Clio

Technical Note 3819A

CB22

Basic manual: Workshop Repair Manual 345 and Technical Note 3286A

Sub-sections concerned: 01A - 04B - 12A - 17B - 19B - 30A - 35A

Special features of Clio II Phase 3

Renault sport

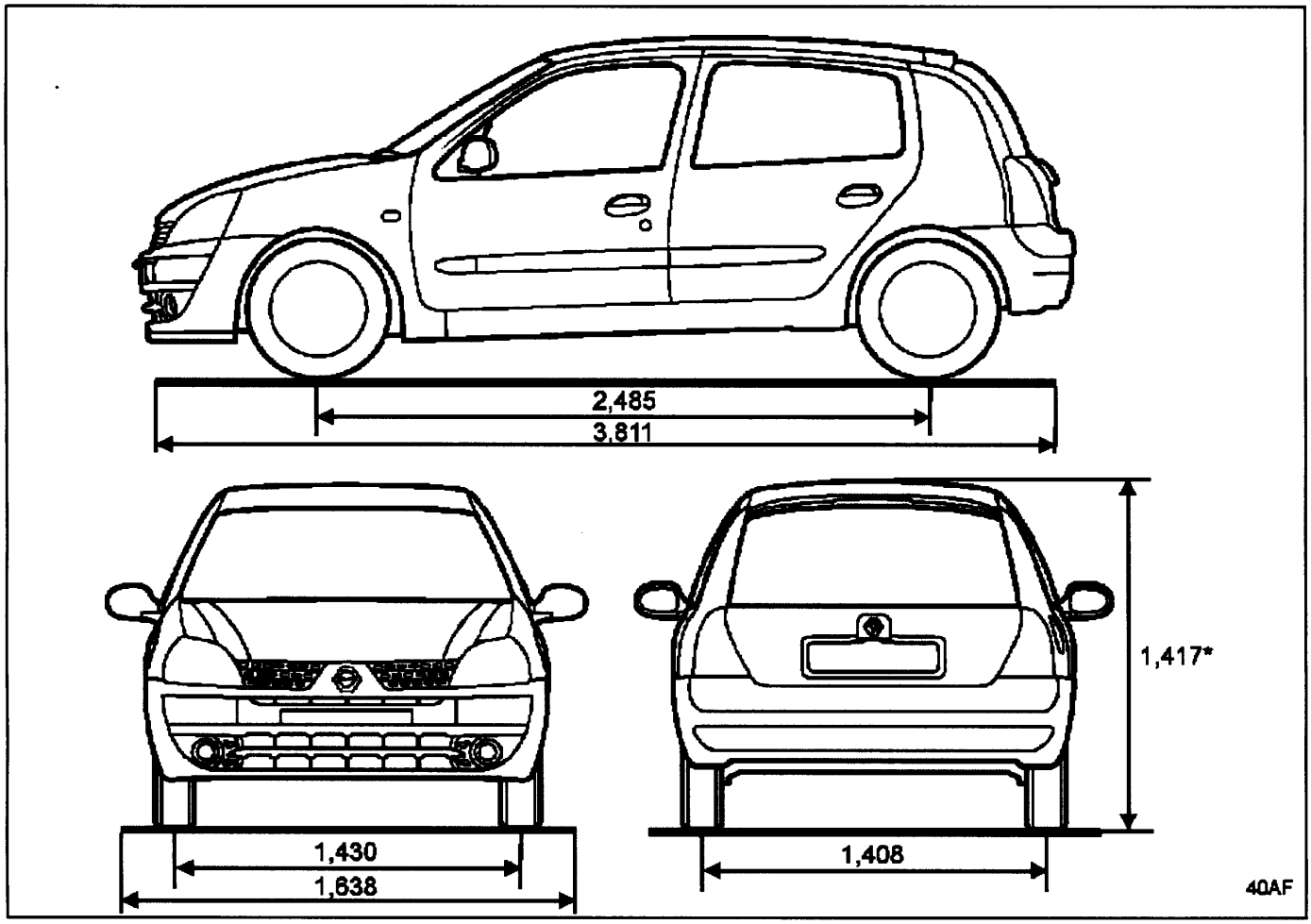
77 11 328 542 APRIL 2004 EDITION ANGLAISE

"The repair methods given by the Manufacturer in this document are based on the technical specifications current when it was prepared.

The methods may be modified as a result of changes introduced by the Manufacturer in the production of the various component units and accessories from which his vehicles are constructed."

Contents

Dimensions in metres



* Unladen

Vehicle type	Engine		Gearbox	
	Type	Suffix	Type	Suffix
CB22	F4R	738	JC5	130

PRODUCT INGREDIENTS
Capacity/Grades

Engine	Average oil capacity (checked with dipstick) (l)	
	Draining	Draining with oil filter replacement
F4R	5	5.2

Gearbox	Capacity (l)
5C5	3.1

Components		Capacity (l)	Grade
Cooling circuit	F4R	7	GLACEOL RX (type D) Add coolant only

Special tooling required	
Tav. 1233-01	Threaded rod for sub-frame loweringl
Tav. 476	Ball joint extractor

Equipment required
Steering wheel lock
Component jack

Tightening torques	
manifold mounting	**1.8 daNm**
exhaust clamp	**2.1 daNm**
catalytic converter bracket mounting	**1 daNm**
sub-frame linkage	**3 daNm**
anti-roll bar bearing bolt	**1.5 daNm**
gearbox control linkage	**2.8 daNm**
subframe/gearbox rubber mounting nut	**3.7 daNm**
torque rod bolt	**6.5 daNm**
track rod end nut	**4.3 daNm**
universal joint bolt	**3 daNm**
body tie-rod bolt	**10.5 daNm**
rear sub-frame bolt	**10.5 daNm**
front sub-frame bolt	**6 daNm**
lower arm mounting	**9 daNm**
wheel bolts	**10.5 daNm**

Mount the vehicle on a two post lift.

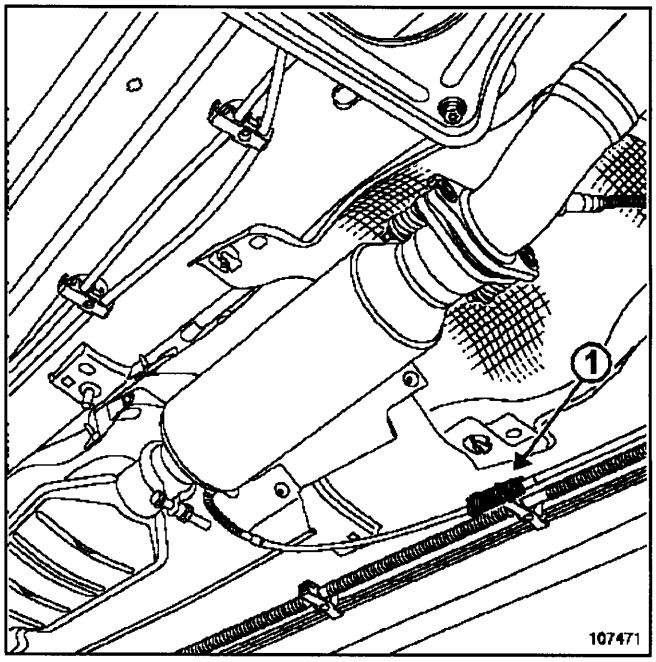
Disconnect the battery, starting with the negative terminal.

REMOVAL

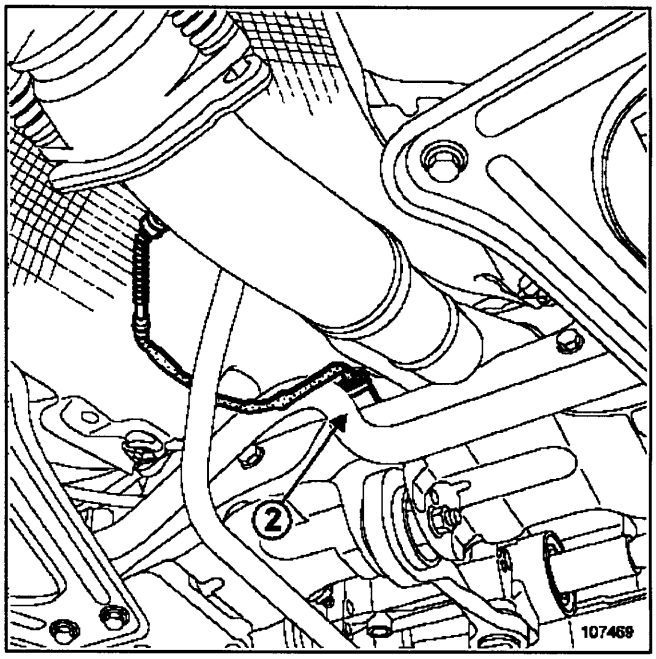
Remove:
...the wheels,
...the engine cover,
...the nine manifold mounting bolts.

Straighten the wheels.

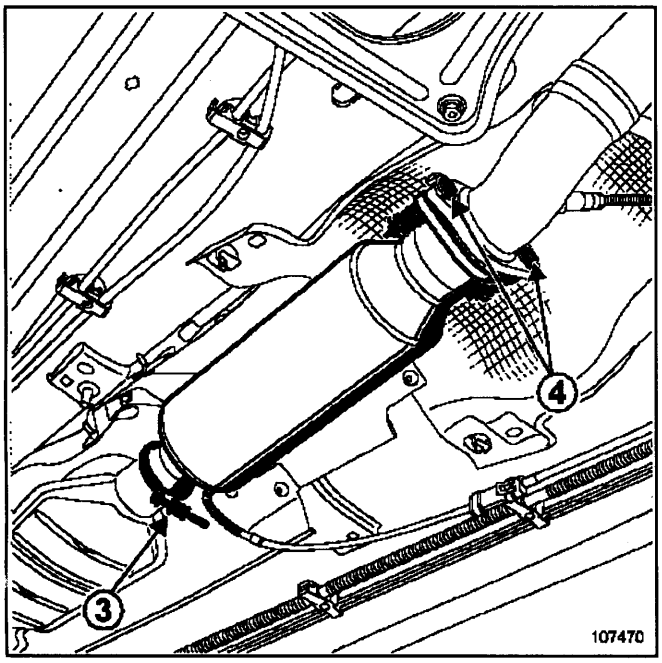
Lock the steering wheel using the steering wheel locking tool.



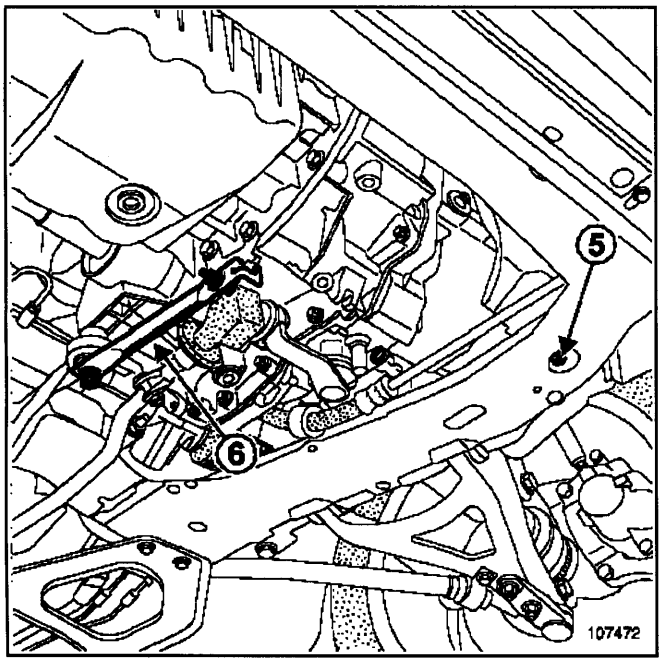
Disconnect downstream oxygen sensor connector (**1**).



Disconnect the upstream oxygen sensor connector (**2**)



Remove:
...the clip (**3**) downstream of the catalytic converter,
...of the bracket upstream of the catalytic converter mountings (**4**),
...the catalytic converter.

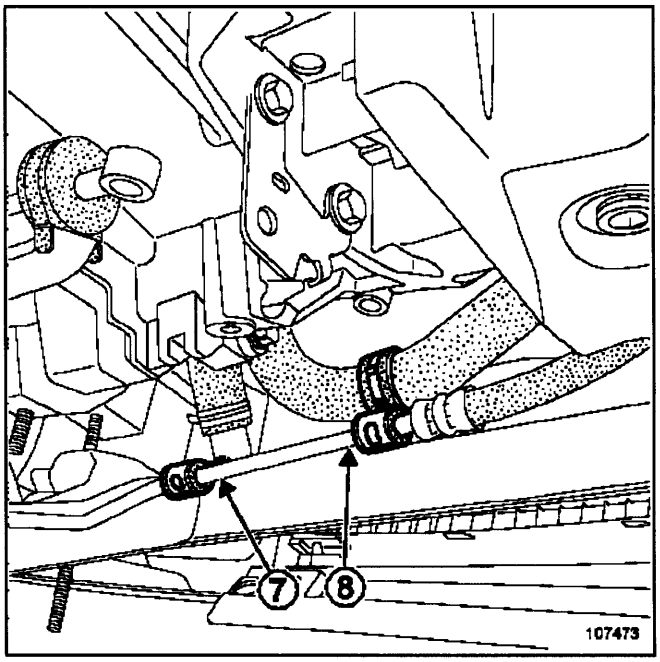


Remove:
...the engine undertray,
...the sub-frame linkages,
...the anti-roll bar bearings at connection with the arms,
...the heat shield underneath the gear lever,
...the gearbox control linkage,
...the geabox rubber mounting nut (**5**) on the sub-frame,
...the linkage (**6**).

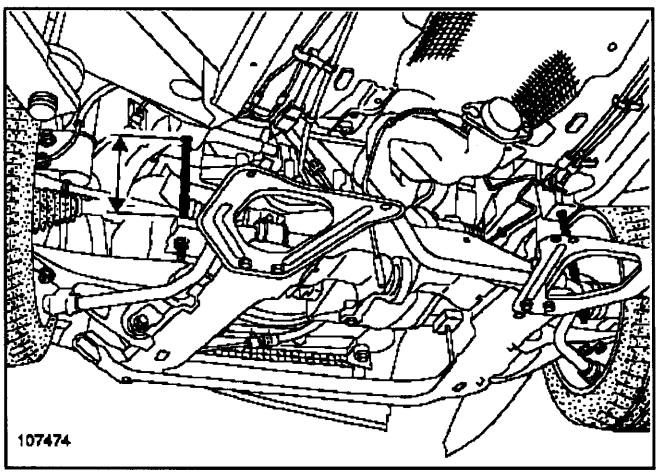
Uncouple the track rod ends with ball joint extractor (**Tav. 476**).

Loosen the sub-frame arms.

Remove the universal joint bolt.



Remove:
...the power assisted steering pipe retaining clip mountings (**7**),
...the cooling hose mounting (**8**).



Remove the body linkage rear mountings.

Fit tool **Tav. 1233-01** in place of the sub-frame mounting nuts.

Lower the sub-frame by:
Front: **140 mm**
Rear: **180 mm**

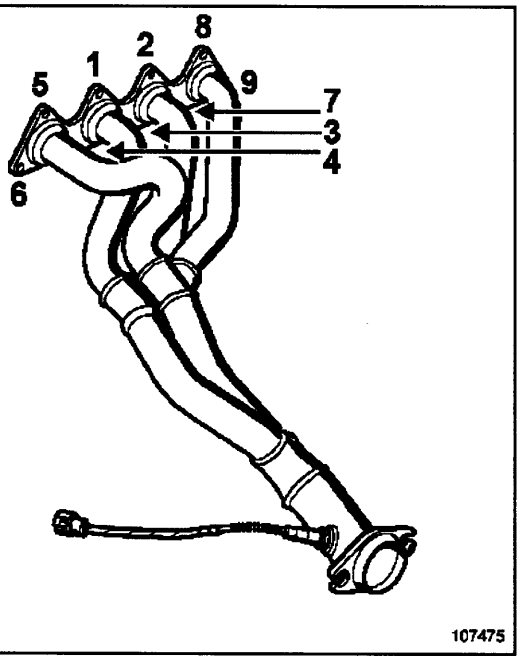
Remove the exhaust manifold.

WARNING
Check the condition of the manifold outlet sealing ring. Replace the sealing ring if necessary.

REFITTING

Proceed in the reverse order to removal.

The exhaust manifold must be tightened in the order described below:



Note:
All removed joints must be replaced.

Set the ground clearance height using a hydraulic jack (see Workshop Repair Manual **337, 31A, Lower arm**).

Tighten to torque.

SPECIAL FEATURES OF THE MULTIPOINT INJECTION SYSTEM FITTED TO THE F4R 738 ENGINE

- **SIEMENS SIRIUS 34 90-track** computer controlling injection and ignition.
- Use of diagnostic tools.
- Multipoint injection operating in sequential mode without a cylinder marking sensor or camshaft position sensor. This means that phasing is controlled by software using the TDC sensor.
- To carry out phasing, drive under half-load in 2nd gear for approximately **1 minute**.
- Injection warning light on instrument panel not operational.
- Special precautions relating to the engine immobiliser:
  Installation of a 3rd generation immobiliser system, integrated into the UCH, requiring a special procedure to replace the computer.
- Idling speed
  ...nominal idle speed (coolant temperature **> 80°C**):
  800 ± 50 rpm
- Fuel vapour absorber bleed solenoid valve controlled by the opening cyclic ratio (OCR) according to engine operation.
- Control of the fan assembly and of the coolant temperature warning light on the instrument panel by the injection computer.
- Controlling a hydrualic inlet camshaft dephaser solenoid valve.
- Maximum engine speeds:
  ...for a coolant temperature of **< 75 °C**: **6750 rpm**.
  ...for a coolant temperature **> 75°C** in 1st or 3rd gear:
  7000 rpm.
  ...for a coolant temperature **> 75°C** in 4th or 5th gear:
  7250 rpm.
- Gear change indicator light comes on approximately **400 rpm** before the maximum engine speed.

This vehicle is fitted with a 3rd generation engine immobiliser system, controlled by a card recognition system with random rolling code which requires a specific procedure for replacing the computer.

REPLACING THE INJECTION COMPUTER

Refer to Workshop Repair Manual **345**, **82A**, **Engine immobiliser** for the immobiliser functions.

Injection computers are supplied without a code, but they can all be programmed with one.

If a computer is replaced, program it with the vehicle code then check that the engine immobiliser function is operating correctly.

To do this, switch on the ignition for a few seconds without starting the engine and then switch it off. With the ignition off, the engine immobiliser function comes into operation after approximately **10 seconds** (the red engine immobiliser warning light flashes).

WARNING
With this immobiliser system, the injection computer retains it immobiliser code for life.
The system has no security code.
It is forbidden to perform tests with computers borrowed from the Parts Department or from another vehicle which must then be returned.
These computers are hard-coded.

POWER ASSISTED STEERING PRESSURE SWITCH / INJECTION COMPUTER LINK

The injection computer receives a signal from the power assisted steering pressure switch (which can be displayed on the diagnostic tools).

The injection computer does not adjust the engine idle speed.

ELECTRICAL CORRECTION ACCORDING TO BATTERY VOLTAGE AND ELECTRICAL POWER LOAD

The aim of this correction is to compensate for the drop in voltage due to operation of a power consumer component when the battery is at low charge.

To achieve this, the idle speed is increased, which increases the rotation speed of the alternator, and this increases the battery voltage.

The lower the voltage, the more significant the correction. Correction of the engine speed is therefore variable.
It begins when the voltage drops below **12.8 V**. The idling speed may reach **900 rpm** maximum.

> Note:
> After a cold start and lengthy idling, a sudden drop in engine speed of approximately **150 rpm** may be noticed.

PRINCIPLE

Under normal warm engine operating conditions, the idle speed **Opening Cyclic Ratio** signal value varies between a high value and a low value, so that the nominal idle speed can be obtained.

It is possible that during variations in the operation of the vehicle (running in, engine fouling, etc.), that the **Opening Cyclic Ratio (OCR)** could become close to the highest or lowest values.

The adaptive correction on the idle **Opening Cyclic Ratio** allows the slow variations of the engine's air requirements to be saved.

This correction only takes effect if the coolant temperature is greater than **75°C**, **20 seconds** after the engine is started and if the nominal idle speed regulation phase is active.

VALUES OF THE IDLING OPENING CYCLIC RATIO AND ITS ADAPTIVE CORRECTION

PARAMETERS	F4R 738 ENGINE
Nominal idle speed	X = 800 ± 50 rpm.
Idling **Opening Cyclic Ratio**	2% to 31%
Idling adaptive **Opening Cyclic Ratio**	End stop MIN: -7% MAX: +7%

Every time the engine is switched off the computer resets the stepper motor to its lower limit.

INTERPRETATION OF THESE PARAMETERS

If there is an excess of air (air intake or throttle stop incorrectly adjusted, etc), the engine idling speed increases and the idle speed **OCR** signal value decreases in order to return to nominal idle speed; the adaptive adjustment value of the idle speed **OCR** signal reduces in order to reset the idle speed regulation.

If there is insufficient air (due to fouling, etc.), the logic is reversed: the idle speed **OCR** signal increases and the adaptive adjustment also increases in order to reset the idle speed regulation operation.

WARNING
After the computer memory has been cleared, the engine must be started and then switched off to allow the potentiometer to be recalibrated. Start the engine again and let it run at idle speed so that the adaptive correction can take place.

Note:
In the event of rough idling, check whether the engine phasing is correct. To do this, drive in 2nd gear under half-load for approximately **1 minute**. Then check status **ET018 Cylinder 1 recognition** using the After Sales diagnostic tool.

SENSOR HEATING

The oxygen sensor is reheated by the injection computer when the engine is started.

The oxygen sensor heating is stopped:
...when the vehicle speed is greater than **108 mph (180 km/h)** (value given for information purposes),
...according to the load and engine speed.

UPSTREAM SENSOR VOLTAGE

The value read on the diagnostic tools (except XR25) under the "Upstream sensor voltage" parameter indicates the voltage supplied to the computer by the oxygen sensor located upstream from the catalytic converter. It is expressed in millivolts.

The voltage should fluctuate between two values during richness regulation:
...**150 ± 100 mV** for a lean mixture,
...**750 ± 100 mV** for a rich mixture.

The smaller the gap between the MIN/MAX values, the poorer the signal quality from the sensor (the variation is usually at least **500 mV**).

> Note:
> If the difference is small, check the sensor heater.

MIXTURE CORRECTION

The value read on the diagnostic tool in the "**mixture correction**" parameter indicates the average of any richness correction performed by the computer in response to the richness of the fuel mixture read by the oxygen sensor located upstream of the catalytic converter.

The correction value has a mid-point of **128** and limits of **0** and **255**:
...value less than **128** = request for mixture to be made leaner.
...value greater than **128** = request for mixture to be made richer.

ENTRY INTO RICHNESS REGULATION MODE

Richness regulation will start after a timed starting period according to the coolant temperature if the oxygen sensor is ready (sufficiently warm).

In all cases, richness regulation should be active after **2 minutes** if the coolant temperature is greater than **70°C**.

When the mixture regulation is complete the parameter value is **128**. Refer to the **richness regulation** status on the diagnostic tool.

Unlooping phase

When richness regulation is occurring, the operating phases when the computer ignores the voltage signal from the oxygen sensor are:
...under full load,
...under heavy acceleration,
...under deceleration with a no load signal,
...when the lambda sensor is faulty.

In this case the value **128** is displayed.

DEFECT MODE IN THE EVENT OF AN OXYGEN SENSOR FAULT

If the voltage supplied by the oxygen sensor is incorrect (varying only slightly or not at all) during richness regulation, the computer will only enter defect mode if the fault has been recognised as present for **10 seconds**. In this case only, the fault will be stored, the: "**richness regulation**" parameter is **128**.

If an oxygen sensor fault is present and recognised and if the fault has already been stored, the system enters open loop mode directly.

PRINCIPLE

In looping phase, the richness regulation corrects the injection time to obtain fuel dosing as close as possible to a richness of **1**. The correction value is close to **128**, with limits of **0** and **255**.

The adaptive correction makes it possible to offset the injection map to realign the richness regulation around **128**.

Following the reinitialisation of the computer (return to **128** of adaptive corrections), a special road test needs to be carried out.

PARAMETERS	F4R 738 ENGINE
Operating adaptive richness	64 ≤ X ≤ 160
Idle adaptive richness	64 ≤ X ≤ 160
Mixture correction	64 ≤ X ≤ 200

ROAD TEST

Conditions:
...engine warm (coolant temperature **> 75°C**).
...do not exceed an engine speed of **4800 rpm**.

Pressure zones which must be passed through during the test

	Range No. 1 (mbar)	Range No. 2 (mbar)	Range No. 3 (mbar)	Range No. 4 (mbar)	Range No. 5 (mbar)
	251 399	517	635	753	873
F4R 738	Average 325	Average 458	Average 576	Average 694	Average 813

Following this test the adjustments will be operational.

Continue the test by driving under normal conditions, in a varied manner for a distance of **3 to 6 miles (5 to 10 kms)**.

After the test, read the adaptive richness values. Initially **128**, should be changed.

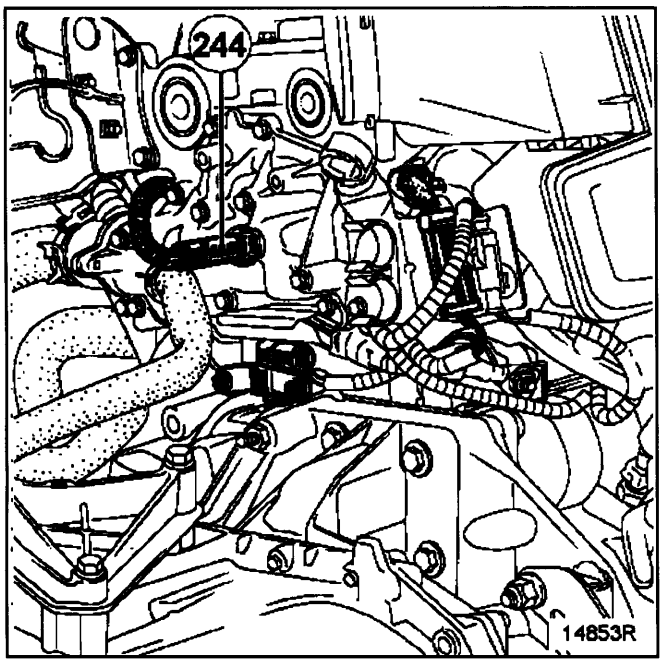
If not, repeat the test ensuring that the test conditions are observed.

INTERPRETATION OF DATA GATHERED DURING A ROAD TEST

In the event of a lack of fuel (injectors fouled, fuel pressure and flow of fuel too low, etc), the richness regulation increases to obtain a richness as close as possible to **1** and the adaptive richness correction increases until the richness correction is centred around **128** again.

In the event of an excessive amount of fuel, the logic is reversed: the richness regulation decreases and the adaptive richness correction also decreases to realign the richness correction at around **128**.

CENTRALISED COOLANT TEMPERATURE MANAGEMENT



244 Coolant temperature sensor (injection and coolant temperature displayed on the instrument panel).

Sensor **3-track**:
...two for the coolant temperature signal,
...one for the instrument panel indicator.

This system is fitted with a single coolant temperature sensor which is used in the injection sytem, fan assembly and temperature warning light on the instrument panel functions.

Operating principle

Sensor **244** enables:
...the coolant temperature to be displayed on the instrument panel,
...the injection computer to be informed of the engine coolant temperature.

The injection computer controls the following according to the coolant temperature:
...the injection system,
...the fan assembly relay,
- the fan assembly is controlled if the coolant temperature exceeds **98°C**,
- the fan assembly only has one speed,
- the fan assembly can be controlled by the antipercolation device,

...the temperature warning light.

COOLANT TEMPERATURE WARNING LIGHT

The coolant temperature warning light is controlled by the injection computer and comes on if the coolant temperature exceeds **118°C** it then goes out if the temperature falls below **115°C**.

The catalytic converter reaches high temperatures, so never park near combustible material.

WARNING
All damaged heat shields must be replaced.
The sealing between the exhaust manifold gasket face and the catalytic converter must be perfect.
Always replace all removed seals.
The catalytic converter must not be subjected to mechanical shock during removal or refitting, as this could damage it.

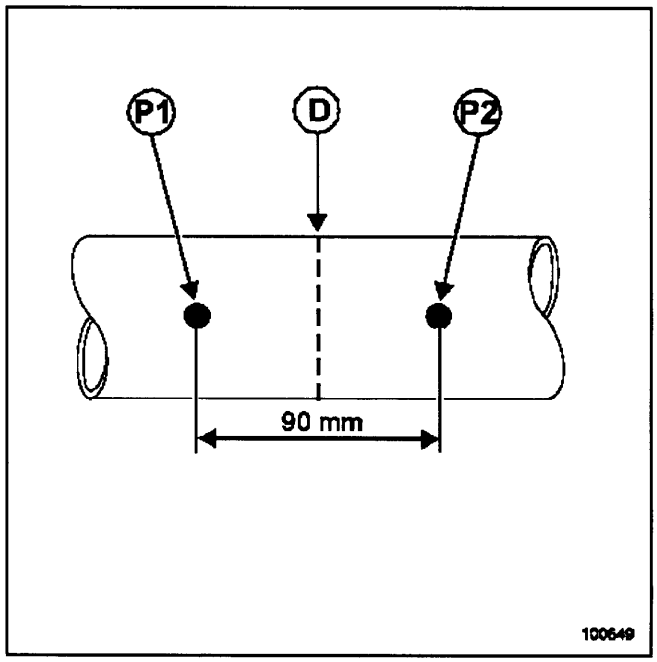
SPECIAL NOTES ON THE EXHAUST PIPE

1 - Cutting the exhaust pipe

When replacing one of the components, cut the exhaust pipe:
...correctly identify the area to be cut.
...correctly use the cutting tool (Mot. 1199-01).
...correctly position the after-sales sleeve.

2 - Identifying the area to be cut

Two punch marks on the exhaust pipe indicate the area to be cut (refer to **19B, Exhaust silencer**).



Before cutting the pipe, mark the area (**D**) between marks (**P1**) and (**P2**).

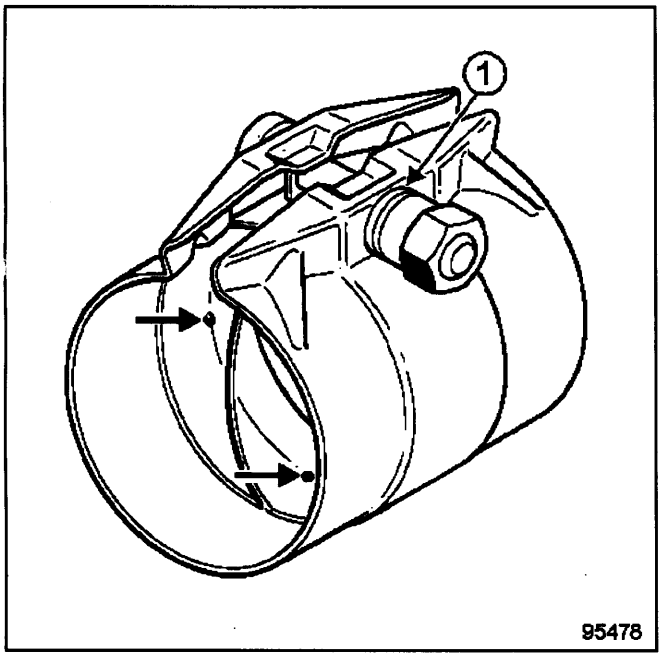
The distance between the two marks is **90 mm**.

3 - Fitting the After-Sales sleeve

To avoid any leaks in the exhaust pipe, the sleeve must be properly positioned on the two lugs.

Placè the sleeve on the worn section of the pipe.

Adjust the clip diameter by tightening carefully.



Place the sleeve end on the worn section of the pipe.

Adjust the diameter of the **sleeve** by tightening carefully.

Apply exhaust mastic inside the sleeve.

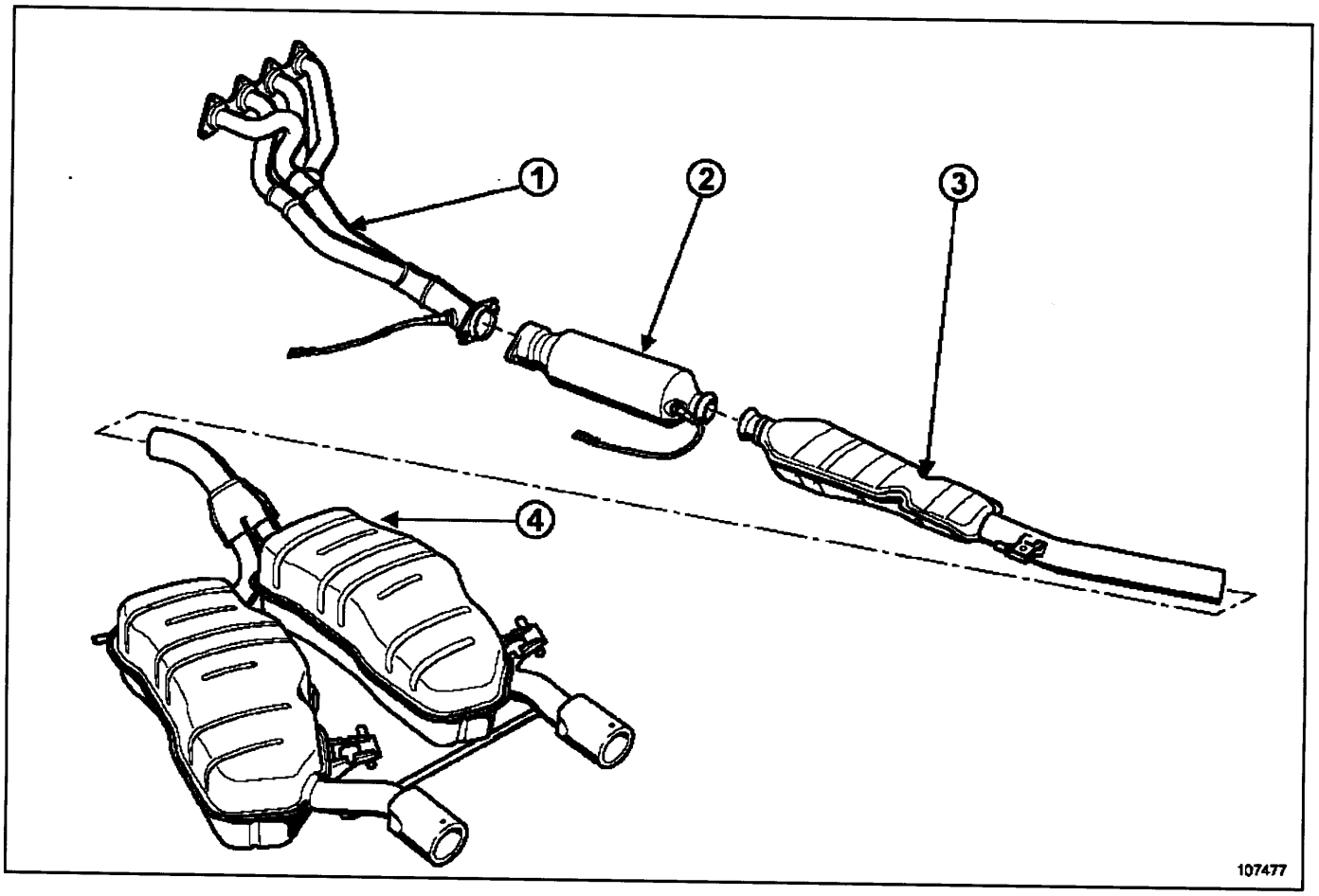
Fit the new component.

> Note:
> The sleeve bolt and tightening nut assembly must be positioned so that they cannot come into contact with the underbody.

Clamp nut (**1**) has a groove to ensure the correct tightening torque.

While tightening, a clicking sound indicates tightening to a torque of **2.5 daNm**.

> **WARNING**
> Do not use a previously fitted clip.



The exhaust system consists of three components:

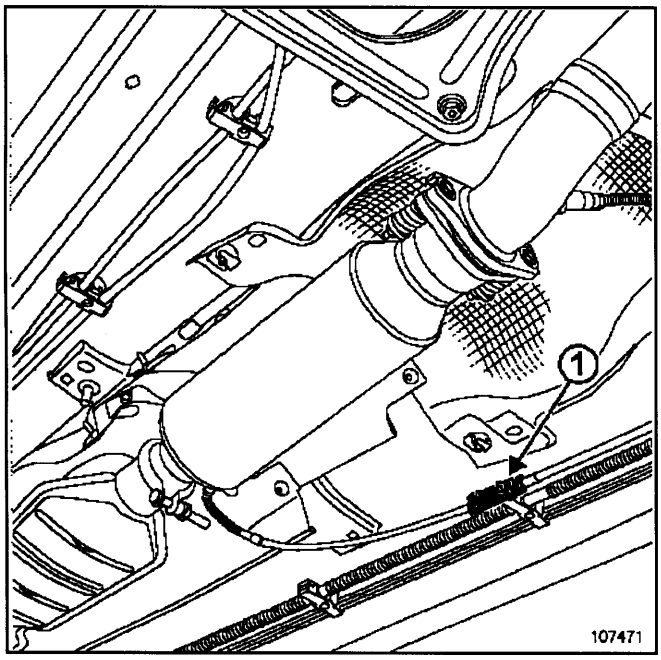
1 Manifold
2 Catalytic converter
3 Expansion chamber
4 Silencer

Special tooling required	
Mot. 1495-01	Pin for the oxygen sensor

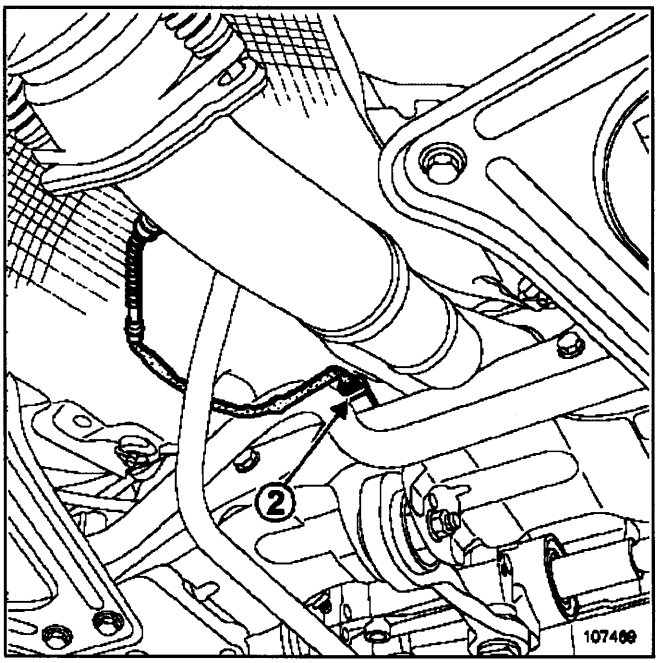
Tightening torques	
exhaust clamp	**2.1 daNm**
catalytic converter front bracket mounting	**1 daNm**
lambda sensor	**4 daNm**

REMOVAL

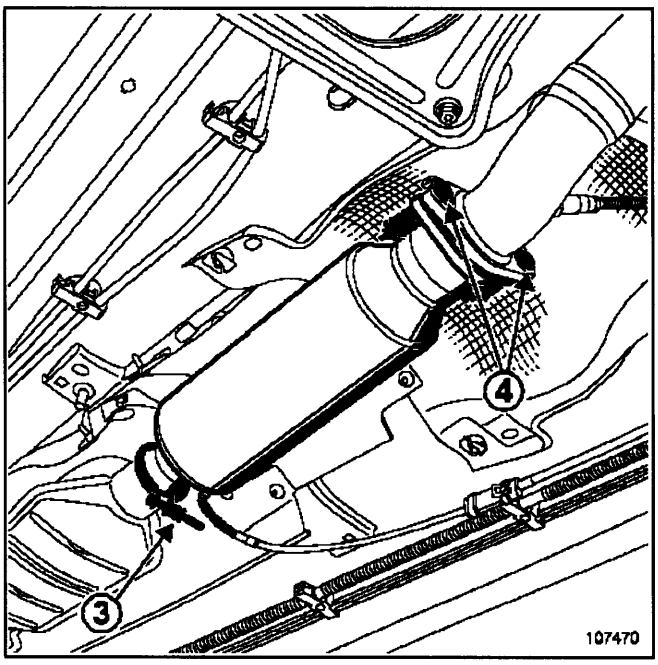
IMPORTANT
Catalytic converters contain ceramic fibres; they are contained within a sealed unit and cannot be dispersed. Cutting or drilling catalytic converters is not permitted.



Disconnect the catalytic converter downstream oxygen sensor connector (**1**).



Disconnect the catalytic converter upstream oxygen sensor connector (**2**).



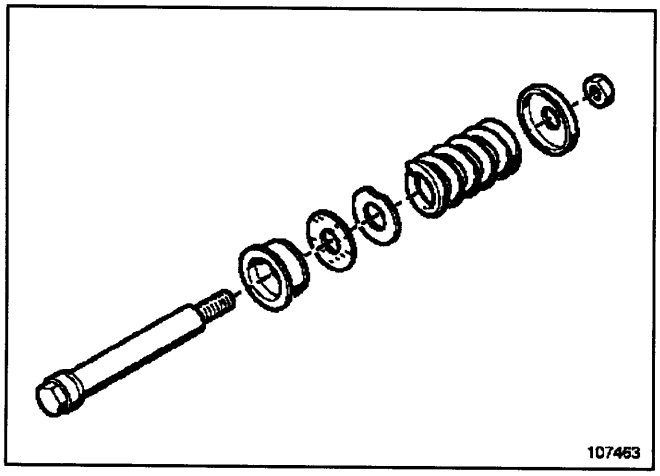
Remove:
...the downstream clip (**3**) on the catalytic converter,
...the catalytic converter upstream bracket mountings (**4**),
...the catalytic converter.

WARNING
Do not let the catalytic converter fall as this could damage its mounting.

REFITTING

Proceed in the reverse order to removal.

Note:
If the catalytic converter is replaced both oxygen sensors also must be replaced.



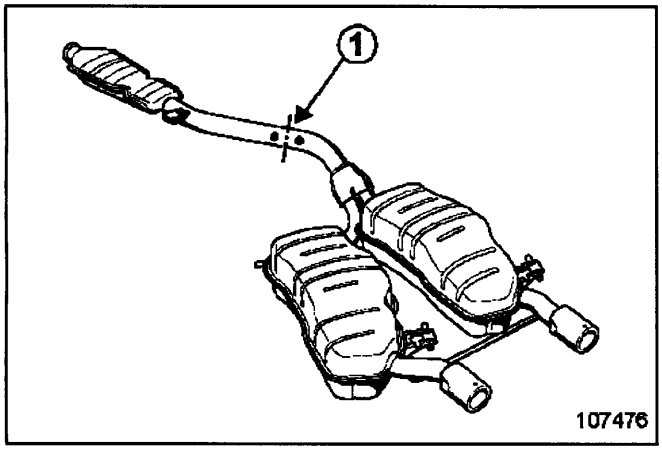
Observe the direction of fitting of the catalytic converter upstream mounting washers.

Tighten to torque:
...the **catalytic converter mountings (1 daNm)**,
...the **exhaust clamp (2.1 daNm)**.

Special tooling required	
Mot. 1199-01	Pipe cutter

Tightening torque	
catalytic converter downstream clip	**2.1 daNm**

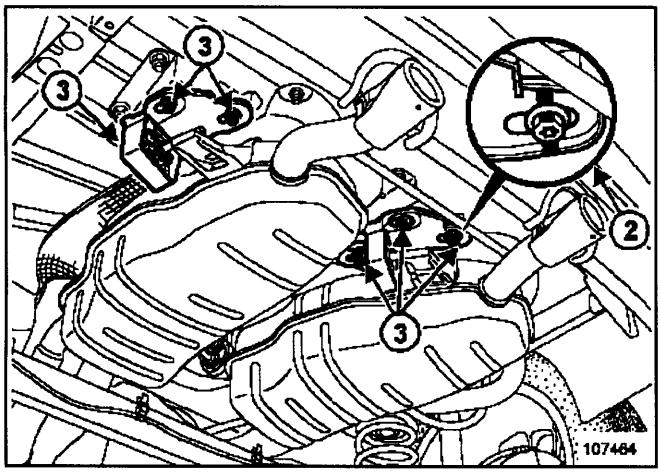
REMOVAL



Mark the two punch points (**1**).

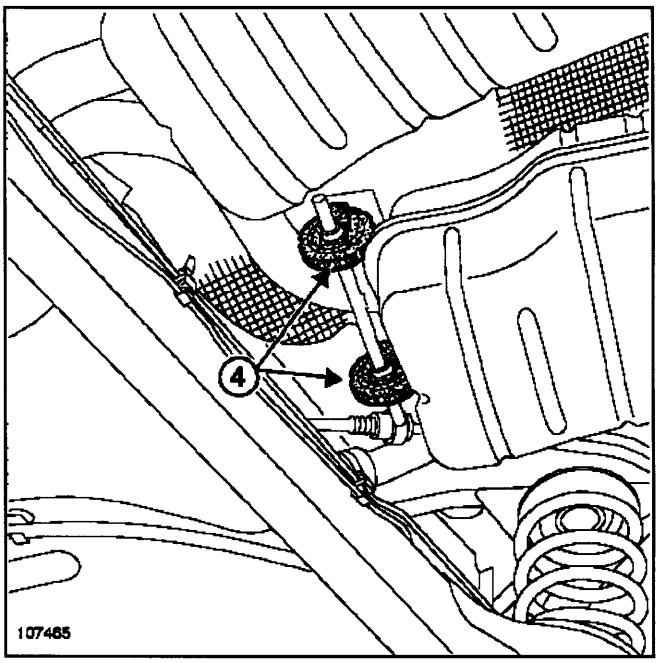
Position the pipe cutter tool (Mot. 1199-01) between the two punch marks.

Cut the pipe.



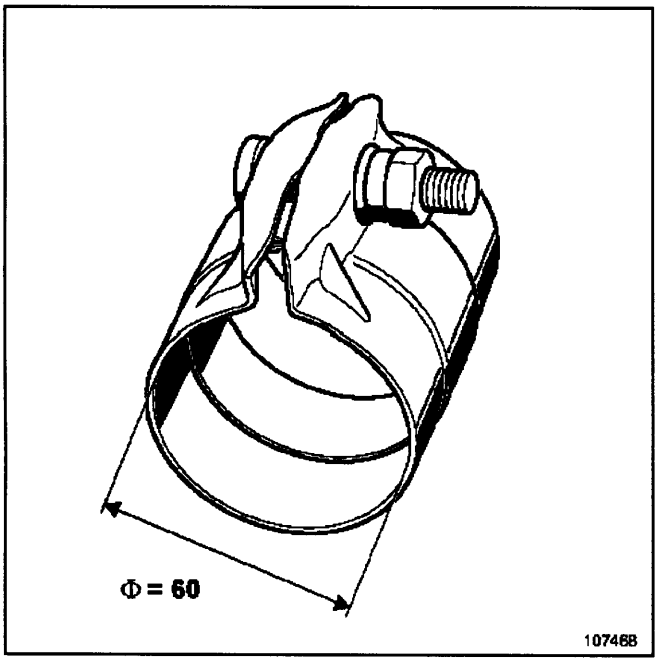
Mark the position of bolts (**2**) on the brackets.

Remove both bracket mounting bolts (**3**)



Remove:
...both rubber mountings (**4**),
...both silencers.

REFITTING



Note:
The sleeve bolt and tightening nut assembly must be positioned so that they cannot come into contact with the underbody.

Remove the expansion chamber without tightening the clamp downstream of the catalytic converter.

Fit sleeve **77 03 083 398** onto the expansion chamber.

Position the two silencers while fitting the two rubber mountings (**4**).

Tighten the sleeve on the silencer pipe.

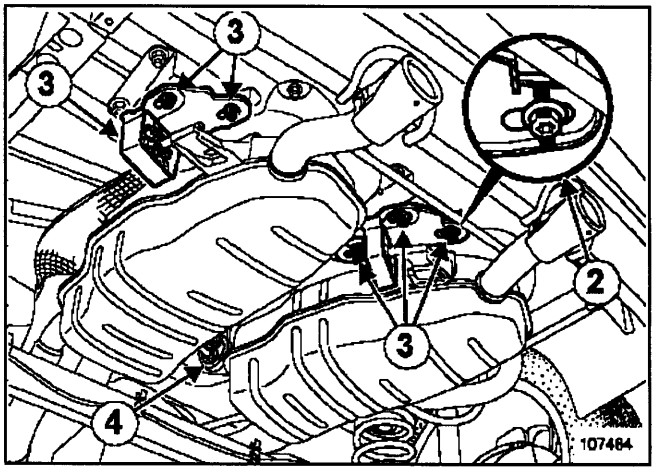
Fit the two rear rubber mountings (**3**) without tightening them.

Tighten the catalytic converter downstream heat sleeve checking that the pipe is correctly positioned (check the position of the rear rubber mountings (**2**)).

Tighten the rear rubber mountings.

Torque tighten the downstream catalytic converter **clamp** to (**2.1 daNm**).

CHECKING THE POSITION OF THE GROOVES



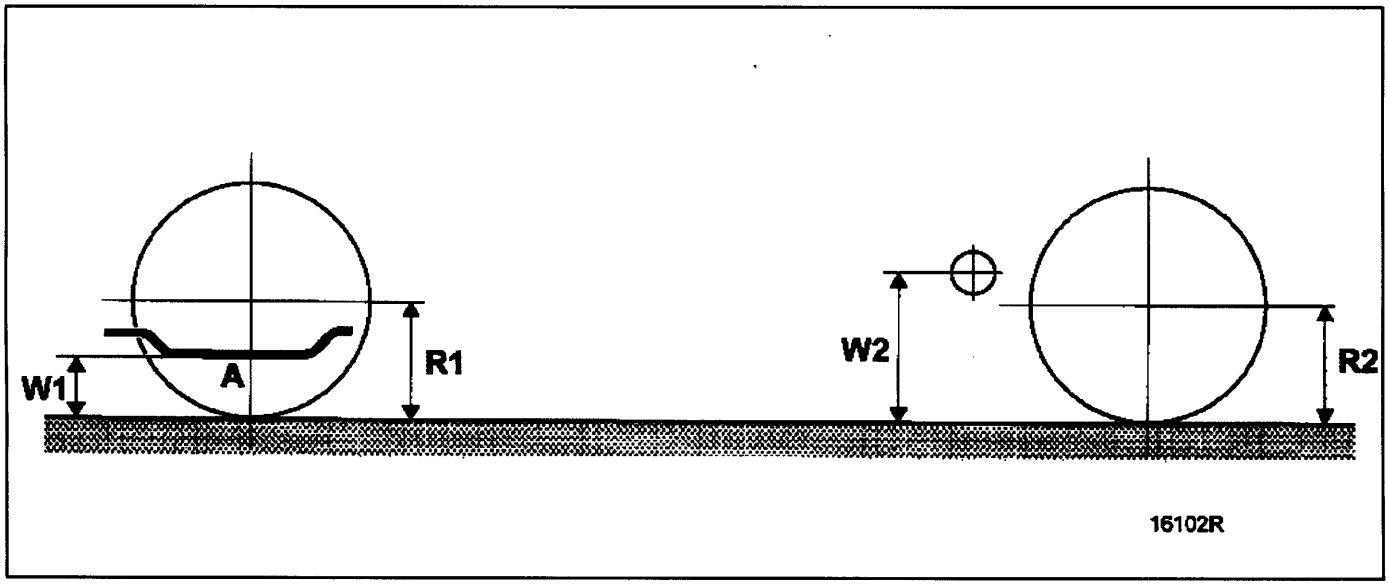
Check that there is **15 mm** clearance between the grooves and the edges of the silencers made in the rear bumper.

Make sure all the exhaust pipe heat shields are in place and properly attached.

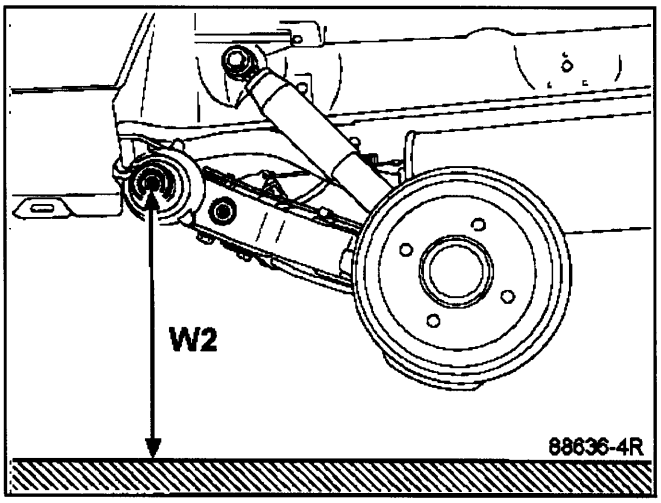
Make sure there is no contact with the underbody.

WARNING
...All damaged heat shields must be replaced.
...Do not reuse a used sleeve.
...The sleeve bolt and tightening nut must be positioned so that they cannot come into contact with the underbody.

MEASURING POINTS



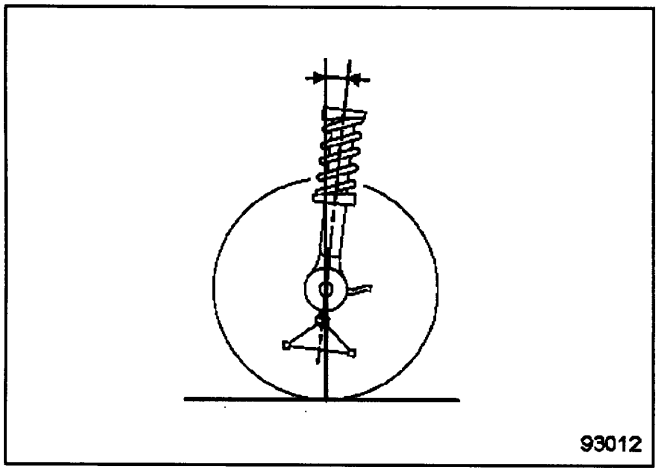
R1 Tyre radius under load.
W1 Height measured between the sub-frame inner surface (**A**) and the ground along the wheel axis.
R2 Radius of rear tyre under load.
W2 Height measured between the rear axle kingpin and the ground



WARNING
Symbols used by RENAULT:
+ = toe-out,
- = toe-in.

I - CASTOR

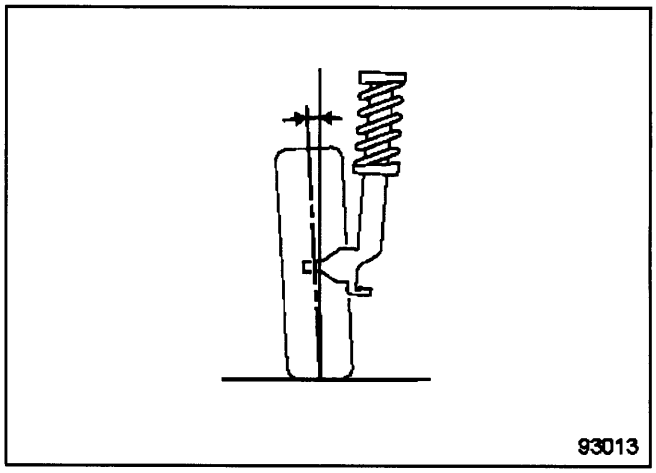
Not adjustable.



Values	Position of front axle (mm)
3°± 30'	W2 - W1 = 118

II - CAMBER

Not adjustable.

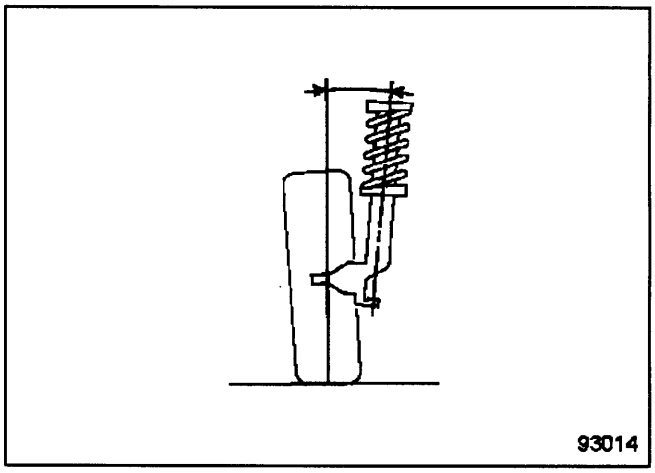


Values	Position of front axle (mm)
Basic version: - 0°30□± 30'	W2 - W1 = 118
Sport version: - 0°45□± 30'	W2 - W1 = 118

The Basic and Sport versions can be distinguished by the colour of the rims:
...Basic version: conventional rim,
...Sport version: charcoal grey rim.

III - KING PIN

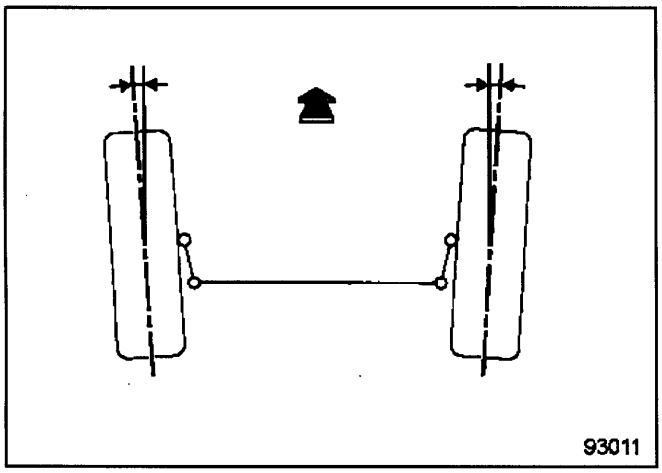
Not adjustable.



Values	Position of front axle (mm)
12°49□± 30'	W2 - W1 = 118

IV - WHEEL ALIGNMENT

Adjustable by rotating the track rod sleeves.



Values	Position of front axle (mm)
(For two wheels) Toe-out 12' ± 5'	Unladen

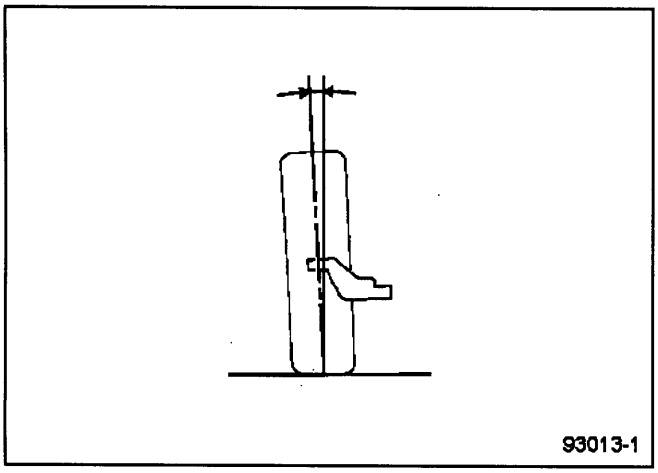
V - POSITION FOR TIGHTENING RUBBER BUSHES

Adjust with no load.

WARNING
Symbols used by RENAULT:
+ = toe-out,
- = toe-in.

II - CAMBER

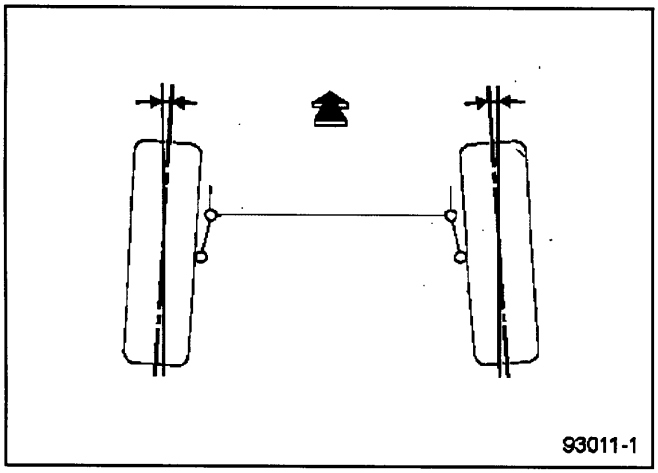
Not adjustable.



Values	Position of rear axle
- 1°30' ± 20'	Unladen

II - WHEEL ALIGNMENT

Not adjustable.



Values	Position of rear axle
(For two wheels) Toe-out - 0°20' ± 30'	Unladen

III - POSITION FOR TIGHTENING RUBBER BUSHES

Adjust with no load.

	ENGINE
	F4R 738
FRONT BRAKES (mm)	
Piston diameter	54
Disc diameter	280
Disc thickness	24
REAR BRAKES (mm)	
Piston diameter	30
Disc diameter	238
Disc thickness	8
MASTER CYLINDER (mm)	
Diameter X Stroke	22.2
Stroke	32

(*) The brake discs are not grindable. If they are excessively worn or scored they must be replaced.

Vehicle	Disc thicknesses (in mm)			
	Front		Rear	
	Max.	Min.	Max.	Min.
CB22	24	21.8	8	7

(**1**) Drum: maximum wear diameter

The disk run-out is a maximum of **0.07 mm**.

Vehicle	Lining thickness (in mm)				Brake fluid
	Front (including mounting)		Rear (not including mounting)		
	New	Min.	New	Min.	
CB22	18	6	11	4.6	SAE J1703 DOT 4

WHEELS AND TYRES
Specifications

Vehicle	Wheel rim	Tyres	Tyre pressure when cold (in bar) (1)	
			Front	Rear
CB22	7 J 16	205 / 45 R16 83 V	2.3	2.1

(**1**) Under full load and on motorways.

Tightening torque of the wheel nuts: **10.5 daNm**
Rim runout: **1.2 mm**.