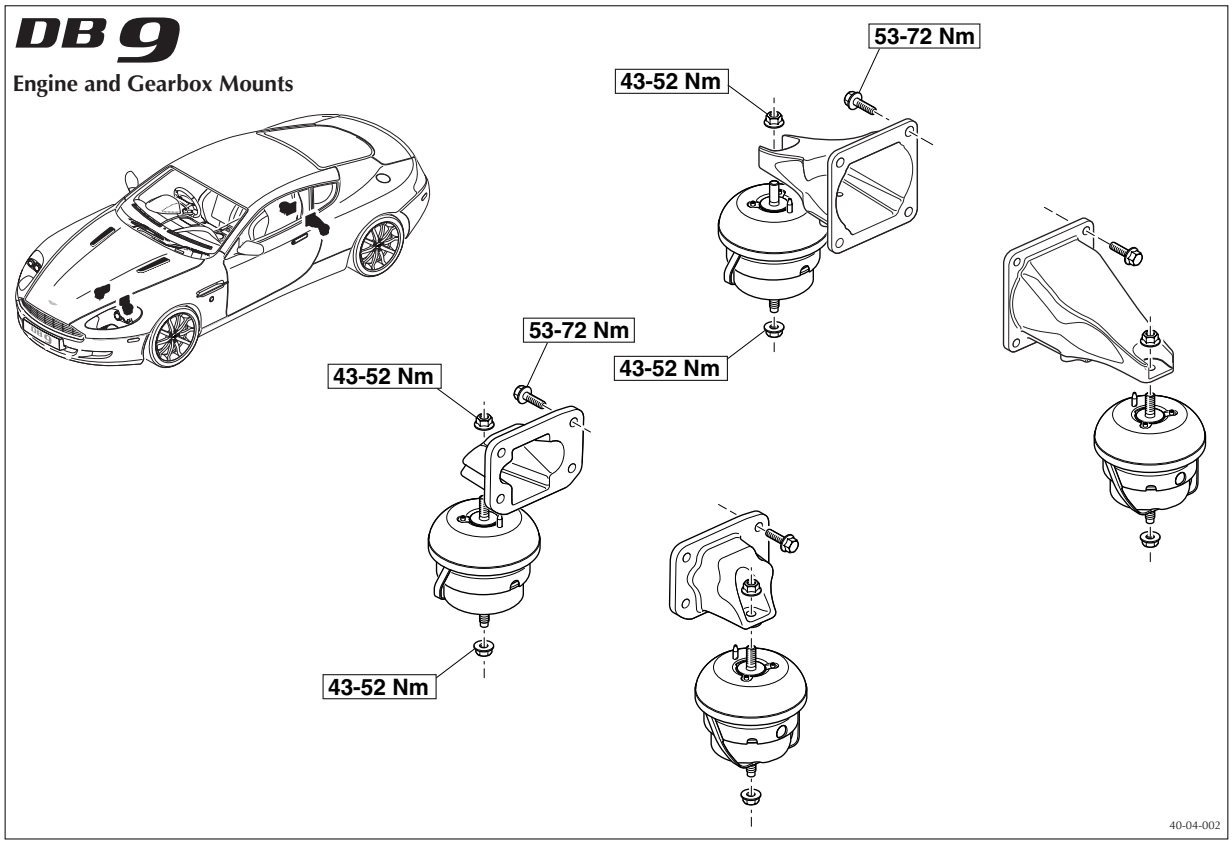
Torque Figures

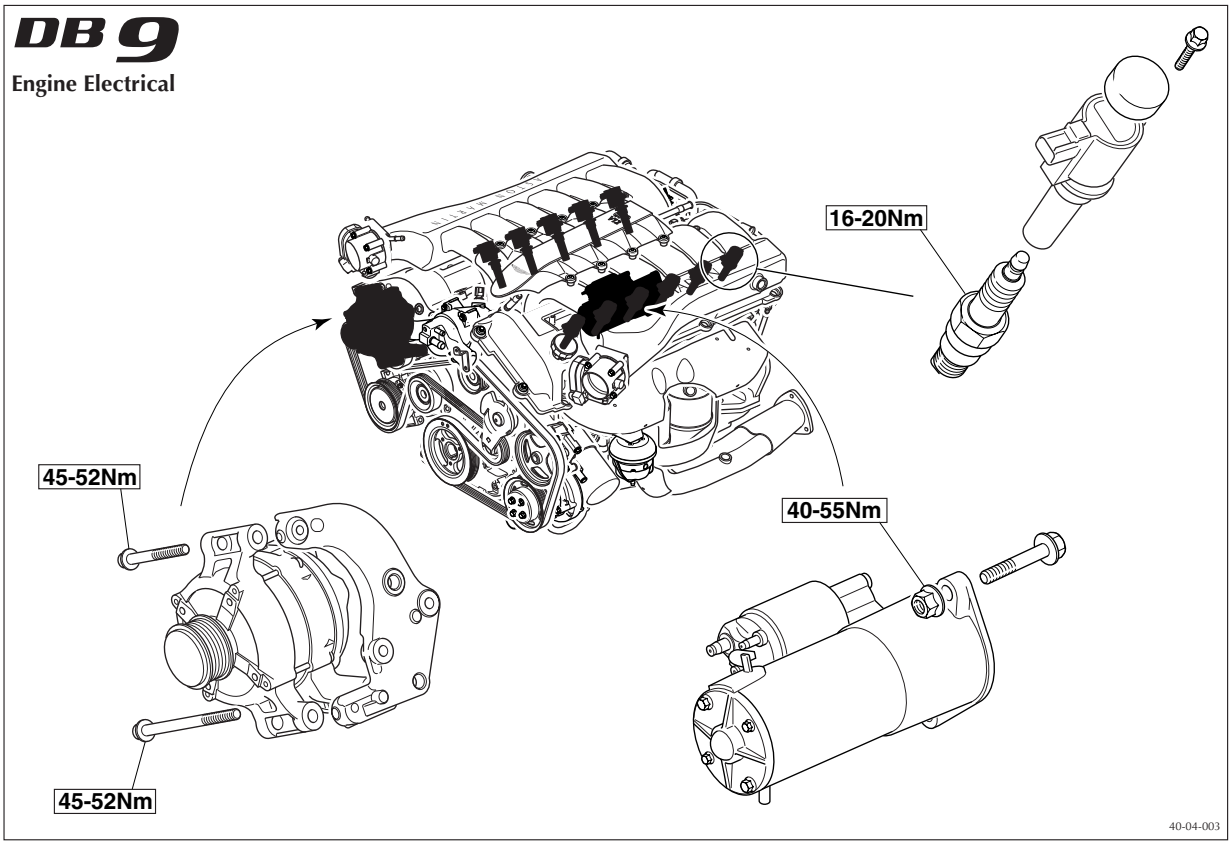
General Torque Figures

Nom. Dia.	Applied Torque (Nm)									
	4.6 & 4.82		8.8 / 8		9.8 / 9		10.9 & 10.9 / 10		12.9 / 12	
	Mean	+/-	Mean	+/-	Mean	+/-	Mean	+/-	Mean	+/-
M3	0.5	0.1	1.4	0.2	-	-	1.9	0.4	2.3	0.5
M4	1.2	0.2	3.1	0.6	-	-	4.5	0.8	5.2	1
M5	2.4	0.5	6.2	1.2	6.9	1.3	8.9	1.7	10.4	2
M6	4.1	0.8	10.4	2	11.8	2.3	15.2	2.7	17.5	3.3
M8	9.9	2	25	5	28	5.5	36	7	42	8
M10	19.5	3.9	50.5	9.5	56	10	72	13	84	16
M12	34.2	6.8	88	17	99	19	126	24	147	28
M14	54.4	10.9	140	28	157	30	200	40	235.5	46.5
M16	85	17.2	217.5	42.5	245	47	310	61	363.5	70.5
M18	116.7	23.4	313.5	58.5	-	-	433	80	509	94
M20	165	33	437.5	82.5	-	-	605	114	707	133
M22	225	45	602.5	102.5	-	-	832	157	974	187
M24	286	57	774	154	-	-	1070	213	1244	247
M27	417	83	1115	215	-	-	1547	298	1810	350
M30	567	113	1520	290	-	-	2102	402	2450	470
M33	722	154	2062	400	-	-	2856	551	3335	645
M36	994	199	2650	510	-	-	3664	703	4275	825
M39	1285	255	3435	660	-	-	4746	910	5545	1065



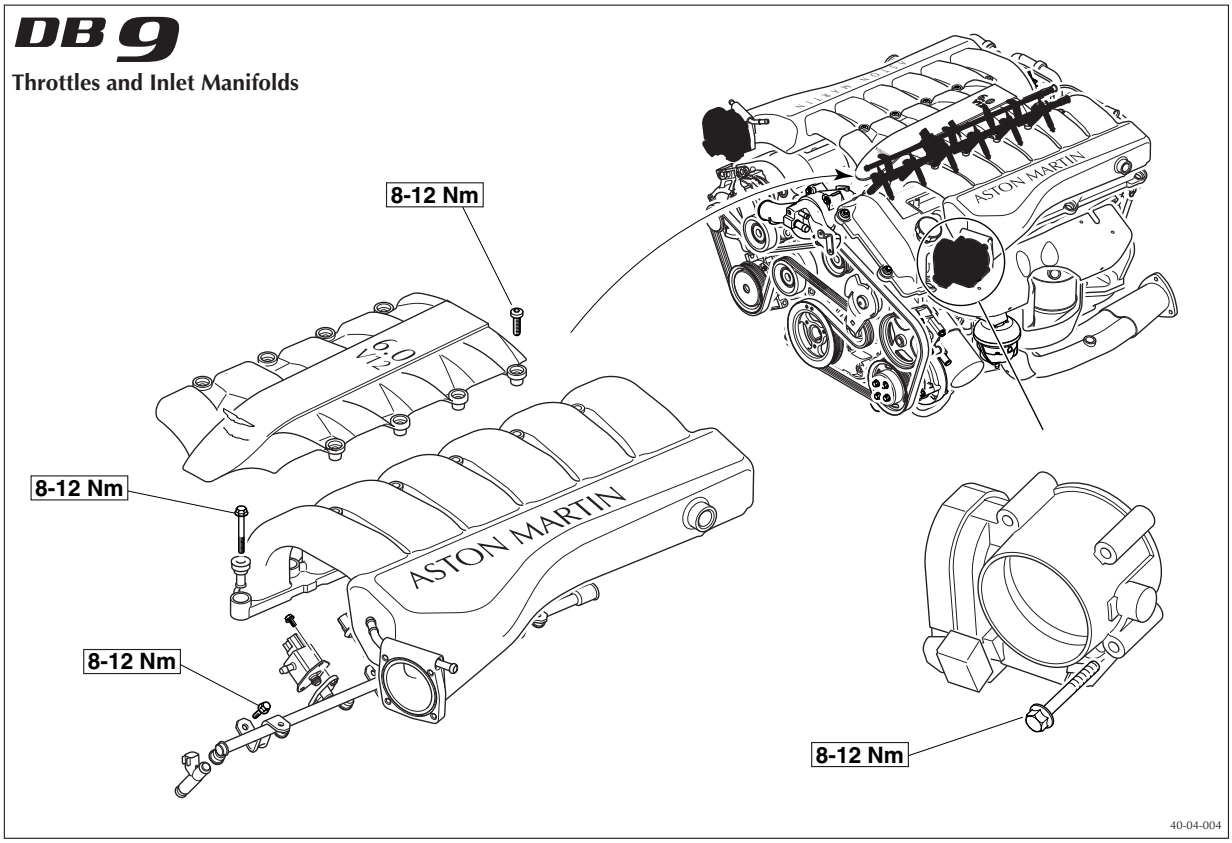
Vehicle Torque Figures





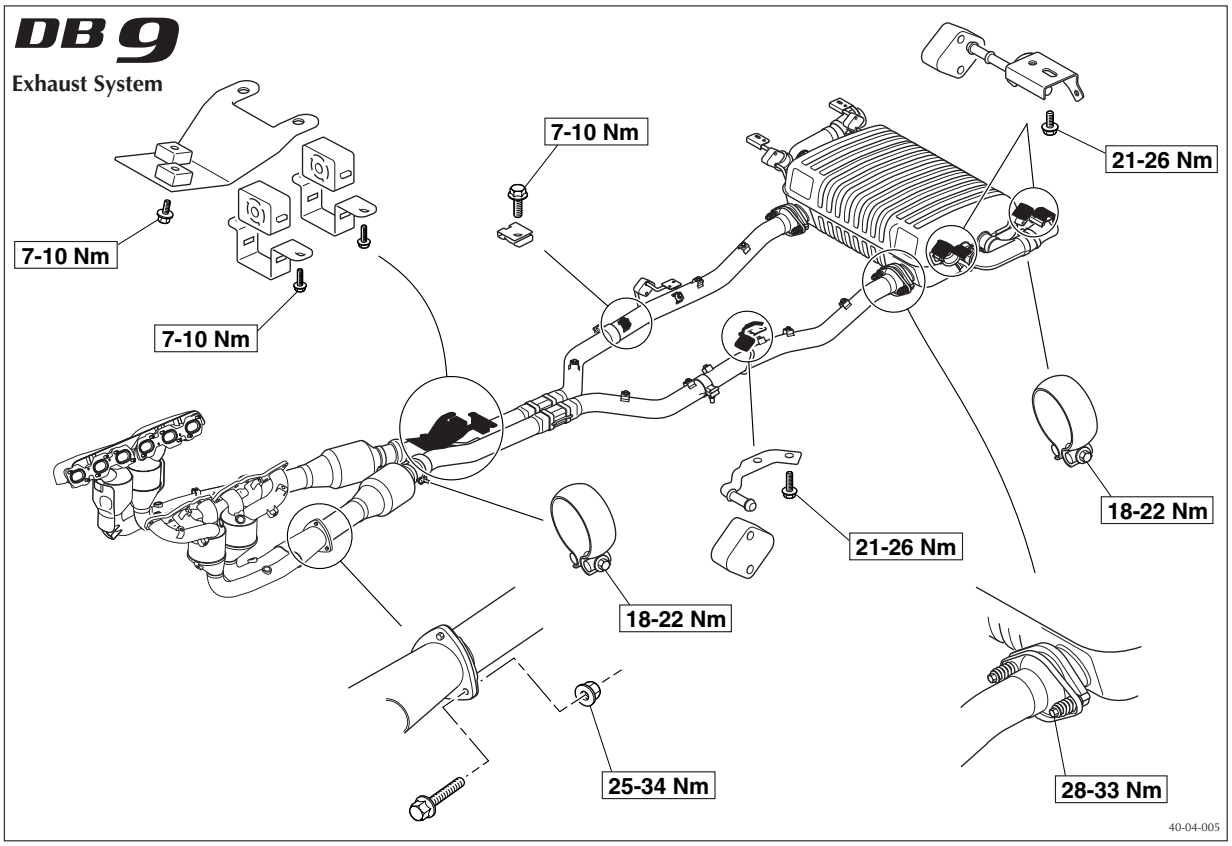
DB 9

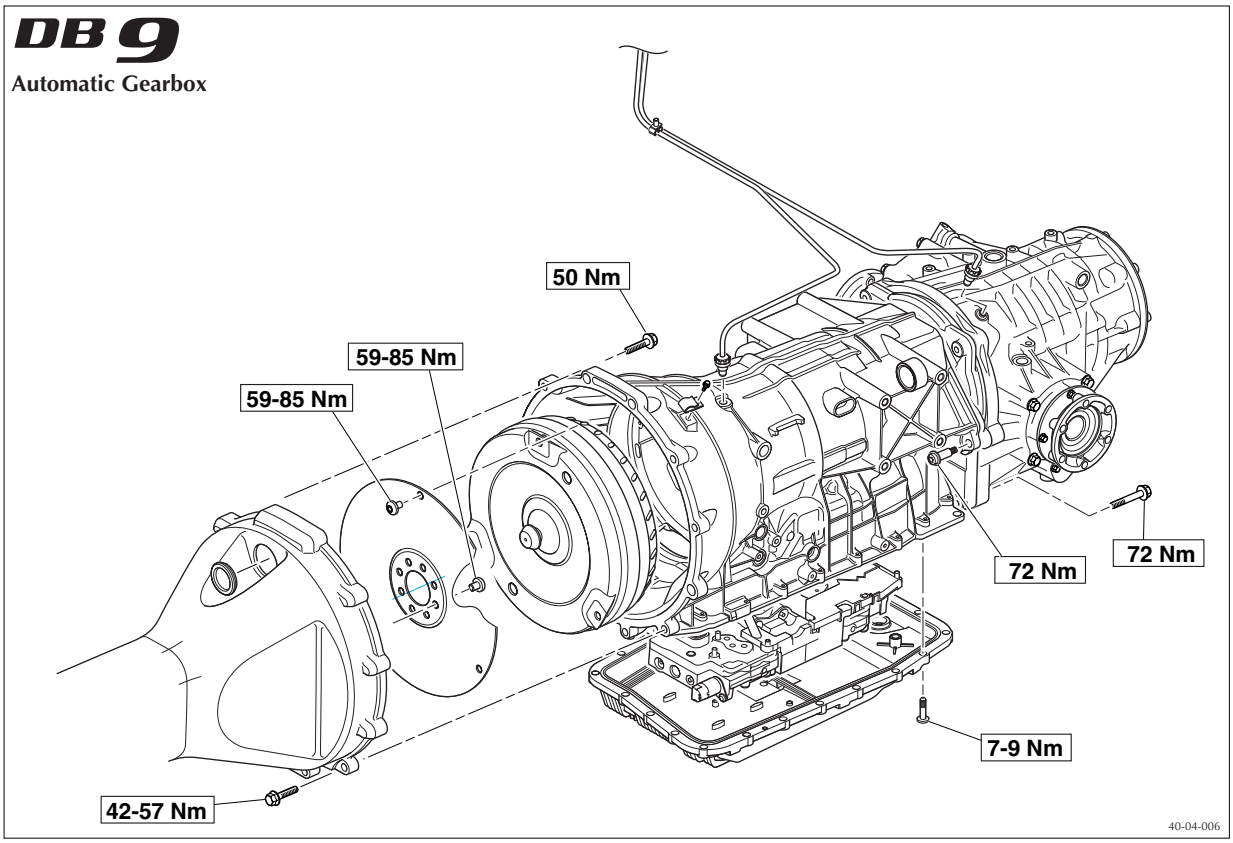
Throttles and Inlet Manifolds

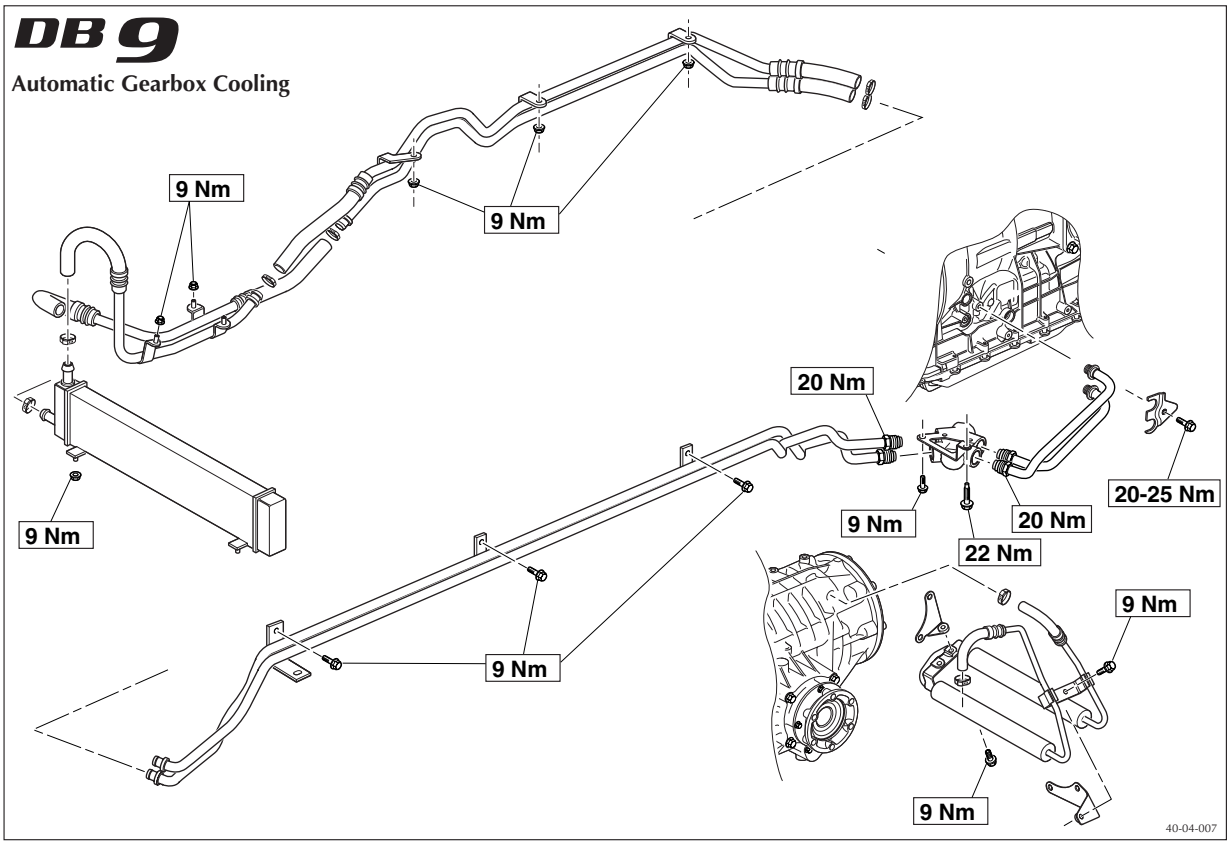


DB 9

Exhaust System

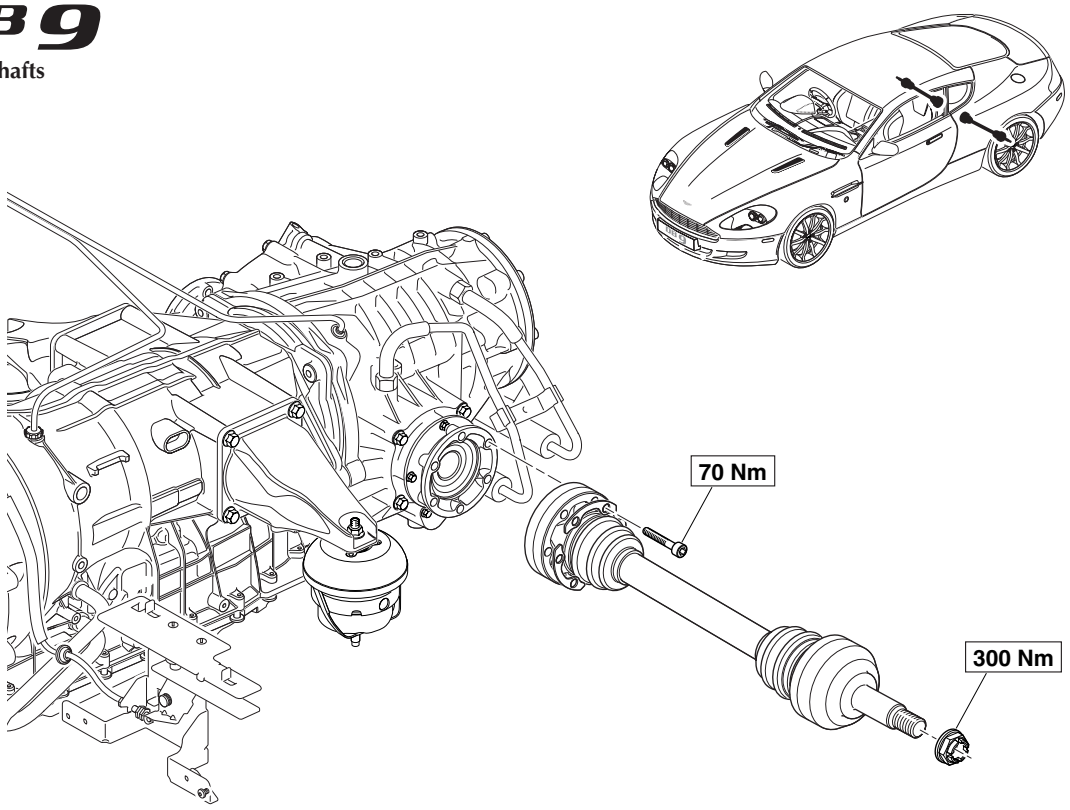



DB 9
Automatic Gearbox
50 Nm
59-85 Nm
59-85 Nm
72 Nm
72 Nm
7-9 Nm
42-57 Nm
40-04-006


DB 9
Automatic Gearbox Cooling
9 Nm
9 Nm
20 Nm
20-25 Nm
9 Nm
9 Nm
20 Nm
22 Nm
9 Nm
9 Nm
9 Nm
40-04-007

DB 9

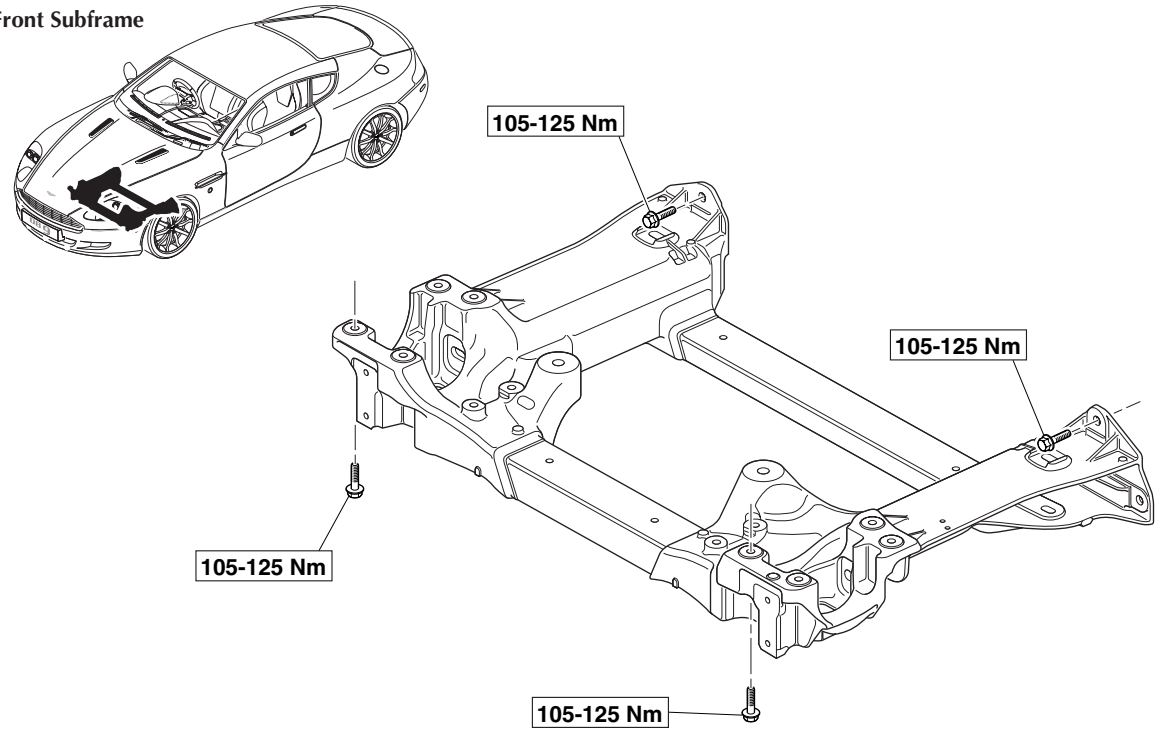
Driveshafts



40-04-008

DB 9

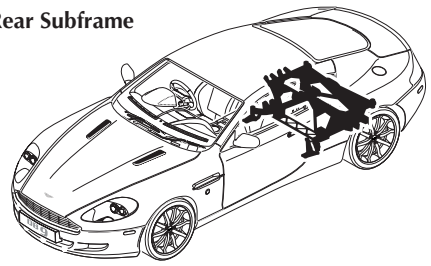
Front Subframe

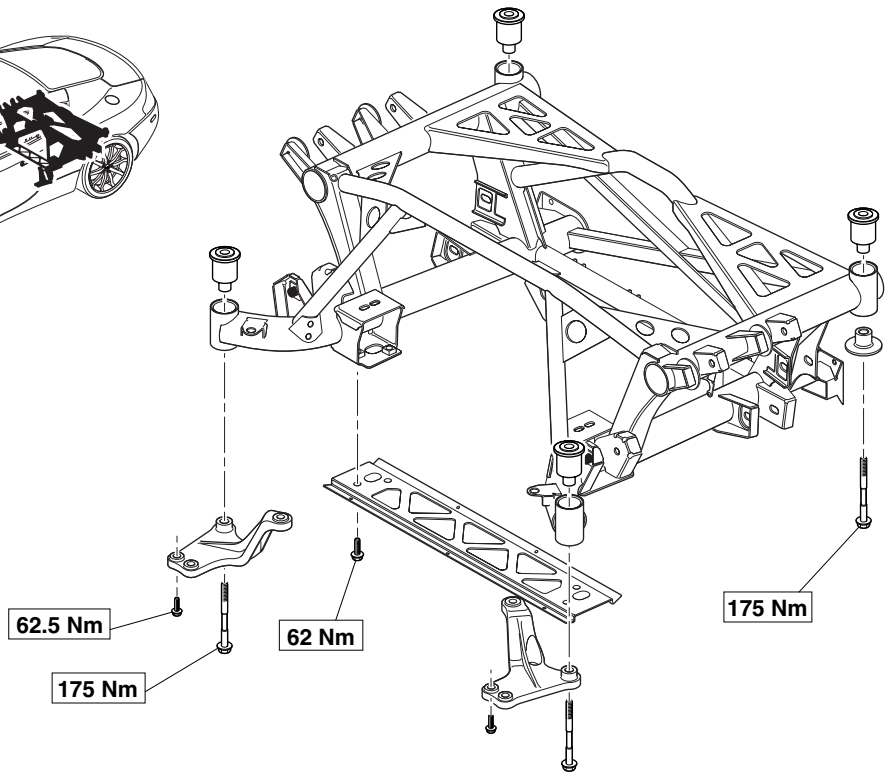


40-04-009

DB 9

Rear Subframe

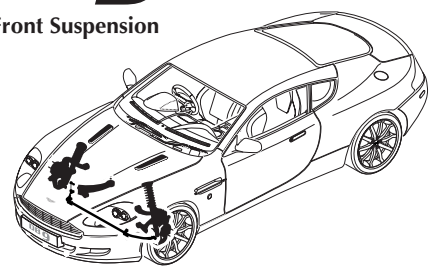


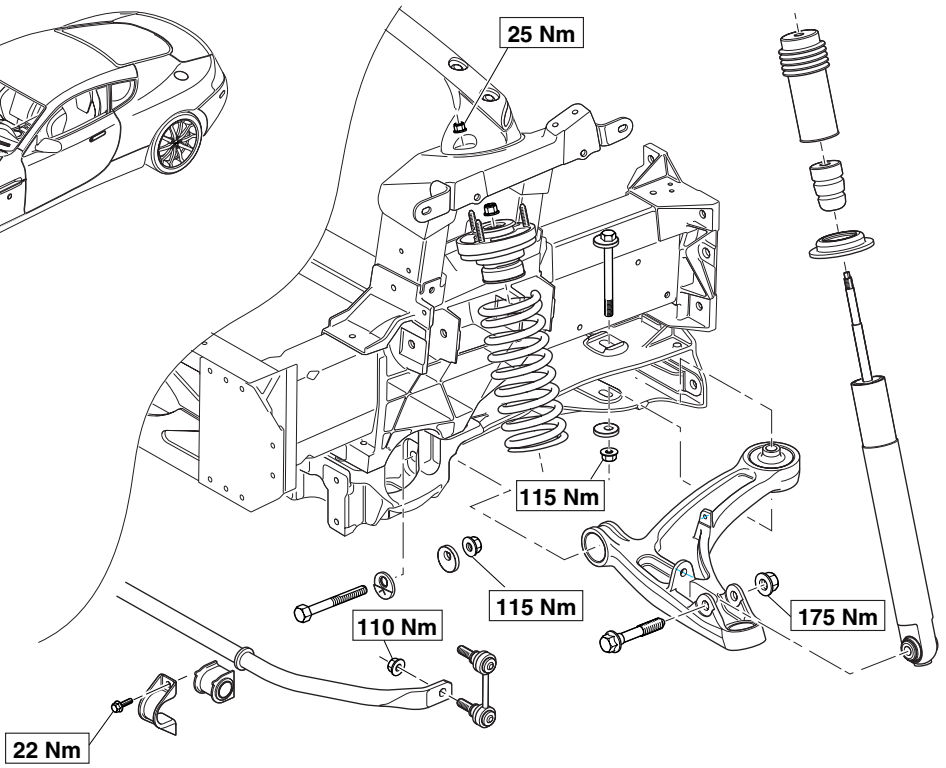


40-04-010

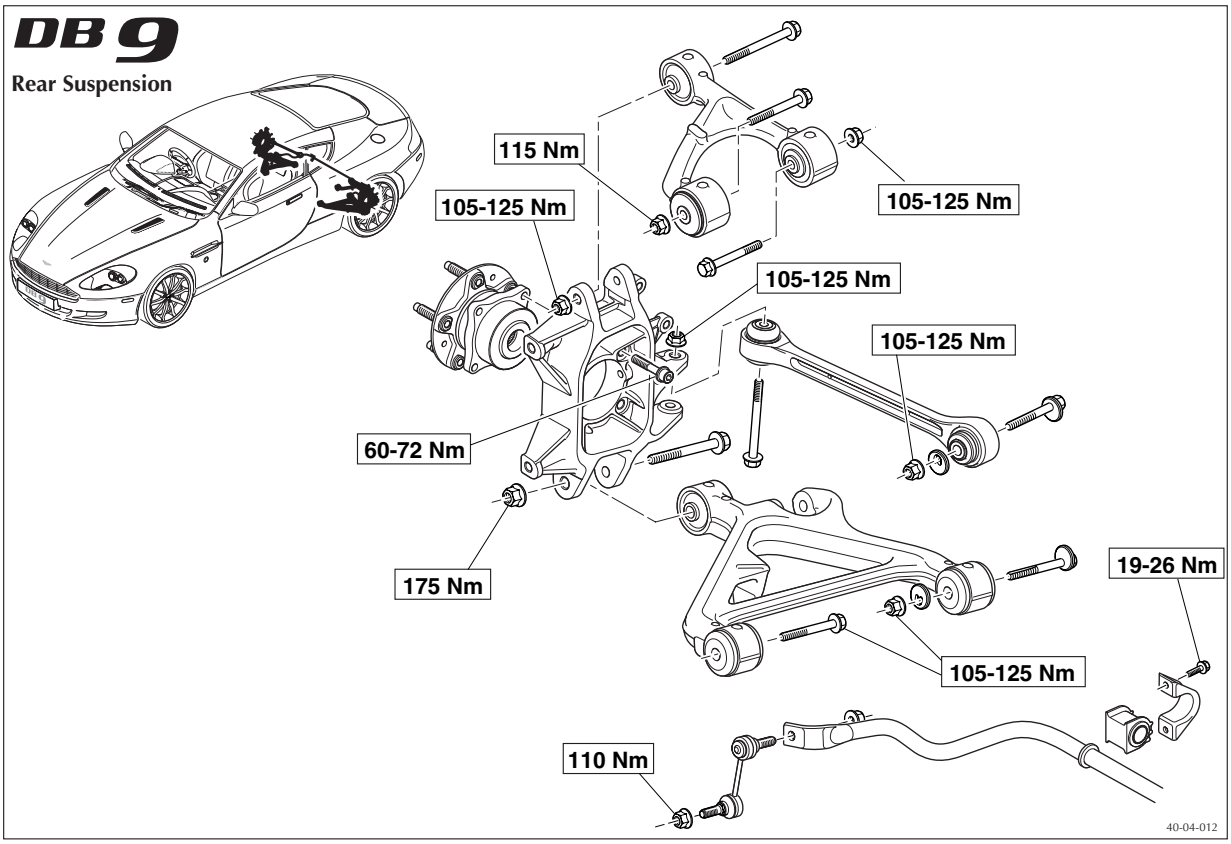
DB 9

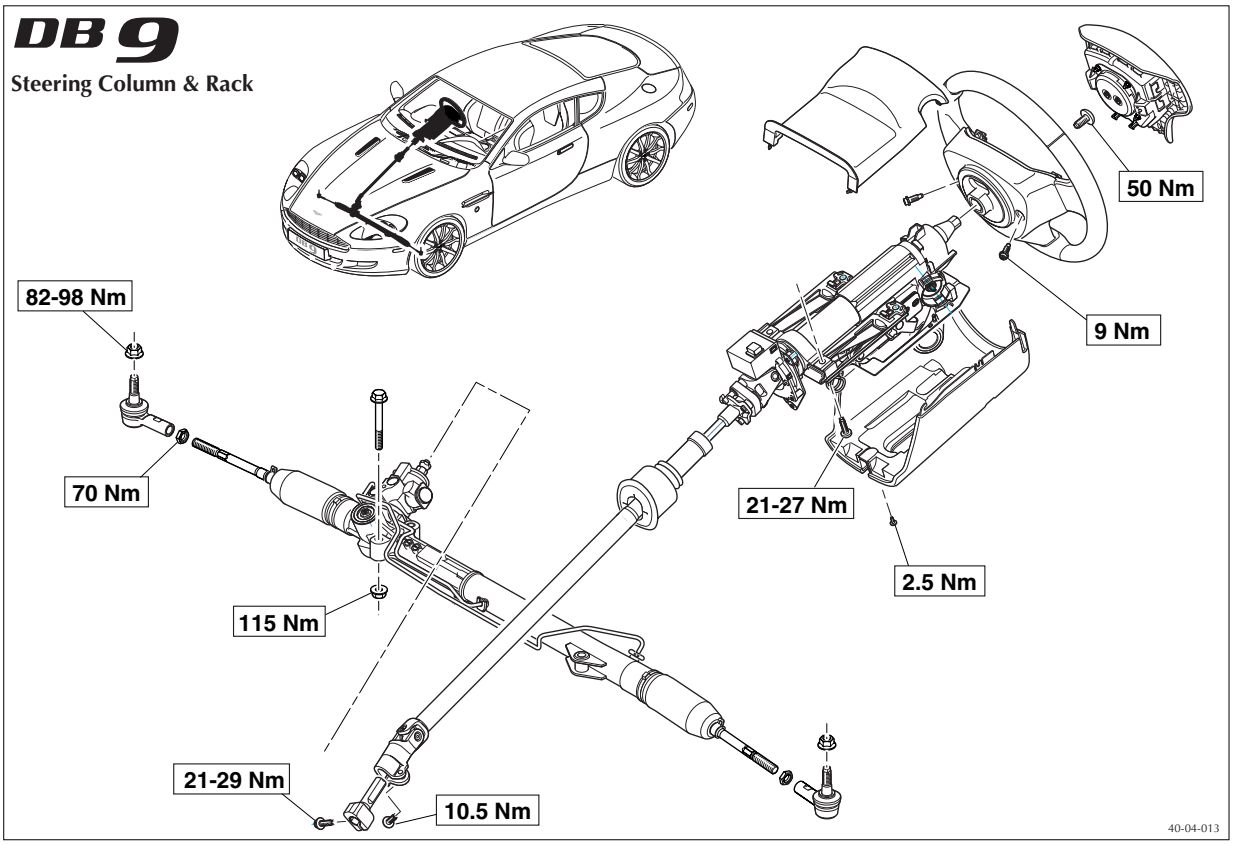
Front Suspension

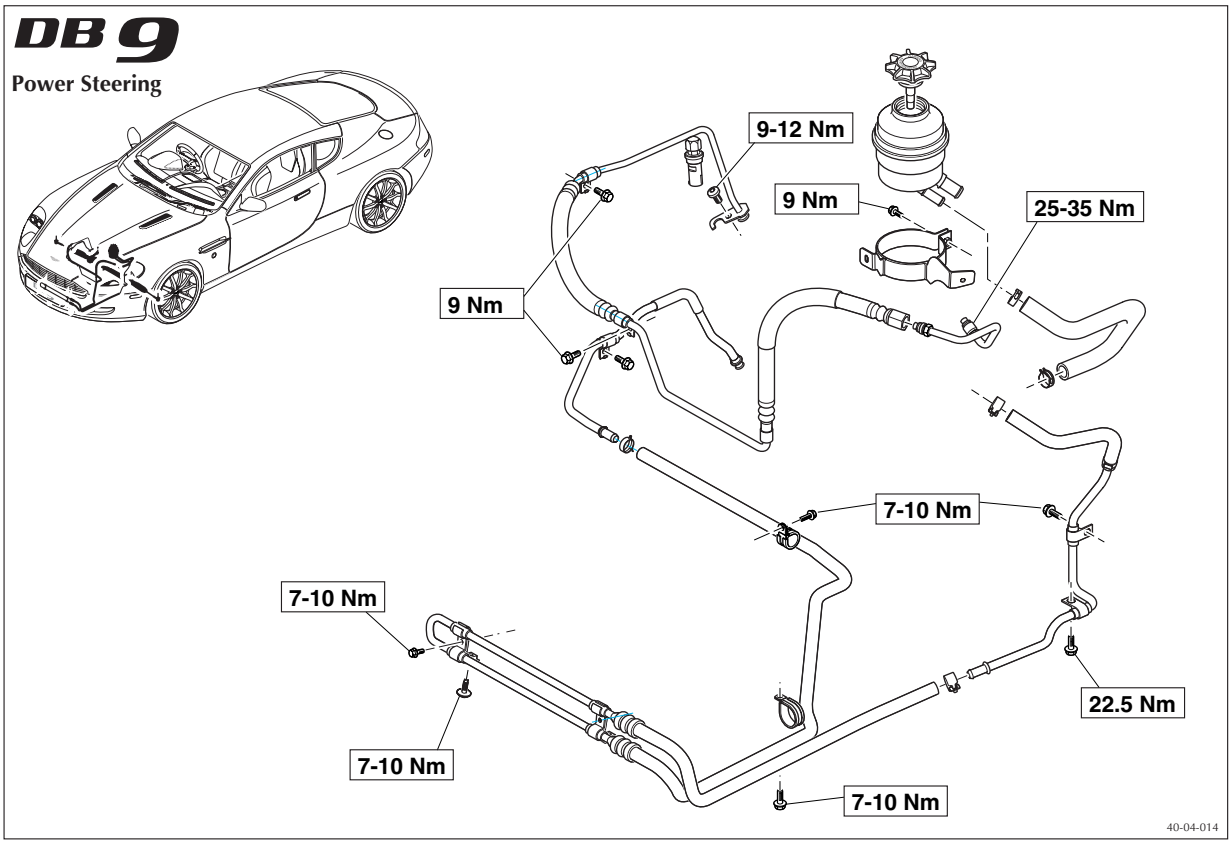


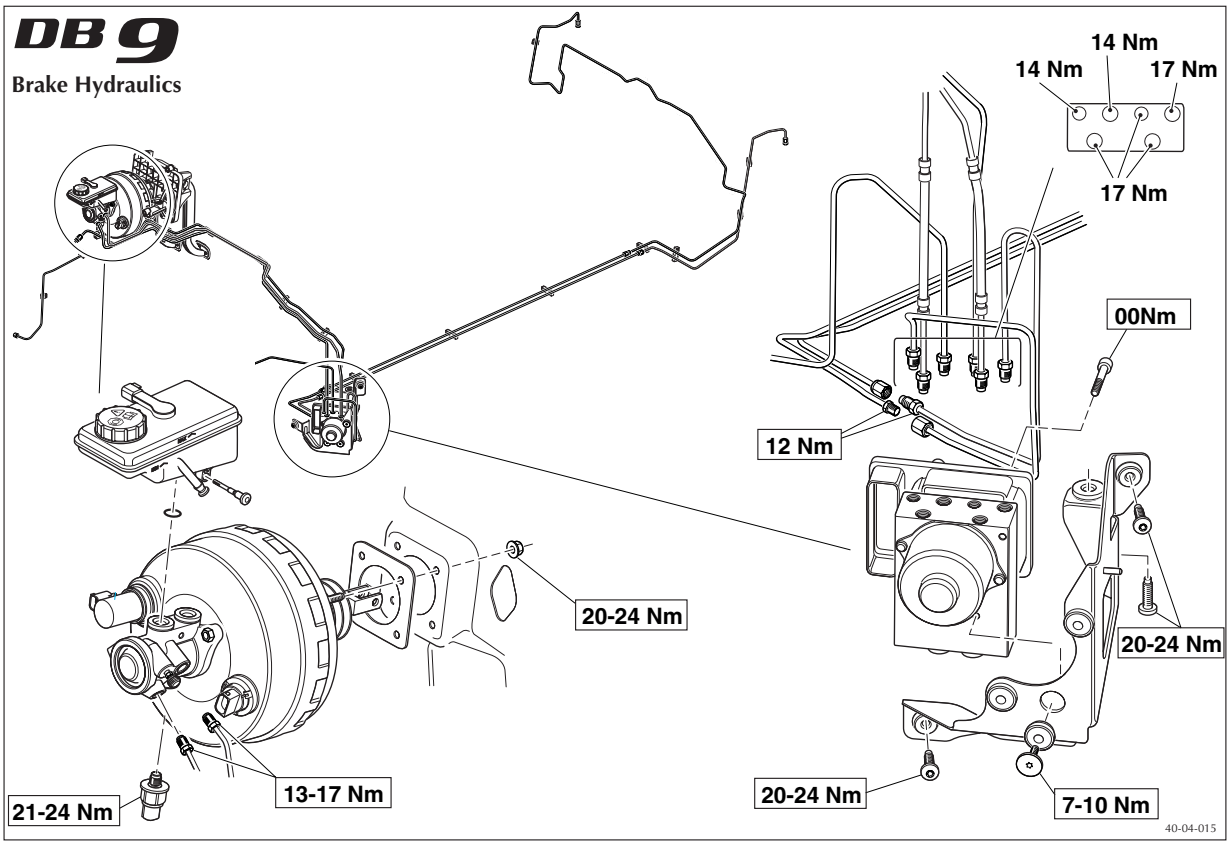


40-04-011


DB 9
Rear Suspension
115 Nm
105-125 Nm
105-125 Nm
105-125 Nm
105-125 Nm
60-72 Nm
175 Nm
19-26 Nm
105-125 Nm
110 Nm
40-04-012

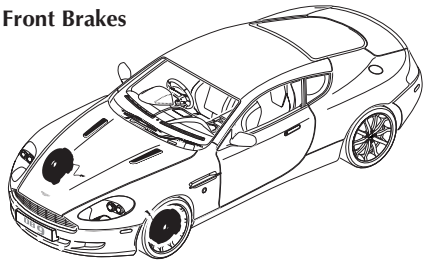

DB 9
Steering Column & Rack
50 Nm
82-98 Nm
9 Nm
70 Nm
21-27 Nm
2.5 Nm
115 Nm
21-29 Nm
10.5 Nm
40-04-013

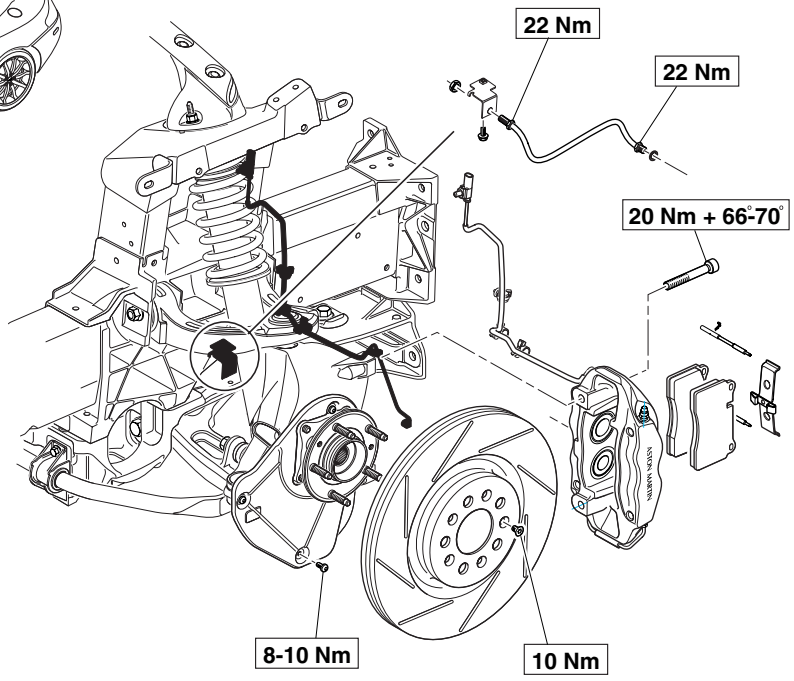

DB 9
Power Steering
9-12 Nm
9 Nm
25-35 Nm
9 Nm
7-10 Nm
7-10 Nm
7-10 Nm
22.5 Nm
7-10 Nm
40-04-014


DB 9
Brake Hydraulics
14 Nm
14 Nm
17 Nm
17 Nm
00Nm
12 Nm
20-24 Nm
20-24 Nm
21-24 Nm
13-17 Nm
20-24 Nm
7-10 Nm
40-04-015

DB 9

Front Brakes

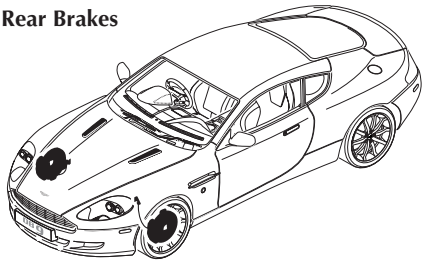


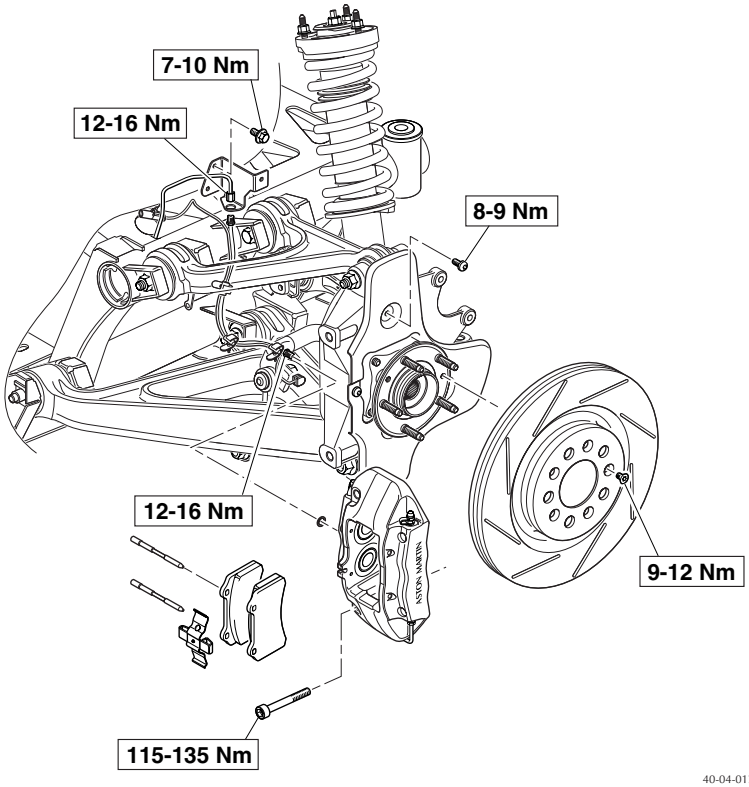


40-04-016

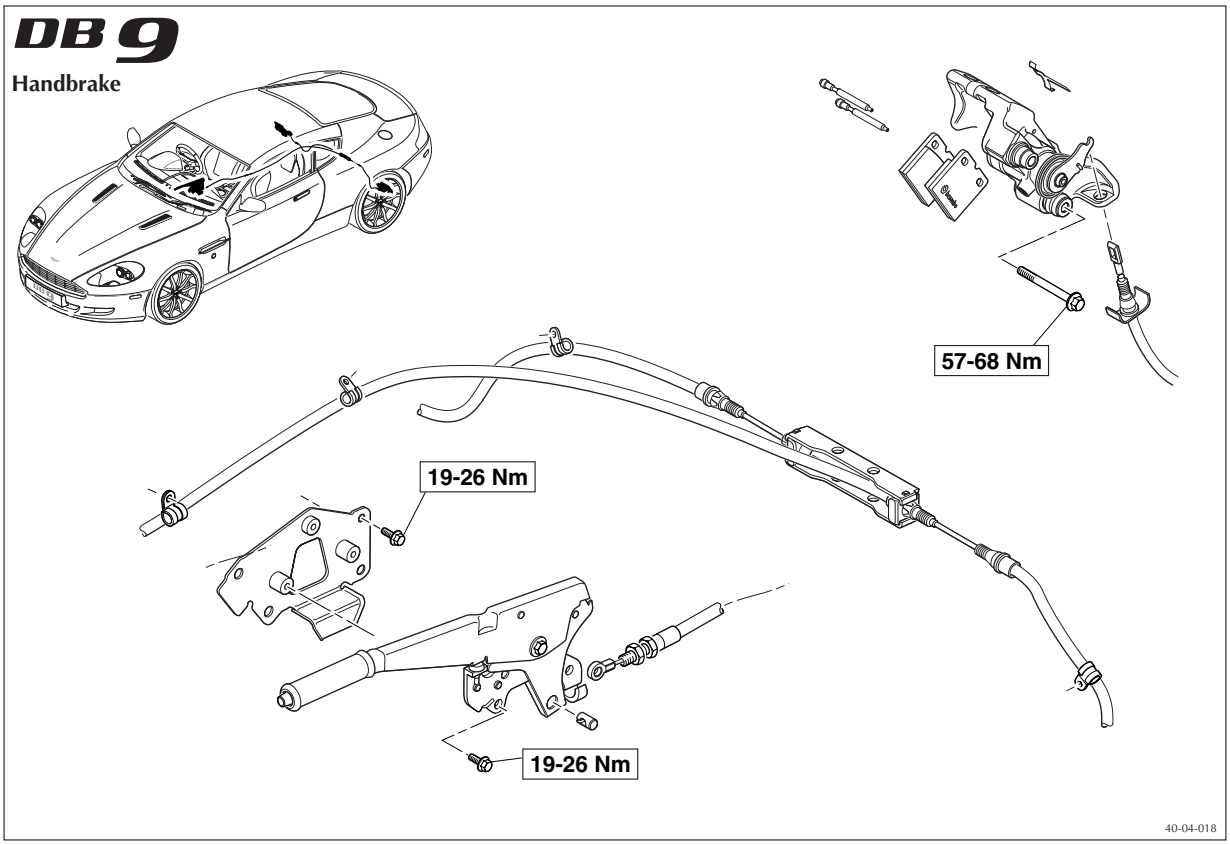
DB 9

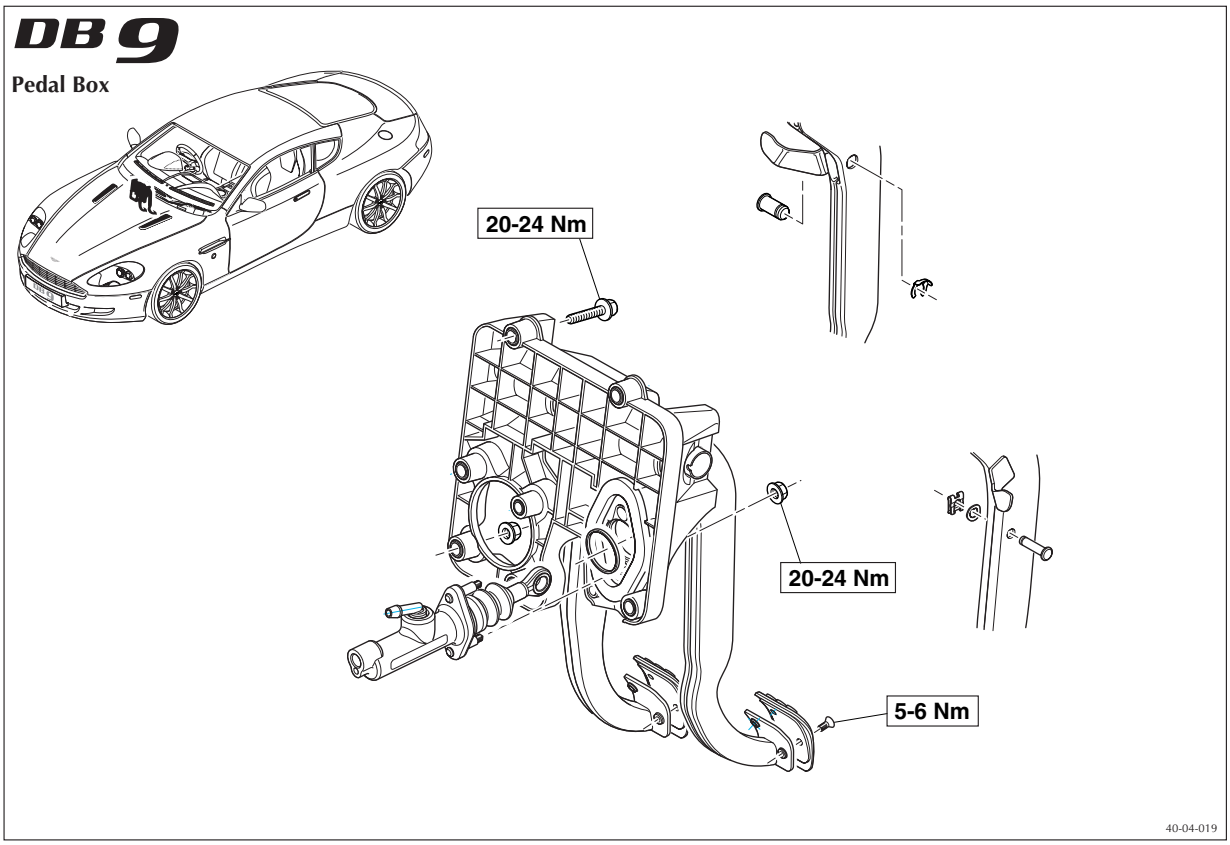
Rear Brakes





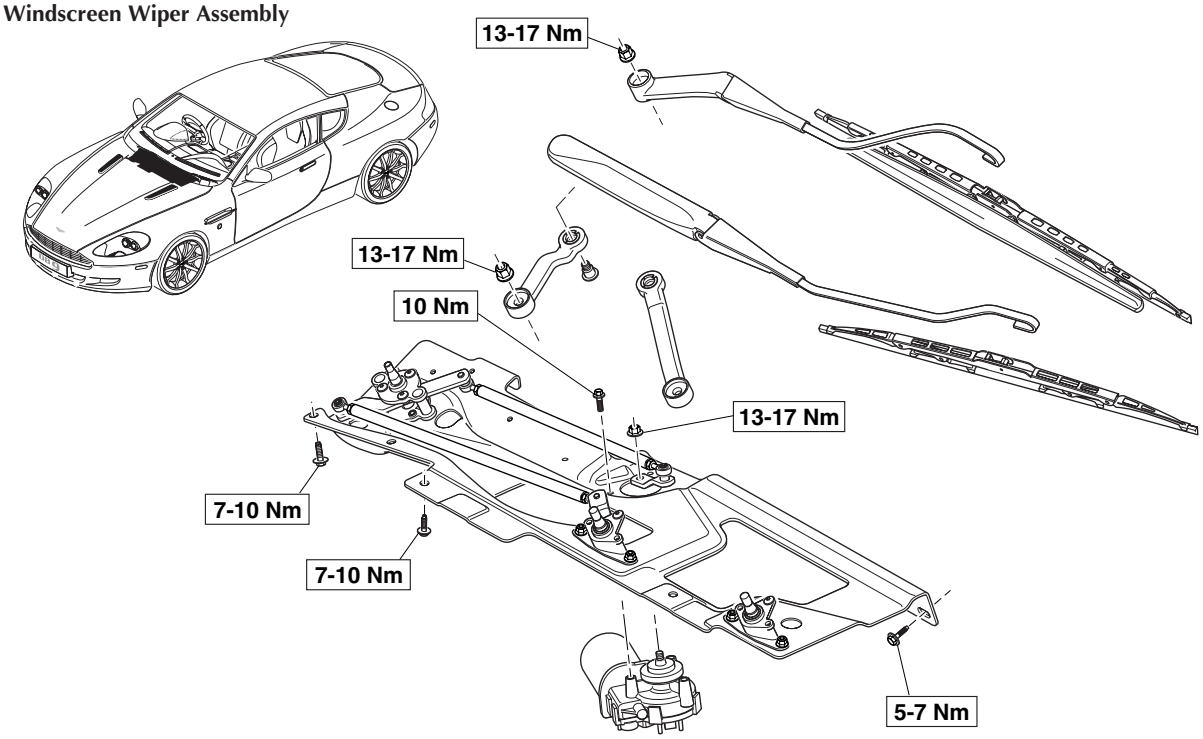
40-04-017


DB 9
Handbrake
57-68 Nm
19-26 Nm
19-26 Nm
40-04-018

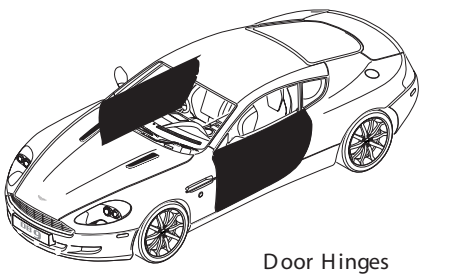

DB 9
Pedal Box
20-24 Nm
20-24 Nm
5-6 Nm
40-04-019

DB 9

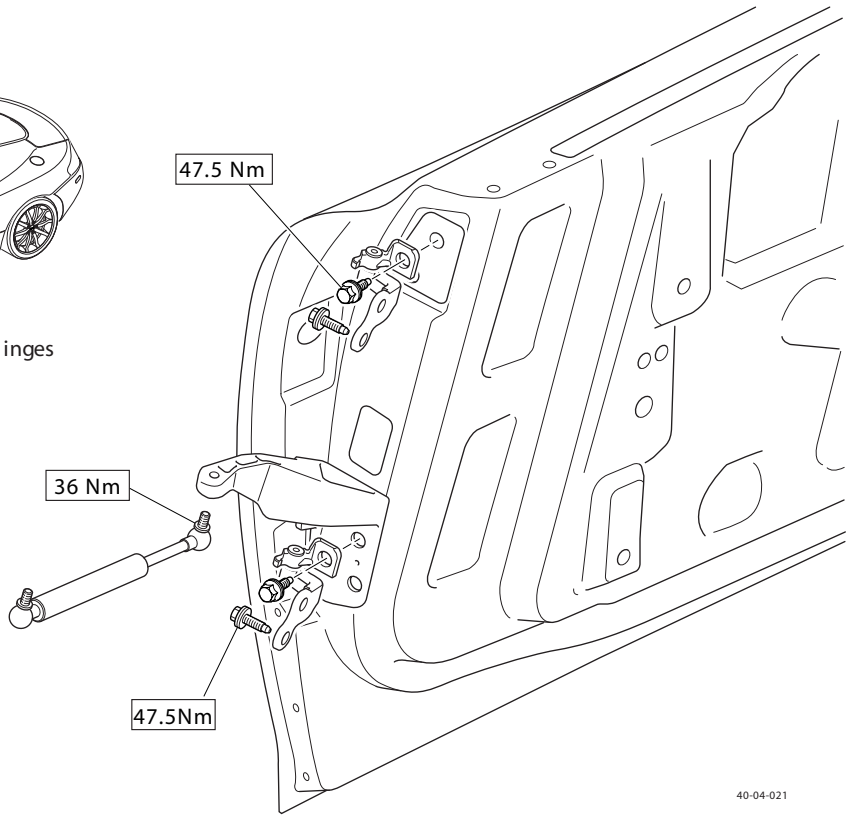
Windscreen Wiper Assembly



DB 9

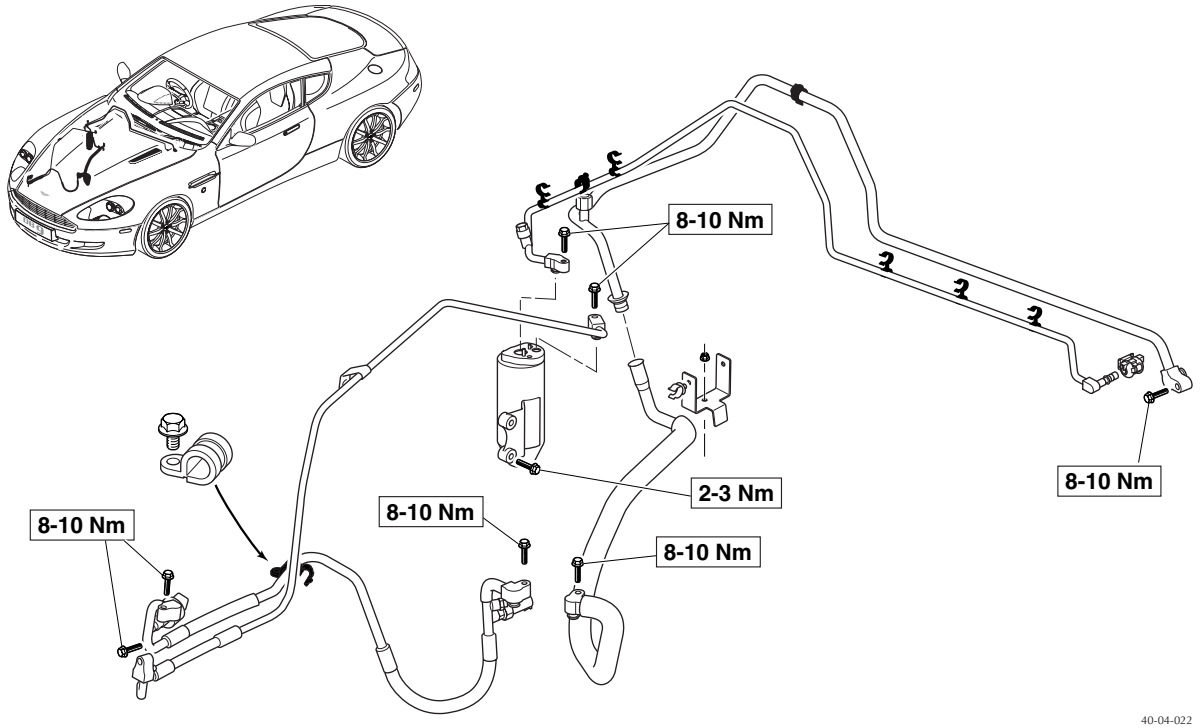


Door Hinges



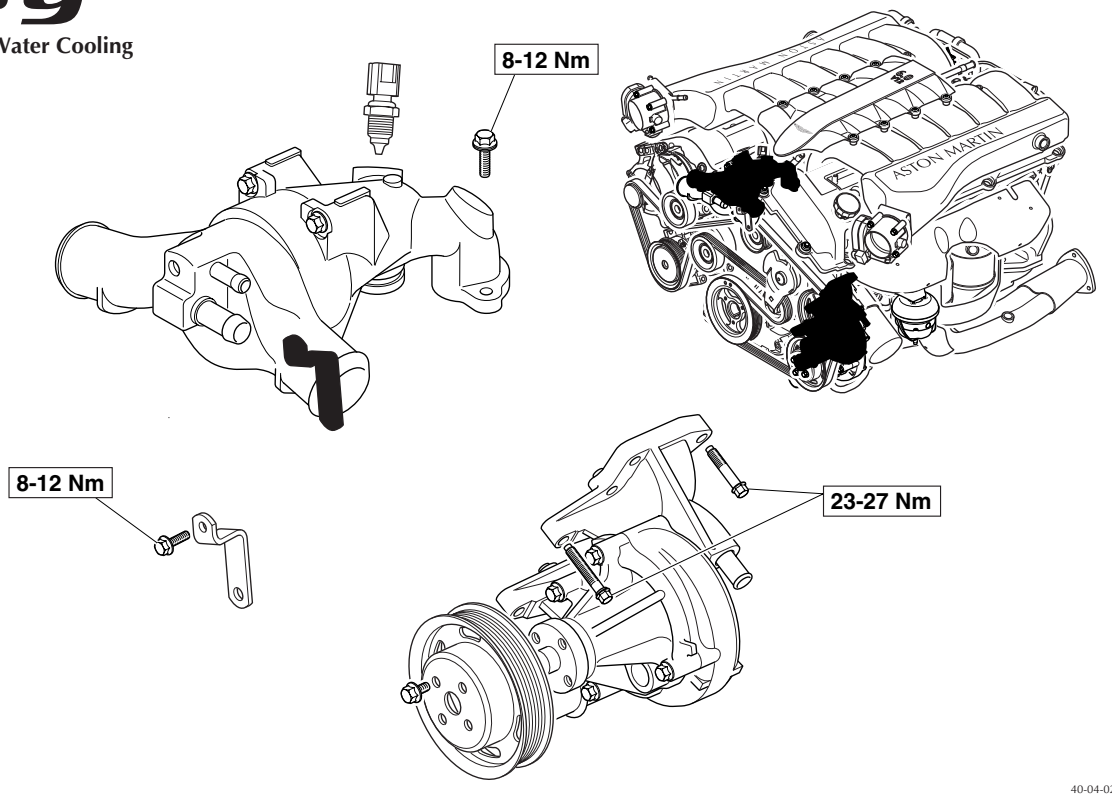
DB 9

Air Conditioning System



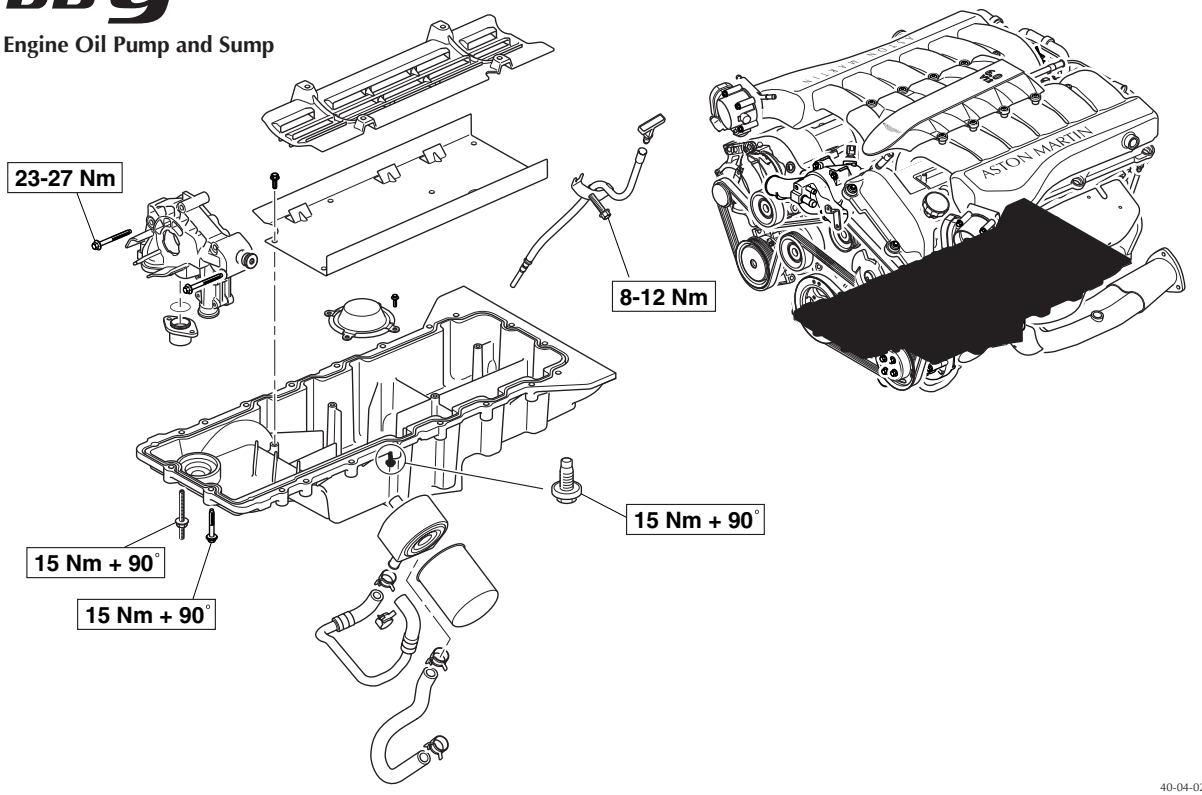
DB 9

Engine Water Cooling



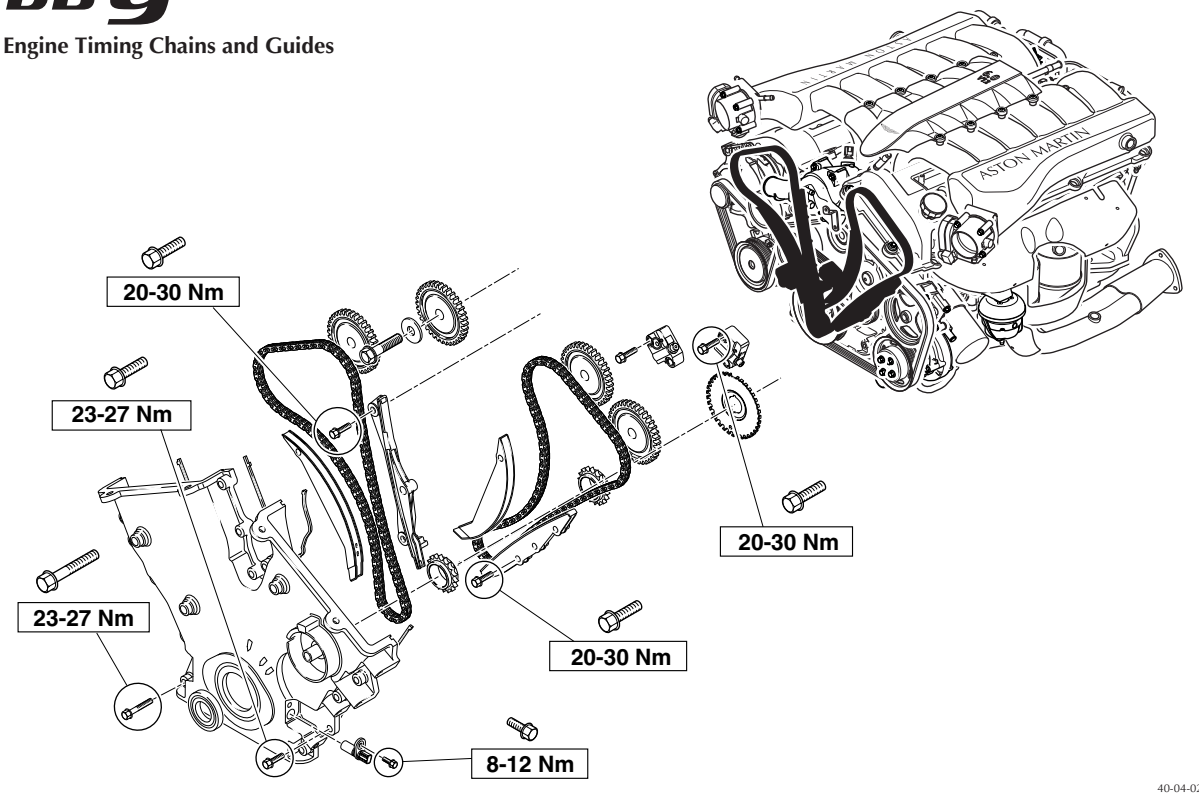
DB 9

Engine Oil Pump and Sump



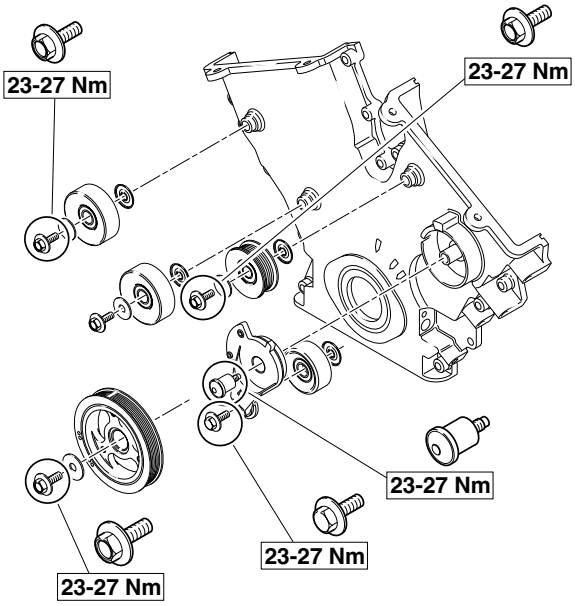
DB 9

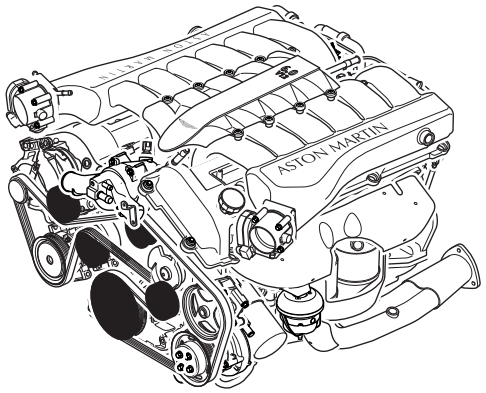
Engine Timing Chains and Guides



DB 9

Engine Pulleys

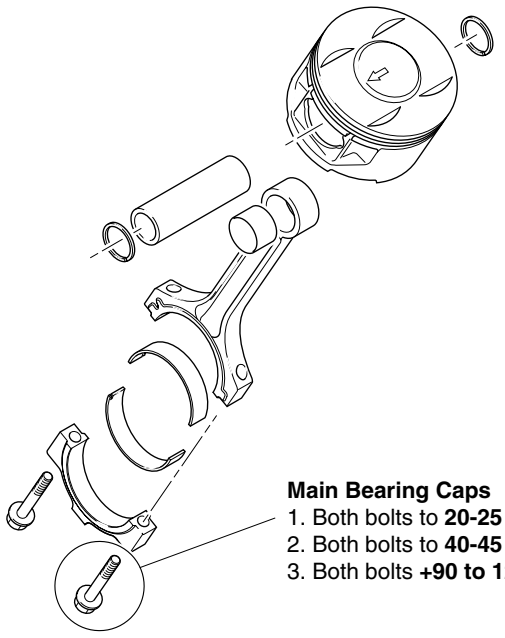




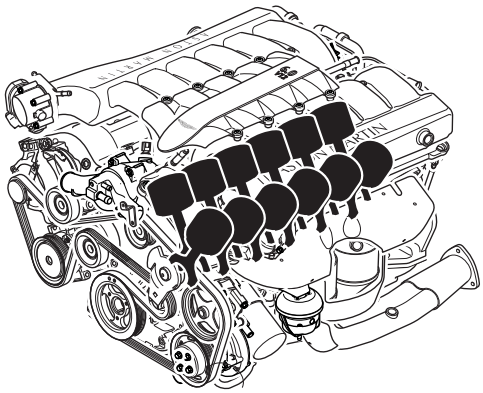
40-04-026

DB 9

Pistons & Connecting Rods



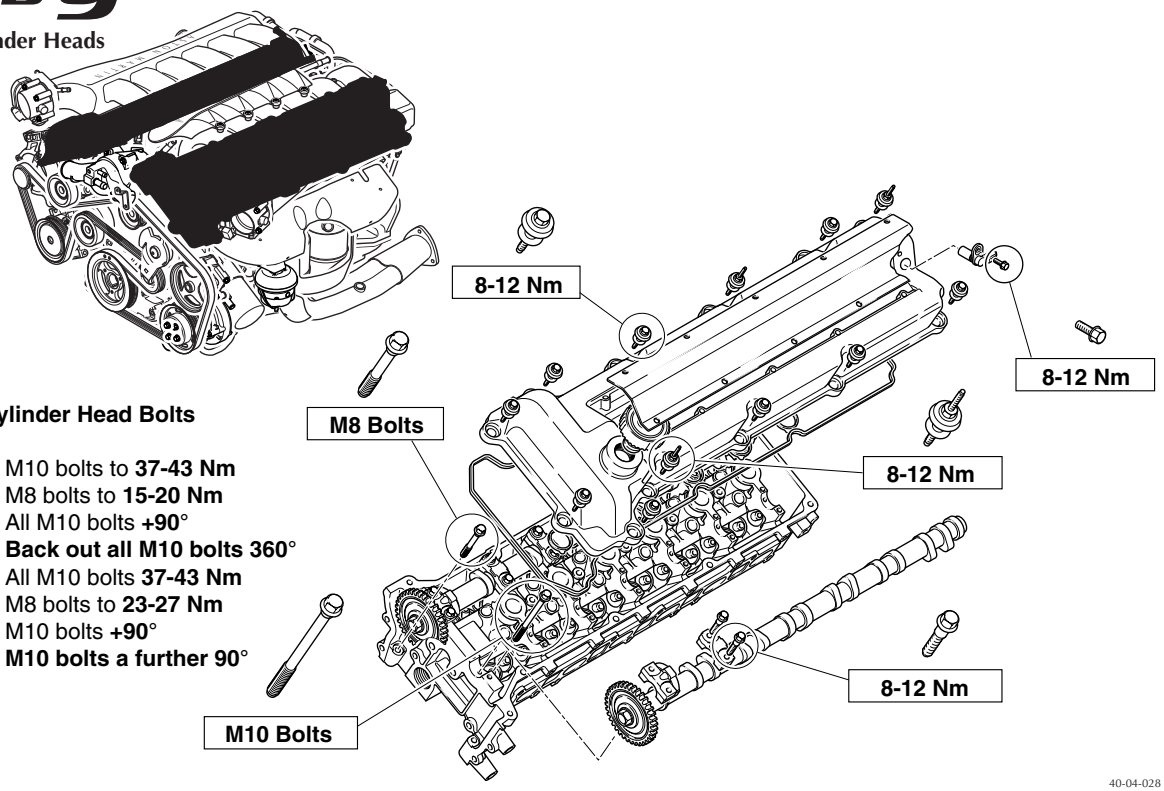
Main Bearing Caps
1. Both bolts to **20-25 Nm**
2. Both bolts to **40-45 Nm**
3. Both bolts **+90 to 120°**



40-04-027

DB 9

Cylinder Heads

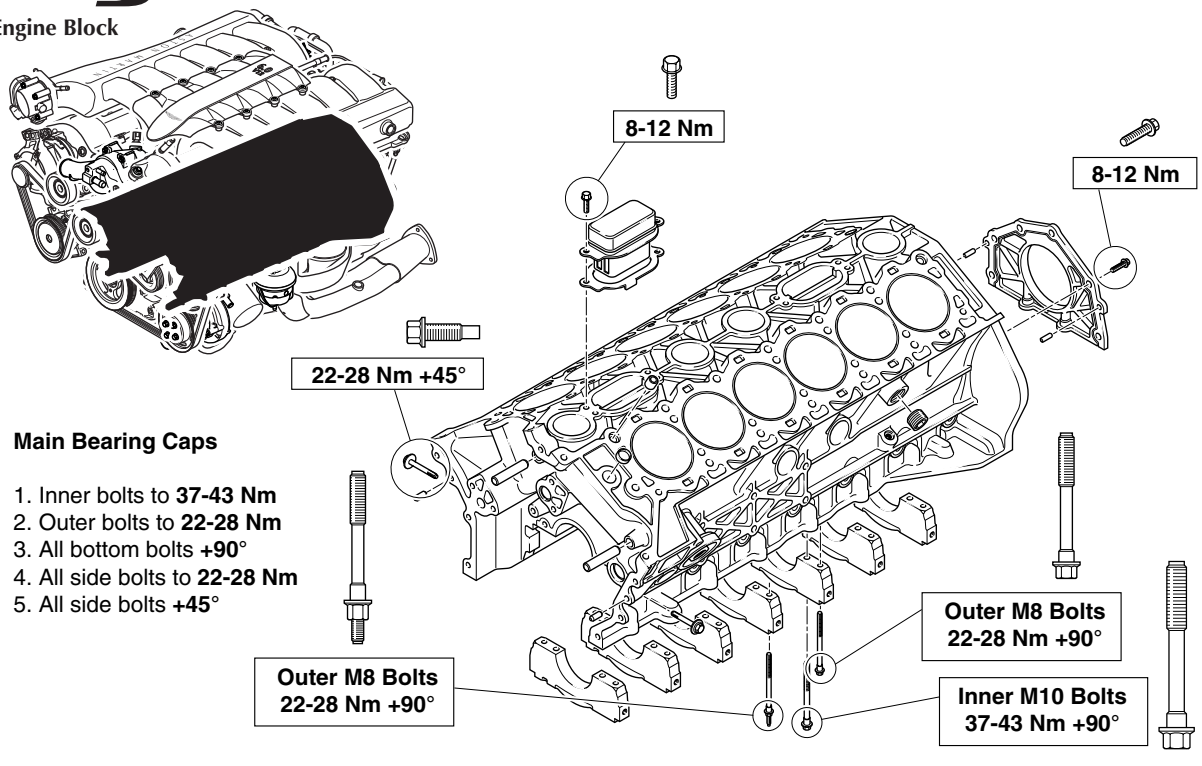


Cylinder Head Bolts

1. M10 bolts to **37-43 Nm**
2. M8 bolts to **15-20 Nm**
3. All M10 bolts **+90°**
4. **Back out all M10 bolts 360°**
5. All M10 bolts **37-43 Nm**
6. M8 bolts to **23-27 Nm**
7. M10 bolts **+90°**
8. **M10 bolts a further 90°**

DB 9

Engine Block

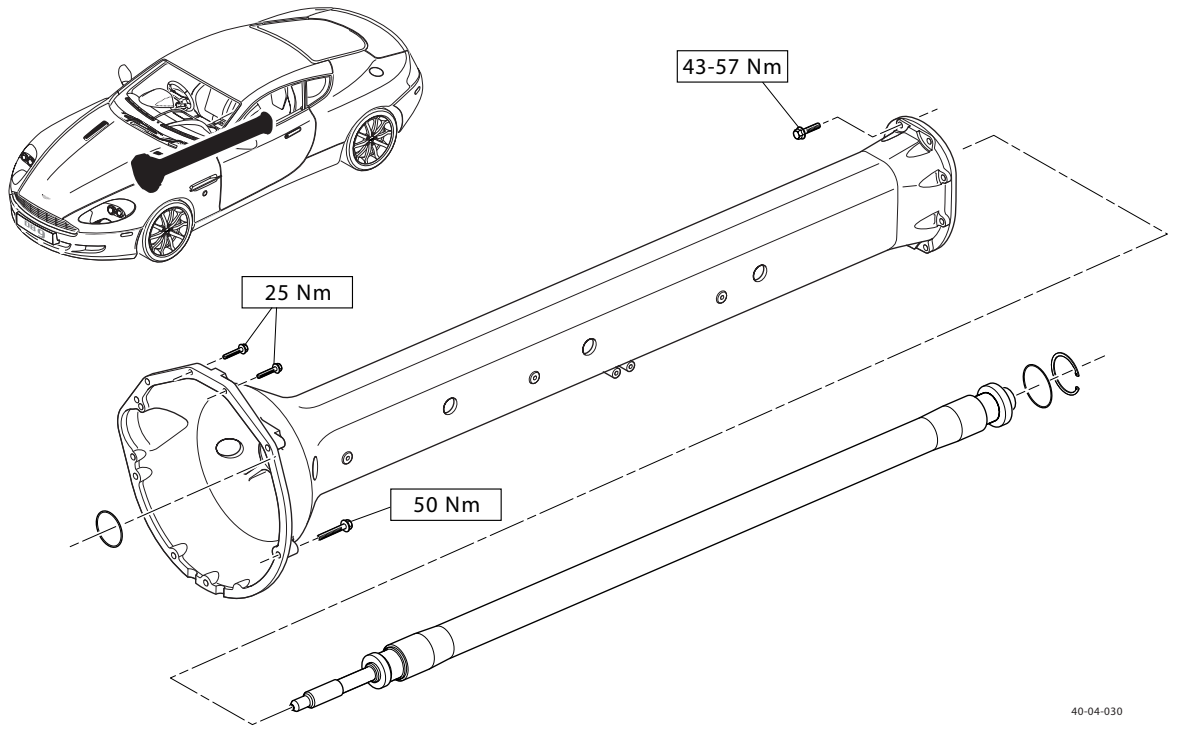


Main Bearing Caps

1. Inner bolts to **37-43 Nm**
2. Outer bolts to **22-28 Nm**
3. All bottom bolts **+90°**
4. All side bolts to **22-28 Nm**
5. All side bolts **+45°**

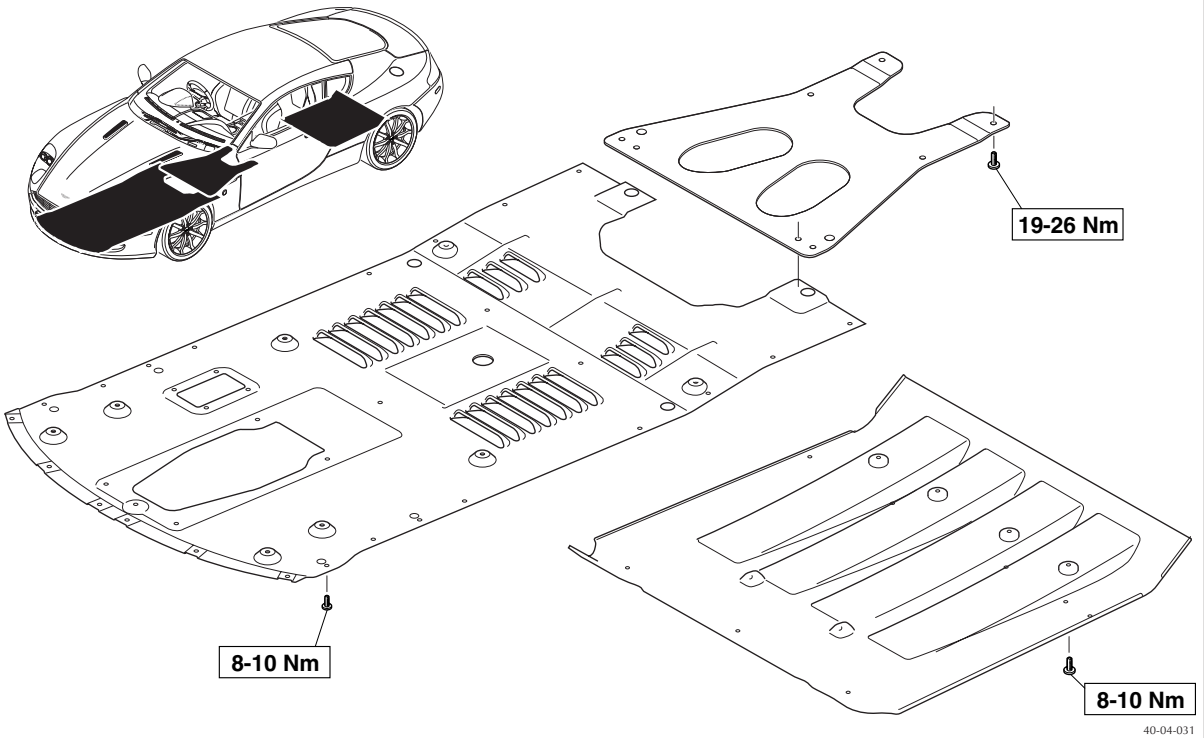
DB9

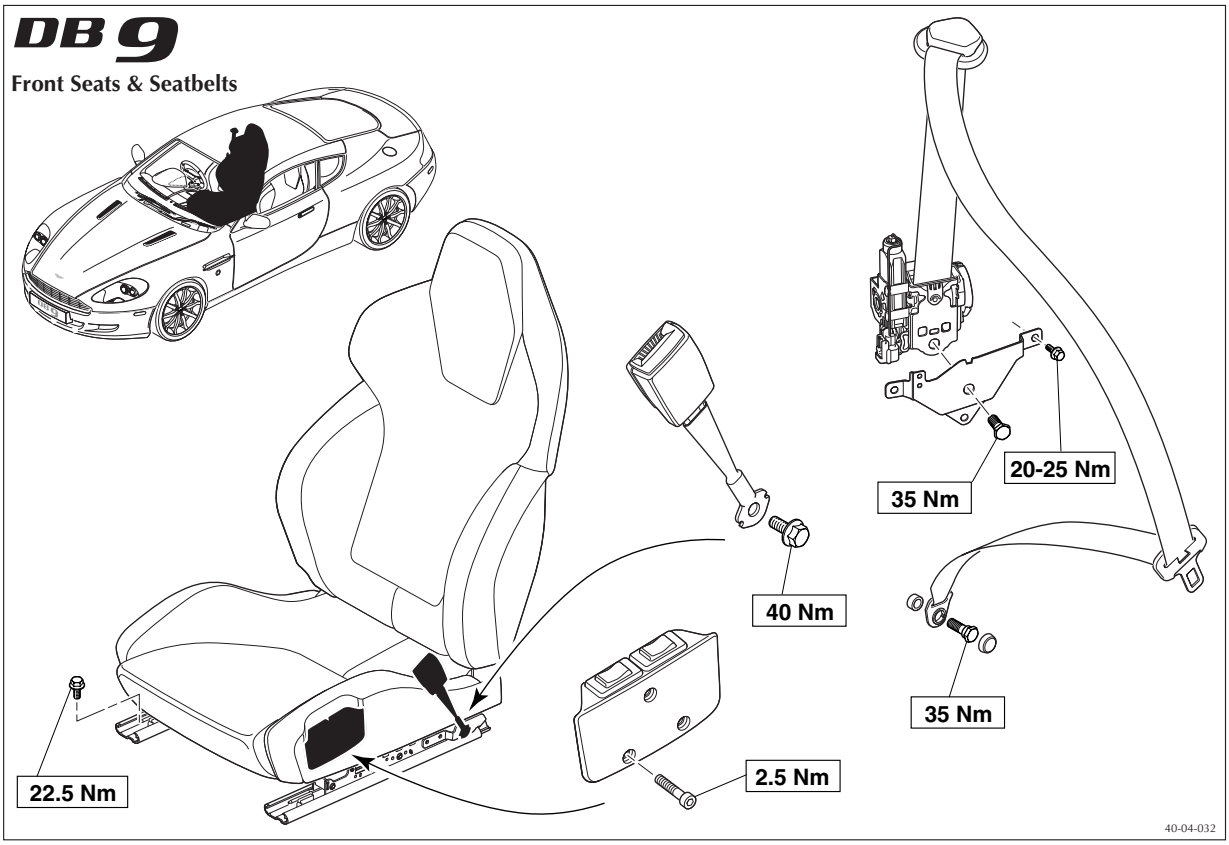
Propshaft & Torque Tube

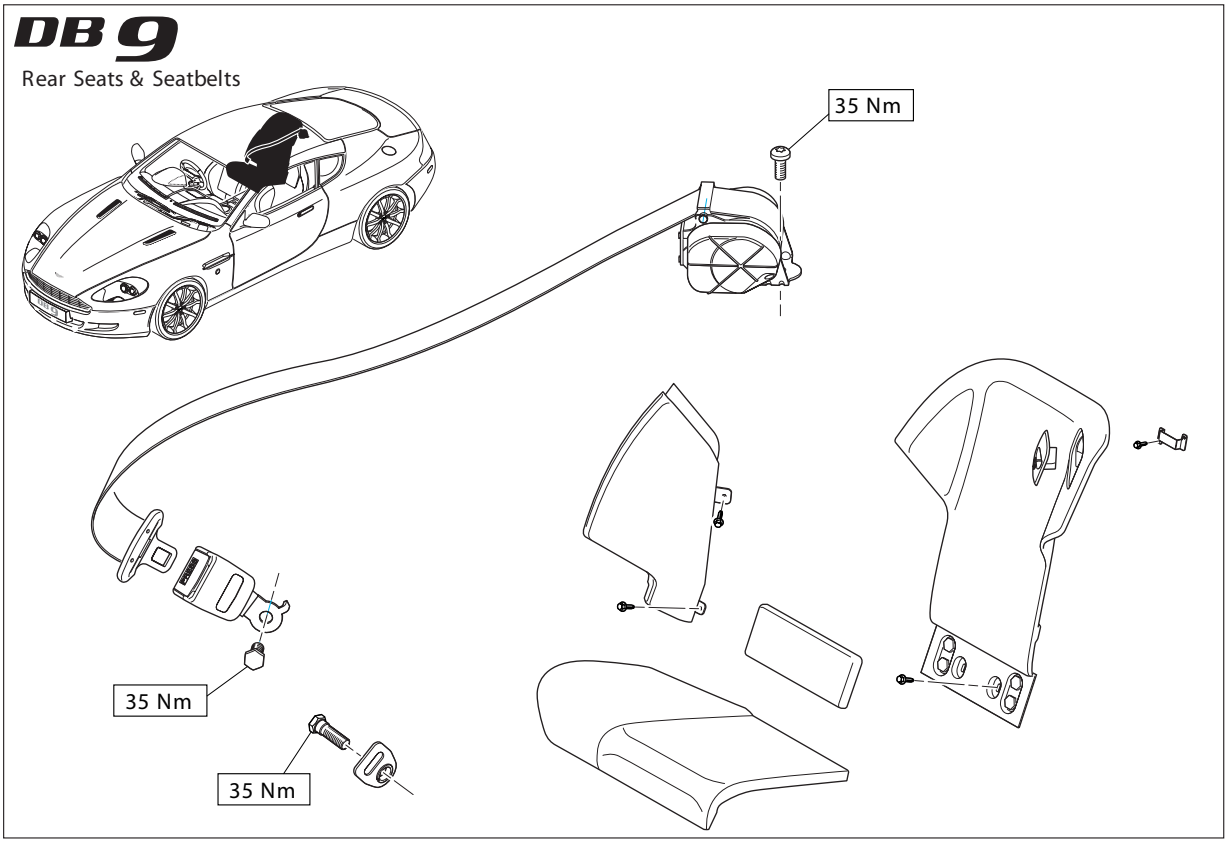


DB9

Under-Panels




DB9
Front Seats & Seatbelts
20-25 Nm
35 Nm
40 Nm
35 Nm
22.5 Nm
2.5 Nm
40-04-032


DB9
Rear Seats & Seatbelts
35 Nm
35 Nm
35 Nm

Torque Conversion Tables

Newton Metres to Pounds Feet										
	Pounds Feet									
Newton Metres	0	1	2	3	4	5	6	7	8	9
0	-	0.74	1.47	2.21	2.95	3.69	4.42	5.16	5.90	6.64
10	7.38	8.11	8.85	9.59	10.33	11.06	11.80	12.54	13.28	14.01
20	14.75	15.49	16.23	16.96	17.71	18.44	19.18	19.91	20.65	21.39
30	22.13	22.86	23.60	24.34	25.08	25.81	20.55	27.29	28.03	28.76
40	29.50	30.24	30.98	31.71	32.45	33.19	33.93	34.68	35.40	36.14
50	36.88	37.62	38.35	39.09	39.83	40.57	41.30	42.04	42.78	43.52
60	44.25	44.99	45.73	46.47	47.20	47.94	48.68	49.42	50.15	50.89
70	51.63	52.37	53.10	53.84	54.58	55.32	56.06	56.79	57.53	58.27
80	59.00	59.74	60.48	61.22	61.95	62.69	63.43	64.17	64.91	65.64
90	66.38	67.12	67.86	68.59	68.33	70.07	70.81	71.54	72.28	73.02
100	73.76	74.49	75.23	75.97	76.71	77.44	78.18	78.92	79.66	80.39
110	81.13	81.87	82.61	83.34	84.08	84.82	85.56	86.29	87.03	87.77
120	88.51	89.24	89.98	90.72	91.46	92.19	92.93	93.67	94.41	95.15
130	95.88	96.62	97.36	98.09	98.83	98.58	100.3	101.00	101.78	102.52
140	103.26	104.00	104.73	105.47	108.21	106.95	107.68	108.42	109.16	109.90
150	110.63	111.37	112.11	112.85	113.59	114.33	115.06	115.80	116.54	117.27
160	118.01	118.75	119.49	120.22	120.98	121.70	122.44	123.17	123.91	124.65
170	125.39	126.12	126.86	127.60	128.34	129.07	129.81	130.55	131.29	132.02
180	132.76	133.50	134.24	134.87	135.71	136.45	137.19	137.92	138.68	139.40
190	140.14	140.87	141.61	142.35	143.09	143.83	144.56	145.30	146.04	140.78
200	147.51	148.25	148.99	149.73	150.46	151.20	151.94	152.68	153.41	154.15
210	154.89	155.63	156.36	157.10	157.83	158.58	159.31	160.05	160.79	161.53
220	162.26	163.00	163.74	164.48	165.21	165.95	166.69	167.43	168.16	168.90
230	169.64	170.38	171.11	171.85	172.59	173.33	174.07	174.80	175.54	176.28
240	177.02	177.75	178.49	179.23	179.97	180.70	181.44	182.18	182.92	133.65
250	184.39	185.13	185.87	186.60	187.34	158.08	188.82	189.55	190.29	191.03
260	191.77	192.50	193.24	193.98	194.72	195.45	196.19	198.93	197.67	198.40
270	198.14	198.58	200.62	201.35	202.09	202.83	203.57	204.31	205.10	205.78
280	206.52	207.26	207.99	208.73	209.47	210.21	210.94	211.68	212.42	213.16
290	213.89	214.63	215.37	216.11	216.84	217.58	218.32	219.06	219.79	220.53
300	221.27	222.01	222.74	223.48	224.22	224.98	225.68	226.43	227.17	227.91
310	228.64	229.38	230.12	230.86	231.68	232.33	233.07	233.81	234.55	235.28
320	236.02	238.76	237.50	238.23	238.97	239.71	240.45	241.18	241.92	242.68
330	243.40	244.13	244.87	245.61	246.35	247.08	247.82	248.56	249.20	250.03
340	250.77	251.51	252.25	252.98	253.72	254.46	255.20	255.93	256.67	257.41
350	258.15	258.68	259.62	260.36	261.10	261.84	262.57	263.31	264.05	264.79
360	265.52	268.26	267.00	267.74	268.47	267.21	269.95	270.68	271.42	272.16
370	272.90	273.64	274.37	275.11	275.85	276.59	277.32	278.06	278.80	279.54
380	280.27	281.01	281.75	282.49	283.22	283.98	284.70	285.44	286.17	286.91
390	287.65	298.38	289.12	289.86	298.68	291.34	292.08	292.81	293.55	294.29

Newton Metres to Pounds Feet (Continued)

Newton Metres	Pounds Feet 0	1	2	3	4	5	6	7	8	9
400	295.03	295.76	298.50	297.24	297.98	298.71	299.45	300.19	300.93	301.68
410	302.40	303.14	303.88	304.61	305.35	306.09	306.83	307.56	308.30	309.04
420	309.78	310.51	311.25	311.99	312.73	313.46	314.20	314.94	315.68	316.41
430	317.15	317.89	318.63	319.36	320.10	320.84	321.58	322.32	323.05	323.79
440	324.53	325.27	326.00	326.74	327.48	328.22	328.95	329.68	330.43	331.17
450	331.90	332.64	333.38	334.12	334.35	335.59	336.33	337.07	337.80	338.54
460	339.28	340.02	340.75	341.49	342.23	342.97	343.70	344.44	345.18	345.92
470	346.65	347.39	348.13	348.87	349.60	350.34	351.08	351.82	352.56	353.29
480	354.03	354.77	355.51	356.24	356.98	357.72	358.46	359.19	359.93	350.67
490	361.41	362.14	362.88	363.62	364.36	365.08	365.83	366.57	367.31	368.04
500	368.78	369.52	370.26	370.99	371.73	372.47	373.21	373.94	374.68	375.42
510	376.16	376.89	377.63	378.37	379.11	379.85	380.58	381.32	382.06	382.80
520	383.53	384.27	385.01	385.75	386.48	387.22	387.96	388.70	389.43	390.17
530	390.91	391.65	392.38	393.12	393.86	394.60	395.33	396.07	396.81	397.55
540	398.28	399.02	399.76	400.50	401.23	401.97	402.71	403.45	404.18	404.92
550	405.68	406.40	407.13	407.87	408.61	409.35	410.09	410.82	411.56	412.30
560	413.04	413.77	414.51	415.25	415.99	416.72	417.40	418.20	418.94	419.67
570	420.41	421.15	421.87	422.62	423.36	424.10	424.84	425.57	426.31	427.05
580	427.79	428.52	429.26	430.00	430.74	431.47	432.21	432.95	433.68	434.42
590	435.16	435.90	436.64	437.37	438.11	438.85	439.59	440.33	441.06	441.80
600	442.54	443.28	444.01	444.75	445.49	448.23	446.96	447.70	448.44	449.18
610	449.91	456.65	451.39	452.13	452.86	453.60	454.34	455.08	455.81	456.55
620	457.29	456.03	458.76	459.50	460.24	460.98	401.71	462.45	463.19	463.93
630	464.66	465.40	468.14	466.88	467.61	468.35	469.09	468.83	470.57	471.30
640	472.04	472.78	473.52	474.25	474.99	475.73	476.47	477.20	477.94	478.68
650	479.42	480.15	480.89	481.63	482.37	483.10	483.84	484.58	485.32	486.05
660	486.79	487.53	488.27	489.00	489.74	490.48	491.22	491.95	492.68	493.43
670	494.17	484.90	489.64	496.38	497.12	497.85	498.59	499.33	500.07	500.81
680	501.54	502.28	503.02	503.76	504.49	505.23	505.97	506.71	507.44	508.18
690	508.92	509.68	510.39	511.13	511.87	512.61	513.34	514.08	514.82	515.56
700	516.29	517.03	517.77	518.51	519.25	519.98	520.72	521.46	522.19	522.93
710	523.67	524.41	525.14	525.88	526.62	527.36	528.10	528.83	529.57	530.31
720	531.05	531.78	532.52	533.26	534.00	534.73	535.47	536.21	536.95	537.68
730	538.42	539.16	539.90	540.63	541.37	542.11	542.85	543.56	544.32	545.06
740	545.80	546.53	547.27	548.01	548.75	549.48	550.22	550.96	551.70	552.43
750	553.17	553.91	554.65	555.38	556.12	556.86	557.60	558.34	559.07	559.80
760	560.55	561.29	562.02	562.76	568.50	564.24	564.97	565.71	568.45	567.19
770	567.92	568.68	569.40	570.14	570.87	571.61	572.35	573.09	573.82	574.56
780	575.30	576.04	576.77	577.51	578.25	578.99	579.72	580.40	581.20	581.94
790	582.67	583.41	584.15	584.89	585.62	586.36	587.10	587.84	588.58	589.31

Newton Metres to Pounds Feet (Continued)											
		Pounds Feet									
		0	1	2	3	4	5	6	7	8	9
Newton Metres	800	590.79	591.53	592.26	593.00	593.74	594.48	595.21	595.95	596.58	596.68
	810	597.43	598.16	598.90	599.64	600.38	601.11	601.85	602.59	603.33	604.06
	820	604.80	605.54	606.28	607.01	607.75	608.49	609.23	609.96	610.70	611.44
	830	612.18	612.91	613.65	614.39	615.13	615.86	616.60	617.34	618.08	618.81
	840	619.55	620.29	621.03	621.77	622.50	623.24	623.98	624.72	625.45	626.19
	850	626.93	627.67	628.40	629.14	629.68	630.62	631.35	632.09	632.83	633.57
	860	634.30	635.04	635.78	636.52	637.25	637.99	638.73	639.47	640.20	640.94
	870	641.68	642.42	643.15	643.89	644.63	645.37	646.10	646.84	647.58	648.32
	880	649.06	649.79	650.53	651.27	652.01	652.74	653.48	654.22	654.96	655.69
	890	656.43	657.17	657.91	658.64	659.38	660.12	660.86	661.59	662.33	663.07
	900	663.81	664.54	665.28	666.02	666.76	667.49	668.23	668.97	669.71	670.44
	910	671.18	671.92	672.66	673.39	674.13	674.87	675.61	676.35	677.08	677.82
	920	678.56	679.30	680.03	680.77	681.51	682.25	682.98	683.72	683.46	685.20
	930	685.93	686.67	687.41	688.15	688.88	689.62	690.36	691.10	691.83	692.57
	940	693.31	694.05	684.78	695.52	696.26	697.00	697.73	698.47	699.21	699.95
	950	700.68	701.42	702.16	702.90	703.63	704.37	705.11	705.85	706.59	707.32
	960	708.06	708.80	708.54	710.27	711.01	711.75	712.49	713.22	713.96	714.70
	970	715.44	716.17	716.91	717.65	718.39	719.12	719.86	720.60	721.34	722.07
	980	722.81	723.55	724.29	725.02	725.76	726.50	727.24	727.97	728.71	729.45
	990	730.19	730.92	731.66	732.40	733.14	733.87	734.61	735.35	736.09	736.83

Pounds Feet to Newton Metres											
		Newton Metres									
		0	1	2	3	4	5	6	7	8	9
Pounds Feet	0	-	1.36	2.71	4.07	5.42	6.78	8.13	9.49	10.85	12.20
	10	13.56	14.91	16.27	17.63	18.98	20.34	21.69	23.05	24.40	25.76
	20	27.12	28.47	29.83	31.18	32.54	33.89	35.25	36.61	37.96	39.32
	30	40.67	42.03	43.39	44.74	46.10	47.45	48.81	50.16	51.52	52.88
	40	54.23	55.59	56.94	58.30	59.66	61.01	62.37	63.72	65.08	66.43
	50	67.79	69.15	70.50	71.86	73.21	74.57	75.93	77.28	78.64	79.99
	60	81.35	82.70	84.06	85.42	86.77	88.13	89.49	90.84	92.20	93.55
	70	94.91	96.26	97.62	98.97	100.33	101.68	103.04	104.40	105.75	107.11
	80	108.47	109.82	111.12	112.53	113.89	115.25	116.60	117.96	199.31	120.67
	90	122.02	123.38	124.74	126.09	127.45	128.80	130.16	131.51	132.87	134.23
	100	135.58	136.94	138.29	139.65	141.01	142.36	143.72	145.07	146.43	147.78
	110	149.14	150.50	151.85	153.21	154.56	155.92	157.28	158.63	159.99	161.34
	120	164.05	165.41	162.70	166.77	163.12	169.48	170.83	172.19	173.55	174.90
	130	176.26	177.61	178.97	180.32	181.68	183.04	184.39	185.75	187.10	188.46
	140	189.82	191.17	192.53	193.88	195.24	196.59	197.95	199.31	200.66	202.02
	150	203.37	204.73	206.08	207.44	208.80	210.15	211.51	212.86	214.22	215.58
	160	216.93	218.29	219.64	221.00	222.35	223.71	225.07	226.42	227.78	229.13
	170	230.49	231.85	233.20	234.56	235.91	237.27	238.64	239.98	241.34	242.69
	180	244.05	245.40	246.76	248.12	249.47	250.83	252.18	253.54	254.89	250.25
	190	257.61	258.96	260.32	261.67	263.03	264.38	265.74	267.10	263.45	269.81

Pounds Feet to Newton Metres (Continued)

Pounds Feet	Newton Metres 0	1	2	3	4	5	6	7	8	9
200	271.16	272.52	273.88	275.23	276.59	277.94	279.30	280.65	282.01	283.37
210	284.72	286.08	287.43	288.79	290.15	291.50	292.86	294.21	295.57	296.92
220	298.28	299.64	300.99	302.35	303.70	305.06	306.42	307.77	309.13	310.48
230	311.84	313.19	314.55	315.91	317.26	318.62	319.97	321.33	322.68	324.04
240	325.40	326.75	328.11	329.46	330.82	332.18	333.53	334.89	336.24	337.60
250	338.95	340.31	341.67	343.02	344.38	345.73	347.09	348.45	349.80	351.16
260	352.51	353.87	355.22	356.58	357.94	359.29	360.65	362.00	363.36	364.72
270	366.07	367.43	368.78	370.14	371.49	372.85	374.21	375.56	376.92	378.27
280	379.63	380.98	382.34	363.70	385.05	386.41	387.76	389.12	390.48	391.63
290	393.19	394.54	395.90	397.26	398.61	398.97	401.32	402.63	464.03	405.39
300	406.75	408.10	409.46	410.81	412.17	413.52	414.98	416.24	417.59	418.95
310	420.30	421.68	423.02	424.37	425.73	427.08	428.44	429.79	431.15	492.51
320	433.86	435.22	436.57	437.93	439.29	440.64	442.00	443.35	444.71	448.06
330	447.42	448.78	450.13	451.49	452.84	454.20	455.56	456.91	458.27	459.62
340	460.98	462.33	463.69	465.05	466.40	467.76	489.11	470.47	471.63	473.18
350	474.54	475.89	477.25	478.60	479.98	481.32	482.67	464.03	485.38	486.74
360	488.09	489.45	498.81	492.16	493.52	494.87	496.23	497.59	498.94	500.30
370	501.65	503.01	504.36	505.72	507.08	598.43	509.79	511.14	512.50	513.86
380	515.21	516.57	517.92	519.28	520.63	521.98	523.34	524.70	526.06	527.41
390	528.77	530.13	531.48	532.84	534.19	535.55	536.90	538.26	539.62	540.97
400	542.33	543.68	545.04	546.40	547.75	549.11	550.46	551.82	553.17	554.53
410	555.89	557.24	558.60	559.95	561.31	562.66	564.02	565.38	566.73	568.09
420	569.45	570.80	572.16	573.51	574.87	576.22	577.59	578.93	580.29	581.65
430	583.00	584.38	585.71	587.07	598.41	589.78	591.14	592.49	593.85	595.20
440	596.56	597.92	599.27	600.63	601.98	603.34	604.70	606.05	607.41	608.76
450	610.12	611.47	612.83	614.19	615.54	616.90	618.25	619.61	620.97	622.32
460	623.68	625.03	626.39	627.74	629.10	630.46	631.81	633.17	634.52	635.98
470	637.23	638.59	639.95	641.30	642.68	644.01	645.37	640.73	648.08	649.44
480	650.79	652.15	653.50	654.86	656.22	657.57	658.93	660.28	661.64	663.00
490	664.35	665.71	667.06	668.42	669.77	671.13	672.49	673.84	675.20	676.55
500	677.91	679.27	680.62	680.98	683.33	684.69	686.04	687.04	688.76	690.11
510	691.47	692.82	694.18	697.54	696.89	698.25	699.60	700.96	702.31	703.67
520	705.03	706.38	707.74	709.09	710.45	711.80	713.16	714.52	715.87	717.23
530	718.58	719.94	721.30	722.65	724.01	725.36	726.72	728.07	729.43	730.79
540	732.14	733.50	734.85	736.21	737.57	738.92	740.28	741.63	742.99	744.35
550	745.70	747.06	748.41	749.77	751.12	752.48	753.84	755.19	756.55	757.90
560	759.26	760.61	761.97	763.33	764.68	766.04	767.39	768.75	770.11	771.48
570	772.82	774.17	775.53	776.88	778.24	779.69	780.95	782.31	783.66	785.02
580	786.37	787.73	789.09	790.44	791.80	793.15	794.51	795.87	797.22	798.58
590	799.93	801.28	802.64	804.00	805.36	806.71	808.07	809.42	810.78	812.14

Pounds Feet to Newton Metres (Continued)											
		Newton Metres									
		0	1	2	3	4	5	6	7	8	9
Pounds Feet	600	813.49	814.85	816.20	817.56	818.91	820.27	821.63	822.98	824.34	825.69
	610	827.05	828.41	829.76	831.12	832.47	833.83	835.18	836.54	837.90	839.25
	620	840.61	841.96	844.32	844.68	848.03	847.39	848.74	850.10	851.45	852.81
	630	854.17	855.52	856.88	858.23	859.59	860.94	862.30	863.68	865.01	868.37
	640	867.72	868.08	870.44	871.79	873.15	874.50	875.86	877.21	878.57	879.93
	650	881.28	882.64	883.99	885.35	886.71	888.06	689.42	890.77	892.13	893.48
	660	894.84	896.20	897.55	898.91	900.26	901.62	902.98	904.33	905.68	907.04
	670	908.40	909.75	911.11	912.47	913.82	915.17	916.55	917.89	919.25	920.60
	680	921.96	923.31	924.67	926.02	927.38	928.74	930.09	931.45	932.80	934.16
	690	935.51	936.87	938.23	939.58	940.94	942.29	943.65	945.01	946.36	947.72
	700	949.07	956.43	951.78	953.14	954.50	955.85	957.21	958.56	959.92	961.28
	710	962.63	963.99	965.34	966.70	968.05	969.41	970.77	972.12	973.47	974.83
	720	976.19	977.55	978.90	980.26	981.61	982.97	984.32	985.68	987.04	988.39
	730	989.75	991.10	992.46	993.82	995.17	996.53	997.68	999.24	1000.6	1002.0
	740	1003.3	1004.7	1006.0	1007.4	1008.7	1010.1	1011.4	1012.8	1014.2	1015.5
	750	1016.9	1018.2	1019.6	1020.9	1022.3	1023.6	1025.0	1026.4	1027.7	1029.1
	760	1030.4	1031.8	1033.1	1034.5	1035.8	1037.2	1038.6	1039.9	1041.3	1042.6
	770	1044.0	1045.3	1048.7	1048.1	1049.4	1050.8	1052.1	1053.5	1054.8	1056.2
	780	1057.5	1058.9	1060.3	1061.6	1063.0	1064.3	1065.7	1067.0	1068.4	1069.7
	790	1071.1	1072.5	1073.8	1075.2	1076.5	1077.9	1079.2	1080.6	1081.9	1083.3
	800	1084.7	1086.0	1087.4	1088.7	1090.1	1091.4	1092.8	1094.2	1095.5	1096.9
	810	1098.2	1099.6	1100.9	1102.3	1103.6	1105.0	1106.4	1107.8	1109.1	1110.4
	820	1111.8	1113.1	1114.5	1115.8	1117.2	1118.6	1119.9	1121.3	1122.6	1124.0
	830	1125.3	1126.7	1128.0	1129.4	1130.8	1132.1	1133.5	1134.8	1136.2	1137.5
	840	1138.9	1140.2	1141.6	1143.0	1144.3	1145.7	1147.0	1148.4	1149.7	1151.1
	850	1152.5	1153.8	1155.2	1156.5	1157.9	1159.2	1160.6	1161.9	1163.3	1164.7
	860	1168.0	1167.4	1168.7	1170.1	1171.4	1172.8	1174.1	1175.5	1176.9	1178.2
	870	1179.6	1180.9	1182.3	1183.6	1185.0	1186.3	1187.7	1189.1	1190.4	1191.8
	880	1193.1	1194.5	1195.8	1197.2	1198.5	1199.9	1201.3	1202.6	1204.0	1205.3
	890	1206.7	1208.0	1209.4	1210.8	1212.1	1213.5	1214.8	1216.2	1217.5	1218.9
	900	1220.2	1221.6	1223.0	1224.3	1225.7	1227.0	1228.4	1229.7	1231.1	1232.4
	910	1233.8	1235.2	1236.5	1237.9	1239.2	1240.6	1241.9	1243.3	1244.6	1246.0
	920	1247.4	1248.7	1250.1	1251.4	1252.8	1254.1	1255.5	1256.8	1258.2	1259.6
	930	1260.9	1262.3	1263.6	1265.0	1266.3	1267.7	1269.1	1270.4	1271.8	1273.1
	940	1274.5	1275.8	1277.2	1278.5	1279.9	1281.3	1282.6	1284.0	1285.3	1286.7
	950	1288.0	1289.4	1290.7	1292.1	1293.5	1294.8	1296.2	1297.5	1298.9	1300.2
	960	1301.6	1302.9	1304.3	1305.7	1307.0	1308.4	1309.7	1311.1	1312.4	1313.8
	970	1315.1	1316.5	1317.9	1319.2	1320.6	1321.9	1323.3	1324.6	1326.0	1327.4
	980	1328.7	1330.1	1331.4	1332.8	1334.1	1335.5	1336.8	1338.2	1339.6	1340.9
	990	1342.3	1343.6	1345.0	1346.3	1347.7	1349.0	1350.4	1351.8	1353.1	1354.5