MASERATI

Hydraulic and electro-hydraulic control

ABS electro-hydraulic control unit - A.S.R.- E.B.D. - E.S.P.

Brake/brake servo pump

Pedal board mount replacement

Brake pedal

SUSPENSIONS AND WHEEL

Tightening torques

Tightening torques

Shock absorbers

Front shock absorbers

Rear shock absorbers

Suspension levers

Upper front lever

Lower front lever

Upper rear lever

Lower rear lever

Front pillar (hub carrier)

REAR pillar (hub carrier)

Toe-in tie-rod

Wheel alignment

Front wheels

Rear wheels

Chassis

Front chassis

Rear chassis

Electronic control unit and sensors

Rear vertical acceleration sensor

Front wheels vertical acceleration sensor

Engine compartment vertical acceleration sensor

Side acceleration and yaw sensor

Rear headlights aiming sensor

Front headlight aiming sensor

Wheels

Replacing the wheels

Tyre pressure monitoring System

Tyre pressure monitoring system aerials

Tyre pressure sensor

Tyre pressure monitoring system ECU

STEERING SYSTEM - AIRBAG - SIDEBAG

Tightening torques

Tightening torques

Toolkit

Toolkit

Airbag/sidebag system with electrical control pre-tensioners
Rules of safety to be observed during servicing of vehicles fitted with airbag system
Driver's side airbag module
Passenger airbag module
Side Airbag
Airbag ecu (NAB)
Pre-tensioner and front seat belts
Spiral contact for airbag module
Side impact sensor
Front seat belt height adjustment device
Windowbag side module
Rear pretensioner and seatbelts
Weight sensors (USA version)
Weight sensor calibration (USA version)
Weight sensor safety regulations (USA version)
Steering controls
Steering wheel
Steering column
Hydraulic steering rack
Hydraulic steering fluid tank
Power steering pump
Fluid check
Fluid check
AIR-CONDITIONER
Component replacement
Air conditioner compressor
Heater-evaporator unit
Air conditioning/heating system ECU
Anti-pollen filter
ELECTRIC-ELECTRONIC SYSTEM APPENDIX
Tightening torques
Tightening torques
Earths
Earths location in the vehicle
Maserati alarm system
Alarm system kit replacement
Storing the key codes
New key programming
ECUs self-learning
Component self-learning in the event of battery disconnection
Satellite tracking system
Satellite tracking system
ECUs and nodes

BODY WORK

Tightening torques

Toolkit

External body panels

Interiors

PREVENTIVE MEASURES AND PROTECTION DEVICES

When performing particular maintenance or repair procedures, the operator must take every precaution to prevent personal injury and damage to the vehicle.
Always wear protective gloves when working on parts that are hot or sharp, or when using dangerous parts. In this latter case, suitable goggles should be worn to protect your eyes.
Avoid producing sparks or flames when working on the vehicle's fuel system as the fuel or the fumes emitted can easily catch fire.
The following paragraphs describe several specific situations in which the conditions of the car or the handling of some parts can originate hazardous situations.

All the operations must be carried out with the utmost care and attention to prevent injuries.
The engine compartment contains many moving and/or hot parts and live wires.
Always take these precautions, strictly following them, whenever carrying out operations in the engine compartment:

- switch off the engine and wait for it to cool down
- do not smoke
- make sure that there is a fire extinguisher in the vicinity.

For some procedures, you are instructed to use specific equipment. The use of this equipment is fundamental to ensure safe working conditions.
Respect regulations in force regarding workshop safety. When necessary, the vehicle manual provides specific instructions to be followed to prevent potentially hazardous situations occurring.

When using chemical products, follow the preventative safety regulations carefully. These can be found on the safety sheet which the supplier is duty-bound to provide the user with.

The air conditioning circuit uses the non-polluting fluid R134a as its coolant.
If it is necessary to work on the circuit, always observe the following safety regulations strictly:
Any R134a fluid that leaks out the air conditioning/ heating system accidentally during draining/ recovery/ refilling can become toxic if it comes into close contact with naked flames or in the presence of some metals (for example magnesium or aluminium) in the form of fine or powdery particles. It is therefore advisable that the work is carried out in well-aerated areas, where there are no naked flames, and where the extracting plant is working.
Avoid prolonged contact with the skin when the R134a fluid is in evaporation stage, as the low temperature it reaches (-26.5) on completing expansion can cause "burns" due to the excessive coldness. It is therefore advisable to wear either leather or very thick fabric gloves.
It is essential to protect your eyes from contact with the coolant, as its excessive and instantaneous low temperature can cause serious injuries.
Releasing the fluid into the air represents an environmental hazard. Always use specially designed equipment to drain the R134a fluid out of the system.

When the engine is warm, its cooling system is pressurised. Wait a few minutes before carrying out any work on the components in the cooling circuit, making sure, in any case, that the pressure has dropped.
- Before starting any work on the electrical system (connectors, electric components, wiring etc..) turn the ignition key to the STOP position and DISCONNECT THE BATTERY.
Every time you have to disconnect the negative battery terminal, proceed as follows:

To release tight-fitting parts, strike them gently using an aluminium or, if the parts are made of iron, lead hammer; Use a wooden or resin mallet for light alloy parts.

During the removal, check that the parts that must be marked for reference purposes duly show the reference marks.

When refitting, lubricate the parts, where necessary, to prevent engagements or seizures in the initial operation stages.

When refitting, it is fundamental that the tightening torques and adjustment data are complied with.

For each refitting operation replace the seals, oil seals, elastic washers, safety plates, self-locking nuts and any parts found to be damaged.
During the operations, when the components are disconnected from the system, close the disconnected unions with suitable water/air-tight stoppers to prevent dampness and impurities from entering the system.
All the system components are specifically designed for the use of R134a and are NOT INTERCHANGEABLE with those from earlier vehicles using Freon R12.
The drainage/recovery station is specific for the R134a fluid.
The antifreeze oil is also specific for the compressor lubrication system and is not the same as the oil used with systems running on Freon R12.

CAUTION
In the event of towing or positioning on the roller stand, remember that the vehicle is endowed with an automatic door locking function when speeds exceed 20 km/h, which is activated/ deactivated via the IT node.
Once the doors are locked, you must operate the internal release button or the external latch with the key to open them. There is no other way of opening them.
Therefore, in the event that a vehicle is used with no-one on board, it is necessary to check in the vehicle settings menu that the ‘autoclose’ function on exceeding 20km/h is deactivated or, alternatively, leave a window open or keep a second key outside the vehicle.

DANGEROUS PARTS

Exhaust system and engine

Using the car, the exhaust system components and the engine itself reach very high temperatures and remain hot for a long time after the engine is turned off.

Always use insulated gloves to handle these components or wait as long as necessary to let them cool down.

Battery

The battery charging procedure generates gases that can become explosive in contact with sparks or flames.

Always charge the battery in a well-ventilated area.

Furthermore, the battery contains sulfuric acid in the form of electrolyte, which can cause irritation if it comes in touch with the skin.

Always wear suitable protective clothing and a mask when handling the electrolyte.

Electric cooling fans

When the vehicle is stopped and the engine is still warm, the electric fans for the cooling system may start up suddenly. Be very careful when working near these parts.

DANGEROUS EMISSIONS AND PRODUCTS

Exhaust gases

In order to carry out some maintenance procedures, the engine must be kept running. The exhaust gases contain carbon monoxide, a highly poisonous gas which, if inhaled for a lengthy period, can also be lethal.

Avoid running the engine in closed areas. If possible, work outdoors or use systems for scavenging exhaust gases.

The devices used for monitoring and controlling the emission of exhaust gases allowed the vehicle to obtain the approval for freely circulating on roadways, in accordance with pollution and noise control regulations in force. Removing or tampering with these devices is prohibited by law.

Under no circumstance should the exhaust silencer be perforated or internal parts be removed. Do not use the vehicle if any of these devices is missing.

The type-approval number is marked on each one of these devices or on a specific plate.

Avoid replacing original devices with non-approved ones.

Furthermore, said devices must be kept in good working condition by carrying out all the interventions indicated in the scheduled maintenance plan.

Fuel

The fuel contained in the tank and in the engine's entire supply system, is highly flammable and, under certain conditions, it can also be explosive.

Avoid smoking, producing sparks or naked flames near the workplace or in the immediate vicinity.

Always work in a well-ventilated area.

Keep out of reach of children!
Do not dispose of fuel in the environment!

Used oil

Prolonged contact of the skin with the used oil can cause severe skin diseases. To avoid all risks, always wear protective gloves and/or thoroughly wash the part that has come into contact with it, using soap and water.

Keep out of reach of children!
Do not dispose of used oil in the environment!

Fluid for hydraulic systems

Besides damaging plastic, rubber, as well as painted parts, the oil contained in the brake and hydraulic

steering systems is very dangerous if it comes into contact with eyes or skin.
In the event of contact, thoroughly rinse the body area involved with running water. To avoid all risks, always wear goggles and protective gloves.

Keep out of reach of children!
Do not dispose of used fluid in the evironment!

Coolant

The fluid contained in the cooling system reaches high temperatures and is under pressure: any accidental contact with it can cause severe burns.
Furthermore, the coolant can cause irritation to the skin and is poisonous swallowed.

Keep out of reach of children!
Do not dispose of coolants in the environment!

cooling system

 **CAUTION**
The high temperature and the pressure of the mixture contained in the circuit can cause severe burns. Always work with the engine cool and taking utmost care.

 **CAUTION**
Do not place hands or clothing near the electric fan as the latter could start up automatically and cause serious injury to the operator.

Filling the system

 **CAUTION**
Perform this procedure only when the engine is cool.
If you have to work with the engine warm, take all necessary measures to prevent burns caused by contact with overheated or pressurised fluid that may drain or leak from the system

FUEL VAPOUR SYSTEM

Component replacement

 **CAUTION**
The fuel contained in the tanks and in the fuel system is highly flammable. Carry out the operation when the engine is cool and the tanks are empty, or contain little fuel, to avoid fire risks.

Do not smoke or produce sparks or naked flames near the workplace or in the immediate vicinity.

Electro-injectors

CAUTION

If it is necessary to disconnect any of the fuel supply system's pipelines, remember that they may be pressurised: this could cause fuel to be sprayed towards the operator. Take special care when carrying out this operation and keep any naked flames clear of the work area.

DIFFERENTIAL-GEARBOX HYDRAULIC SYSTEM

CAUTION

In case of damage to pipes (e.g. after an accident) through which foreign matters may enter into the circuit, the Power Unit, the actuator and the respective pipes must be replaced.

CAUTION

The hydraulic system contains high pressure oil.

steering system

Hydraulic steering pump

CAUTION

The oil contained in the system can cause injury to eyes and skin and may damage the car's painted parts.

BRAKE SYSTEM

Component replacement

CAUTION

The fluid used in the braking and clutch system can cause injury to eyes and skin; in case of contact, rinse the body part involved with abundant running water. In addition, the fluid may damage the car's painted parts.

AIR BAG MODULES

 **CAUTION**

NEVER expose the Airbag modules to temperatures over 150 °C (300 °F), since the high temperature, and not the current, is the factor which triggers bursting.

 **CAUTION**

Before carrying out any intervention or replacing a system component, check that the ignition key is turned to the STOP position and disconnect the battery

When welding operations have to be performed on the car, the ECU must be disconnected as well.

 **CAUTION**

The driver's and passenger's Airbag modules must be replaced every ten years after their installation (see C/E plate), even if the car has never been involved in collisions.
No restraining systems for children can be installed on the passenger seat.
Where the legislation in force provides it, children under twelve cannot travel on the front seats.
In the event of a crash with consequent activation of Airbag modules, dispose of the exploded modules as harmful waste, in accordance with the legislation in force in the related country.

SEATBELTS and Pre-tensionerS

 **CAUTION**

After disconnecting the battery, wait at least one minute before disconnecting the pre-tensioners.

Operations on the components

 **CAUTION**

Do not use a percussion screwer.

AIR CONDITIONING AND HEATING SYSTEM

System draining

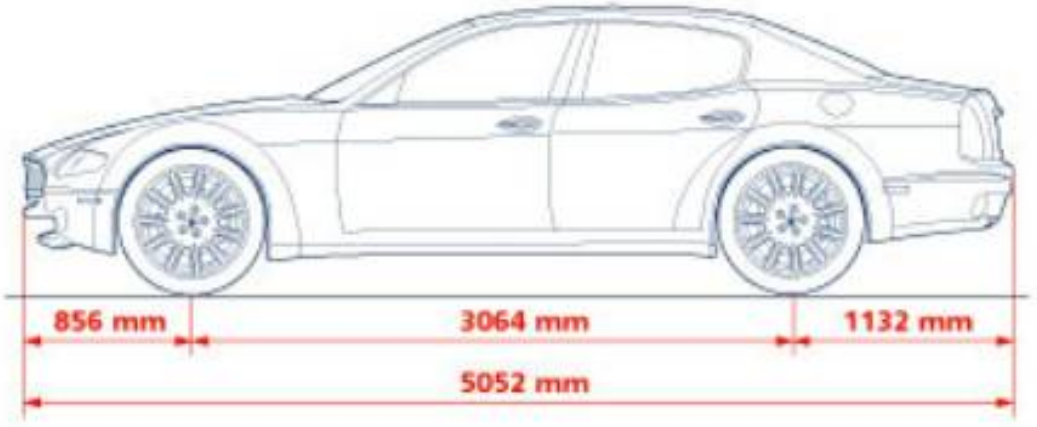
 **CAUTION**

Do not drain the coolant near naked flames as this could produce a toxic gas (phosgene).

CAUTION

Do not use naked flames to locate coolant leaks as this produces a toxic gas.

dimensions



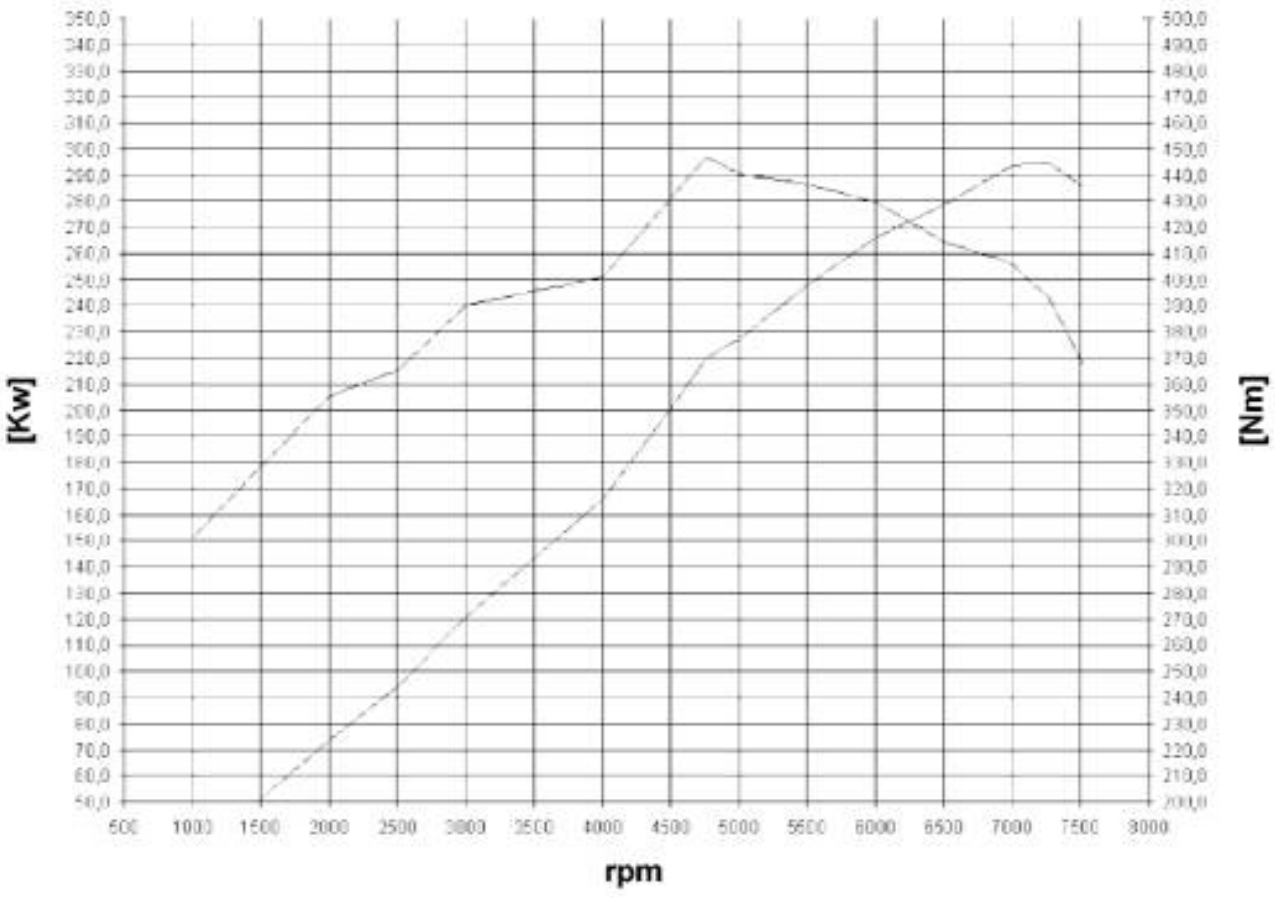
Wheelbase	**3064 mm**
Front overhang	**856 mm**
Rear overhang	**1132 mm**
Length	**5052 mm**
Height	**1438 mm**
Width	**1895 mm**
Front axle	**1587 mm**
Rear axle	**1595 mm**

weights

Tank capacity	**90 liters**
Low fuel	**18 litres**
Kerb weight (with fuel, tools and accessories)	**1970 kg**
Full load weight (5 persons and kg in the luggage compartment)	**2345 kg**

ENGINE

General	
Type code	M139
Cycle	Eight
Cylinder number and position	8-90° V
Number of valves per cylinder	4
Piston bore and stroke	92x79,8 mm
Total displacement	4244 cm^3
Compression ratio	11,058 ± 0,2:1
Maximum output (EEC)	295 kw – 400 CV
Corresponding rpm	7250 r.p.m.
Maximum torque (EEC)	442 Nm – 45 kgm
Corresponding rpm	4750 r.p.m.
Injection	
Type	Bosch Motronic ME7
Ignition	
Static ignition	
Firing sequence	1-8-6-2-7-3-4-5
Ignition coil (up to engine part number 102268)	Bosch ZS-K-1X1E
Ignition coil (from engine part number 102269)	Bosch ELDOR
Spark plugs	NGK PMR8A alternatively, NGK PMR8B
Alternator	Denso 12V - 150 A
Battery	FIAM 12V 100Ah - 850A



Speed, RPM	Torque, Nm	Power, kw
1009	301.8	31.5
1501	328.5	50.9
2000	355.2	73.4
2506	365.7	94.7
3003	390.6	121.2
4000	401.1	165.8
4501	430.7	200.3
5001	440.2	227.5
5501	436.4	248.0
6000	429.7	266.4
6500	414.4	278.3
7003	405.8	293.6
7513	367.6	285.3

The engine is an 8-cylinder, 90° V aspirated engine with a displacement of 4243.8 cm 3, 92 mm bore, 79.8 mm stroke, which generates a max. power of 400 HP (294.9 kW) at 7250 RPM.
The maximum torque rate that can be obtained is 444.5 Nm (45 Kgm) at 4750 RPM.
This performance is achieved through some technical solutions such as:

- variable timing system with stepless timing variator on the intake camshafts;

- motor-driven accelerator throttle valve (drive by wire)
- Cylinder heads in hardened aluminium/silicium alloy with high volumetric and thermodynamic efficiency combustion chamber.
- Hardened aluminium/silicon alloy crankcase with pressed-in nikasil cylinder liners.
- Single-cast crankshaft in hardened steel, individually balanced, resting on five journals with bearings.

The engine is equipped with a Bosch Motronic ME7 integrated ignition-injection system. The timing system uses four overhead camshafts (two per bank) and four valves per cylinder, controlled by hydraulic tappets.
The intake camshafts are equipped with a continuous high-pressure timing variator, which has a specific pump and is controlled by the injection ECU by means of a solenoid valve.
This system is capable of varying the timing of the intake valves, as required by the engine running conditions.
The timing system is controlled by two chains, whose tension is determined by hydraulic tensioners.
The engine is equipped with a dry sump, an oil-water exchanger incorporated into the upper crankcase and a plastic intake manifold, optimised along the length of the ducts.
The engine is cooled by an anti-freeze coolant mixture.

gearbox

Data valid up to serial number 21586

Differential bevel gear pair ratio EUROPE 41/11 = 3,727
Differential bevel gear pair ratio USA 46/11 = 4,182

Transmission ratios EUROPE

Gears	Gearbox ratios	End reduction ratios (engine revolutions/wheel turns)
1 st	46/14 = 3,286	13,4726
2 nd	41/19 = 2,158	8,8478
3 rd	37/23 = 1,609	6,5969
4 th	33/26 = 1,269	5,2029
5 th	30/29 = 1,034	4,2394
6 th	28/33 = 0,848	3,4768
R	46/14 = 3,286	13,4726

Transmission ratios USA

Gears	Gearbox ratios	End reduction ratios (engine revolutions/wheel turns)
1 st	46/14 = 3,286	13,741
2 nd	41/19 = 2,158	9,024
3 rd	37/23 = 1,609	6,547
4 th	33/26 = 1,269	5,307
5 th	30/29 = 1,034	4,324
6 th	29/33 = 0,878	3,670
R	46/14 = 3,286	13,741

Data valid from serial number 21587

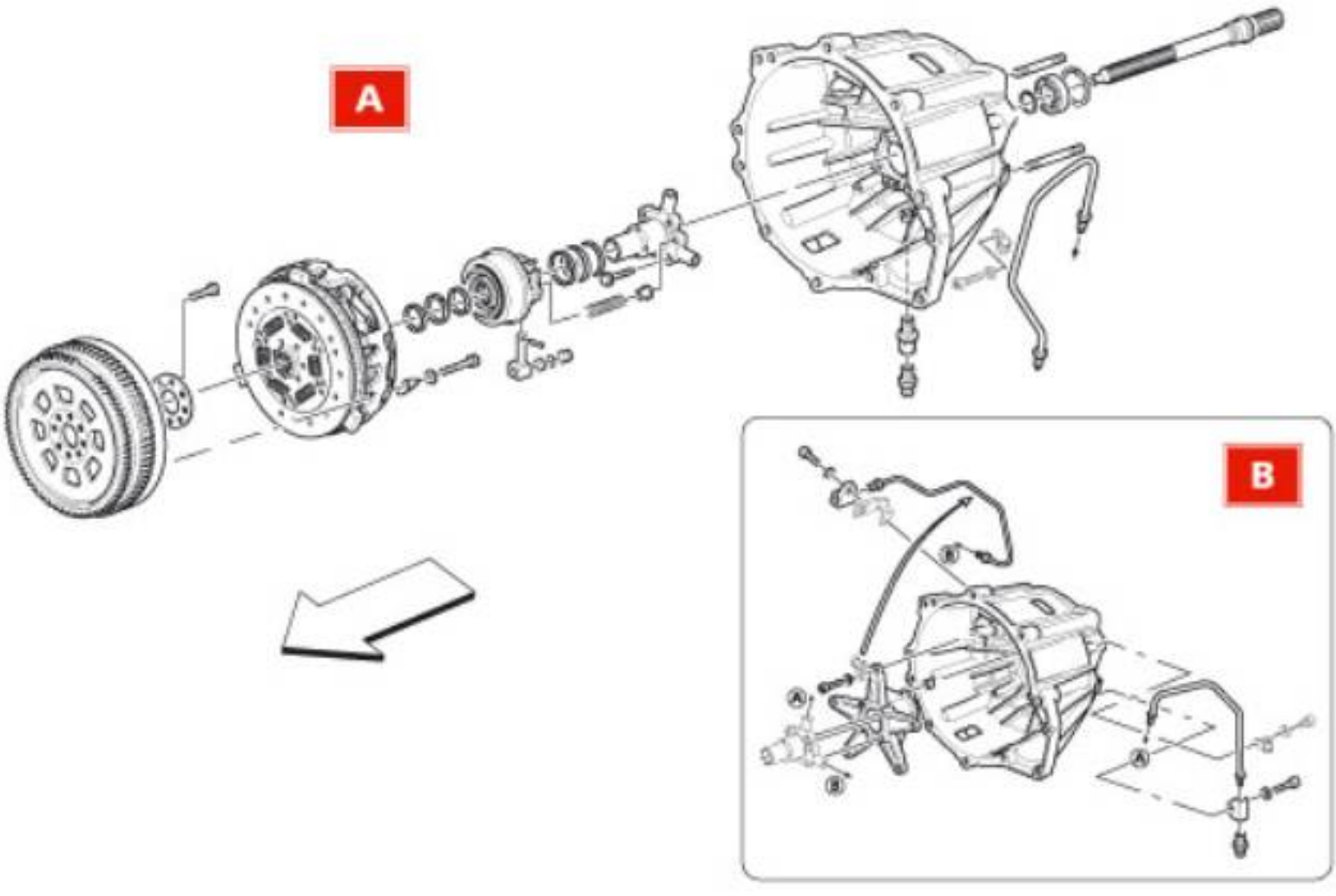
Differential bevel gear pair ratio 41/10 = 4,1

Gears	Gearbox ratios	End reduction ratios (engine revolutions/wheel turns)
1 st	45/14 = 3,21	13,44
2 nd	41/20 = 2,05	8,57
3 rd	33/23 = 1,43	6,00
4 th	34/31 = 1,10	4,59
5 th	28/31 = 0,90	3,78

6 th	28/37 = 0,76	3,16
R	46/14 = 3,29	13,74

clutch

Type	Dry double-plate clutch with flexible single ramp coupling and with double series of tangs to retain the intermediate pressure plate and for rising control.
Gasket outside diameter	215 mm



A: Clutch assembly valid from assembly no. **14805**
B: Clutch assembly valid up to assembly no. **14804**

differential

Differential type	self-locking with blades
Reduction crown wheel and pinion	Spiral (GLEASON)
Gear ratio for EUROPE and from assembly no. **21587**, also valid for the USA	10 : 41
Gear ratio only for USA up to assembly no. **21586**	11 : 46
Pre-load adjustment	by means of spacing washers (adjusting screws)
Support bearings	tapered roller type

Service brake

Type

The brake system is equipped with a large brake servo (8"+9") and consists of 4 self-ventilating discs with 4-piston fixed calipers, an electronic braking distributor (E.B.D.) incorporated into the A.B.S. system A.S.R., which also performs the anti-skid functions during traction and can be selected from the driver's seat in the following conditions:

- dry;
- wet;
- cut-out.

The A.B.S./A.S.R. and E.B.D. functions are integrated within the E.S.P. stability check system (M.S.P.) which operates separately for each brake on the 4 wheels and for the engine control.

Service brakes

Front discs	
Outer diameter	**330 mm**
Effective radius	**136.7 mm**
Total thickness	**32 mm**
Rear discs up to serial number 27859	
Outer diameter	**316 mm**
Effective radius	**158 mm**
Total thickness	**28 mm**
Rear discs from serial number 27860	
Outer diameter	**330 mm**
Effective radius	**- mm**
Total thickness	**28 mm**
Front Brake Calipers	
Small piston diameter:	
Input	**40 mm**
Output	**44 mm**
Rear brake calipers up to serial number 27859	
Small piston diameter:	
2 facing each other	**44 mm**
Rear brake calipers from serial number 27860	
Small piston diameter:	
Brembo – fixed, 4 pistons	**32/36 mm**

ABS-MSR-EBD-MSP system (up to assembly no. 24274)

Integrated system **Bosch VDC 5.7**, with ECU joined onto the hydraulic modulator; version for crossed brake circuit, rear traction. Braking distributor valve function obtained with specific routine software in the control program.

-

ABS-MSR-EBD-MSP system (from assembly no. 24275)

The BOSCH ABS braking system currently used on the Quattroporte is the most advanced on the market and helps ensure enhanced driving safety. To achieve this, the ESP 8.0 system has been integrated in the electro-hydraulic ECU.
The ESP system is automatically activated when the vehicle is started and cannot be deactivated by the user. ESP (Electronic Stability Program) is an active safety system to control the vehicle during dynamic manoeuvres on the road and is activated in emergency conditions. It holds the vehicle stable in case of sudden manoeuvres, above all on slippery road surfaces. It quickly reacts to both oversteering and understeering, bringing the vehicle back to stable conditions thus giving the driver full control over the vehicle. This has been achieved by using specific sensors, i.e. the steering angle sensor and the yaw/ lateral acceleration sensor (the latter is integrated and no longer found under the centre console). The ESP system is controlled by the ABS ECU, which incorporates a specific electro-hydraulic control unit that processes the following signals:
- steering angle/steering wheel rotation speed sensor
- yaw/lateral acceleration/longitudinal acceleration sensor
- engine motor-driven throttle position
- wheel revolution sensors
- hydraulic brake system pressure sensor

Furthermore, the ECU uses special algorithms implemented in its software to calculate the values of the data for the vehicle's dynamic control:
- longitudinal and transversal sliding between the wheels and the road surface
- axle drift.

Through these values, the system interprets the vehicle's actual dynamics, identifying all the critical conditions due to environmental factors (e.g. low-grip surface) or errors made by the user (e.g. panic situations), and acts on the brakes and the engine torque to return the vehicle to good driving conditions.
The new electronic control unit controls the Hill Holder function, i.e. it assists the driver in starting in forward or reverse gear when the vehicle is on a road with a gradient of more than 2%. The Hill Holder automatically supplies sufficient braking torque to hold the vehicle stationary until the clutch has been fully released and the engine torque is sufficient to start the vehicle comfortably.
The Hill Holder is automatically activated when the brake pedal is depressed in conjunction with:

- Vehicle speed equal to zero
- Gradient of more than 2%
- Clutch pedal depressed.

The instant the brake pedal is released, provided that the other conditions are unchanged, the Hill Holder function holds the braking system under pressure for about 1.5 seconds so as to allow the driver to move his foot from the brake pedal to the accelerator pedal, without the vehicle moving and without having to use the handbrake.
Once the accelerator pedal is depressed, the Hill Holder function continues holding the vehicle stationary for a further 1.5 seconds or until there is sufficient engine torque to start the vehicle.

CAPITOLO

Parking brake

type	mechanical on the rear wheels
control	with tunnel lever

Suspensions

Front suspensions	articulated quadrilateral, with arms and hub carrier in forged aluminium
shock absorbers	BILSTEIN type, gas operated, with aluminium body
helical	springs
Rear suspensions	articulated quadrilateral, with arms and hub carrier in forged aluminium
shock absorbers	BILSTEIN type, gas operated, with aluminium body
springs	helical
Adjustable damping suspensions (optional)	Electronically controlled system which enables the user to choose two different setting levels for the shock absorbers, according to the roadbed conditions, speed and driving comfort

Steering

TYPE	Hydraulic steering with pinion and rack, with pump controlled by the crankshaft and tank
MIN. STEERING DIAMETER	12,3 m
STEERING COLUMN	Speed-sensitive steering wheel, i.e. it stiffens as the speed increases. Articulated, with energy absorption and tilt and axial adjustment. It isfitted with a steering angle sensor to manage the vehicle's dynamic control functions (ESP/MSP).

WHEELS

RIMS AND TIRES			
	Rim size	**Tire size**	**Pressures**
Front	8.5”J x 18” ET52	245/45ZR 18	2,2 bar
	8.5”J x 19”	245/40ZR 19	2,2 bar
only on SPORT GT	8.5”J x 20”	245/35ZR 20	2,2 bar
Rear	10.5”J x 18” ET50,5	285/40ZR 18	2,2 bar
	10.5”J x 19”	285/35ZR 19	2,2 bar
only on SPORT GT	10.5”J x 20”	285/30ZR 20	2,0 bar
Front (OPT snow tyre)	8.5”J x 18” Winter	245/45VR 18	-
Rear (OPT snow tyre)	10.5”J x 18” Winter	285/40VR 18	-
Front (OPT)	8.5”J x 19”	245/40ZR 19	-
Rear (OPT)	10.5”J x 19”	285/35ZR 19	-
Spare wheel (optional)	6" J x 17"	185/60 R17	-

RUN FLAT (optional)	**Rim size**	**Tire size**	**Pressures**
Front	8.5”J x 18”	245/45ZR 18	2,2 bar
	8.5”J x 19”	245/40ZR 19	2,2 bar
Rear	10.5”J x 18”	285/40ZR 18	2,2 bar
	10.5”J x 19”	285/35ZR 19	2,2 bar

CAUTION
The maximum speed that can be reached with winter tires is indicated by the tire manufacturer. In any case, always comply with the regulations in force in the Country where the car is circulating.
Only use winter tires of the prescribed dimensions and brand.

IMPORTANT
Notwithstanding the prescribed sizes, it is essential that tires of the same brand and type are fitted to all the wheels in order to ensure safe driving.

IMPORTANT
Do not use air chambers on Tubeless tires.

	Tyre size:	**Brand/Type**
SNOW CHAINS	285/40ZR 18	Konig/Super Magic

IMPORTANT
The maximum radial protrusion permitted beyond the tyre profile is 9 mm.
The snow chains must be fitted only on the rear tyres

INITIAL FLUID SUPPLIES CHART

COMPONENT	PRODUCT	QUANTITY
Engine (Italian market) Engine (foreign markets)	Sint Evolution 2000 5W-40 Tecsint SL 5W-40	9.5 + 1 litres
Gearbox and transmission oil	Oil specifications: SAE 75W/90 above API GL4-GL5C API MT1-PG2 specifications. Recommended: Rotra LSX 75W-90	2.7 litres
Hydraulic steering	SpecificationsOil type ATF DEXRON II D LEV, SAE 10W. ATF IID, DEXRON	-
DuoSelect gearbox	CHF 11S	0.33 litres
Brakes	Synthetic fluid speficications: NHTSA n.116 DOT4, ISO 4925, SAE J1703 J1704, CUNA NC 956-01. Recommended: DOT4 Plus Brake Fluid	-
Air Conditioning System	R134 a	1100 cc
Compressor oil	SP10	125 cc
Windscreen washer fluid tank	Water-washing fluid mixture: CUNA N.C. 956 – II specifications Recommended: DP1	6.5 litres
Engine cooling circuit	Water-coolant mixture; CUNA N.C 956 – 16 specifications Recommended: ANTIFREEZE PLUS / ECOPERMANENT.	13 litres

TIGHTENING TORQUES

Part	Nominal torque	Products
Screw fastening damper to the crankshaft	450 Nm	LOCTITE 242
Screw fastening flywheel to crankshaft	91 Nm	
Solenoid valves' Screw fastening screw	10 Nm	
Screw fastening pump control gearing	23 Nm	
Oil filter cartridge	30 Nm	engine oil on gasket
Screw fastening piston cooling system multiple union (oil nozzles)	3 Nm	LOCTITE 242
Screw fastening RH head alternator	49 Nm	
Screw fastening LH head alternator	49 Nm	
Timing chain tensioner for camshaft axle control	40 Nm	
Screw fastening belt-tensioner pulley	49 Nm	
Screw fastening coils on head cover	10 Nm	
Screw fastening pumps to the sump	25 Nm	
Crankcase pumps fastening	25 Nm	
Screw fastening exchanger to crankcase	10 Nm	
Screw fastening variator oil pump	3 Nm	

Part	Nominal torque	Products
Screw fastening exhaust manifolds	25 Nm	
Screw fastening front cover to sub-crankcase-crankcase-heads	10 Nm	
Check valve on LH cylinder head	30 Nm	
Threaded union on delivery pump for fastening oil filter	60 Nm	
Mounting bracket - engine fastening	45 Nm	

Sub-crankcase - crankcase fastening (external seam)	10 Nm	
Chassis plate - bushing fastening	50 Nm	
Self-locking nut for fastening bushing	120 Nm	
Alternator cable - starter motor fastening	14 Nm	
Injectors to fuel pipes connection	30 Nm	
Pipe from accumulator to cylinder heads	22 Nm	
Union on heads and accumulator, for oil pipes running from accumulator and heads	27 Nm	
Threaded plug for clutch housing - crankcase oil hole	60 Nm	
Plug on oil tank suction screen	32 Nm	
Exhaust system thermocouples	10 Nm	
Lambda sensors	50 Nm	
Water temperature sensor	16 Nm	
Screw fastening injector rails to intake manifold	15 Nm	
Screw fastening detonation sensor	20 Nm	
Spark plug	10 Nm	Spark plug lubricant
"Torca" clamp for exhaust system	54 Nm	with spinner max 400 rpm
Screw fastening r.p.m. sensor	8 Nm	
Threaded plug on front cover for bleeding	15 Nm	
Timing variators	200 Nm	
Outlet union for water vapour from the exchanger	15 Nm	
Screw fastening hydraulic steering pump	25 Nm	
Screw fastening A.C. compressor	25 Nm	
Screw fastening auxiliary belt tensioners	25 Nm	
Screw fastening timing control transmission mount	6 Nm	LOCTITE 242
Screw fastening bushing for LH head tensioner	10 Nm	

Screw fastening gearing on timing variator	15 Nm	LOCTITE 242

Part	Nominal torque	Products
Screw fastening pipe running from the compressor to the condenser	50 Nm	
Screw fastening timing sensor and revolution sensor	8 Nm	
Screw fastening cylinder head cover	12 Nm	
Screw fastening fixed runner onto transmission	10 Nm	
Screw fastening fixed runner for timing system control	25 Nm	
Screw fastening pump control fixed runner	10 Nm	
Screw fastening moving runner for transmission	10 Nm	
Screw fastening timing system movable runner	25 Nm	
Screw fastening pump movable runner	10 Nm	
Screw fastening intake manifold to head	10 Nm	
Screw fastening oil delivery pipe to pump	10 Nm	
Threaded union on pipe from exchanger to oil tank	75 Nm	
Fastening on tank for oil delivery pipe to oil pump	78 Nm	
Clutch - flywheel engine fastening	18 Nm	
Threaded plug on cylinder head cover for timing inspection	50 Nm	
Screw fastening wiring cover	7 Nm	LOCTITE 242
Pump - inlet water cover fastening	10 Nm	
Thermal pressure gauge cover fastening	10 Nm	
Screw fastening engine electric earth	25 Nm	
Threaded union on fibre plenum chamber for brake servo vacuum	22 Nm	
Threaded union on oil tank in suction screen area	75 Nm	

Threaded plug for oil bleeding into the sub-crankcase	60 Nm	
Nuts for fastening oil suction screen onto tank	16 Nm	
Belt tensioner - crankcase fastening	25 Nm	
Nut for fastening sub-crankcase to crankcase in clutch housing area	10 Nm	
Screw for fastening mounting bracket to starter motor	10 Nm	LOCTITE 242
Nut for fastening bracket to starter motor	6 Nm	LOCTITE 242
Triple gearing retaining screw	25 Nm	
Fastening for gearing on exhaust camshaft	17 Nm	LOCTITE 242
Self-locking nut for fastening rubber bushing	5 Nm	LOCTITE 242
Threaded tapered plug on cylinder heads (M6)	7 Nm	LOCTITE 242
Threaded tapered plug on cylinder heads (M8)	10 Nm	LOCTITE 242
Threaded tapered plug on cylinder heads (M10)	32 Nm	
Electric oil pressure transmitter	40 Nm	

Toolkit

Specific tooling

Description	Code	
Wrench for fuel tank pump ringnut		900026390
RH/LH cylinder head retaining tool		900026520
Tool for fitting exhaust valve cotters on cylinder heads		900026970
Tool for fitting seal ring on valve		900026980
Special wrench for fitting variator oil filters		900026990
Punch for fitting cylinder head centering dowel		900027000
Punch for fitting centering dowel		900027010
Tool for fitting diameter-6 centering dowel		900027260
Tool for fitting diameter-13 centering dowel		900027270
Special wrench for fitting timing variator on F136 camshaft		900027020
Punch for fitting pump unit control shaft on sub-crankcase		900027030
Punch for fitting pump unit bearing on sub-crankcase		900027040
Punch for fitting pump unit seal ring on sub-crankcase		900027050
Punch for fitting seal ring on front crankcase cover		900026590
Special wrench for tightening pump body screws to torque		900027150
Cylinder liner extracting tool		900026610
Crankshaft rotation-stop tool for dumper (off line)		900026560
Punch for fitting rear seal ring onto crankshaft		900027060
Punch for fitting crankshaft bearing, clutch side		900026550

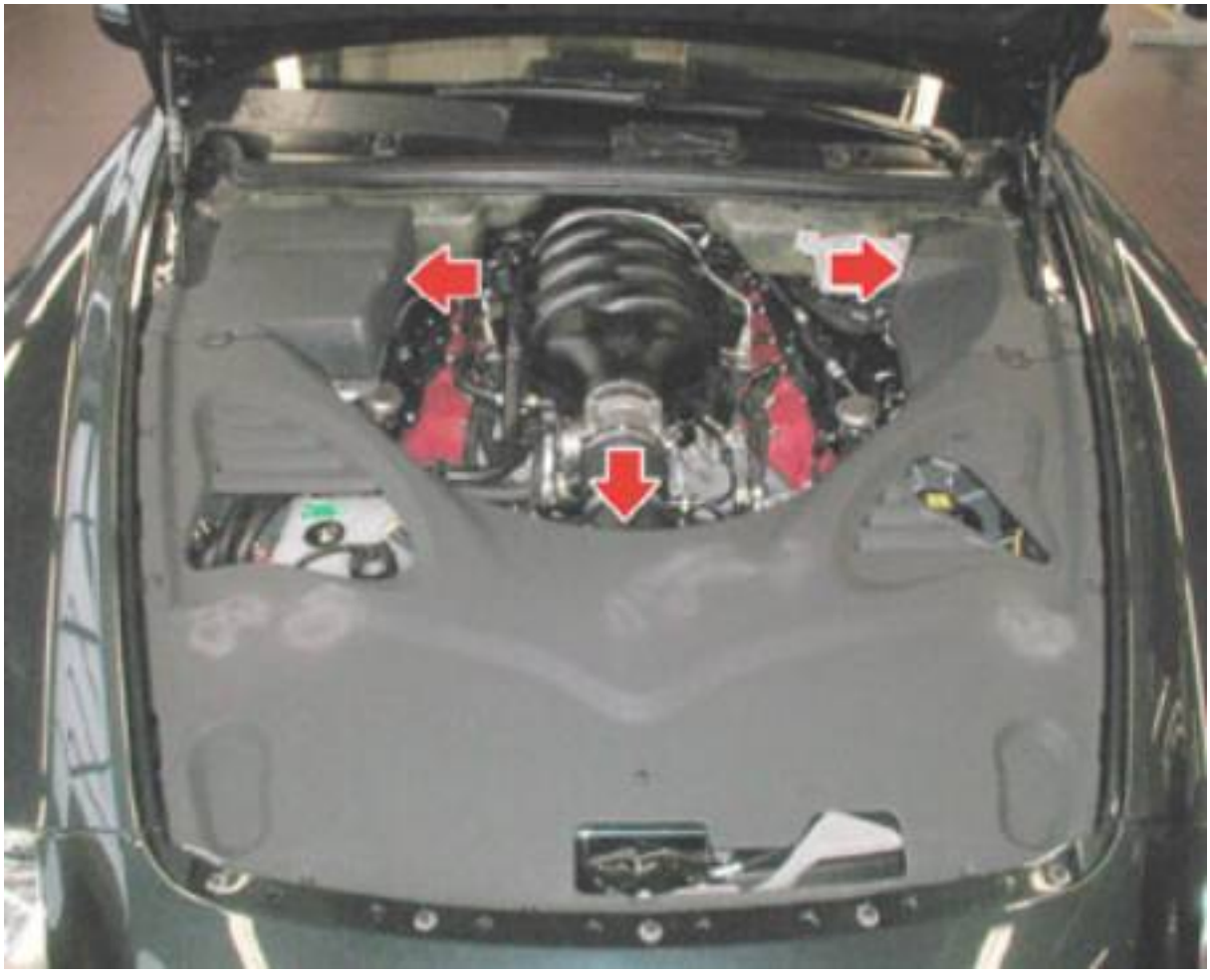
Description	Code

Engine support for stand		900026310
Punch grip		900026300
Extracting tool		95972714
Extracting tool pins		900026400

Removing-refitting the engine

Removing the engine

- Remove the trim panels.



- Rotate the plastic fastening screws on the engine compartment fuse box cover by 90°, then remove the cover.

- Undo the two fastening screws on the engine compartment fuse box.

- Undo the three fastening screws and remove the engine compartment fuse box mount.

- Remove the windscreen wiper unit.

Removing-refitting the windscreen wiper unit

- Undo the two screws fastening the brake oil pan.

- Disconnect the two pipes for draining the water from the service pan.

- For vehicles that have the AQS sensor fitted on the shield, proceed as follows.
- Detach the electrical connection.

- Undo the screws fastening the connected devices' pan underneath the windscreen.

- Undo the screws fastening the left-hand pan for the connected devices underneath the windscreen and remove the pan.

- Drain the air conditioning system using the specific tool connected to the system's valves.

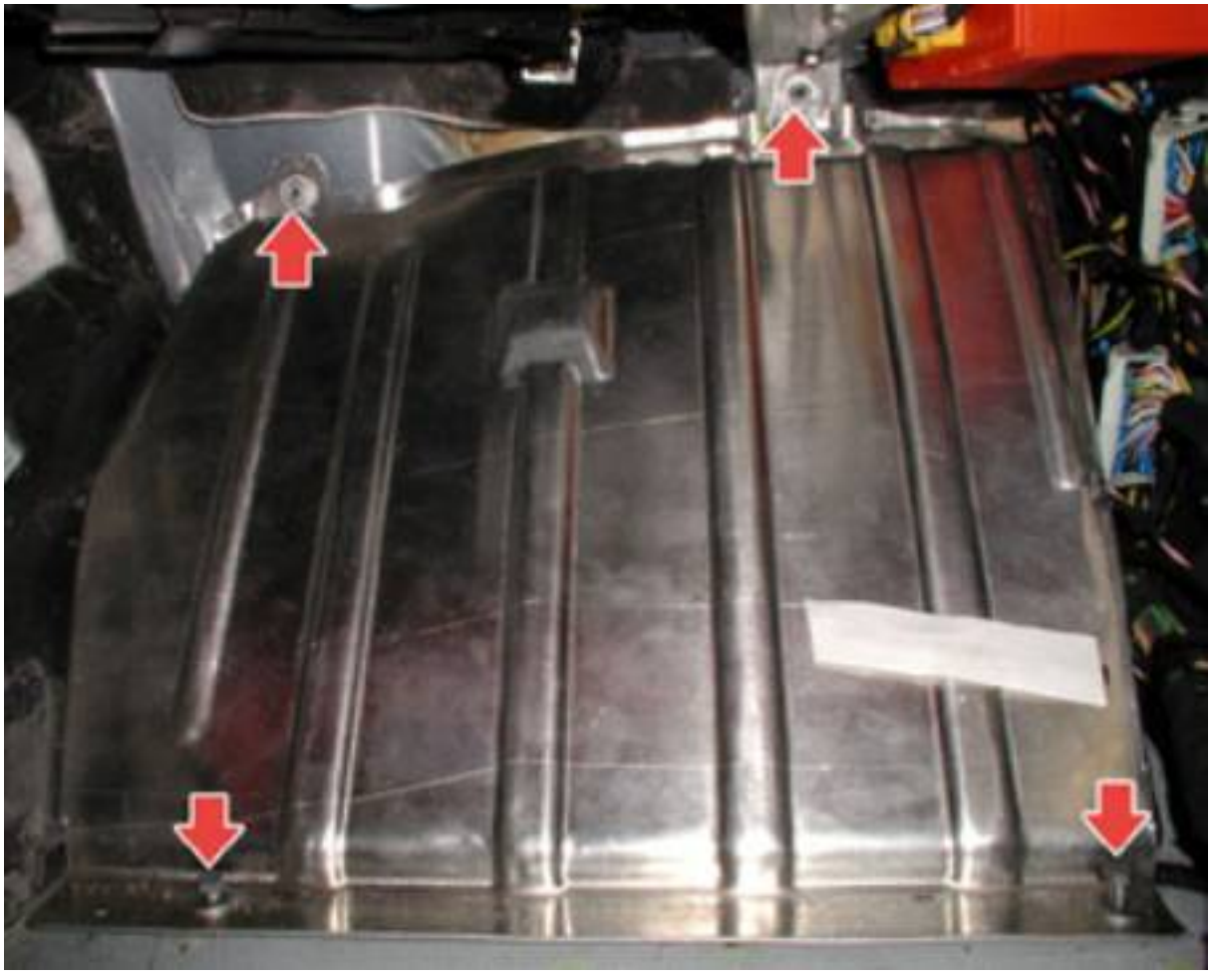
- Disconnect the battery's negative terminal
- Undo the three fastening screws on the tunnel side valance panel, then remove the trim panel **1** as well.

- Remove the snap-fitted trim panel on the door side.

- Lift the passenger compartment mat slightly.

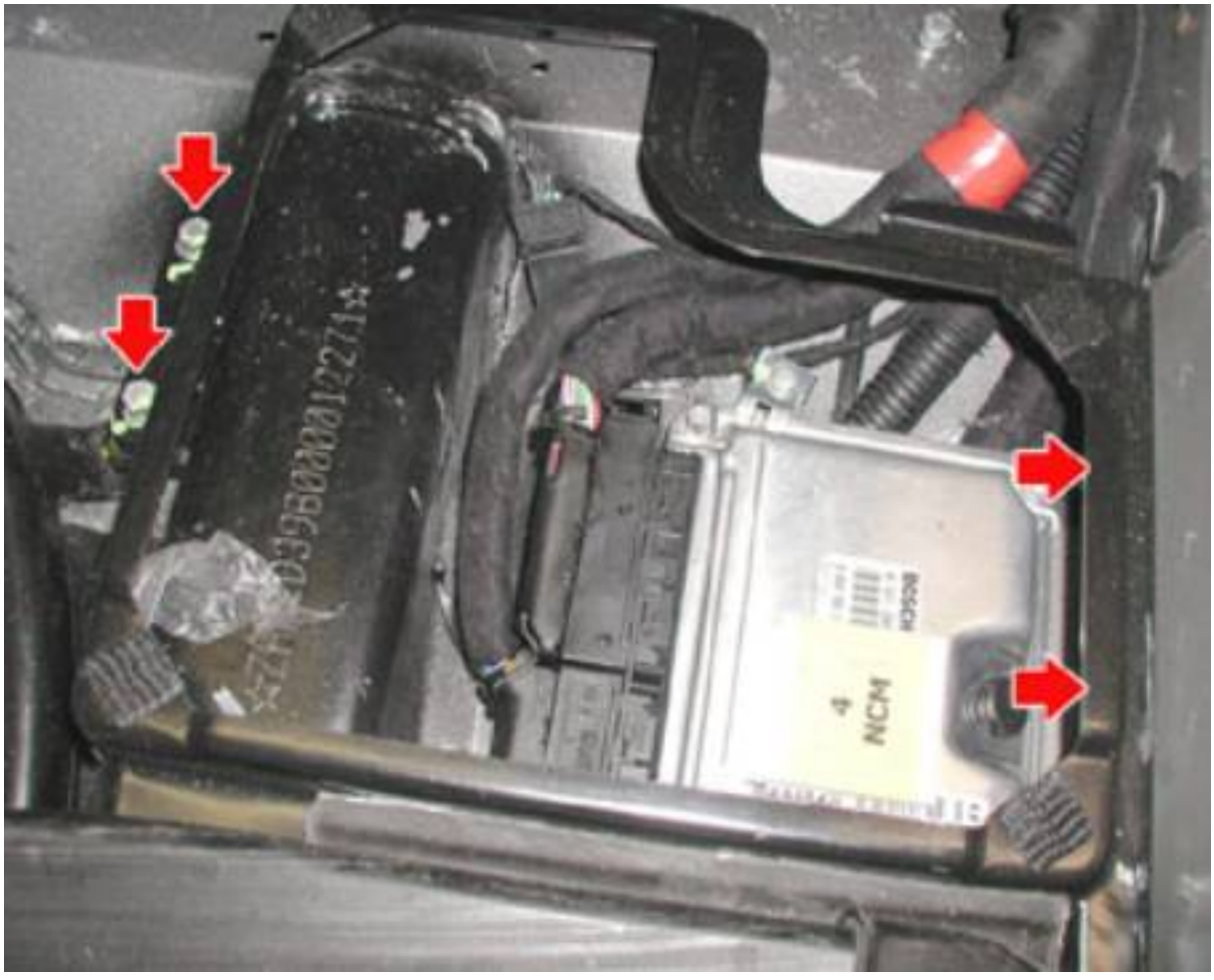
- Lift the guard partially.

- Undo the four fastening screws on the metal guard, then remove it.



- Undo the three fastening screws, detach the electric connection, then remove the bass box.

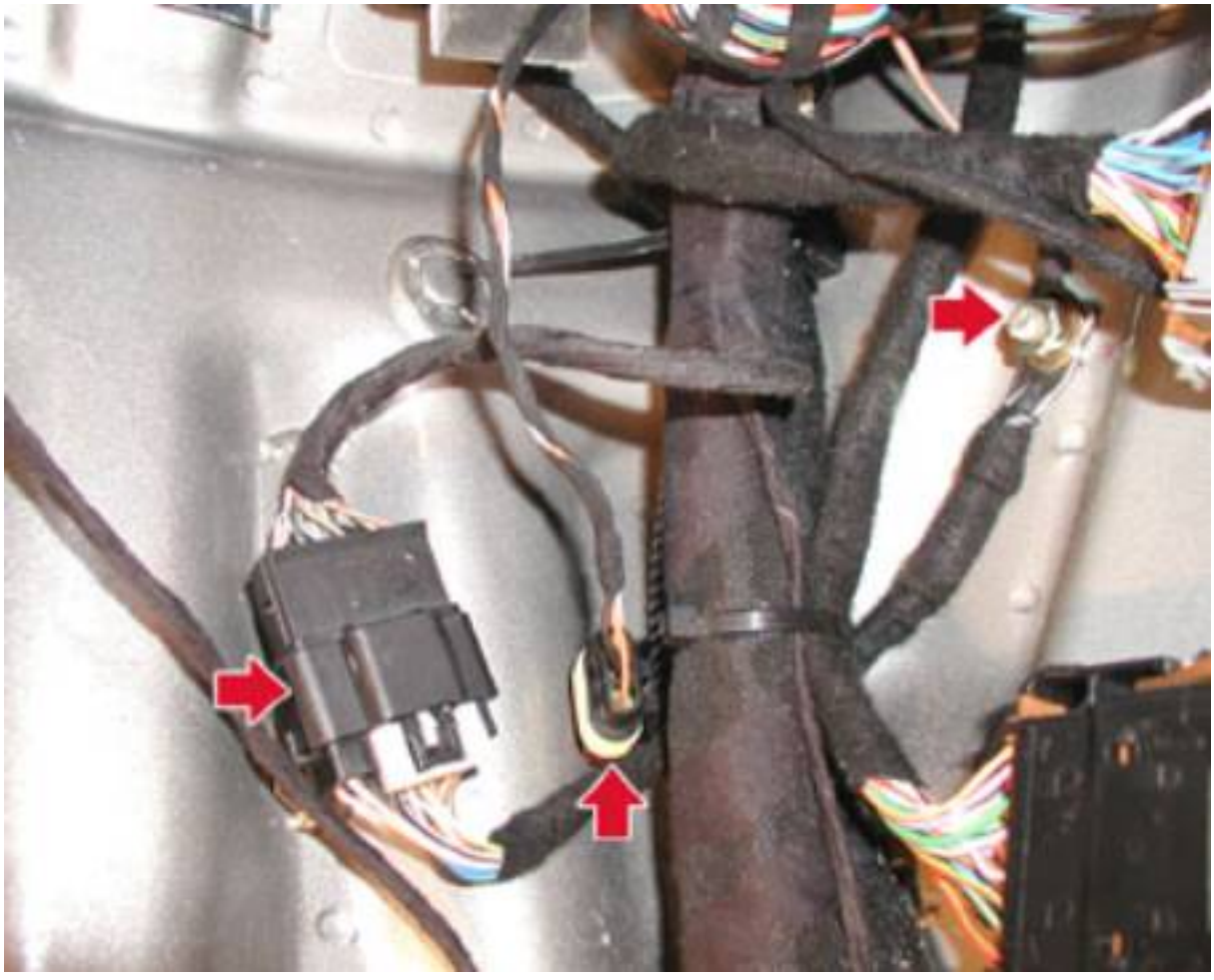
- Move the floor panel as far back as possible and undo the two screws and the two nuts on bracket for the engine control node compartment .



- Loosen the fastening screw and rotate the fastening clamp on the engine control node.

- Disconnect the two electric connections and remove the engine control node.

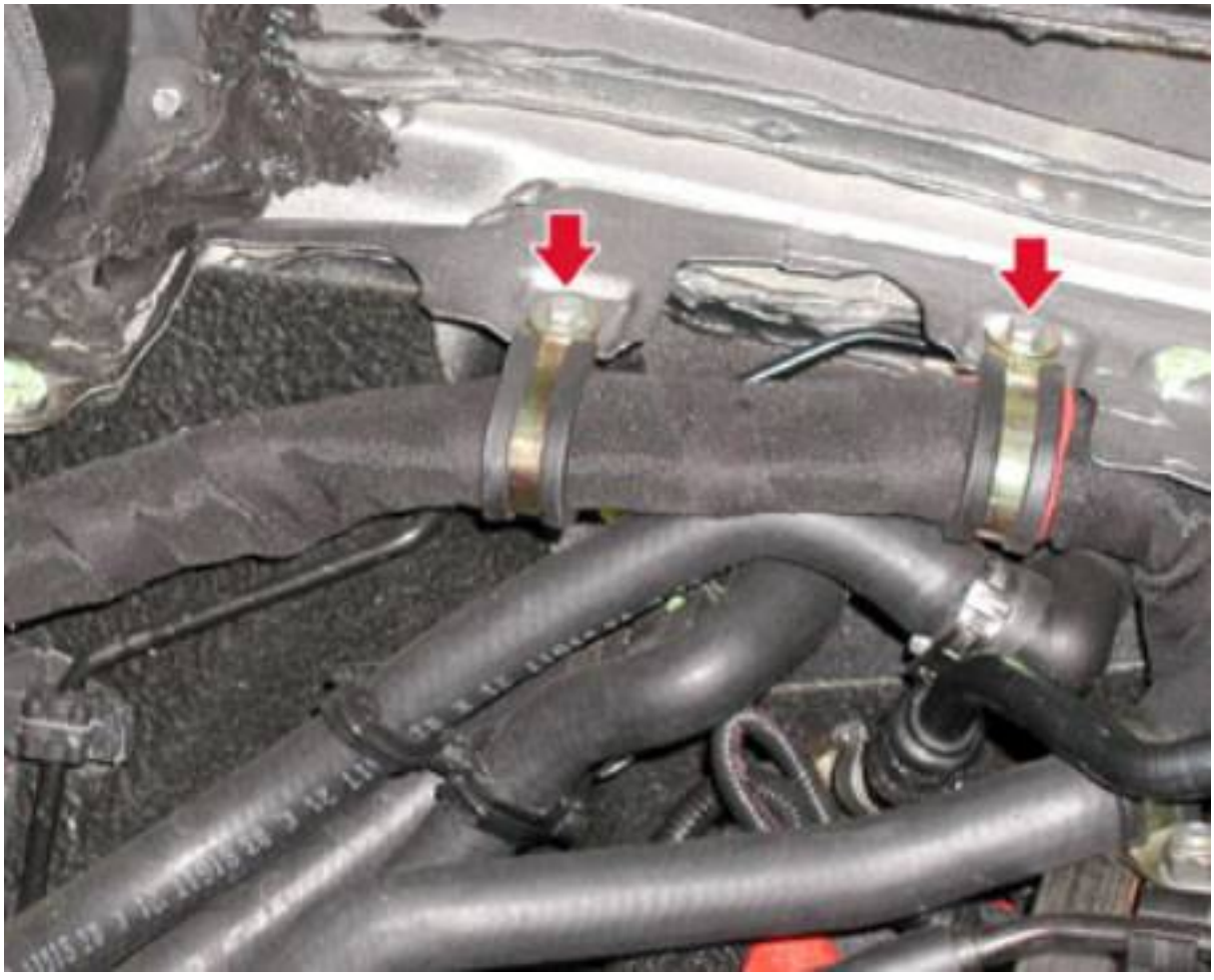
- Unscrew the nut and disconnect the earth cable from the bodywork, then detach the two electric connections.



- Cut the plastic clamps and separate the engine wiring from the passenger compartment wiring.
- Detach the electric connection.

- Detach the two electric connections secured to the mudguard and the electric connection on the fuel vapour solenoid valve.

- Undo the fastening screws on the clamps fastening the engine wiring.



- Working from inside the engine compartment and from the passenger compartment, pass the engine wiring out through the hole on the passenger compartment/engine compartment partition panel, arranging it so it does not hinder subsequent operations.

N.B.
Slide the wiring out carefully so that it does not damage the electric connections and to prevent the wiring itself being cut by the sharp parts of the sheet.

- Place the vehicle on the hoist
- Remove the floor guard beneath the engine

Removing-refitting the engine floor guard

- Remove the exhaust tailpipes.

Removing-refitting the tailpipe

- Remove the gearbox.

Removing-refitting the gearbox

- Remove the transmission shaft.

Removing-refitting the transmission shaft

- Remove both front wheels.

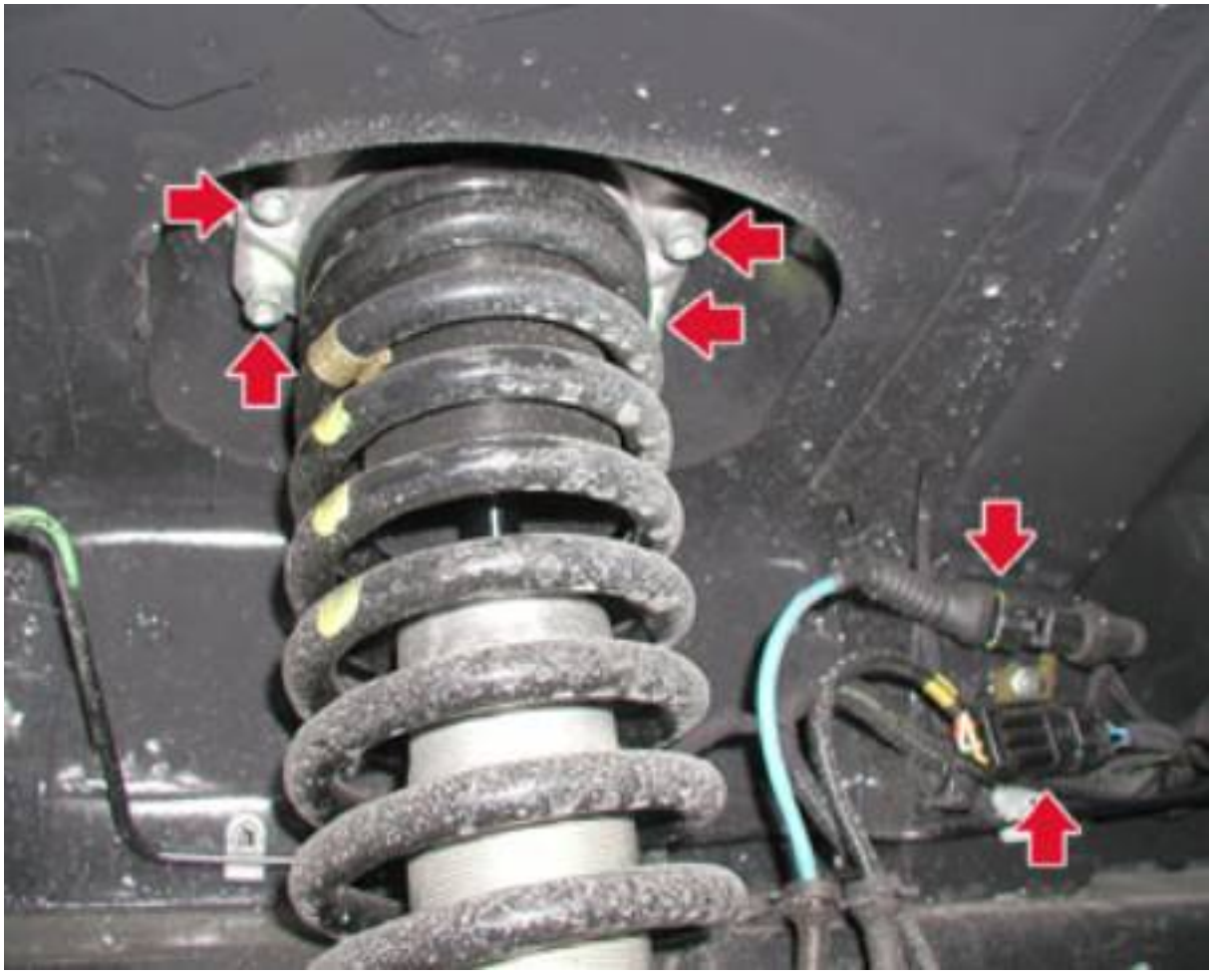
Replacing the wheels

- Remove both the front wheelhouses.

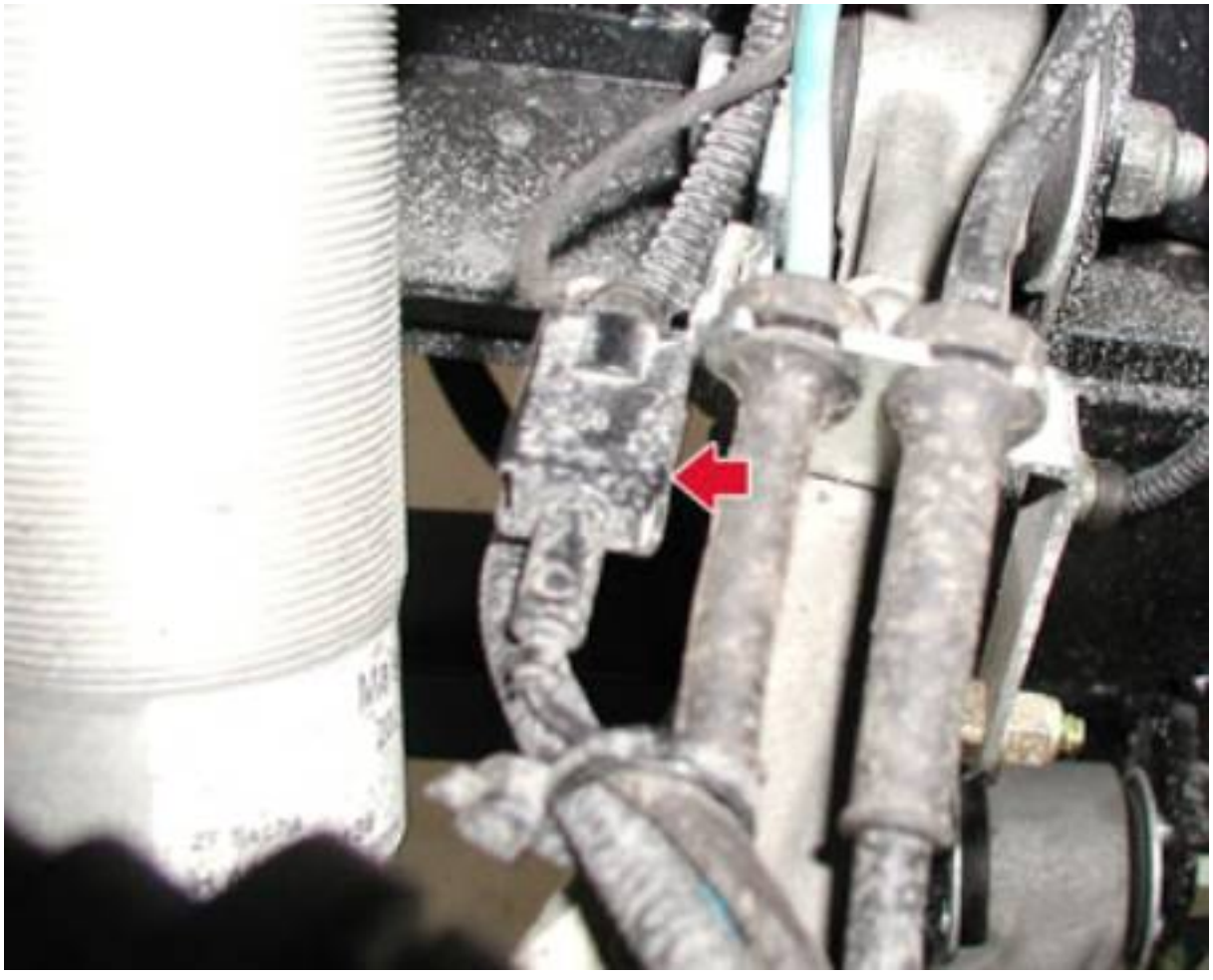
Removing-refitting the front wheelhouse

- Undo the fastening screws on the reinforcement bracket and remove it (both sides).

- Undo the screws fastening the shock absorbers to the bodywork and detach the electric connections on the ABS sensors and on the acceleration sensors.



- Detach the electric connection on the brake pad wear sensor (this sensor is only found on the left-hand side of the vehicle)

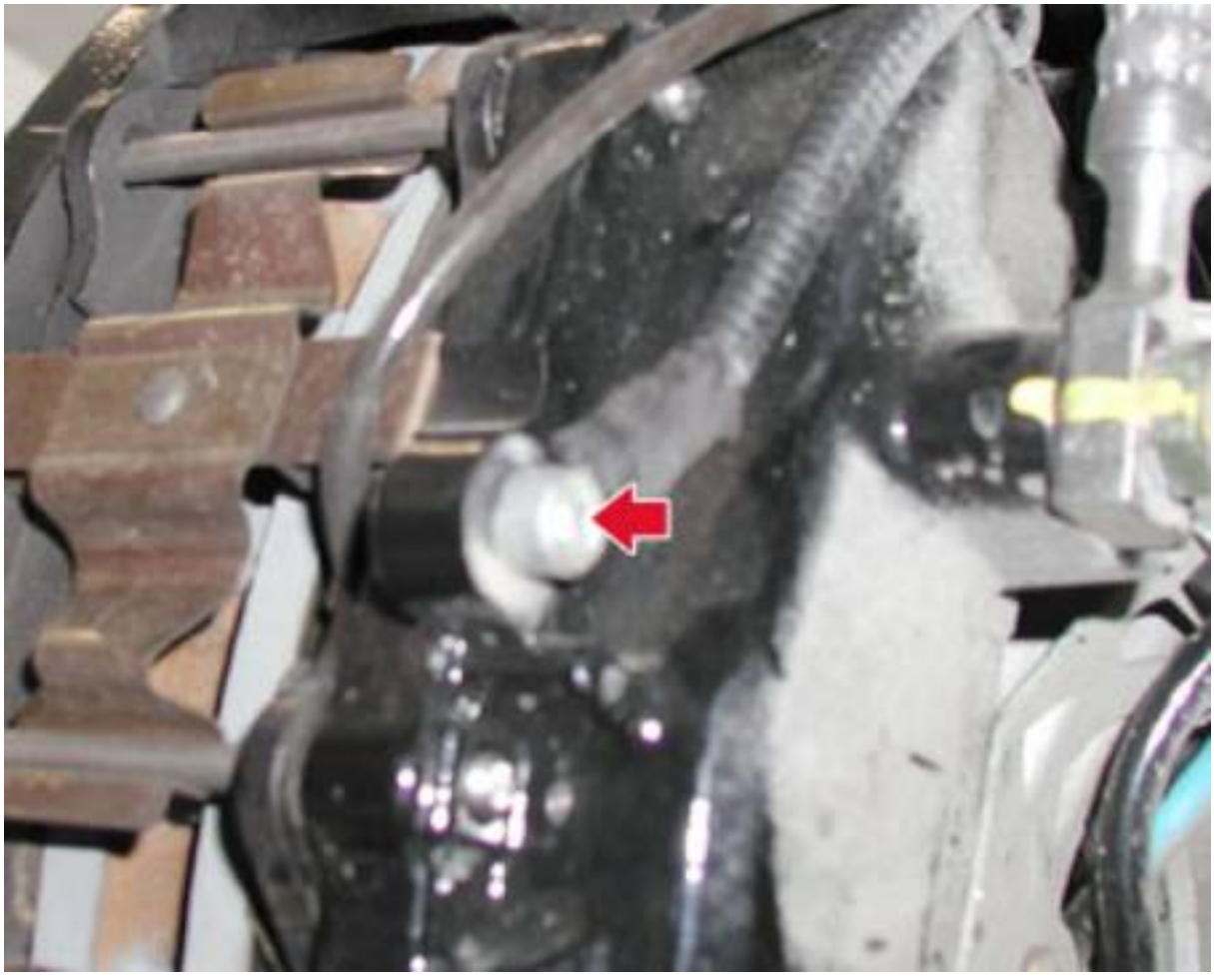


- Remove the lower screw fastening the shock absorbers on both sides.

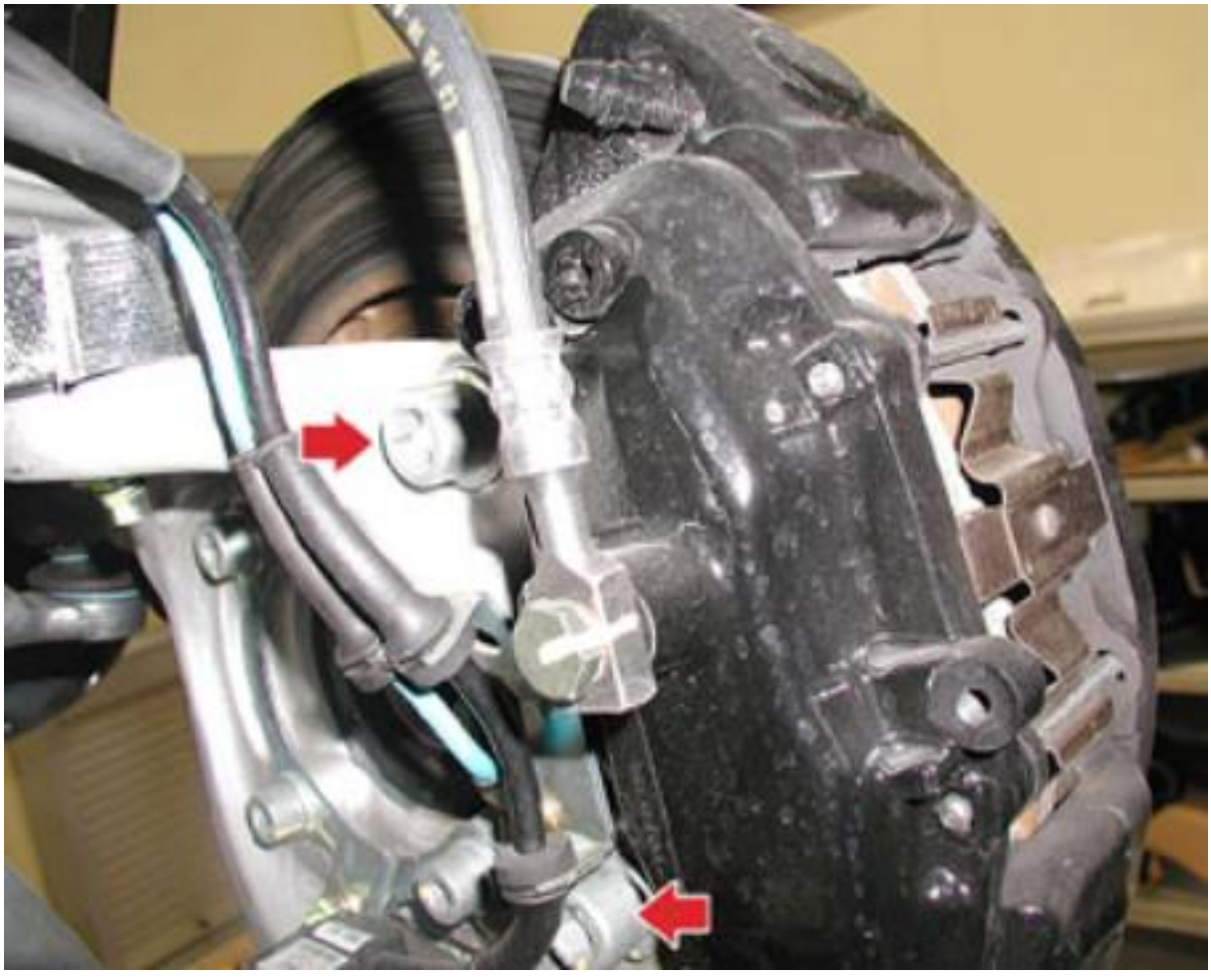
- Detach the electric connection on the headlight adjustment potentiometer, on both sides of the vehicle.

- Unscrew the nut fastening the cable for the headlights adjustment potentiometer, working on both sides of the vehicle.

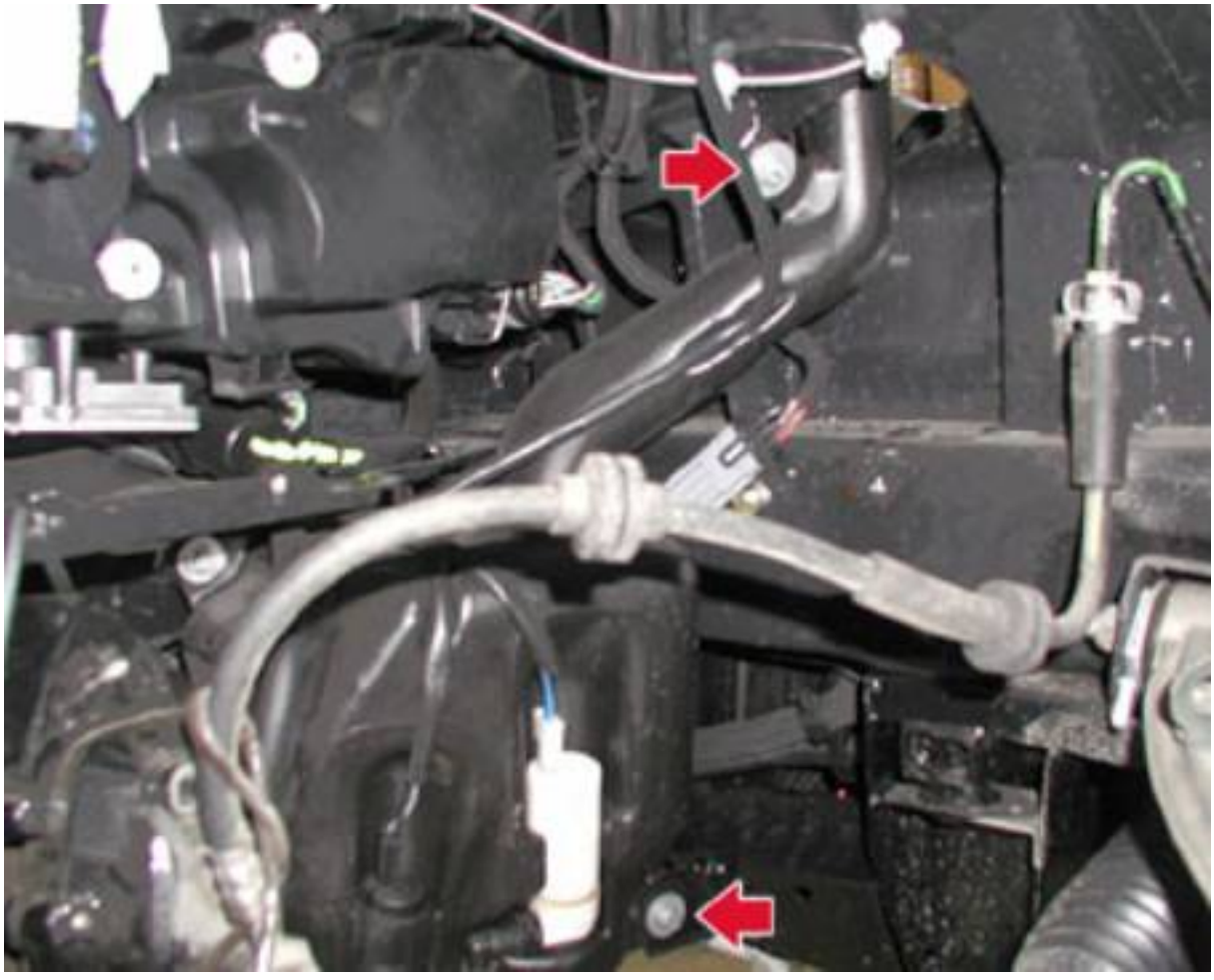
- Undo the screw fastening the earth cable on the front right- and left-hand brake calipers



- Undo the two screws fastening the brake caliper to the pillar, then move it sideways, securing it with suitable means to ensure the weight of the caliper does not weigh down the oil line.



- Unscrew the upper fastening screw and loosen the lower fastening screw on the windscreen washer fluid tank.



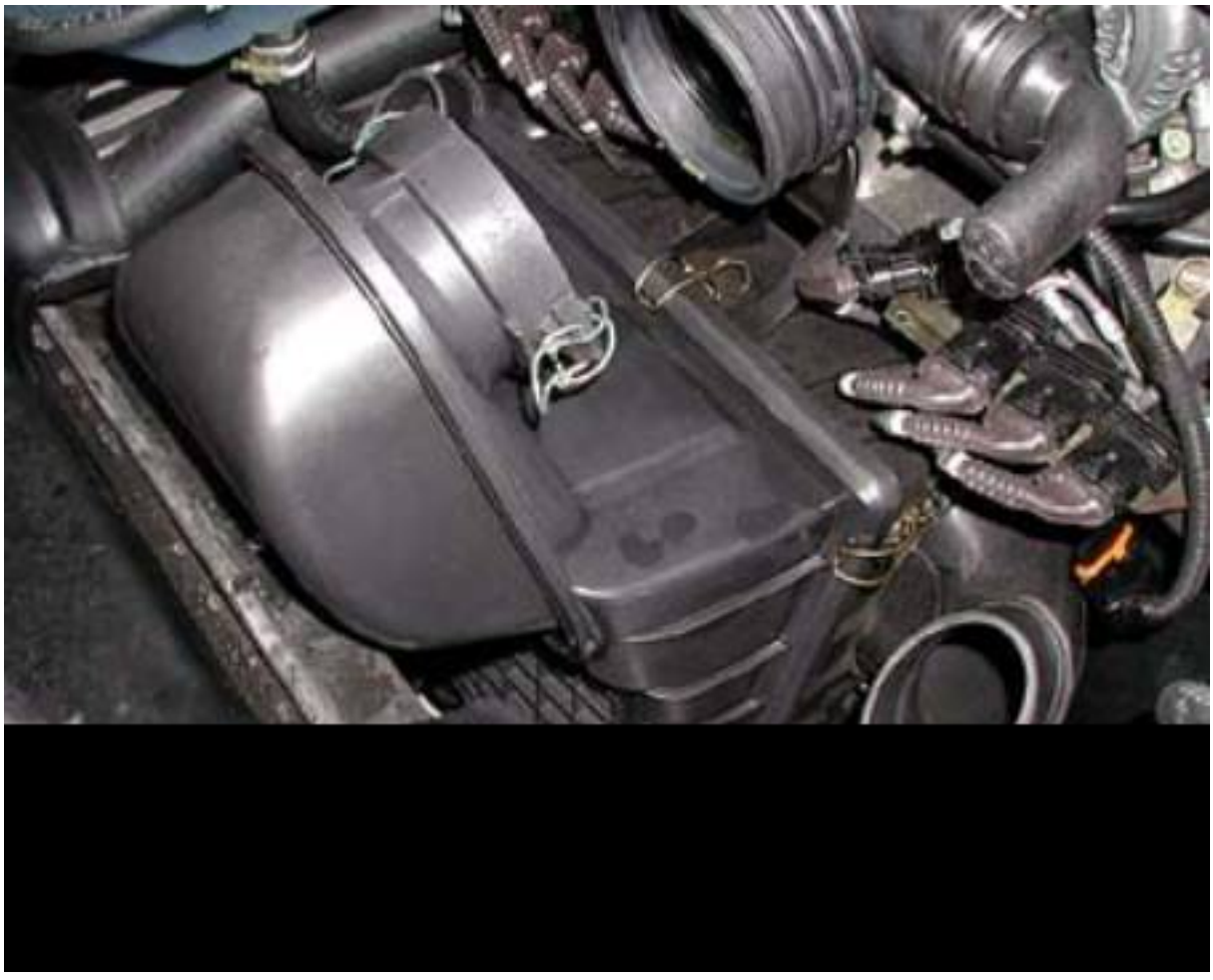
- Detach the electric connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the domes' bar.

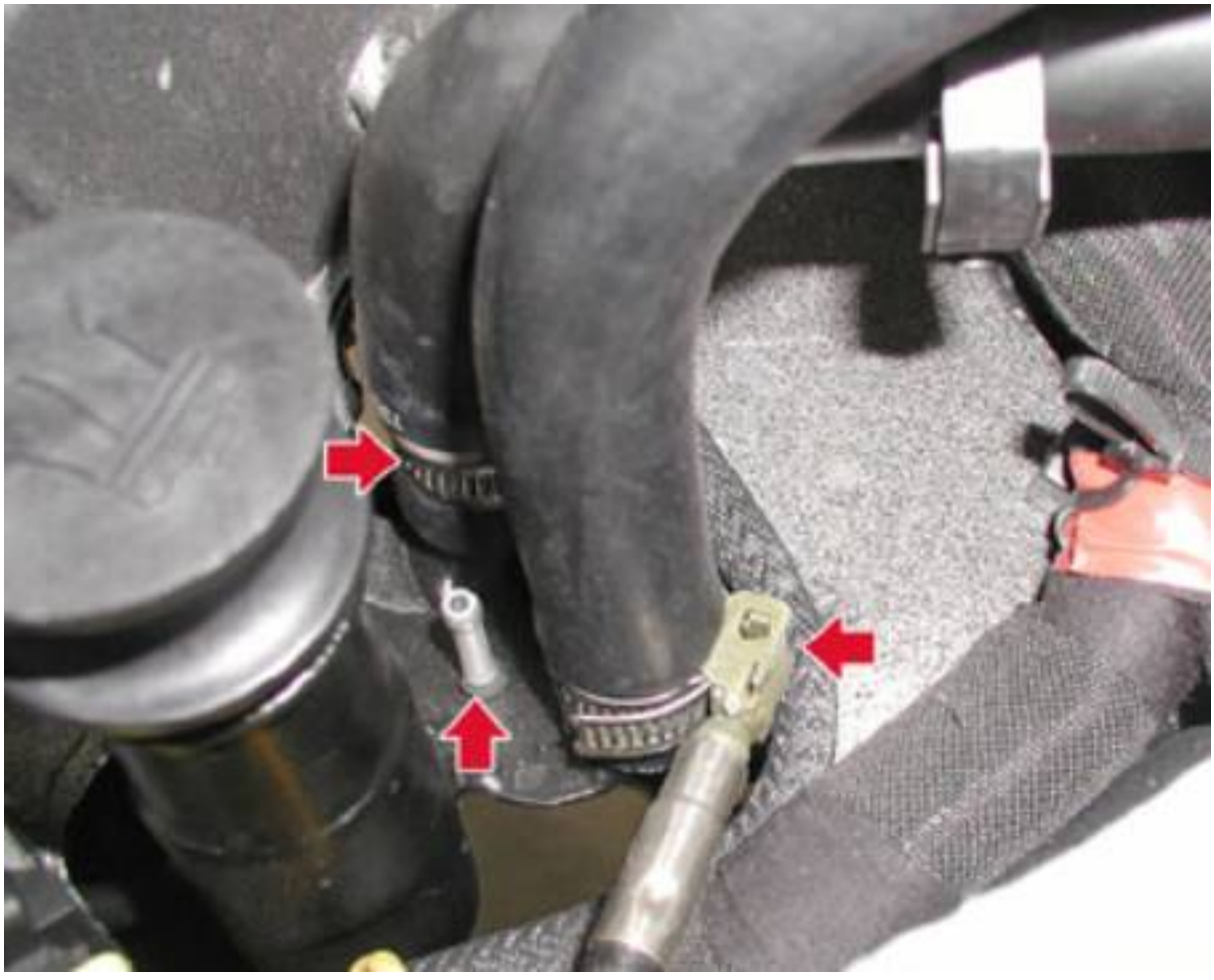
- Remove the air filter housing.

- Disconnect the line from the union on the intake manifold.

- Open the clamp and remove the union joining the intake manifold and air flow meter.

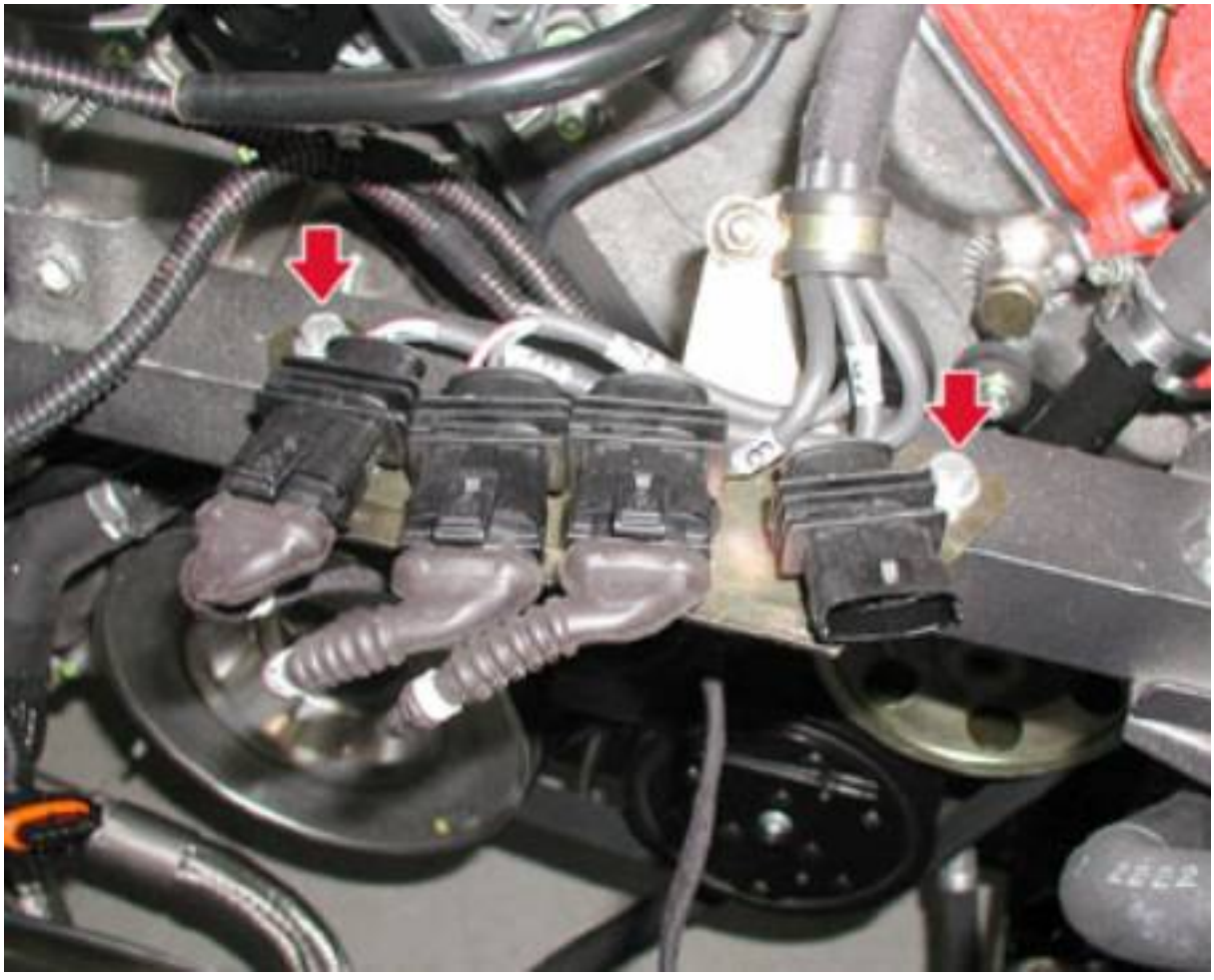
- Unscrew the fastening screw on the engine coolant tank.

- Disconnect the three oil vapour lines to the engine oil tank.



- Drain the engine cooling system by unscrewing the relative cap.

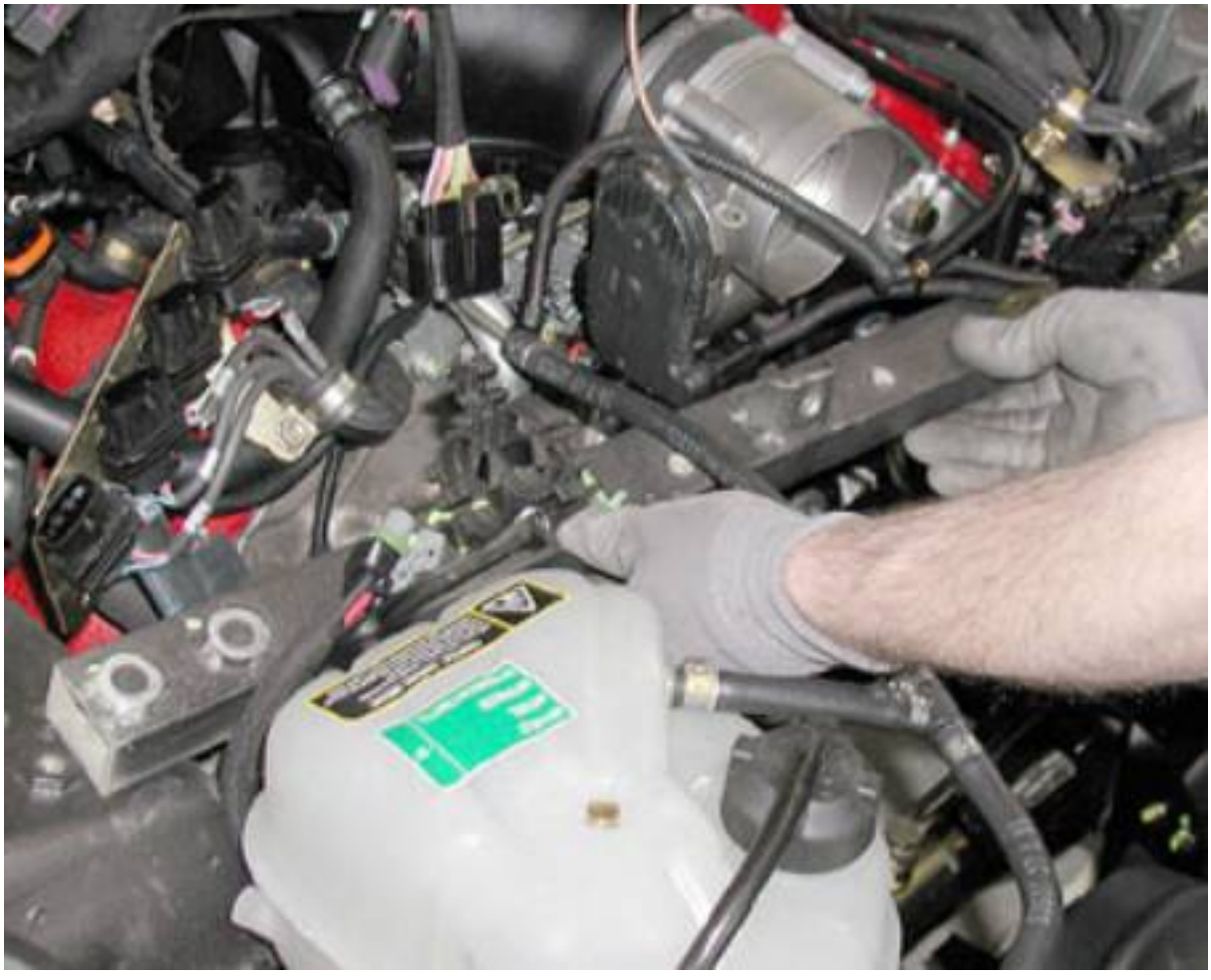
- Disconnect the ignition coil connections and undo the fastening screws on the connector fastening brackets.
- Operation to be carried out for vehicles up to assembly no.**24274**, engine part number **102269**.



- Detach the electric connection on the additional air pump, then undo the fastening screws on the dome bar bracket.

- Undo the four fastening screws on the dome bar.

- Remove the dome bar from the engine compartment.



- Remove the front grille.

- Undo the lateral fastening screws on the radiator air duct.

- Undo the upper fastening screws on the radiator air duct.

- Remove the radiator air duct.

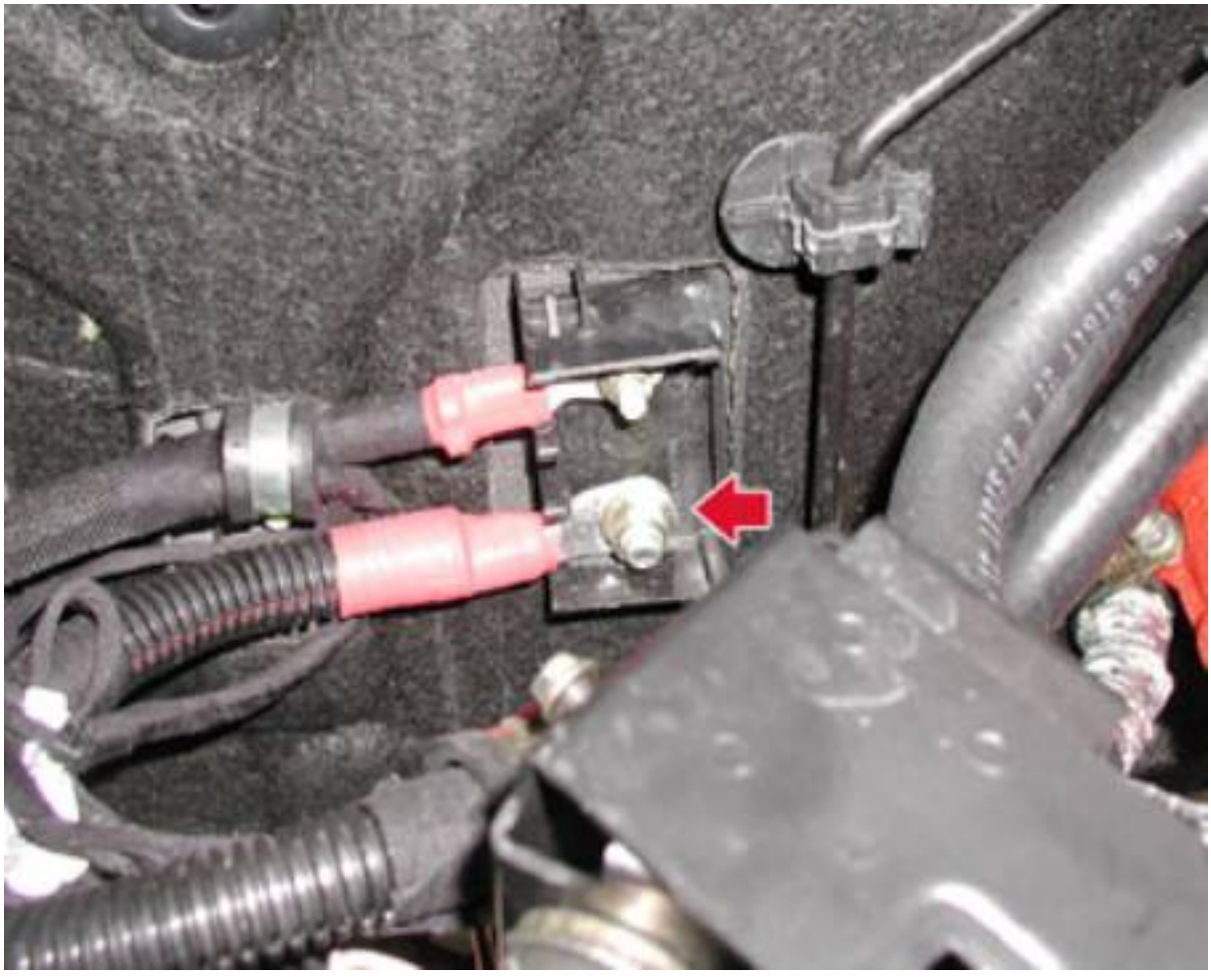
- Undo the fastening screws on the dual tone horns and release the wiring from the clamps fastening them to the bodywork.

- Detach the electric connection and remove the dual tone horns.

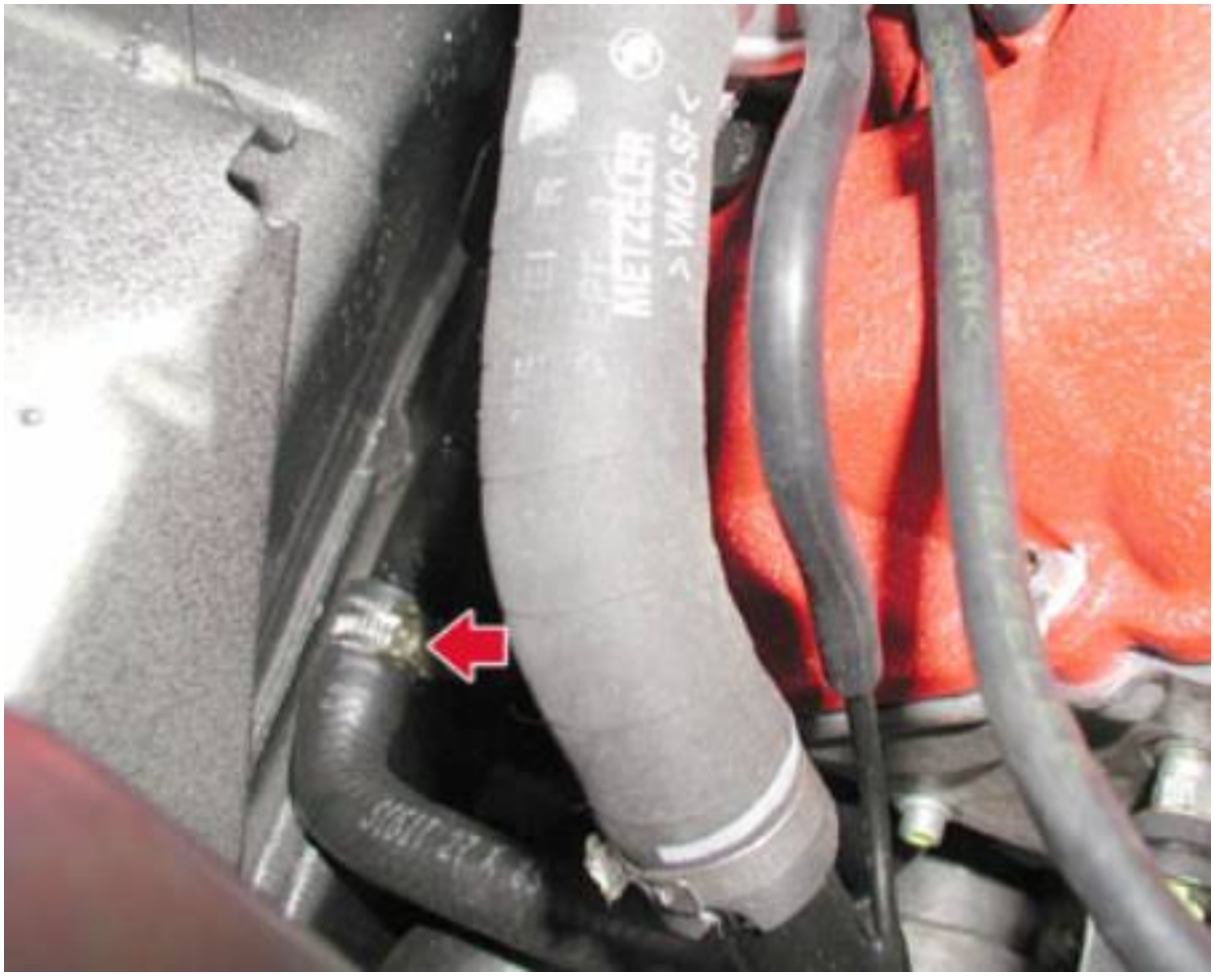
- Disconnect the two quick couplings on the fuel lines, then disconnect the water line from the pump.

- Disconnect the anti-evaporation system line from the intake manifold and release it from the plastic fastening clamps.

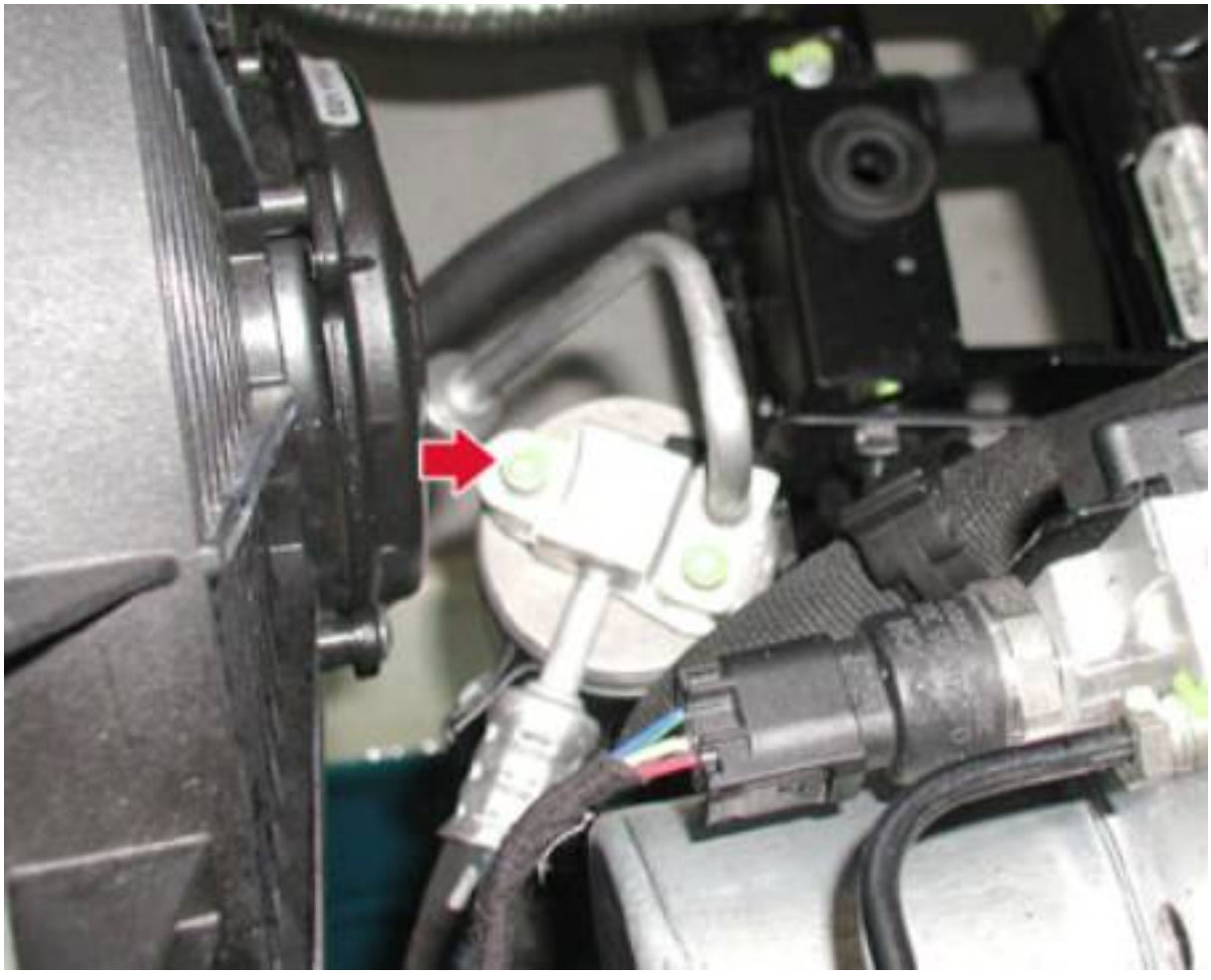
- Unscrew the nut fastening the starter motor cable.



- Disconnect the water line running to the heating unit at the point shown.



- Undo the fastening screw and disconnect the air conditioning system line from the dehydrator filter.

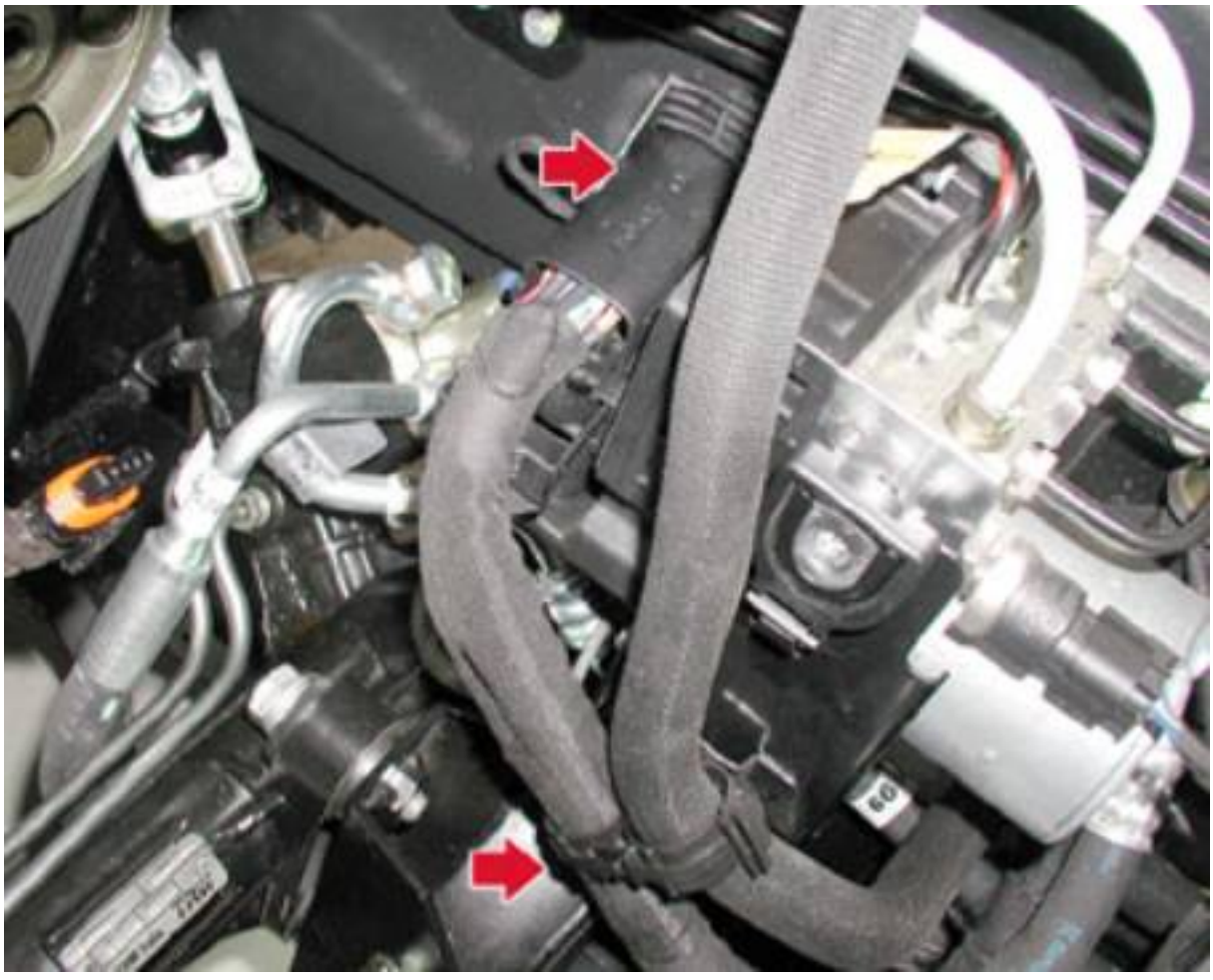


- Disconnect the air conditioning system line from the expansion valve.

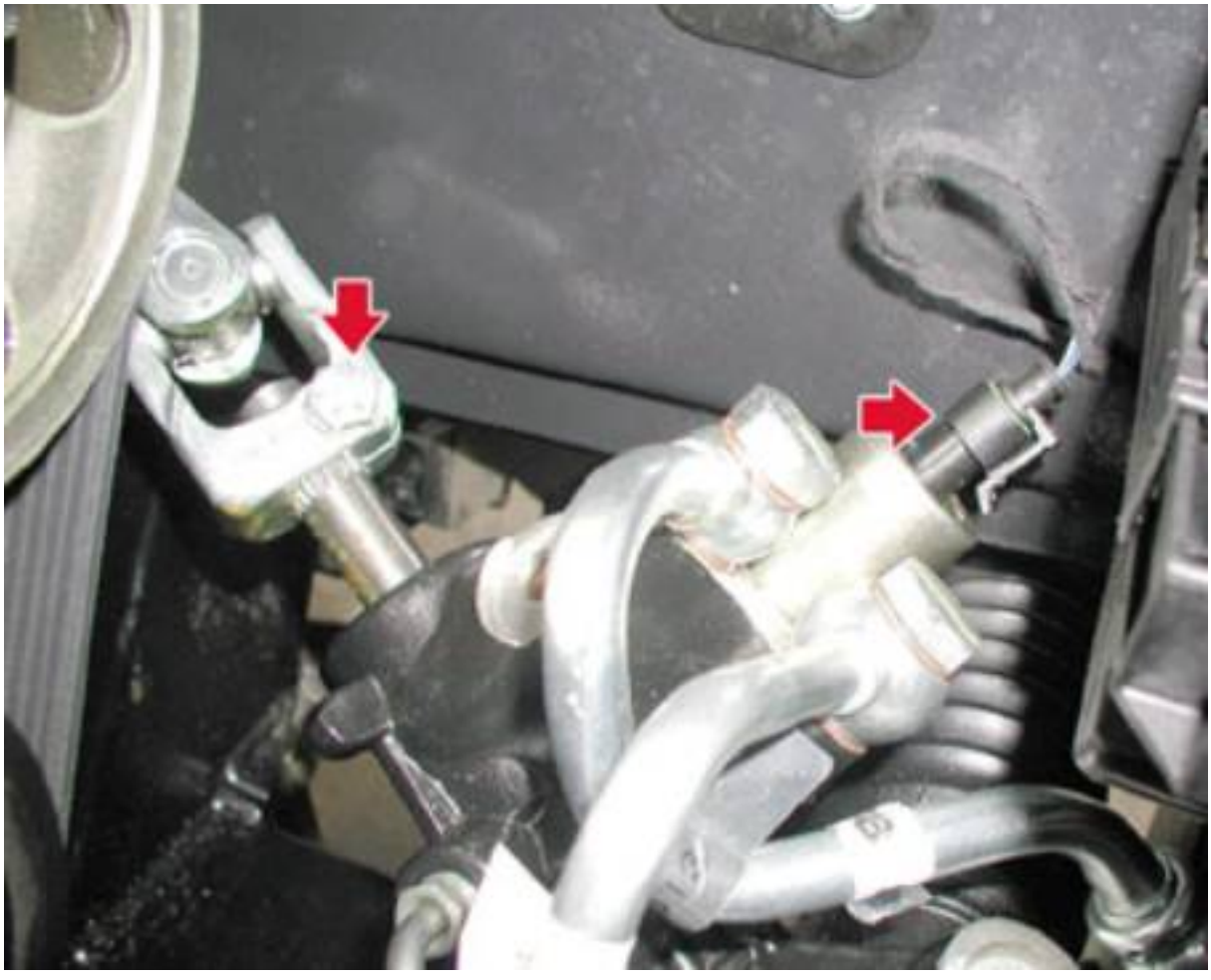
- Undo the screw fastening the hydraulic steering oil tank to the relative mounting bracket.
- Operation to be carried out for vehicles up to assembly no.**24274**.

- Undo the screw that secures the hydraulic steering tank to the relative support bracket and release the bracket from the coupling.
- Operation to be carried out for vehicles from assembly no. **24275**.

- Detach the electric connection on the brake node (ABS-ASR-MSP ECU)
- Open the plastic clamp fastening the wiring and the hydraulic steering oil line.



- Detach the electric connection and undo the screw fastening the steering column and the steering box.



- Disconnect the vacuum line from the brake servo.

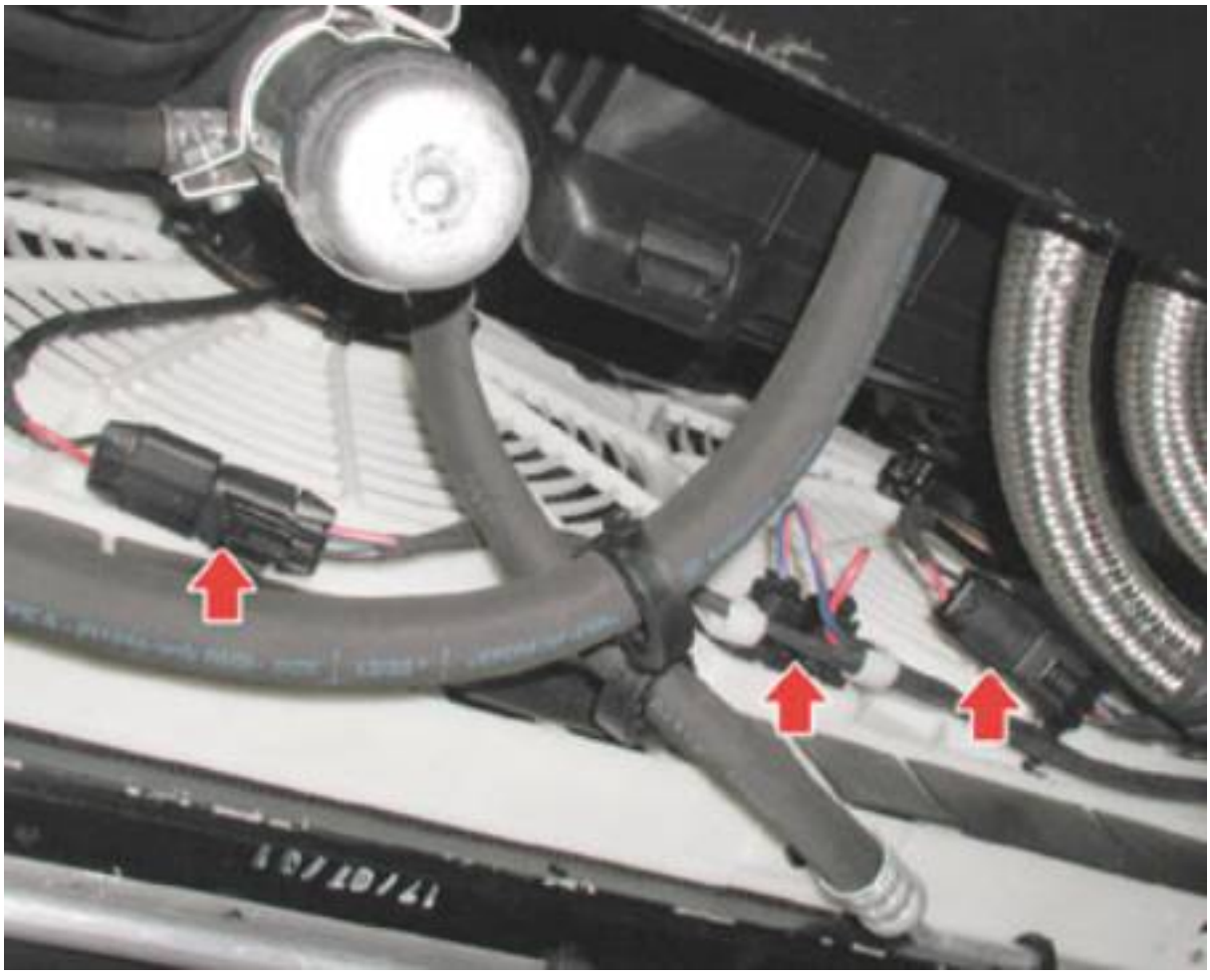
- Unscrew and remove the complete union, unscrewing it from the rigid line.

- Disconnect the two connectors for the suspension sensors, taking care to lift the safety tang.

- Unscrew the two upper nuts fastening the radiator.

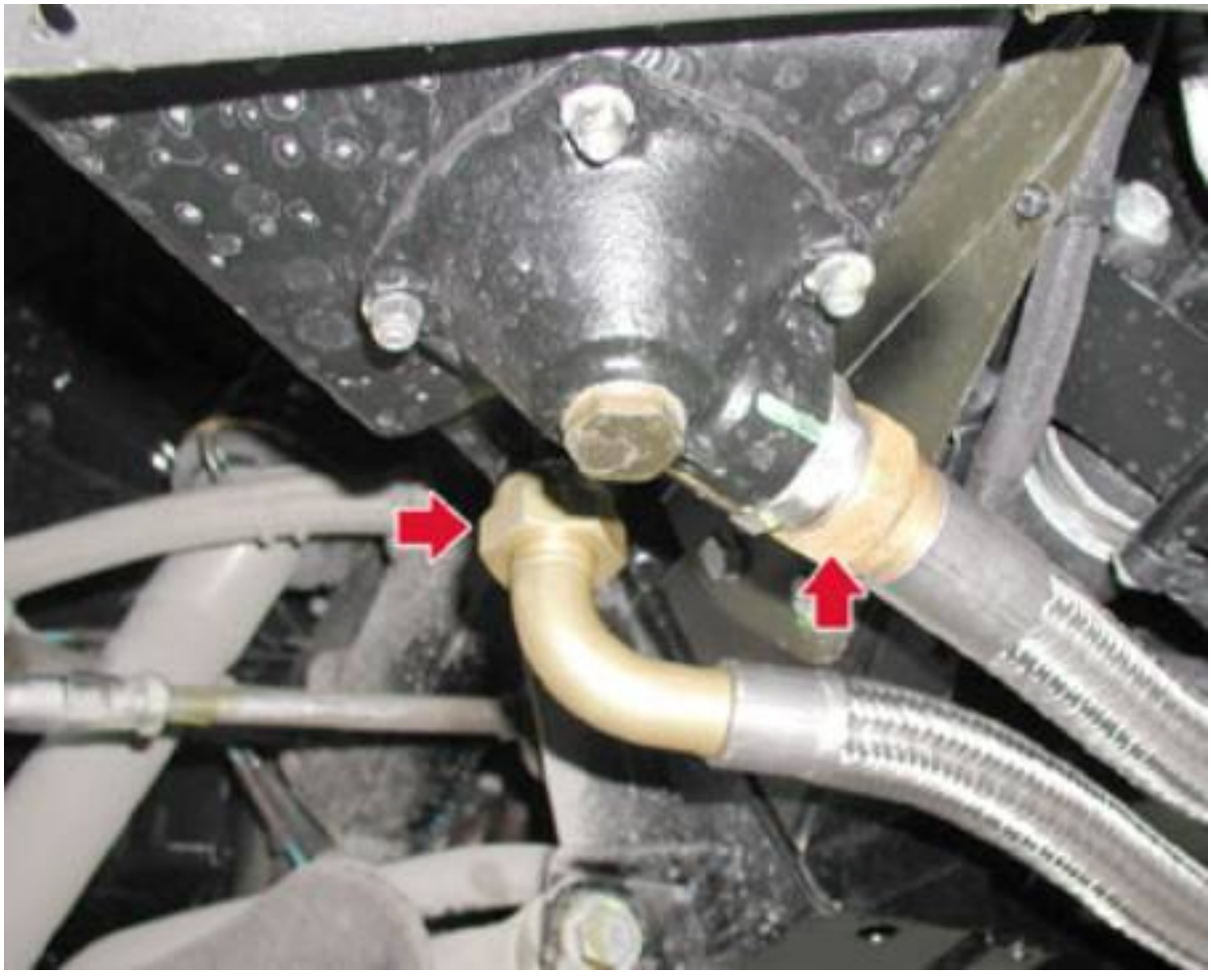
- Unscrew the nut fastening the starter motor cable retaining clamp to the right-hand cylinder head cover.

- Lift the hoist and detach the electric connections on the electric fans.

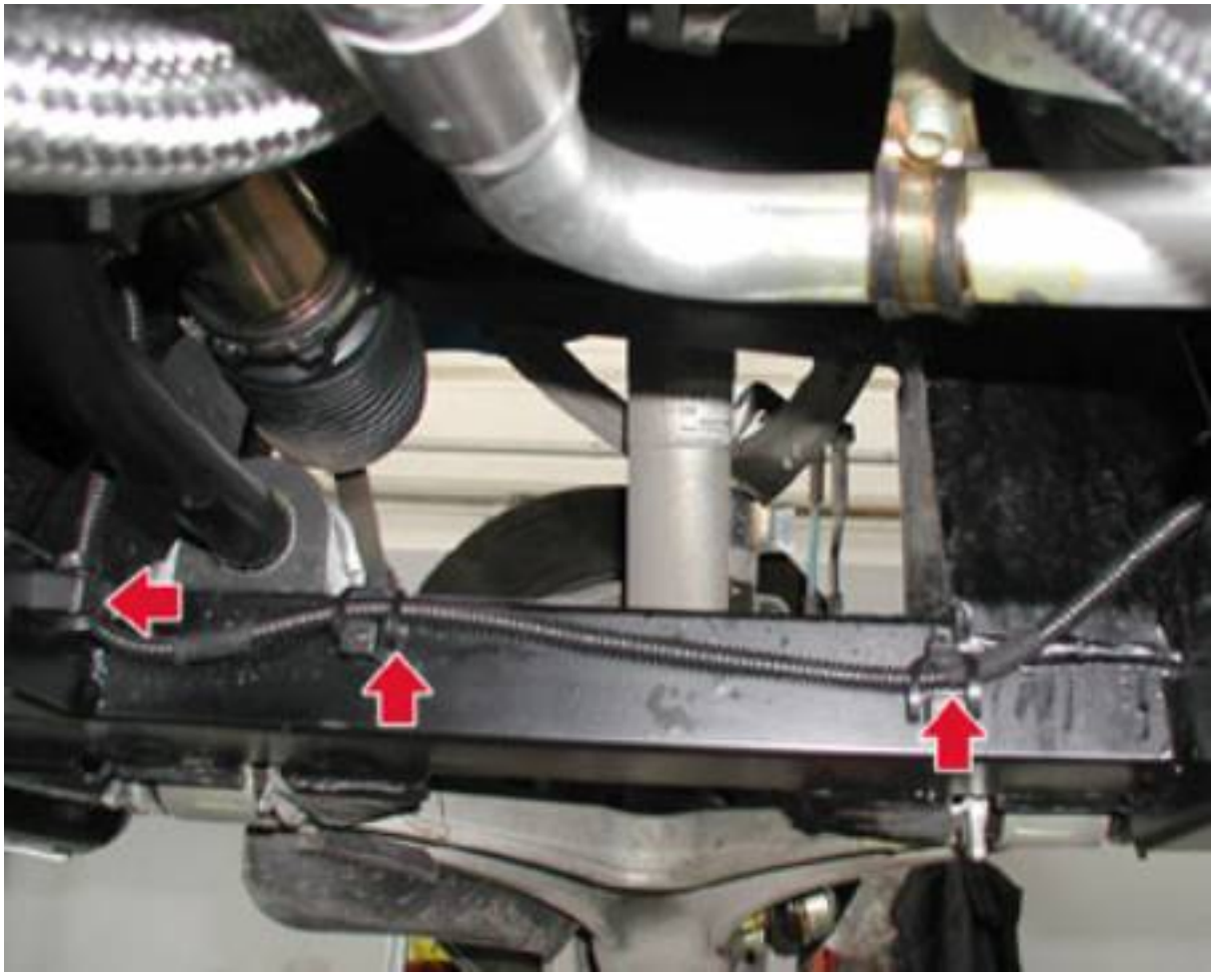


- Remove the cap to drain out the engine lubrication oil.

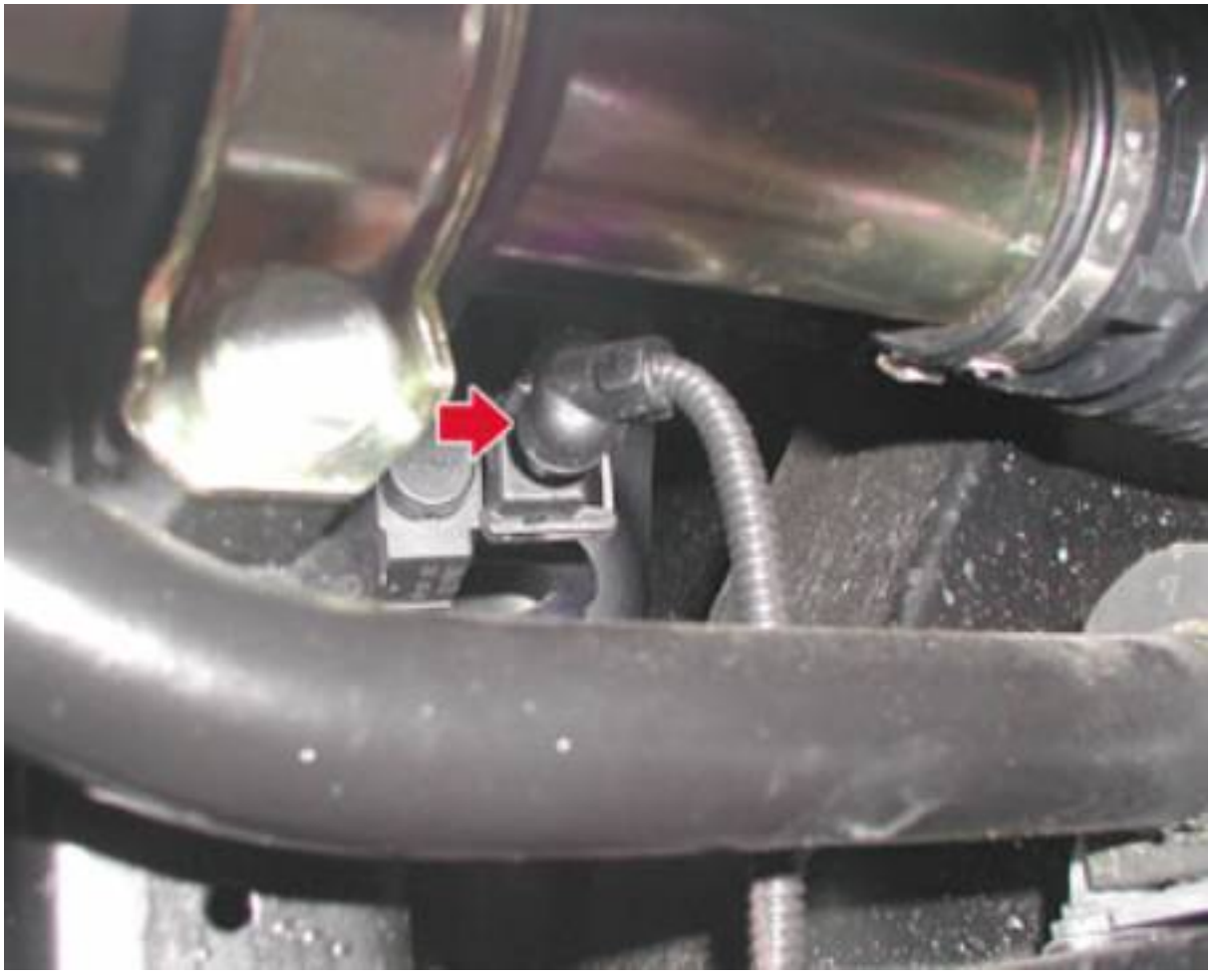
- Unscrew the two unions and disconnect the two engine oil lines from the tank.



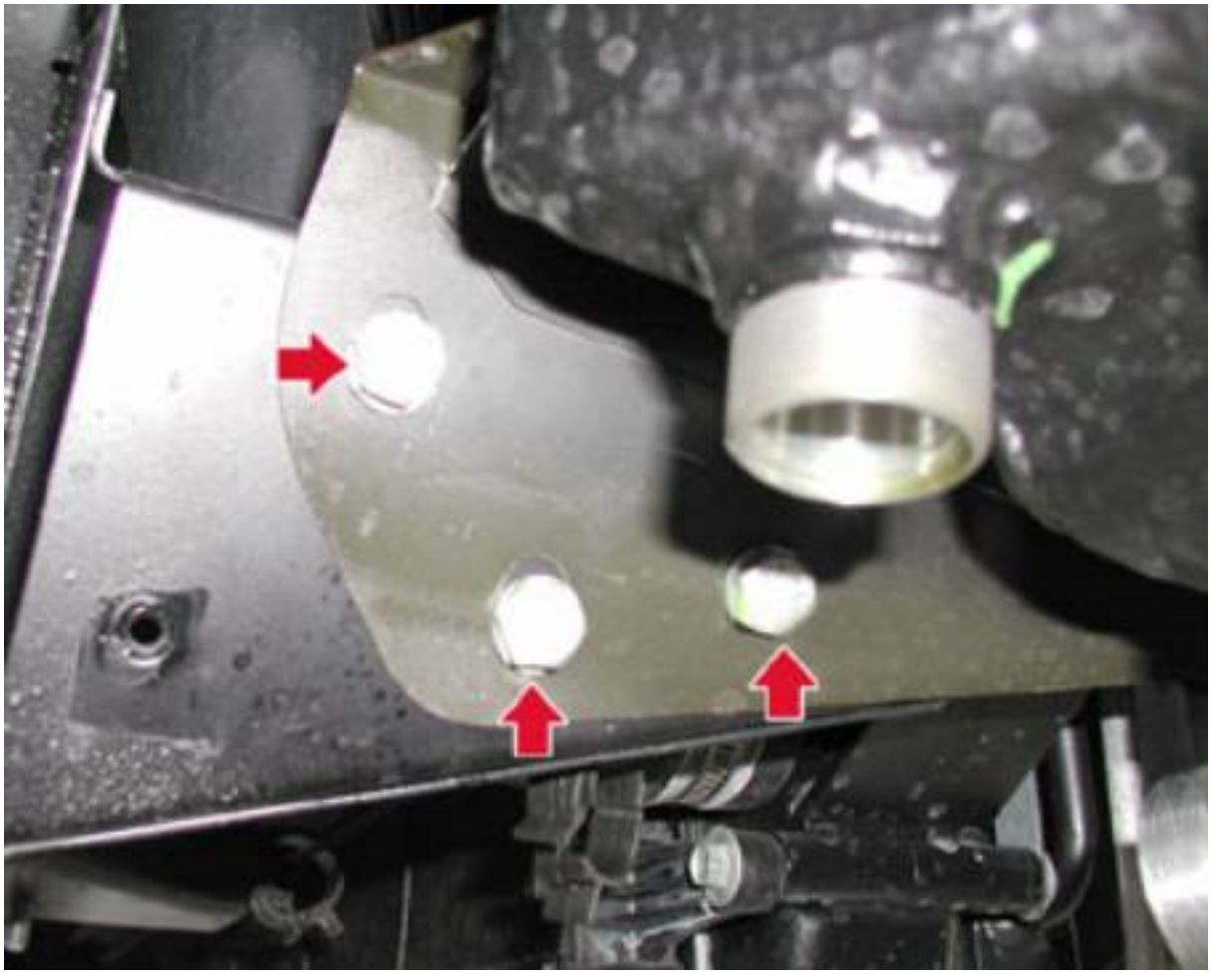
- Release the wiring from the clips secured to the chassis.



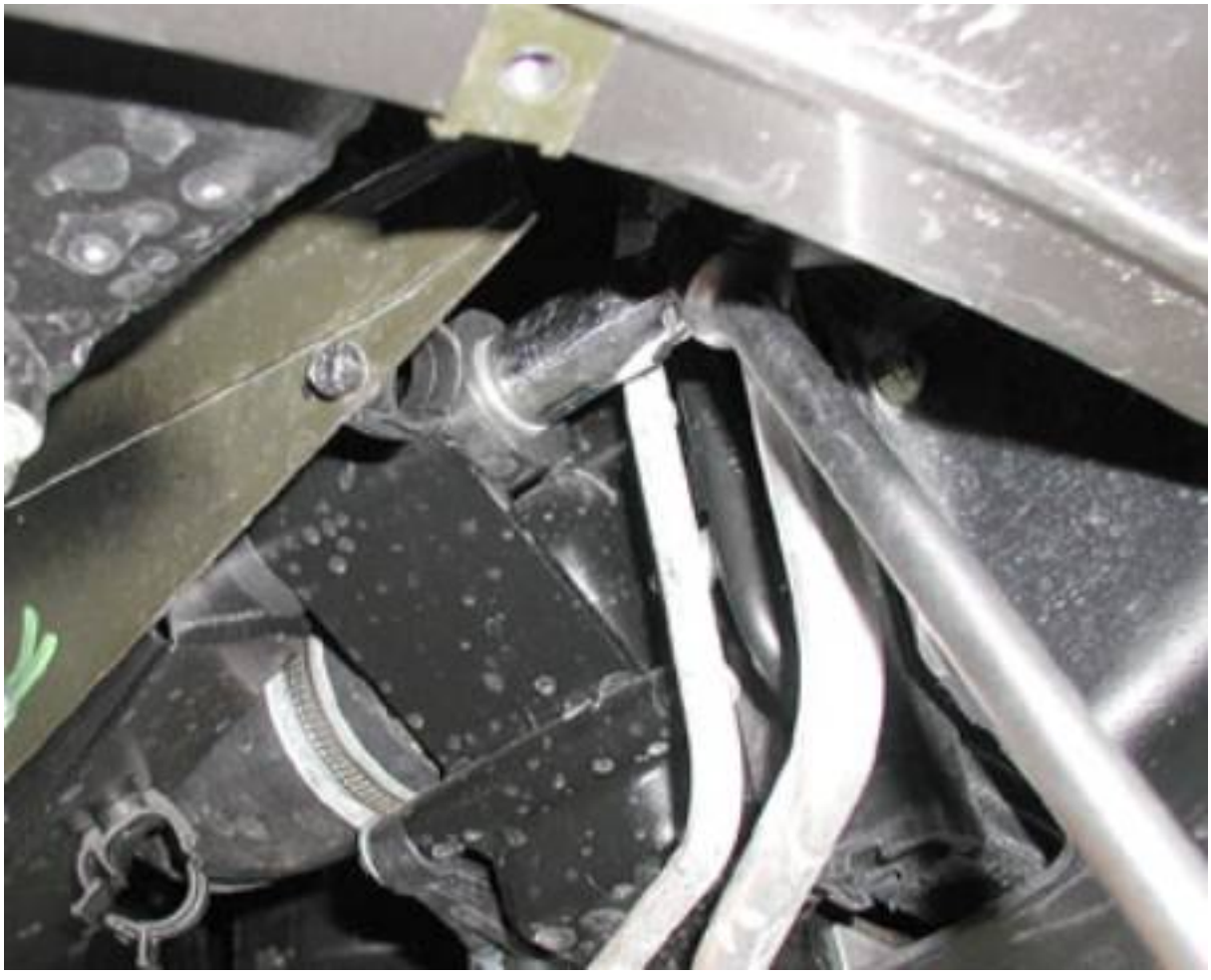
- Detach the electric connection for the solenoid valve controlling the secondary air system pneumatic actuator.



- Undo the screws fastening the engine oil tank to the chassis.



- Loosen the lower screws fastening the engine radiator.



- Undo the rear screws fastening the engine frame to the bodywork.

- Position a suitable supporting tool beneath the engine frame, to allow the engine to be removed.

- Undo the screws fastening the frame to the bodywork.

- Using the tool, lower the engine-frame assembly taking care not to damage the wiring, the electric connections, the steering column and any interfering parts fitted in the vehicle.

- Lift the vehicle and remove the engine, complete with frame.

- Unscrew the retaining clamp, disconnect the hydraulic steering oil inlet pipe on the pump, then drain the hydraulic steering oil system.

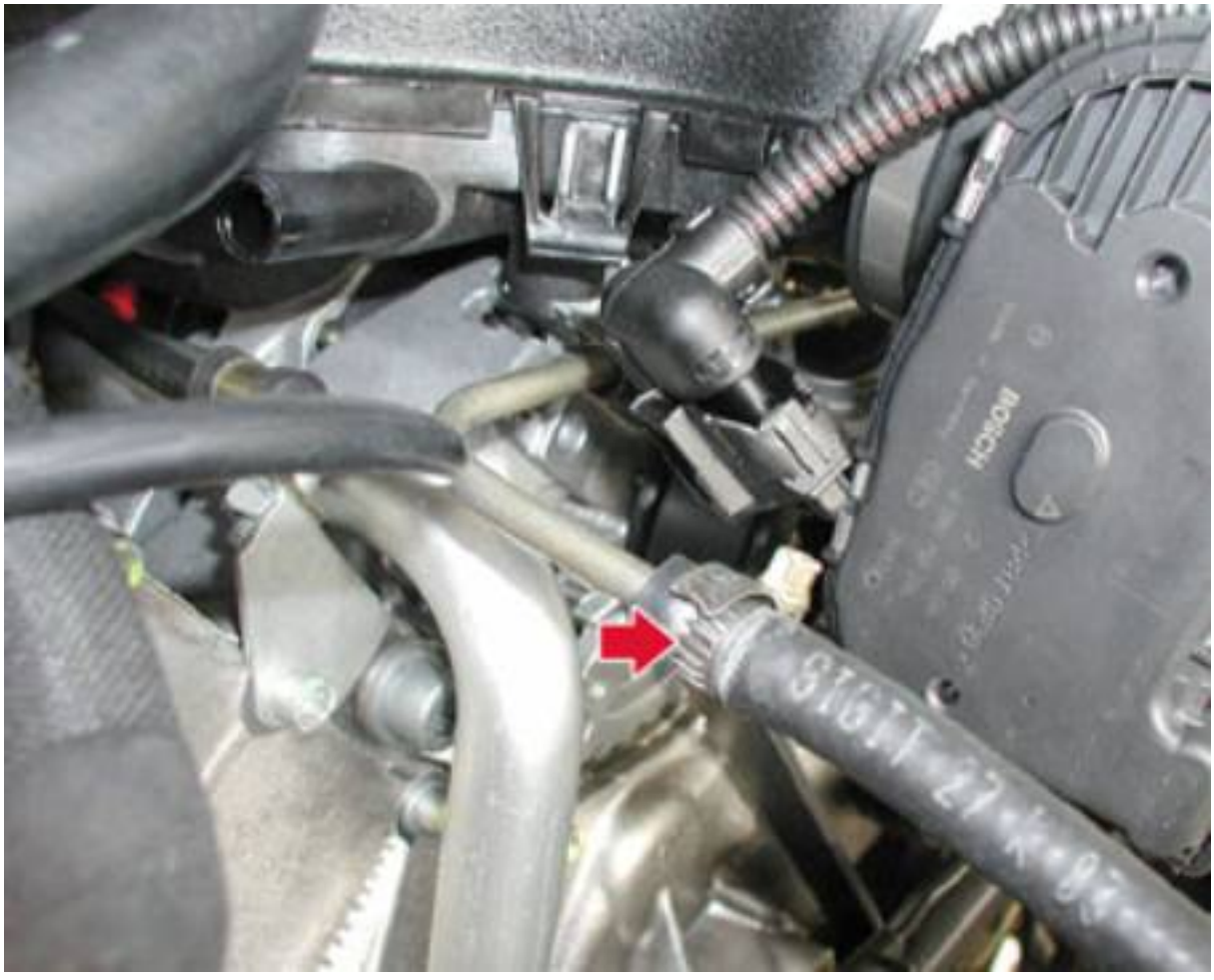
- Release the hydraulic steering oil delivery pipe from the clamp.

- Unscrew the hydraulic steering oil delivery pipe to detach it from the pump.

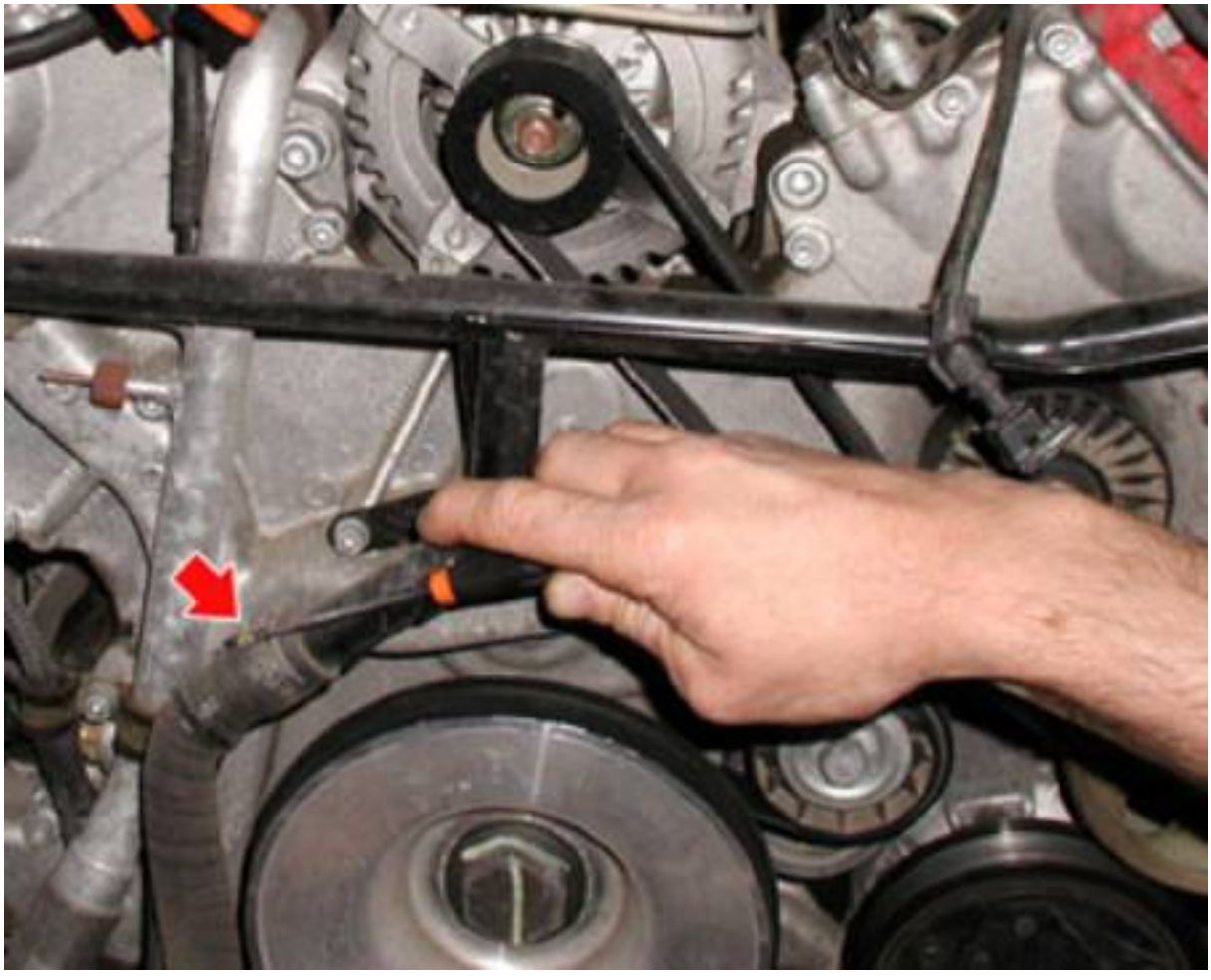
- Unscrew the clamp, then disconnect the engine coolant delivery pipe from the pump.

- Unscrew the fastening clamp, then disconnect the engine coolant pipe.

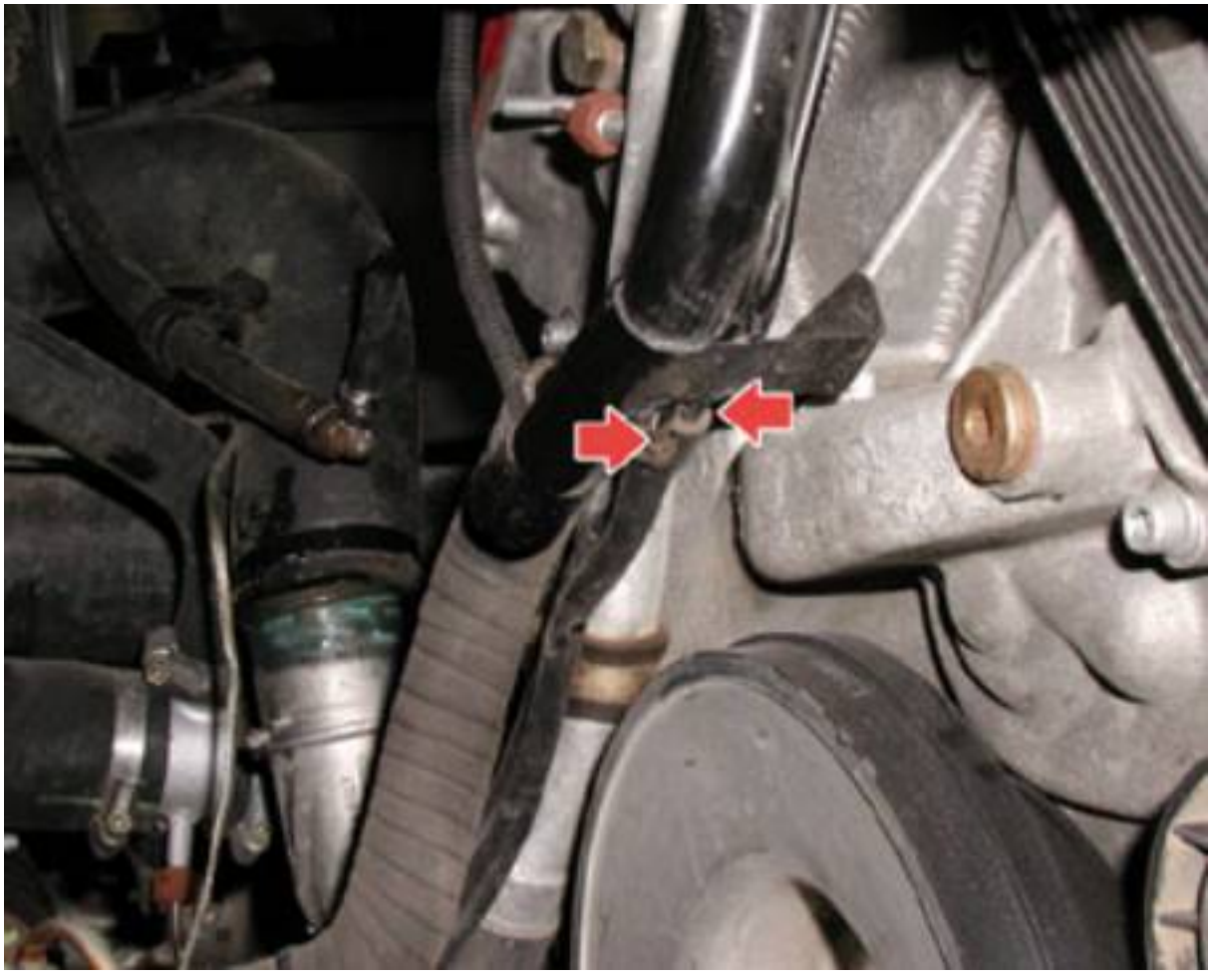
- Disconnect the engine coolant recirculation line.



- After removing the clamp, disconnect the air pump pipe.



- Disconnect the two small pipes.



- Undo the nut fastening the air conditioning system pipe.

- Unscrew the two nuts fastening the engine to the mount (one per side).

- After suitably harnessing the engine, remove it with a hydraulic lift.

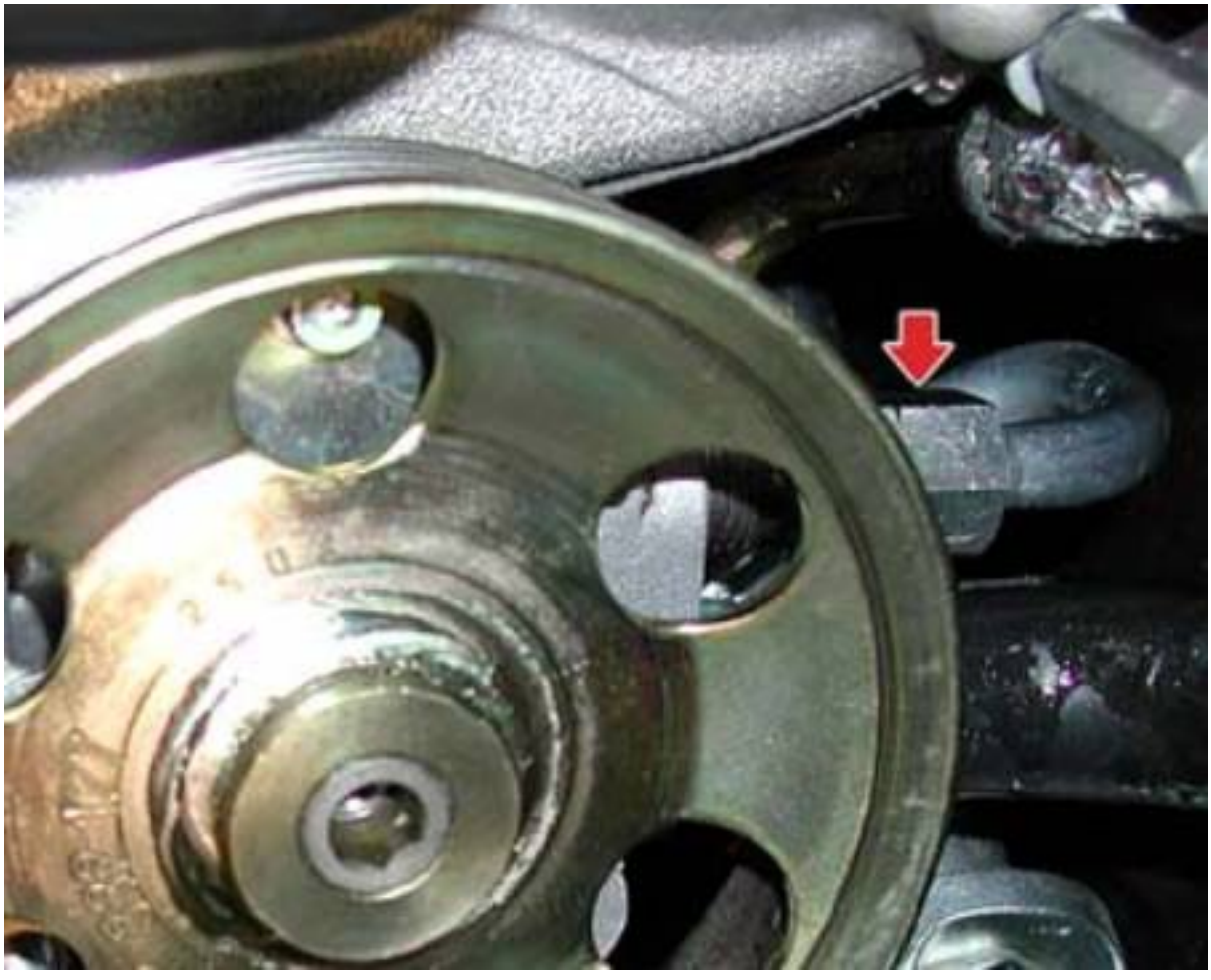
Refitting the engine

- Fit the engine on the frame using a hydraulic lift.
- Tighten the two nuts fastening the engine to the mount (one per side) to a torque of **120 Nm**

- Connect the air conditioning system pipe and tighten the fastening nut.

N.B.
Replace the rubber gaskets on the two lines.

- Connect the rubber unions to the secondary air system rigid lines.
- Connect the engine coolant recirculation line.
- Connect the two engine coolant lines to the pump.
- Tighten the union joining the power steering box delivery line to the pump to a torque of **35 Nm**.



- Connect the rubber hose to the hydraulic steering pump.

- Position the engine - frame assembly beneath the vehicle, lower the hoist, check the frame is aligned with the respective holes, then lift the tool and move the frame so that it is touching the bodywork.

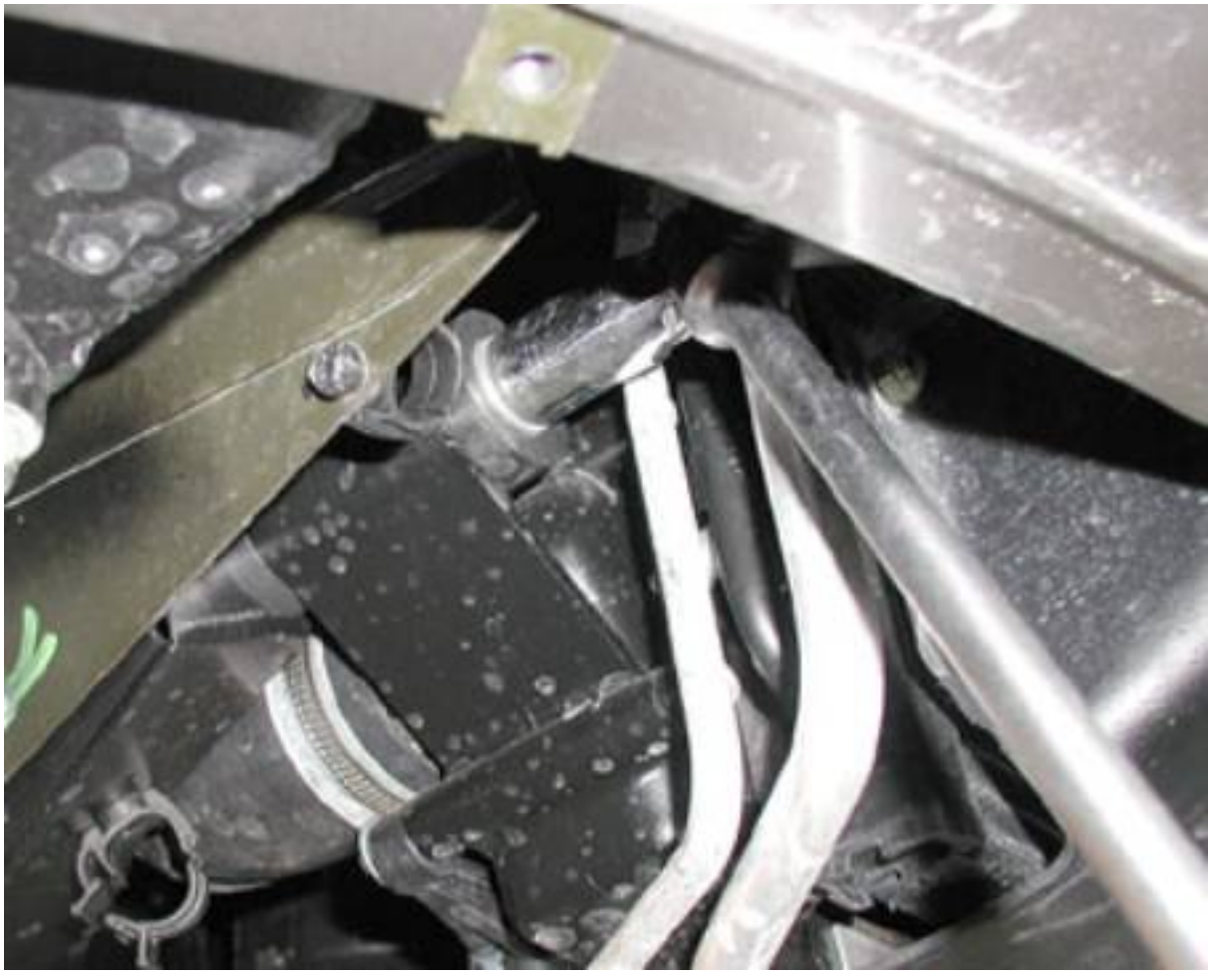
- Tighten the screws fastening the frame to the bodywork to a torque of **123 Nm**.

N.B.
Replace the screws fastening the frame to the bodywork with new screws.

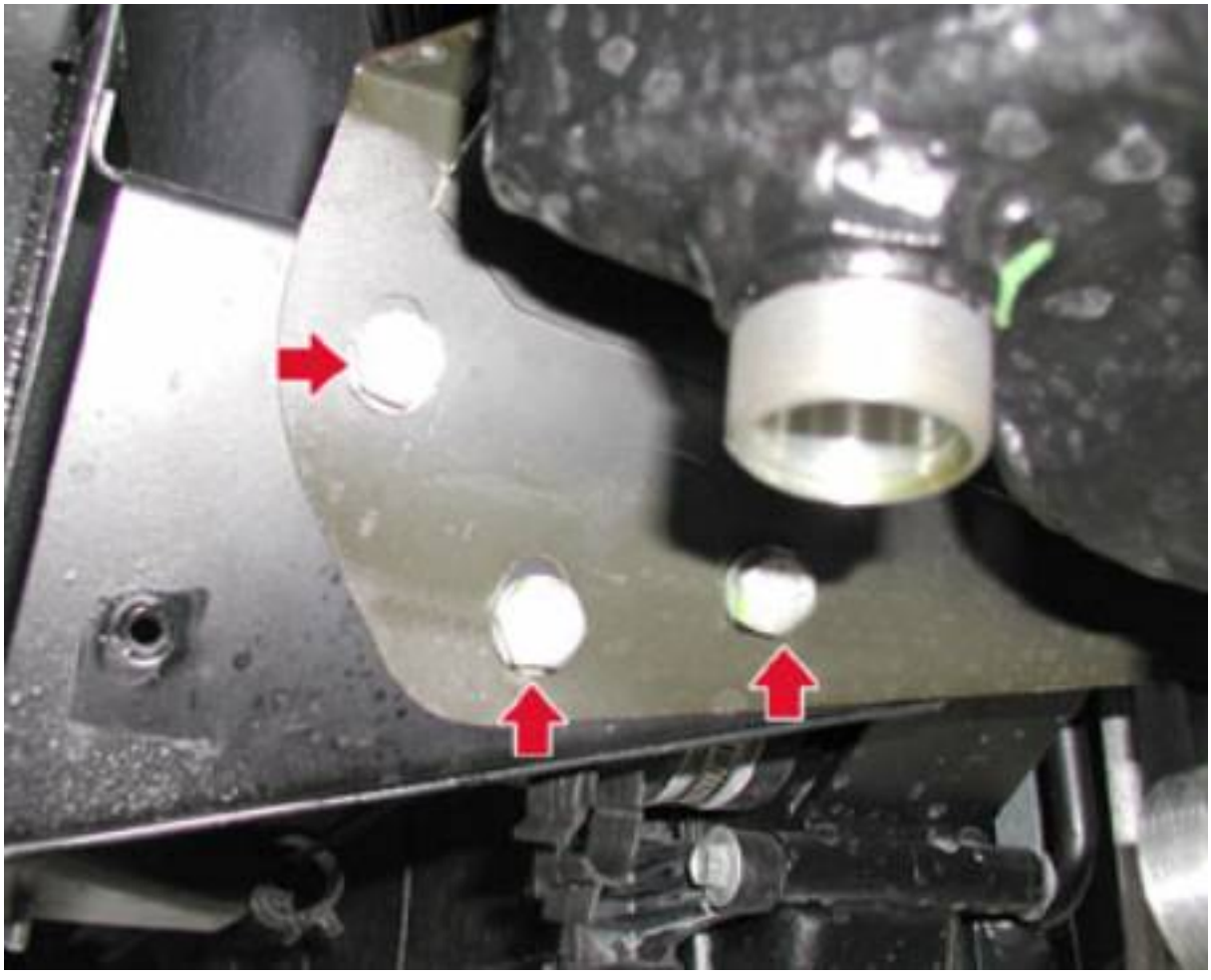
- Remove the engine supporting tool and tighten the rear screws fastening the frame to the vehicle bodywork to a torque of **123 Nm**

N.B.
Replace the screws fastening the frame to the bodywork with new screws.

- Tighten the lower fastening screws on the radiator.



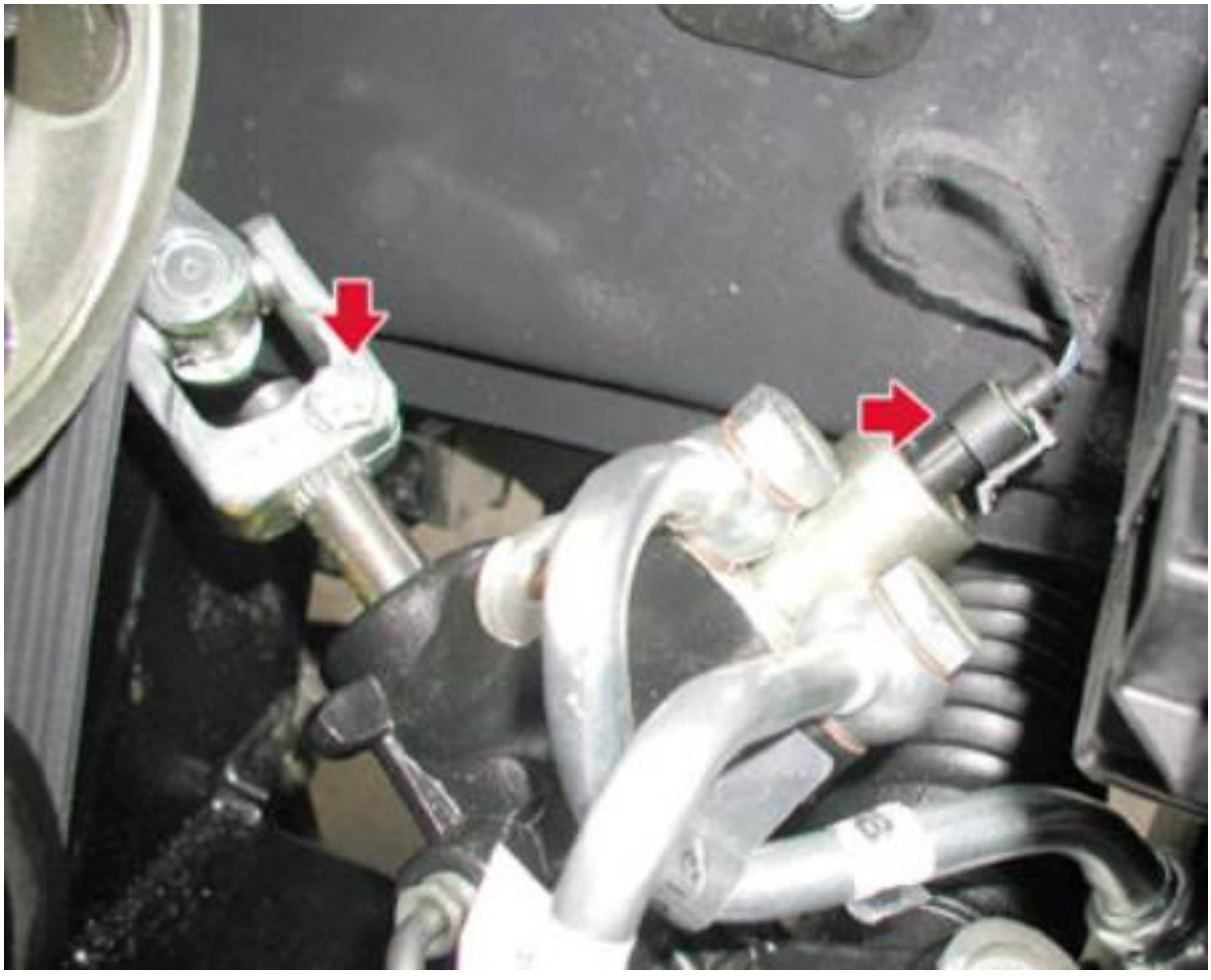
- Tighten the screws fastening the engine oil tank to the frame to a torque of **25 Nm**.



- Attach the electric connection on the secondary air system pneumatic actuator control solenoid and fasten the relative electric wiring to the frame.
- Tighten the unions on the two oil lines on the engine oil tank.
- Attach the two electric engine fans' electric connectors.
- Tighten the nut fastening the starter motor cable retaining clamp to the right-hand cylinder head cover.
- Tighten the upper fastening nuts on the engine radiator to a torque of **24 Nm**.

- Attach the two suspension sensors' connectors.
- Fit the union and screw it onto the rigid secondary air system line.

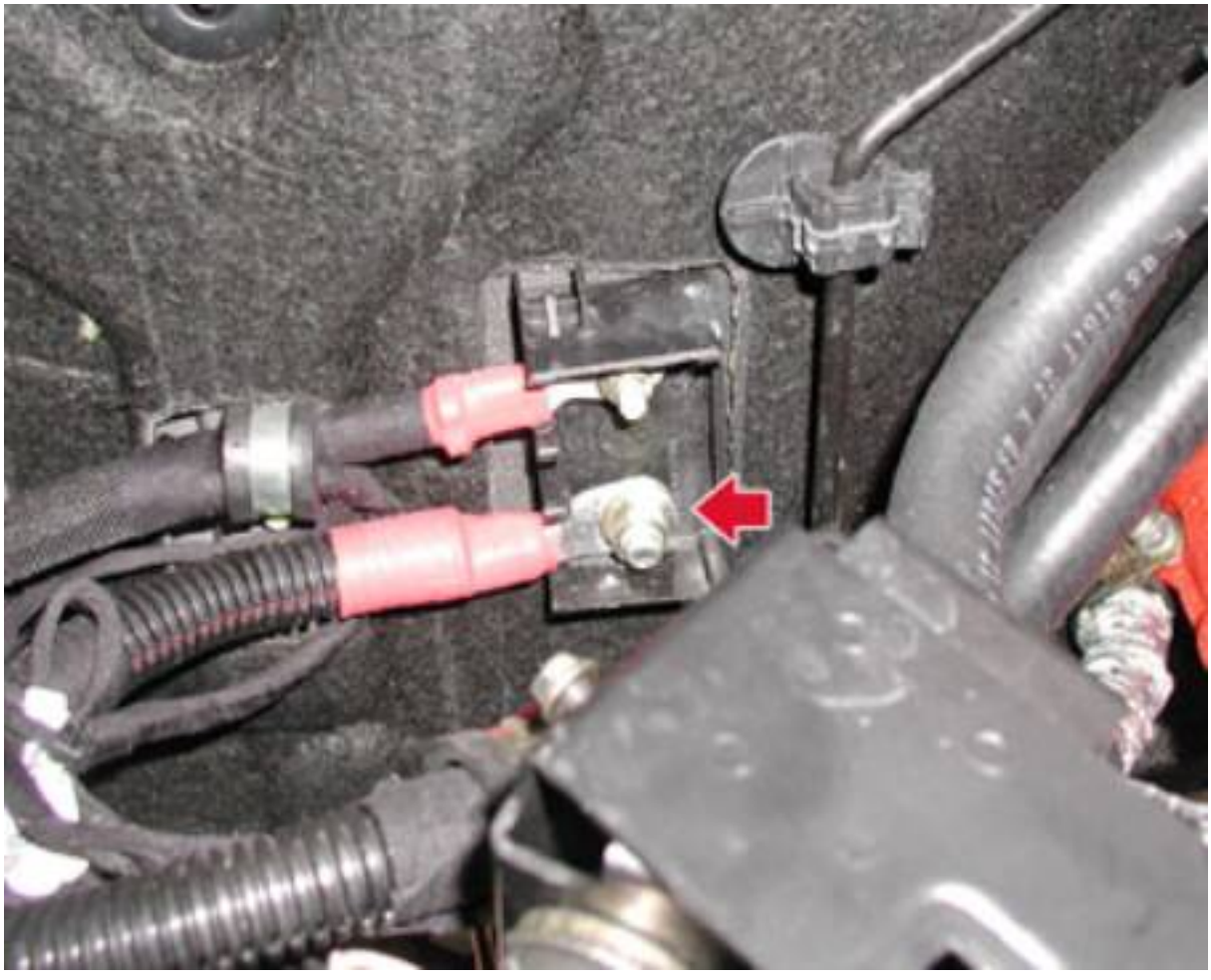
- Connect the vacuum line to the brake servo.
- Attach the electric connection and tighten the screw fastening the steering column and steering box to a torque of **25 Nm**.



- Attach the Brake Node electric connection (ABS-ASR-MSP ECU)
- Tighten the screw fastening the hydraulic steering oil tank to the relative supporting bracket.
- Using the plastic clamp, fasten the electric ABS wiring to the hydraulic steering system line.
- Connect the air conditioning system line from the expansion valve.

- Connect the air conditioning system line from the dehydrator filter.
- Connect the water line to the heater unit.

- Tighten the starter motor cable to a torque of **9 Nm**.



- Connect the anti-evaporation system line to the intake manifold and fasten it with plastic clamps.
- Connect the two quick couplings on the fuel lines, then connect the water line to the pump.
- Fit the dual tone horns and attach the electric connection.
- Tighten the fastening screws on the dual tone horns.
- Fit the radiator air duct and tighten all the fastening screws.
- Fit the front grille.

- Fit the dome bar in its seat inside the engine compartment and tighten the fastening screws to a torque of **49 Nm**.

- Attach the electric connection on the additional air pump, and fasten it to the dome bar with the fastening screws on the bracket.
- Attach the connections on the ignition coils and tighten the fastening screws on the brackets fastening the connectors.
- Connect the three oil vapour lines to the engine oil tank.
- Screw up the fastening screw on the engine coolant tank.
- Fit the intake manifold and air flow meter joining sleeve.

- Connect the line to the intake manifold.

- Fit the air filter housing and tighten the fastening screw to the dome bar.

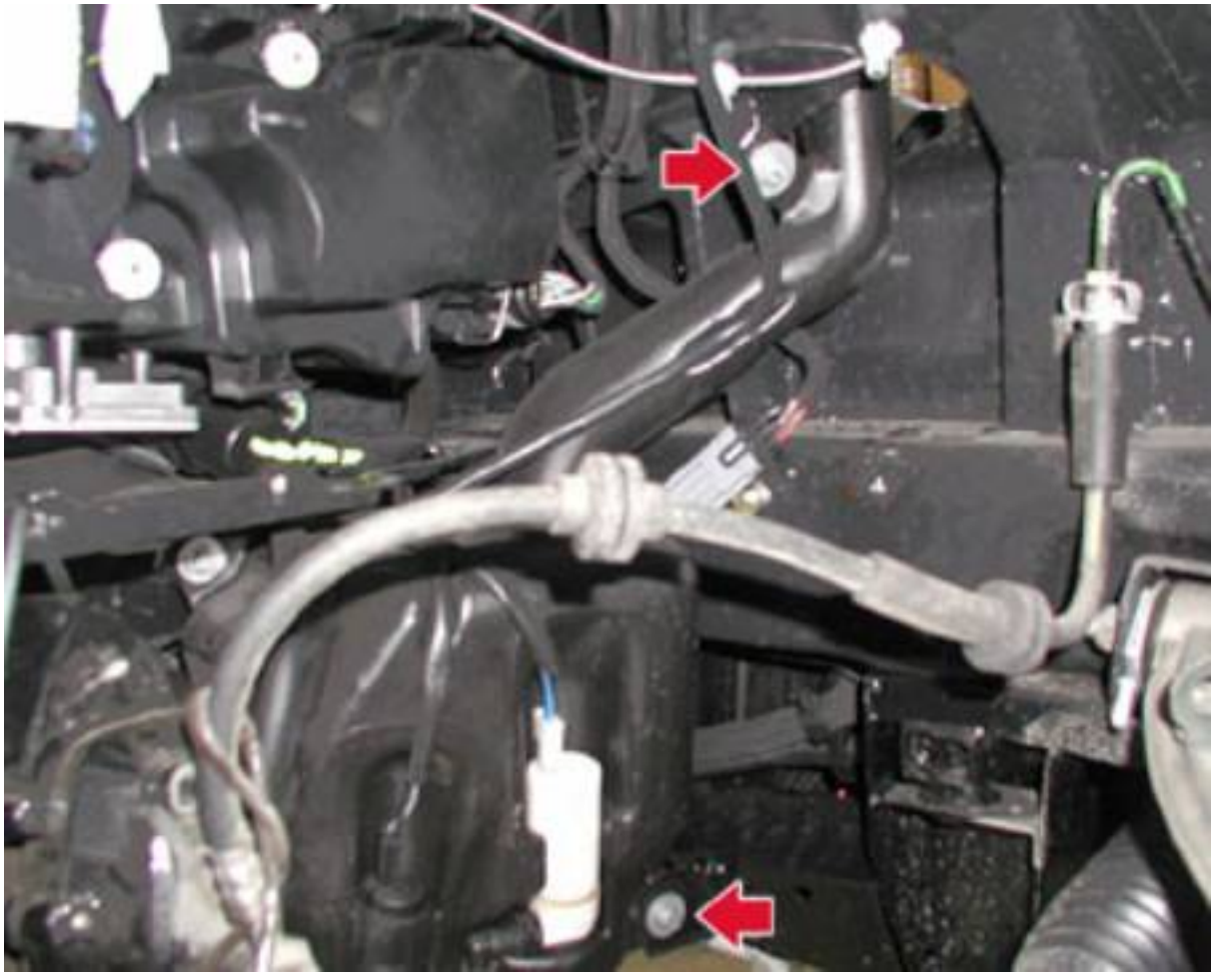
- Fit the new air filter and the relative cover on the filter housing and fasten it with the relative clips.

- Fit the two cold air intake lines.

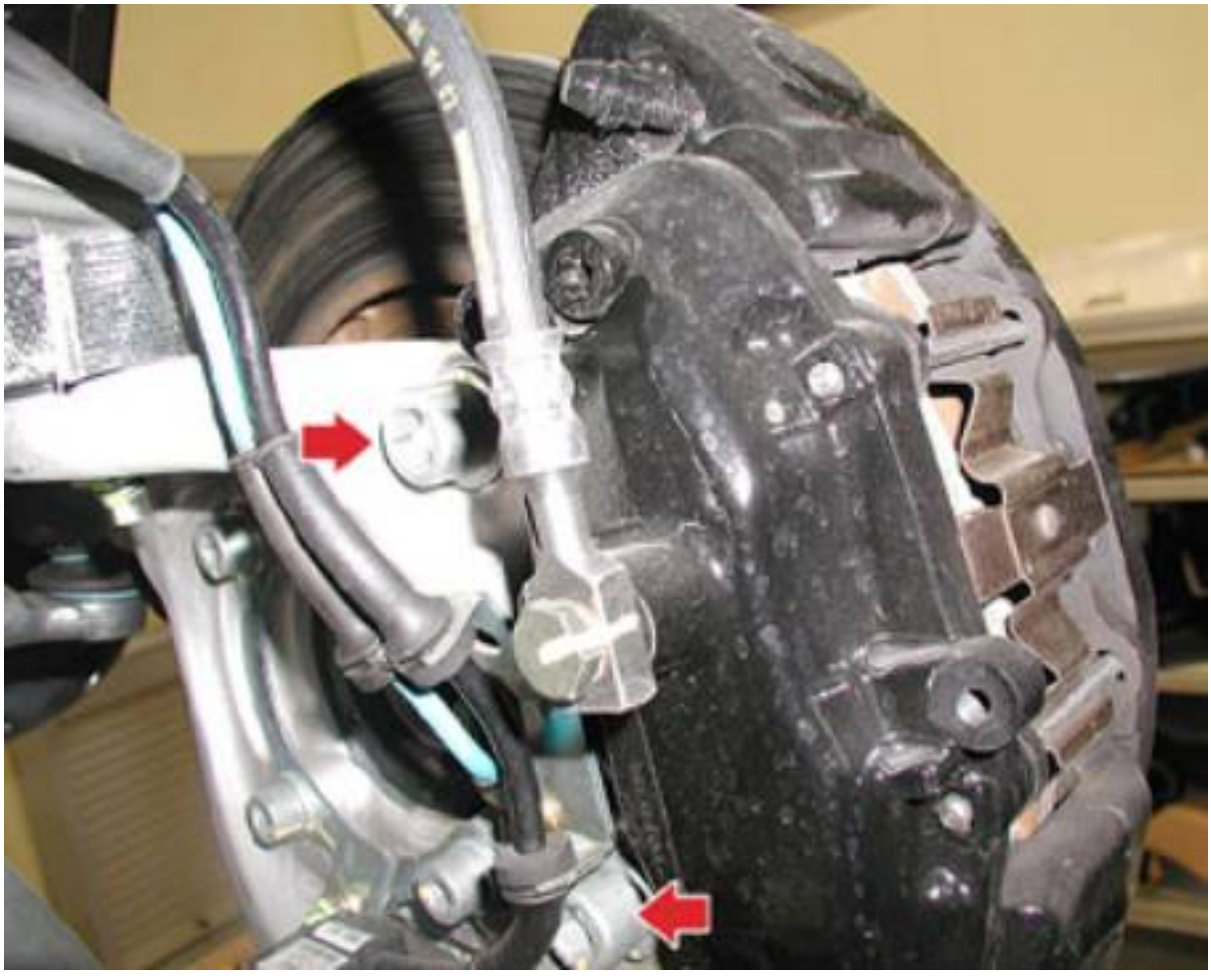
- Fit the air flow meter and fasten it using a new clamp.

- Detach the electric connection on the air flow meter and release the two clips from the air filter housing.

- Tighten the fastening screw on the windscreen washer fluid tank.



- Position the brake calipers on the disk and tighten the screws fastening the front brake calipers to the front pillar to a torque of **145Nm.**



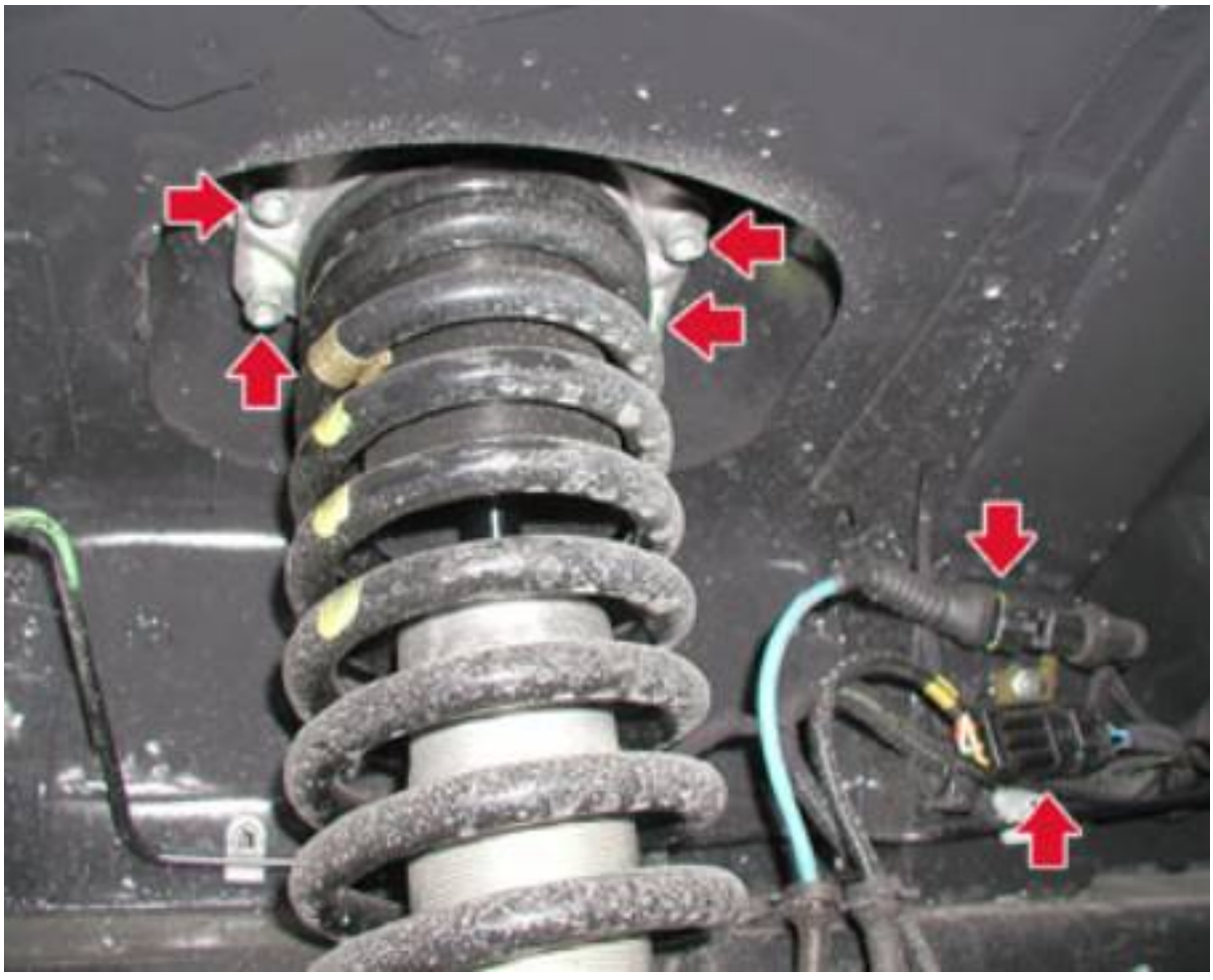
- Connect the earth cable from the front right- and left-hand brake calipers.
- Attach the electric connection on the headlight adjustment potentiometer, on both sides of the vehicle.
- Tighten the bolt fastening the shock absorber to the lower wishbone (lever) to a torque of **78 Nm**.

- Attach the electric connection on the brake pad wear sensor (this sensor is only found on the left-hand side of the vehicle)

- Tighten the screws that fasten the shock absorber to the dome and attach the ABS and acceleration sensors' electric connectors.

- **33.6 Nm** for **EUROPE** vehicles up to assembly no. **18534** in the left-hand drive version and **17235** in the right-hand drive versions

- 25 Nm for **EUROPE** vehicles from assembly no.**18535** in the left-hand drive version and **17236** in the right-hand drive versions in addition, for all the **USA – CND** versions.



- Fit the reinforcement bracket on the bumper (on both sides).
- Fit both front wheelhouses.

Removing-refitting the front wheelhouse

- Fit both front wheels.

Replacing the wheels

- Fit the transmission shaft.

Removing-refitting the transmission shaft

- Fit the gearbox.

Removing-refitting the gearbox

- Fit the exhaust tailpipes.

Removing-refitting the tailpipe

- Remove the vehicle from the hoist.

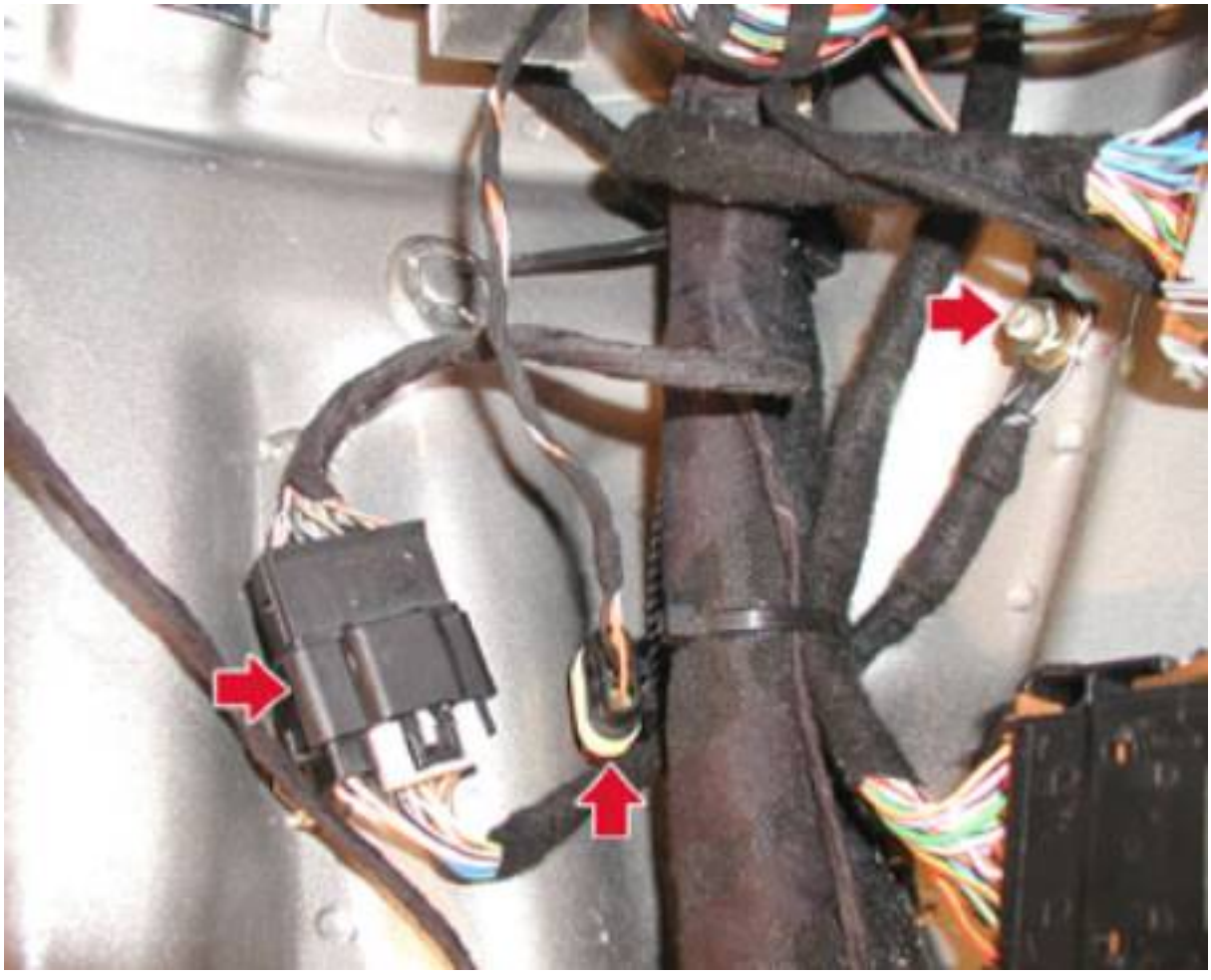
- Working from the engine compartment towards the passenger compartment, bring the engine wiring through to the passenger compartment.

N.B.

- Fit the wiring carefully, taking care not to damage the electric connections or cut the wiring on the sharp parts of the sheet.

- Connect the two electric connections to the engine control node.

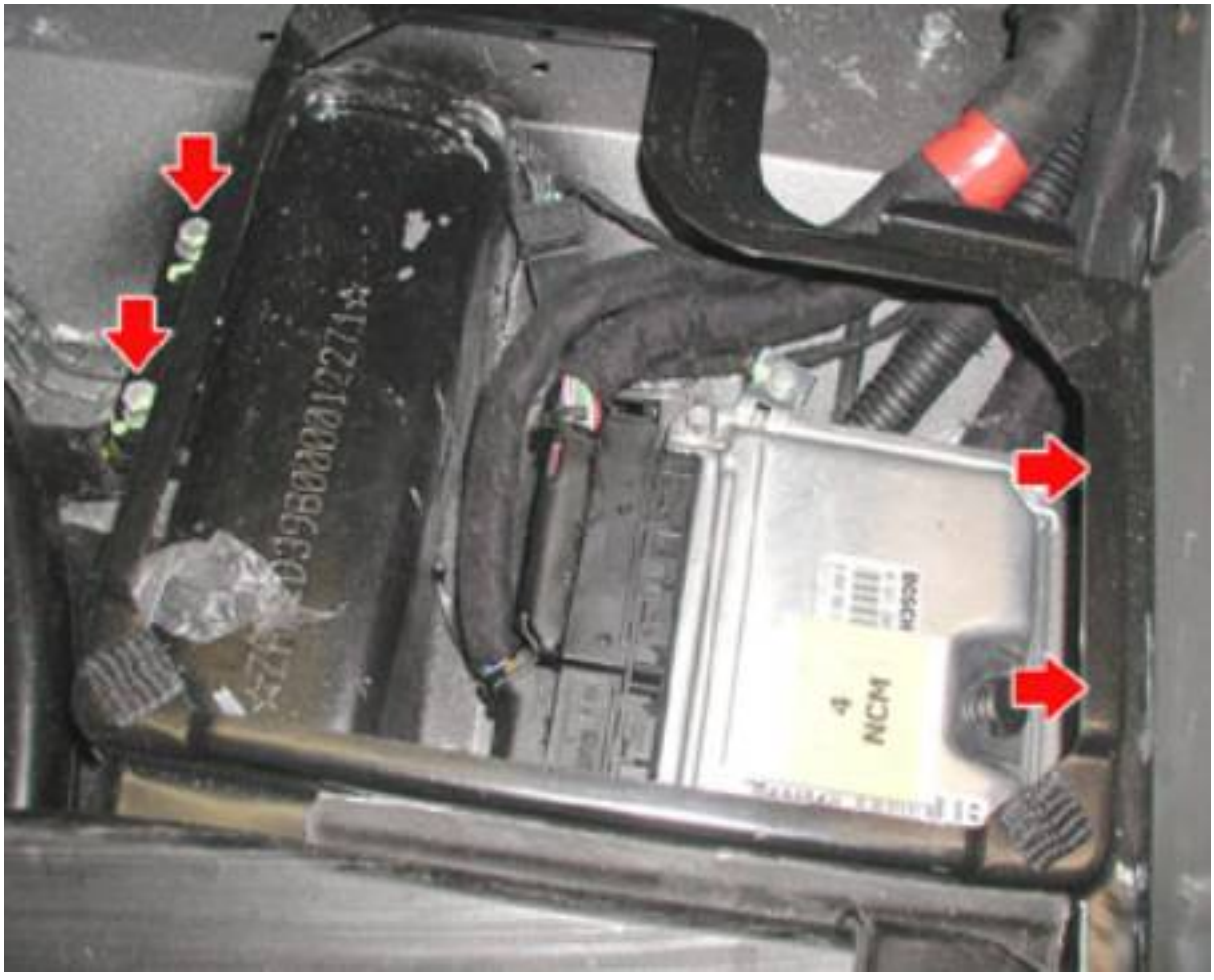
- Pull the wiring so it is laid out correctly and connect the earth cable, then attach the two electric connections.



- Attach the electric connection located in the engine control node area and fasten the cable with the relative clamps.

- Fasten the engine control node.

- Fit the engine node protective bracket and tighten the two screws and the two fastening nuts.



- Attach the two electric connections fastened to the mudguard and the electric connection on the fuel vapour solenoid valve.

- Fit the Bass Box proceeding as outlined for its removal but in reverse order.
- Fit the service pan and the windscreen wiper motor assembly, proceeding as outlined for their removal but in reverse order.

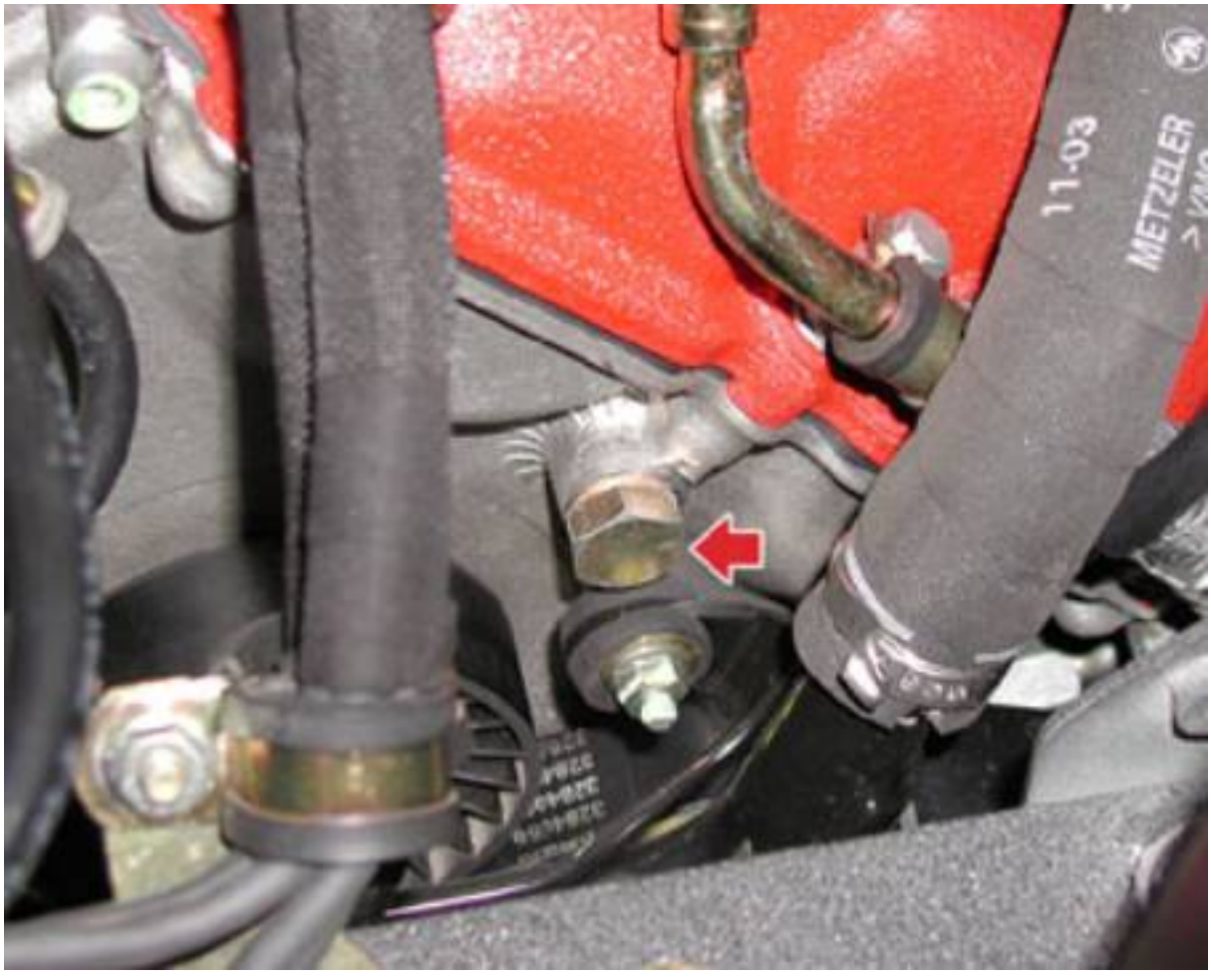
- Connect the equipment used to fill the R134a fluid and run a vacuum cycle to remove all R134a residues or air that has entered. Upon completion of the vacuum cycle, proceed by filling the air conditioning system.

- Connect the battery's negative terminal.
- Open the engine coolant tank cap and pour in the fluid until it reaches the **MAX** notch marked on the tank.
- Working from inside the vehicle, set the maximum temperature (+32°C) for the air conditioning/ heating system manually, from both the driver's and passenger control panels.

N.B.
This operation allows the engine coolant to flow in and out the heating/air conditioning system.

- Fill the engine oil tank.

- Start the engine, keeping it idling.
- Wait until the electric fans start up at least once (engine temperature approximately 90°C) and the air that comes out the vents in the passenger compartment is warm.
- During this stage, the level of the coolant contained in the tank could drop below the **MIN** notch, so top it up and keep it level with the **MAX** notch.
- If you are unable to release all the air in the system, open the two breather caps positioned on the two cylinder heads (figure below).


METZELER
11-03

- Stop the engine.
- Check the engine oil level, then top it up to the **MAX** notch marked on the dipstick.
- Check that the engine coolant is level with the **MAX** notch.
- Allow the engine to cool.
- Pour a suitable amount of oil into the hydraulic steering oil tank, until it reaches the **MAX** notch marked on the tank cap dipstick.
- The system is self-draining. Draining is carried out by turning the steering wheel as far as possible to the left and to the right several times with the engine running and the vehicle stationary.
- Check the oil level once again after bleeding.
- Connect the SD3 **95970312** and bleed the clutch.

Bleeding the clutch

- Fit the trim panels on the engine compartment.

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

- Check the front and rear wheel alignment.

Front wheels
Rear wheels

CIRCUIT FILLING AND LEVEL CHECKS

Circuit filling and check point locations

- Below is a list of the positions of the tanks and dipsticks for checking the system fluid levels and for topping-ups (if necessary).

1) Dipstick for engine oil level checks
2) Engine coolant tank
3) Power steering fluid tank
4) Windscreen washer fluid tank
5) Brake system fluid tank

Engine lubrication circuit

caution
When the engine is warm, be very careful when working inside the engine compartment: risk of burns!
Remember that when the engine is warm, the electric fan could start to move: risk of injuries!

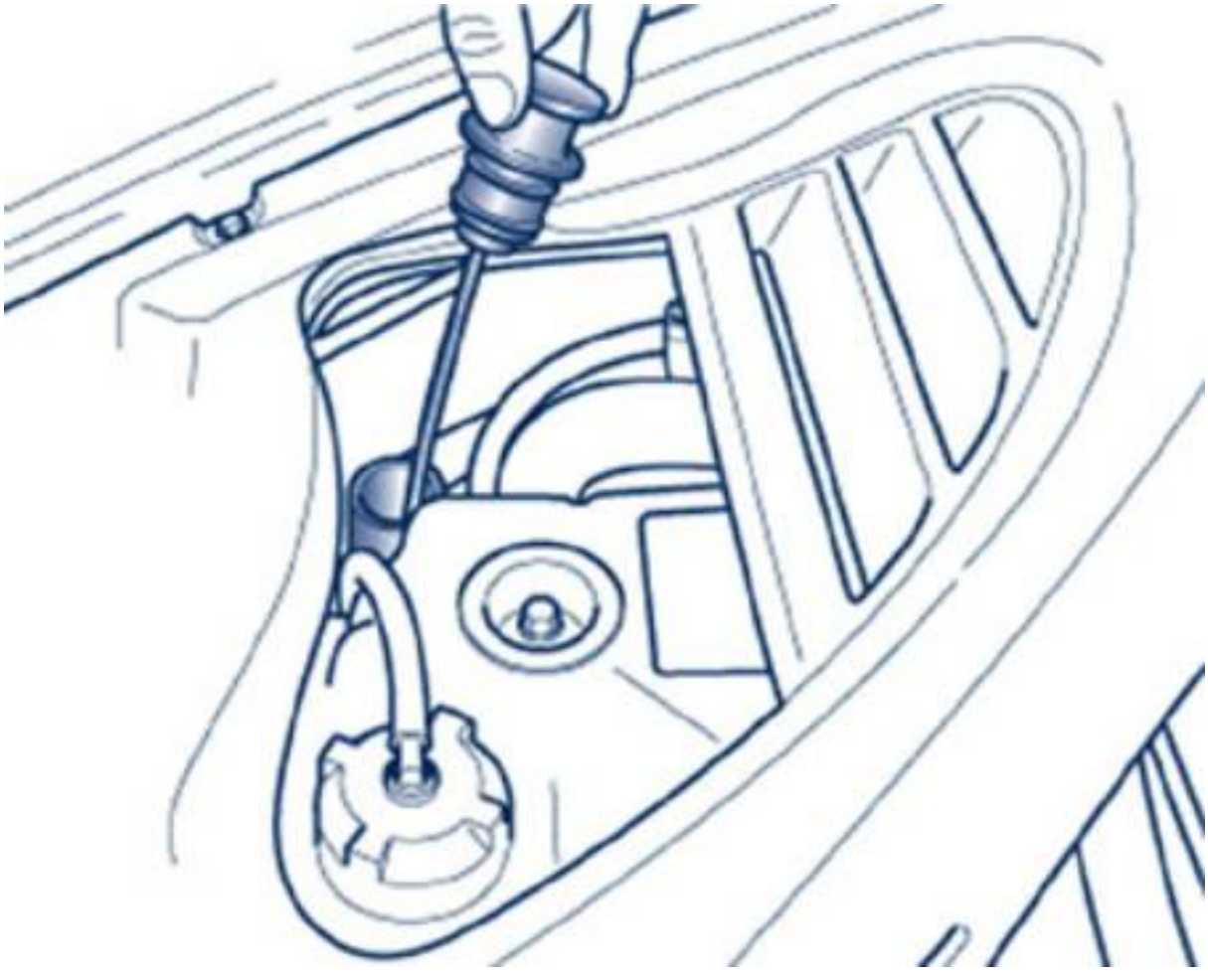
- The level check must be performed with the vehicle on a flat surface and the engine warm and

idling. The oil level must be between the **MIN** and **MAX** notches on the dipstick **.** The gap between **MIN** and **MAX** corresponds to about 1 litre of oil.

important
Do not top up with oil whose specifications differ from those of the oil already used in the engine.

caution
The engine oil used and the oil filter replaced contain substances that are dangerous for the environment. You are advised to contact the Maserati Service Network for oil and filter changes since they have the right facilities for disposing of the used oils and filters, ensuring respect for the environment and observance of the regulations in force.

- If the engine oil level is close to or actually below the **MIN** reference mark, add oil through the filler cap until the **MAX** reference mark is reached. The oil level should never exceed the **MAX** reference point.

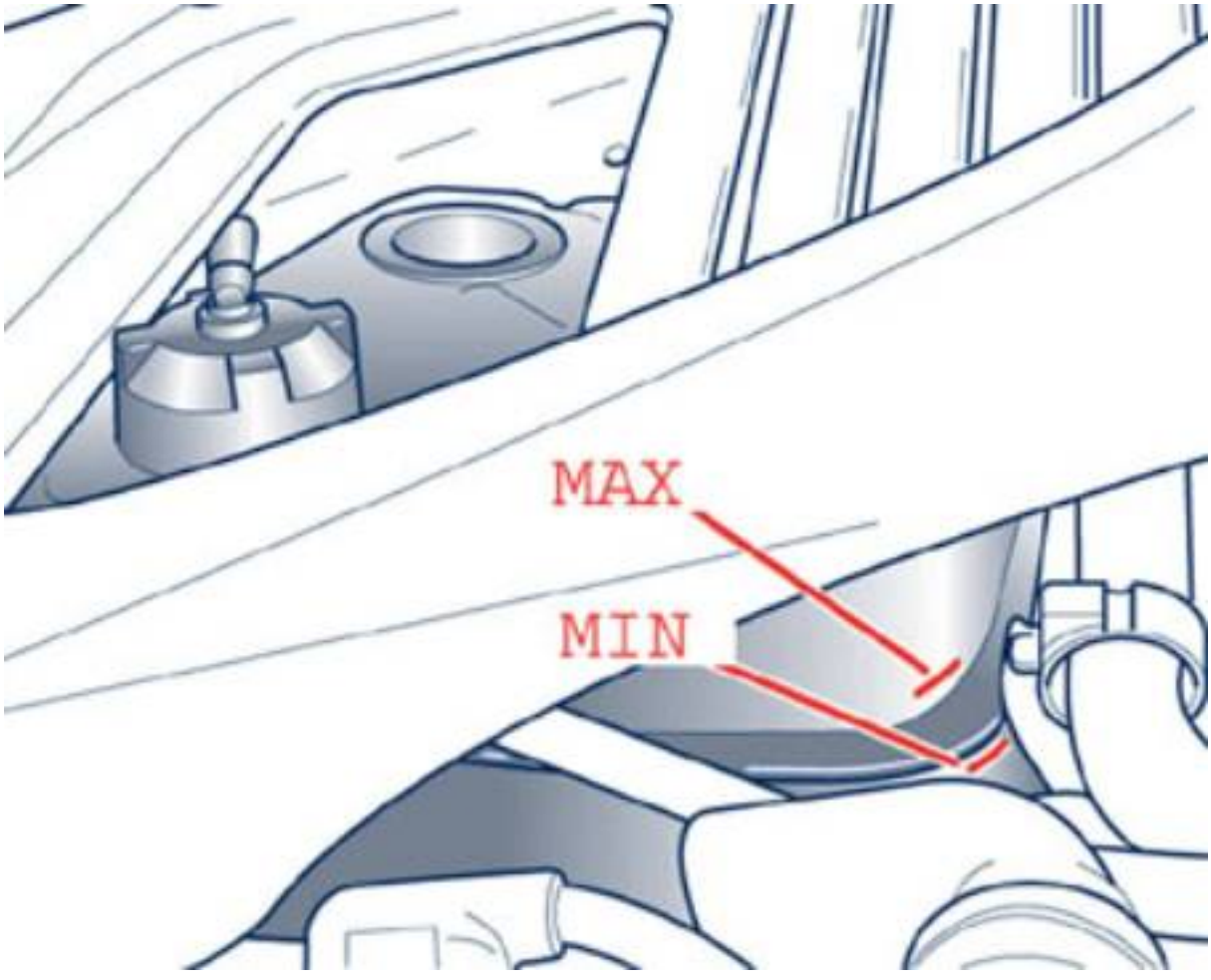


Engine coolant circuit

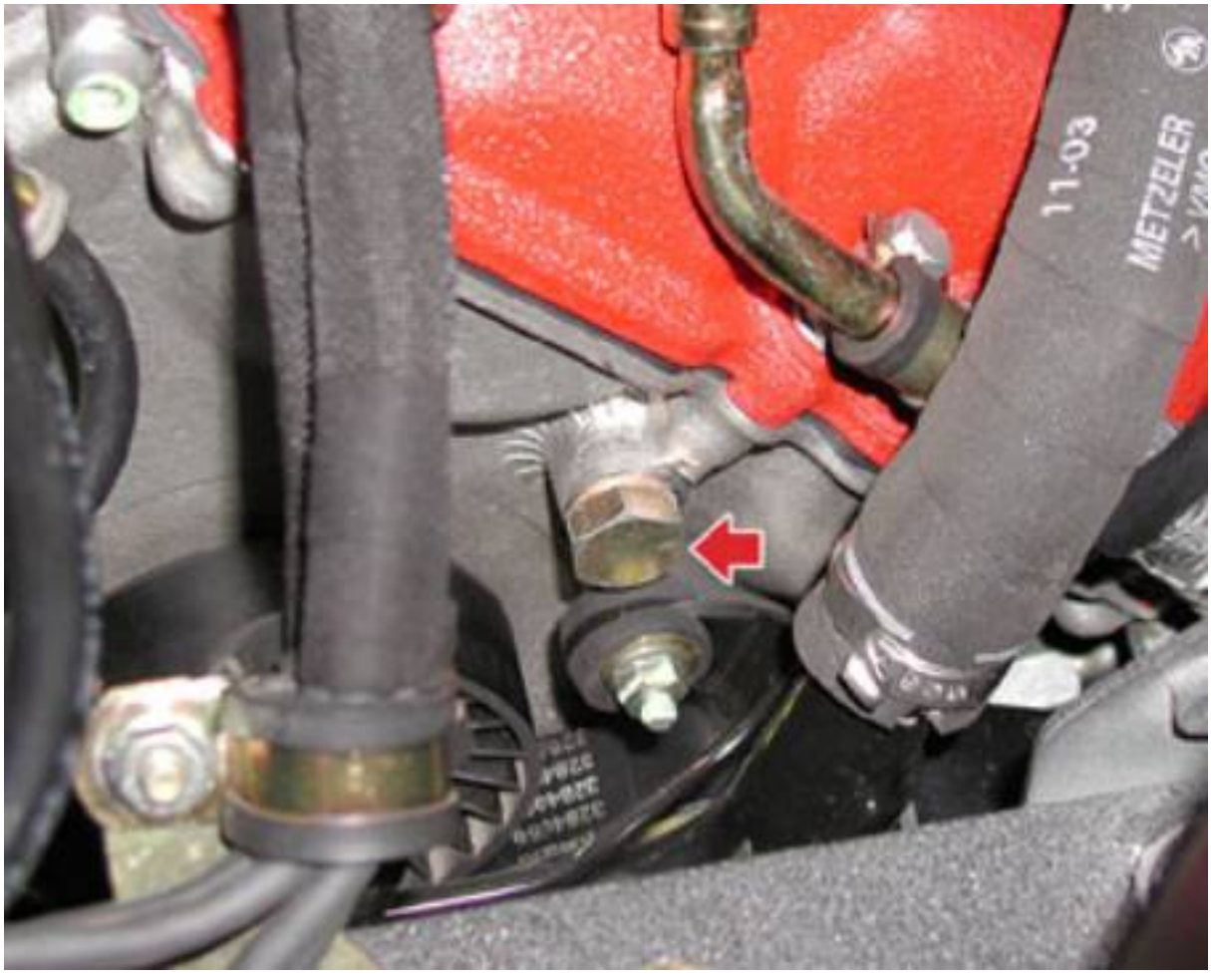
caution
When the engine is very hot, do not remove the pan cap: risk of burns!

- The fluid level must be checked when the engine is cold, and it must fall between the **MIN** and **MAX** references marked on the pan. If the level is low, slowly pour the prescribed fluid through the filler neck

on the pan until the level is close to the **MAX** reference point.



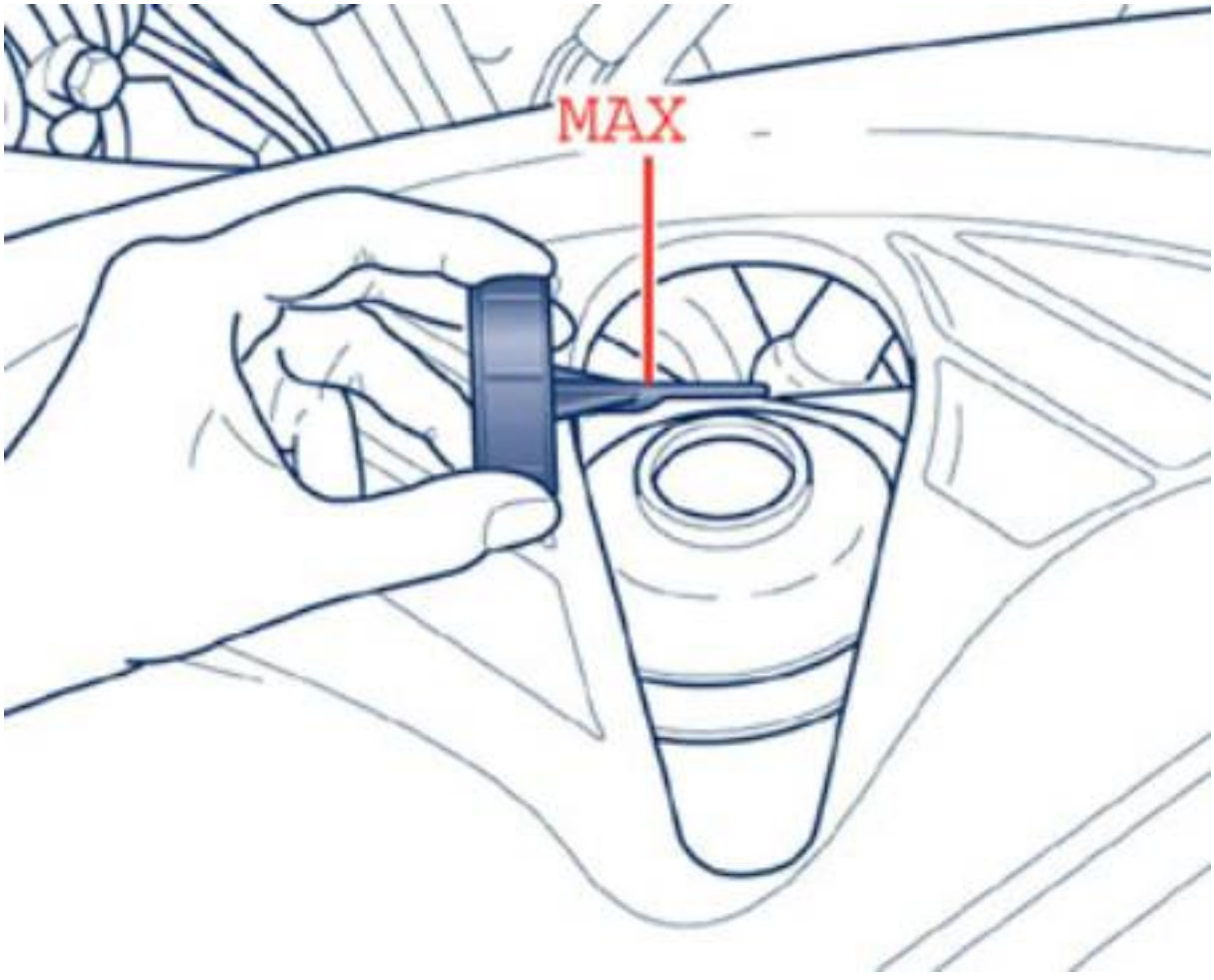
- The operation for filling the engine's water circuit must be carried out by partially unscrewing the two water outlet caps on the heads. These caps are located in the front section of the engine to permit breathing of any air contained in the top part of the engine during the filling stage.


METZELER
11-03

Hydraulic steering fluid circuit

important
Make sure that the power steering fluid does not come into contact with the engine’s hot parts as it is flammable.

- With the vehicle on flat ground and the engine cold, check that the fluid level reaches the **MAX** reference point on the tank cap dipstick. To carry out the check, back off the plug, clean the dipstick, replace and tighten the cap, then remove it again and check the level.



The system is self-draining. Draining is carried out by turning the steering wheel as far as possible to the left and to the right several times with the engine running and the vehicle stationary. This procedure must be carried out every time the delivery and return lines which run to the steering box are disconnected

- Check the oil level once again after draining.
- With the engine running, also check for any oil leakages from the hydraulic steering system.

Windscreen washer/headlight washer fluid circuit

- To add fluid, open the headlight and windscreen washer fluid tank cover, extract the filler neck extension and pour in the detergent and water mixture, in the proportions indicated on the bottle.

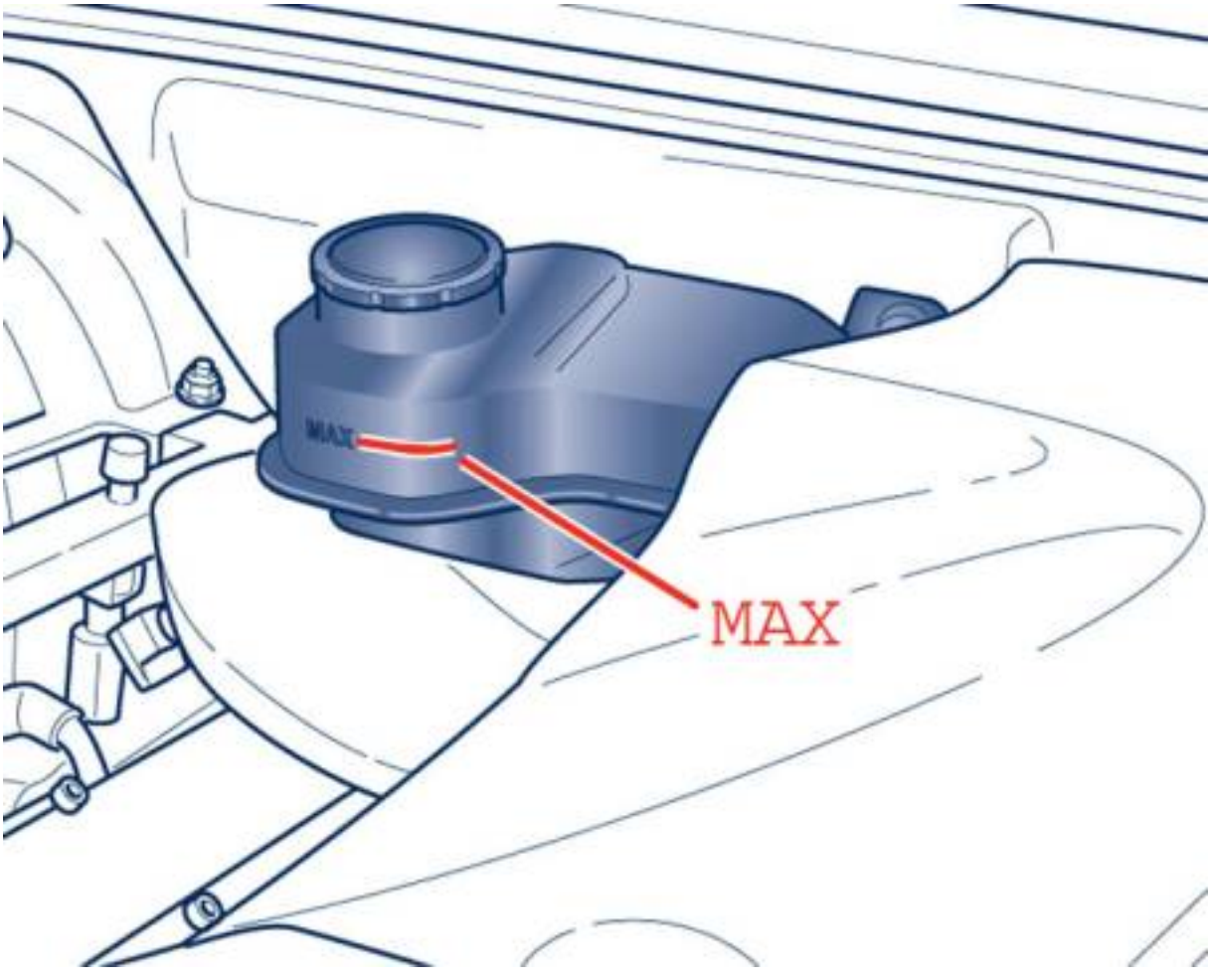
N.B.
If the temperature is below 20°C, use pure detergent fluid.

Brake circuit oil

- Check that the fluid level in the reservoir is at the maximum level (**MAX** notch). If the level drops below the minimum, with the starter key at **MAR**, the relative warning light on the instrument panel lights up.
- If fluid is needed, use only the type classified as DOT4;

IMPORTANT
The brake fluid is hygroscopic (i.e. it absorbs humidity). For this reason, if the car is used mainly in areas with a high rate of atmospheric humidity, the fluid should be changed more frequently than indicated in the Service Time Schedule.

IMPORTANT
Do not let the brake fluid, which is highly corrosive, come into contact with the paintwork. If this does occur, wash the paintwork immediately with water.
The symbol on the container identifies the synthetic type of brake fluid, distinguishing it from the mineral type. Using mineral fluids damages the special rubber linings of the brake system beyond repair.



Connecting the equipment used to carry out procedures on the air-conditioning system coolant.

The system lines have two unions, one for the high and one for the low pressure, which are used for coolant-related operations such as:

- coolant absorption;
- system drainage and dehydration;
- finding leakages in the circuit;
- filling the oil for the vacuum pump;
- filling the system with coolant (R134a);

Version	Quantity
USA	1100 g +/- 25
EUROPE	1100 g +/- 25

- checking the system operation.

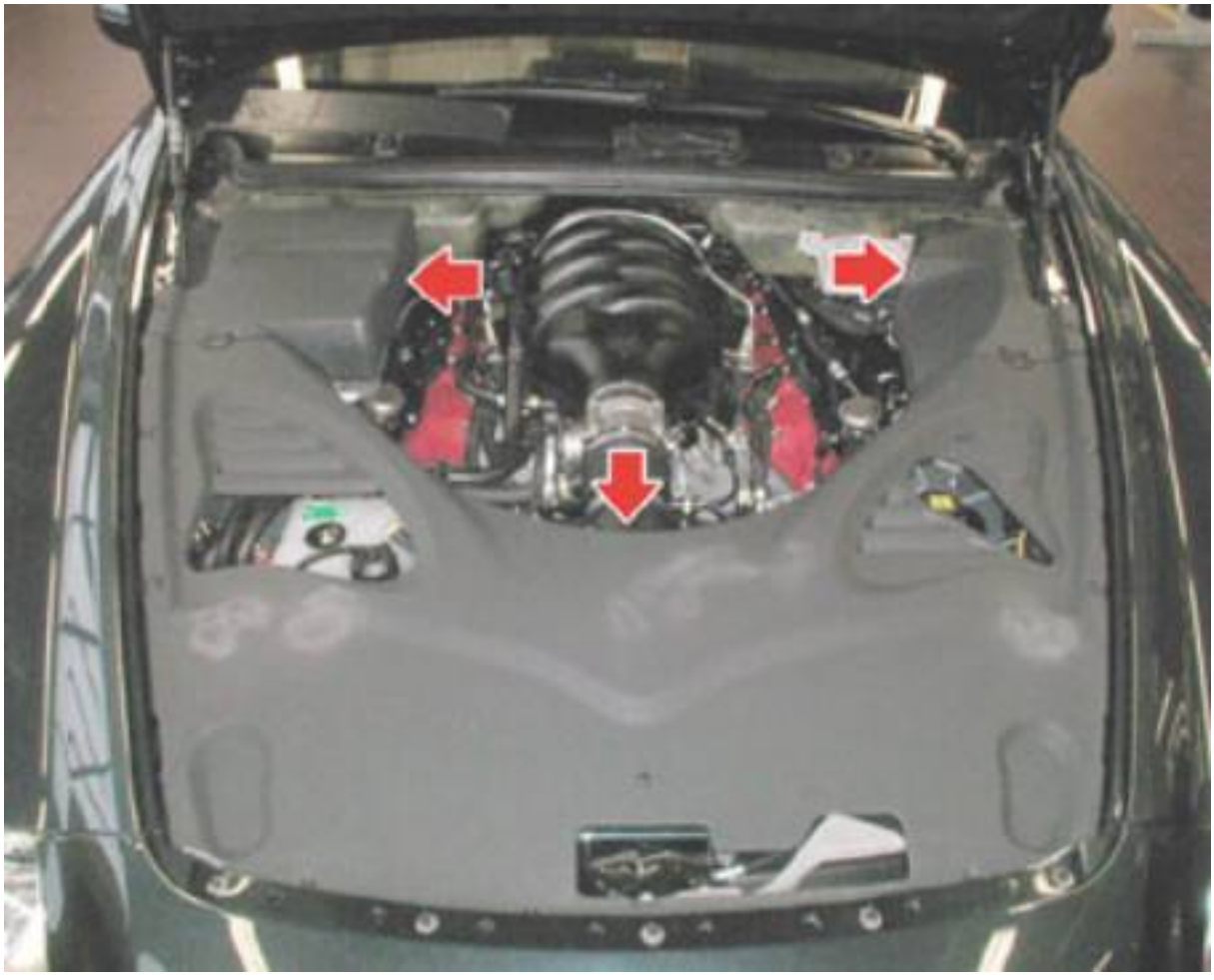
The operations outlined above can be carried out with different types of equipment, which can have different operating procedures; because of this, you should refer to the Owner’s Manual for the machinery

employed for more detailed information.
The high and low pressure unions are shown in the vehicle with the charging equipment connections.

Right-hand side engine mount

Removal

- Place the vehicle on the hoist.
- Remove the trim panels.

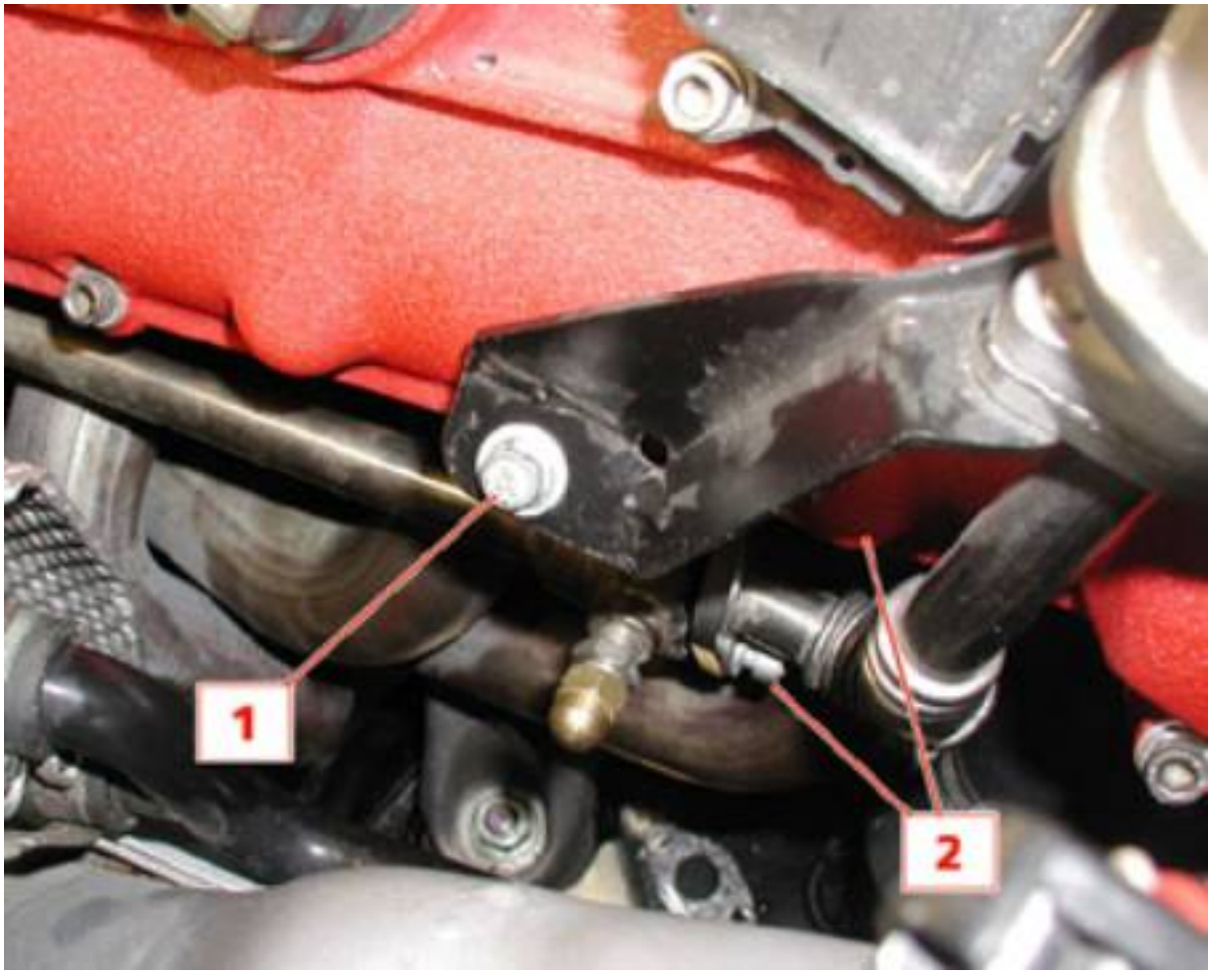


- Rotate the plastic fastening screws on the engine compartment fuse box cover by 90°, then remove the cover.

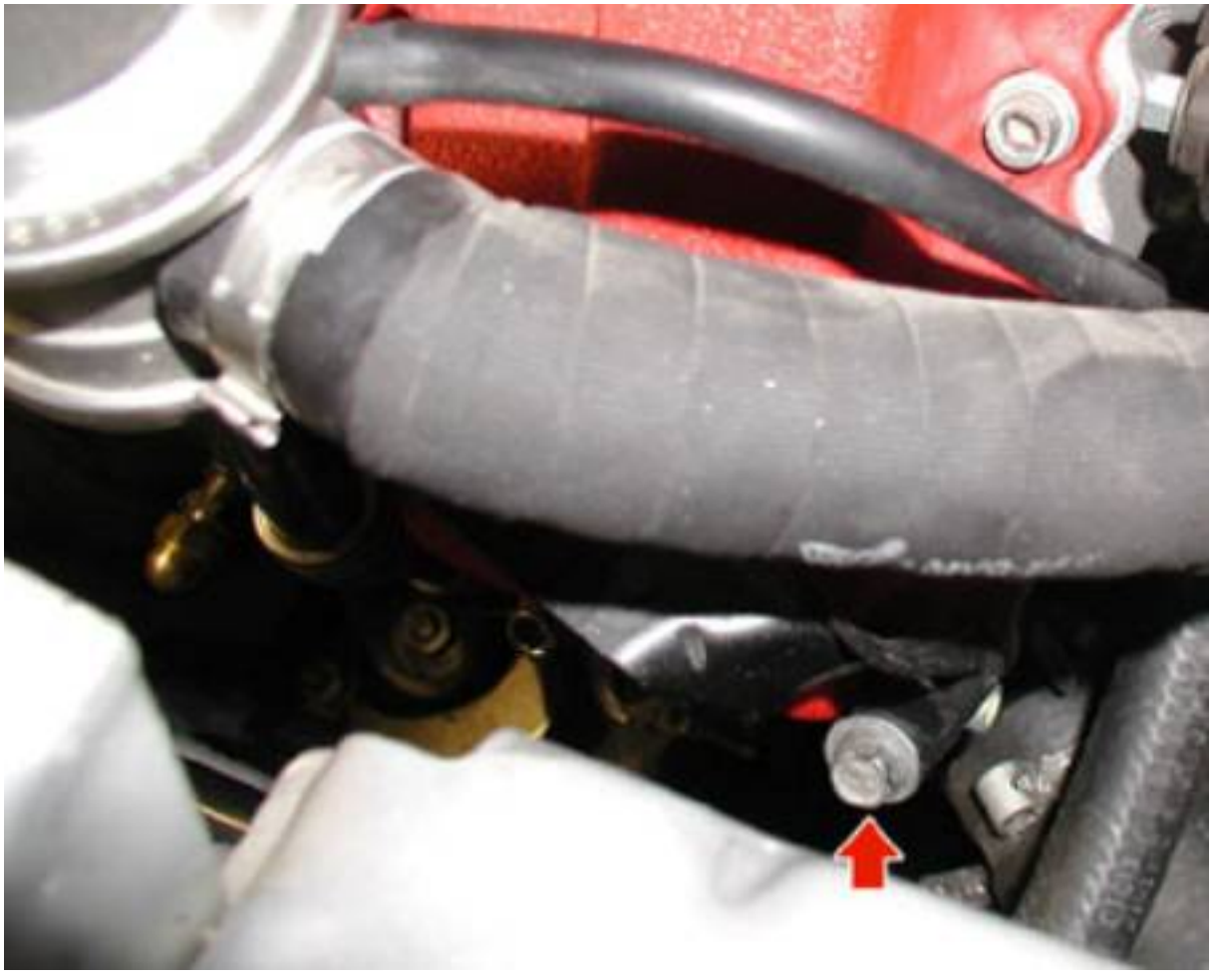
- Undo the two fastening screws on the engine compartment fuse box.

- Undo the three fastening screws and remove the engine compartment fuse box mount.

- Undo the bracket screw **(1)** and the rigid line screws **(2)**.



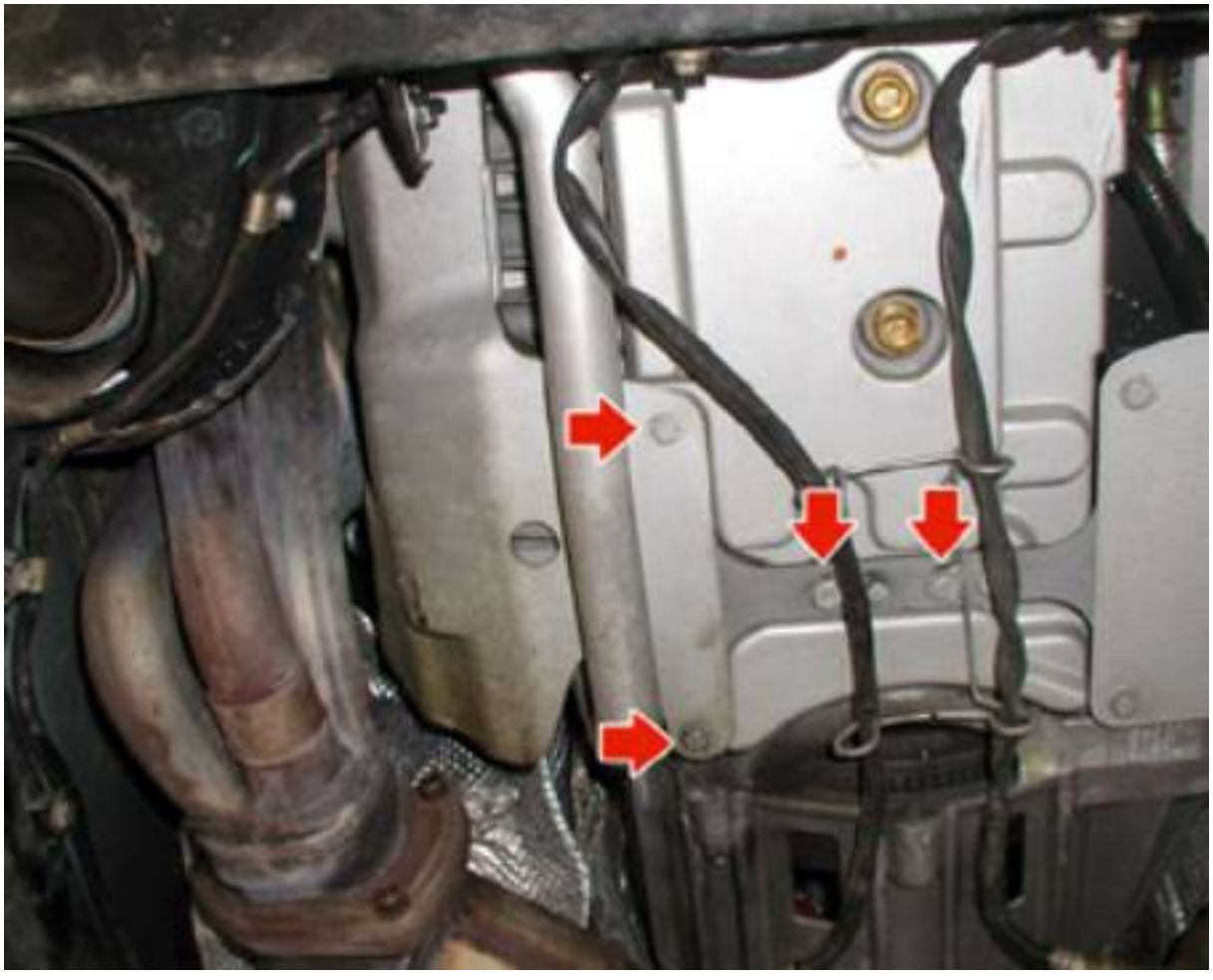
- Undo the remaining retaining screw for the pneumatic valve bracket.



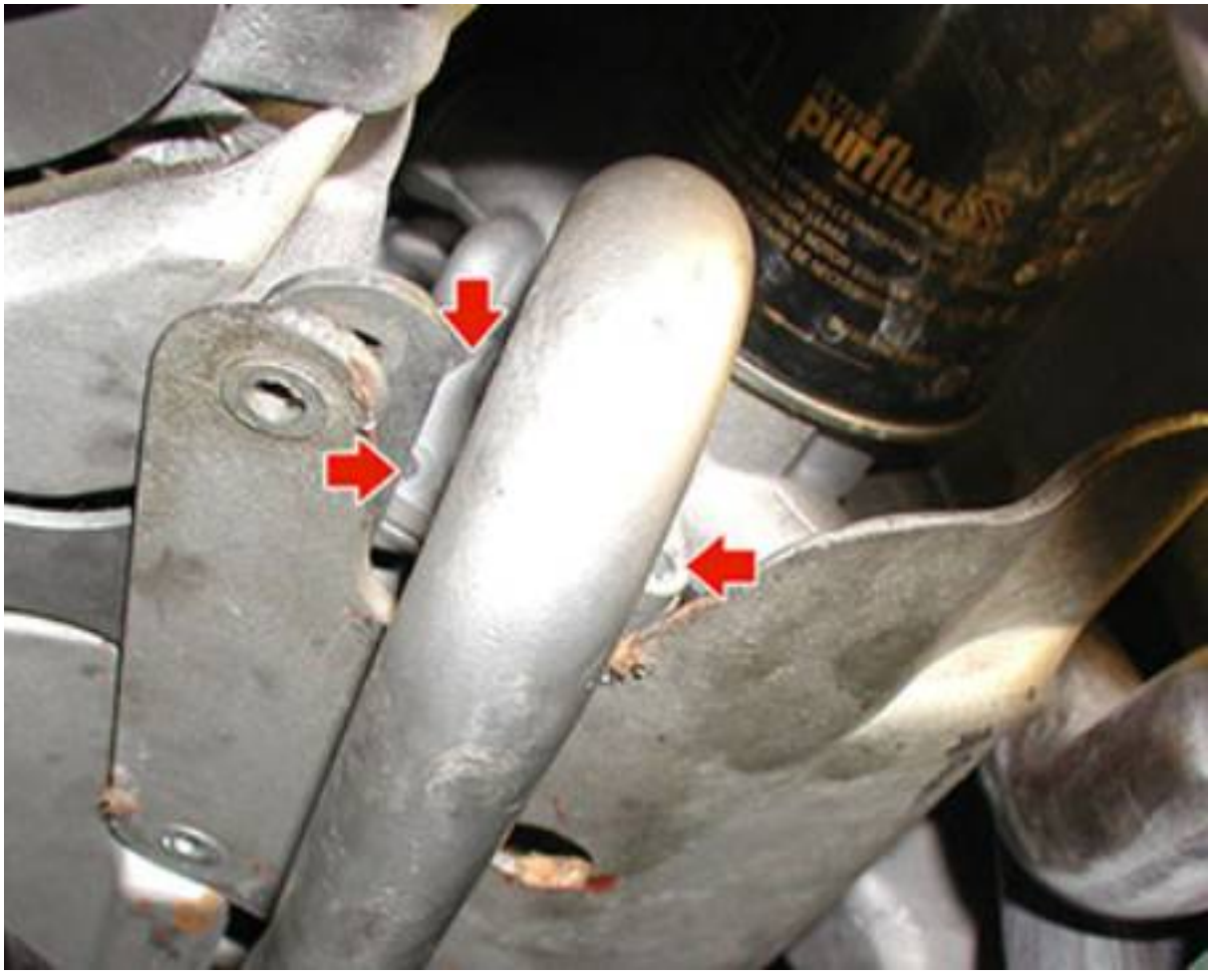
Remove the floor guard beneath the engine.
Engine floor guard

- Place a pan under the engine oil tank cap to collect the oil.
- Unscrew the cap **(1)** and wait until all the engine oil has drained out.
- When the oil has drained out, screw the oil tank cap back on.

- Undo the retaining screws of the engine oil filter heat shield.



- Undo the screws that secure the rigid engine oil line from the pump.

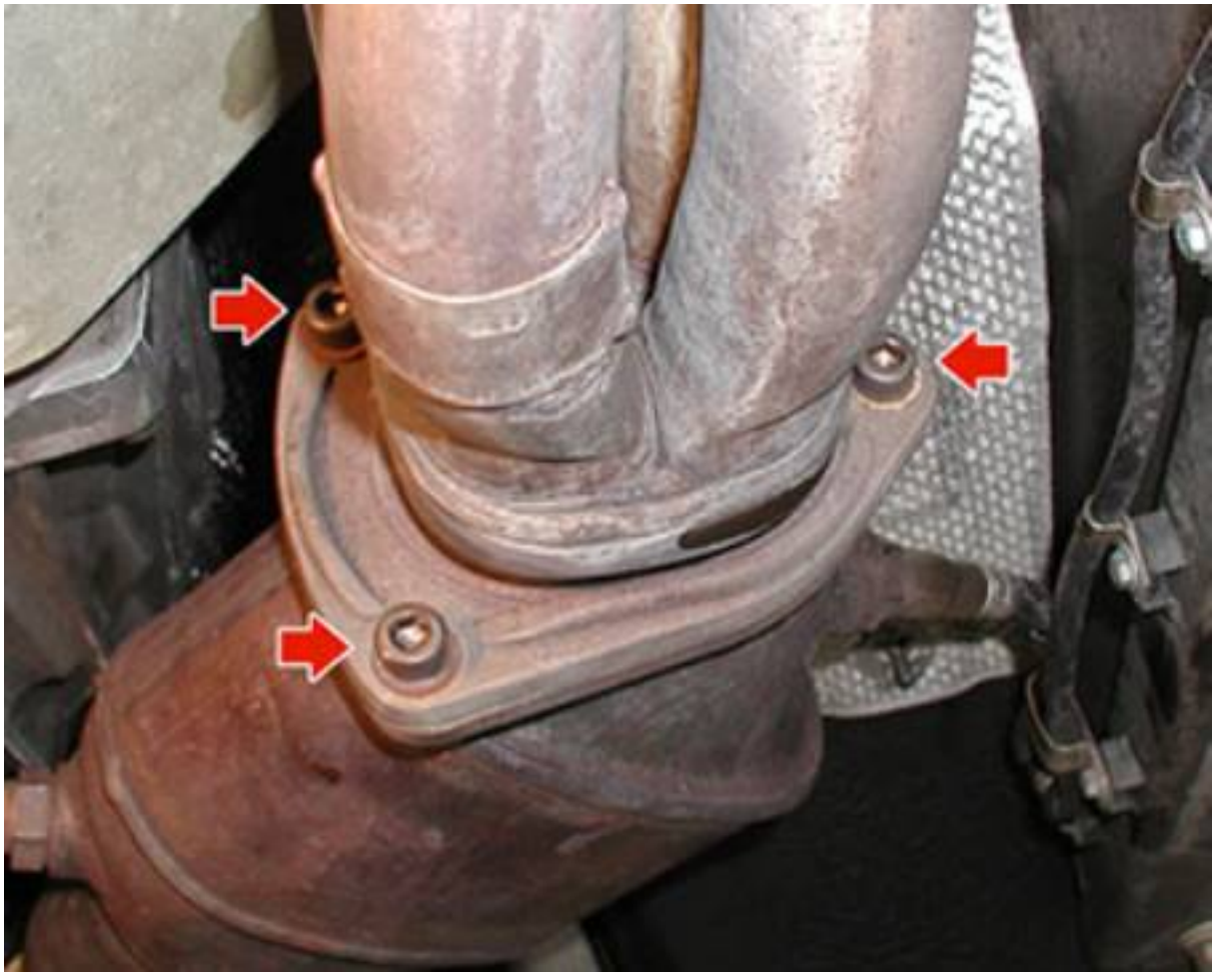


- Using a generic tool, unscrew and remove the oil filter.

- Undo the remaining two upper screws and remove the heat shield of the engine oil filter.

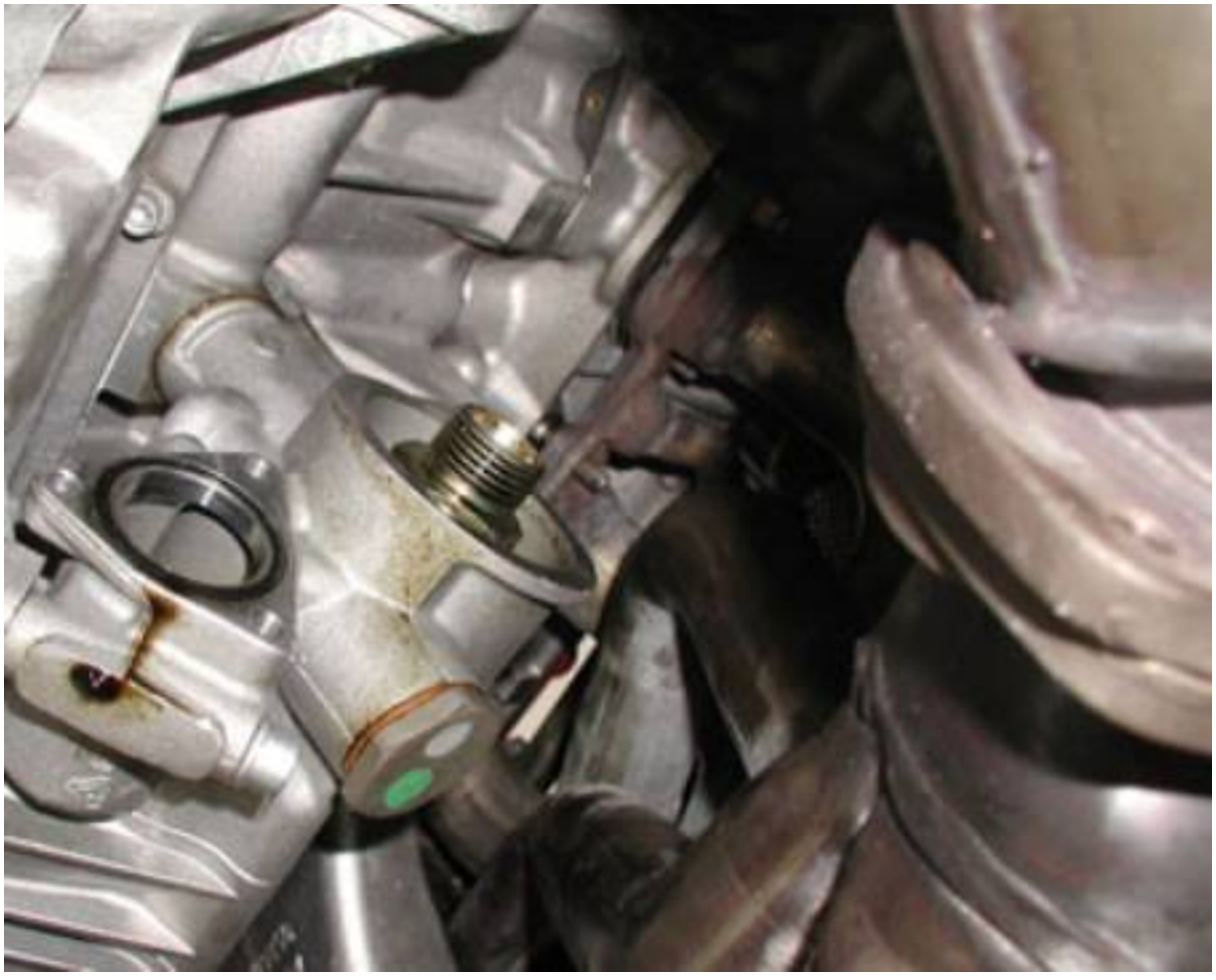
- The operation described below is applicable to all the EUROPE vehicles manufactured up to serial number 24274.

- Undo the screws securing the catalytic converter to the exhaust manifold.



- The operation described below is applicable to all the EUROPE vehicles manufactured up to serial number 24274.

- Unscrew the nuts fastening the exhaust manifold to the cylinder head.
- Remove the RH exhaust manifold by slipping it off the stud bolts.



- The operation described below is applicable to all the EUROPE vehicles manufactured up to serial number 24274.

- View of the flange which attaches the exhaust manifold to the cylinder head.

- The operation described below is applicable to all the USA - CND vehicles and all the EUROPE vehicles manufactured starting from serial number 24275.

- Remove the right-hand side exhaust manifold.

Exhaust manifold

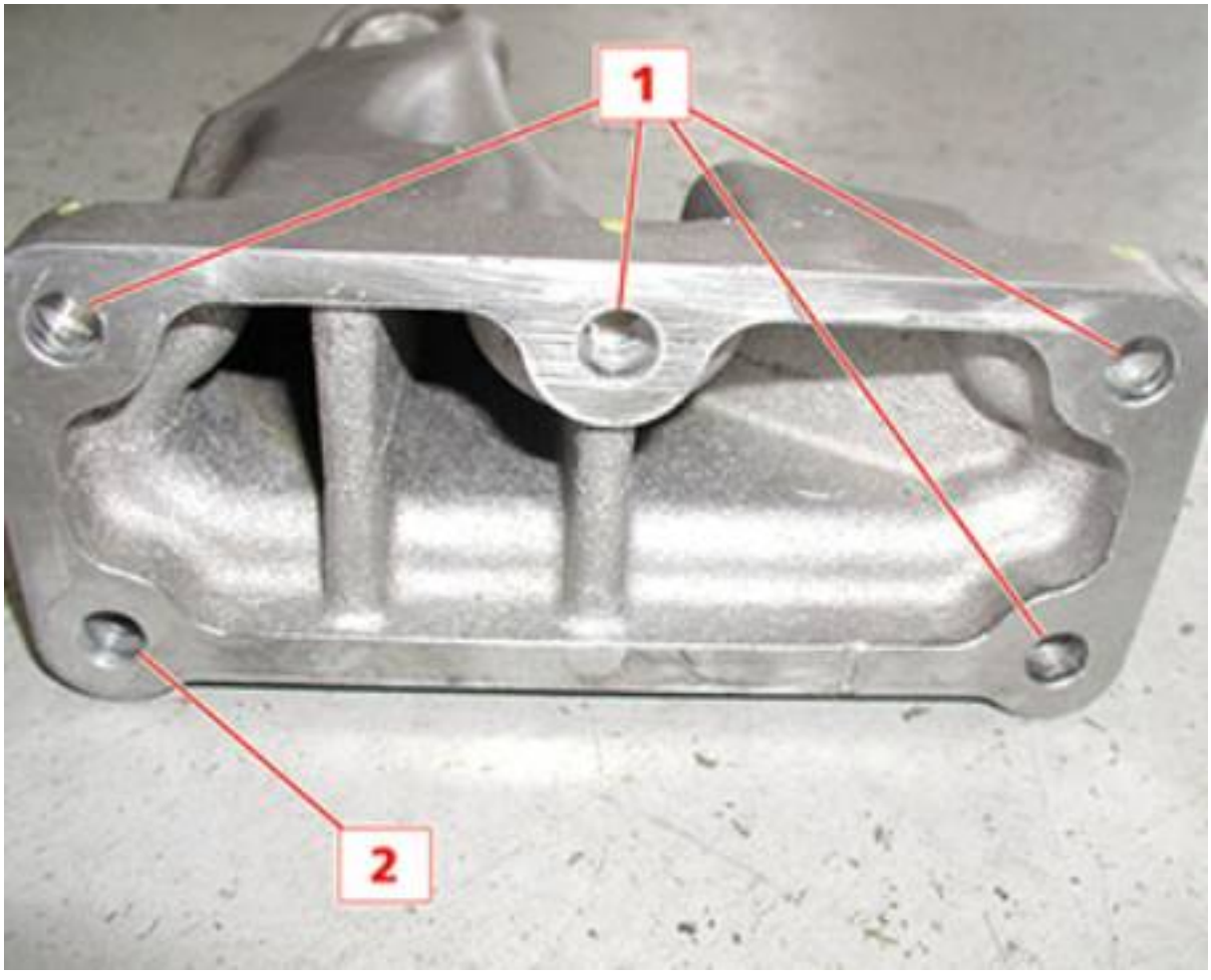
- The subsequent operations are applicable to all vehicles.

- Unscrew the nut that secures the RH engine mount to the relevant dowel block.

- Place a hydraulic supporting and lifting device **(1)** under the engine so as to work in safety.

- Undo the screws that secure the RH engine mount to the crankcase.

- The retaining screws **(1)** are easily accessible, while the retaining screw **(2)** needs to be accessed with a special wrench.



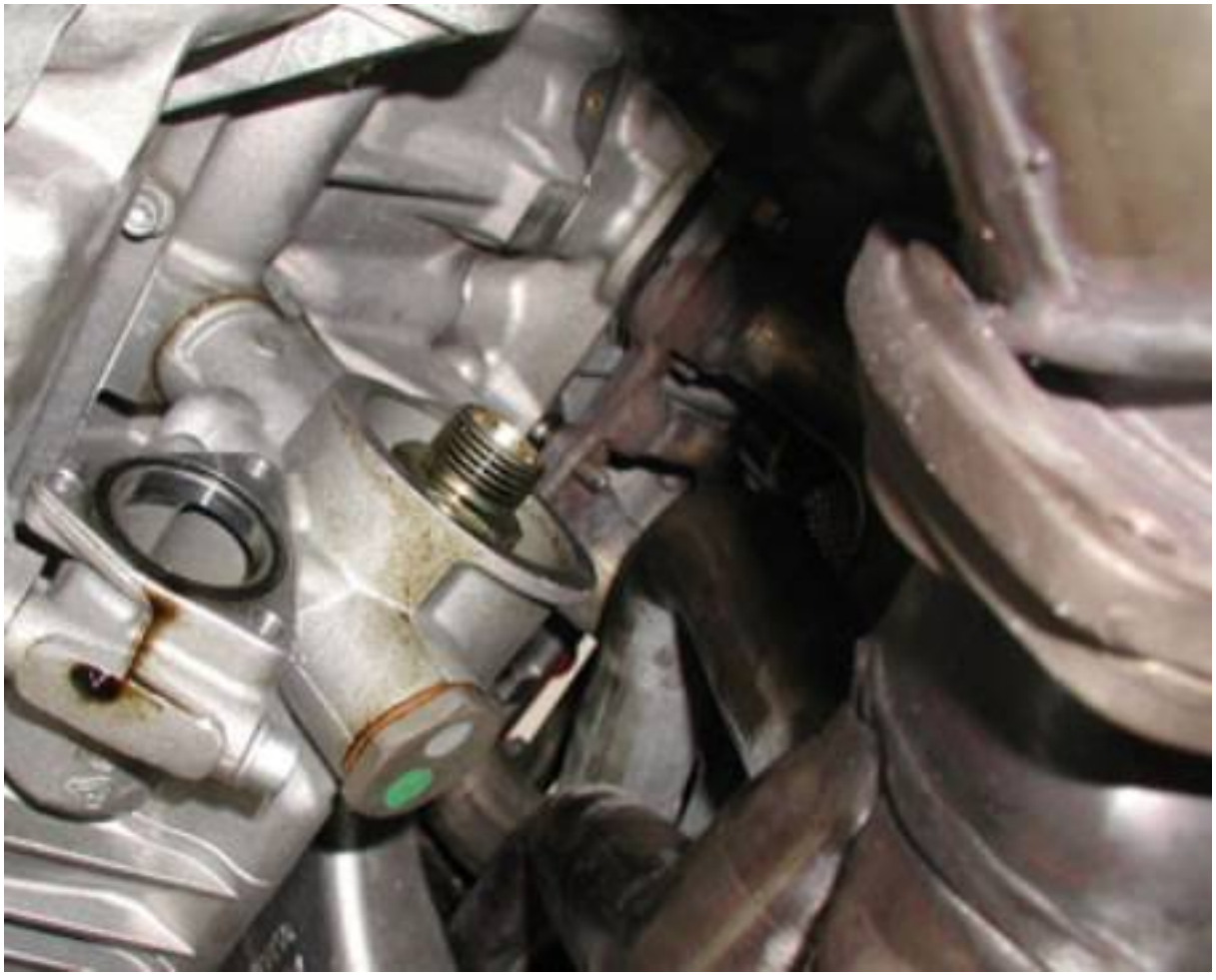
- Remove the RH engine mount.

Refitting

- Check that the component is intact.
- Fit the engine mount in its seat and tighten the crankcase retaining screws to a torque of **45 Nm**.
- Tighten the nut fastening the mount to the dowel screw to a torque of **120 Nm**.

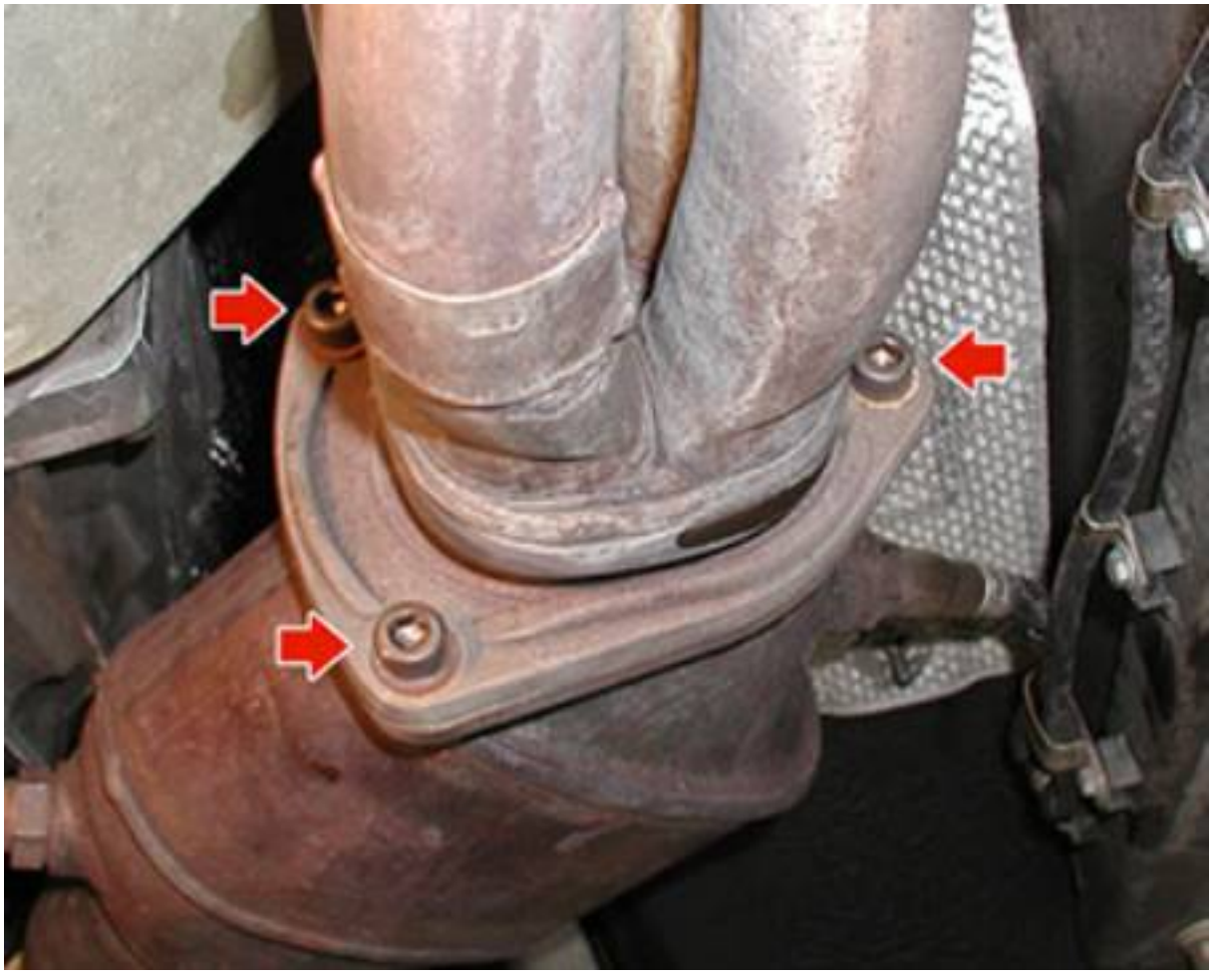
- Remove the hydraulic supporting and lifting device **(1)** positioned previously from under the engine.

- Fit the new gasket, fit the exhaust manifold complete and tighten the fastening nuts to a torque of **25 Nm**.



- The operation described below is applicable to all the EUROPE vehicles manufactured up to serial number 24274.

- Tighten the screws fastening the exhaust manifold to the catalytic converter to a torque of **25 Nm**.



- The operation described below is applicable to all the USA - CND vehicles and all the EUROPE vehicles manufactured starting from serial number 24275.

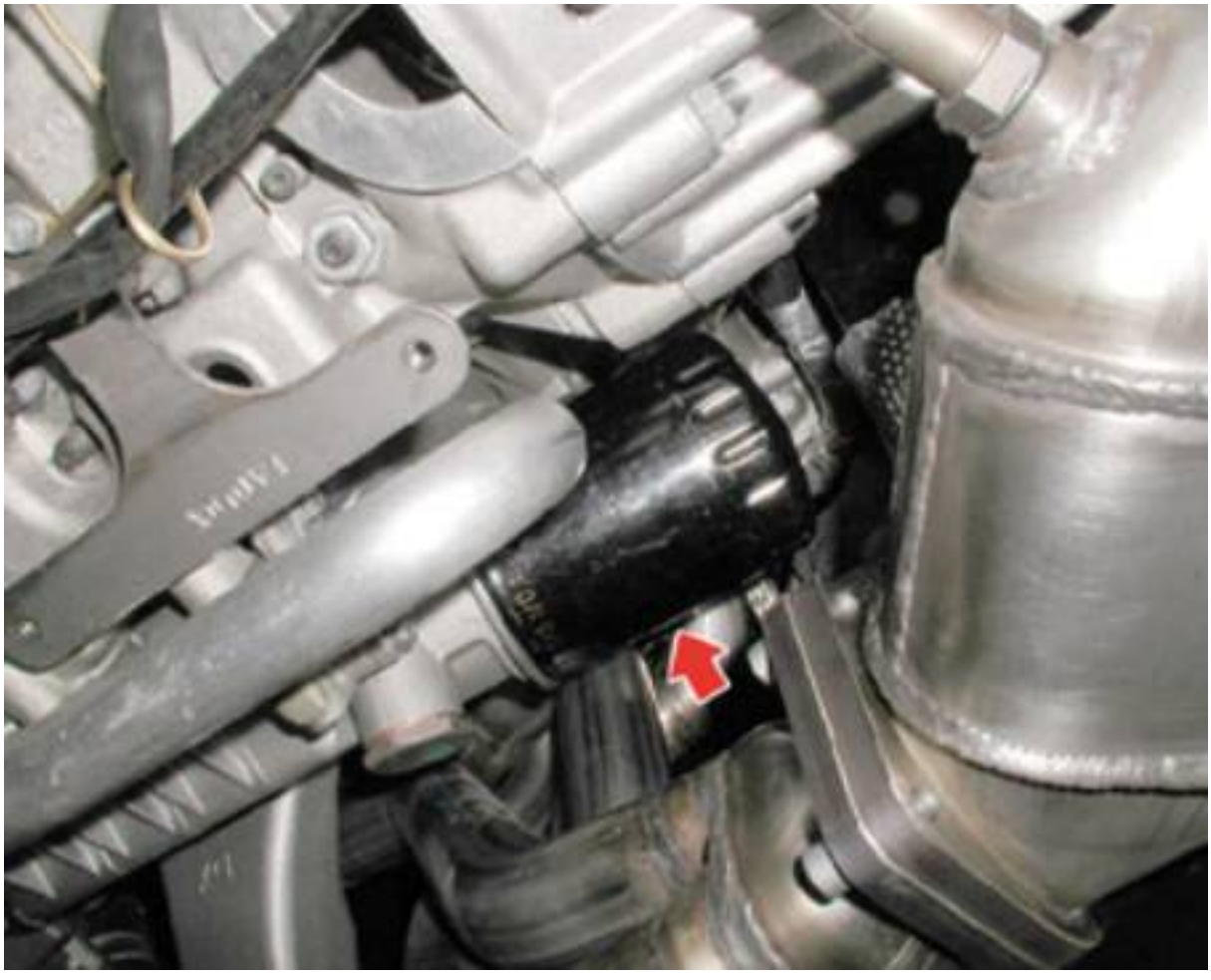
- Remove the right-hand side exhaust manifold.

Exhaust manifold

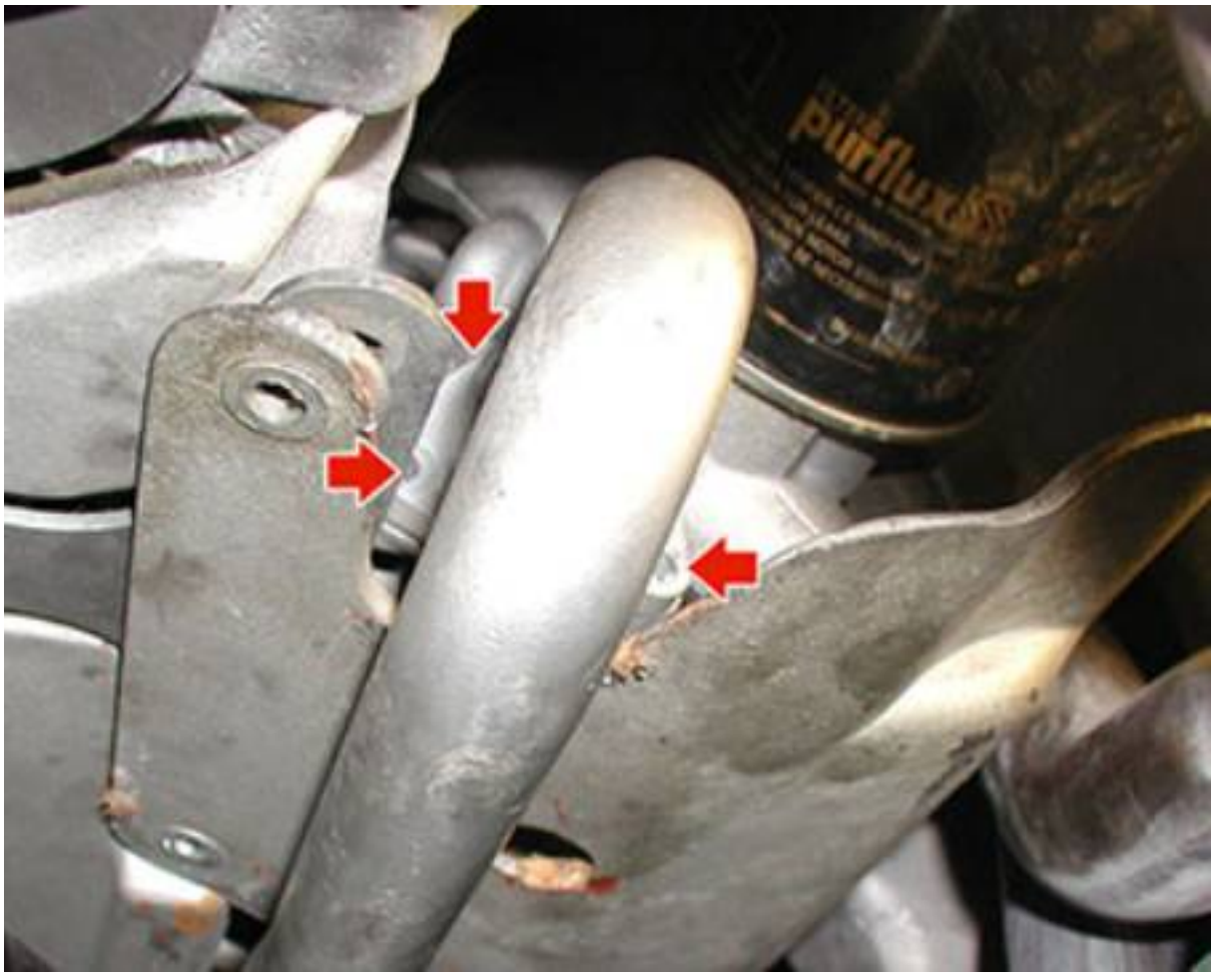
- The subsequent operations are applicable to all vehicles.

- Fit the engine oil filter heat shield and tighten the upper retaining screws.

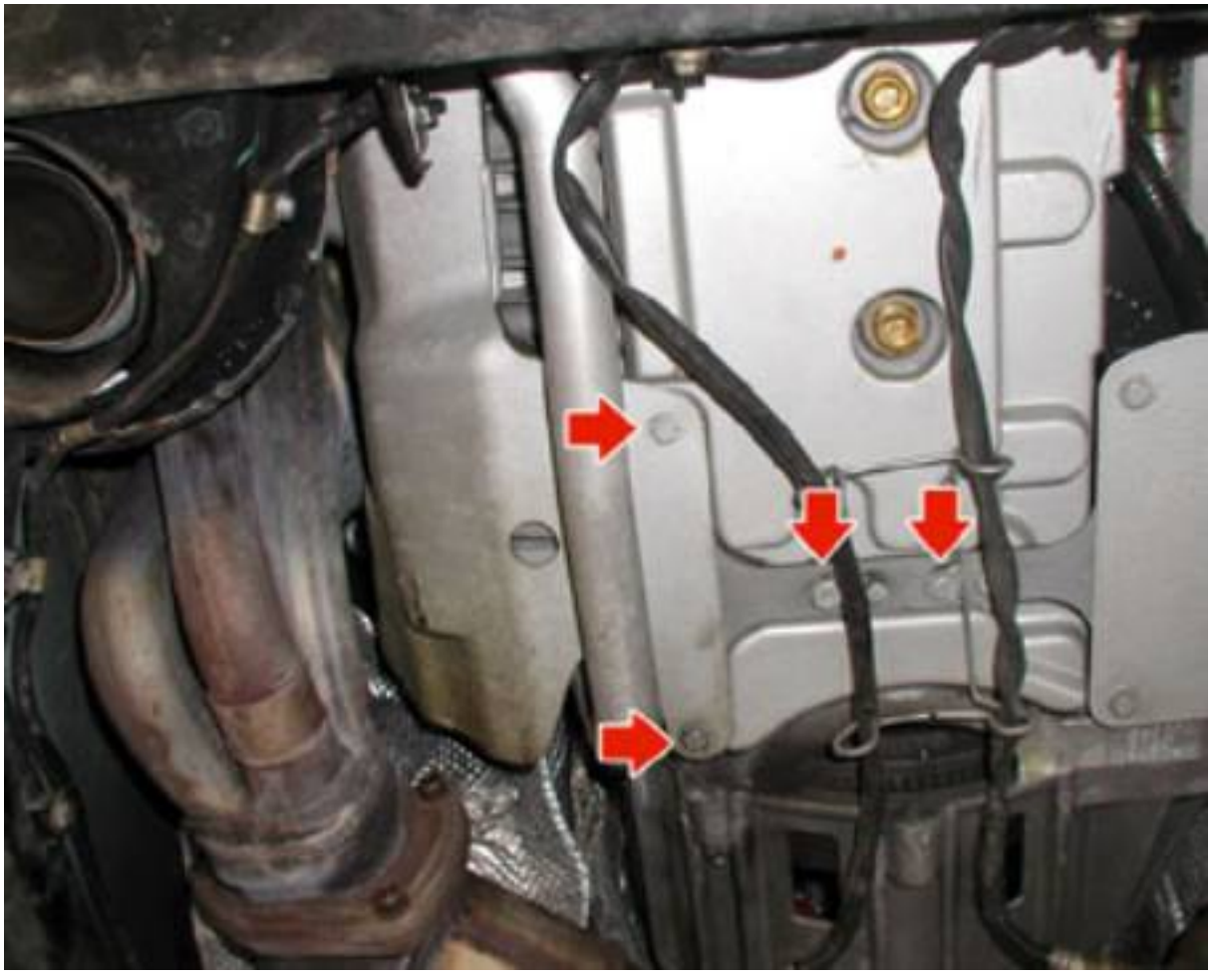
- Lubricate the oil filter surfaces using engine oil
- Fit the new oil filter, screwing it on manually.



- Tighten the screws that secure the rigid engine oil line from the pump.



- Tighten the retaining screws of the engine oil filter heat shield.



- Secure the pneumatic valve tightening the bracket screws.
- Fit the engine compartment fuse box mount.
- Fit the engine compartment fuse box cover.
- Secure the engine compartment fuse box cover.
- Connect the negative terminal of the battery.
- Fill the engine oil tank.

- Start the engine, keeping it idling.
- Wait for the electric fans to start up at least once (engine temperature approximately 90°C).
- Stop the engine.
- Check the engine oil level, then top it up to the **MAX** notch marked on the dipstick.
- Fit the trim panels on the engine compartment.

- After connecting the battery's negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

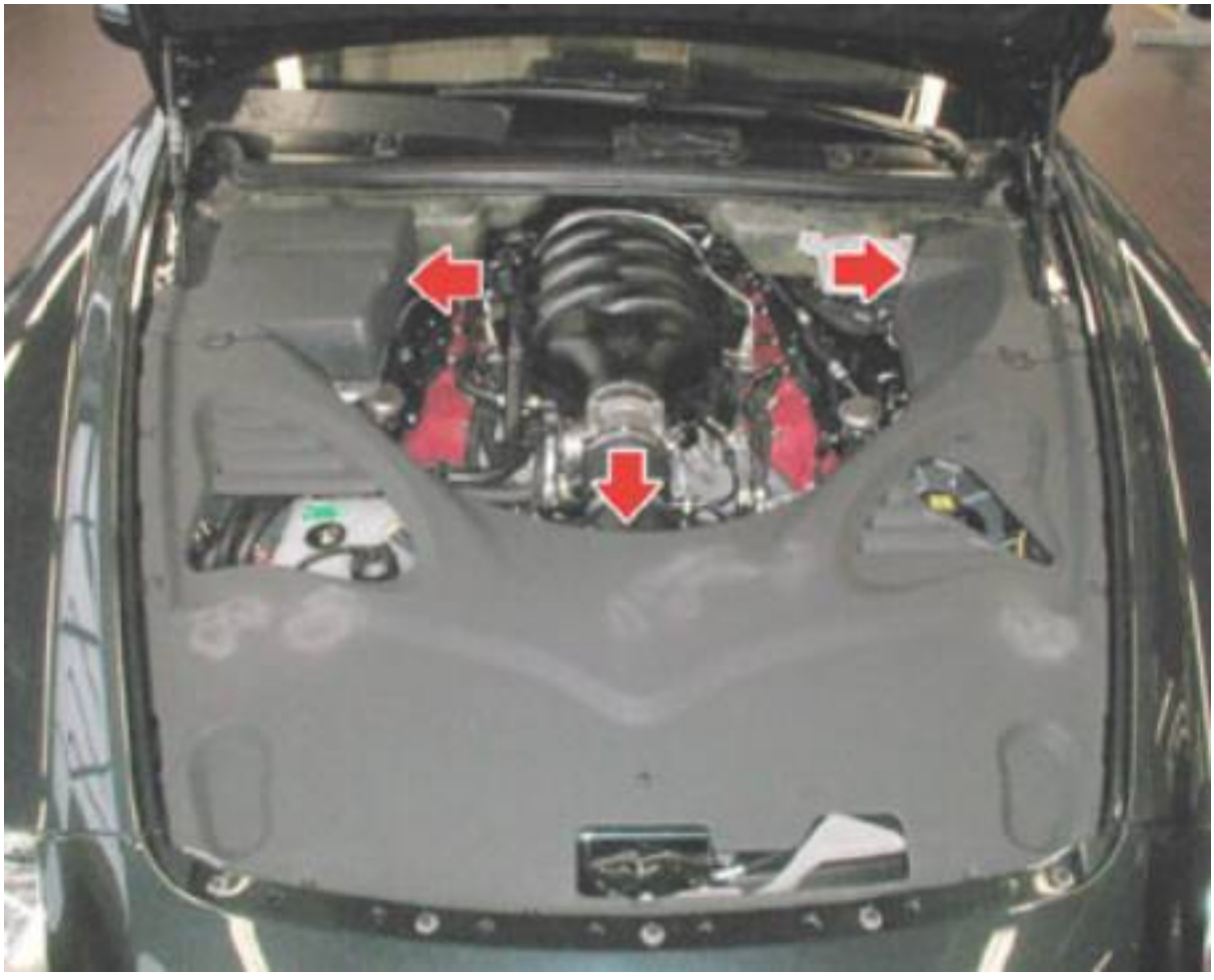
- Fit the engine floor guard.

Engine floor guard

Rubber bushing on the right-hand side of the engine

Removal

- Place the vehicle on the hoist.
- Remove the trim panels.



- Rotate the plastic fastening screws on the engine compartment fuse box cover by 90°, then remove the cover.

- Undo the two fastening screws on the engine compartment fuse box.

- Undo the three fastening screws and remove the engine compartment fuse box mount.

- Remove the floor guard beneath the engine.

Engine floor guard

- Remove the front wheels.

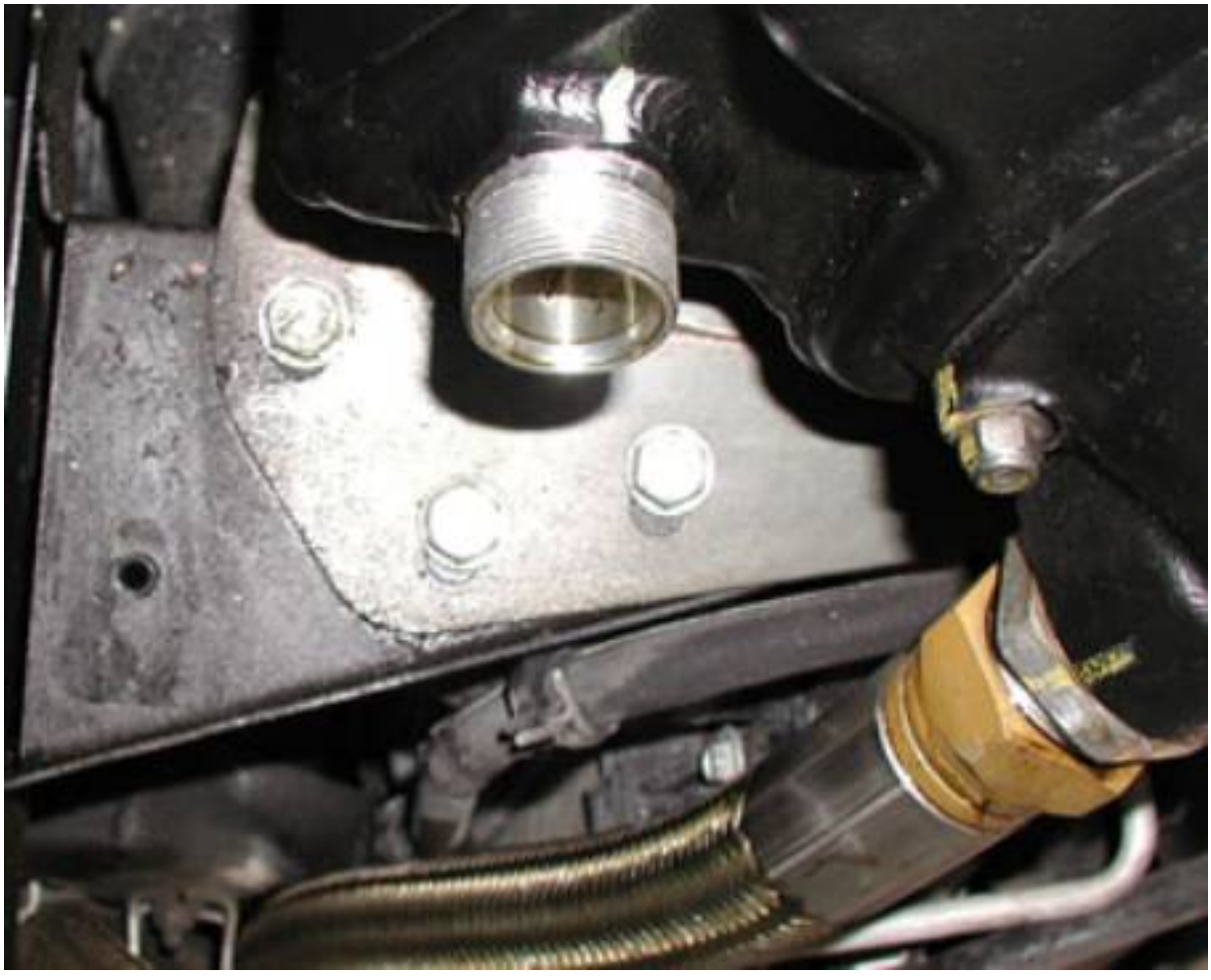
Replacing the wheels

- Undo the screw that fastens the steering column to the steering box.

- Remove the eight retaining screws for the wheelhouse and then remove it (both sides of the vehicle).

- Undo the fastening screws on the reinforcement bracket and remove it (both sides).

- Undo the three screws that secure the oil tank to the vehicle frame.



- Undo the lower screw that secures the windscreen washer-headlight washer fluid tank to the front frame.

- Undo the two screws that secure the radiator to the front frame (Figs.**1 and 2**).


Fig./Abb. 1

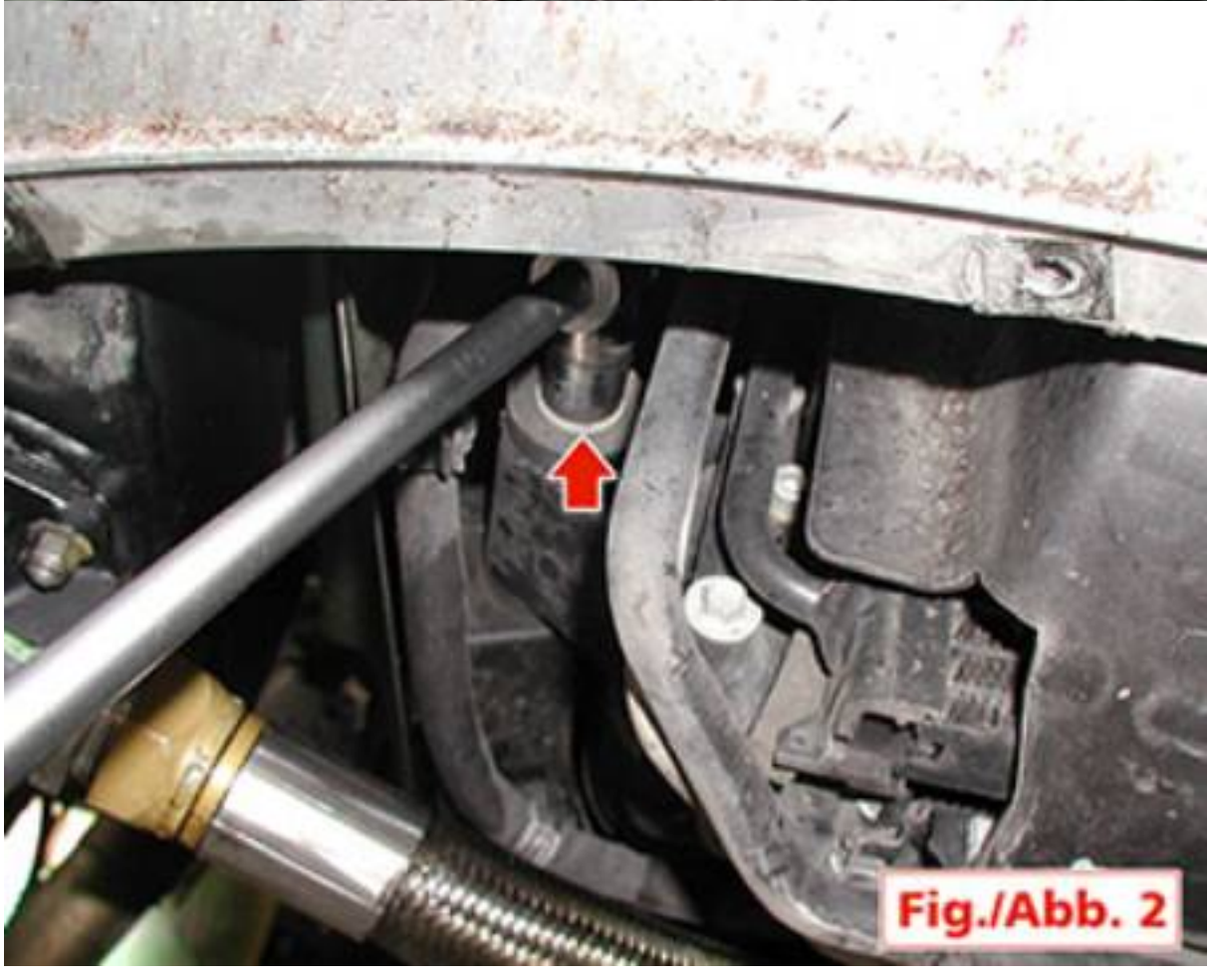
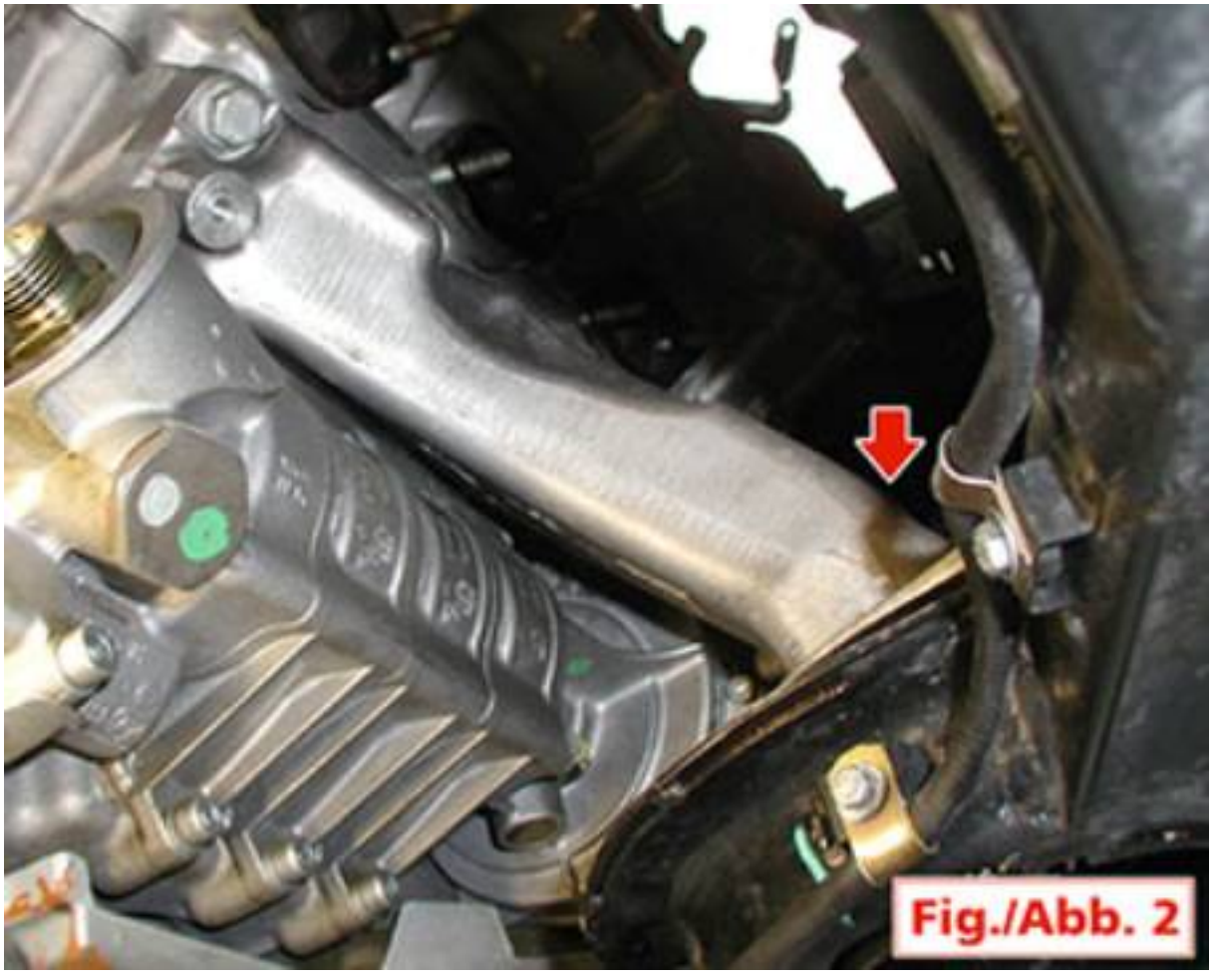


Fig./Abb. 2

- Lower the hoist.
- As illustrated, work from the upper part of the engine compartment using a sufficiently long articulated wrench **(Fig 1)** in order to act on the fastening nut that secures the rigid mount to the engine rubber bushing **(Fig 2)**. Perform this operation on both rubber bushings.



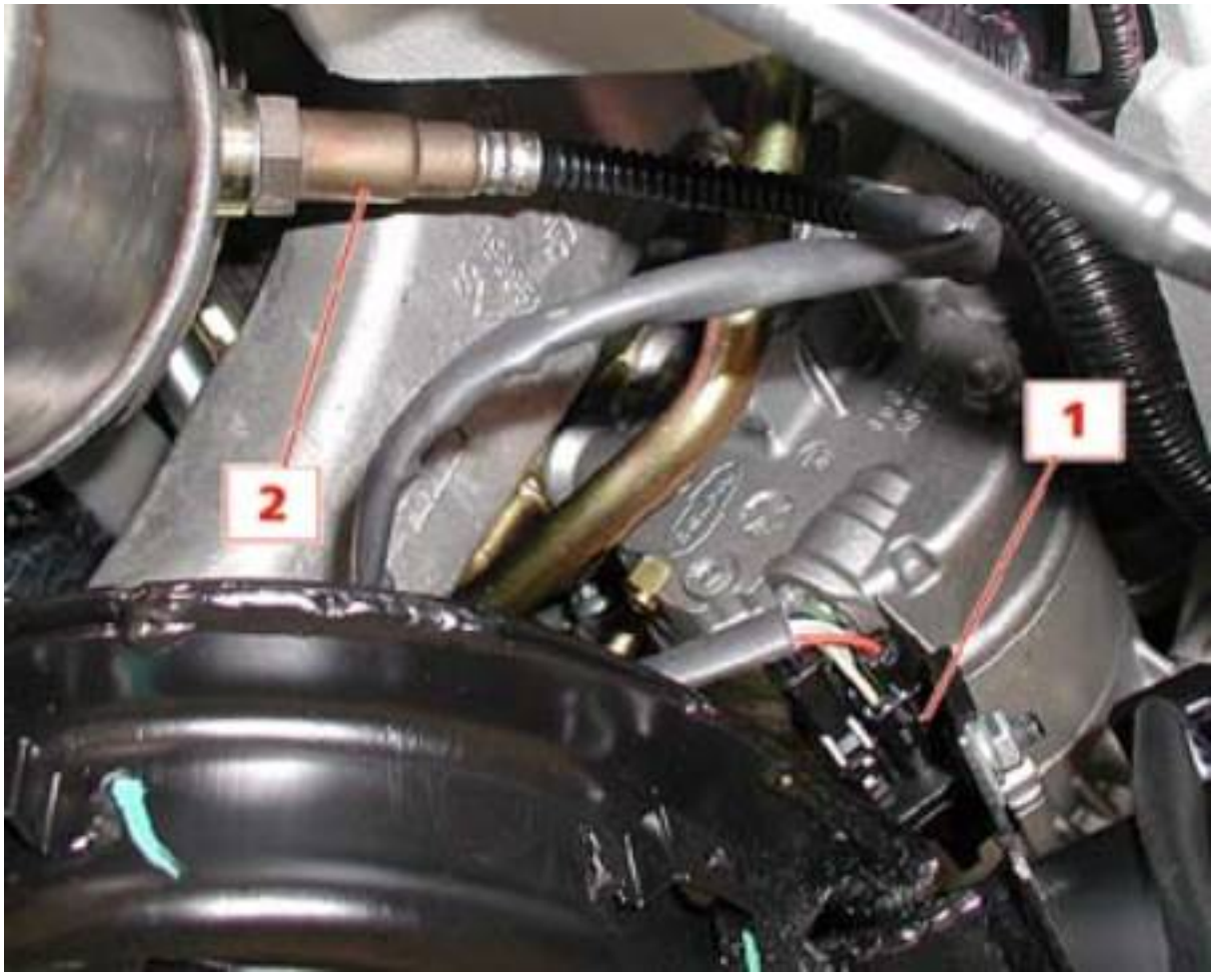
- Detach the electric connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

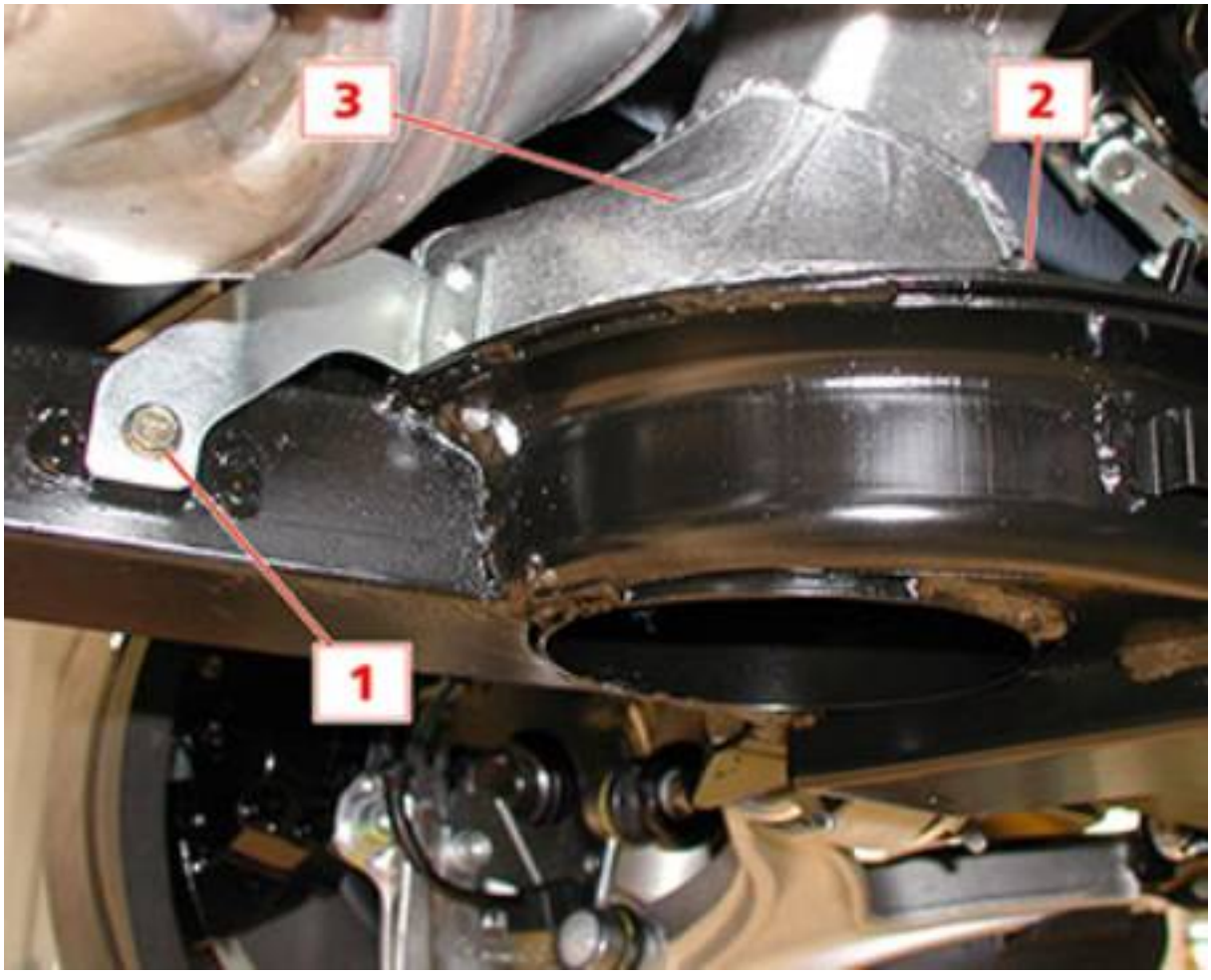
- Partially raise the hoist.
- Unscrew the bolt that fastens the shock absorber to the lower wishbone (lever)

- Completely raise the hoist.
- Disconnect the electrical connector **(1),** undo the screws on the clamps fastening the Oxygen sensor wiring, then remove the upper LH Oxygen sensor **(2).**

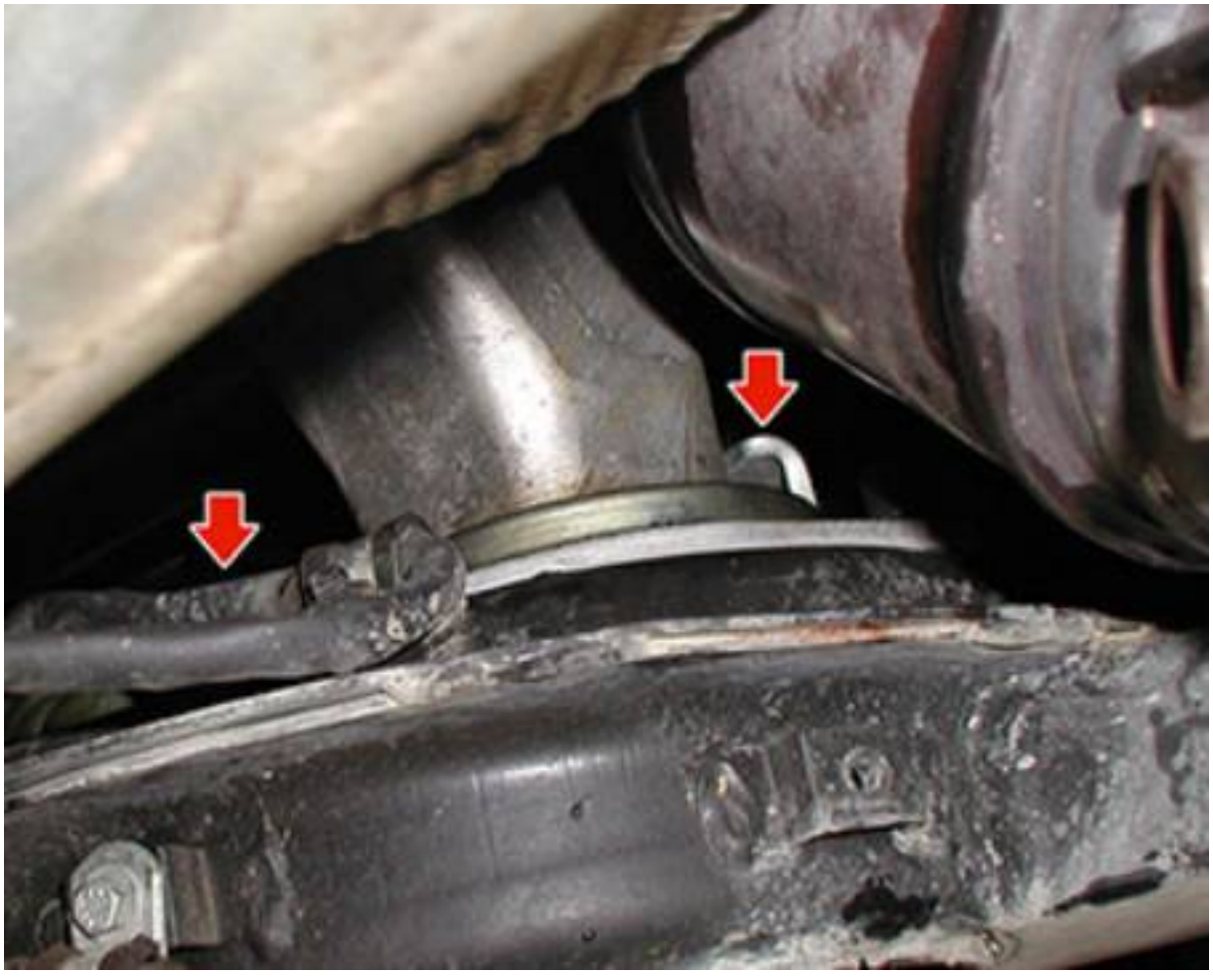


- Disconnect the electrical connector, undo the screws on the clamps fastening the Oxygen sensor wiring **(1),** then remove the upper RH Oxygen sensor **(2).**

- For versions equipped with a heat guard, undo the screw **(1)** and the nut **(2)** and remove rubber bushing heat guard **(3)** .



- Unscrew the two nuts that fasten the right-hand and left-hand rubber bushings to the frame.

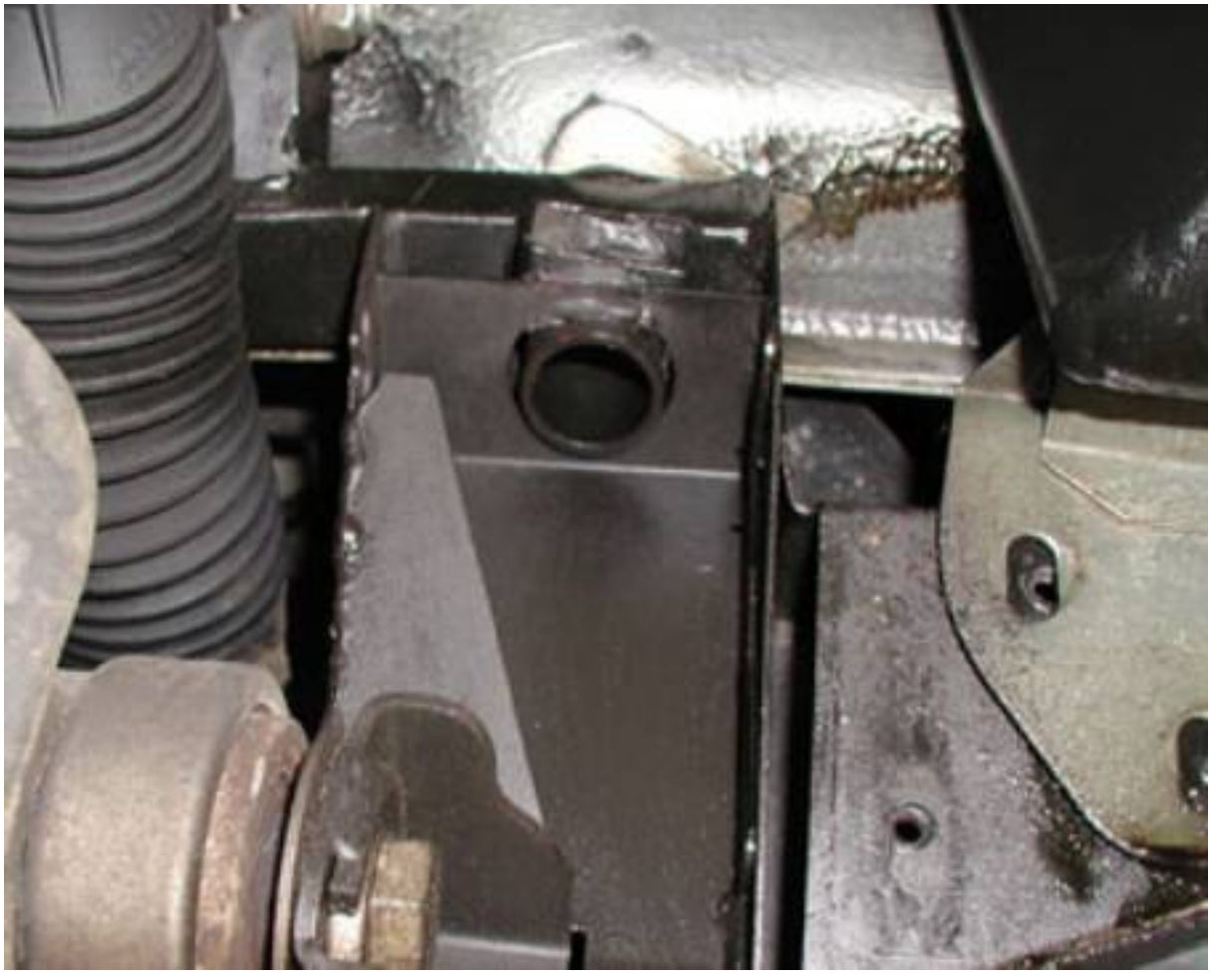


- Position two hydraulic support devices, the first **(1)** underneath the frame and the second **(2)** underneath the engine. The first one will be used to slowly lower the frame in order to access the rubber bushings. The second one will be used to slowly lift the engine/gearbox assembly so that the rubber bushing stud bolt can be slipped off the relative rigid mounts.

- Undo the rear screws that fasten the engine frame to the bodywork.

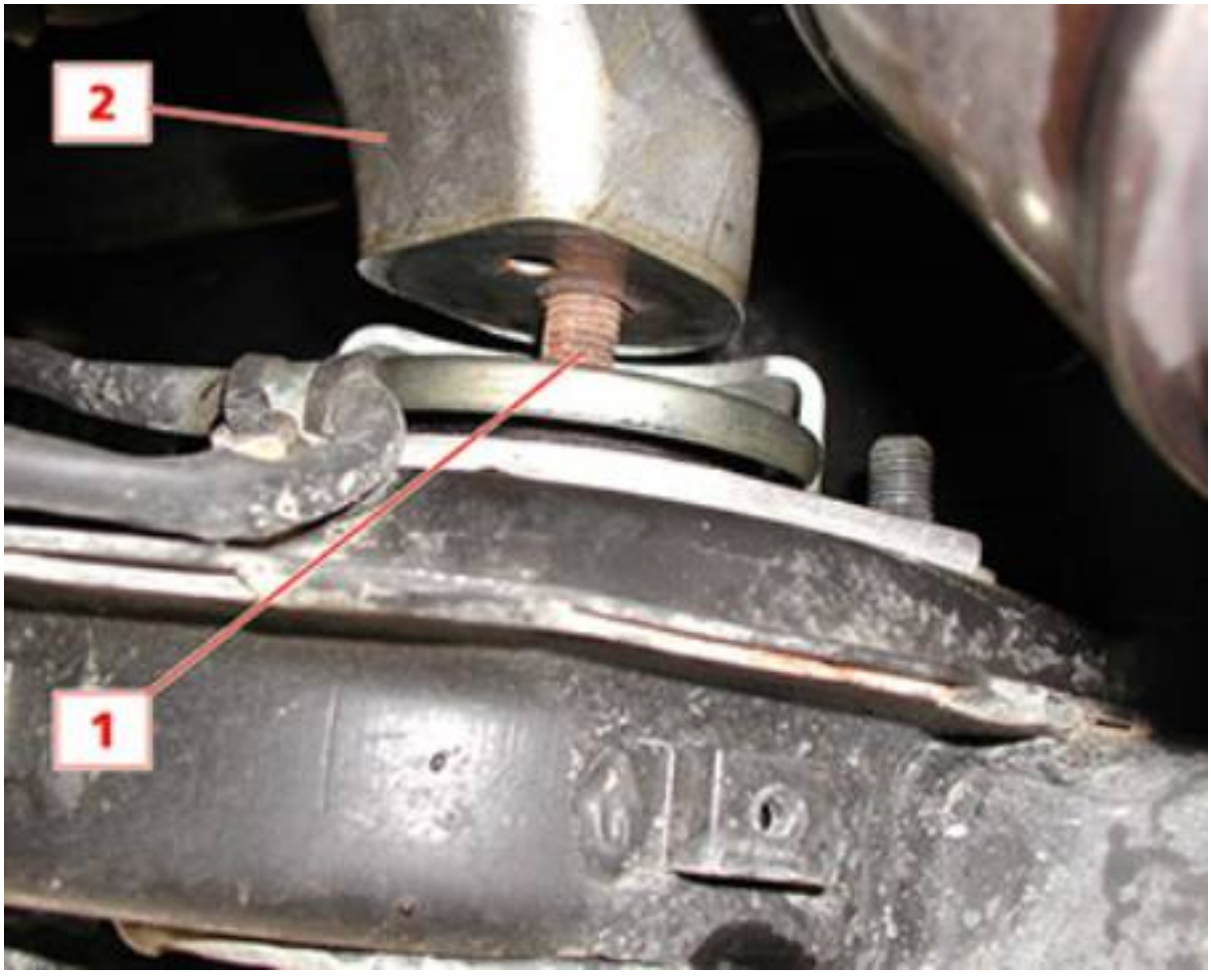
- Undo the screws that fasten the tank wiring to the bodywork.

- Undo the screws that fasten the tank wiring to the bodywork.



- Loosen the front screw that secures the engine frame to the bodywork.

- Working on the two hydraulic support devices previously positioned, slowly lower the engine frame and lift the engine until the threaded pin **(1)** of the rubber bushing is released from the rigid mount **(2)**.

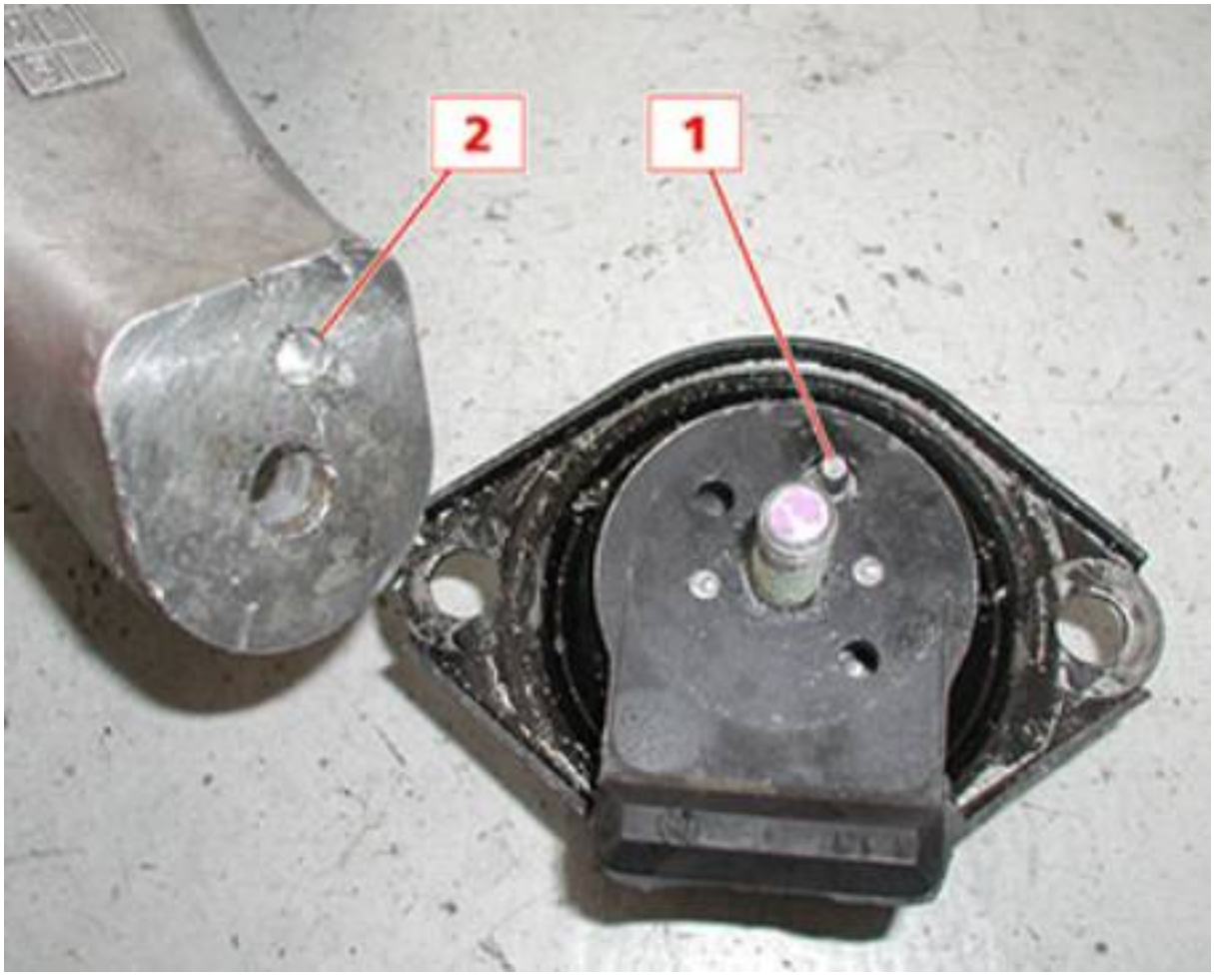


- Remove the relative rubber bushing.
- It is recommended to replace both rubber bushings if one of the two is cut or damaged.

Refitting

- Check that the component is in perfect working order and replace it if necessary.
- Fit the rubber bushing and tighten the two nuts that secure the rubber bushing to the engine frame to a torque of **50 Nm**.

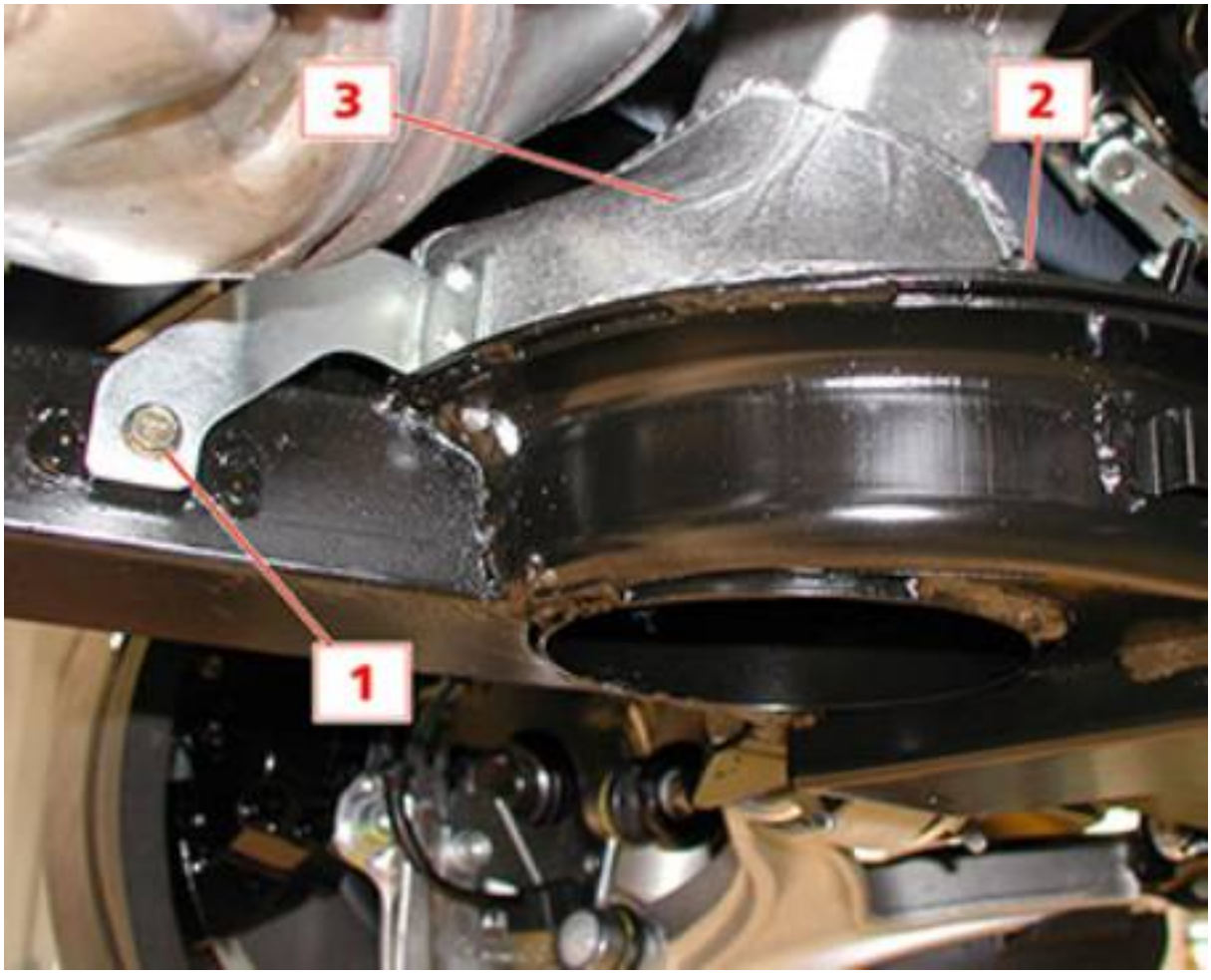
- When refitting the rubber bushing, be careful with its orientation on the frame.
- Fit the rubber bushing in such a way that the pin **(1)** can be coupled to the hole **(2)** on the engine mount.



- After fitting the new rubber bushings, it is recommended to clean the contact surface between the engine frame and the bodywork, in order to prevent infiltration of foreign bodies which may affect proper positioning.
- Working on the hydraulic support devices, lift the engine frame and screw in the screws that secure the frame to the bodywork without tightening them.
- Remove the hydraulic support device of the engine/gearbox assembly.
- Tighten all the screws that secure the frame to the bodywork to a torque of **123 Nm** .

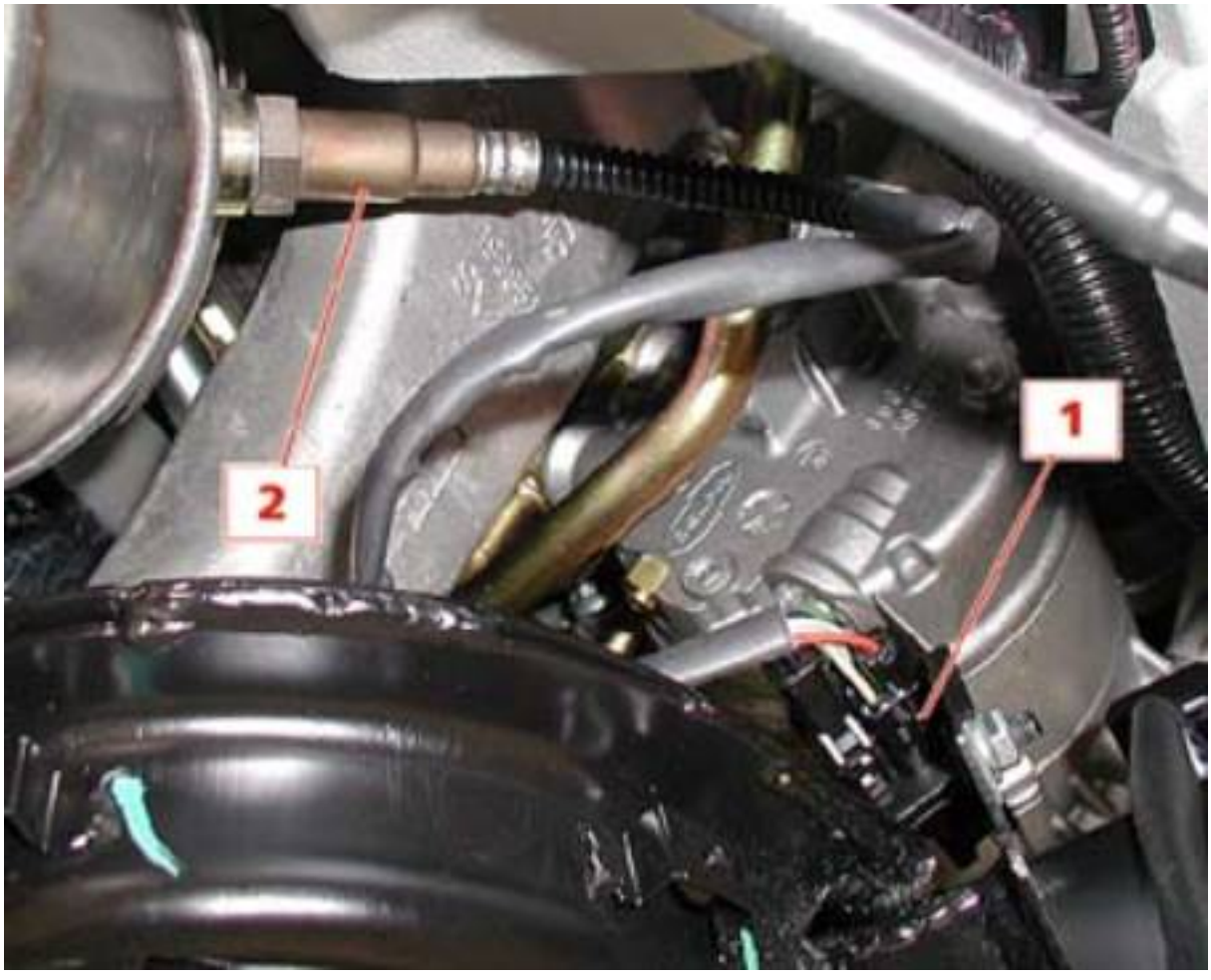
N.B.
Replace the screws that fasten the frame to the bodywork with new screws.

- Remove the hydraulic support device from the frame.
- For versions equipped with a heat guard, screw in the screw **(1)** and the nut **(2)** of the rubber bushing heat guard **(3)** .



- Connect the electrical connector, screw in the screws for clamps that fasten the oxygen sensor wiring **(1),** then tighten the upper right-hand oxygen sensor **(2)** to a torque of **50 Nm.**

- Connect the electrical connector **(1),**, screw in the screws for the oxygen sensor, then tighten the upper left-hand oxygen sensor **(2)** to a torque of **50 Nm.**



- Partially lower the hoist.
- Tighten the bolt that fastens the shock absorber to the lower wishbone (lever) to a torque of **78 Nm**.

- Lower the hoist.
- Fit the air flow meter.
- Tighten the nut that fastens the rigid mount to the rubber bushing of the engine to a torque of **120 Nm**. Perform this operation on both rubber bushings.
- Tighten the two screws that secure the radiator to the front frame to torque.
- Tighten the lower screw that secures the windscreen washer/headlight washer fluid tank to the front frame to torque.
- Tighten the screws that fasten the engine oil tank to the frame to a torque of **25 Nm**.

- Fit the two metal protection shields of the oil radiator and the windscreen washer tank on both sides.
- Fit the wheelhouse guards (both sides of the vehicle).
- Tighten the screw that fastens the steering column and steering box to a torque of **25 Nm**.

- Fit the front wheels.

Replacing the wheels

- Fit the engine floor guard.

Engine floor guard

- Fully tighten the three fastening screws on the engine compartment fuse box.

- Fully tighten the two fastening screws on the engine compartment fuse box.

- Fit the fuse box cover and rotate the plastic screws by 90°.

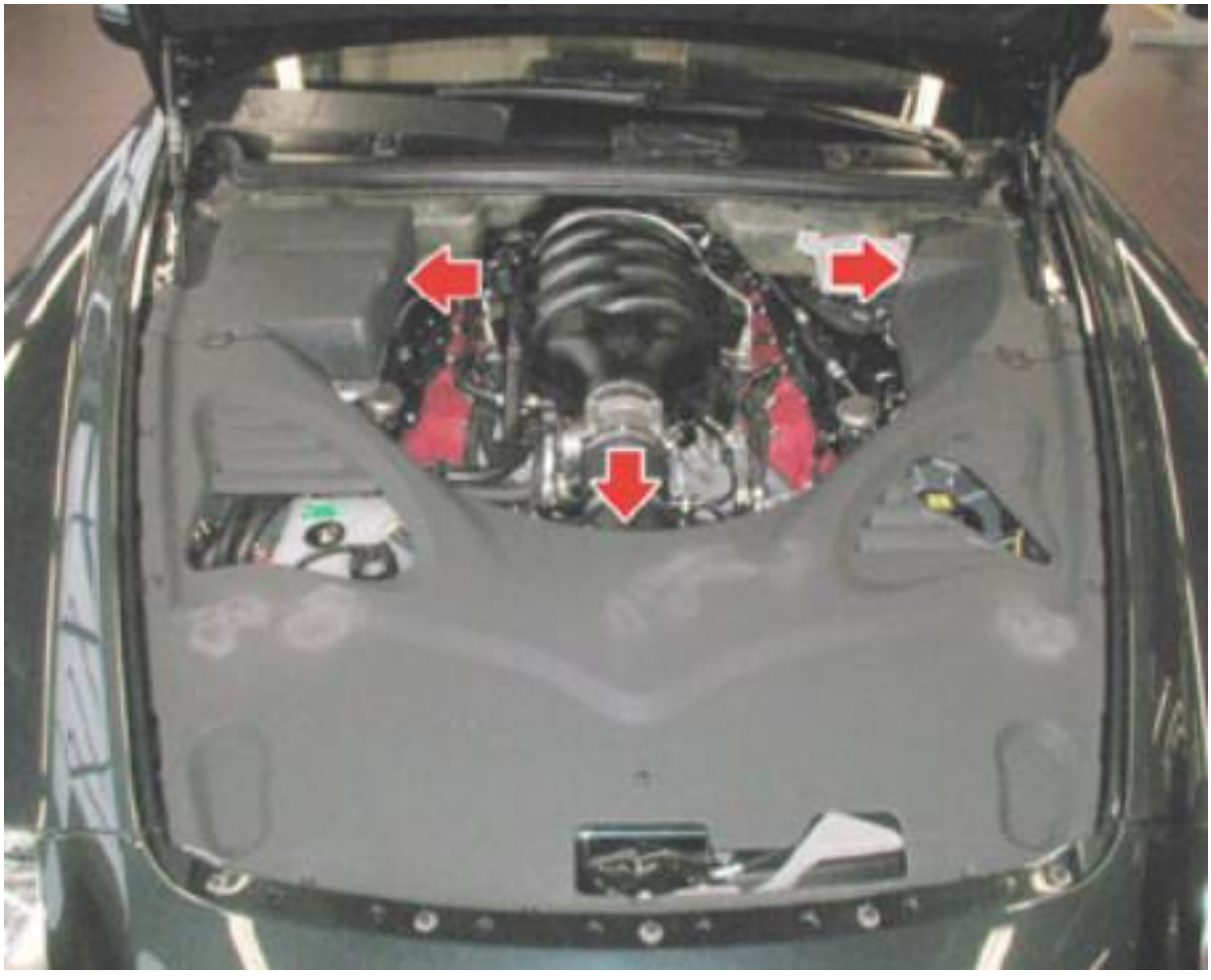
- Fit the trim panels on the engine compartment.
- After connecting the battery’s negative terminal, the following self-learning operations must be performed in order to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Left-hand side engine mount

Removal

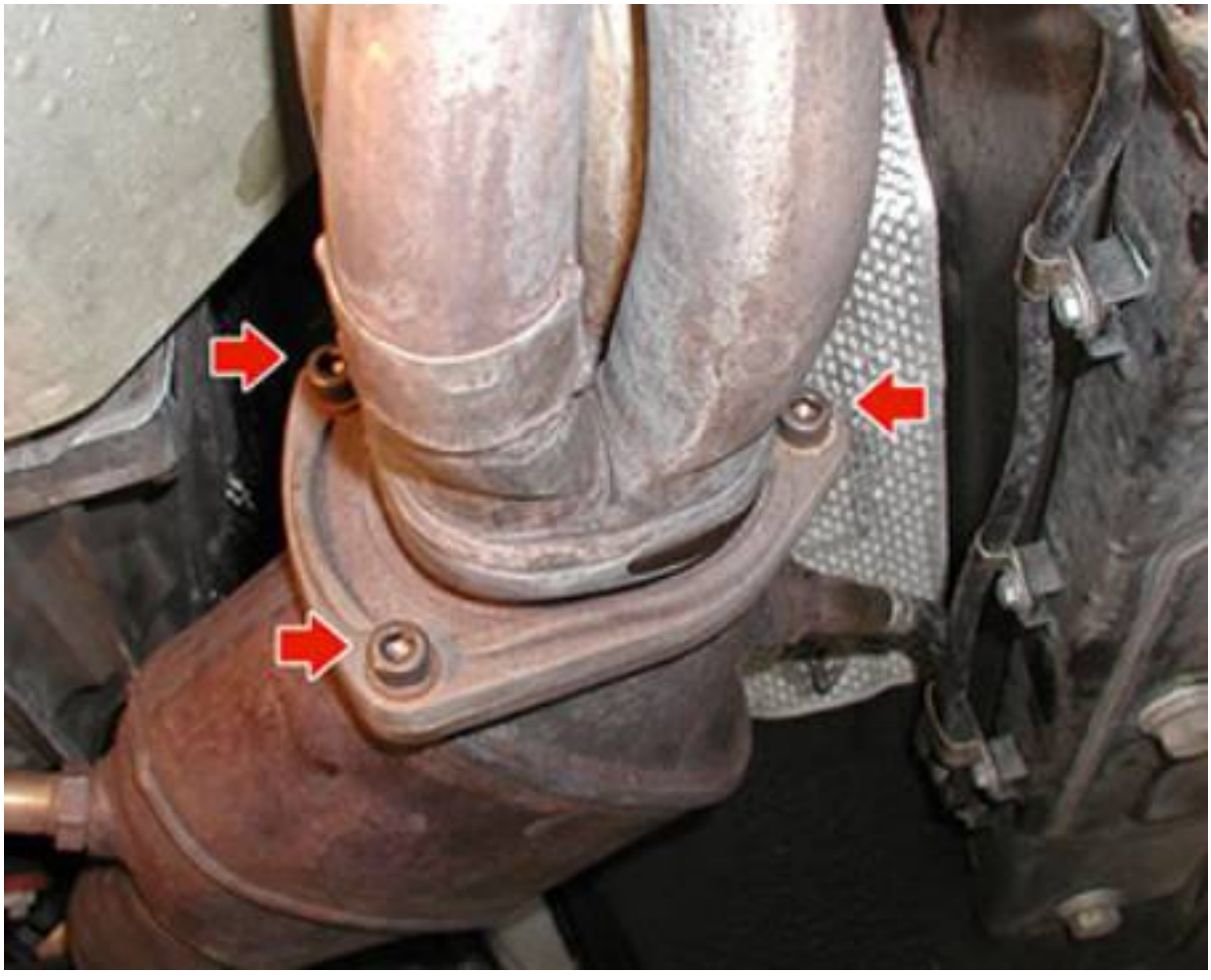
- Place the vehicle on the hoist.
- Remove the trim panels.



- Remove the floor guard beneath the engine.

Engine floor guard

- Undo the screws securing the catalytic converter to the exhaust manifold.



- Open the clamp and free the hydraulic steering system line.

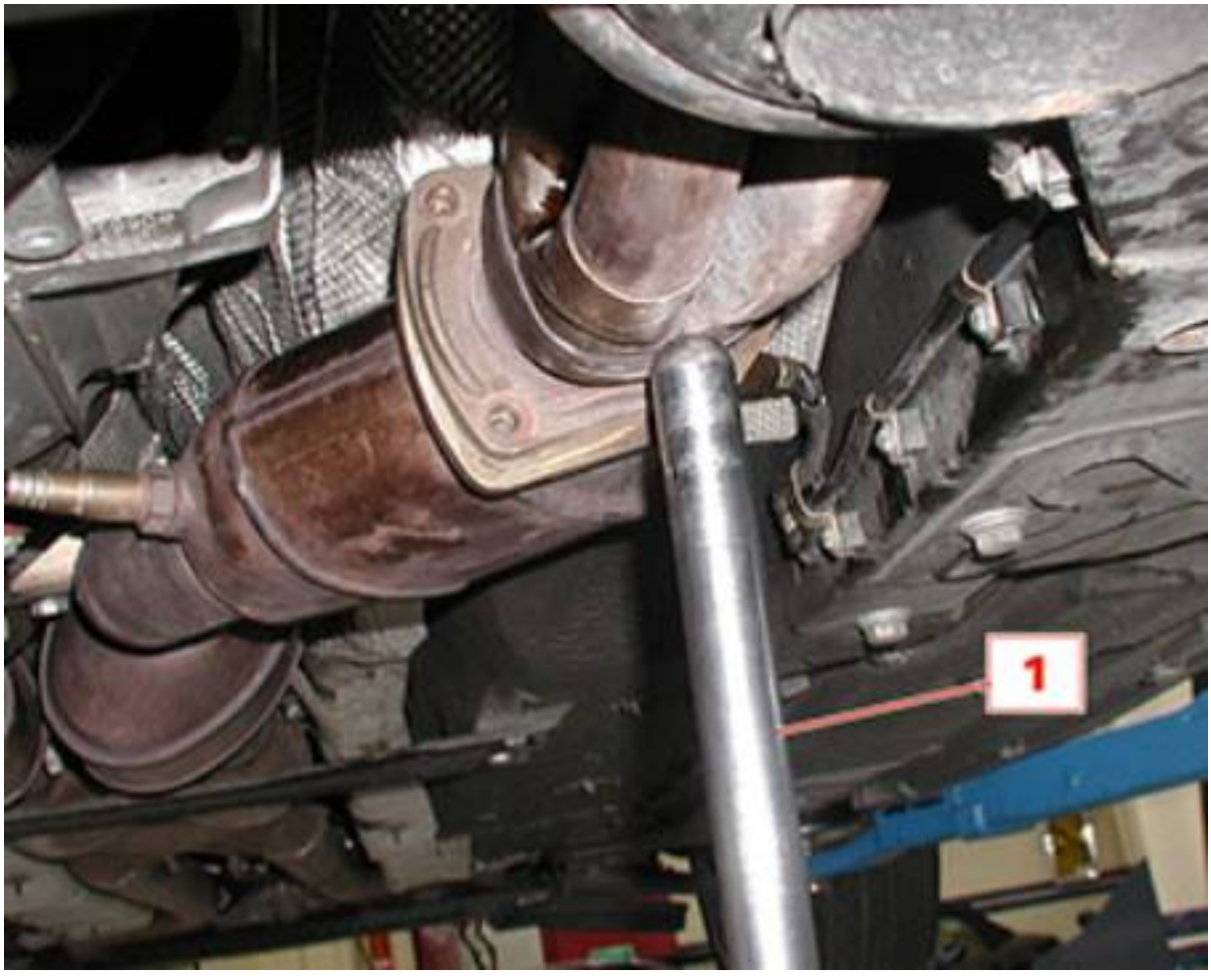
- Remove the starter motor.

Starter motor

- Unscrew the nut that secures the mount to the dowel block.

N.B.
As this operation is difficult to carry out from the lower part of the vehicle, we recommend you perform it working from the upper part of the engine compartment, accessing the nut with a long wrench and a suitable bushing.

- Place a hydraulic supporting and lifting device **(1)** under the engine so as to work in safety.



- Undo the screws that secure the RH engine mount to the crankcase.

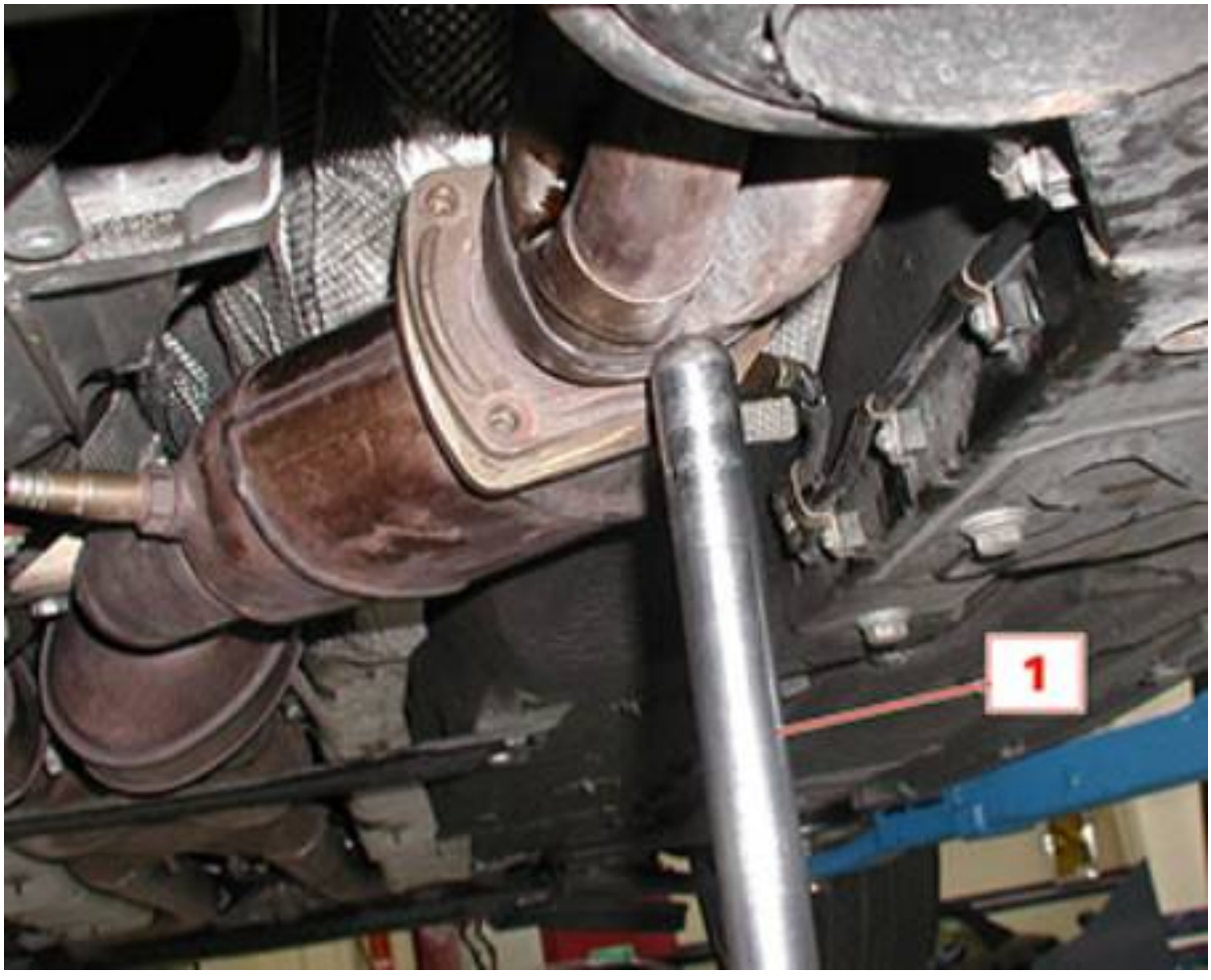
- All the retaining screws are easily accessible and a there is no need to use any special wrench.

- Remove the LH engine mount.

Refitting

- Check that the component is intact.
- Fit the engine mount in its seat and tighten the retaining screws on the crankcase to a torque of **45 Nm**.
- Tighten the nut fastening the mount to the dowel block to a torque of **120 Nm**.

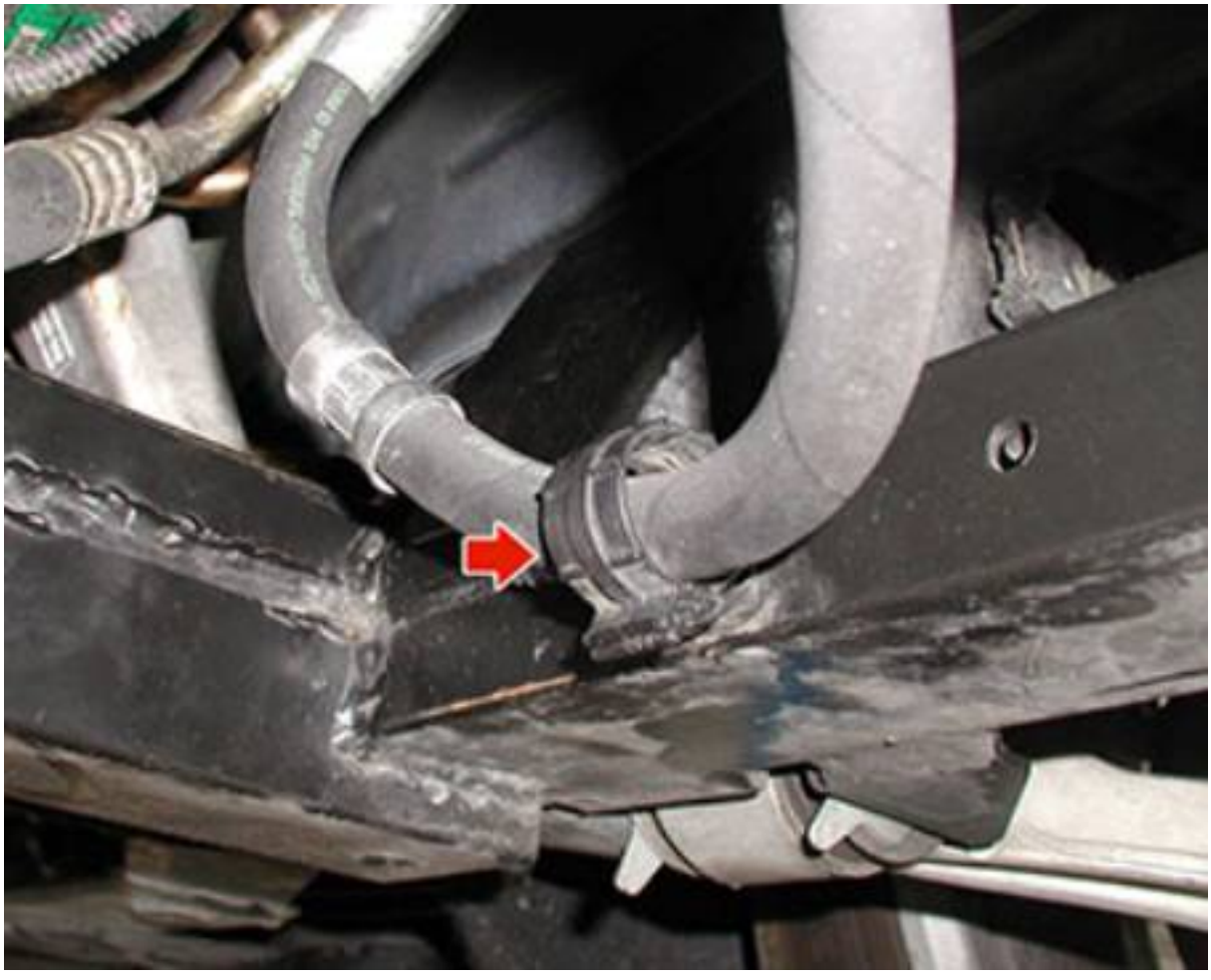
- Remove the hydraulic supporting and lifting device **(1)** positioned previously from under the engine.



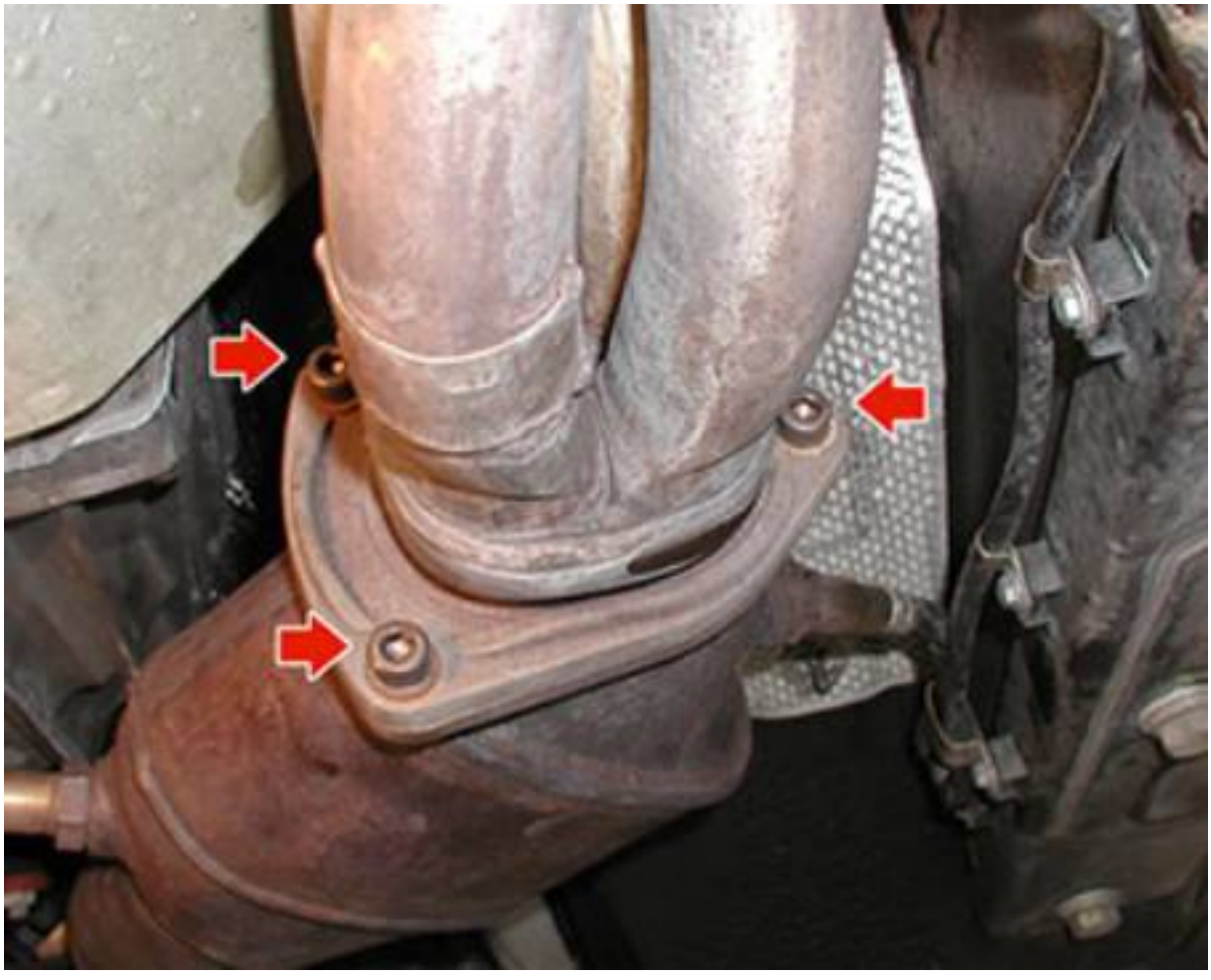
- Fit the starter motor.

Starter motor

- Secure the hydraulic steering system using the specific clamp.



- Tighten the screws fastening the exhaust manifold to the catalytic converter to a torque of **25 Nm**.



- Fit the engine floor guard.

Engine floor guard

- Fit the trim panels.
- Remove the vehicle from the hoist.

Rubber bushing on the left-hand side of the engine

Removal

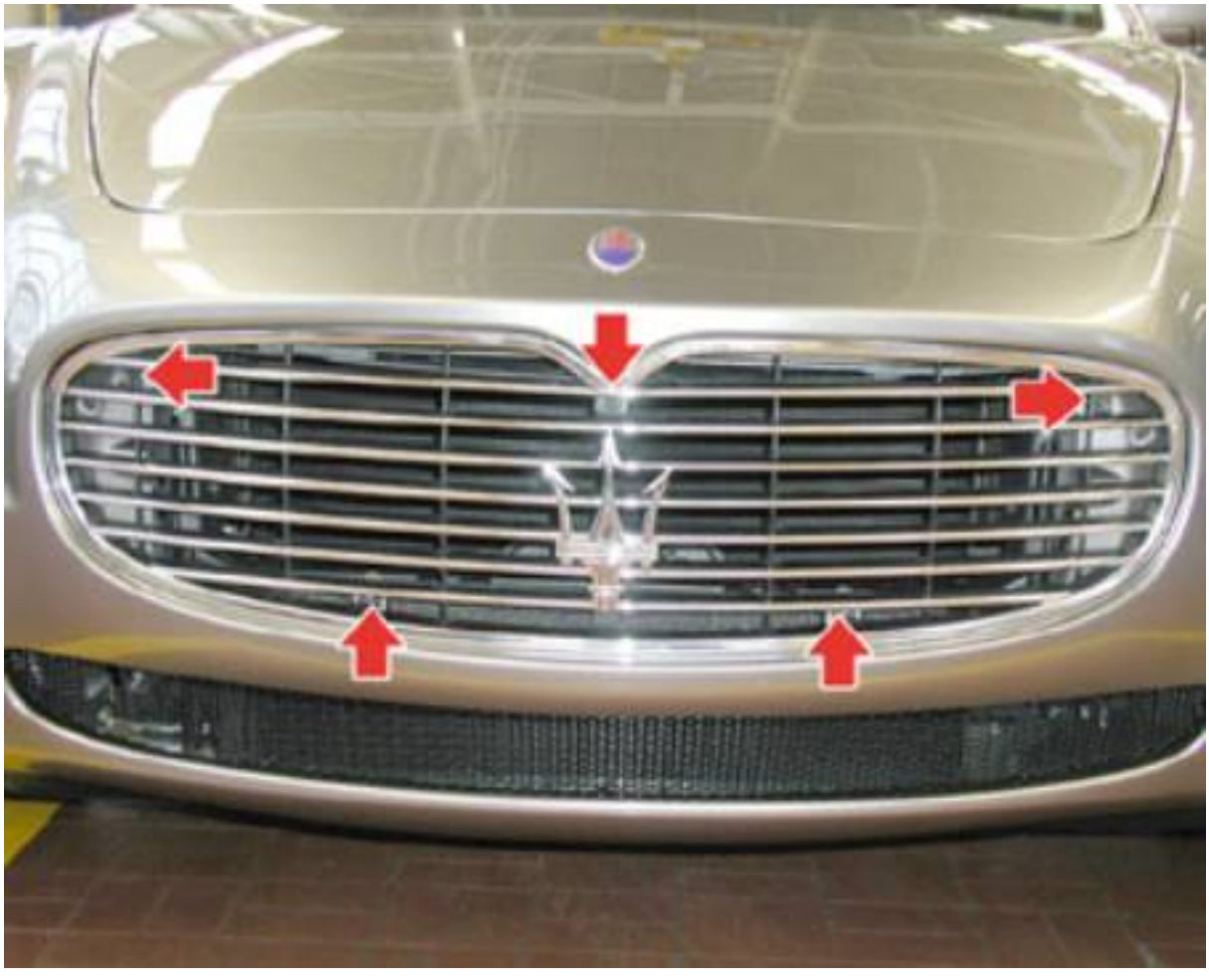
- To remove the rubber bushing on the left-hand side of the engine, follow the same procedure as described for the right-hand side rubber bushing.

Rubber bushing on the right-hand side of the engine

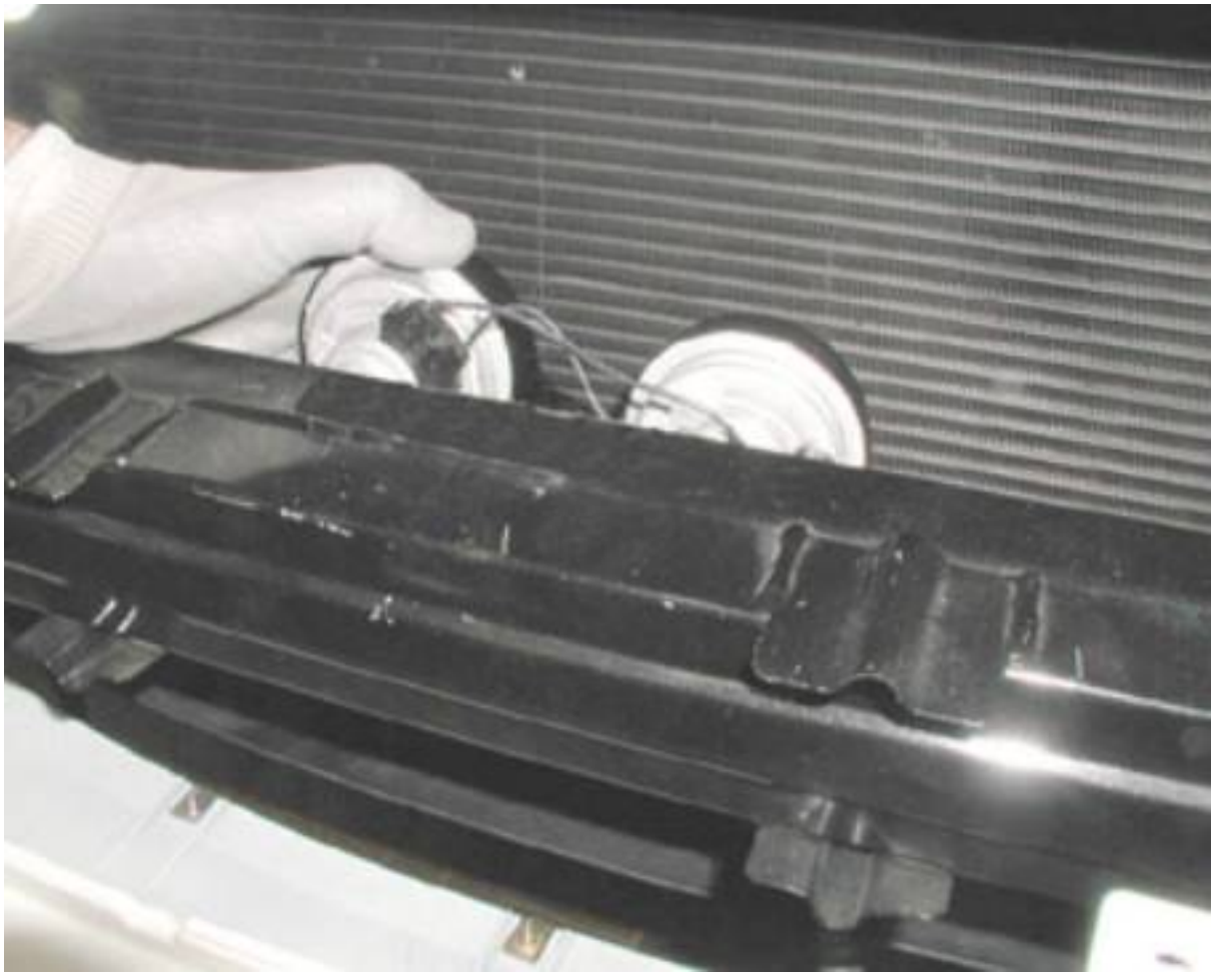
RADIATORS

Removing the radiators

- Place the vehicle on the hoist.
- After undoing the five fastening screws, remove the front grille.



- Unscrew the fastening on the buzzers, detach the electrical connections and then remove the buzzers.



- Bleed the air conditioning system using the specific tool connected to the system's valves.

- Remove the floor guard beneath the engine

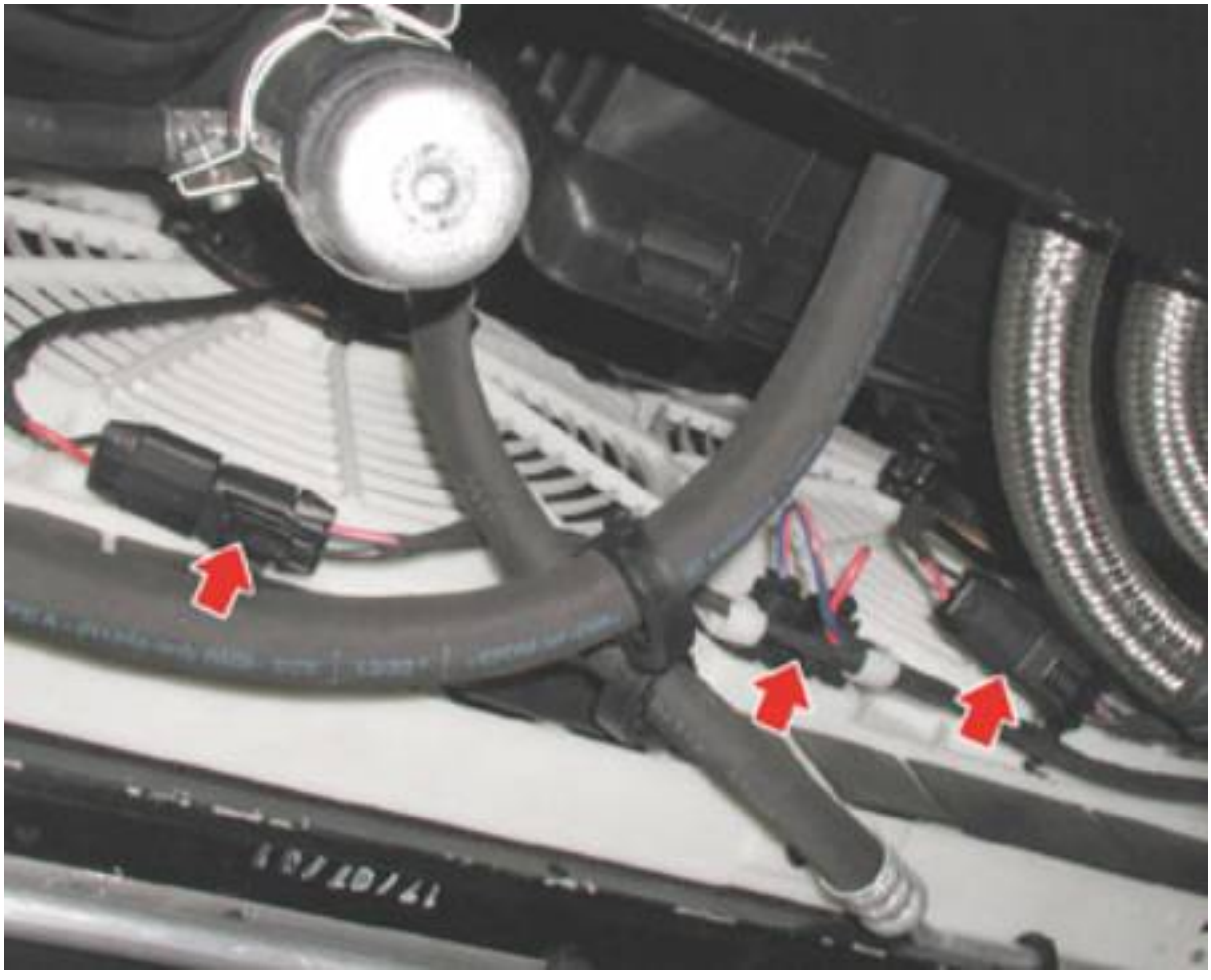
Removing-refitting the engine floor guard

- Undo the screw fastening the air conditioning system pipe to the dehydrator filter.

- Drain the system by unscrewing the relative plug.

- Undo the screw fastening the air conditioning system pipe to the cooling coil.

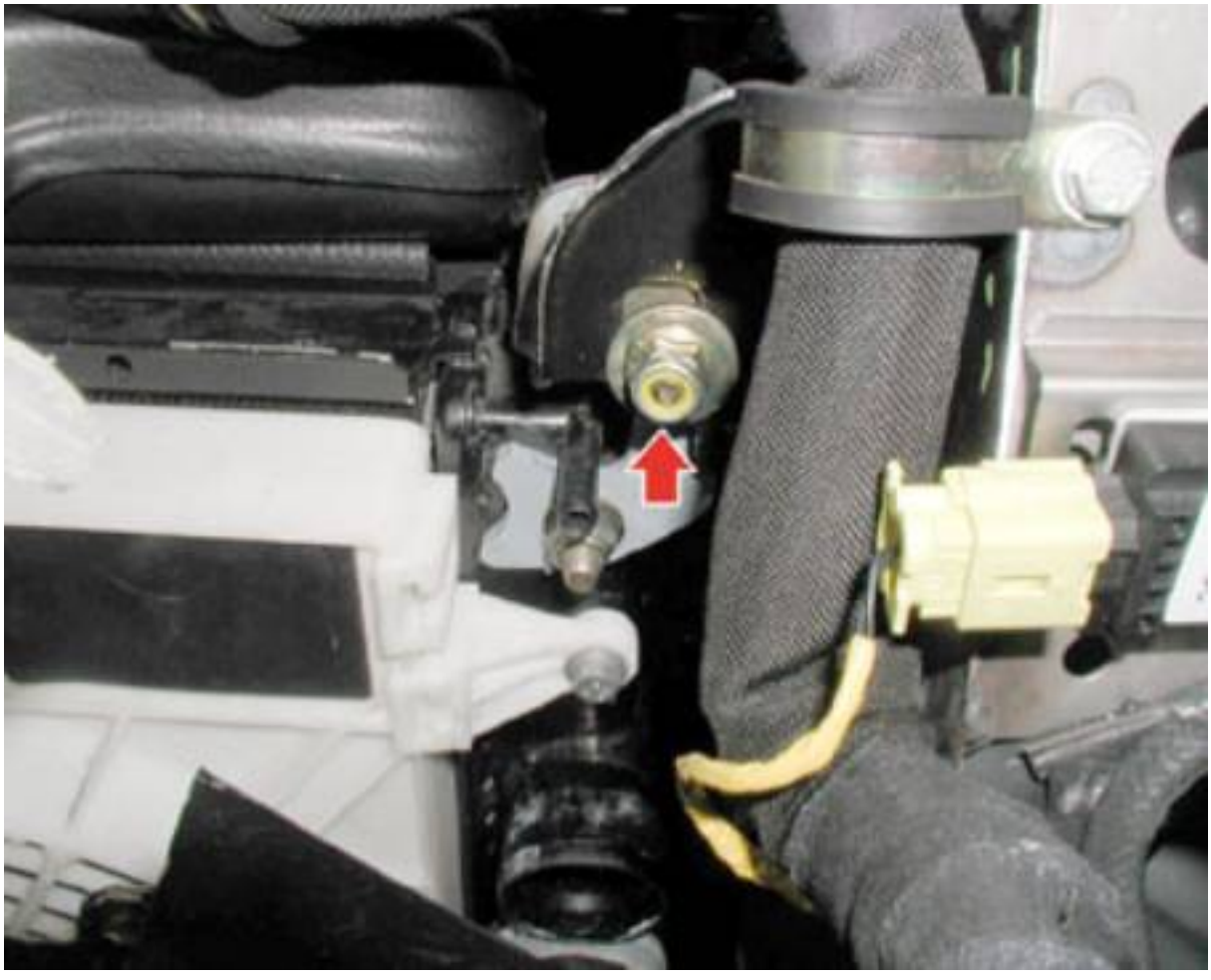
- Detach the two cooling system fan connectors and the fan speed adjustment sensor.



- Disengage the pipe connecting the expansion tank and the radiator.

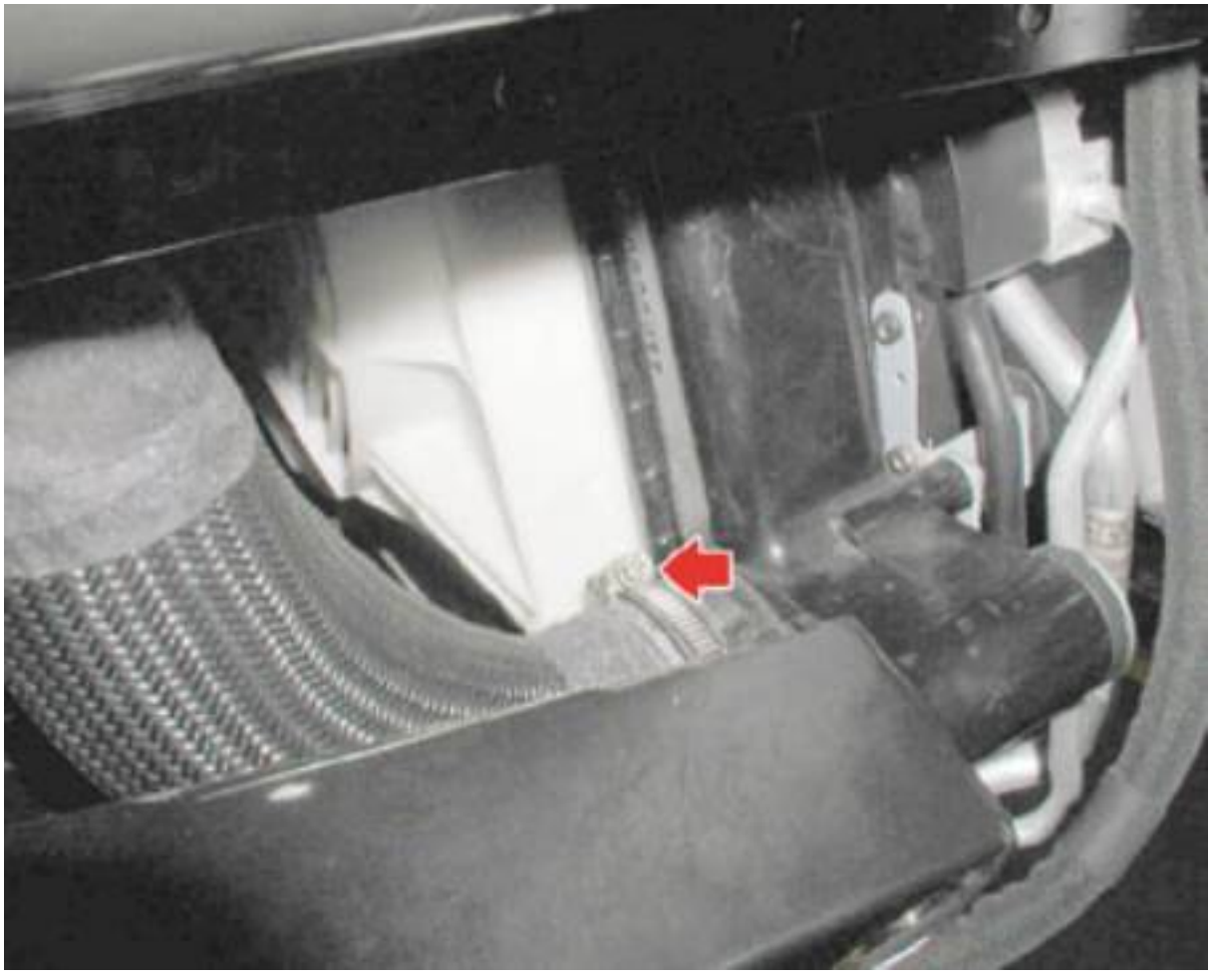
- Undo the screw fastening the expansion tank.

- Unscrew the two upper radiator fastening nuts.

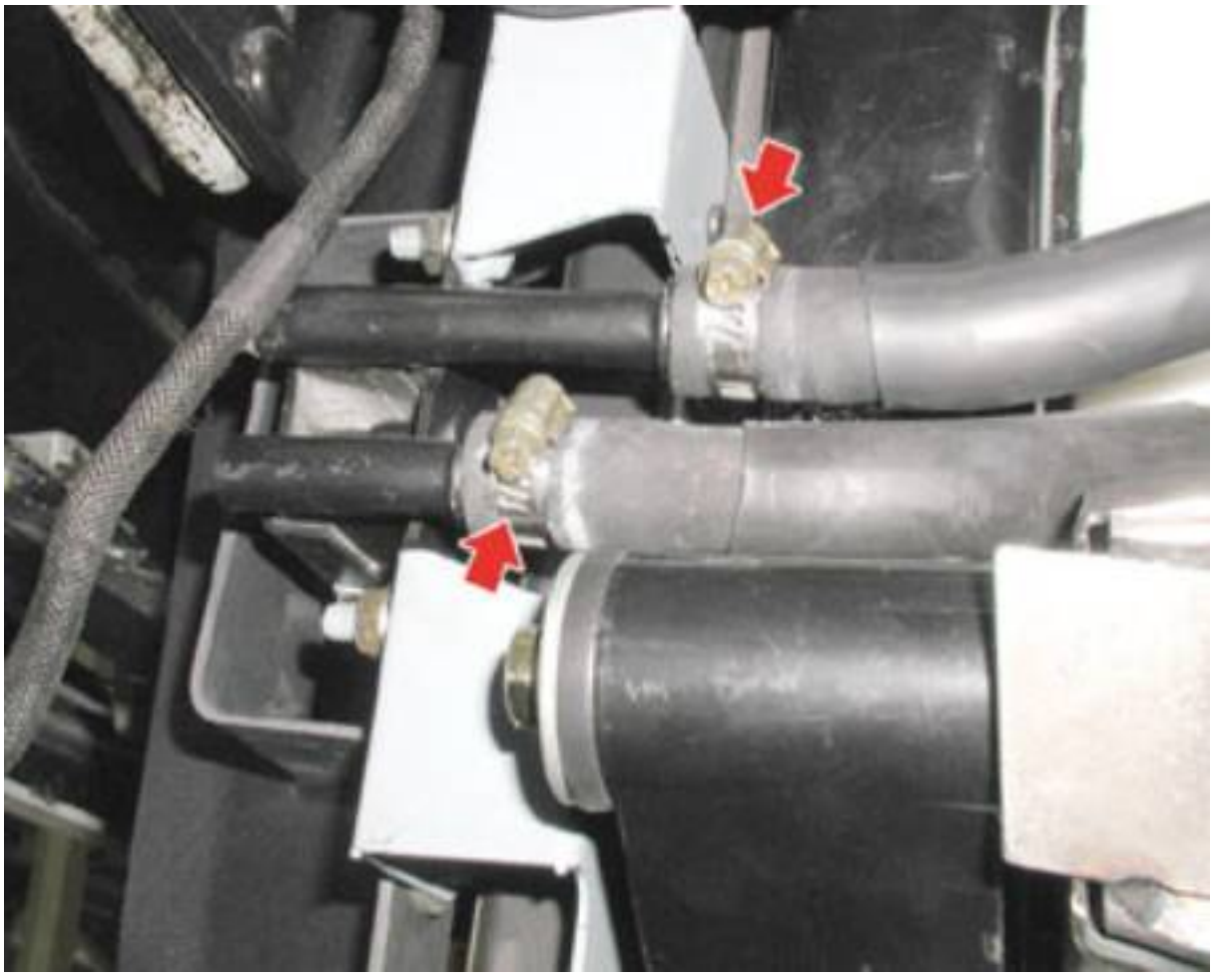


- Loosen the clamp fastening the upper sleeve then disengage it.

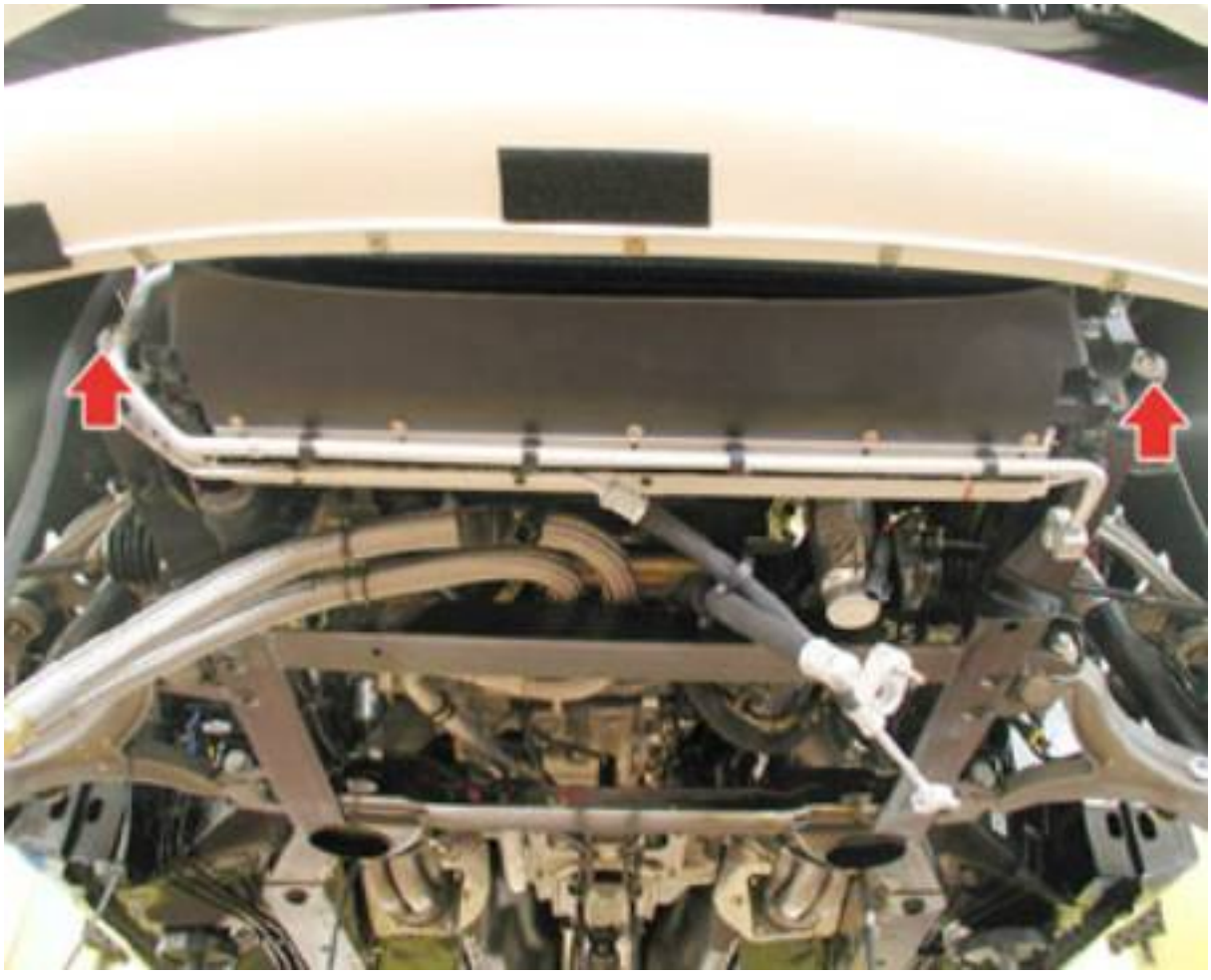
- Loosen the clamp fastening the lower sleeve, then disengage it.



- Loosen the clamp fastening the hydraulic steering pipes, then disengage them, making sure you recover the liquid.

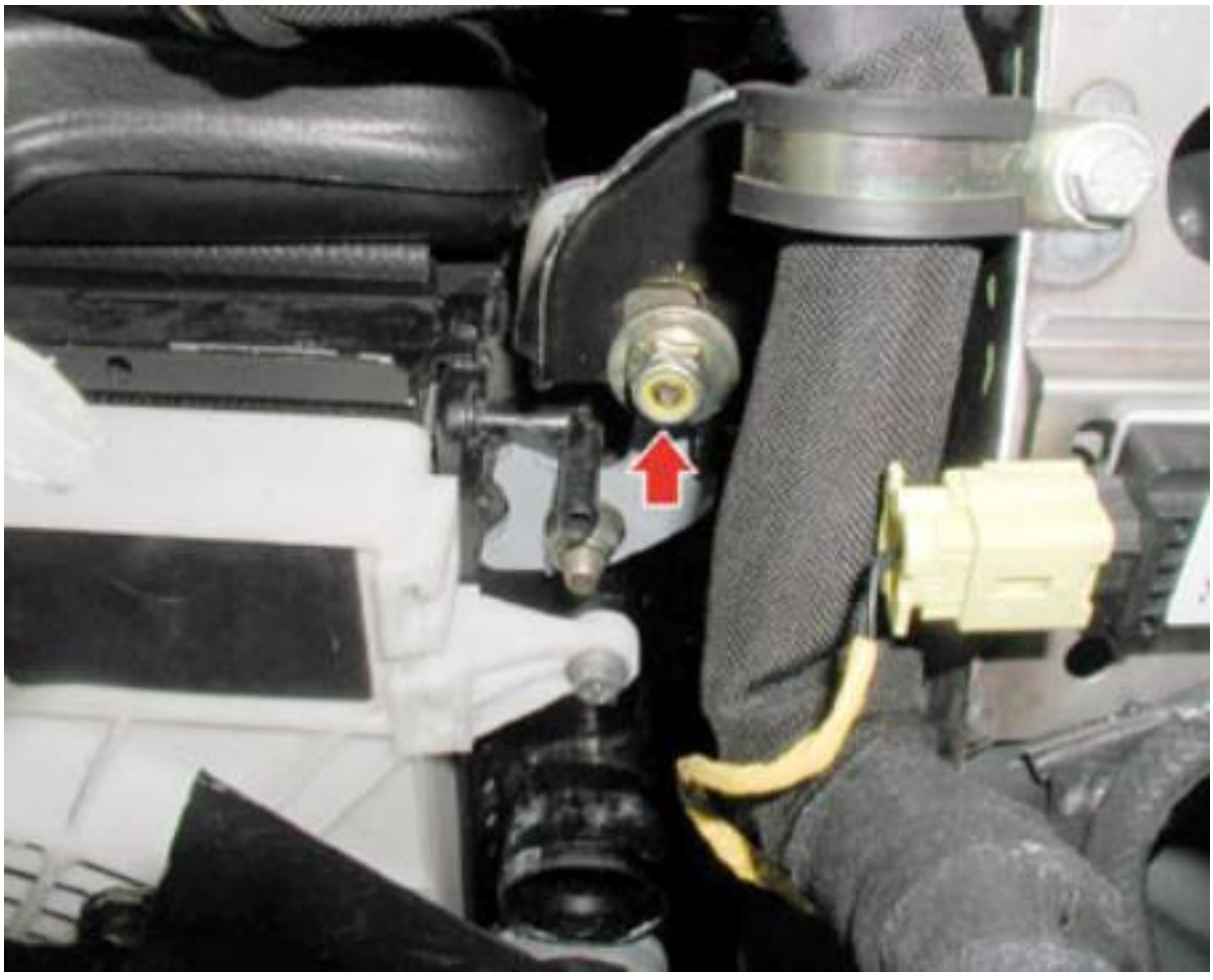


- Undo the two lower radiator fastening screws then remove them by sliding them out from the bottom.



Refitting the radiators

- Fit the radiator- electric fan-condenser assembly and tighten the lower fastening screws.
- Connect the two hydraulic steering oil connection lines with the cooling system coil.
- Connect the lower and upper unions to the radiator.
- Tighten the upper fastening nuts on the radiator to a torque of **24 Nm**.



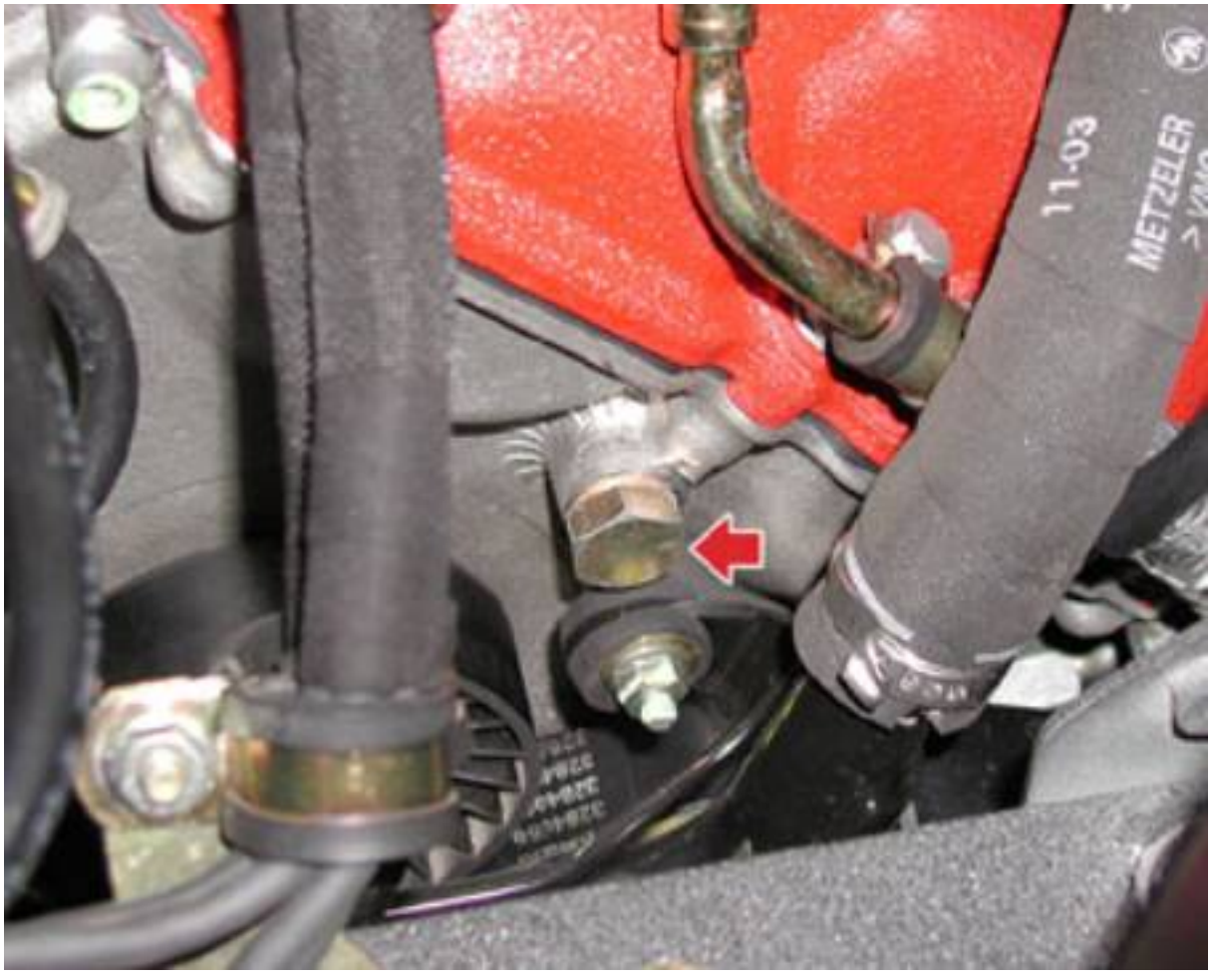
- Fit the engine coolant tank and tighten the fastening screw, then connect the pipe between the tank and the radiator
- Connect the two cooling system fan connectors and the fan speed adjustment sensor.
- Screw up the screw fastening the air conditioning system line to the cooling coil.
- Screw up the screw fastening the air conditioning system line to the dehydrator filter.
- Fit the horns and attach the electric connections.
- Fit the front grille and tighten the fastening screws.

- Connect the equipment used to fill the R134a fluid and run a vacuum cycle to remove all R134a residues or air that has entered. Upon completion of the vacuum cycle, proceed by filling the air conditioning system.

- Connect the battery's negative terminal.
- Open the engine coolant tank cap and pour in the fluid until it reaches the **MAX** notch marked on the tank.
- Working from inside the vehicle, set the maximum temperature (+32°C) for the air conditioning/ heating system manually, from both the driver's and passenger control panels.

N.B.
This operation allows the engine coolant to flow in and out the heating/air conditioning system.

- Start the engine, keeping it idling.
- Wait until the electric fans start up at least once (engine temperature approximately 90°C) and the air that comes out the vents in the passenger compartment is warm.
- During this stage, the level of the coolant contained in the tank could drop below the **MIN** notch, so top it up and keep it level with the **MAX** notch.
- If you are unable to release all the air in the system, open the two breather caps positioned on the two cylinder heads (figure below).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- Stop the engine.
- Check that the engine coolant is level with the MAX notch.
- Allow the engine to cool.
- Pour a suitable amount of oil into the hydraulic steering oil tank, until it reaches the MAX notch marked on the tank cap dipstick.
- The system is self-draining. Draining is carried out by turning the steering wheel as far as possible to the left, then to the right, doing this several times with the engine running and the vehicle stationary.
- Fit the trim panels on the engine compartment.

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

- Fit the engine floor guard

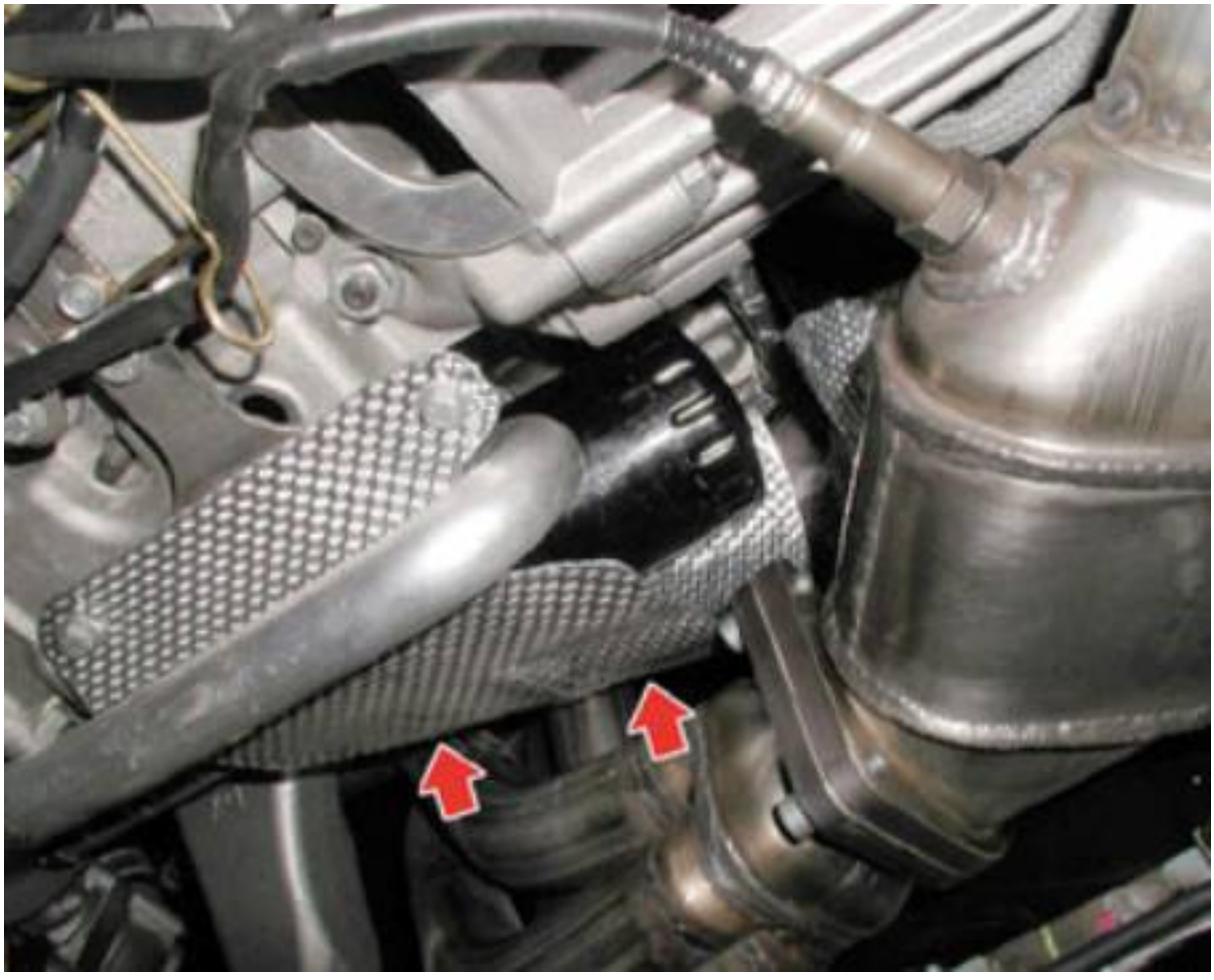
Removing-refitting the engine floor guard

OIL FILTER

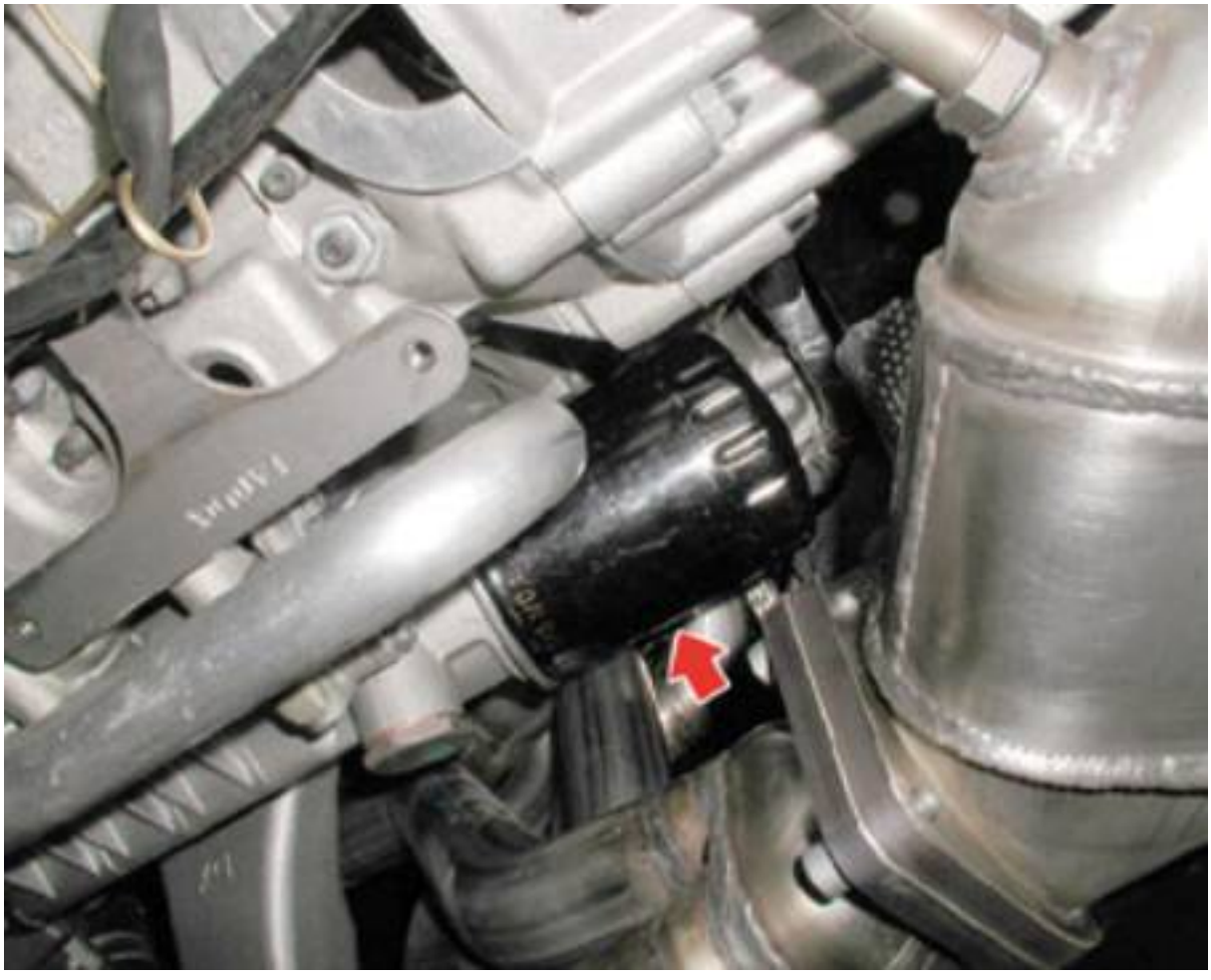
Detaching the oil filter

- Remove the cap and drain out the engine lubrication system oil.

- After undoing the three fastening screws, remove the guard.

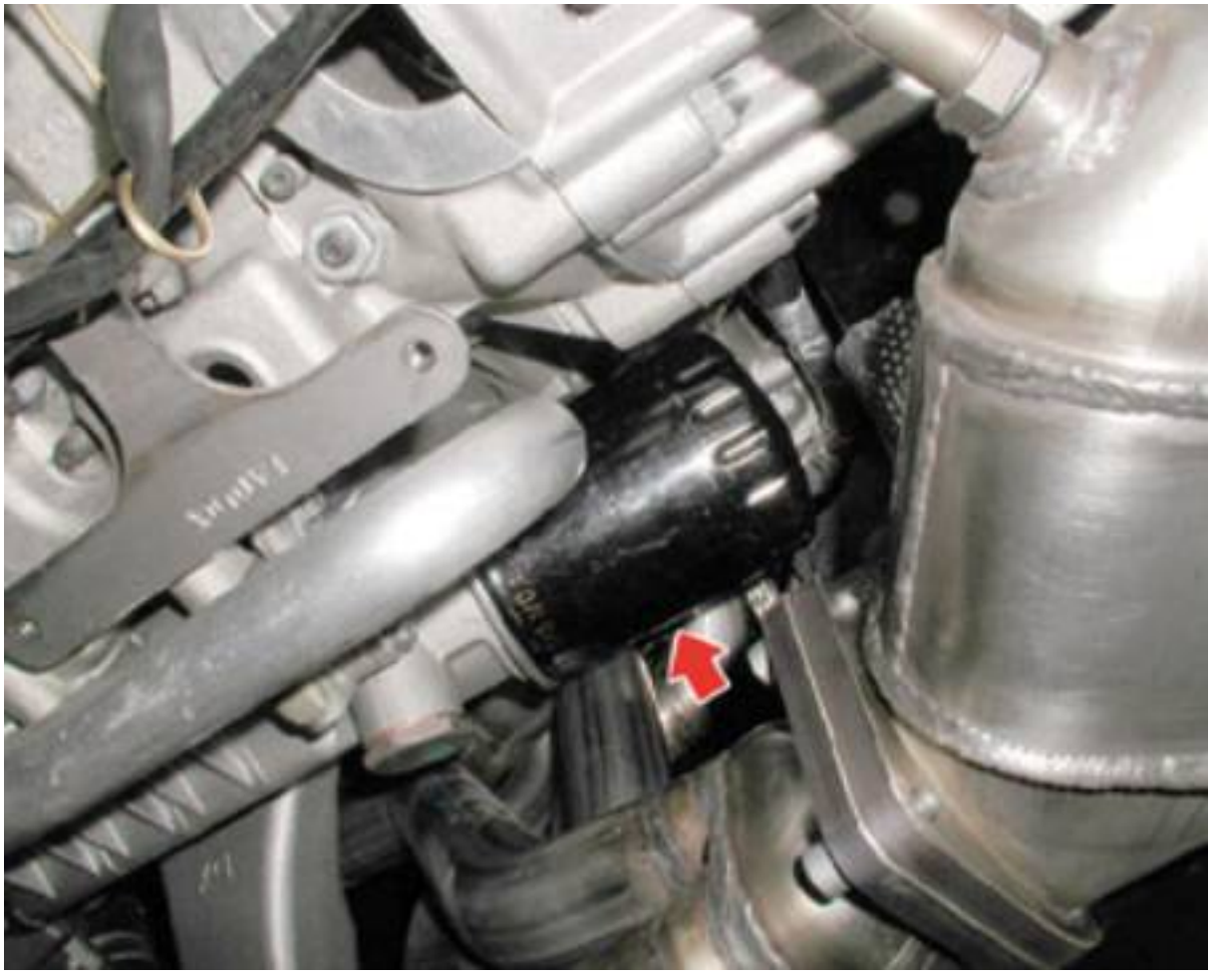


- Remove the oil filter using the relevant standard tool.



Refitting the oil filter

- Lubricate the oil filter surfaces using engine oil
- Fit the new oil filter, screwing it on manually.



- Fit the guard on the engine oil filter.
- Connect the battery's negative terminal.
- Fill the engine oil tank.

- Start the engine, keeping it idling.
- Wait for the electric fans to start up at least once (engine temperature approximately 90°C).
- Stop the engine.
- Check the engine oil level, then top it up to the **MAX** notch marked on the dipstick.
- Fit the trim panels on the engine compartment.

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

AIR FILTER

Removing-refitting the air filter

- Remove the trim guards.

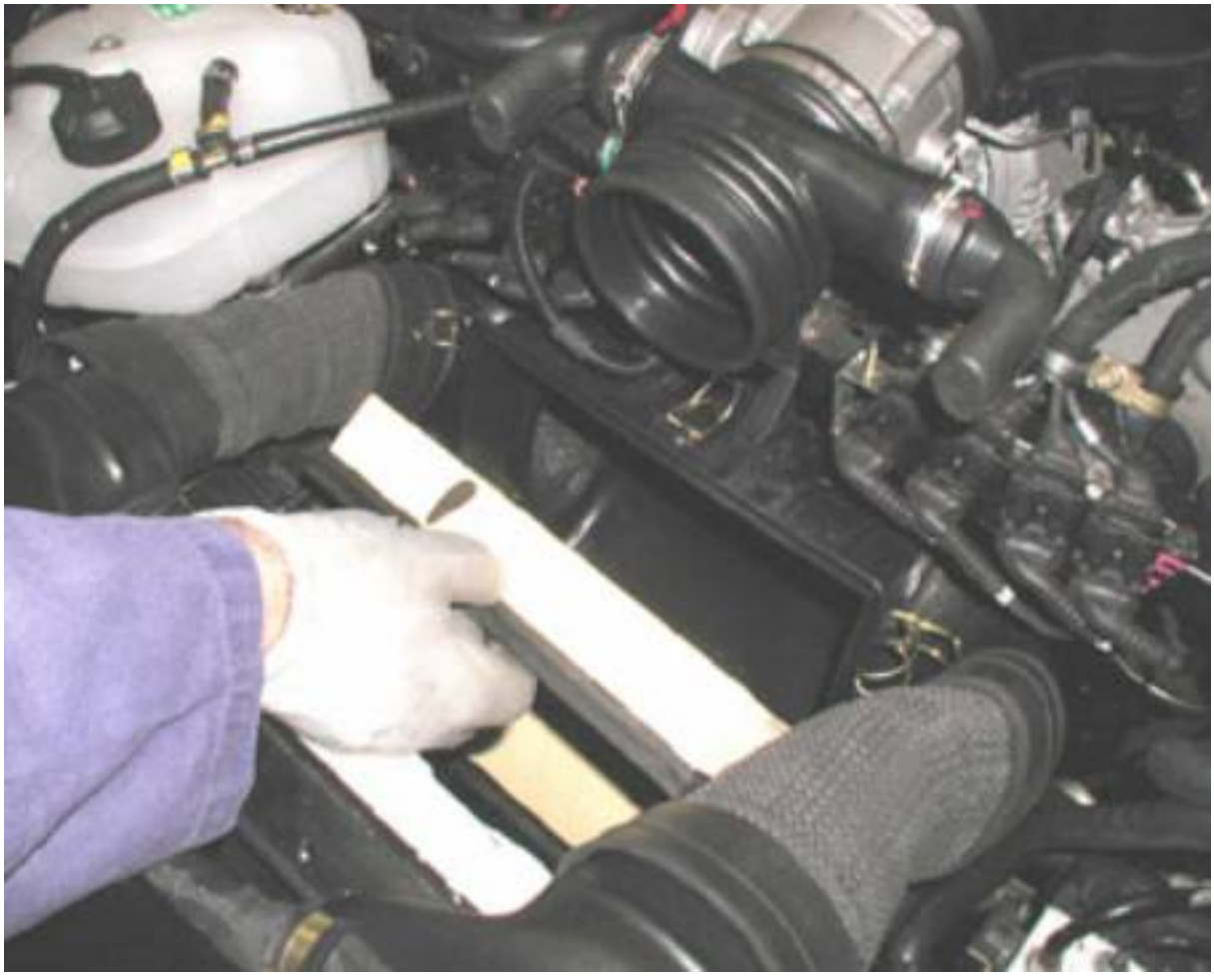
- Detach the air flow meter electrical connection.

- Undo the screw fastening the air filter housing to the domes' bar.

- Remove the retaining clamp and release the two clips, then remove the air flow meter.

- After releasing the five locking clips, detach the cover from the housing.

- Extract the air filter from the relative housing.



N.B.
Before refitting the new air filter, clean the relative housing carefully.

When refitting, follow the above procedures in reverse order

Water/engine oil pump

Removal

- Place the vehicle on the hoist.
- Remove the RH engine mount.

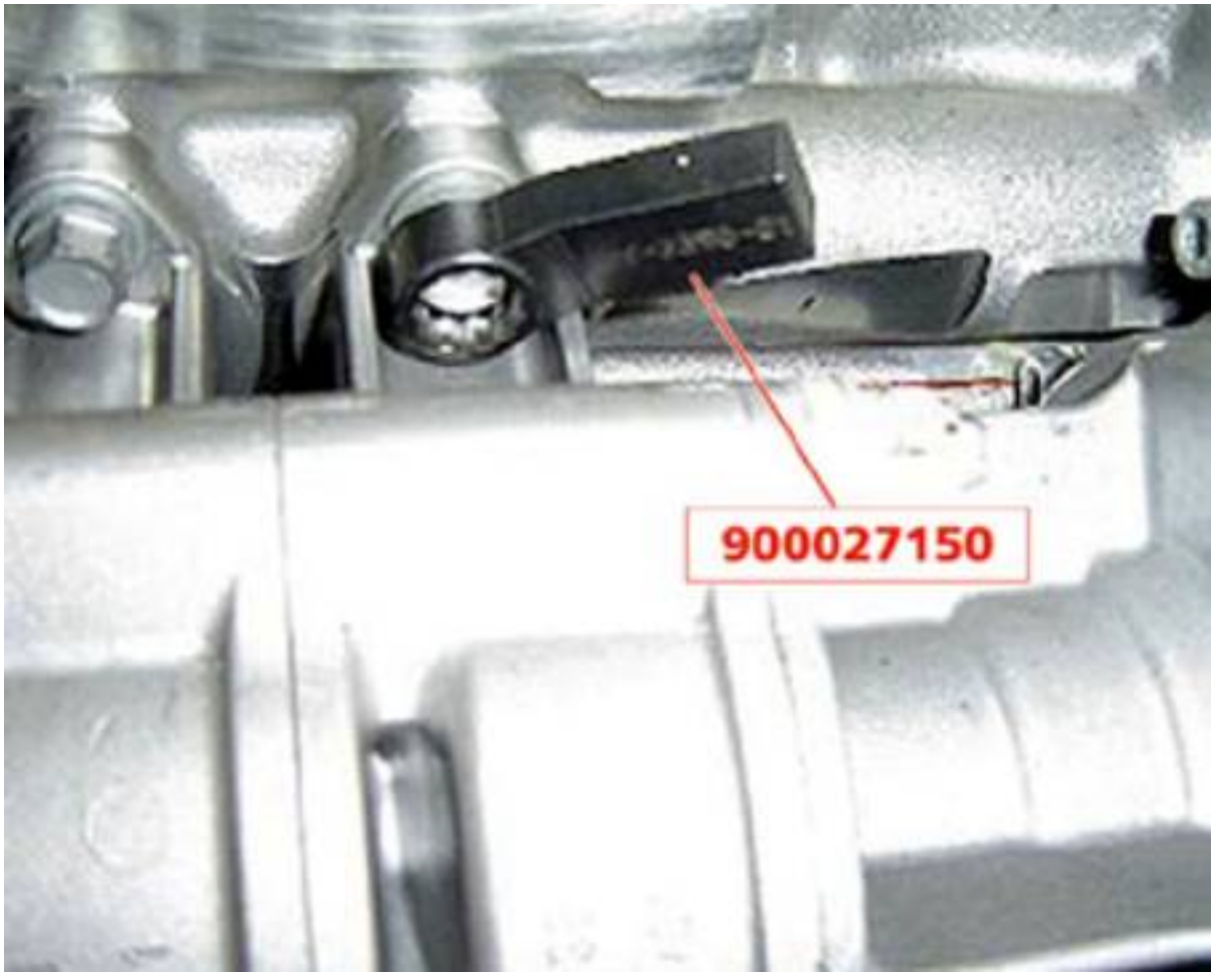
Right-hand side engine mount

- Drain the engine cooling system by unscrewing the relative cap.

- Undo the three retaining screws and detach the rigid union of the water pump line.

- Undo the screws that secure the water/oil pump to the engine crankcase and remove it.

- Use the specific tool **900027150** to undo the upper retaining screws**.**

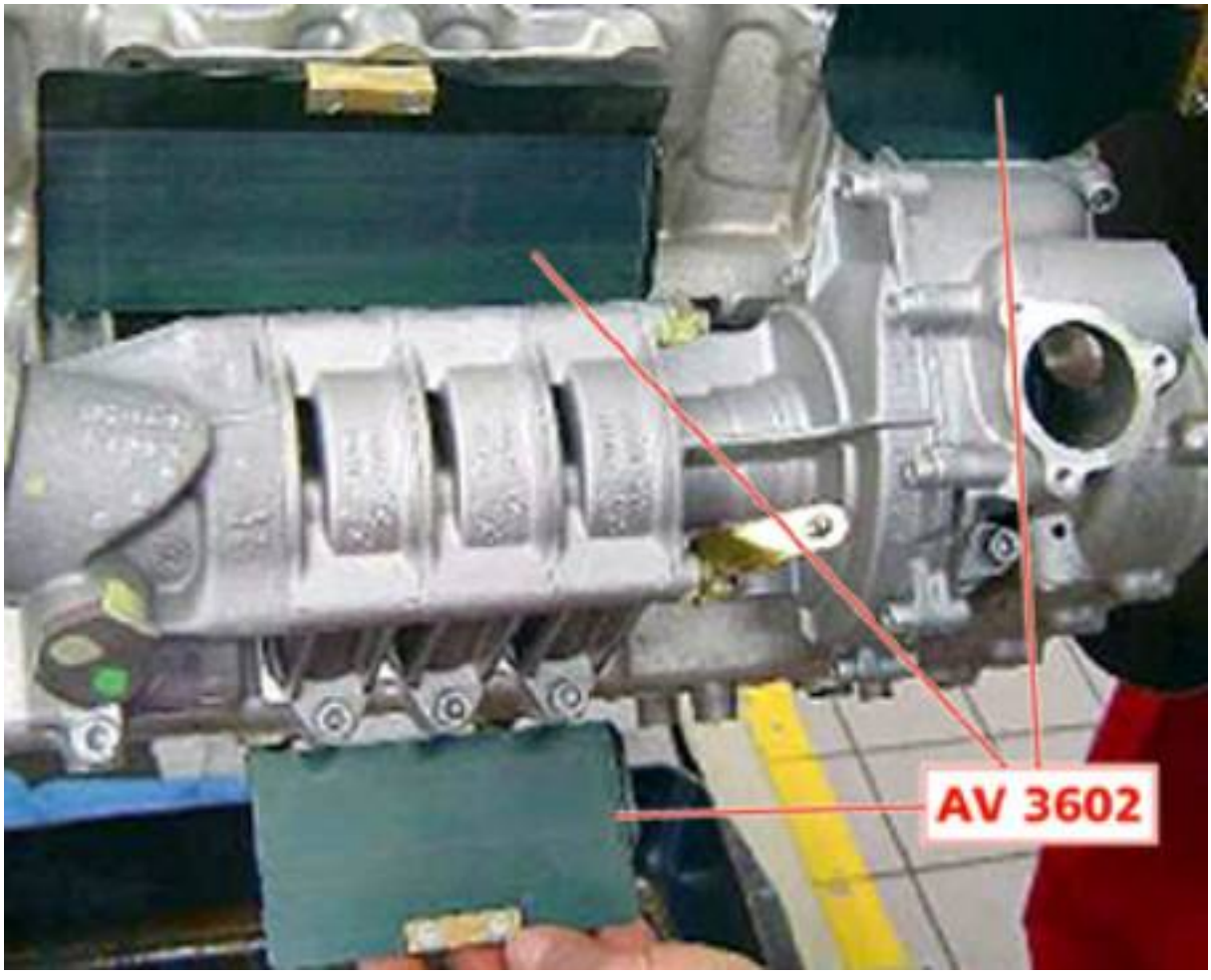


Refitting

- Check the oil-water pump to verify that there are no leakages from the draining holes.
- Check the groove on the oil/water pump shaft for wear.

N.B.
Always replace the pump OR.

- Lubricate the pump drive shaft with Molycote 1000 grease.
- Arrange the three O-Ring protection plates of tool **AV3602**.
- Fit the oil-water pump into its seat by inserting the shaft into the joint.
- Check that there are no signs of peeling of the O-rings in the area where the pumps join the crankcase. Fit the four M8x25 small headed screws to secure the unit to the crankcase, the two M8x65 screws to secure the pumps to the lower part of the crankcase and the three M8x25 screws to secure the pump to the crankcase, and at the same time remove the three plates **AV3602**.



- Tighten the pump retaining screws to a torque of **25 Nm**, using tool **900027150** for the upper retaining screws.

- Connect the rigid union of the water pump line tightening the three retaining screws.

N.B.
Always replace the gasket

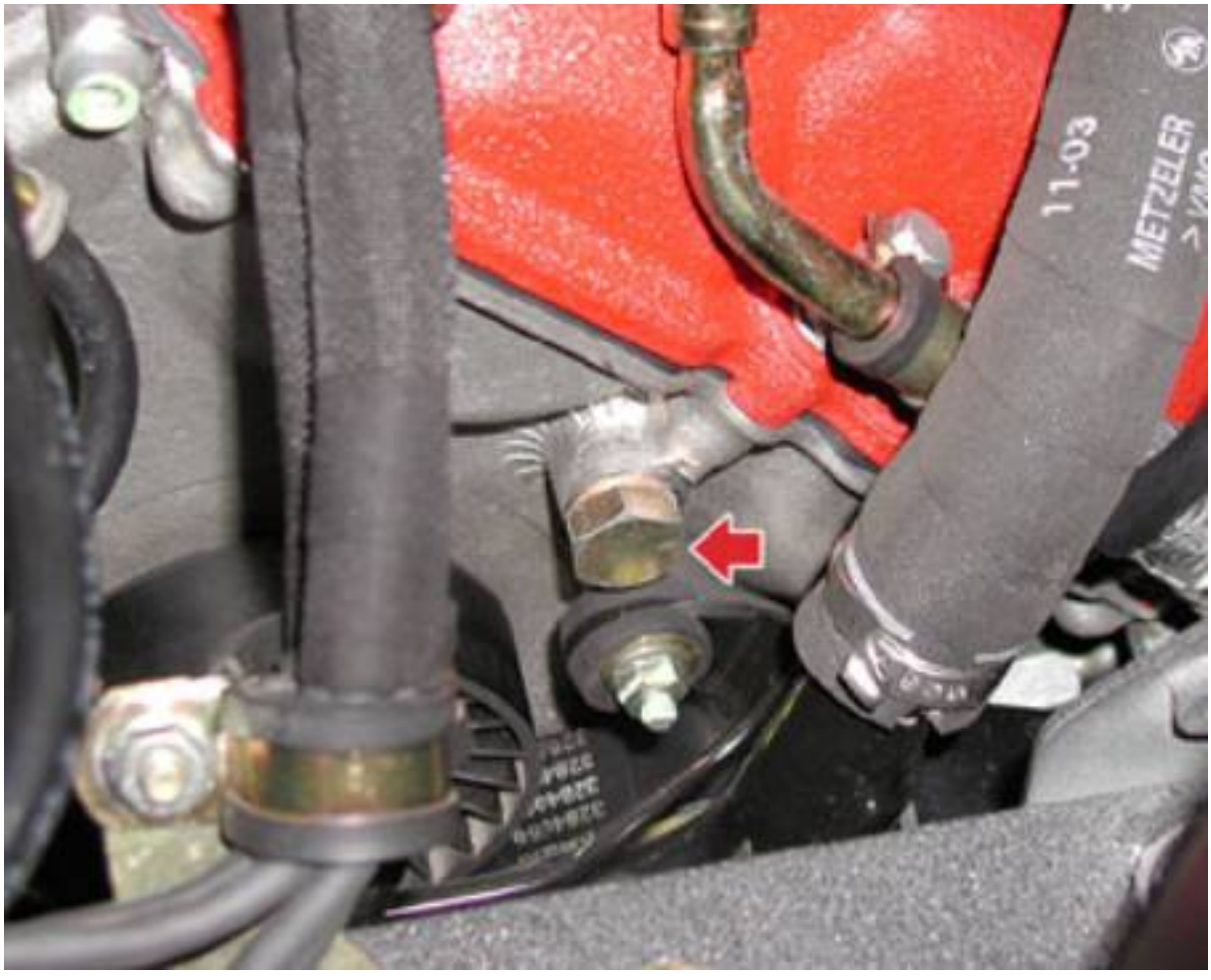
- Install the engine mount, right-hand side.

Right-hand side engine mount

- Open the engine coolant tank cap and pour in the fluid until it reaches the **MAX** notch marked on the tank.
- Working from inside the vehicle, set the maximum temperature (+32°C) for the air conditioning/ heating system manually, from both the driver's and passenger control panels.

N.B.
This operation allows the engine coolant to flow in and out the heating/air conditioning system.

- Start the engine, keeping it idling.
- Wait until the electric fans start up at least once (engine temperature approximately 90°C) and the air that comes out the vents in the passenger compartment is warm.
- During this stage, the level of the coolant contained in the tank could drop below the **MIN** notch, so top it up and keep it level with the **MAX** notch.
- If you are unable to bleed all the air in the system, open the two breather caps positioned on the two cylinder heads (figures below).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- Stop the engine.
- Check that the engine coolant is level with the **MAX** notch.
- Allow the engine to cool down.
- Fit the trim panels on the engine compartment.

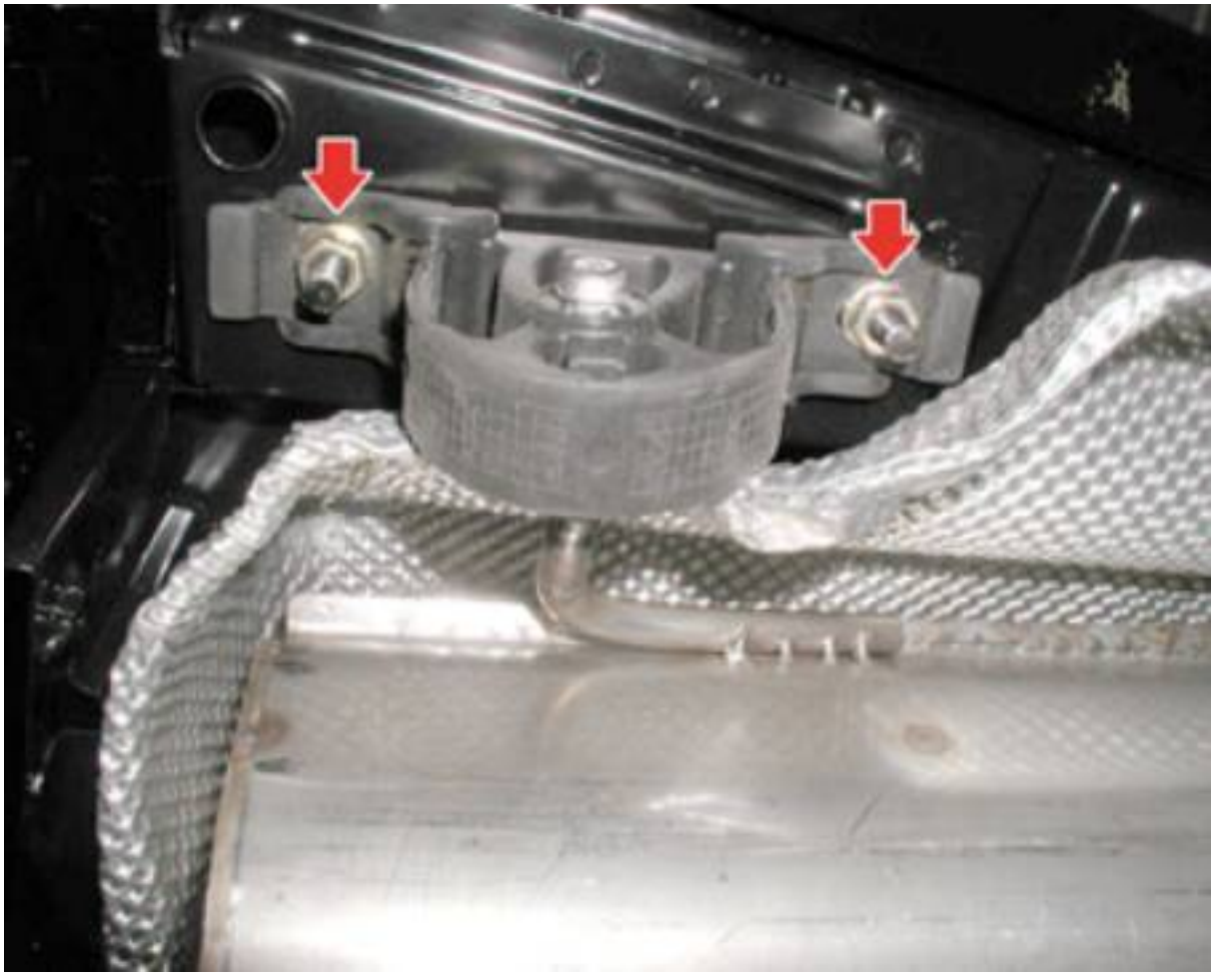
TAILPIPE

Removing the tailpipe

- Place the vehicle on the hoist.

- Undo the two screws on the crossmember fastening the tailpipes and remove it. Then unscrew the clamp connecting the exhaust extension and the tailpipe.

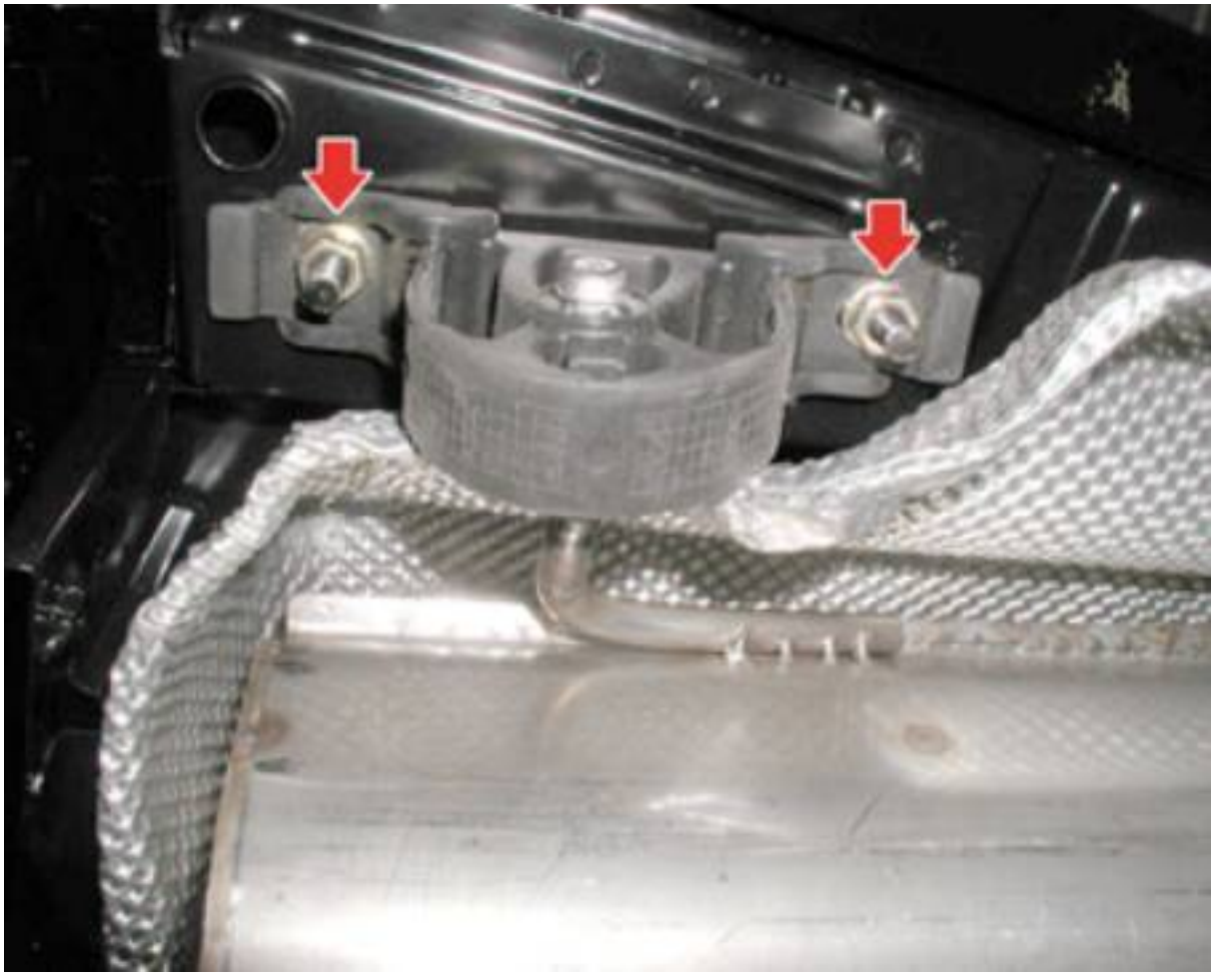
- Unscrew the two fastening screws on the front tailpipe support.



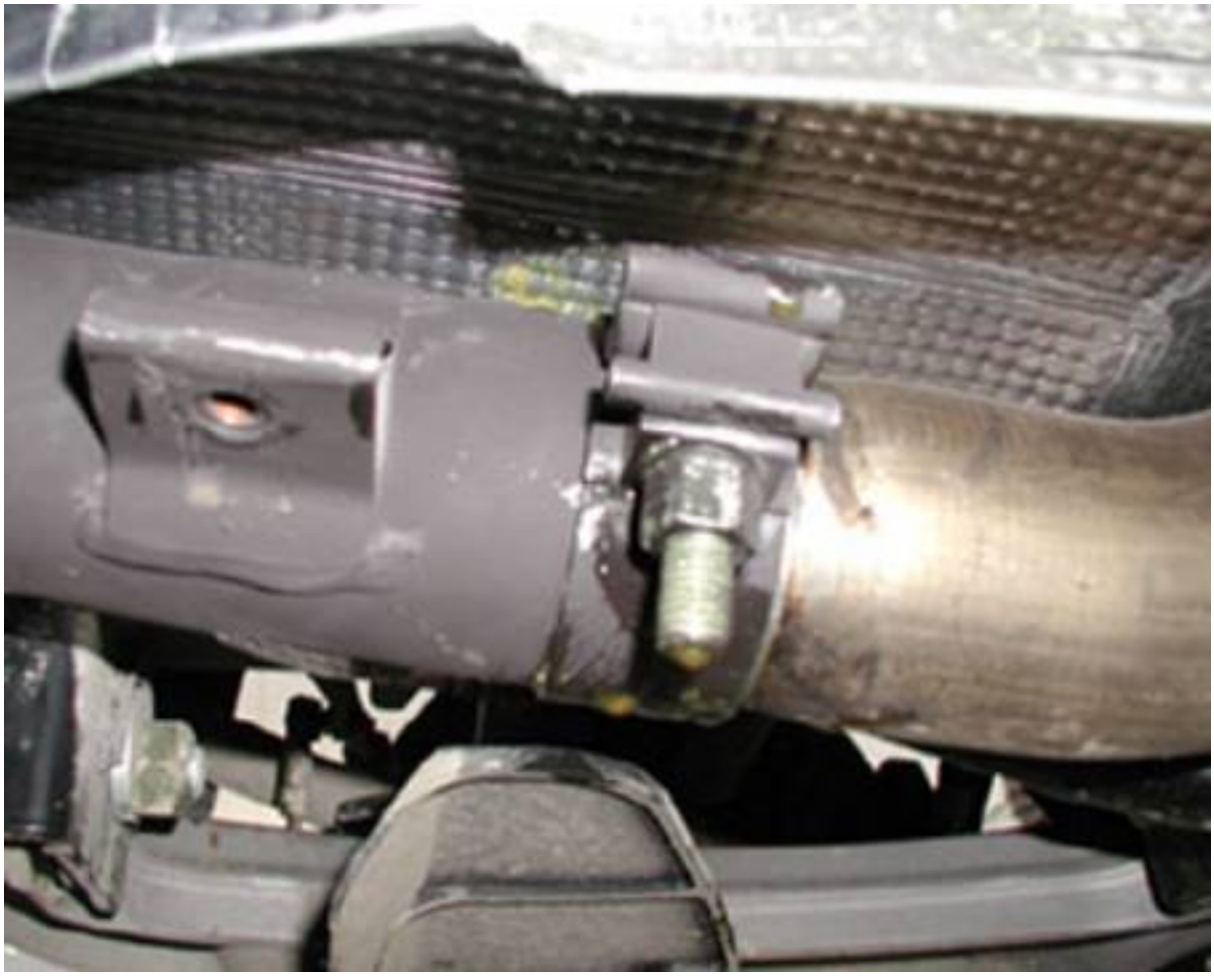
- Unscrew the two fastening screws on the rear tailpipe support then remove it, taking care not to damage the rear bumper.

Refitting the tailpipe

- Fit the exhaust tailpipes onto the exhaust extension pipes and screw on, without tightening them, all the screws and nuts fastening the mounts to the bodywork.
- Tighten the screws and the nuts fastening the mounts to the bodywork to a torque of **24 Nm**.



- Tighten the fastening nut on the clamp securing the tailpipe to the exhaust extension pipes to a torque of **54 Nm**.



- Fit the cross member and tighten the fastening screws.
- Remove the vehicle from the hoist.

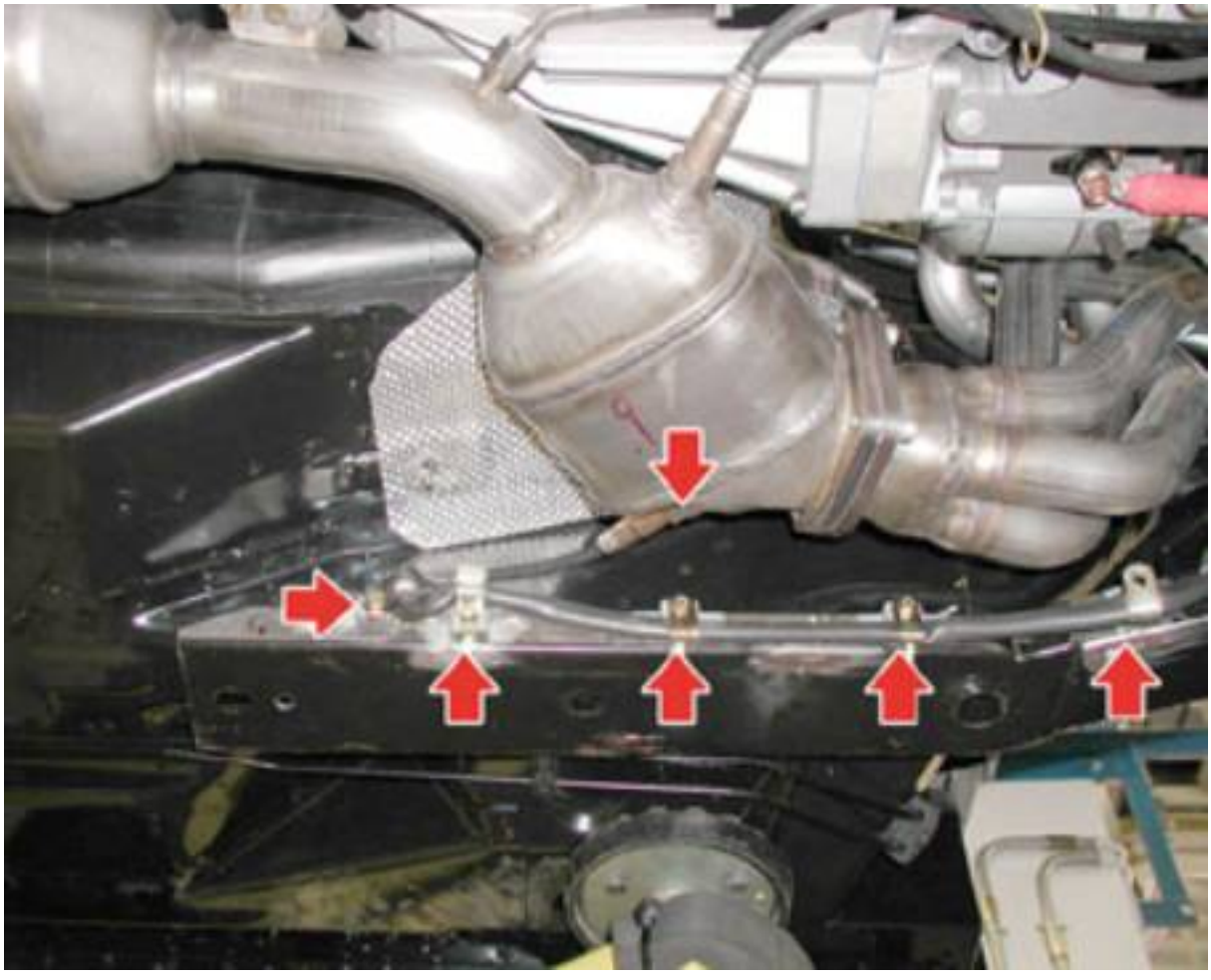
Catalytic converter

Removing the catalytic converter for the EUROPE version up to serial number 24274

IMPORTANT
After the procedure described below, we will describe the procedure for removing the catalytic converters of the USA - CANADA version and the EUROPE version from serial number 24275.

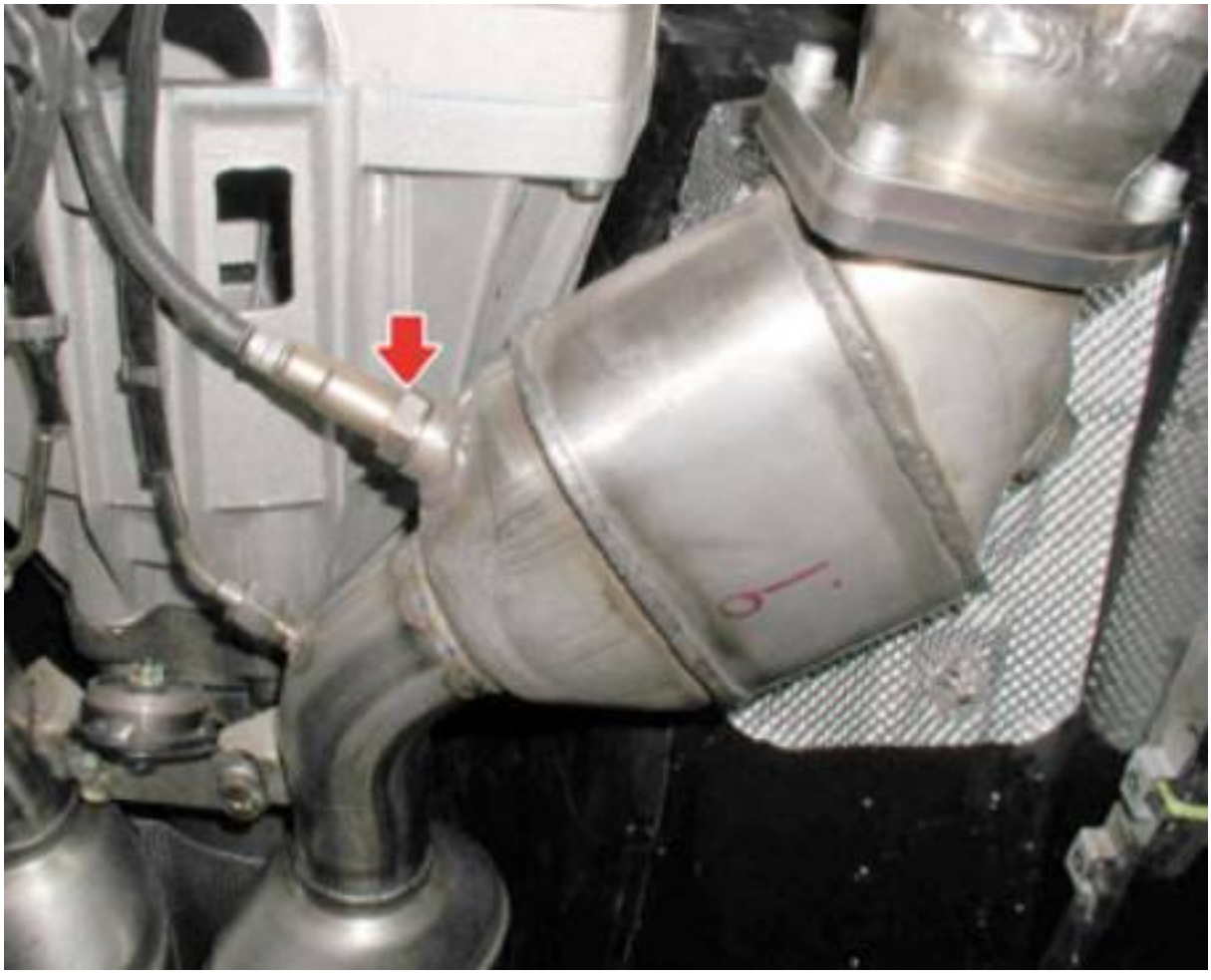
- Place the vehicle on the hoist.
- Undo the fastening screws on the bodywork reinforcement bracket.

- Release the front Lambda sensor wiring from the five clamps, then remove the front Lambda sensor.



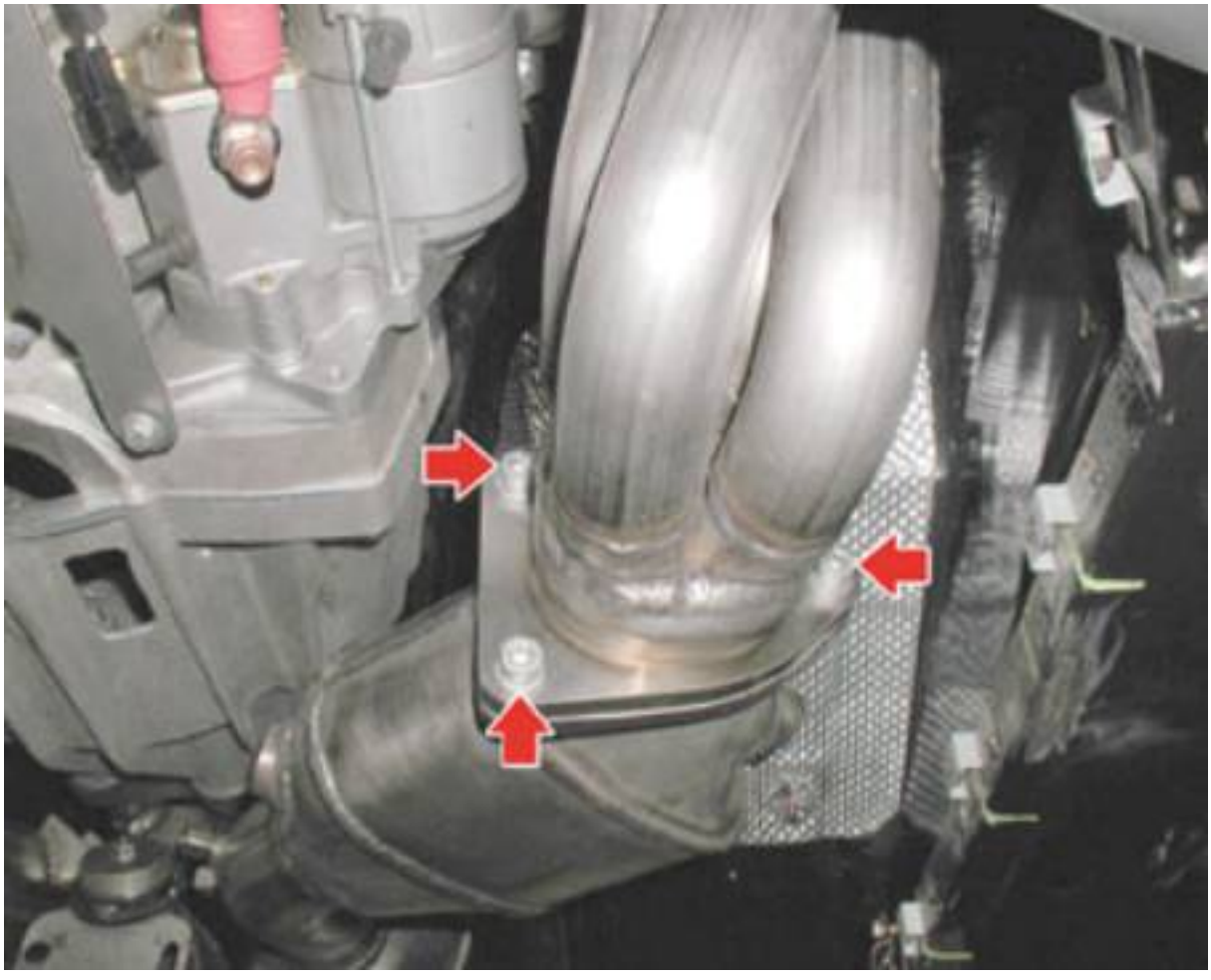
N.B.
When unscrewing the Lambda sensors, make sure the cables do not get damaged by twisting.

- Unscrew the rear Lambda sensor, then remove it.

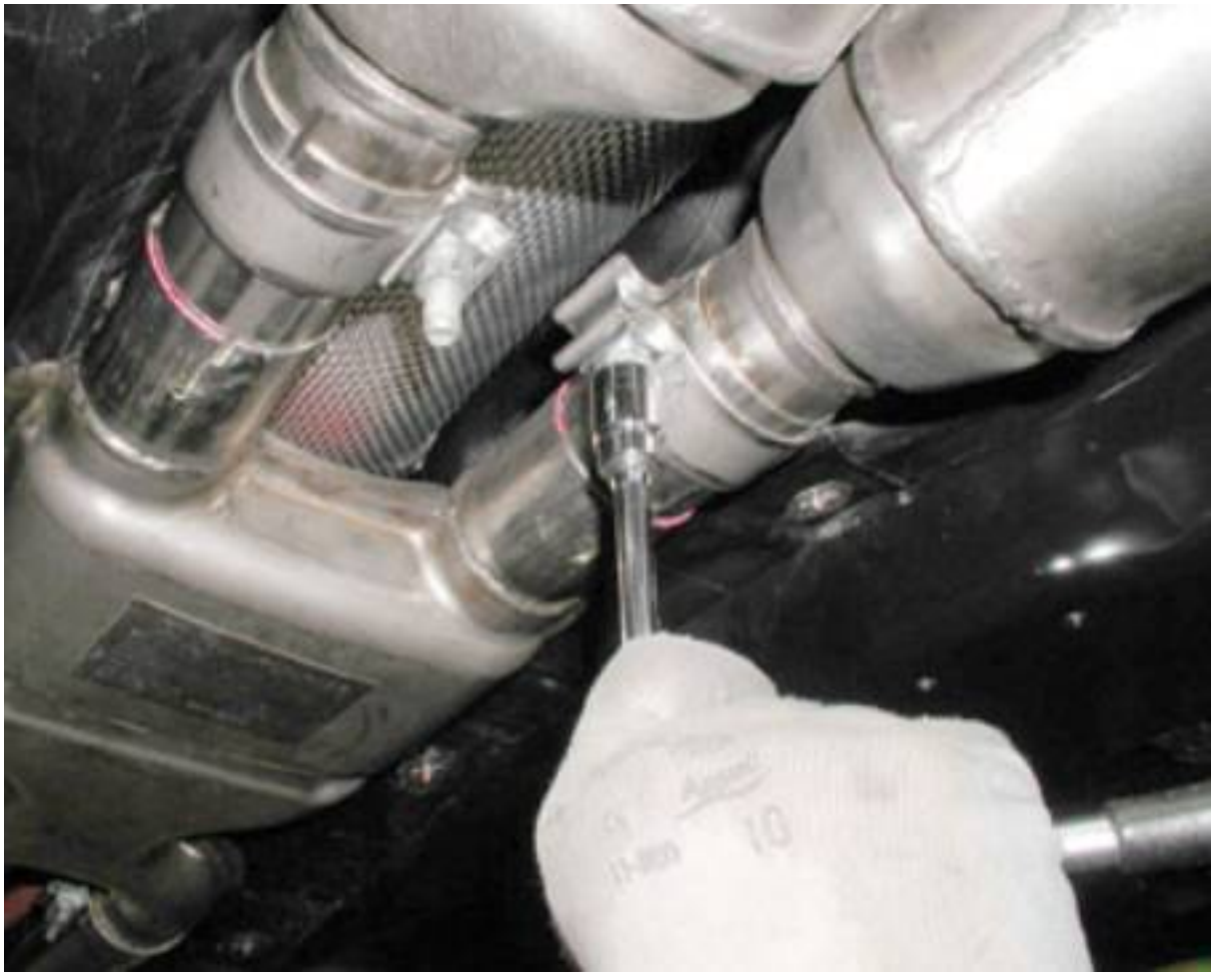


- Unscrew the two screws fastening the pipe to the central bracket

- Undo the three screws linking the exhaust manifold to the catalytic converter.
- Retrieve the gasket below.



- Unscrew the clamp connecting the catalytic converters and the central silencer.



- Remove the catalytic converter concerned.

N.B.
Follow the same procedure for the remaining catalytic converter.

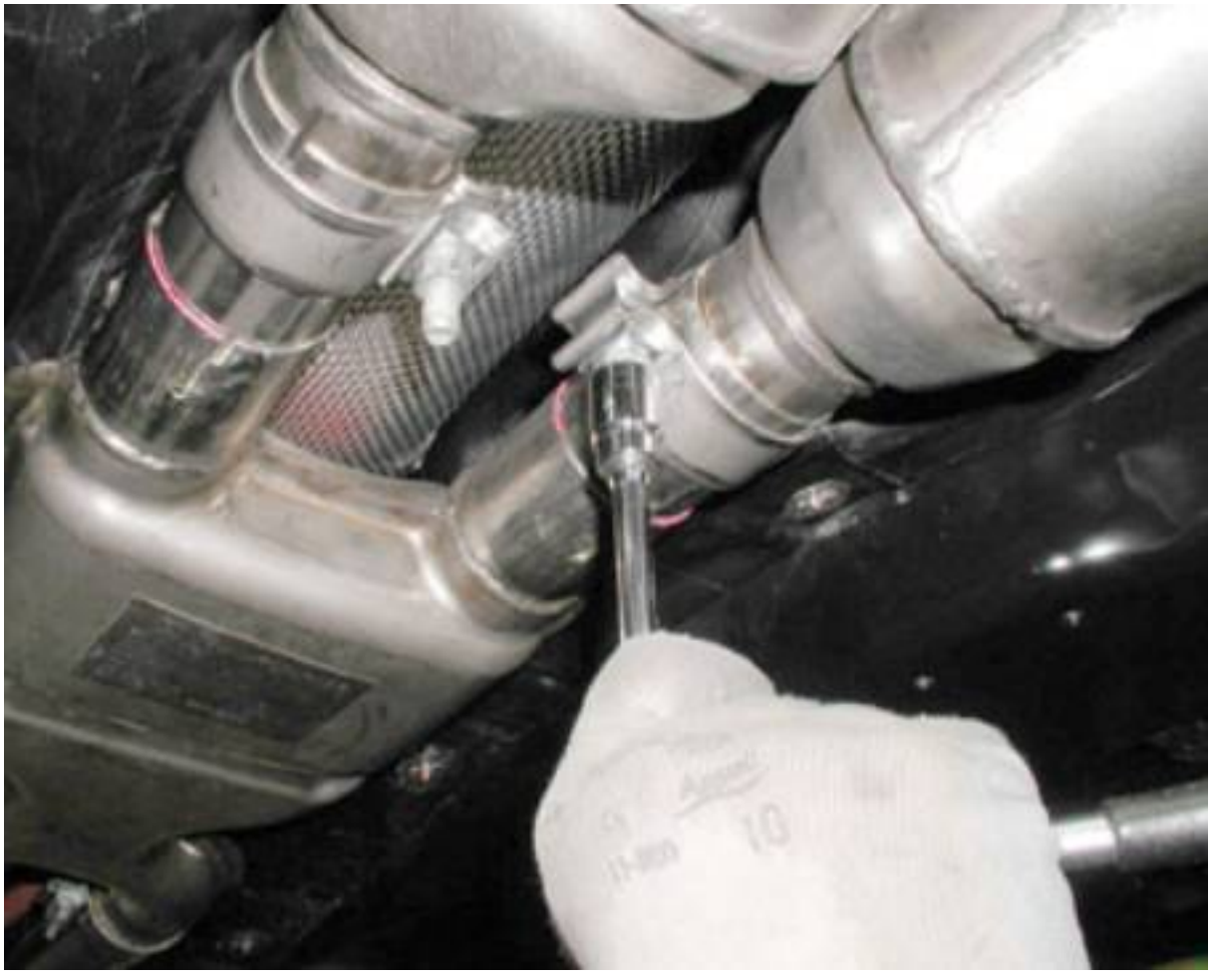
Refitting the catalytic converter for the EUROPE version up to serial number 24274

- Fit the catalytic converter removed into its seat on the central silencer and screw it in without tightening the fastening screws on the exhaust manifold flange.

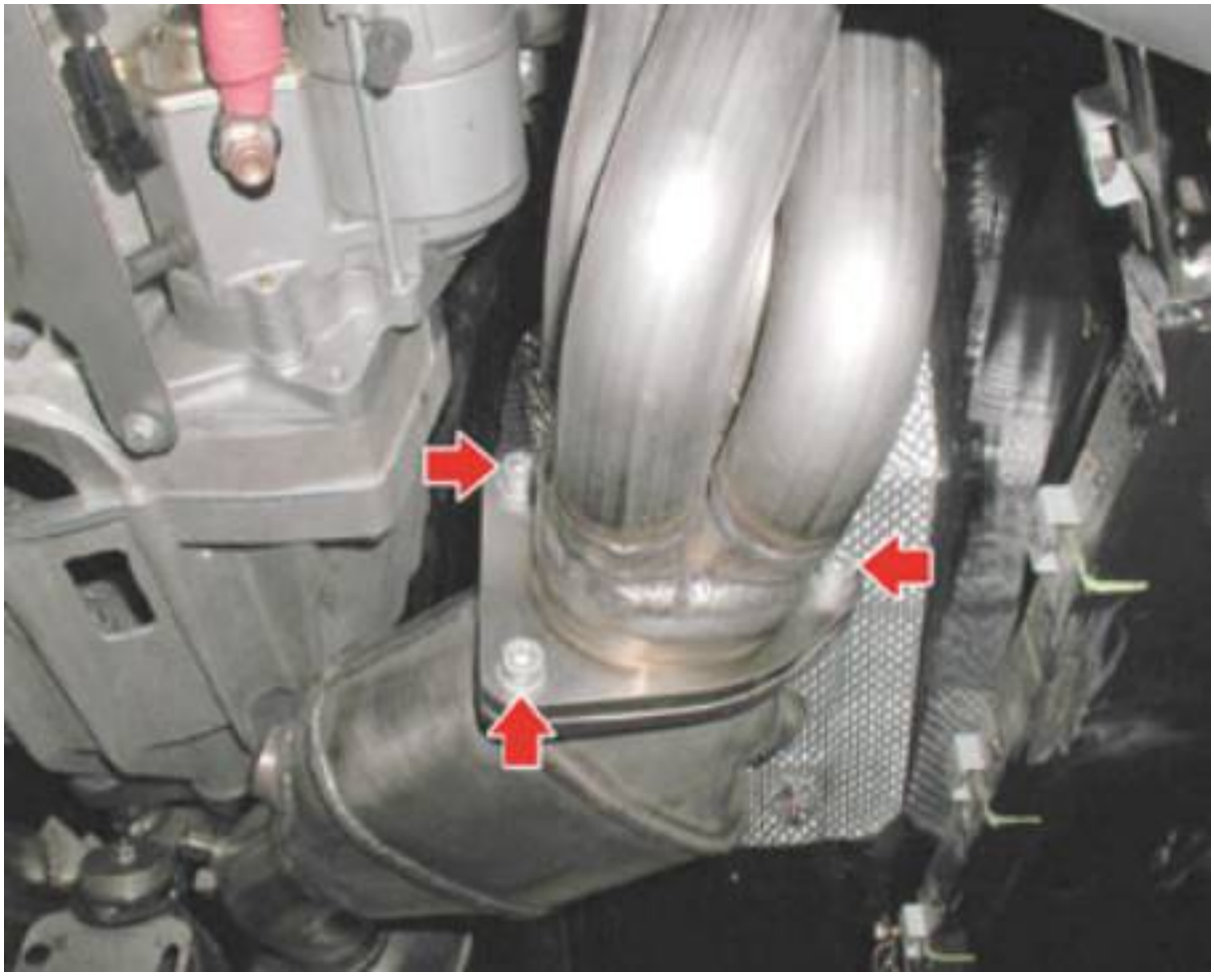
N.B.
Visually inspect that the gasket located underneath the flange joining the catalytic converter and the exhaust manifold is intact and if signs of wear are found, replace it.

N.B.
The conductive gaskets must never be fitted more than once. The second time the component is fitted, they must be replaced

- Tighten the fastening nuts on the clamps securing the catalytic converter to the central silencers to a torque of **54 Nm**.

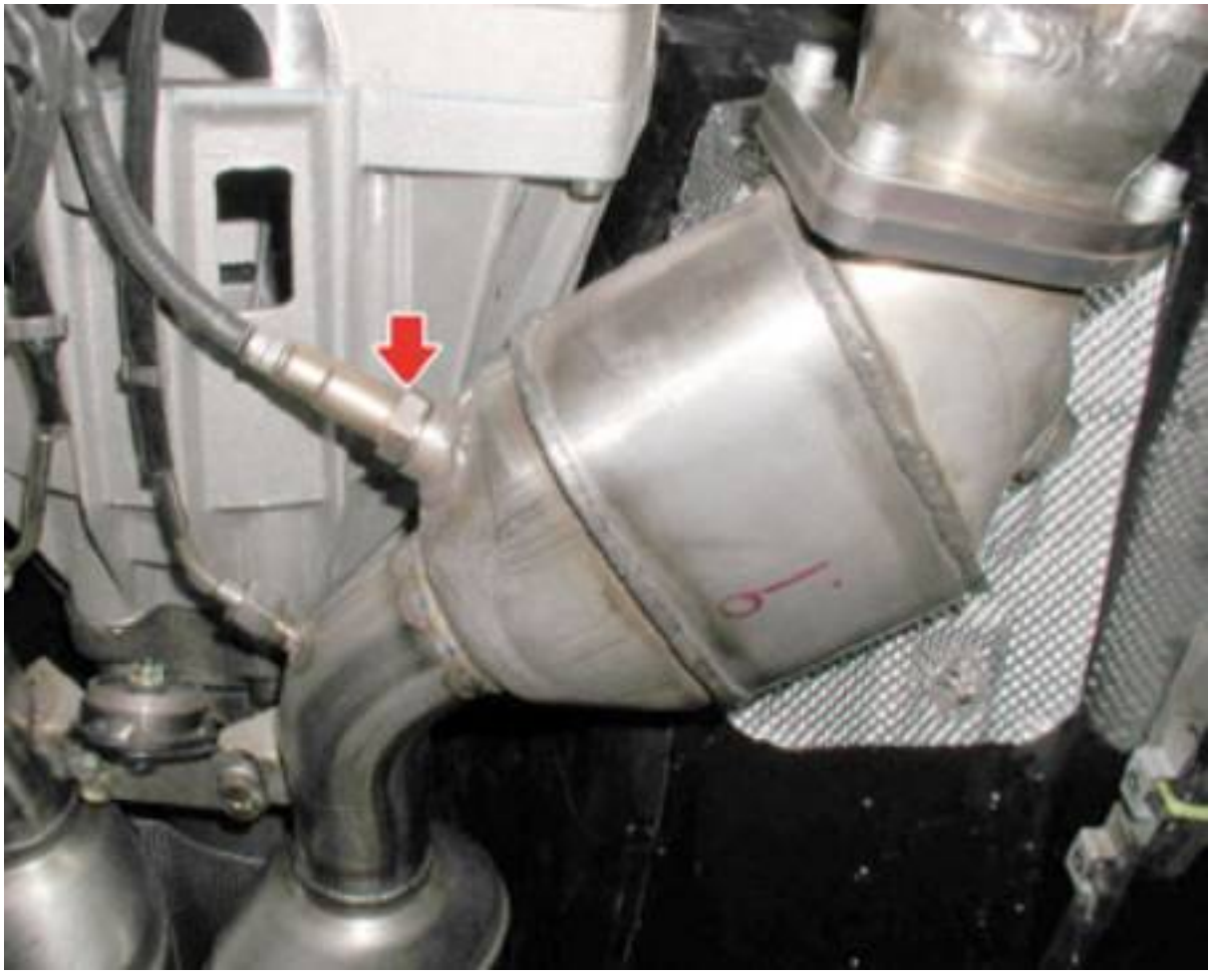


- Tighten the screws fastening the exhaust manifold to the catalytic converter to a torque of **25 Nm**.



- Tighten the fastening screws on the central catalytic converter holder bracket to a torque of **25 Nm**.

- Fit the front and rear Lambda sensors, then tighten them to a torque of **50 Nm.**
- Fasten the front Lambda sensor wiring to the engine mounting frame correctly.



- Fit the bodywork reinforcement bracket and tighten the fastening screws to torque.

- Lower the hoist and remove the vehicle.

Removing the catalytic converter for all the USA – CANADA versions and the EUROPE version from serial number 24275

IMPORTANT
The exhaust pipe of the USA – CANADA vehicles has remained unchanged, while the EUROPE vehicles from serial number 24275 are equipped with the same exhaust pipe as the versions for the American/Canadian markets.

USA - CANADA VERSION

- Place the vehicle on the hoist.
- Remove the exhaust tailpipes.

Tailpipe

- Remove the two exhaust extensions.

Exhaust extension pipe

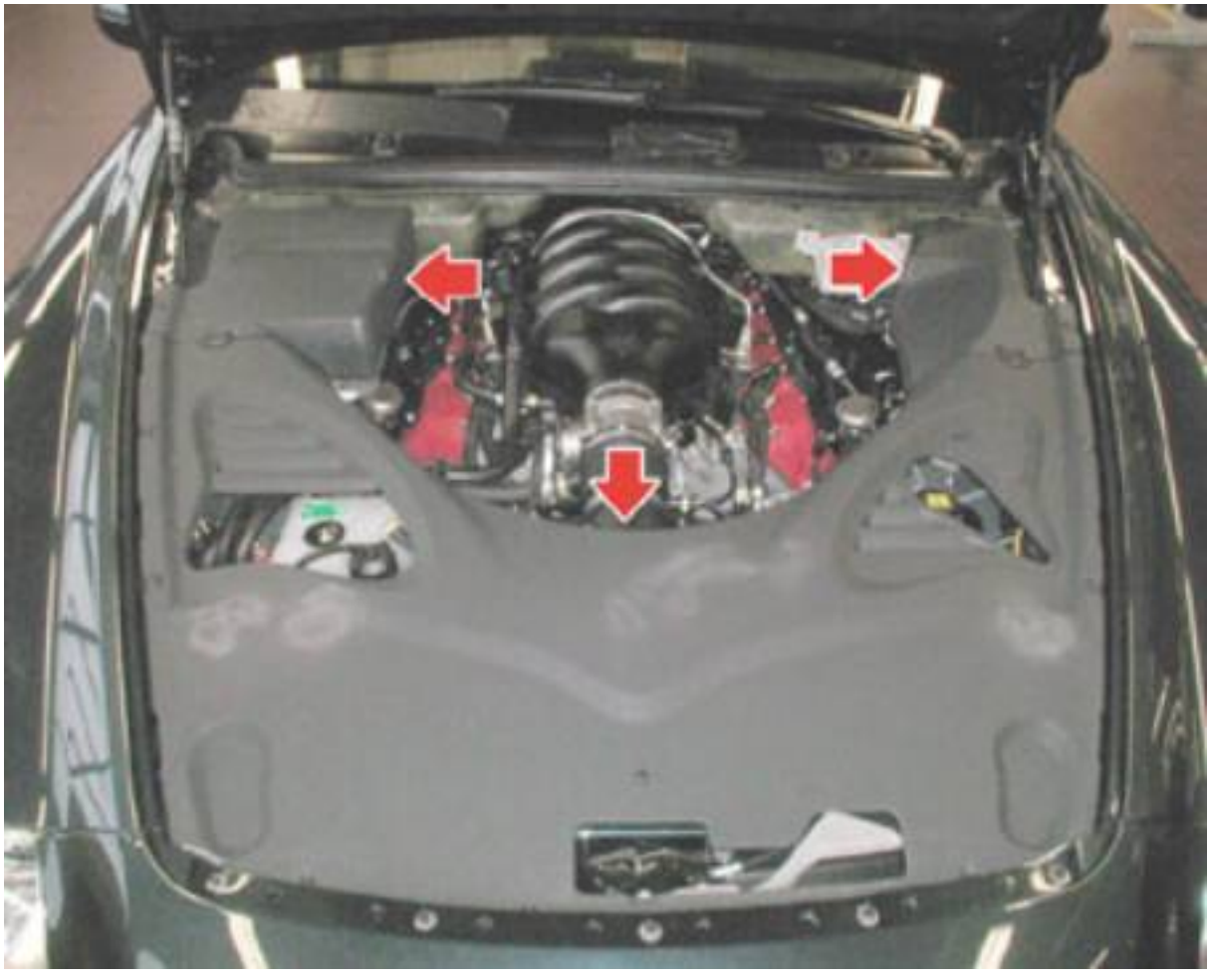
- Remove the central exhaust silencer.

Exhaust silencer

- Remove the floor guard beneath the engine.

Engine floor guard

- Lower the hoist.
- Remove the trim panels.



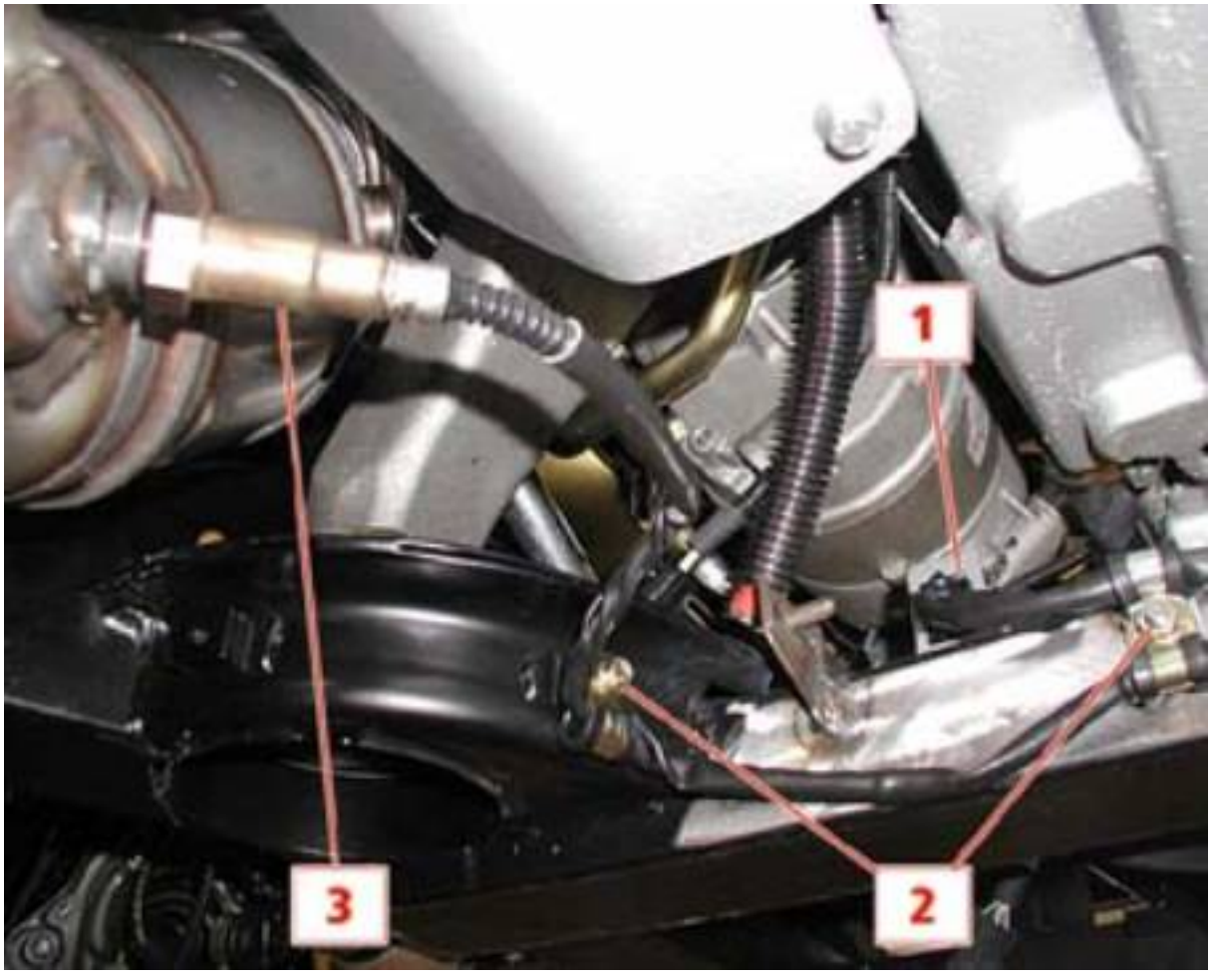
- Rotate the plastic fastening screws on the engine compartment fuse box cover by 90°, then remove the cover.

- Undo the two fastening screws on the engine compartment fuse box.

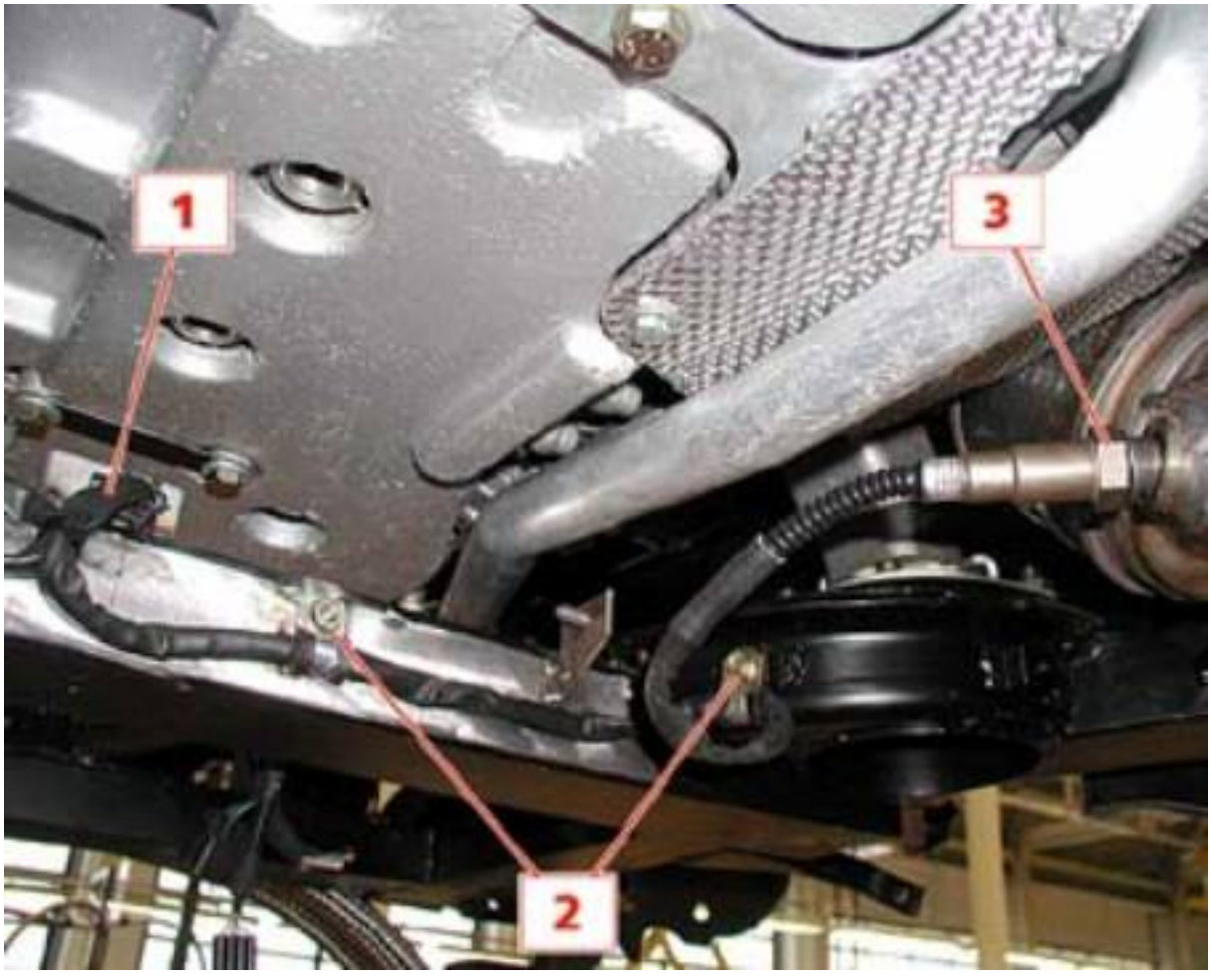
- Undo the three fastening screws and remove the engine compartment fuse box mount.

- Lift the hoist and remove the starter motor shield.

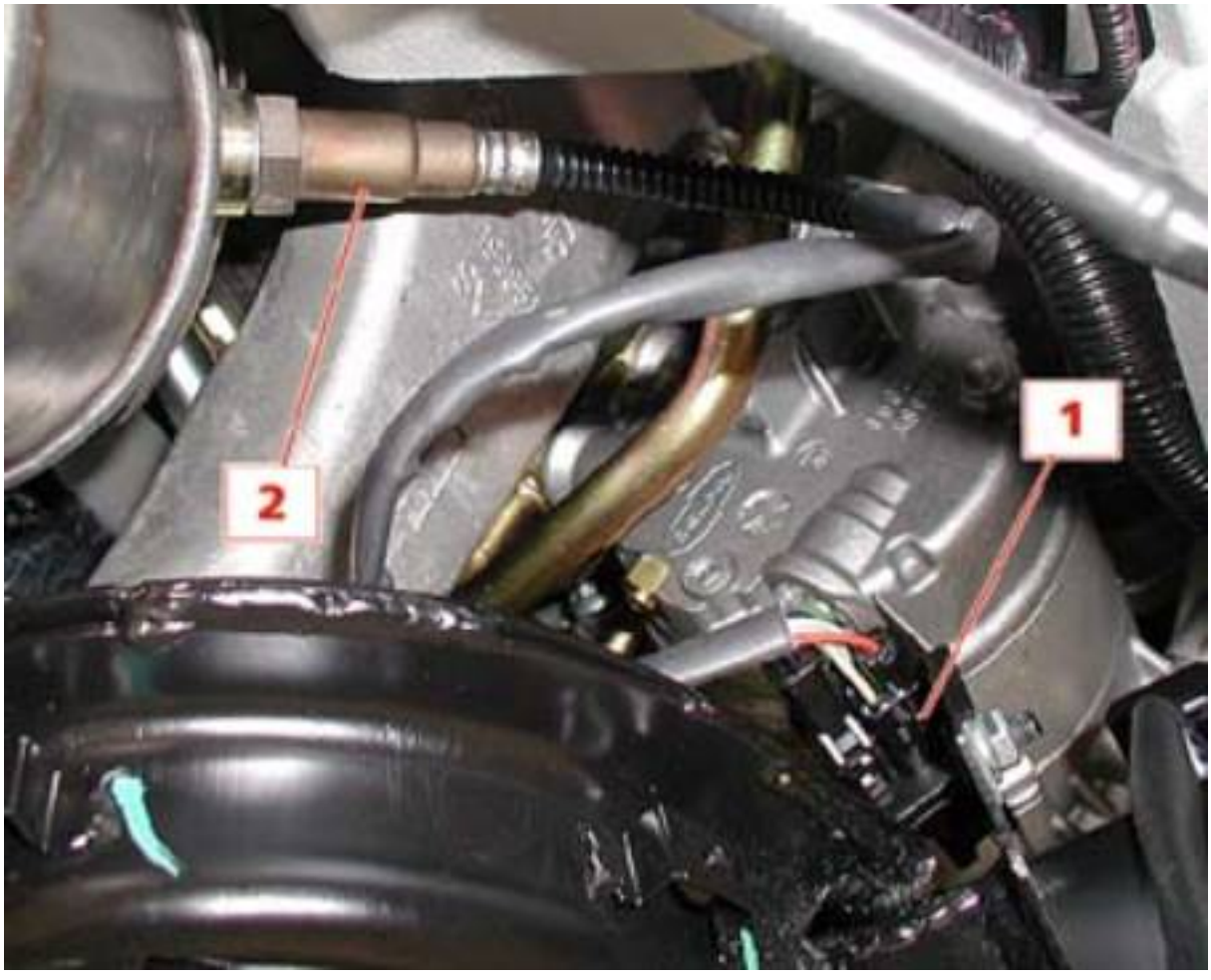
- Disconnect the electrical connector **(1),** undo the screws on the clamps **(2)** fastening the Lambda sensor wiring, then remove the lower LH Lambda sensor **(3).**



- Disconnect the electrical connector **(1),** undo the screws on the clamps **(2)** fastening the Lambda sensor wiring, then remove the lower RH Lambda sensor **(3).**



- Disconnect the electrical connector **(1),** undo the screws on the clamps fastening the Lambda sensor wiring, then remove the upper LH Lambda sensor **(2).**

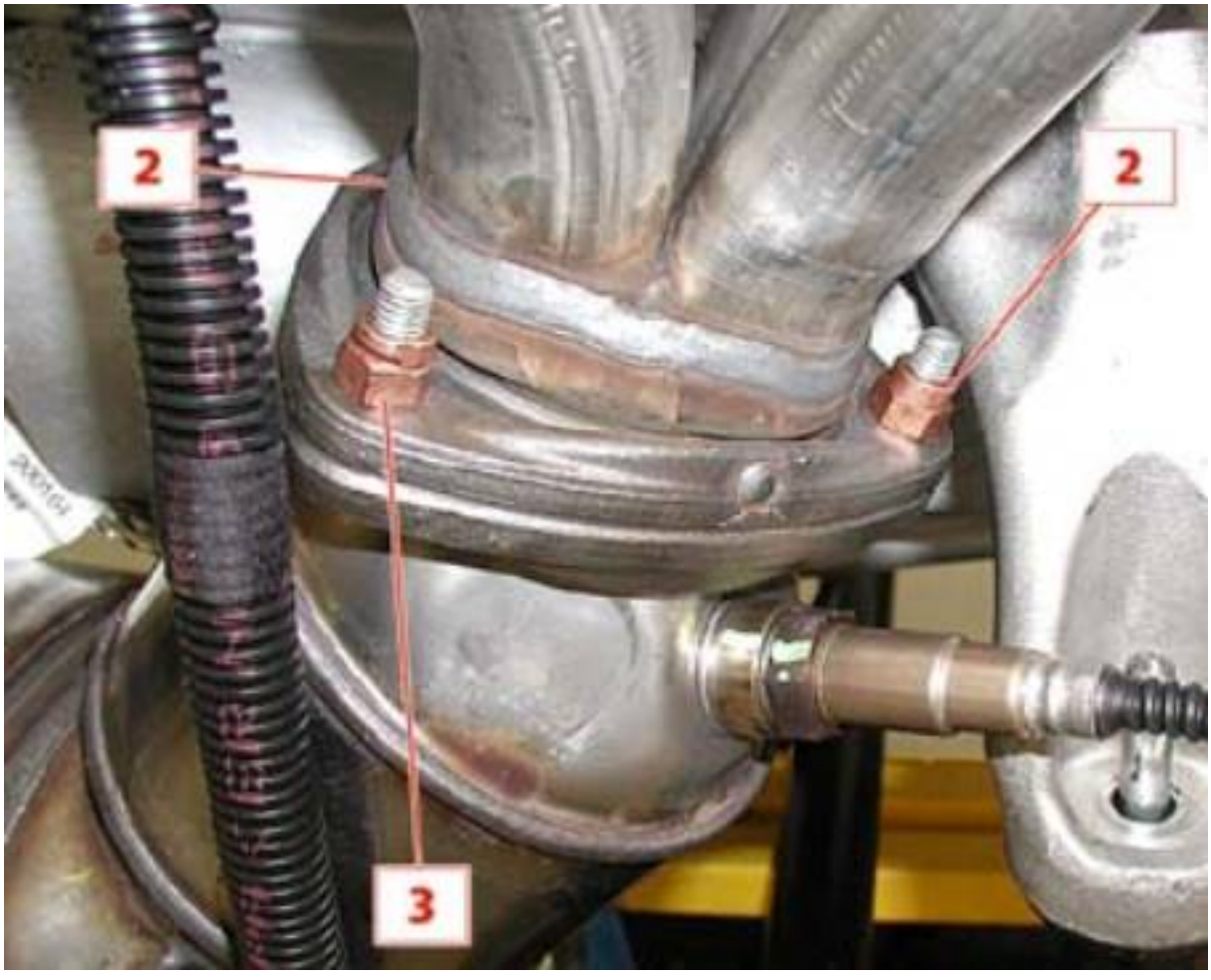


- Disconnect the electrical connector, undo the screws on the clamps fastening the Lambda sensor wiring **(1),** then remove the upper RH Lambda sensor **(2).**

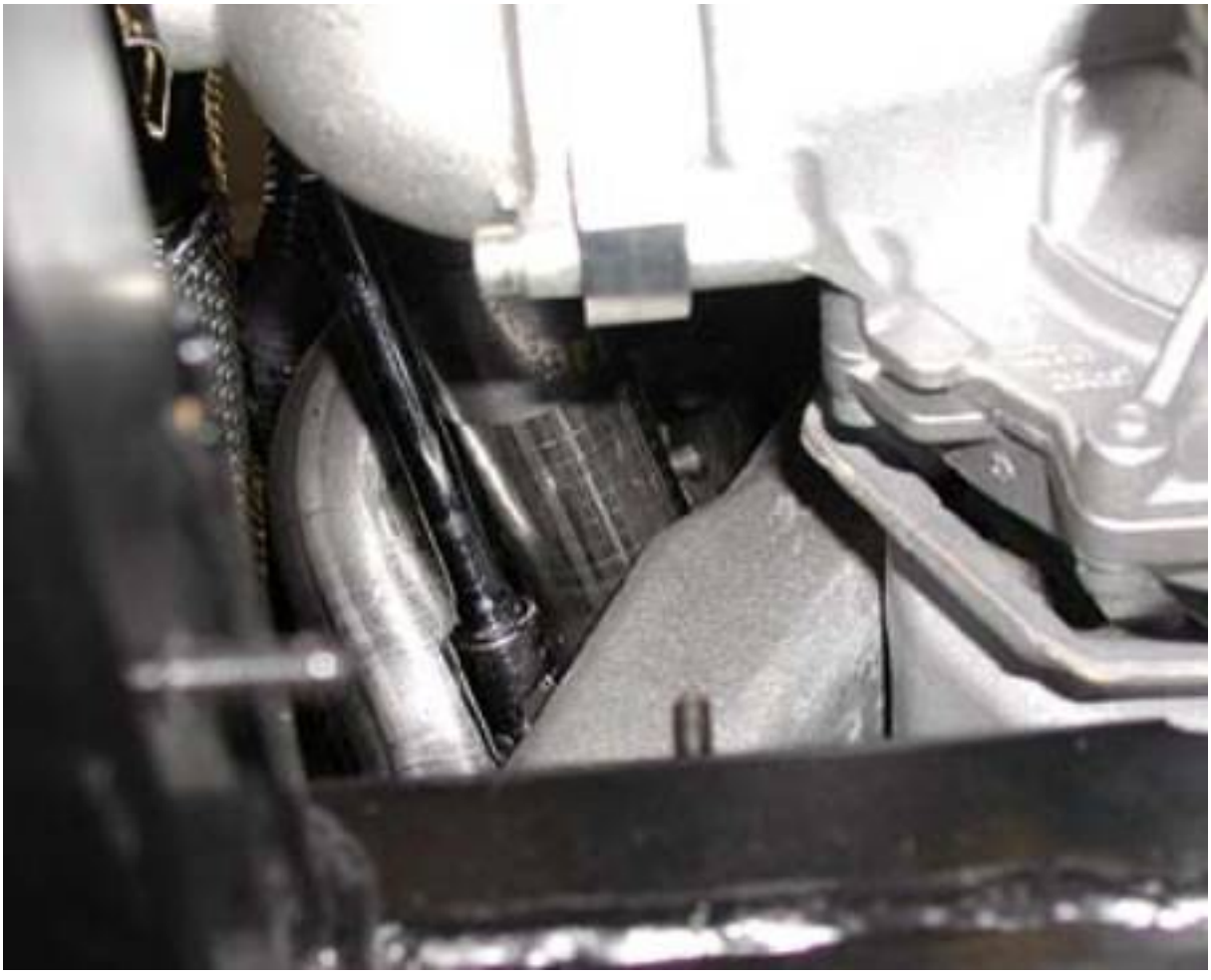
- Unscrew and remove the oil filter **(1),** then unscrew the fastening screws and remove the engine oil filter heat shield **(2)**.

N.B
Place a container under the oil filter to collect the engine oil that is discharged. Carefully clean any surrounding components hit by the discharged engine oil.

- Working on the RH catalytic converter, prepare the wrench required to access the fastening.
- View of the fastening nuts on the RH catalytic converter.

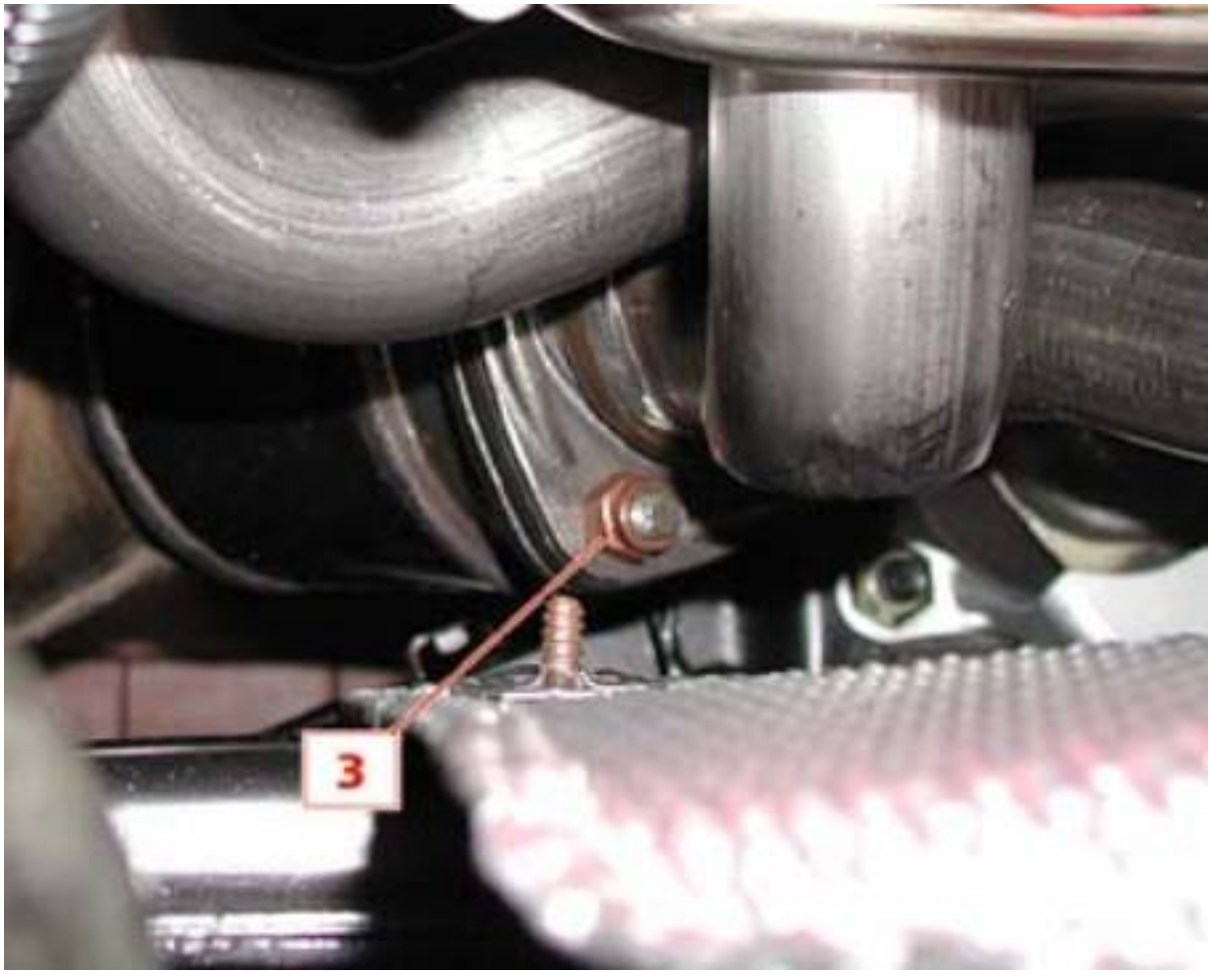


- To unscrew the nut (**1 see previous figure**), use a 3/8 ratchet wrench, connecting a 250 mm long extension, a 3/8 universal joint and 3/8 bush with diam.
13 mm to it.
- Working from the lower side of the vehicle, unscrew the nut **(1 see previous figure)** fastening the exhaust manifold catalytic converter coupling.

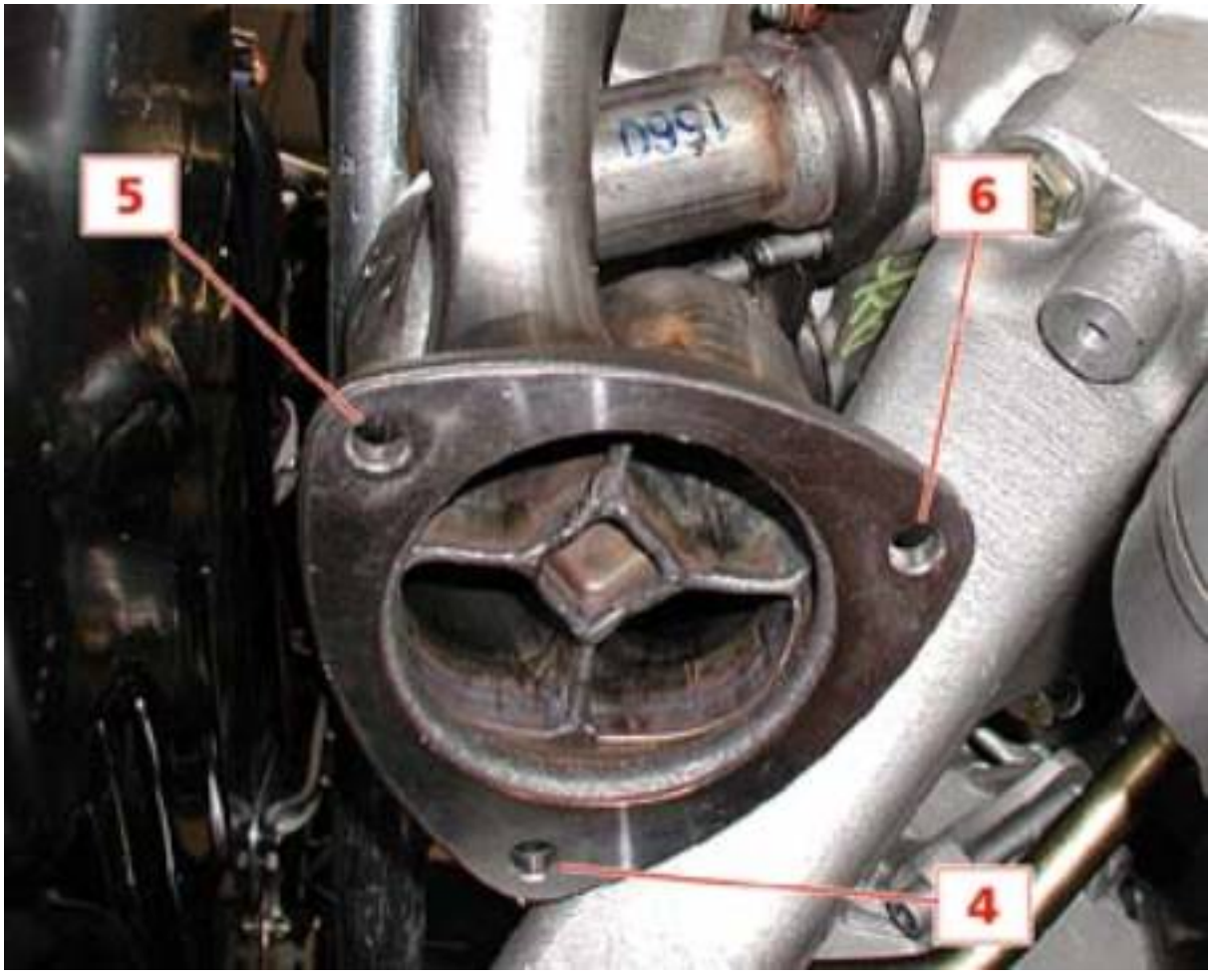


- To loosen the nut **(2 see previous figure),** use a 3/8 ratchet wrench, with a 3/8 bush.
- To unscrew the nut **(2 see previous figure),**completely use a ¼ ratchet wrench, with ¼ bush.
- Working from the lower side of the vehicle, unscrew the nut **(2 see previous figure)** fastening the exhaust manifold catalytic converter coupling.

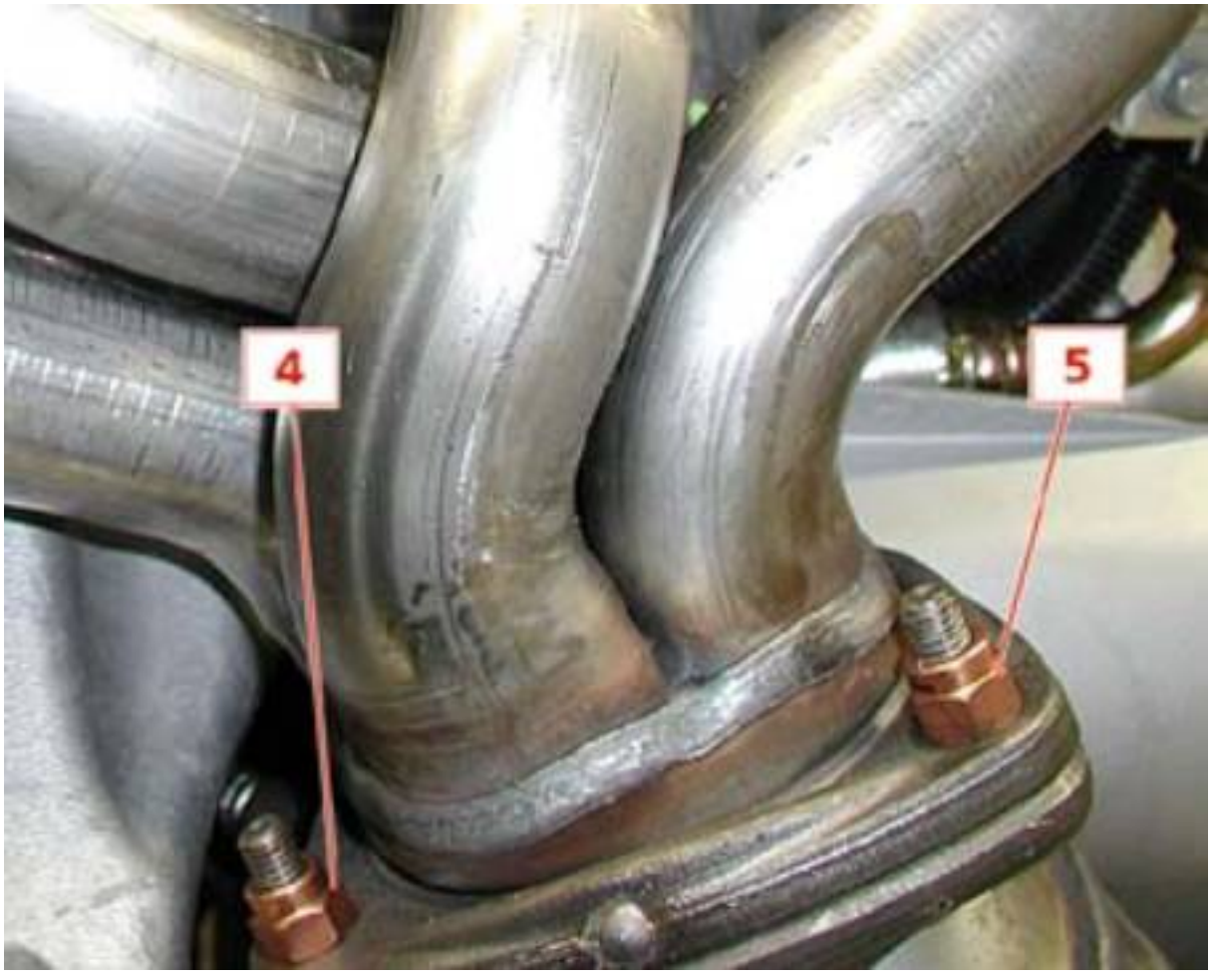
- Lower the hoist.
- To loosen the nut **(3)** use a 3/8 ratchet wrench, two 250 mm long extensions, a straight 120 mm long extension and a 120 mm long 8° jointed extension with a 3/8 bush with diam. 13 mm.
- Working from the lower side of the vehicle, unscrew the nut **(3** see previous figure) fastening the exhaust manifold catalytic converter coupling.



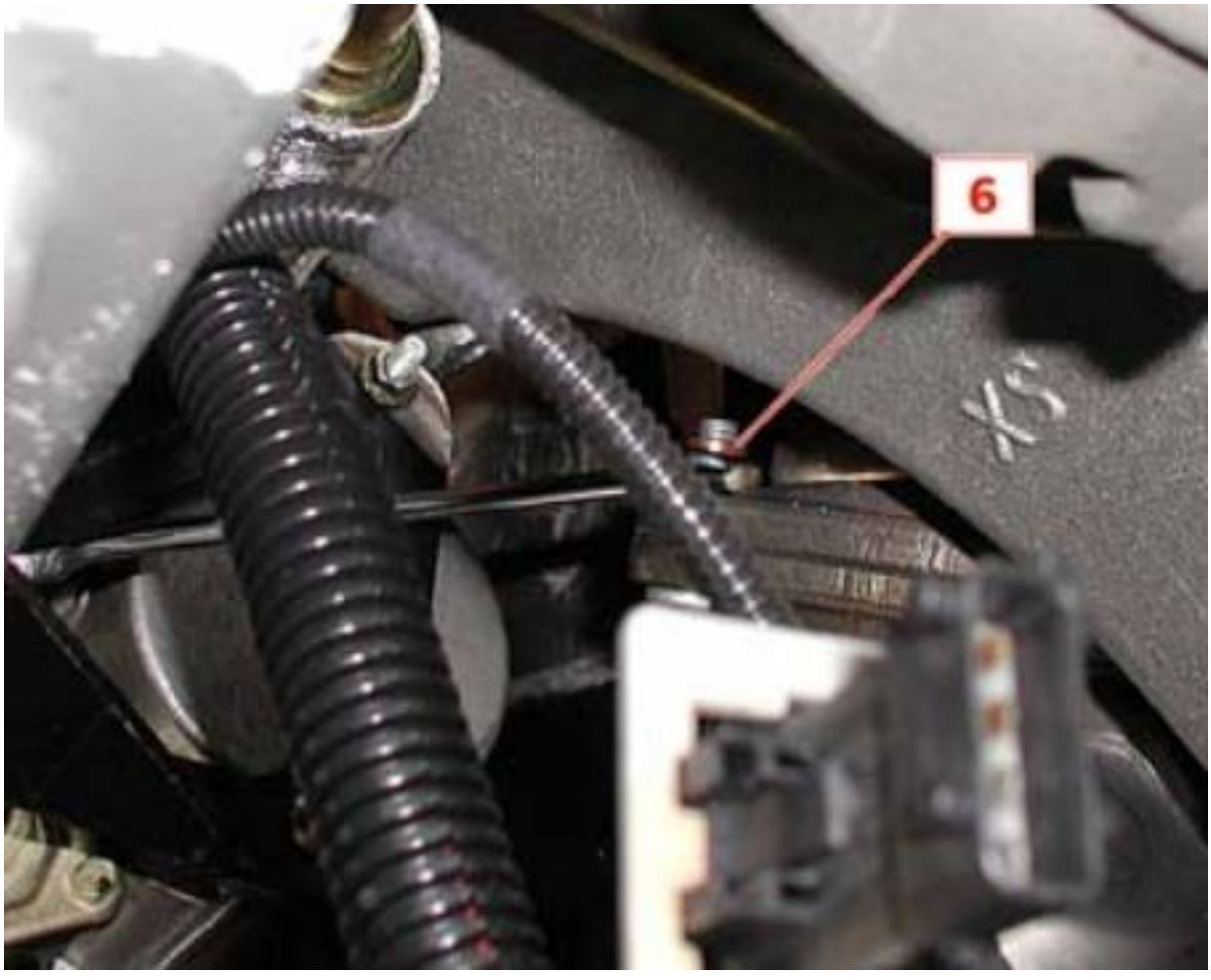
- View of the points at which the RH catalytic converter is fixed to the LH exhaust manifold.



- Keep the hoist in the lowered position.
- To unscrew the nuts **(4)** and **(5)** use a 3/8 ratchet wrench, two 250 mm long extensions and a 120 mm long 8° jointed extension with a 3/8 bush with diam. 13 mm.
- Working from the upper side of the vehicle, unscrew the fastening nuts **(4)** and **(5)** on the exhaust manifold catalytic converter coupling.



- Lift the hoist.
- Using 13 mm wrench, unscrew the nut **(6)** fastening the LH catalytic converter coupling to the relative manifold.



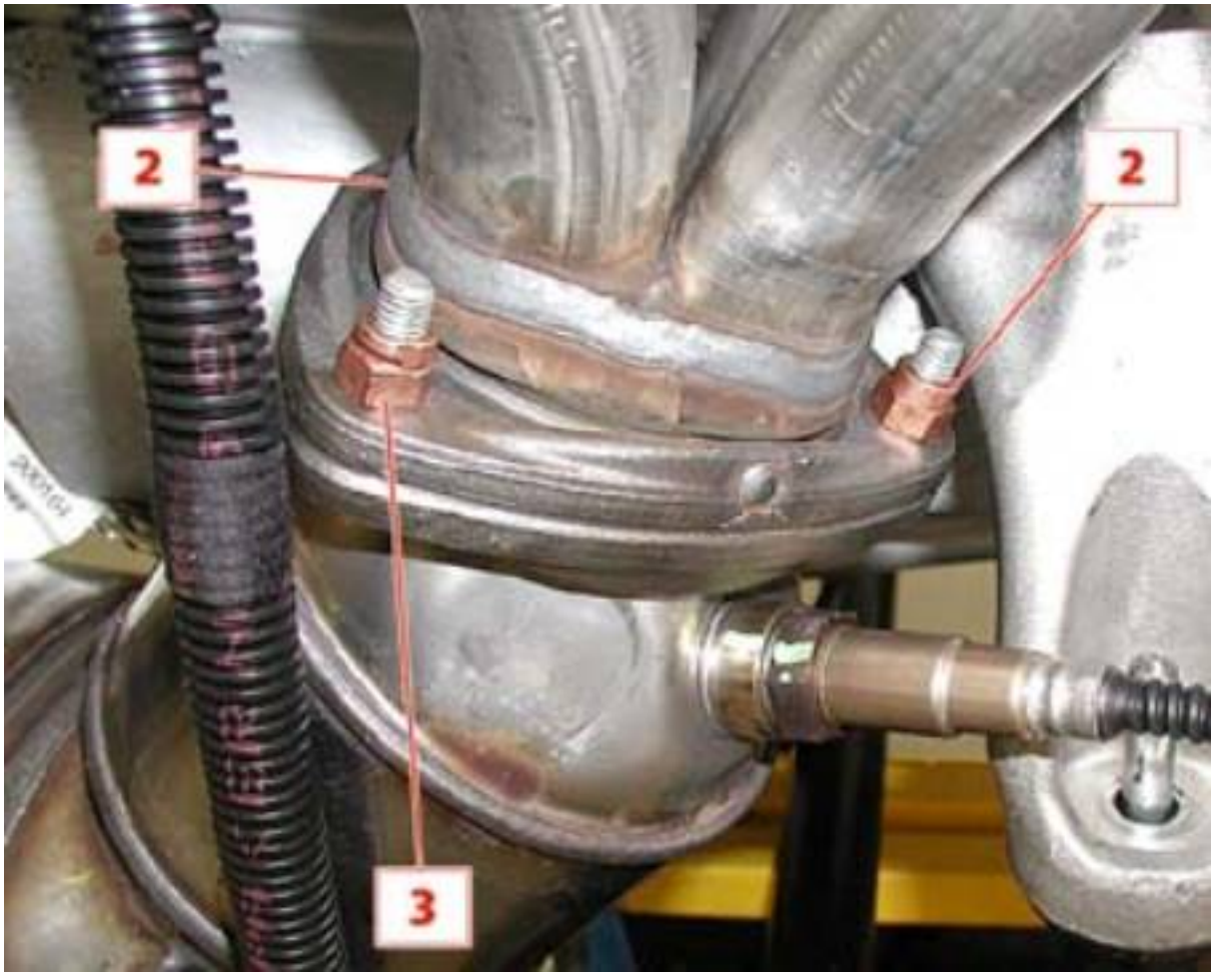
- Undo the screws fastening the catalytic converters onto the central mount.

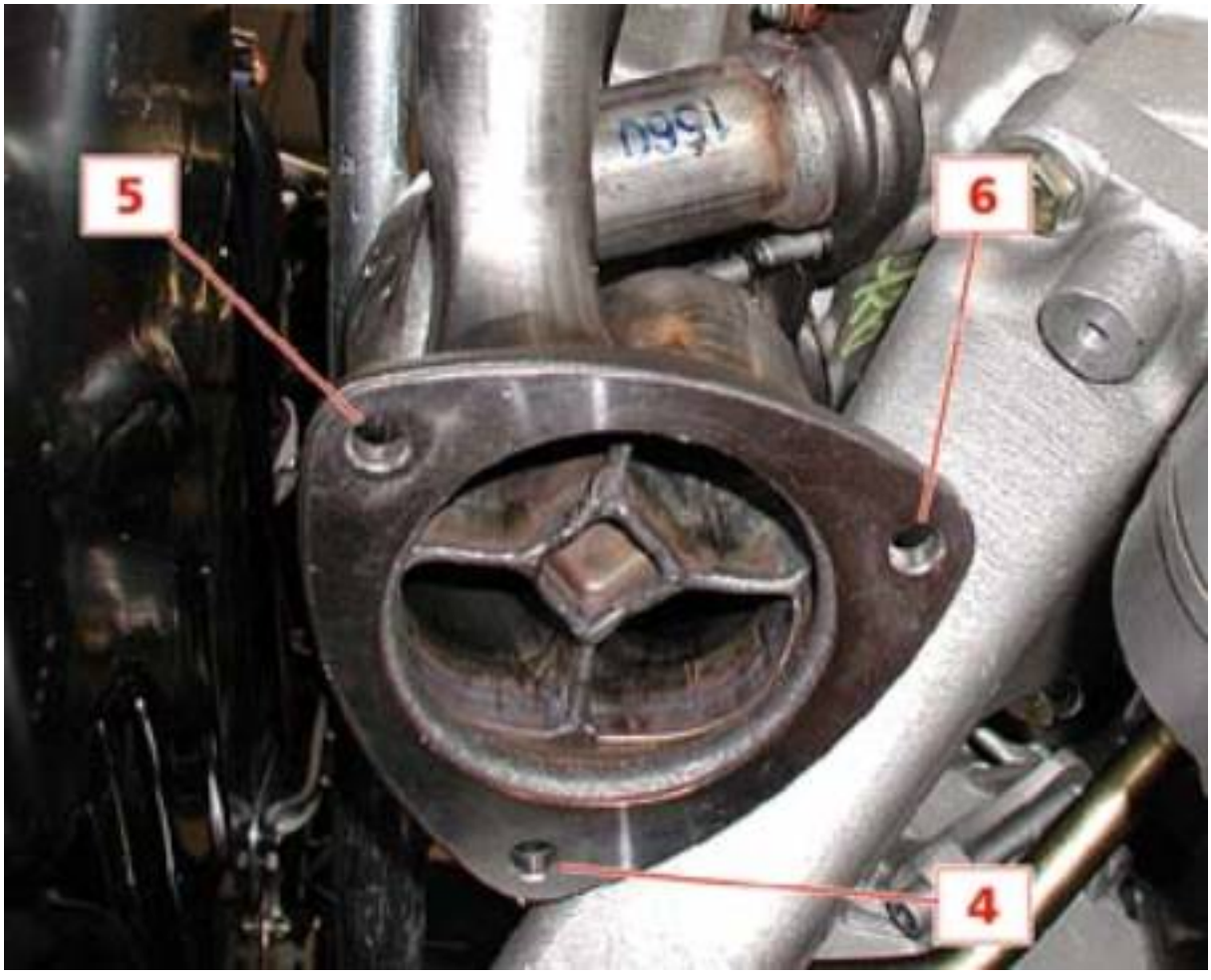
- Remove the two catalytic converters from the lower part of the vehicle.

Refitting the catalytic converter for all the USA – CANADA versions and the EUROPE version from serial number 24275

- Fit the two catalytic converters into their seats on the exhaust manifolds.
- Fit the screws fastening the catalytic converters onto the central mount, then tighten to a torque of **25 Nm**.

- Using the same wrenches as instructed for the removal, screw in the fastening nuts **(1), (2), (3), (4), (5)** and **(6)** those fastening the catalytic converters to the relative manifolds, remembering to tighten them to a torque of **25 Nm.**.


2
2
3



- Tighten the new oil filter**(1) manually,** then fit the engine oil filter heat shield **(2)**.

- Fit the four Lambda sensors into their seats on the catalytic converters, tightening them to a torque of **50 Nm,** then wire up the electrical connections and fasten the wiring with the relative clamps.

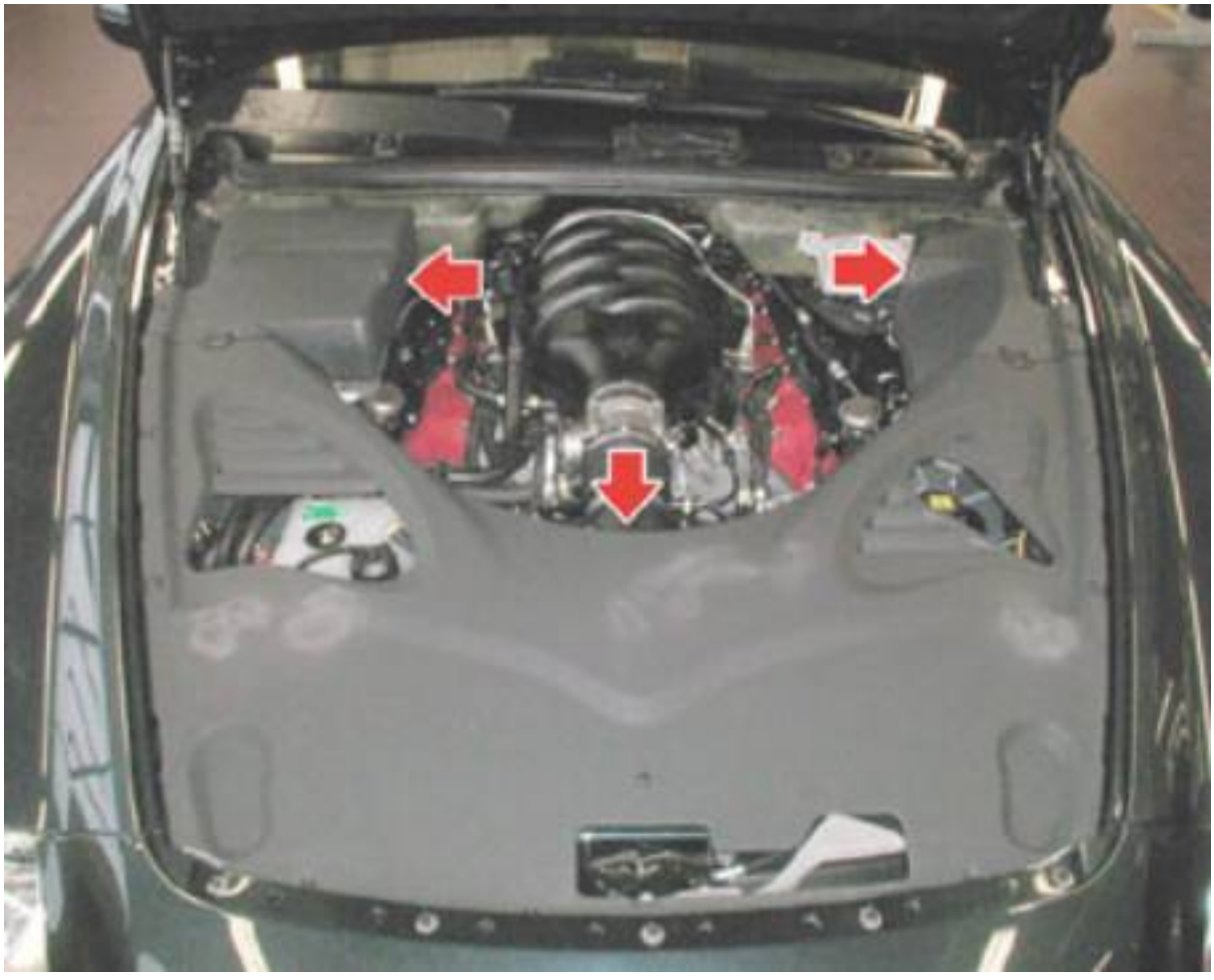
- Fit the starter motor shield.

- Fit the engine compartment fuse box holder.

- Fit the engine compartment fuse box

- Fit the engine compartment fuse box cover.

- Fit the trim panels.



- Carry out the engine floor guard refitting procedure.

Engine floor guard

- Carry out the central exhaust silencer refitting procedure.

Exhaust silencer

- Carry out the refitting procedure for the two exhaust extension pipes.

Exhaust extension pipe

- Carry out the refitting procedure for the exhaust tailpipes.

Tailpipe

- Top up the oil in the engine oil tank (using the prescribed oil) to the MAX level on the dipstick.
- Remove the vehicle from the hoist.

CENTRAL silencer

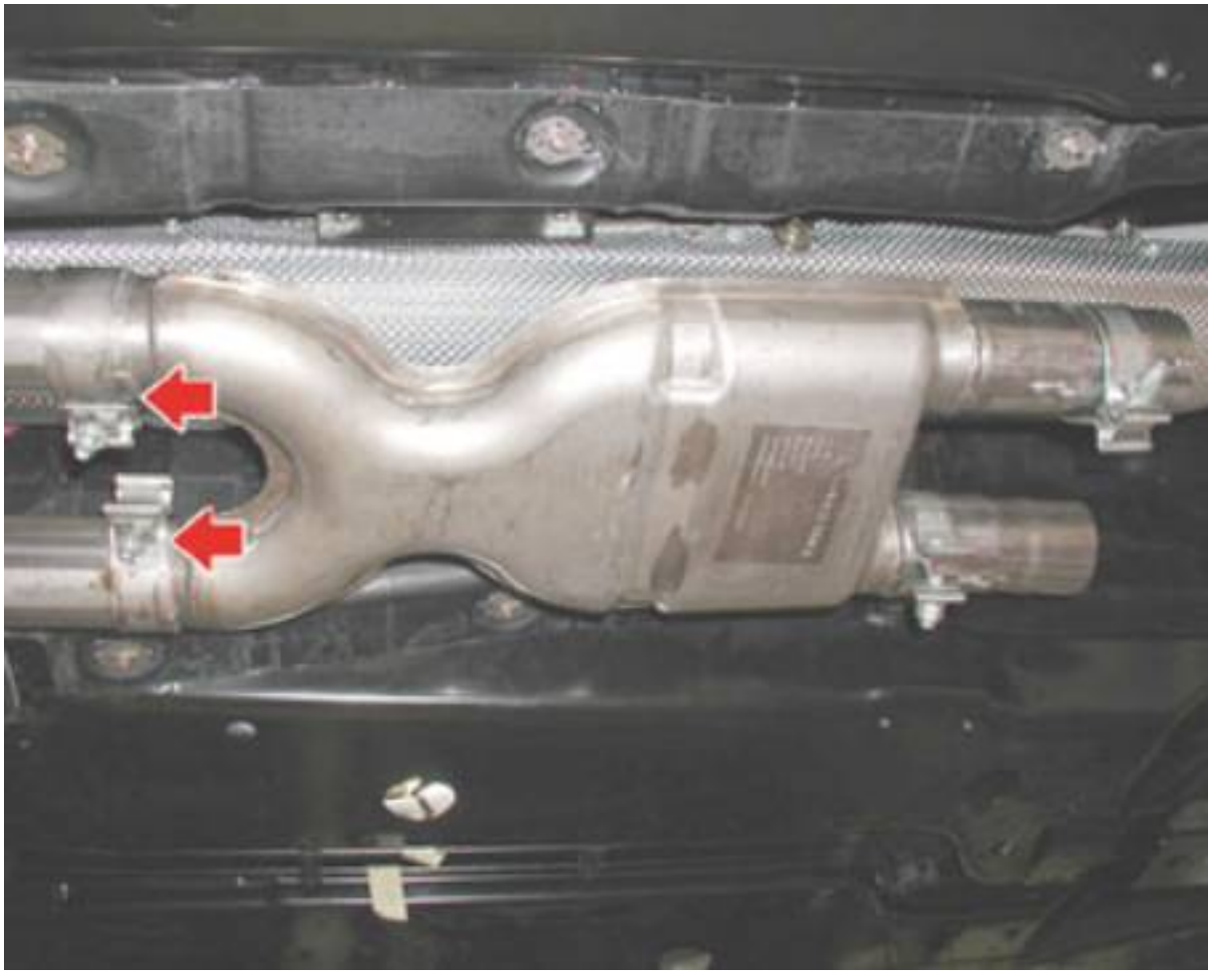
Removing the central silencer for the EUROPE version up to serial number 24274

IMPORTANT
After the procedure described below, we will describe the procedure for removing the central silencer of the USA - CANADA version and the EUROPE version from serial number 24275.

- Place the vehicle on the hoist.
- Remove both the catalytic converters.

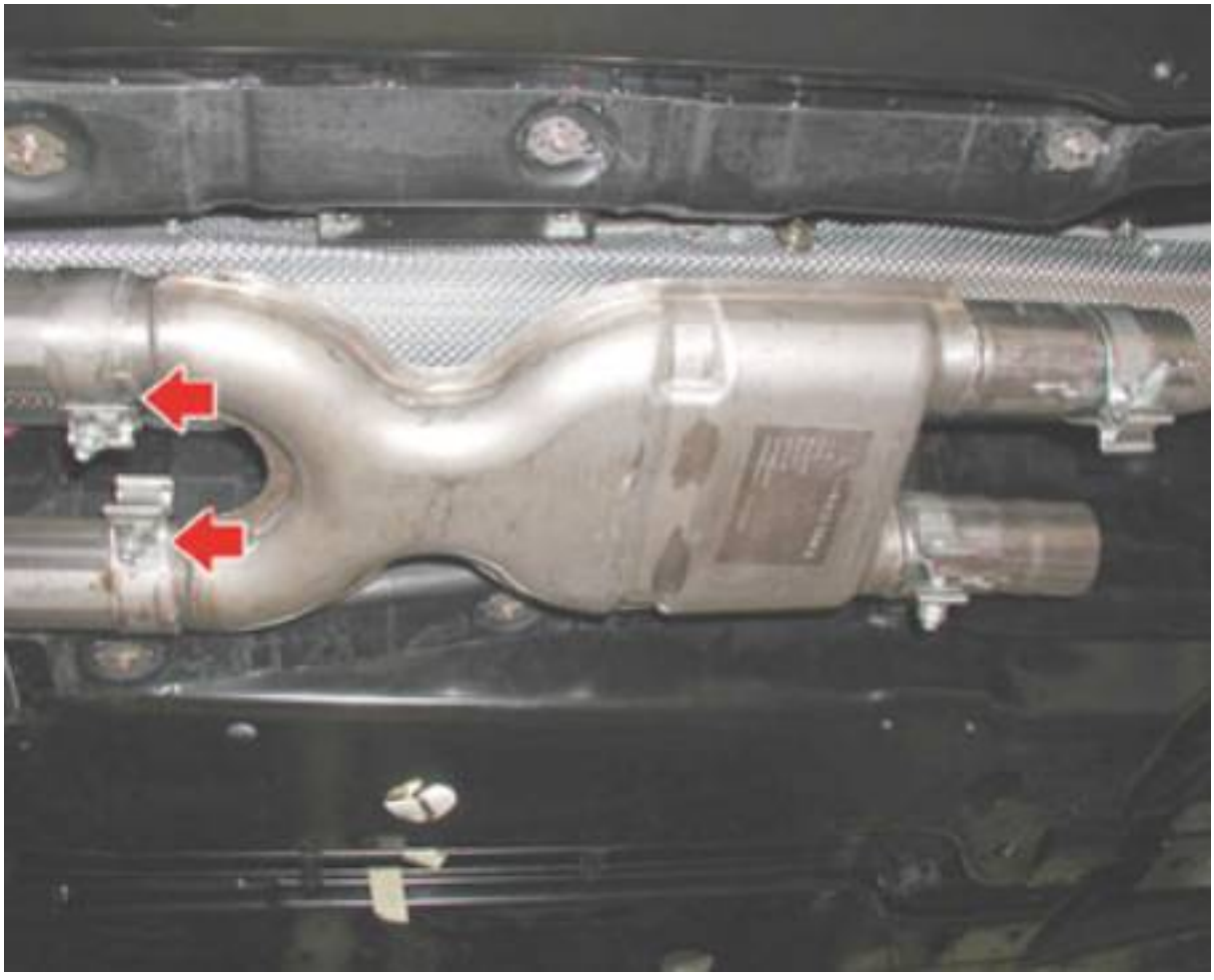
Removing-refitting the catalytic converter

- Unscrew the two clamps connecting the exhaust extension pipes and the central silencer, then remove it.



Refitting the central silencer for the EUROPE version up to serial number 24274

Fit the central silencer on the catalytic converter and tighten the fastening nuts on the clamps securing the silencers to the exhaust extension pipes to a torque of **54 Nm**



Removing the central silencer for all the USA – CANADA versions and the EUROPE version from serial number 24275

IMPORTANT
The exhaust pipe of the USA – CANADA vehicles has remained unchanged, while the EUROPE vehicles from serial number 24275 are equipped with the same exhaust pipe as the versions for the American/ Canadian markets.

- Place the vehicle on the hoist.
- Remove the exhaust tailpipes.

Tailpipe

- Remove the two exhaust extensions.

Exhaust extension pipe

- Unscrew the two linking clamps between the central silencer and the catalytic converters, then remove the central silencer.

Refitting the central silencer for all the USA – CANADA versions and the EUROPE version from serial number 24275

- Fit the central silencer on the catalytic converter and tighten the fastening nuts on the clamps to a torque of **54 Nm**.

Exhaust extension pipe

Removing the exhaust extension pipe for the EUROPE version up to serial number 24274

IMPORTANT
After the procedure described below, we will describe the procedure for removing the exhaust extension pipes of the USA - CANADA version and the EUROPE version from serial number 24275.

- Place the vehicle on the hoist.
- Remove both the catalytic converters.

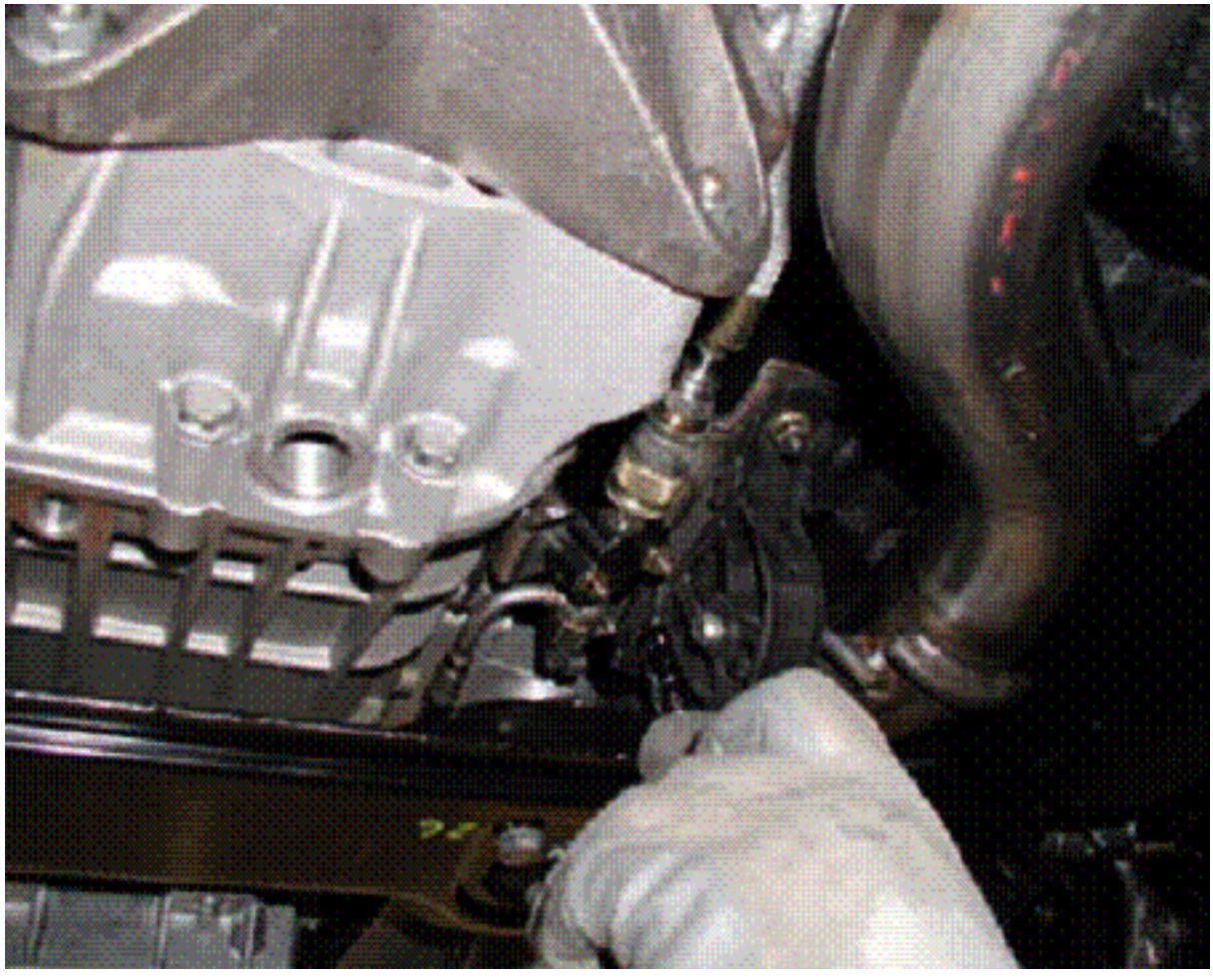
Removing-refitting the catalytic converters

- Remove the central silencer.

Removing-refitting the central silencer

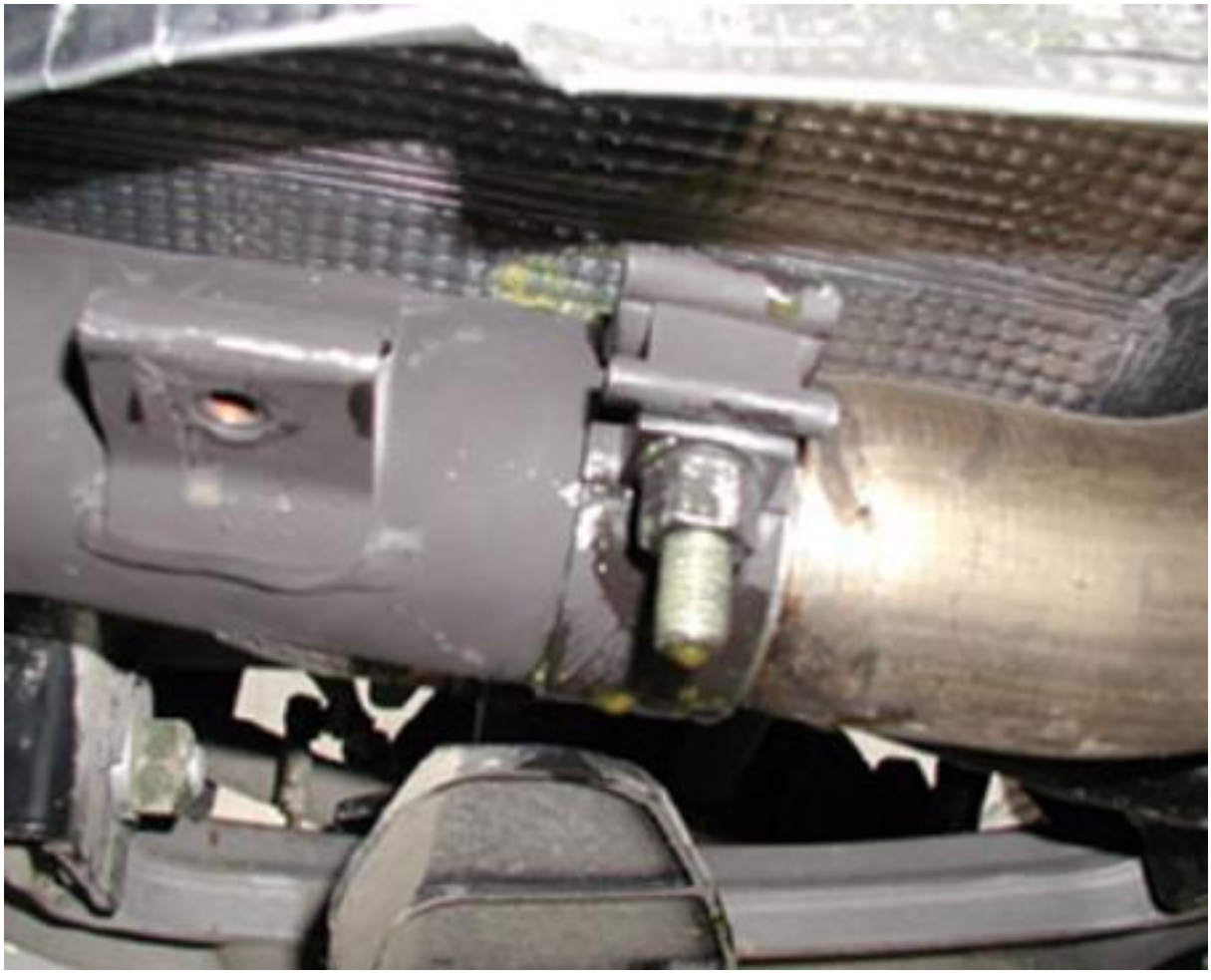
- Before removing the guard for the exhaust extension pipes, undo the fastening screws (five for the left-hand shield, two for the right-hand shield), then unscrew the clamp connecting the exhaust extension and the tailpipes.

- Unscrew the two fastening screws on the support, then extract the line.



Refitting the exhaust extension pipe for the EUROPE version up to serial number 24274

- Fit the extension for the exhaust line into the rear silencers and tighten the screws fastening the mounts to the bodywork.
- Tighten the nut securing the tailpipe fastening clamp to the exhaust extension pipes to a torque of **54 Nm**.



- Tighten the screws fastening the mounts to the bodywork to a torque of **24 Nm**.

- Fit the central silencer.

Removing-refitting the central silencer

- Fit both catalytic converters.

Removing-refitting the catalytic converters

- Remove the vehicle from the hoist.

Removing the exhaust extension pipe for all the USA – CANADA versions and the EUROPE version from serial number 24275

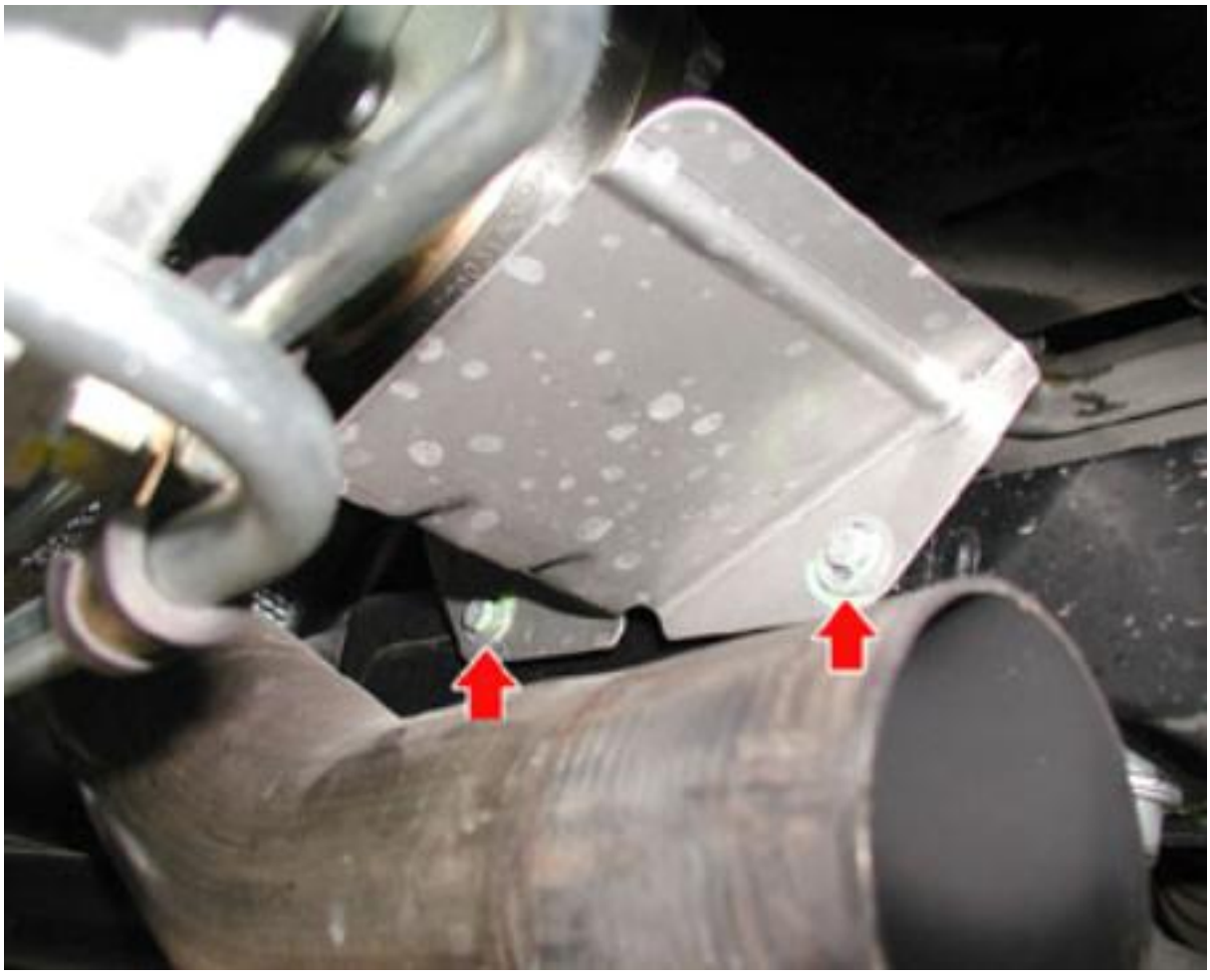
IMPORTANT
The exhaust pipe of the USA – CANADA vehicles has remained unchanged, while the EUROPE vehicles from serial number 24275 are equipped with the same exhaust pipe as the versions for the American/Canadian markets.

- Place the car on the hoist.
- Remove the exhaust tailpipes.

Tailpipe

- Undo the fastening screws and remove the heat guard on the left-hand exhaust line.

- Undo the fastening screws and remove the heat guard on the right-hand exhaust line.



- Unscrew the nuts fastening the mount for the right-hand exhaust extension to the bodywork.
- Carry out the same operation for the left-hand exhaust extension by undoing the screws fastening the extension pipe to the bodywork.

- Unscrew the two nuts fastening the metal clamps joining the exhaust tailpipes and central silencers.

- Remove the two exhaust extensions.

Refitting the exhaust extension pipe for all the USA – CANADA versions and the EUROPE version from serial number 24275

- Fit the exhaust tailpipes on the central silencers and tighten the fastening nuts on the fastening clamps to a torque of **54 Nm**

- Tighten the screws fastening the mounts to the bodywork to a torque of **24 Nm**.

- Fit the exhaust tailpipes.

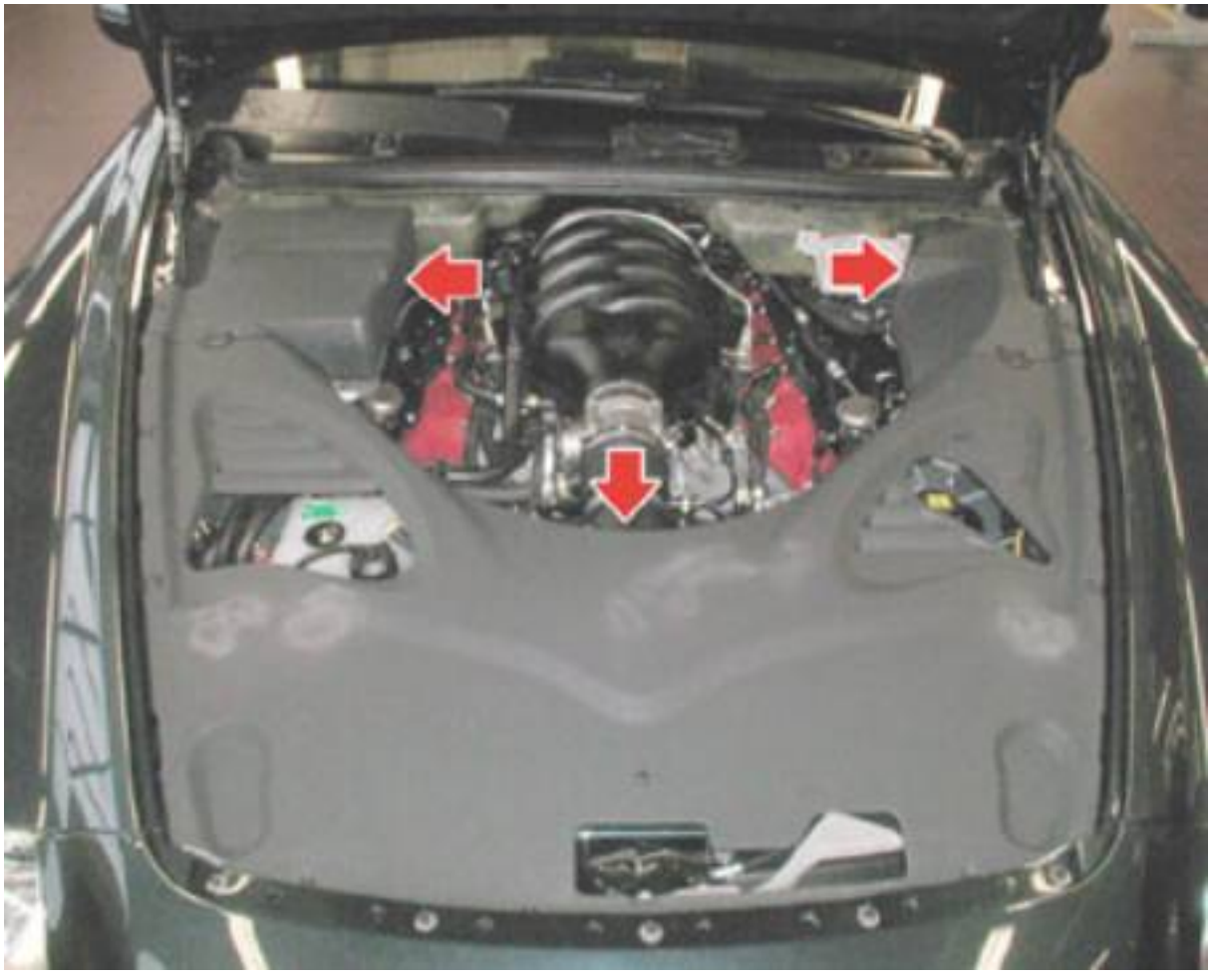
Tailpipe

- Remove the vehicle from the hoist.

ELECTRO-INJECTORS

Removing the electro-injectors

- Disconnect the battery's negative terminal.
- Remove the trim panels.



- To remove the electro-injectors positioned on the right-hand side, proceed as follows.
- Remove the complete windscreen wiper unit.

Removing-refitting the windscreen wiper unit

- Rotate the plastic screws fastening the engine compartment fuse box cover by 90°, then remove the cover.

- Undo the two fastening screws on the engine compartment fuse box.

- Unscrew the three fastening screws, and remove the engine compartment fuse box mount.

- Open the fastening clamps on the anti-evaporation / engine oil and fuel vapor recirculation system piping.

- Release the rigid fuel pipe from the two fastening clips.

- Unscrew the fuel line union on the injector manifold.

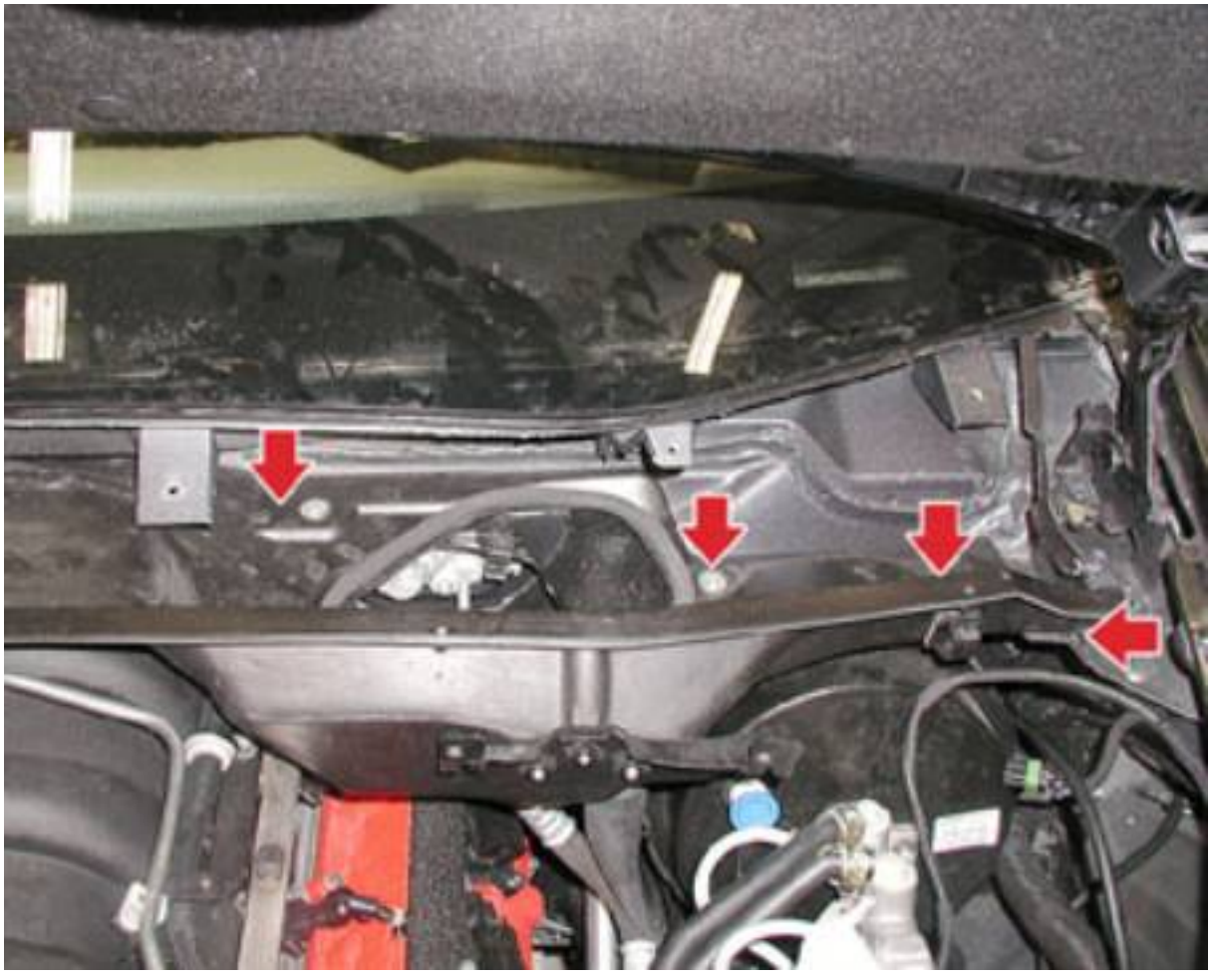
- Unscrew the fastening nuts on the bracket and remove it.

- Unscrew the brake oil tank fastening screws.

- Detach the electrical connection.

- Undo the screws fastening the connected devices' pan underneath the windscreen.

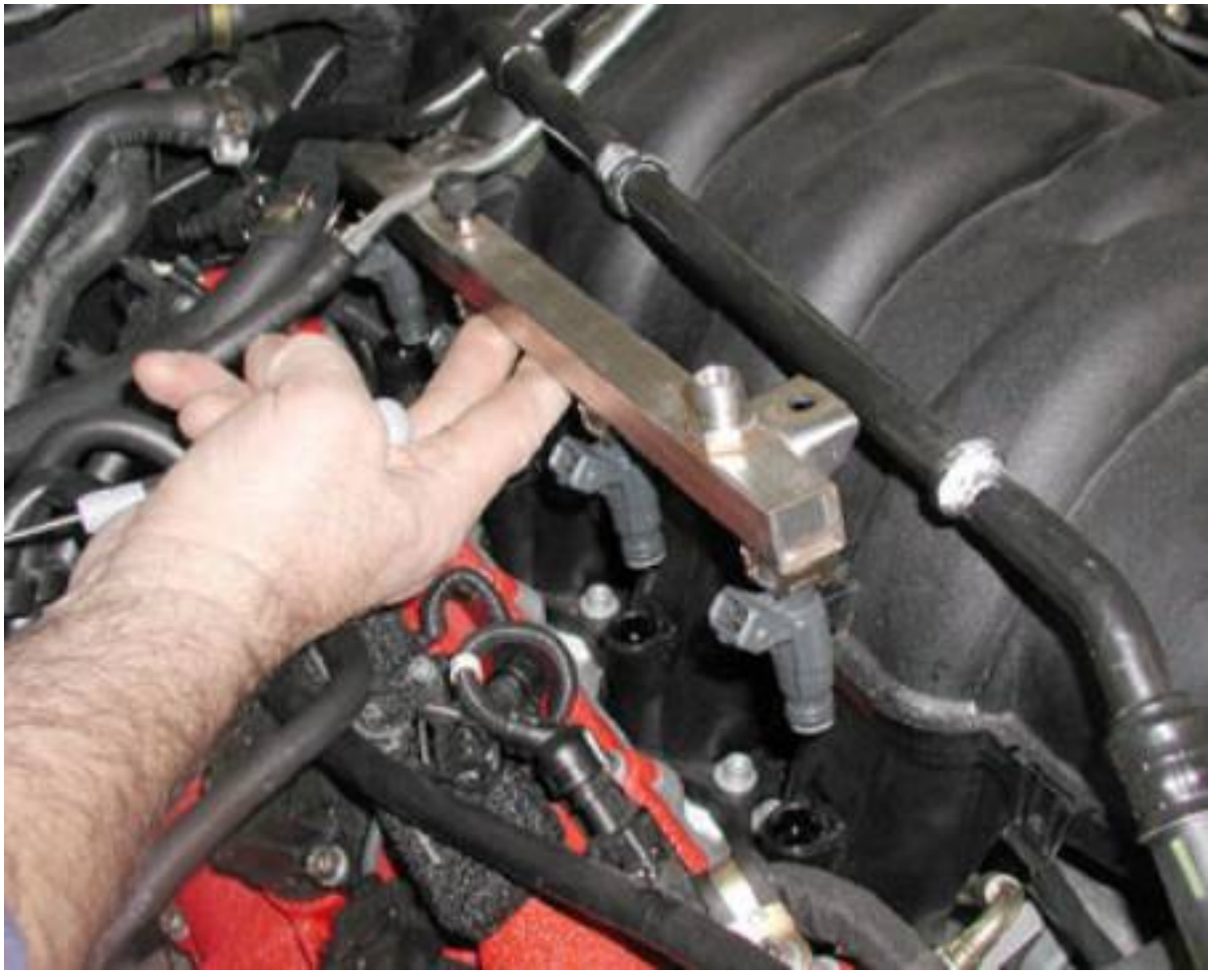
- Undo the screws fastening the left-hand connected devices' pan underneath the windscreen and remove the pan.



- Detach the electro-injectors’ electrical connections.

- Unscrew the fastening nuts on the fuel manifold.

- Remove the fuel manifold, complete with electro-injectors.



- With the fuel manifold on the bench, remove the clip and separate the electro-injector from the fuel manifold.

To remove the electro-injectors located on the left-hand side, proceed as follows.

- Unscrew the fuel line union, open the clamp and release the brake servo vacuum line.

- Unscrew the two fastening nuts on the bracket and remove it, opening the other two clamps fastening the brake servo vacuum line (not shown).

- Unscrew the two fastening nuts on the fuel connector and detach the electro-injectors’ electrical connections.

- Remove the fuel manifold, complete with electro-injectors.

- With the fuel manifold on the bench, remove the clip and separate the electro-injector from the fuel manifold.

Refitting the electro-injectors

- To fit the electro-injectors positioned on the left-hand side, proceed as follows:
- Fit the fuel manifold, complete with electro-injectors, attach the electric connections and tighten the two fastening nuts to a torque of 15 Nm.

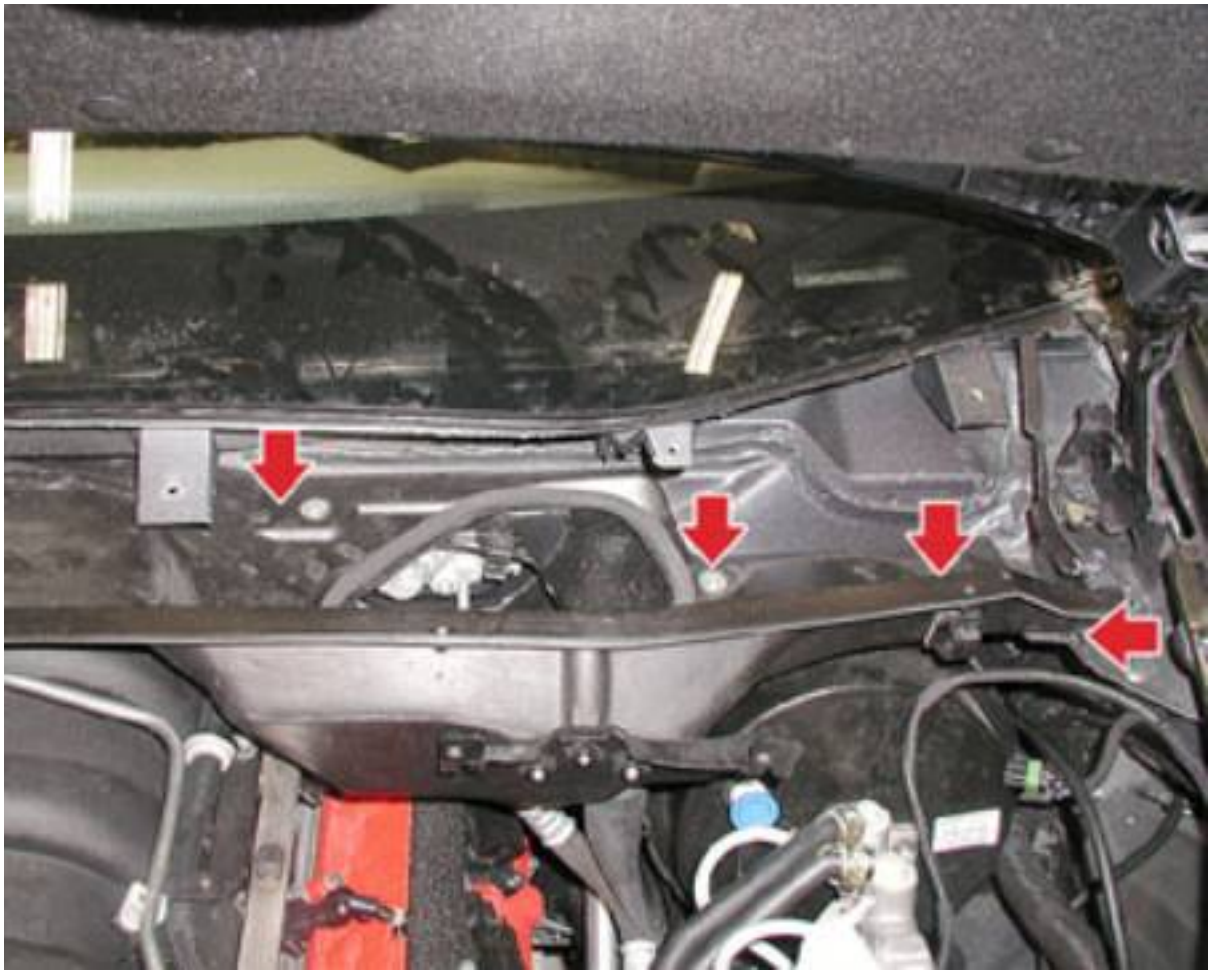
- Fit the bracket in the seat, connect the vacuum line to the two clamps (not shown) located near the shield, fully tighten the fastening nuts and secure the vacuum line with the last remaining clamp.

Tighten the fuel line union to a torque of **30 Nm**, and restrain the fuel line with the specific clip.

- To fit the electro-injectors positioned on the right-hand side, proceed as follows.
- Fit the electro-injectors on the fuel manifold, then mount the fuel manifold, tightening the nuts to a torque of **15 Nm**.

- Connect the electro-injectors’ electrical connections.

- Fit the connected devices' pan underneath the windscreen and tighten the left-hand fastening screws fully.



- Tighten the screws fastening the right-hand connected devices' pan underneath the windscreen fully.

- Attach the electrical connection.

- Fit the brake oil tank and fully tighten the fastening screws.

- Fit the bracket and screw up the fastening nuts.

- Tighten the fuel line union on the injectors manifold to a torque of **30 Nm**.

- Restrain the rigid fuel pipe with the two fastening clamps.

- Restrain the anti-evaporation / engine oil and fuel vapour recirculation system piping using the clamps indicated.

- Fully tighten the three fastening screws on the engine compartment fuse box.

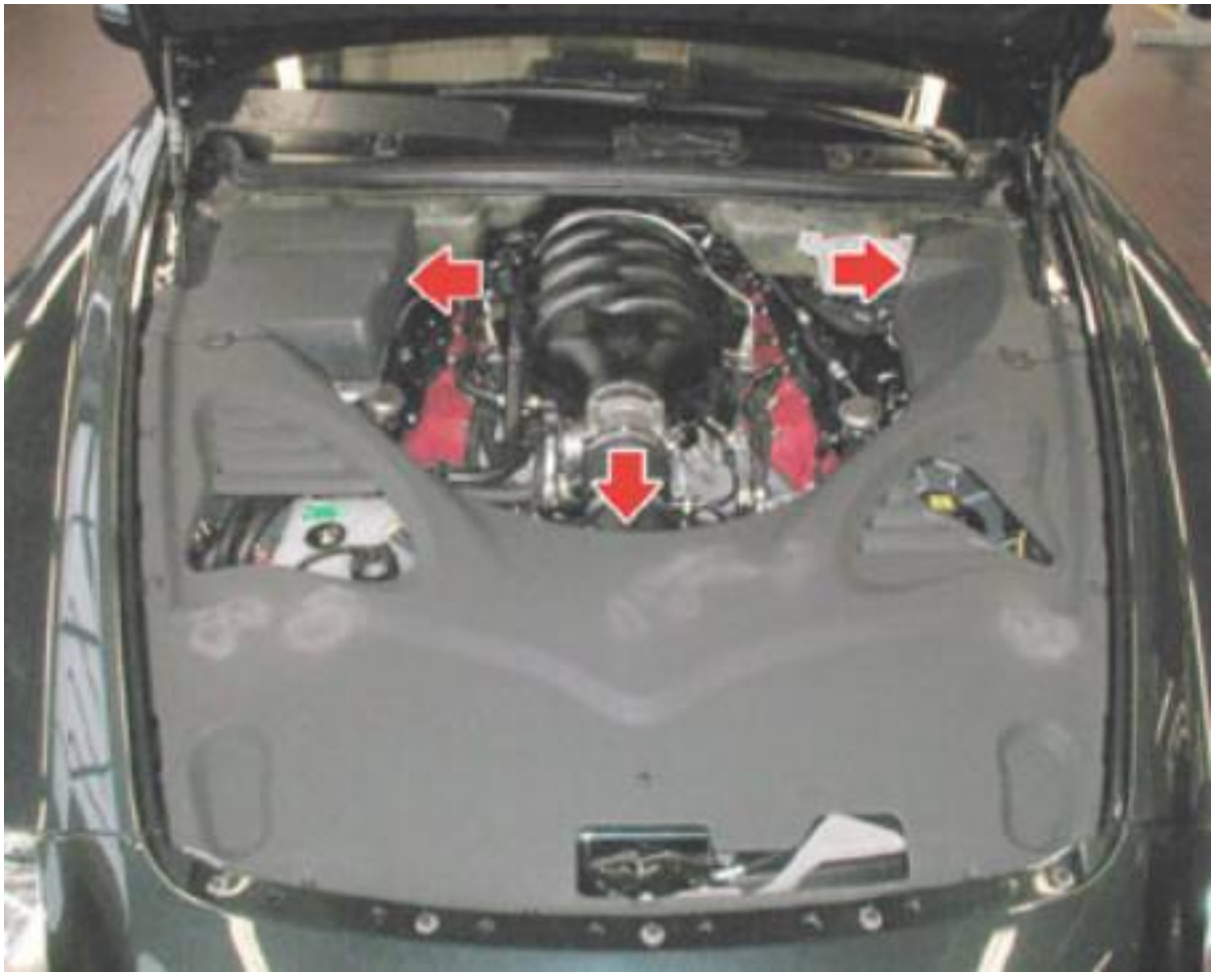
- Fully tighten the two fastening screws on the engine compartment fuse box.

- Fit the fuse box cover and rotate the plastic screws by 90°.

- Fit the complete windscreen wiper unit.

Removing-refitting the windscreen wiper unit

- Connect the battery’s negative terminal, turn the key to the ON position and perform a visual check to ensure there are no leaks from the injectors.
- Fit the engine compartment trim covers (this operation is the same for both procedures).



- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to the section:

Component self-learning in the event of battery disconnection

BATTERY

Disconnecting-reconnecting the battery

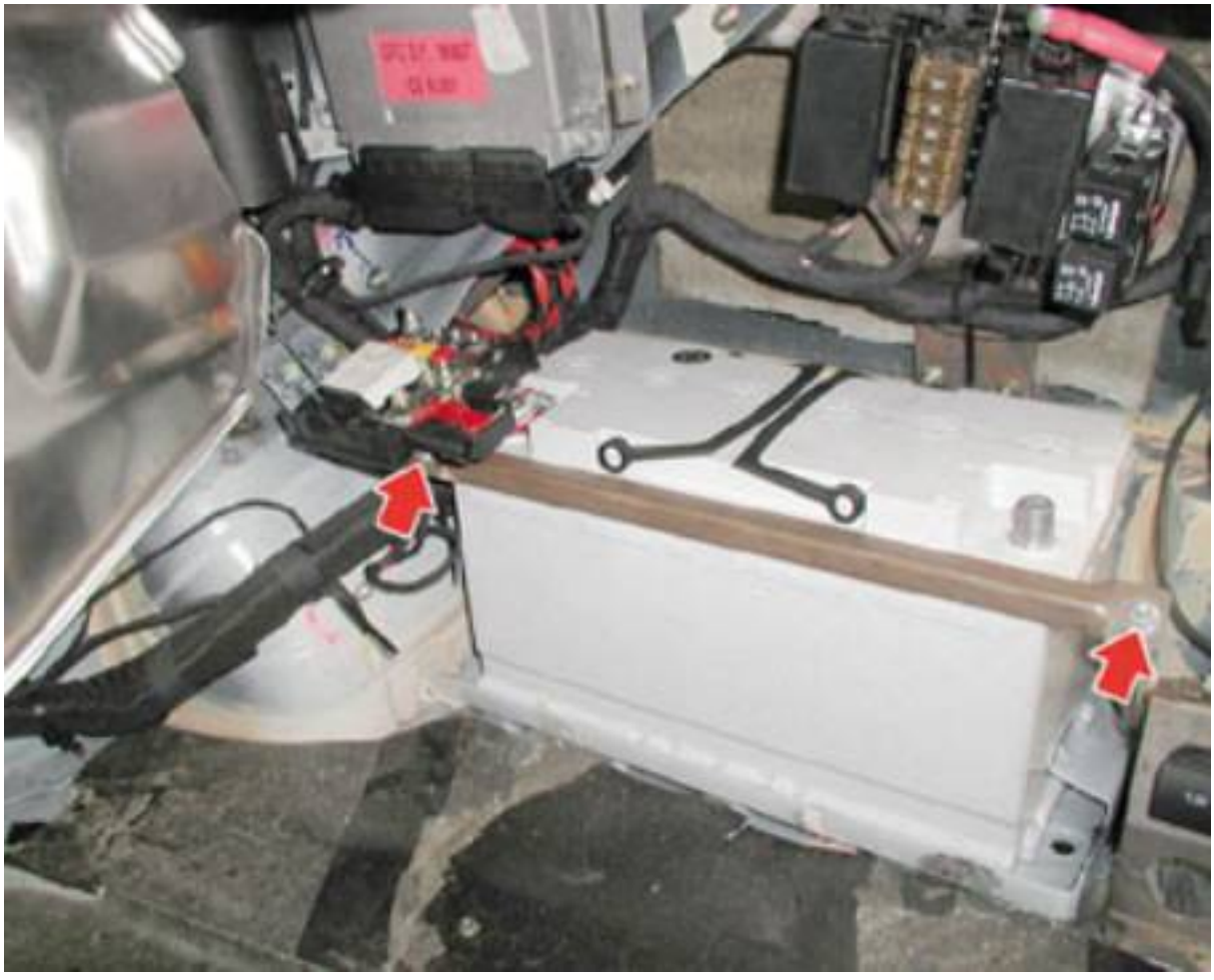
- Remove the right-hand internal flap.

- Remove the five fastening screws on the rear covering panel, then remove it.

- After removing the spare wheel housing cover, unscrew the covering panel's six fastening screws and remove it.

- Remove the right-hand cover, releasing the upper fastening button first.

- Unscrew the two fastening nuts on the battery's retaining bracket.



- Disconnect the battery's terminals.

When refitting, follow the above procedures in reverse order

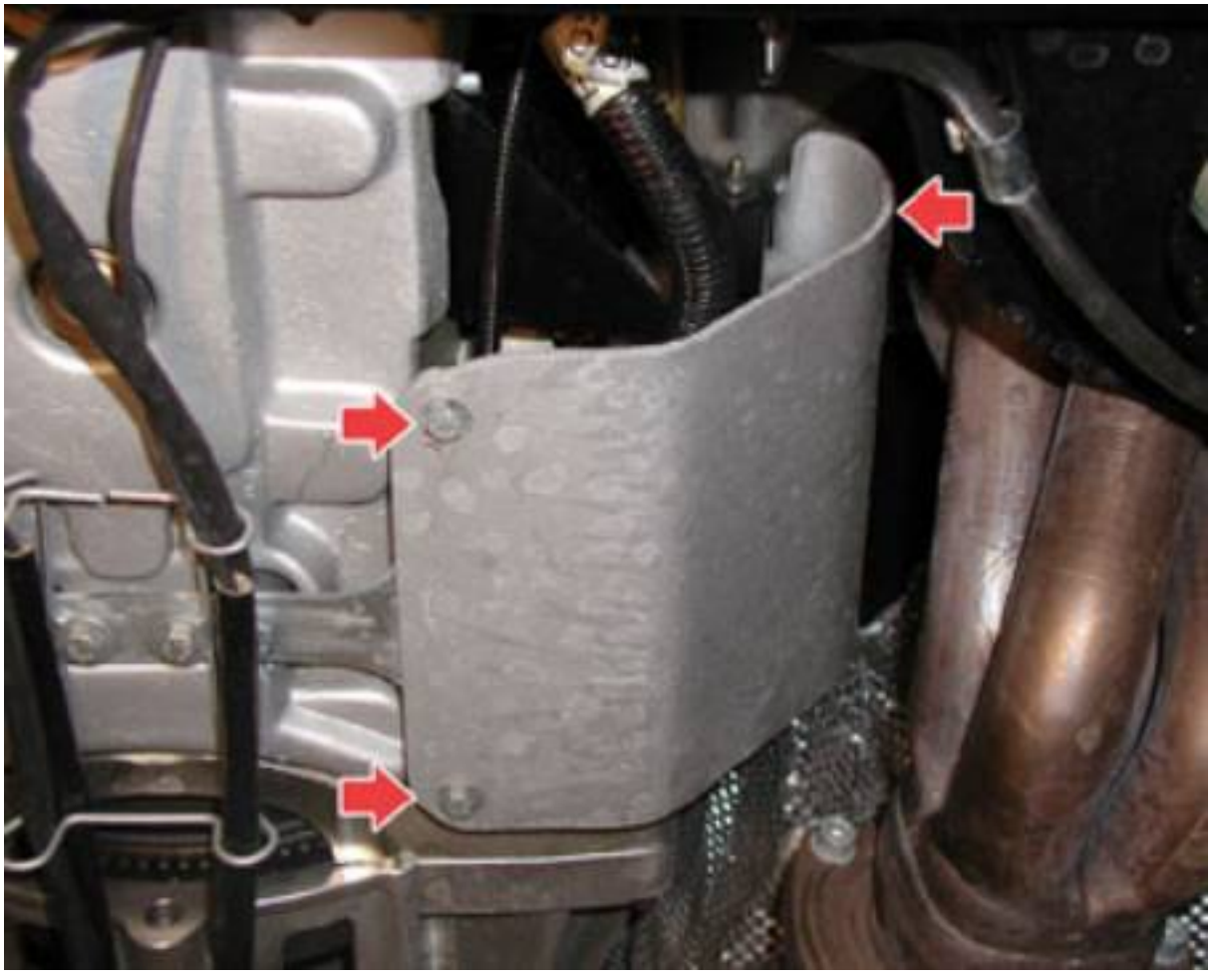
- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to the section:

Component self-learning in the event of battery disconnection

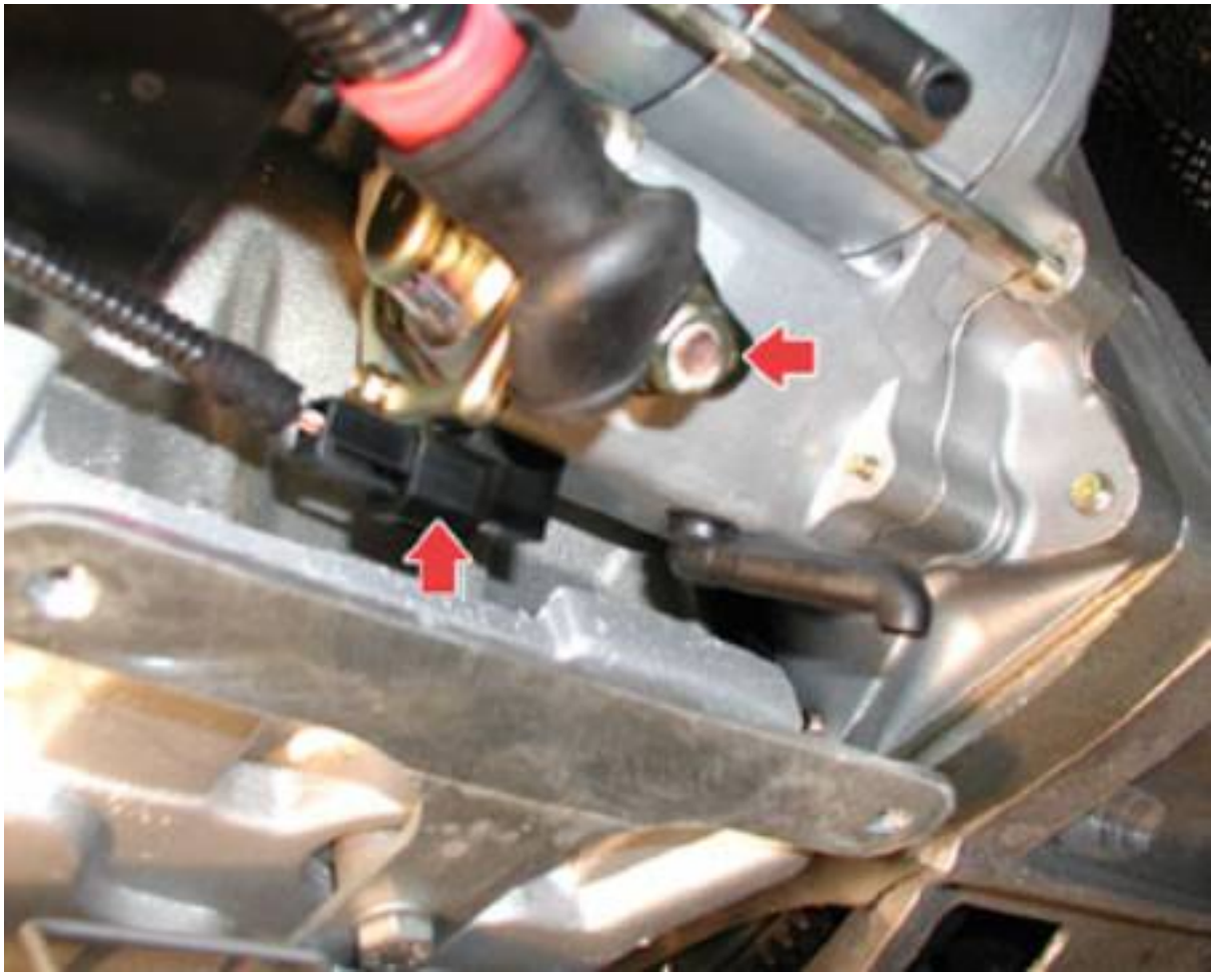
STARTER MOTOR

Removing the starter motor

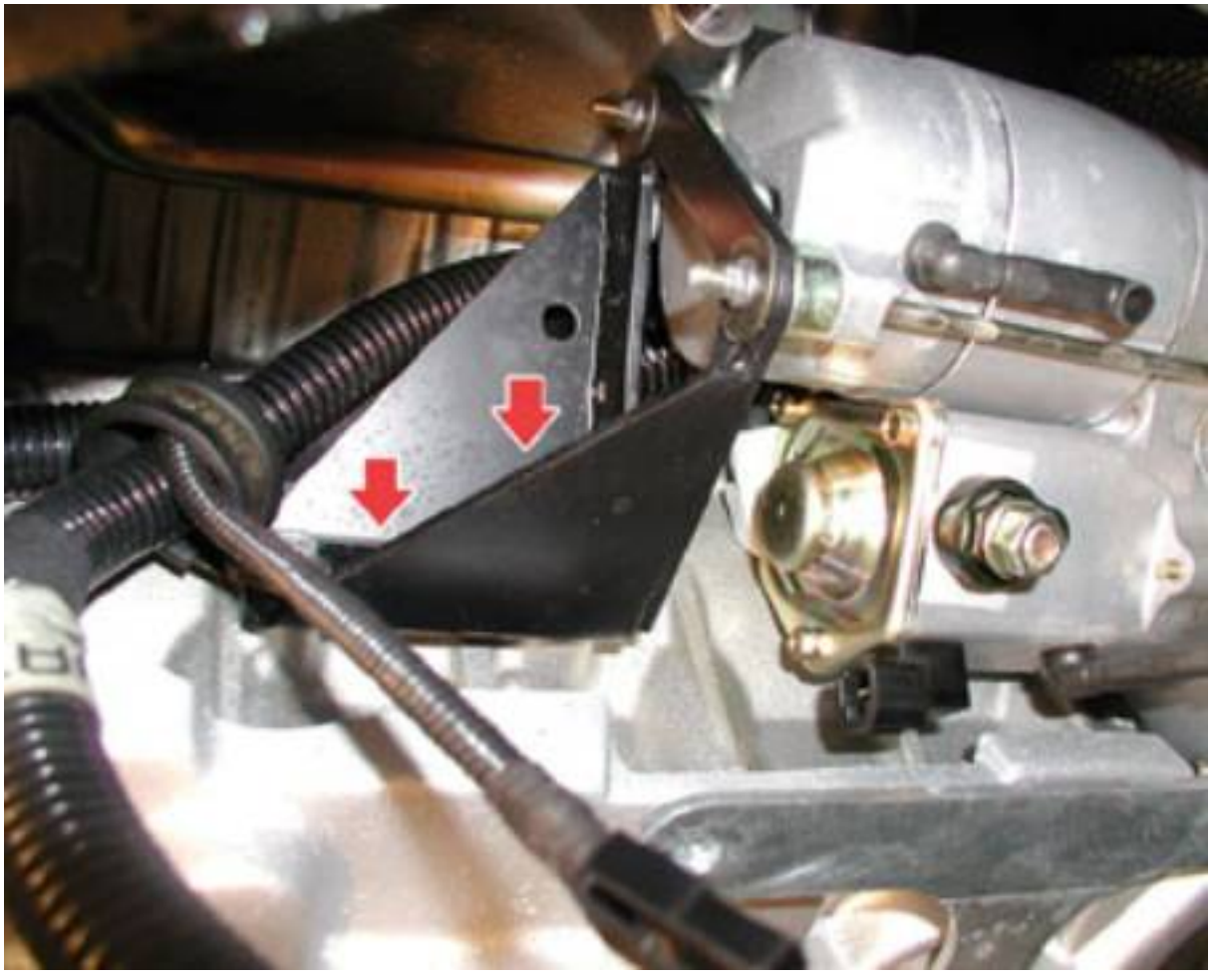
- Place the car on the hoist.
- Disconnect the battery's negative terminal.
- Lift the car, undo the three fastening screws and remove the starter motor guard.



- Lift the rubber guard and unscrew the nut fastening the starter motor power supply cable, then detach the electrical connection.



- Undo the screws fastening the starter motor reinforcing bracket.



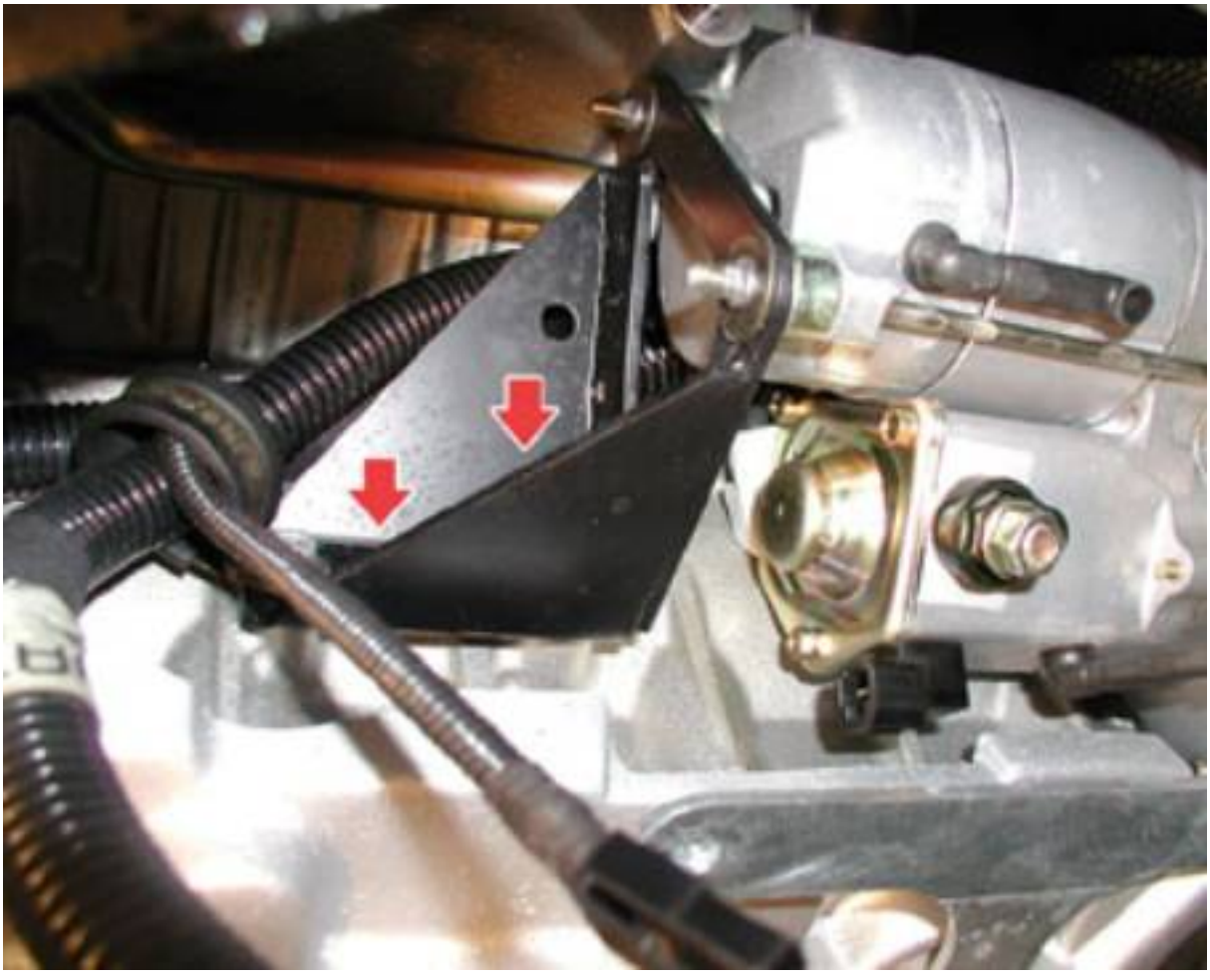
- Undo the three fastening screws on the starter motor.

- Remove the starter motor.

Refitting the starter motor

- Fit the starter motor and tighten the three fastening screws to a torque of **24 Nm**.

- Tighten the two screws fastening the reinforcing bracket to the gearbox to a torque of **7.4 Nm**.



When refitting, follow the remaining procedures in reverse order

- After connecting the negative battery terminal, the following self-learning operations are necessary to ensure certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

FUEL TANK

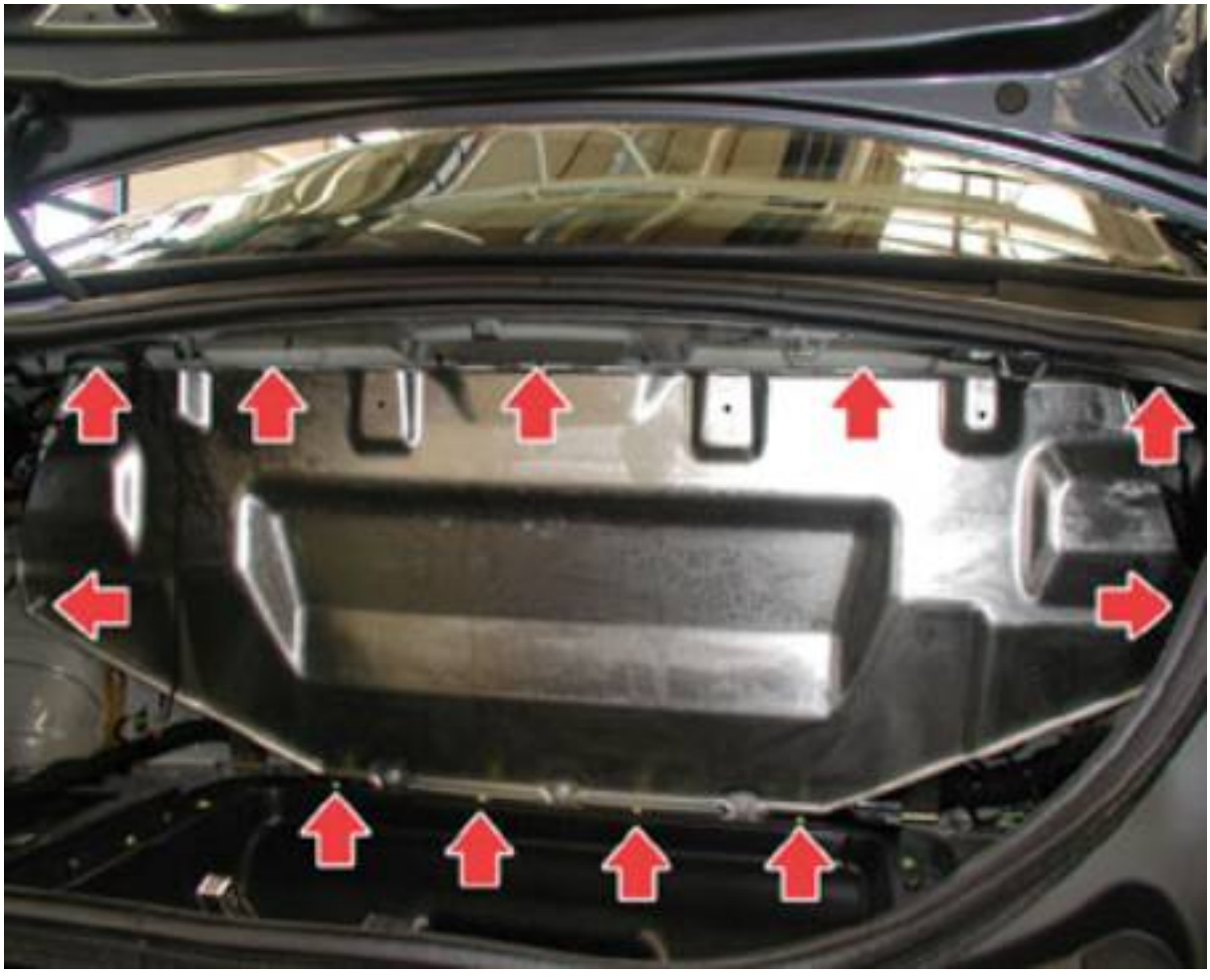
Removing the fuel tank

- Disconnect the battery's negative terminal.
- Remove all the luggage compartment trim panels.

Luggage compartment trim panels

N.B.
Before working on the tank, make sure it is either empty or that there is a small amount of fuel in it. Suck the fuel out of the tank using suitable suction equipment and protections, in compliance with the safety regulations currently in force, DO NOT SMOKE AND DO NOT USE NAKED FLAMES

- Undo the screws and the fastening nuts and remove the protective guard for the fuel tank.



- Detach the quick coupling for the recirculation system from the fuel tank.

- Detach the electrical connection for the fuel tank wiring.

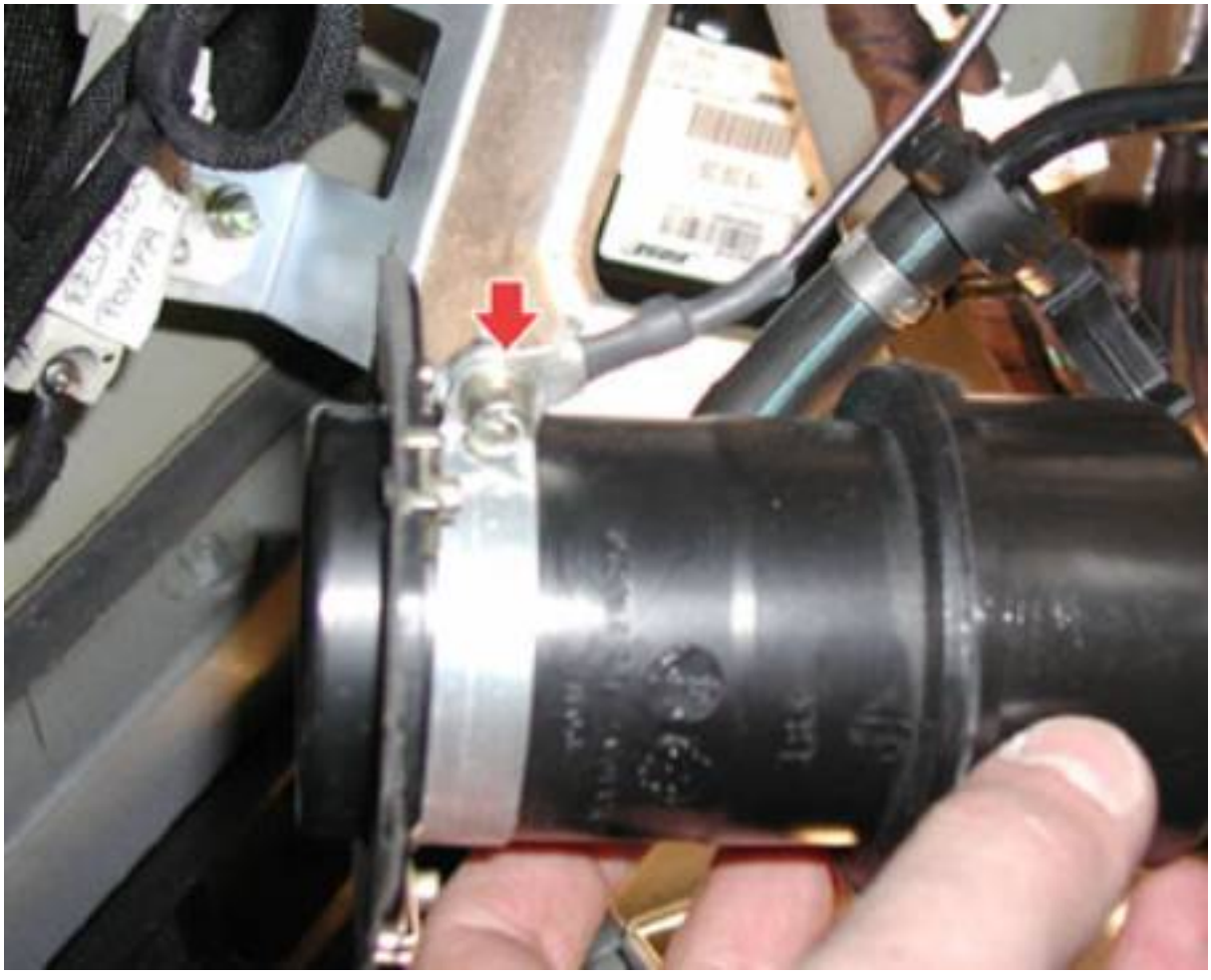
- Undo the screws fastening the tank wiring to the bodywork.

- Open the flap, undo and remove the fuel filler neck cap from its seat.

- Undo the four fastening screws on the filler neck.

- Disconnect the flexible section of the fuel tank filler pipe.

- Undo the screw, disconnect the earth cable, then remove the fuel filler pipe.



ALL VERSIONS EXCEPT USA- CANADA

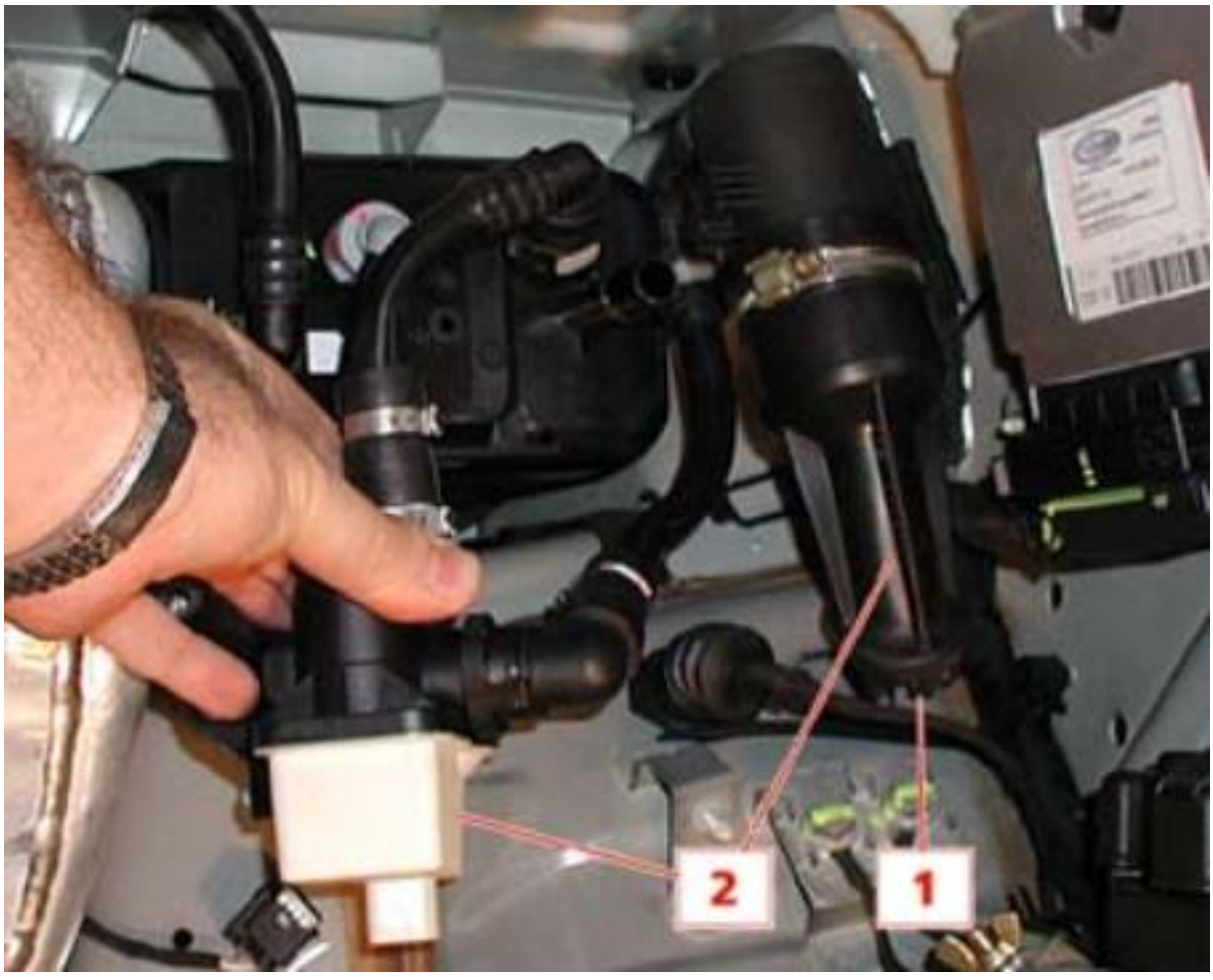
- Disconnect the two anti-evaporation system pipes from the active carbon filter.

USA - CANADA VERSION

- Disconnect the connection **(1),** detach the piping from the quick coupling **(2),** then undo the screws **(3)** fastening the diagnosis pump to the fuel tank.

USA - CANADA VERSION

- Lift the anti-evaporation system filter, disengaging the lower rubber couplings **(1)** from the bodywork, then remove the pump-filter assembly **(2)**.



USA - CANADA VERSION

- Detach the quick coupling on the anti-evaporation piping.

ALL EU – USA – CND VERSIONS up to assembly no. 24274

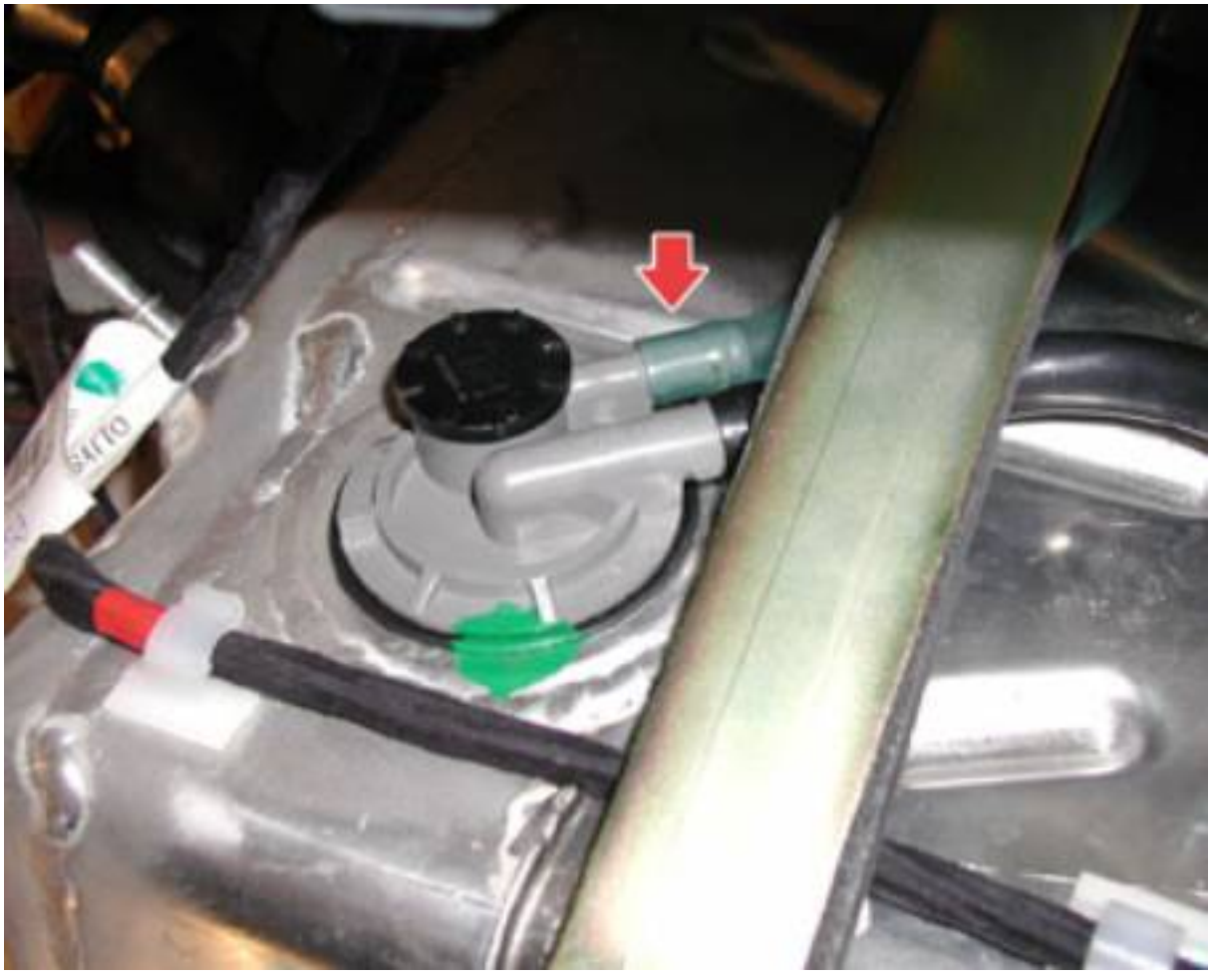
- Undo the two fastening screws on the tank retaining brackets.

ALL EU – USA – CND VERSIONS from assembly no. 24275

- Undo the two fastening screws on the tank retaining brackets.

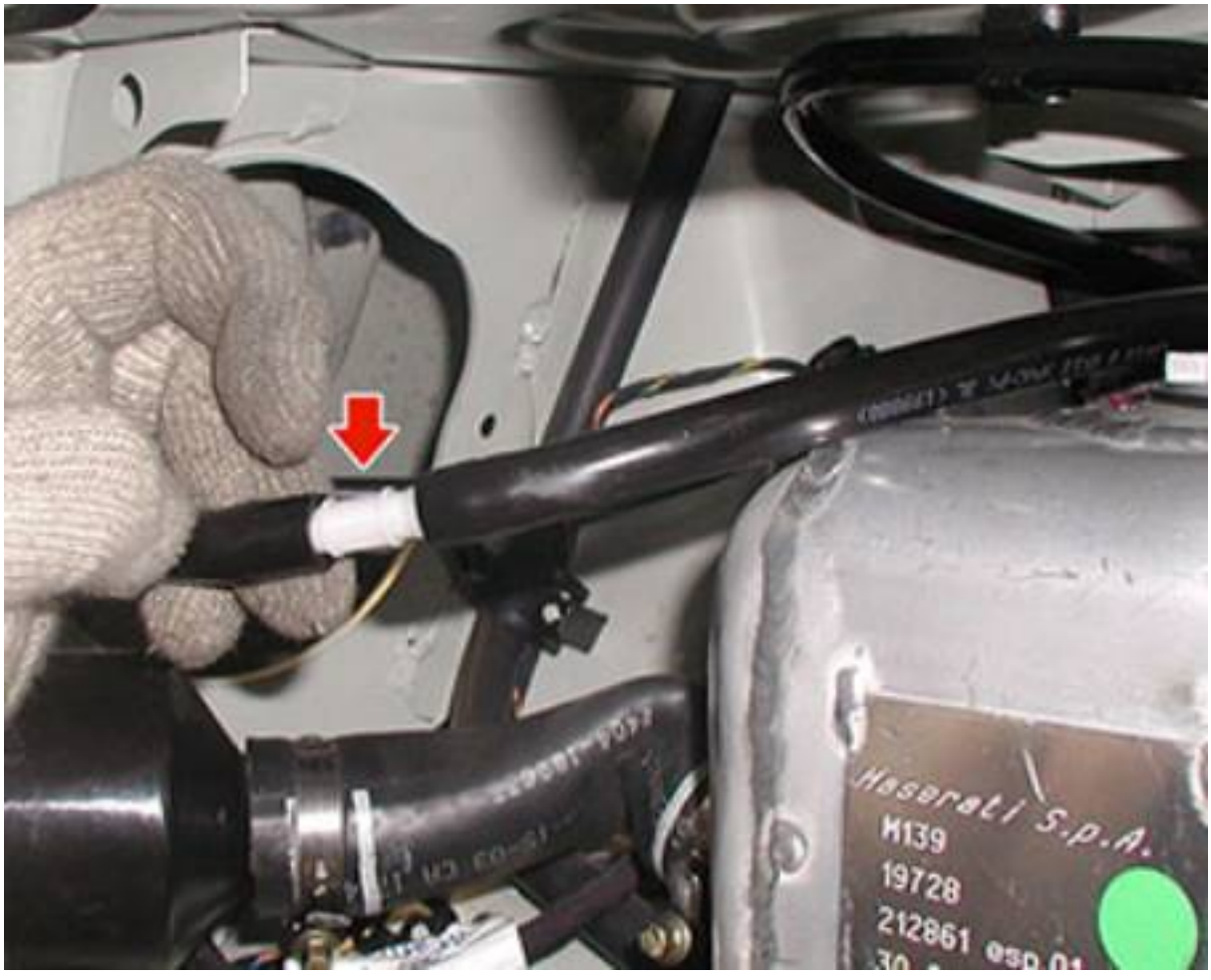
ALL EU – USA – CND VERSIONS up to assembly no. 24274

- Move the fuel tank backwards and disconnect the breather pipe from the ventilation valve.



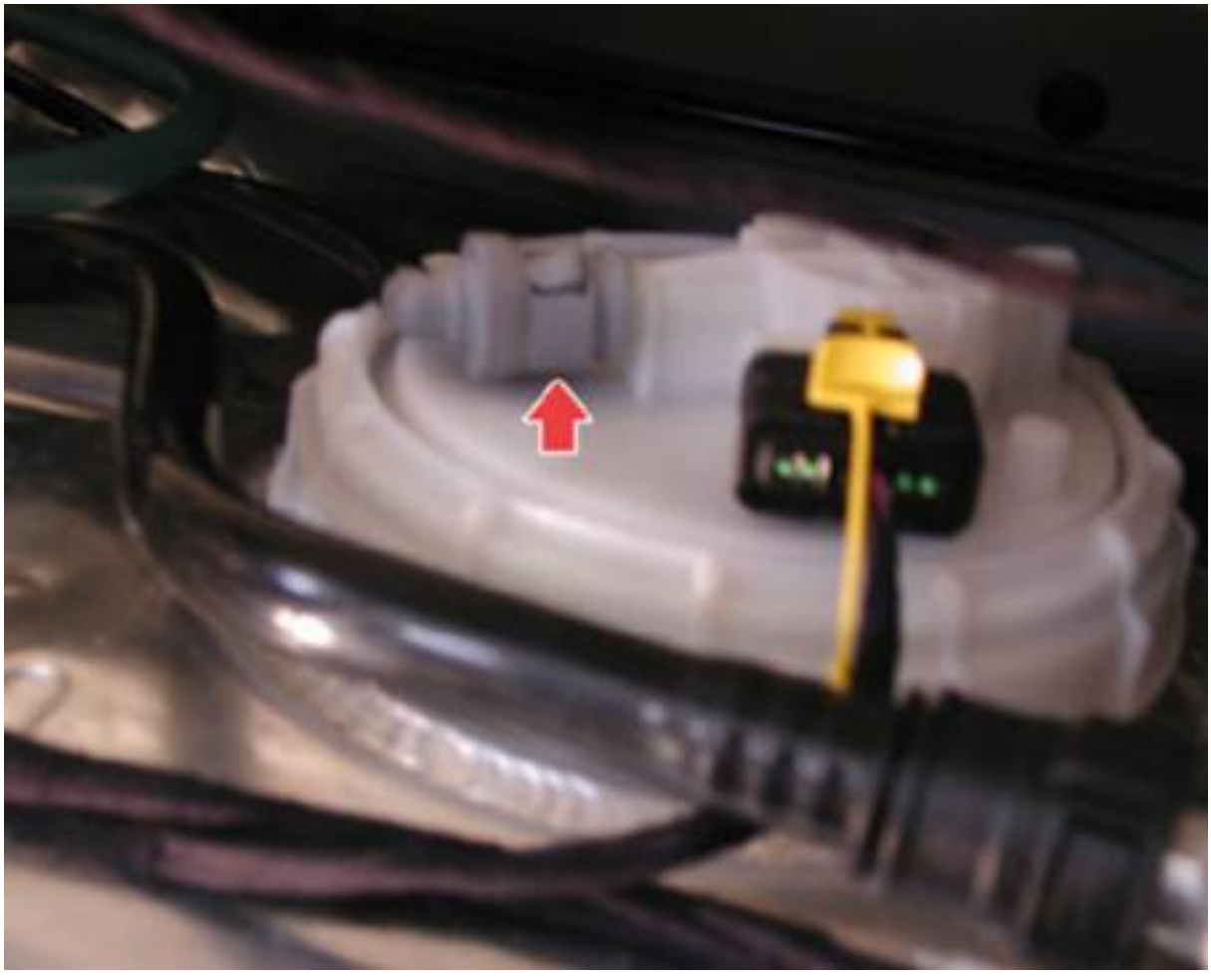
ALL EU – USA – CND VERSIONS from assembly no. 24275

- Move the fuel tank backwards and disconnect the ventilation valve breather pipe from the union.



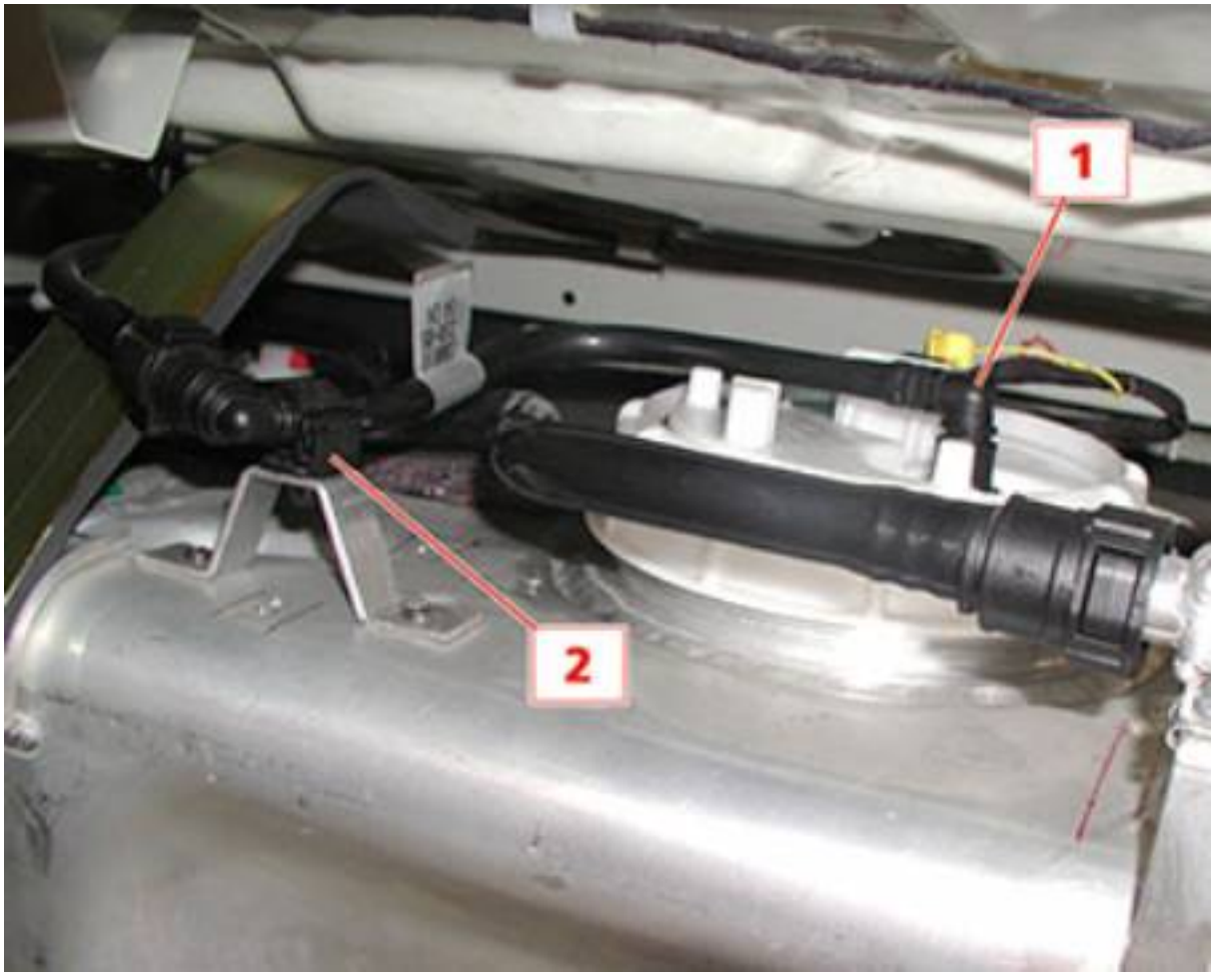
ALL EU – USA – CND VERSIONS up to assembly no. 24274

- Disconnect the delivery pipes from both the motor-driven fuel pumps.



ALL EU – USA – CND VERSIONS from assembly no. 24275

- Disconnect the fuel delivery pipe from the coupling **(1)** on the pump and release the pipe from the clamp **(2)**.



ALL EU – USA – CND VERSIONS up to assembly no. 24274

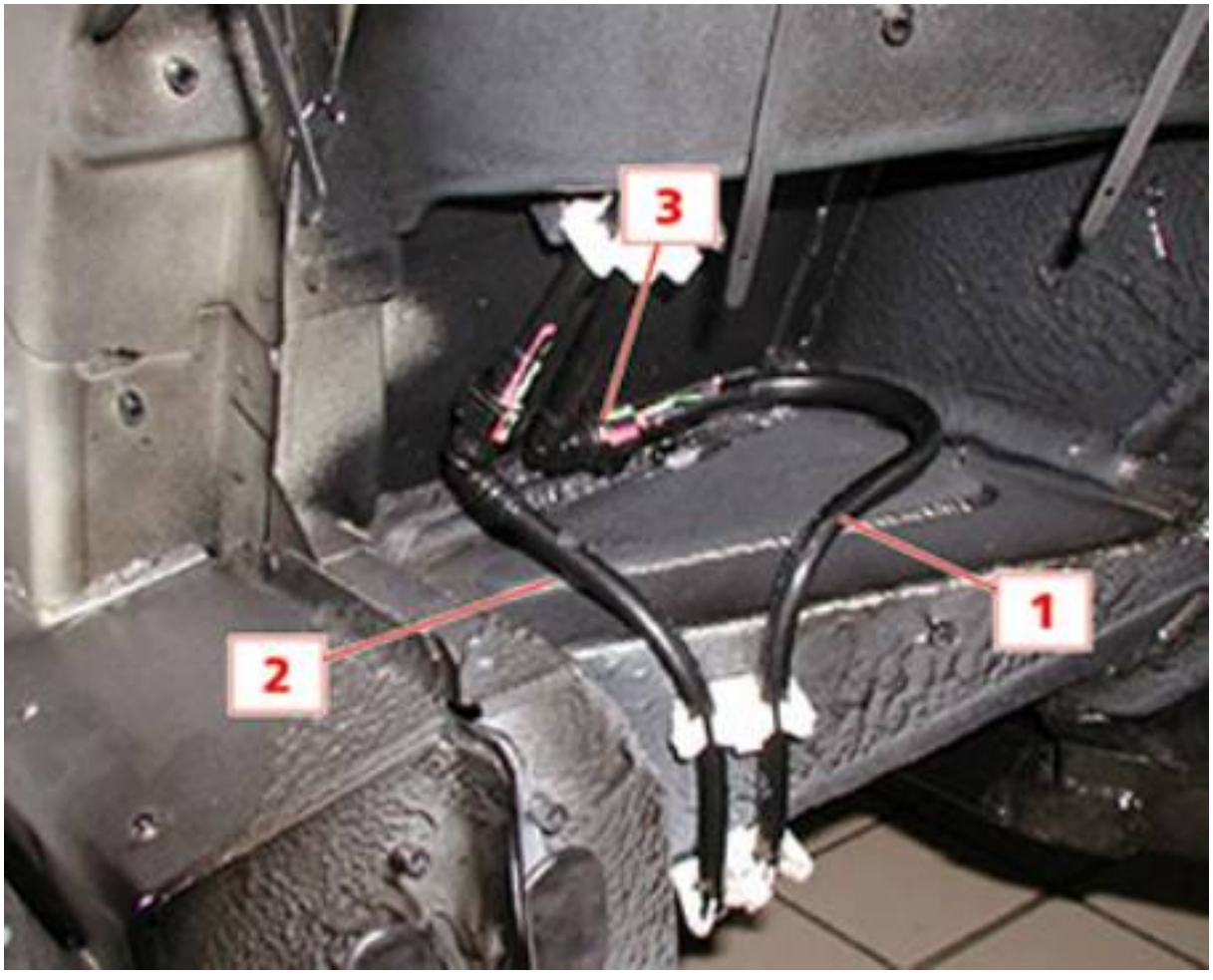
- Remove the fuel tank, taking care not to damage the cable bundle secured to the floor, near the base of the said tank.

ALL EU – USA – CND VERSIONS from assembly no. 24275

- Remove the fuel tank, taking care not to damage the cable bundle secured to the floor, near the base of the said tank.
- The new tank is made of the same material and has the same dimensions as the previously fitted tank. It differs in that it is equipped with only one electric fuel pump and in the path of the fuel pipes.

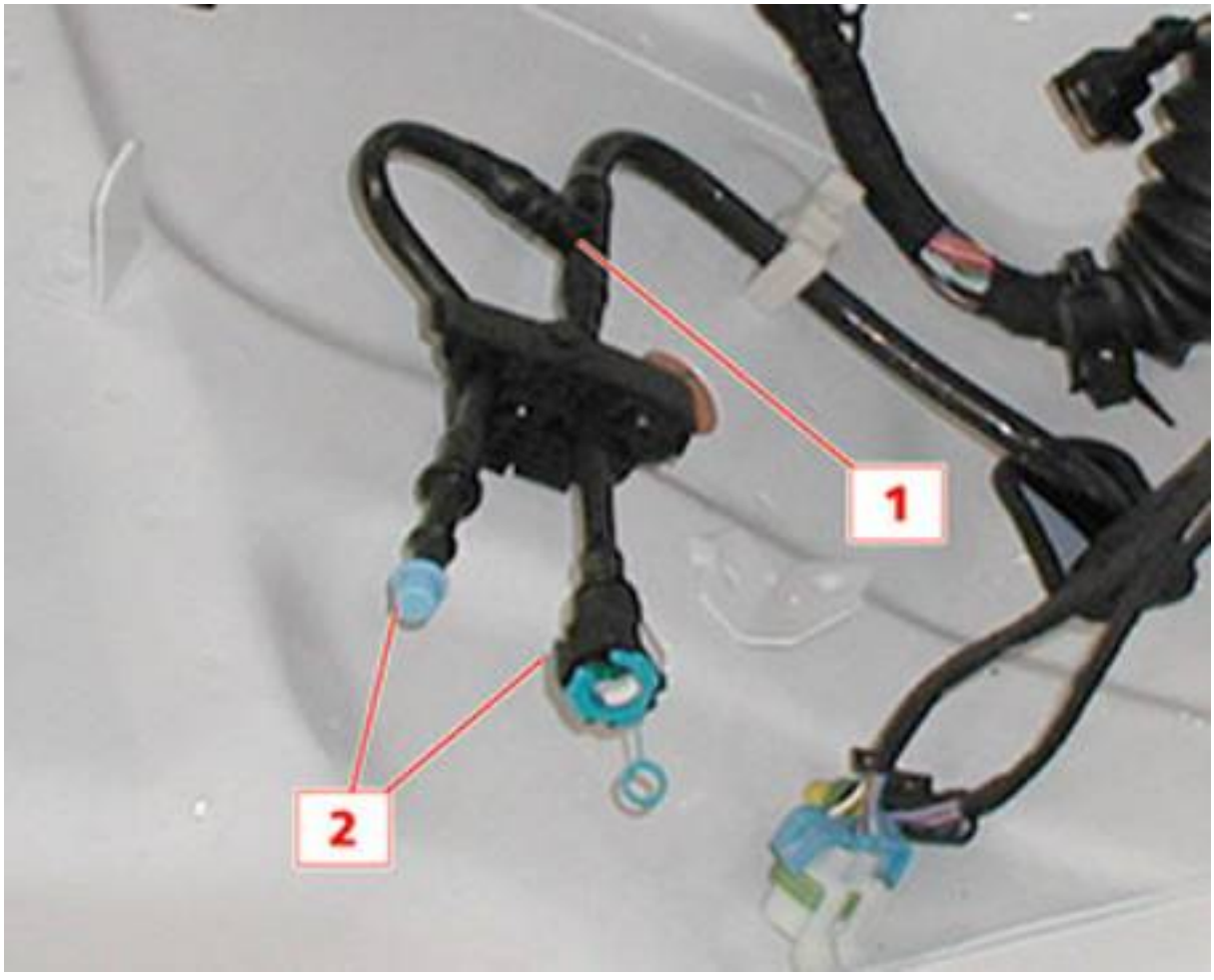
ALL EU – USA – CND VERSIONS from assembly no. 24275

- The fuel pipe **(1)** runs in the underbody parallel to the pipe **(2)** that leads from the active carbon filter to the vapour on-off solenoid valve. The lower section of the fuel pipe is connected to the engine compartment pipe section by means of a quick-coupling **(3)** in the area of the right-hand front dust guard.



ALL EU – USA – CND VERSIONS from assembly no. 24275

- The delivery pipe that runs from the quick-coupling (see previous figure) to the engine compartment is equipped with a **T-union (1)** so that it can be split into two delivery pipes **(2)** for the two cylinder banks.



Refitting the fuel tank

- If you have to replace the tank, you will need to remove the following components, referring to this service manual for each individual operation.

Motor-driven fuel pump pan assemblies

Anti-evaporation system

- If you refit the tank just removed, clean and wash it out carefully.
- Fit the fuel tank in the luggage compartment and position it in its seat, then connect the two quick couplings on the fuel lines.
- Connect the breather pipe from the ventilation valve.
- Tighten the two fastening screws on the tank retaining brackets to a torque of **12 Nm**.

ALL VERSIONS EXCEPT USA- CANADA

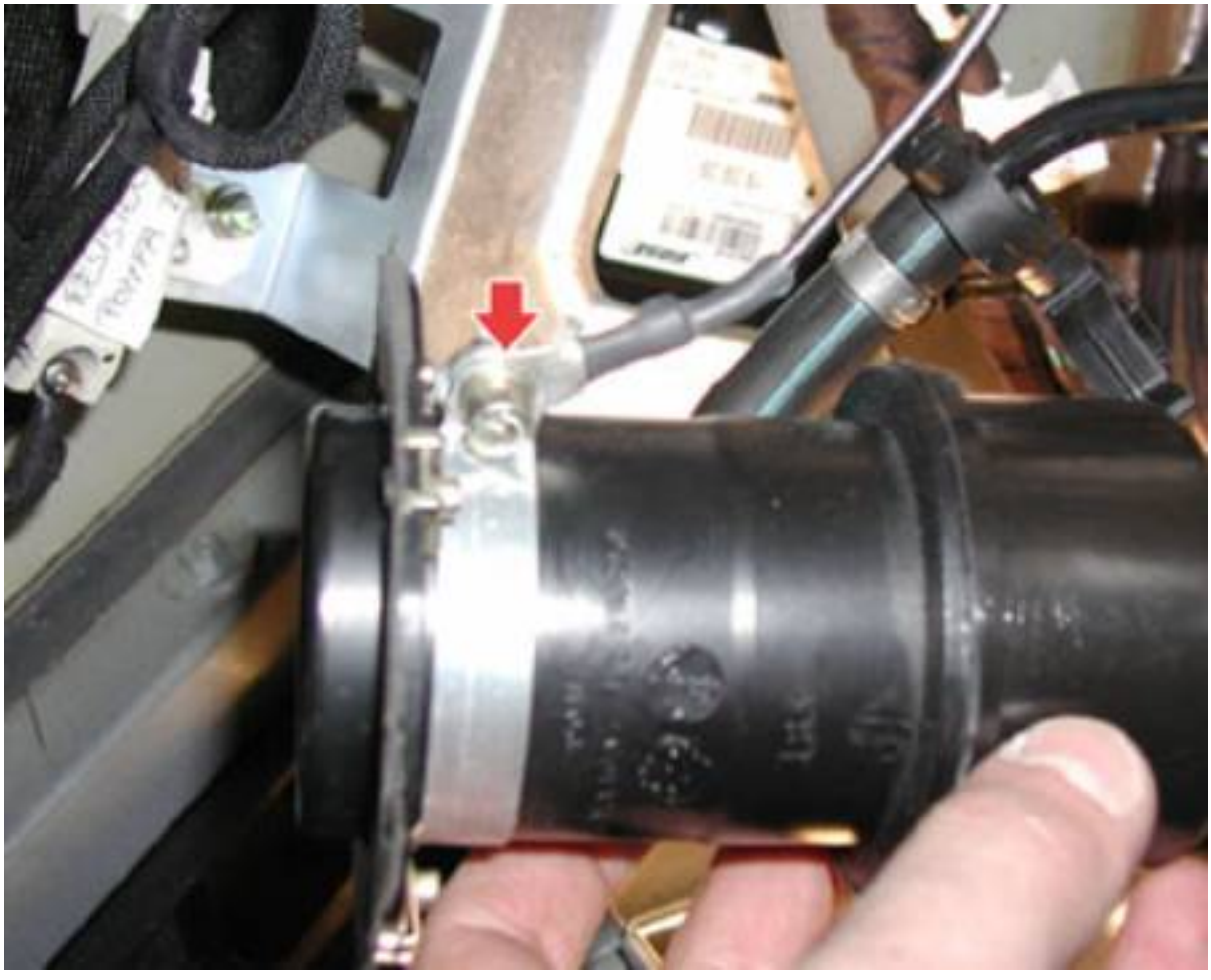
Connect the two anti-evaporation system pipes to the active carbon filter.

USA - CANADA VERSION

- Fit the diagnosis pump, complete with the filter.

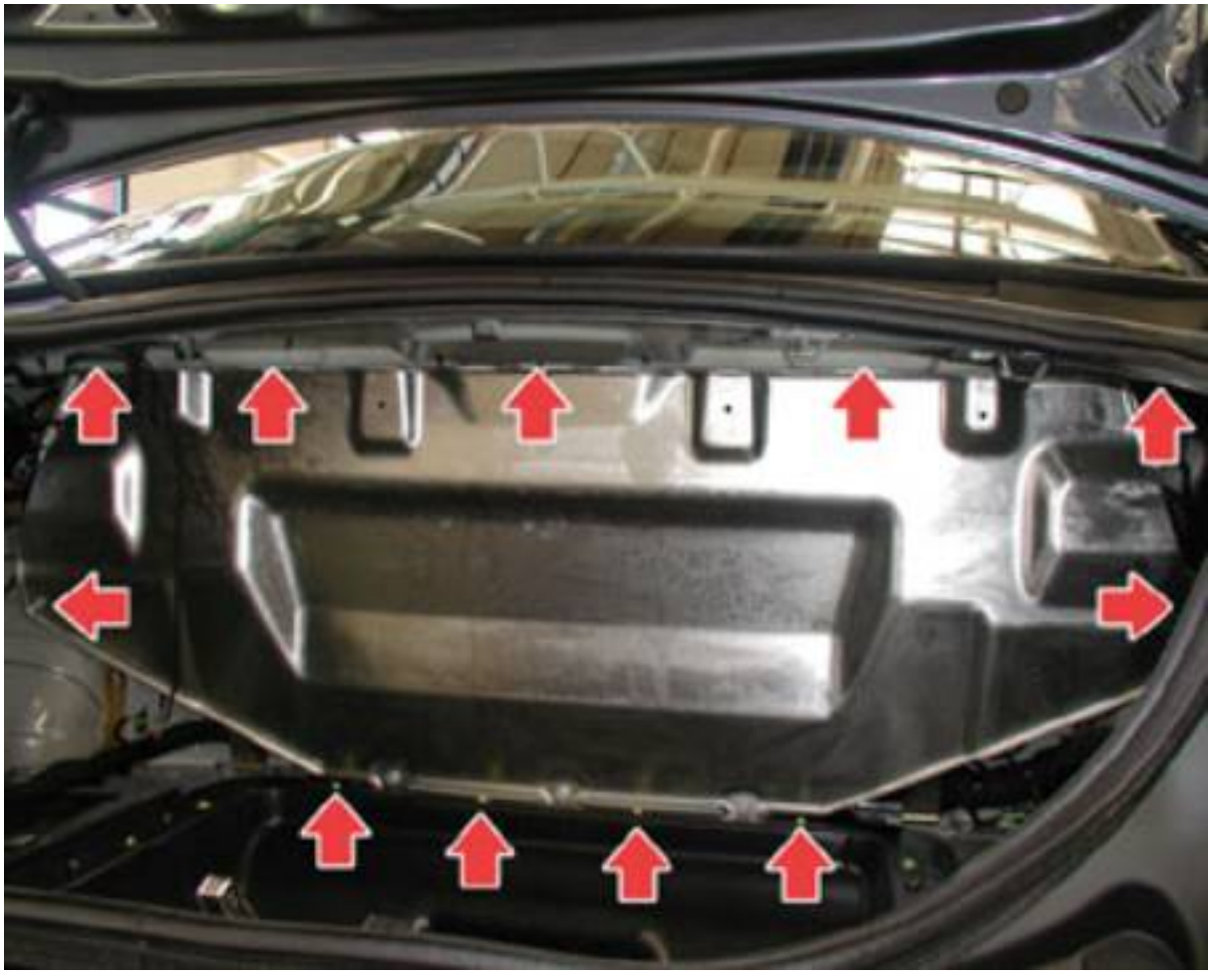
ALL VERSIONS

- Fit the fuel filler pipe, connect to the earth cable and tighten the relative screw.
- Undo the screw, disconnect the earth cable, then remove the fuel filler pipe.



- Connect the flexible section of the fuel filler pipe to the fuel tank.
- Tighten the four fastening screws on the filler neck to a torque of no more than **1.3 Nm**.

- Fit the fuel filler neck cap and close the flap..
- Tighten the screw fastening the tank wiring to the bodywork.
- Attach the fuel tank wiring’s electrical connection.
- Connect the quick coupling for the recirculation system to the fuel tank.
- Fit the fuel tank’s protective guard and tighten the nuts and the fastening screws to a torque of **7.4 Nm**.



- Carry out all the refitting operations for all the luggage compartment trim panels.

Luggage compartment trim panels

- Disconnect the battery's negative terminal.
- After connecting the negative battery terminal, the following self-learning operations must be carried out to ensure certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

MOTOR-DRIVEN PUMP PAN ASSEMBLY

Detaching the motor-driven pump pan assembly

N.B.
The operations described below apply to tanks equipped with a double fuel pump as well as tanks equipped with a single fuel pump.

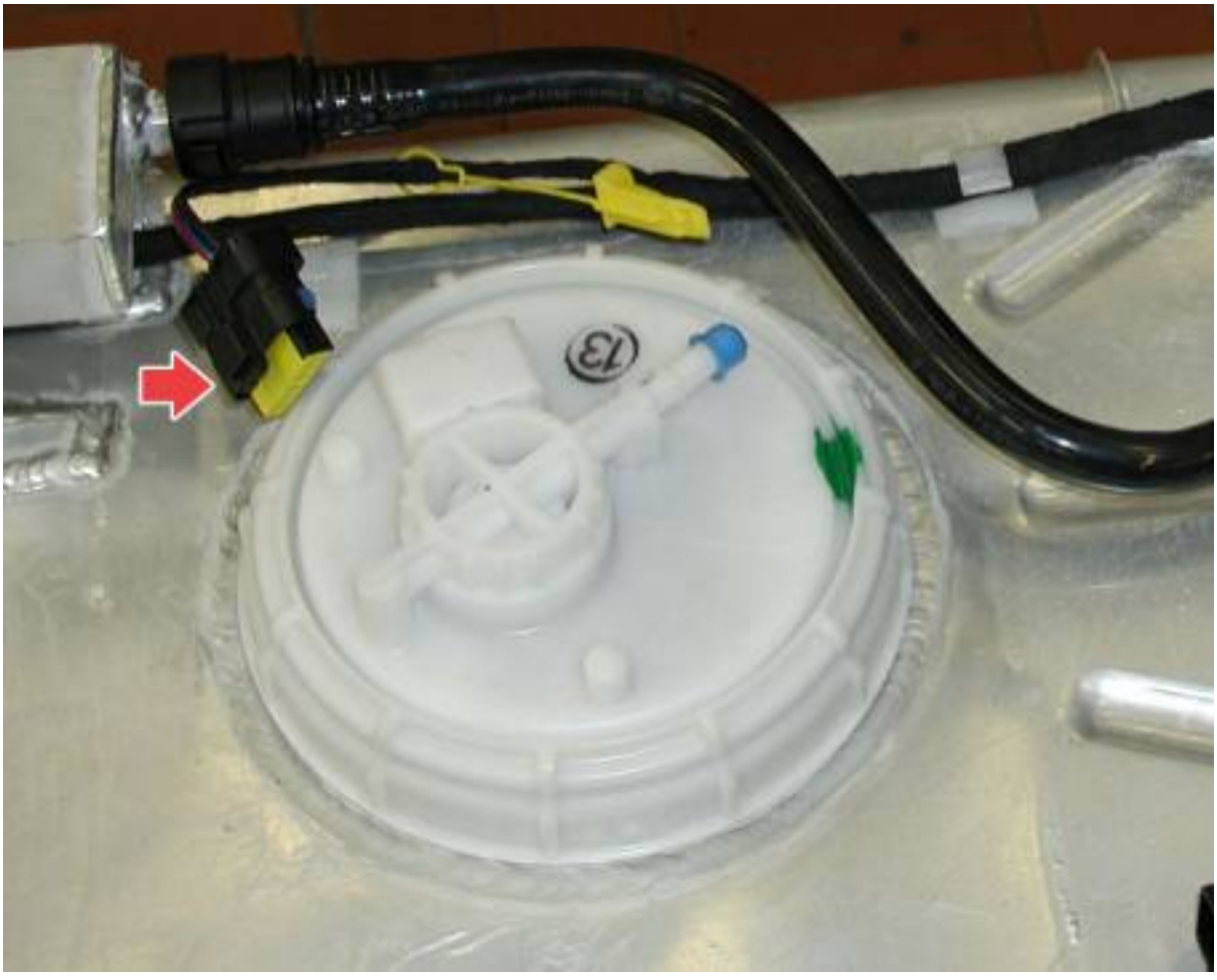
- Remove all the luggage compartment trim panels.

Luggage compartment trim panels

- Remove the fuel tank

Fuel tank

- Detach the electrical connection for the motor driven pump.



- Using the specific tool **900026390**, undo the locknut and remove the motor-driven pump pan.

N.B.
Carry out the same procedure for the remaining motor-driven pump.

Refitting the motor-driven pump pan assembly

- Fit the motor-driven pump pan assembly, aligning the reference tab on the motor-driven pump with the seat on the tank.
- Tighten the locknut manually and, using tool **900026390**, tighten it to a torque of **60 Nm**.

- Refit the fuel tank

Fuel tank

- Refit all the luggage compartment trim panels.

Luggage compartment trim panels

ANTI-EVAPORATION SYSTEM

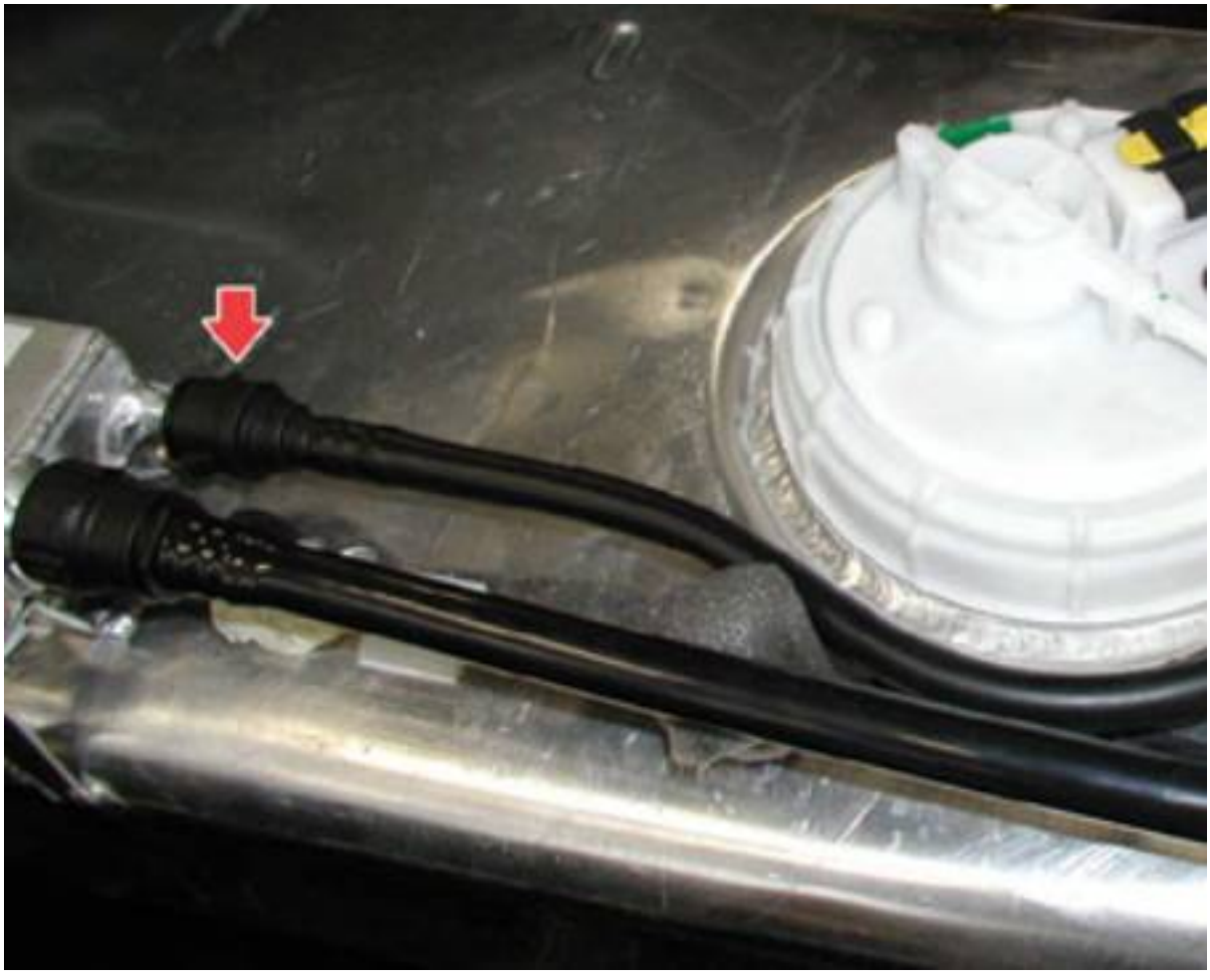
Component removal

- **Below is an explanation of the removal and refitting operations for the anti-evaporation system components which require the removal of the fuel tank; The following procedure outlines the component removal and refitting operations (specific for the USA-CANADA MARKET) which do not require the removal of the fuel tank.**

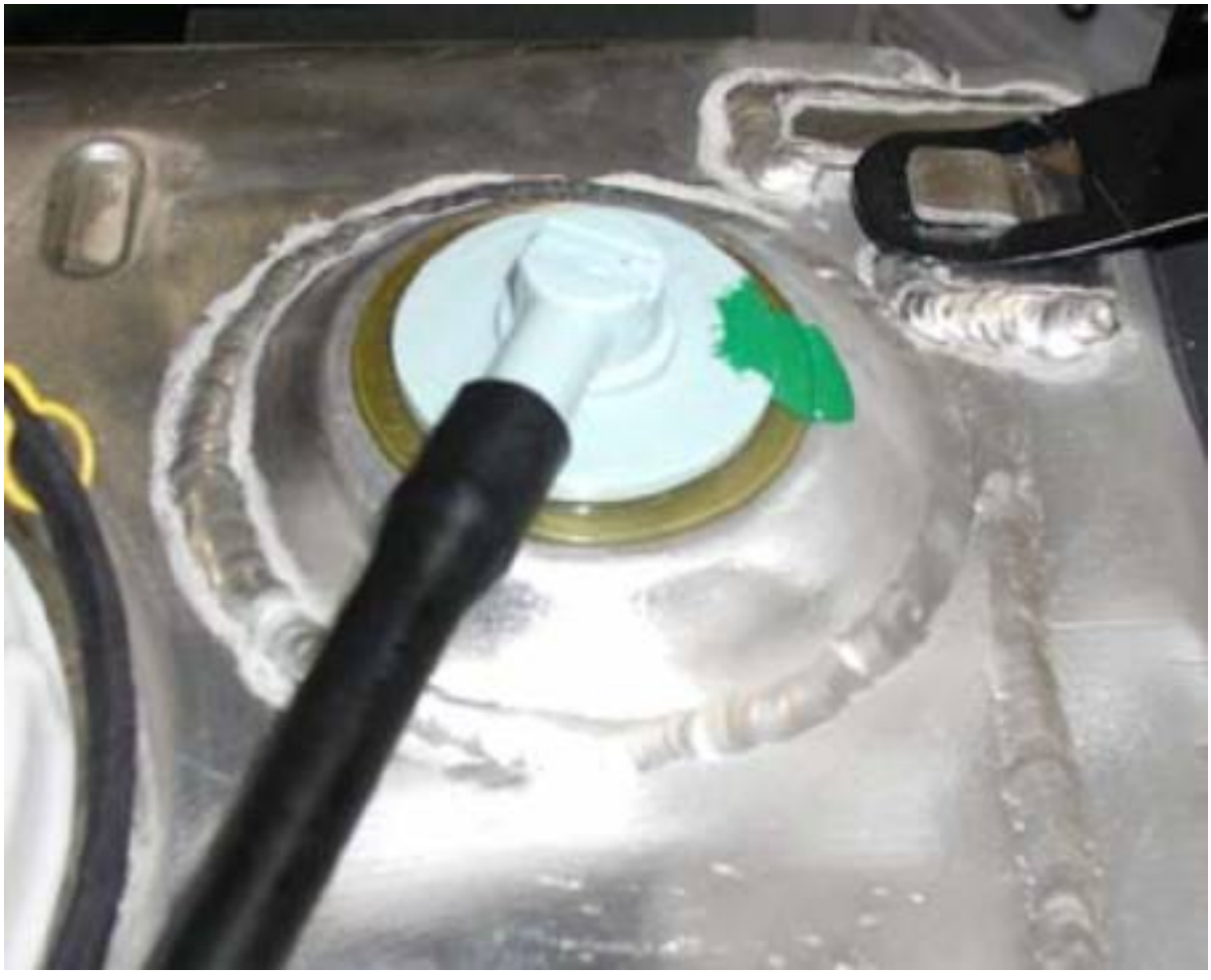
N.B.
The operations described below apply to tanks equipped with a double fuel pump as well as tanks equipped with a single fuel pump.

Fuel tank

- To remove the ventilation valves, proceed as follows.
- Disconnect the quick coupling on the ventilation valve line.



- Rotate the ventilation valve anticlockwise by 90° degrees and remove it from the tank.



- To remove the multi-function valve found on the tank, disconnect the pipe **(1)** and rotate in the direction shown on the valve (**Ref. 3, Fig.2**) then remove the valve **(2)** from the tank.

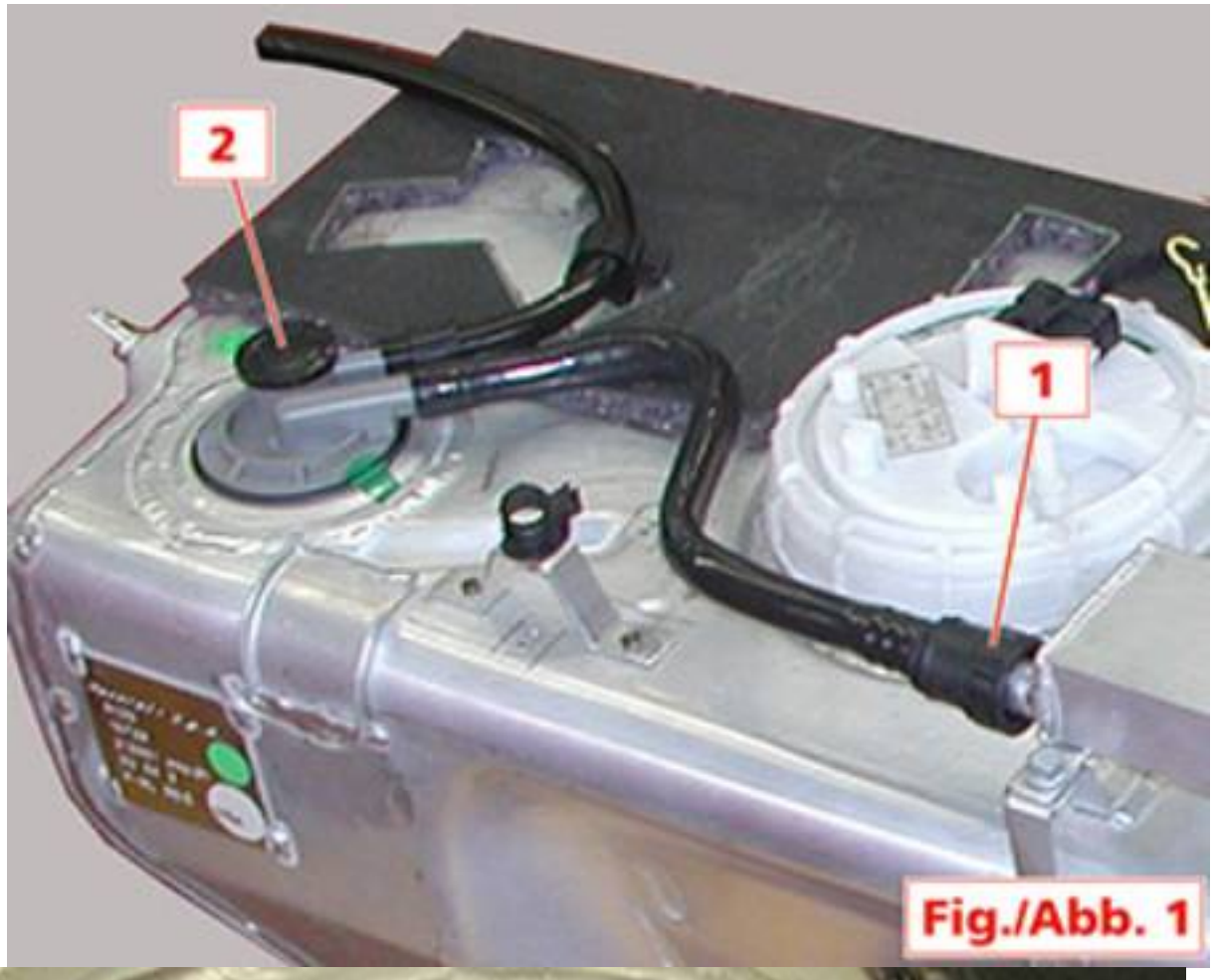


Fig./Abb. 1

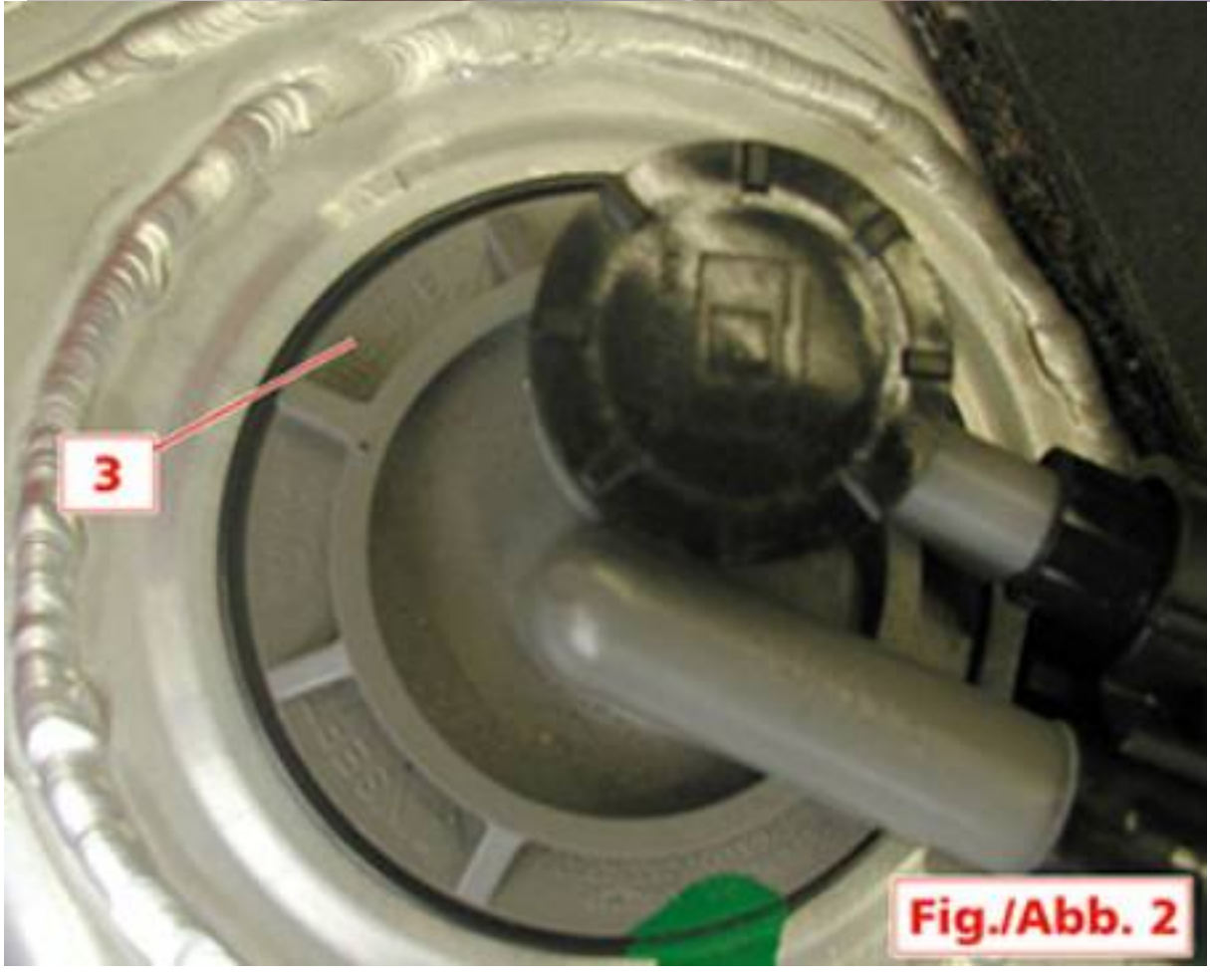
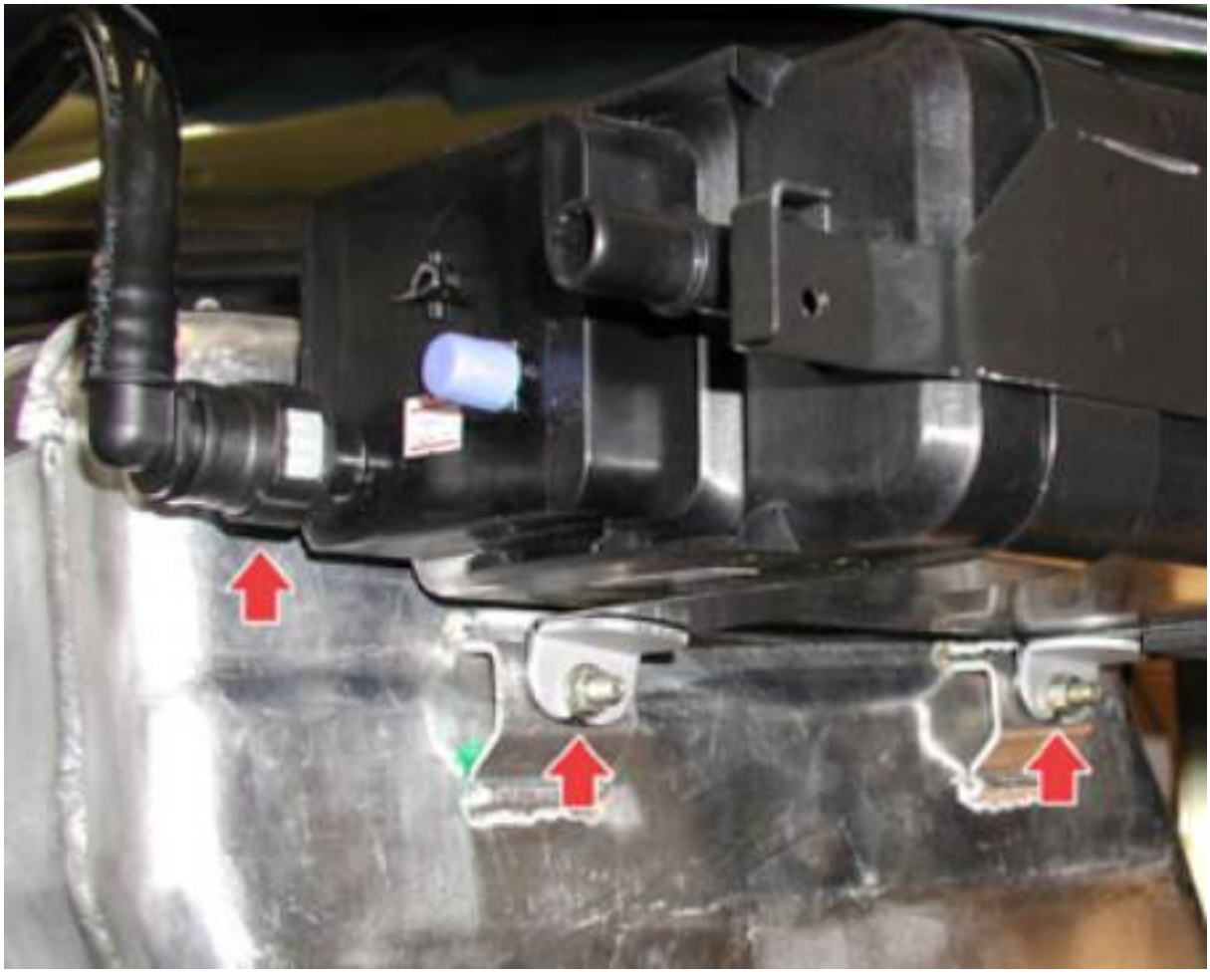


Fig./Abb. 2

- Disconnect the quick coupling on the line connecting the tank with the decanter and unscrew the two nuts fastening the active carbon filter brackets.



- Release the fastening brackets from the stops on the upper section of the fuel tank.

- Remove the active carbon filter.

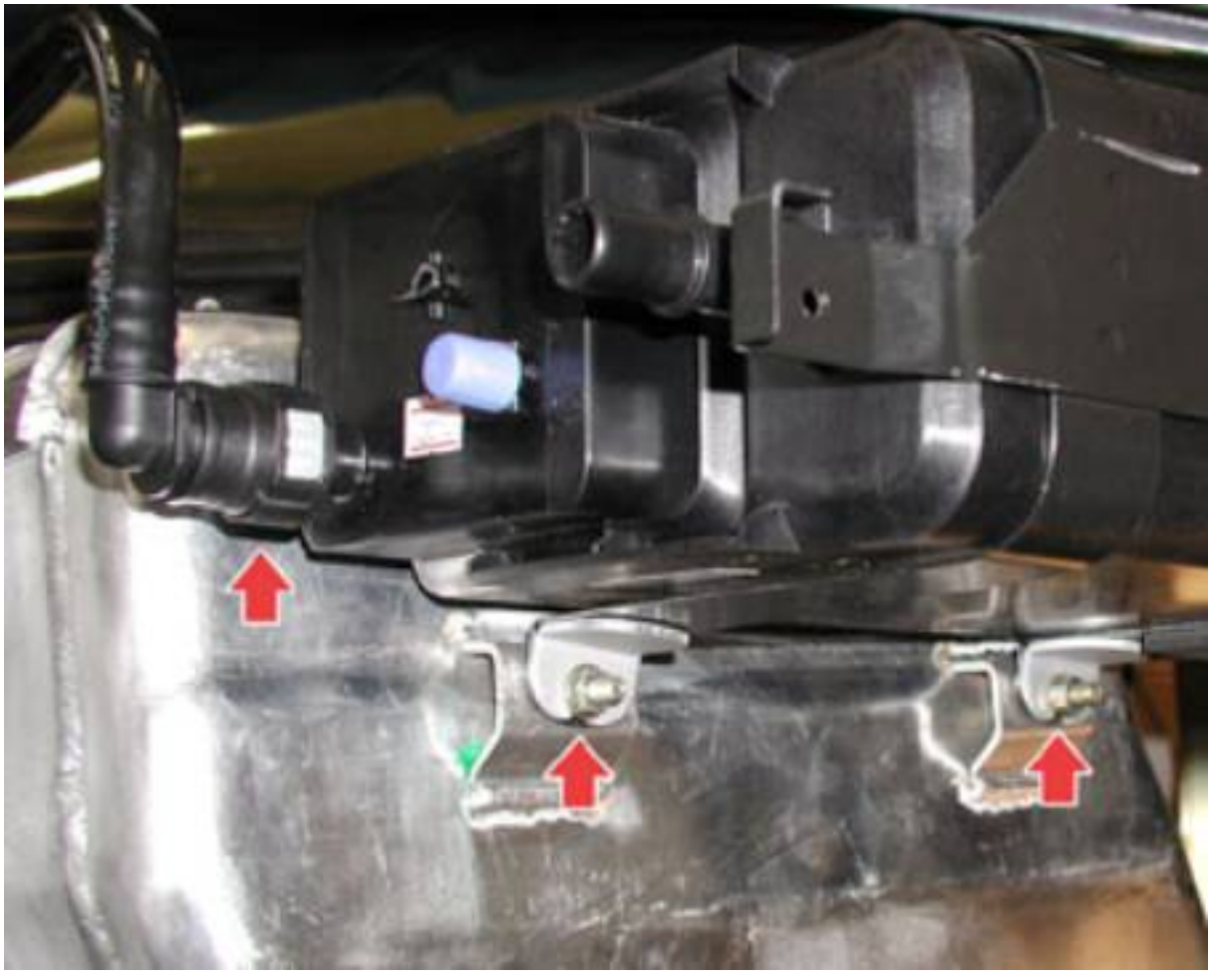
- To remove the fluid decanter, proceed as follows.
- Disconnect the three quick couplings on the lines, undo the three fastening screws and remove the decanter from the fuel tank.

Component fitting

- To fit the fluid decanter, proceed as follows.
- Fit the decanter, placing the earth cable on the fastening shown, and tighten the three fastening screws.
- Connect the three anti-evaporation system pipes.

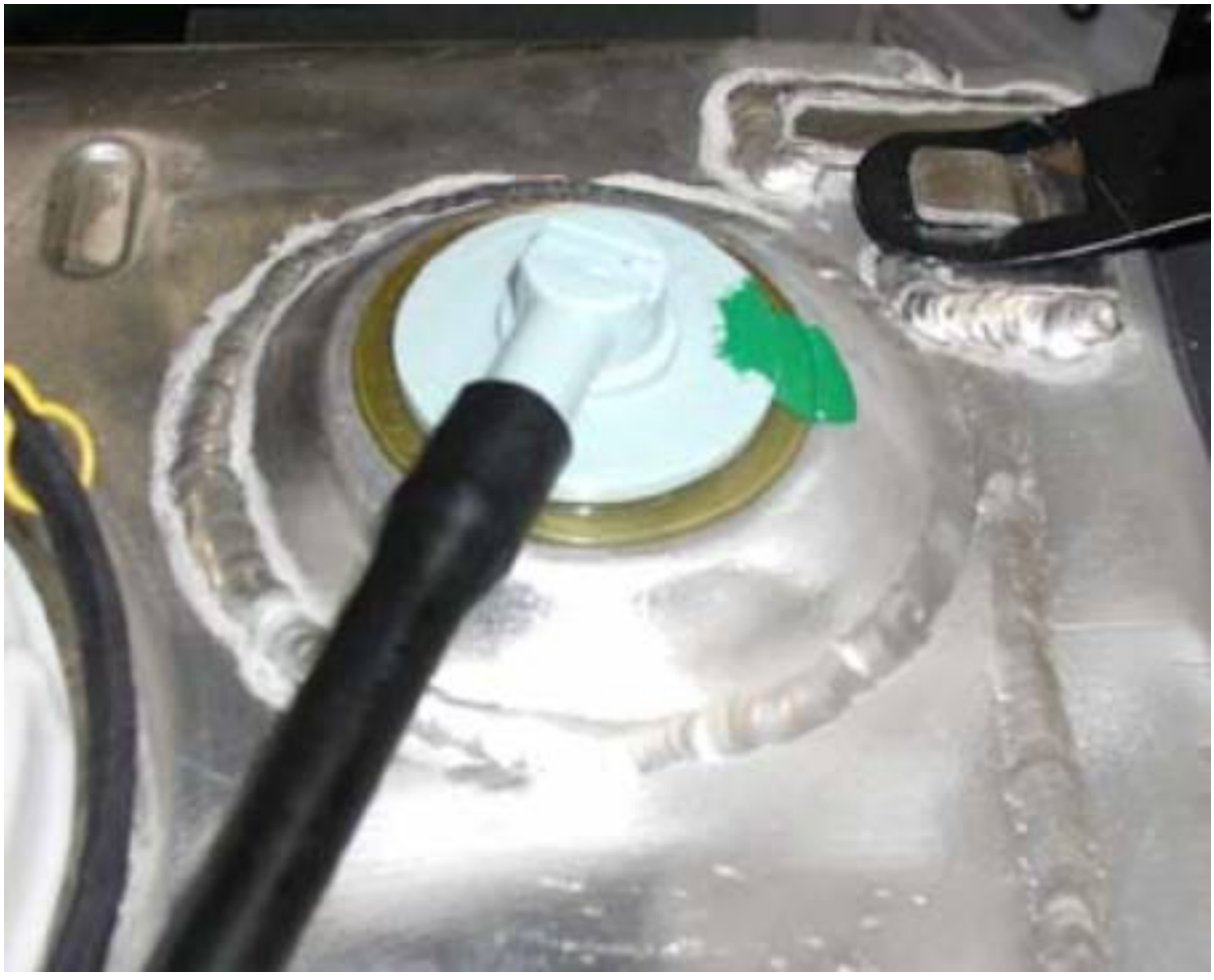
- To fit the active carbon filter, proceed as follows.
- Fit the active carbon filter and secure the fastening brackets to the stops on the upper section of the fuel tank.

- Tighten the brackets’ fastening nuts to a torque of 8.5 Nm and connect the quick coupling on the line leading to the decanter.

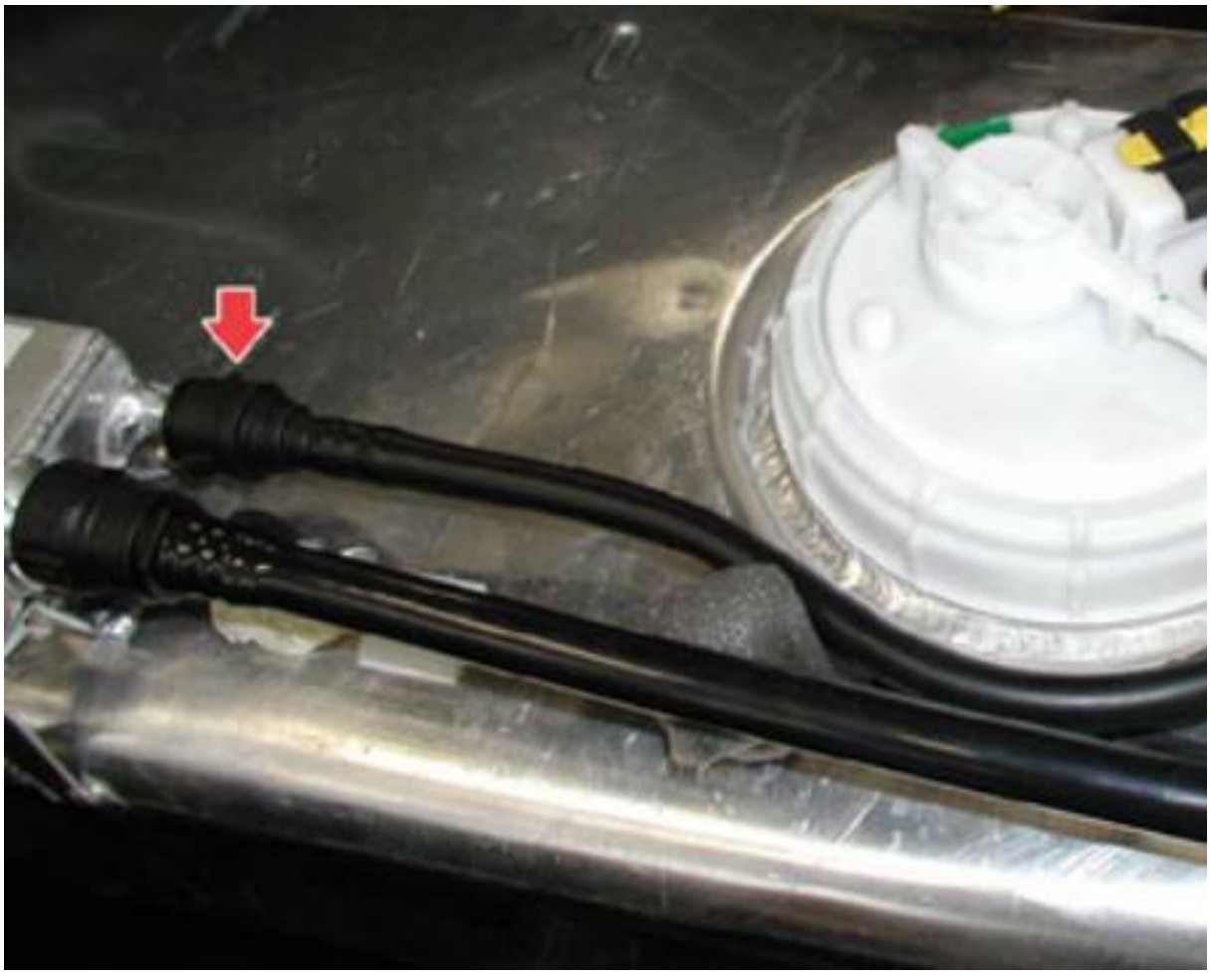


- To fit the ventilation valves, proceed as follows.
- Fit the two ventilation valves in their seat.

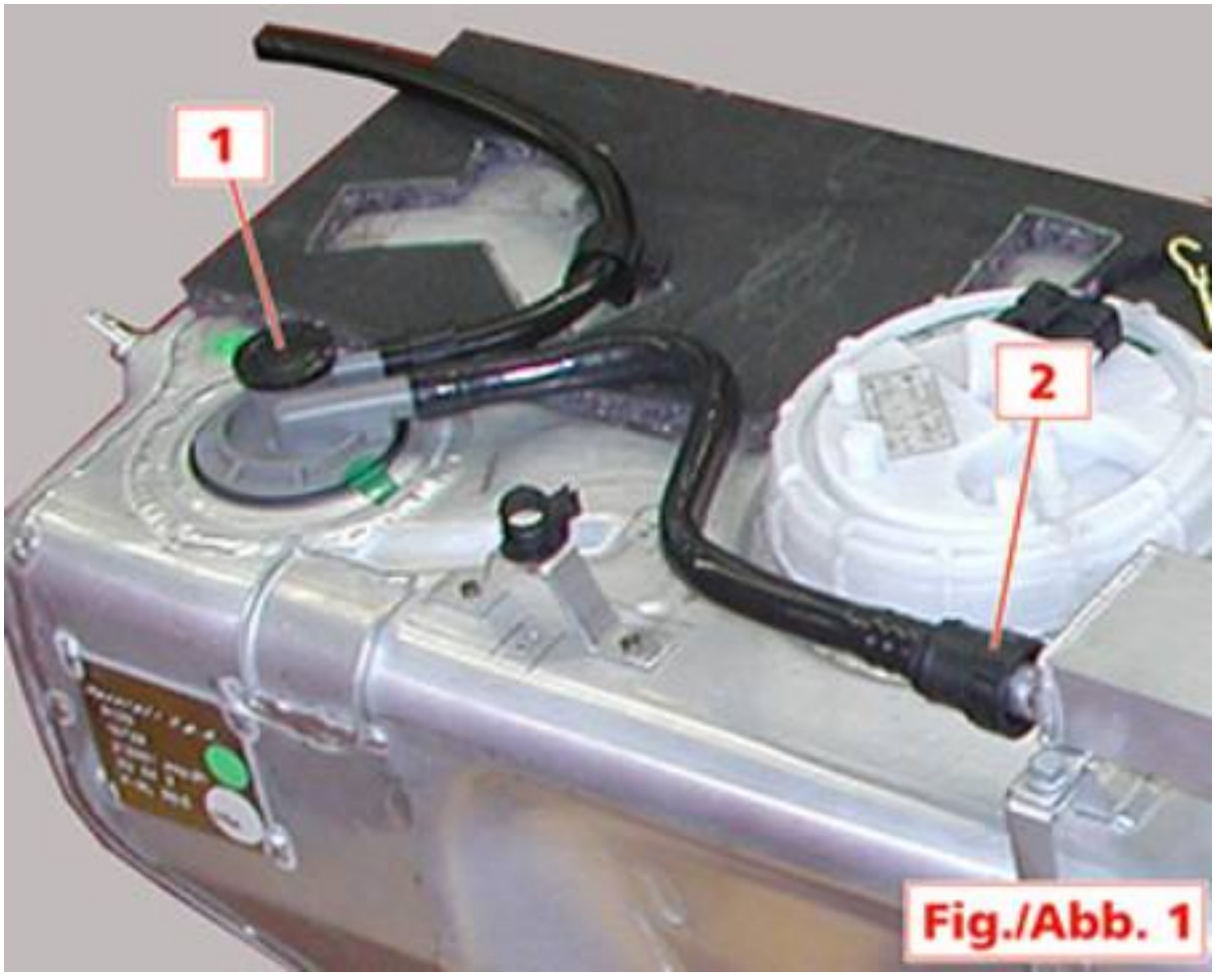
- Rotate clockwise by 90° degrees and secure the ventilation valve to the tank.

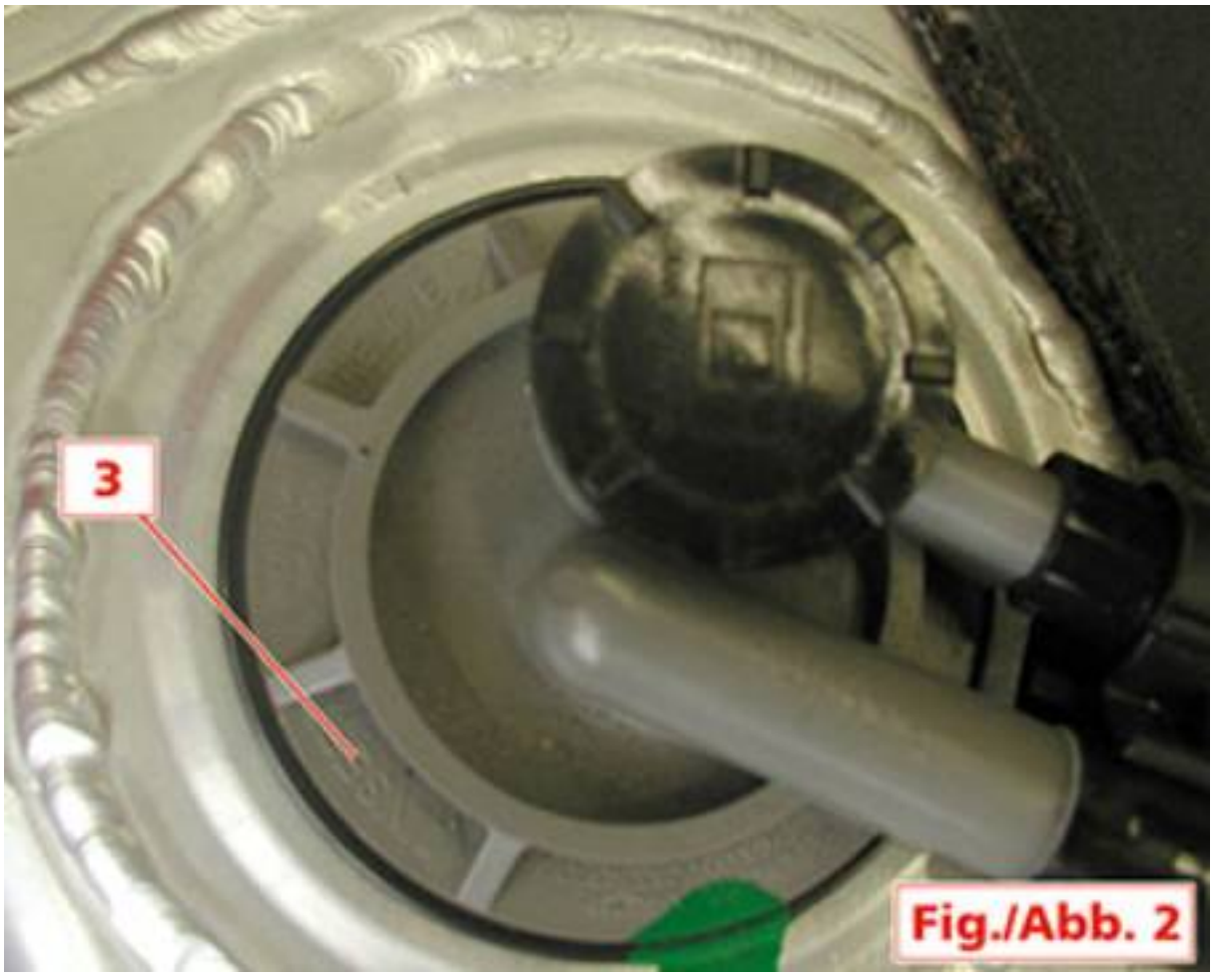


- Connect the quick coupling for the ventilation valve line to the decanter.



- To fit the multi-function valve (**1**) on the tank, rotate in the direction shown on the valve (Ref.**3-**Fig. 2) and connect the pipe (**2**).


1
2
Fig./Abb. 1



- Refit the fuel tank.

Fuel tank

USA - CANADA VERSION

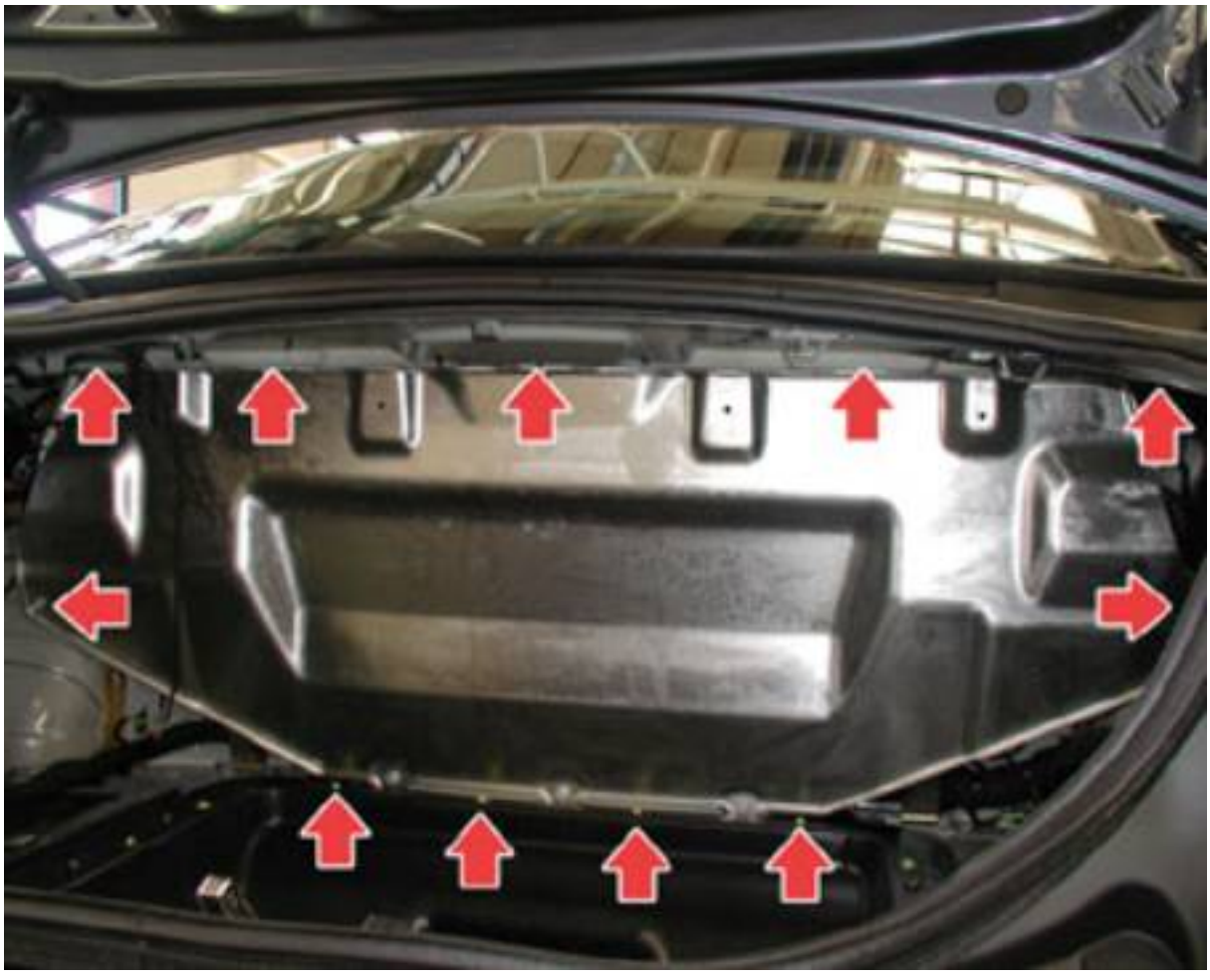
Removing - refitting the diagnosis pump

- Disconnect the battery's negative terminal.
- Remove all the luggage compartment trim panels.

Luggage compartment trim panels

N.B.
Before working on the tank, make sure it is either empty or that there is a small amount of fuel in it. Suck the fuel out of the tank using suitable suction equipment and protections, in compliance with the safety regulations currently in force, DO NOT SMOKE AND DO NOT USE NAKED FLAMES

- Undo the screws and the fastening nuts and remove the protective guard for the fuel tank.



- Detach the connection **(1),** disconnect the piping from the quick coupling **(2),** disconnect the piping **(3),** undo the fastening screws **(4)** and remove the diagnosis pump.

When refitting, follow the above procedures in reverse order

USA - CANADA VERSION

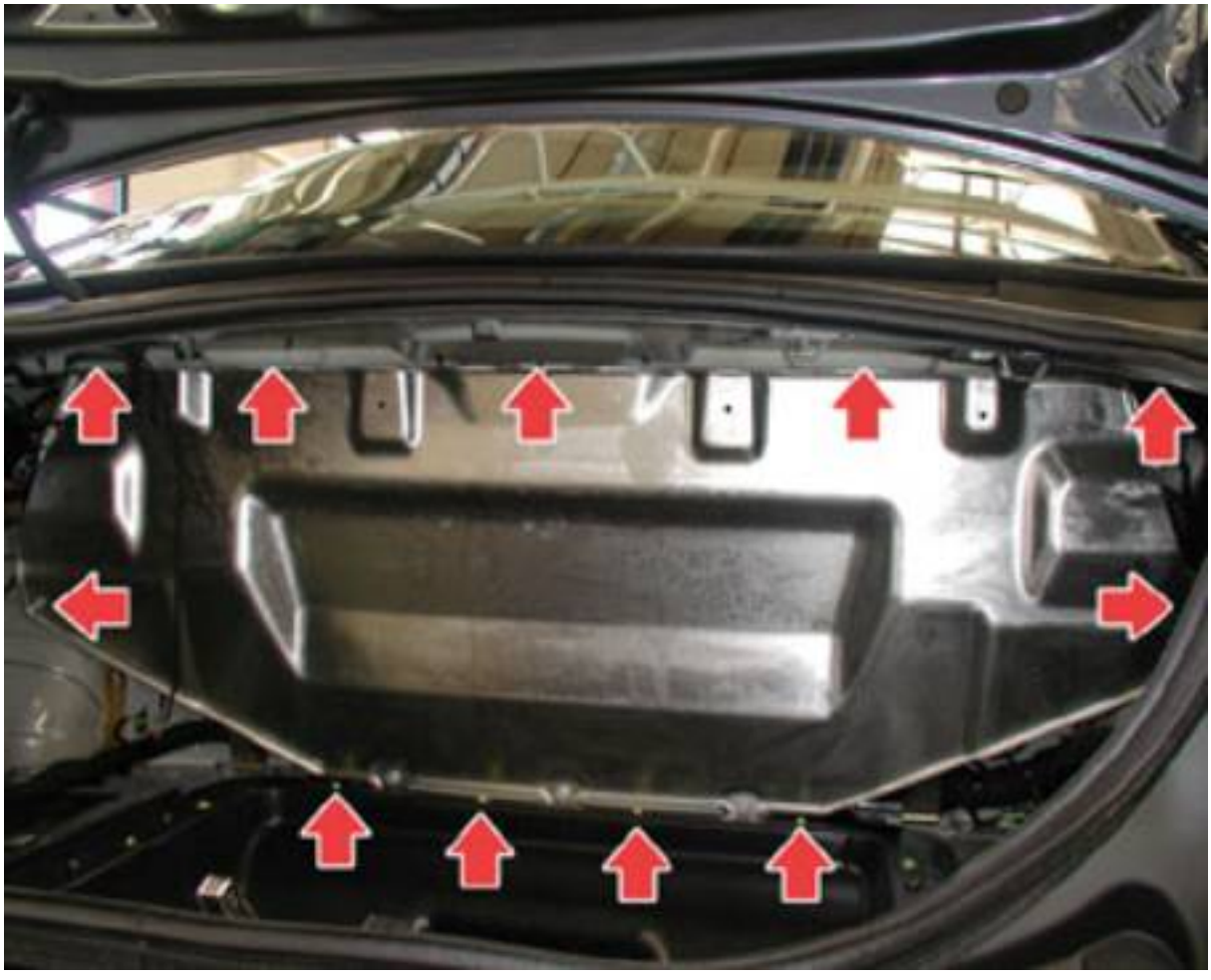
Diagnosis pump filter replacement

- Disconnect the battery's negative terminal.
- Remove all the luggage compartment trim panels.

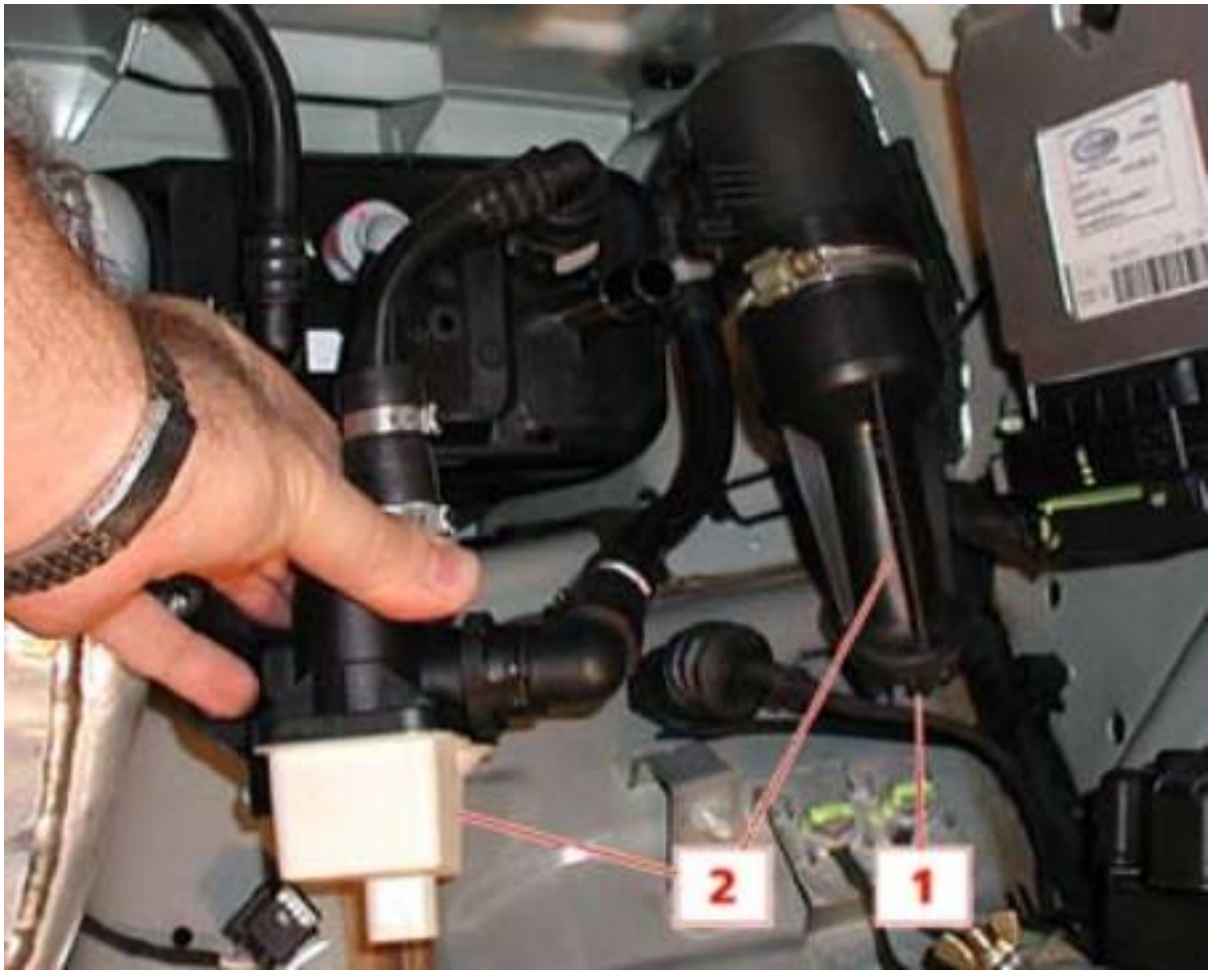
Luggage compartment trim panels

N.B.
Before working on the tank, make sure it is either empty or that there is a small amount of fuel in it. Suck the fuel out of the tank using suitable suction equipment and protections, in compliance with the safety regulations currently in force, DO NOT SMOKE AND DO NOT USE NAKED FLAMES

- Undo the screws and the fastening nuts and remove the protective guard for the fuel tank.



- Lift the anti-evaporation system filter, disengaging the lower rubber couplings **(1)** from the bodywork, then remove the pump-filter assembly **(2)**.



- With the assembly on the bench, disconnect the piping **(1)**from the filter, open the clamp **(2)** and remove the diagnosis pump filter **(3)**.

- To ensure the best possible system operation, the diagnosis pump filter must be replaced every 50,000 km.

When refitting, follow the above procedures in reverse order

REPLACING THE ACCELERATOR PEDAL

Removing-refitting the accelerator pedal

- Disconnect the battery's negative terminal.
- Undo the three screws fastening the accelerator pedal to the vehicle’s floor.

- Detach the electrical connection on the accelerator pedal potentiometer, then remove the accelerator pedal.

When refitting, follow the above procedures in reverse order

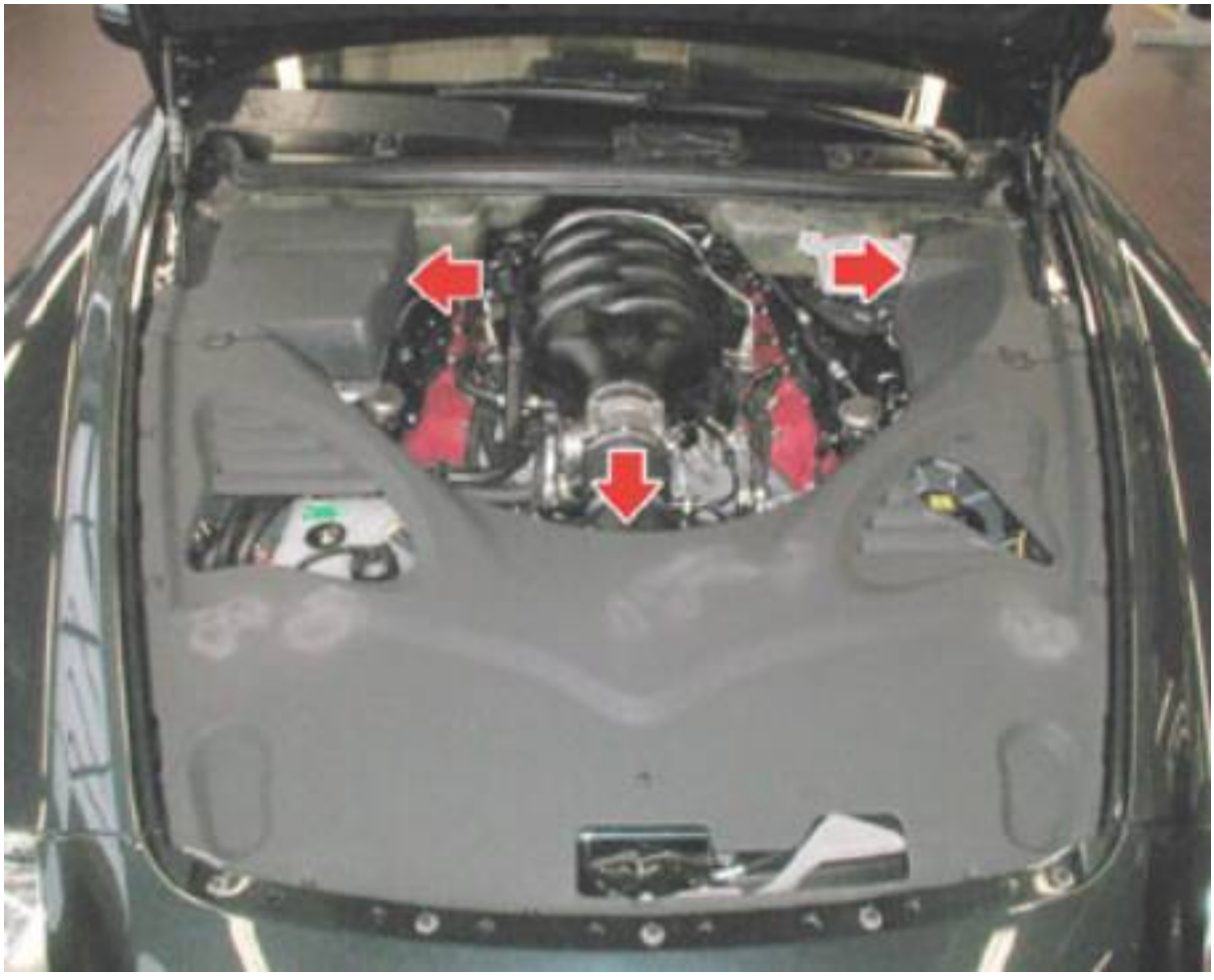
- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

SPARK PLUGS

Removing the spark plugs

- Disconnect the battery's negative terminal.
- Remove the trim panels.



- Remove the complete windscreen wiper unit.

Removing-refitting the windscreen wiper unit

- Rotate the plastic screws fastening the engine compartment fuse box cover by 90°, then remove the cover.

- Undo the two fastening screws on the engine compartment fuse box.

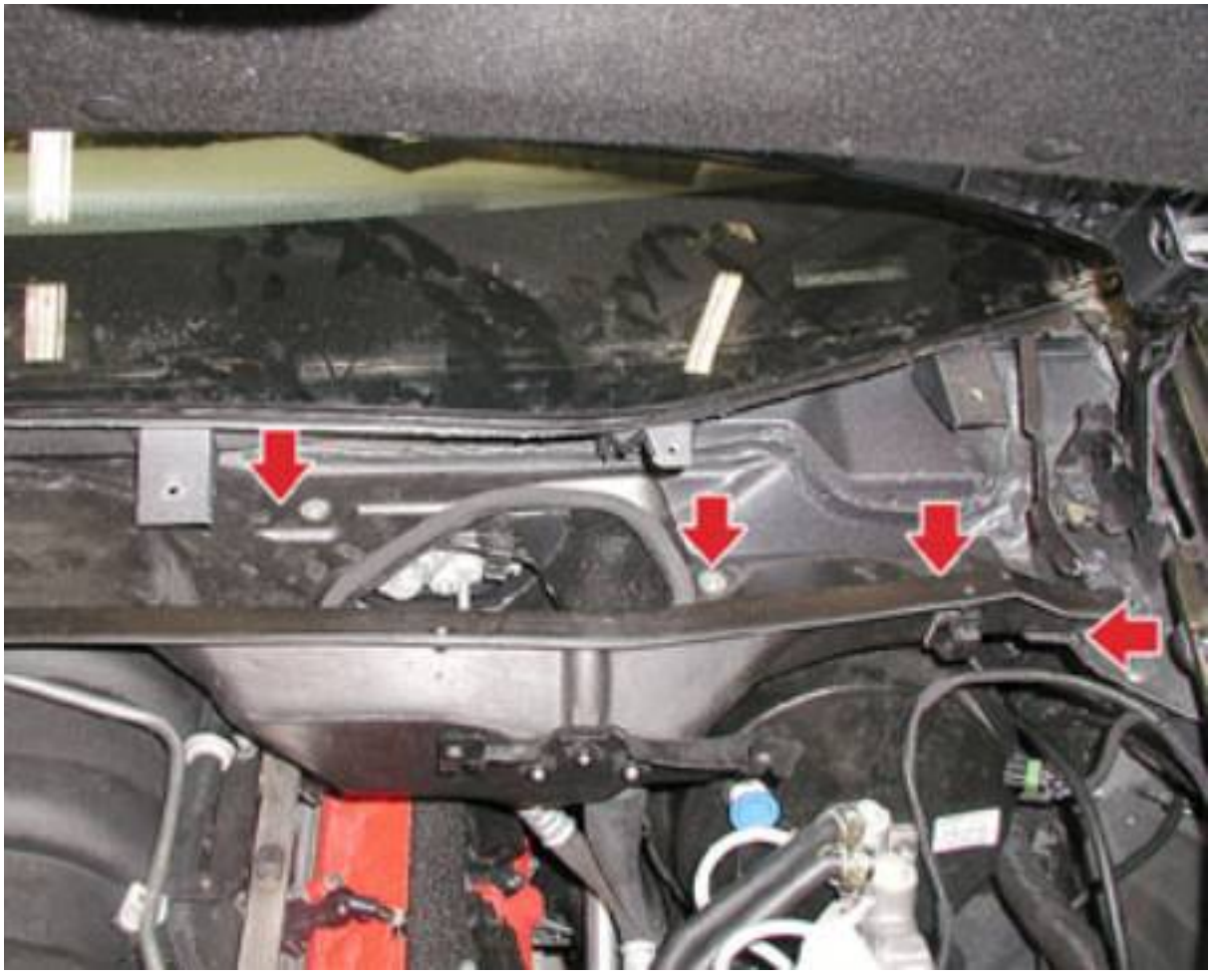
- Unscrew the three fastening screws, and remove the engine compartment fuse box mount.

- Undo the two fastening screws on the brake fluid tank.

- Detach the electrical connection.

- Undo the screws fastening the connected devices' pan underneath the windscreen.

- Undo the screws fastening the left-hand connected devices' pan underneath the windscreen and remove the pan.



- Undo the fastening screws and remove the electric wiring cover (operation to be carried out on both cylinder heads)

- The operation described below applies to vehicles equipped with engine part number 102268.

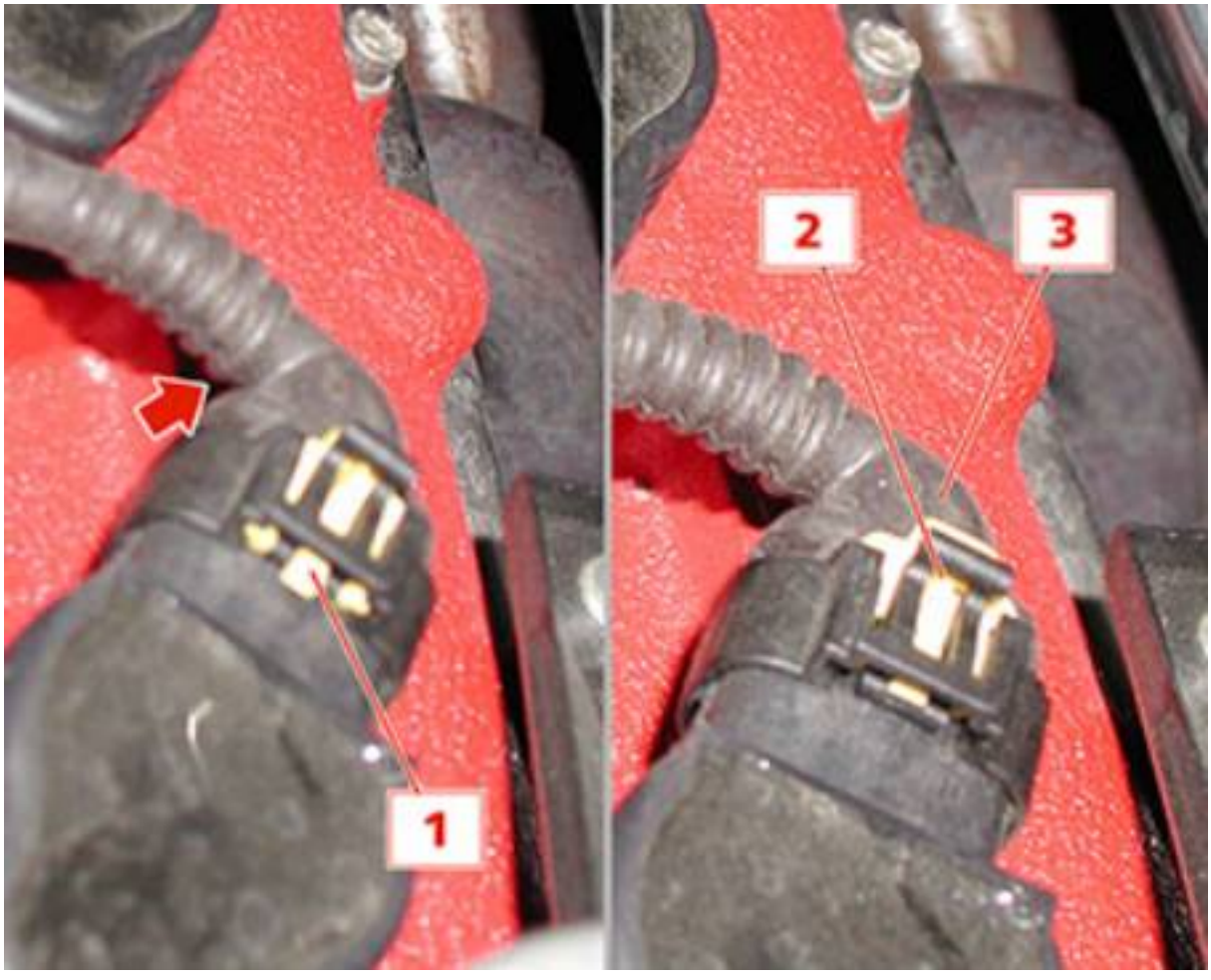
- Undo the fastening screws on all the ignition coils for the left-hand and right-hand cylinder heads

- The operation described below applies to vehicles equipped with engine part number 102268.

- Remove the ignition coils.

- The operation described below applies to vehicles equipped with engine part number 102269.

- Using a small screwdriver, push the yellow catch **(1)** in the direction of the arrow, then push on the black tab **(2)** and detach the connector from the coil **(3)**.



- The operation described below applies to vehicles equipped with engine part number 102269.

- Remove all the ignition coils from the right-hand and left-hand bank.

- The operation described below applies to all vehicles

- Using a specific wrench, remove all the spark plugs.

Refitting the spark plugs

- Check that the component is intact.
- Using a feeler gauge, check the gap between the earth electrode **(1)** and the central electrode **(2)**.
- To ensure that the spark plug falls within the optimal parameters for reuse, the gap must be **6** mm.

- Using a specific wrench and a torque wrench, tighten all the spark plugs to a torque of **10 Nm**.

- The operation described below applies to vehicles equipped with engine part number 102268.

- Fit all the ignition coils and tighten the fastening screws to a torque of **10 Nm**.

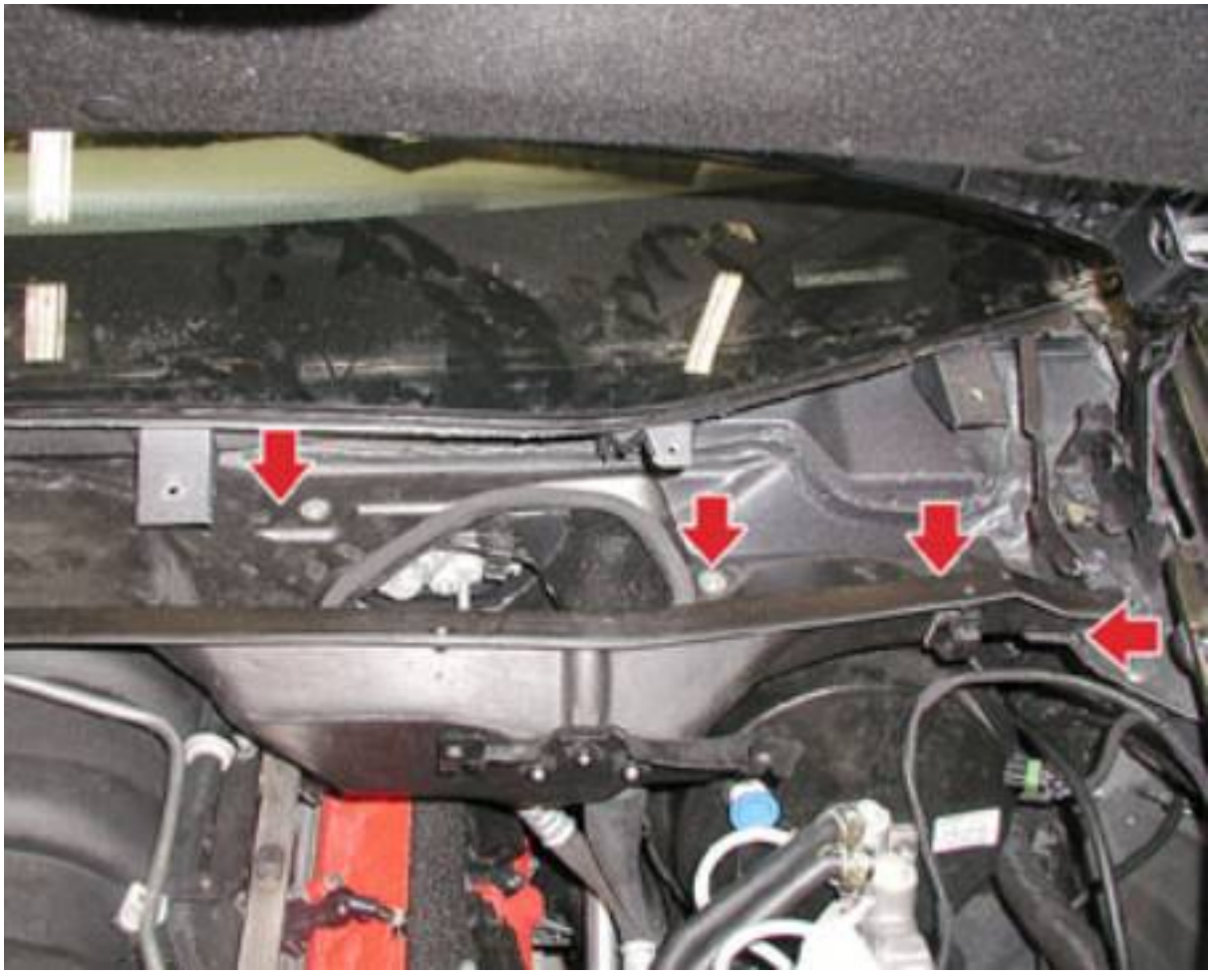
- The operation described below applies to vehicles equipped with engine part number 102269.

- Fit all the ignition coils of the right-hand and left-hand bank and connect the electrical connectors.

- The operation described below applies to all vehicles

- Fit the electrical wiring cover, apply Loctite 242 to the screws and tighten them to a torque of **7 Nm**.

- Fit the connected devices' pan underneath the windscreen and tighten the left-hand fastening screws fully.



- Tighten the screws fastening the right-hand connected devices' pan underneath the windscreen fully.

- Attach the electrical connection.

- Tighten the two fastening screws on the brake fluid tank fully

- Fit the engine compartment fuse box mount and tighten the three fastening screws fully.

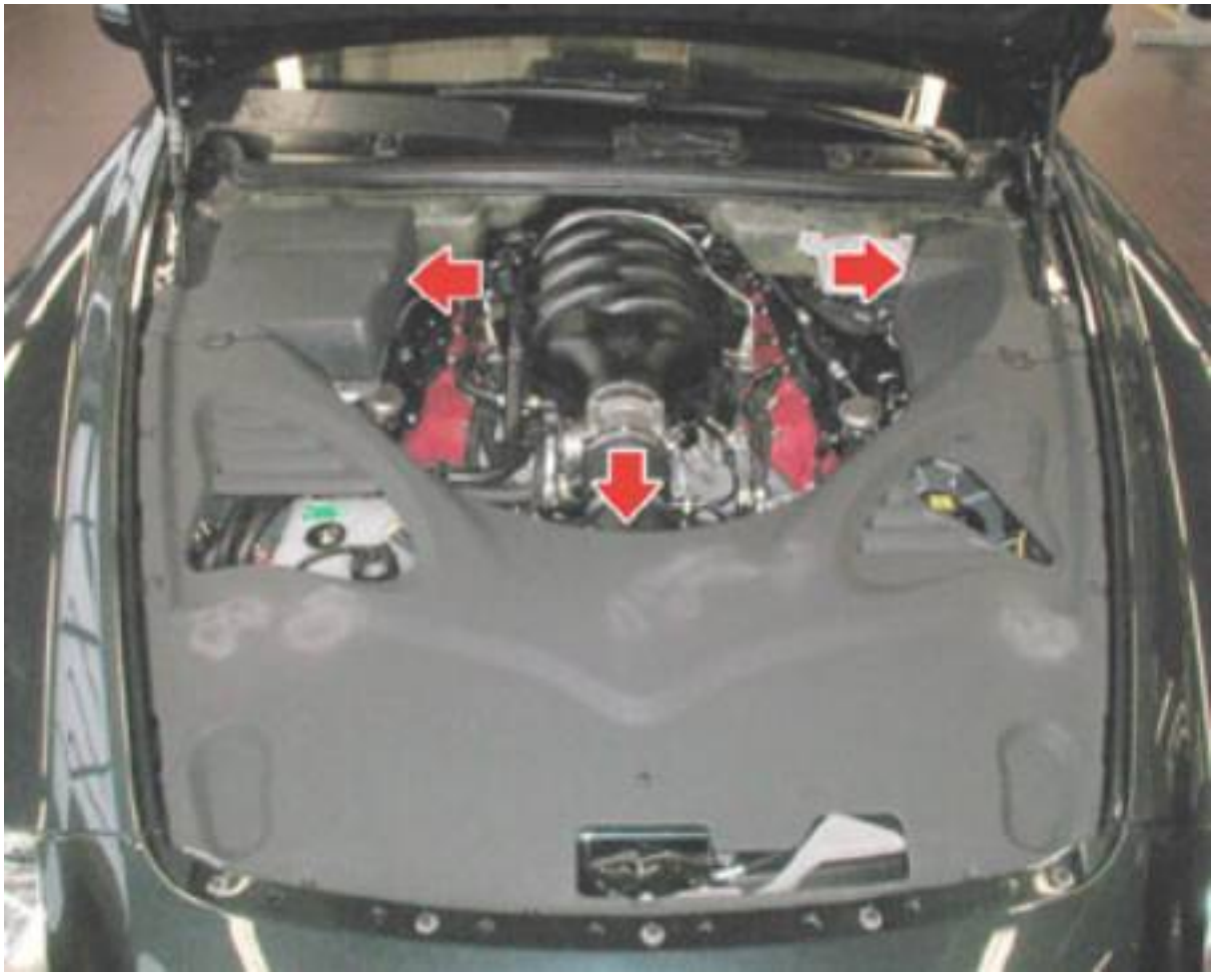
- Fit the engine compartment fuse box mount and tighten the three fastening screws fully.

- Fit the fuse box cover and rotate the plastic screws by 90°.

- Fit the complete windscreen wiper unit.

Removing-refitting the windscreen wiper unit

- Fit the engine compartment trim panels.



- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

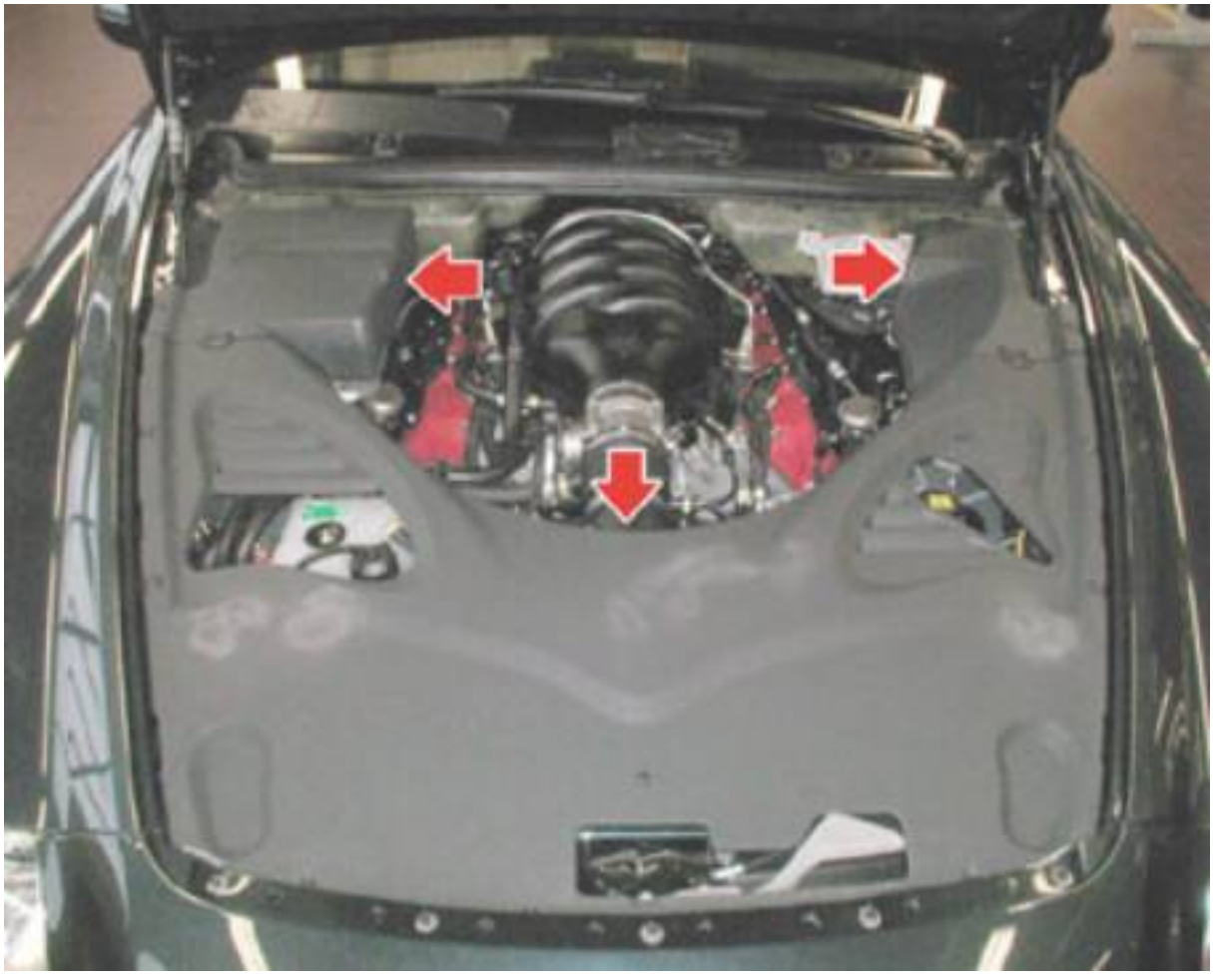
Component self-learning in the event of battery disconnection

IGNITION COILS

Removing the ignition coils for engine part number up to 102268.

- The operation described below applies to all vehicles manufactured up to engine part number 102268; the coil removal/refitting procedure for engines with a later part number will be described subsequently.

- Disconnect the battery's negative terminal.
- Remove the trim panels.



- To remove the ignition coils on the right-hand side , proceed as follows:
- Rotate the plastic screws fastening the engine compartment fuse box cover by 90°, then remove the cover.

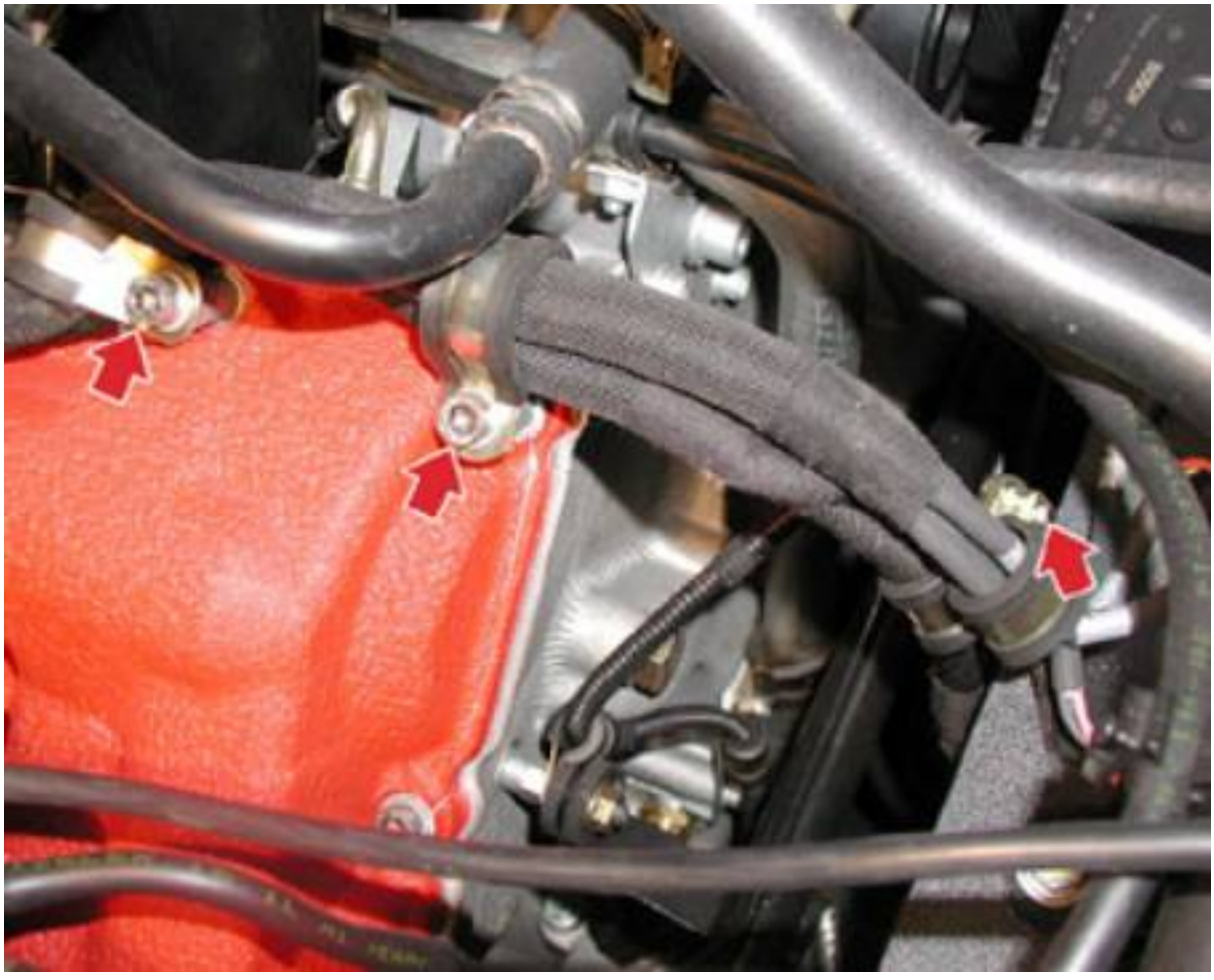
- Undo the two fastening screws on the engine compartment fuse box.

- Unscrew the three fastening screws, and remove the engine compartment fuse box mount.

- Loosen the clamp screw and remove the water drainage pipe from the trim panel underneath the windscreen.

- Undo the fastening screws on all the right-hand cylinder head’s ignition coils, remove them from the spark plugs seats, and undo the fastening screws on the electrical wiring cover and remove it.

- Undo the two screws and the fastening nut on the wiring brackets.

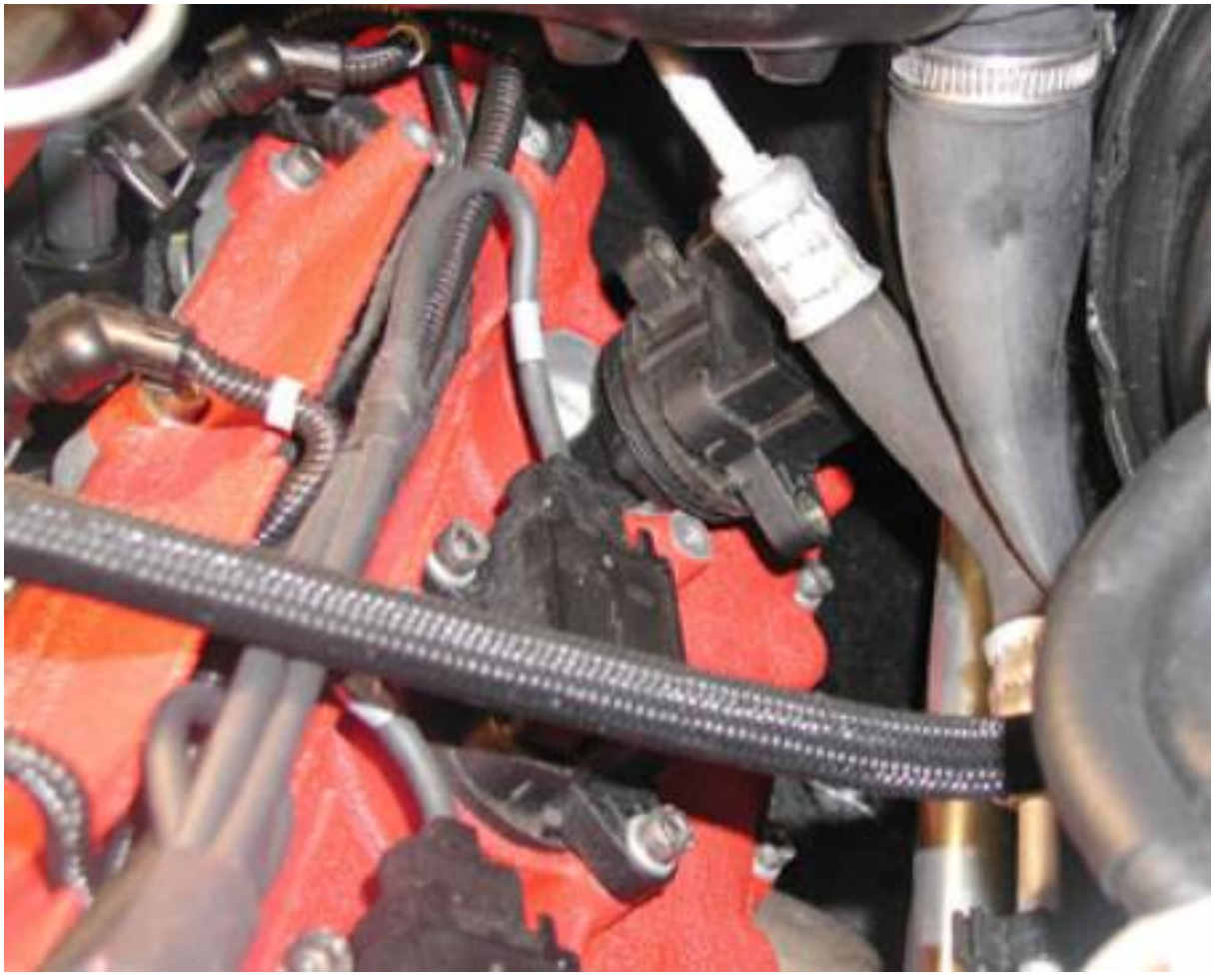


- Detach the four electrical connectors and remove the ignition coils located on the right-hand cylinder head.

- To remove the left-hand ignition coils, proceed as follows:
- Undo the two fastening screws on the brake fluid tank.

- Undo the fastening screws and remove the electrical wiring cover.

- Undo the fastening screws on all the left-hand cylinder head’s ignition coils, and remove them from the spark plugs seats.

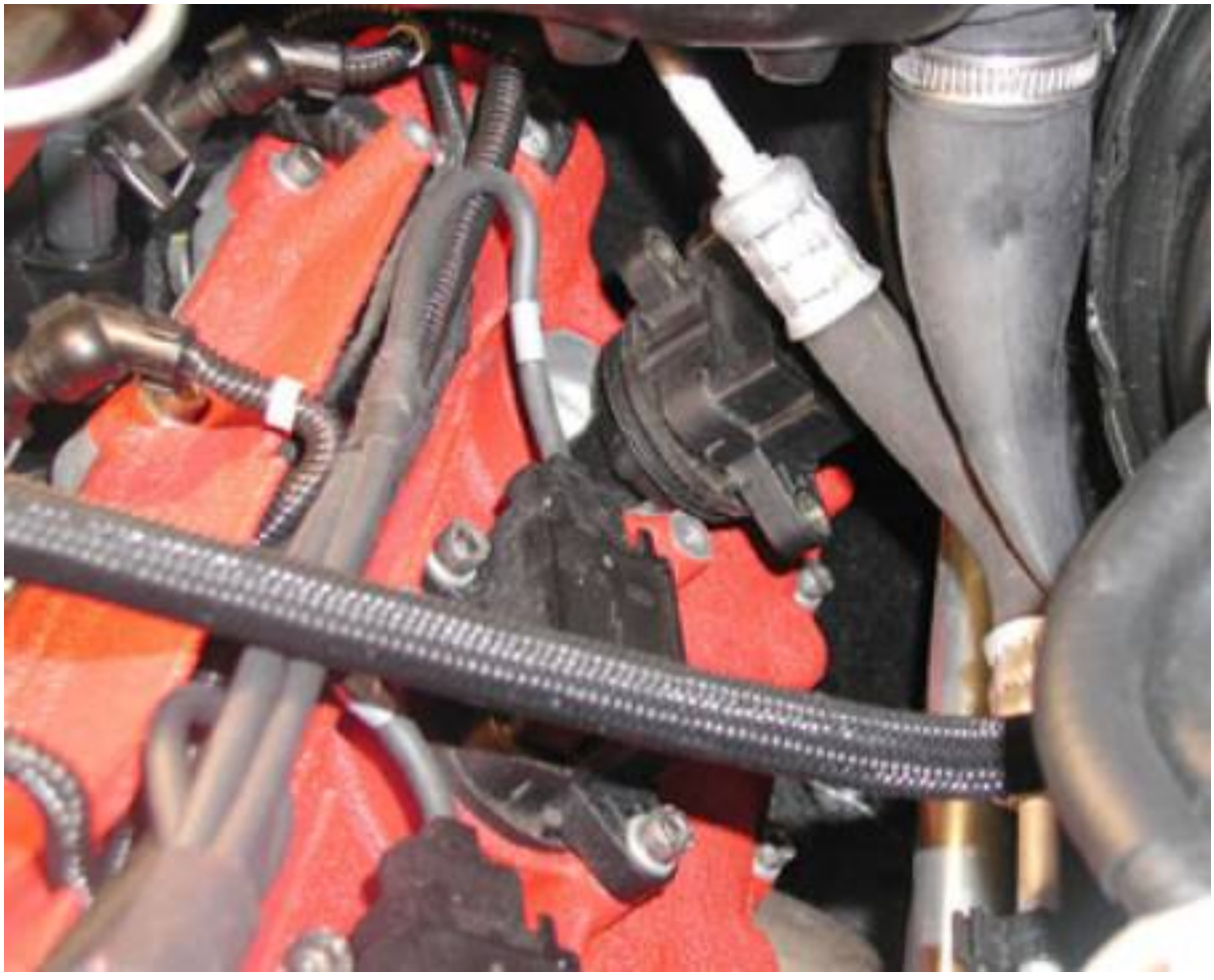


- Undo the screws on the two wiring brackets.

- Undo the fastening screw on the wiring bracket, disconnect the four electrical connectors and remove the ignition coils located on the left-hand cylinder head.

Refitting the ignition coils for engine part number up to 102268.

- To refit the left-hand ignition coils, proceed as follows:
- Fit all the ignition coils and tighten the fastening screws to a torque of 10 Nm.



- Attach the four electrical connectors and tighten the fastening screw on the wiring bracket fully.

- Tighten the fastening screws on the two wiring brackets fully.

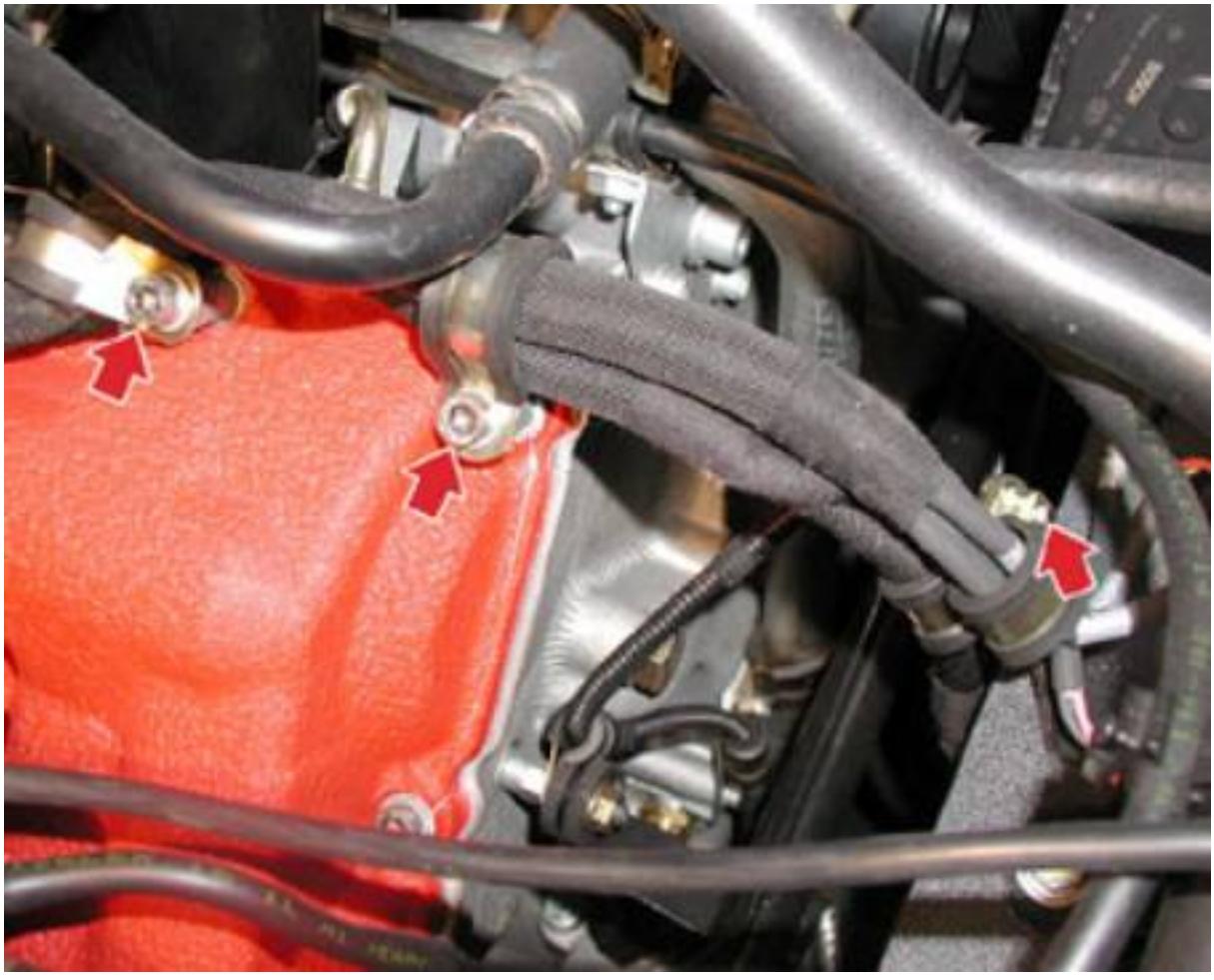
- Fit the electrical wiring cover, apply Loctite 242 to the screws and tighten them to a torque of 7 Nm.

- Tighten the two fastening screws on the brake fluid tank fully.

- To fit the left-hand ignition coils, proceed as follows:
- Fit the ignition coils positioned on the right-hand cylinder head and attach the four electric connectors.

- Fit the coils, tighten the fastening screws to a torque of 10 Nm; fit the electric wiring cover, apply Loctite 242 to the screws and tighten them to a torque of 7 Nm.

- Tighten the two fastening screws and the fastening nut on the wiring bracket fully.



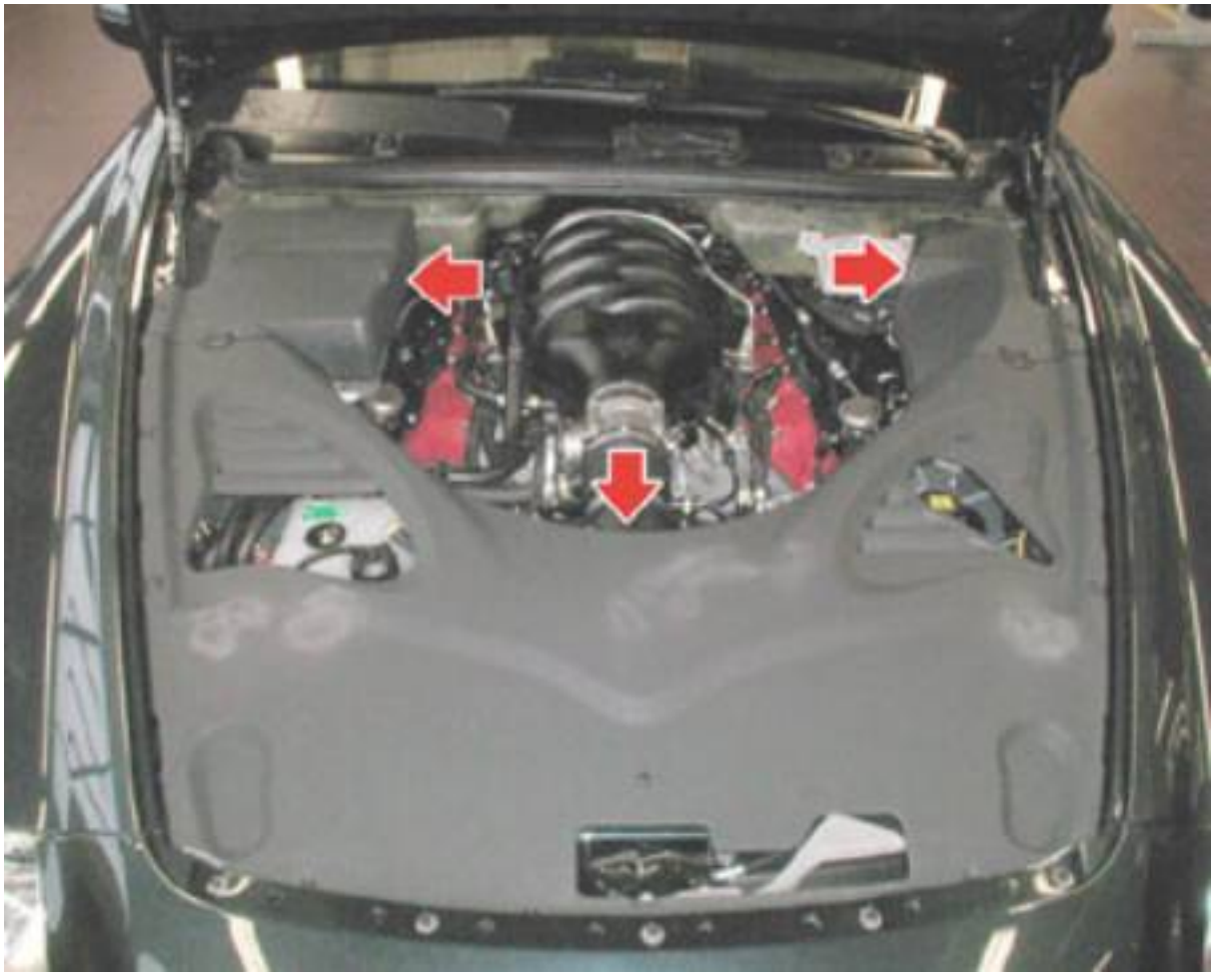
- Fit the water drainage pipe from the trim panel underneath the windscreen and secure it by tightening the relative clamp.

- Fit the engine compartment fuse box mount and tighten the three fastening screws fully.

- Fit the engine compartment fuse box mount and tighten the fastening screws fully.

- Fit the fuse box cover and rotate the plastic fastening screws by 90°.

- Fit the engine compartment trim panels.



- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

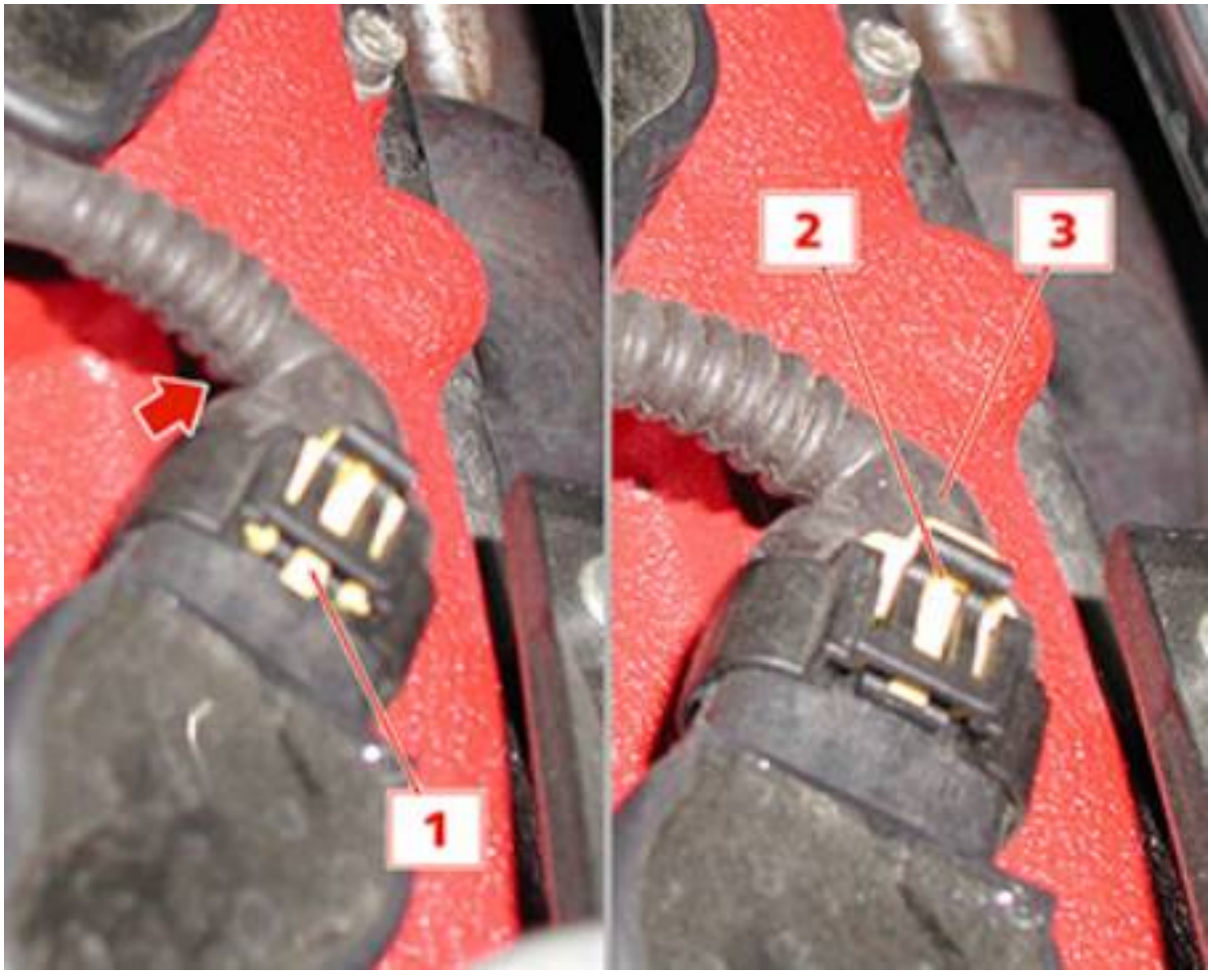
Component self-learning in the event of battery disconnection

Removing/refitting the ignition coils for engine part number up to 102269.

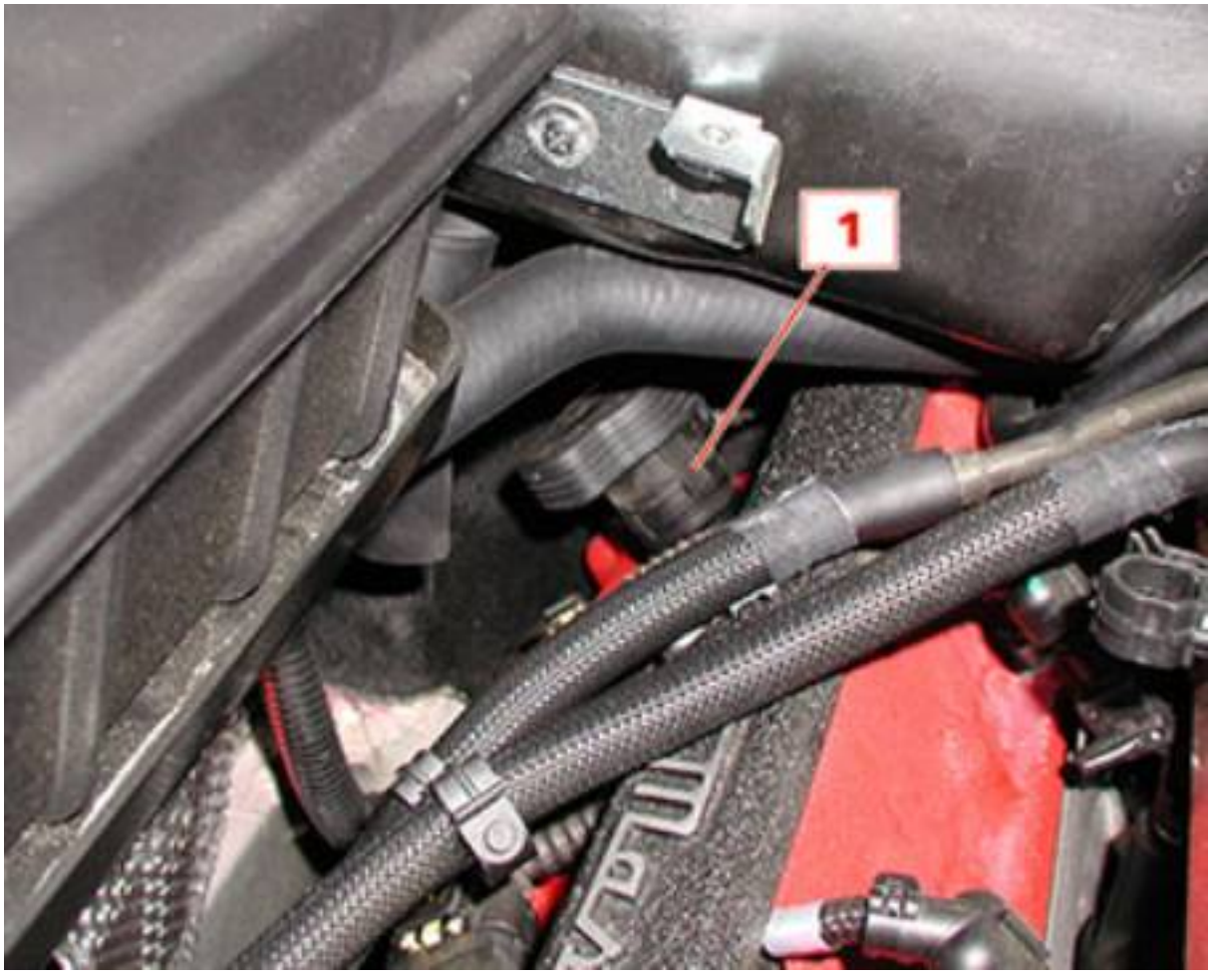
- The operation described below applies to vehicles manufactured from engine part number 102269 onwards.

- Remove the right-hand upper side guard **(1)**.

- Using a small screwdriver, push the yellow catch **(1)** in the direction of the arrow, then push on the black tab **(2)** and detach the connector from the coil **(3)** .



- Lift the coil **(1)** involved.



- Slide it out of the seat and remove it.

IMPORTANT
For the illustration, the 4th cylinder coil was chosen as it is the most complicated. This is due to the little space available and to the pipes that interfere with the operation. Because of these difficulties, the trim panel must be removed. To remove the other ignition coils no additional components have to be removed.

ALTERNATOR

Removing the alternator

- Place the vehicle on the hoist.
- Remove the electro-injectors from the engine.

Removing-refitting the electro-injectors

- Remove the belt controlling the engine auxiliary devices.

Removing-refitting the engine auxiliary devices' control belt

- Disconnect the blow-by system line from the right and left-hand cylinder heads.

- Disconnect the anti-evaporation system line from the intake manifold and the coolant recirculation line.

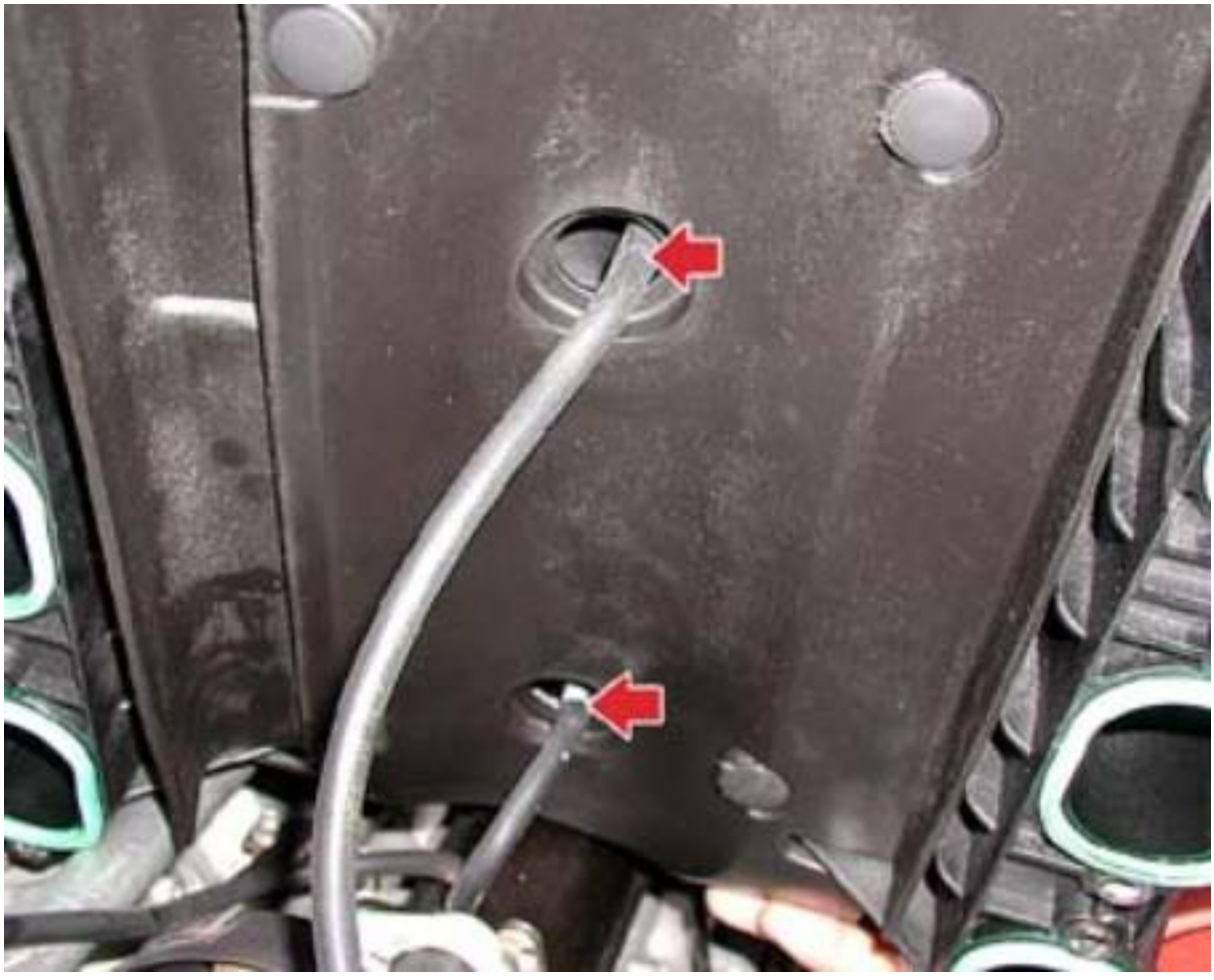
- By means of the tear-clamp, separate the throttle body from the intake manifold.

- Undo the screws fastening the intake manifold to the right-hand cylinder head.

- Undo the screws fastening the intake manifold to the left-hand cylinder head.

- Lift the intake manifold.

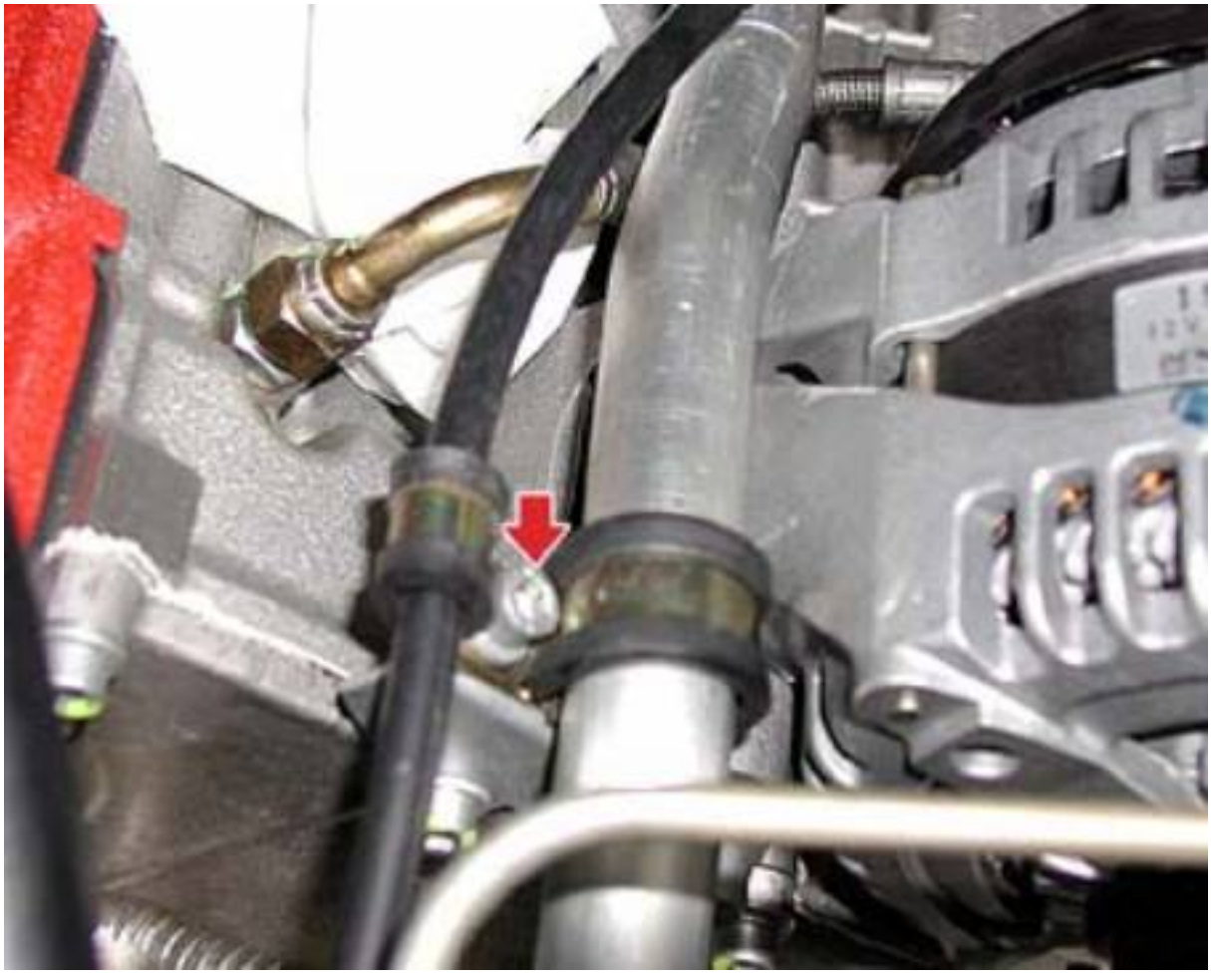
- Disconnect the two lines and remove the intake manifold.



- Remove the protection for the alternator power supply cable.

- Unscrew the fastening nut and disconnect the power supply cable, then disconnect the electrical connection.

- Undo the fastening screw on the blow-by line bracket.



- Undo the two fastening screws on the alternator.

- Loosen the coolant line union on the cylinder head.

- Loosen the fastening nuts on the bracket, and then loosen the left-hand threaded adjusting pin on the alternator.

- Rotate the alternator until it is released from its seat, taking care not to damage the engine coolant's recirculation pipeline and the blow-by pipe, then remove the alternator.

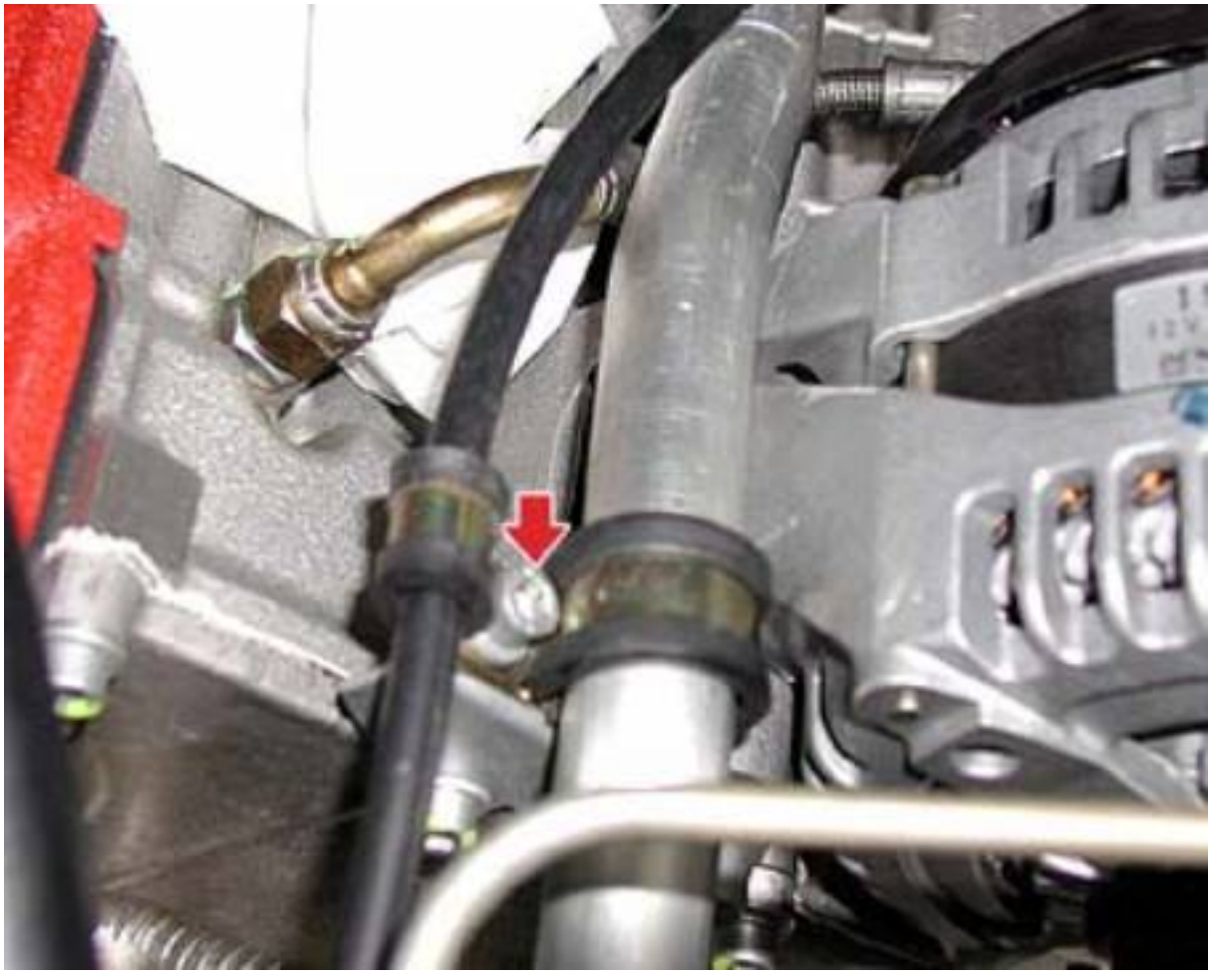
Refitting the alternator

- Fit the alternator in its seat between the two cylinder heads.
- Tighten the fastening nuts on the alternator bracket.
- Tighten the coolant line union on the cylinder head and clean the surrounding area to remove the coolant filtered by the cylinder head.

- Check the hole on the alternator and the relative centring pin are aligned, then apply Loctite 242 to the nut threads and tighten them to a torque of **10 Nm**.
- Apply Loctite 242 to the thread on the centring pin and tighten it so that it is flush with the bracket.

- Tighten the fastening screws on the alternator to a torque of **49 Nm**.

- Tighten the fastening screw on the blow-by line bracket.



- Connect the power supply cable and secure it with the fastening nut, then attach the electrical connection.
- Position the power supply cable protection guard.

- Check the gaskets on the intake manifold lines are intact. As a rule, they should be replaced every time the manifold is removed.

- Fit the intake manifold and connect the vacuum and recirculation pipes.
- Tighten all the fastening screws on the intake manifold to a torque of **10 Nm**.

When refitting, follow the remaining procedures in reverse order to those outlined for the removal.

- Fit the belt controlling the engine auxiliary devices.

Removing-refitting the engine auxiliary devices' control belt

- Carry out the refitting operation for the electro-injectors.

Removing-refitting the electro-injectors

- Remove the car from the hoist.

Engine auxiliary devices’ control belt

Removing-refitting the engine auxiliary devices’ control belt

- Place the vehicle on the hoist.
- Remove the floor guard beneath the engine

Removing-refitting the engine floor guard

- Remove the trim guards.

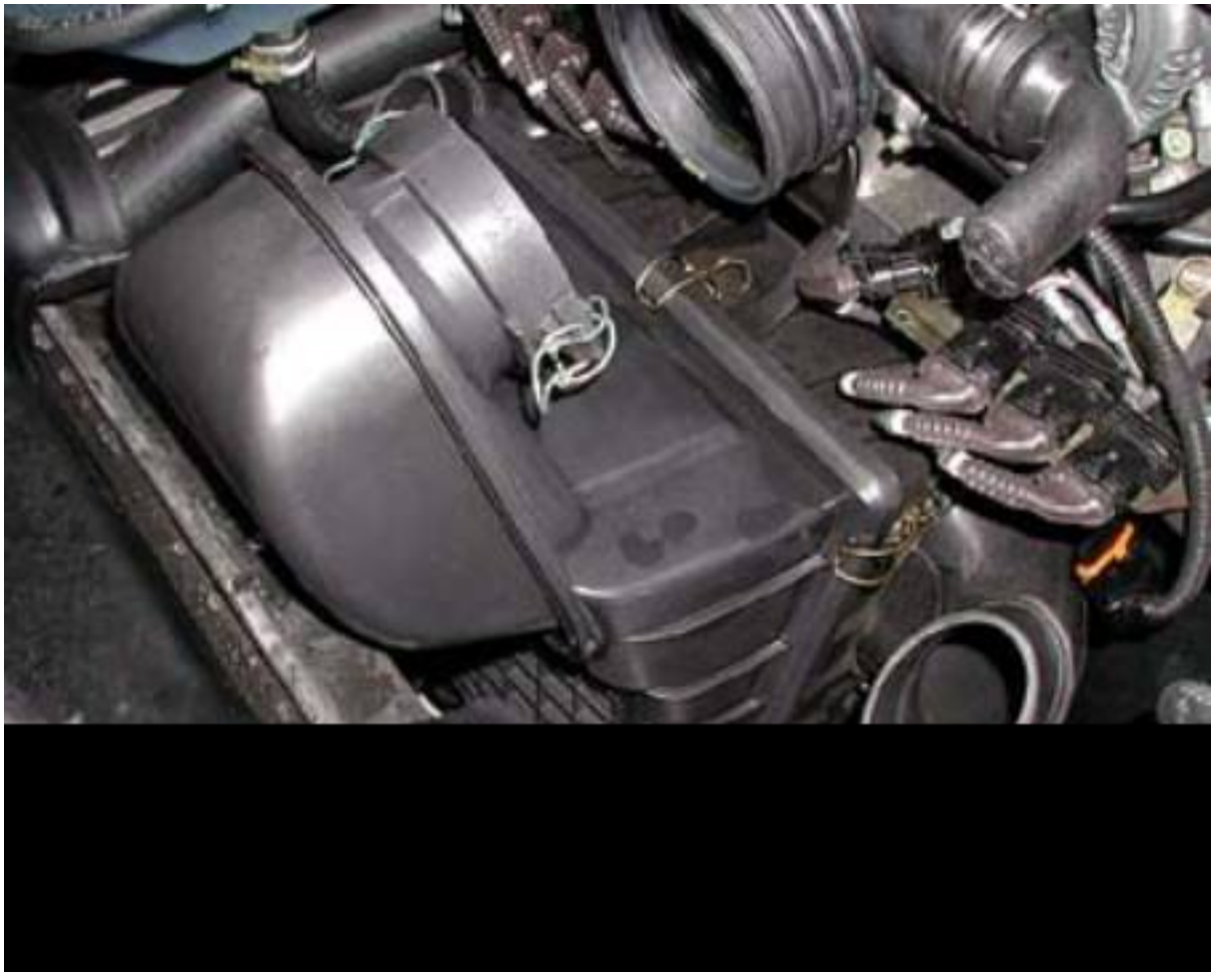
- Detach the electrical connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



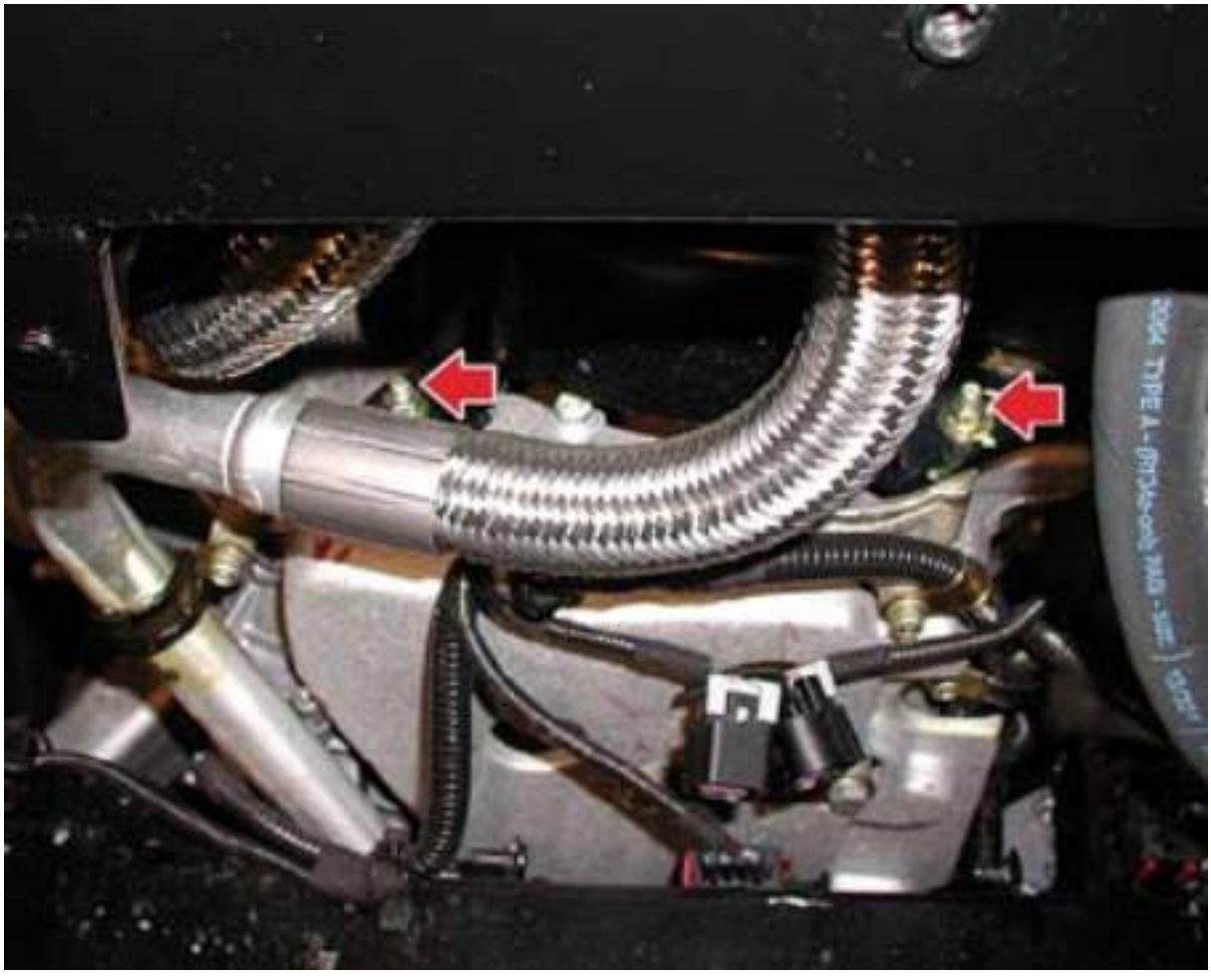
- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the dome bar.

- Remove the air filter housing.

- Unscrew the two upper nuts on the guard for the engine auxiliary devices’ control belt.

- Lift the hoist and unscrew the two lower nuts on the guard for the engine auxiliary devices’ control belt .



- Lower the hoist and remove the guard for the engine auxiliary devices' control belt.

- Using a wrench, rotate the automatic tensioning device clockwise and remove the engine auxiliary devices’ control belt.

Refitting the engine auxiliary devices’ control belt

- Fit the engine auxiliary devices’ control belt onto the pulleys, then rotate the automatic tensioning device anticlockwise, insert the belt underneath the device’s pulley and release the device slowly.

N.B.
The tensioning device is automatic and, by means of a preloaded spring, it is capable of tensioning the belt correctly during its fitting and of automatically recovering the slack created during standard operation. No tension check is therefore necessary.

CAUTION
Do not let the belt come into contact with oil or solvents that could alter the elasticity of its rubber material, with a consequent reduction in grip potential. Also check that there are no cracks or cuts on the belt and, if any are found, replace the belt.

When refitting, follow the remaining procedures in reverse order and, in addition, clean the air flow meter and the filter housing thoroughly to prevent the infiltration of impurities which could impair the operation of the air flow meter's sensor.

INTAKE MANIFOLD

Removing the intake manifold

- Place the vehicle on the hoist.
- Remove the electro-injectors from the engine.

Removing-refitting the electro-injectors

- Disconnect the blow-by system line from the right and left-hand cylinder heads.

- Disconnect the anti-evaporation system line from the intake manifold and the coolant recirculation line.

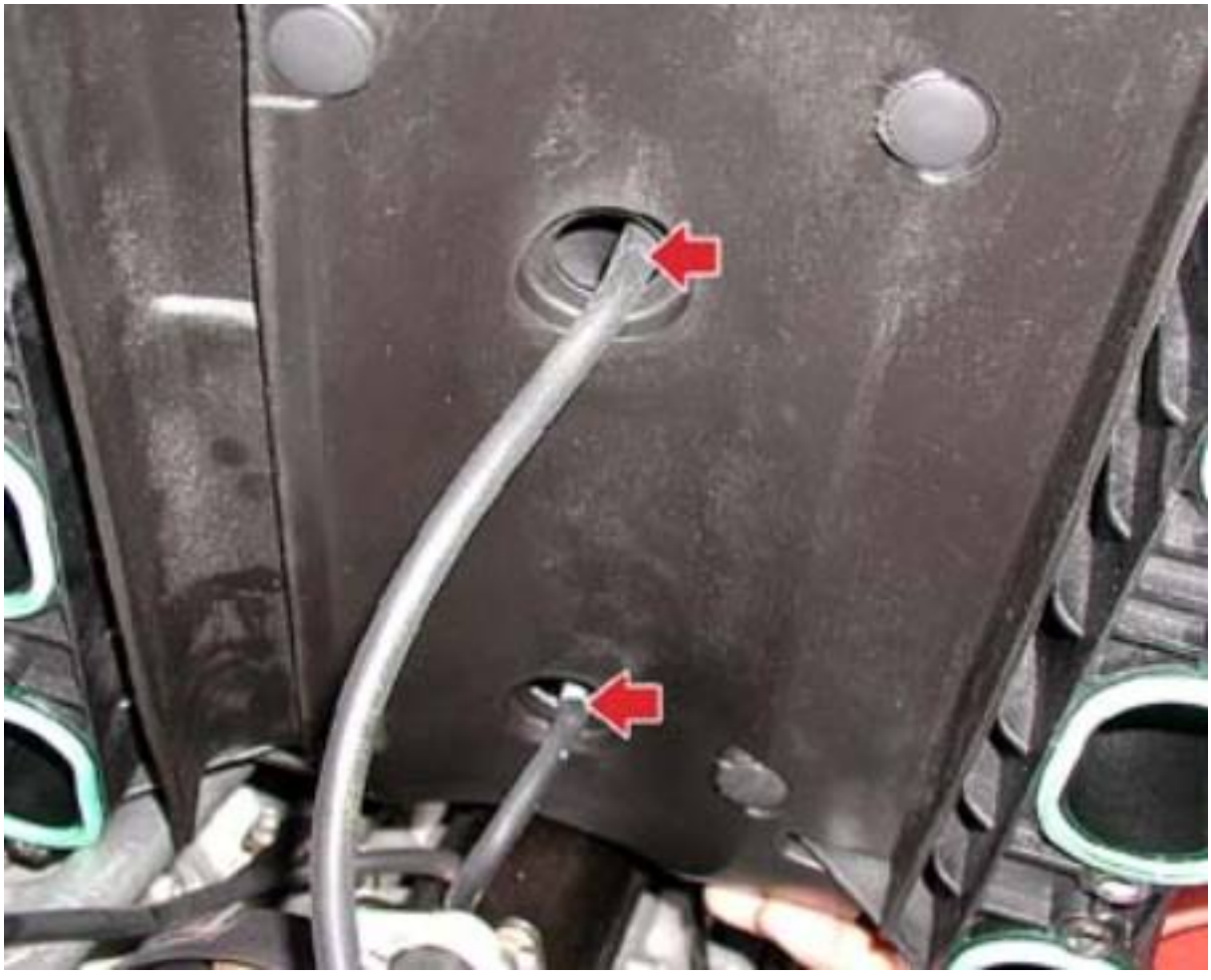
- By means of the tear-clamp, separate the throttle body from the intake manifold.

- Undo the screws fastening the intake manifold to the right-hand cylinder head.

Undo the screws fastening the intake manifold to the left-hand cylinder head.

- Lift the intake manifold.

- Disconnect the two lines and remove the intake manifold.



Refitting the intake manifold

- Check the gaskets on the intake manifold lines are intact. As a rule, they should be replaced every time the manifold is removed.

- Fit the intake manifold and connect the vacuum and recirculation pipes.
- Tighten all the fastening screws on the intake manifold to a torque of **10 Nm**.

When refitting, follow the remaining procedures in reverse order to those outlined for the removal.

- Refit the electro-injectors.

Removing-refitting the electro-injectors

- Remove the vehicle from the hoist.

EXHAUST MANIFOLDS

Removing the exhaust manifolds for the EUROPE version up to serial number 24274

- Place the vehicle on the hoist.

IMPORTANT
After the procedure described below, we will describe the procedure for removing the exhaust manifolds of the USA - CANADA version and the EUROPE version from serial number 24275.

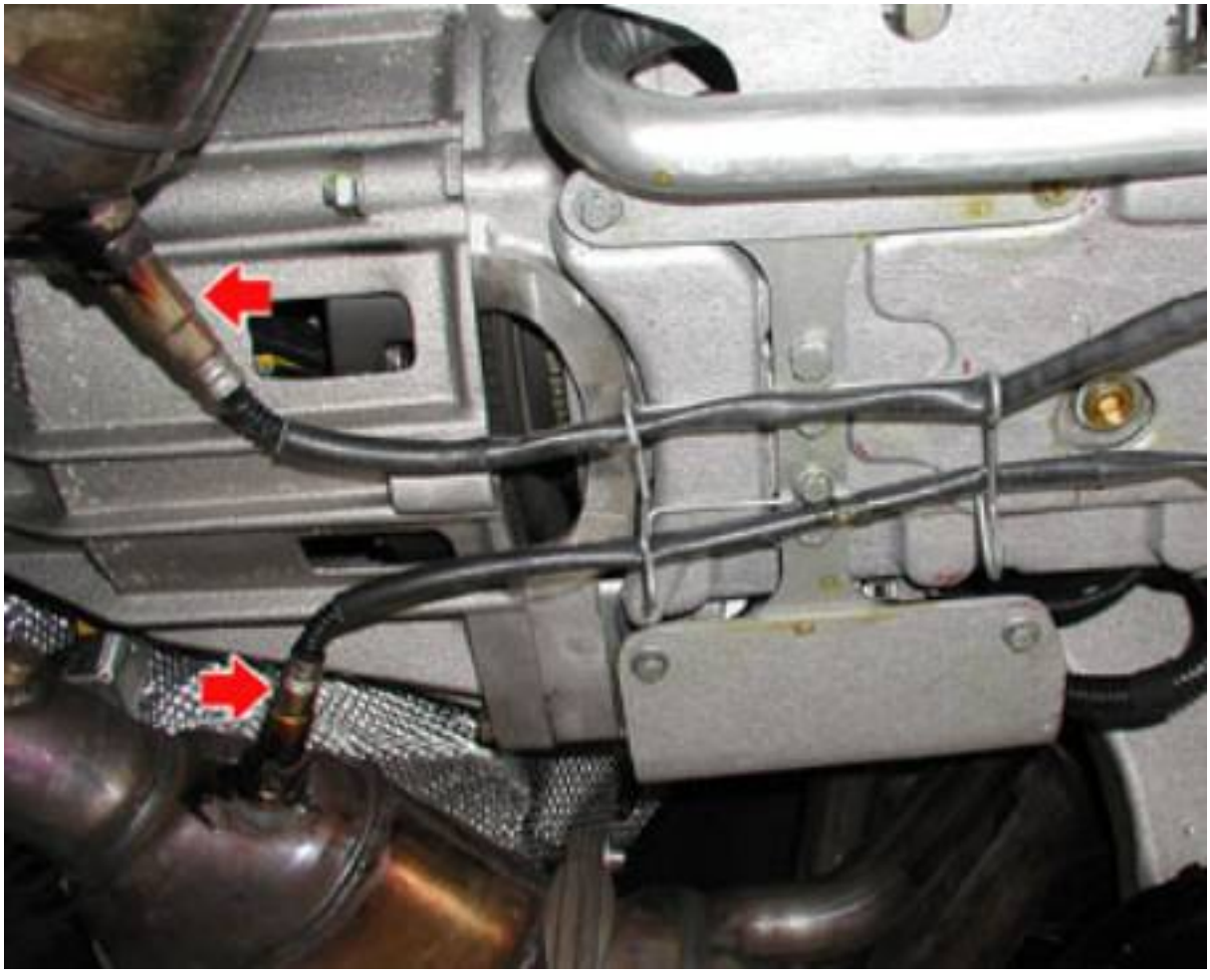
- Remove the floor guard beneath the engine.

Engine floor guard

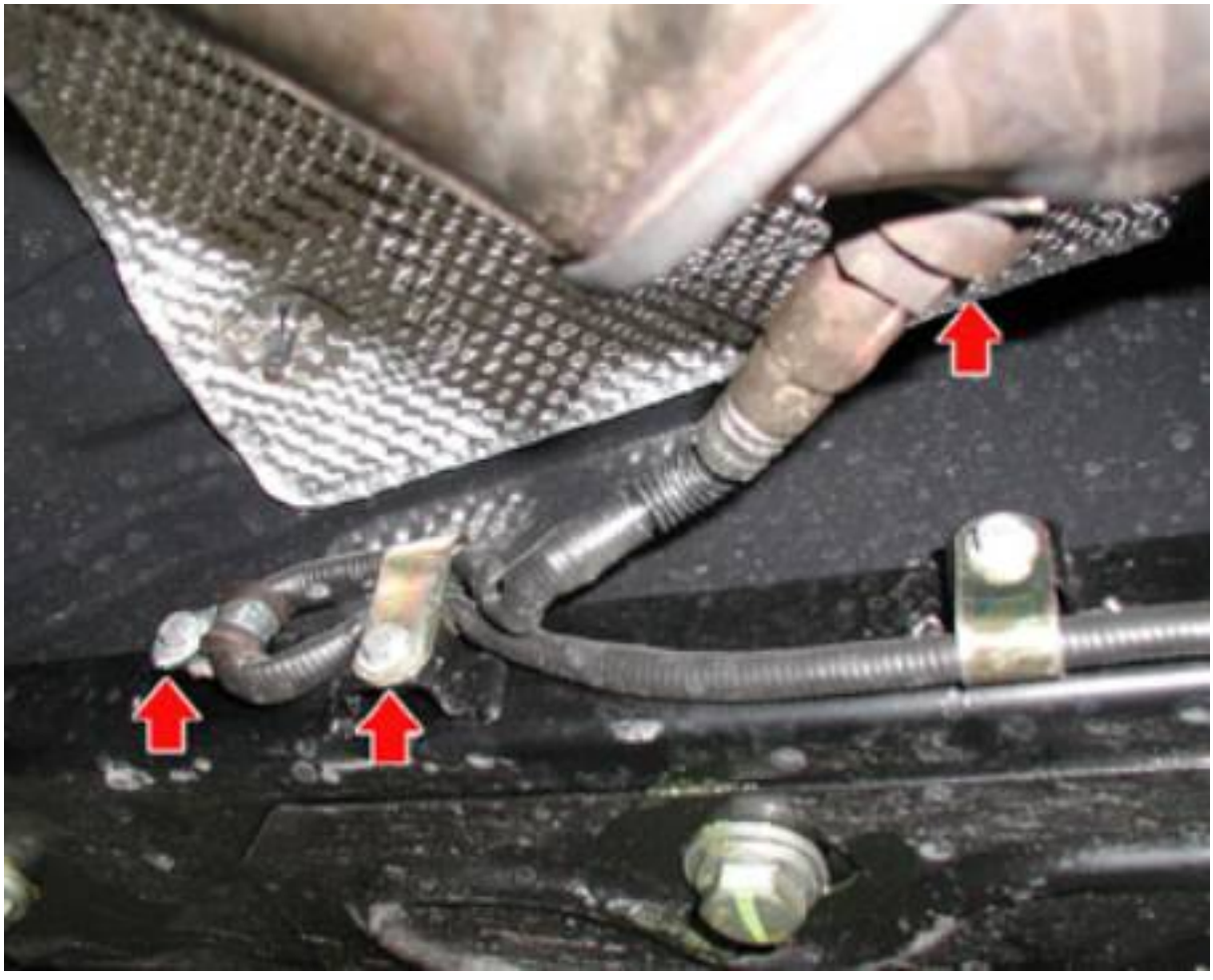
- Remove the exhaust tailpipes.

Removing-refitting the tailpipe

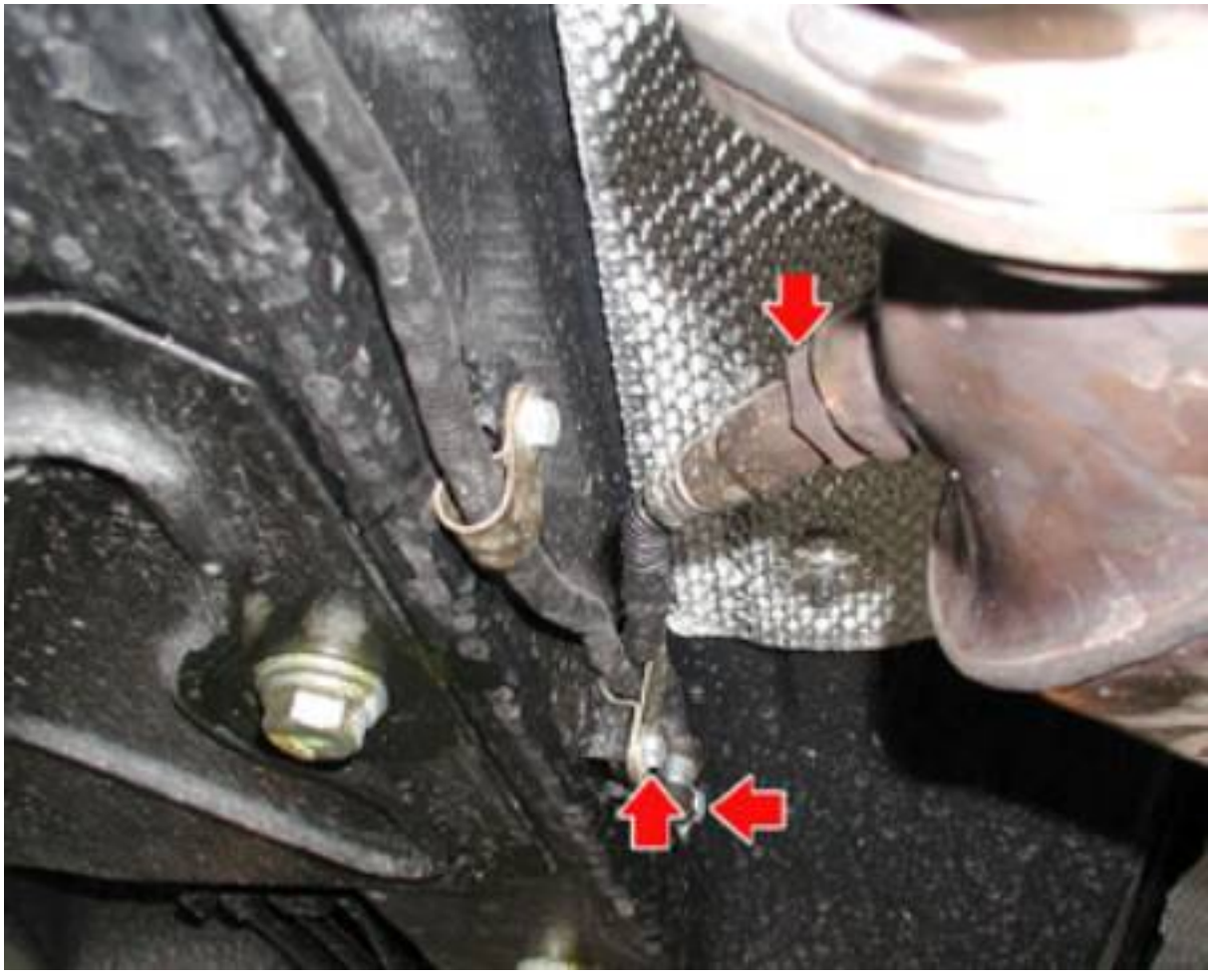
- Unscrew the two rear Lambda sensors on the catalytic converters and release the cables from the central fastening bracket.



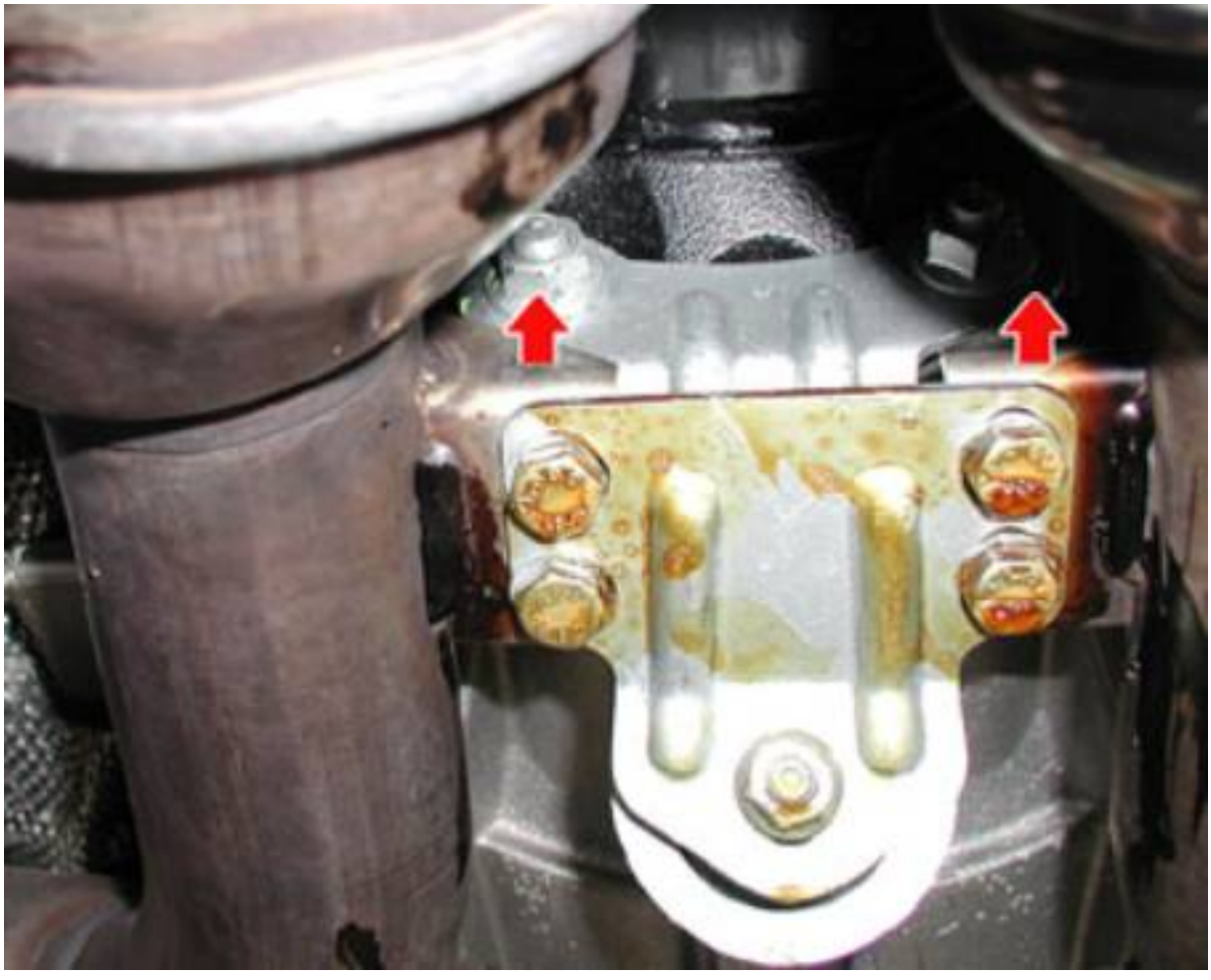
- Undo the wiring fastening screws, then unscrew the Lambda sensor from the left-hand catalytic converter.



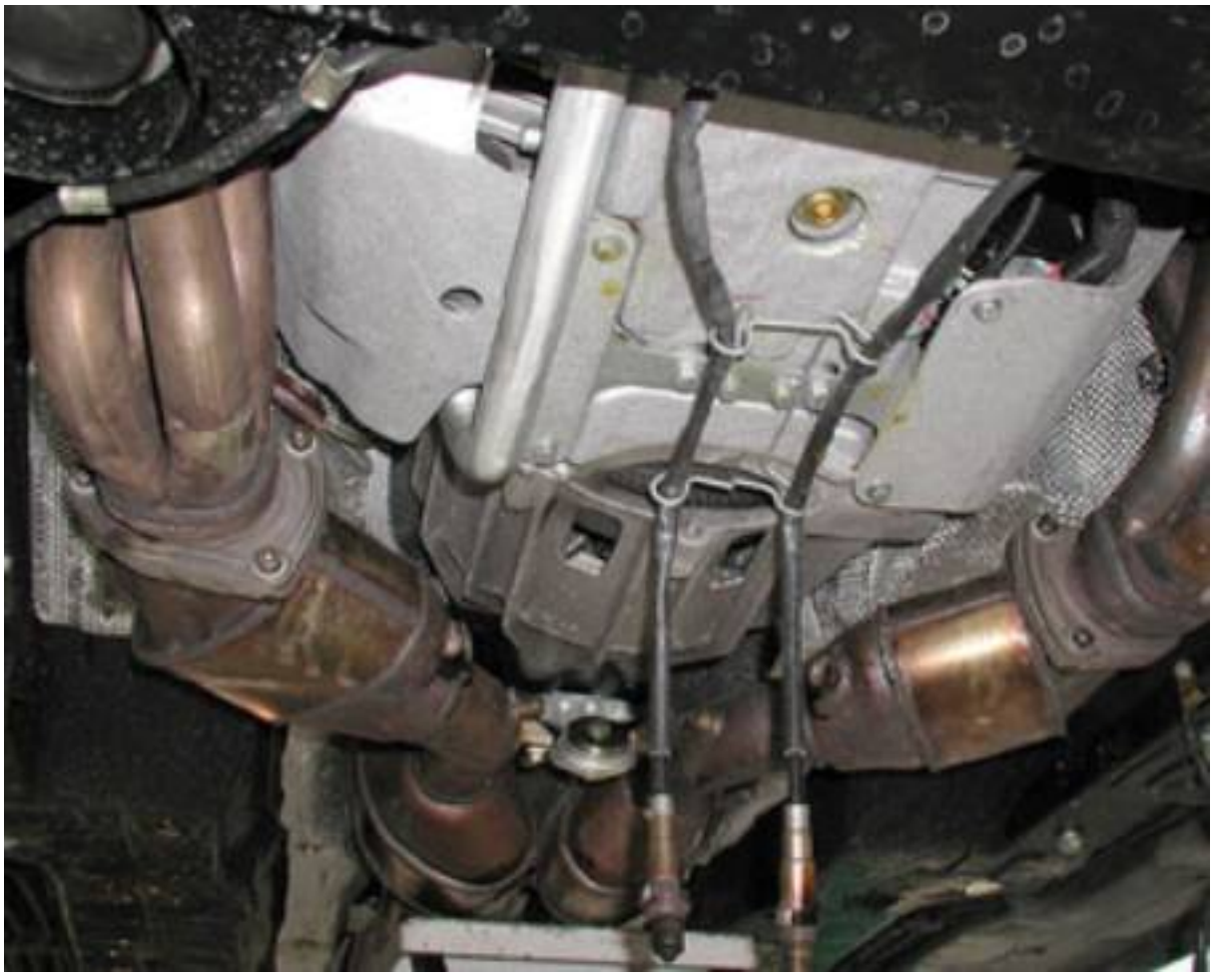
- Undo the wiring fastening screws, then unscrew the Lambda sensor from the right-hand catalytic converter.



- Unscrew the fastening nuts on the central catalytic converter mount.



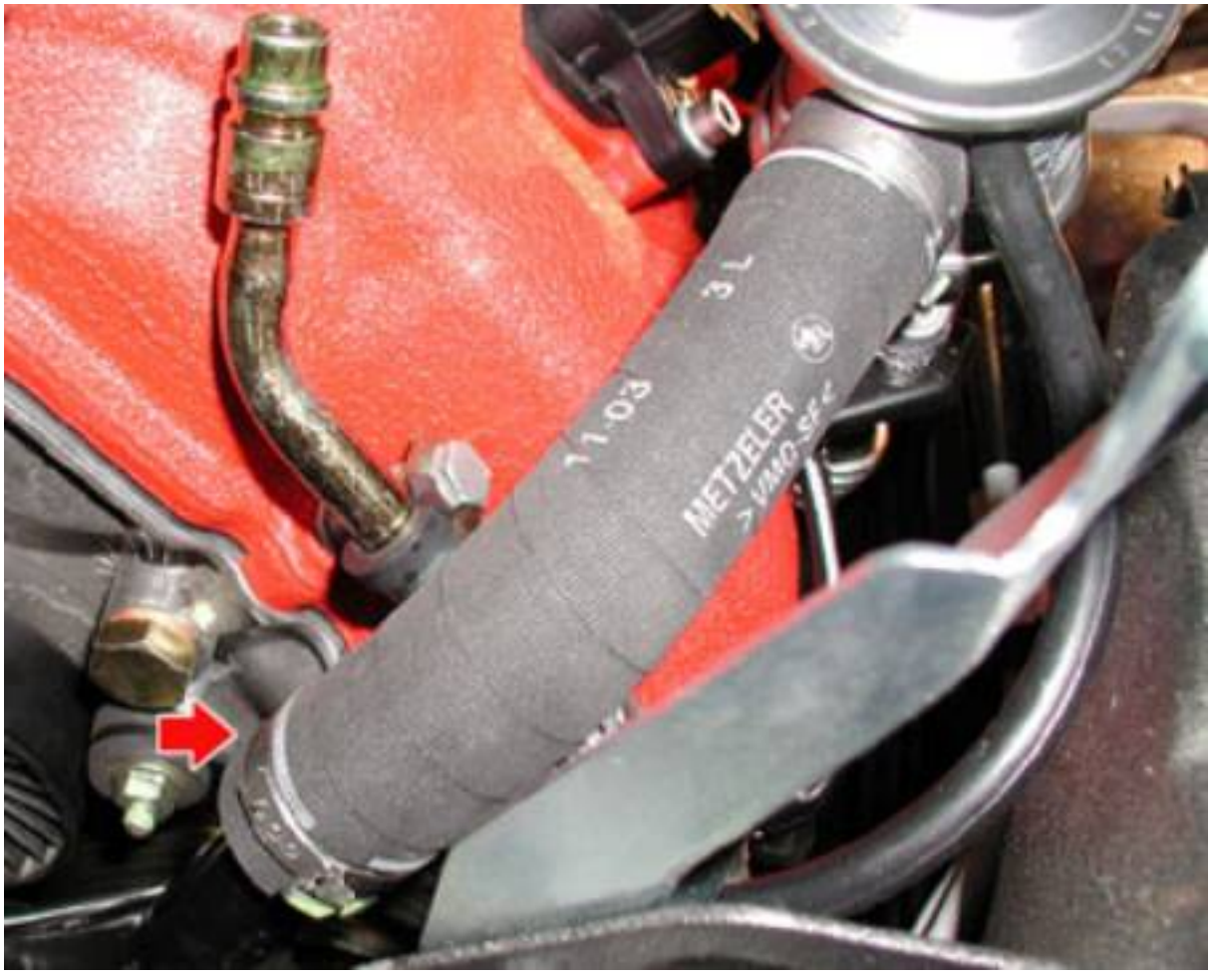
- Unscrew the six screws fastening the catalytic converter to the relative manifolds.



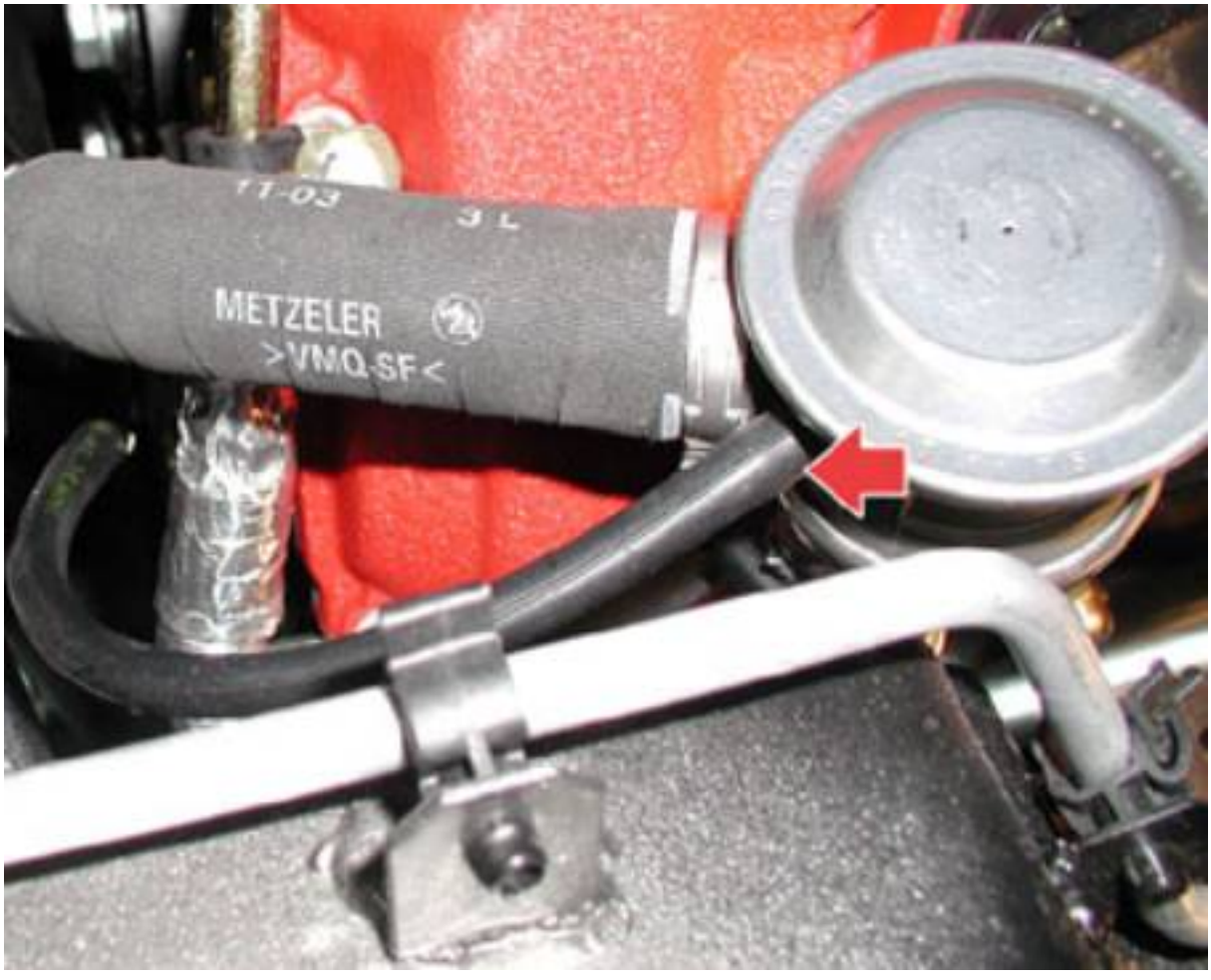
- Position a hydraulic support beneath the catalytic converter/ central exhaust silencer assembly, lower it slowly, then remove the catalytic converters together with the central exhaust silencers.
- Retrieve the catalytic converter conductive gaskets.

- Remove the trim guards.

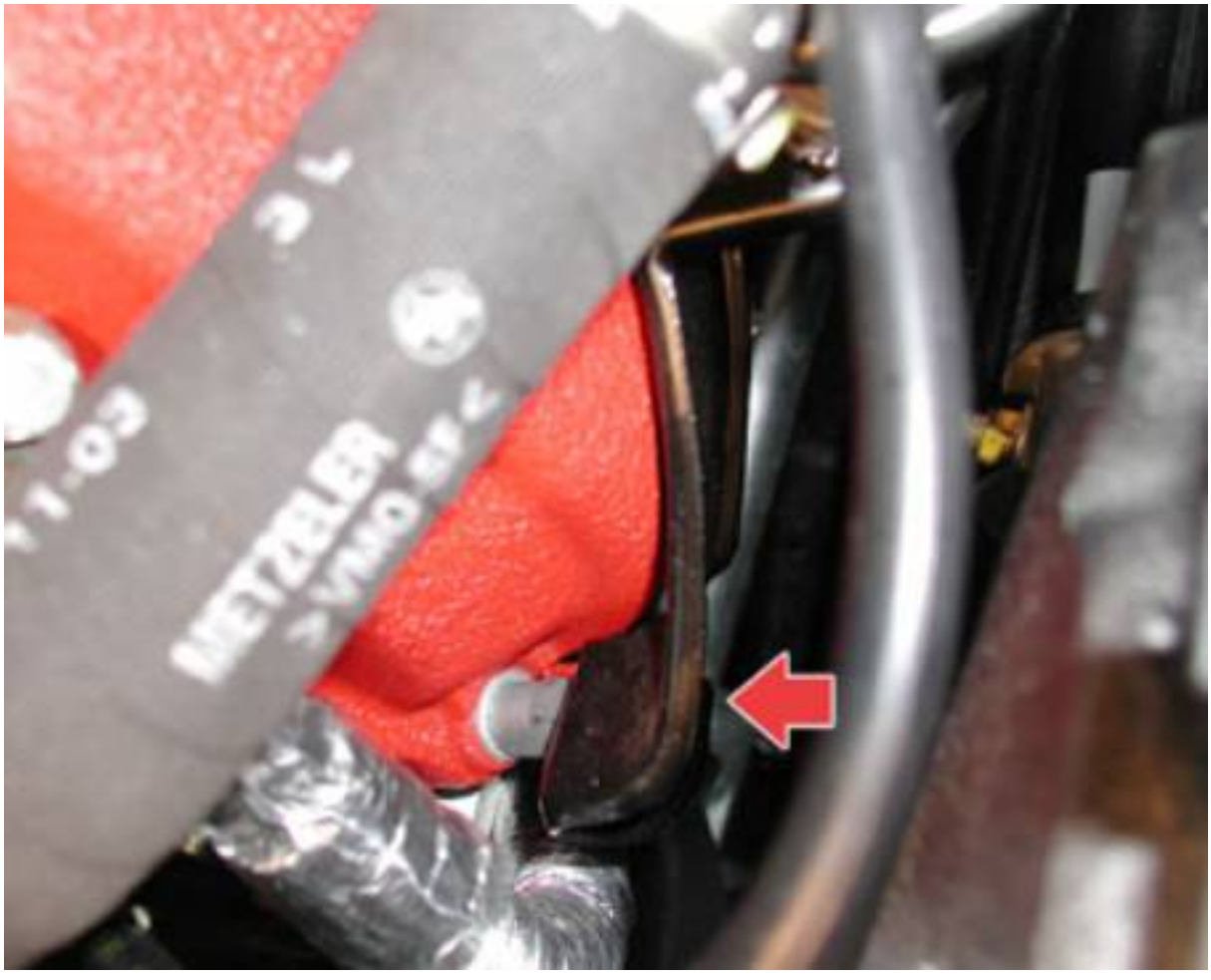
- Disconnect the air hose from the rigid line.



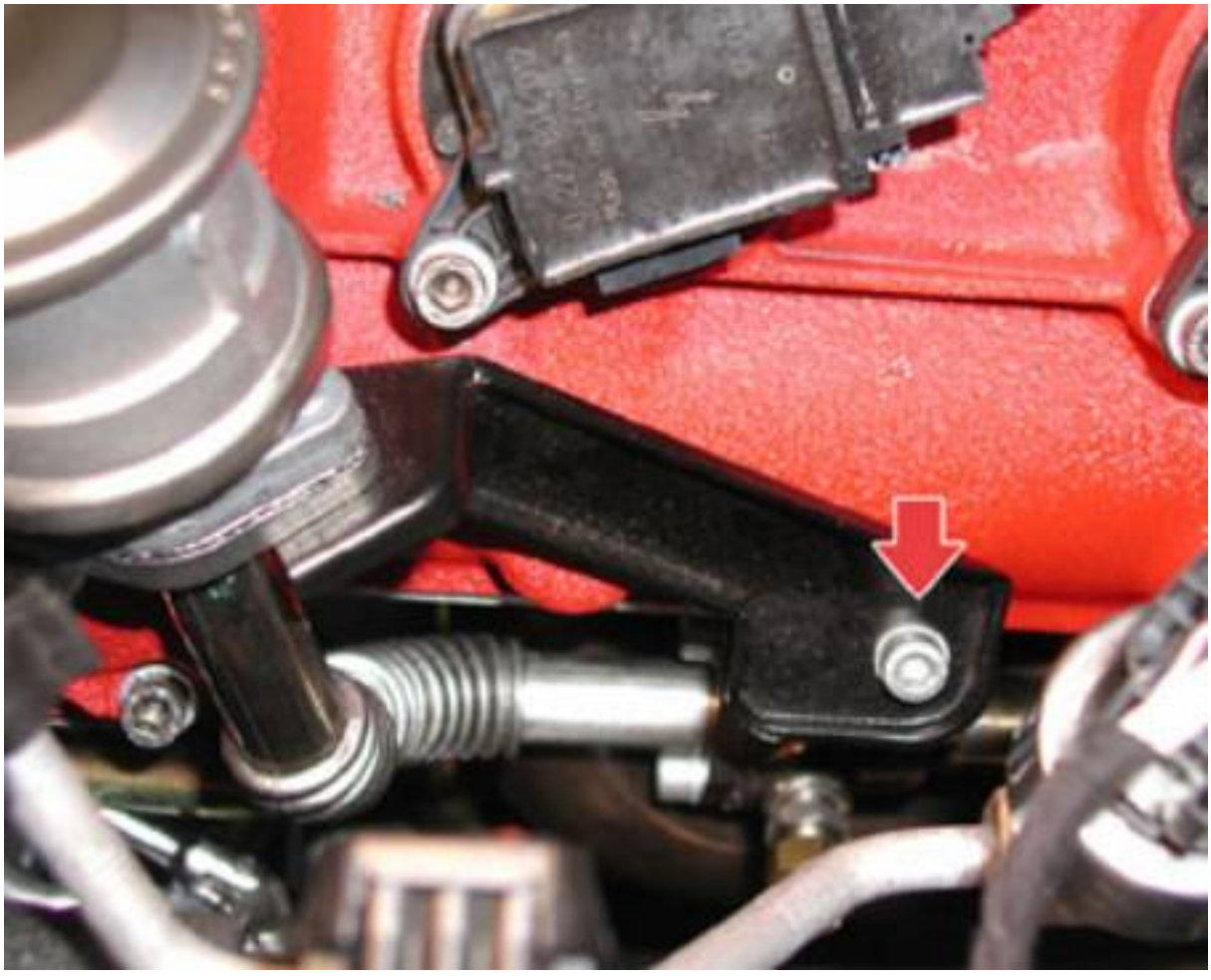
- Disconnect the vacuum pipe from the valve.



- Undo the front fastening screw on the valve supporting bracket.



- Undo the rear fastening screw on the valve supporting bracket.



- Unscrew and remove the complete union, unscrewing it from the rigid line.

- Lift the hoist and undo the fastening screws, then remove the starter motor's metal guard.

Undo the screw fastening the steering column to the box, then separate them.

- Unscrew the nuts fastening the exhaust manifold to the cylinder head.

- View of the points at which the exhaust manifold is fastened to the cylinder head.

- Release the manifold from the stud bolts and remove it, taking care not to damage the secondary air system’s pneumatic valve.
- Retrieve the exhaust manifold gasket.

N.B.
This procedure also applies to the other exhaust manifold, provided that you remember to remove the engine compartment fuse box and relative mount before working on the manifold.

Refitting the exhaust manifolds for the EUROPE version up to serial number 24274

- Fit the new gasket, fit the exhaust manifold complete with the pneumatic valve and tighten the fastening nuts to a torque of **25 Nm**.

- Tighten the screw fastening the steering column and steering box to a torque of **25 Nm**.

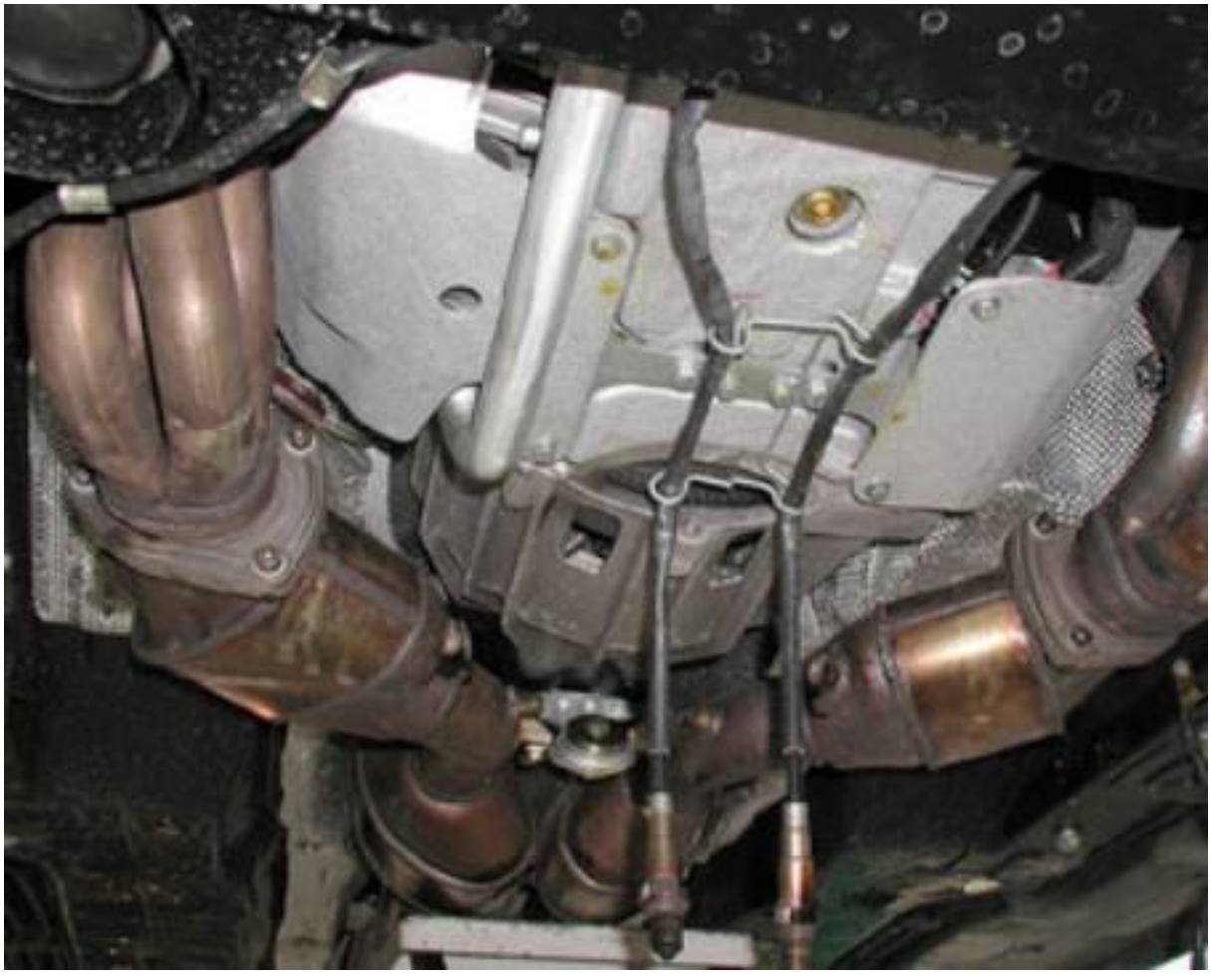
- Fit the metal guard on the starter motor and tighten the three fastening screws.
- Tighten the whole union on the rigid line.
- Tighten the screws fastening the pneumatic valve mounting bracket to the cylinder head.
- Connect the air vacuum pipe to the valve and to the rigid line.
- Fit the trim guards.
- Using a hydraulic support positioned underneath the catalytic converter/central exhaust silencer assembly, position the catalytic converters in their seat together with the central exhaust silencers.

N.B.
Visually inspect that the gasket located underneath the flange joining the catalytic converter and the exhaust manifold is intact and if signs of wear are found, replace it.

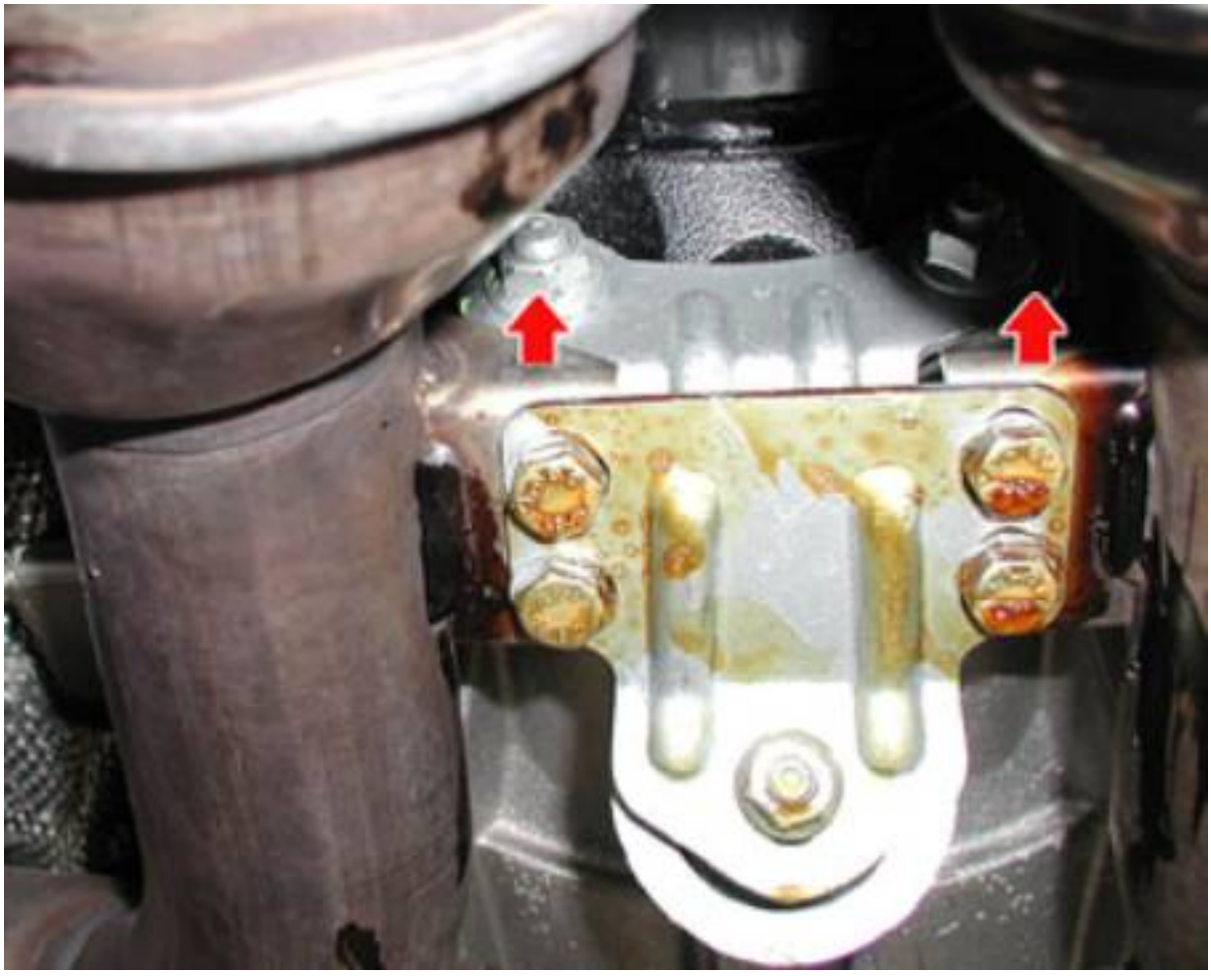
N.B.
The conductive gaskets must never be fitted more than once. The second time the component is fitted, they must be replaced

- Fit the conductive gaskets.

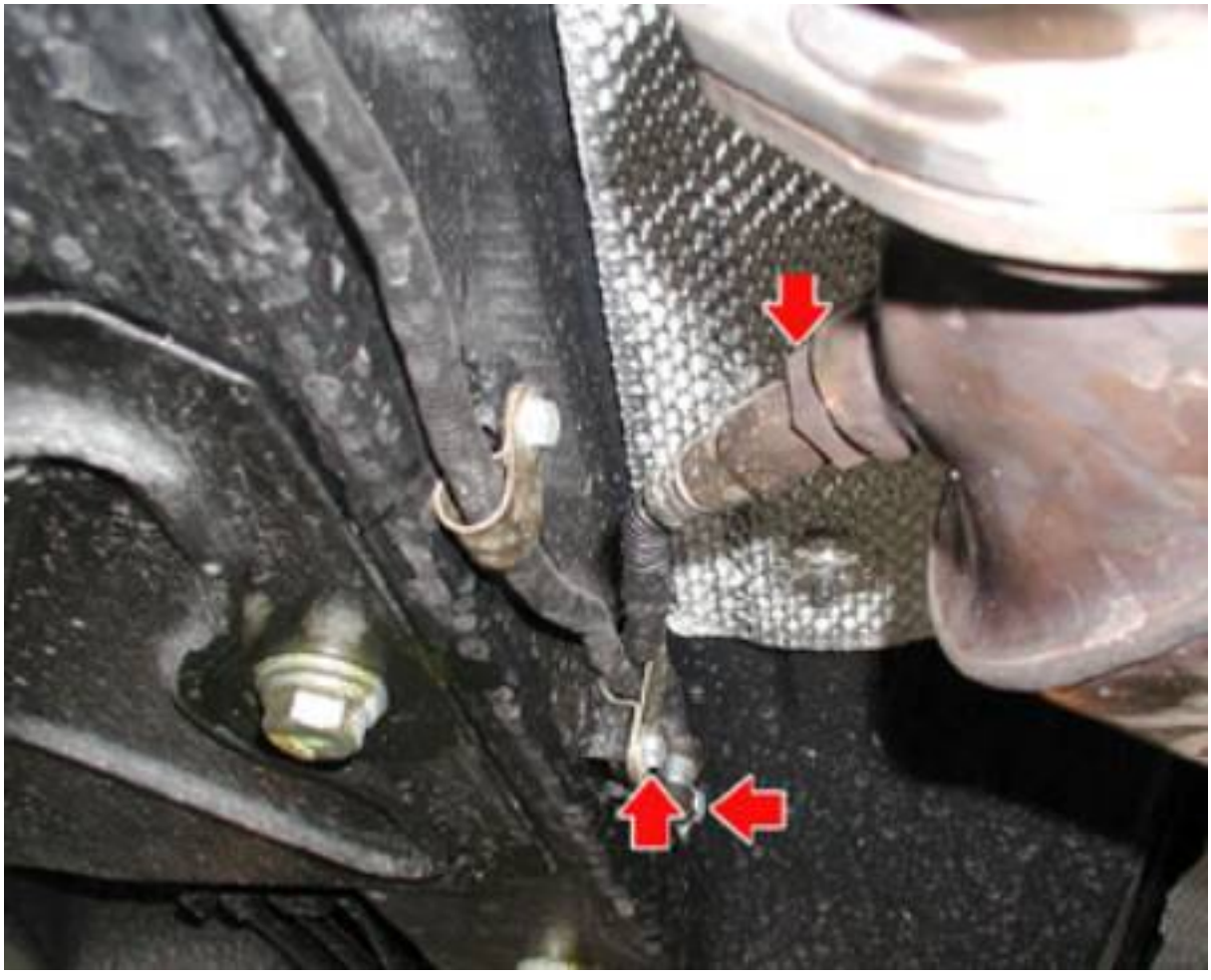
- Tighten the screws fastening the exhaust manifold to the catalytic converter to a torque of **25 Nm**.



- Tighten the fastening nuts on the central catalytic converter mount.



- Fit all the Lambda sensors, then tighten them to a torque of **50 Nm.**
- Suitably secure the front Lambda sensor wiring to the engine frame.



- Proceed by refitting the exhaust tailpipes.

Removing-refitting the tailpipe

- Remove the floor guard beneath the engine.

Engine floor guard

Removing the exhaust manifolds for all the USA– CANADA versions and the EUROPE version from serial number 24275

IMPORTANT
The exhaust pipe of the USA – CANADA vehicles has remained unchanged, while the EUROPE vehicles from serial number 24275 are equipped with the same exhaust pipe as the versions for the American/Canadian markets.

- Place the vehicle on the hoist.
- Remove the exhaust tailpipes.

Tailpipe

- Remove the two exhaust extensions.

Exhaust extension pipe

- Remove the central exhaust silencer.

Exhaust silencer

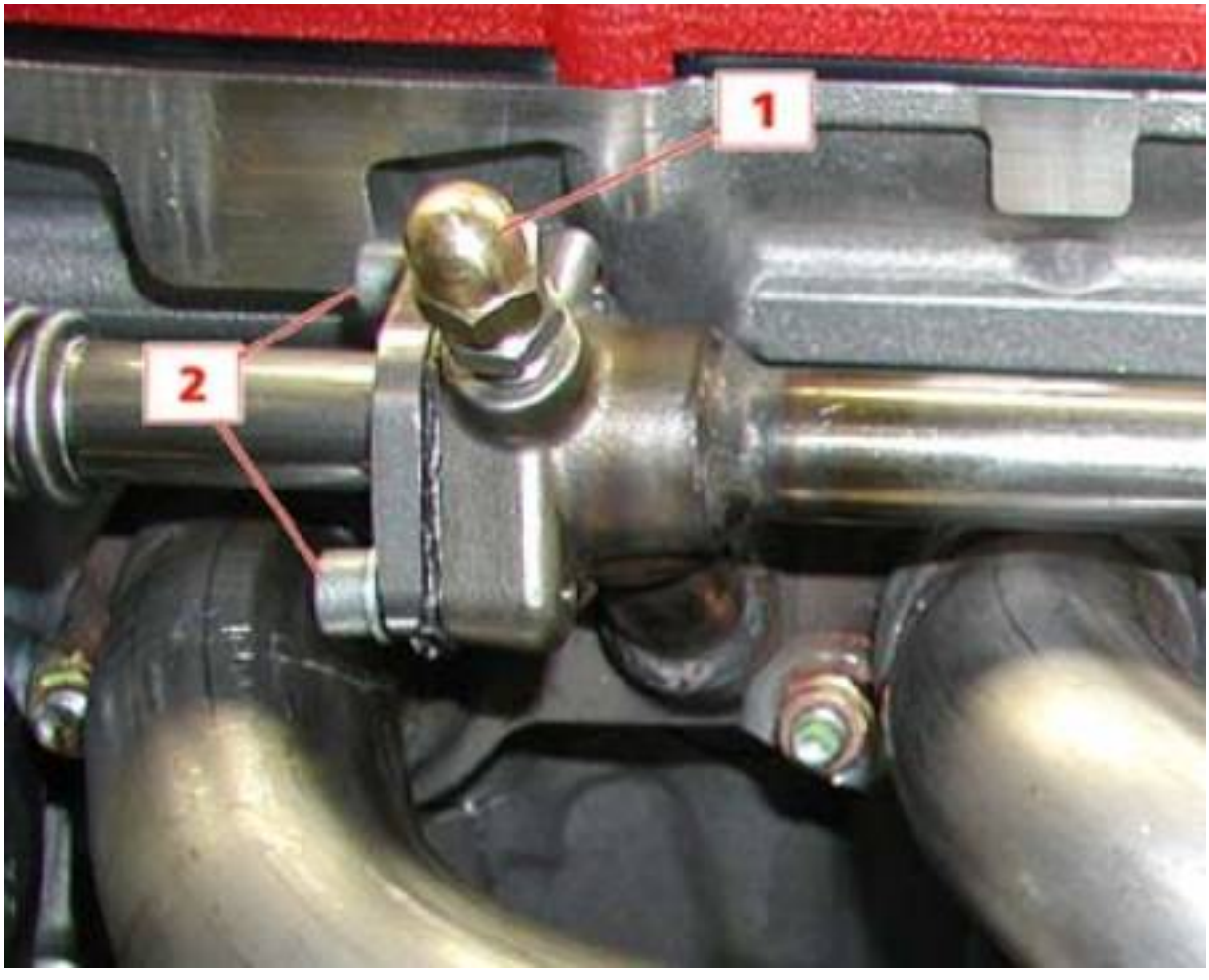
- Remove the floor guard beneath the engine.

Engine floor guard

- Remove both catalytic converters.

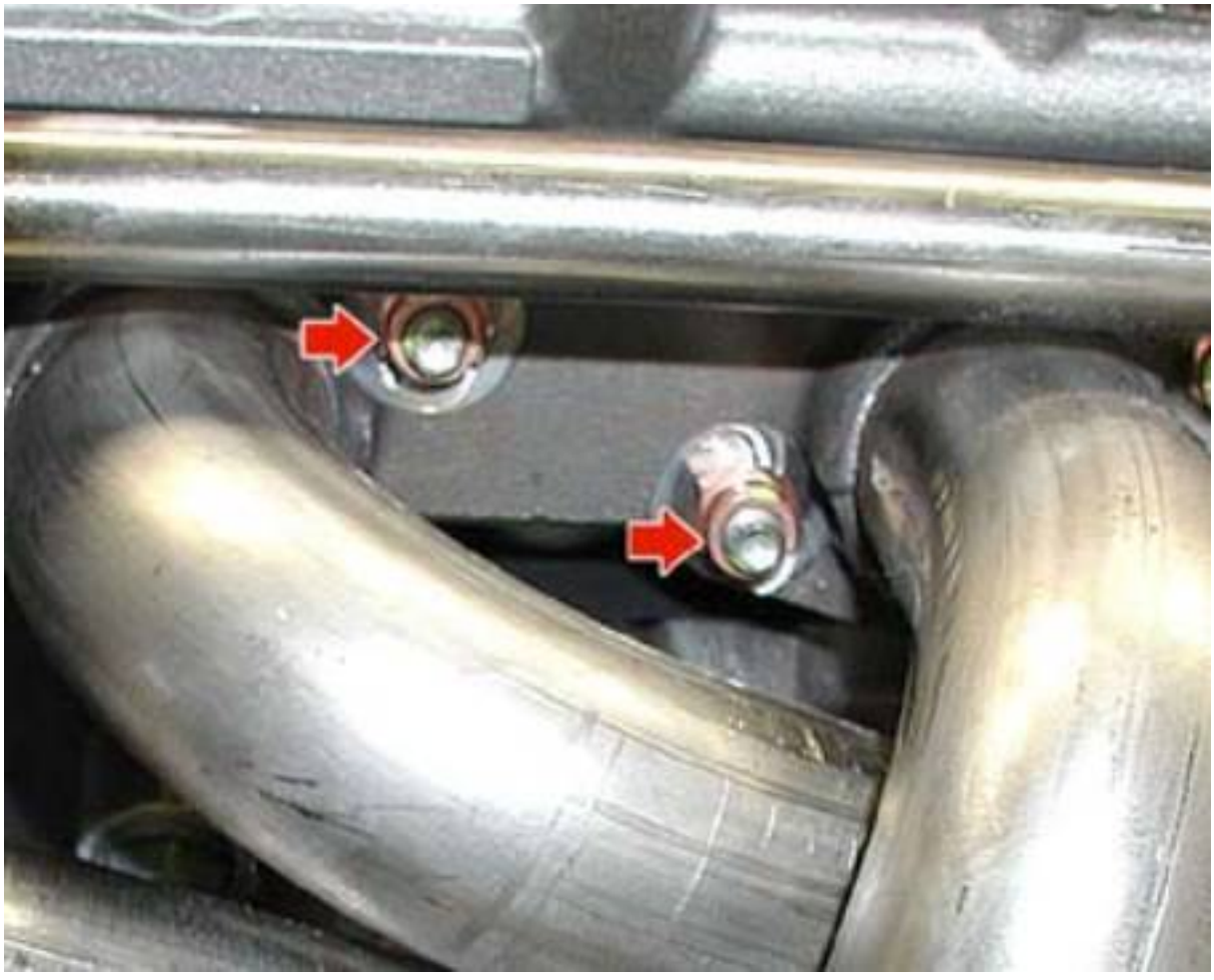
Catalytic converters

- Unscrew and remove the union **(1),** undo the two screws **(2)** and separate the rigid secondary air piping.



- Undo the screw fastening the steering column to the box, then separate them.

- Working from the top, for the RH manifold, using a ratchet connected to an **USAG 236 3/8 TS** type extension with a length of **75mm** or a **BETA 910 AN/75** extension, unscrew the two fastening nuts indicated.
- Using the same wrenches, lift the hoist and unscrew the same fastening nuts on the LH manifold.



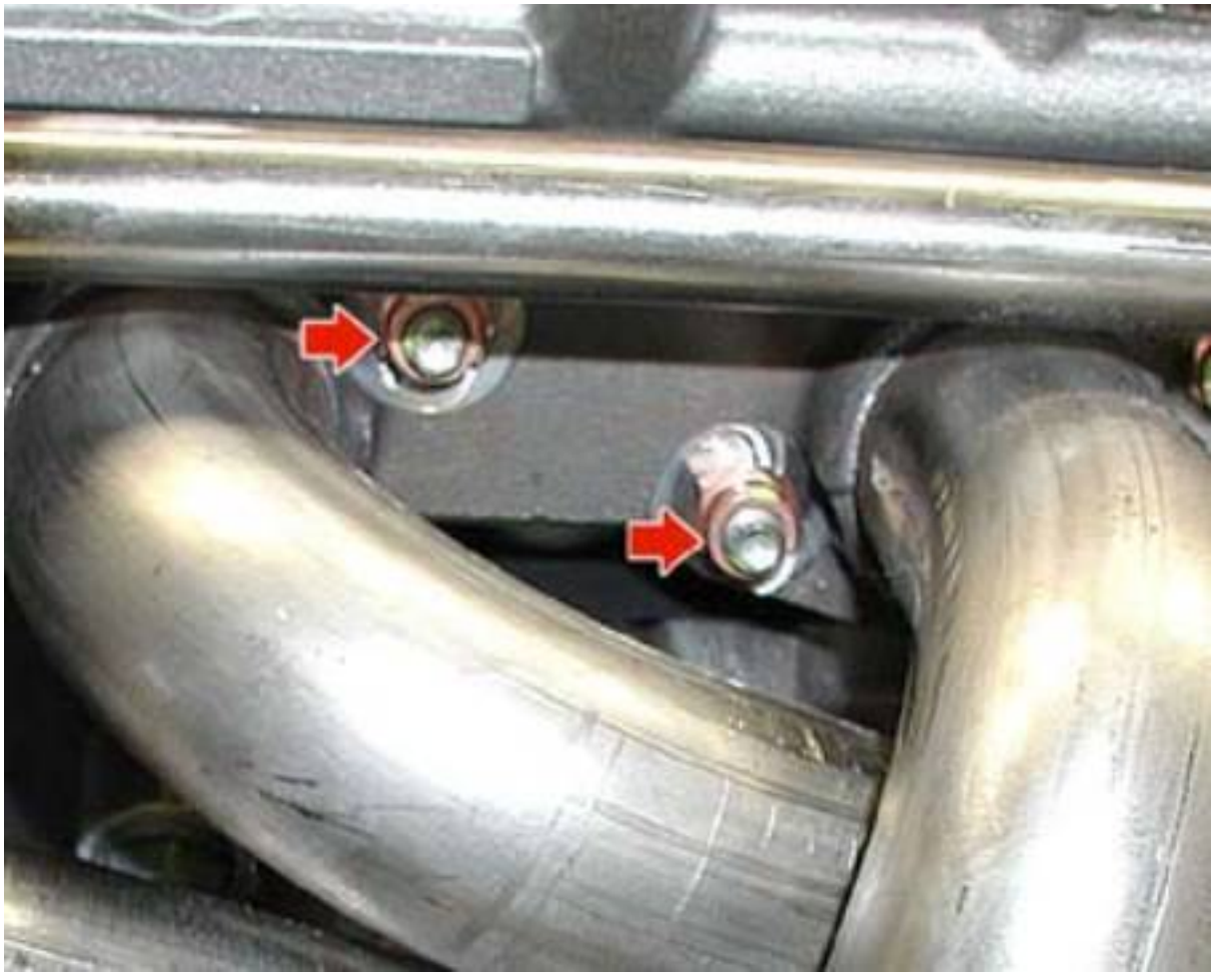
- Keeping the hoist lifted, unscrew the remaining nuts fastening the exhaust manifolds to the heads, then remove them.
- Retrieve the exhaust manifold gaskets.

Refitting the exhaust manifolds for all the USA – CANADA versions and the EUROPE version from serial number 24275

- Fit the new exhaust gaskets onto the stud bolts on the cylinder heads.
- Fit the two exhaust manifolds and tighten the fastening nuts accessible from lower part of the vehicle.

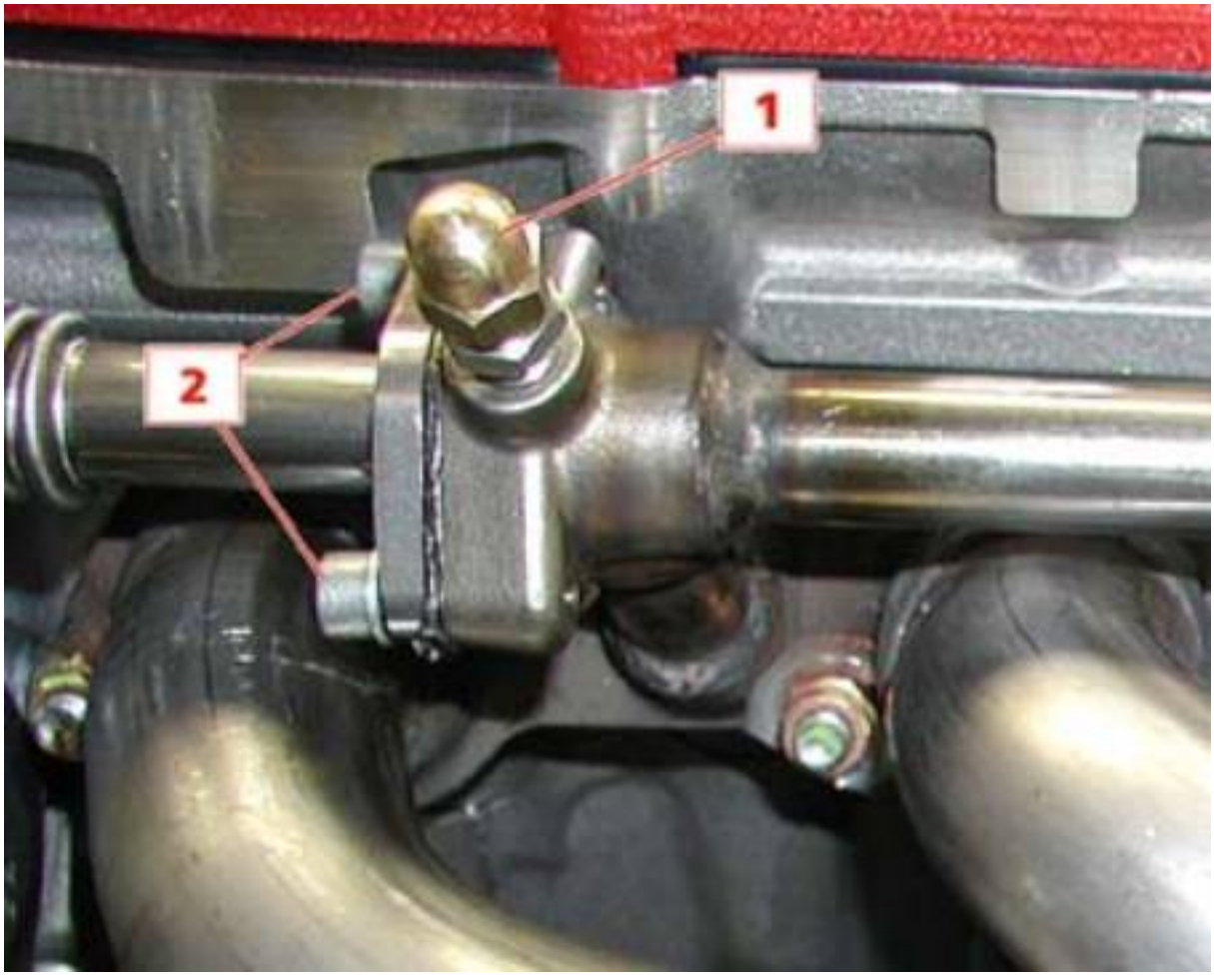
- Lower the hoist and tighten the two nuts accessible from the top of the RH exhaust manifold.

N.B
The fastening nuts on the exhaust manifolds must be tightened to a torque of 25 Nm.



- Tighten the screw fastening the steering column and steering box to a torque of **25 Nm**.

- Fit the union **(1),** and tighten the two screws **(2)** on the rigid secondary air piping coupling flange.



- Fit both catalytic converters.

Catalytic converters

- Fit the engine floor guard.

Engine floor guard

- Fit the central exhaust silencer.

Exhaust silencer

- Fit the two exhaust extension pipes.

Exhaust extension pipe

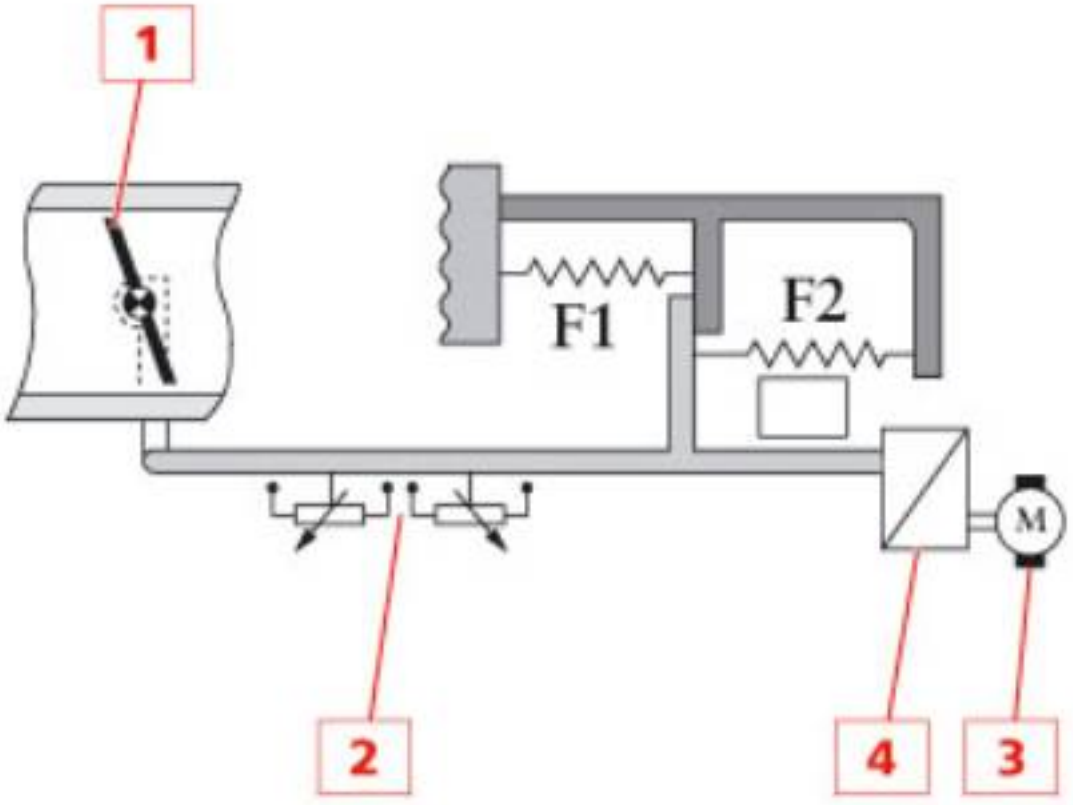
- Fit the exhaust tailpipes.

Tailpipe

Remove the car from the hoist.

THROTTLE BODY

The motor-driven throttle body is installed between the air flow meter and the intake manifold of the engine.
This device incorporates a throttle valve, a DC motor and the throttle RPM sensor (potentiometer).



1 - Throttle
2 - Potentiometers
3 - Electric motor
4 - Gearing

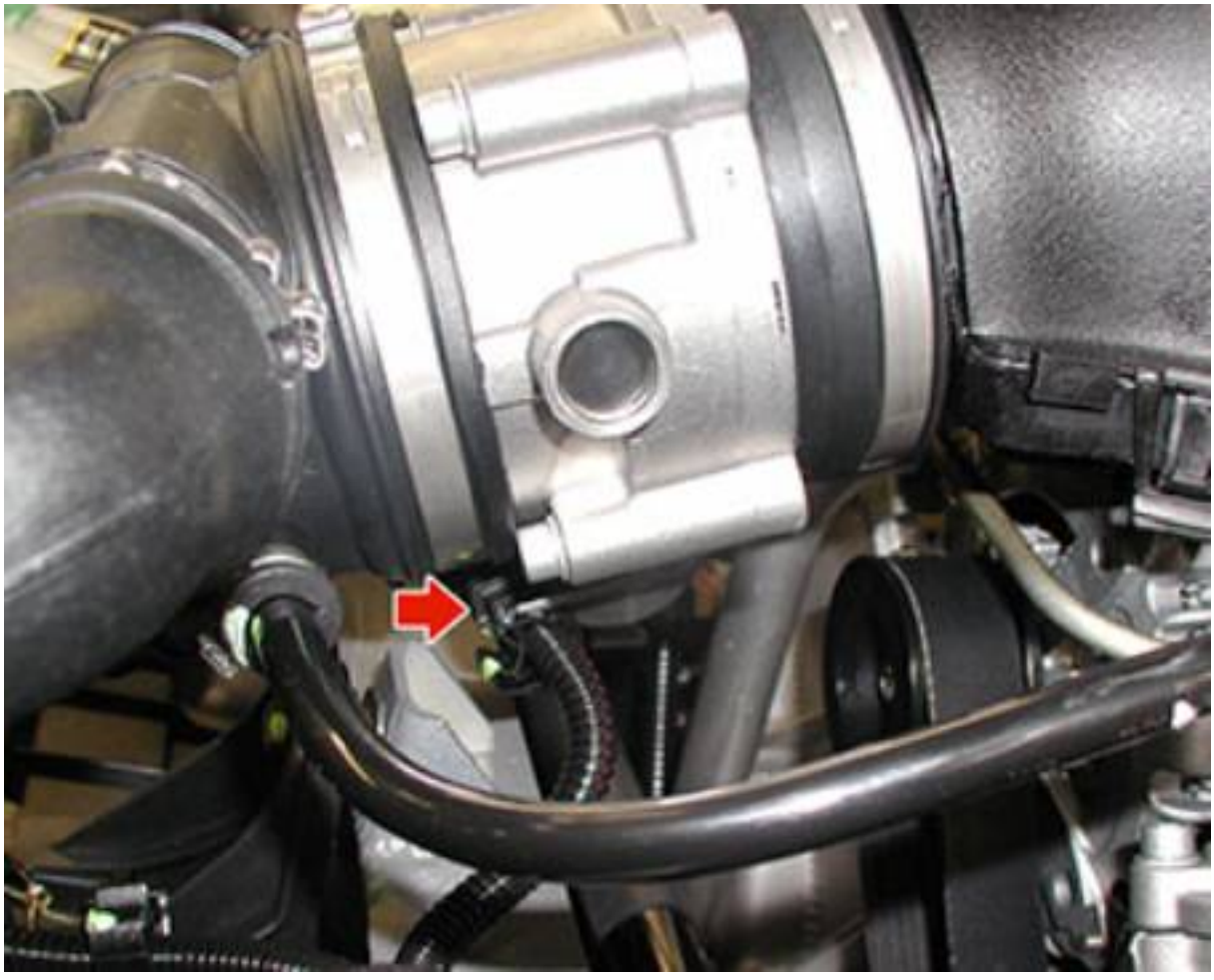
In the event of throttle failure, the engine reverts to a recovery condition, i.e. it runds at a maximum speed of 1500 RPM.

Removing/refitting the throttle body

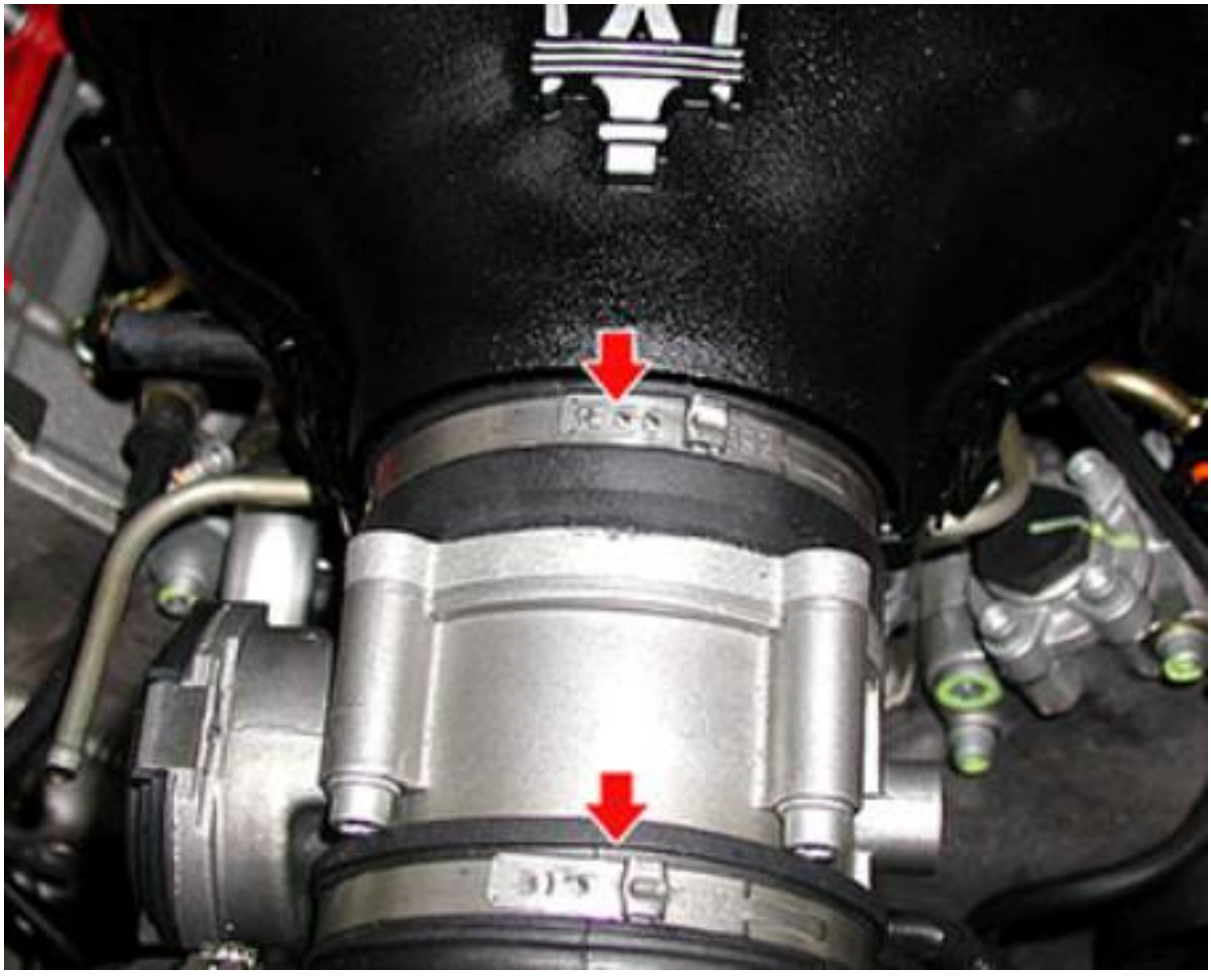
- Remove the air flow meter.

Air flow meter

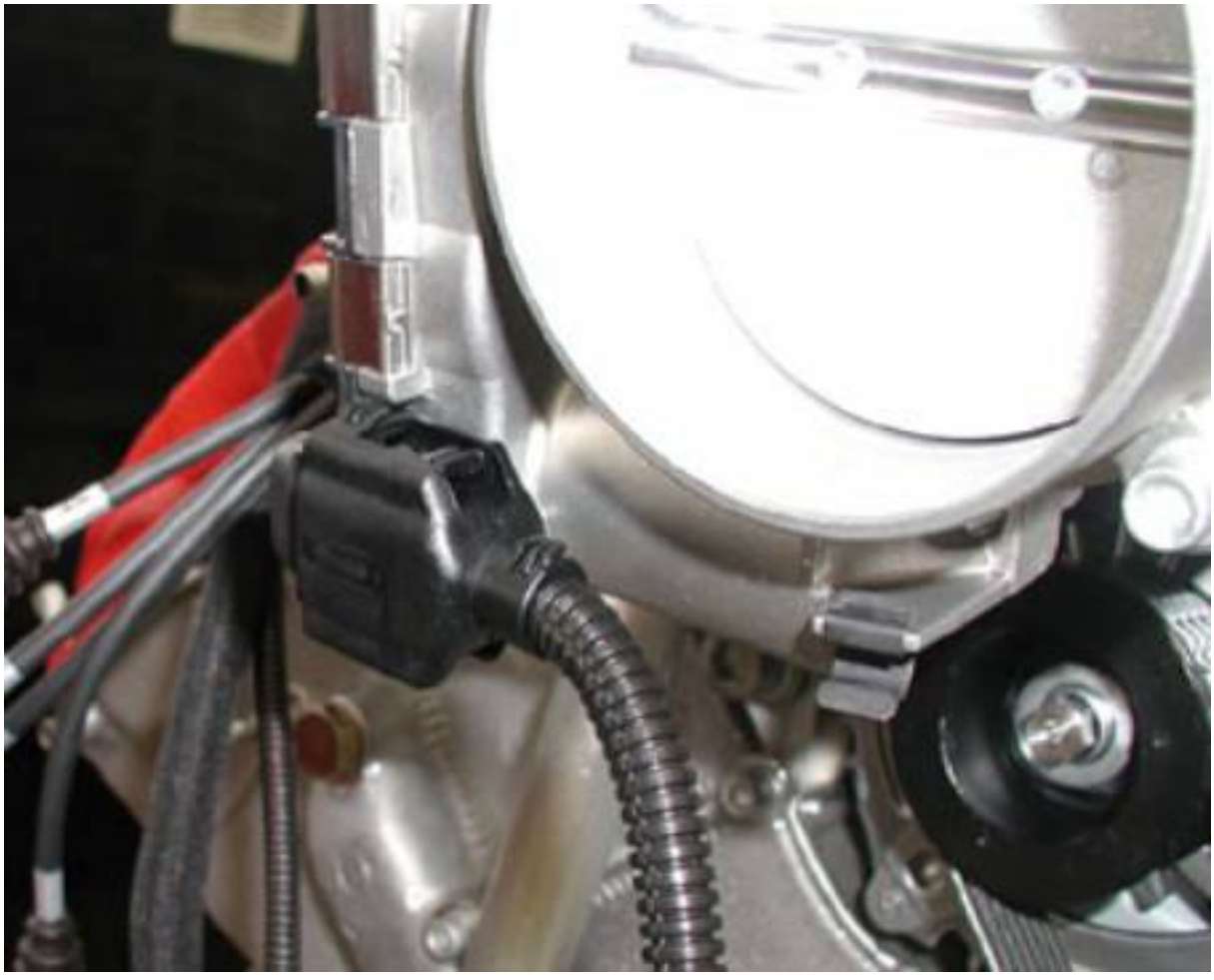
- Release the electric wiring of the throttle valve potentiometer.



- Working on the tear-clamps that secure the throttle body to the intake manifold and to the front sleeve,



- disconnect the electrical connector from the throttle body and remove it.



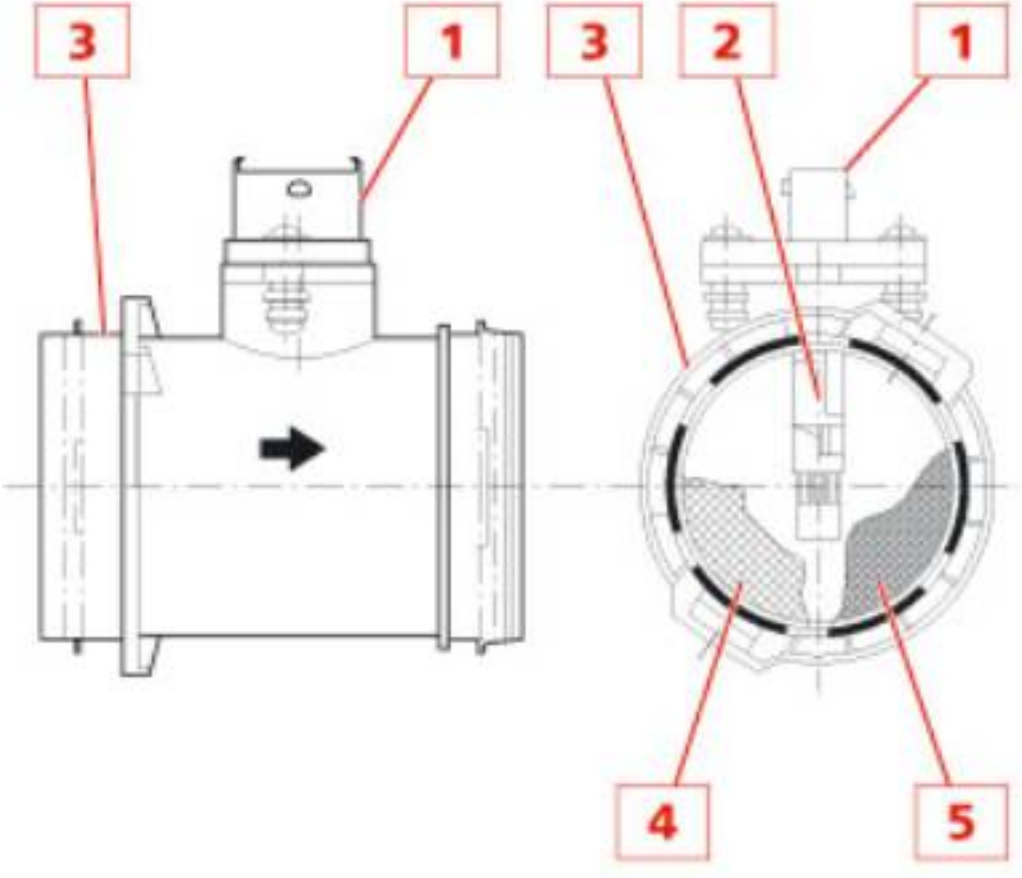
IMPORTANT
Do not place the device on anything that may cause vibration.
After replacing the motor-driven throttle body, you must run a self-learning cycle.

- The self-learning procedure is necessary if the throttle body is replaced, if accidentally switching off the vehicle with the key in the ON position, and if the battery is disconnected.
- **If the vehicle is accidentally turned off with the key in the ON position** , the next time the engine is started, the engine ECU automatically runs the self-learning procedure, therefore, restart the engine and let it idle for at least 15 seconds.
- **If the battery is disconnected** , set the ignition switch to ON (KEY ON) and wait at least 15 sec. After running the self-learning procedure for the "throttle position", run the VVT self-learning procedure; where necessary, start the engine and let it idle for about 15 seconds.

Refit the parts removed for the procedure.

AIR FLOW METER

The engine load and therefore the aspirated air mass (necessary to quantify the amount of fuel) are measured through the signal generated by the air flow meter.
The air aspirated by the engine passes through the air flow meter and sweeps across the hot-film sensor inside the air flow duct.
The platinum hot-film sensor is a thermal resistor, i.e. a resistor whose value increases as the temperature rises.
As the quantity of aspirated air increases, the quantity of heat subtracted to the sensor rises as well. This causes a reduction in the sensor's resistance. As this is fitted into a "bridge-type" measuring electrical circuit, it causes an increase in the output voltage, which is detected by the ECU in order to calculate the quantity of air aspirated by the engine.
The air flow meter is also capable of discriminating the air flow direction, therefore, the data relates to the actual quantity of air aspirated by the engine with no turbulence.
An air temperature sensor is also incorporated in the air flow meter.



1 - Electrical connector
2 - External body hot-film sensor
3 – External body
4 - Protection grille
5 - Metal mesh

If the air flow meter malfunctions and provides data that are incorrect data or recognised as not plausible

by the ECU, the recovery procedure is activated. This analyses the signal coming from the potentiometer on the throttle body in order to determine opening of the throttle valve and, as a result, the amount of air aspirated by the engine. In this case, the adjustment is not as fine as obtained with the air flow meter, but it is in any case sufficient to keep the vehicle in proper working order, preventing it from stopping.

Removing/refitting the air flow meter

- Remove the trim panels.

- Detach the electric connector on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

When refitting, follow the above procedures in reverse order

Cylinder compression test

To perform the cylinder compression test, all the ignition spark plugs must be removed.

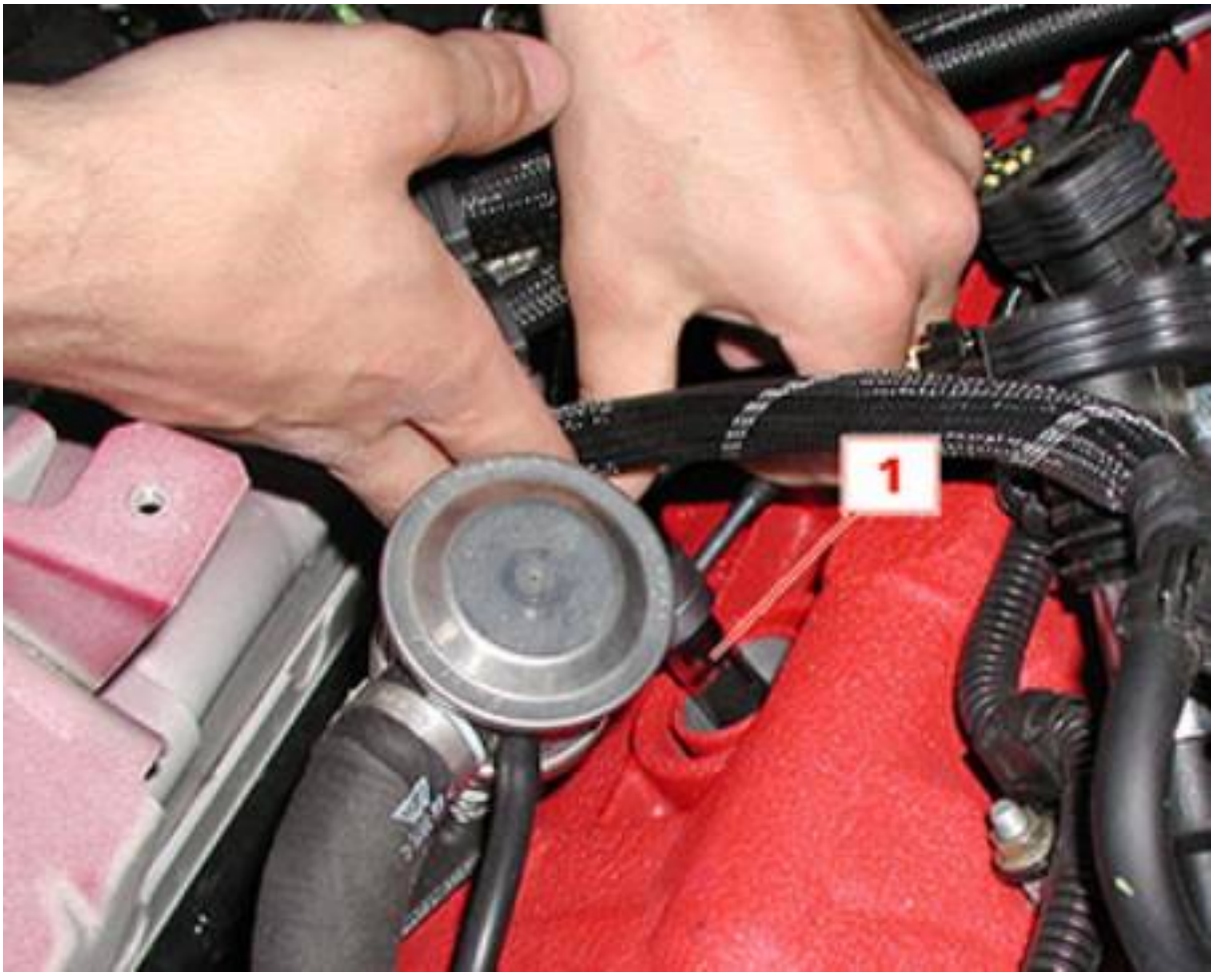
Spark plugs

- Take the cylinder compression measuring instrument.

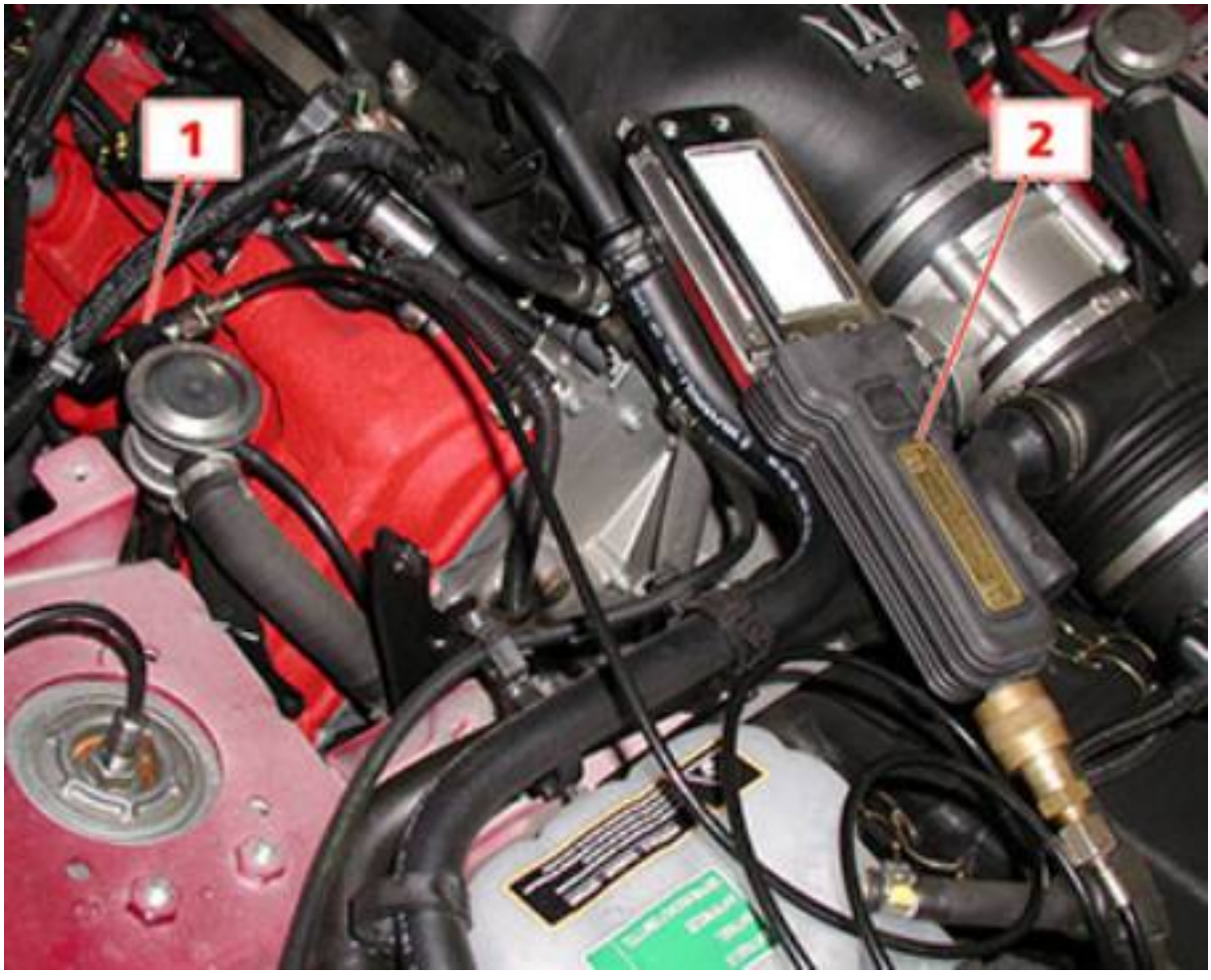
- Open the luggage compartment lid, remove the battery protection cover and remove the two relays **(1)** of the fuel pump.

- Position the instrument **(1)** in the seat of the spark plug of cylinder 1. Choose a plunger of suitable length.

CAPITOLO



- Connect the plunger (1) to the instrument (2) for measuring and reading the cylinder compression data.



- With the help of a second operator, start the vehicle. Read the compression data of cylinder 1 read on the instrument. Turn the ignition key to OFF and stop the engine.
- The x-axis shows the compression in bar and the y-axis the number of cylinders involved in the test.
- Check that the value measured falls within the specified values; if the values are incorrect, repeat the test and then identify the failure.

When refitting, follow the above procedures in reverse order

ENGINE REMOVING

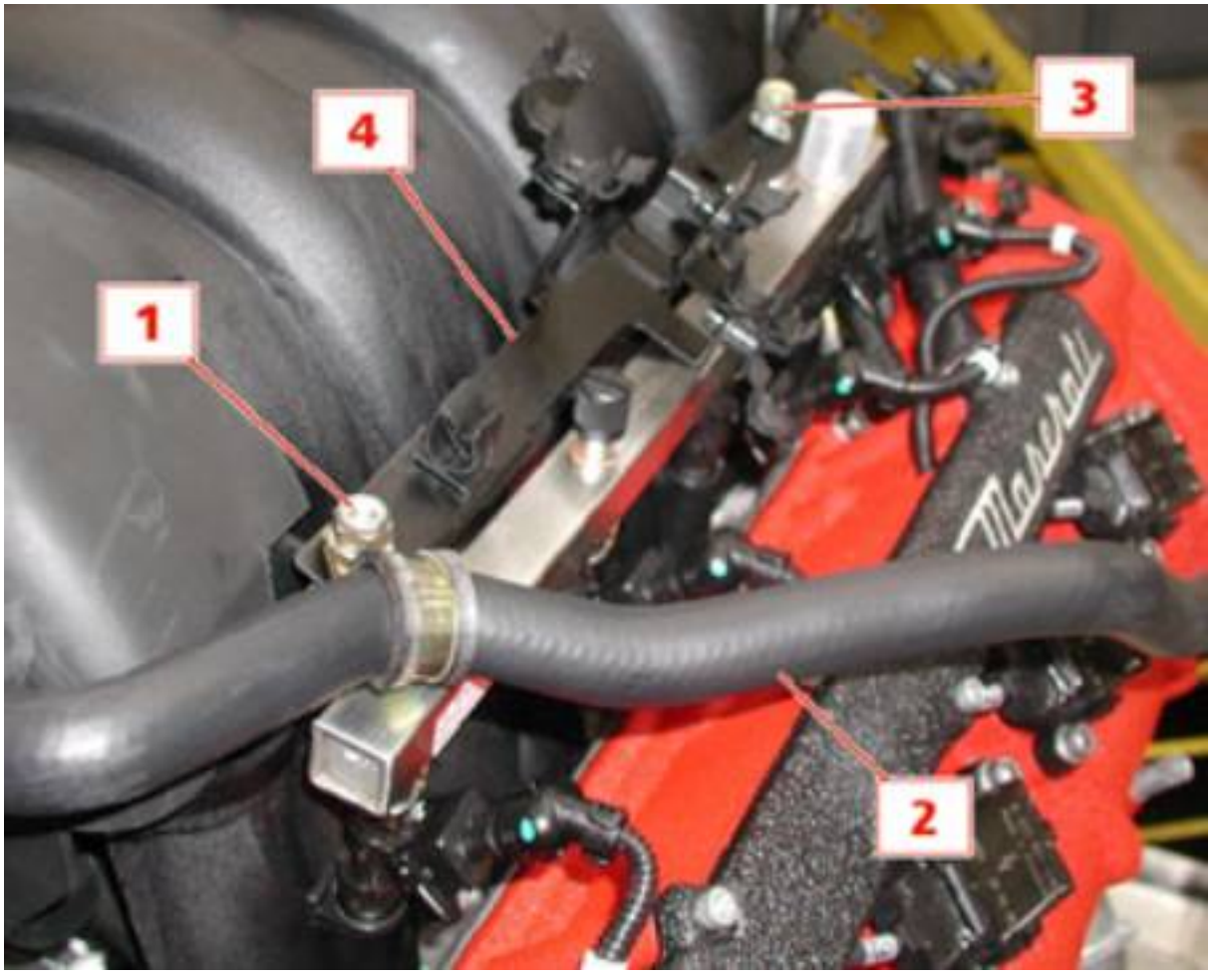
- Position the engine, without the clutch, onto the support stand **AV2023** , fixing it with the support tool **900026310**.
- Open the two fastening clamps **(1)** of the vapour recirculation line.

- Remove the clamp **(1)** and disconnect the vapour recirculation line from the tappet cover of the right-hand cylinder bank.

- Remove the clamp **(1)** and disconnect the vapour recirculation line from the tappet cover of the left-hand cylinder bank.
- Remove the complete line from the engine.

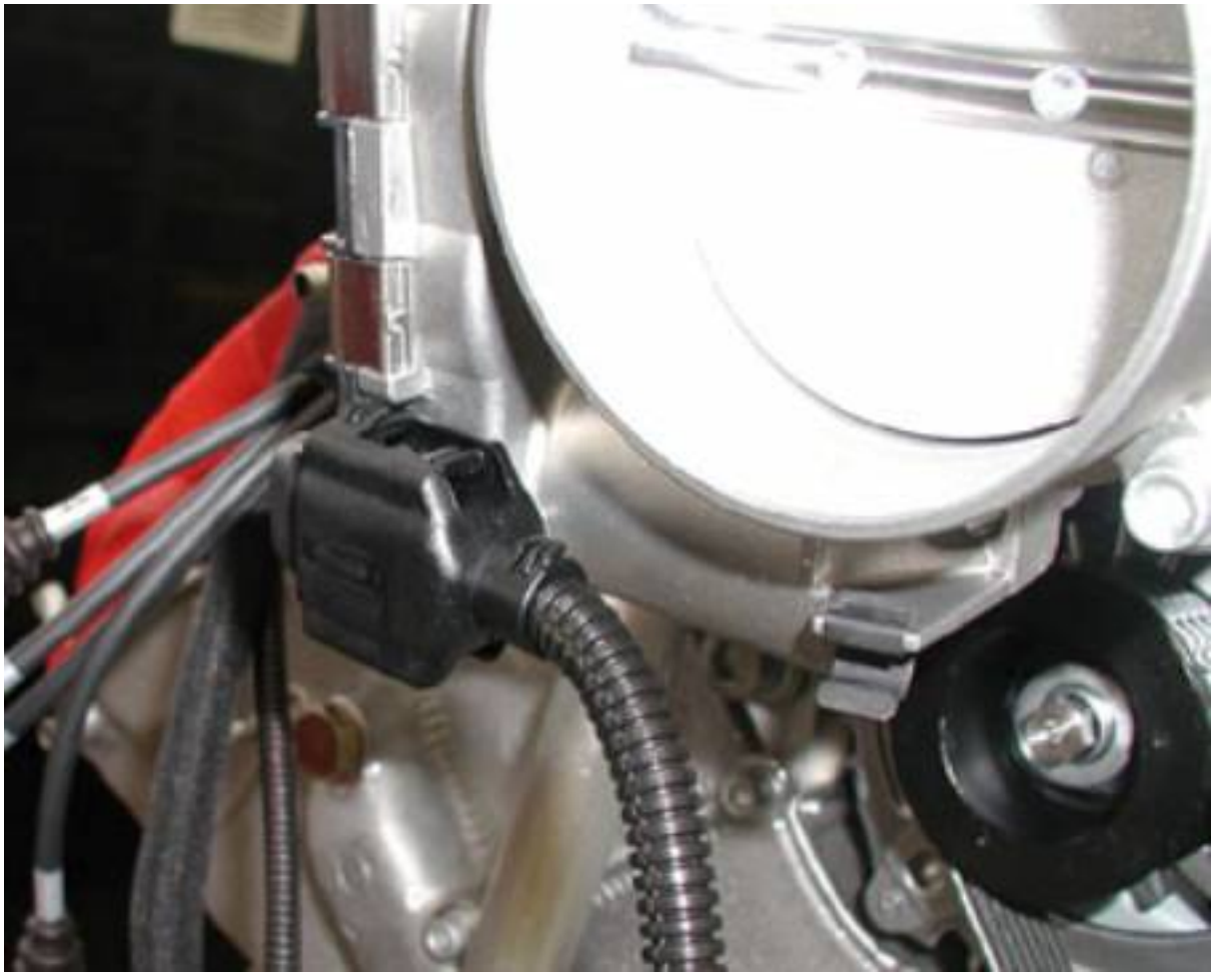
- Disconnect the flexible hose from the rigid pipe.

- Unscrew the nut **(1)** and remove the flexible hose **(2)** complete with fastening clamp. Unscrew the nut **(3)** and remove the line support bracket **(4)**.



- Unscrew the nuts **(1)**, detach the electrical connectors of the electro-injectors **(2)** and remove the fuel manifold complete with electro-injectors **(3)**.

- Disconnect the wiring from the motor driven throttle.



- Unfasten the bolts on the intake manifold.

- Remove the intake manifold by lifting it upwards.

- Remove the gaskets on the intake ducts.

- Fit the tools **AV3332**, securing them with two nuts to avoid allowing foreign bodies to enter the cylinders.

- Remove the wiring covers.

- Detach the ignition coil connectors, check that all wires are identified in order to position them correctly during the reassembly stage.

- After having detached the solenoid valve connection in the timing variator, move the coil wiring and the injector wiring.

- Remove the retaining clamps, detach the connection on the water temperature sensors and move the wiring on the clutch side.

- Remove the battery-generator wire.

- Disconnect the wiring on the air conditioning system compressor.

- Detach the connections on the alternator and remove the wiring.

- Detach the connections on the detonation sensors, the timing sensors and the revolution sensor on the supporting bracket.

CAUTION

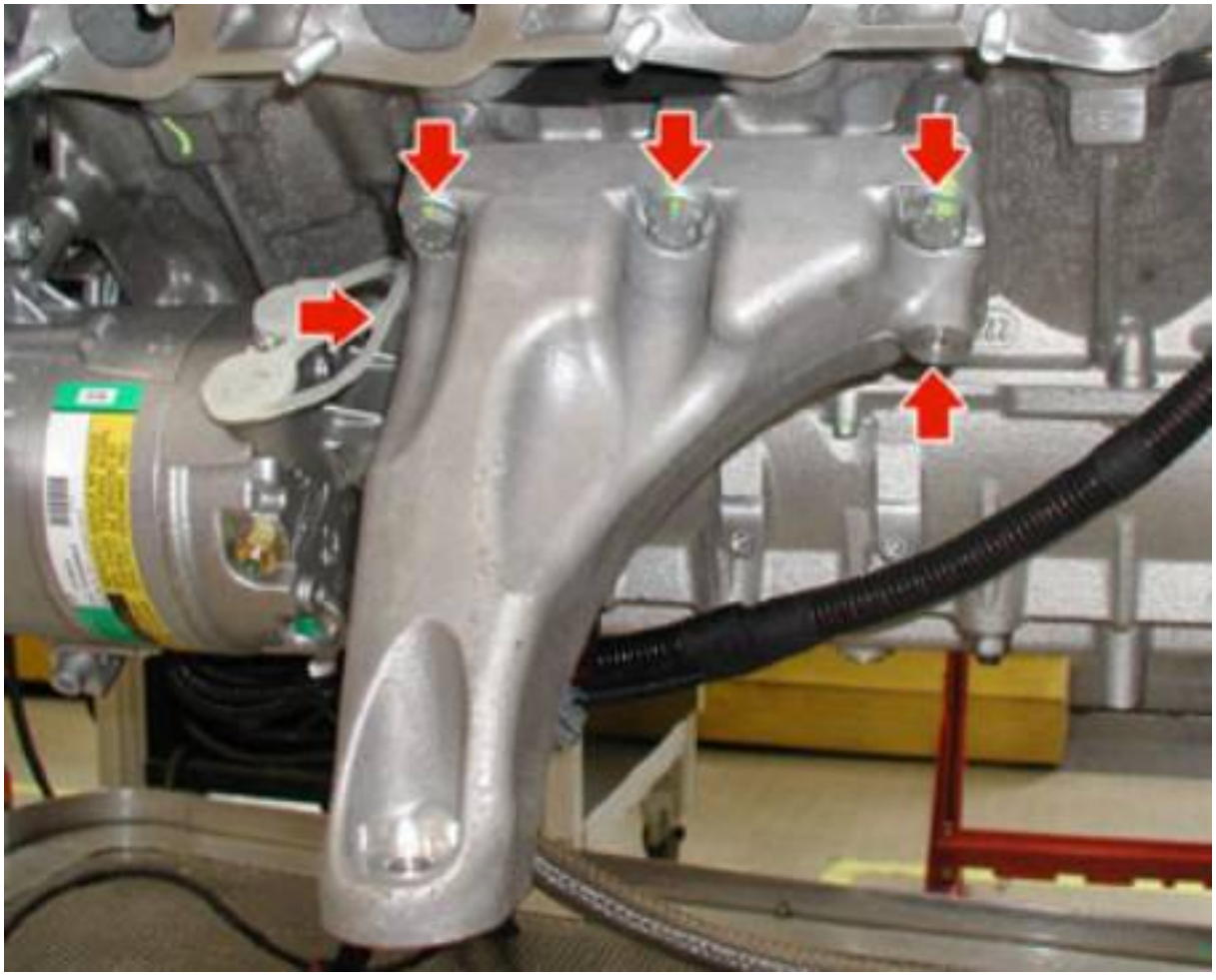
Check that the sensors on each wire correspond, consulting the electric system manual if necessary.

- Unscrew the injection wiring's seven retaining clamps.

- Remove the engine wiring's earth connection.

- Take away the engine wiring.

- Undo the retaining screws and remove the engine mounting brackets.



- Remove the starter motor.

- Loosen the poliV belt by turning the tensioner and, holding the tensioner back, slide the belt off the pulleys and remove it.

- Undo the screws fastening the air conditioning system compressor and then remove it.

- Remove the **6 mm** screw from the hydraulic steering pump using the holes on the pulley.

- Unfasten the two **8 mm** screws and remove the pump.

- Open the clamps on the heads' water outputs and remove the entire connecting pipe.

- Take the bearing out of the clutch shaft support using the extracting tool **95972714**.

- Fit the tool **900026560** for locking the crankshaft.

- Remove the torsion damper Once the fastening screw has been removed, the damper can be taken out by hand.

- Remove the tool **900026560** for locking the crankshaft.

- Remove the belt tensioner, undoing the 8mm fastening screw.

- Remove the fixing bracket for the pipe which runs from the exchanger to the oil tank.

- Remove the pipe running from the exchanger to the oil tank, unscrewing the **36 mm** nut.

- Undo the two screws fastening the alternator and remove it by moving it upwards.

- Remove the ignition coils by unfastening the two retaining screws.

- Extract the retaining seeger ring from the timing variator's wire guide.

- Place the connectors for the timing (rh and lh), revolution (rh) and detonation (four) sensors into their housings on the support bracket.

CAUTION
Check that the sensors on each wire correspond, consulting the electric system manual if necessary.

N.B.
If necessary, remove the timing sensors (Figure 2).

Smontaggio motore

- To remove the tappet covers, the stud bolt supporting the wiring and the fourteen perimetral socket head screws must be unfastened.

- Lift the cover, taking care to slide out the solenoid valve wire on the timing variator.

- Remove the two fastening screws from the left-hand bank belt tensioner.

- Remove the screws from the cover.

- Using a screwdriver, separate the front cover from the engine.

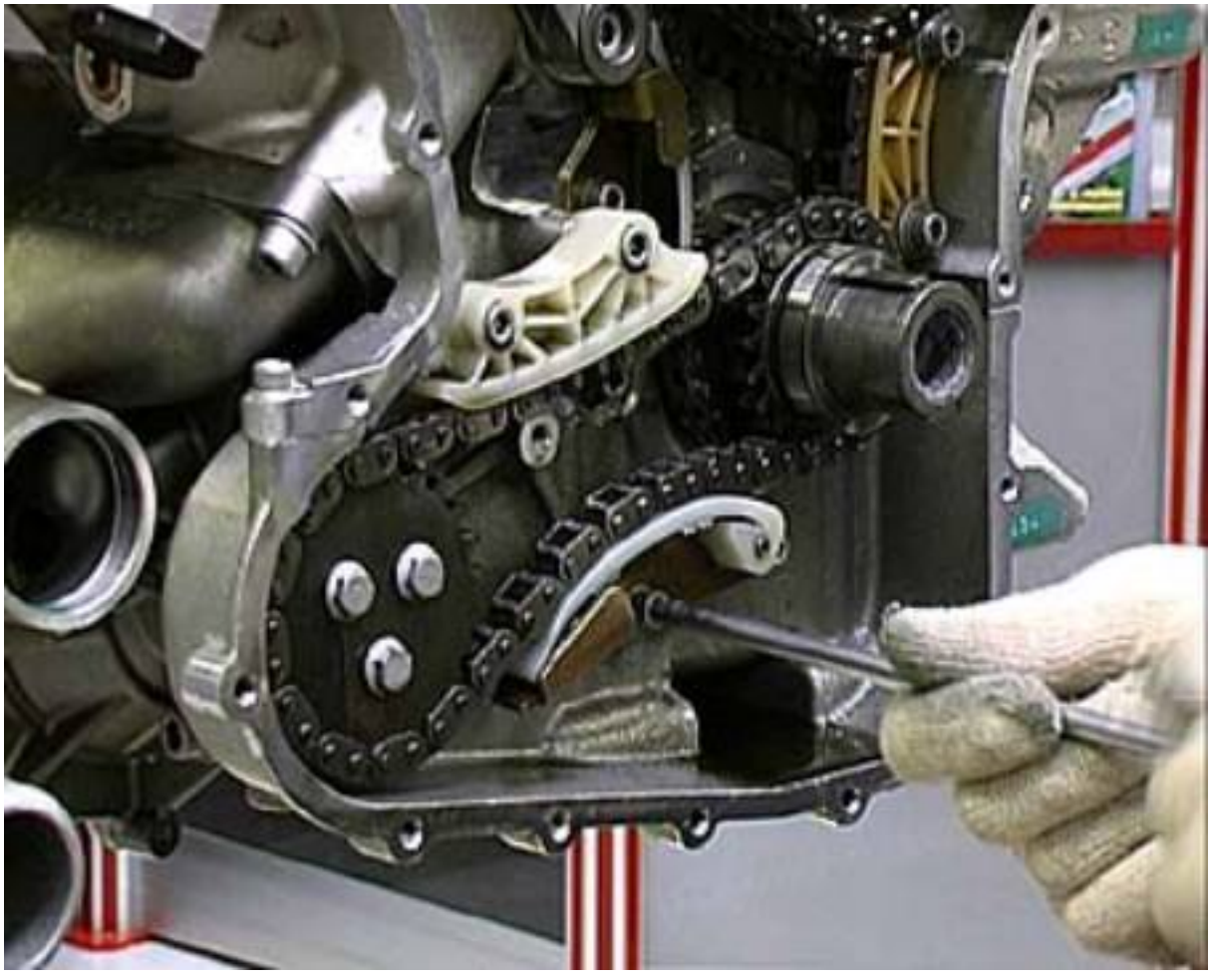
N.B.
Keep the gasket located between the upper edge of the housing and the left-hand belt tensioner.

- Keep the upper gasket and remove the cover (**Figure 1**).

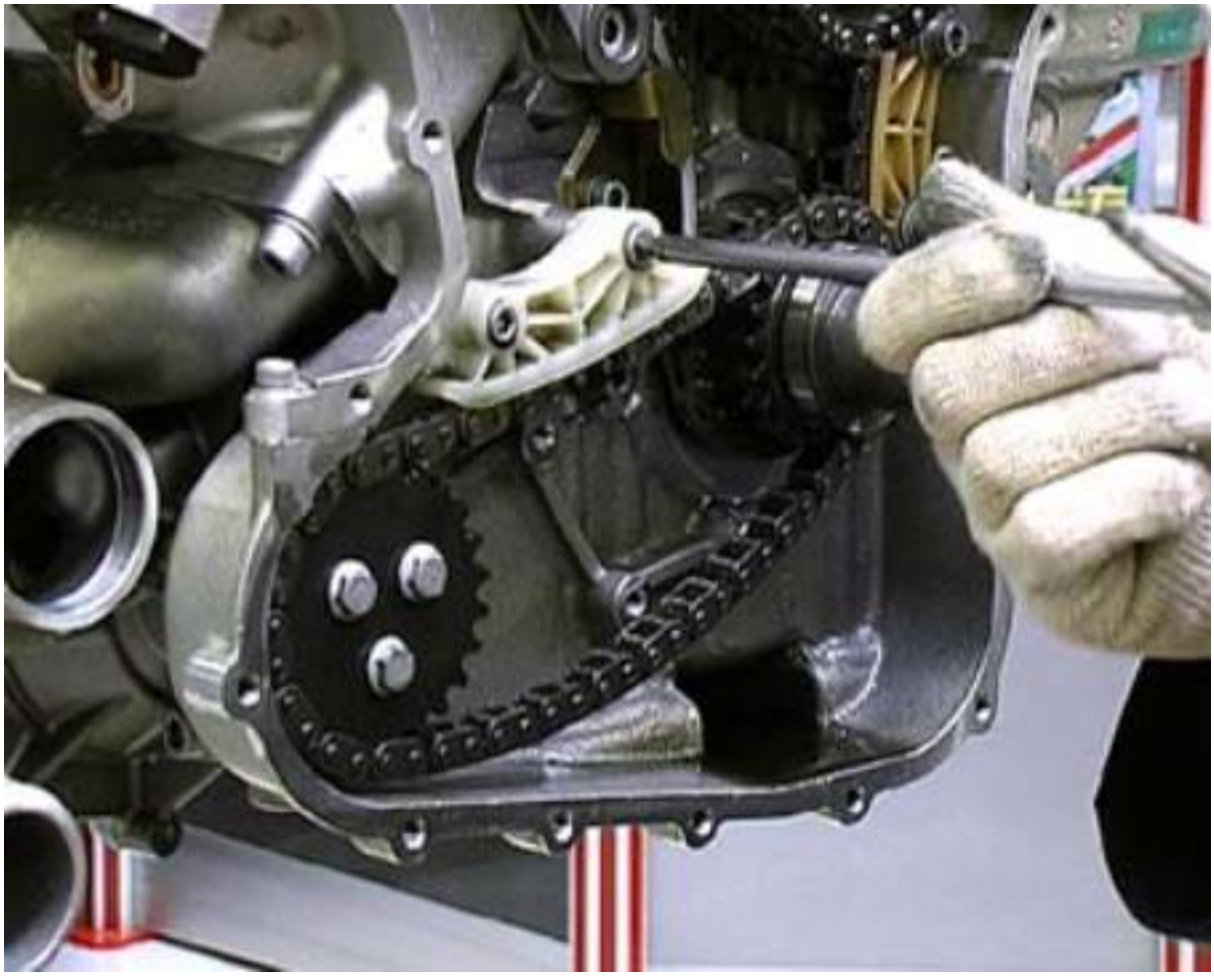
N.B.
The lower gasket remains attached to the cover: remember to keep it for future assembly (Figure 2).

Smontaggio motore

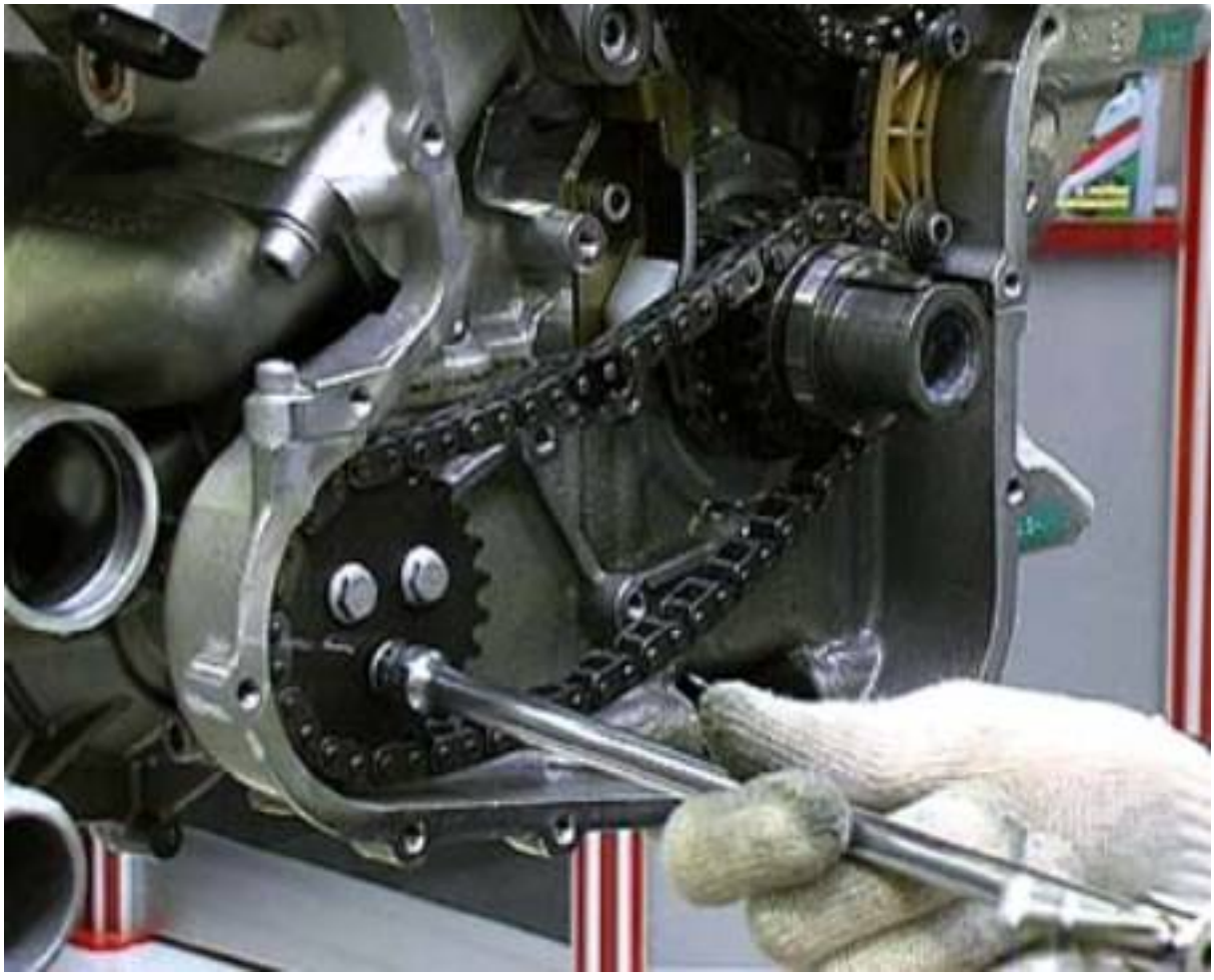
- Remove the mechanical tensioner from the oil-water pump chain.



- Remove the fixed shoe.

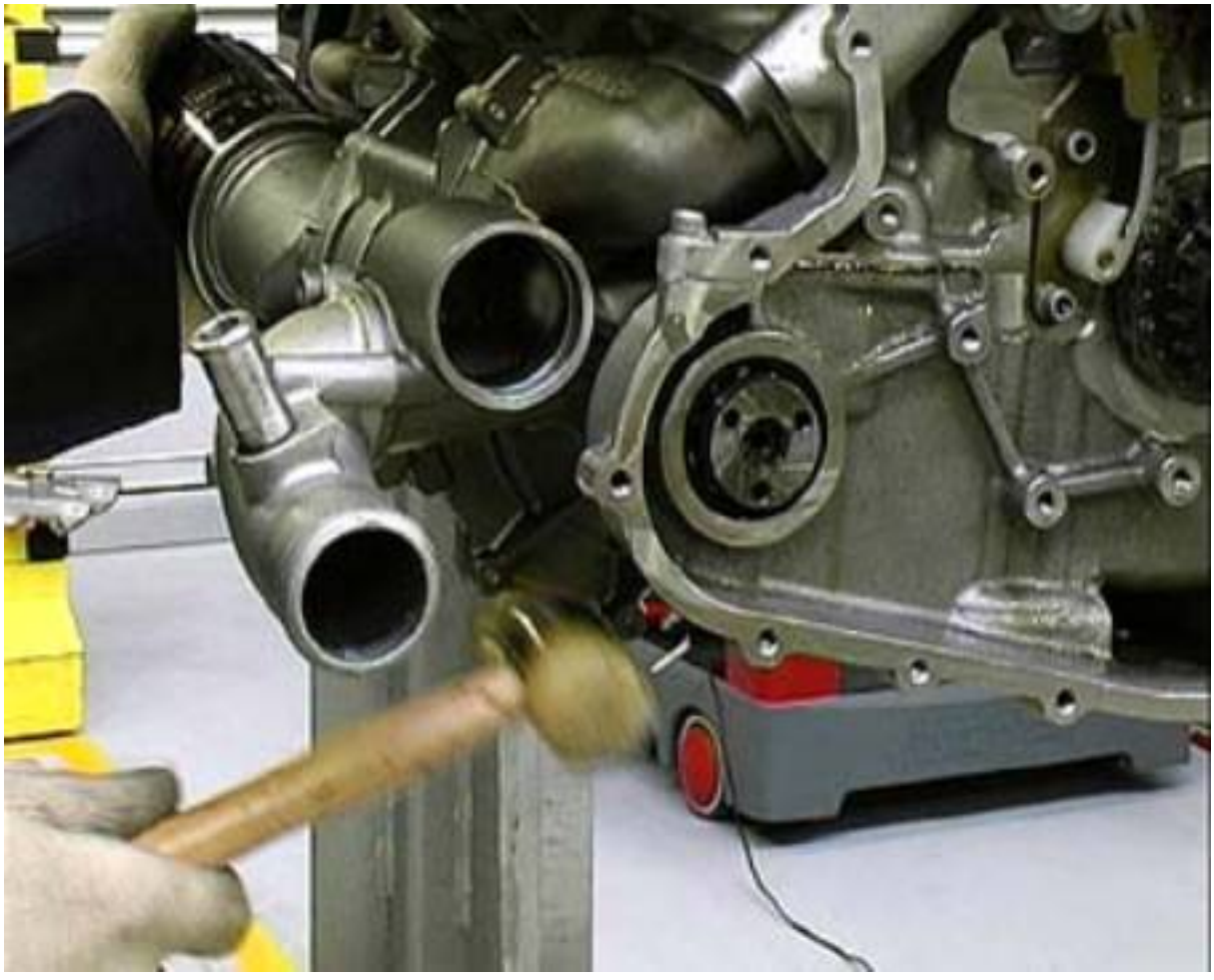


- Undo the screws on the pump's toothed control wheel and remove it along with the chain.

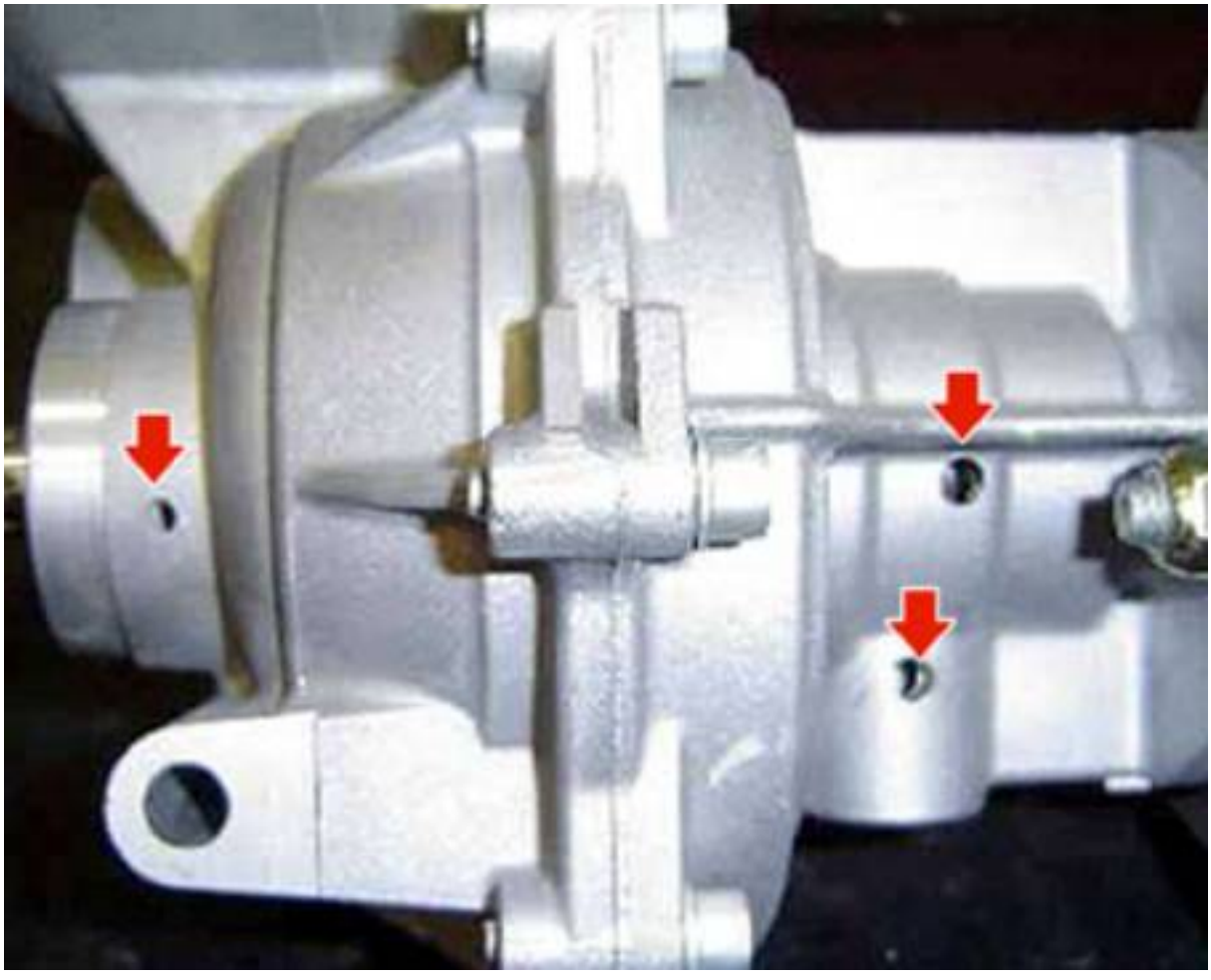


- Undo the screws which fix the oil-water pump to the crankcase.

- Move the oil-water pump backwards by hitting it lightly with a rubber hammer, and then remove it.



- After removing the pump, check through the three inspection holes that there are no leakages or spills.



- Remove the tensioners from the timing chains (**Figure 1 and 2**).

Smontaggio motore

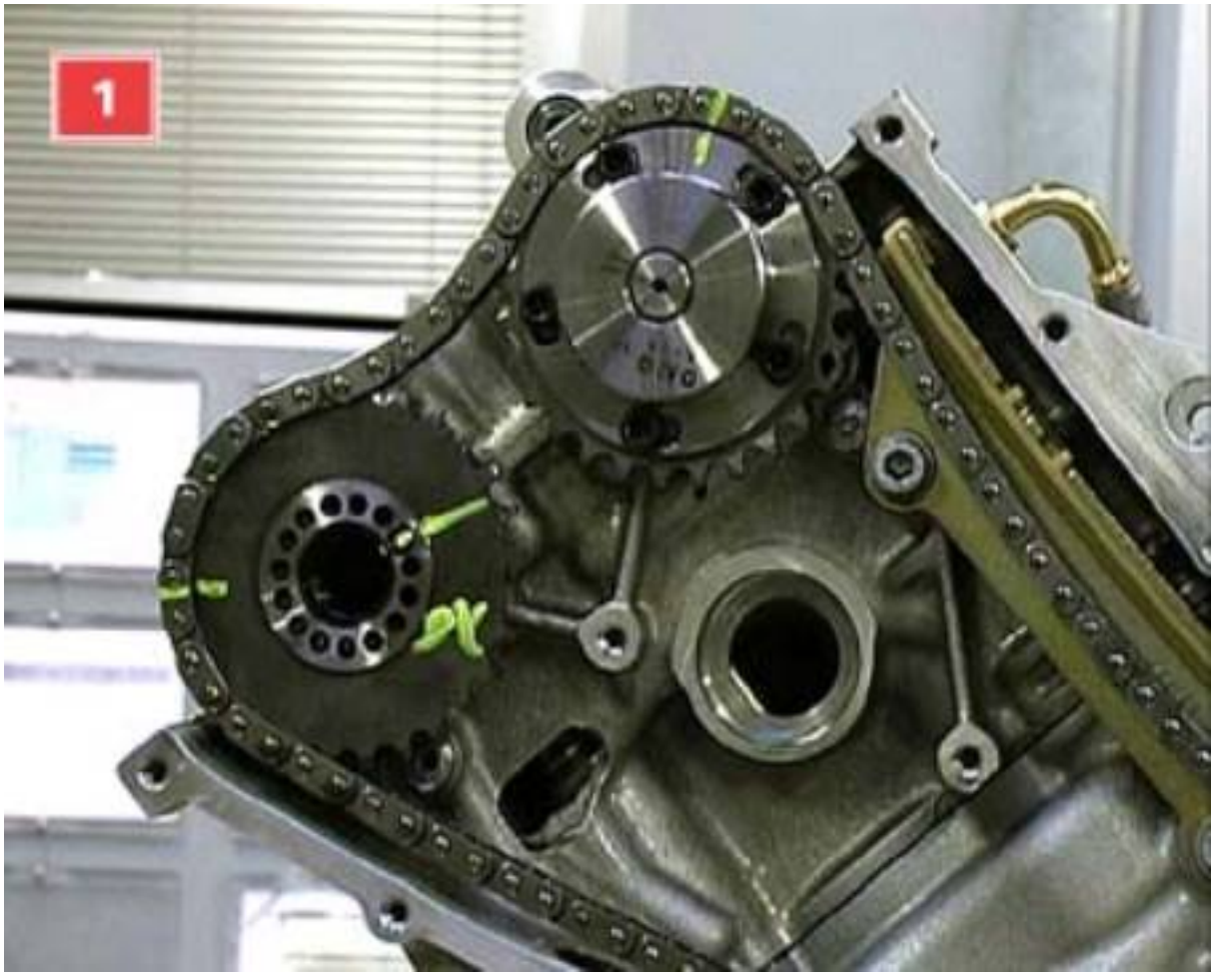
- Remove the upper fixed shoes.

- Remove the timing system's movable shoes.

- Remove the exhaust camshaft screw, countering the rotation with a wrench inserted into the special hexagon machined on the shaft.

N.B.
If it is necessary to keep the same timing, mark the toothed wheels and the chains(Figure 1 and 2) at the correct point.

Smontaggio motore

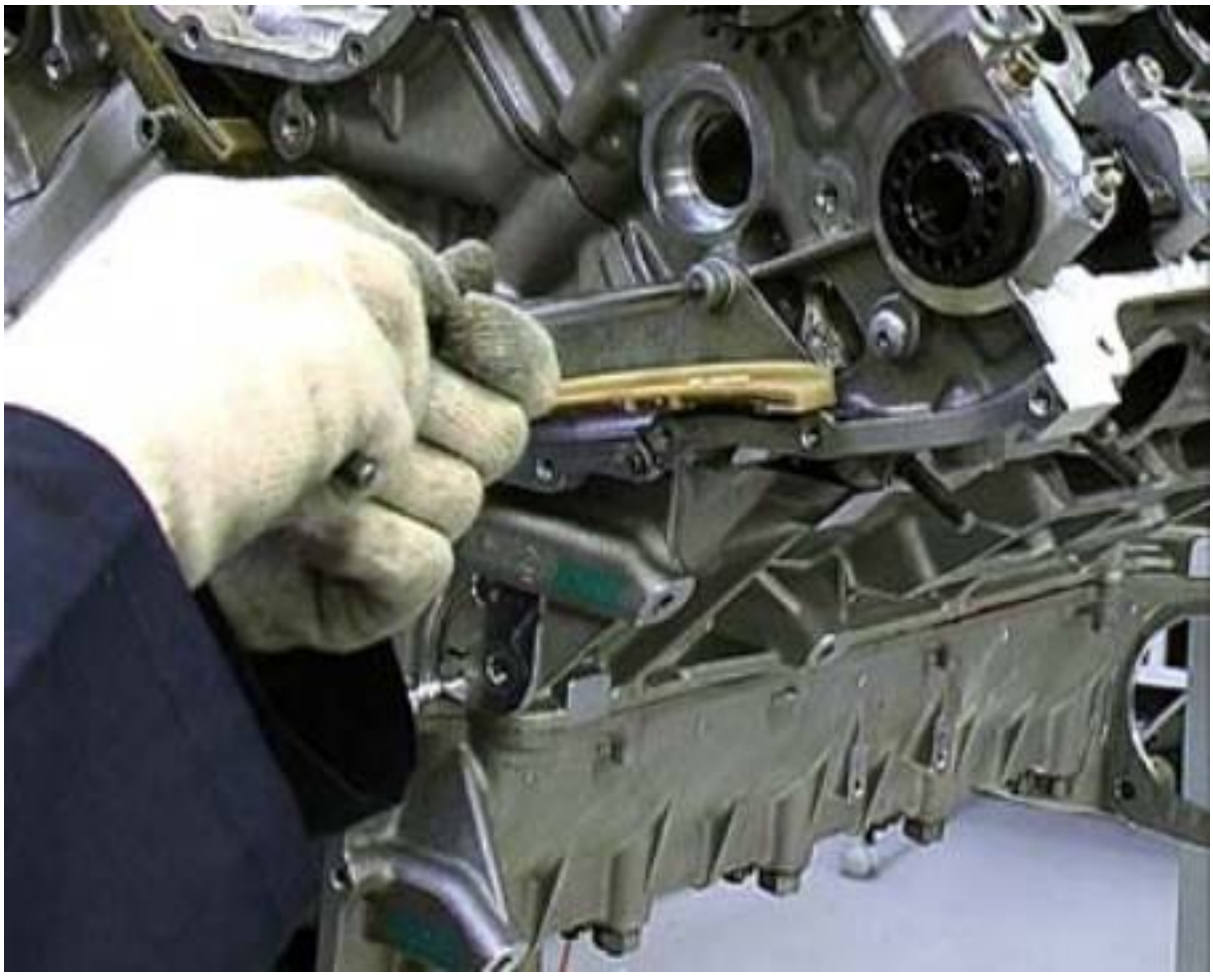


- Proceed with removing the chains, sliding the toothed wheels off the exhaust camshafts (**Figure 1**).

N.B.
Keep the centring dowel (Figure 2).

Smontaggio motore

- Remove the timing chain's fixed shoes.



- Remove the tranmission axle's mechanical tensioner and the fixed shoe.

- Take the seeger ring and the relative shim off the transmission axle.

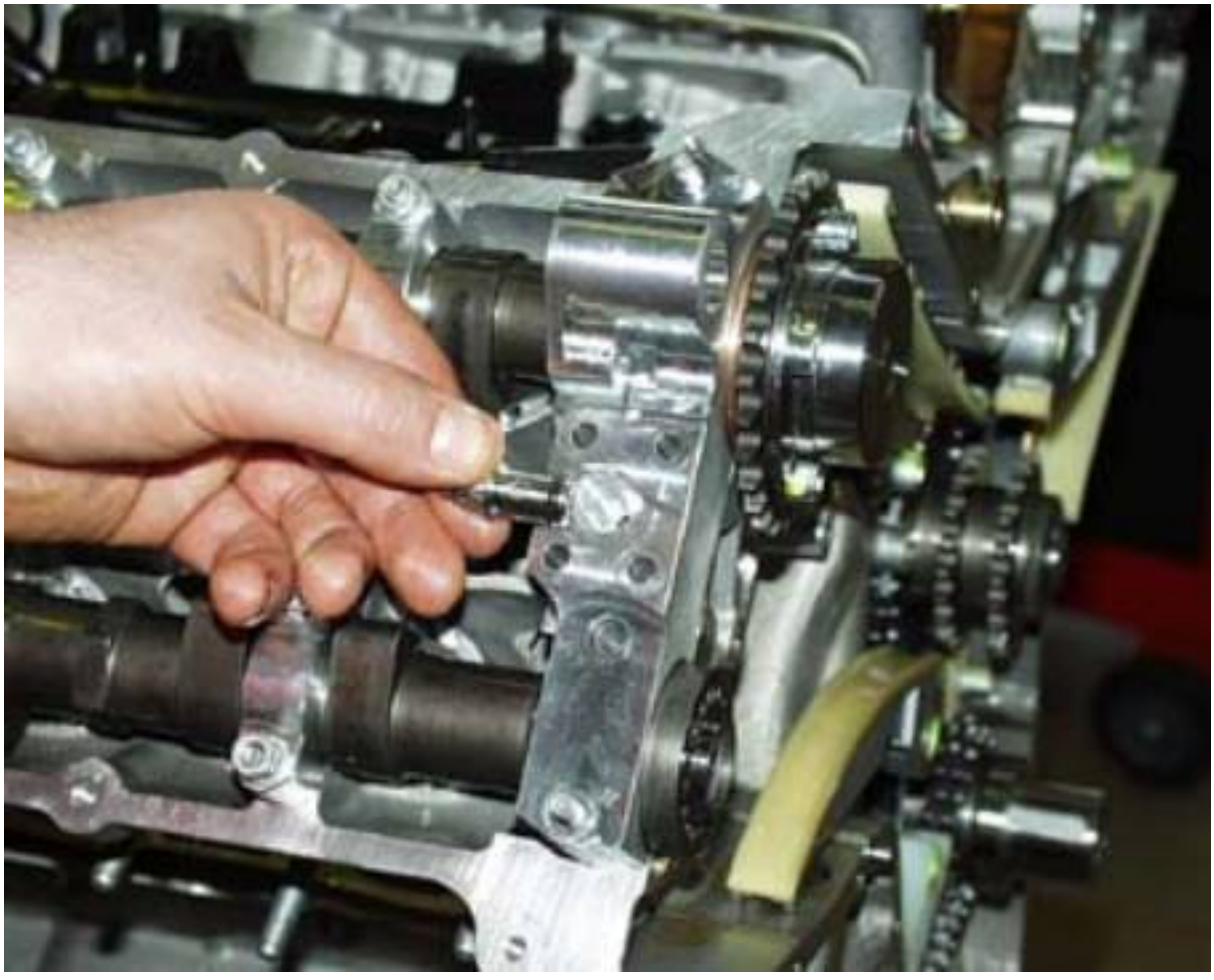
- Slide out the toothed wheels, paying attention to the roller cages on the transmission axle.

- Remove the transmission axle, paying attention to the grommet.

- Remove the union pipes leading from the oil accumulator to the heads.

- Unfasten the retaining nuts on the camshaft caps.

- Remove the oil filter.



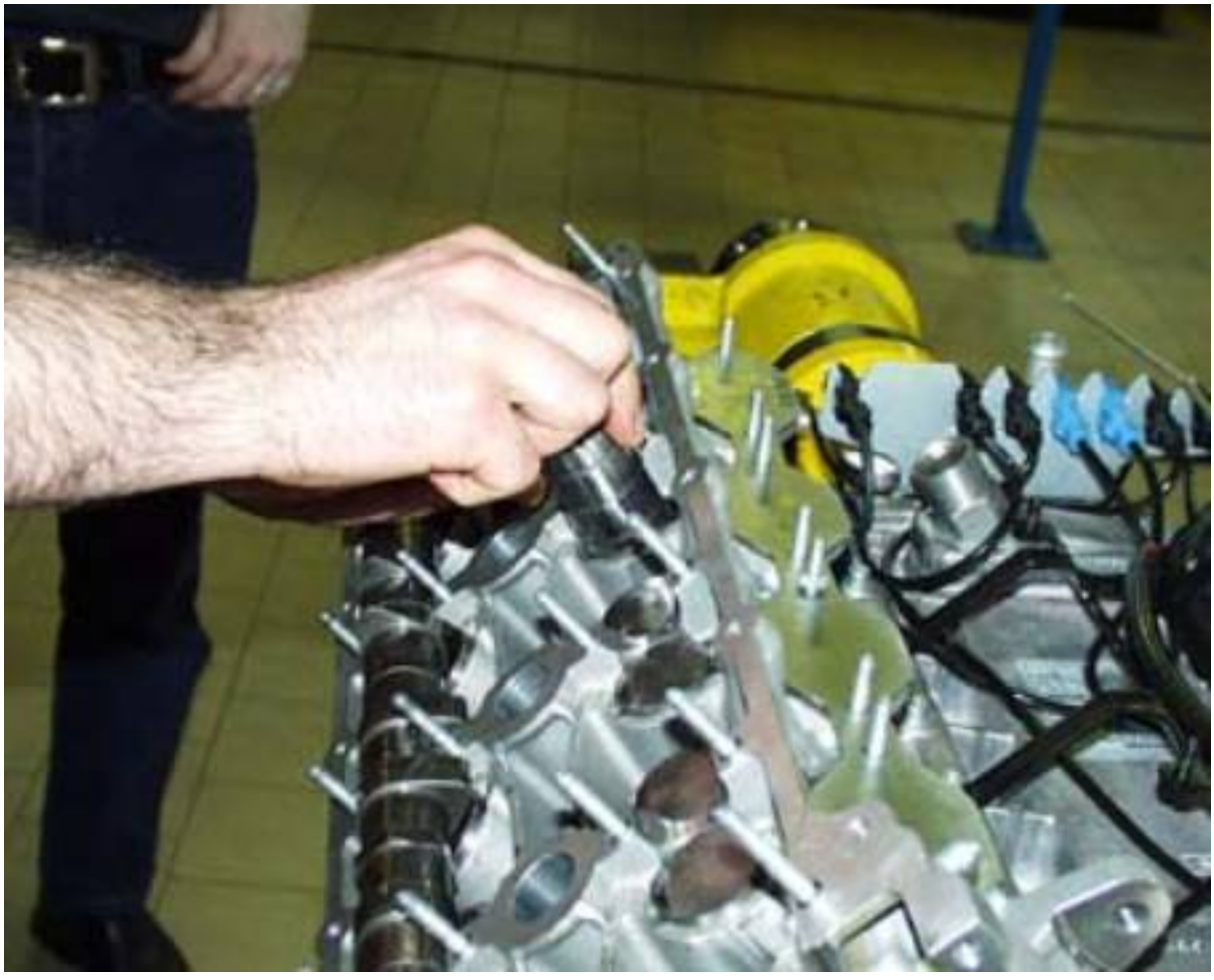
- Remove the screws which fasten the timing variator oil pump onto the left-hand bank intake camshaft.
- Remove the caps checking that the reference number is stamped on them.

- Remove the exhaust camshaft and then the intake camshaft.

N.B.
In this last stage, be sure to recover the timing variator tabs.

- If necessary, remove the continuous timing variator using tool **900027020**, provided for this purpose.

- Using a magnet, take the valve buckets out of their seats, checking their reference numbers.



- Unscrew the ten head fastening nuts.

- Remove the heads using a rubber hammer if necessary.

- Remove the head gaskets.

- Unscrew the RPM sensor.

- Proceed with the removal of the sub-crankcase by unfastening the perimetral screws.

- Unfasten the nuts on the sub-crankcase stud bolts.

- Move the sub-crankcase away by hitting it lightly with a hammer and then remove it completely.

- Remove the crankshaft oil seal.

- Fit the tool **AM105786** onto the crankshaft and rotate the shaft in order to gain access the connecting rod bolts easily.

- Loosen the connecting rod caps and move them away by hitting them lightly with a hammer. Remove the bolts by hand and take off the caps.

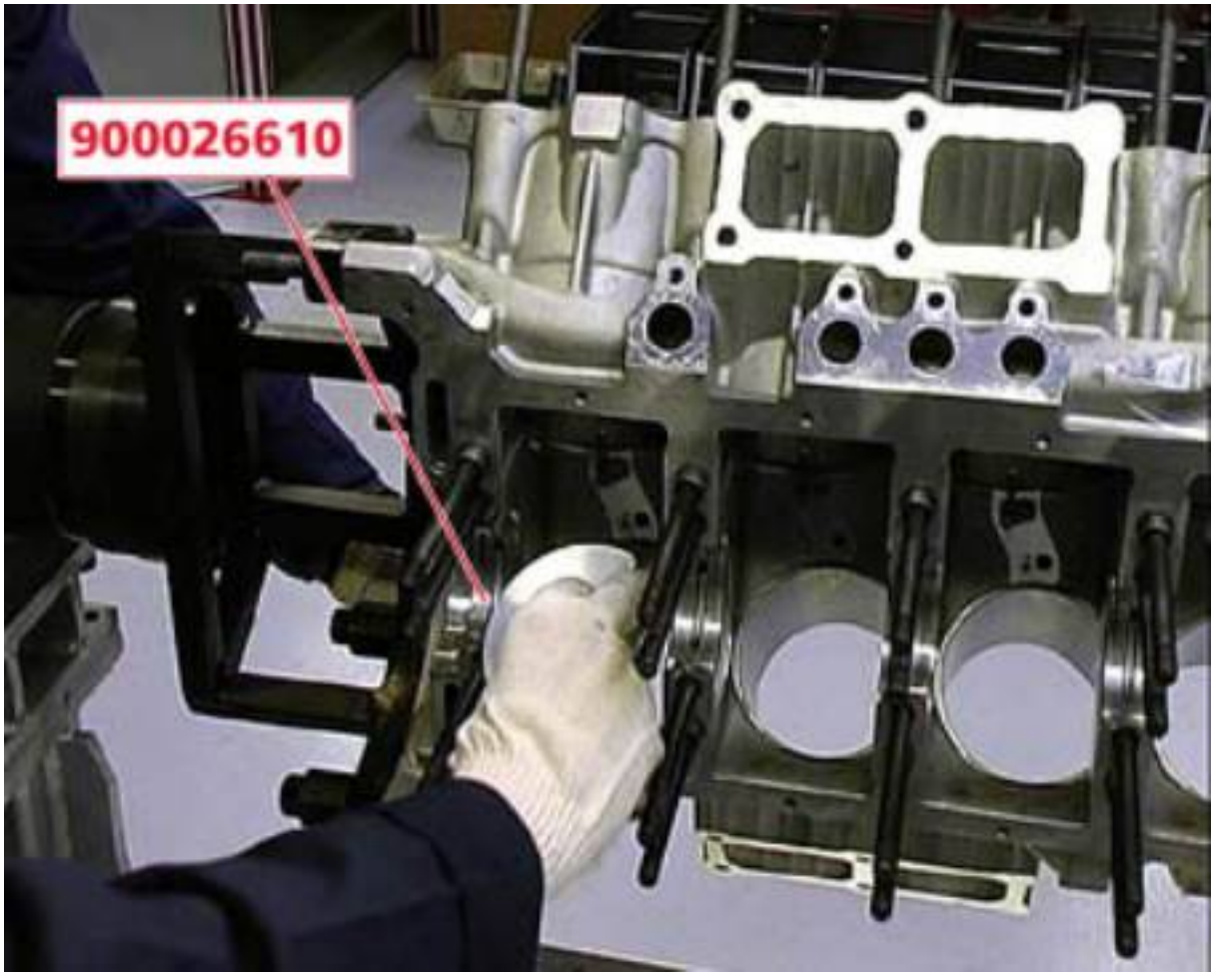
- Remove the crankshaft and the bearings (**Figure 1**) taking care not to drop the crankshaft's central support shimmings (**Figure 2**).

Smontaggio motore

- Remove the pistons.

- Remove the oil nozzles underneath the pistons.

- Remove the cylinder liners using the tool **900026610**.



- Remove the oil pressure sensor, the revolution sensor.

- Unscrew the four anti-detonation sensors.

- Remove the oil accumulator for the variators.

- Remove the heat exchanger.

Smontaggio motore

Fitting and timing the engine

In order to install the cylinder liners, the crankcase must be heated up in an oven. The crankcase must be completely bare.
The chokes for the pressurised oil delivered to the heads
have different diameters and are fitted on both cylinder banks. Each choke is fitted on a check valve. Upon each
overhaul, it is essential to check that this valve is clean and that it works properly. The crankcase is removed using an extracting tool, while for reassembly it is interference fitted.
Using tool **AV3605** (not illustrated) loosely fit the choking dowels.

N.B.
During the reassembly stage, check that the oil choking dowels on the heads are installed correctly: the dowel with a 5.5mm internal diameter is found on the left-hand bank (Fig. 1), while that with a 3mm internal diameter is found on the right-hand bank (Fig. 2).

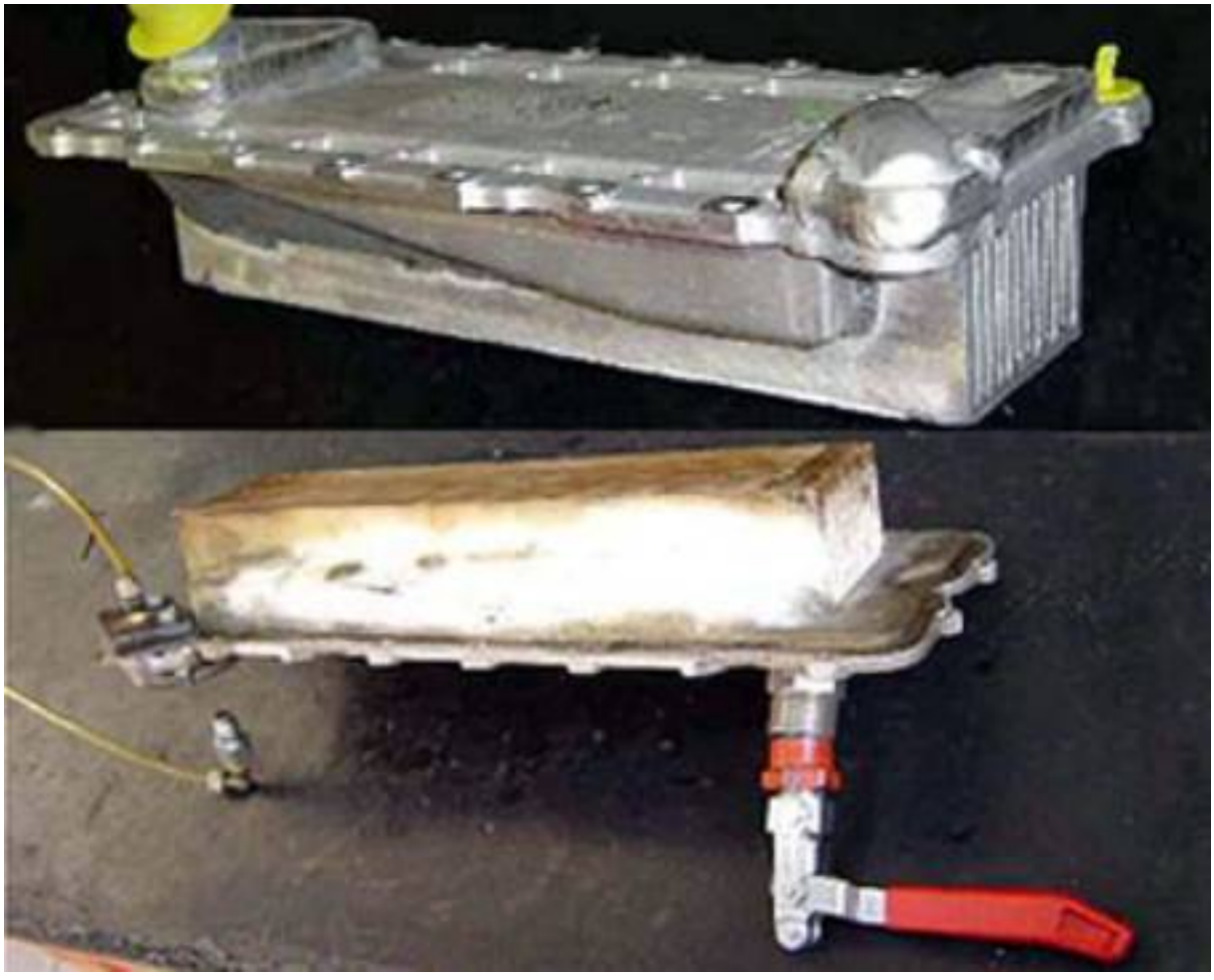
- After checking the dimensions of the cylinder liners and the respective seats in the upper crankcase, check that the cylinder liner resting surfaces are perfectly clean, then measure the liner protrusion with respect to the crankcase as follows:
- Fit the cylinder liner to be installed turned upside down on the crankcase.
- Using the specific tool equipped with dial gauge with DTI plunger **CS0102916**measure the protrusion of the cylinder liner from the crankcase, checking that it falls within the **0.001÷0.05 mm** value range.
- If necessary, try the various liners in the various seats so as to obtain the correct coupling.
- It is important that the protrusion is uniform for all the cylinder liners on each bank.
- After coupling the various cylinder liners to the respective seats, number them in order to prevent a coupling error during assembly.

- Heat the bare crankcase in an oven for about 60 minutes to a temperature of 40-50°C, and cool down the cylinder liners to a temperature of -15 to -20°C putting them in a freezer or liquid nitrogen.
- When the specified temperatures for the crankcase and the cylinder liners have been reached, fix the crankcase on the support tool and proceed with installation as follows.
- Position the O-rings on the cylinder liners and lubricate them with engine oil.

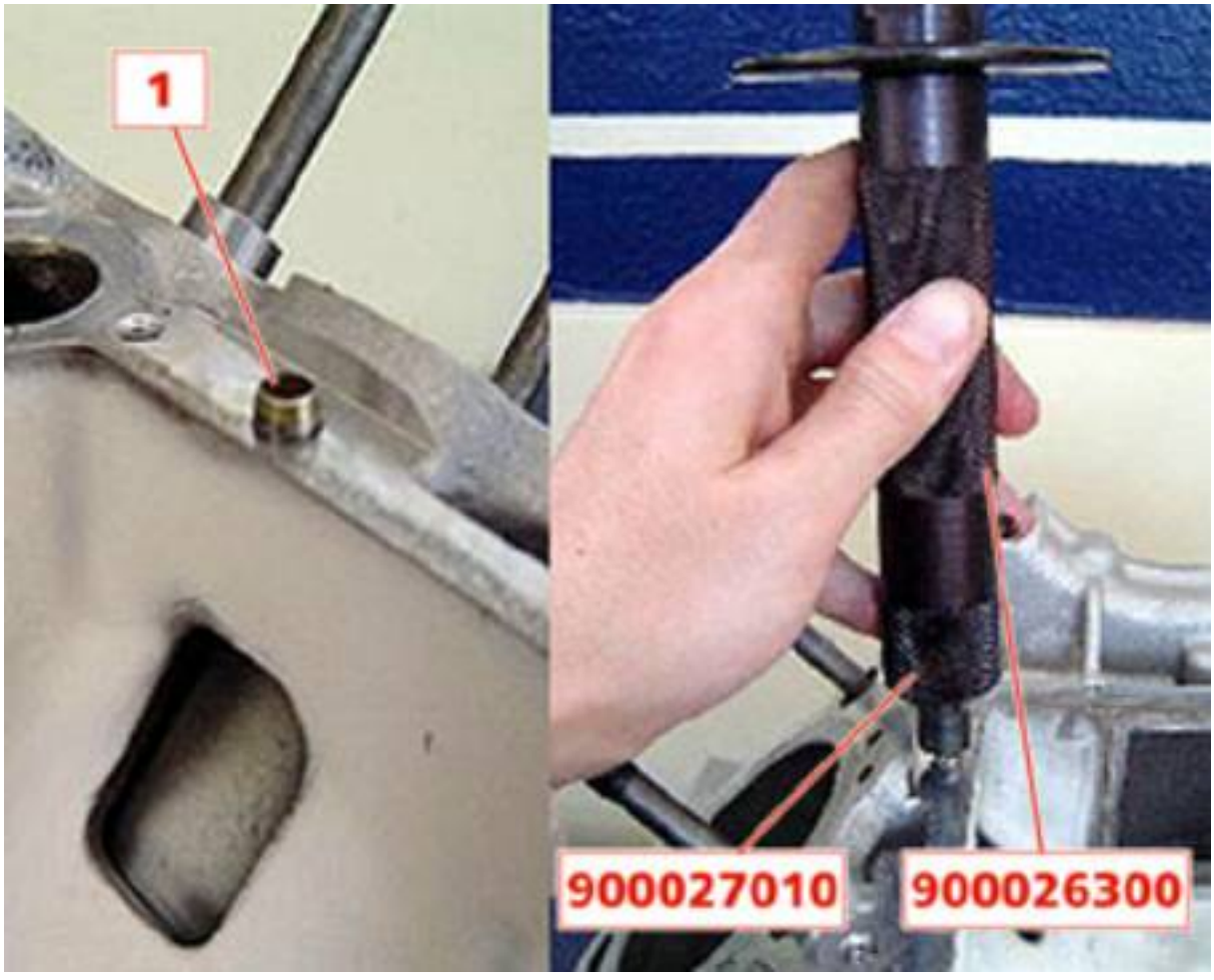
- Insert the cylinder liners in the crankcase, carefully respecting the coupling order established when checking the protrusion, and take care that the two adjoining faces of the upper edge, between the various cylinder liners, do not interfere with each other.
- To fully bed in the cylinder liner, evenly tap on its perimeter with a rubber hammer.
- The cylinder liners must be fitted within two minutes from taking the crankcase out of the oven.
- Check once again that the total cylinder liner protrusion for each cylinder bank is between **0.01 and 0.05** mm.

- If the cylinder liners are not replaced, but the same ones are reinstalled in their seats, always check the protrusion of the coupling edge with respect to the crankcase, in order to make sure that there are no faults.
- Make sure that there is no interference between the adjoining faces of the upper edge.

- When installing the water/oil heat exchanger, it is advisable to visually inspect the conditions of the radiator core. Thoroughly clean the part to assure maximum heat dissipation in operating conditions.
- To check that there is no leakage or spillage, before installing the heat exchanger, perform a pressure test by immersing it in a container of water, plugging one of the two inlets and blasting in air from the other inlet.



- If the centring dowels **(1)** for the Ø 6 heat exchanger on the crankcase are damaged or have been removed, you must use tool **900026300** together with tool **900027010**.



- Position the heat exchanger.

- Always replace the adhesive gasket of the heat exchanger.

- Properly fit the gasket on the heat exchanger.

- Install the sealing gasket **(1)** between the heat exchanger and the crankcase and position the heat exchanger.

- Fit the accumulator mount.

- Fit the air bleeding union for the water cooling circuit and tighten it to a torque of **15Nm**.

- Fit the accumulator mount and tighten it with the exchanger to a torque of **10 Nm**.

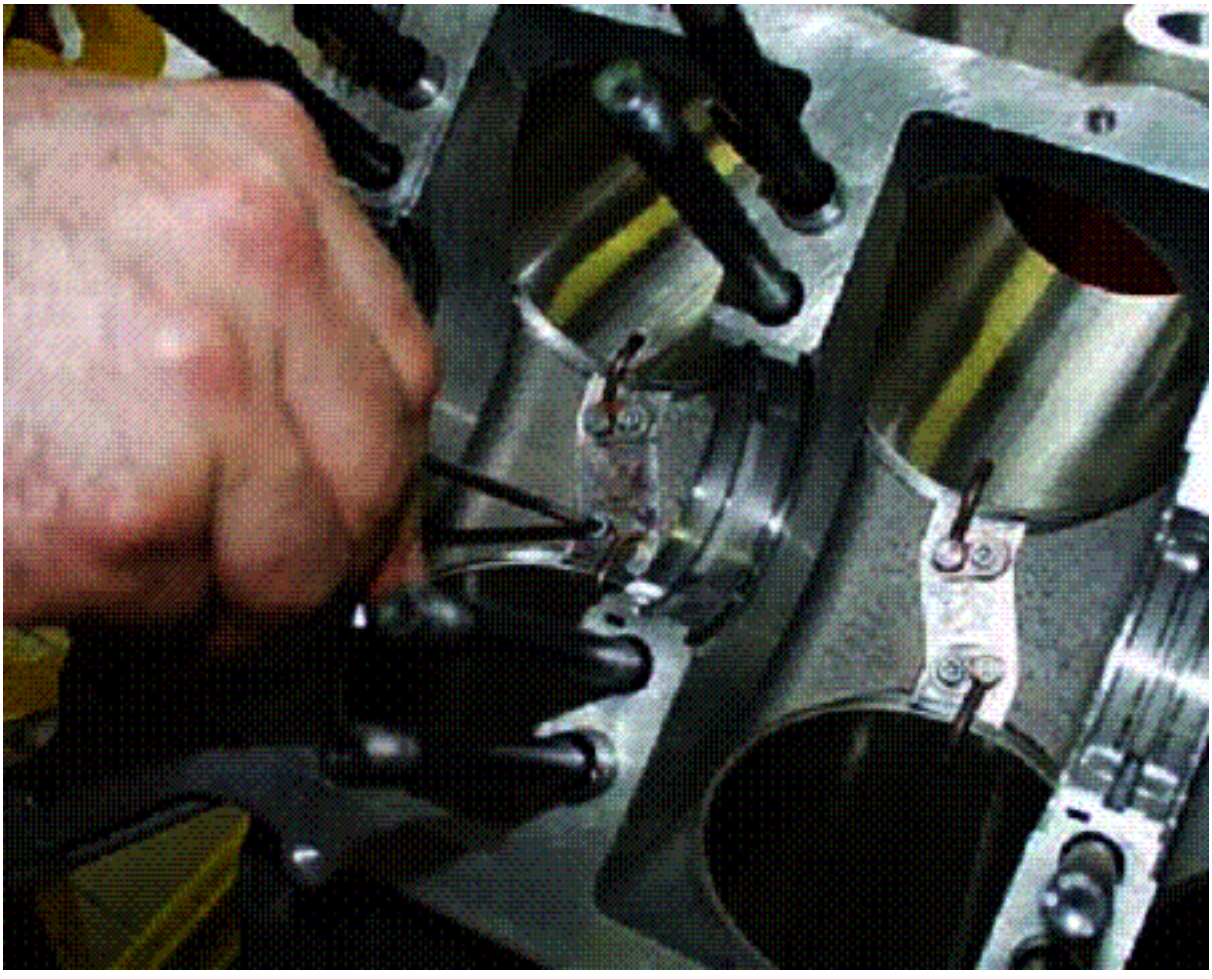
- Fit the four anti-detonation sensors and tighten them to a torque of **20 Nm**.

- Fit the rpm sensor and tighten it to a torque of **8 Nm**.

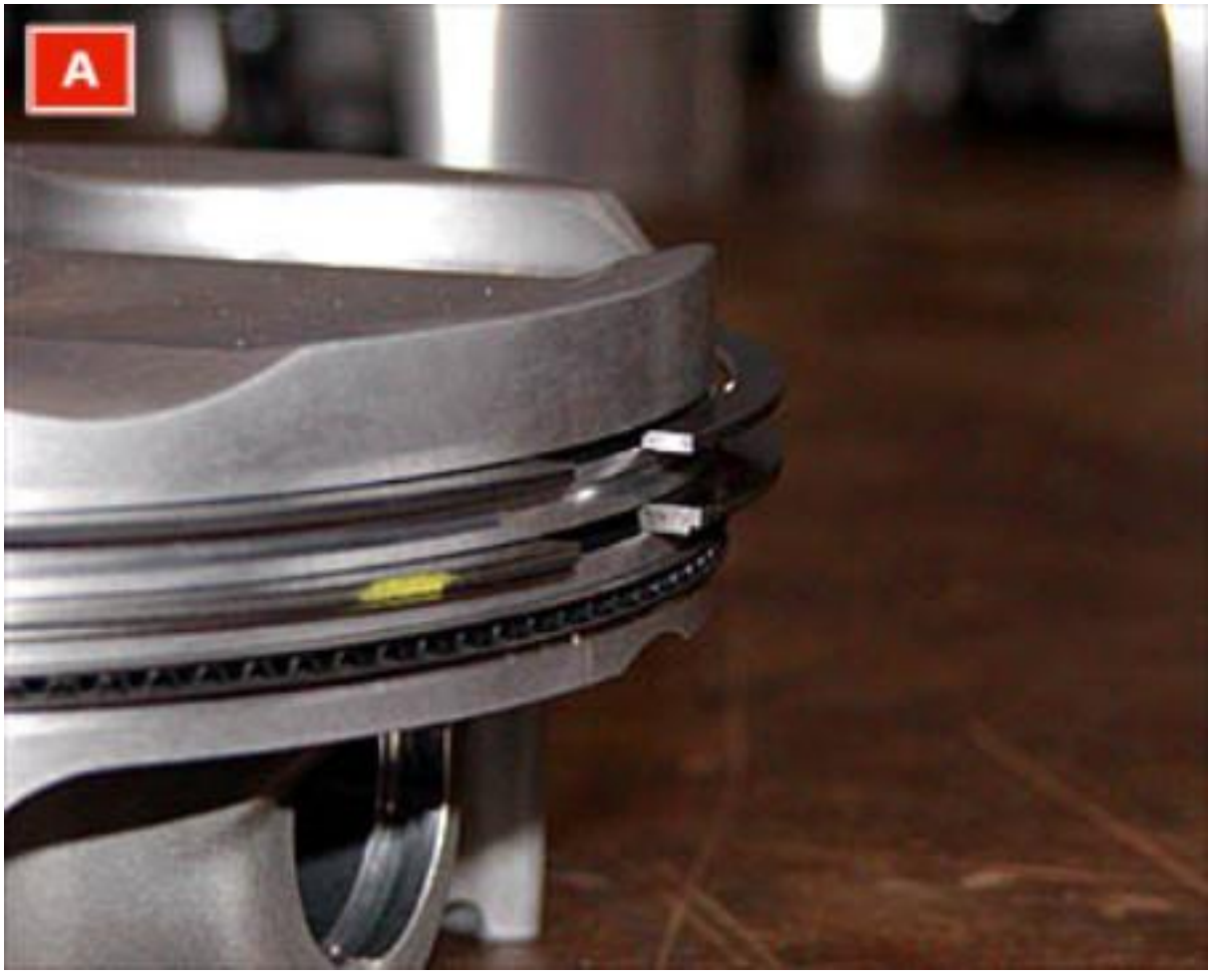
- Fit the oil accumulator for the variators.

- Fit the oil pressure sensor taking care not to damage the rpm sensor cable and tighten it to a torque of **40 Nm**.

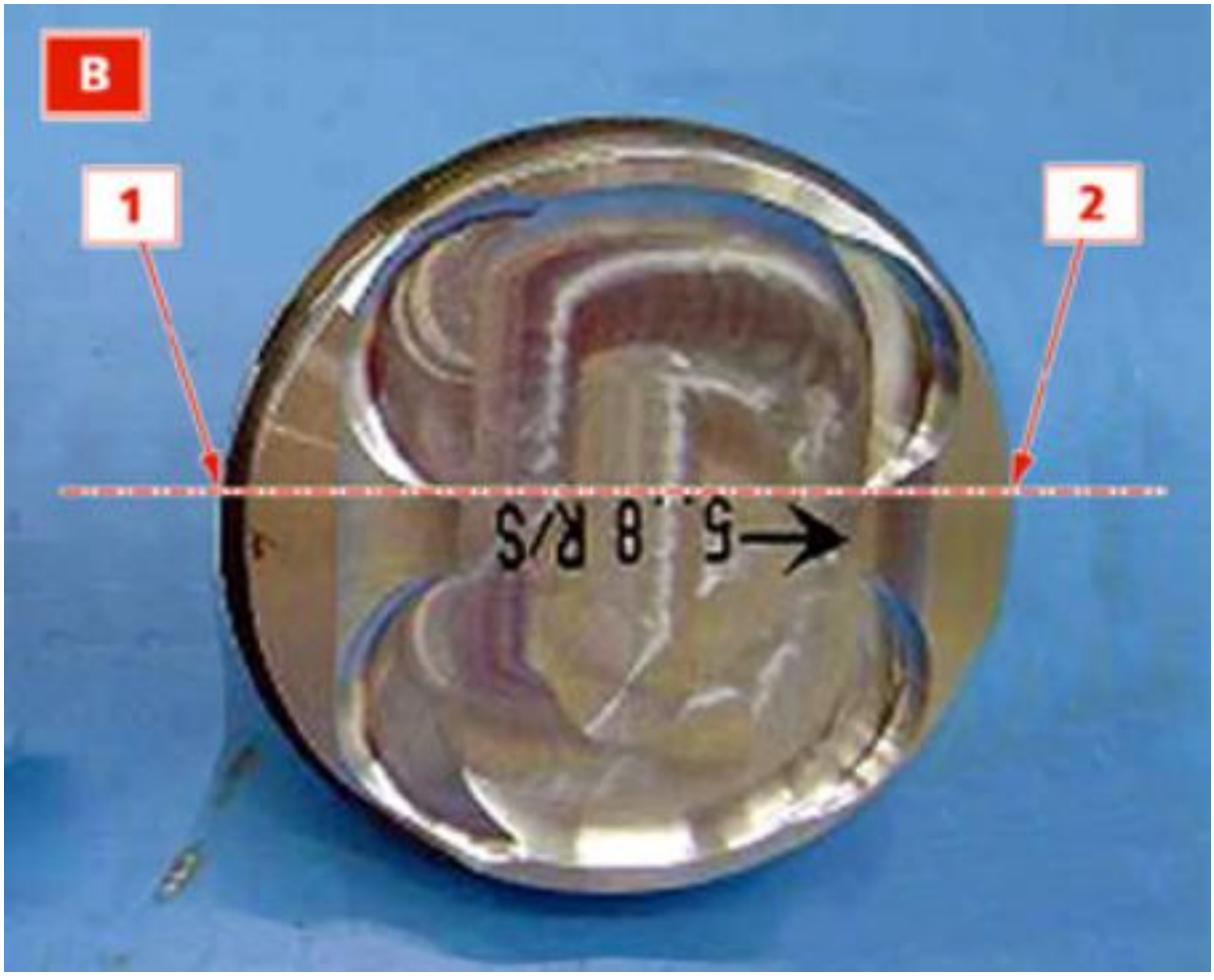
- After having applied a thin layer of Loctite 242 on the oil nozzles, install and tighten them to a torque of **3 Nm**.



- Position the piston sealing segments in the direction shown in Figure **(A)** with the openings of the first **(1)** and the second **(2)** sealing segment at **180°** between them, as shown in Figure **(B).**



- **(1)** = Upper sealing segment opening
- **(2)** = Central sealing segment opening



There is no specific fitting direction for the oil scraper ring, nonetheless, take care at the joint of the internal clip: do not position it near the opening of the upper and lower rings.

- Mount the connecting rod on the piston, taking care that the mark on the lower part of the connecting rod is positioned on the piston exhaust side.

IMPORTANT
After every removal, replace the pin stop rings. The connecting rod caps match the respective connecting rods. An identification number is printed on both the connecting rod and the connecting rod cap.

- Lubricate the piston skirt and the cylinder liner with engine oil.

- Fit the half-bearings into their seats on the connecting rod and the cap.

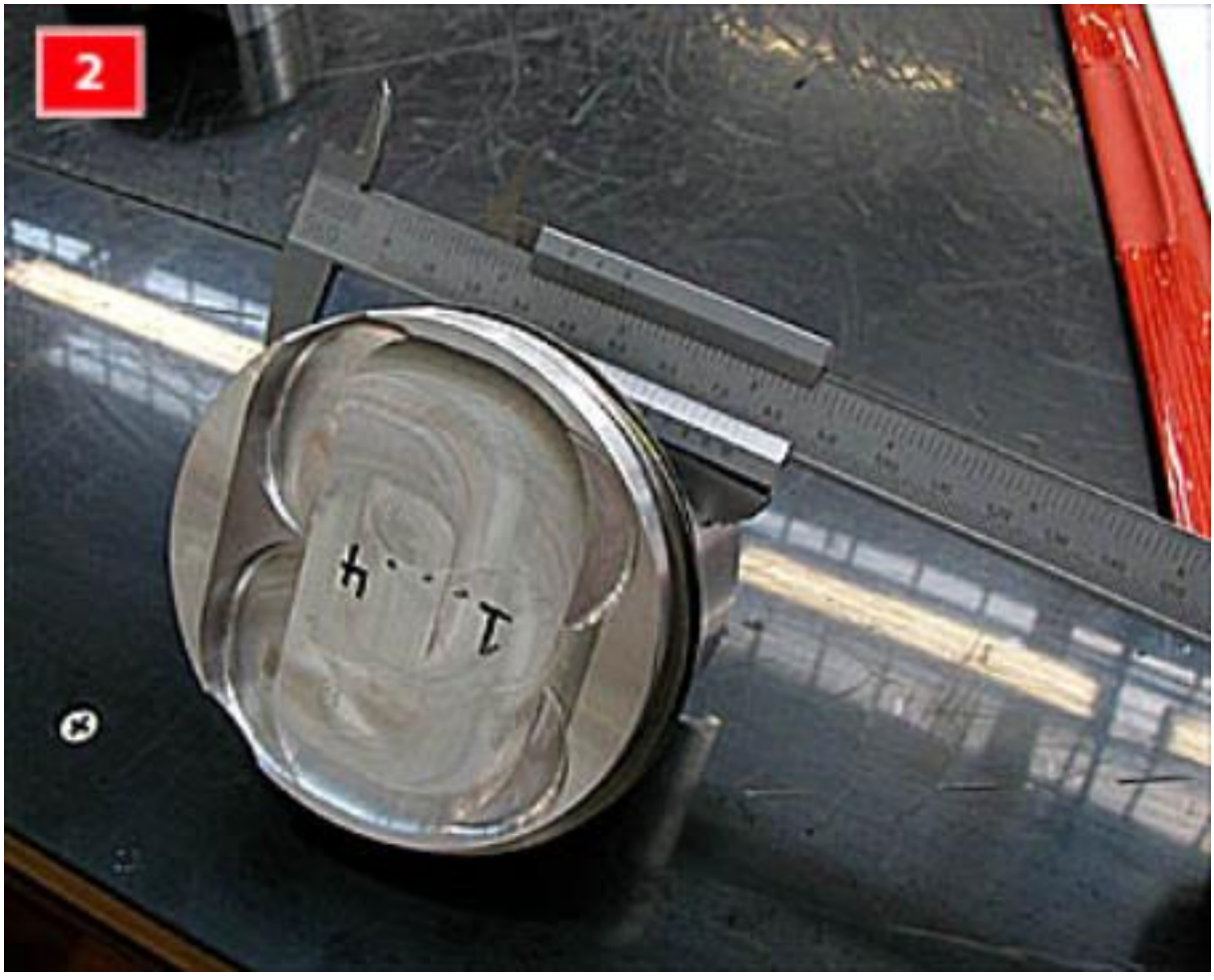
UNIT OF MEASURE mm		CRANKPIN CONNECTING ROD SEAT	CRANKPIN CONNECTING ROD SEAT
SEAT YIELD= 0.008		47.129 – 47.135 CLASS X	47.136 – 47.142 CLASS Y
CRANKSHAFT CRANKPIN	43.630 – 43.637 CLASS X	YELLOW 1.727 – 1.732 YELLOW 1.727 – 1.732	GREEN 1.732 – 1.737 GREEN 1.732 – 1.737
CRANKSHAFT CRANKPIN	43.621 – 43.629 CLASS X	GREEN 1.732 – 1.737 GREEN 1.732 – 1.737	BROWN 1.737 – 1.742 BROWN 1.737 – 1.742
THE CLEARANCES ARE CALCULATED AT A REFERENCE TEMPERATURE OF 20°C			

- Insert the piston into the dummy cylinder liner, so that the lower part of the skirt comes out slightly **(Figure 1)**.
- Loosely fit the piston on the cylinder liner, taking care to observe the correct direction, then push it

firmly in.

IMPORTANT

When fitting the piston, take care that the piston offset is set as in Figures 2, 3 and 4.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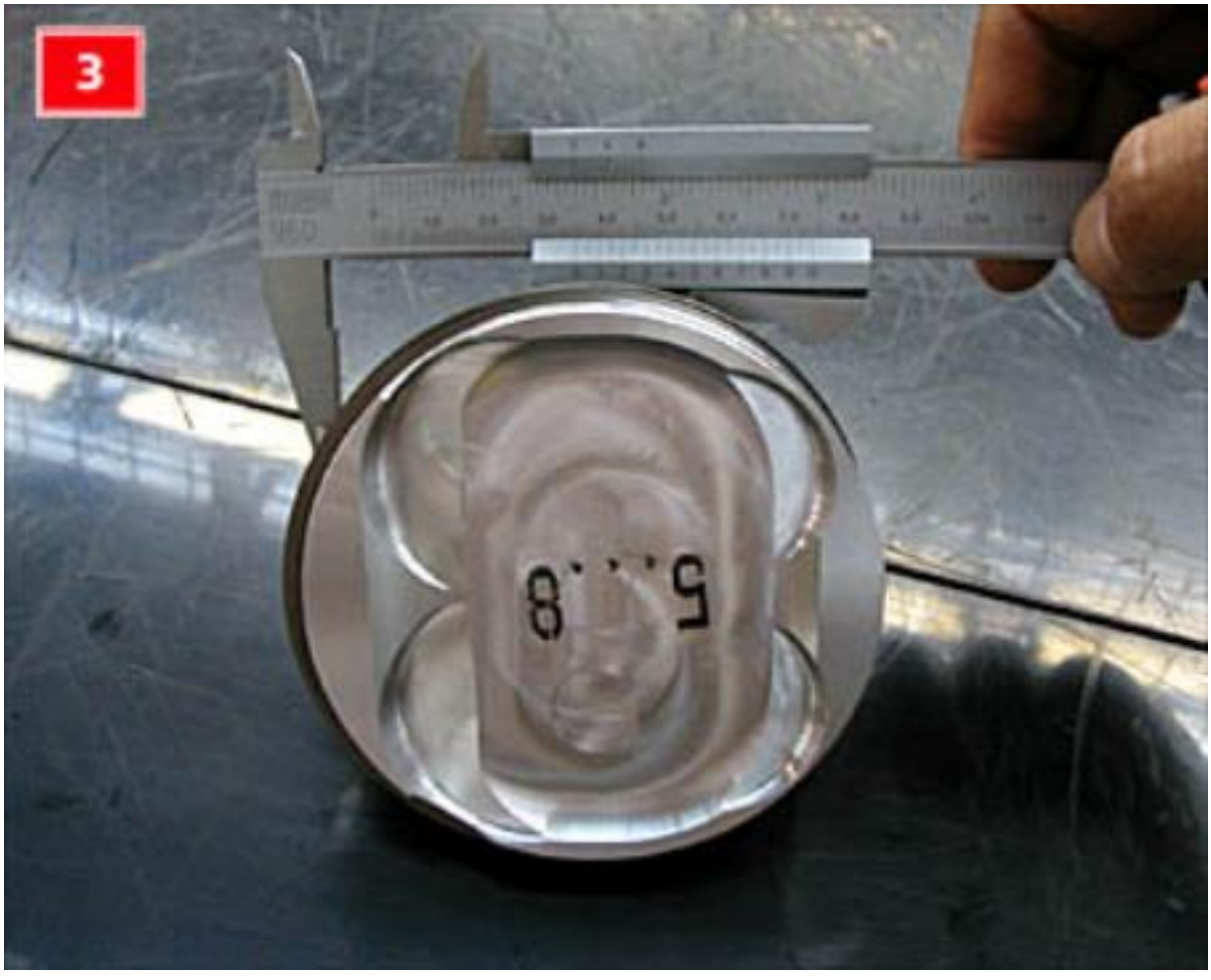
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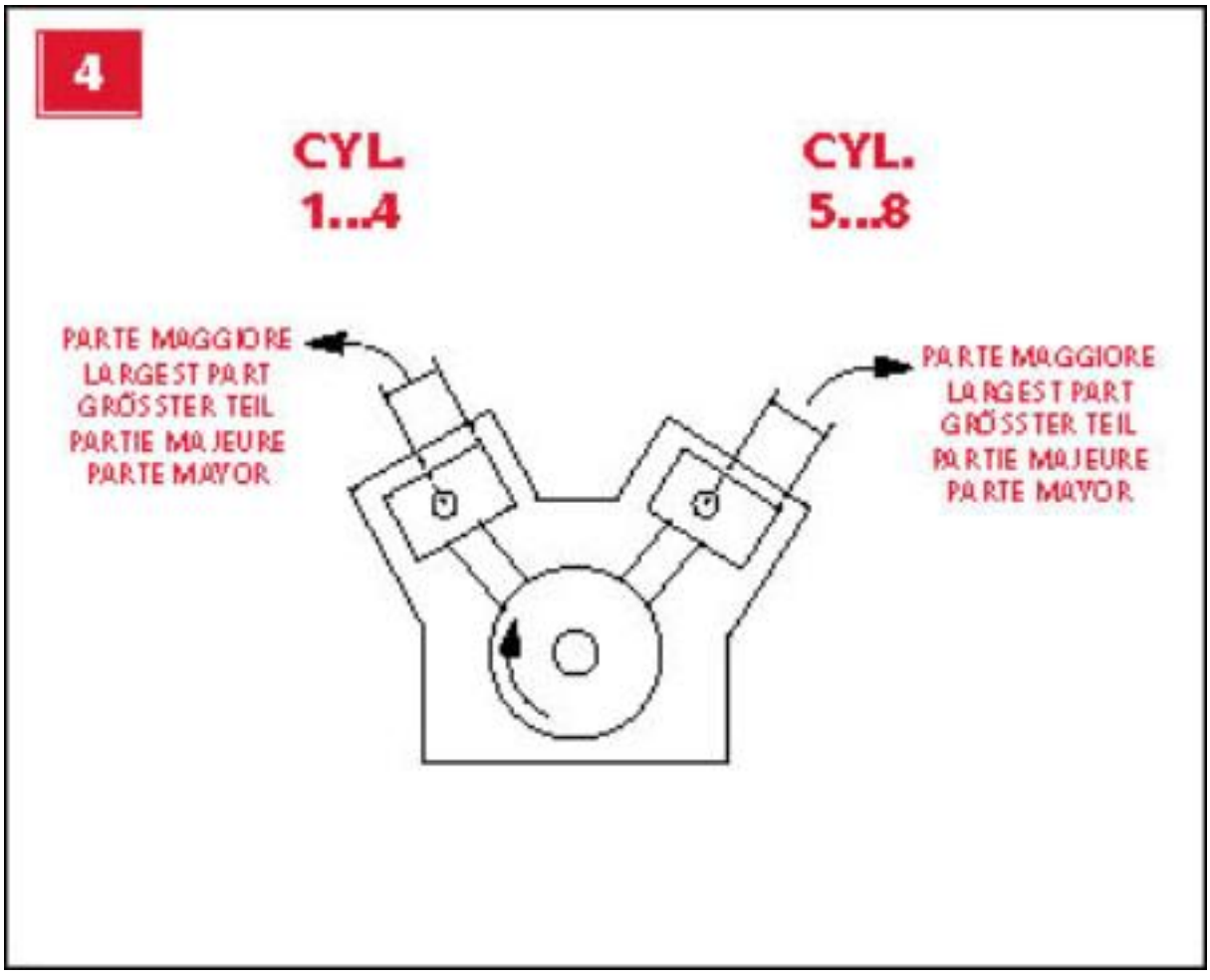


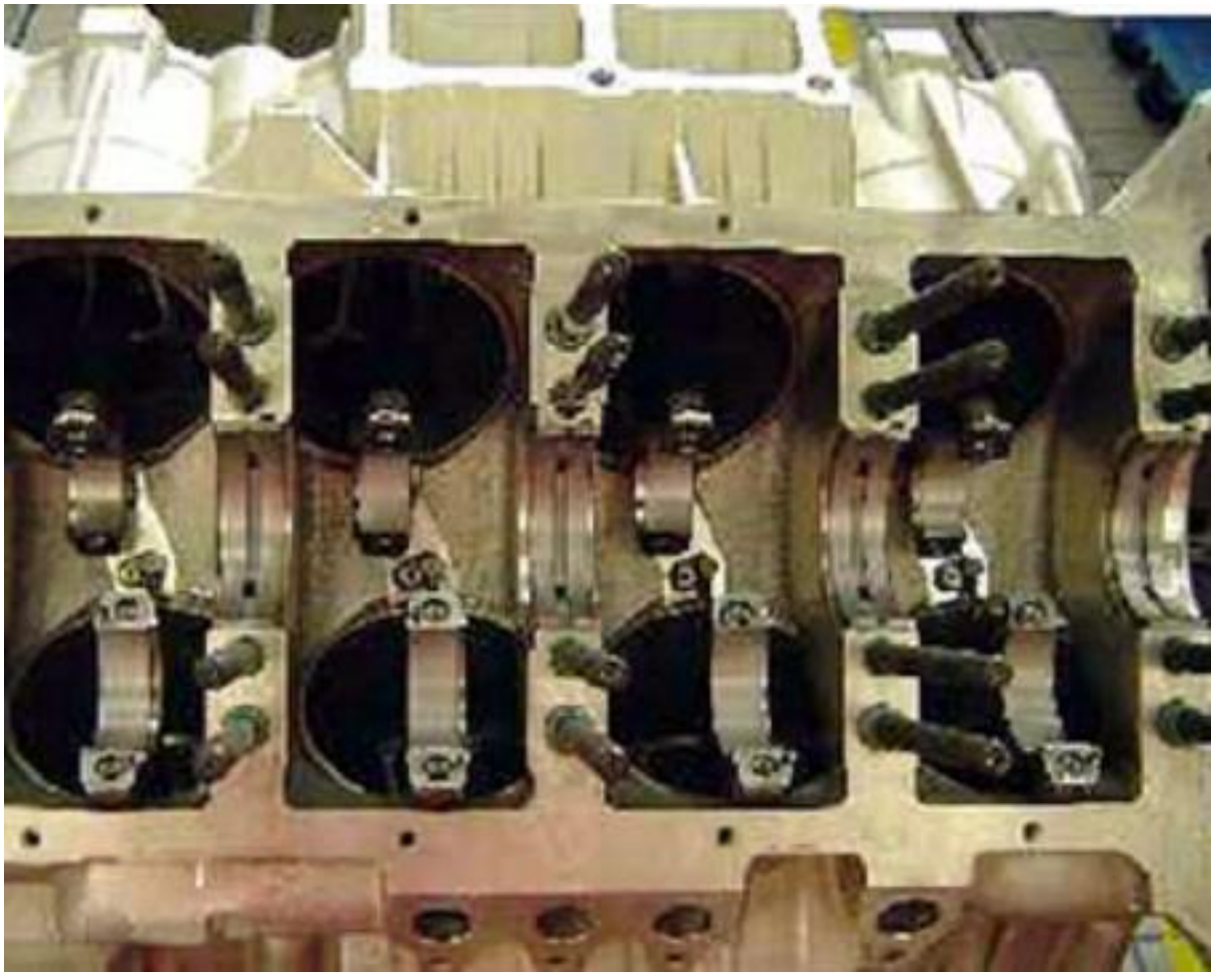
- Position all the pistons at the top dead centre before proceeding with the installation of the crankshaft, so as to avoid interference.

- Fit the bearings on the crankcase lubricating them with oil.

- Choose the main bearings according to the instructions on the table.

UNIT OF MEASURE mm		MAIN BEARING JOURNALS CRANKCASE SEAT	MAIN BEARING JOURNALS CRANKCASE SEAT
SEAT YIELD= 0.035		66.675 – 66.681 CLASS A	66.682 – 66.688 CLASS B
CRANKSHAFT MAIN BEARING JOURNALS	58.994 – 59.000 CLASS A	BLUE 3.843 – 3.848 BLUE 3.843 – 3.848	GREEN 3.848 – 3.853 GREEN 3.848 – 3.853
CRANKSHAFT MAIN BEARING JOURNALS	43.621 – 43.629 CLASS X	YELLOW 3.848 – 3.853 YELLOW 3.848 – 3.853	GREEN 3.853 – 3.858 GREEN 3.853 – 3.858
THE CLEARANCES ARE CALCULATED AT A REFERENCE TEMPERATURE OF 20°C			

- Abundantly lubricate the half-bearings.



- Fit the crankshaft on its mounts.

- After having thoroughly lubricated the components, fit the connecting rod caps.

N.B.

- Be sure that the two marks on the connecting rod and the connecting rod big end are on the same side during the assembly procedure.

- Apply Molykote 1000 grease on the connecting rod tightening screws.

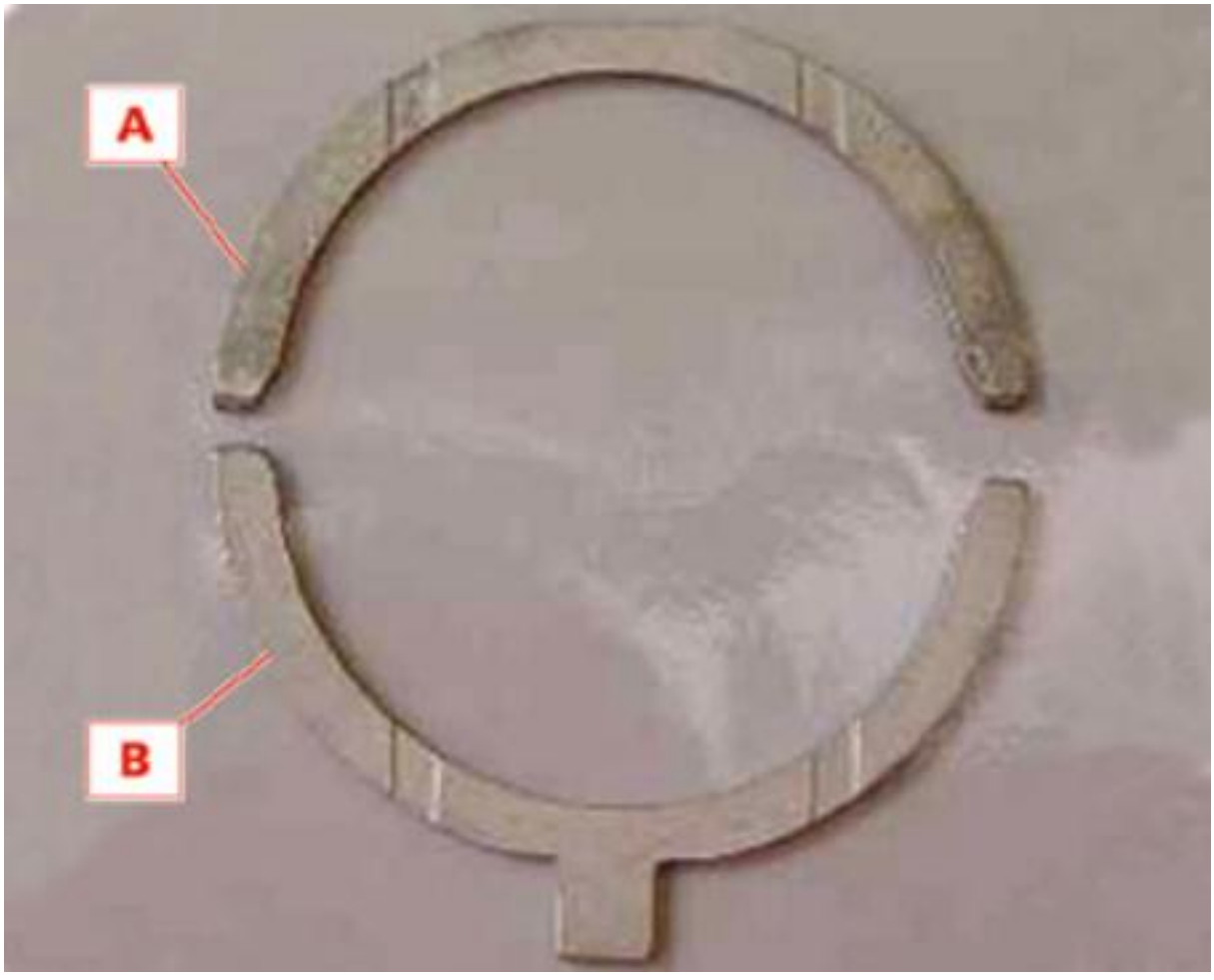
- After having closed them by hand first, tighten all the screws to a torque of **15 Nm**, then use a 60° tightening angle so as to obtain a torque of **55±10 Nm**.

N.B.
If the required torque is not attained after having applied the tightening angle, the entire procedure must be repeated.

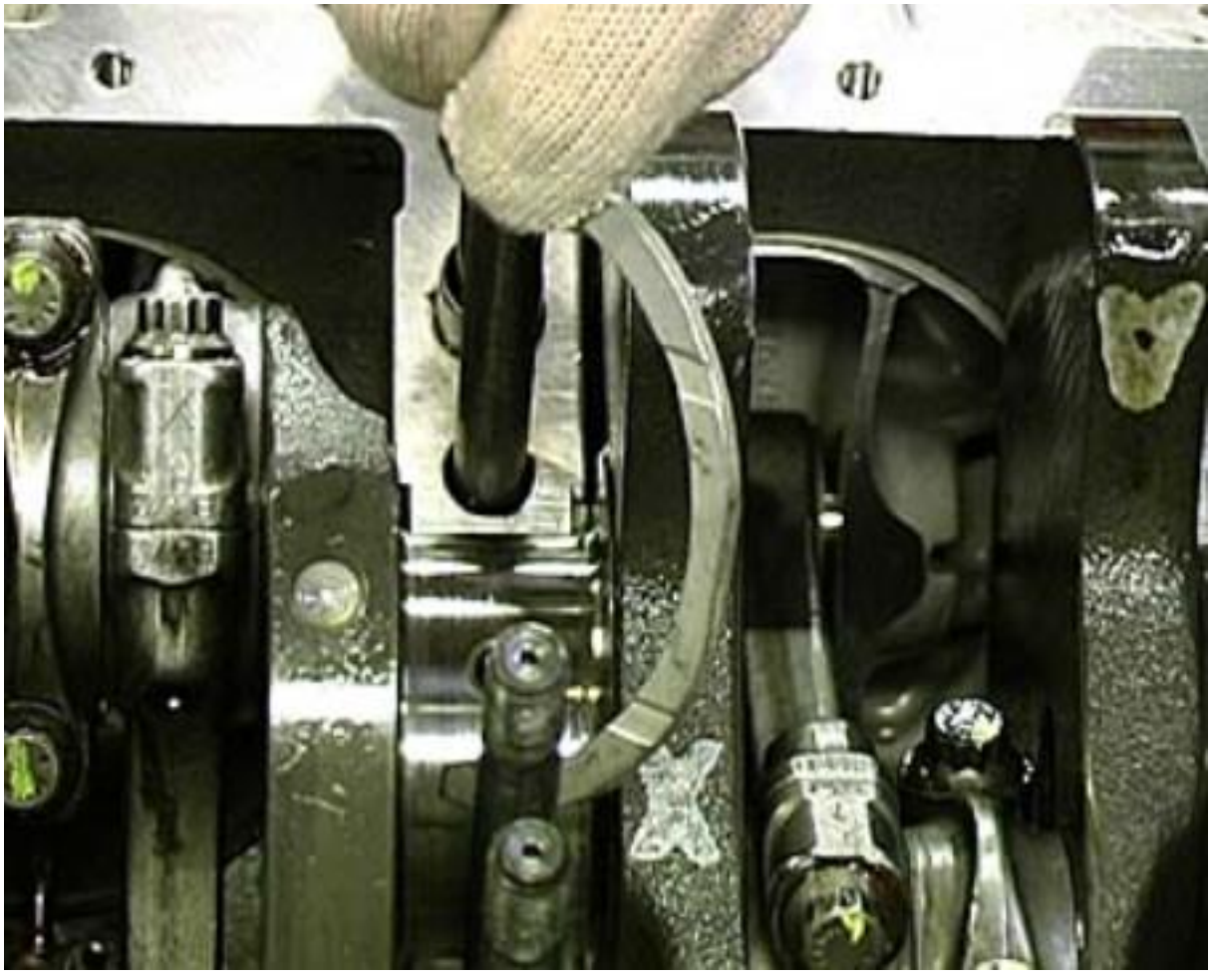
IMPORTANT
Every time the connecting rod screws are tightened, use a new set of screws.

- Fit the shims for the lower central crankshaft mount, being careful with the installation direction: the side with the two lubrication grooves must face the crankshaft shoulder. These shim rings help defining the axial play of the crankshaft. Different shims are available (standard, 1st allowance, 2nd allowance) depending on the type of coupling to be achieved.

- **A** – Upper crankcase shim
- **B** – Lower crankcase shim



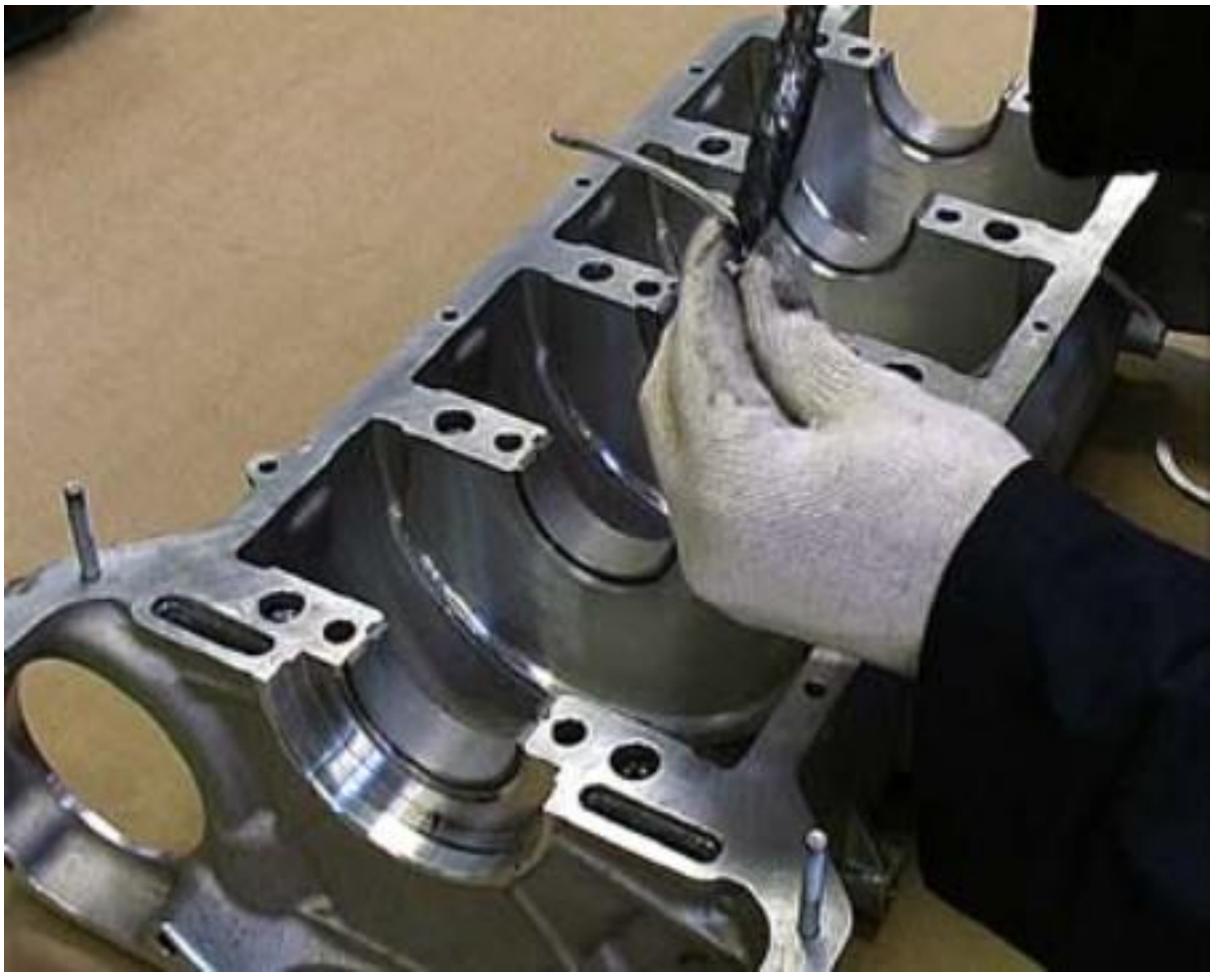
- Insert the upper central mounting shims, following the correct installation direction by turning the rounded part facing outwards.



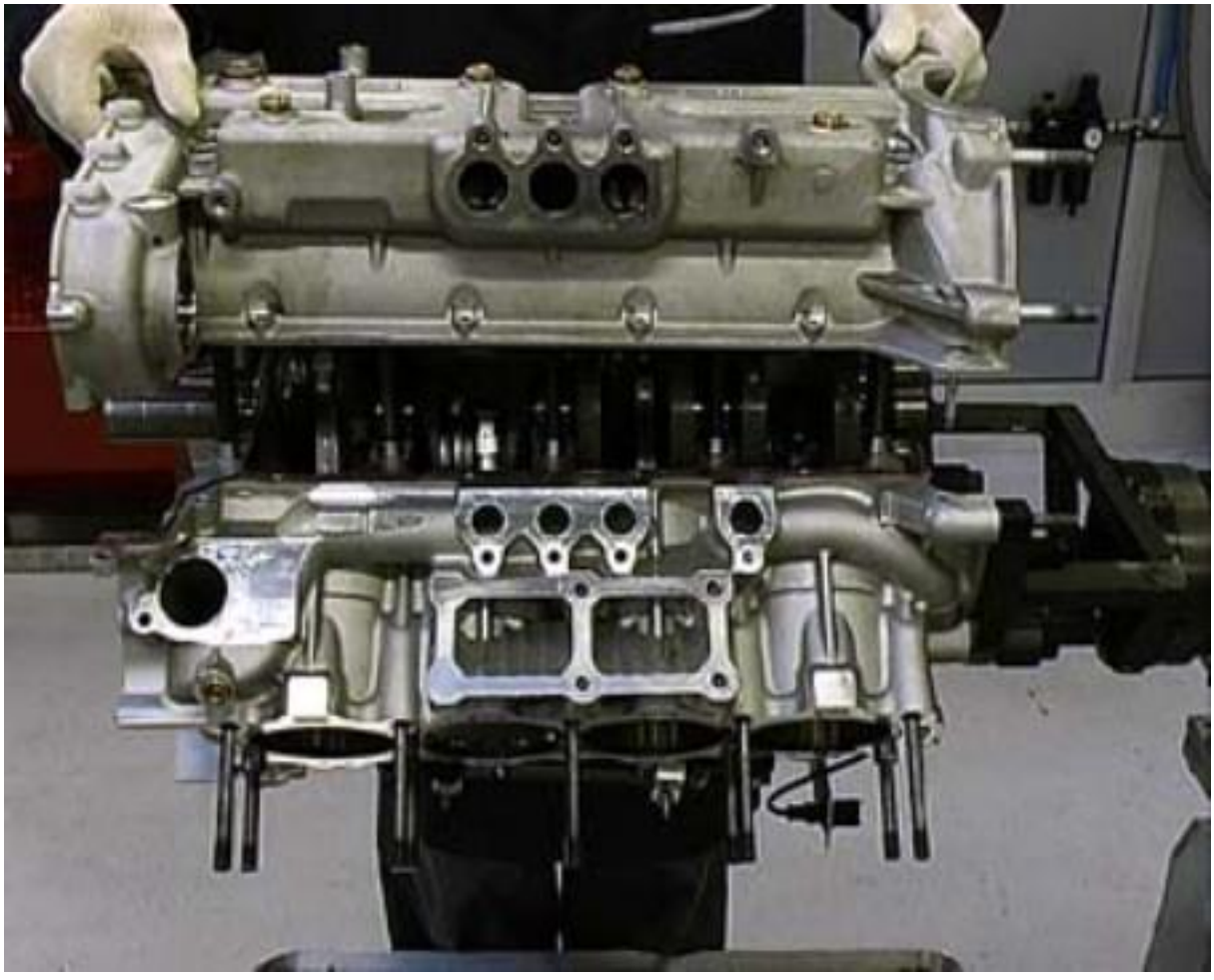
- Use the special tool (thickness 20-30) to check that the axial play of the connecting rods falls within the values **0.20-0.25 mm**.

- Put the silicon sealing compound Loctite 518 along the perimeter of the engine crankcase.

- Prepare the lower part of the engine crankcase by fitting the bearings and the lower central mounting shims, respecting the fitting direction, i.e. with the rounded part facing outwards.



- Fit the lower part of the crankcase on the engine crankcase.

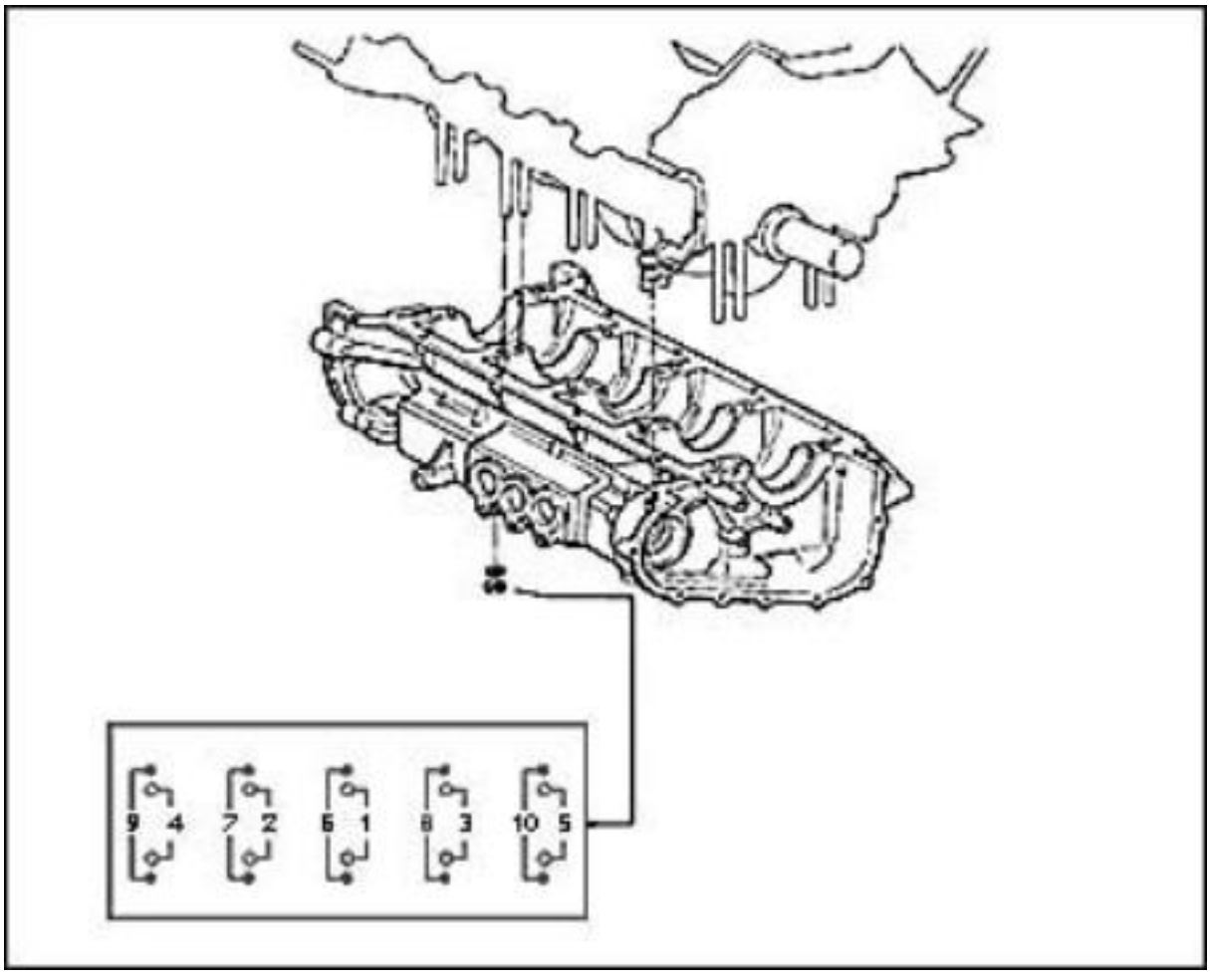


- Lubricate the tie-rods and the relative washers with Molycote 1000 grease, then loosely fit the nuts onto the stud bolts, checking that the stamped part is facing outwards.

- Tighten the nuts to a pre-load of **30Nm** for the inner nuts and **25 Nm** for the outer ones.

Finally, tighten the internal ones to a torque of **60 Nm** and the external ones to a torque of **55 Nm**.
During the procedure check that the shaft turns freely.

- Observe the tightening sequence.

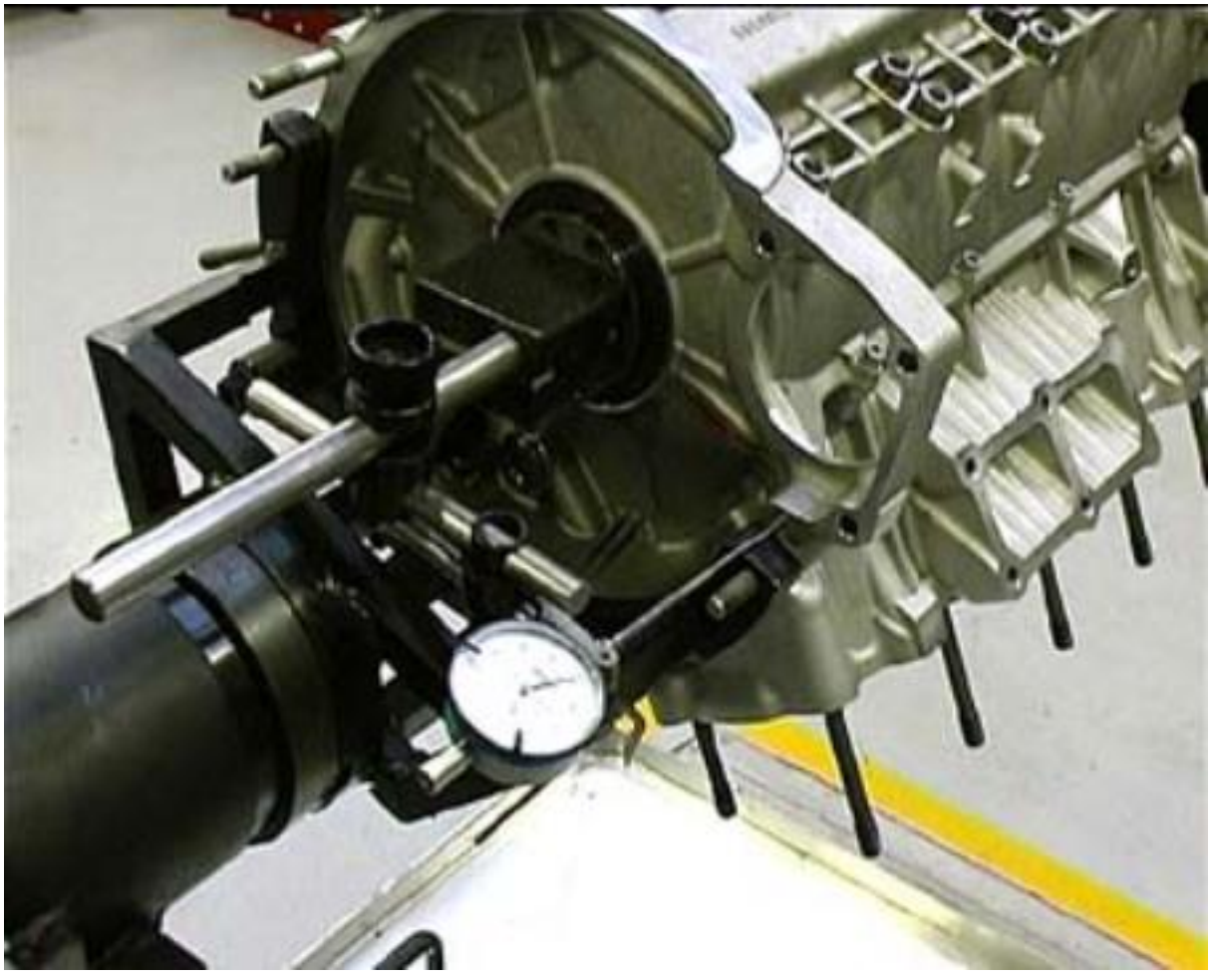


- Fit the 6mm screws onto the crankcase perimeter and the small hexagonal fastening nuts for the 2 stud bolts on the clutch side, tightening them to the a torque of **10 Nm.**

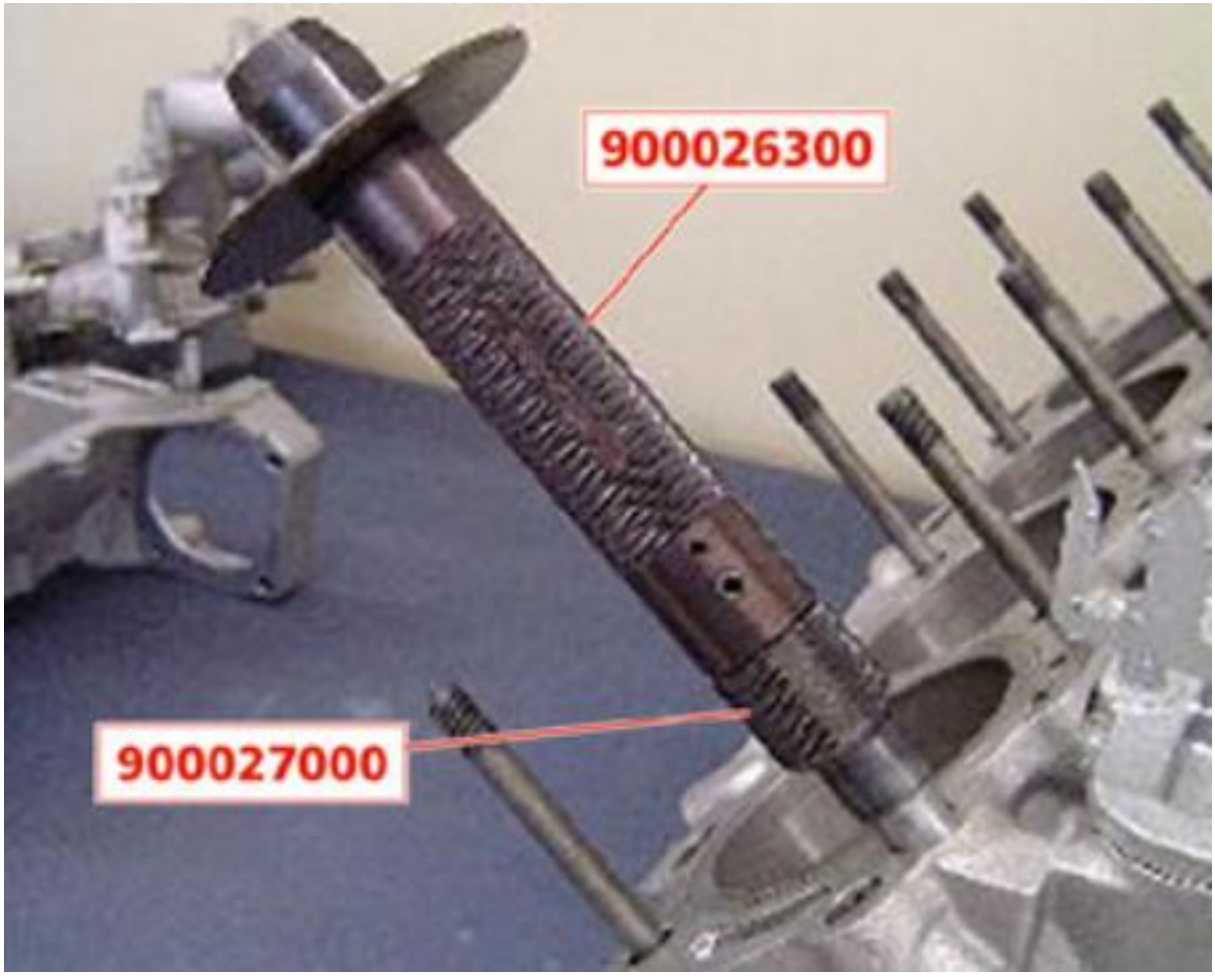
- Insert the oil seal for the crankshaft into its seat on the clutch side, using the specific tool.

- Fit tool **AM105786** for crankshaft rotation and check the shaft end float using a dial gauge.

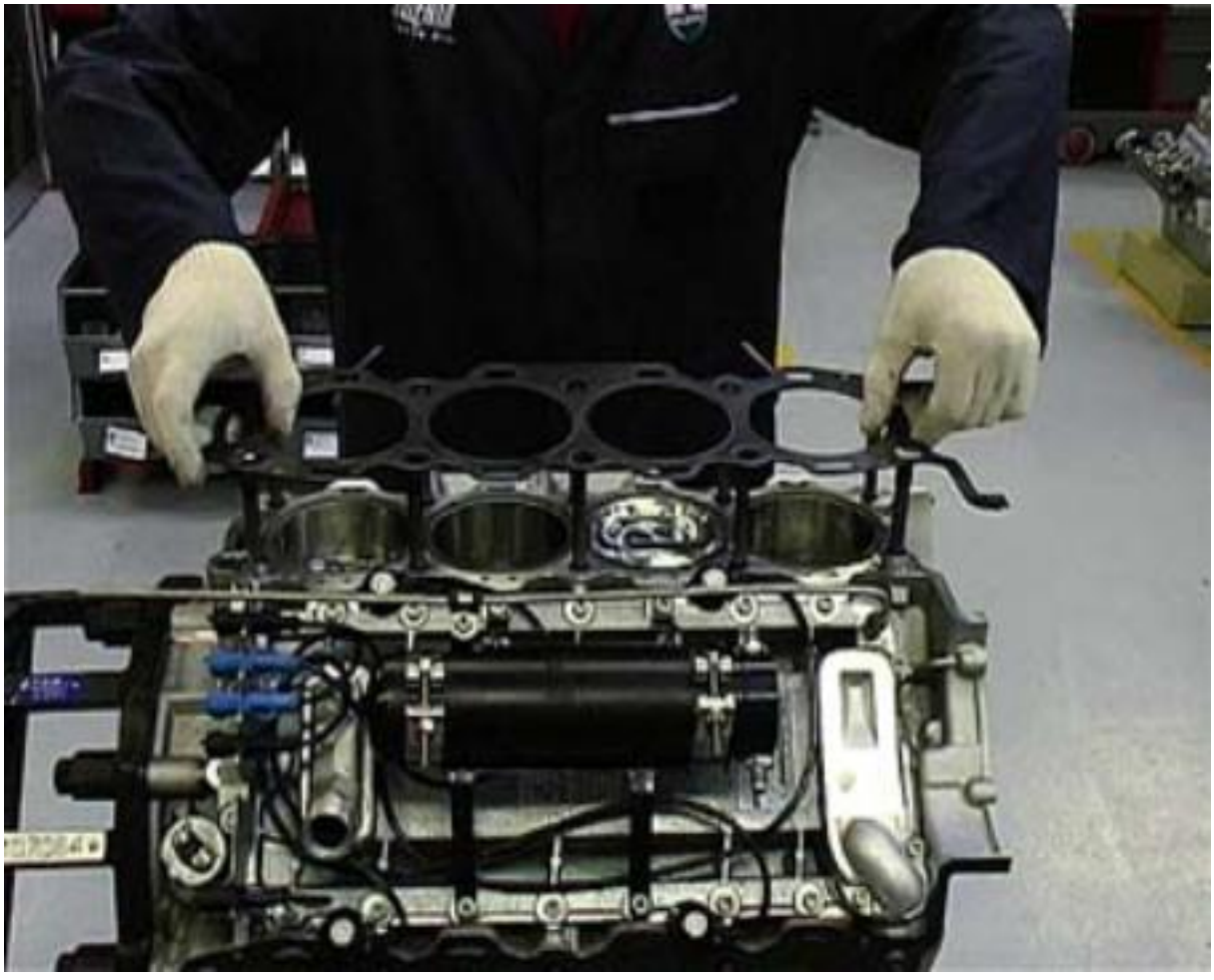
The value must fall between **0.08**and **0.18 mm**
After completing the check, it is recommended to position piston number 1 at the top dead centre.



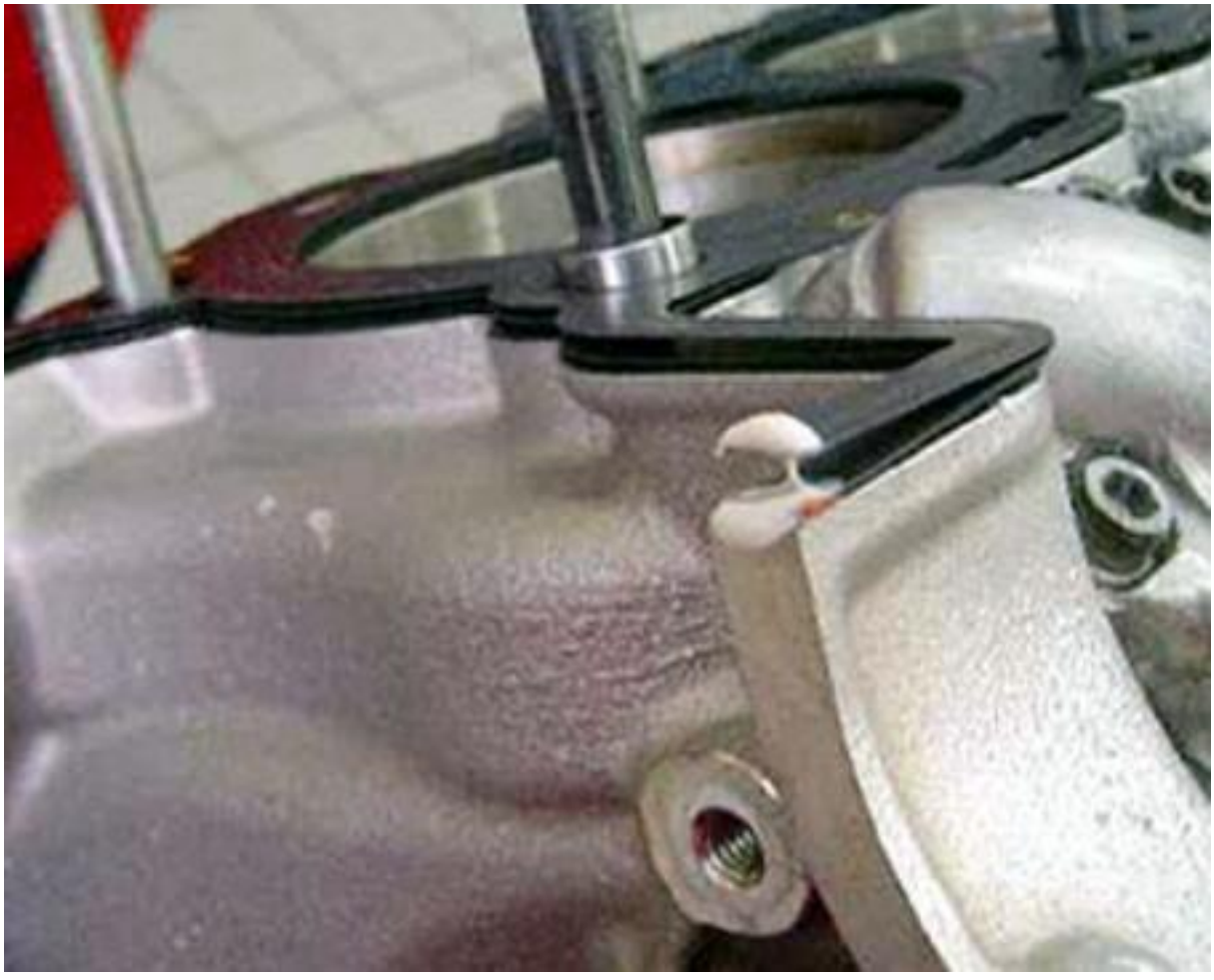
- If the head centring bushings have been damaged or removed, you must refit them using punch **900026300** equipped with tool **900027000.**



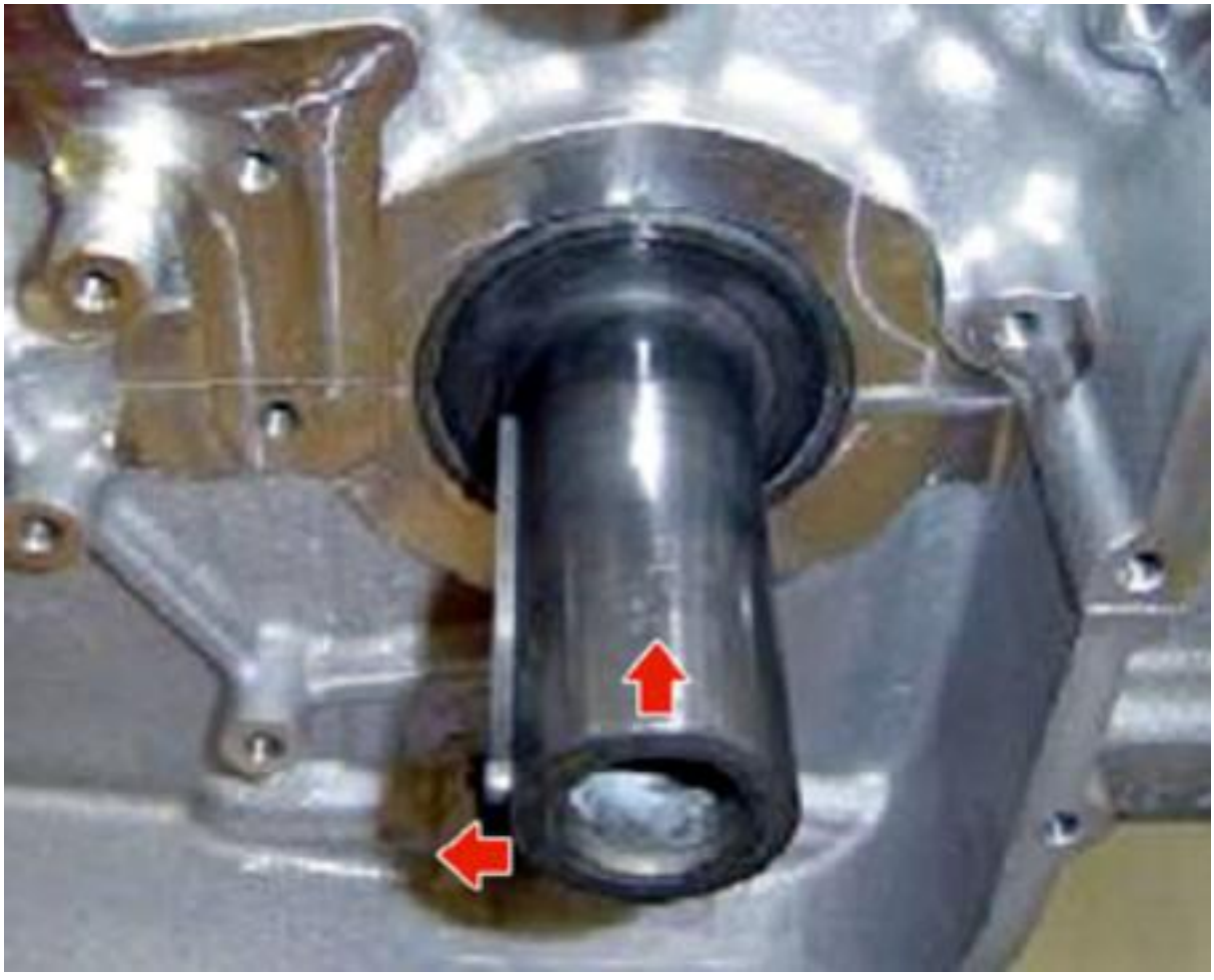
- Position the head gaskets, making sure that they are intact.



- It is advisable to apply a small amount of silicone **CAF4** on the ends of the head gaskets, on the timing side.



N.B.
Before fitting the engine head, turn the crankshaft in such a way that all the pistons are positioned below the TDC. To do this, you must rotate the crankshaft until the tab on the crankshaft (timing side) is positioned as shown in the figure.



- Grease the threading of the crankcase stud bolts and the resting surfaces of the head fastening nuts.

- Grease the stud bolts with **MOLYCOTE 1000**.

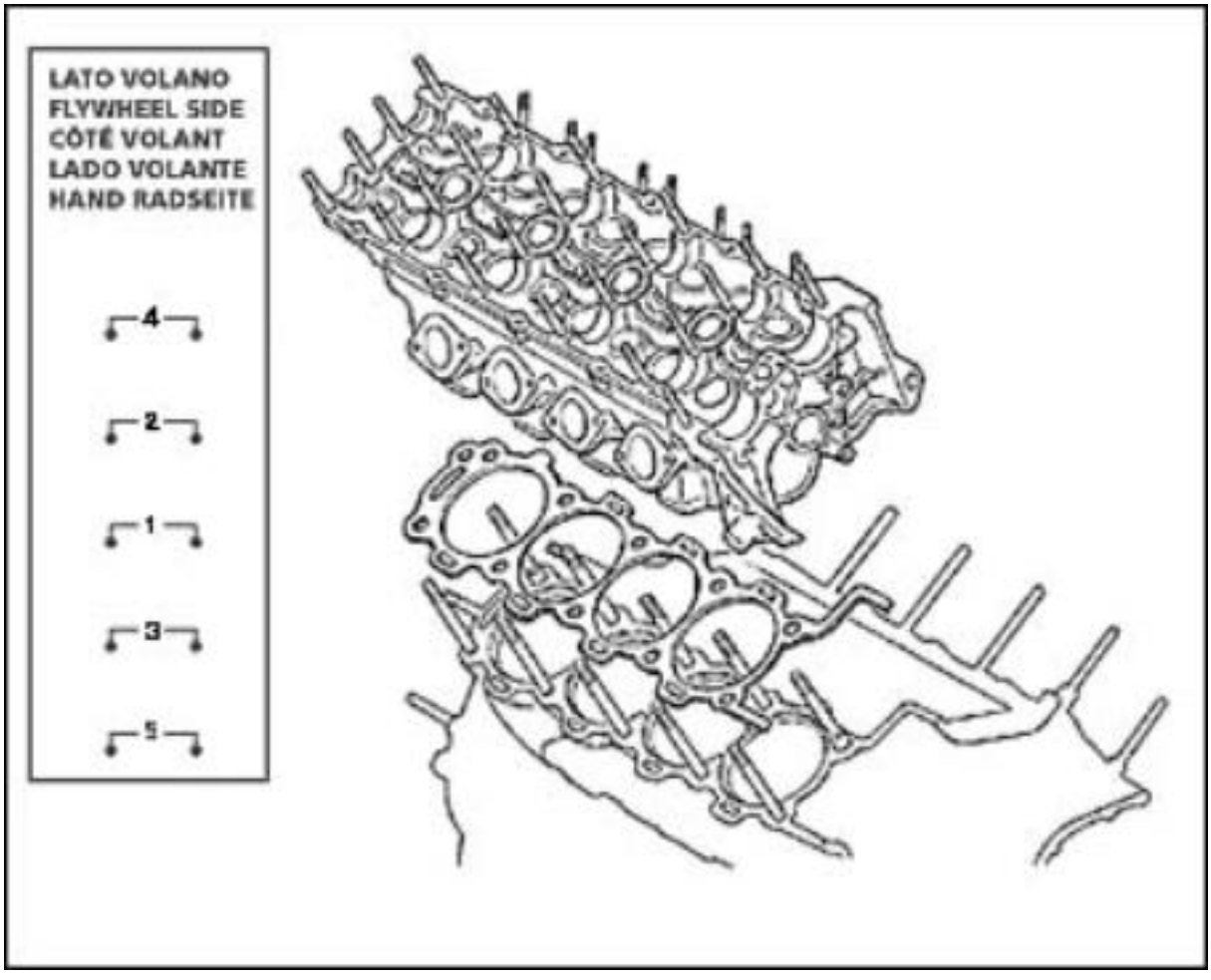
- Position the heads.

- Loosely fit the nuts with the relative washers, suitably greased with MOLYCOTE 1000.

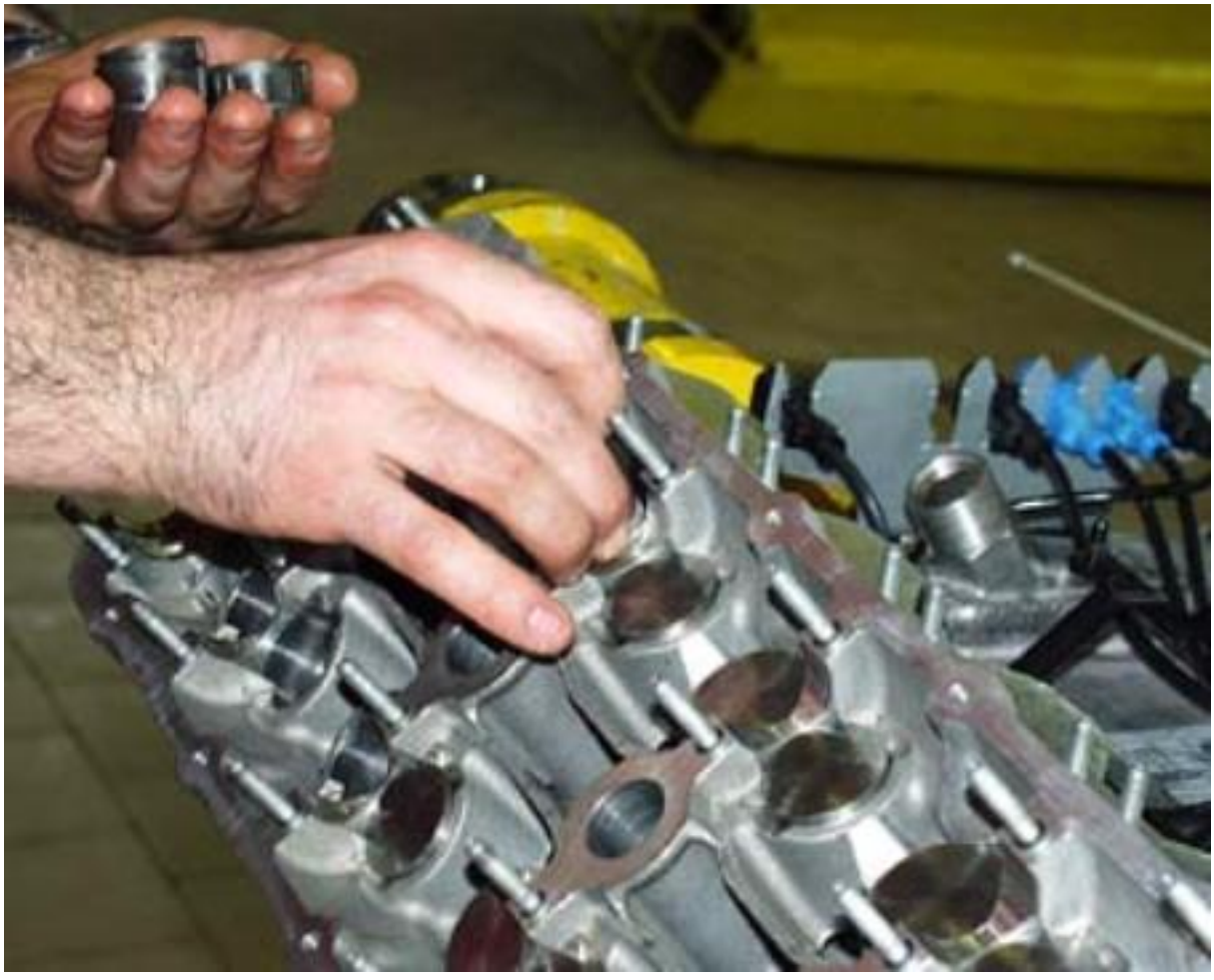
- Apply a pre-load equal to **60Nm**.

- Turn a further **90°** so as to obtain a torque of **80±10 Nm**; if the desired torque is not obtained, the operation must be repeated.

- Observe the tightening sequence.



- Position the valve buckets.



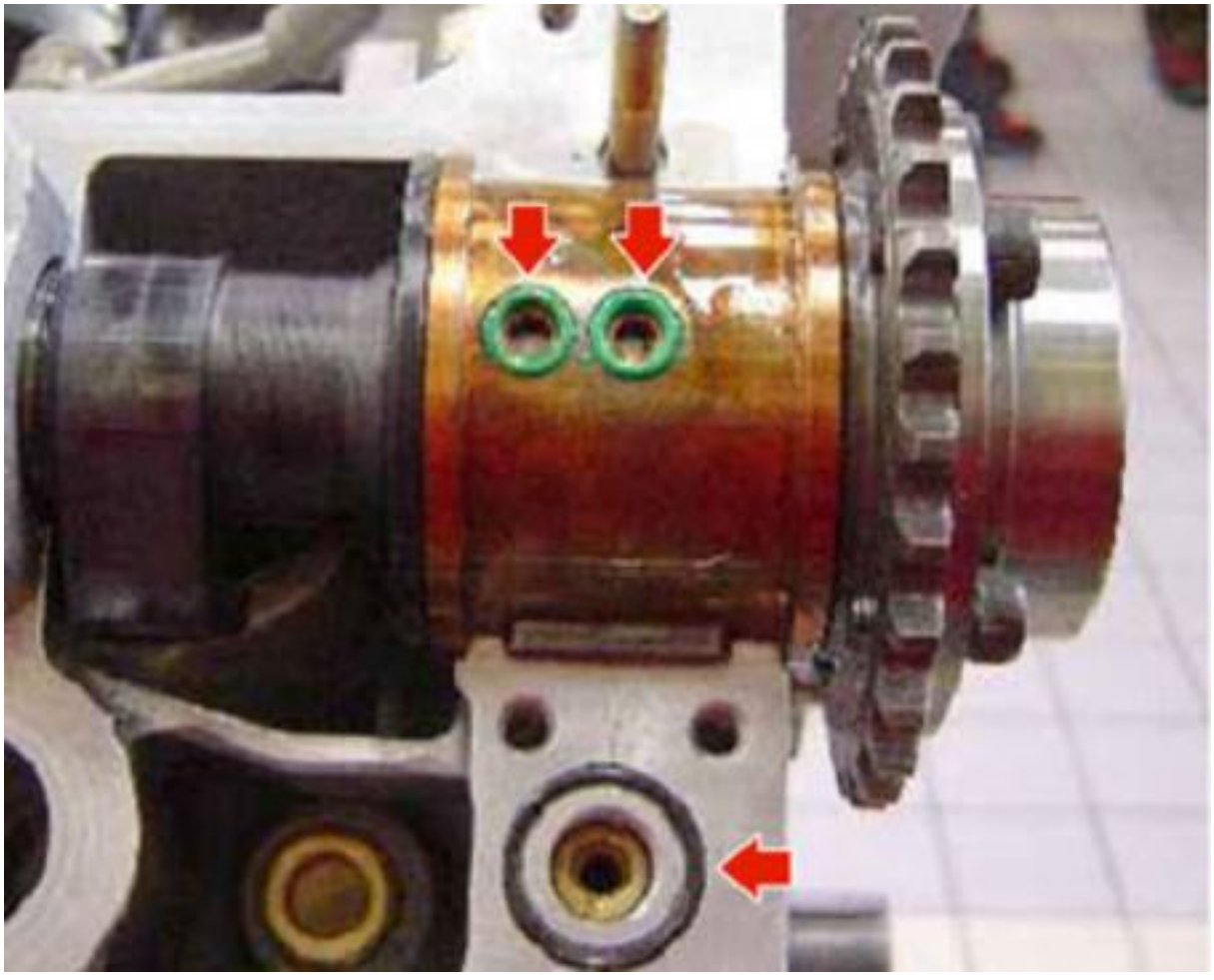
- Lubricate the camshaft mounts on the head.
- Make sure that the grommets are duly fit on the seat of the oil pump timing variators.

- Position the intake camshaft on the head, fitting the timing variator tab and positioning the oil pump timing variators in their seats.

- Position the exhaust camshaft and proceed with fitting the camshaft caps tightening them to a torque of **9 Nm** (the two nuts and the Allen screw of the first cap must be tightened to a torque of **10 Nm**).

- Position the protection filter (if it was removed) for the variator pressure control valve using tool **900026990**. Carry out this operation on both engine heads.

- Position the two 7Øx1.78 O-rings for the timing variator bushing. Perform this operation on both engine heads



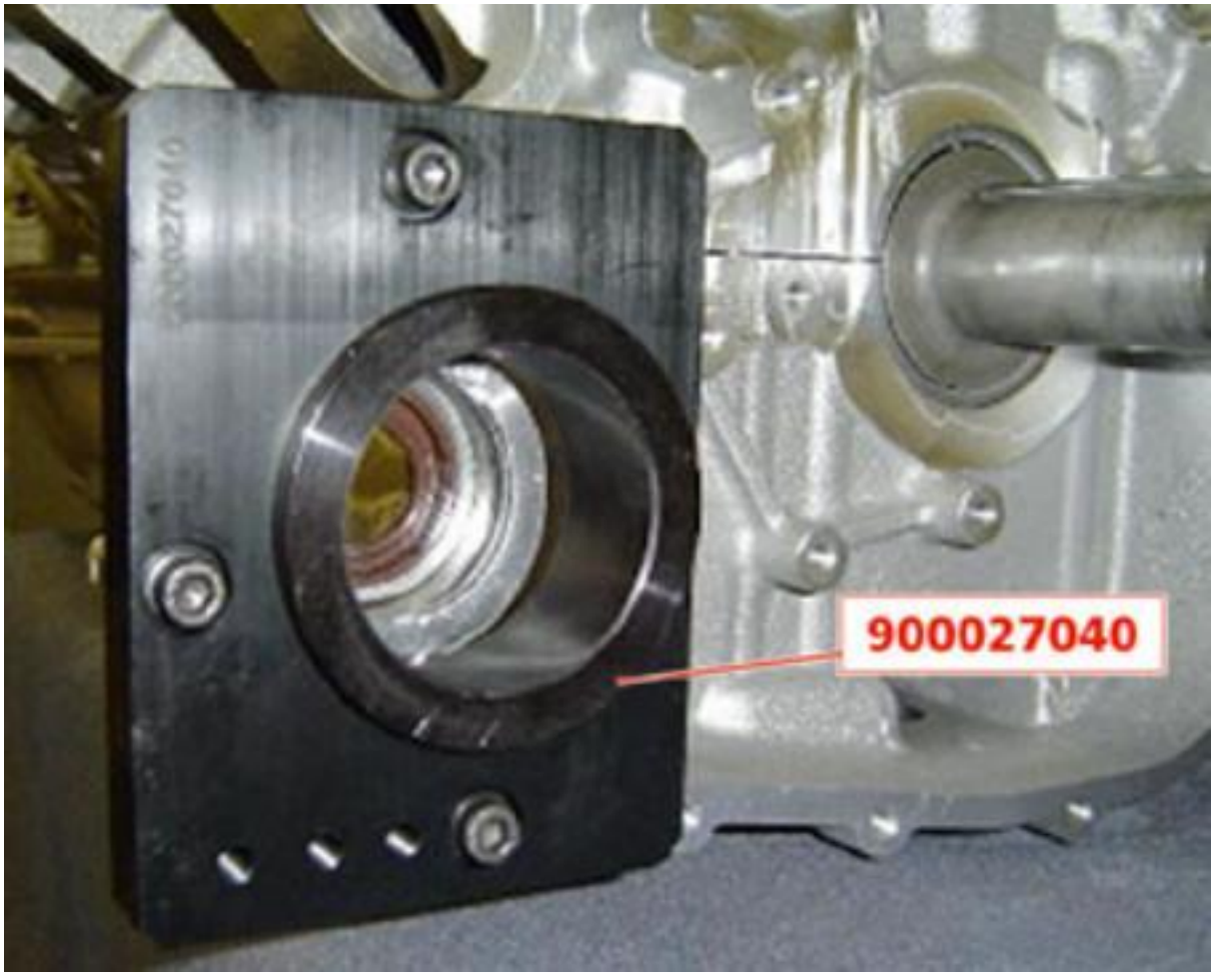
- Fasten the oil pump timing variators tightening the four Allen screws on the left-hand head and on the relative cap.

- Fit the timing variator solenoid valve, lubricate the mount and tighten the retaining screw to a torque of **10 Nm**.

- Fit the grommet for the timing control transmission mount into its seat.

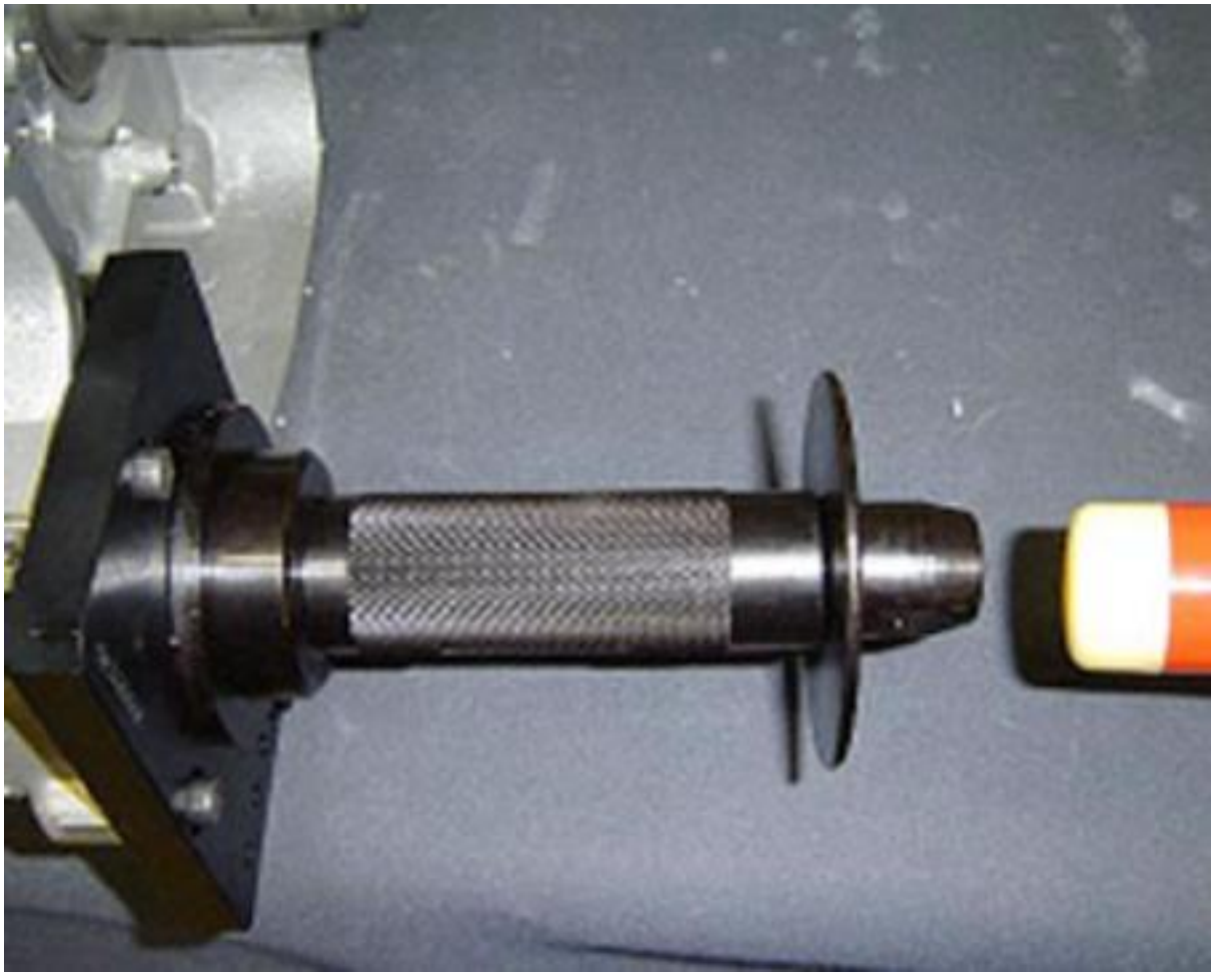
- Fit the timing control transmission mount, tightening the fastening screws with Loctite 242 to a torque of **6 Nm**.

- If the pump assembly shaft bearing has been removed, refit it following the procedure described.
- Position the bearing centring template **900027040**.



- Place the Ø 25-47x12 ball bearing on the fitting punch.

- Insert the punch into the template and bed in the bearing by tapping it with a plastic hammer.
- Subsequently check that the bearing has been fitted correctly.

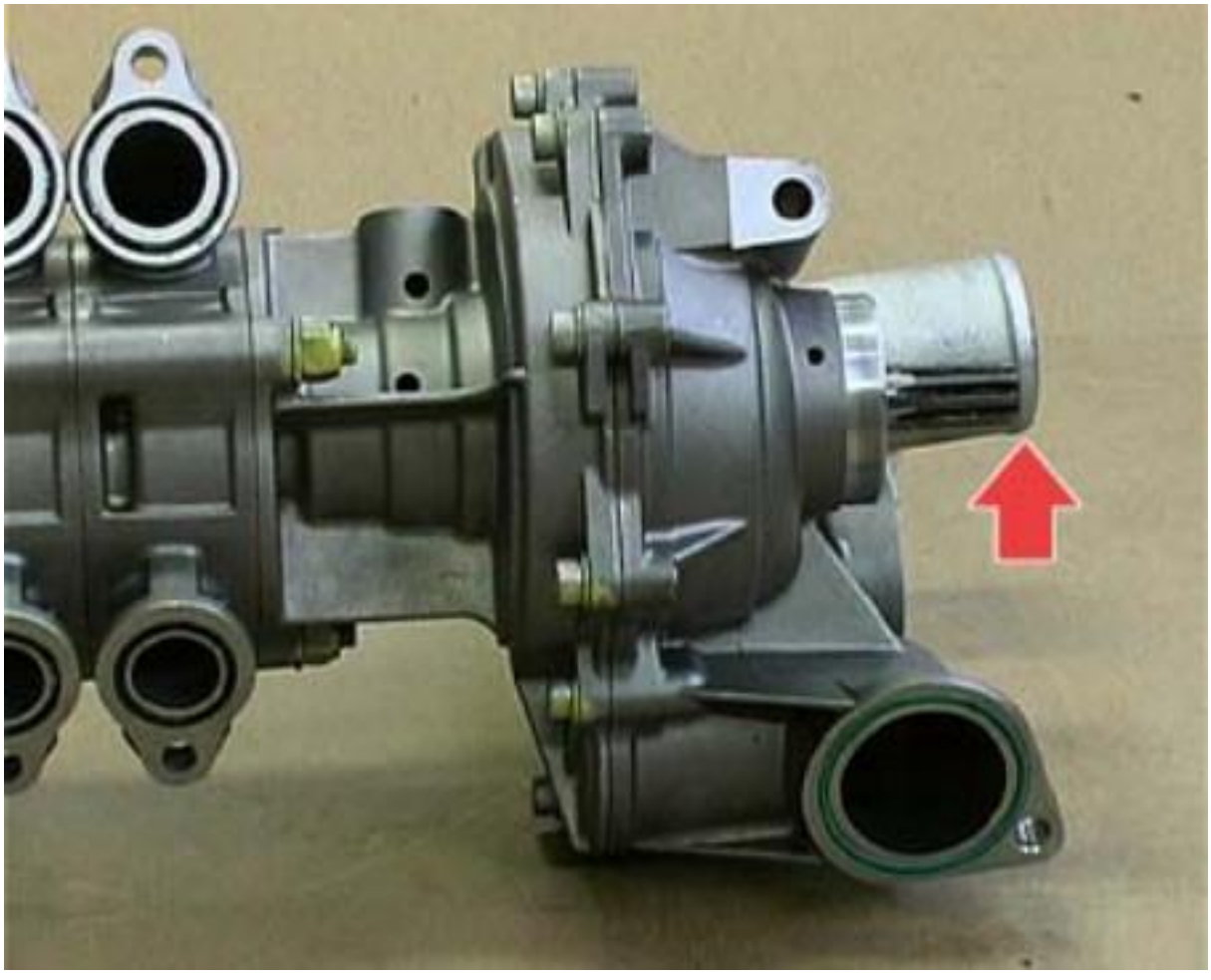


- Fit the water/oil pump drive shaft in its seat.

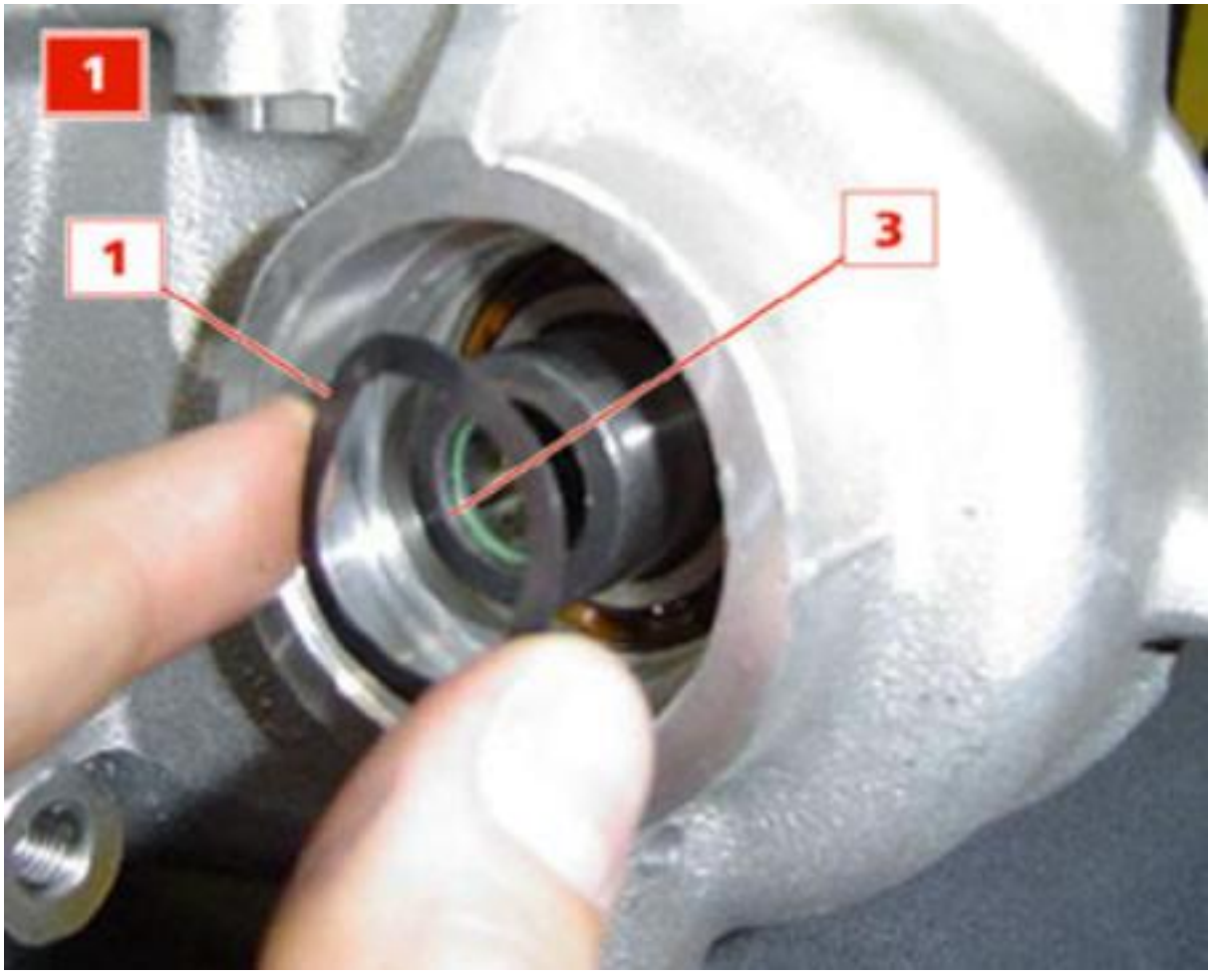
- Using tool **900027030**, fit the pump drive shaft into place.

- Check the condition of the oil-water pump verifying that there is no leakage from the draining holes.

- Check the wear condition of the groove on the oil/water pump shaft.



- Fit the balancing ring **(1)** and relevant Seeger ring **(2)** on the drive shaft (pump side).
- Fit the O-ring **(3)** (**Figures 1 and 2**) in the drive shaft seat.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1
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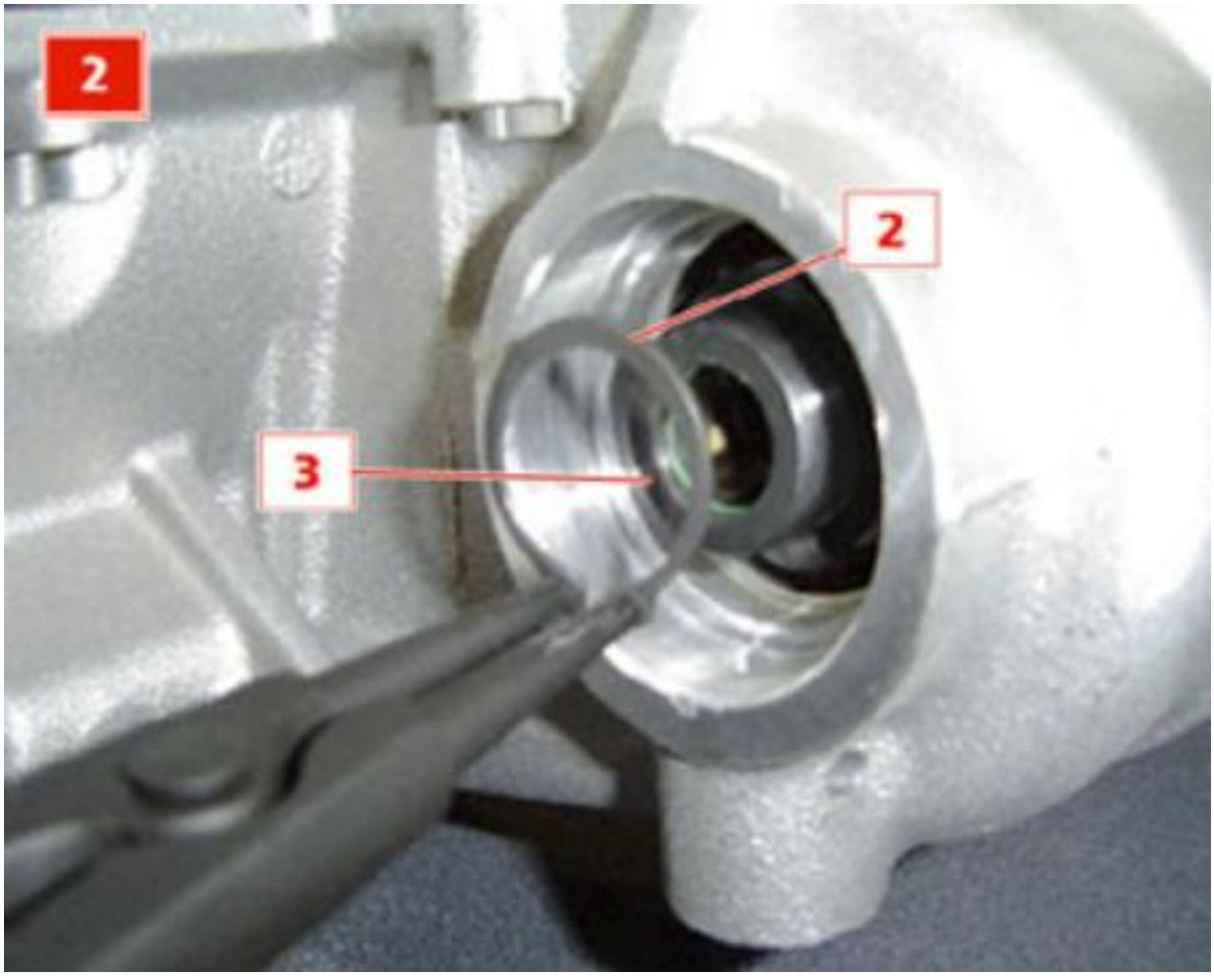
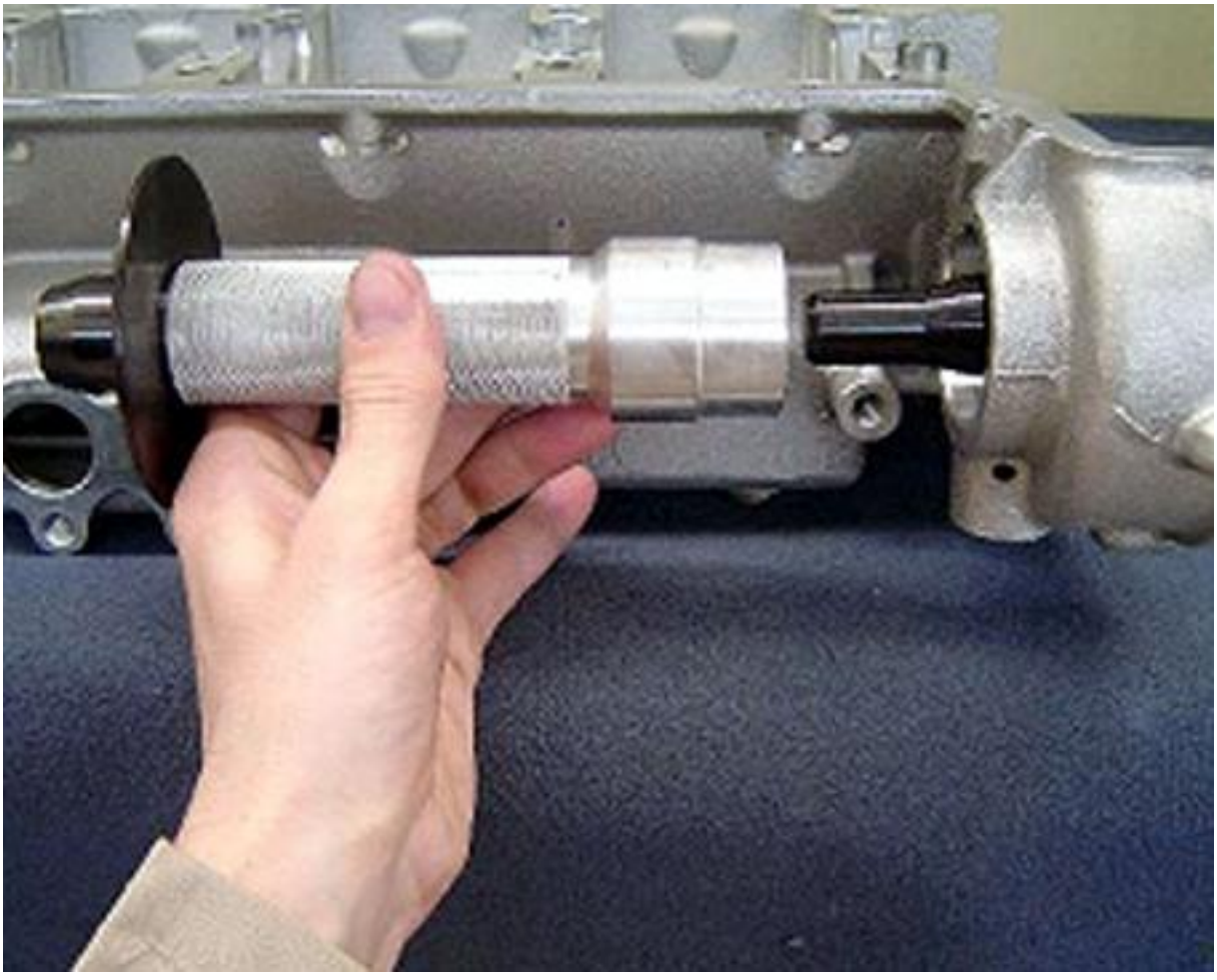


- Arrange tool **900027050** on the pump drive shaft to fit the oil seal.

- Fit the oil seal.

- Use the special punch to fit the grommet in its seat. Subsequently fit the balancing ring and the see ger ring which retains the bearing on the timing side.

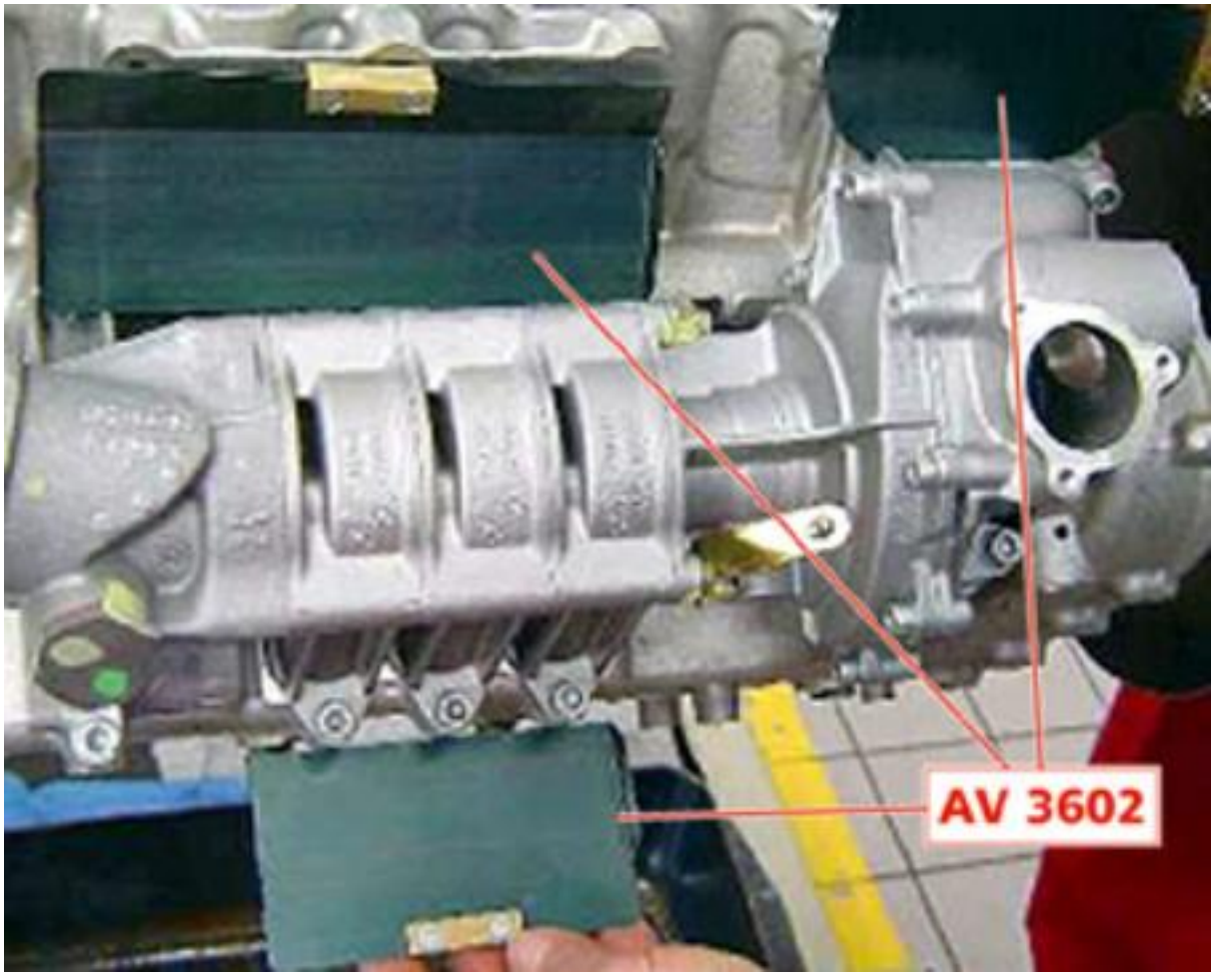


- Subsequently fit the balancing ring and the see ger ring which retains the bearing on the timing side.

- Lubricate the driving joint seat with Molykote 1000 grease.

N.B.
Always replace the pump OR.

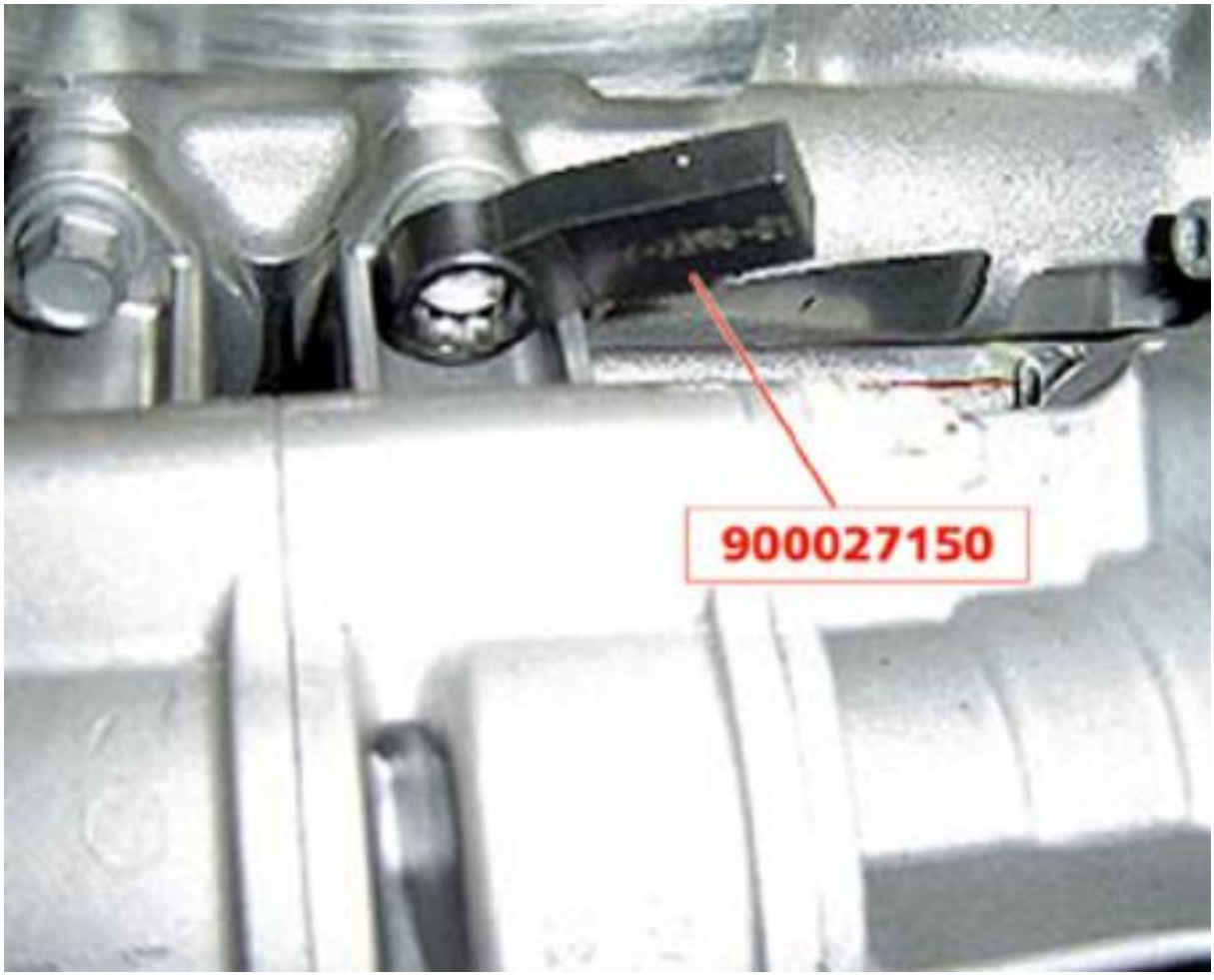
- Lubricate the pump drive shaft with Molycote 1000 grease.
- Arrange the three O-Ring protection plates of tool **AV3602**.
- Fit the oil-water pump into its seat by inserting the shaft into the joint.
- Check that there are no signs of peeling of the O-rings in the area where the pumps join the crankcase. Fit the four M8X25 small headed screws to secure the assembly to the crankcase, the two M8X65 screws to secure the pumps to the lower part of the crankcase, and the three M8X25 screws to secure the pump to the crankcase, and at the same time remove the three plates **AV3602**.



- Tighten the pump fastening screws to a torque of **25 Nm**.

- To fit the screws housed in the upper part of the pump assembly, use tool **900027150.**

Use a torque wrench to tighten to a torque of **25 Nm**.



IMPORTANT:
The tightening torques for the chain runners are 10 Nm for the 6mm screws and 25 Nm for the 8mm screws.

- Install the mechanical tensioner for the transmission axle.

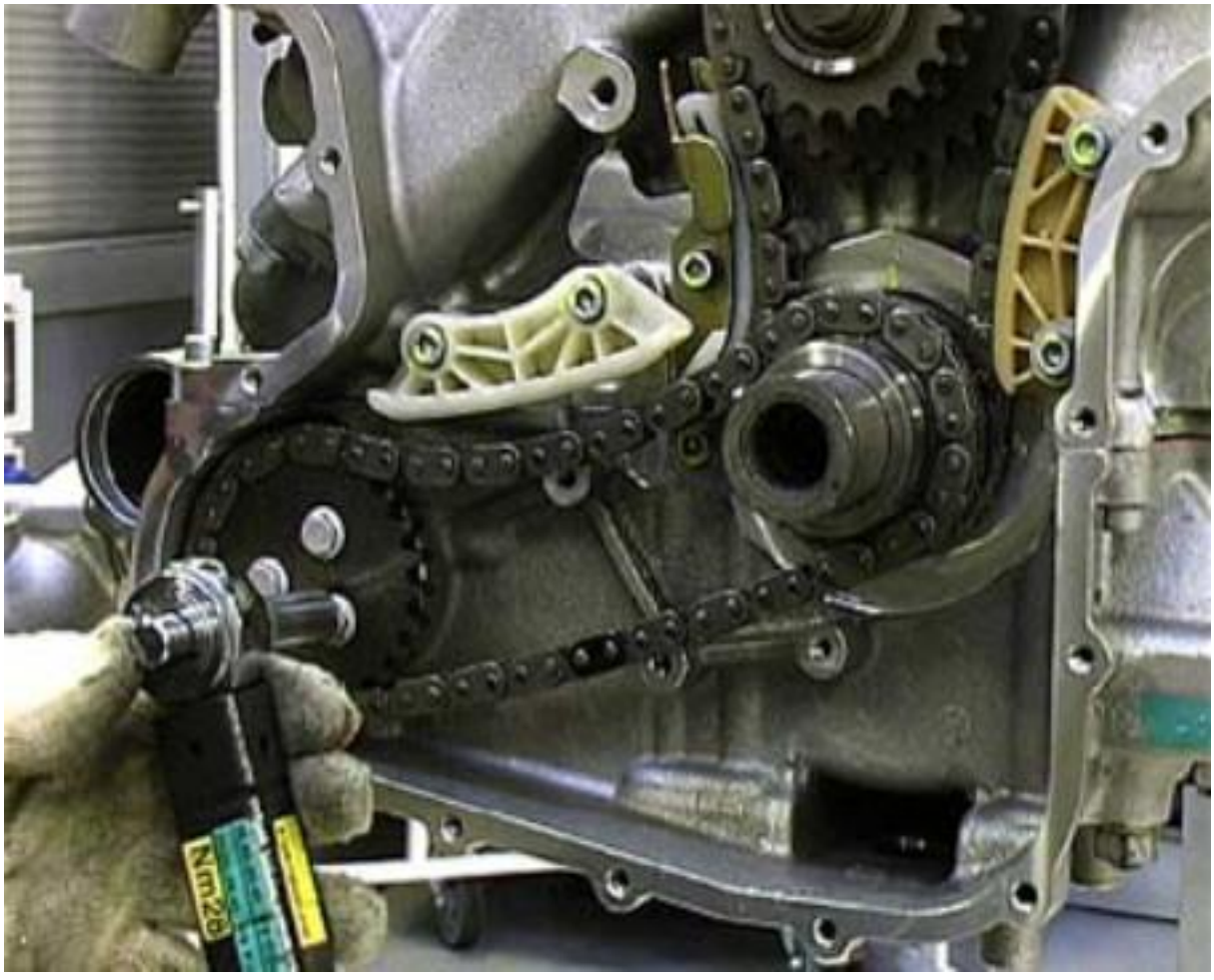
- Fit the transmission chain - toothed wheel unit onto the shaft using tool **AV3311**.

- Install the fixed runner and fit the shoulder, the balancing ring, the elastic pin and the Seeger ring.

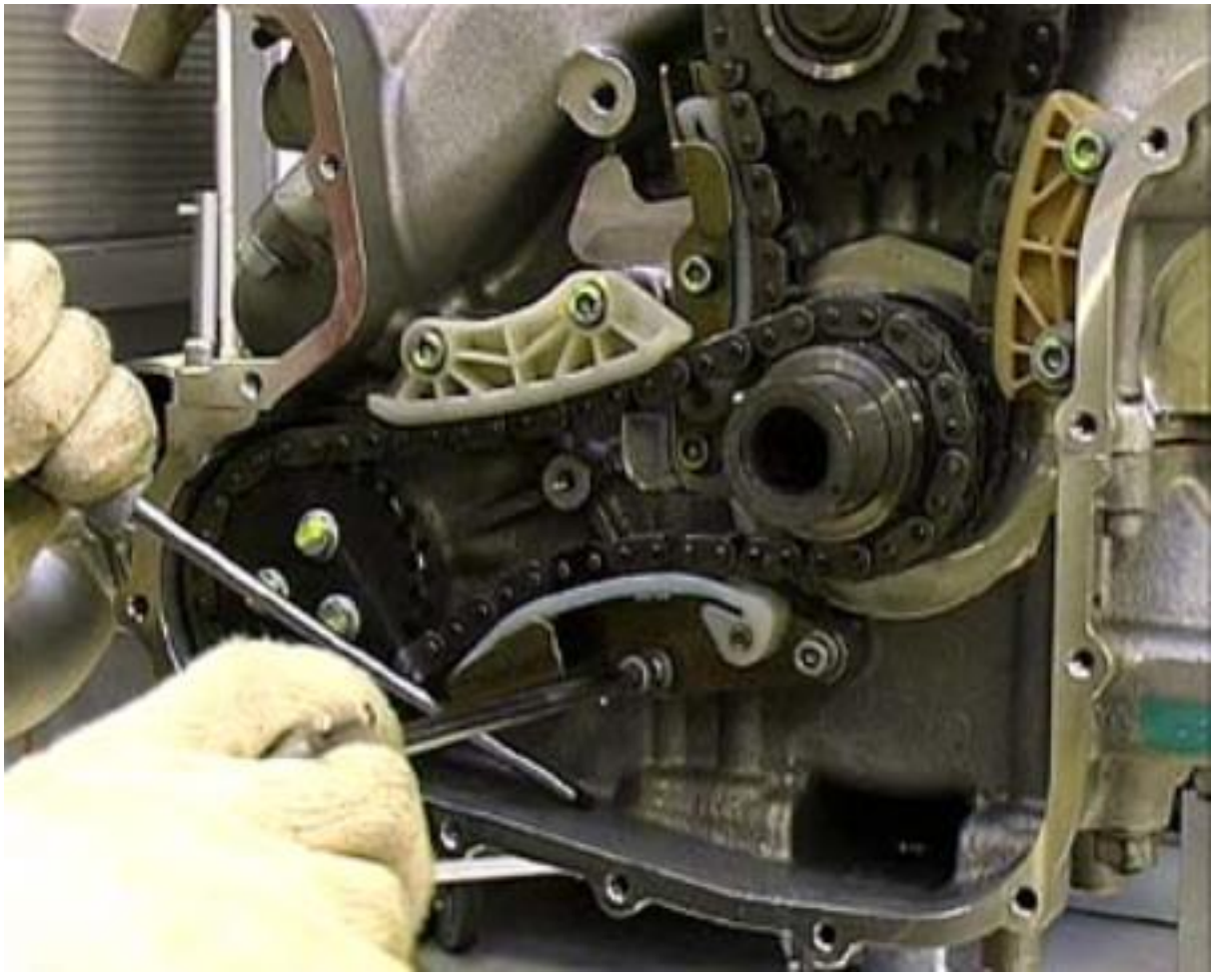
- Install the fixed runner for oil-water pump control.

- Position the auxiliary pump chain on the toothed wheel for oil-water pump control and engage it with the crankshaft toothed wheel.

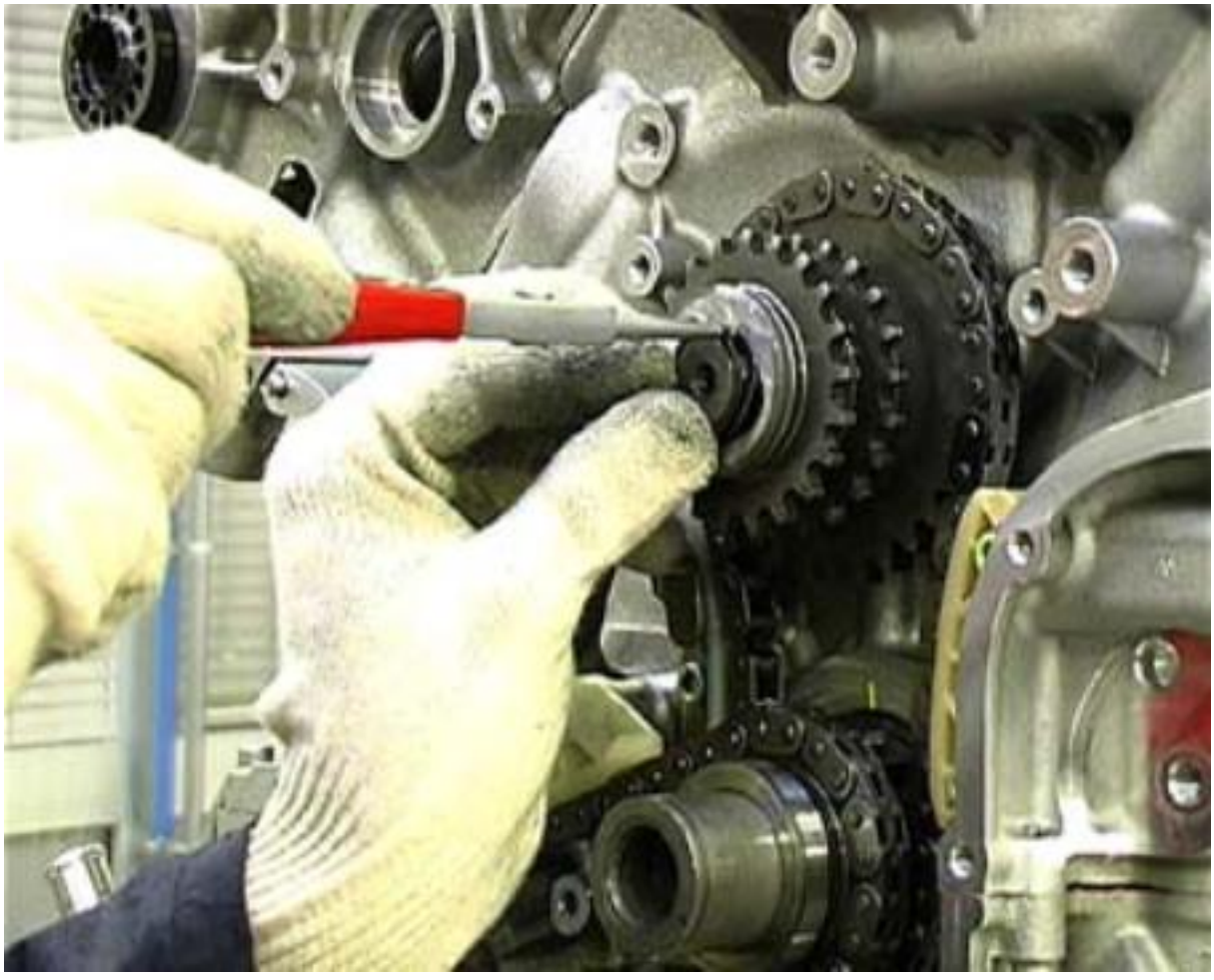
- Fasten the toothed wheel for oil-water pump control onto the oil-water pump driving joint, and tighten the fastening screws to a torque of **23 Nm**.



- Install the pump axle mechanical tensioner, tightening the fastening screws to the prescribed torque.



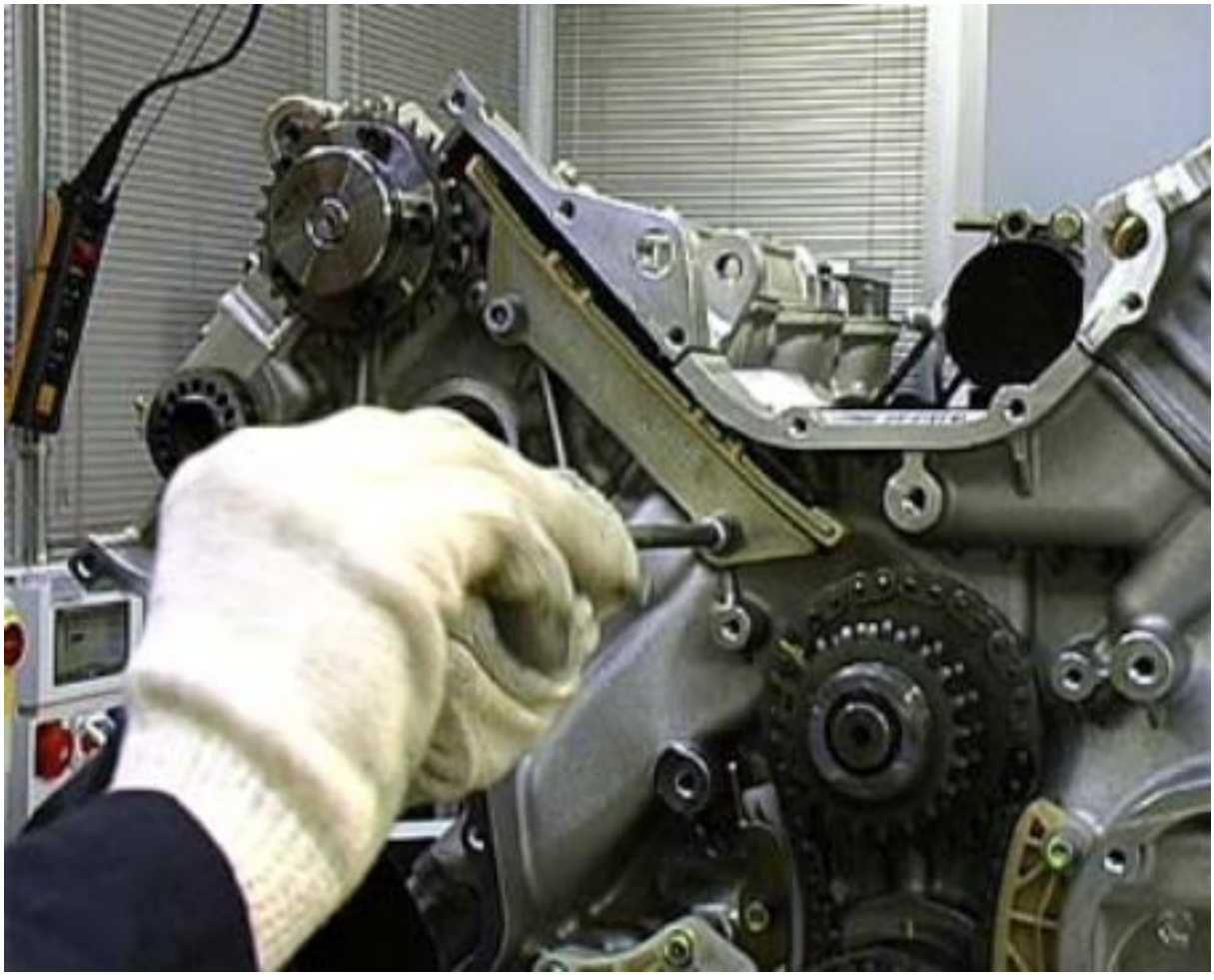
- Fit the elastic pin onto the transmission axle, insert the triple gearing shoulder support and the balancing ring.
- Fix the assembly with the see ger ring provided.



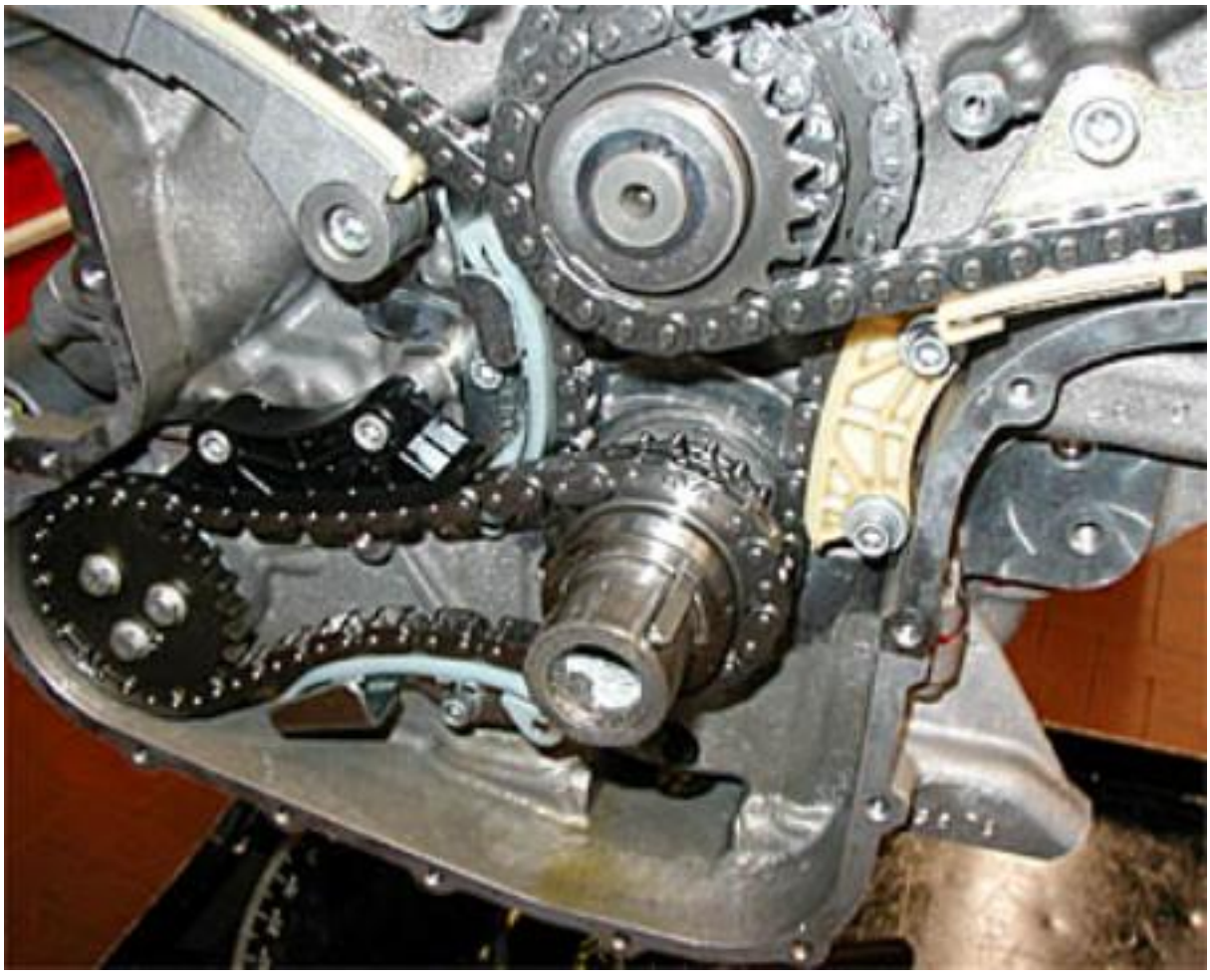
- Fit the fixed runners and the timing chain tensioners tightening them to the specified torque of **25 Nm**.

N.B.

To facilitate subsequent fitting of the camshaft drive chain, it is advisable to keep the two retaining screws of the RH fixed chain tensioner runner loose.



- Position the crankshaft so that the small wrench is at 45°, in order to prevent damaging the valves.



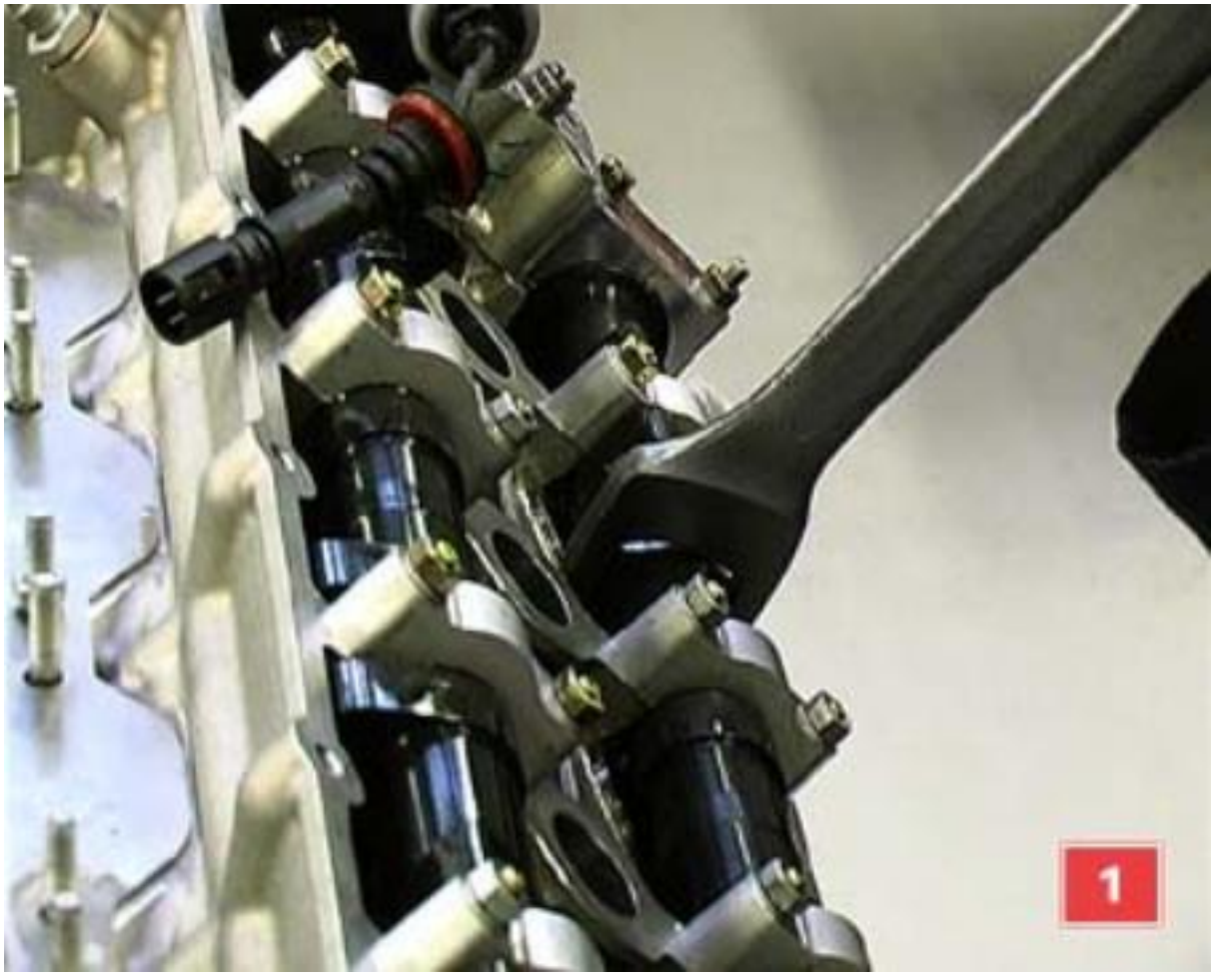
- Turn the camshafts of the two cylinder banks in such a way that the references at the ends of the shafts match the marks on the respective fixing caps. Lock the camshaft rotation.
- Having previously positioned all the pistons below the TDC, there is no risk of interference between the valves and the pistons during operation of the timing camshafts.
-

N.B.
Depending on the version, the camshafts may be differently machined so as to allow rotation during timing. The part number identifying the spare part is the same, but there may be a hexagon on the camshaft for positioning a fixed wrench, or an opening machined to host a wrench, or a hole to position a cylindrical punch.

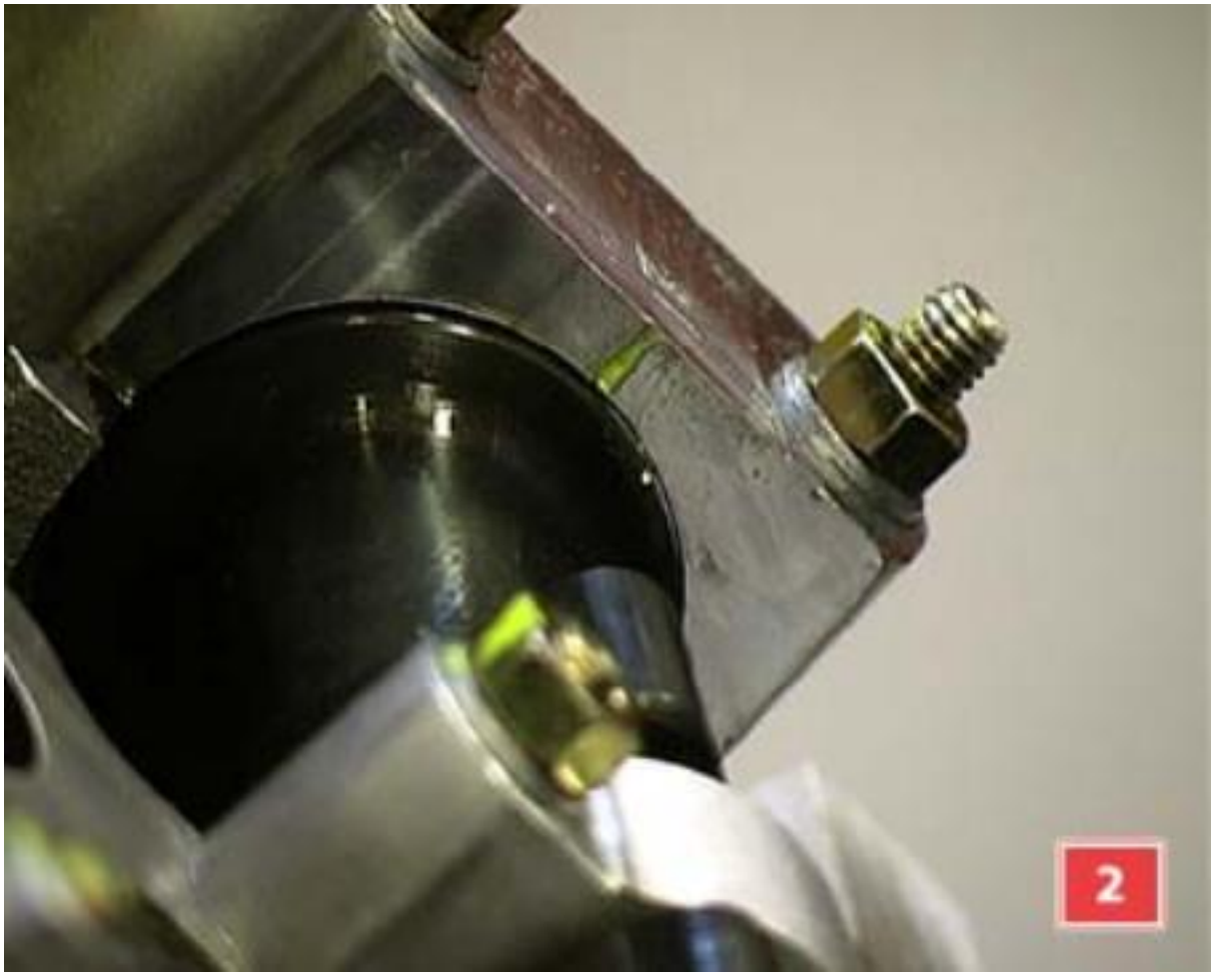
important
At this point in the assembly procedure, the engine timing must be checked or restored.

- Move the camshafts to align the reference marks on the heads with those on the shafts themselves (**Figures 1, 2** and **3**).

Smontaggio motore

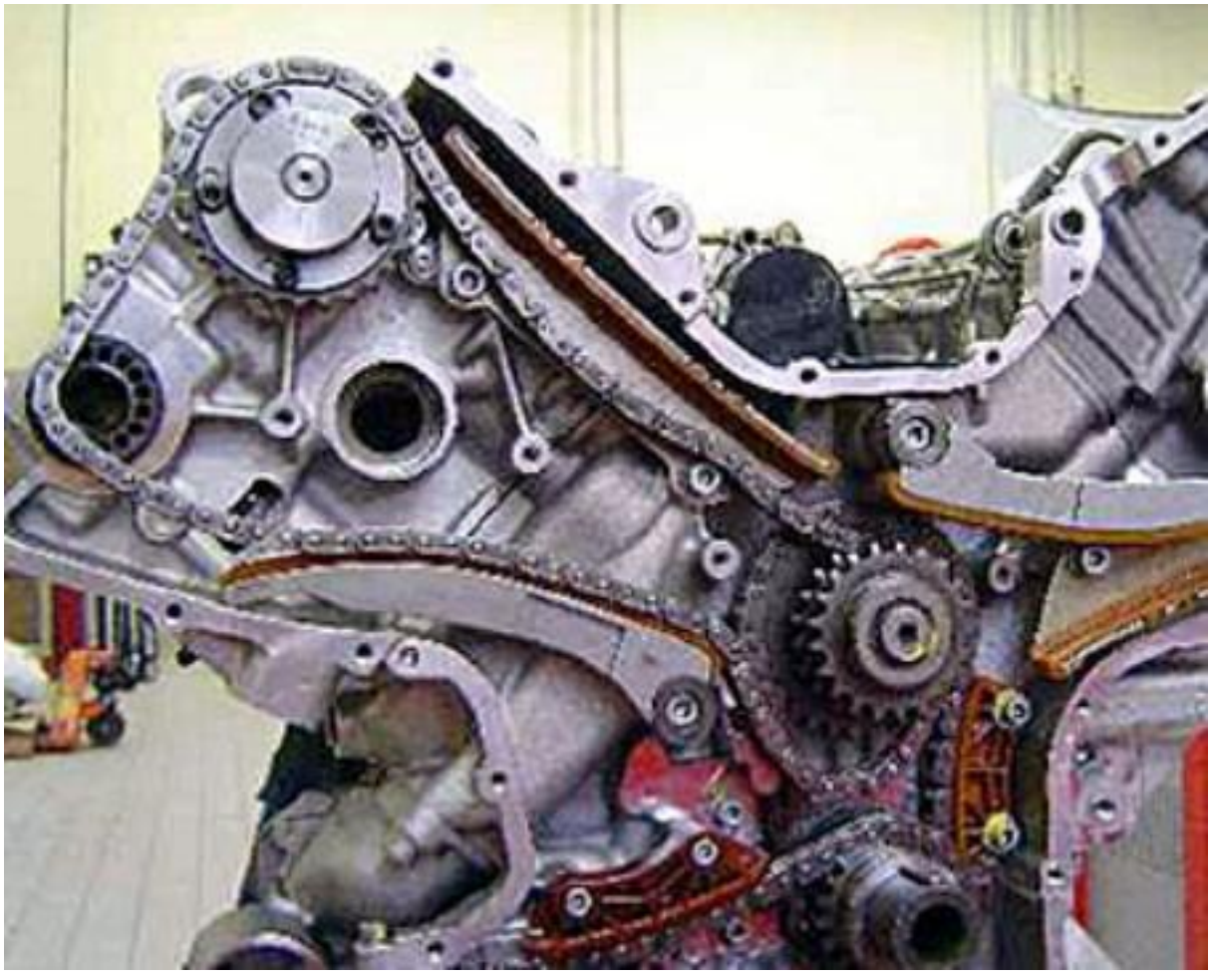


Smontaggio motore

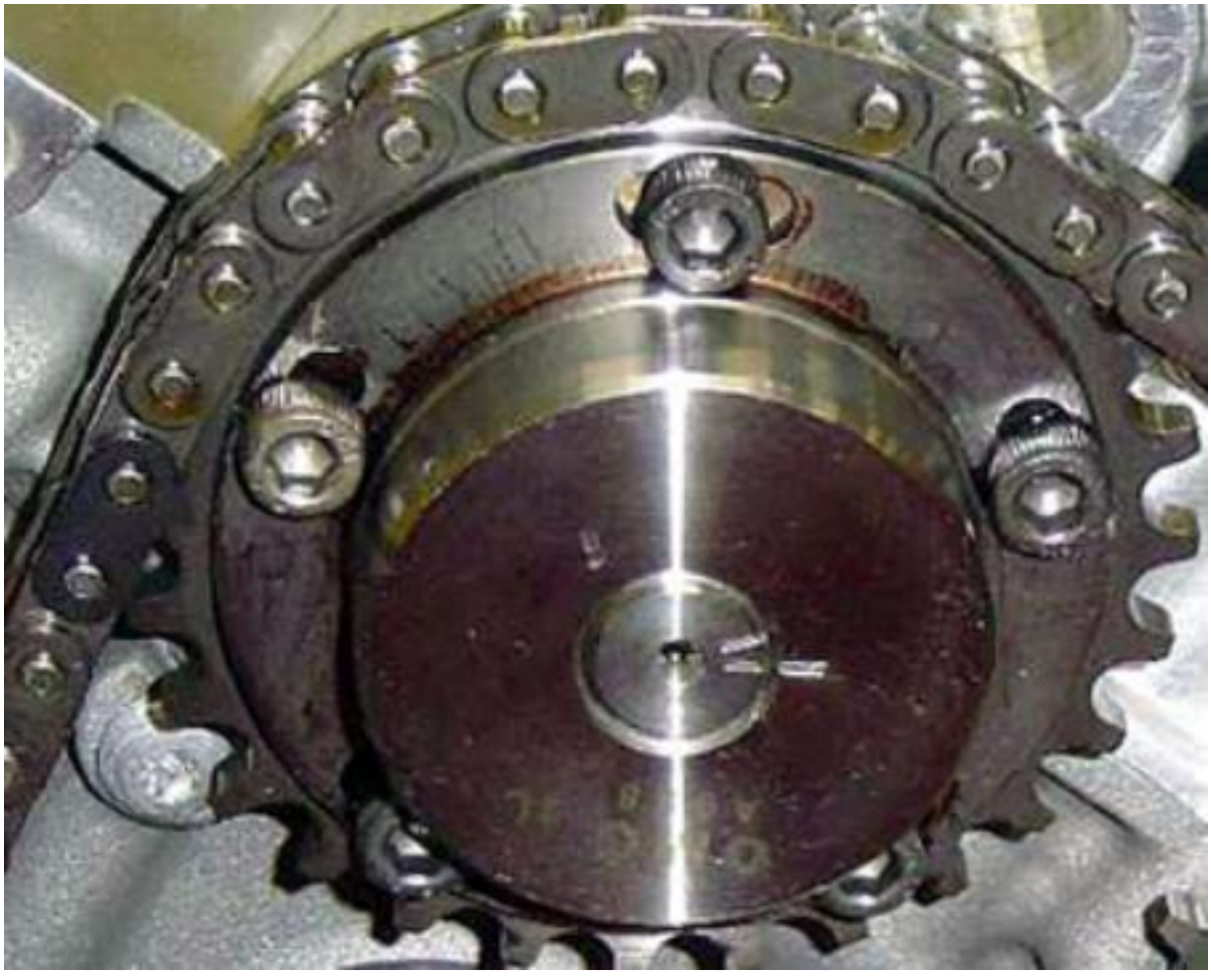


- Fit the centesimal dial gauge with its holder **CS104488**, screwing it into the spark plug hole of the first cylinder.
- Position the goniometer and turn the crankshaft until reaching the **TDC**

- Position the camshaft drive chain on the right-hand cylinder bank. Position the chain on the innermost gear of the crankshaft.



- When fitting the chain, loosen the screws on the timing variator of the right-hand and left-hand cylinder bank.
- Position the adjustment slots in the centre of the available adjustment range, so that play can be recovered during timing adjustment. Tighten at least two retaining screws on the variator.
- After positioning the timing chain on the engine, tighten the two retaining screws of the right-hand fixed chain tensioning runner to a torque of **25 Nm** using a torque wrench.



- Fit the gearwheel for the exhaust camshaft. Position the centring dowel into the first free hole available, after coupling the gearwheel onto the camshaft.

- Check that the pointer of the dial gauge fitted on the holder **CS104488** always indicates the TDC position.

- Fit the hydraulic chain tensioner and use a torque wrench to tighten to a torque of **70 Nm**.

- Repeat the operation for the left-hand cylinder bank.
- When the assembly procedures have been completed, check the TDC position with the dial gauge.

- Screw down by hand, without tightening, the two retaining screws for the exhaust camshaft gearwheels.

- Position the hydraulic chain tensioner together with the gasket on the left-hand cylinder bank using two screws with washers.
- Use a torque wrench to tighten the two screws to a torque of 10 Nm.
- Use a torque wrench to tighten the tensioner screw to a torque of 40 Nm

- Release the camshafts.
- Turn the engine anticlockwise and check that there is no interference.

ADJUSTING THE INTAKE SHAFT TIMING

- Turn the engine anticlockwise and position the first piston at the TDC. Make sure that the dial gauge is on zero.
- Place a support for the magnetic base of the dial gauge holder on the right-hand engine head.
- position a magnetic base with a long-rod centesimal dial gauge.
- Turn the engine clockwise positioning the intake cam immediately before the opening ramp. In this condition, the hydraulic tappet is still in the rest position.
- Position the dial gauge plunger above the tappet of an intake valve. The dial gauge rod must be as perpendicular as possible to the tappet surface.

- Reset the dial gauge that measures the movement of the intake tappet.
- Go back to the TDC position and check the dial gauge previously reset. In this position (TDC), the intake valves of the first cylinder have already started their travel. Therefore, carefully check the position on the dial gauge positioned on the tappet.
- Turn the crankshaft **15°** beyond the TDC. This corresponds to a piston stroke of 1.75 **mm** beyond the TDC.
- Check that the tappet downstroke (begun before the TDC) and hence the intake valve upstroke is **0.59±0.08** mm.
- Should the values measured in these conditions be out of tolerance, hold the crankshaft still, loosen the screws on the timing variator and turn the intake camshaft until obtaining the desired intake valve upstroke. For this reason, as described earlier, it is advisable to get ready for the timing procedure by positioning the variator adjustment slots in the centre of the angular adjustment.
- Check the timing again.
- Use a torque wrench to tighten the previously loosened screws that secure the variator to a torque of **15 Nm**, after applying Loctite 242.

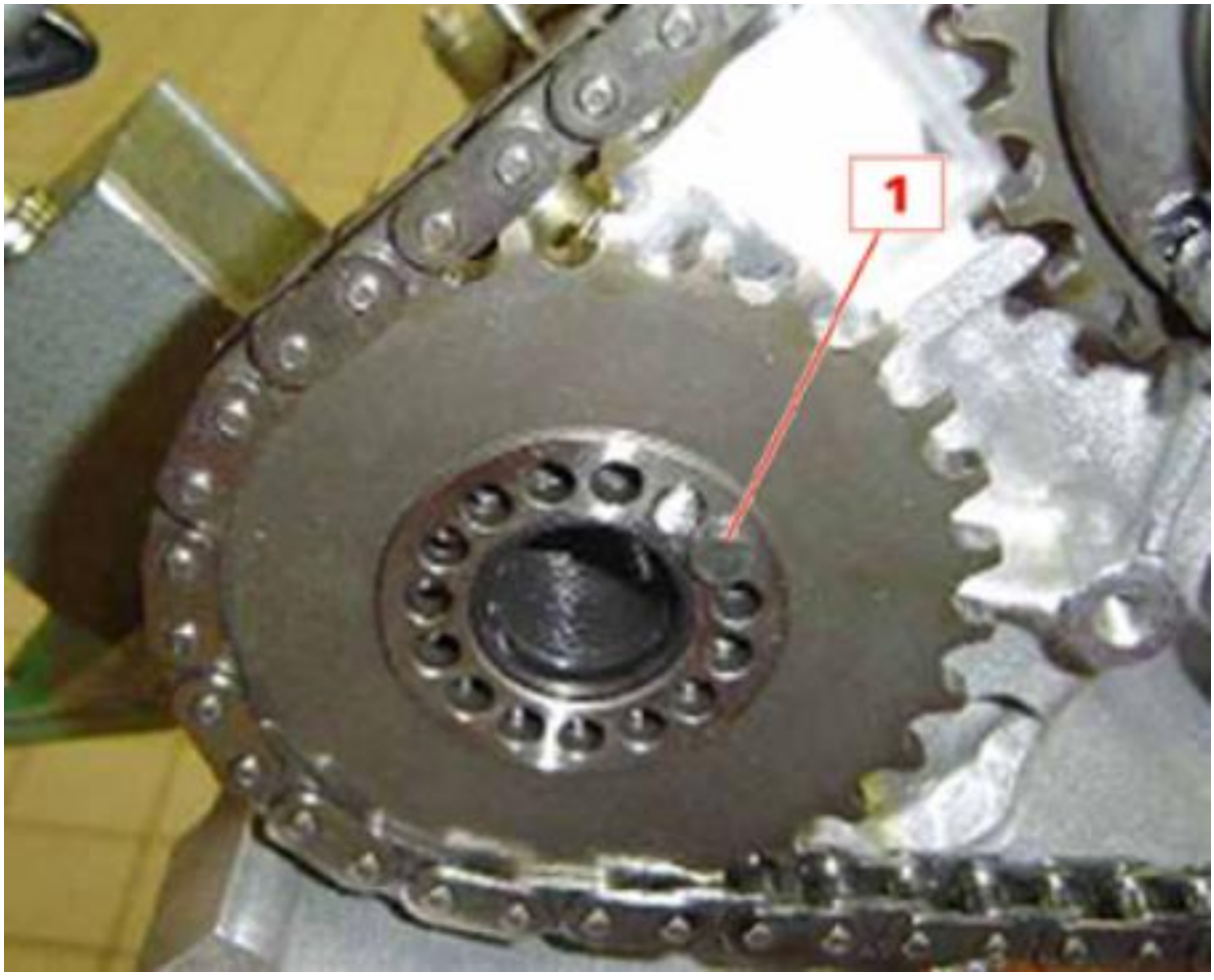
Intake data summary.

Beginning before TDC **15°± 1**
End after TDC **66°± 1**

ADJUSTING THE EXHAUST SHAFT TIMING

- Turn the engine clockwise and position the first piston at the TDC with the camshafts balanced (exhaust closed and intake open). Make sure that the dial gauge is on zero.
- Position the dial gauge plunger on the tappet of an exhaust valve. The dial gauge rod must be as perpendicular as possible to the tappet surface.
- Reset the dial gauge that measures the movement of the exhaust tappet.
- Turn the crankshaft clockwise until an exhaust valve is closed.
- Check that the tappet downstroke and hence the exhaust valve upstroke is **0.57±0.08 mm**

- Should the values measured in these conditions be out of tolerance, hold the crankshaft still, move the centring dowel anticlockwise or clockwise (depending on whether you wish to delay or advance the shaft) until obtaining the desired timing value.
- Fit the retaining dowel **(1)** in the hole immediately after or before the centring dowel, whatever is easier.



- To complete the operation, fix the exhaust camshaft gearwheel.

N.B.
Use engine oil to lubricate the thread and underhead of the retaining screw on the exhaust camshaft and the toothed ring gear.

- Tighten the retaining nut with sealing washer to a torque of **200 Nm**.
- During the procedure, lock the camshaft by working on the handling hexagon in such a way as not to load the timing belt.

- Perform the same procedure for the left-hand cylinder bank, positioning the dial gauge holder in the seat of the spark plug of cylinder number 8.

N.B.
After adjusting the timing, it is advisable to perform an OIL PRESSURE TEST, introducing pressurised engine oil through the oil filter union at a pressure of 5-6 bar. In this way, you can check the lubrication of the camshaft seats, hydraulic chain tensioners, tappets and central transmission pin.

Exhaust data summary.

Beginning before BDC **15°± 1**
End **0°± 1**

- Fit the upper runner and tighten the retaining screws to a torque of **10 Nm**

- With the aid of short stud bolts, position the gaskets on the crankcase.

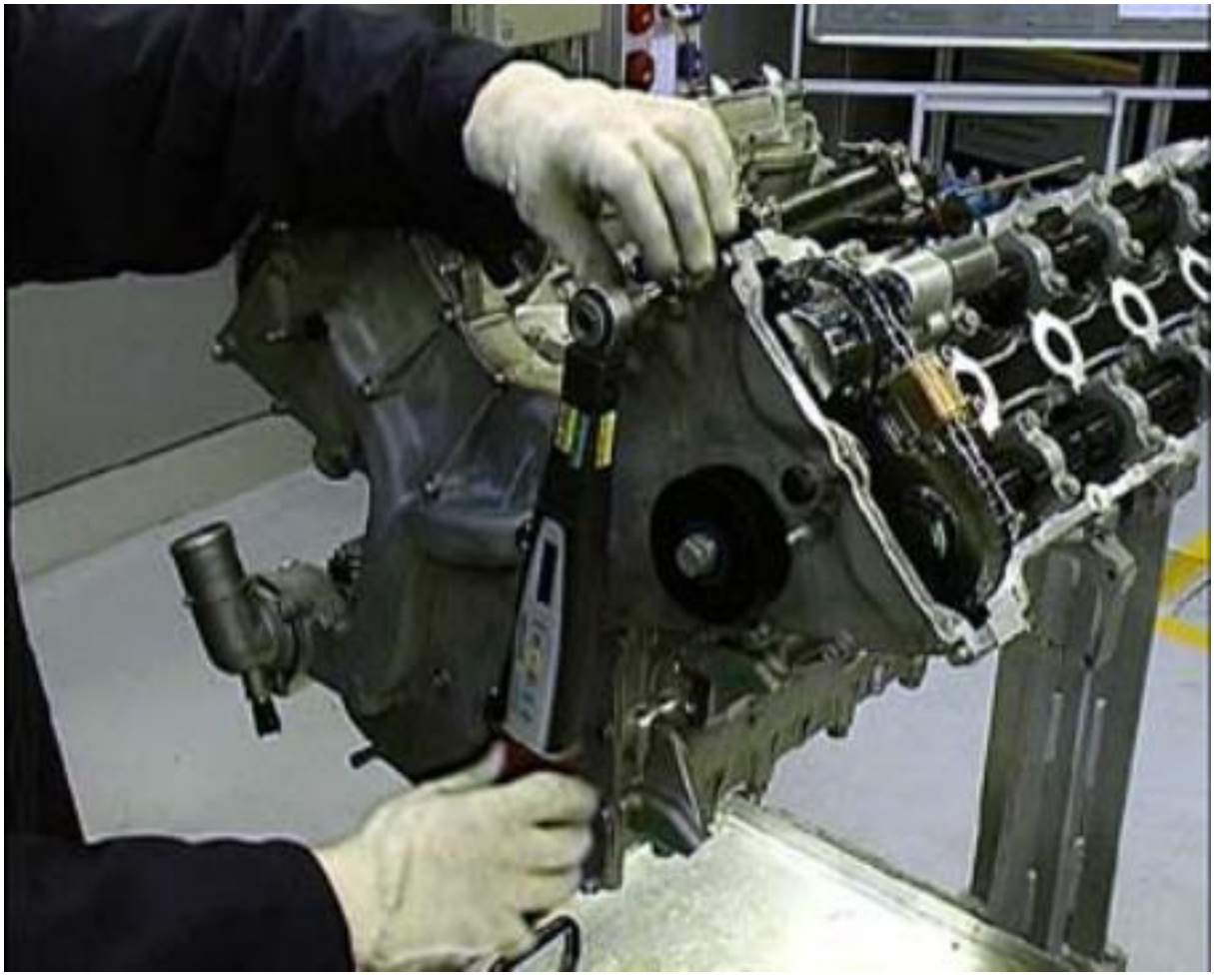
- Lubricate the seats of the cooling circuit grommets.

- Fit tool **900026590** onto the crankshaft, in such a way that the oil seal will not be damaged when the cover is installed.

- Install the front crankcase cover.

- Replace the stud bolts together with the fastening screws.

- Tighten the front cover screws to a torque of **10 Nm.**



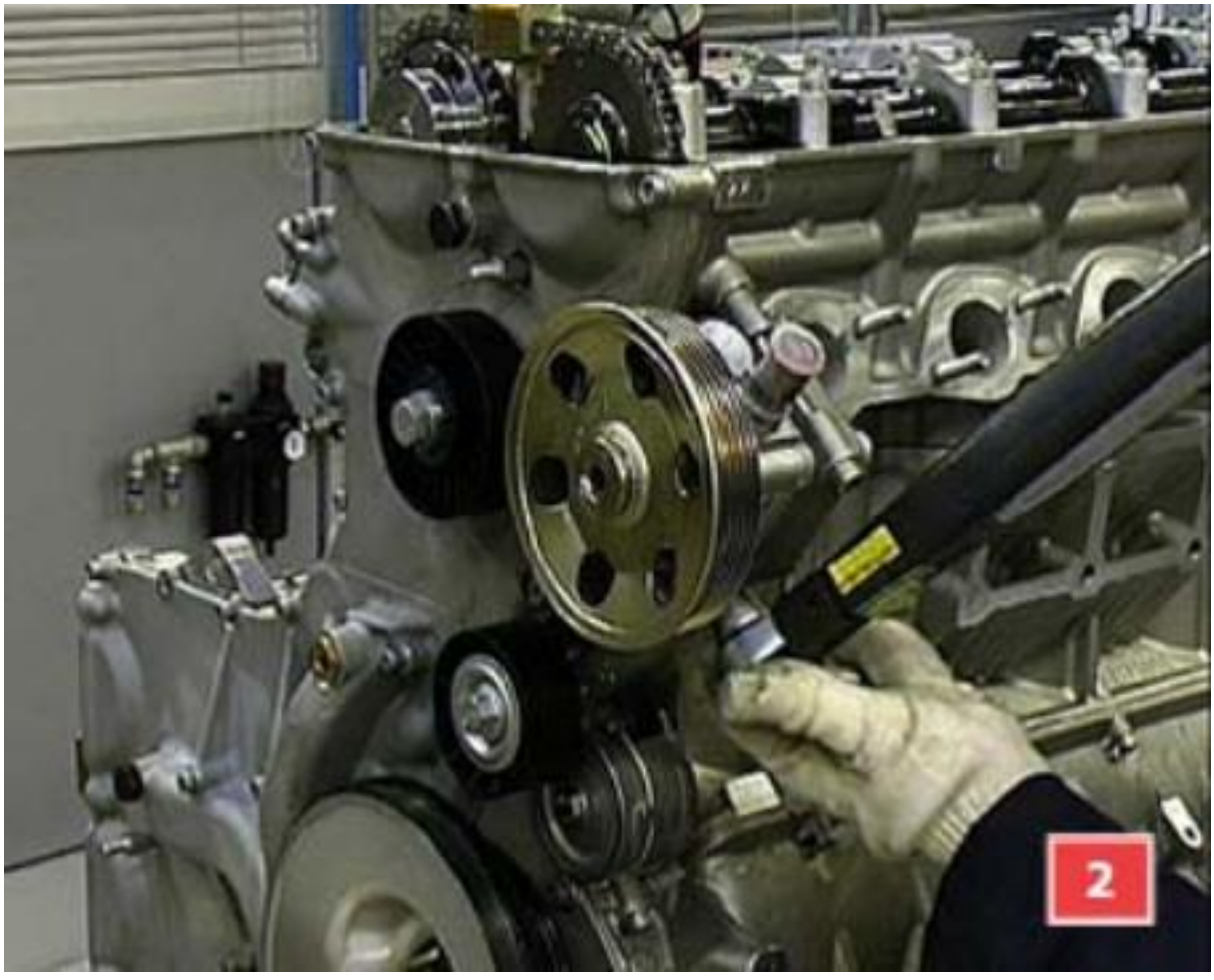
- Fit the belt tensioner paying particular attention to the position of the reference pin, and tighten to a torque of **25Nm.**

- Fit tool **900026560** to lock the crankshaft rotation.

- Position the torsion damper on the shaft and tighten the fastening screw with Loctite 242 to a torque of **450 Nm.**

- Fit the hydraulic steering pump, tightening the front screw to a torque of **10 Nm** (**Figure 1**) and the rear screw to a torque of **25 Nm** (**Figure 2**).

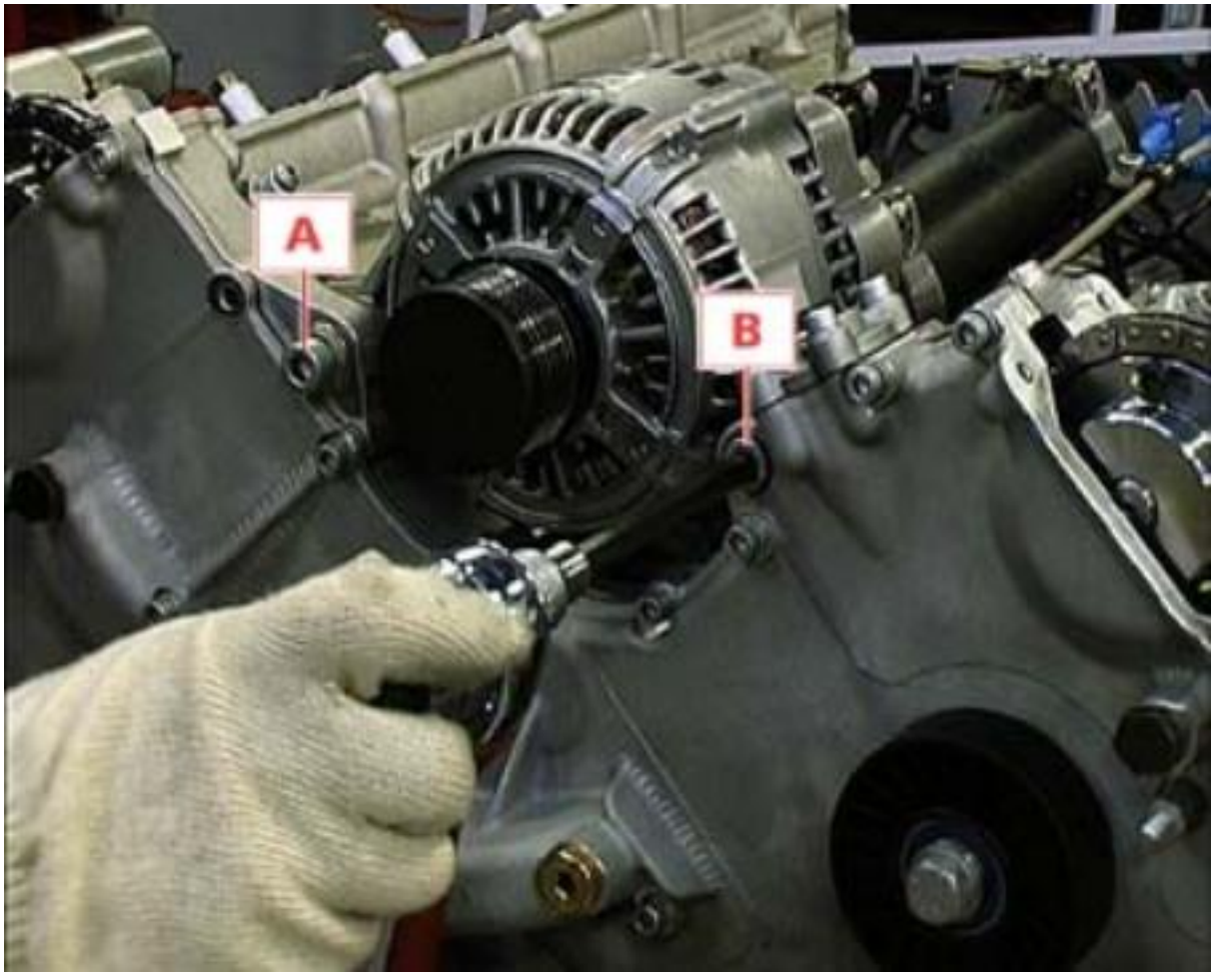
Smontaggio motore



- Secure the air-conditioning system compressor by tightening the screws to a torque of **25 Nm.**

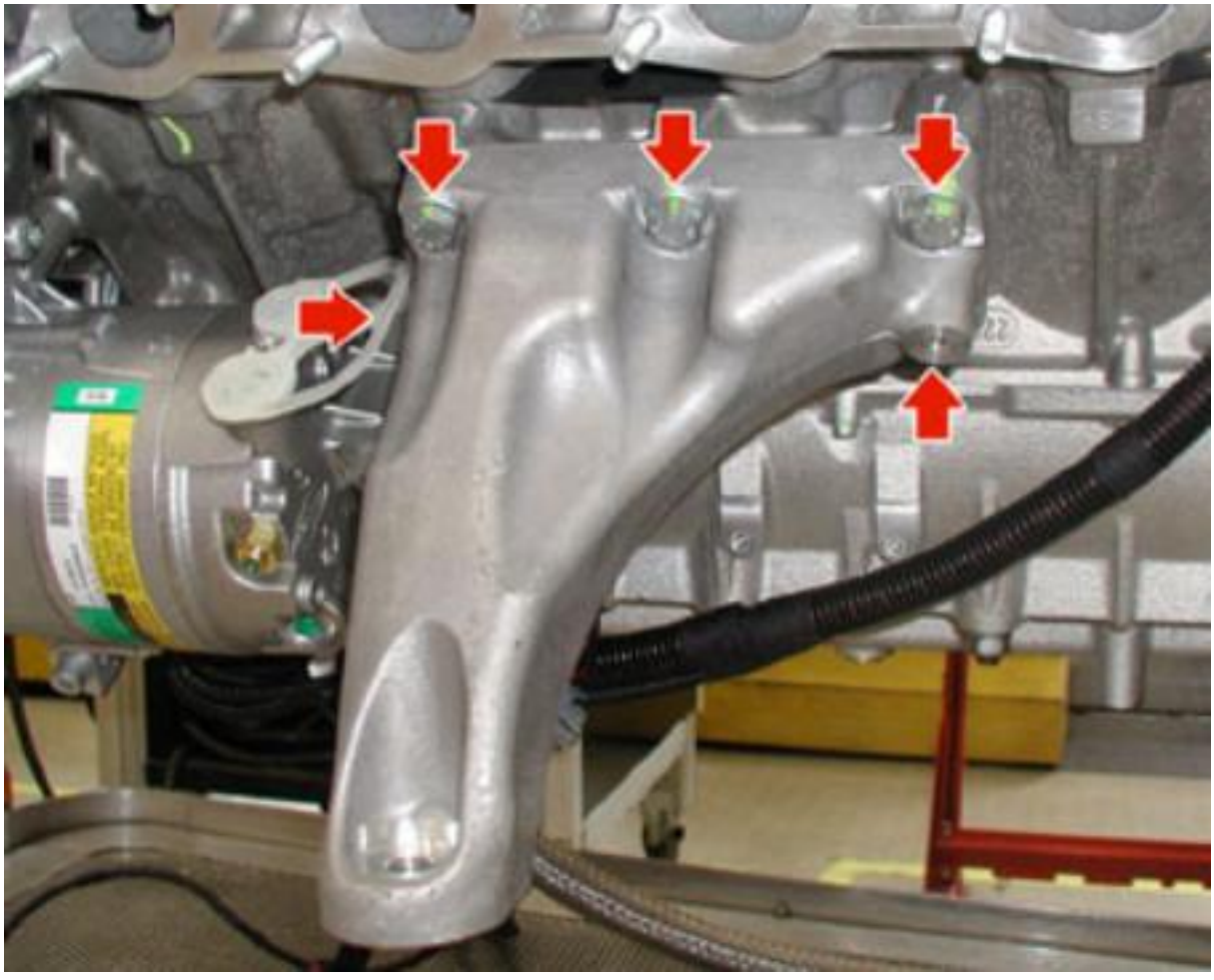
- Insert the bushings to fasten the alternator onto the crankcase.

- Fit the alternator by tightening screw A to a torque of **49Nm** and screw **B** to a torque of **59 Nm.**



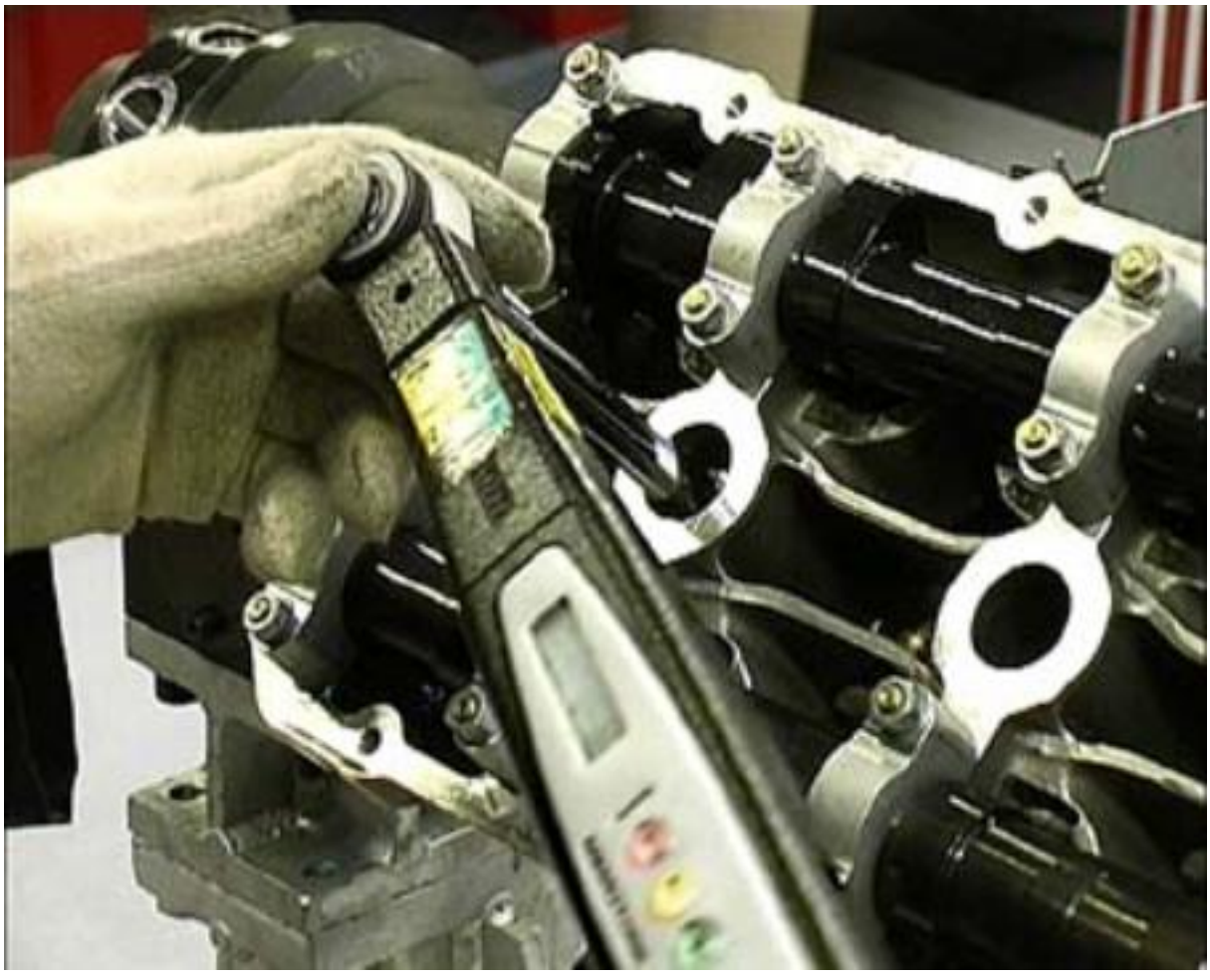
- Turn the movable tensioner and fit the multifunctional belt.

- Fit the engine mounting brackets and tighten the retaining screws to a torque of **53 Nm**.



- Install the starter motor, tightening the fastening screws to a torque of **14 Nm**.

- Fit the spark plugs after having lubricated the threading with Champion 2612 grease.



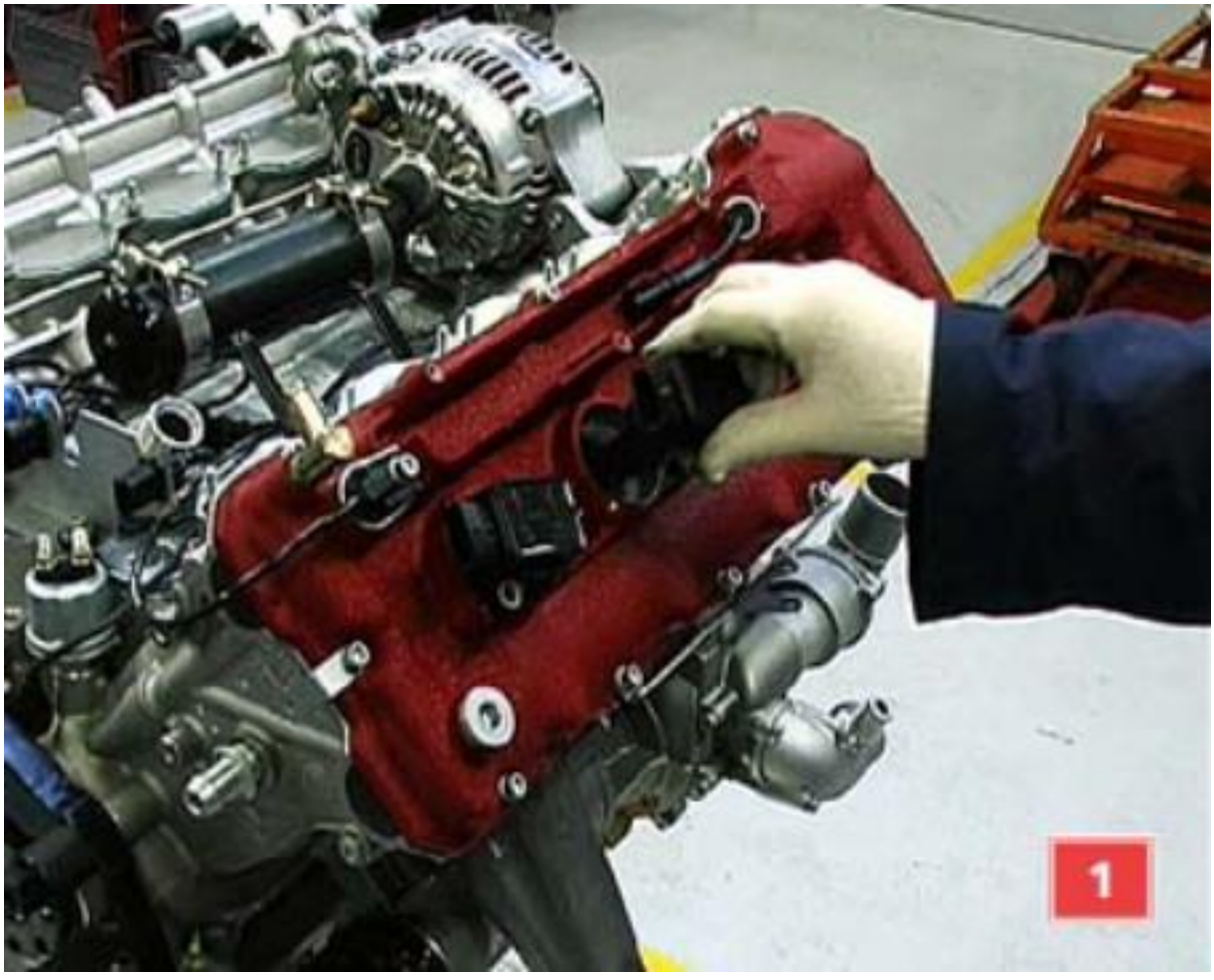
- Fit the tappets' cover remembering to arrange the head gaskets and the spark plug tube gaskets beforehand. Insert the timing variator connector through the specific hole.

- Working from the middle outwards, tighten the closing screws to a torque of **10 Nm.**

- Fit the Seeger ring for the cable guide of the timing variator valve using tool **AV3333**.

- Fit the ignition coils (**Figure 1**) and tighten the retaining screws to a torque of **10 Nm** (**Figure 2**).

Smontaggio motore



- Working from their housings on the support bracket, take out the connectors of the timing sensors (RH and LH), the rpm sensor (RH) and the detonation sensors (four).

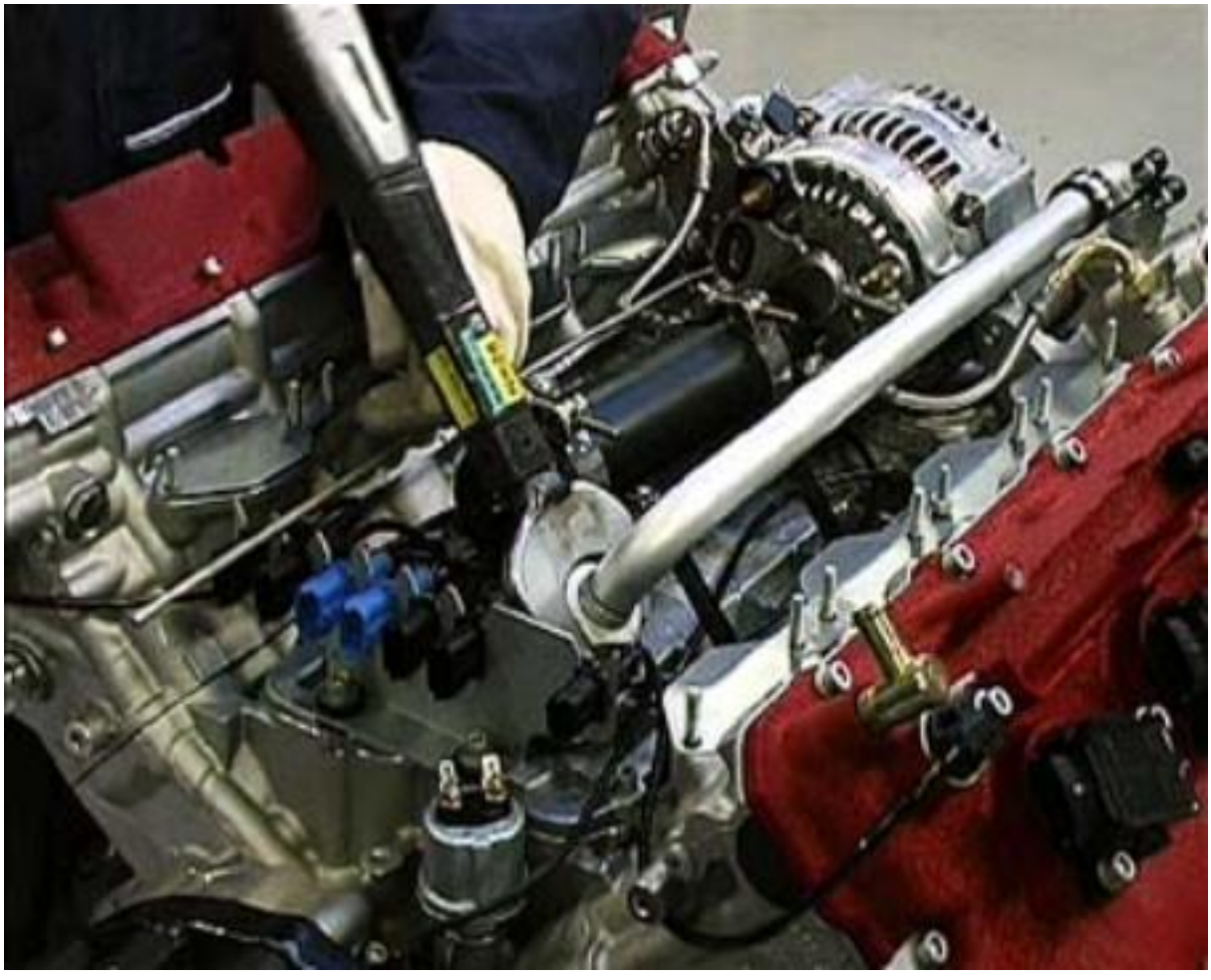
Caution

Check that the sensors on each wire match, consulting the electric system manual if necessary.

- Install the tubes which run from the accumulators to the timing variator solenoid valves.

- Fit the tube which runs from the exchanger to the tank. Fit the fastening nut onto the exchanger and secure the retaining bracket.

- Complete the procedure by tightening the nut on the exchanger to a torque of **75 Nm.**



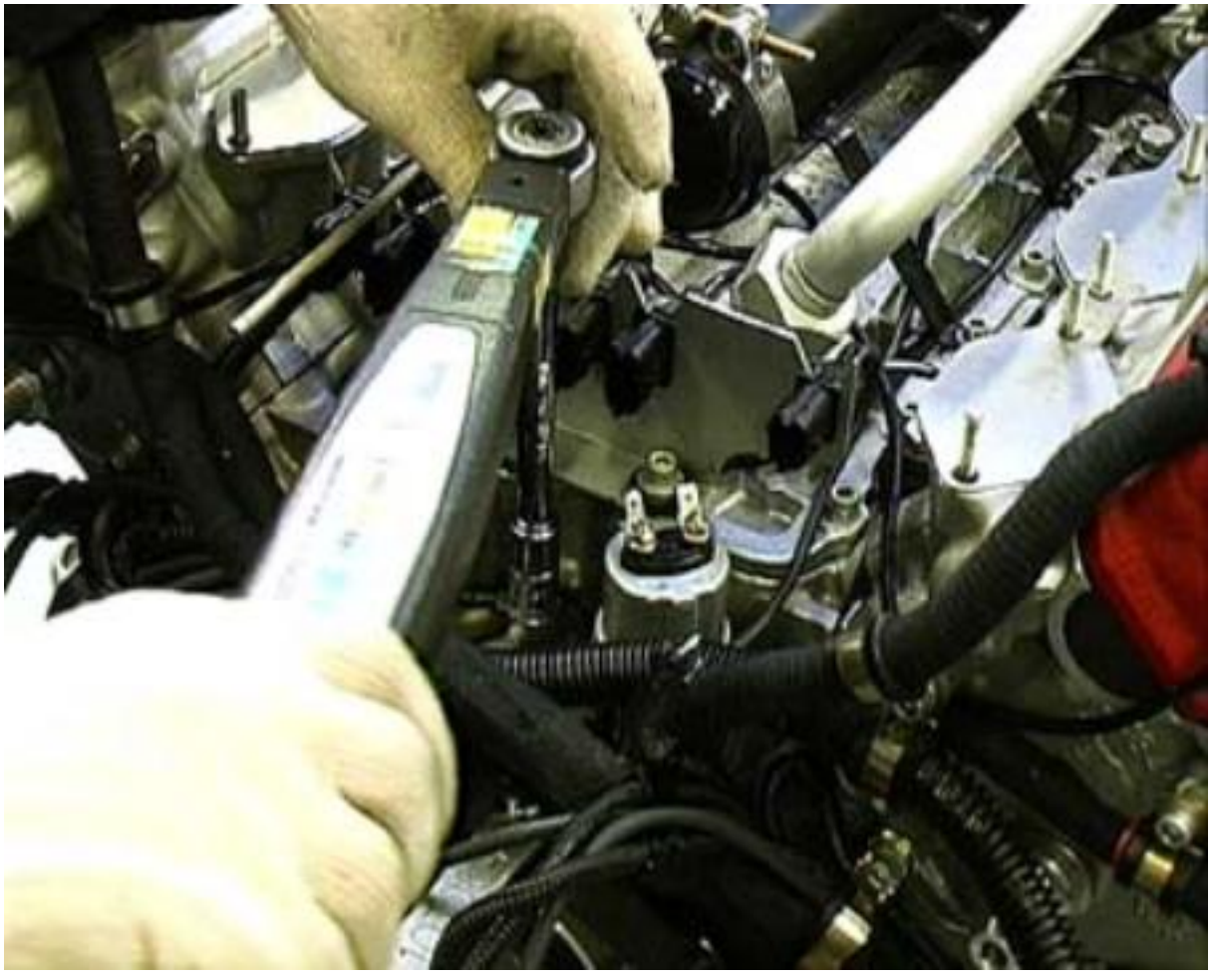
- Secure the service wire onto the alternator and tighten it to a torque of **10 Nm.**

- Using a clamp, secure the injection cable onto the right-hand head.

- Using a clamp, secure the wiring leading to the head coils and the wiring leading to the injectors and the fuse box.

- Fit the connector onto the alternator.

- Secure the earth terminal onto the crankcase, tightening the fastening screw to a torque of **25 Nm**.



- Attach the connectors to the wiring support bracket.

- Connect the oil pressure sensor.

- Secure the wire which leads to the A/C compressor and to the starter motor.

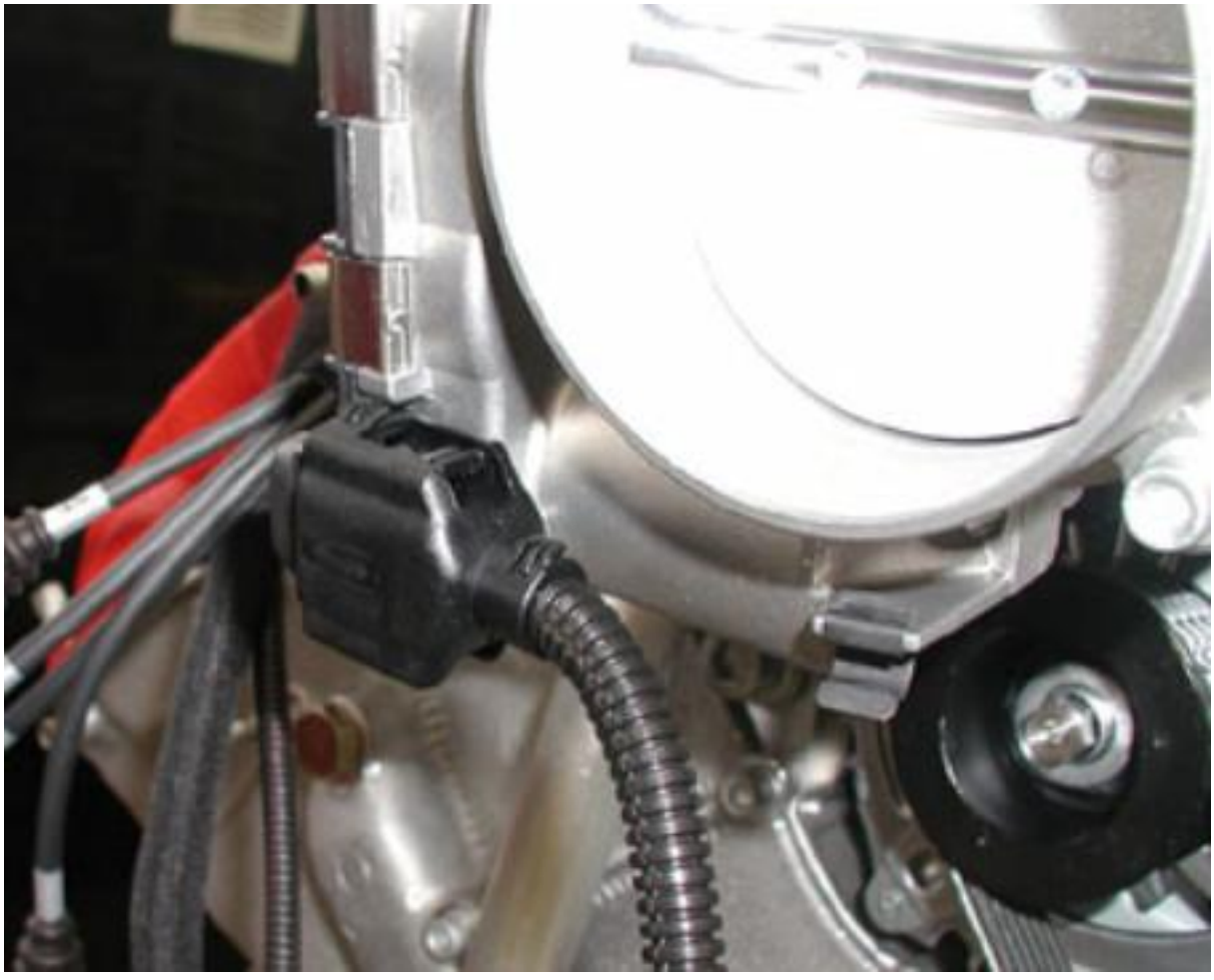
- Remove the tools **AV3332** protecting the intake ducts and position the gasket on the manifolds.

- Position some pins **(1)** in the holes on the ends of the intake ducts for reference and centring of the intake manifold.

- Position the intake manifold, centring it on the duct's stud bolts.

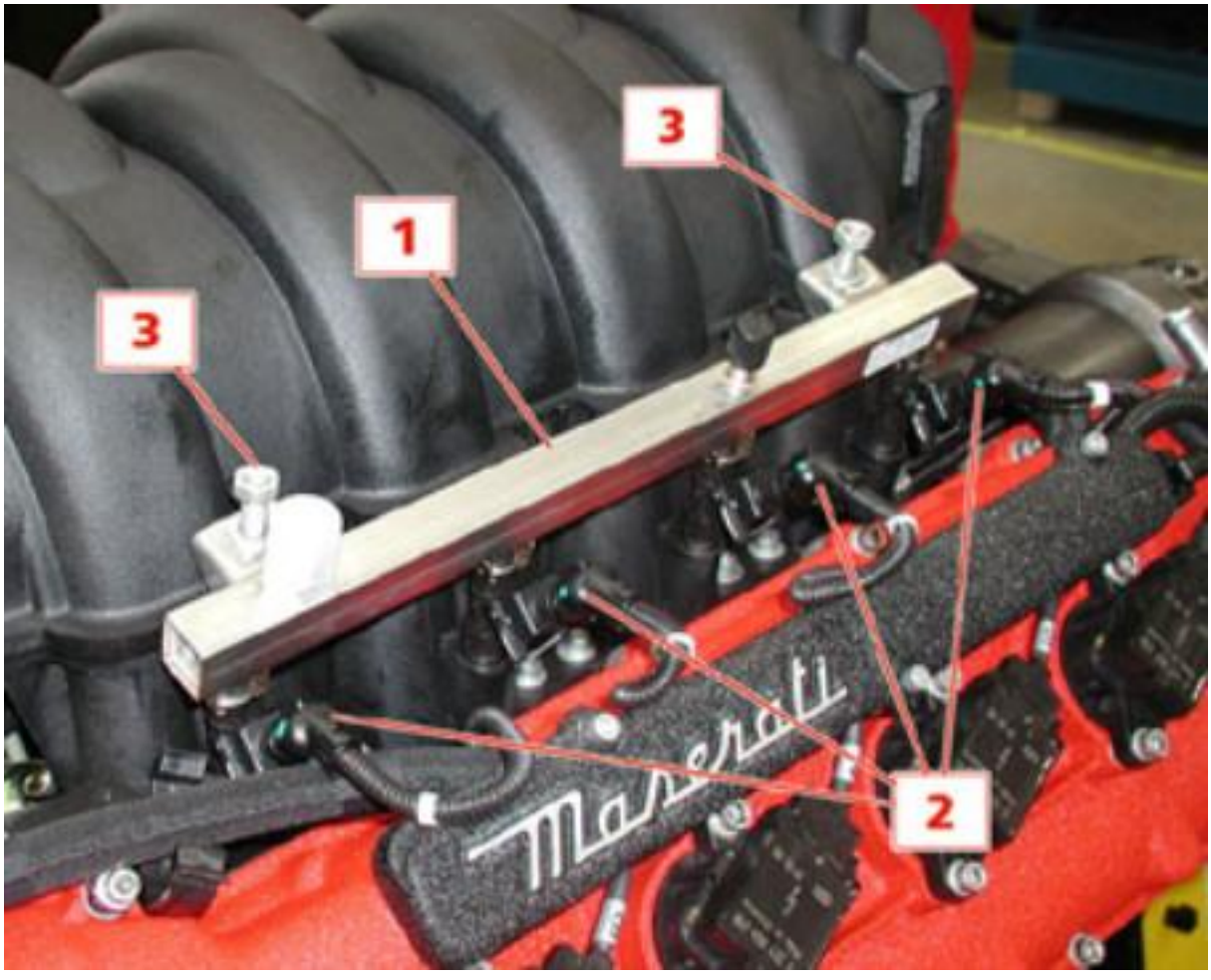
- Remove the pins used for centring **.**
- Tighten the bolts to a torque of **10 Nm.**

- Connect the wiring leaving from the motor-driven throttle.



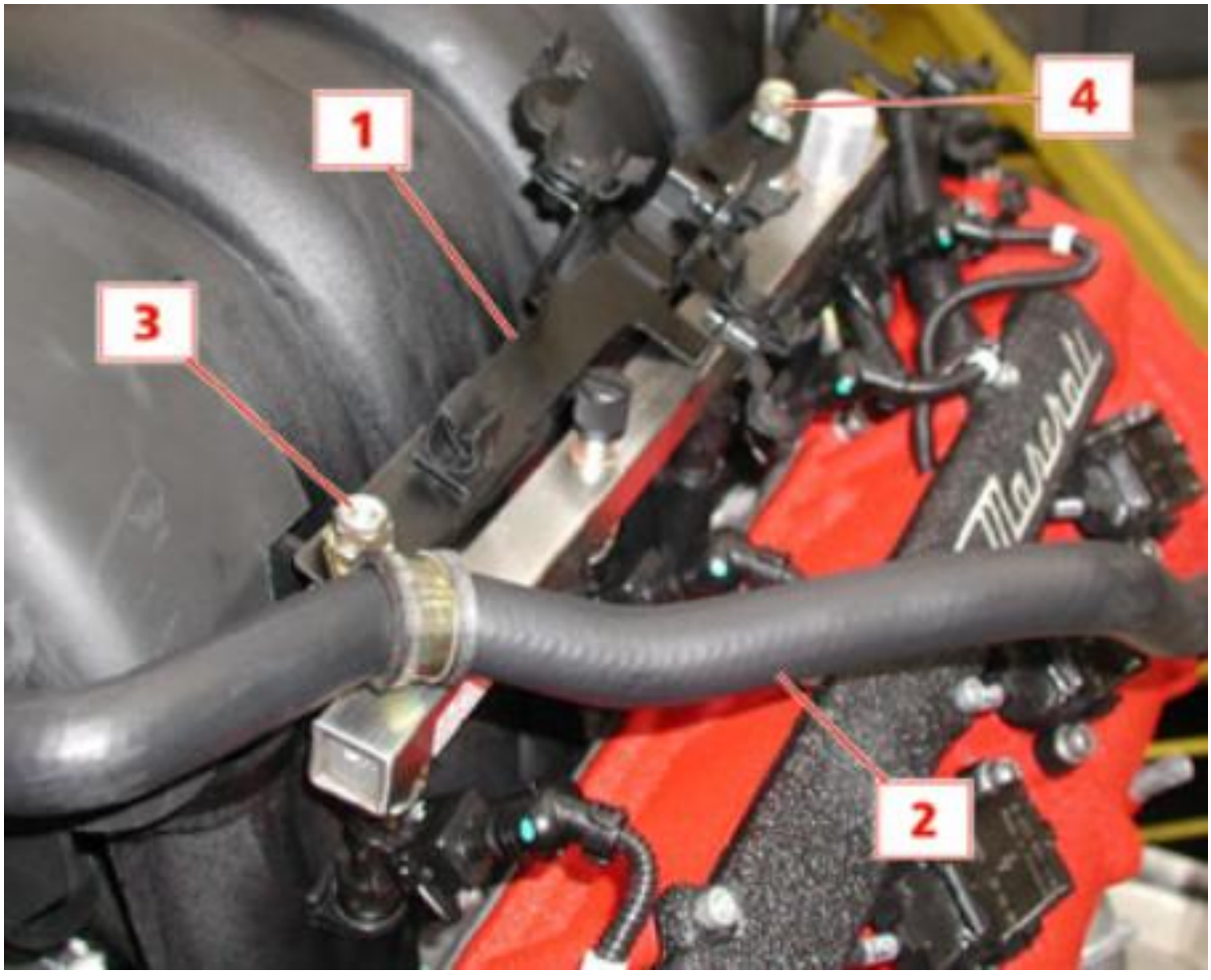
- Before refitting, replace the seal of the electro-injectors.

- Fit the fuel manifold complete with electro-injectors **(1)**.
- Attach the electrical connectors of the electro-injectors **(2)** and tighten the nuts **(3)** to a torque of **15 Nm**.



- Connect the flexible hose to the rigid pipe.

- Fit the line support bracket **(1)** and connect the flexible hose **(2)** complete with fastening clamp; screw on the nut **(3)**.
- Tighten the nut **(4)** of the line support bracket.



- Connect the vapour recirculation line **(1)** to the tappet cover of the left-hand cylinder bank.

- Connect the vapour recirculation line **(1)** to the tappet cover of the right-hand cylinder bank.

- Lock the two fastening clamps **(1)** of the vapour recirculation line.

- Using tool **900026550**, insert the clutch shaft support bearing.

Important
Once the engine assembly procedure is complete, check that the wiring is correctly positioned, consulting the electric system manual if necessary.

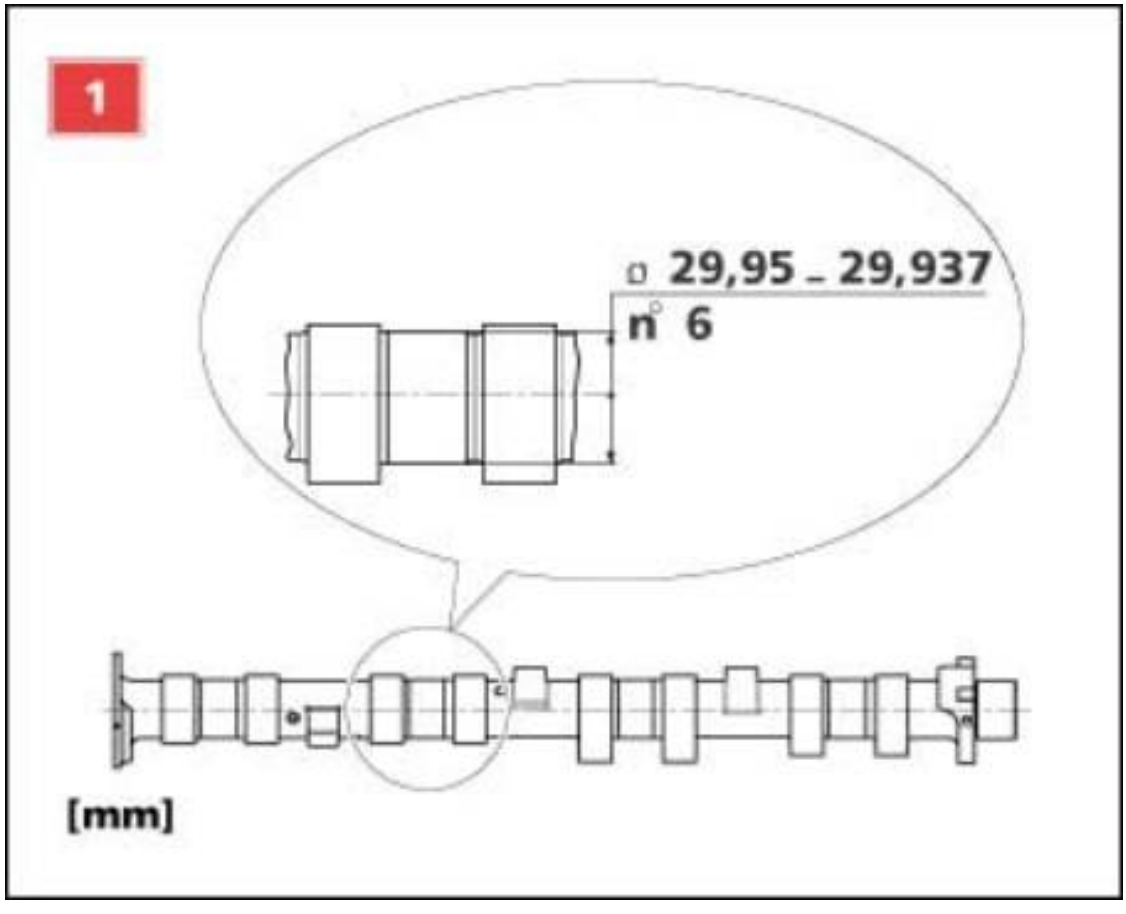
DIMENSIONAL CHECKS

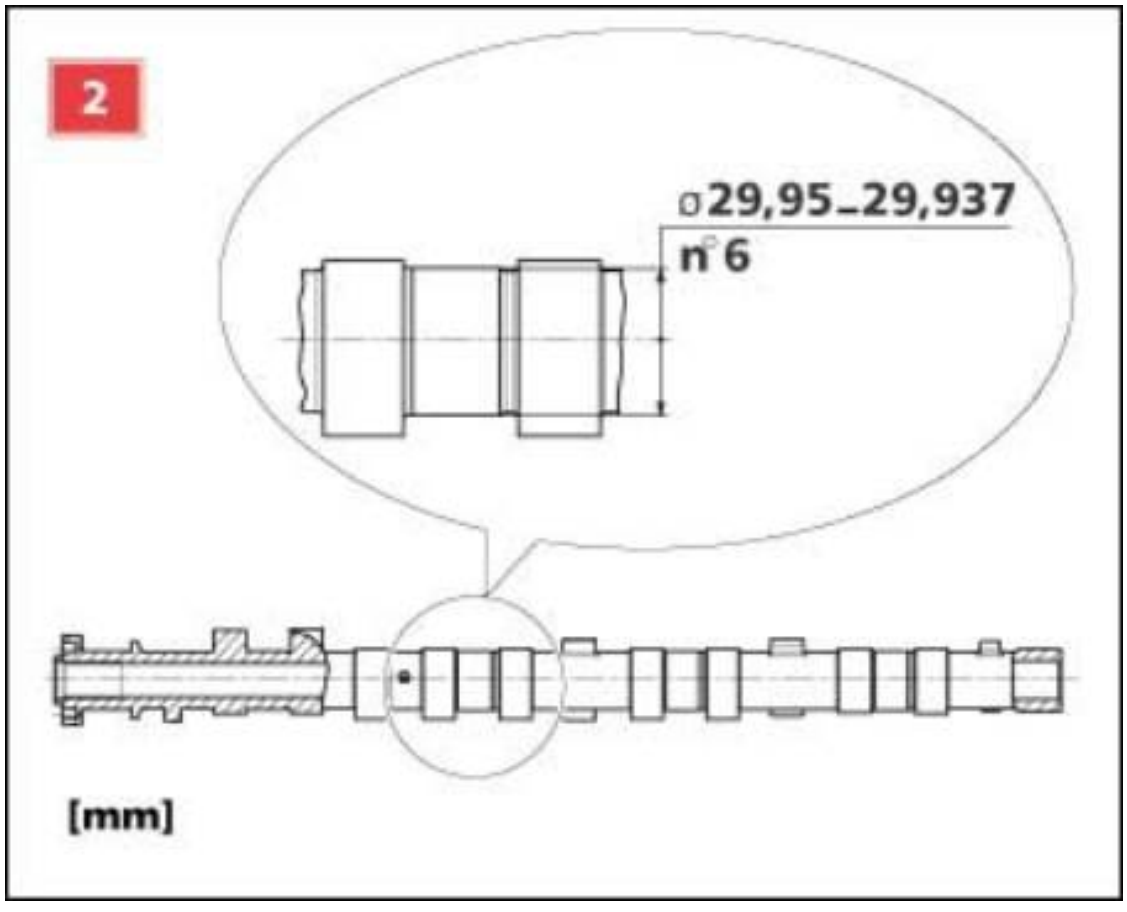
Checking the camshaft dimensions

- Check that the main bearing journals and the cams do not show scoring or excessive wear.

- Measure the main bearing journals with the micrometer.

- The dimensions measured must fall within the indicated values (**Figure 1** e **2**)..

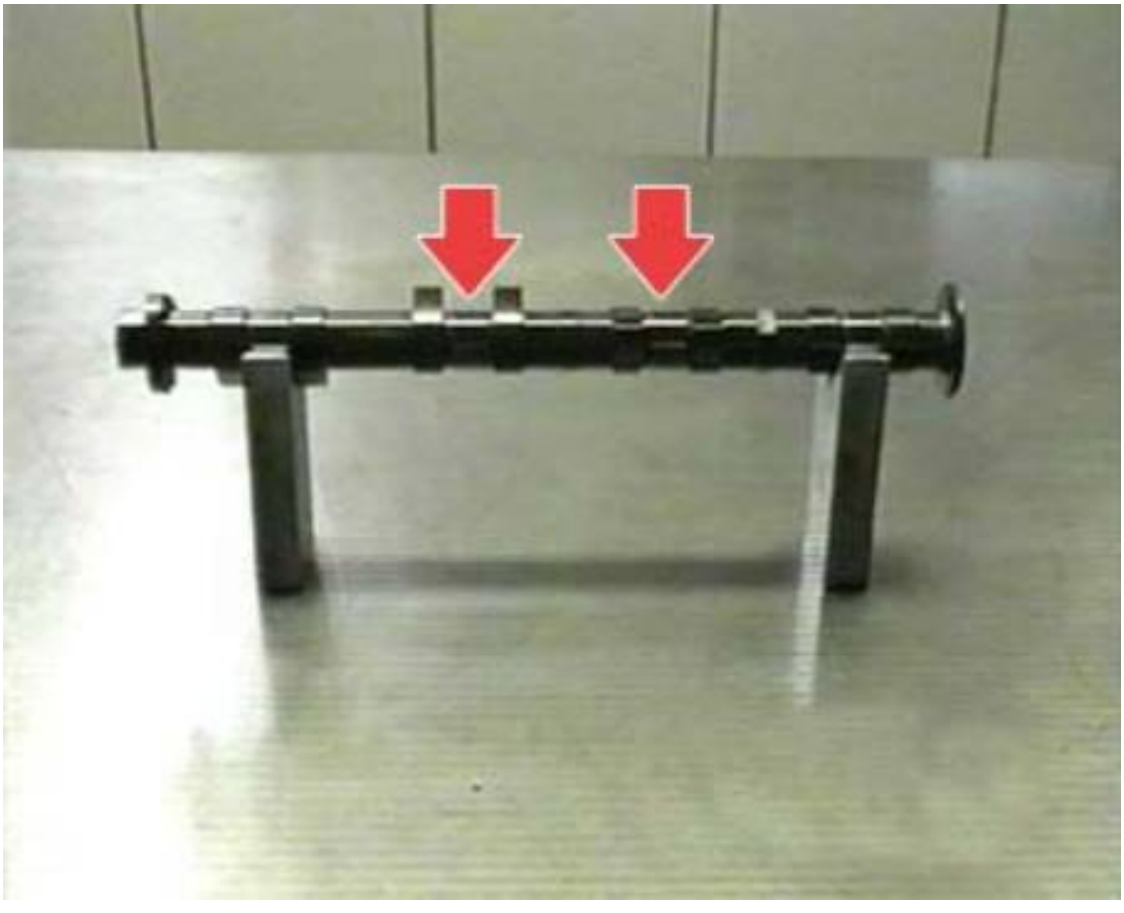




n.b.
To check the coaxial factor of the main bearing journals, a checking plane is required.

- Place the camshaft on the indicated tool. **AV3135**.
- Reset the dial gauge on the main bearing journal to be examined and rotate the shaft checking the dial gauge indication.
- The coaxial factor error detected must be lower than the prescribed value.

- Repeat the operation for the marked journals.

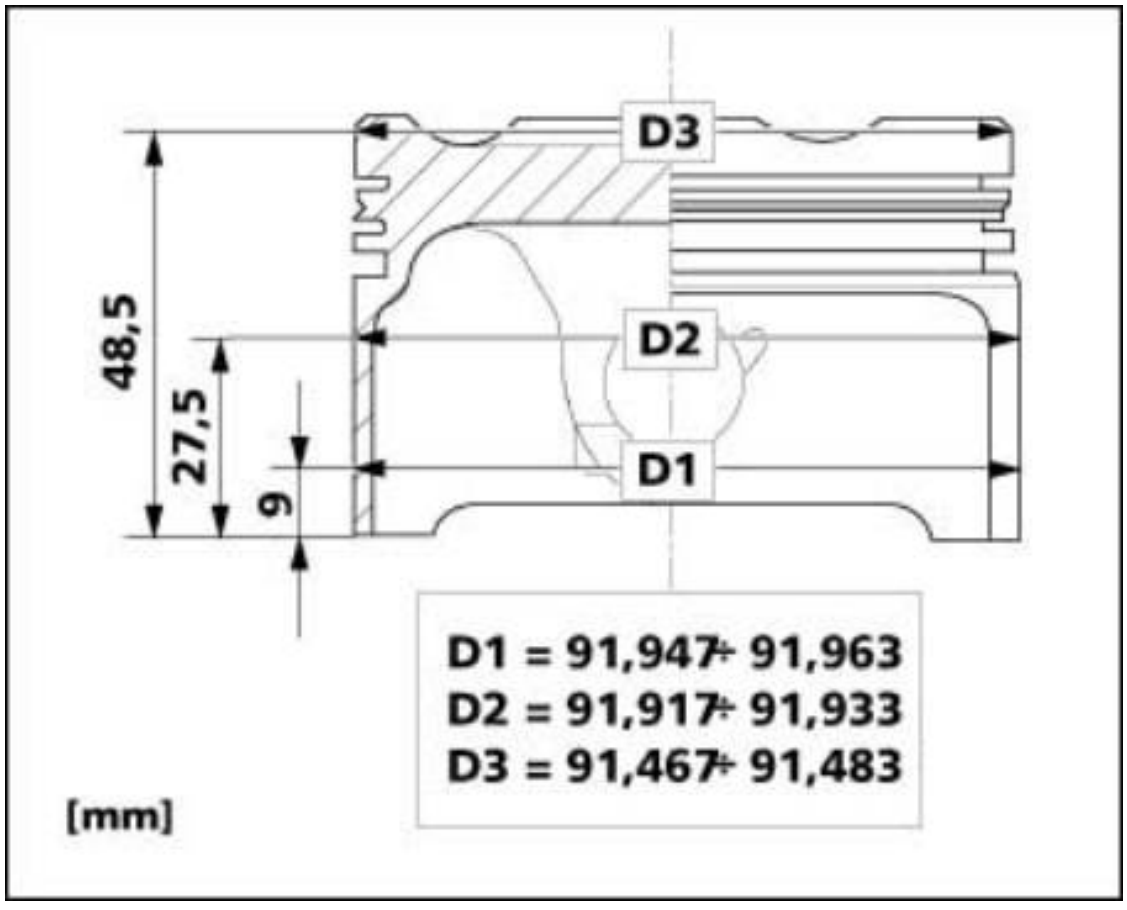


Piston dimensional check

- Carry out a careful visual check of the skirt checking that there is no scoring or excessive wear.

- Measure the piston diameter taking three measurements at the reference heights.

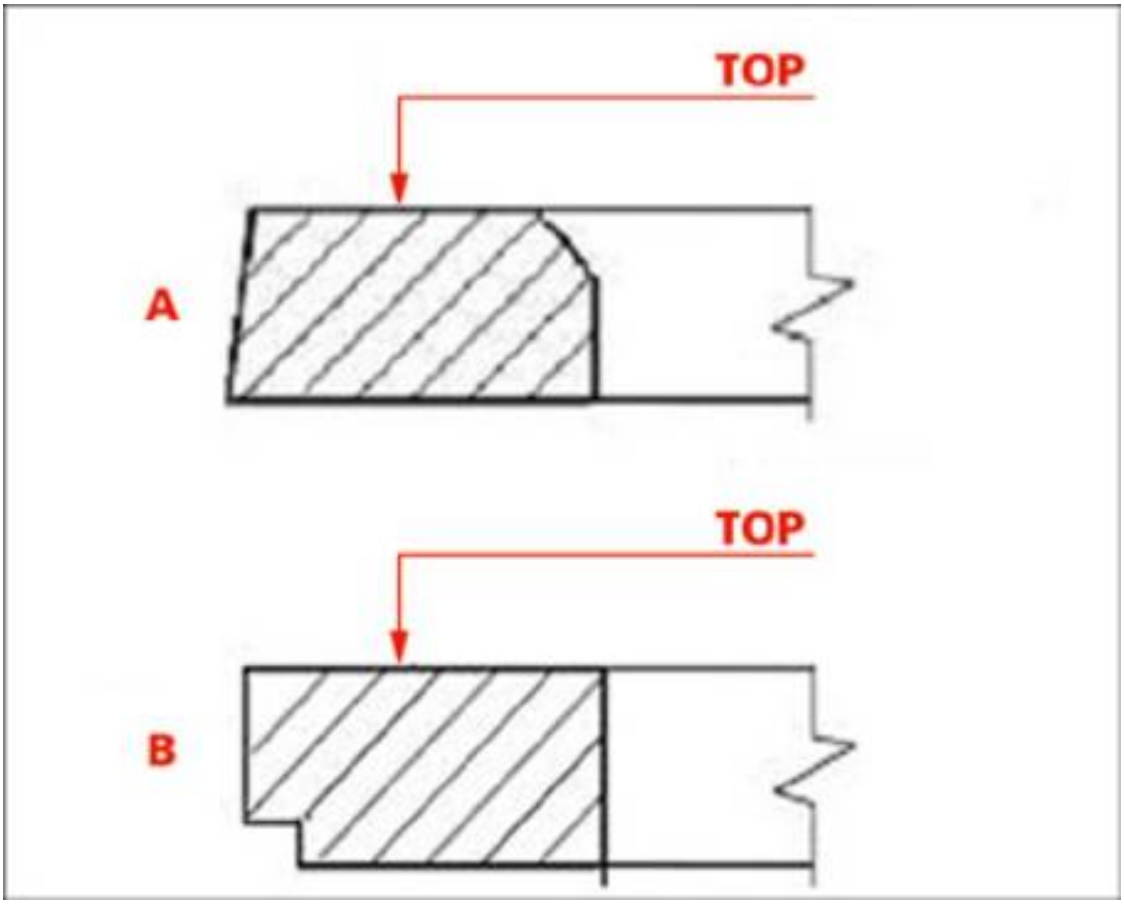
- The dimensions detected must fall within the indicated values.
- In addition, check the pin seat diameter, which must be **20+0.011+0.005 mm,** and the pin outer diameter, which must be **20 – 0.005 mm.**



IMPORTANT
The pin hole is NOT symmetrical with the piston axis.
The reason for this offset is the need to limit the lateral forces that are perpendicular to the cylinder liner.
The offset follows the rotation direction of the crankshaft and, for this reason, the RH bank pistons are different from those on the LH cylinder bank.

- After removing the grommets from the piston, carefully inspect them. In the event of scoring, cracks or signs of abnormal wear, they must be replaced.

IMPORTANT
There is no specific fitting direction for the oil scraper ring, nonetheless, take care at the joint of the internal clip: do not position it on the upper and lower ring opening.



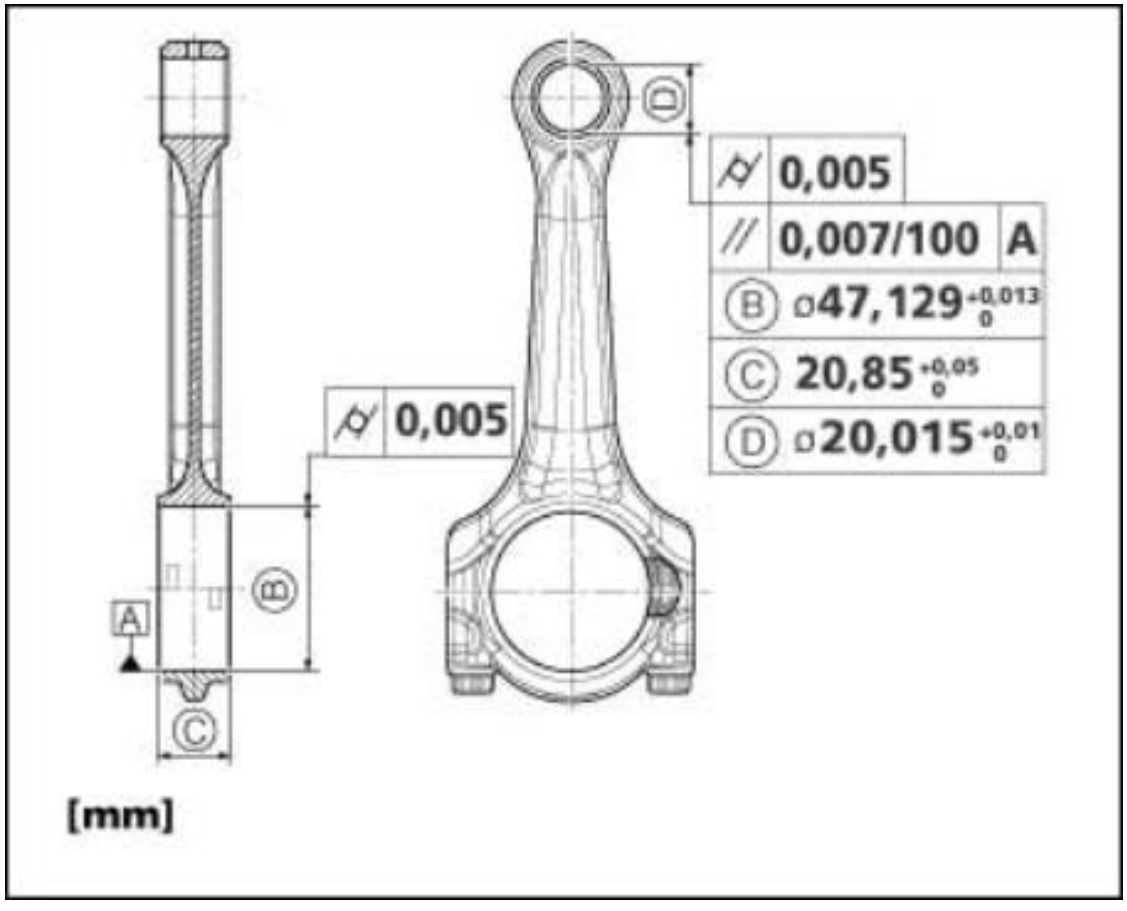
Connecting rods dimensional check

n.b.
All checks of the connecting rods must be carried out with used screws.

- To measure the diameter of the connecting rod big end, reset the bore-meter on tool **ALZ F04702**.

- Using a torque wrench, tighten the fastenings on the connecting rod big end to torque.
- Check the diameter of the connecting rod big end taking two measurements at a distance of 90°.

- The dimensions detected must fall within the indicated values.

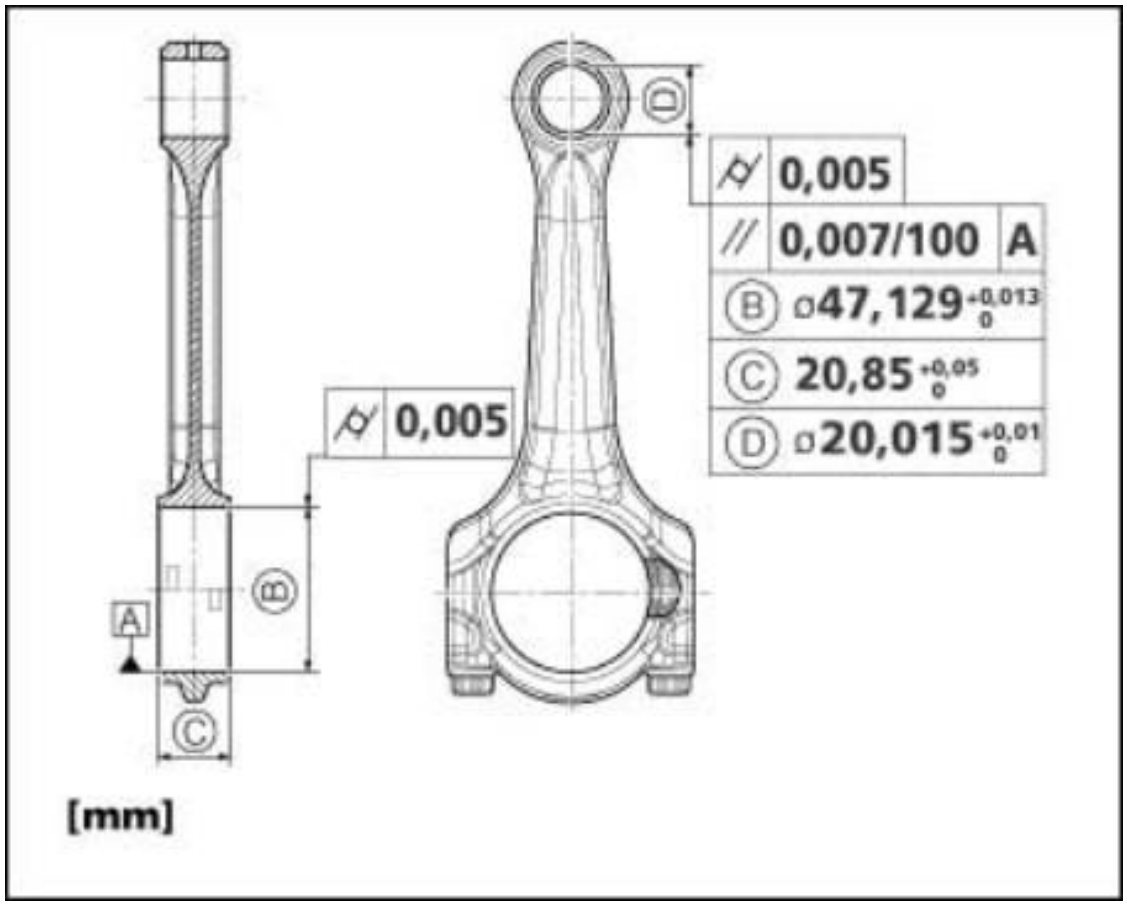


- To measure the diameter of the connecting rod small end, reset the bore meter on the indicated tool (diameter 20 mm).

- Check the diameter of the connecting rod small end taking two measurements at a distance of 90°.

- Proceed with a second inspection of the connecting rod small end using the "go-no-go" gauge **TLDF02060**

- The dimensions detected must fall within the indicated values.



N.B.

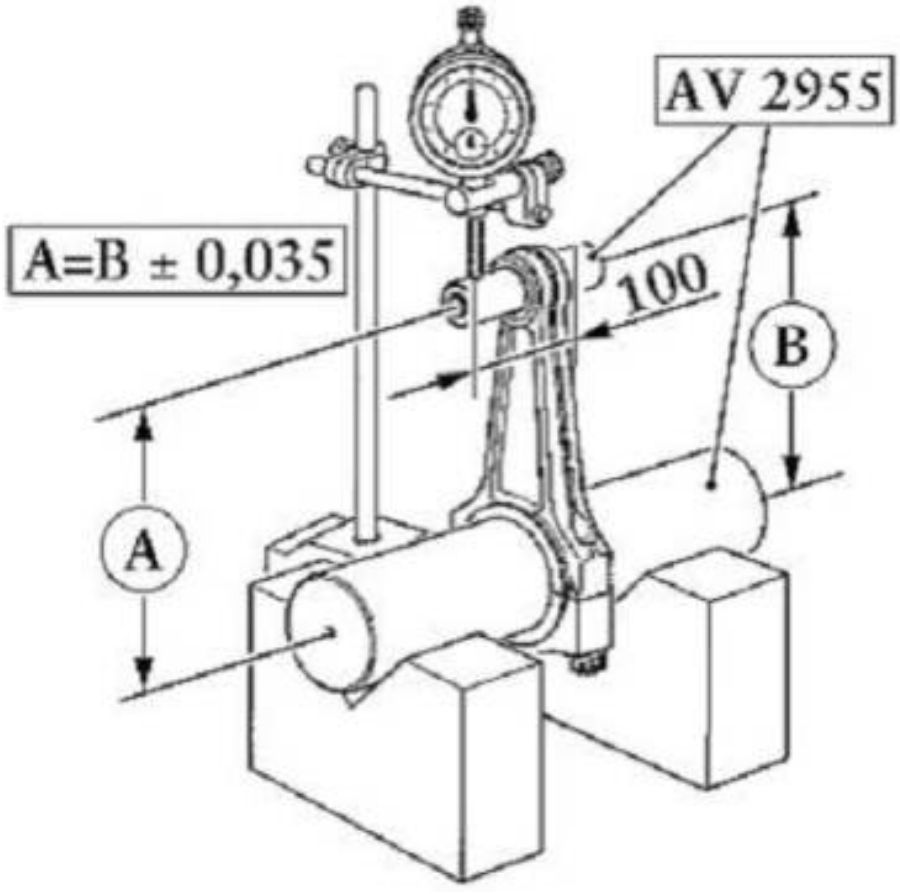
To balance the connecting rod a checking plane is required.

- The parallelism of the connecting rod axes is checked by means of tool **AV2955.**

Insert the pins supplied into the connecting rod small end and the connecting rod big end, then check for any parallelism error with the dial gauge.

- Rotate the connecting rod by 90° and repeat the procedure.

- The values measured must correspond to those indicated in the drawing.



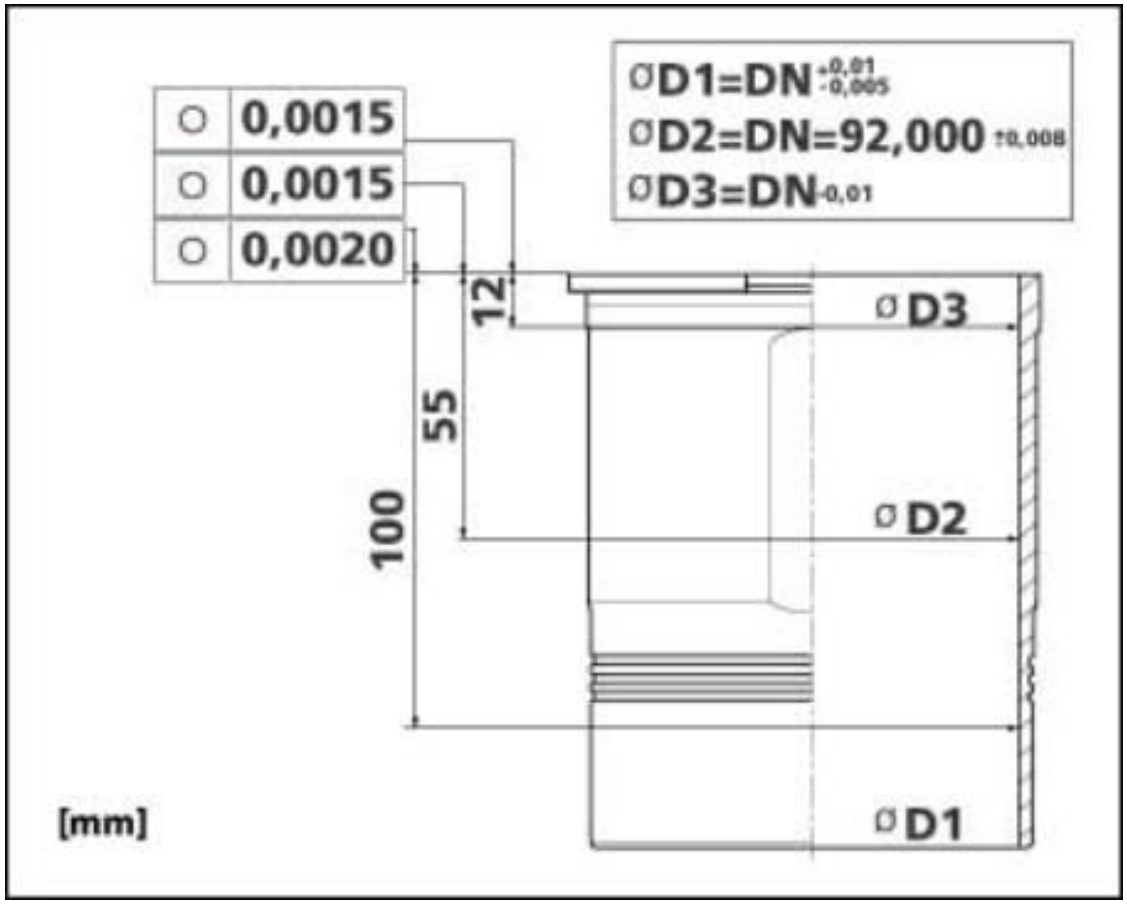
Cylinder liner dimensional check

n.b.
To carry out the dimensional check of the cylinder liners a bore-meter and the relative reference ring are required.

- Reset the bore-meter on the prescribed tool.

- Measure the diameter of the cylinder liner taking three measurements at the reference heights, then rotate the liber by 90° and repeat the procedure.

- The dimensions measured must fall within the indicated values.

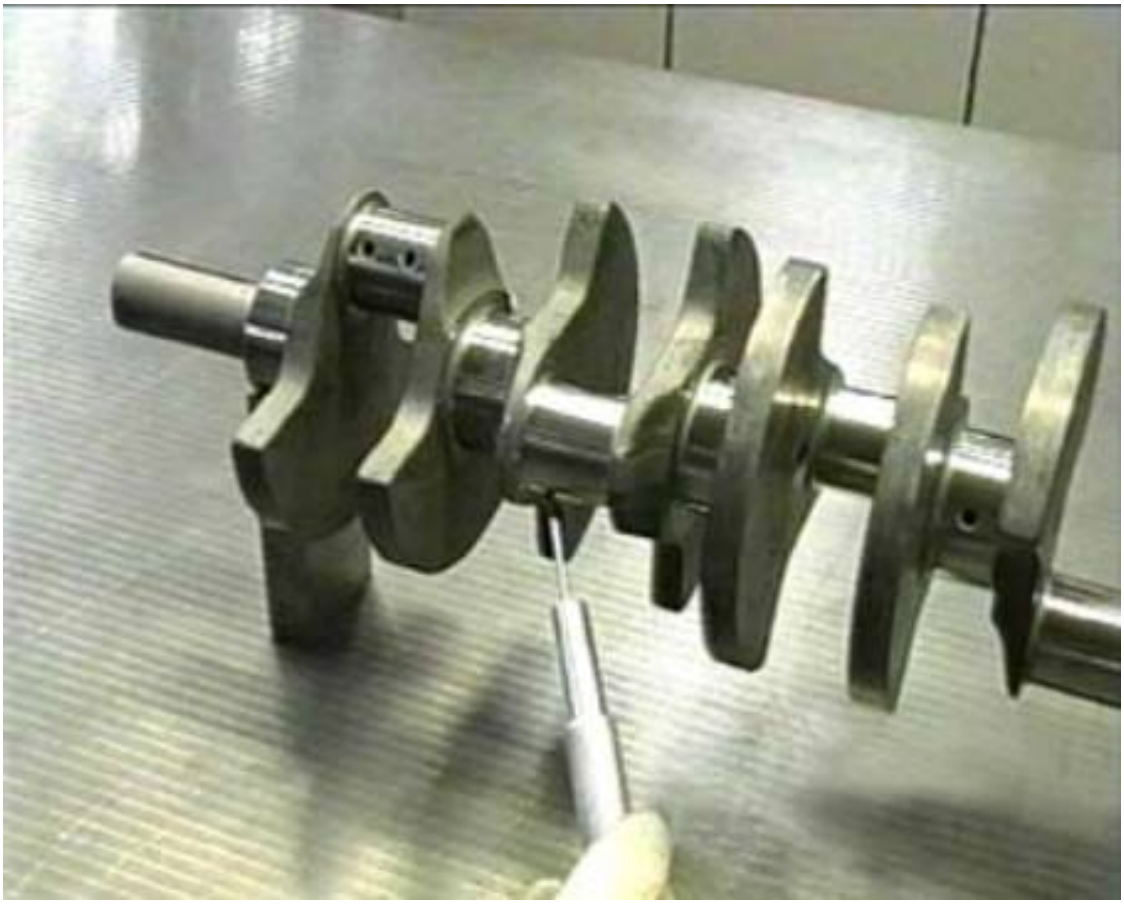


Drive shaft dimensional check

- Check that the main bearing journals do not show scoring or excessive wear.

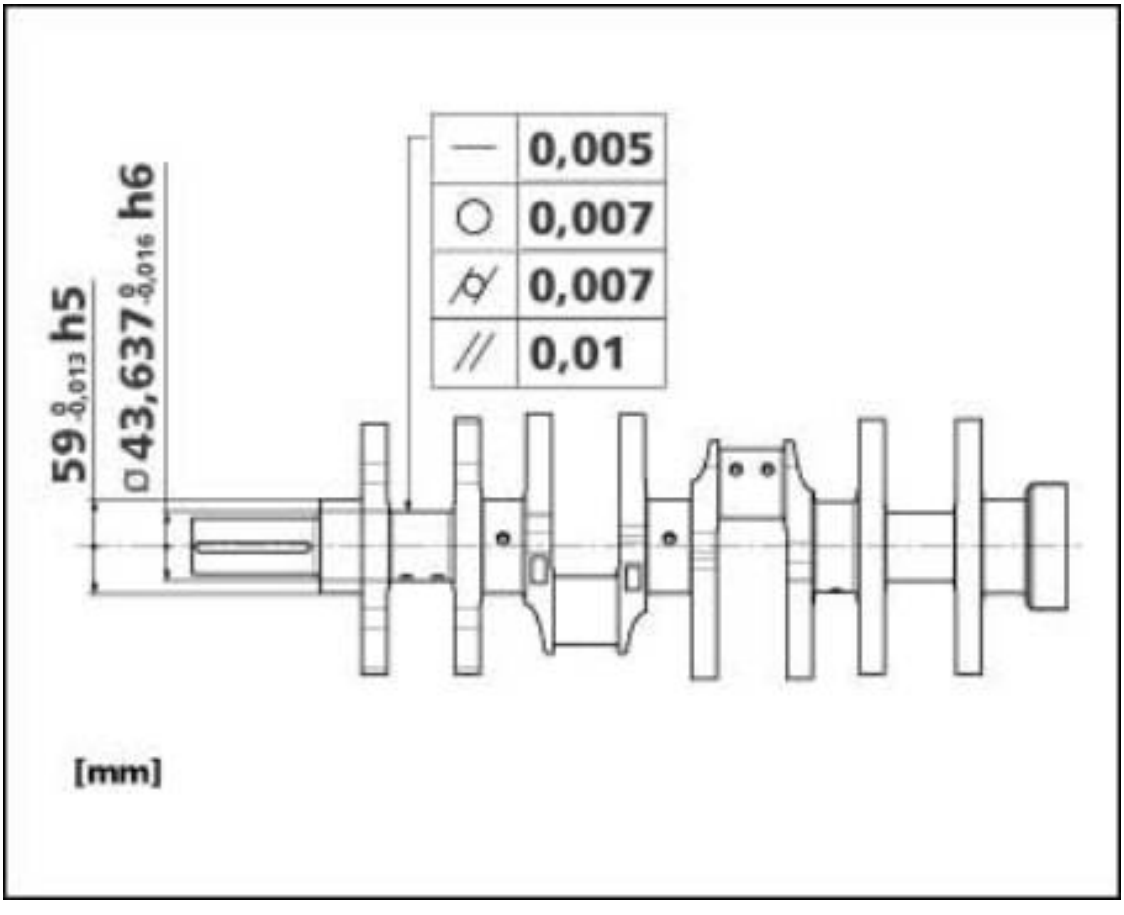
- Check the condition of the rear plug on the clutch side.

- Using a tube-brush, check that the oil passages are not clogged.



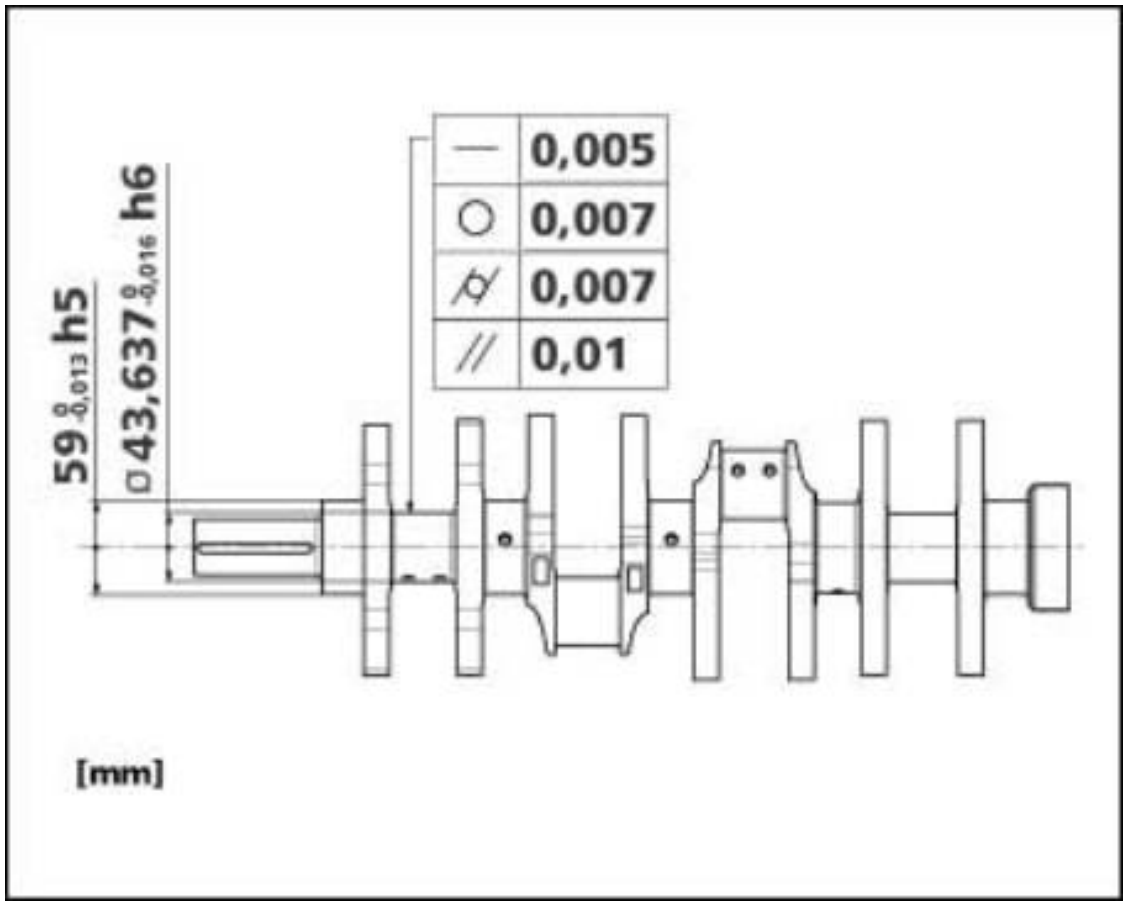
- Measure the main bearing journals using a micrometer.

- The dimensions detected must fall within the indicated values.



- Measure the crankpins with the micrometer.

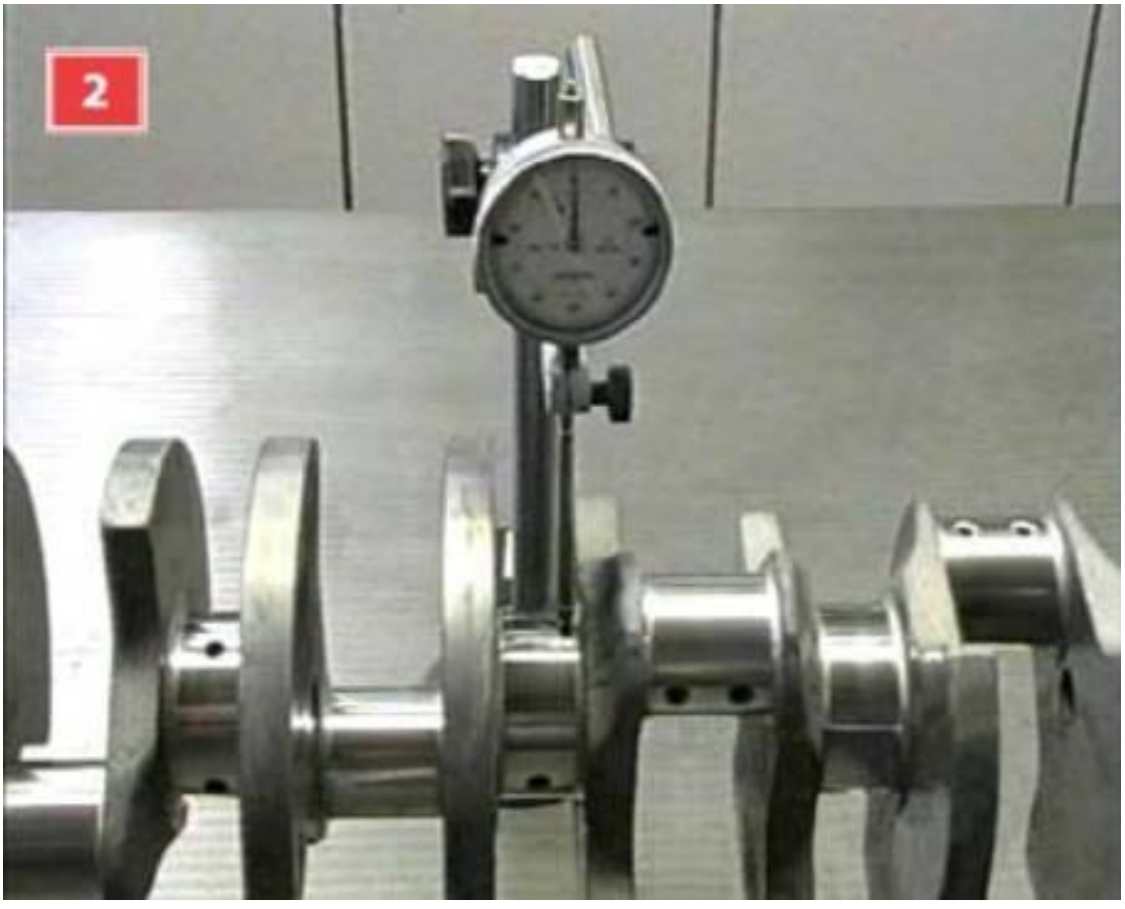
- The dimensions detected must fall within the indicated values.



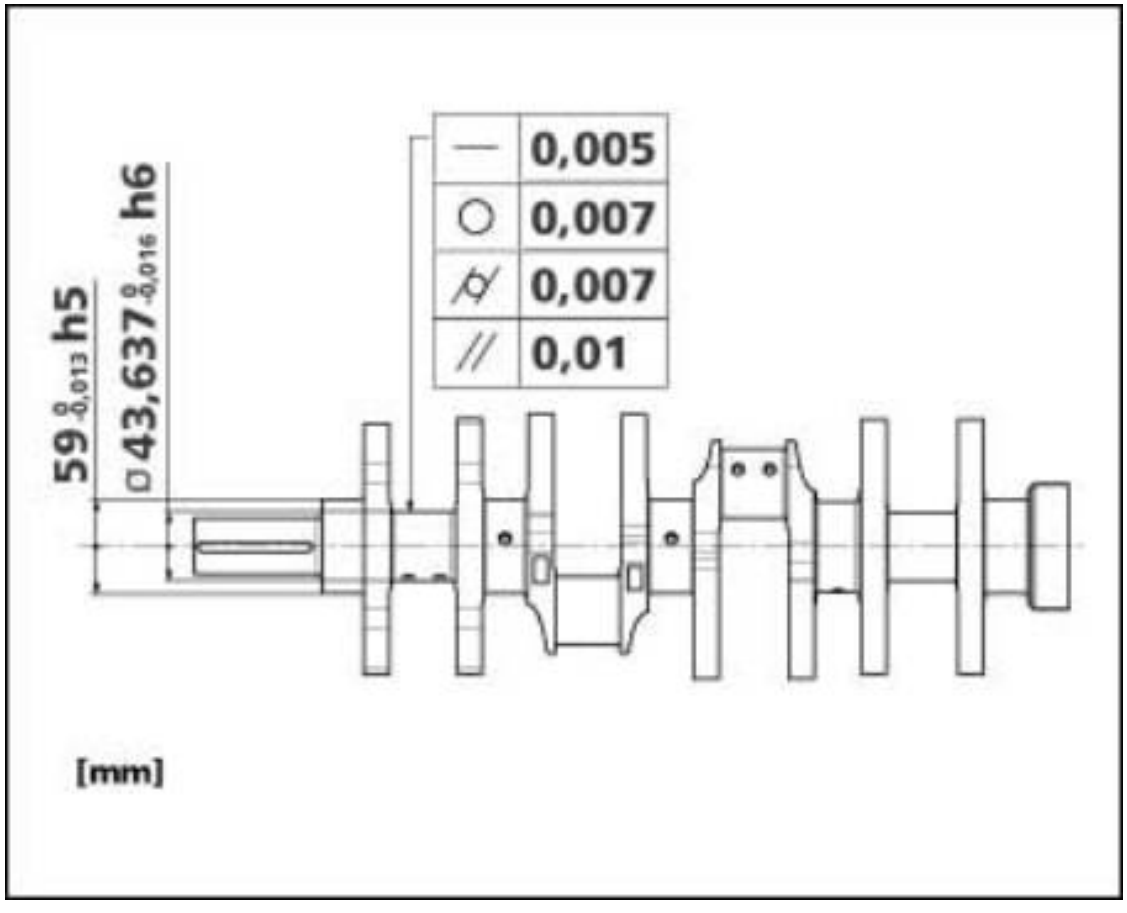
n.b.
To check the coaxial factor of the main bearing journals a checking plane is required.

- Arrange the crankshaft on the specified tool **AV3135**.

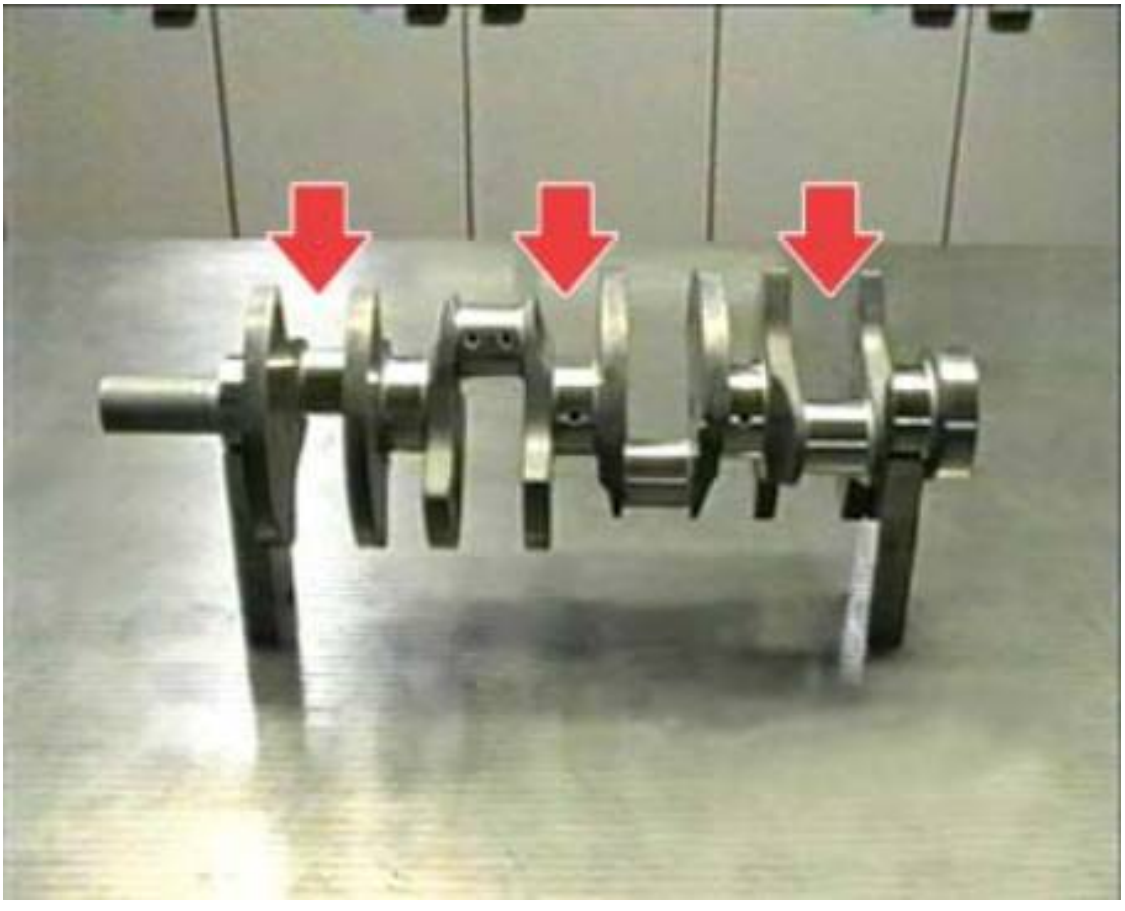
- Reset the dial gauge on the main bearing journal to be checked and rotate the shaft checking the dial gauge indication (**Figura 1** e **2**).



- The coaxial factor error detected must be lower than the indicated value.



- Repeat the operation for the marked main bearing journals.



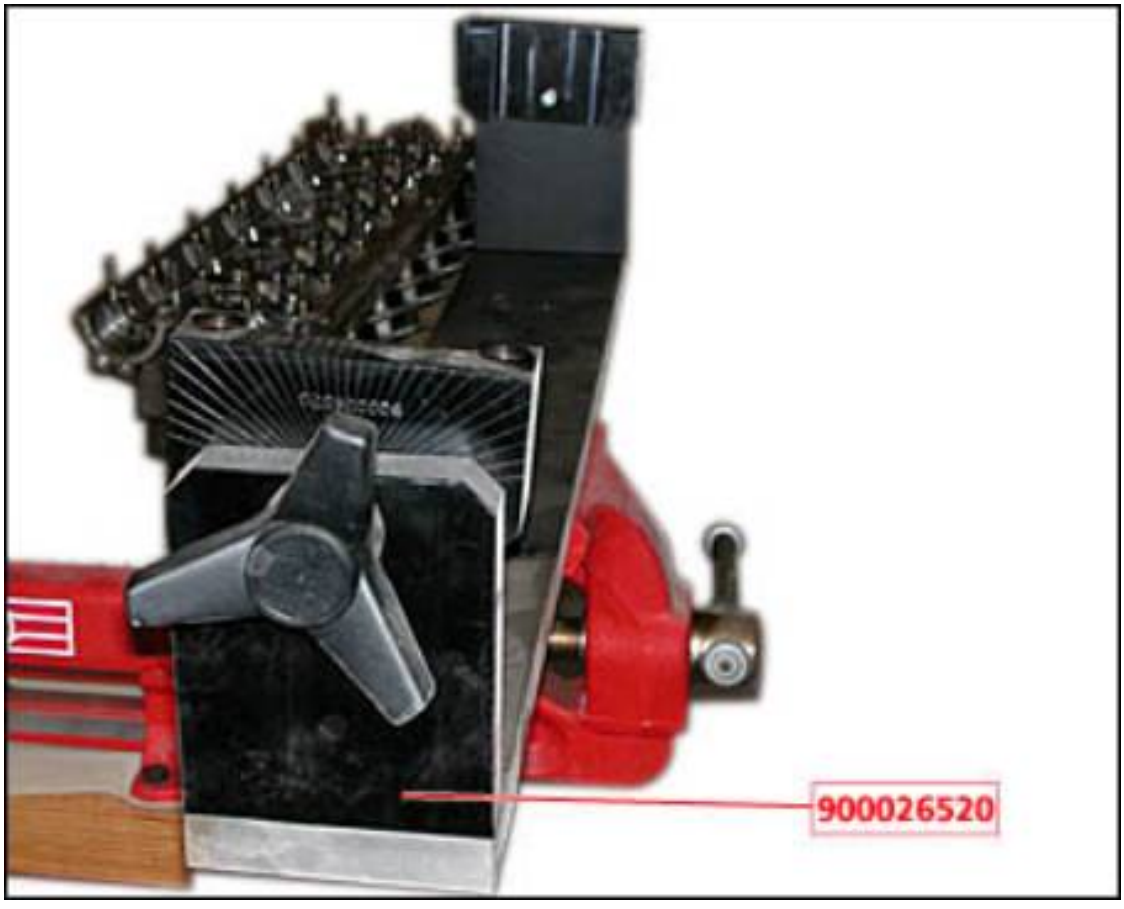
Main cylinder head data

Interference between the valve guide and the housing on the head	0.032 ÷ 0.068 mm
Interference between the valve seat and the housing on the head	
• Intake.	0,080 ÷ 0,140 mm
• Draining	0,080 ÷ 0,140 mm
Coupling between the valve rod and the relative guide	
• Fitting clearance (intake)	0,030 ÷ 0,060 mm
• Fitting clearance (draining)	0,035 ÷ 0,065 mm
• Wear limit	0.100 mm T.B.D.
Max. shift between valve stem and contact surface with bucket	
• Intake and draining	0.025 mm
Clearance between bucket and relative seat	
• Fitting clearance	0,025 ÷ 0,057 mm
• Wear limit	0,100 mm

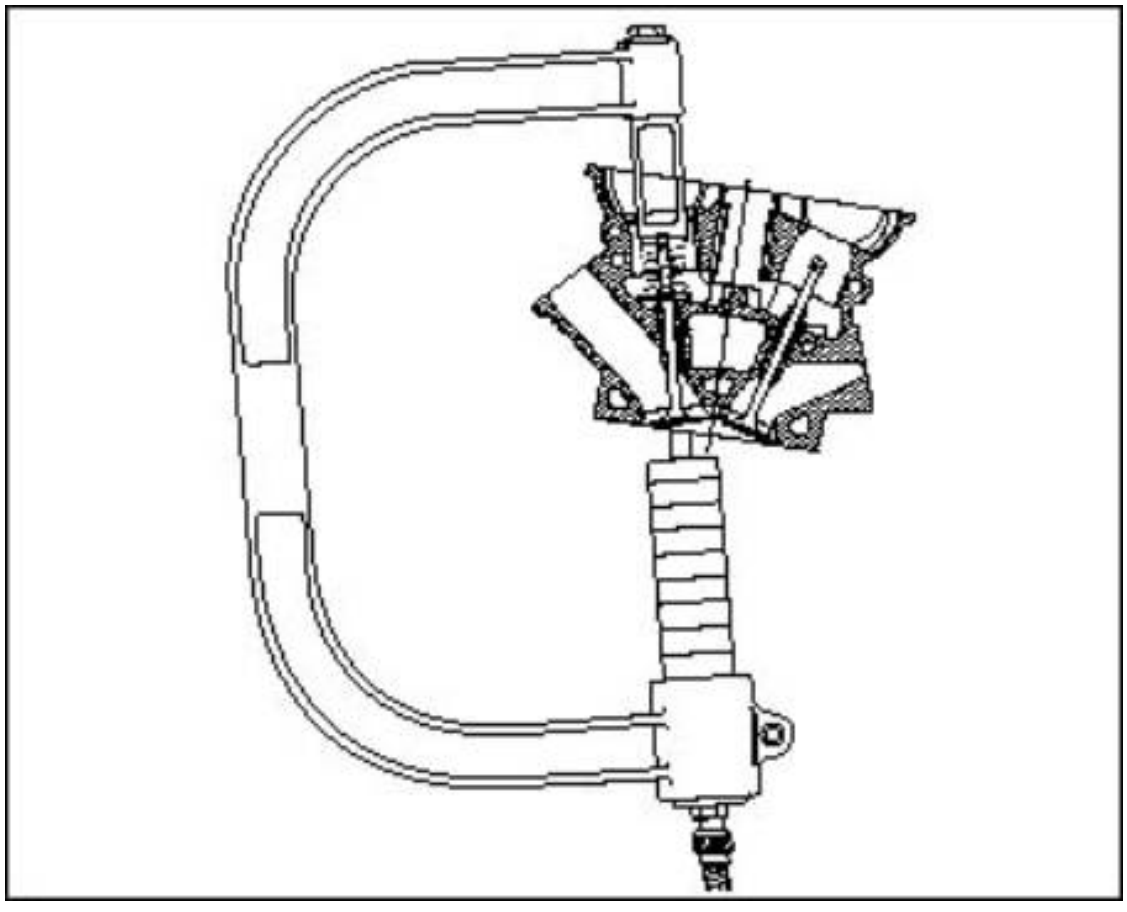
Checking the cylinder heads

N.B.

To ensure the best working conditions, position the cylinder heads on the tool 900026520

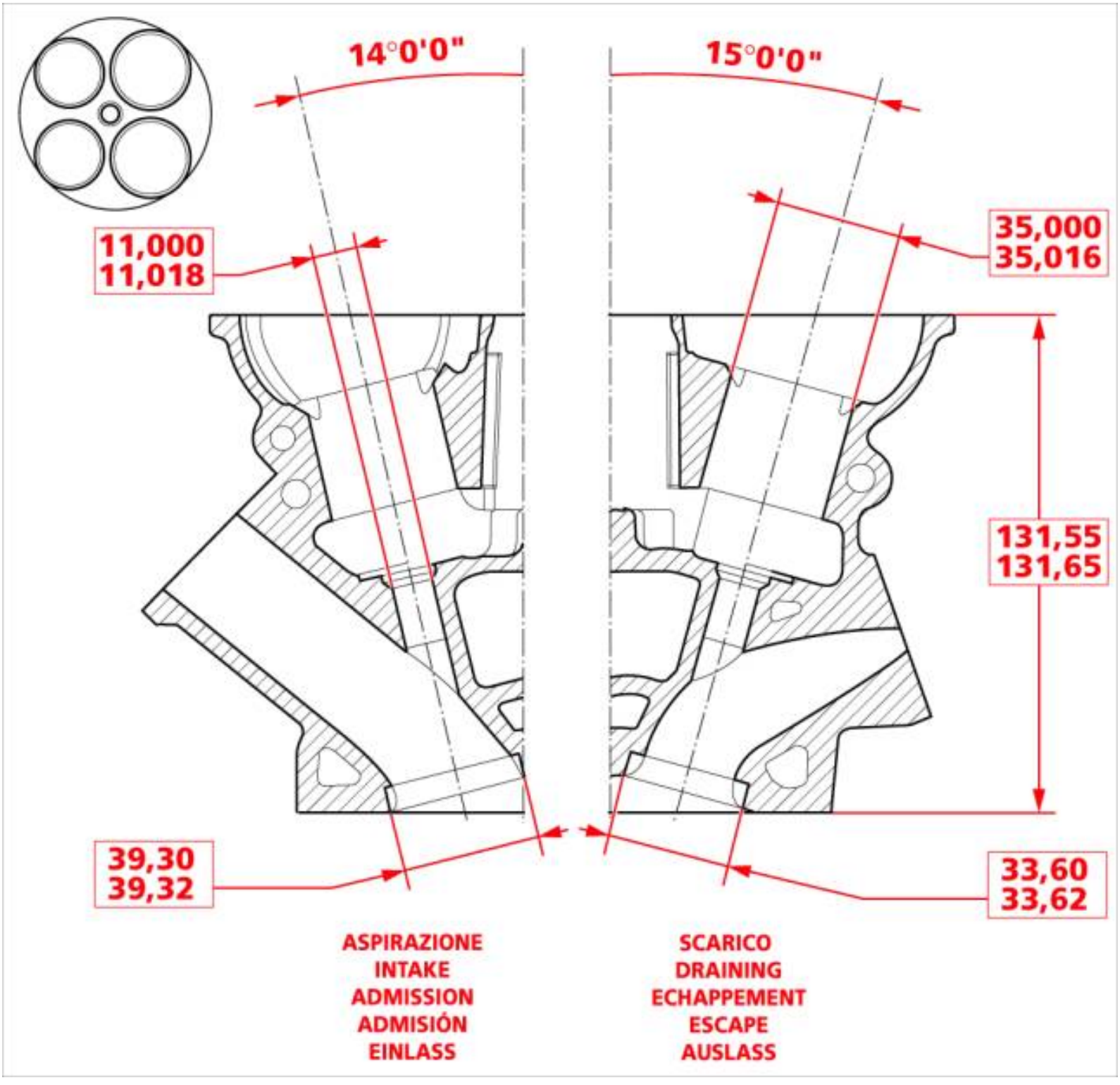


- Remove the valves, using specific standard pneumatic equipment.



- Clean the heads carefully, removing all traces of scaling from the combustion chambers and the oil and water lines. For this purpose, it is advisable to inject pressurised petroleum into the oil lines and a standard descaling liquid into the water lines. Perform these operations with the aid of tool **900026970** (not shown).
- Check the state of the spark plugs' seats.
- Using the bore-meter, check the valve control bucket seats for wear and the camshafts seats.
- On a straightening surface, check if the head and crankcase coupling surfaces are perfectly flat.

- If the head surface needs to be corrected, always comply with the value given in the figure.



Checking the valve seats and guides

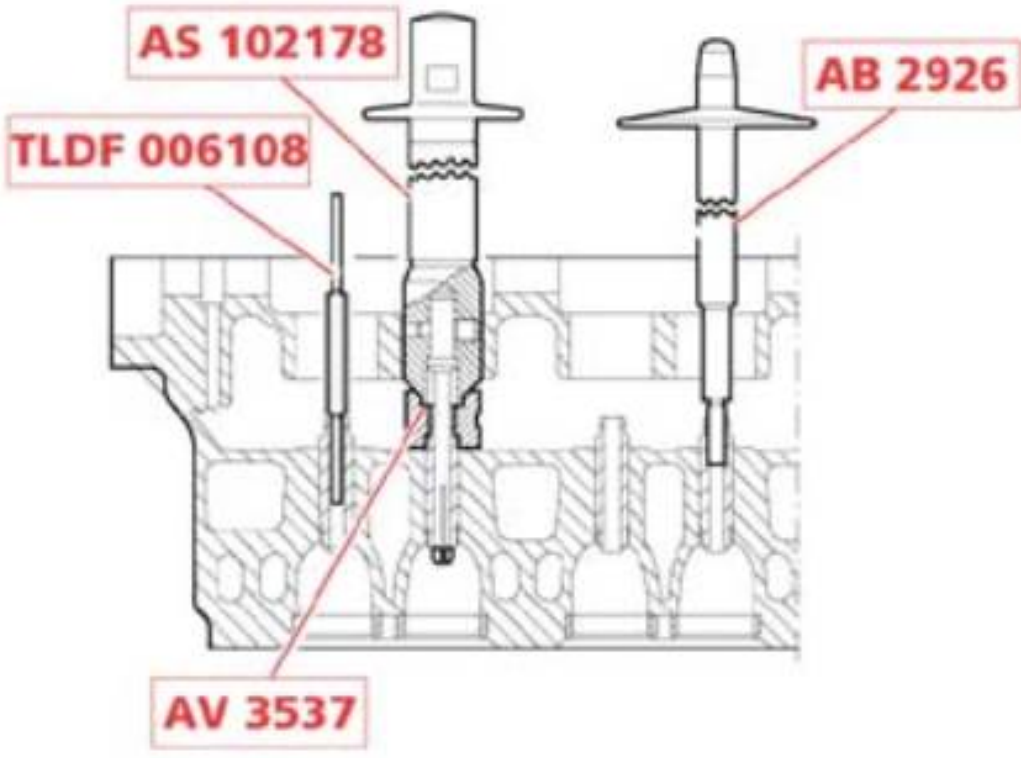
- Following the checks, if replacement of the valve seats is required, they must be removed by milling in order to prevent damage to the housing on the head.
- Check the dimensions of the grooves and the seats to ensure that the prescribed interference is created after assembly.
- To insert the new seats, heat the head in a kiln until it reaches a temperature of **190 °C**, for **six minutes**, then cool down the seats in liquid nitrogen, for about **five minutes**.

NOTEs

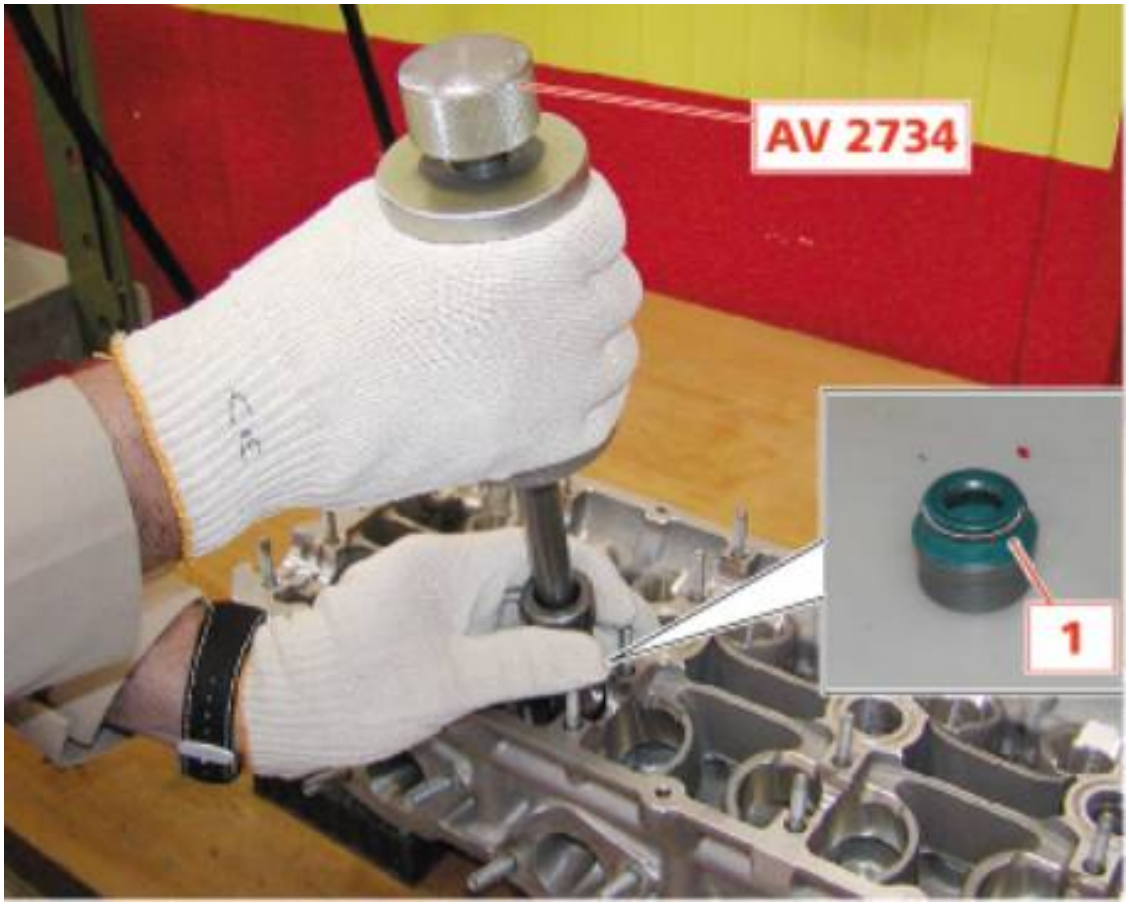
The above described operation must be exclusively carried out by a specialized laboratory.

- Insert the seats onto the head using the special punch. Carefully check that the kickback does not cause the previously installed seats to fall out; if necessary, check that all installed seats are correctly fitted.
- Using gauge **TLDF 006108**, check the valve guides for wear.

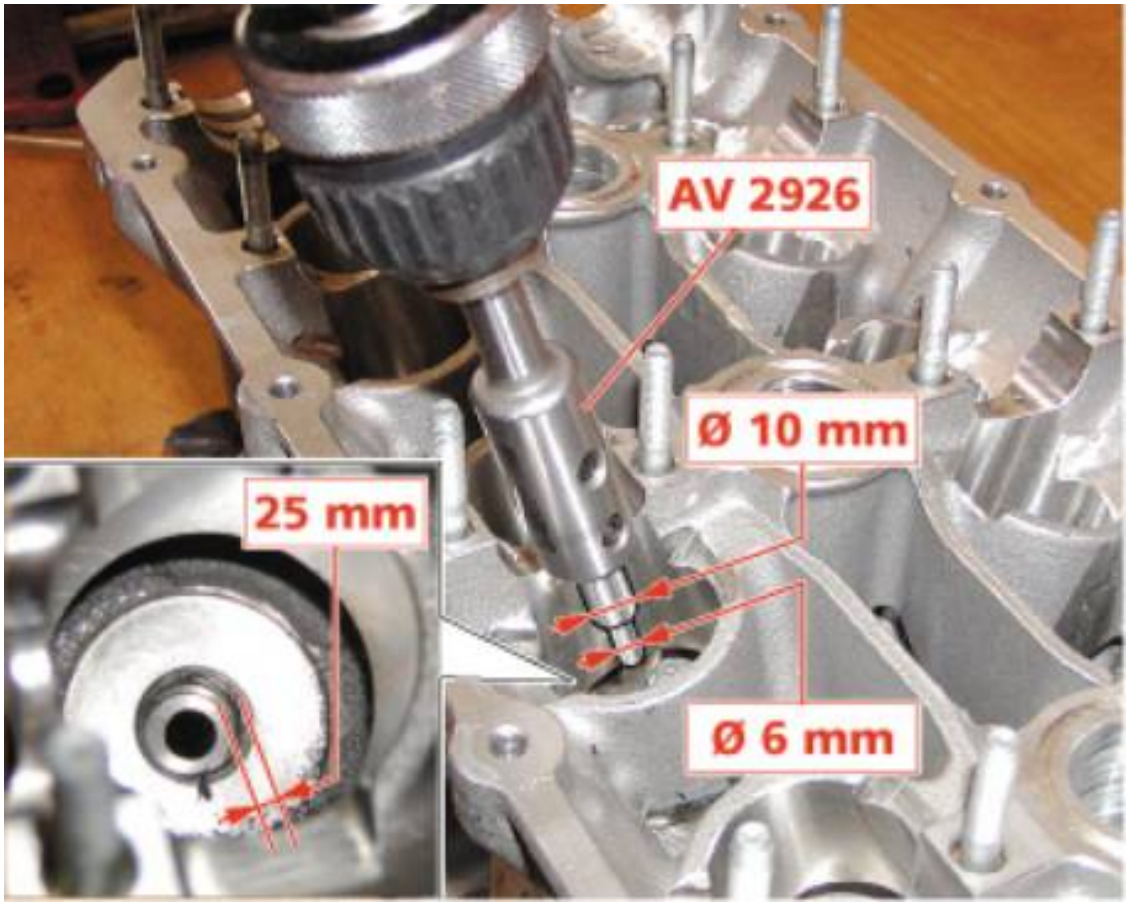
- If the gauge inside the guide features an excessive backlash, replace with new guides in order to obtain the prescribed assembly engagement.
- The guides can be removed following the below procedure



- Using tool **AV 2734** extract the seal rings **(1)** from the valve guides

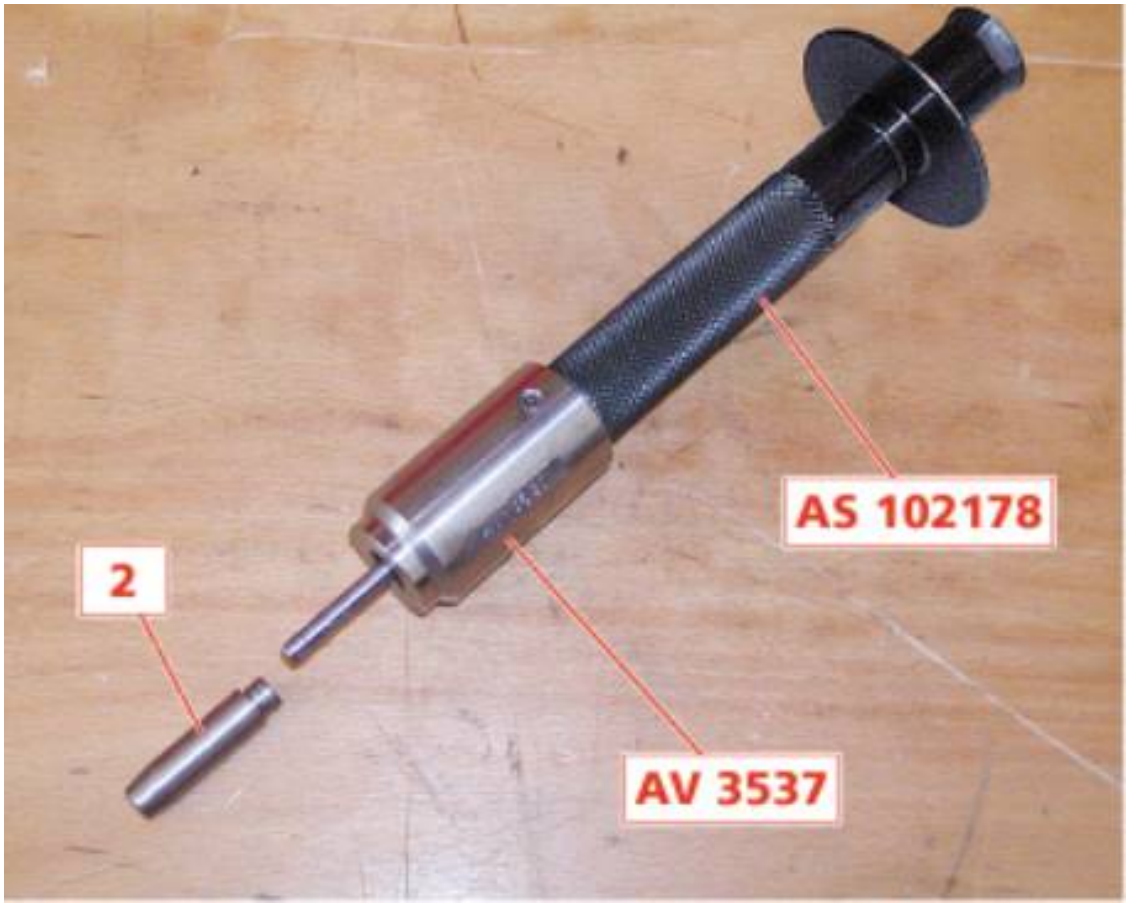


- Using a **Ø 10 mm** miller, with a **Ø 6 mm** tapered shank, supplied with tool **AV 2926**, mill the guide on the seal ring side for about **25 mm** from its end, lubricating the miller to prevent it from breaking and keeping it aligned with the valve guide.

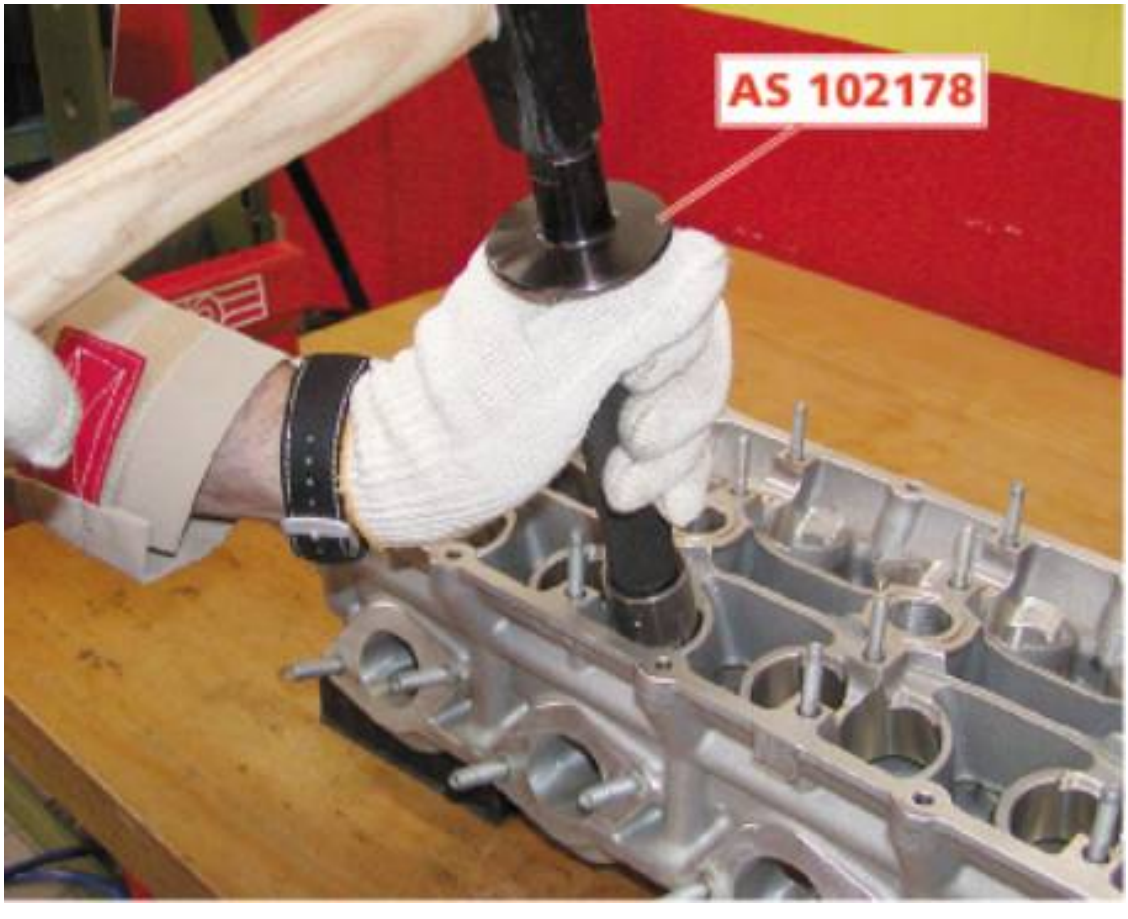


- Heat the head in a kiln at about **100 °C**, for ca. **thirty minutes**, to ease removal, then position it on two rubber shims.
- Extract the guide using the punch supplied with tool **AV 2926.**

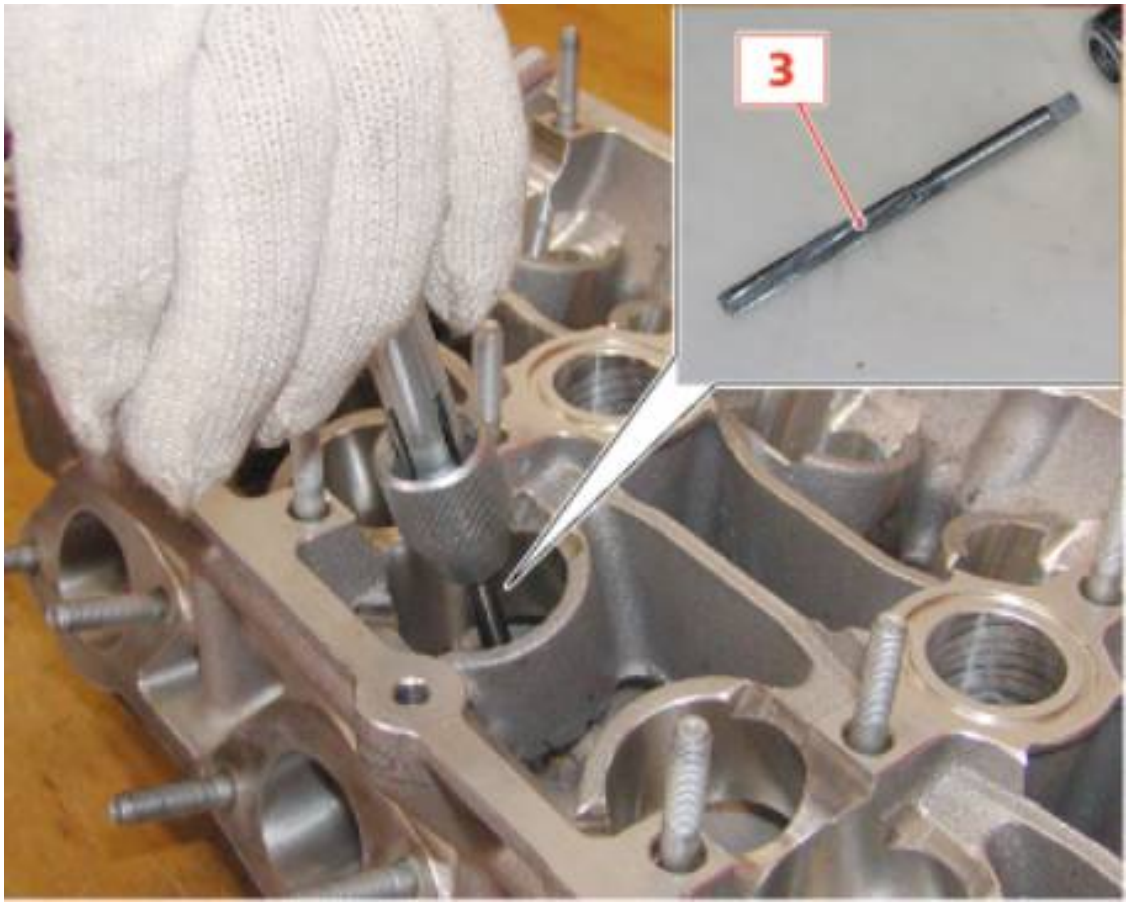
- To insert the new guides, it is necessary to heat the head at about **100 °C** for ca. **1 hour** and then cool down the guides in liquid nitrogen.
- To install the new guide **(2)** use tool **AS 102178** with shim **AV 3537**.



- Lubricate the guide with "SEGO" grease and push it into its seat, until the shim **AV 3537** comes flush with the head.



- After this procedure, **dry bore** the guides using a reamer **(3)** diameter **6 H7 mm**, fitted in the speacial hand-operated spindle. Before carrying out the operation, check that the reamer cutting edges are sharp.



- Using gauge **TLDF 006108,** directed towards side "P", check that the guide is properly bored.

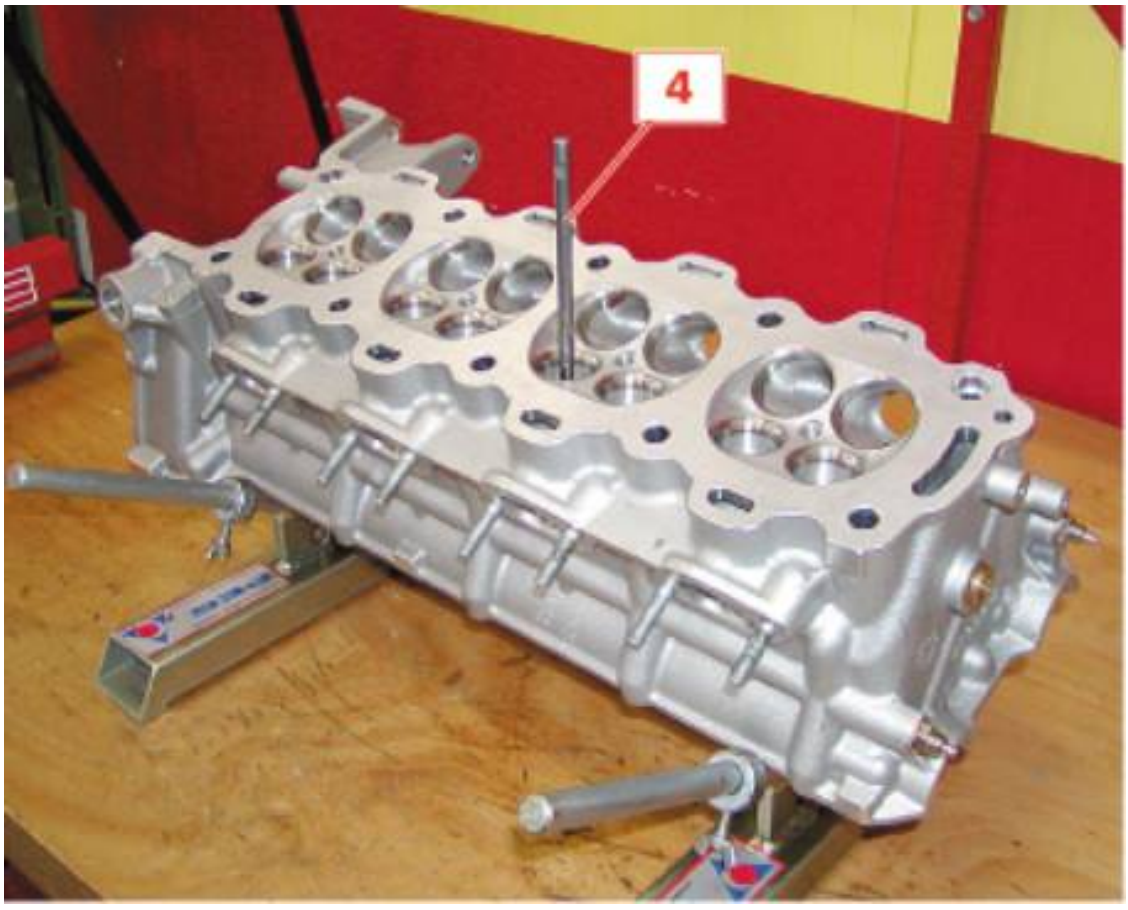
If, once the checks have been carried out, the valve seats need to be replaced, remove them by milling in order to prevent damaging their seat on the head.

- Check the dimensions of the recesses and seats.
- After fitting, it is absolutely essential to have the indicated interference.
- To fit the new seats, heat the head in the oven to a temperature of **190°C** for six minutes, and cool down the seats in liquid nitrogen for approx. **five minutes**.

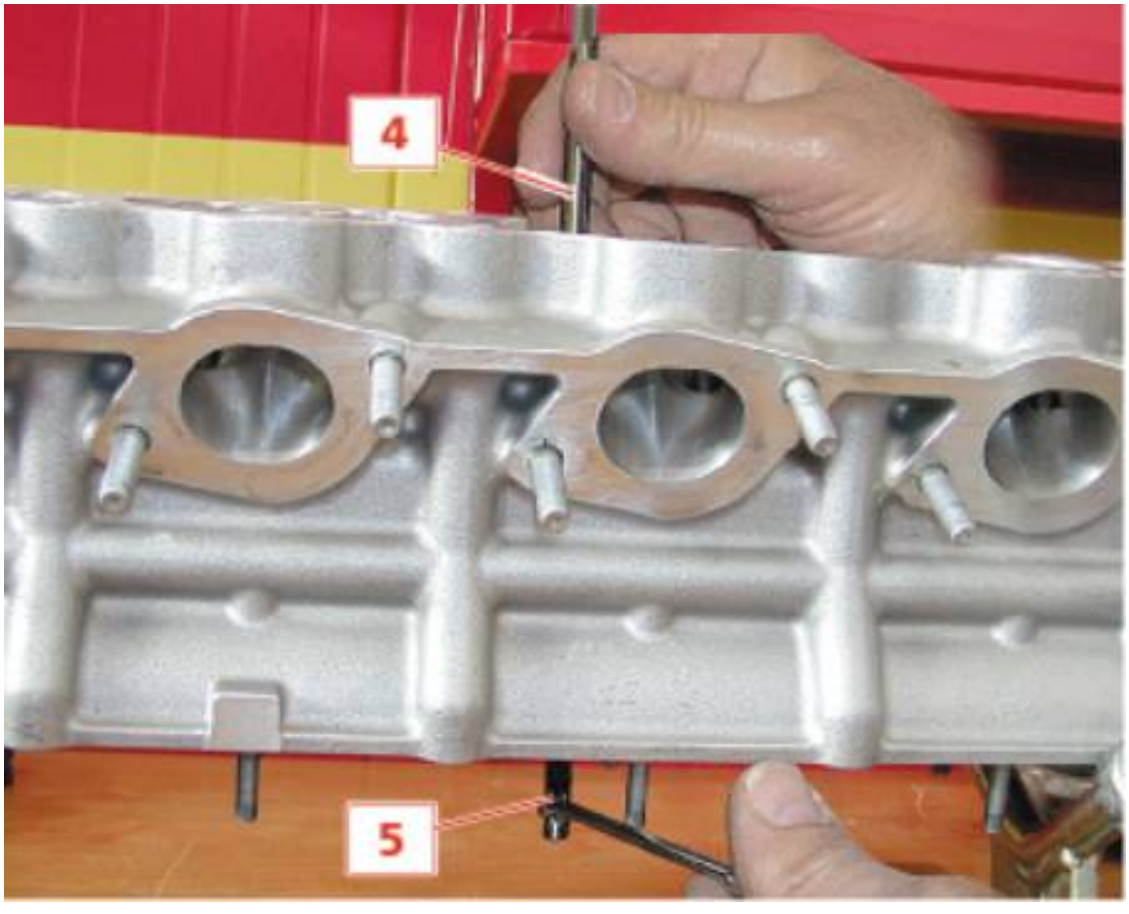
N.B.
The above described operation must be carried out by a specialized laboratory only

After having replaced the valve guides, it is necessary to grind the valve seats, thereby obtaining the prescribed union angle in order to perfectly match the seat-valve support surfaces. For this operation, use the recommended grinder for valve seats equipped with the relative

- To work on both sides of the head, position it on the special supports, working from the lid side.
- Insert the centering stem into the guide **(4)**, diameter **6 mm**, working from the side equipped with tightening screw.



- Lock the centering stem in the guide **(4)**, by means of the tightening screw **(5)**.

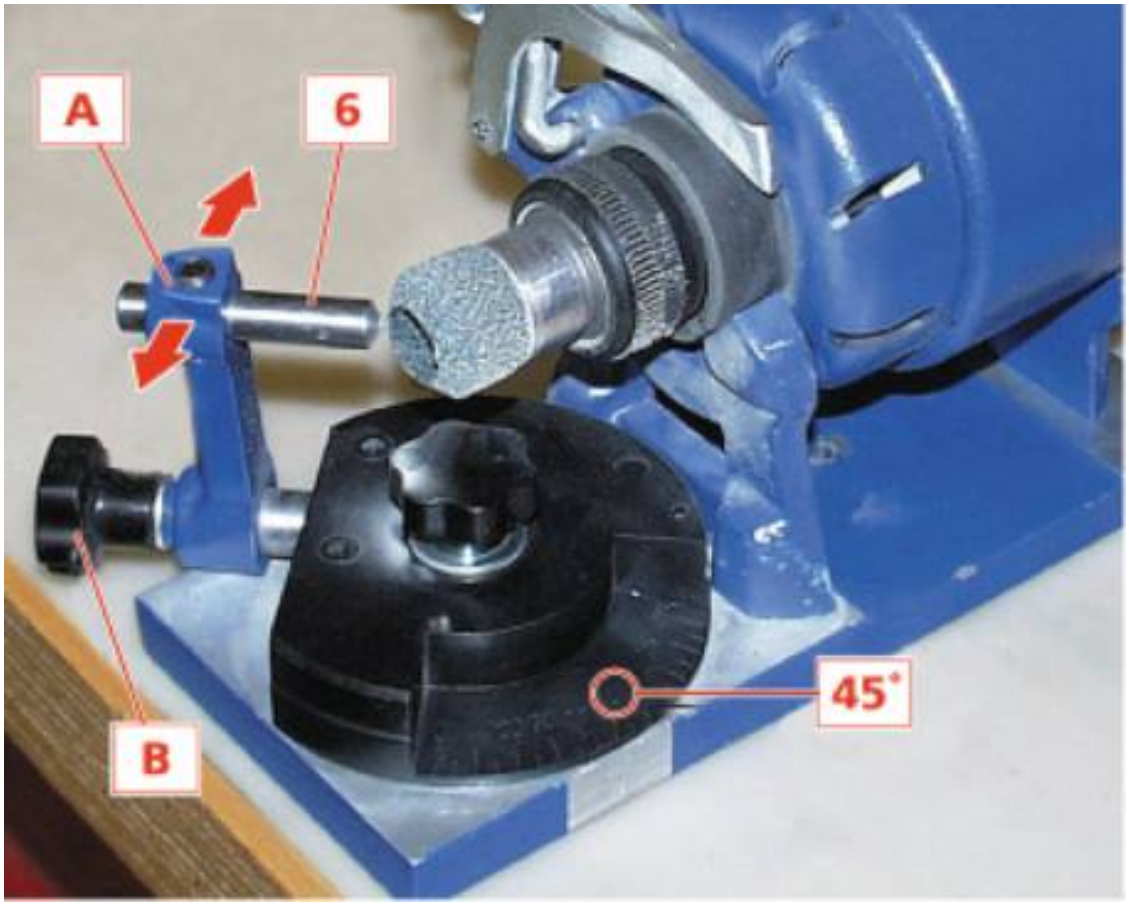


- The grinder must be fitted with the specific wheel for the valve seat to be machined:
  - for the intake valves use a **37 mm** diameter wheel;;
  - for the exhaust valves use a **33 mm** diameter wheel.

NOTEs
The wheel outer diameter must be slightly larger than that of the valve.

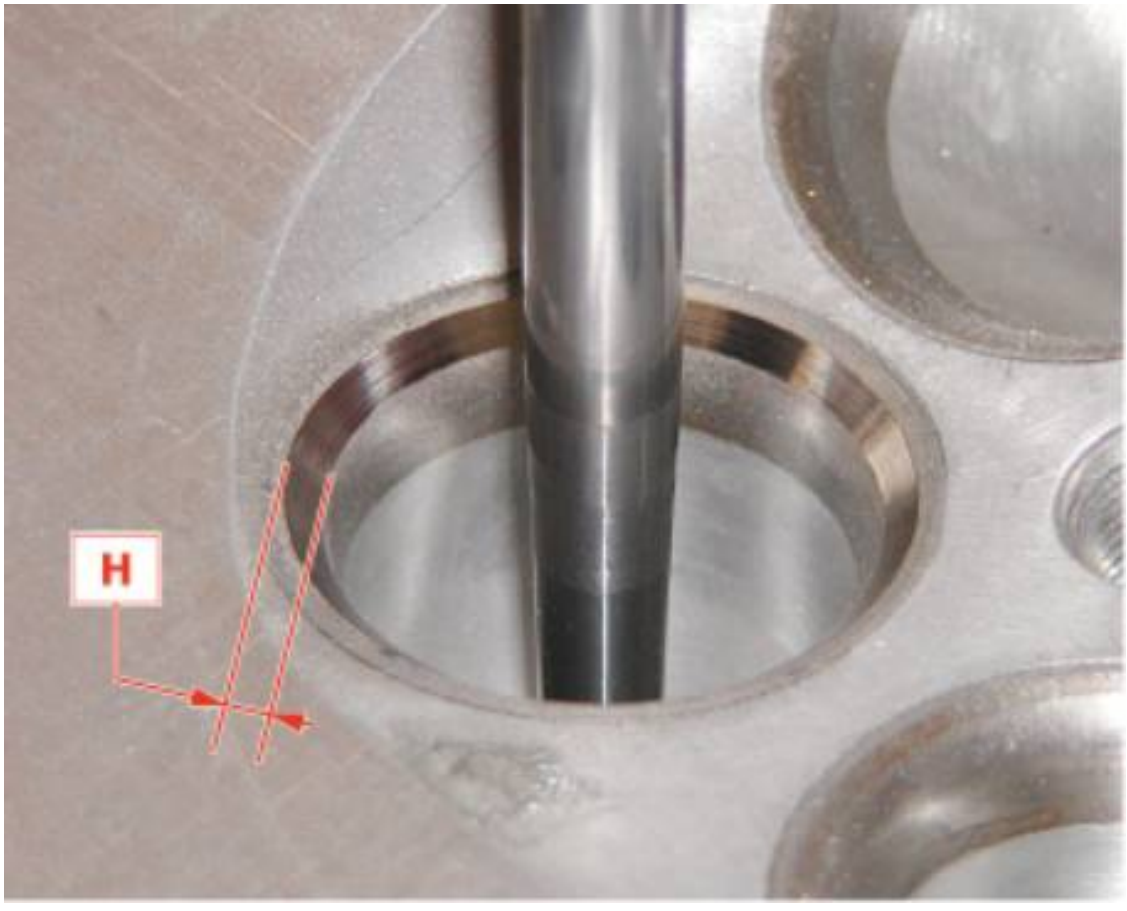
- Set the diamond point inclination **(6)** to **45°**, with respect to the fixed index on the base.
- Sharpen the wheel swinging the small connecting rod (**A**) which holds the diamond point and, at the same time, operate the control knob (**B**).

IMPORTANT
To prevent the abrasive product from infiltrating into the camshaft central hole, plug the latter and clean with compressed air

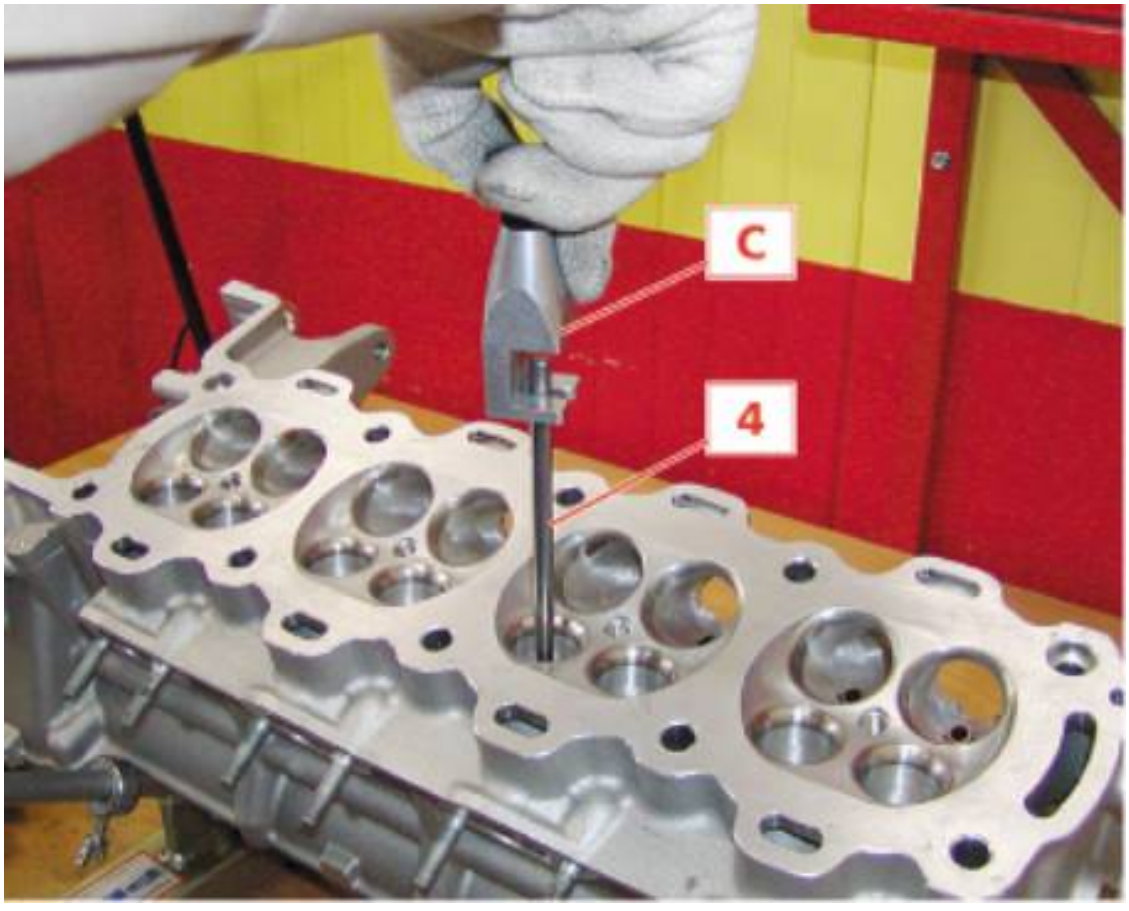


- Grease the centering stem and fit the grinder
- Move the wheel so that it skims the valve seat, and lock the screw which positions the knob **(7)** used to adjust the cutting depth..

- Start-up the grinder and machine the valve seat, gradually increasing the cutting depth using the knob **(7)**.
- Grind the whole surface **(H)** of the valve seat, letting the machine work freely for a few seconds. Check the working depth and the alignment (centering) of the machining with respect to the seat, adjusting the grinder position if necessary..



- Once the machining procedure is completed, lift the wheel operating the knob then remove it from the centering stem.
- Release the centering stem, working on the lower tightening screw.
- Using tool **(C)** supplied with the grinder, extract the centering stem **(4)** from the valve guide.



IMPORTANT
After having ground the seats as described above, it is not necessary to lap the valves before re-assembly.

There are two methods for checking the seat machining:
- application of a "Prussian Blue" layer;
- check of the hydraulic seal with "Vacutest".

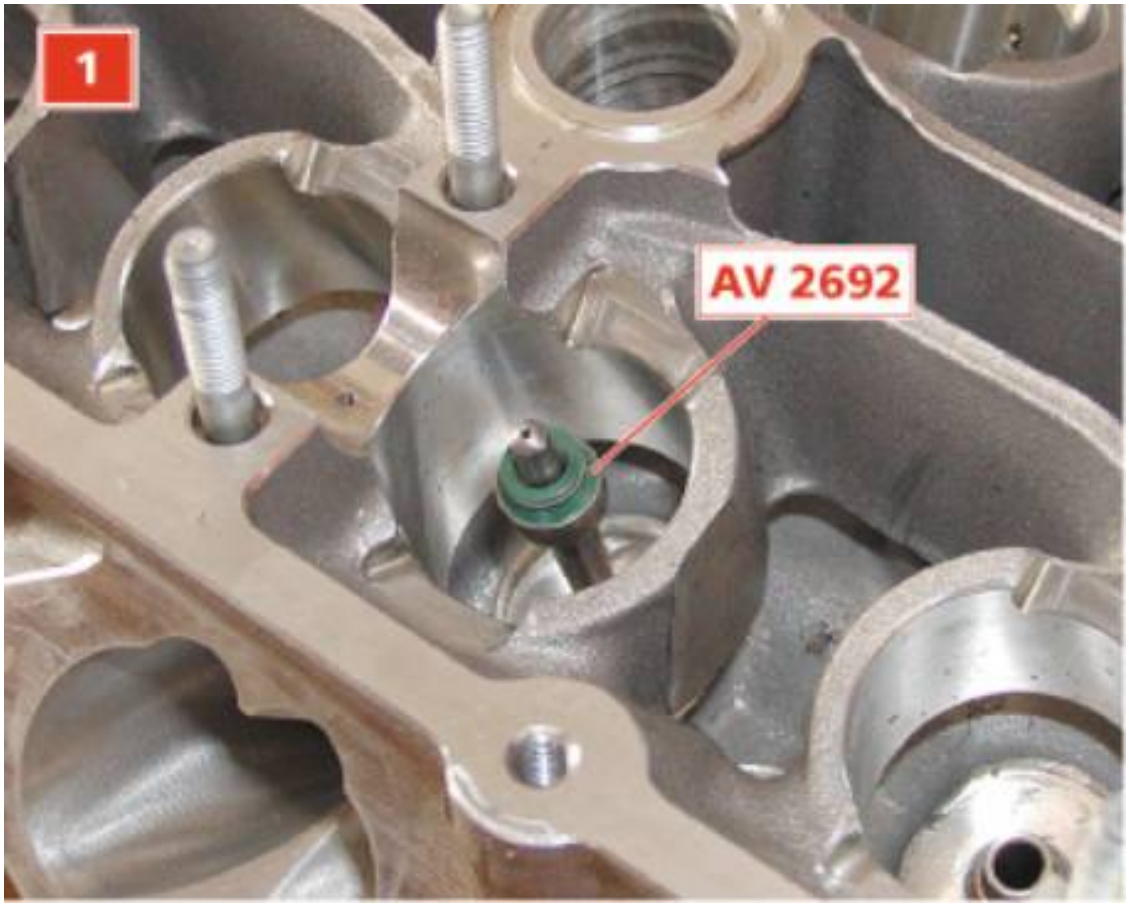
Check through the application of a "Prussian Blue" layer

- Using a paintbrush, apply a thin and uniform layer of "Prussian Blue" on the whole resting surface of the valve.
- Insert the valve into its guide, making it "strike" on its seat.
- Then rotate it manually and, after having removed it, check that the "Prussian Blue" layer is evenly distributed on the whole seat. If this is not the case, grind the seat once again.

Check of the hydraulic seal with "Vacutest""

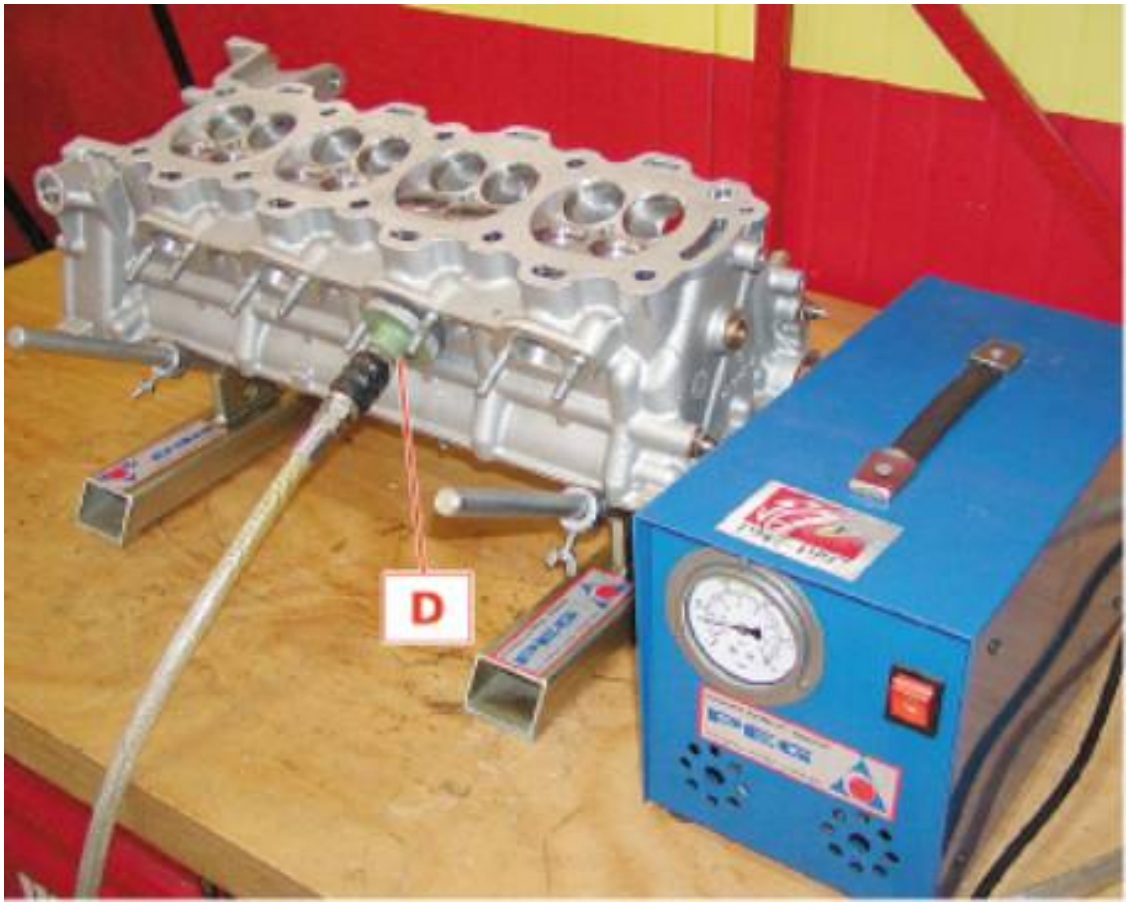
- Fit all the valves for a duct (intake or exhaust) and, in order to avoid that the cotter grooves - on the valve stem - damage the inside sealing surface of the grommet, fit the protection cap **AV 2944** and lubricate the coupling with engine oil

- Fit the sealing rings on the valve guides to be tested using the fitting tool **900026980** (Maserati part no.) or **AV 2692** (Ferrari part no.).



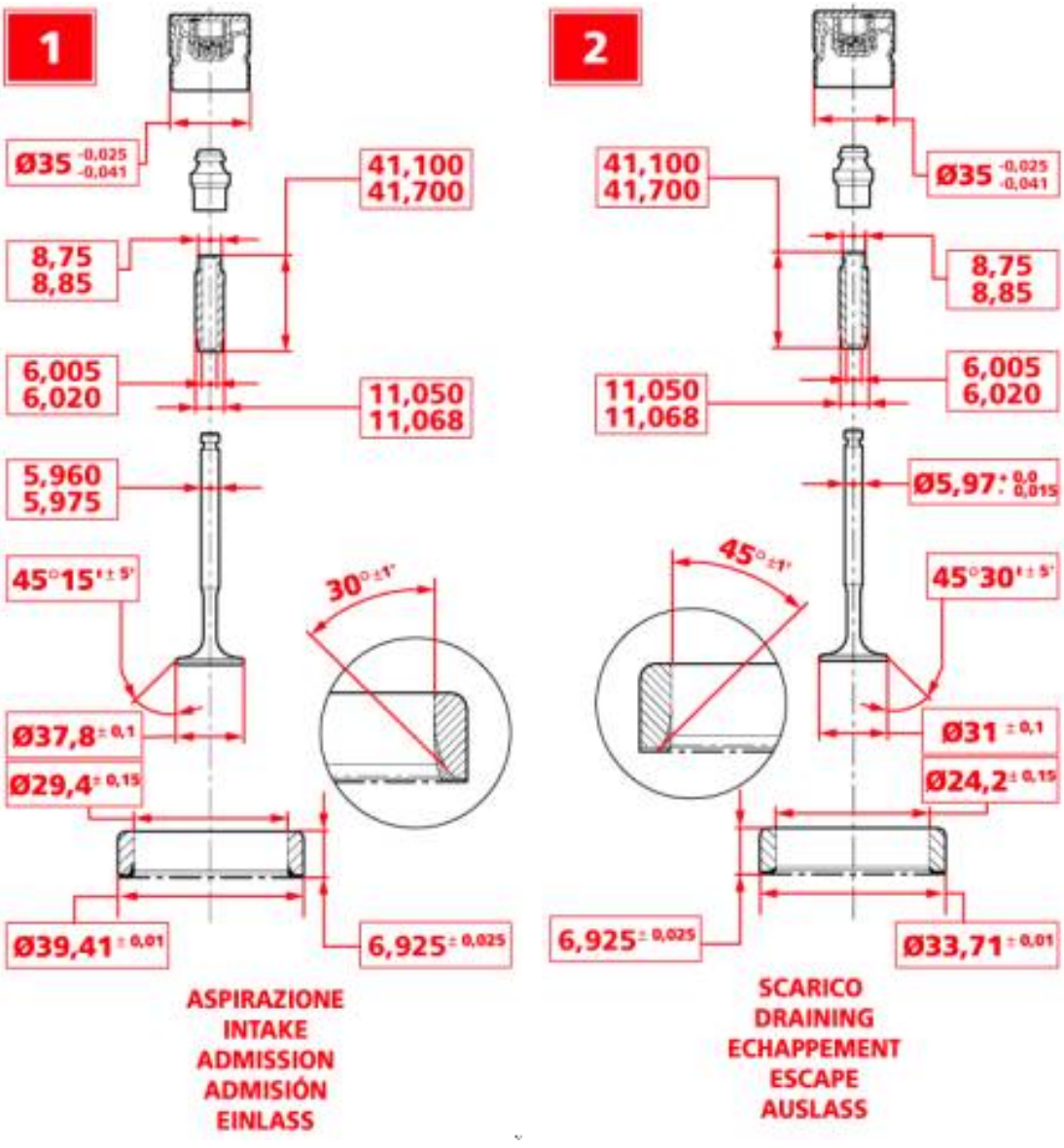
- Fit the rectangular punch **(D)**, supplied with the equipment, to plug the intake duct. Fit a round-shaped punch to plug the exhaust duct

- Activate the "Vacutest" and check on the pressure gauge that vacuum ranges between **0,94** and **0,86 bar**. If the value proves to be lower, check once again applying a "Prussian Blue" layer, in order to verify which is the seat to be ground once again.

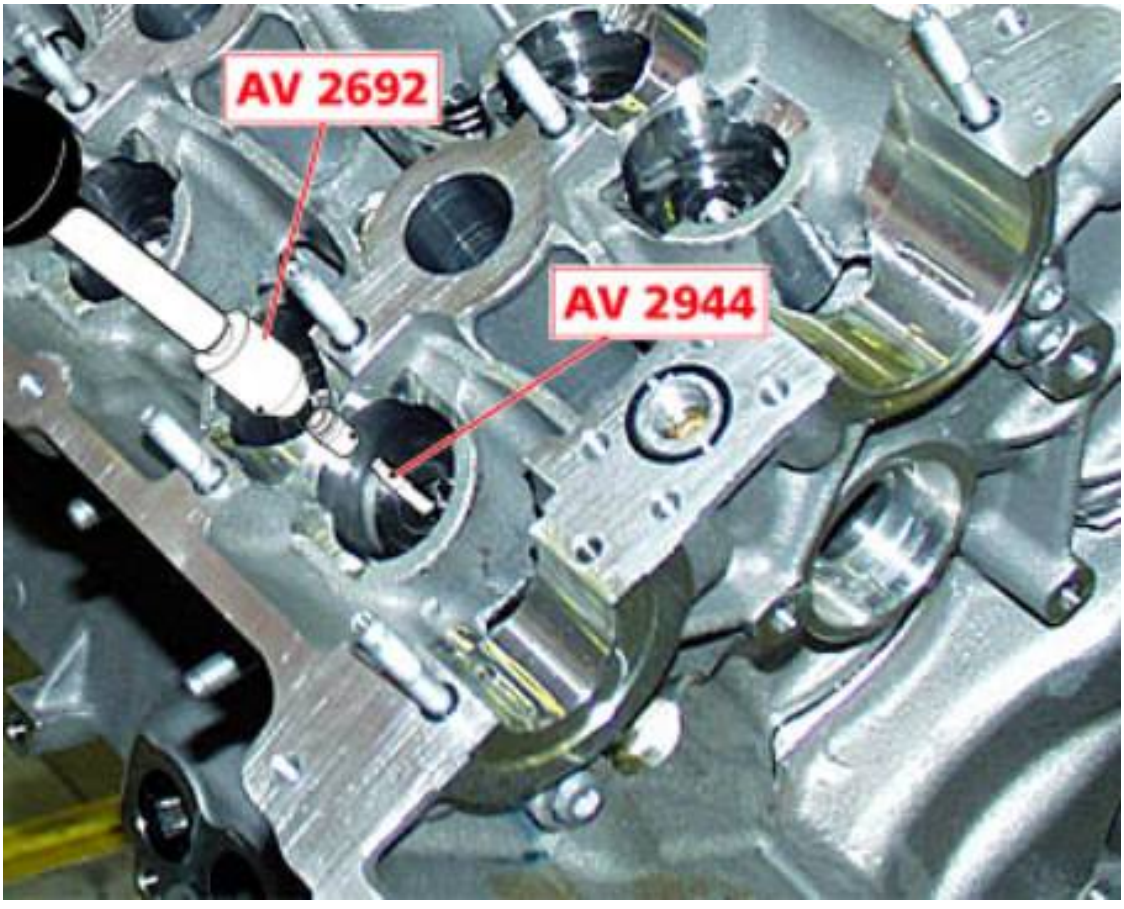


Fitting the valves and checking the springs

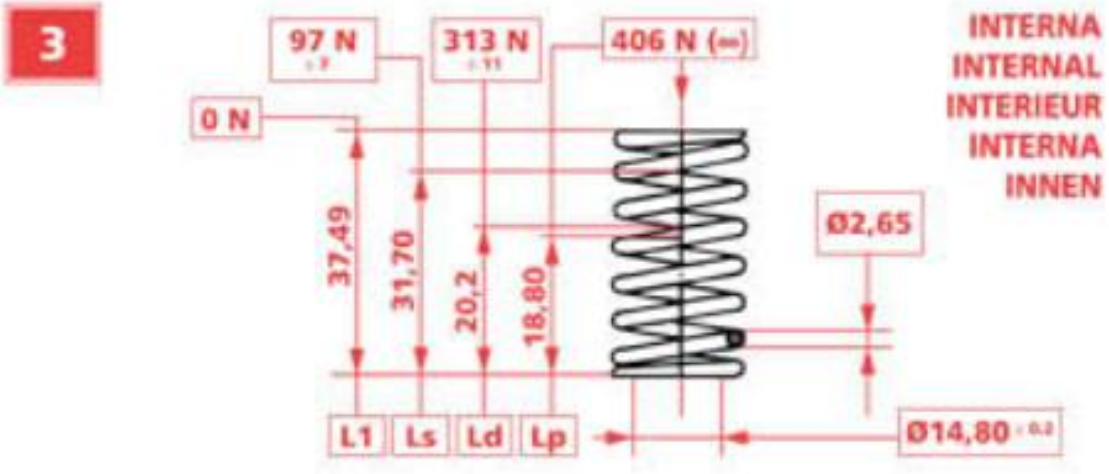
- During servicing, after a careful examination, check the state of the valves (Figure **1** and **2)** and, if necessary, replace them.

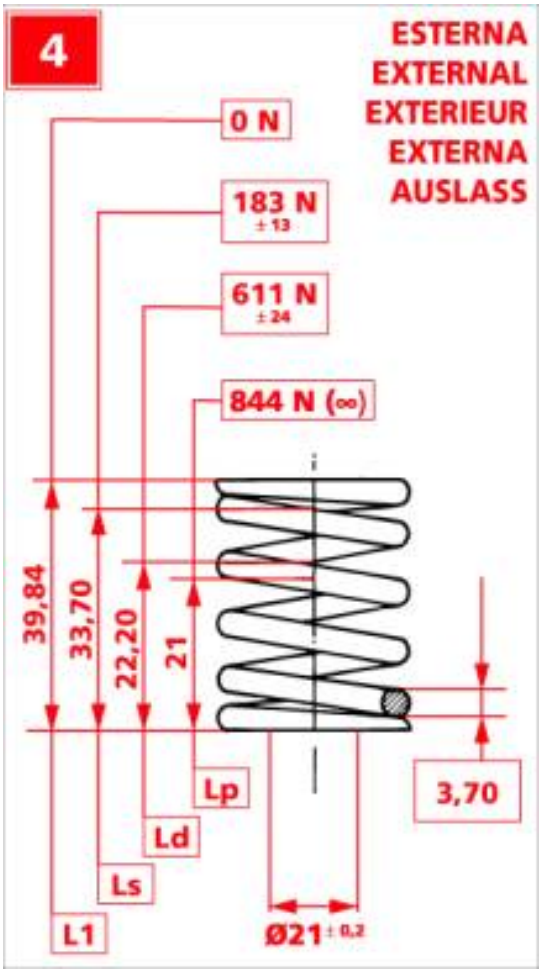


- Whenever necessary or, in any case, when fitting new valves, replace the grommets**,** using the punch **AV 2692** to insert them.
- To prevent the cotter grooving on the valve stem damaging the inner surface of the grommet, fit the protective cap **AV 2944** and lubricate the coupling with engine oil.



- The figures **3** and **4** show the nominal lengths (**L**) the spring must have depending on the charge (**N**) applied.



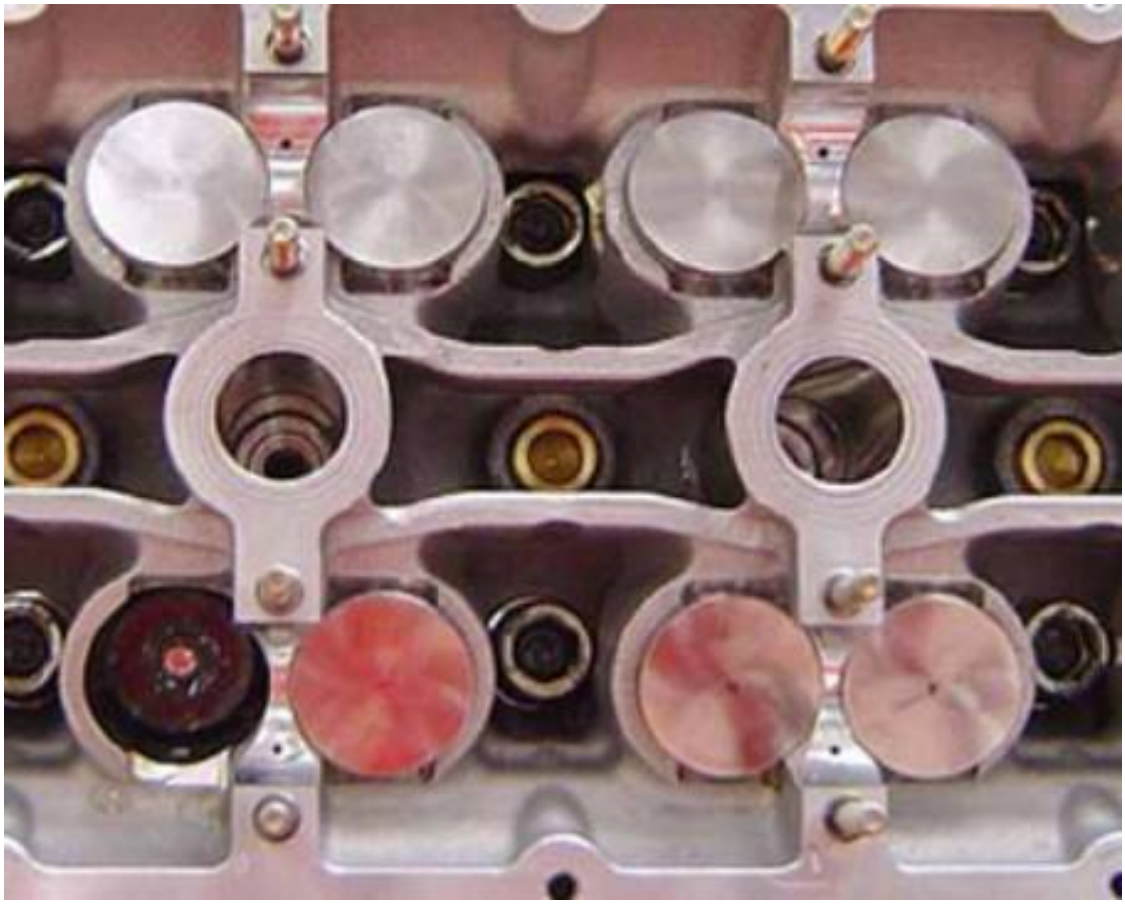


- Replace the deformed springs with new ones with a static charge of **30 ÷ 50 N**
- Examine the upper and lower washers visually to make sure they are intact.
- Refit the components, using the compression tool employed to remove them.

- The outer and inner valve springs must be fitted in a specific direction. A mark indicates the correct fitting direction: the marked end of both springs must be positioned in contact with the engine head.

- Fit the hydraulic tappets, abundantly lubricating the housings on the head and checking them for wear. The tappets on the head do not need to be positioned following a specific sequence, however, it is recommended to refit the hydraulic tappets following the same order in which they were removed.

Verifica dimensionale alberi a camme



SECONDARY AIR PUMP

Removing-refitting the secondary air pump

- Place the vehicle on the hoist.
- Remove the floor guard beneath the engine

Removing-refitting the engine floor guard

- Remove the trim guards.

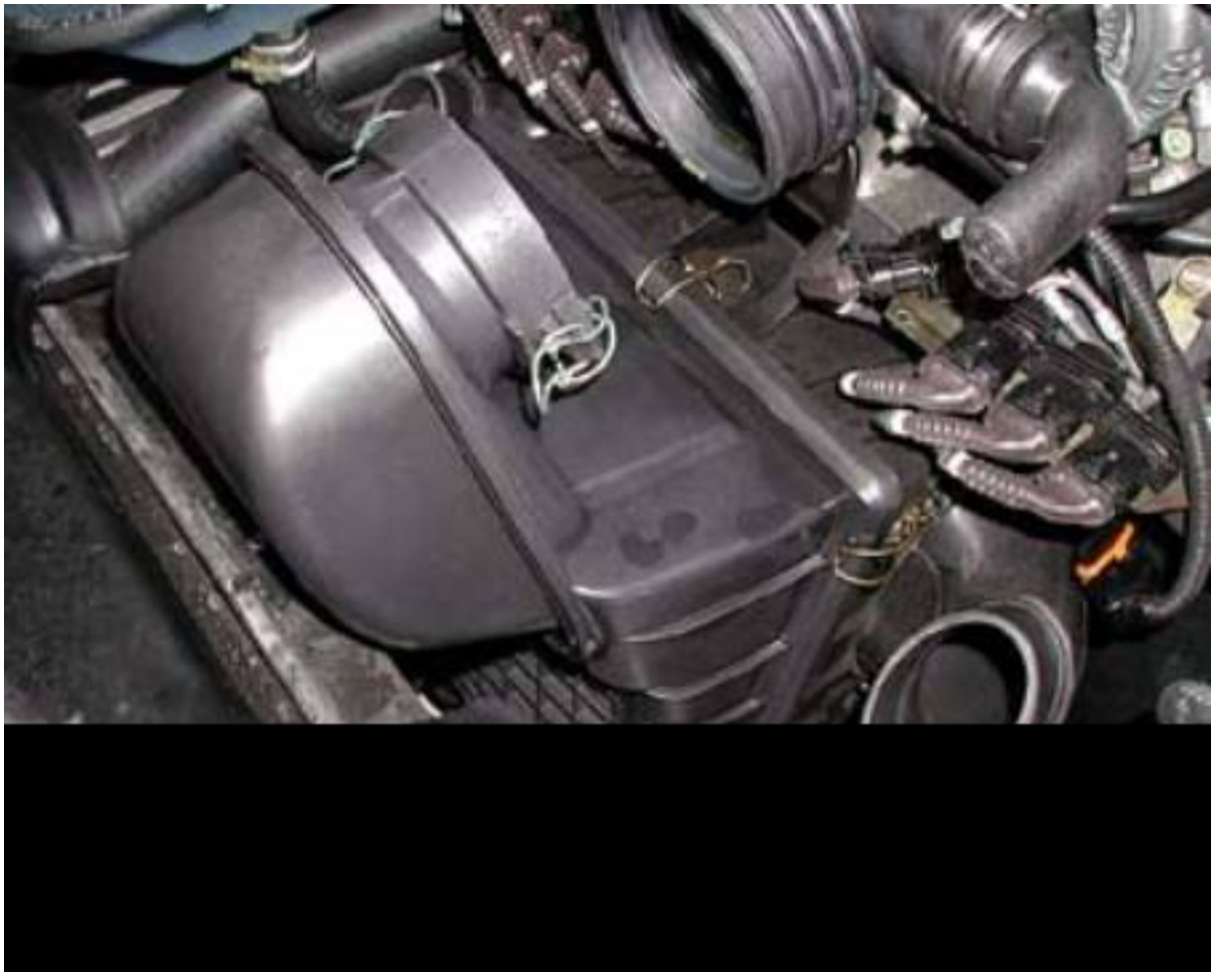
- Detach the electrical connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



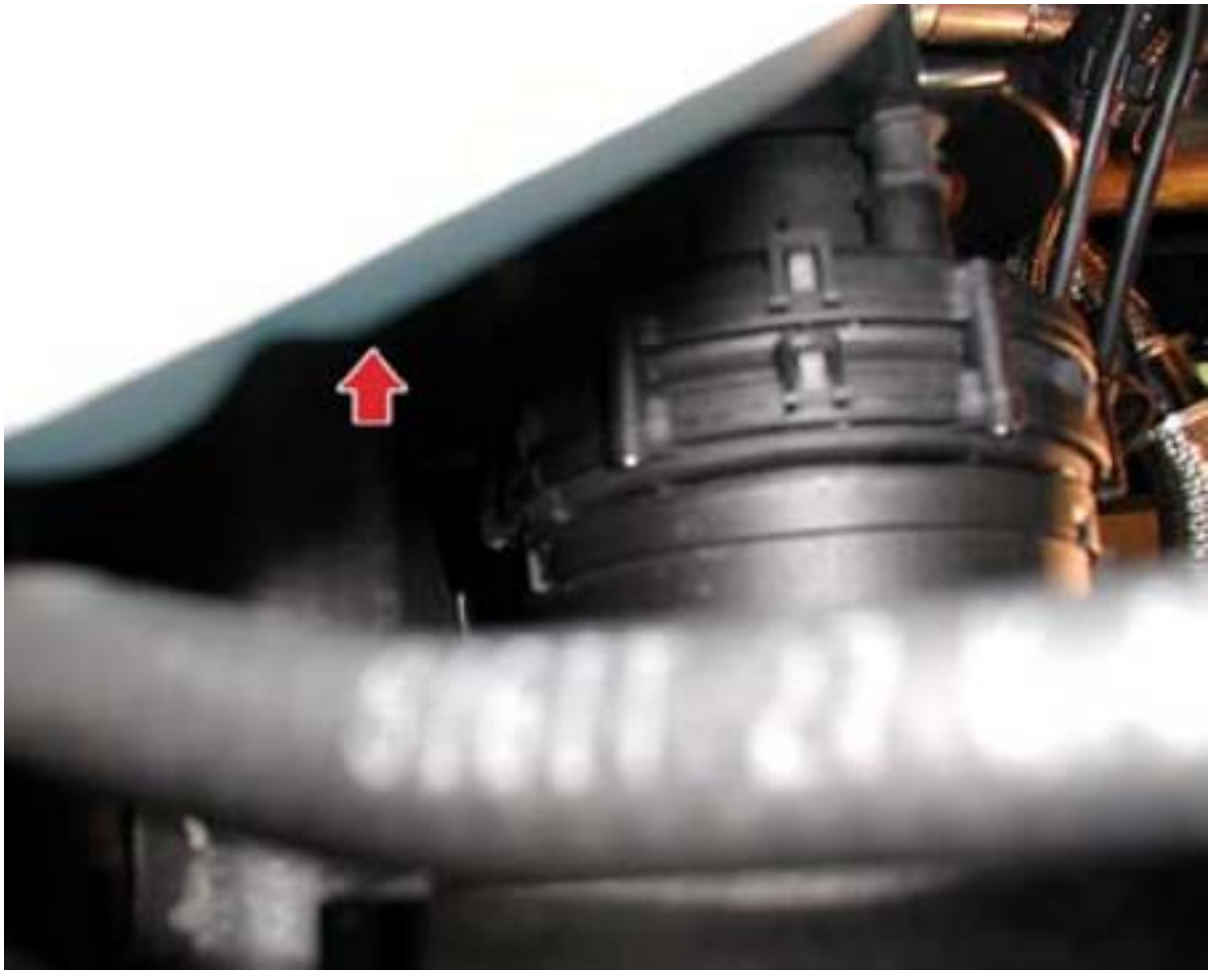
- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the domes' bar.

- Remove the air filter housing.

- Disconnect the hosing from the pump.

- Lift the hoist and undo the lower fastening screw on the air pump support bracket.



- View of the part removed, showing the correct position of the lower fastening screw, accessible with the vehicle lifted and working from underneath the vehicle itself.

- Lower the hoist and undo the upper fastening screw on the air pump support bracket.

- Detach the electrical power supply connection and remove the supplementary air pump.

- With the component on the bench, undo the screws fastening the pump to the bracket and detach them.

When refitting, follow the above procedures in reverse order and, in addition, clean the air flow meter and the filter housing thoroughly to prevent the infiltration of impurities which could impair the operation of the air flow meter sensor.

VACUUM TANK

Removing-refitting the vacuum tank

- Place the vehicle on the hoist.
- Remove the floor guard beneath the engine

Removing-refitting the engine floor guard

- Remove the trim guards.

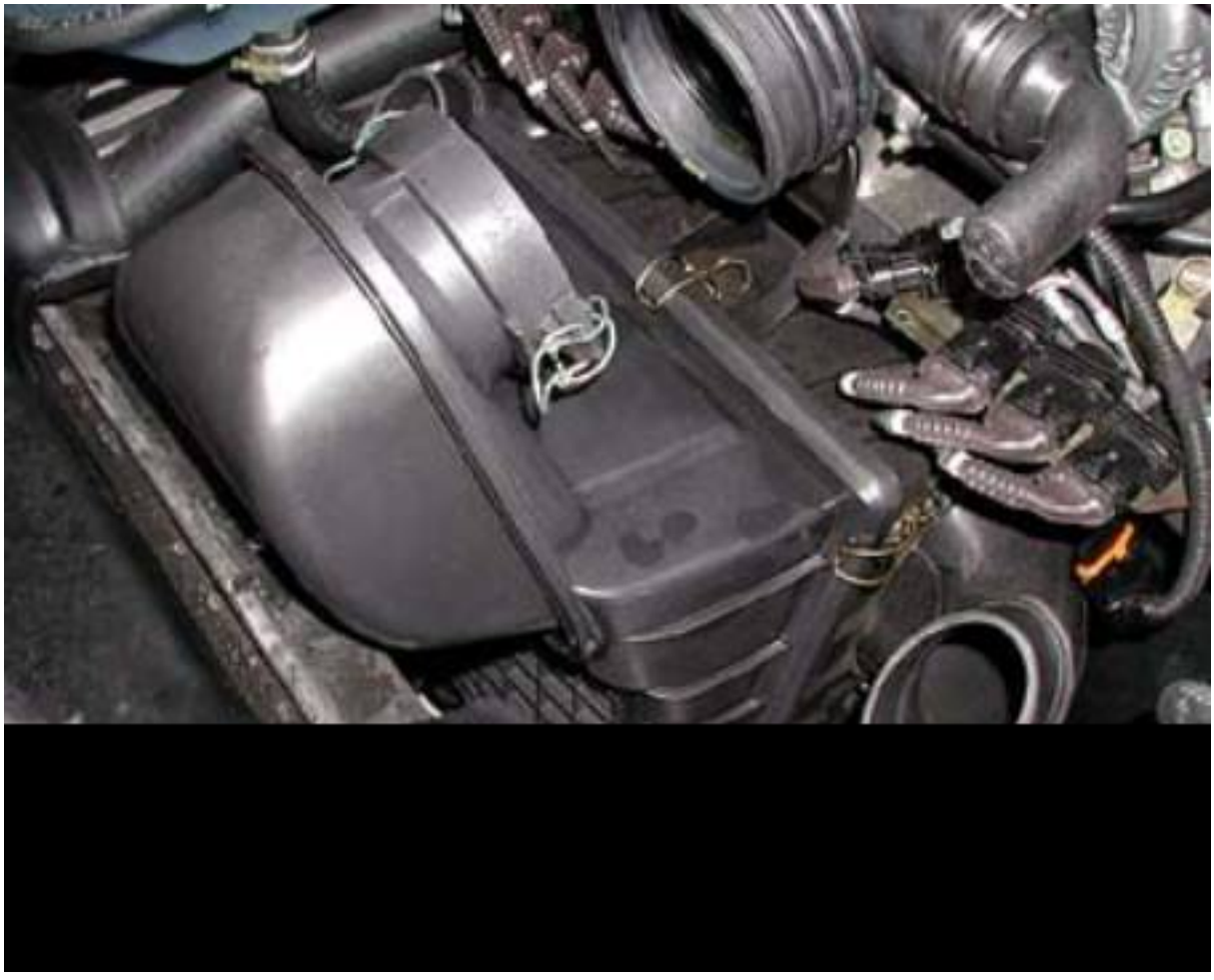
- Detach the electrical connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



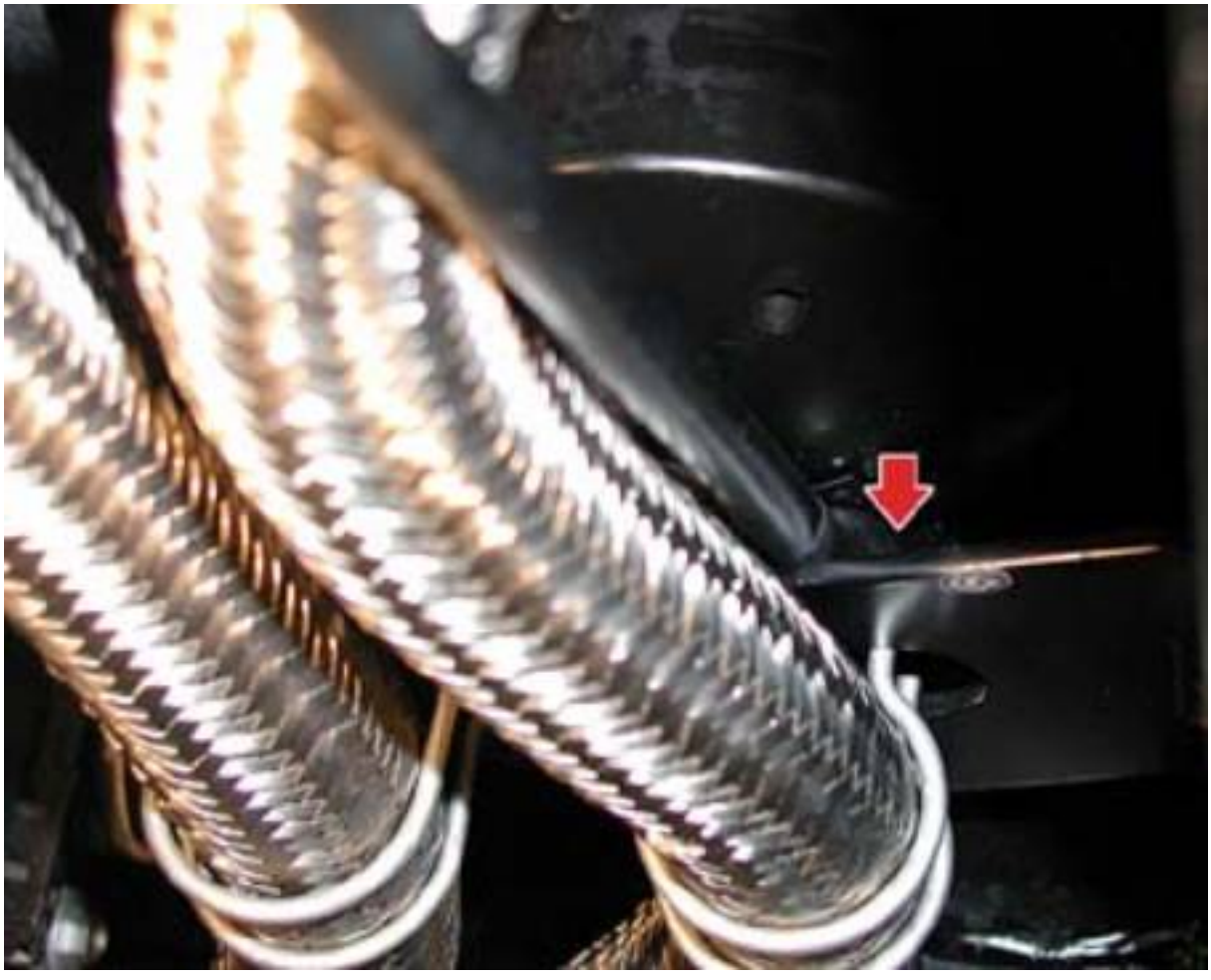
- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the domes' bar.

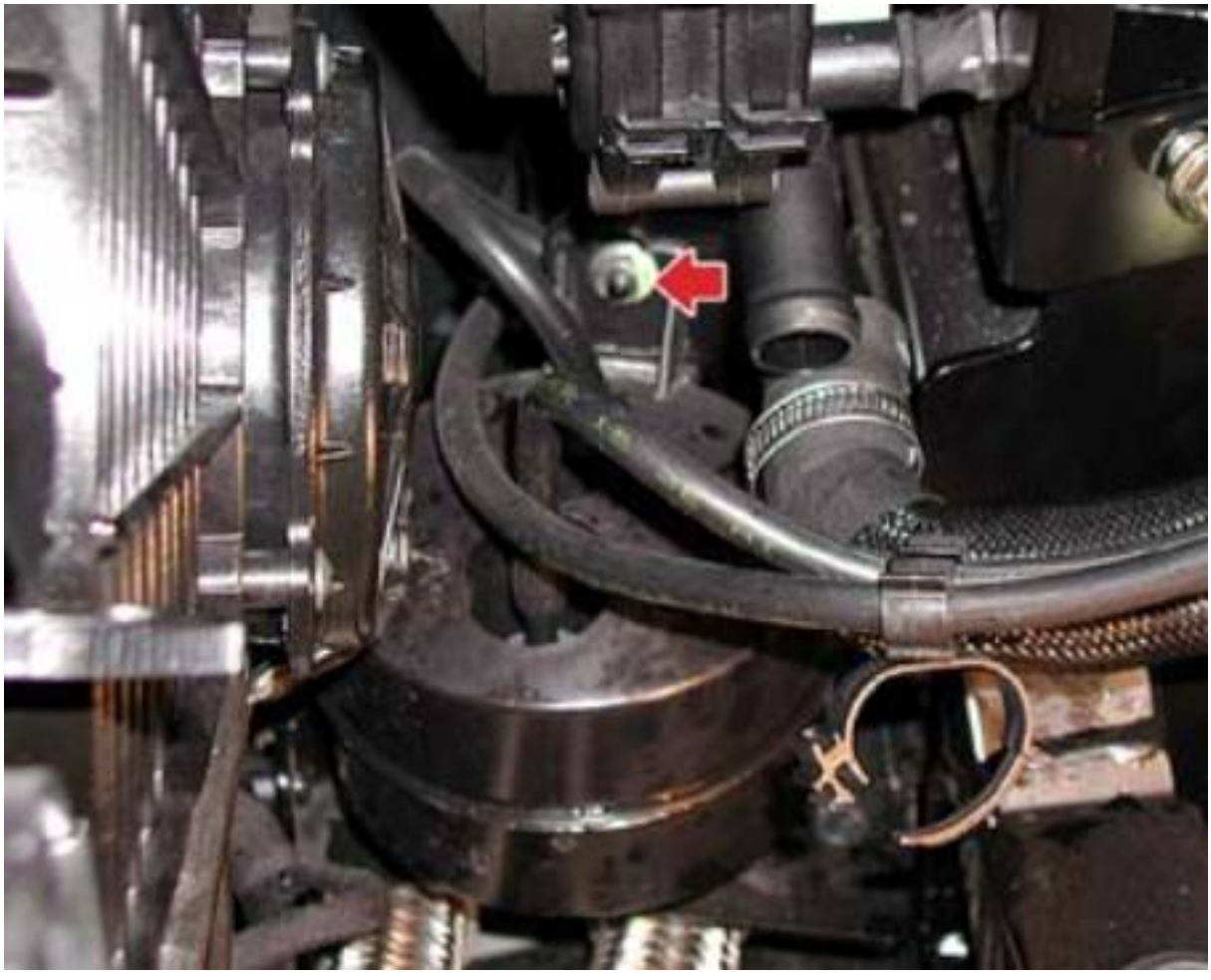
- Remove the air filter housing.

- Lift the hoist and unscrew the nut fastening the two oil pipes’ bracket.

- Loosen the lower fastening nut on the vacuum tank.



- Lower the hoist and loosen the upper fastening nut on the vacuum tank.



- Disconnect the two vacuum lines and remove the vacuum tank.

When refitting, follow the above procedures in reverse order and, in addition, clean the air flow meter and the filter housing thoroughly to prevent the infiltration of impurities which could impair the operation of the air flow meter sensor.

PNEUMATIC ACTUATOR CONTROL SOLENOID VALVE

Removing-refitting the pneumatic actuator control solenoid valve

- Place the vehicle on the hoist.
- Remove the secondary air pump.

Secondary air pump

- Undo the two fastening screws, detach the electrical connection, disconnect the two vacuum lines and remove the pneumatic actuator control solenoid valve.

When refitting, follow the above procedures in reverse order.

Union between pump and PIPELINE FOR AIR DISTRIBUTION TO VALVES

Removing-refitting the union between the pump and the pipeline for air distribution to the valves

- Remove the trim guards.

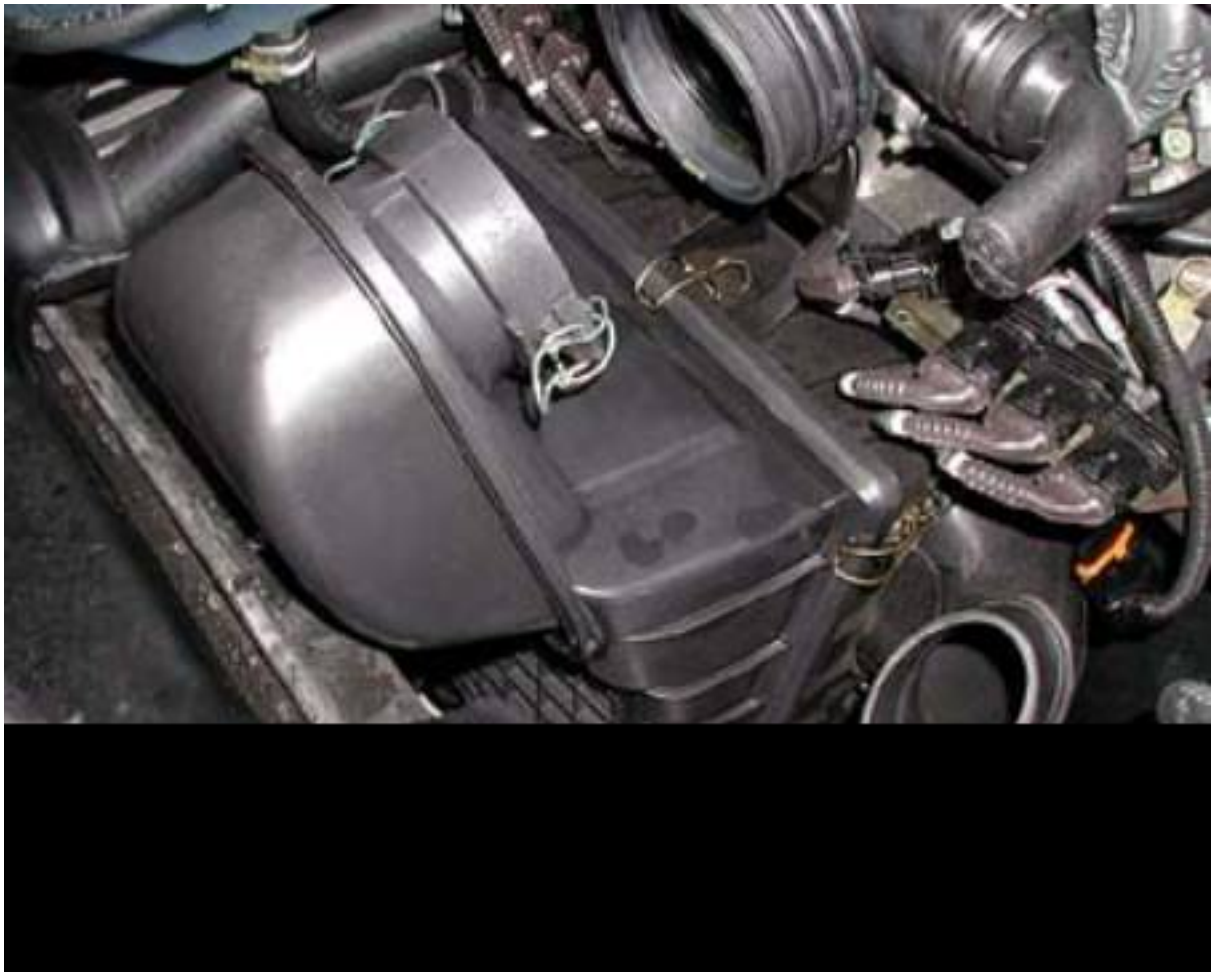
- Detach the electrical connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the domes' bar.

- Remove the air filter housing.

- Disconnect the union from the air pump.

- Disconnect the sleeve from the pipeline, open the clamps and remove it.

When refitting, follow the above procedures in reverse order and, in addition, clean the air flow meter and the filter housing thoroughly to prevent the infiltration of impurities which could impair the operation of the air flow meter sensor.

Secondary air pneumatic actuator valves

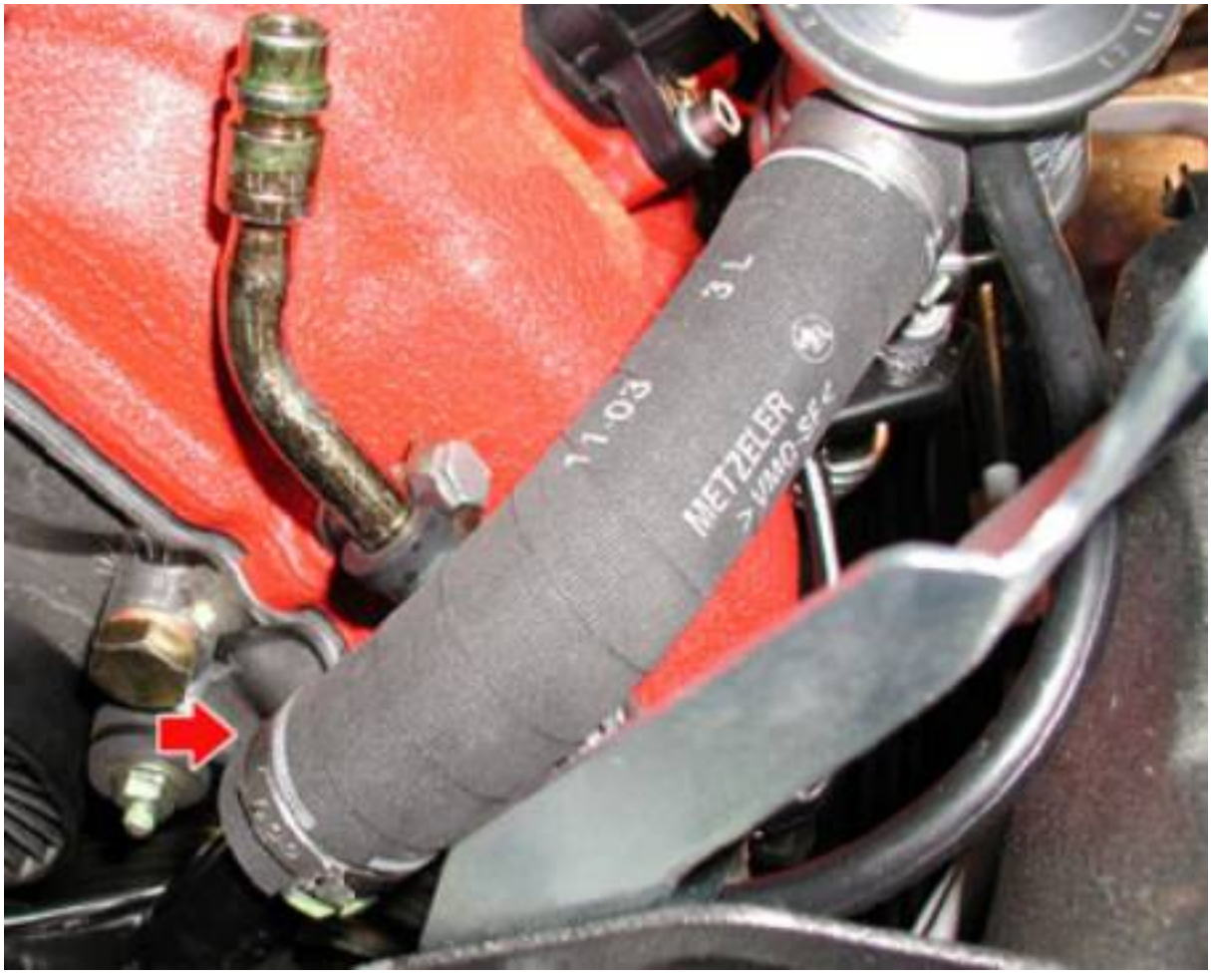
Removing-refitting the secondary air pneumatic actuator valves

- Remove the floor guard beneath the engine

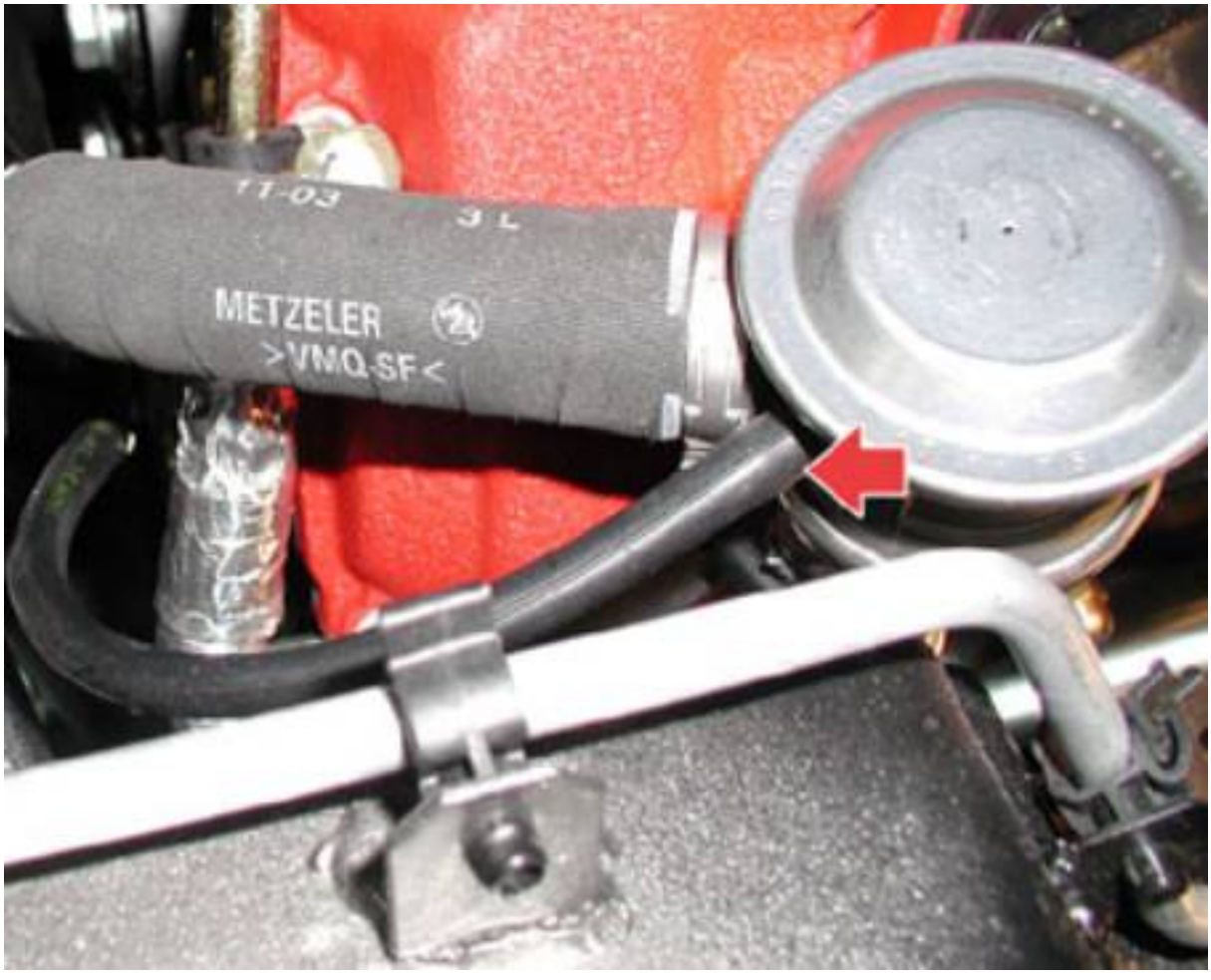
Removing-refitting the engine floor guard

- Remove the trim guards.

- Disconnect the air hose from the pipeline.

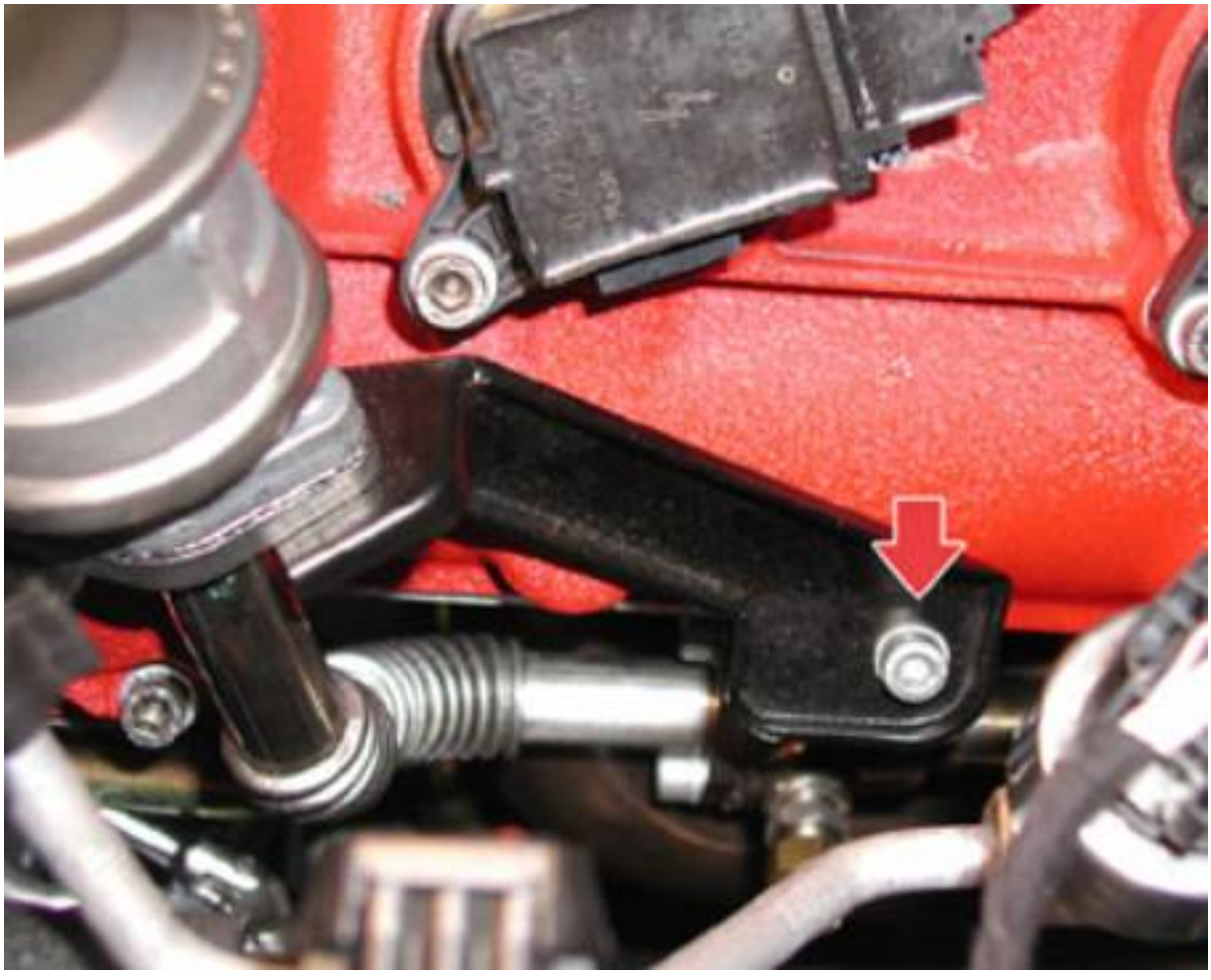


- Disconnect the vacuum air pipe from the valve.

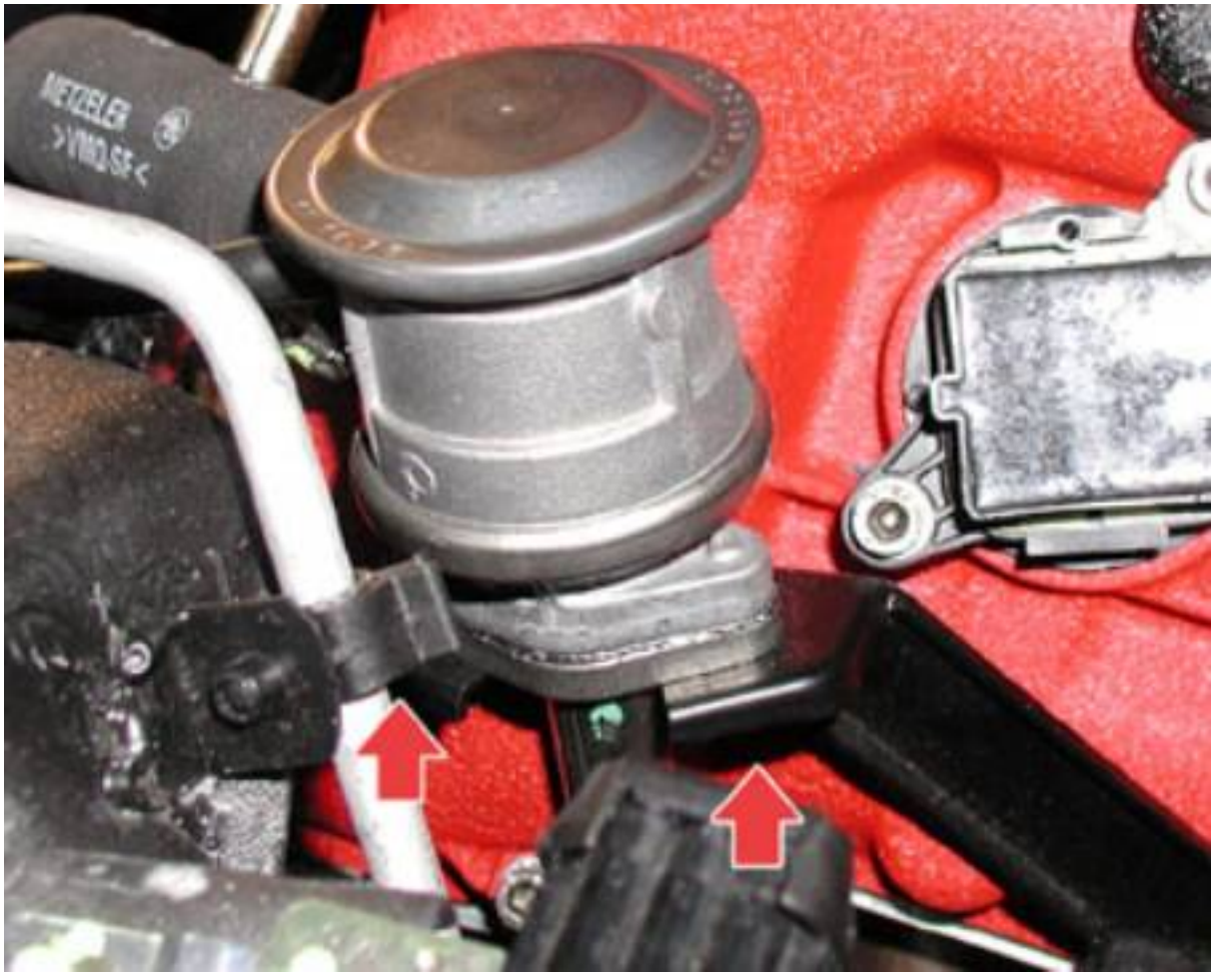


- Undo the front fastening screw on the valve support bracket.

- Undo the rear fastening screw on the valve support bracket.



- Lift the hoist and, working from beneath the vehicle, undo the two screws fastening the valve to the air pipeline.



- Remove the secondary air pneumatic actuator valve complete with the gasket and support bracket.

N.B.
This procedure can also be applied to the other pneumatic actuator valve, provided that you remove the fuse box in the engine compartment and the relative support before working on the valve.

When refitting, follow the above procedures in reverse order

Tightening torques

DESCRIPTION	TORQUE	PRODUCT
Nut fastening bushing to gearbox	130 Nm	
Screw fastening rubber bushing to rear underframe	50 Nm	
Nut for fastening RH exhaust extension mounting brackets to gearbox	24 Nm	
Nut and stud bolt for fastening LH exhaust extension mounting brackets to gearbox	7,4 Nm	
Unions for oil coils to gearbox	34 Nm	
Unions on radiator for oil lines	34 Nm	
Nut for fastening engine/gearbox connection pipe	70 Nm	
Screw for fastening F1 to gearbox	24 Nm	
Screw for fastening F1 to gearbox	32 Nm	
Screw for fastening upper bracket to actuator	24 Nm	
Screw for fastening lower bracket to actuator	24 Nm	
Srew for fastening lower actuator bracket to differential housing	49 Nm	
Nut fastening upper actuator bracket to gearbox housing	24 Nm	
Screw for fastening F1actuator cover to gearbox	7.4 Nm	
Screw for fastening F1actuator cover to gearbox	7.4 Nm	
Nut for fastening clutch housing to crankcase	70 Nm	
Flanged screw for fastening starter motor	24 Nm	

TOOLKIT

Specific Equipment

Description	Code	
Clutch centring shaft	900026250	
Transmission line mount	900027300	
Tool for checking electronically-controlled gearbox oil level	900027330	
Key for clutch pressure sensor	900027370	

REMOVING-REFITTING THE CLUTCH

Clutch removal

- Remove the exhaust tailpipes.

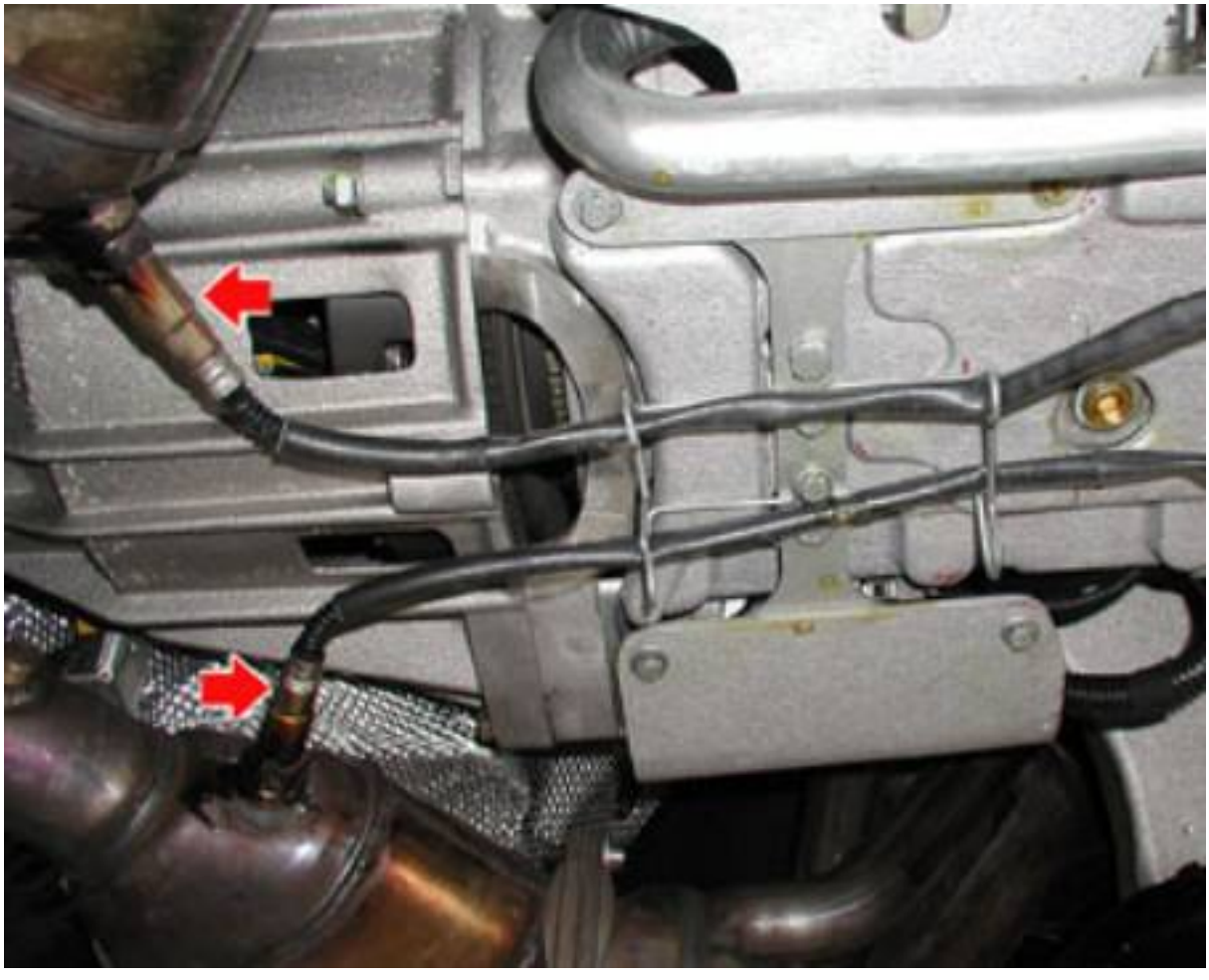
Removing-refitting the tailpipe

- Remove the gearbox.

Removing-refitting the gearbox

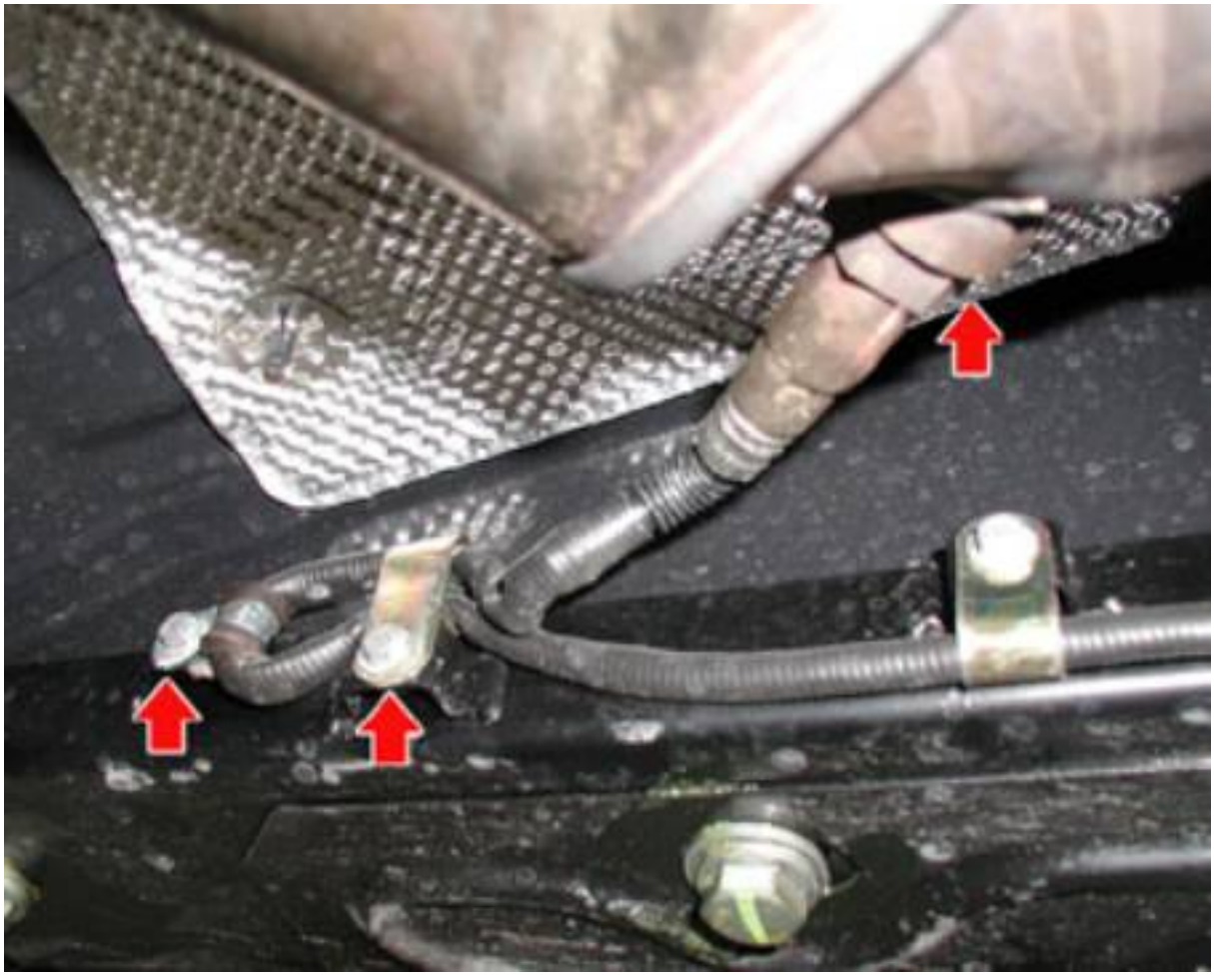
ALL VERSIONS EXCEPT USA- CANADA

- Unscrew the two rear Lambda sensors on the catalytic converters and release the cables from the central fastening bracket.



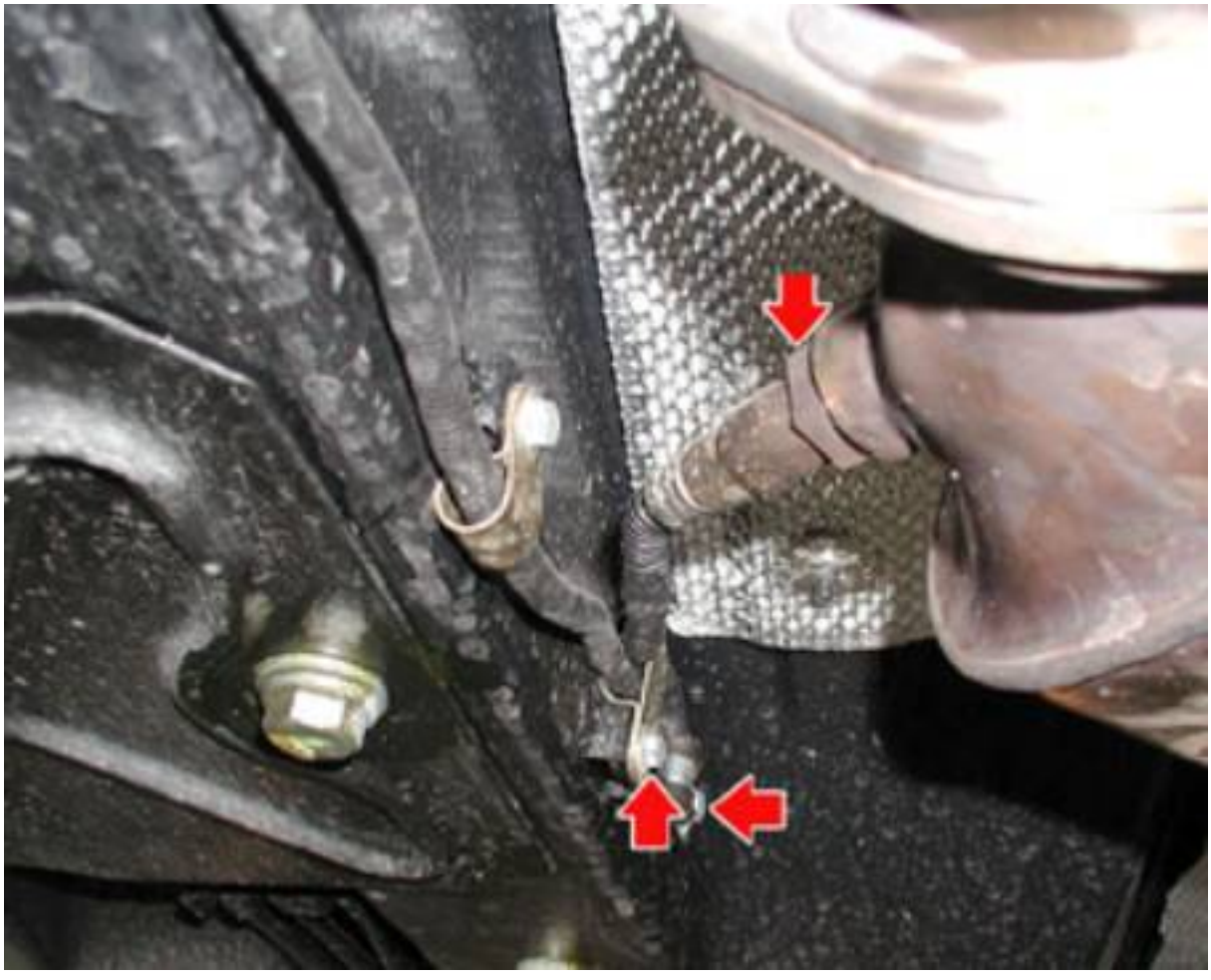
ALL VERSIONS EXCEPT USA- CANADA

- Undo the wiring fastening screws, then unscrew the Lambda sensor from the left-hand catalytic converter.



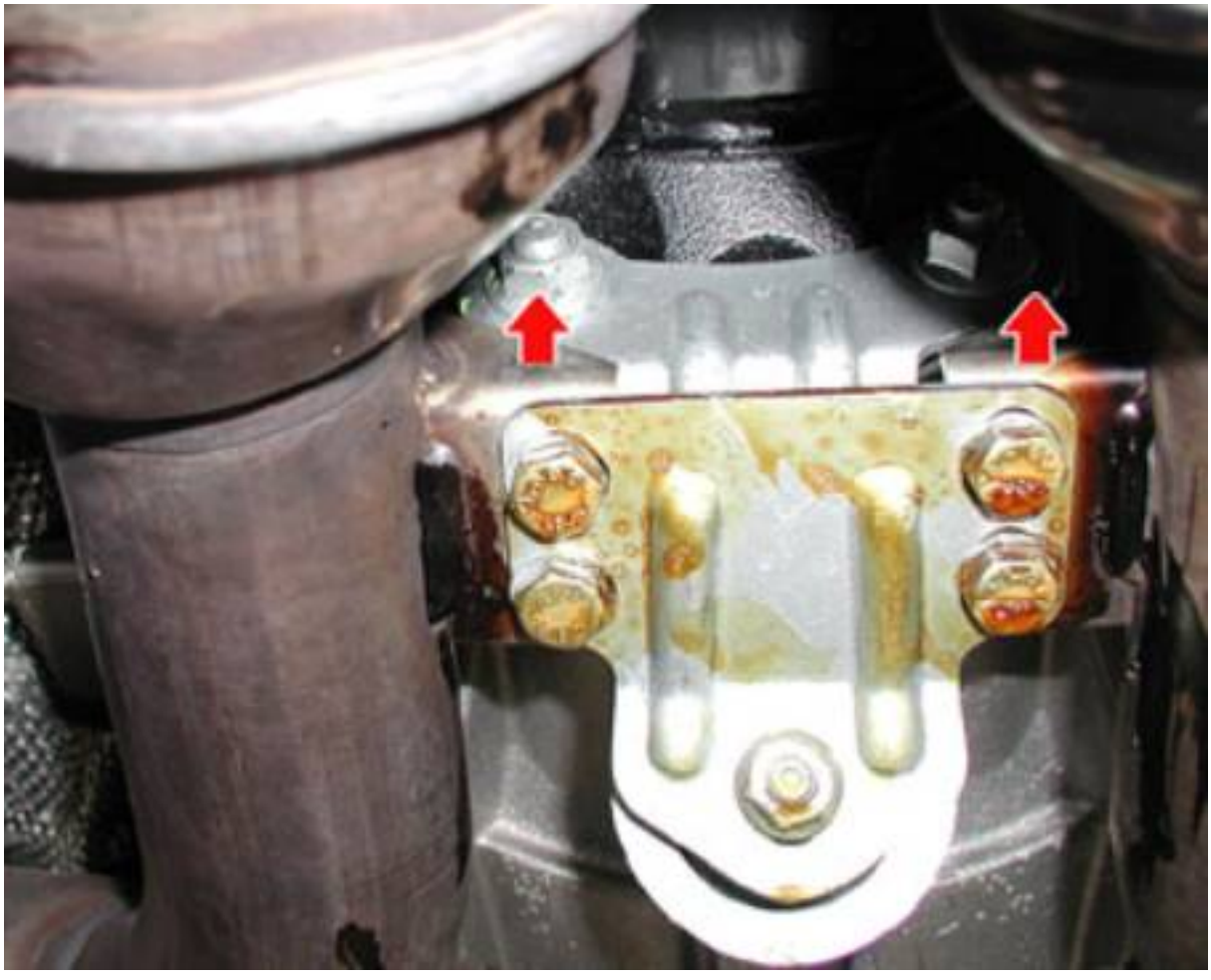
ALL VERSIONS EXCEPT USA- CANADA

- Undo the wiring fastening screws, then unscrew the Lambda sensor from the right-hand catalytic converter.



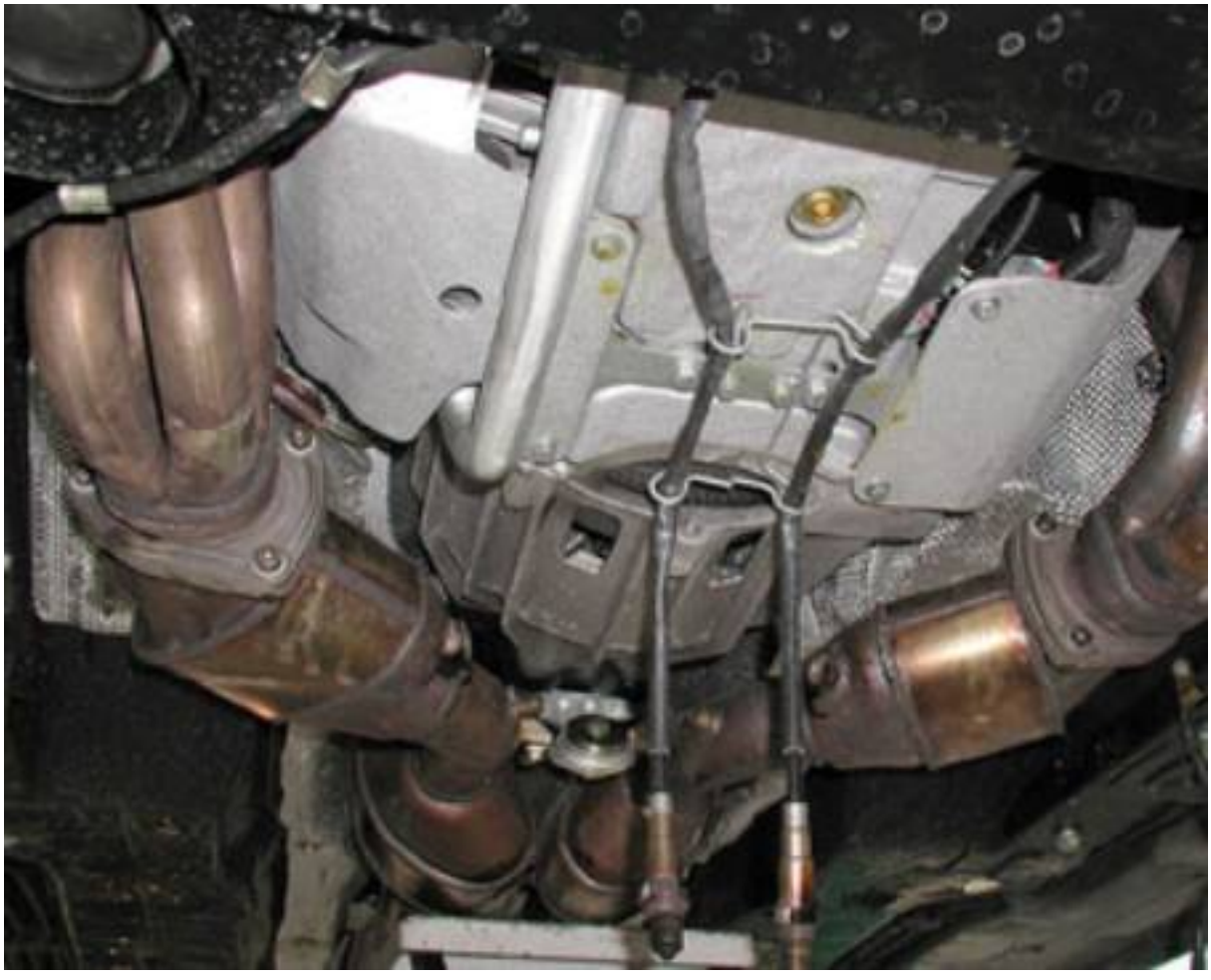
ALL VERSIONS EXCEPT USA- CANADA

- Unscrew the fastening nuts on the central catalytic converter mount.



ALL VERSIONS EXCEPT USA- CANADA

- Unscrew the six screws fastening the catalytic converter to the relative manifolds.



ALL VERSIONS EXCEPT USA- CANADA

- Position a hydraulic support beneath the catalytic converter/ central exhaust silencer assembly, lower it slowly, then remove the catalytic converters together with the central exhaust silencers.
- Retrieve the catalytic converter conductive gaskets.

FOR USA-CANADA VERSION ONLY

- Remove the two exhaust extensions.

Exhaust extension pipe

- Remove the central exhaust silencer.

Exhaust silencer

- Remove the floor guard beneath the engine.

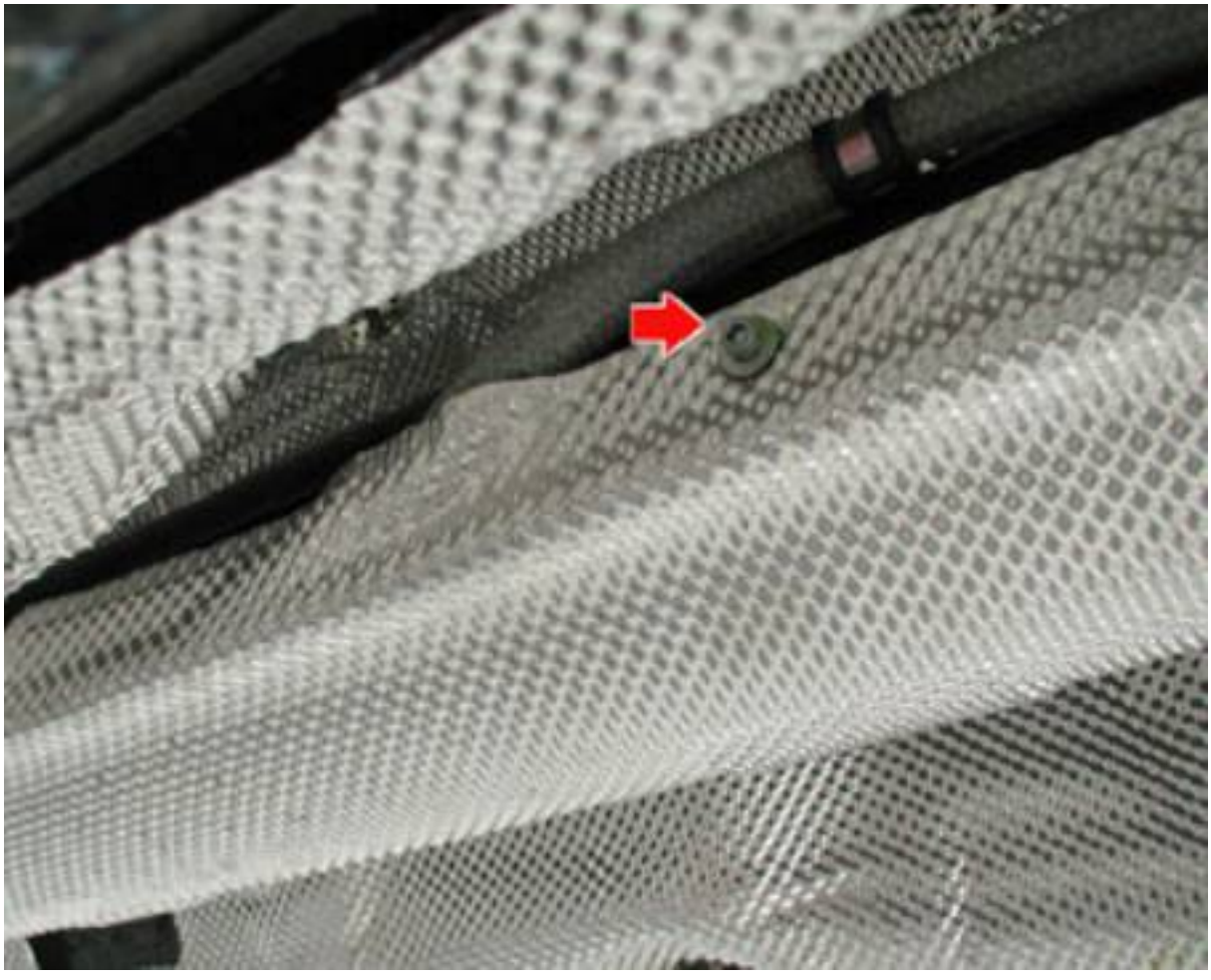
Engine floor guard

- Remove the catalytic converters.

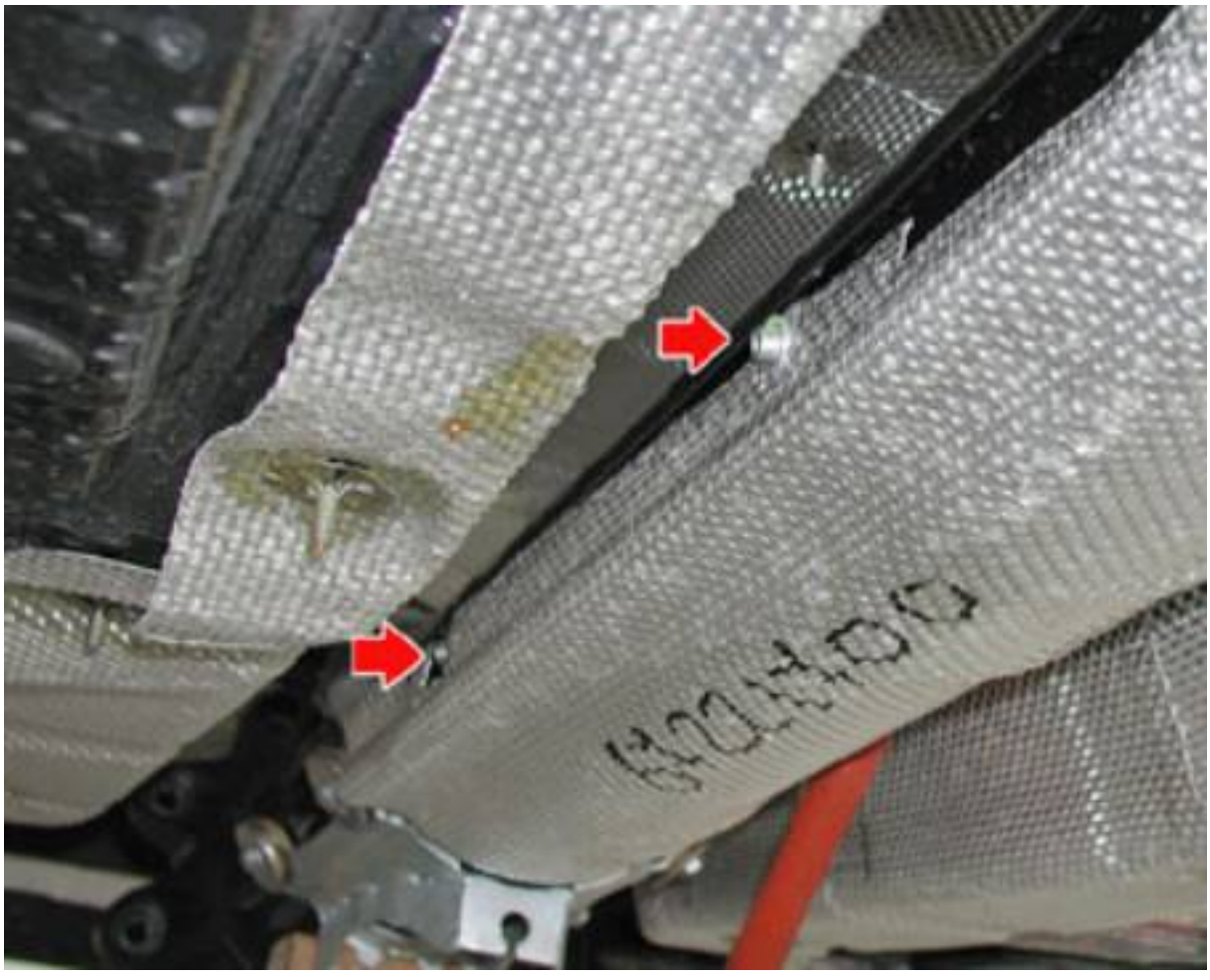
Catalytic converters

OPERATIONS VALID FOR ALL VERSIONS

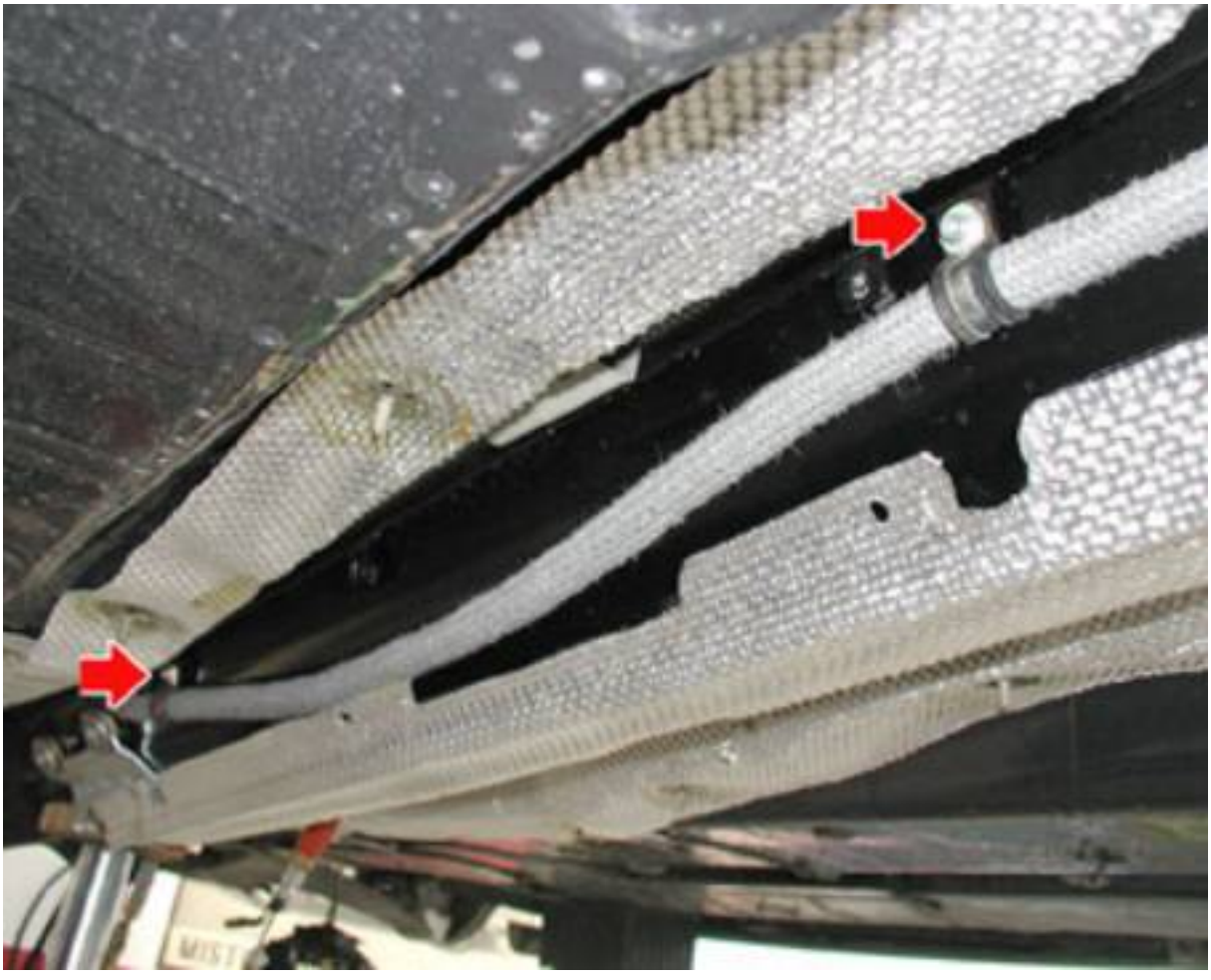
- Undo the front fastening screw on the transmission shaft heat guard.



- Undo the rear fastening screws on the transmission shaft heat guard.



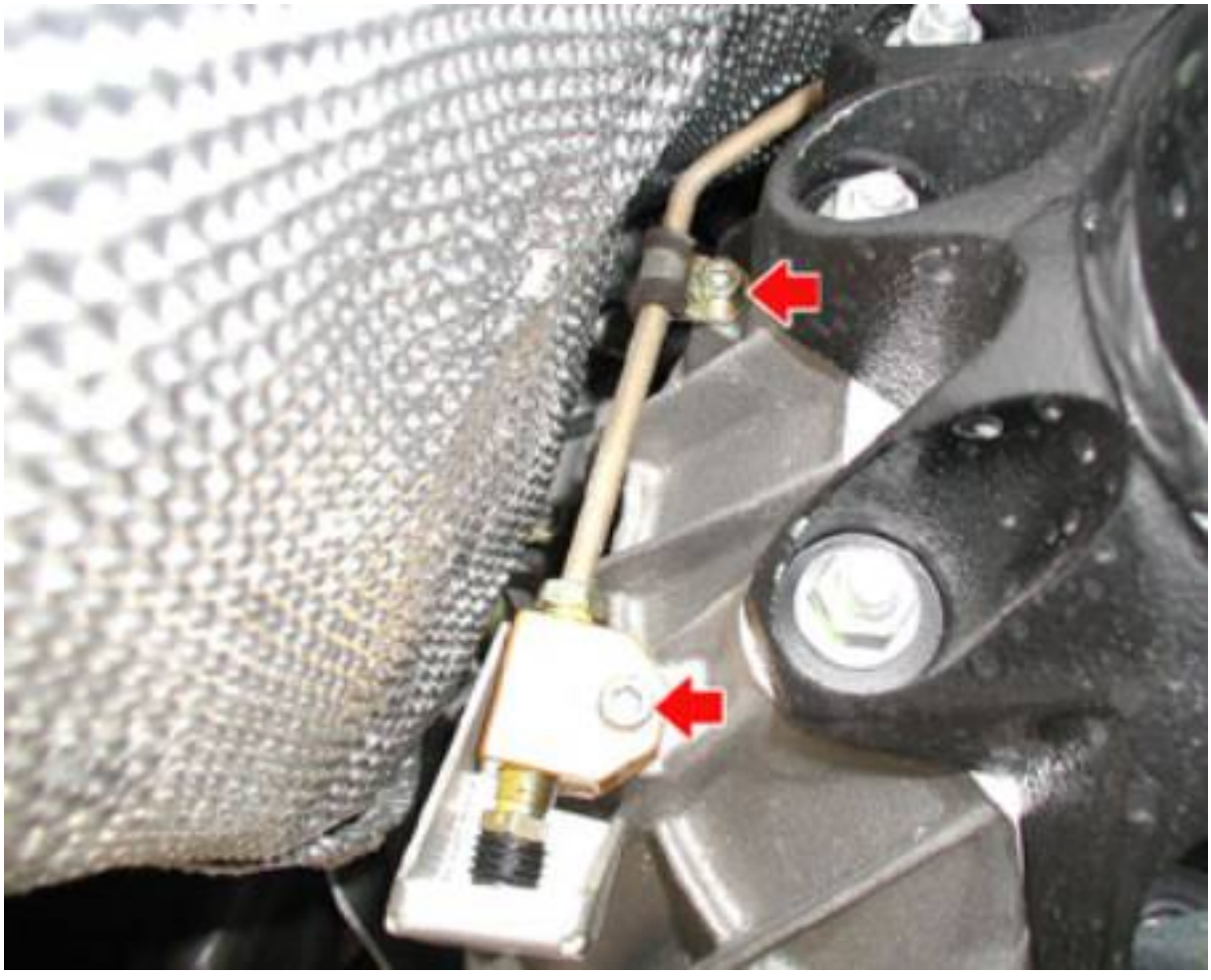
- Unscrew the nuts fastening the clutch oil line to the transmission shaft.



- Undo the two screws fastening the clutch oil line to the relative housing.

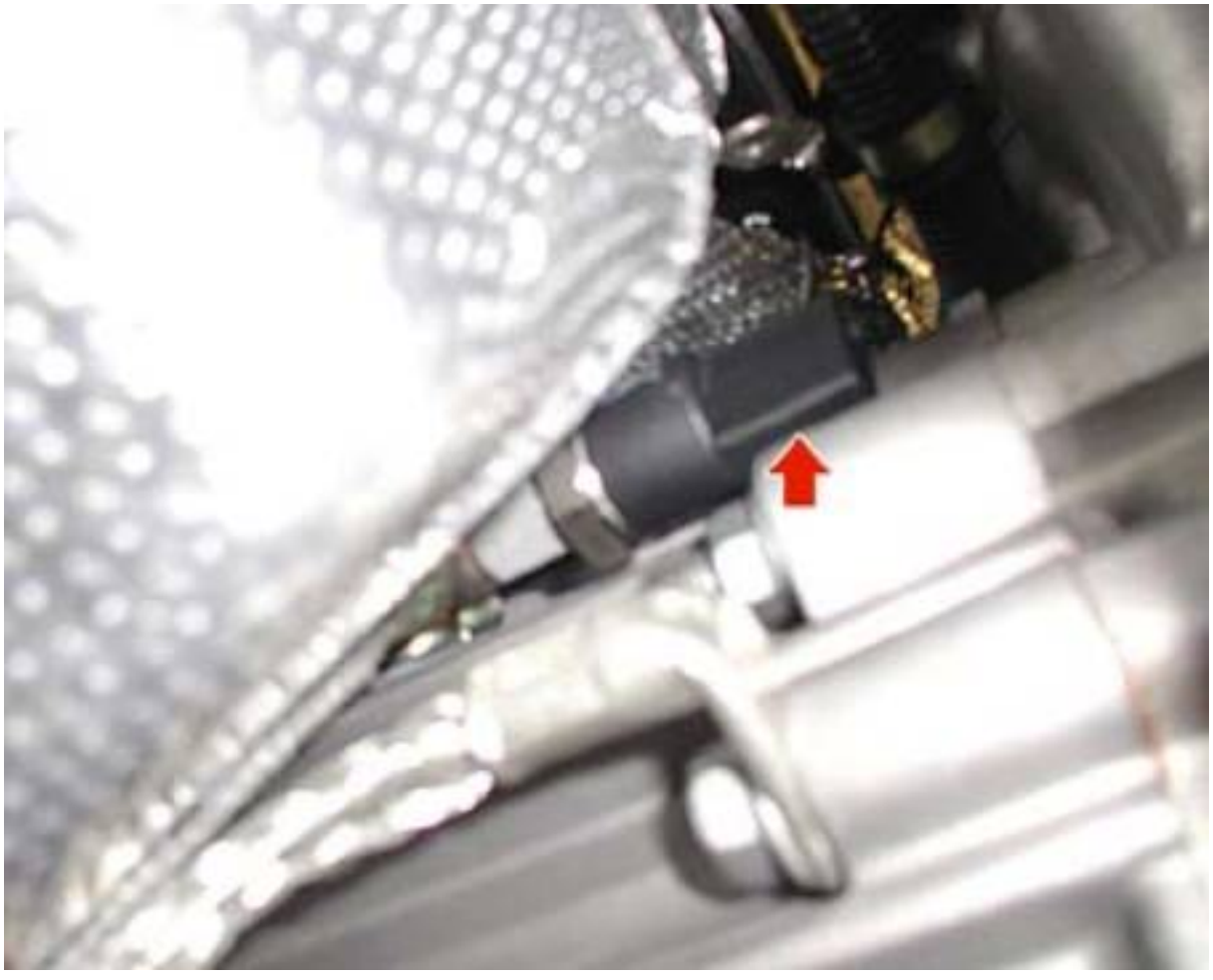
N.B

This operation must only be carried out on vehicles fitted with a lateral bleeding clutch housing.

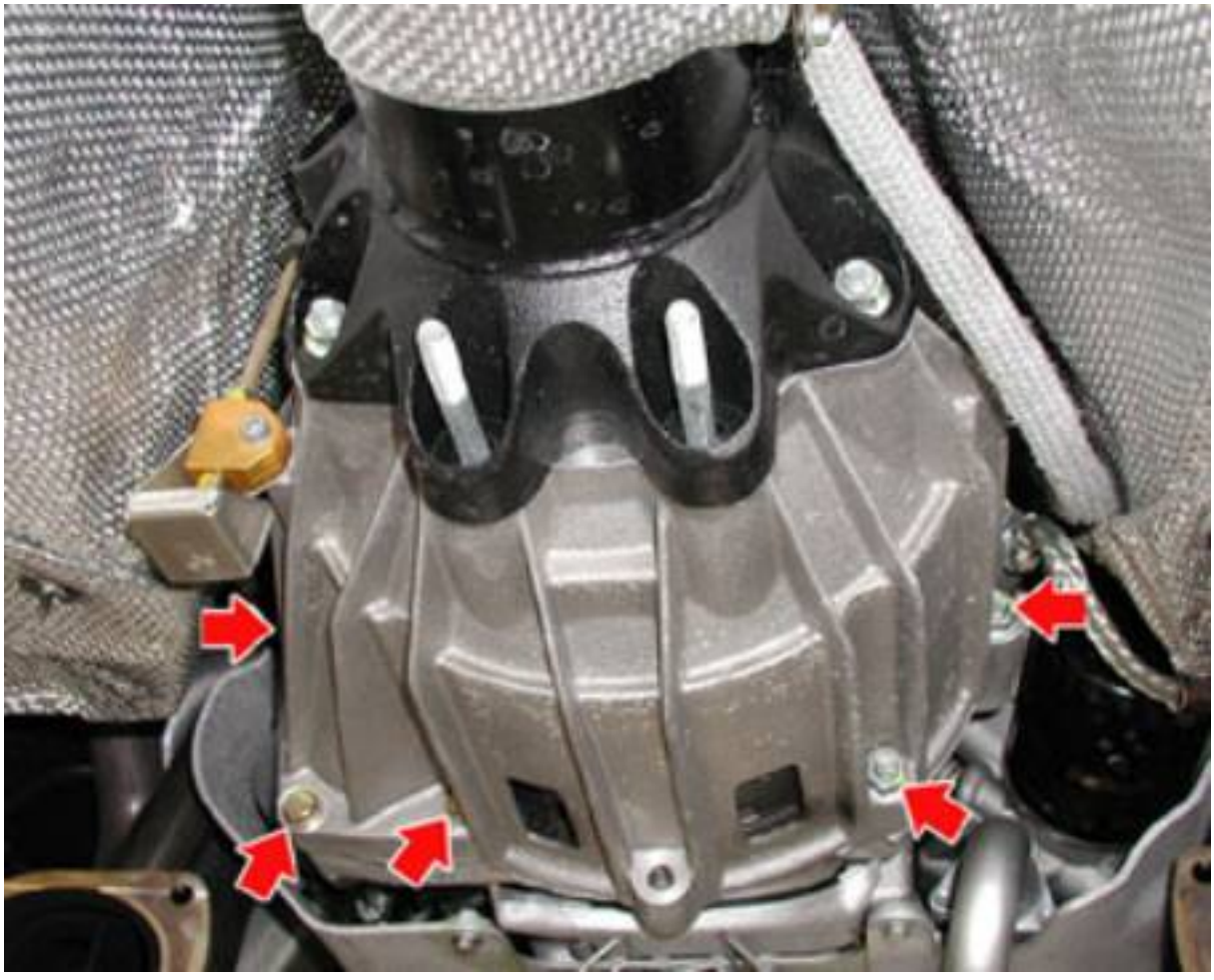


N.B
These operations must only be carried out on versions fitted with a SOFAST 3 gearbox

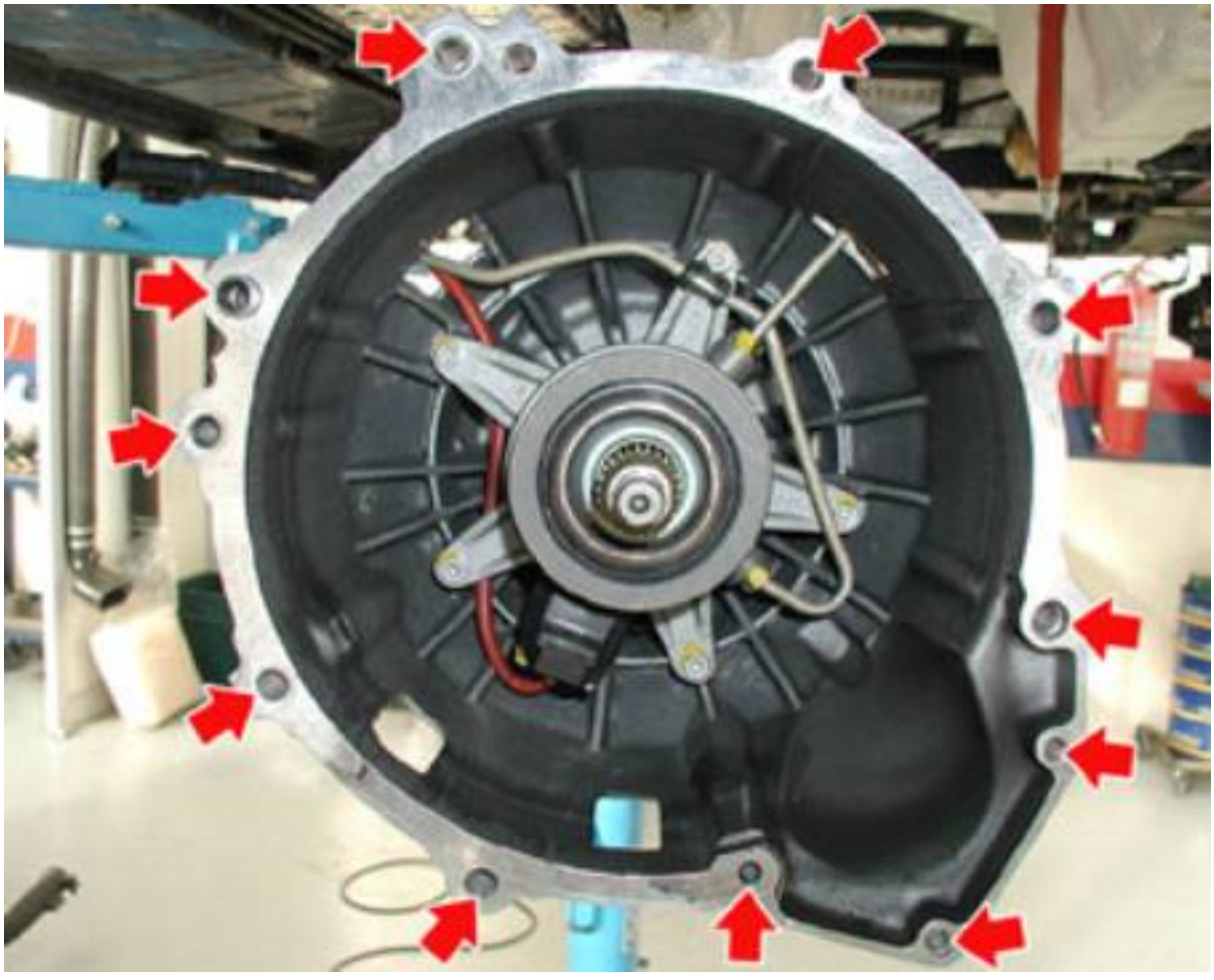
- Detach the clutch pressure sensor’s electrical connection.



- Unscrew the nuts fastening the clutch housing to the engine.



- Overview of the locations of the clutch housing fastenings.

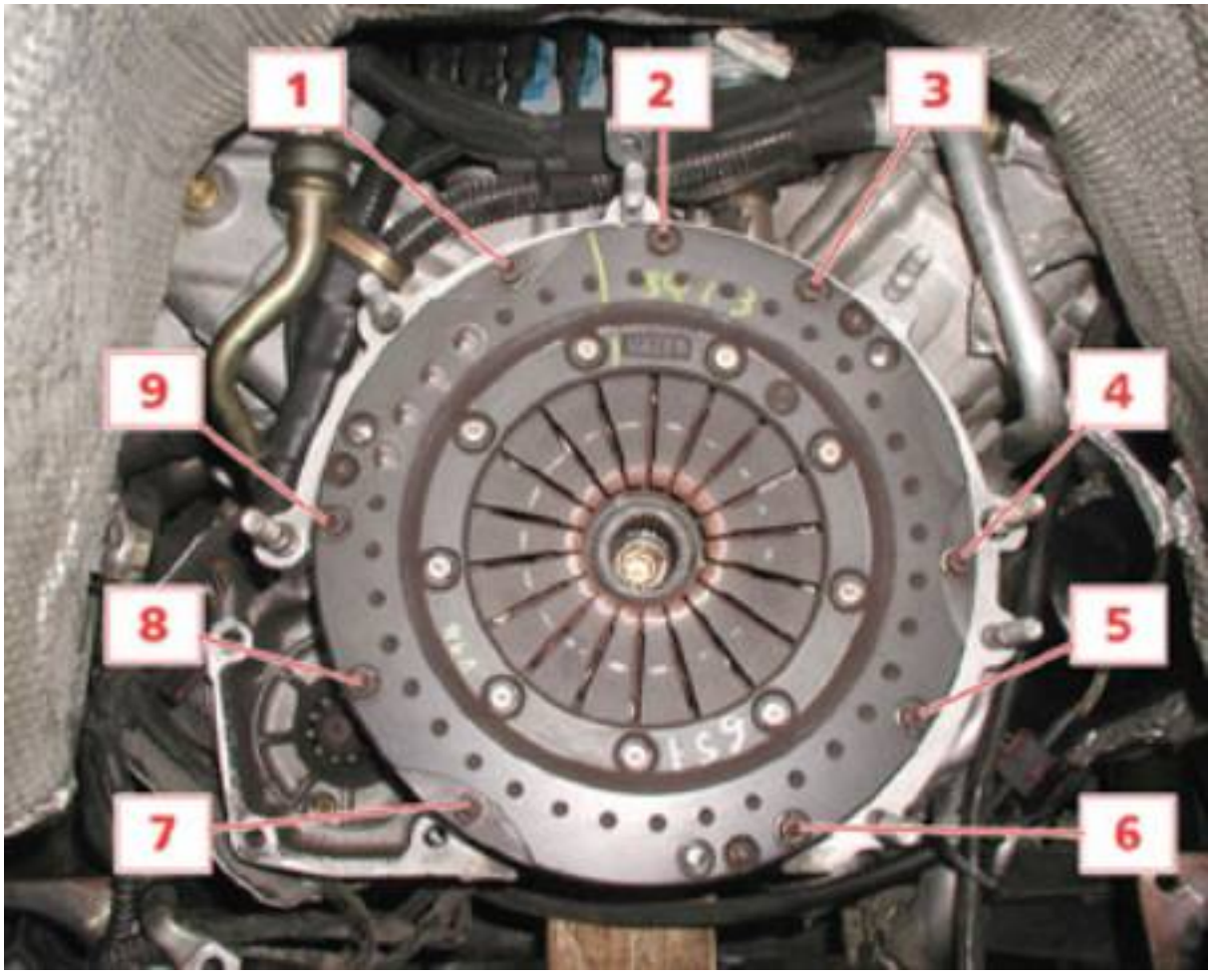


- Remove the earth cable from the clutch housing.

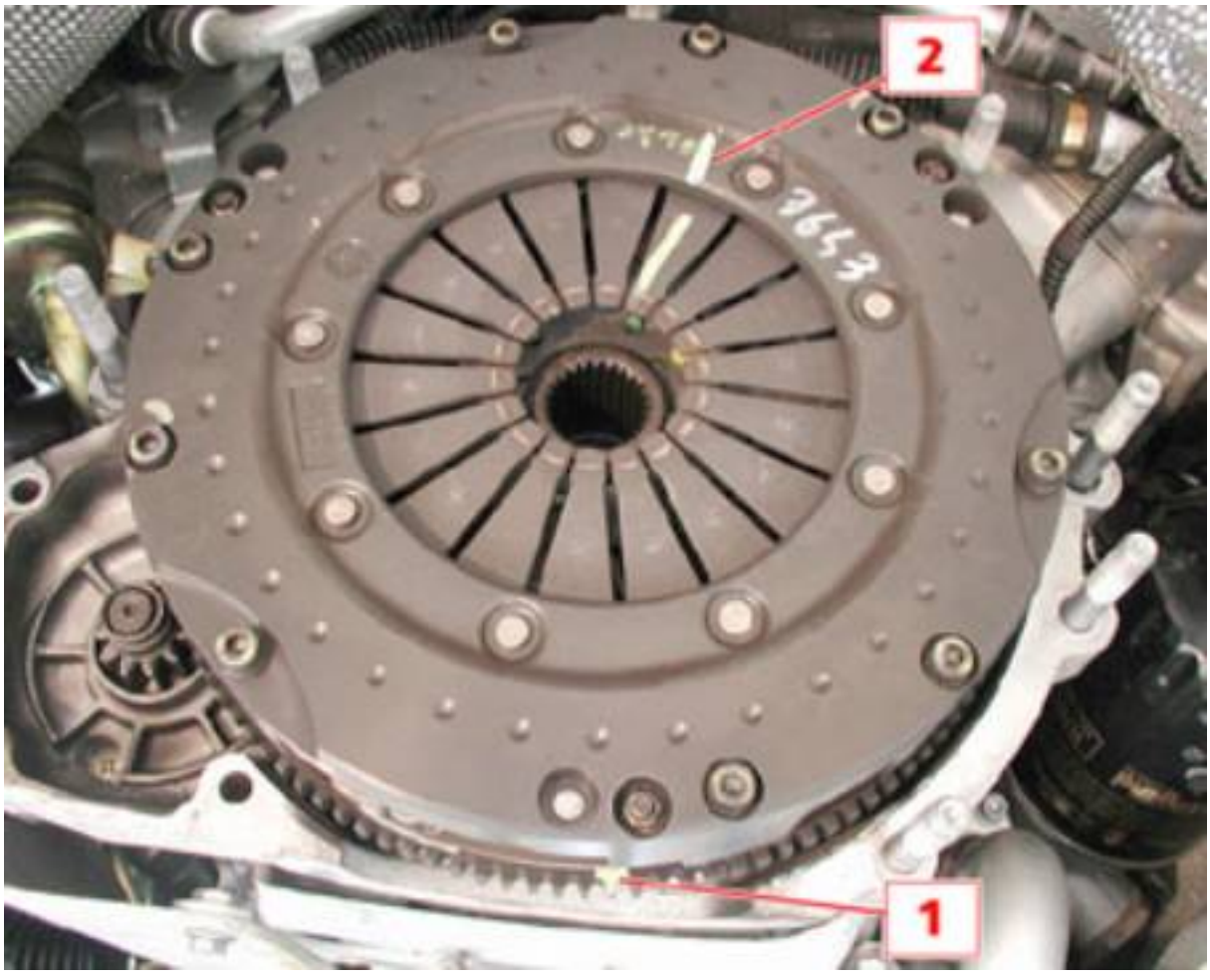
- Position tool **900027300**, in order to support the transmission shaft during the removal of the transmission shaft - clutch housing assembly, and remove the rear mount placed there previously during the gearbox removal operation.

- Position a hydraulic device under the engine to support it.
- Take the clutch housing out of its seat and remove the transmission shaft - clutch housing assembly.

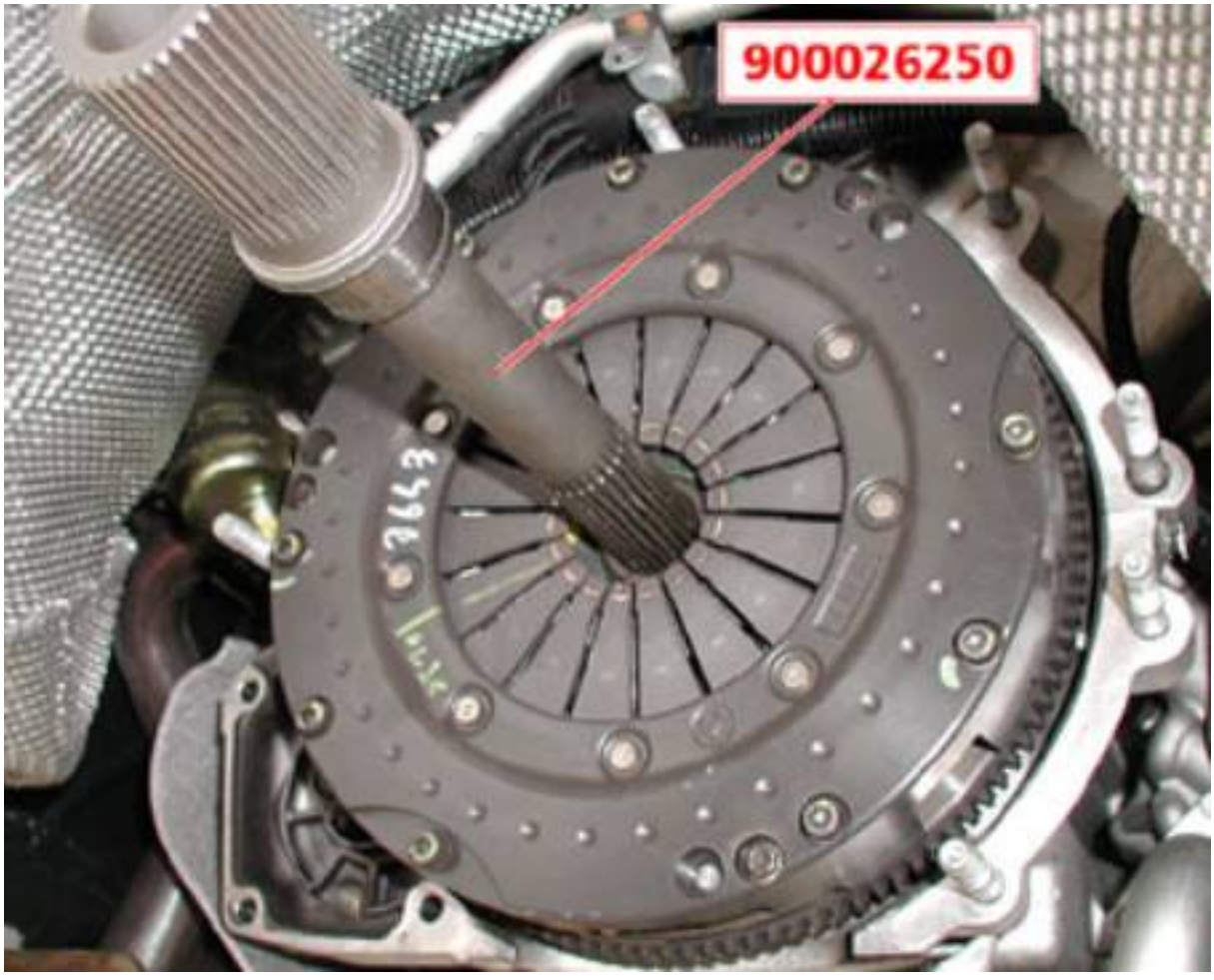
- Loosen the six retaining screws (1,3,4,6,7,9) on the clutch pack.



- Rotate the engine flywheel manually, bringing the mark on the flywheel **(1)** (maximum flywheel unbalance position) level with the mark on the clutch on the opposite side **(2)** (maximum clutch unbalance position).



- Position the centring shaft **900026250** on the clutch pack.
- Mark the positions of the screws **(1,7,4)**, and their spacers, as they act as counterweights
- Undo the remaining retaining screws **(2**,**5**,**8)** (**previous Figure**)



- Remove the complete clutch.

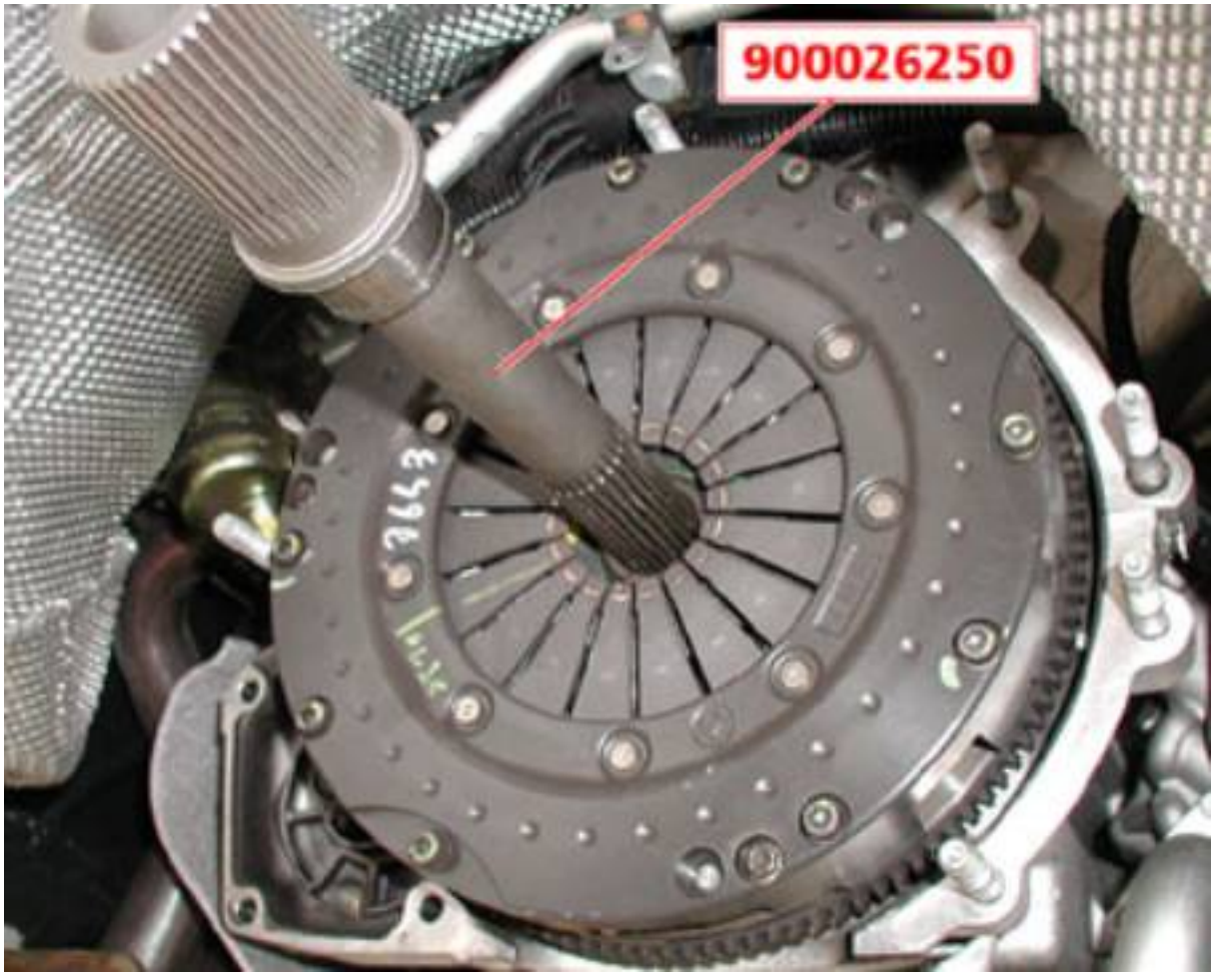
Refitting the clutch

- Fit the clutch assembly in its seat on the flywheel using the clutch centring tool **900026250**.

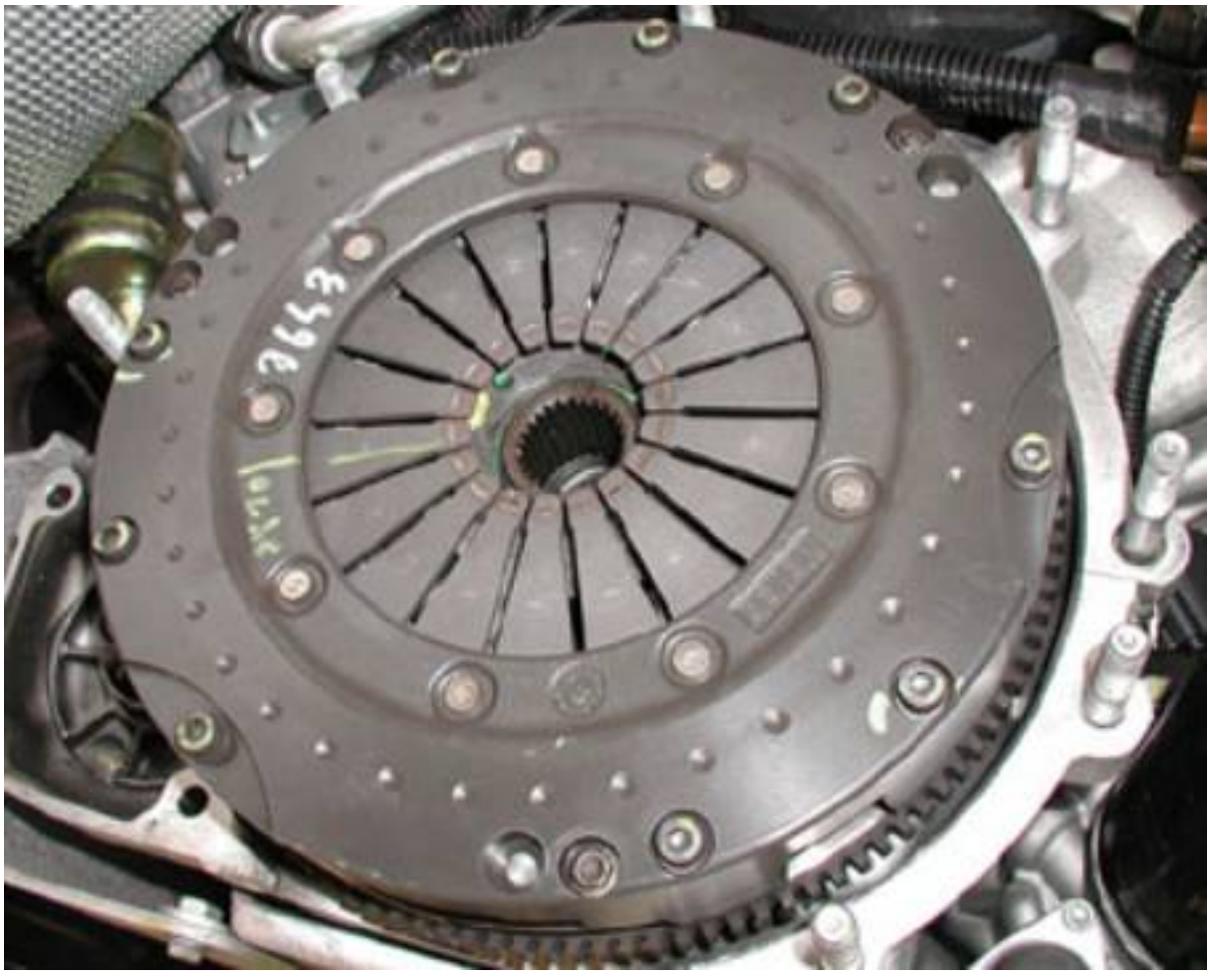
IMPORTANT
If refitting a clutch unit which has been previously removed from the car, follow the markings made during its removal.

N.B.
The clutch disk is supplied by the manufacturer with the maximum unbalance point marked.

IMPORTANT
If fitting a new clutch disk, its maximum unbalance point must be oriented at 180° with respect to the maximum unbalance point of the flywheel.



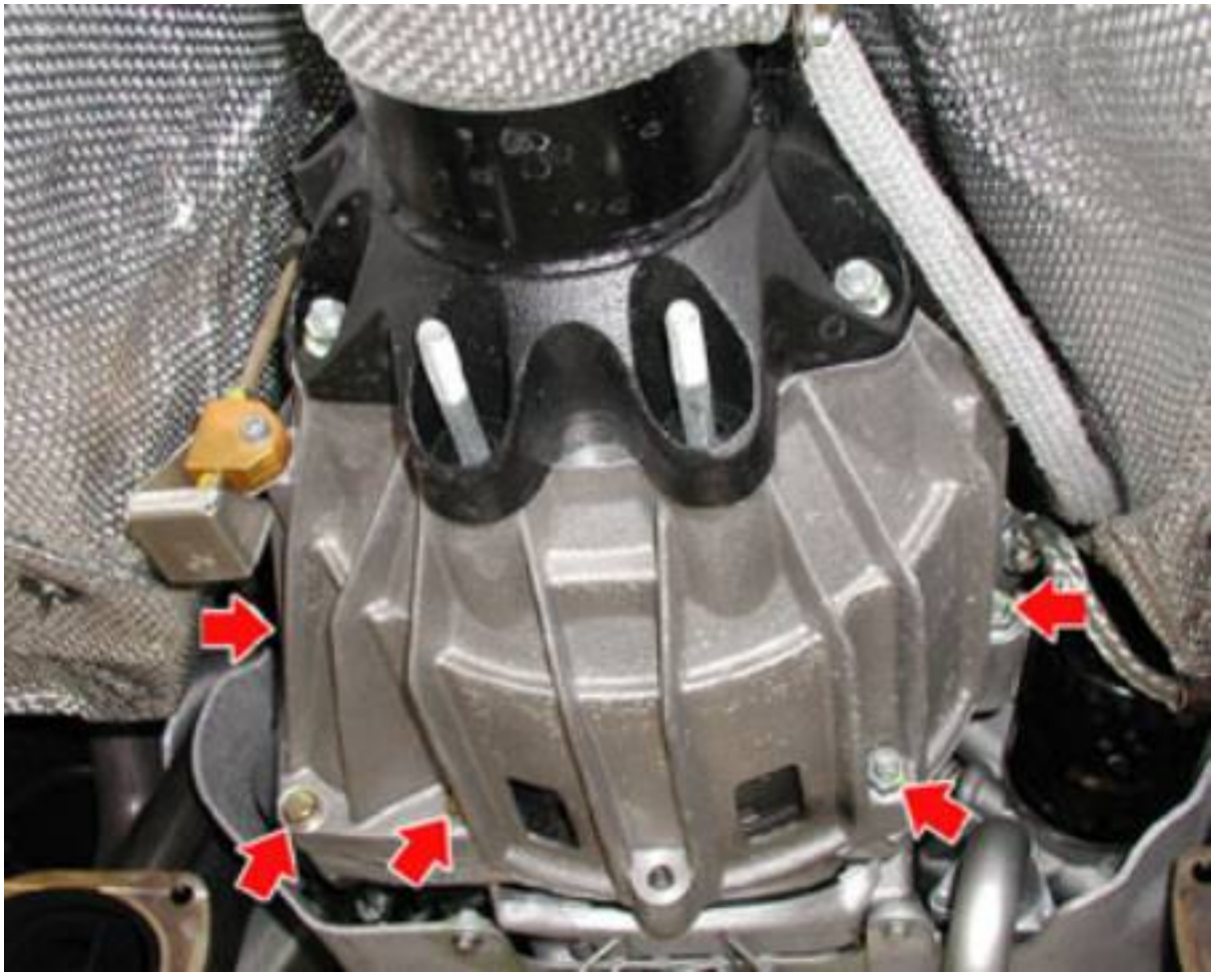
- Tighten the nine screws securing the clutch to a torque of **18Nm**, in a crosswise sequence.



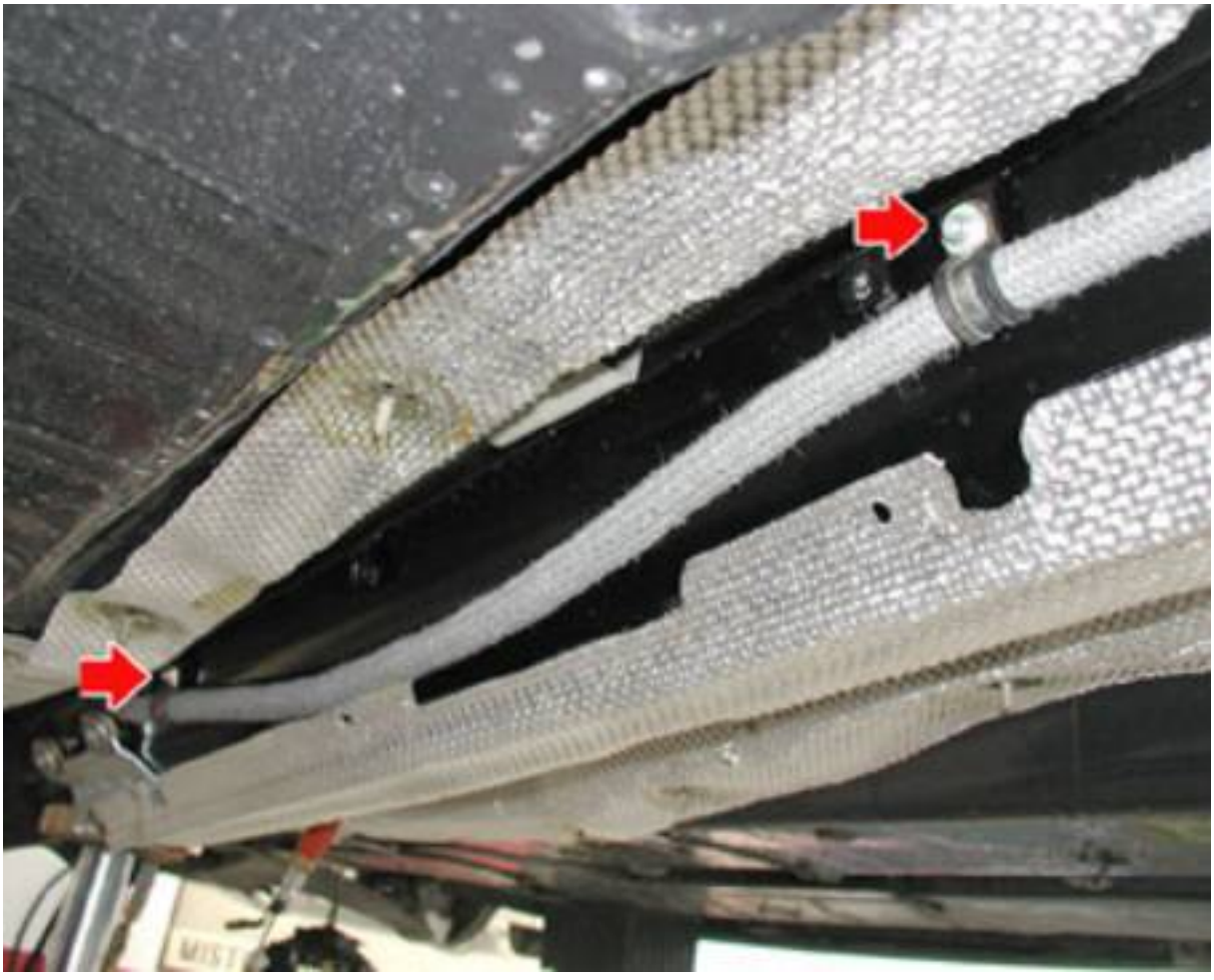
- Apply a layer of water-repellent grease to the grooved profile of the thrust bearing and to the centring two dowels on the clutch housing.

- Using tool **900027300**, fit the transmission shaft - clutch housing assembly in its seat on the engine.

- Connect the earth cable to the clutch housing.
- Tighten the nuts fastening the clutch housing to the engine to a torque of **70 Nm**.



- Remove the lifting device placed under the engine earlier and position it beneath the rear end of the rear transmission.
- Remove tool **900027300** from beneath the transmission shaft.
- Tighten the nuts fastening the clutch oil line to the transmission shaft, then tighten the fastening screws on the heat guard.



ALL VERSIONS EXCEPT USA- CANADA

- Using a hydraulic support positioned underneath the catalytic converter/central exhaust silencer assembly, position the catalytic converters in their seat together with the central exhaust silencers.

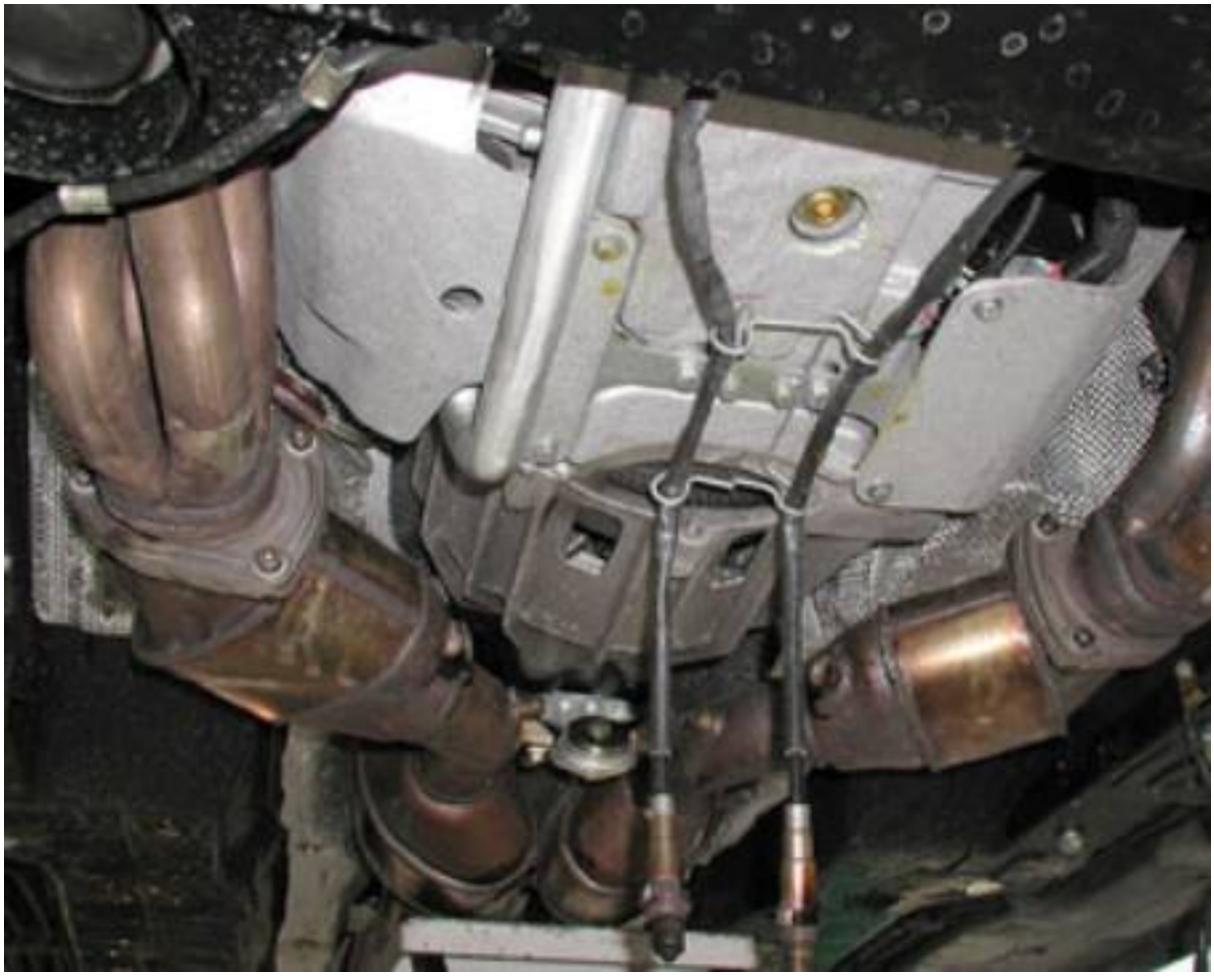
N.B.
VISUALLY INSPECT THAT THE GASKET LOCATED beneath the flange joining the catalytic converter to the exhaust manifold is intact. IF WORN, REPLACE IT.

N.B.
THE CONDUCTIVE GASKETS MUST NEVER BE FITTED MORE THAN ONCE. THE SECOND TIME THE COMPONENT IS FITTED, THEY MUST BE REPLACED

- Fit the conductive gaskets.

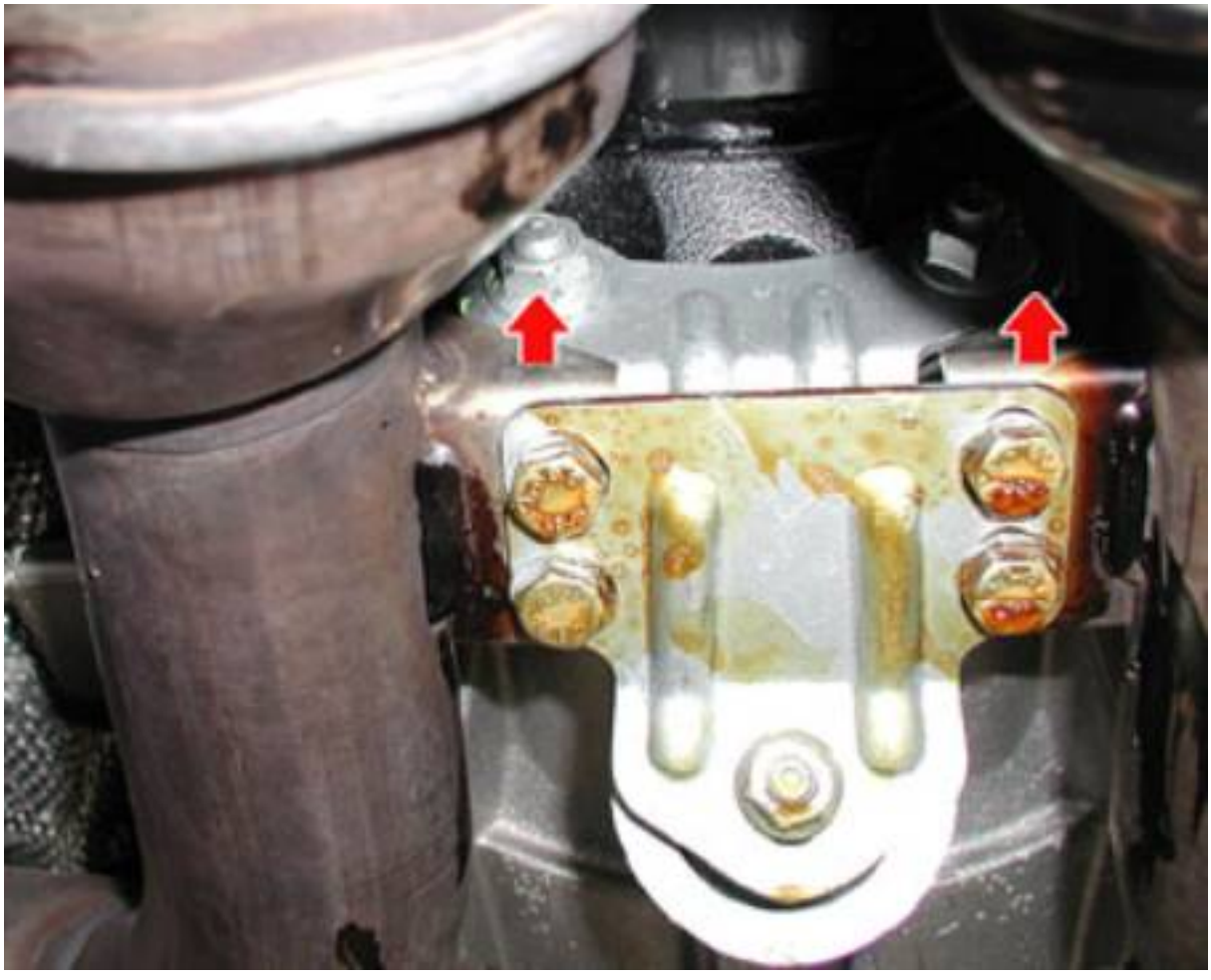
ALL VERSIONS EXCEPT USA- CANADA

- Tighten the screws fastening the exhaust manifold to the catalytic converter to a torque of **25 Nm**.



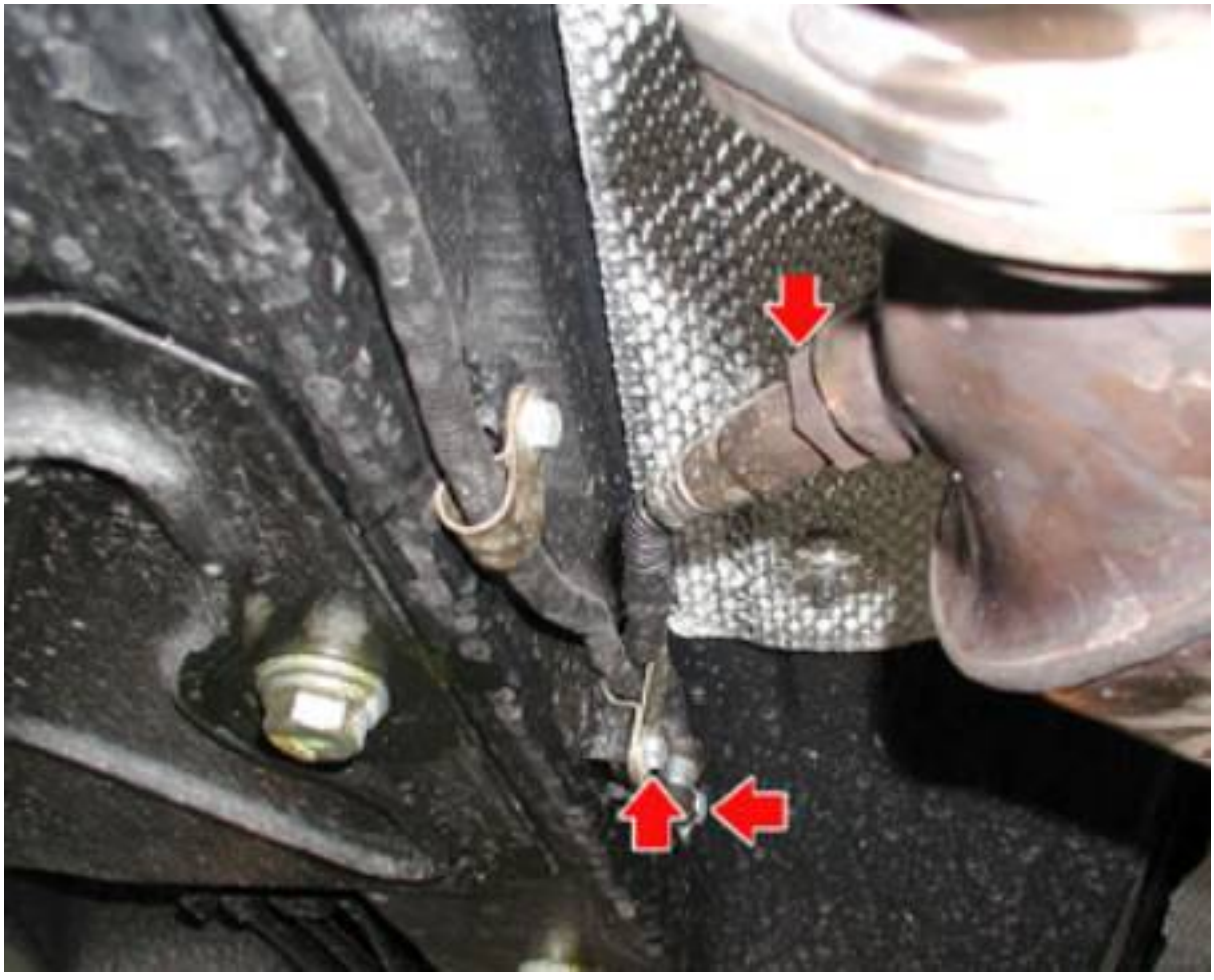
ALL VERSIONS EXCEPT USA- CANADA

- Tighten the fastening nuts on the central catalytic converter mount.



ALL VERSIONS EXCEPT USA- CANADA

- Fit all the Lambda sensors, then tighten them to a torque of **10Nm**.
- Suitably secure the front Lambda sensor wiring to the engine frame.



FOR USA-CANADA VERSION ONLY

- Refit the catalytic converters.

Catalytic converters

- Refit the engine floor guard.

Engine floor guard

- Refit the central exhaust silencer.

Exhaust silencer

- Refit the two exhaust extension pipes.

Exhaust extension pipe

ALL VERSIONS

- Proceed by refitting the gearbox.

Removing-refitting the gearbox

- Proceed by refitting the exhaust tailpipes.

Removing-refitting the tailpipe

- Proceed by bleeding the clutch’s hydraulic system.

Bleeding the clutch

- Carry out the KISS POINT (PIS) adjustment procedure.

Kiss point (PIS) adjustment procedure

N.B

This operation must only be carried out on versions fitted with the SOFAST 3 gearbox

- If the clutch unit is replaced, the self-calibration procedure for the DEIS parameters must be performed

DEIS parameter self-calibration

BLEEDING THE CLUTCH

After replacing the system components, bleed the air from the circuit.

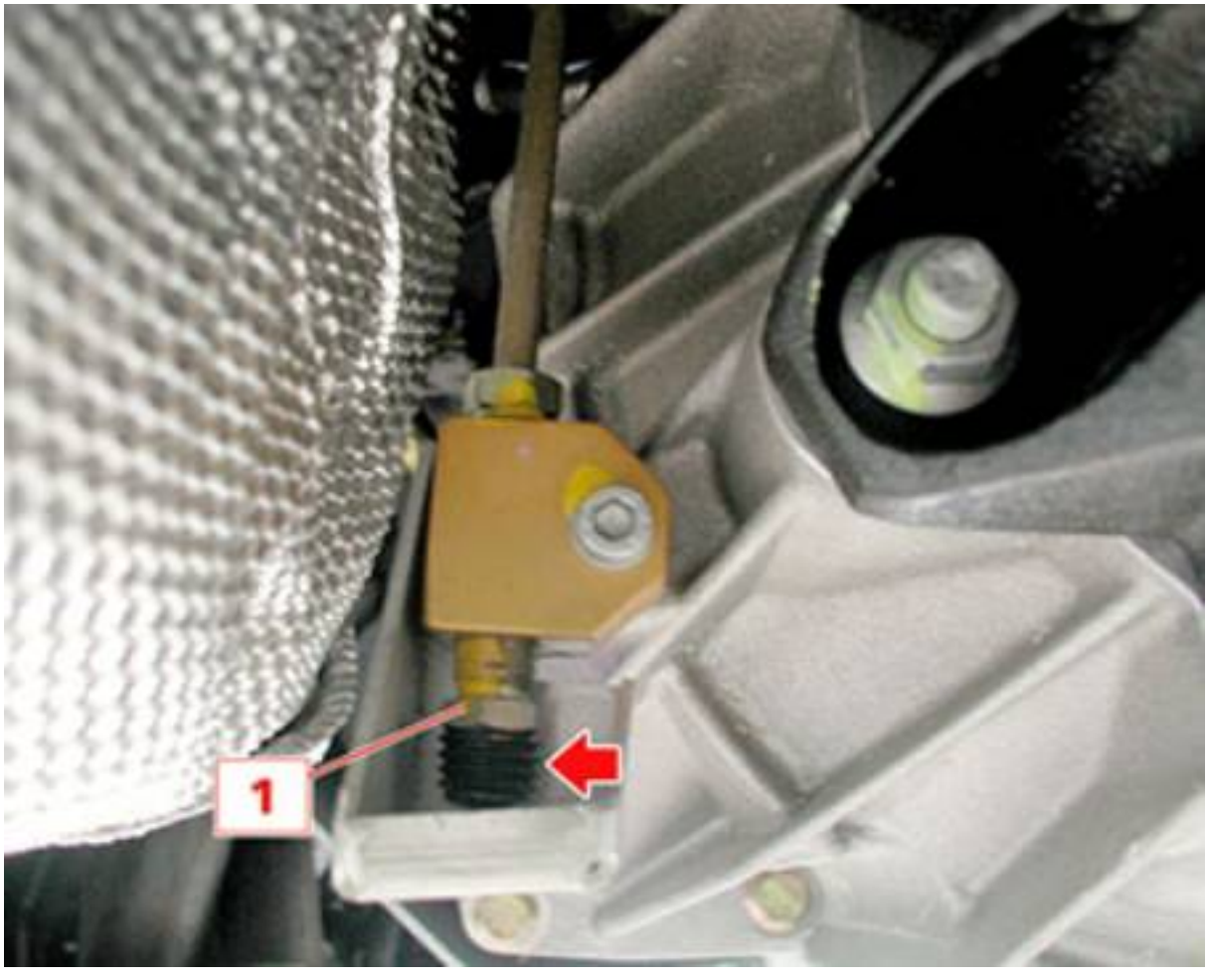
Important

1. **During the bleeding phase, keep checking the oil level in the tank: this must never fall below the "MIN" level**
2. **Never re-use the oil which has leaked or come out from the system**

- This operation requires the use of the special SD3 **tester 95970312**.

N.B.
This operation must only be carried out on vehicles fitted with a lateral bleeding clutch housing.

- Slacken off the bleed union **(1)** on the LH side of the clutch housing and connect a small pipe to drain and collect any excess oil which leaks during bleeding into a suitable pan.



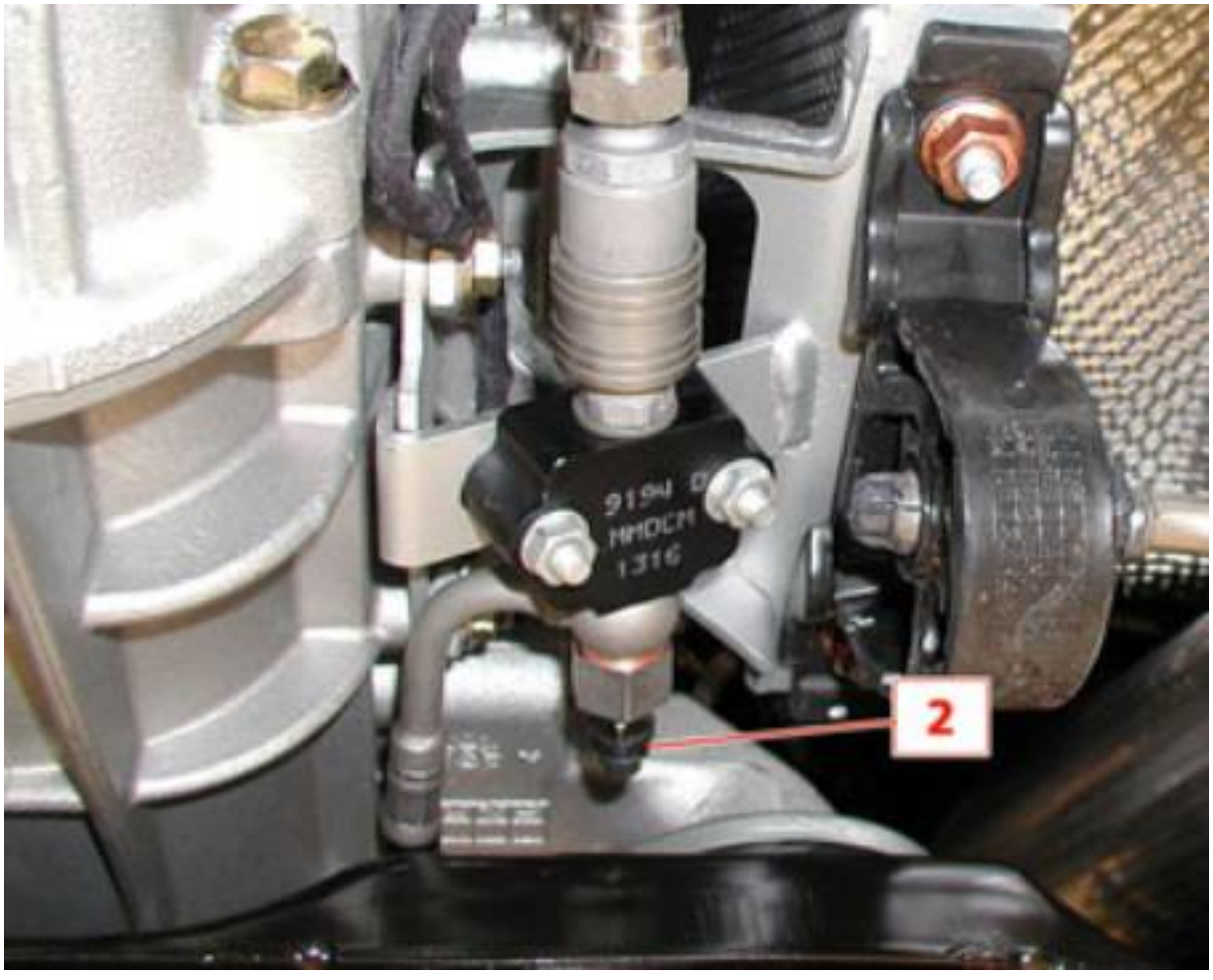
N.B.
This operation must only be carried out on vehicles fitted with lower or central bleeding clutch housings.

- The bleeding cap **(1)** located in the central and lower section of the clutch housing must be loosened and a small pipe fitted thereto, in order to allow the excess oil drained out to be collected in a

suitable pan

N.B.
These operations are valid for all clutch housing versions

- The system has a second bleeder **(2)** located in proximity of the quick-coupling block for the clutch pipe.



- Connect the SD3 diagnostic tester to the diagnostic socket.
- Access the **DIAGNOSTICS** section from the main menu.
- Select **CLUTCH BLEEDING**
- Add oil to the tank to prevent the level from dropping.
- Press **ENTER** to activate the tester.
- Open the clutch bleeder **(2)** and wait 3-4 seconds for the oil to flow out, then close the bleeder.
- Check the oil level in the tank and top up if necessary.
- Open the clutch bleeder **(1)** and wait 3-4 seconds for the oil to flow out, then close the bleeder.
- Tighten the two bleeders to torque.
- Wait until the SD3 tester indicates that the cycle has been completed successfully.
- Shift gear a few times.
- Upon completion of the cycle, check the Power Unit oil level.

Establishing the oil tank level for the Power Unit (electronically controlled gearbox)

N.B.
This operation must only be carried out on versions fitted with the SOFAST 3 gearbox

- We recommend you carry out the DEIS adjustment procedure.

DEIS adjustment procedure

Clutch thrust bearing

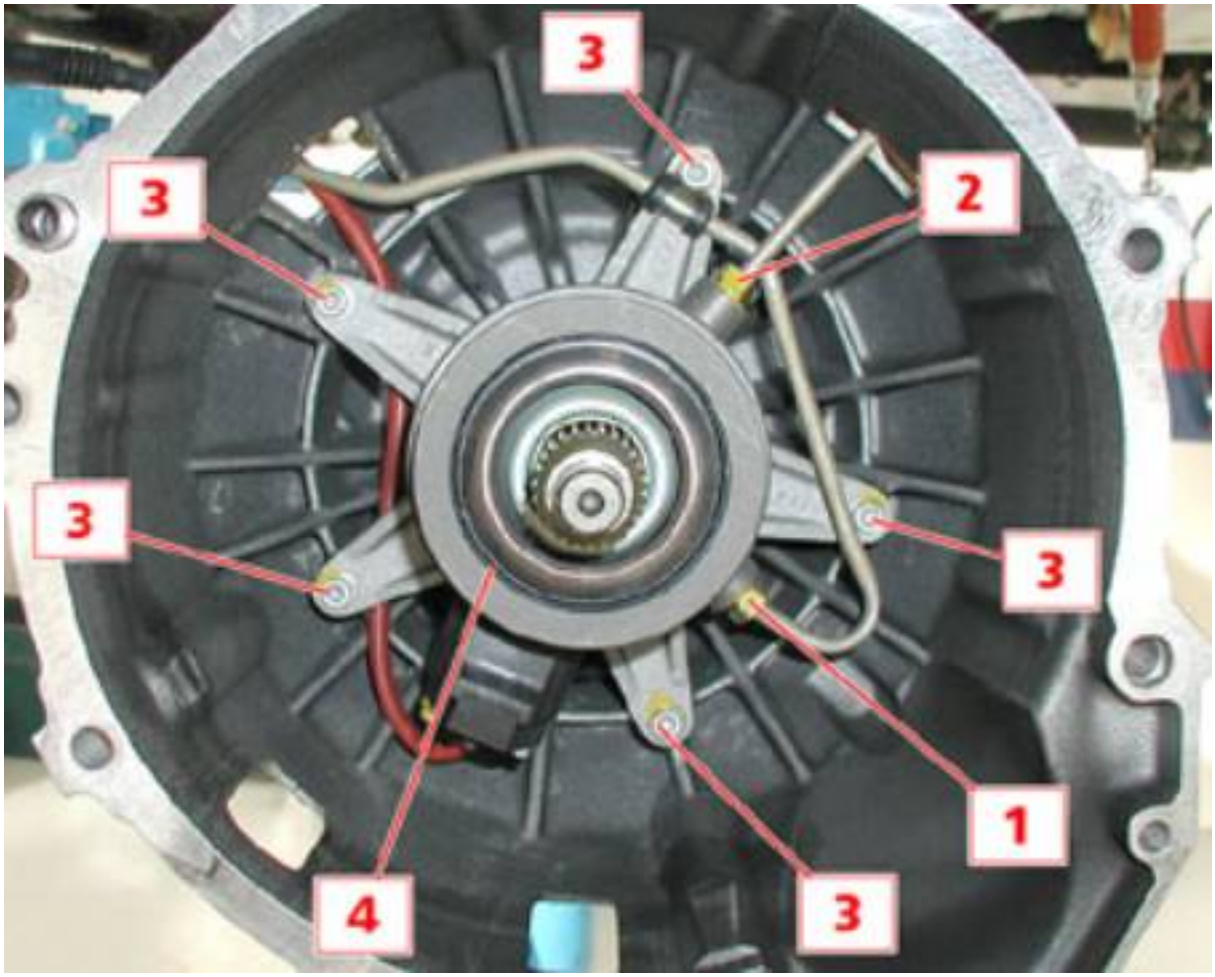
Clutch thrust bearing removal

- Remove the clutch housing

Clutch removal

N.B
This operation must only be carried out on vehicles fitted with a lateral bleeding clutch housing.

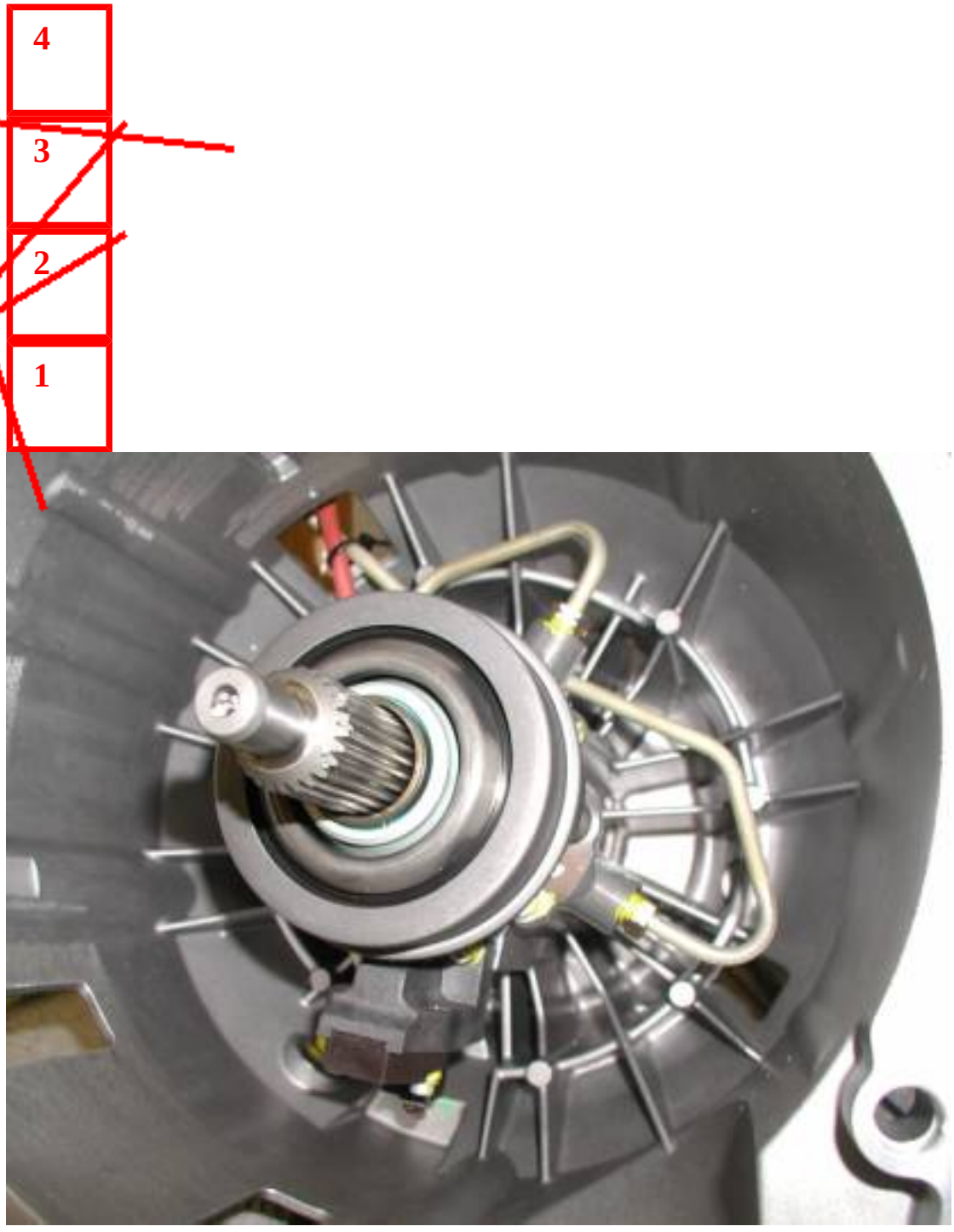
- Unscrew the lower union **(1)** on the thrust bearing block.
- Unscrew the upper union **(2)** on the thrust bearing block.
- Remove the five fastening screws **(3)** from the thrust bearing unit
- Extract the thrust bearing unit **(4)** from the clutch housing



N.B
This operation must only be carried out on vehicles fitted with lower or central bleeding clutch housings with a new thrust bearing.

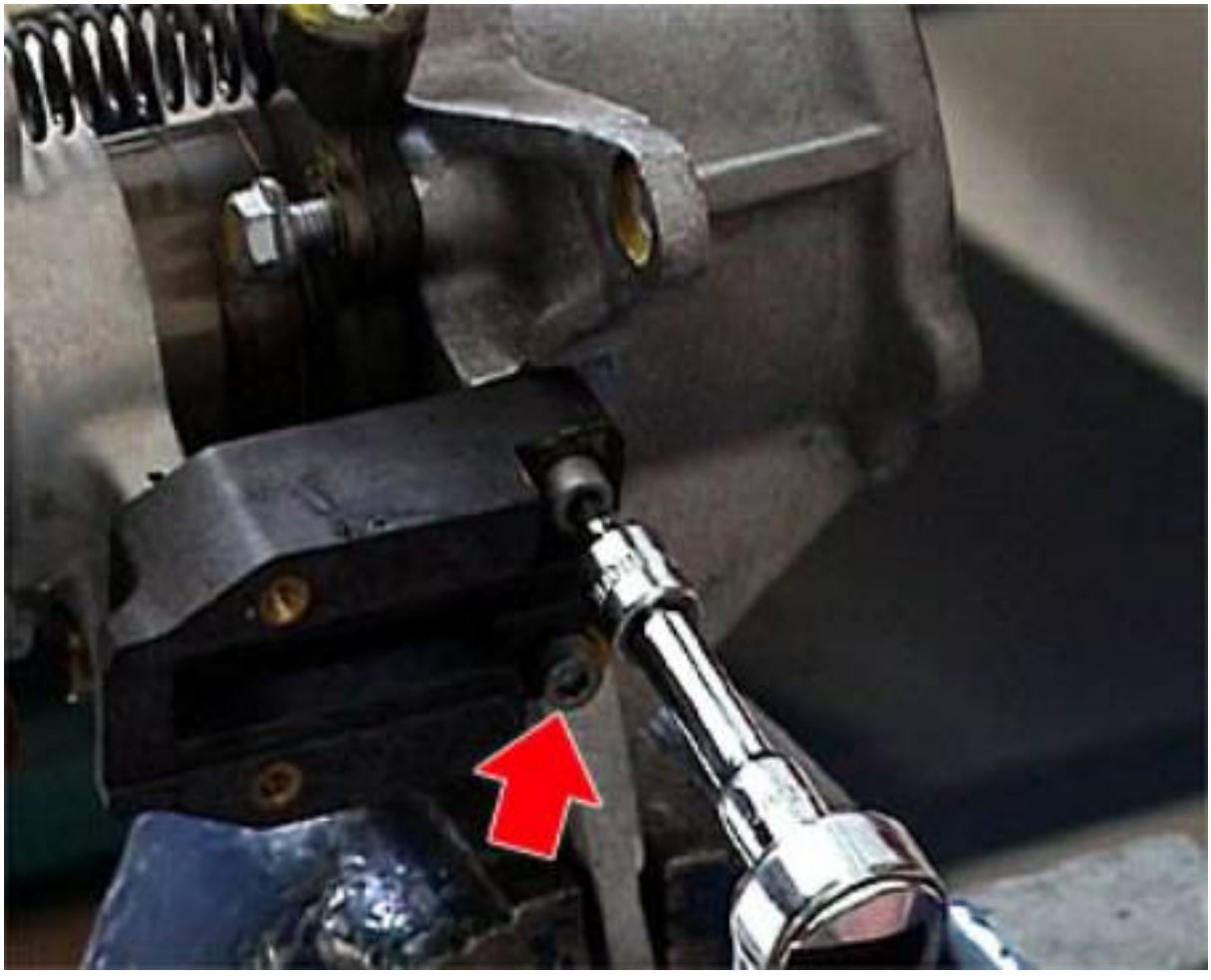
- Unscrew the lower union **(1)** on the thrust bearing block.

- Unscrew the upper union **(2)** on the thrust bearing block.
- Cut the clamp **(3).**
- Undo the fastening screws on the thrust bearing unit
- Extract the thrust bearing unit **(4)** from the clutch housing



N.B
The procedure below illustrates how to remove one of the two thrust bearings, however the same procedure applies to both types.

- Undo the two fastening screws to remove the lower element



- With the thrust bearing unit on bench, unscrew the four fastening screws.

- Unscrew the two fastening pins.

- Detach the steering column from the thrust bearing; keep the two springs and pins.

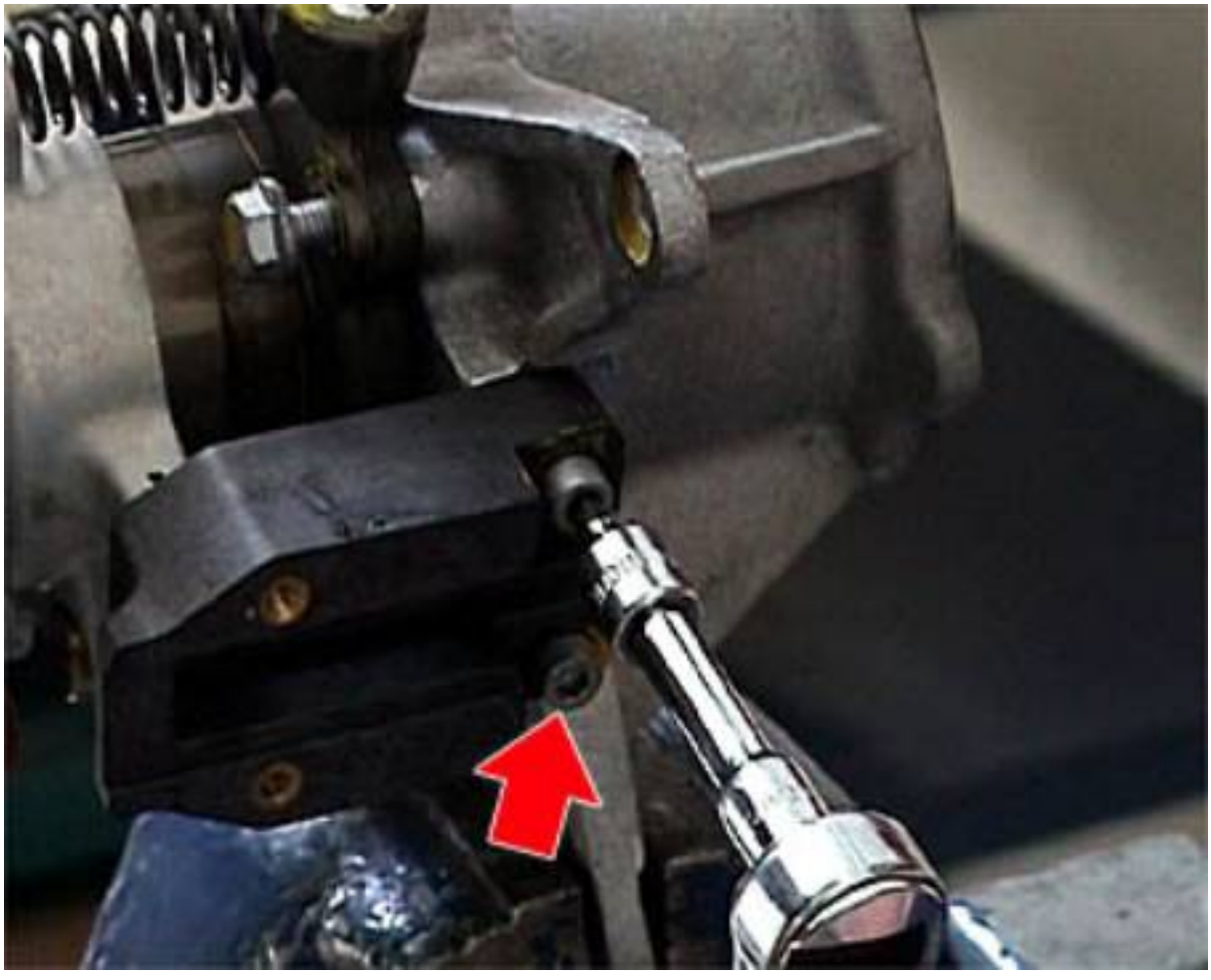
Refitting the clutch thrust bearing

- Insert the thrust bearing into the steering column.

- Tighten the two fastening pins to torque.

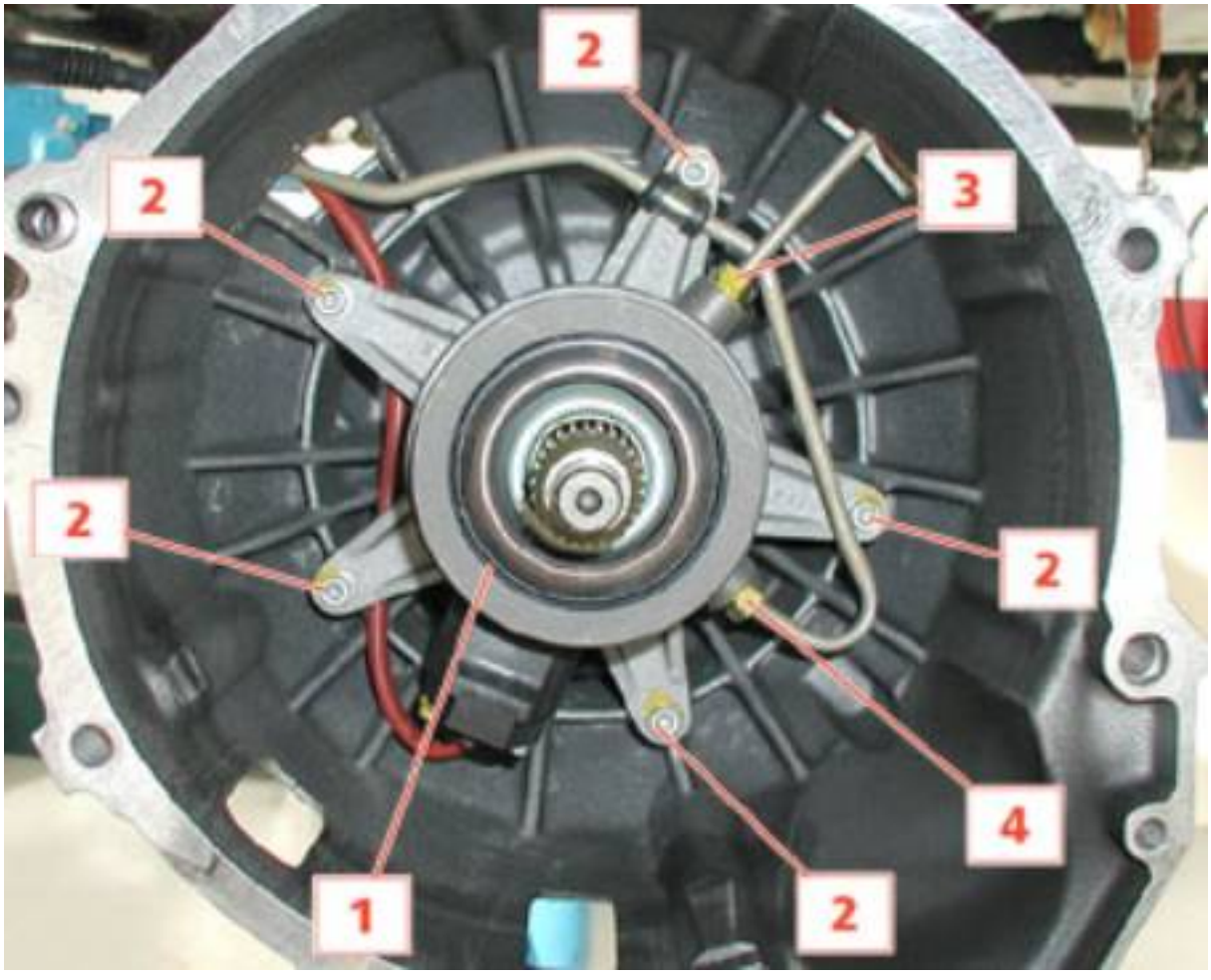
- Tighten the two fastening screws to torque.

- Refit the lower element and tighten the two fastening screws to torque.



N.B
This operation must only be carried out on vehicles fitted with a lateral bleeding clutch housing.

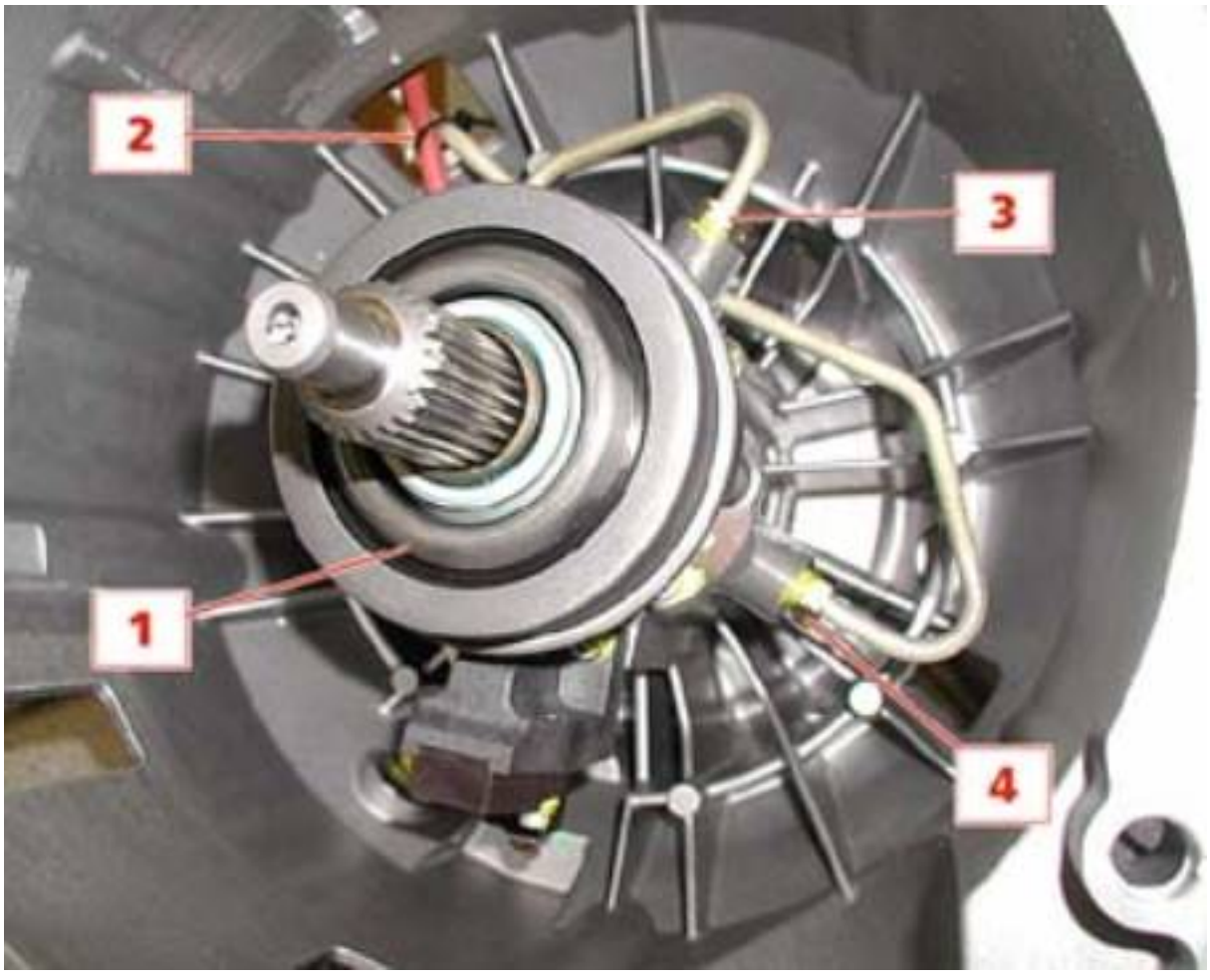
- Insert the thrust bearing unit **(1)** into the clutch housing
- Tighten the five fastening screws **(2)** on the thrust bearing unit to torque.
- Tighten the upper union **(3)** on the thrust bearing block to torque.
- Tighten the lower union **(4)** on the thrust bearing block to torque.



N.B

This operation must only be carried out on vehicles fitted with lower or central bleeding clutch housings with a new thrust bearing.

- Insert the thrust bearing unit **(1)** into the clutch housing
- Tighten the five fastening screws on the thrust bearing unit to torque.
- Position the electrical cables correctly and fasten them with a new clamp **(2).**
- Tighten the upper union **(3)** on the thrust bearing block to torque.
- Tighten the lower union **(4)** on the thrust bearing block to torque.



- Mount the clutch housing.

Refitting the clutch

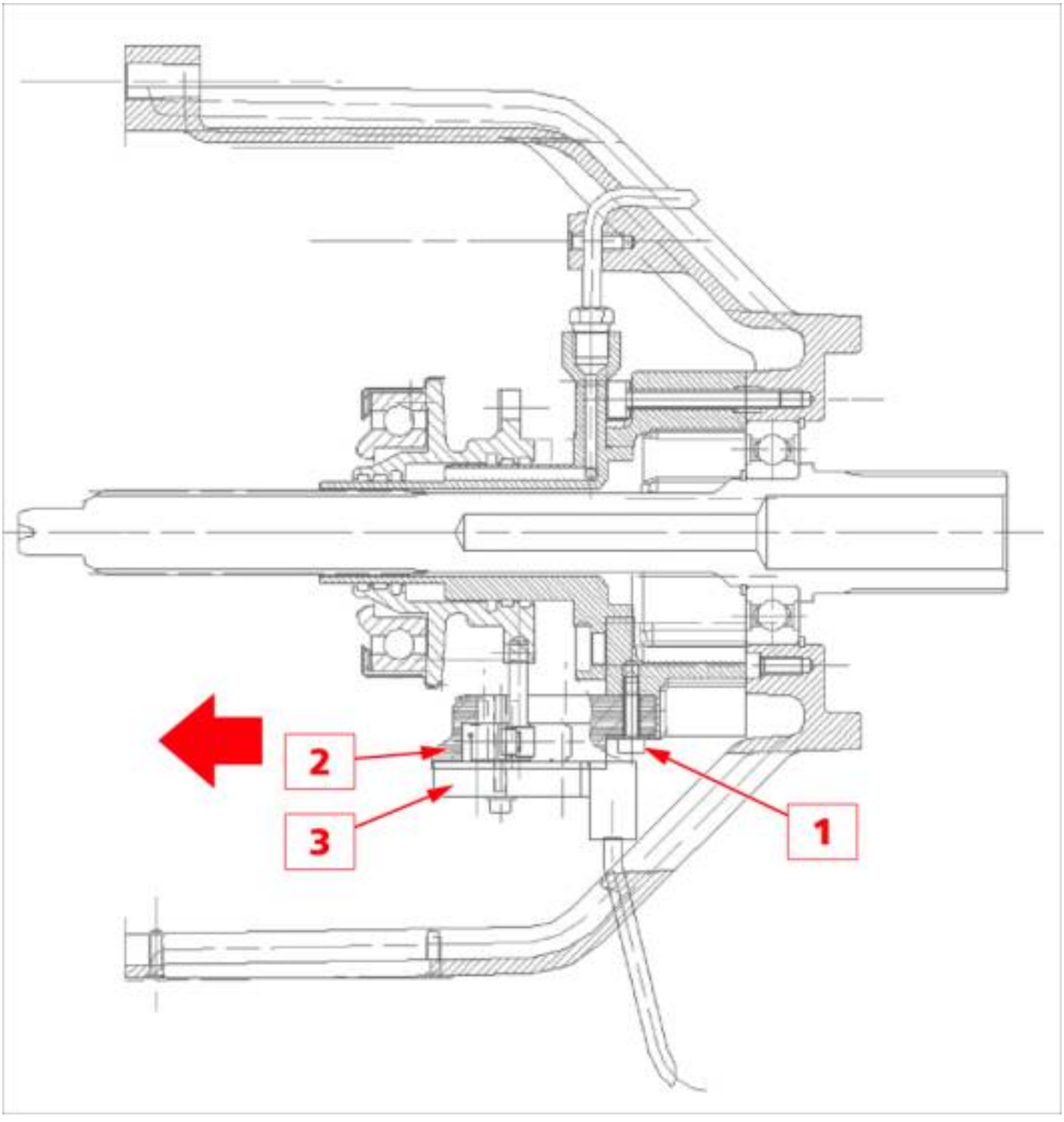
Adjusting the clutch sensor magnet

- Remove the clutch housing

Clutch removal

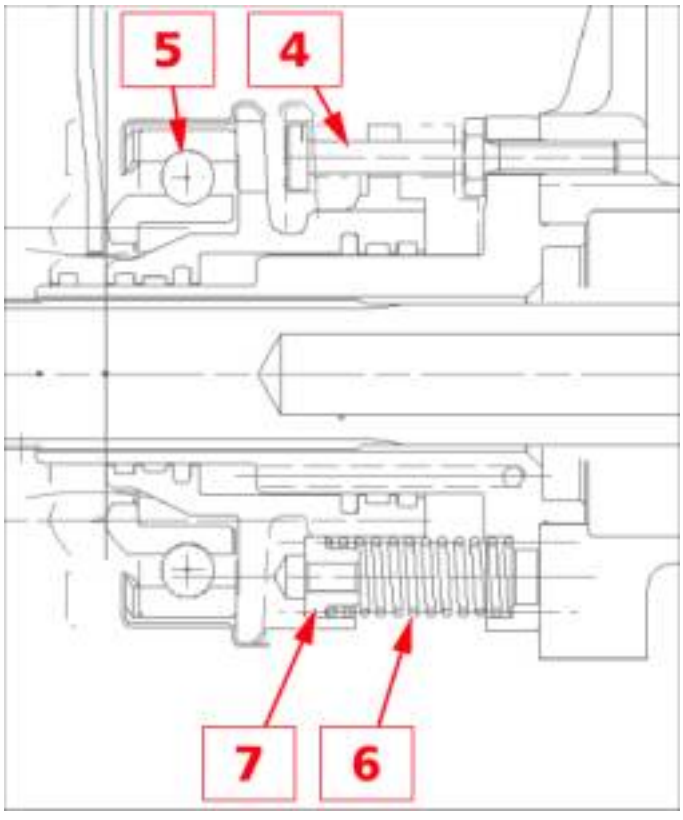
- Undo screws **(1)**.

Slide the mount **(2)** out in the direction indicated without removing the sensor **(3).**

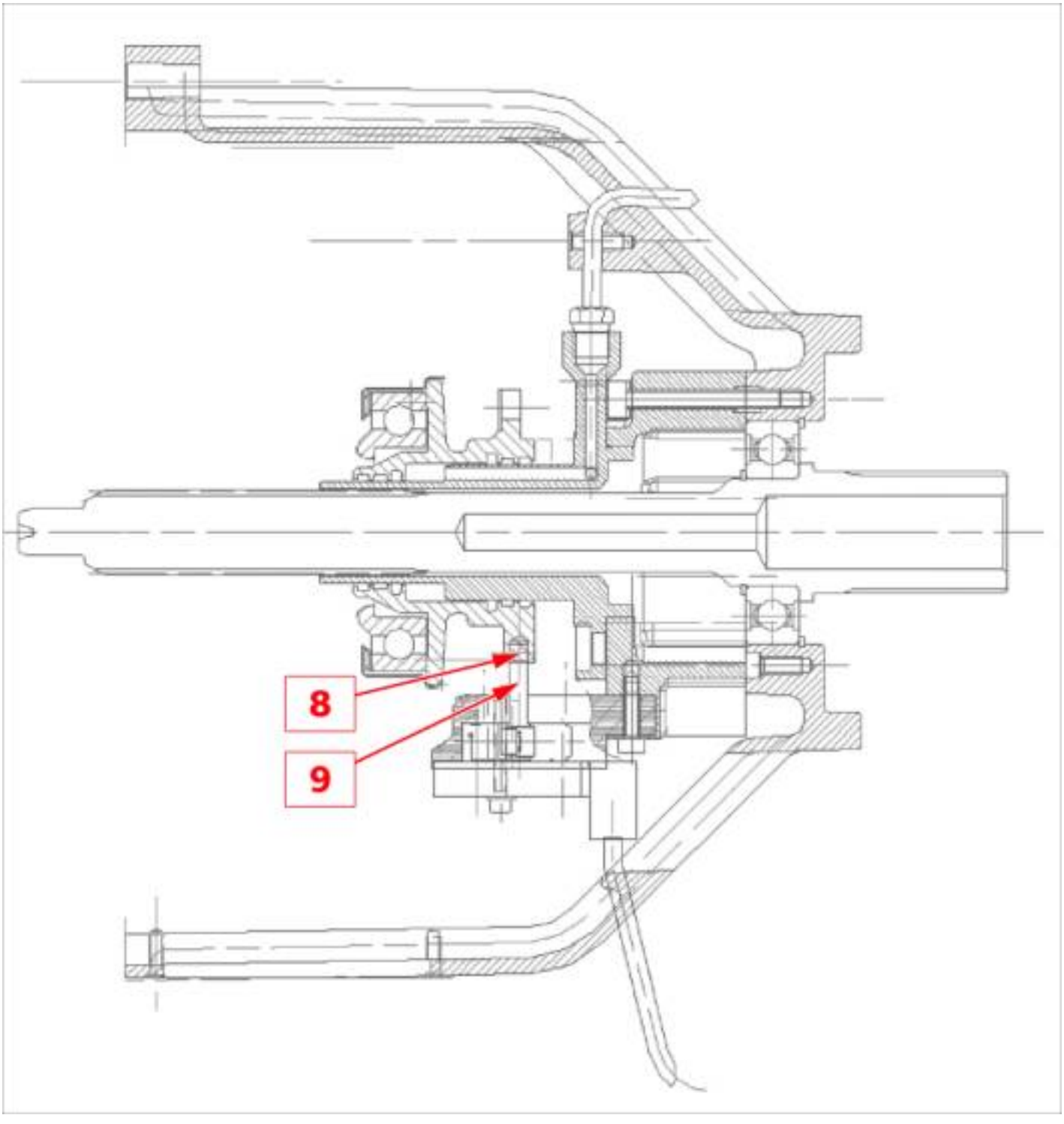


- Undo the stud bolts **(4)**.
- Extract the thrust bearing **(5)** taking care not to damage the inner grommets.

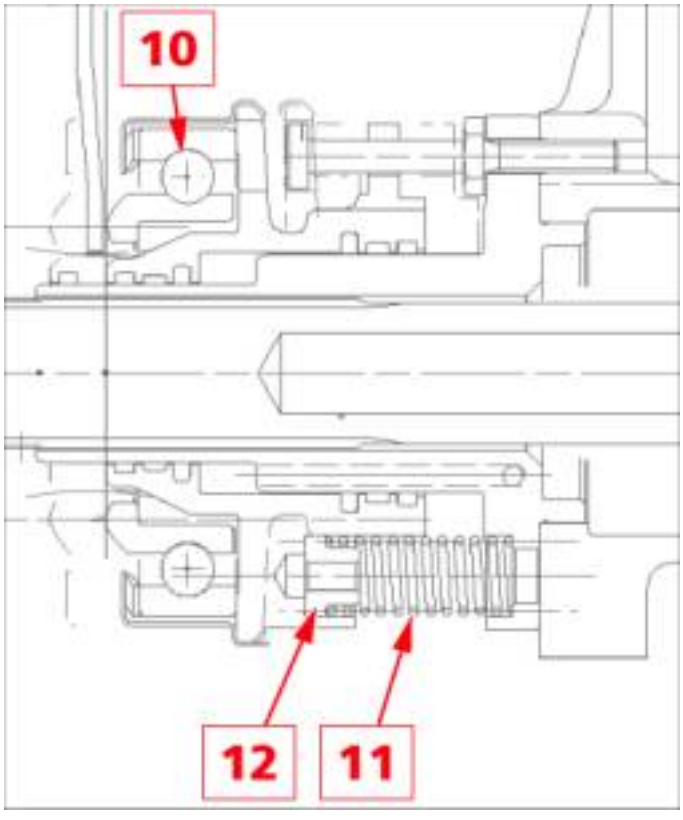
- Remove the springs **(6)** and the spacers **(7)**.



- Remove the pin **(8)** from the thrust bearing
- Rotate the magnet mount **(9)** by 180°.
- Re-insert the pin **(8)**.

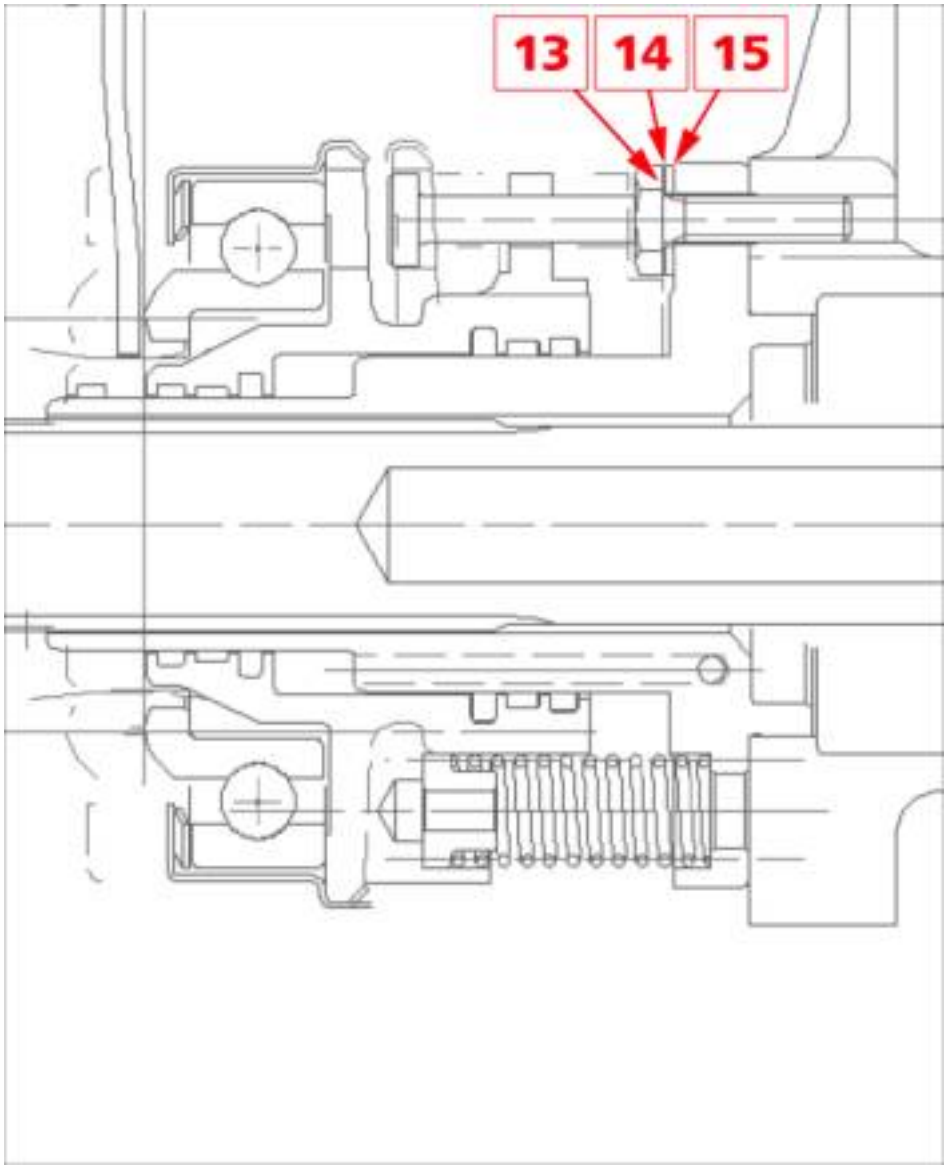


- Dampen the thrust bearing seals **(10) with oil from the gearbox actuator unit.**
- Carefully slip the thrust bearing over the sliding flange inserting the springs **(11)** and the spacers **(12).**



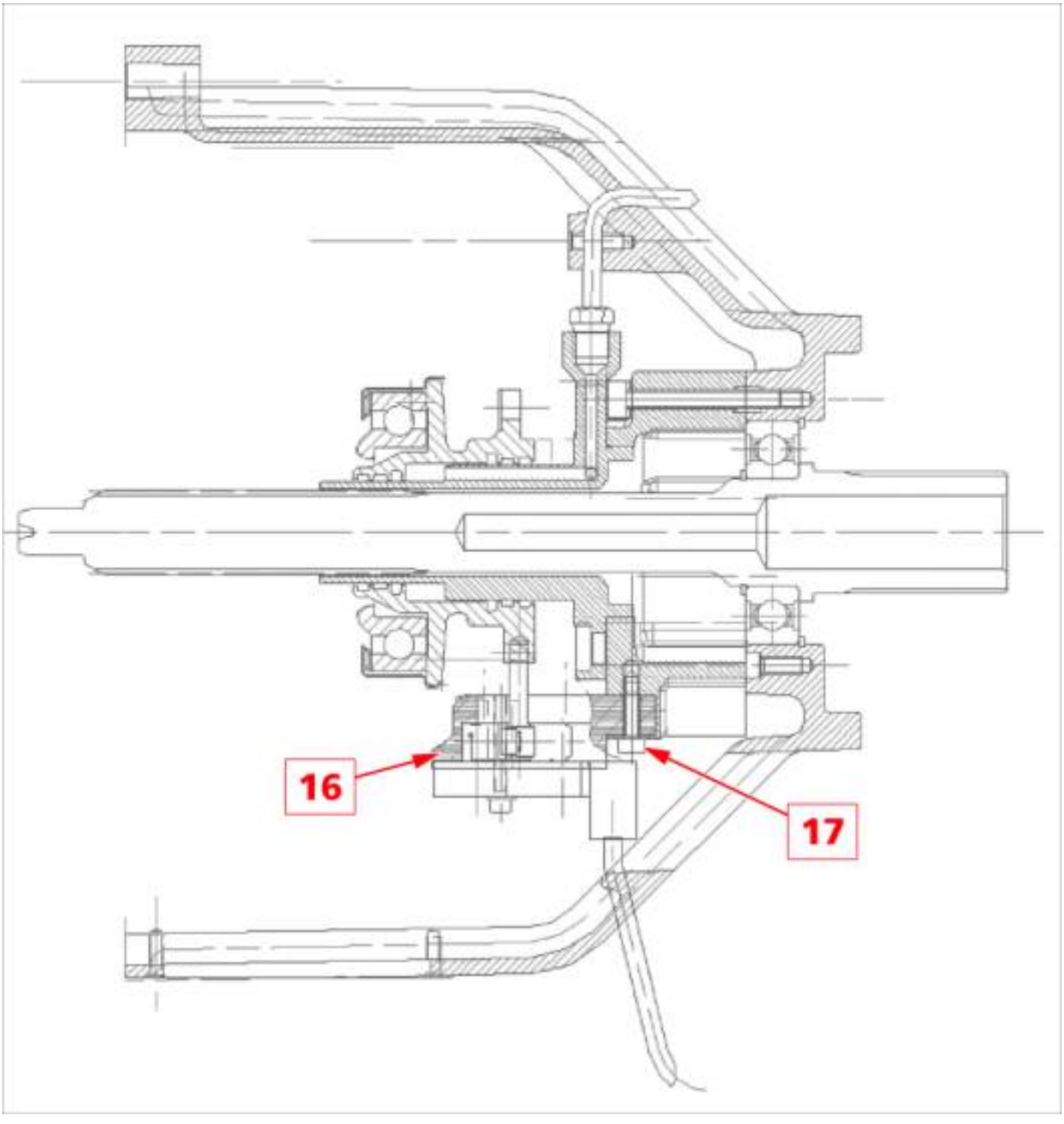
- Tighten the stud bolts **(13)** to **7.4 Nm**, fitting the washers **(14)** and the washers **(15)**.

N.B.
For all the fastenings use Loctite medium thread brake.



- Fit the mount **(16)**.
- Tighten the screws **(17)** to **1.2 Nm**.

N.B.
For all the fastenings use Loctite medium thread brake.



- Mount the clutch housing.

Refitting the clutch

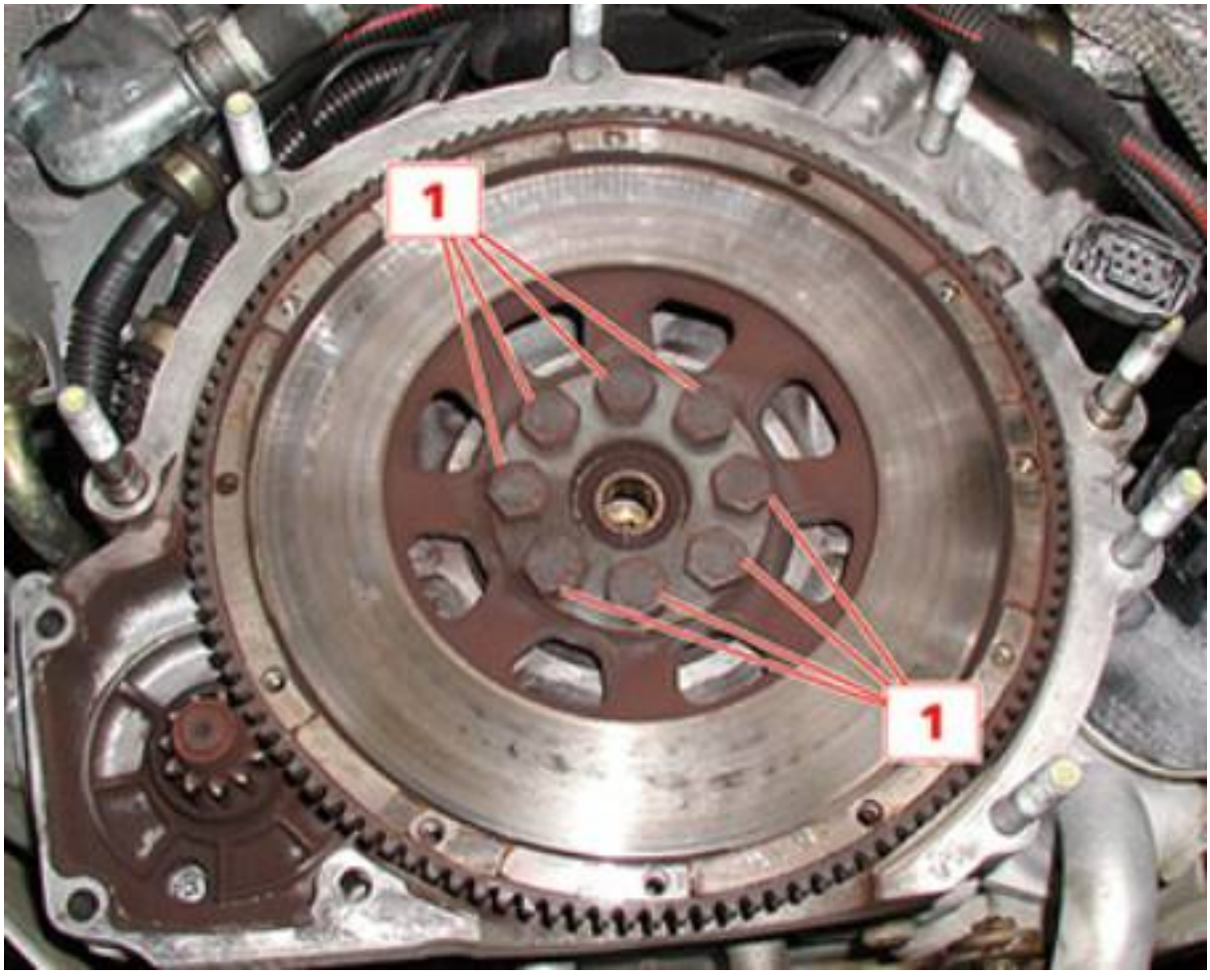
Engine flywheel

Removing the engine flywheel

- Remove the clutch assembly.

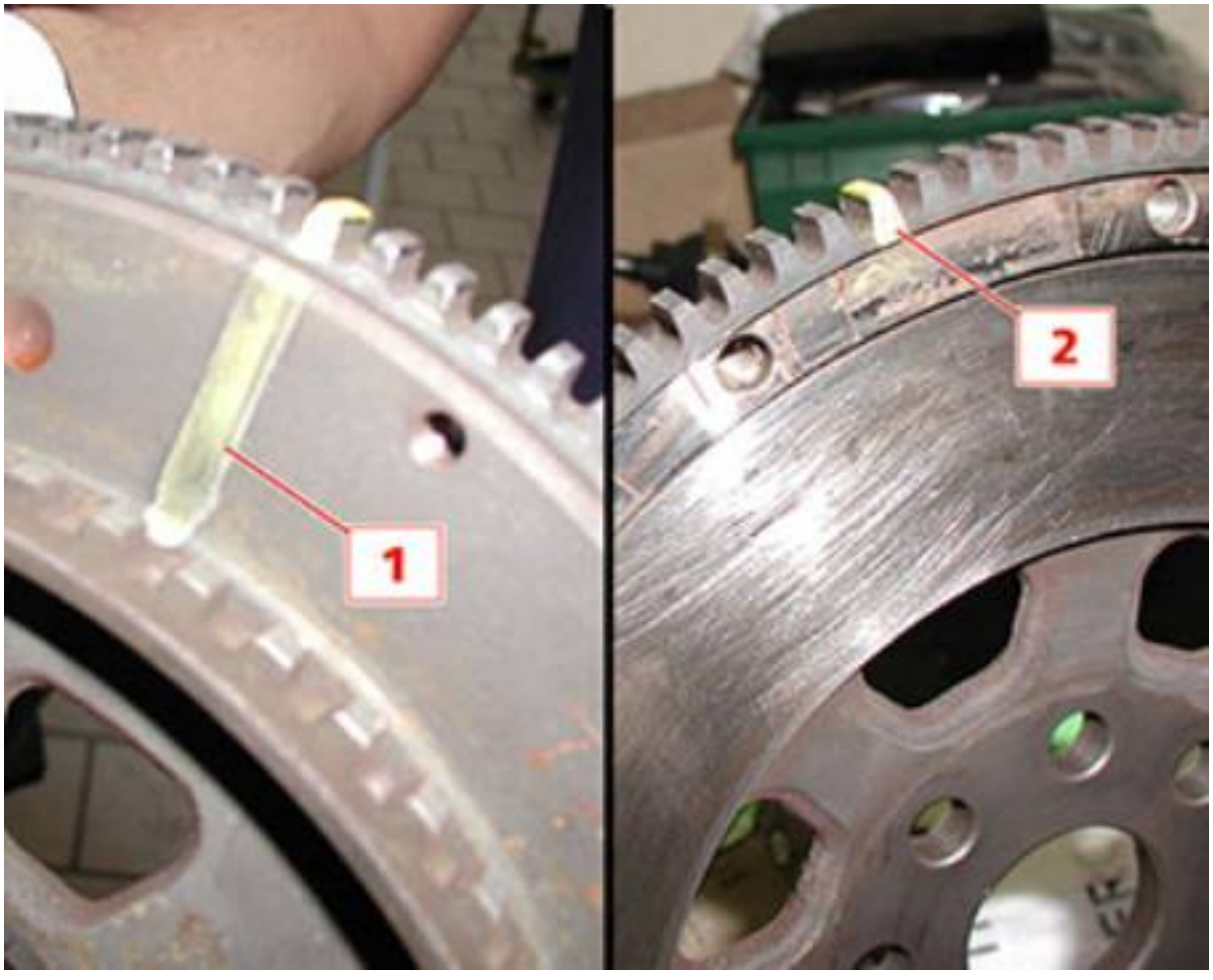
Removing/refitting the clutch

- Using a suitable tool to lock the crankshaft rotation, undo the retaining screws **(1)** of the engine flywheel.
- Remove the engine flywheel from its seat



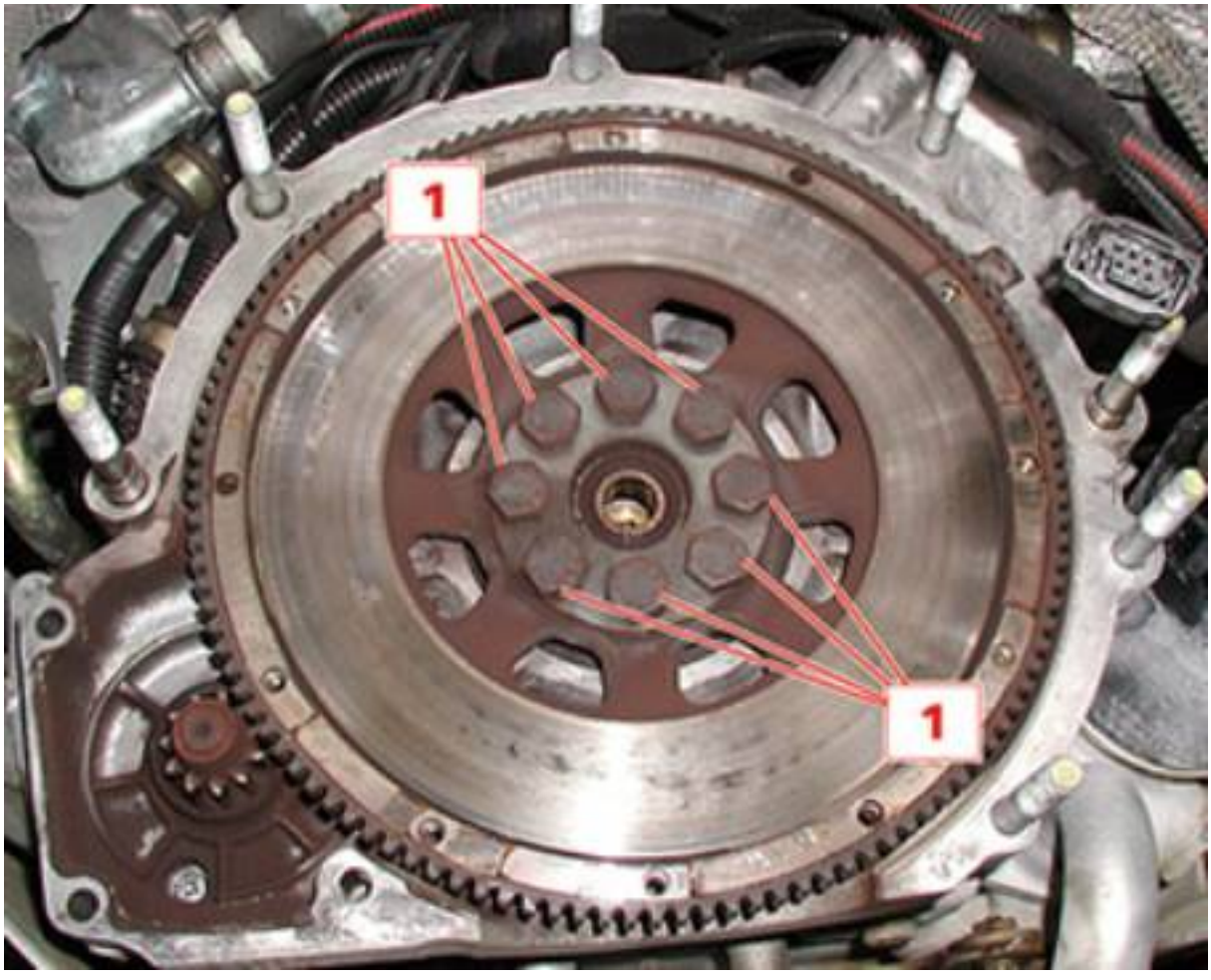
Refitting the engine flywheel

- Check the working surface of the clutch disc on the flywheel. There must not be any grooves or deformations.
- Check the surface planarity.
- There is a maximum unbalance mark on the rear part of the engine flywheel, which coincides with that on the clutch.
- To make the subsequent clutch fitting operation easier, it is advisable to copy the maximum unbalance mark **(1)** - found on the rear part of the flywheel (therefore not visible when the flywheel is fitted) - onto the front part of the flywheel with a felt-tip pen **(2)**, so that it will perfectly match the one marked on the clutch.



- The flywheel can only be fitted in one position, since one of the 8 holes is not on the same axis as the others. It is positioned slightly backward with respect to the other holes. Mark the different hole on the flywheel and on the spacer.

- Using a suitable tool to lock the crankshaft rotation, first loosely fit and then tighten the retaining screws **(1)** of the engine flywheel to a torque of **91 Nm**.



- Fit the clutch assembly.

Removing/refitting the clutch

Clutch shaft support bearing

Removing the clutch shaft support bearing

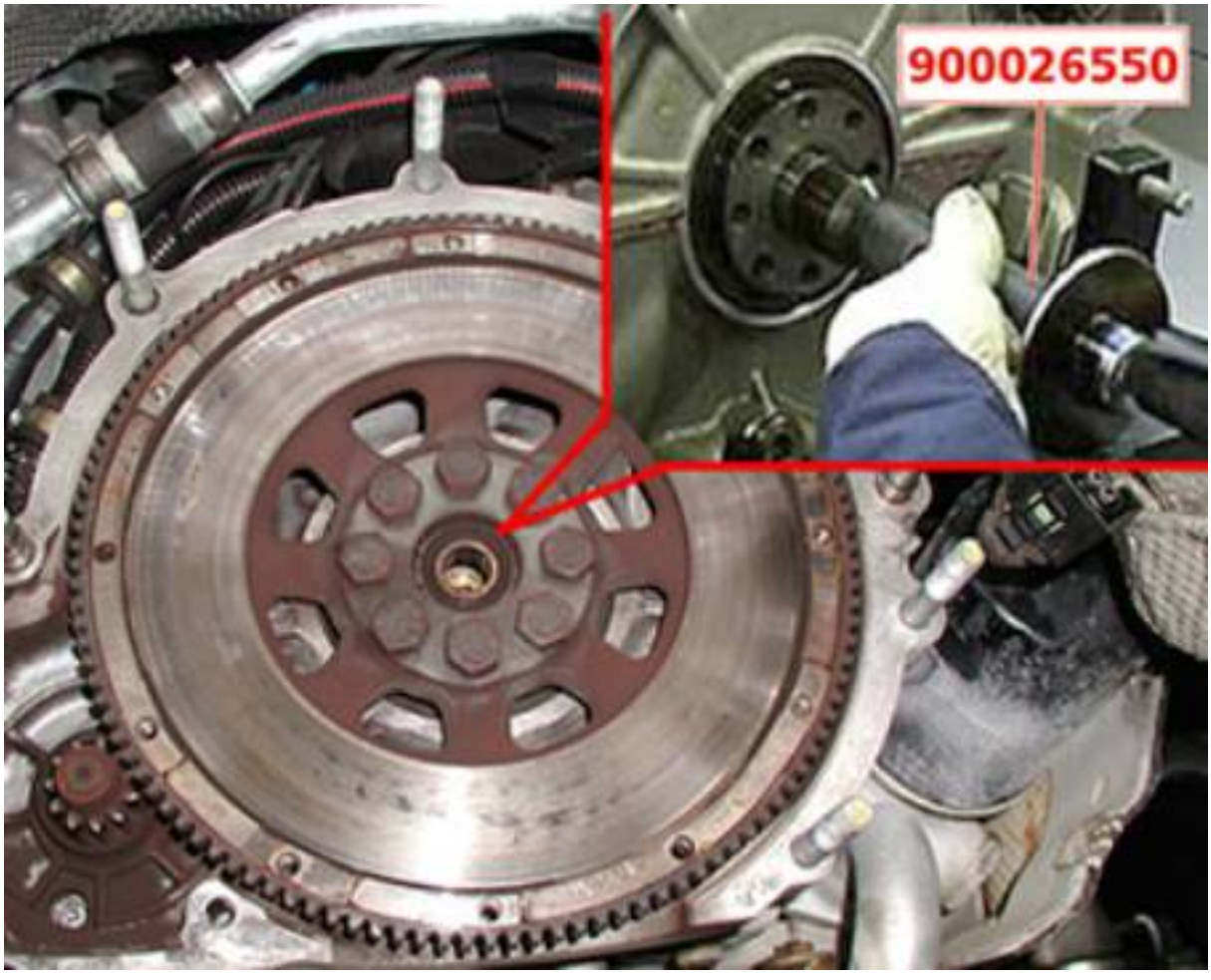
- Remove the clutch assembly.

Removing/refitting the clutch

- Using the extracting tool **95972714**, extract the clutch shaft support bearing **(1)**.

Refitting the clutch shaft support bearing

- Check that the component is in perfect working order.
- Whenever a bearing is removed, it is recommended to replace it.
- Visually inspect the bearing seat and remove any impurities if necessary.
- Using the introducer **900026550**, position the bearing in its seat.



- Fit the clutch assembly.

Detaching-reattaching the clutch

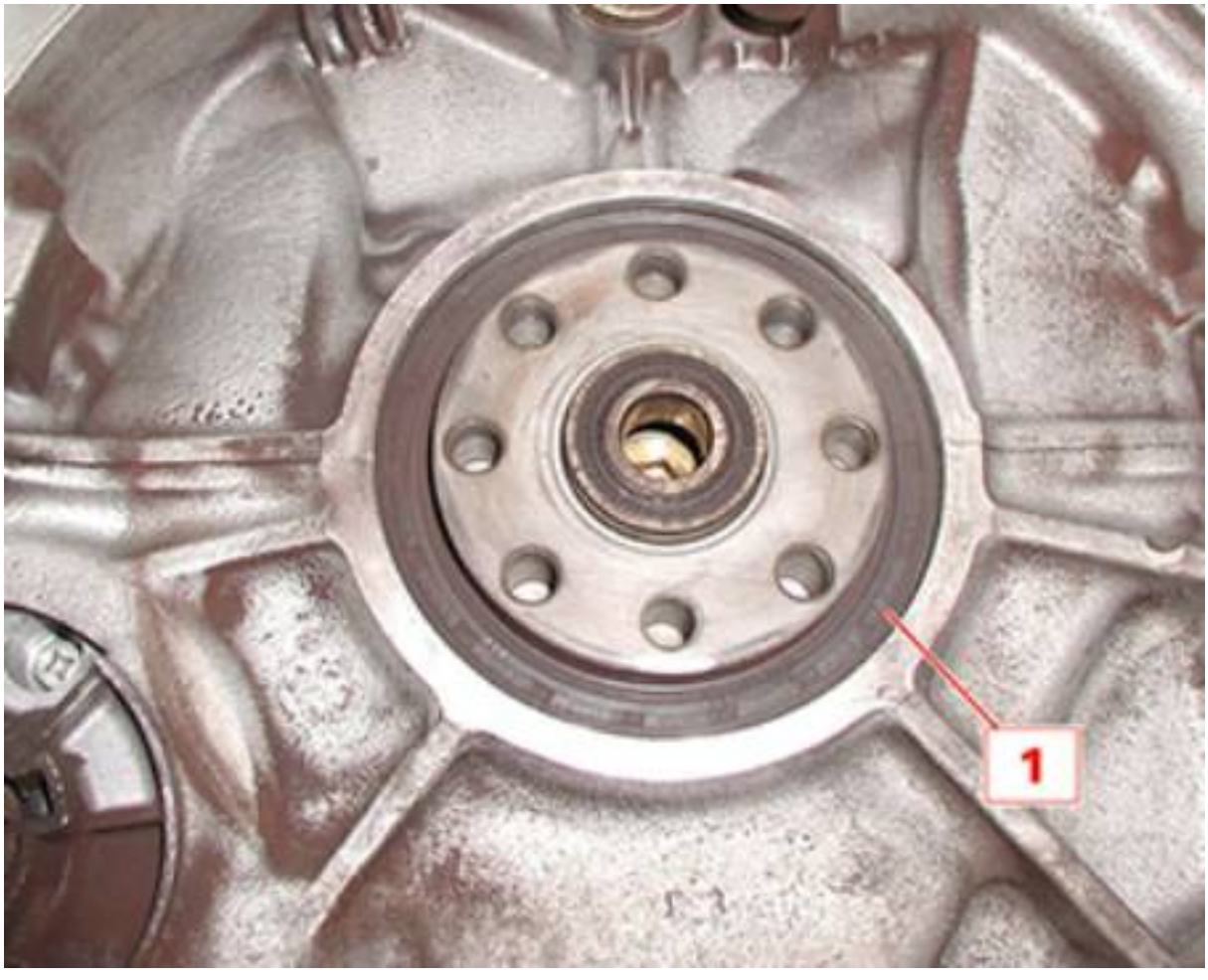
Crankshaft oil seal on the flywheel side

Removing the crankshaft oil seal on the flywheel side

- Remove the engine flywheel.

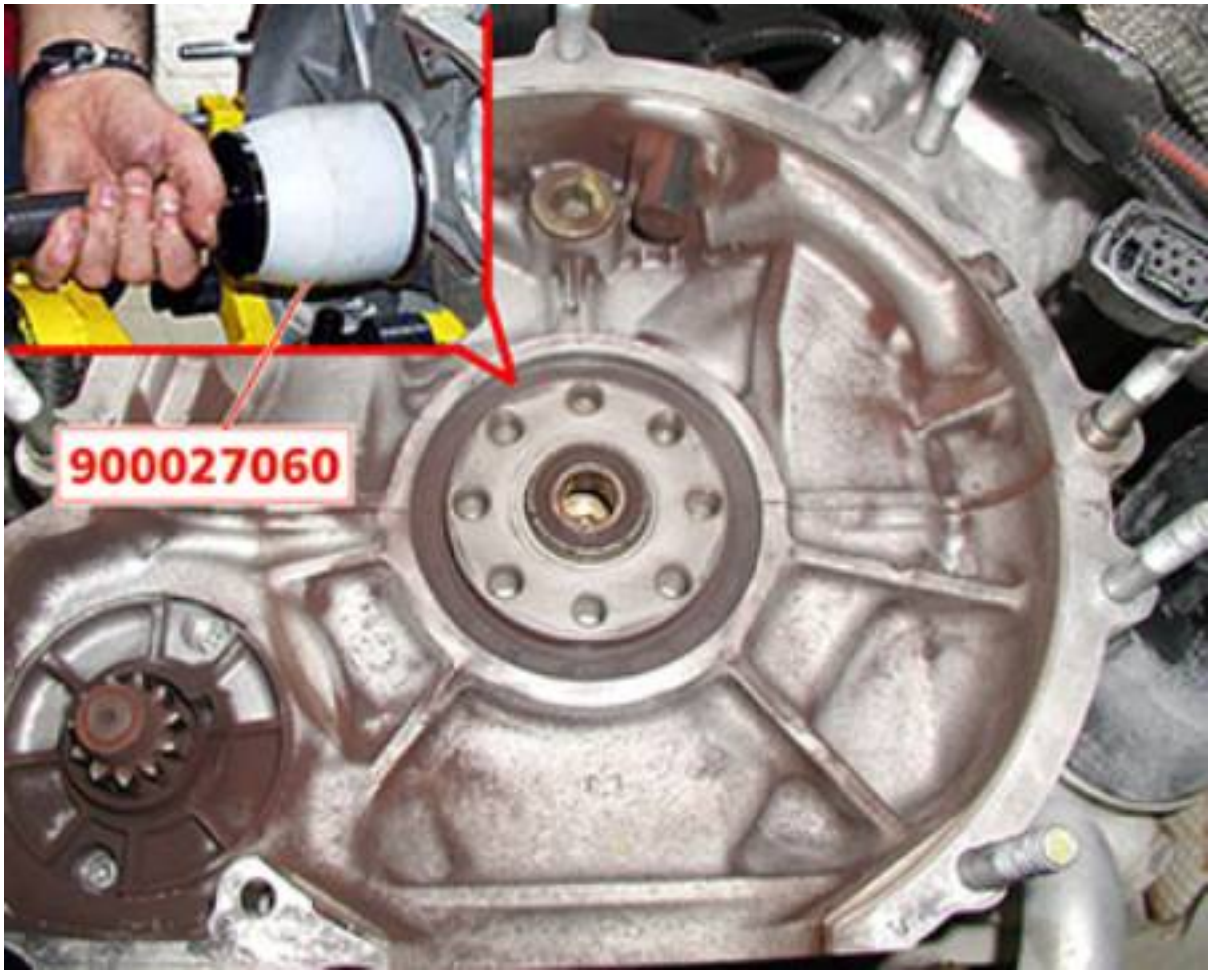
Engine flywheel

- Remove the crankshaft oil seal **(1)** positioned underneath the flywheel.
- The oil seal will be destroyed during removal, but work carefully so as not to damage the oil seal seat.



Refitting the crankshaft oil seal on the flywheel side

- As a spare part, you must use an oil seal of the same dimensions and characteristics.
- Clean off any impurities in the oil seal seat.
- Using the introducer **900027060**, fit the new oil seal in its seat on the cover.



- Fit the engine flywheel.

Engine flywheel

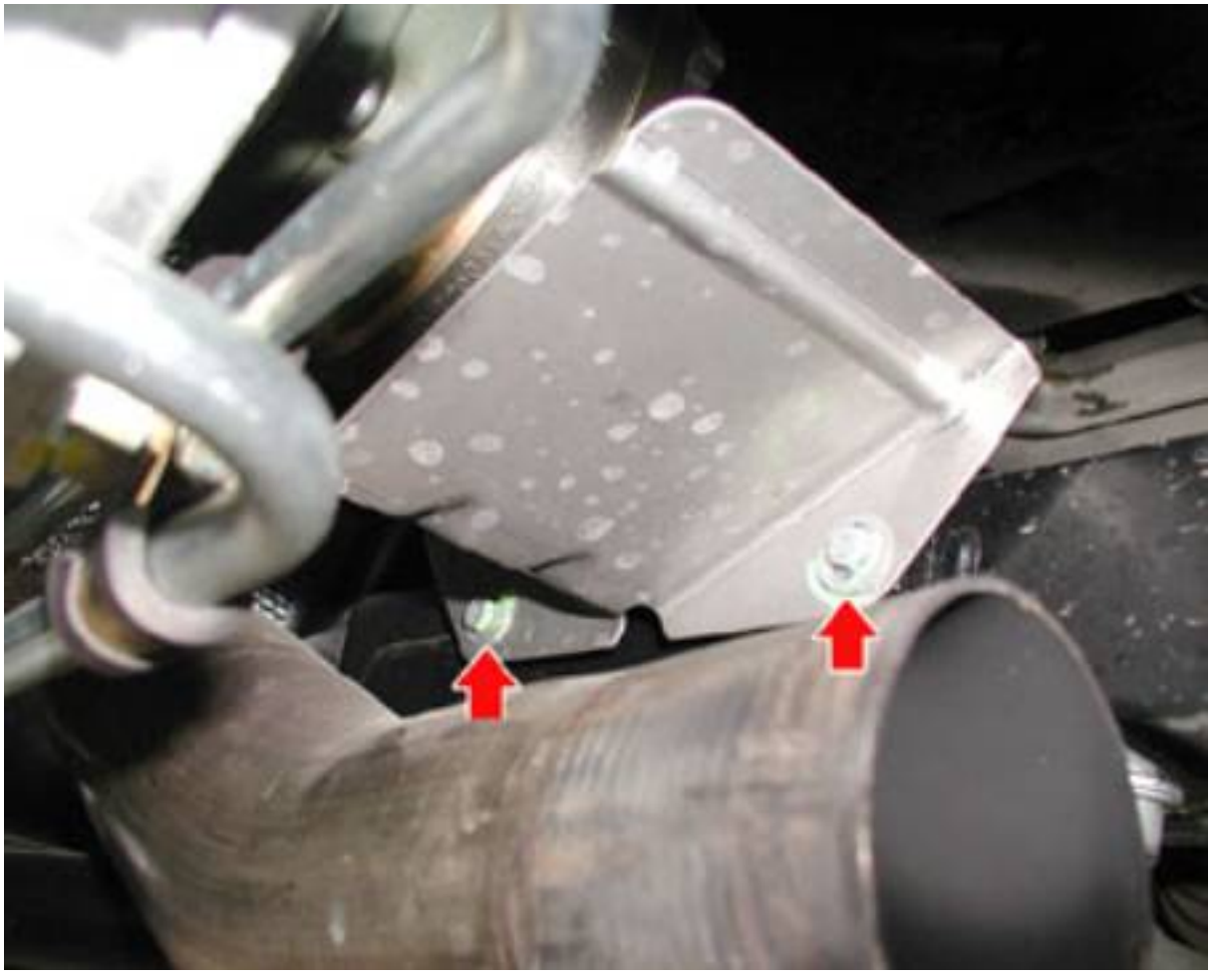
Removing-refitting the gearbox

- Disconnect the battery's negative terminal.
- Place the car on the hoist.
- Remove the exhaust tailpipes.

Removing-refitting the tailpipe

- Undo the fastening screws and remove the heat guard on the left-hand exhaust line.

- Undo the fastening screws and remove the heat guard on the right-hand exhaust line.

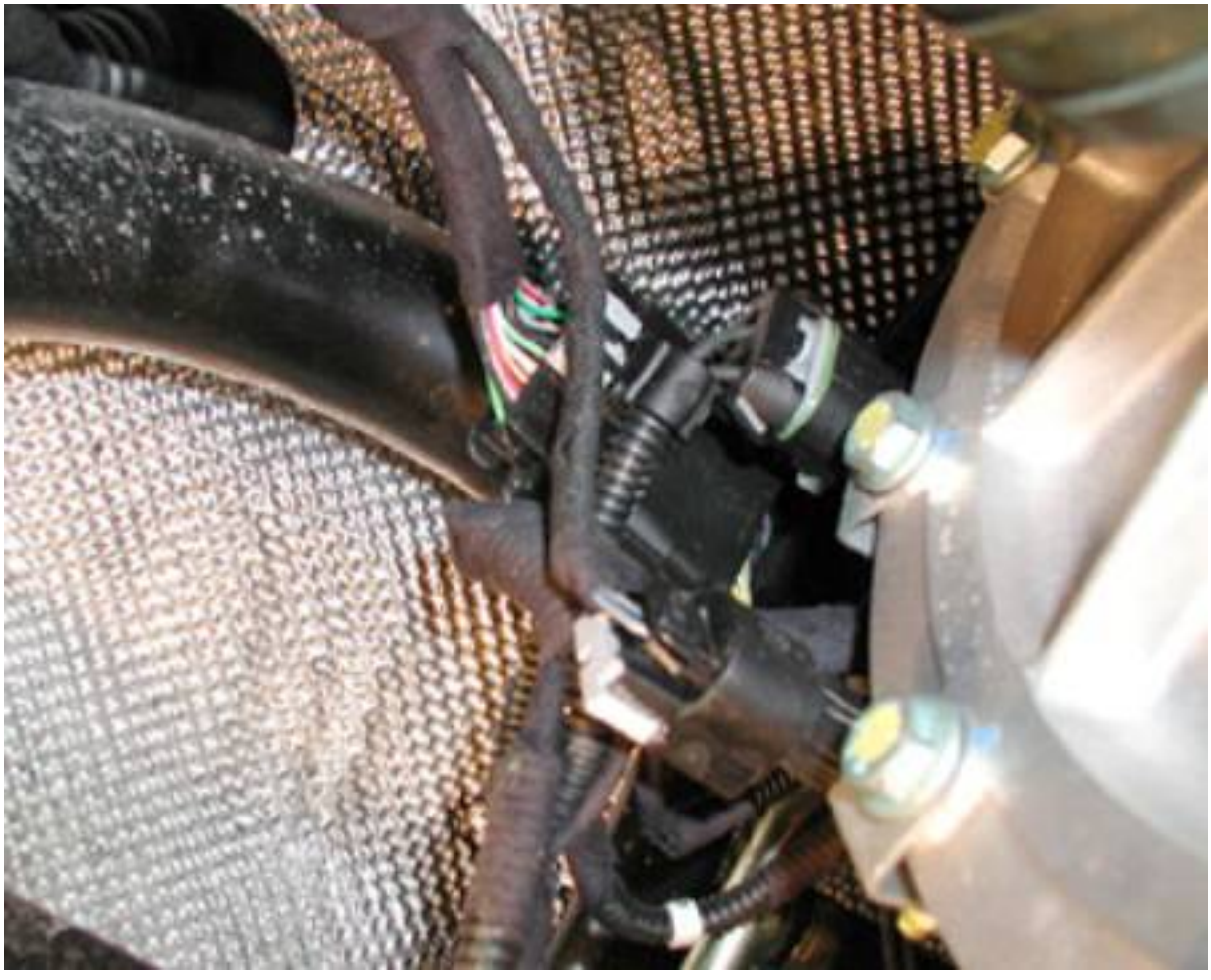


- Unscrew the nuts fastening the mount for the right-hand exhaust extension to the bodywork.
- Carry out the same operation for the left-hand exhaust extension by undoing the screws fastening the extension pipe to the bodywork.

- Unscrew the two nuts fastening the metal clamps joining the exhaust tailpipes and central silencers.

- Remove the two exhaust extensions.

- Detach the three electric connectors.

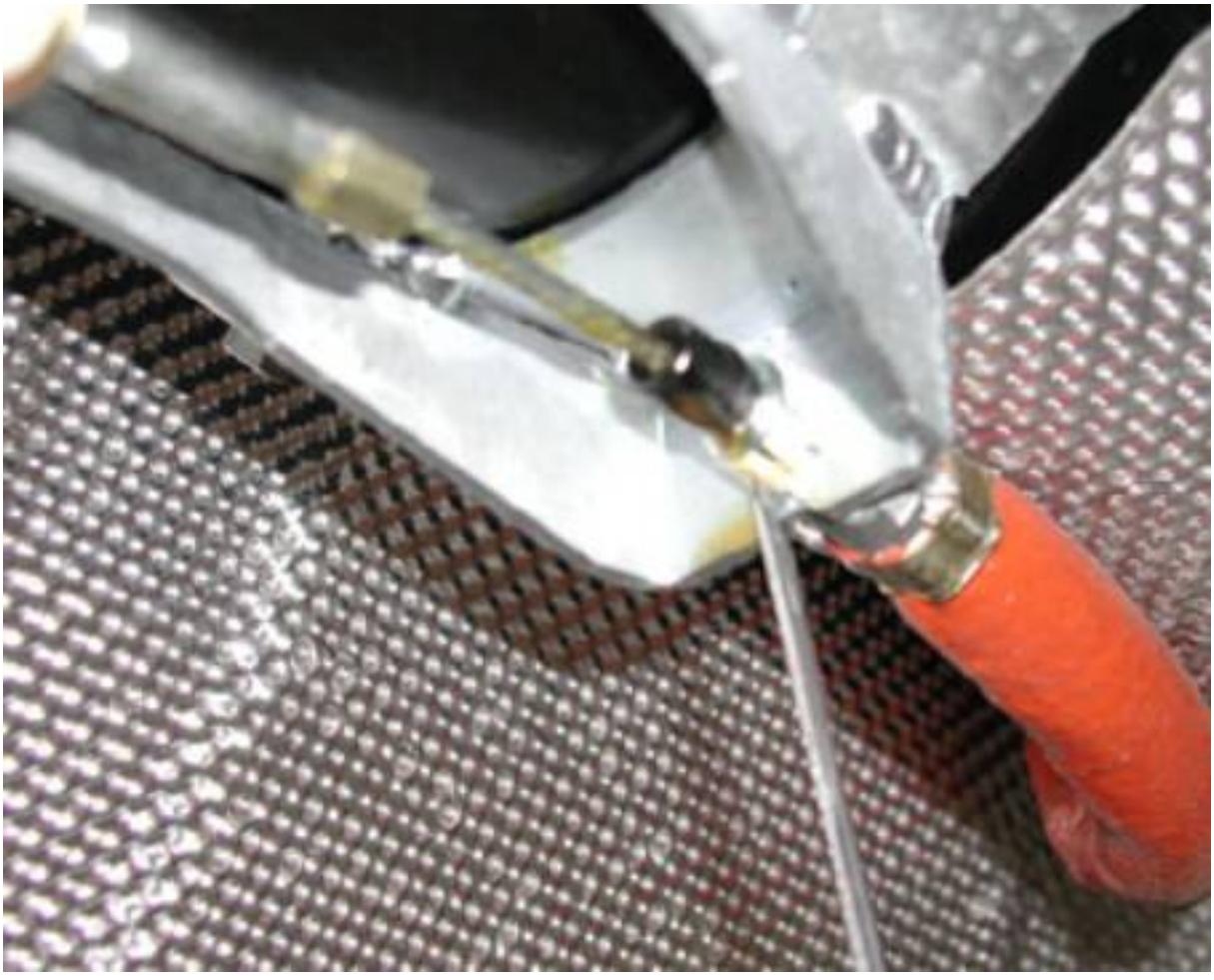


- Undo the screw fastening the electric connector to the chassis.

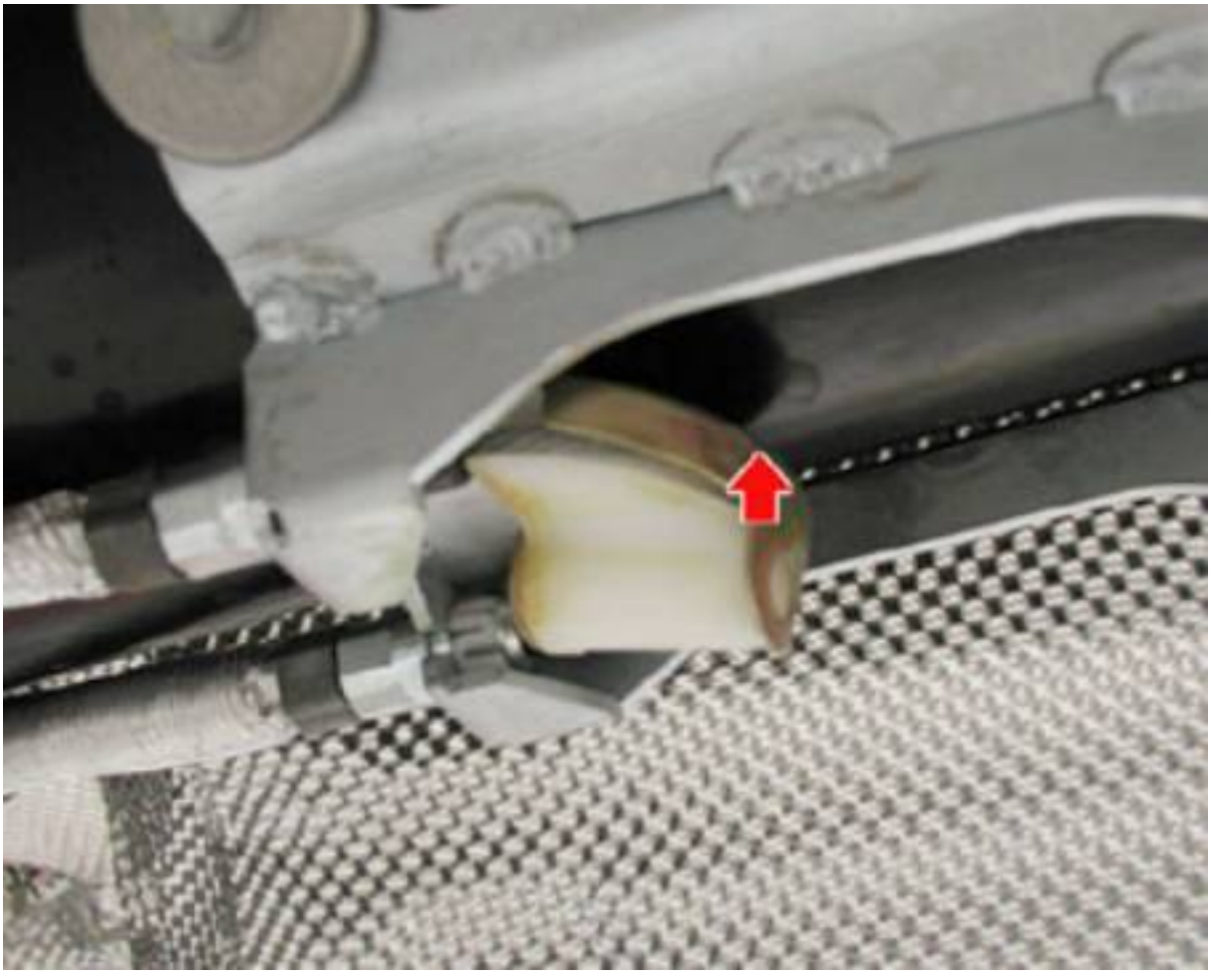
- Undo the nut and the check nut used to fasten and adjust the handbrake cable.

- Remove the plastic retaining clamp from its seat on the handbrake clamp, then release the handbrake cable from the bracket.

N.B.
Make sure you do not break the plastic clamp



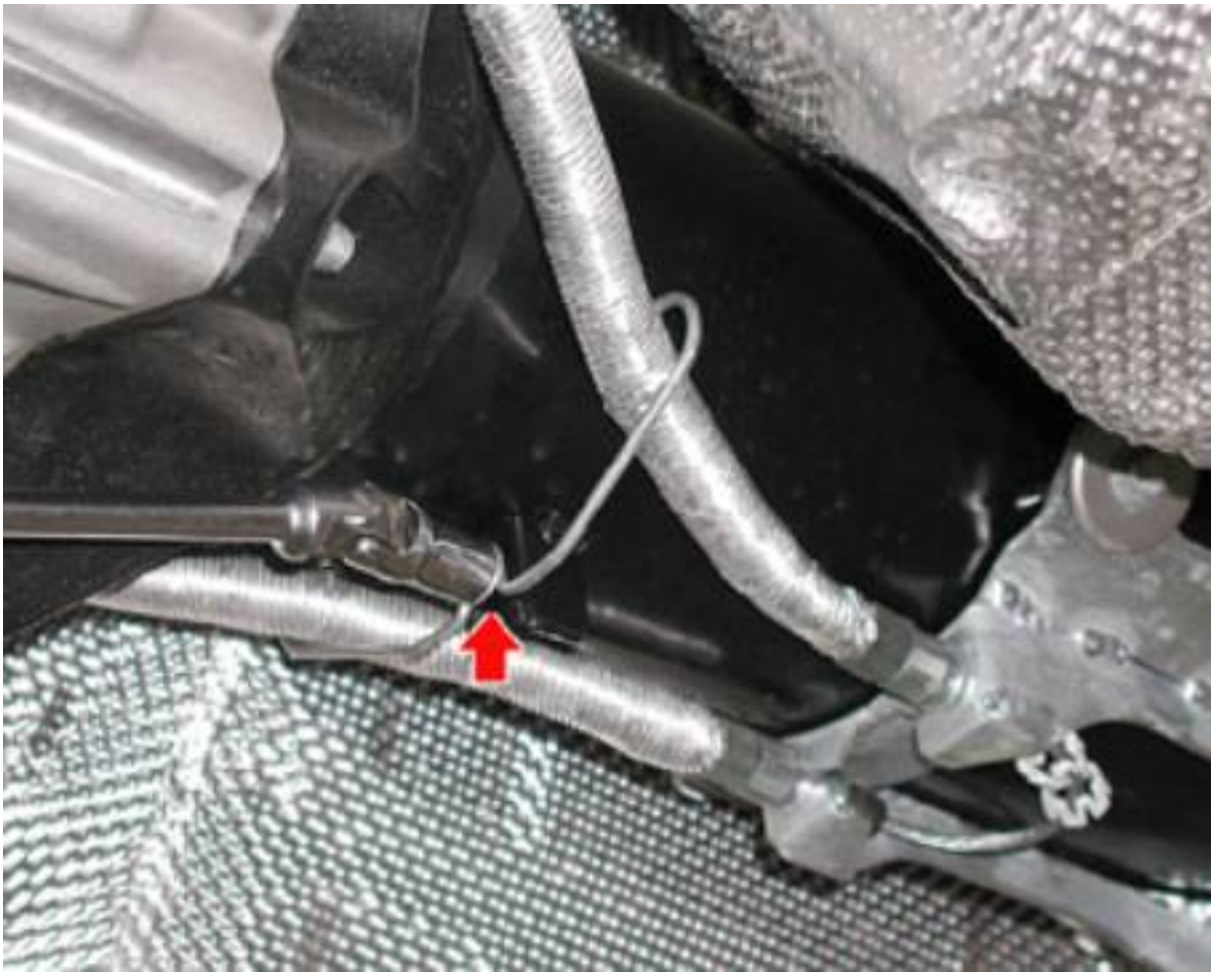
- Remove the spacer.



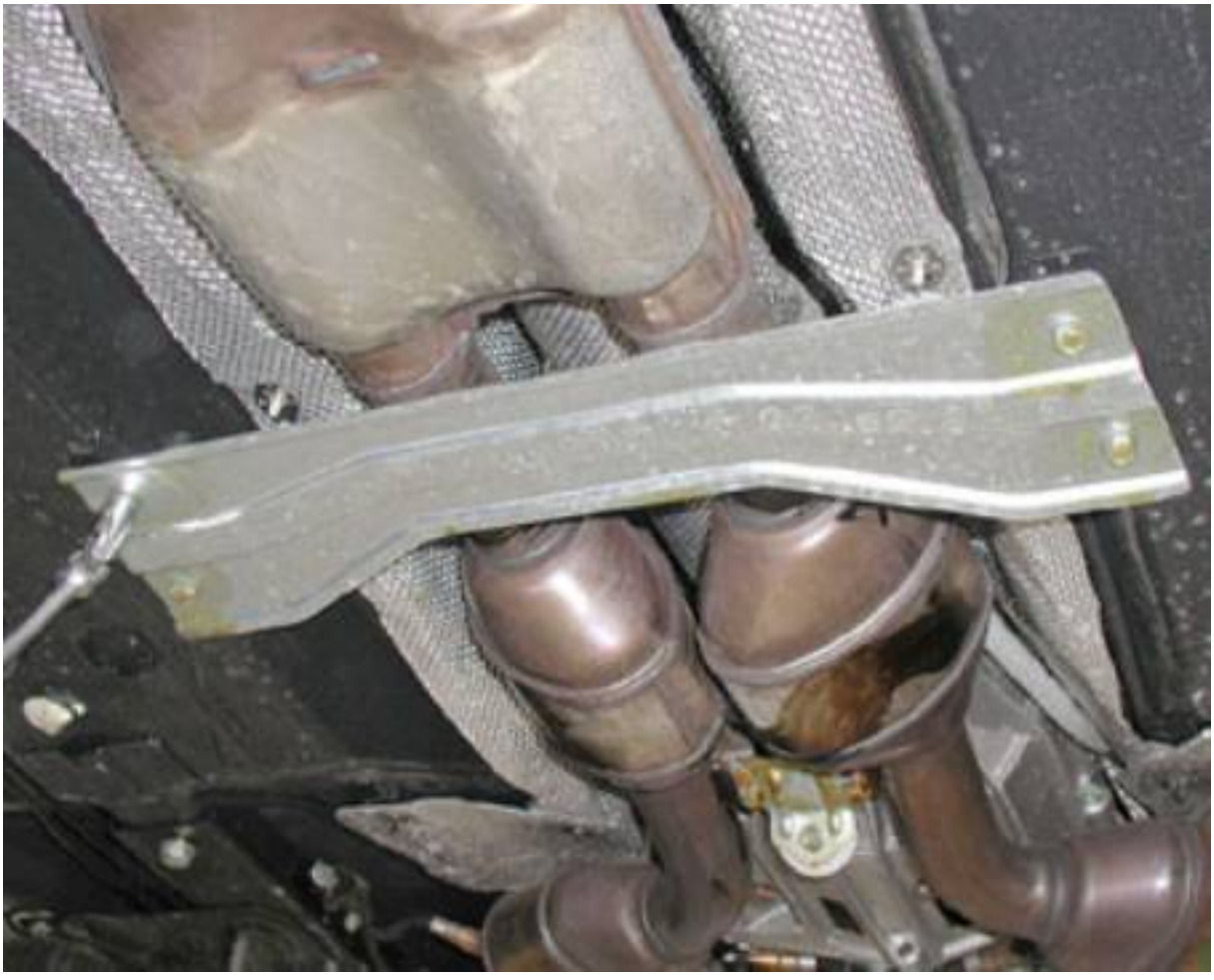
- Remove the plastic handbrake cable retaining clamps from their seat.

N.B.
Make sure you do not break the plastic clamps

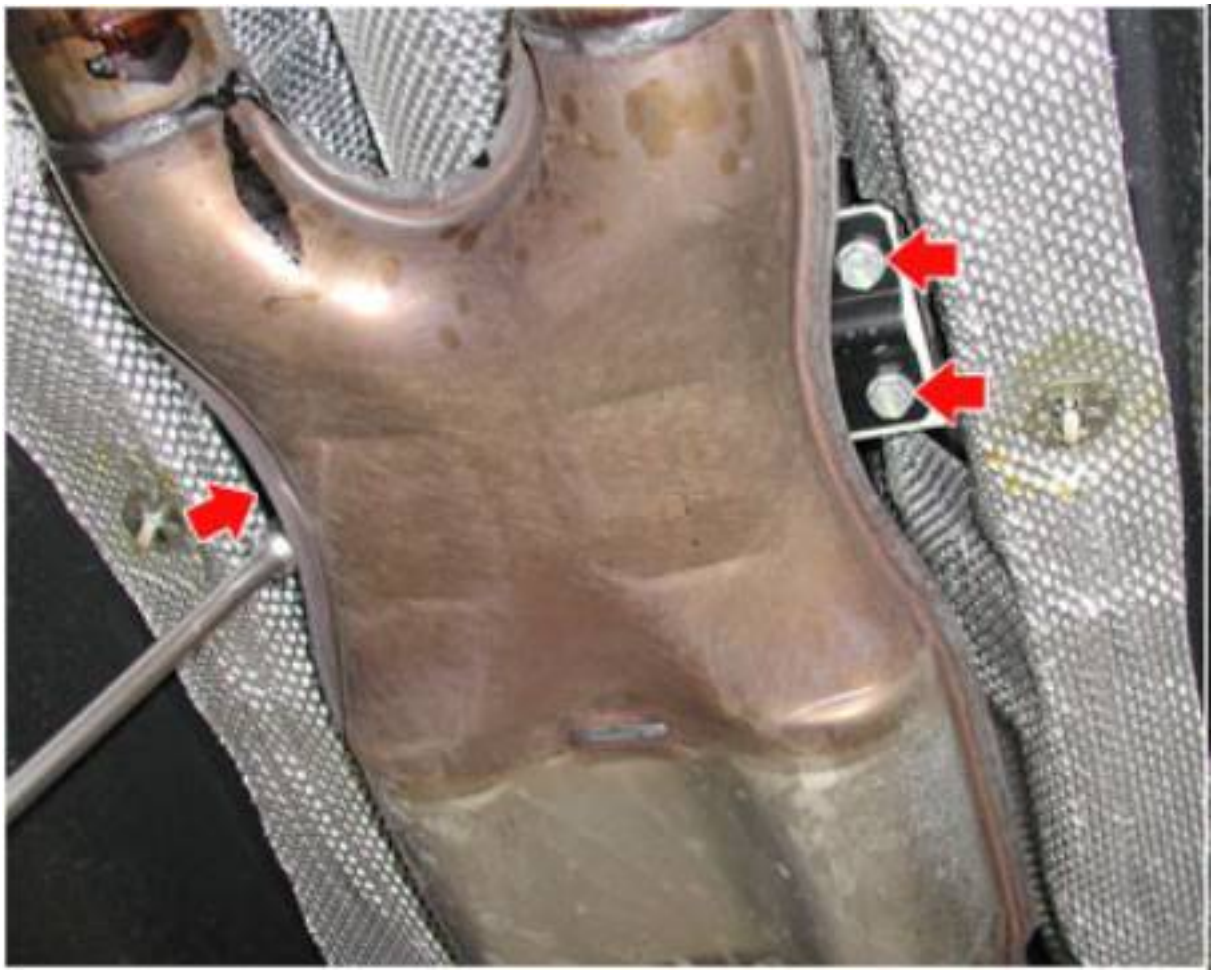
- Unscrew the nut, remove the bracket and take the handbrake cables out the mount.



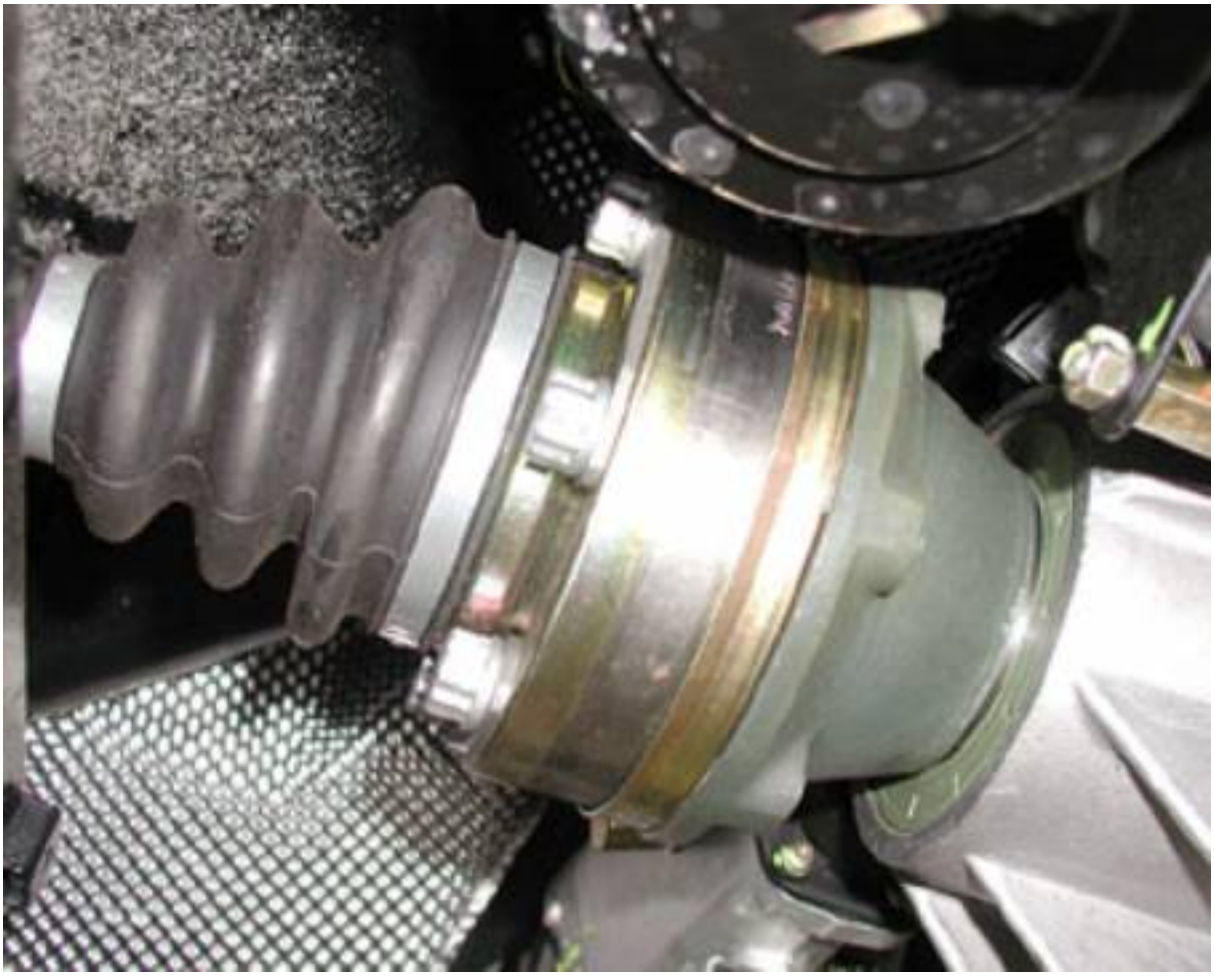
- Undo the lower fastening screws and remove the bodywork reinforcement bracket.



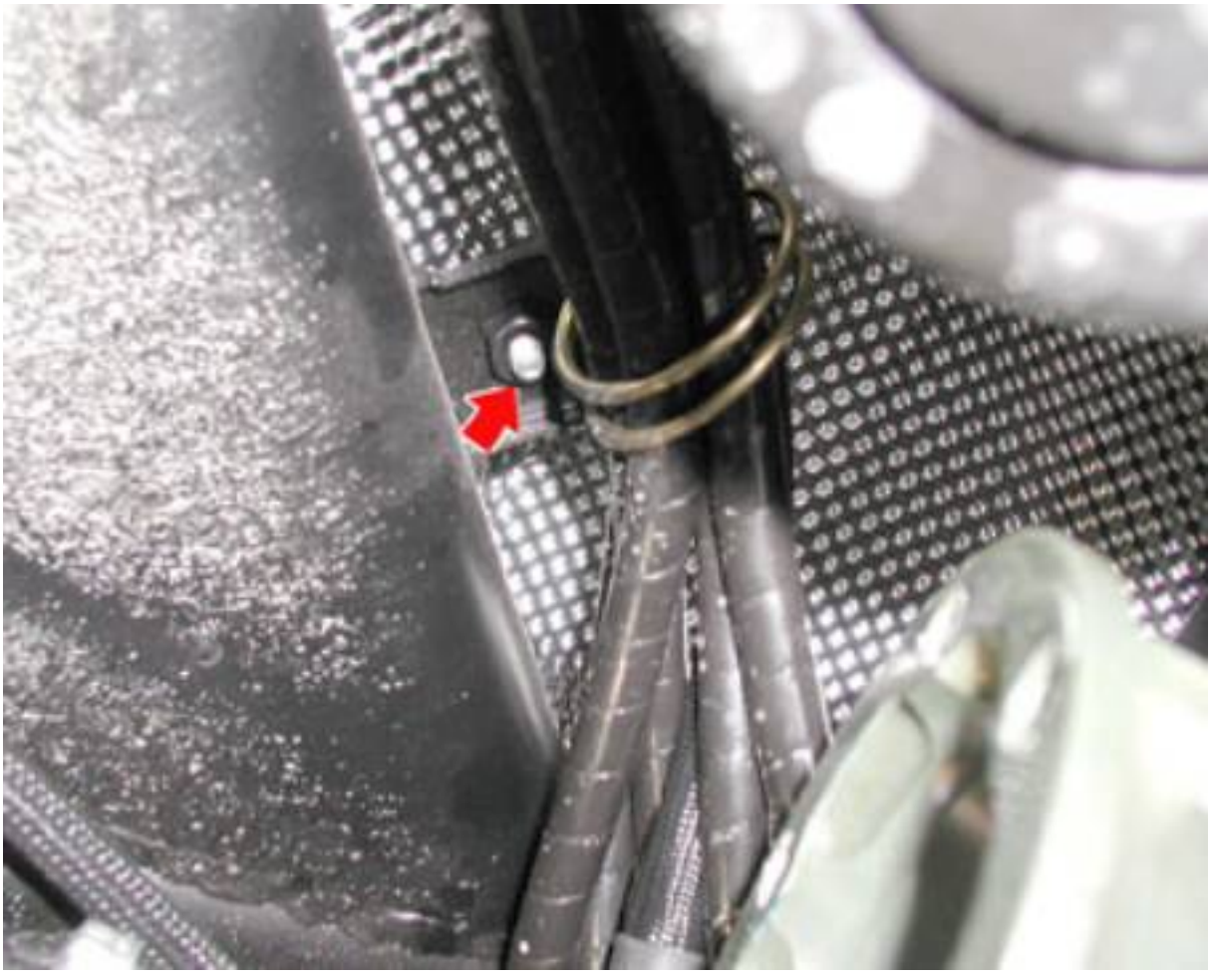
- Undo the fastening screws and remove the bodywork reinforcement bracket located between the transmission shaft and the central silencers.



Undo the screws fastening the right- and left-hand axle shafts to the gearbox.



- Undo the fastening screw on the electronically-controlled gearbox oil line bracket.



- Disconnect the quick coupling connecting the oil delivery line to the clutch.

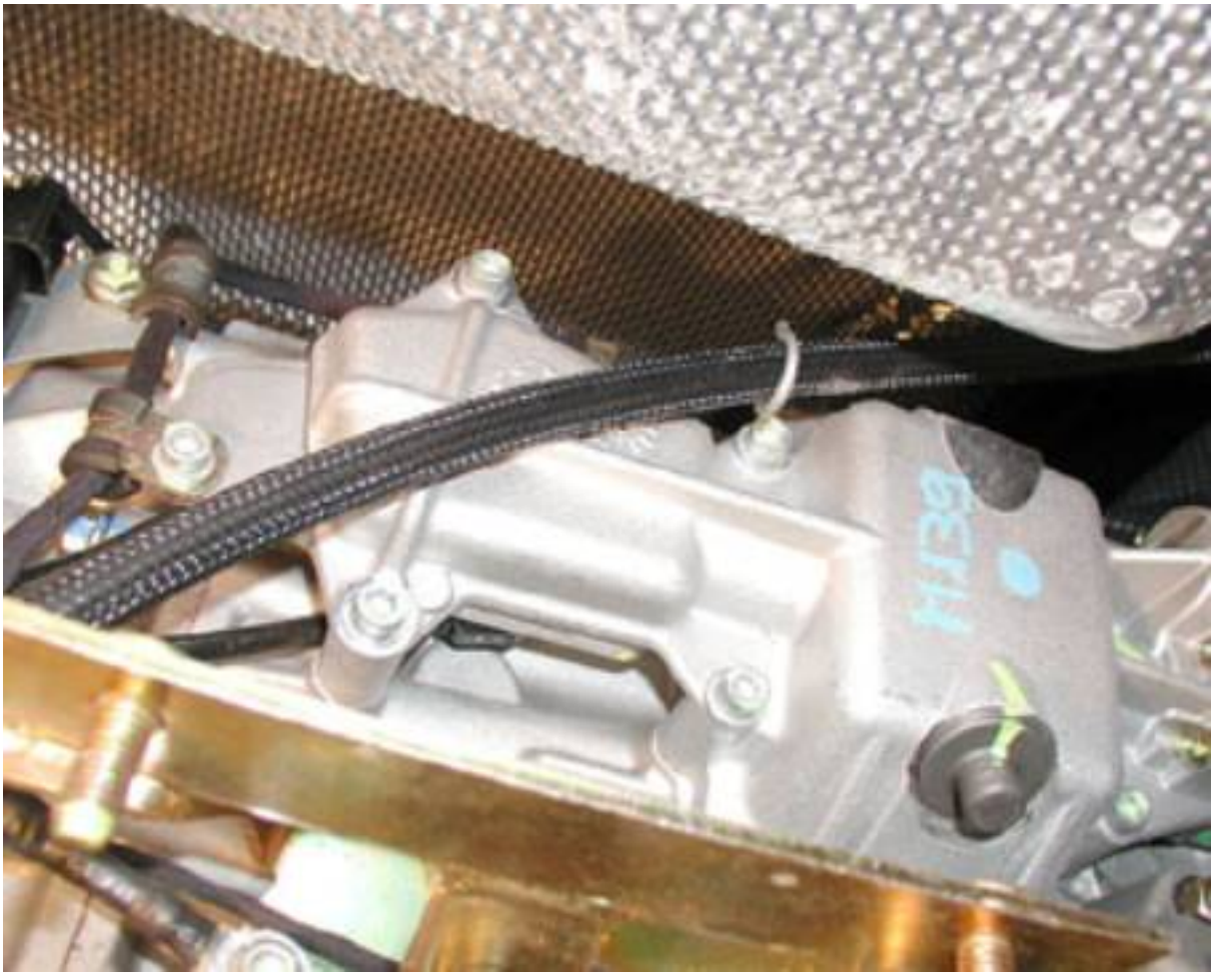
- Unscrew the two fastening nuts and remove the plastic guard fastened to the lower lever.

- Position a hydraulic lifting device under the gearbox supporting cross member, fitted with a suitable tool for the gearbox cross member to rest on.

N.B.
Keep the gearbox aligned with the rear transmission by fitting suitable shims under the gearbox housing.

- Undo the fastening screws on the gearbox supporting cross member.

- Lower the gearbox unit until the left-hand handbrake cable can be accessed and released from the fastening bracket.



- Unscrew the fastening nut and release the right-hand handbrake cable from the gearbox.

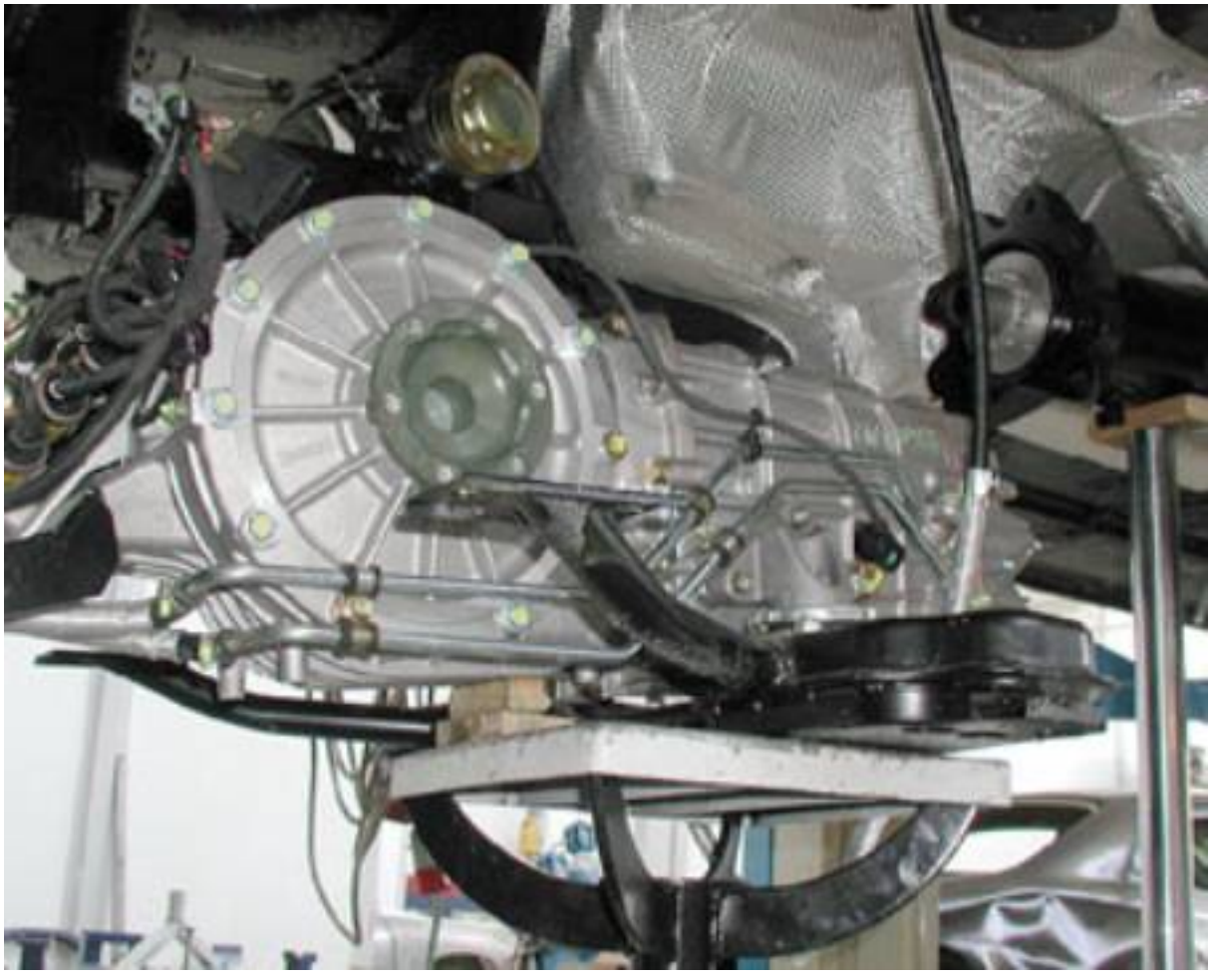
- Place a hydraulic device in position to support the transmission shaft.

- Unscrew the nuts fastening the transmission shaft to the gearbox.

- Working from the transmission shaft -gearbox coupling area, separate the gearbox unit from the transmission shaft.

- Slowly lower the hydraulic device and remove the gearbox from its seat on the vehicle.

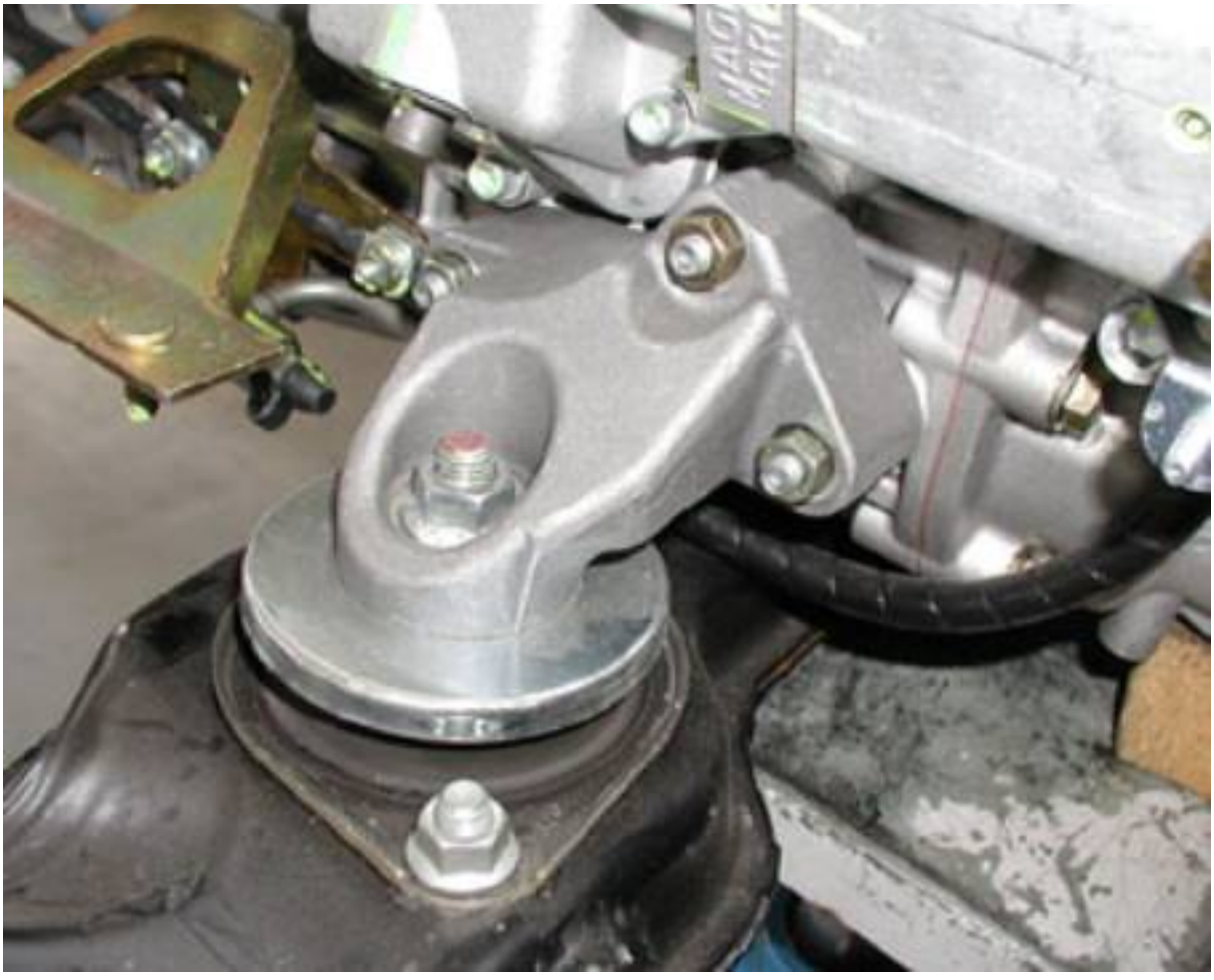
N.B.
During the gearbox removal operation, take care to ensure the oil radiator is not damaged.



- Unscrew the nuts fastening the two gearbox mounts to the relative rubber bushings and separate the gearbox from the lower cross member.

Refitting the gearbox

- With the gearbox on the bench, check the level of the oil in the tank, then visually inspect that the components are intact and the main fastenings are tightened to the correct torque.
- Position the gearbox on the supporting cross member and tighten the nuts fastening the rubber bushings to the gearbox mounts to a torque of **130 Nm**.

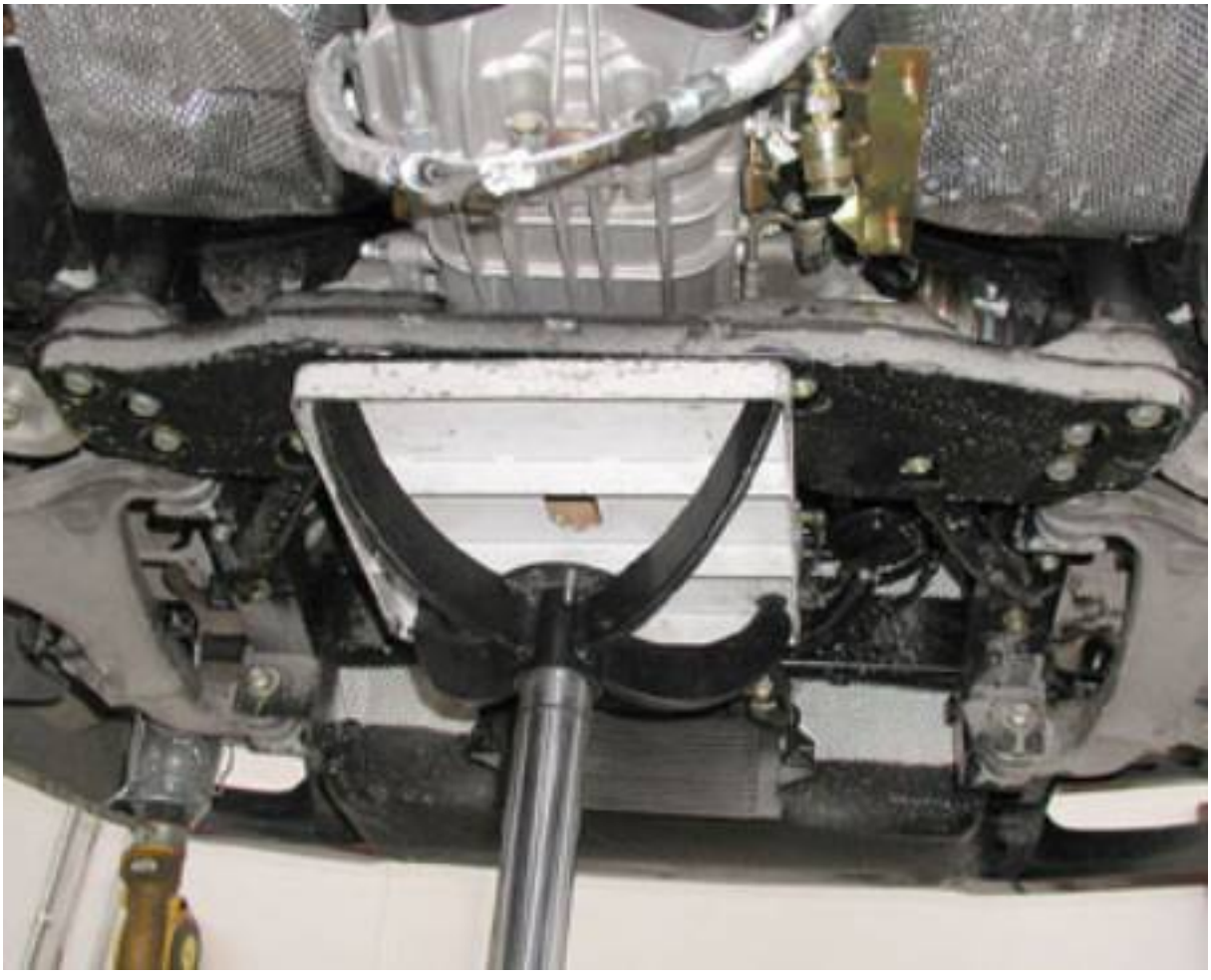


- Position the gearbox and cross member assembly on the hydraulic lifting device complete with the tool to support the gearbox, then fit the gearbox in the relative compartment on the vehicle.
- Connect the gearbox to the transmission shaft and tighten the fastening nuts to a torque of **70 Nm**.

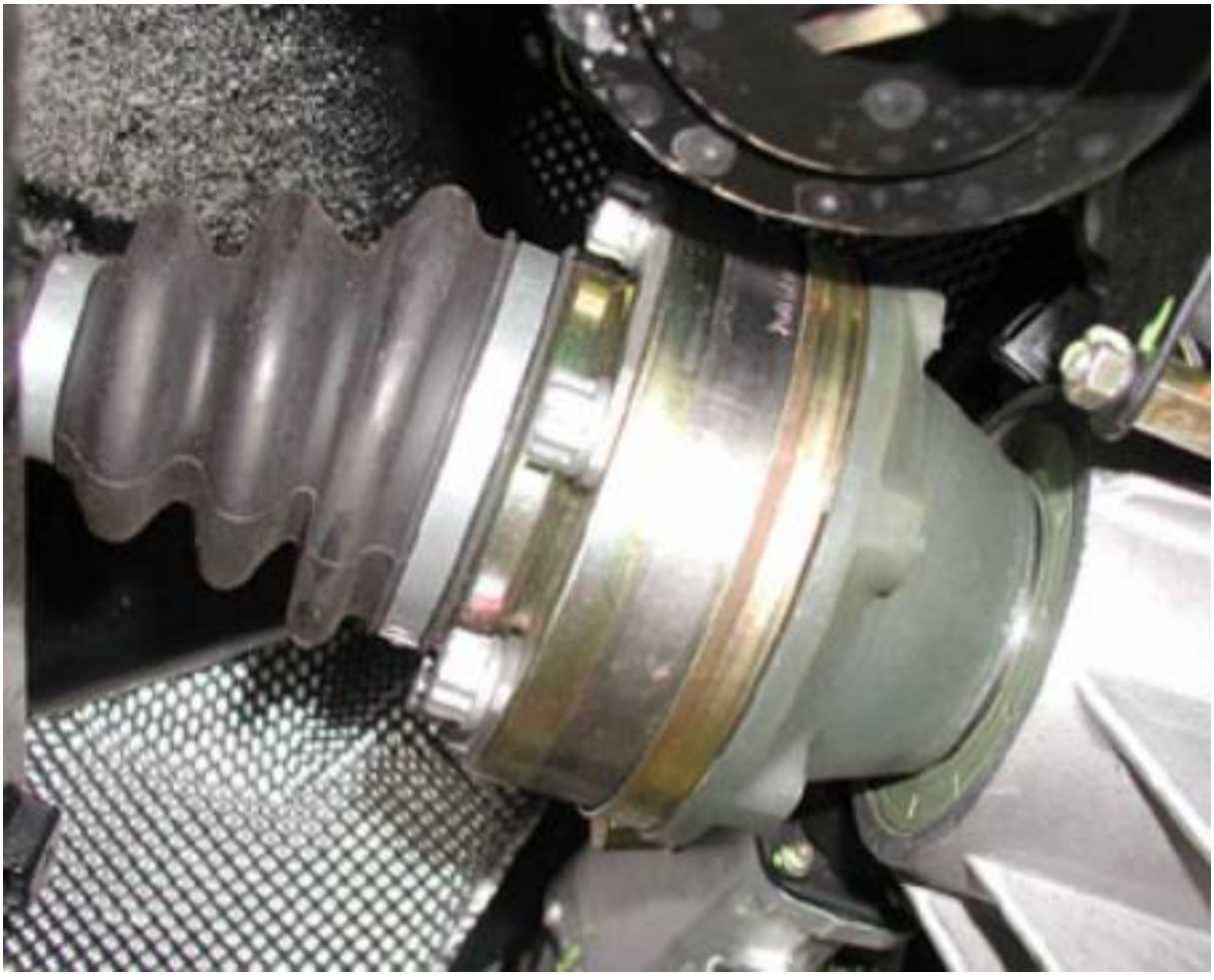
- Tighten the nut fastening the right-hand handbrake cable to the gearbox.
- Fasten the handbrake cable in the relative seat on the left-hand side of the gearbox.
- Position a hydraulic lifting device under the gearbox supporting cross member, fitted with a suitable tool for the gearbox cross member to rest on.

N.B.
Keep the gearbox aligned with the rear transmission by fitting suitable shims under the gearbox housing.

- Lift the gearbox and position it in its seat, then tighten the fastening screws on the gearbox supporting cross member to torque.

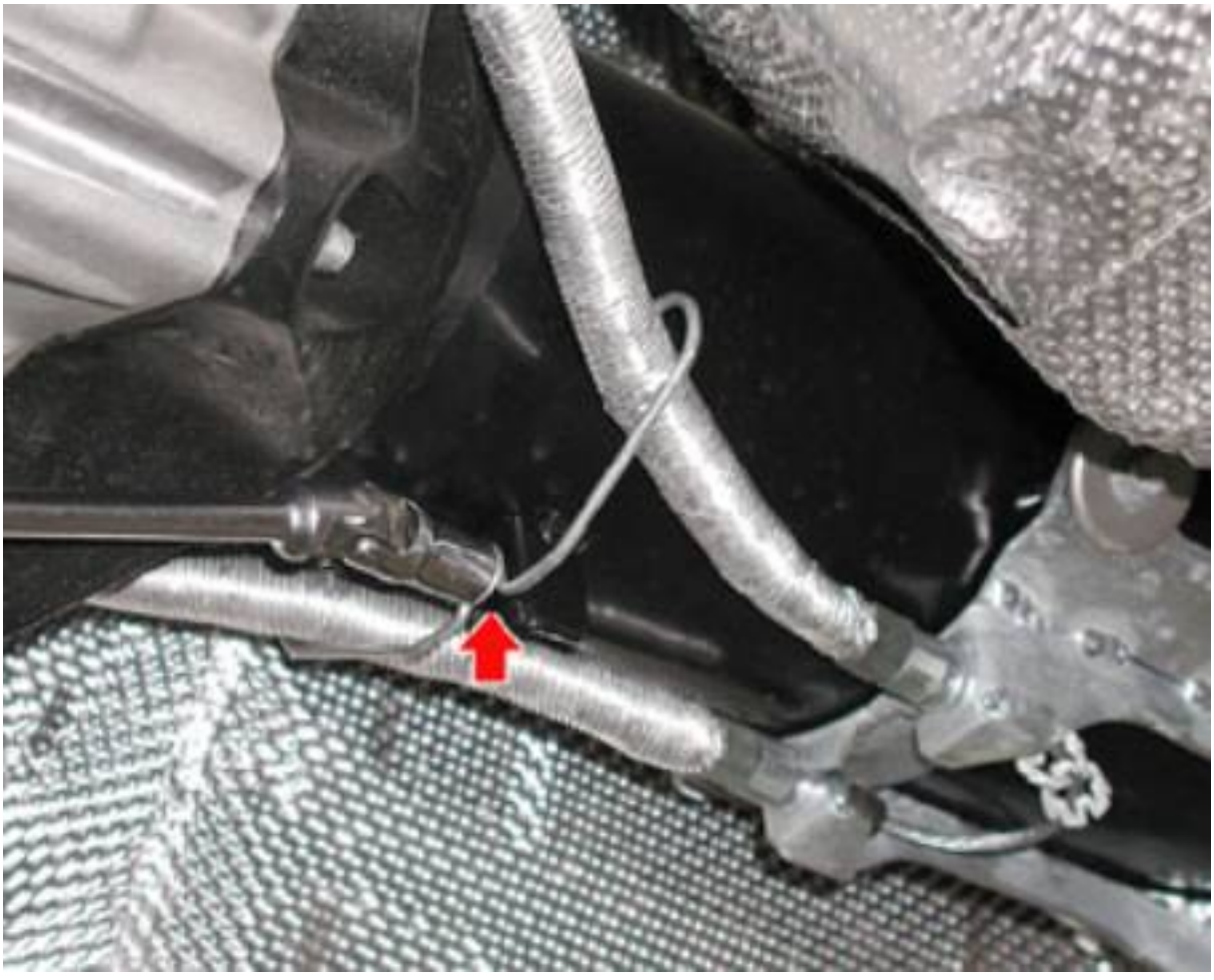


- Remove the hydraulic lifting device fitted with the tool used for removing and refitting the gearbox.
- Fit the plastic guard fastened to the lower lever and tighten the two fastening nuts.
- Connect the oil delivery line to the clutch with the quick coupling.
- Tighten the fastening screw on the electronically-controlled gearbox oil line bracket.
- Tighten the screws fastening the right- and left-hand axle shafts to the gearbox to a torque of **80Nm**.



- Fit the bodywork reinforcement bracket located between the transmission shaft and the central silencers and tighten the fastening screws to torque.
- Fit the bodywork reinforcement bracket located under the central exhaust silencers.

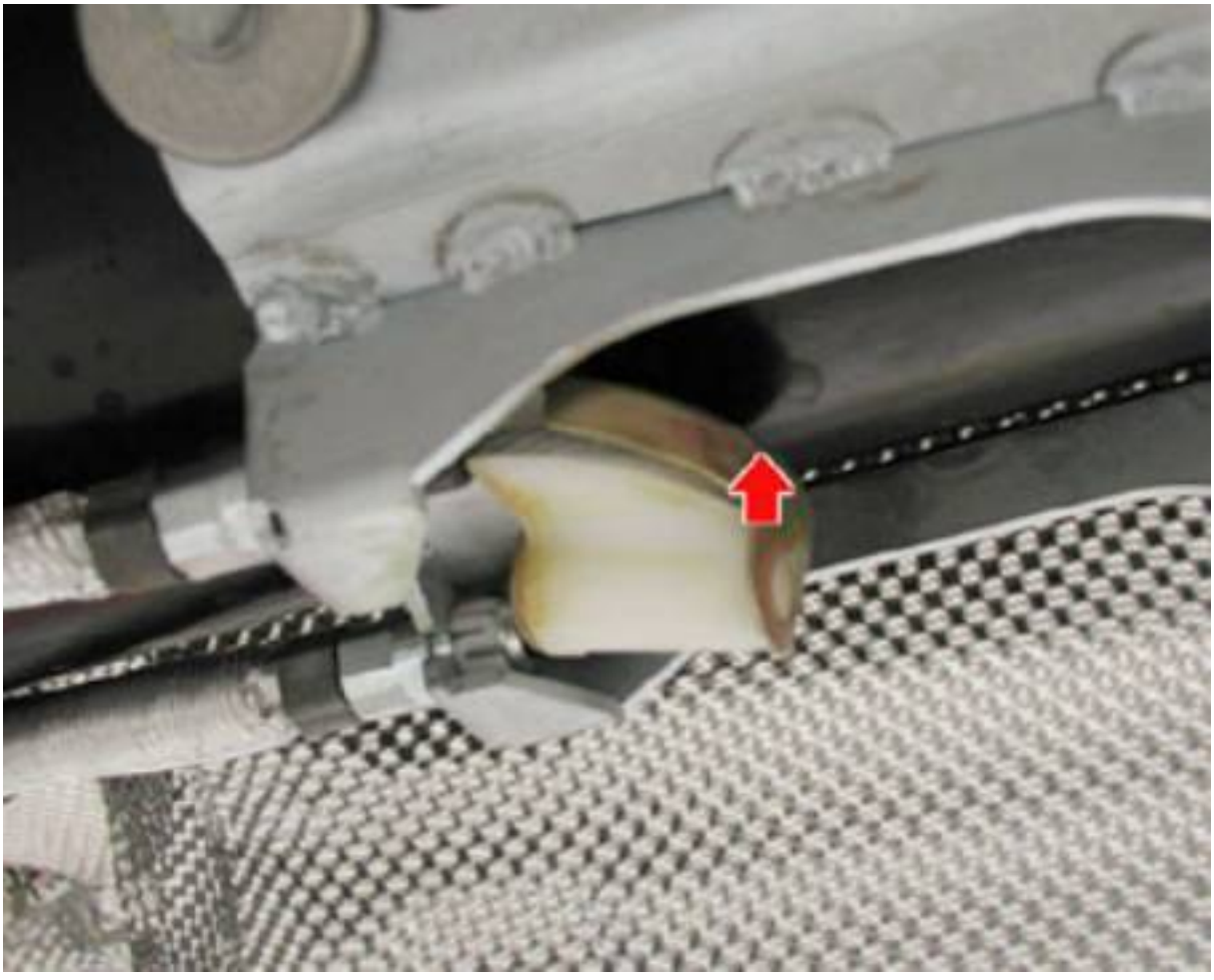
- Fit the handbrake cables in their seat on the mount, then tighten the fastening nut on the retaining bracket.



- Fit the plastic clamps retaining the handbrake cables in their seat.

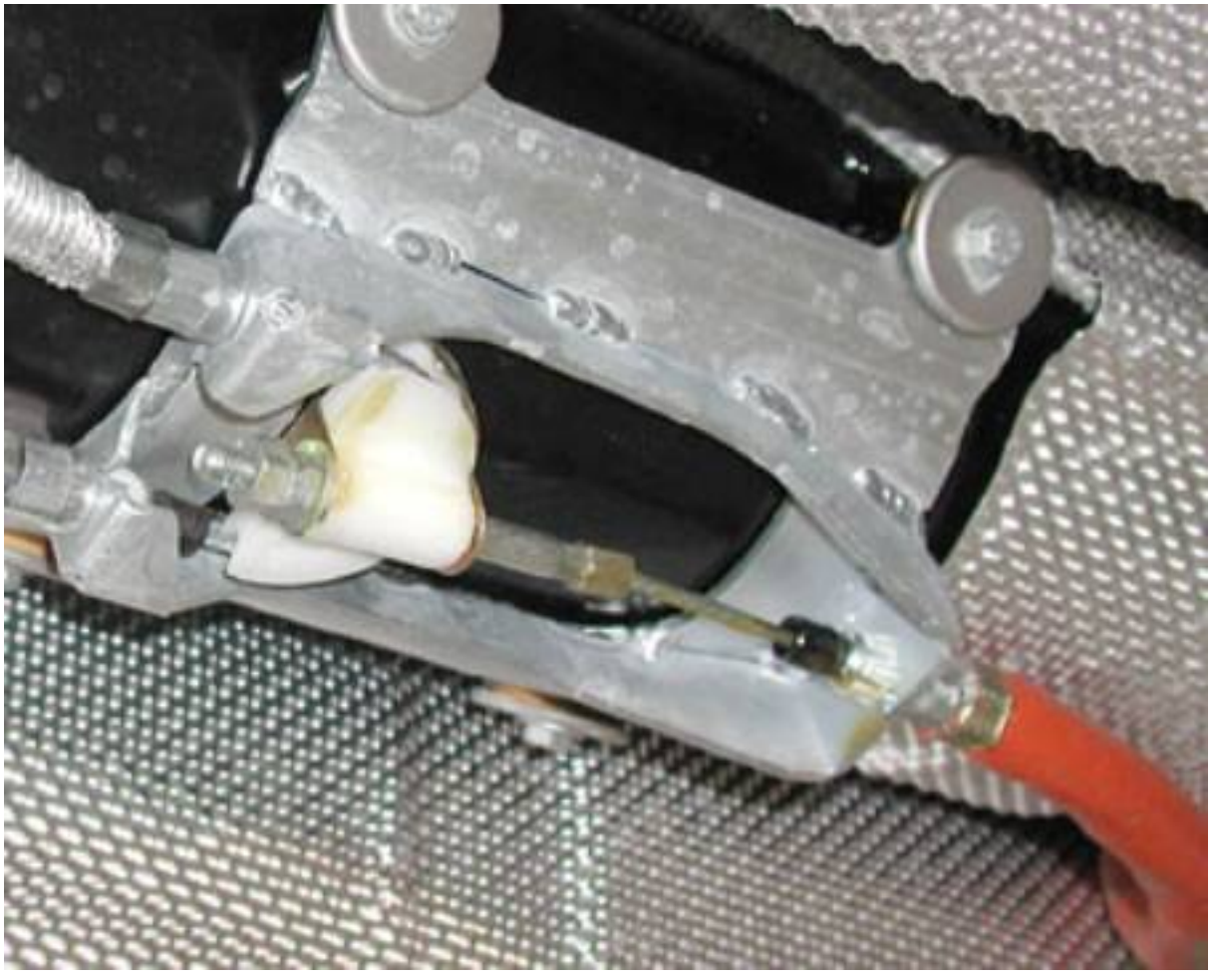
N.B.
When fitting, make sure you do not break the plastic clamps and always check that they are fitted correctly

- Fit the spacer.



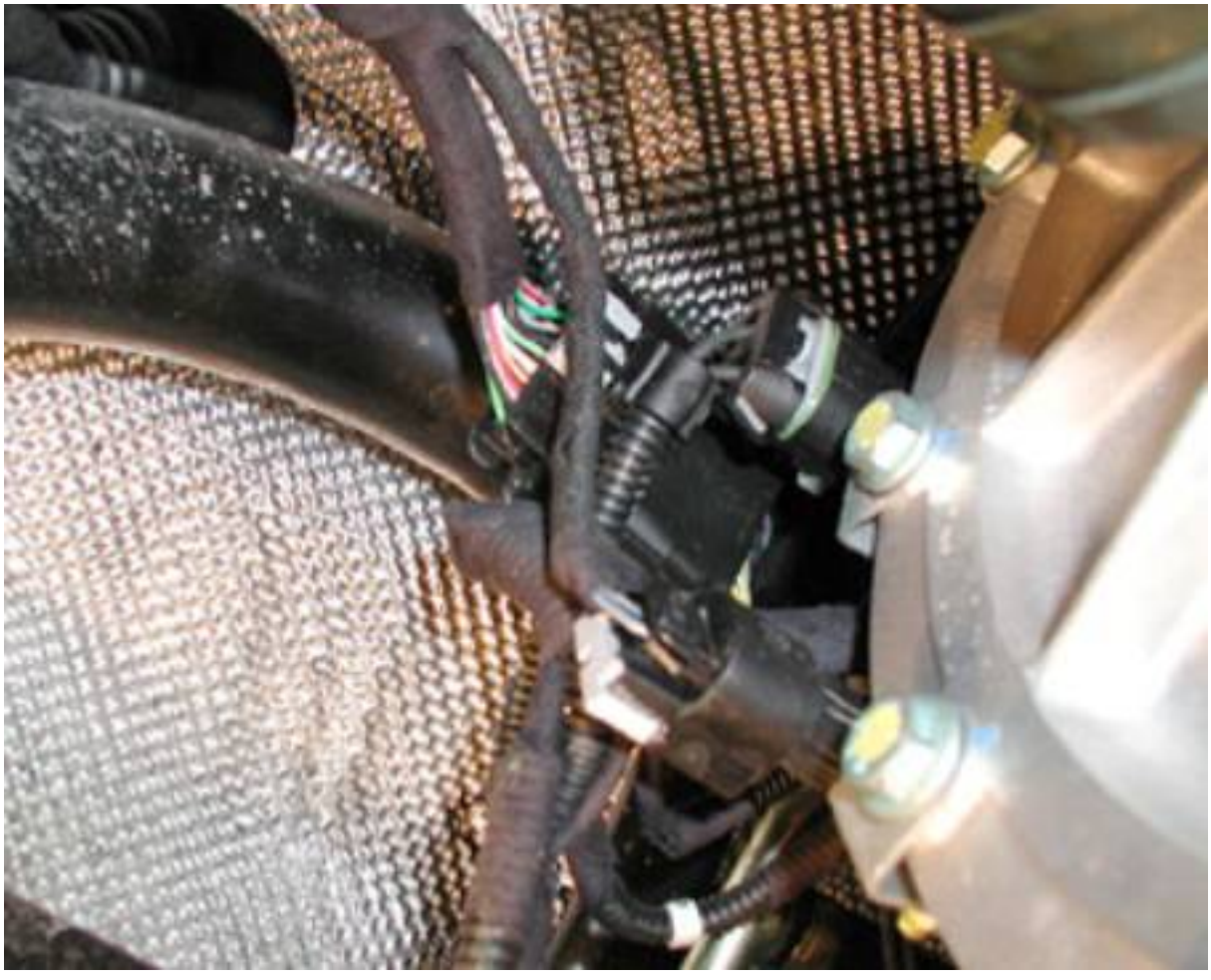
- Position the handbrake cable in its seat connected to the lever, fit the end into the spacer and tighten the nut and check nut.
- Fit the plastic clamp retaining the handbrake cable in its seat.

N.B.
When fitting, make sure you do not break the plastic clamp and always check that it is fitted correctly.



- Fasten the electric connector to the chassis by tightening the fastening screw.

- Attach the three electric connectors.



- Fit the exhaust tailpipes on the central silencers and tighten the fastening nuts on the fastening clamps to a torque of **54 Nm**

- Tighten the screws fastening the mounts to the bodywork to a torque of **24 Nm**.

- Fit the right- and left-hand heat guards.

- Fit the exhaust tailpipes.

Removing-refitting the tailpipe

- Carry out the handbrake adjustment operation.

Handbrake cable adjustment

- Remove the vehicle from the hoist.
- Connect the battery's negative terminal.
- After connecting the battery’s negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:

Refer to section:

Component self-learning in the event of battery disconnection

- Using the SD3 diagnostics tester, run the self-learning procedure of the gear grid:

Replacing the electronically-controlled gearbox control unit (TCU)

Removing-refitting the electronically-controlled gearbox control unit (TCU)

- Remove the right-hand internal flap.

- Disconnect the battery's negative terminal.
- Unscrew the two nuts fastening the ECU retaining bracket then, holding the ECU, detach the two electrical connections.

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

N.B
This operation must only be carried out on versions fitted with the SOFAST 3 gearbox

- If the NCR ECU needs to be replaced, you must carry out the following procedures: the "DEIS Check Parameter self-calibration", the self-learning for the gears and the accelerometer calibration.
- Position the vehicle on an even surface.
- To carry out the DEIS adjustment procedure, you must connect the SD3 diagnosis instrument (**95970312**) to the diagnosis socket on the Body Computer.
- Select the **"ACTIVE DIAGNOSIS" field.**
- Select the **"SINGLE ECU DIAGNOSIS" button".**
- Select the vehicle manufacturer and model.
- Select the ECU concerned (NCR M139 SOFAST3).
- Wait for the data to load and follow the guided procedure.
- Select **"ACTIVE DIAGNOSIS ENVIRONMENT".**

- A menu will appear with the following six different submenus:

  - **UPLOAD/DOWNLOAD**
  - **DEIS check parameter self-calibration**
  - **Self-learning**
  - **Accelerometer offset self-calibration**
  - **1st gear engagement**
  - **st gear engagement 2**

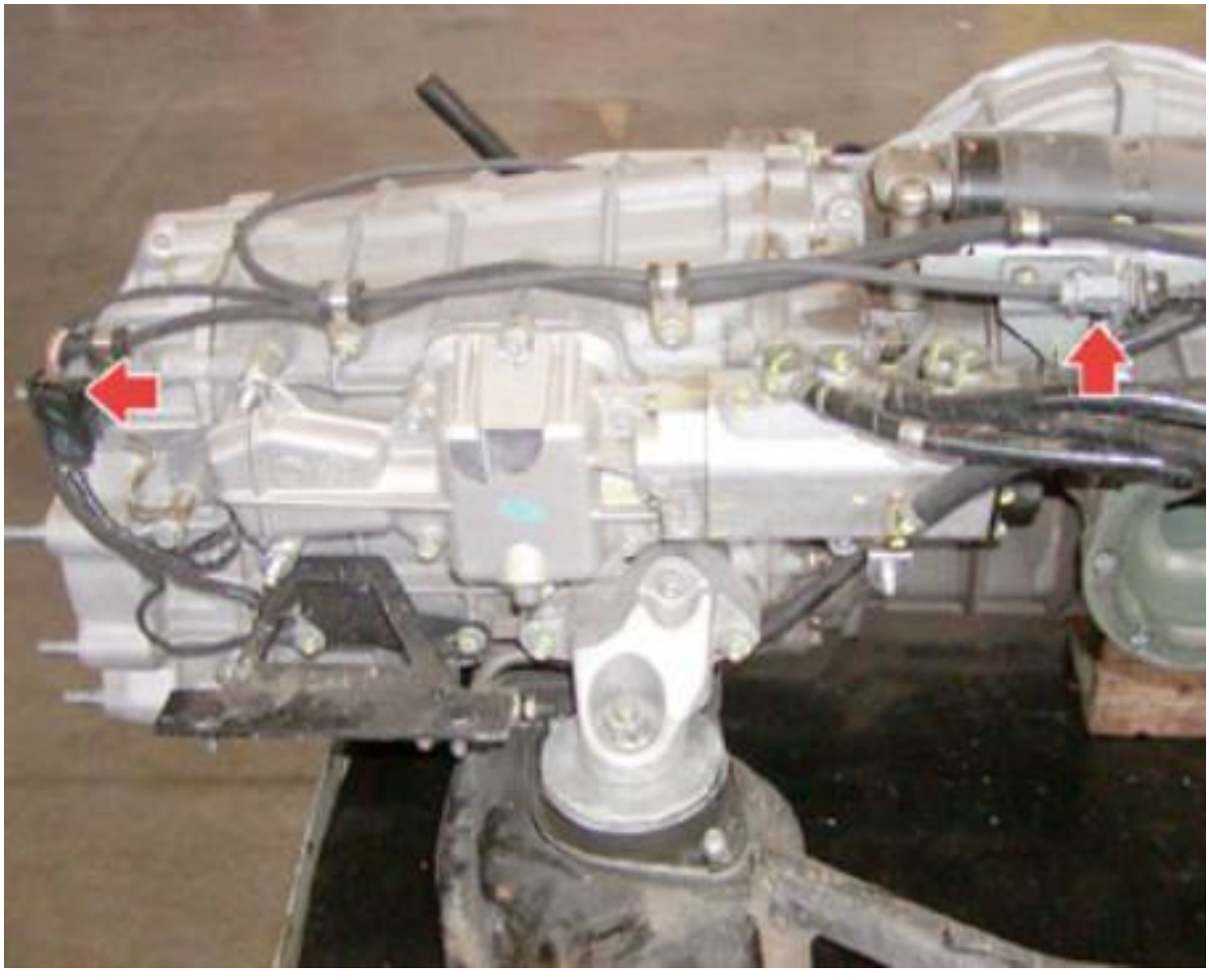
- Select "**DEIS check parameter self-calibration"** and wait for the automatic loading procedure to finish.
- This procedure should take approximately 3 minutes and 30 seconds with a check time of 6 minutes, after which the procedure is considered unsuccessful if not completed.
- If the procedure is completed successfully, continue with the gear grid self-calibration (self-learning).
- If the DEIS adjustment procedure has ended unsuccessfully, identify the causes and carry out the following checks:
  - Check that the clutch bleeding has been carried out correctly.
  - Check that the clutch control solenoid valve is operating properly.
  - Repeat the **DEIS Check Parameter Self-Calibration procedure**

- Continue the gear grid self-calibration by selecting "**self-learning"** then wait for the automatic procedure to finish**.**
- This procedure should take approximately 1 minutes and 30 seconds with a check time of 2 minutes, after which the procedure is considered unsuccessful if not completed..
- If the procedure is completed successfully, continue with the accelerometer self-calibration.
- Select "**Accelerometer offset self-calibration"** and wait for the automatic procedure to finish.
- This procedure should take approximately 30 seconds with a check time of 40 seconds, after which the procedure is considered unsuccessful if not completed.
- If the procedure has been successfully completed and no further adjustments are required, turn the ignition key to "**OFF**" and wait at least 25 seconds. This is the shortest time required to enable the ECU to store the parameters learnt.

POWER UNIT

Removing-refitting the Power Unit

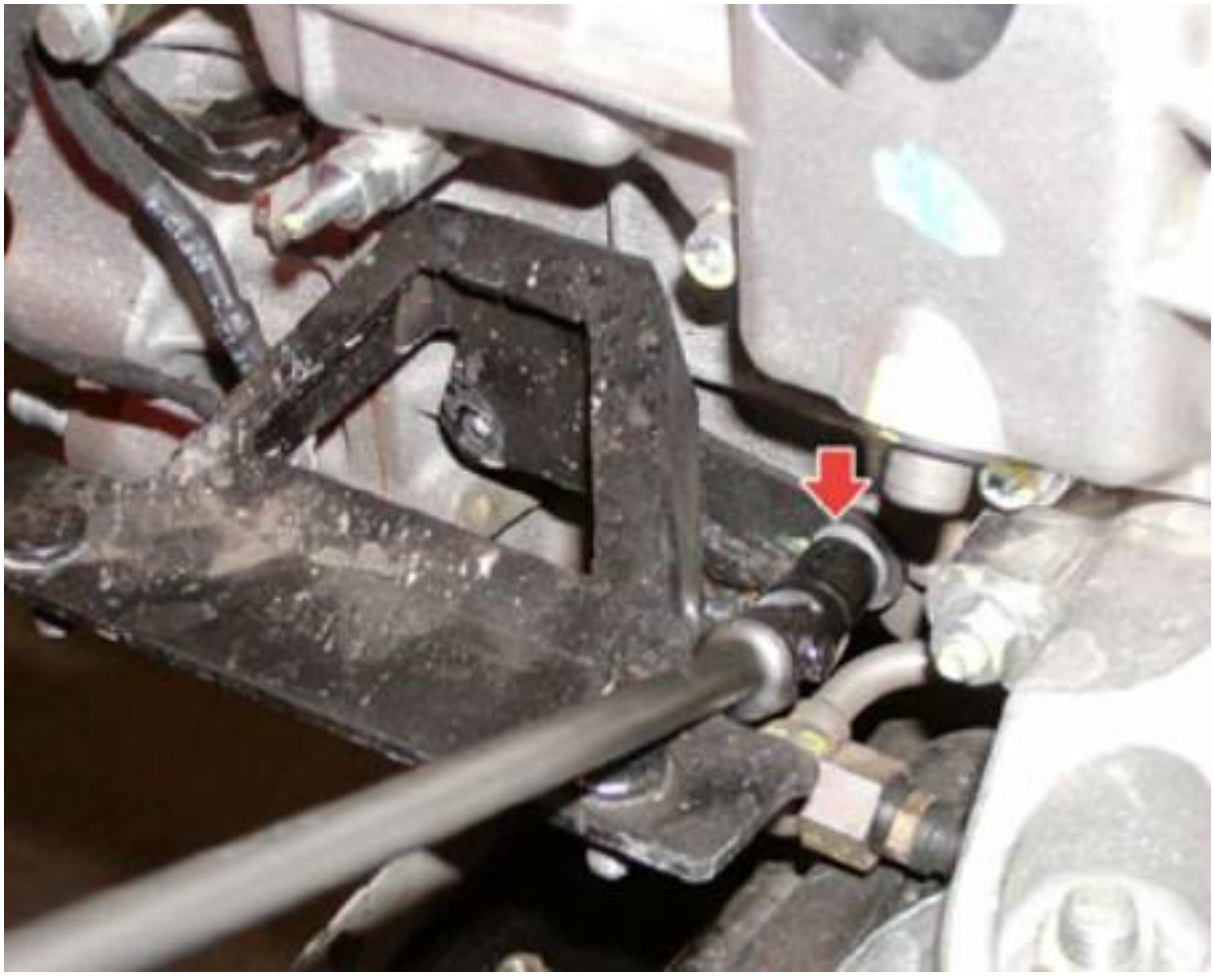
- Disconnect the connector for the gearbox rpm sensor and for the potentiometer.



- Unscrew the three nuts fastening the electric system and the screw fastening the earths.

- Unscrew the two nuts fastening the clutch control pipe's coupling valve block.

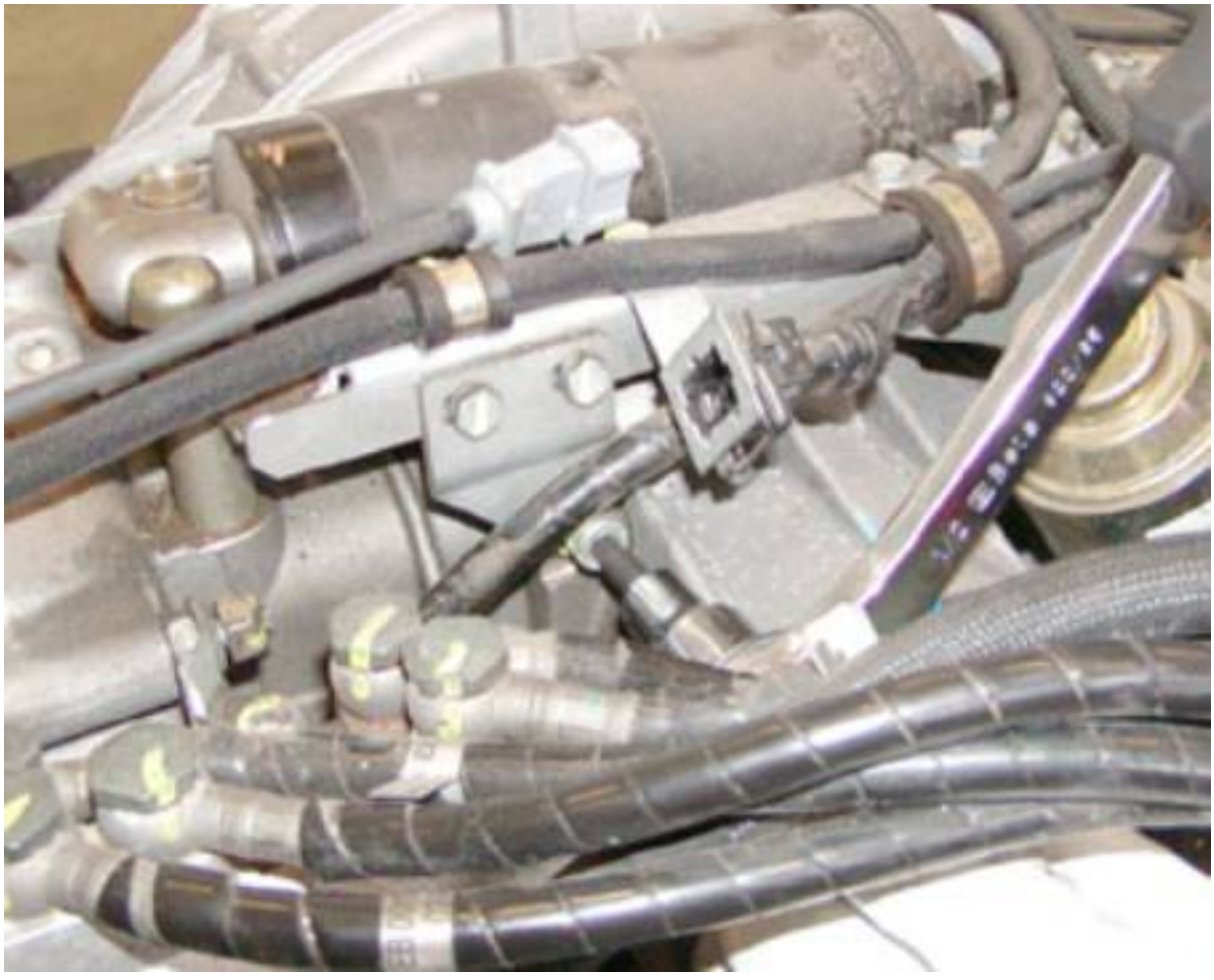
- Undo the screw fastening the mounting bracket for the exhaust tailpipes' bushings and remove it.



- Loosen the nut fastening the upper bracket.

- Undo the screw fastening the lower bracket.

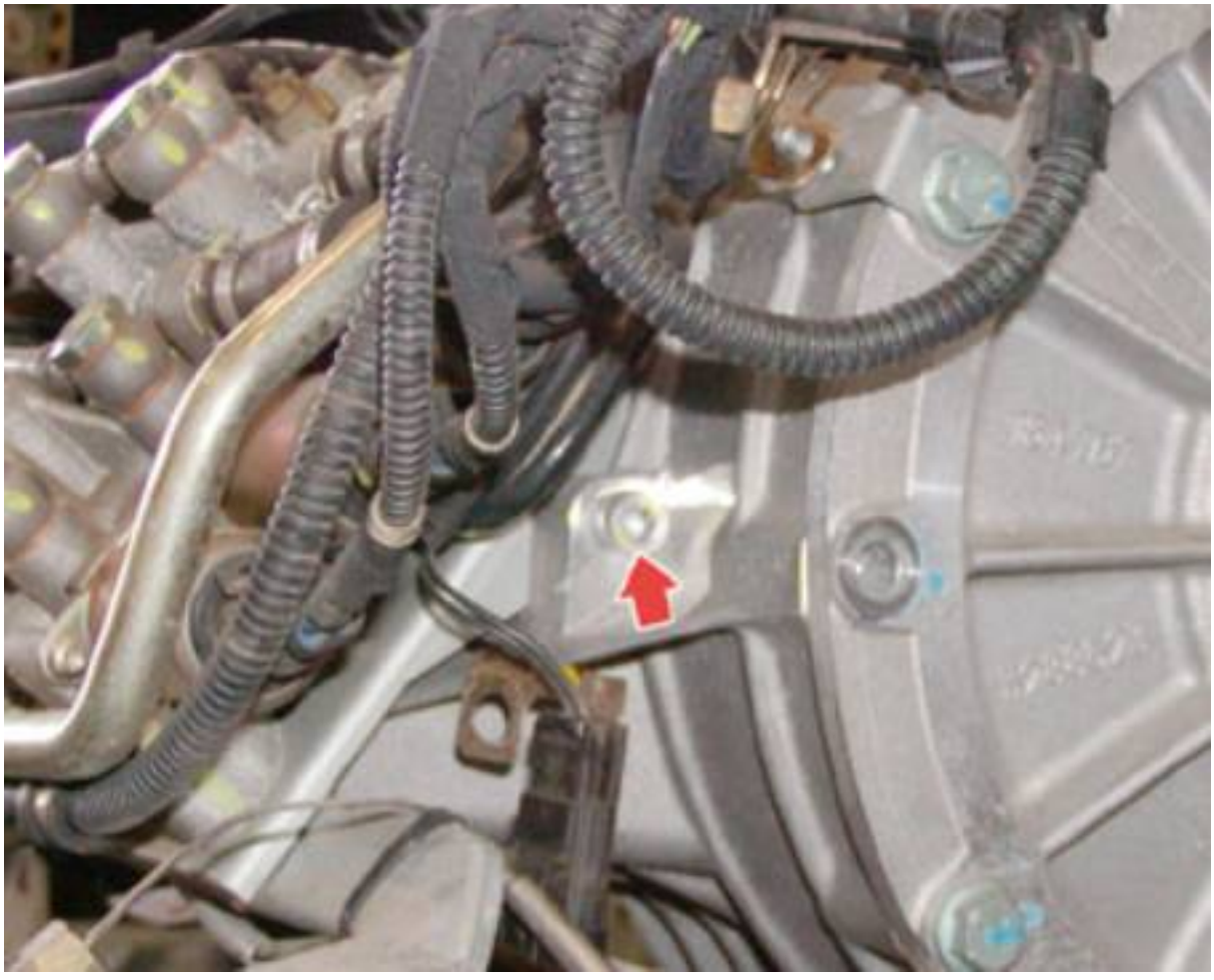
- Undo the upper fastening screw on the power unit mounting bracket, on the left-hand side of the gearbox.



- Undo the lower fastening screw on the power unit support bracket, on the left-hand side of the gearbox.

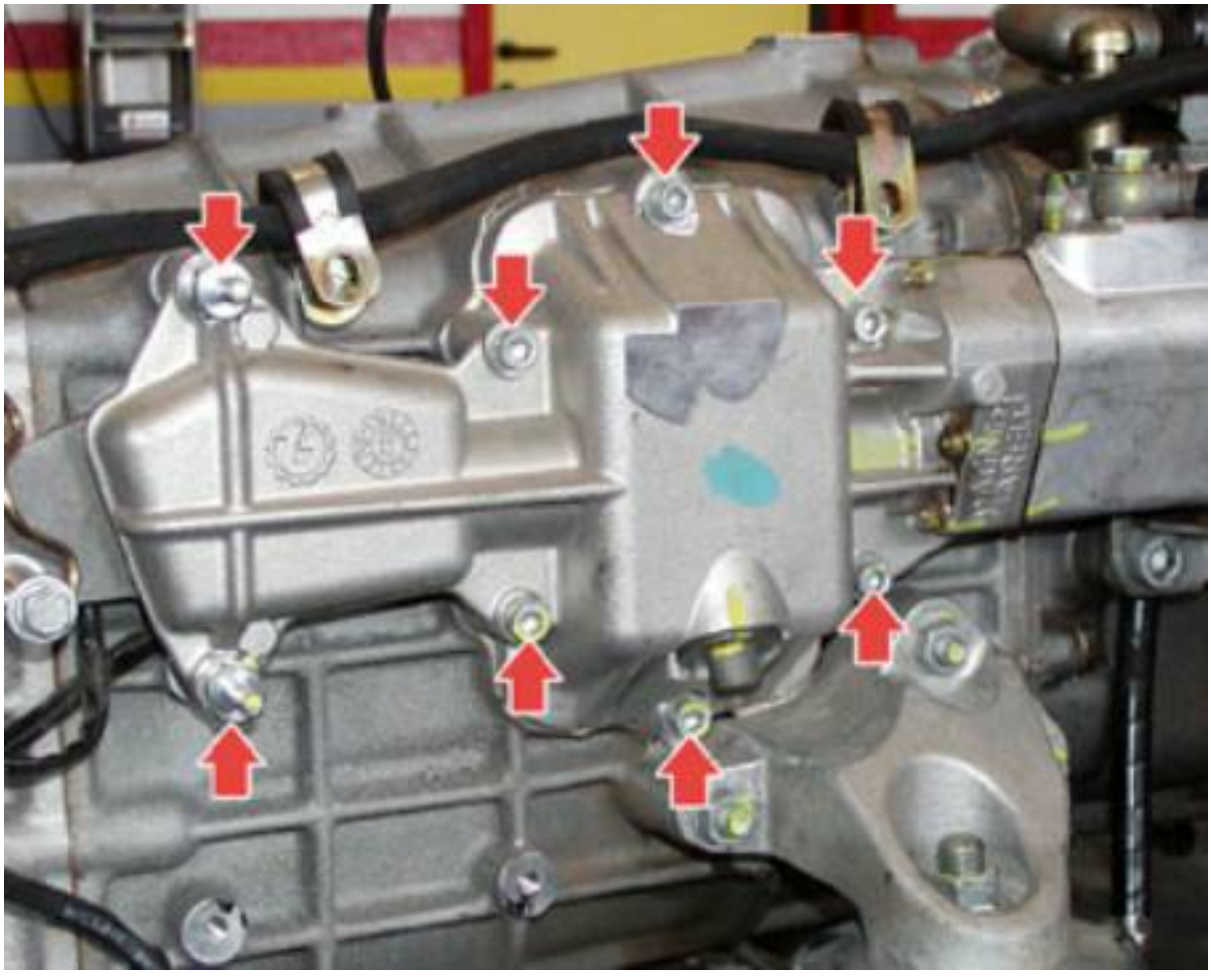
- Undo the three fastening screws on the power unit mounting bracket, that are located on the rear of the gearbox, and the nut fastening the electric system retaining clamp.

- Undo the fastening screw on the power unit mounting bracket, on the right-hand side of the gearbox.



- Remove the potentiometers connector from the bracket.

- Unscrew the eight actuator fastenings, then remove the actuator



- Clean the contact surface between the actuator and the gearbox housing carefully.

N.B.

During the refitting stage, apply CAF 4 sealant to the area between the gearbox and the actuator.

When refitting, follow the above procedures in reverse order

Establishing the electronically-controlled gearbox oil tank level

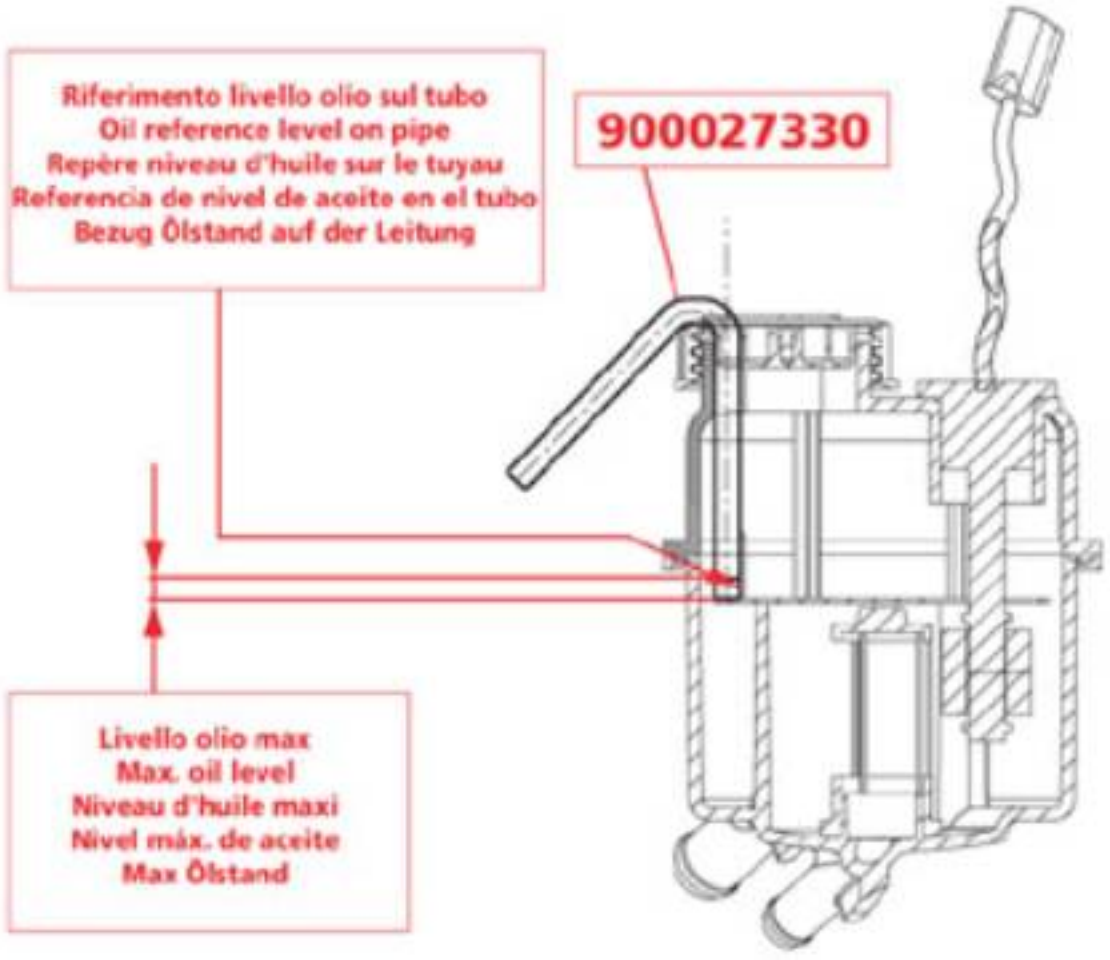
N.B.
The following procedure shows how to establish the electronically-controlled gearbox's oil tank level in the vehicle.

- Working from the rear of the vehicle, unscrew the cap

- Using a syringe, top up the oil in the electronically-controlled gearbox oil tank.

- Set the key in the "key on" position on the panel.
- Make sure the motor-driven pump has charged the electronically-controlled gearbox system.

- Drain out the oil from the tank using the specific tool **900027330**, making sure the remaining oil level is between the **MIN** and **MAX** notches on the tool.

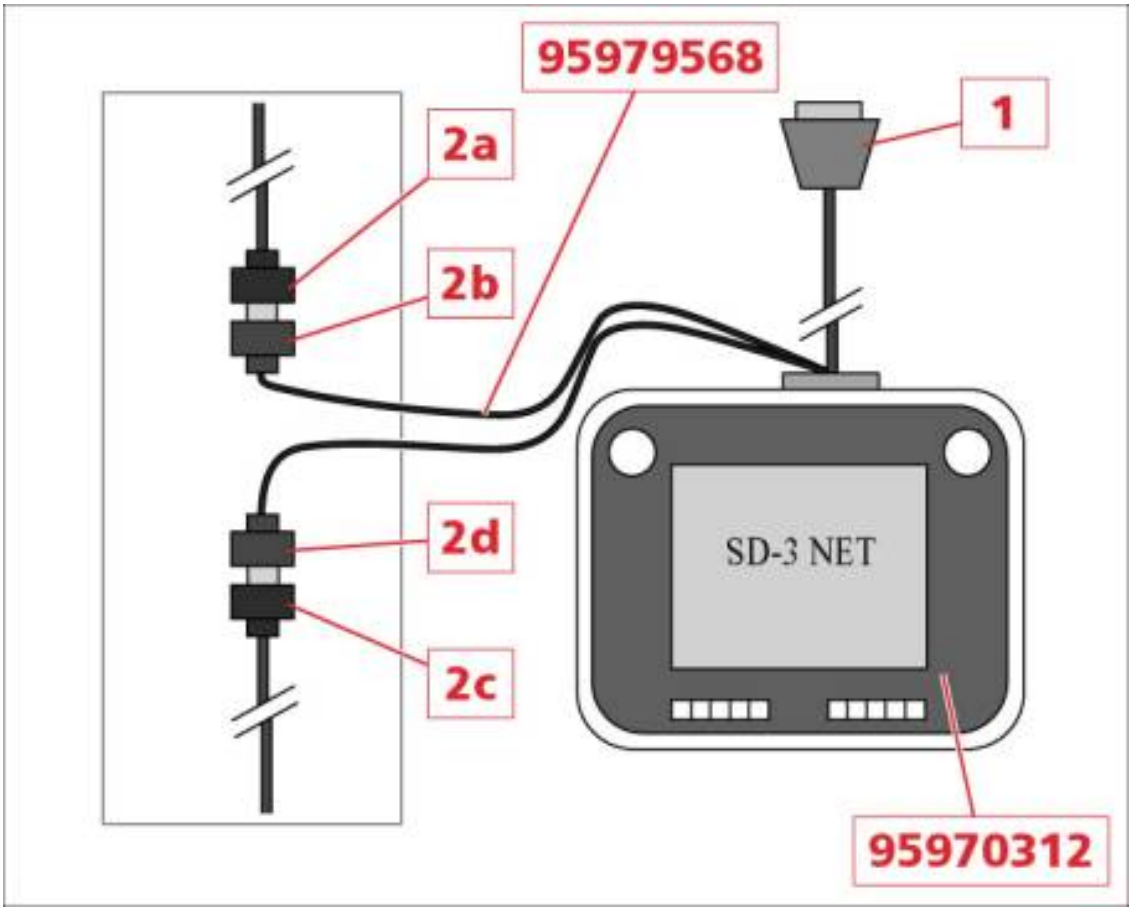

Riferimento livello olio sul tubo
Oil reference level on pipe
Repère niveau d'huile sur le tuyau
Referencia de nivel de aceite en el tubo
Bezug Ölstand auf der Leitung
900027330
Livello olio max
Max. oil level
Niveau d'huile maxi
Nivel máx. de aceite
Max Ölstand

kisS point (PIS) AJDUSTMENT PROCEDURE

- Proceed by adjusting the KISS POINT (PIS).
- Lift the suspension control node guard.

- Access the 4-way connector for the C-CAN line located in the suspension control node compartment and detach it.

- Plug the SD3 (**95970312**) into the EOBD diagnosis connector **(1).**
- Attach the C-CAN connector **(2a)** to the SD3 cable bundle (**95979568**) **(2b).**
- Attach the C-CAN connector **(2c)** to the SD3 cable bundle (**95979568**) **(2d).**



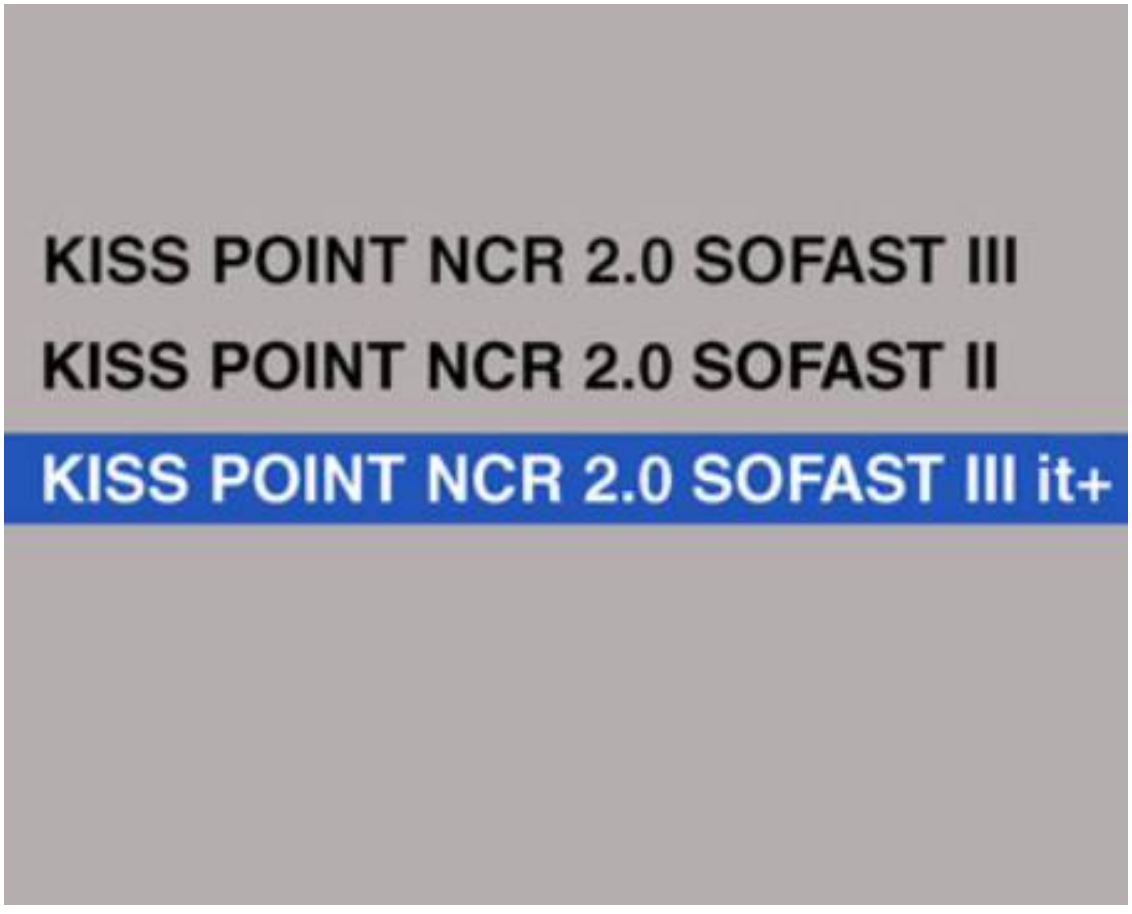
CAUTION

For the KISS-POINT value to be reliable and useful for clutch testing, this should be measured in the normal clutch operating conditions ([80¸100]°C). To allow the clutch to reach these temperature conditions, i.e. a stabilised and uniform thermal state, you must perform the following manoeuvres on the road:

- Warm up the engine by driving normally (without using the clutch) for 5 minutes.
- Perform 4 pick-up manoeuvres by fully depressing the pedal. The pick-up manoeuvre is complete when synchronisation between the engine and the input shaft has been reached (the clutch will be completely closed at about 5000 rpm).
- Wait a few seconds between one pick-up and the other.
- Wait for the clutch to reach its operating temperature by driving normally for 5 minutes (ideally at 4000 rpm), avoiding further pick-ups or gearshifts as far as possible. In case of frequent pick-up manoeuvres, extend the cooling time (15 min.).

- Turn on the SD3 tester and, from the list of diagnostic programs, select **INDIVIDUAL ECU DIAGNOSIS**, the manufacturer **MASERATI** and the vehicle model **M139**.

- Select the correct type of program based on the vehicle type.
- For vehicles manufactured up to serial number **18821**, select **KISS POINT NCR 2.0 SOFAST II**.
- For vehicles manufactured from serial number **18822** up to serial number **21925**, select **KISS POINT NCR 2.0 SOFAST III.**
- For vehicles manufactured from serial number **21926**, select **KISS POINT NCR 2.0 SOFAST III. it+**.



- The user is guided through the subsequent stages by the diagnostic system chosen.
- Select **KISS POINT ENVIRONMENT** and enter the vehicle serial number.

- The system will display a warning message for the user, advising him/her of the vehicle conditions required to run the calibration procedure correctly.

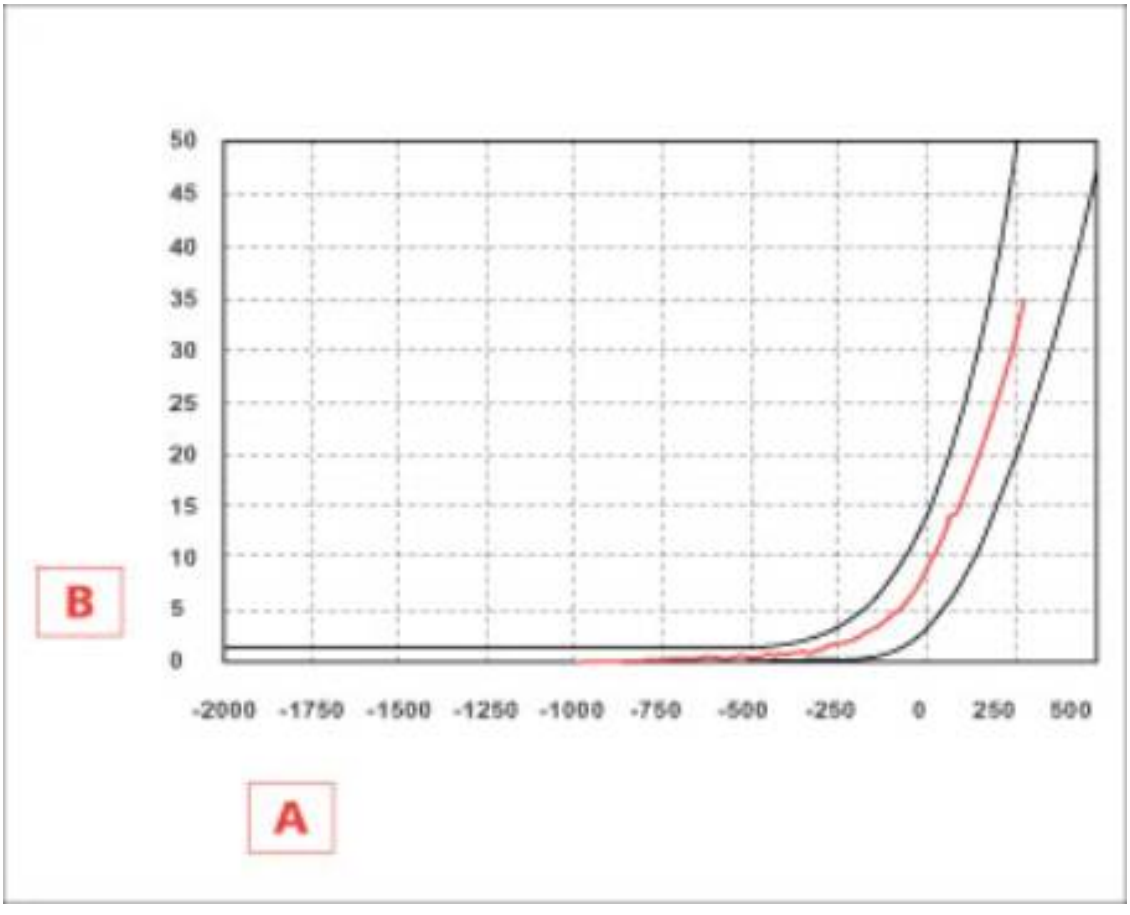
N.B.
If a high clutch temperature is signalled, let the clutch cool down even further, possibly while driving or in N, letting the engine run.

- If the vehicle meets the conditions which permit the procedure to continue, press "ENTER".
- Shift the gear to neutral, rotate the ignition switch to the OFF position, wait approximately 15 seconds, then start the engine and select "ENTER" on the SD3.
- Select "**START PROCEDURE** "

- The following screen pages instruct the user to keep the accelerator pedal pressed throughout the entire data acquisition period.
- The system will carry out 10 clutch opening and closing cycles automatically, with the gearbox in the neutral position, during which the SD3 will acquire the data needed to calculate the touch point (PIS) correctly.
- Wait for the data acquisition procedure end message to appear on the display and a tone to be emitted by the instrument panel node.

- The SD3 will display the "TRANSMITTABILITY" graph, i.e. the current touch point (PIS) position (in red) and the two references curves (in black) indicating the tolerance range within which the touch point curve must be located.
- For vehicles up to serial number **21925**, a graph made up of three curves is displayed, where the central curve is the current position of the CSC.
- For vehicles from serial number **21926**, a graph made up of three curves is displayed, where the central

broken-line curve indicates the current position of the CSC.



A = CSC bearing movement (Thousandths)
B = Torque (Nm)

- The system will automatically check that the touch point (PIS) curve read lies within the two tolerance curves.
- Two results are possible, depending on the outcome of this processing:

- the data are correct and therefore the system will proceed with the next data acquisition stages.
- the data are incorrect and therefore the procedure will be cancelled and an error message will be displayed with instructions for problem solving.

- At the end of each data acquisition and processing sequence, the following parameters will be displayed:

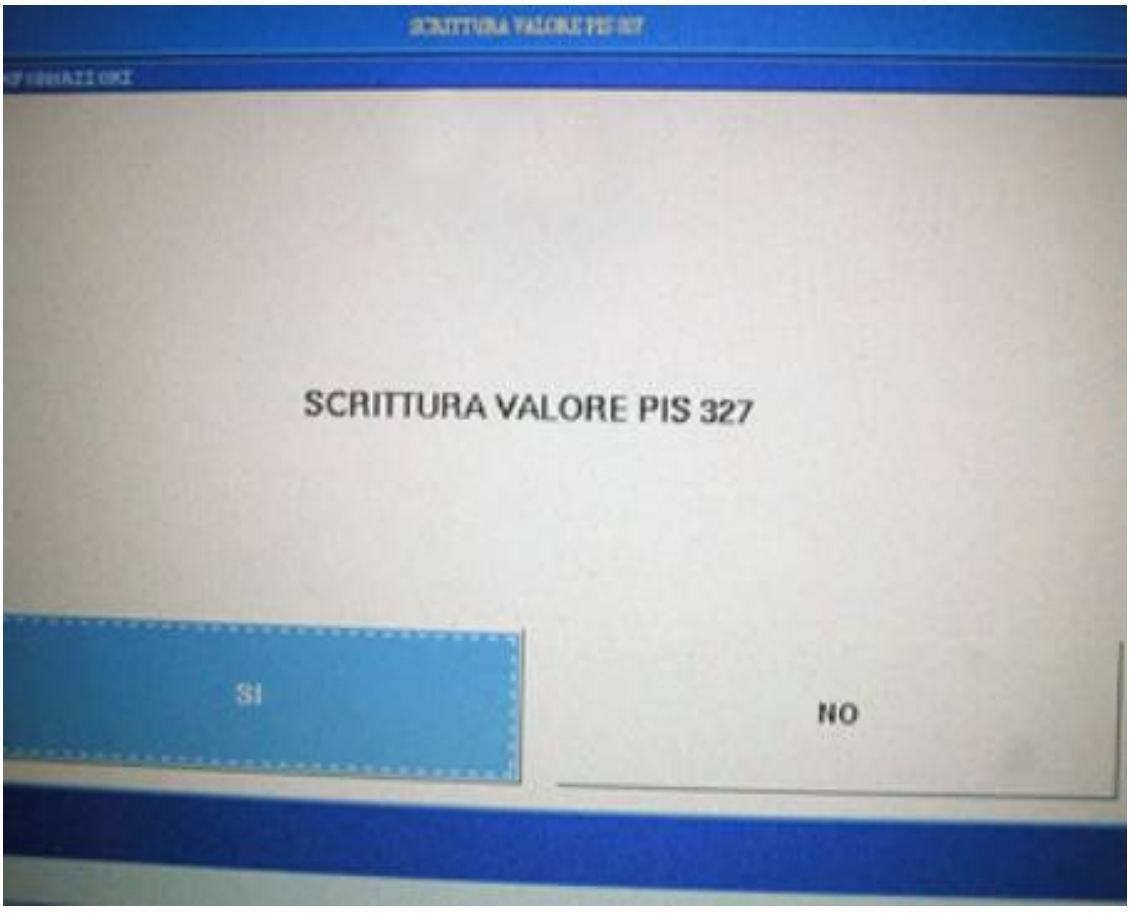
Number of pick-ups (1-2, 2-2)
Touch point (PIS) value (bit,mm) (Min 6.00 120 bit, MAX 160 bit) and the value in millimetres
POINT SCATTERING value (Min 0 bit, MAX 10 bit)

- Click on Continue to display the following parameters:

KISS POINT value in TCU ECU **Example 327**
Calculated KISS POINT value **Example 327**
Clutch wear value **Example 4000**

- If successfully completed, the procedure will be run a second time.
- Subsequently, select **YES** if you want to transfer the KISS POINT value to the ECU, or**NO** if not, and then

repeat the test.



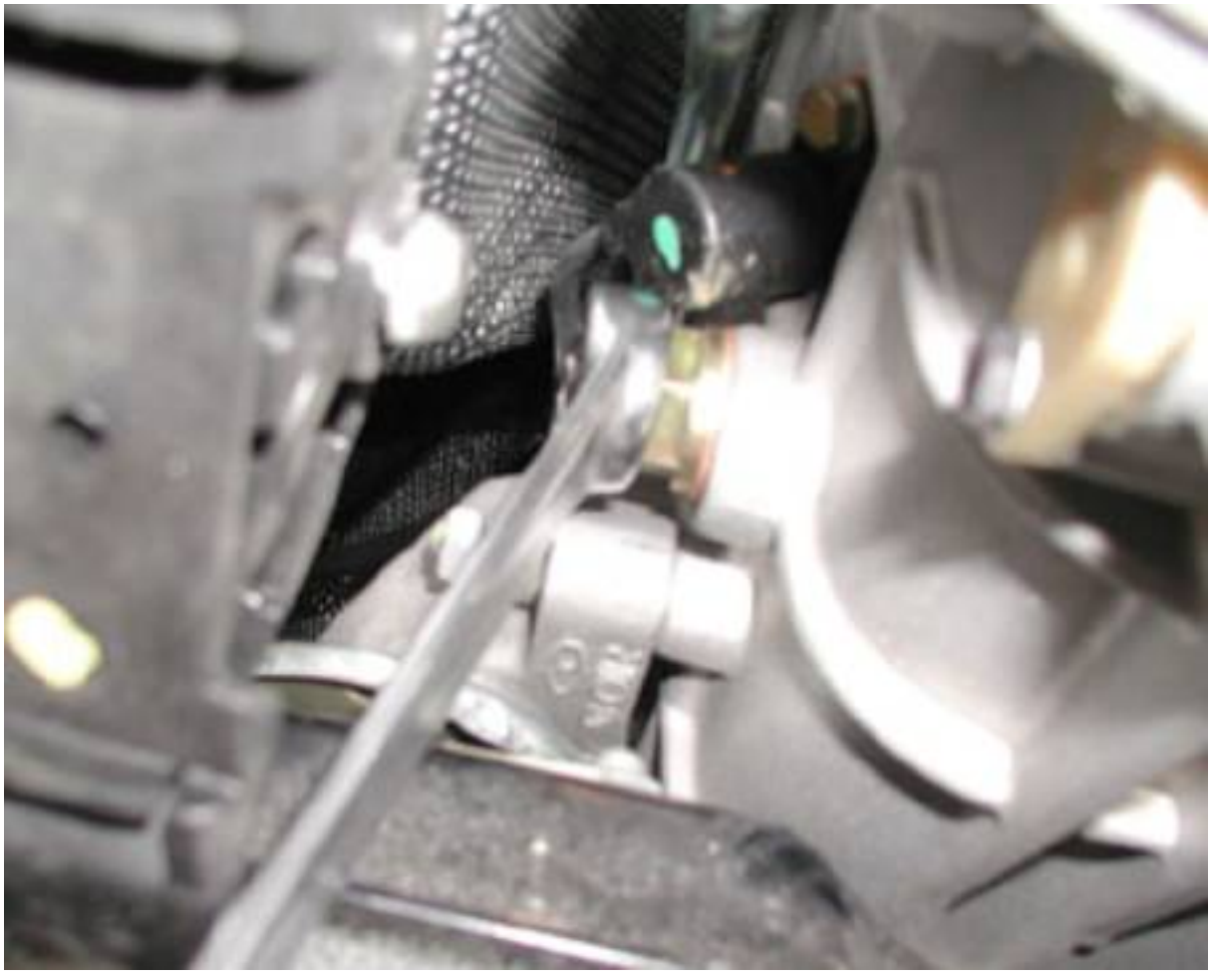
- End the cycle by answering the question on whether the clutch is new or has been replaced.

Checking and topping-up the oil level in the gearbox housing

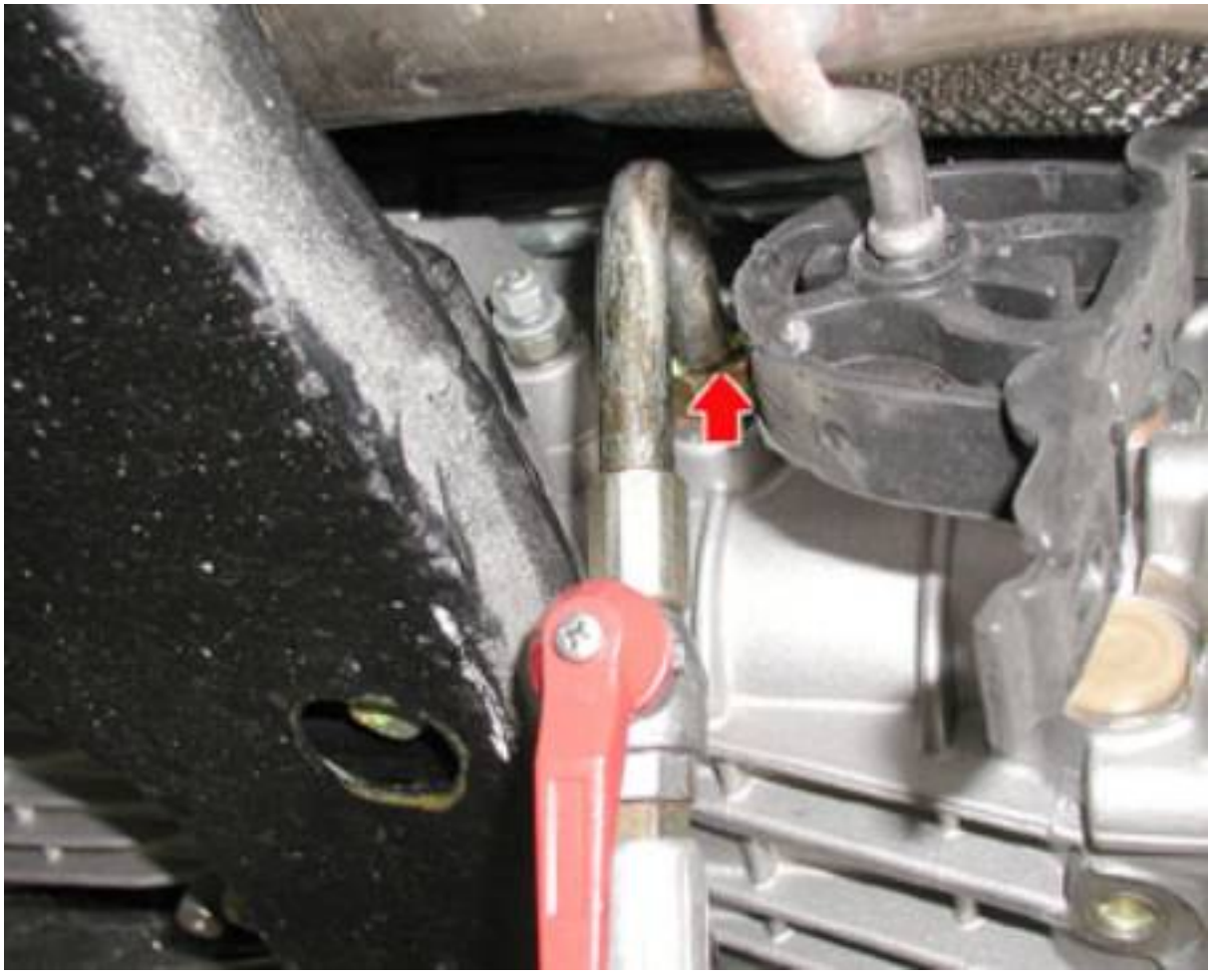
Checking and topping-up the oil level in the gearbox housing

- Place the vehicle on the hoist.
- Unscrew the fastening nuts on the exhaust tailpipe mount, then unscrew the three fastening nuts on the bracket and remove it.

- Unscrew the cap.
- Check that the oil level is skimming the lower edge of the filling hole.



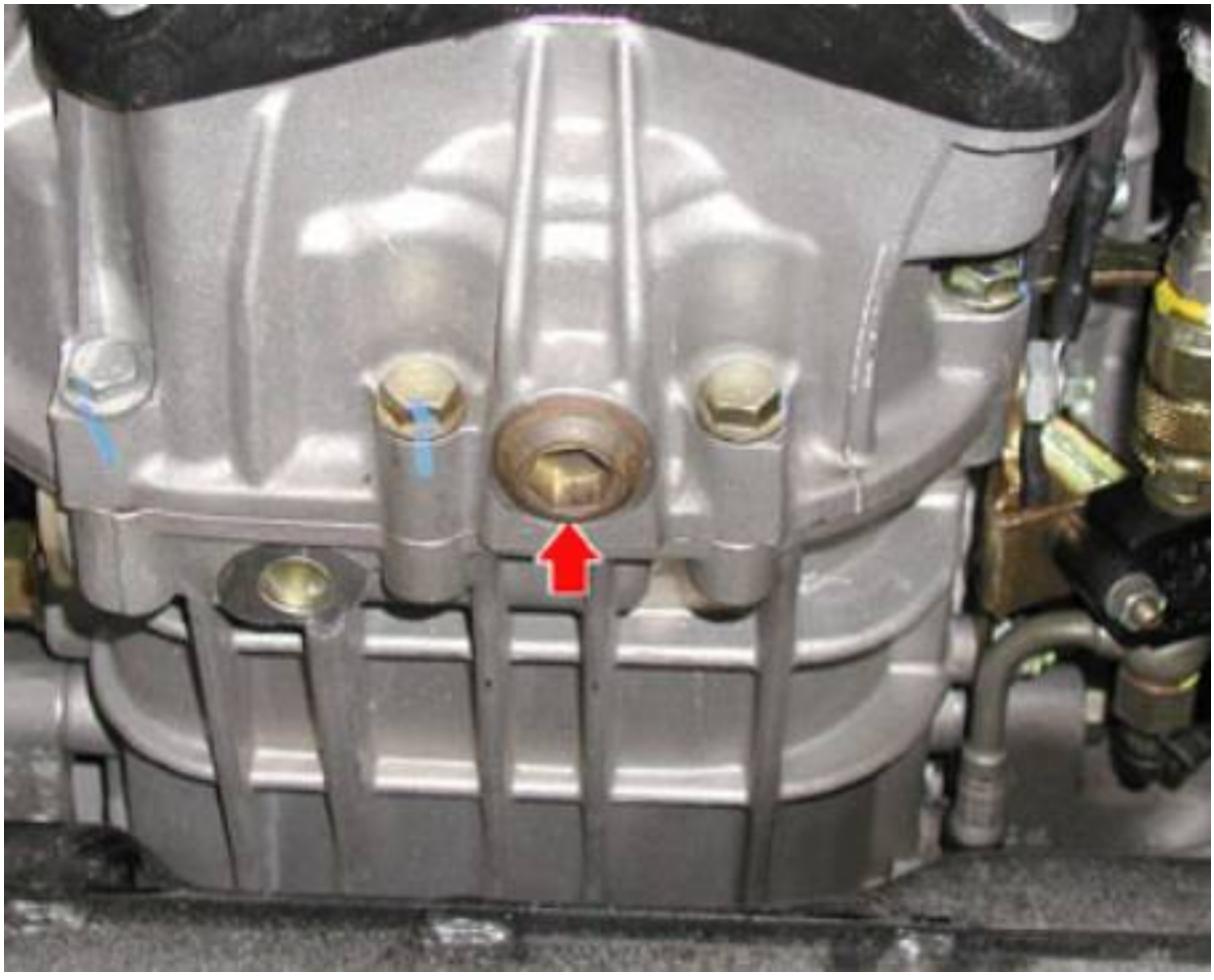
- If the oil level is below the hole, top it up using suitable equipment, until it reaches the lower edge of the filling hole.



- Once topped up, clean the filling hole and replace the sealing gasket.
- Tighten the filling cap.
- Fit the bracket and screw up the fastening nuts.
- Tighten the nuts fastening the mount to the bodywork to a torque of **24 Nm**.

- Remove the vehicle from the hoist.

If the gearbox oil needs to be changed, the oil draining cap shown in the figure must be unscrewed.

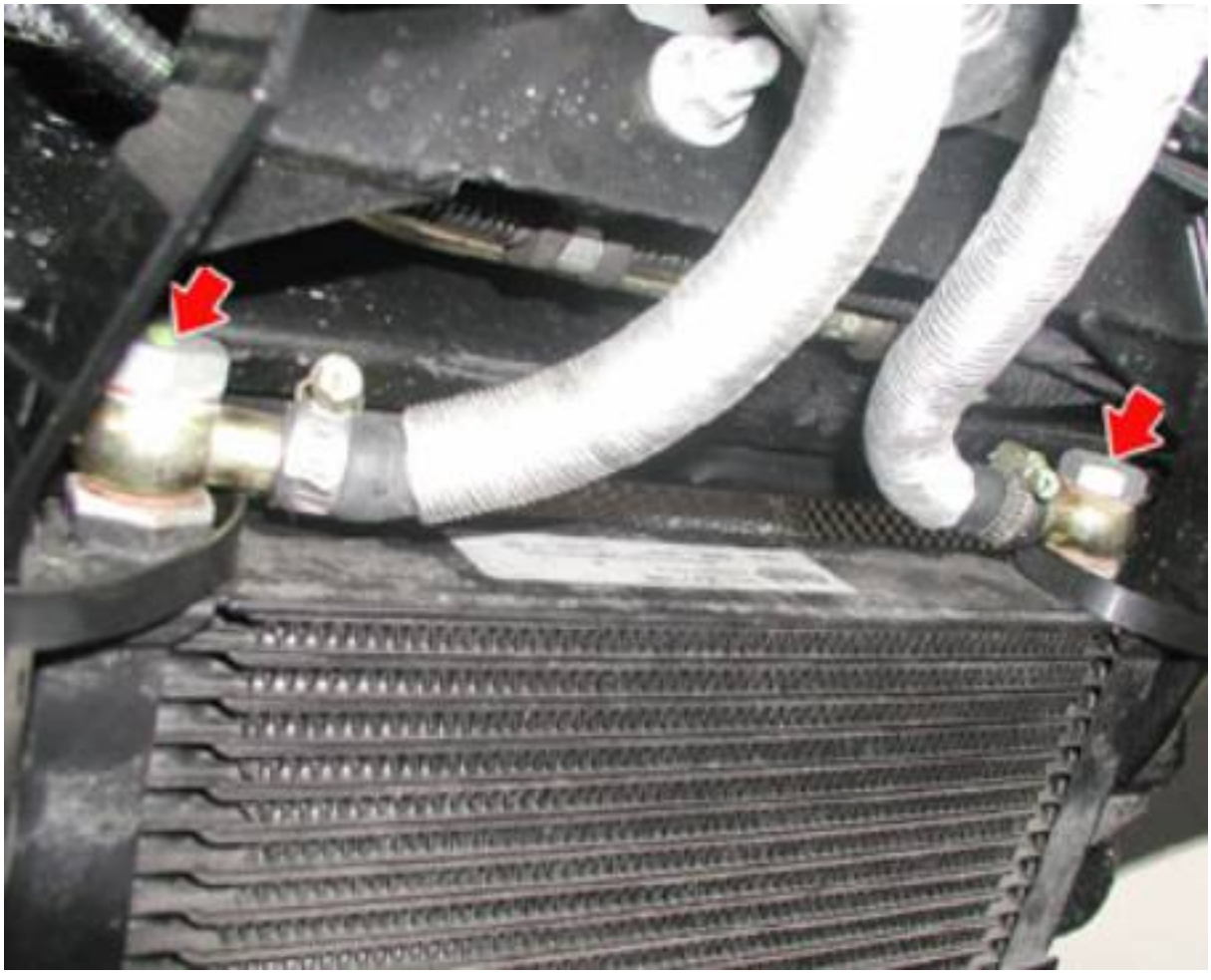


Gearbox oil COOLING radiator

Removing the gearbox oil cooling radiator

N.B
Component not present on US versions and fitted on the other versions until the end of 2004

- Place the vehicle on the hoist.
- Unscrew the two unions on the two oil delivery and return lines.
- Place a suitable pan beneath the lines to salvage the oil and plug the two lines as required.

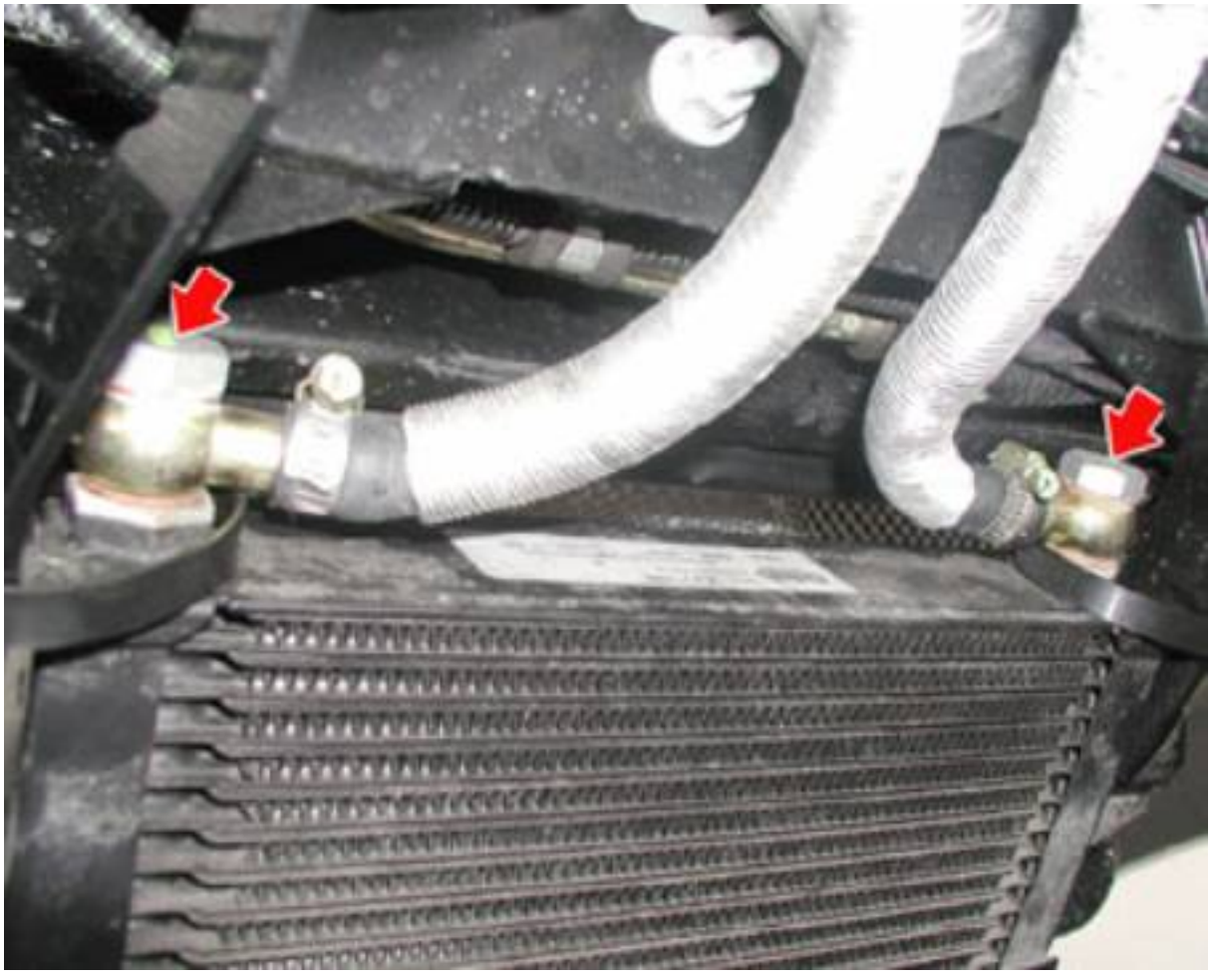


- Unscrew the two nuts fastening the oil radiator to the mounting bracket and remove it.

Refitting the gearbox oil cooling radiator

- Fit the oil radiator in its seat on the bracket and tighten the two fastening nuts.
- Connect the two delivery and return lines and tighten the two unions to a torque of **34 Nm**.

important
The gaskets on the two oil line fastening unions must always be replaced.



- Proceed by topping up the level of the oil in the gearbox.

Checking and topping-up the oil level in the gearbox housing

- Remove the vehicle from the hoist.

Clutch pressure sensor

Removing – refitting the clutch pressure sensor

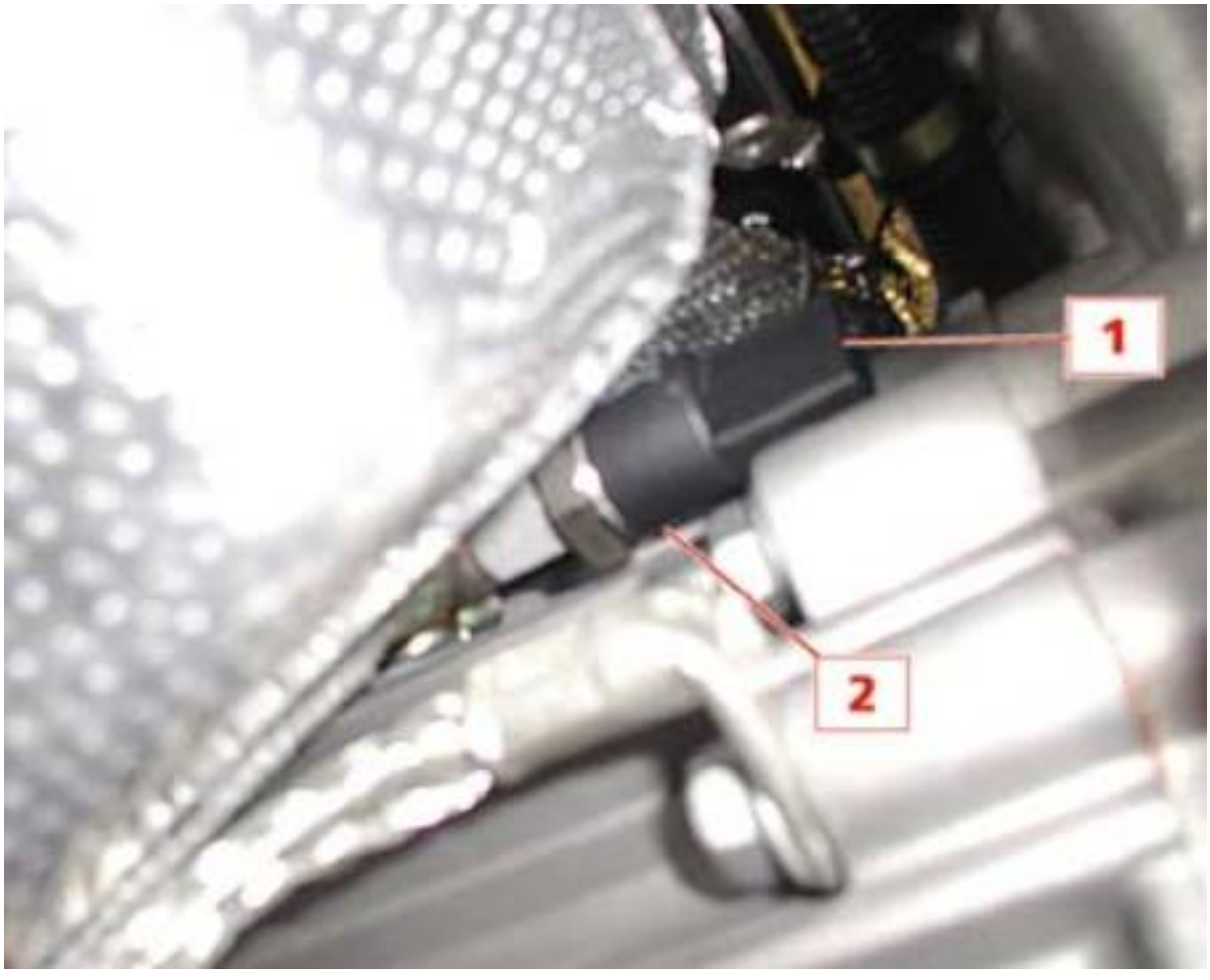
N.B

Component included on the SOFAST 3 gearbox versions only

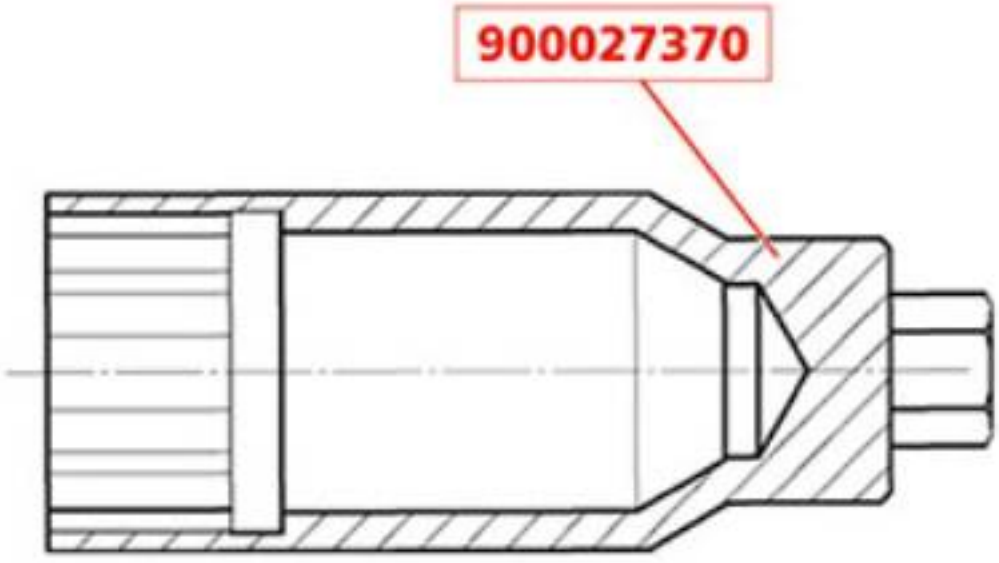
- Place the vehicle on the hoist.
- Remove the RH catalytic converter.

Catalytic converters

- Disconnect the electrical connector **(1)** using the specific tool **900027370**, then unscrew and remove the clutch pressure sensor **(2)**.



- Cross-section view of tool **900027370**.



When refitting, follow the above procedures in reverse order.

- When the component has been fitted, bleed the hydraulic clutch system.

Bleeding the clutch

DEIS adjustment procedure

- Following the replacement of the clutch unit or the robotised gearbox unit (NCR), the DEIS procedure, which consists in the self-calibration of the clutch spring, must be carried out.
- To carry out the DEIS adjustment procedure, you must connect the SD3 diagnosis instrument (**95970312**) to the diagnosis socket on the Body Computer.
- Select the **“ACTIVE DIAGNOSIS” field.**
- Select the **“SINGLE ECU Diagnosis” button”.**
- Select the vehicle manufacturer and model.
- Select the ECU concerned (NCR M139 SOFAST3).
- Wait for the data to load and follow the guided procedure.
- Select **“ACTIVE DIAGNOSIS ENVIRONMENT”.**
- A menu will appear with the following six different submenus:

    - **UPLOAD/DOWNLOAD**
    - **DEIS check parameter self-calibration**
    - **Self-learning**
    - **Accelerometer offset self-calibration**
    - **st gear engagement 1**
    - **st gear engagement 2**

- Select “**DEIS Check Parameter Self-Calibration”** then wait for the automatic procedure to finish.
- This procedure should take approximately 3 minutes and 30 seconds with a check time of 6 minutes, after which the procedure is considered unsuccessful if not completed.
- If the procedure has been successfully completed and no further adjustments are required, turn the ignition key to “**OFF**” and wait at least 25 seconds. This is the shortest time required to enable the ECU to store the parameters learnt.
- If the DEIS adjustment procedure has ended unsuccessfully, identify the causes and carry out the following checks:

    - Check that the clutch bleeding has been carried out correctly
    - Check that the clutch control solenoid valve is operating properly.
    - Repeat the **DEIS Check Parameter Self-Calibration procedure**

Accelerometer self-calibration procedure

- The replacement or removal-refitting of the accelerometer or the replacement of the robotised gearbox (NCR) ECU must be followed by the accelerometer self-calibration procedure.
- Position the vehicle on an even surface.
- To carry out the DEIS adjustment procedure, you must connect the SD3 diagnosis instrument (**95970312**) to the diagnosis socket on the Body Computer.
- Select the **“ACTIVE DIAGNOSIS” field.**
- Select the **“SINGLE ECU Diagnosis” button”.**
- Select the vehicle manufacturer and model.
- Select the ECU concerned (NCR M139 SOFAST3).
- Wait for the data to load and follow the guided procedure.
- Select **“ACTIVE DIAGNOSIS ENVIRONMENT”.**
- A menu will appear with the following six different submenus:

    - **UPLOAD/DOWNLOAD**
    - **DEIS check parameter self-calibration**
    - **Self-learning**
    - **Accelerometer offset self-calibration**
    - **st gear engagement 1**
    - **st gear engagement 2**

- Select “**Accelerometer offset self-calibration”** then wait for the automatic procedure to finish.
- This procedure should take approximately 30 seconds with a check time of 40 seconds, after which the procedure is considered unsuccessful if not completed.
- If the procedure has been successfully completed and no further adjustments are required, turn the ignition key to “**OFF**” and wait at least 25 seconds. This is the shortest time required to enable the ECU to store the parameters learnt.

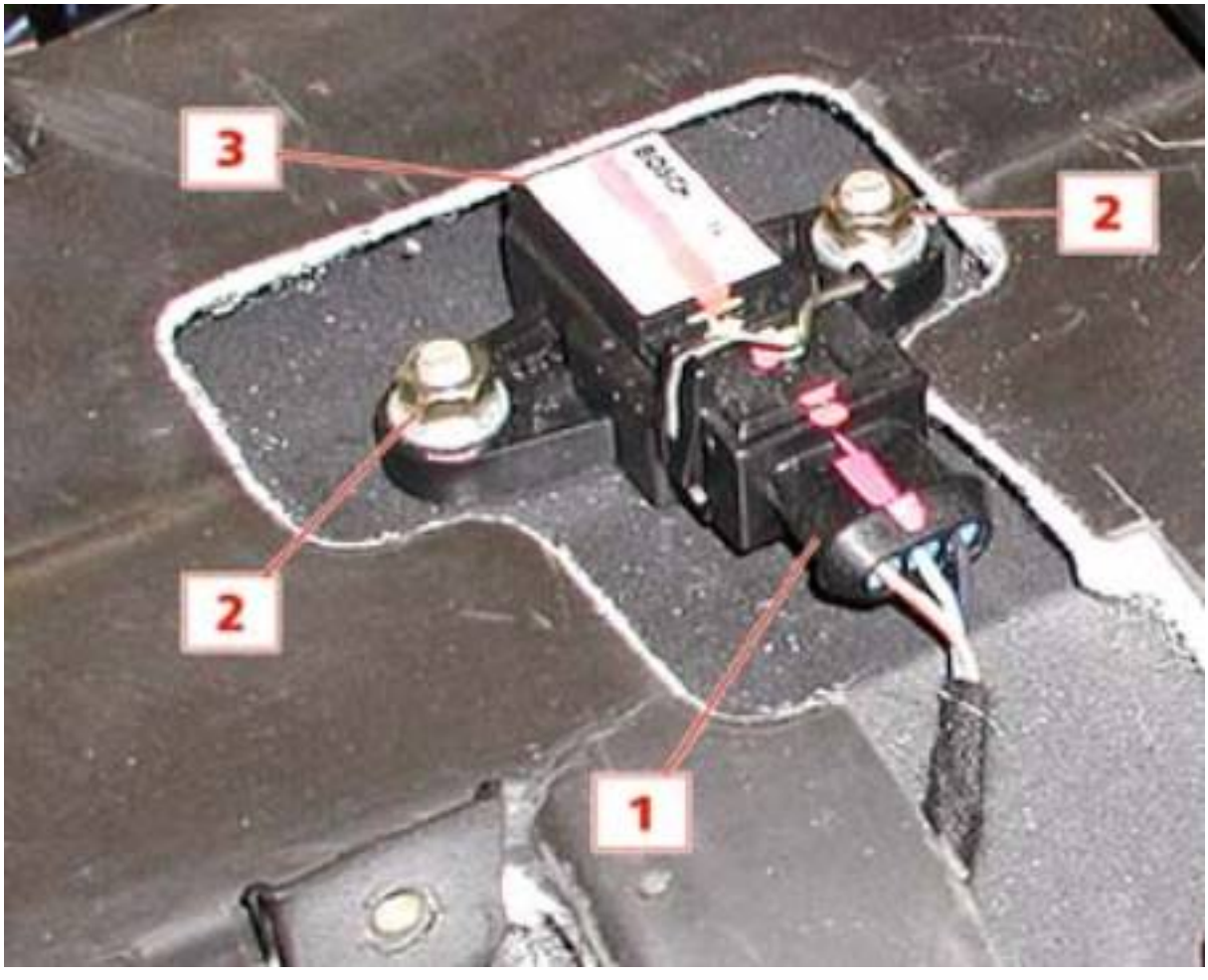
ACCELERATION SENSOR

Removing–refitting the acceleration sensor

- This component is fitted on vehicles up to serial number **24274**; for vehicles from serial number **24275** its functions have been integrated in the yaw sensor.
- Component specific to the electronically-controlled gearbox with Sofast 3 type management
- Remove the central tunnel

Central tunnel

- Detach the electrical connection **(1),** unscrew the fastening nuts **(2)** and remove the acceleration sensor **(3)**.



When refitting, follow the above procedures in reverse order.

- Once the component fitting stage is complete, perform the sensor self-calibration procedure using the SD3, whether the component has been replaced or removed and refitted.

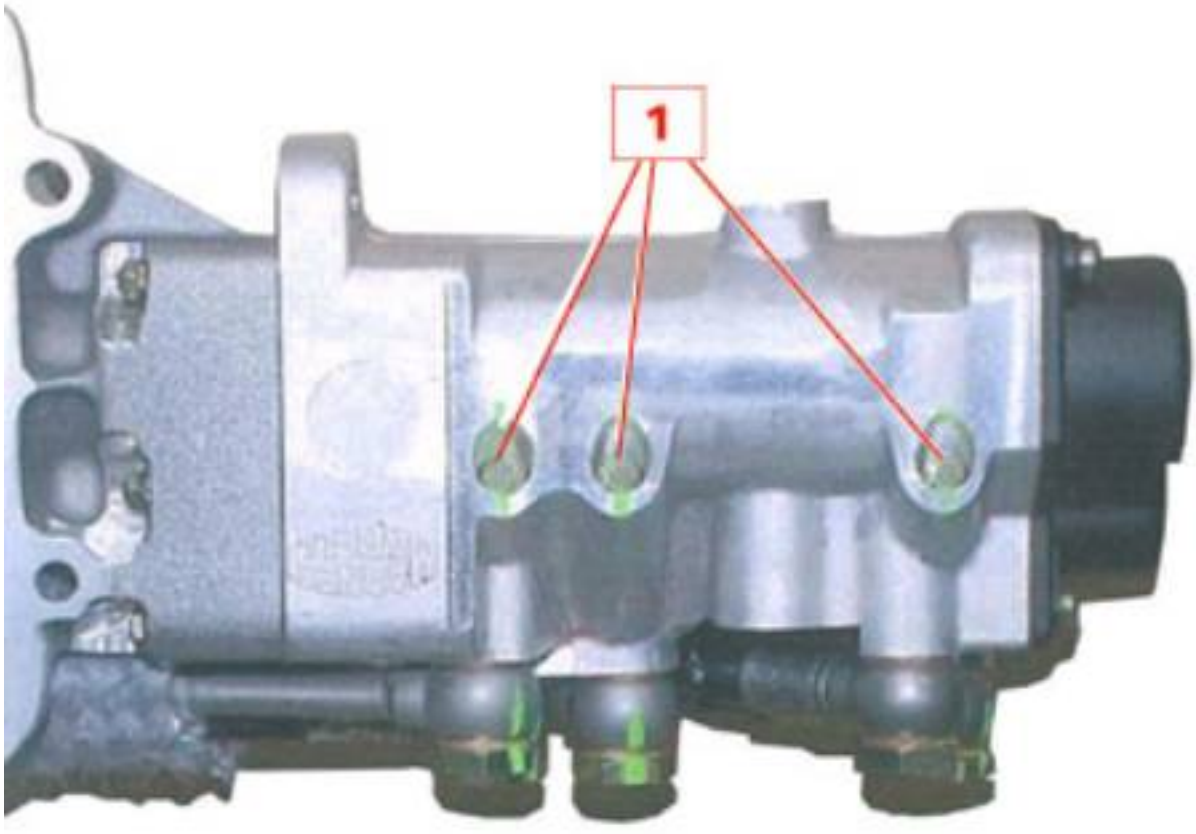
Accelerometer self-calibration procedure

Power Unit actuator bleeding

In order to access the bleeding screws of the actuator, it must be removed leaving it connected to the electric and hydraulic system.
Remove the actuator and appropriately support it so as to work in safety.

Important
During the bleeding operations, support the actuator in such a way that the sensor cables are not pulled and the pipes are not bent with a reduced radius. Keep your hands away from the actuator during the bleeding operation.

- Connect the SD3 diagnostic tester to the diagnostic socket.
- Access the DIAGNOSTICS section from the main menu.
- **Check the oil level in the tank and top up if necessary.**
- **Loosen the three actuator bleeders (1)** by two turns



- Select **ACTUATOR BLEEDING**
- Press **ENTER** to activate the tester.
- Wait until the SD3 tester indicates that the cycle has been completed successfully.
- Tighten the two bleeders to torque.
- Check the oil level in the tank and top up if necessary.
- Fit the actuator and tighten the relative screws to the specified torque.

- Run the self-learning procedure for the engagement and selection thresholds by selecting the **GEARBOX SELF-LEARNING** function from the **DIAGNOSTICS** menu.

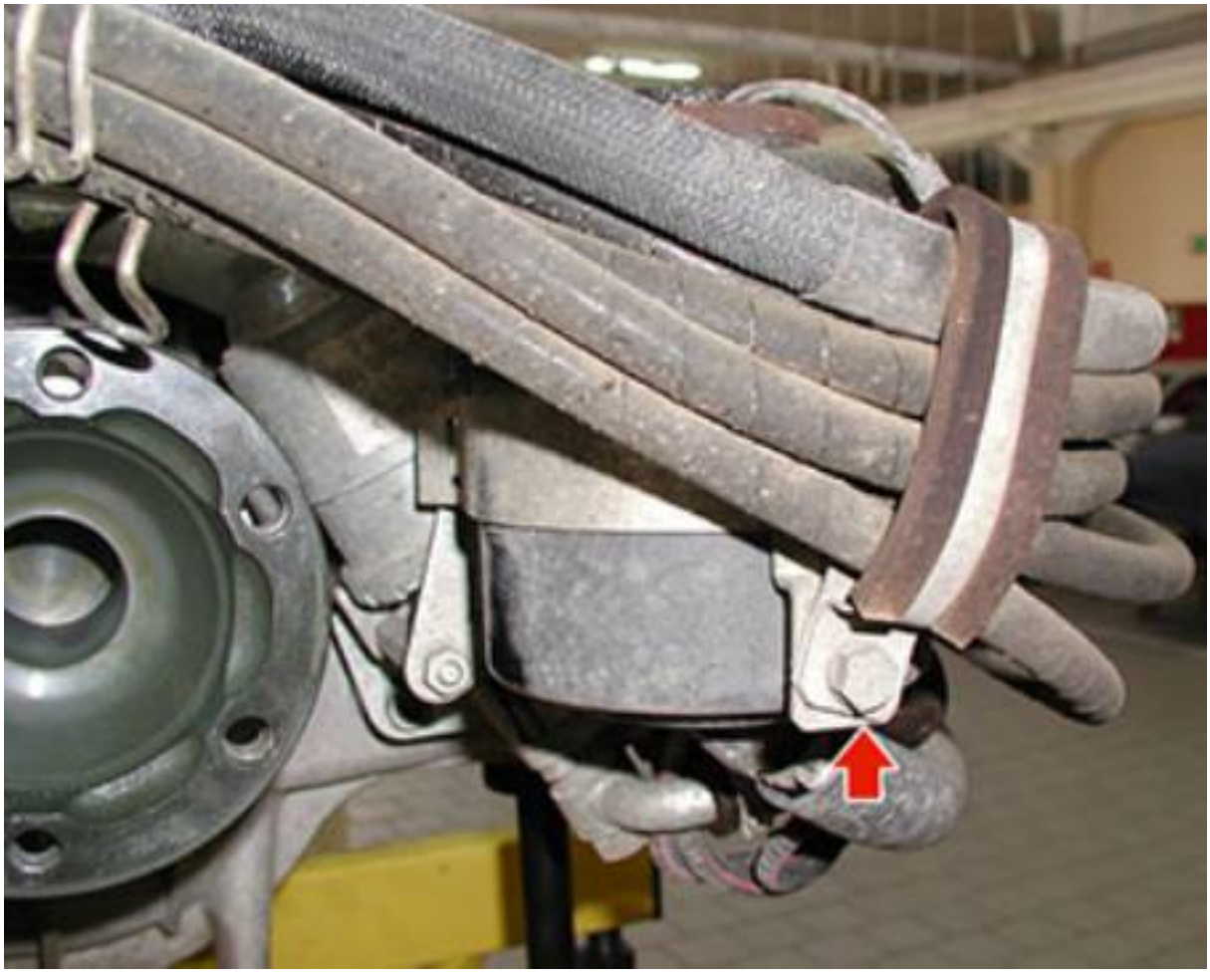
Power unit oil pump

Removing/refitting the power unit oil pump

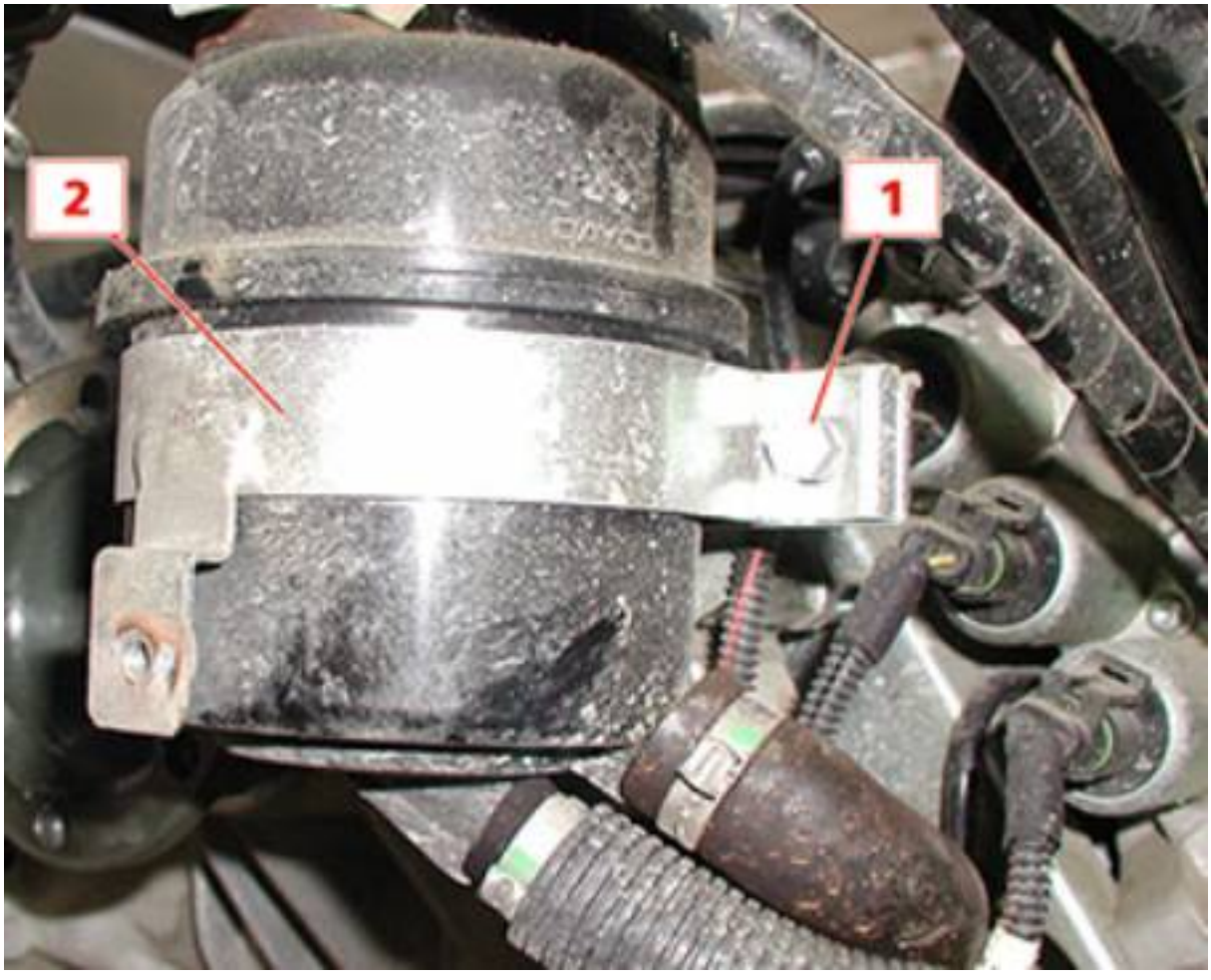
- Place the vehicle on the hoist.
- Remove the gearbox assembly.

Removing/refitting the gearbox

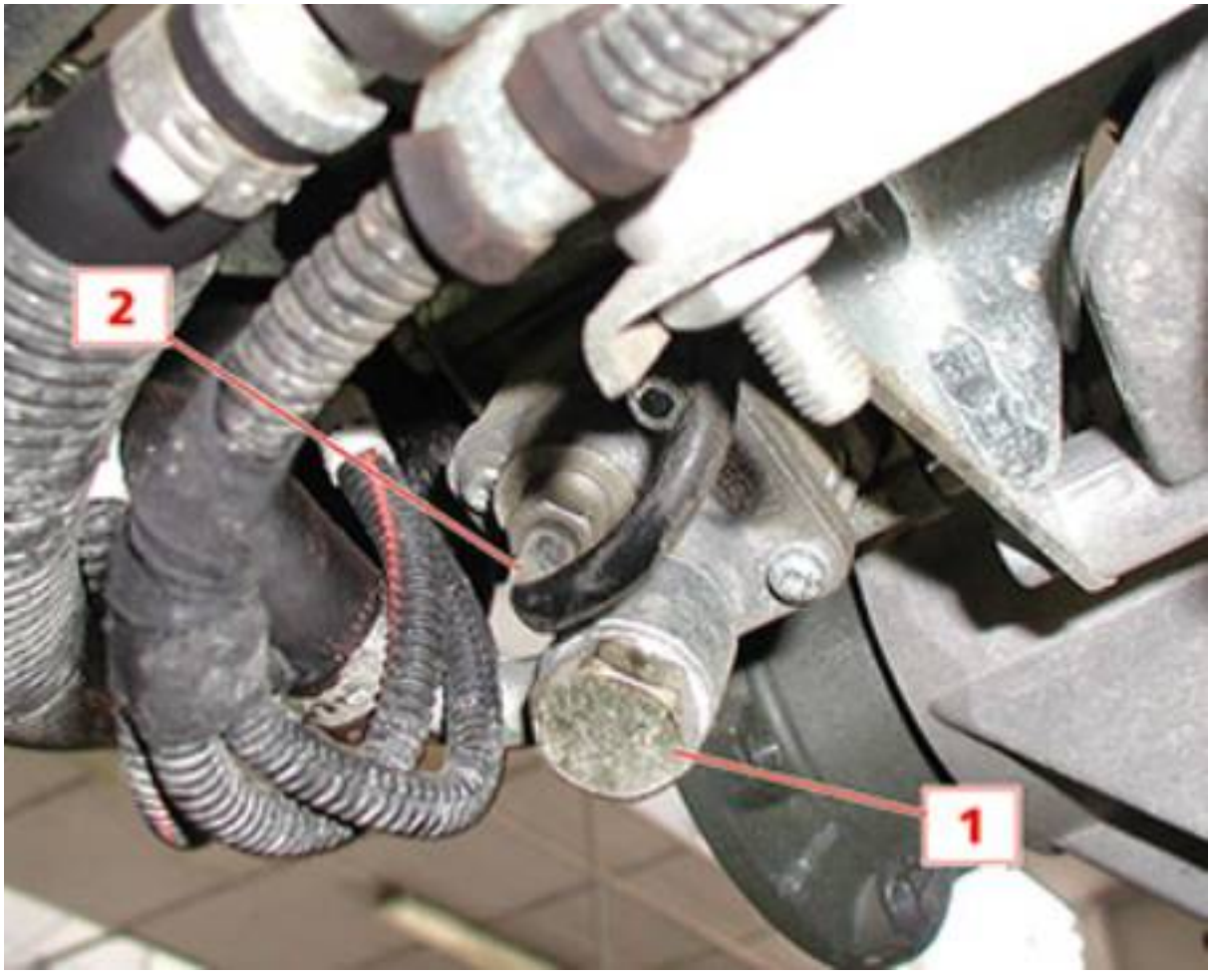
- Undo the fastening screw on the wiring retaining clamp .



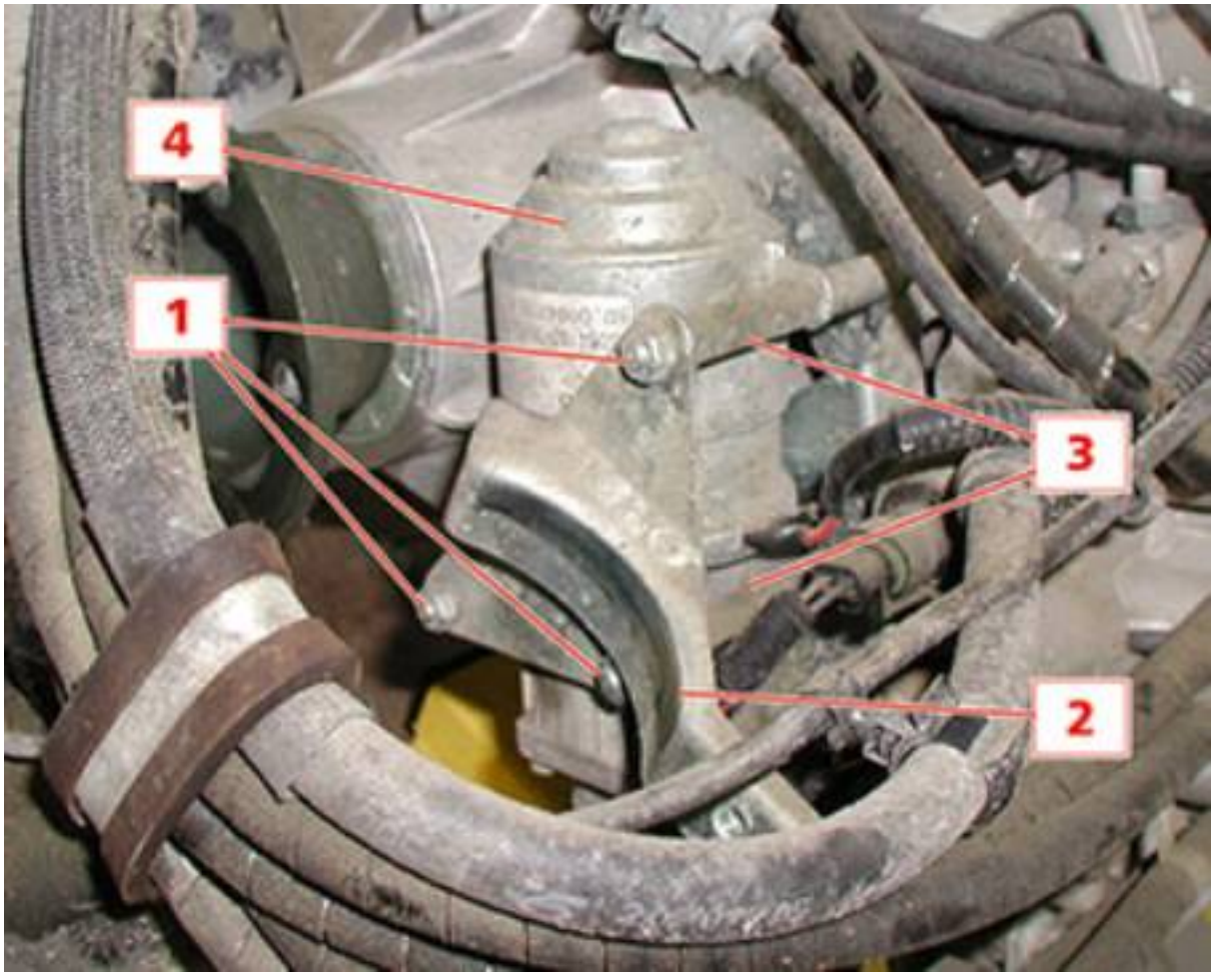
- Move the pipes and undo the retaining screw **(1)** for the power unit oil tank.
- Remove the fastening bracket **(2)** and move the oil tank away from the working area.



- Unscrew the union **(1)** and disconnect the oil pipe **(2)**.



- Unscrew the fastening nuts **(1)**, remove the tank support bracket **(2)**, undo the three stud bolt screws **(3)** and remove the power unit oil pump **(4)**.



When refitting, follow the above procedures in reverse order

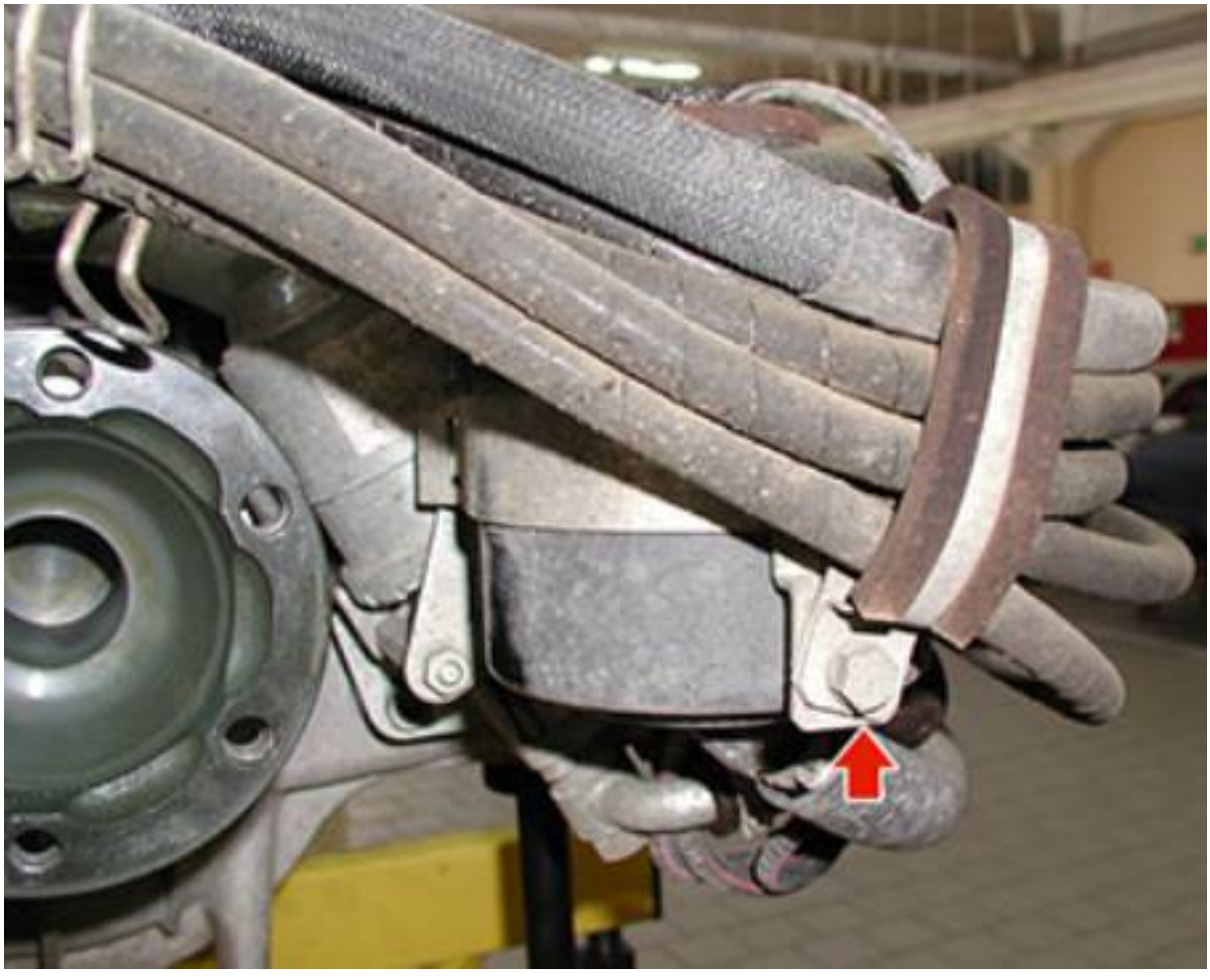
Power unit oil tank

Removing/refitting the power unit oil tank

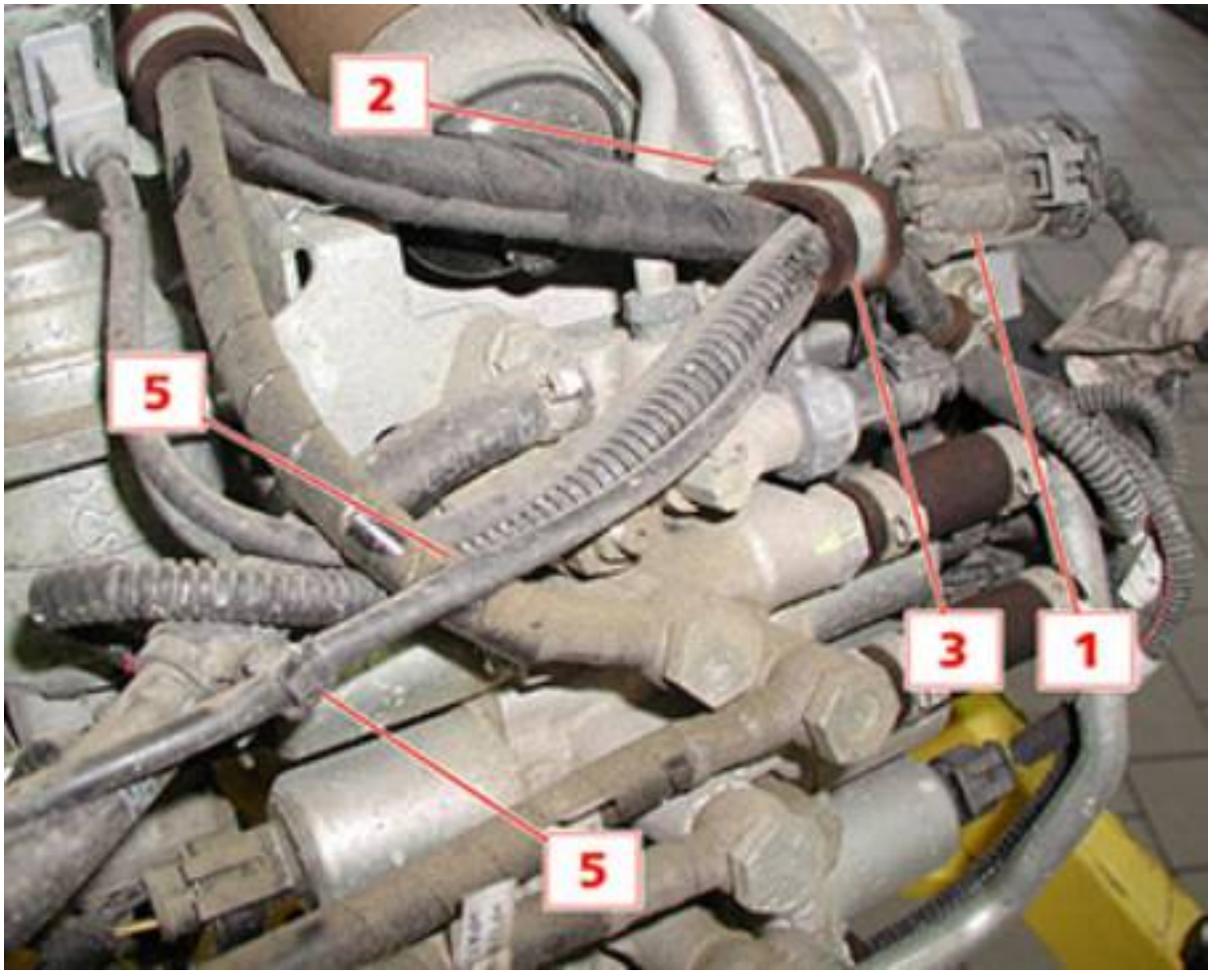
- Place the vehicle on the hoist.
- Remove the gearbox assembly.

Removing-refitting the gearbox

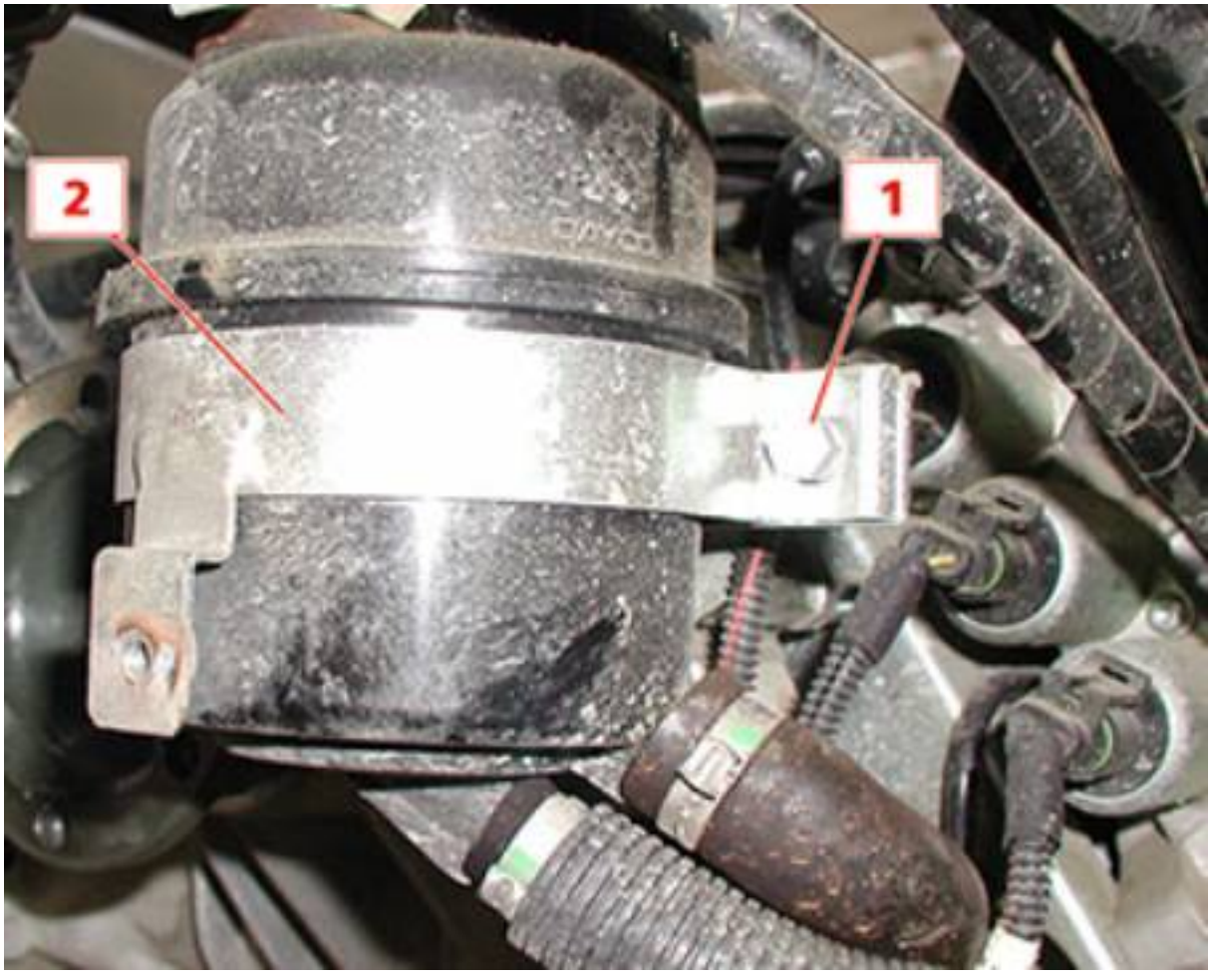
- Undo the fastening screw on the wiring retaining clamp .



- Detach the electrical connector **(1)**, unscrew the nut **(2)** and open the electric cable fastening clamp **(3)**.
- Release the electric cable **(4)** of the level sensor from the clamp **(5)**.



- Move the pipes and undo the retaining screw **(1)** for the power unit oil tank.
- Remove the fastening bracket **(2)**.
- Disconnect the two pipes **(3)** and remove the power unit oil tank.



When refitting, follow the above procedures in reverse order

Axle shafts

Removing the axle shafts

- Remove the wheel concerned.

Replacing the wheels

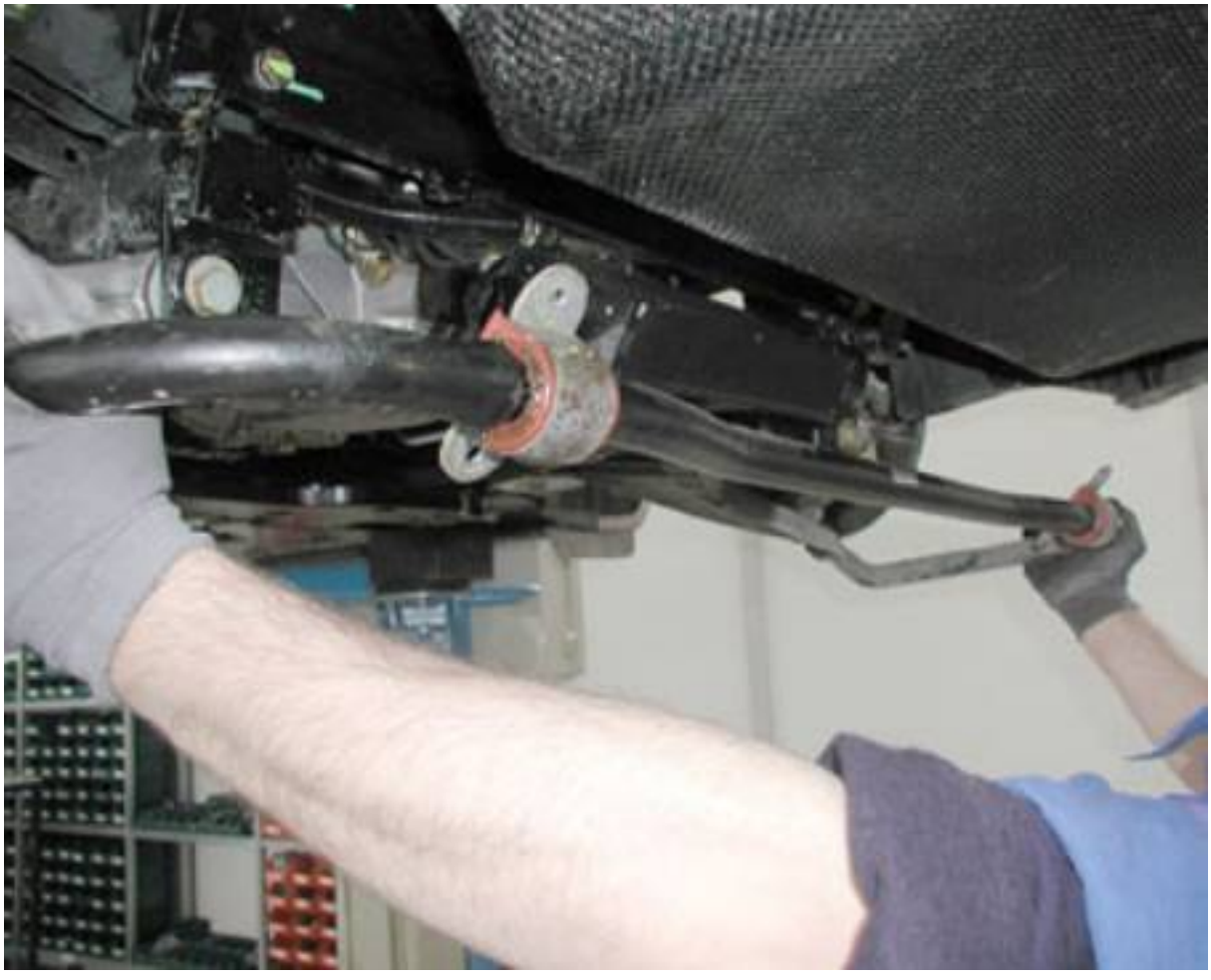
- Remove the rear shock absorber concerned

Rear shock absorbers

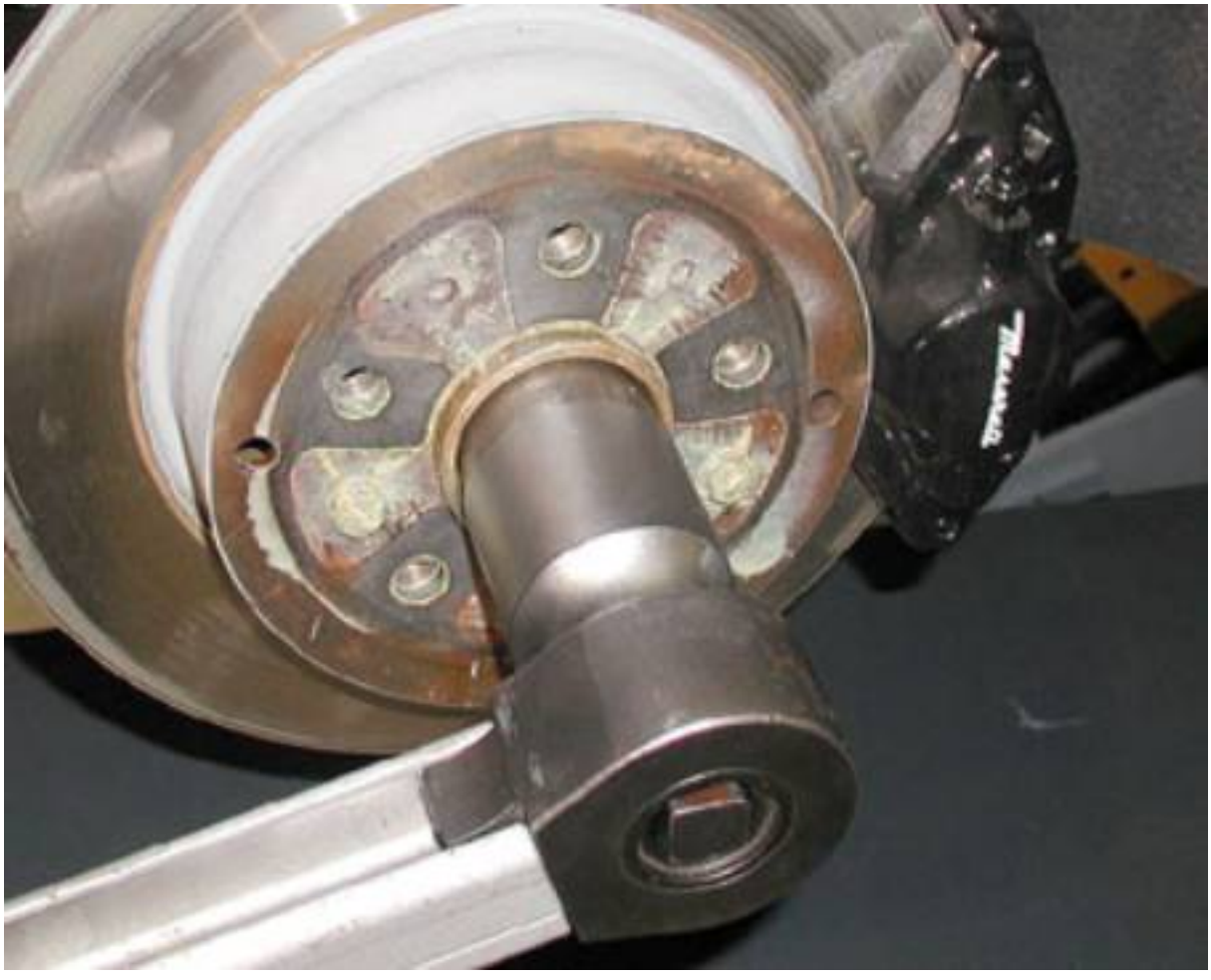
- Unscrew the nut fastening the stabiliser bar connecting rod, on the right- and left-hand side of the vehicle.

- Undo the nuts fastening the stabiliser bar to the chassis.

- Remove the stabiliser bar.



- Remove the flattened part from the nut fastening the wheel hub to the axle shaft and loosen the said nut.



- Remove the relative rear wheel brake disc.

Rear brake disc

- Position the specific tool to remove the axle shaft from the hub carrier.
- Screw it onto the threaded pin of the tool and proceed with removal of the axle shaft.

- Undo the nut fastening the upper lever to the hub carrier.

- Using the extracting tool shown, draw the lever’s tapered pin out the hub carrier.

- Unscrew the nut and, using an extracting tool, separate the tapered head of the toe-in tie-rod from the hub carrier.

- Undo the screws that secure the constant speed universal joint to the flange, then remove the axle shaft from the vehicle.

Refitting the axle shafts

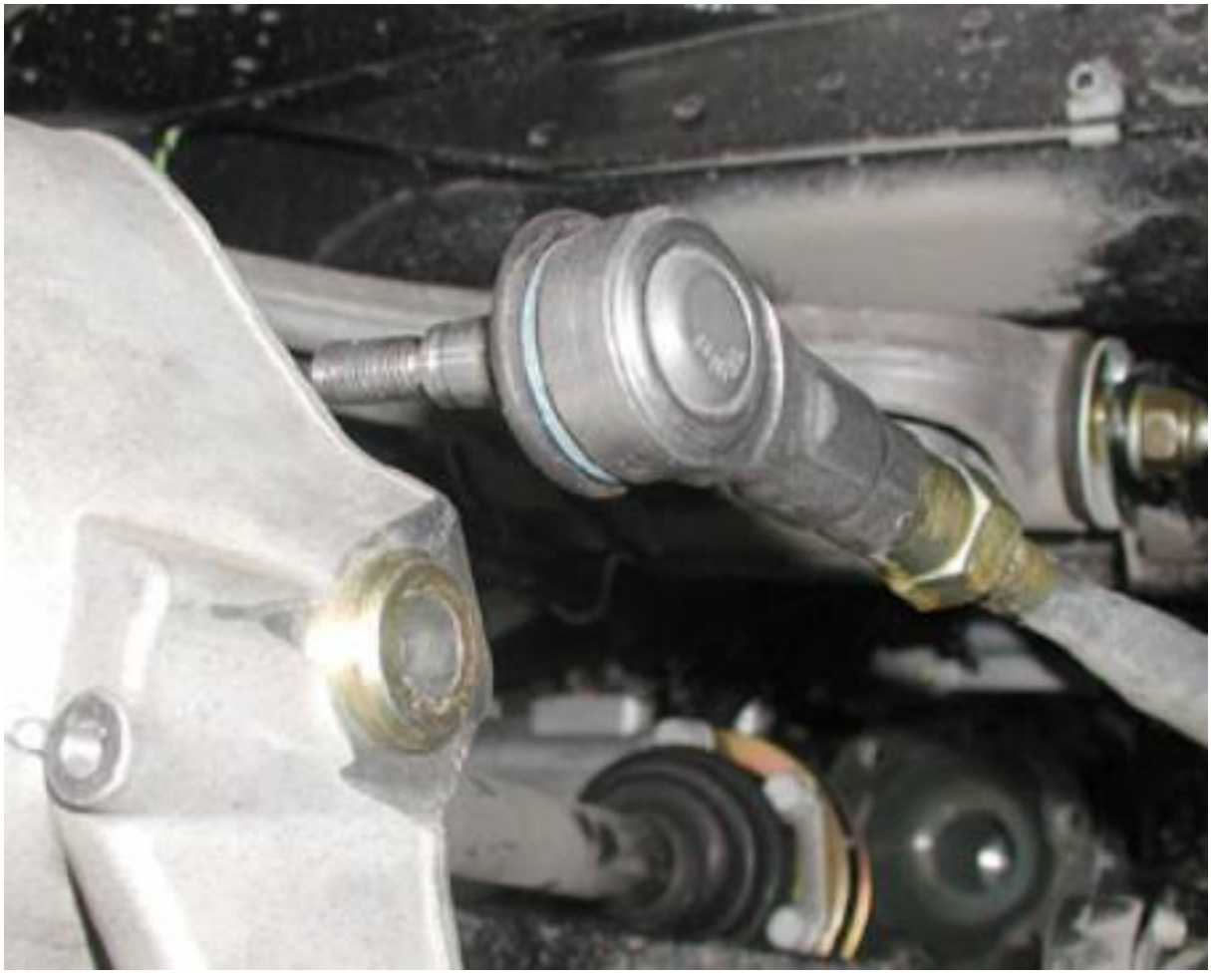
IMPORTANT
The components of the rear suspension must be tightened with the vehicle under static load, i.e.: all fluids up to top level (including fuel) plus 75+75 kg on the front seats.

- Check that the rubber boots are intact.
- Also check that there is no grease leakage.
- Position the axle shaft on the hub carrier and in the flange on the gearbox and tighten the retaining screws on the flange to a torque of **80 Nm**.

- Connect the toe-in tie-rod to the hub carrier and tighten the fastening nut to torque.

- **80 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 45 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

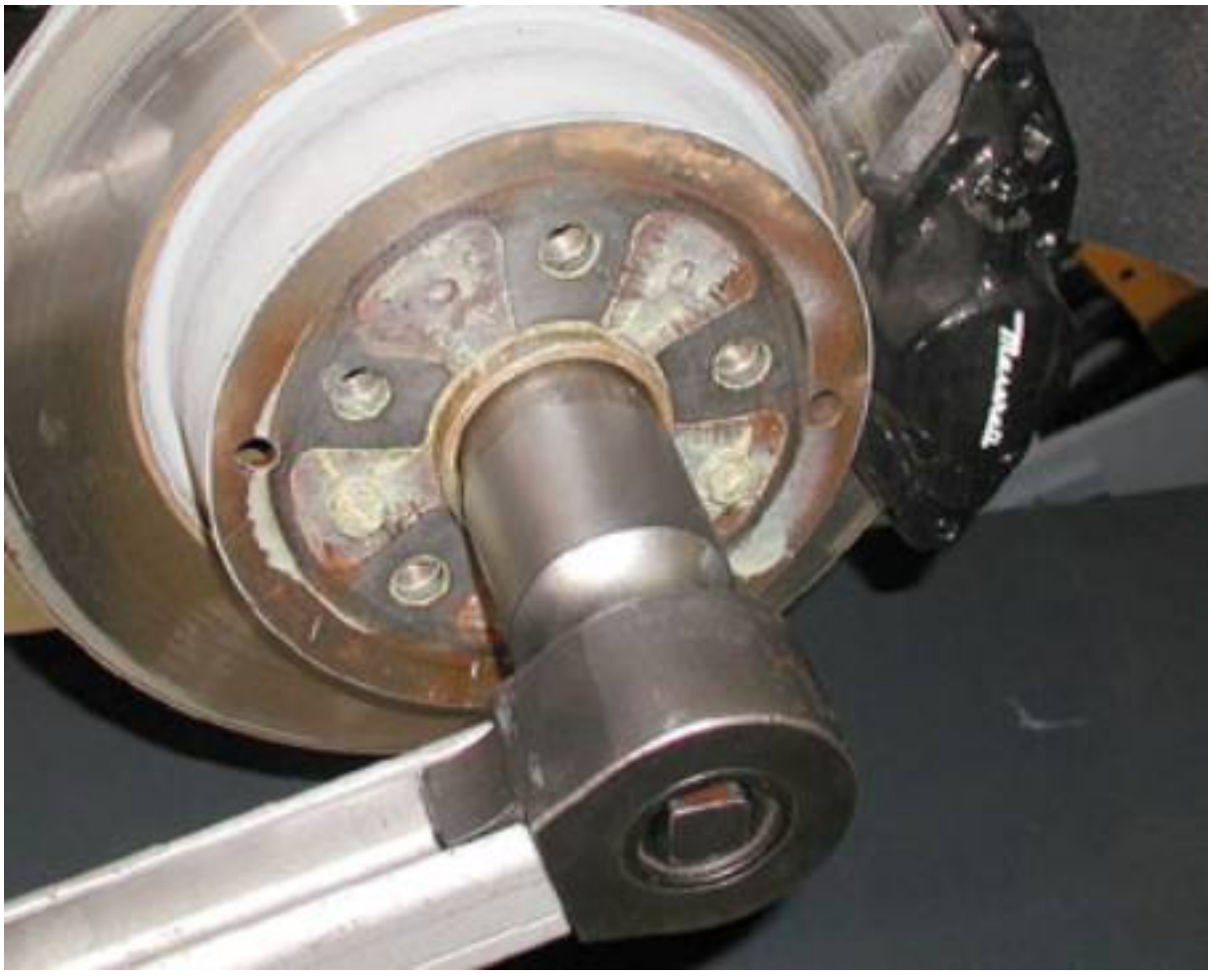


- Tighten the nut fastening the lever to the pillar (hub carrier) to a torque of **52 Nm**.

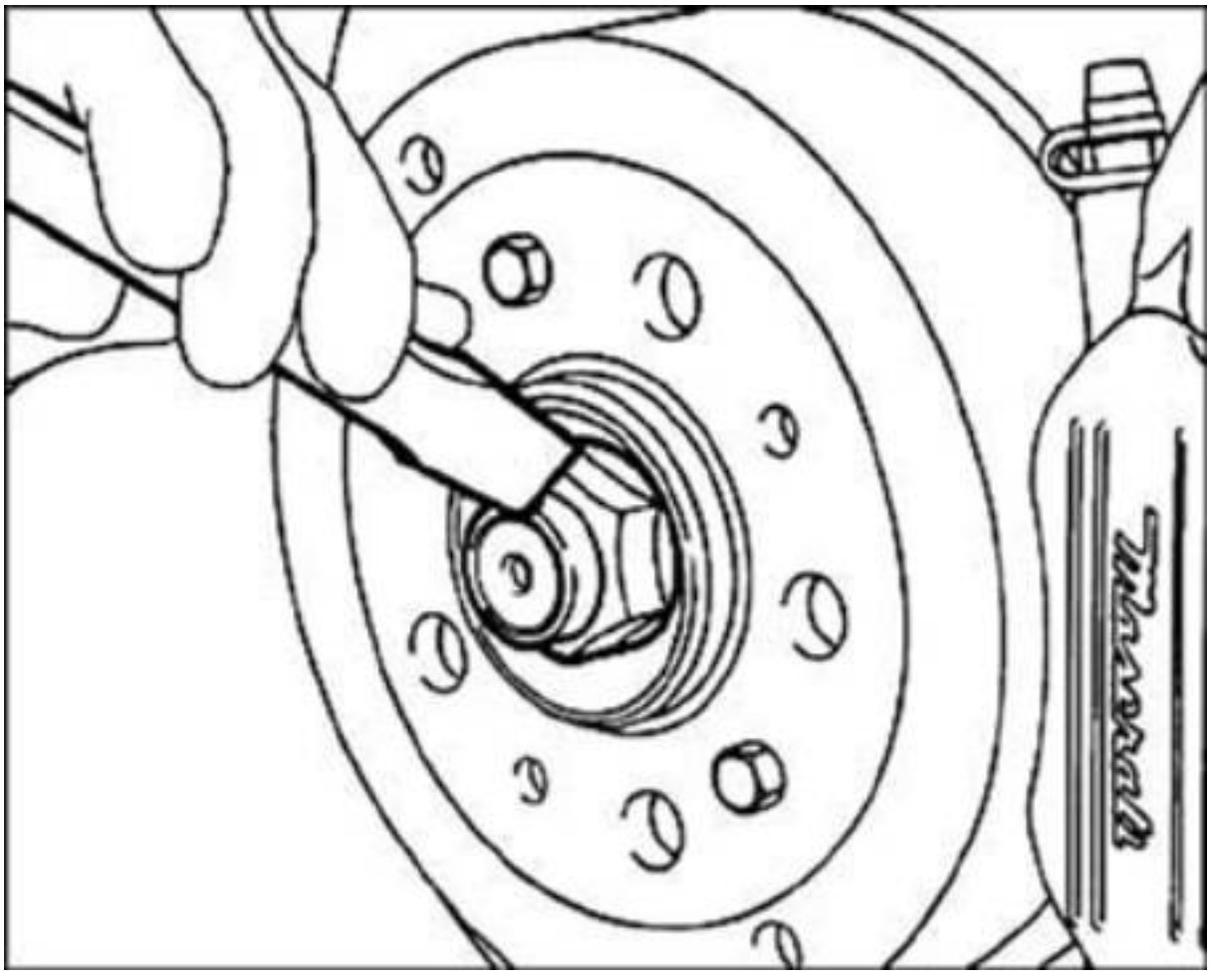
- Complete the procedure by carrying out all the refitting operations for the rear brake disc concerned.

Rear brake disc

- Tighten the nut fastening the wheel hub to the axle shaft to a torque of **275 Nm**



- Flatten the fastening nut.



- Fit the stabiliser bar and tighten the fastening nuts to a torque of **24 Nm**.

- Tighten the nuts fastening the small connecting rods to the stabiliser bar to a torque of **50 Nm**.

- Fit the rear shock absorber removed.

Rear shock absorbers

- Complete the procedure by carrying out all the refitting operations for the wheel concerned.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific chapter

Wheel alignment - Front wheels
Wheel alignment - Rear wheels

Removing-refitting the transmission shaft

Removing the transmission shaft

- Remove the exhaust tailpipes.

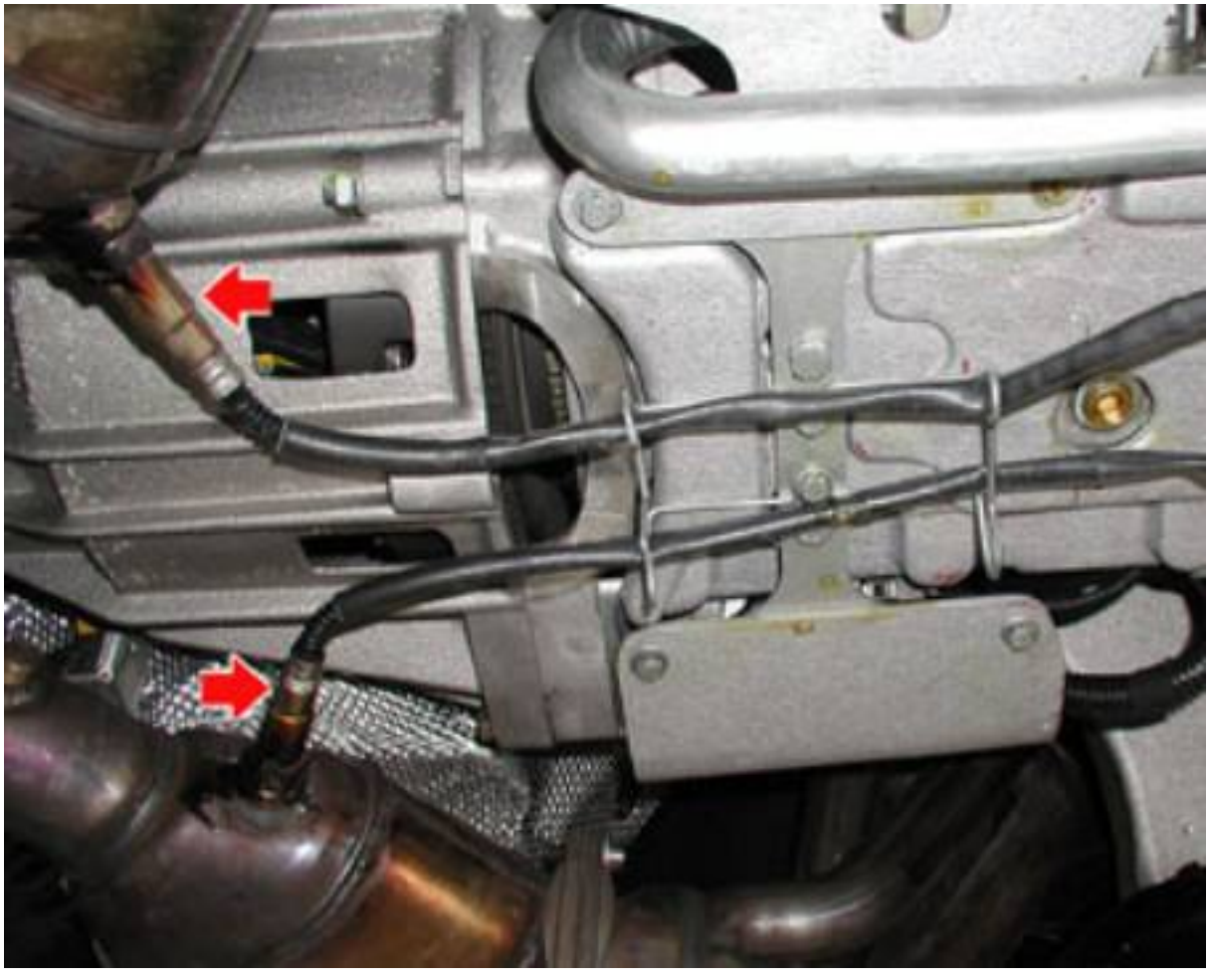
Removing-refitting the tailpipe

- Remove the gearbox.

Removing-refitting the gearbox

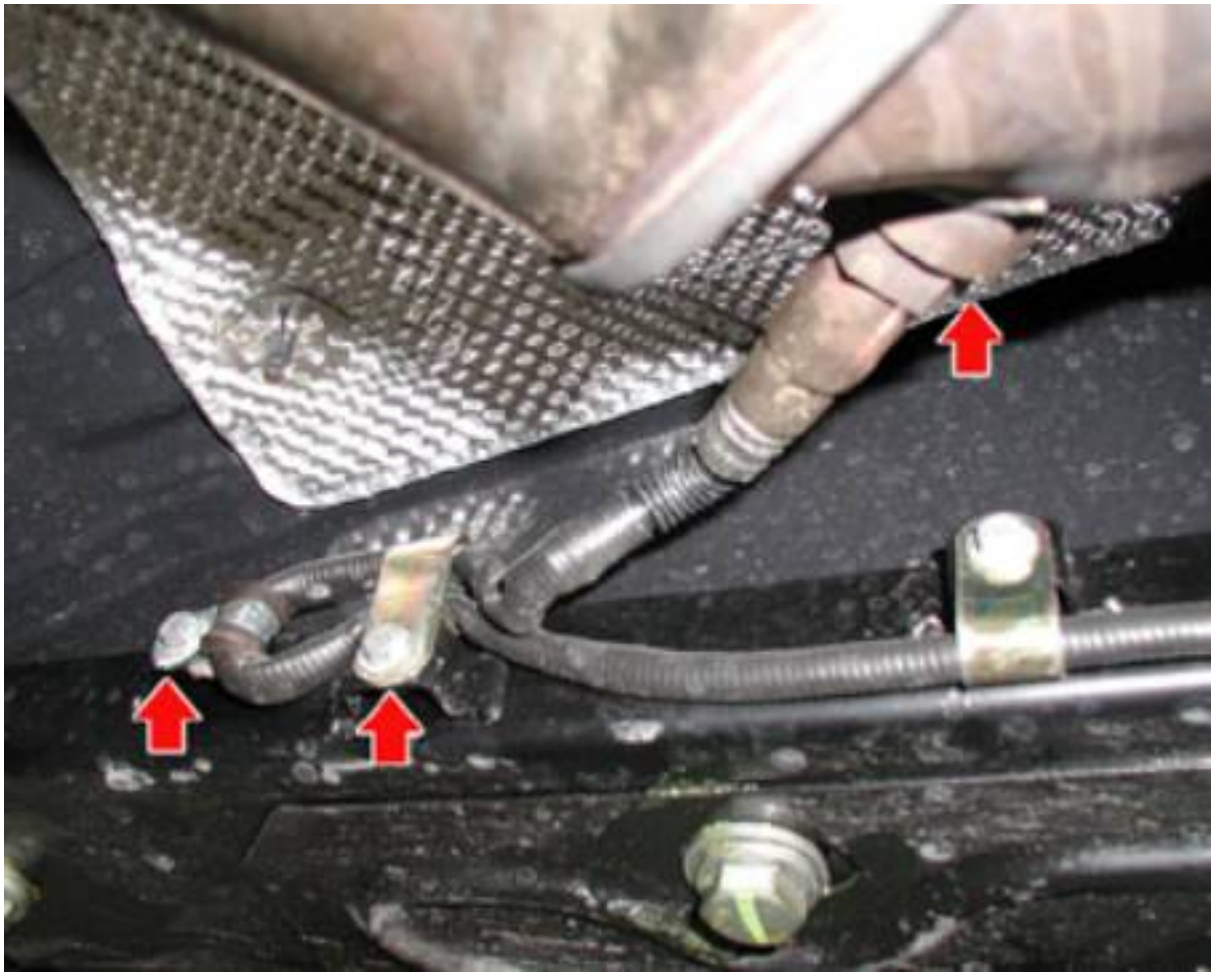
Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Unscrew the two rear Lambda sensors on the catalytic converters and release the cables from the central fastening bracket.



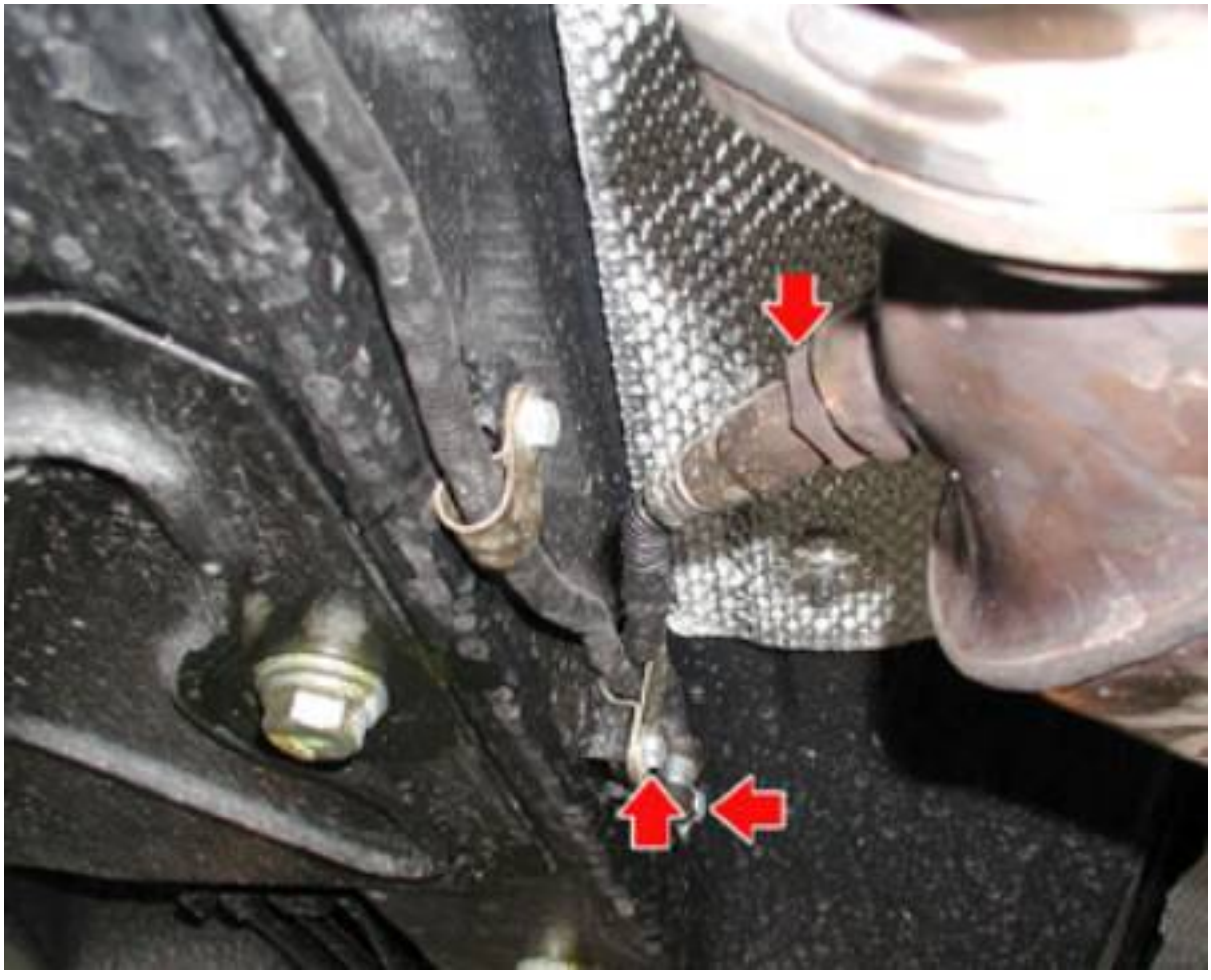
Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Undo the wiring fastening screws, then unscrew the Lambda sensor from the left-hand catalytic converter.



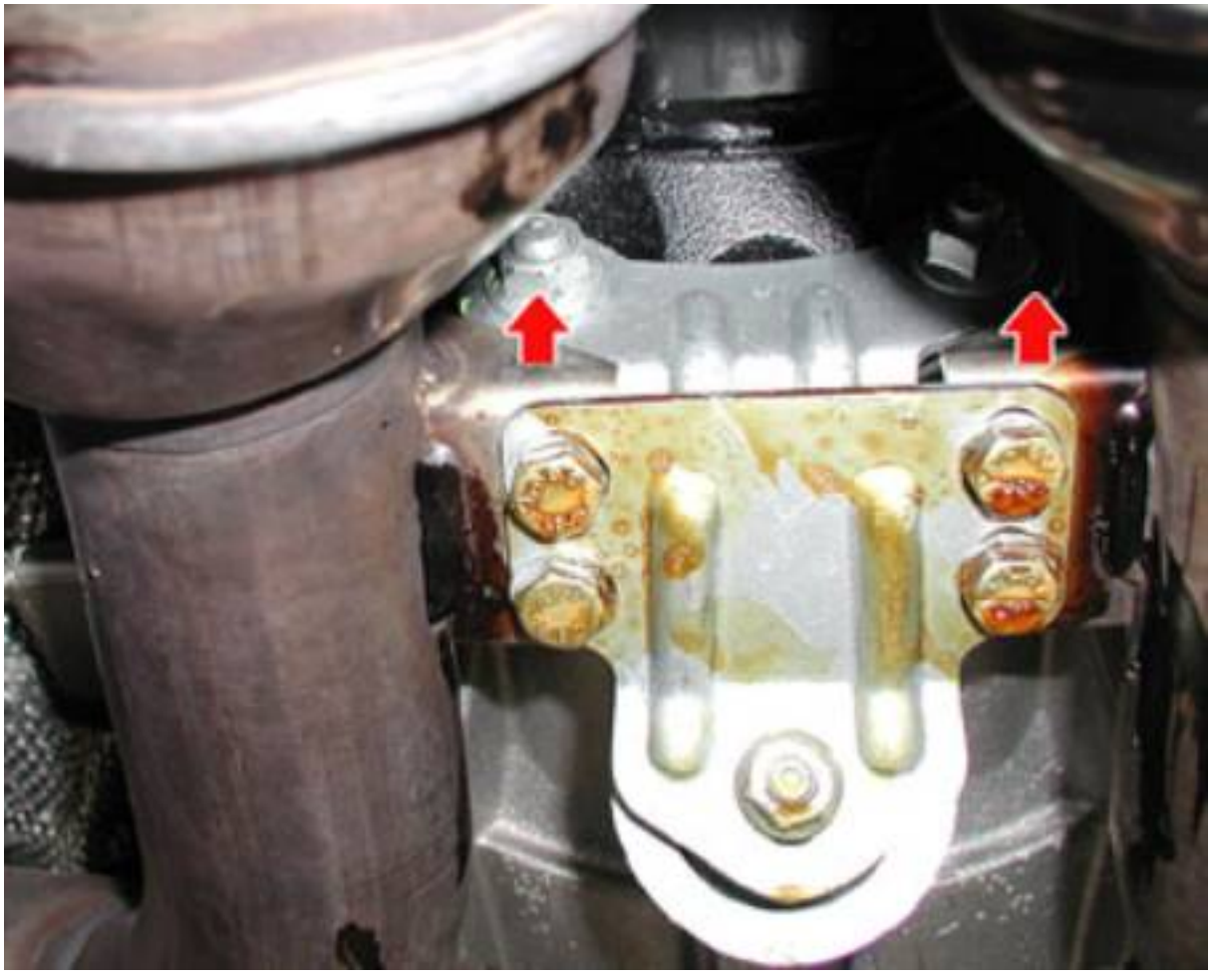
Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Undo the wiring fastening screws, then unscrew the Lambda sensor from the right-hand catalytic converter.



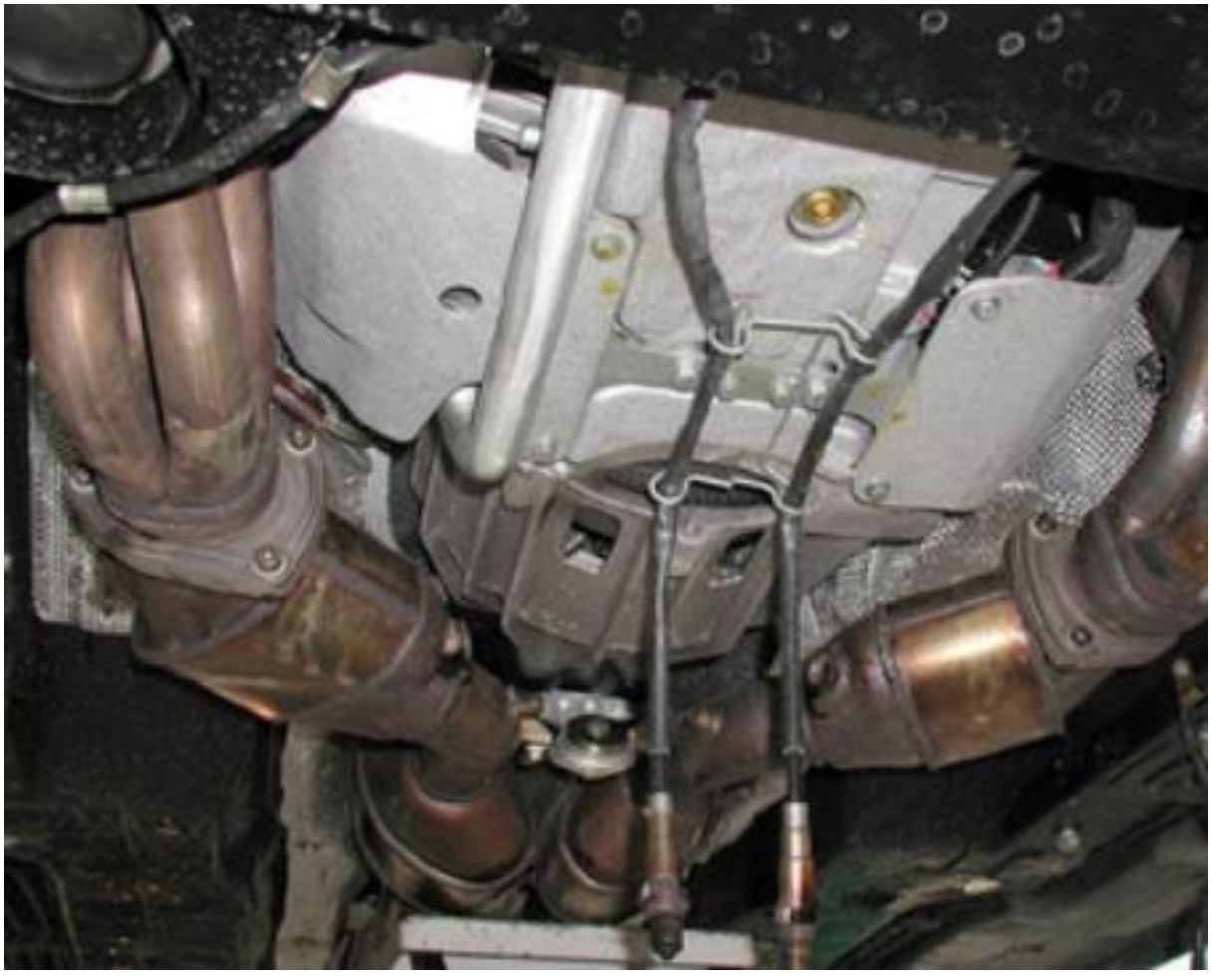
Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Unscrew the fastening nuts on the central catalytic converter mount.



Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Unscrew the six screws fastening the catalytic converter to the relative manifolds.



Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

Position a hydraulic support beneath the catalytic converter/ central exhaust silencer assembly, lower it slowly, then remove the catalytic converters together with the central exhaust silencers.

- Retrieve the catalytic converter conductive gaskets.

Operation valid for ALL THE USA-CANADA versions and for the EUROPE version from serial number 24276.

- Remove the two exhaust extensions.

Exhaust extension pipe

- Remove the central exhaust silencer.

Exhaust silencer

- Remove the floor guard beneath the engine.

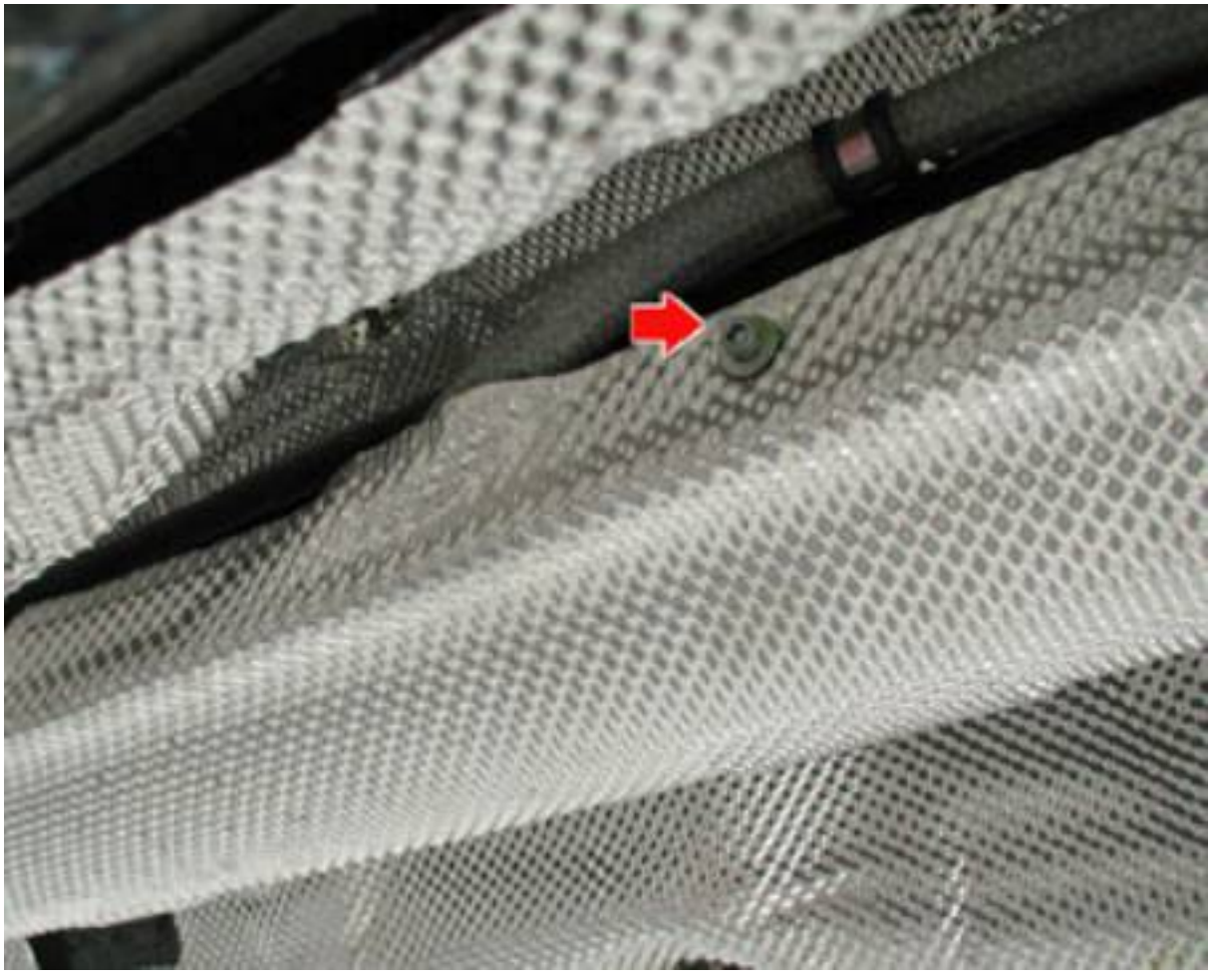
Engine floor guard

- Remove the catalytic converters.

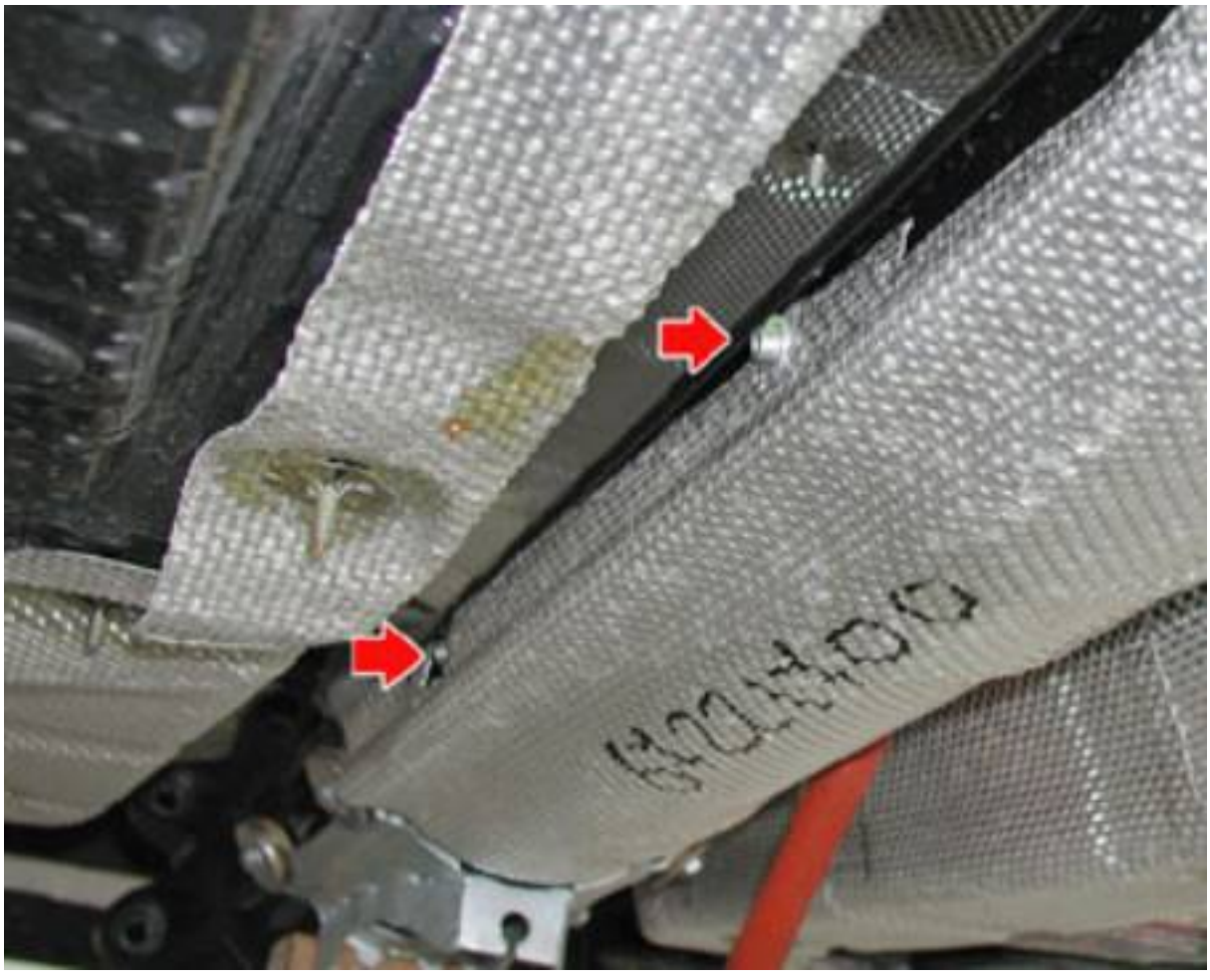
Catalytic converters

OPERATIONS VALID FOR ALL VERSIONS

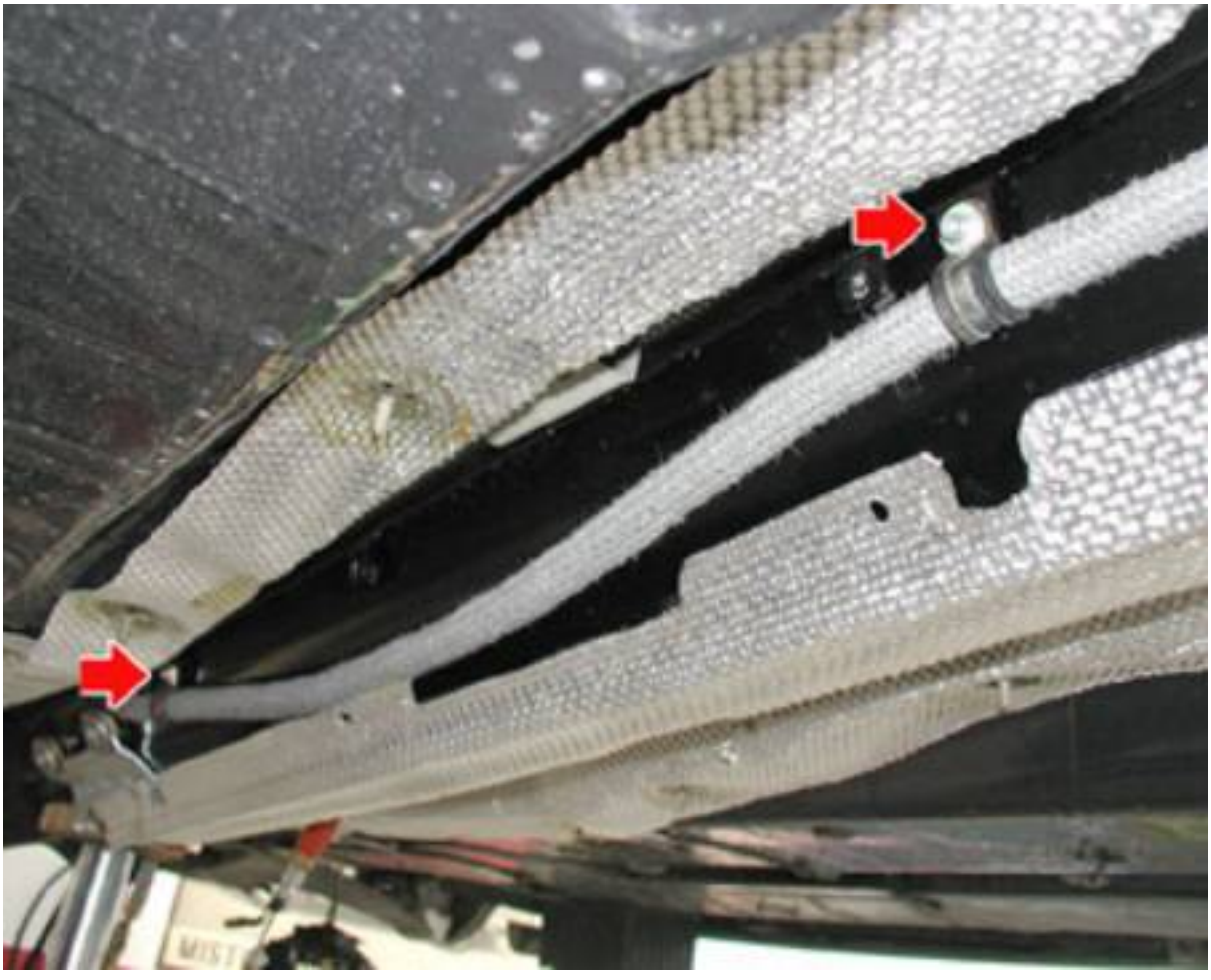
- Undo the front fastening screw on the transmission shaft heat guard.



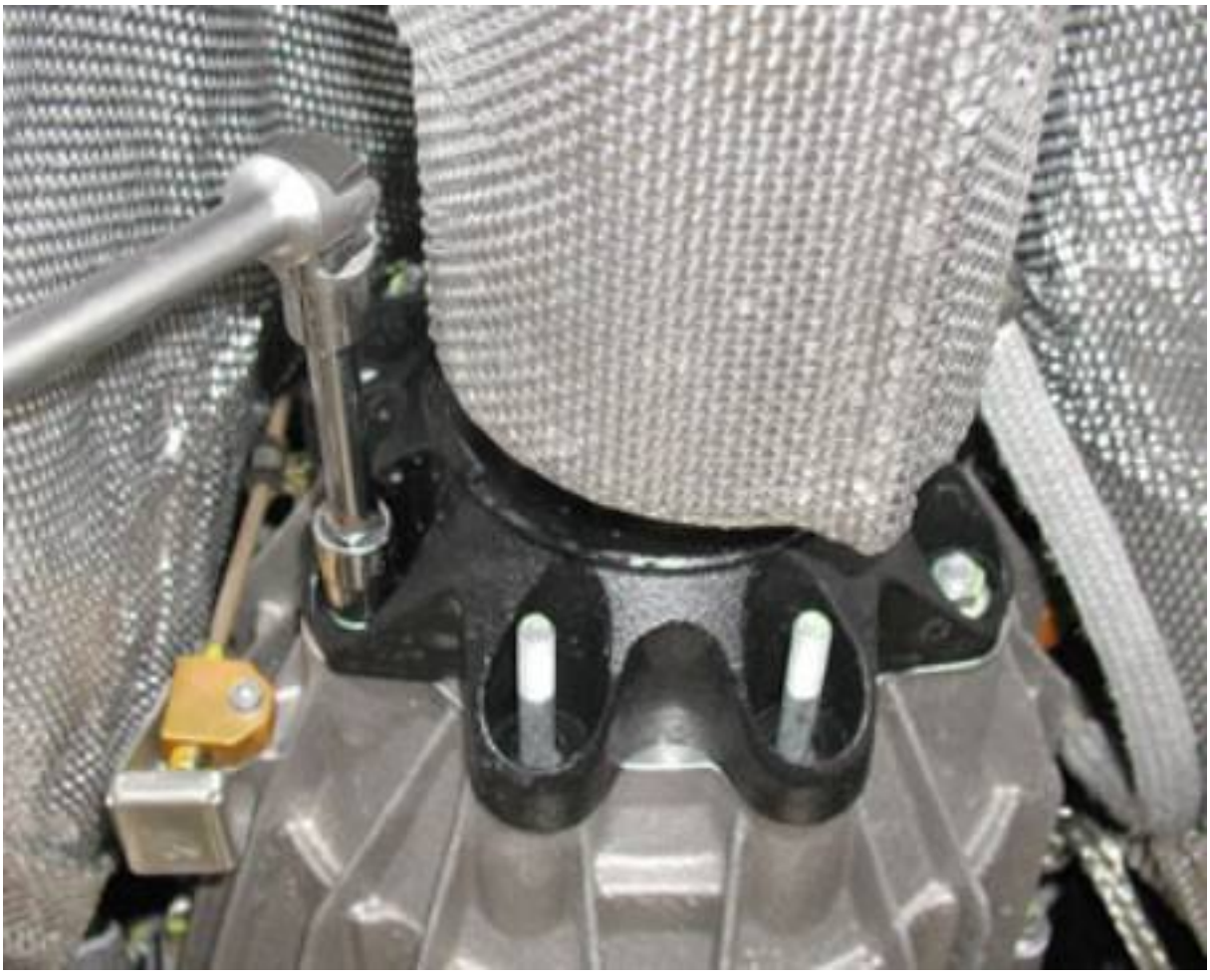
- Undo the rear fastening screws on the transmission shaft heat guard.



- Unscrew the nuts fastening the clutch oil line to the transmission shaft.



- Unscrew the nuts fastening the transmission shaft to the clutch housing.



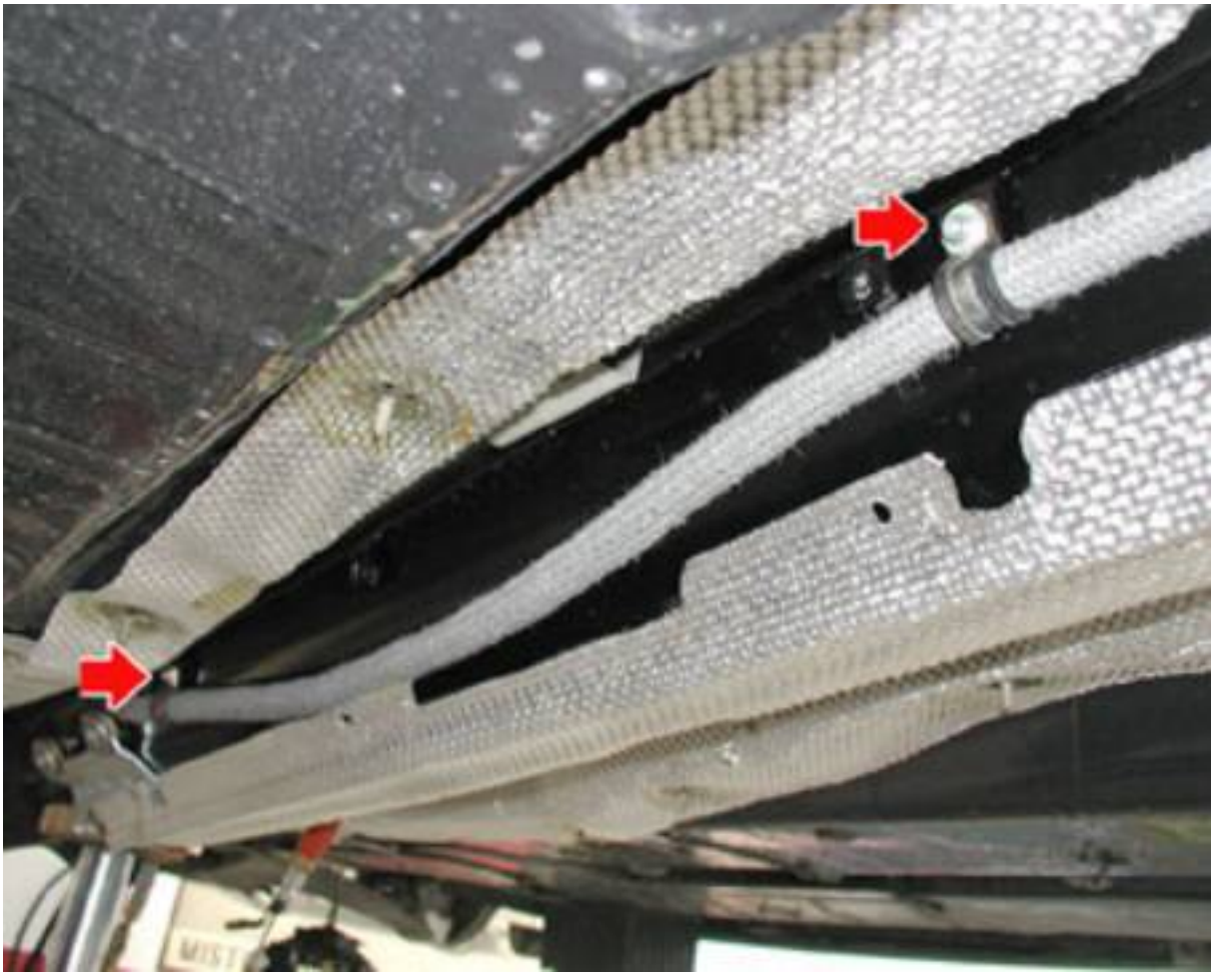
- Position tool **900027300** to support the transmission shaft during its removal and remove the rear mount placed there previously during the removal of the gearbox.
- Slide the transmission shaft out the clutch housing, then remove it.

Refitting the transmission shaft

- Using tool **900027300** to support the transmission shaft, fit the said shaft in its seat on the vehicle and engage it correctly in the seat on the clutch housing.
- Position a hydraulic support device under the rear section of the transmission shaft, screw in some of the nuts fastening the shaft to the clutch housing without tightening them fully and remove tool **900027300**.

- Tighten the nuts fastening the transmission shaft to the clutch housing to a torque of **70 Nm**.

- Tighten the nuts fastening the clutch oil line to the transmission shaft, then tighten the fastening screws on the heat guard.



Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Using a hydraulic support positioned underneath the catalytic converter/central exhaust silencer assembly, position the catalytic converters in their seat together with the central exhaust silencers.

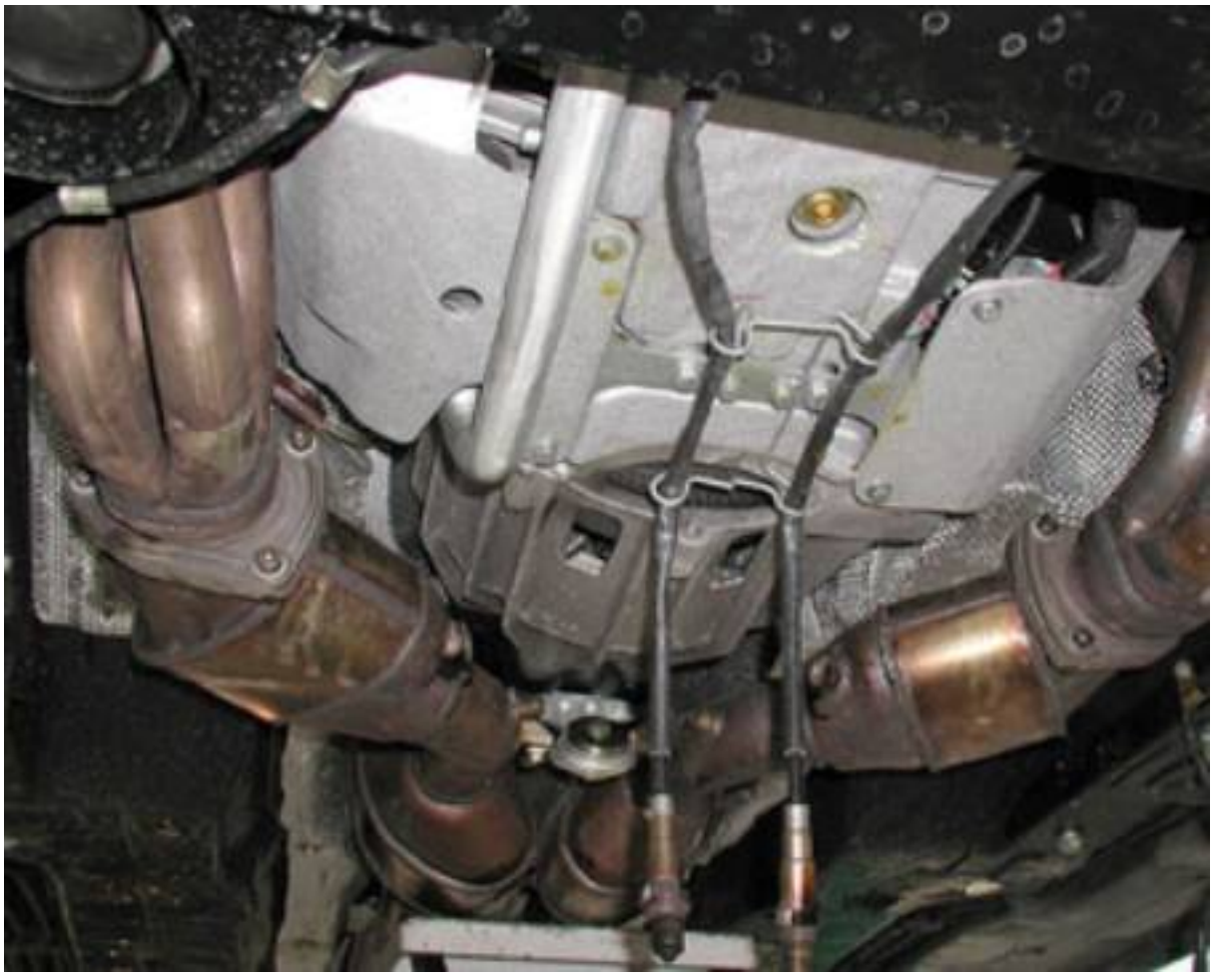
N.B.
Visually inspect that the gasket located underneath the flange joining the catalytic converter and the exhaust manifold is intact and if signs of wear are found, replace it.

N.B.
The conductive gaskets must never be fitted more than once. The second time the component is fitted, they must be replaced

- Fit the conductive gaskets.

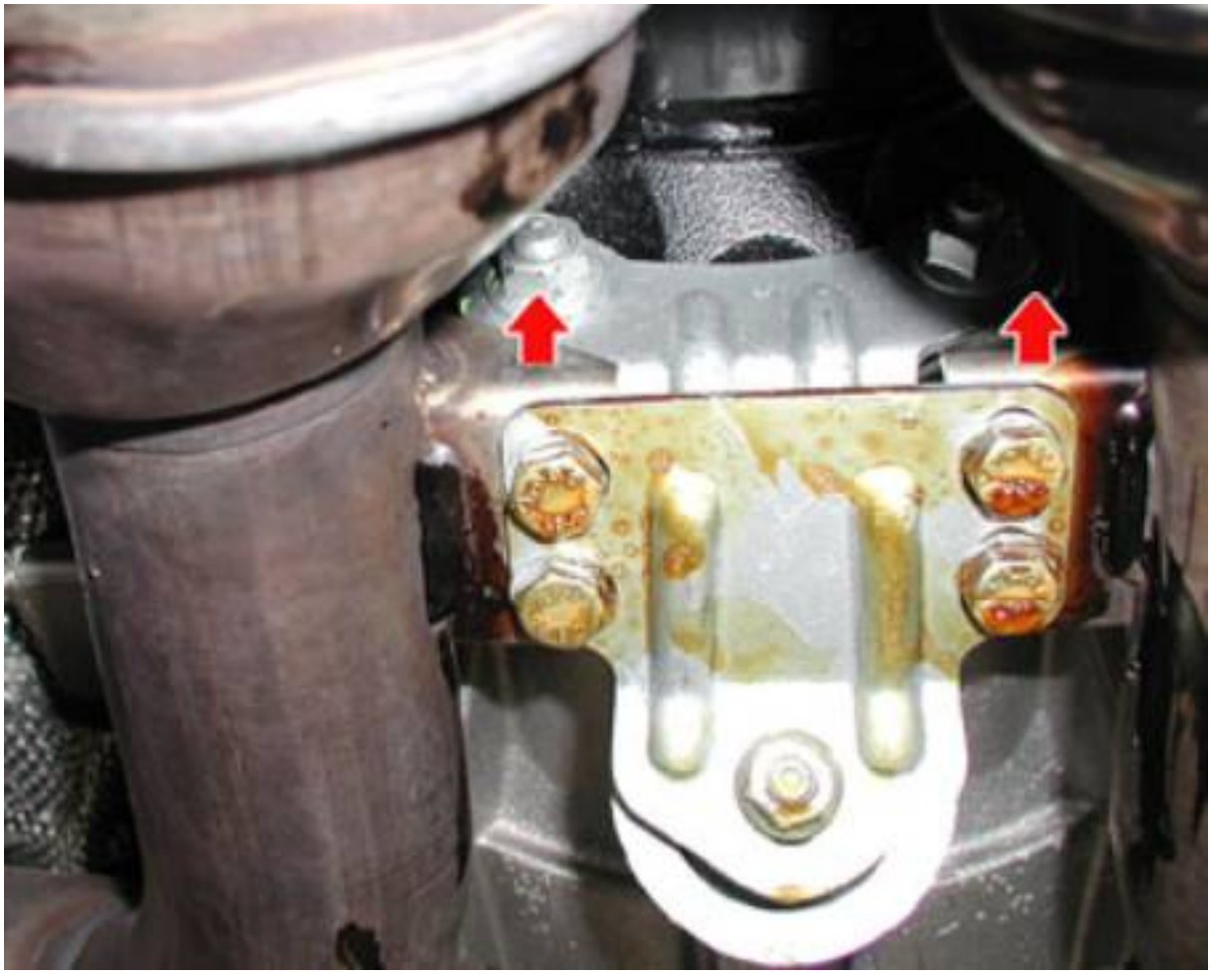
Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Tighten the screws fastening the exhaust manifold to the catalytic converter to a torque of **25 Nm**.



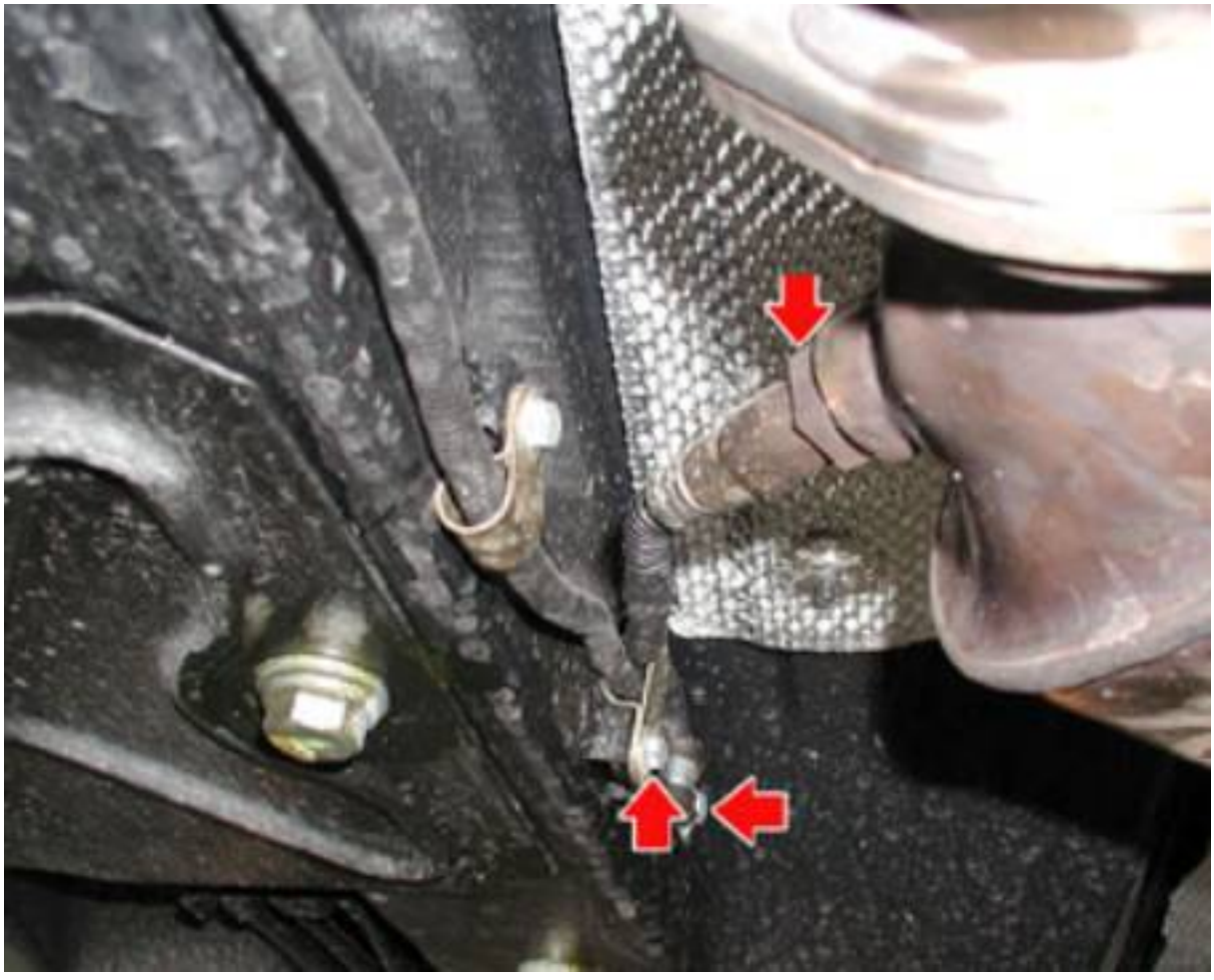
Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Tighten the fastening nuts on the central catalytic converter mount.



Operation valid for ALL THE VEHICLES/MARKETS except USA-CANADA and for the EUROPE version from serial number 24275.

- Fit all the Lambda sensors, then tighten them to a torque of **50 Nm.**
- Suitably secure the front Lambda sensor wiring to the engine frame.



Operation valid for ALL THE USA-CANADA versions and for the EUROPE version from serial number 24276.

- Refit the catalytic converters.

Catalytic converters

- Refit the engine floor guard.

Engine floor guard

- Refit the central exhaust silencer.

Exhaust silencer

- Refit the two exhaust extension pipes.

Exhaust extension pipe

OPERATIONS VALID FOR ALL VERSIONS

- Proceed by refitting the gearbox.

Removing-refitting the gearbox

- Proceed by refitting the exhaust tailpipes.

Removing-refitting the tailpipe

tightening torques

Description	Torque	Product
Front brake		
Front brake caliper screws	145 Nm	
Brake fluid union	24 Nm	
Brake disk screws	15,5 Nm	
Screws fastening bearing to hub carrier	60 Nm	
Rear brake		
Brake caliper retaining screws (up to serial number 27859)	60 Nm	
Brake caliper retaining screws (from serial number 27860)	125 Nm	
Screws for fastening the rear caliper bracket to the hub carrier (from serial number 27860)	65 Nm	
Rear brake disk screws	15 Nm	
Brake caliper flexible hose	15 Nm	
Screw fastening brake shoe housing	7,4 Nm	
Screws fastening bearing to hub carrier	60 Nm	
Hydraulic and electro-hydraulic control		
Nut and tapered washer for fastening electro-hydraulic control unit mounting bracket to chassis	7,4 Nm	
Electro-hydraulic control unit brake pipe union locknut	14 Nm	
Nut and washer for fastening yaw sensor	4,4 Nm	

Description	Torque	Product
Handbrake		
Nut and counternut for cable anchorage	15 Nm	
Screw fastening handbrake on car body	25 Nm	

Pedal box		
Nut for fastening pedal board to fireproof bulkhead	24 Nm	
Nut for fastening brake servo	24 Nm	

FRONT BRAKE PADS

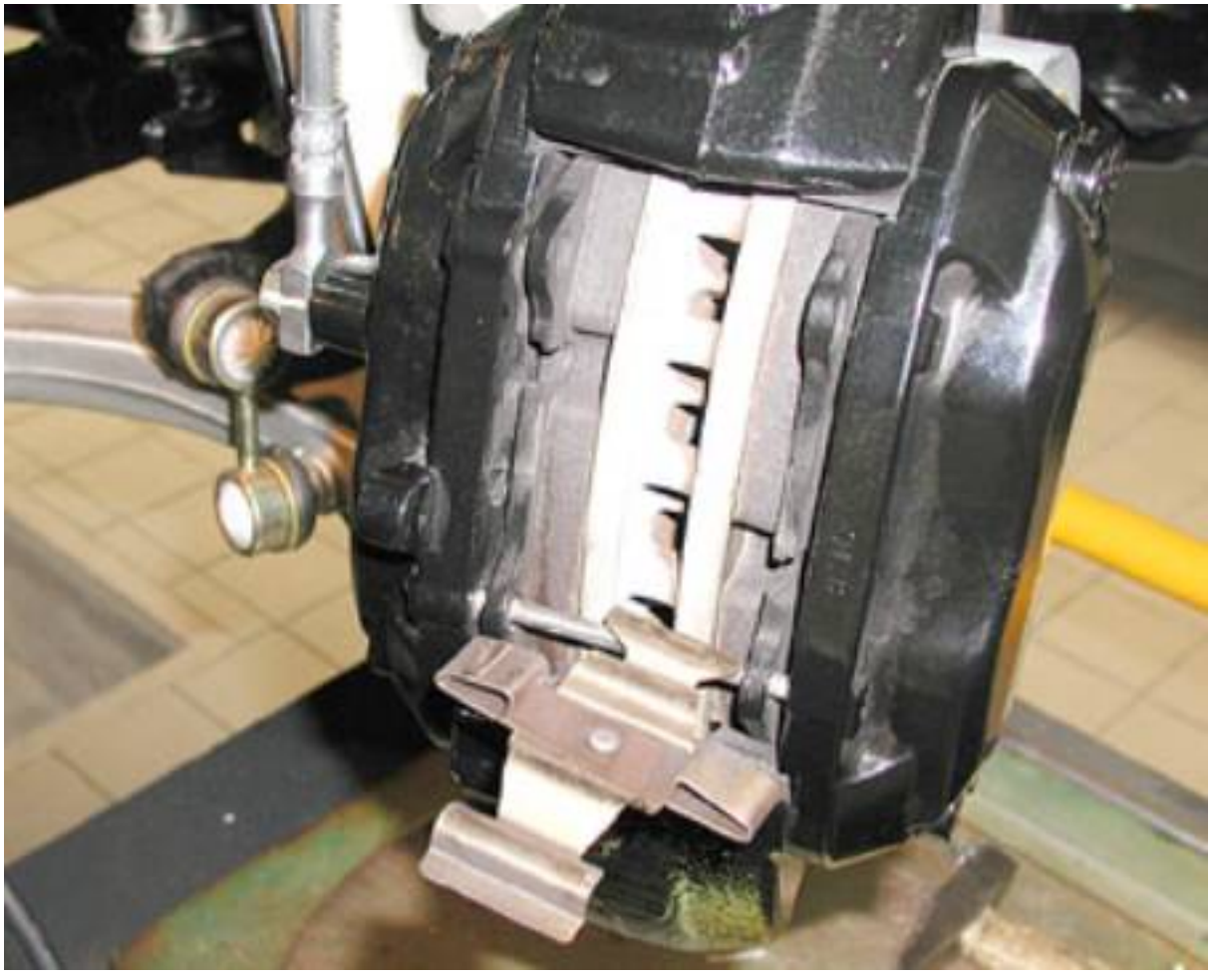
Removing-refitting the front brake pads

- Remove the relative wheel.

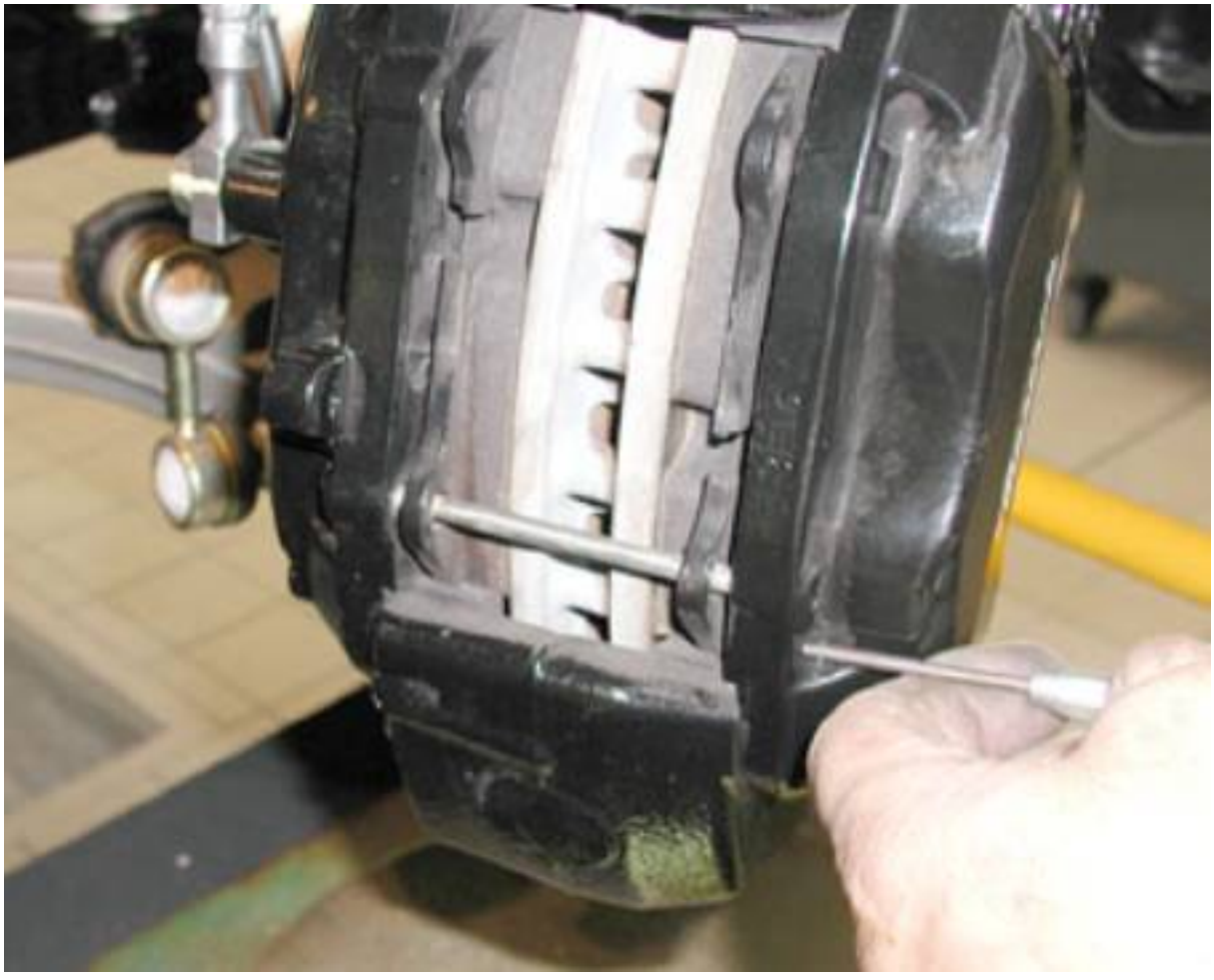
Replacing the wheels

- Insert a punch in the upper hole in the calipers and press until the brake pad retaining pin slides out of its seat.

- Remove the clip from the front brake calipers.



- Insert a punch in the lower hole in the calipers and press until the brake pad retaining pin slides out of its seat.



- Remove the brake pads from the seat on the calipers.
- Proceed in the same way for the brake pads fitted on the other brake calipers.

When refitting, follow the above procedures in reverse order

FRONT BRAKE CALIPERS

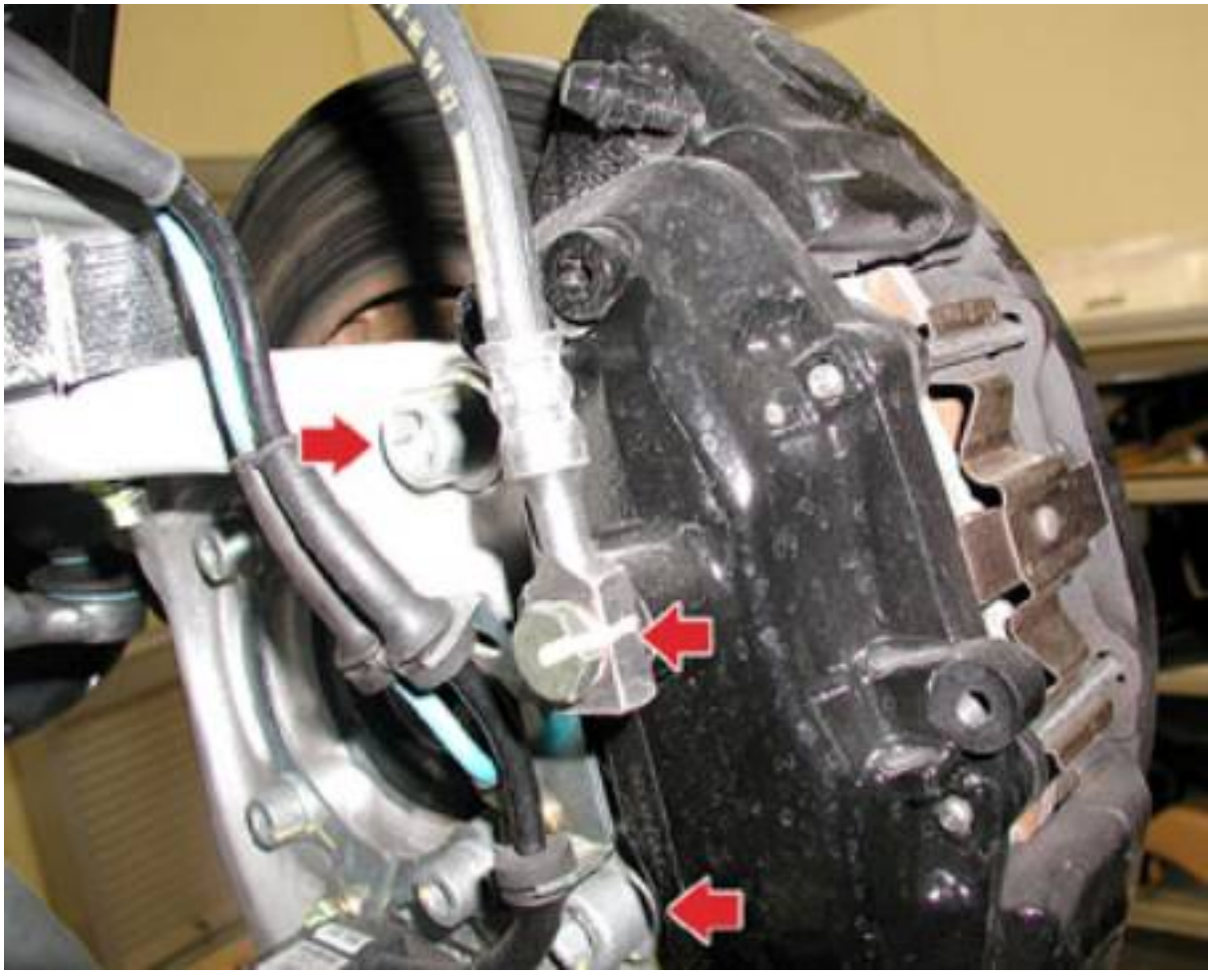
Removing the front brake calipers

- Remove the relative wheel.

Replacing the wheels

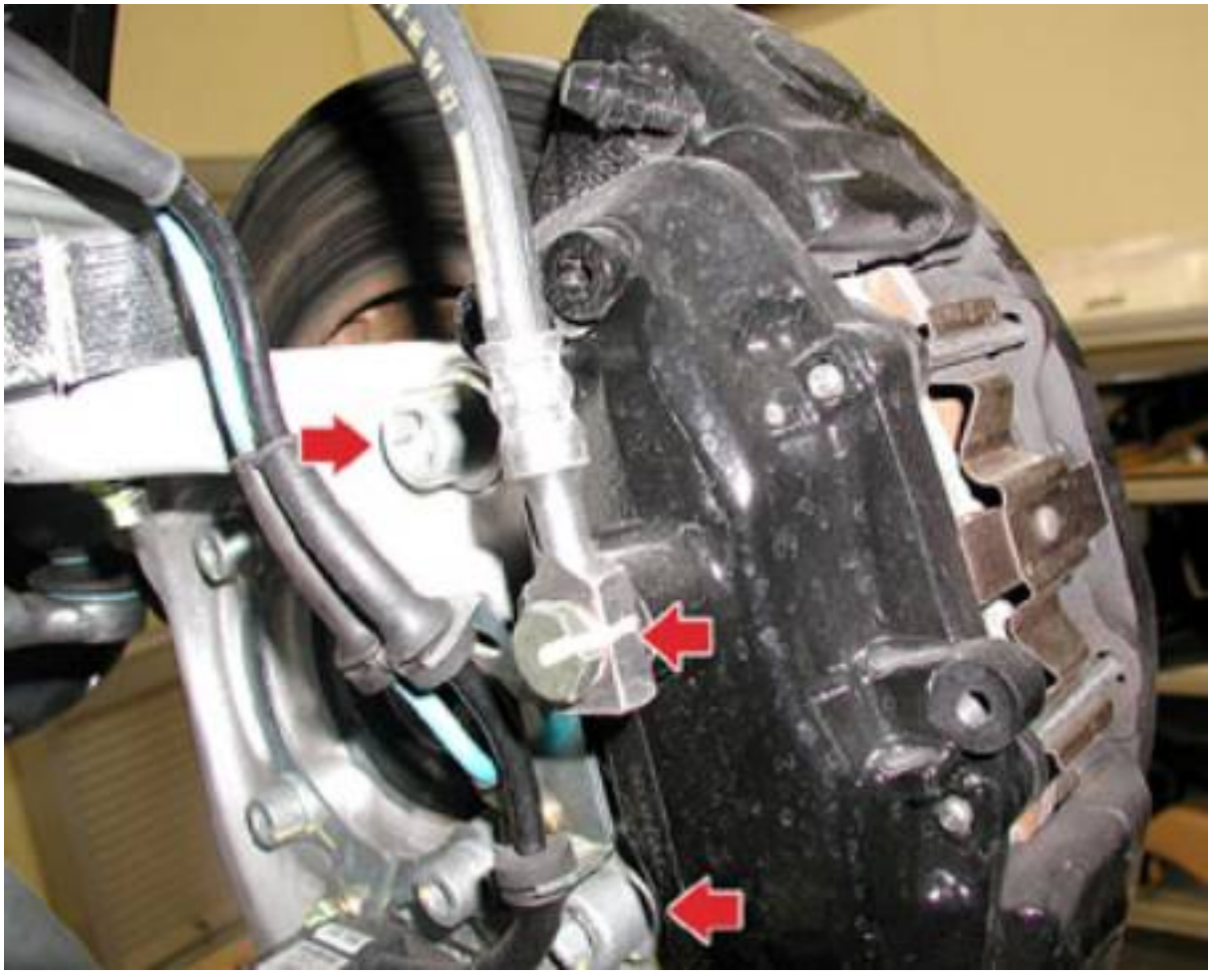
- Undo the screw and disconnect the brake oil line. Undo the two screws fastening the brake calipers to the pillar, then remove them.

N.B.
Fit a specific rubber plug onto the brake fluid hose to impede fluid leakages.



Refitting the front brake calipers

- Move the small piston on the caliper away manually to facilitate fitting the calipers.
- Position the brake calipers on the disc and tighten the two screws fastening the brake calipers to the front pillar to a torque of **145Nm**. Tighten the brake piping union to a torque of **24 Nm**.



- Bleed the air from the front brake circuit.

Bleeding the front brakes

- Carry out the refitting procedure on the wheel removed earlier.

Replacing the wheels

FRONT BRAKE DISK

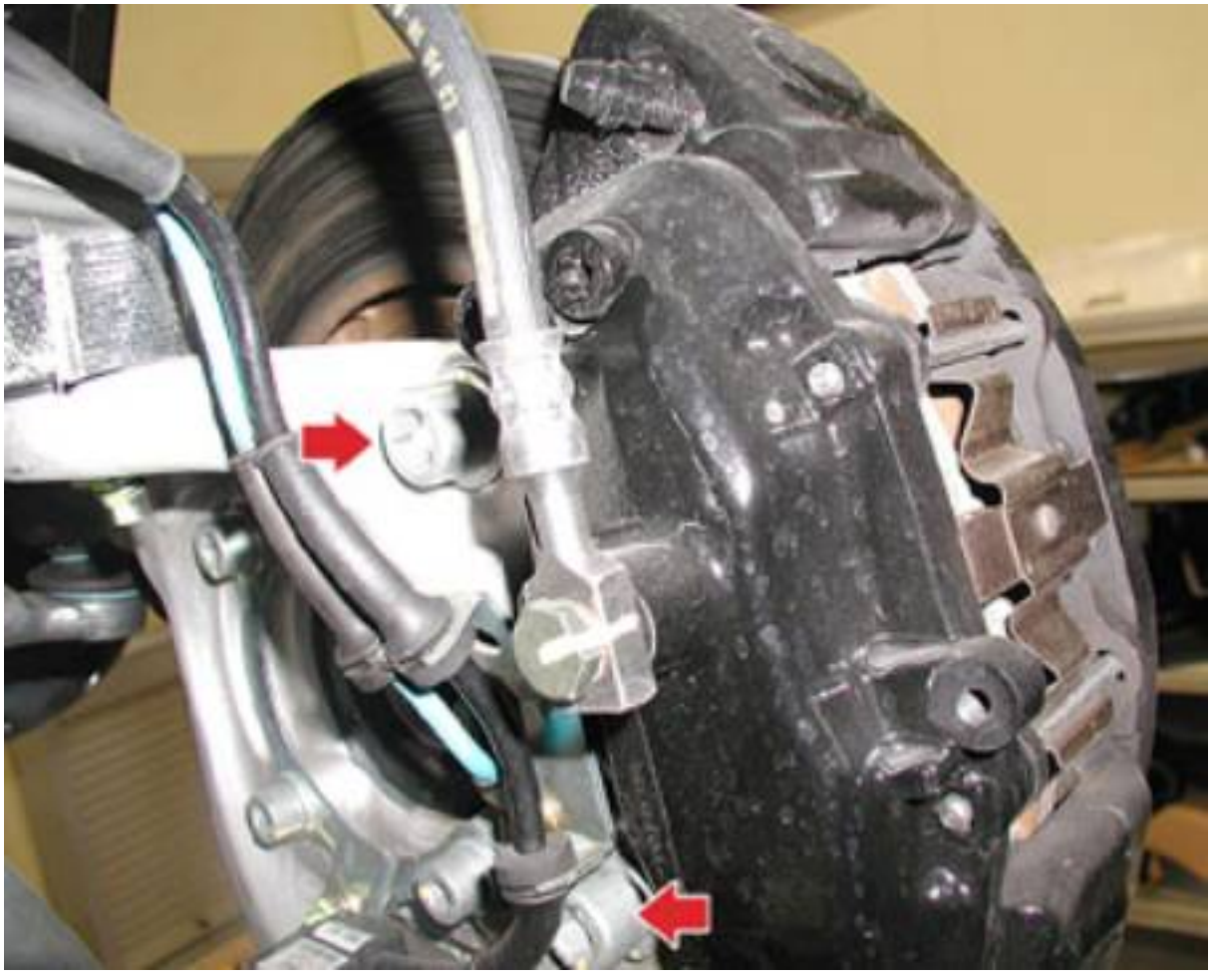
Removing the front brake disk

- Remove the relative wheel.

Replacing the wheels

- Release the electrical wiring and the oil line from the fastening on the upper wishbone.

- Undo the two screws fastening the brake calipers to the pillar, then move them sideways, securing it with suitable means to ensure the weight of the calipers does not weigh down the oil line.



Unscrew the two brake disk fastening screws and remove the disk.

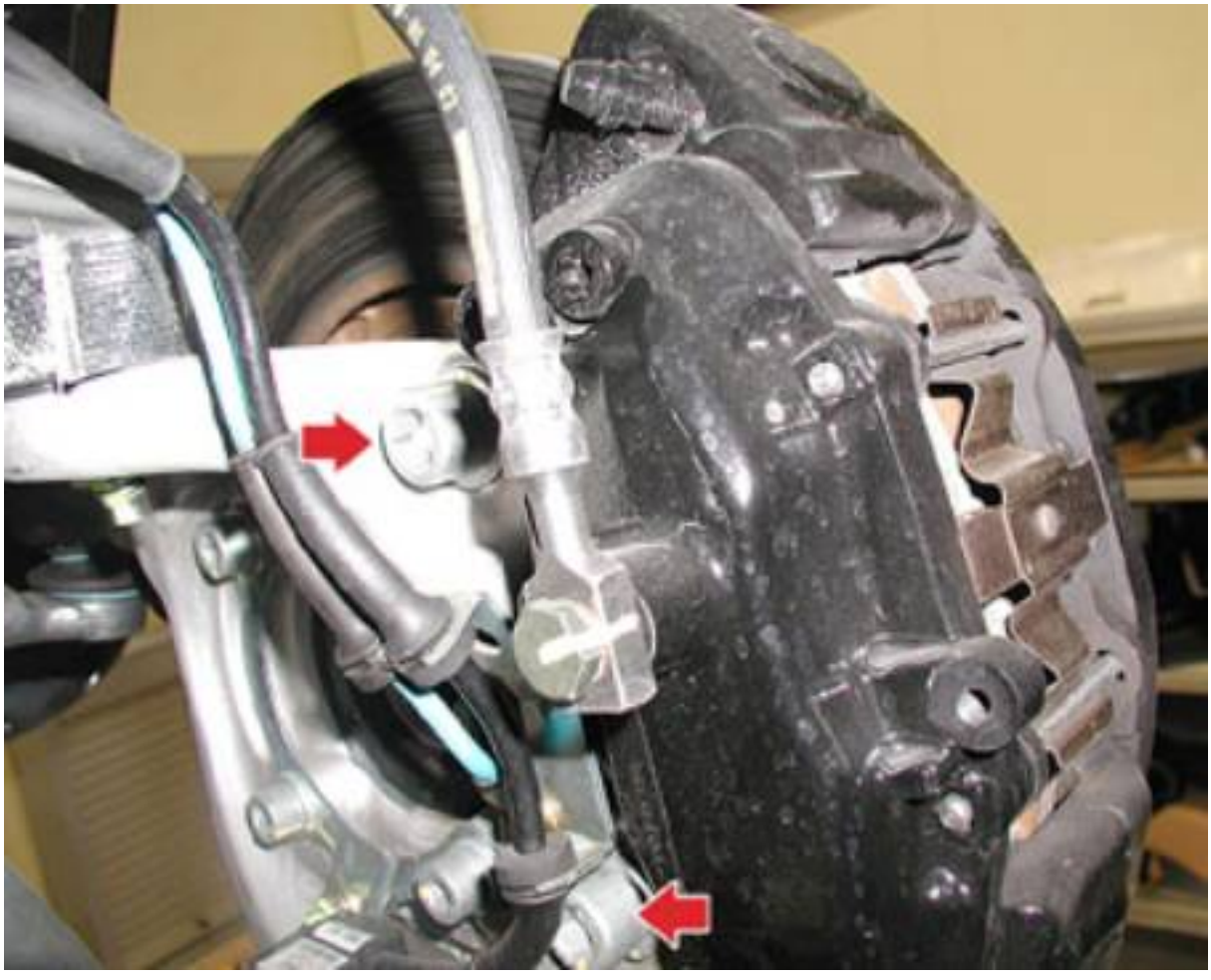
Refitting the front brake disk

N.B.
Check that the front brake disk's thickness is no less than 30mm and that the front brake disc is offcentered by no more than 0.05mm.

N.B.
The minimum disc thickness permissible is shown on the disc.

- Fit the brake disk and tighten the two fastening screws to a torque of **15.5Nm**.

- Position the brake calipers on the disk and tighten the front brake calipers hub carrier screws to a torque of **145Nm.**



- Fasten the electrical wiring and the oil line to the bracket on the upper wishbone.

- Fit the relative wheel (carry out the refitting operations only).

Replacing the wheels

BLEEDING THE FRONT BRAKES

important
Bleed the air from the front braking circuit every time the brake fluid hose is disconnected from the front calipers, the brake master cylinder or the ABS electro-hydraulic control unit or when brake malfunction due to air in the circuit is detected.

CAUTION
Any air contained in the hydraulic circuit acts as a "cushion", absorbing a high percentage of the pressure exerted by the brake master cylinder and reducing braking efficiency. The presence of air is revealed by "sponginess" of the brake pedal and a reduction of braking efficiency.

- Remove the front and rear wheels.

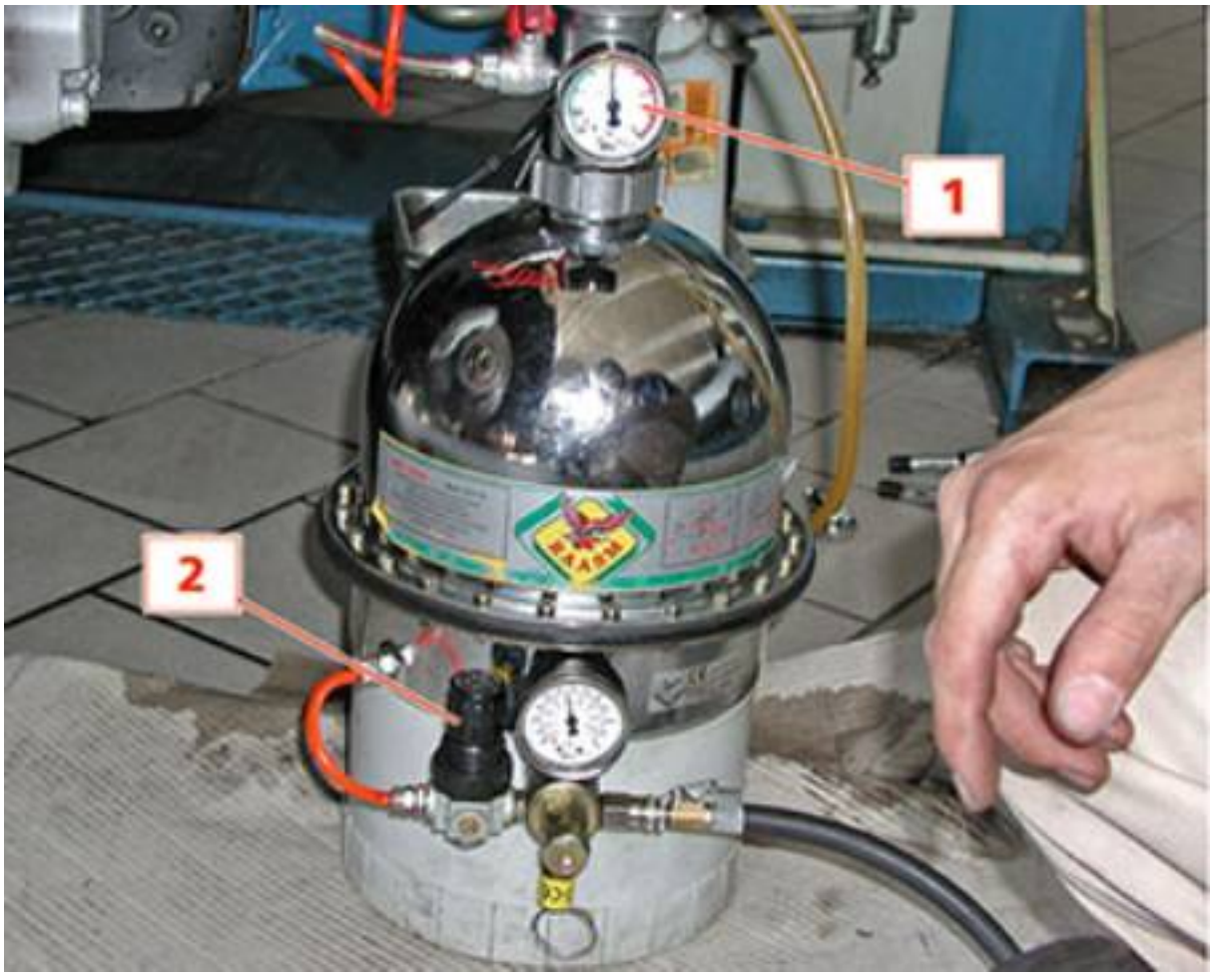
Replacing the wheels

- To hold the circuit under pressure during the bleeding operation and to ensure a continuous flow of oil into the pipes, a commercially available tool similar or with the same characteristics as the one shown in the figure must be used.

- Check that the oil tank of the tool contains the quantity of oil recommended by the manufacturer. If the quantity is not sufficient, add the required amount, remembering to ALWAYS release any residual pressure inside the tool.

- Connect the system pressurisation tool to the brake fluid pan. Position the brake fluid recovery tank provided with the tool next to the pan.

- Inject pressurised air until the pressure gauge **(1)** indicates **2 bar**. Adjust the overall tool pressure with the knob **(2)**.

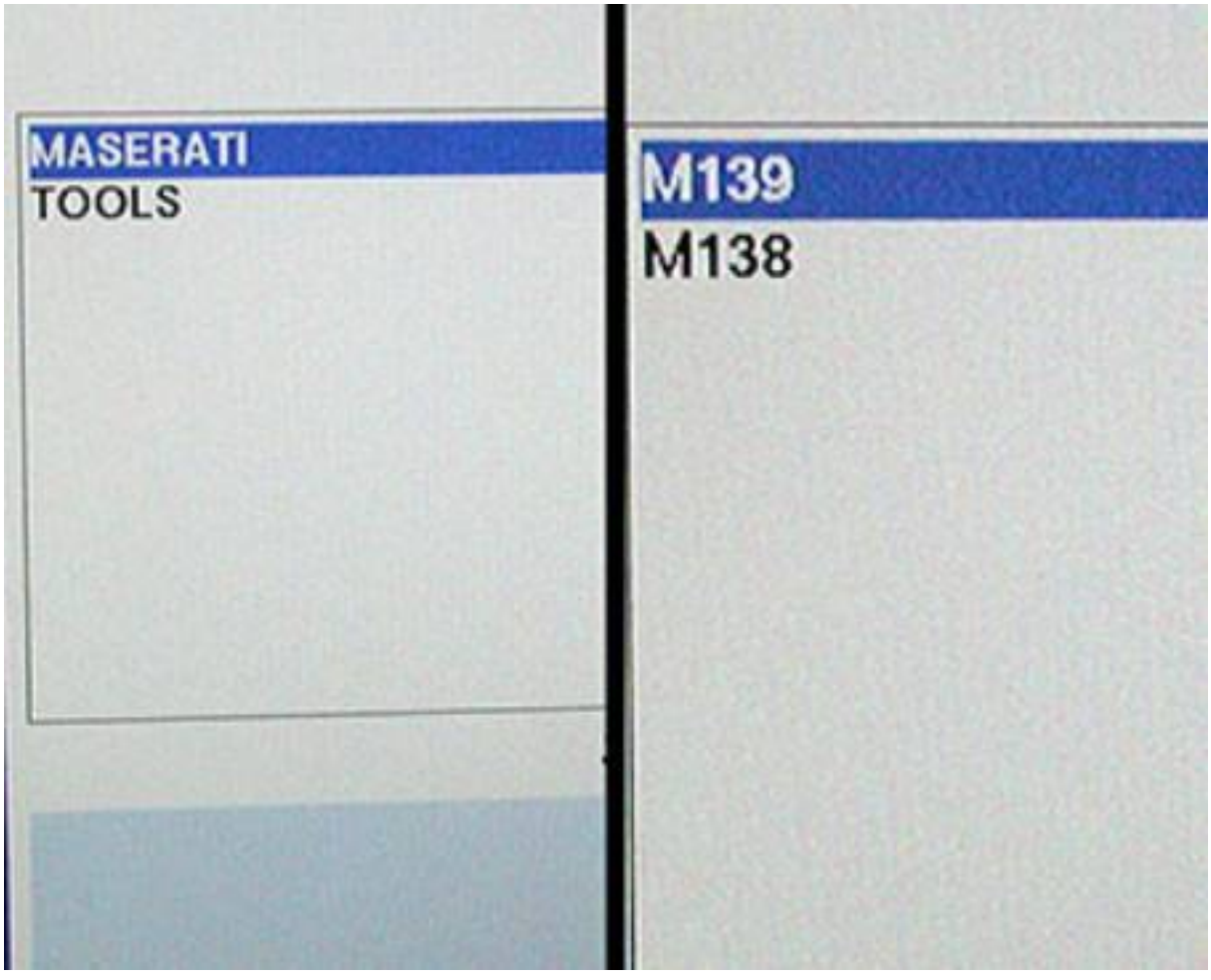


- When the pressure has been adjusted, turn the tool lever to the indicated position.
- With the lever in this position the oil circuit is under pressure; turning it 90° anticlockwise, the pressure is released from the system.

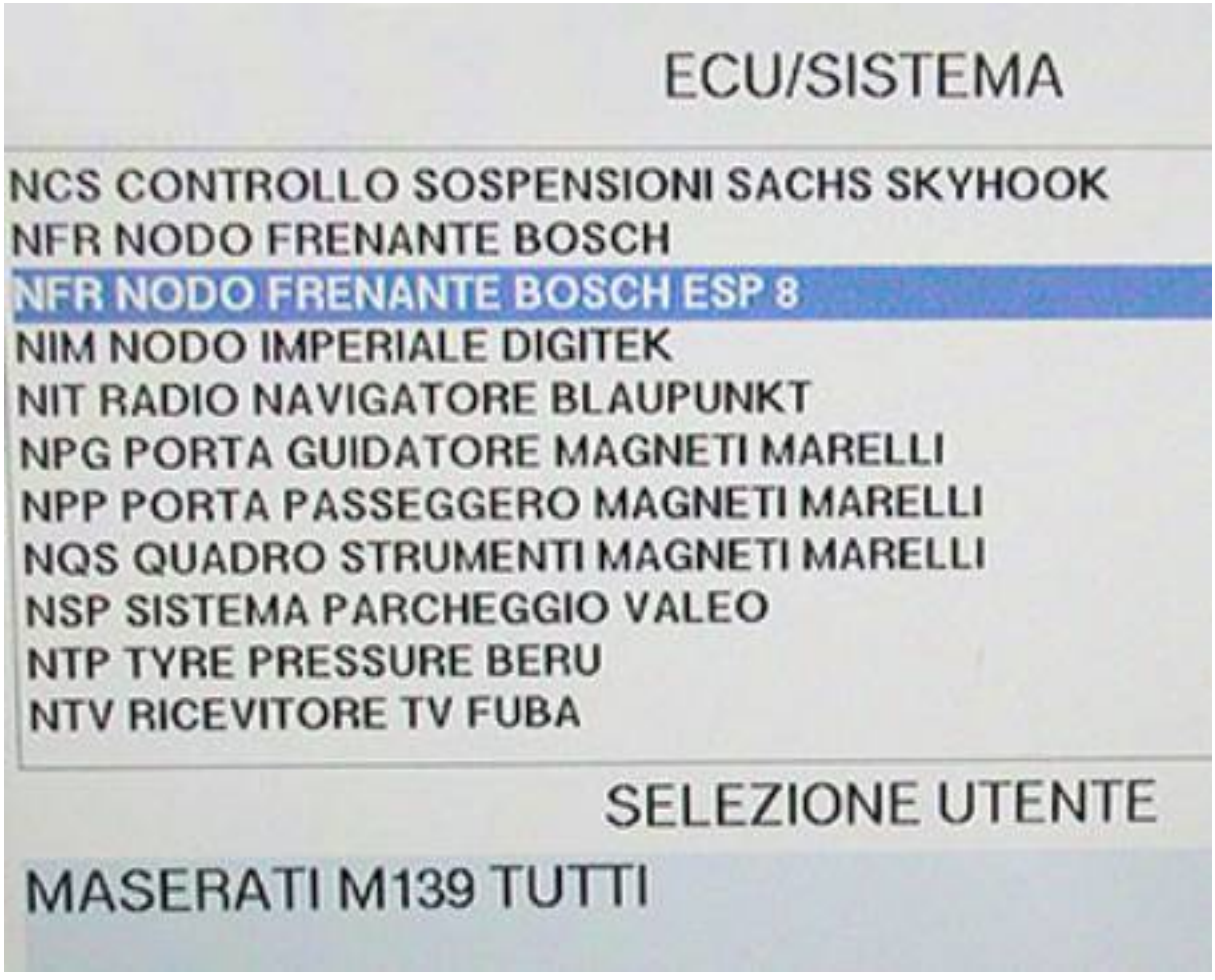
- Connect the SD3 diagnostic tester and start the **DIAGNOSTIC** procedure.

- Select **SERIAL DIAGNOSTICS**.

- Select **MASERATI** and then the model **M139**



- For vehicles up to serial number **24274**, select **NFR BOSCH BRAKING NODE**
- For vehicles from serial number **24275**, select **NFR BOSCH ESP 8 BRAKING NODE**



- Follow the guided procedure and select the **BLEEDING** operation.

- Follow the SD3 guided procedure, which will prompt you to start opening the caliper bleeders and to collect the oil in a suitable container, in the sequence described below.
- For vehicles up to serial number **24274**, the sequence is as follows:

- Internal bleeding of the right-hand rear caliper
- External bleeding of the right-hand rear caliper
- Internal bleeding of the left-hand rear caliper
- External bleeding of the left-hand rear caliper
- Internal bleeding of the right-hand front caliper
- External bleeding of the right-hand front caliper
- Internal bleeding of the left-hand front caliper
- External bleeding of the left-hand front caliper

- For vehicles up to serial number **24275**, the sequence is as follows:

- Internal bleeding of the left-hand rear caliper
- External bleeding of the left-hand rear caliper
- Internal bleeding of the left-hand front caliper
- External bleeding of the left-hand front caliper
- Internal bleeding of the right-hand front caliper
- External bleeding of the right-hand front caliper
- Internal bleeding of the right-hand rear caliper
- External bleeding of the right-hand rear caliper

- Access the bleed valves of the front brake calipers.
- Connect a small pipe and a container to them.

- Carefully and completely run the bleeding cycle until the end-of-cycle screen appears on the SD3 tester.
- Check that the brake pedal travel is correct.
- If the pedal travel is incorrect, repeat the bleeding cycle.
- Briefly road test the vehicle to check proper functioning of the braking system.

N.B.
Do not re-use the old brake fluid. Refill with new brake fluid.

FRONT ABS SENSORS

Removing-refitting the front ABS sensors

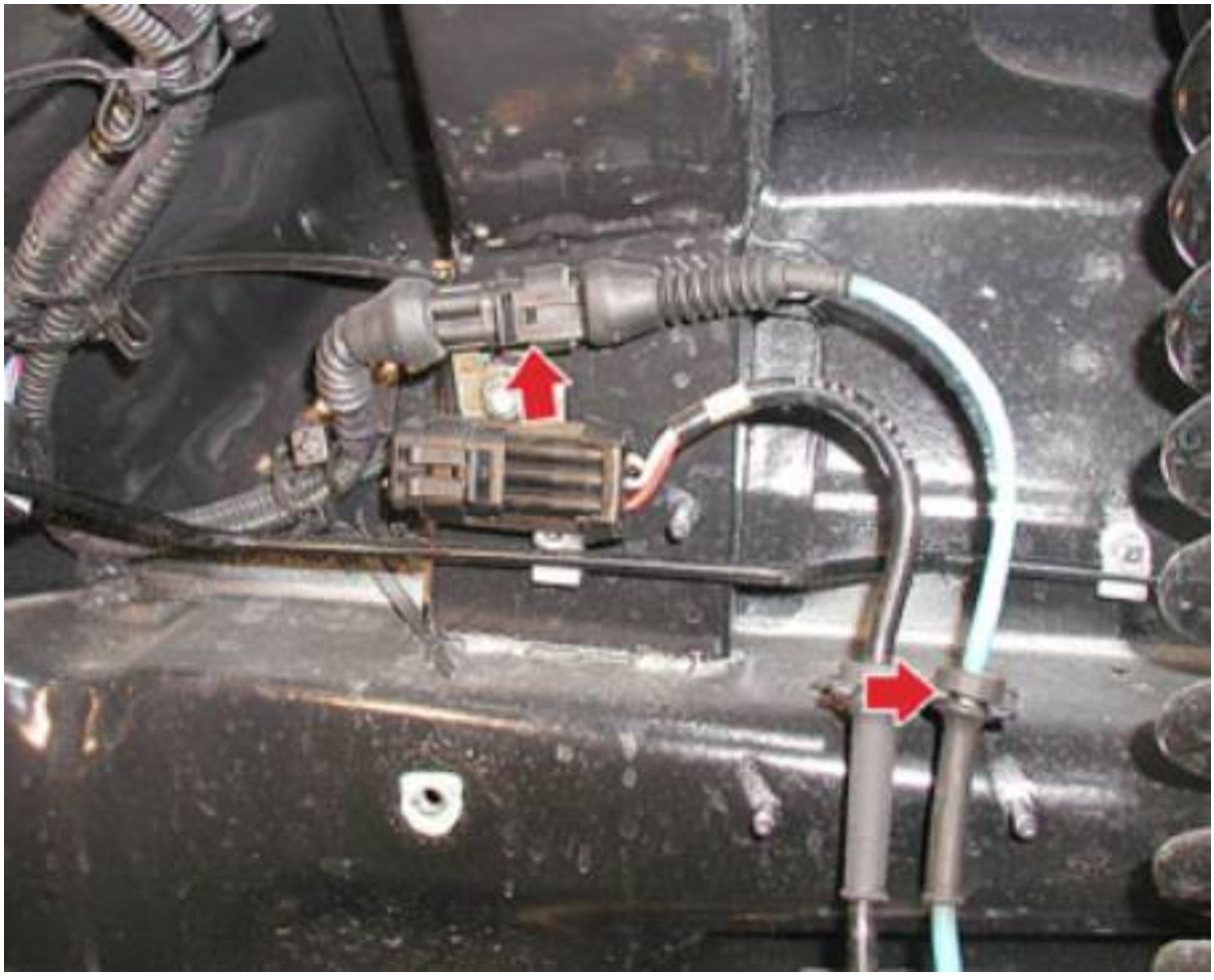
- Disconnect the battery's negative terminal.
- Remove the relative wheel.

Replacing the wheels

- Undo the lower fastening screws on the wheel bay dust-protection shield.

Unscrew the six fastening screws, and remove the five snap-fit buttons, then remove the wheel bay dust-protection shield.

- Detach the ABS rpm sensor’s electrical connection and release the wiring from its fastening on the bodywork.



- Release the electrical wiring and the oil line from the fastening on the upper wishbone.

- Remove the relative front brake disk.

Front brake disk

- Undo the screws fastening the wheel hub to the pillar.

- Remove the front wheel hub, complete with bearing and ABS rpm sensor.

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

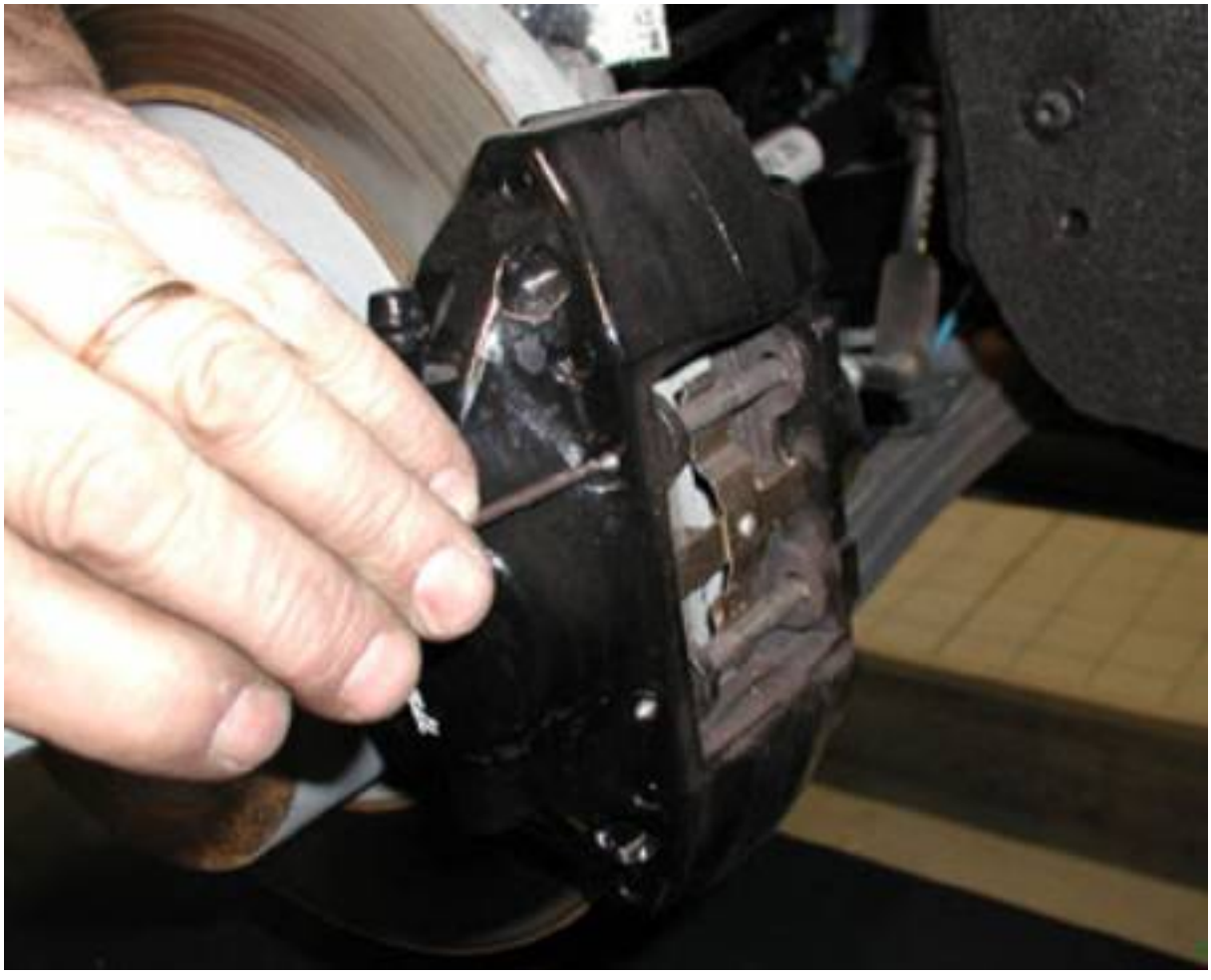
REAR BRAKE PADS

Removing/refitting the rear brake linings up to serial number 27859

- Remove the rear left-hand wheel concerned.

Replacing the wheels

- Insert a punch in the upper hole on the calipers and press until the brake pad retaining pin slides out of its seat



- Using the same punch, insert it in the upper hole on the calipers and press until the brake pad retaining pin slides out of its seat

- Remove the two upper and lower pins, in addition to the retaining clips on the brake pads.

- Remove the brake pads from the seat on the calipers.
- Proceed in the same way for the brake pads fitted on the other brake calipers.

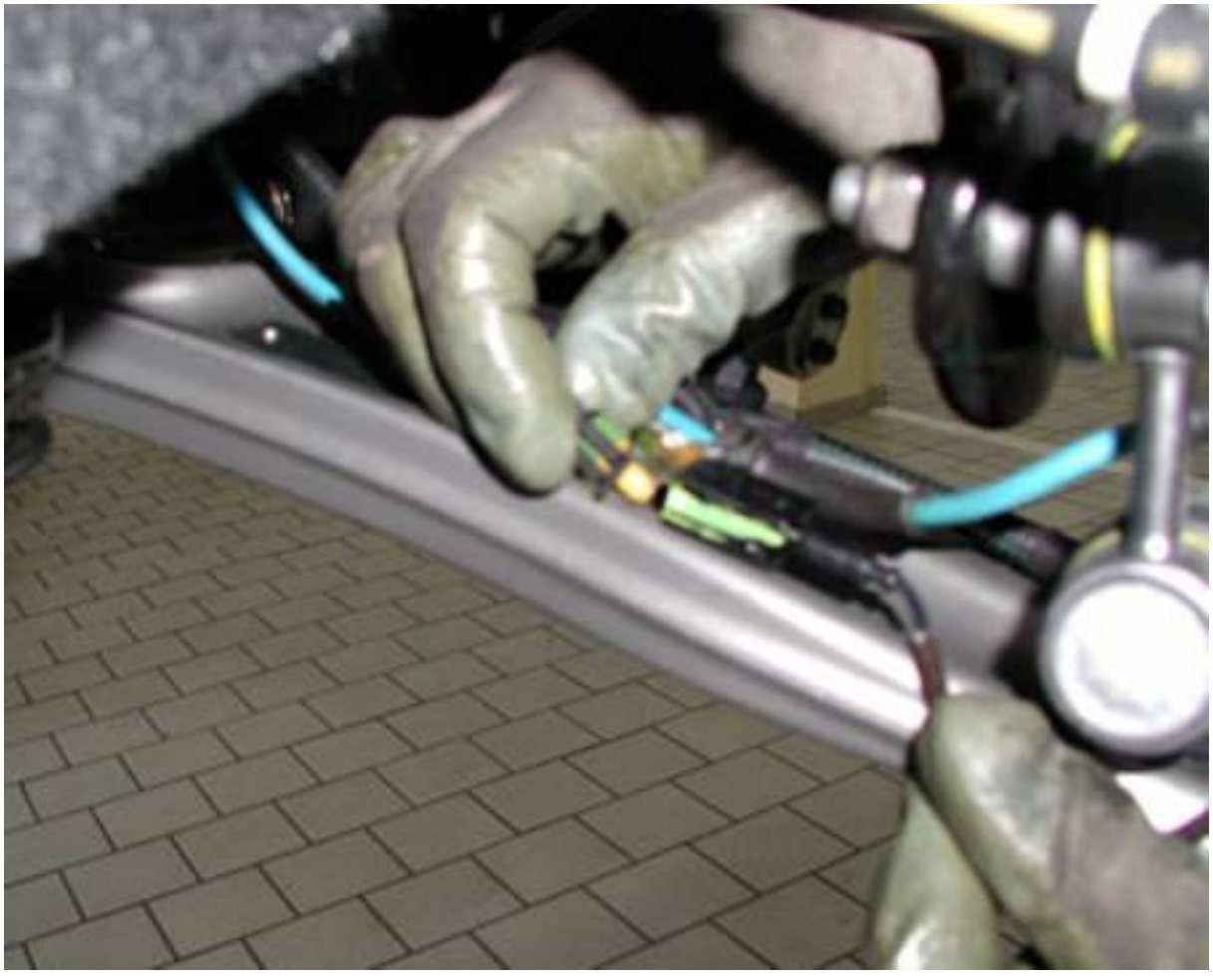
When refitting, follow the above procedures in reverse order

Removing/refitting the rear brake linings from serial number 27860

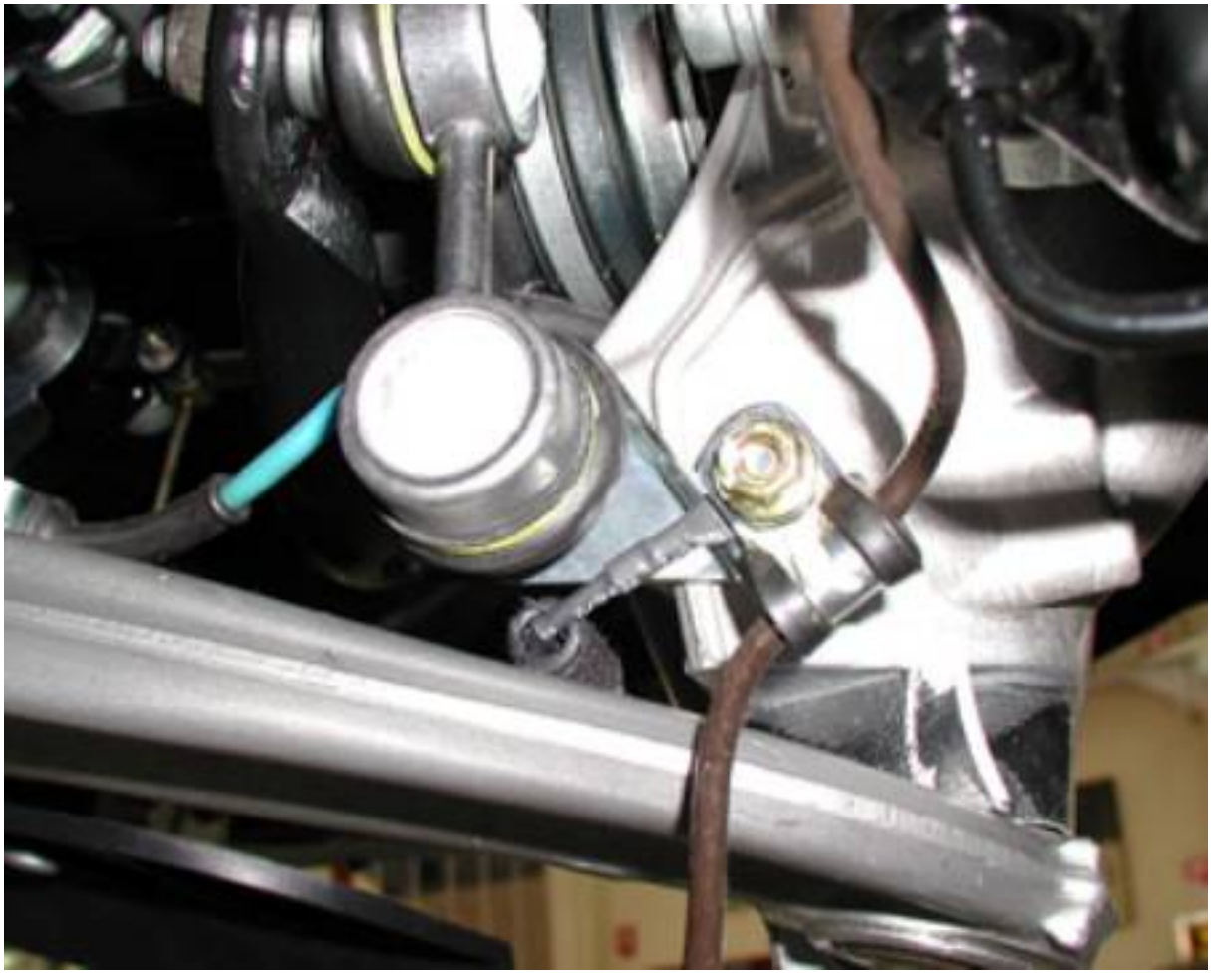
- Remove the rear left-hand wheel concerned.

Replacing the wheels

- Detach the electrical connector for the rear brake pad wear sensor.

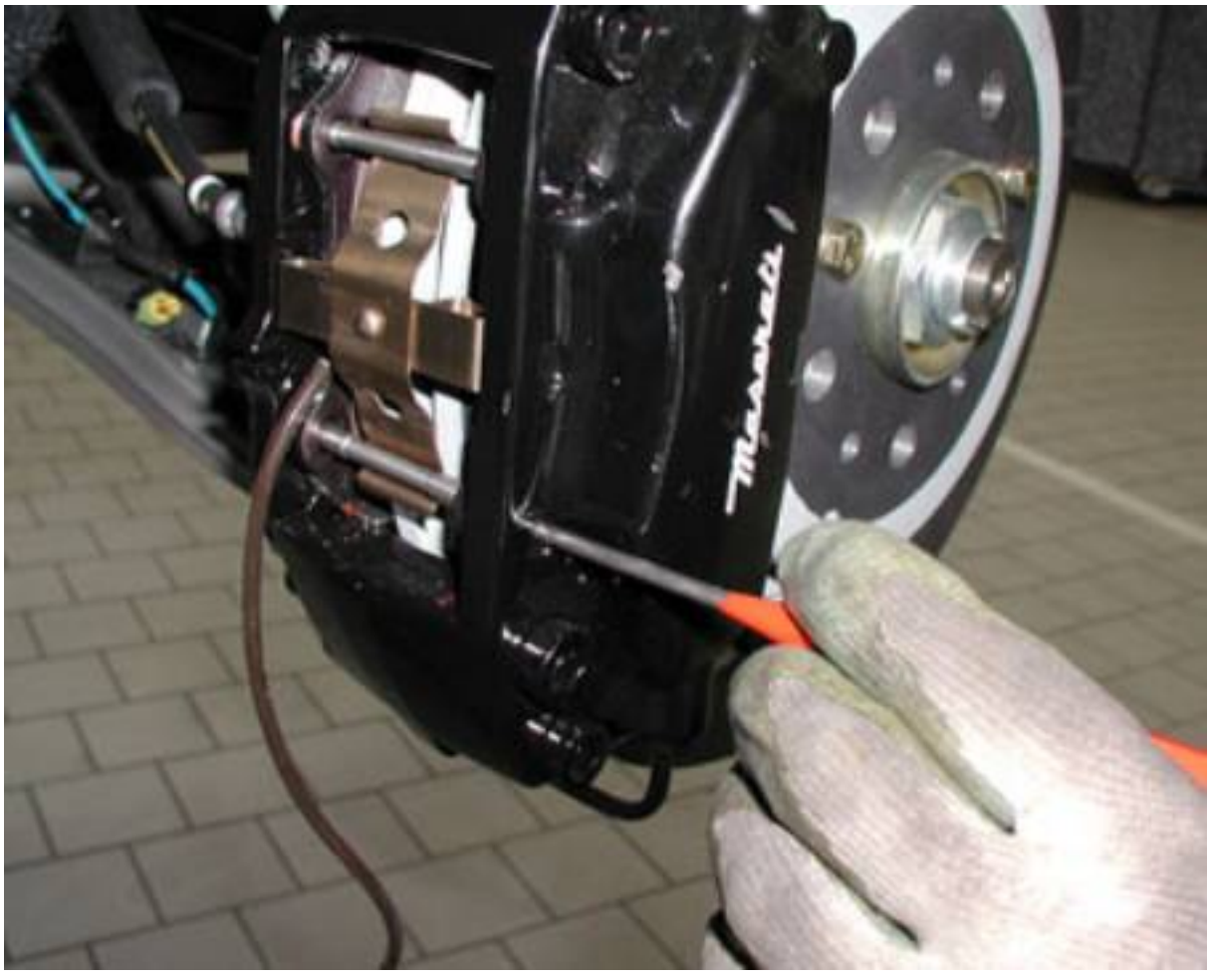


- Unscrew the nut that fastens the wear sensor cable clamp.



- Insert a punch in the upper hole on the calipers and press until the brake pad retaining pin slides out of its seat

- Using the same punch, insert it in the upper hole on the calipers and press until the brake pad retaining pin slides out of its seat
- Remove the two upper and lower pins, in addition to the retaining clips on the brake linings.



- Remove the brake linings from their seat on the caliper.
- Proceed in the same way for the brake linings fitted on the other brake caliper.
- Remember that the rear brake pad wear sensor is fitted only on the rear left-hand caliper.

When refitting, follow the above procedures in reverse order

Rear BRAKE CALIPERS

Removing the rear brake caliper up to serial number 27859

- Remove the rear left-hand wheel concerned.

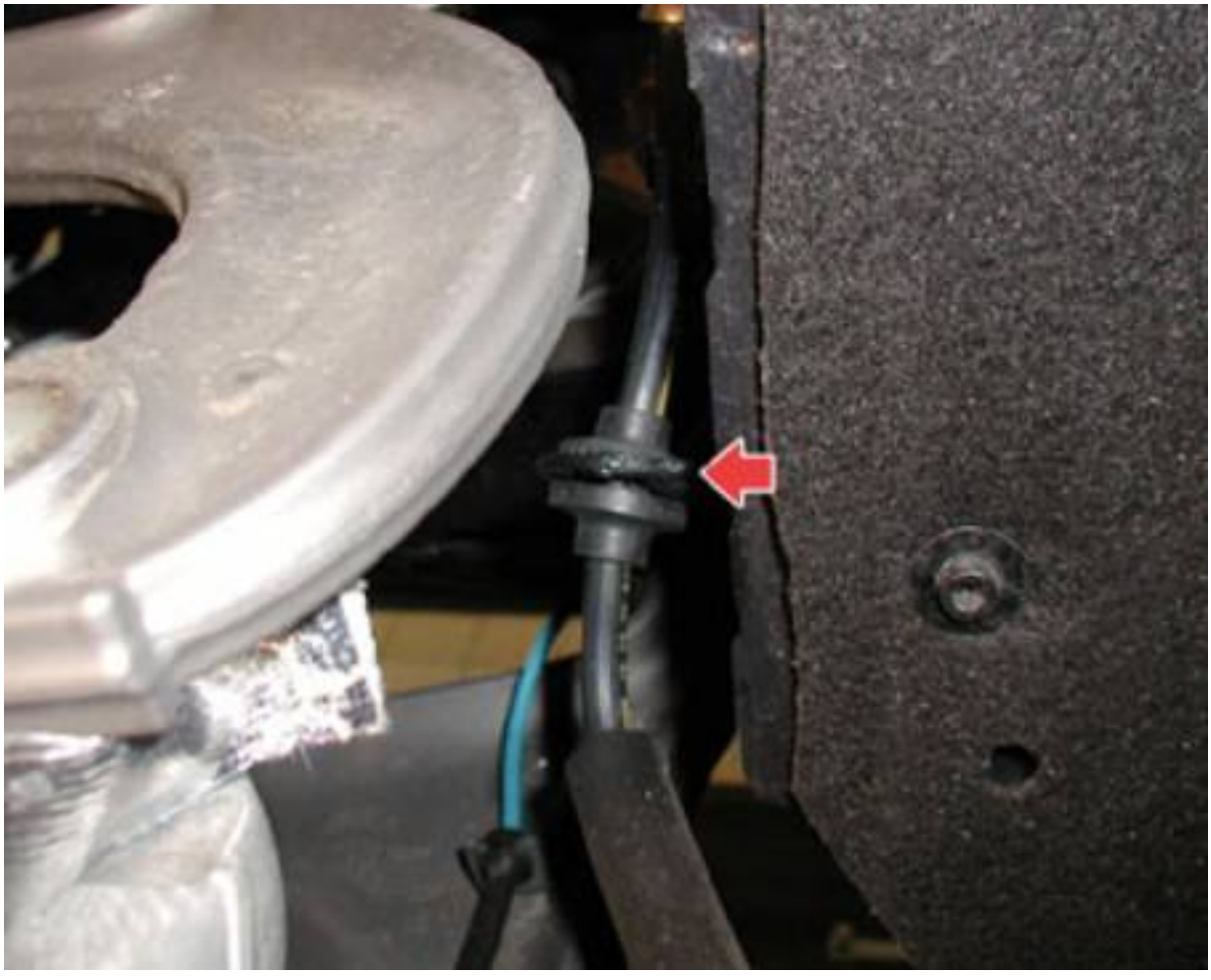
Replacing the wheels

- Undo the union and disconnect the brake oil hose from the rigid section of the line.

N.B.

Insert a specific rubber stopper into the brake fluid hose to prevent fluid leakages.

- Release the brake oil hose from the snap-fastener located on the chassis.



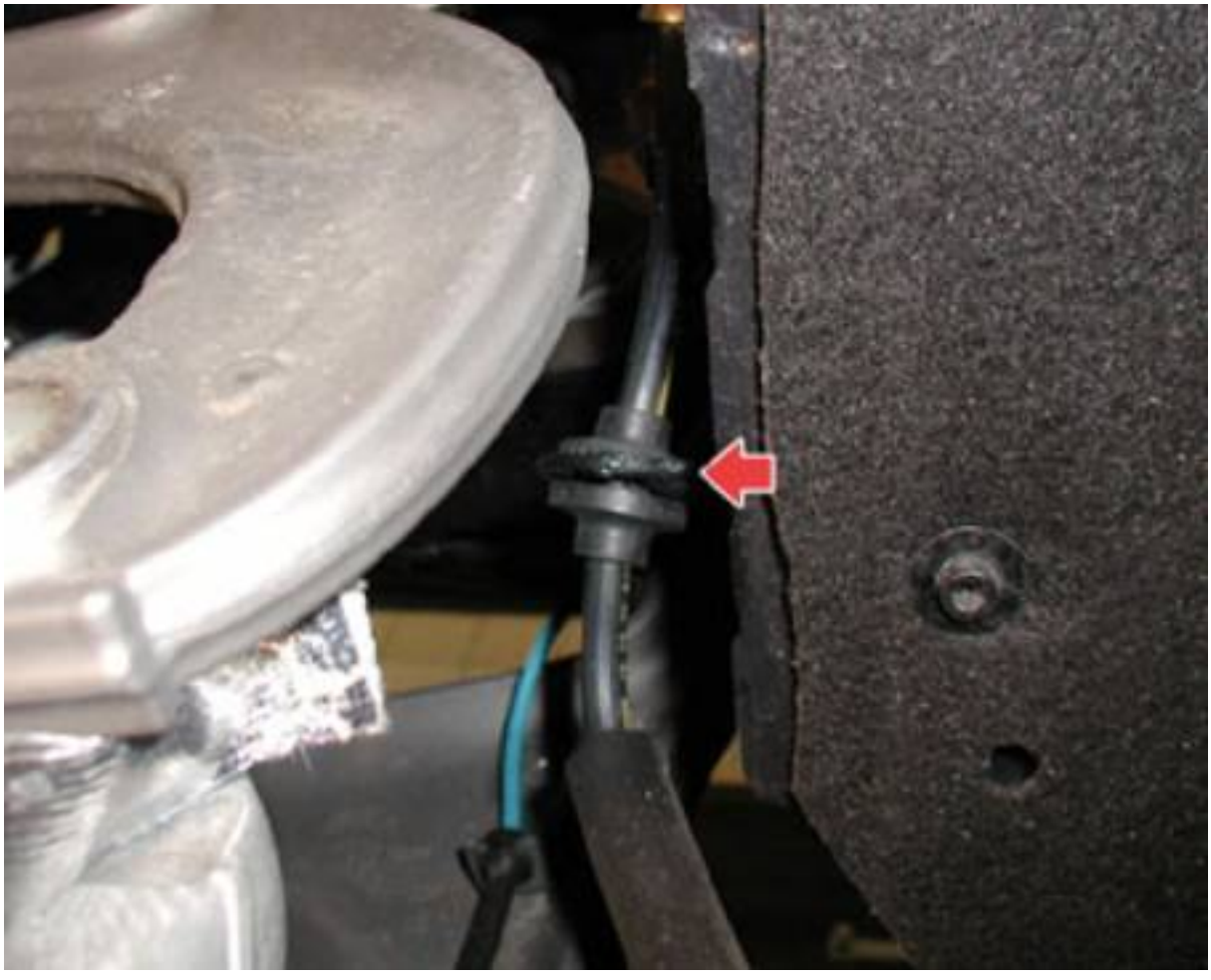
- Undo the two fastening screws on the brake calipers and remove it.

Refitting the rear brake caliper up to serial number 27859

- Move the small piston on the caliper away manually to facilitate fitting the calipers.
- Position the brake calipers on the disc and tighten the brake caliper fastening screws to a torque of **60Nm**.

- Tighten the union between the brake oil hose and the rigid section of the line to a torque of **18.5 Nm**

- Fasten the brake oil hose to the chassis.



- Bleed the air in the rear brake fluid circuit.

Bleeding the air in the rear brake fluid circuit

- Fit the rear wheel concerned.

Replacing the wheels

Removing the rear brake caliper from serial number 27860

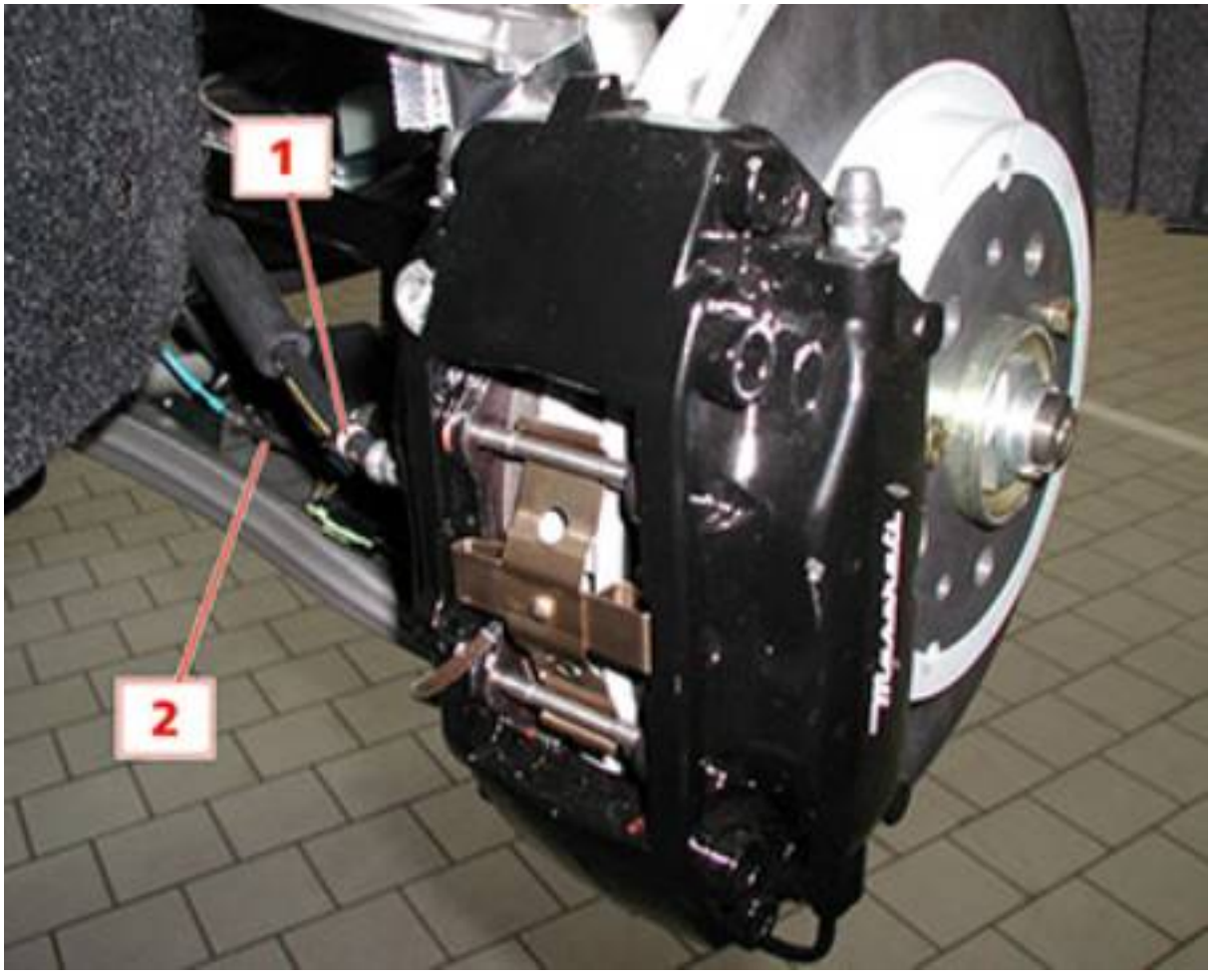
- Remove the rear left-hand wheel concerned.

Replacing the wheels

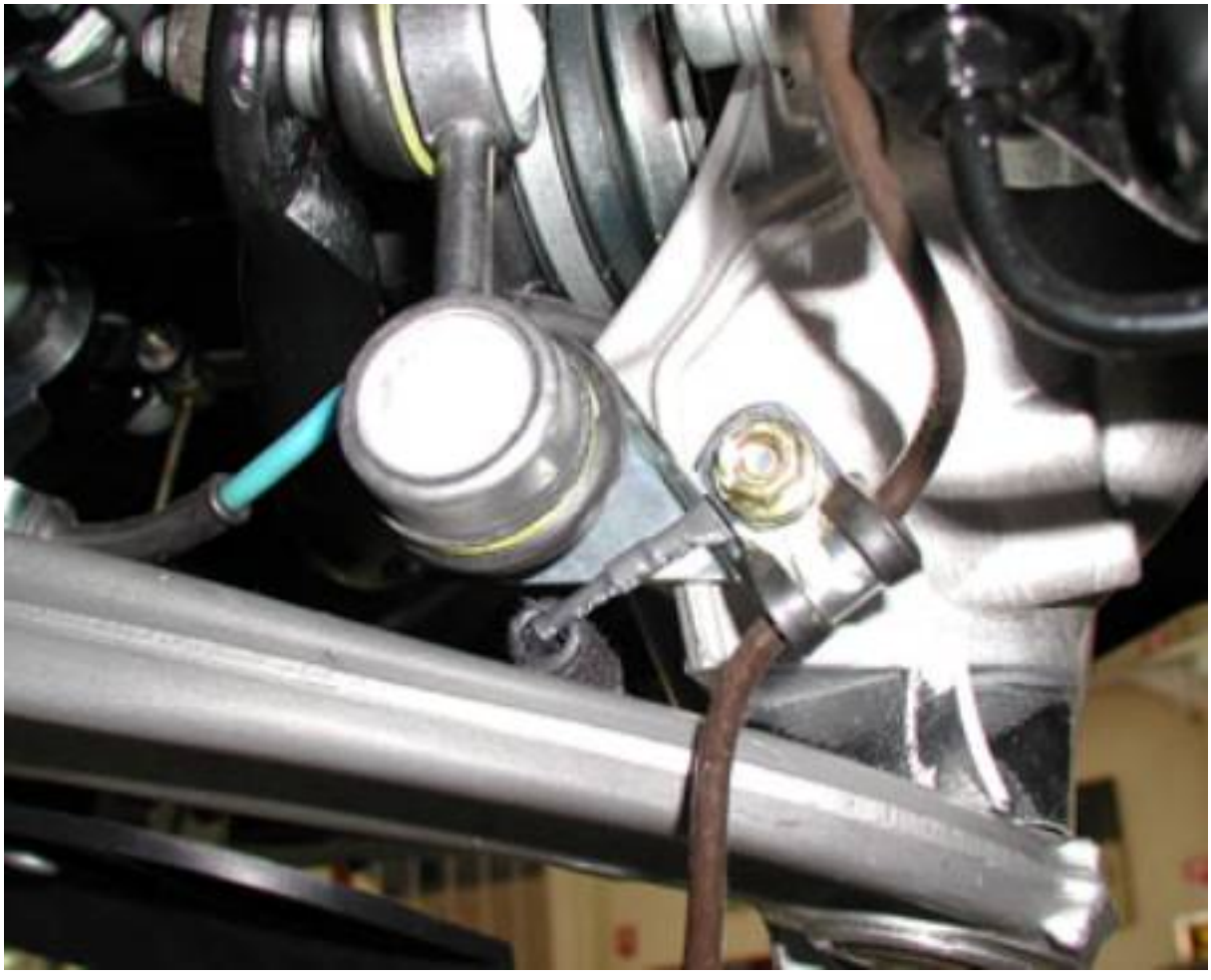
- Undo the union and disconnect the brake oil hose **(1)** of the caliper

N.B.
Insert a specific rubber cap into the brake fluid hose to prevent fluid leakages.

- Detach the electrical connector **(2)** for the wear sensor positioned on the rear brake pad.

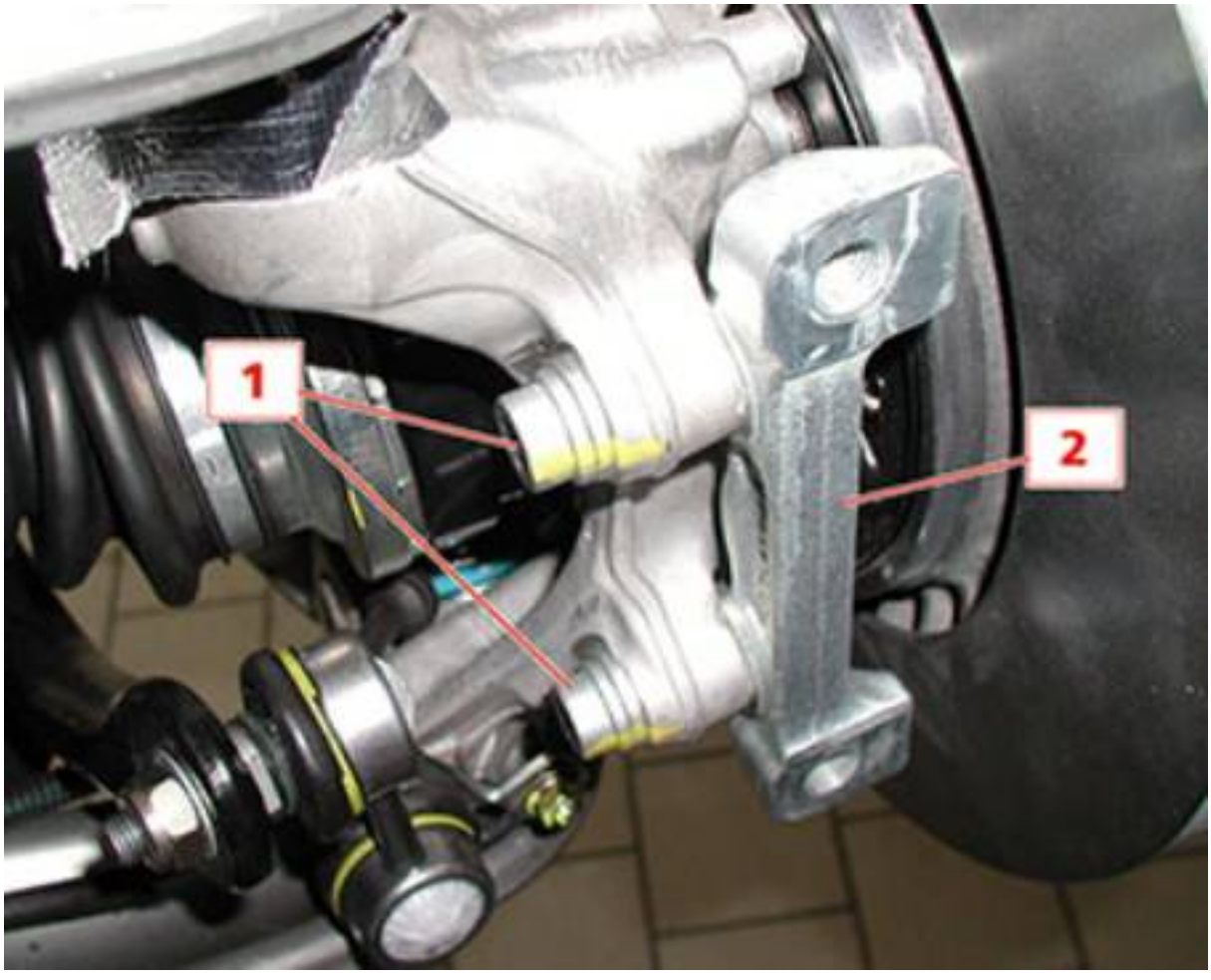


- Unscrew the nut that fastens the wear sensor cable clamp.



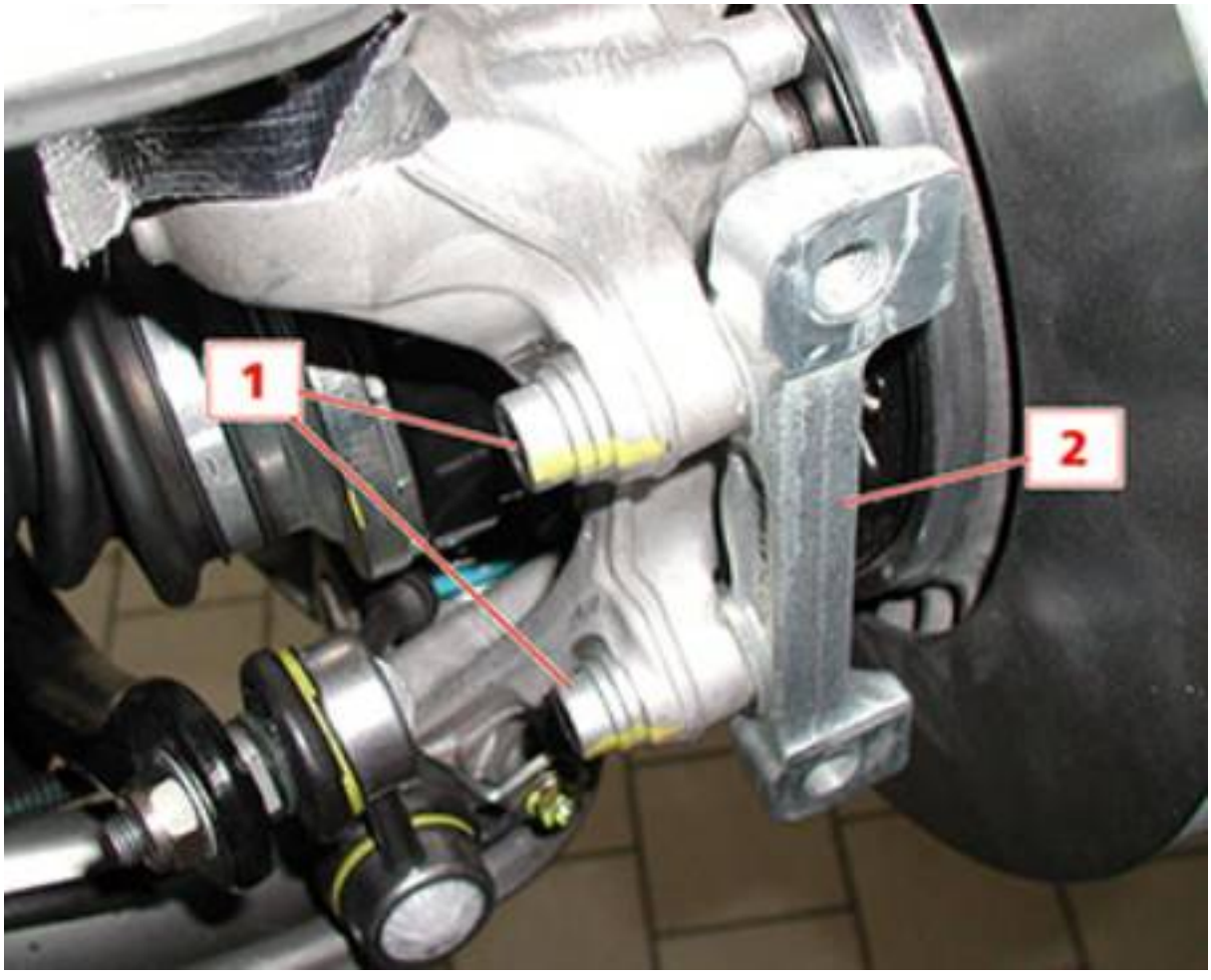
- Undo the two screws that secure the brake caliper to the support bracket and remove it from its seat.

- If necessary, undo the two retaining screws **(1)** and remove the brake caliper mounting bracket **(2)**.



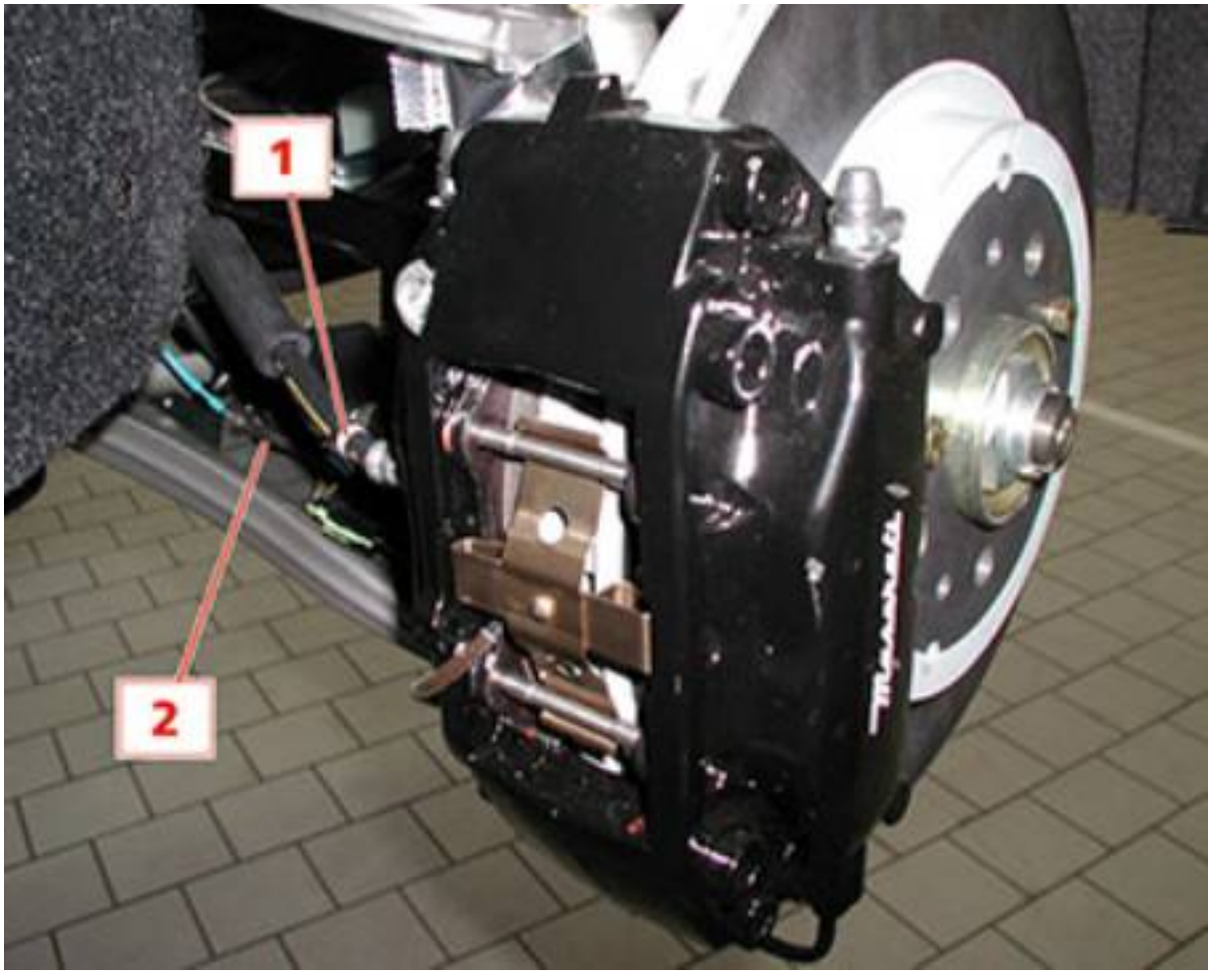
Refitting the rear brake caliper from serial number 27860

- If removed, fit the brake caliper bracket **(2)** and tighten the two retaining screws **(1)** to a torque of 65 Nm.



- Move the small piston on the caliper away manually to facilitate fitting the calipers.
- Position the brake calipers on the disc and tighten the brake caliper fastening screws to a torque of **125Nm**.

- Tighten the union of the brake fluid flexible hose **(1)** for the caliper.
- Attach the electrical connector **(2)** of the wear sensor positioned on the rear brake pad.



- Bleed the air in the rear brake fluid circuit.

Bleeding the rear brakes

- Fit the rear wheel concerned.

Replacing the wheels

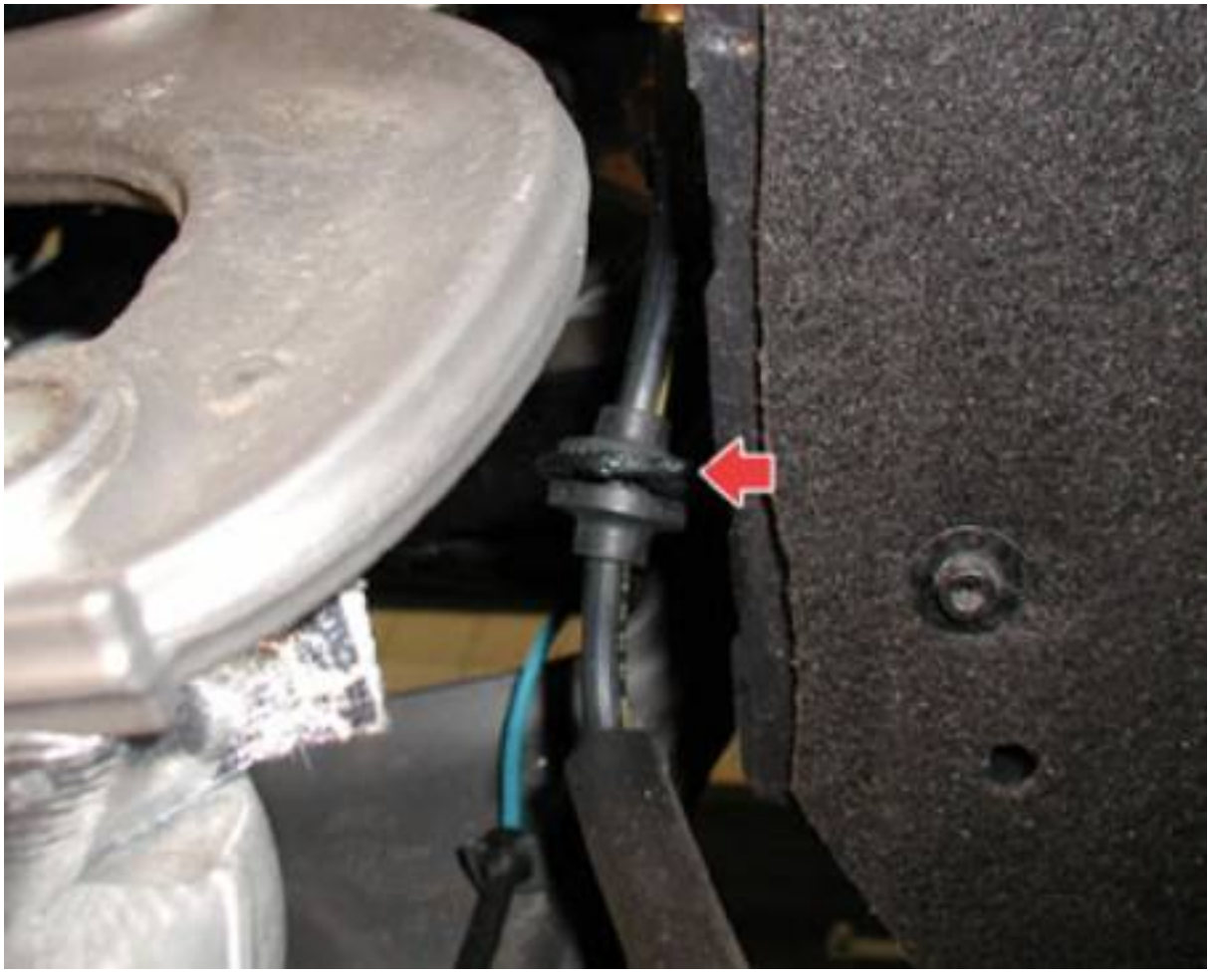
REAR BRAKE DISC

Removing the rear brake disc

- Remove the wheel concerned.

Replacing the wheels

- Release the brake oil hose from the snap-fastener located on the chassis.

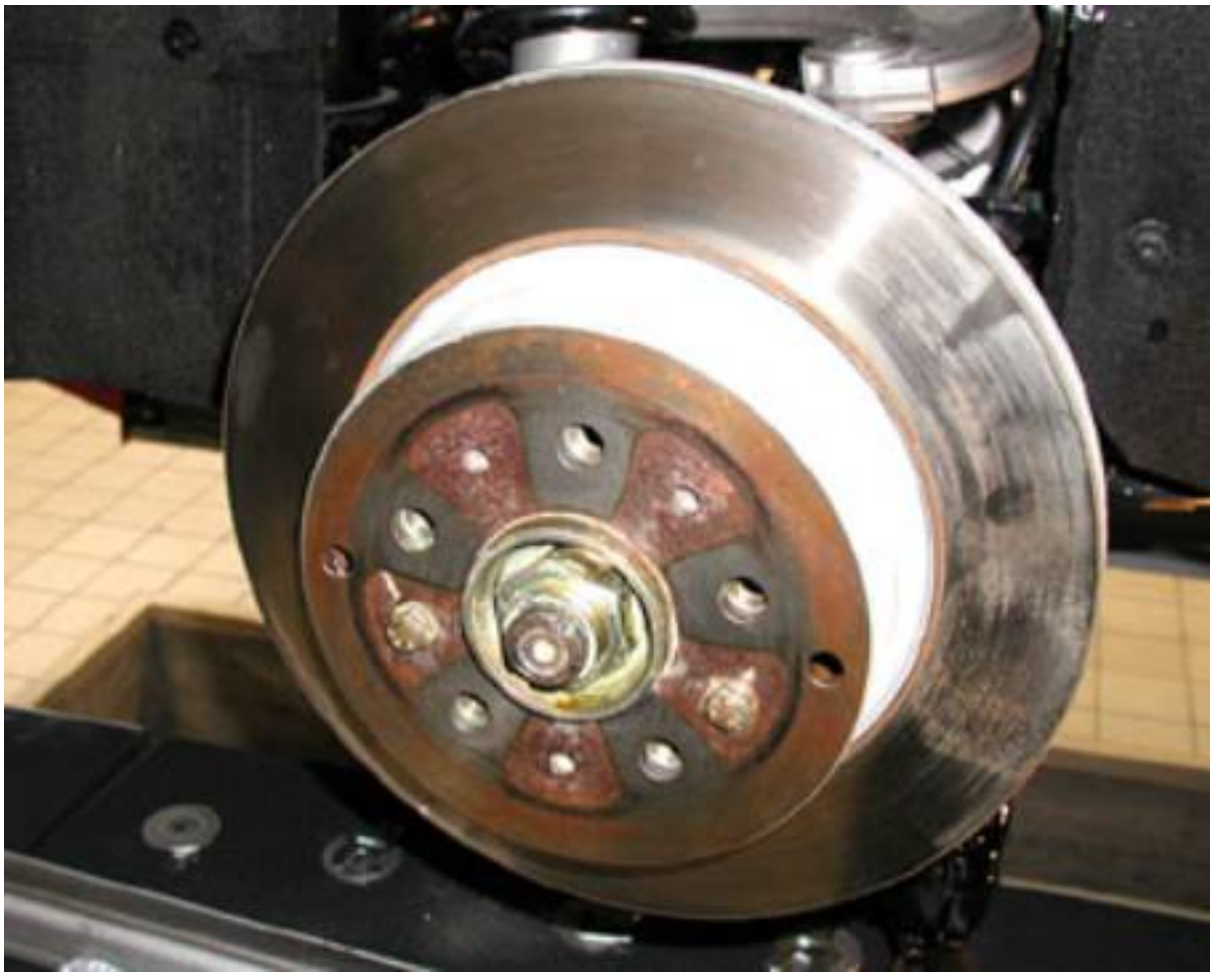


For vehicles up to serial number 27859

- Undo the two fastening screws on the brake calipers, remove the disc from its seat and secure it so that it cannot damage the hose.

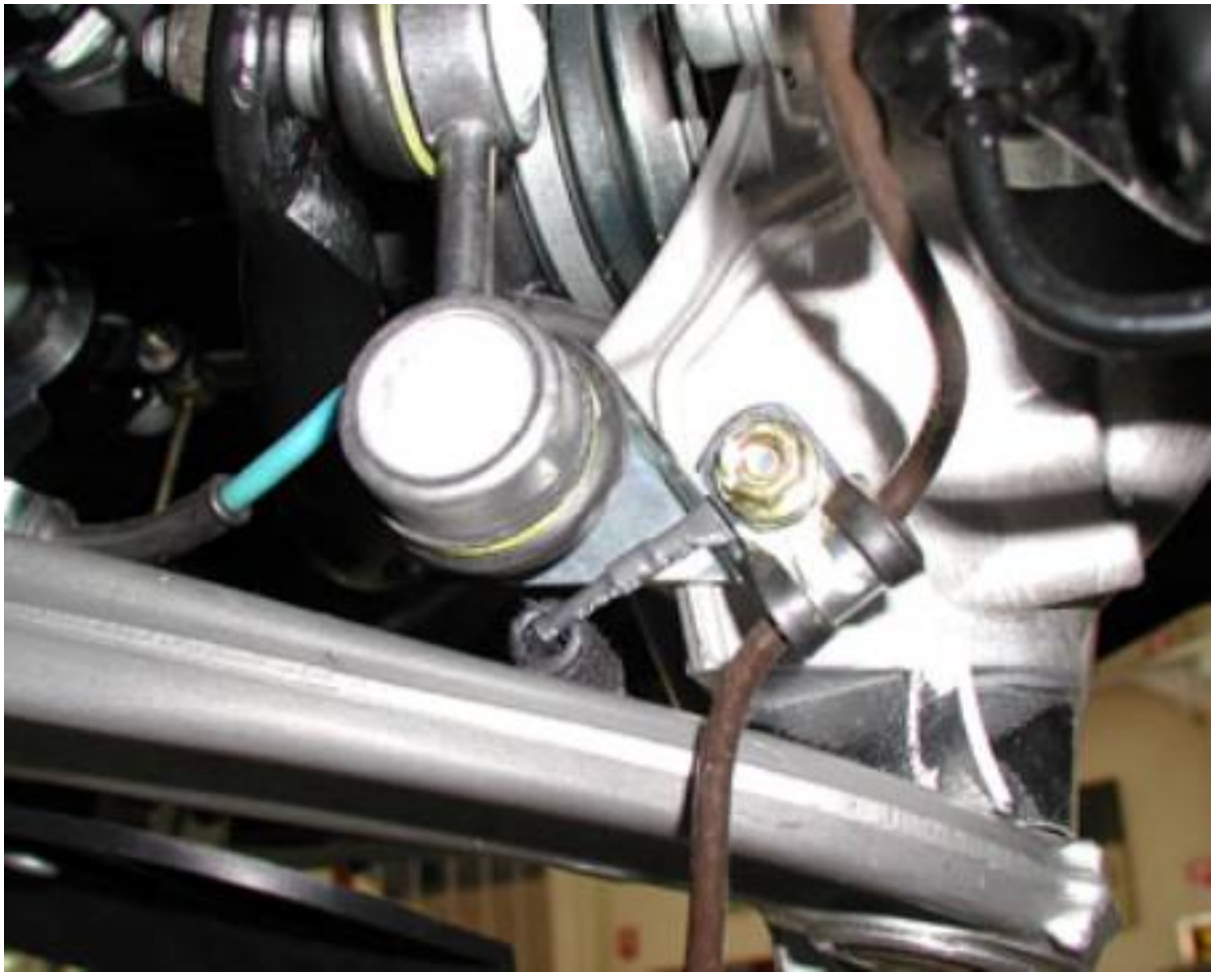
For vehicles up to serial number 27859

- Unscrew the two brake disc fastening screws and remove the disc.



For vehicles from serial number 27860

- Unscrew the nut that fastens the wear sensor cable clamp.



For vehicles from serial number 27860

- Undo the two screws that secure the brake caliper to the support bracket and remove it from its seat.

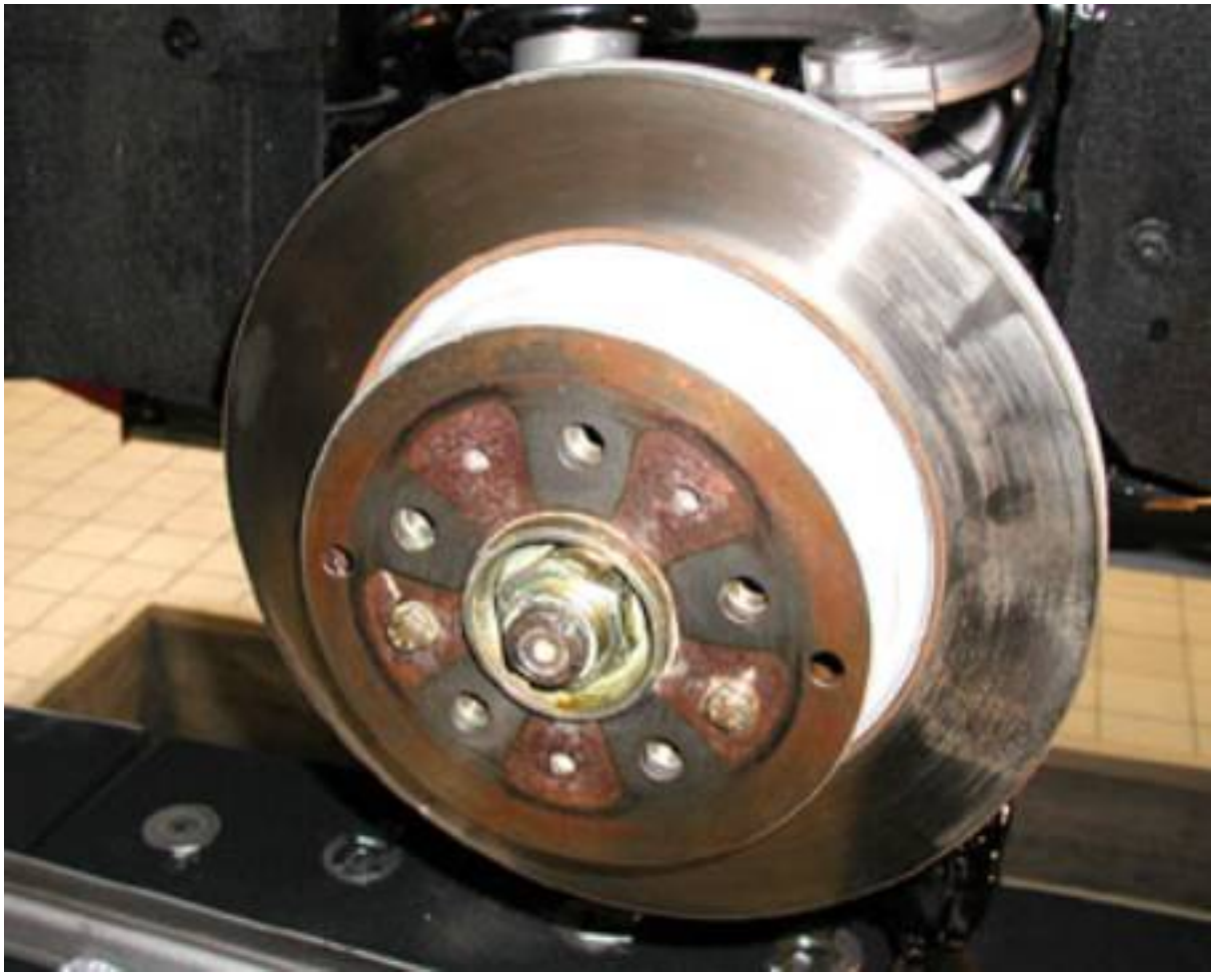
For vehicles from serial number 27860

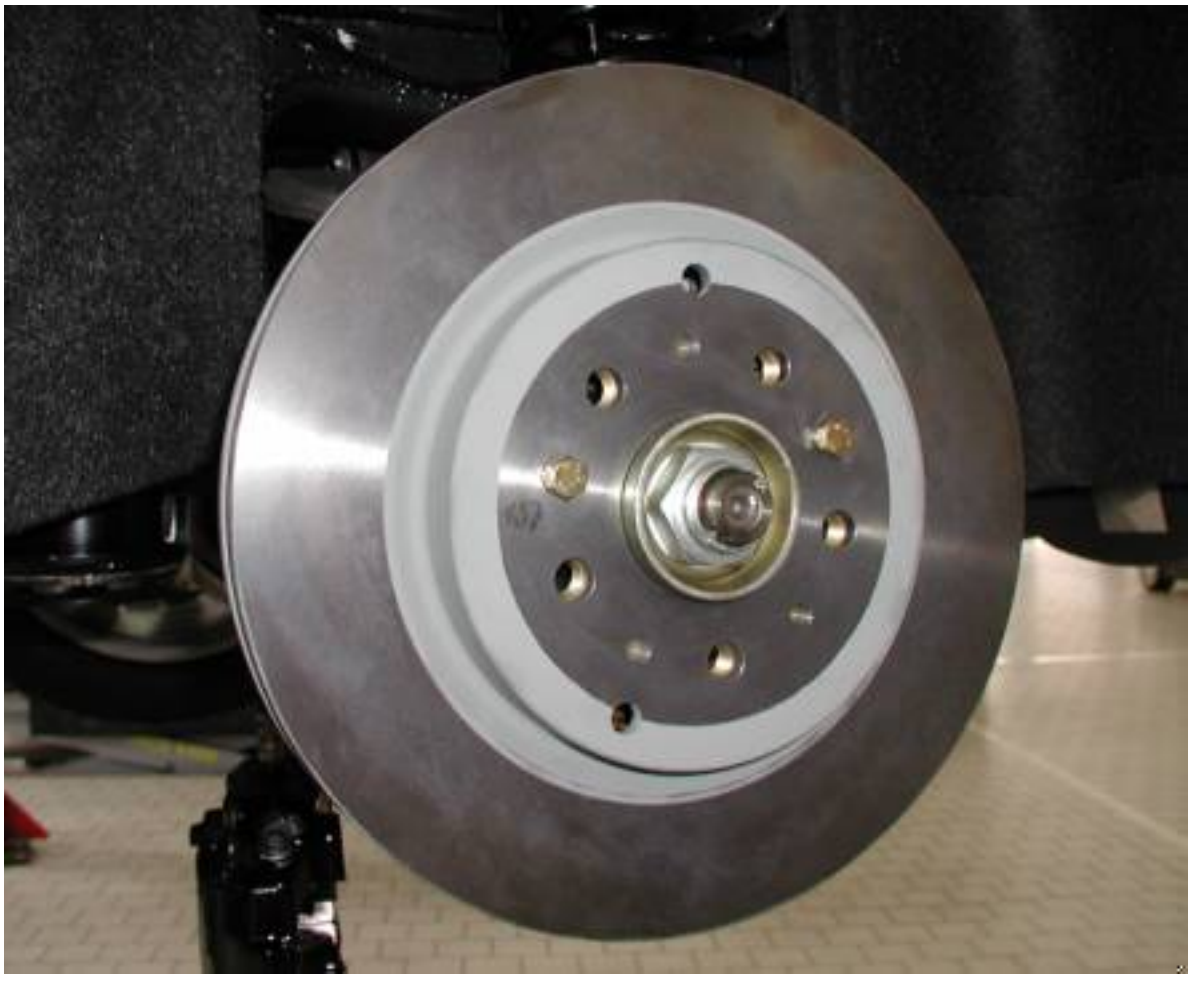
- Unscrew the two brake disc fastening screws and remove the disc.

Refitting the rear brake disc

N.B.
Check that the thickness of the front brake disc is no less than 30mm and that the front brake disc is off-centred by no more than 0.05mm. The minimum disc thickness permissible is shown on the disc.

- Fit the brake disc **(regardless of the serial number of the vehicle)** and tighten the two retaining screws to a torque of **15 Nm**.





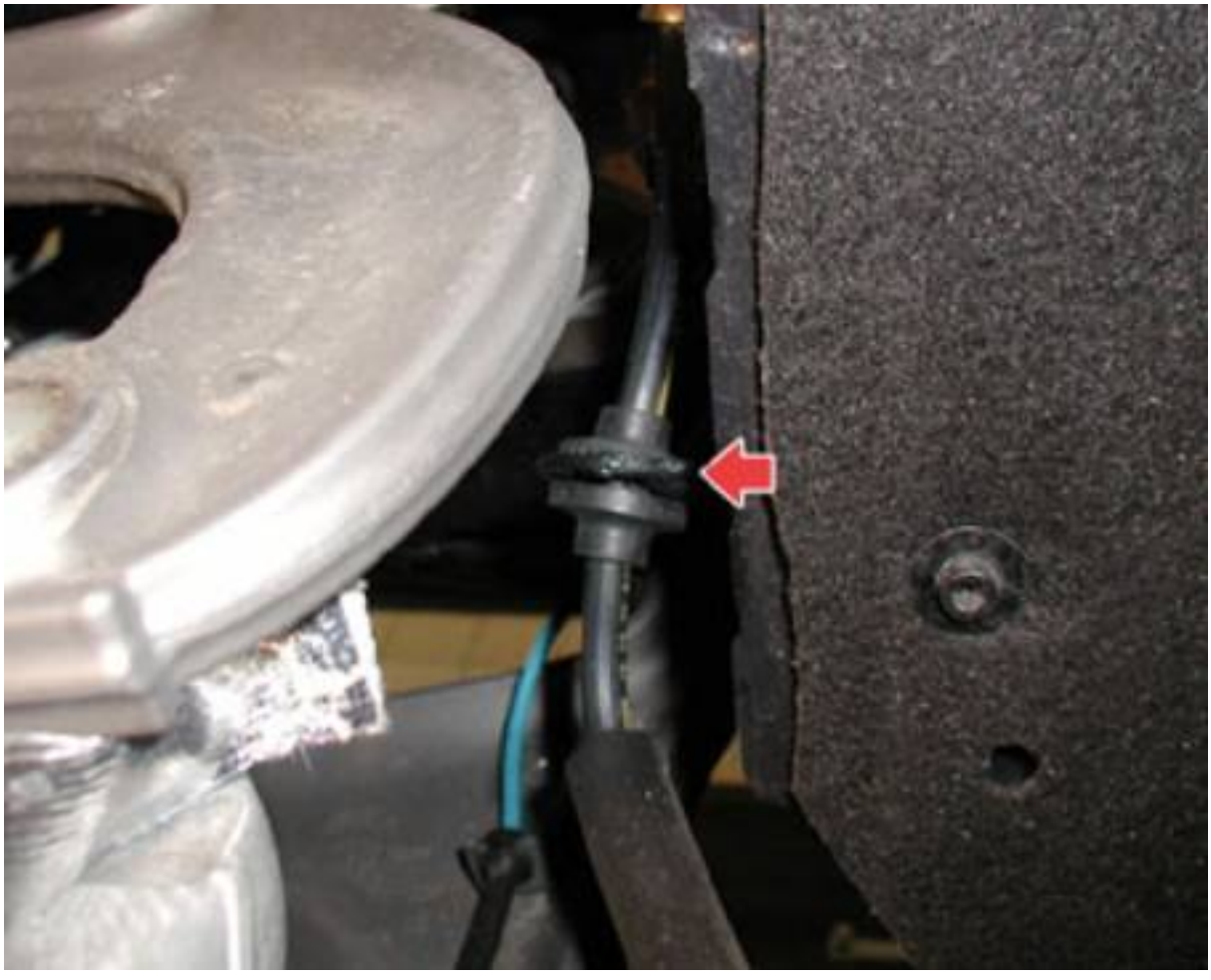
For vehicles up to serial number 27859

- Position the brake calipers on the disc and tighten the brake caliper fastening screws to a torque of **60Nm**.

For vehicles from serial number 27860

- Position the brake calipers on the disc and tighten the brake caliper fastening screws to a torque of **125 Nm**.

- Fasten the brake oil hose to the chassis.



- Fit the relative wheel (carry out the refitting operations only).

Replacing the wheels

BLEEDING THE AIR IN THE REAR BRAKE FLUID CIRCUIT

- The rear brake air bleeding procedure is performed together with the front brake bleeding procedure, therefore refer to the procedure described in the section of this manual relating to the front brakes.

Front brake air bleeding

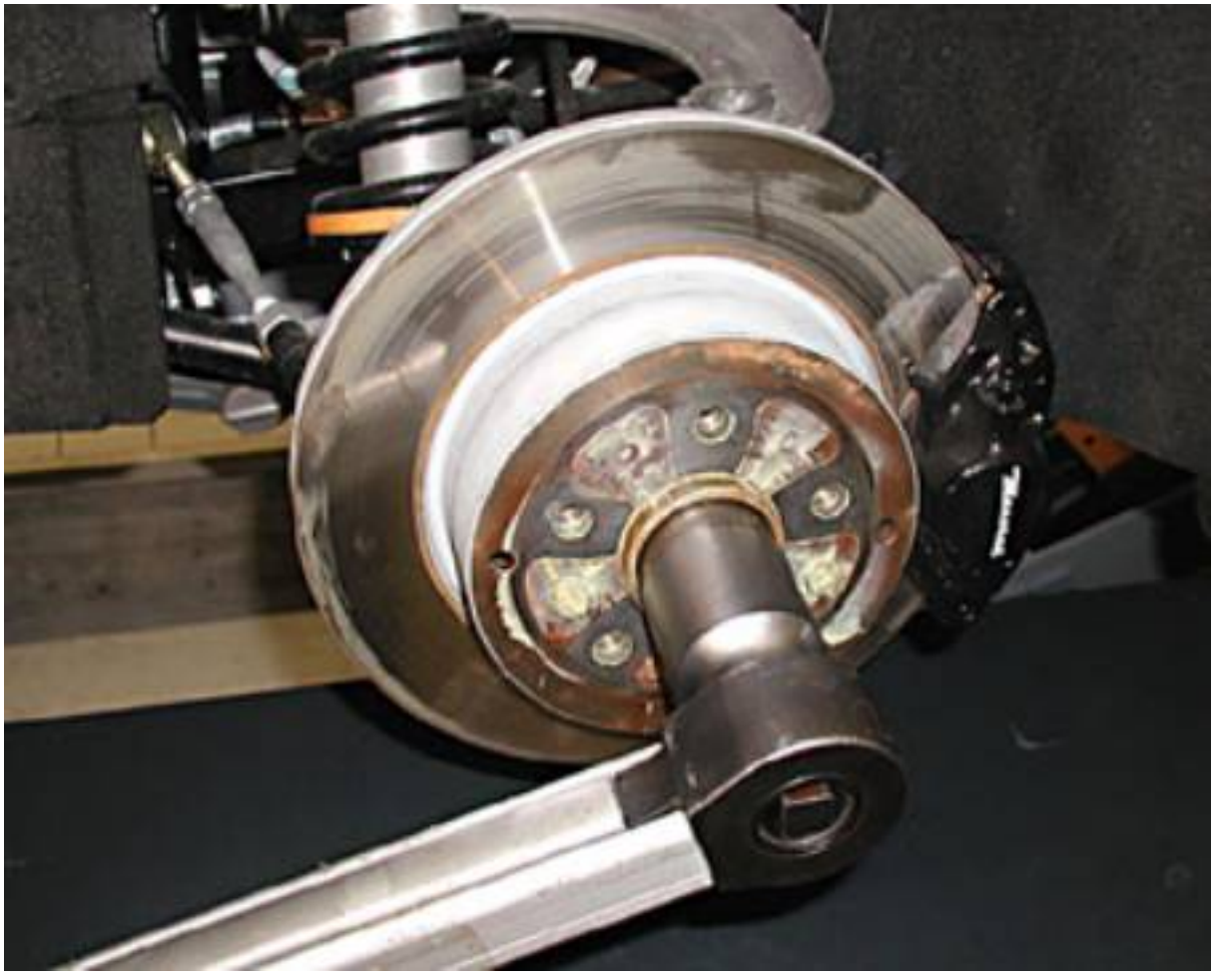
A.B.S. SENSORS FOR REAR WHEELS

Detaching the rear A.B.S. sensors

- Remove the wheel concerned.

Replacing the wheels

- Remove the flattened part of the nut fastening the wheel hub to the axle shaft and undo the said nut.



- Remove the relative rear wheel brake disc.

Rear brake disc

- Remove the rear shock absorber concerned

Rear shock absorbers

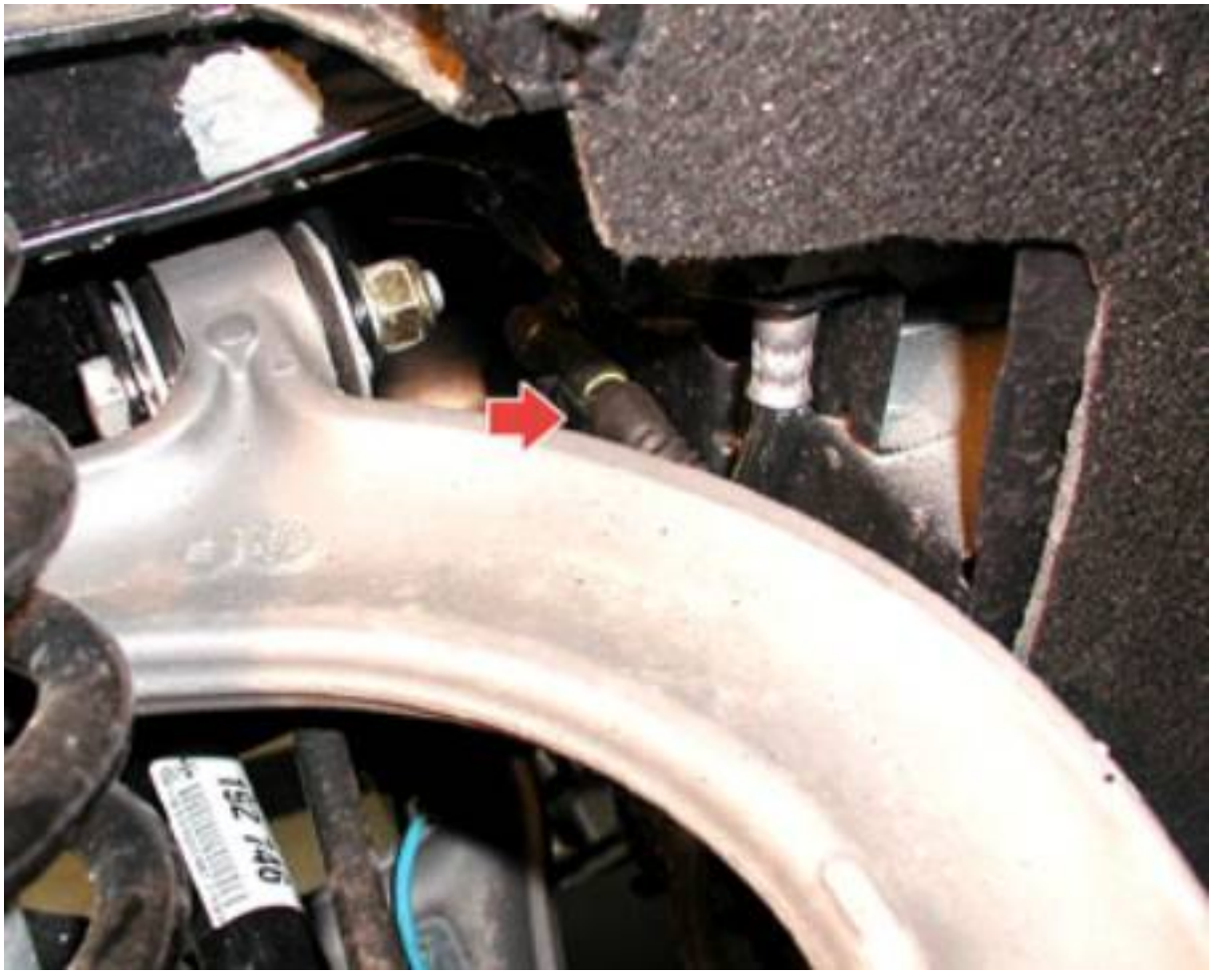
- Remove the shoe from the relative brake

Brake shoes

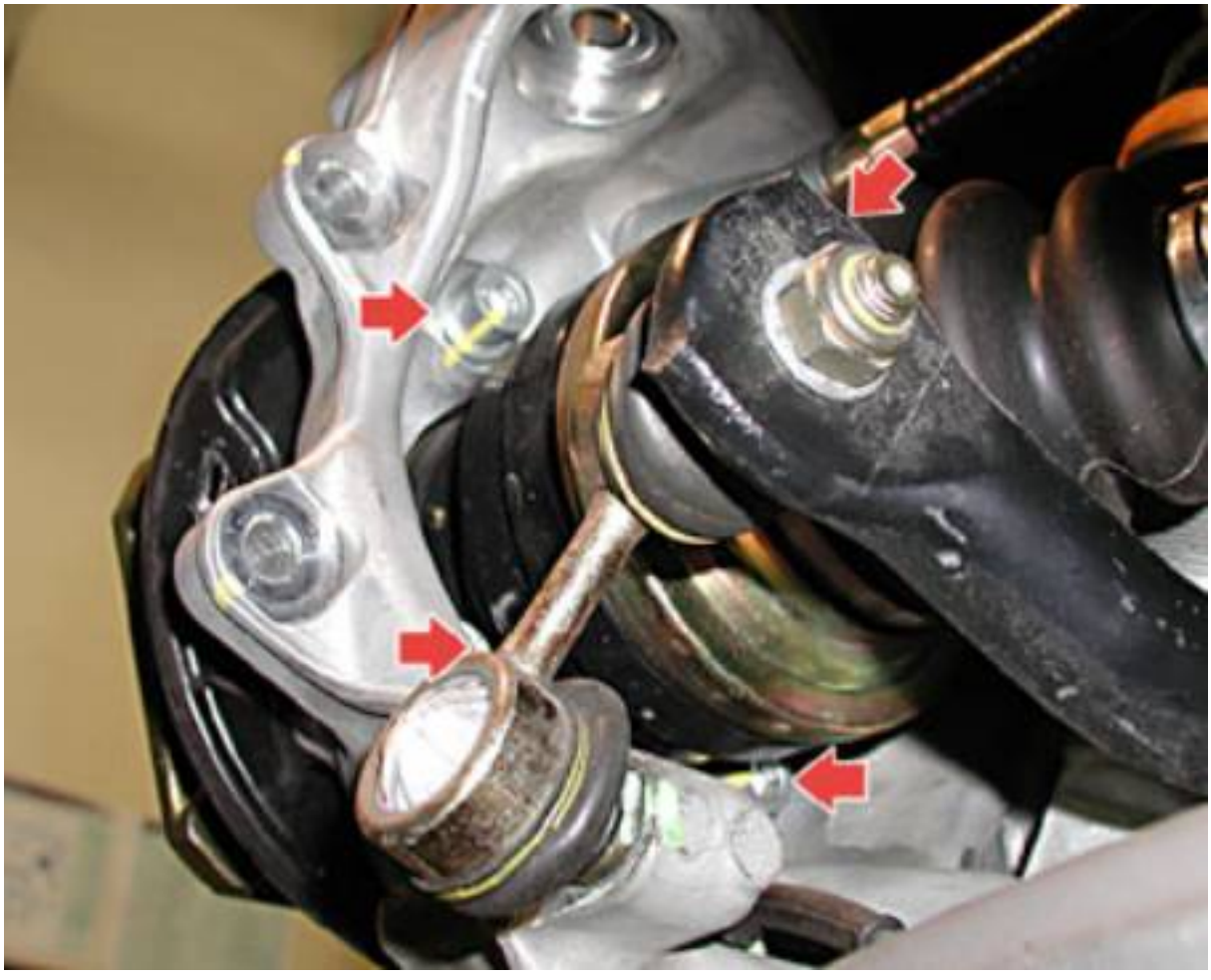
- Remove the device used to hook the handbrake cable to the brake shoes.

- Remove the central pin (not shown) and detach the handbrake cable from the transmission device.

- Disconnect the ABS sensor’s electrical connection.



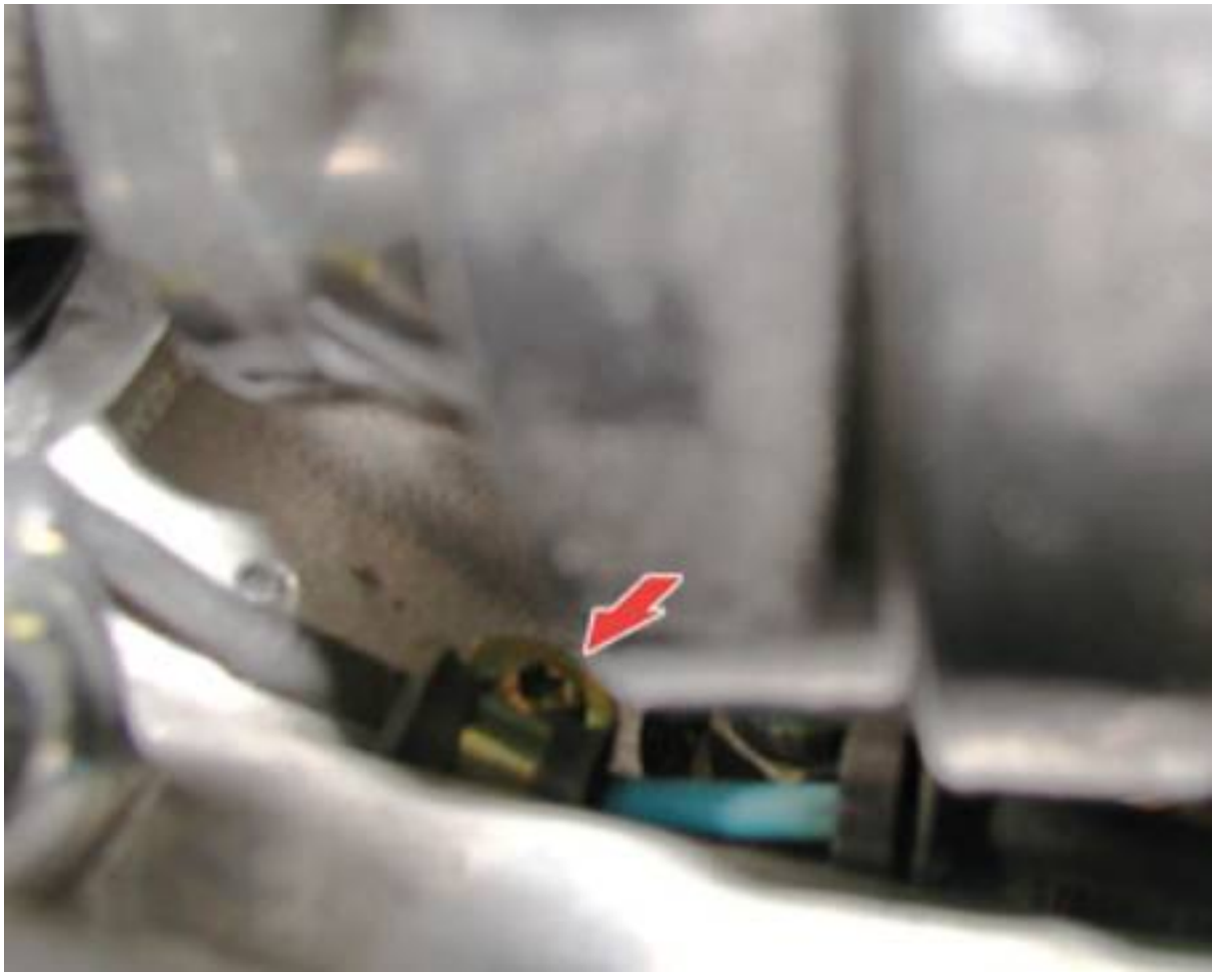
- Undo the four fastening screws on the wheel hub.



- Position the tool that you need to remove the wheel hub from the axle shaft. Tightening the screw on the tool, remove the wheel hub from the axle shaft.

- Move the axle shaft backwards and undo the screw fastening the retaining clamp for the ABS sensor wiring.

CAUTION:
During this operation, take care not to damage the ABS sensor cable.



- Remove the rear wheel hub together with the ABS sensor for the rear wheels.

Refitting the rear A.B.S. sensors

- Fit the rear wheel hub, complete with the ABS sensor for the rear wheels, in its seat and position the sensor wiring correctly.
- Tighten the screw fastening the ABS sensor.
- Bring the wheel hub flush with the hub carrier.
- Tighten the four fastening screws on the wheel hub to a torque of **60 Nm**.

- Attach the ABS sensor’s electrical connection.
- Fasten the handbrake cable to the transmission device with the central pin and fit the handbrake cable hooking device onto the shoes.

- Complete the procedure by carrying out all the refitting operations for the brake shoe concerned.

Brake shoes

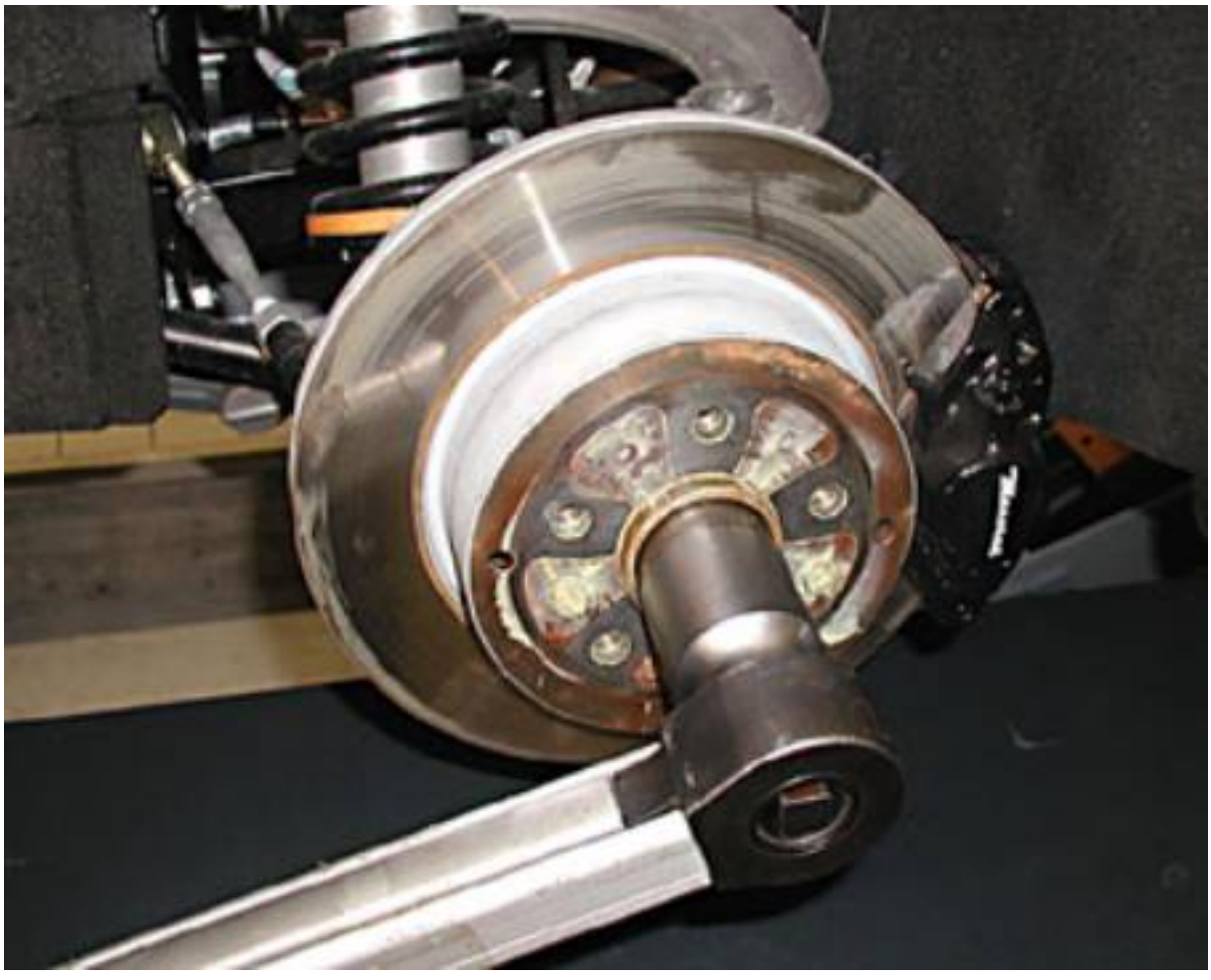
- Complete the procedure by carrying out all the refitting operations for the brake disc concerned.

Rear brake disc

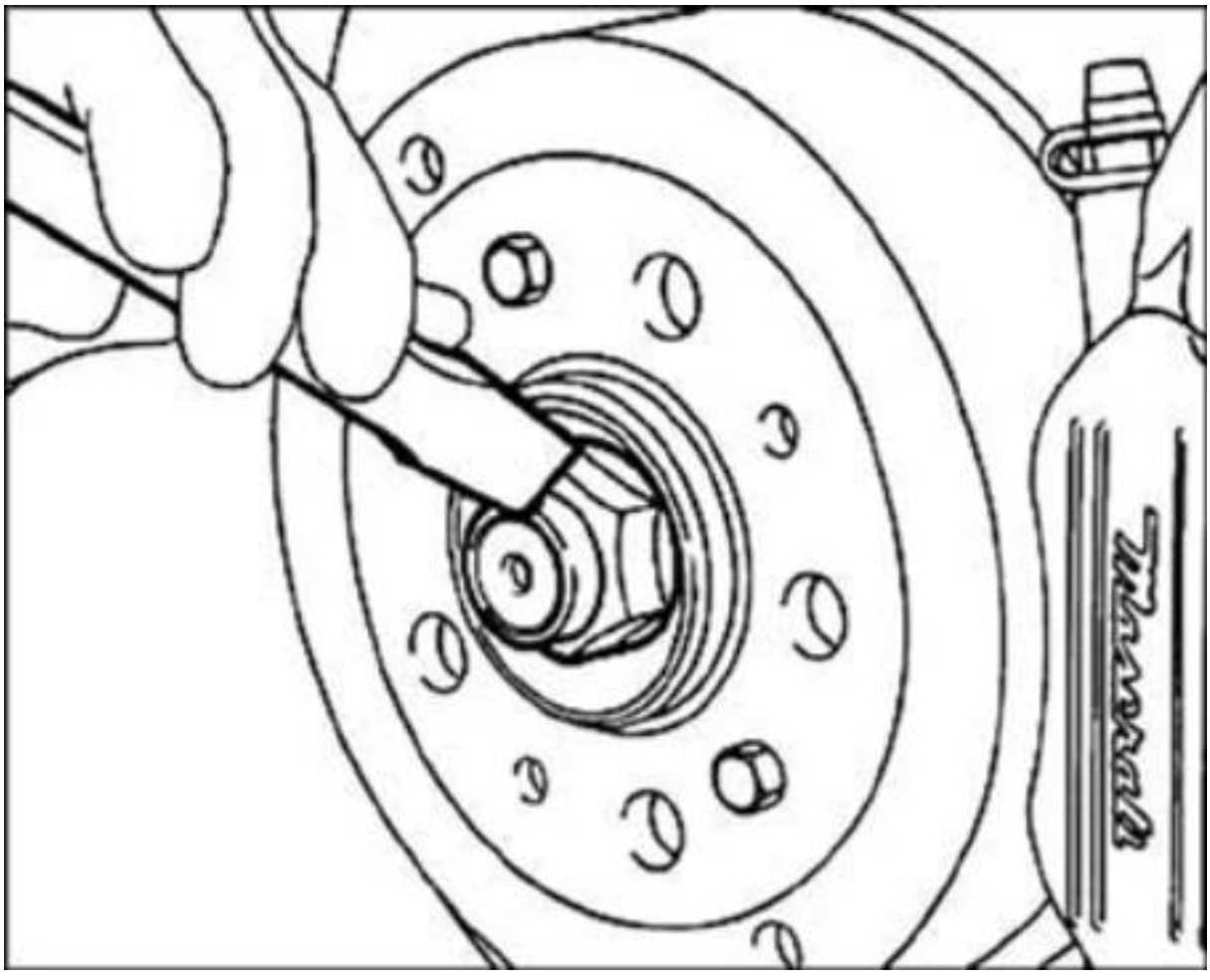
- Fit the rear shock absorber concerned.

Rear shock absorbers

- Tighten the nut fastening the wheel hub to the axle shaft to a torque of **275 Nm**



- Flatten the fastening nut.



- Fit the wheel.

Replacing the wheels

Cables and tie-rods

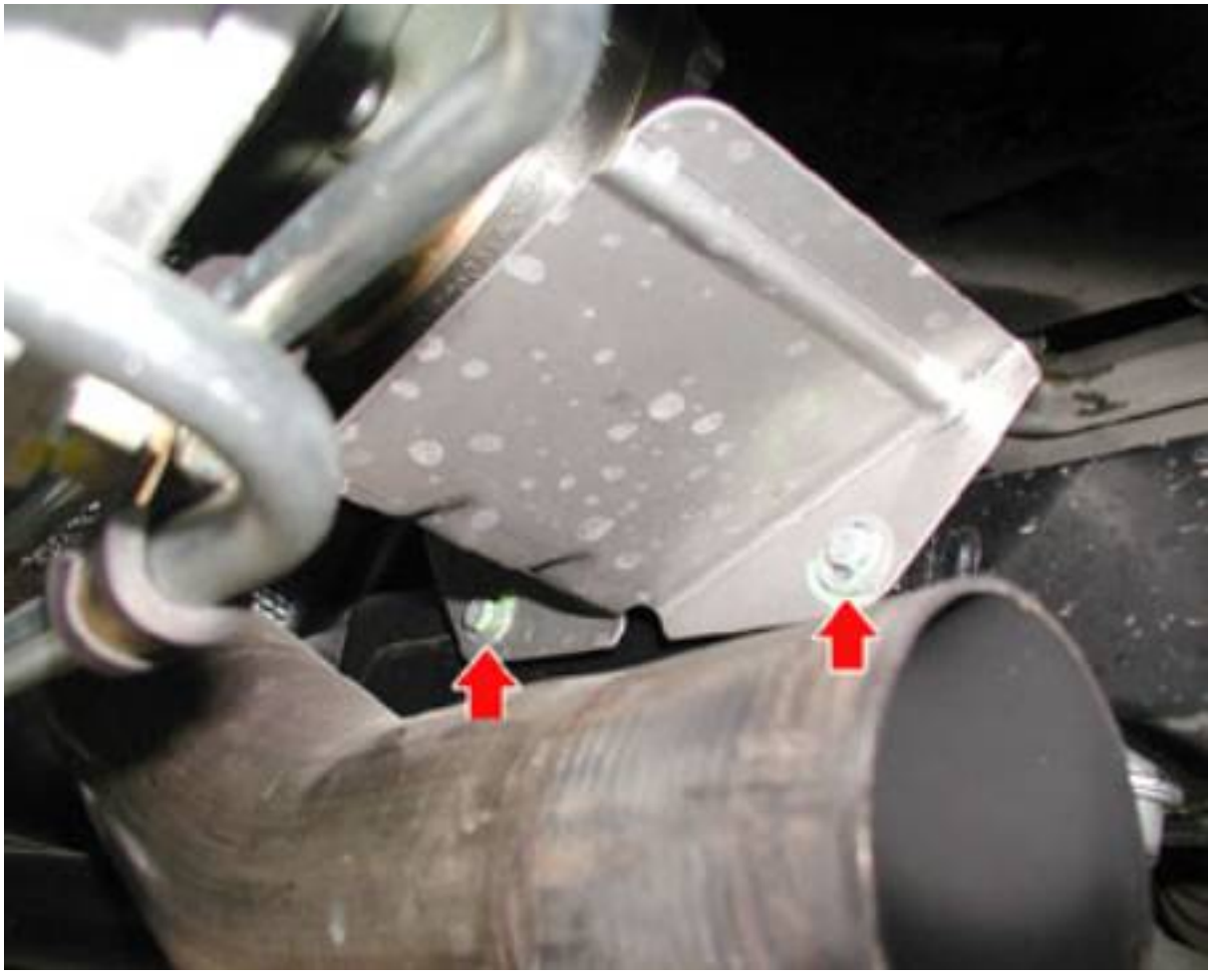
Removing the cables and tie-rods

- Disconnect the battery's negative terminal.
- Place the car on the hoist.
- Remove the exhaust tailpipes.

Removing-refitting the tailpipe

- Undo the fastening screws and remove the heat guard on the left-hand exhaust line.

- Undo the fastening screws and remove the heat guard on the right-hand exhaust line.

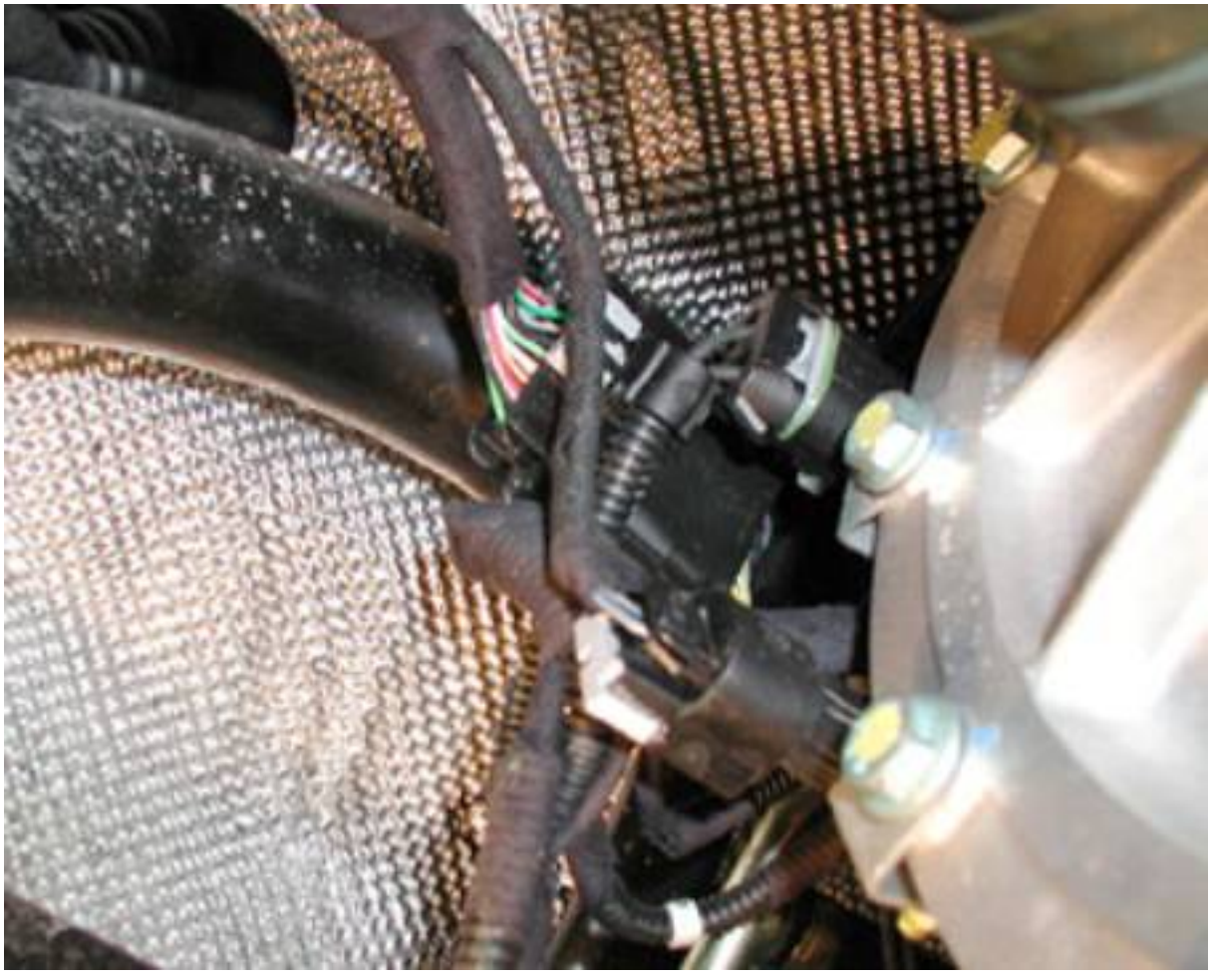


- Unscrew the nuts fastening the mount for the right-hand exhaust extension to the bodywork.
- Carry out the same operation for the left-hand exhaust extension by undoing the screws fastening the extension pipe to the bodywork.

- Unscrew the two nuts fastening the metal clamps joining the exhaust tailpipes and central silencers.

- Remove the two exhaust extensions.

- Detach the three electric connectors.

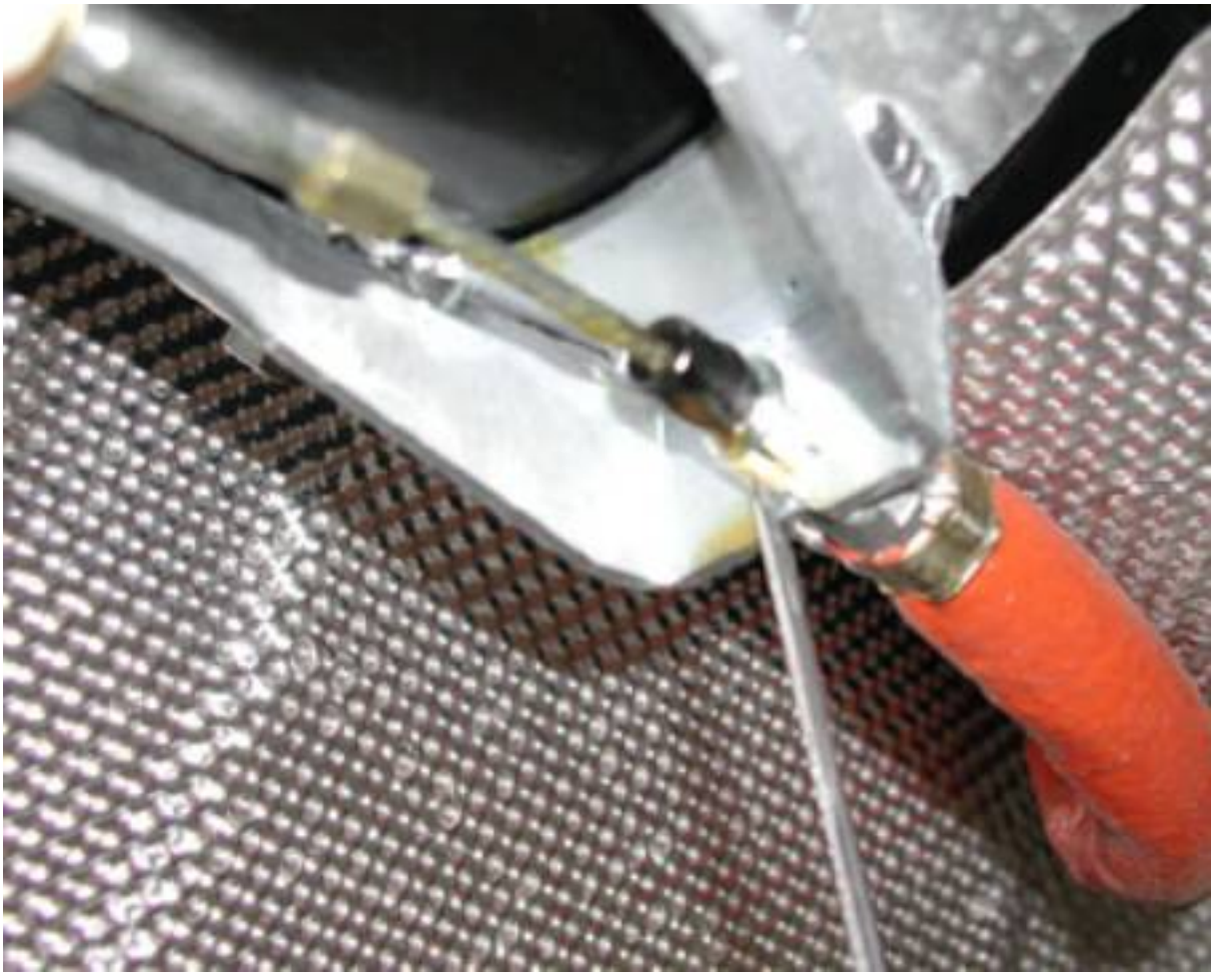


- Undo the screw fastening the electric connector to the chassis.

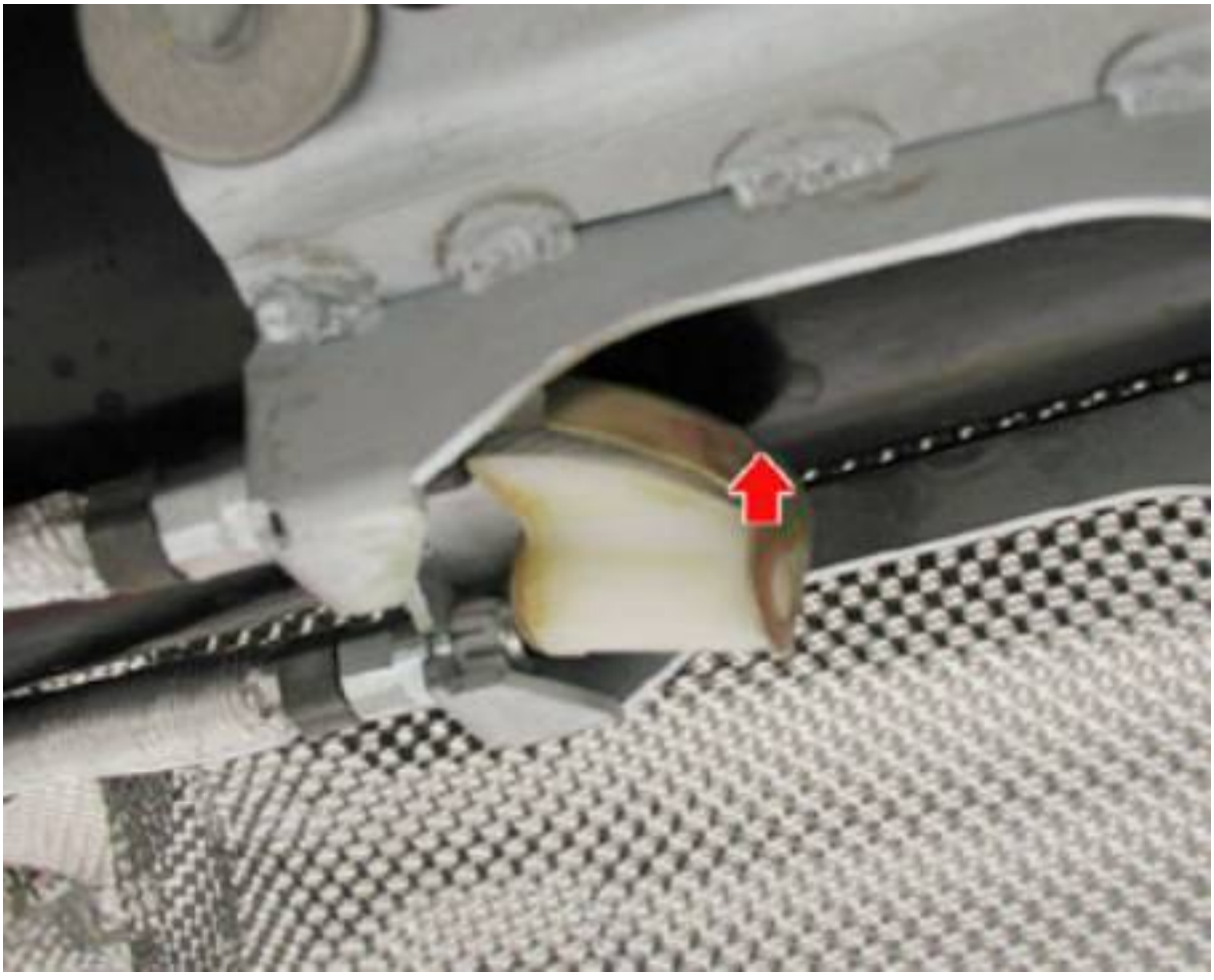
- Undo the nut and the check nut used to fasten and adjust the handbrake cable.

- Remove the plastic retaining clamp from its seat on the handbrake clamp, then release the handbrake cable from the bracket.

N.B.
Make sure you do not break the plastic clamp



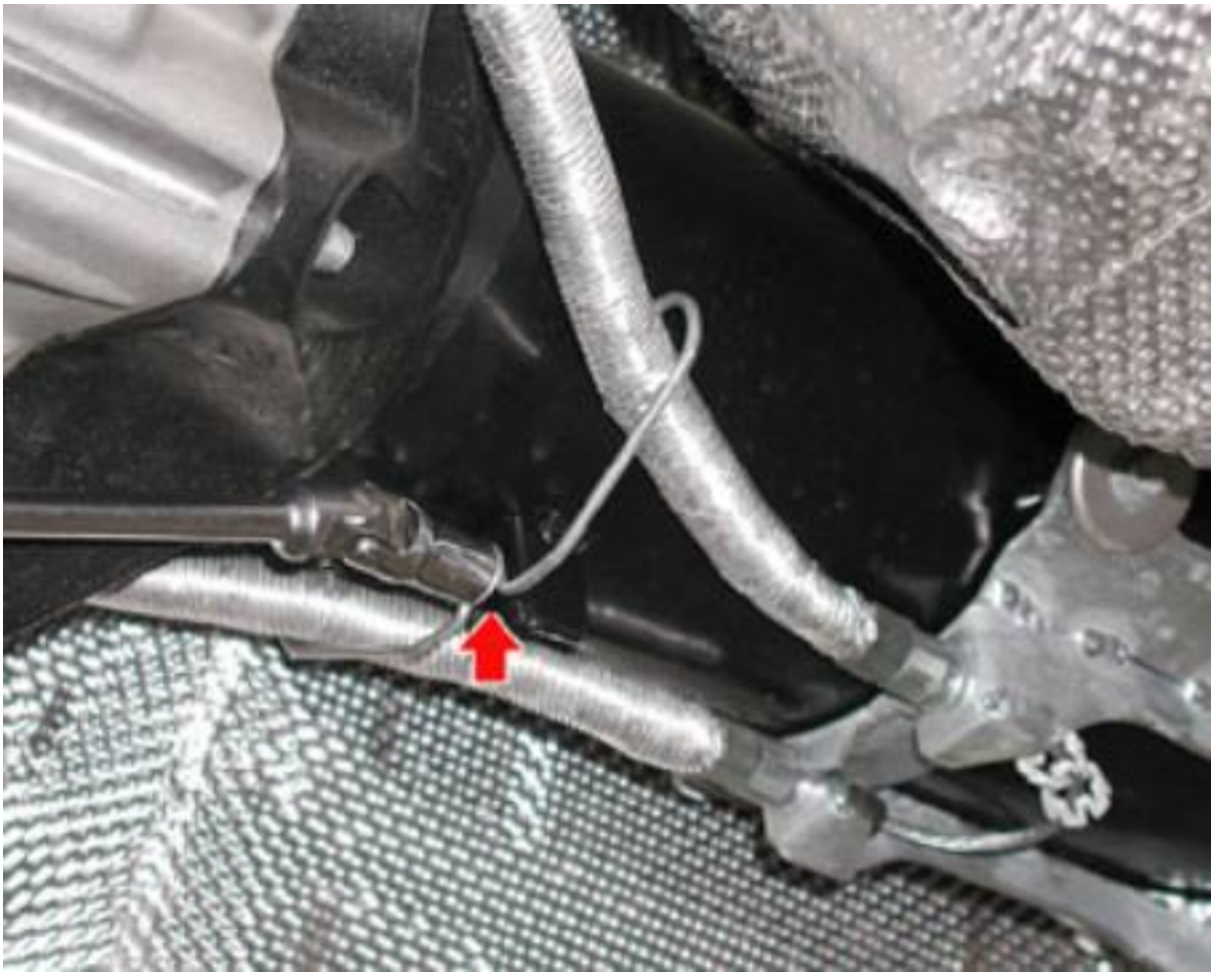
- Remove the spacer.



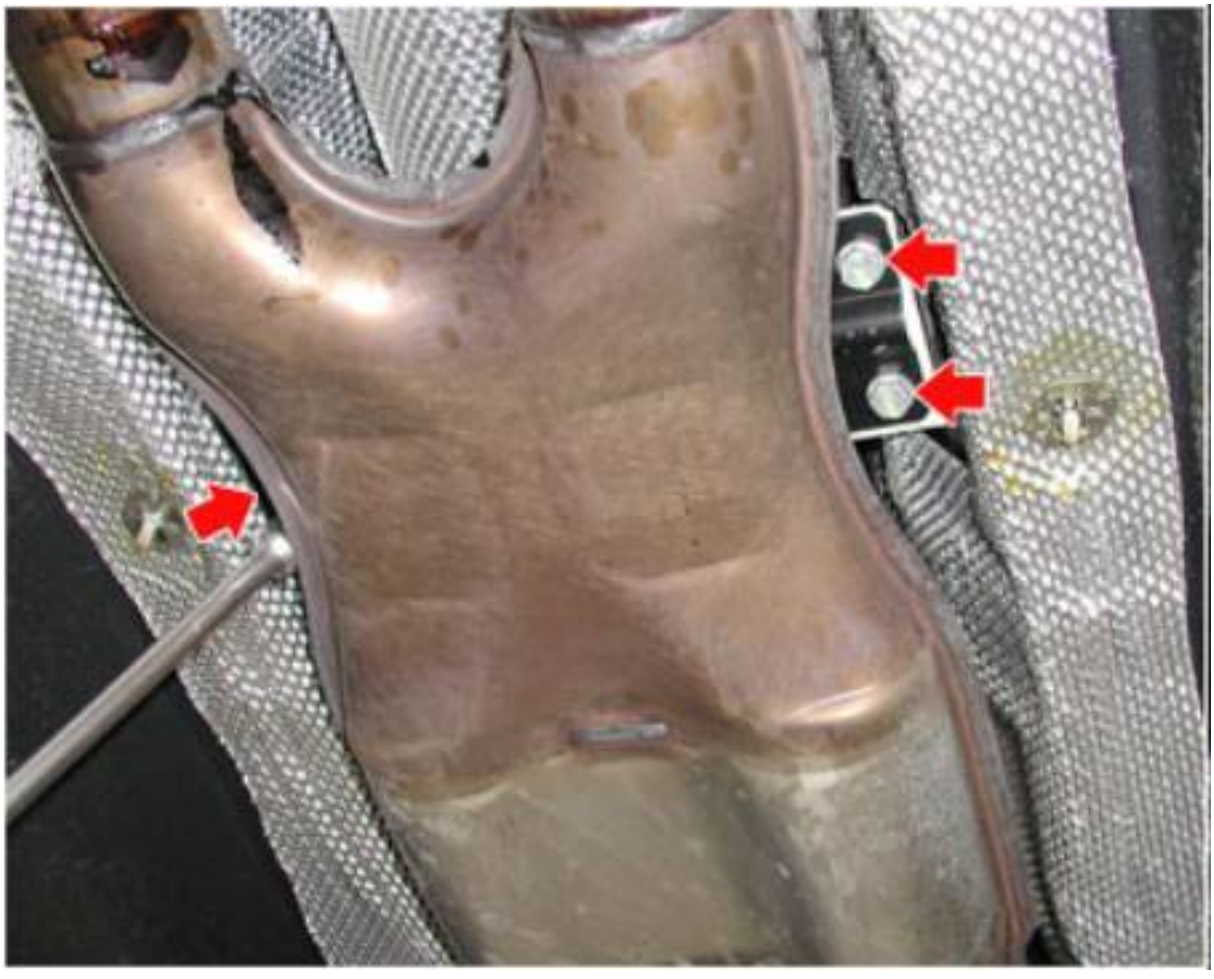
- Remove the plastic handbrake cable retaining clamps from their seat.

N.B.
Make sure you do not break the plastic clamps

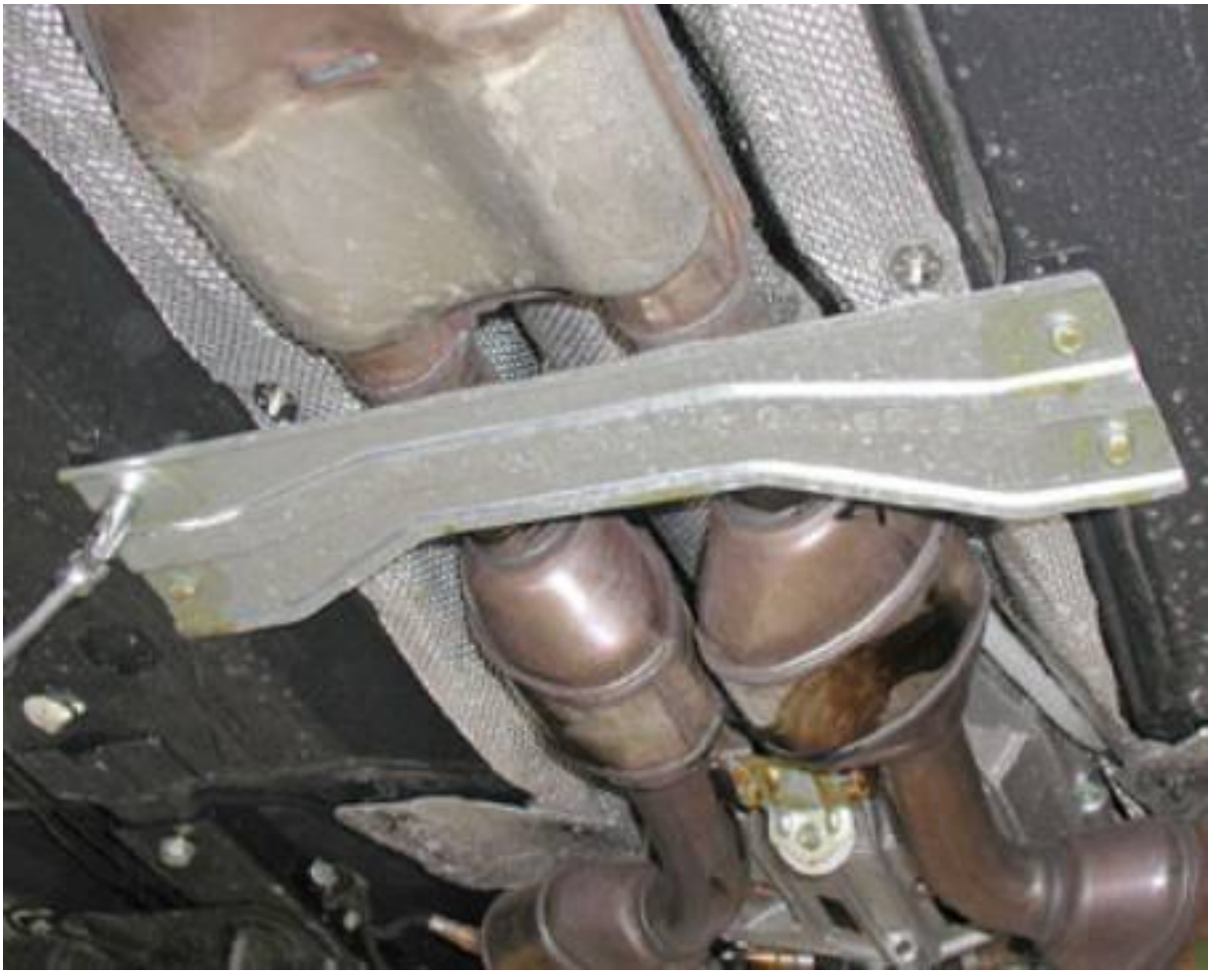
- Unscrew the nut, remove the bracket and take the handbrake cables out the mount.



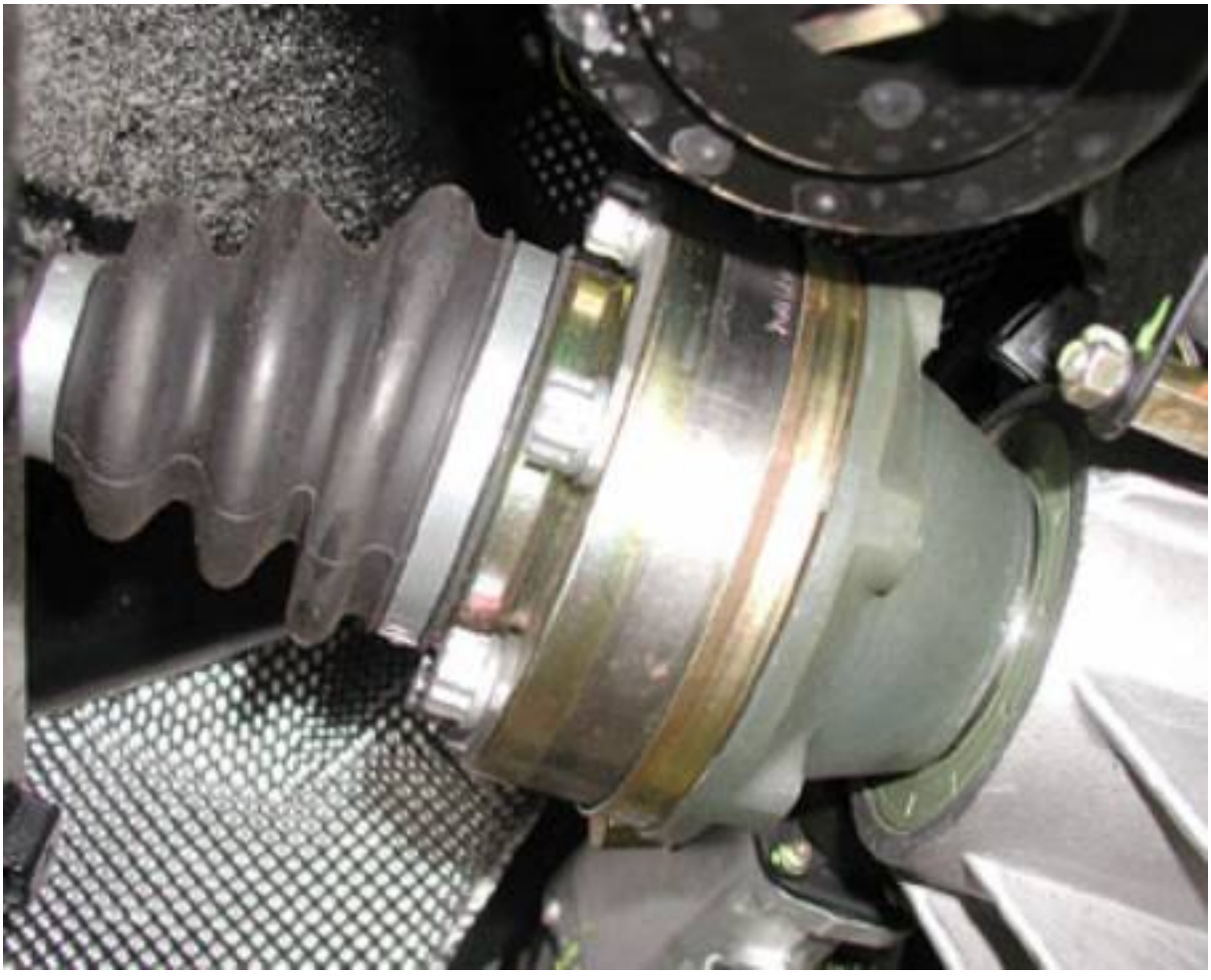
- Undo the fastening screws and remove the bodywork reinforcement bracket located between the transmission shaft and the central silencers.



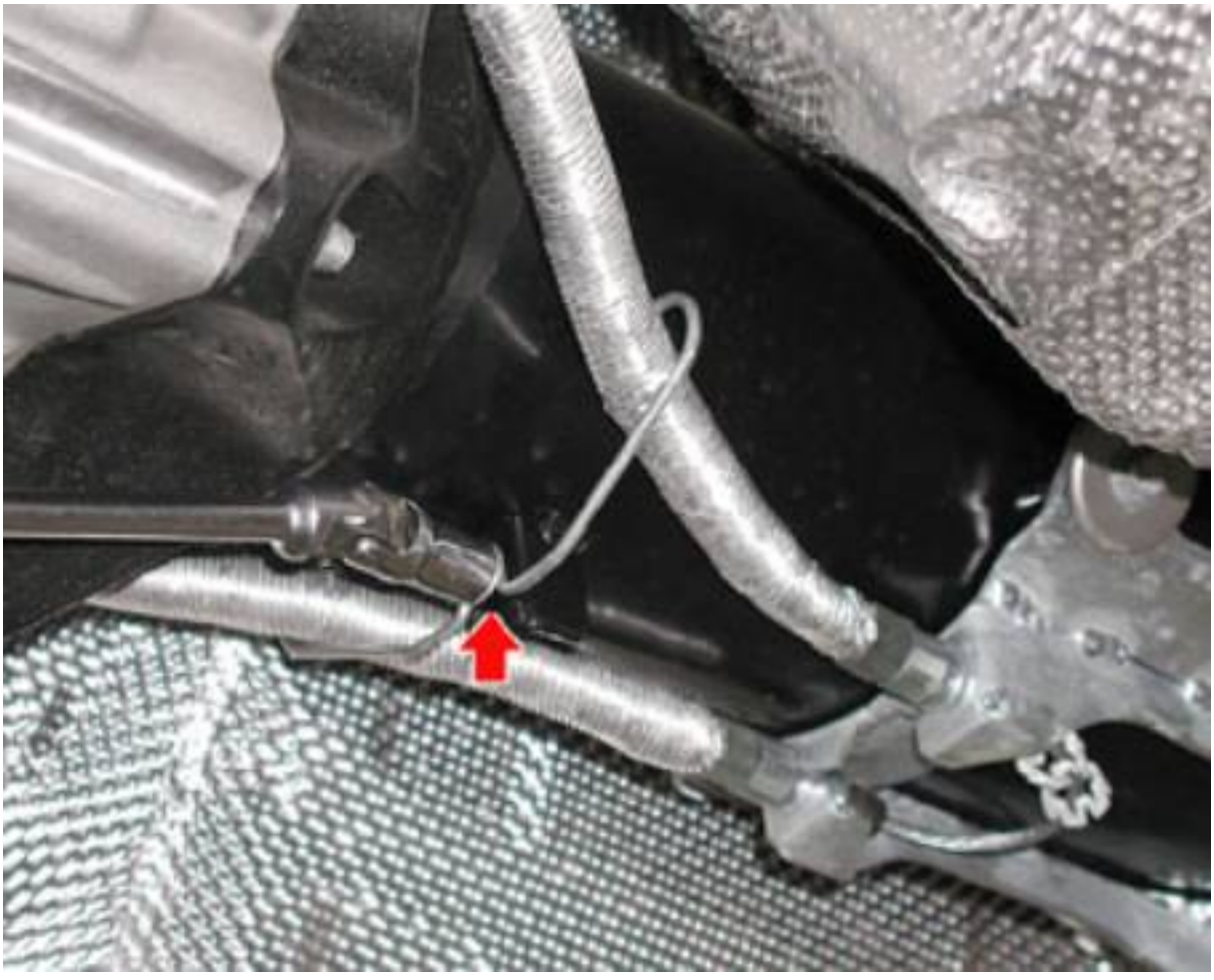
- Undo the lower fastening screws and remove the bodywork reinforcement bracket.



- Undo the screws fastening the right- and left-hand axle shafts to the gearbox.



- Undo the fastening screw on the electronically-controlled gearbox oil line bracket.



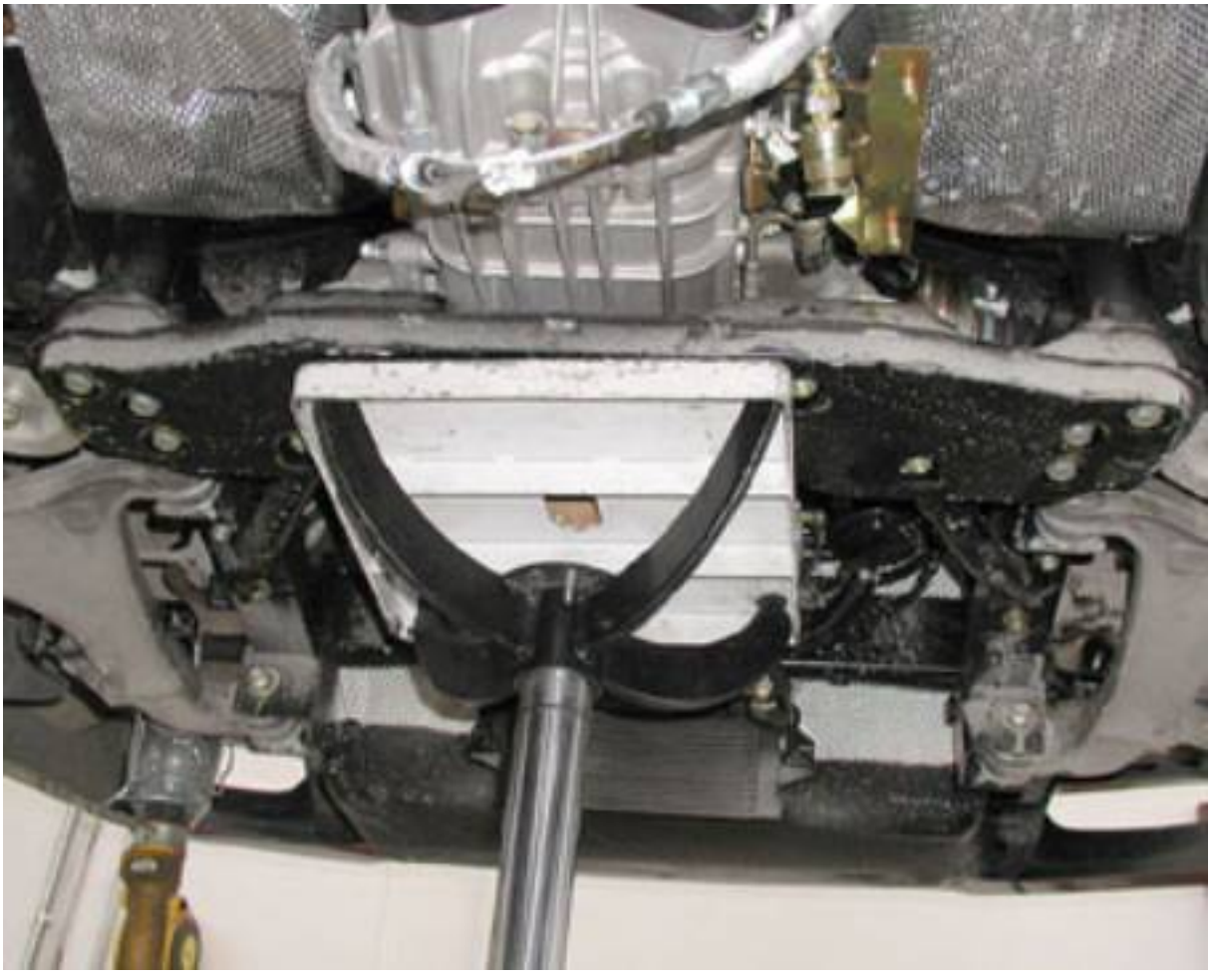
- Disconnect the quick coupling connecting the oil delivery line to the clutch.

- Unscrew the two fastening nuts and remove the plastic guard fastened to the lower lever.

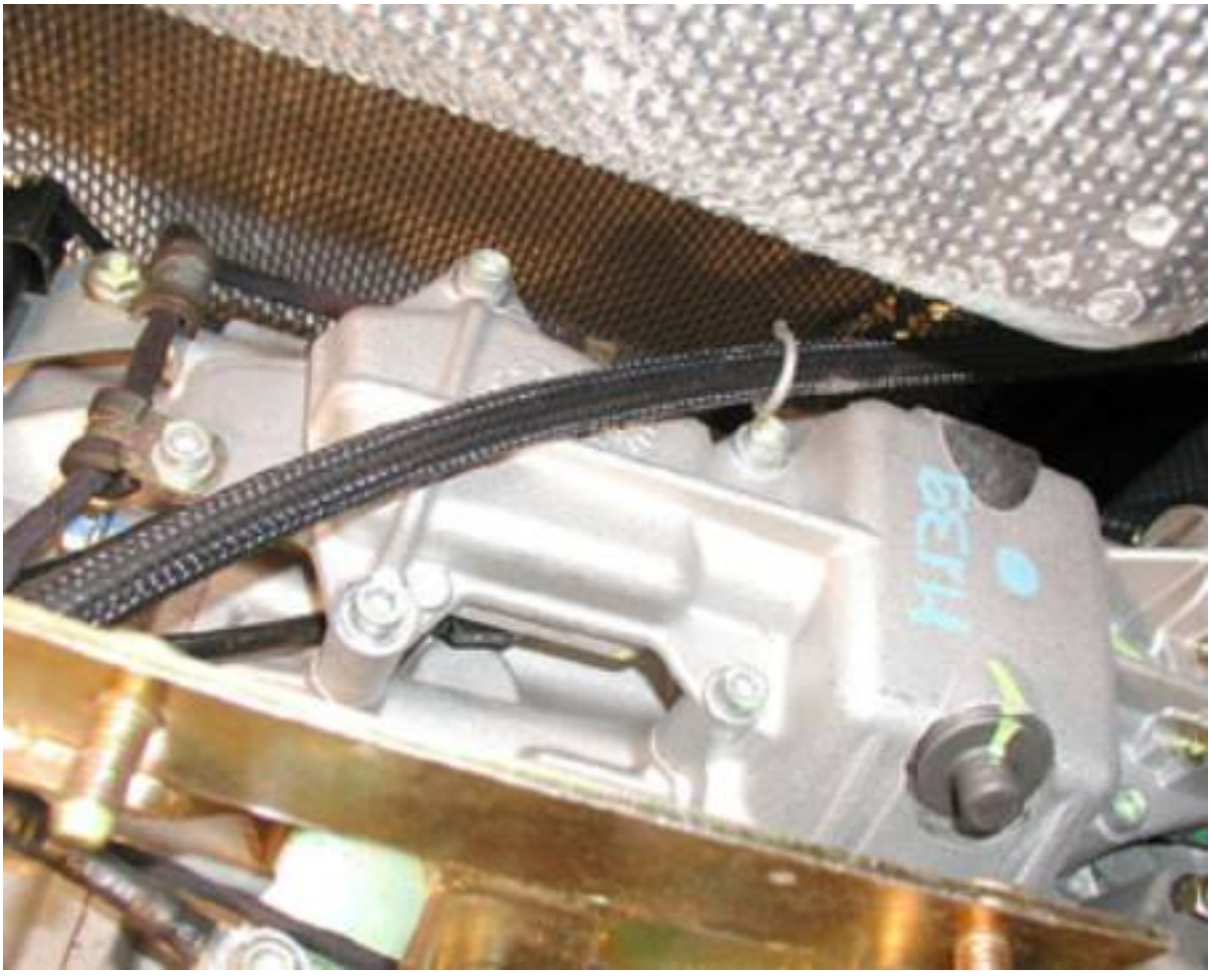
- Position a hydraulic lifting device under the gearbox supporting cross member, fitted with a suitable tool for the gearbox cross member to rest on.

N.B.
Keep the gearbox aligned with the rear transmission by fitting suitable shims under the gearbox housing.

- Undo the fastening screws on the gearbox supporting cross member.



- Lower the gearbox unit until the left-hand handbrake cable can be accessed and released from the fastening bracket.

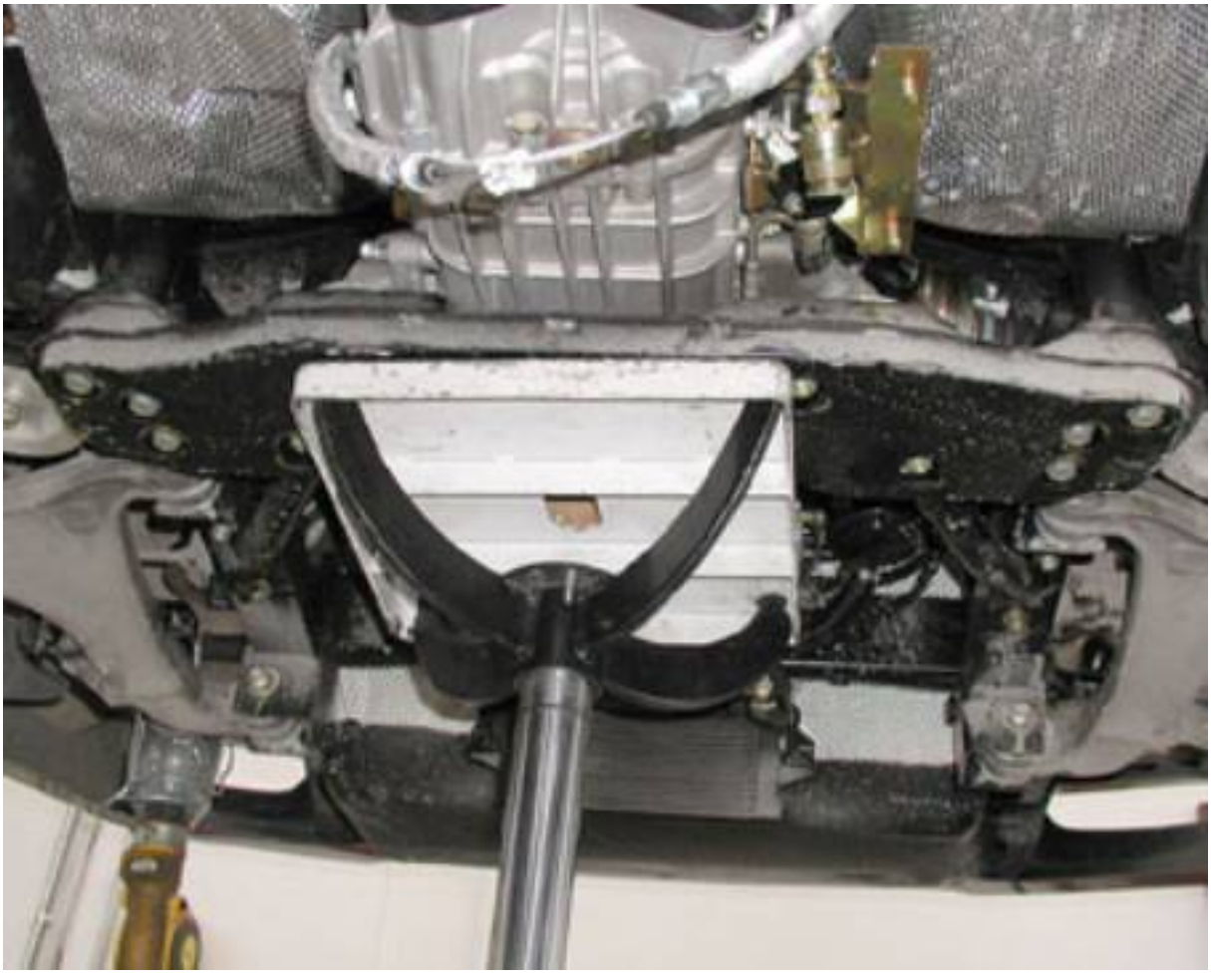


- Unscrew the fastening nut and release the right-hand handbrake cable from the gearbox.

- Release the handbrake cables from the shoes and remove the said cables.

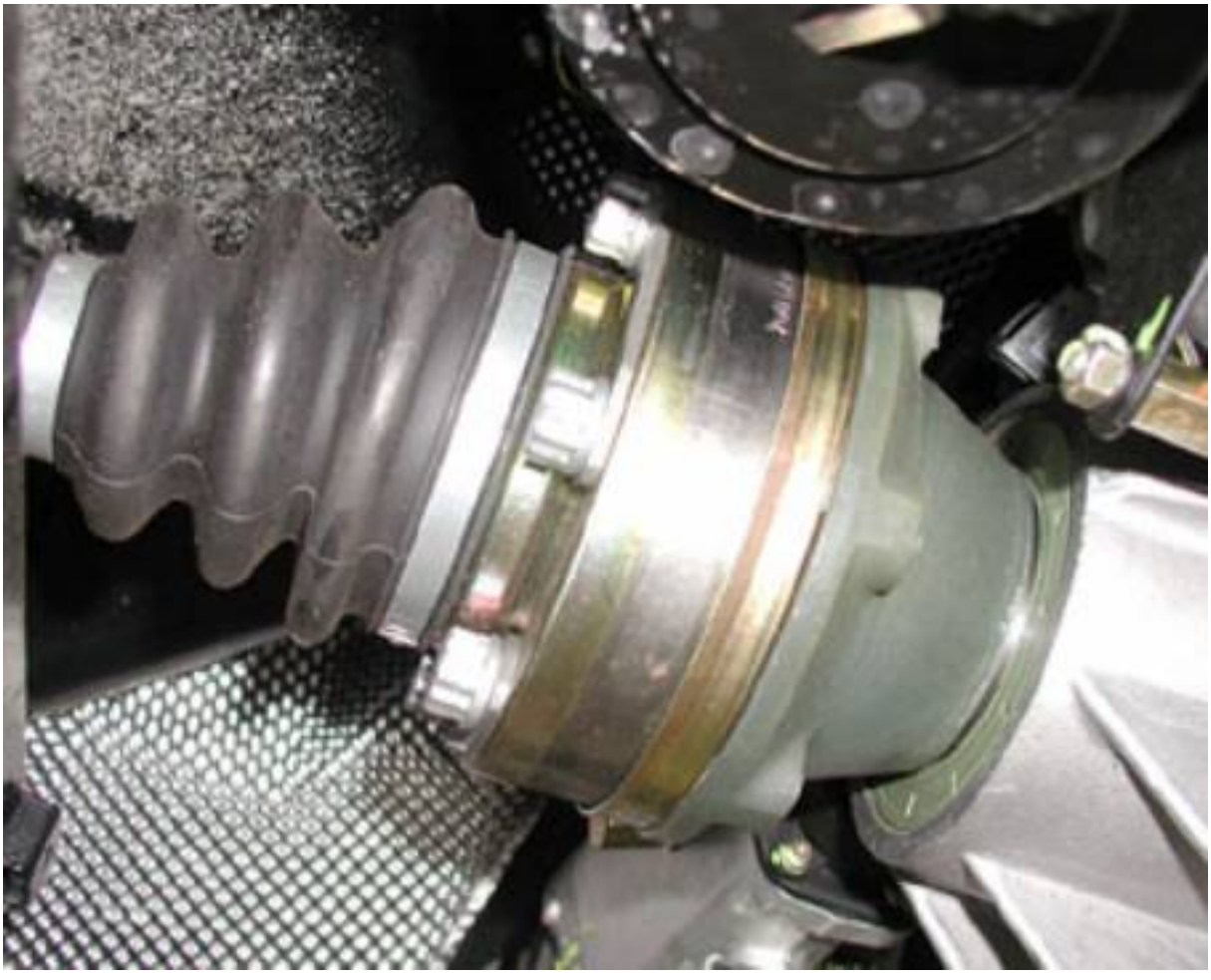
Refitting the gearbox

- Fit the handbrake cables and connect them to the shoes.
- Tighten the nut fastening the right-hand handbrake cable to the gearbox.
- Fasten the handbrake cable in the relative seat on the left-hand side of the gearbox.
- Lift the gearbox and position it in its seat, then tighten the fastening screws on the gearbox supporting cross member to torque.

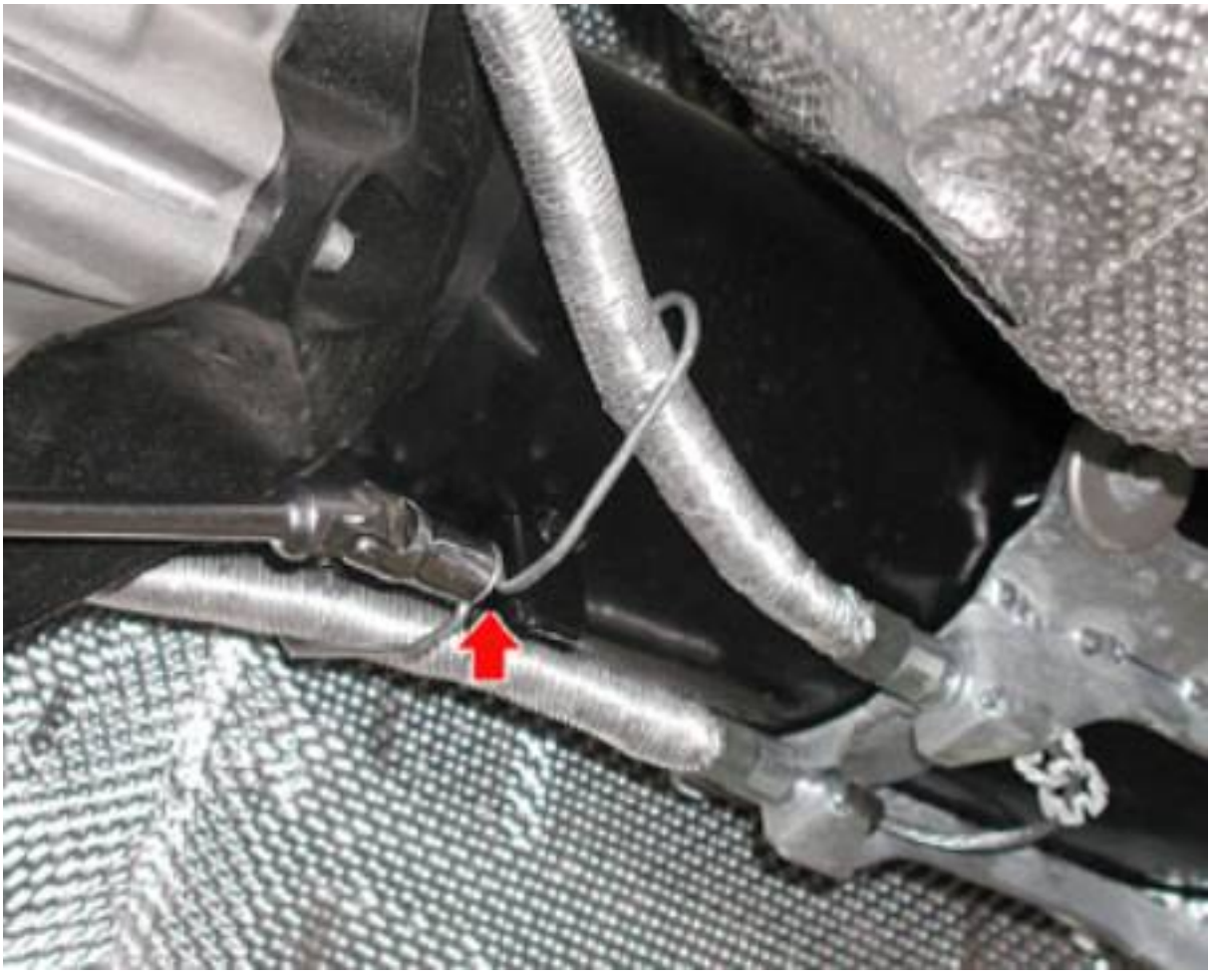


- Remove the hydraulic lifting device fitted with the tool used for removing and refitting the gearbox.
- Fit the plastic guard fastened to the lower lever and tighten the two fastening nuts.
- Connect the oil delivery line to the clutch with the quick coupling.
- Tighten the fastening screw on the electronically-controlled gearbox oil line bracket.

- Tighten the screws fastening the right- and left-hand axle shafts to the gearbox to a torque of **80Nm**.



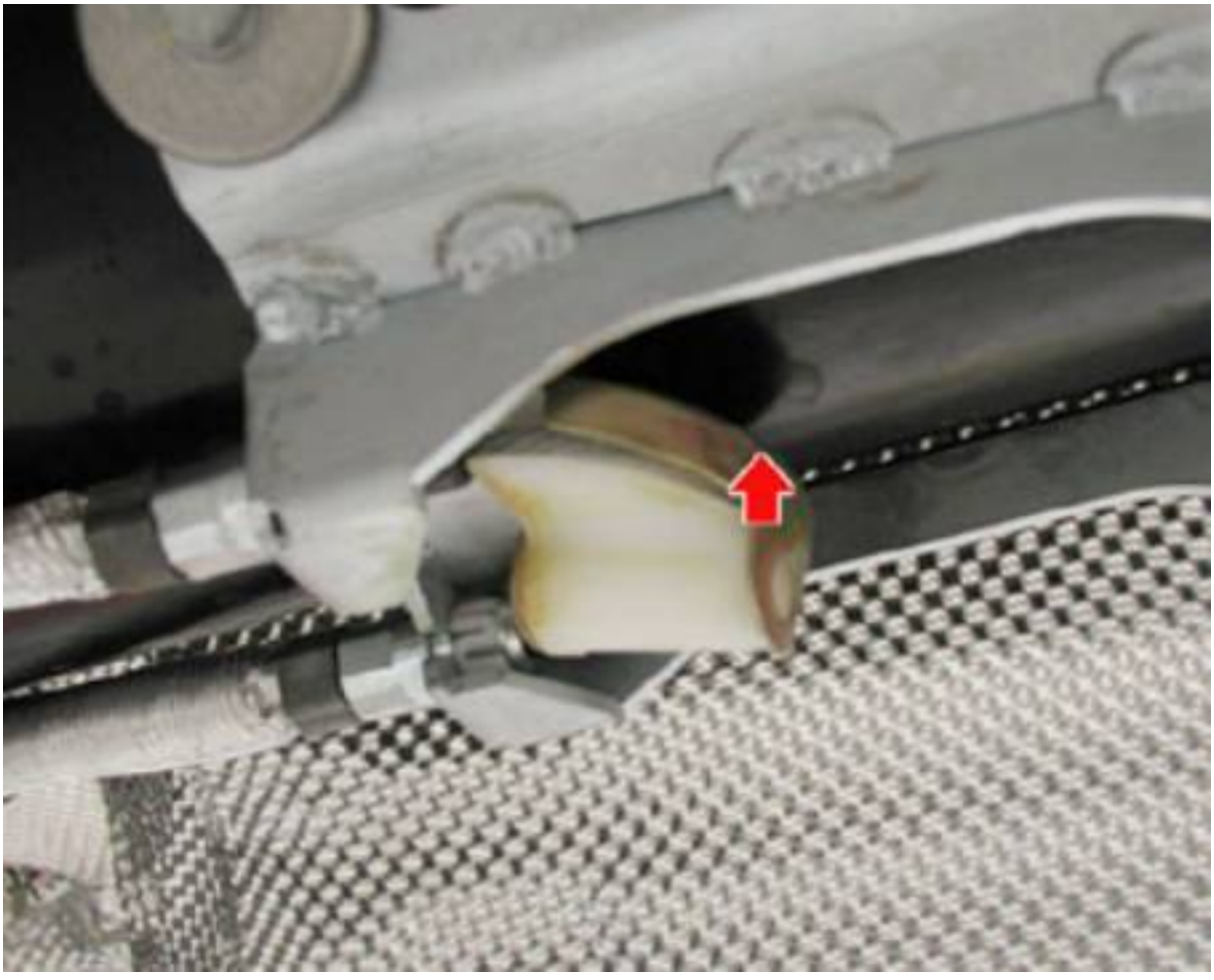
- Fit the bodywork reinforcement bracket located between the transmission shaft and the central silencers and tighten the fastening screws to torque.
- Fit the bodywork reinforcement bracket located under the central exhaust silencers.
- Fit the handbrake cables in their seat on the mount, then tighten the fastening nut on the retaining bracket.



- Fit the plastic clamps retaining the handbrake cables in their seat.

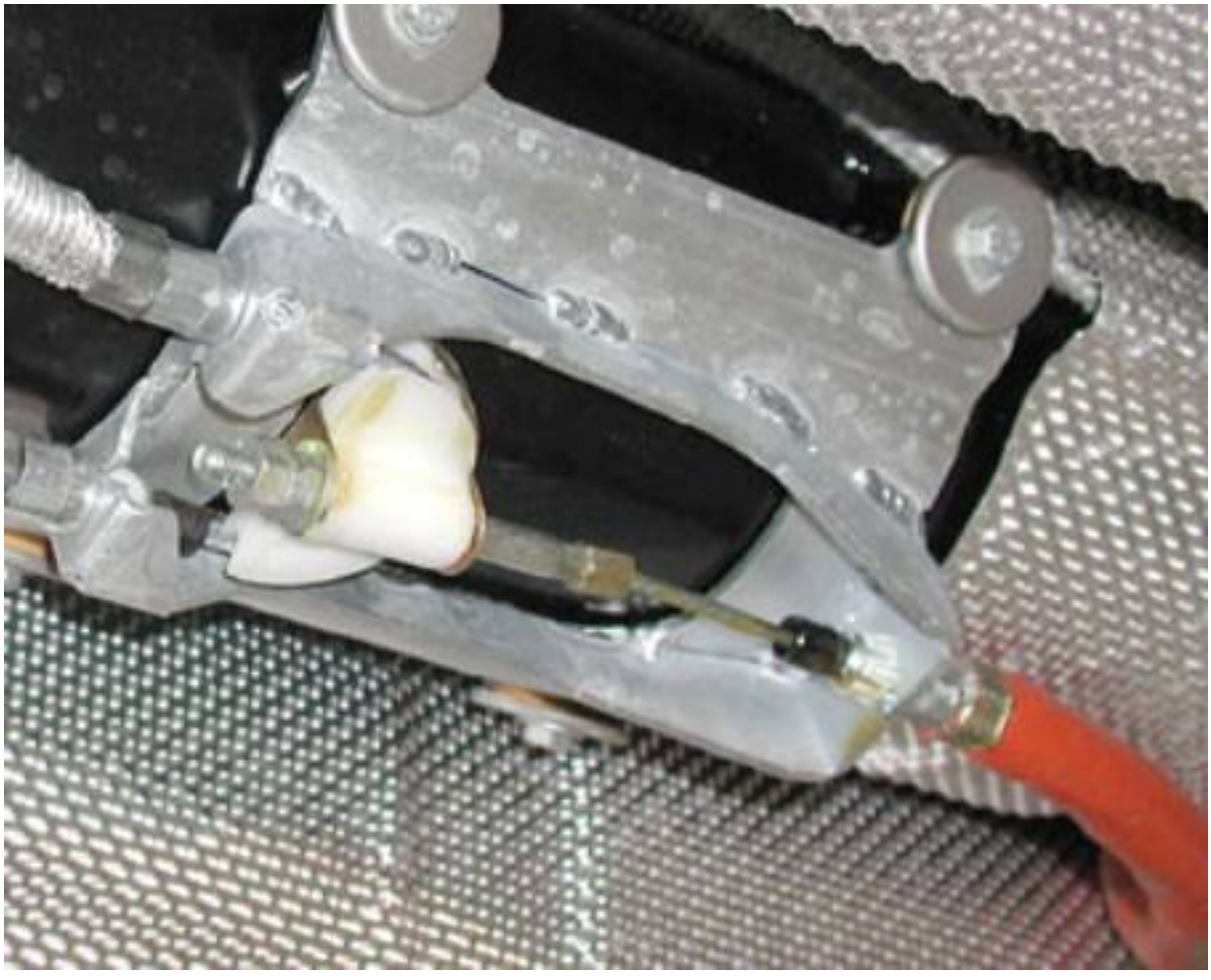
N.B.
When fitting, make sure you do not break the plastic clamps and always check they are fitted correctly.

- Fit the spacer.



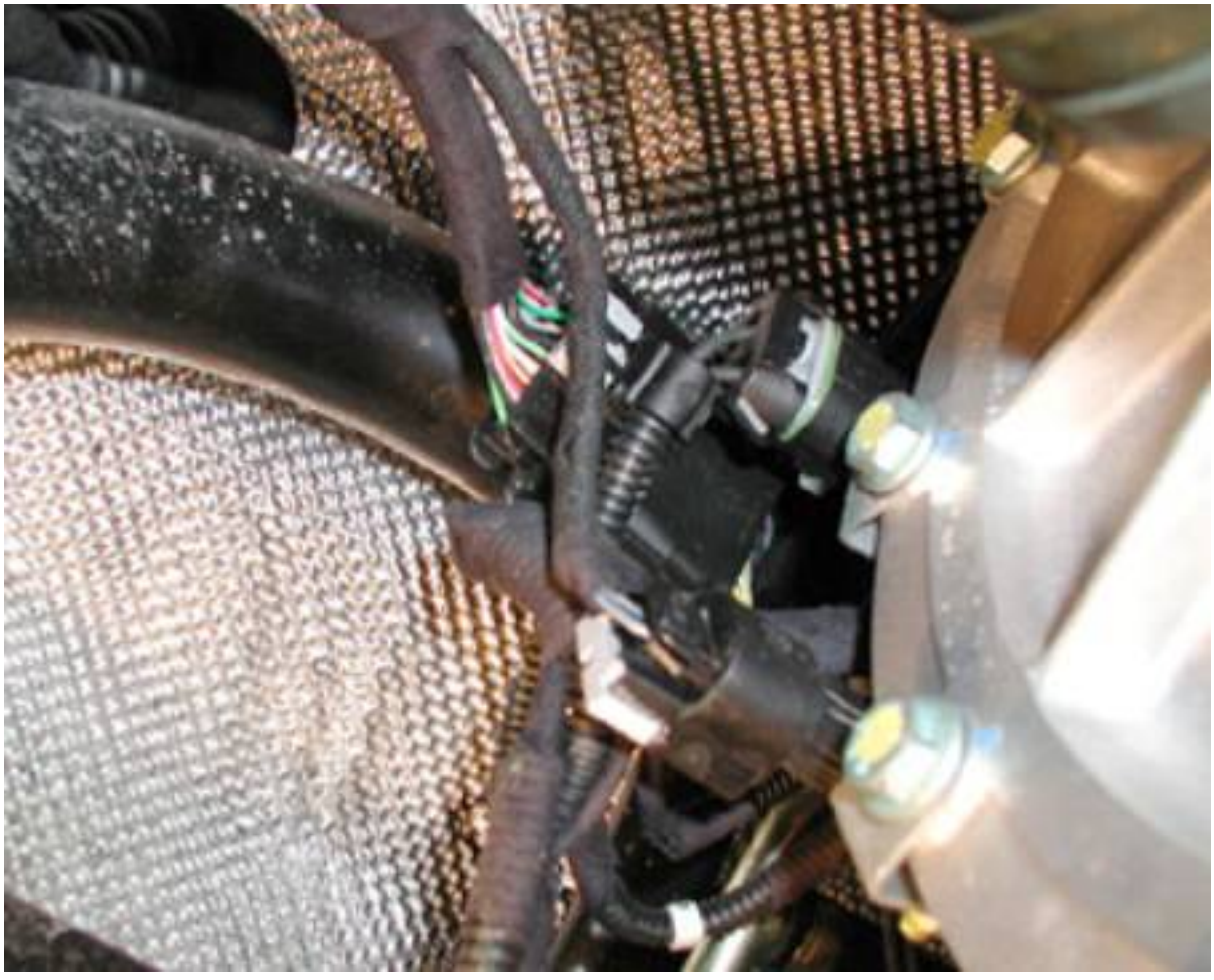
- Position the handbrake cable in its seat connected to the lever, fit the end into the spacer and tighten the nut and check nut.
- Fit the plastic clamp retaining the handbrake cable in its seat.

N.B.
When fitting, make sure you do not break the plastic clamp and always check that it is fitted correctly.



- Fasten the electric connector to the chassis by tightening the fastening screw.

- Attach the three electric connectors.



- Fit the exhaust tailpipes on the central silencers and tighten the fastening nuts on the fastening clamps to a torque of 54 Nm.

- Tighten the screws fastening the door limiting device to the bodywork to a torque of **24 Nm**.

- Fit the right- and left-hand heat guards.

- Fit the exhaust tailpipes.

Removing-refitting the tailpipe

- Carry out the handbrake adjustment operation.

Handbrake cable adjustment

- Remove the vehicle from the hoist.
- Connect the battery's negative terminal.
- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:

Refer to section:

Component self-learning in the event of battery disconnection

BRAKE SHOES

Removing-refitting the brake shoes

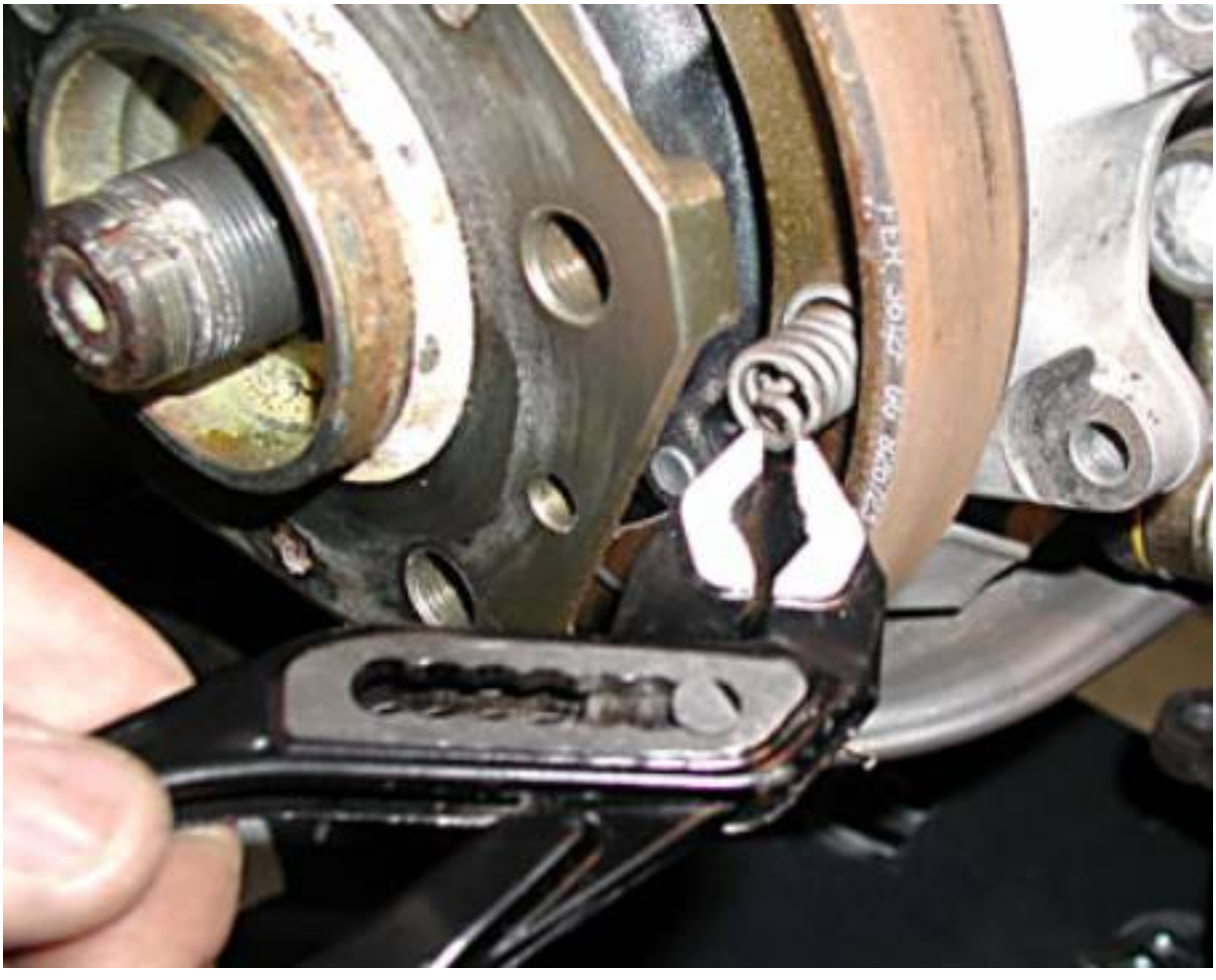
- Remove the wheel concerned.

Replacing the wheels

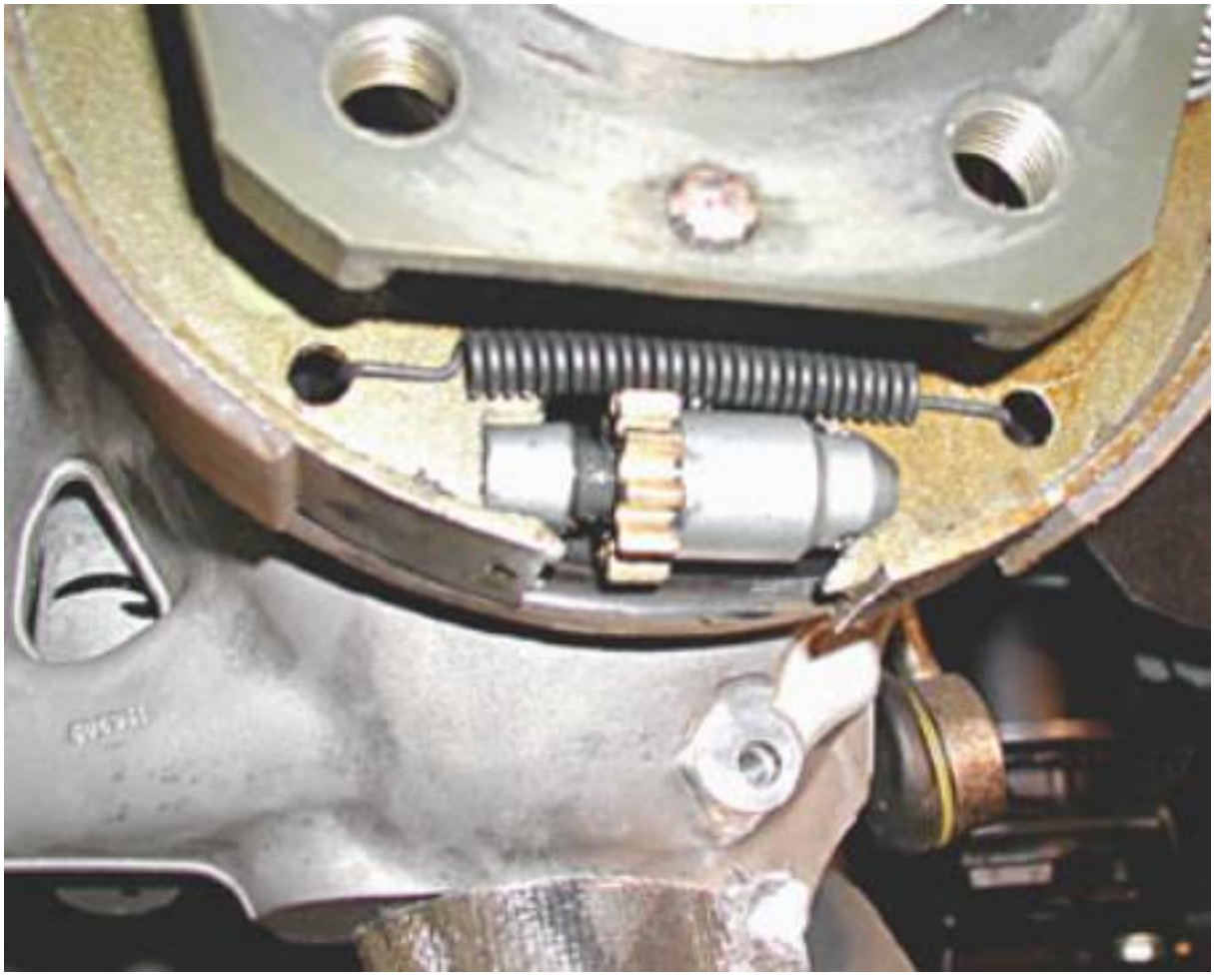
- Remove the relative rear wheel brake disc.

Rear brake disc

- Rotate and remove the two lateral springs on the shoes.



- Remove the lower return spring on the shoes.



- Grip the the lower part of the shoes to open them, and remove the backlash adjustment device.

- Remove the upper return spring and release the two shoes from the handbrake cable transmission, then remove the two shoes.

- Check that the springs, the backlash adjustment device and the shoes are intact and in good working order. If any of the components are damaged, replace them.

When refitting, follow the above procedures in reverse order

Handbrake cable adjustment

Handbrake cable adjustment

- Place the vehicle on the hoist.
- Lift the vehicle, then loosen the handbrake cable fully.
- Re-tighten the adjusting nut on the handbrake cable in its original position.

- Make sure that when the handbrake lever is in the resting position, the rear wheels can rotate freely.
- Check that the handbrake’s braking action begins soon as you hear the mechanism's first click.
- Once the adjustment is complete, check that the lever does not require more than four or five recesses in the toothed section to engage.

ABS electro-hydraulic control unit – A.S.R.-– E.B.D. – E.S.P.

Removing the ABS electro-hydraulic control unit - A.S.R. - EBD – ESP valid for vehicles up to assembly no. 24274

- Disconnect the battery's negative terminal.
- Remove the trim guards.

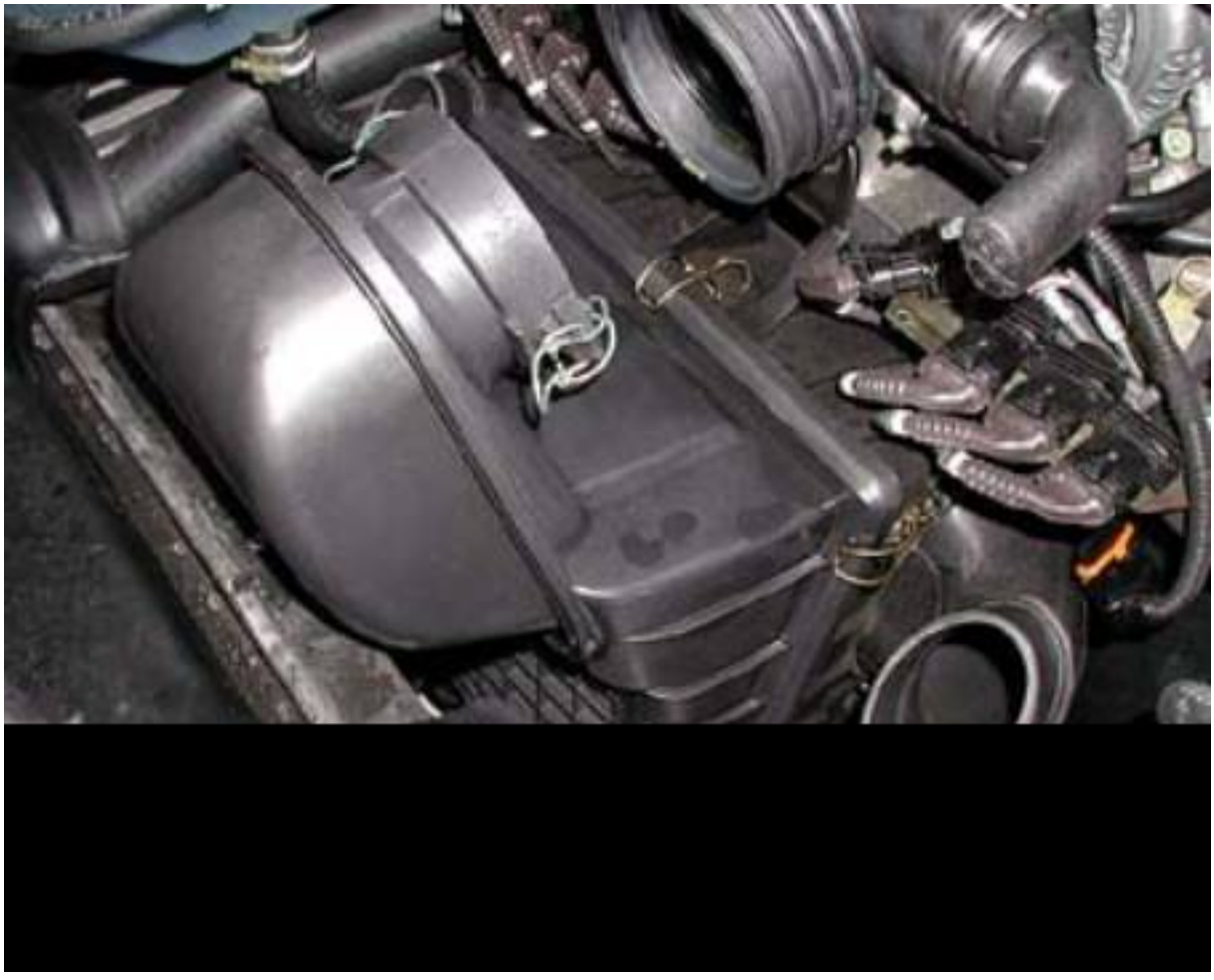
- Detach the electrical connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



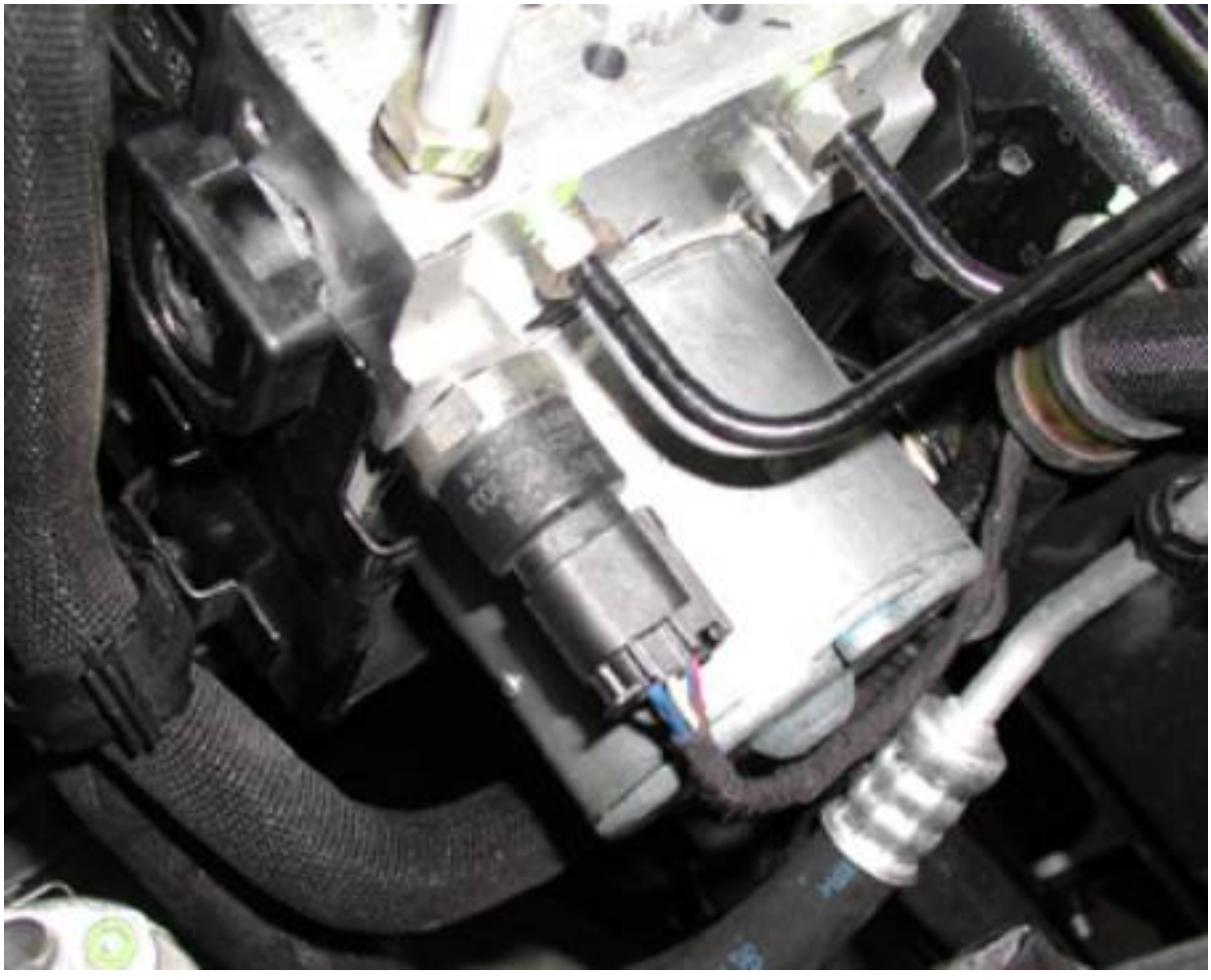
- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the domes' bar.

- Remove the air filter housing.

- Suck the oil from the brake oil tank.
- Detach the electrical connection on the A.B.S. electro-hydraulic control unit. – A.S.R.-– E.B.D. – E. S.P

- Detach the sensor’s electrical connection.



- Unscrew the pipeline unions on the front and rear calipers and the unions for the rigid pipelines coming from the brake master cylinder.

- Tighten the pin and remove the pin’s retaining clip.

- Remove the A.B.S. electro-hydraulic control unit – A.S.R.-– E.B.D. – E.S.P

Refitting the A.B.S. electro-hydraulic control unit – ASR - EBD – ESP valid for vehicles up to assembly no. 24274

- Fit the A.B.S. electro-hydraulic control unit – A.S.R.-– E.B.D. – E.S.P
- Unscrew the pin until it is flush with the bracket when centred, then fit the pin’s retaining clip.

- Tighten the unions on the rigid pipelines to a torque of **14 Nm**.

To refit the remaining components, proceed as outlined for the removal but reversing the order of the operations.

- Bleed the air system to remove any air that may have entered the lines or the A.B.S. control unit.

Bleeding the front brakes

Bleeding the rear brakes

- Top the brake system oil up to the correct level.

Circuit filling and level checks

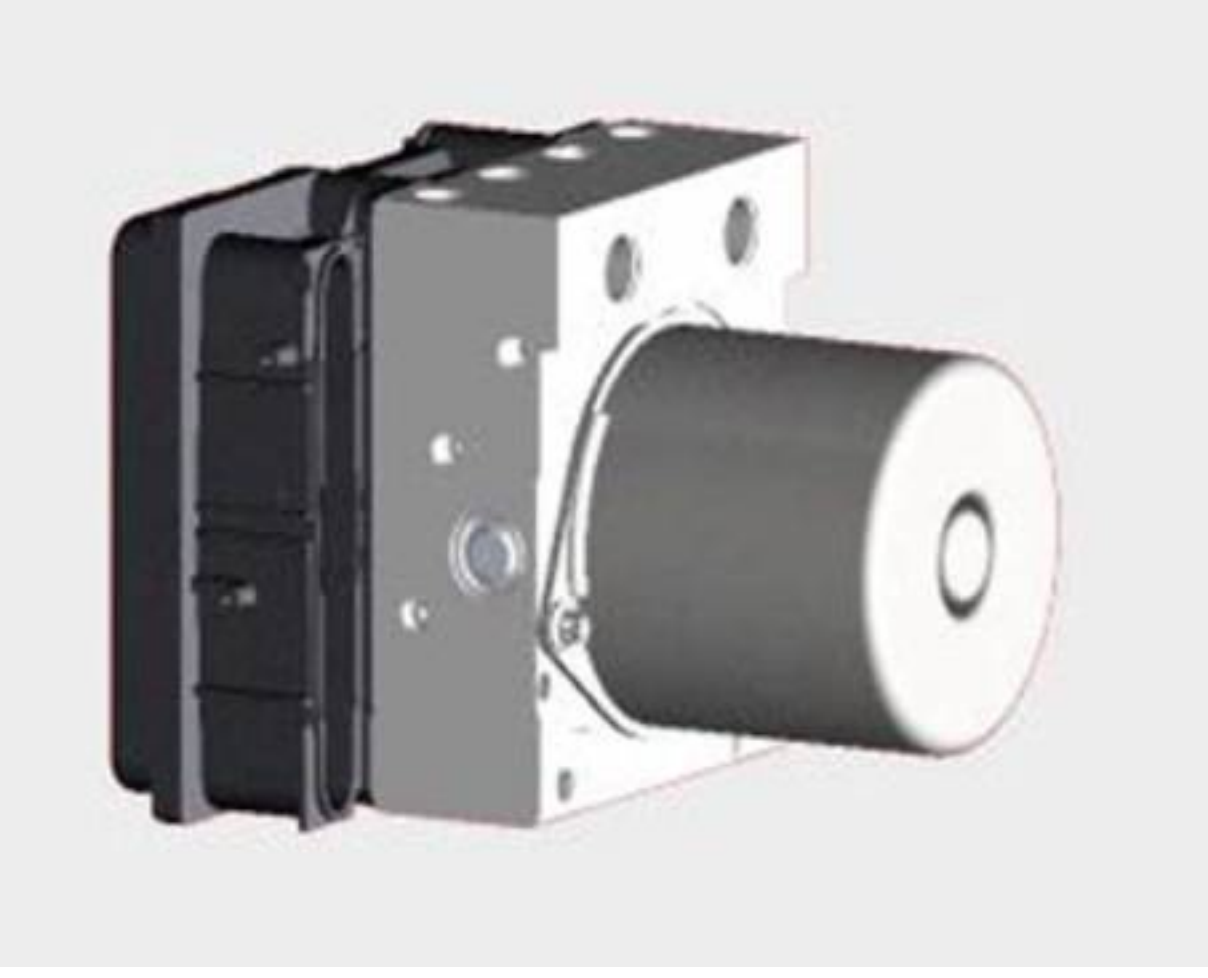
- After connecting the negative battery terminal, the following self-learning cycles must be run out to ensure certain connected devices acknowledge the system again:

Refer to section:

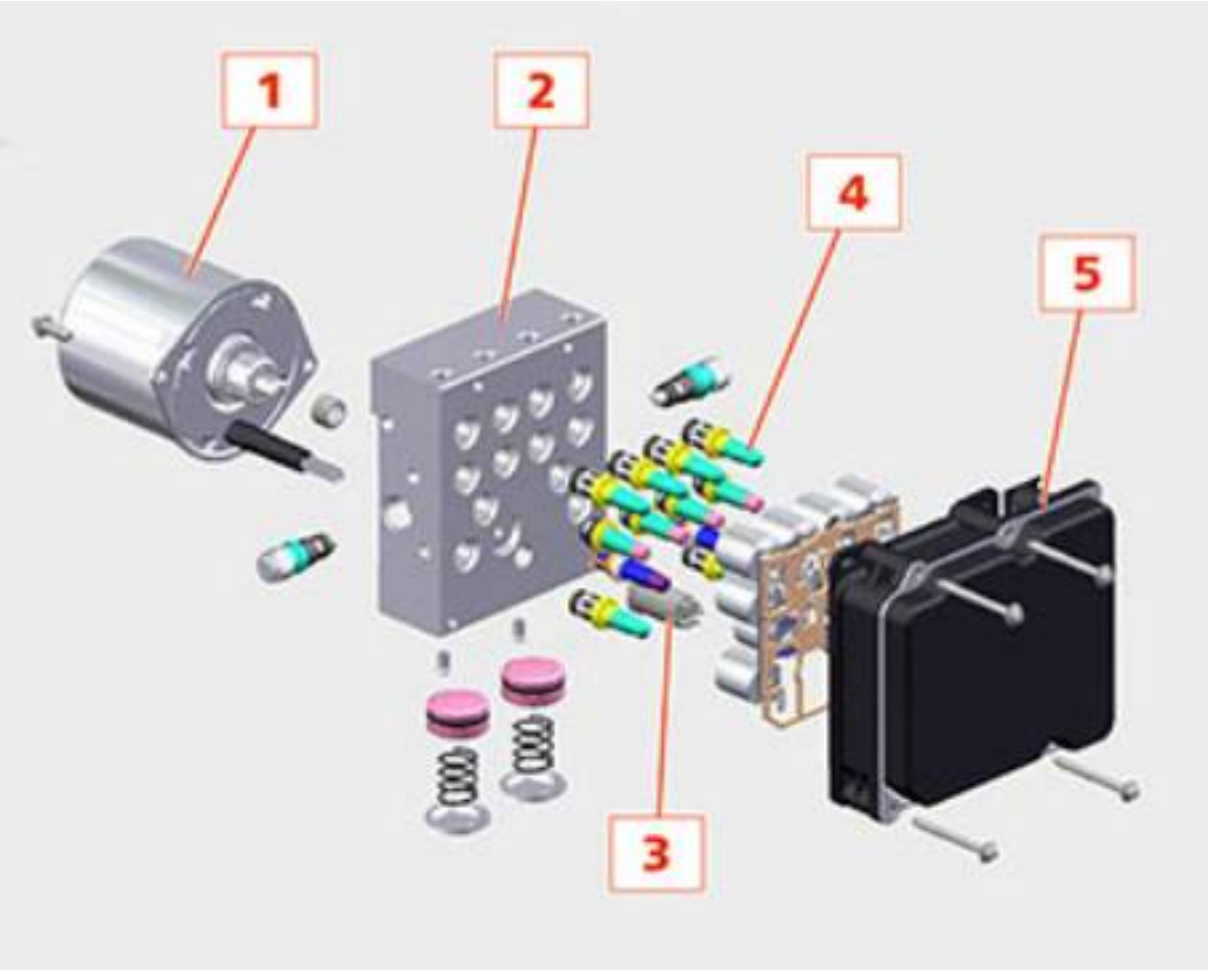
Component self-learning in the event of battery disconnection

Removing the A.B.S. electro-hydraulic control unit - A.S.R. - EBD – ESP valid for vehicles from assembly no. 24275

- From vehicle assembly no. **24275**, a new type of ABS equipped with Bosch ESP 8.0 system has been fitted; the dimensions and weight have been reduced by about 25% with respect to the previous ABS.



- The operating principles of the sub-functions are the same as those of the previous ABS – ESP 5.7. The exploded diagram below shows the components making up the new ABS - ESP 8.0.



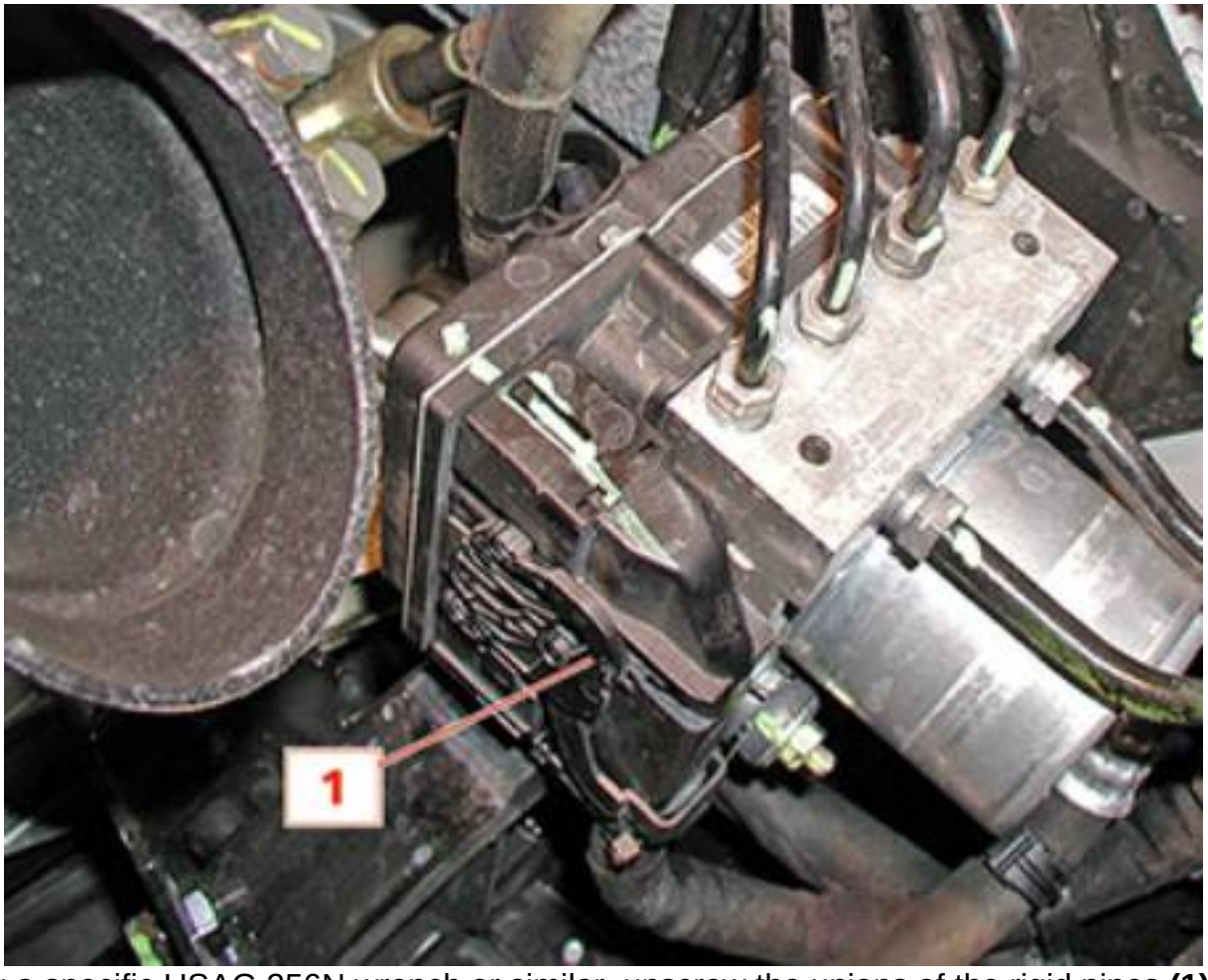
1. Pump motor
2. Valve block
3. Pressure sensor
4. Hydraulic valves
5. Electronic control unit
    - Disconnect the battery's negative terminal.
    - Remove the trim panels.

- Remove right-hand cold air intake pipe from the filter box.

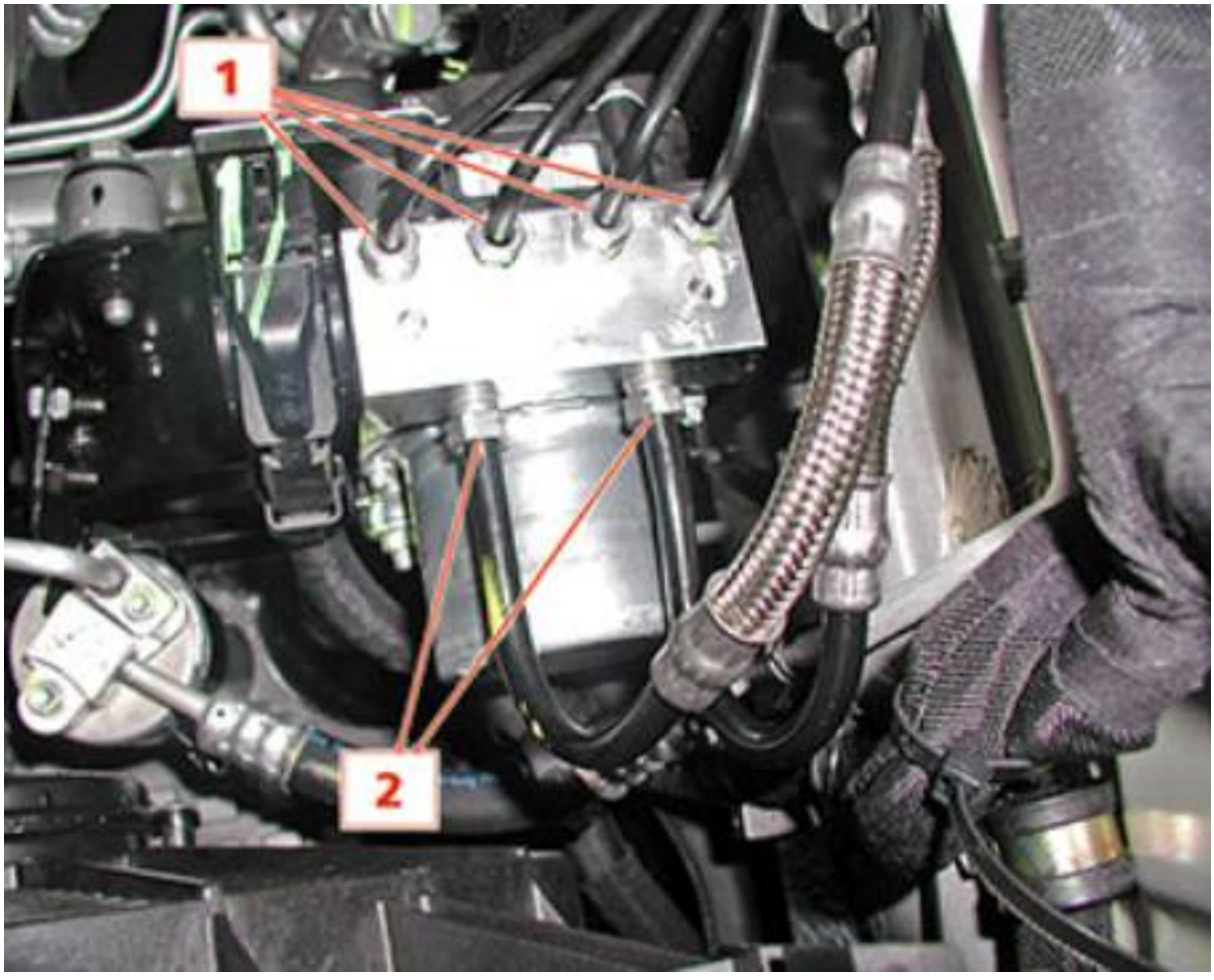
- Draw the oil from the brake oil tank.
- Lift the vehicle and remove the engine floor guard to prevent it from being soiled with brake oil.

Engine floor guard

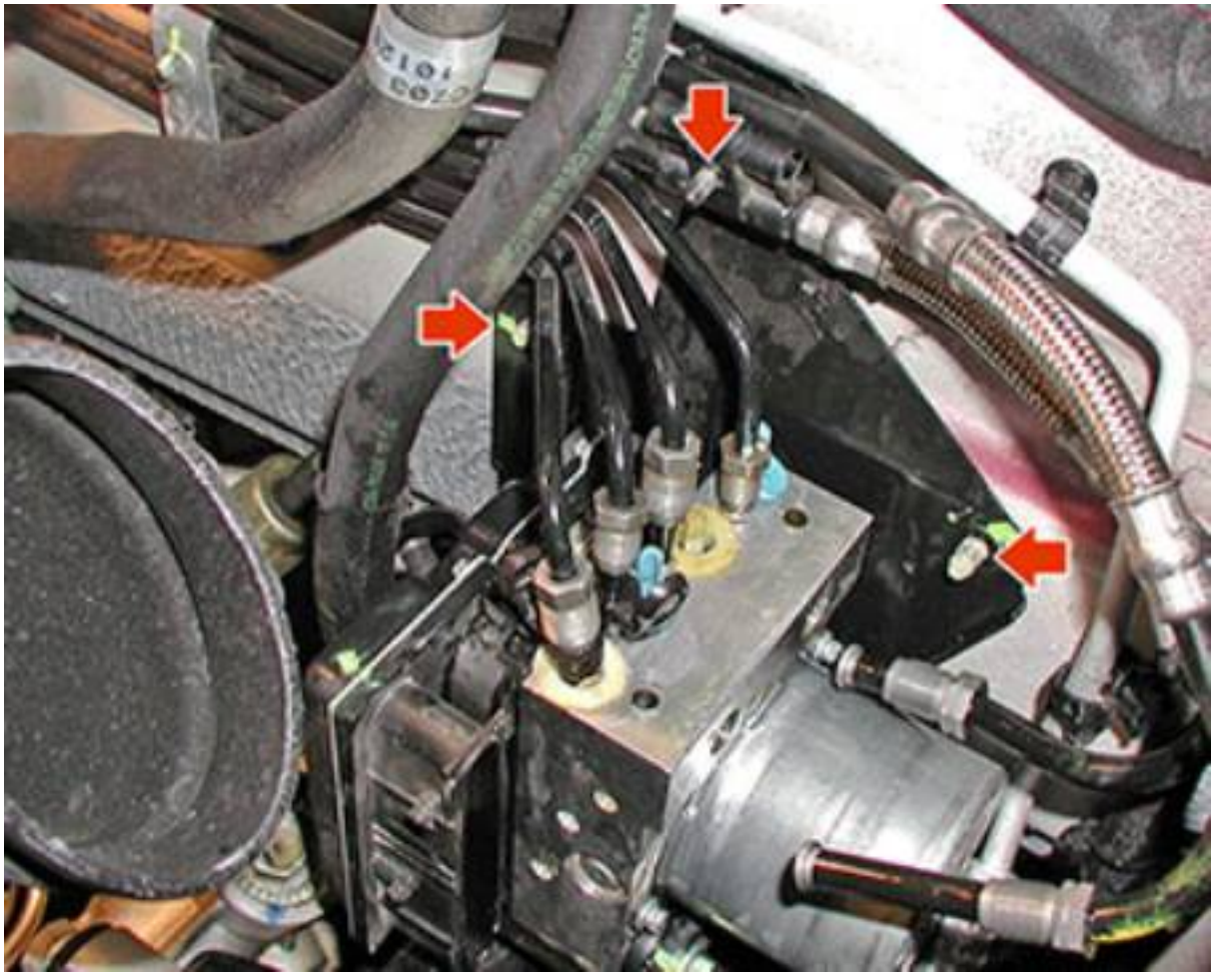
- Detach the electrical connector **(1)** on the ABS electro-hydraulic control unit. – ASR- EBD – ESP
- Scollegare la connessione elettrica **(1)** della centralina elettroidraulica A.B.S. – A.S.R.-E.B.D – E.S.P.



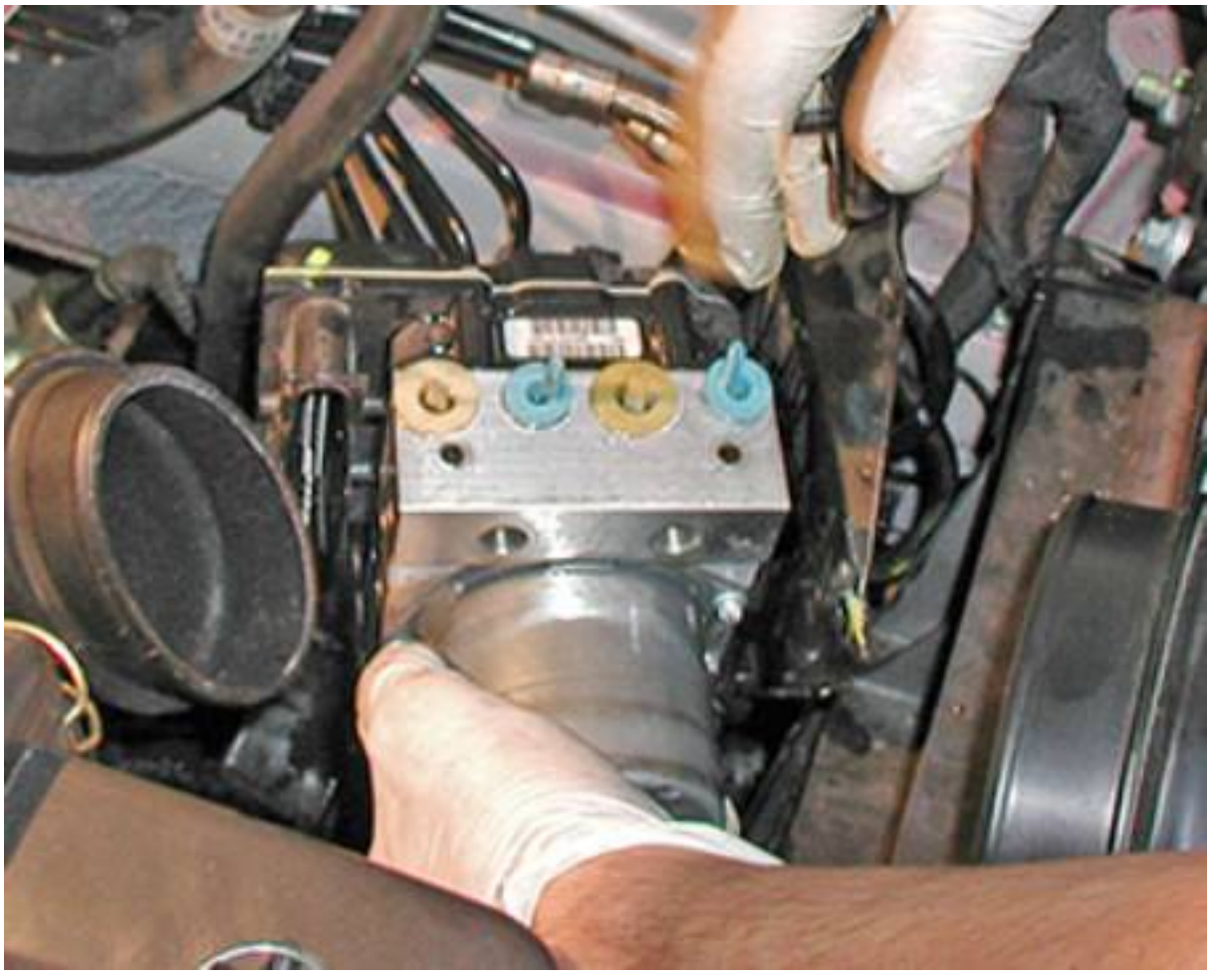
- Using a specific USAG 256N wrench or similar, unscrew the unions of the rigid pipes **(1)** on the front and rear calipers and the unions of the rigid pipes **(2)** leading from the brake pump.
- Plug the pipes and holes on the ABS to prevent infiltration of air and impurities.



- Unscrew the three retaining nuts of the ABS support bracket.



- Remove the ABS electro-hydraulic ECU complete with support bracket and place it on a bench.



- Unscrew the two retaining nuts **(1)** and lift the ABS electro-hydraulic ECU off the support bracket, removing it from the centring pin **(2)**.

Refitting the ABS electro-hydraulic control unit – ASR– EBD – ESP valid for vehicles from assembly no. 24275

- Fit the ABS electro-hydraulic ECU on the bracket, centring the pin in the hole on the bracket.
- Screw down the unit retaining nuts on the support bracket.
- Fit the ABS and bracket assembly and tighten the bracket retaining nuts to a torque of **7.4 Nm**.
- Screw down the unions of the brake pipes leading from the pump and the brake calipers, then tighten them to a torque of **14 Nm**.
- Detach the electrical connector of the ABS electro-hydraulic control unit. – ASR - EBD – ESP

- Bleed the air system to remove any air that may have entered the lines or the ABS control unit.

Bleeding the front brakes

Bleeding the rear brakes

- If replacing the ABS, use the SD3 diagnostic tester to delete the errors from the ABS ECU. Subsequently, access the PARAMETERS environment, display the parameters that the ECU has self-learned, print them and keep them in the vehicle logbook.
- Disconnect the SD3 tester.

- After connecting the battery's negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:

Refer to section:

Component self-learning in the event of battery disconnection

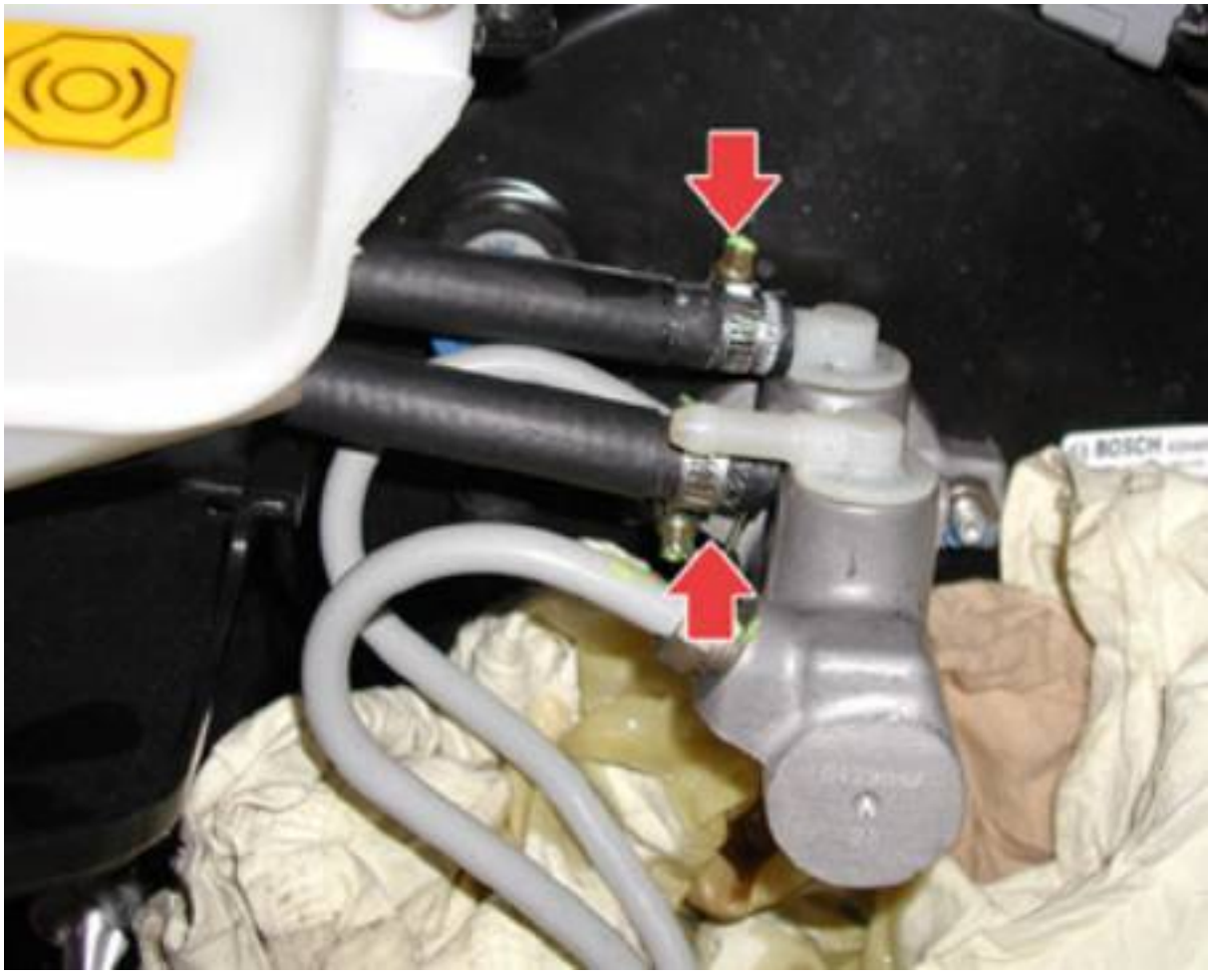
To refit the remaining components, proceed as outlined for the removal but reversing the order of the operations.

BRAKE/BRAKE SERVO PUMP

Removing the brake master cylinder/brake servo

- Remove the trim guards.

- Suck the oil from the brake oil tank.
- Disconnect the two oil delivery pipes (coming from the tank) from the brake master cylinder.

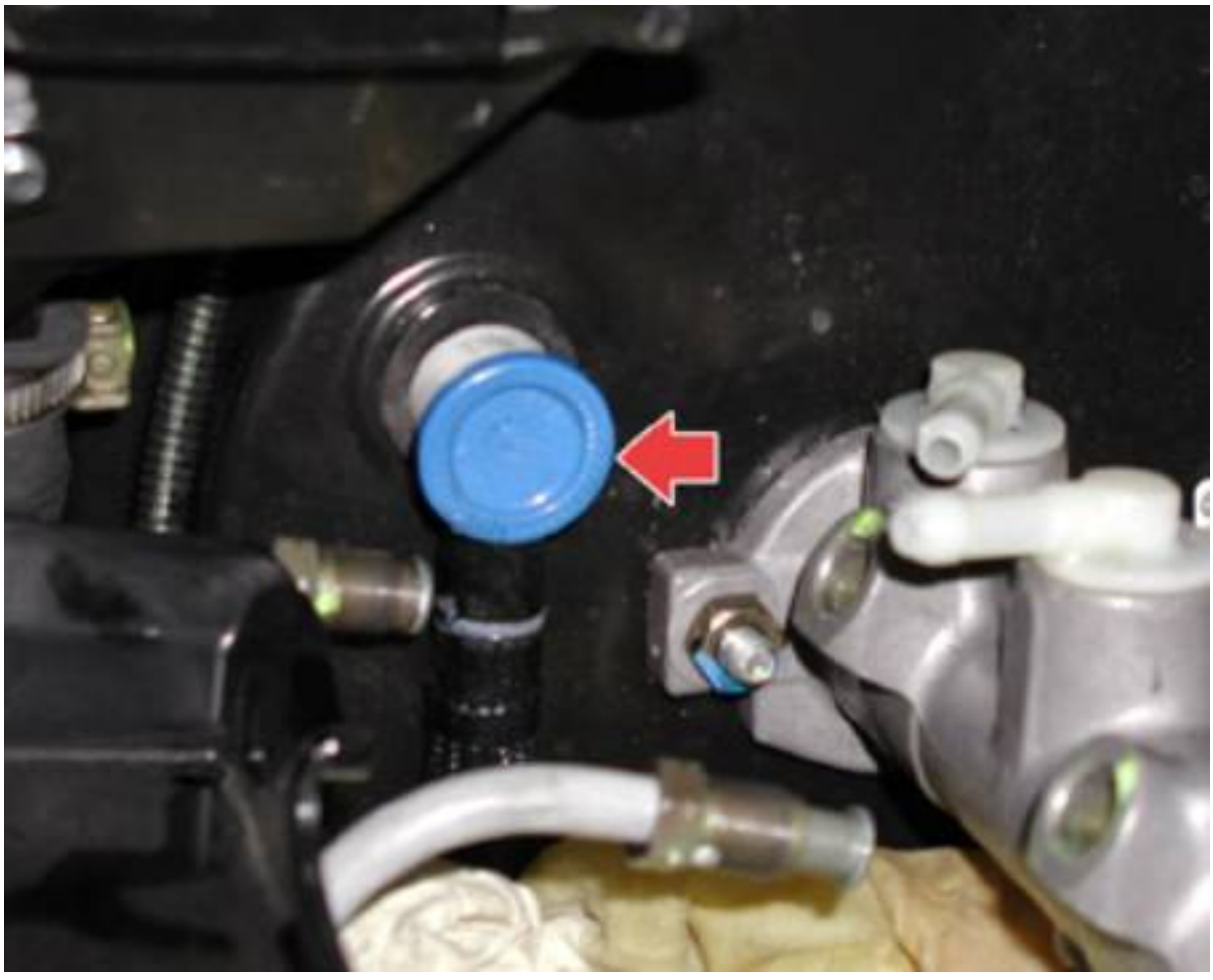


- Undo the screws fastening the brake oil tank.

- Detach the electrical connection and remove the brake oil tank.

- Unscrew the two unions and disconnect the two brake pipelines from the brake master cylinder

- Disconnect the one-way valve from the brake servo.



- Remove the body computer node.

Body computer node

- Remove the CD player compartment

CD player compartment

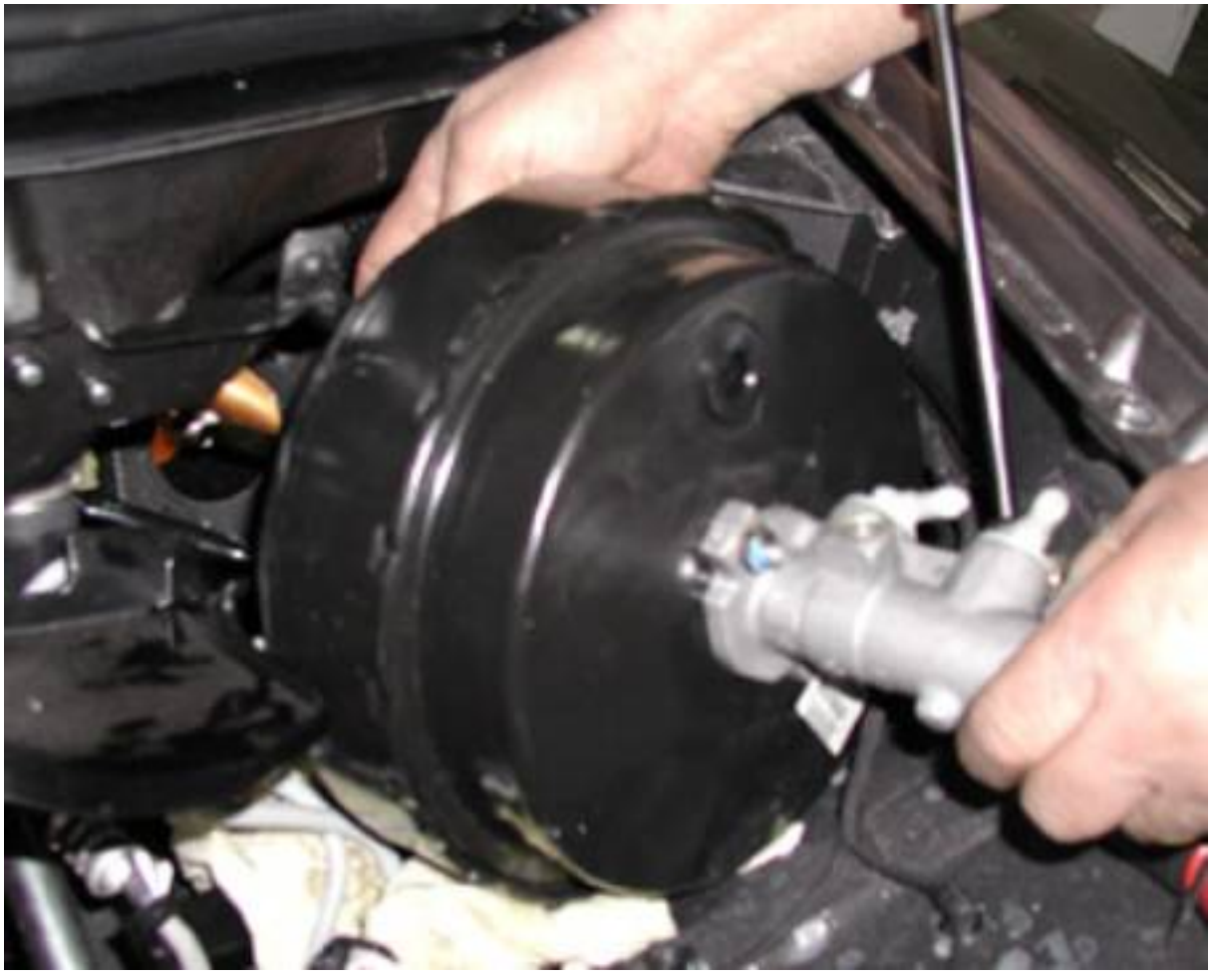
- Remove the brake pedal

Brake pedal

- Unscrew the two lower nuts fastening the brake servo.

- Unscrew the two upper nuts fastening the brake servo.

- Working from the engine compartment, remove the brake master cylinder and brake servo assembly.



Refitting the brake master cylinder/brake servo

- Working from the engine compartment, fit the brake master cylinder and brake servo assembly
- Working from inside the vehicle, tighten the four nuts on the brake master cylinder and brake servo assembly to a torque of **24 Nm**.

- Fit the brake pedal

Brake pedal

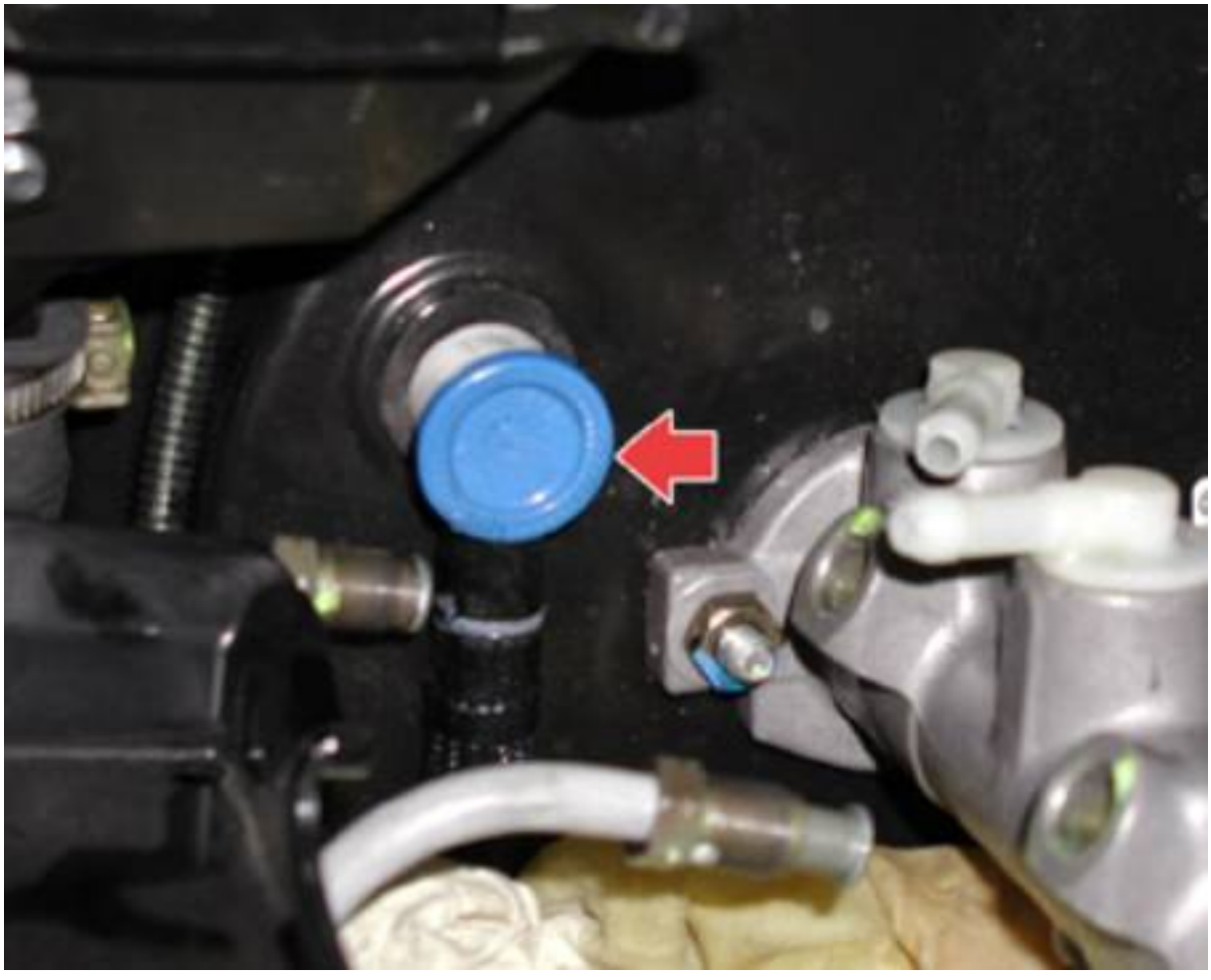
- Fit the CD player compartment

CD player compartment

- Fit the body computer node.

Body Computer Node

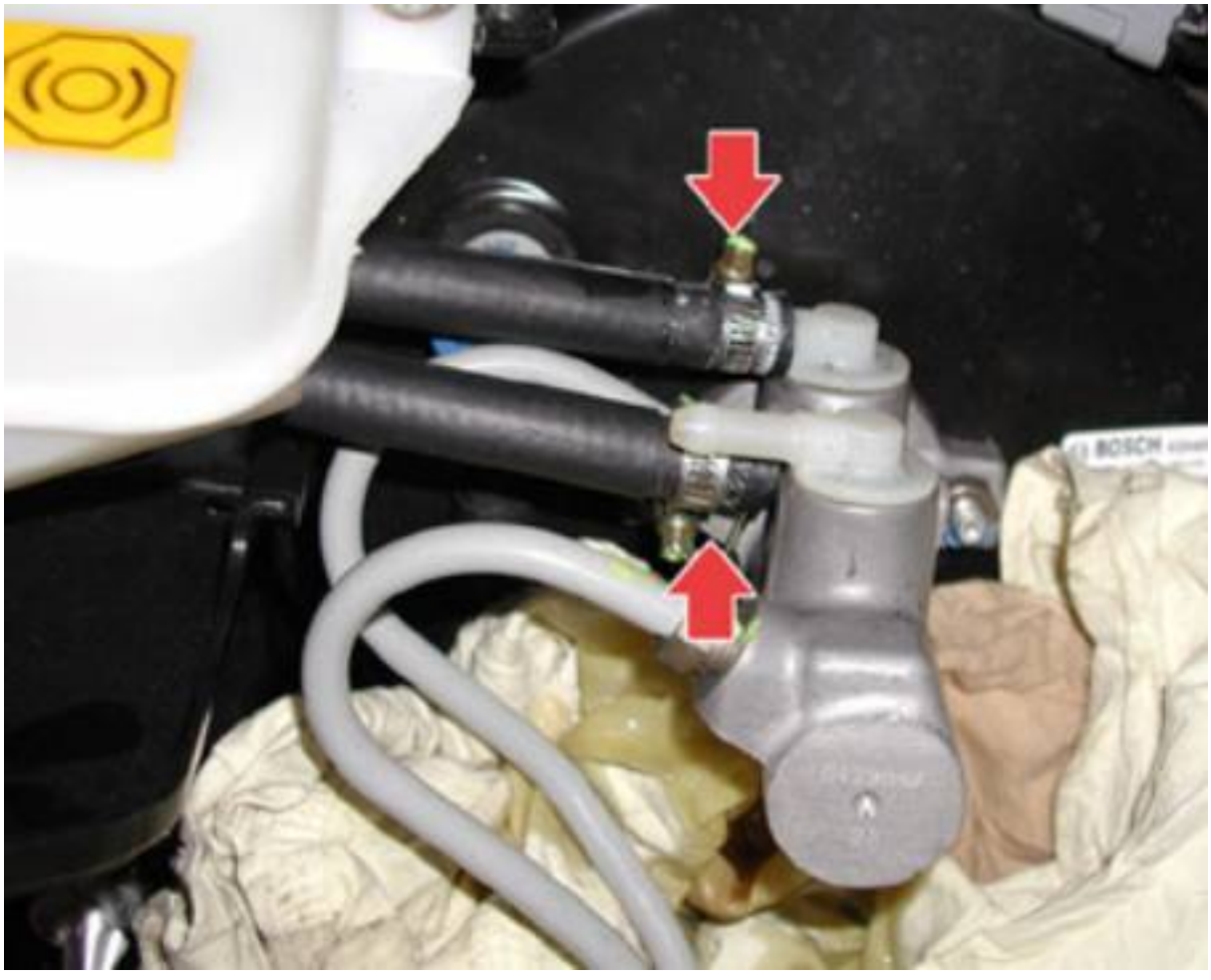
- Connect the one-way valve from the brake servo.



- Tighten the two unions on the brake pipelines to a torque of **14 Nm**.

- Attach the electrical connection for the low brake oil level warning light .
- Screw up the screws fastening the brake oil tank.

- Connect the two oil delivery pipes (coming from the tank) to the brake master cylinder.



- Fit the trim guards.

- Bleed the air system to remove any air that may have entered the lines or the A.B.S. control unit.

Bleeding the front brakes

Bleeding the air in the rear brake fluid circuit

- Top the brake system oil up to the correct level.

Circuit filling and level checks

Pedal board mount replacement

Removing the pedal board mount

- Remove the Body computer node.

Body Computer Node

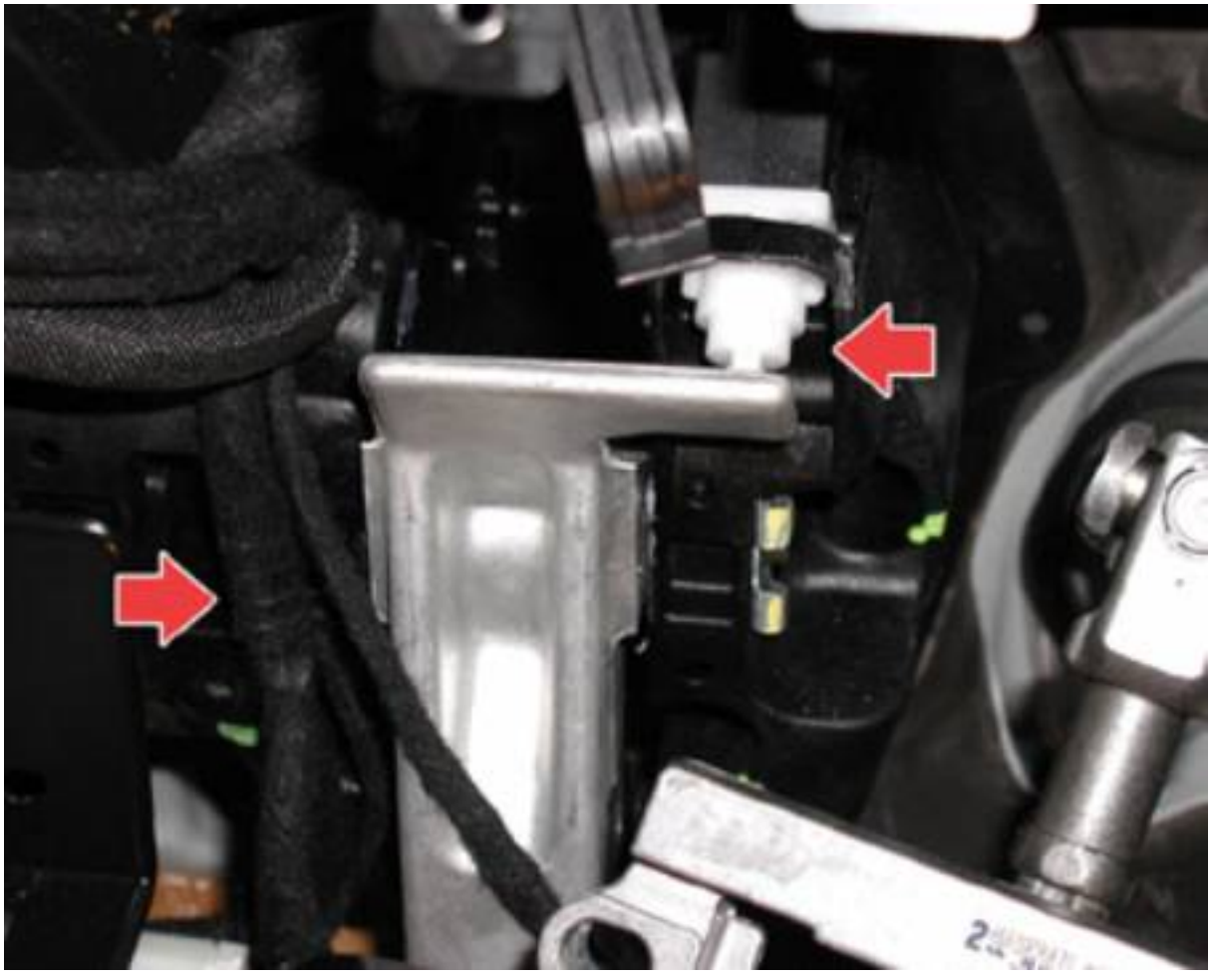
- Remove the dashboard trim panel.

Removing-refitting the dashboard

- Undo the screws fastening the steering column to the air conditioning/heating unit support frame.

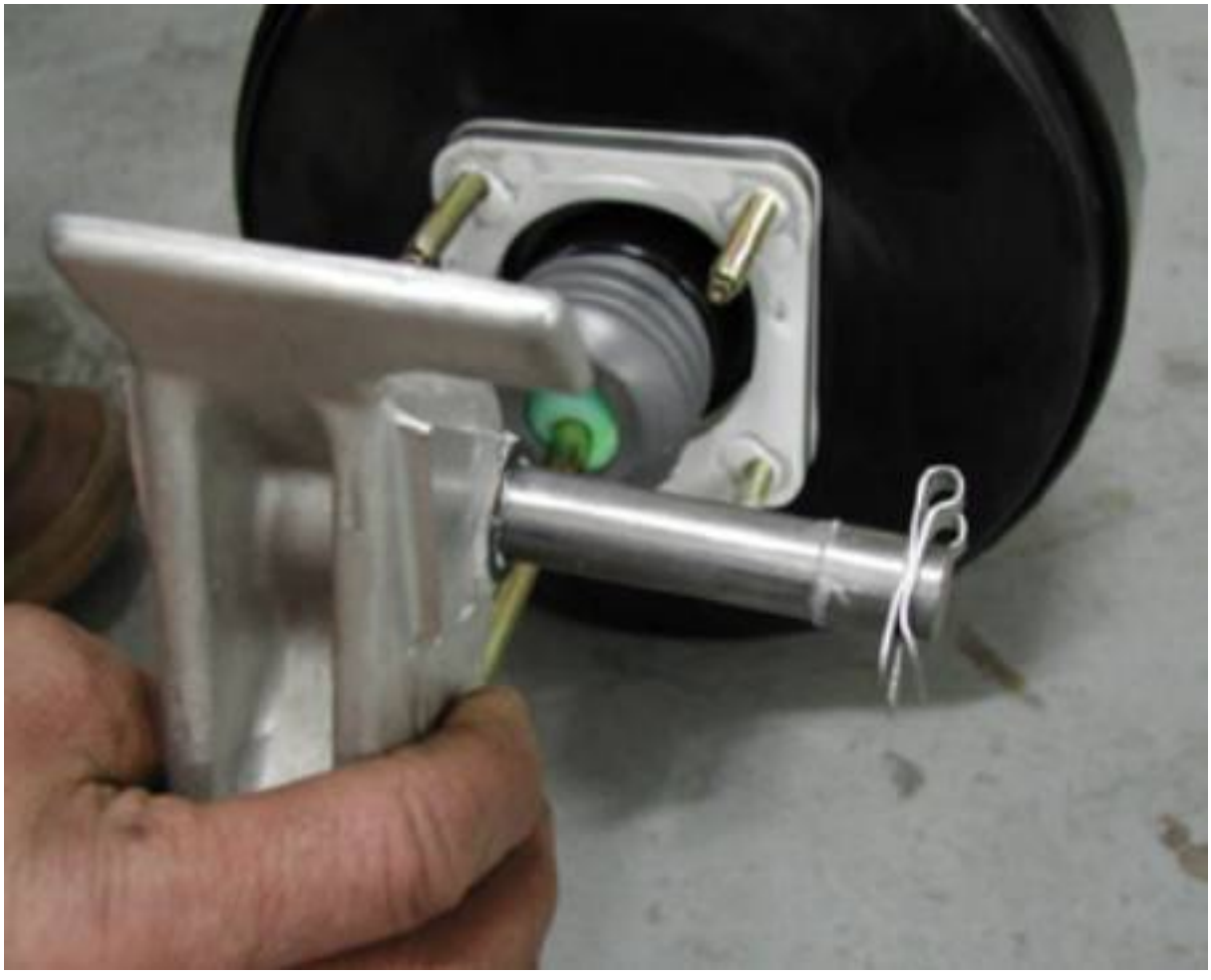
- Undo the lower screws fastening the steering column to the air conditioning/heating unit support frame, then lower the steering column.

- Remove the fastening clip on the brake pedal pin, then remove the brake pedal switch from its seat on the mount.



- Take out the accelerator pedal fastening pin.

N.B.
For photographic reasons, the operation was photographed on the bench.



- Disconnect the brake servo push rod from the bushing on the brake pedal, then remove the pedal.

N.B.
For photographic reasons, the operation was photographed on the bench.

- Unscrew the two upper and lower nuts fastening the brake servo to the pedal board mount.

- Unscrew the fastening nuts and remove the pedal board mount.

Refitting the pedal board mount

- Fit the pedal board mount and tighten the fastening nuts to a torque of **24 Nm**.
- Tighten the four nuts on the brake master cylinder and brake servo assembly to a torque of **24 Nm**.

- Fit the accelerator pedal and connect the brake servo push rod from the bushing on the brake pedal.
- Check that the plastic components (colour: black and white) which fasten the brake servo push rod are intact. As a rule, these should be replaced every time the pedal is removed.

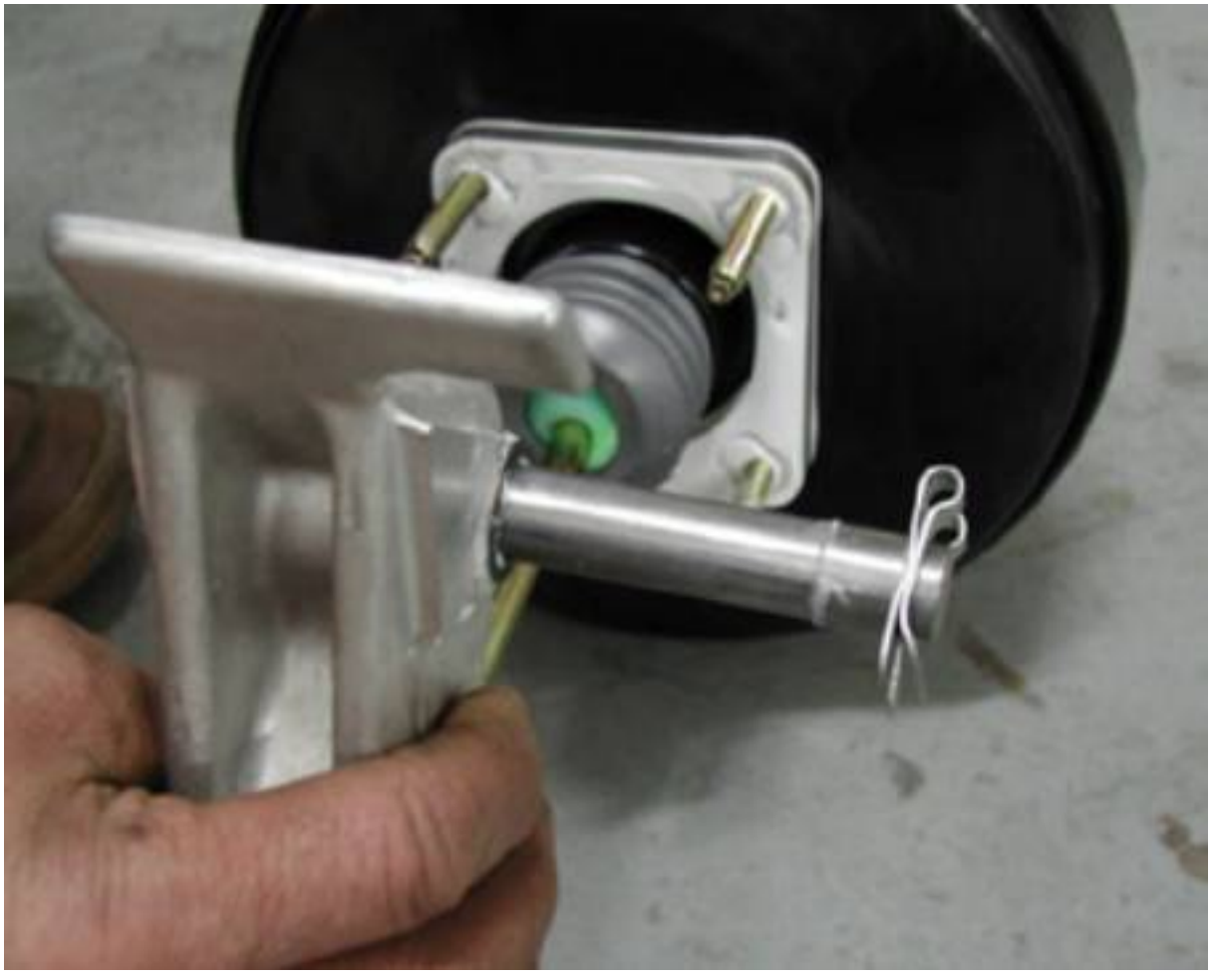
N.B.

For photographic reasons, the operation was photographed on the bench.

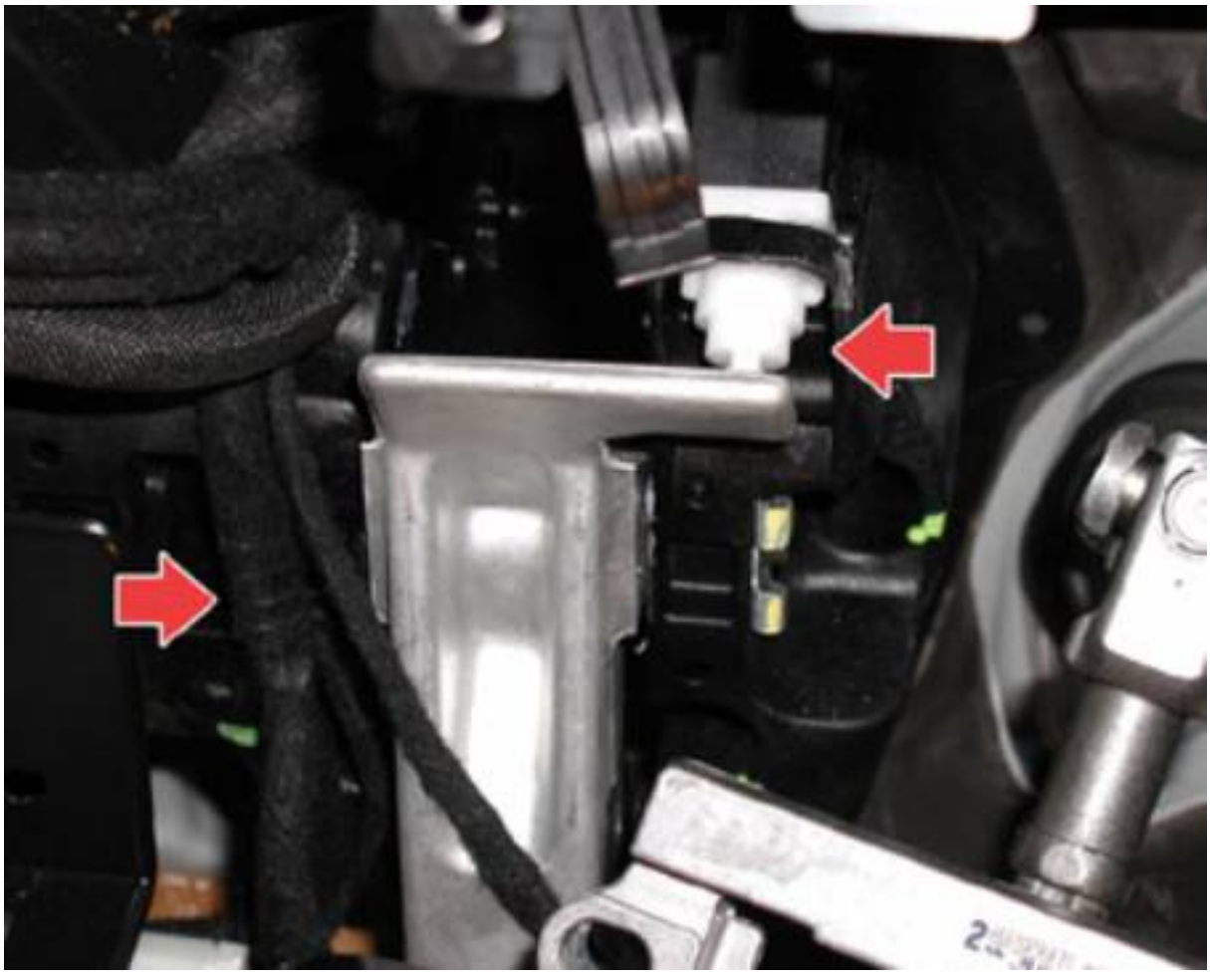
- Insert the pedal fastening pin fully down, pushing from the clip side to secure the pedal on the pedal board mount.

N.B.

For photographic reasons, the operation was photographed on the bench.



- Fasten the pin by inserting the brake pedal fastening clip, then fit the brake pedal switch from the seat on the mount.



- Tighten the screws with M8 threading to a torque of **24 Nm** and the screw with M6 threading to a torque of **7.4 Nm** to fasten the steering column to the dashboard mounting crossmember.

- Fit the dashboard trim panel.

Removing-refitting the Dashboard

- Fit the Body computer node.

Body Computer Node

BRAKE PEDAL

Removing the brake pedal

- Remove the driver's side glove compartment.

Driver's side glove compartment

- Remove the Body computer node.

Body Computer Node

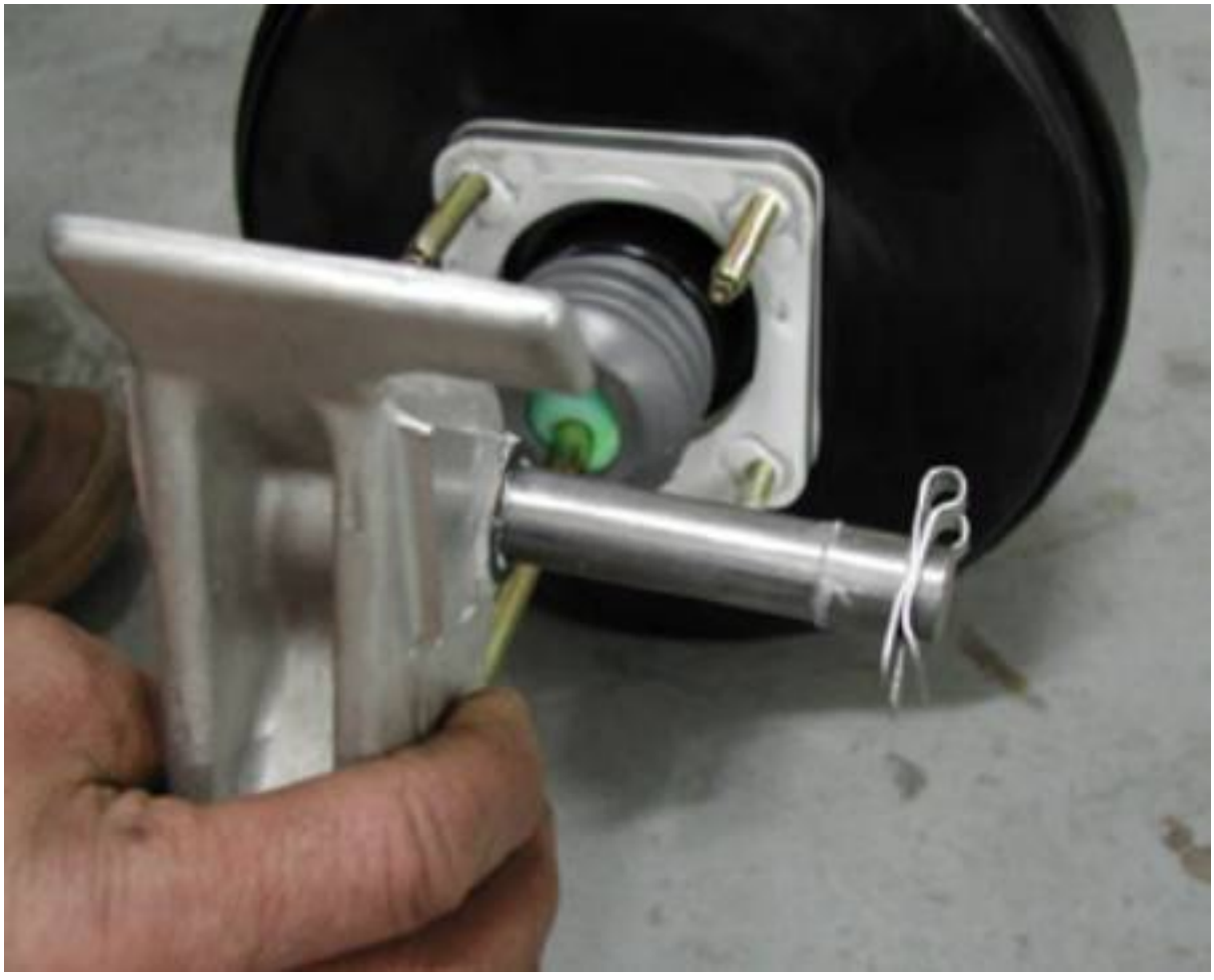
- Remove the CD player compartment

CD player compartment

- Undo the two screws and the fastening nut, then remove the bracket.

- Remove the clip fastening the brake pedal pin.

- Take out the accelerator pedal fastening pin.



- Disconnect the brake servo push rod from the bushing on the brake pedal, then remove the pedal.

Refitting the brake pedal

- Check that the plastic components (colour: black and white) which fasten the brake servo push rod are intact. As a rule, these should be replaced every time the pedal is removed.

To refit the remaining components, proceed as outlined for the removal but reversing the order of the operations.

tightening torques

Tightening torques valid for EUROPE vehicles up to assembly no. **18534** in the left-hand drive version and **17235** in the right-hand drive versions.

Description	Torque	Product
Front suspensions		
Nut for fastening lower lever to hub carrier	63 Nm	
Nut for fastening upper lever to hub carrier	52 Nm	
Threaded ring nut for locking shock absorber disc	59 Nm	
Nut for fastening hyperbloc to shock absorber	75 Nm	
Screw for shock absorber to lower lever fastening nut	78 Nm	
Nut for shock absorber to lower lever fastening screw	78 Nm	
Screw with eccentric for fastening lower lever	98 Nm	
Nut for fastening lower lever	98 Nm	
Screw for shock absorber to upper lever fastening nut	78 Nm	
Nut for fastening upper lever	78 Nm	
Screw for upper shock absorbers fastening	33,6 Nm	
Screw for fastening bar support to underframe	31 Nm	
Nut for fastening connecting rods to rollbar	50 Nm	
BOGE sensor fastening screws	8 Nm	
Nut fastening potentiometer tie-rod for Xenon headlights	4,4 Nm	
Rear suspensions		
Threaded self-locking nut for fastening lower lever to hub carrier	52 Nm	

Nut and counternut for toe-in tie-rod	78 Nm	
Nut and counternut for tie-rod ball joint	50 Nm	
Self-braking nut for fastening toe-in tie-rod to hub carrier	80 Nm	
Nut for fastening upper lever to hub carrier	52 Nm	

Description	Torque	Product
Threaded ring nut for locking shock absorber disc	59 Nm	
Self-locking nut for fastening hyperbloc to shock absorber	75 Nm	
Special screw for fastening shock absorber to hub carrier	196 Nm	
Nut complete with washer	275 Nm	
Screw with eccentric for fastening lower lever	98 Nm	
Nut for fastening lower lever	98 Nm	
Self-locking screw for fastening toe-in tie-rod to underframe	80 Nm	
Screw for fastening upper lever	78 Nm	
Nut for upper lever fastening screw	78 Nm	
Screw for fastening axle shafts to the gearbox	80 Nm	
Screw for upper shock absorbers fastening	33,6 Nm	
Nut for fastening bar to underframe	24 Nm	
Nut for fastening connecting rods to rollbar	50 Nm	
Nut fastening potentiometer tie-rod for Xenon headlights	4,4 Nm	
Front chassis		

Front chassis fastening screws	123 Nm	
Rear chassis		
Screws fastening rear chassis	123 Nm	
Wheels		
Stud bolts fastening front and rear wheels	Pre-tightening to 130 Nm, loosening and tightening to 98 Nm	

Tightening torques valid for **EUROPE** vehicles from assembly **18535** in the left-hand drive version and **17236** in the right-hand drive versions; In addition, for all the **USA - CND** versions

Description	Torque	Product
Front suspensions		
Lower lever/hub carrier fastening nut	- pre-tightening to 90 Nm - complete untightening - tightening to 63 Nm	
Nut for fastening upper lever to hub carrier	52 Nm	
Threaded ring nut for locking shock absorber disc	59 Nm	
Nut for fastening hyperbloc to shock absorber	40 Nm	
Screw for shock absorber to lower lever fastening nut	78 Nm	
Nut for shock absorber to lower lever fastening screw	78 Nm	
Screw with eccentric for fastening lower lever	120 Nm	
Nut for fastening lower lever	120 Nm	
Screw for fastening upper lever	120 Nm	

Nut for fastening upper lever	120 Nm	
Screw for upper shock absorbers fastening	25 Nm	
Screw for fastening bar support to underframe	40 Nm	
Nut for fastening connecting rods to rollbar	50 Nm	
Connecting rod-suspension lever fastening	40 Nm	
Nut fastening potentiometer tie-rod for Xenon headlights	7,4 Nm	
Rear suspensions		
Threaded self-locking nut for fastening lower lever to hub carrier	52 Nm	
Nut and counternut for toe-in tie-rod	78 Nm	
Nut and counternut for tie-rod ball joint	50 Nm	
Self-braking nut for fastening toe-in tie-rod to hub carrier	45 Nm	
Nut for fastening upper lever to hub carrier	52 Nm	

Description	Torque	Product
Threaded ring nut for locking shock absorber disc	59 Nm	
Self-locking nut for fastening hyperbloc to shock absorber	40 Nm	
Special screw for fastening shock absorber to hub carrier	78 Nm	
Nut complete with washer	275 Nm	
Screw with eccentric for fastening lower lever	120 Nm	
Nut for fastening lower lever to screw with cam	120 Nm	
Self-locking screw for fastening toe-in tie-rod to underframe	63 Nm	

Screw for fastening upper lever	98 Nm	
Nut for upper lever fastening screw	98 Nm	
Screw for fastening axle shafts to the gearbox	80 Nm	
Screw for upper shock absorbers fastening	25 Nm	
Left-hand blind nut for fastening point 1 of the lower lever	35 Nm	
Nut fastening point 1 of the lower lever to the stud bolt	retightening to 30 Nm + 120 Nm	
Nut fastening toe-in tie-rod to lower part of frame	63 Nm	
Nut for fastening bar to underframe	24 Nm	
Nut for fastening connecting rods to rollbar	50 Nm	
Connecting rod-hub carrier fastening	40 Nm	
Nut fastening potentiometer tie-rod for Xenon headlights	7,4 Nm	
Front chassis		
Front chassis fastening screws	123 Nm	
Rear chassis		
Screws fastening rear chassis	123 Nm	

Description	Torque	Product
Wheels		
Stud bolts fastening front and rear wheels	Pre-tightening to 130 Nm, loosening and tightening to 98 Nm	

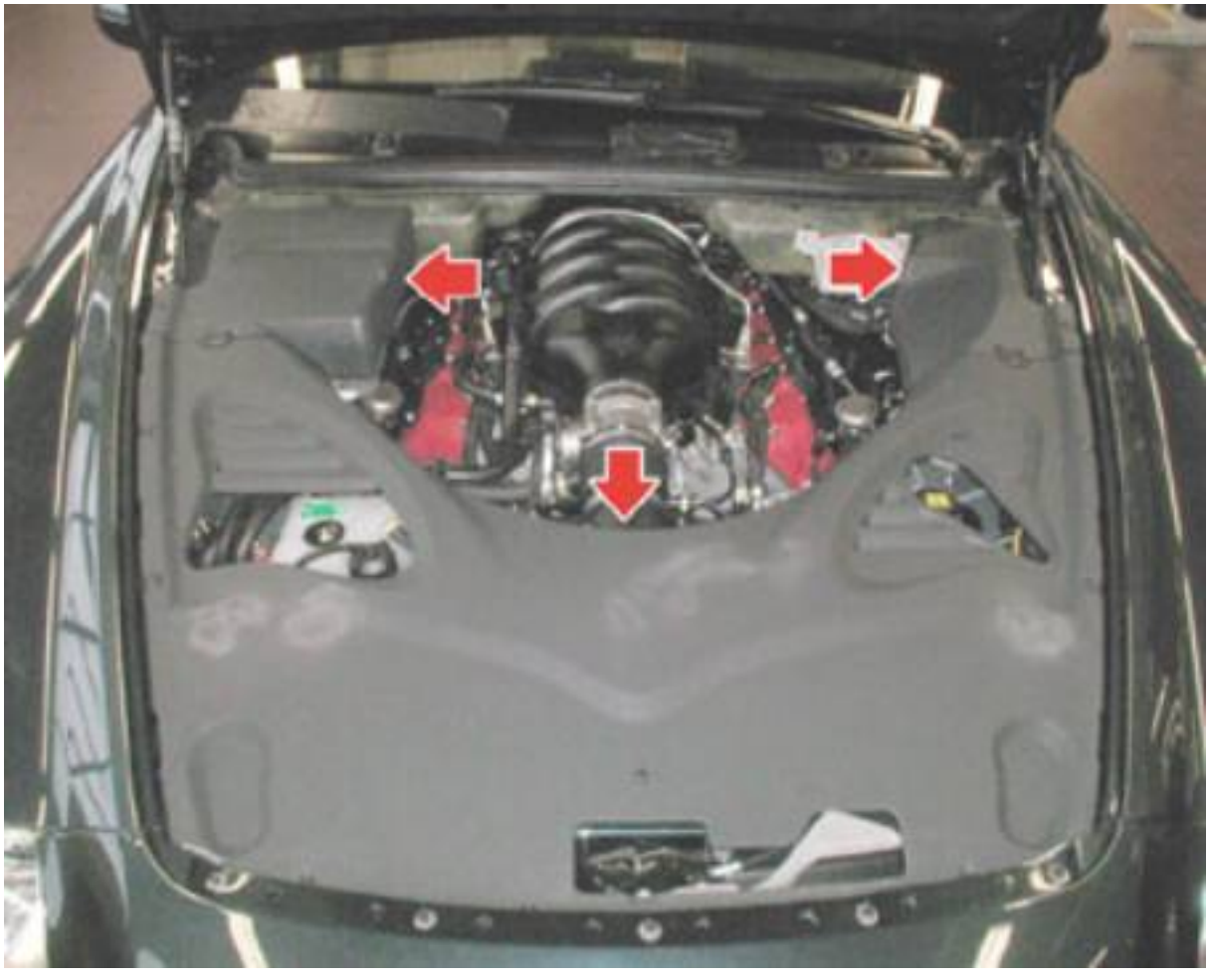
Front shock absorbers

Removing the front shock absorbers

- Disconnect the negative terminal of the battery.
- Remove the wheel concerned.

Replacing the wheels

- Remove the trim panels.



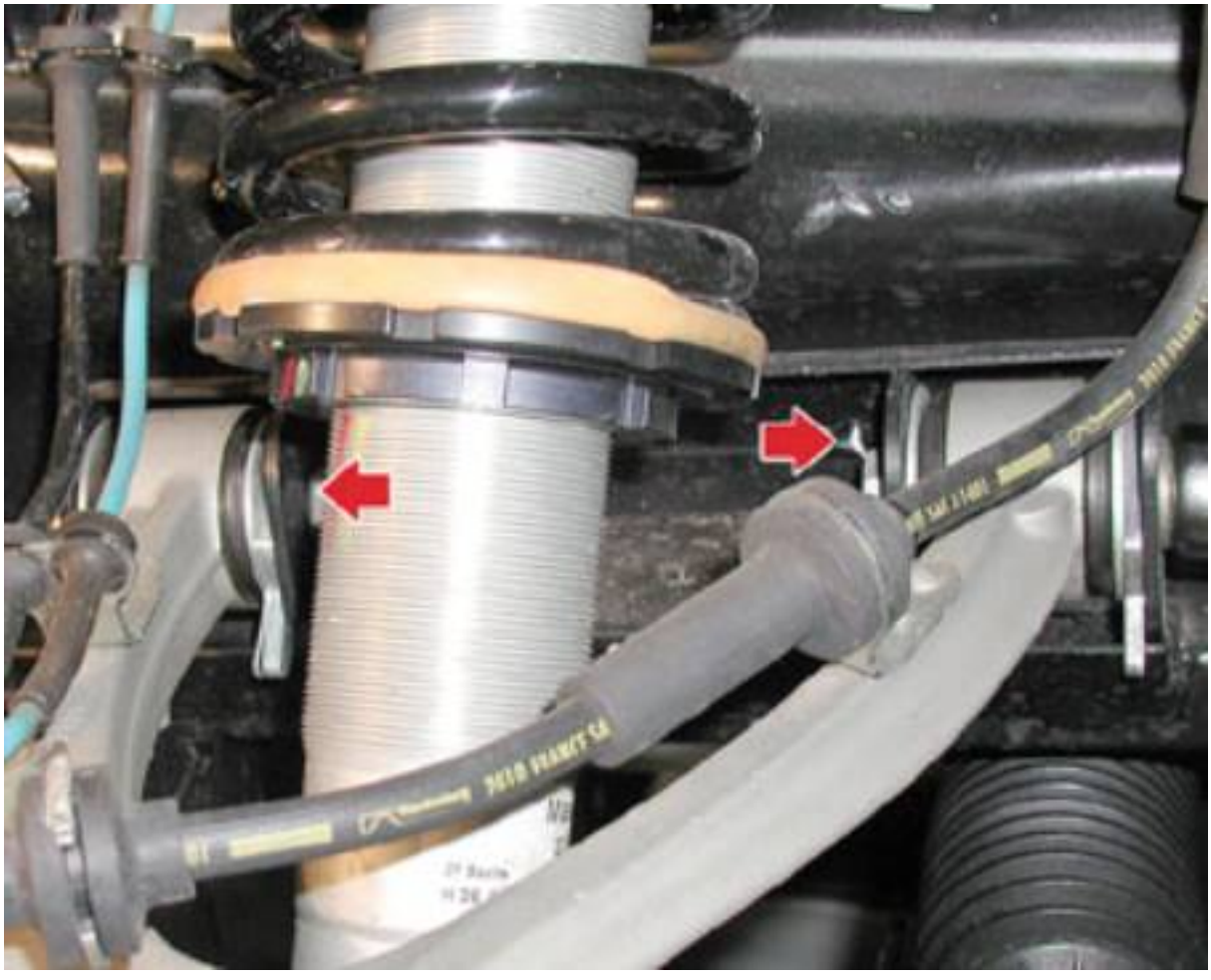
- Detach the shock absorber’s electrical connection.

- Undo the lower fastening screws on the wheel bay dust-protection guard.

- Unscrew the six fastening screws, and remove the five snap-studs, then remove the wheel bay dust-protection guard.

- Release the electrical wiring and the oil line from the fastening on the upper wishbone.

- Unscrew the bolts that fasten the upper fastening wishbone (lever) to the bodywork.



- Remove the spacers and the washers, remembering to note down the number of spacers removed and their positions.

- Unscrew the nuts that fasten the front wheels’ vertical acceleration sensor.

- Undo the screws that fasten the shock absorber to the dome.

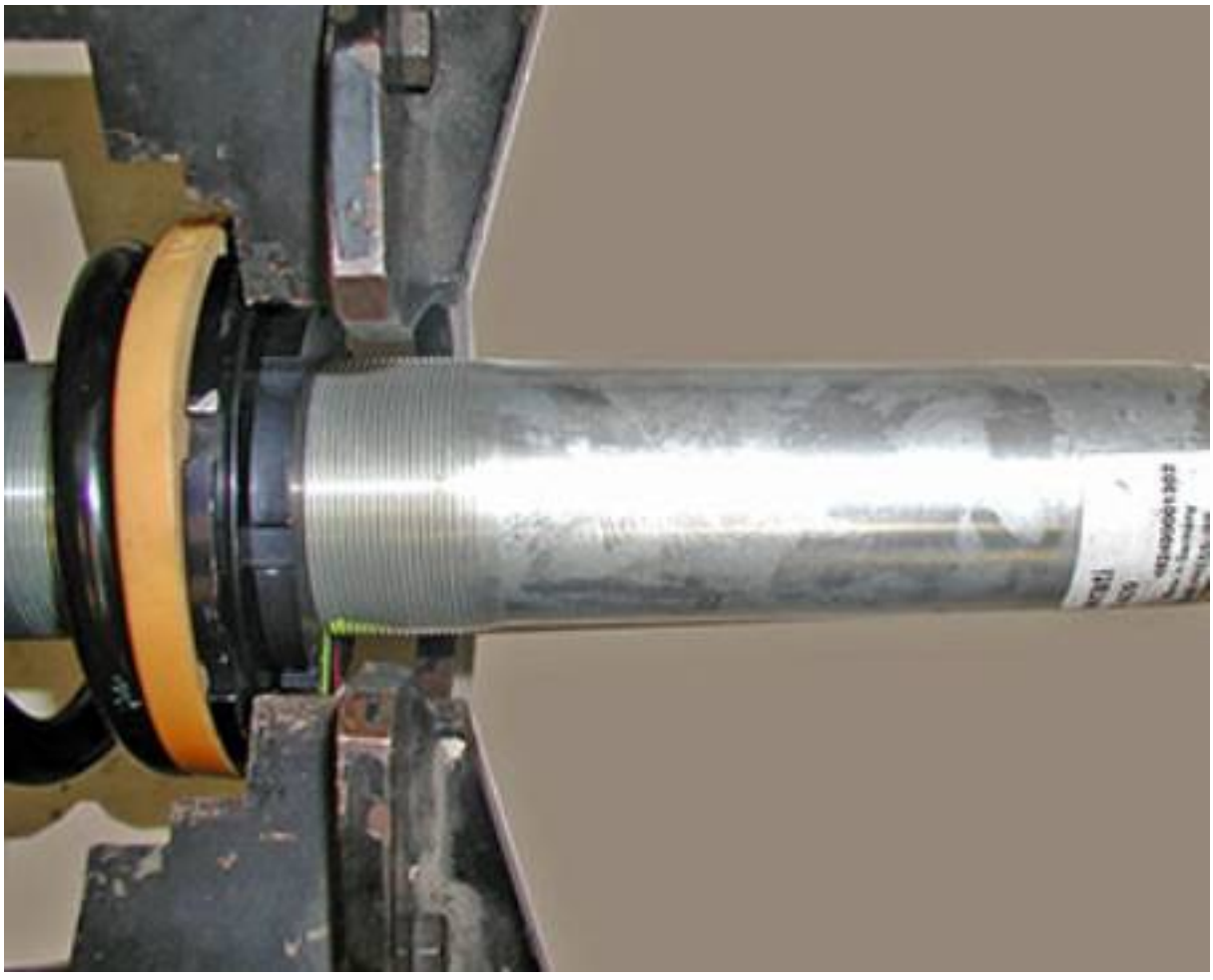
- Unscrew the bolt that fastens the shock absorber to the lower wishbone (lever)

- Remove the shock absorber from it seat.

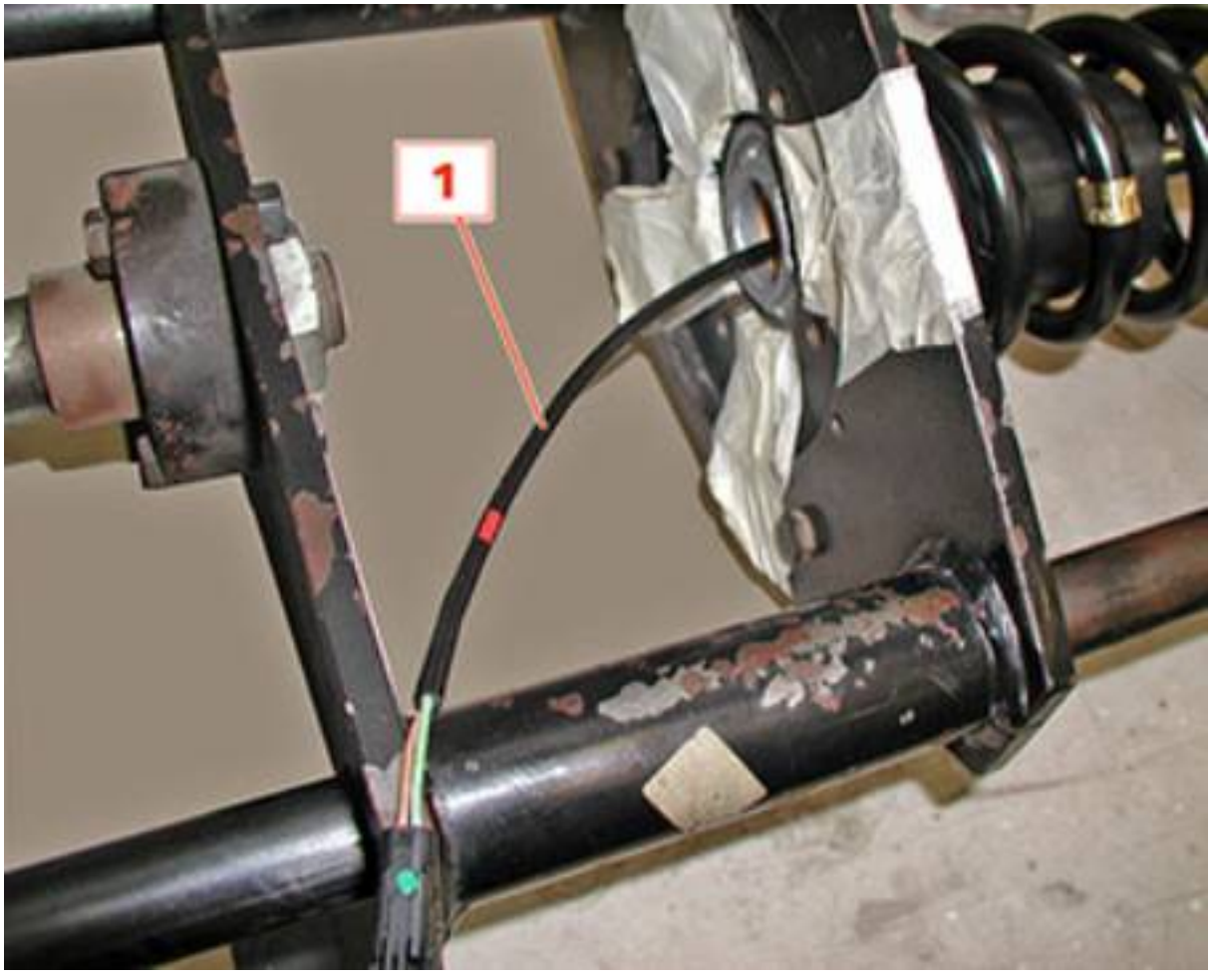
Removing the front shock absorbers

- Mount the shock absorber in a suitable press to compress its spring.

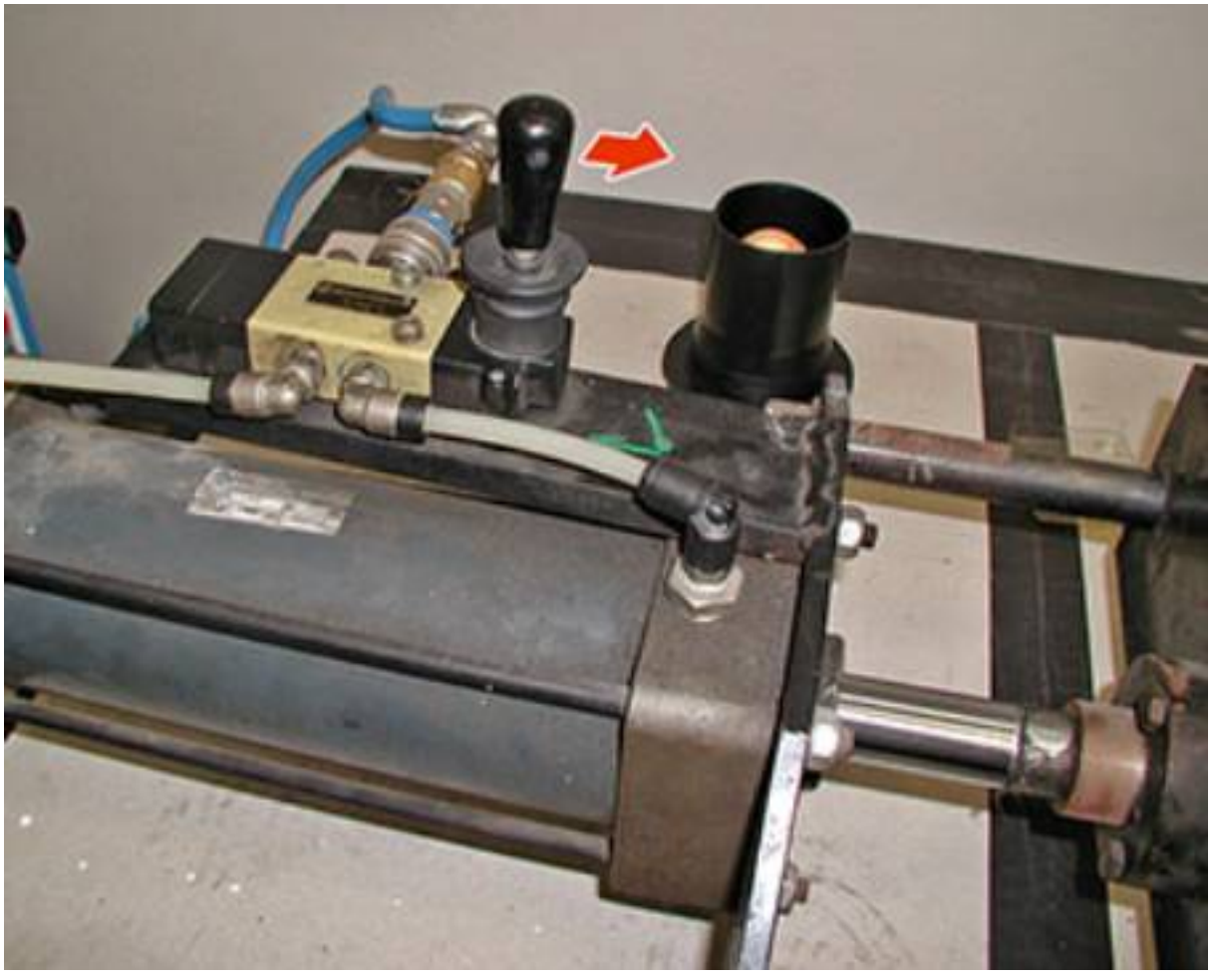
- Check that the lower part of the shock absorber is firmly coupled to the seat of the tool.



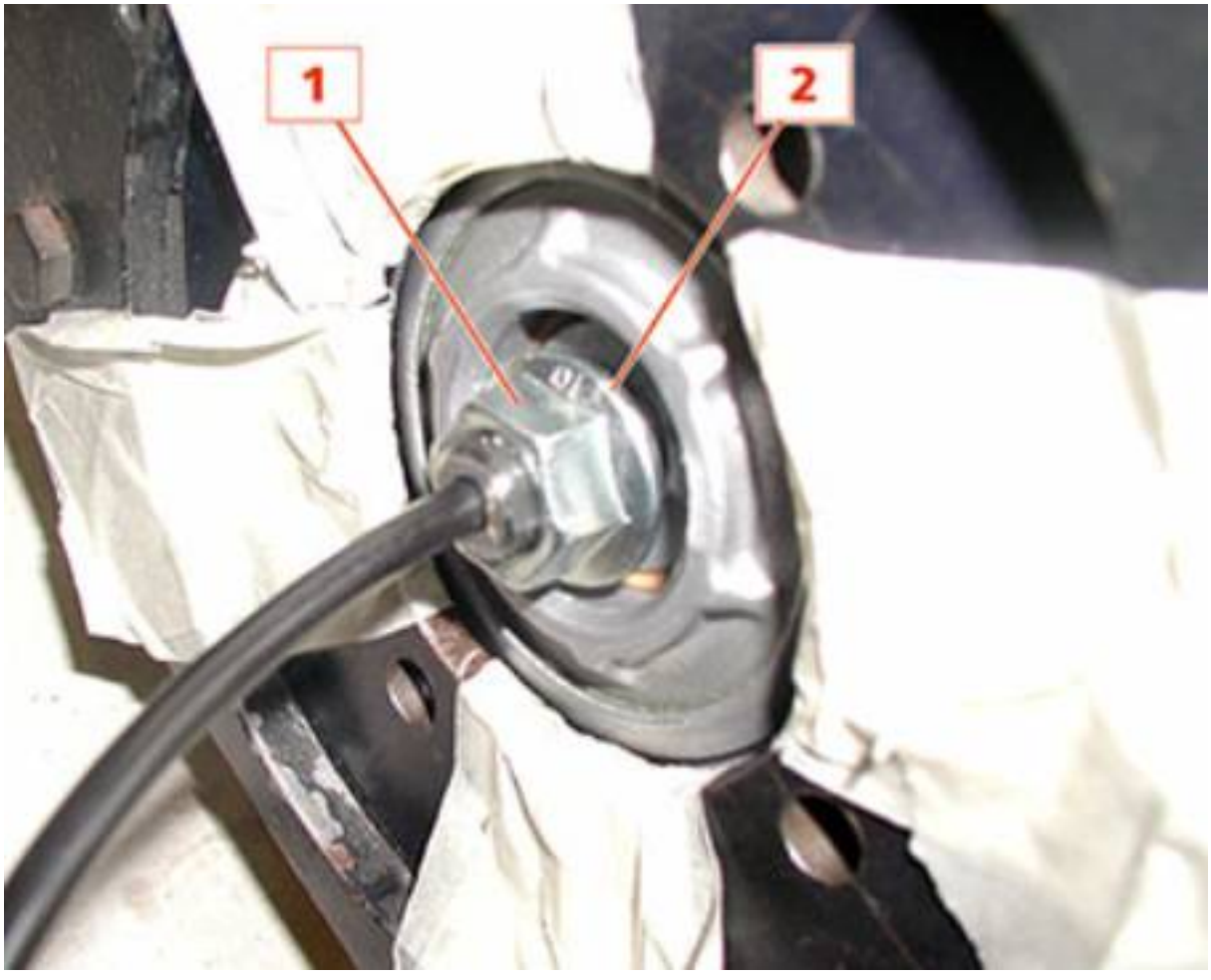
- Also check that the electric cable of the shock absorber is properly positioned and that it does not interfere with or be damaged during spring compression.



- Activate the pneumatic press by operating the lever in the direction of the arrow and compress the shock absorber until you are able to access the retaining nut.



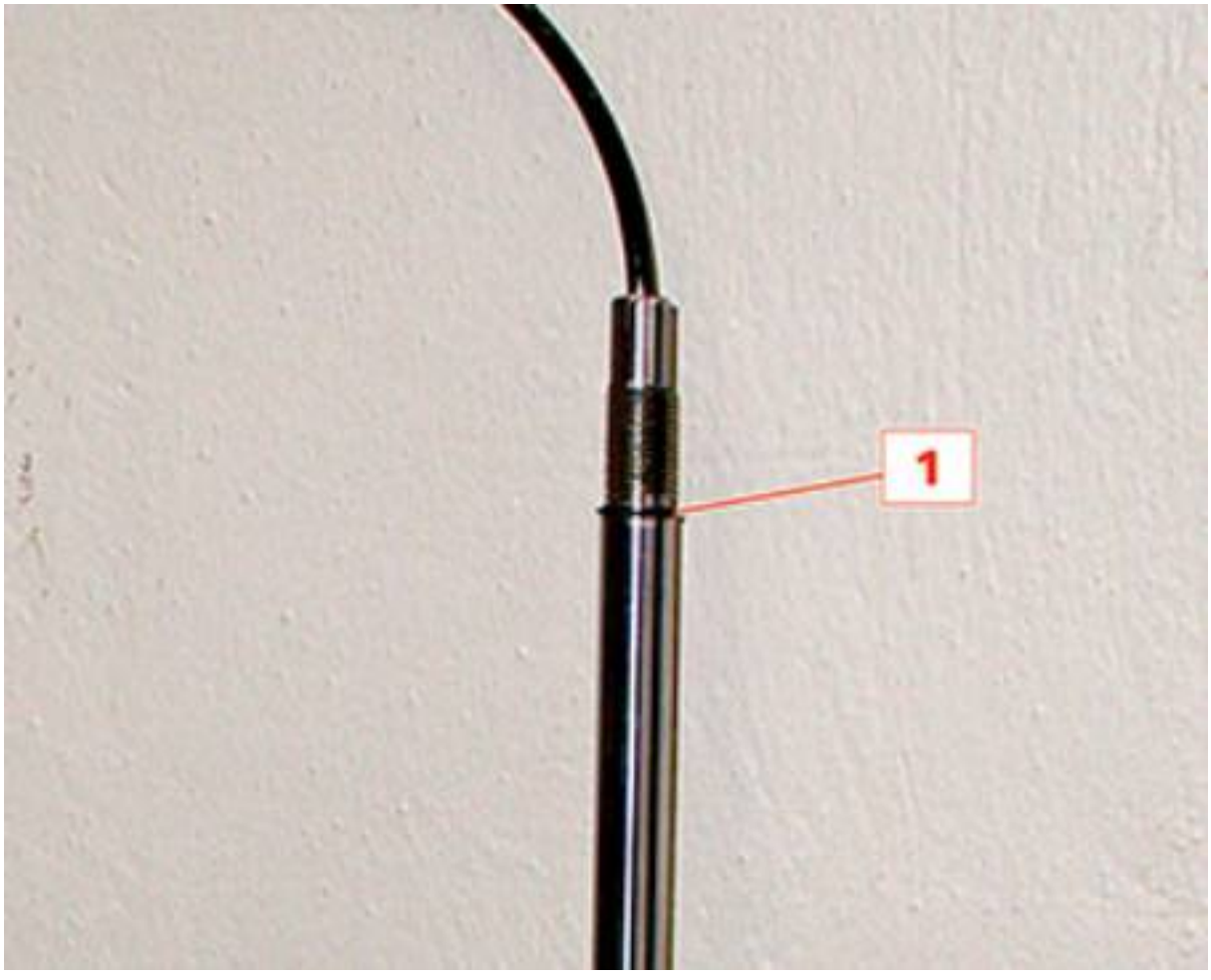
- Unscrew the retaining nut **(1)** and retrieve the washer **(2)**.



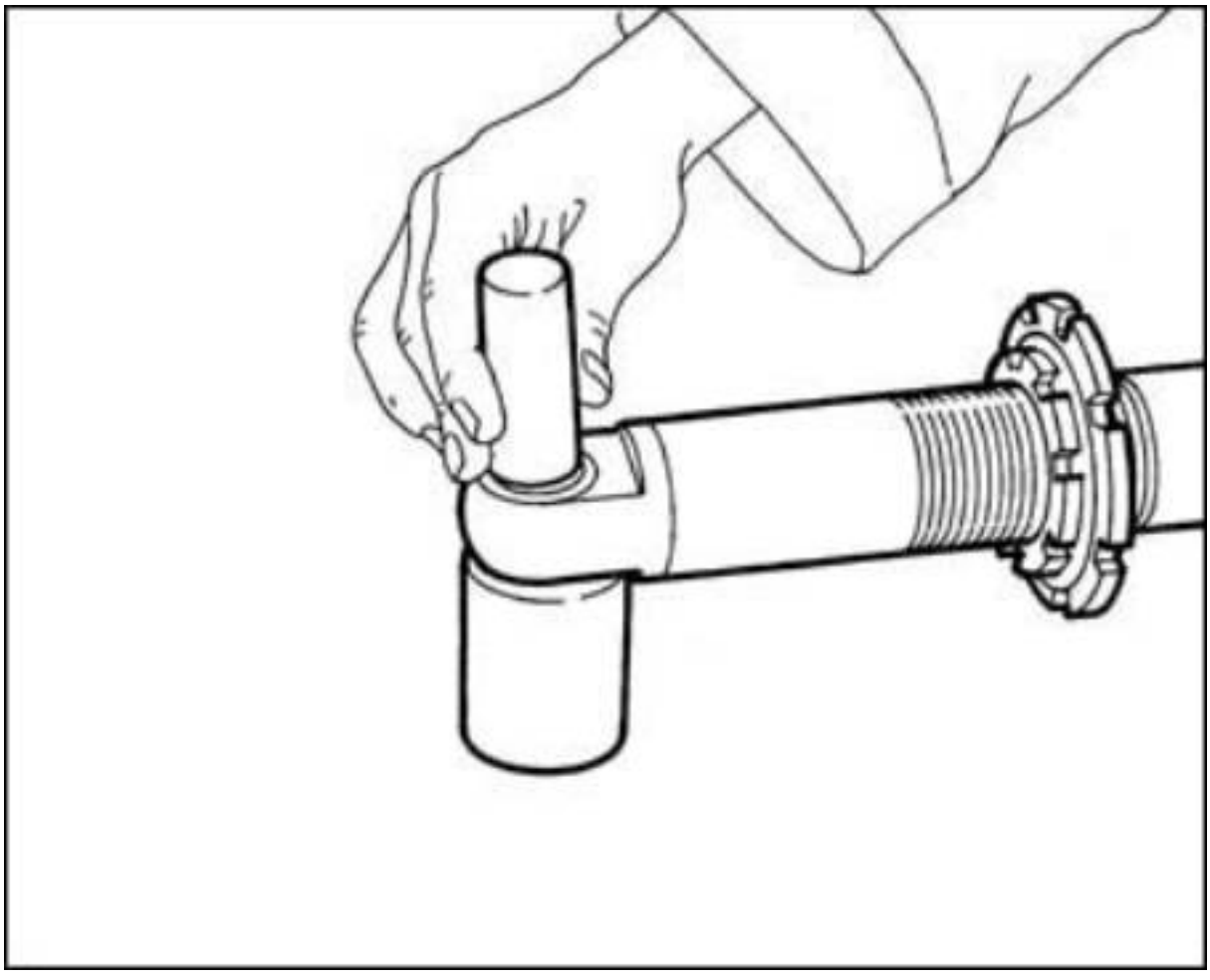
- Remove the top mount **(1)** complete with upper bushing **(2)**.

- Remove the upper rubber spacer **(1)**, then remove the spring **(2)**.

- If necessary, remove the tapered washer **(1)**.



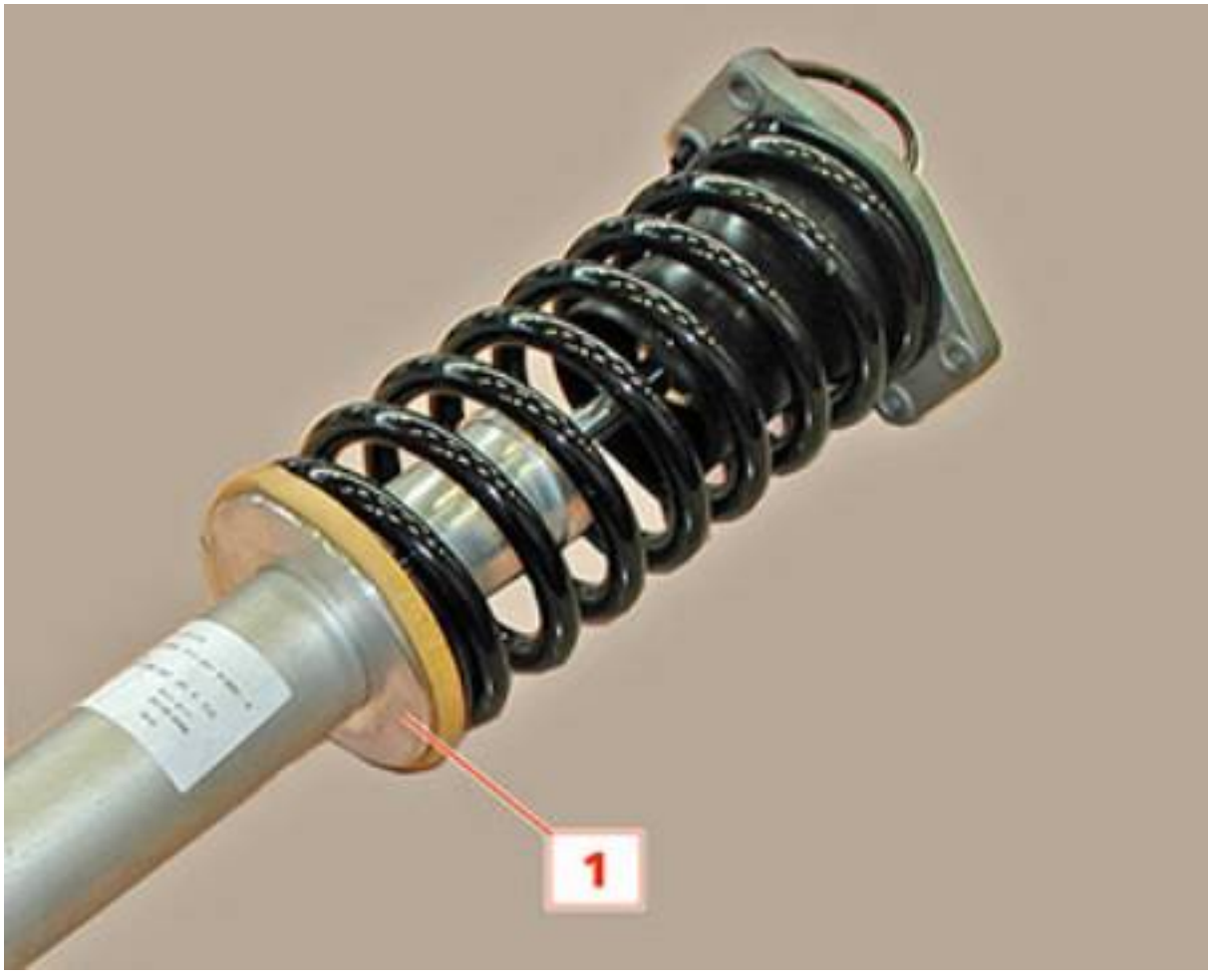
- Place the shock absorber on a suitable surface and use a drift to remove the lower joint, which must be replaced with a new one during re-assembly.



- Remove the lower rubber spacer from its seat.

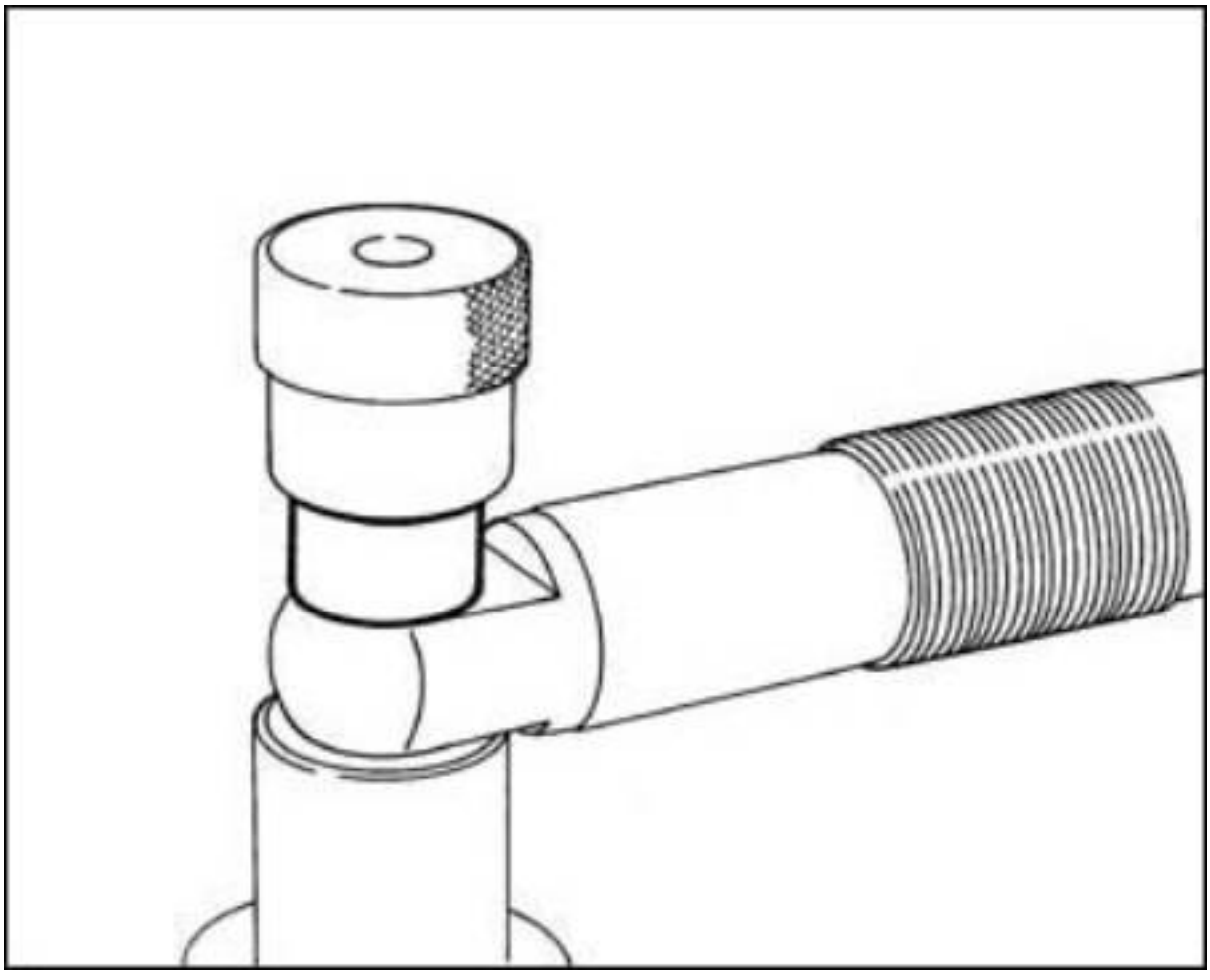
- For vehicles up to assembly no. **25042**, i.e. with shock absorbers equipped with adjustable ring nut, proceed as illustrated.
- Unscrew the spring positioner ring nut **(1)** and its locknut **(2)** and extract them from the shock absorber.

- From assembly no. **25043**, shock absorbers equipped with a fixed spring stop are fitted.
- On these components, the ring nut for adjusting the spring preload has been replaced with a washer **(1)** that is incorporated in the shock absorber stem and it is therefore no longer adjustable.
- This solution has been adopted to eliminate the possibility of incorrect spring adjustments which alter the vehicle height and so compromise vehicle safety.
- The old solution of the shock absorber with adjustable ring nut is interchangeable with the new solution with fixed washer, however, it is important that shock absorbers of the same type are fitted on the same axle.
- The colour of the front axle springs does not need to be the same as that of the rear axle (yellow springs can be fitted on the front axle and red springs on the rear axle or vice versa).

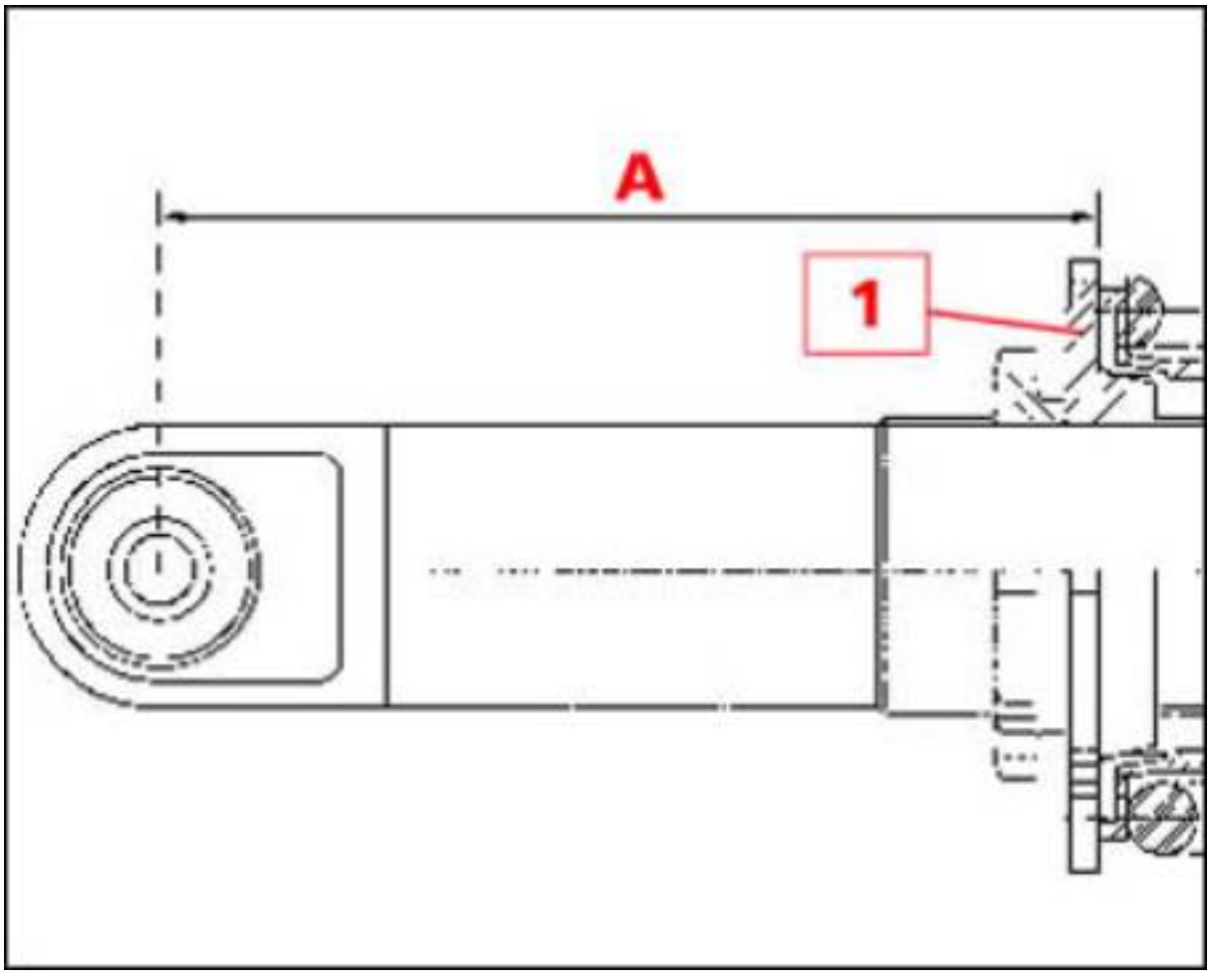


Refitting the front shock absorbers

- Fit the lower joint to the shock absorber.



- For vehicles up to assembly no. **25042, i.e. with shock absorbers equipped with adjustable ring nut, proceed as illustrated.**
- Fit the positioner ring nut **(1)** and, depending on the spring, adjust the distance **A** from the hub centre to the value given in the table below.



- **Figures valid for vehicles until October 2004-**

A (mm)	Spring colour
Front	
366.5 ± 1.5	Red
368.5 ± 1.5	Yellow

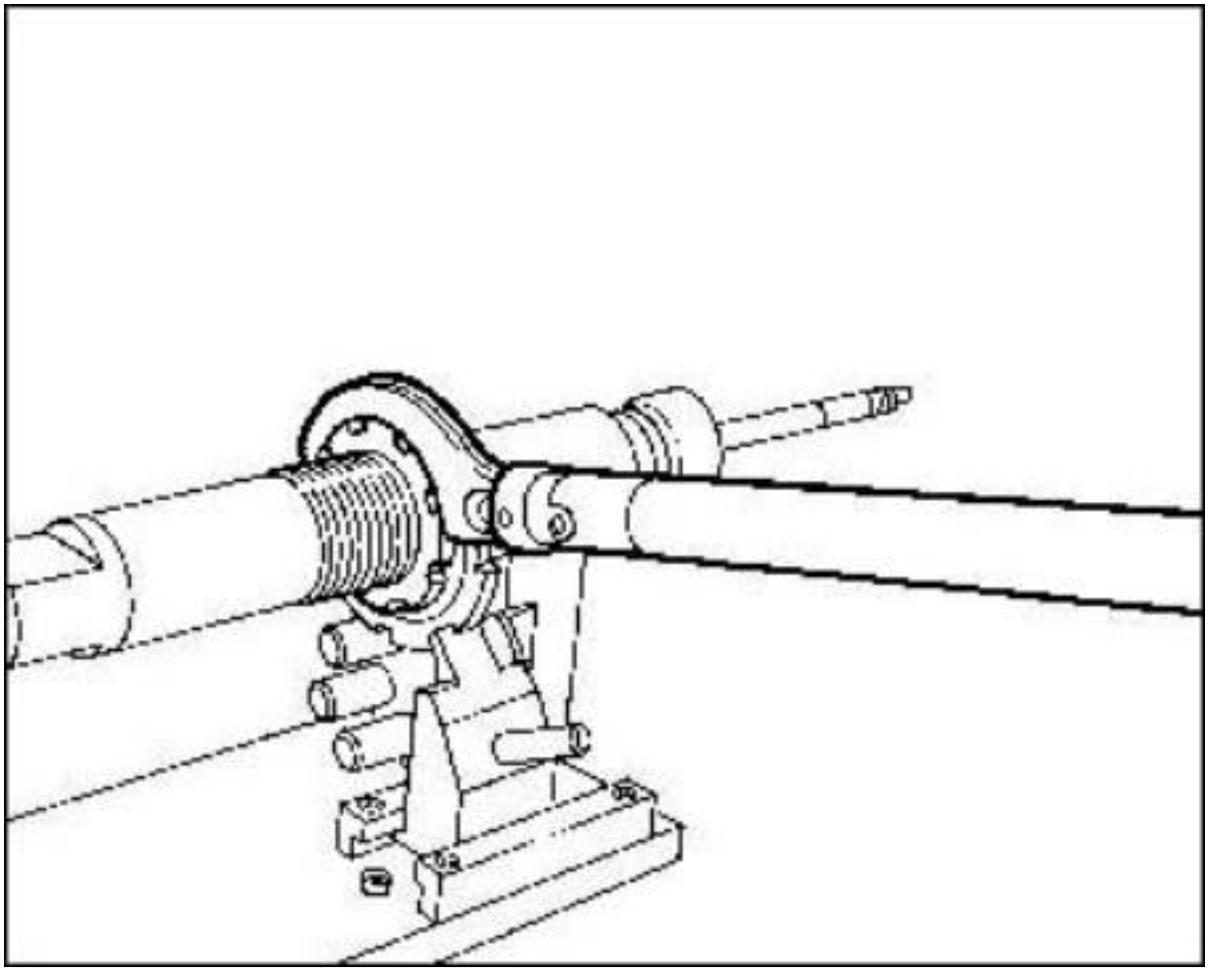
- **Figures valid for vehicles manufactured from October 2004 up to assembly no. 21586**

A (mm)	Spring colour
Front	
366.5 ± 1.5	Red
369.5 ± 1.5	Yellow

- **Figures valid for vehicles from assembly no. 21587 up to 25042**

A (mm)	Spring colour
Front	
384 ± 0.5	Red
387 ± 0.5	Yellow

- For vehicles up to assembly no. 25042, i.e. with shock absorbers equipped with adjustable ring nut, proceed as illustrated.
- Tighten the locknut to a torque of **59Nm**.



- Check that the spring is in perfect condition and that its dimensions comply with the indicated values.
- For vehicles up to assembly no. **21586**.

Front spring	Spring colour	Values
Front		
Free spring height	**All colours**	**355.2 mm**
Static length with min. load of 5869 N and max. 6050 N	**Yellow**	**192 mm**
Static length with min. load of 6050 N and max. 6232 N	**Red**	**192 mm**
Wire diameter	**All colours**	**12.75 mm**

- For vehicles from assembly no. **21587**, regardless of whether they are fitted on shock absorbers with adjustable ring nut or with fixed calibration.

Front spring	Spring colour	Values

Front		
Free spring height	**All colours**	**365 mm**
Static length with min. load of 624-639 kg	**Yellow**	**187 mm**
Static length with min. load of 635-650 kg	**Red**	**187 mm**
Wire diameter	**All colours**	**12.75 mm**

- Fit the lower rubber spacer into the seat.

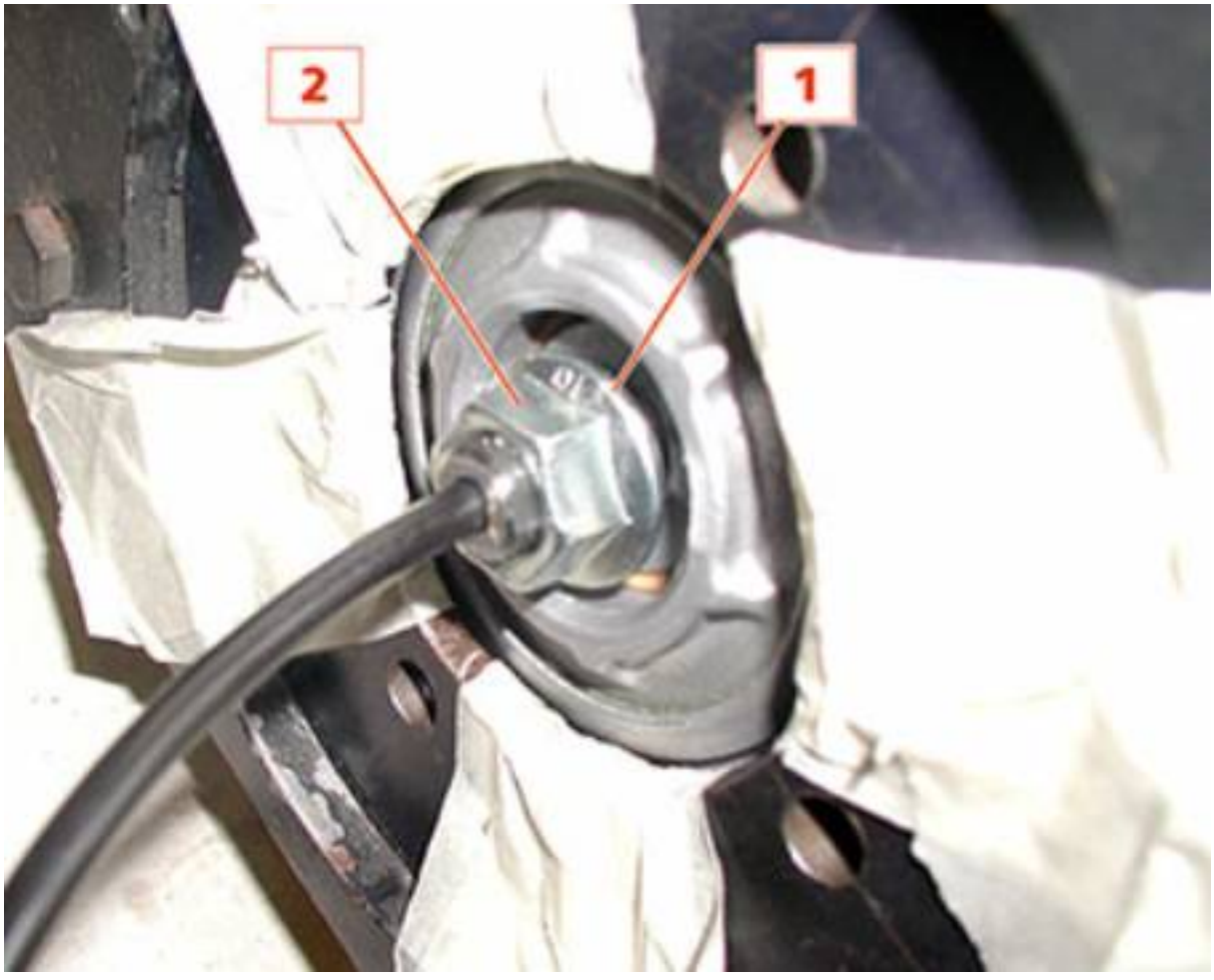
- Fit the spring **(1)** and then the upper rubber spacer **(2)**

- Fit the top mount **(1)** complete with upper bushing **(2)**.

- Position the complete shock absorber in the seat of the pneumatic press as described above, then compress the spring.
- Position the washer **(1)** and fully screw down the nut **(2)**, then tighten it to a torque of:

- **75 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- **40 Nm** for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.



Refitting the front shock absorbers

- Fit the shock absorber and tighten the screws that secure the shock absorber to the dome to a torque of:

- 33.6 **Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 25 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

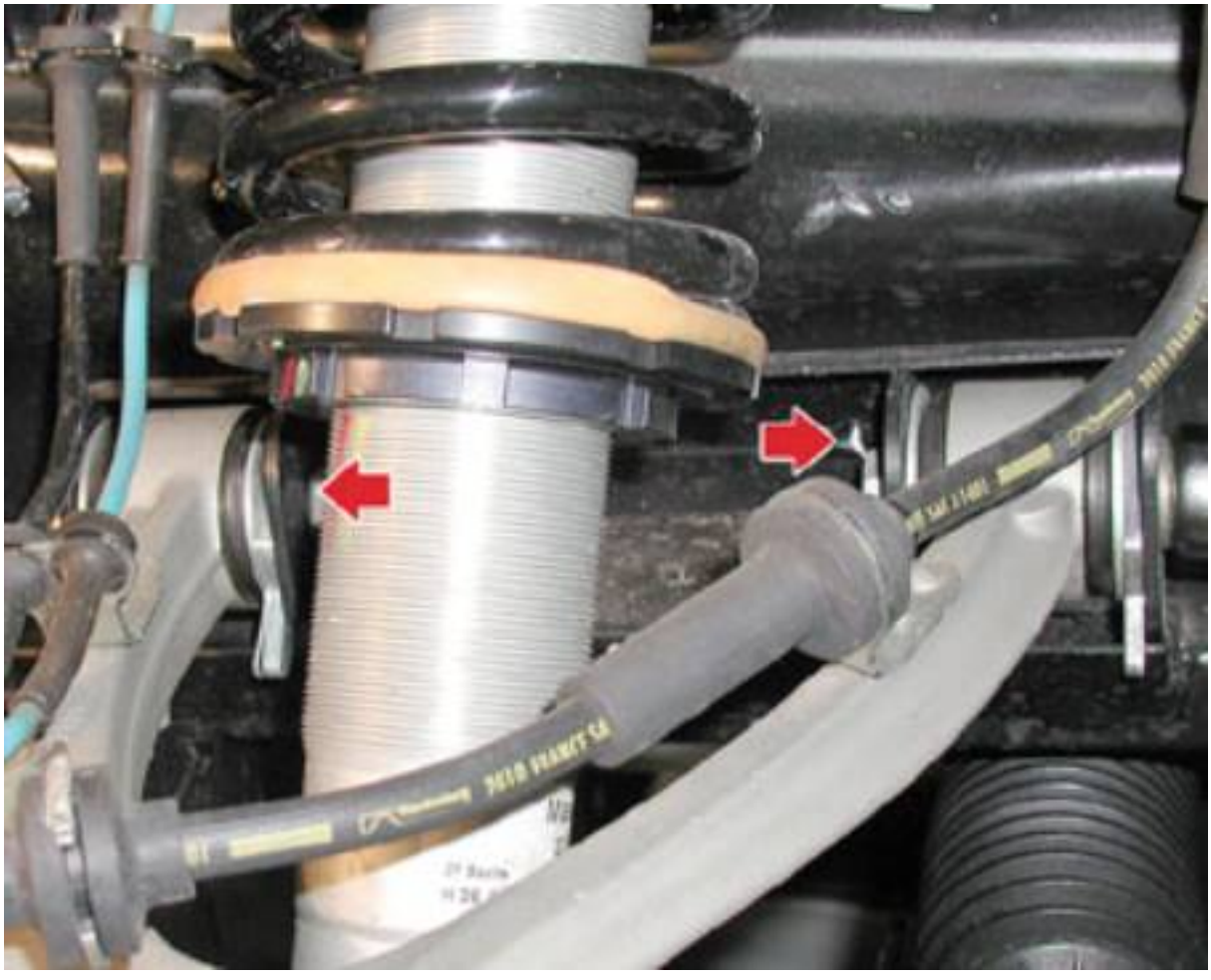
- Tighten the bolt that fastens the shock absorber to the lower wishbone (lever) to a torque of **78 Nm**.

- Tighten the fastening nuts on the front wheels' vertical acceleration sensor to a torque of **8 Nm**.

- Fit the upper front lever in its seat, inserting the fastening screws, fit the shims removed during disassembly between the silent blocks and the frame structure, then tighten the bolts to a torque of :

- **78 Nm** for **EUROPE** vehicles up to assembly no. **18534** in the left-hand drive version and **17235** in the right-hand drive versions

- **120 Nm** for **EUROPE** vehicles from assembly no. **18535** in the left-hand drive version and **17236** in the right-hand drive versions in addition, for all the **USA – CND** versions.



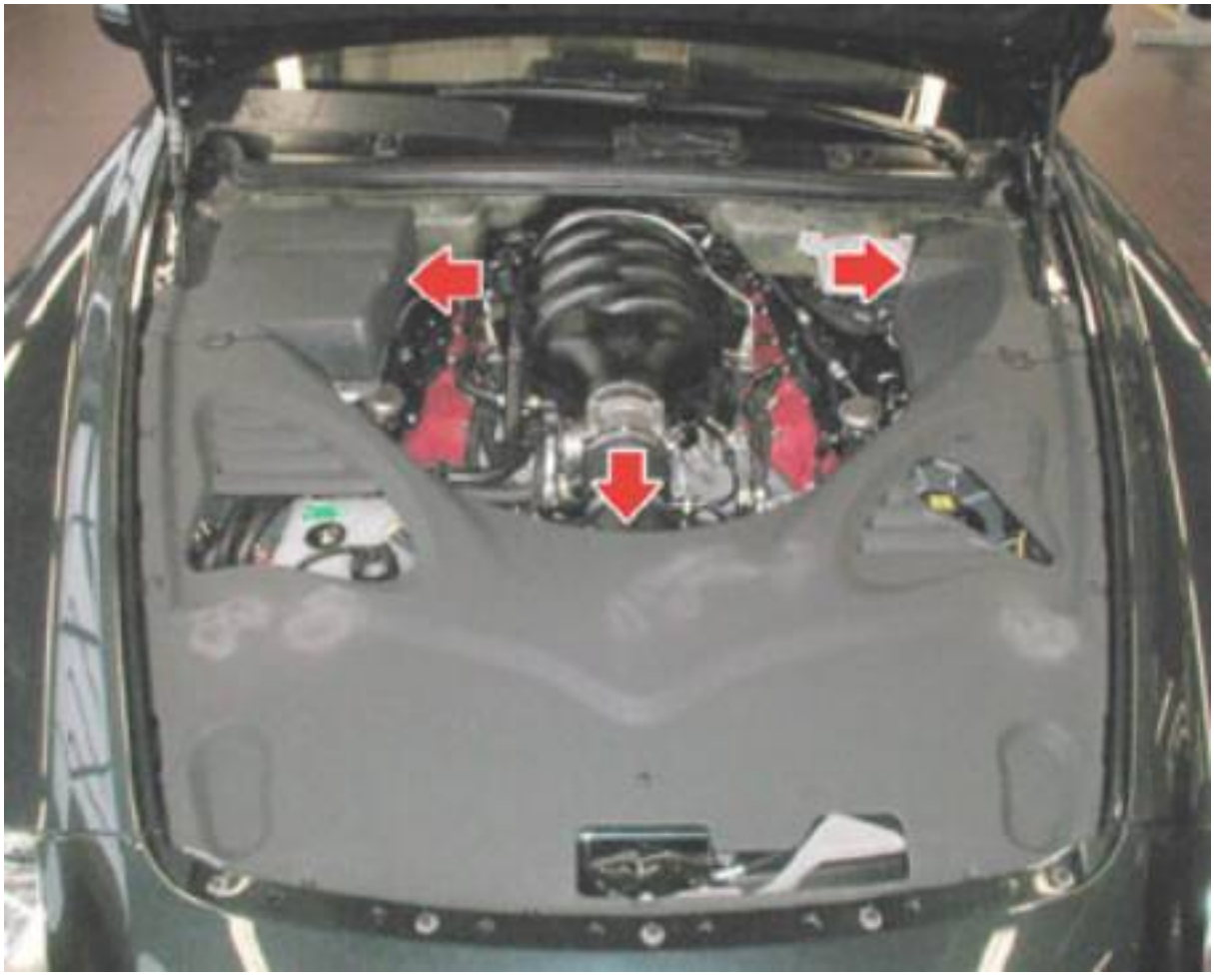
- Secure the electrical wiring and the oil line from the fastening on the upper wishbone.

- Fit the wheel bay dust-protection guard and tighten the six fastening screws fully, then fasten the five snap-studs.

- Fully screw down the lower fastening screws on the wheel bay dust-protection guard.

- Connect the shock absorber’s electrical connector

- Fit the trim panels.



- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

- After connecting the battery’s negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Rear shock absorbers

Removing the rear shock absorbers

- Disconnect the negative terminal of the battery.
- Remove the wheel concerned.

Replacing the wheels

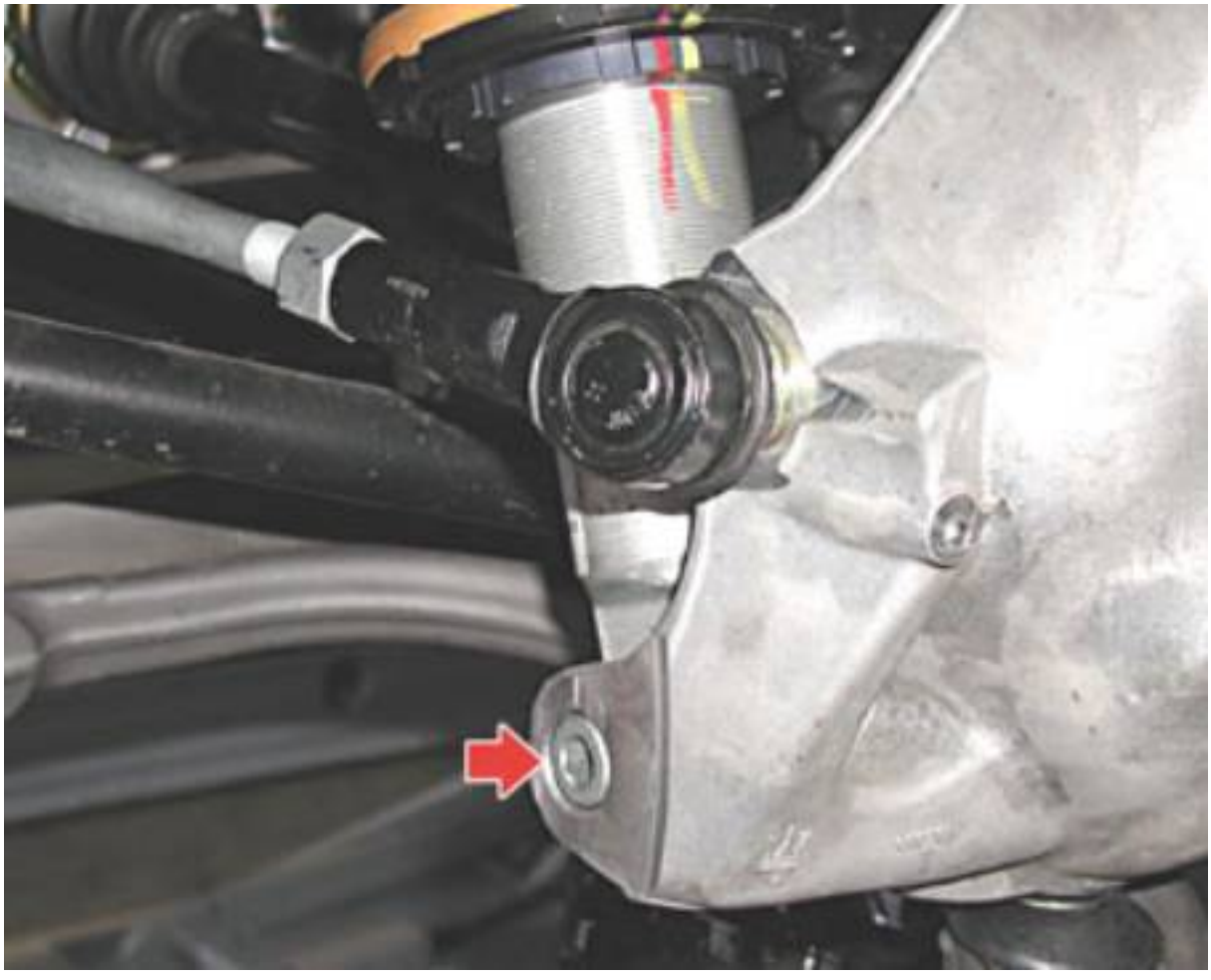
- Remove the luggage compartment trim panels.

Luggage compartment trim panels

- Detach the rear shock absorber’s electrical connection.

- Undo the three screws that secure the shock absorber to the body.

- Undo the screw that fasten the shock absorber to the hub carrier.

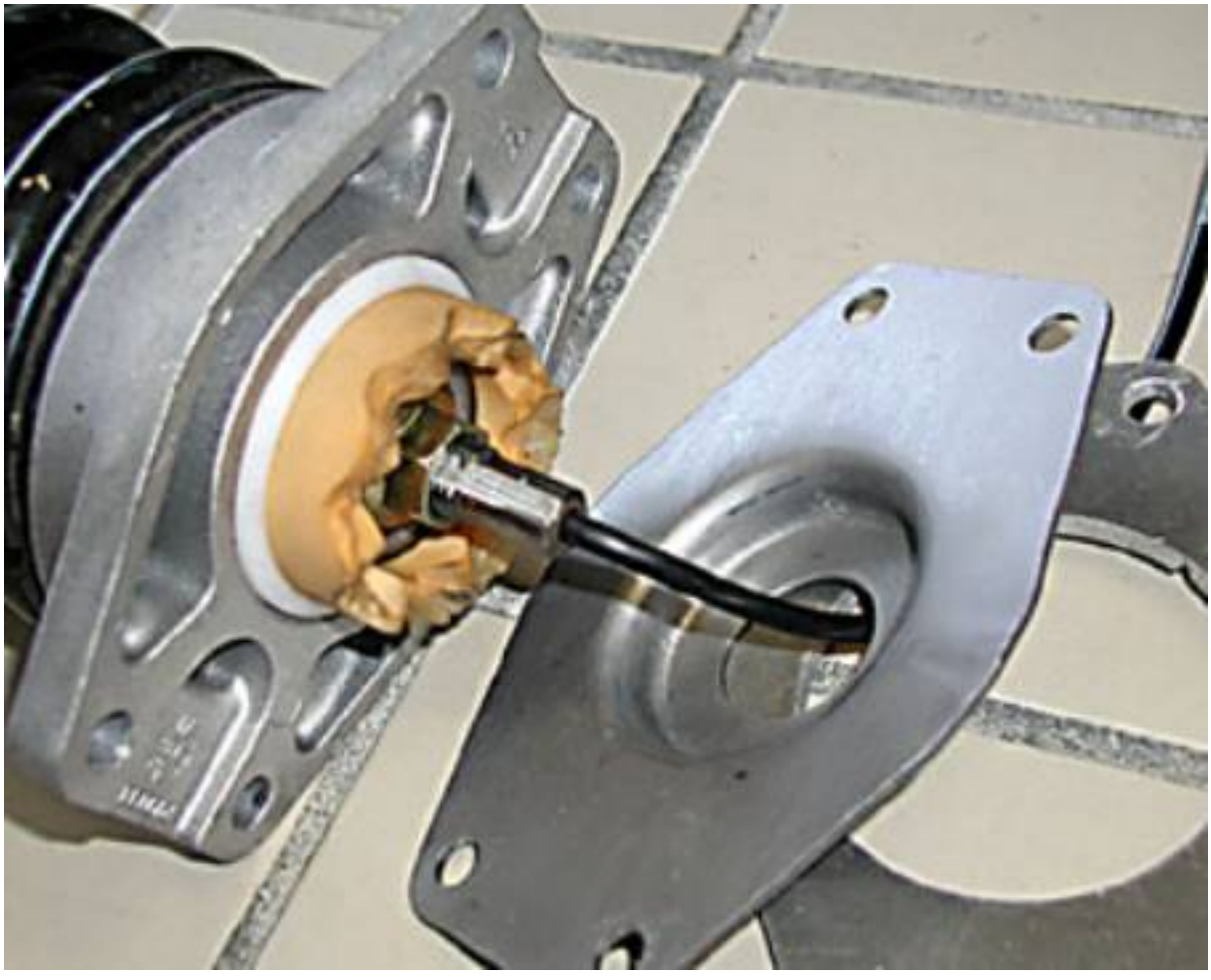


- Tilt and remove the rear shock absorber complete with the spring.

Removing the rear shock absorbers

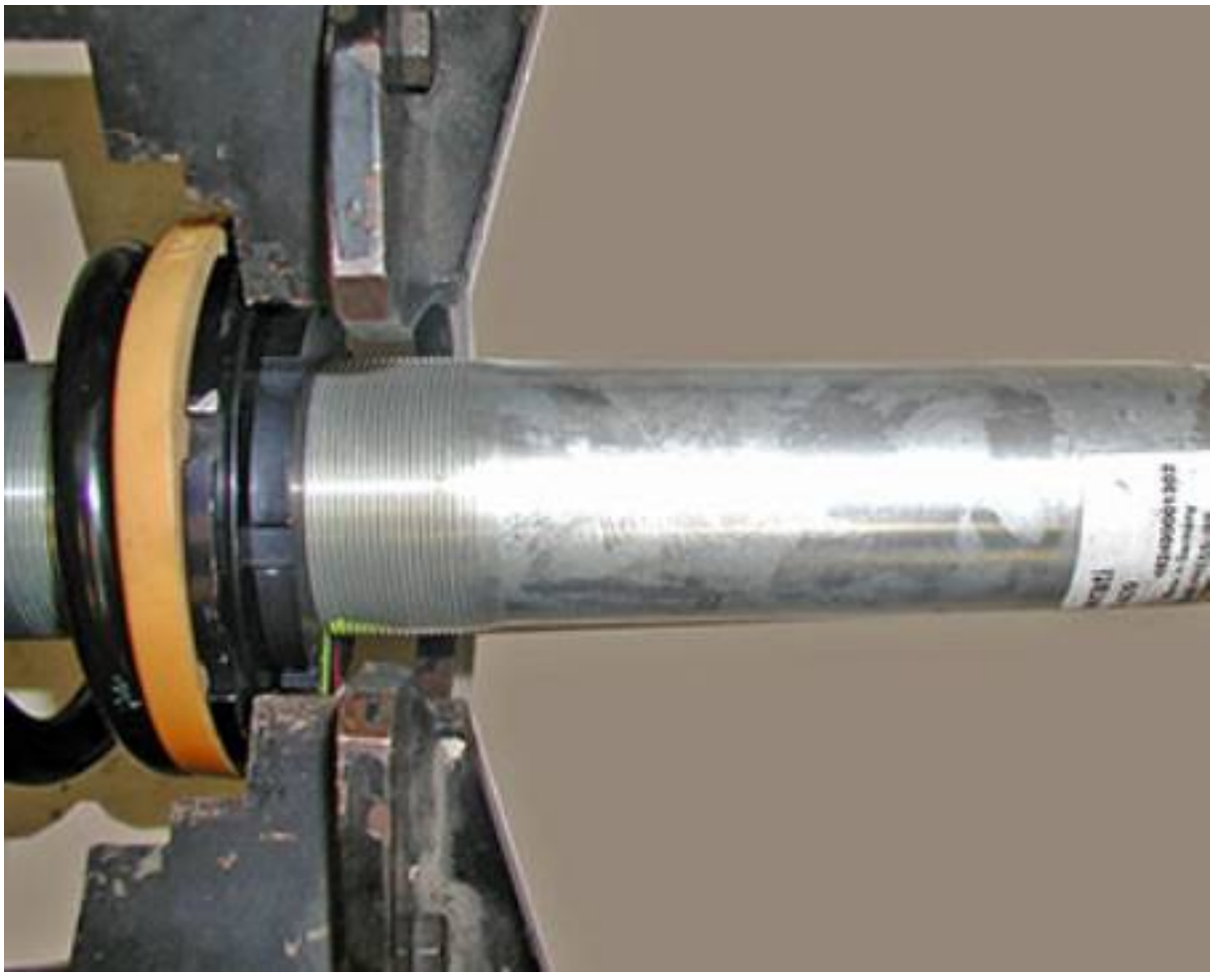
- Remove the two shock absorber flanges

N.B.
When refitting, respect the original order and direction of the two flanges.

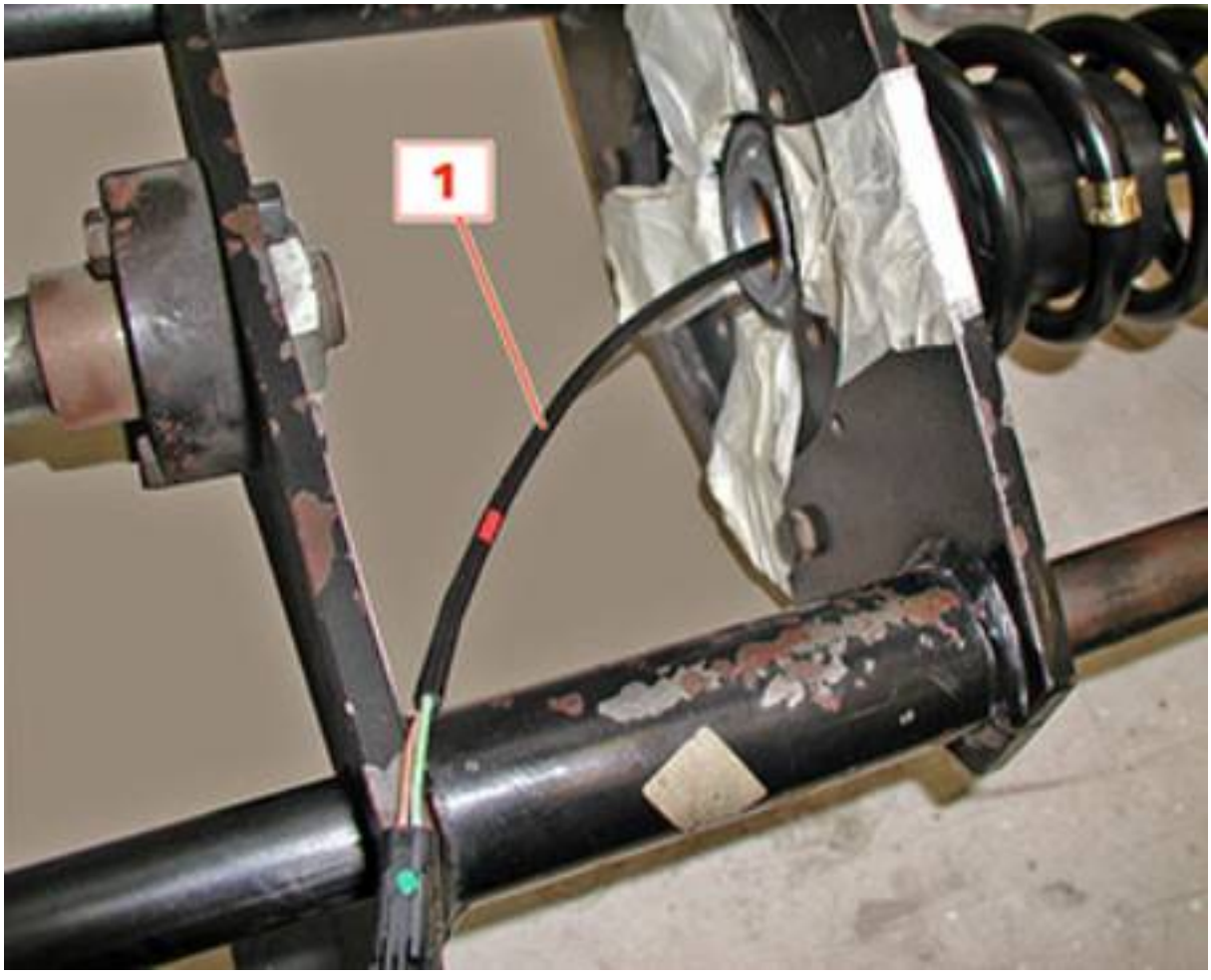


- Mount the shock absorber in a suitable press to compress its spring.

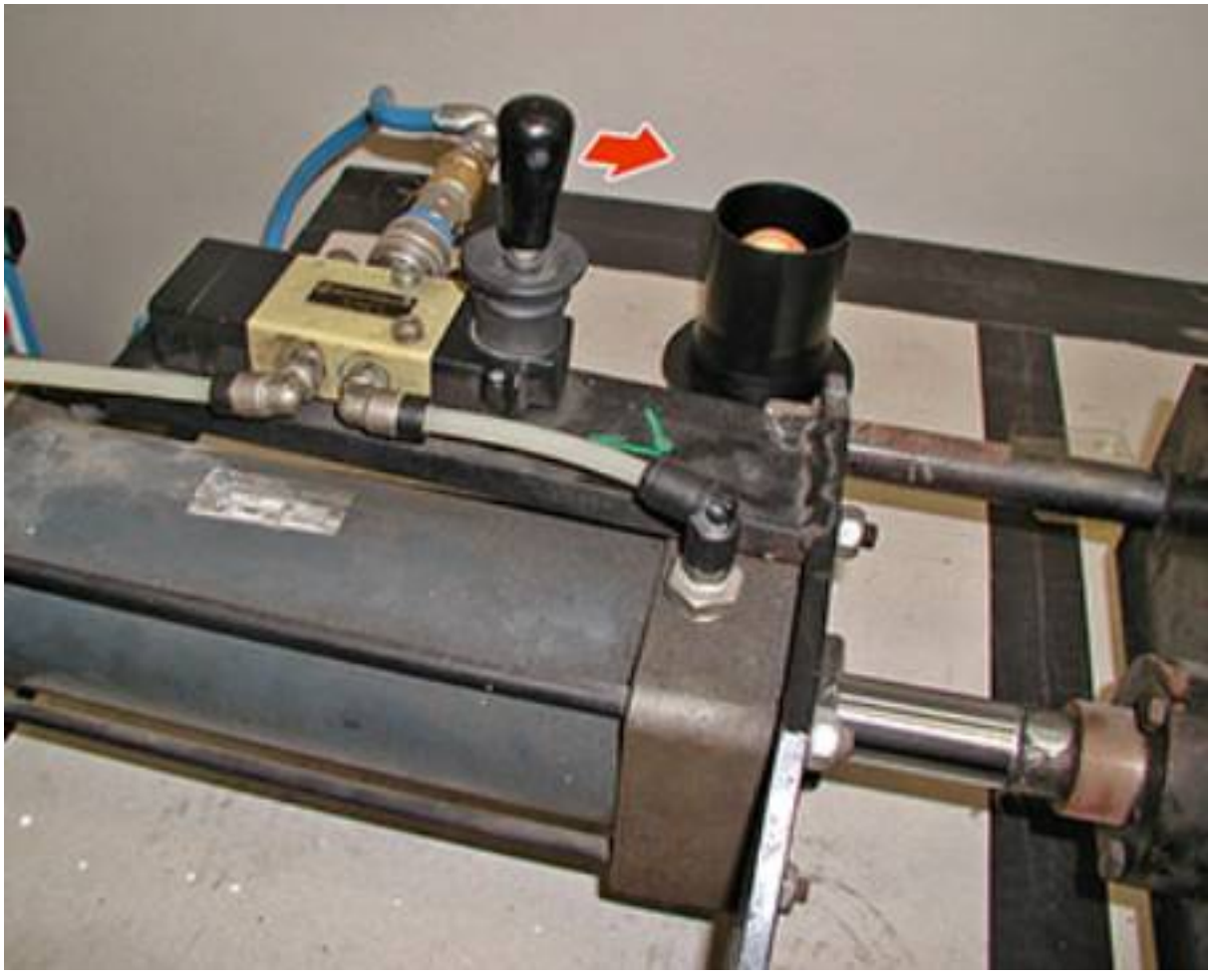
- Check that the lower part of the shock absorber is firmly coupled to the seat of the tool.



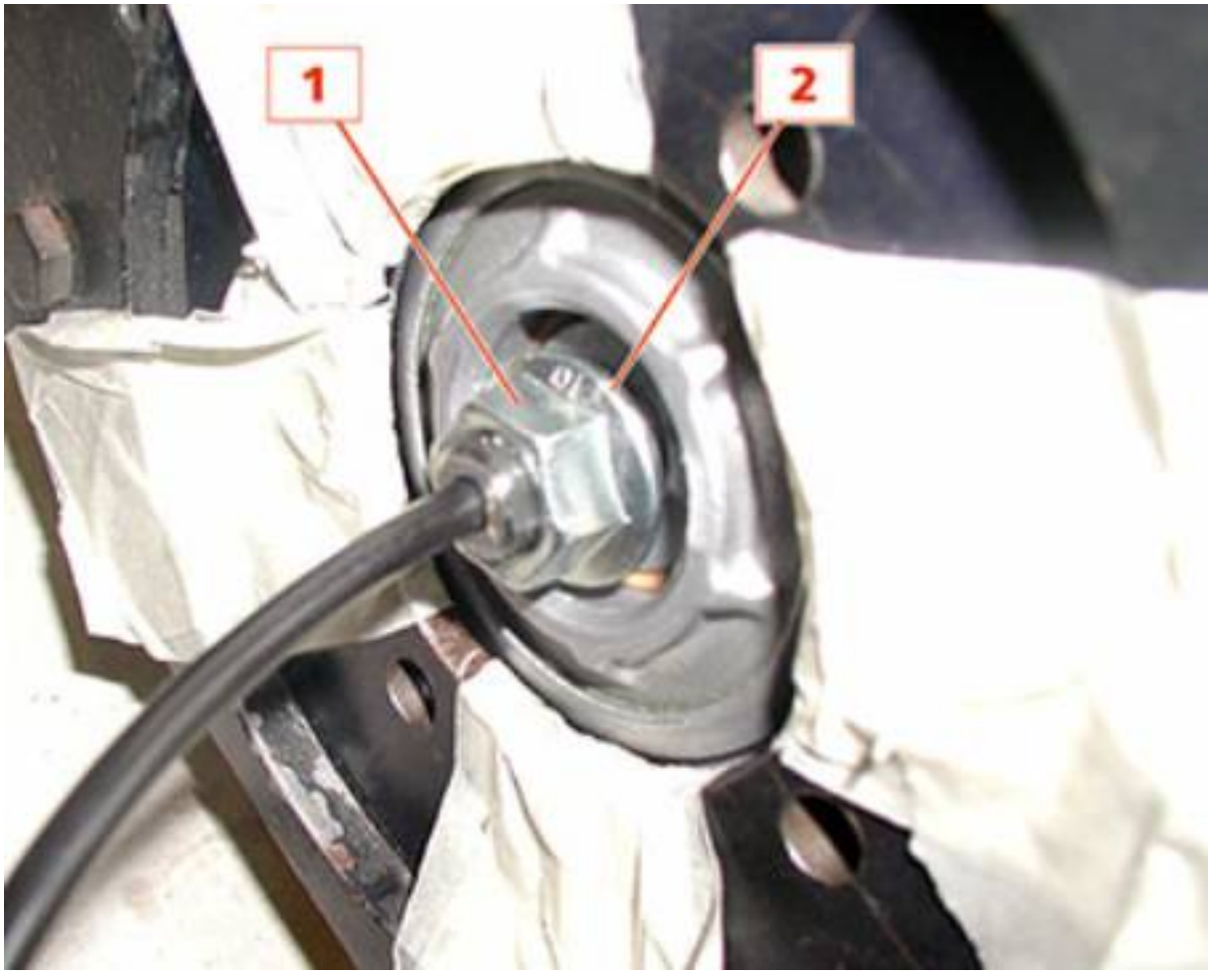
- Also check that the electric cable of the shock absorber is properly positioned and that it does not interfere with or be damaged during spring compression.



- Activate the pneumatic press by operating the lever in the direction of the arrow and compress the shock absorber until you are able to access the retaining nut.



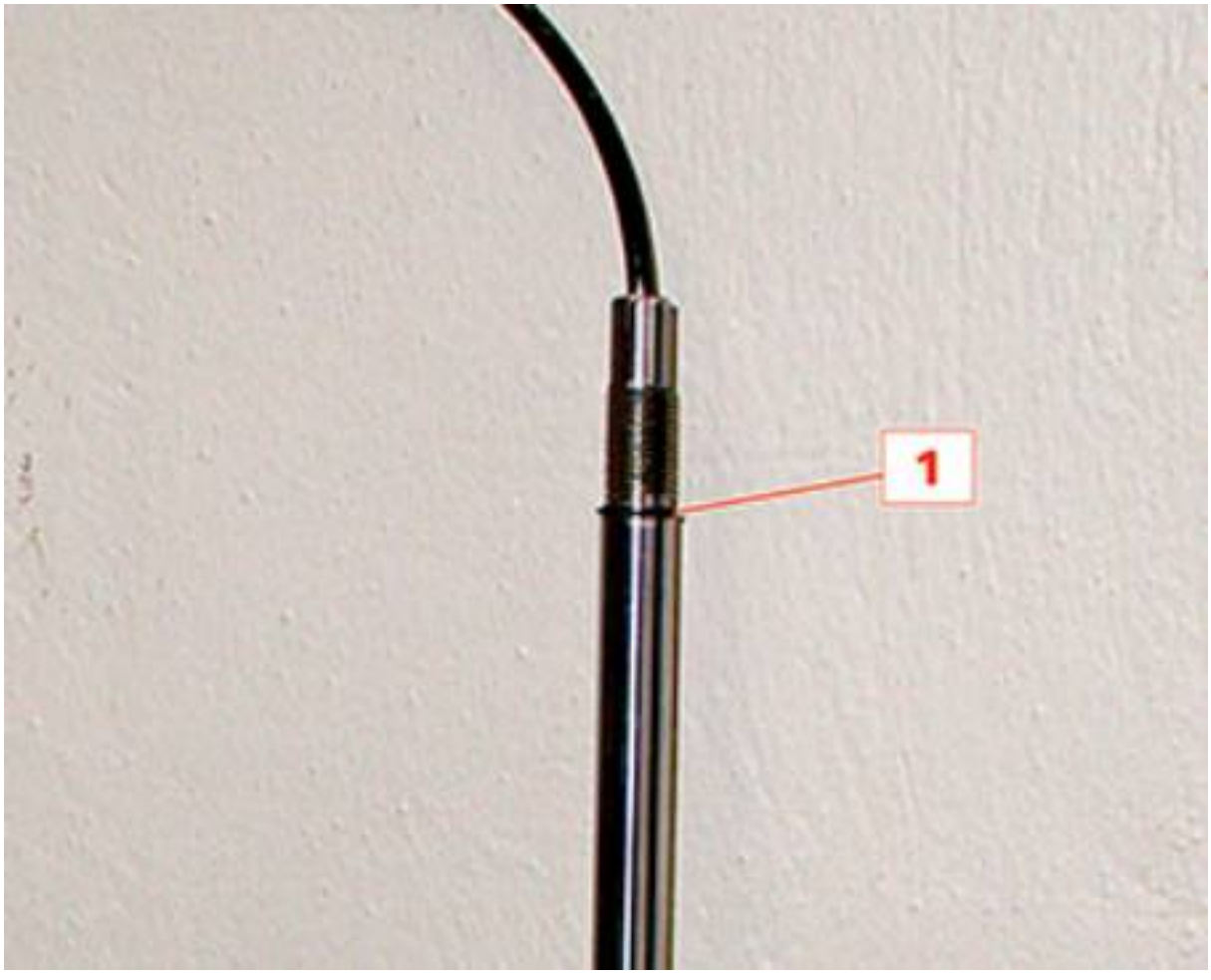
- Unscrew the retaining nut **(1)** and retrieve the washer **(2)** .



- Remove the top mount **(1)** complete with upper bushing **(2)** .

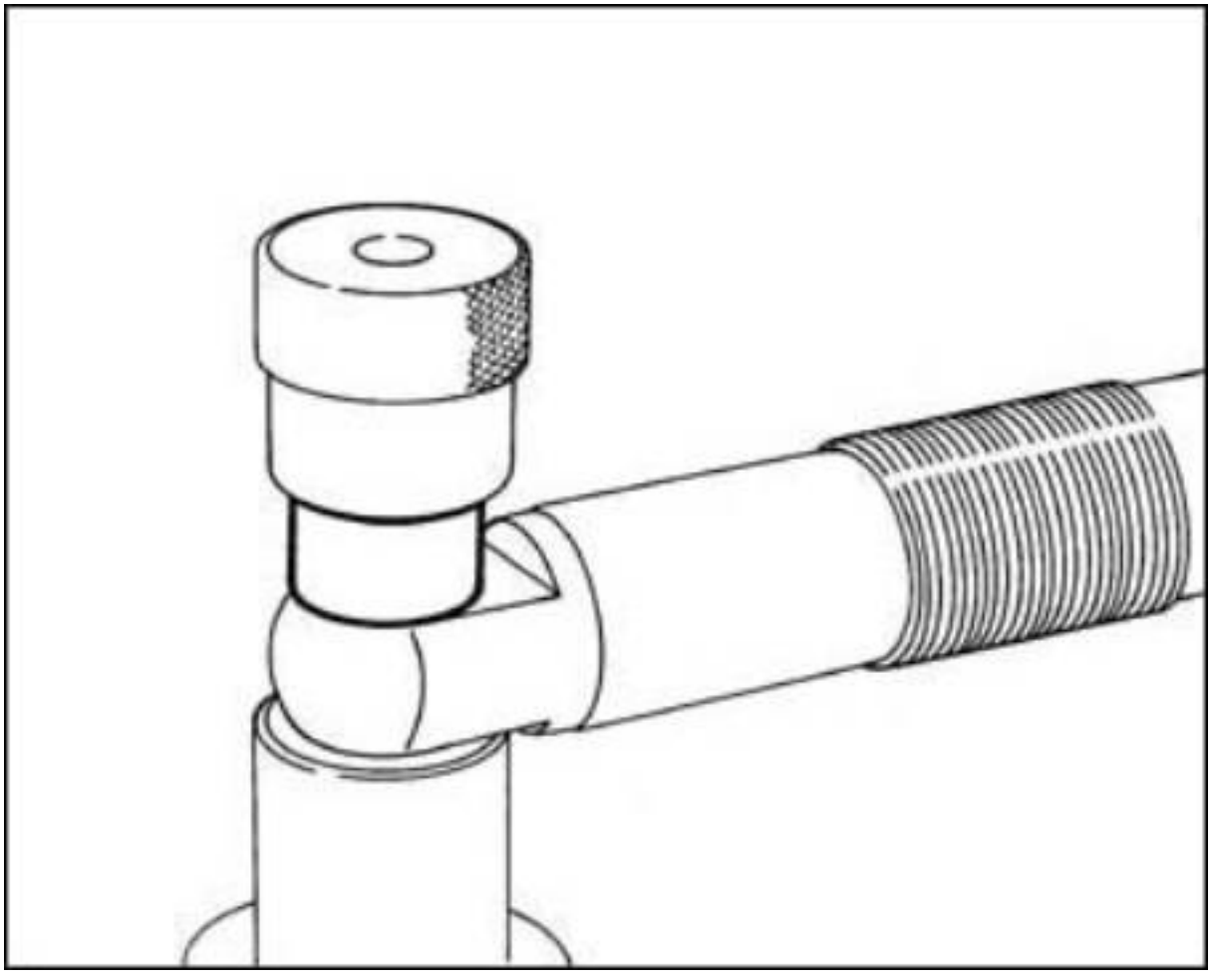
- Remove the upper rubber spacer **(1)** , then remove the spring **(2)** .

- If necessary, remove the tapered washer **(1)** .

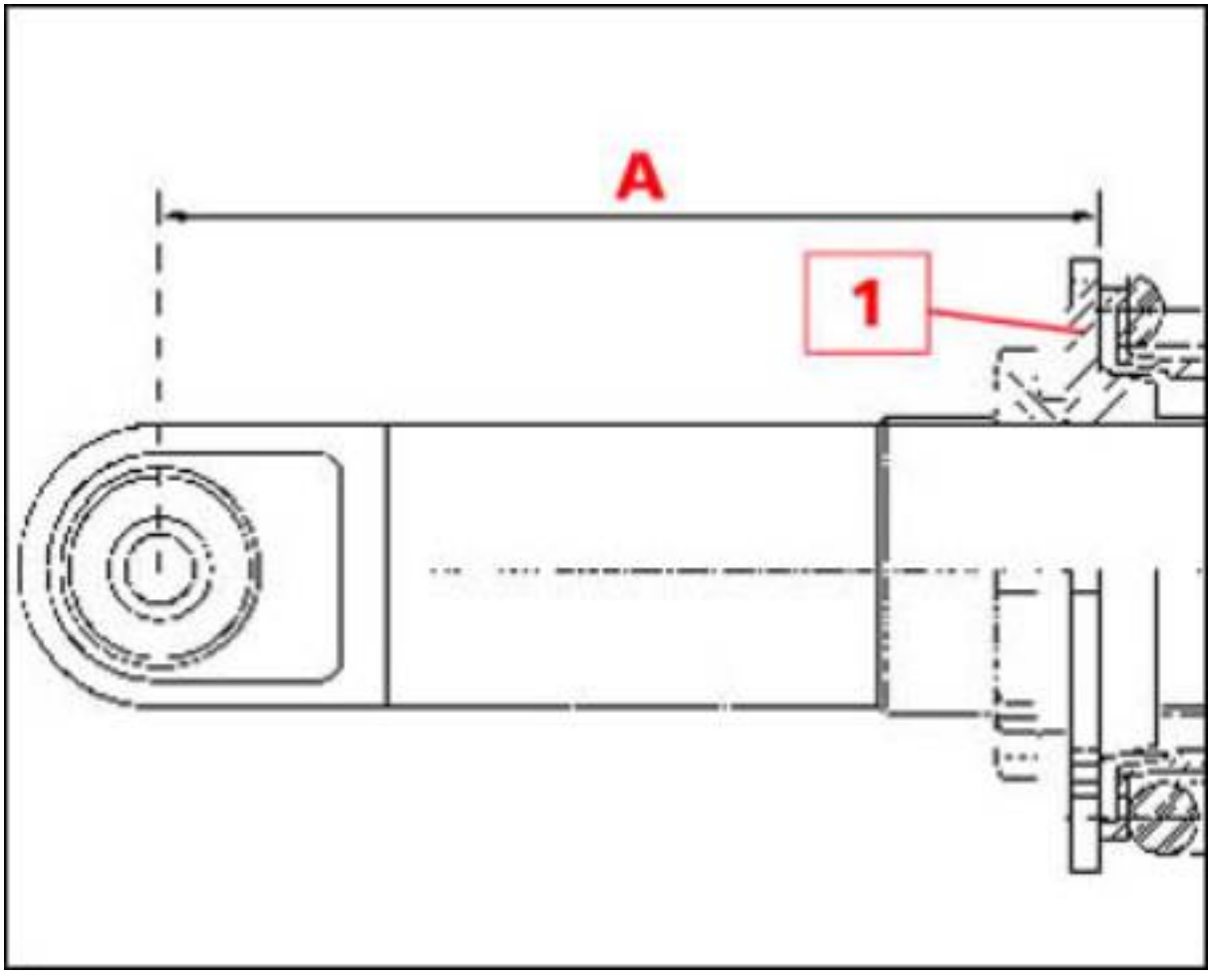


Refitting the rear shock absorbers

- Fit the lower joint to the shock absorber.



- Fit the positioner ring nut **(1)** and, depending on the spring, adjust the distance **A** from the hub centre to the value given in the table below.



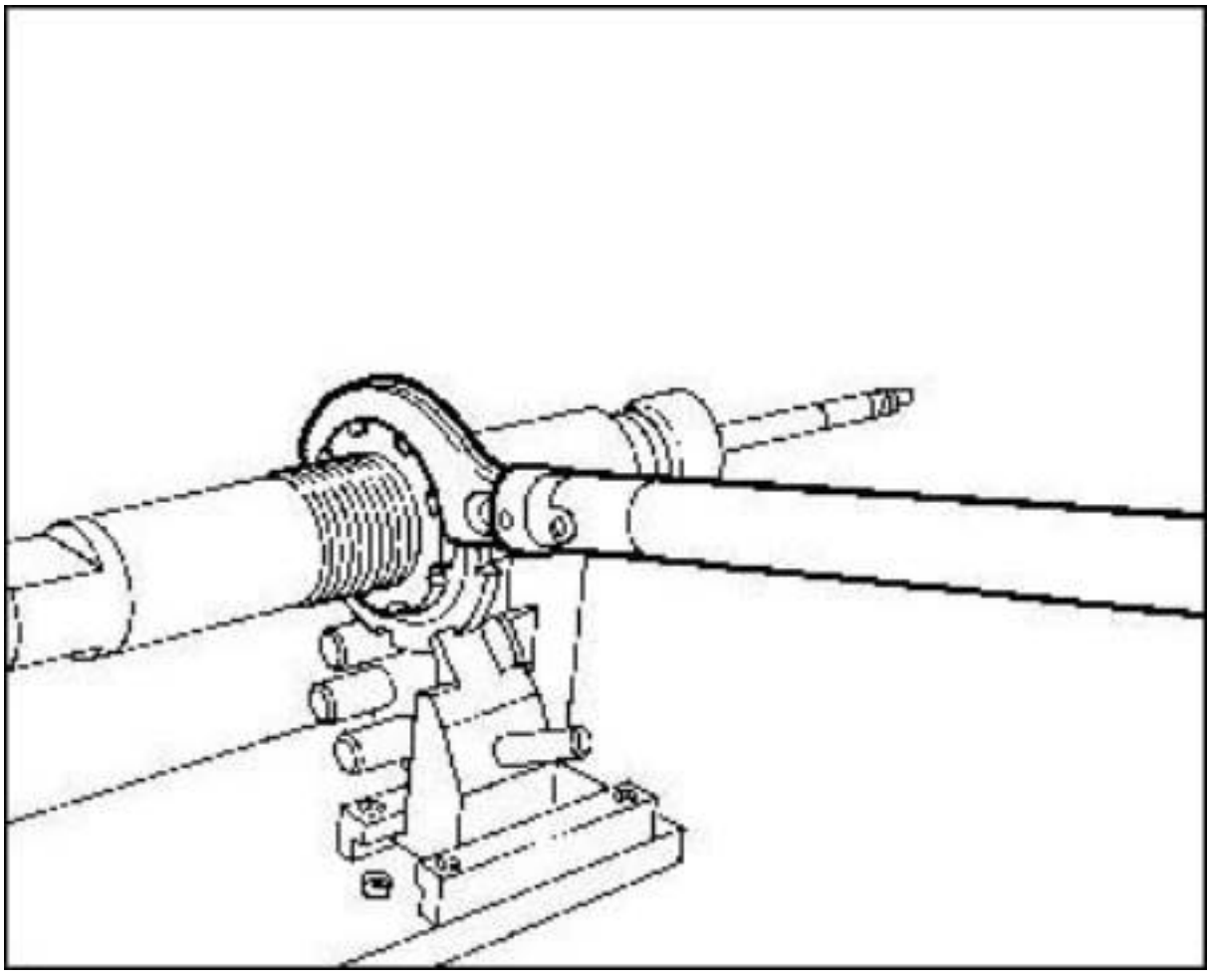
- **Figures valid for vehicles up to assembly no. 21586**

A (mm)	Spring colour
Rear	
163 ± 1.5	Red
166 ± 1.5	Yellow

- **Figures valid for vehicles from assembly no. 21587**

A (mm)	Spring colour
Front	
279.5± 0.5	Red
282.5± 0.5	Yellow

- Tighten the locknut to a torque of **59Nm**.



- Check that the spring is in proper working order and that its dimensions comply with the indicated values.
- For vehicles up to assembly no. **21586**.

Rear spring	Spring colour	Values
Rear		
Free spring height	**All colours**	**342 mm**
Static length with min. load of 5378 N and max. 5518 N	**Yellow**	**192 mm**
Static length with min. load of 5278 N and max. 5418 N	**Red**	**192 mm**
Wire diameter	**All colours**	**13.25 mm**

- For vehicles from assembly no. **21587**, regardless of whether they are fitted on shock absorbers with adjustable ring nut or with fixed calibration.

Rear spring	Spring colour	Values
Rear		
Free spring height	**All colours**	**333 mm**
Static length with a load of 571-585 kg	**Yellow**	**193 mm**

Static length with a load of 581-594 kg	**Red**	**193 mm**
Wire diameter	**All colours**	**12.75 mm**

- Fit the lower rubber spacer into the seat.

- Fit the spring **(1)** and then the upper rubber spacer **(2)**

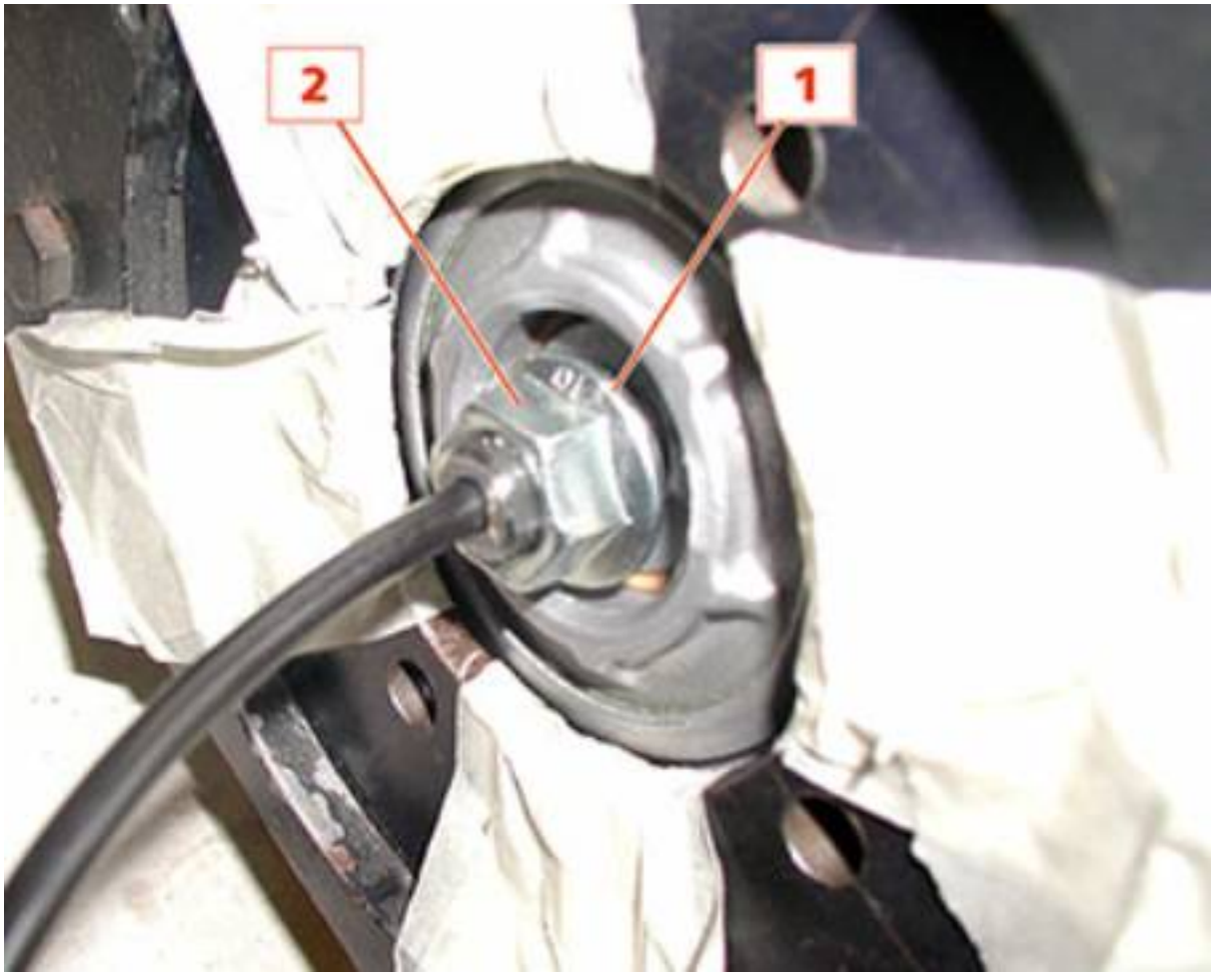
- Fit the top mount **(1)** complete with upper bushing **(2)** .

- Position the complete shock absorber in the seat of the pneumatic press as described above, then compress the spring.

- Position the washer **(1)** and fully screw down the nut **(2)**, then tighten it to a torque of:

- **75 Nm** for **EUROPE** vehicles up to assembly no. **18534** in the left-hand drive version and **17235** in the right-hand drive versions

- **40 Nm** for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

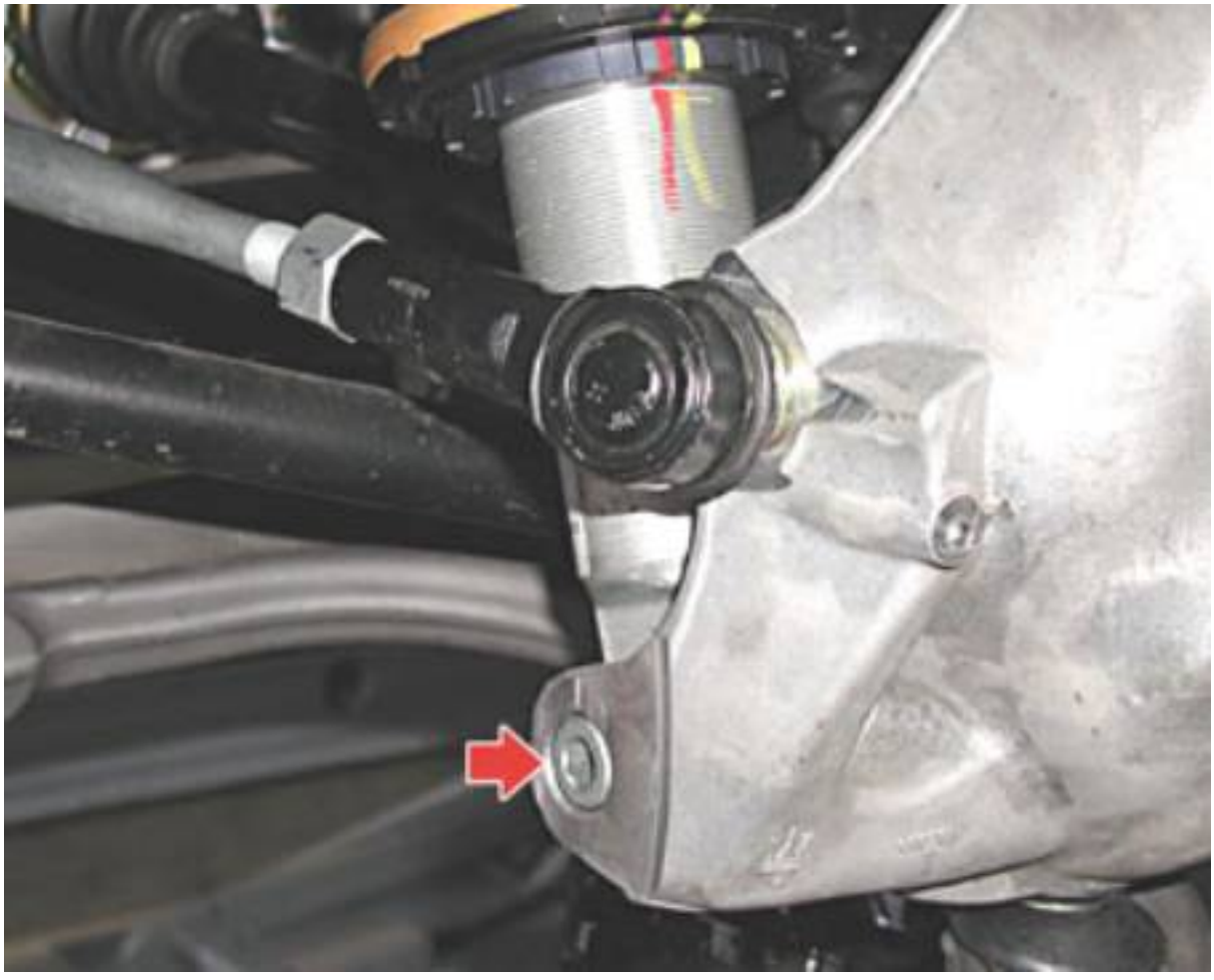


Refitting the rear shock absorbers

- Fit the shock absorber and tighten the screw that fastens the shock absorber to the hub carrier to torque.

- **196 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- **78 Nm** for **EUROPE** vehicles from assembly no. **18535** in the left-hand drive version and **17236** in the right-hand drive versions in addition, for all the **USA – CND** versions.



- Tighten the three screws that secure the shock absorber to the body to torque.

- **33.6 Nm** for **EUROPE** vehicles up to assembly no. **18534** in the left-hand drive version and **17235** in the right-hand drive versions
- **25 Nm** for **EUROPE** vehicles from assembly no. **18535** in the left-hand drive version and **17236** in the right-hand drive versions in addition, for all the **USA – CND** versions.

- Attach the rear shock absorber’s electrical connection.

- Complete the procedure by refitting the luggage compartment trim panels.

Luggage compartment trim panels

- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

- After connecting the battery’s negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection.

UPPER FRONT LEVER

Removing the upper front lever

- Remove the relative wheel.

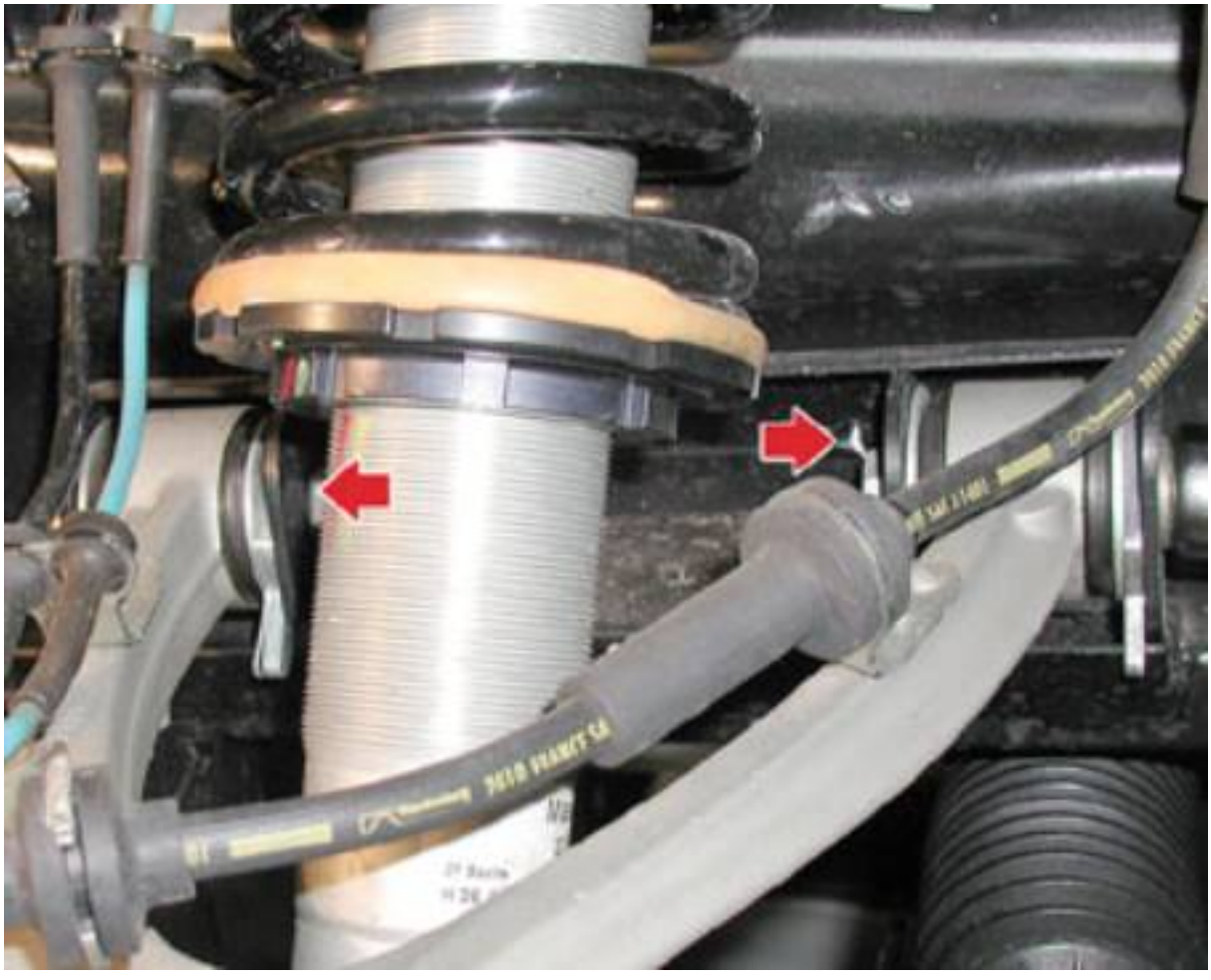
Replacing the wheels

- Undo the lower fastening screws on the wheel bay dust-protection shield.

- Unscrew the six fastening screws, and remove the five snap-fit buttons, then remove the wheel bay dust-protection shield.

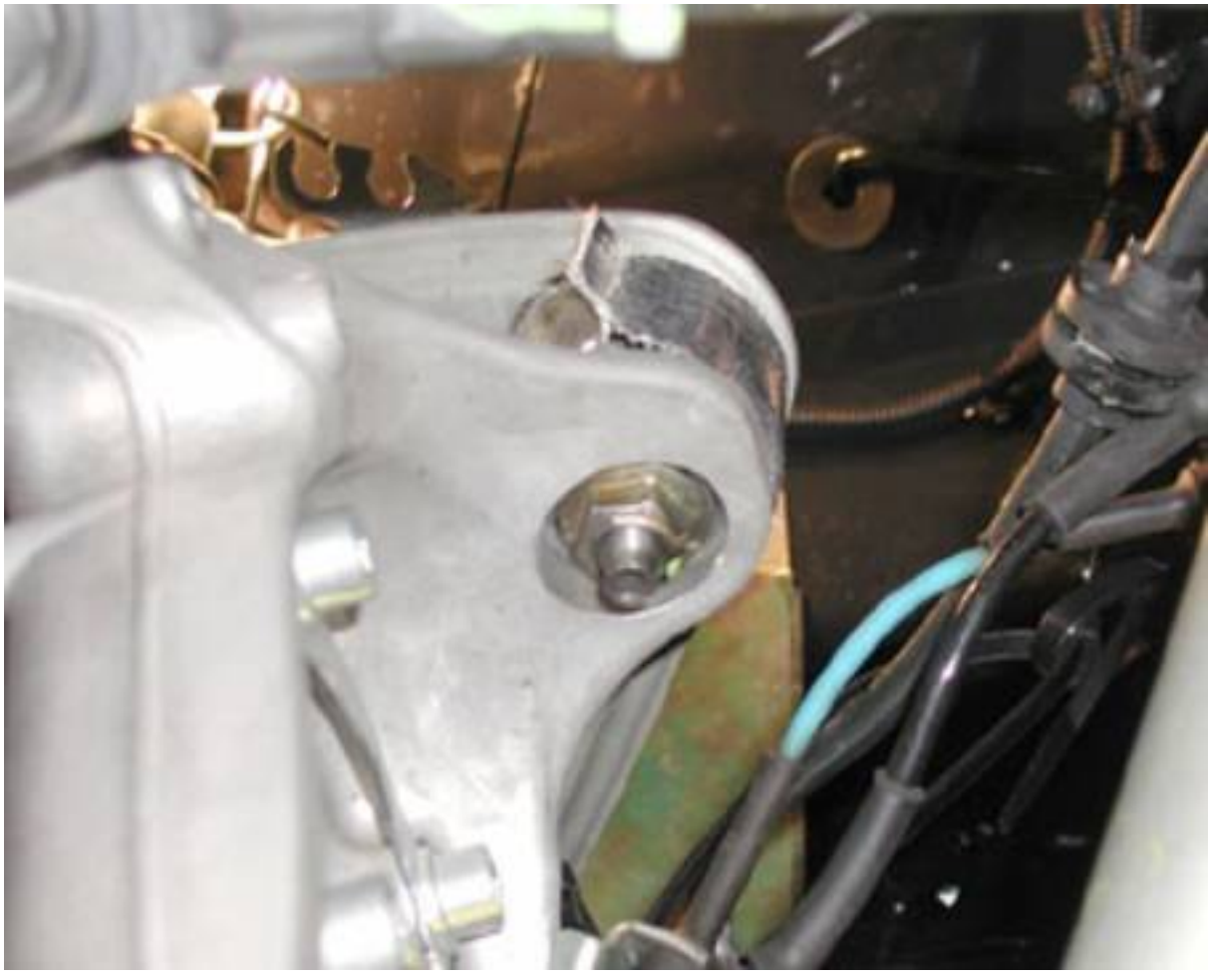
- Release the electrical wiring and the oil line from the fastening on the upper wishbone.

- Unscrew the bolts fastening the upper fastening wishbone (lever) to the bodywork.

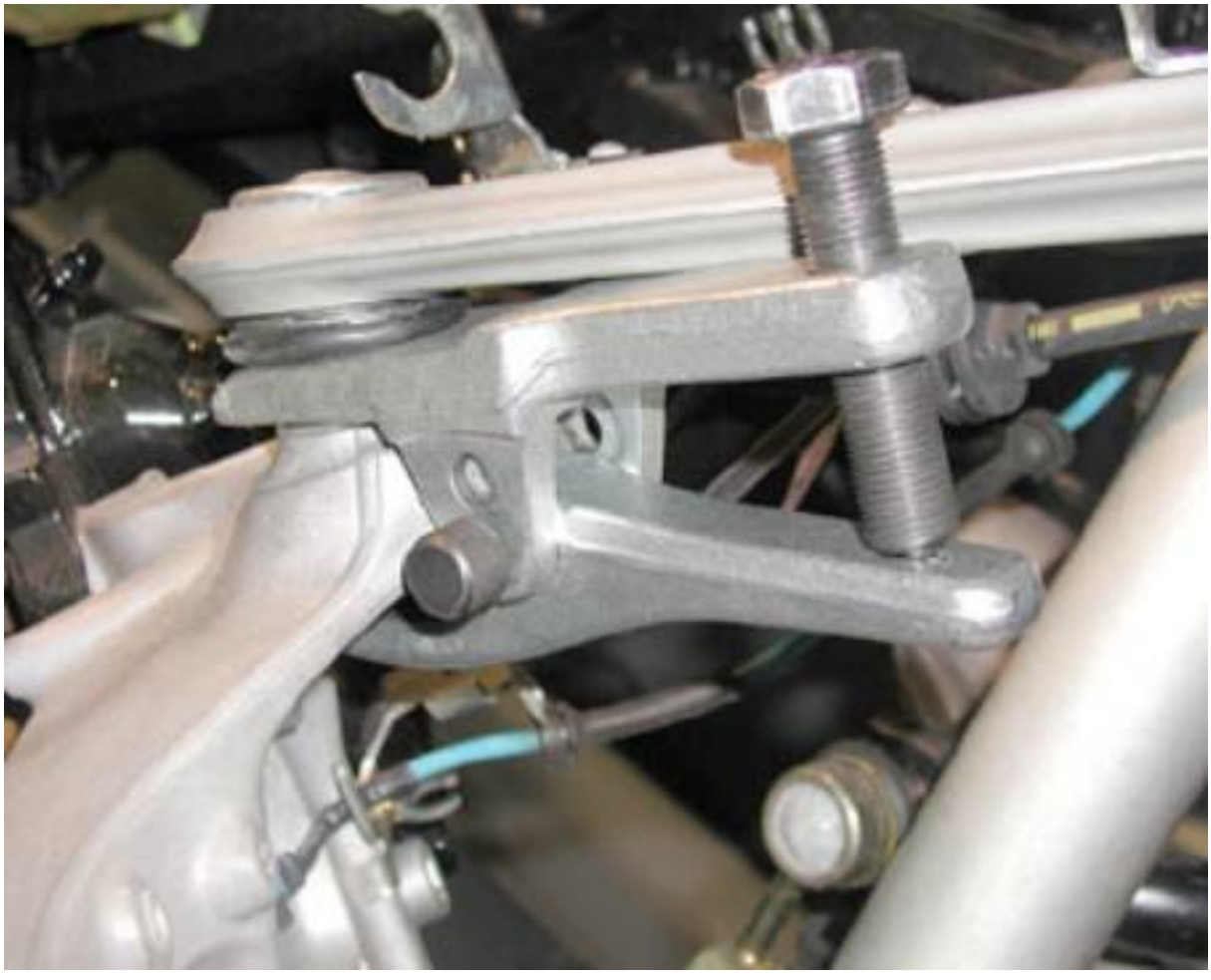


- Remove the spacers and the washers, remembering to note down the number of spacers removed and their positions.

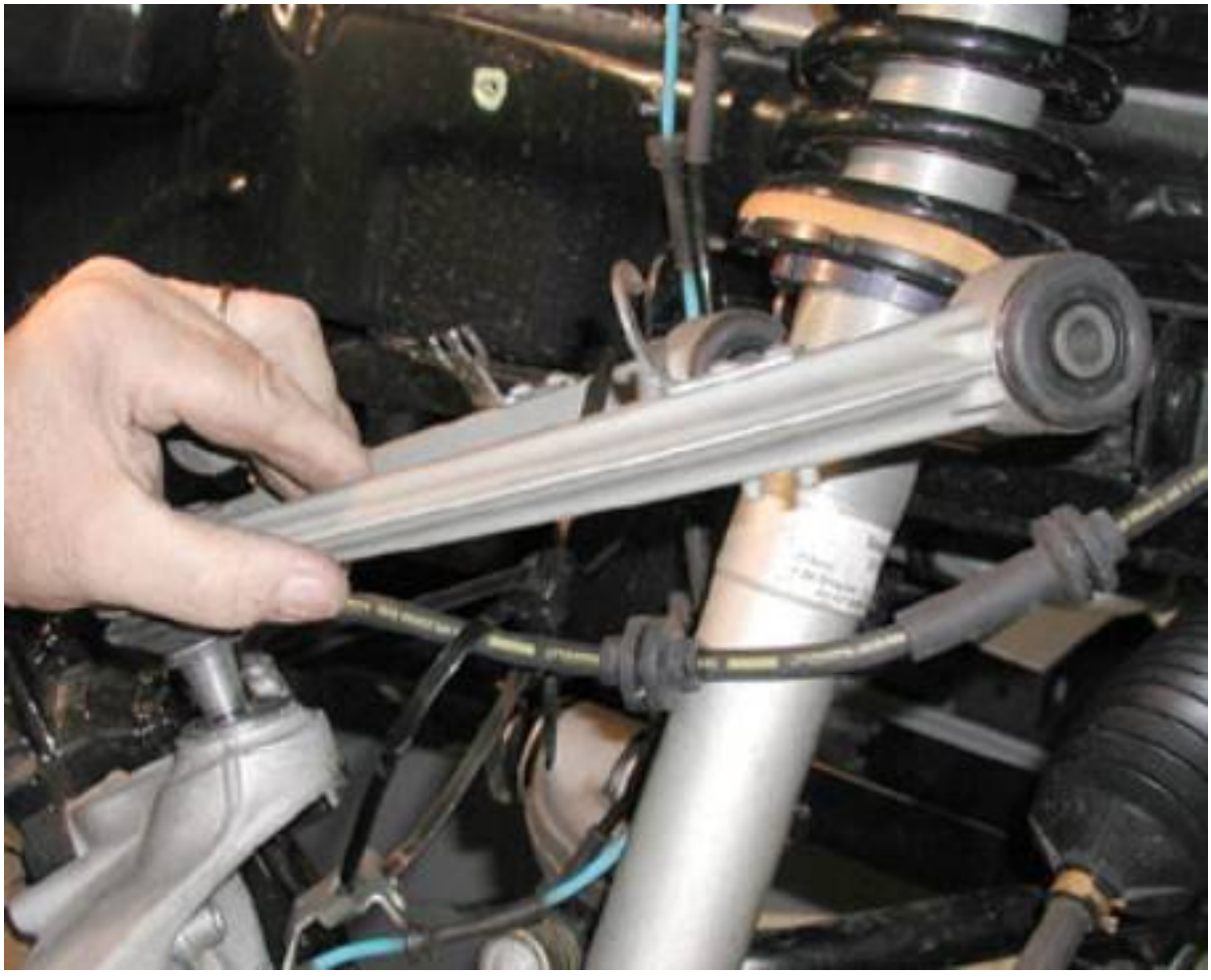
- Unscrew the nut fastening the lever to the pillar (hub carrier).



- Using the extracting tool shown in the figure, extract the lever’s tapered pin from the pillar (hub carrier).



- Remove the upper wishbone (lever).

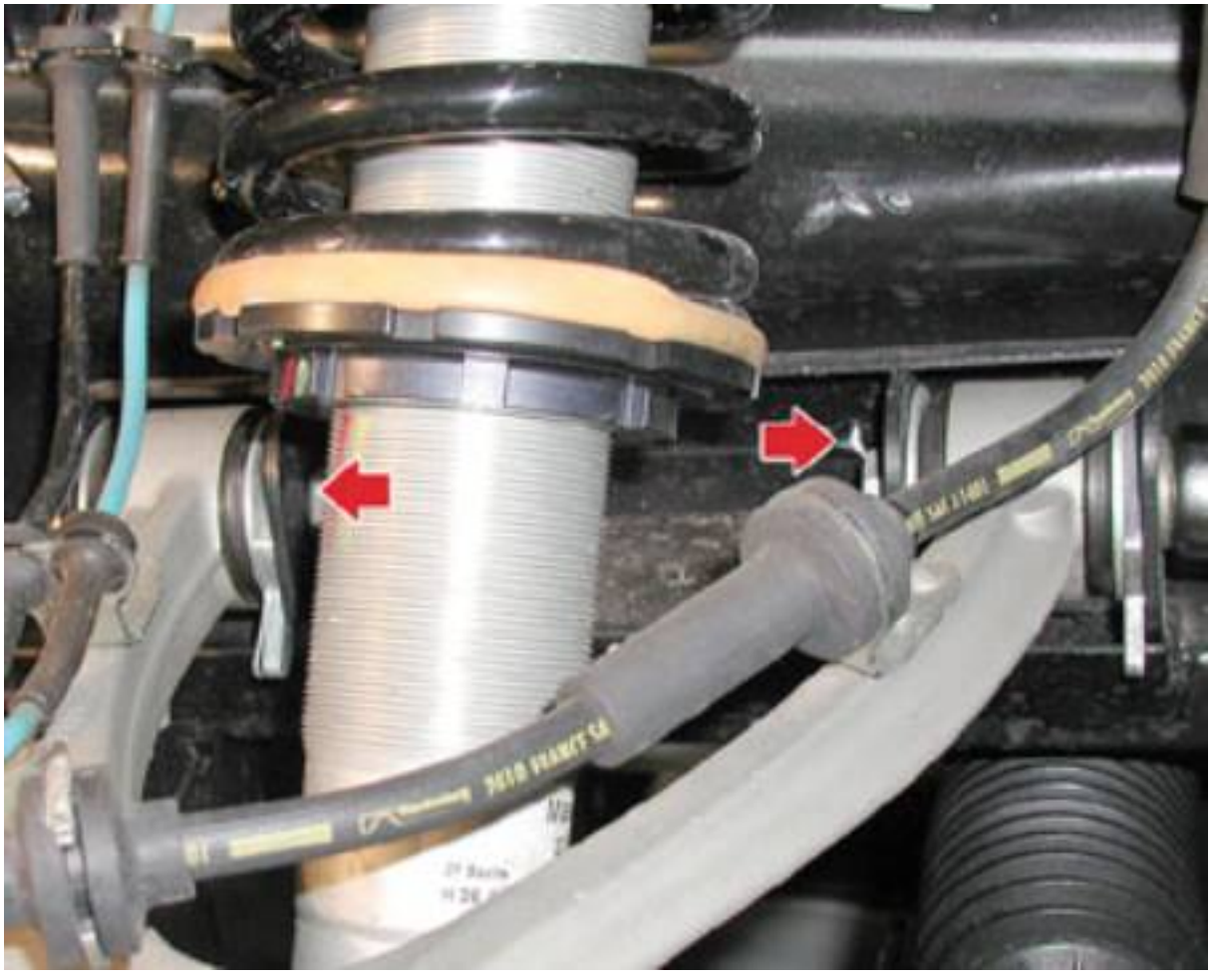


Refitting the upper front lever

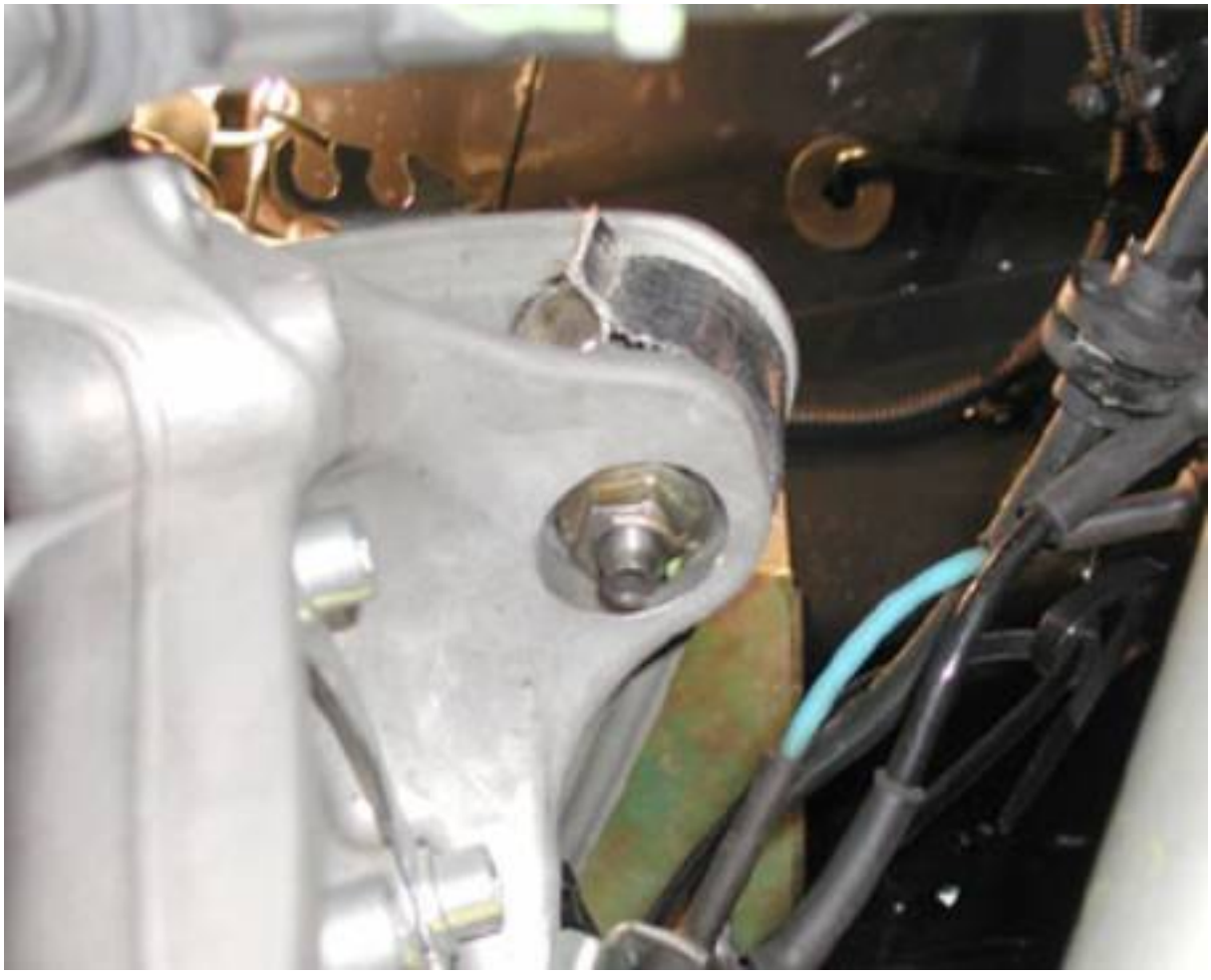
- Fit the upper front lever in its seat, inserting the fastening screws, fit the shims removed during disassembly between the silent blocks and the frame structure, then tighten the bolts to a torque of:

- **78 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- **120 Nm** for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.



- Tighten the nut fastening the lever to the pillar (hub carrier) to a torque of **52 Nm**.



- Secure the electrical wiring and the oil line from the fastening on the upper wishbone.

- Fit the wheel bay dust-protection shield and tighten the six fastening screws fully, then fasten the five snap-fit buttons.

- Tighten the lower fastening screws on the wheel bay dust-protection shield fully.

- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific paragraph
Wheel alignment - Front wheels

LOWER FRONT LEVER

Removing the lower front lever

- Remove the relative wheel.

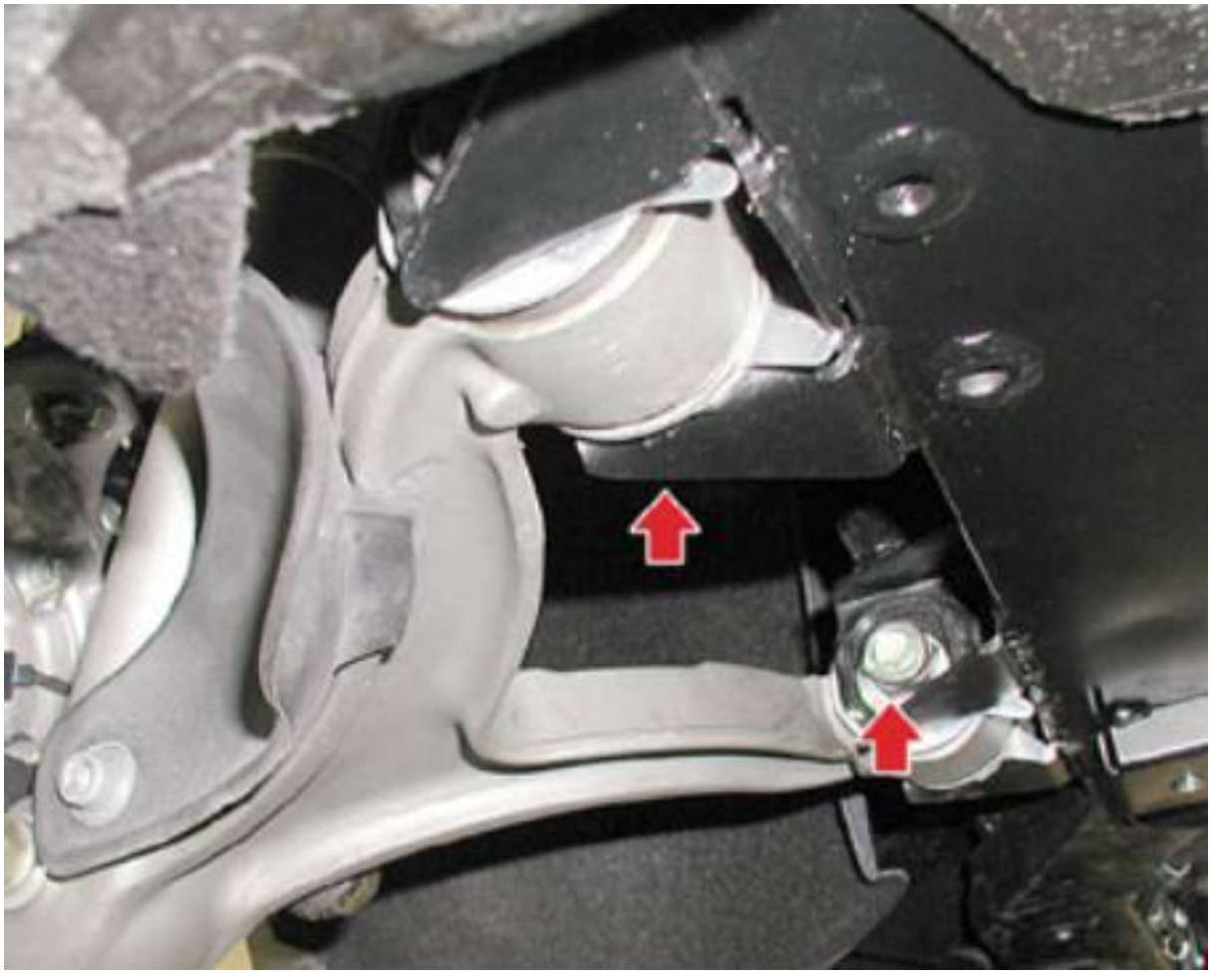
Replacing the wheels

- Undo the lower fastening screws on the wheel bay dust-protection shield.

- Unscrew the six fastening screws, and remove the five snap-fit buttons, then remove the wheel bay dust-protection shield.

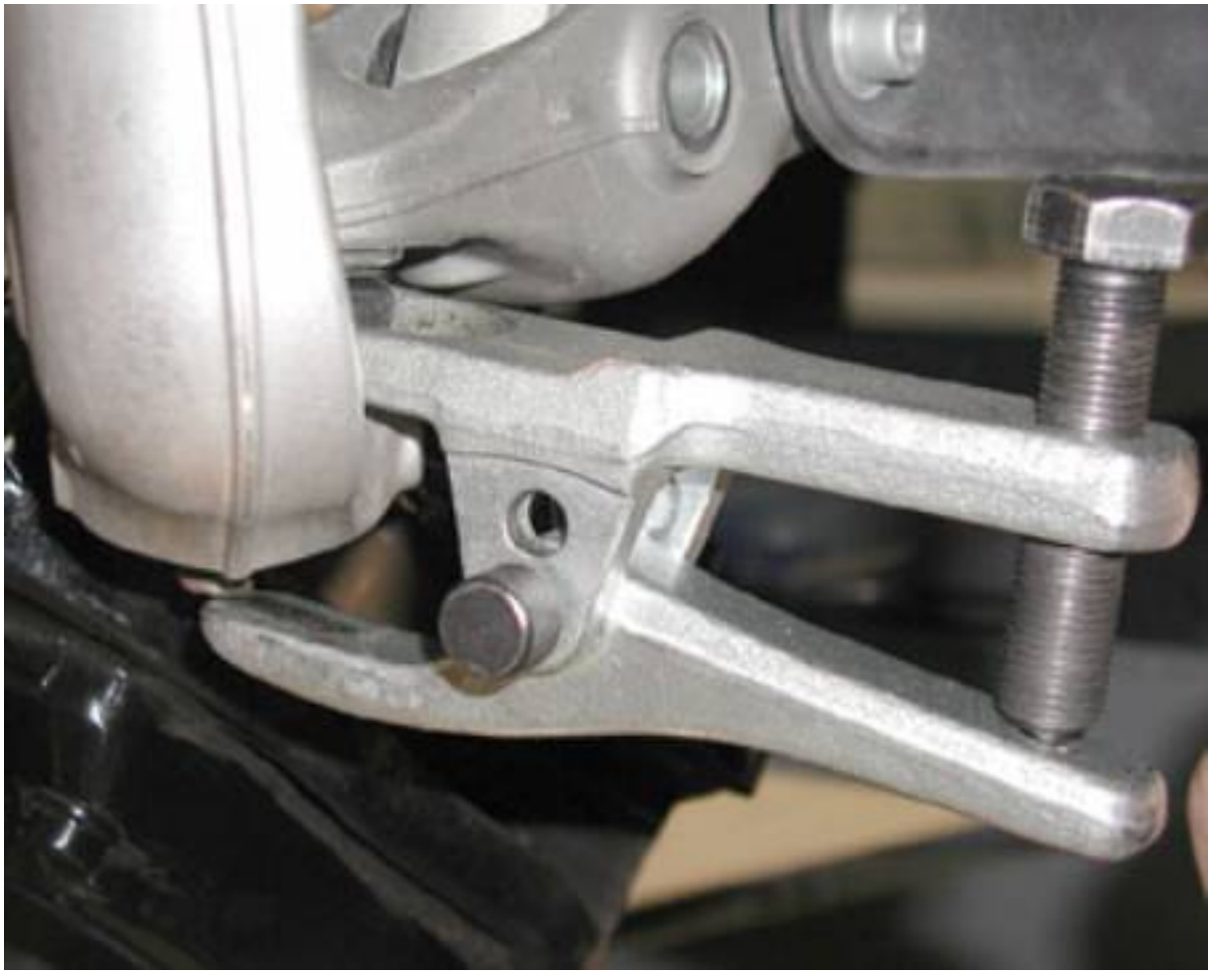
- Release the electrical wiring and the oil line from the fastening on the upper wishbone.

- Unscrew the fastening bolts on the lower fastening wishbone (lever). Remove the spacers and the washers, remembering to note down the number of spacers removed and their positions.



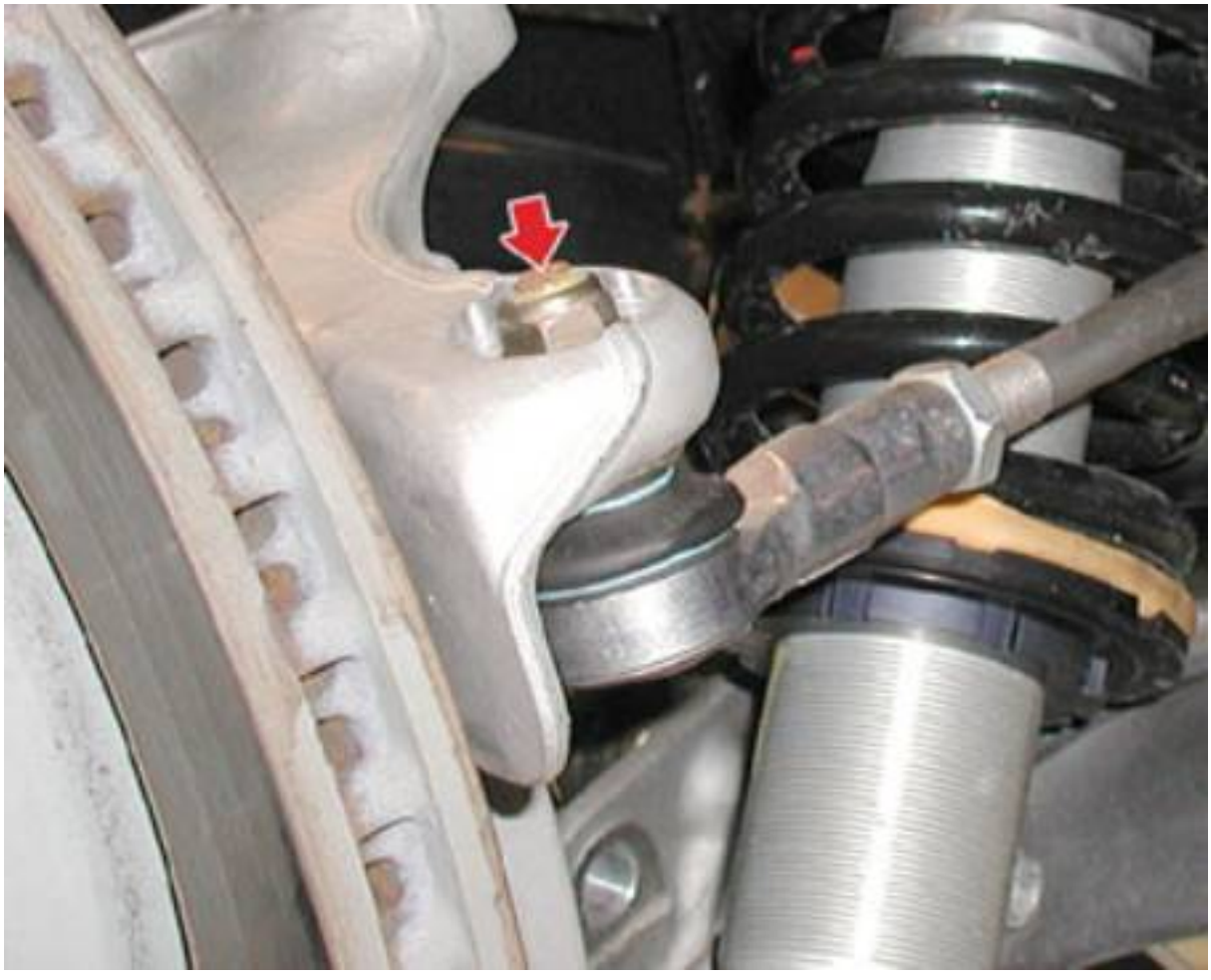
- Unscrew the nut fastening the lever to the pillar (hub carrier).

- Using the extracting tool shown in the figure, extract the lever’s tapered pin from the pillar (hub carrier).

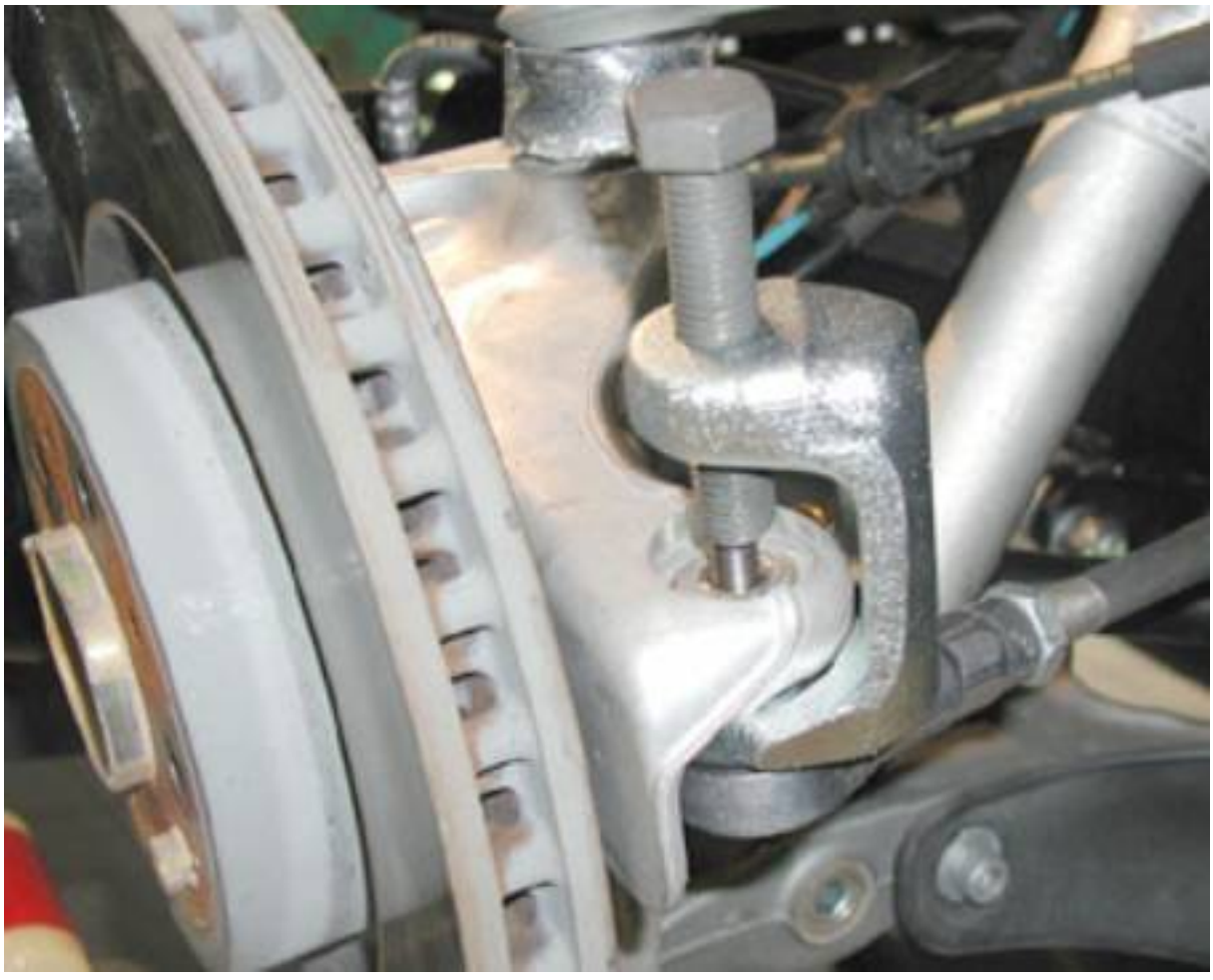


- Unscrew the bolt fastening the shock absorber to the lower wishbone (lever)

- Unscrew the fastening nut on the steering tie-rod’s tapered head.



- Using the extracting tool, disconnect the steering tie-rod’s tapered head from the pillar.



N.B.
Place a hydraulic supporting device under the lower wishbone (lever) to ensure it does not reach its stroke limit during removal as this could impair the operation of the suspension.

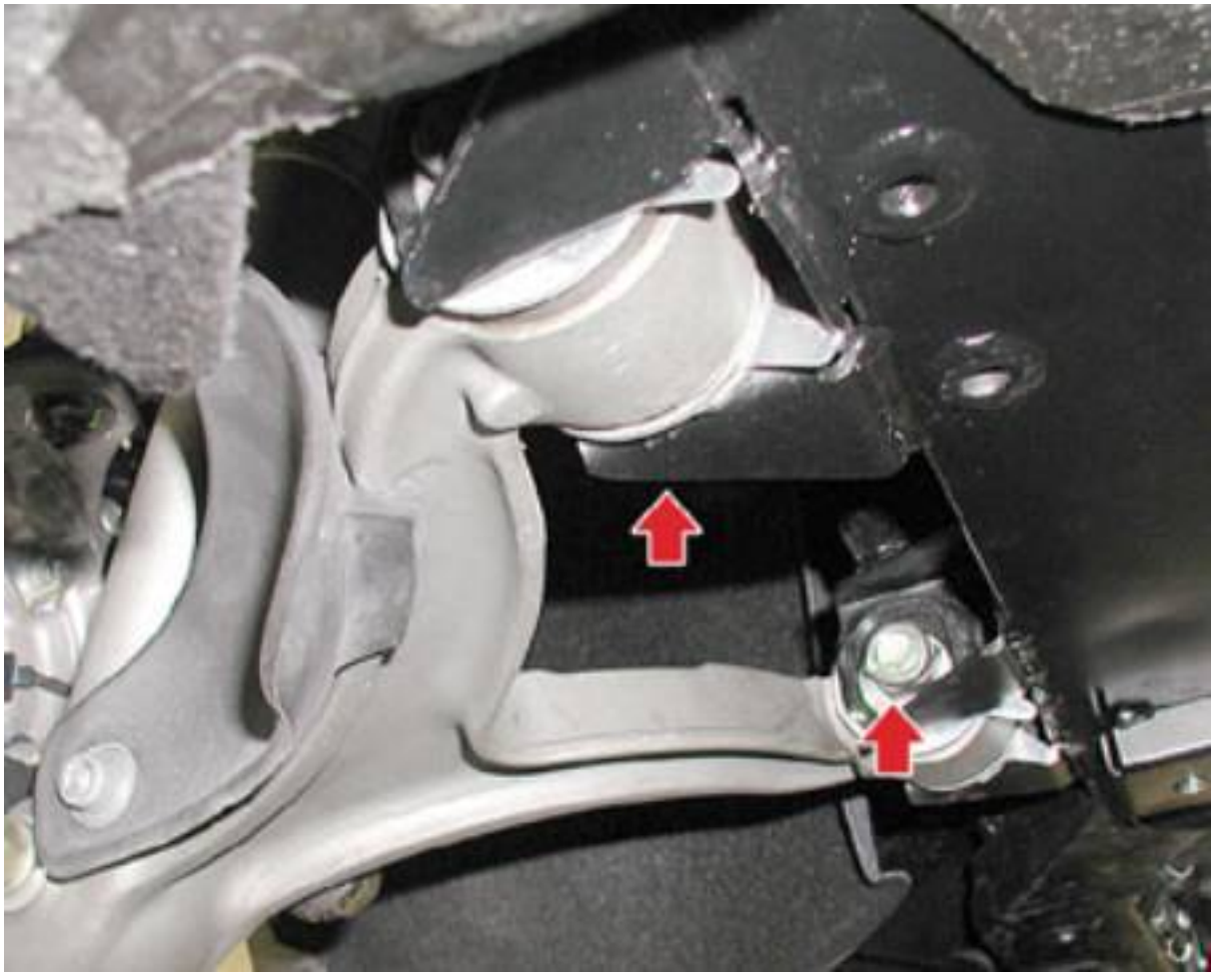
- Unscrew the fastening nut on the stabilizer bar’s articulated joint and remove the lower wishbone (lever).

Refitting the lower front lever

- Fit the lower front lever in its seat, inserting the fastening screws, fit the shims removed during disassembly between the silent blocks and the frame structure, then tighten the bolts to a torque of:

- **98 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

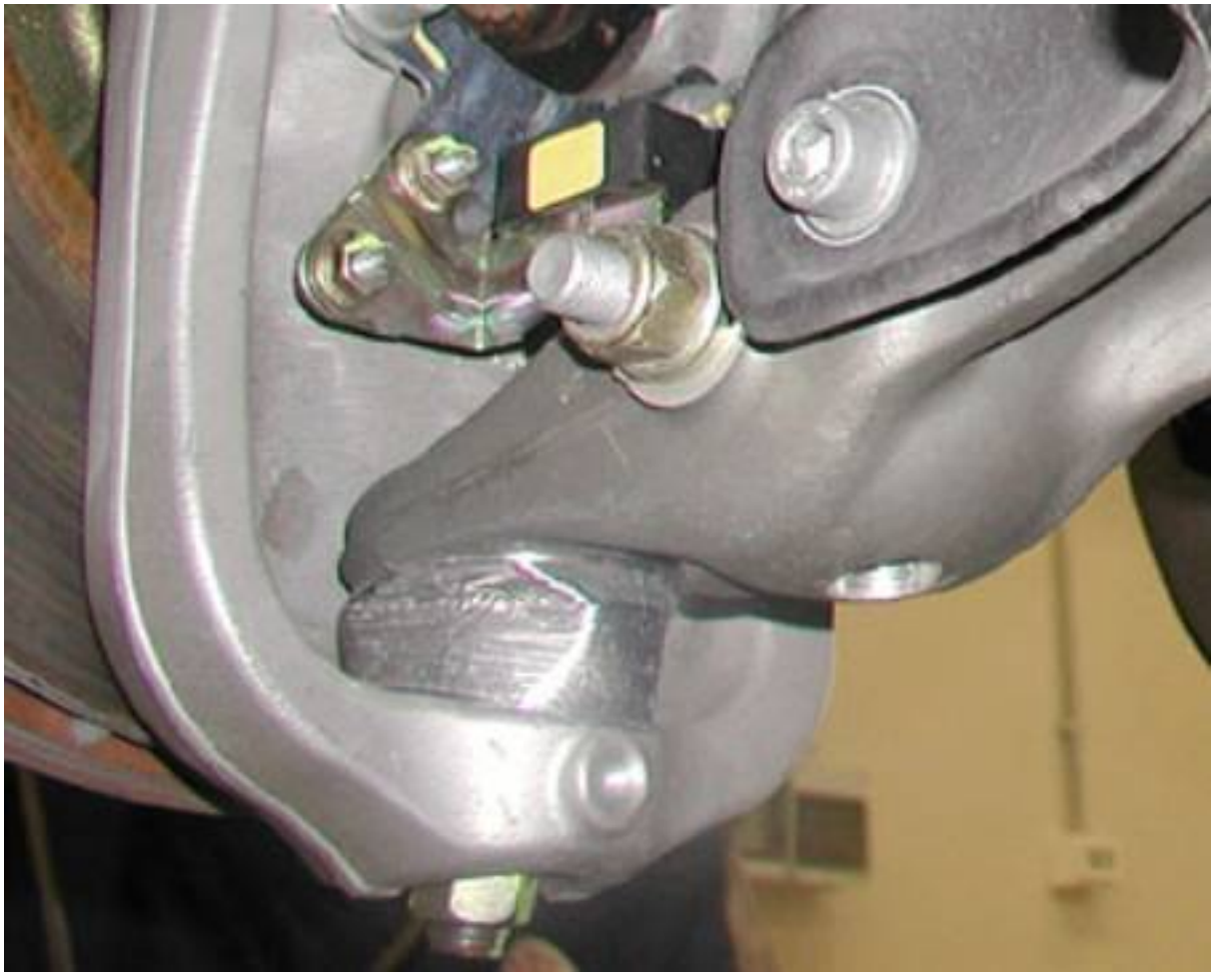
- 120 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.



- Tighten the nut that fastens the lever to the pillar (hub carrier) to torque.

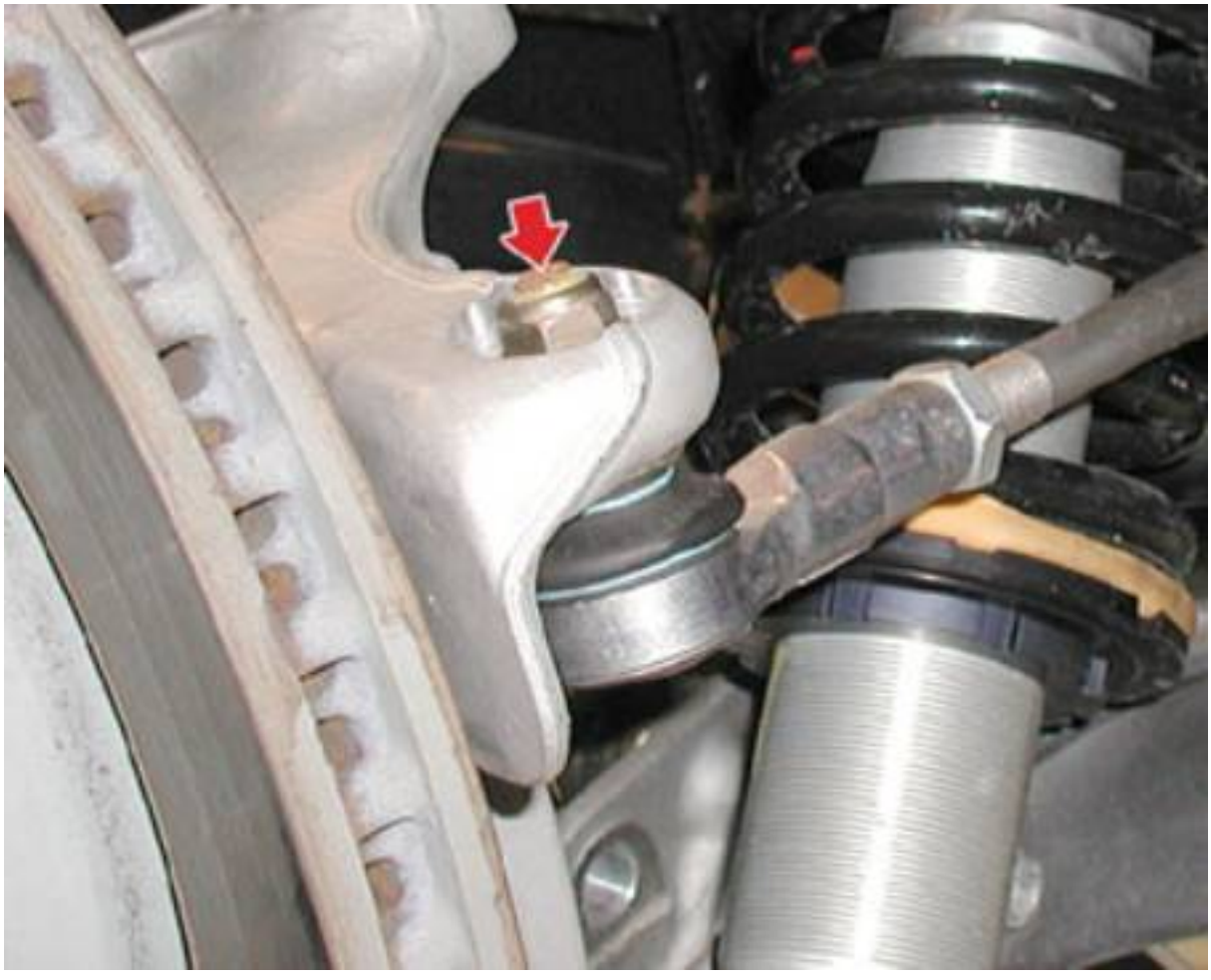
- **63 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- pretighten to 90 Nm, loosen the nut and tighten to **63 Nm**; for **EUROPE** vehicles from assembly **18535** in the left-hand drive version and **17236** in the right-hand drive versions; in addition, for all the **USA – CND** versions.



- Tighten the nut that fastens the stabilizer bar's joint to the lower lever to a torque of **50 Nm**

- Tighten the fastening nut on the steering tie-rod’s tapered head to a torque of **40 Nm**



- Tighten the bolt fastening the shock absorber to the lower wishbone (lever) to a torque of **78 Nm**

- Secure the electrical wiring and the oil line from the fastening on the upper wishbone.

- Fit the wheel bay dust-protection shield and tighten the six fastening screws fully, then fasten the five snap-fit buttons.

- Tighten the lower fastening screws on the wheel bay dust-protection shield fully.

- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

N.B.

We recommend you check the wheel alignment data by carrying out the operations outlined in the specific paragraph

Wheel alignment - Front wheels

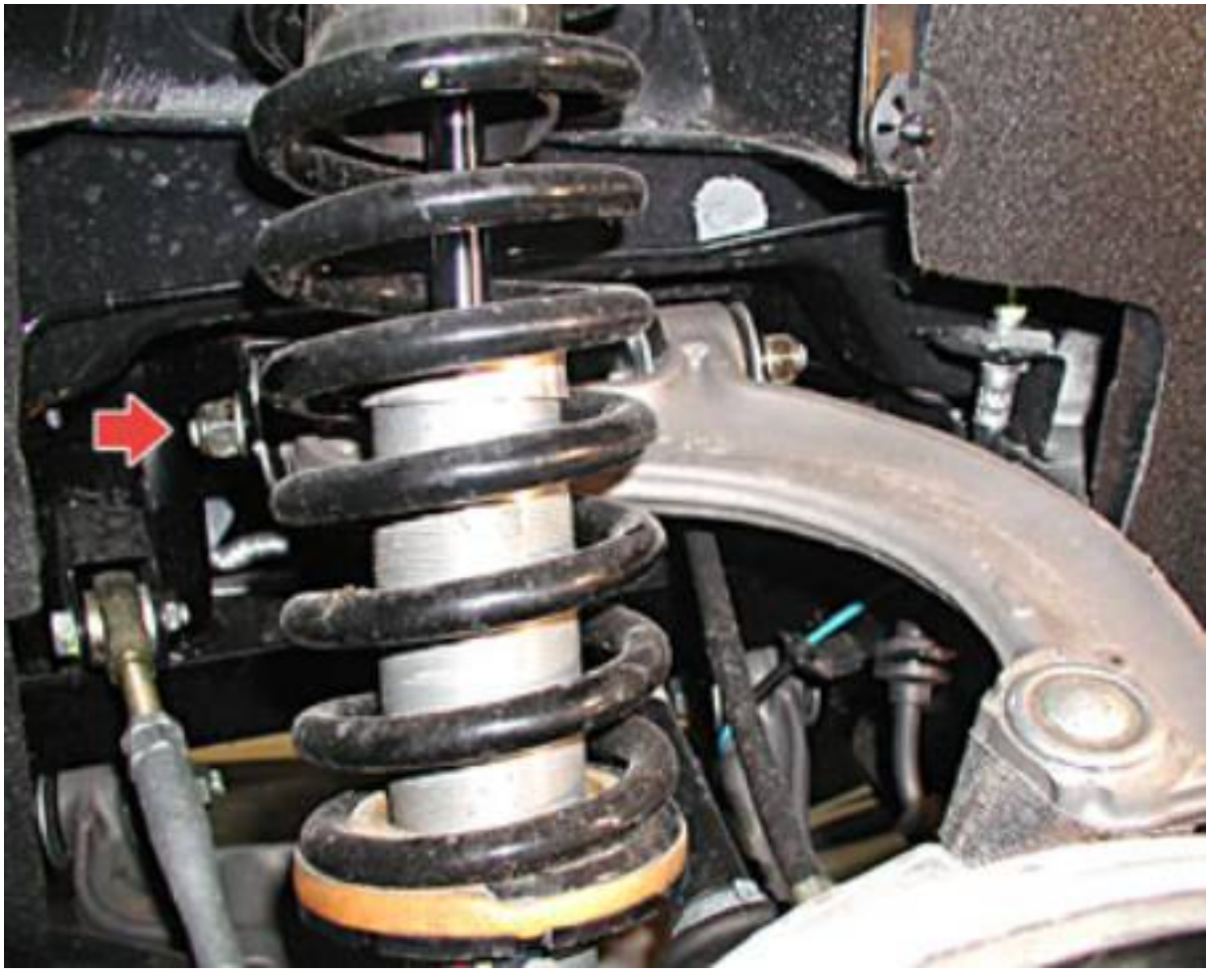
UPPER REAR LEVER

Removing the upper rear lever

- Remove the wheel concerned.

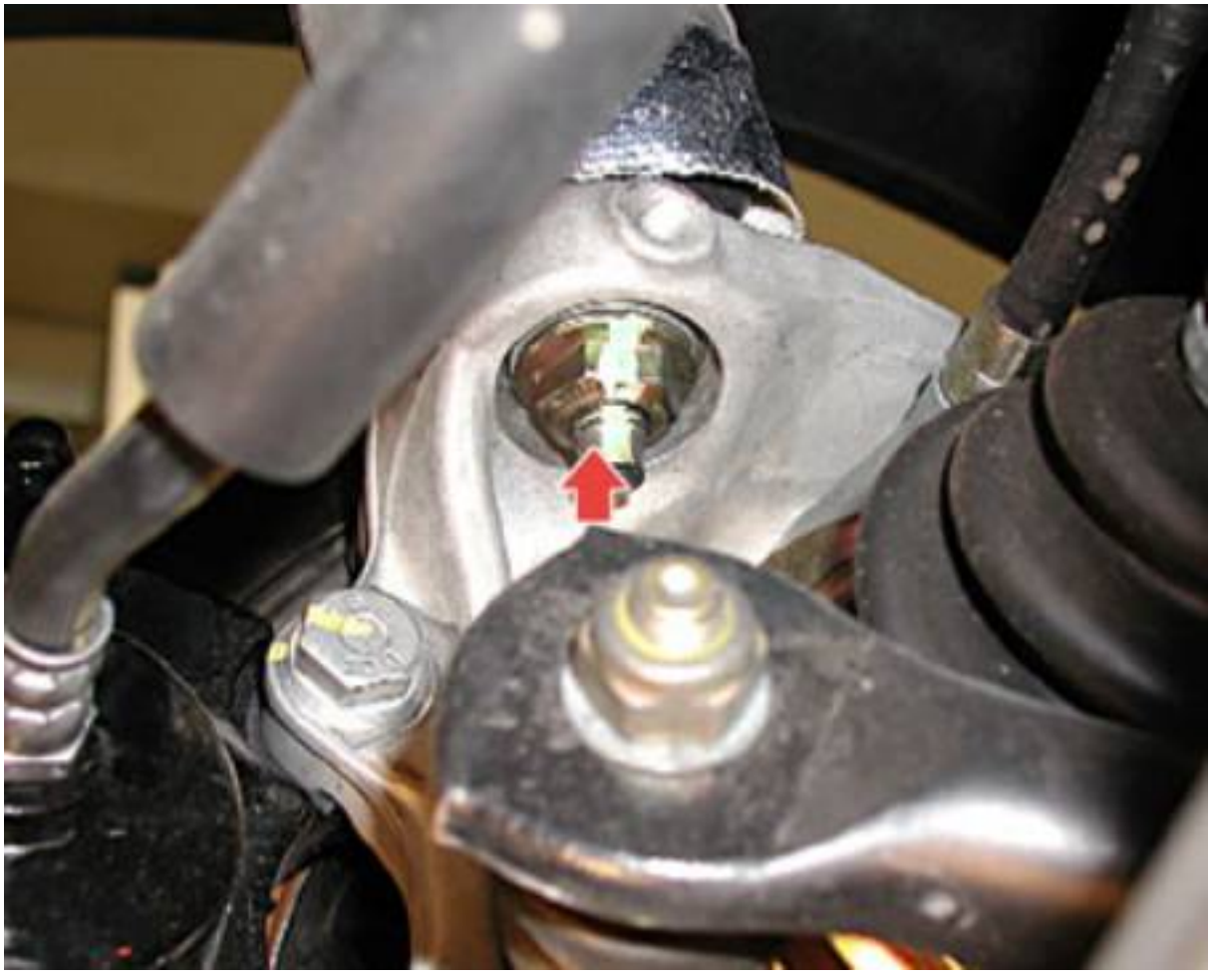
Replacing the wheels

- Undo the bolts fastening the upper rear lever to the bodywork.

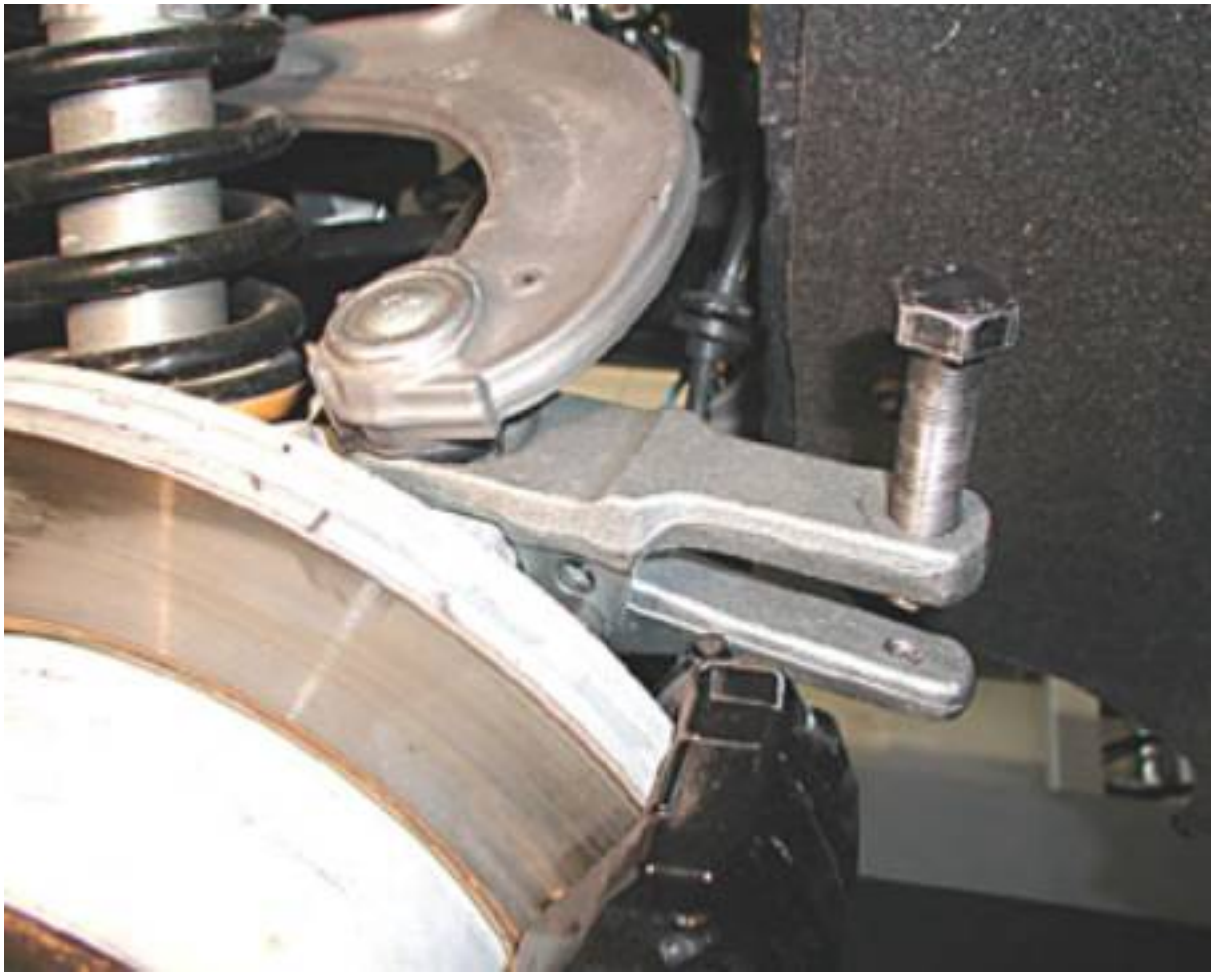


- Remove the spacers and the washers, remembering to note down the number of spacers removed and their positions.

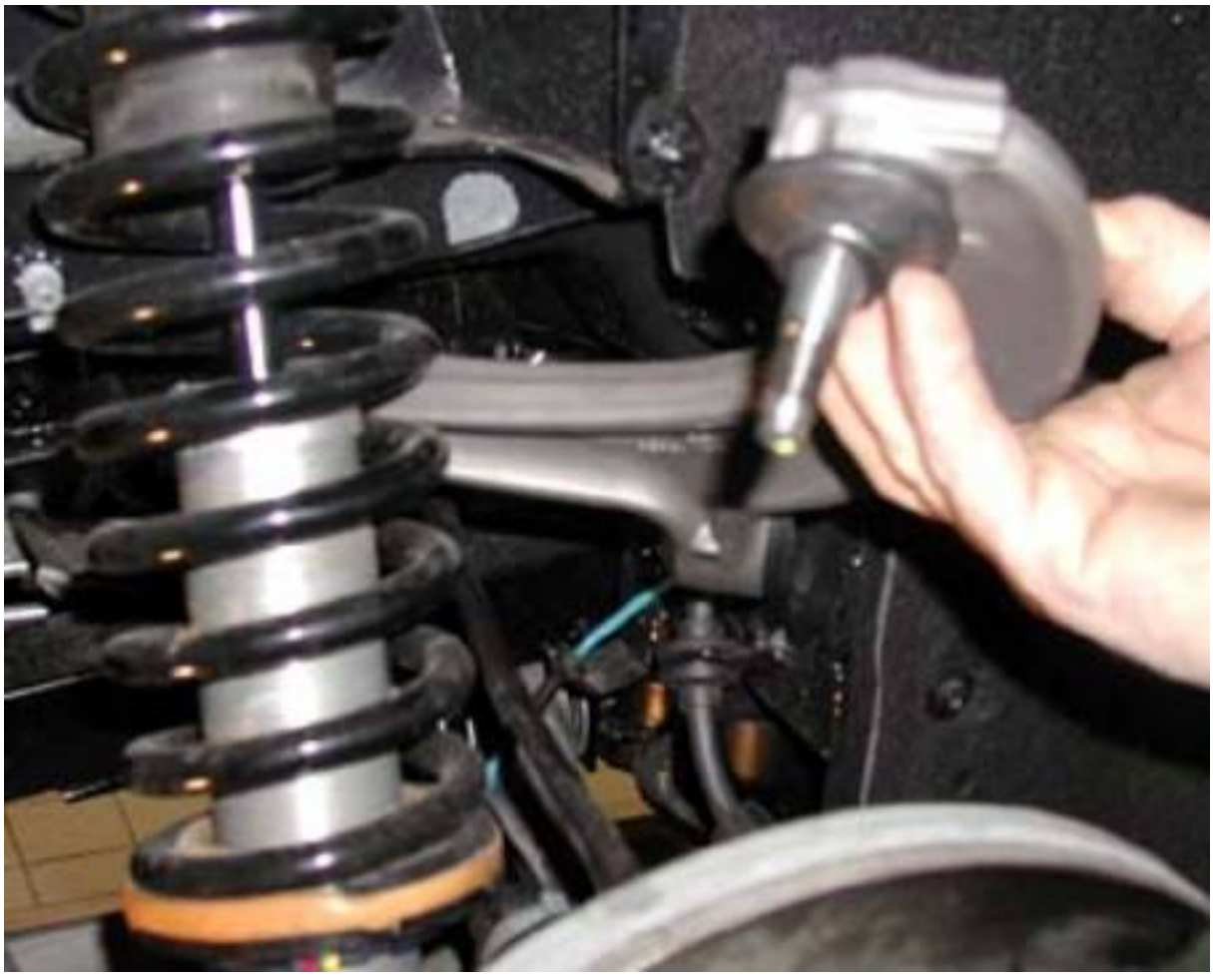
- Unscrew the nut fastening the lever to the hub carrier.



- Using the extracting tool shown, extract the lever’s tapered pin from the hub carrier.



- Remove the upper rear lever.



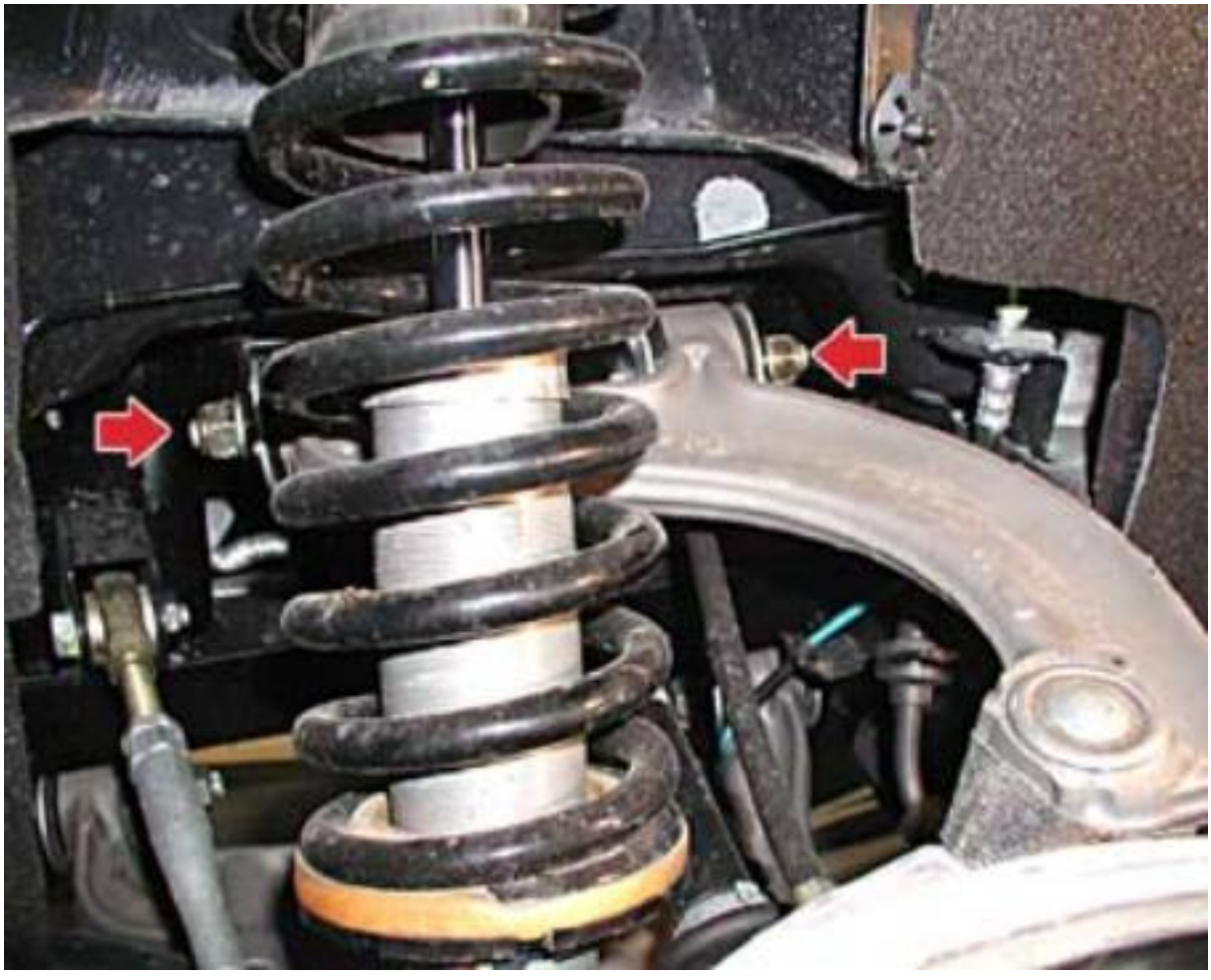
Refitting the upper rear lever

IMPORTANT
The components of the rear suspension must be tightened with the vehicle under static load, i.e.: all fluids (including fuel) up to top level, plus 75+75 kg on the front seats.

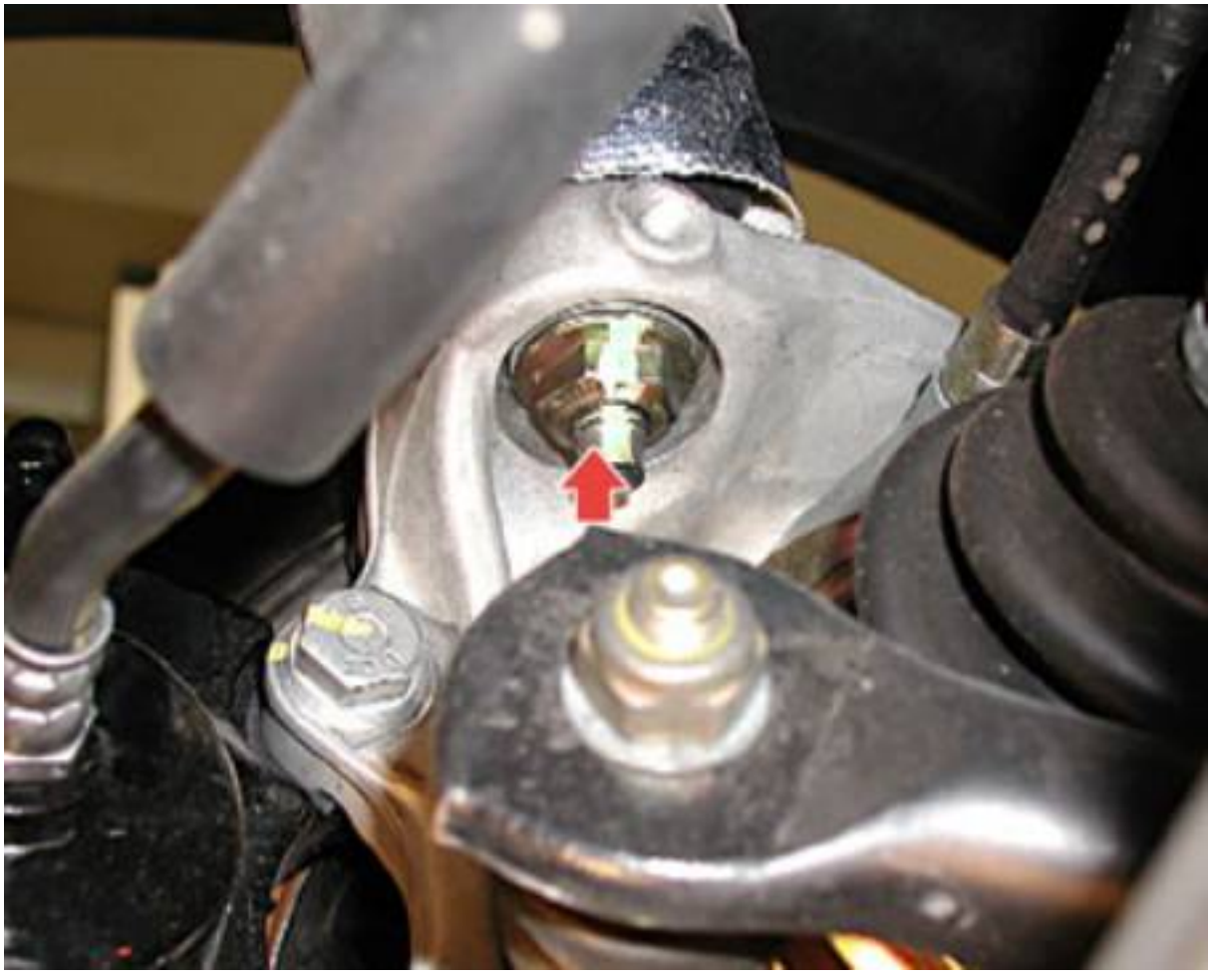
- Fit the upper front lever in its seat, fit the shims removed during disassembly between the silent blocks and the frame structure, then tighten the bolts to a torque of:

- **78 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 98 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND**versions.



- Tighten the nut fastening the lever to the pillar (hub carrier) to a torque of **52 Nm**.



- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific chapter

Wheel alignment - Front wheels
Wheel alignment - Rear wheels

LOWER REAR LEVER

Removing the lower rear lever

- Remove the wheel concerned.

Replacing the wheels

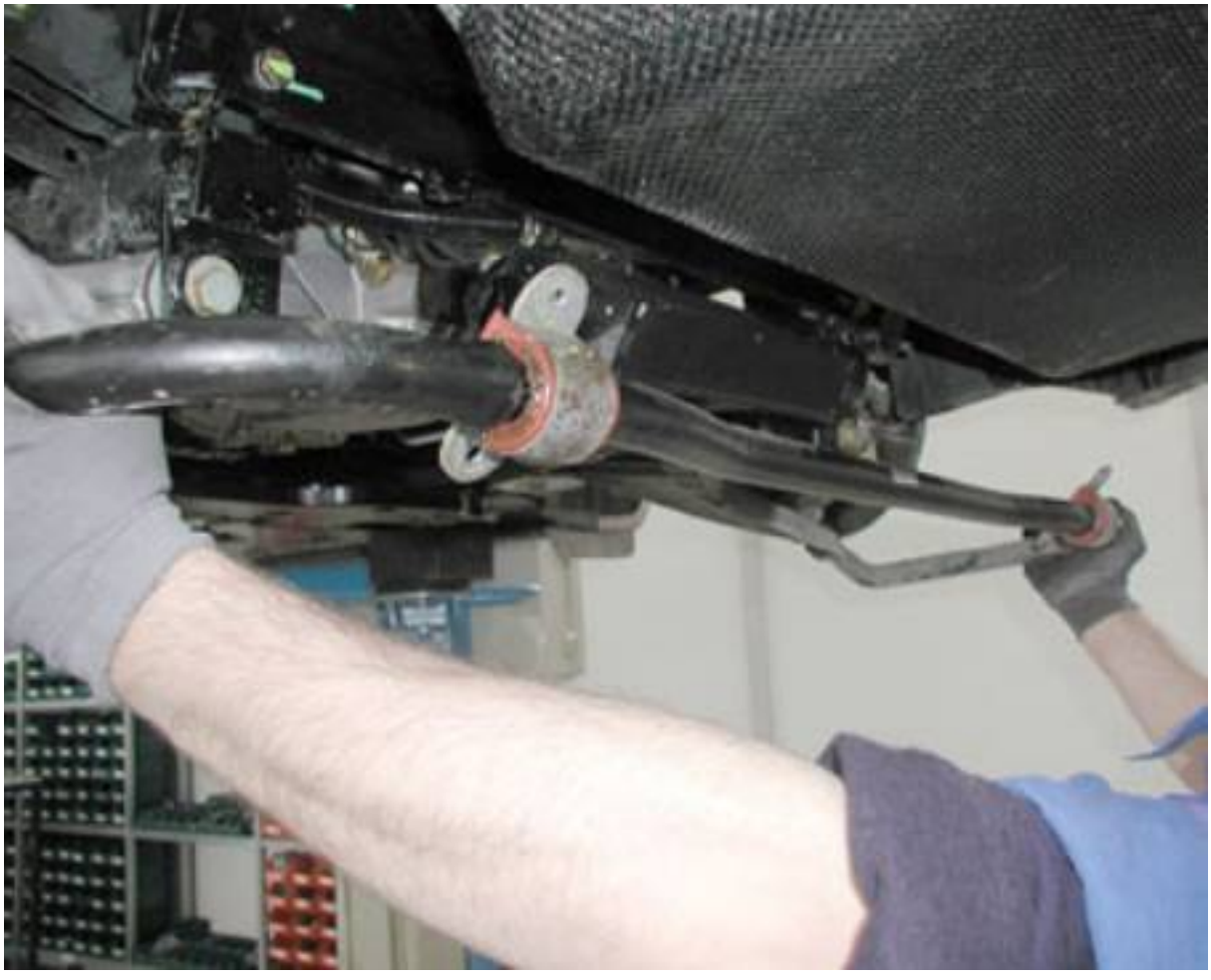
- Remove the rear shock absorber concerned

Rear shock absorbers

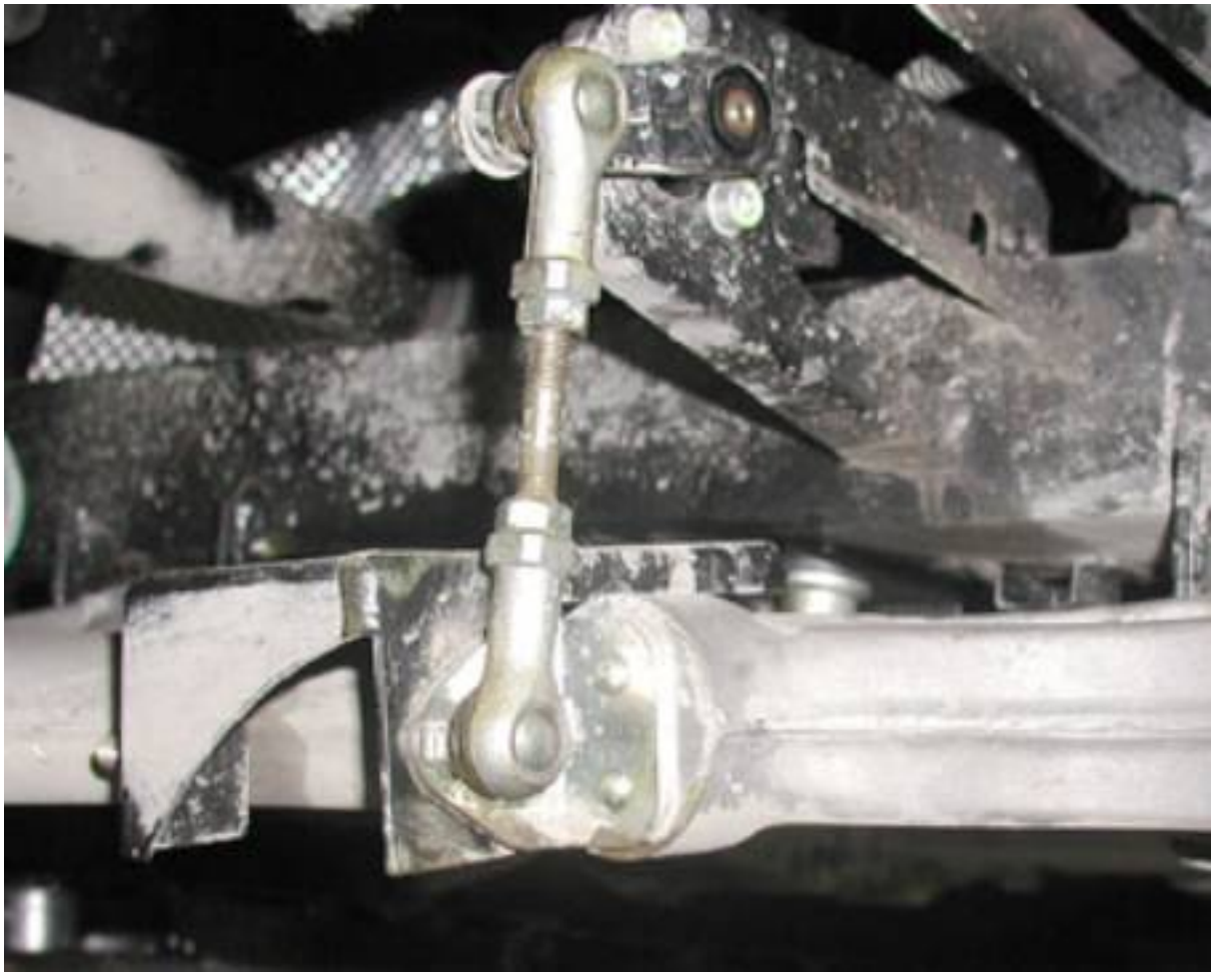
- Unscrew the nut fastening the stabiliser bar connecting rod, on the right- and left-hand side of the vehicle.

- Undo the nuts fastening the stabiliser bar to the chassis.

- Remove the stabiliser bar.



- Unscrew the nut and separate the head of the headlight adjustment potentiometer from the lower lever.



- Unscrew the nut and, using an extracting tool, separate the tapered head of the toe-in tie-rod from the hub carrier.

- Release the electric cable on the wheel revolution sensor from the fastenings on the lower lever.

N.B.
Place a hydraulic support device underneath the hub carrier to ensure the entire suspension does not reach its stroke limit during removal, as this could impair the operation of the suspension.

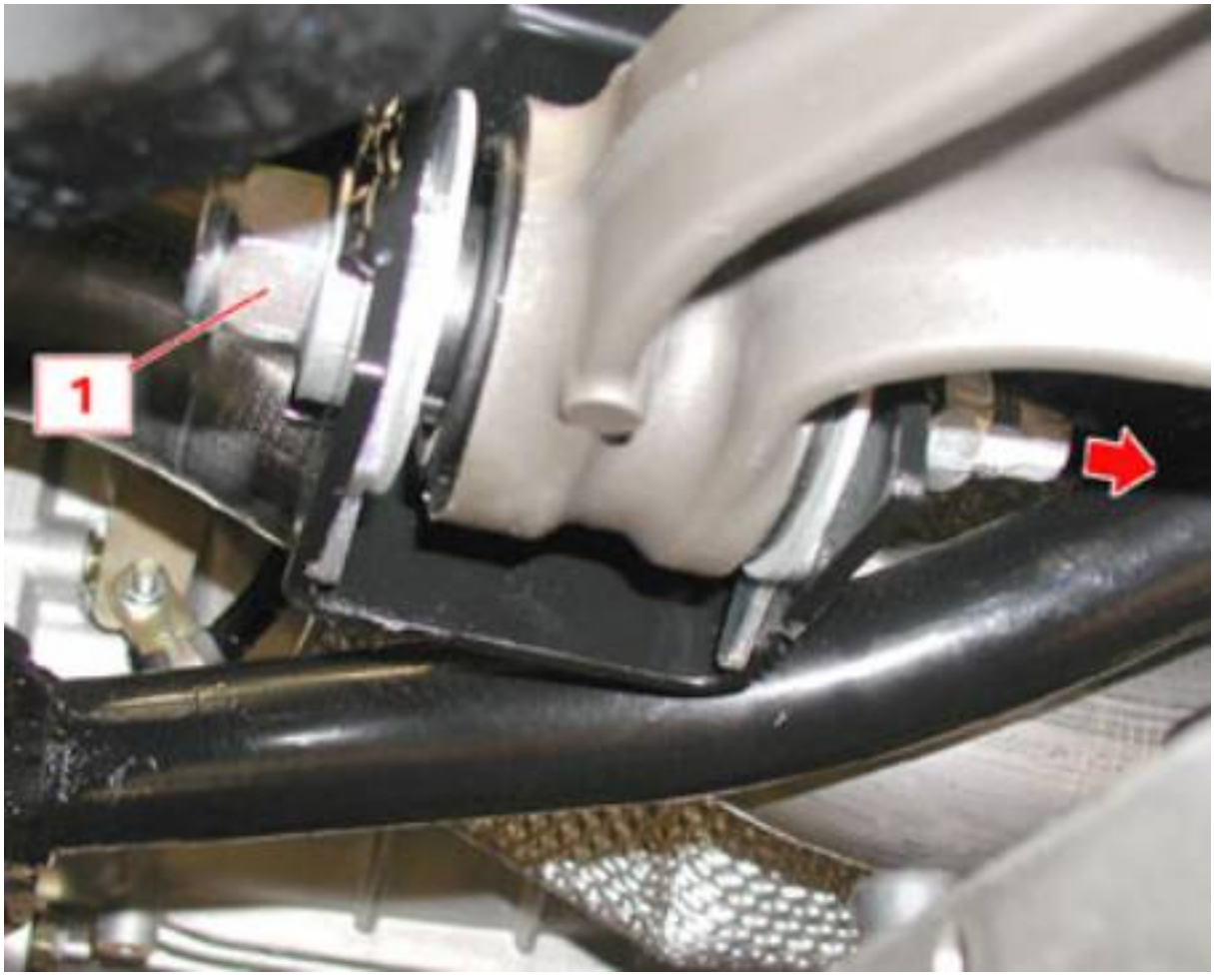
- Unscrew the nut fastening the rear lever to the hub carrier.

- Rotate the hub carrier in order to fit the extracting tool, then detach the tapered head of the lever from its seat on the hub carrier.

- Undo the bolt fastening the lever to the rear chassis and remove the spacers and the washers, remembering to note down the number of spacers removed and their positions.

- For vehicles manufactured up to serial number 13199/ chassis n. 14332, proceed as follows.
- Undo the remaining bolt fastening the lever to the rear chassis, remove the spacers and the washers, remembering to note down the number of spacers removed and their positions, then remove the lower rear lever.

- For vehicles manufactured up to serial number 13199/ chassis n. 14333, the front fastening on the lever has been altered, therefore proceed as follows to remove it.
- Undo the left-hand threaded nut **(1)** by unscrewing it anticlockwise, then slide the pin out the rear section (see direction of the arrow).
- Remove the spacers and the washers, remembering to note down the number of spacers removed, then remove the rear lower lever.



Refitting the rear lower lever

IMPORTANT
The components of the rear suspension must be tightened with the vehicle under static load, i.e.: all fluids (including fuel), up to top level plus 75+75 kg on the front seats.

- Fit the lower rear lever in its seat, inserting the fastening screws, then fit the shims removed during disassembly between the silent blocks and the frame structure, then tighten the bolt to a torque of:

- **98 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

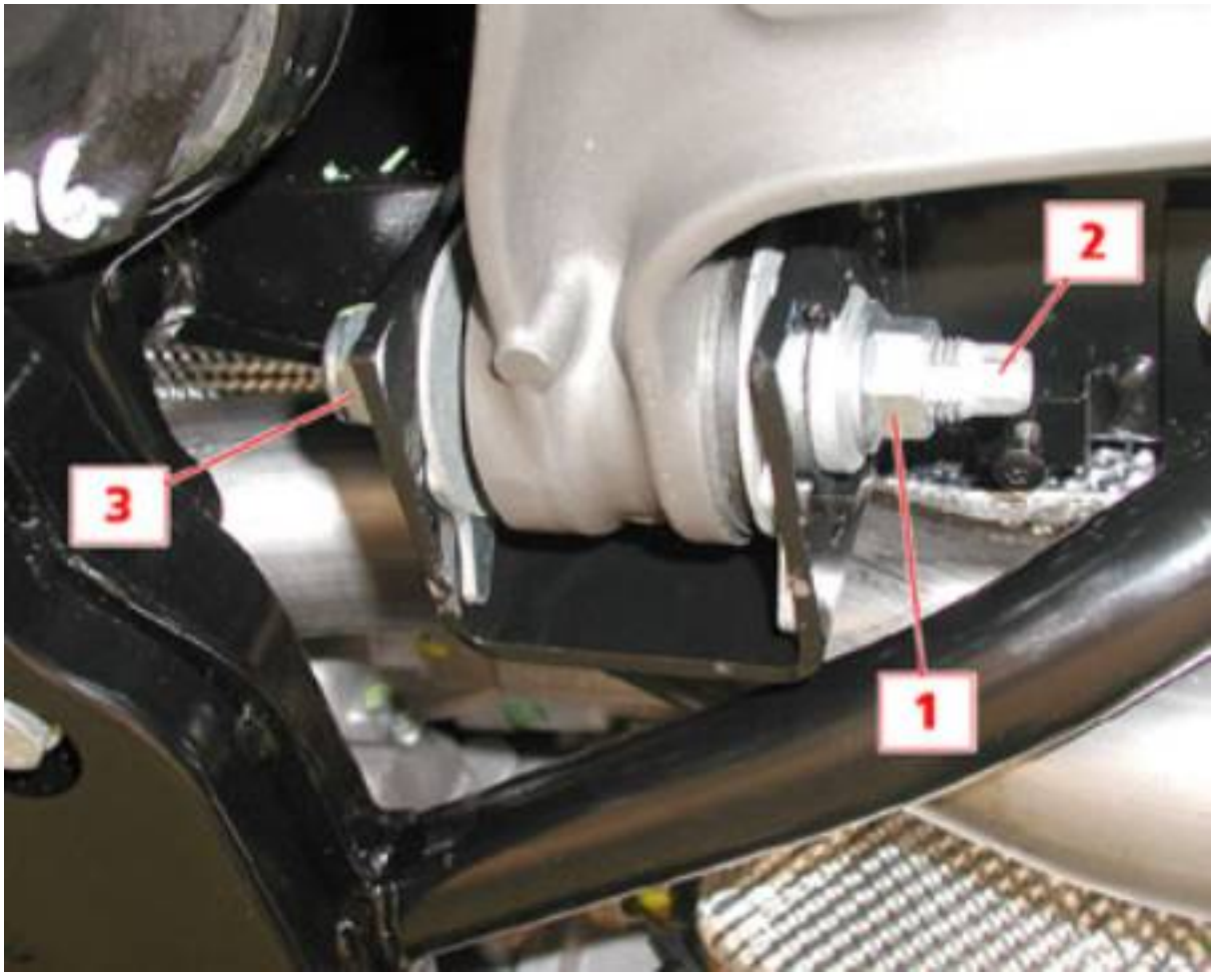
- 120 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

- For vehicles manufactured up to serial number 13199/ chassis n. 14332, proceed as follows.
- Tighten the remaining bolt to a torque of **98 Nm**.

- For vehicles manufactured up to serial number 13199/ chassis n. 14333, the front fastening on the lever has been altered, therefore, proceed as follows for fitting the pin and for tightening it.

IMPORTANT
The pin removed earlier cannot be refitted. Always replace all the components with new parts.

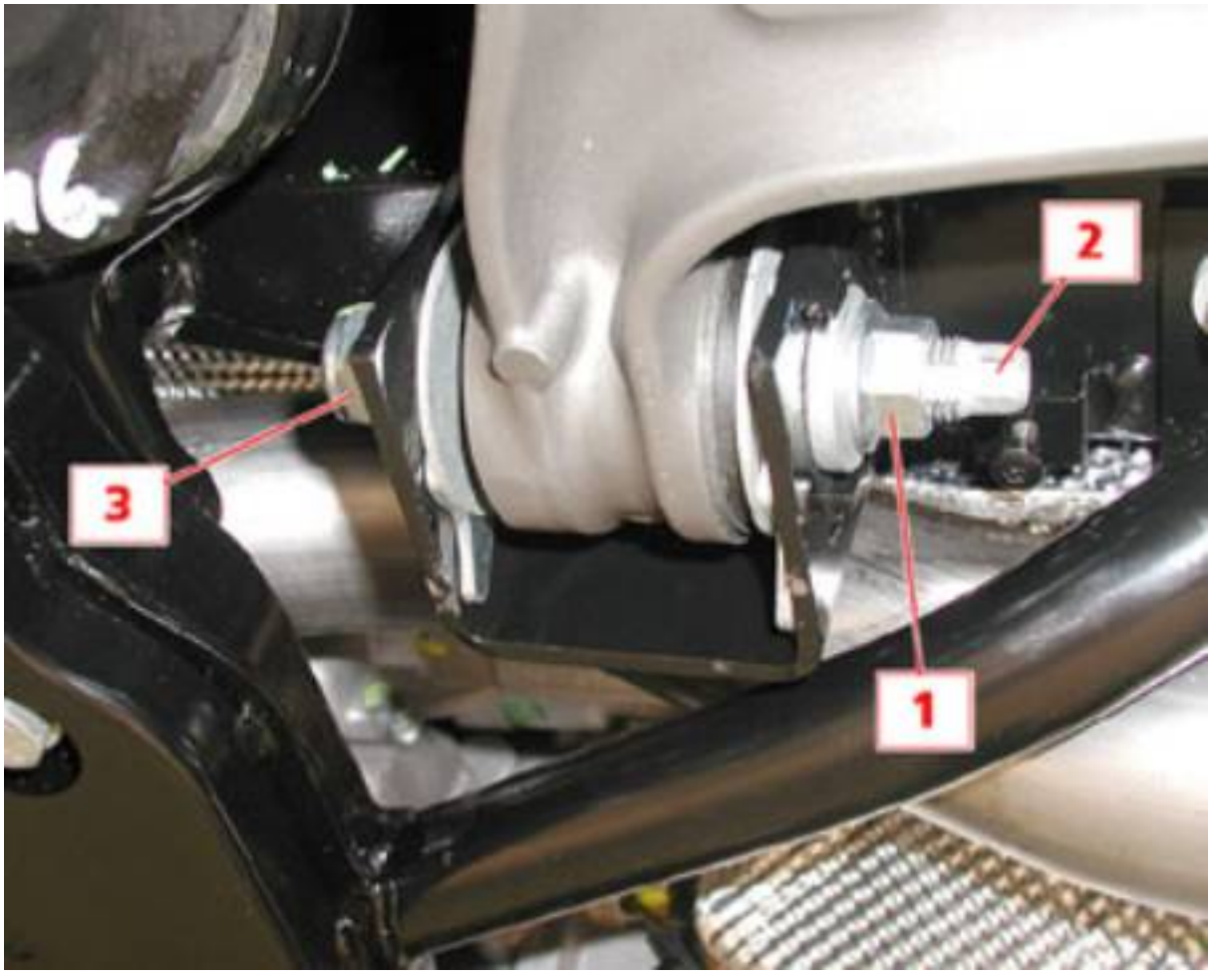
- Fit the new pin with the hexagonal head facing the rear of the vehicle, insert the shims removed earlier, then fit the front cap nut (1).
- Tighten the fastening nut (1) to a torque of **35 Nm** exerting a counterforce on the hexagonal pin head (2).
- Screw up the fastening without tightening it (3) exerting a counterforce on the hexagonal pin head (2).



- Adjust the camber by proceeding as follows.
- With the nut (1) loosened, adjust the camber by rotating the pin using the hexagonal head (2) until the right value is reached.
- Refit the nut loosely (1) exerting a counterforce on the hexagonal head (2).
- Then tighten the nut (1) to a torque of **120 Nm** without exerting any counterforce.

IMPORTANT
All these operations must be carried out without exerting any counterforce on the front nut (3)

IMPORTANT
The pin is prepared with an adhesive product which is activated after the cap nut is tightened, therefore it is essential not to engage the nut for at least 45 minutes after it is tightened the first time.



- There are no differences in the refitting stages outlined below, and therefore the steps described are applicable to all the models manufactured.
- Tighten the nut fastening the lever to the hub carrier to a torque of **52 Nm**.

- Position the electric cable on the wheel revolution sensor, fastening it on the lower lever.
- Connect the toe-in tie-rod to the hub carrier and tighten the fastening nut to torque.

- **80 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 45 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

- Screw the nut on the head of the headlight adjustment potentiometer onto the lower lever.
- Fit the stabiliser bar and tighten the fastening nuts to a torque of **24 Nm**.

- Tighten the nuts fastening the small connecting rods to the stabiliser bar to a torque of **50 Nm**.

- Fit the rear shock absorber removed.

Rear shock absorbers

- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific chapter

Wheel alignment - Front wheels
Wheel alignment - Rear wheels

Front pillar (hub carrier)

Removing the front pillar (Hub carrier)

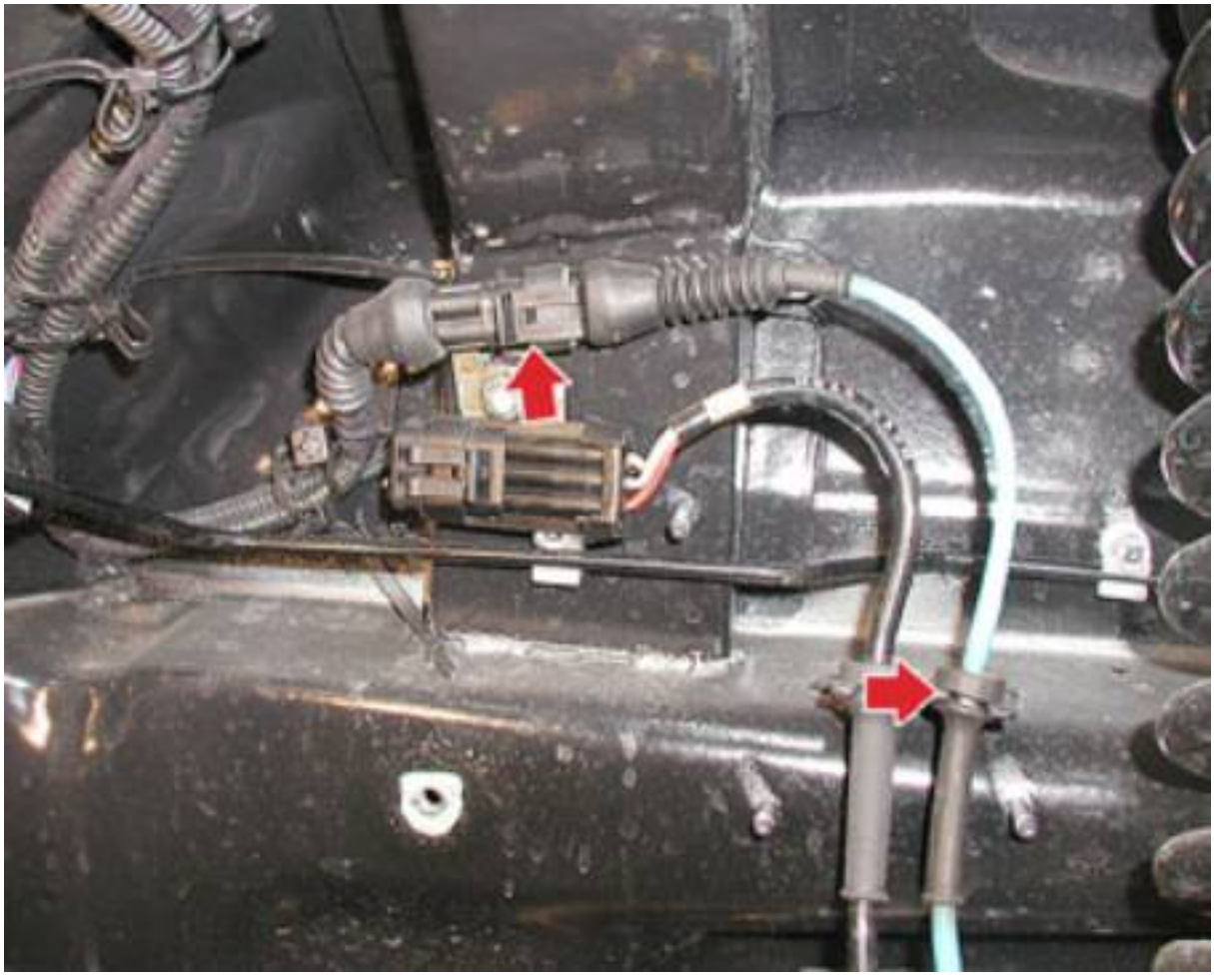
- Remove the wheel concerned.

Replacing the wheels

- Undo the lower fastening screws on the wheel bay dust-protection guard.

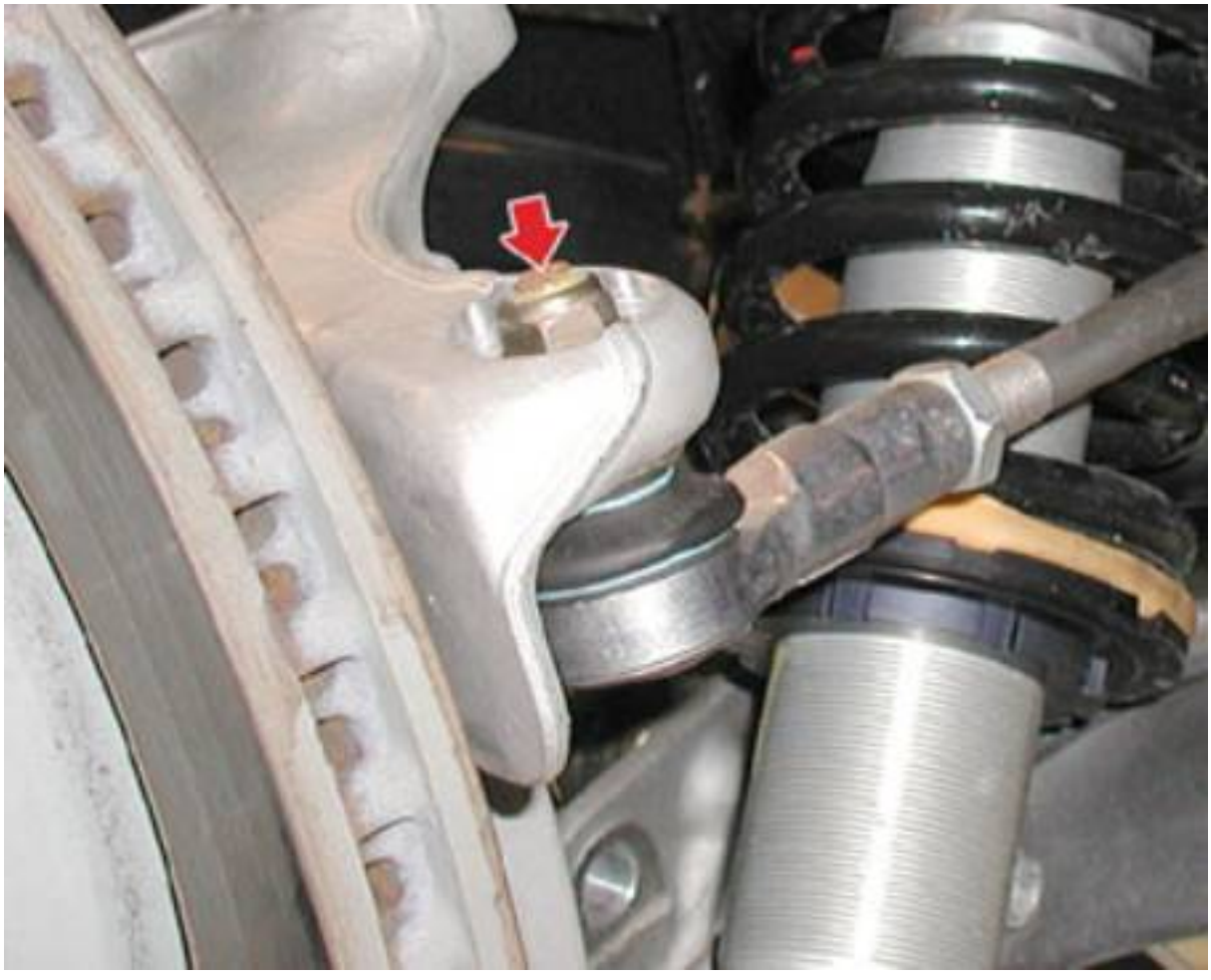
- Unscrew the six fastening screws, and remove the five snap-fastening buttons, then remove the wheel bay dust-protection guard.

- Detach the ABS rpm sensor’s electrical connection and release the wiring from its fastening on the bodywork.

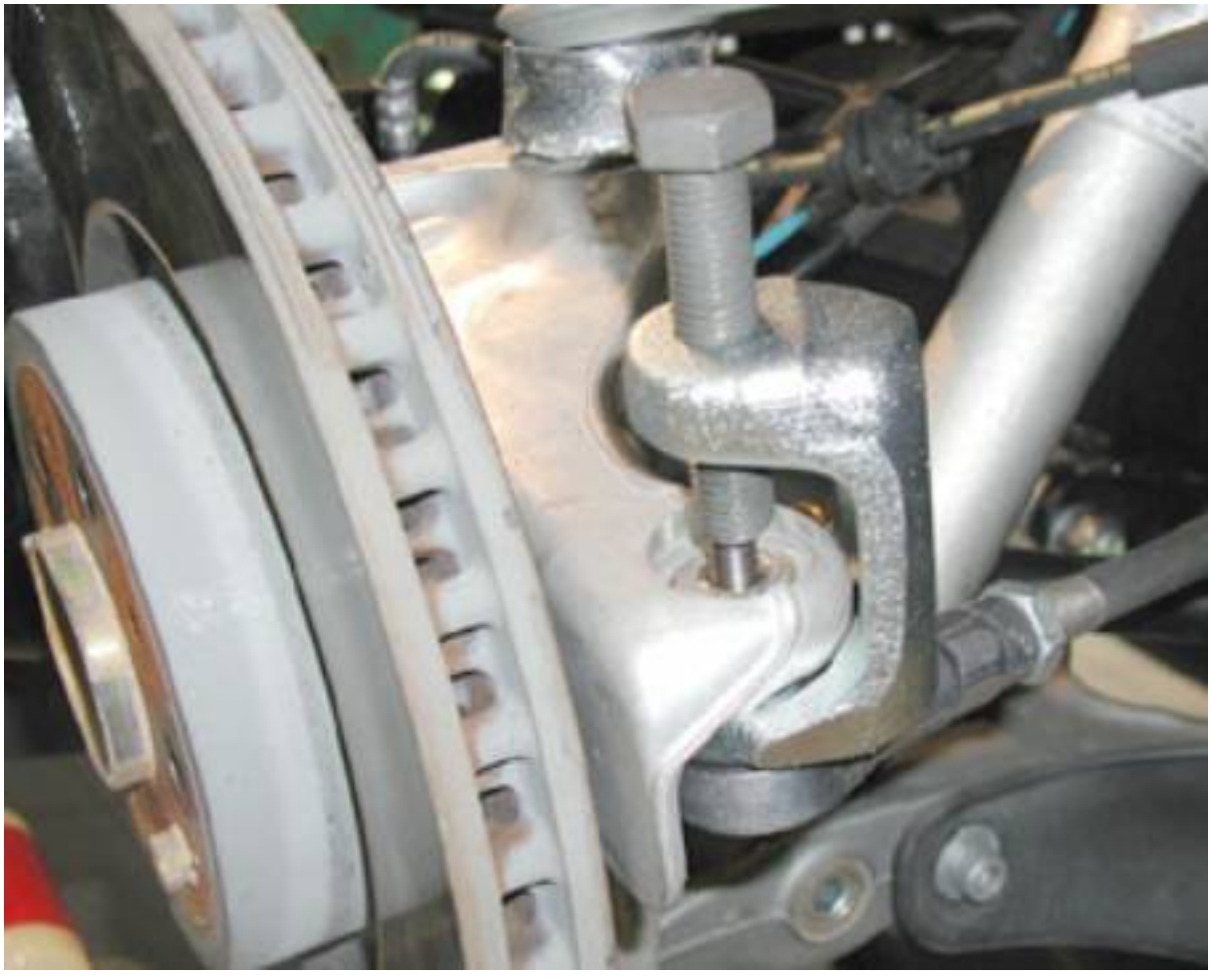


- Release the electrical wiring and the oil line from the fastening on the upper wishbone.

- Unscrew the fastening nut on the steering tie-rod’s tapered head.



- Using the extracting tool, disconnect the steering tie-rod’s tapered head from the pillar.



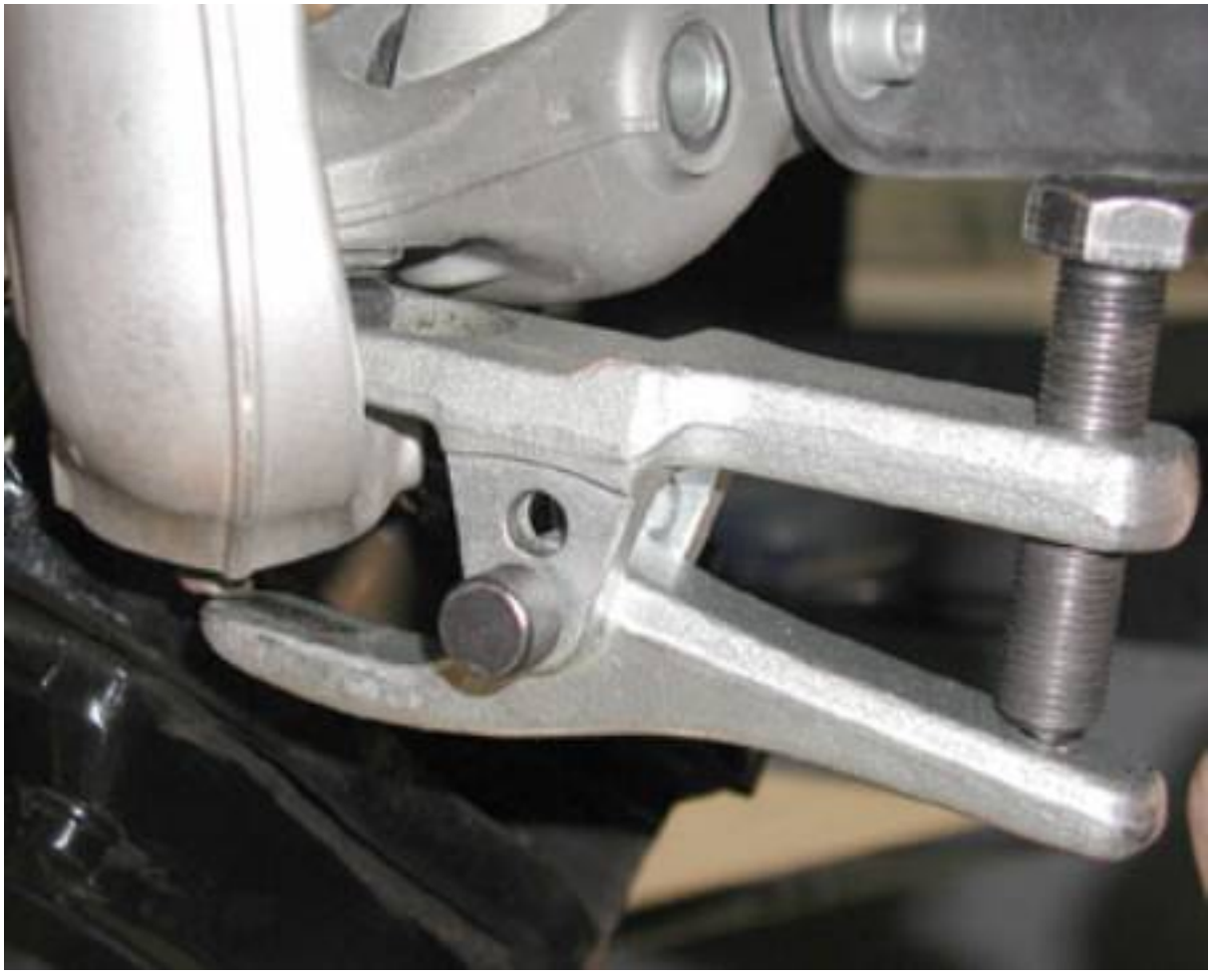
- Remove the relative front brake disc.

Front brake disc

- Unscrew the nut fastening the lever to the pillar (hub carrier).

- Unscrew the nuts fastening the front wheels’ vertical acceleration sensor.

- Using the extracting tool shown in the figure, extract the lever’s tapered pin from the pillar (hub carrier).



- Unscrew the bolt fastening the shock absorber to the lower wishbone (lever)

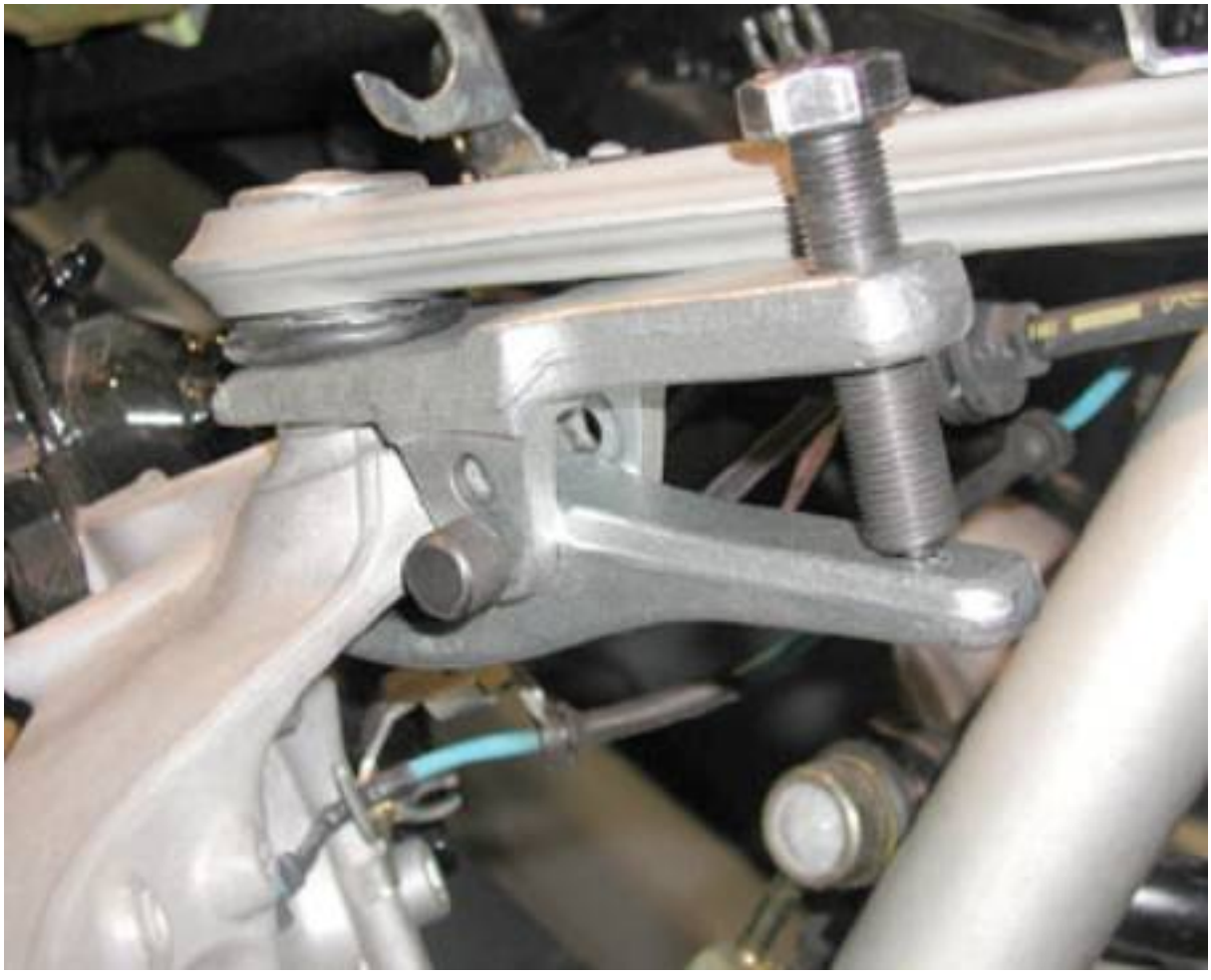
- Undo the screws fastening the wheel hub to the pillar.

- Remove the front wheel hub, complete with bearing and ABS rpm sensor.

N.B.
Place a hydraulic supporting device under the lower wishbone (lever) to ensure it does not reach its stroke limit during removal, as this could impair the operation of the suspension.

- Unscrew the nut fastening the lever to the pillar (hub carrier).

- Using the extracting tool shown in the figure, extract the lever’s tapered pin from the pillar (hub carrier).



- Remove the front pillar (hub carrier) from the front suspension.

Refitting the front pillar (hub carrier)

- Fit the the front suspension pillar and tighten the nut fastening the lever to the pillar (hub carrier) to a torque of 52 Nm.

- Fit the front wheel hub complete with bearing and ABS rpm sensor, and tighten the fastening screws to torque.

- Tighten the bolt fastening the shock absorber to the lower wishbone (lever) to a torque of **78 Nm**

- Fit the fastening nuts for the front wheels’ vertical acceleration sensor in their seats and tighten them to a torque of **8 Nm**.

- Tighten the nut that fastens the lever to the pillar (hub carrier) to torque.

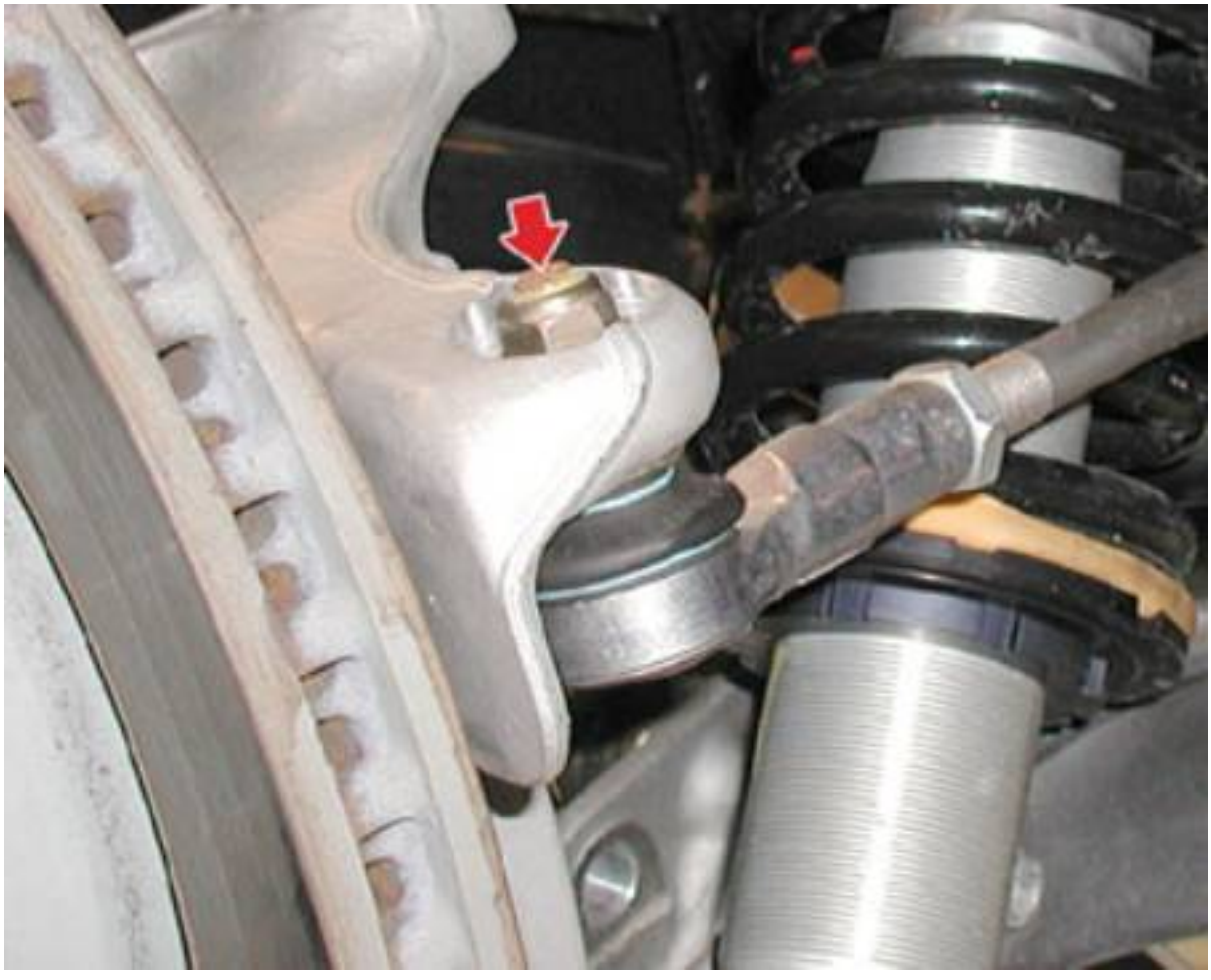
- **63 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- pretighten to **90 Nm** , loosen the nut and tighten to 63 Nm ; for **EUROPE** vehicles from assembly **18535** in the left-hand drive version and **17236** in the right-hand drive versions; in addition, for all the **USA – CND** versions.

- Fit the front brake disc concerned.

Front brake disk

- Tighten the fastening nut on the steering tie-rod’s tapered head to a torque of **40 Nm**



- Secure the electrical wiring and the oil line from the fastening on the upper wishbone.

- Fit the wheel bay dust-protection guard and tighten the six fastening screws fully, then fasten the five snap-fit buttons.

- Tighten the lower fastening screws on the wheel bay dust-protection guard fully.

- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific chapter

Wheel alignment - Front wheels
Wheel alignment - Rear wheels

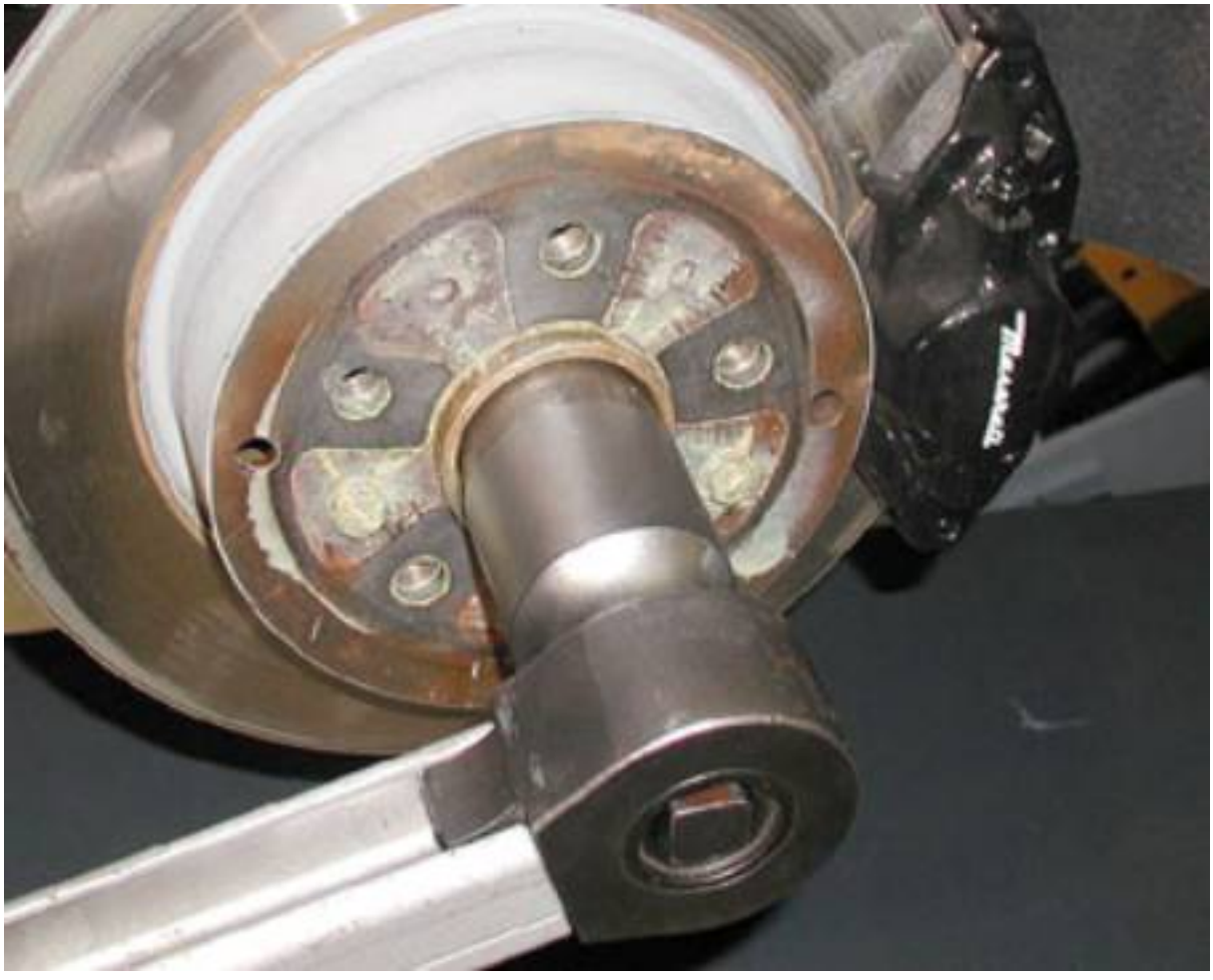
REAR pillar (hub carrier)

Removing the rear pillar (hub carrier)

- Remove the wheel concerned.

Replacing the wheels

- Remove the flattened part from the nut that secures the wheel hub to the axle shaft, then loosen the said nut.



- Remove the rear wheel brake disc concerned.

Rear brake disc

- Remove the shoe from the relative brake.

Brake shoes

- Remove the rear shock absorber concerned.

Rear shock absorbers

- Undo the nut fastening the upper lever to the hub carrier.

- Using the extracting tool shown, remove the lever’s tapered pin from the hub carrier.

- Position the tool to remove the axle shaft from the wheel hub. Screwing down the tool screw, remove the axle shaft from its seat on the hub.

- Unscrew the nut and, using an extracting tool, separate the tapered head of the toe-in tie-rod from the hub carrier.

- Release the electric cable of the wheel rpm sensor from the fastenings on the lower lever.

- Detach the electrical connection for the ABS rpm sensor.

- Remove the device used to hatch the handbrake cable to the brake shoes.

- Remove the central pin (not shown) and detach the handbrake cable from the transmission device.

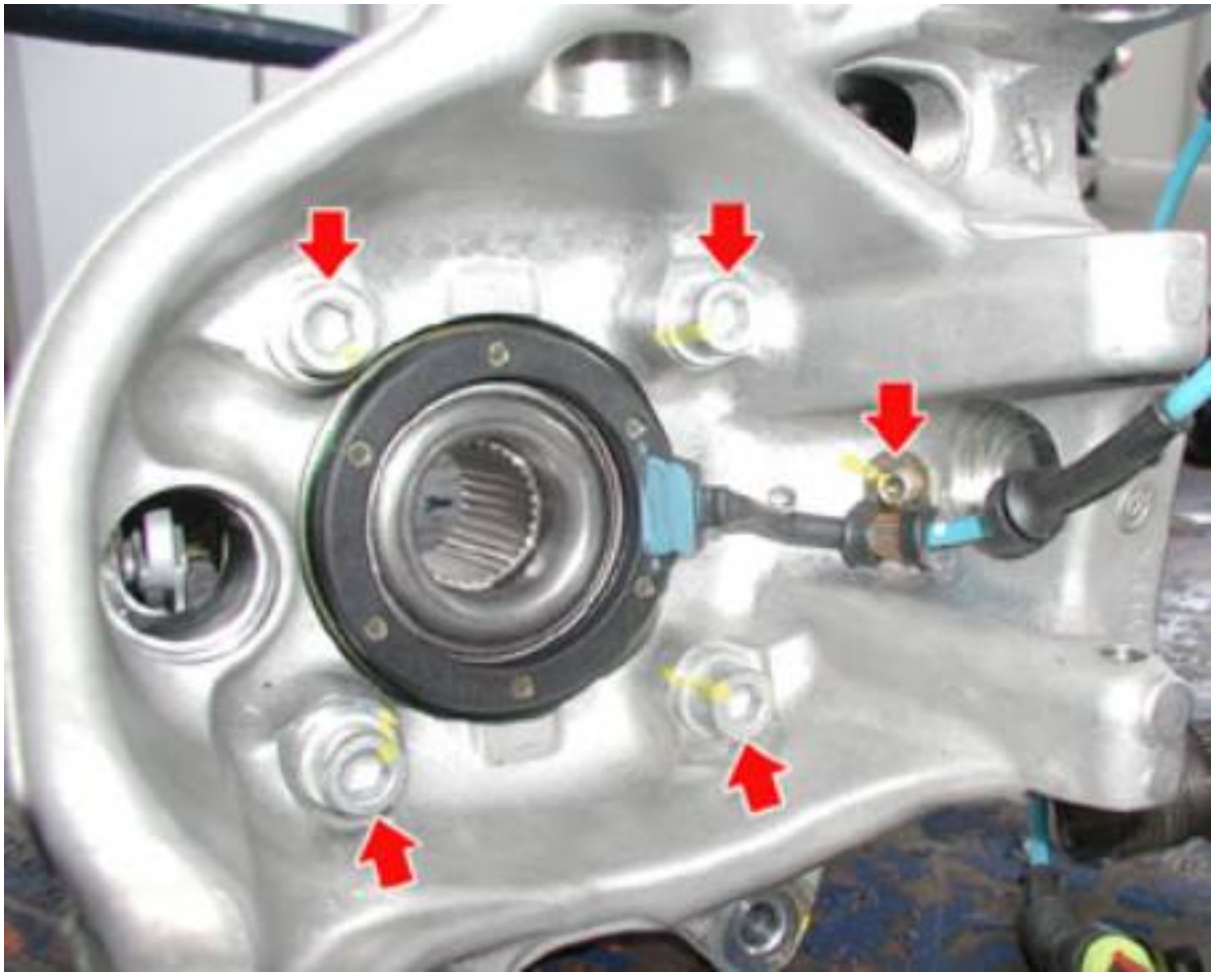
- Undo the nut that fastens the tie-rod on the stabiliser bar to the hub carrier
- Using the same extractor tool as used earlier for the other heads, extract the tapered head on the stabiliser bar tie-rod from the hub carrier.

N.B.
Place a hydraulic supporting device underneath the lower lever to ensure it does not reach its stroke limit during removal of the hub carrier, as this could impair the operation of the suspension.

- Undo the nut that fastens the lower lever to the hub carrier.

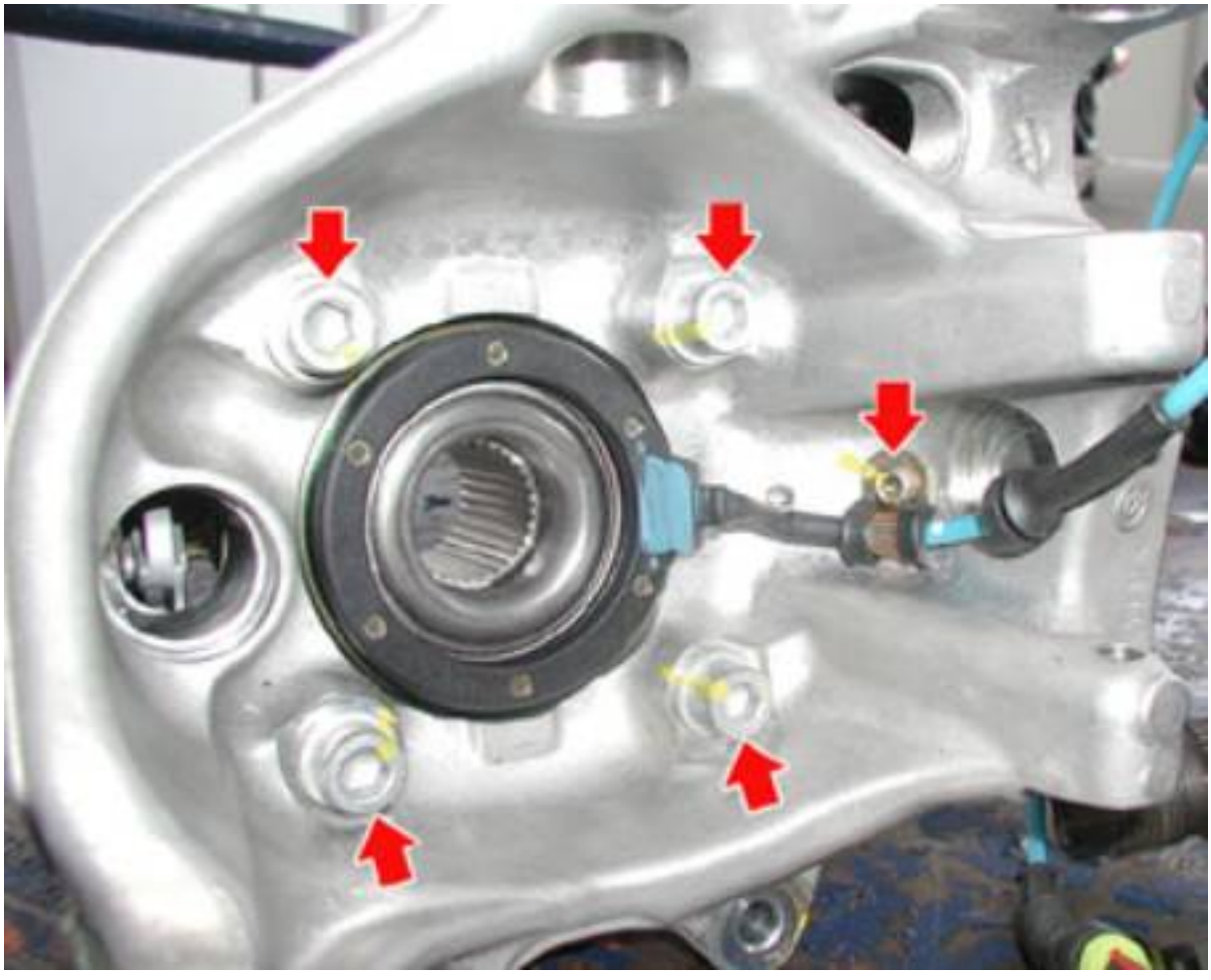
- Rotate the hub carrier in order to fit the extracting tool, then detach the tapered head of the lower lever from its seat on the hub carrier.

- Remove the hub carrier/wheel bearing assembly (ABS sensor) and separate the two components working as described below.
- Undo the fastening screw on the ABS sensor electric cable and unscrew the four screws that fasten the sensor to the hub carrier.
- Separate the sensor from the hub carrier.



Refitting the rear pillar (hub carrier)

- Fit the rear wheel hub, complete with the ABS sensor for the rear wheels, in its seat on the hub carrier and position the sensor wiring correctly.
- Tighten the screw fastening the ABS sensor on the hub carrier.
- Tighten the four screws fastening the wheel hub, complete with ABS sensor, to the hub carrier to a torque of **60 Nm**.



IMPORTANT
The components of the rear suspension must be tightened with the vehicle under static load, i.e.: all fluids up to top level (including fuel) plus 75+75 kg on the front seats.

- Fit the hub carrier in its seat, insert the lower lever’s tapered head and tighten the fastening nut to a torque of **52 Nm**.

- Fit the handbrake cable hatching device into its seat on the brake shoes.
- Attach the electrical connection on the ABS rpm sensor.
- Position the electric cable on the wheel rpm sensor in the fastenings on the lower lever.

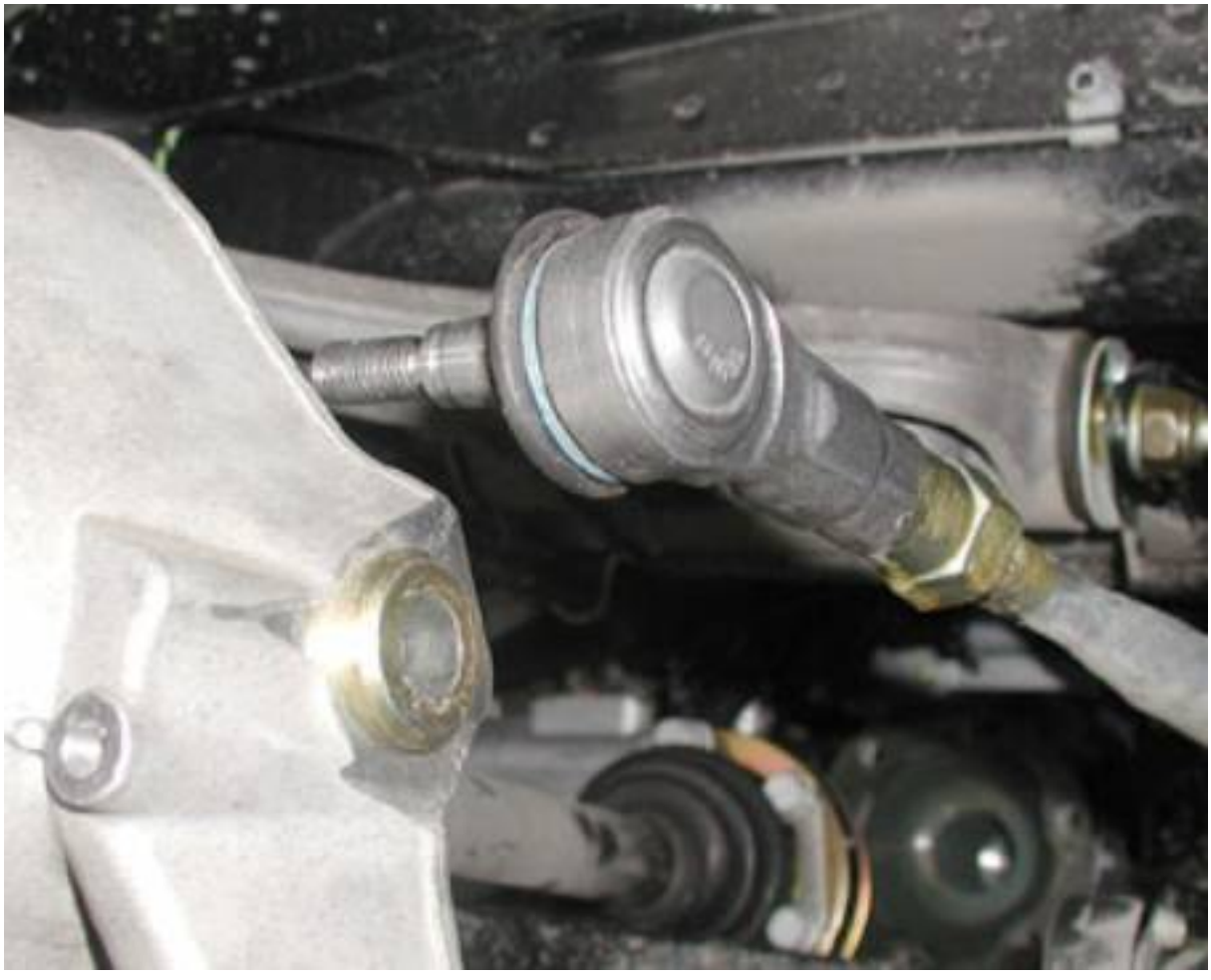
- Tighten the nut fastening the stabiliser bar tie-rod to a torque of **50 Nm**.

- Connect the toe-in tie-rod to the hub carrier and tighten the fastening nut to torque.

- 80 Nm for EUROPE vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 45 Nm for EUROPE vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the USA – CND versions.

N.B.
After performing the above operating step, remove the hydraulic supporting device positioned there earlier.



- Tighten the nut fastening the lever to the pillar (hub carrier) to a torque of **52 Nm**.

- Remove the rear shock absorber concerned

Rear shock absorbers

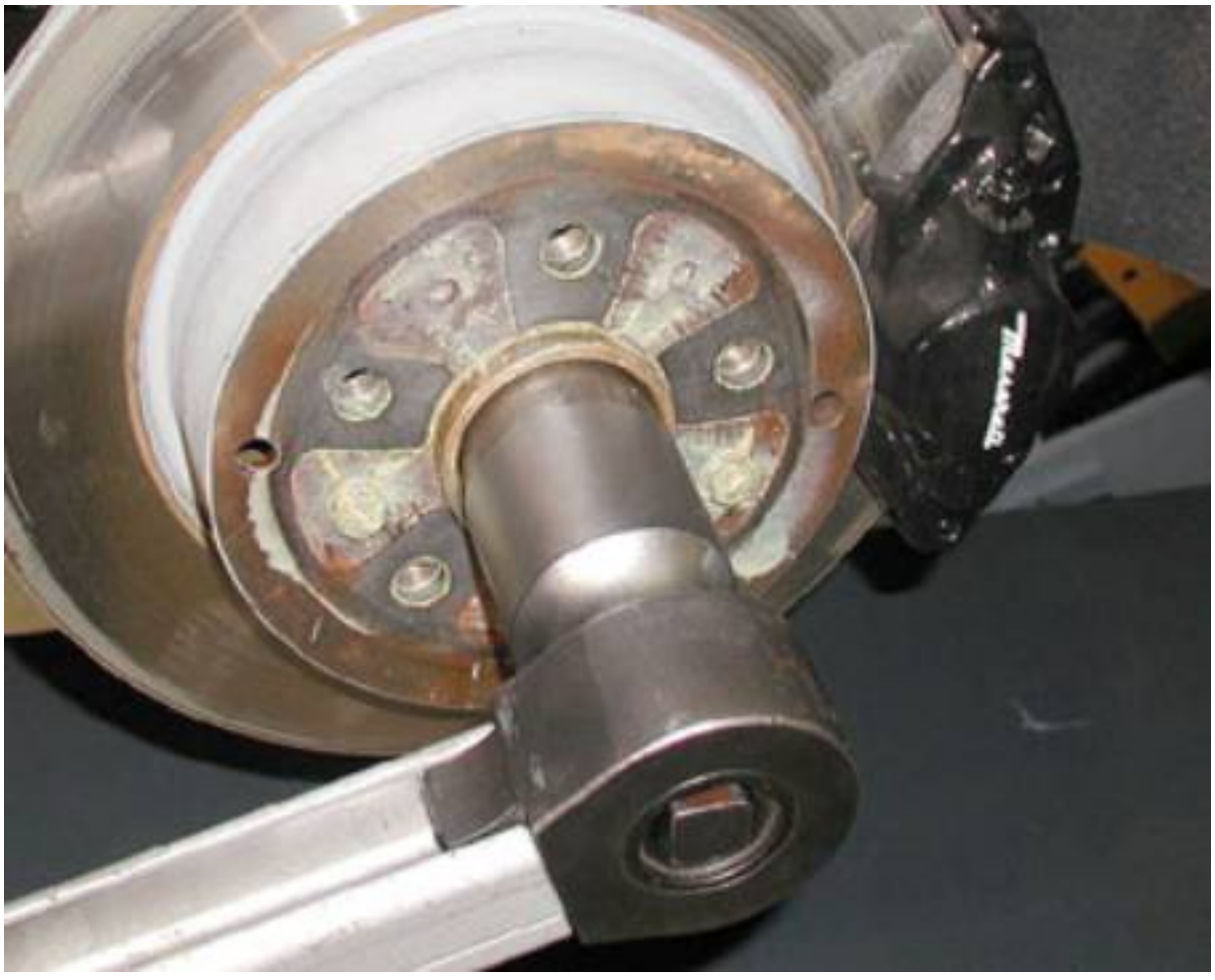
- Complete the procedure by performing all the refitting operations for the brake shoe concerned.

Brake shoes

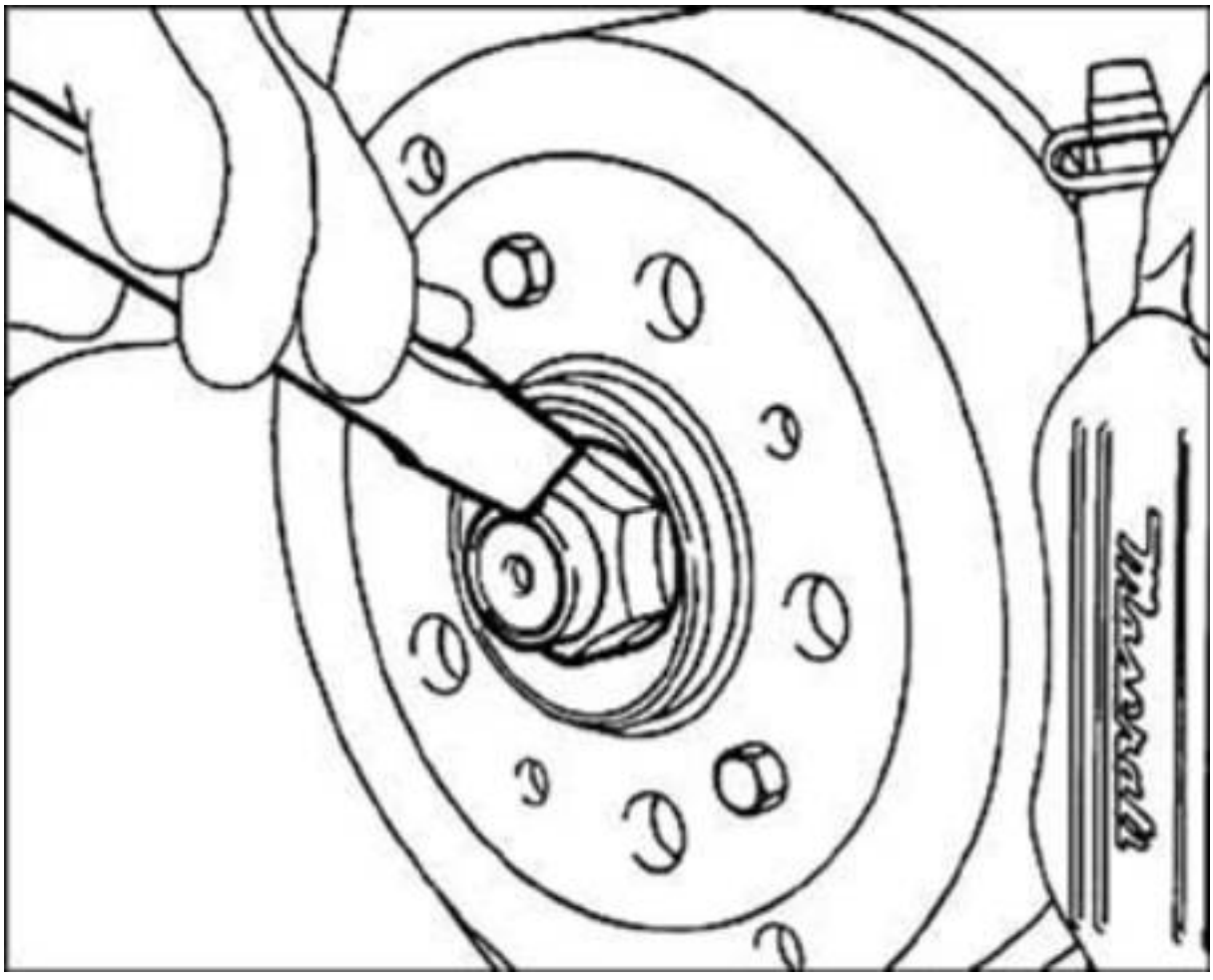
- Complete the procedure by performing the refitting operations for the rear brake disc concerned.

Rear brake disc

- Tighten the nut fastening the wheel hub to the axle shaft to a torque of **275 Nm**



- Beat the fastening nut to flatten it.



- Complete the procedure by performing all the refitting operations for the wheel concerned.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific chapter

Wheel alignment - Front wheels
Wheel alignment - Rear wheels

TOE-IN TIE-ROD

Removing the toe-in tie-rod

- Remove the wheel concerned.

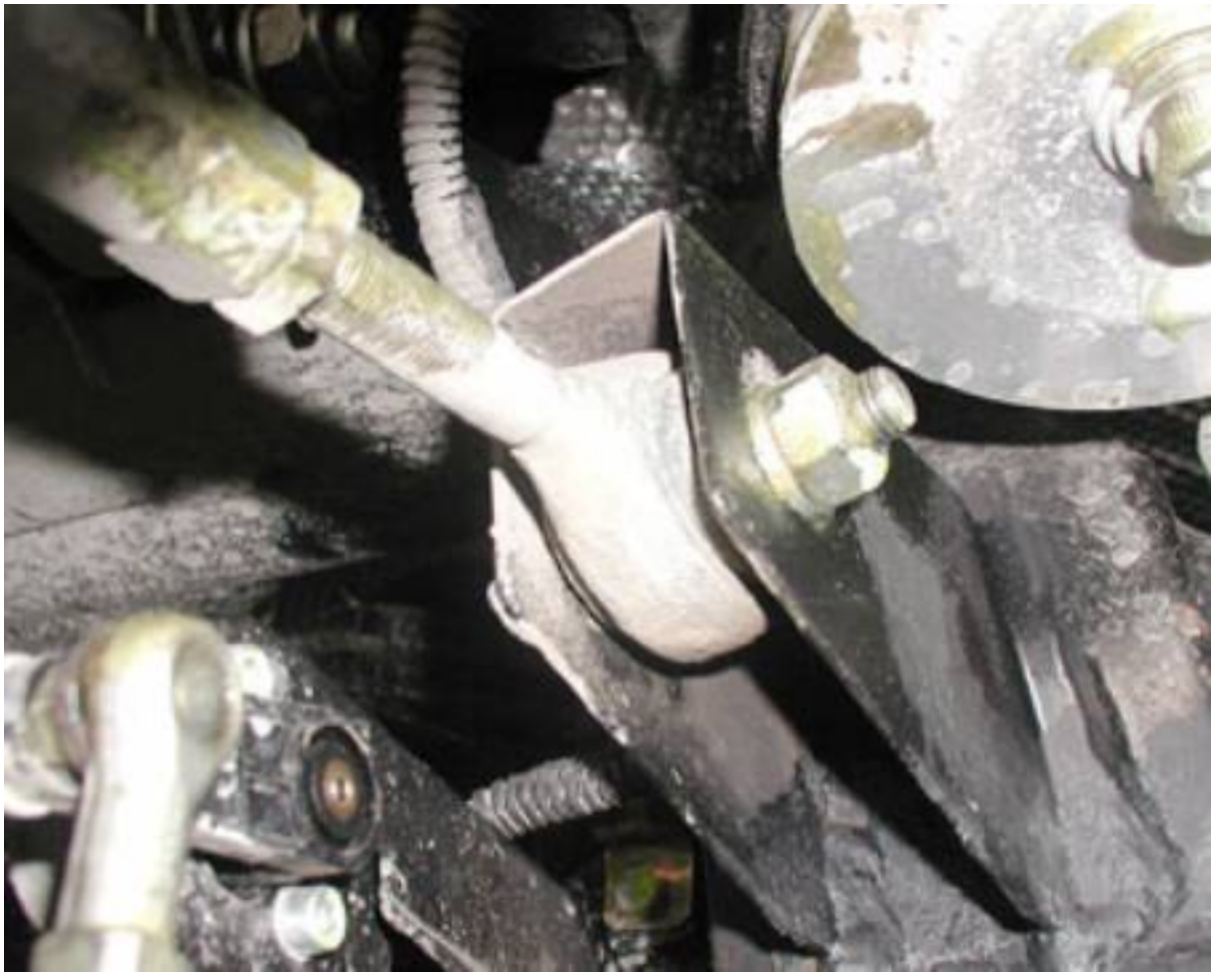
Replacing the wheels

- Remove the rear shock absorber concerned

Rear shock absorbers

- Undo the fastening nut and, using an extractor tool, remove the tapered head on the toe-in tie-rod from the hub carrier.

- Undo the fastening bolt and remove the toe-in adjustment tie-rod.



Refitting the toe-in tie-rod

IMPORTANT
The components of the rear suspension must be tightened with the vehicle under static load, i.e.: all fluids (including fuel) up to top level, plus 75+75 kg on the front seats.

- Connect the toe-in tie-rod to the hub carrier and tighten the fastening nut to torque.

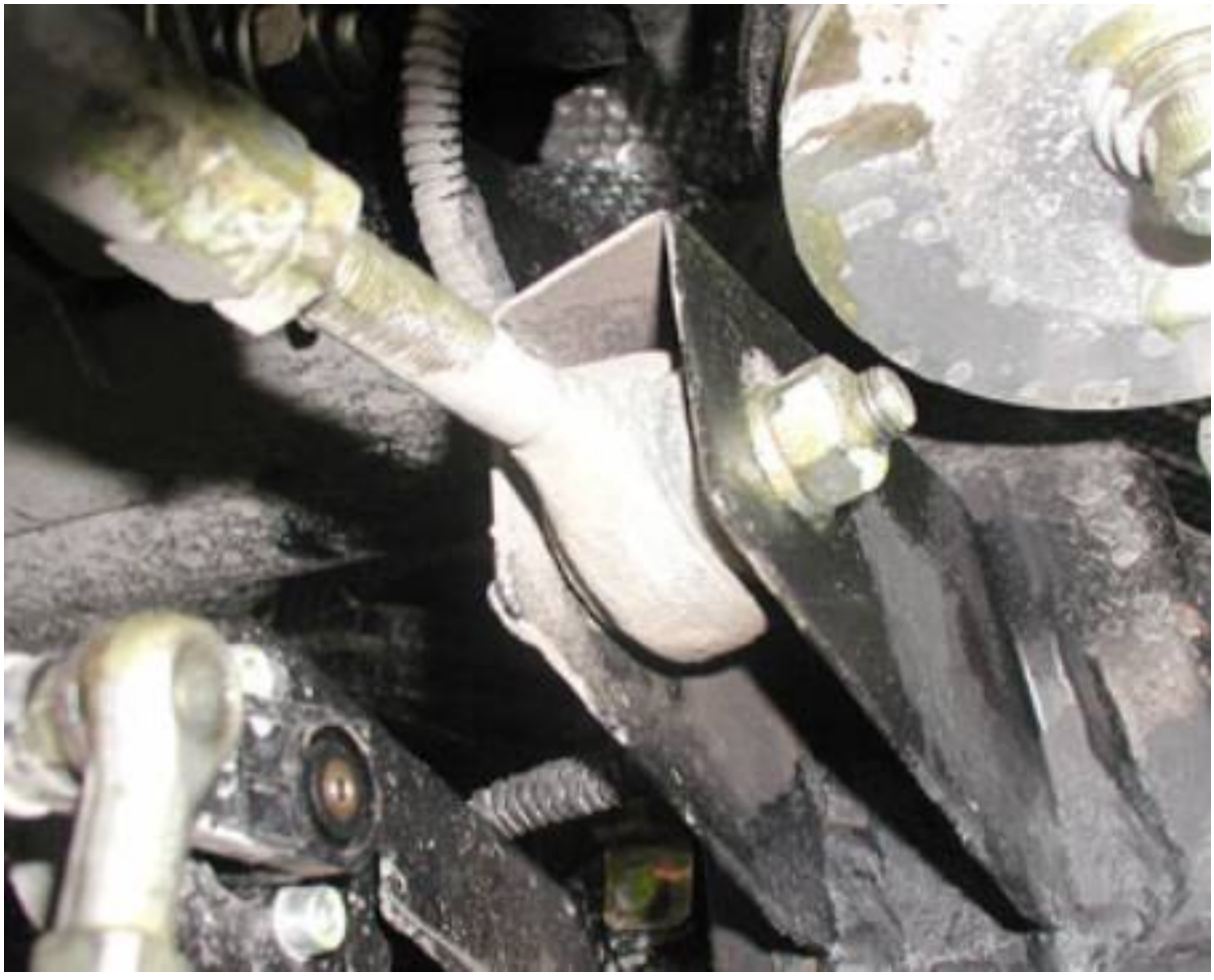
- **80 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 45 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

- Tighten the bolt that fastens the toe-in adjustment tie-rod to torque.

- **80 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 63 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.



- Fit the rear shock absorber removed.

Rear shock absorbers

- Complete the procedure by carrying out all the refitting operations for the wheel concerned.

Replacing the wheels

N.B.
We recommend you check the wheel alignment data by carrying out the operations outlined in the specific chapter

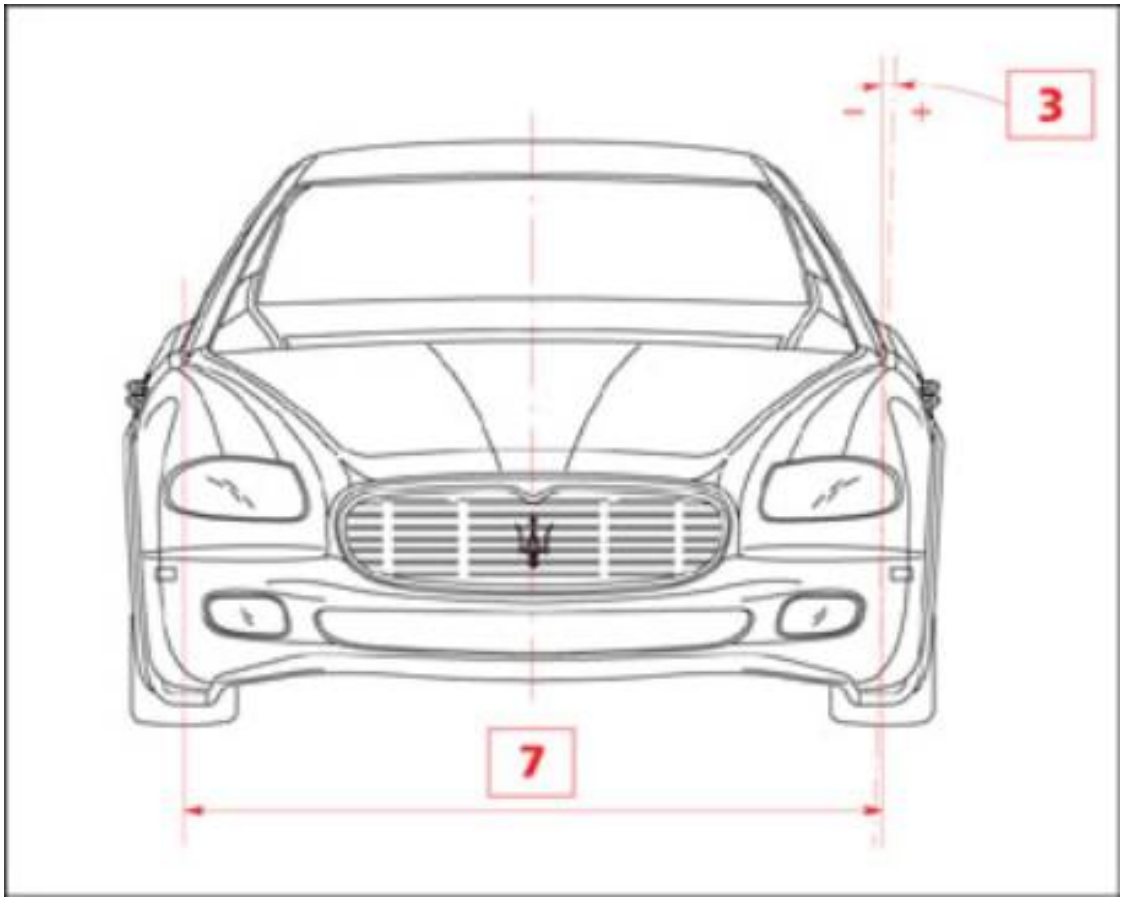
Wheel alignment - Front wheels
Wheel alignment - Rear wheels

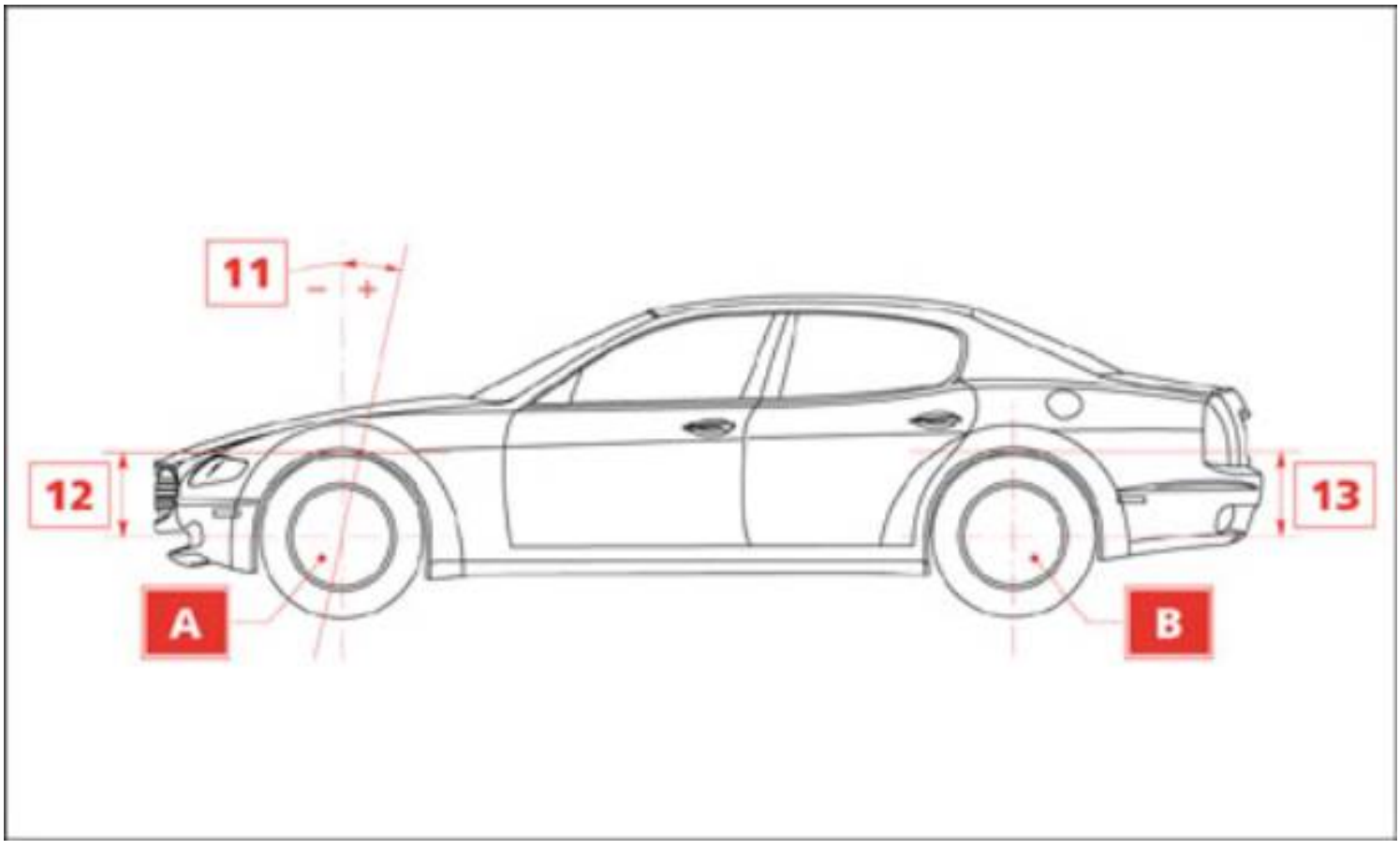
FRONT WHEELS

Use wheel alignment equipment to measure the vehicle geometry, which must fall within the following ranges.

Important
Under static load: all fluids up to top level (including fuel) plus 75+75 kg on the front seats.

	Front	Rear	Ref. figure
Tyres	245/45 R18	285/40 R18	
	245/40ZR 19	285/35ZR 19	
	245/35 ZR20	285/30 ZR20	
Wheel rims	8.5 x 18” ET52	10.5 X 18” ET50.5	
	8.5”J X 19”	10.5”J X 19”	
	8.5" J X 20"	10.5" J X 20"	
Camber	-0°30’ +/- 0°10’	-1°30’ +/- 0°10’	3-4
Toe-in	-2.0 +/- 0.4mm	+4.0 +/- 0.4mm	1-2
Caster	+3°48’ +/- 0°20’		11
Height	173+10/-5mm	159+10/-5mm	5-6
Height 2	392+10/-5mm	394+10/-5mm	12-13
Track	1587mm	1569.6mm	7-8
Weight	983 kg	1136 kg	
Steering angle	Int. 34.0°/ext.40.8°		

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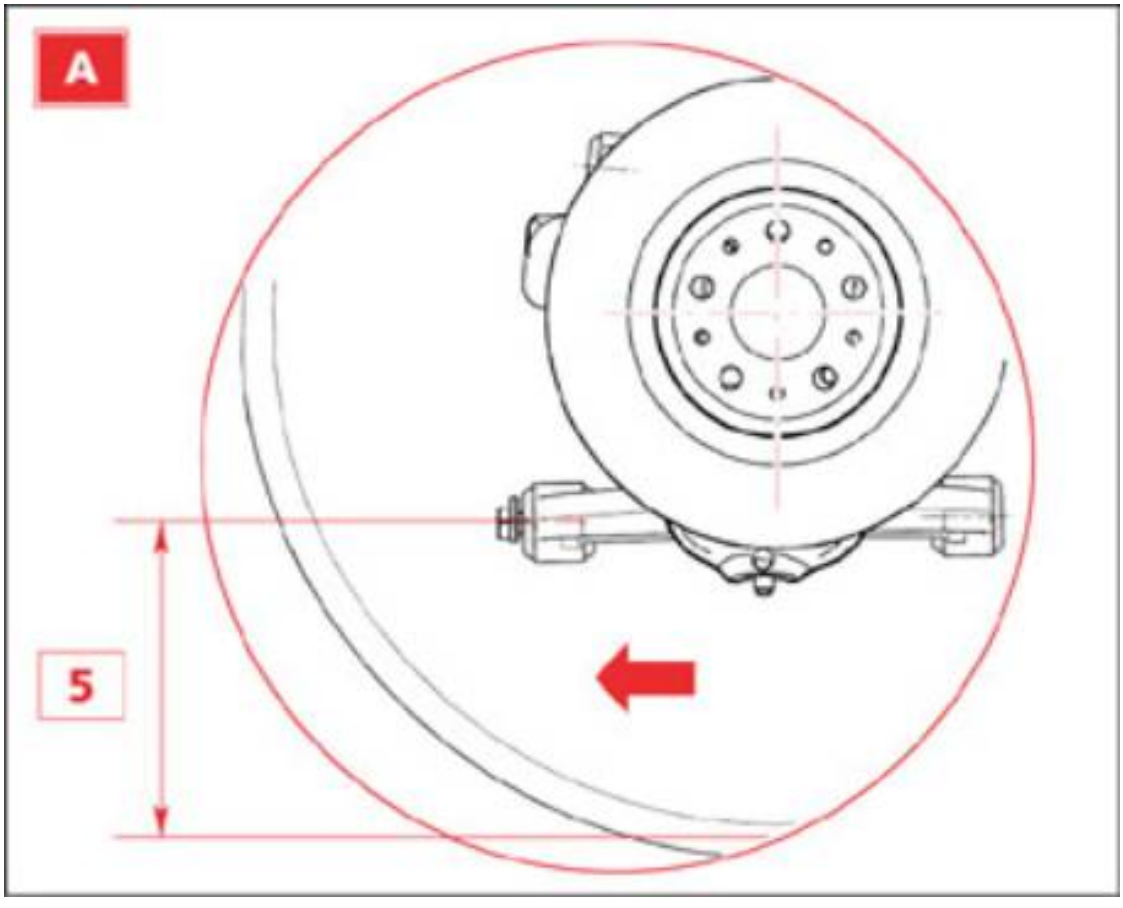
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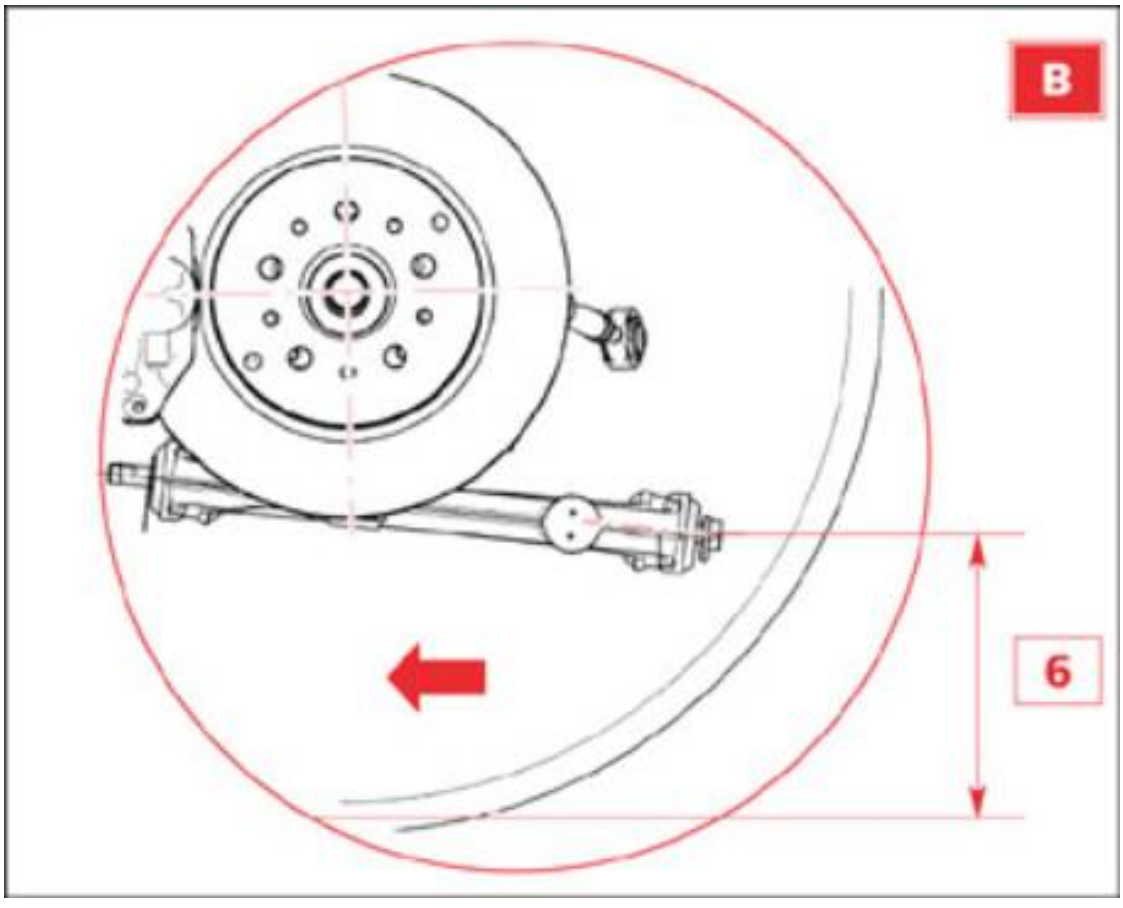
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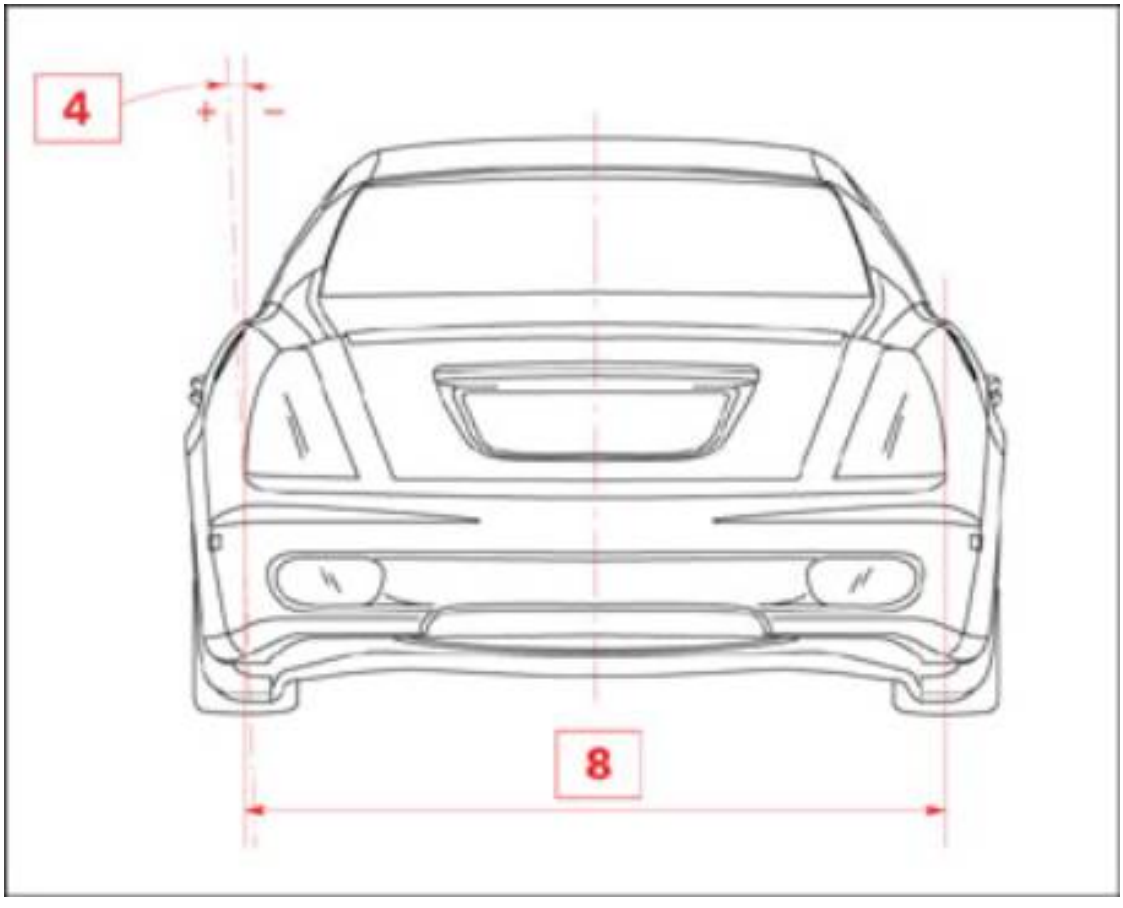
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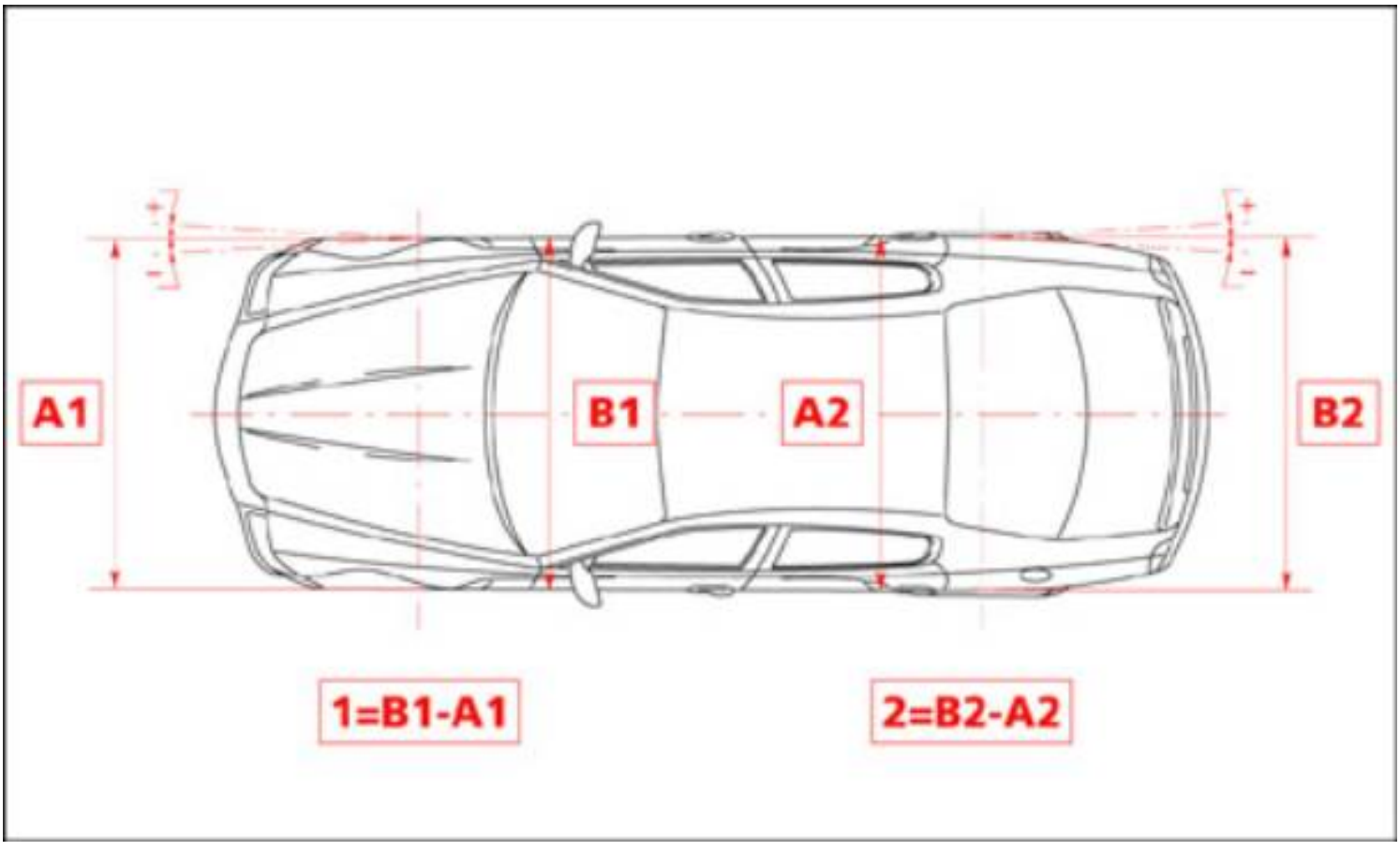
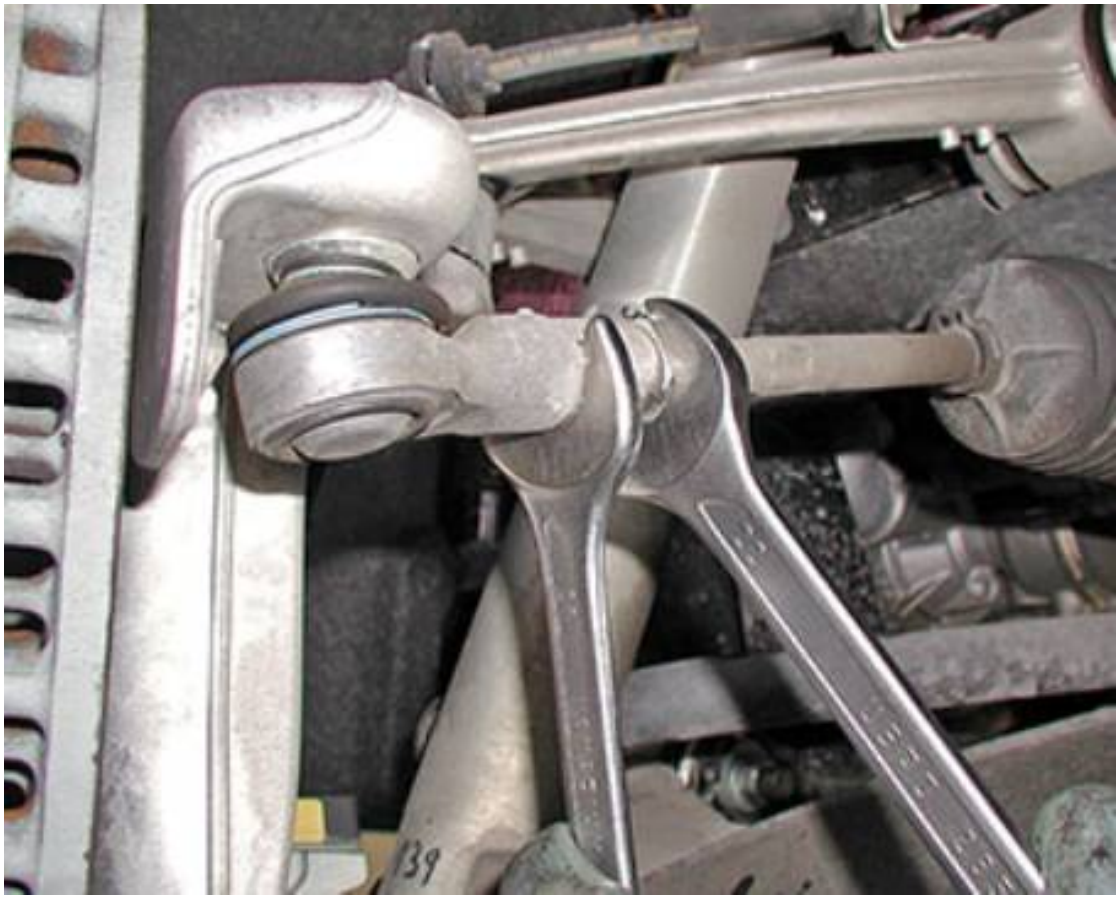
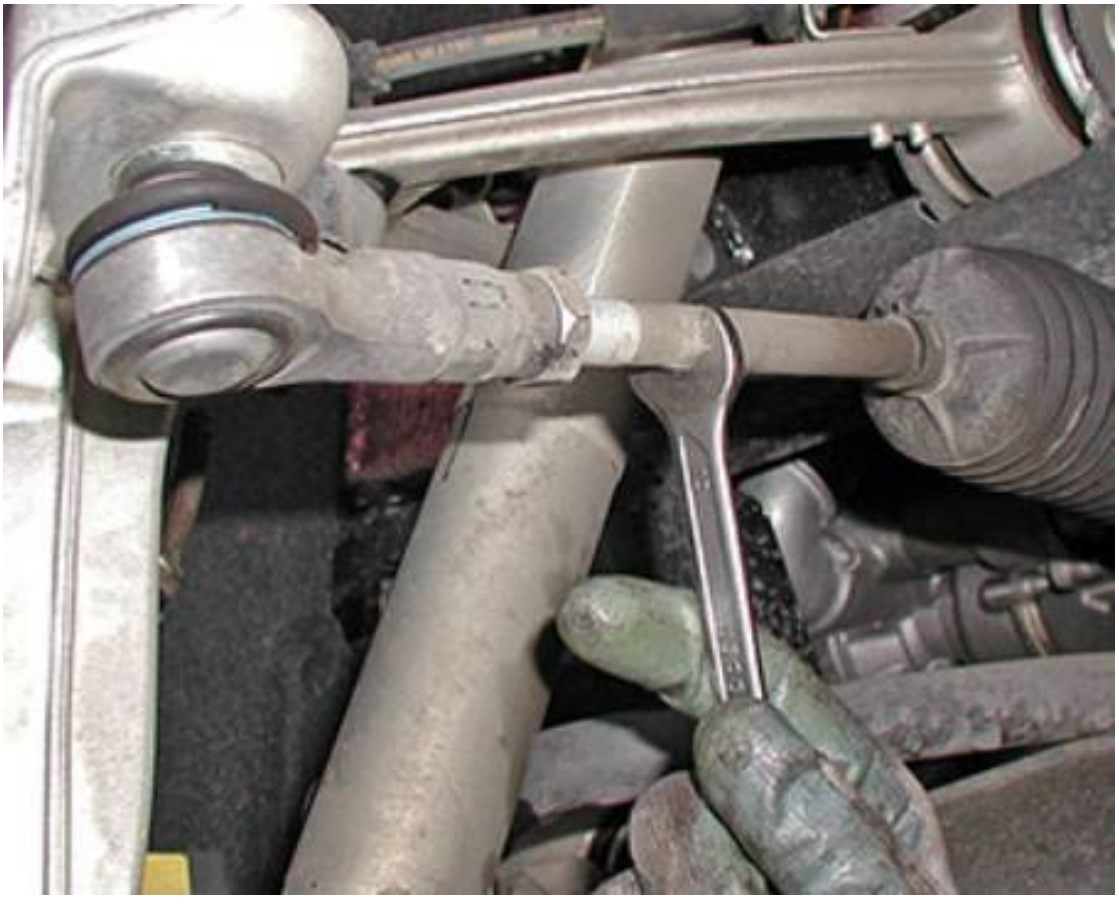


Front toe-in adjustment

- **If the value measured by the instrument does not fall within the specified values, adjust the front wheel toe-in.**
- **With the vehicle in "static load" conditions, i.e. full of fluids (including fuel) plus 75+75 kg on the front seats, proceed with adjustment as described below.**
- **Straighten the wheels and lock them in this position.**
- **Loosen the retaining nut of the steering wheel head tie-rod.**

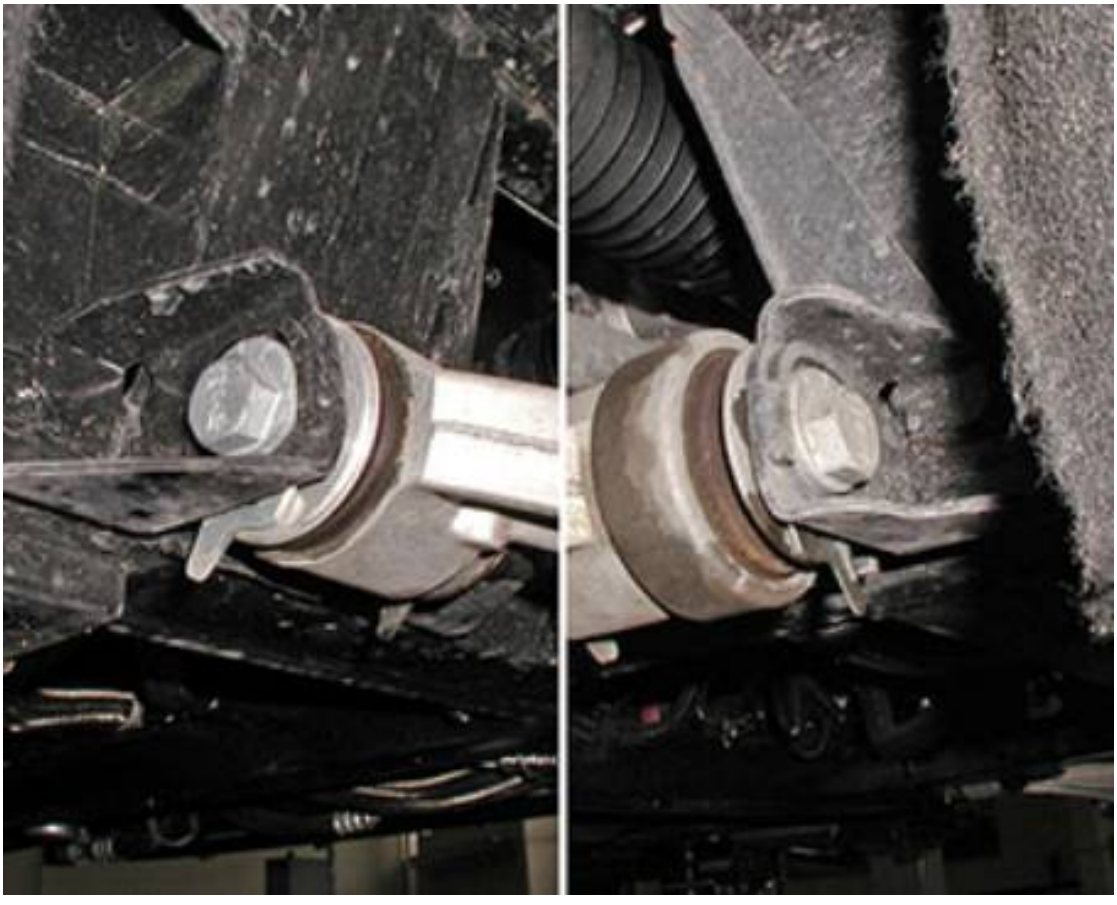


- **Turn the hexagon positioned on the steering wheel tie-rod clockwise or anticlockwise until reaching the toe-in value indicated in the table. Then tighten the loosened parts to the specified torque.**



Front camber adjustment

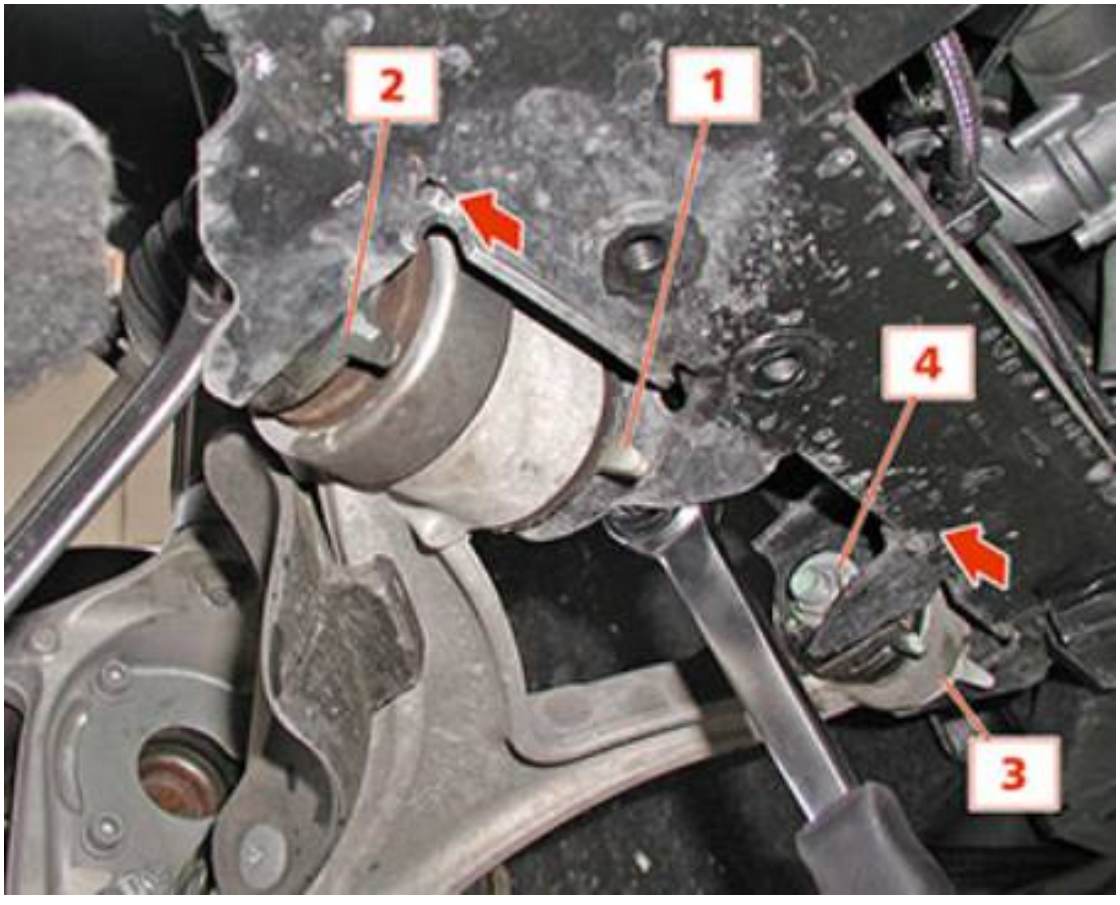
- **If the value measured by the instrument does not fall within the specified values, adjust the front wheel camber.**
- **With the vehicle in "static load" conditions, i.e. full of fluids (including fuel) plus 75+75 kg on the front seats, proceed with adjustment as described below.**
- **Adjust the camber value of the front wheels by acting on the two cams on the tips of the coupling between the lever and the front frame.**
- **Turn the cams until the instrument measures the value indicated in the table.**
- **During adjustment check that the cams are facing in the same direction.**
- **Then tighten the loosened parts to the specified torque.**



- **After adjusting the front camber, proceed with adjusting the toe-in operating as described above.**

Front caster adjustment

- **If the value measured by the instrument does not fall within the specified values, adjust the front wheel caster.**
- **With the vehicle in "static load" conditions, i.e. full of fluids (including fuel) plus 75+75 kg on the front seats, proceed with adjustment as described below.**
- **Loosen the fittings that fasten the lever to the frame and act on the shims. If you need to move a shim from the lever point** (1) **to the lever point** (2)**, the shims on the other lever point must be moved in the same way, i.e. moving them from position** (3) **to position** (4) **by an equal distance.**
- **Then tighten the loosened parts to the specified torque.**



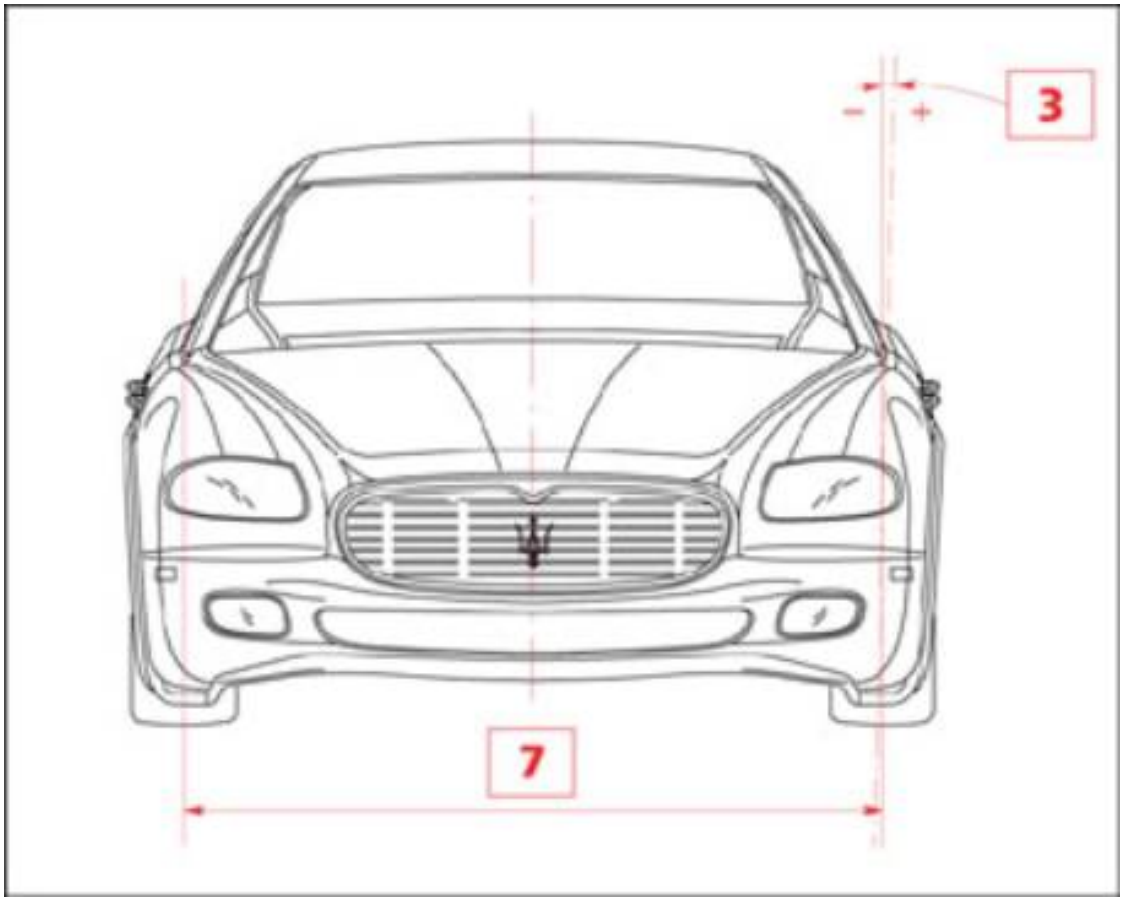
- **After adjusting the front caster value, you must adjust the camber and then the toe-in, operating as described above.**

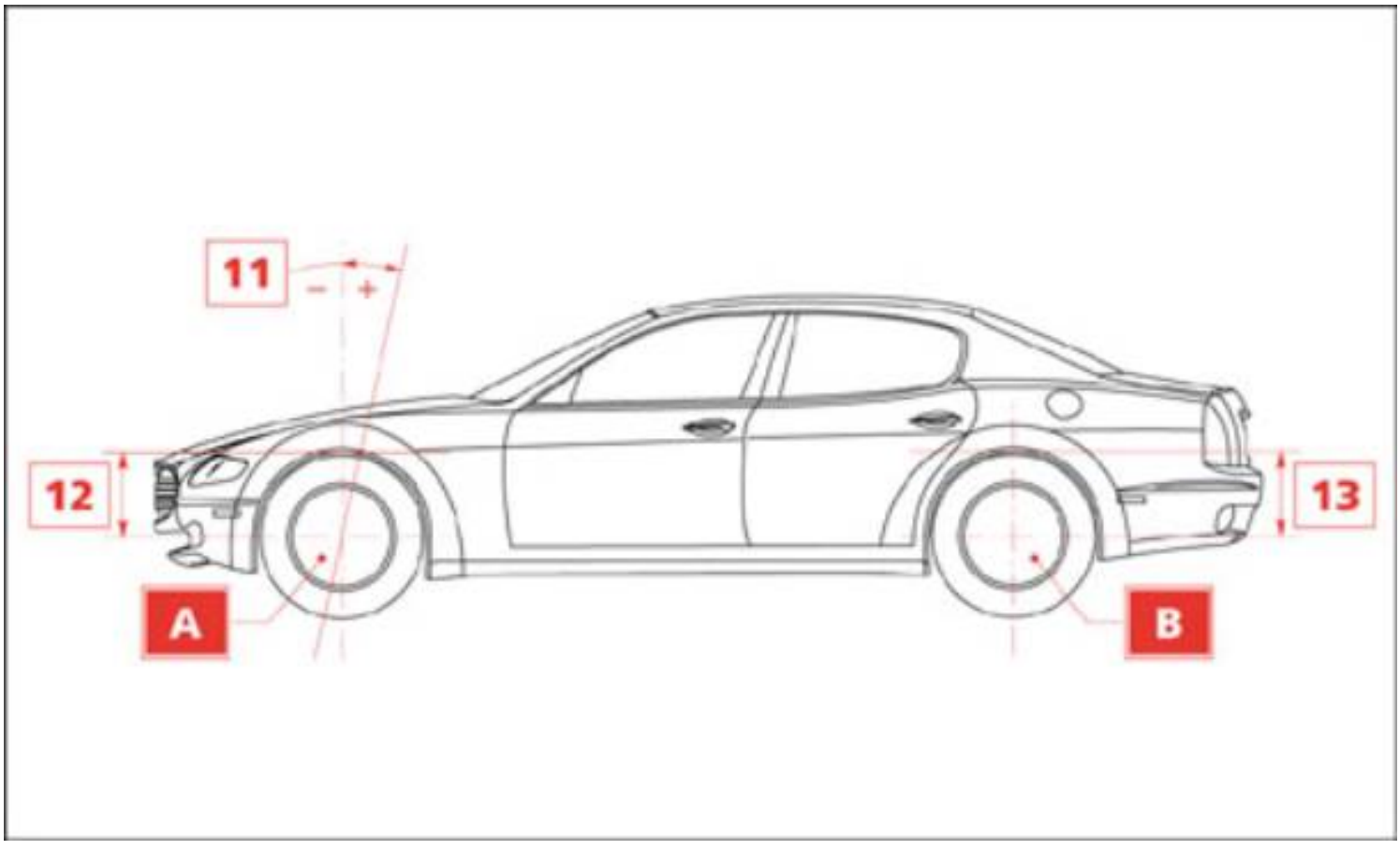
REAR WHEELS

Use wheel alignment equipment to measure the vehicle geometry,
which must fall within the following ranges.

Important
Under static load: all fluids up to top level (including fuel) plus 75+75 kg on the front seats.

	Front	Rear	Ref. figure
Tyres	245/45 R18	285/40 R18	
	245/40ZR 19	285/35ZR 19	
	245/35 ZR20	285/30 ZR20	
Wheel rims	8.5 x 18” ET52	10.5 X 18” ET50.5	
	8.5”J X 19”	10.5”J X 19”	
	8.5" J X 20"	10.5" J X 20"	
Camber	-0°30’ +/- 0°10’	-1°30’ +/- 0°10’	3-4
Toe-in	-2.0 +/- 0.4mm	+4.0 +/- 0.4mm	1-2
Caster	+3°48’ +/- 0°20’		11
Height	173+10/-5mm	159+10/-5mm	5-6
Height 2	392+10/-5mm	394+10/-5mm	12-13
Track	1587mm	1569.6mm	7-8
Weight	983 kg	1136 kg	
Steering angle	Int. 34.0°/ext.40.8°		

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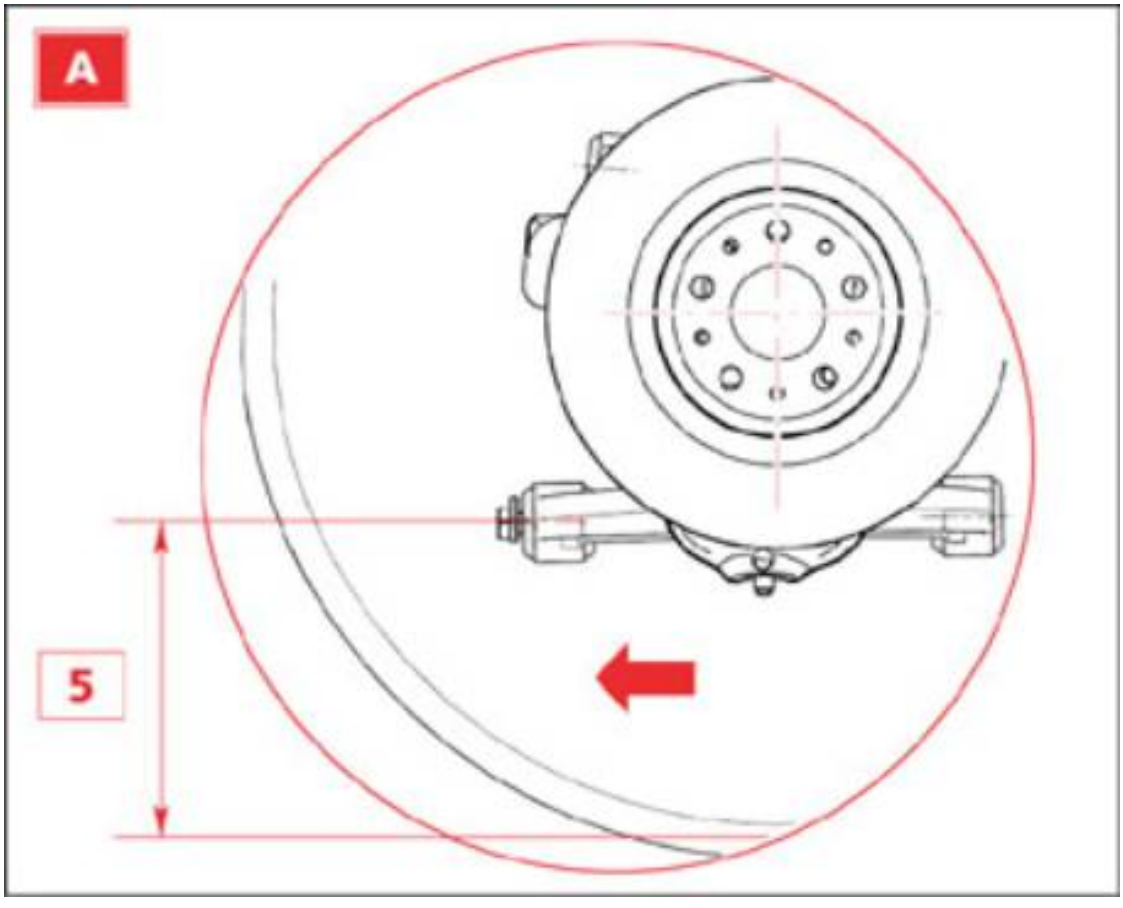
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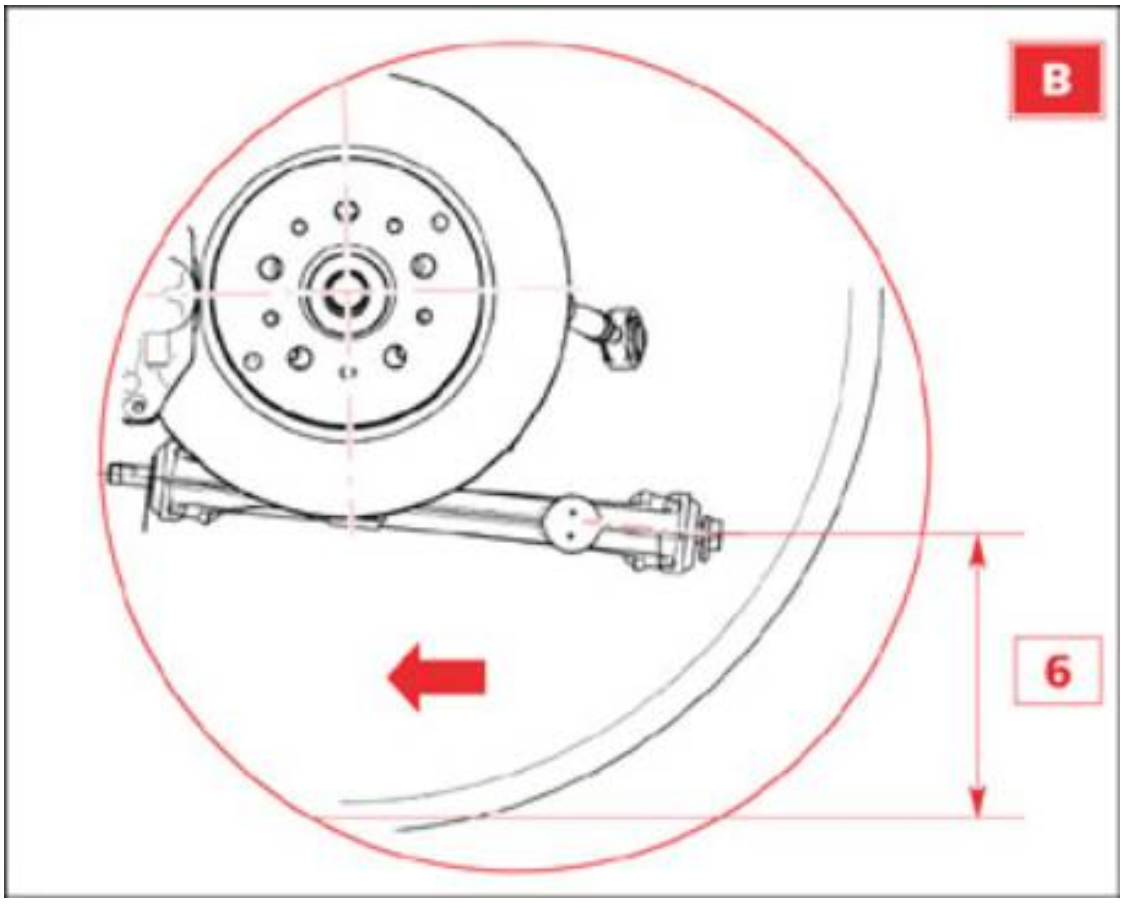
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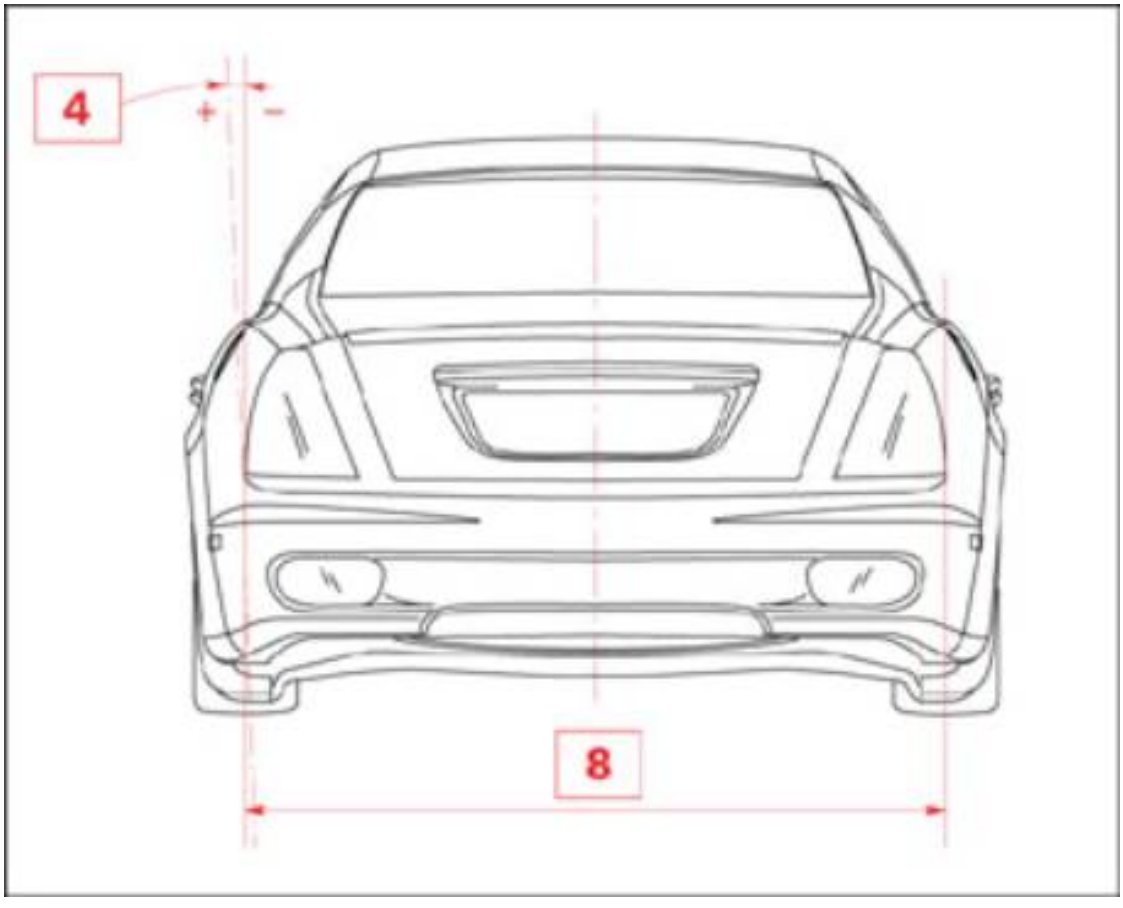
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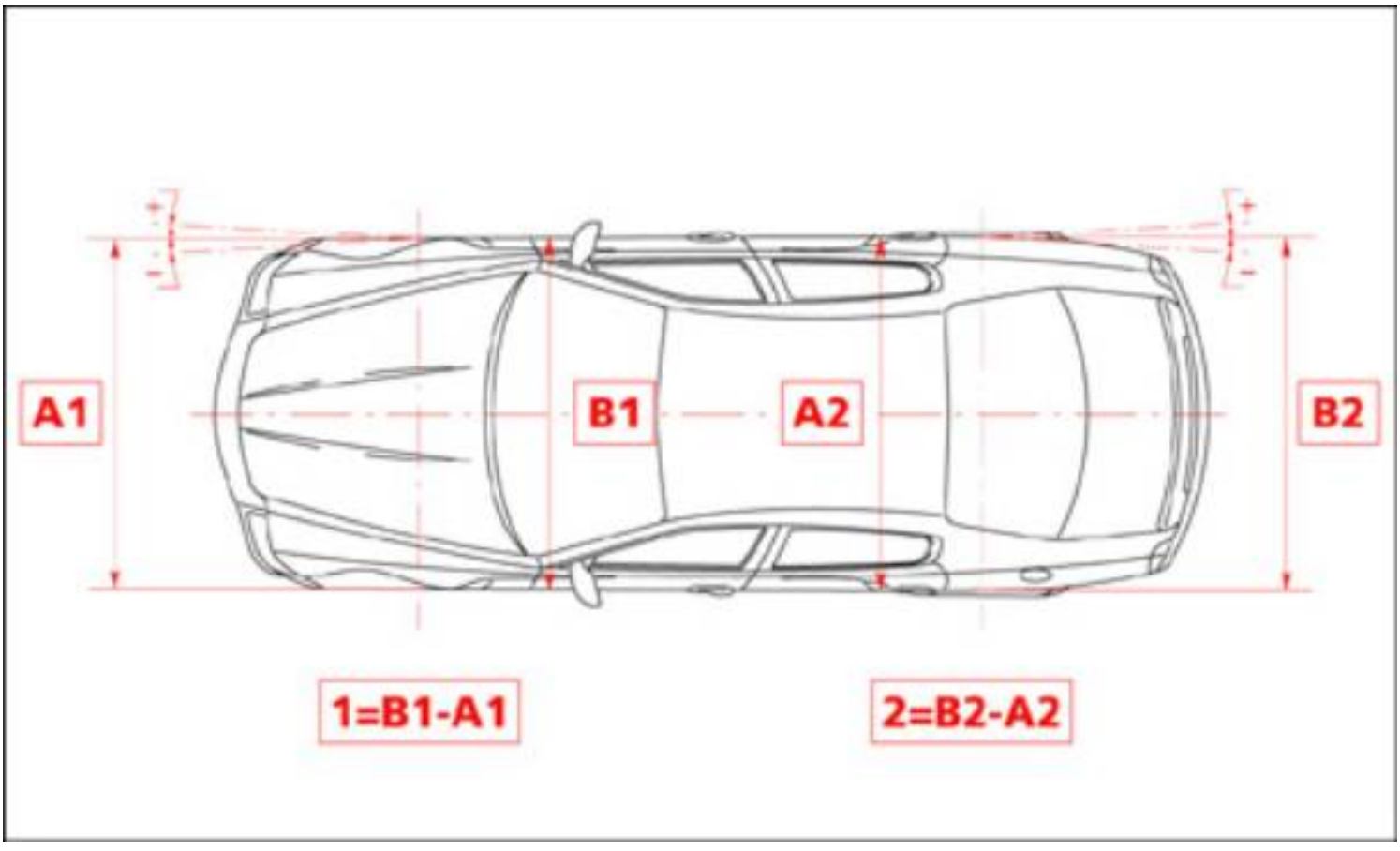
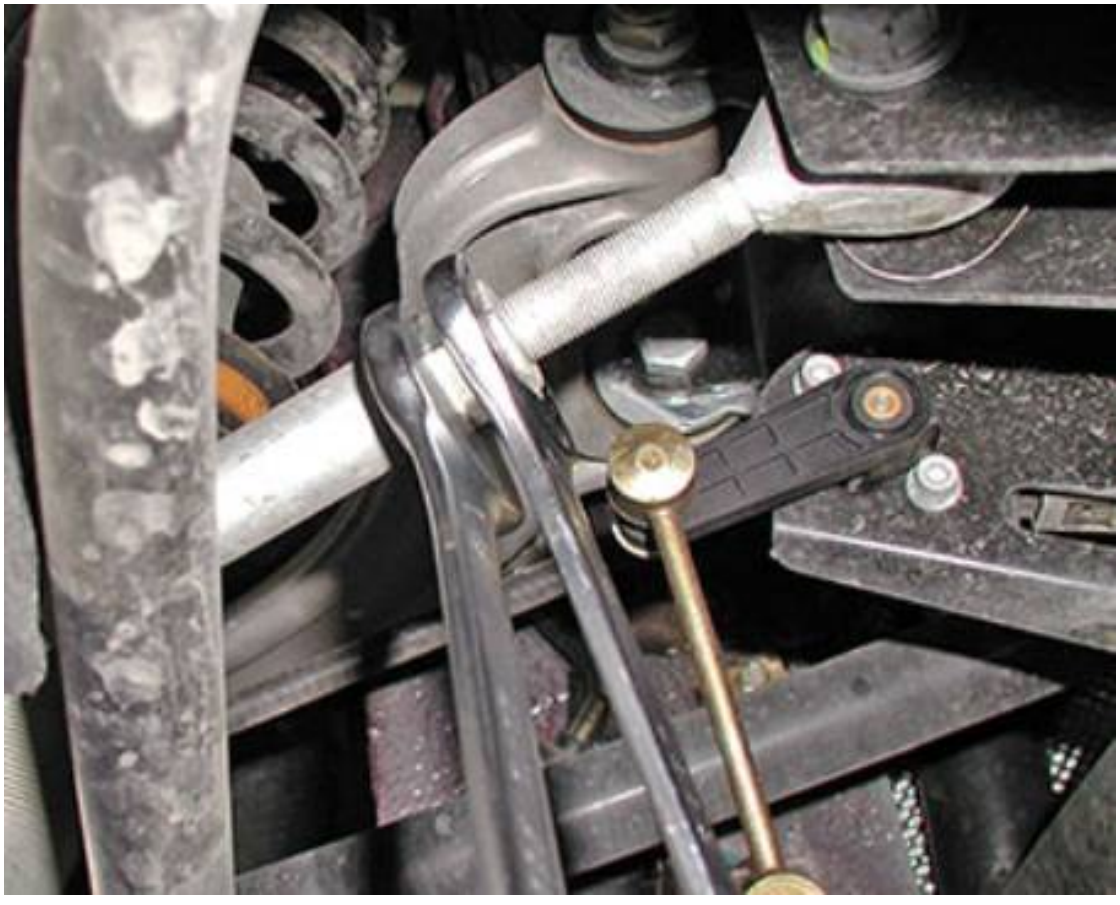
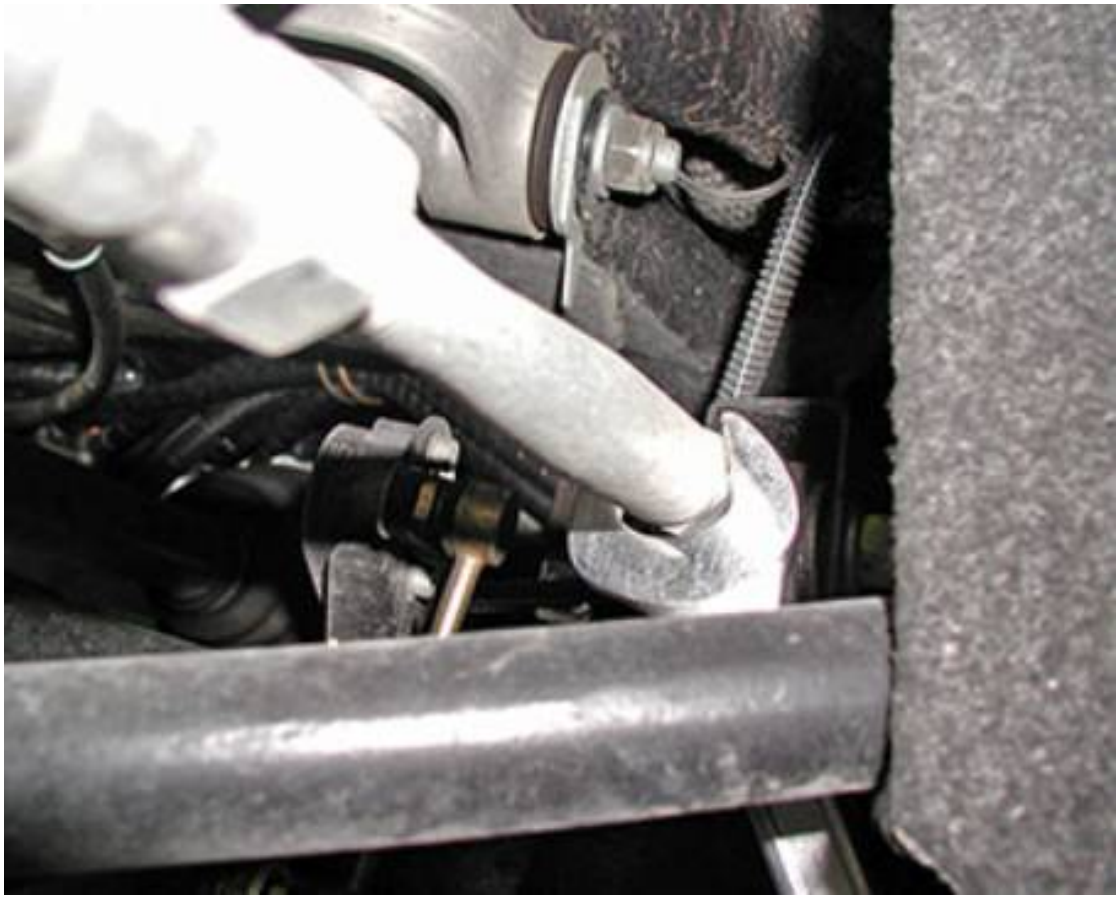


Rear toe-in adjustment

- If the value measured by the instrument does not fall within the specified values, adjust the rear wheel toe-in.
- With the vehicle in "static load" conditions, i.e. full of fluids (including fuel) plus 75+75 kg on the front seats, proceed with adjustment as described below.
- Loosen the retaining nut for the rear toe-in tie-rod.

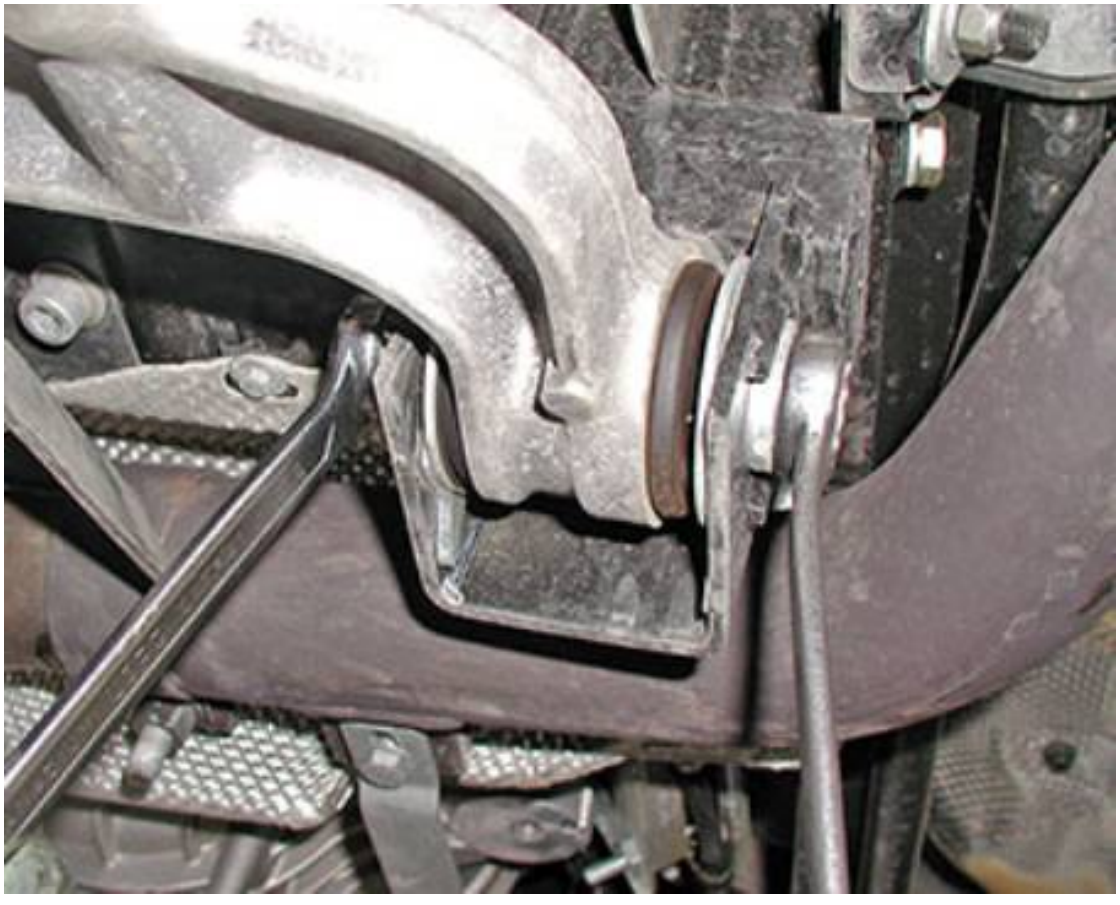


- Turn the hexagon positioned on the tie-rod clockwise or anticlockwise until reaching the toe-in value indicated in the table. Then tighten the loosened parts to the specified torque.



Rear camber adjustment

- If the value measured by the instrument does not fall within the specified values, adjust the rear wheel camber.
- With the vehicle in "static load" conditions, i.e. full of fluids (including fuel) plus 75+75 kg on the front seats, proceed with adjustment as described below.
- Correct the camber value of the rear wheels by acting on the two cams on the tips of the coupling between the lever and the rear frame.
- Loosen the fittings that fasten the lever to the frame.



- Turn the cams until the instrument measures the value indicated in the table.
- During adjustment check that the cams are facing in the same direction.
- Then tighten the loosened parts to the specified torque.

- After adjusting the rear camber value, you must adjust the rear toe-in operating as described above.

FRONT chassis

Removing the engine from the front chassis

- Remove the engine.

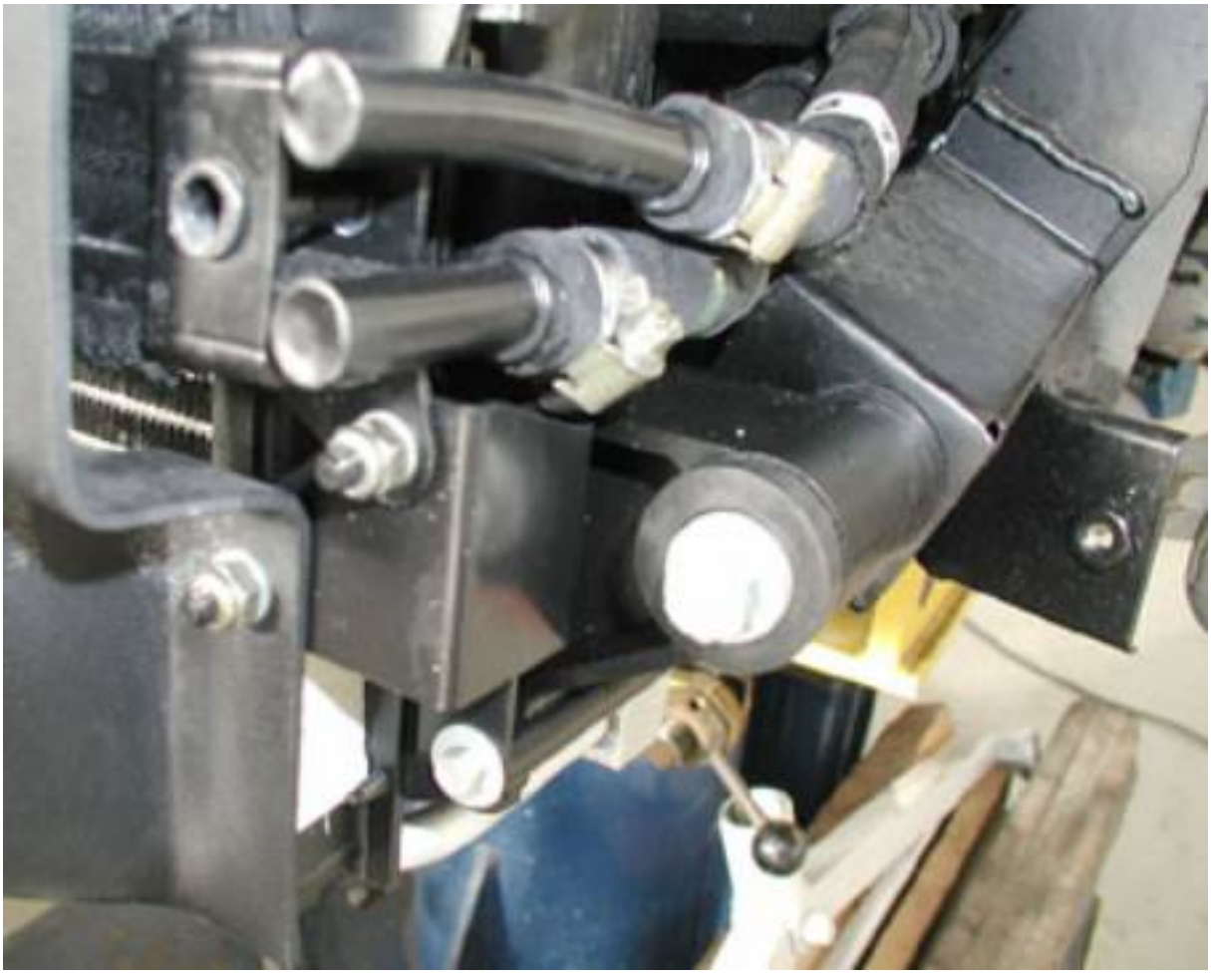
Removing-refitting the engine

- Unscrew the unions and disconnect the oil lines from the steering box.

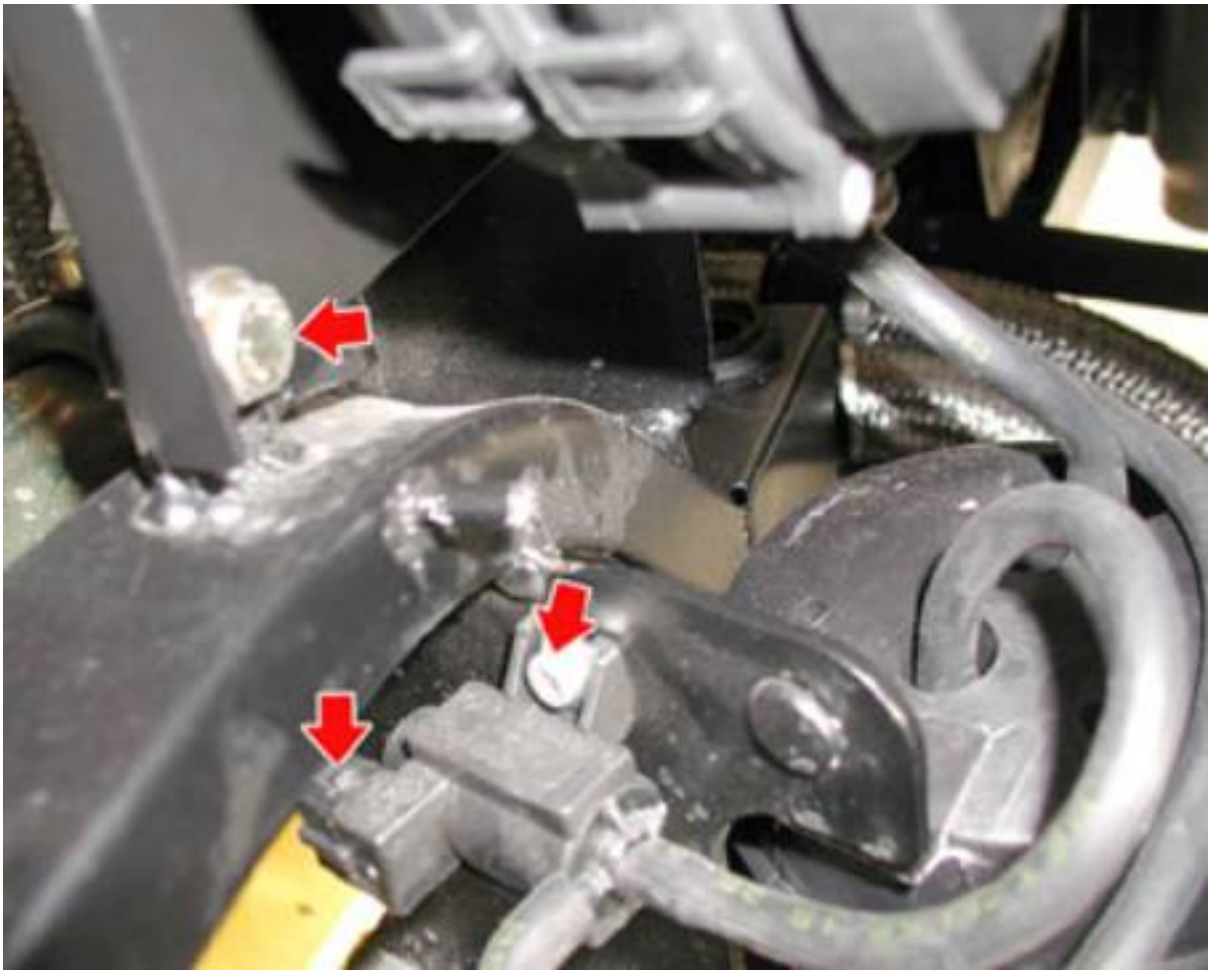
- Open the clip and release the hydraulic steering oil line.

- Undo the screws fastening the dehydrator filter bracket to the chassis.

- Unscrew the lower radiator screws and remove the radiator/dehydrator filter and engine coolant tank assembly from the chassis.

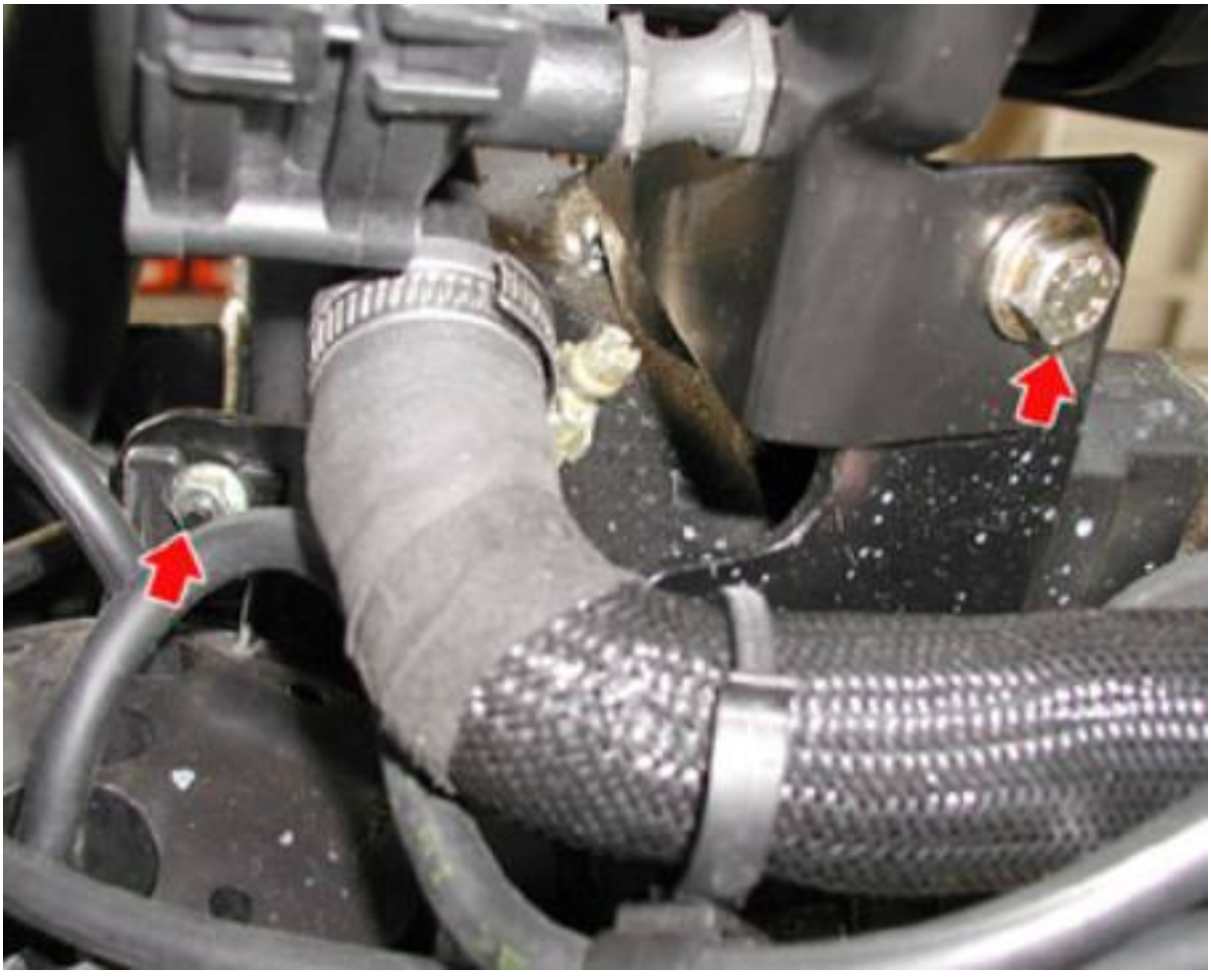


- Undo the lower fastening screw on the secondary air system pump, undo the solenoid valve fastening screw and detach the relative electric connection.



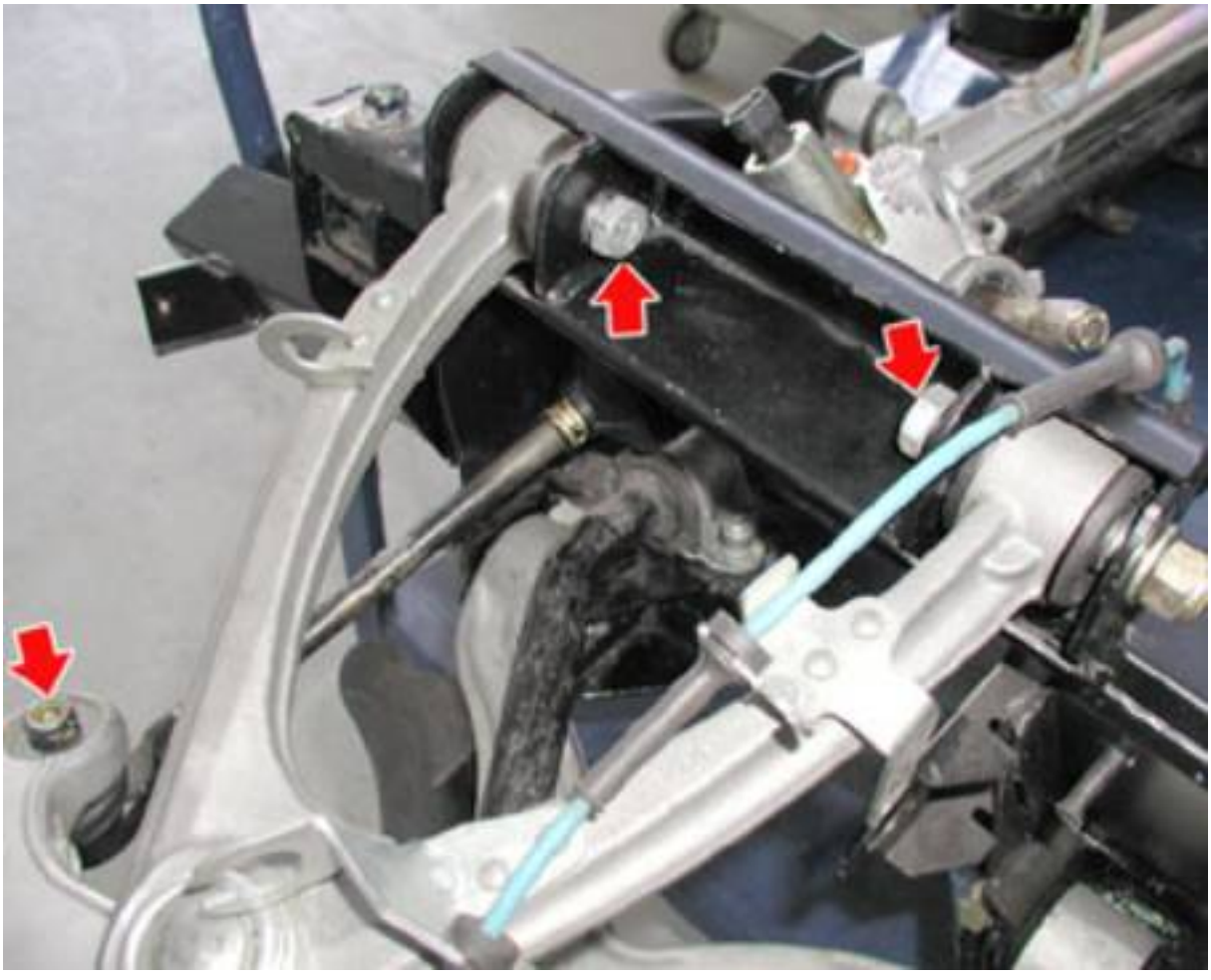
- Unscrew the fastening nut on the secondary air system vacuum tank.

- Unscrew the upper fastening screw on the vacuum tank, unscrew the fastening screw on the pump and remove the secondary air system pump and vacuum tank assembly.



- Remove the shock absorbers from their seats on the relative suspensions.

- Unscrew the fastening bolts on the upper levers, unscrew the fastening nut and, using an extracting tool, separate the tapered head of the steering tie-rod from the hub carrier.
- Retrieve the shims for the set-up adjustment.



- Unscrew the fastening bolts on the lower lever, unscrew the fastening nut on the stabiliser bar head and remove the front left-hand suspension assembly.
- Carry out the same procedure on the right-hand suspension.

- Undo the screws fastening the steering box to the chassis on the right-hand side, undo the screws fastening the stabiliser bar to the chassis on the right-hand side.

- Undo the screws fastening the steering box to the chassis on the left-hand side, undo the screws fastening the stabiliser bar to the chassis on the left-hand side.
- Remove the steering box and stabiliser bar assembly.

- Remove the chassis from the supporting tool.
- Overview of front chassis

Refitting the front chassis

- Position the front chassis on the bench or on the supporting tool used for the removal of the engine.

Fit the steering box and stabilizer bar assembly in its seat on the frame and tighten the screws that fasten the hydraulic steering box to the frame to a torque of **40 Nm**.

- Tighten the screws that fasten the stabilizer bar to the frame to a torque of:

- **31 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 40 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND**versions.

- Fit the front suspension assembly and tighten the nut fastening the small connecting rod to the stabiliser bar to a torque of **50 Nm.**
- Fit the shims removed during disassembly, then tighten the bolts on the lower lever to a torque of:

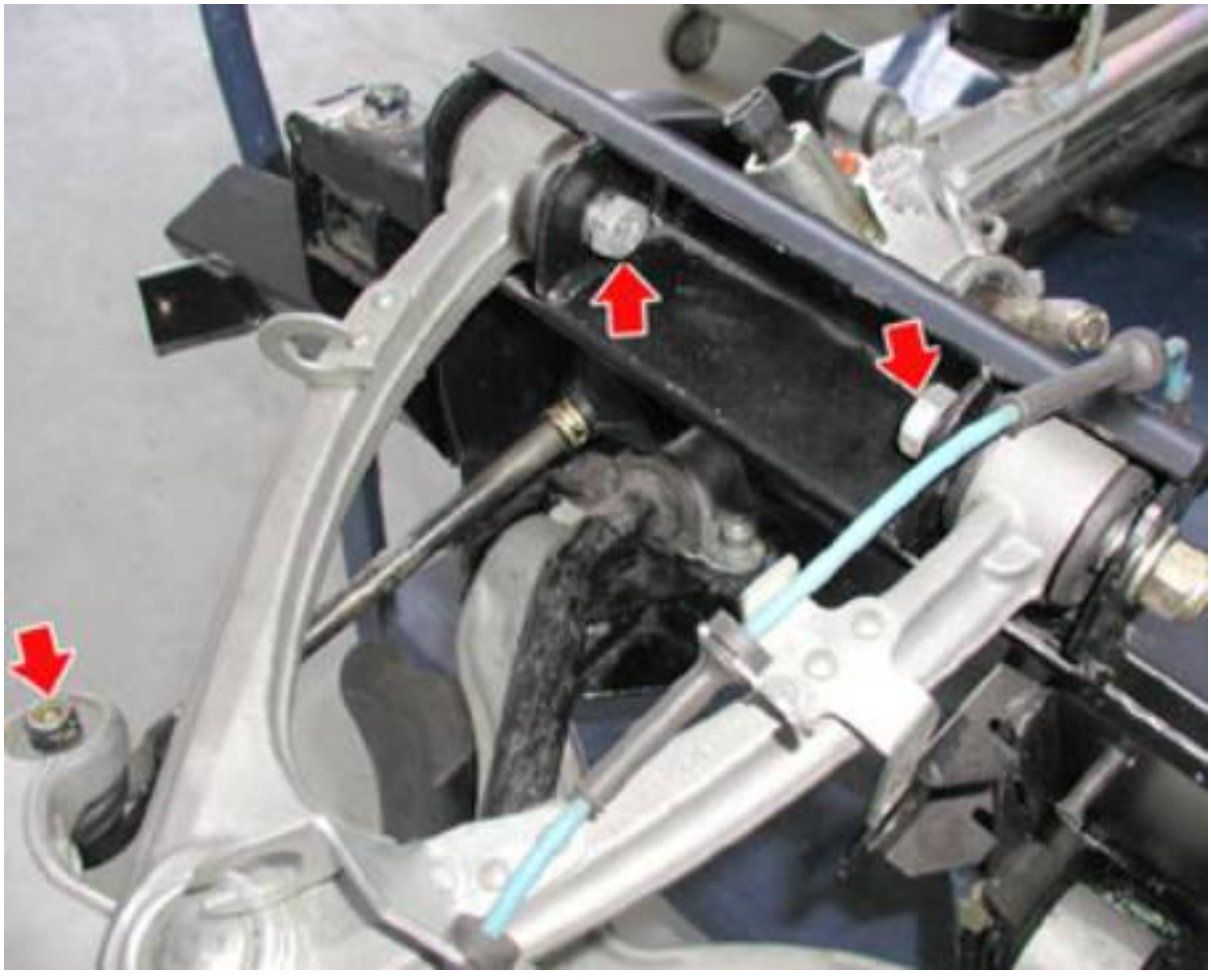
- **98 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 120 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

- Tighten the fastening nut on the steering tie-rod’s tapered head to a torque of **40 Nm**
- Fit the shims removed during disassembly, then tighten the bolts on the upper lever to a torque of:

- **78 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 120 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.



- Fit the shock absorbers in their seats on the relative suspensions.

- Fit the secondary air system pump and vacuum tank assembly and screw up the fastening screws on the pump and on the vacuum tank.
- Screw up the fastening screw on the solenoid valve and attach the relative electric connection.
- Fit the radiator/dehydrator filter and engine coolant tank assembly in its seat on the chassis.
- Screw up the fastening screws on the radiator, without tightening them.
- Screw up the two screws fastening the dehydrator filter bracket to the chassis.

- Connect the oil lines from the steering box and tighten the two unions to a torque of **35 Nm**.

- Proceed by fitting the engine.

Removing-refitting the engine

REAR CHASSIS

Removing the rear chassis

- Remove the rear wheels.

Replacing the wheels

- Loosen the screws fastening the shock absorber to the body (on both sides).

- After positioning a hydraulic lift below the suspension assembly, undo the screw fastening the shock absorber to the suspension assembly (on both sides).

- Remember to keep the shimming ring.

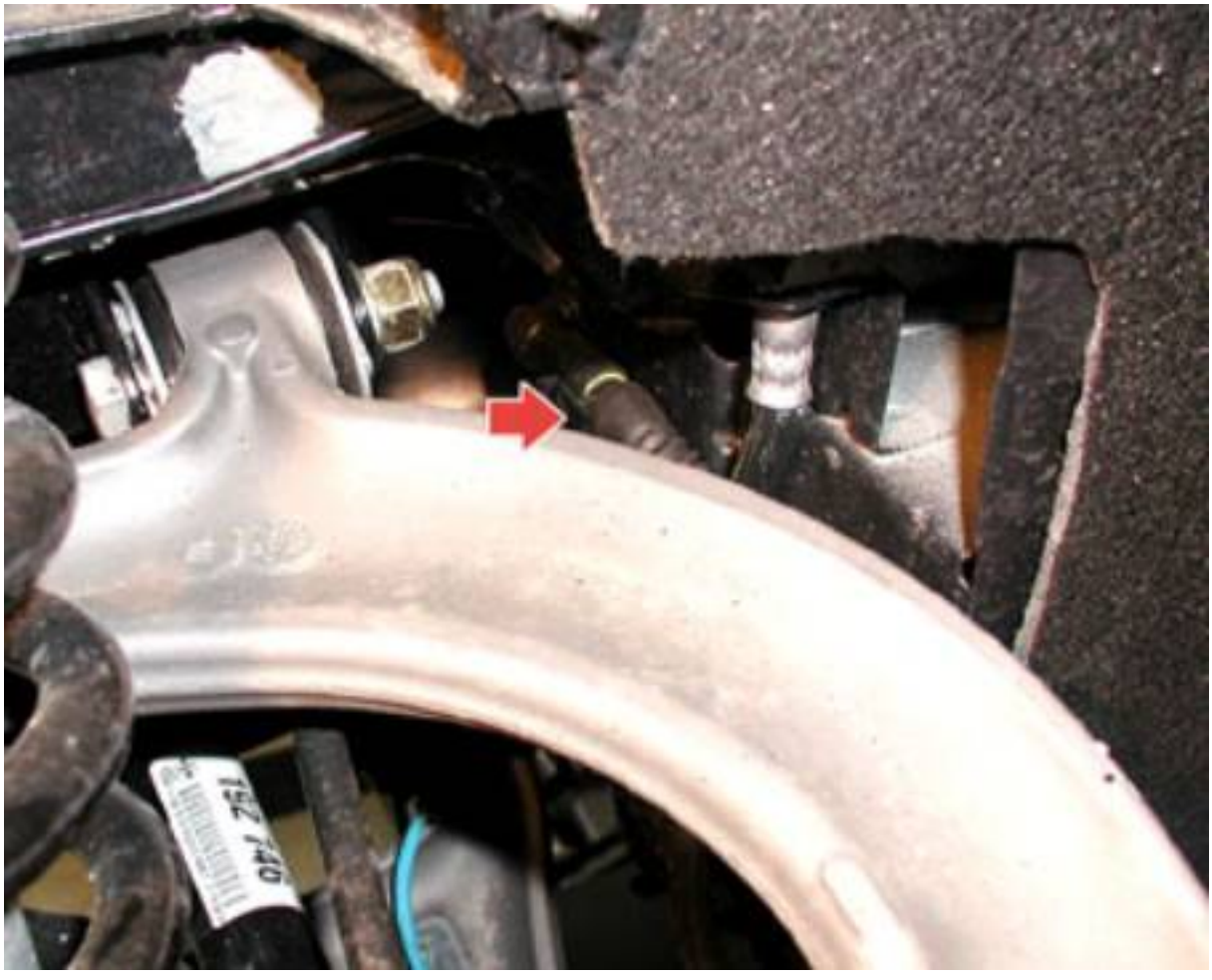
N.B.
When refitting, position the shimming ring in its seat before inserting the shock absorber fastening screw.

- Remember to keep the shimming washer.

- Remove the gearbox.

Removing-refitting the gearbox

- Detach the ABS cable connection on both sides of the vehicle.

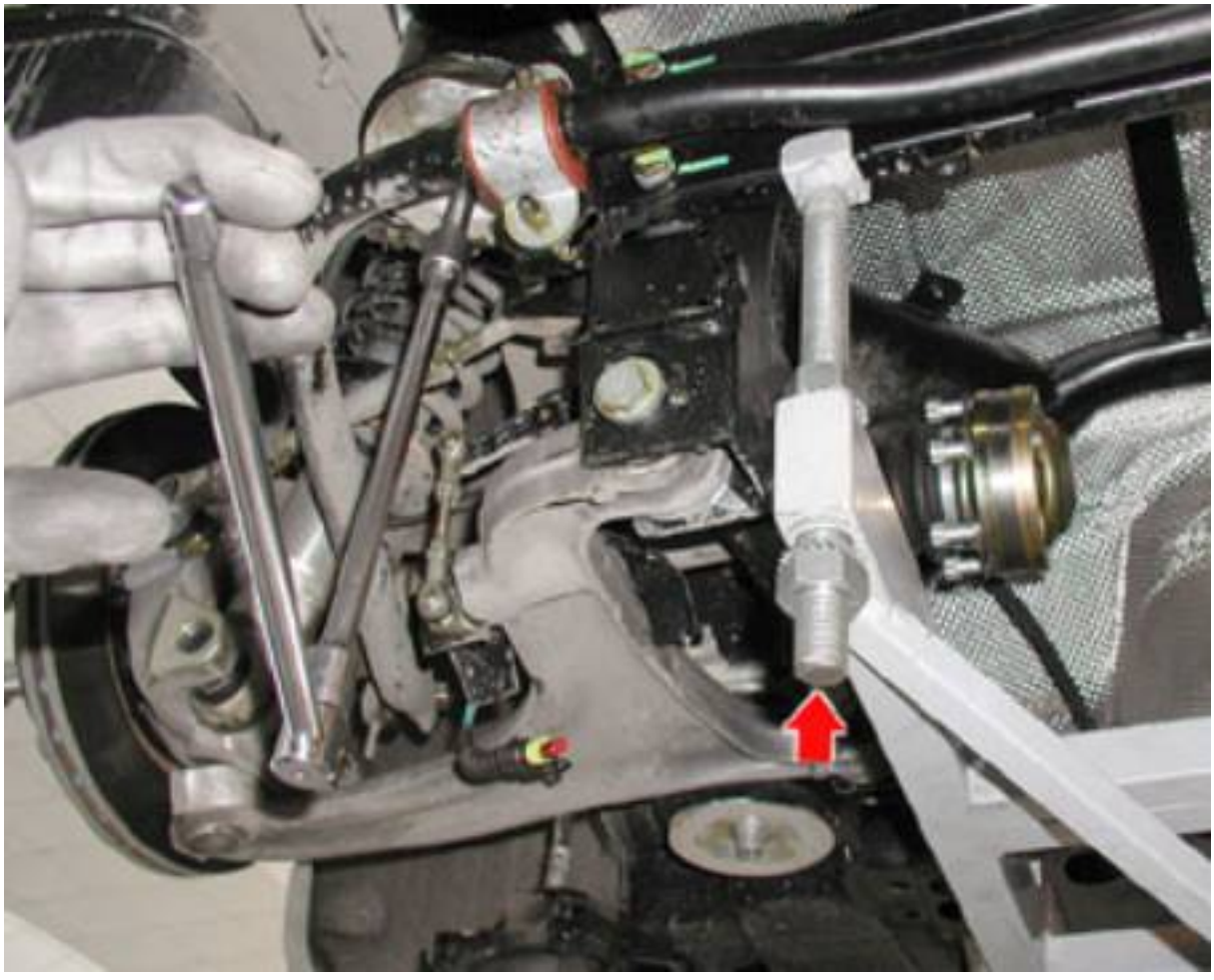


- Detach the electrical connection on the headlight adjustment potentiometer.

- Undo the two fastening screws on the brake caliper, on both sides.

- Reposition the cross member removed earlier in its seat, together with the gearbox unit, and loosely fit two fastening screws per side.
- Position a supporting tool under the rear chassis **900027340**.

- Undo the fastening screws on the rear chassis on the right-hand side to the bodywork.



- Undo the fastening screws on the rear chassis on the left-hand side to the bodywork, lower the hydraulic lift and remove the rear chassis - rear suspension assembly.

Refitting the rear chassis

- Fit the rear chassis assembly, complete with the suspensions, on the tool.
- Using the hydraulic lift, bring the rear chassis in position with the fastening holes on the four rubber bushings.
- Loosely fit the fastening screws and before proceeding to tighten them, check that the bevel edge of the metal discs on the rear rubber bushings is facing the stabiliser bar area, as shown in the figure below.

- Tighten the screws fastening the door limiting device to the bodywork to a torque of **123 Nm**.

- Lower the hydraulic lift and remove the tool from the lift.
- Undo the screws fitted loosely earlier and remove the cross member supporting the gearbox.
- Tighten the fastening screws on the brake calipers to a torque of **145 Nm**.

- Attach the electrical connection on the headlight adjustment potentiometer.

- Attach the ABS cable connection from both sides of the vehicle.

- Carry out the gearbox refitting operations.

Removing-refitting the gearbox

- Fit the washer and the shimming ring and tighten the screw that fastens the shock absorber to the suspension assembly (on both sides) to torque.

- **196 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 98 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND** versions.

- Tighten the screws that fasten the shock absorber to the bodywork to torque.

- **33.6 Nm** for **EUROPE** vehicles up to assembly no. 18534 in the left-hand drive version and 17235 in the right-hand drive versions

- 25 Nm for **EUROPE** vehicles from assembly no. 18535 in the left-hand drive version and 17236 in the right-hand drive versions in addition, for all the **USA – CND**versions.

- Fit the rear wheels.

Replacing the wheels

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

- Check the vehicle geometry is correct.

Front wheels

Rear wheels

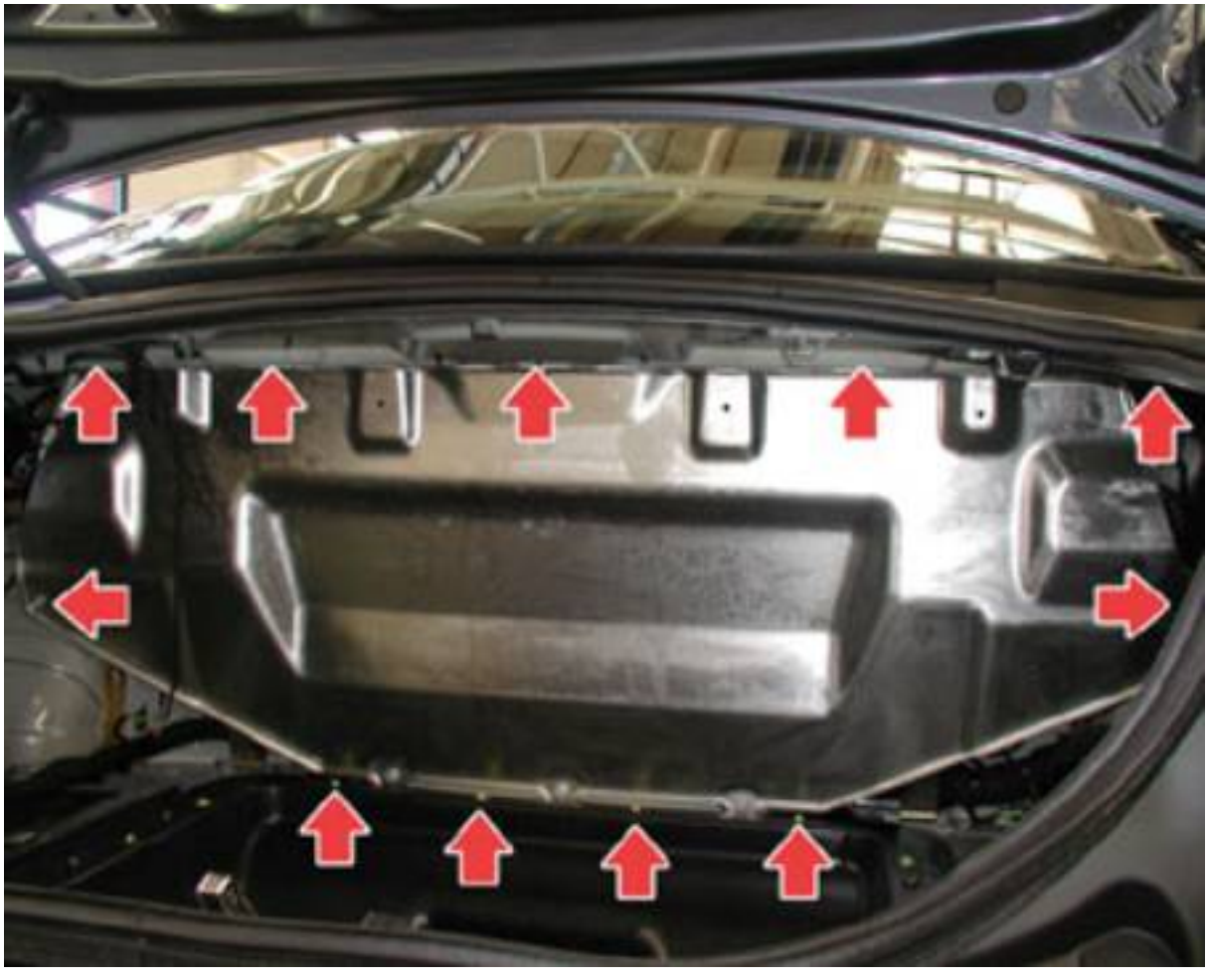
REAR VERTICAL ACCELERATION SENSOR

Removing- refitting the rear vertical acceleration sensor

- Disconnect the battery's negative terminal.
- Remove the luggage compartment trim panels.

Luggage compartment trim panels

- Undo the screws and the fastening nuts and remove the protective guard for the fuel tank.



- Detach the electrical connector, undo the two fastening nuts and remove the rear vertical acceleration sensor.

When refitting, follow the above procedures in reverse order

- After connecting the negative battery terminal, the following self-learning operations must be carried out to ensure certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

FRONT WHEELS VERTICAL ACCELERATION SENSOR

Removing the front wheels vertical acceleration sensor

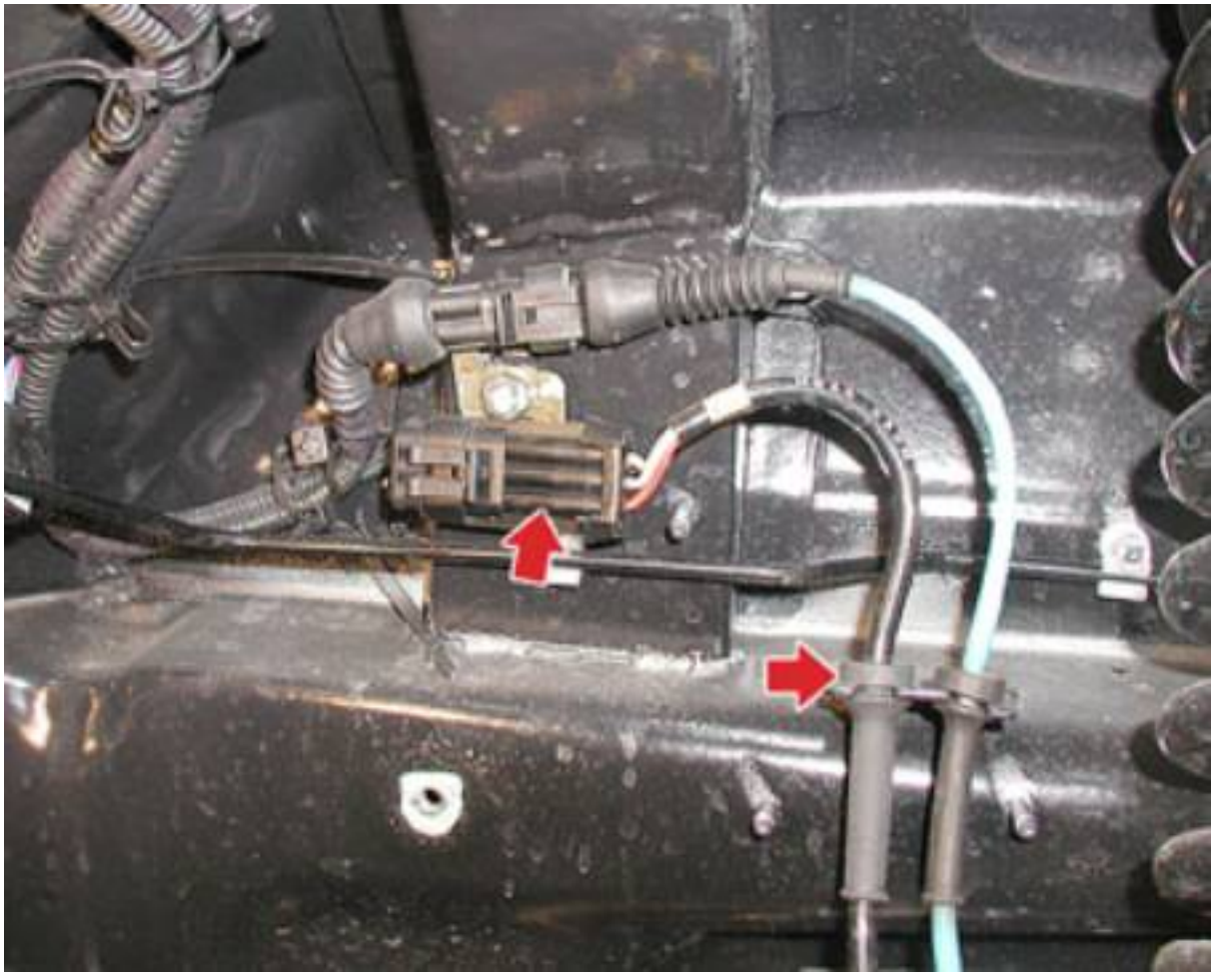
- Remove the relative wheel.

Replacing the wheels

- Undo the lower fastening screws on the wheel bay dust-protection shield.

- Unscrew the six fastening screws, and remove the five snap-fit buttons, then remove the wheel bay dust-protection shield.

- Detach the sensor’s electrical connection and release the wiring from the fastening on the bodywork.



- Release the electrical wiring from the fastening on the upper wishbone.

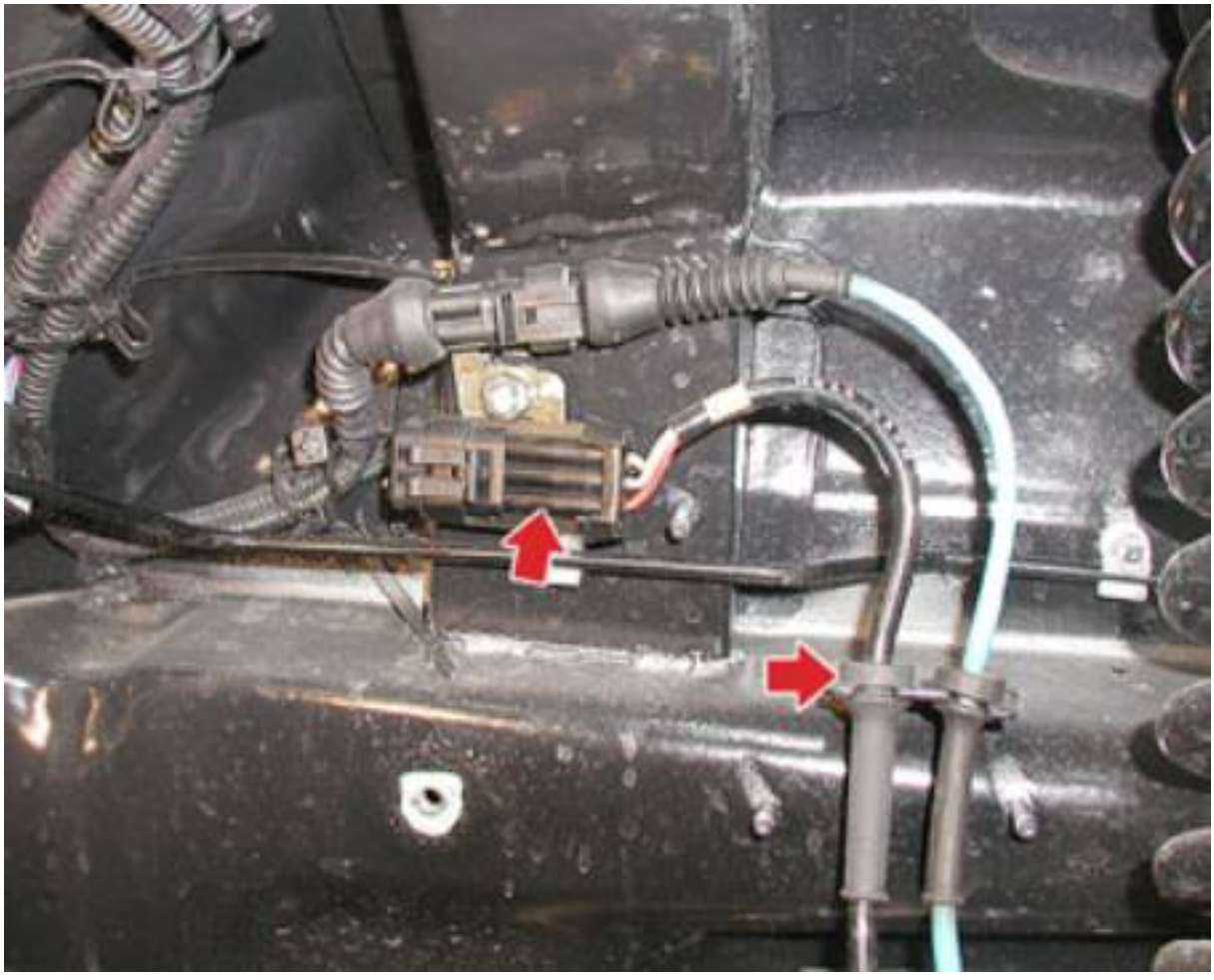
- Unscrew the fastening nuts on the front wheels vertical acceleration sensor, then remove it.

Refitting the front wheels vertical acceleration sensor

- Tighten the fastening nuts on the front wheels vertical acceleration sensor to a torque of **8 Nm**.

- Secure the electrical wiring and the oil line from the fastening on the upper wishbone.

- Attach the sensor’s electric connection and fasten the wiring to the bodywork.



- Fit the wheel bay dust-protection shield and tighten the six fastening screws fully, then fasten the five snap-fit buttons.

- Tighten the lower fastening screws on the wheel bay dust-protection shield fully.

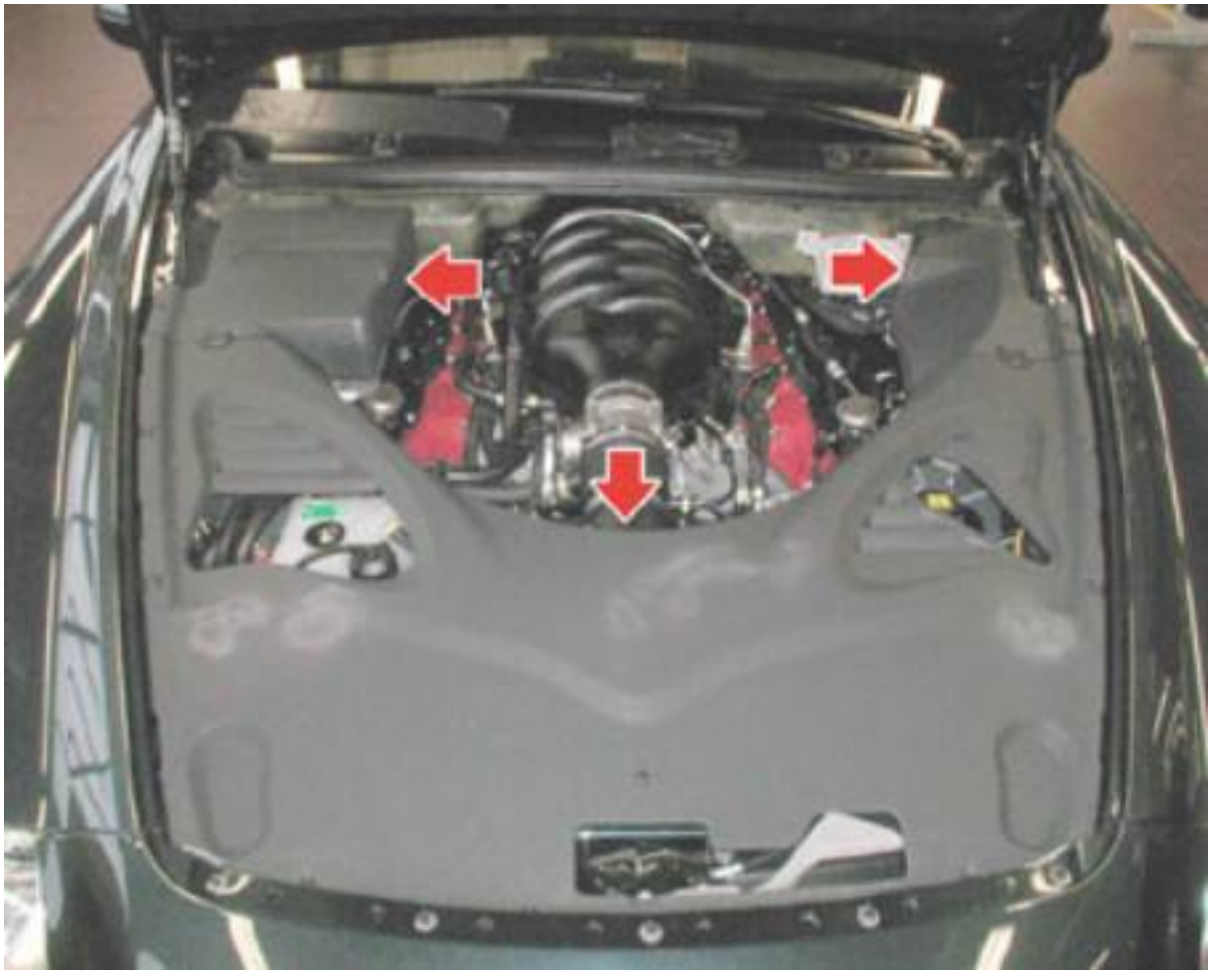
- Fit the relative wheel, carrying out the refitting operations only.

Replacing the wheels

ENGINE COMPARTMENT VERTICAL ACCELERATION SENSOR

Removing - refitting the ENGINE COMPARTMENT vertical acceleration sensor

- Disconnect the battery's negative terminal.
- Remove the trim panels.



- To remove the vertical acceleration sensor located on the right-hand side of the engine compartment, proceed as follows.
- Rotate the plastic screws fastening the engine compartment fuse box cover by 90°, then remove the cover.

- Undo the two fastening screws on the engine compartment fuse box.

- Unscrew the three fastening screws, and remove the engine compartment fuse box mount.

- Detach the electrical connector, undo the two fastening nuts and remove the vertical acceleration sensor from the right-hand side of the engine.

- To remove the vertical acceleration sensor located on the left-hand side of the engine compartment, proceed as follows.
- After removing the engine compartment trim panels, detach the electrical connector, undo the two fastening nuts and remove the vertical acceleration sensor from the left-hand side of the engine.

When refitting, follow the above procedures in reverse order

- After connecting the negative battery terminal, the following self-learning operations must be carried out to ensure certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Side acceleration and yaw sensor

Removing - refitting the side acceleration and yaw sensor

- Remove the central console.

Removing-refitting the central console

- Undo the fastening screws, detach the electrical connection and remove the side acceleration and yaw sensor.

- From vehicle serial number **24275** the lateral acceleration and yaw sensor also incorporates the functions previously performed by the vehicle acceleration and inclination sensor, found under the centre console.
- Only for vehicles equipped with this new yaw sensor (serial number **24275**), if you remove, refit or replace the component, you must run the accelerometer self-calibration procedure using the SD3 diagnostic tester.

Accelerometer self-calibration procedure

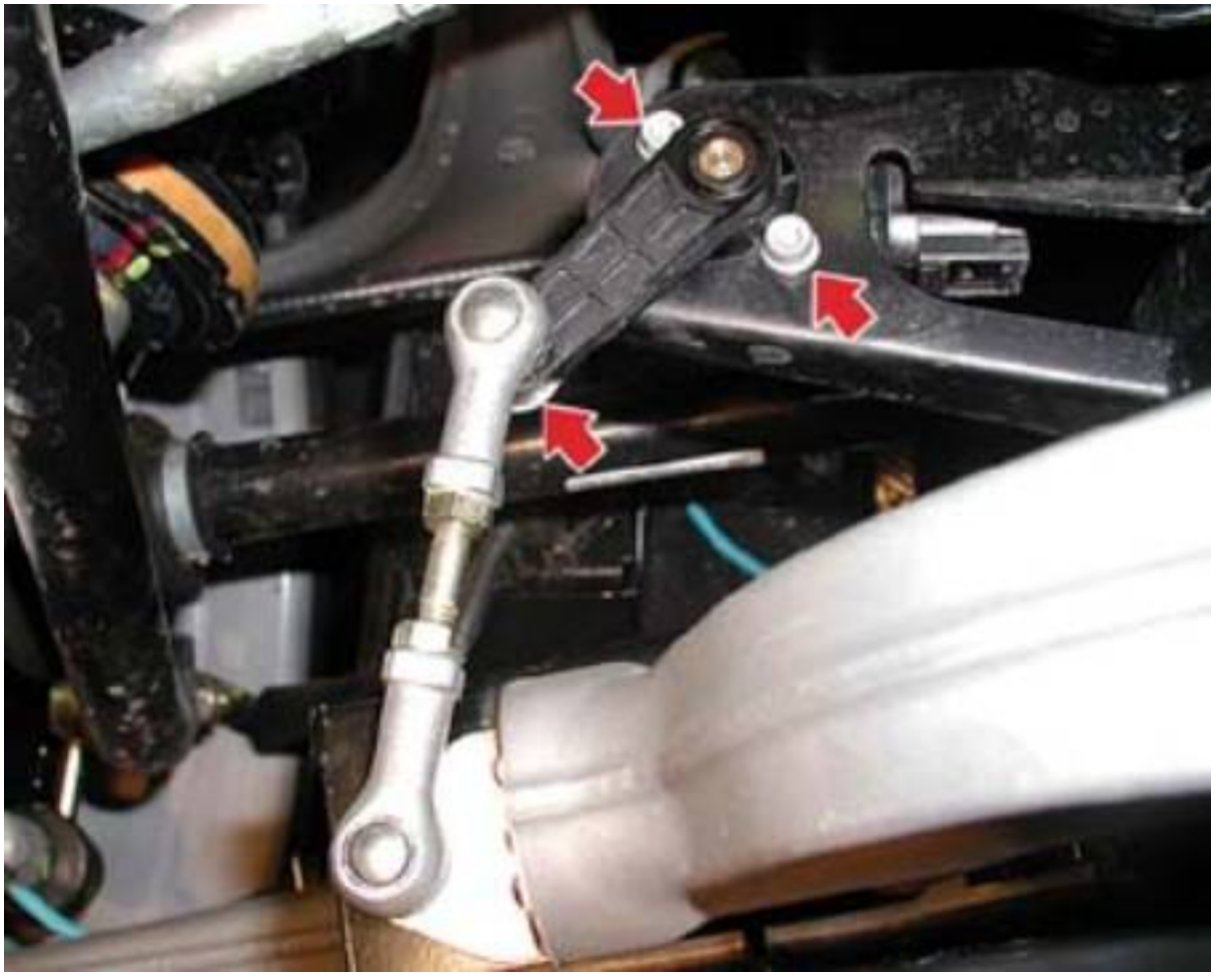
When refitting, follow the above procedures in reverse order

REAR HEADLIGHTS AIMING SENSOR

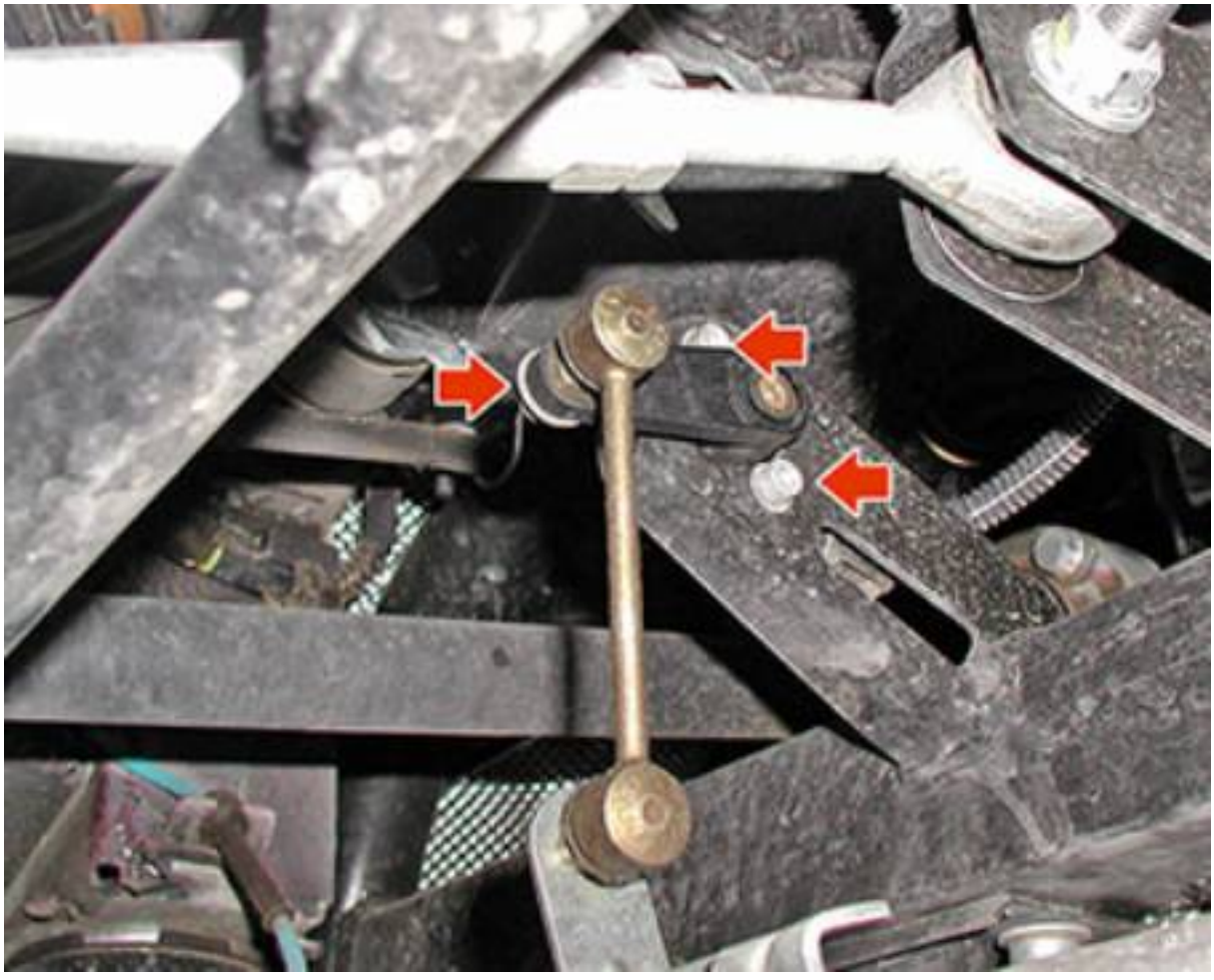
Removing - refitting the rear headlights aiming sensor

- Place the car on the hoist.
- Detach the sensor’s electrical connection.

- The version with adjustable tie-rod is illustrated.
- Undo the two screws and the nut and remove the sensor.



- The version with fixed tie-rod is illustrated.
- Undo the two screws and the nut and remove the sensor.

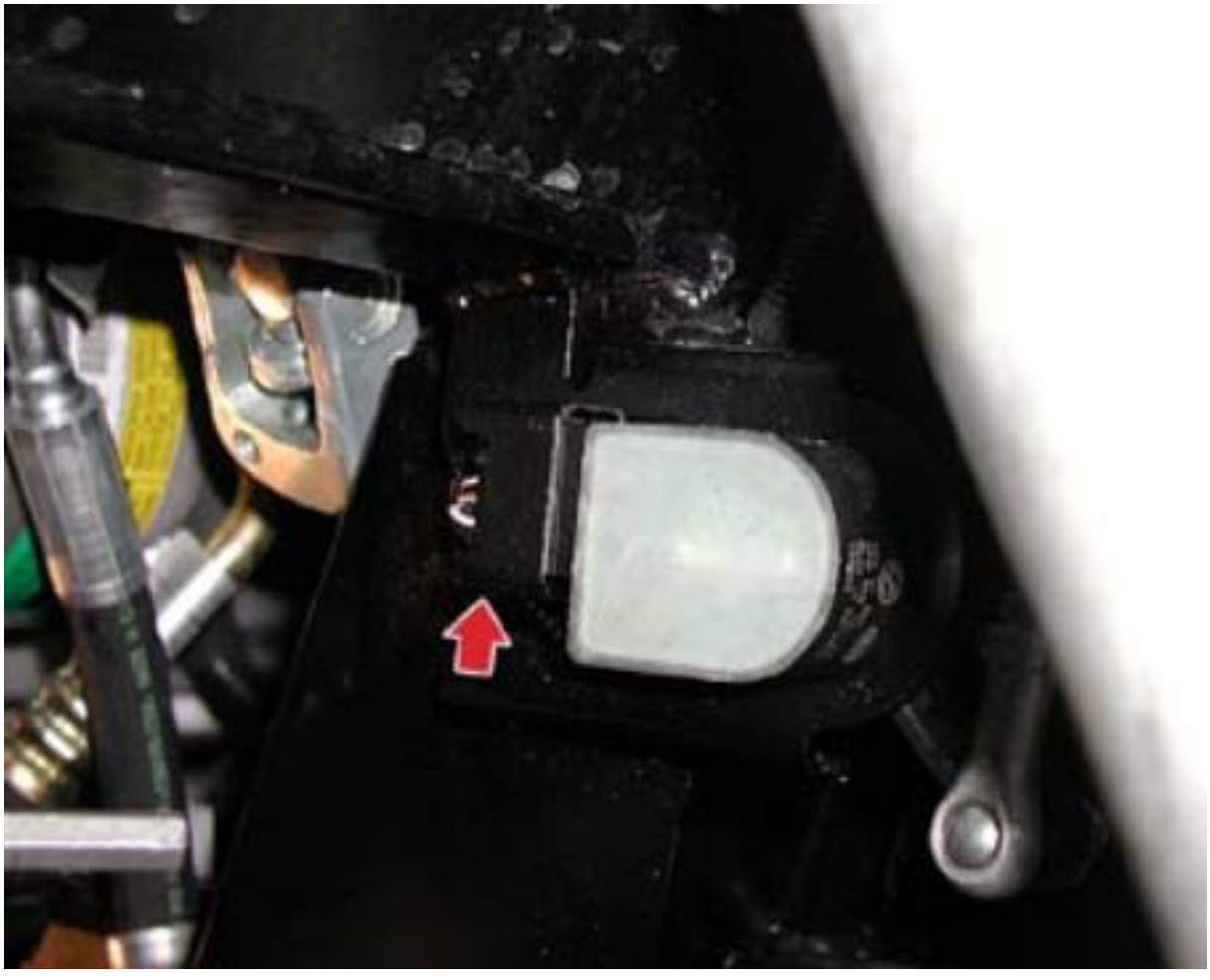


When refitting, follow the above procedures in reverse order

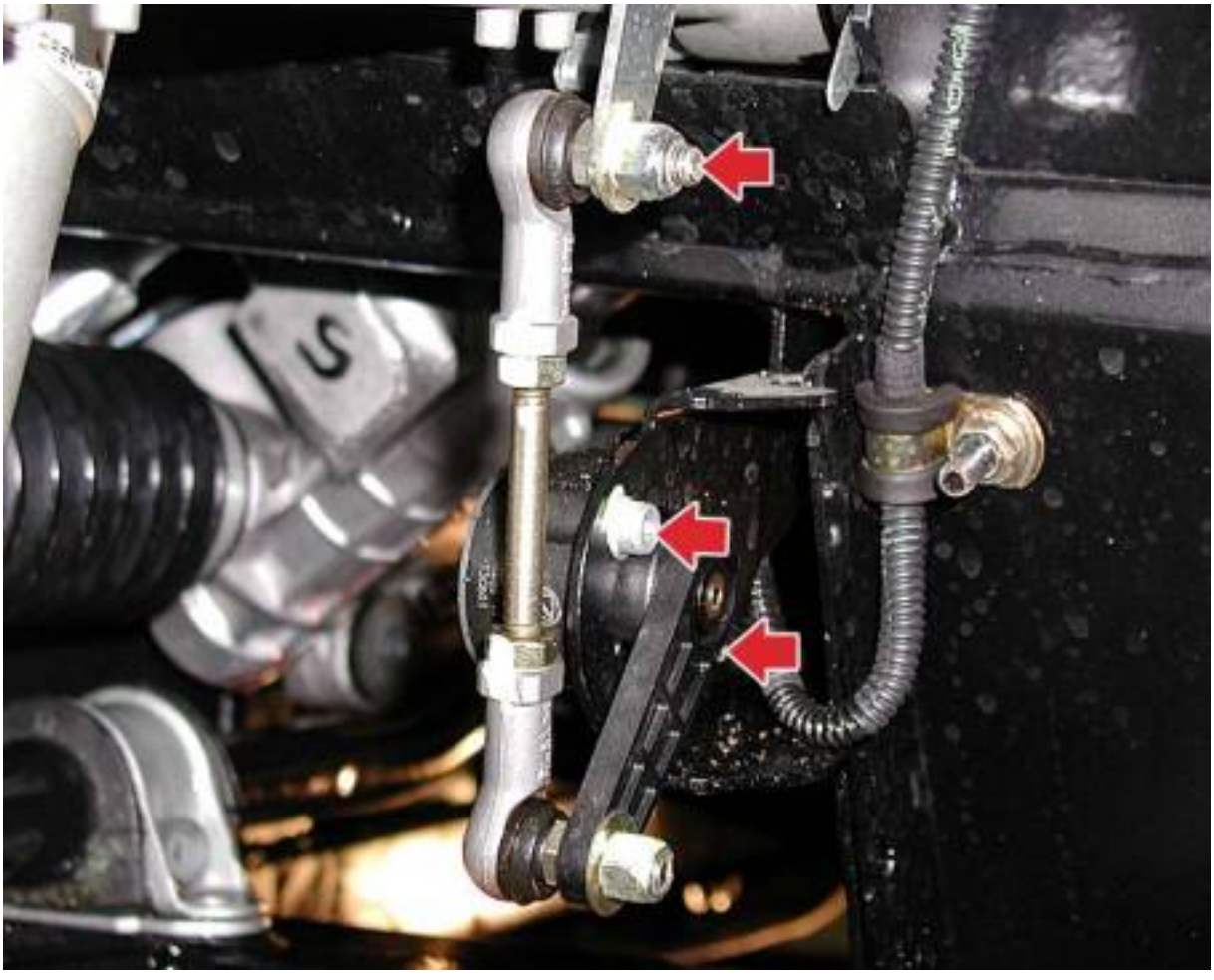
Front headlight aiming sensor

Removing - refitting the front headlight aiming sensor

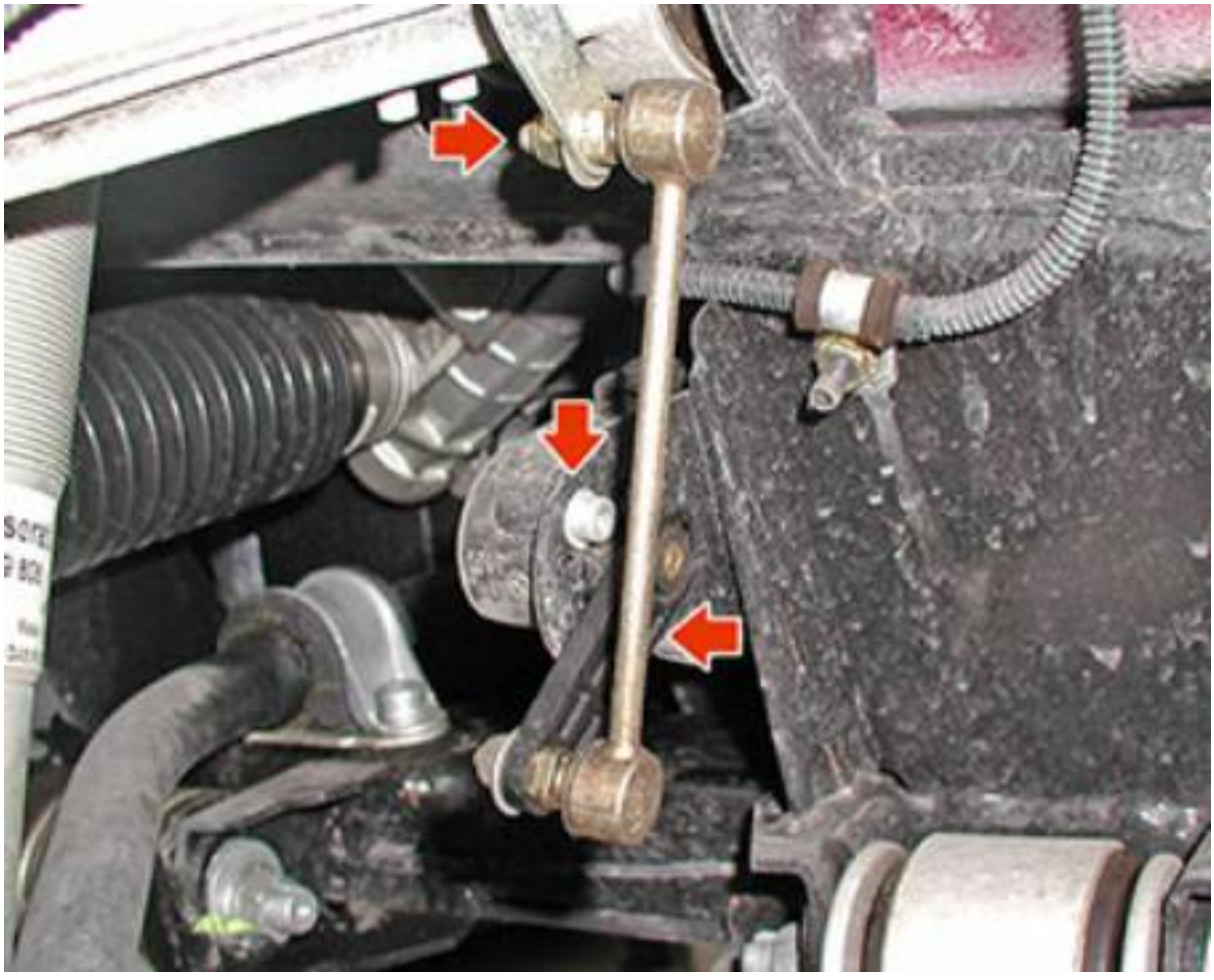
- Place the vehicle on the hoist.
- Rotate the front wheels so that the sensor is accessible.
- Detach the sensor’s electrical connection.



- The version with fixed tie-rod is illustrated.
- Undo the two screws and the nut and remove the sensor, complete with the adjustment tie-rod.



- The version with fixed tie-rod is illustrated.
- Undo the two screws and the nut and remove the sensor, complete with the adjustment tie-rod.



When refitting, follow the above procedures in reverse order

Replacing the wheels

- To remove the wheels, unscrew the five stud bolts

IMPORTANT
When fitting, work crosswise and tighten the screws to a torque of 130 Nm, loosen the stud bolts and retighten them to a torque of 98 Nm.

- For vehicles equipped with pressure sensors (optional component), in the event that the system is not calibrated (further to the replacement of a tyre) **the system must be calibrated** by pressing the specific button on the front ceiling light fixture for over 4 seconds (but no longer than 10 seconds).
- The system calibration requires 20 minutes at the most, when the vehicle is moving.
- The driver will be advised of completion of the calibration on the instrument panel (Calibration begun).

- If you intend to leave the vehicle unused for a lengthy period, we recommend you increase the tyre inflation pressure to 3.2 bar, to prevent them “flattening”.
- Before using the vehicle, inflate the tyres to the pressure levels recommended by the manufacturers (2.2 bar front and rear).

Tyre pressure monitoring system aerials

Removing – refitting the tyre pressure monitoring system aerials

- To remove the front aerials, remove the two front wheelhouses.

Front wheelhouse

- To remove the rear aerials, remove the two rear wheelhouses.

Rear wheelhouse

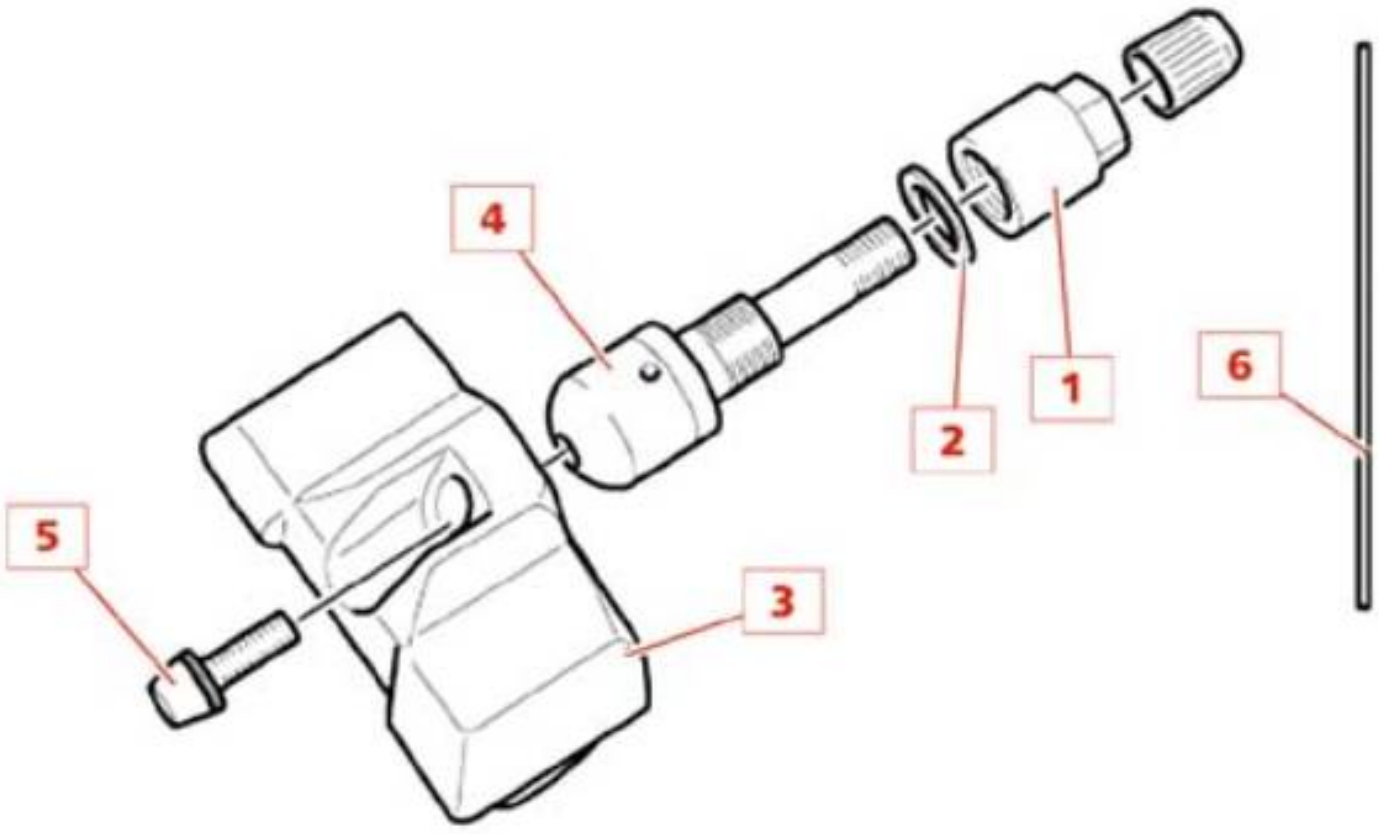
- To remove the front or rear aerials, proceed as follows.
- Detach the electrical connection, undo the three fastening screws and remove the tyre pressure monitoring system aerial.

When refitting, follow the above procedures in reverse order

Tyre pressure sensor

Removing the tyre pressure sensor

- The sensors are fastened to the wheel rim, using the inflation valve as an anchoring point.
- The sensor-valve coupling is fundamental for the system to operate correctly.
- Remove the tyre from the wheel rim.
- Block the rotation of the inflation valve by inserting the rod, supplied in the kit, into the hole on the sensor side.
- Unscrew the nut on the inflation valve and retrieve the washer.
- Remove the sensor with the valve from the wheel rim.

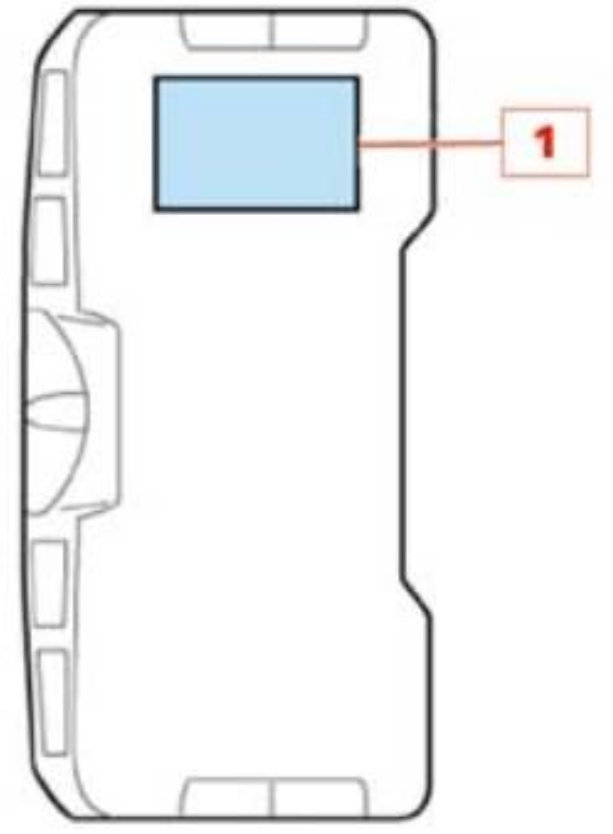


- **(1)**Inflation valve nut
- **(2)** Washer
- **(3)** Sensor
- **(4)** Valve
- **(5)** Fastening screw
- **(6)** Rod to prevent inflation valve rotating

IMPORTANT
Even if only one of the components is damaged, the sensor-valve assembly must be replaced.
Before carrying out any interventions on the rim or on the tyre, you must always check whether the wheel is equipped with a sensor.
Detaching the tyre from the rim without taking the necessary care could irreparably damage the sensor.

IMPORTANT

The sensor should not be treated with detergents, solvents or any other harsh products.
Do not use pressurised air or fluids (eg. pulivapor) to clean it.
Take special care not to tear the surface which interfaces with the filter (1) on the sensor's lower surface.
Always replace the sensor if this surface is dirty or torn.
The sealant liquid contained in the anti-puncture spray bottles can damage the sensor. Always replace the sensor on a wheel which has been repaired in this way.
All of the sensor-valve assembly components must be stored in a clean, dry place.



Fitting the tyre pressure sensor

- Clean the area where the sensor makes contact with the wheel rim.

IMPORTANT
Before beginning a new batch of sensors, always use up the components in the old batch as the sensors have a battery with a limited life-span.
The battery charge range is approximately 80 months. When the battery charge is running low, a warning light of the tyre pressure monitoring system will come on to indicate a malfunction.
Connect the SD3 tester to check that the malfunction is due to a flat battery.

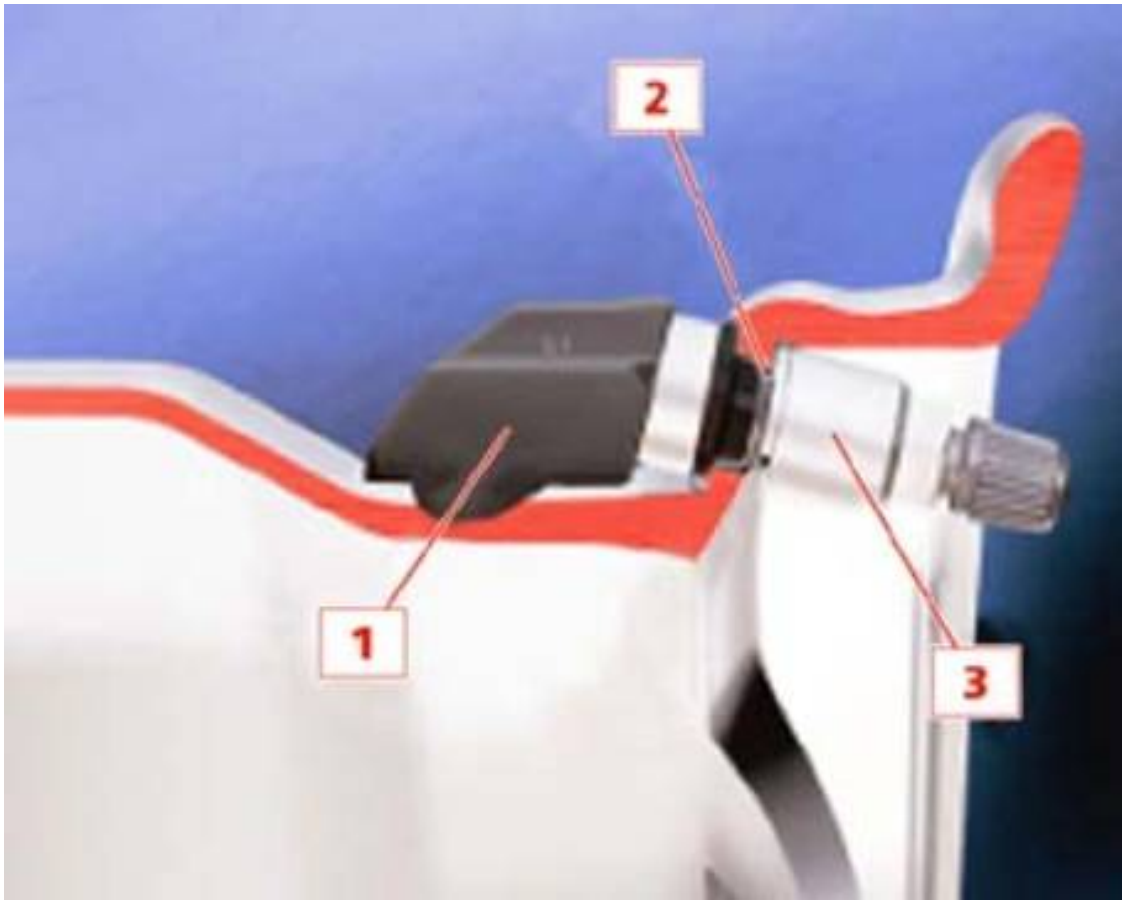
- The pressure sensors have two different operating frequencies, which depend on their distribution markets:

- 433 MHz Dark grey
- 315 MHz Light grey

- If you have to replace the sensors, run the calibration procedure.

- Fit the self-locking screw **(1)** into the sensor hole and tighten the valve **(2)** giving it two or three turns.

- Fit the valve **(1)** complete with the sensor, into the hole on the wheel rim.
- Fit the insulating washer **(2)** and tighten the nut **(3)** until it is flush.



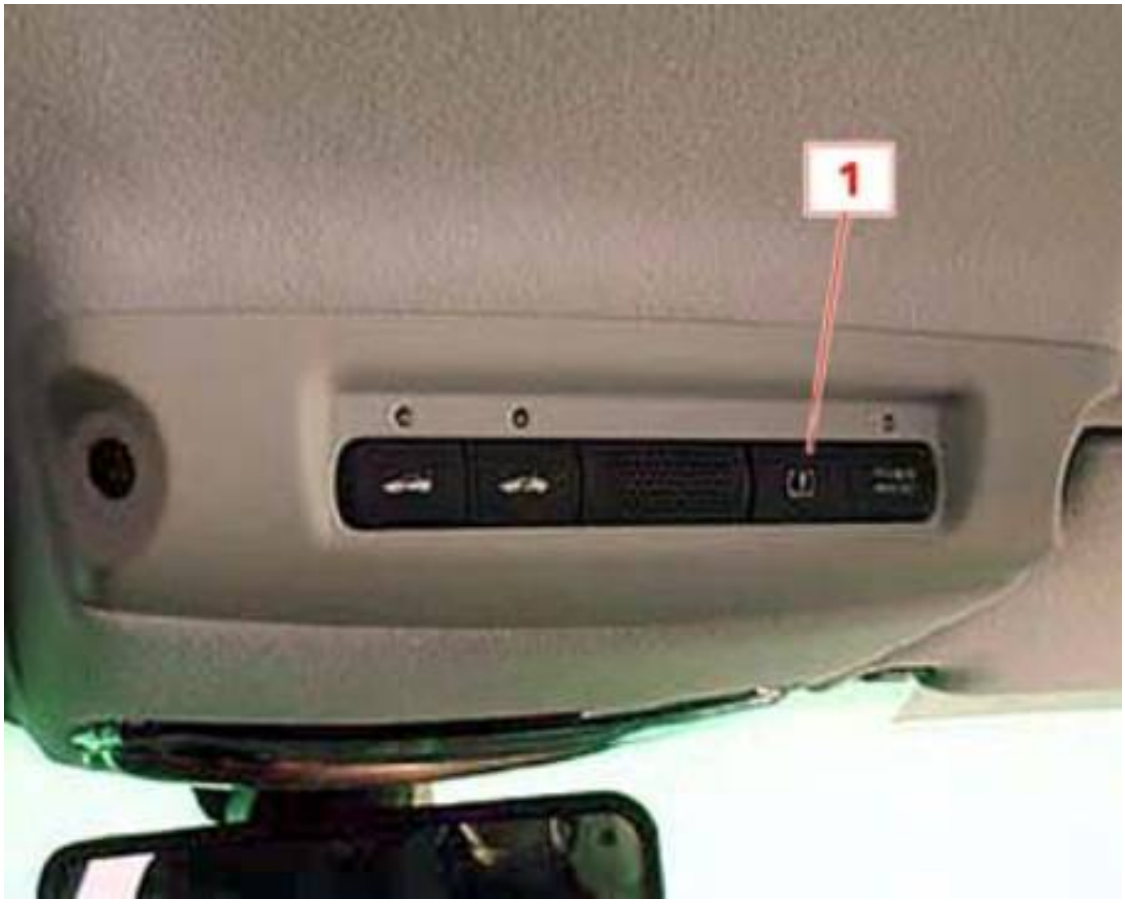
- Fit the rod **(1)** into the radial hole on the valve and tighten the nut to a torque of **4 Nm**.
- Remove the rod **(1)**.

- Press the sensor gently against the rim so that the sensor’s resting points come into contact with the rim.
- Tighten the self-locking screw fully **(1)** to a torque of **4 Nm**.

IMPORTANT
For proper operation, there must be contact between the rim and the sensor's resting points. If positioned differently, the system may not function correctly.

Calibration button

- The system calibration button **(1)** is located on the ceiling light holding the motion sensors, therefore it cannot be replaced alone, the entire ceiling light must be replaced.



Tyre calibration procedure

- If the system is not calibrated (for example, further to the replacement of a tire), it must be calibrated by pressing the specific key on the front ceiling light for over 4 seconds (but no longer than 10 seconds).
- The calibration begins when the moving vehicle exceeds 7 km/h and stops when it drops to below 3 km/h.
- The system takes a maximum of 20 minutes to complete the calibration procedure with the vehicle in motion.
- The calibration process completion will then be indicated on the instrument panel (Calibration started).
- The user can view the pressure levels of the four tyres by pressing the **MODE** button, which also allows you to view the other "Tyre pressure" information.
- This screen page remains displayed for 10 seconds.
- Furthermore, the system acknowledges the following conditions:

- system temporarily not active (e.g. external radio interference)
- system not calibrated (e.g. tyre replaced)
- System failure

- System not active (if it is disabled by the diagnostics system)
- low pressure or puncture in front LH, front RH tyres or rear LH and rear RH tyres
- low pressure or puncture in unidentified tyre.

Tyre pressure monitoring system ECU

- In the chapter titled "ECUs and nodes" and the paragraph "Tyre pressure node (NTP)" you will find explanations on how to remove and refit the tyre pressure monitoring system.

Tyre pressure node (NTP)

tightening torques

Description	Torque	Product
Screw for fastening steering column to crossmember	24 Nm	
Screw for fastening steering column to crossmember	7.4 Nm	
Screw for fastening steering column to steering box	25 Nm	
Nut for fastening steering column boot plate	4.4 Nm	
Steering wheel-steering column fastening nut	50 Nm	
Screw for fastening steering box to chassis	40 Nm	
Nut for fastening steering box tie-rod to hub carrier	40 Nm	
Nut for fastening ball joint tie-rod to steering box tie-rod	50 Nm	
Union screw (for delivery pipe) on hydraulic steering	35 Nm	
Union screw (for return pipe) on hydraulic steering	30 Nm	
Delivery pipe union on pump	35 Nm	
Screw for fastening front belt winders onto lower central pillar.	40 Nm	
Screw for fastening front seatbelts onto front seat.	40 Nm	
Screw for fastening rear side belt winders.	40 Nm	
Screw for fastening rear central belt winders.	40 Nm	
Screw for fastening rear seatbelts onto body.	40 Nm	
Screw for fastening rear buckles onto body.	40 Nm	
Screw for fastening seatbelt height adjuster.	20 Nm	
Nut for fastening transmission ring to height adjuster (safety device).	40 Nm	
Screw for fastening sidebag sensor to sidebag bracket sensor	2.5 Nm	
Screw with washer for fastening airbag bracket sensor and central pillar housing	8 Nm	

Description	Torque	Product
Special screw for fastening rear door tie-rod	7.4 Nm	
Special screw for fastening striker plate reinforcement to central pillar reinforcement	24 Nm	
Flanged screw for fastening airbag module to right-hand air-bag fastening bracket.	7.4 Nm	
Flanged screw for fastening to dashboard crossmember complete with bracket for fastening airbag module	4.1 Nm	
Nut with flange for fastening airbag module to upper bracket for fastening airbag module	7.4 Nm	
Fastening screw for right-hand bracket for fastening airbag to dashboard casing	2.6 Nm	
Fastening screw for left-hand bracket for fastening airbag to dashboard casing	2.6 Nm	

TOOLKIT

Specific Equipment

Description	Code	
Air Bag release tool	900027310	
Air Bag control connector	900027450	

RULES OF SAFETY TO BE OBSERVED DURING SERVICING OF VEHICLES FITTED WITH AIRBAG SYSTEM

Operations to be performed on the vehicle

The following instructions must STRICTLY BE COMPLIED WITH whenever servicing any components on vehicles fitted with Airbag.
Also remember that Airbag modules are explosive devices. Therefore handling and storage of them must comply with the laws applying to explosives in the country in which the vehicle is marketed.

Before starting servicing operations involving:

- bodywork repairs,
- welding,
- removal of Airbag modules or control unit,
- the following preliminary operations must be performed:

A. Always disconnect the battery, i.e. DISCONNECT BOTH TERMINALS (+) and (-) from their poles and INSULATE THEM THOROUGHLY.
B. Wait at least 10 minutes from battery disconnection then disconnect the control unit connection
C. If the cushion inflation device is to be removed, scrupulously follow this procedure:
1 wait at least 10 minutes from battery disconnection before removing the module;
2 slacken the fastening screws;
3 disconnect the connector of deployment devices (modules).
4 stow the devices with the outer cover upwards in a locked metal cabinet. The cabinet shall be used only for this purpose and no other material shall be stored in it, especially if inflammable. The cabinet shall be of a suitable type for the storage of explosive charges (shock resistant and provided with grids to allow natural ventilation inside) and shall be fitted with stic-kers envisaged by law (DANGER EXPLOSIVES – DO NOT USE NAKED FLAMES – ACCESS PERMITTED TO AUTHO-RISED PERSONNEL ONLY).

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to the section:

Component self-learning in the event of battery disconnection

After an acciden

A. VEHICLE TO BE SERVICED – DEPLOYED AIRBAG TO BE REPLACED
After an accident, if the car can still be repaired, the following components are to be replaced:

- the deployed airbag module;
- the pretensioners and the belts;
- the electronic control unit only if the collision caused deployment of both pretensioners and airbag, since data transferred automatically to the Crash memory cannot be cleared. This also causes the warning lamp on the dashboard to stay on per-manently;
- if only the pretensioners were operated during the crash, control unit replacement is not required but the error must be cleared from the memory after replacing the pretensioners to keep the crash memory clear;
- the specific airbag system should be replaced if damaged or faulty cables are found, either through

a sight check or diag-nostics.

Airbag components cannot be serviced and must always be replaced. Modules removed, following all the safety procedu-res, may be dismantled and the parts grouped according to the type of material (plastic, metal, aluminium, etc.) or kept as one piece for disposal. Modules can be disposed of locally as special waste and, as such must be registered on the special waste register and handed over to companies specialised in special waste.

B. VEHICLE FOR DEMOLITION – AIRBAG DEPLOYED

Follow the same procedure as for paragraph “a”.

C. VEHICLE TO BE REPAIRED – AIRBAG NOT DEPLOYED

If the airbag did not deploy during the crash, it should be considered as still active. It is therefore necessary to carry out all the instructions of the **“Operations to be performed on the vehicle”** Section before removing it from its housing. Check the efficiency of the whole system using diagnostic tools; if in doubt, replace the module.

D. VEHICLE FOR DEMOLITION – AIRBAG NOT DEPLOYED

Follow the instructions of the **“Operations to be performed on the vehicle”** Section to remove the airbag and in cases “c” and “d” send the material to Maserati without trying to service, neutralise or activate the module. These operations involve specific risks and may only be performed by specialised personnel duly authorised by the authorities concerned. The material should be sent to Maserati completing the note of delivery with the following wording:
“AIRBAG/PRETENSIONER DEVICE WITH EXPLOSIVE CHARGE TO BE DEFUSED”.

All modules sent to Maserati must absolutely be wrapped in the same packing as those sent with spares. Clearly, the packing of spare AIRBAGS AND PRETENSIONERS should be kept intact to be used for shipment of undeployed material to Maserati.

E. FOREIGN MARKETS.

The laws in force on foreign markets should be studied and the network must be informed of them.

CAUTION

Never send vehicles for demolition with undeployed bags or unexploded device.

Rules of safety for handling airbag modules

Under normal conditions, the airbag is operated by the elec-tronic control unit signal during collision. The gas gener-ated is mainly non-toxic nitrogen. The airbag is a safety device subjected to laws applying to explosives (5^{th} class, group A); therefore any operator servicing the airbag must strictly follow the rules of safety given below.

Servicing of these devices is to be performed by trained per-sonnel only.

A. Whenever removing or replacing a closed Airbag, always use safety goggles. For deployed airbags, remove only one module at a time wearing protective gloves and goggles.
B. Always rest the module with the opening lid and bre-aking line turned upwards. Do not lay anything on it.

When servicing is completed, thoroughly wash hands with neutral soap. If the eyes or skin have been exposed to residual pow-der, rinse immediately under running water.

Servicing of front seats of vehicles fitted with airbags is strictly forbidden unless the system is made inoperative by disconnecting the two battery cables and waiting for 10 minutes.

The metal components of an airbag that has just deployed are very hot. Avoid touching these components until they have cooled down.

A. NEVER handle the airbag module holding it from cables or the connector on the bottom.
B. Never apply electric current to the airbag, except as specified by installation and servicing procedures.
C. Airbag modules cannot be serviced. All faulty airbags should be sent back to Maserati.
D. Do not heat the Airbag module for example by welding, hammering, drilling or mechanical machining operations, etc.

- Storage of spares is allowed only with components in their original packing and their temporary storage is subjected to the same procedure as an undeployed Airbag module removed from the car, i. e. using a suitable key-locked metal cabinet (shock resistant and provided with grids to allow natural ventilation inside).

The cabinet shall be provided with suitable warning stickers (DANGER EXPLOSIVES – DO NOT USE NAKED FLAME – AC-CESS PERMITTED TO AUTHORISED PERSONNEL ONLY).

- Airbags may only be transported in the boot in special containers. Transporting airbags in the passenger compartment is forbid-den.
- If the electric system is serviced, or an anti-theft system or car radio is installed on a vehicle fitted with airbag, disconnect both terminals (+) and (-) from the battery and insulate them carefully. If the inflating devices are to be removed, in addition to discon-necting the battery, wait at least 10 minutes before starting any servicing operation.

Rules of safety for the handling seat belt assembly with electronic pretensioner

- Pretensioners are explosive charges and must therefore be handled and stored with care to prevent any damage or injury (Fig. 143).
- Under normal conditions, the pretensioner is triggered only by the electronic control during collision. A small amount of gas is developed during deployment which mainly contains non-toxic nitrogen.

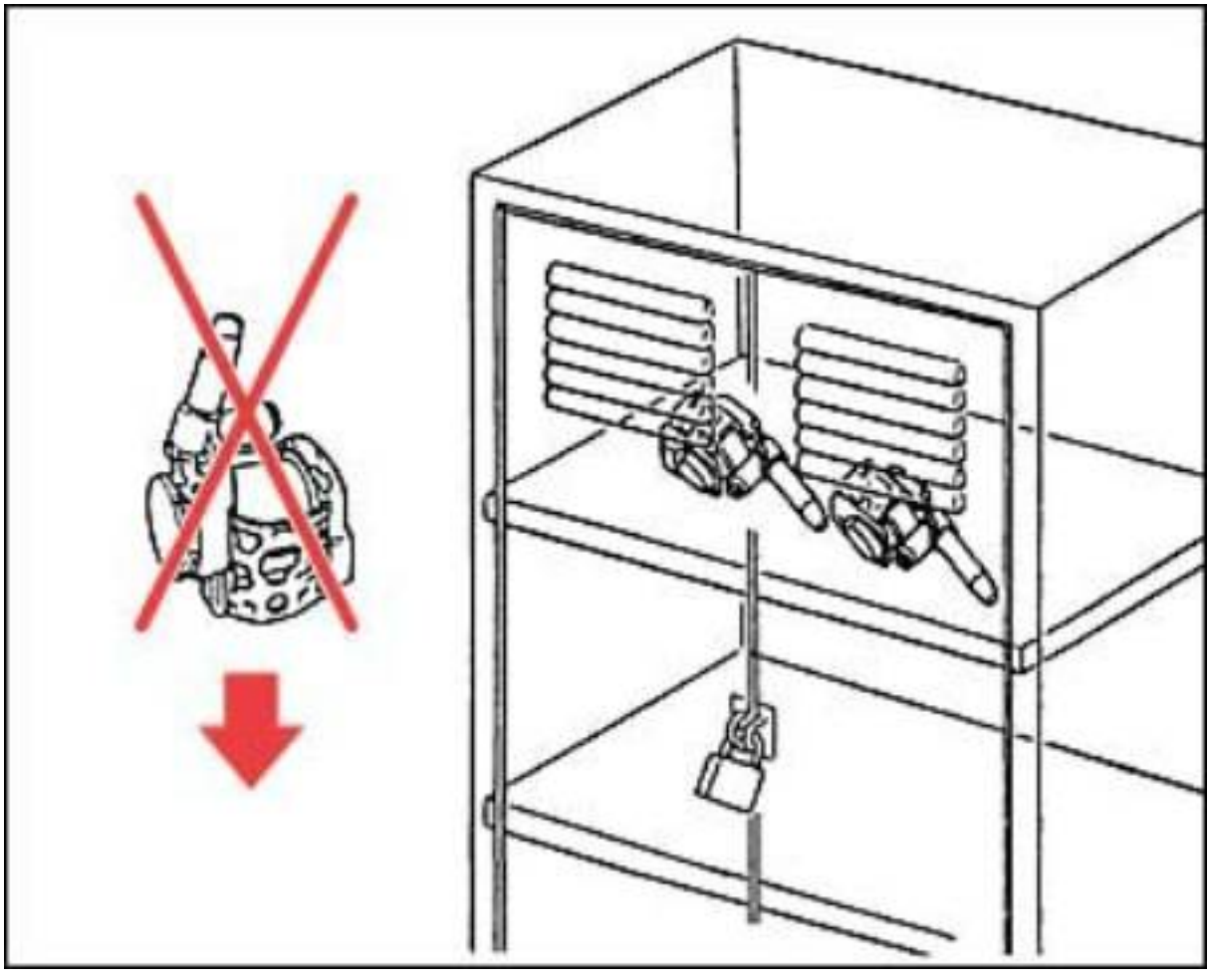
The following rules must be STRICTLY complied with for operator safety, to prevent damage to the seat belt assembly and to meet the laws in force applying to explosives (5^{th} class, group A). Before servicing the vehicle, disconnect the battery terminals and ISOLATE THEM ACCURATELY; wait 10 minutes before disconnecting the pretensioner connectors.

A. Do not hold pretensioners from the pipe.
B. Do not hold pretensioners from the belt.
C. Do not tamper or repair the pretensioner, send any faulty pretensioners back to the Manufacturer.
D. Do not hammer, drill or machine the pretensioner and do not warm it by welding.

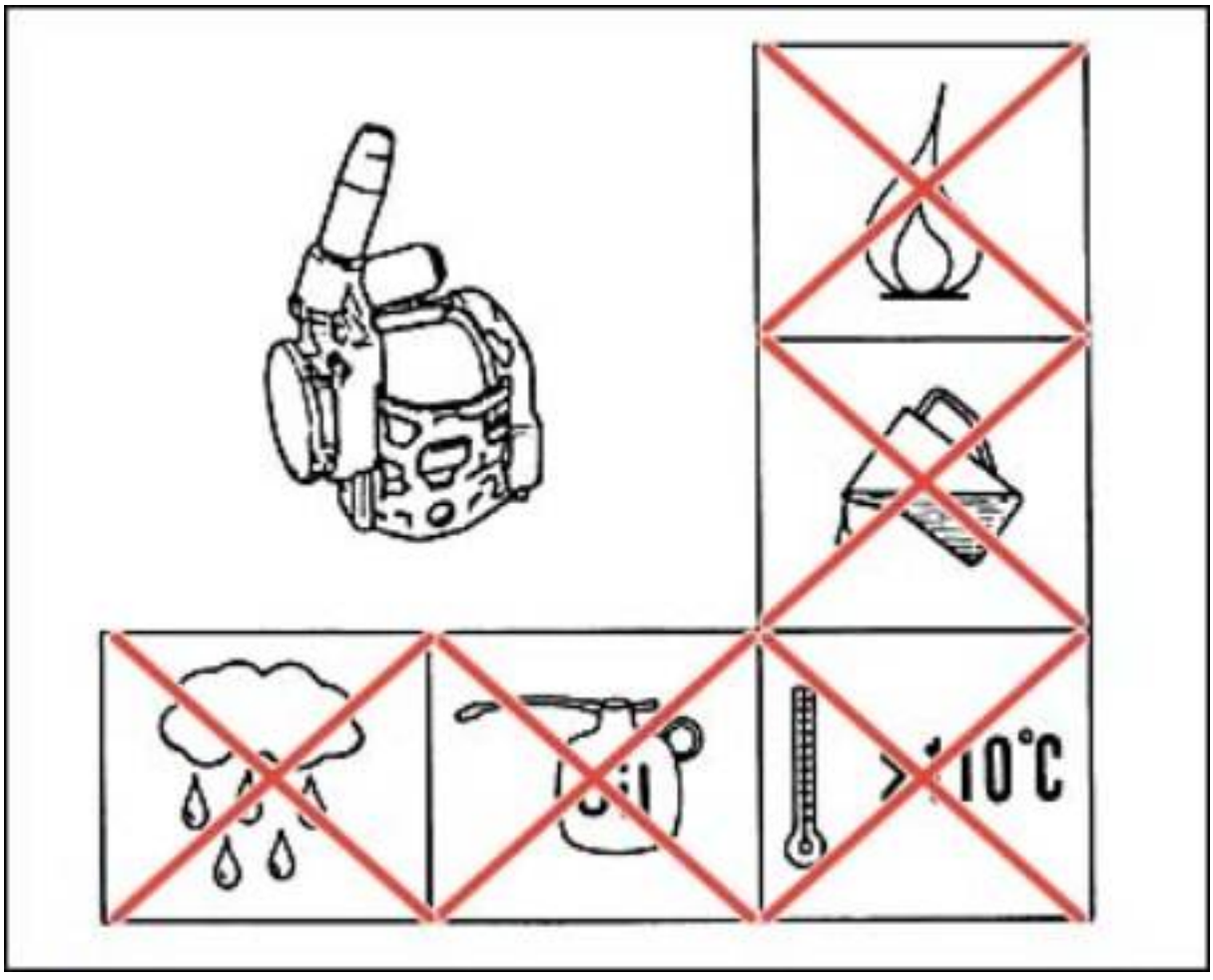
Be careful to prevent the assembly from falling and avoid any shock.

N.B.
If a pretensioner has fallen from a height exceeding 1 m, it must not be used and is to be returned to the sup-plier.

In the event of temporary removal for servicing, place them in a locked metal cabinet suitable for containing explosive charges**.**



- Do not approach the assembly with naked flames, liquids, solvents or lubricants and do not expose it to temperatures exceeding 110°C. With temperatures above 180°C the gas generator may self-ignite.
- To handle a deployed device, use protective gloves and gog-gles.
- Before handling the assembly, ALWAYS let at least 30 minutes elapse before touching it.
- Carefully wash hands with soap and water after handling the device.

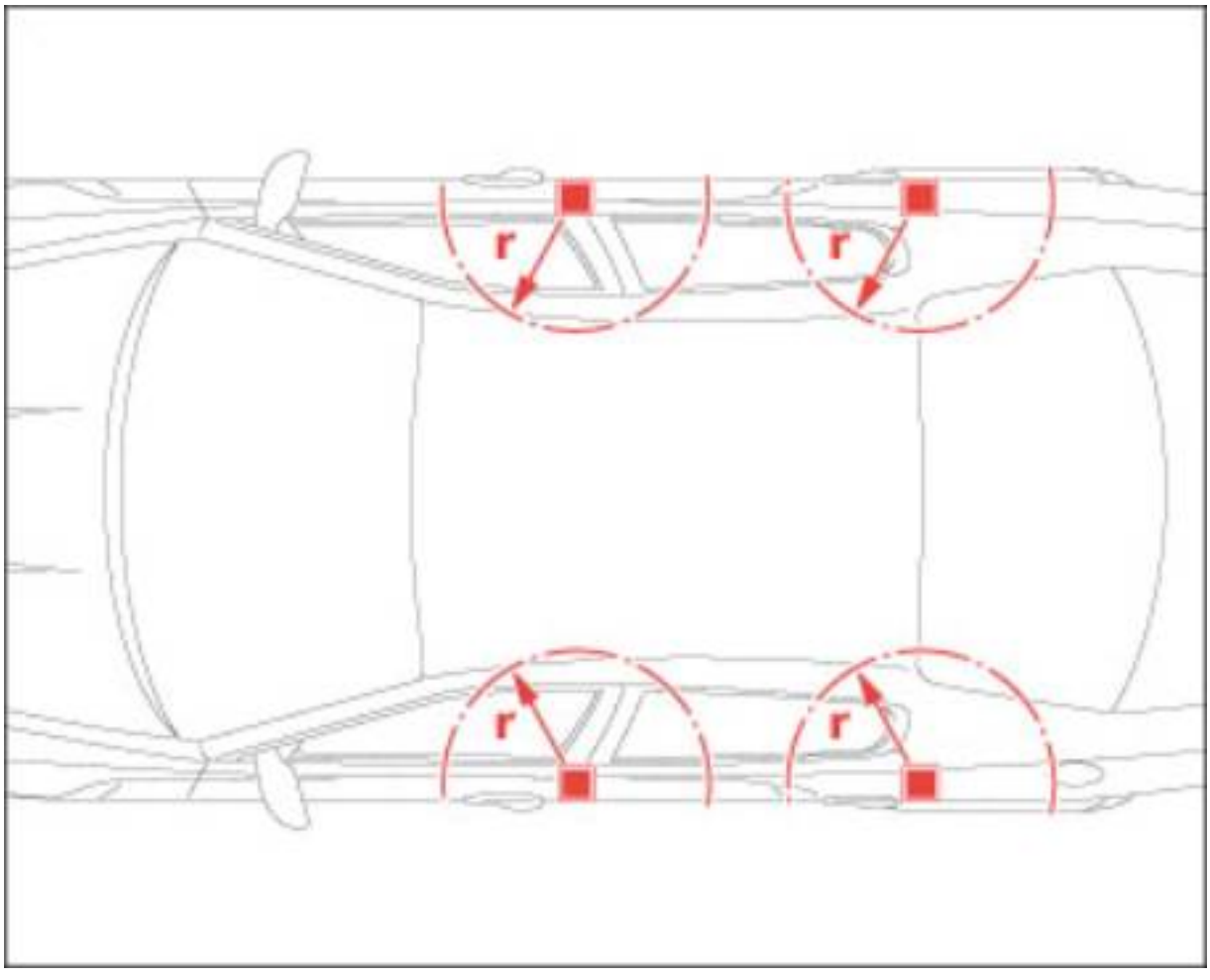


n.b.
In the event of exceptional weather conditions (floods, sea storms, etc.) if water and mud reach such a level as to affect the device components, it must be replaced.
The pretensioner does not require any servicing and must never be lubricated. Any alteration to its origi-nal conditions will invalidate its efficiency.

Work on the body

Do not expose the area surrounding the pretensioner (60 – 70 cm radius) to heavy shocks (e.g. hammering); if necessary, remove the complete pretensioner assembly.

- If repairs are carried out on different areas than those men-tioned above, just disconnect the battery terminals and wait for about 10 minutes.
- For painting operations, use radiant lamps in the area sur-rounding the pretensioner; remove the pretensioner/re-tractor assembly in the case of welding or brazing.



Transport with road vehicles must be in the boot only.
Transport in the passenger compartment is forbidden.
The pretensioner that did not deploy during collision is to be considered as still “active” All pretensioners (complete device) still “active”, faulty or with warranty terms expired or for which other causes require their replacement, must be sent to the Centre concerned following the same procedure as described previously for airbag modules.

Ordering procedure

Follow the same procedure described for airbag modules.

N.B.
The TRW safety system with additional restraining device have been specifically designed for a certain type of vehicle, therefore they cannot be adapted, re-used or installed on other cars except those for which they have been designed and manufactured.

Any attempt to re-use, adapt or install a pretensioner on a different type of vehicle might result in serious injury to passengers and damage to the vehicle in the event of a crash.

Air bag system operation summary

1. **Rear collision**

In the case of collision only from the rear, the airbag is not operated as the vehicle occupants are pushed backwards and not for-wards towards the steering wheel. Conversely if the vehicle is pushed from behind against any obstacle, the airbag can deploy only if the second collision is sufficiently violent.

2. **Side collision**

The airbag is not operated in the case of a side collision. If the vehicle was travelling forwards, the deceleration rate might cause airbag deployment. However, the system has been designed to be deployed in the case of front collision, within a deviation angle of +30° to the direction of travel.

3. **The Airbag does not deploy unless a collision occurs**

Heavy and stringent tests, very often producing heavy damage to the suspensions and body as a consequence of the stress trans-mitted from uneven or bumpy roads do not result in airbag deployment. Therefore, the airbag is not deployed during braking, on narrow bends or on uneven and bumpy roads.

4. **Persons wearing glasses**

In the event of deployment, the airbag impact is designed to be directed towards the head and chest of passengers, therefore part of the impact could reach the glasses worn by the passenger. However any possible injury will be consistently less critical than injuries resulting from impact of the head and chest against the steering wheel or windscreen. For further protection, the Airbag is suitably shaped and hinged along the break line and it is tightly retrained to prevent fragments or other materials causing injury to persons.

5. **Airbag without belt fastened (with or without pretensioners)**

The airbag is an additional restraint device designed to operate in conjunction with safety belts. Therefore, max. efficiency of the system is achieved with the safety belt fastened. In the case of head-on collision, the passenger’s head and chest are protected against the steering wheel, dashboard and windscreen; if the seat belts are not fastened, serious injuries might result to the knees, legs and wrists.

6. **After deployment the airbag is hot**

The cushion itself is not hot, while the components inside the module remain hot for a short time. These components are accessible and can, therefore, cause burns.

7. **Fire on a vehicle fitted with Airbag**

The airbag is designed to deploy automatically if, in case of fire, vehicle temperature exceeds 150°C. Under this condition the airbag might deploy without exploding or breaking the gas container (or sodium azide). All the most effective means may be used to extinguish, water included.

8. **Crashed car and airbag not deployed**

If the airbag did not deploy during the crash, it can no longer explode as the sensors that send the signals to the control unit are designed to respond only in the case of the heavy stresses developed during a crash, therefore it is impossible or highly unlikely that these signals can be sent with the vehicle stationary. To deactivate the airbag, disconnect the battery cables and wait approx. 10 minutes to cut out the backup

source and before servicing the system.

9. Airbag and noise produced

The noise produced when an airbag deploys is relatively loud, however it is considerably lower than the noise produced by the

DRIVER'S SIDE AIRBAG MODULE

Removing the driver's airbag module

- Disconnect the battery's negative terminal.

CAUTION
Follow the instructions and the relative safety regulations for removal and storage of the airbag modules.

Safety regulations for the airbag modules

Undo the screws fastening the lower steering column covering to the upper steering column covering.

- Open the retaining tongues, then remove the lower section of the steering column covering.

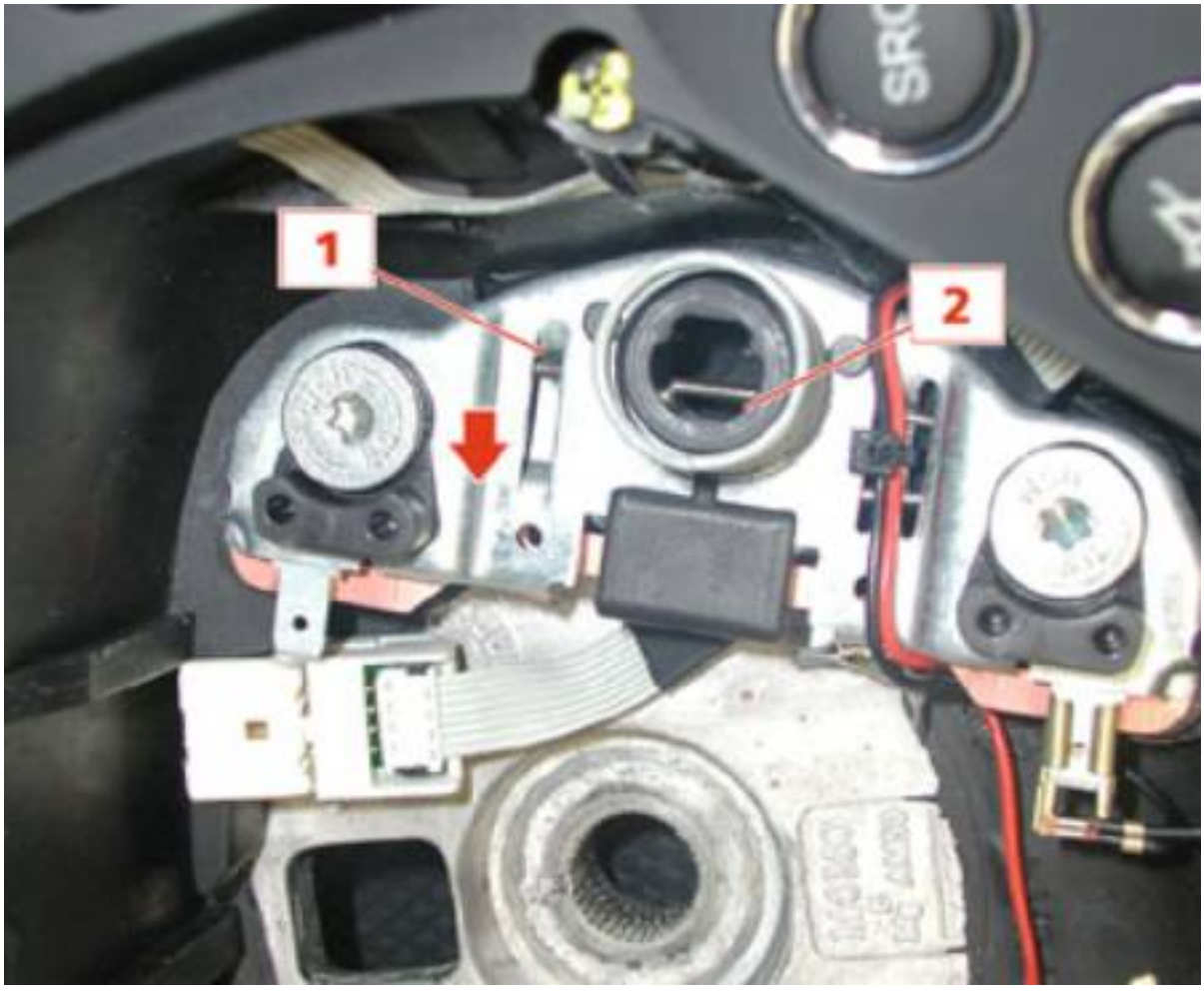
CAUTION
Take care not to damage or break the retaining clamps.

- Position the specific tool **900027310** into the holes **(1)** found on the rear side of the steering wheel.


900027310

- The tool will exert its action on the two clips (one per side) fastening the Airbag module's pins, therefore using the tip of the tool, press the clips towards the central area of the steering wheel, until both pins on the Airbag module are released.

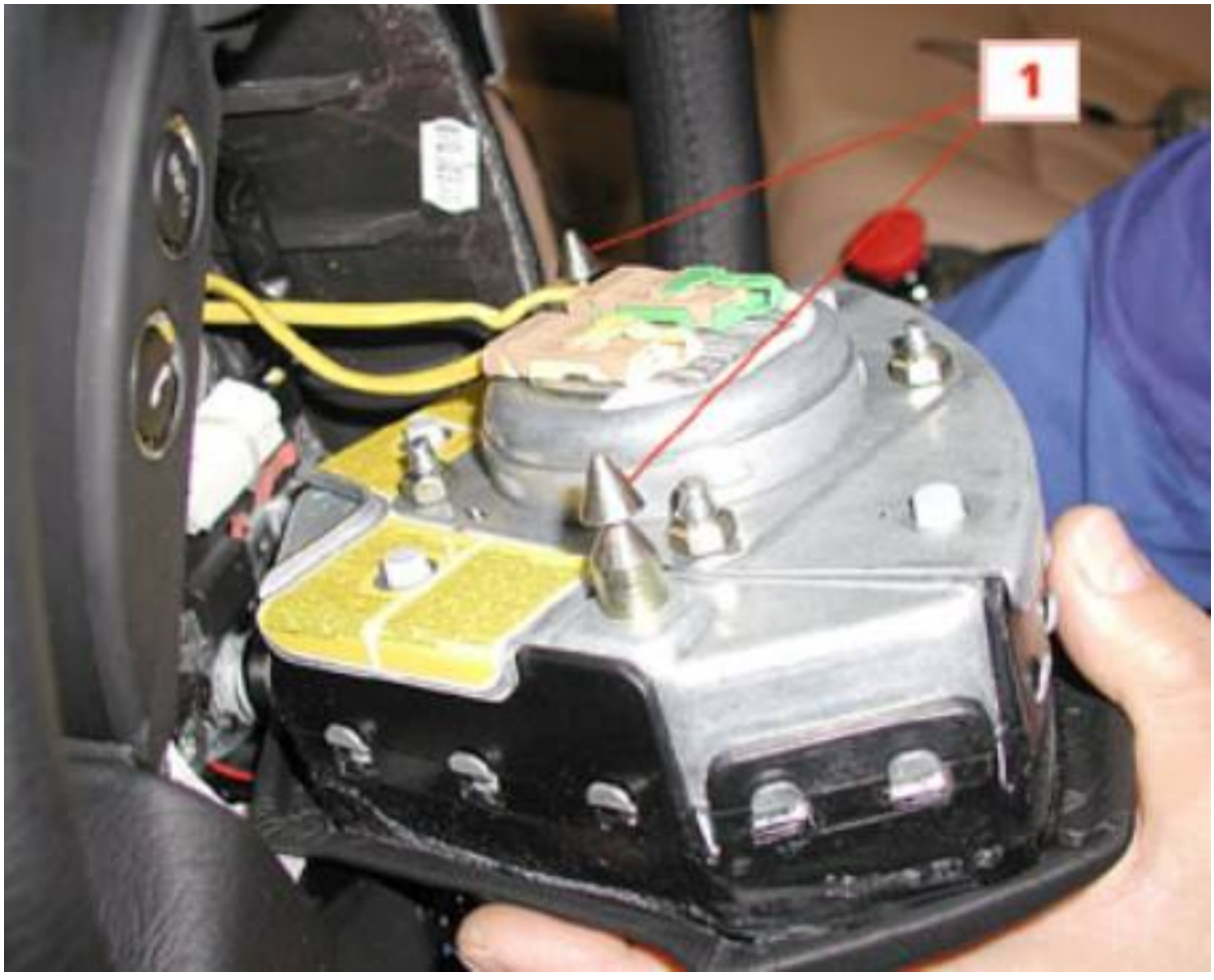
- The tip of the tool works in the clip's area **(1)**. By pressing it downwards (see arrow), you will also lower the central area automatically **(2)**, so allowing the Airbag fastening pin to be released. Follow the same procedure for the other fastening clip.



- Remove the airbag module from its seat on the steering wheel and detach the electrical connections.
- Remove the airbag module and handle it with care, respecting the safety regulations.

Refitting the driver's airbag module

- Attach the electric connections and fit the Airbag module into its seat on the steering wheel, by inserting the fastening pins **(1)** into the two reference holes **(2)** and verifying that the clips have properly locked in place (See figure 2).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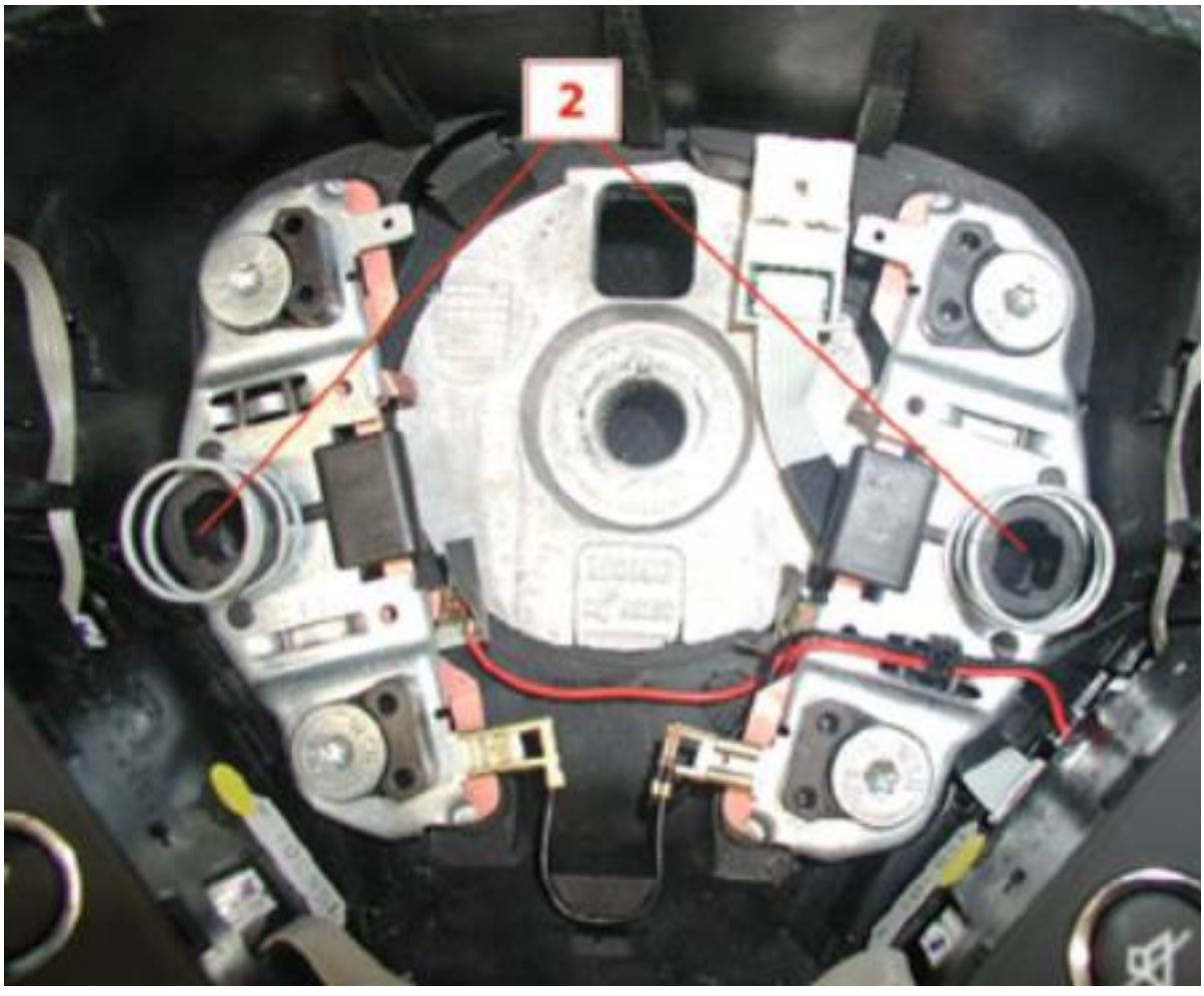


- Fit the lower section of the steering column covering panel, taking care not to damage the plastic retaining fins.

- Screw up the screws fastening the lower section of the steering column covering panel to the upper section of the steering column covering panel.

When refitting, follow the above procedures in reverse order

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

PASSENGER AIRBAG Module

Removing-refitting the passenger airbag module

- Disconnect the battery's negative terminal.

- Remove the passenger side glove compartment

Removing-refitting the passenger side glove compartment

CAUTION
Follow the instructions and respective safety regulations for removal and storage of the airbag modules.

Safety regulations to follow when working on vehicles equipped with the airbag system

- Detach the electrical connection, undo the two fastening screws and remove the passenger airbag module.
- Retrieve any shims located under the airbag module.

When refitting, follow the above procedures in reverse order

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:

- Refer to the section:

Component self-learning in the event of battery disconnection

SIDE AIRBAG

Removing - refitting the side airbag

- Remove the front seat concerned from the vehicle.

Front seats

- Remove the guards from the front seat.

Front seat guards

- Remove the upholstery from the seatback on the front seat

Seatback upholstery (front seat)

- Undo the nut fastening the side Airbag.

- Detach the electrical connection, undo the fastening nut and remove the side airbag module from the chassis.

When refitting, follow the above procedures in reverse order

AIRBAG ECU (NAB)

Removing – refitting the Airbag ECU

- Remove the central console.

Removing-refitting the central console

- Undo the fastening screws and remove the side guard.

- Undo the fastening nuts, detach the electrical connections and remove the Airbag Node (NAB).

When refitting, follow the above procedures in reverse order

- If you need to replace the Airbag node, you must perform the initialisation procedure.
- To perform the initialisation procedure, you must detach the electrical connectors of the driver's airbag, passenger's airbag and of the sidebag, which are found underneath the front seats. You must then detach the headbag connectors, that are found underneath the rear pillar trim panel.

CAUTION
Follow the instructions and the relative safety regulations for removal and storage of the airbag modules.

Safety regulations for the airbag modules

Undo the screws fastening the lower steering column covering to the upper steering column covering.

- Open the retaining tongues, then remove the lower section of the steering column covering.

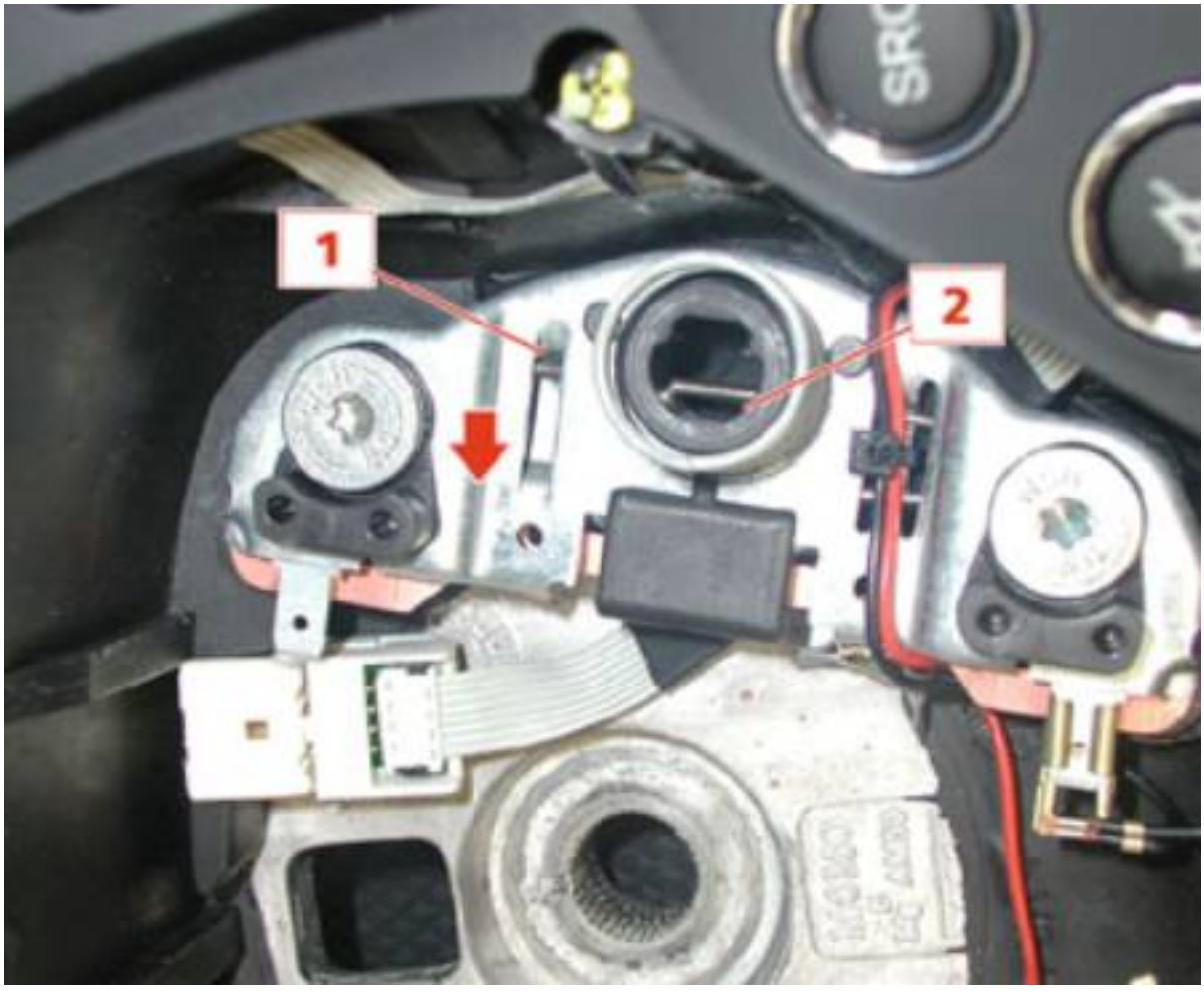
CAUTION
Take care not to damage or break the retaining clamps.

- Position the specific tool **900027310** into the holes **(1)** found on the rear side of the steering wheel.


900027310

- The tool will exert its action on the two clips (one per side) fastening the Airbag module's pins, therefore using the tip of the tool, press the clips towards the central area of the steering wheel, until both pins on the Airbag module are released.

- The tip of the tool works in the clip's area **(1)**. By pressing it downwards (see arrow), you will also lower the central area automatically **(2)**, so allowing the Airbag fastening pin to be released. Follow the same procedure for the other fastening clip.



- Remove the airbag module from its seat on the steering wheel and detach the electrical connections.

IMPORTANT
Take special care not to damage the trim panels at the removal stage.

- Disengage the snap-fitted fixing plate.

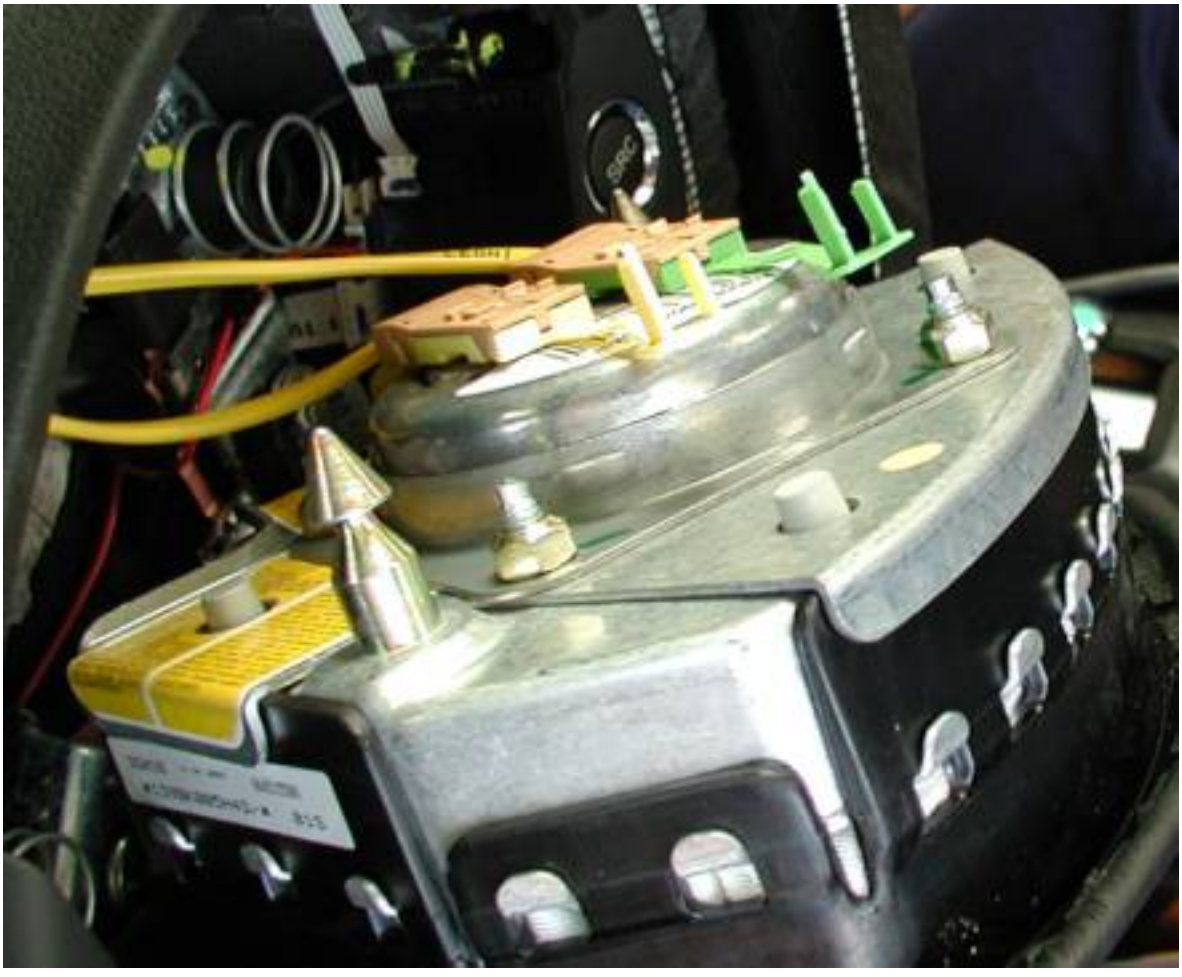
- Undo the fastening screw, then remove the upper part of the rear pillar covering panel from its seat.

- Undo the fastening screw and remove the rear pillar covering panel.

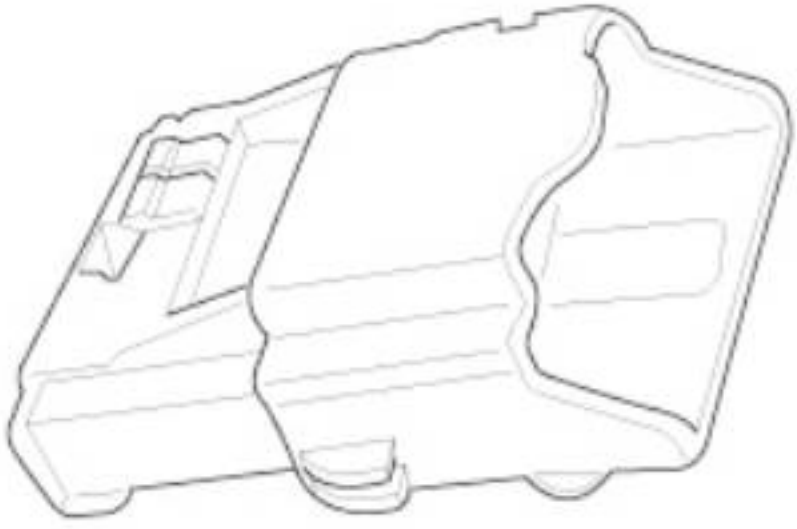
- Move the lower guard and detach the passenger's airbag connector.

- Move the seats backwards and detach the two sidebag's electrical connectors.

- Connect the SD3 diagnostics tester to the NBC diagnostic socket.
- Enter the "CYCLE ENVIRONMENT"
- Select the configuration cycle for the airbag node and proceed.
- After entering the vehicle's data, select "CONTINUE" and turn the key to ON.
- Wait for the checks to be completed and then follow the guided procedure, by means of which the tester will check the information available in the ECU.
- Continue with the cycle until the tester prompts you to connect the driver's airbag connectors, but without fitting the two secondary locks (safety devices for the connectors).
- Connect the two secondary locks, first connecting the yellow one and then the green one.



- The following screen page will then appear "**ATTACH THE CONNECTOR THAT KEEPS LINE 1 OF THE PASSENGER'S AIRBAG SHORT-CIRCUITED**". The part number of the fake connector is **900027450**. This can be ordered from Maserati's Spare Parts Department.



- Connect the fake connector **900027450**.

- Wait until the following screen pages prompt you to remove the fake connector **900027450** and to attach passenger's airbag connector.
- Attach the passenger's airbag connector.
- Wait until the following screen pages prompt you to attach the LH and RH headbag connectors.
- Subsequently the screen page prompting you to attach the sidebag connectors will be displayed.
- Connect the sidebag connectors.
- The diagnostic tester will then perform a check of the switches for the front and rear seat belts.
- Buckle the seat belts in the following order:
  - Front seat, driver's side
  - Rear left-hand seat
  - Central seat
  - Rear seat, passenger's side
  - Front seat, passenger's side

- The buckled seat belts are displayed in red.

- The diagnostic tester then prompts the user if the passenger airbag manual deactivation device is fitted.
- For USA – CDN versions, reply "NO" and continue with the cycle.
- For EU versions reply "YES" and continue with the cycle.
- For EU versions, perform the requested operations to check that the manual airbag deactivation device is properly functioning.
- The diagnostic tester will then prompt you to check that the airbag warning light on the instrument panel is off.
- When the cycle progress log is displayed, print the document.
- Keep the printed document in a safe place.
- Refit all the components previously removed to access the airbag system connectors.

Pre-tensioner and FRONT seat belts

Removing the pre-tensioner and the front seat belts

CAUTION
When removing the pre-tensioner, always follow the instructions and the relative safety regulations.

Safety regulations for the airbag modules

CAUTION
After disconnecting the battery, wait at least 1 minute before working on the pre-tensioners.

- Disconnect the battery's negative terminal.

- Remove the complete central pillar covering panel.

Removing-refitting the pillar covering panel

- Unscrew the two nuts fastening the air inlet duct.

- Unscrew the nut fastening the seat belt to the seat belt’s height adjustment device.

- Remove the fastening clip and slide the pin out of its seat.

- Move the air inlet duct slightly to allow access to the screw, then unscrew the lower fastening screw on the seat belt.

- Detach the pre-tensioner’s electrical connection, then remove the seat belt and pre-tensioner set.

Refitting the pre-tensioner and seat belts

- Attach the pre-tensioner’s electrical connection.

- Position the pre-tensioner and seat belt in the seat on the pillar.
- Tighten the screw fastening the pre-tensioner to the pillar to a torque of 40 Nm

- Tighten the nut fastening the seat belt to the seat belt’s height adjustment device to a torque of 40 Nm

N.B.
Check the fastening clip is intact; if the clip is damaged or warped, replace it with a new one

- Place the seat belt against the pillar, fit the pin in its seat and, using the fastening clip, restrain the seat belt retaining clip.

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

SPIRAL CONTACT for airbag module

Removing- refitting the airbag module spiral contact

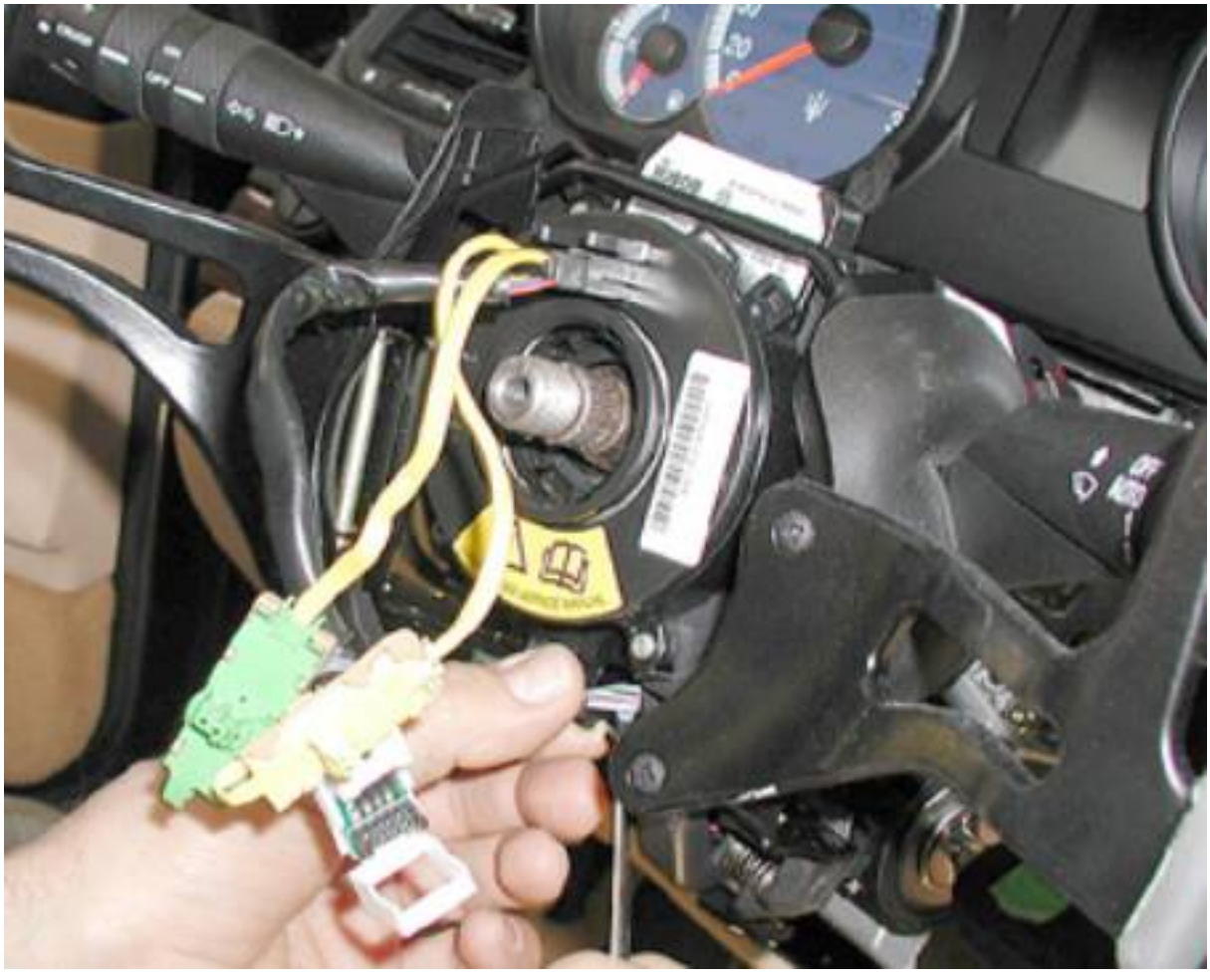
- Remove the airbag module on the driver's side.

Removing-refitting the driver's side airbag module

- Remove the steering wheel.

Removing-refitting the steering wheel

- Unscrew the three fastening screws and remove the spiral contact from the seat on the steering column.



When refitting, follow the above procedures in reverse order

Side impact sensor

Removing-refitting the side impact sensor

- Disconnect the battery's negative terminal.

- Move the seat as far forwards as possible, free the rear door bay strip partially and remove the lower section of the snap-fit central pillar covering panel.

N.B.
Check the five retaining pins on the pillar covering panel are intact and replace any damaged ones using the specific tool

- Unscrew the fastening screw and detach the electrical connection, then remove the side impact sensor.

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Front seat belt height adjustment device

Removing the front seat belt height adjustment device

- Disconnect the battery's negative terminal..
- Remove the complete central pillar covering panel.

Removing-refitting the pillar covering panel

- Unscrew the nut fastening the seat belt to the seat belt’s height adjustment device.

- Undo the two fastening screws and remove the front seat belt height adjustment device.

Refitting the front seat belt height adjustment device

- Fit the front seat belt height adjustment device and tighten the two fastening screws to a torque of **20 Nm**

- Tighten the nut fastening the seat belt to its height adjustment device to a torque of **40 Nm**

- Fit the complete central pillar covering panel.

Removing-refitting the pillar covering panel

- Connect the battery's negative terminal.
- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Windowbag side module

Removing-refitting the Windowbag side module

- Disconnect the battery's negative terminal.

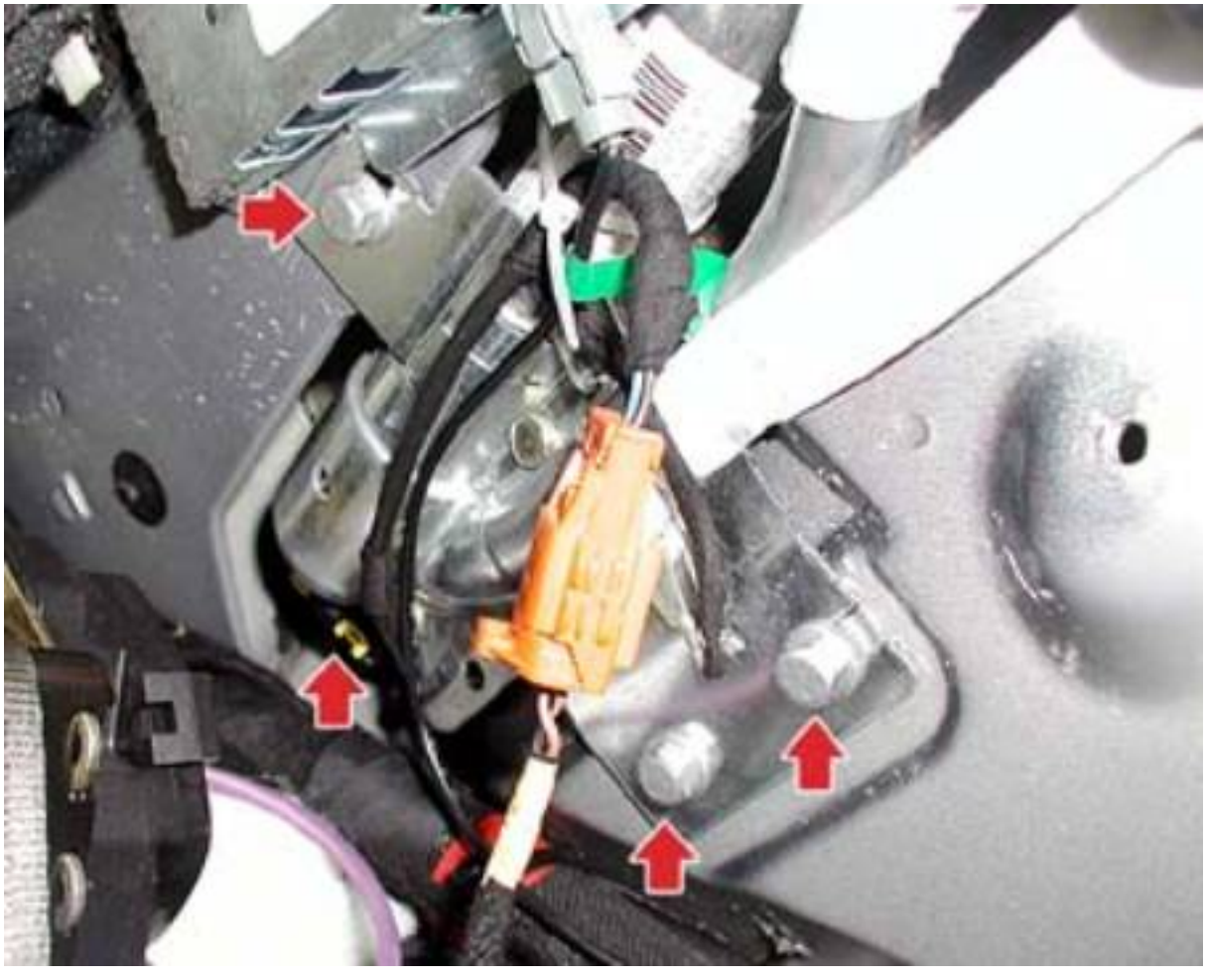
CAUTION
Follow the instructions and respective safety regulations for removal and storage of the airbag modules.

Safety regulations for the airbag modules

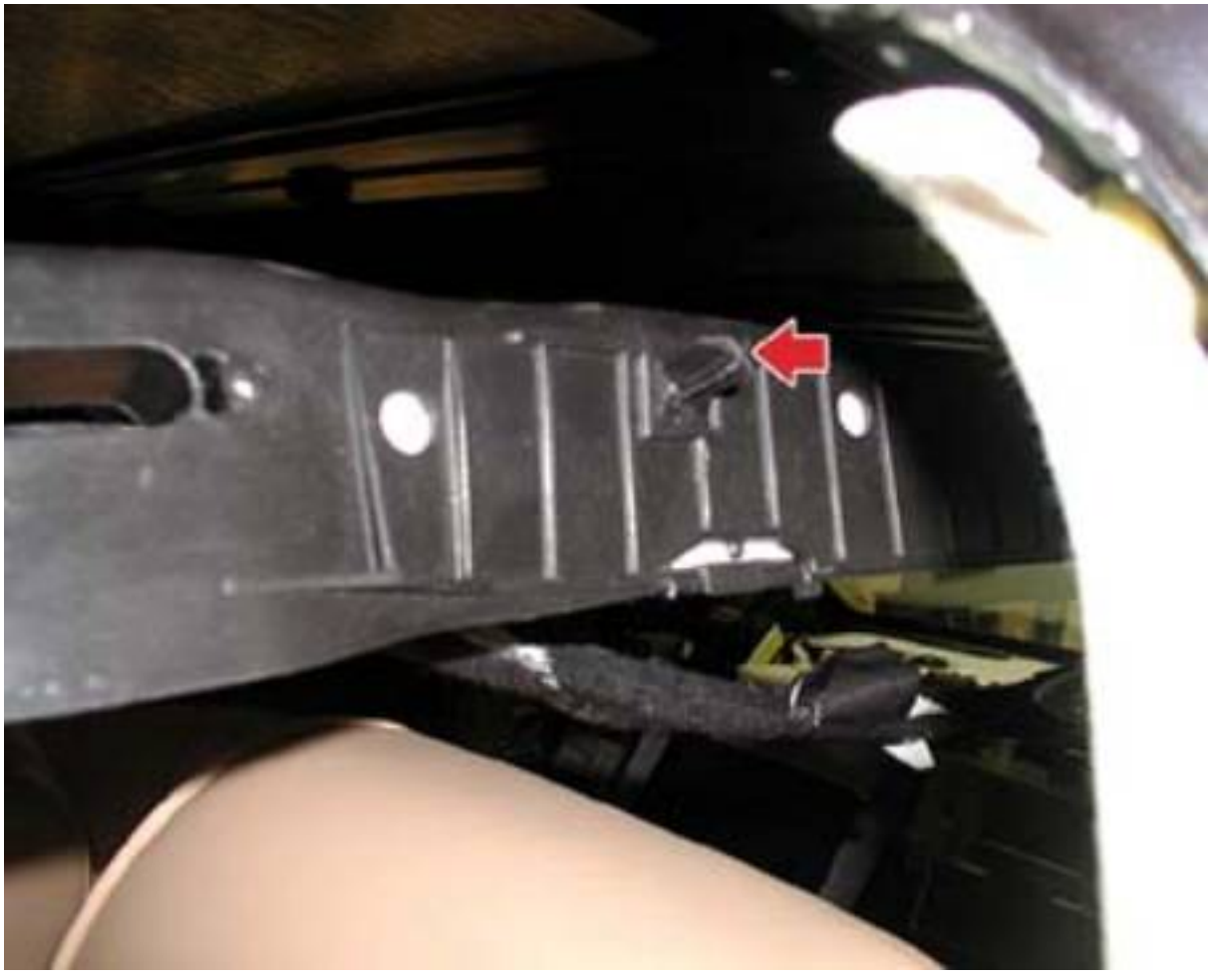
- Remove the roof trim panel.

Removing-refitting the roof trim panels

- Undo the fastening screws and detach the electrical connection.



- Working with care, lever the pin fastening the Windowbag to the bodywork out of its seat.



- Remove the Windowbag.
- Replace the airbag module in the relative cabinet, resting it on a clear surface with the bag facing upwards.

When refitting, follow the above procedures in reverse order

- Handle the Airbag module with extreme care.
- If you are fitting a new Airbag module, arrange the relative labels accordingly.
- After connecting the negative battery terminal, the following self-learning operations must be carried out to ensure certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

REAR pretensioner and seatbelts

Removing the rear pretensioner and seatbelts

CAUTION
When removing the pretensioner, always follow the instructions and the relative safety regulations.

Safety regulations for the airbag modules

CAUTION
After disconnecting the battery, wait at least 1 minute before working on the pretensioners.

- Disconnect the battery's negative terminal
- Remove the rear seats

Removing-refitting the rear seats

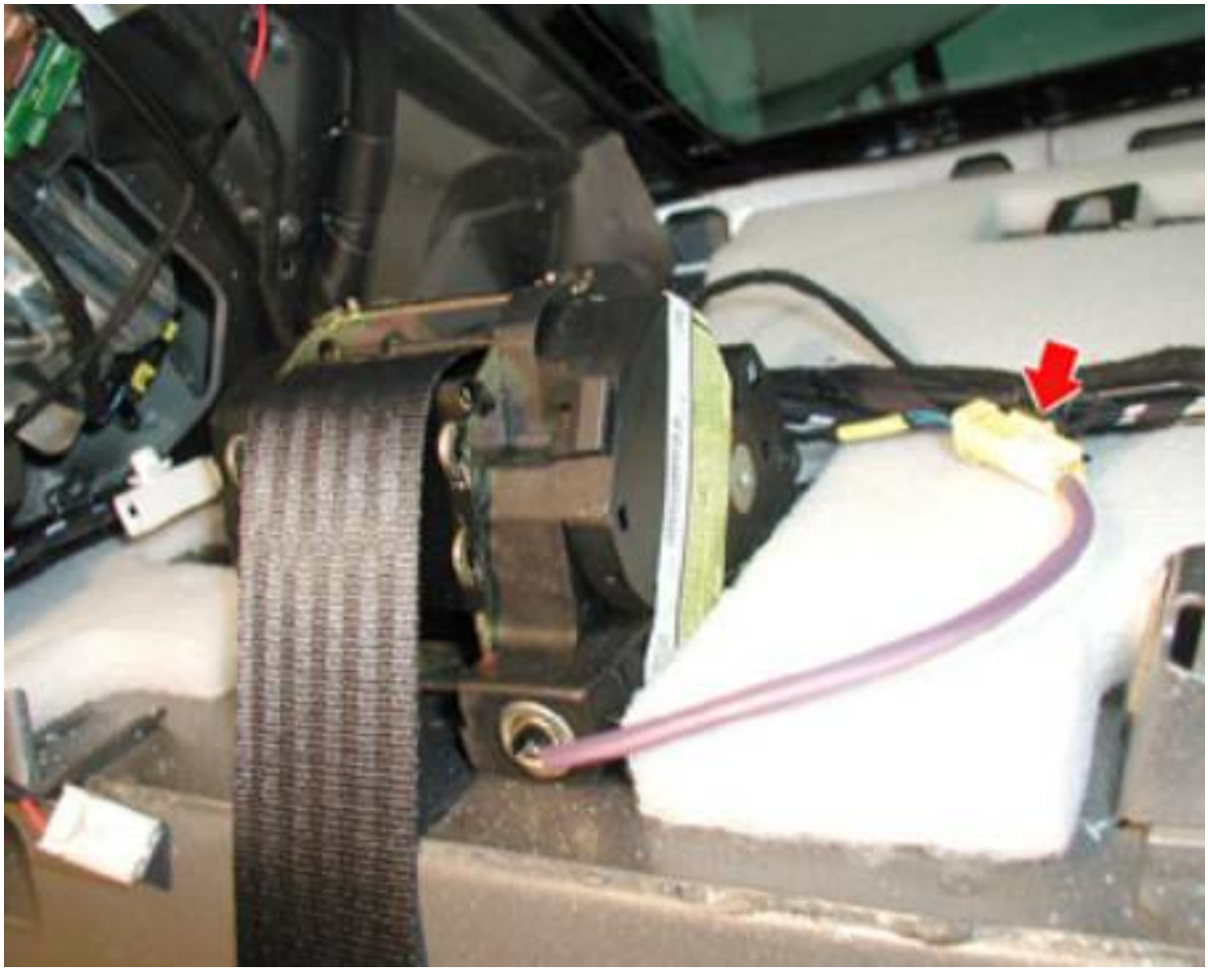
- Remove the upper part of the rear pillar covering panels

Removing-refitting the rear pillar covering panel

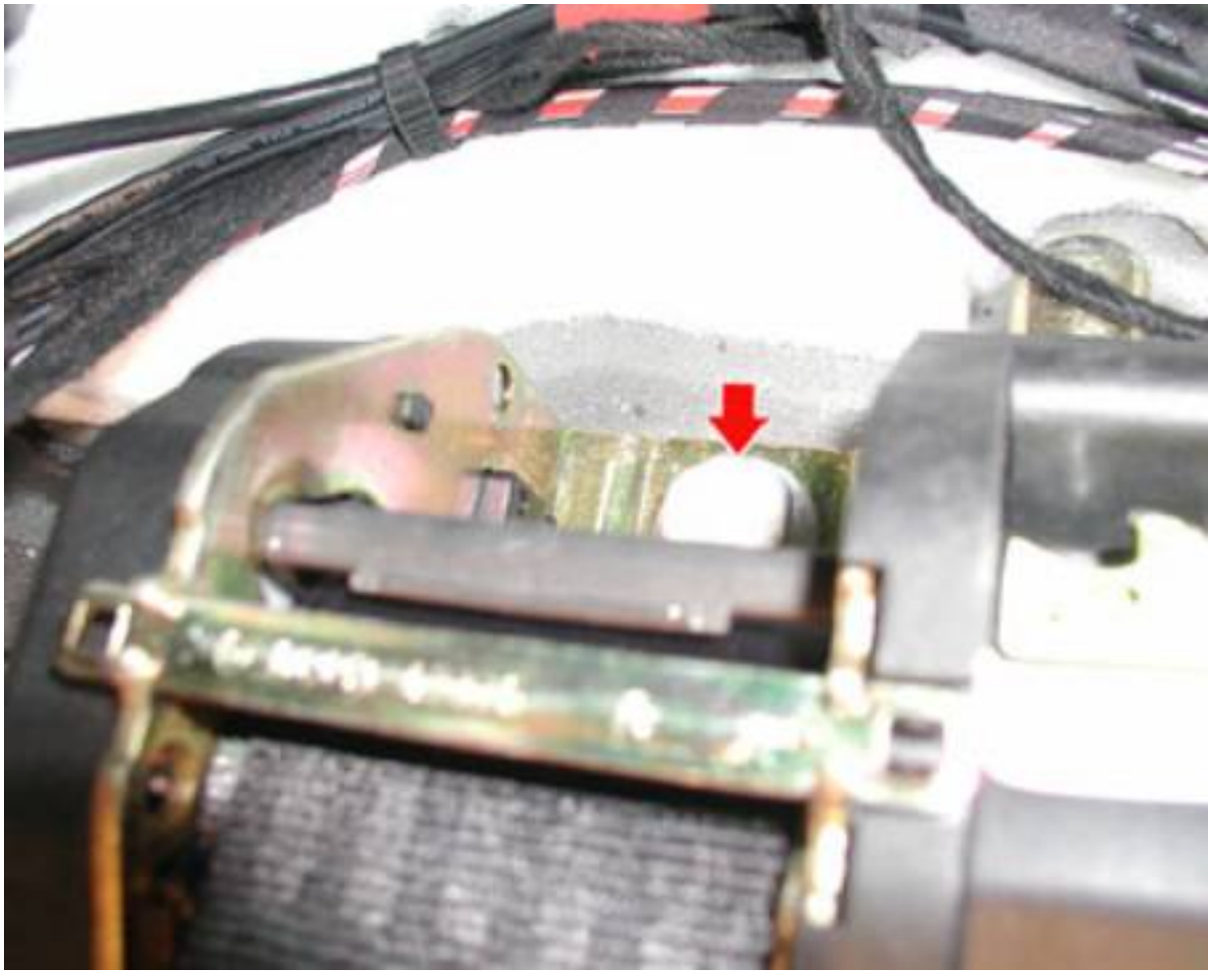
- Remove the complete central pillar covering panel

Removing-refitting the rear shelf

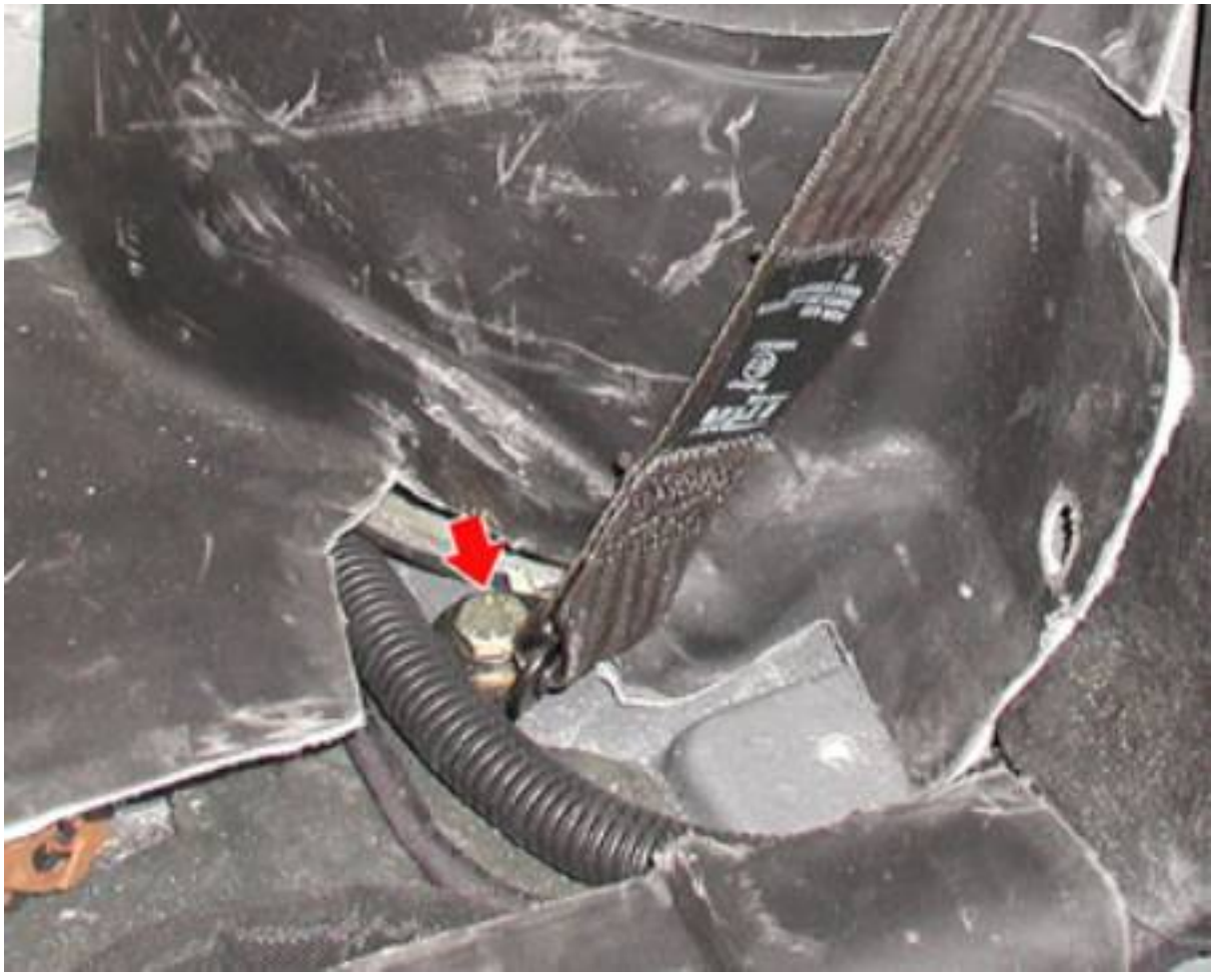
- Detach the electrical connection on the rear right-hand pretensioner (proceed in the same way for the left-hand pretensioner).



- Undo the screw fastening the pretensioner to the bodywork (proceed in the same way for the left-hand pretensioner).



- Undo the screw fastening the rear seatbelt to the floor, then remove the rear seatbelt and pretensioner assembly (proceed in the same way for the left-hand pretensioner).



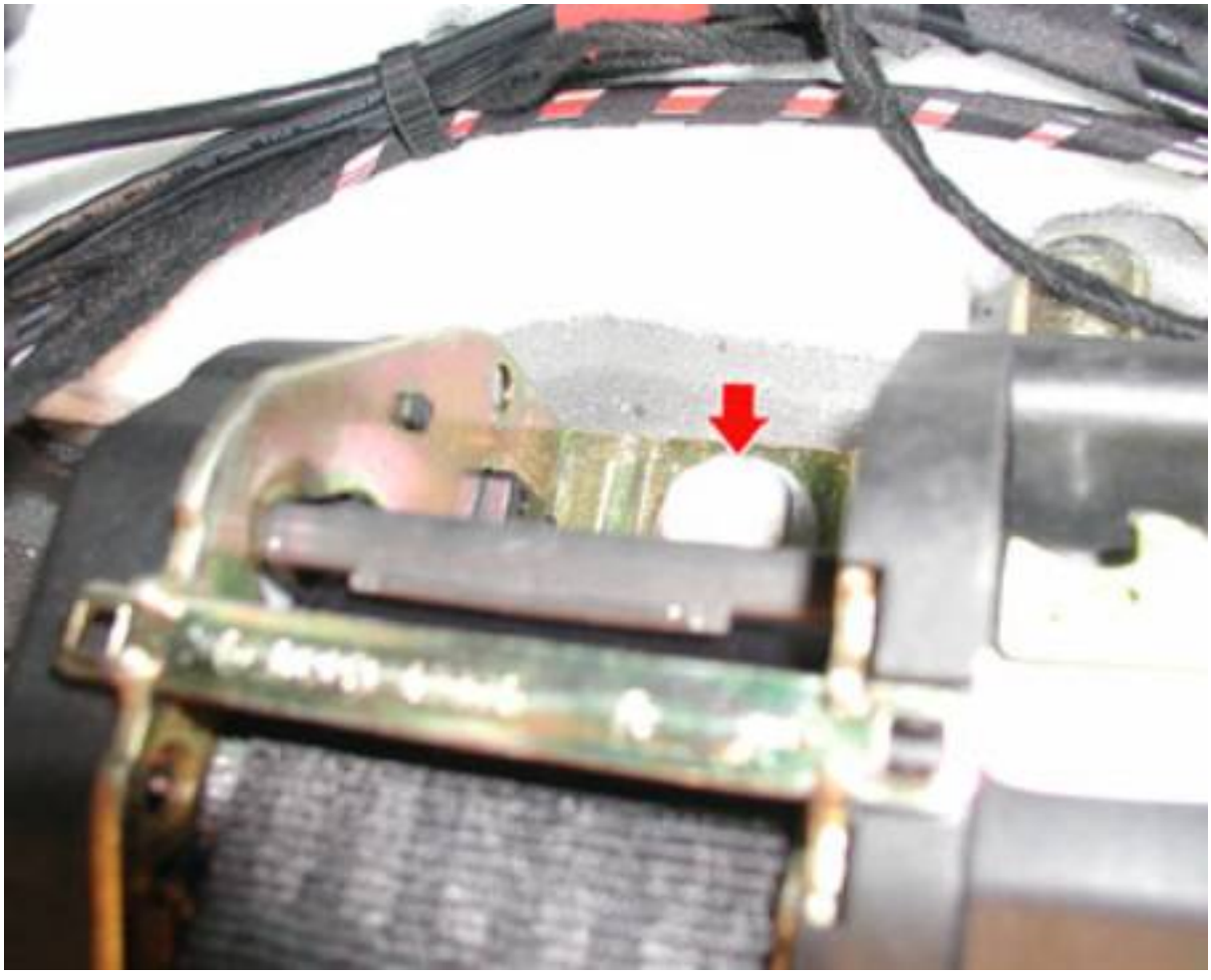
N.B.
The procedure outlined above is also applicable to the central seatbelt with the only exception that the central seatbelt is not fitted with a pretensioner, only a winder, therefore there is no electric connection.

- Undo the fastening screw and remove the hooking section of the rear seatbelts.

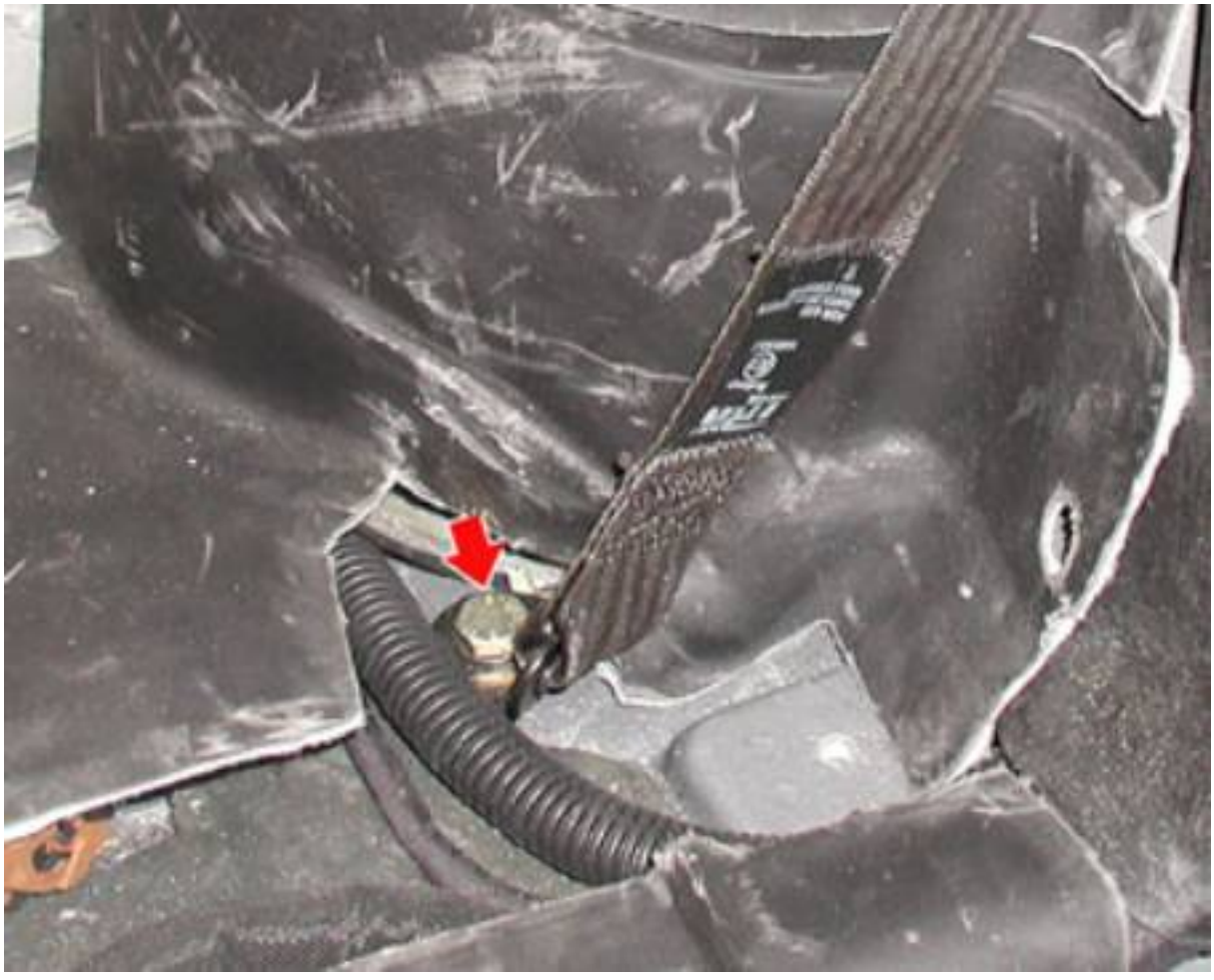
Refitting the rear pretensioner and seatbelts

- Tighten the fastening screw on the hooking section of the rear seatbelts to a torque of **40 Nm**.

- Tighten the screw fastening the winder or the pretensioner on the rear seatbelts to the bodywork to a torque of **40 Nm**.



- Tighten the lower screw fastening the seatbelts to the floor to a torque of **40Nm**.



- Attach the electrical connection on the rear right- and left-hand pretensioners.

- Fit the complete central pillar covering panel.

Disconnecting-reconnecting the rear parcel shelf

- Remove the upper section of the rear pillar covering panels

Removing-refitting the rear pillar covering panel

- Fit the rear seats

Removing-refitting the rear seats

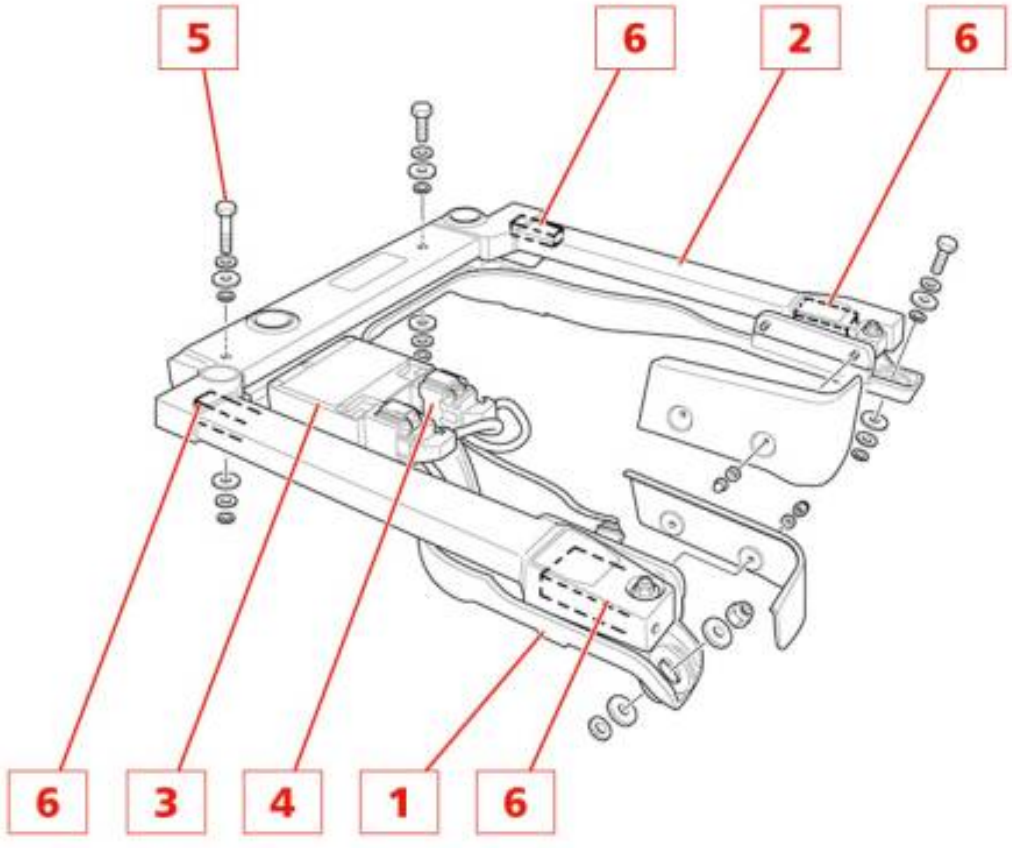
- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

WEIGHT SENSORS (USA version)

In order to meet the requirements of the laws in force in the United States, a device has been developed for the Quattroporte to detect when a seat is occupied. This device has been designed to deactivate the front passenger airbag in certain conditions.
If the passenger seat is not occupied or if a child seat is detected, the front passenger airbag is deactivated by the airbag ECU.
The airbag deactivation is signaled by a warning light on the instrument panel.
The weight sensor assembly is installed under the passenger seat runners and is secured directly to the vehicle bodywork.
This device is connected to the airbag system by means of an ECU which directly communicates with the airbag ECU.
The weight sensor assembly is made up as follows:

- Lower frame in aluminium
- Weight sensors
- Upper frame in steel
- Electronic control unit



1. Lower frame in aluminium
2. Upper frame in steel
3. Electronic control unit
4. Sensor connection wiring
5. Weight sensor retaining screws and washers
6. Weight sensors

The ECU processes the signals received from the weight sensors (pressure). Based on the pressure values received, the ECU is capable of detecting the total weight on the passenger seat.
If the weight is less than or equal to 25 kg, the ECU detects that a child seat may be fitted on the passenger seat, and the front airbag is therefore deactivated.
If the weight is between 25 kg and 40 kg, the ECU, based on the pressure read by the weight sensors and the type of impact detected by the pre-contact sensors, decides whether or not to activate the front passenger airbag.
If the weight is more than 40 kg, the ECU detects the presence of an adult and activates the front passenger airbag.
The weight sensors continuously communicate the pressure status detected to the relative ECU, so helping ensure immediate adjustment of the airbag status depending on the weight variation.
The layout of the components in the weight sensor assembly must **NEVER** be modified.
MASERATI **does not** authorize replacement of the components installed as individual parts.
In the event of a faulty component, all the components need to be replaced together.
The weight sensors are safety components and should therefore be treated as such. Carefully read the warnings listed in the specific chapter.

Removing the weight sensors

- Remove the front seat on the passenger side.

Removing-refitting the front seats

- Disconnect the battery's negative terminal
- Undo the three fastening screws on the tunnel side panel, then remove the trim panel **1** as well.

- Remove the snap-fitted trim panel on the door side.

01

- Lift the passenger compartment mat slightly.

- Lift the guard partially.

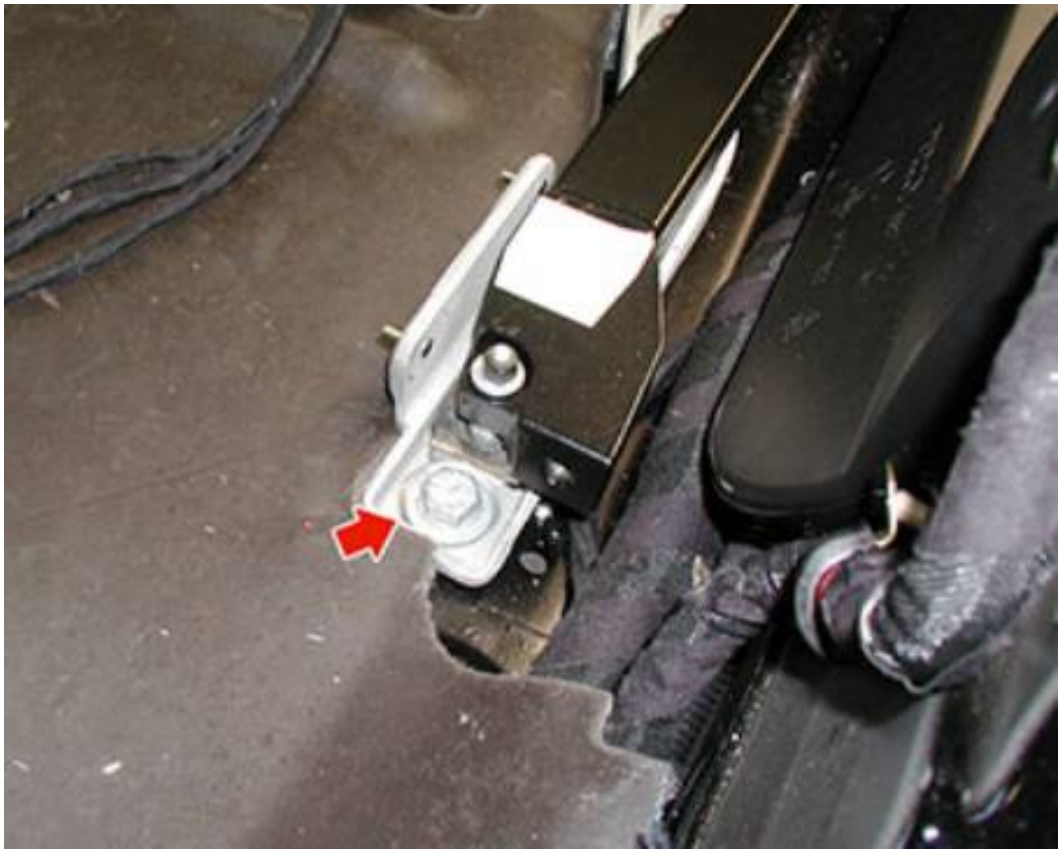
- Remove the passenger-side mat from the passenger compartment in order to access the screws that fasten the weight sensor frame.

- Undo the front retaining screws and retrieve the two screws and all the washers, taking care to mark their position so that they can be refitted in the same place.

- Unscrew the rear fastening nut and retrieve the nut and all the washers, taking care to mark their position so that they can be refitted in the same place.

- Undo the rear retaining screw and retrieve the screw and all the washers, taking care to mark their position so that

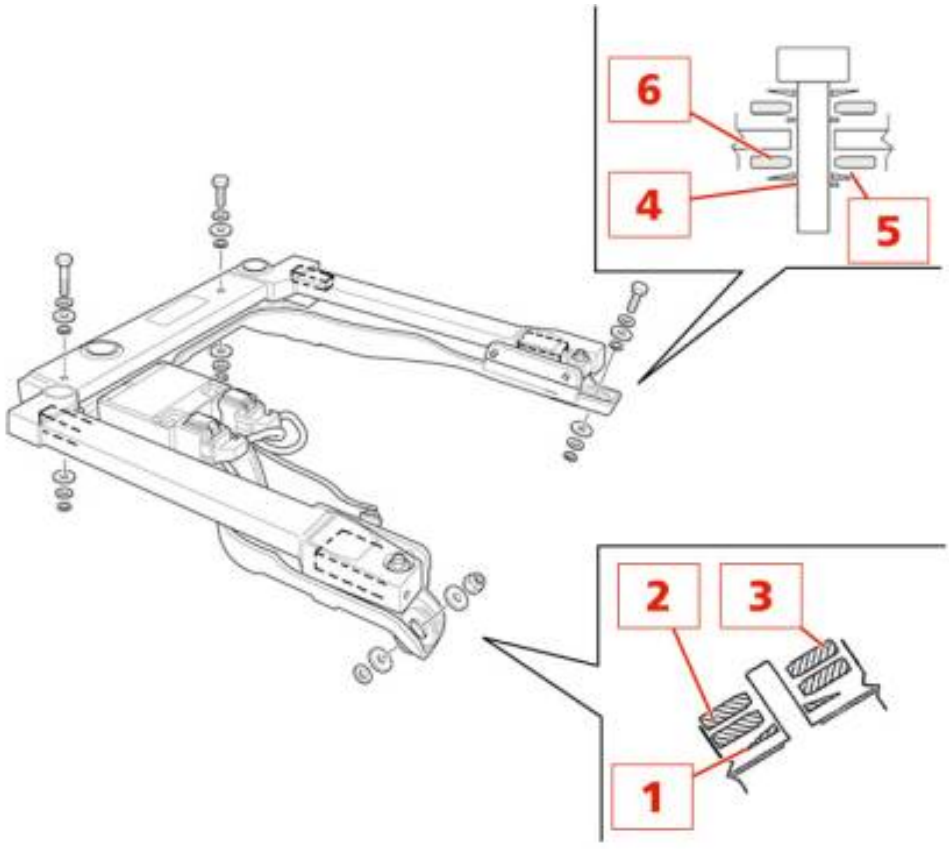
they can be refitted in the same place.



- Detach the electrical connectors for the weight sensor wiring, then remove the entire assembly (this will be supplied as a single spare part).

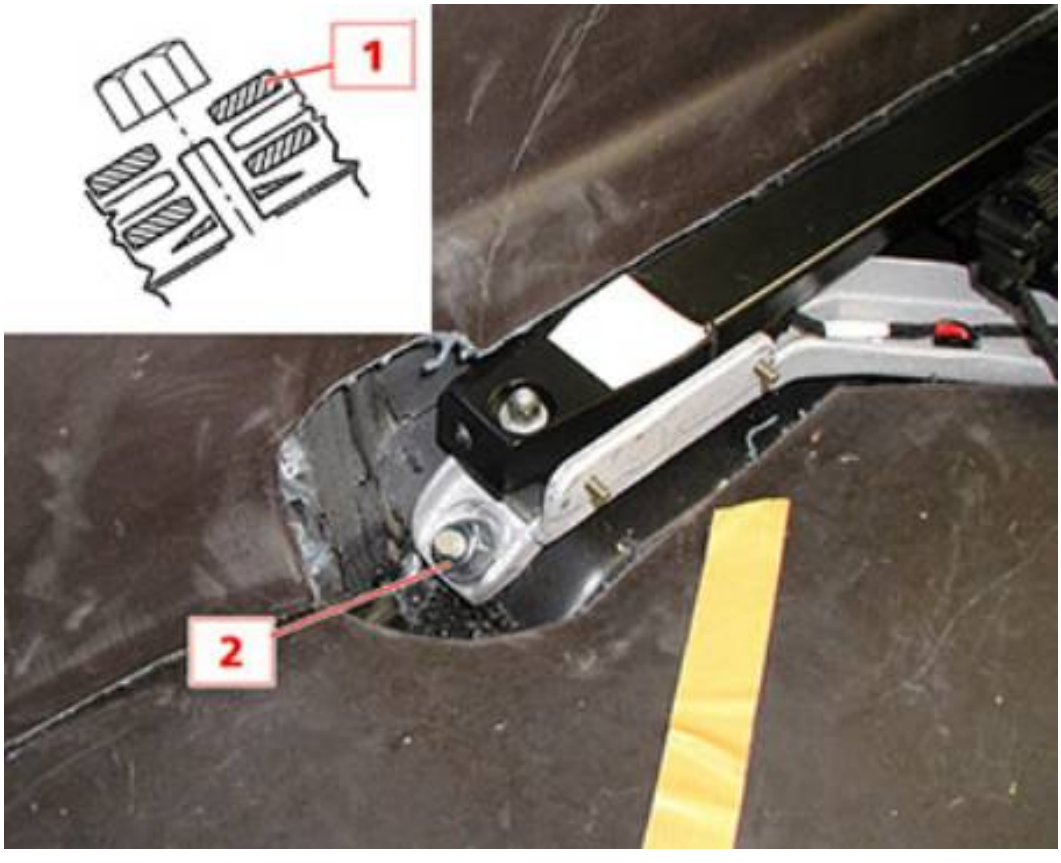
Refitting the weight sensors

- Fit the washers previously removed onto the frame, carefully following the instructions given in the figure.
- **Fastening the reclined panel:** fit the convex washer **(1)** so that its flat surface faces the vehicle floor, fit the double concave washer **(2)** and the split washer (**3**).
- **Planar fastening elements:** The fitting sequence for the three planar fastening elements is the following: plastic washer (**4**), convex washer **(5)** with its flat surface facing downward, double concave washer **(6)**.



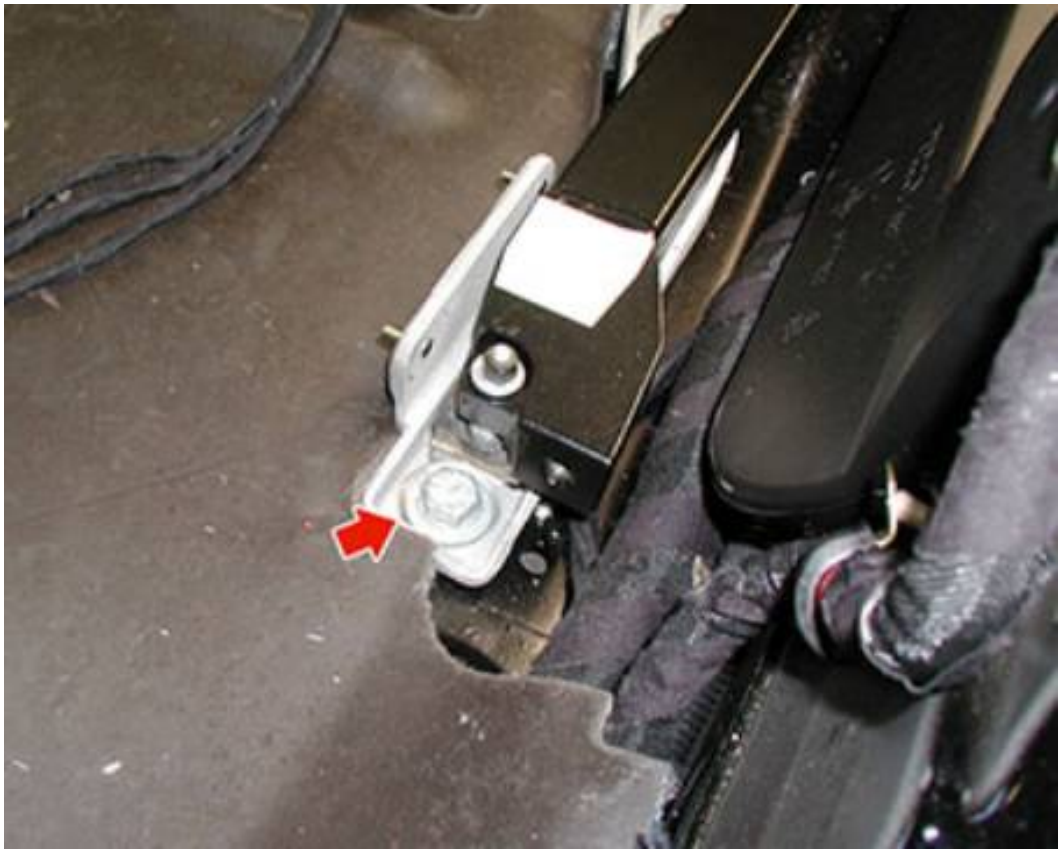
- Fit the weight sensor assembly.

- Position the double concave washer **(1**) and screw down the fastening nut **(2)** using your hands only.



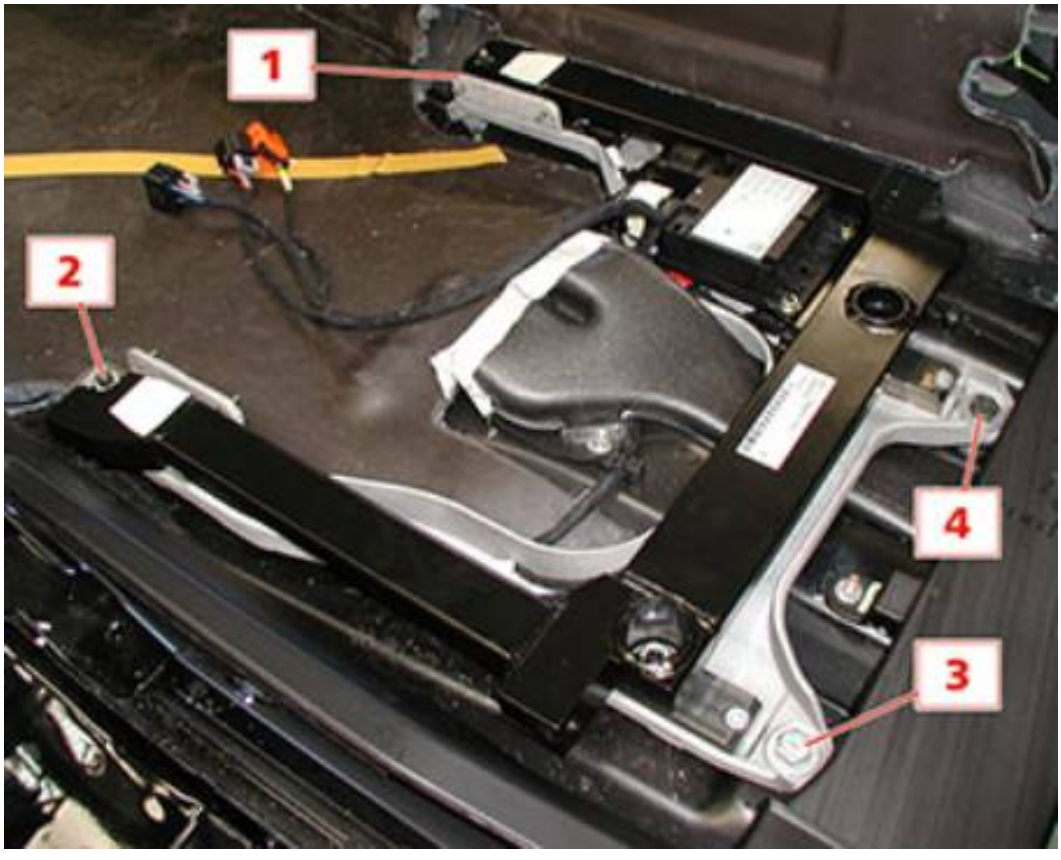
- Position the washers and the fastening screw, of the same type, in the same quantity and following the same sequence noted during removal, and screw down the rear fastening screw.

01



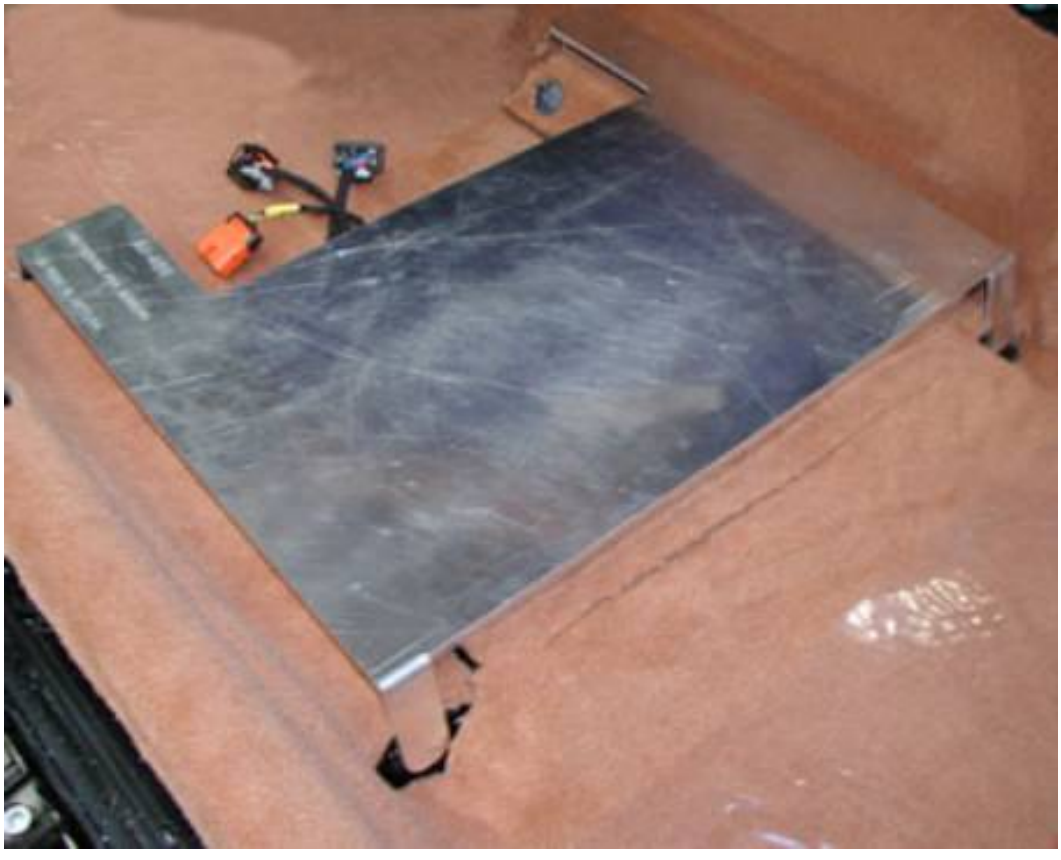
- Position the washers and the fastening screw, of the same type, in the same quantity and following the same sequence noted during removal, and screw down the rear fastening screw.

- Tighten the weight sensor fastening nut **(1)** to a torque of **40 Nm**.
- Tighten the following, respecting the sequence given: the rear screw **(2)**, the fastening screw **(3)** and finally the screw **(4),** applying a torque of **40 Nm** on each screw.
- Then connect the sensor's electric wiring to the vehicle wiring. Make sure that they are properly connected by performing a traction test.



- Place the passenger compartment mat on the weight sensor, positioning it correctly so that it does not interfere with or affect the weight sensors or the seat.

- Position a metal guard on the weight sensor assembly, so as to protect it while refitting the other components previously removed.



- **Proceed with fitting the remaining components removed previously.**
- After fitting all the components, check that the weight sensors function properly; then perform the sensor calibration

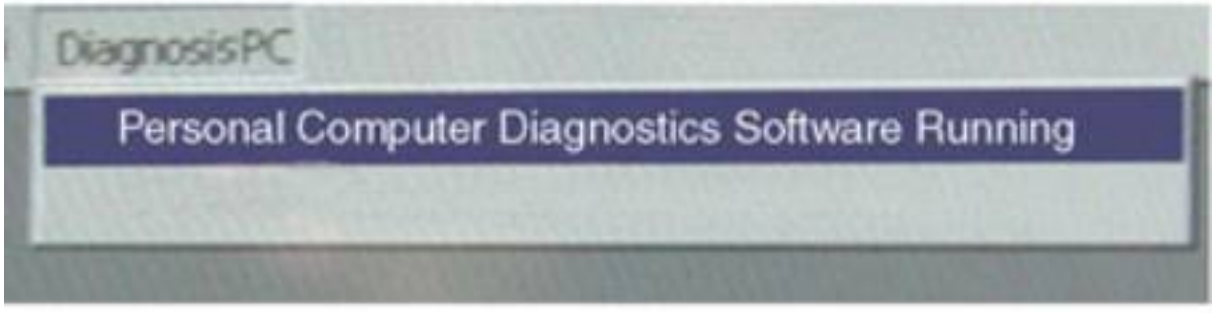
procedure with the SD3 tester.

Weight sensor calibration

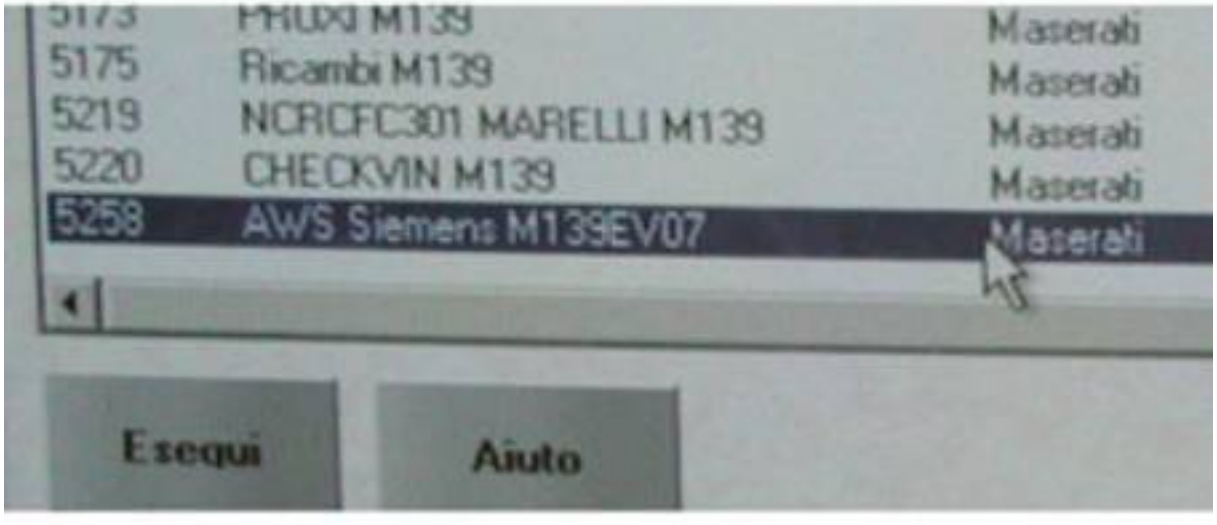
WEIGHT SENSOR CALIBRATION (USA version)

Calibration cycle with SD3

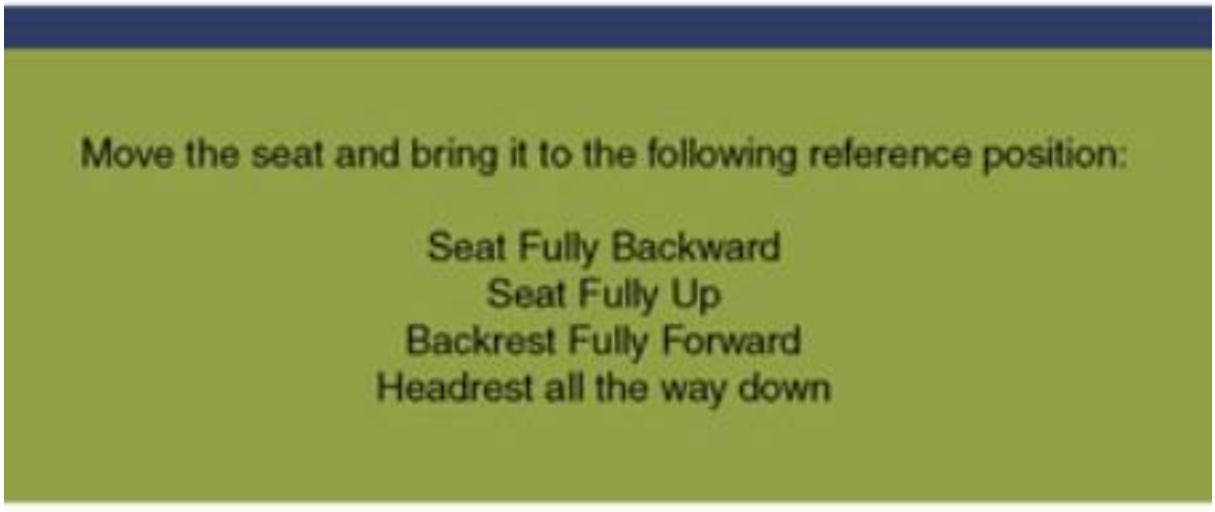
- When the weight sensors have been replaced or removed and refitted, the calibration cycle with the SD3 tester must be performed in order to test proper functioning of the sensors.
- This cycle must be performed periodically as indicated in the Maintenance Schedule.
- Using SD3 Net connected to the SD3 tester, run the **PERSONAL COMPUTER DIAGNOSTIC SOFTWARE RUNNING procedure.**

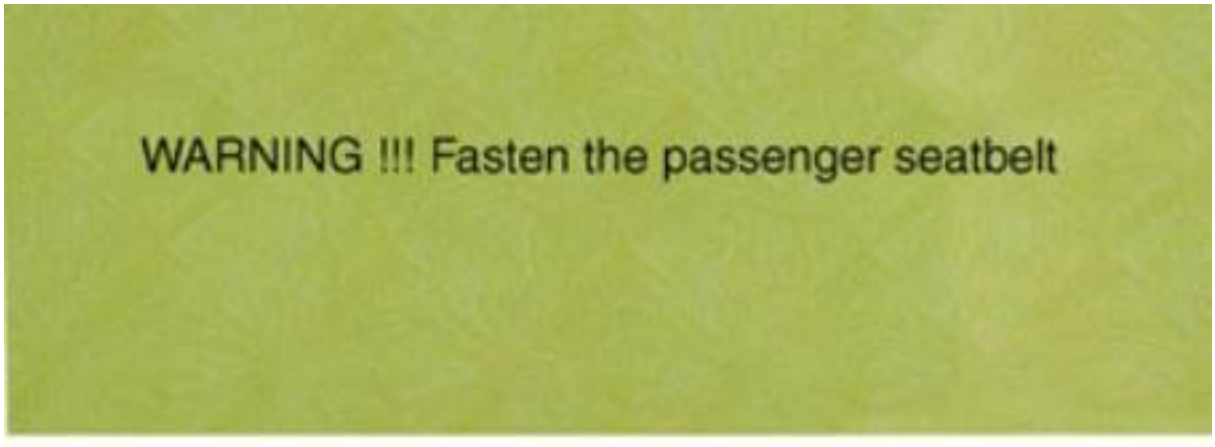


- Select the relative software.

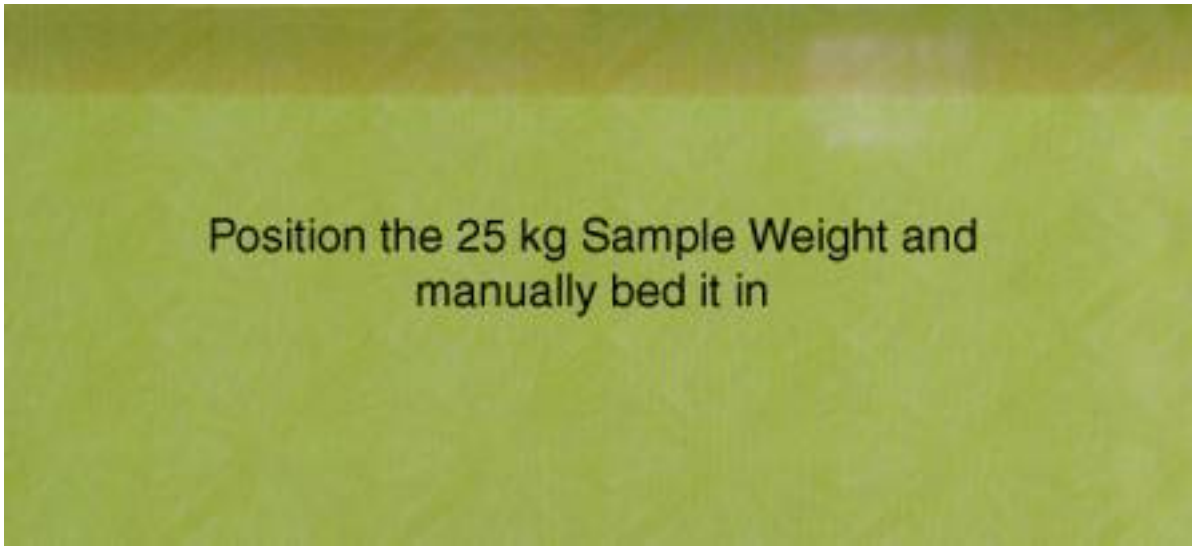


- Follow the on-screen instructions and fill in the vehicle data sheet.
- The sensor calibration cycle will be interrupted to allow you to move the seat (as indicated on the screen) for the first data acquisition session.
- Position the seat as requested by the system, also fastening the seat belt.

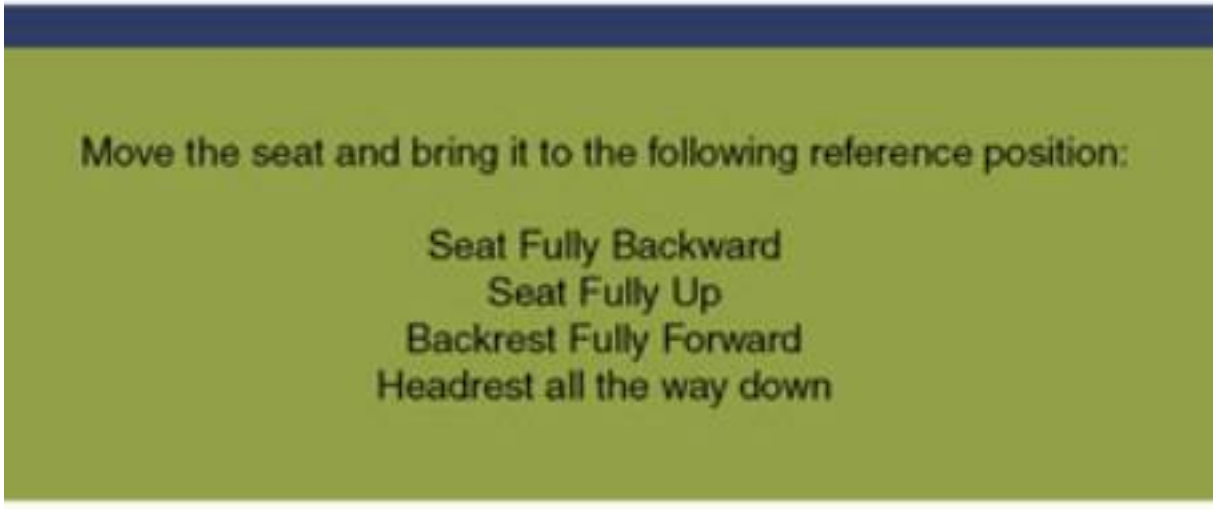




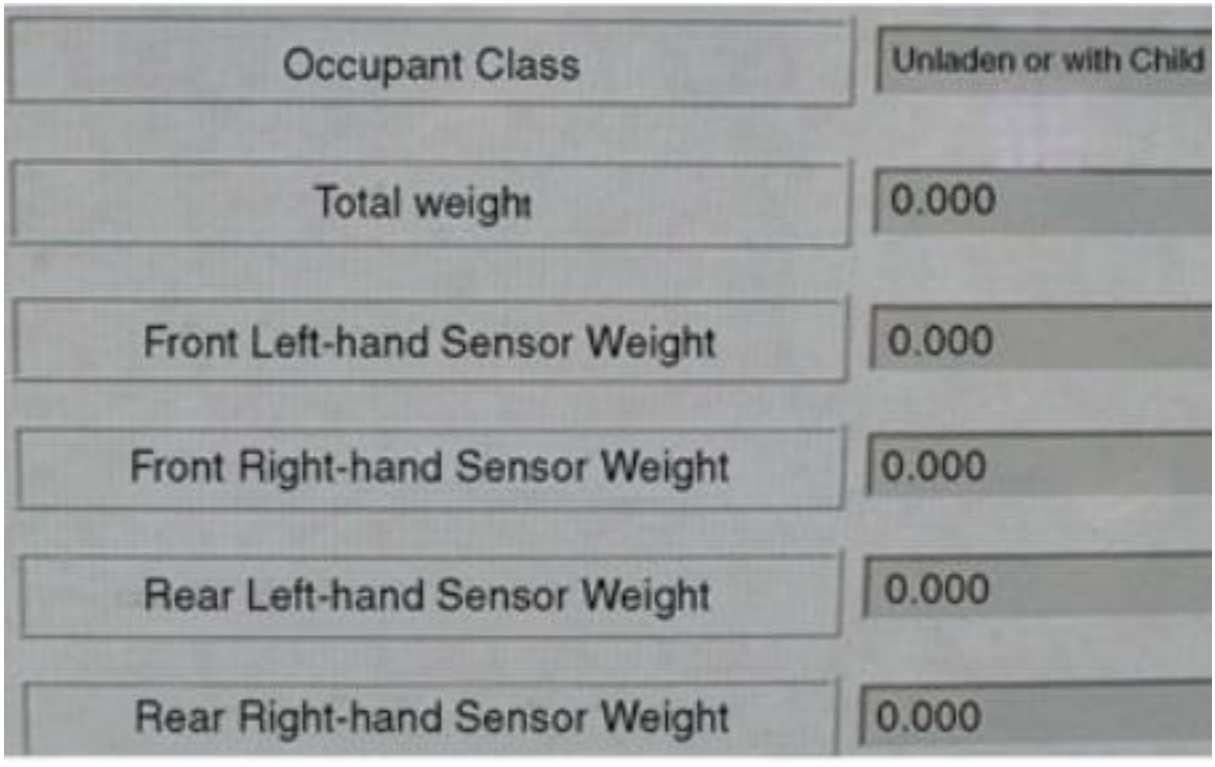
- Follow the guided procedure, during which the tester will perform a test on the system, displaying any errors detected.
- The program performs a test of all the system components and initialises the ECU if necessary.
- A screen page will then appear and you will be prompted to position a weight of 25 kg on the front passenger seat for the first acquisition of the data, that will be read and sent to the ECU by the weight sensors.



- Position the seat as requested by the program.

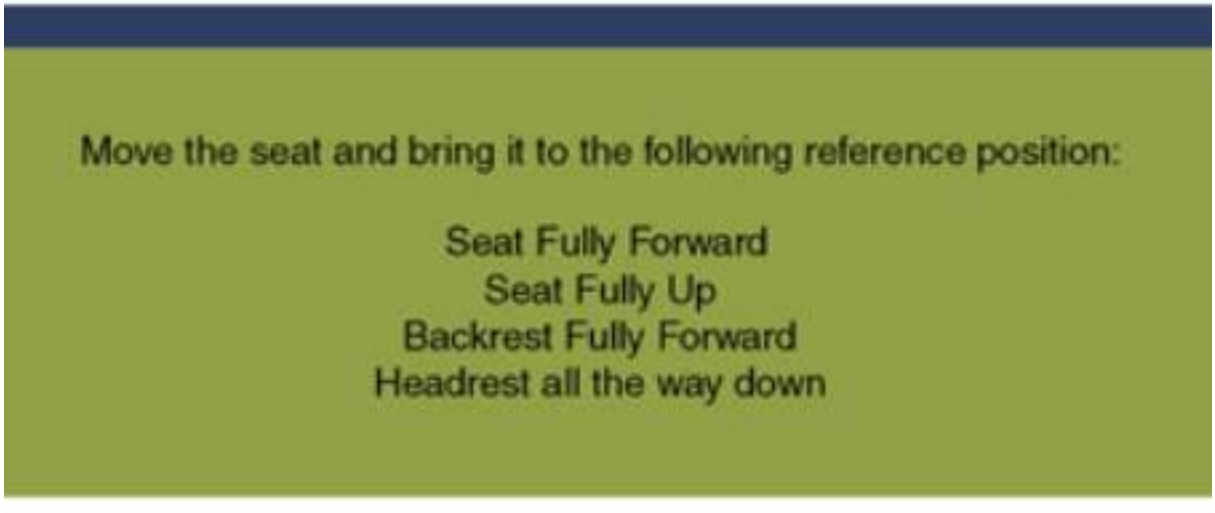


- The data acquired, the occupant class (based on the weight on the seat) and the values acquired by the four sensors with a maximum tolerance of 1 kg will be then displayed.



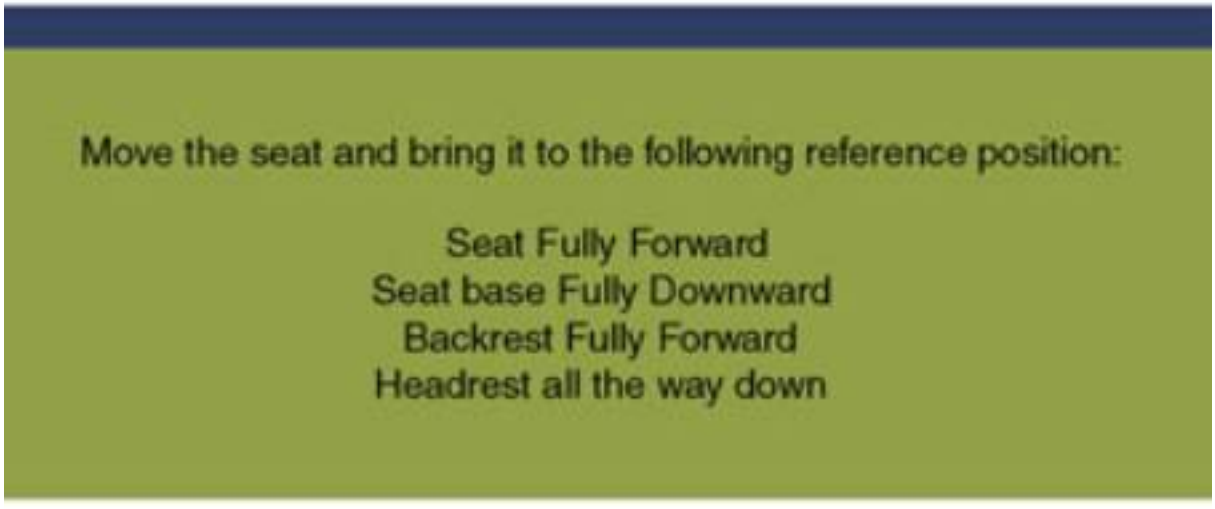
OCCUPANT CLASS: Type of occupant detected based on the weight on the seat.
TOTAL WEIGHT: Total weight detected (in this case 25 kg)
The data shown in the boxes relating to the sensors are not significant, since the procedure has been executed with the vehicle without the 25 kg weight.

- Continue the procedure performing the various operations requested by the program.
- Change the seat position to perform the second test on the weight sensors, again with 25 kg positioned on the seat.

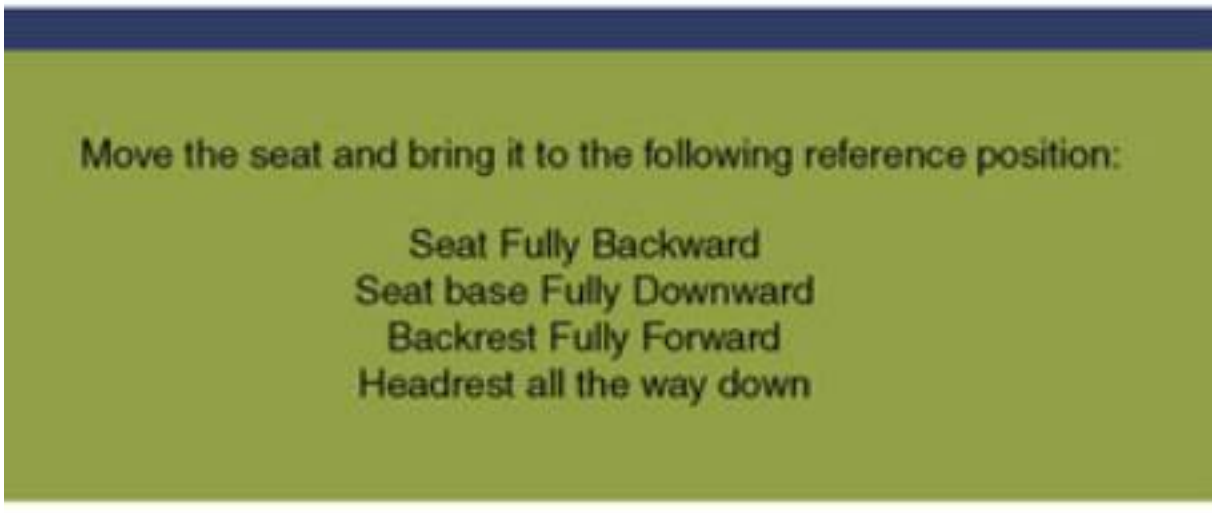


- Check that the data acquired is correct and within the tolerance range.
- Check that the AIRBAG warning light is on and press **YES**, then continue with the procedure.

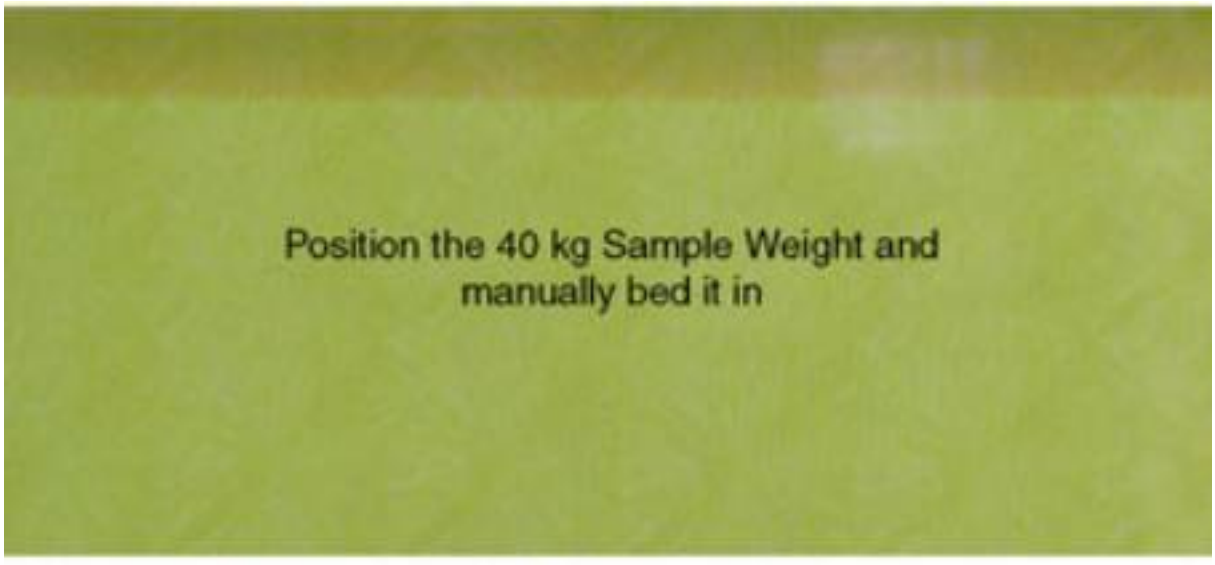
- Change the seat position to perform the third test on the weight sensors, again with 25 kg positioned on the seat.



- Check that the data acquired is correct and within the tolerance range.
- Check that the AIRBAG warning light is on and press **YES** , then continue with the procedure.
- Change the seat position to perform the fourth test on the weight sensors, again with 25 kg positioned on the seat.



- Change the seat position to perform the fourth test on the weight sensors, again with 25 kg positioned on the seat.
- Check that the data acquired is correct and within the tolerance range.
- Check that the AIRBAG warning light is on and press **YES** , then continue with the procedure.
- The diagnostic cycles on the sensors with 25 kg weight have now been completed. If the data shown in the tables is correct and therefore the procedure has not been interrupted, the program then performs the same steps requesting a weight of 40 kg.



- Follow the guided procedure moving the seat when requested by the program and in the order illustrated for the tests with 25 kg weight.
- At the end of the cycle, whatever the outcome, print the listing with the summary of the data acquired and keep it in the vehicle logbook.
- If the cycle was not completed successfully, check what caused the incorrect procedure.
- In addition to the active diagnosis with SD3, it is important to visually inspect that no objects interfere with the weight sensors.
- It is important to check that there are no objects under the seat which may affect the test.
- Also check that, as a result of normal wear, the passenger mat has not moved from its original position. This would cause it to interfere with the side of the seat, creating friction and hence affecting the test values.

01

WEIGHT SENSOR SAFETY REGULATIONS (USA version)

This section is an integral part of the section "MANDATORY SAFETY REGULATIONS FOR OPERATIONS ON VEHICLES EQUIPPED WITH AIRBAG SYSTEM" and it deals with management and warnings concerning the passenger airbag system controlled by the weight sensors.

For the best protection in the event of a collision, all the vehicle's occupants must travel seated and protected by all the suitable restraining systems. The seat belts are designed to be used by persons whose physical characteristics (age, height, weight) are provided for by established legislation in each country. Anyone who does not comply with these provisions may not travel in the front passenger seat. This also applies to children. Their heads are proportionally heavier and larger than those of adults, while their bones and muscles are relatively undeveloped. To help protect them in case of a collision, they must use special restraint or safety systems, even in the rear seat.

WARNING
Incorrect fastening of a child restraint system increases the risk of injury to the child in the event of a collision.

The use of specific restraint systems for newborns and children is mandatory, as provided by the law in all the 50 States of the United States, the District of Columbia, the USA territory and the Canadian provinces. Newborns and children must travel seated in suitable restraint systems, using adequate safety abdominal or diagonal belts or, if present, an upper anchoring point and a system with 2 lower anchoring points, in order to be compliant with the U.S. Federal Motor Vehicle Safety Standards 213 and 225 and with the Canadian Motor Vehicle Safety Standards 213 and 210.2.

WARNING
Children under 12 years of age may not travel on the front passenger seat.

WARNING
Never place an object over or near the driver and passenger airbags. In the event that the passenger airbag is deployed, it will project any object over it, or near it, in the passenger compartment at very high speed. The object will be transformed into a projectile propelled in the passenger compartment. This could cause serious injuries.

WARNING
The airbag modules must be replaced at the intervals indicated in the "Warranty Booklet and Maintenance Schedule", even if the vehicle was not involved in collisions.

Occupant classification system

The occupant classification system is designed to:
disable passenger airbag deployment if a child of weigh and size up to the typical one-year old infant typical weight and size (up to 20 lbs - 9.1 kg up to 26 in - 66 cm) in a rearward- facing child seat is present on the front passenger seat (child seat heavier tested is 18.5 lbs - 8.5 kg), (child and child seat 55 lbs – 25 kg);

Activate the passenger-side airbag if the weight of the passenger traveling in the front passenger seat is higher than that of a small woman weighing 103 lbs (47 Kg);

disable or enable passenger airbag deployment if a child heavier than a typical one-year old infant is seated on the front passenger seat;
deactivate the passenger-side airbag if the nobody is traveling in the front passenger seat or if an object is placed on top of it (object weight under 75 lbs - 34 kg).

The status of the passenger airbag will be indicated by the warning light “PASSENGER AIRBAG OFF” (**F**) on the roof panel:
- when passenger airbag deployment is disabled, the warning light “PASSENGER AIRBAG OFF” will be illuminated;
- when passenger airbag deployment is enabled, the warning light “PASSENGER AIRBAG OFF” will NOT be illuminated.

WARNING
Adults should not ride in the front passenger seat if the “PASSENGER AIRBAG OFF” light is illuminated.

WARNING
The extra weight applied to the seat during child seat installation might delay correct occupant classification if the ignition key is in position MAR (ON) when the child seat is being mounted.

After key MAR (ON) the Occupant Classification System will continuously try to classify every object or person on the front passenger seat in one of two categories: “Infant” (for which passenger airbag deployment is dangerous and must be disabled) or “Adult” (for which passenger airbag deployment is beneficial and must be provided). Occupants or objects lighter than a typical one-year old child sitting on a child seat (including an empty seat) will be classified as “infant”. Occupants or objects heavier than a small adult will be classified as “adult”.

If the Occupant Classification System identifies the front passenger as an “infant”, the passenger airbag deployment will be disabled and the warning light “PASSENGER AIRBAG OFF” on the roof panel will be illuminated.

If the Occupant Classification System identifies the front passenger as an “adult”, passenger airbag deployment will be enabled and the warning light “PASSENGER AIRBAG OFF” will not be illuminated.

WARNING
The system does not disable the front passenger seat belt pretensioner (also known as emergency tensioning device).

When the key is turned to be MAR (ON) position, the system will require a few seconds to identify the passenger on the front seat. As long as the system is in the process of classifying the occupant, the default setting will be “infant”, to avoid the risk of injuring an infant during this time.
If the Occupant Classification System identifies a change in the classification of the front passenger after the vehicle is started (for example, if the driver stops without turning off the engine to allow a front passenger to come in or get out), the system will update the passenger airbag status and the “PASSENGER AIRBAG OFF” warning light status accordingly.
Please note that the system will take some time to update the front passenger classification when the passenger status changes.
If the Occupant Classification System recognizes an internal error, it will signal the airbag control unit that

there may be a malfunction, and the control unit will attempt to:

- illuminate the “airbag” red warning light on the instrument cluster;
- disable the passenger airbag deployment to avoid the risk of injuring an infant, lacking a certain occupant classification;
- illuminate the “PASSENGER AIRBAG OFF” warning light on the roof panel.

WARNING

When a passenger is sitting in the front seat:
- always check that no objects are stuck underneath the seat;
- always check that no objects are loose on the floor, either in front, or behind the seat;
- check that no objects contacts the seat;
- instruct the rear occupants not to lean on the front passenger seat, and not to push with their legs against it;
- make sure the “PASSENGER AIRBAG OFF” light status is appropriate for the type of occupant (ON for a child in a rearward-facing child seat, OFF for an adult, either ON or OFF for a child properly secured in a forward- facing child restraint system).

STEERING WHEEL

Removing-refitting the steering wheel

- Disconnect the battery's negative terminal.
- Position the steering wheel so that the wheels are as parallel to the vehicle’s longitudinal axis as possible.

Safety regulations for the airbag modules

CAUTION
Follow the instructions and respective safety regulations for removal and storage of the airbag modules.

- Remove the driver’s side airbag module.

Driver’s side airbag module

- Unscrew the nut fastening the steering wheel to the steering column.

- Detach the electrical connections.

- Remove the steering wheel taking care to slide it out without damaging the electric wiring.

When refitting, follow the above procedures in reverse order taking care to tighten the steering wheel fastening nut to a torque of 50 Nm

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Steering column

Removing the steering column

- Remove the trim guards.

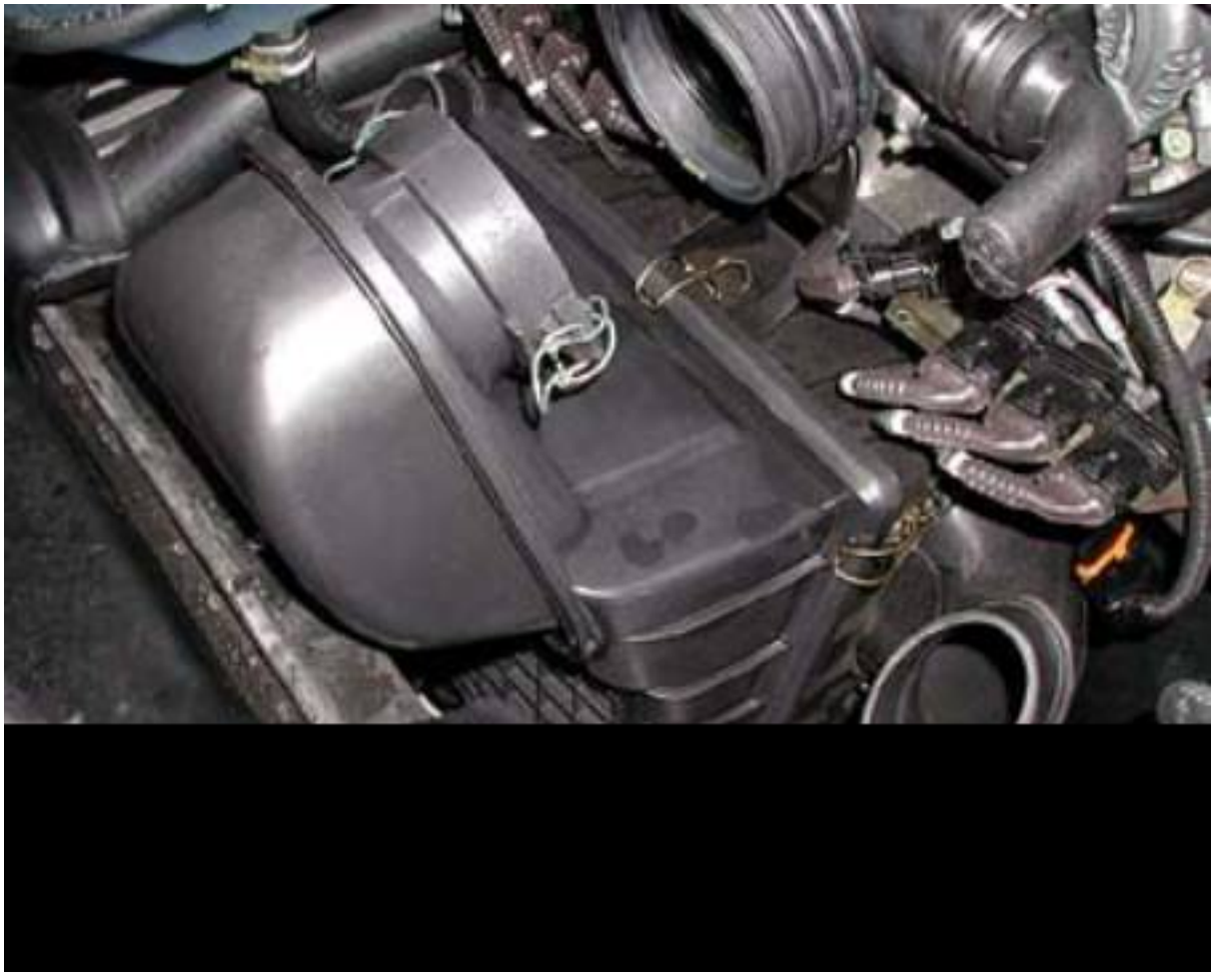
- Detach the electrical connection on the air flow meter and release the two clips from the air filter housing.

- Remove the air flow meter fastening clamp.

- Remove the air flow meter.

- Remove the two cold air intake lines.

- Release the clips fastening the cover to the air filter housing.



- Remove the cover and take out the air filter.

- Undo the screw fastening the air filter housing to the domes' bar.

- Remove the air filter housing.

- Remove the complete windscreen wiper unit.

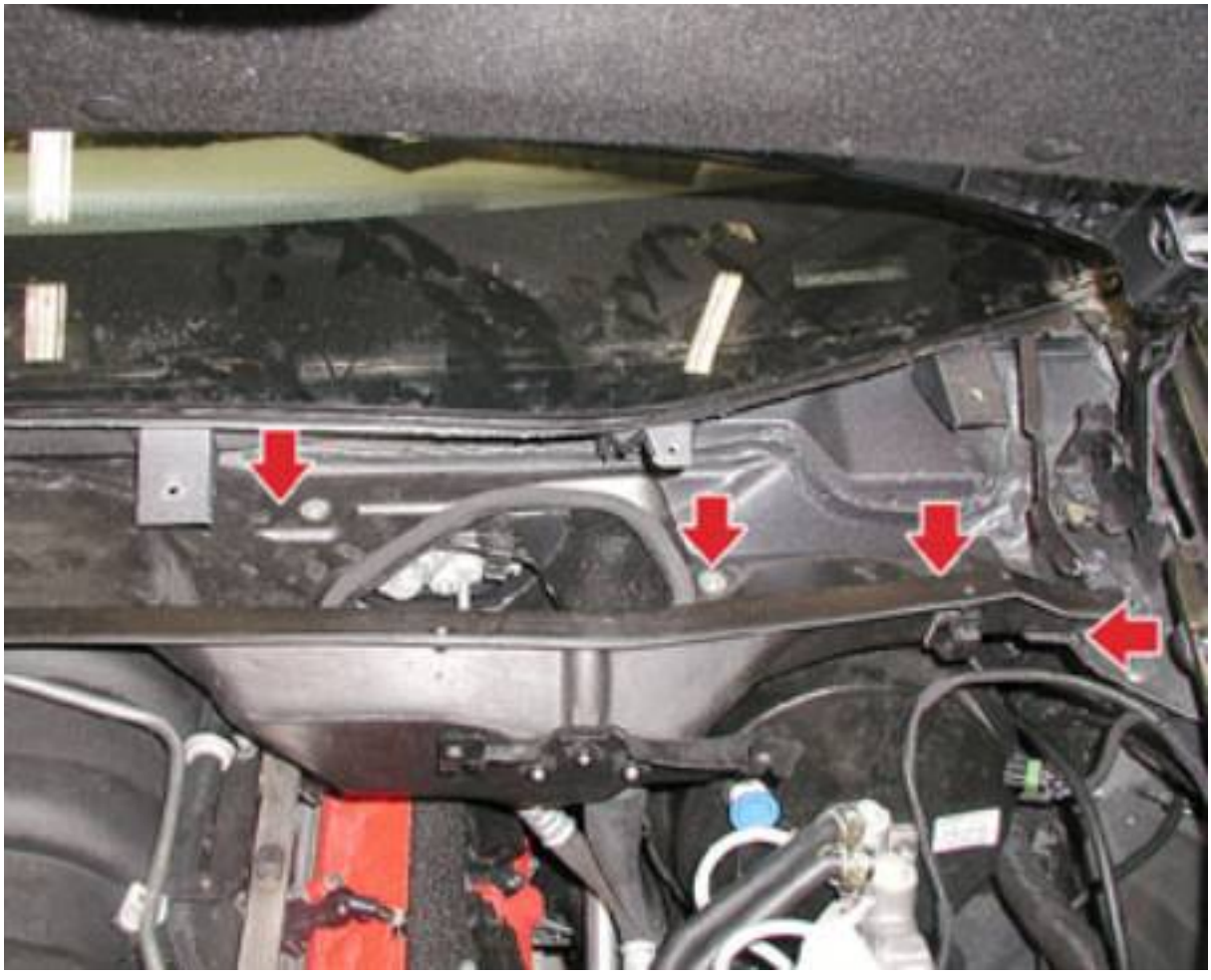
Windscreen wiper unit

- Undo the screws fastening the brake oil tank.

- Detach the electrical connection.

- Undo the screws fastening the connected devices' pan underneath the windscreen.

- Undo the screws fastening the left-hand pan for the connected devices underneath the windscreen and remove the pan.



- Undo the screw fastening the steering column to the steering rack.

- Unscrew the nuts fastening the steering column flange to the engine compartment/ passenger compartment partition panel.

- Remove the airbag module on the driver's side.

Removing-refitting the driver's airbag module

- Remove the steering wheel.

Removing-refitting the steering wheel

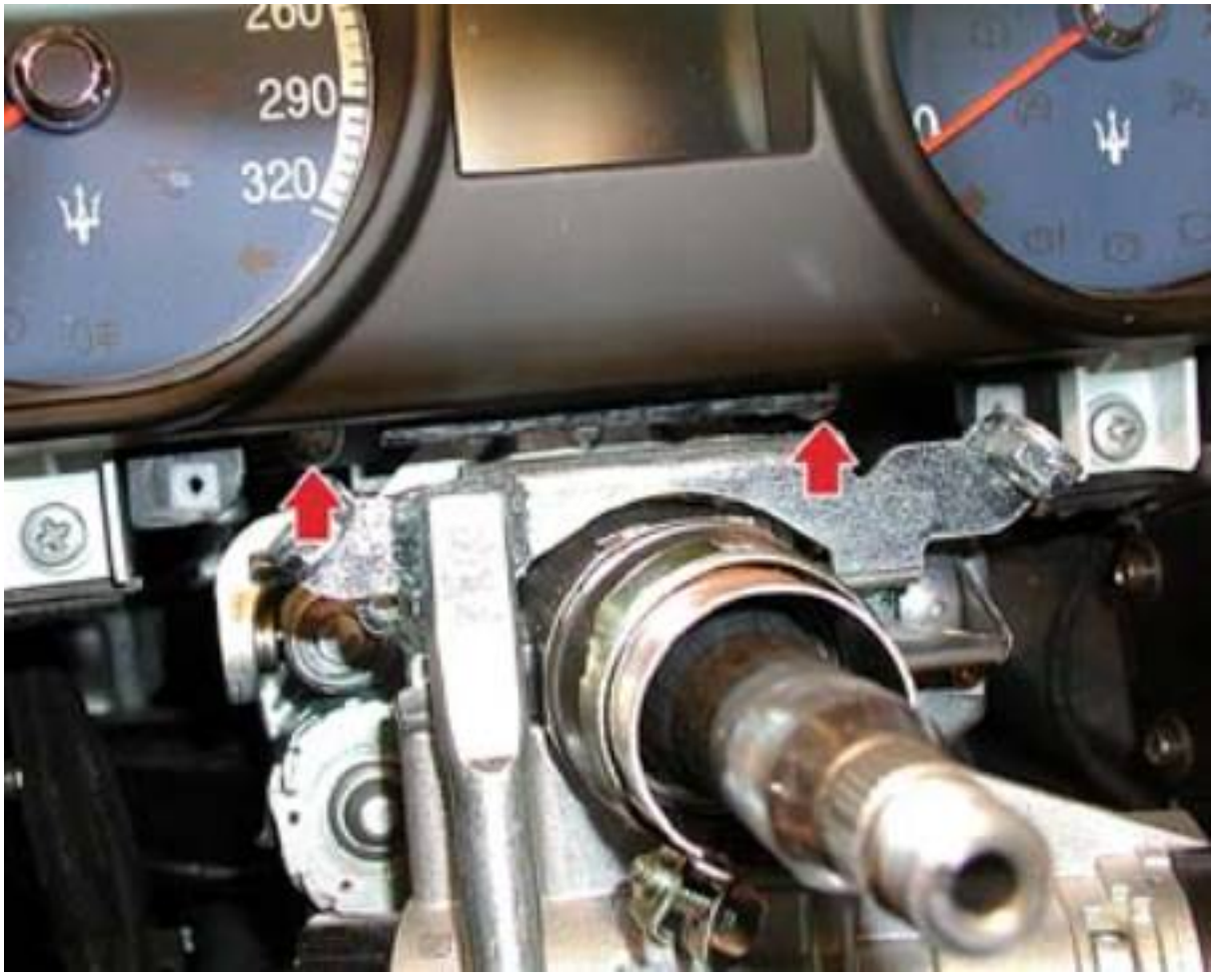
- Remove the steering column stalk and the electronically-controlled gearbox levers.

Removing-refitting the steering column stalk and the electronically-controlled gearbox levers

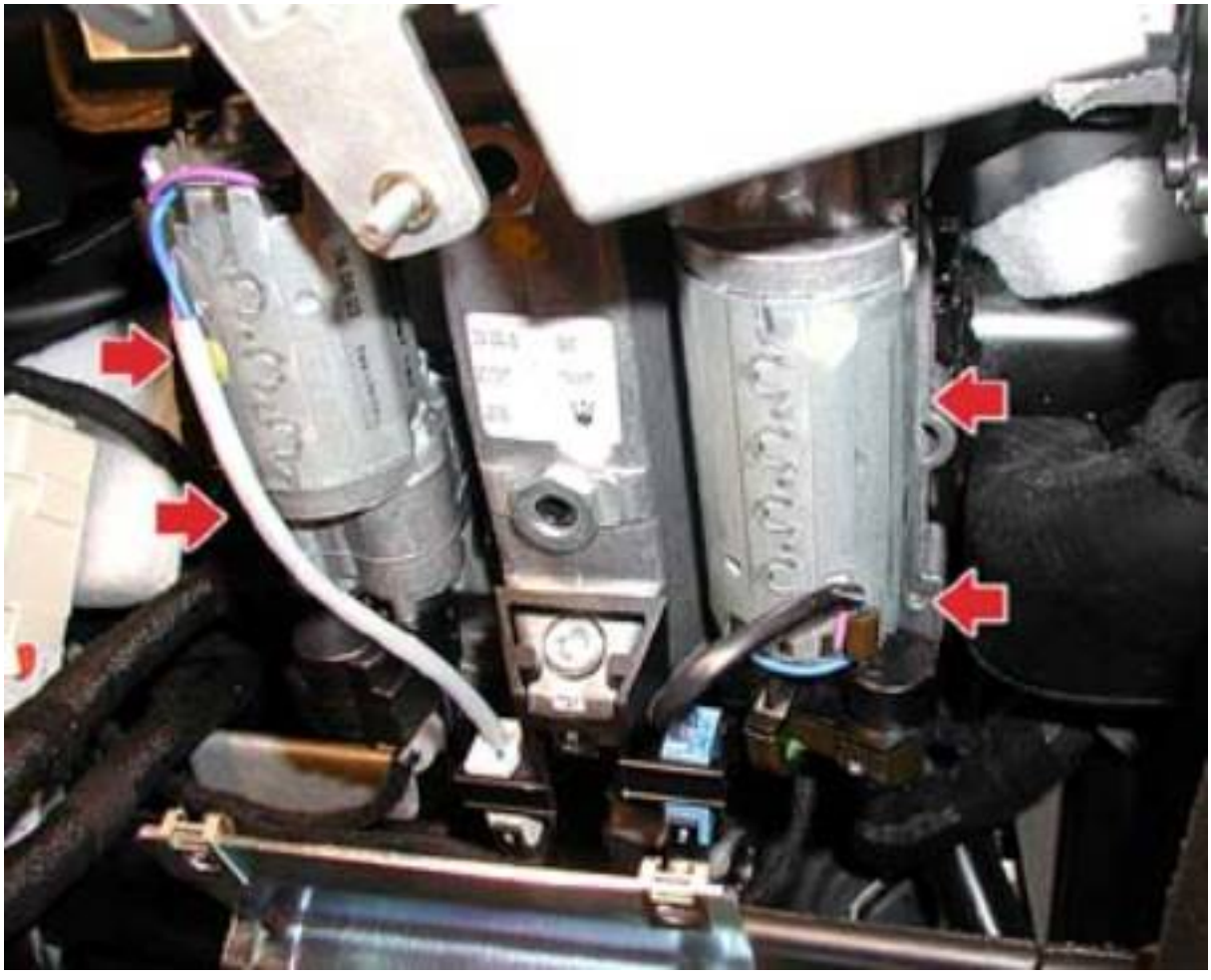
- Remove the ignition switch.

Removing-refitting the ignition switch

- Undo the screws fastening the steering column to the dashboard mounting crossmember.

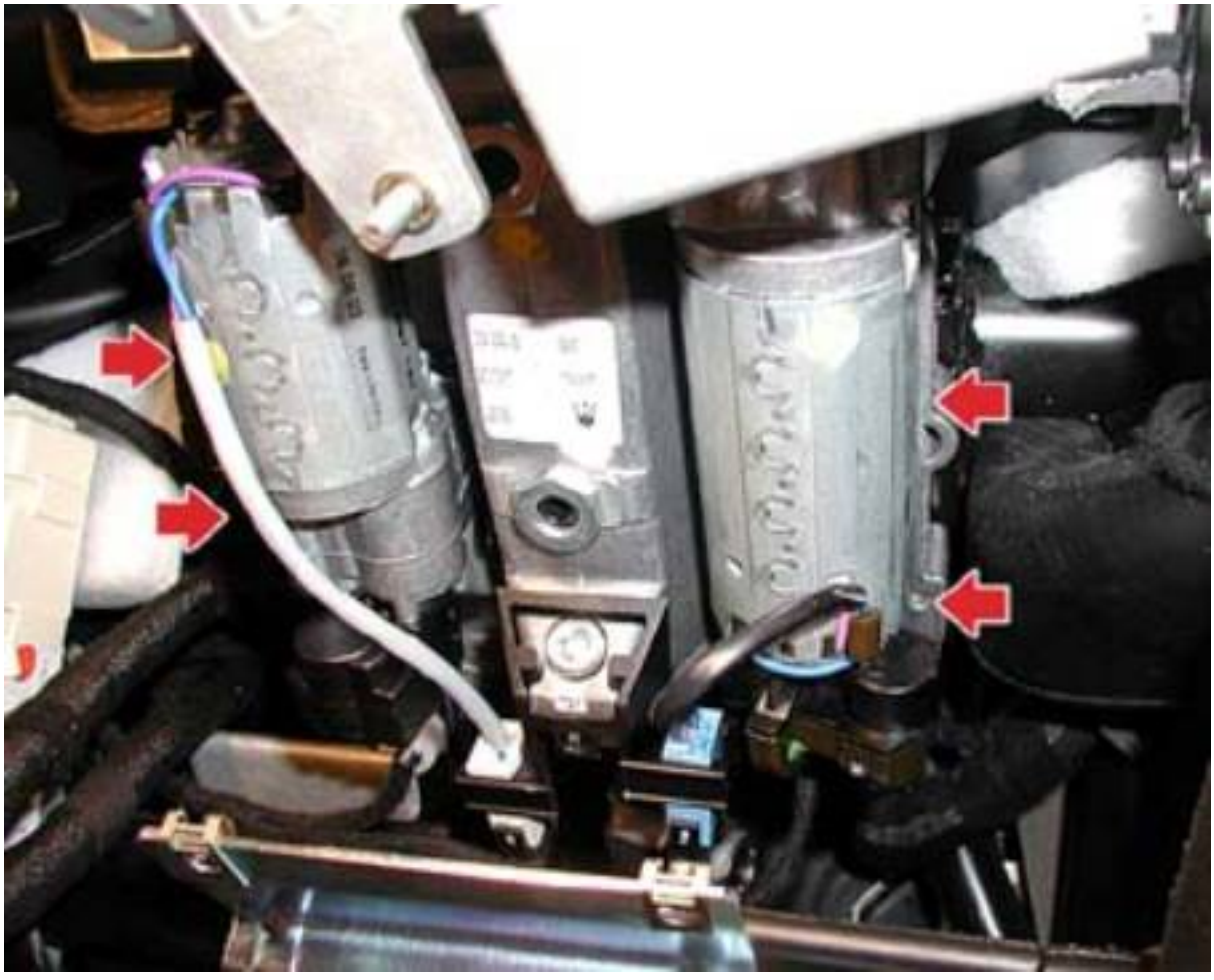


- Undo the screws fastening the steering column to the dashboard mounting crossmember and remove the steering column complete with flange and rubber bushing.



Refitting the steering column

- Fit the steering column in its bay and move the shaft so that it comes out into the engine compartment.
- Position the flange and the rubber bushing correctly.
- Tighten the screws with M8 threading to a torque of **24 Nm** and the screw with M6 threading to a torque of **7.4 Nm** to fasten the steering column to the dashboard mounting crossmember.



- Fit the ignition switch.

Removing-refitting the ignition switch

- Fit the steering column stalk and the electronically-controlled gearbox levers.

Removing-refitting the steering column stalk and the electronically-controlled gearbox levers

- Fit the steering wheel.

Removing-refitting the steering wheel

- Fit the driver's airbag module.

Removing-refitting the driver's airbag module

- Tighten the nuts fastening the steering column flange to the engine compartment/ passenger compartment partition panel to a torque of **4.4 Nm**.

- Tighten the screw fastening the steering column to the steering rack to a torque of **25 Nm**

When refitting, follow the remaining procedures in reverse order

HYDRAULIC STEERING RACK

Detaching the hydraulic steering rack

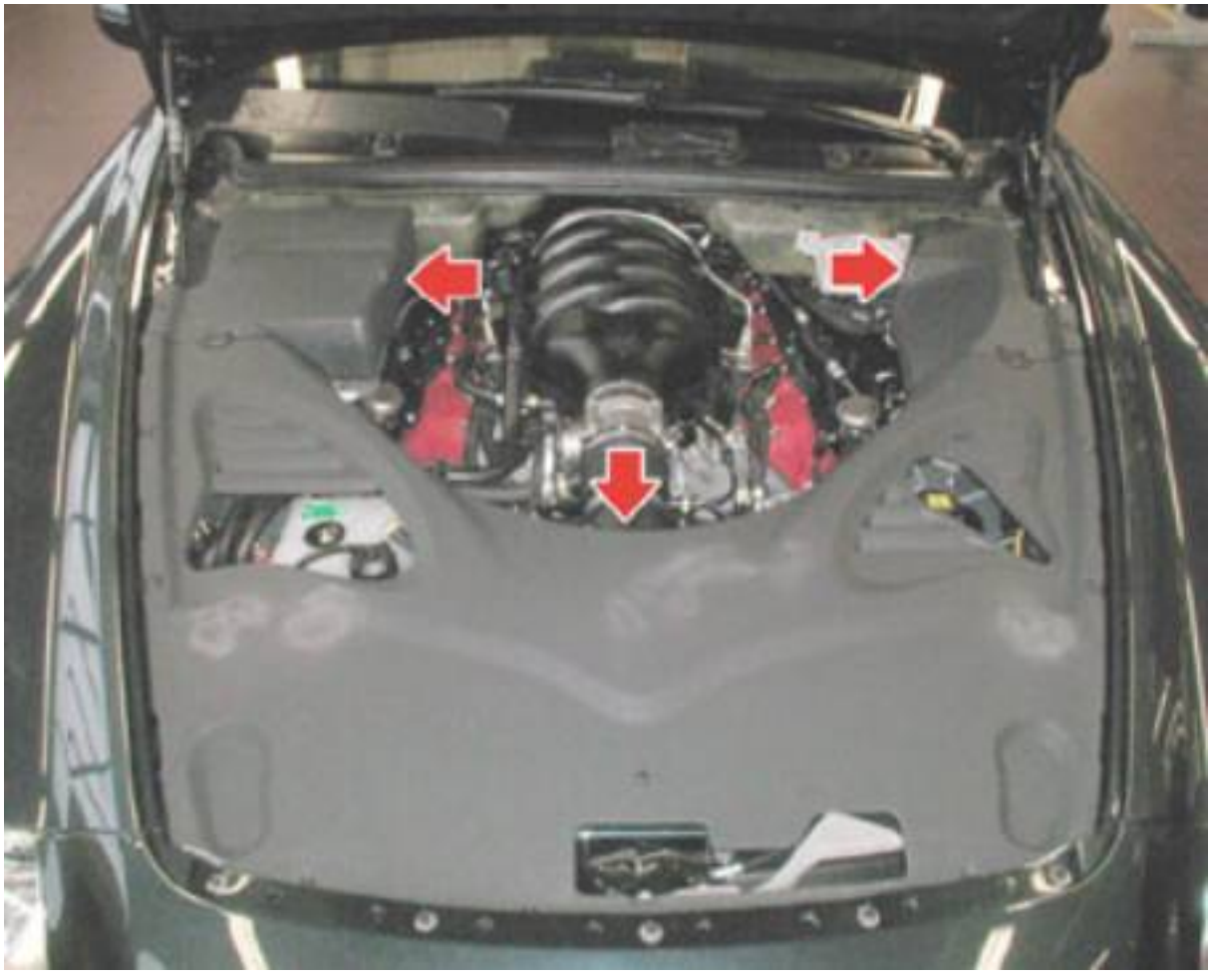
- Place the vehicle on the hoist with the wheels perfectly straight.
- Mark the position of the steering wheel using the upper half-rack.
- Remove the front wheels.

Replacing the wheels

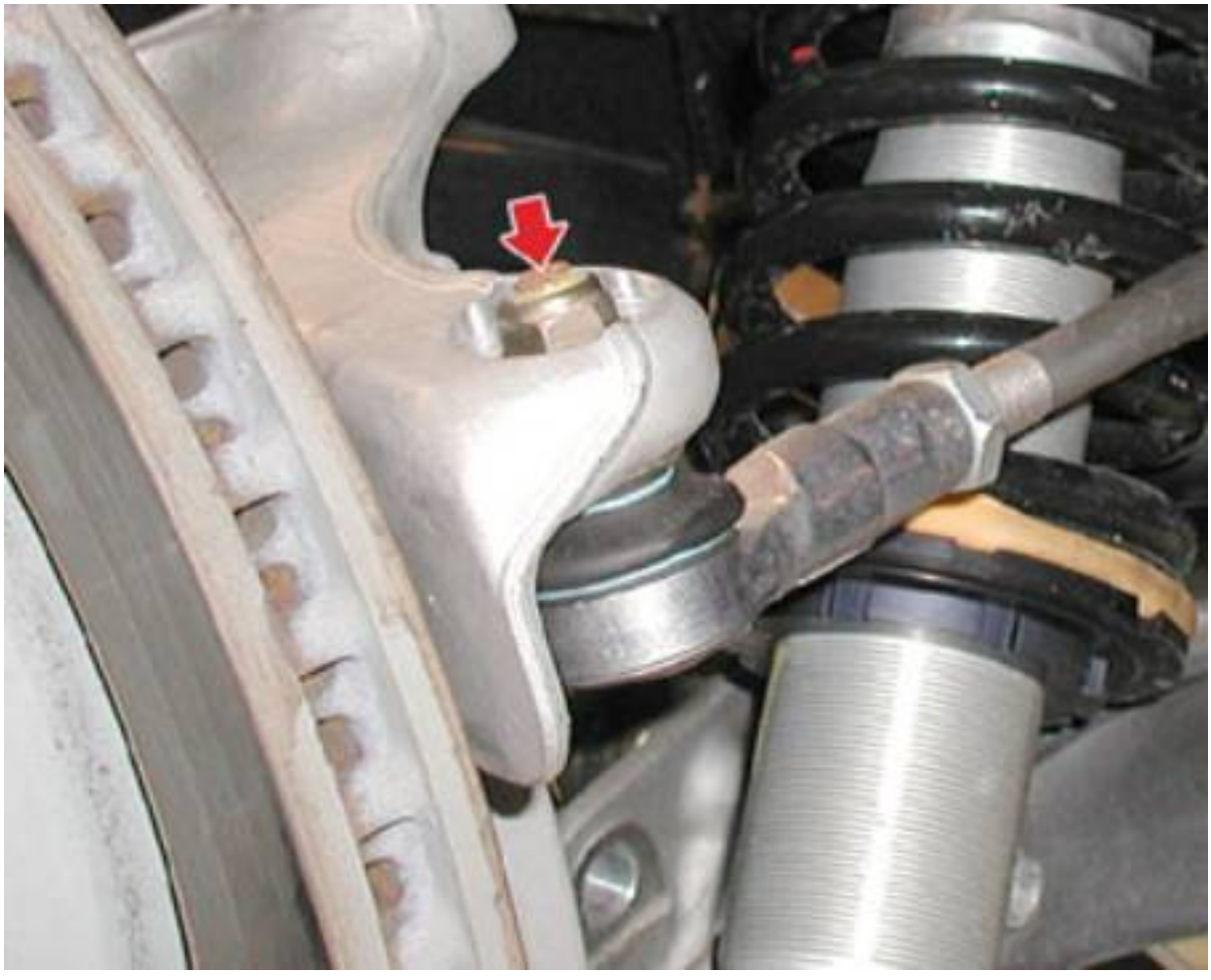
- Remove the engine floor guard (underfloor).

Engine floor guard

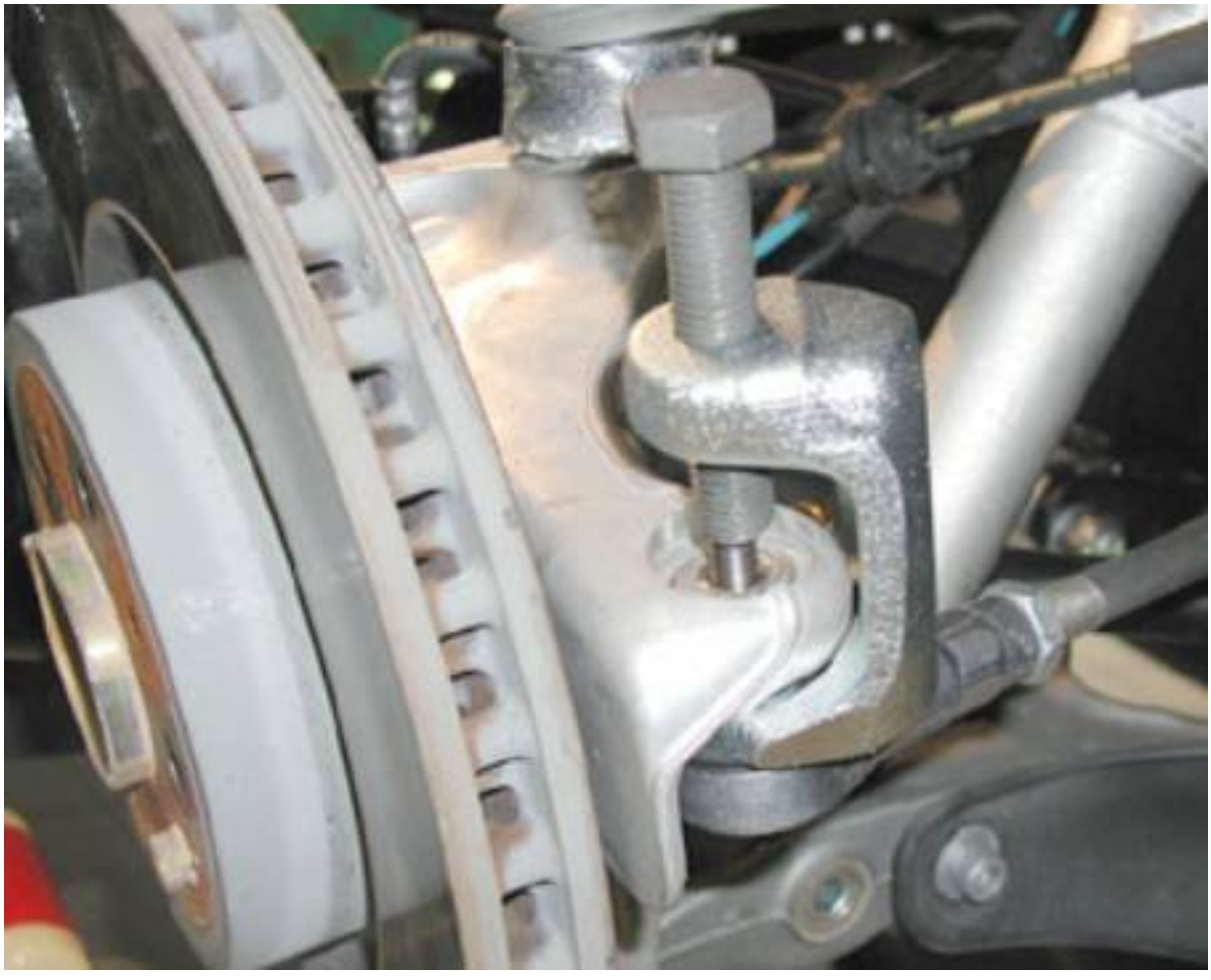
- Remove the trim guards.



- Using suction equipment, drain the oil from the hydraulic steering fluid tank located in the engine compartment.
- Unscrew the fastening nut on the steering tie-rod’s tapered head.

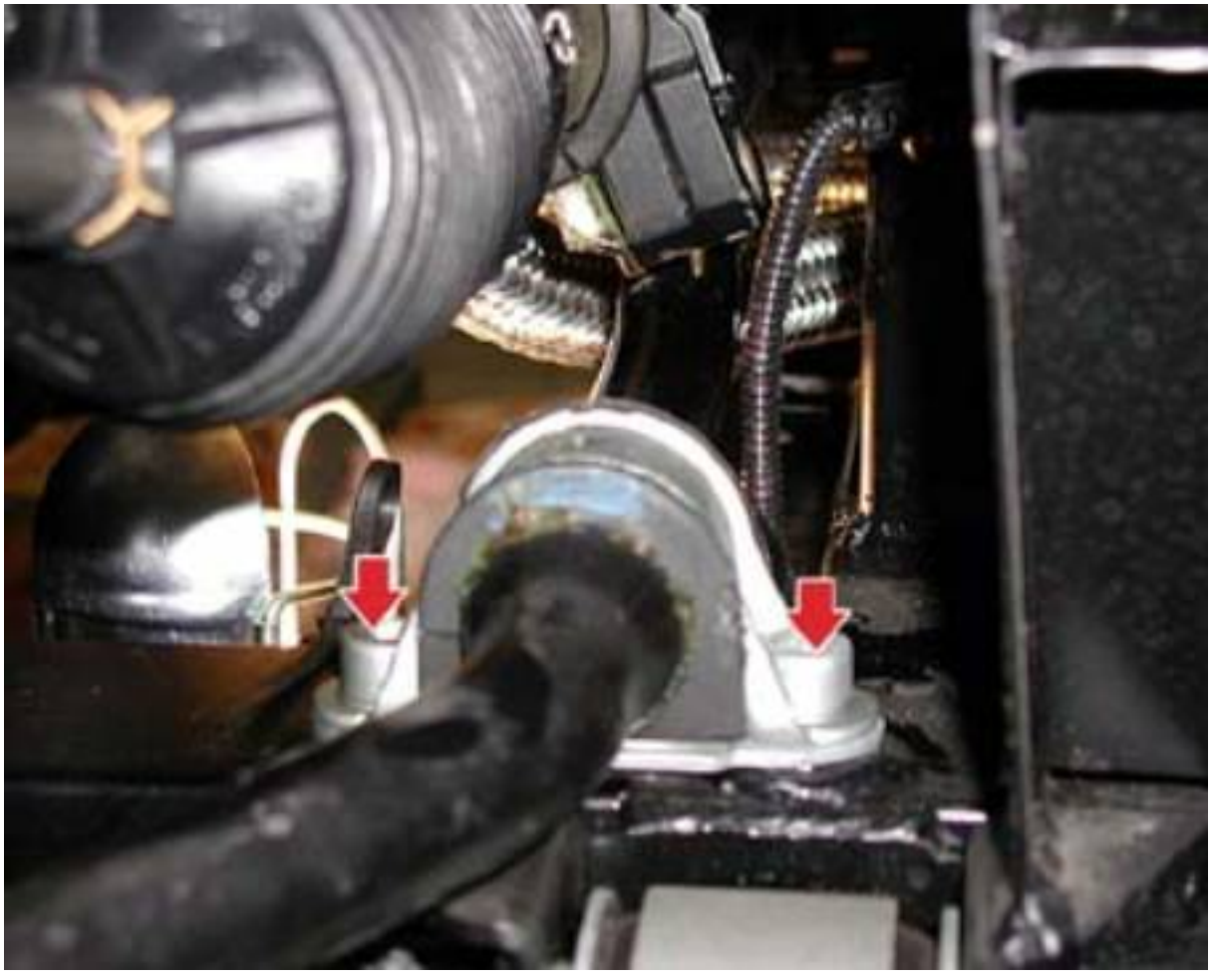


- Using the extractor tool, remove the steering tie-rod’s tapered head from the pillar.



- Undo the fastening screw and detach the steering column from the steering rack.

- Undo the screws fastening the stabiliser bar to the chassis. Repeat the operation on the opposite side.

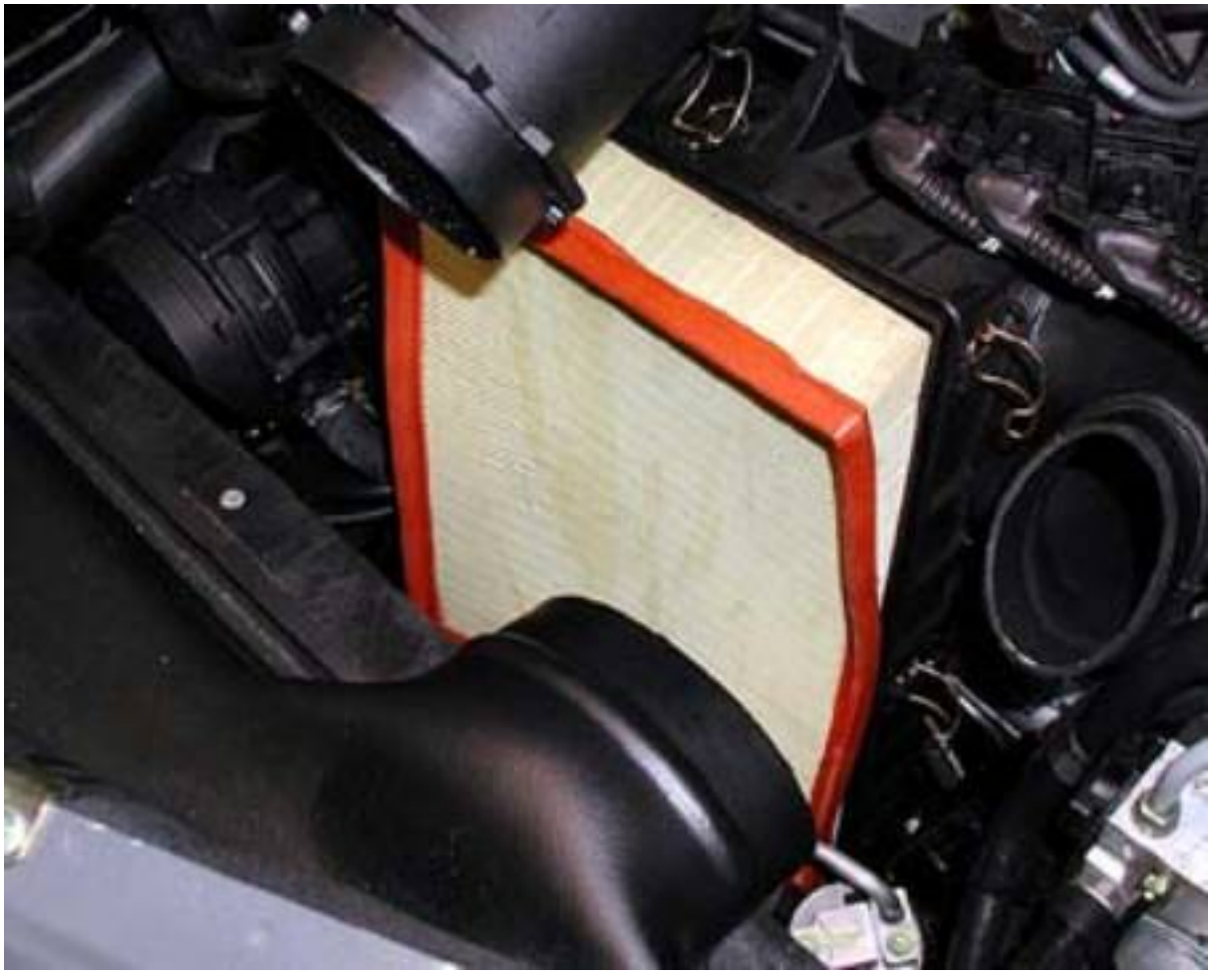


- Undo the nut fastening the small connecting rod to the stabiliser bar. Repeat the operation on the opposite side.

- Remove the two air intake pipes, disconnecting them from the air inlet and the filter housing.

- Release the springs fastening the air filter housing and remove it.

- Remove the air filter from its seat.



- Undo the screw fastening the filter housing.

- Undo the unions and disconnect the two oil lines from the hydraulic steering system, then detach the electrical connection from the hydraulic steering rack.

- Undo the fastening screws on the hydraulic steering rack.

- Remove the hydraulic steering rack from the vehicle’s left-hand wheel bay, taking care not to damage nearby components.

Refitting the hydraulic steering rack.

- Fit the hydraulic steering rack in the vehicle’s left-hand wheel bay, ensuring it is positioned correctly in its seat.
- Tighten the screws fastening the hydraulic steering rack to the chassis to a torque of **40 Nm**

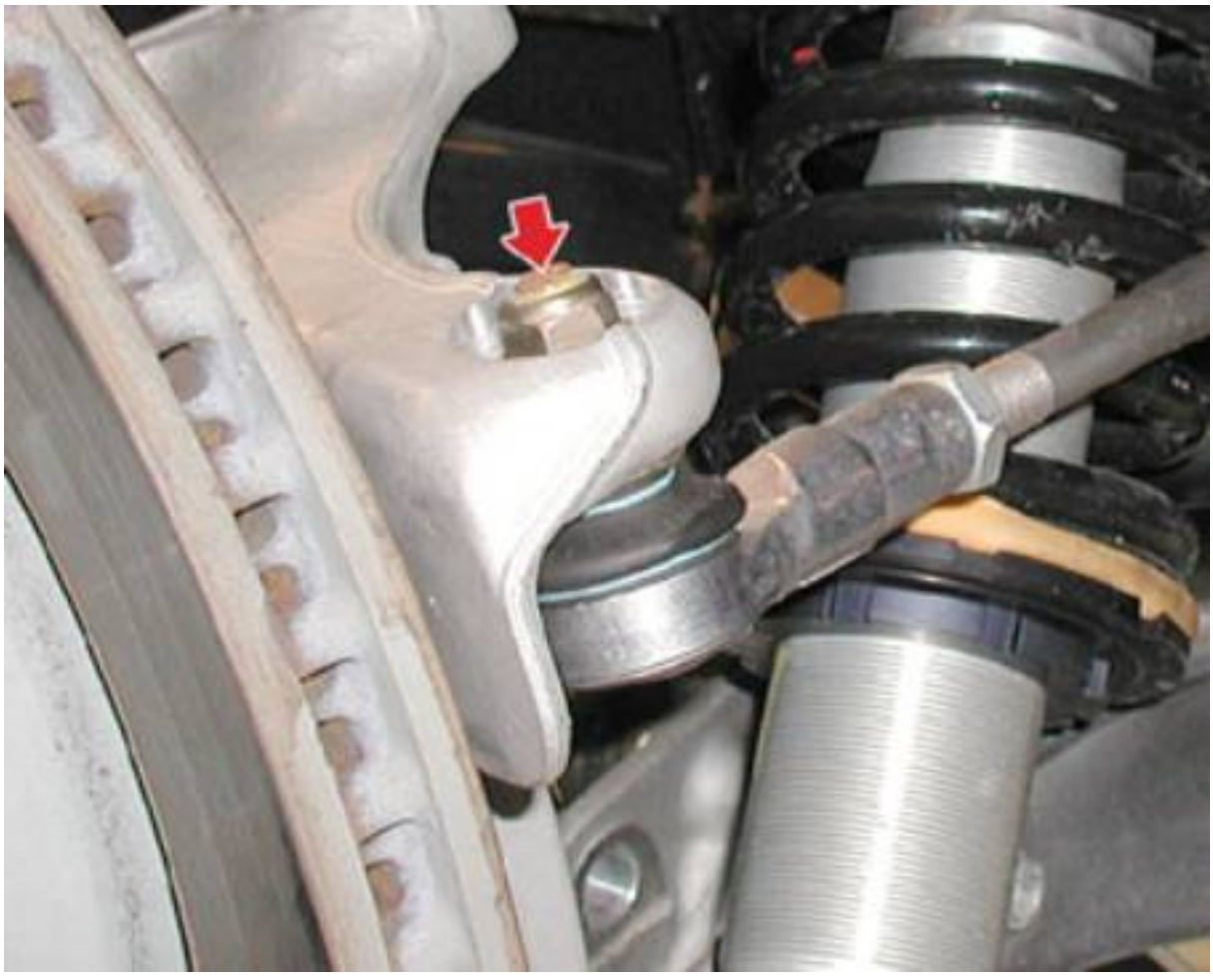
- Clean the area where the oil lines engage with the hydraulic steering rack carefully, in order to remove any residual oil.
- Tighten the unions to a **35 Nm** torque and attach the electrical connection from the hydraulic steering rack.

- Fit the air filter and relative rack cover, proceeding as described earlier for its removal but in reverse order.
- Tighten the nut fastening the small connecting rod to the stabiliser bar to a torque of **50 Nm**. Repeat the operation on the opposite side.

- Tighten the screws fastening the stabiliser bar to the chassis to a torque of **31 Nm** Repeat the operation on the opposite side.

- Tighten the fastening screw to a torque of **25 Nm**.

- Tighten the fastening nut on the steering tie-rod’s tapered head to a torque of **40 Nm**



- Fit the trim panels on the engine compartment.
- Fit the two front wheels.

Replacing the wheels

- Fit the engine floor guard (underfloor).

Engine floor guard

- For filling and draining the hydraulic steering oil circuit, see the section on "Circuit filling and level checks".

Circuit filling and level checks

- Remove the car from the hoist.

Hydraulic steering fluid tank

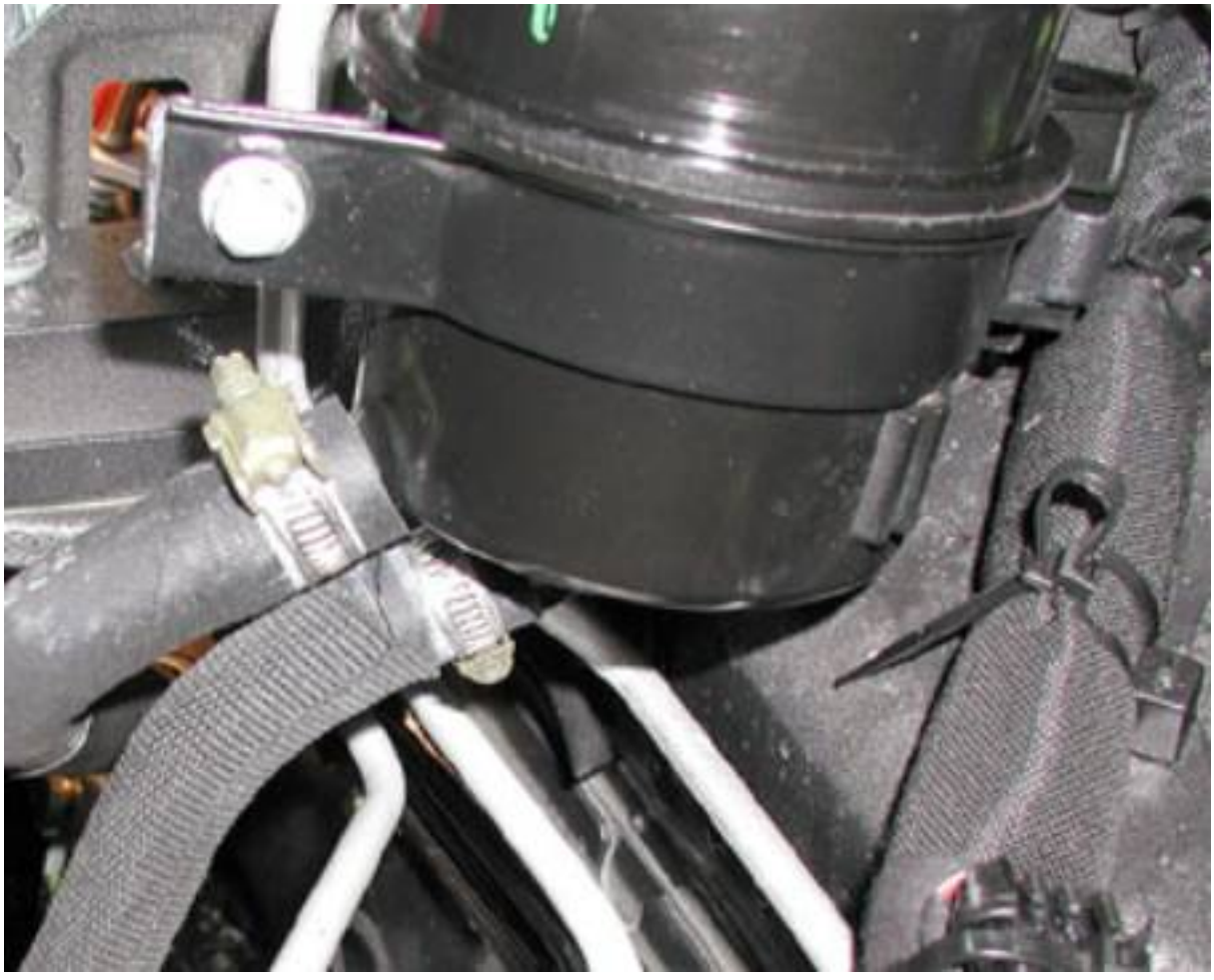
Removing the hydraulic steering fluid tank

- Remove the trim guards.

- Drain all the oil out the relative tank.
- Undo the screws, disconnect the two hoses and remove the hydraulic steering fluid tank .

N.B.
After detaching them from the tank, plug the two oil lines.

N.B.
Hydraulic steering fluid tank fitted on vehicles up to serial number 24274



N.B.
Hydraulic steering fluid tank fitted on vehicles from serial number 24275

Refitting the hydraulic steering fluid tank

- Fit the hydraulic steering fluid tank and connect the two hoses.
- Fasten the tank to the mounting bracket.
- For filling and draining the hydraulic steering oil circuit, see the chapter on "Circuit filling and level checks".

Circuit filling and level checks

- Fit the trim guards.

POWER STEERING PUMP

Removing the power steering pump

- Place the vehicle on the hoist.
- Remove the trim guards.

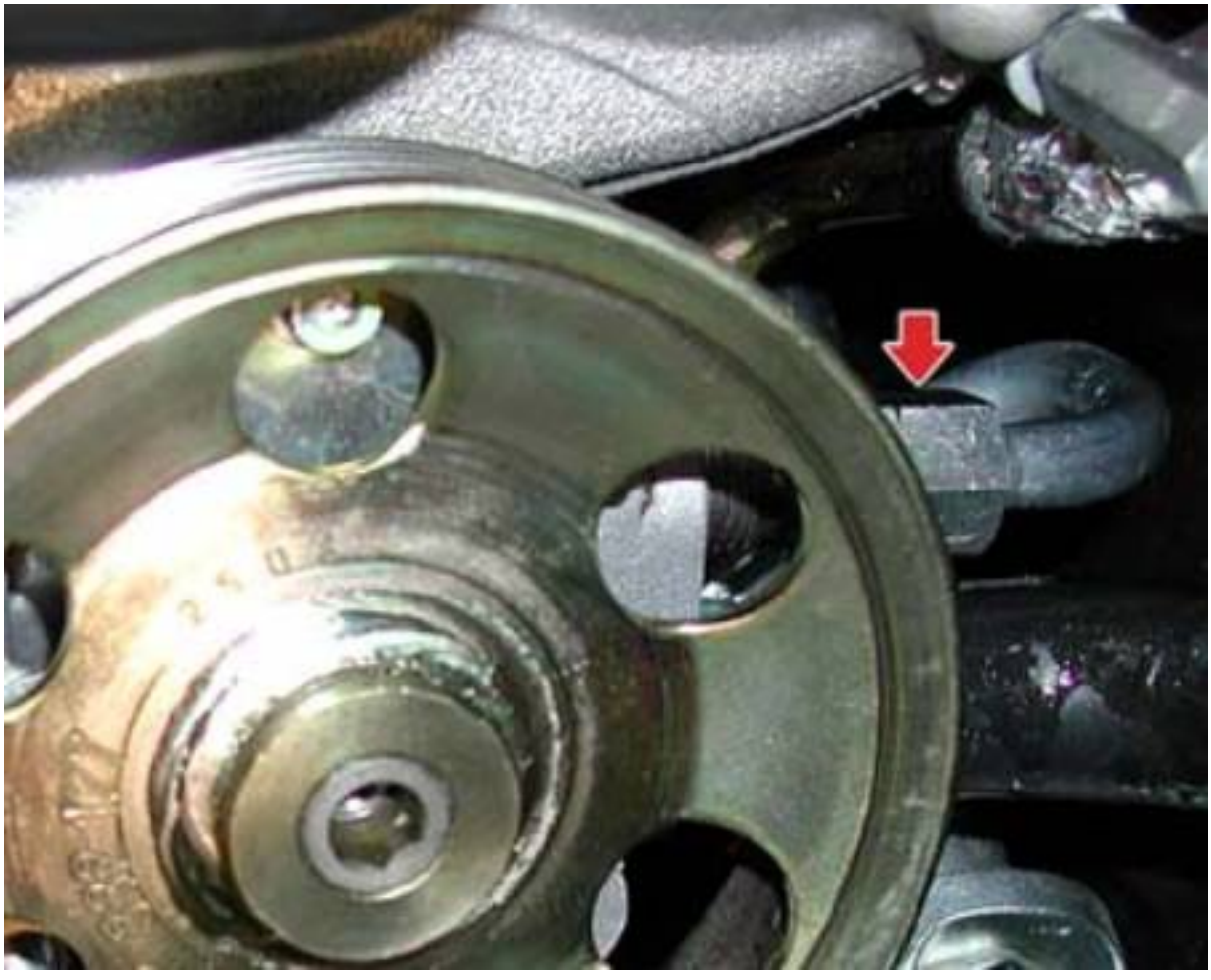
- Suck out the oil in the relative tank.
- Remove the belt controlling the engine auxiliary devices.

Engine auxiliary devices' control belt

- Unscrew the union fastening the oil line to the power steering rack and salvage the oil that leaks out.

- Disconnect the delivery line leading from the tank to the pump.

- Unscrew the union leading from the pump for the delivery line to the power steering rack.

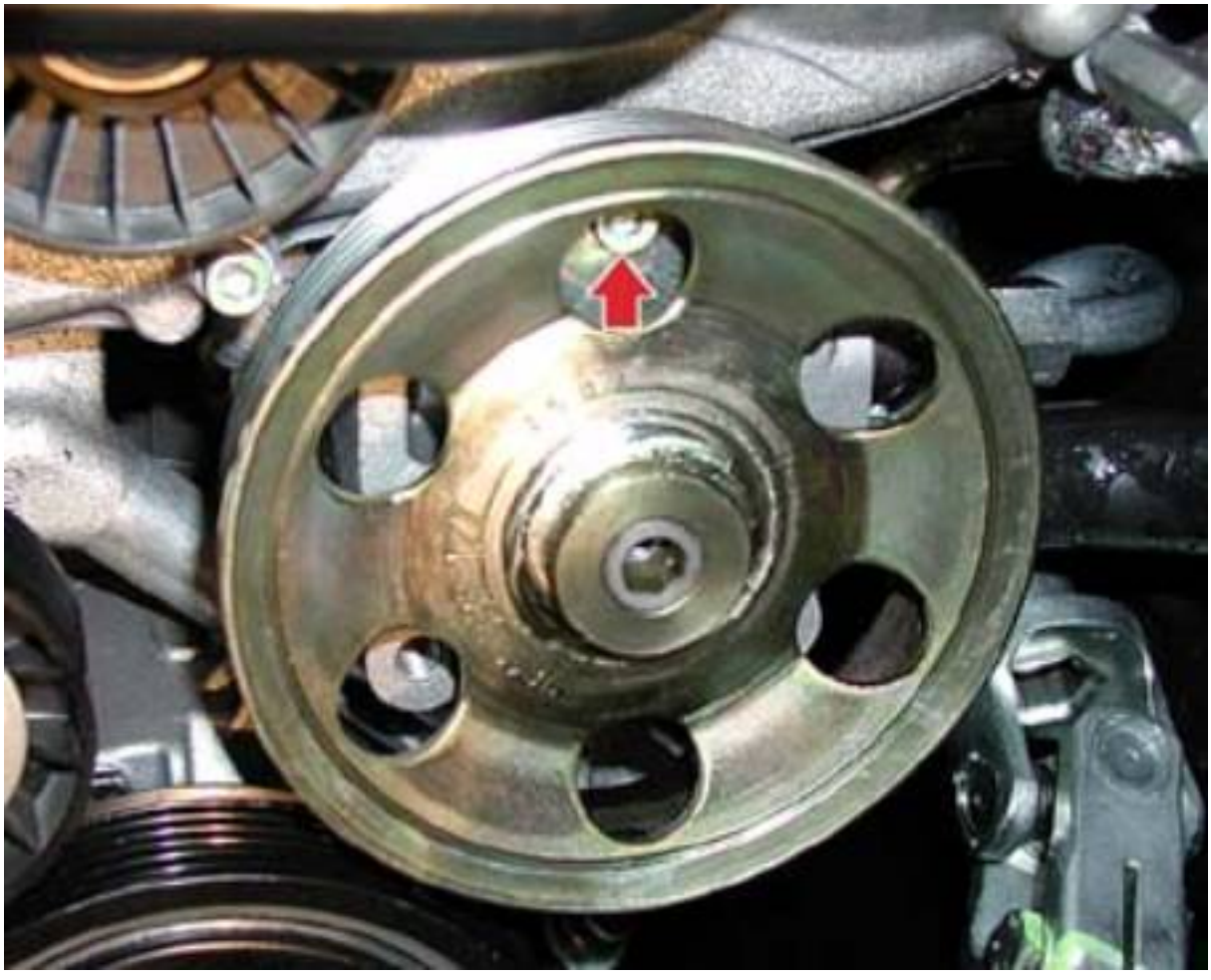


- Lift the hoist and undo the lower fastening screw on the power steering pump.

- Lower the hoist and undo the fastening screw on the automatic belt tensioning device, then remove the latter.

- Undo the lateral fastening screw on the power steering pump.

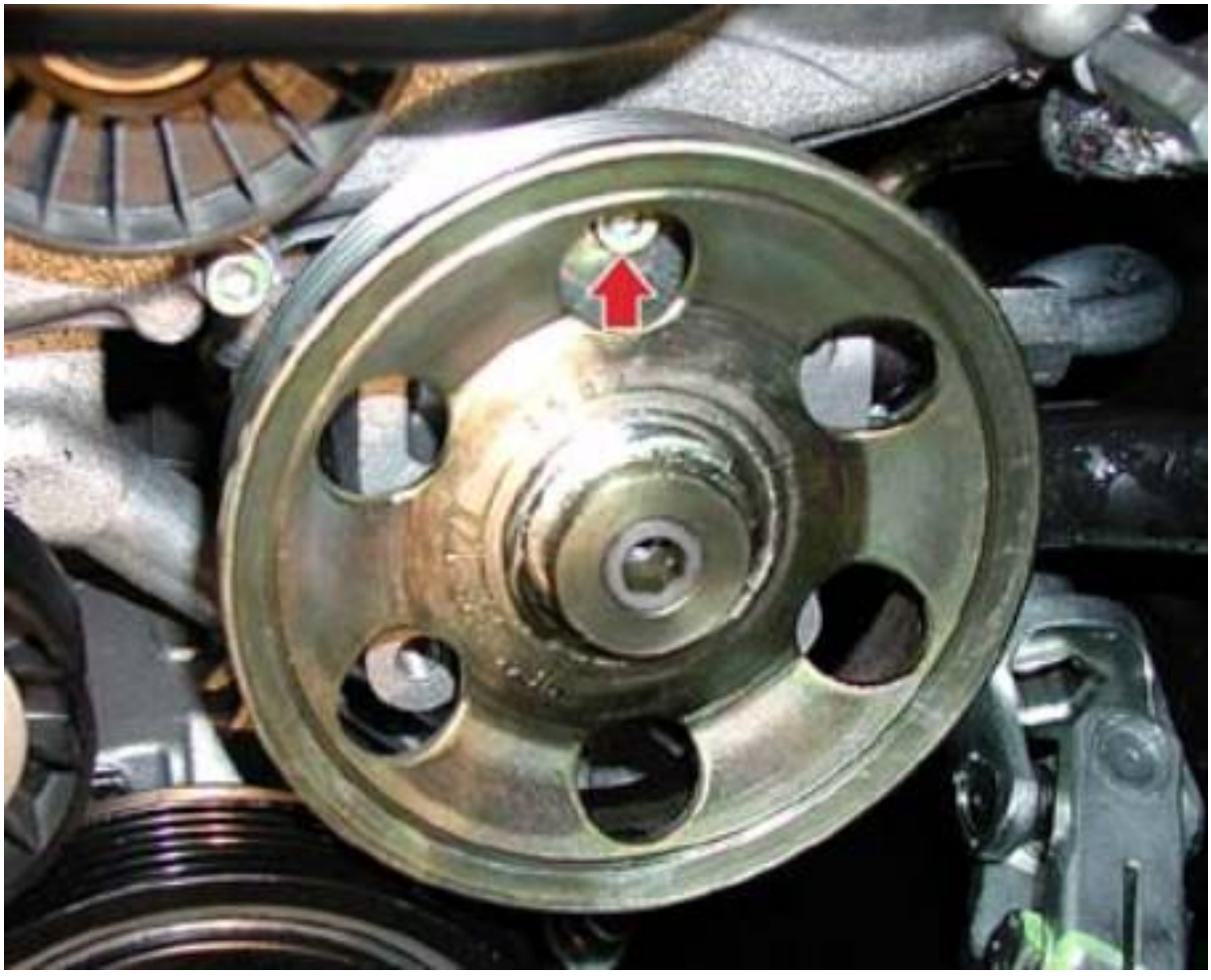
- Rotate the pulley so that the screw underneath it is accessible, then unscrew it.



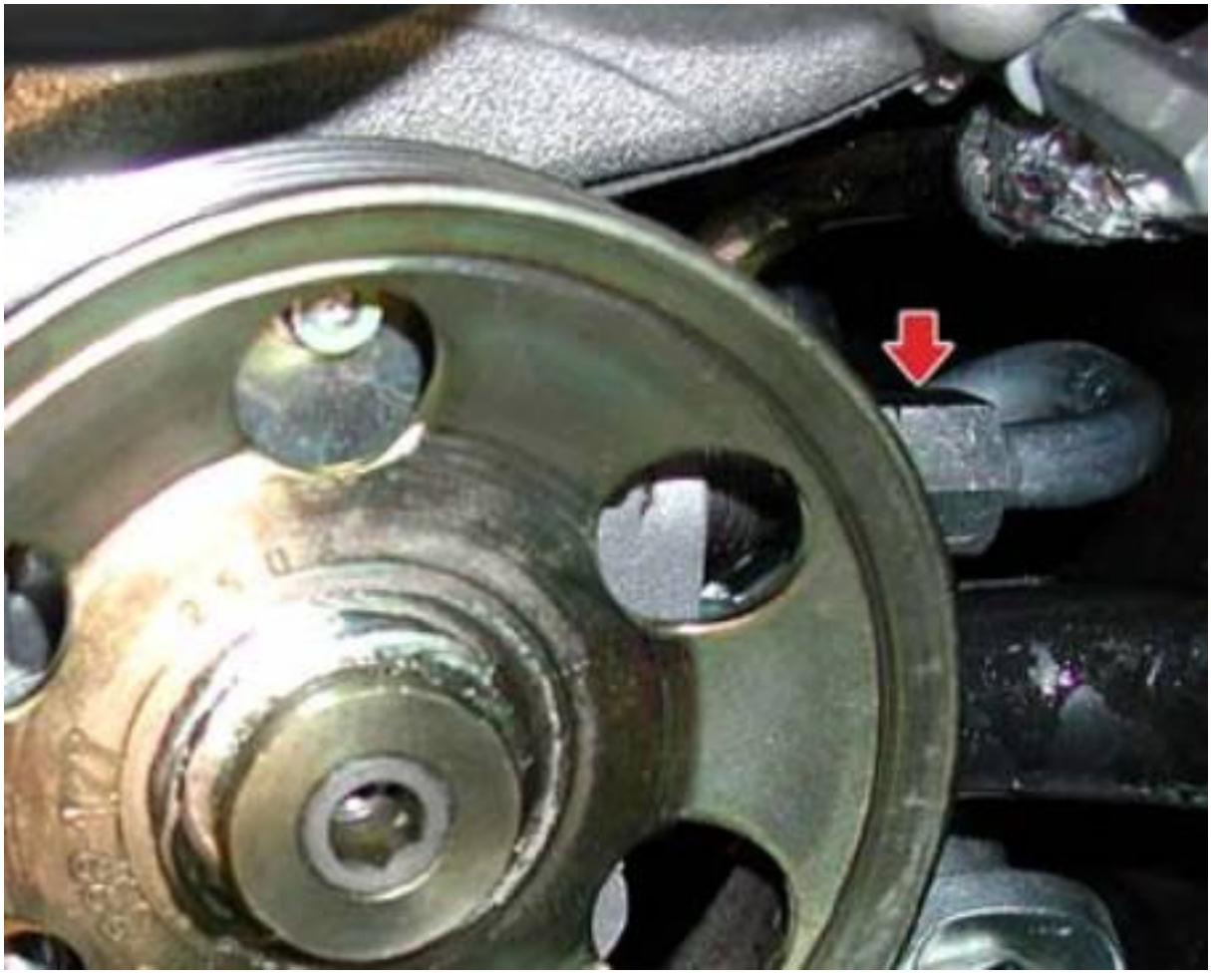
- Remove the power steering pump from the engine compartment.

Refitting the power steering pump

- Fit the power steering pump and tighten all the fastening screws to a torque of **25 Nm** .



- Tighten the union on the delivery line leading from the power steering rack to the pump to a **35 Nm** torque.



- Connect the delivery line from the tank to the pump.

- Tighten the fastening screw on the automatic belt tensioning device to a torque of **25 Nm**

- Clean the area where the oil line engages with the hydraulic steering rack carefully, in order to remove any residual oil.
- Tighten the union on the line to a **35 Nm** torque.

- Fit the belt controlling the engine auxiliary devices.

Engine auxiliary devices' control belt

- For filling and draining the hydraulic steering oil circuit, see the chapter "Circuit filling and level checks".

Circuit filling and level checks

- Fit the trim guards.
- Remove the vehicle from the hoist.

Fluid check

Hydraulic steering oil circuit

For filling and draining the hydraulic steering oil circuit, see the chapter headed "Circuit filling and level check".

Circuit filling and level checks

air conditioner compressor

Removing the air conditioner compressor

- Place the vehicle on the hoist.
- Remove the trim guards.

- Before carrying out the drainage/recovery operation on the air conditioning/ heating system, take the safety and prevention measures described in the relative chapter.

Prevention measures and protection devices

- Connect the drainage/recovery/refilling equipment to the two unions on the two high and low pressure air conditioning system lines, then drain the system.

- Remove the belt controlling the engine auxiliary devices.

Engine auxiliary devices' control belt

- Undo the fastening screw on the two lines leading to the air conditioner compressor.

- Detach the electrical connection on the electromagnetic joint, unscrew the four fastening screws and remove the air conditioner compressor.

Refitting the air conditioning compressor

- Fit the air conditioner compressor and tighten the four fastening screws to a torque of 25 Nm.
- Attach the electrical connection on the electromagnetic joint.

- Connect the two lines to the air conditioner compressor and tighten the fastening screw.

- Fit the belt controlling the engine auxiliary devices.

Engine auxiliary devices' control belt

- Before refilling the air conditioning system, take the safety and prevention measures described in the relative chapter.

Prevention measures and protection devices

- Top the coolant up to the correct level, referring to the relative chapter for the quantity.

Circuit filling and level checks

- Connect the refilling equipment to the two unions on the two high and low pressure air conditioning system lines, then refill the system.

- Fit the trim guards.
- Remove the vehicle from the hoist.

Heater-evaporator unit

Removing the heater-evaporator unit

- Remove the trim guards.

- Before carrying out the drainage/recovery operation on the air conditioning/ heating system, take the safety and prevention measures described in the relative chapter.

Prevention measures and protection devices

- Connect the drainage/recovery/refilling equipment to the two unions on the two high and low pressure air conditioning system lines, then drain the system.

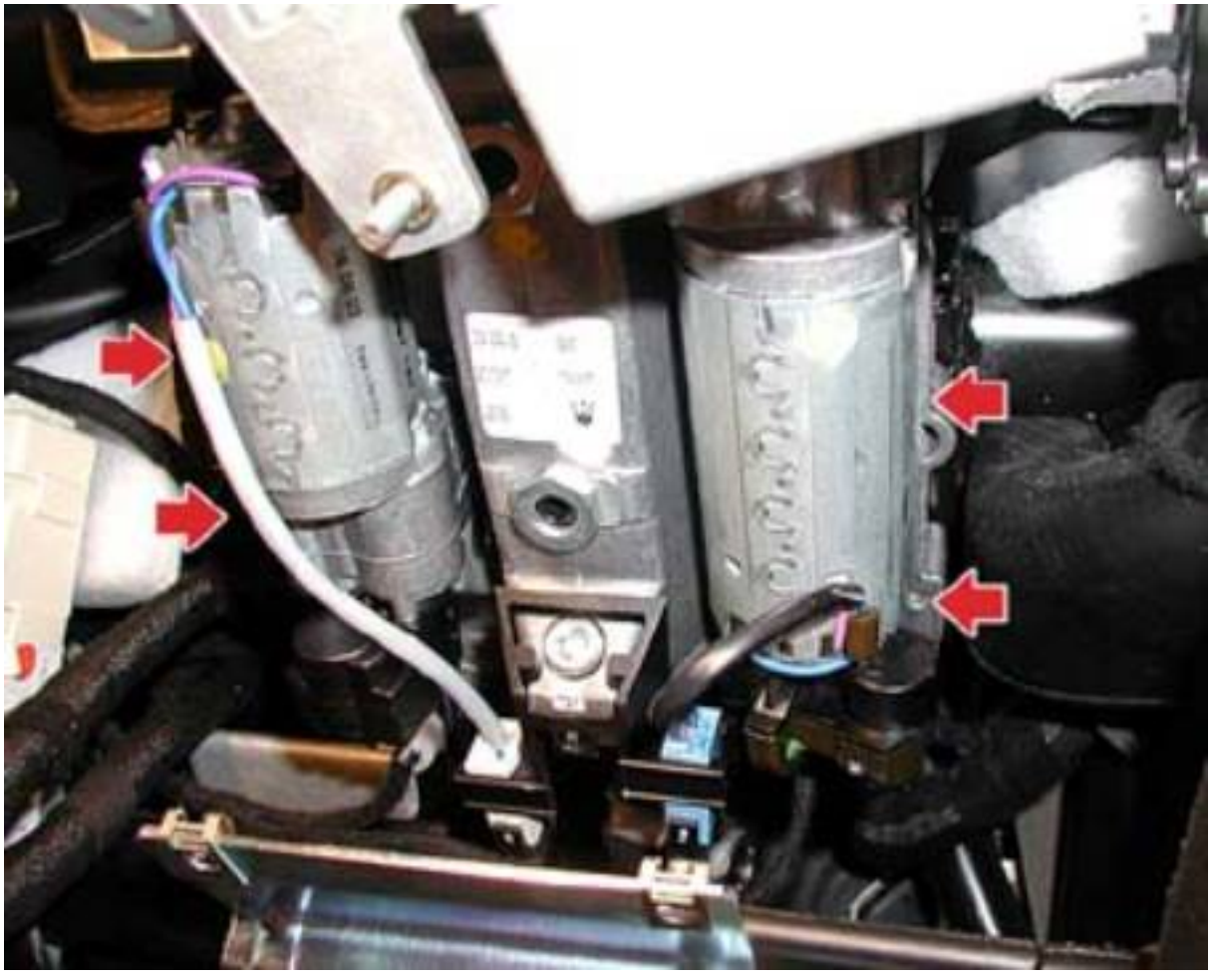
- Disconnect the battery's negative terminal.
- Remove the instrument panel.

Removing-refitting the dashboard

- Remove the Body Computer node.

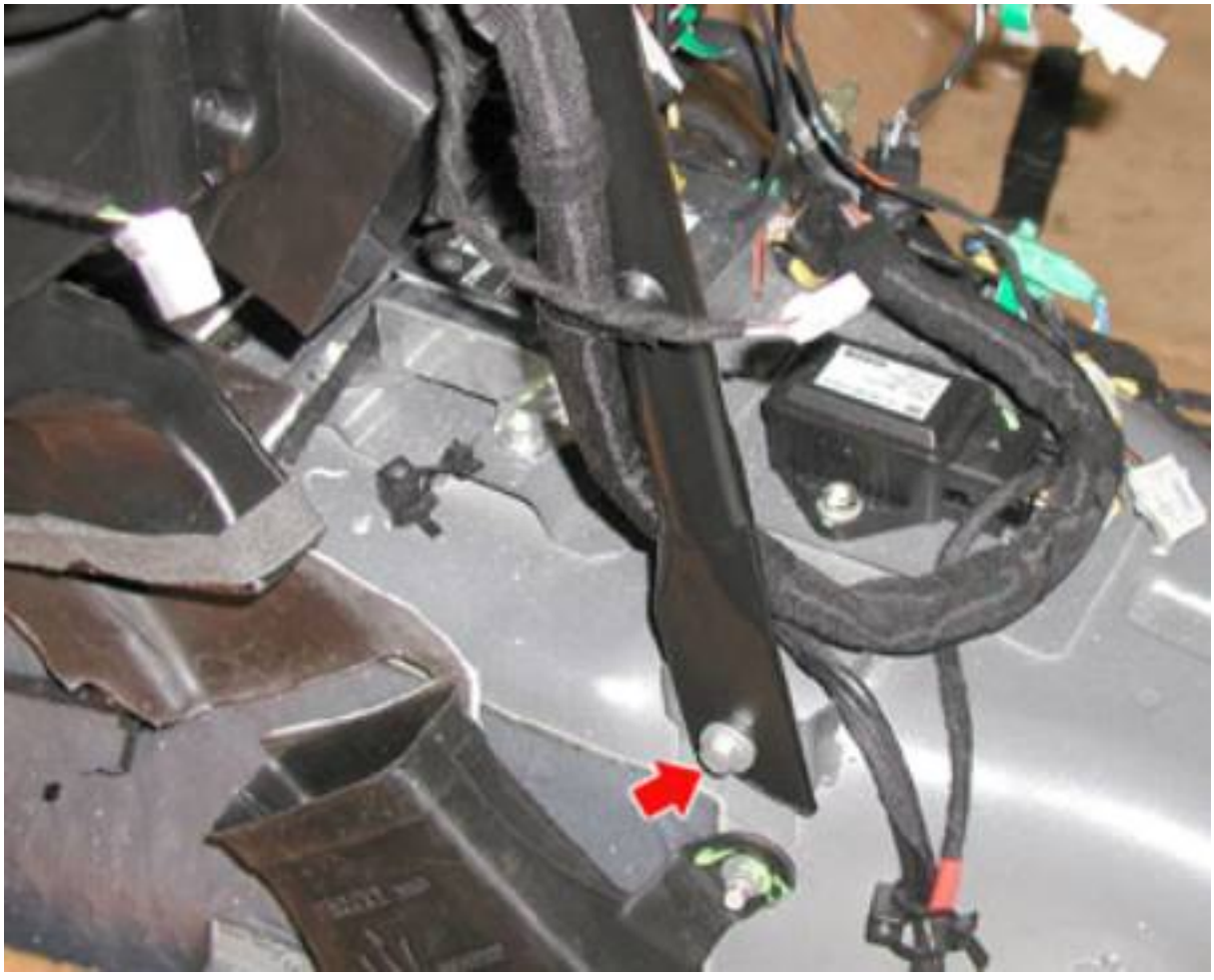
Removing - refitting the Body Computer node (NBC)

- Undo the screws (two upper screws not shown) fastening the steering column to the cross member supporting the dashboard and lower the steering column.



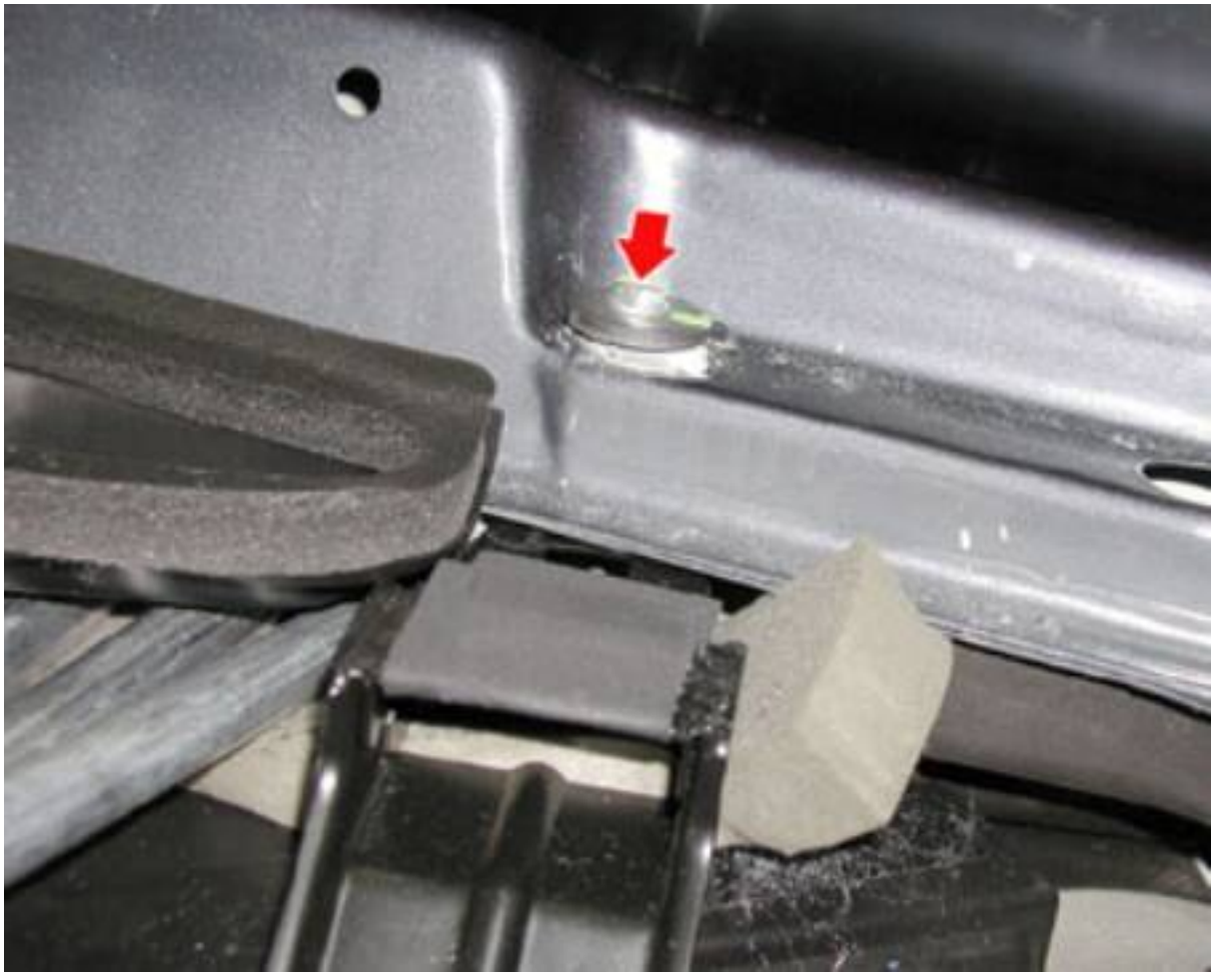
- Undo the two right- and left-hand screws fastening the mounting frame to the bodywork.

- Undo the screws fastening the dashboard mounting frame to the floor.

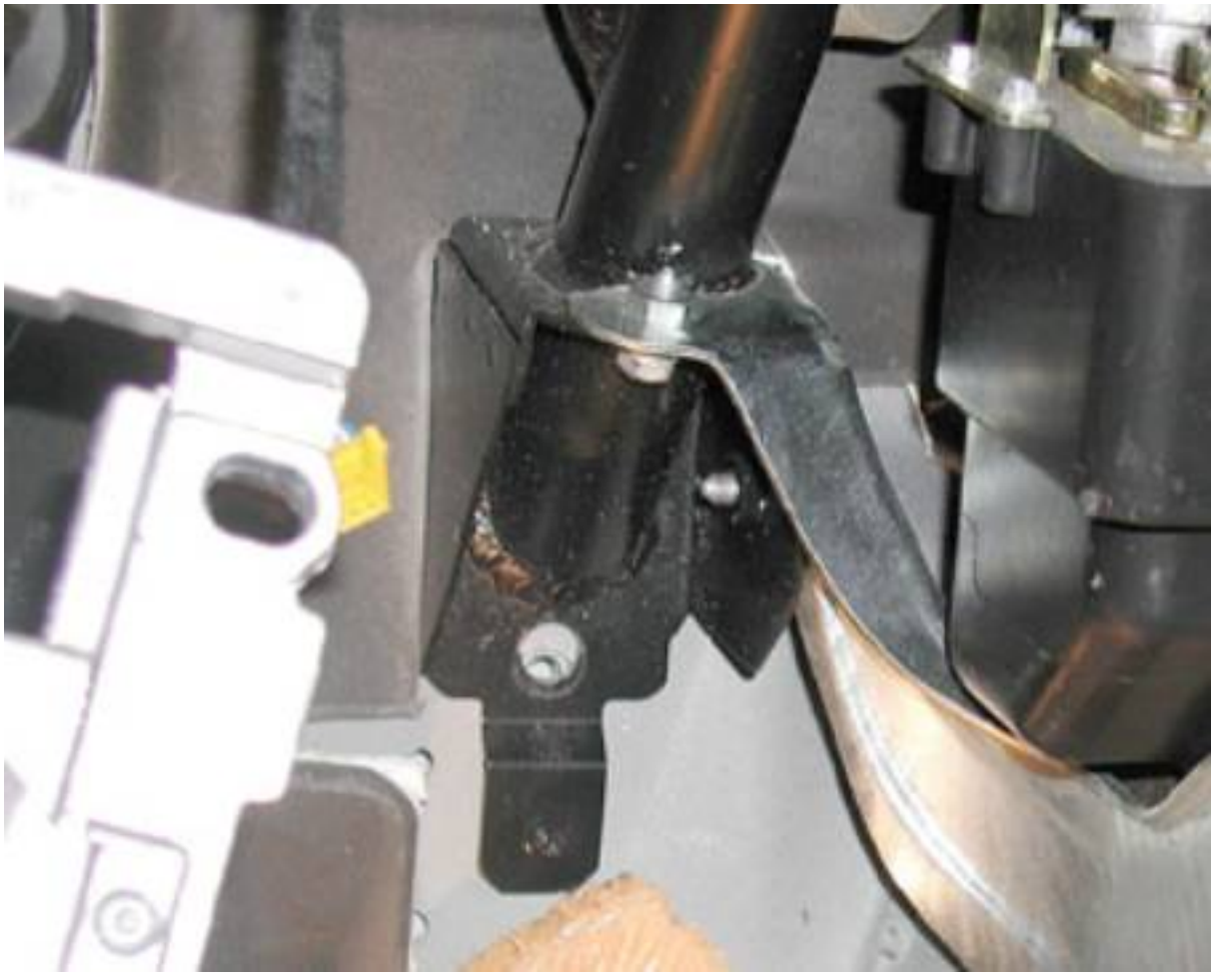


- Undo the two screws (left-hand side) fastening the dashboard mounting frame to the bodywork.

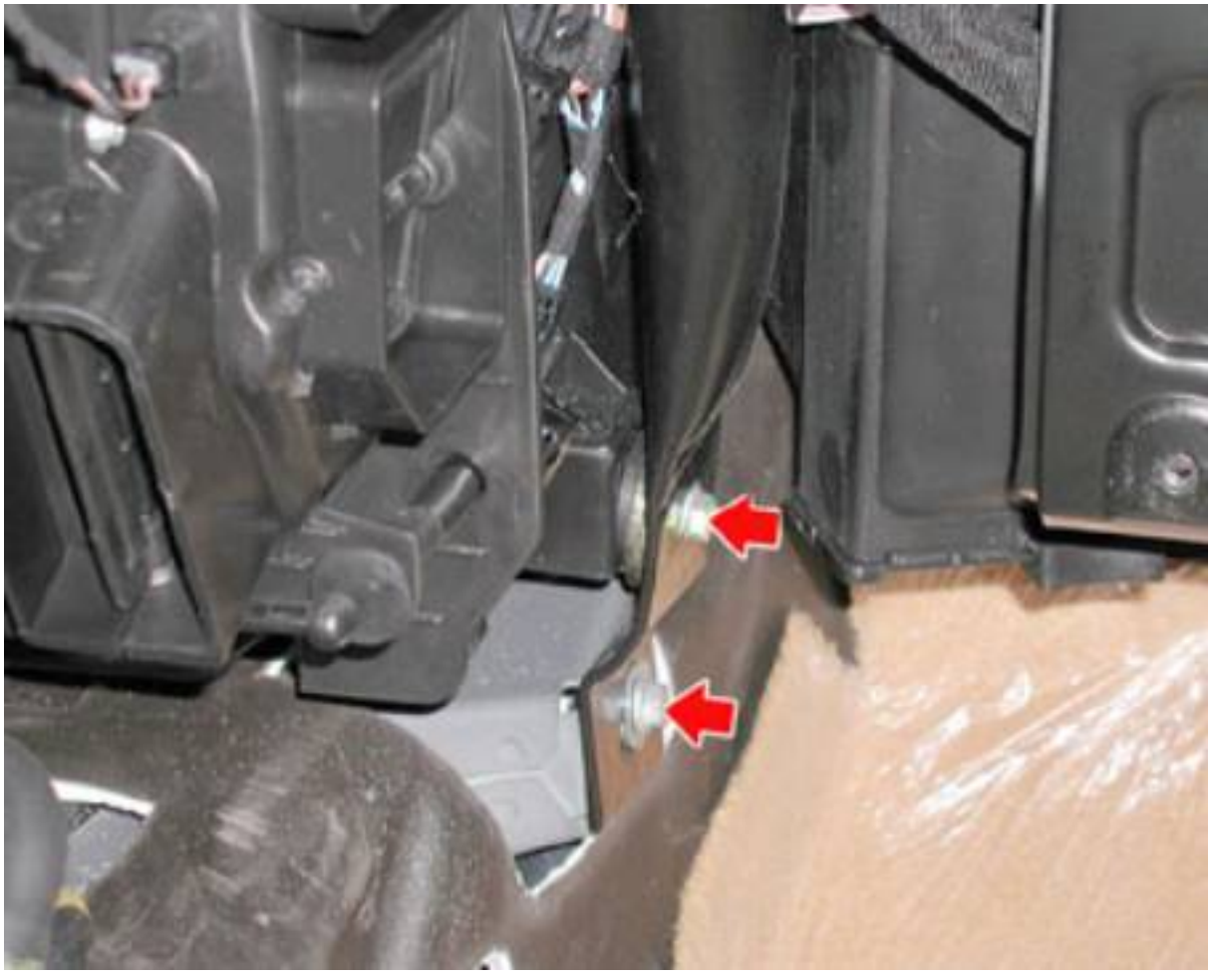
- Undo the screw (right-hand side) fastening the dashboard mounting frame to the bodywork.



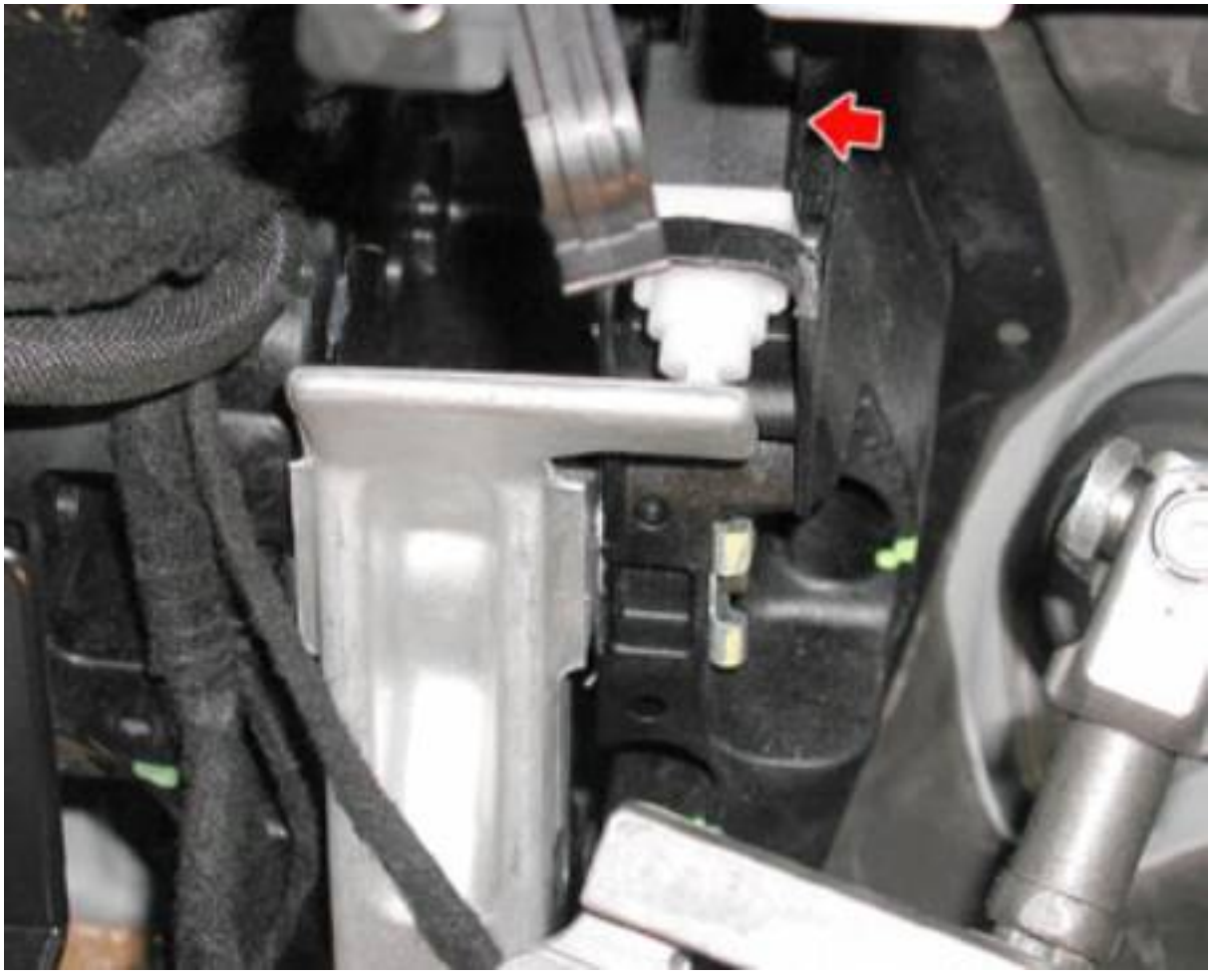
- Undo the screws and the nut fastening the dashboard mounting frame to the left-hand bodywork.



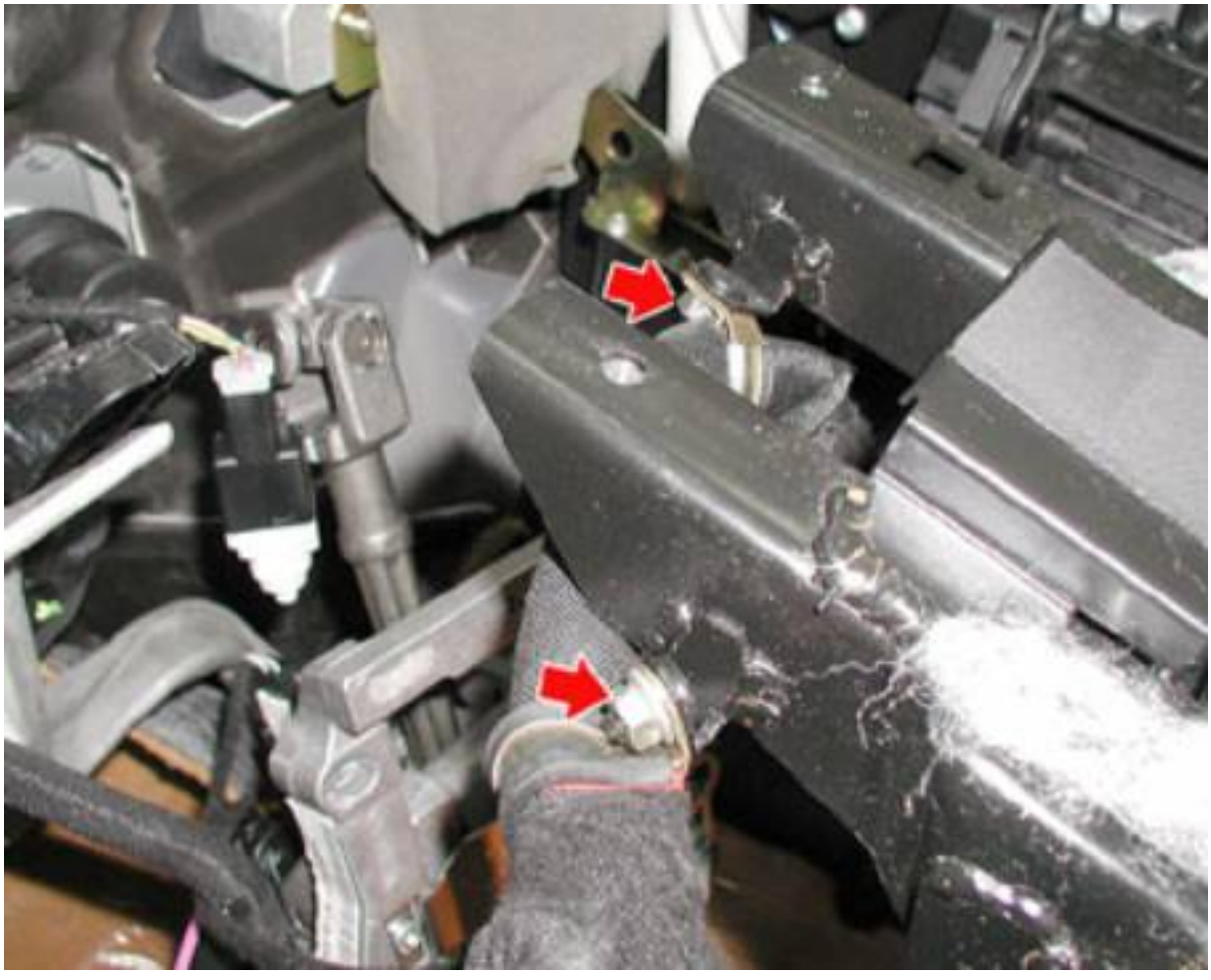
- Undo the screws fastening the mounting frame to the bodywork and to the heater-air conditioning unit.



- Detach the electric connection for the brake pedal switch.



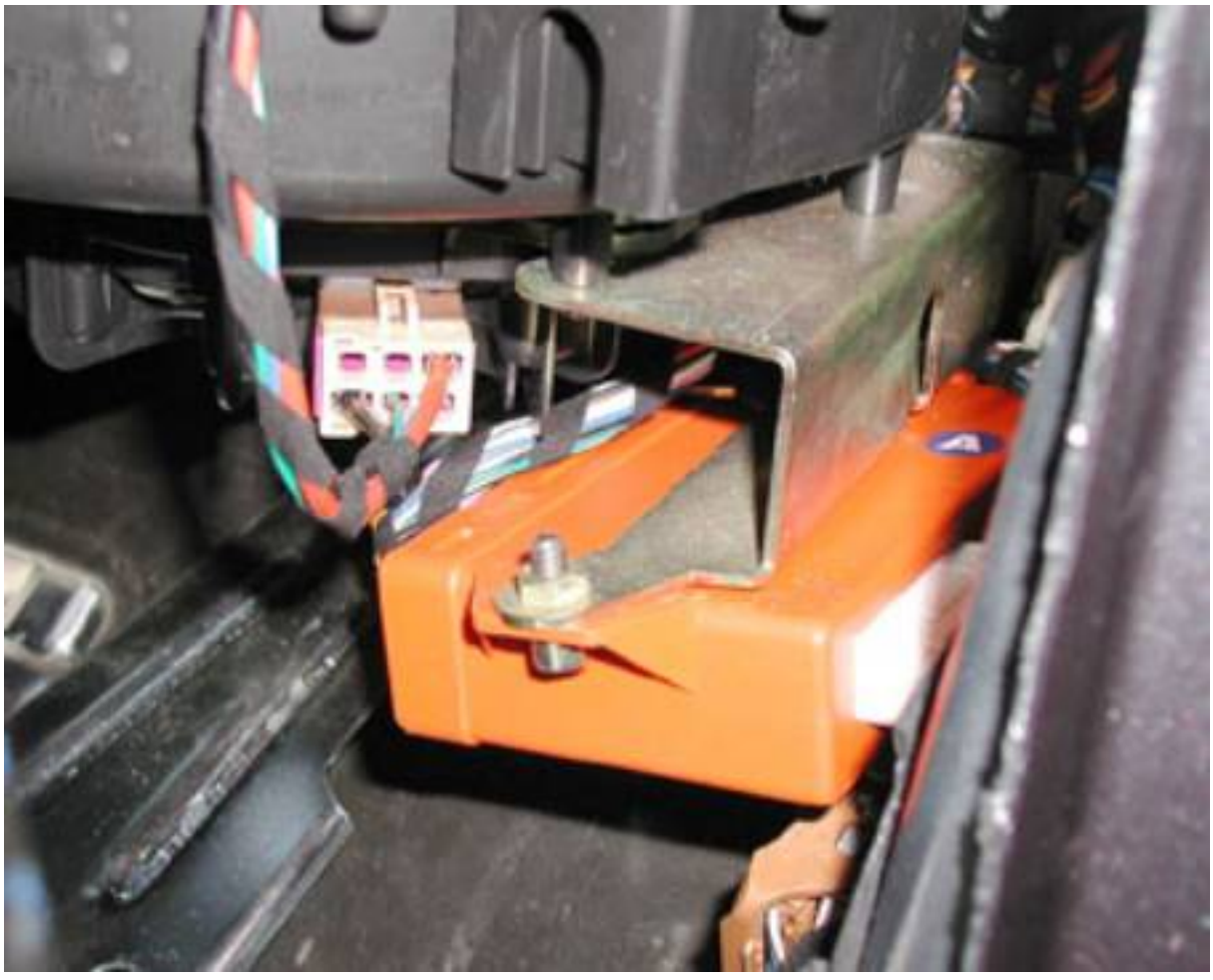
- Pull the dashboard mounting frame out of its seat partially and unscrew the fastening nuts on the dashboard wiring.



- Disconnect the condensation outlet hose on the air conditioning/heating unit.

- Undo the fastening screws on the air conditioning and heating system node (NCL).

N.B.
Do not detach the electric connections on the air conditioning and heating system node



- Pull the dashboard mounting frame out of its seat as far as possible, without damaging the wiring connected to it.

- Remove the plugs covering the windscreen wiper fastening.

- Unscrew the fastening nuts and screw and remove the two windscreen wipers.

- Undo the outer edge screws fastening the connected devices' pan cover and remove it. .

- Detach the windscreen wiper motor's electric connection.

- Undo the two upper fastening screws on the windscreen wiper unit.

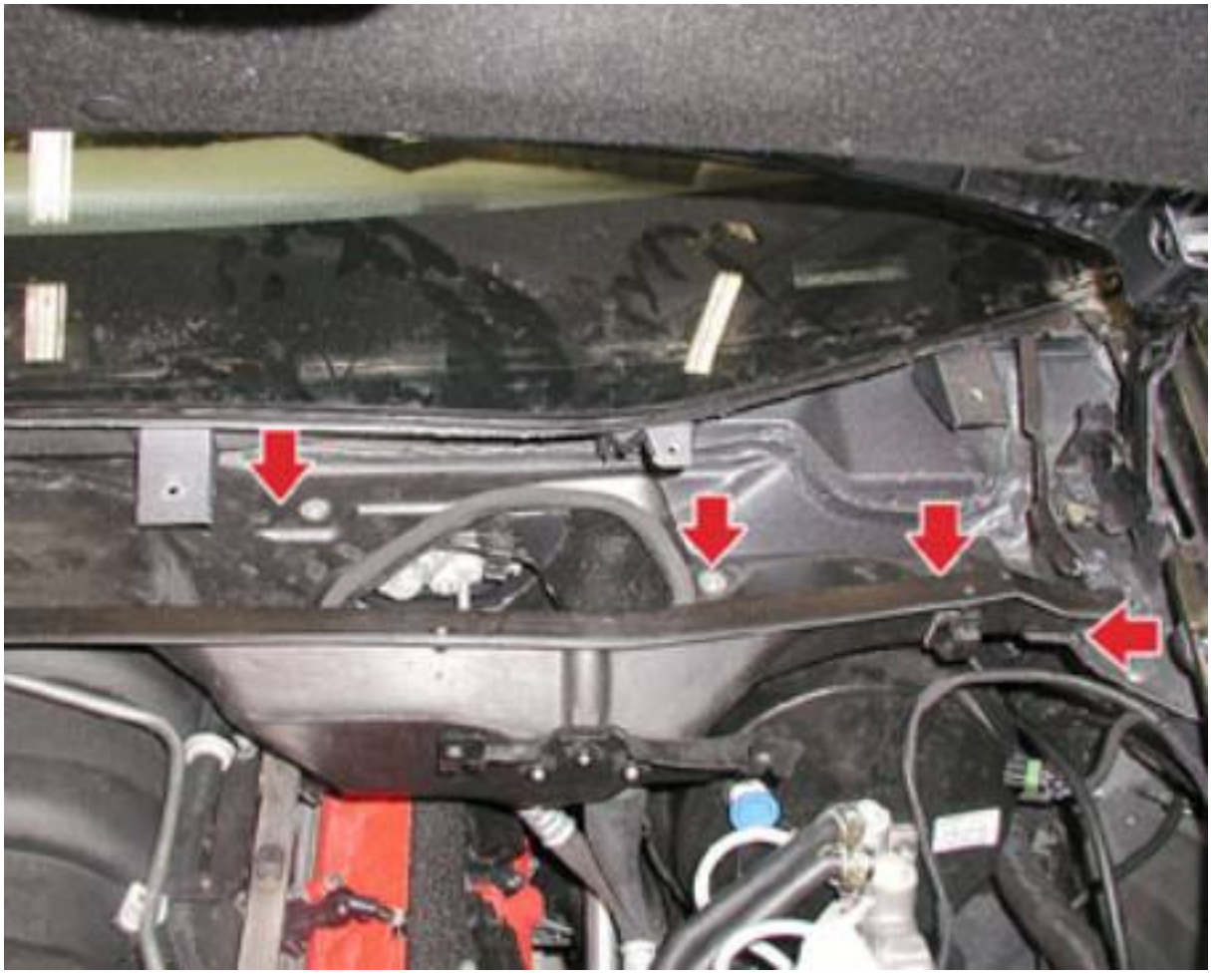
- Undo the two lower fastening screws on the windscreen wiper unit, then remove it.

- Undo the screws fastening the brake oil tank.

- Detach the electric connection.

- Undo the screws fastening the connected devices' pan underneath the windscreen.

- Undo the screws fastening the left-hand pan for the connected devices underneath the windscreen and remove the pan.

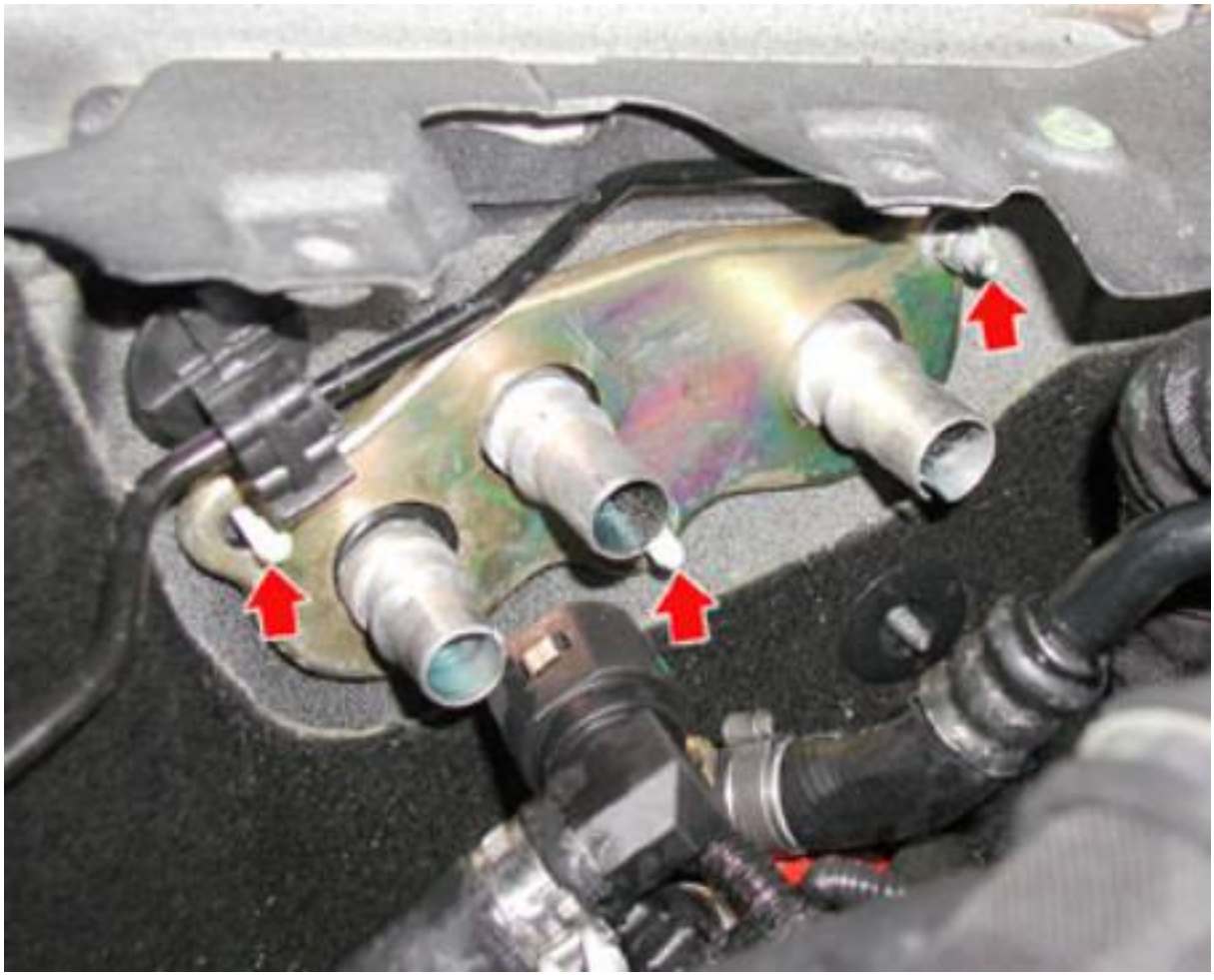


- Undo the fastening screws and disconnect the two high and low pressure lines on the air conditioning/ heating system from the expansion valve.

- Disconnect the engine coolant lines from the heater/air conditioning unit.

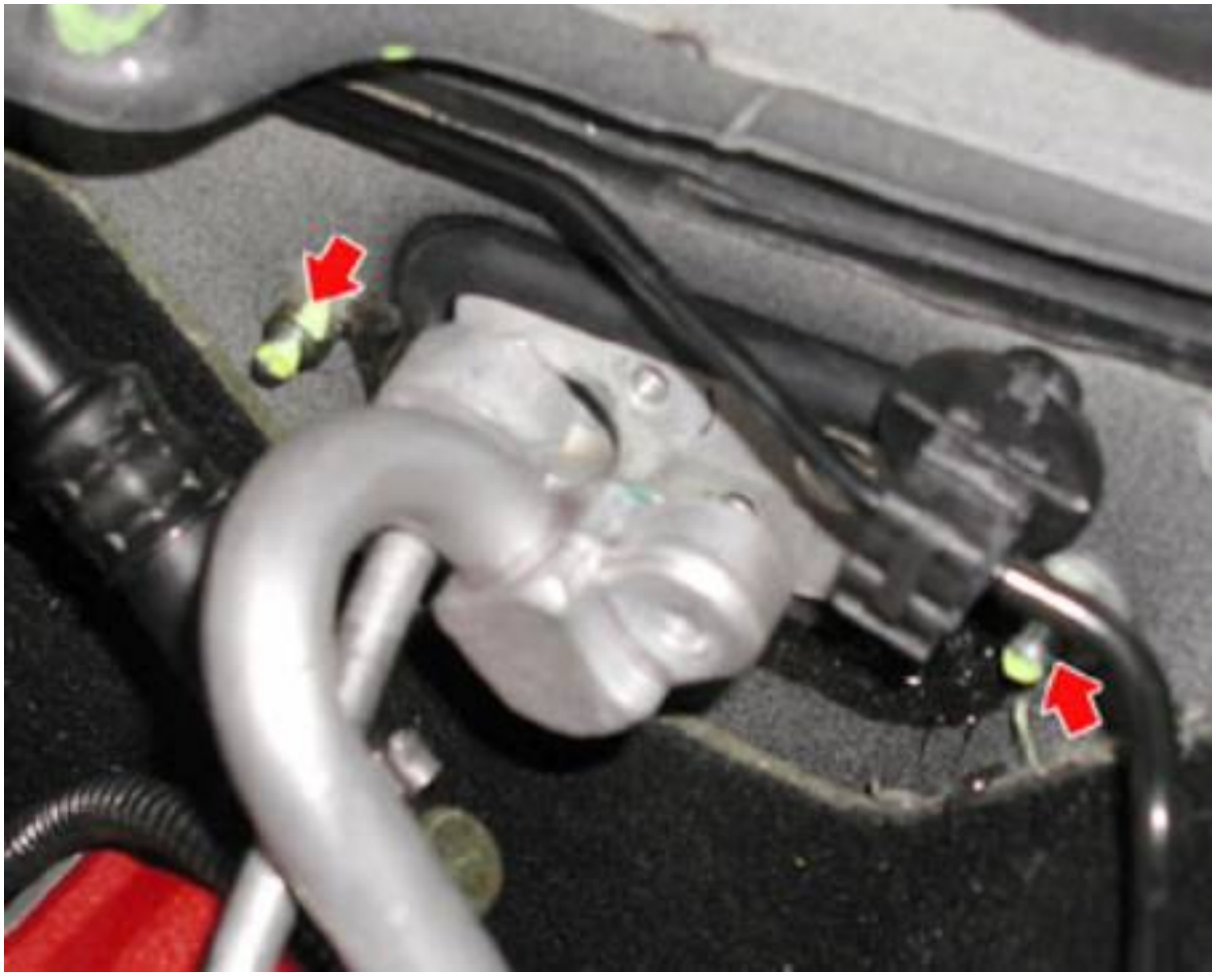
- Undo the two screws fastening the wiring to the body.

- Unscrew the three fastening nuts on the flange for the heater unit lines.



- Remove the flange complete with the gasket underneath it.

- Unscrew the fastening nuts on the flange for the air conditioning/heating unit lines.



- Pull the air conditioning/heating unit out of its seat partially and disconnect the wiring joint on the air conditioning/heating system

- With the help of a second operator, remove the air conditioning/heating system from the passenger compartment.

When refitting, follow the above procedures in reverse order

AIR CONDITIONING/HEATING SYSTEM ECU

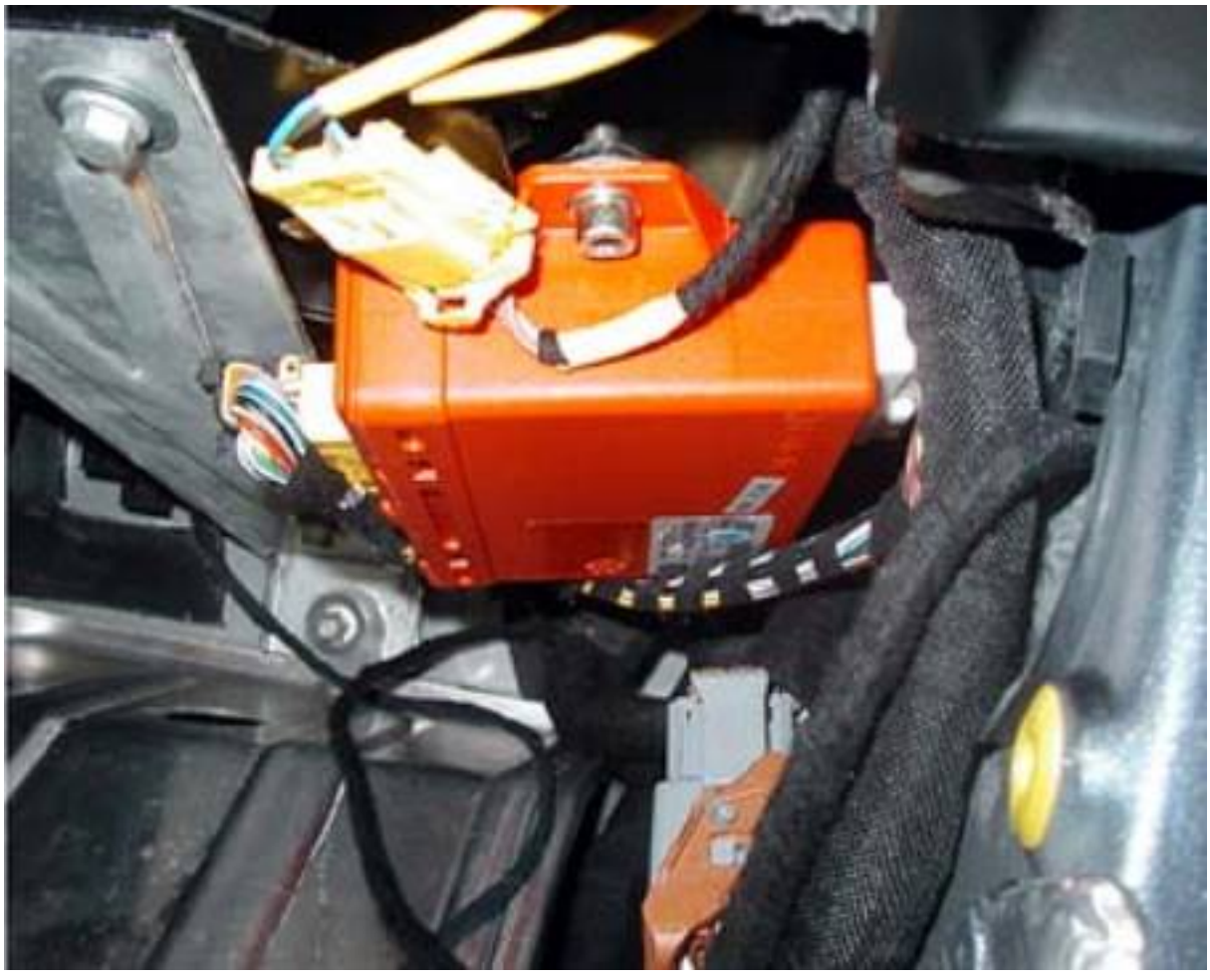
Removing-refitting the Air conditioning/heating system ECU

- Disconnect the battery's negative terminal.
- Undo the fastening screws and remove the side guard.

- Remove the corner guard from the floor trim panel.

- Lift and tilt the floor trim panel and the soundproofing material on the floor area.

- Undo the fastening screws (one per side, one of which is not shown), detach the electric connections and remove the Air conditioning/heating system ECU.



When refitting, follow the above procedures in reverse order

- After connecting the negative battery terminal, the following self-learning operations must be carried out to ensure certain connected devices acknowledge the system again.
- Refer to section:

Component self-learning in the event of battery disconnection

- In the event that the air conditioning/heating system ECU (NCL) is replaced, the "Proxy" procedure must be run so that the new component recognises the Can network and begins to dialogue with it.
- Connect the SD3 tester (**95970312)** to the diagnostics socket and run the "Proxy" procedure.

ANTI-POLLEN FILTER

Removing-refitting the anti-pollen filter

- Slide the cover underneath the passenger side glove compartment.

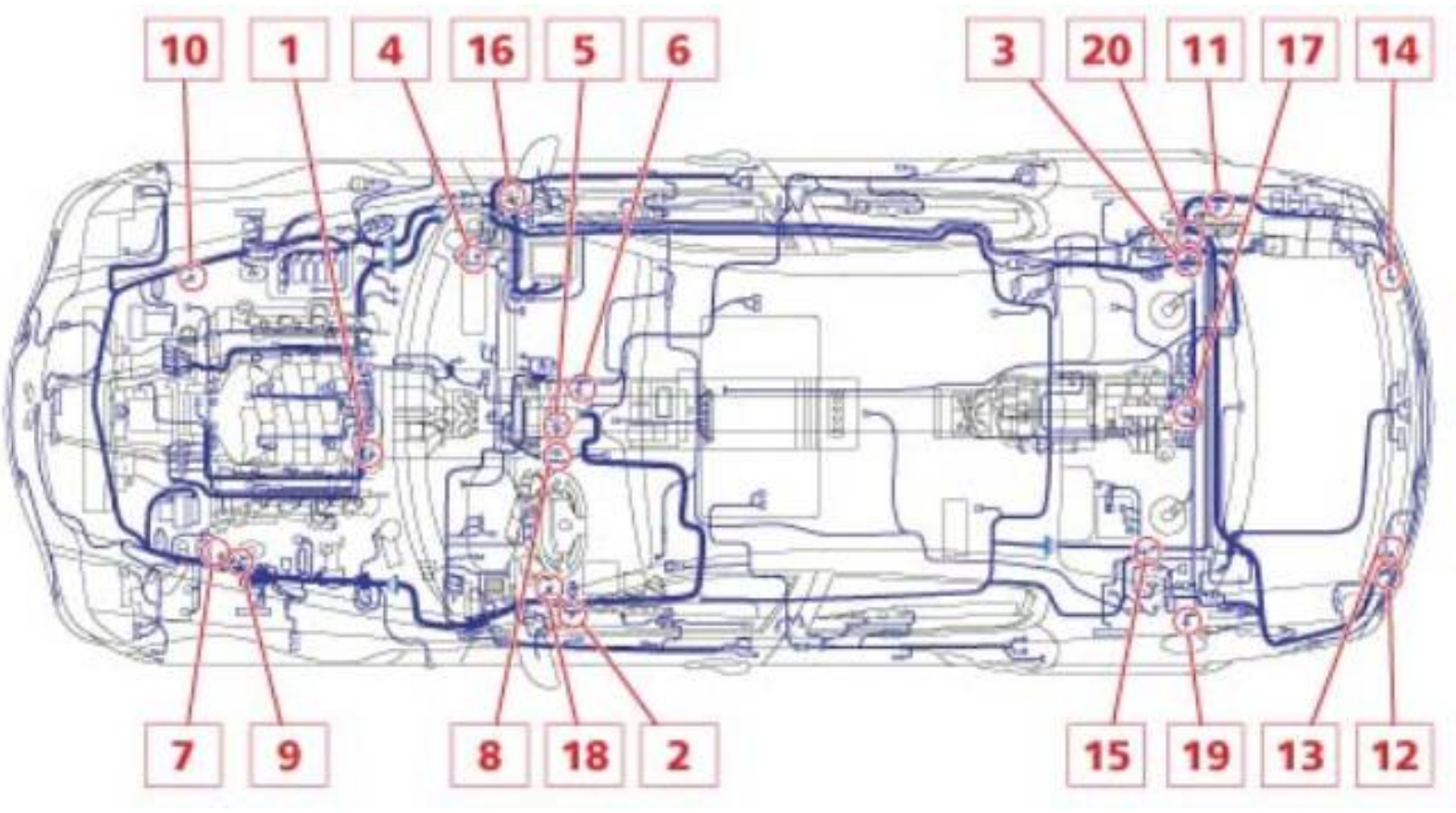
- Remove the cover and the filter, sliding them both downwards.

When refitting, follow the above procedures in reverse order

Tightening torques

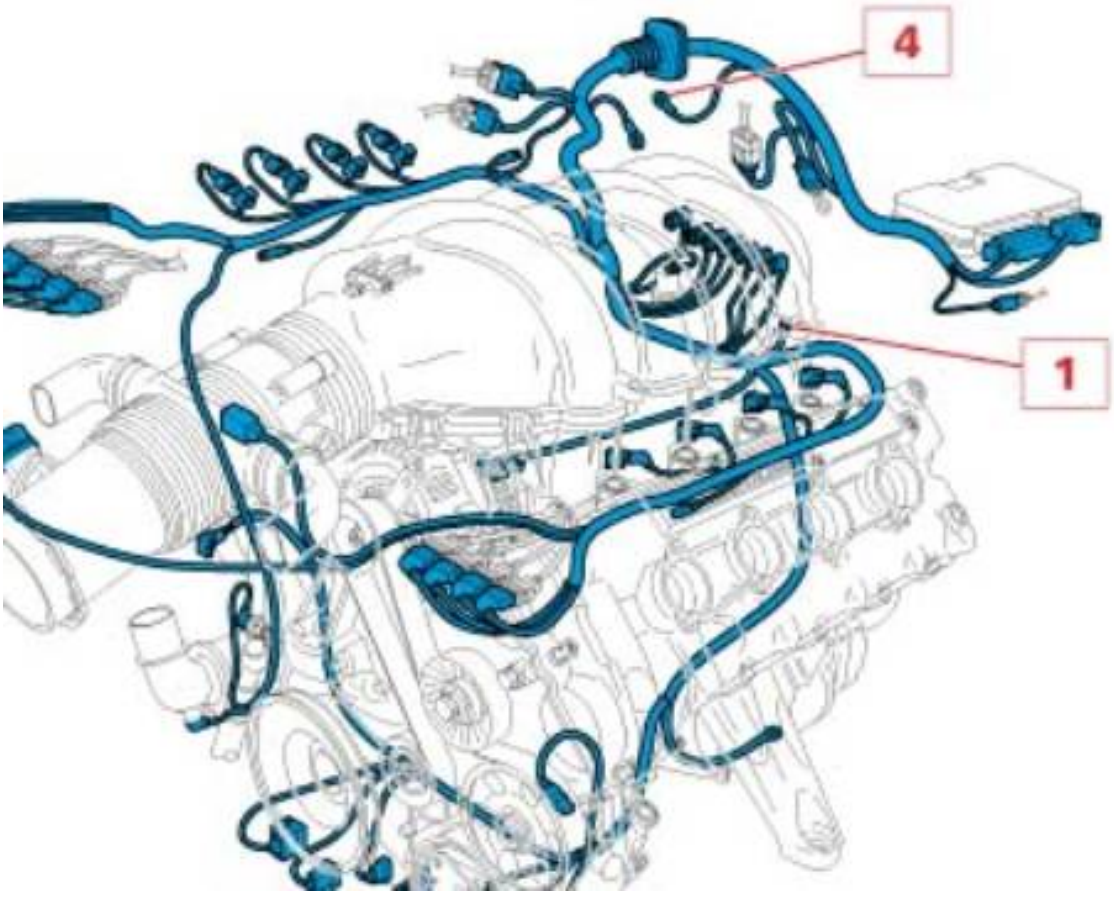
Description	Torque	Product
Nut fastening positive and negative terminal plate on battery	5	
Nut fastening positive cables to battery link	11	
Nut fastening positive cables to branching node	15	
Screw fastening earths with stainless steel plates	15	
Nut fastening positive cable to 30+ starter motor	9	
Nut fastening earth cable onto gearbox	15	
Nut fastening earths onto welded pins	10	
Nut fastening buzzer bracket onto bodywork	8	
Nut fastening AIR–BAG ECU	8	
Nut fastening NAG ECU	8	
Nut fastening headlights set-up ECU onto mount	8	
Nut and screw fastening lower TV tuner bracket to floor	8	

EARTHS LOCATION IN THE VEHICLE

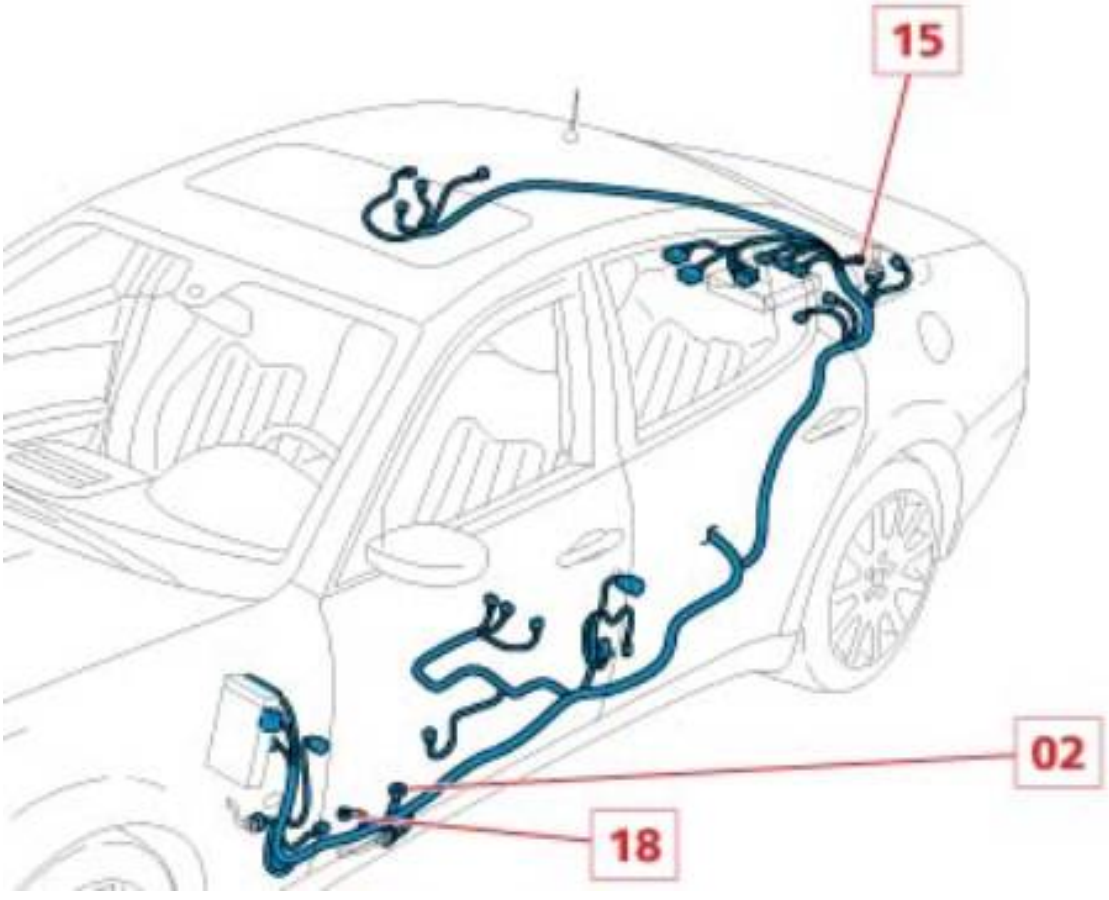


- 1.INJECTION EARTH ON ENGINE
- 2.FRONT LH EARTH
- 3.F1 GEARBOX EARTH B
- 4.INJECTION EARTH ON BODYWORK
- 5.DASHBOARD CABLE EARTH ON RH SIDE OF TUNNEL
- 6.AIRBAG EARTH ON PASSENGER COMPARTMENT CABLE
- 7.ABS EARTH
- 8.AIR-BAG ECU EARTH
- 9.FRONT LH ENGINE COMPARTMENT EARTH
- 10.FRONT RH ENGINE COMPARTMENT EARTH
- 11. EARTH AND F1 GEARBOX
- 12.LH LUGGAGE COMPARTMENT EARTH
- 13.LH LUGGAGE COMPARTMENT EARTH
- 14.RH LUGGAGE COMPARTMENT EARTH
- 15.REAR PASSENGER COMPARTMENT EARTH ON PARCEL SHELF
- 16.FRONT LH EARTH ON PASSENGER COMPARTMENT CABLE
- 17.FUEL TANK EARTH
- 18.FRONT LH EARTH
- 19.FUEL FILLER NECK EARTH
- 20. F1 GEARBOX EARTH

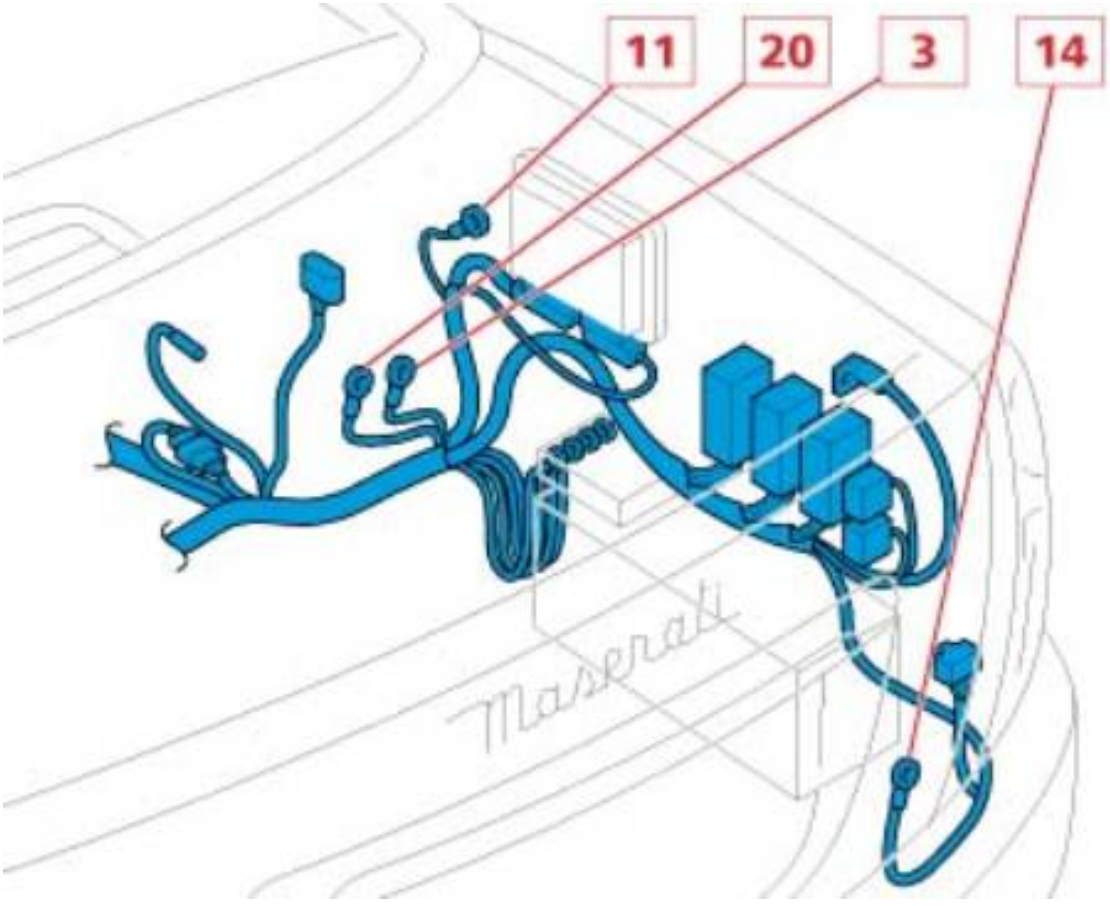
- 01 INJECTION EARTH ON ENGINE
- 04 INJECTION EARTH ON BODYWORK



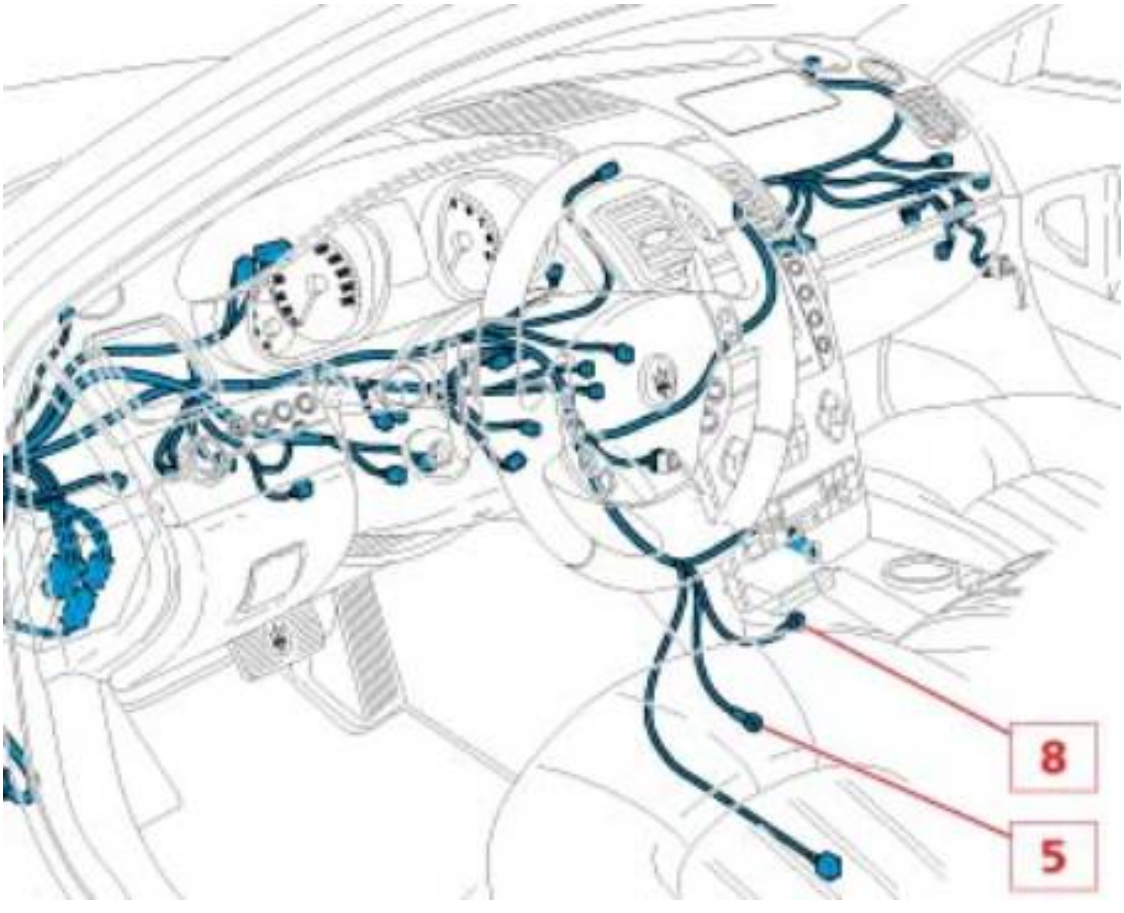
- 02 FRONT LH EARTH
- 15 REAR PASSENGER COMPARTMENT EARTH ON PARCEL SHELF
- 18 FRONT LH EARTH



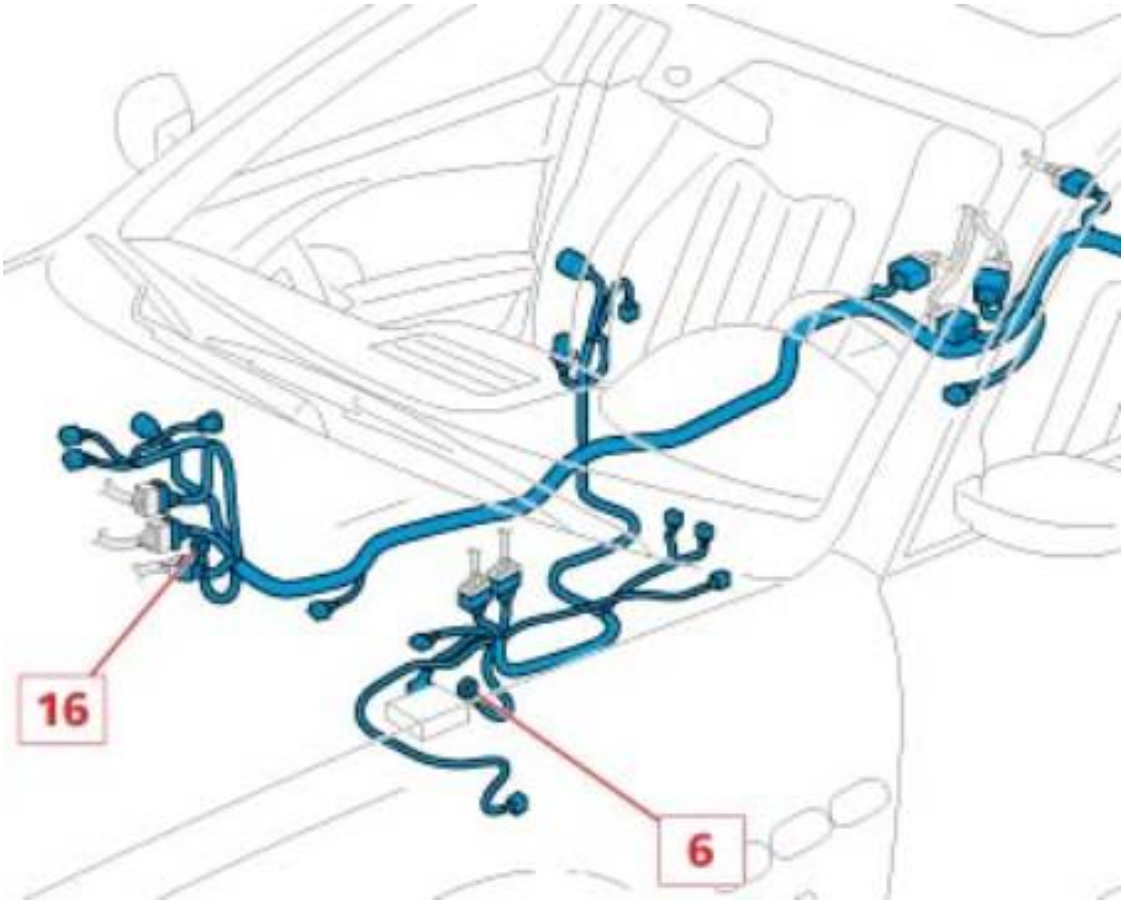
- 03 F1 GEARBOX EARTH B
- 11 EARTH AND F1 GEARBOX
- 14 RH LUGGAGE COMPARTMENT EARTH
- 20 F1 GEARBOX EARTH



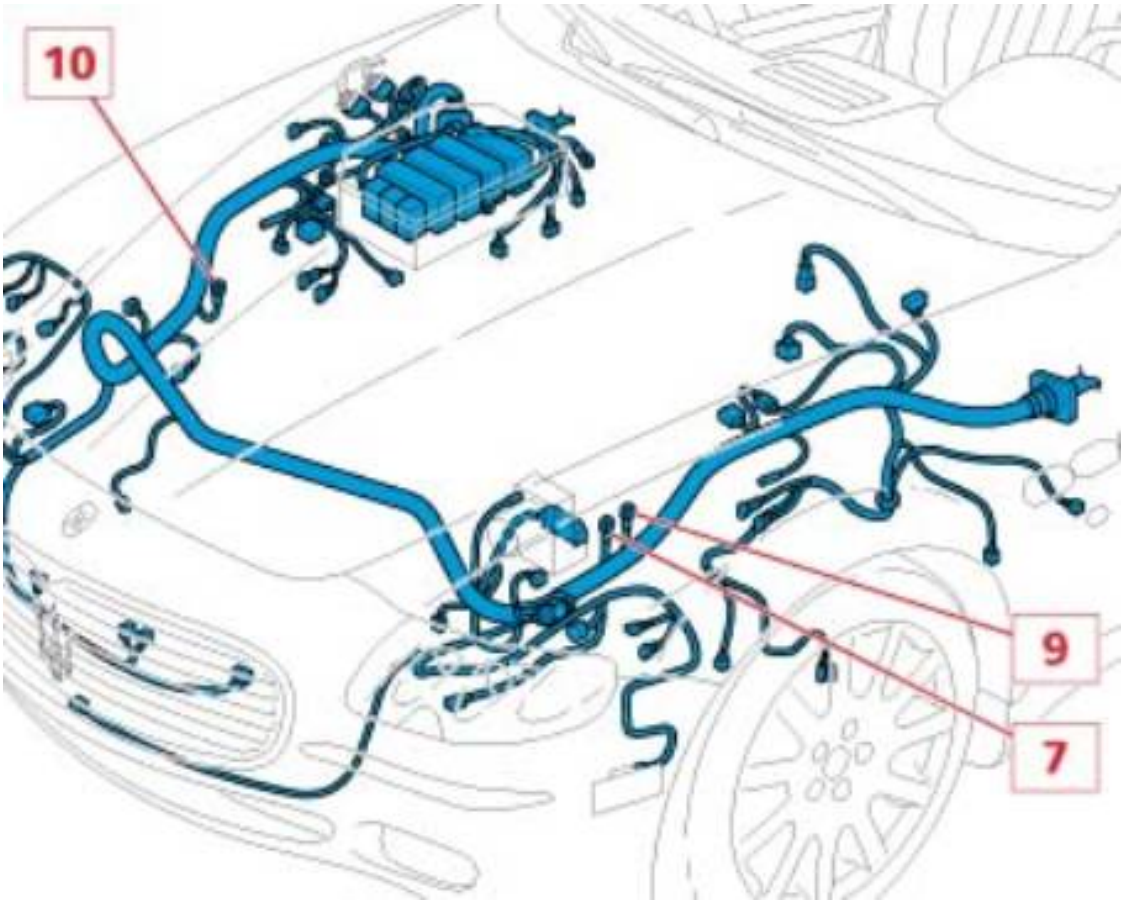
- 05 DASHBOARD CABLE EARTH ON RH SIDE OF TUNNEL
- 08 AIR-BAG ECU EARTH



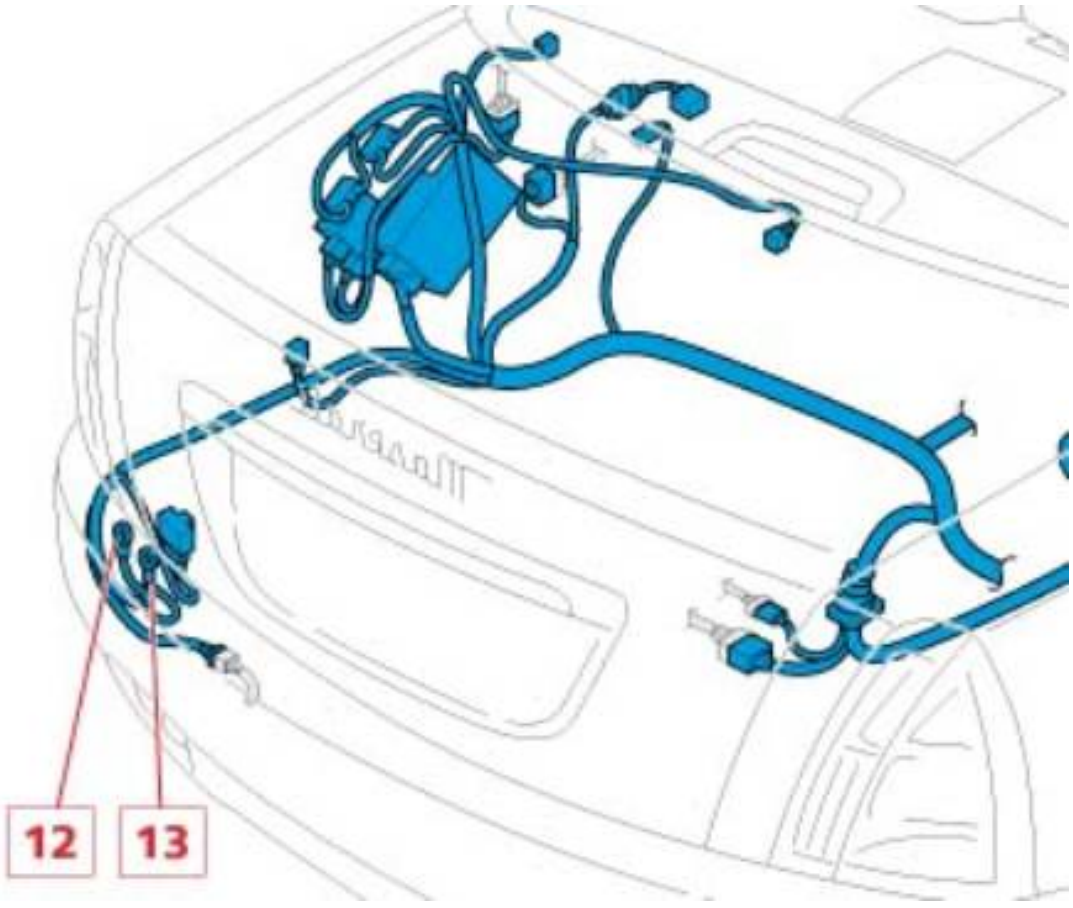
- 06.AIRBAG EARTH ON PASSENGER COMPARTMENT CABLE
- 16 FRONT LH EARTH ON PASSENGER COMPARTMENT CABLE



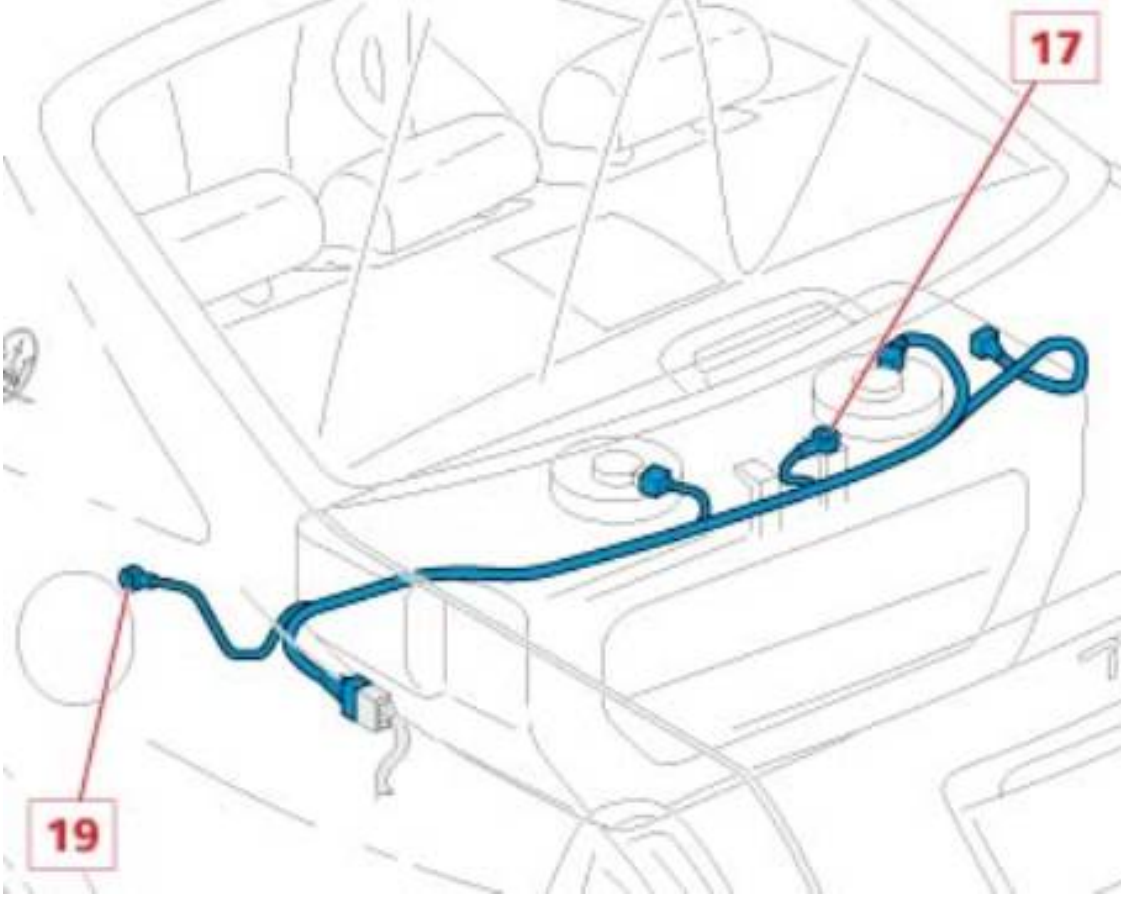
- 07 ABS EARTH
- 06 AIRBAG EARTH ON PASSENGER COMPARTMENT CABLE
- 10 FRONT RH ENGINE COMPARTMENT EARTH



- 12 LH LUGGAGE COMPARTMENT EARTH
- 13 LH LUGGAGE COMPARTMENT EARTH



- 17 FUEL TANK EARTH
- 19 FUEL FILLER NECK EARTH



ALARM SYSTEM KIT REPLACEMENT

Removing-refitting the motion sensors

- The motion sensors are built into the ceiling lamp shown and in the event of malfunctioning, the whole ceiling lamp unit must be replaced, following the procedure outlined below.
- Disengage the motion sensors' mount from its seat.

- Detach the electrical connections and remove the motion sensors' mount.

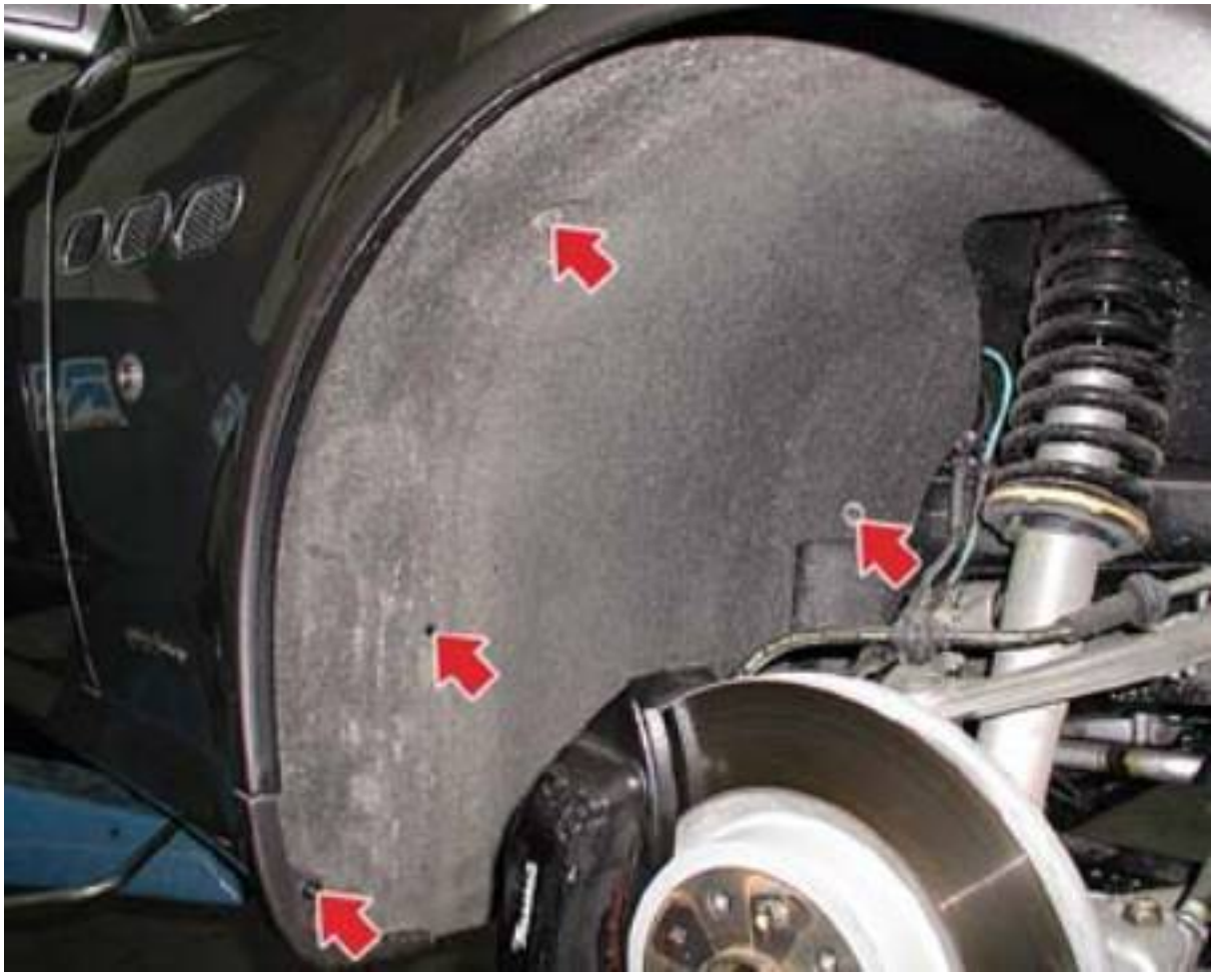
Follow the above procedures in reverse order.

Removing-refitting the alarm system siren

- Remove the front right-hand wheel.

Replacing the wheels

- Undo the fastening screws and lever the rear section of the right-hand dust-protection guard out of its seat partially.



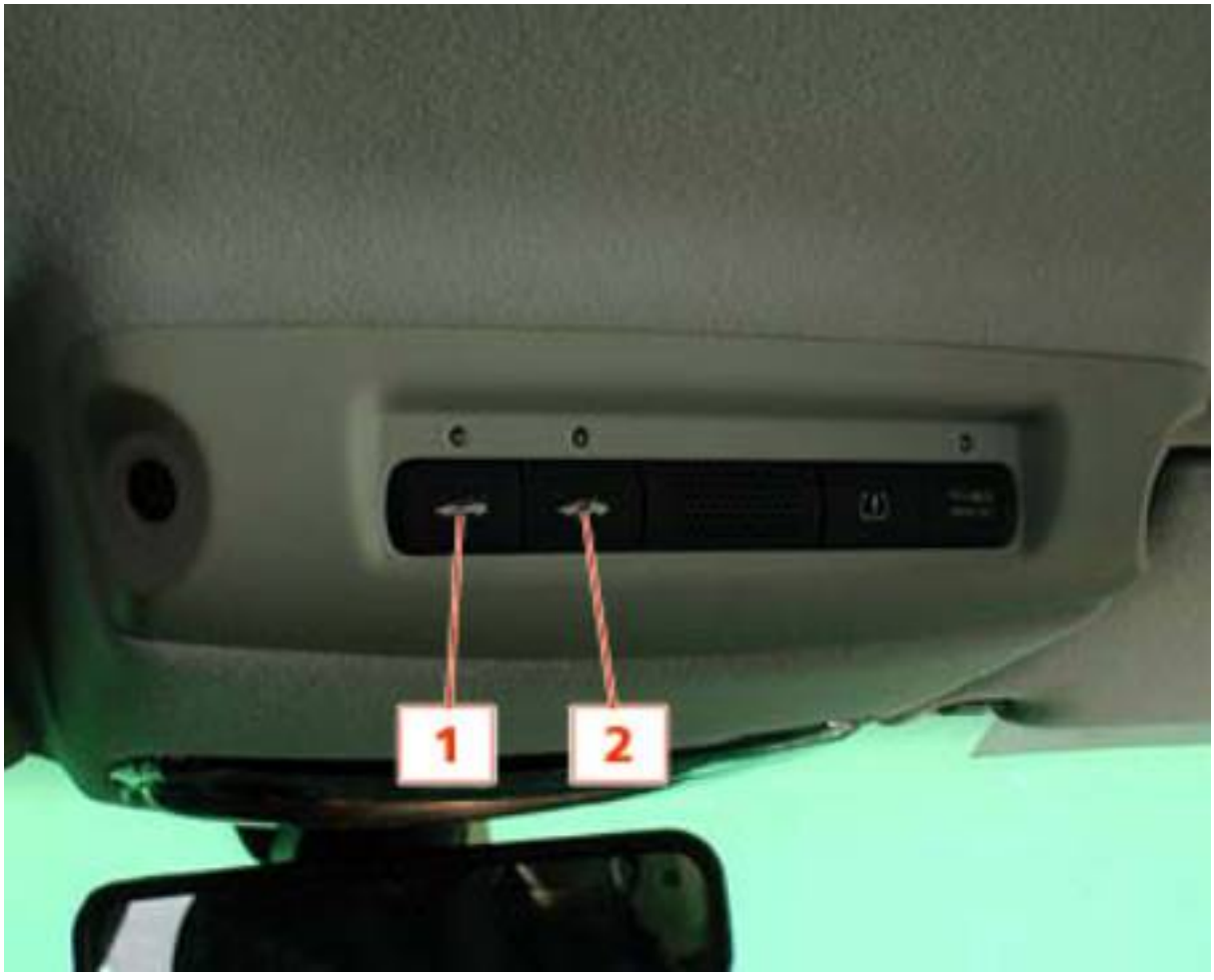
- Loosen the two fastening nuts and take the siren out of the supporting bracket.

- Detach the electrical connection and remove the alarm system siren.

Follow the above procedures in reverse order.

Deactivating the motion sensing alarm and anti-lifting sensor

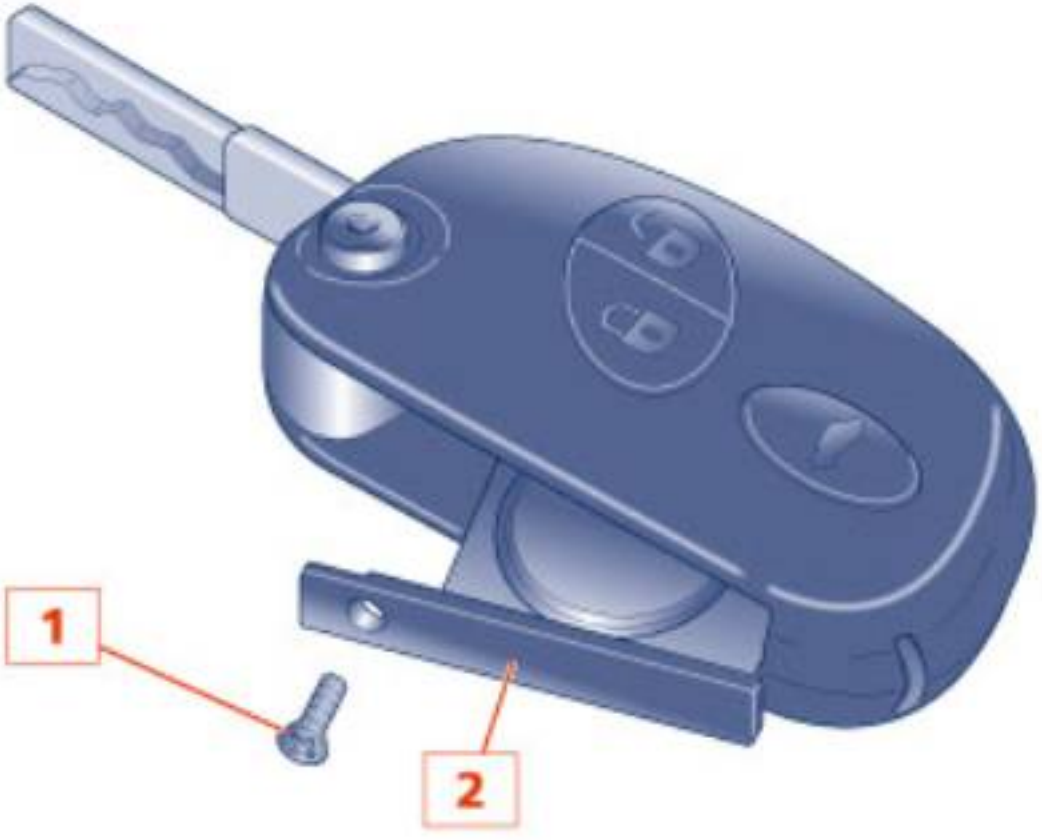
- The motion sensing alarm system can be deactivated by pressing the button **(1)** located on the front dome light. When this function is deactivated, the LED on the button flashes for 3 seconds and then turns off.
- Pressing button (**2)**deactivates the anti-lift protection alarm. When this function is deactivated, the LED on the button flashes for 3 seconds and then turns off.



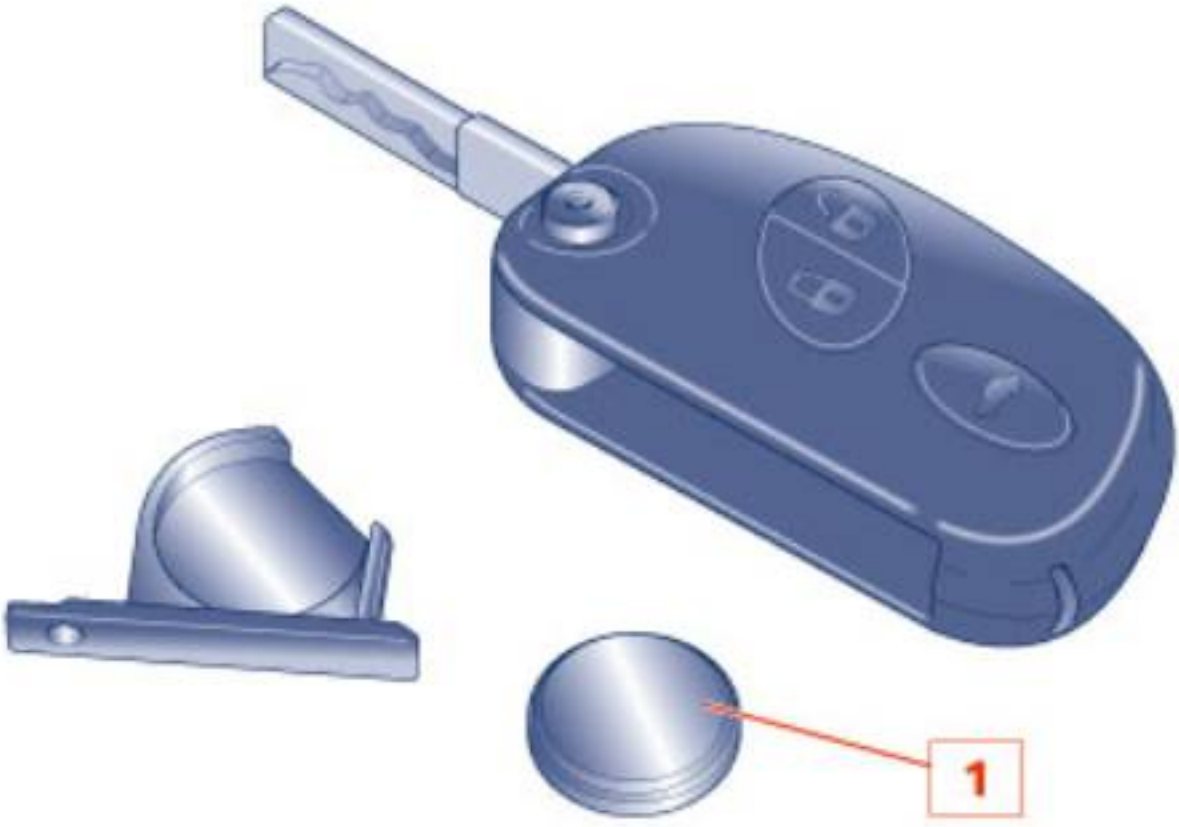
Replacing radio operated control batteries

- To replace the battery of the radio control, operate as follows.
- Remove the key insert by pressing the button **(1)** and extract the key.

- Undo the screw **(1)** and remove the battery mount **(2)**.



- extract the battery **(1)** from its retaining ring
- fit a new battery of the same type, observing the indicated polarity.



Follow the above procedures in reverse order.

New key programming

To register a new key, you will need the electronic codes of the old keys (grey card) and, obviously, the new keys.
The SD3 tester (**95970312**) is fitted with a software package which enables the Immobilizer codes and Alarm system codes to be learnt.

When ordering new keys, you will be asked to provide the serial number of the vehicle for which the keys are required.

- Connect the SD3 tester (**95970312**) to the diagnostics socket.
- Run the PC diagnosis mode on SD3 NET.
- Start the session and access the **“RICAMBI M139”** environment.
  - Start the " **Key Reprogramming** " procedure
- Enter the serial number and fill in the remaining data requested on the screen page.
- Press "CONTINUE"
- Carefully follow the procedure for programming the keys and remote controls shown on the PC.

N.B.
The programming stage cannot be considered complete until the data have been stored; Any keys not included in this procedure will not be useable.

Component self-learning in the event of battery disconnection

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices recognize the system again:

- **MOTOR DRIVEN THROTTLE SELF-LEARNING:**
- Set the ignition switch to ON (KEY ON) and wait at least 15 seconds.
- After running the self-learning procedure for the "throttle position", run the VVT self-learning procedure; where necessary, start the engine and let it idle for about 15 seconds.

- **CENTRAL DOOR LOCKING:**
- Perform a door LOCK /UNLOCK operation with the remote control

- **SUNROOF:**
- Sunroof closed and key ON
- Rotate the selector switch fully to the maximum tilting position (B3 position in the previous figure, the part of the selector switch with three notches)
- press the selector switch and, keeping it pressed, wait for the sunroof to lock mechanically
- release the selector switch
- within 5 sec. press the selector switch again and keep it pressed
- after a few seconds the sunroof will start an automatic cycle (keep the selector switch pressed)
- at the end of the movement, the initialization is complete
- release the selector switch

- **IT Node (NIT) and CLOCK:**
  - When the NIT is switched on, the NIT code must be entered:
  - Using the knob on the right, enter the four-digit code which will enable you to unlock the navigator.

- **Reset the correct time by proceeding as follows:**
  - Set the ignition switch in the ON position (KEY ON)
  - Switch on IT Node
  - Press SETUP button
  - Set the correct time.
    - Before turning the ignition switch to the OFF position (KEY-OFF), wait for the clock to switch to the time set via the IT node.

- **Set the correct DATE by carrying out the following procedure:**
- Press the SETUP button
- Rotate the dial on the right to select the TIME and DATE options
- Rotate the dial on the right to select the DATE option
- Rotate the dial on the right to select the correct date and confirm it by pressing the same dial.
- Check that the instrument panel is displaying the correct date

- **Set the information that you wish to be displayed on the instrument panel as well:**
  - Press the SETUP button
  - Rotate the dial on the right to select the VEHICLE SETUP option
  - Rotate the dial on the right to select the INSTRUMENT PANEL INFORMATION option
  - Select (ticked boxes) all three sets of information to be repeated on the instrument panel (AUDIO, NAVI and TELEPHONE)

- **Travelstore function:**
- Press the Radio button
- Rotate the dial on the right to select the SCANS./TS third option
- Press the dial on the right at length (ENTER) until you hear a tone (beep).
- Wait until the memorisation of the stations is complete.

- **Set the "SPEED LIMIT":**

- Press the TRIP button
- Rotate the dial on the right to select the "SPEED LIMIT" option
- Set the alarm that is not active (empty box)
- Set the limit to 250 km/ h

- **Set the measurement Unit for Consumption:**
- Press the TRIP button
- Rotate the dial on the right to select the “SETTINGS” option
- Select “Unit for consumption”
- Select and enter "Km/l"

- **Set the Navigation settings:**
  - Insert the navigation CD (remember that: if a Navigation CD has never been inserted in the NIT, a screen will appear on which the flash memory data will be loaded. Wait for the data loading to be completed (this will take a few seconds), then press the NAV button
  - Rotate the dial on the right to select “SETTINGS and OPTIONS”
  - Select “ROUTE OPTIONS ” and confirm ‘quickest route’ by pressing the encoder dial on the right (coloured dot).
  - Select “SCREEN MODE” and confirm “autom. direct. indic.” by pressing the encoder dial on the right (coloured dot)
  - Select “MAP VIEW” and confirm “TRAVELLING DIRECTION” by pressing the encoder dial on the right (coloured dot).
  - Select “ MAP TYPE” and confirm “CAR POSITION” by pressing the encoder dial on the right (coloured dot).

Satellite tracking system

Removing – refitting the satellite tracking system

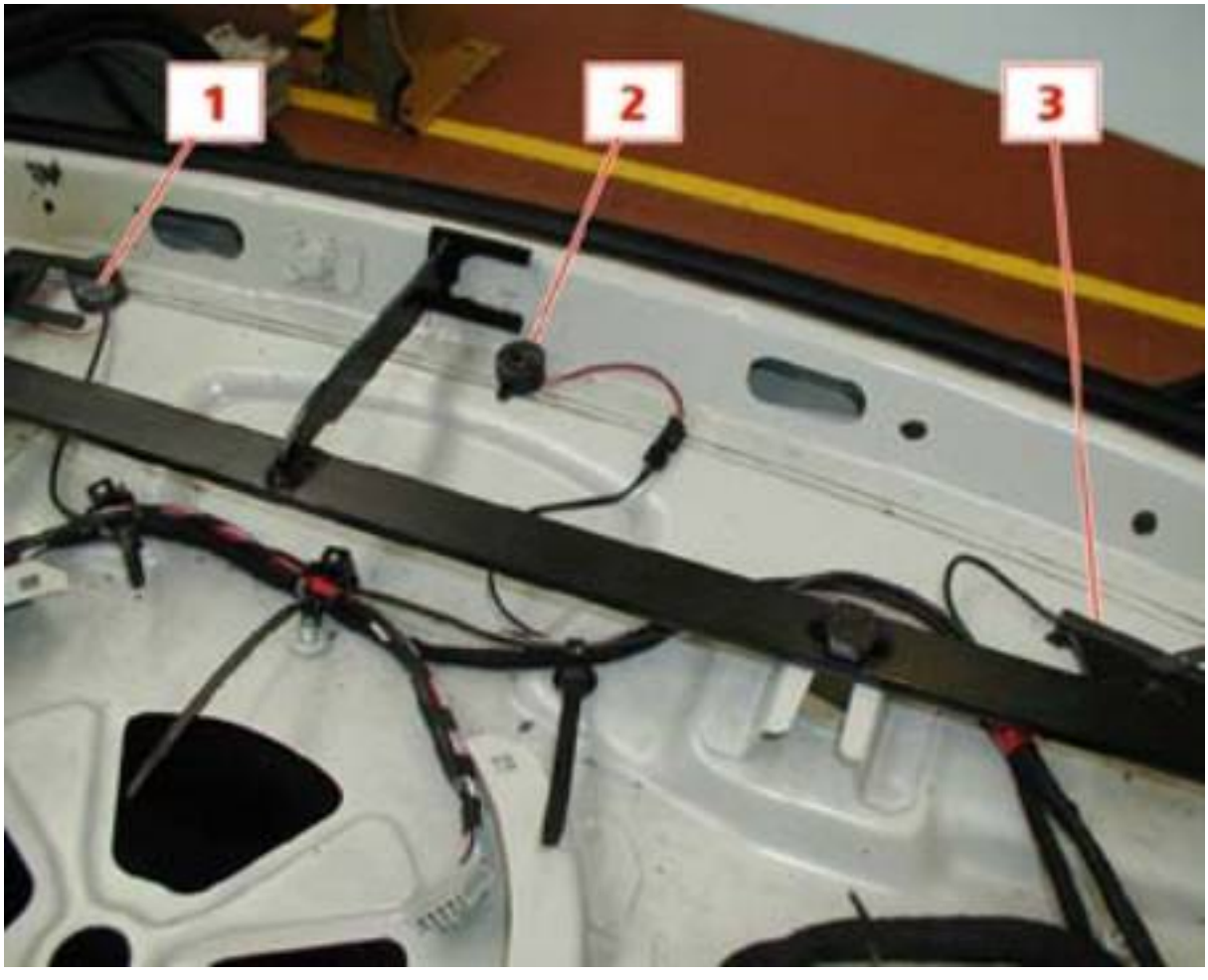
- Remove the rear parcel shelf

Rear parcel shelf

- Remove the LH trim panel in the luggage compartment

Luggage compartment trim panels

- Working from inside the vehicle, mark the position of the GPS aerial **(1),** the GSM aerial **(2)** and the buzzer **(3)** and disengage them from the bodywork.
- Cut the clamps fastening the vehicle wiring to the tracking system wiring.



- Unscrew the lower fastening nuts **(1)** on the bracket, unscrew the upper fastening nuts (not visible, indicated with an arrow), then undo the electrical wiring fastening screw **(2)**.

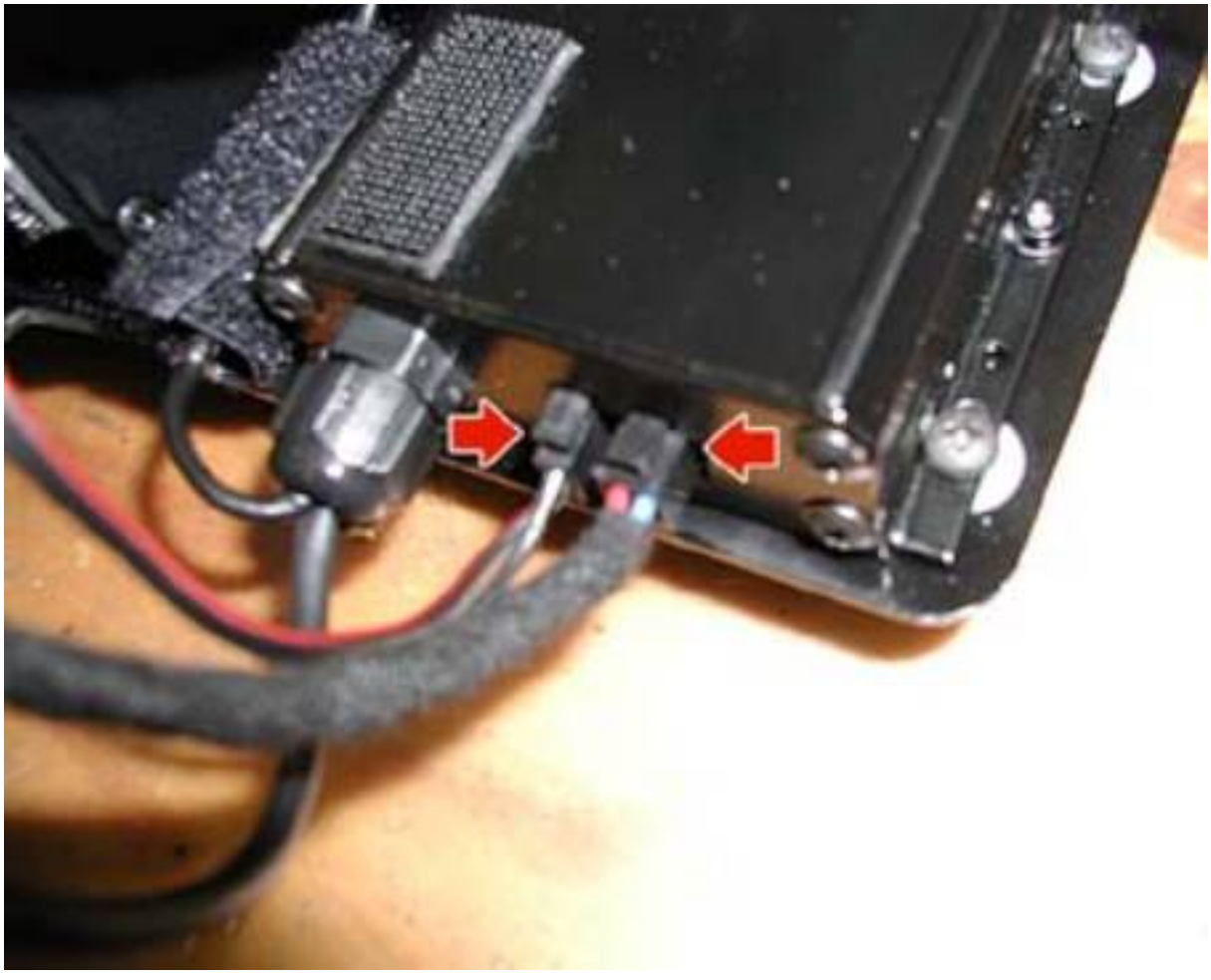
- Remove the ECUs - aerials assembly, pulling the electrical wiring out through the hole on the bodywork and taking care not to damage it.

When refitting, follow the above procedures in reverse order remembering to refit the GPS and GSM aerials and the buzzer in their original position (as marked) and fasten them with double-sided adhesive tape. Check the double-sided adhesive tape holds perfectly and that the components are fastened properly.

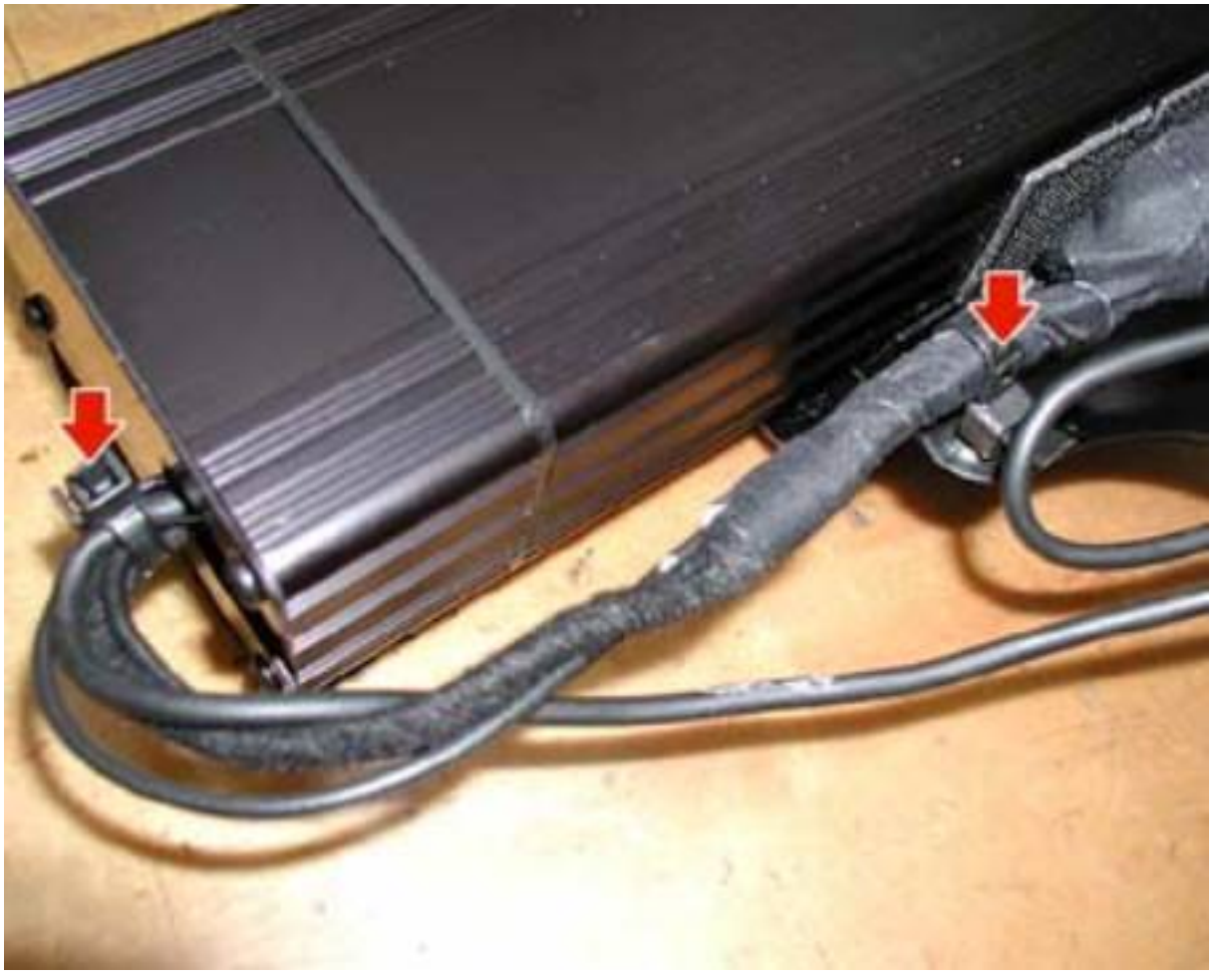
Disconnecting – reconnecting the satellite tracking system wiring

- Remove the ECUs - aerials assembly, as described earlier.
- Remove the adhesive tape and release the DCU/aerials control unit wiring from the GSM module cable.

- Disconnect the two connectors from the GSM module.



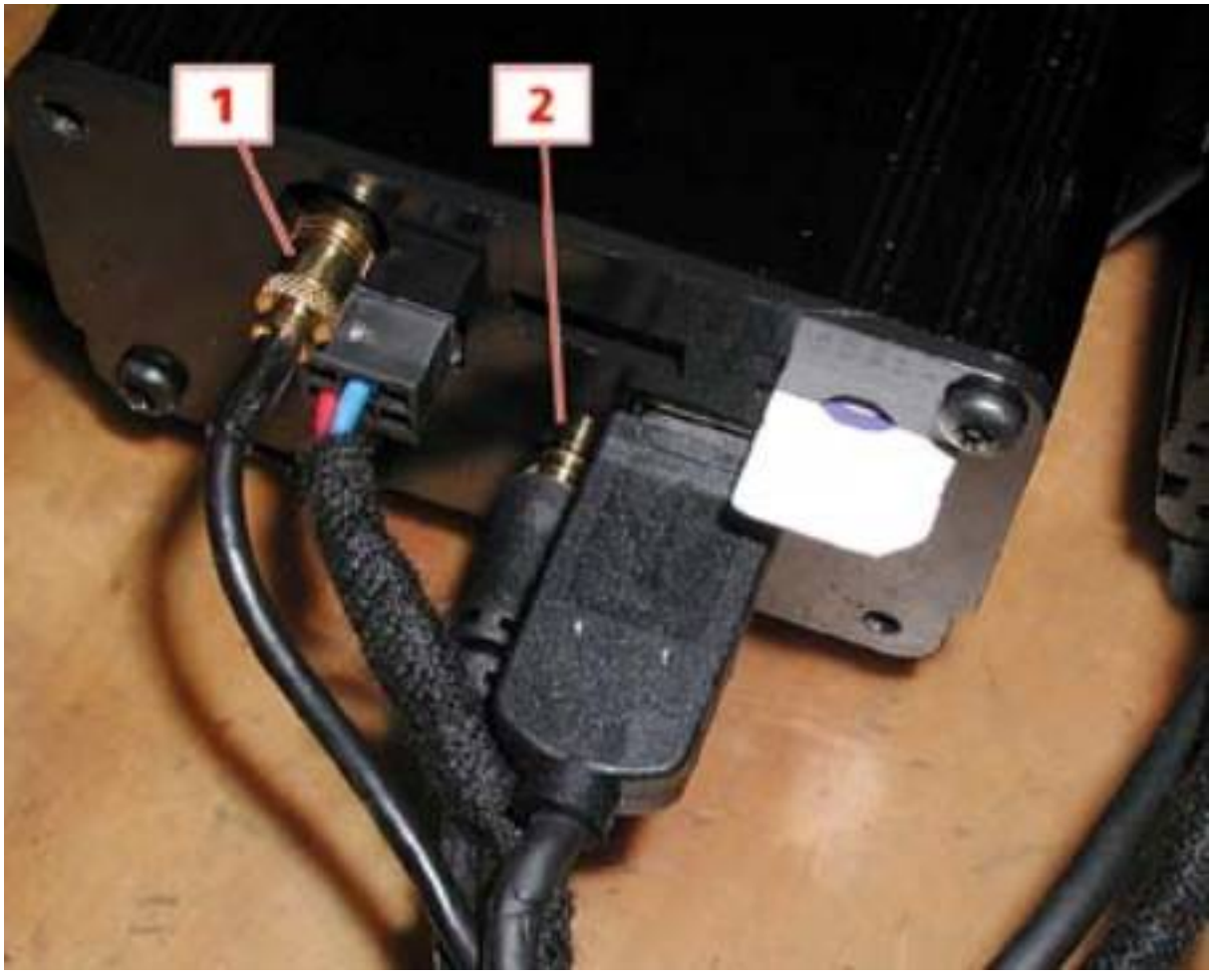
- Cut the two fastening clamps on the electric wiring.



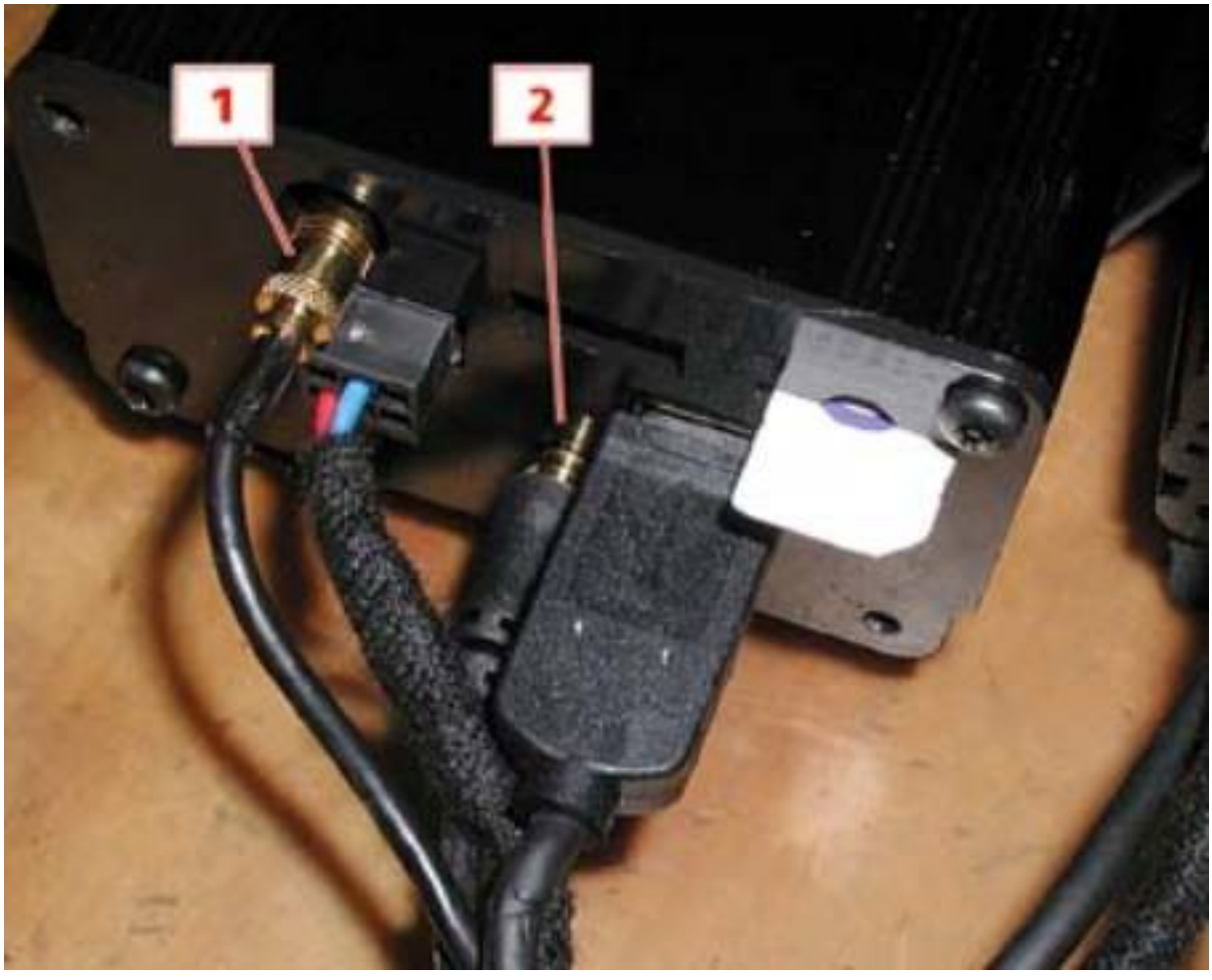
- Release the two fuse boxes and the electrical connector from the bracket.

- Undo the four screws and remove the rear DCU module cover.

- Detach the GSM aerial connector **(1)** and the GPS aerial connector **(2)**.



- Detach the GSM aerial connector **(1)** and the GPS aerial connector **(2)**.



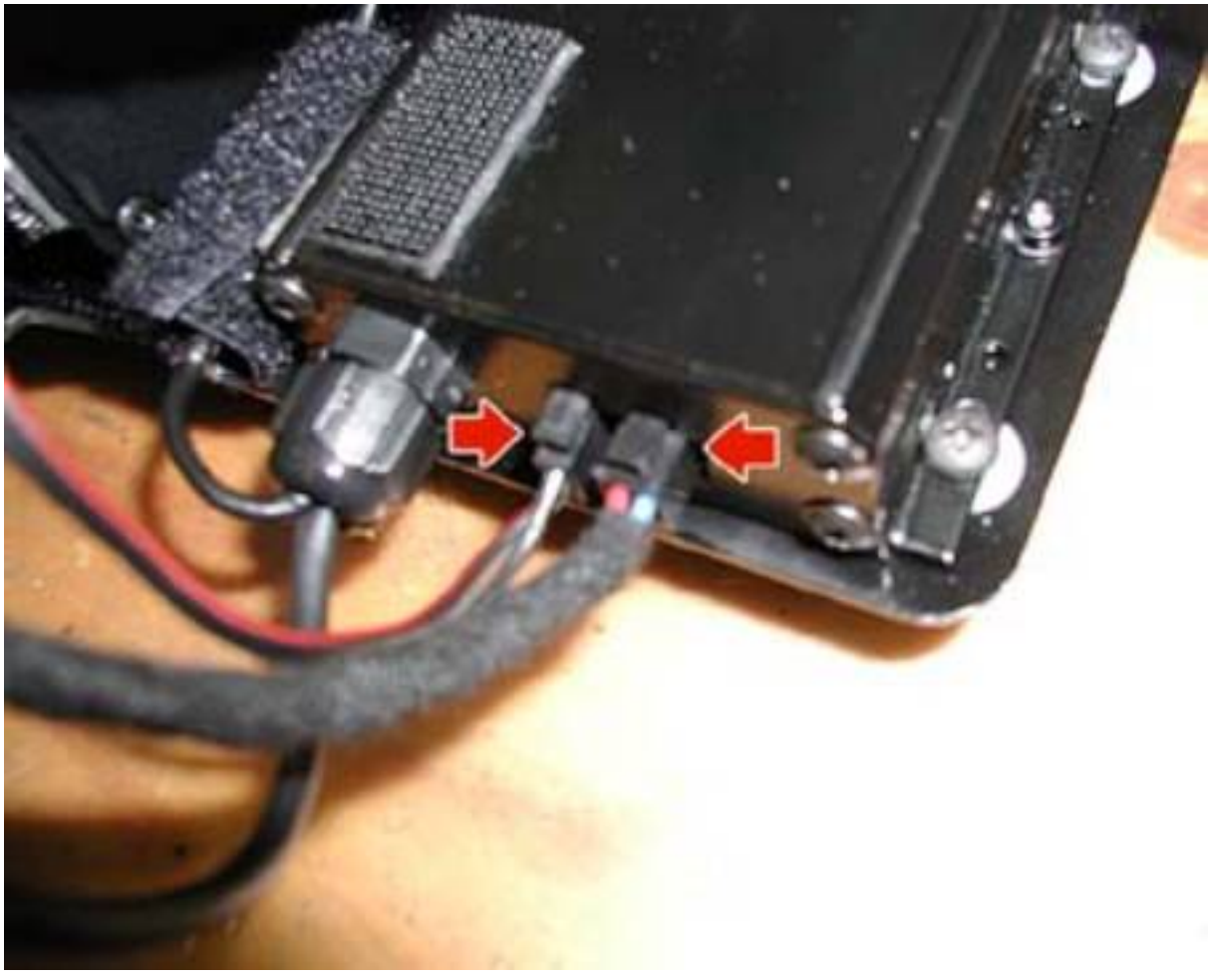
- Peel off the adhesive tape and detach the connection beneath it, then remove the wiring complete with the aerials and buzzer.

When refitting, follow the above procedures in reverse order.

Removing – refitting the GSM module

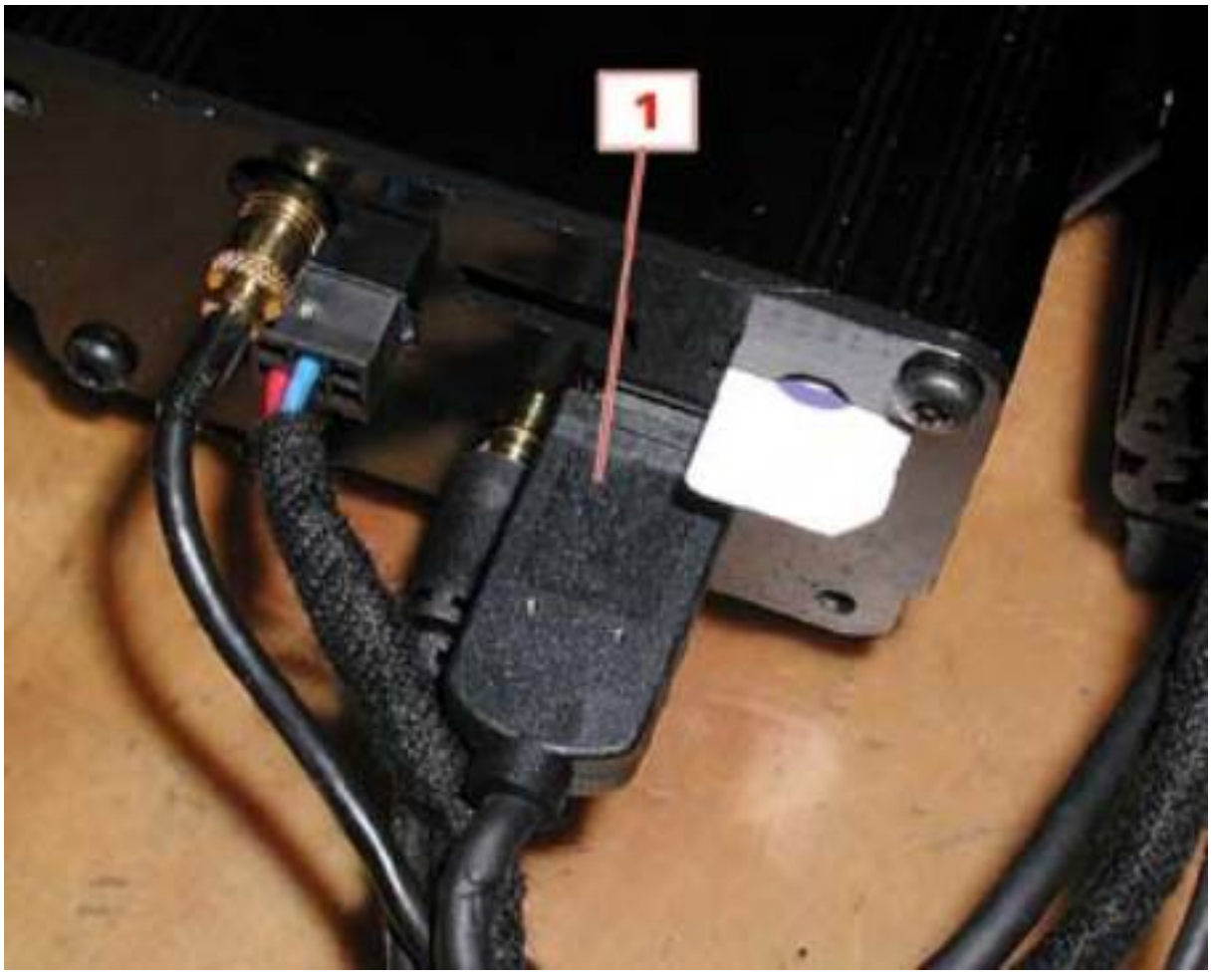
- Remove the ECUs - aerials assembly, as described earlier.
- Remove the adhesive tape and release the DCU/aerials control unit wiring from the GSM module cable.

- Disconnect the two connectors from the GSM module.



- Undo the four screws and remove the rear DCU module cover.

- Detach the USB connector **(1)** on the GSM module from the DCU module.



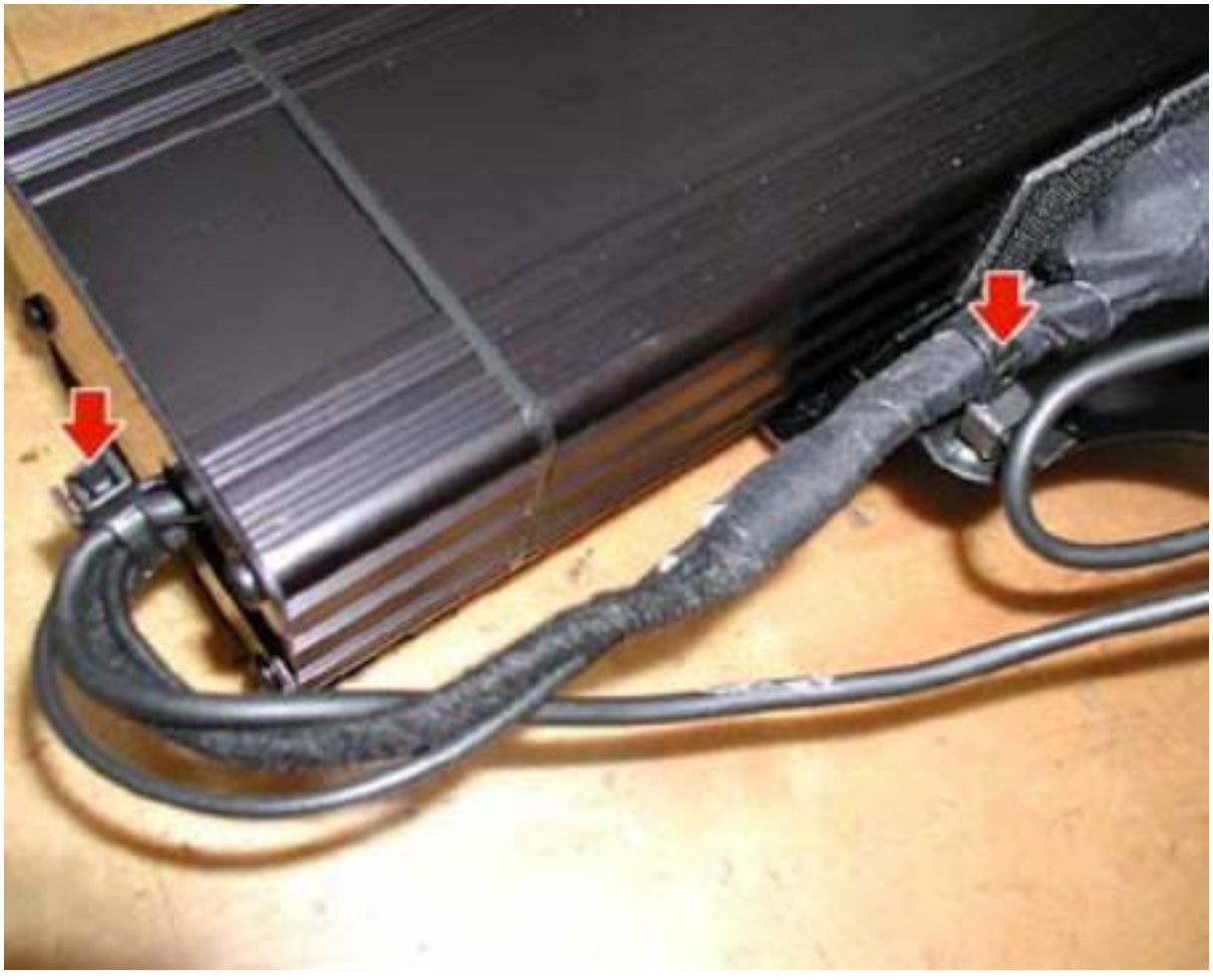
- Peel off the adhesive tape and detach the connection beneath it.

- Undo the screws fastening it to the bracket and remove the GSM module.

When refitting, follow the above procedures in reverse order.

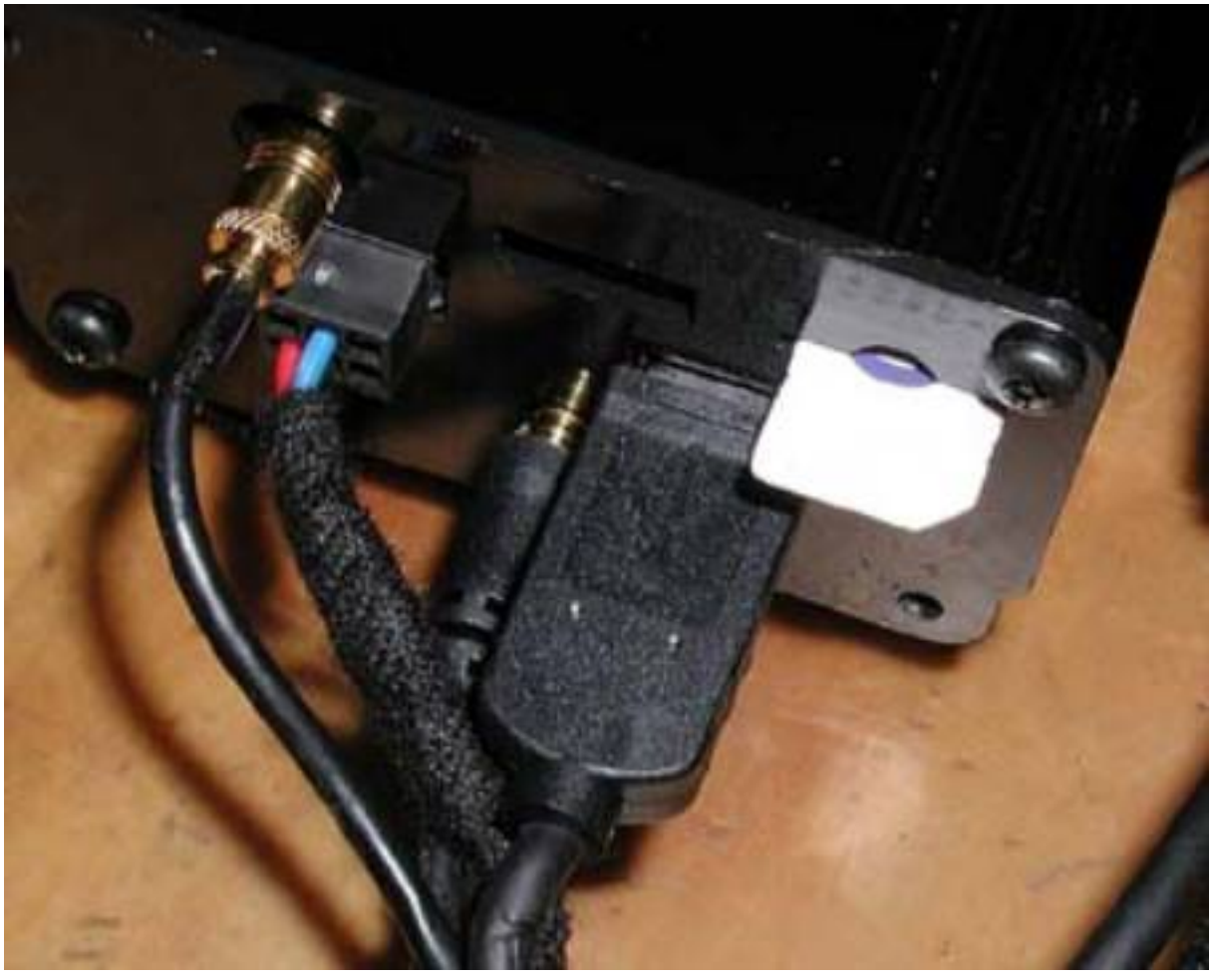
Removing – refitting the DCU module.

- Remove the ECUs - aerials assembly, as described earlier.
- Cut the two fastening clamps on the electric wiring.



- Undo the four screws and remove the rear DCU module cover.

- Detach all the connectors from the DCU module.



- Release the fastening clips and remove the DCU module from the bracket.

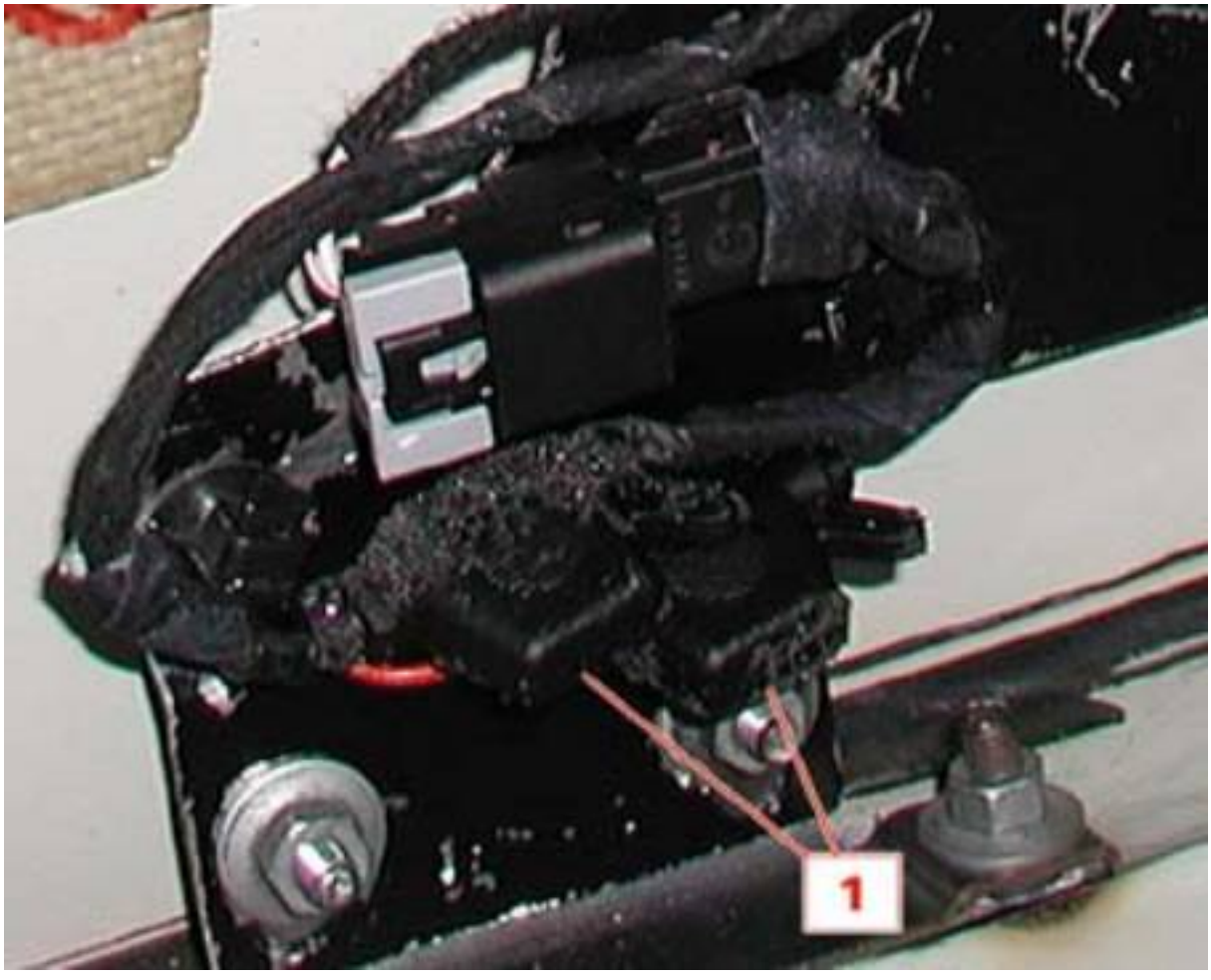
When refitting, follow the above procedures in reverse order.

Replacing the system’s protective fuses

- Remove the LH trim panel in the luggage compartment

Luggage compartment trim panels

- The two protective fuses are located in the boxes **(1)** fastened to the bracket holding the modules assembly.



- Open the protective cap and replace the fuse with one with the same specifications.

CAPITOLO

Body computer node (NBC)

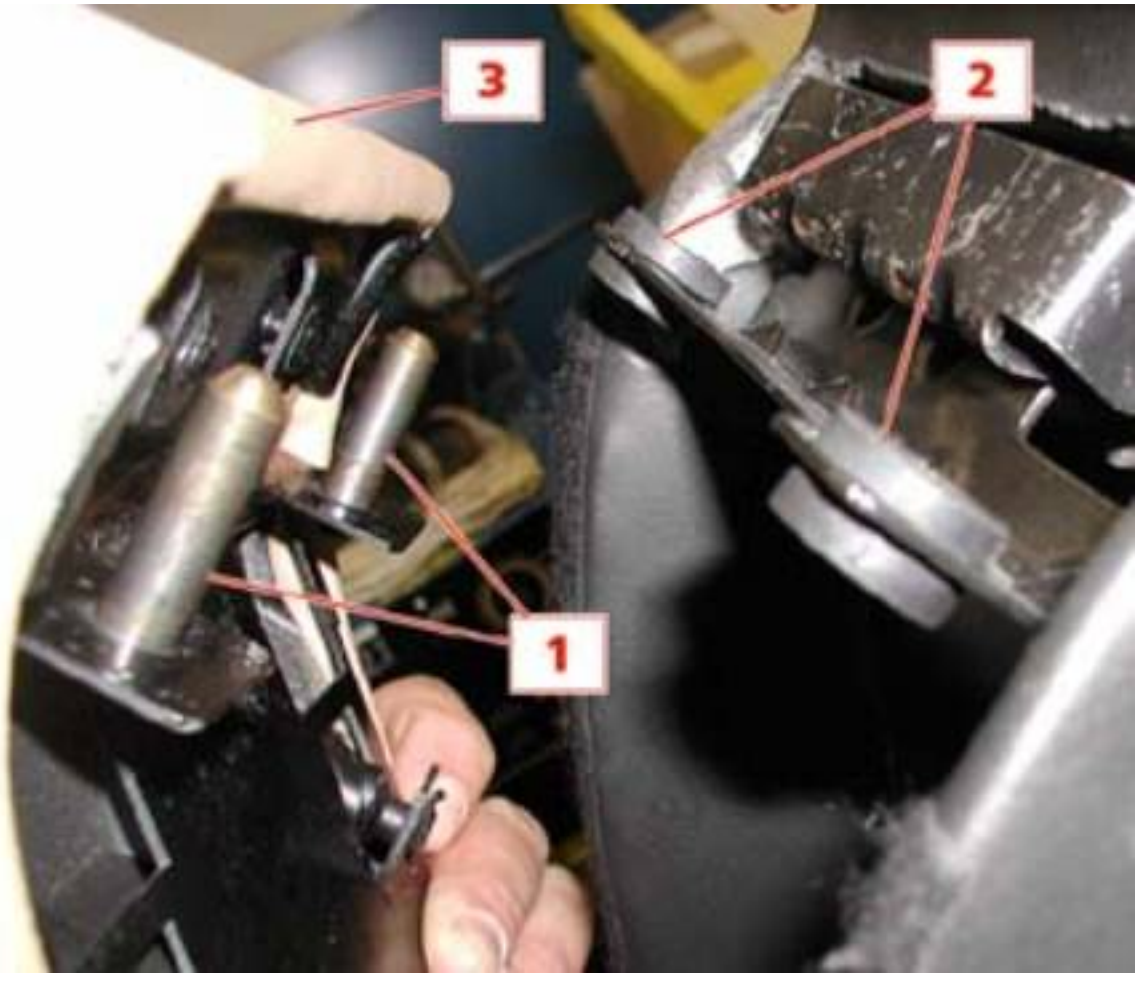
Removing - refitting the body computer node (NBC)

- Disconnect the battery's negative terminal.

For all versions except the USA-CANADA version, remove the driver's side glove compartment
Driver's glove compartment

- For the **USA –CANADA version**, remove the NBC guard, proceeding as follows.
- Unscrew the lower fastenings on the Body Computer Node guard.

- Extract the pins **(1)** from the holes fitted with rubber antifriction bushings **(2),** and remove the Body Computer Node guard **(3).**

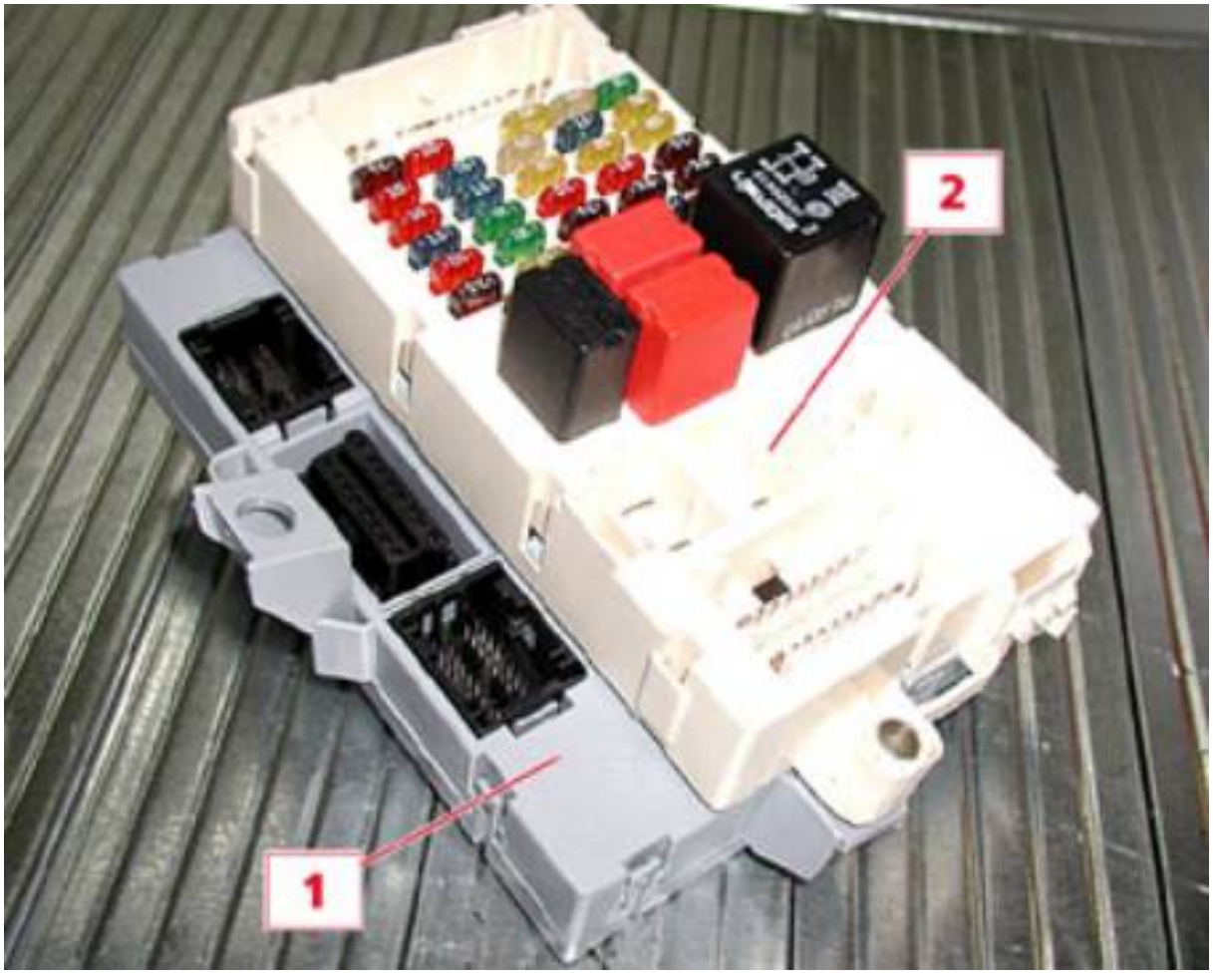


The operations below apply to all versions and markets.

- Detach the electrical connections at the front and undo the two fastening screws on the body computer node.

- Rotate the body computer node, detach the electrical connections on the rear section and remove the part.

- If necessary, separate the body computer node **(1)** from the dashboard node **(2)**.



When refitting, follow the above procedures in reverse order

- After connecting the battery’s negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

N.B.
In the event of replacement of the Body Computer node, it is not necessary to run the "proxy" procedure as the new component is supplied by the Spare Parts department ready for connection to the CAN network and to dialogue correctly with the ECUs installed in the vehicle.

DASHBOARD node (NPL)

Removing - refitting the dashboard node (NPL)

- The dashboard node (NPL) is composed of the Body Computer node and dashboard ECU assembly, therefore to remove or replace it, follow the procedure shown for removing-refitting the Body Computer node without taking the two components apart.

Body computer node

- In the event of replacement of the dashboard node, the "Proxy" procedure must be carried out to ensure the new NPL recognises the components connected to the CAN network and begins to dialogue with them.
- Connect the SD3 tester (**95970312)** to the diagnostics socket and run the "Proxy" procedure.

Headlight set-up ECU (CAF)

Removing-refitting the headlight set-up ECU (CAF)

- Move the front seat on the driver’s side as far back as possible
- Disconnect the battery's negative terminal.
- Remove the protective cover on the suspension control node compartment.

- Undo the fastening screw, detach the electric connection and move the suspension control node out the compartment.

- Unscrew the fastening nuts on the mounting bracket.

- Pull out the bracket, unscrew the fastening nuts, detach the electric connection and remove the headlight set-up ECU (CAF).

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Suspension control node (NCS)

Removing-refitting the suspension control node (NCS)

- Move the front seat on the driver’s side as far back as possible
- Disconnect the battery's negative terminal.
- Remove the protective cover on the suspension control node compartment.

- Undo the fastening screw, detach the electric connection and remove the suspension control node from the relative compartment.

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Electronically-controlled GEARBOX NODE (NCR)

Removing-refitting the electronically-controlled gearbox node (NCR)

- The removal and refitting of the electronically-controlled gearbox node is outlined in the section "Transmission devices - electronically-controlled gearbox controls" in the chapter headed "Electronically-controlled gearbox control unit (TCU)".

Replacing the electronically-controlled gearbox control unit (TCU)

ENGINE CONTROL NODE (NCM)

Removing-refitting the engine control node (NCM)

- Disconnect the battery's negative terminal.
- Move the front seat on the passenger side as far back as possible.
- Remove the protective cover on the engine control node compartment.

- Undo the fastening screw on the bracket, detach the two electric connections and remove the engine control node from the relative compartment.

When refitting, follow the above procedures in reverse order

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

BRAKE SYSTEM NODE (NFR)

Removing-refitting the brake system node (NFR)

- The removal and refitting of the brake system node is outlined in the section "Brakes - Electro-hydraulic and hydraulic control unit" in the chapter headed "ABS . – A.S.R.-– E.B.D. – E.S.P. electro-hydraulic control unit".

A.B.S- A.S.R.-- E.B.D. - E.S.P electro-hydraulic control unit.

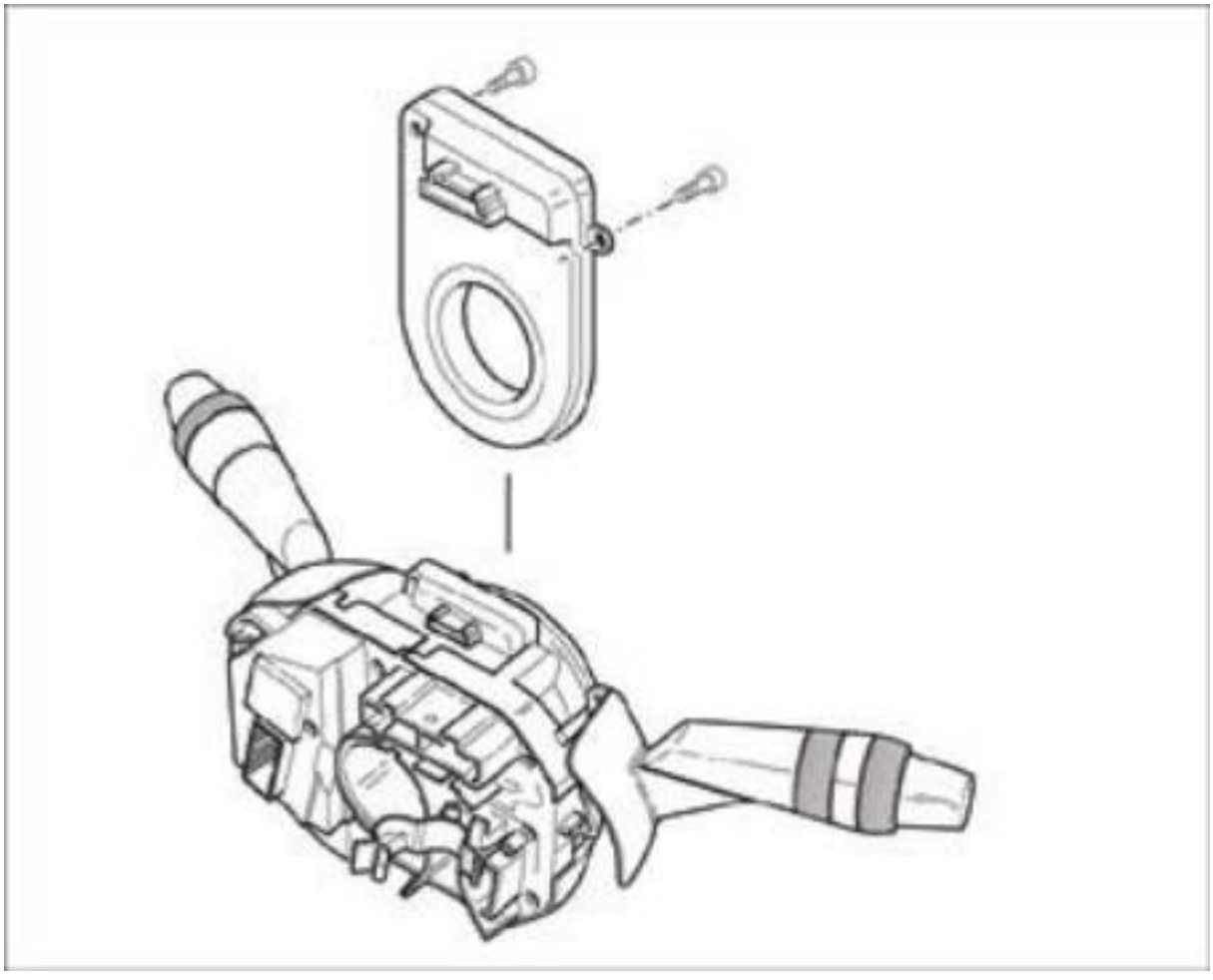
STEERING ANGLE NODE (NAS)

Removing-refitting the steering angle node (NAS)

- Remove the steering column stalk from the steering column.

Steering column stalk and electronically-controlled gearbox levers

- With the steering column stalk on the bench, undo the two fastening screws and remove the steering angle node.



- Fit the steering angle node and complete the operation by refitting all the components previously removed.
- Proceed with calibrating the steering angle sensor.
- Connect the SD3 tester to the diagnostic socket.
- Position the wheels perfectly straight and lock the steering wheel in this position.
- From the SD3 tester, select SERIAL DIAGNOSTICS and then INDIVIDUAL ECU DIAGNOSTICS.
- Select the manufacturer and the vehicle model and then the node concerned.
- Select ACTIVE DIAGNOSTIC ENVIRONMENT and then launch the calibration procedure.
- Drive a distance of 10 metres in a straight line. When the message that calibration has been performed correctly appears on the SD3 tester, stop the vehicle and remove the SD3.

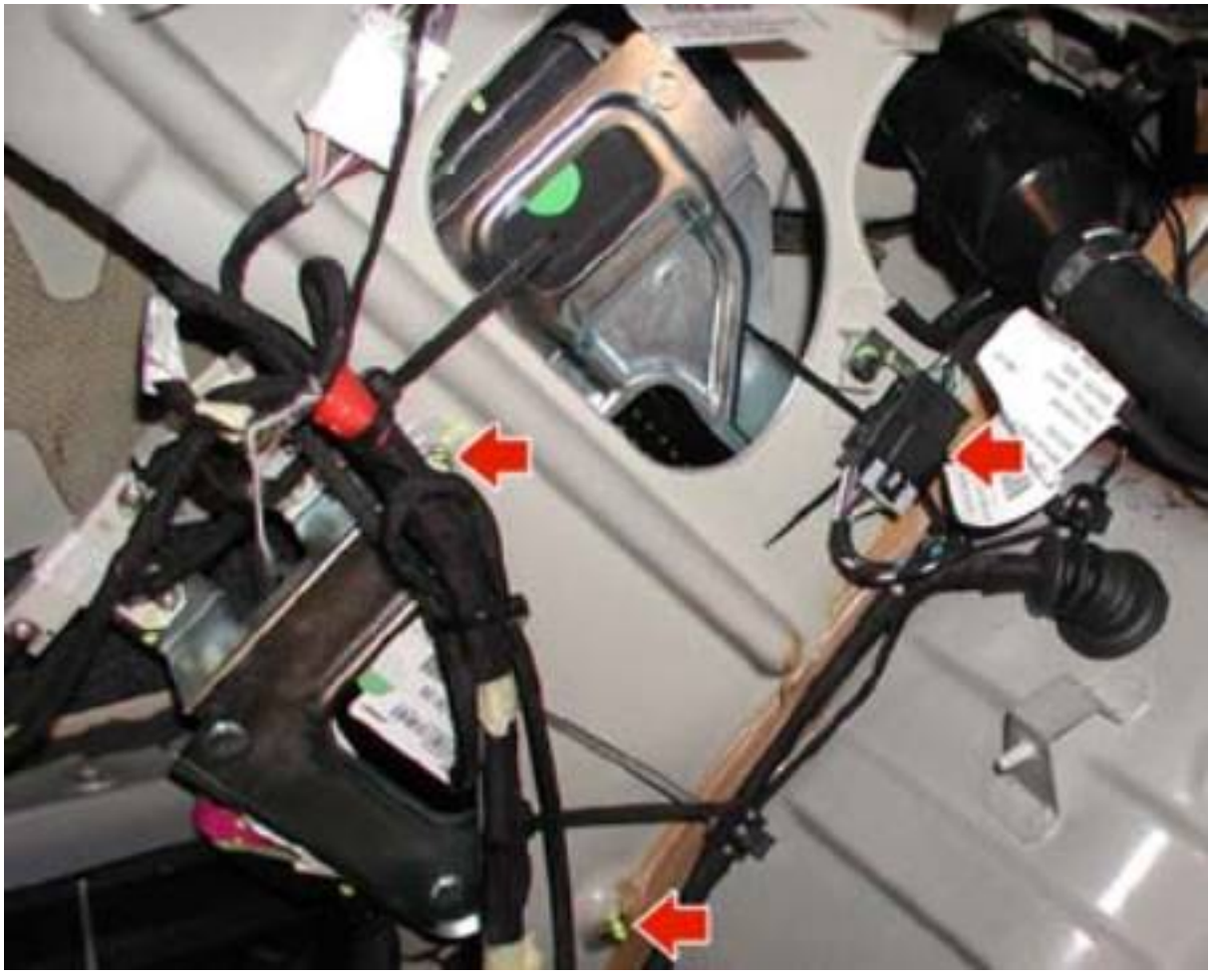
Parking sensor node (NSP)

Removing – refitting the parking sensor node (NSP)

- Remove the LH trim panel in the luggage compartment

Compartment trim panels

- Unscrew the fastening nuts on the ECU and digital stereo system amplifier holder bracket.



- Unscrew the nut, disconnect the electrical connections, then remove the parking sensor node (NSP).

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Power steering ECU (CSG)

Removing-refitting the power steering ECU (CSG)

- Disconnect the battery's negative terminal.
- Undo the fastening screws on the footrest covering.

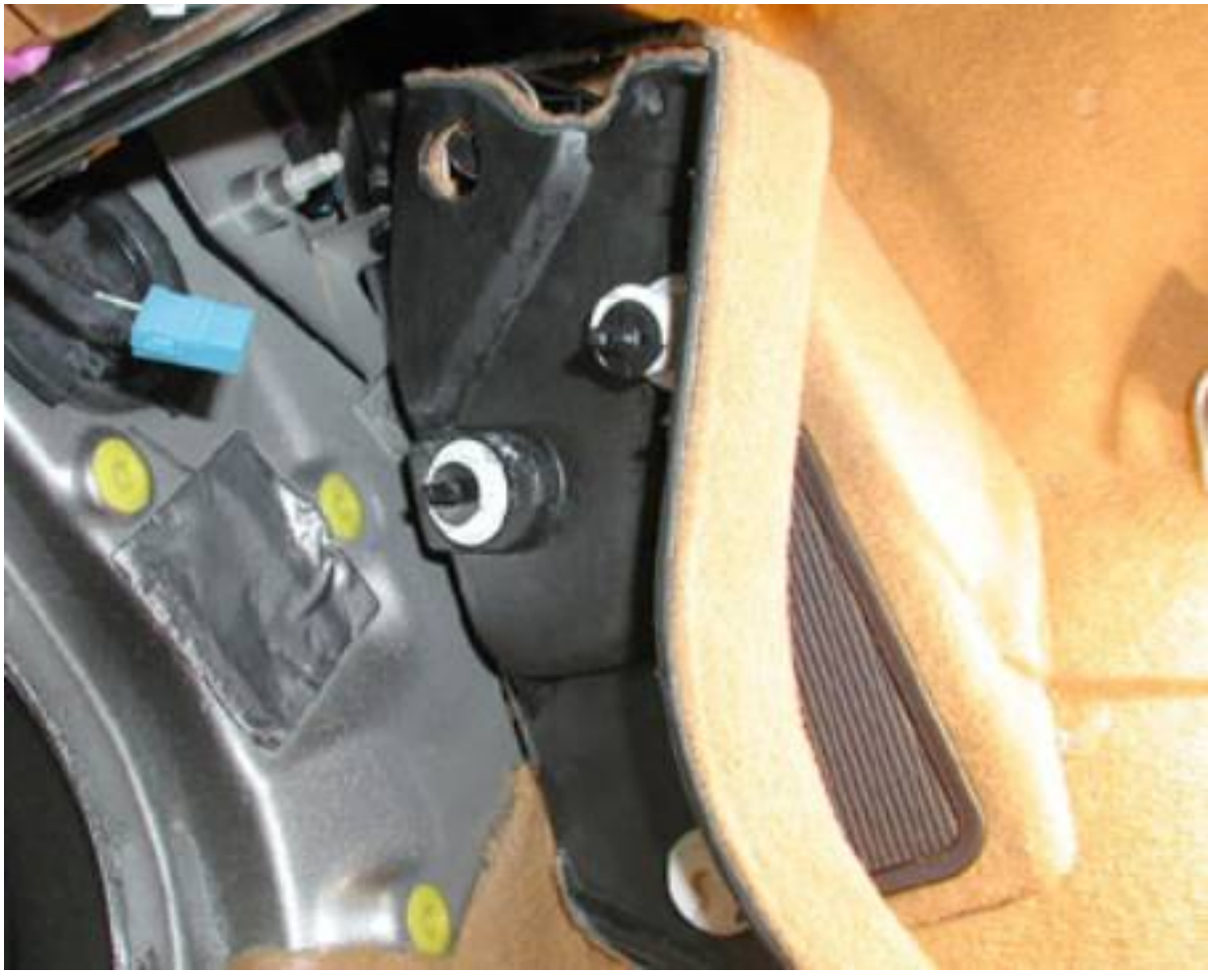
- Lever the lower part of the weather strip out the driver’s door bay.
- Remove the screw covering plug on the engine lid opening lever.

- Unscrew the fastening nut on the engine lid opening lever.

- Pull the lever out of the threaded pin without disconnecting the opening cable.

- Remove the corner trim panel.

- When removing the corner trim panel from the door, take care not to damage the plastic fastening pins on the trim panel itself.



- Undo the two fastening screws and remove the footrest covering.

- Unscrew the three fastening screws and extract the ECUs' mounting bracket .

- Unscrew the nuts, detach the electric connection and remove the power steering ECU (CSG).

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

AIRBAG NODE (NAB)

Removing-refitting the Airbag node (NAB)

- The removal and refitting of the Airbag node is outlined in the section "Steering Airbag - Airbag / sidebag system with electrically-controlled pretensioners" in the chapter headed " Airbag and sidebag ECU".

Airbag and sidebag ECU

LUGGAGE COMPARTMENT NODE (NVB)

Removing-refitting the luggage compartment node (NVB)

- Disconnect the battery's negative terminal.
- Remove the rear parcel shelf

Removing-refitting the rear parcel shelf

- Detach the electrical connections, unscrew the 4 fastening nuts and remove the luggage compartment node (NVB).

When refitting, follow the above procedures in reverse order

- After connecting the battery’s negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Air conditioning and heating system node (NCL)

Removing-refitting the air conditioning and heating system node (NCL)

- The removal and refitting of the air conditioning and heating system node (NCL) is outlined in the section "Air conditioning/heating system - Replacing the components" in the chapter headed "Air conditioning/heating system ECU".

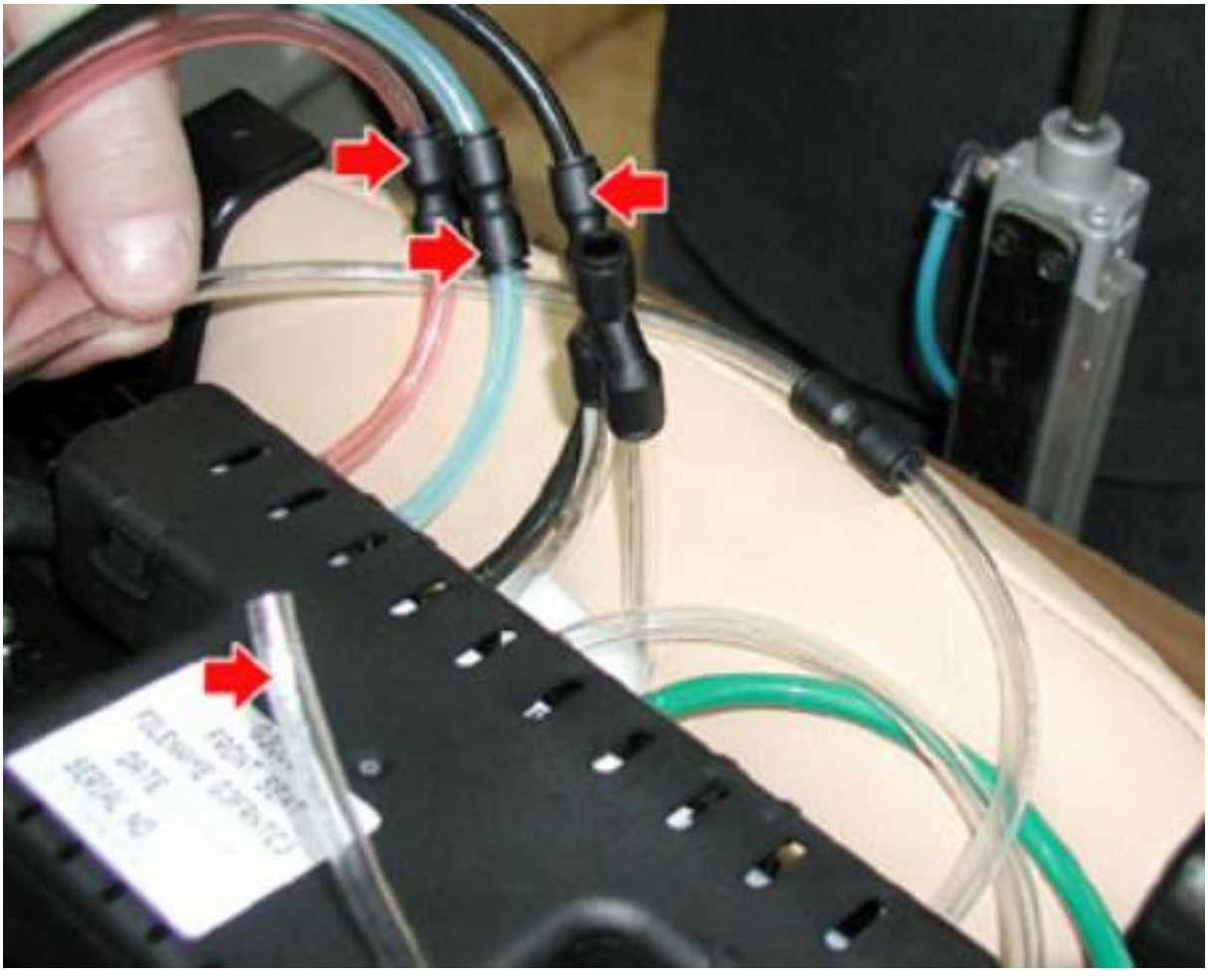
Air conditioning/heating system ECU

Driver position node (NAG)

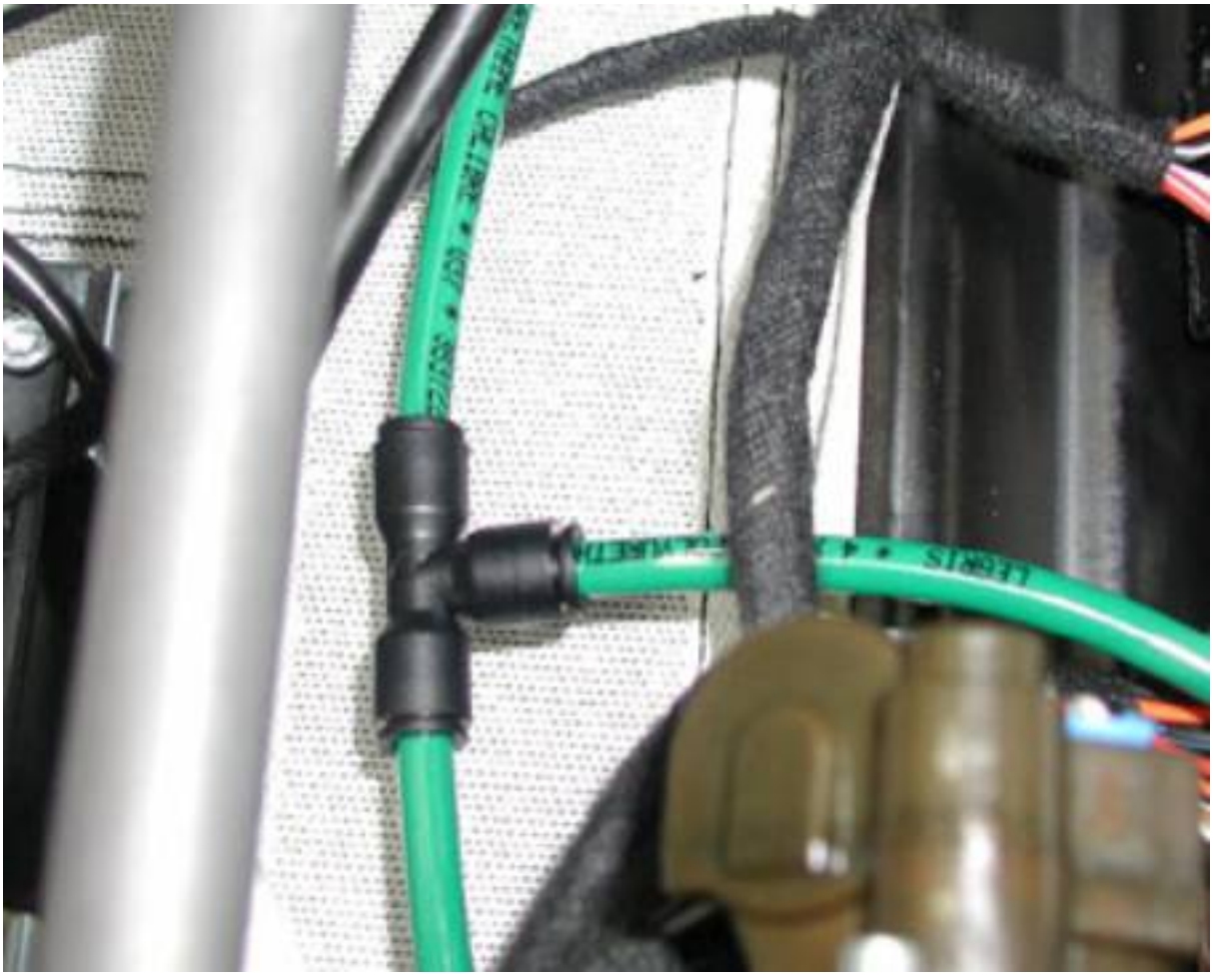
Removing-refitting the driver position node (NAG)

- Remove the front seat concerned from the vehicle and the relative guards from the front seat.
  Front seats

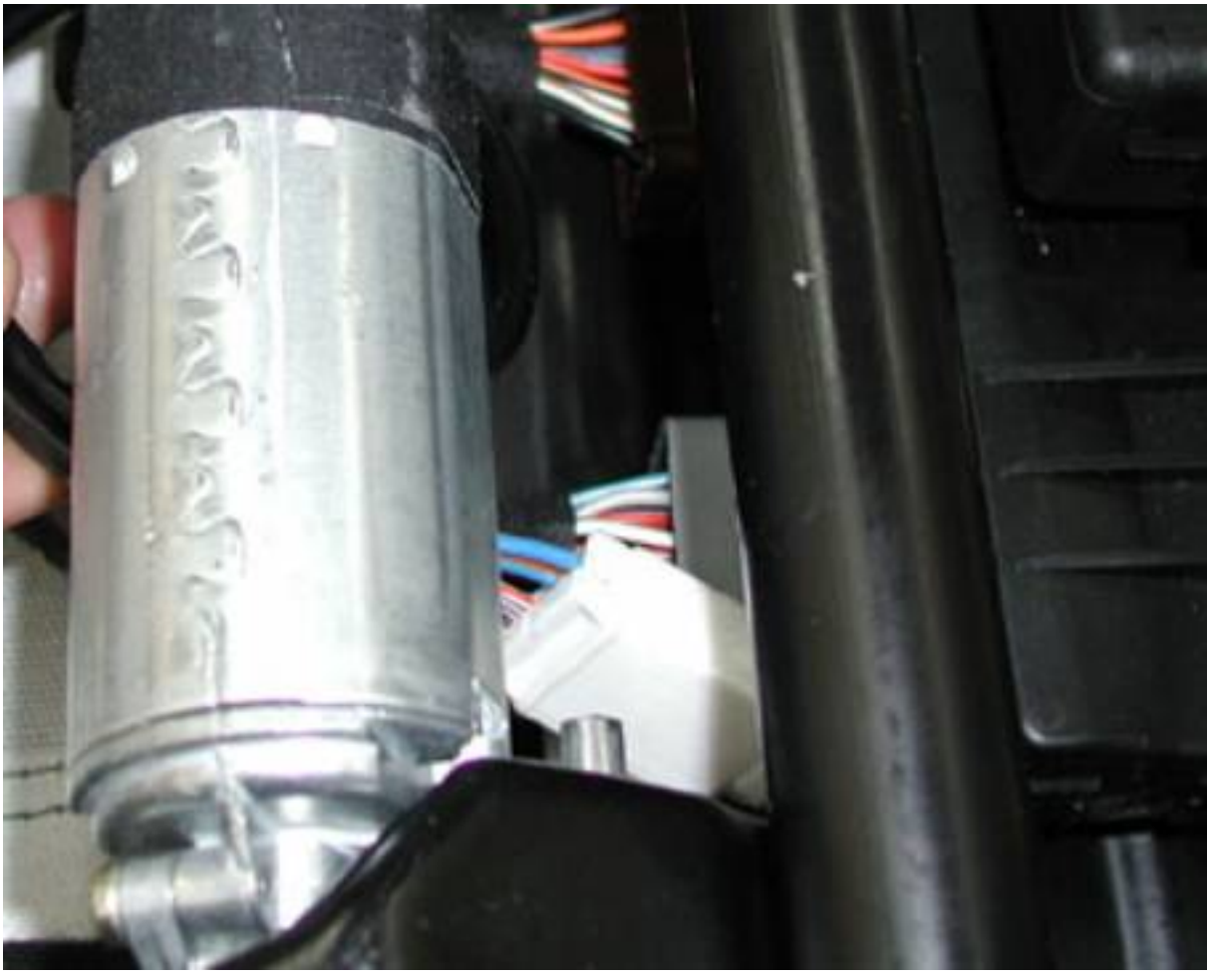
- Disconnect the pneumatic lines from the couplings on the massage and ventilation ECU.



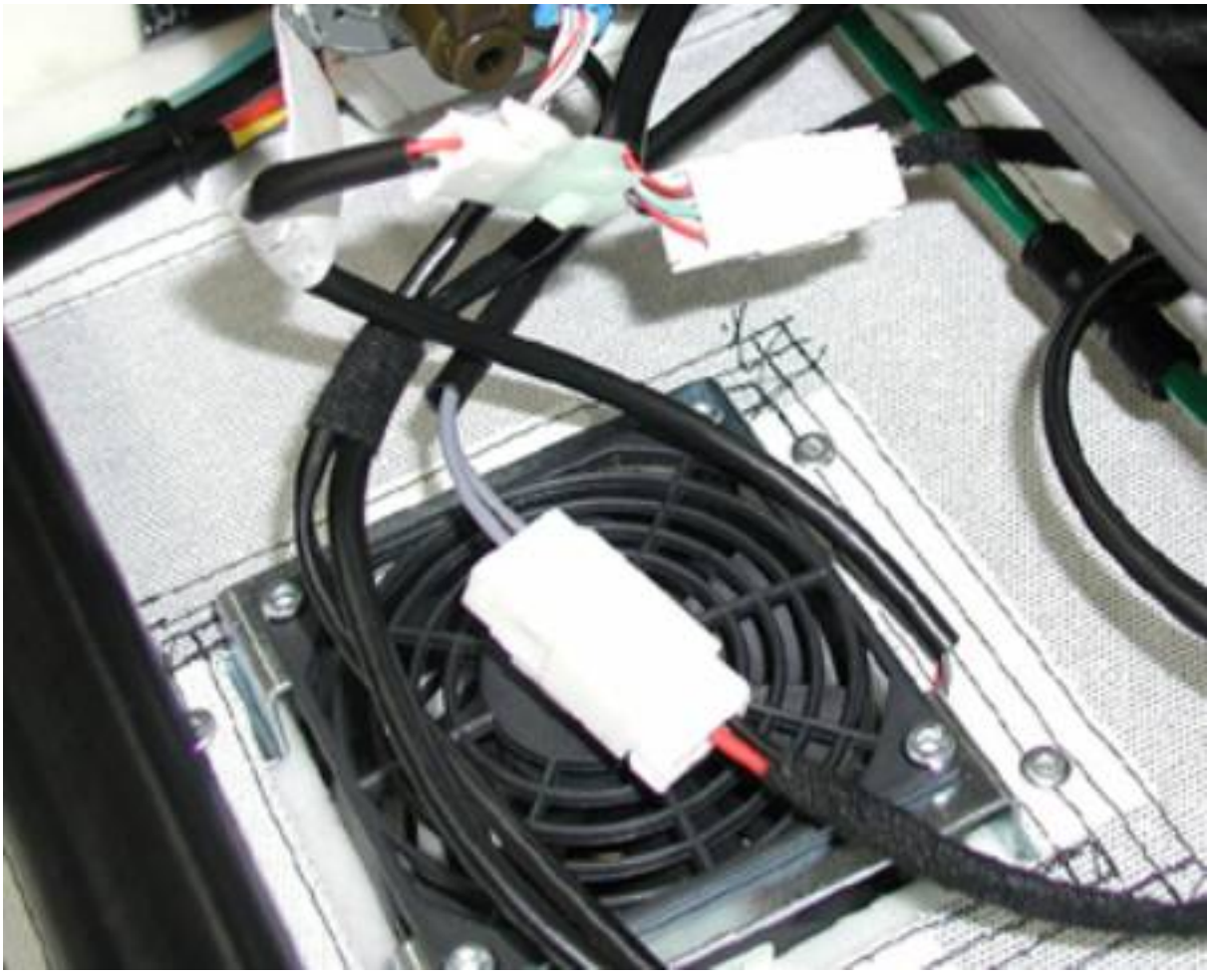
- Disconnect the pneumatic line from the jointing.



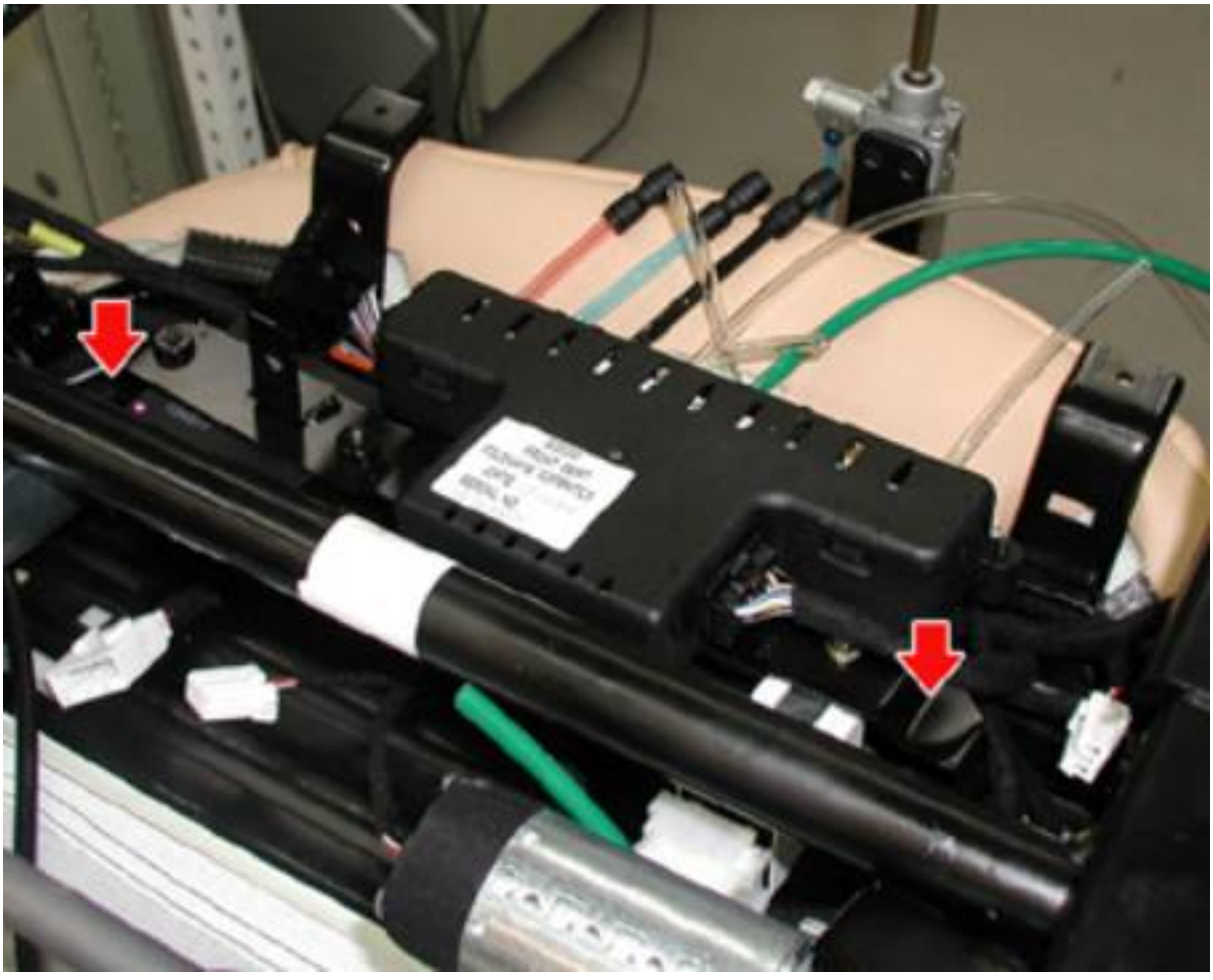
- Detach the electric connection.



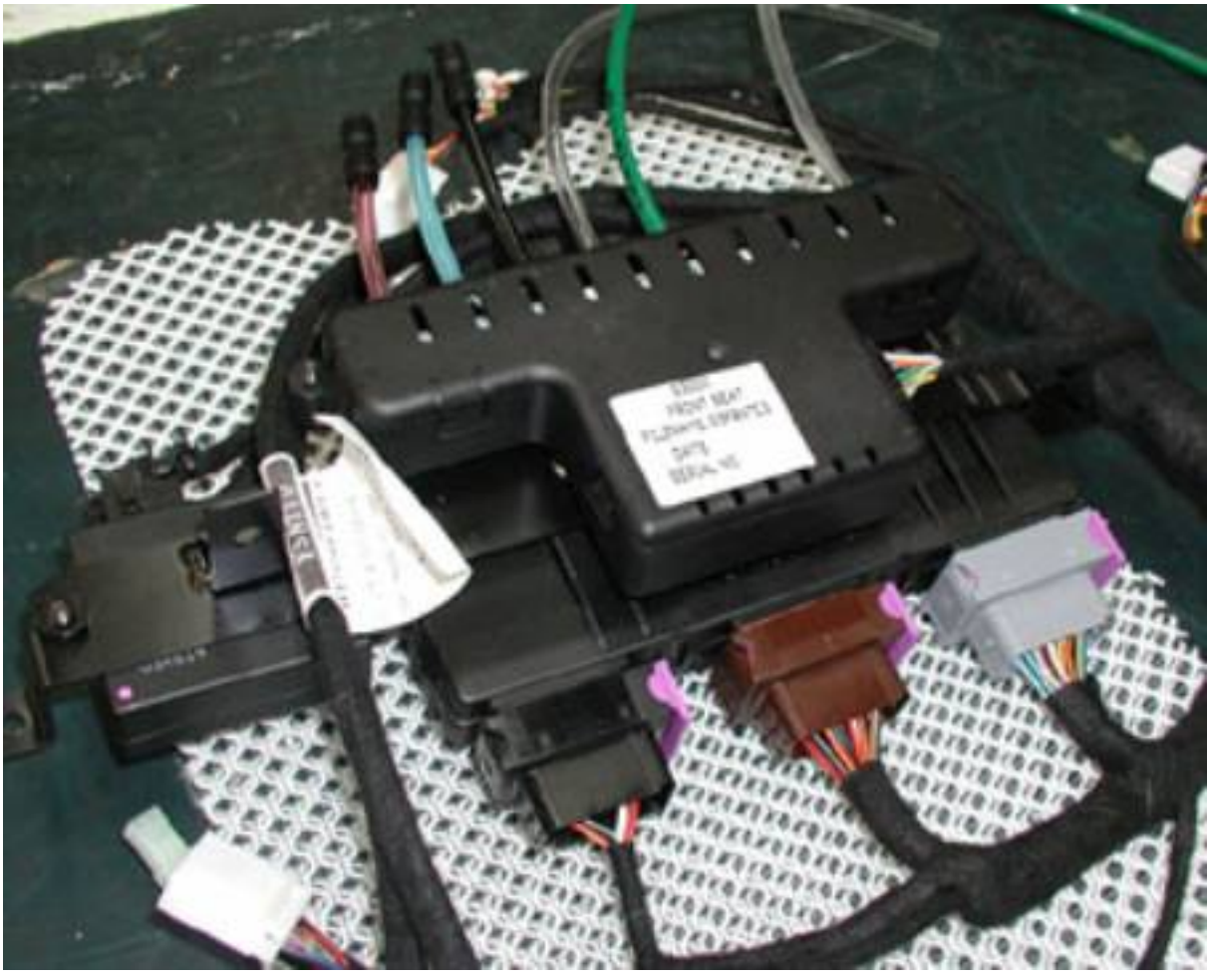
- Detach the electric connections.



- Undo the two fastening screws and remove the driver position node (NAG) and the pneumatic control unit complete with its bracket.



- With the assembly on the bench, separate the driver position node (NAG) from the bracket and from the massage function pneumatic control unit.



When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

DRIVER'S DOOR NODE (NPG)

Removing-refitting the driver's door node (NPG)

- The removal and refitting of the driver's door node is outlined in the section "Bodywork - Interiors" in the chapter headed "Front power window control button/ECU ".

Front power window control button/ECU

PASSENGER’s door node (NPP)

Removing-refitting the passenger's door node (NPP)

- The removal and refitting of the passenger's door node (NPP) is identical to the procedure followed when removing the driver's door node (NPG).

Front power window control button/ECU

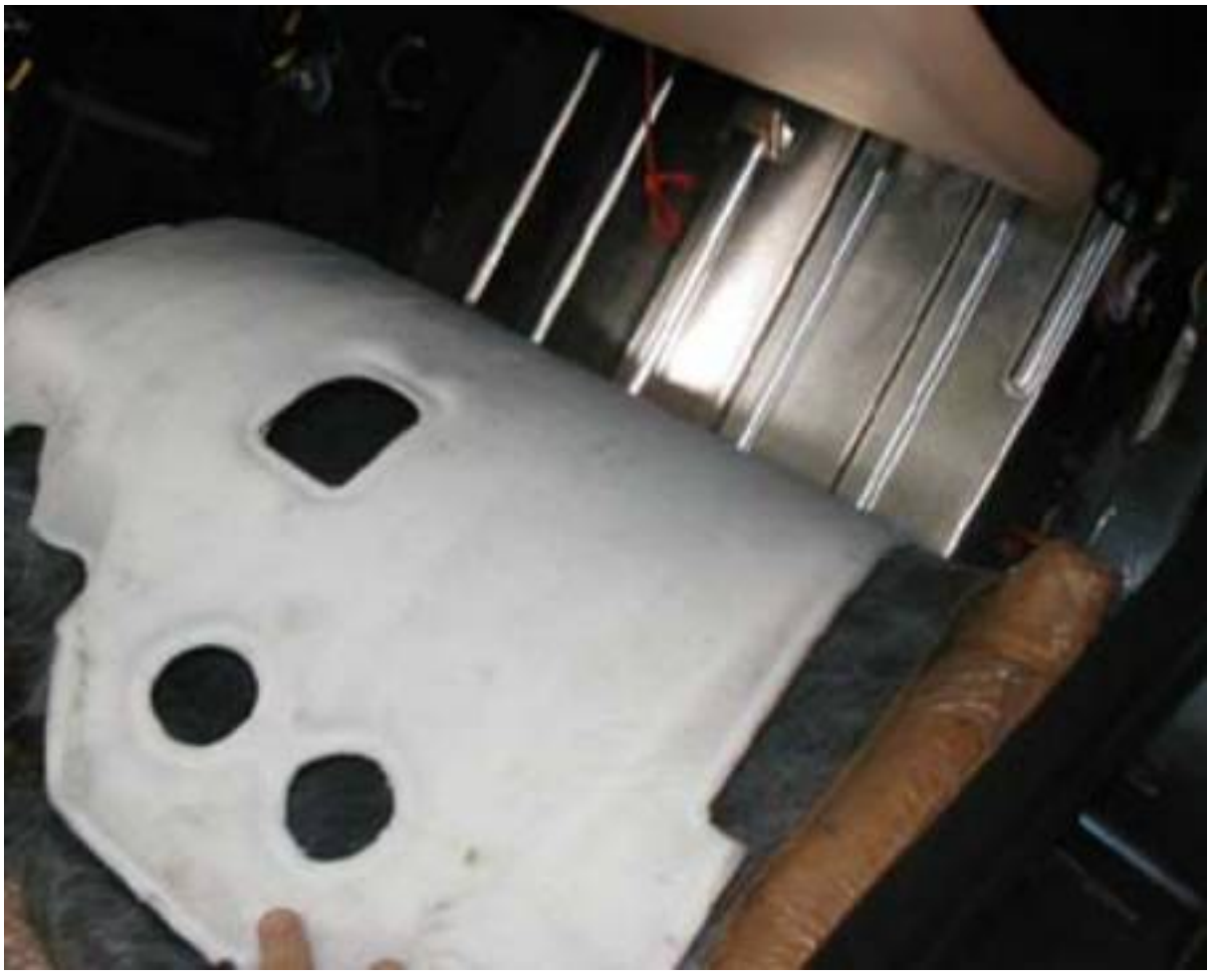
INTERNAL ROOF PANEL NODE (NIM)

Removing-refitting the internal roof node (NIM)

- Disconnect the battery's negative terminal.
- Undo the fastening screws and remove the side guard.

- Remove the corner guard from the floor trim panel.

- Lift and tilt the floor trim panel and the soundproofing material on the floor area.



- Undo the fastening screw, detach the electrical connections and remove the internal roof node NIM from the seat.

When refitting, follow the above procedures in reverse order

- After connecting the battery’s negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

- In the event of replacement of the dashboard node (NIM), the "Proxy" procedure must be carried out to ensure the new component recognises and begins to dialogue with the CAN network.
- Connect the SD3 tester (**95970312)** to the diagnostics socket and run the "Proxy" procedure.

INSTRUMENT PANEL node (NQS)

Removing-refitting the instrument panel node (NQS)

- The removal and refitting of the instrument panel node (NQS) is outlined in the section "Bodywork - Interiors" in the chapter headed "Control panel".

Control panel

RAIN/TWILIGHT SENSOR ECU (CSP)

Removing - refitting the rain/twilight sensor ECU (CSP)

- Disconnect the battery's negative terminal.
- Remove the windscreen anti-mist sensor.

Windscreen anti-mist sensor

- Remove the upper snap-fitted plate.

- Lift the internal rear-view mirror until it is released from the joint glued to the windscreen, then remove it.

- Detach the electrical connection, open the fastening clips and remove the rain/ twilight sensor ECU.

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal, the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Windscreen wiper control unit (CTC)

Removing-refitting the windscreen wiper control unit (CTC)

- Disconnect the battery's negative terminal.
- Undo the fastening screws on the footrest covering panel.

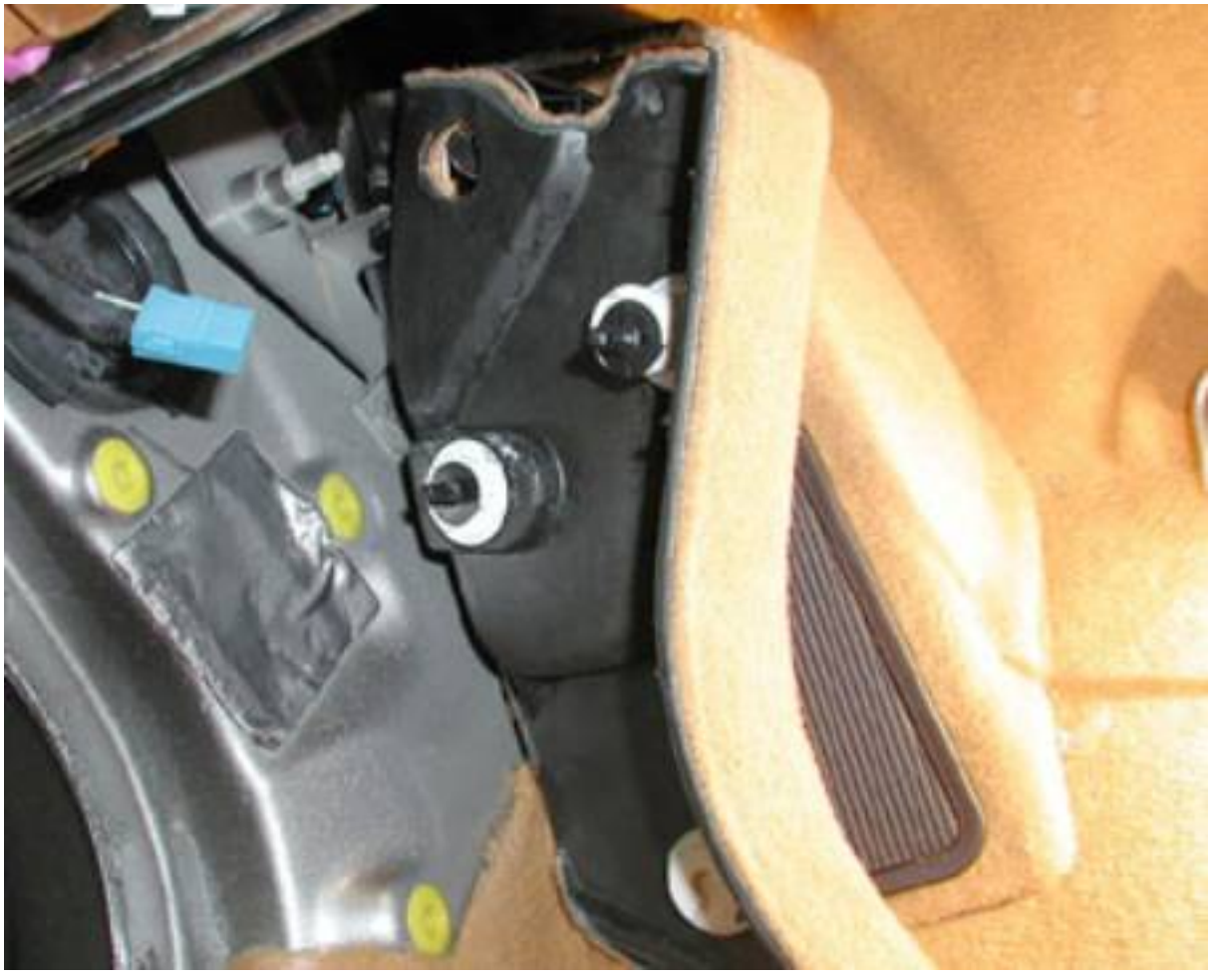
- Lever the lower part of the weather strip out the driver’s door bay.
- Remove the screw covering plug on the engine lid opening lever.

- Unscrew the fastening nut on the engine lid opening lever.

- Pull the lever out of the threaded pin without disconnecting the opening cable.

- Remove the corner trim panel.

- When removing the corner trim panel from the door, take care not to damage the plastic fastening pins on the trim panel itself.



- Undo the two fastening screws and remove the footrest covering.

- Unscrew the three fastening screws and extract the ECUs' mounting bracket .

- Unscrew the nuts, detach the electric connection and remove the windscreen wiper control unit (CTC)

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

Motion-sensing alarm control unit (CAV)

Removing-refitting the motion-sensing alarm control unit (CAV)

- The removal and refitting of the motion-sensing alarm control unit (CAV) is outlined in the section “Electric-electronic system Appendix" in the chapter headed "Alarm system kit replacement - Removing-refitting the motion sensors".

Alarm system kit replacement

Alarm system siren control unit (CSA)

Removing-refitting the alarm system siren control unit (CSA)

- The removal and refitting of the alarm system siren control unit (CSA) is outlined in the section “Electric-electronic system Appendix" in the chapter headed "Alarm system kit replacement - Removing-refitting the alarm system siren".

Alarm system kit replacement

TV Node (NTV)

Removing - refitting the TV node (NTV)

- Remove the upper trim panel in the luggage compartment

Luggage compartment trim panels

- Disconnect the electrical connections on the TV node.

- Unscrew the fastening nuts and lower the robotised gearbox node without disconnecting the electrical connections.

- Unscrew the fastening nuts on the bracket and remove the bracket and TV node assembly.

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

IT info node (NIT)

Removing-refitting the IT info node (NIT)

- The removal and refitting of the IT info node (NIT) is outlined in the section " Bodywork - Interiors" in the chapter headed "IT Module".

IT module

Tyre pressure node (NTP)

Removing – refitting the tyre pressure node (NTP)

- Move the front seat on the driver's side as far back as possible
- Disconnect the negative terminal of the battery.
- Remove the protective cover on the suspension control node compartment.

- Undo the fastening screw, detach the electric connection and move the suspension control node out the compartment.

- Unscrew the fastening nuts on the mounting bracket.

- Take out the bracket, unscrew the fastening nuts, detach the electrical connection and remove the tyre pressure node (NTP).

When refitting, follow the above procedures in reverse order

- After connecting the battery's negative terminal the following self-learning operations must be carried out to ensure that certain connected devices acknowledge the system again:
- Refer to section:

Component self-learning in the event of battery disconnection

DASHBOARD CONTROL UNIT (CPL)

Removing-refitting the dashboard control unit (CPL)

- The dashboard control unit (CPL) is secured to the Body Computer node, therefore, to remove or replace it, follow the procedure outlined for removing-refitting the Body Computer node.

CAUTION
As far as the dashboard control unit is concerned, the Proxy and realignment procedures are not necessary.

Body Computer node

Tightening torques

Description	Torque	Product
Fastening for luggage compartment lid striker plate	6.0	
Fastening securing rear bumper cross member assembly to chassis	28	
Fastening for lower front window guide bracket	7.4	
Fastening for upper hinge on front door	32	
Fastening for front door tie-rod	7.4	
Fastening securing front window guide bracket to reinforcement	7.4	
Front door lock fastening	15	
Fastening securing power window to front door framework	7.4	
Fastening for lower hinge on front door	32	
Fastening for lower hinge on rear door	32	
Fastening for rear door tie-rod	7.4	
Rear door lock fastening	15	
Fastening securing power window to rear door framework	7.4	
Fastening securing luggage compartment lid hinge to luggage compartment framework	7.4	
Luggage compartment lock fastening	24	
Fastening securing engine compartment lid hinge to chassis	24	
Fastening securing engine compartment lid hinge to hinge coupling bracket	24	
Fastening securing luggage compartment lid hinge to rear raceway	7.4	
Fastening securing striker plate reinforcement to rear mud guard exterior	24	
Fastening securing striker plate reinforcement to central pillar reinforcement	24	
Fastening securing front lid lock to cross member	7.4	

Fastening securing front cross member to cross member and front reinforcement.	11	
Fastening securing instrument panel to dashboard cross member	70	
Fastening securing instrument panel to dashboard cross member	24	
Fastening securing instrument panel to dashboard cross member	7.4	
Armrest fastening	24	
Armrest fastening	7.4	
Lower rear seat fastening	24	
Central headrest fastening	24	
Upper fastening for rear seat	24	
Tunnel cross member fastening	25	
Fastening securing rear cross member to tunnel	25	
Upper fastening for front bumper	7.4	
Fastening securing front bumper to bracket	2.6	
Lateral fastening securing front bumper to front mudguard	7.4	
Front seat fastening	40	
Fastening securing upper section of rear bumper	7.4	
Fastening securing lower section of rear bumper	7.4	
Fastening securing end piece support bracket to rear bumper	7.4	
Fastening securing rear bumper to rear mud guard	7.4	
Fastening for front bumper cross member	45	
Fastening for radiator grille cross member (USA version only)	25	
Fastening securing windscreen wiper - headlight washer tank	25	

Windscreen wiper tank fastening	24	

Screw fastening TGK valve support bracket	7.4	
Nut fastening TGK valve support bracket	24	

TOOLKIT

Specific Equipment

Description	Code	
Luggage compartment lock set adjustment wrench	900027320	