

# RENAULT

## Technical Note6027A

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**X56, and F4P or F4R - X64, and F4P or F4R - X65, and F4R - X66, and F4R - X73, and F4R - X74, and F4P or F4R - X81, and F4R - X83, and F4R, and RENAULT BRAND - X84, and F4R - X85, and F4R - X91, and F4R - X95, and F4R**

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## F4 engine

**Edition 8**

**This note cancels and replaces Technical Note 3783A**

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DECEMBER 2009

EDITION ANGLAISE

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

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

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# F4 engine

## Contents

Pages

<b>10A</b>	<b>ENGINE AND CYLINDER BLOCK ASSEMBLY</b>		<b>10A</b>	<b>ENGINE AND CYLINDER BLOCK ASSEMBLY</b>	
	Engine: Precautions for the repair	10A-1		Crankshaft: Check	10A-219
	Engine: Specifications	10A-3		Piston base cooling jet: Removal - Refitting	10A-225
	Engine: Standard replacement	10A-7		Cylinder block: Removal - Refitting	10A-235
	Engine: New replacement	10A-10		Cylinder block: Cleaning	10A-241
	Engine: Repair	10A-13		Cylinder block: Check	10A-242
	Engine support equipment: Use	10A-21			
	Rocker cover: Removal - Refitting	10A-25			
	Camshaft: Removal - Refitting	10A-74			
	Camshaft: Check	10A-104			
	Cylinder head: Removal - Refitting	10A-109			
	Valve: Removal - Refitting	10A-170			
	Valve: Check	10A-175			
	Cylinder head: Stripping - Rebuilding	10A-180			
	Cylinder head: Cleaning	10A-182			
	Cylinder head: Check	10A-184			
	Piston - Con rod: Removal - Refitting	10A-189			
	Piston - Con rod: Check	10A-200			
	Crankshaft: Removal - Refitting	10A-207			

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## Engine: Precautions for the repair

X73 – X74 – X81 – X83 – X84 – X91 – X95 – X64 – X65 – X56 – X66 – X85

**I - SAFETY****General information**

All information contained in these manuals is intended exclusively for automotive industry professionals.

The documentation is intended to cover all vehicles in the **RENAULT** range throughout the world, but may not cover equipment designed for use in specific countries.

The procedures and fault finding procedures recommended and described in this manual have been designed by automotive industry repair professionals.

**a - General recommendations**

Observe basic principles of vehicle repair.

The quality of repair depends first and foremost on the care exercised by the person in carrying it out.

To ensure good repair:

- use recommended professional products and original parts,
- observe the tightening torques,
- observe the recommendations for parts that should always be replaced after removal, refitting or replacement operations,
- clean and degrease the sections to be bonded, to ensure they bond correctly.

**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

**WARNING**

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

The design quality of the vehicles demands that nothing be left to chance during repair. Consequently, parts or components must be refitted in their original positions (for example: heat shields, wiring routing, pipe routing).

Use professional products and apply them with care. For example, do not apply too much sealant to joint faces, in order to avoid plugging engine oil or coolant pipes.

**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

**b - Special tooling - ease of use**

The repair procedures have been designed using special tools; they must therefore be carried out using these tools to ensure a high degree of working safety and quality of repair.

The equipment we have approved has undergone careful research and testing, and must be used and maintained with care.

**c - Safety**

Certain devices and parts must be handled with particular attention to safety and cleanliness and, above all, with due care.

The safety symbol used in this manual indicates that special attention must be paid to the procedure or the tightening torque values.

Working safely:

- use suitable tools which are in good condition (use of « multi-purpose » tools, such as adjustable pliers, etc., should be avoided wherever possible),
- use supports and adopt a correct posture when performing heavy work or raising loads,
- check that the working area is clean and tidy during the operation,
- use personal protection (gloves, goggles, work shoes, masks, skin protection, etc.),
- always follow the safety instructions associated with the operation to be performed,
- do not smoke when working on vehicles,
- do not use harmful products in unventilated rooms,
- do not ingest any chemicals (brake fluid, coolant, etc.).

Respecting the environment:

- sort waste according to its particular qualities,
- do not burn discarded products (tyres, etc.).

## Engine: Precautions for the repair

X73 – X74 – X81 – X83 – X84 – X91 – X95 – X64 – X65 – X56 – X66 – X85

### ***d - Conclusion***

The procedures contained in this document merit your attention. Please read them carefully in order to reduce the risk of injury, and avoid using incorrect procedures that could damage the vehicle or make it dangerous in use.

Following the recommended procedures will help you to provide a quality of service which will ensure the vehicles achieve the highest levels of performance and reliability.

Maintenance and repair operations must be carried out under the proper conditions to ensure that our vehicles run safely and reliably.

## **II - CLEANLINESS**

### **Risks relating to contamination**

#### ***Protective bags***

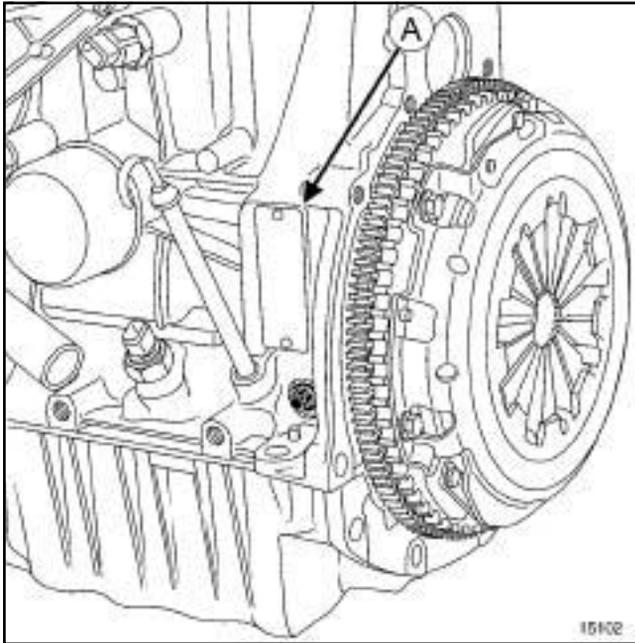
Use hermetically-resealable plastic bags, using adhesive tape, for example, to store components which will be refitted and reused. Stored parts will therefore be less subject to the risk of contamination.

These are single-use bags: after use they must be discarded.

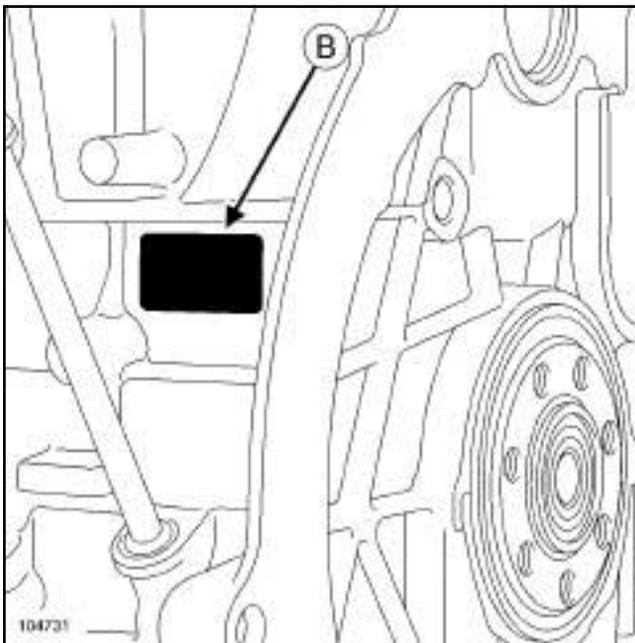
## Engine: Specifications

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### I - ENGINE IDENTIFICATION



15102



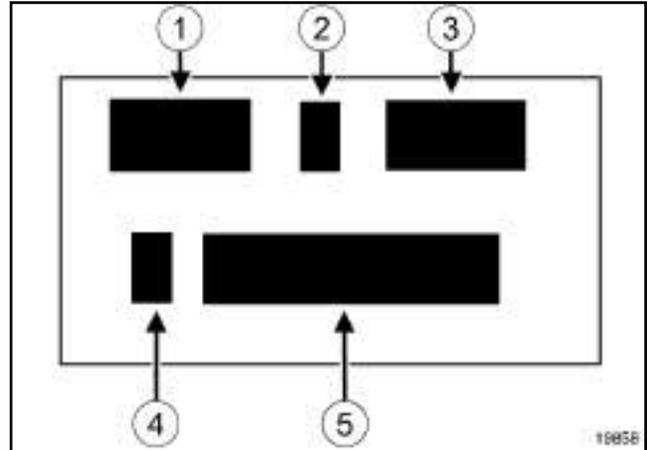
104731

The engine identification is located on the cylinder block, above the dipstick.

It is either on a riveted plate or engraved on the cylinder block.

The markings may be written vertically (**A**) or horizontally (**B**).

### Details of markings



19858

The markings include:

- (1) : the engine type,
- (2) : the engine approval letter,
- (3) : the engine suffix,
- (4) : the factory where the engine is fitted,
- (5) : the engine production number.

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### II - TABLE OF ENGINE SPECIFICATIONS

Engine type	Engine suffix	Cubic capacity(cc)	Bore (mm)	Stroke (mm)	Compression ratio
F4P	720	1783	82.7	83	9.8/1
	722				
	760				
	770				
	771				
	772				
	773				
	774				
	775				
F4R	700	1998	82.7	93	9.8/1
	701				
	712				
	713				
	714				
	715				
	720				11.2/1
	730				
	732				11/1
	736				
	738				
	740				9.8/1
	741				
	744				
	746				
	747				9.5/1
	760				
761					
762					

# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Engine: Specifications

# 10A

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

Engine type	Engine suffix	Cubic capacity(cc)	Bore (mm)	Stroke (mm)	Compression ratio
F4R	763	1998	82.7	93	9.5/1
	764				
	765				
	766				
	767				
	770				9.8/1
	771				9.8/1
	774				9/1
	776				9.5/1
	780				9.8/1
	784				9/1
	786				9.5/1
	787				9.5/1
	790				9.8/1
	792				9.8/1
	794				9.5/1
	795				9.5/1
	796				9.5/1
	797				9.5/1
	800				9/1
	811				9.5/1
	813				9.5/1
	820				9.8/1
830	11.5/1				
832	11.5/1				
867	9.5/1				
870	9.5/1				
872	9.5/1				
874	8.5/1				

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

Engine type	Engine suffix	Cubic capacity(cc)	Bore (mm)	Stroke (mm)	Compression ratio
F4R	886	1998	82.7	93	9.5/1
	887				
	896				
	897				

## Engine: Standard replacement

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### STANDARD ENGINE REPLACEMENT

#### 1 - Preparation of the old engine for return

- Clean the engine.
- Drain:
  - the engine oil (see **Engine oil: Draining - Refilling**),
  - the coolant (see **Cooling system: Draining - Refilling**).
- Secure the old engine to the stand and in the same conditions as the standard replacement engine:
  - fit the plastic plugs and covers,
  - fit the cardboard cover over the whole assembly.

#### 2 - Parts to leave on the old engine or to include in the return box:

- Leave on the used engine or include in the return box:
  - the dipstick,
  - the oil decanter,
  - the oil filter,
  - the coolant - oil heat exchanger,
  - the pinking sensor,
  - the oil level sensor,
  - the spark plugs,
  - the cylinder head,
  - the oil pump,
  - the coolant pump,
  - the coolant pump inlet pipe,
  - the entire timing face (crankshaft sprocket, belts, tensioning roller, fixed roller(s), camshaft sprockets),
  - the sump,
  - the timing covers,
  - the crankshaft accessories pulley.

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Leave on the used engine or include in the return box:
  - the clutch pressure plate and disc,
  - the flywheel.

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Leave on the used engine or include in the return box:
  - the drive plate.

#### 3 - Parts to be removed from the old engine and fitted on the new engine

- Remove the following parts from the old engine:
  - all the cooling system pipes,
  - the air filter,
  - the water chamber,
  - the ignition coils,
  - the injectors,

## Engine: Standard replacement

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the inlet distributor,
- the exhaust manifold,
- the exhaust manifold heat shields,
- the injector holder shim,
- the TDC sensor,
- the air inlet pressure sensor (if fitted),
- the air inlet temperature sensor (if fitted),
- the camshaft position sensor,
- the coolant temperature sensor,
- the engine oil pressure sensor,
- the starter,
- the accessories (alternator, power-assisted steering pump).

X56, and AIR CONDITIONING or CLIMATE CONTROL – X64, and AIR CONDITIONING or CLIMATE CONTROL – X65, and AIR CONDITIONING or CLIMATE CONTROL – X66, and AIR CONDITIONING or CLIMATE CONTROL – X73, and AIR CONDITIONING or CLIMATE CONTROL – X74, and AIR CONDITIONING or CLIMATE CONTROL – X81, and AIR CONDITIONING or CLIMATE CONTROL – X83, and AIR CONDITIONING or CLIMATE CONTROL – X84, and AIR CONDITIONING or CLIMATE CONTROL – X85, and AIR CONDITIONING or CLIMATE CONTROL – X91, and AIR CONDITIONING 01 or AIR CONDITIONING 02 – X95, and AIR CONDITIONING or CLIMATE CONTROL

- Remove the air conditioning compressor from the old engine.
- Remove the following parts from the old engine:
  - the multifunction support,
  - the engine lifting eyes (if there is a difference between those on the standard replacement engine and the old engine),
  - the oxygen sensors.

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- From the old engine, remove:
  - the turbocharger,
  - the primary catalytic converter.

#### 4 - Parts always to be replaced

- Always replace:
  - the water chamber seal,
  - the inlet distributor seal,
  - the exhaust manifold gasket,
  - the dipstick guide tube seal,
  - the camshaft position sensor seal,
  - the coolant temperature sensor seal,
  - the air inlet pressure sensor seal (if fitted),
  - the air inlet temperature sensor seal (if fitted),
  - the inlet distributor studs,
  - the exhaust manifold studs,
  - the exhaust manifold nuts,
  - the accessories belt,
  - the accessories belt tensioning roller,
  - the accessories belt fixed roller.

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Always replace:
  - the turbocharger seal,
  - the turbocharger bolts,
  - the turbocharger oil supply pipe,
  - the turbocharger supply pipe seals,

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the turbocharger return pipe seals,
- the catalytic converter seal.

- Refit the parts removed from the old engine on the new engine.

## Engine: New replacement

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### NEW ENGINE REPLACEMENT

#### 1 - Preparation of the old engine for return

- Clean the engine.
- Drain:
  - the engine oil (see **Engine oil: Draining - Refilling**),
  - the coolant (see **Cooling system: Draining - Refilling**).
- Secure the old engine to the stand and under the same conditions as for new engine replacement:
  - fit the plastic plugs and covers,
  - fit the cardboard cover over the whole assembly.

#### 2 - Parts to leave on the old engine or to include in the return box:

- Leave on the used engine or include in the return box:
  - the dipstick,
  - the oil decanter,
  - the oil filter,
  - the coolant - oil heat exchanger,
  - the oil level sensor,
  - the spark plugs,
  - the cylinder head,
  - the oil pump,
  - the coolant pump,
  - the coolant pump inlet pipe,
  - the entire timing face (crankshaft sprocket, belts, tensioning roller, fixed roller(s), camshaft sprockets),
  - the sump,
  - the timing covers,
  - the crankshaft accessories pulley.

#### 3 - Parts to be removed from the old engine and fitted on the new engine

- Remove the following parts from the old engine:
  - all the cooling system pipes,
  - the air filter,
  - the water chamber,
  - the ignition coils,

- the injectors,
- the pinking sensor,
- the inlet distributor,
- the exhaust manifold,
- the exhaust manifold heat shields,
- the injector holder shim,
- the TDC sensor,
- the air inlet pressure sensor (if fitted),
- the air inlet temperature sensor (if fitted),
- the camshaft position sensor,
- the coolant temperature sensor,
- the engine oil pressure sensor,
- the starter,
- the accessories (alternator, power-assisted steering pump).

X56, and AIR CONDITIONING or CLIMATE CONTROL – X64, and AIR CONDITIONING or CLIMATE CONTROL – X65, and AIR CONDITIONING or CLIMATE CONTROL – X66, and AIR CONDITIONING or CLIMATE CONTROL – X73, and AIR CONDITIONING or CLIMATE CONTROL – X74, and AIR CONDITIONING or CLIMATE CONTROL – X81, and AIR CONDITIONING or CLIMATE CONTROL – X83, and AIR CONDITIONING or CLIMATE CONTROL – X84, and AIR CONDITIONING or CLIMATE CONTROL – X85, and AIR CONDITIONING or CLIMATE CONTROL – X91, and AIR CONDITIONING 01 or AIR CONDITIONING 02 – X95, and AIR CONDITIONING or CLIMATE CONTROL

- Remove the air conditioning compressor from the old engine.

- Remove the following parts from the old engine:
  - the multifunction support,
  - the engine lifting eyes (if there is a difference between those on the standard replacement engine and the old engine),
  - the oxygen sensors.

## Engine: New replacement

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- From the old engine, remove:
  - the turbocharger,
  - the primary catalytic converter.

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- From the old engine, remove:
  - the clutch pressure plate and disc,
  - the flywheel.

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- From the old engine, remove:
  - the drive plate.

#### 4 - Parts always to be replaced

- Always replace:
  - the water chamber seal,
  - the inlet distributor seal,
  - the exhaust manifold gasket,
  - the dipstick guide tube seal,
  - the camshaft position sensor seal,
  - the coolant temperature sensor seal,
  - the air inlet pressure sensor seal (if fitted),
  - the air inlet temperature sensor seal (if fitted),
  - the inlet distributor studs,
  - the exhaust manifold studs,
  - the exhaust manifold nuts,
  - the accessories belt,
  - the accessories belt tensioning roller,
  - the accessories belt fixed roller.

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Always replace:
  - the turbocharger seal,
  - the turbocharger bolts,
  - the turbocharger oil supply pipe,

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the turbocharger supply pipe seals,
- the turbocharger return pipe seals,
- the catalytic converter seal.

- Refit the parts removed from the old engine on the new engine.

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Special tooling required

**Mot. 1677** Flywheel locking tool.

### Tightening torques

oil filter nipple **15 N.m**

## REMOVAL

### I - ENGINE REPAIR PREPARATION OPERATION

#### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

#### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

Remove the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

Disconnect the manual gearbox from the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

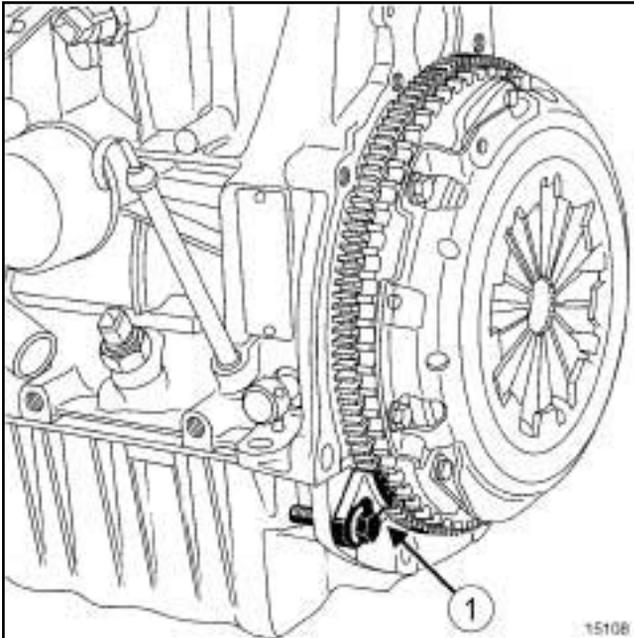
X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

Disconnect the automatic gearbox from the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

Remove the accessories belt (see **Accessories belt: Removal - Refitting**).

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



15108

- Immobilise the flywheel or the drive plate using the tool (**Mot. 1677**) (1) .
- Remove the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Remove:
  - the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch),
  - the flywheel (see **Flywheel: Removal - Refitting**) ,
  - the (**Mot. 1677**).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Remove:
  - the drive plate (see **Drive plate: Removal - Refitting**) ,
  - the (**Mot. 1677**).
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21) .
- Drain the engine (see **Engine oil: Draining - Refilling**) .

### II - UPPER ENGINE REMOVAL OPERATION

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Remove:
  - the oxygen sensor (see **Oxygen sensors: Removal - Refitting**) ,
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
  - the turbocharger (see **Turbocharger: Removal - Refitting**) .
- Remove:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the timing sprockets (see **Timing sprocket: Removal - Refitting**) ,

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the crankshaft seal on the timing side (see **Crankshaft seal on timing end: Removal - Refitting**) ,
- the throttle valve (see **Throttle valve: Removal - Refitting**) ,
- the injector rail (see **Injector rail - Injectors: Removal - Refitting**) ,
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the ignition coils (see **Coils: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the exhaust manifold (see **Exhaust manifold: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the camshafts, marking the inlet and the exhaust camshaft (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) ,
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page 10A-109) ,
- the thermostat (see **Thermostat: Removal - Refitting**) ,
- the coolant temperature sensor (see **Coolant temperature sensor: Removal - Refitting**) ,
- the water chamber (see **Water chamber: Removal - Refitting**) ,
- the valves (see **10A, Engine and cylinder block assembly, Valve: Removal - Refitting**, page 10A-170) .

## III - UPPER ENGINE REPAIR OPERATION

- Clean the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Cleaning**, page 10A-182) .

 Check:

- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Check**, page 10A-184) ,
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Check**, page 10A-104) ,
- the valves and the valve springs (see **10A, Engine and cylinder block assembly, Valve: Check**, page 10A-175) .

## Note:

Replace the parts whose values are outside the permitted tolerance values.

## IV - LOWER ENGINE REMOVAL OPERATION

 Remove:

- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**) ,
- the power-assisted steering pump (see **Power-assisted steering pump: Removal - Refitting**) ,
- the alternator (see **Alternator: Removal - Refitting**) .

X56, and AIR CONDITIONING or CLIMATE CONTROL – X64, and AIR CONDITIONING or CLIMATE CONTROL – X65, and AIR CONDITIONING or CLIMATE CONTROL – X66, and AIR CONDITIONING or CLIMATE CONTROL – X73, and AIR CONDITIONING or CLIMATE CONTROL – X74, and AIR CONDITIONING or CLIMATE CONTROL – X81, and AIR CONDITIONING or CLIMATE CONTROL – X83, and AIR CONDITIONING or CLIMATE CONTROL – X84, and AIR CONDITIONING or CLIMATE CONTROL – X85, and AIR CONDITIONING or CLIMATE CONTROL – X91, and AIR CONDITIONING 01 or AIR CONDITIONING 02 – X95, and AIR CONDITIONING or CLIMATE CONTROL

- Remove the air conditioning compressor (see **Compressor: Removal - Refitting**) .

 Remove:

- the multifunction support (see **Multifunction support: Removal - Refitting**) ,
- the coolant pump inlet pipe (see **Coolant pump inlet pipe: Removal - Refitting**) ,

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the engine oil pressure sensor (see **Oil pressure sensor: Removal - Refitting**) ,
- the pinking sensor (see **Pinking sensor: Removal - Refitting**) ,
- the oil level sensor (see **Oil level sensor: Removal - Refitting**) ,
- the oil filter (see **Oil filter: Removal - Refitting**) .

X56, and F4P – X64, and F4P – X74, and F4P

- Remove the oil filter nipple.

X56, and F4R – X64, and F4R – X65 – X66 – X73 – X74, and F4R – X81 – X83 – X84 – X85 – X91 – X95

- Remove the oil-water heat exchanger (see **Oil-coolant heat exchanger: Removal - Refitting**) .

- Remove:

- the sump (see **Lower cover: Removal - Refitting**) ,
- the coolant pump (see **Coolant pump: Removal - Refitting**) ,
- the oil pump (see **Oil pump: Removal - Refitting**) ,
- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page **10A-189**) ,
- the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) ,
- the piston base cooling jets (see **10A, Engine and cylinder block assembly, Piston base cooling jet: Removal - Refitting**, page **10A-225**) ,
- the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Removal - Refitting**, page **10A-235**) .

### V - LOWER ENGINE REPAIR OPERATION

- Clean the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Cleaning**, page **10A-241**) .

- Check:

- the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Check**, page **10A-242**) ,
- the « piston and con rod » assemblies (see **10A, Engine and cylinder block assembly, Piston - Con rod: Check**, page **10A-200**) ,
- the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Check**, page **10A-219**) .

### REFITTING

#### I - REFITTING PREPARATION OPERATION

- Parts always to be replaced:

- the accessories belt,
- the accessories belt tensioning roller,
- the accessories belt fixed roller,
- the accessories belt tensioning roller bolt,
- the accessories belt fixed roller bolt,
- the timing belt,
- the crankshaft accessories pulley bolt,
- the timing belt tension wheel,
- the fixed roller of the timing belt,
- the damper pulley (if fitted),
- the damper pulley bolt (if fitted),
- the crankshaft seal on the timing end,
- the crankshaft seal at the flywheel end,
- the exhaust manifold gasket,
- the exhaust manifold nuts,
- the inlet distributor seal,
- the coolant outlet unit seal on the cylinder head,
- the valve stem seals,
- the thermostat,
- the cylinder head gasket,
- the cylinder head bolts,
- the caps from the rocker cover and bottom of the cylinder head (flywheel end),
- the valve guides,
- the camshaft pulley nuts,
- the cap from the inlet camshaft dephaser (if fitted),

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the oil filter,
- the coolant pump seal,
- the engine oil sump drain plug seal,
- the con rod cap bolts,
- the crankshaft bearing cap bolts,
- the piston base cooling jets.

X65, and F4R, and 738 – X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X85, and F4R, and 830 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Parts always to be replaced:

- the turbocharger oil supply pipe,
- the turbocharger oil return pipe seal,
- the turbocharger nuts,
- the turbocharger cooling pipes,
- the catalytic converter seal.

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Always replace the flywheel bolts.

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Systematically replace the drive plate bolts.

### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

### WARNING

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

## II - LOWER ENGINE REFITTING OPERATION

- Refit the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Removal - Refitting**, page **10A-235**) ,
- When replacing the crankshaft or the crankshaft bearing shells, always determine the thickness class for each bearing shell to be refitted on each crankshaft bearing to ensure that the journal clearance is within the tolerances (see **10A, Engine and cylinder block assembly, Crankshaft: Check**, page **10A-219**) .

### Note:

Any clearances of the crankshaft journal outside the tolerances can cause engine damage.

- Refit:

- the piston base cooling jets (see **10A, Engine and cylinder block assembly, Piston base cooling jet: Removal - Refitting**, page **10A-225**) ,

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**),
- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page **10A-189**),
- the oil pump (see **Oil pump: Removal - Refitting**),
- the coolant pump (see **Coolant pump: Removal - Refitting**),
- the sump (see **Lower cover: Removal - Refitting**).

X56, and F4P – X64, and F4P – X74, and F4P

- Refit the oil filter nipple.
- Torque tighten the **oil filter nipple (15 N.m)**.

X56, and F4R – X64, and F4R – X65 – X66 – X73 – X74, and F4R – X81 – X83 – X84 – X85 – X91 – X95

- Refit the oil-water heat exchanger (see **Oil-coolant heat exchanger: Removal - Refitting**).

 Refit:

- the oil filter (see **Oil filter: Removal - Refitting**),
- the oil level sensor (see **Oil level sensor: Removal - Refitting**),
- the pinking sensor (see **Pinking sensor: Removal - Refitting**),
- the engine oil pressure sensor (see **Oil pressure sensor: Removal - Refitting**),
- the coolant pump inlet pipe (see **Coolant pump inlet pipe: Removal - Refitting**),
- the multifunction support (see **Multifunction support: Removal - Refitting**).

X56, and AIR CONDITIONING or CLIMATE CONTROL – X64, and AIR CONDITIONING or CLIMATE CONTROL – X65, and AIR CONDITIONING or CLIMATE CONTROL – X66, and AIR CONDITIONING or CLIMATE CONTROL – X73, and AIR CONDITIONING or CLIMATE CONTROL – X74, and AIR CONDITIONING or CLIMATE CONTROL – X81, and AIR CONDITIONING or CLIMATE CONTROL – X83, and AIR CONDITIONING or CLIMATE CONTROL – X84, and AIR CONDITIONING or CLIMATE CONTROL – X85, and AIR CONDITIONING or CLIMATE CONTROL – X91, and AIR CONDITIONING 01 or AIR CONDITIONING 02 – X95, and AIR CONDITIONING or CLIMATE CONTROL

- Refit the air conditioning compressor (see **Compressor: Removal - Refitting**).

 Refit:

- the alternator (see **Alternator: Removal - Refitting**),
- the power-assisted steering pump (see **Power-assisted steering pump: Removal - Refitting**),
- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**).

**III - UPPER ENGINE REFITTING OPERATION** Refit:

- the valves (see **10A, Engine and cylinder block assembly, Valve: Removal - Refitting**, page **10A-170**),
- the water chamber (see **Water chamber: Removal - Refitting**),
- the coolant temperature sensor (see **Coolant temperature sensor: Removal - Refitting**),
- the thermostat (see **Thermostat: Removal - Refitting**),
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**),
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**),
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**).

## Engine: Repair

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**),
- the exhaust manifold (see **Exhaust manifold: Removal - Refitting**),
- the oil decanter (see **Oil decanter: Removal - Refitting**),
- the ignition coils (see **Coils: Removal - Refitting**),
- the inlet distributor (see **Inlet distributor: Removal - Refitting**),
- the injector rail (see **Injector rail - Injectors: Removal - Refitting**),
- the throttle valve (see **Throttle valve: Removal - Refitting**),
- the crankshaft seal on the timing side (see **Crankshaft seal on timing end: Removal - Refitting**),
- the timing sprockets (see **Timing sprocket: Removal - Refitting**),
- the timing belt (see **Timing belt: Removal - Refitting**).

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Refit:
  - the turbocharger (see **Turbocharger: Removal - Refitting**),
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**),
  - the oxygen sensor (see **Oxygen sensors: Removal - Refitting**).

#### IV - FINAL OPERATION

- Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**).
- Immobilise the flywheel or the drive plate using the tool (**Mot. 1677**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Refit:
  - the flywheel (see **Flywheel: Removal - Refitting**),
  - the clutch pressure plate and disc (see **Pressure plate - Disc: Removal - Refitting**) (**20A, Clutch**).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Refit the drive plate (see **Drive plate: Removal - Refitting**).
- Refit the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**).
- Remove the tool (**Mot. 1677**).
- Refit the accessories belt (see **Accessories belt: Removal - Refitting**).

## Engine: Repair

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X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

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X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Connect the manual gearbox to the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Connect the automatic gearbox to the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .
- Top up the engine oil (see **Engine oil: Draining - Refilling**) .

## Engine support equipment: Use

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

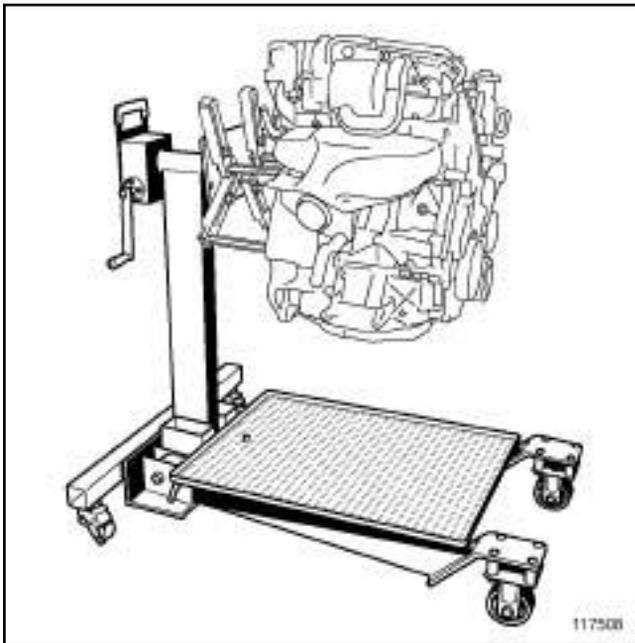
### Special tooling required

<b>Mot. 1723</b>	Engine support, can be adapted for Desvil stand.
<b>Mot. 1794</b>	M4R adapter pin for engine support tool Mot.1723

### Equipment required

workshop hoist

### I - PREPARING TO INSTALL THE ENGINE ON THE COMPONENT SUPPORT



117508

#### IMPORTANT

To work on the engine in complete safety, it is essential to use a component support.

#### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump may also damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

Remove the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Disconnect the manual gearbox from the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).
- Remove:
  - the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch),
  - the flywheel (see **Flywheel: Removal - Refitting**).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

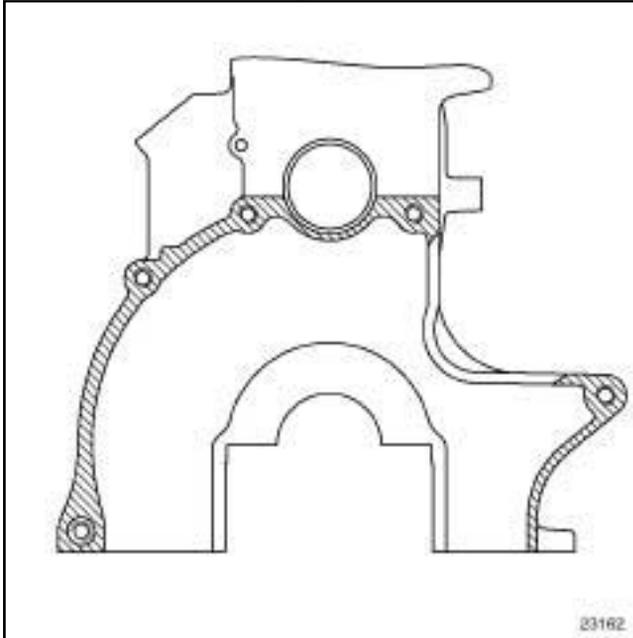
- Disconnect the automatic gearbox from the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).
- Remove the drive plate (see **Drive plate: Removal - Refitting**).

## Engine support equipment: Use

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

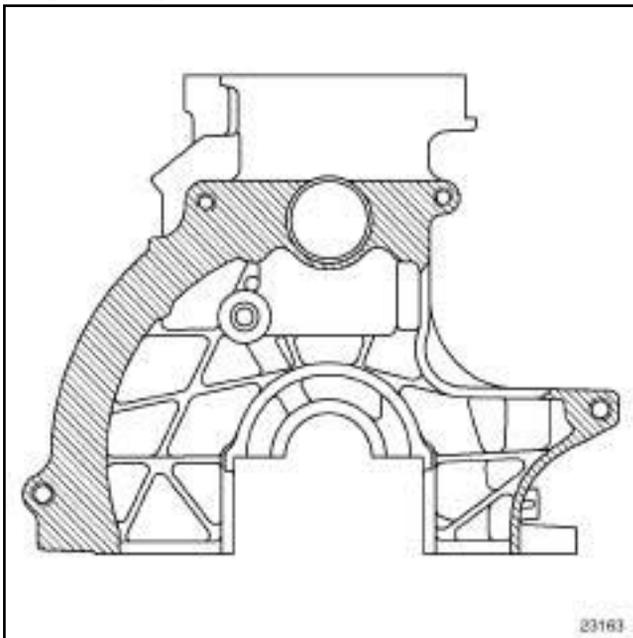
1 - Fitting the engine on the component support fitted with Mot. 1723

Gearbox mating face of "conventional" cylinder block with "small mating face"

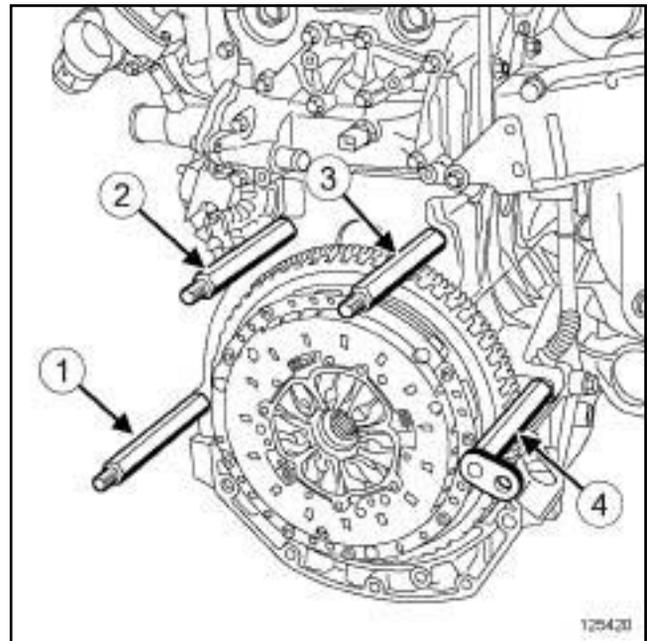


23162

Gearbox mating face of a cylinder block with a "large mating face"



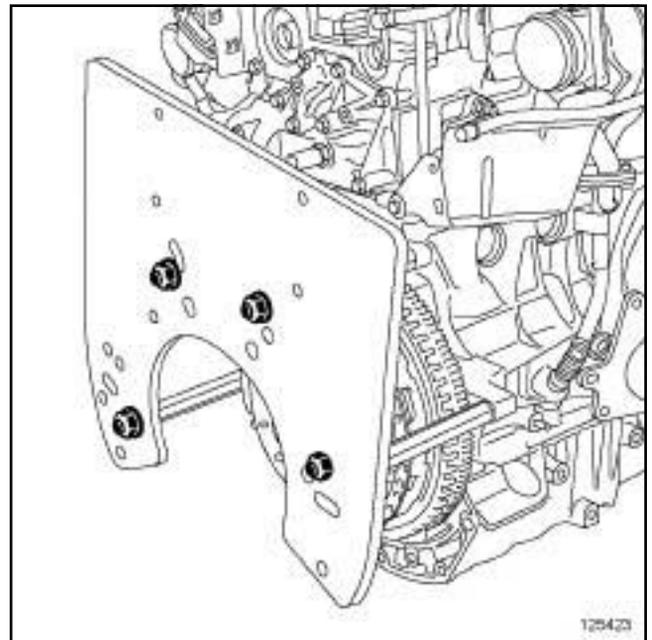
23163



125420

□ Fit:

- the studs (1) , (2) and (3) of tool (Mot. 1723),
- the stud to the shortest arm (4) of the tool (Mot. 1794).



125423

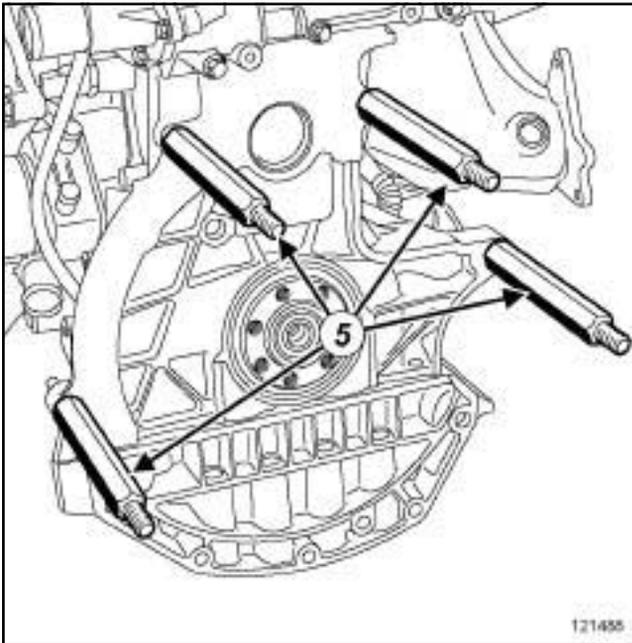
□ Fit the support plate (Mot. 1723) by placing the support stud:

- (1) in hole number 14,
- (2) in hole number 4,
- (3) in hole number 1,
- (4) in hole number 8.

## Engine support equipment: Use

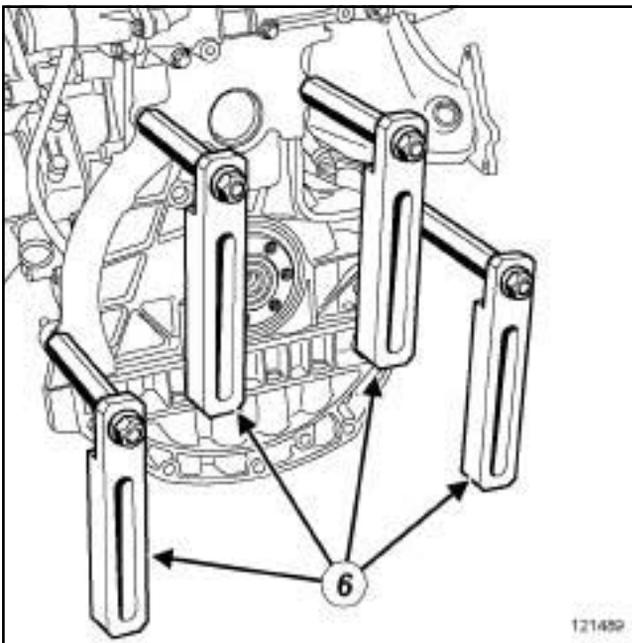
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### 2 - Fitting the engine on the component support equipped with retaining bars



121488

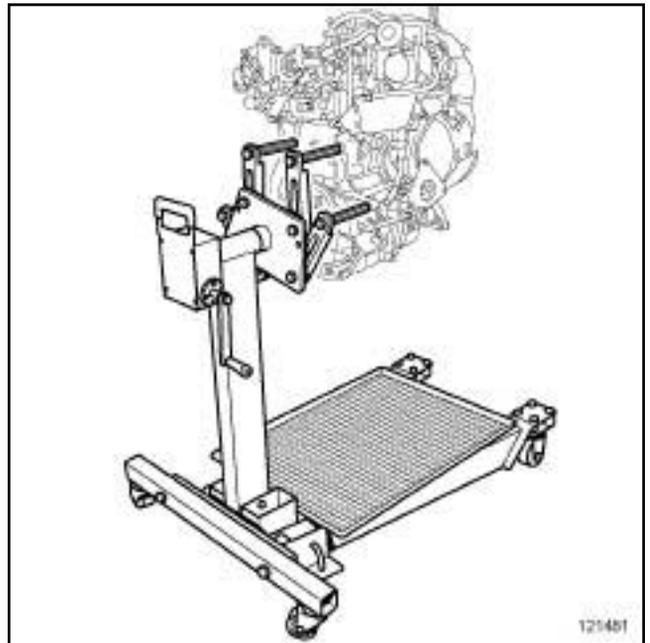
- Fit the support studs (5) supplied with the component support to the mating face of the cylinder block.



121489

- Fit the retaining bars (6) on the studs.

### II - FITTING THE ENGINE ON THE COMPONENT SUPPORT



121481

- Position the « engine - support studs - engine support plate » assembly or the « engine - support studs - retaining bar » assembly on the component support using the **workshop hoist** and a load positioner.
- Set the blocks to ensure that the component stand does not move.
- Tighten the nuts of the engine stand plate or of the retaining bars on the component stand.
- Remove the load positioner.

### III - REMOVING THE ENGINE FROM THE COMPONENT SUPPORT

- Position the « engine - support studs - engine stand plate » assembly or the « engine - support studs - retaining bar » assembly on the component stand using the **workshop hoist** and a load positioner.
- Remove the engine stand plate nuts or the retaining bars on the component stand.
- Separate the « engine - support studs - engine stand plate » assembly or the « engine - support studs - retaining bar » assembly from the component stand using the **workshop hoist** and the load positioner.

### IV - FINAL OPERATION

- Remove:
  - the support stud nuts on the stand plate or the retaining bar nuts,

## Engine support equipment: Use

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the stand plate or the retaining bars,
- the studs of the tool (**Mot. 1723**),
- the stud to the shortest arm of the tool **Mot. 1794** (if this was used).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

Refit:

- the flywheel (see **Flywheel: Removal - Refitting**) ,
- the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch).

- Connect the manual gearbox to the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Refit the drive plate (see **Drive plate: Removal - Refitting**) .

- Connect the automatic gearbox to the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic gearbox).

- Refit the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

## Rocker cover: Removal - Refitting

X85

## Special tooling required

<b>Mot. 1716</b>	Removes housing with silicone seals.
------------------	--------------------------------------

## Equipment required

Diagnostic tool
-----------------

Tightening torques 

rocker cover mounting bolts (22), (23), (20), (13)	<b>8 Nm</b>
rocker cover mounting bolts (1) to (12), (14) to (19), (21) and (24)	<b>12 Nm</b>
rocker cover mounting bolts (22), (23), (20), (13)	<b>12 Nm</b>

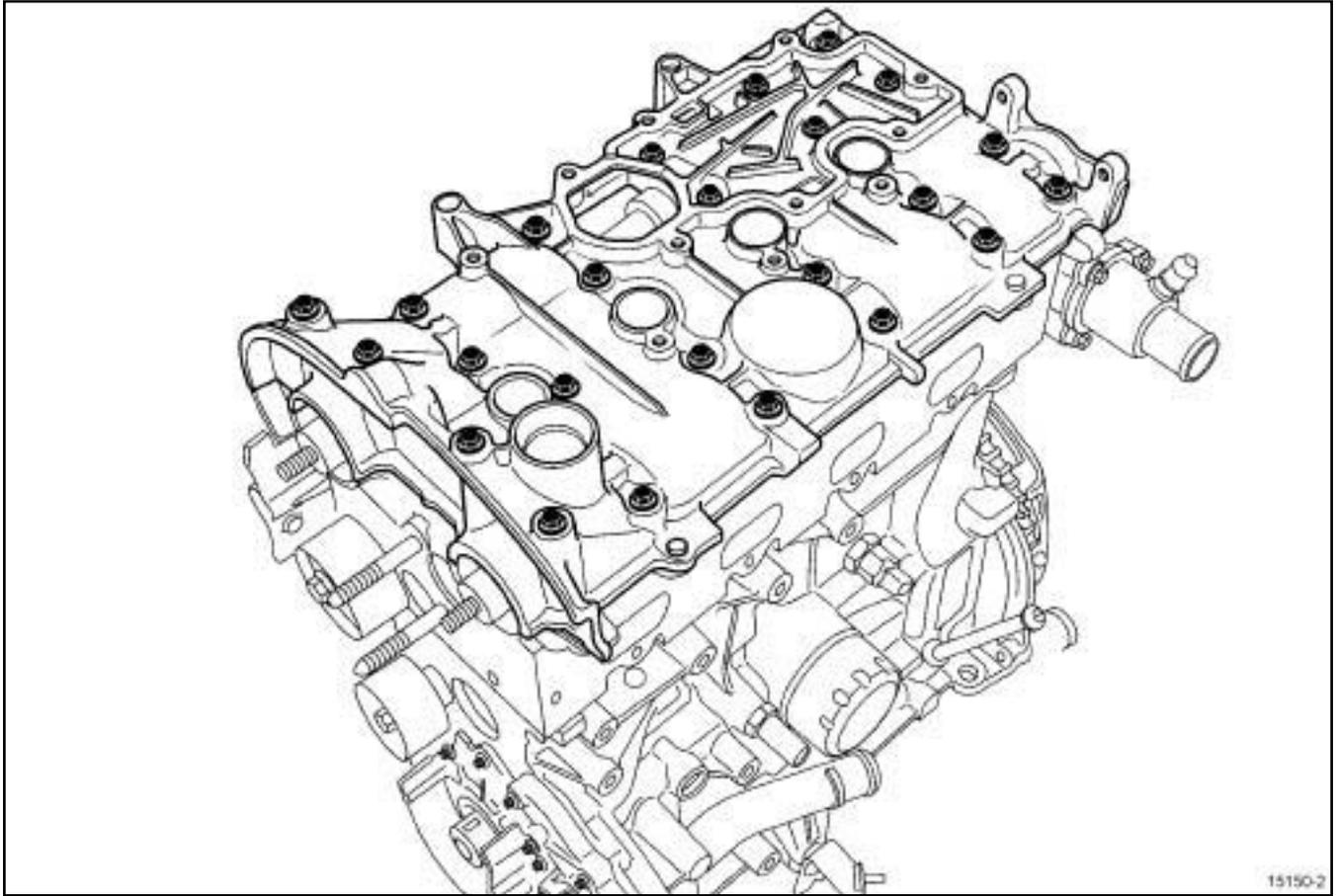
## REMOVAL

## I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **02A, Lifting equipment, Vehicle: Towing and lifting**).
- Disconnect the battery (see **80A, Battery, Battery: Removal - Refitting**)
- Remove:
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the inlet manifold (see **Inlet distributor: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the battery (see **80A, Battery, Battery: Removal - Refitting**),
  - the air filter box (see **Air filter unit: Removal - Refitting**) ,
  - the front right-hand wheel (see **35A, Wheels and tyres: Wheel: Removal - Refitting**),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) .

X85

### II - OPERATION FOR REMOVAL OF PART CONCERNED

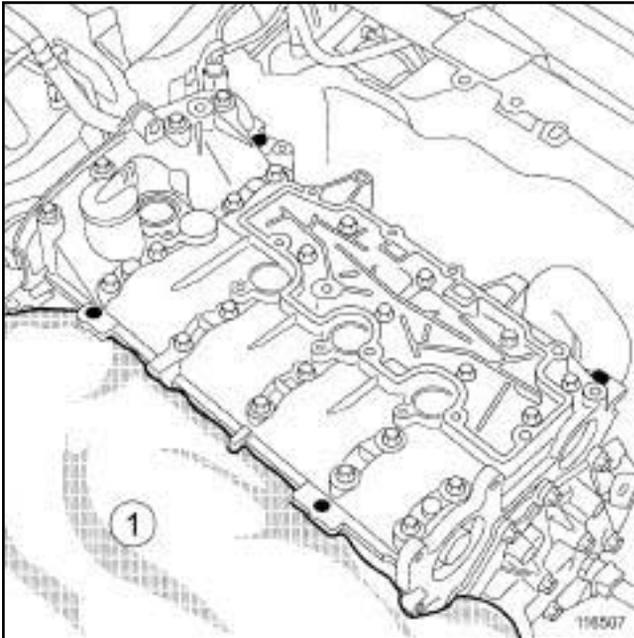


15150-2

15150-2

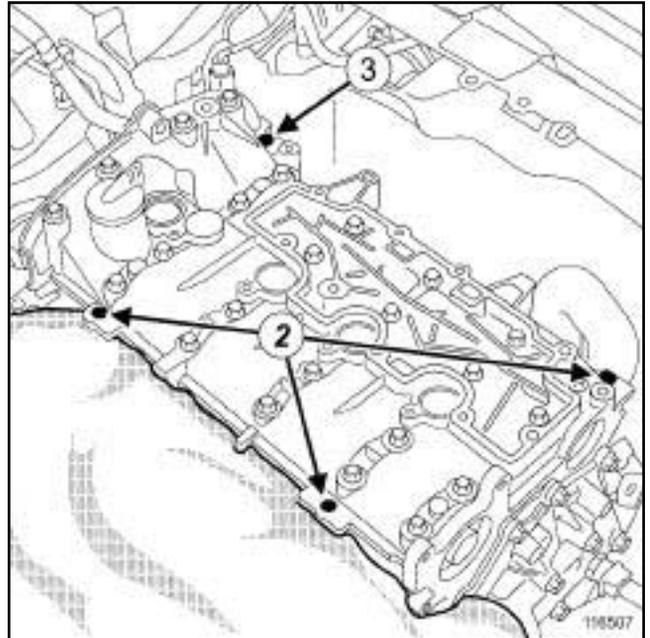
- Undo all the mounting bolts from the rocker cover.
- Remove the rocker cover bolts.

X85

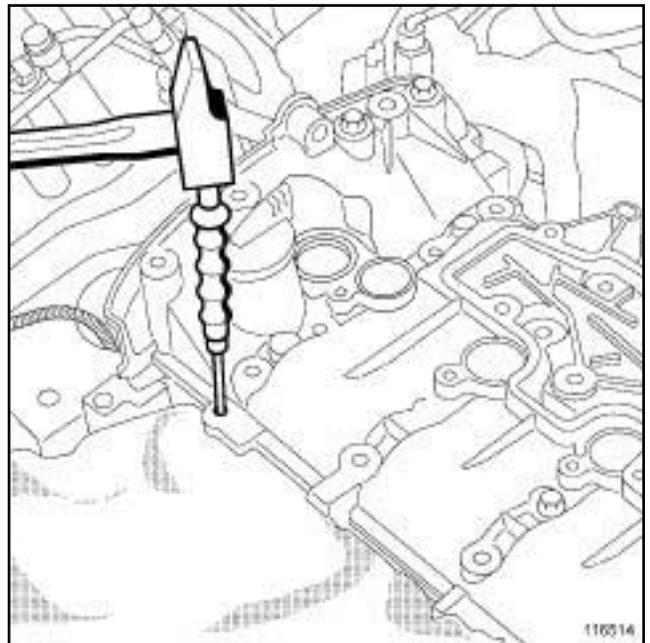


116507

- Using a clean cloth (1) , protect:
  - the injector holder plate pipe openings to prevent any impurities from entering,
  - the injector rail,
  - the camshaft position sensor location.



116507



116514

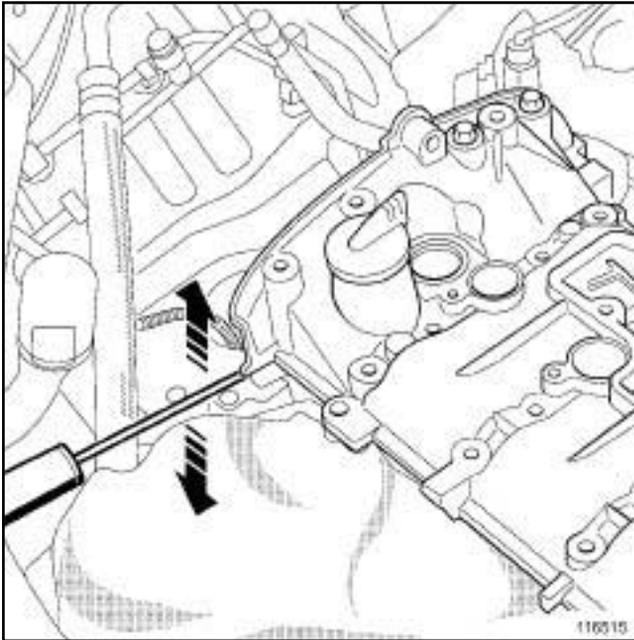
- Remove the rocker cover centring devices (2) using a hammer and a drift to knock them out from above.

**Note:**

The centring device (3) must not be removed under any circumstances. Not following these instructions could damage the cylinder head.

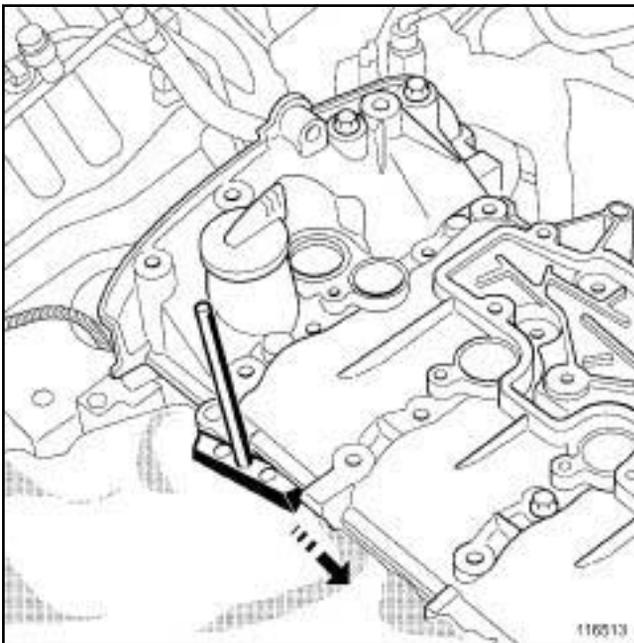
## Rocker cover: Removal - Refitting

X85



116515

- Press a flat-blade screwdriver onto the injector holder plate and use it to gently remove the adhesive from the rocker cover.



116513

- Remove the rocker cover using the **(Mot. 1716)**.
- Remove the rocker cover.

### REFITTING

#### I - REFITTING PREPARATION OPERATION

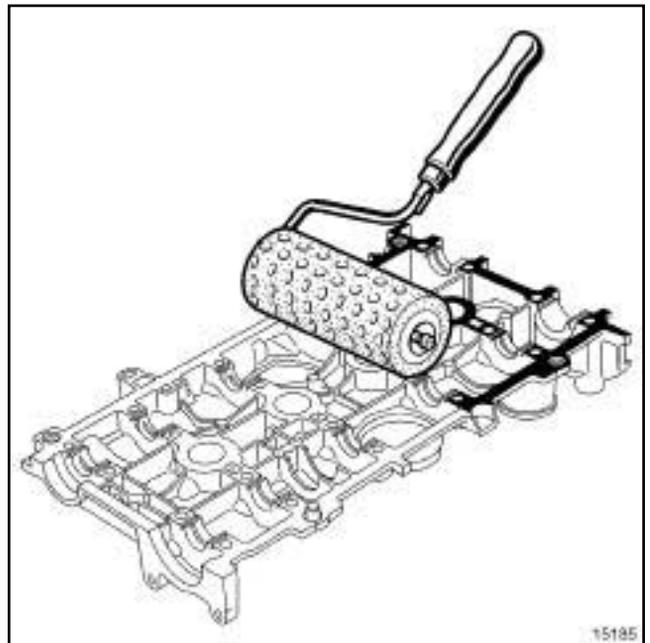
- Refit the centring devices on the cylinder head using a hammer and drift.

Note:

The seal faces must be clean, dry and free from grease (avoid finger marks).

Excess sealant could be squeezed out when the parts are tightened. The product-fluid mix may damage some components (engine, radiator).

#### II - REFITTING OPERATION FOR PART CONCERNED



15185

15185

- Apply some **RESIN ADHESIVE** to the rocker cover gasket face using a stipple roller.

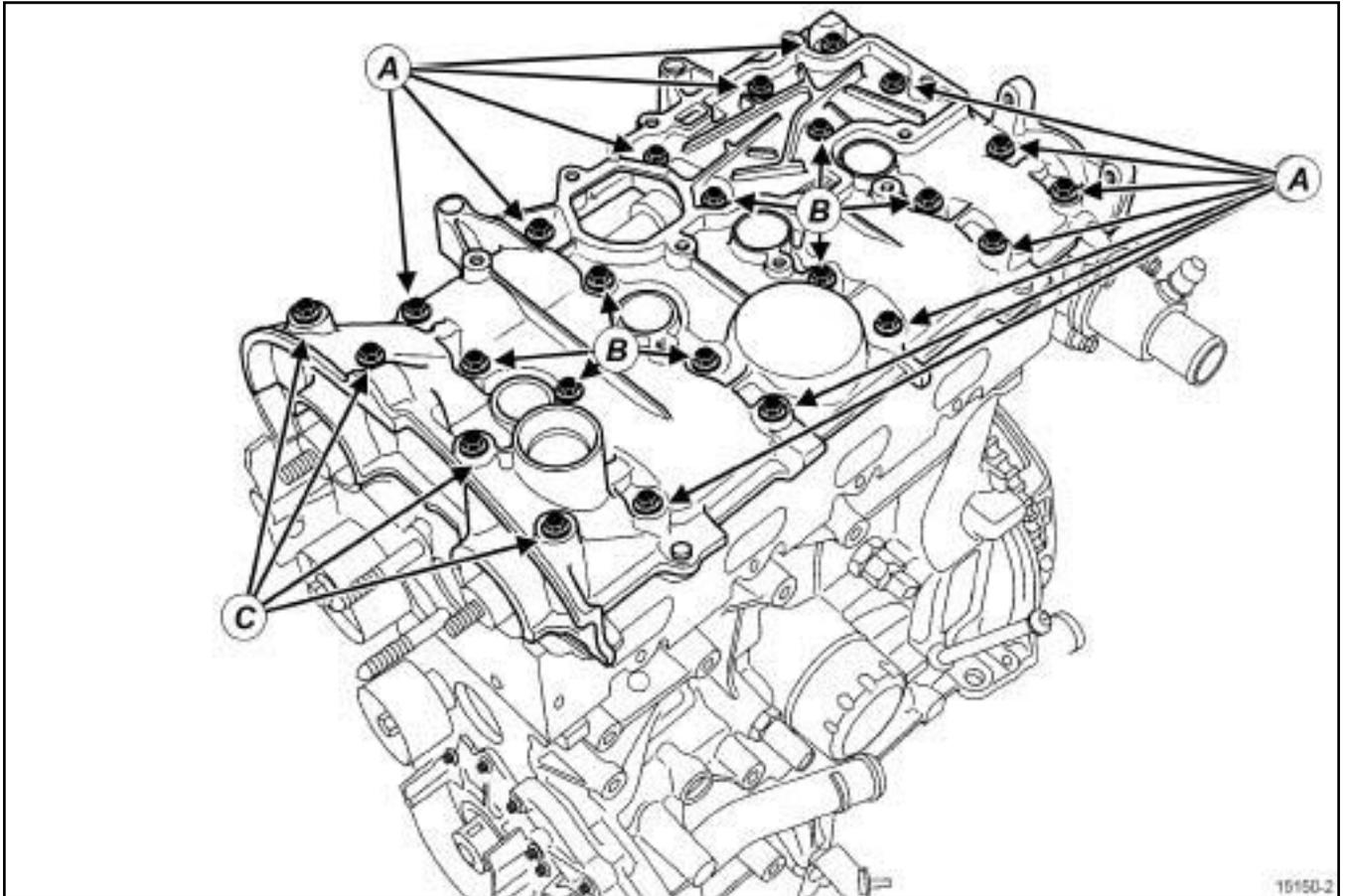
Note:

Use a cloth to remove any **RESIN ADHESIVE** on the rocker cover bearings.

- Fit the rocker cover.

X85

mounting bolt location



15150-2

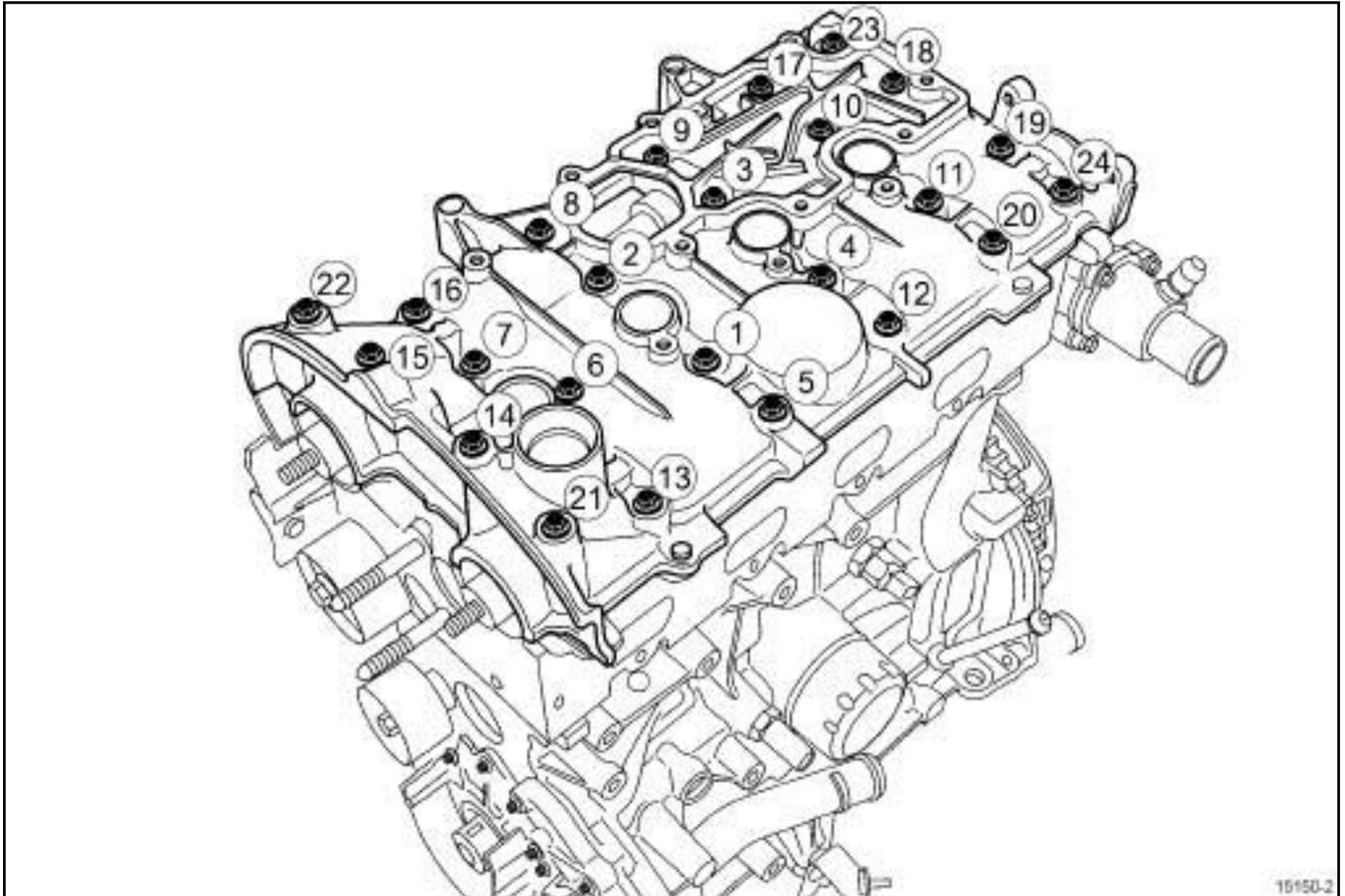
15150-2

- (A) short bolts
- (B) medium bolts
- (C) long bolts

Insert all the rocker cover mounting bolts.

X85

tightening order for rocker cover mounting bolts



15150-2

15150-2

- Tighten in order and to torque the **rocker cover mounting bolts (22), (23), (20), (13) (8 Nm)** to correctly fit the rocker cover.
  - Tighten in order and to torque the **rocker cover mounting bolts (1) to (12), (14) to (19), (21) and (24) (12 Nm)**.
  - Loosen rocker cover mounting bolts (22), (23), (20) and (13).
  - Tighten in order and to torque **rocker cover mounting bolts (22), (23), (20), (13) (12 Nm)**.
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the inlet manifold (see **Inlet distributor: Removal - Refitting**) ,
  - the throttle valve (see **Throttle valve: Removal - Refitting**) .
- Connect the battery (see **80A, Battery, Battery: Removal - Refitting**),
  - Using the **Diagnostic tool**, check that there are no faults stored by the injection computer and clear them if necessary.

### III - FINAL OPERATION

- Refit:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the front right-hand wheel (see **35A, Wheels and tyres: Wheel: Removal - Refitting**),
  - the air filter box (see **Air filter unit: Removal - Refitting**) ,

## Rocker cover: Removal - Refitting

X83

### Special tooling required

<b>Mot. 1801</b>	Camshaft sprocket locking tool F4 engines.
<b>Mot. 1716</b>	Removes housing with silicone seals.
<b>Mot. 1512</b>	Tool for fitting exhaust camshaft seals (28 x 47).
<b>Mot. 1517</b>	Tool for fitting inlet camshaft seal.

### Equipment required

Diagnostic tool

### Tightening torques

toothed sprocket nuts of the tool	<b>80 N.m</b>
rocker cover bolts (22), (23), (20), (13)	<b>8 N.m</b>
rocker cover bolts (1) to (12), (14) to (19), (21) and (24)	<b>12 N.m</b>
rocker cover bolts (22), (23), (20), (13)	<b>12 N.m</b>

- the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) .

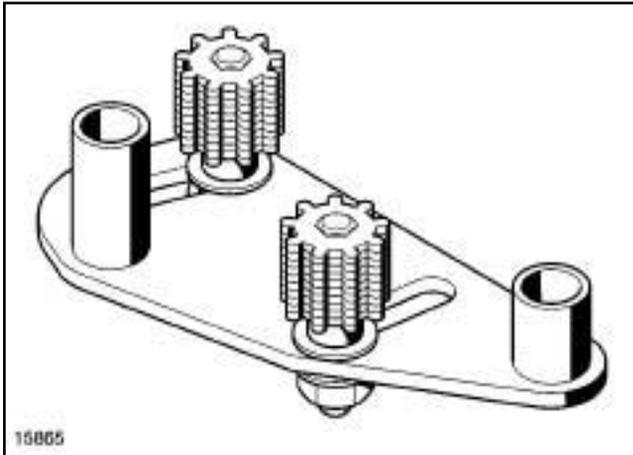
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

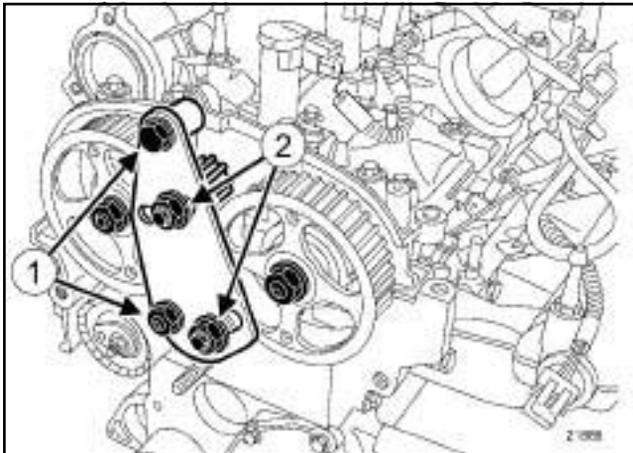
- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Disconnect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Remove:
  - the air filter unit (see **Air filter unit: Removal - Refitting**) ,
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the inlet manifold (see ) ,
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,

X83

## II - OPERATION FOR REMOVAL OF PART CONCERNED



15865



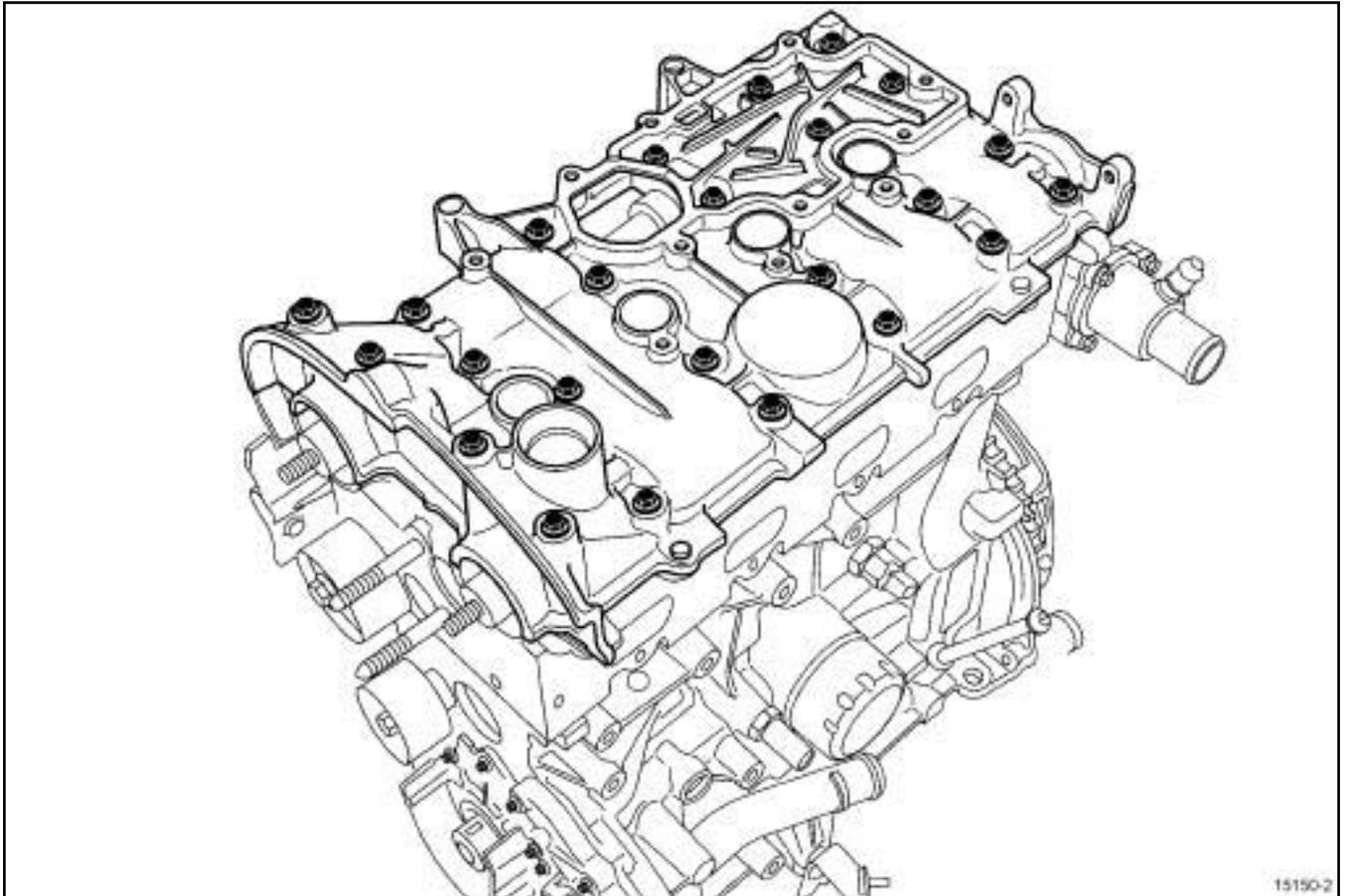
21886

- Position the **(Mot. 1801)**.
- Tighten the bolt and the collar nut **(1)** .
- Offer up the toothed sprocket nuts **(2)** against the camshaft pulleys.
- Torque tighten the **toothed sprocket nuts of the tool (80 N.m)**.
- Remove:
  - the camshaft pulley nuts,
  - the **(Mot. 1801)**,
  - the camshaft pulleys.

## Note:

It is essential to replace the camshaft stud if the stud becomes loose with the nut (see ) (Technical Note 6027A, 10A, Engine and cylinder block assembly).

X83



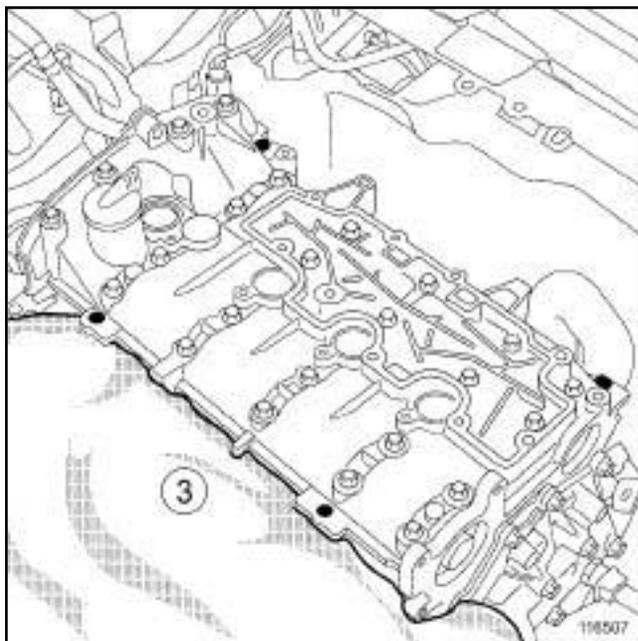
15150-2

15150-2

- Undo all of the rocker cover bolts.
- Remove the rocker cover bolts.

## Rocker cover: Removal - Refitting

X83

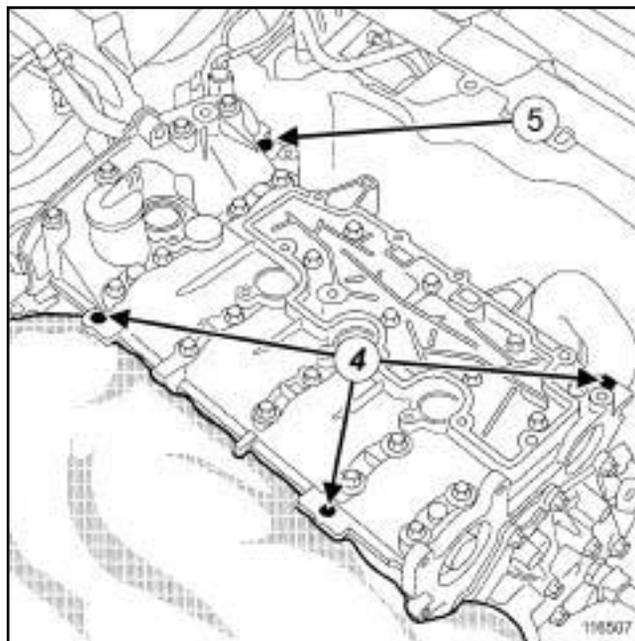


116507

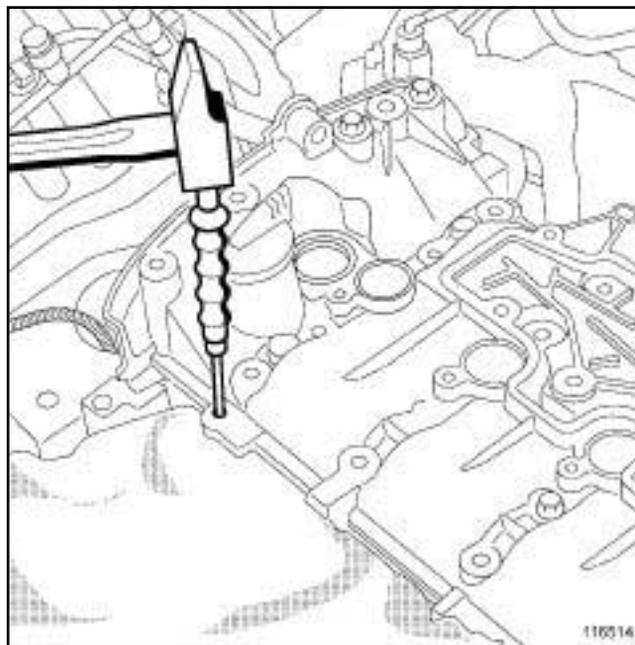
- Using a clean cloth (3) , protect:
- the injector holder plate pipe openings to prevent any impurities from entering,
  - the injector rail,
  - the camshaft position sensor location.

## Note:

The centring device (5) must not be removed under any circumstances. Not following these instructions could damage the cylinder head.



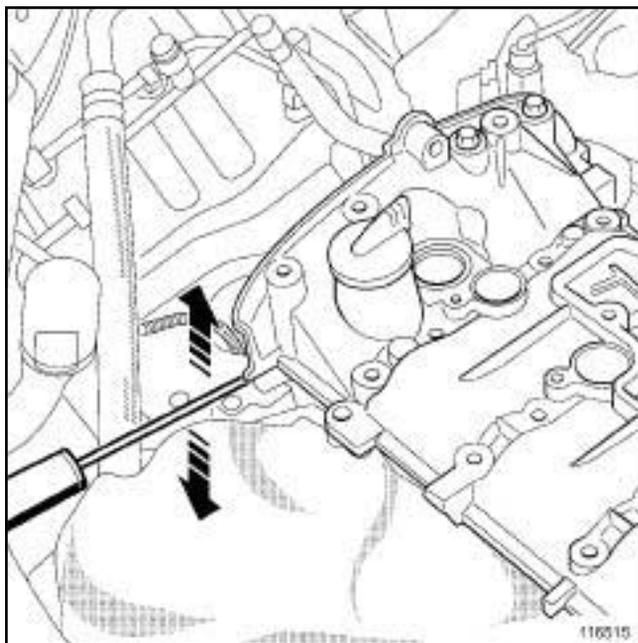
116507



116514

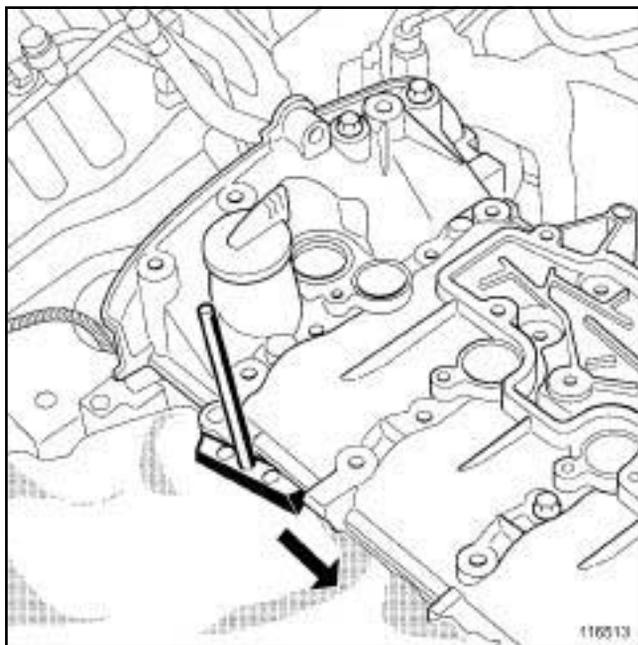
- Remove the rocker cover centring devices (4) using a hammer and a drift to knock them out from above.

X83



116515

- Press a flat-blade screwdriver onto the injector holder plate and use it to gently remove the adhesive from the rocker cover.



116513

- Remove the rocker cover using the **(Mot. 1716)**.
- Remove:
  - the rocker cover,
  - the camshaft seals.

## REFITTING

## I - REFITTING PREPARATION OPERATION

□

**WARNING**

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

**IMPORTANT**

Wear goggles with side protectors for this operation.

**IMPORTANT**

Wear latex gloves during the operation.

**WARNING**

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

- Clean the rocker cover sealing surface with **SUPER DECAPANT FOR SEALING SURFACES** to dissolve any seal still adhering.
- Apply the product to the section to be cleaned; wait approximately ten minutes, then remove the residue using a wooden spatula.

**Note:**

The gasket faces on the rocker cover must be clean, dry and free from grease (avoid finger marks).

## Rocker cover: Removal - Refitting

X83

- Lubricate the cylinder head camshaft bearings with engine oil.

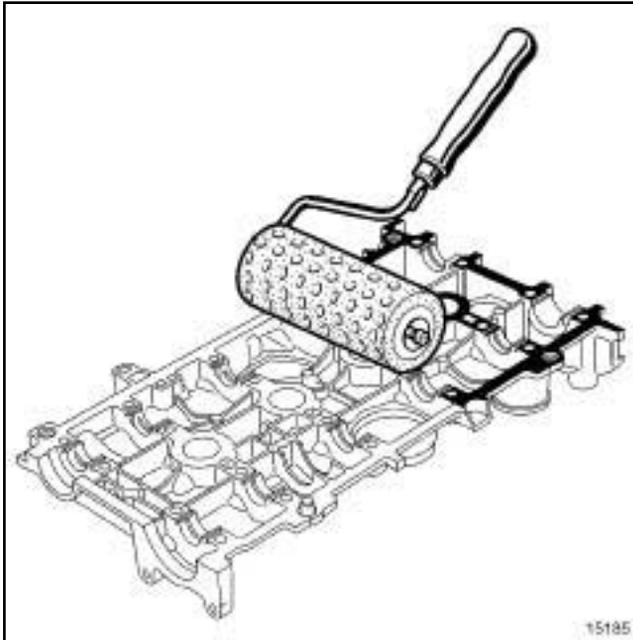
Note:

Do not put oil on the cylinder head rocker cover.

**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

- Refit the centring devices on the cylinder head using a hammer and drift.
- Always replace:
  - the camshaft seals,
  - the camshaft nuts,
  - the camshaft stud if necessary.

**II - REFITTING OPERATION FOR PART CONCERNED**15185  
15185

- Apply some **RESIN ADHESIVE** to the rocker cover gasket face using a stipple roller.

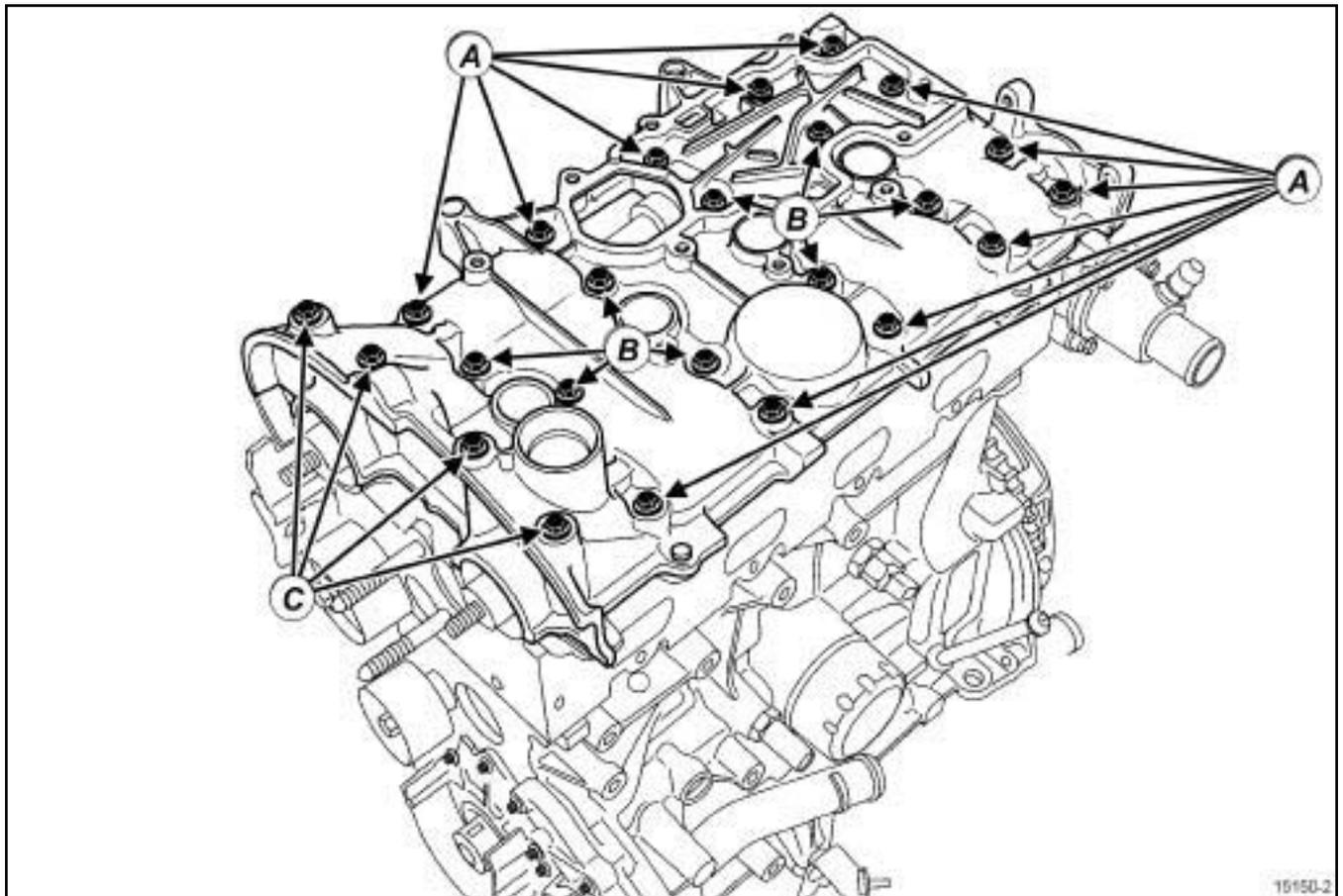
Note:

Use a cloth to remove any **RESIN ADHESIVE** on the rocker cover bearings.

- Fit the rocker cover.

X83

### Position of the rocker cover bolts



15150-2

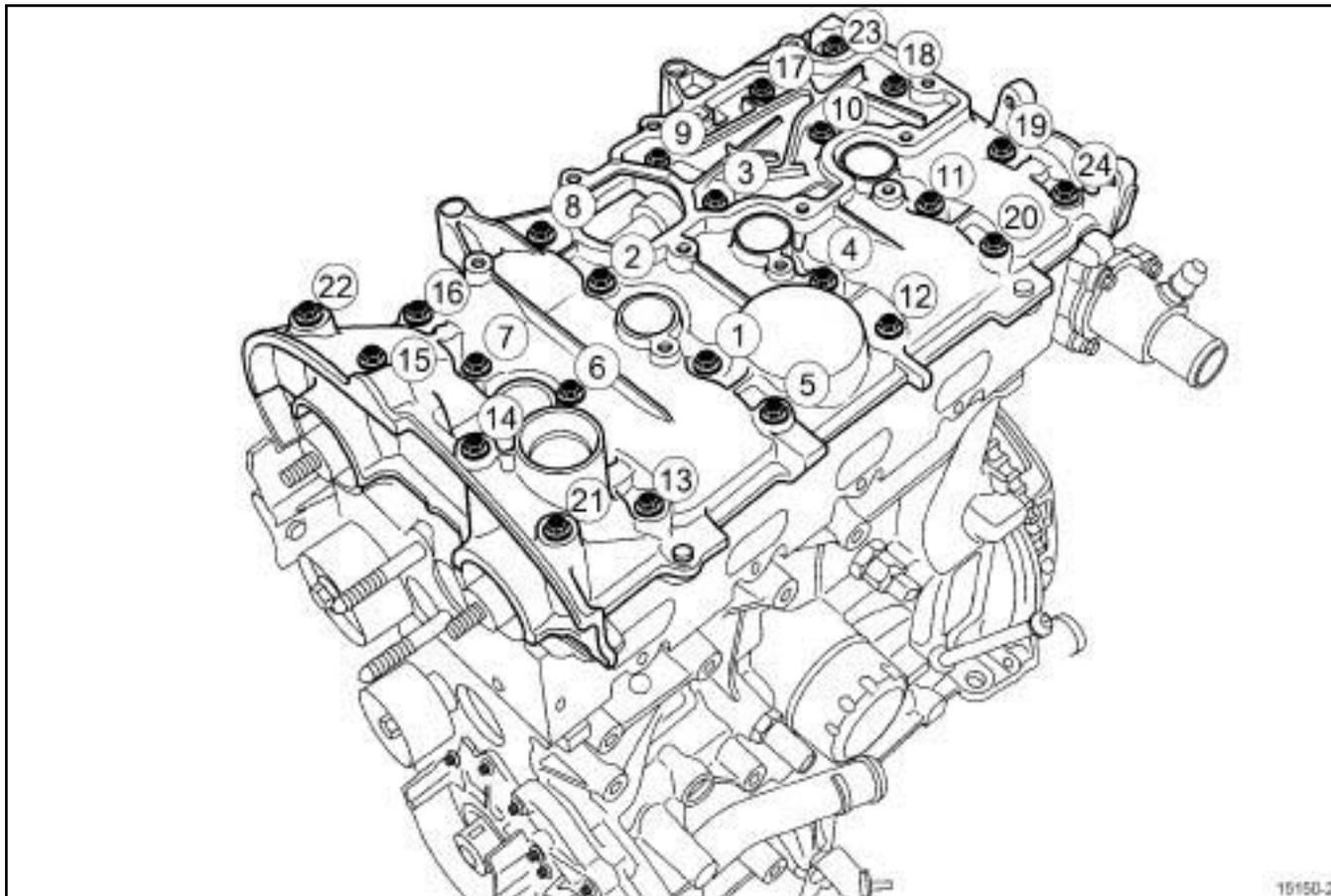
15150-2

- (A) short bolts
- (B) medium bolts
- (C) long bolts

Position the rocker cover bolts.

X83

## Rocker cover bolt tightening order



15150-2

15150-2

- Tighten in order and to torque the **rocker cover bolts (22), (23), (20), (13) (8 N.m)** to correctly fit the rocker cover.
  - Tighten in order and to torque the **rocker cover bolts (1) to (12), (14) to (19), (21) and (24) (12 N.m)**.
  - Undo the rocker cover bolts **(22) (23) (20)** and **(13)**.
  - Tighten in order and to torque **rocker cover bolts (22), (23), (20), (13) (12 N.m)**.
  - Refit:
    - a new exhaust camshaft seal using the tool **(Mot. 1512)**,
    - a new inlet camshaft seal using the tool **(Mot. 1517)**.
- III - FINAL OPERATION**
- Refit:
    - the timing belt with the camshaft pulleys, using the first procedure (see **Timing belt: Removal - Refitting**) ,
    - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
    - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
    - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
    - the inlet distributor (see **Inlet distributor: Removal - Refitting**)
    - the inlet manifold (see ) ,
    - the ignition coils (see **Coils: Removal - Refitting**) ,
    - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
    - the air filter unit (see **Air filter unit: Removal - Refitting**) .
  - Connect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
  - Using the **Diagnostic tool**, check that there are no faults stored by the injection computer and clear them if necessary.

## Rocker cover: Removal - Refitting

X81, and F4R, and 797 or 896, and DOCUMENTATION PHASE 2

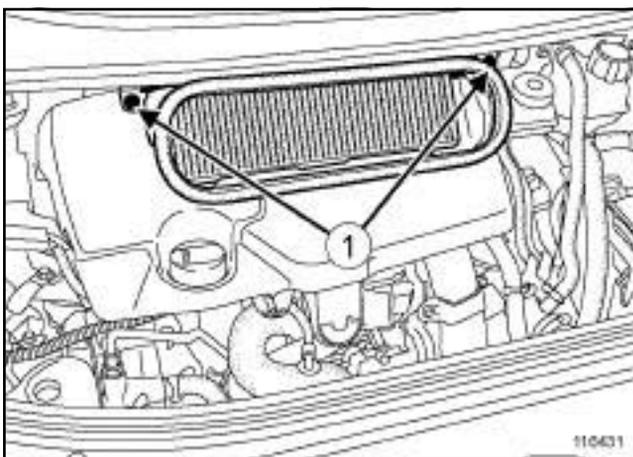
Special tooling required	
<b>Mot. 1801</b>	Camshaft sprocket locking tool F4 engines.
<b>Mot. 1509-01</b>	Adapter kit for tool Mot.1509 or Mot.1801
<b>Mot. 1496</b>	Camshaft timing tool.

Tightening torques 	
rocker cover bolts 22, 23, 20 and 13	<b>8 Nm</b>
rocker cover bolts 1 to 12, 14 to 19, 21 to 24	<b>12 Nm</b>
rocker cover bolts 22, 23, 20 and 13	<b>12 Nm</b>

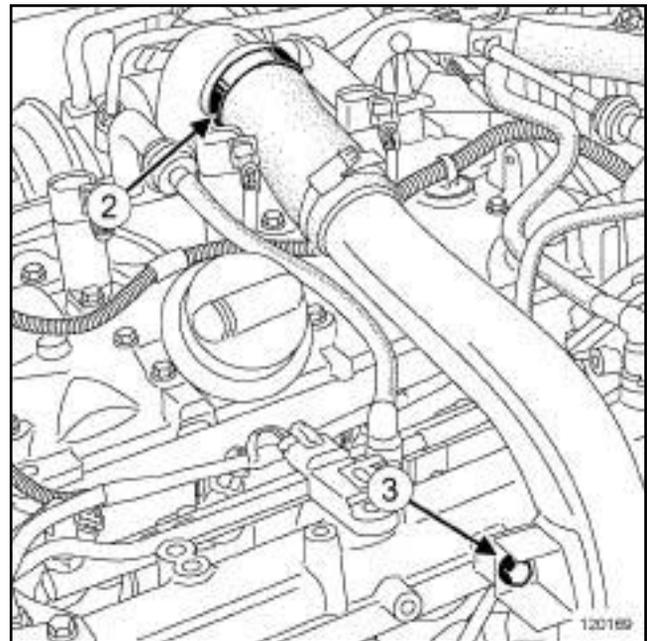
### REMOVAL

#### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift ( (see **Vehicle: Towing and lifting**) ).
- Disconnect the battery ( (see **Battery: Removal - Refitting**) ).

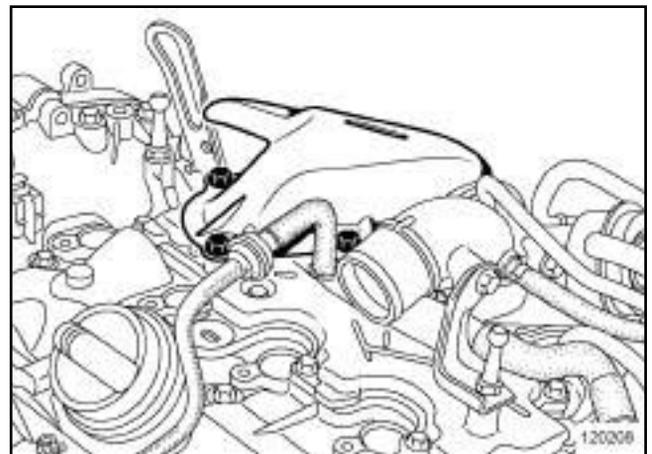


- Remove:
  - the air intake unit bolts (1) ,
  - the air intake unit,
  - the engine cover.



120169

- Undo the intercooler air inlet pipe clip (2) .
- Remove the intercooler air inlet pipe bolt (3) .
- Disconnect the intercooler air inlet pipe from the turbocharger.

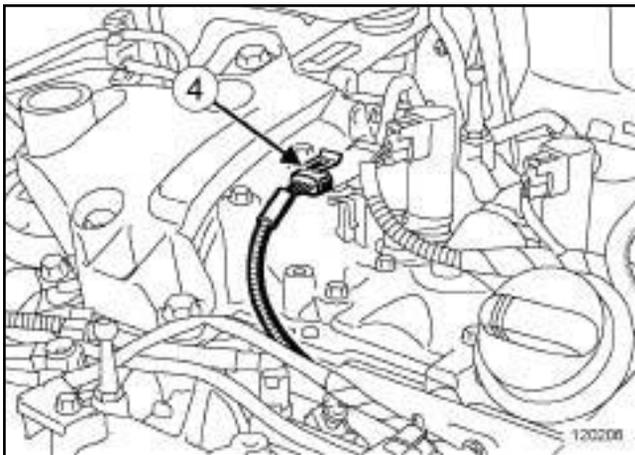


120208

- Remove:
  - the catalytic converter heat shield bolts,
  - the catalytic converter heat shield.

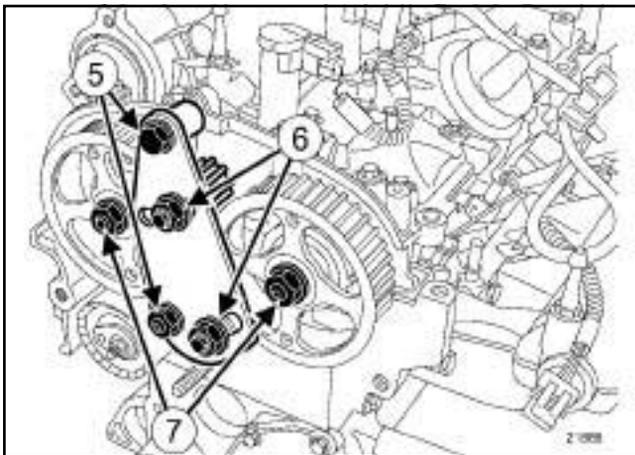
## Rocker cover: Removal - Refitting

X81, and F4R, and 797 or 896, and DOCUMENTATION PHASE 2



120206

- Disconnect the oxygen sensor connector (4) .
- Unclip the wiring harness from the rocker cover.
- Remove:
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) .

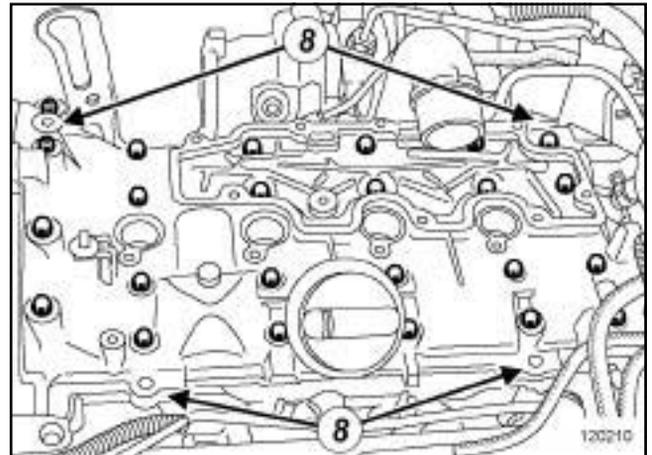


21886

- Position the (**Mot. 1801**) and (**Mot. 1509-01**).
- Tighten the bolt and the shouldered nut (5) .
- Torque tighten the **toothed sprocket nuts (80 Nm)** (6) .
- Remove:
  - the nuts (7) from the camshaft pulleys,
  - the (**Mot. 1801**) and (**Mot. 1509-01**),
  - the camshaft pulleys,
  - the (**Mot. 1496**),

- the oil decanter (see **Oil decanter: Removal - Refitting**) .

### II - REMOVAL OPERATION FOR PART CONCERNED



120210

- Remove the rocker cover bolts.
- Remove the rocker cover vertically by tapping the lugs (8) with a copper hammer.

#### WARNING

Do not scratch the aluminium joint faces: any surface damage to the joint faces may cause leaks.

### REFITTING

#### I - REFITTING PREPARATIONS OPERATION

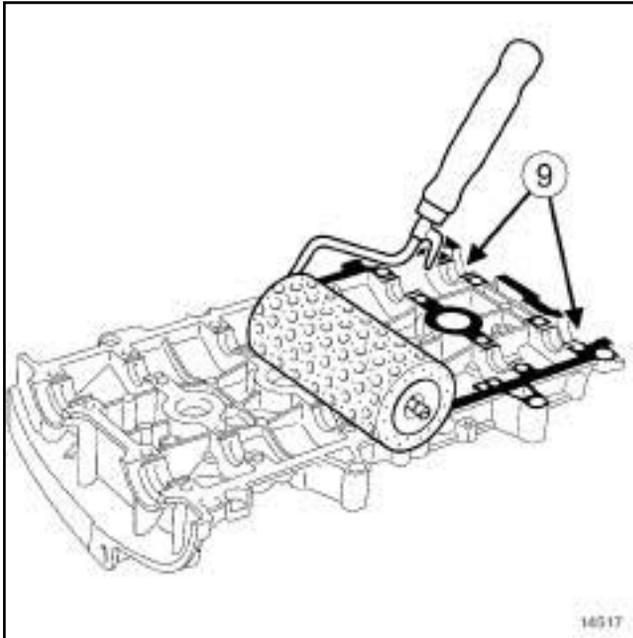
- Clean the rocker cover gasket face with **DECAP-JOINT** to dissolve any gasket still adhering.
- Apply the product to the section to be cleaned; wait approximately ten minutes, then remove the residue using a wooden spatula.

#### WARNING

The joint faces must be clean, dry and free from grease (avoid finger marks).

## Rocker cover: Removal - Refitting

X81, and F4R, and 797 or 896, and DOCUMENTATION PHASE 2



14517

- ❑ Using a stipple roller, apply **RESIN ADHESIVE** to the camshaft rocker cover joint face until it is well coated.

**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

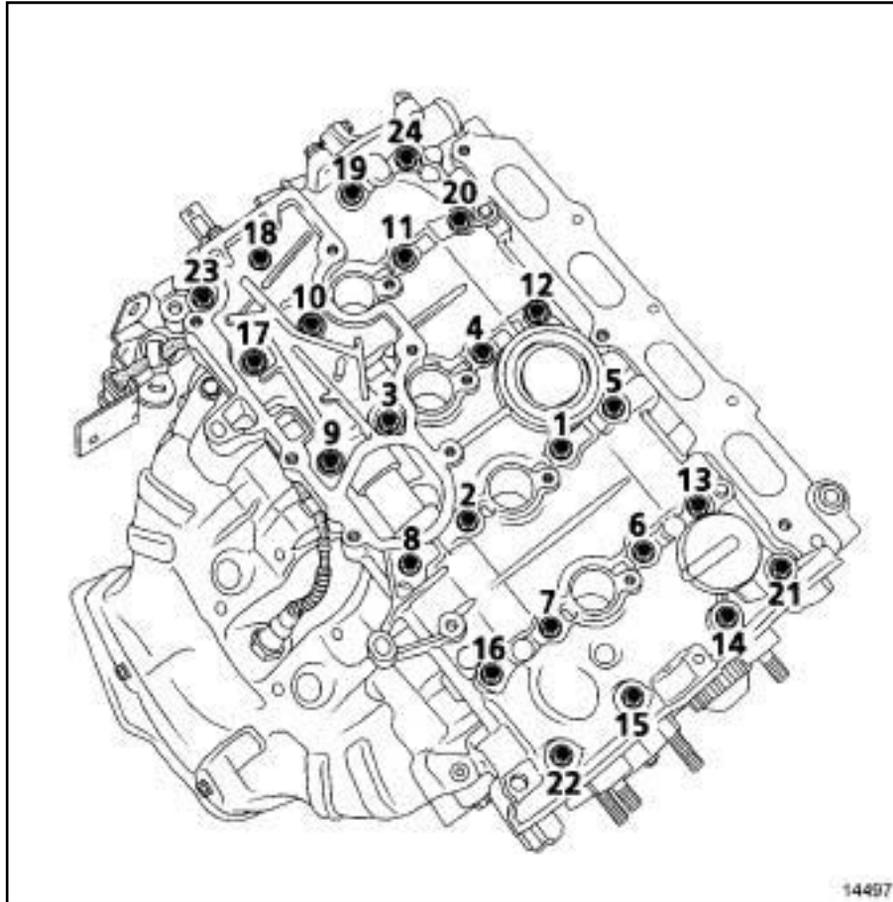
**Note:**

Use a cloth to remove any **RESIN ADHESIVE** from the camshaft rocker cover bearings (9) .

**II - REFITTING OPERATION FOR PART CONCERNED**

- ❑ Refit the rocker cover.

X81, and F4R, and 797 or 896, and DOCUMENTATION PHASE 2



14497

- Torque tighten in order:
  - **rocker cover bolts 22, 23, 20 and 13 (8 Nm),**
  - **rocker cover bolts 1 to 12, 14 to 19, 21 to 24 (12 Nm).**
- Slacken bolts 22, 23, 20 and 13, in order.
- Torque tighten in order **rocker cover bolts 22, 23, 20 and 13 (12 Nm).**

### III - FINAL OPERATION.

- Refit:
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the camshaft pulleys,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) .
- Clip the oxygen sensor wiring harness onto the rocker cover.
- Connect the oxygen sensor connector.

- Refit:
  - the catalytic converter heat shield,
  - the catalytic converter heat shield bolts.
- Connect the intercooler air inlet pipe to the turbo-charger.
- Tighten the intercooler air inlet pipe clip.
- Refit:
  - the intercooler air inlet pipe bolt on the intake distributor,
  - the engine cover,
  - the air intake unit,
  - the air intake unit bolts.
- Connect the battery ( (see **Battery: Removal - Refitting**) ).

X84

## Equipment required

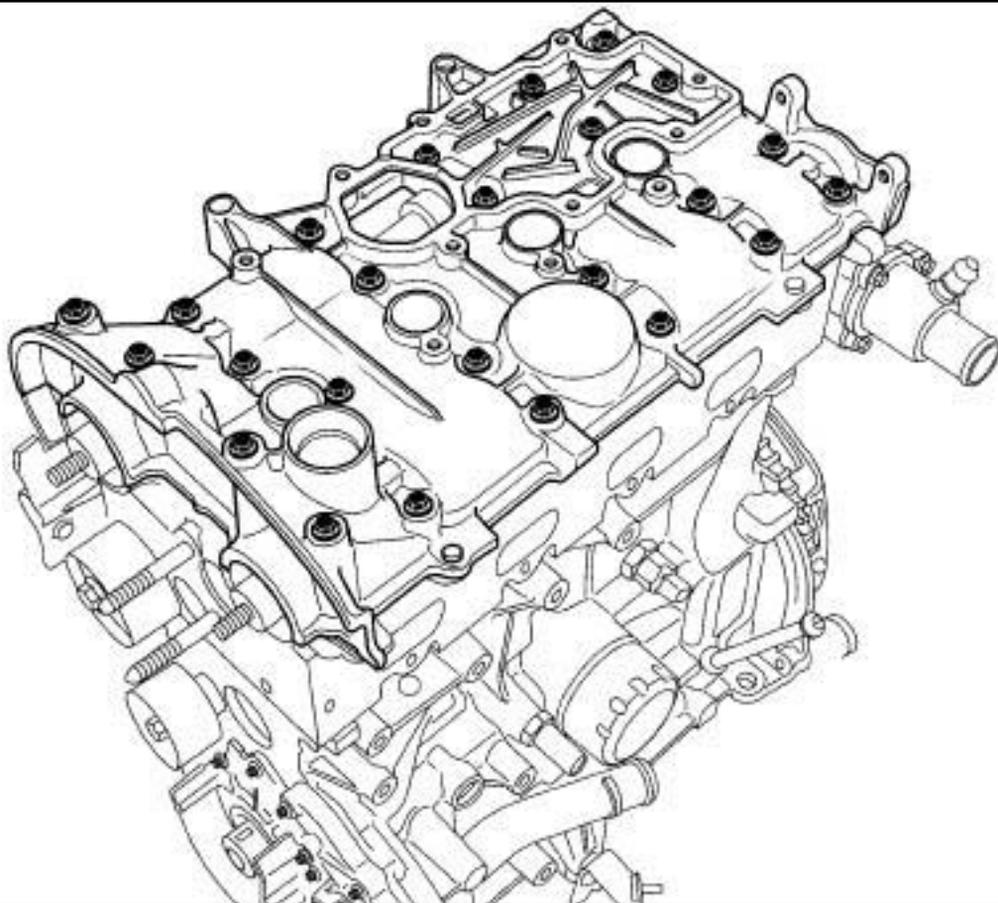
Diagnostic tool

## I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (MR 364, 02A, Lifting equipment).
- Disconnect the battery (see **Battery: Removal - Refitting**) (MR 364, 80A, Battery).
- Remove:
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the intake distributor (see **Inlet distributor: Removal - Refitting**) ,

- the ignition coils (see **Coils: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the battery (see **Battery: Removal - Refitting**) (MR 364, 80A, Battery),
- the air filter box (see **Air filter unit: Removal - Refitting**) ,
- the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 364, 35A, Wheels and tyres),
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) .

## II - OPERATION FOR REMOVAL OF PART CONCERNED



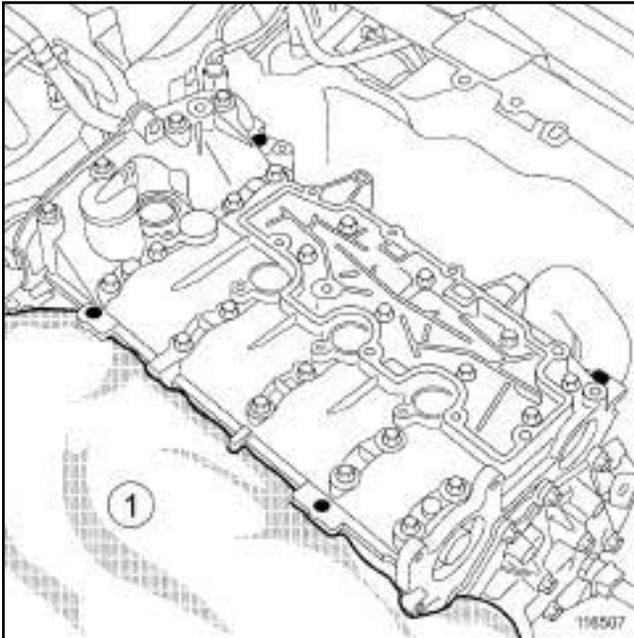
15150-2

15150-2

- Undo all of the rocker cover bolts.
- Remove the rocker cover bolts.

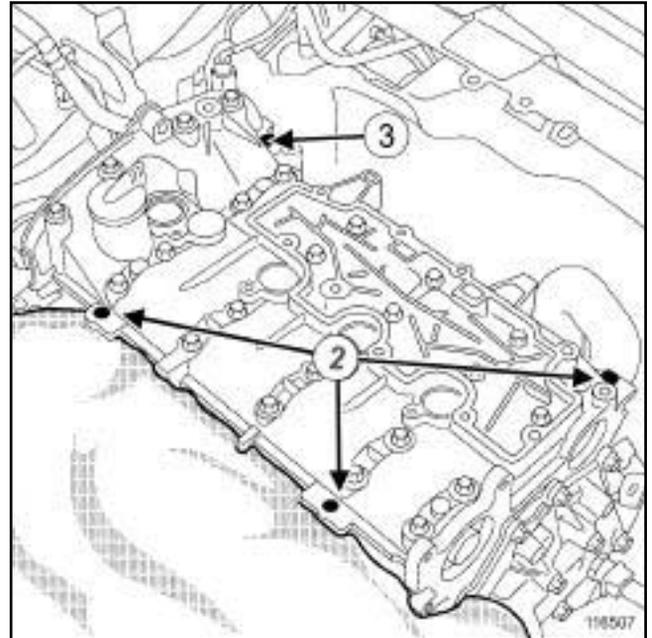
## Rocker cover: Removal - Refitting

X84

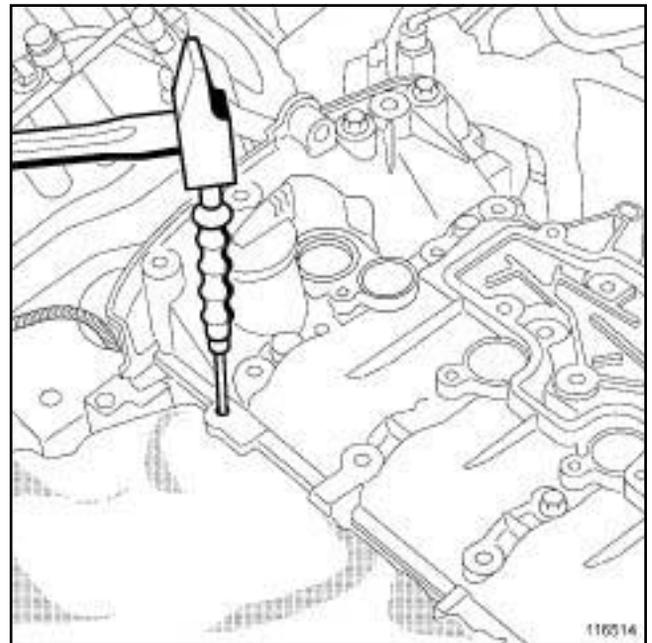


116507

- Using a clean cloth (1) , protect:
  - the injector holder plate pipe openings to prevent any impurities from entering,
  - the injector rail,
  - the camshaft position sensor location.



116507



116514

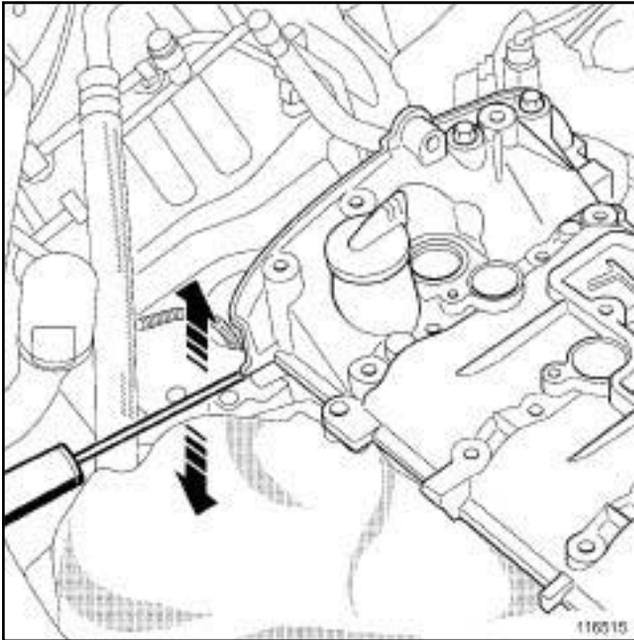
- Remove the rocker cover centring devices (2) using a hammer and a drift to knock them downwards.

## Note:

The centring device (3) must not be removed under any circumstances. Not following these instructions could damage the cylinder head.

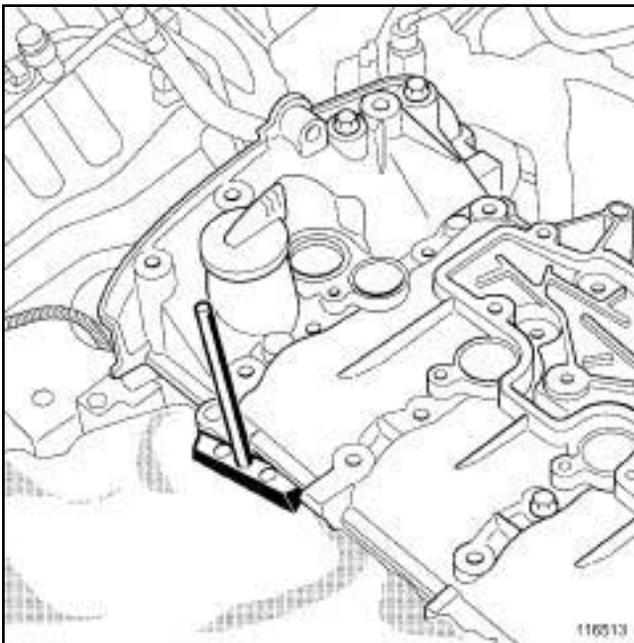
## Rocker cover: Removal - Refitting

X84



116515

- Press a flat-blade screwdriver onto the injector holder plate and use it to gently remove the adhesive from the rocker cover.



116513

- Remove the rocker cover using the.
- Remove the rocker cover.

## I - REFITTING PREPARATIONS OPERATION

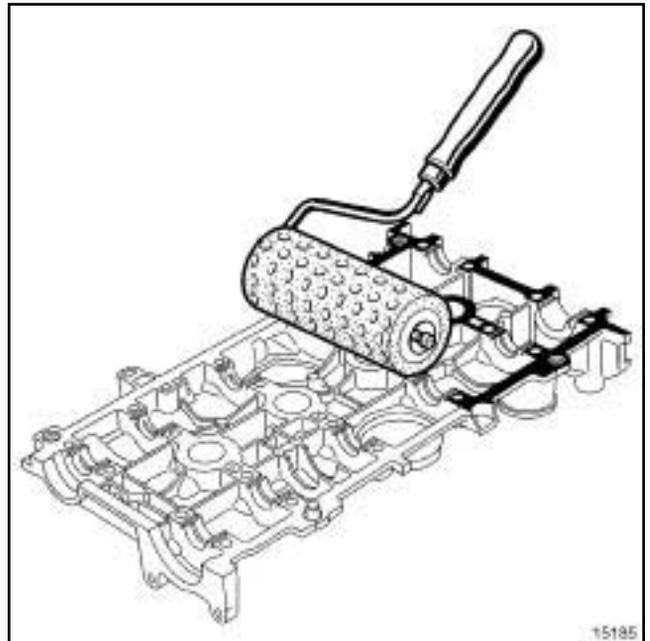
- Refit the centring devices on the cylinder head using a hammer and drift.

**WARNING**

The joint faces must be clean, dry and free from grease (avoid finger marks).

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

## II - OPERATION FOR REFITTING PART CONCERNED



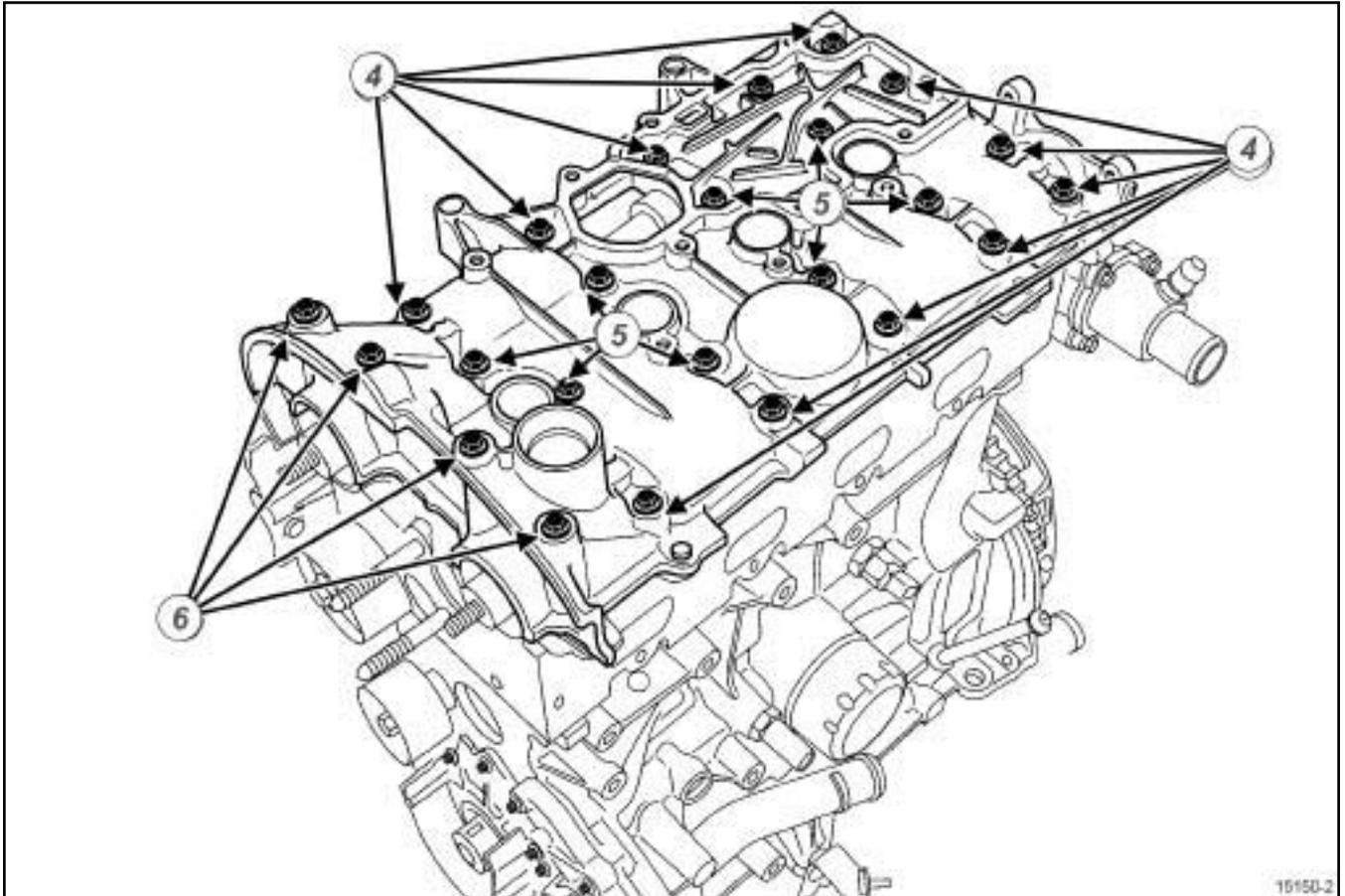
15185

15185

- Remove any « **RESIN ADHESIVE** » (see ) (MR 364, 04B, Products-consumables) on the rocker cover bearings using a cloth.
- Apply some « **RESIN ADHESIVE** » to the rocker cover gasket face using a stipple roller.
- Fit the rocker cover.

X84

### Position of the bolts



15150-2

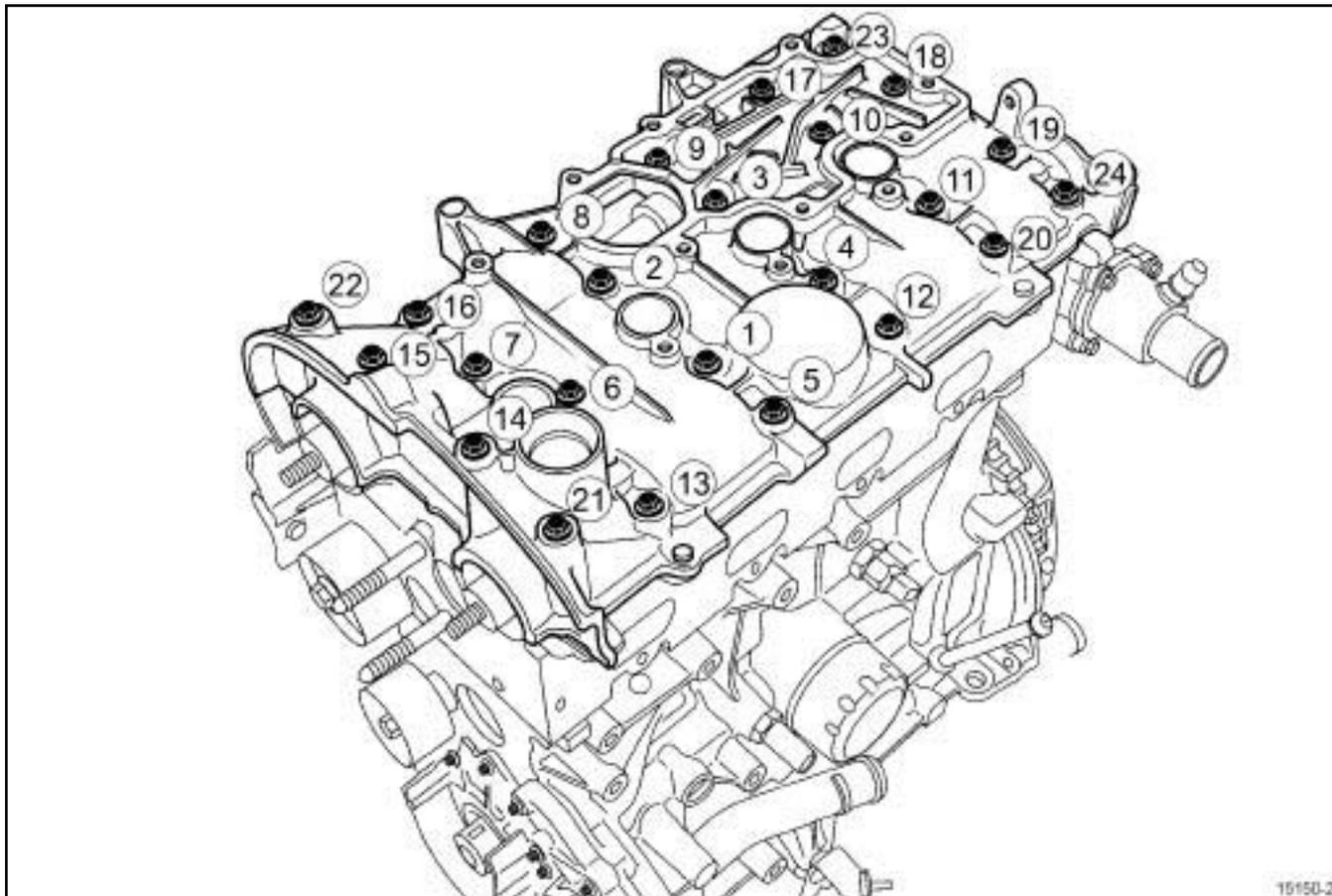
15150-2

- (4) « short » bolts
- (5) « medium » bolts
- (6) « long » bolts

Position the rocker cover bolts.

X84

## Rocker cover bolt tightening order



15150-2

15150-2

- Tighten to torque and in order the **rocker cover bolts (22) , (23) , (20) , (13) (8 Nm)** to correctly position the rocker cover.
- Tighten to torque and in order the **rocker cover bolts (1) to (12) , (14) to (19) , (21) and (24) (12 Nm)**.
- Tighten to torque and in order the rocker cover bolts **(22) , (23) , (20) , (13) (12 Nm)**.

**III - FINAL OPERATION.**

- Refit:
  - the timing belt (see **Timing belt: Removal - Refitting**) .
  - the accessories belt (see **Accessories belt: Removal - Refitting**) .
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 364, 35A, Wheels and tyres),
  - the air filter box (see **Air filter unit: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,

- the intake distributor (see **Inlet distributor: Removal - Refitting**) ,
- the throttle valve (see **Throttle valve: Removal - Refitting**) .

- Connect the battery (see ) (MR 364, 80A, Battery).
- Using the **Diagnostic tool**, check that there are no faults stored by the injection computer and clear them if necessary.

X91

### Special tooling required

**Mot. 1716** Removes housing with silicone seals.

### Equipment required

roll pin punch

### Tightening torques

rocker cover bolts (22), (23), (20), (13) **8 Nm**

rocker cover bolts (1) to (12), (14) to (19), (21), (24) **12 Nm**

rocker cover bolts (22), (23), (20), (13) **12 Nm**

### IMPORTANT

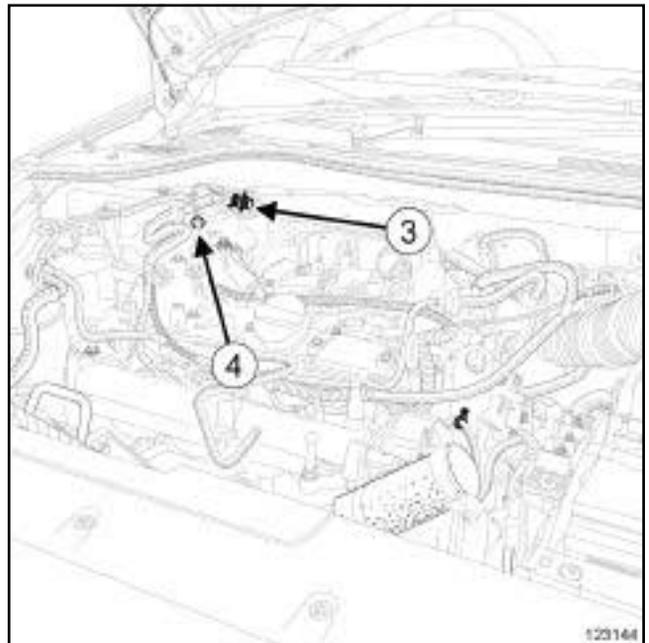
Wear latex gloves during the operation.

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (MR 415, 02A, Lifting equipment).
- Disconnect the battery (see **Battery: Removal - Refitting**) (MR 415, 80A, Battery).
- Remove:
  - the engine cover,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 415, 35A, Wheels and tyres),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (MR 416, 55A, Exterior protection),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the engine undertray bolts,
  - the engine undertray,

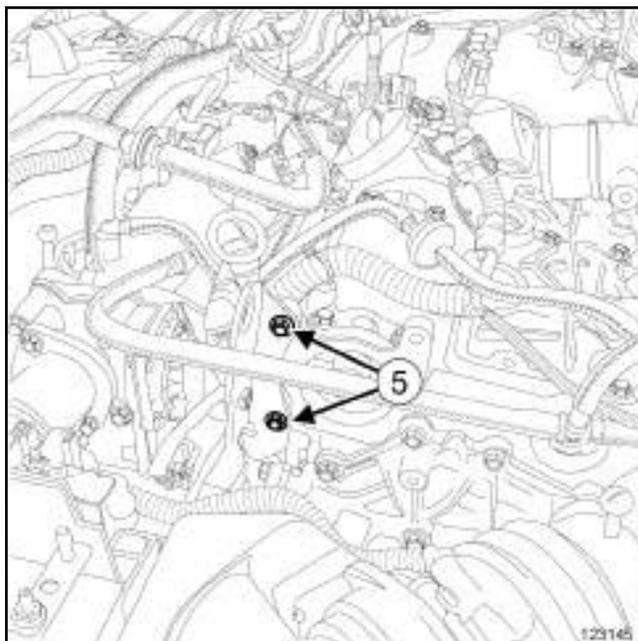
- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .
- the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) .



123144

- Disconnect the connector (3) from the fuel vapour absorber solenoid valve.
- Unclip:
  - the fuel vapour absorber solenoid valve wiring at (4) ,
  - the fuel vapour re-breathing hose.
- Disconnect the fuel supply union on the injector rail.
- Insert the blanking plugs.

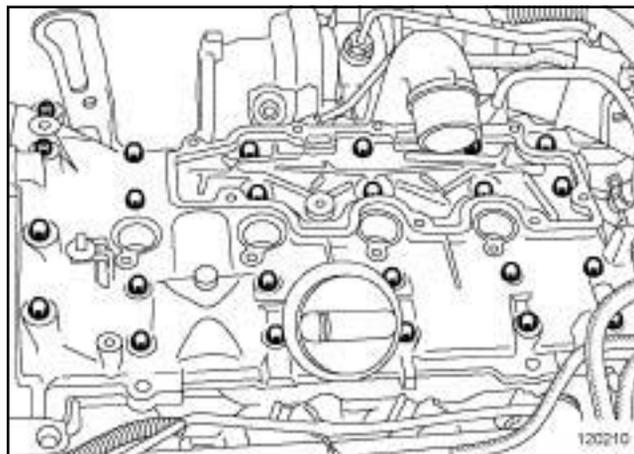
X91



123145

- Unclip:
  - the injector wiring on the gearbox side lifting eye,
  - the throttle valve wiring on the gearbox side lifting eye.
- Remove:
  - the bolts (5) from the lifting eye on the gearbox side,
  - the gearbox side lifting eye.

## II - REMOVAL OPERATION FOR PART CONCERNED



120210

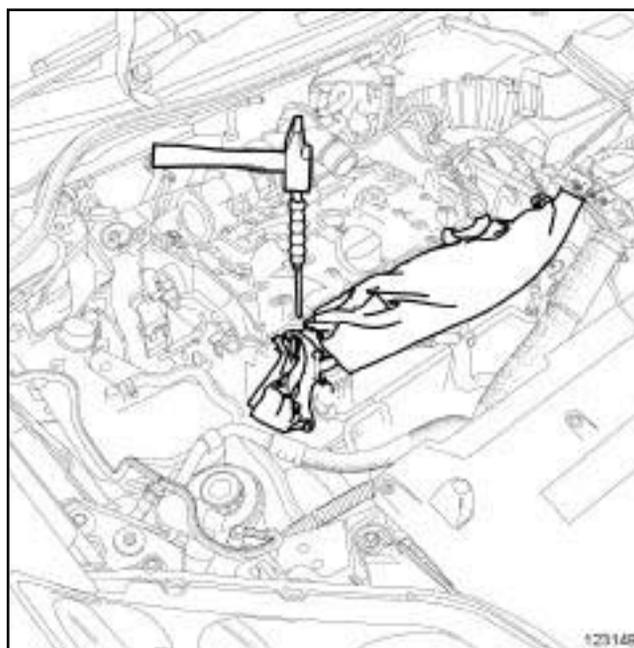
- Remove the rocker cover bolts.

### Note:

The rocker cover bolts are not the same length; mark their positions.

### Note:

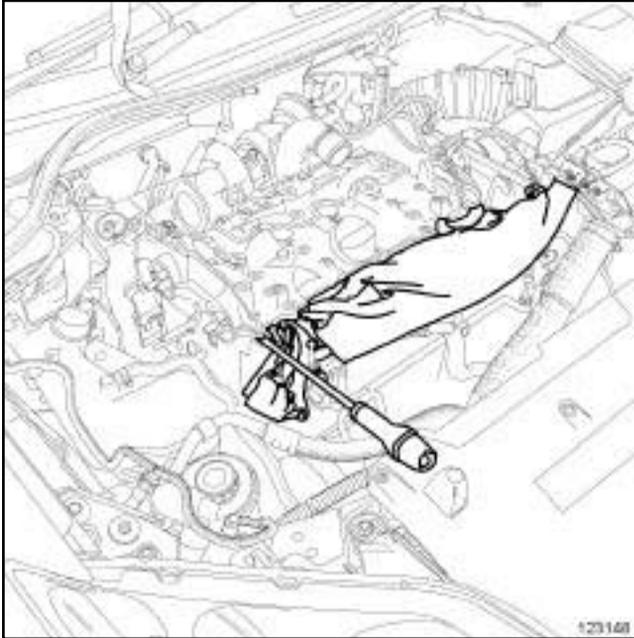
Place a cloth on the intake distributor and exhaust manifold to recover the rocker cover centring devices.



123149

- Remove the rocker cover centring devices using a **roll pin punch** and a hammer to knock them out from above.

X91



123148

- Press a flat-blade screwdriver between the cylinder head and the rocker cover and use it to gently release the rocker cover.



123150

- Remove the rocker cover using the **(Mot. 1716)**.
- Remove the rocker cover.

## REFITTING

## I - REFITTING PREPARATIONS OPERATION

- Use **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (MR 415, 04B, Consumables - Products) to clean and degrease the joint faces:
  - on the rocker cover if it is being reused,
  - on the cylinder head.

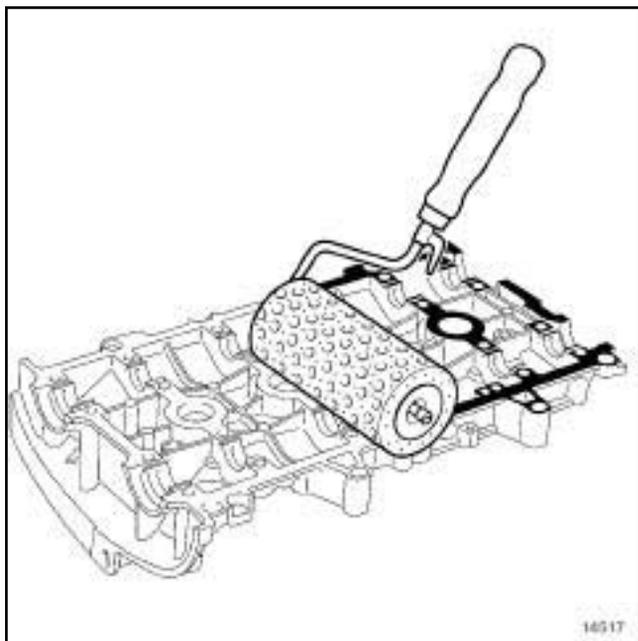
**WARNING**

Do not scratch the aluminium joint faces: any surface damage to the joint faces may cause leaks.

**WARNING**

The joint faces must be clean, dry and free from grease (avoid finger marks).

X91



14517

- Use a stipple roller to apply **RESIN ADHESIVE** (see **Vehicle: Parts and consumables for the repair**) (MR 415, 04B, Consumables - Products) to the rocker cover joint face until it is well covered.

**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

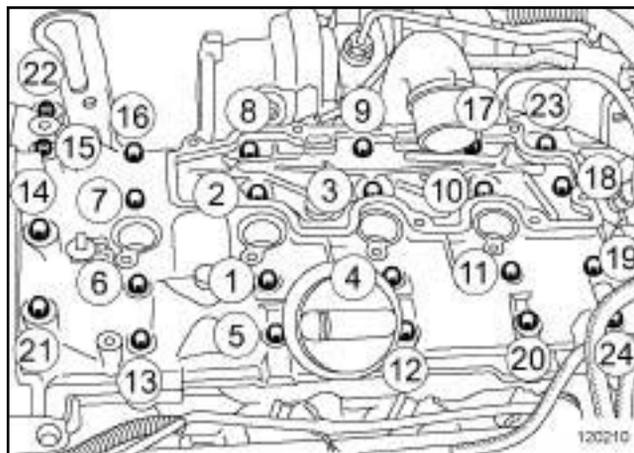
**Note:**

Use a cloth to remove any **RESIN ADHESIVE** in the rocker cover bearings.

- Refit the rocker cover centring devices using a **roll pin punch** and a hammer.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit the rocker cover.
- Fit without tightening the rocker cover bolts.



120210

- Torque tighten:

- the **rocker cover bolts (22), (23), (20), (13) (8 Nm)**,
- the **rocker cover bolts (1) to (12), (14) to (19), (21), (24) (12 Nm)**,
- the **rocker cover bolts (22), (23), (20), (13) (12 Nm)**.

**III - FINAL OPERATION.**

- Refit:

- the lifting ring on the gearbox side,
- the gearbox side lifting eye bolts.

- Tighten the gearbox side lifting eye bolts.

- Clip:

- the injector wiring on the gearbox side lifting eye,
- the throttle valve wiring on the gearbox side lifting eye.

- Remove the blanking plugs.

- Connect:

- the fuel supply union to the injector rail,
- the fuel vapour absorber solenoid valve connector.

- Clip:

- the fuel vapour rebreathing pipe,
- the fuel vapour absorber solenoid valve wiring.

- Refit:

- the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,

X91

- the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) .
- Refit:
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (MR 416, 55A, Exterior protection),
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 415, 35A, Wheels and tyres),
  - the oil decanter (see **Oil decanter: Removal - Refitting**)
  - the ignition coils (see **Coils: Removal - Refitting**) .
- Connect the battery (see **Battery: Removal - Refitting**) (MR 415, 80A, Battery).
- Refit:
  - the engine undertray,
  - the engine undertray bolts.
- Tighten the engine undertray bolts.
- Refit the engine cover.

X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2

Special tooling required	
<b>Mot. 1716</b>	Removes housing with silicone seals.
<b>Mot. 1517</b>	Tool for fitting inlet camshaft seal.
<b>Mot. 1512</b>	Tool for fitting exhaust camshaft seals (28 x 47).

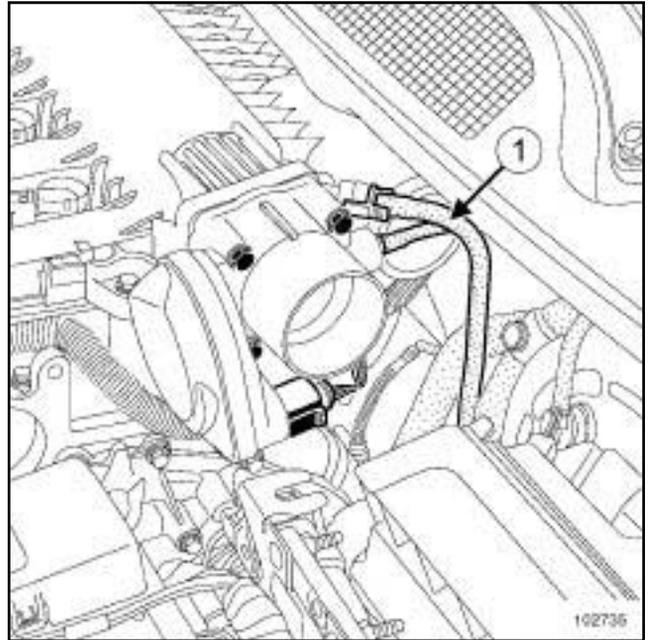
Equipment required
roll pin punch

Tightening torques 	
rocker cover bolts 22, 23, 20 and 13	<b>8 Nm</b>
rocker cover bolts 1 to 12, 14 to 19, 21 to 24	<b>12 Nm</b>
rocker cover bolts 22, 23, 20 and 13	<b>12 Nm</b>

## REMOVAL

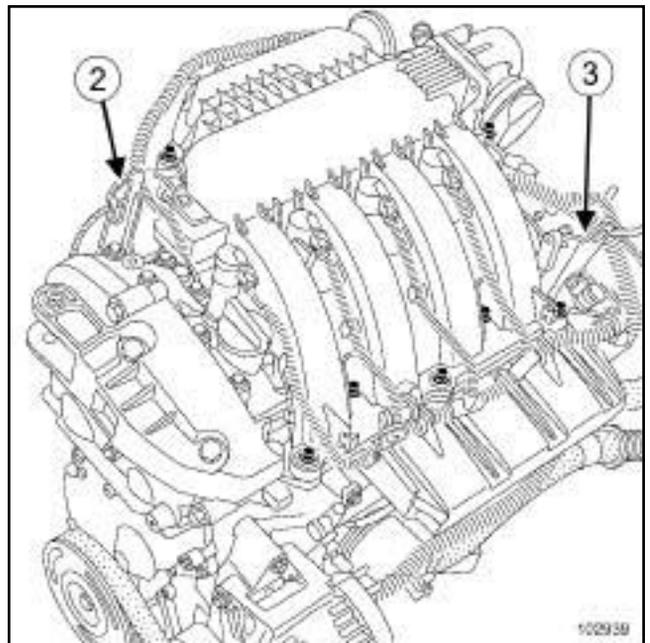
### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (MR 395, 02A, Lifting equipment).
- Remove:
  - the engine cover,
  - the engine undertray.
- Disconnect the battery (see **Battery: Removal - Refitting**) (MR 395, 80A, Battery).
- Remove:
  - the air filter box (see **Air filter unit: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) .



102735

- Disconnect the brake servo vacuum pipe (1) on the intake distributor side.
- Remove:
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the spark plugs (see **Plugs: Removal - Refitting**) ,
  - the camshaft dephaser solenoid valve.



102939

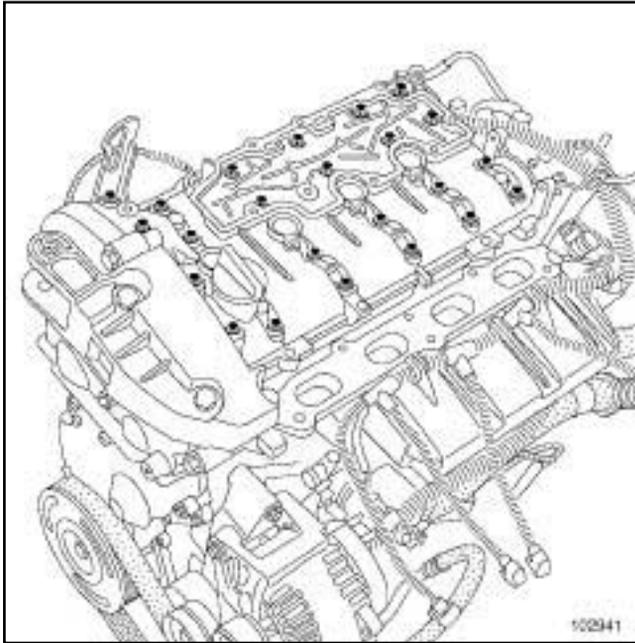
- Remove:
  - the engine lifting bracket (2) on the timing end,
  - the intake distributor (see **Inlet distributor: Removal - Refitting**) ,

## Rocker cover: Removal - Refitting

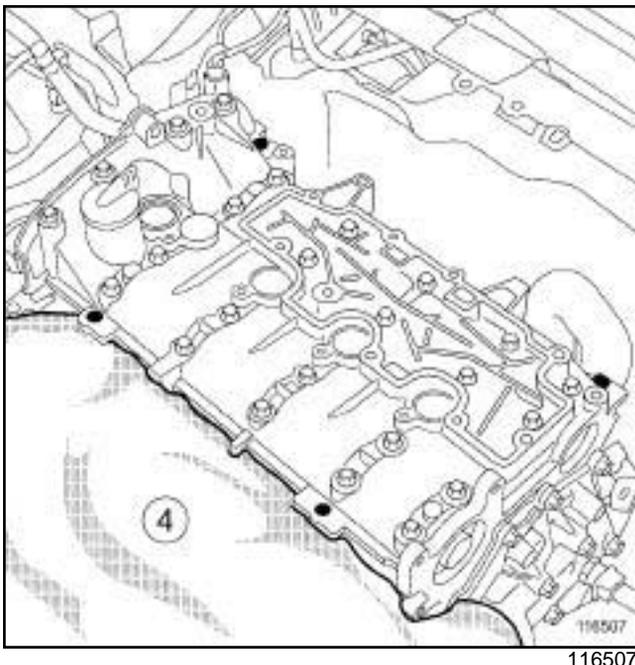
X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2

- the lifting bracket (3) at the flywheel end,
- the oil decanter (see **Oil decanter: Removal - Refitting**).

### II - REMOVAL OPERATION FOR PART CONCERNED

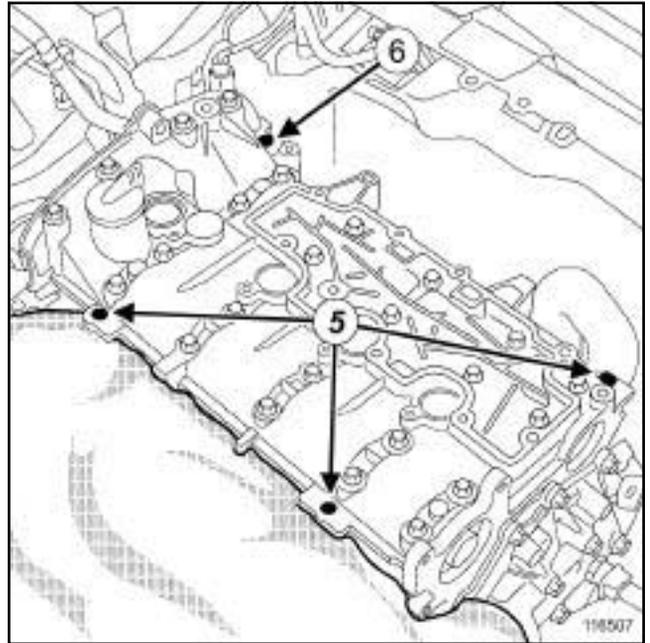


- Remove the rocker cover bolts.

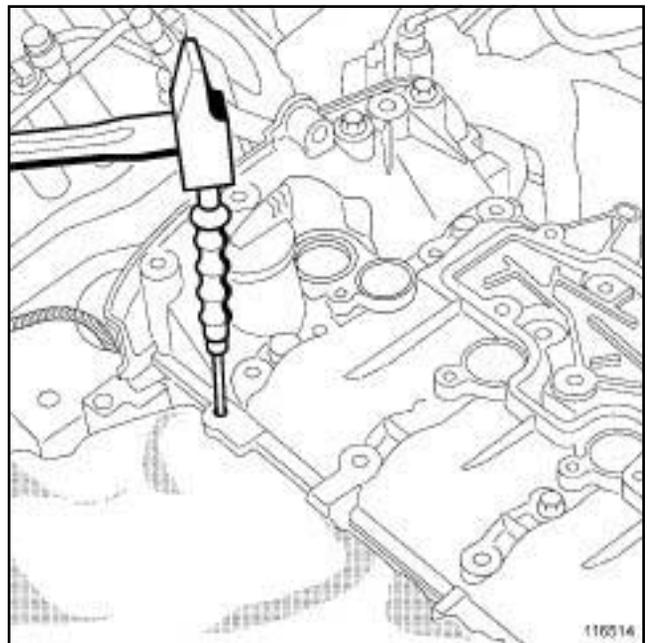


- Using a clean cloth (4), protect:
  - the injector holder plate pipe openings to prevent any impurities from entering,
  - the injector rail,

- the camshaft position sensor location.



116507



116514

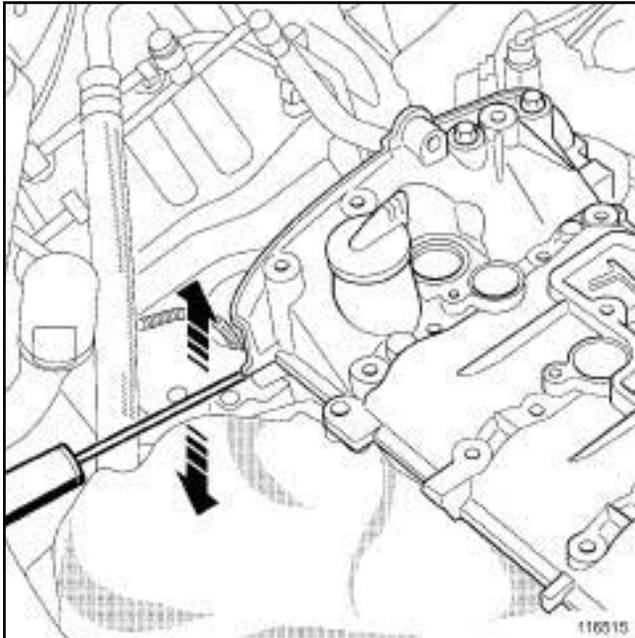
- Remove the rocker cover centring devices (5) using a hammer and a drift to knock them out from above.

#### Note:

The centring device (6) must not be removed under any circumstances. Not following these instructions could damage the cylinder head.

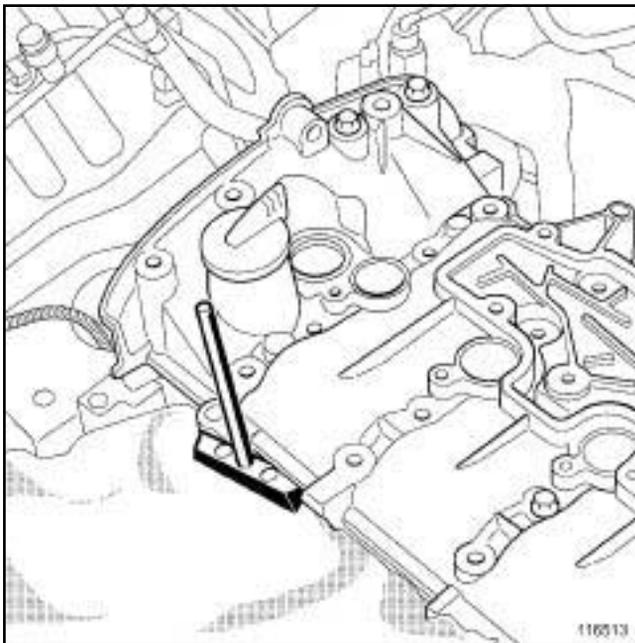
## Rocker cover: Removal - Refitting

X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2



116515

- Press a flat-blade screwdriver onto the injector holder plate and use it to gently remove the adhesive from the rocker cover.



116513

- Remove the rocker cover using the **(Mot. 1716)**.
- Remove the rocker cover.

## REFITTING

## I - REFITTING PREPARATIONS OPERATION

- Clean the joint faces with **SUPER CLEANER FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (MR 395, 04B, Consumables - Products).

**WARNING**

Do not scratch the aluminium joint faces: any surface damage to the joint faces may cause leaks.

**WARNING**

The joint faces must be clean, dry and free from grease (avoid finger marks).

**WARNING**

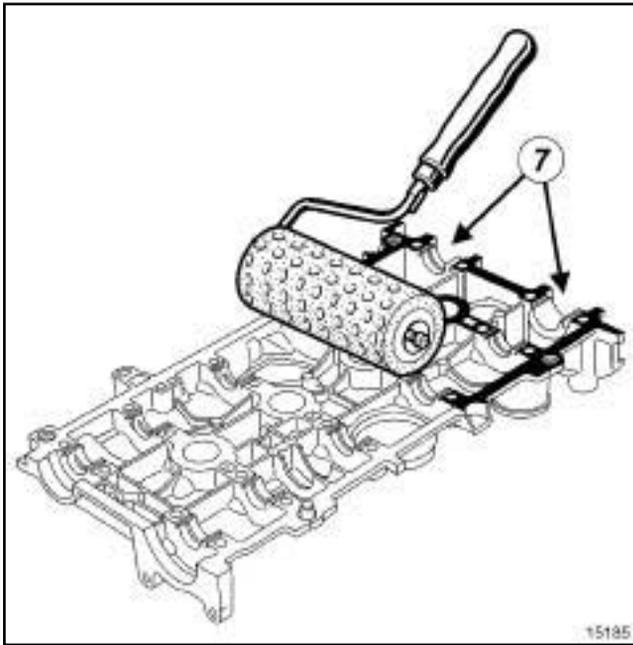
Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

- Refit the centring devices on the cylinder head using a **roll pin punch** and a **hammer**.

## Rocker cover: Removal - Refitting

X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2

## II - REFITTING OPERATION FOR PART CONCERNED



15185

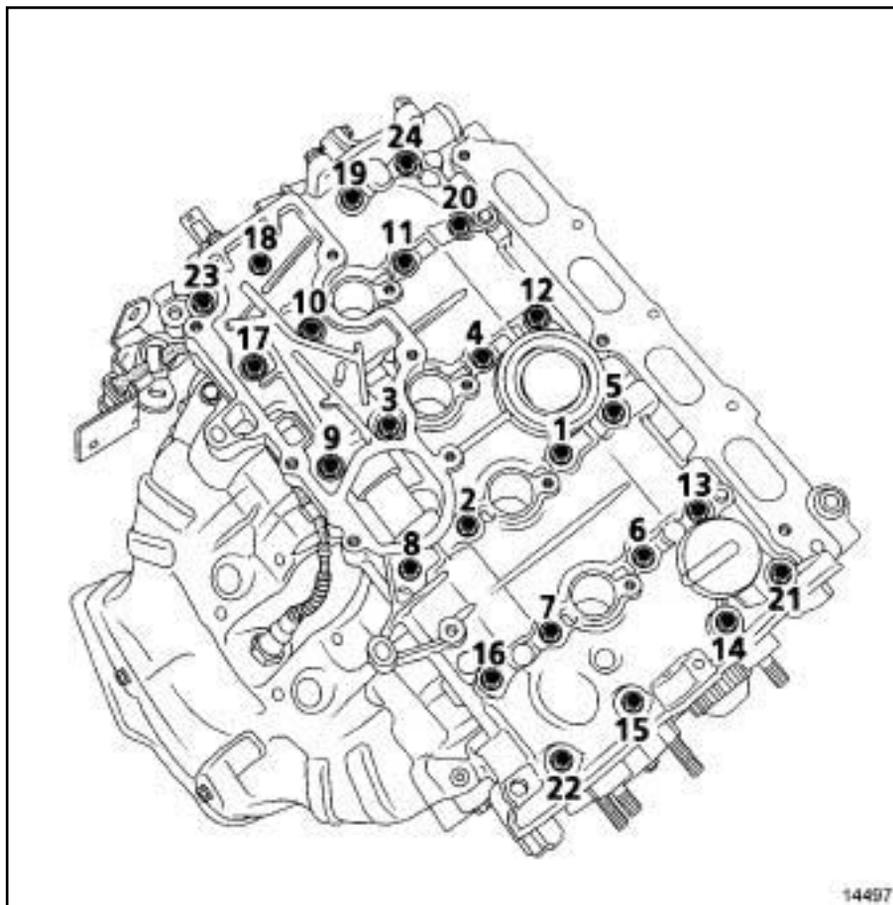
- Use a stipple roller to apply **RESIN ADHESIVE** (see **Vehicle: Parts and consumables for the repair**) (MR 395, 04B, Consumables - Products) to the rocker cover joint face until the rocker cover joint face is well covered.

## Note:

Use a cloth to remove any **RESIN ADHESIVE** (see **Vehicle: Parts and consumables for the repair**) (MR 395, 04B, Consumables - Products) remaining on the rocker cover camshaft bearings (7).

- Refit the rocker cover.
- Position the new rocker cover bolts.

X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2



14497

14497

- Torque tighten and in order:
  - rocker cover bolts 22, 23, 20 and 13 (8 Nm),
  - rocker cover bolts 1 to 12, 14 to 19, 21 to 24 (12 Nm).
- Loosen bolts 22, 23, 20 and 13, in order.
- Torque tighten in order rocker cover bolts 22, 23, 20 and 13 (12 Nm).

### III - FINAL OPERATION.

- Refit:
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the flywheel end engine lifting bracket,
  - the intake distributor with a new seal (see **Inlet distributor: Removal - Refitting**) ,
  - the engine lifting bracket on the timing end,
  - the inlet camshaft dephaser solenoid valve complete with a new seal,
  - the spark plugs (see **Plugs: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) .

- Connect the brake servo vacuum pipe
- Replace the camshaft seals.
  - use the (**Mot. 1517**) for the inlet camshaft seal,
  - use the (**Mot. 1512**) for the exhaust camshaft seal.
- Refit:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the air filter box (see **Air filter unit: Removal - Refitting**) .
- Connect the battery (see **Battery: Removal - Refitting**) (MR 395, 80A, Battery).
- Refit:
  - the engine undertray,
  - the engine cover.

## Rocker cover: Removal - Refitting

X73, and DOCUMENTATION PHASE 2

Special tooling required	
<b>Mot. 1496</b>	Camshaft timing tool.

Equipment required	
roll pin punch	

Tightening torques 	
rocker cover bolts (22), (23), (20) and (13)	<b>8 Nm</b>
rocker cover bolts (1) to (12), (14) to (19), (21) and (24)	<b>12 Nm</b>
rocker cover bolts (22), (23), (20) and (13)	<b>12 Nm</b>

### IMPORTANT

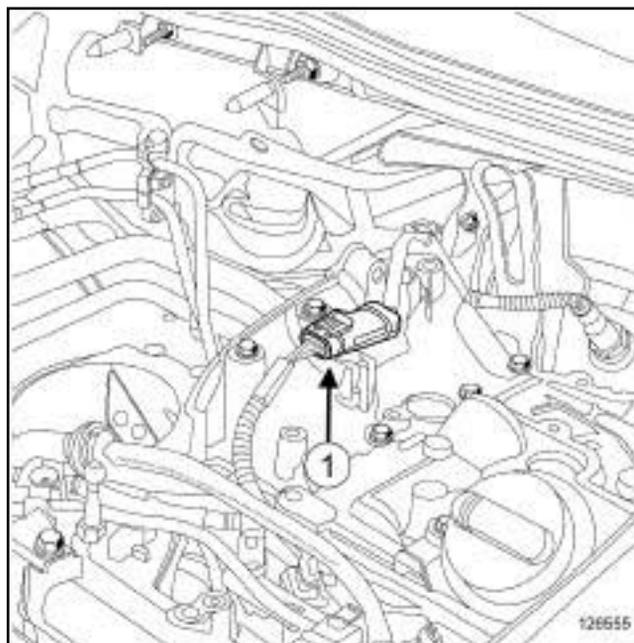
Wear latex gloves during the operation.

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove the front engine cover.
- Disconnect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Remove:
  - ignition coils (see **Coils: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the engine undertray bolts,
  - the engine undertray,
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,

- the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
- the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the seal of each camshaft on the timing end (see **Camshaft seal, timing end: Removal - Refitting**)

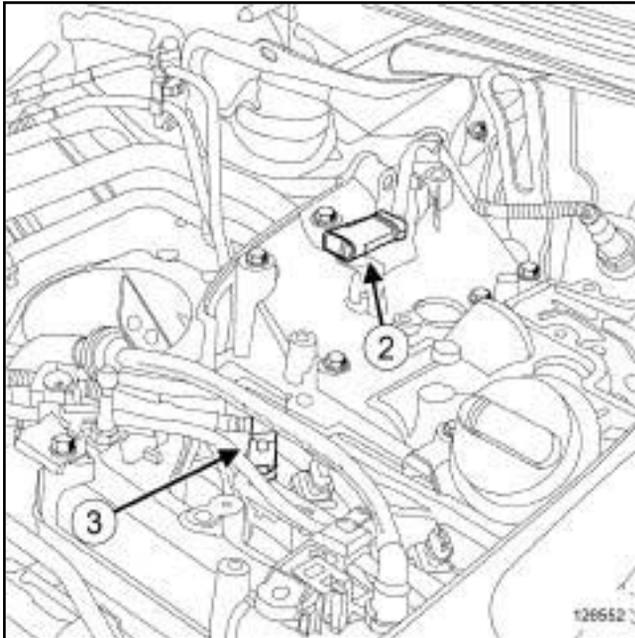


126555

- Disconnect the upstream oxygen sensor connector (1) .

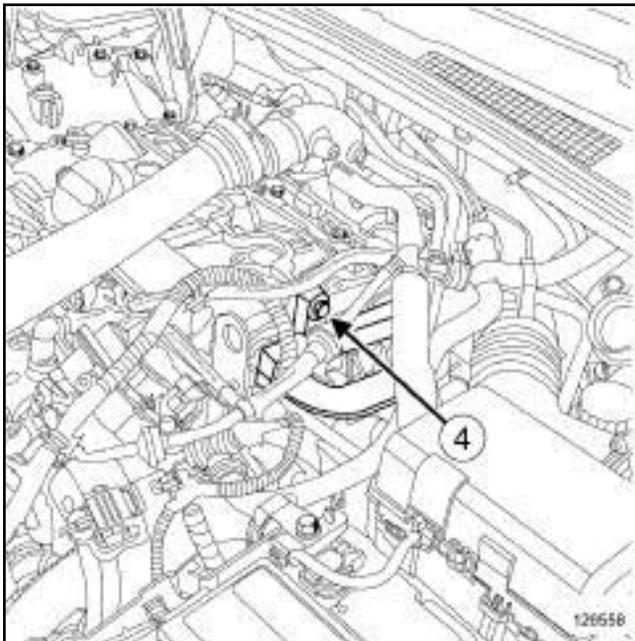
## Rocker cover: Removal - Refitting

X73, and DOCUMENTATION PHASE 2



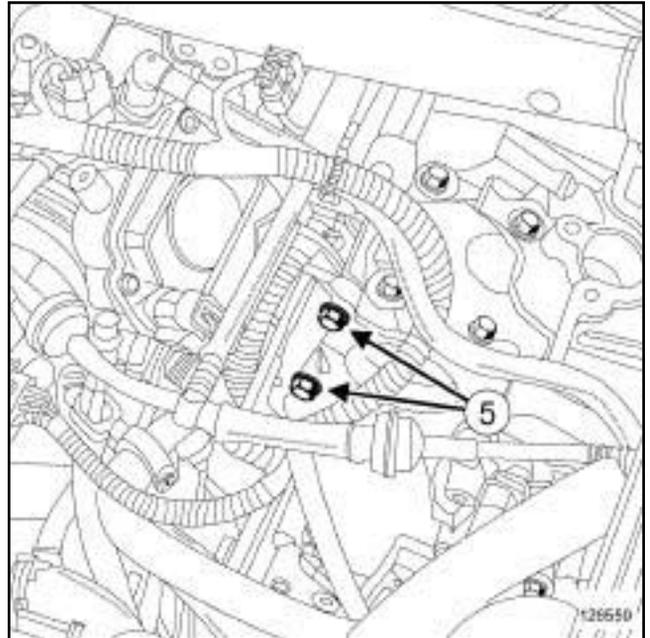
126552

- Unclip the upstream oxygen sensor connector (2) from the rocker cover.
- Disconnect the fuel supply pipe union (3) on the injector rail.
- Insert the blanking plugs.



126558

- Remove:
  - the retaining bolt of the tool (**Mot. 1496**) (4) ,
  - the (**Mot. 1496**).



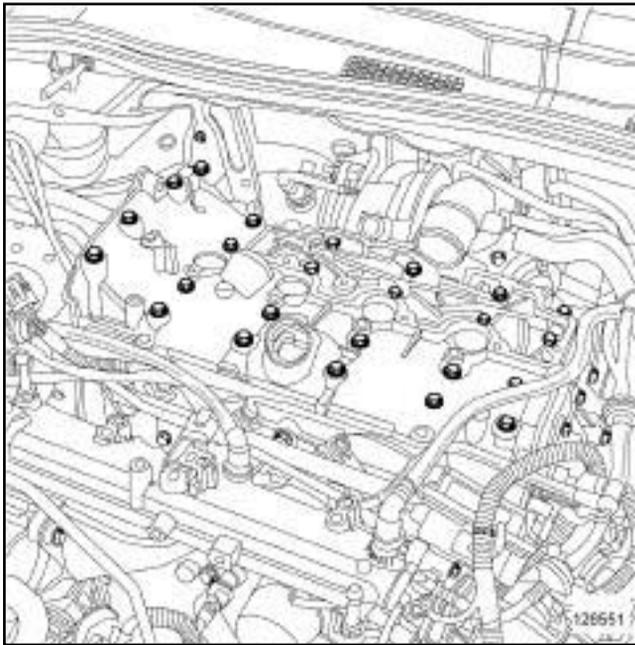
126550

- Unclip the injector wiring on the lifting eye on the gearbox side.
- Remove:
  - the gearbox side lifting eye bolts (5) ,
  - the gearbox side lifting eye.

## Rocker cover: Removal - Refitting

X73, and DOCUMENTATION PHASE 2

## II - OPERATION FOR REMOVAL OF PART CONCERNED



126551

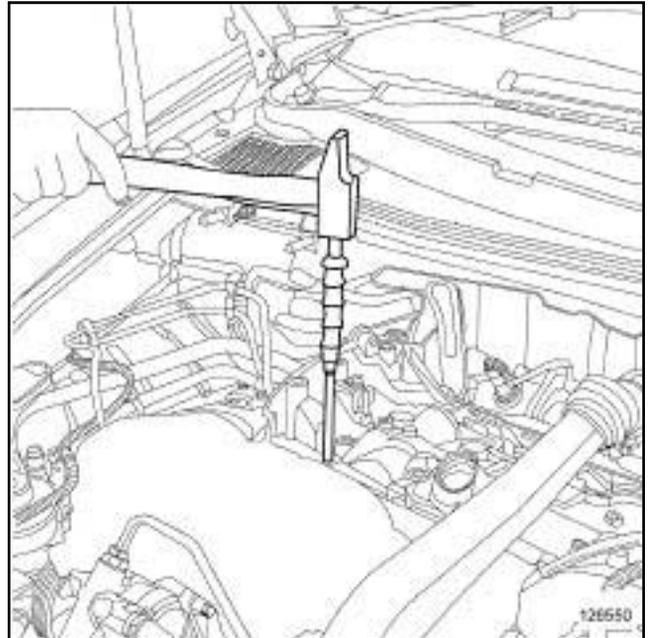
- Remove the rocker cover bolts.

## Note:

The rocker cover bolts do not have the same length, mark their positions.

## Note:

Place a cloth on the intake distributor and on the exhaust manifold to retrieve the rocker cover centring devices.



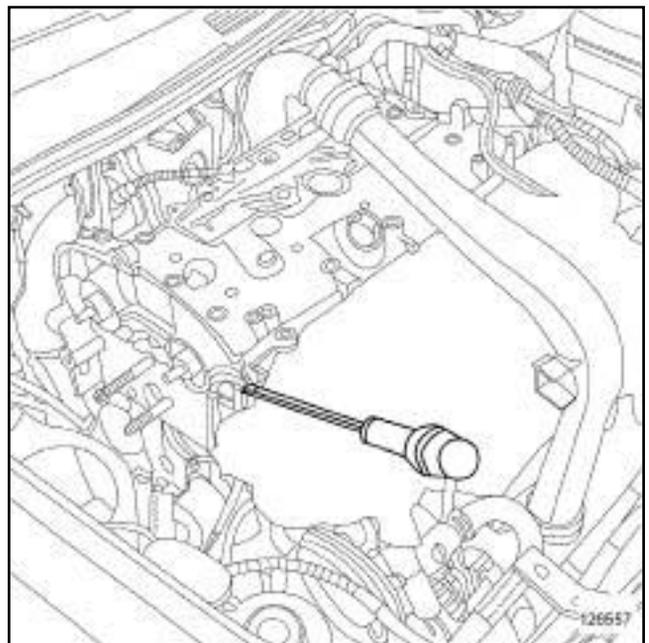
126550

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## Note:

Do not remove the rear centring device on the timing end.

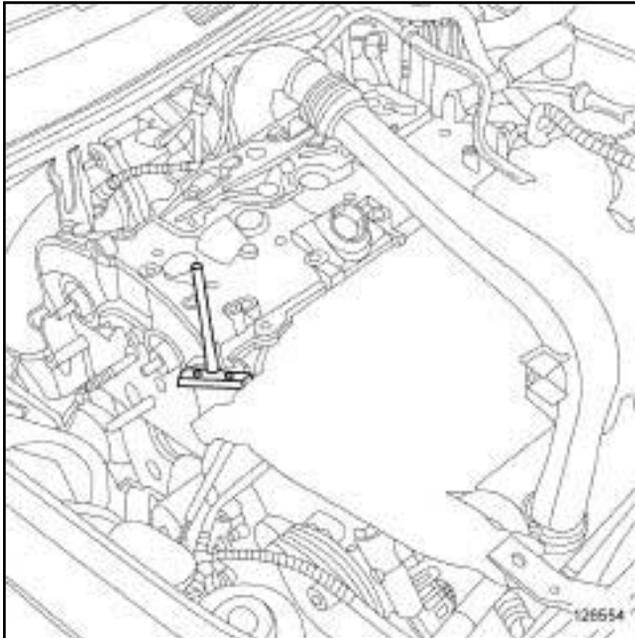
- Remove the rocker cover centring devices using a **roll pin punch** and a hammer to knock them out from above.



126557

- Place a flat screwdriver between the cylinder head and the rocker cover and carefully use it as a lever to detach the rocker cover.

X73, and DOCUMENTATION PHASE 2



126554

- Remove the rocker cover using the.
- Remove the rocker cover.

## REFITTING

### I - REFITTING PREPARATION OPERATION

- Clean the joint face using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products):
  - of the rocker cover,
  - of the cylinder head.

- Use **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) to degrease the joint faces:

- of the rocker cover,
- of the cylinder head.

#### WARNING

When cleaning parts, it is essential that the parts do not impact on each other, otherwise their mating faces may be damaged and therefore their adjustments may be altered, which could damage the engine.

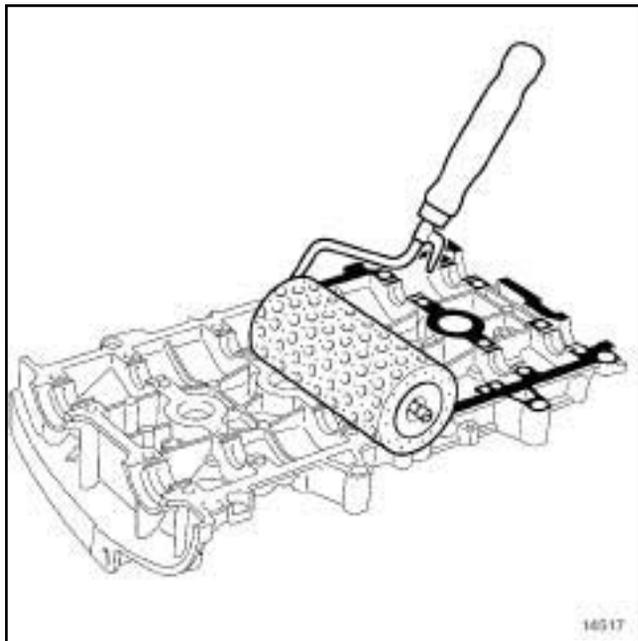
#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### WARNING

The joint faces must be clean, dry and free from grease (avoid finger marks).

X73, and DOCUMENTATION PHASE 2



14517

- Apply **RESIN ADHESIVE** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) using a stipple roller on the joint face of the rocker cover until the joint face is completely coated.

**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

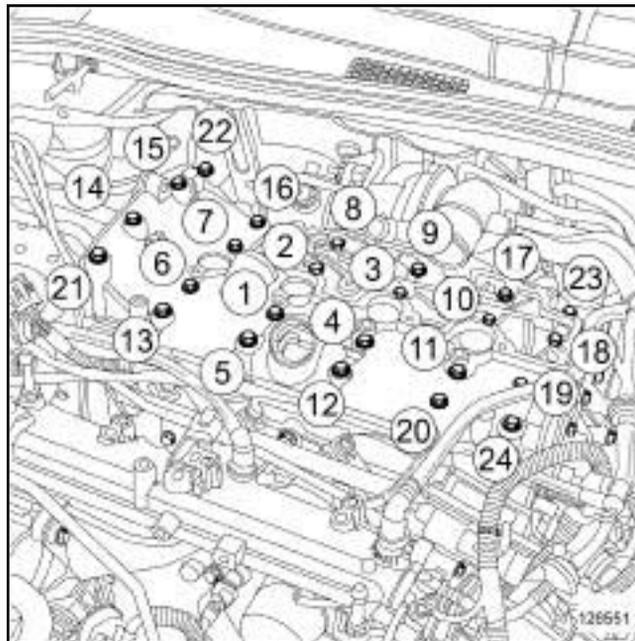
**Note:**

Use a cloth to remove any **RESIN ADHESIVE** on the rocker cover bearings.

- Refit the rocker cover centring devices using a **roll pin punch** and a hammer.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit the rocker cover.



126551

- Tighten to torque:

- rocker cover bolts (22), (23), (20) and (13) (8 Nm),
- rocker cover bolts (1) to (12), (14) to (19), (21) and (24) (12 Nm),
- rocker cover bolts (22), (23), (20) and (13) (12 Nm).

**III - FINAL OPERATION.**

- Refit the gearbox side lifting eye.
- Clip on the injector wiring on the lifting eye on the gearbox side.
- Refit the **(Mot. 1496)**.
- Remove the blanking plugs.
- Connect the fuel supply pipe union on the injector rail.
- Clip the upstream oxygen sensor connector onto the rocker cover.
- Connect the upstream oxygen sensor connector.
- Refit:
  - the seal of each camshaft on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,

## Rocker cover: Removal - Refitting

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X73, and DOCUMENTATION PHASE 2

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- the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**),
  - the engine undertray,
  - the accessories belt (see **Accessories belt: Removal - Refitting**),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the oil decanter (see **Oil decanter: Removal - Refitting**),
  - the ignition coils (see **Coils: Removal - Refitting**).
- Connect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Refit the engine cover.

## Rocker cover: Removal - Refitting

X95

Special tooling required	
<b>Mot. 1453</b>	Engine anchorage support with multiple adjustments and retaining straps.
<b>Mot. 1453-01</b>	Additional handle nut for engine lifting support tool Mot. 1453.
<b>Mot. 1390</b>	Support for removal - refitting of engine - gearbox assembly
<b>Mot. 1716</b>	Removes housing with silicone seals.

Equipment required
safety strap(s)

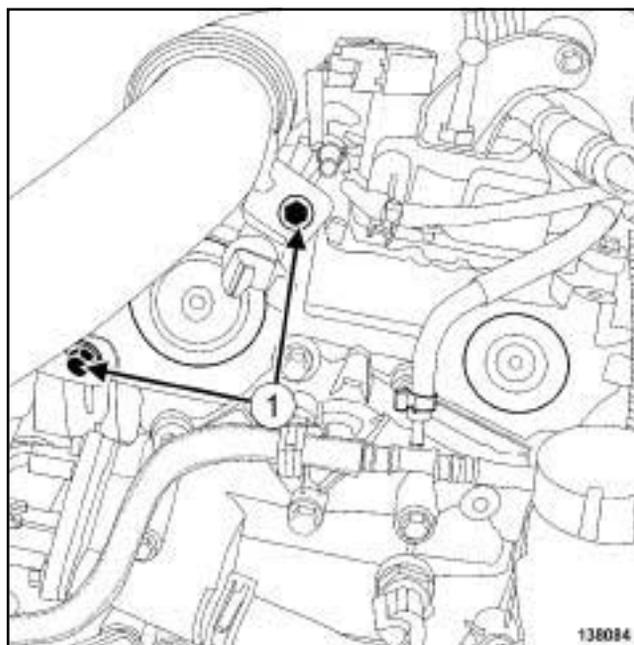
Tightening torques 	
rocker cover bolts (22), (23), (20), (13)	<b>8 N.m</b>
rocker cover bolts (1) to (12), (14) to (19), (21), (24)	<b>12 N.m</b>
rocker cover bolts (22), (23), (20), (13)	<b>12 N.m</b>
catalytic converter strut nut	<b>44 N.m</b>
catalytic converter strut bolt	<b>8 N.m</b>
clip for the intercooler air inlet pipe	<b>6 N.m</b>

### REMOVAL

#### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove:
  - the engine cover,
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),

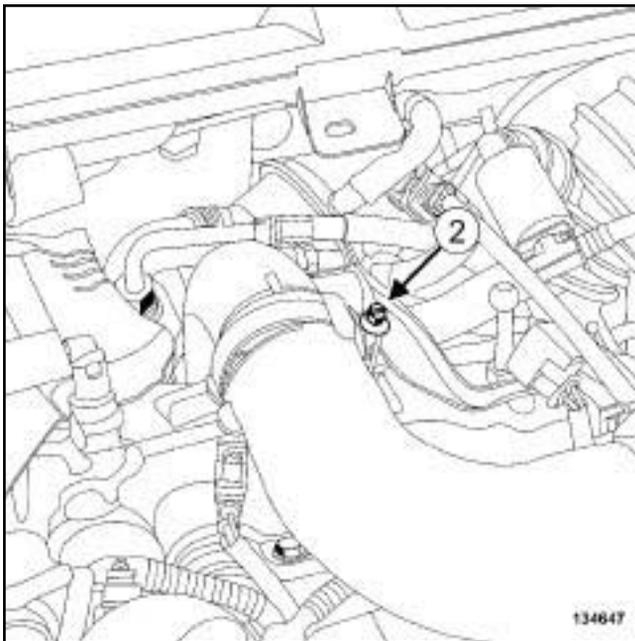
- the windscreen wiper arms (see **Scuttle panel grille: Removal - Refitting**) (85A, Wiping - Washing),
- the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
- the scoop under the scuttle panel grille (see **Scoop under the scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
- the ignition coils (see **Coils: Removal - Refitting**).



138084

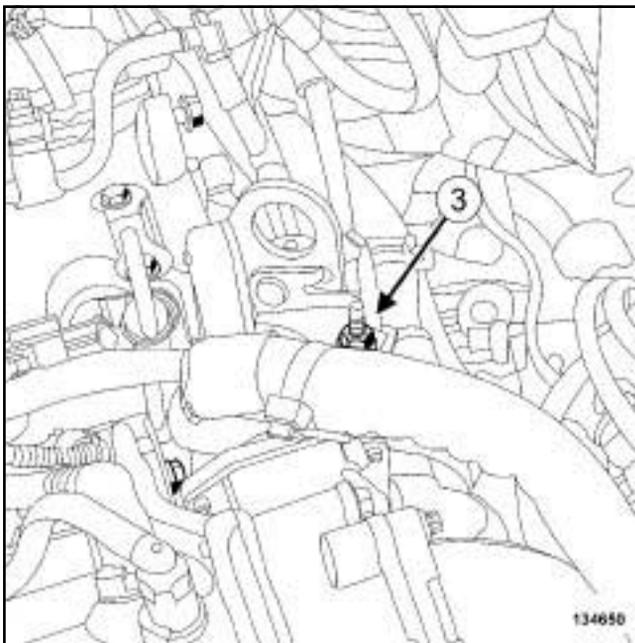
- Remove the retaining bolts (1) of the intercooler air inlet pipe.

X95



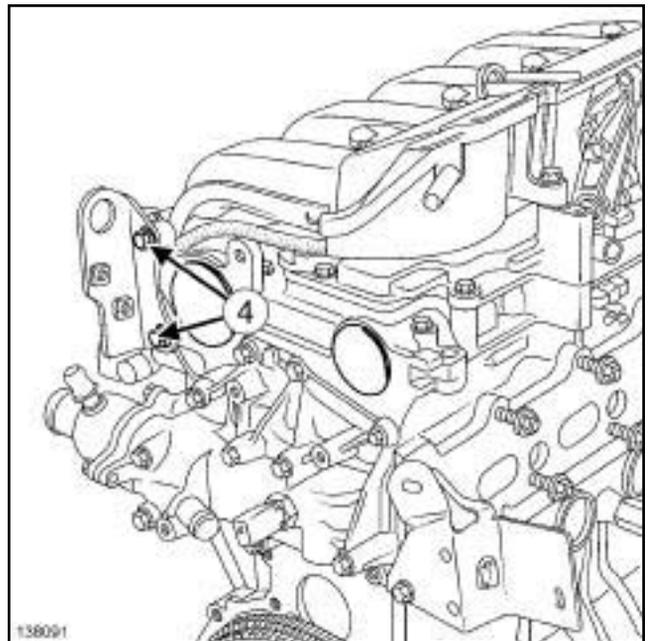
134647

- Loosen the clip (2) on the intercooler air inlet pipe.
- Disconnect the intercooler air inlet pipe.
- Remove the intercooler inlet air pipe.



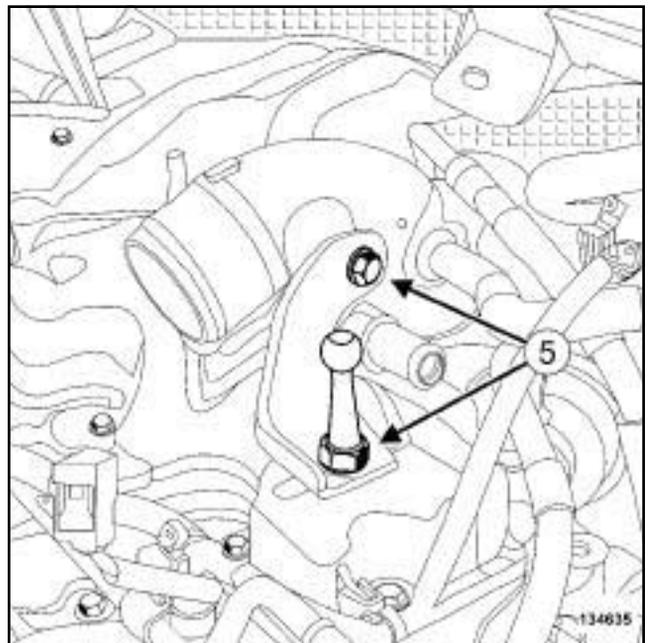
134650

- Remove the engine wiring nut (3) on the gearbox side lifting eye.



138091

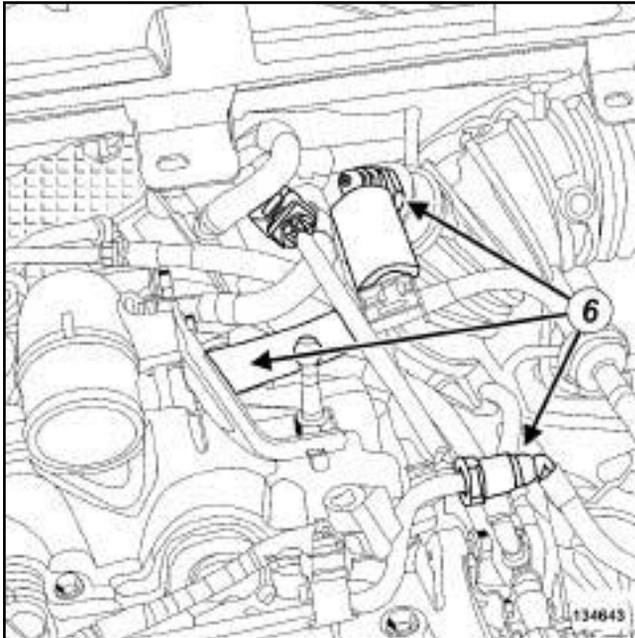
- Remove:
  - the gearbox side lifting eye bolts (4) ,
  - the gearbox side lifting eye.



134635

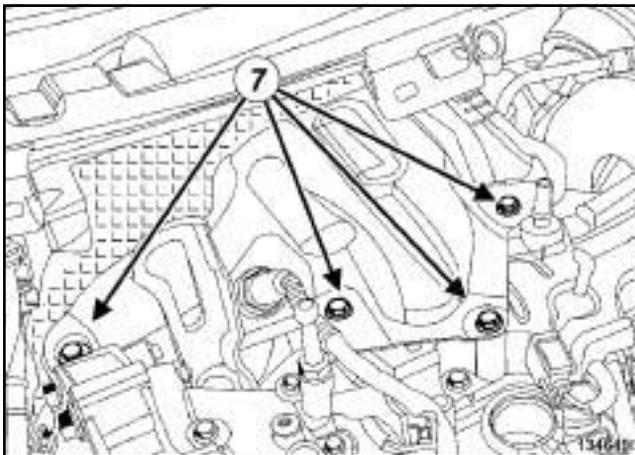
- Remove:
  - the bolts (5) of the turbocharger bracket,
  - the turbocharger bracket.

X95



134643

- Unclip the oil vapour rebreathing pipe at (6) .
- Remove the oil vapour rebreathing pipe.



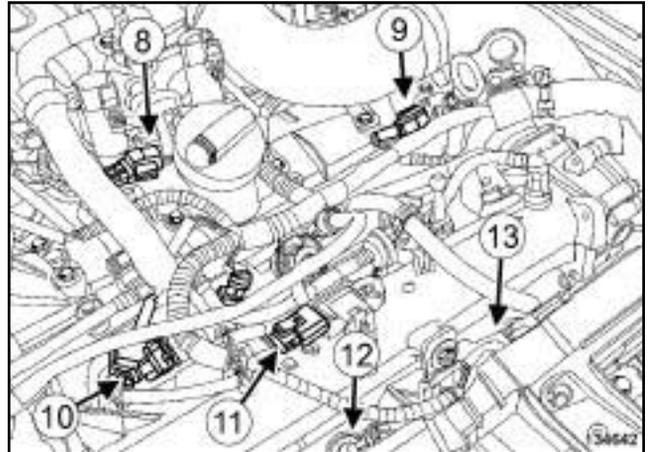
134649

- Remove:
  - the bolts (7) from the turbocharger heat shield,
  - the turbocharger heat shield.

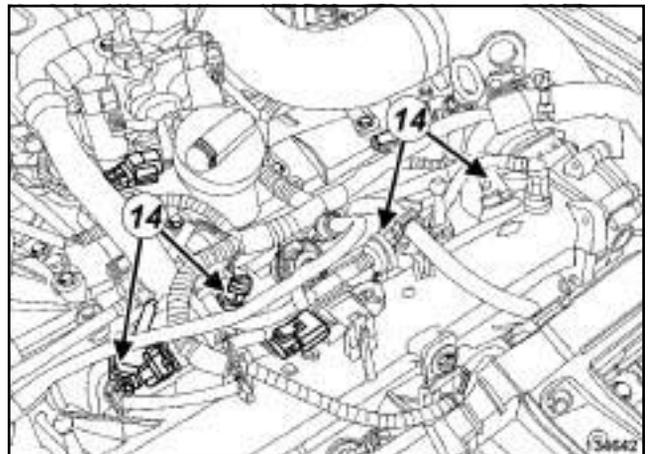
**WARNING**

To prevent the surrounding components from overheating, do not damage (tear, pierce, bend, etc.) a heat shield.

Any damaged heat shields must be replaced.



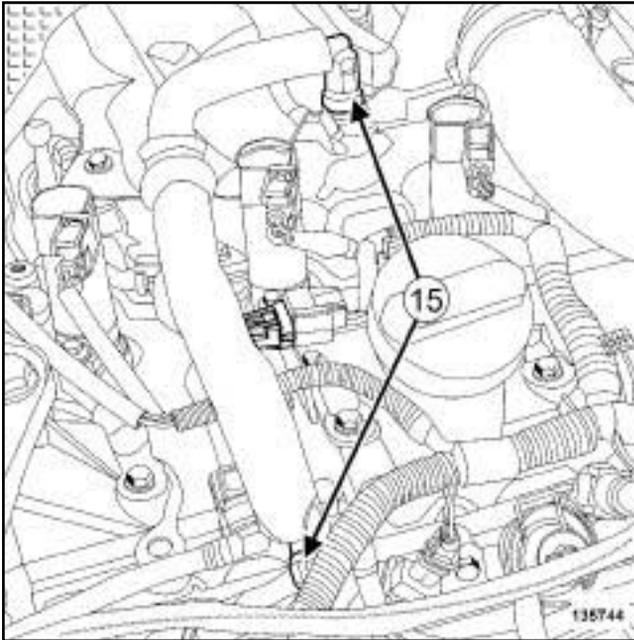
134642



134642

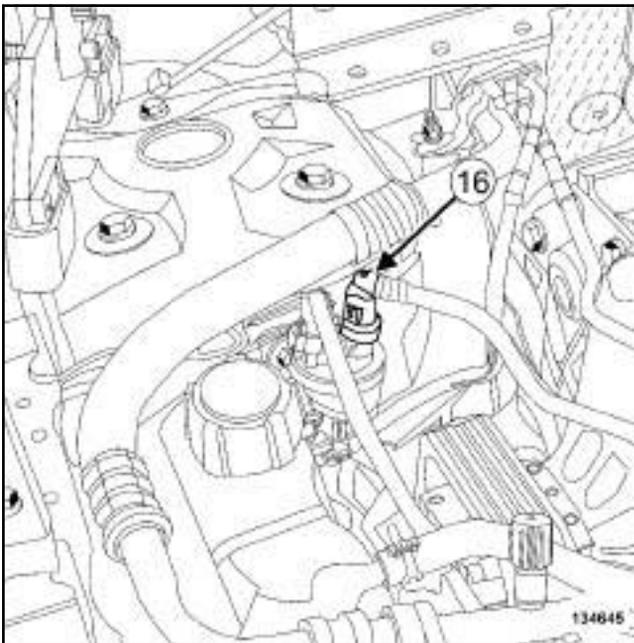
- Disconnect:
  - the upstream oxygen sensor connector (8) ,
  - the camshaft position sensor connector (9) ,
  - the oil vapour recirculation solenoid valve connector (10) ,
  - the air pressure sensor connector on the inlet manifold (11) ,
  - the air temperature sensor connector on the inter-cooler air outlet pipe (12) ,
  - the air pressure sensor connector on the intercooler air outlet pipe (13) ,
  - the petrol injector connectors (14) .
- Move aside the engine wiring.

X95



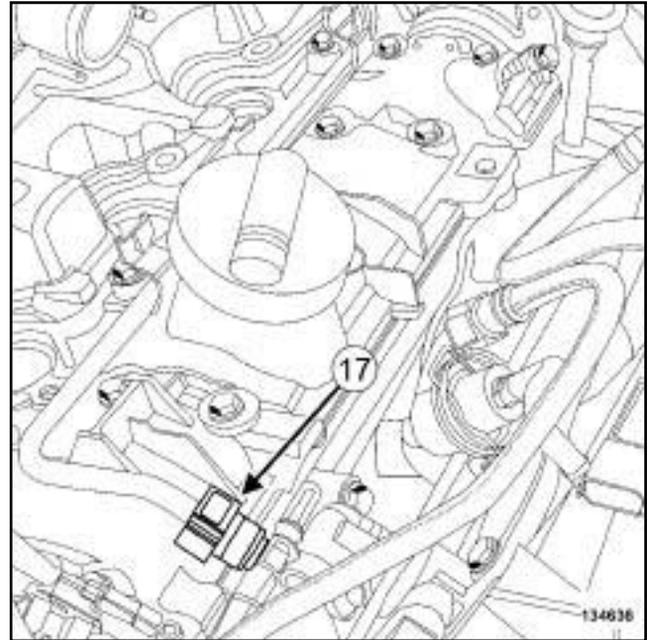
135744

- Disconnect the oil vapour rebreathing pipe at (15) .
- Remove the oil vapour rebreathing pipe.



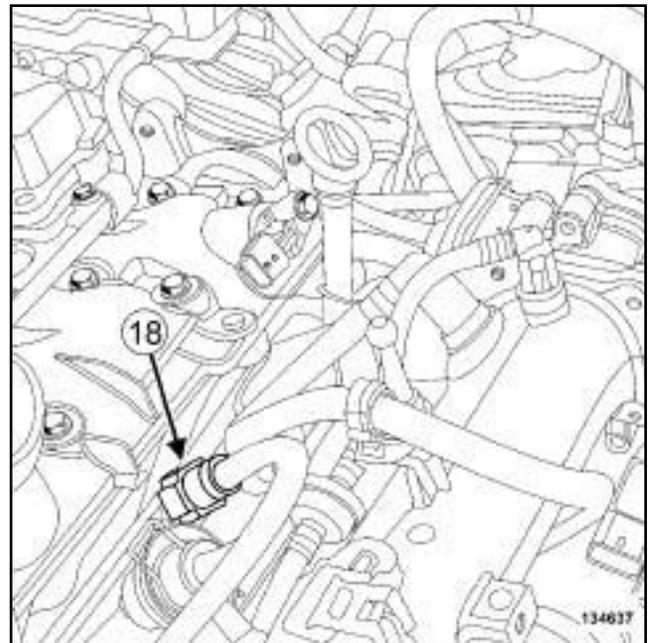
134645

- Disconnect the petrol vapour rebreathing pipe at (16) .



134636

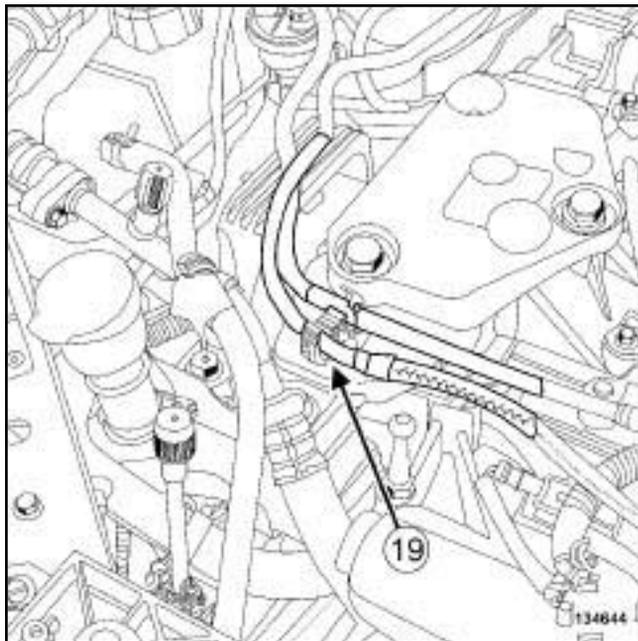
- Disconnect the petrol vapour rebreathing pipe at (17) .
- Remove the petrol vapour rebreathing pipe.



134637

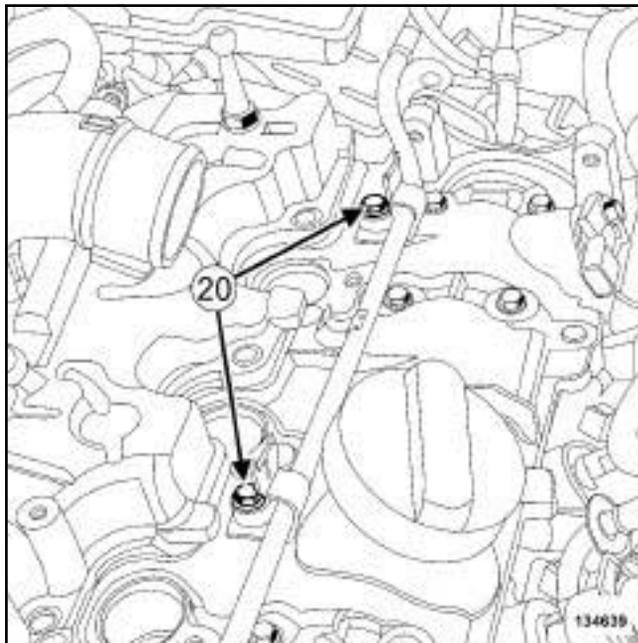
- Disconnect the fuel supply pipe at (18) .

X95



134644

- Unclip the fuel supply pipe at (19) .
- Move aside the fuel supply pipe.



134639

- Remove:
  - the bolts (20) of the oil vapour rebreathing rigid pipe,
  - the oil vapour rebreathing rigid pipe,
  - the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front section of the front wheel arch liners (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),

- the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),

- the radiator mounting cross member (see **Radiator mounting cross member: Removal - Refitting**) (31A, Front axle components),

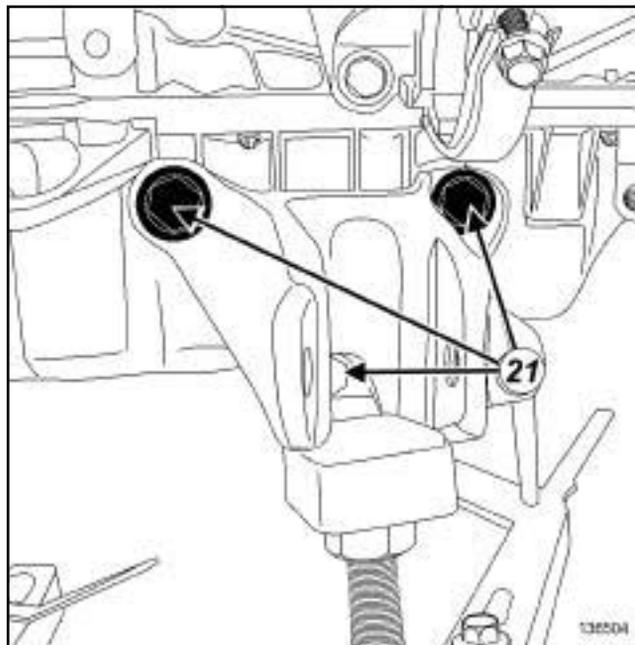
- Drain the manual gearbox (see **Manual gearbox oils: Draining - Filling**) (21A, Manual gearbox).

- Remove:

- the front right-hand driveshaft (see **Front right-hand driveshaft: Removal - Refitting**) (29A, Driveshafts),

- the right-hand differential output seal (see **Differential output seal: Removal - Refitting**) (21A, Manual gearbox),

- the lower engine tie-bar (see **Lower engine tie-bar: Removal - Refitting**) .



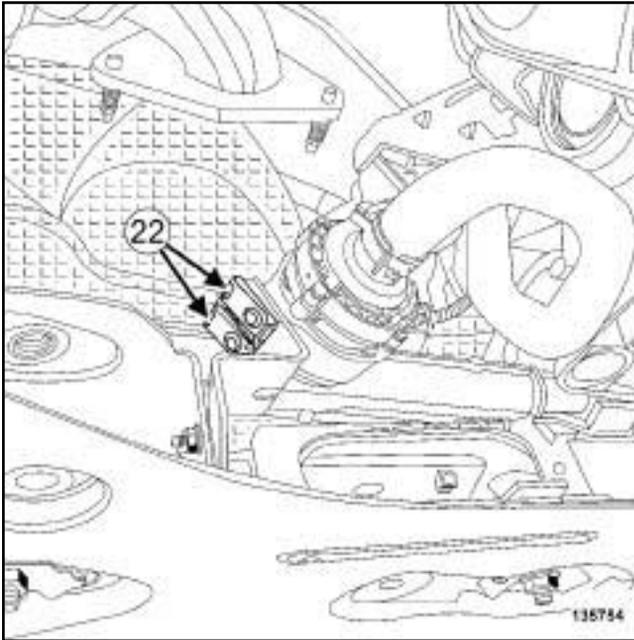
136504

- Remove:

- the lower engine tie-bar support bolts (21) on the sump,

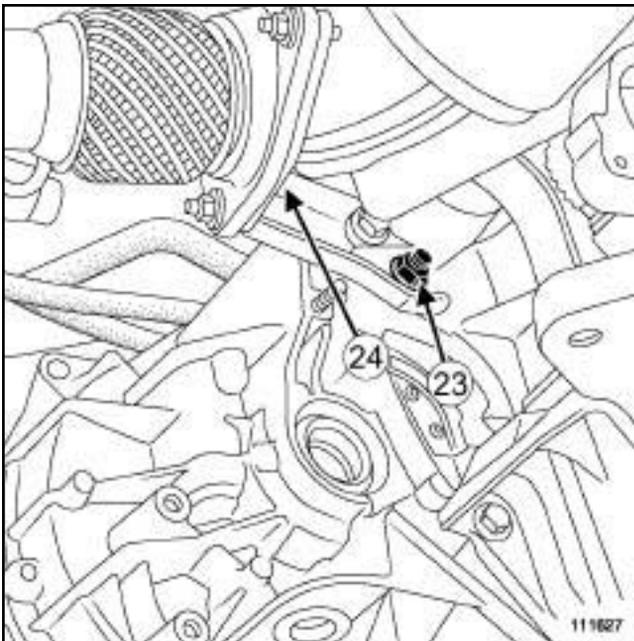
- the lower engine tie-bar support on the sump.

X95



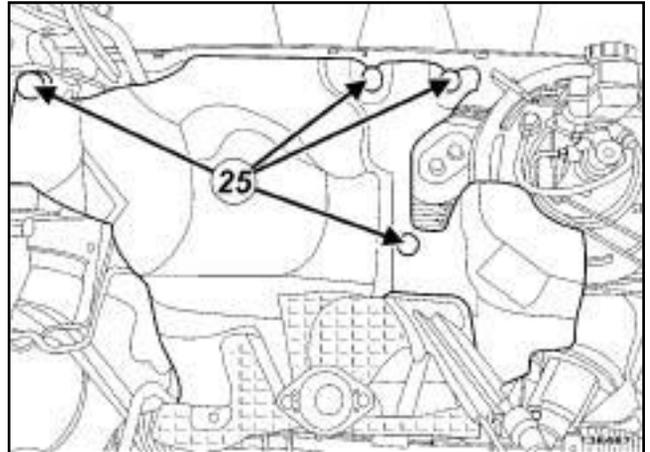
135754

- Remove the clips (22) from the electric coolant pump.
- Move aside the electric water pump.



111627

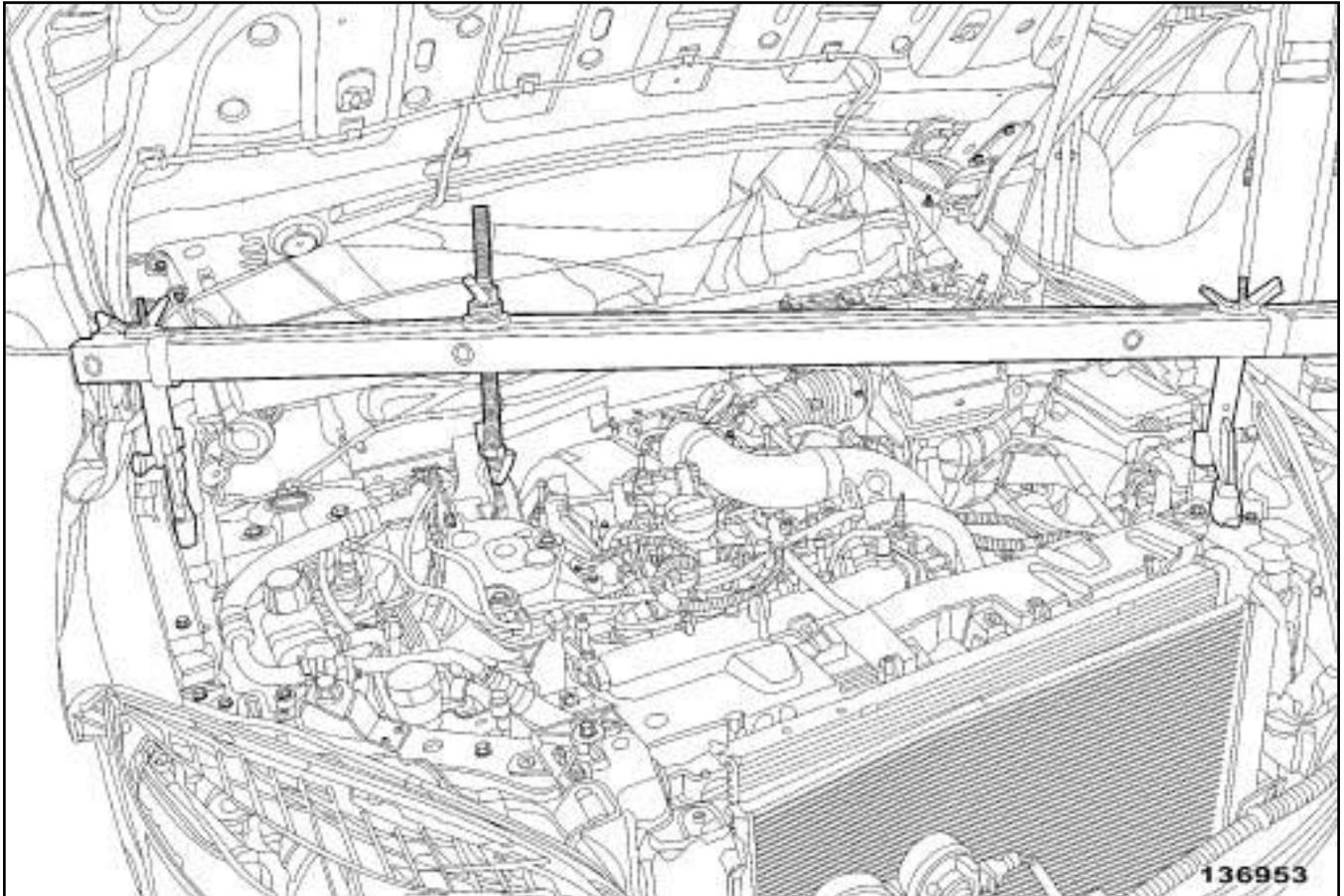
- Remove:
  - the nut (23) and the bolt (24) from the catalytic converter strut,
  - the catalytic converter strut,
  - the connecting hose (see **Connecting hose: Removal - Refitting**).



136467

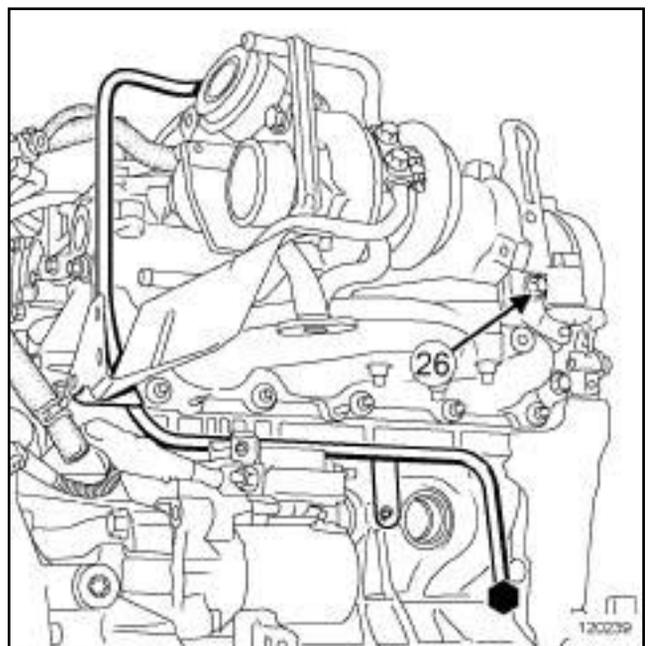
- Remove:
  - the bolts (25) from the upper heat shield,
  - the upper heat shield,
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**),
  - the turbocharger (see **Turbocharger: Removal - Refitting**),
  - the accessories belt (see **Accessories belt: Removal - Refitting**).

X95



136953

- Fit the **(Mot. 1453)** equipped with **(Mot. 1453-01)** and a **safety strap(s)**.
- Remove:
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**),
  - the timing belt (see **Timing belt: Removal - Refitting**).
- Position the **(Mot. 1390)**.
- Remove the tool **(Mot. 1453)** equipped with the tool **(Mot. 1453-01)** and the **safety strap(s)**.



120239

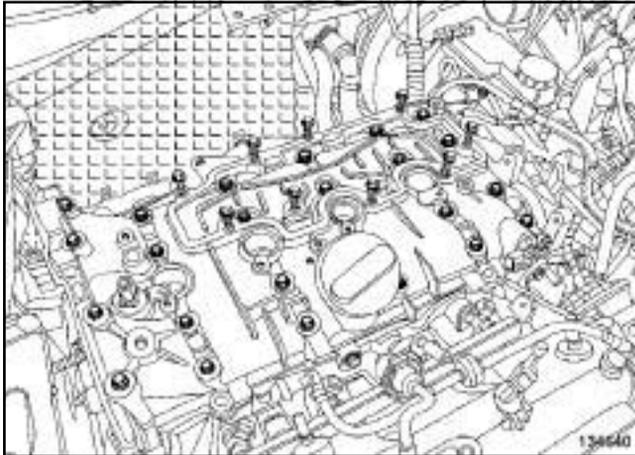
- Remove:
  - the timing end lifting eye bolt **(26)**,
  - the lifting eye on the timing end,

## Rocker cover: Removal - Refitting

X95

- the oil separator (see **Oil decanter: Removal - Refitting**).

### II - OPERATION FOR REMOVAL OF PART CONCERNED



134640

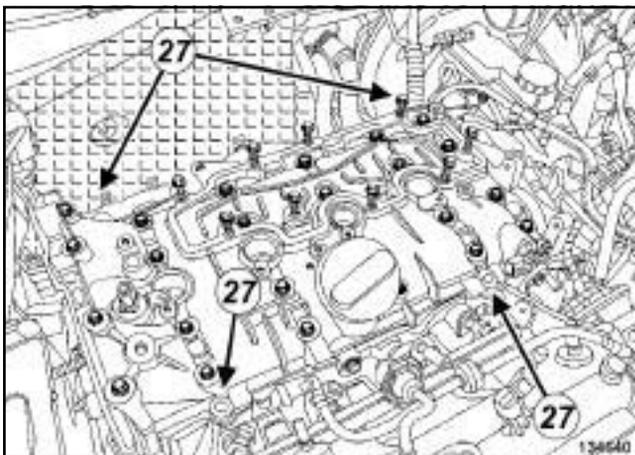
□

Note:

The rocker cover bolts are not the same length; mark their positions.

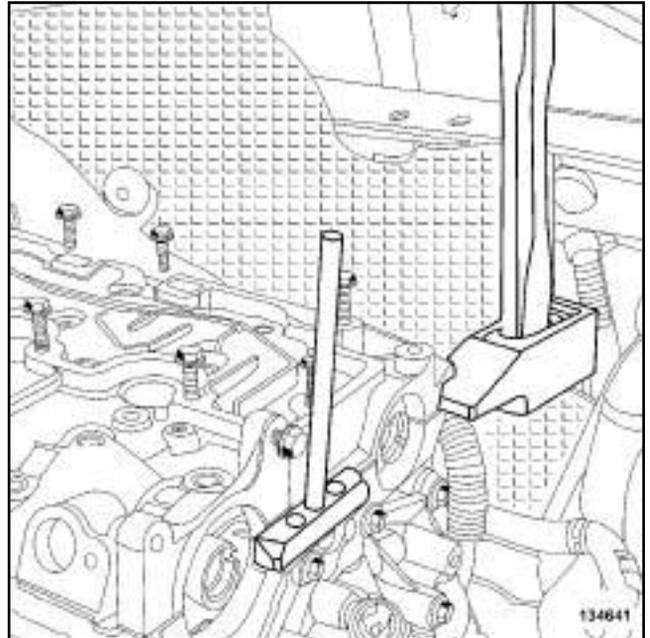
□ Remove:

- the rocker cover bolts,
- the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**).



134640

□ Remove the centring devices (27) using a hammer and a roll pin punch to knock them out from above.



134641

- Detach the rocker cover using a hammer as a lever and detach it using the tool (**Mot. 1716**).
- Remove the rocker cover.

### REFITTING

#### I - REFITTING PREPARATION OPERATION

□ Clean and degrease using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products):

- the rocker cover joint face if it is to be re-used,
- the cylinder head joint face.

#### WARNING

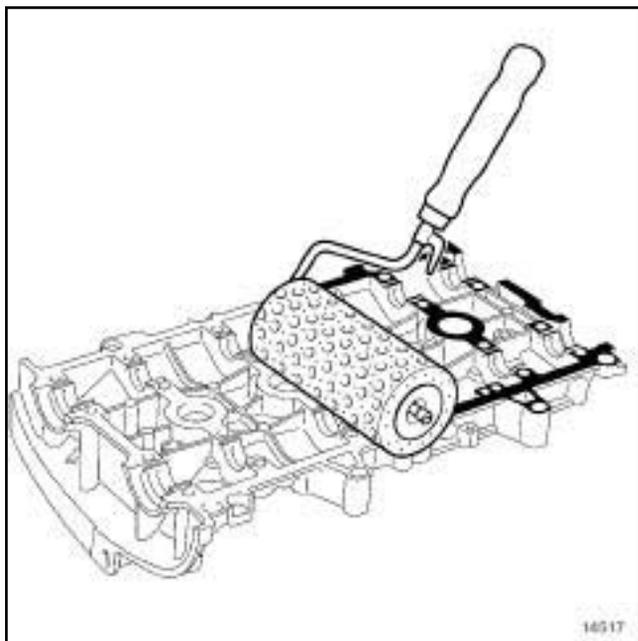
Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

□ **parts always to be replaced: seal between catalytic converter and exhaust downpipe hose.**

X95



14517

□

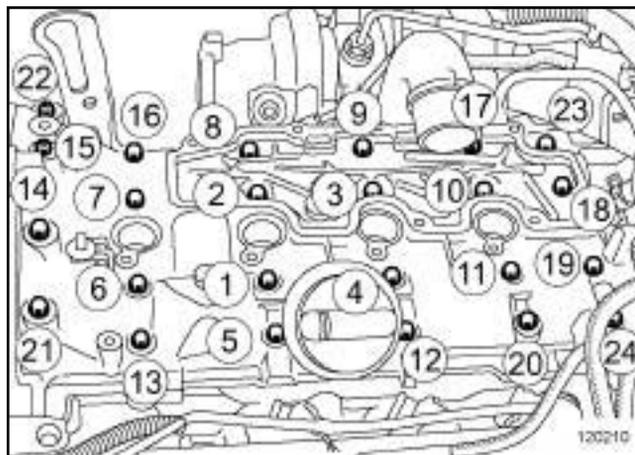
**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).

- Apply **RESIN ADHESIVE** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) using a stipple roller on the joint face of the rocker cover until the joint face is completely coated.
- Use a cloth to remove any **RESIN ADHESIVE** on the rocker cover bearings.
- Refit the centring devices of the rocker cover using a roll pin punch and a hammer.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit the rocker cover.
- Fit without tightening the rocker cover bolts.



120210

- Tighten to torque and in order:
  - the **rocker cover bolts** (22), (23), (20), (13) (8 N.m),
  - the **rocker cover bolts** (1) to (12), (14) to (19), (21), (24) (12 N.m),
  - the **rocker cover bolts** (22), (23), (20), (13) (12 N.m).

**III - FINAL OPERATION**

- Refit:
  - new camshaft timing end seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the oil separator (see **Oil decanter: Removal - Refitting**) ,
  - the lifting eye on the timing end.
- Fit the tool (**Mot. 1453**) equipped with the tool (**Mot. 1453-01**) and the **safety strap(s)**.
- Remove the (**Mot. 1390**).
- Refit:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the turbocharger (see **Turbocharger: Removal - Refitting**) ,
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
  - the upper heat shield,

## Rocker cover: Removal - Refitting

X95

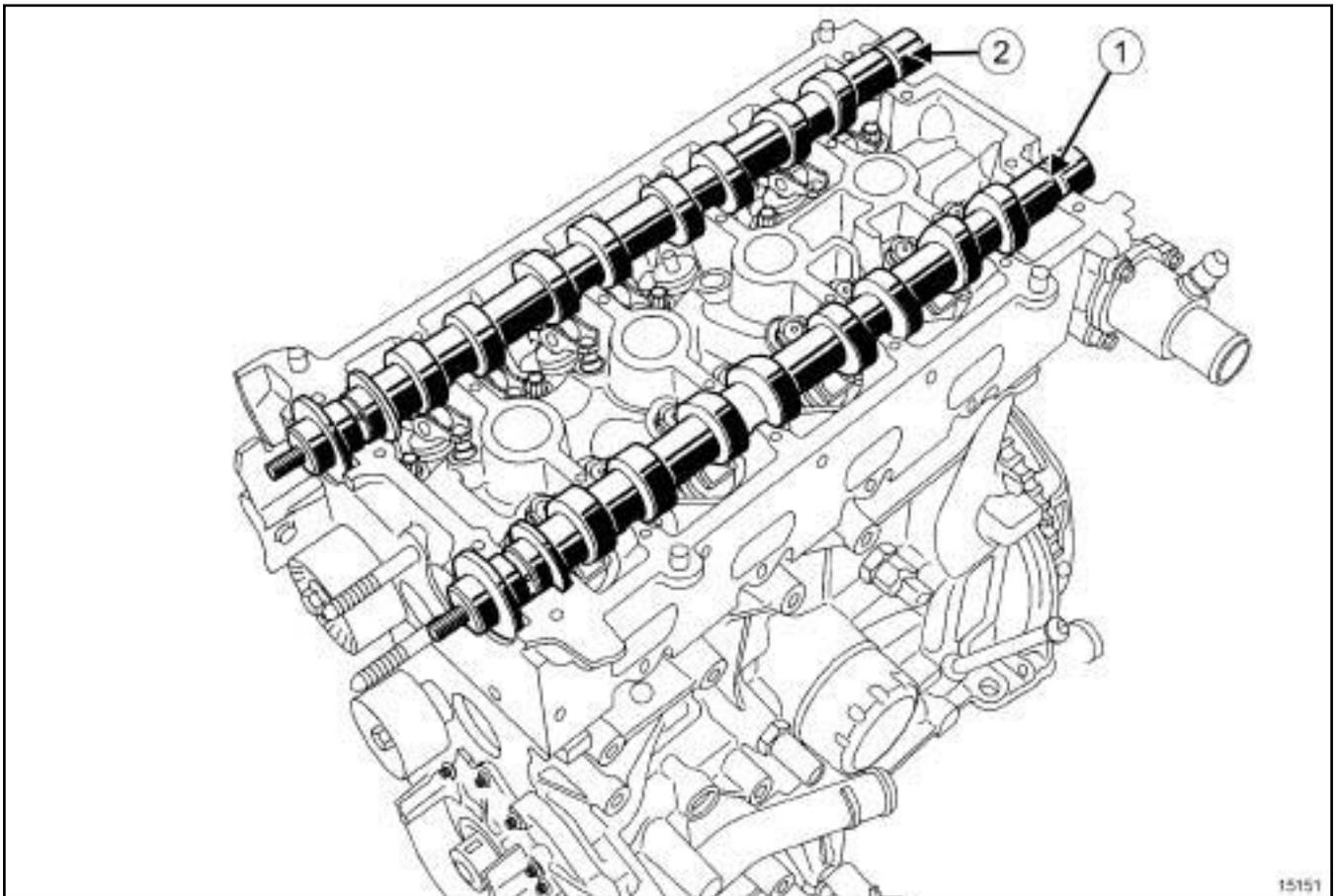
- the connecting hose (see **Connecting hose: Removal - Refitting**),
- the catalytic converter strut,
- Tighten to torque:
  - the **catalytic converter strut nut (44 N.m)**,
  - the **catalytic converter strut bolt (8 N.m)**.
- Fit the electric coolant pump.
- Refit:
  - the electric coolant pump clips,
  - the lower engine tie-bar support on the sump,
  - the lower engine tie-bar (see **Lower engine tie-bar: Removal - Refitting**),
  - a right-hand differential output seal (see **Differential output seal: Removal - Refitting**) (21A, Manual gearbox),
  - the front right-hand wheel driveshaft (see **Front right-hand driveshaft: Removal - Refitting**) (29A, Driveshafts),
- Fill the manual gearbox (see **Manual gearbox oils: Draining - Filling**) (21A, Manual gearbox).
- Refit:
  - the radiator mounting cross member (see **Radiator mounting cross member: Removal - Refitting**) (31A, Front axle components),
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the front section of the front wheel arch liners (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the oil vapour rebreathing rigid pipe,
- Connect the fuel supply pipe.
- Clip on the fuel supply pipe.
- Refit the fuel vapour rebreathing pipes.
- Connect the fuel vapour rebreathing pipes.
- Fit the wiring on the engine.
- Connect:
  - the petrol injector connectors,
  - the air pressure sensor connector on the intercooler air outlet pipe,
  - the air temperature sensor connector on the intercooler air outlet pipe,
- the air pressure sensor connector on the inlet manifold,
- the oil vapour recirculation solenoid valve connector,
- the camshaft position sensor connector,
- the upstream oxygen sensor connector.
- Refit:
  - the turbocharger heat shield,
  - the oil vapour rebreathing pipe.
- Clip on the oil vapour rebreathing pipe.
- Refit:
  - the turbocharger bracket,
  - the gearbox side lifting eye,
  - the engine wiring nut onto the lifting eye.
- Connect the intercooler air inlet pipe.
- Torque tighten the **clip for the intercooler air inlet pipe (6 N.m)**.
- Refit:
  - the retaining bolts of the intercooler air inlet pipe,
  - the ignition coils (see **Coils: Removal - Refitting**),
  - the scoop under the scuttle panel grille (see **Scoop under the scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the windscreen wiper arms (see **Windscreen wiper arm: Removal - Refitting**) (85A, Wiping - Washing),
  - the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the engine cover.

X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2

**REMOVAL****I - REMOVAL PREPARATION OPERATION**

- Position the vehicle on a two-post lift ( (see ) ).
- Remove:
  - the engine covers,
  - the engine undertray.
- Disconnect the battery ( (see **Battery: Removal - Refitting**) ).

- Remove:
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**) .
- Remove the camshaft seals.

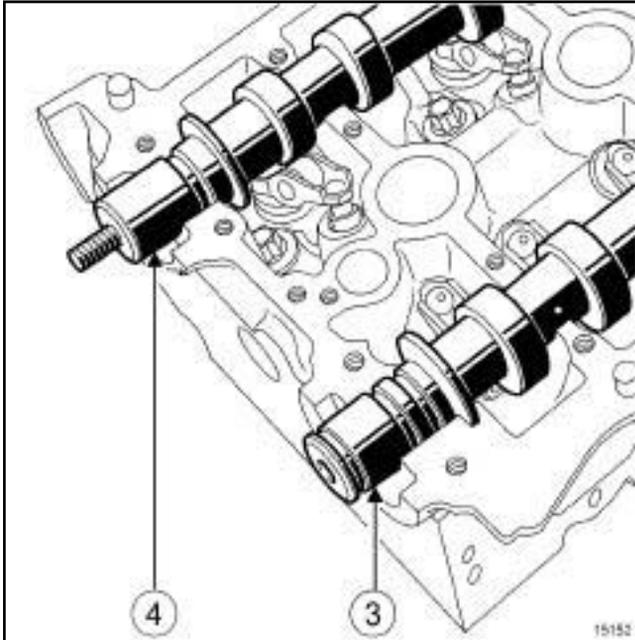
**II - OPERATION FOR REMOVAL OF PART CONCERNED**

15151

15151

- Remove the inlet camshaft (1) and exhaust camshaft (2) .

X74, and F4R, and 714 or 715, and DOCUMENTATION PHASE 2

**REFITTING****I - REFITTING PREPARATION OPERATION**

15152

- The camshafts are identified by the pulley mountings.

Detailed view of the pulley mountings:

- (3) : inlet camshaft,
- (4) : exhaust camshaft.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit the camshafts, oiling the bearings.

**III - FINAL OPERATION**

- Refit:
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**),
  - the timing belt (see **Timing belt: Removal - Refitting**),
  - the accessories belt (see **Accessories belt: Removal - Refitting**).
- Connect the battery ( (see **Battery: Removal - Refitting** ) ).
- Refit:
  - the engine covers,
  - the engine undertray.

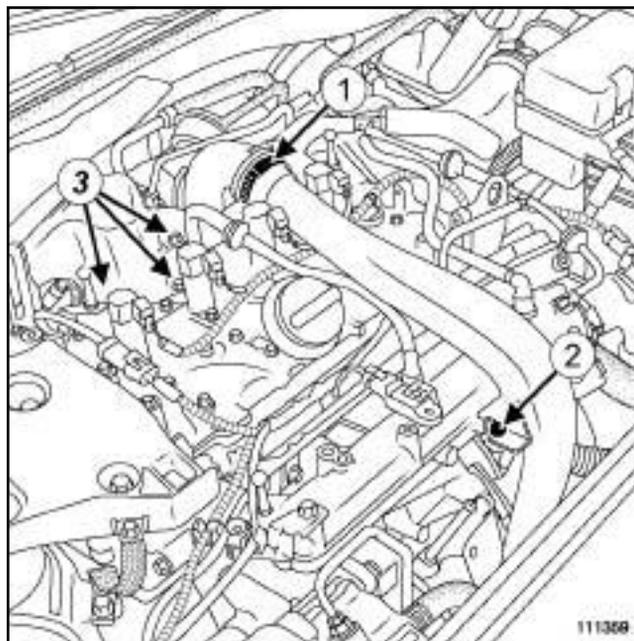
X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2

Tightening torques 	
rocker cover mounting bolts 22, 23, 20, 13	<b>8 Nm</b>
rocker cover mounting bolts 1 to 12, 14 to 19 and 21 to 24	<b>12 Nm</b>
rocker cover mounting bolts 22, 23, 20 and 13	<b>12 Nm</b>
new or original oil separator mounting bolts (into a tapped hole)	<b>10 Nm</b>
new oil separator mounting bolts (in non-tapped holes)	<b>15 Nm</b>
plugs	<b>25 to 30 Nm</b>
coils (if holes already tapped)	<b>12 Nm</b>
coils (if holes not tapped)	<b>15 Nm</b>

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

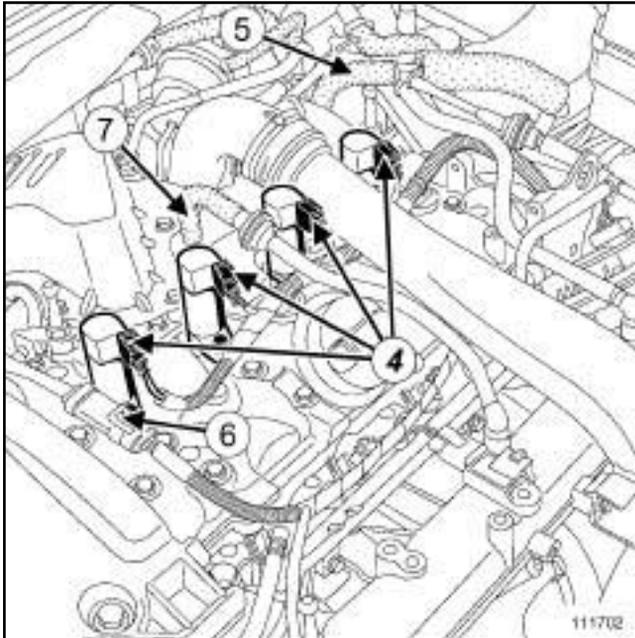
- Position the vehicle on a two-post lift ( (see ) ).
- Disconnect the battery ( (see **Battery: Removal - Refitting**) ).
- Remove the timing belt (see **Timing belt: Removal - Refitting**) .



111359

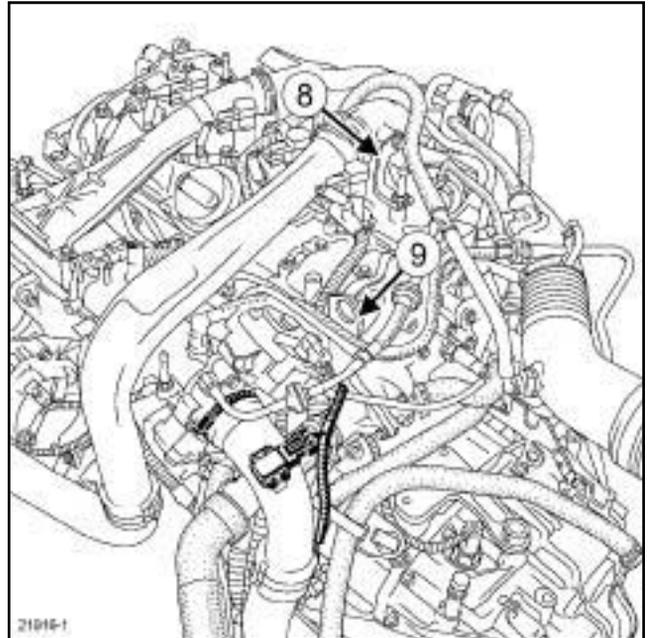
- Remove:
  - the air inlet hose upper mounting clip (1) ,
  - the air inlet hose mounting bolt (2) ,
  - the air inlet hose lower mounting clip,
  - the air inlet hose.
- Remove:
  - the heat shield mounting bolts (3) ,
  - the heat shield.

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2



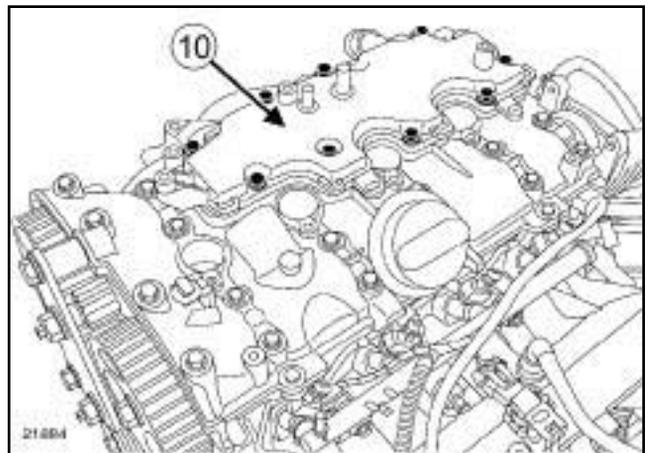
111702

- Disconnect:
  - the ignition coil connectors (4) ,
  - the oil vapour recirculation pipe (5) ,
  - the upstream oxygen sensor connector (6) ,
  - the oil separator oil vapour recirculation hose (7) .
- Unclip the wiring harness clip and move the wiring harness from the ignition coil connectors.
- Remove the ignition coils.
- Remove the plugs.



21916-1

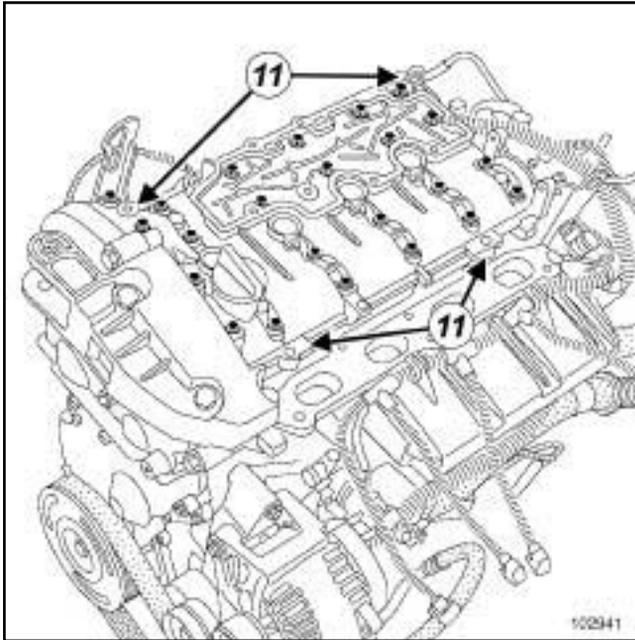
- Remove:
  - the bracket (8) ,
  - the flywheel end engine lifting bracket (9) .



21884

- Remove:
  - the oil separator mounting bolts,
  - the oil separator (10) .

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2



102941

- Remove the rocker cover bolts.
- Remove the rocker cover vertically, tapping the lugs (11) with a copper hammer.

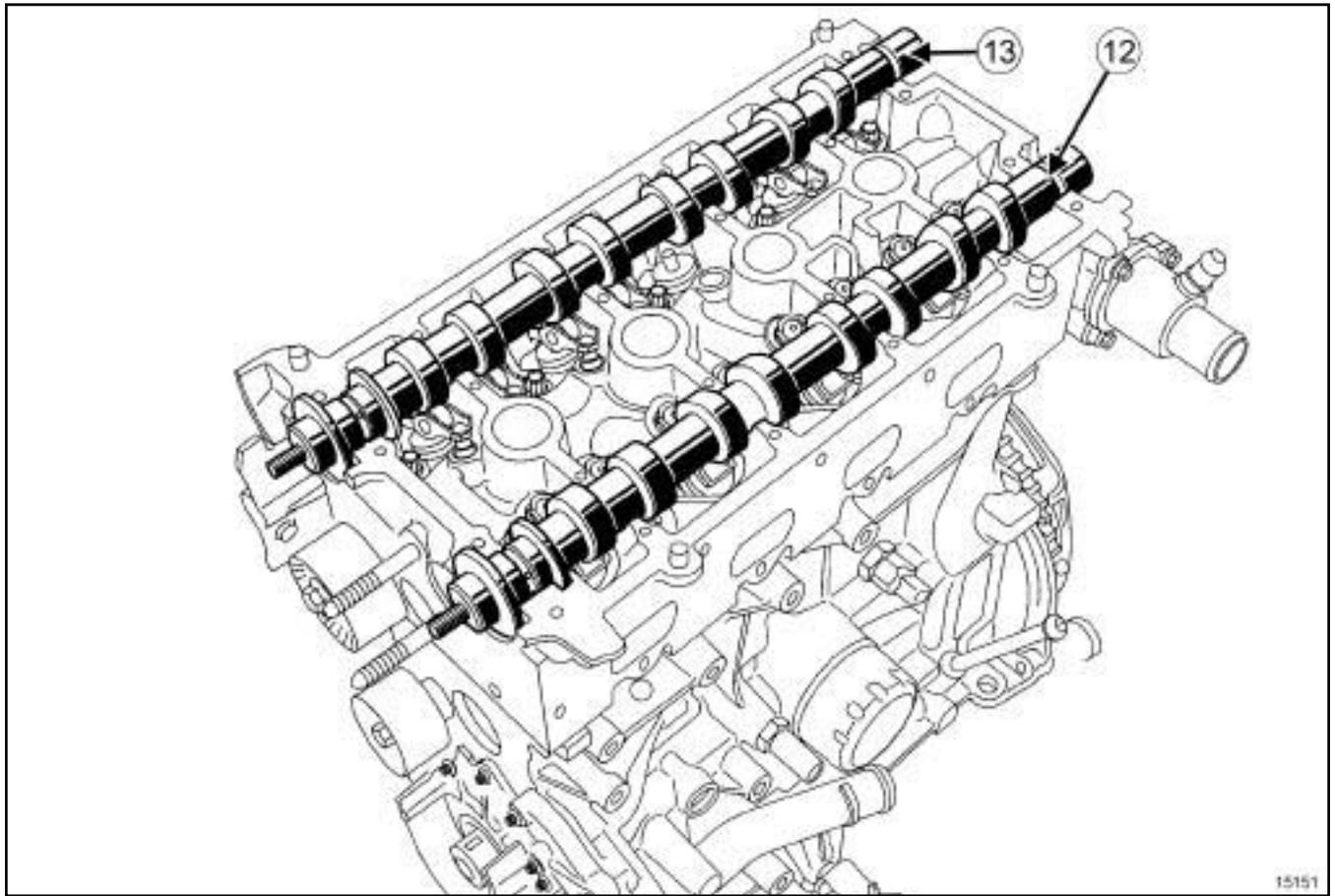
### **WARNING**

Do not damage the aluminium surfaces.

- Remove the camshaft seals.

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2

### II - OPERATION FOR REMOVAL OF PART CONCERNED



15151

15151

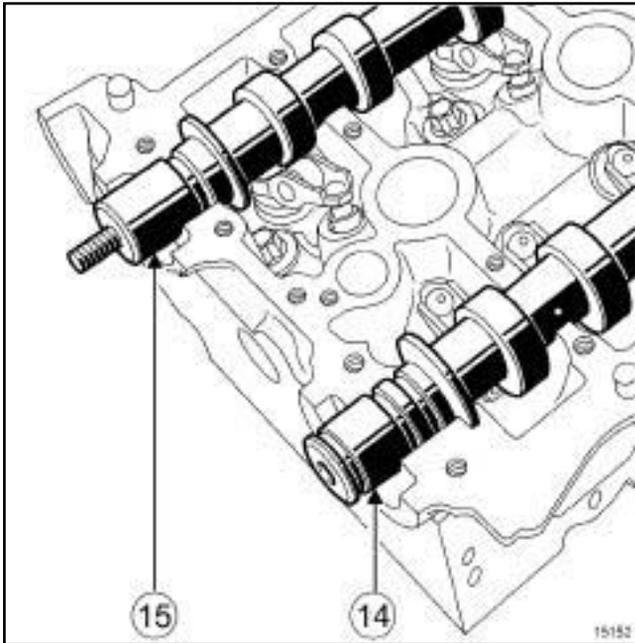
- ❑ Remove the inlet camshaft (12) and exhaust camshaft (13) .

## Camshaft: Removal - Refitting

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2

## REFITTING

## I - REFITTING PREPARATION OPERATION



15152

- The camshafts are identified by the pulley mountings.

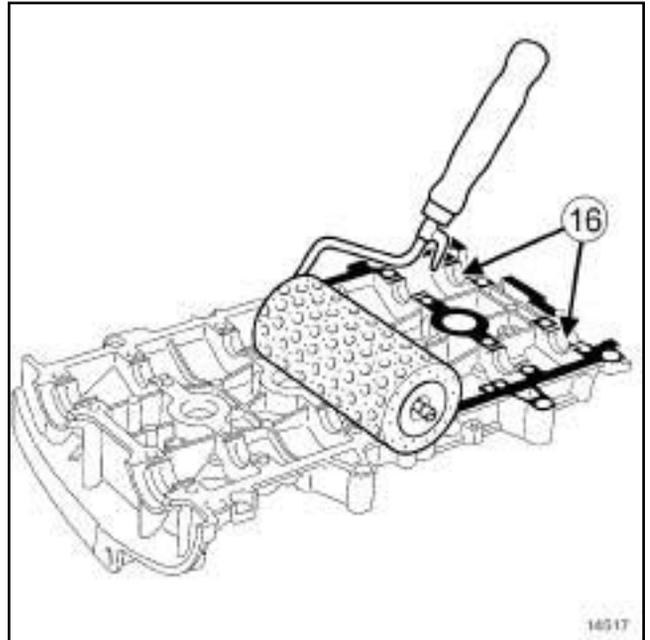
Detailed view of the pulley mountings:

- (14) : inlet camshaft,
- (15) : exhaust camshaft.

## II - REFITTING OPERATION FOR PART CONCERNED

- Refit the camshafts, oiling the bearings.

## III - FINAL OPERATION



14517

- 

Note:

The seal faces must be clean, dry and free from grease (avoid finger marks).

Note:

Applying excess sealant could cause it to be squeezed out when parts are tightened. The product-fluid mix may cause damage to some components (engine, radiator, etc.).

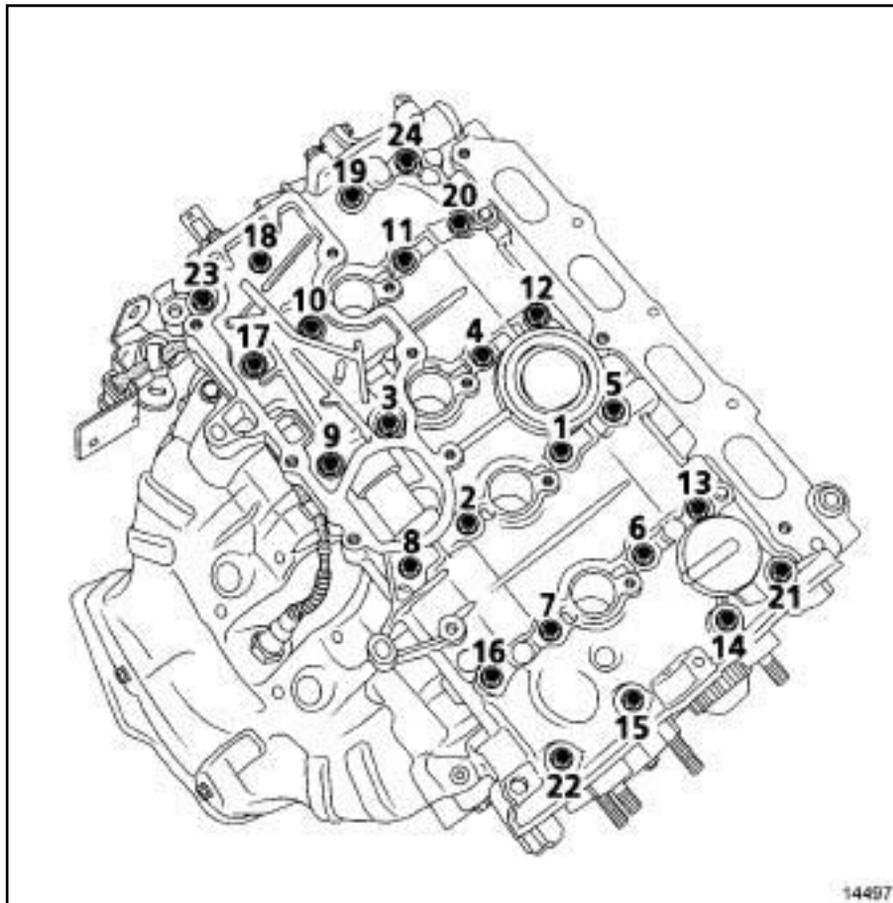
- Using a stipple roller, apply **LOCTITE 518** to the camshaft rocker cover seal face until the seal face is reddish in colour.

Note:

Using a cloth, remove any **LOCTITE 518** from the camshaft rocker cover bearings (16) .

- Refit the rocker cover.

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2

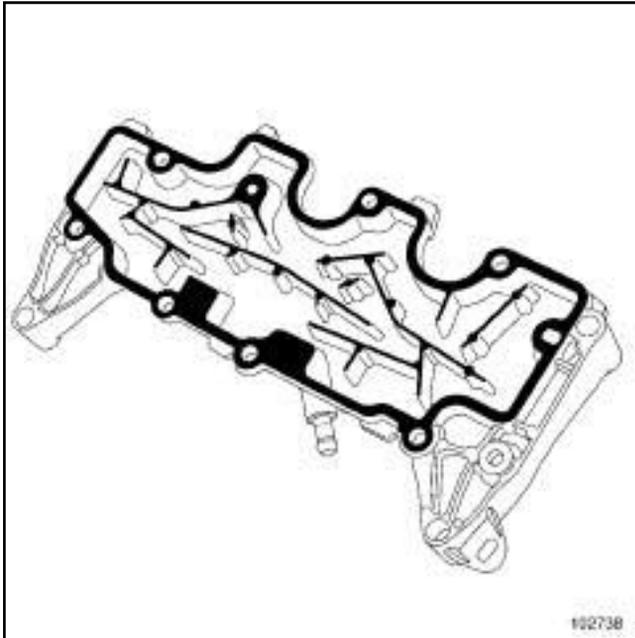


14497

14497

- Tighten to torque and in order:
  - the **rocker cover mounting bolts 22, 23, 20, 13 (8 Nm)**,
  - the **rocker cover mounting bolts 1 to 12, 14 to 19 and 21 to 24 (12 Nm)**.
- Loosen in order bolts 22, 23, 20 and 13.
- Tighten to torque and in order **rocker cover mounting bolts 22, 23, 20 and 13 (12 Nm)**.

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2



102738



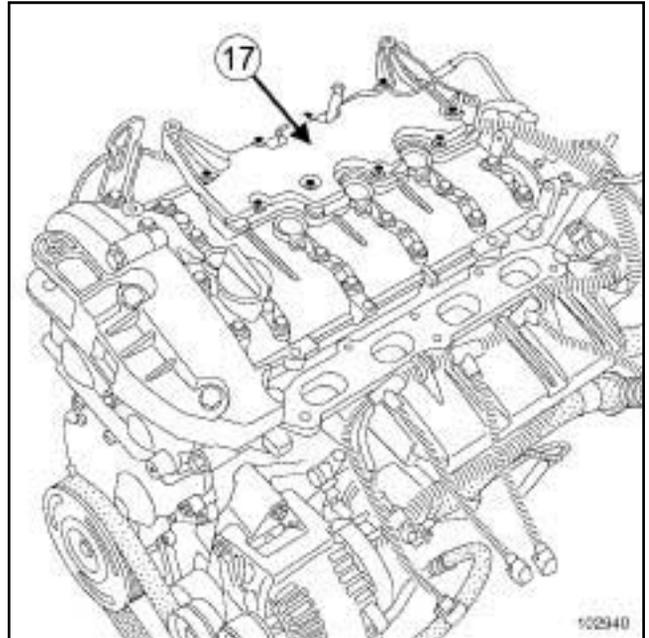
## Note:

The seal faces must be clean, dry and free from grease (avoid finger marks).

## Note:

Applying excess sealant could cause it to be squeezed out when parts are tightened. The product-fluid mix may cause damage to some components (engine, radiator, etc.).

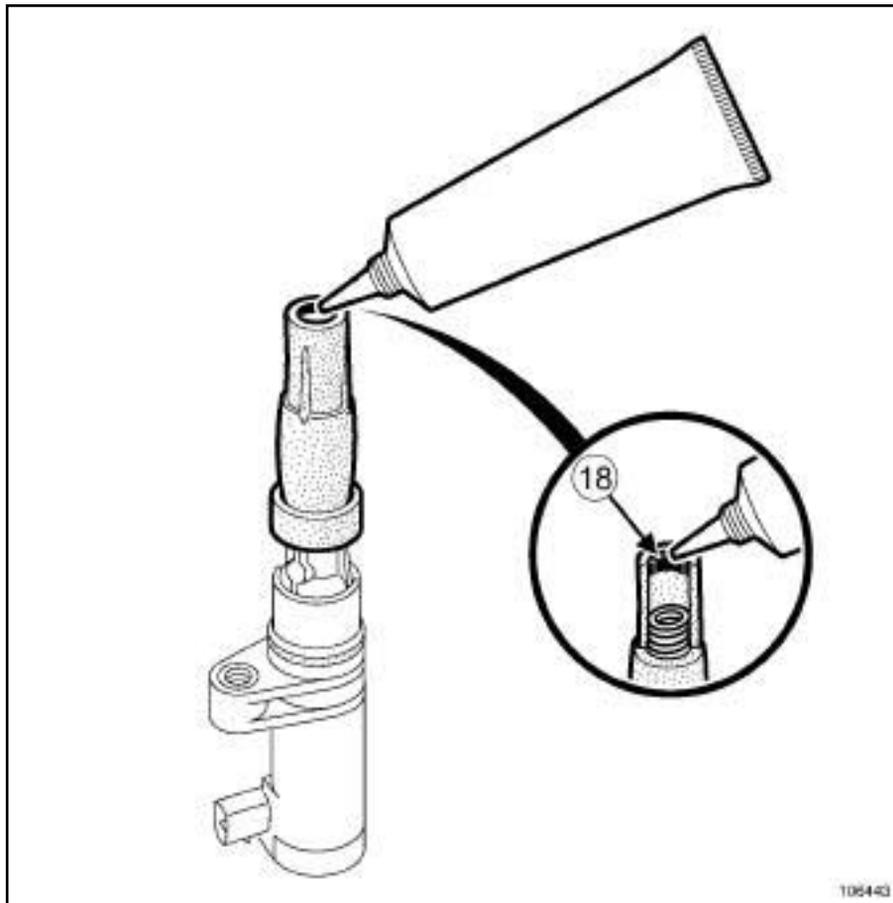
- Using a stipple roller, apply **LOCTITE 518** to the oil separator seal face until it is a reddish colour.



102940

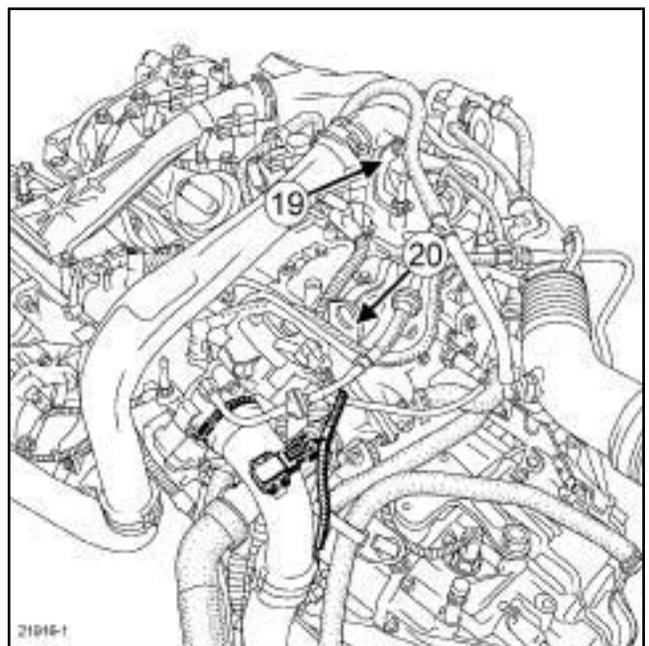
- Refit the oil separator (17) .
- Tighten to torque and in order:
  - the **new or original oil separator mounting bolts (into a tapped hole) (10 Nm)**,
  - the **new oil separator mounting bolts (in non-tapped holes) (15 Nm)**.

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2



106443

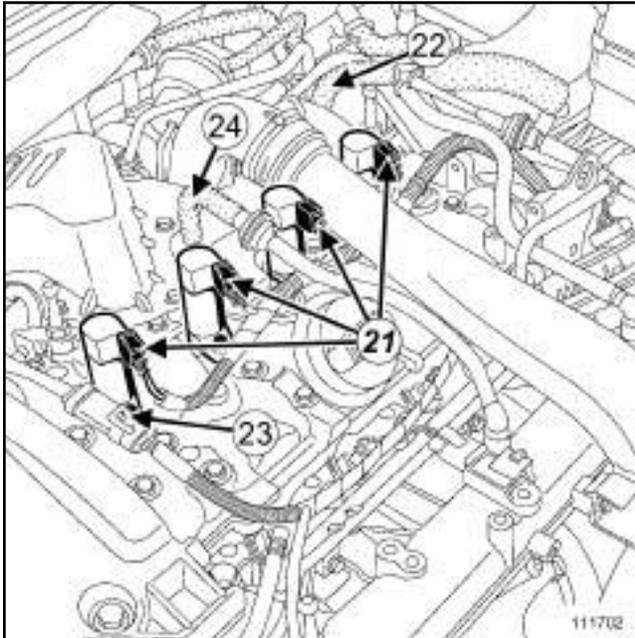
- Apply, to the four ignition coils, a bead (18) of **FLUORINATED GREASE 82 00 169 855 2 mm** in diameter on the inner edge of the high-tension cap.
- Refit the plugs.
- Tighten to torque the **plugs (25 to 30 Nm)**.
- Refit the coils.
- Tighten to torque:
  - the **coils (if holes already tapped) (12 Nm)**,
  - the **coils (if holes not tapped) (15 Nm)**.



21916-1

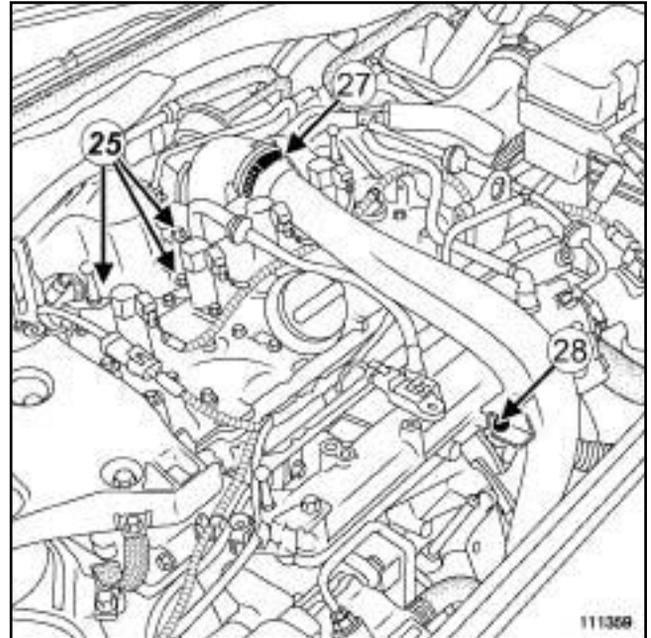
- Refit:
  - the bracket (19) ,
  - the flywheel end engine lifting bracket (20) .

X74, and F4R, and 784 or 786 or 787 or 886 or 887, and DOCUMENTATION PHASE 2



111702

- Position the ignition coil connector wiring harness and attach the wiring harness clip.
- Connect:
  - the ignition coil connectors (21) ,
  - the oil vapour recirculation pipe (22) ,
  - the upstream oxygen sensor connector (23) ,
  - the oil separator oil vapour recirculation hose (24) .



111359

- Refit:
  - the heat shield,
  - the heat shield mounting bolts (25) .
- Refit:
  - the air inlet hose,
  - the air inlet hose upper mounting clip (27) ,
  - the air inlet hose mounting bolt (28) ,
  - the air inlet hose lower mounting clip.
- Refit the timing belt (see **Timing belt: Removal - Refitting**) .
- Connect the battery ( (see **Battery: Removal - Refitting**) ).

X83

### Equipment required

Diagnostic tool

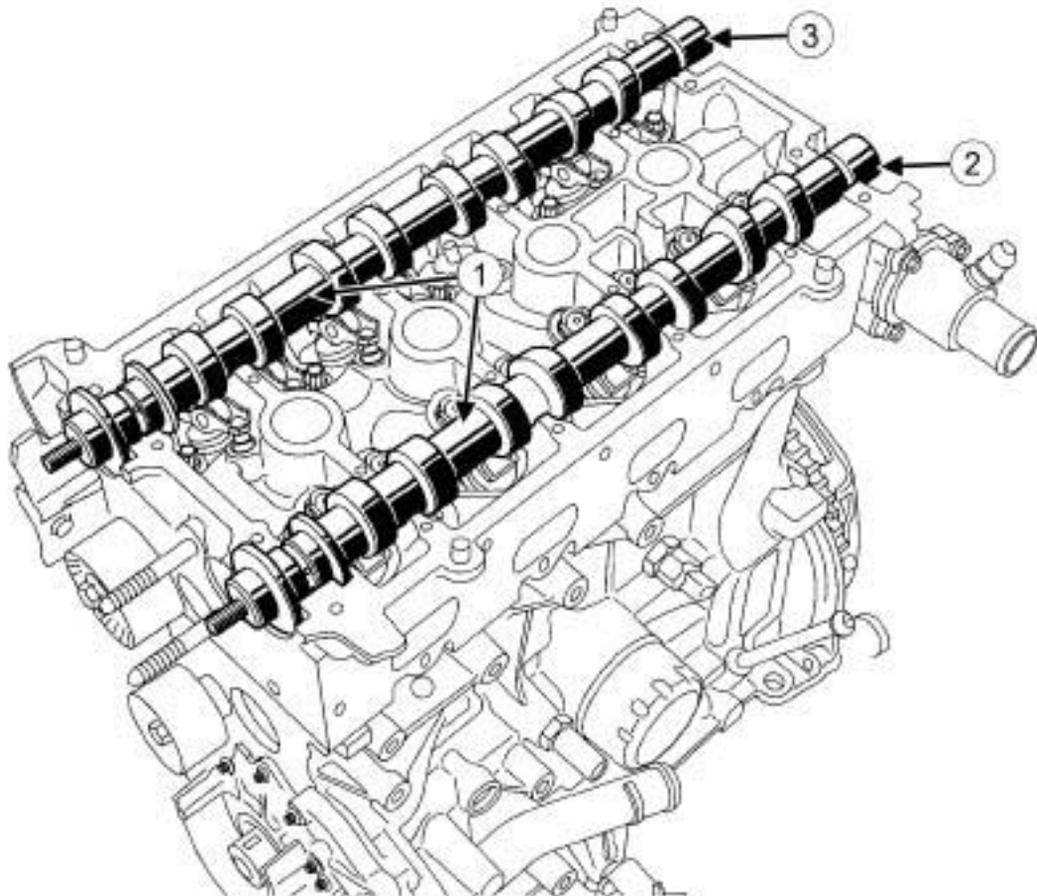
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift ( (see **Vehicle: Towing and lifting**) ).
- Disconnect the battery ( (see **Battery: Removal - Refitting**) )
- Remove:
  - the air filter unit (see **Air filter unit: Removal - Refitting**) ,
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,

- the inlet manifold ( see ) ,
- the intake distributor (see **Inlet distributor: Removal - Refitting**)
- the oil separator (see **Oil decanter: Removal - Refitting**) ,
- the battery ( (see **Battery: Removal - Refitting**) ) ,
- the front right-hand wheel ( (see **Wheel: Removal - Refitting**) ) ,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) .

### II - OPERATION FOR REMOVAL OF PART CONCERNED

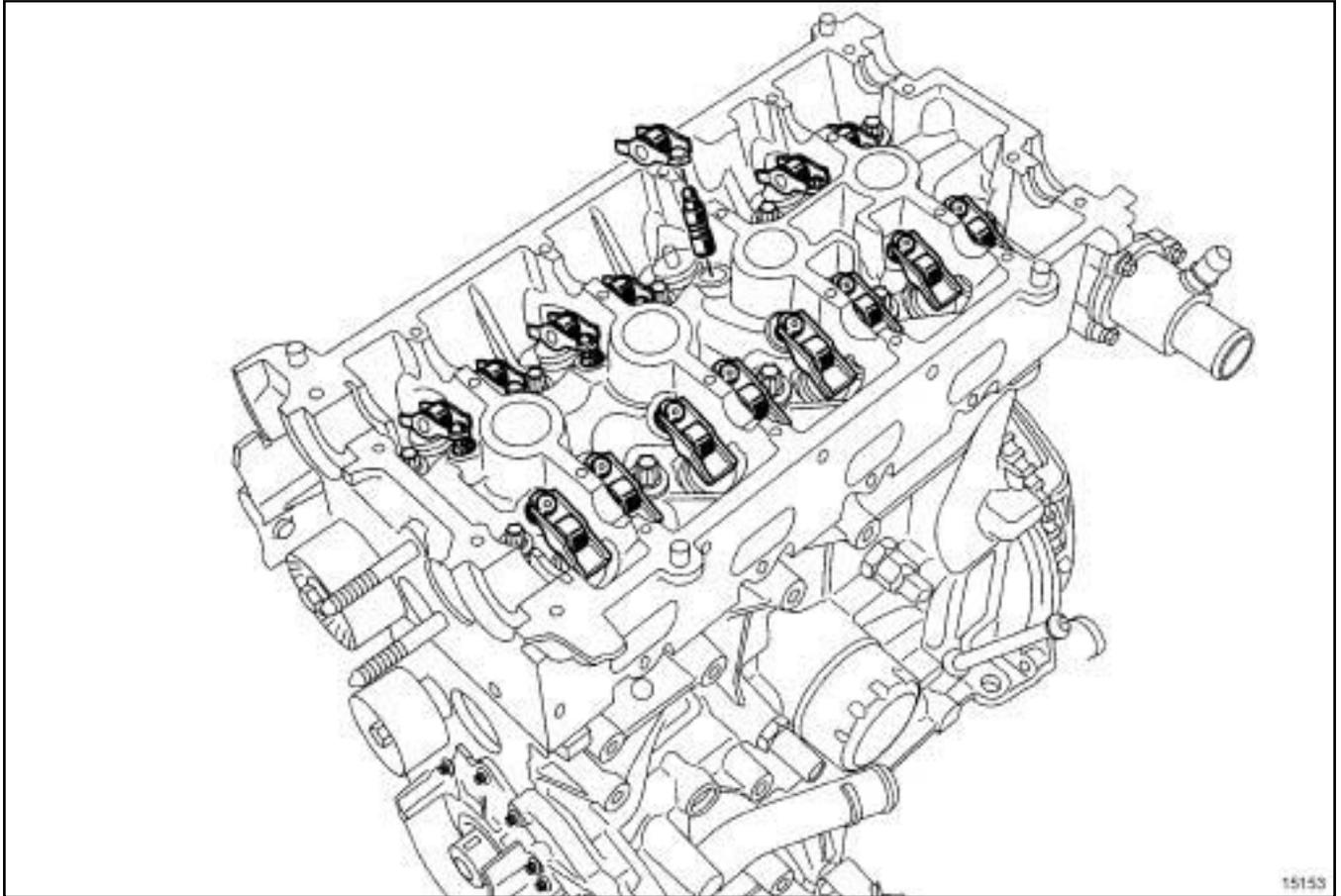


15151

15151

- Mark the inlet and exhaust camshafts (if they are not identified by a marking) using an indelible marker at (1) and not on the bearings.
- Remove the inlet (2) and exhaust camshafts (3) .

X83

**REFITTING****I - REFITTING PREPARATION OPERATION**

15153

15153

- Clean the thread hole of the camshafts carefully to prevent foreign bodies from entering the camshaft.

**WARNING**

Protect the oilway so that foreign bodies do not enter the oil pipes in the cylinder head.

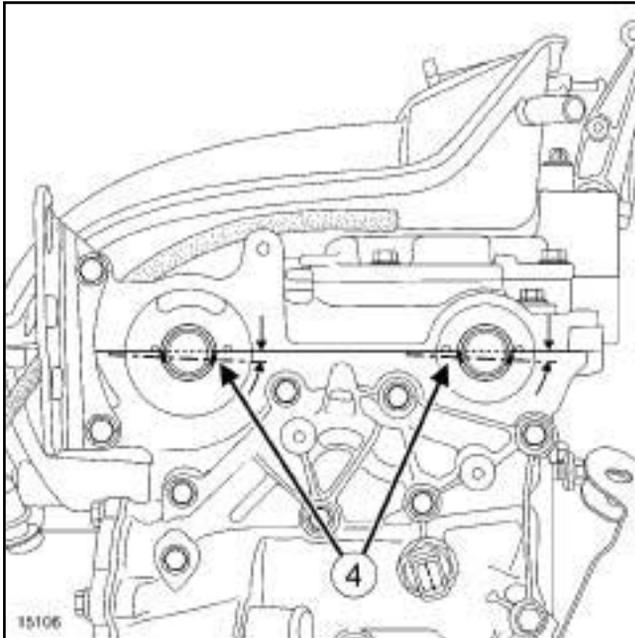
Failure to follow this instruction could lead to the blocking of the oilways, resulting in a rapid deterioration of the camshaft.

- Oil the camshaft bearings.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit the camshafts in their respective positions.

X83



15106

- Position the offset grooves (4) horizontally below the centreline.

### III - FINAL OPERATION

- Refit:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**),
- the timing belt (see **Timing belt: Removal - Refitting**),
- the accessories belt (see **Accessories belt: Removal - Refitting**),
- the front right-hand wheel ( (see **Wheel: Removal - Refitting** ) ),
- the battery ( (see **Battery: Removal - Refitting** ) ),
- the oil separator (see **Oil decanter: Removal - Refitting**),
- the intake distributor (see **Inlet distributor: Removal - Refitting**)
- the inlet manifold (see ),
- the ignition coils (see **Coils: Removal - Refitting**),
- the throttle valve (see **Throttle valve: Removal - Refitting**),
- the air filter unit (see **Air filter unit: Removal - Refitting**).

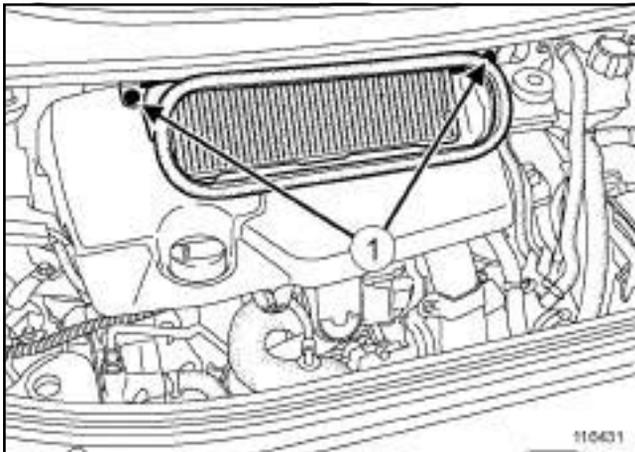
- Connect the battery ( (see **Battery: Removal - Refitting** ) ),

- Using the **Diagnostic tool**, check that there are no faults stored by the injection computer and clear them if necessary.

X81, and F4R, and 797 or 896, and DOCUMENTATION PHASE 2

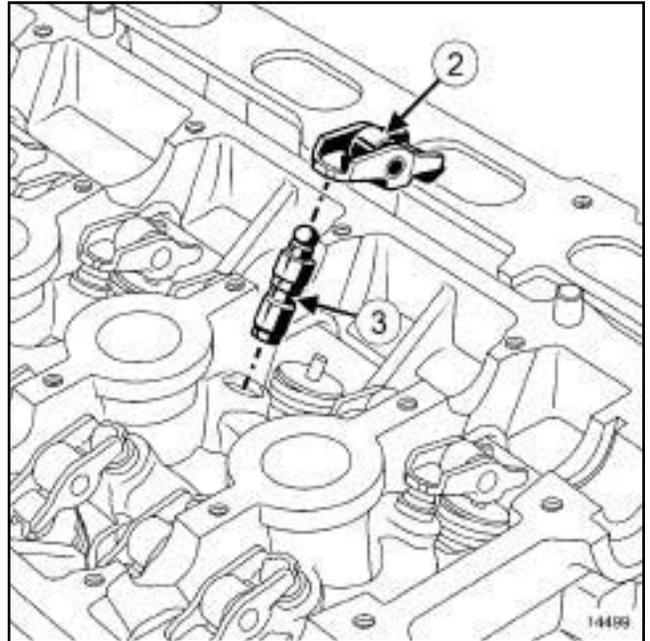
**REMOVAL****I - REMOVAL PREPARATION OPERATION**

- Position the vehicle on a two-post lift ( (see **Vehicle: Towing and lifting**) ).
- Disconnect the battery ( (see **Battery: Removal - Refitting**) ).



116431

- Remove:
  - the air intake unit bolts (1) ,
  - the air intake unit,
  - the engine cover,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**) .

**II - FINAL OPERATION.**

14499

- Remove:
  - the camshafts,
  - the valve rockers (2) ,
  - the hydraulic tappets (3) .

**REFITTING****I - REFITTING PREPARATIONS OPERATION**

- 

**Note:**

It is essential to reprime the hydraulic tappets as these may become drained if removed for a long time.

- To check whether the hydraulic tappets need repriming, press the top of the tappet with your thumb. If the tappet piston can be pressed down, immerse the tappets in a container filled with diesel and then reprime them.

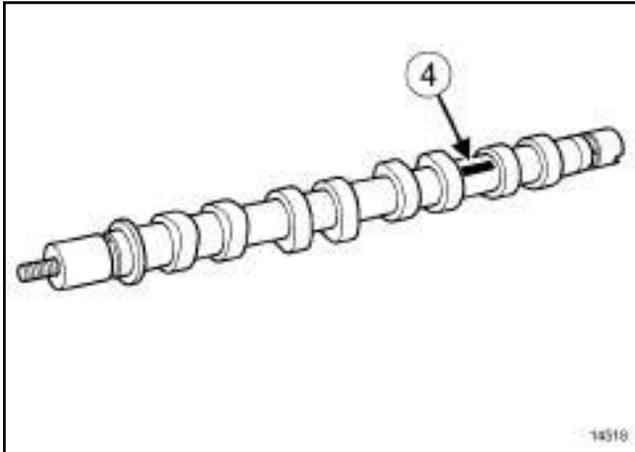
**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit:
  - the hydraulic tappets,
  - the valve rockers.

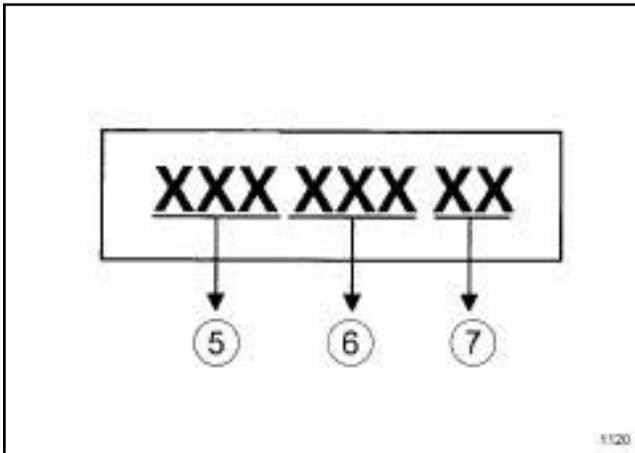
## Camshaft: Removal - Refitting

X81, and F4R, and 797 or 896, and DOCUMENTATION PHASE 2

## Camshaft markings



14518



1120

- The camshafts can be identified by a marking at (4) .

Markings (5) and (6) are only for the supplier

Marking (7) serves to distinguish the inlet camshaft from the exhaust camshaft:

- AM: inlet
- EM: exhaust

- Refit, lubricating the bearings:

- the inlet camshaft,
- the exhaust camshaft.

## III - FINAL OPERATION.

- Refit:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,

- the ignition coils (see **Coils: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the engine cover,
  - the air intake unit,
  - the air intake unit bolts.
- Connect the battery ( (see **Battery: Removal - Refitting**) ).

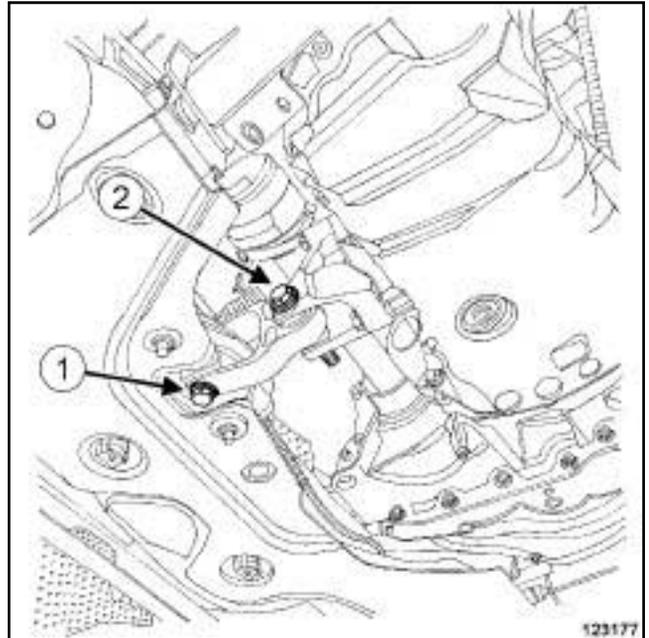
X91

Tightening torques 	
engine tie-bar bolt on the engine tie-bar mounting	190 Nm
engine tie-bar bolt on the subframe	115 Nm

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (MR 415, 02A, Lifting equipment).
- Remove:
  - the engine cover,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 415, 35A, Wheels and tyres),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (MR 416, 55A, Exterior protection),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the engine undertray bolts,
  - the engine undertray,
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .

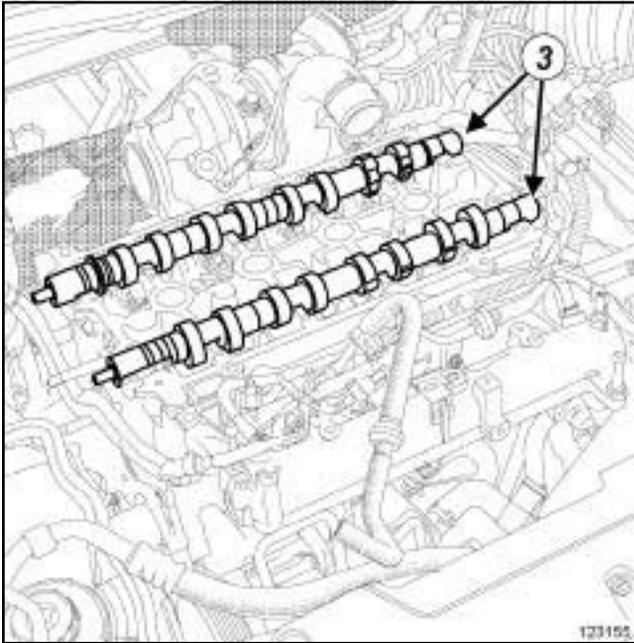


123177

- Remove:
  - the engine tie-bar bolt (1) on the subframe,
  - the bolt (2) from the engine tie-bar on the engine tie-bar mounting,
  - the lower linkage,
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**) .

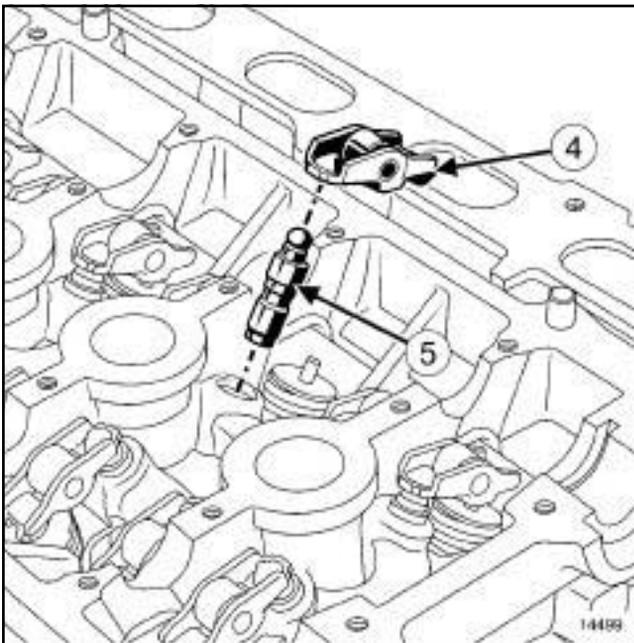
X91

## II - REMOVAL OPERATION FOR PART CONCERNED



123155

- Remove the camshafts (3) .



14499

- Remove:
  - the valve rockers (4) ,
  - the hydraulic tappets (5) .

## Note:

To prevent any risk of unpriming the hydraulic tappets make sure that they are vertical.

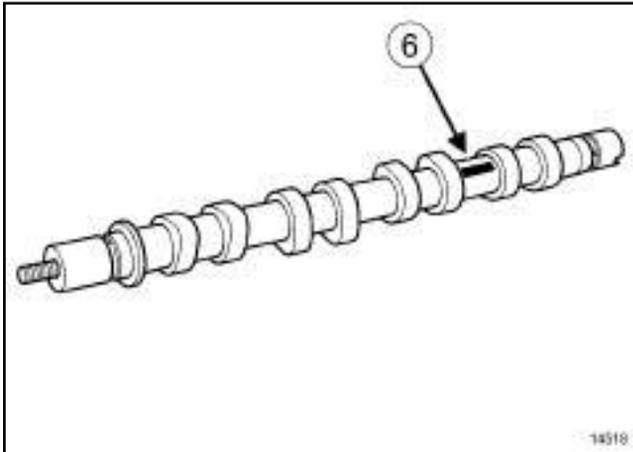
## Camshaft: Removal - Refitting

X91

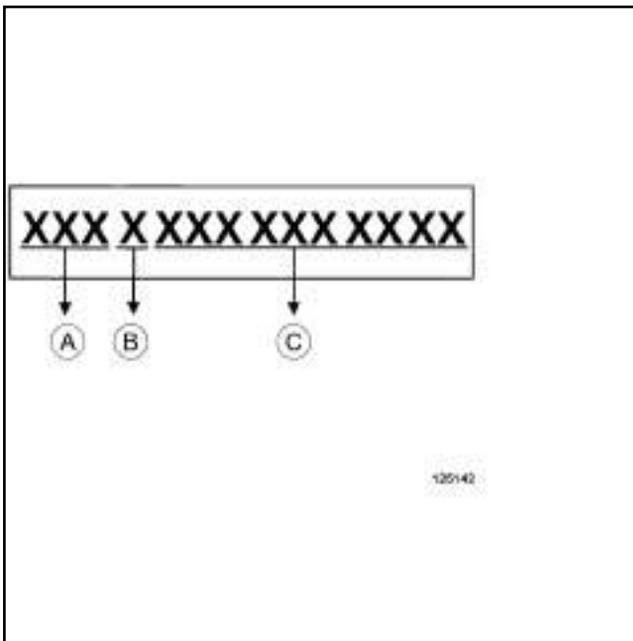
## REFITTING

## I - REFITTING PREPARATIONS OPERATION

## Camshaft marking



14518



125579

- The camshafts can be identified by a marking at (6) .

The mark (A) corresponds to the engine type.

Marking (B) serves to distinguish the inlet camshaft from the exhaust camshaft:

- A: Inlet,
- E: Exhaust.

The mark (C) is for the supplier's use only.

## Note:

It is essential to reprime the hydraulic tappets as these may become drained if removed for a long time.

- To check if re-priming is necessary, press the top of the tappet with your thumb. If the tappet piston sinks, dip the tappets in a container filled with diesel fuel then reprime them.

## II - REFITTING OPERATION FOR PART CONCERNED

- Refit:

- the hydraulic thrust bearings,
- the valve rockers,
- the inlet camshaft, lubricating the bearings,
- the exhaust camshaft, lubricating the bearings.

## III - FINAL OPERATION.

- Refit:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**) ,
- the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
- the lower linkage,
- the engine tie-bar bolt on the engine tie-bar mounting,
- the engine tie-bar bolt on the subframe.

- Torque tighten:

- the **engine tie-bar bolt on the engine tie-bar mounting (190 Nm)**,
- the **engine tie-bar bolt on the subframe (115 Nm)**.

- Refit:

- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
- the engine undertray,
- the engine undertray bolts,

X91

- Tighten the engine undertray bolts.
- Refit:
  - the accessories belt (see **Accessories belt: Removal - Refitting**),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (MR 416, 55A, Exterior protection),
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) MR 415, 35A, Wheels and tyres),
  - the engine cover.

## Camshaft: Removal - Refitting

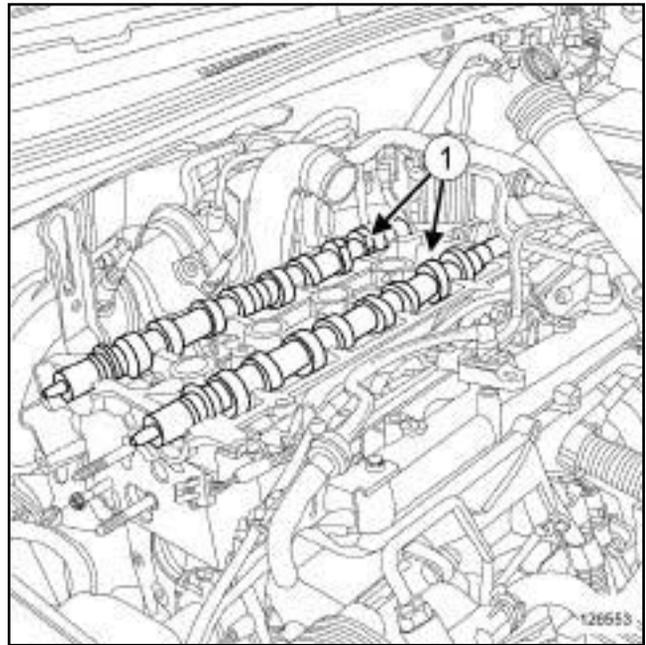
X73, and DOCUMENTATION PHASE 2

## REMOVAL

## I - REMOVAL PREPARATION OPERATION

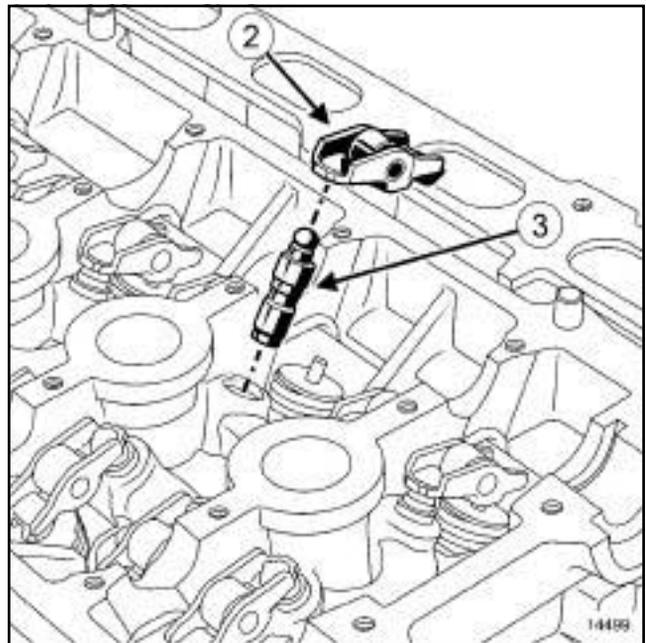
- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove the front engine cover.
- Disconnect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Remove:
  - the coils (see **Coils: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the engine undertray bolts,
  - the engine undertray,
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the seal of each camshaft on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) .

## II - OPERATION FOR REMOVAL OF PART CONCERNED



126553

- Remove the camshafts (1) .



14499

- Remove:
  - the valve rockers (2) ,
  - the hydraulic tappets (3) .

## Note:

To prevent any risk of unpriming the hydraulic tappets make sure that they are vertical.

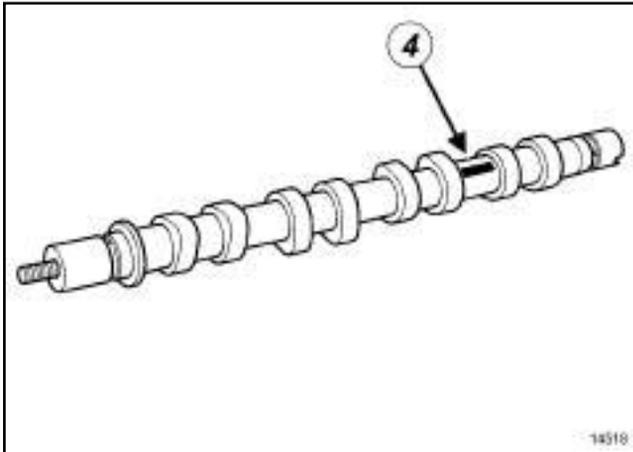
## Camshaft: Removal - Refitting

X73, and DOCUMENTATION PHASE 2

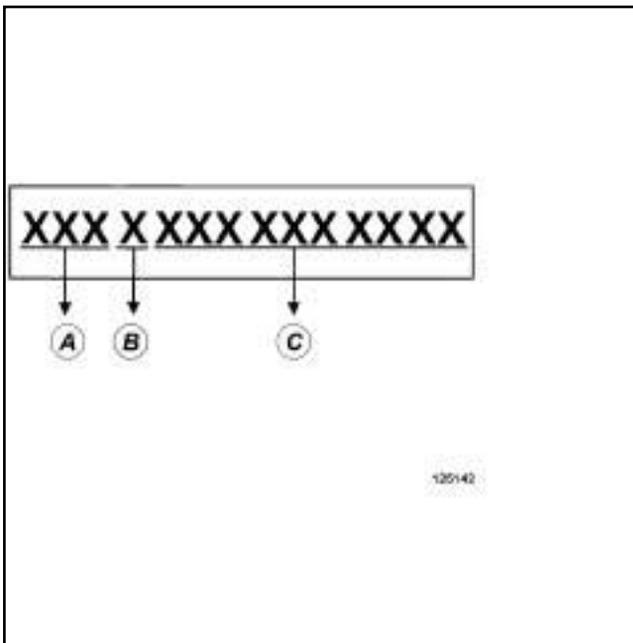
## REFITTING

## I - REFITTING PREPARATION OPERATION

## Camshaft markings



14518



125579

- The camshafts can be identified by a marking at (4) .

Marking (A) corresponds to the engine type.

Marking (B) serves to distinguish the inlet camshaft from the exhaust camshaft:

- A: inlet,
- E: exhaust.

Marking (C) is only relevant to the supplier.

## Note:

It is essential to reprime the hydraulic tappets as these may become drained if removed for a long time.

- To check if re-priming is necessary, press the top of the tappet with your thumb. If the tappet piston depresses, immerse the tappets in a container full of diesel then reprime them.

## II - REFITTING OPERATION FOR PART CONCERNED

- Refit:

- the hydraulic tappets,
- the valve rockers,
- the inlet camshaft, oiling the inlet camshaft bearings,
- the exhaust camshaft, oiling the exhaust camshaft bearings.

## III - FINAL OPERATION.

- Refit:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the seal of each camshaft on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
- the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
- the engine undertray,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
- the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),

X73, and DOCUMENTATION PHASE 2

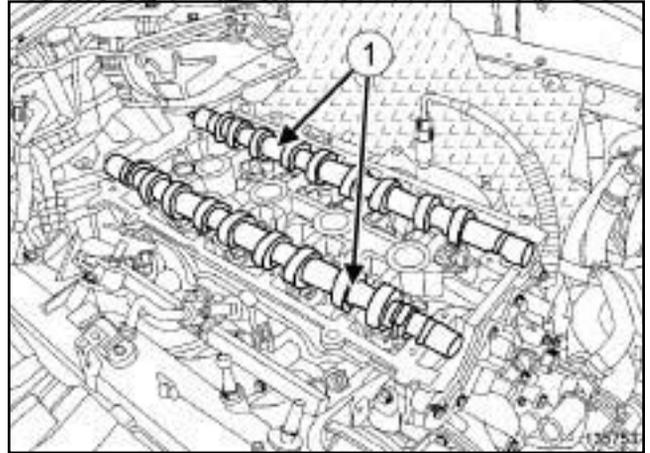
- the oil decanter (see **Oil decanter: Removal - Refitting**),
- the coils (see **Coils: Removal - Refitting**).
- Connect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Refit the engine cover.

X95

**REMOVAL****I - REMOVAL PREPARATION OPERATION**

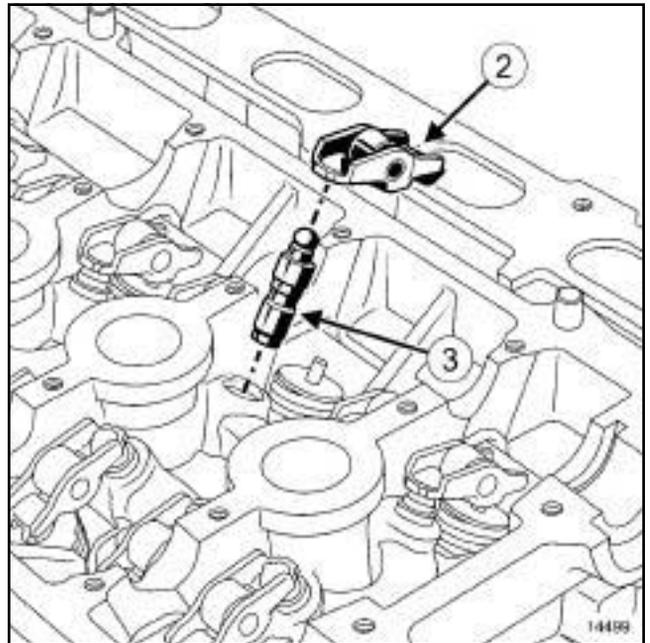
- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove:
  - the engine cover,
  - the battery (see ) (80A, Battery),
  - the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),
  - the engine undertray bolts,
  - the engine undertray,
  - the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front section of the front wheel arch liners (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the radiator mounting cross member (see **Radiator mounting cross member: Removal - Refitting**) (31A, Front axle components),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
  - the lower engine tie-bar (see **Lower engine tie-bar: Removal - Refitting**) ,
  - the windscreen wiper arms (see **Windscreen wiper arm: Removal - Refitting**) (85A, Wiping - Washing),
  - the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the scoop under the scuttle panel grille (see **Scoop under the scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the oil separator,

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) .

**II - OPERATION FOR REMOVAL OF PART CONCERNED**

135753

- Remove the camshafts (1) .



14499

- Remove:
  - the valve rockers (2) ,
  - the hydraulic tappets (3) .

**Note:**

To prevent any risk of unpriming the hydraulic tappets make sure that they are vertical.

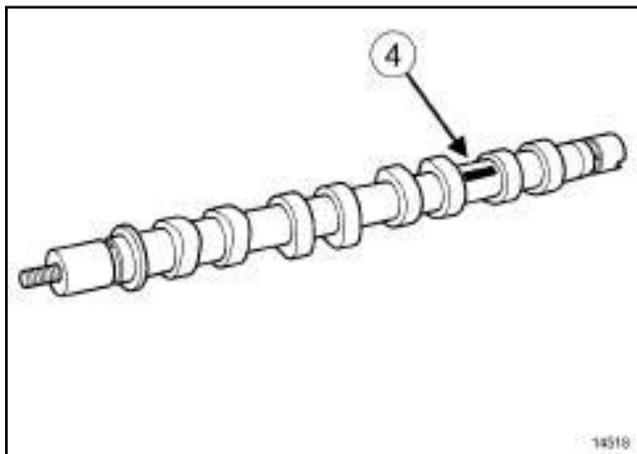
## Camshaft: Removal - Refitting

X95

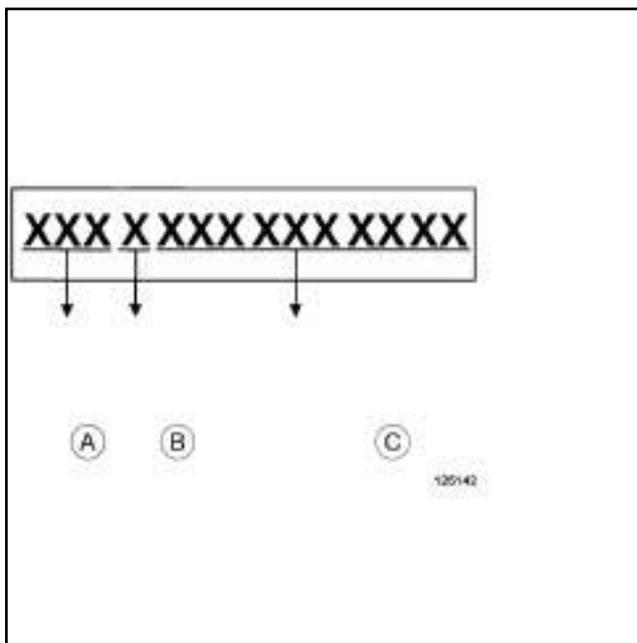
## REFITTING

## I - REFITTING PREPARATION OPERATION

## Camshaft marking



14518



125579

- The camshafts can be identified by a marking at (4) :

- the mark (A) corresponds to the engine type,
- the mark (B) serves to distinguish the inlet camshaft from the exhaust camshaft:
- A: inlet
- E: exhaust
- the mark (C) is for the supplier's use only.

## Note:

If the exhaust camshaft stud is loosened (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) (see Technical Note 3884A, Replacing F4 camshaft pulley studs).

## Note:

It is essential to reprime the hydraulic tappets as these may become drained if removed for a long time.

- To check if repriming is necessary, press the top of the tappet with your thumb. If the tappet piston depresses, immerse the tappets in a container full of diesel then reprime them.

## II - REFITTING OPERATION FOR PART CONCERNED

 Refit:

- the hydraulic thrust bearings,
- the valve rockers,
- the inlet camshaft, by lubricating the inlet camshaft bearings,
- the exhaust camshaft, by lubricating the exhaust camshaft bearings.

## III - FINAL OPERATION

 Refit:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the oil separator,
- new camshaft timing end seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
- the scoop under the scuttle panel grille (see **Scoop under the scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
- the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),

## Camshaft: Removal - Refitting

X95

- the windscreen wiper arms (see **Windscreen wiper arm: Removal - Refitting**) (85A, Wiping - Washing),
- the lower engine tie-bar (see **Lower engine tie-bar: Removal - Refitting**) ,
- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the radiator mounting cross member (see **Radiator mounting cross member: Removal - Refitting**) (31A, Front axle components),
- the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
- the front section of the front wheel arch liners (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
- the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
- the engine undertray,
- the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),
- the battery (see ) (80A, Battery),
- the engine cover.

## Camshaft: Removal - Refitting

X84, and F4R, and 774 or 776

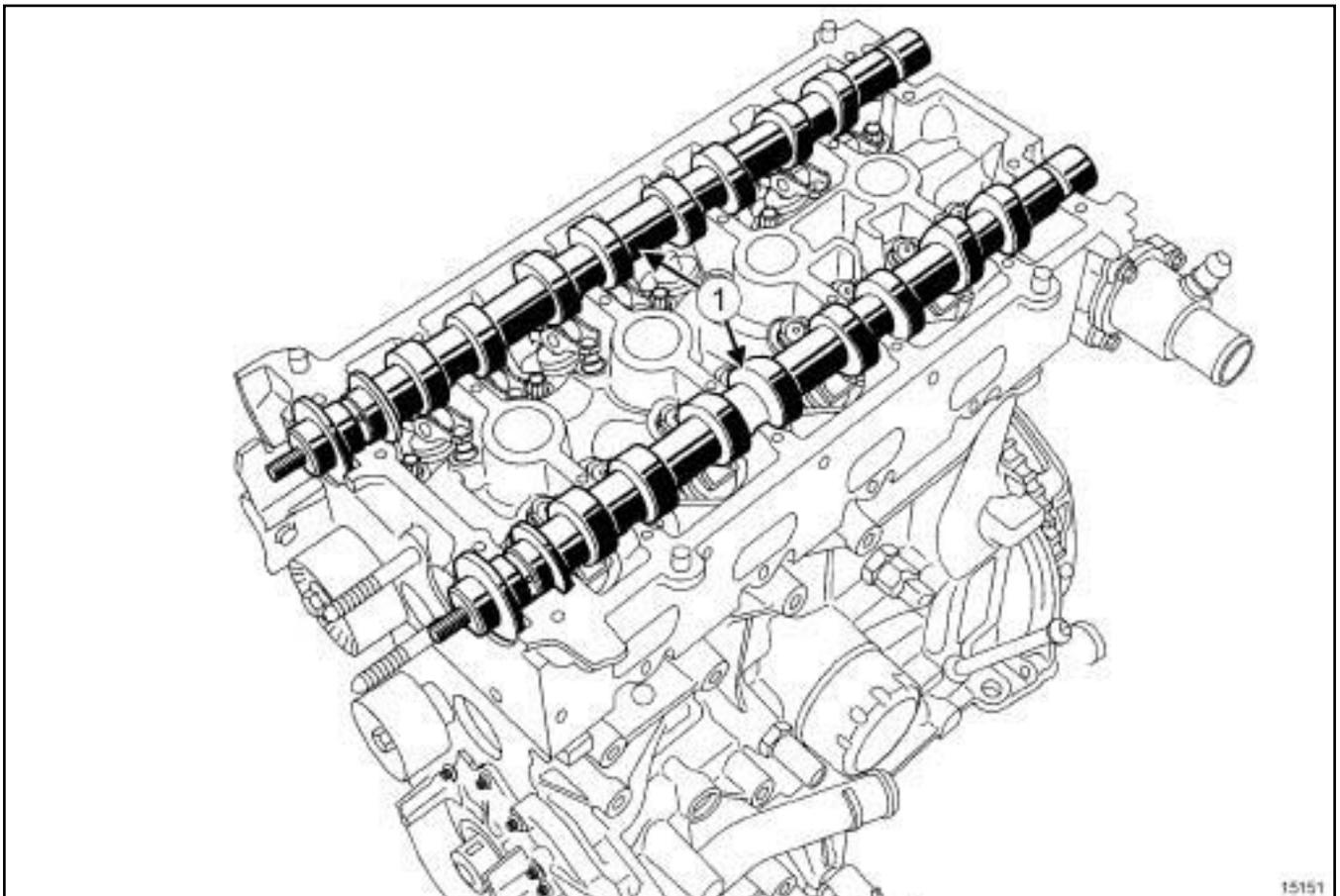
## REMOVAL

## I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove:
  - the engine covers,
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the air filter unit (see **Air filter unit: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),

- the throttle valve (see **Throttle valve: Removal - Refitting**) ,
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the coils (see **Coils: Removal - Refitting**) ,
- the oil separator (see **Oil decanter: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) .

## II - OPERATION FOR REMOVAL OF PART CONCERNED

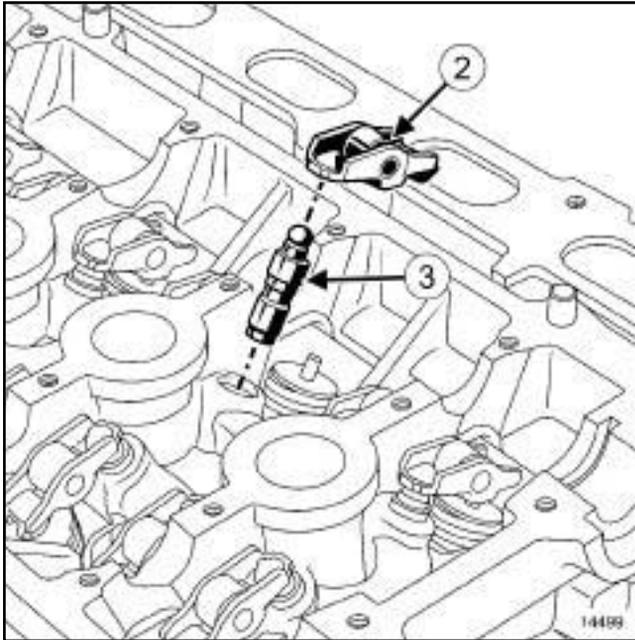


15151

15151

- Remove the camshafts (1) .

X84, and F4R, and 774 or 776



14499

❑ Remove:

- the valve rockers (2) ,
- the hydraulic tappets (3) .

Note:

To prevent any risk of unpriming the hydraulic tappets make sure that they are vertical.

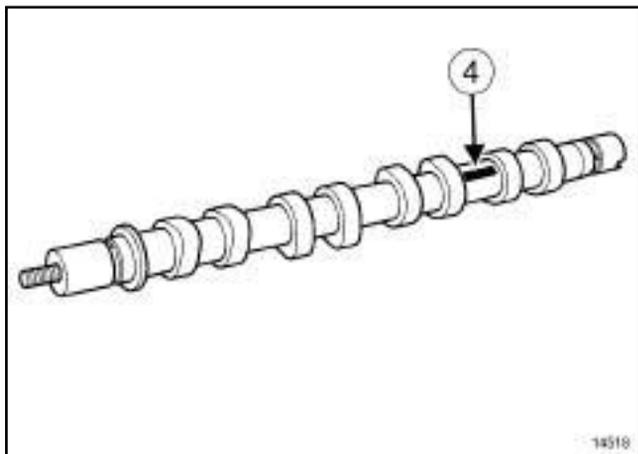
## Camshaft: Removal - Refitting

X84, and F4R, and 774 or 776

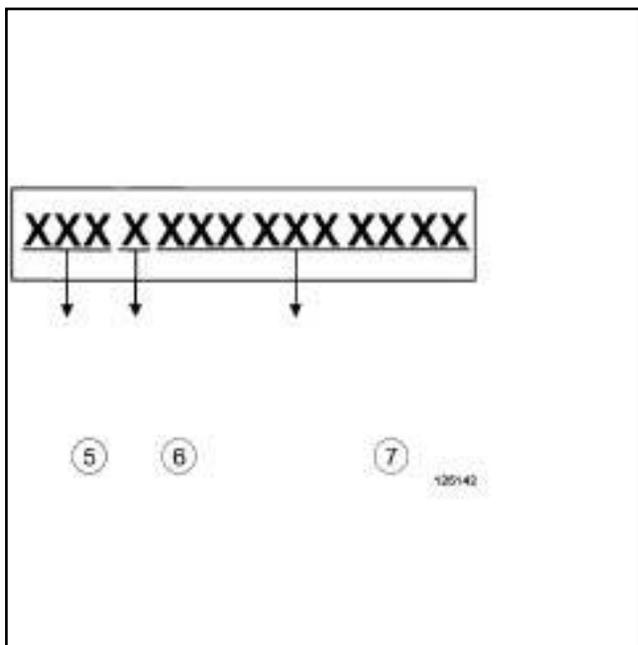
### REFITTING

#### I - REFITTING PREPARATION OPERATION

##### Camshaft marking



14518



125579

- The camshafts can be identified by a marking at (4) :

- the mark (5) corresponds to the engine type,
- the mark (6) serves to distinguish the inlet camshaft from the exhaust camshaft:
- A: Inlet
- E: Exhaust
- The mark (7) is for the supplier's use only.

#### Note:

If the exhaust camshaft stud is loosened (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) (Technical Note 3884A, Replacing F4 camshaft pulley studs).

#### Note:

It is essential to reprime the hydraulic tappets as these may become drained if removed for a long time.

- To check if repriming is necessary, press the top of the tappet with your thumb. If the tappet piston depresses, immerse the tappets in a container full of diesel then reprime them.

#### II - REFITTING OPERATION FOR PART CONCERNED

- Refit:
  - the hydraulic tappets,
  - the valve rockers,
  - the inlet camshaft, by lubricating the inlet camshaft bearings,
  - the exhaust camshaft, by lubricating the exhaust camshaft bearings.

#### III - FINAL OPERATION

- Refit:
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
  - the oil separator (see **Oil decanter: Removal - Refitting**) ,
  - the coils (see **Coils: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),

X84, and F4R, and 774 or 776

- the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
- the air filter unit (see **Air filter unit: Removal - Refitting**),
- the battery (see **Battery: Removal - Refitting**) (80A, Battery),
- the engine covers.

## Camshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

**Special tooling required****Mot. 588**                      Cylinder block liner clamps.**Equipment required**

compressed air nozzle

external micrometer

dial gauge support

Dial gauge

radial play measuring tape

**II - CHECKING THE CAMSHAFT****1 - Identification of the camshafts**

The camshafts can be identified in two ways:

**I - PREPARATION OPERATION FOR CHECK****IMPORTANT**

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

**WARNING**

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

Remove:

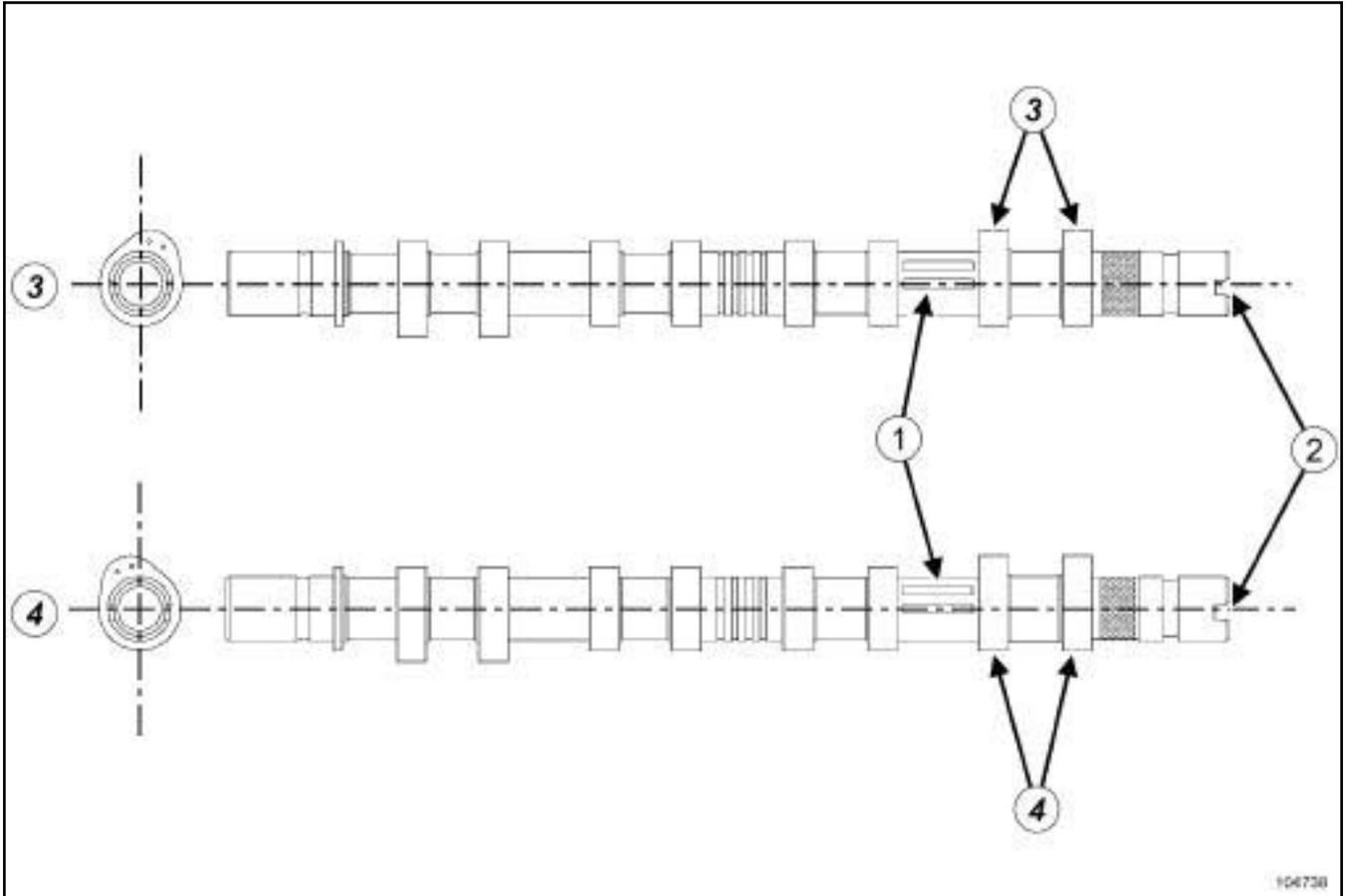
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**),
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**).

Before any checks:

- clean the camshafts with **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) and dry them using a **compressed air nozzle**,
- check that the camshafts are not scratched and do not show signs of impact or abnormal wear (replace the camshaft if necessary).

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

1) Either by a horizontal or vertical marking at (1)



104738

104738

Details of markings:

A	B	C
F4R	E	668 104 14 22

- A refers to the engine type

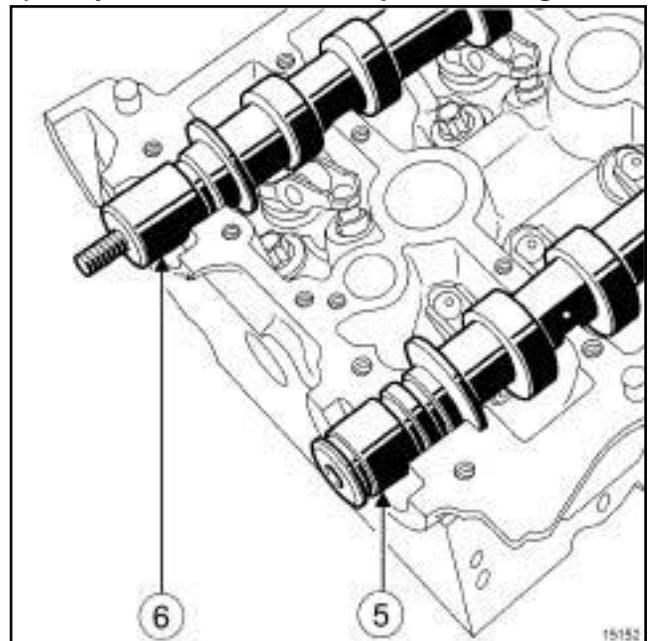
- B refers to the camshaft identification:

**A** = Inlet

**E** = Exhaust

- C is for supplier use only

2) Or by the inlet camshaft dephaser configuration



15152

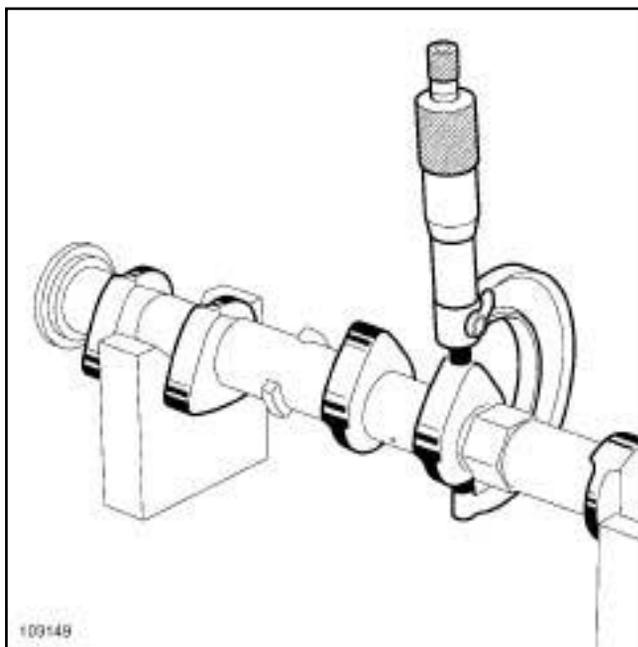
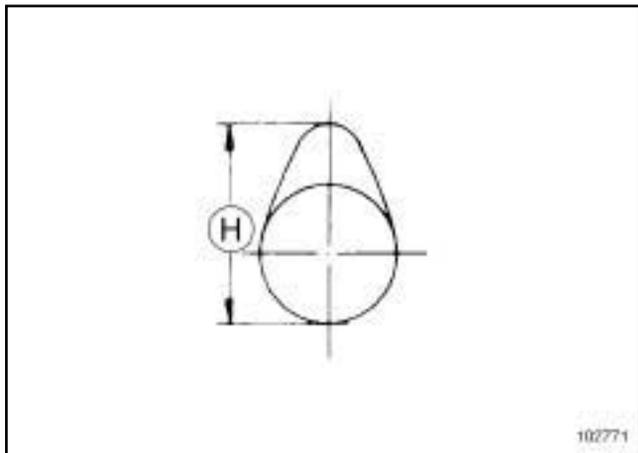
15152

- (5) inlet camshaft fitted with a dephaser
- (6) exhaust camshaft not fitted with a dephaser

## Camshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### 2 - Checking the height of the cam lobes



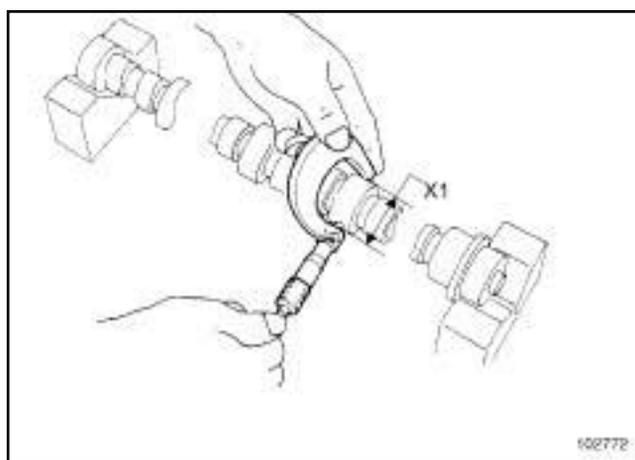
Place the camshaft on two slightly oiled v-blocks.

Using a **external micrometer**, measure the height of the cams (**H**) which should be:

	Inlet mm	Exhaust mm
F4P/722, 760	40.586 to 40.646	40.407 to 40.467
F4P/720 F4R/720, 820	40.586 to 40.646	39.559 to 39.619
F4P/770, 771, 772, 773, 774, 775	40.252 to 40.312	39.444 to 39.504

	Inlet mm	Exhaust mm
F4R/700, 701, 740, 741, 744, 746, 747, 780	40.994 to 41.054	40.997 to 41.057
F4R/712, 713, 714, 715, 790, 792	40.994 to 41.054	40.141 to 40.201
F4R/730, 732, 736, 738	41.501 to 41.561	40.989 to 41.049
F4R/770, 771	40.994 to 41.054	39.559 to 39.619
F4R/760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 784, 786, 787, 794, 795, 796, 797, 813, 867, 870, 872, 874, 886, 887, 896, 897	40.647 to 40.707	40.607 to 40.667
F4R/800, 802, 811	42.501 to 42.561	41.994 to 42.054
F4R/830, 832	41.724 to 41.784	41.379 to 41.439

### 3 - Checking the camshaft journal diameters



Note:

Camshaft bearing No.1 is on the flywheel end.

Using a **external micrometer**, measure the diameter (**X1**) of the camshaft journals, which should be:

- bearing No.1: **24.97 mm to 25.00 mm**,

## Camshaft: Check

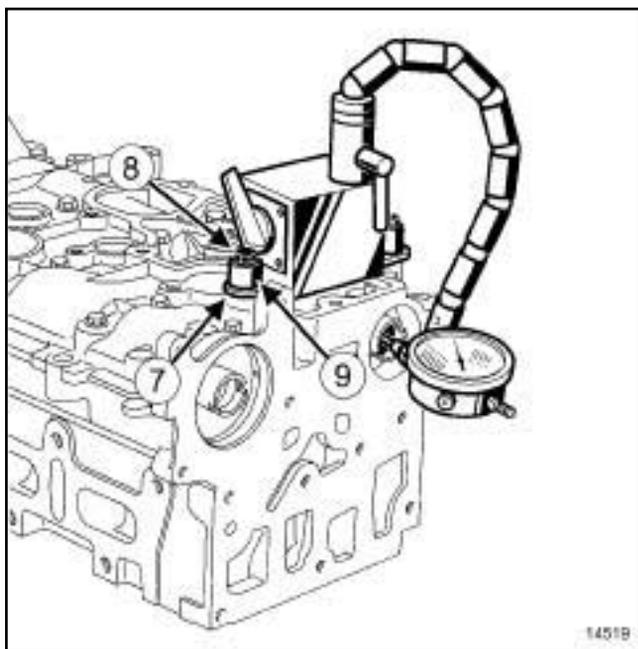
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- bearings No.2, No.3, No.4 and No.5: **24.979 mm** to **25.00 mm**,
- bearing No.6: **27.979 mm** to **28.00 mm**.

### 4 - Checking camshaft longitudinal clearance

Refit:

- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**),
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**).



Fit:

- a metal plate (7) on the rocker cover (example: tool **(Mot. 588)**) and secure it using the bolts (8) of the oil separator and spacers (9), whose dimensions are as follows:

- external diameter **18 mm**,
- bolt hole diameter **9 mm**,
- height **15 mm**,
- the **dial gauge support** on the metal plate,
- the **Dial gauge** on the mounting.

Fit the sensor of the **Dial gauge** against the end of the camshaft.

Move the camshaft towards the dial gauge until it hits a stop.

Set the **Dial gauge** to zero.

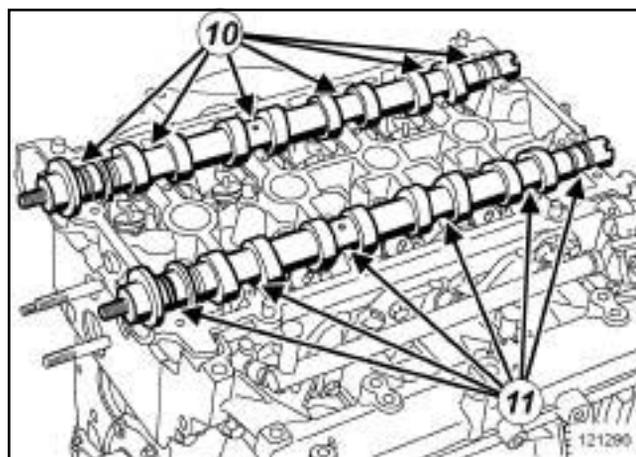
Move the camshaft towards the side opposite the **Dial gauge** until it hits the other stop.

Check the longitudinal play, which must be between **0.08 mm** and **0.18 mm**.

Remove:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**),
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**).

### 5 - Checking the camshaft diametric clearance



Cut **12** pieces of **radial play measuring tape** the width of the camshaft journal mating face.

Place each piece of wire on the rocker cover camshaft journal mating faces in line with the camshaft at (10) and (11).

Note:

Do not allow the camshaft to turn during the operation in order to avoid distorting the measurement.

Refit:

- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**),
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**).

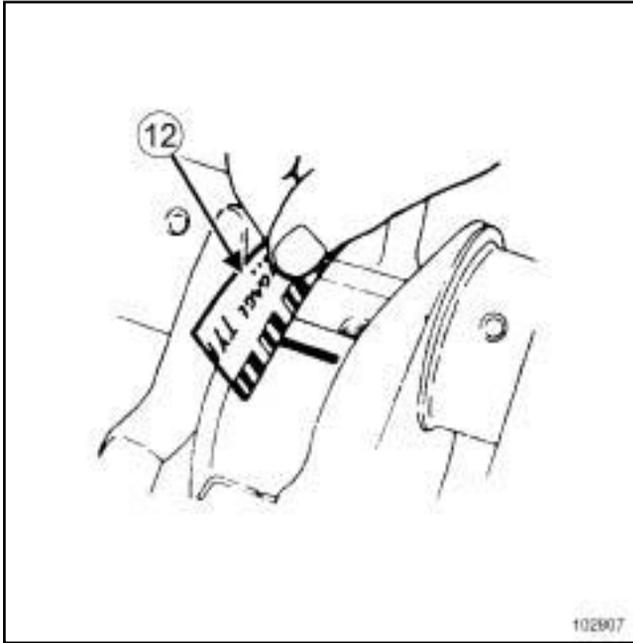
Remove:

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**),

## Camshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**).



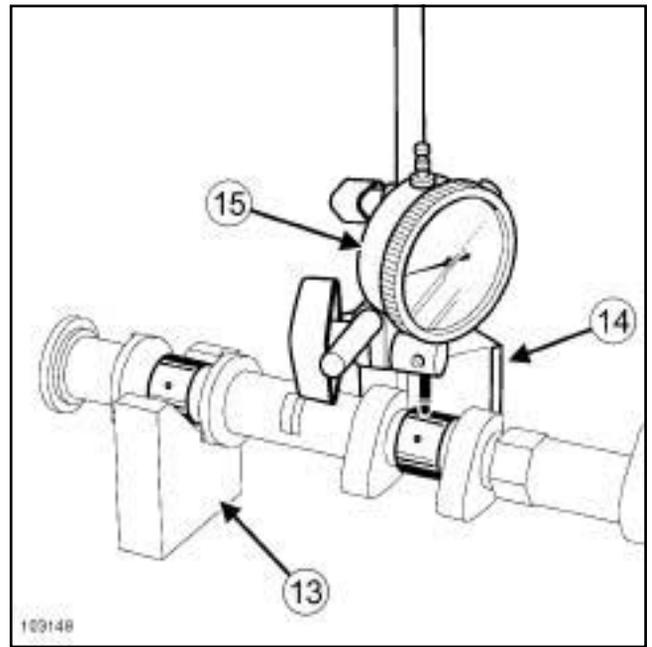
102807

Measure the flattening of the wire measuring the radial play using the gauge printed on the wrapping paper of the wire (12).

The radial play should be:

- bearing No.1: **0.040 mm to 0.091 mm**,
- bearing No.2, No.3, No.4, No.5, No.6: **0.040 mm to 0.082 mm**.

### 6 - Checking the concentricity of the camshaft journals



103148

Place the camshaft on two slightly oiled v-blocks (13).

Fit:

- the **dial gauge support (14)**,
- the **Dial gauge (15)**.

Fit the sensor of the **Dial gauge** against the centre of the camshaft journal mating face.

Set the **Dial gauge** to zero.

Rotate the camshaft while avoiding the lubrication holes to check the journal concentricity, which must be less than **0.05 mm**.

### III - FINAL OPERATION

Refit:

- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**),
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**).

## Cylinder head: Removal - Refitting

X84, and B84 or C84 or E84 or K84 or L84

**REMOVAL**

- Remove the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

**Note:**

Removal and refitting of the turbocharger requires careful application of the repair procedures to ensure that the system is sealed correctly. Failure to comply with these instructions may have serious safety-related consequences for the driver.

- Remove the cylinder head (see ) (Technical Note 6027A, 10A, Engine and peripherals).

**REFITTING**

- Refit the cylinder head (see ) (Technical Note 6027A, 10A, Engine and peripherals).
- Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

X74, and F4R

### Special tooling required

**Mot. 1573**      Cylinder head support

### Equipment required

cylinder head rule

set of feeler gauges

cylinder head test tank

### Tightening torques

cylinder head bolts (initial torque)      **30 N.m**

cylinder head bolts      **30 N.m + 180° ± 25°**

injector rail protector bolts      **25 N.m**

heat shield bolts      **10 N.m**

### IMPORTANT

Wear leaktight gloves (Nitrile type) for this operation.

### IMPORTANT

Wear protective gloves during the operation.

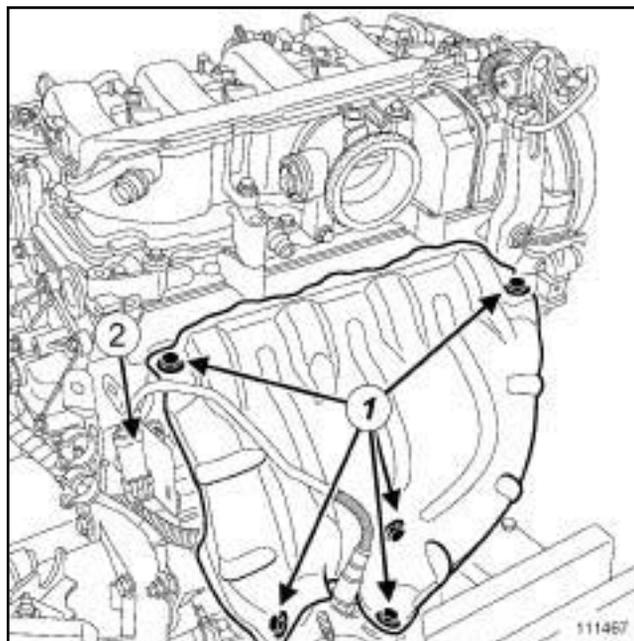
### IMPORTANT

Wear heat protective gloves during the operation.

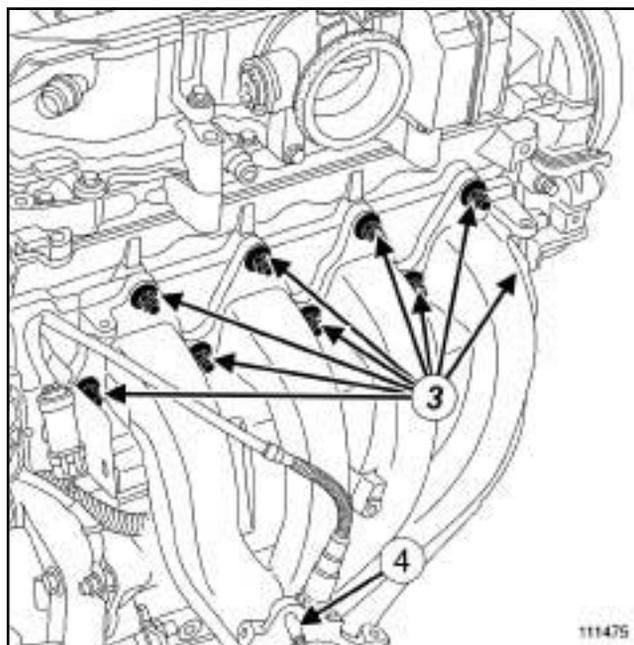
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove:
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) .
- Drain the cooling system (see **Cooling system: Draining - Refilling**) .

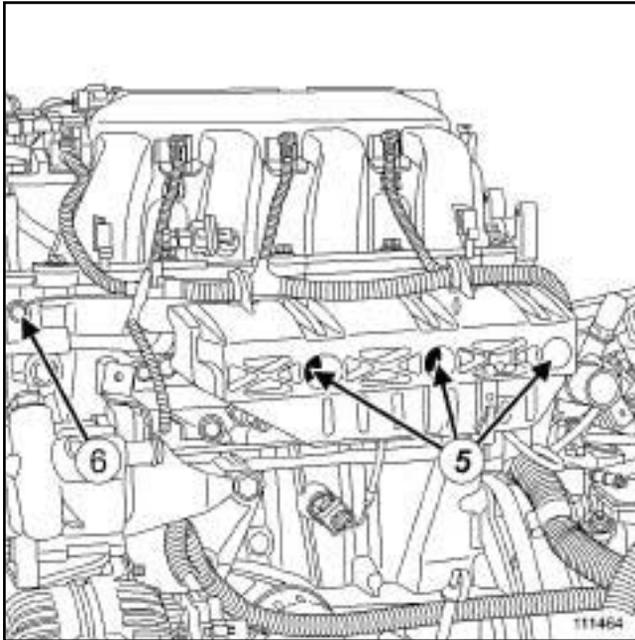


- Remove:
  - the bolts (1) from the heat shield,
  - the heat shield.
- Disconnect the oxygen sensor connector (2) .



- Remove:
  - the nuts (3) from the exhaust manifold on the cylinder head,
  - the nuts from the exhaust manifold on the catalytic converter at (4) ,
  - the exhaust manifold.

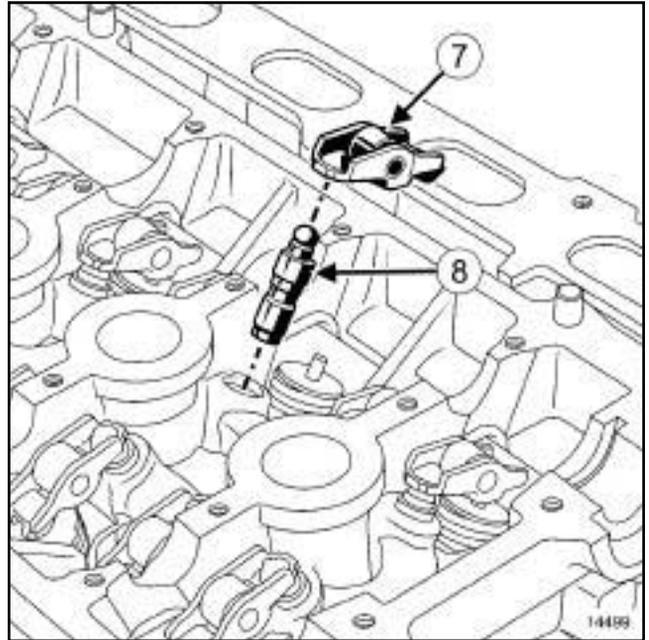
X74, and F4R



111464

□ Remove:

- the bolts (5) from the injector rail protector,
- the front section of the inlet distributor,
- the electrical wiring bolt (6) ,
- the injector rail (see **Injector rail - Injectors: Removal - Refitting**) ,
- the inlet manifold,
- the cylinder head water chamber (see **Water chamber: Removal - Refitting**) ,
- the oil separator (see **Oil decanter: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) .



14499

□ Remove:

- the valve rockers (7) ,
- the hydraulic tappets (8) .

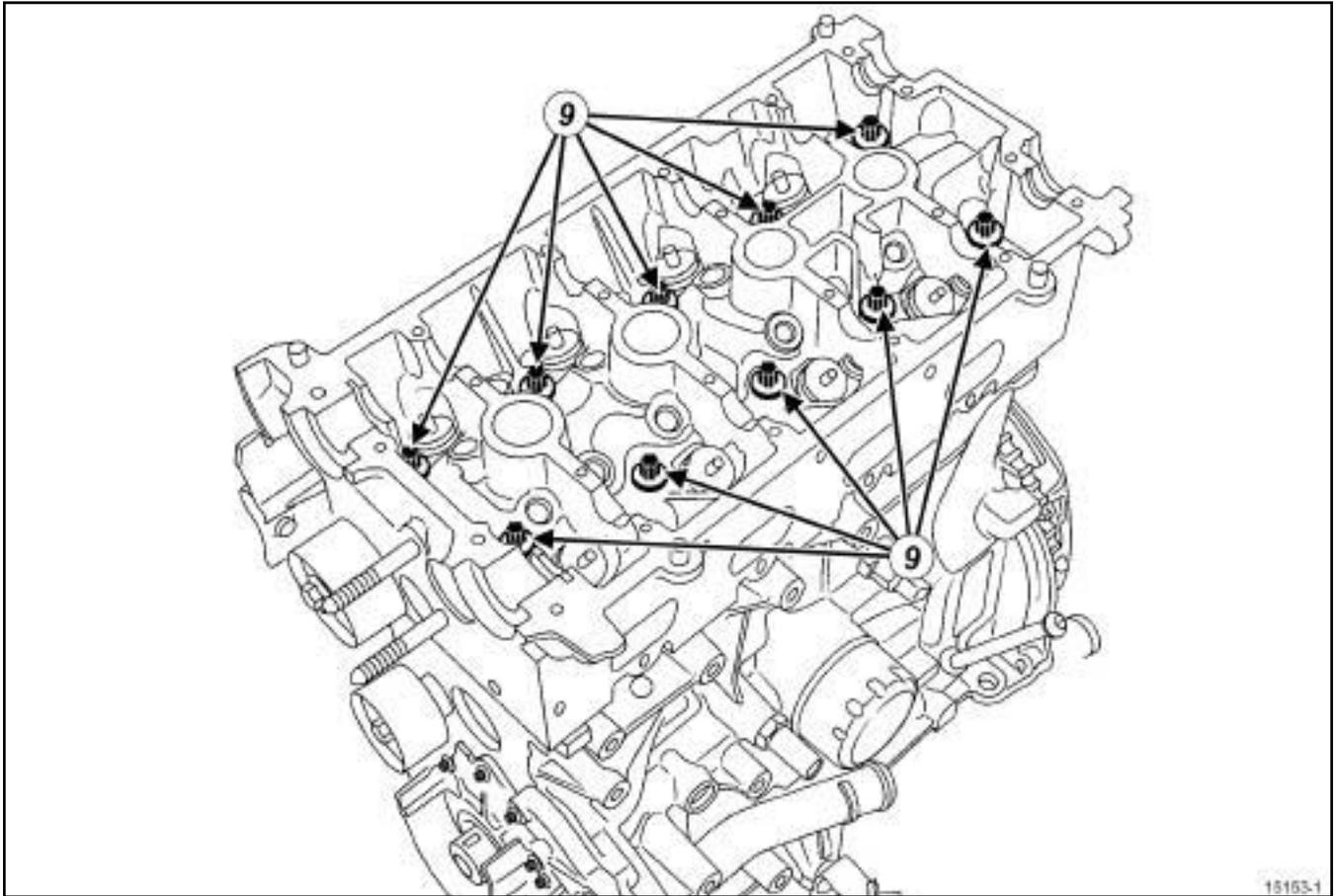
Note:

It is essential to keep the hydraulic tappets in a vertical position during the whole removal operation so that they remain primed.

## Cylinder head: Removal - Refitting

X74, and F4R

## II - OPERATION FOR REMOVAL OF PART CONCERNED



15153-1

15153-1

 Remove:

- the cylinder head bolts (9) ,
- the cylinder head,
- the cylinder head gasket.

- 
- Mount the cylinder head on the cylinder head support (Mot. 1573).

## REFITTING

## I - REFITTING PREPARATION OPERATION

## 1 - CLEANING

- 
- Perform the following operations:

- clean the cylinder head,
- clean the joint faces using **SUPER CLEANER FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) to dissolve any part of the seal still adhering

## Cylinder head: Removal - Refitting

X74, and F4R

by applying the product to the section to be cleaned; wait for about ten minutes, then remove the residue using a wooden spatula.

**WARNING**

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

**WARNING**

Protect the oilway so that foreign bodies do not enter the oil pipes in the cylinder head.

Failure to follow this instruction could lead to the blocking of the oilways, resulting in a rapid deterioration of the camshaft.

**WARNING**

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

**2 - CHECKING THE GASKET FACE**

- Check with a **cylinder head rule** and a **set of feeler gauges** to determine if the joint face has been deformed.

The maximum deformation is **0.05 mm**.

**WARNING**

No regrinding of the cylinder head is permitted.

- Test the cylinder head for any cracks using the **cylinder head test tank** (see **Cylinder head test tank: Use**) (Technical Note 6026A, 11A, Top and front of engine).
- For the cylinder head stripping down procedure (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding**, page **10A-180**) (Technical Note 6027A, 10A, Engine and peripherals).

**II - REFITTING OPERATION FOR PART CONCERNED**

- parts always to be replaced: Cylinder head gasket**

**parts always to be replaced: cylinder head bolts**

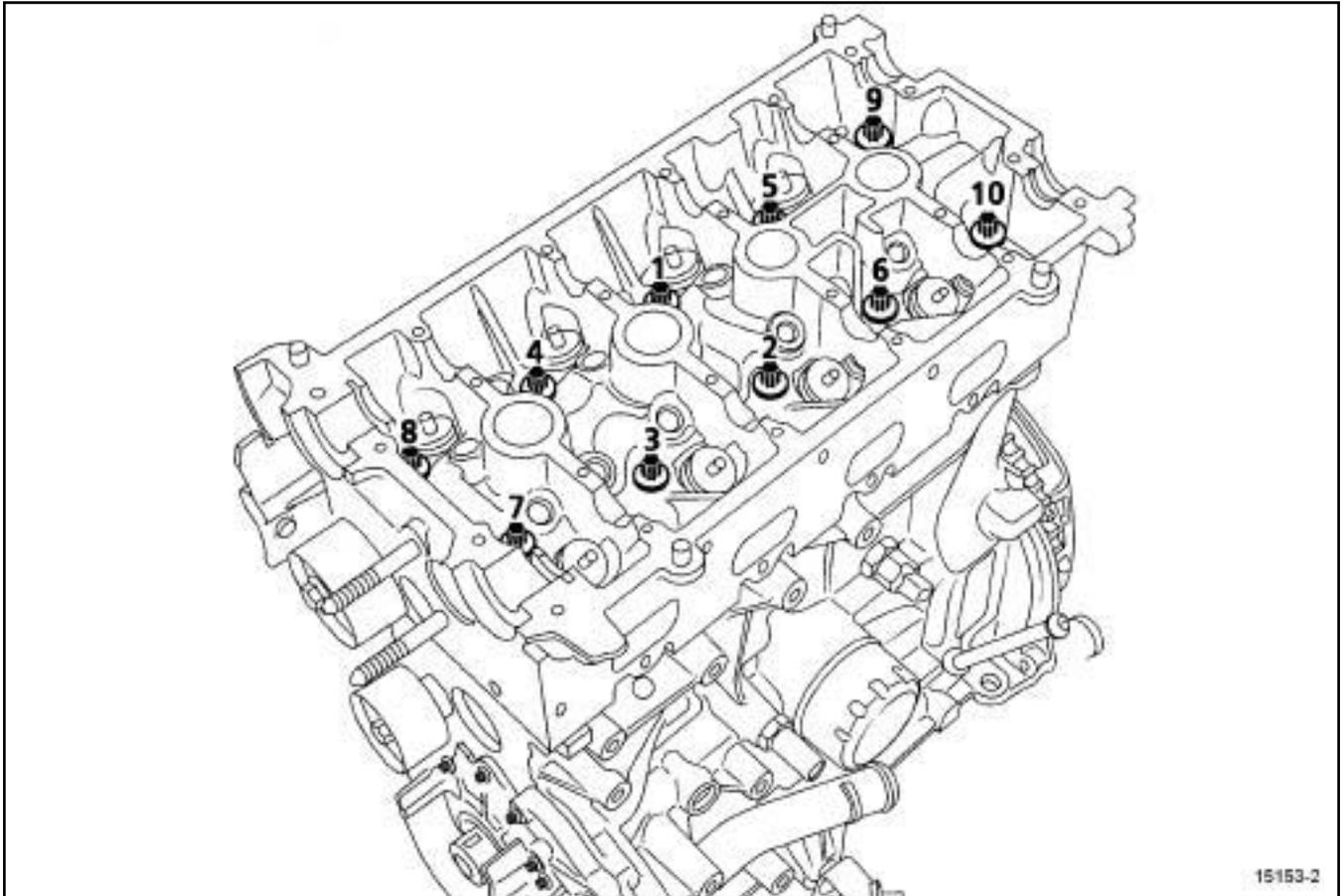
- Always position the pistons at mid-stroke to prevent any contact with the valves when refitting the camshafts.
- Refit the cylinder head.

**WARNING**

In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

- Refit new cylinder head bolts.

X74, and F4R



15153-2

15153-2

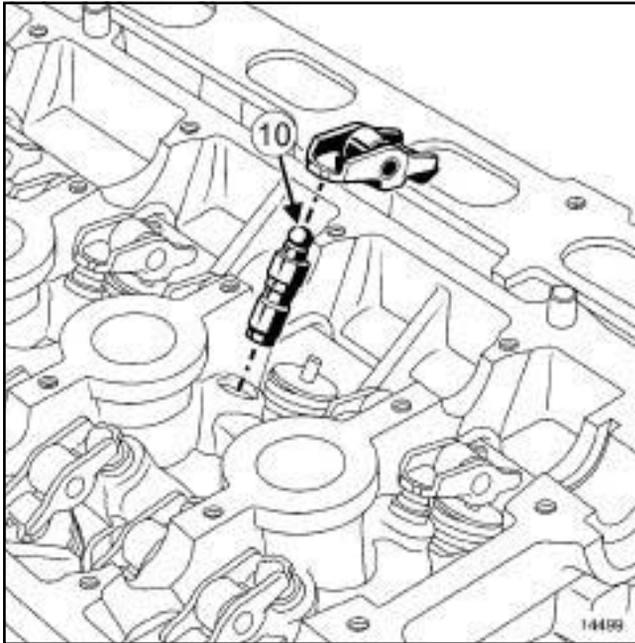
- Torque tighten (initial tightening) in order the **cylinder head bolts (initial torque) (30 N.m)**.
- Torque tighten in order and to angle the **cylinder head bolts (30 N.m + 180° ± 25°)**.

**WARNING**

Do not retighten the cylinder head bolts after applying this procedure.

X74, and F4R

## III - FINAL OPERATION



14499

- Reprime the hydraulic tappets (hydraulic tappets may empty after a long down time).

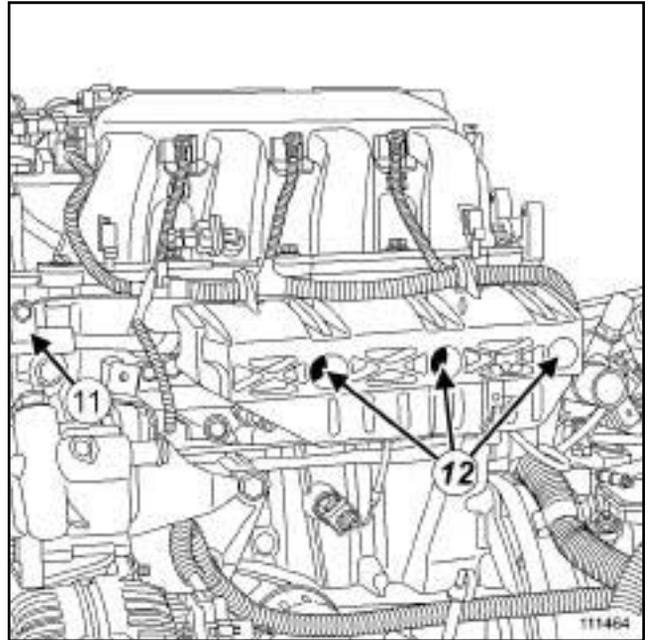
To check or reprime them, press the top of the tappet at (10) with your thumb.

If the tappet piston depresses:

- immerse the tappets in a container of fuel,
- refit the hydraulic tappets.

- Refit:

- the valve rockers,
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**),
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**),
- the oil separator (see **Oil decanter: Removal - Refitting**),
- the cylinder head water chamber (see **Water chamber: Removal - Refitting**),
- the inlet distributor (see **Inlet distributor: Removal - Refitting**).



111464

- Refit:

- the injector rail (see **Injector rail - Injectors: Removal - Refitting**),
- the electrical wiring bolt (11),
- the front section of the inlet distributor,
- the injector rail protector bolts (12).

- Torque tighten the **injector rail protector bolts (25 N.m)**.

- Refit the exhaust manifold (see **Exhaust manifold: Removal - Refitting**).

- Connect the oxygen sensor connector.

- Refit:

- the heat shield,
- the heat shield bolts.

- Torque tighten the **heat shield bolts (10 N.m)**.

- Refit:

- the timing belt (see **Timing belt: Removal - Refitting**),
- the accessories belt (see **Accessories belt: Removal - Refitting**).

- Fill and bleed the cooling system (see **Cooling system: Draining - Refilling**).

## Cylinder head: Removal - Refitting

X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2

### Equipment required

cylinder head testing tools

### Tightening torques

turbocharger oil return pipe bolts	8 N.m
------------------------------------	-------

turbocharger oil supply pipe union	25 N.m
------------------------------------	--------

## REMOVAL

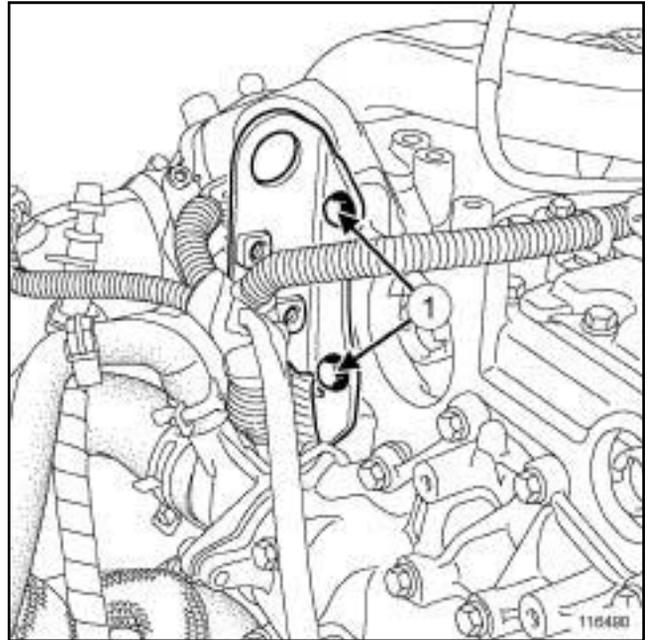
### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).

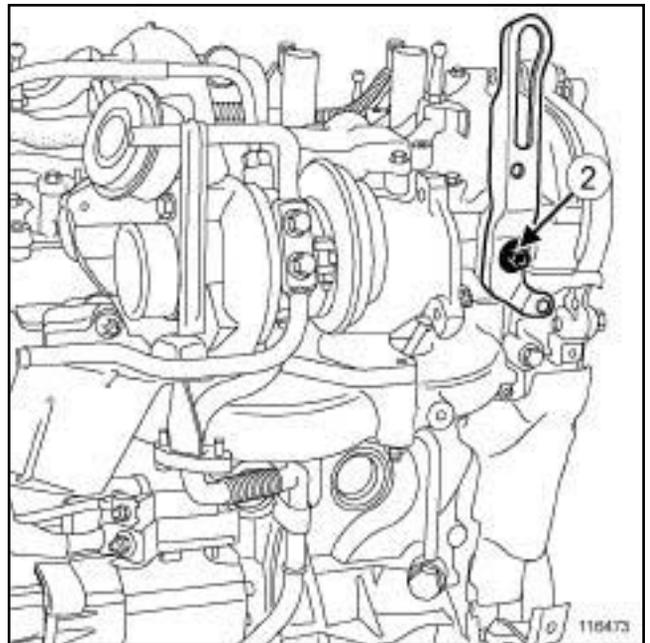
#### IMPORTANT

During this operation, secure the vehicle to the lift with a strap, to avoid any imbalance.

- Disconnect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Remove:
  - the engine cover,
  - the engine protector.
- Drain the cooling system (see **Cooling system: Draining - Refilling**) .
- Remove:
  - the catalytic pre-converter (see **Catalytic pre-converter: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) .



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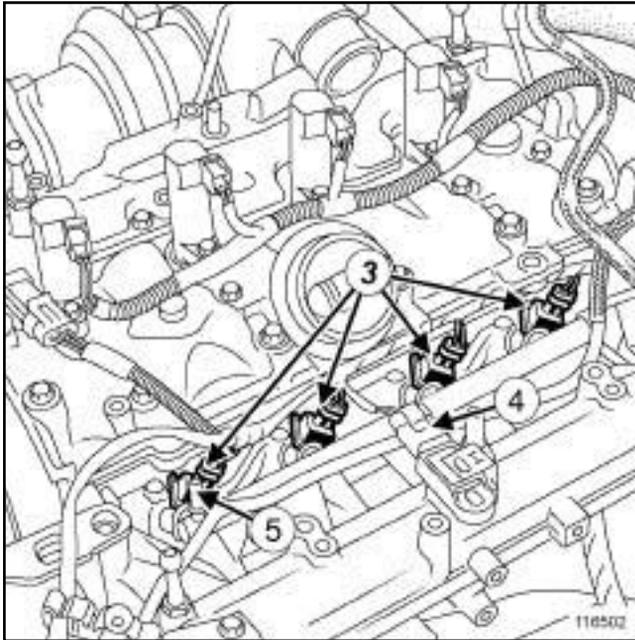
- Remove:
  - the mounting bolts (1) of the gearbox side lifting bracket,
  - the gearbox side lifting bracket,
  - the mounting bolt (2) of the lifting bracket on the suspended engine mounting side,
  - the suspended engine mounting side lifting bracket,
  - the ignition coils (see **Coils: Removal - Refitting**) ,

X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2

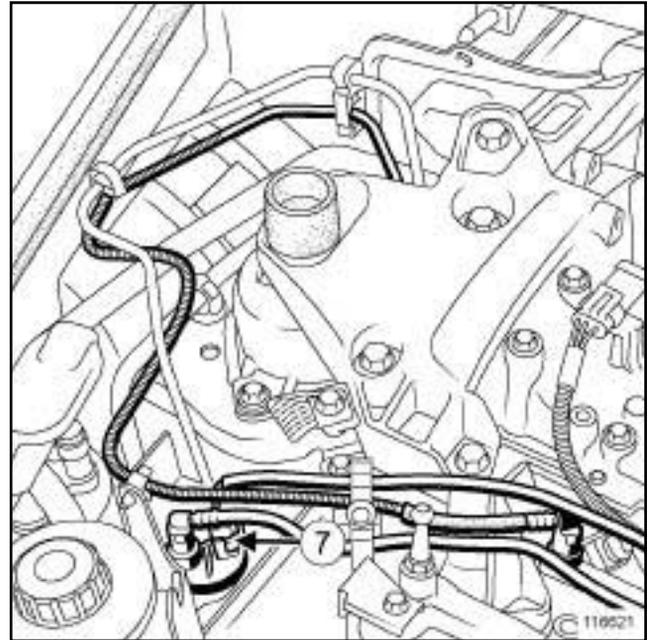
-the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**).

## Cylinder head: Removal - Refitting

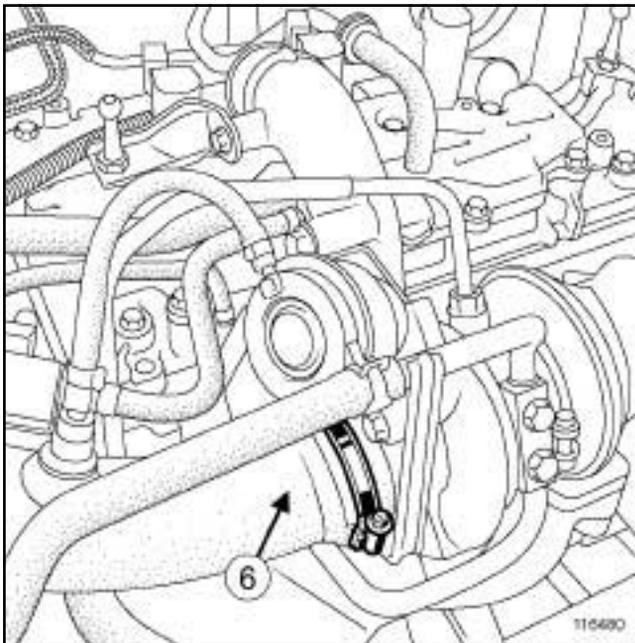
X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2



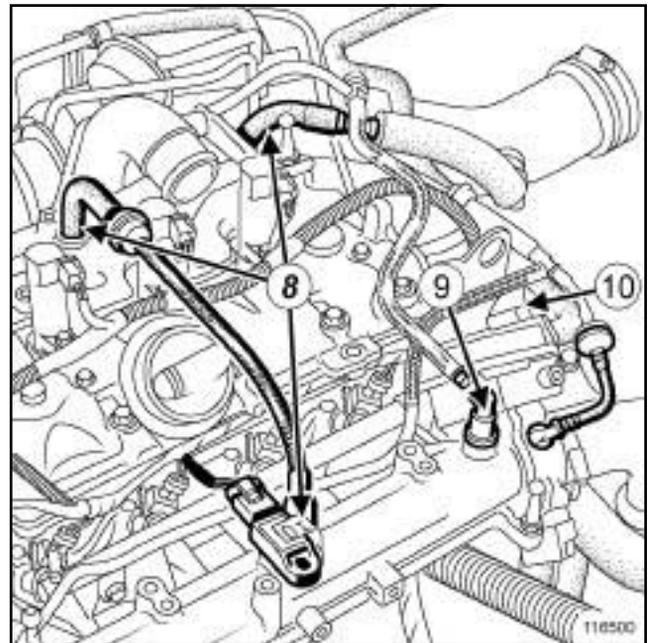
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116500

❑ Disconnect:

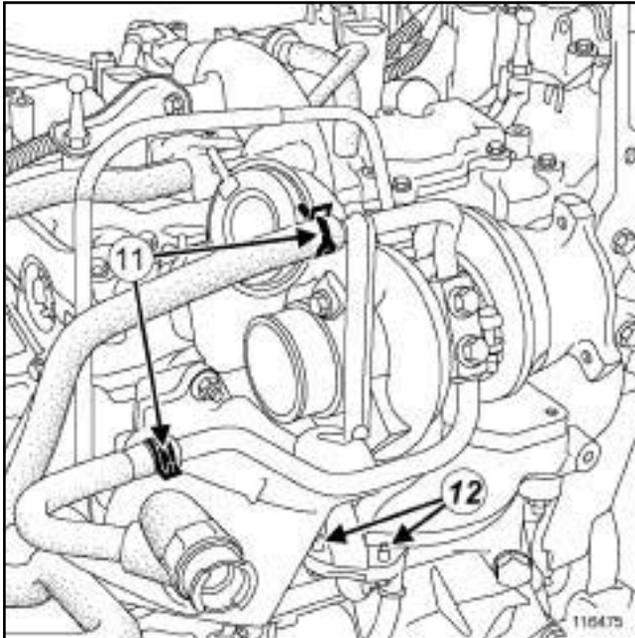
- the injector connectors (3) ,
- the downstream inlet pressure sensor connector (4) ,
- the fuel supply pipe on the rail at (5) ,
- the air inlet duct on the throttle valve,
- the turbocharger air inlet duct (6) ,
- the fuel vapour recirculation valve connector (7) ,
- the oil vapour recirculation pipes (8) on the inlet manifold,

X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2

- the pipe **(9)** from the brake servo on the inlet manifold,
  - the throttle valve connector **(10)** .
- Move the injector harness to one side.

## Cylinder head: Removal - Refitting

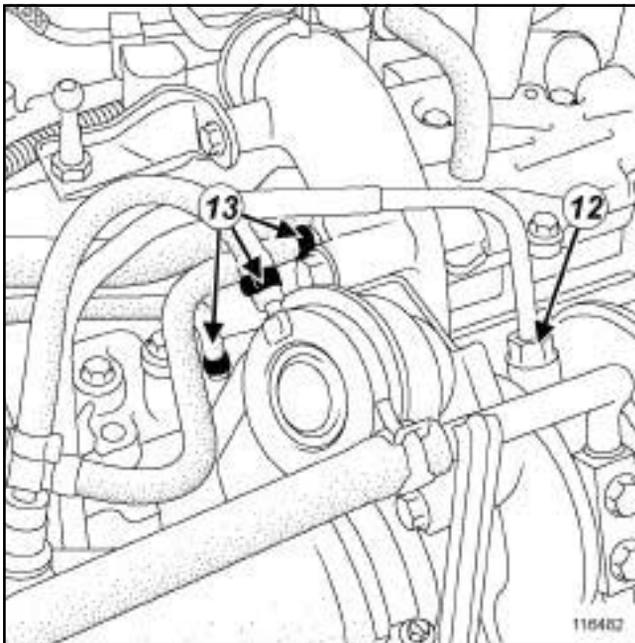
X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2



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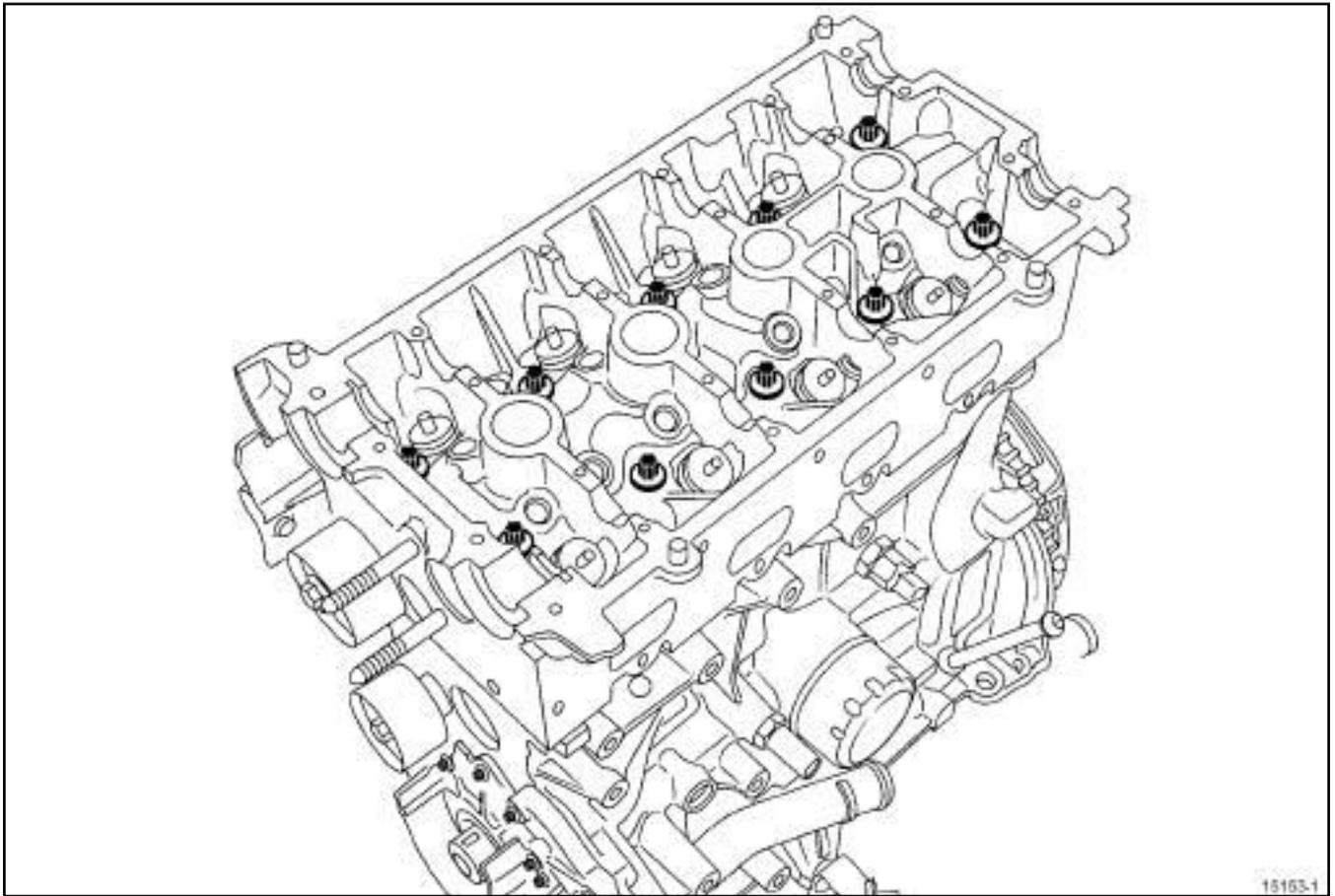
 Remove:

- the mounting clips (11) from the turbocharger cooling hoses,
- the turbocharger cooling hoses,
- the turbocharger oil supply and return pipes at (12) ,
- the turbocharging pressure regulation hoses on the turbocharger at (13) ,
- the cooling hose clips (14) on the water chamber,
- the cooling hoses on the water chamber.

## Cylinder head: Removal - Refitting

X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2

### II - OPERATION FOR REMOVAL OF PART CONCERNED



15153-1

15153-1

- Remove:
  - the cylinder head mounting bolts,
  - the cylinder head.

### CLEANING

- 

#### IMPORTANT

Do not scratch the aluminium sealing surfaces.  
Wear goggles.  
Wear gloves during the operation.

- Clean the gasket faces with **DECAPJOINT** to dissolve off any part of the gasket still attached.

- Apply the product to the part to be cleaned, wait approximately ten minutes, then remove the residue with a wooden spatula.

#### WARNING

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

## Cylinder head: Removal - Refitting

X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2

## CHECK

## CHECKING THE CYLINDER HEAD GASKET FACE

- Check that there is no gasket face bow by using a ruler and a set of feeler gauges.

Maximum deformation: **0.05 mm**.

**WARNING**

No regrinding of the cylinder head is permitted.

- Test the cylinder head to detect any possible cracks using the **cylinder head testing tools**.
- For the cylinder head stripping down procedure (see ) (Technical Note 6027A, 10A, Engine and peripherals).

## REFITTING

## I - REFITTING PREPARATION OPERATION

- Position the pistons at mid-stroke to prevent any contact with the valves when refitting the camshafts.
- Rebuild the cylinder head (see ) (Technical Note 6027A, 10A, Engine and peripherals).

## II - REFITTING OPERATION FOR PART CONCERNED

- 

**WARNING**

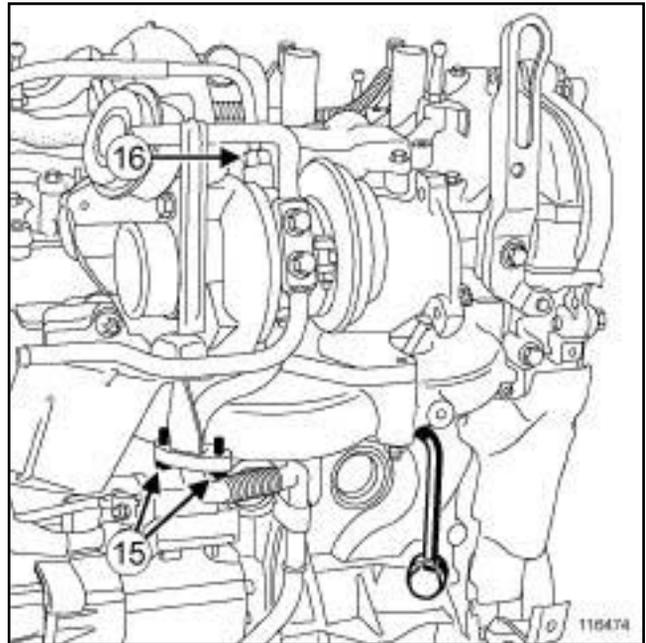
In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

- Fit the new cylinder head gasket.
- Refit the cylinder head.
- Tighten the cylinder head (see **MR 353 Mechanical, 07A, Engine and transmission assembly values and adjustment: Cylinder head tightening**).

## III - FINAL OPERATION

- Refit:
  - the cooling hoses on the water chamber,
  - the cooling hose clips on the water chamber,
  - the turbocharging pressure regulation hoses on the turbocharger,
  - the turbocharger oil supply and return pipes,
  - the turbocharger cooling hoses,

- the turbocharger cooling hose mounting clips,



116474

- Torque tighten:
  - the **turbocharger oil return pipe bolts (8 N.m) (15)**,
  - the **turbocharger oil supply pipe union (25 N.m) (16)**.
- Fit the injector wiring harness.
- Connect:
  - the throttle valve connector,
  - the brake servo pipe from the inlet manifold,
  - the oil vapour recirculation pipes on the inlet manifold,
  - the fuel vapour recirculation valve connector,
  - the turbocharger air inlet duct,
  - the air inlet duct on the throttle valve,
  - the fuel supply pipe on the rail,
  - the downstream inlet pressure sensor connector,
  - the injector connectors.
- Refit:
  - the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**),
  - the ignition coils (see **Coils: Removal - Refitting**),
  - the lifting bracket on the timing end,
  - the suspended engine mounting side lifting bracket mounting bolt,

## Cylinder head: Removal - Refitting

X73, and F4R, and 766 or 767, and DOCUMENTATION PHASE 2

- the gearbox side lifting bracket,
  - the gearbox side lifting bracket mounting bolts,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the catalytic pre-converter (see **Catalytic pre-converter: Removal - Refitting**) ,
  - the engine cover,
  - the engine protector.
- Connect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Perform the following operations:
- fill the cooling system (see **Cooling system: Draining - Refilling**) ,
  - bleed the cooling system (see ) .

X83

Equipment required	
cylinder head testing tools	
workshop hoist with adapter for removing CNG tanks	
Diagnostic tool	

Tightening torques 	
cylinder head bolts	30 N.m
cylinder head bolts	180° ±25°

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

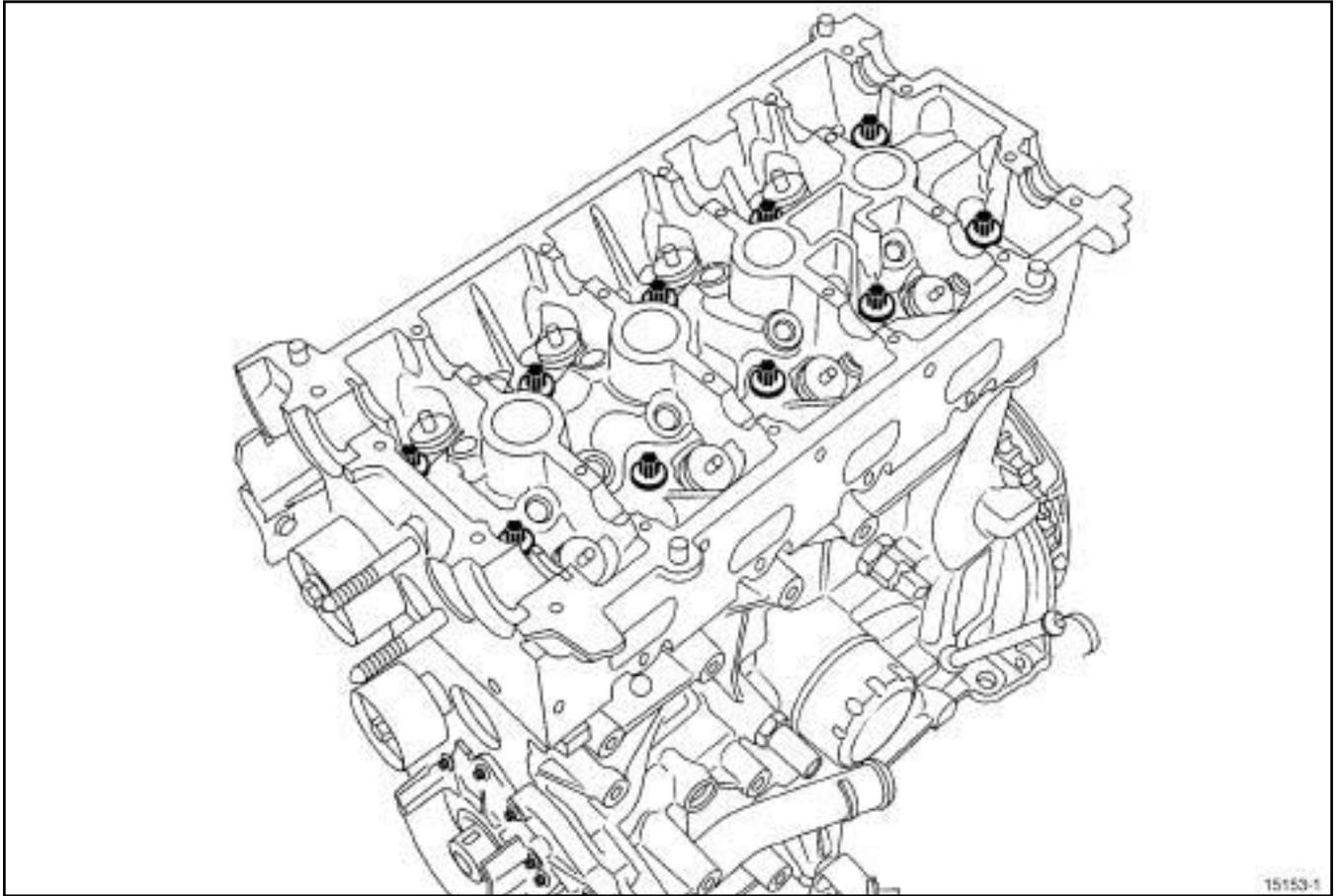
- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Disconnect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Remove:
  - the air filter unit (see **Air filter unit: Removal - Refitting**) ,
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the inlet manifold (see ) ,
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**)
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) .
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the exhaust manifold (see **Exhaust manifold: Removal - Refitting**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,

- the inlet and exhaust camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) .

## Cylinder head: Removal - Refitting

X83

## II - OPERATION FOR REMOVAL OF PART CONCERNED

15153-1  
15153-1 Remove:

- the cylinder head bolts,
- the cylinder head.

**REFITTING****I - REFITTING PREPARATION OPERATION****IMPORTANT**

Wear goggles with side protectors for this operation.

**IMPORTANT**

Wear cut-resistant gloves during the operation.

**WARNING**

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

**WARNING**

The gaskets must always be replaced with new gaskets.

## Cylinder head: Removal - Refitting

X83

- Clean the joint faces with **SUPER CLEANER FOR JOINT FACES** to dissolve any seal still adhering.
- Apply the product to the section to be cleaned; wait approximately ten minutes, then remove the residue using a wooden spatula.

**WARNING**

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

**WARNING**

Protect the oilway so that foreign bodies do not enter the oil pipes in the cylinder head.

Failure to follow this advice could block the oil supply pipes, causing rapid camshaft damage.

- With a ruler and set of feeler gauges, check for cylinder head gasket face bow.
- The maximum deformation is **0.05 mm**.

**WARNING**

No regrinding of the cylinder head is permitted.

- Strip the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding**, page **10A-180**) (Technical Note 6027A, 10A, Engine and peripherals).
- Test the cylinder head to detect any possible cracks using **cylinder head testing tools**.

**WARNING**

In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

**WARNING**

The joint faces must be clean, dry and free from grease (avoid finger marks).

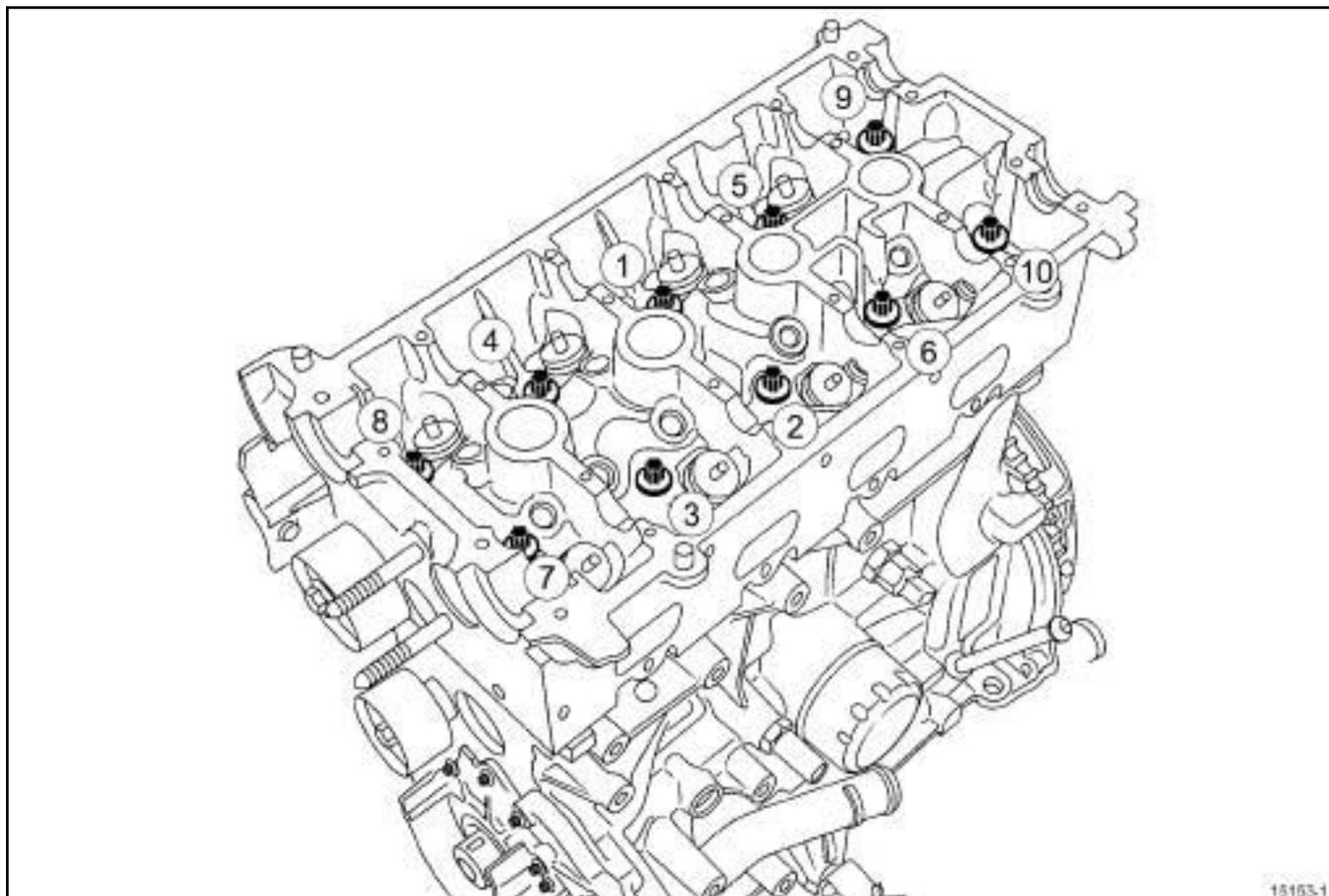
- Check for the presence of centring devices on the cylinder block.
- Fit a new cylinder head gasket.

- Bring the pistons to mid-stroke position to prevent any risk of contact with the valves when tightening the cylinder head.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit the cylinder head.
- Remove **workshop hoist with adapter for removing CNG tanks**.

X83



15153-1

15153-1

- Refit the new cylinder head bolts.

**WARNING**

Do not retighten the cylinder head bolts after applying this procedure.

- Torque tighten in order the **cylinder head bolts (30 N.m)**.
- Check that all of the cylinder head bolts are tightened to the correct torque.
- Angle tighten in order the **cylinder head bolts (180° ±25°)**.
- Check that all of the cylinder head bolts are tightened to the correct torque.

**III - FINAL OPERATION**

- Refit:
  - the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**),
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**),

- the exhaust manifold (see **Exhaust manifold: Removal - Refitting**),
- the battery (see **Battery: Removal - Refitting**) (80A, Battery),
- the timing belt (see **Timing belt: Removal - Refitting**).
- the accessories belt (see **Accessories belt: Removal - Refitting**),
- the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
- the oil decanter (see **Oil decanter: Removal - Refitting**),
- the inlet distributor (see **Inlet distributor: Removal - Refitting**),
- the inlet manifold (see ),
- the ignition coils (see **Coils: Removal - Refitting**),
- the throttle valve (see **Throttle valve: Removal - Refitting**),
- the air filter unit (see **Air filter unit: Removal - Refitting**).
- Connect the battery (see **Battery: Removal - Refitting**) (80A, Battery).

X83

- Using the **Diagnostic tool**, check that there are no faults stored by the injection computer and clear them if necessary.

## Cylinder head: Removal - Refitting

X91

Special tooling required	
<b>Mot. 1448</b>	Remote operation pliers for hose clips.
<b>Mot. 1202-01</b>	Clip pliers for hose clips (large size).
<b>Mot. 1202-02</b>	Clip pliers for hose clips (small size)
<b>Mot. 1054</b>	TDC setting pin.

Tightening torques 	
cylinder head bolts	<b>30 Nm</b>
cylinder head bolts	<b>30 Nm</b>
cylinder head bolts	<b>180° ± 25°</b>

### IMPORTANT

Wear protective gloves during the operation.

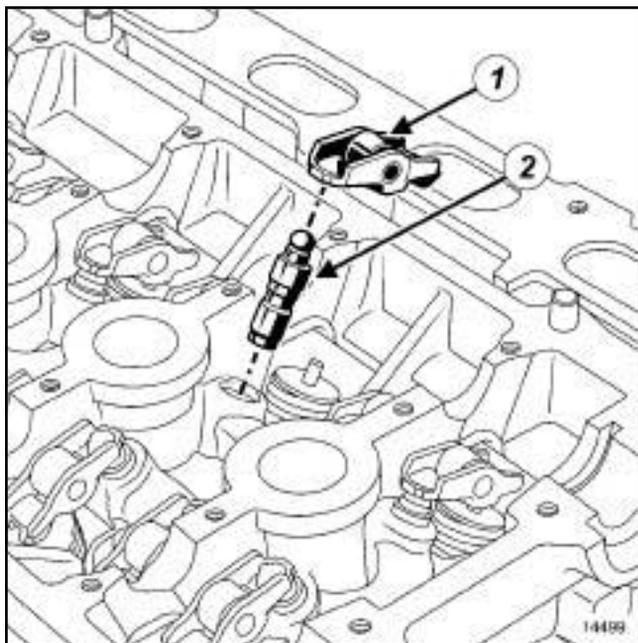
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (MR 415, 02A, Lifting equipment).
- Disconnect the battery (see **Battery: Removal - Refitting**) (MR 415, 80A, Battery).
- Drain the cooling system (see **Cooling system: Draining - Refilling**) .
- Clean the cooling system (see **Cooling system: Draining - Refilling**) .
- Remove:
  - the engine cover,
  - the coils (see **Coils: Removal - Refitting**) ,
  - the oil decanter (see **Oil decanter: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 415, 35A, Wheels and tyres),
  - the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (MR 416, 55A, Exterior protection),
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,

- the engine undertray bolts,
- the engine undertray,
- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
- the rear suspended engine mounting (see **Lower engine tie-bar: Removal - Refitting**) ,
- the front right-hand driveshaft (see **Front right-hand driveshaft: Removal - Refitting**) (MR 415, 29A, Driveshafts),
- the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
- the turbocharger oil return pipe (see **Turbocharger oil pipe: Removal - Refitting**) ,
- the turbocharger supply pipe (see **Turbocharger oil pipe: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the timing end camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) .

X91



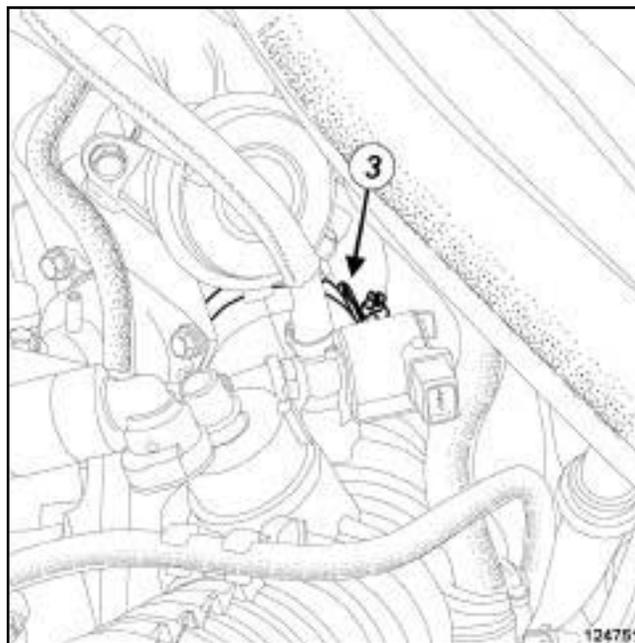
14499

❑ Remove:

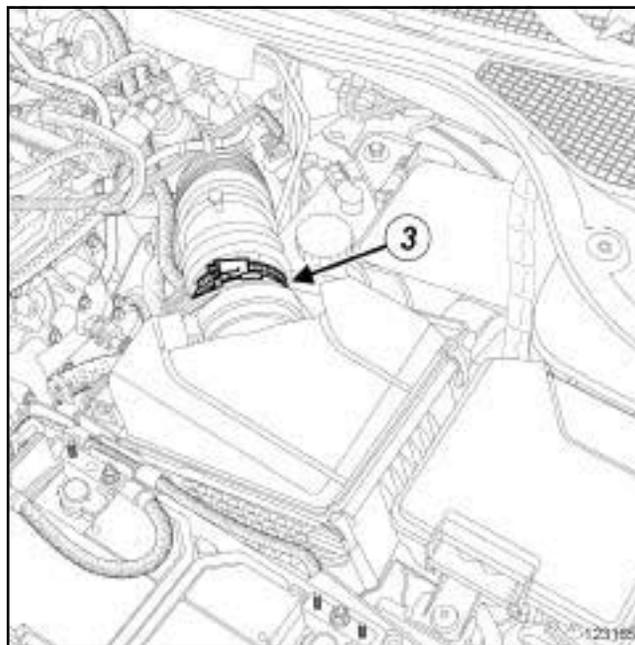
- the valve rockers (1) ,
- the hydraulic tappets (2) .

Note:

To prevent any risk of unpriming the hydraulic tappets make sure that they are vertical.



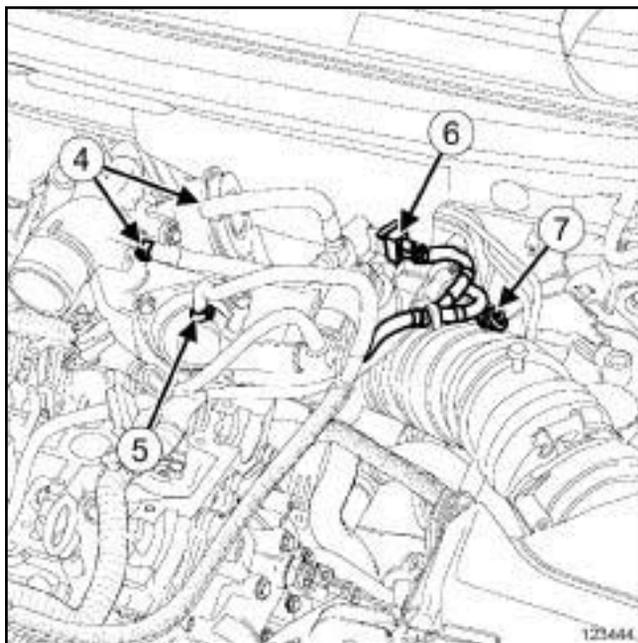
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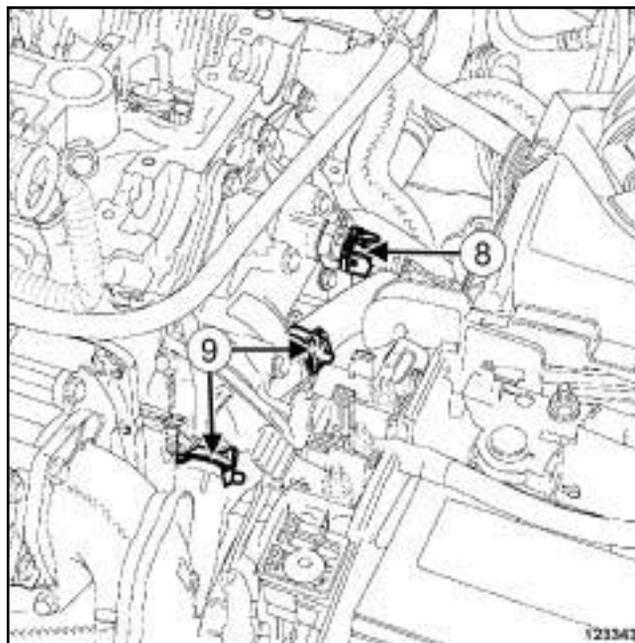
- ❑ Undo the air filter unit air outlet pipe clips (3) .

X91



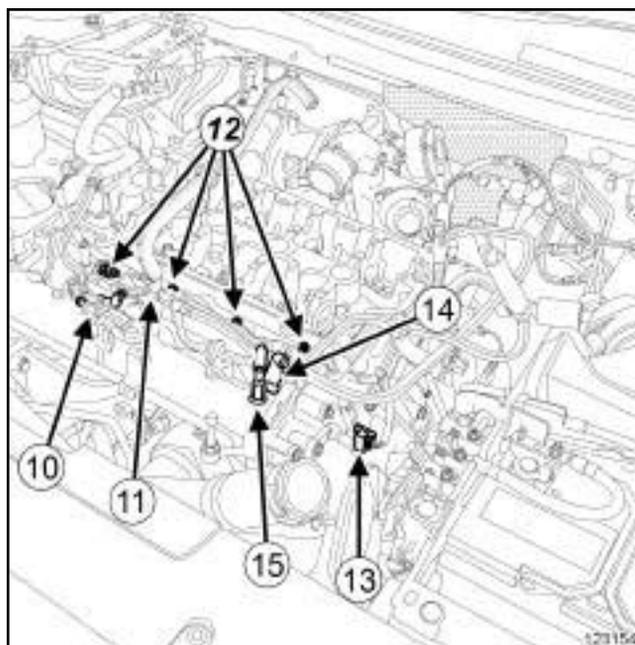
123344

- Unclip:
  - the clip (4) of each turbocharging pressure regulation hose,
  - the clip (5) of the anti-surge valve hose.
- Disconnect:
  - the turbocharging pressure regulation hoses,
  - the anti-surge valve hose,
  - the turbocharging pressure regulation solenoid valve connector (6) ,
  - the brake servo double non-return valve connector (7) .
- Unclip the hoses on the air filter unit air outlet pipe.
- Remove the air filter box air outlet pipe.



123343

- Disconnect the coolant temperature sensor connector (8) .
- Move aside the clip (9) of each water chamber cooling hose using tool (Mot. 1448) or (Mot. 1202-01) or (Mot. 1202-02).
- Disconnect the water chamber cooling hoses.
- Remove the engine wiring bolt from the cylinder head.



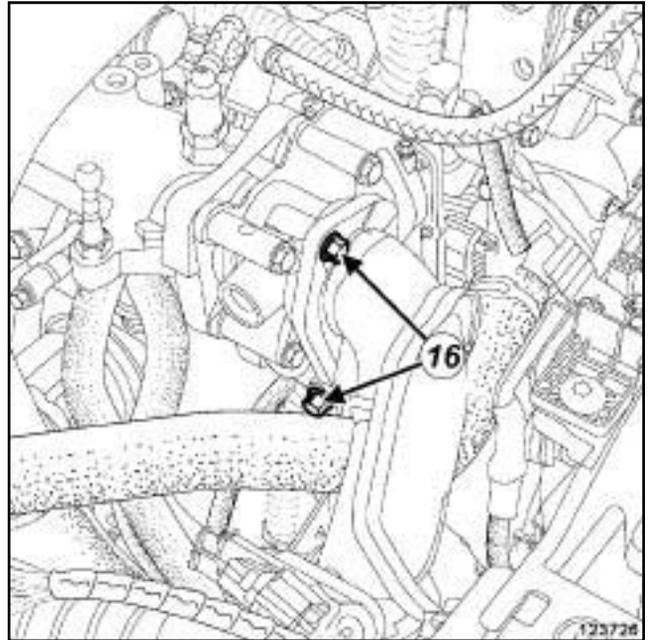
123154

- Disconnect the connector (10) from the air pressure sensor.
- Unclip the wiring from the air inlet pressure sensor.

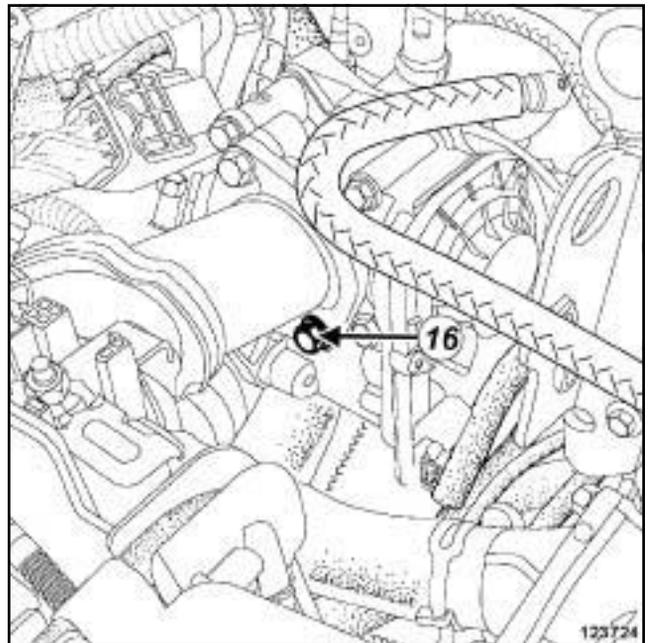
## Cylinder head: Removal - Refitting

X91

- Disconnect:
  - the oil vapour rebreather solenoid valve connector **(11)**,
  - the injector connectors **(12)**,
  - the throttle valve connector **(13)**,
  - the brake servo vacuum pipe union **(14)** on the intake distributor,
  - the petrol vapour rebreather pipe union **(15)** on the intake distributor.
- Move the injector wiring to one side.
- Unclip the petrol vapour rebreather pipe on the injector rail.



123726

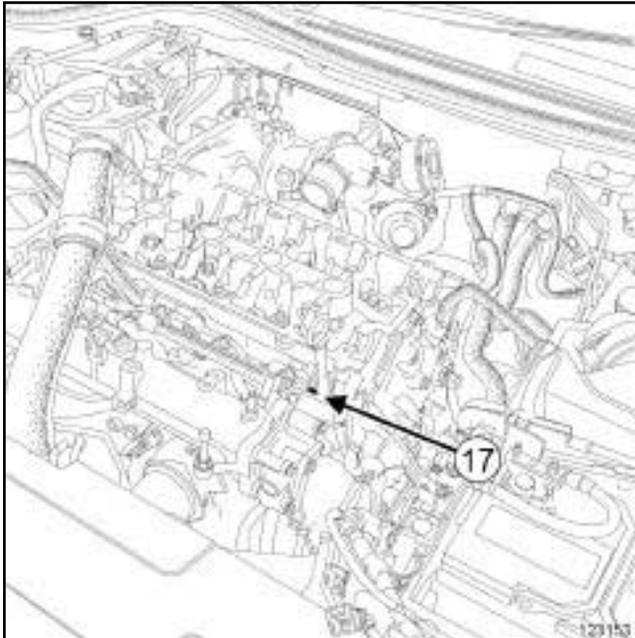


123724

- Remove the intercooler air outlet pipe bolts **(16)**.
- Disconnect the intercooler outlet air pipe.

## Cylinder head: Removal - Refitting

X91

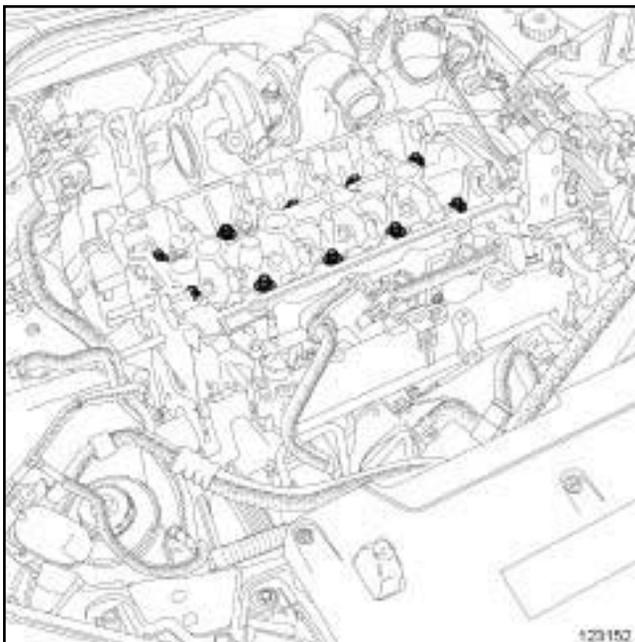


123153

Remove:

- the oil dipstick,
- the dipstick well bolt (17) ,
- the dipstick well.

### II - OPERATION FOR REMOVAL OF PART CONCERNED



123152

Remove:

- the cylinder head bolts,
- the cylinder head,

- the cylinder head gasket.

### REFITTING

#### I - REFITTING PREPARATION OPERATION

- Always replace the cylinder head bolts.

#### 1 - CLEANING THE CYLINDER HEAD

- Clean the cylinder head.

#### IMPORTANT

Wear goggles with side protectors for this operation.

#### IMPORTANT

Wear latex gloves during the operation.

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### WARNING

The joint faces must be clean, dry and free from grease (avoid finger marks).

#### WARNING

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

- Clean the joint faces using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (MR 415, 04B,

X91

Consumables - Products) to dissolve the part of the seal that is still attached to the cylinder head and the cylinder block.

- Apply the product to the part to be cleaned, wait approximately ten minutes then remove the residue with a wooden spatula.
- Check for gasket face deformation using a ruler and a set of shims.

the maximum deformation is **0.05 mm**.

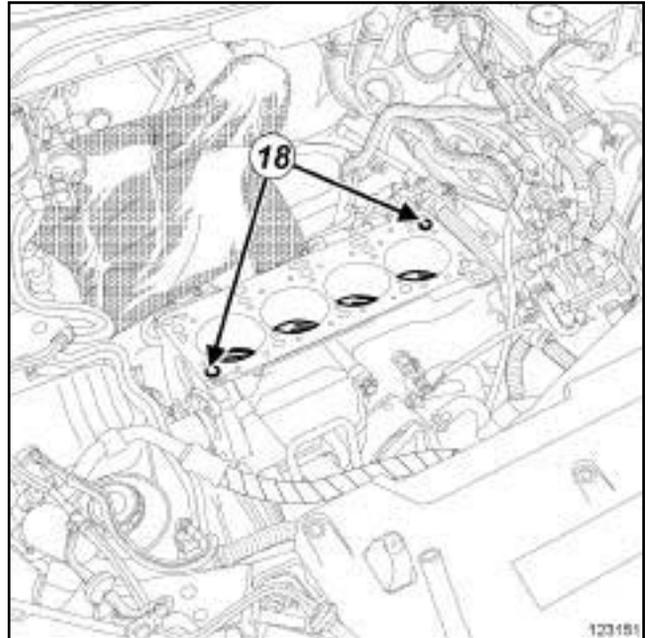
**WARNING**

No regrinding of the cylinder head is permitted.

- Strip down the cylinder head (see ) (Technical Note 6027A, 10A, Engine and peripherals).
- Test the cylinder head for any cracks with the cylinder head testing kit (see **Garage Equipment catalogue**).
- Rebuild the cylinder head (see ) (Technical Note 6027A, 10A, Engine and peripherals).

**2 - PREPARING TO FIT THE CYLINDER HEAD**

- Remove the TDC setting pin (**Mot. 1054**).
- Refit:
  - the crankshaft sprocket,
  - the crankshaft accessories pulley,
  - the crankshaft accessories pulley bolt.



123151

- Place the pistons at half stroke.
- Check that the centring devices (**18**) are present and in good condition on the cylinder block.

**WARNING**

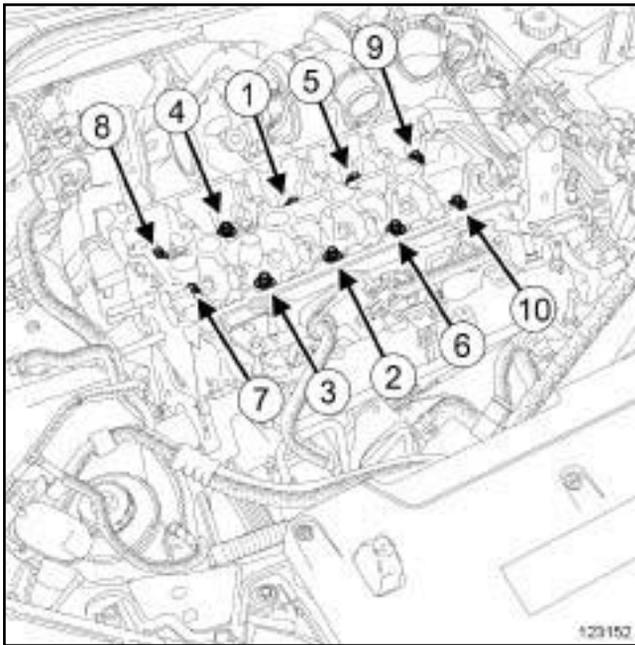
In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

- Refit the new cylinder head gasket.

## Cylinder head: Removal - Refitting

X91

## II - REFITTING OPERATION FOR PART CONCERNED



123152

- Refit the cylinder head.
- Refit the new cylinder head bolts.
- Screw in the cylinder head bolts in order, without tightening them.
- Firstly, torque tighten in order the **cylinder head bolts (30 Nm)**.
- Again torque tighten in order the **cylinder head bolts (30 Nm)**.
- Angle tighten in order the **cylinder head bolts (180° ± 25°)**.

**WARNING**

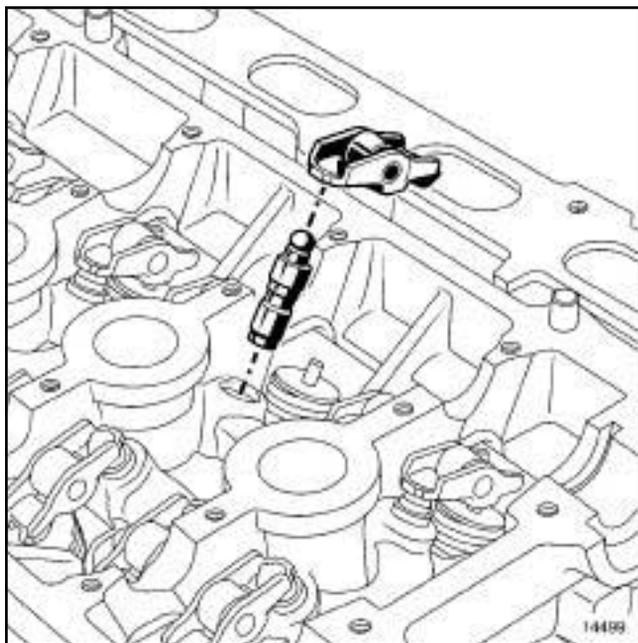
Do not retighten the cylinder head mounting bolts after applying this procedure.

## III - FINAL OPERATION.

- Refit:
  - the dipstick well,
  - the dipstick well bolt,
  - the dipstick.
- Connect the intercooler air outlet pipe.
- Refit the intercooler air outlet pipe bolts.
- Clip the petrol vapour rebreather pipe on the injector rail.
- Position the injector wiring.

- Connect:
  - the petrol vapour rebreather pipe union on the intake distributor,
  - the brake servo vacuum pipe union on the intake distributor,
  - the throttle valve connector,
  - the injector connectors,
  - the oil vapour rebreather solenoid valve connector,
- Clip the wiring of the air inlet pressure sensor.
- Connect the air inlet pressure sensor connector.
- Refit the engine wiring bolt on the cylinder head.
- Connect the cooling hoses to the water chamber.
- Position the clips of the water chamber cooling hoses using tool **(Mot. 1448)** or **(Mot. 1202-01)** or **(Mot. 1202-02)**.
- Connect the coolant temperature sensor connector.
- Refit the air filter box air outlet pipe.
- Connect:
  - the brake servo double non-return valve connector,
  - the turbocharging pressure regulation solenoid valve connector,
  - the anti-surge valve hose,
  - the turbocharging pressure regulation hoses
- Clip:
  - the clip of the anti-surge valve hose,
  - the clip of each turbocharging pressure regulation hose.
- Clip:
  - the hoses on the air filter unit air outlet pipe,
  - the turbocharger regulation solenoid valve wiring,
  - the brake servo vacuum pipe on the air filter unit air outlet pipe.
- Tighten the clips on the air filter unit air outlet pipe.

X91



14499

- To check whether the hydraulic tappets need repriming, press the top of each tappet with your thumb. If the tappet piston can be pressed in, immerse the tappet in a container filled with diesel fuel.
- Press on the top of the tappet to expel air bubbles.
- Refit:
  - the hydraulic tappets.
  - the valve rockers,
  - the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**)
  - the camshaft seals on the timing end (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the turbocharger supply pipe (see **Turbocharger oil pipe: Removal - Refitting**) ,
  - the turbocharger oil return pipe (see **Turbocharger oil pipe: Removal - Refitting**) ,
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
  - the front right-hand driveshaft (see **Front right-hand driveshaft: Removal - Refitting**) (MR 415, 29A, Driveshafts),
  - the suspended engine mounting (see **Lower engine tie-bar: Removal - Refitting**) ,

- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the front right-hand wheel arch liner (see **Front wheel arch liner: Removal - Refitting**) (MR 416, 55A, Exterior protection),
- the front right-hand wheel (see **Wheel: Removal - Refitting**) (MR 415, 35A, Wheels and tyres),
- the oil decanter (see **Oil decanter: Removal - Refitting**)
- the coils (see **Coils: Removal - Refitting**) ,
- the engine cover.

- Perform the following operations:

- fill the cooling system (see **Cooling system: Draining - Refilling**) ,
- bleed the cooling system (see **Cooling system: Draining - Refilling**) .

- Refit:

- the engine cover,
- the engine undertray,
- the engine undertray bolts.

- Tighten the engine undertray bolts.

- Connect the battery (see **Battery: Removal - Refitting**) (MR 415, 80A, Battery).

## Cylinder head: Removal - Refitting

X95

## Special tooling required

**Mot. 1448** Remote operation pliers for hose clips.

Tightening torques 

cylinder head bolts **30 N.m**

cylinder head bolts **180° ± 25°**

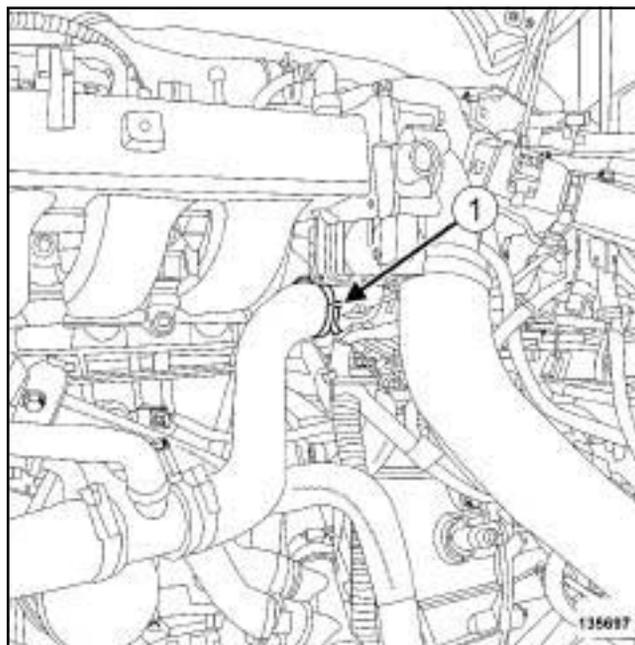
**IMPORTANT**

Wear protective gloves during the operation.

**REMOVAL****I - REMOVAL PREPARATION OPERATION**

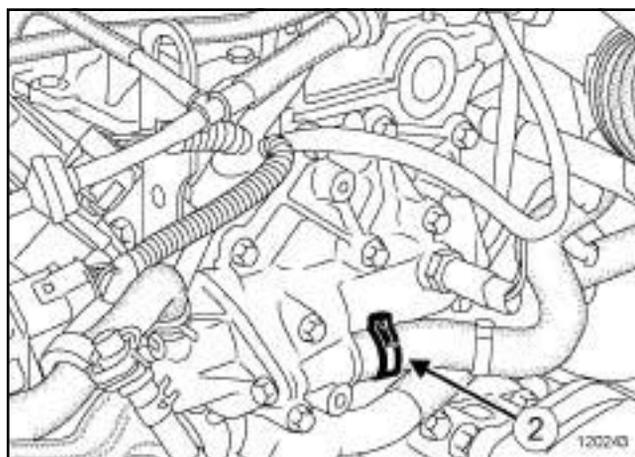
- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove:
  - the engine cover,
  - the battery (see ) (80A, Battery),
  - the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),
  - the engine undertray bolts,
  - the engine undertray,
  - the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front section of the front wheel arch liners (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the radiator mounting cross member (see **Radiator mounting cross member: Removal - Refitting**) (31A, Front axle components),
  - the windscreen wiper arms (see **Windscreen wiper arm: Removal - Refitting**) (85A, Wiping - Washing),
  - the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the scoop under the scuttle panel grille (see **Scoop under the scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment).

- Drain the cooling system (see **Cooling system: Draining - Refilling**).



135697

- Using the tool (**Mot. 1448**), separate the clip (1) on the water chamber outlet hose.
- Disconnect the outlet hose from the water chamber.

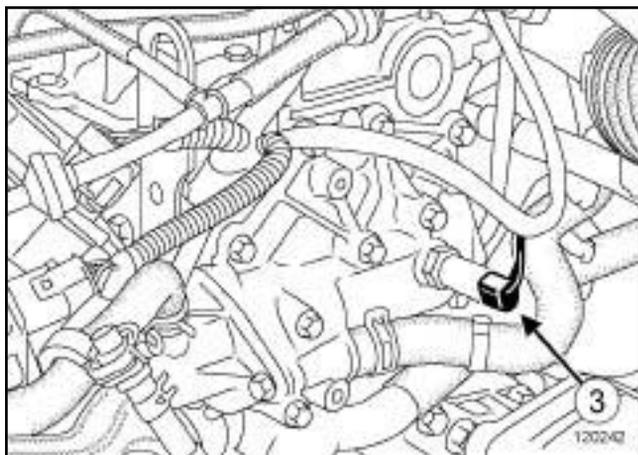


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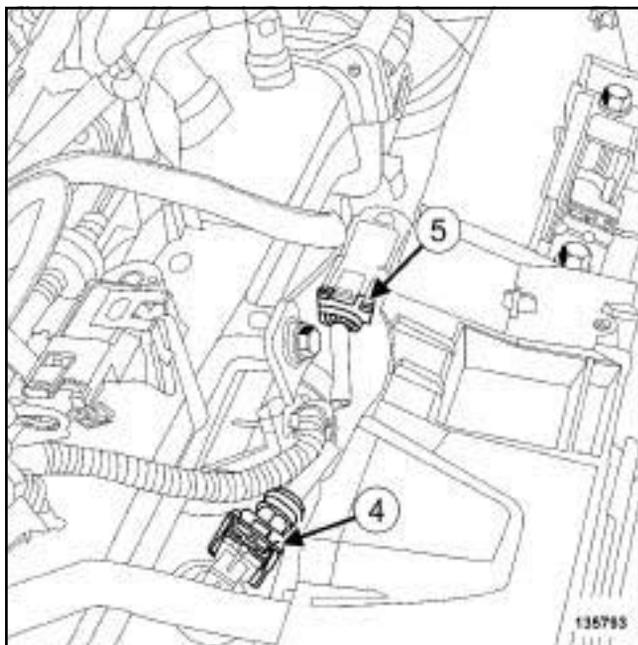
- Using the tool (**Mot. 1448**), separate the clip (2) on the heater matrix hose.
- Disconnect the heater matrix hose.

## Cylinder head: Removal - Refitting

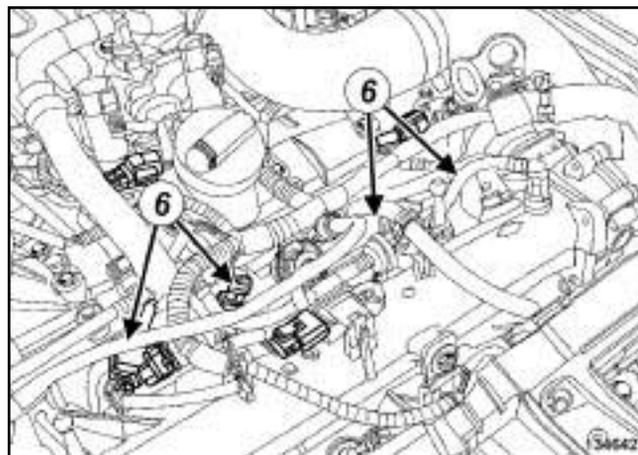
X95



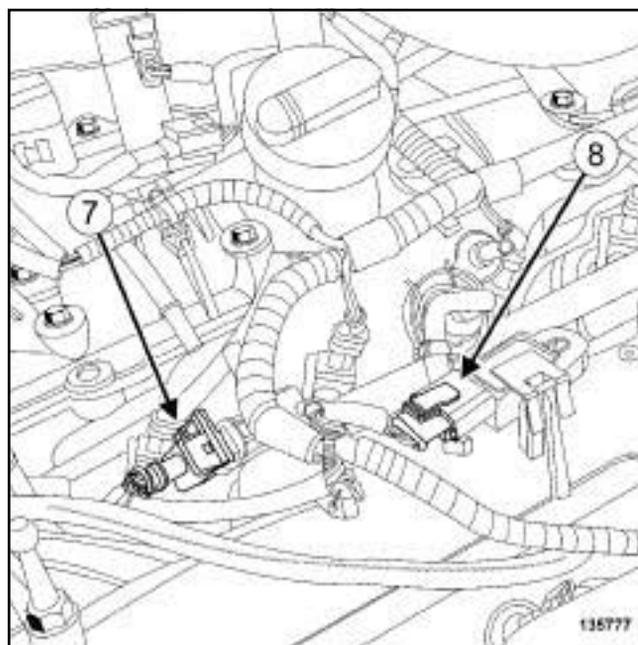
- ❑ Disconnect the coolant temperature sensor connector (3) from the water chamber.



- ❑ Disconnect:
  - the air temperature sensor connector (4) on the intercooler air outlet pipe,
  - the air pressure sensor connector (5) on the intercooler air outlet pipe.

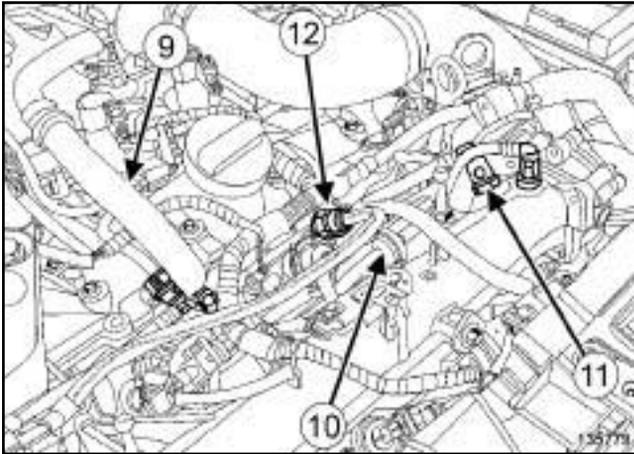


- ❑ Disconnect the injector connectors (6) .



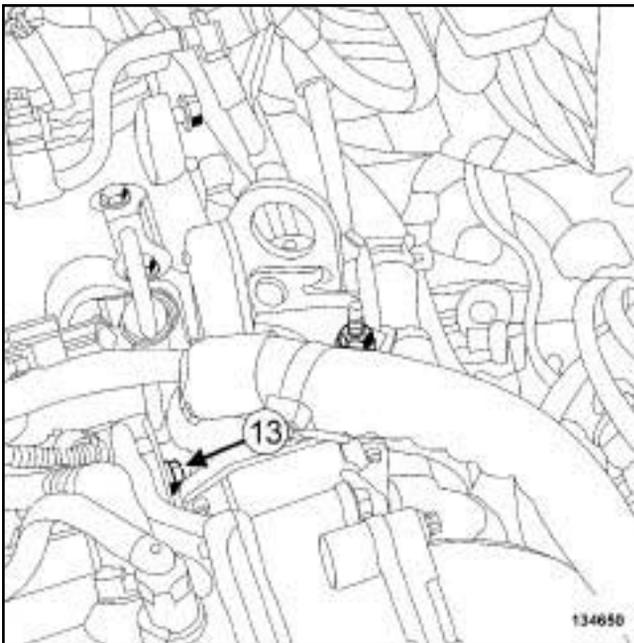
- ❑ Disconnect:
  - the oil vapour rebreathing solenoid valve connector (7) ,
  - the air pressure sensor connector (8) on the inlet manifold.

X95



135779

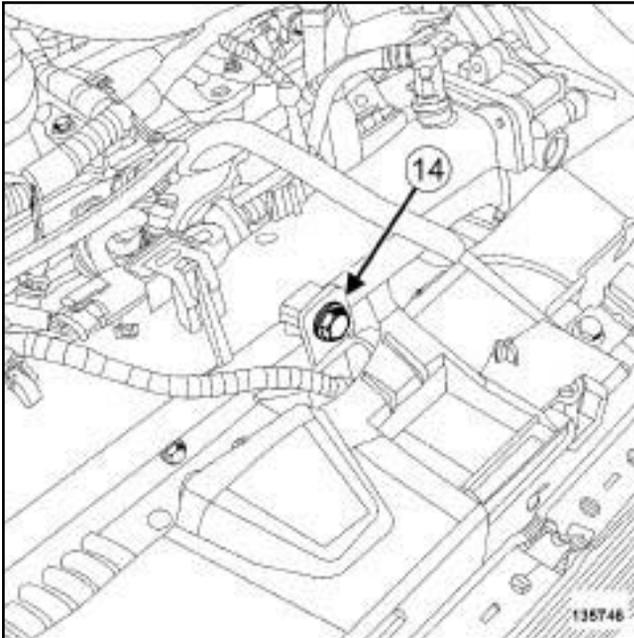
- Remove:
  - the oil vapour rebreathing pipe (9) ,
  - the petrol vapour rebreathing pipe (10) .
- Disconnect the vacuum pipe connector (11) from the brake servo.
- Move the brake servo vacuum pipe to one side.
- Disconnect the fuel supply pipe (12) from the injector rail.
- Move the fuel supply pipe aside.



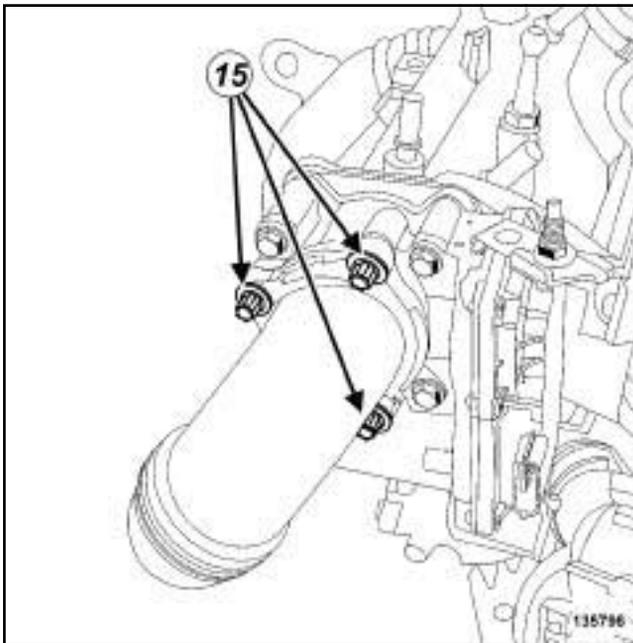
134650

- Remove:
  - the dipstick guide bolt (13) ,
  - the dipstick tube.

X95



135746



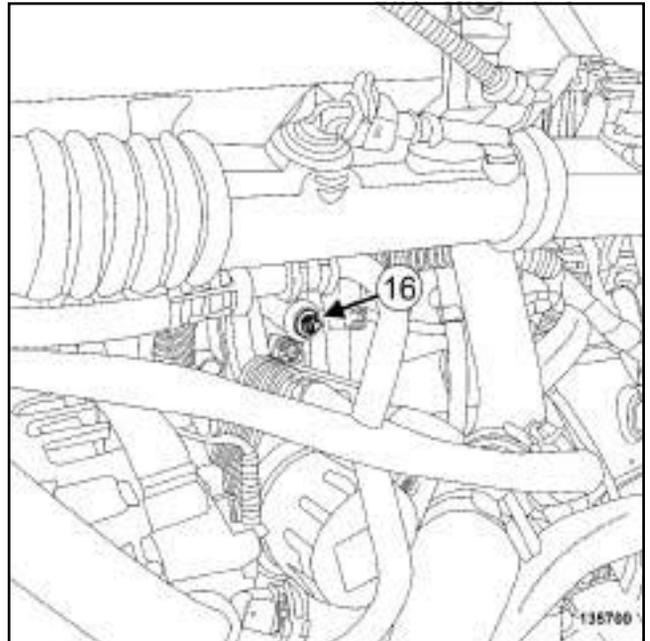
135796

- Remove:
  - the bolt (14) from the intercooler air outlet pipe on the inlet manifold,
  - the bolts (15) from the intercooler air outlet pipe on the throttle valve.
- Move the intercooler air outlet pipe to one side.
- Remove:
  - the camshaft position sensor (see **Camshaft position sensor: Removal - Refitting**) ,
  - the camshaft dephaser solenoid valve (see **Camshaft dephaser solenoid valve: Removal - Refitting**) ,

ting) ,

- the ignition coils (see **Coils: Removal - Refitting**) ,
- the spark plugs (see **Plugs: Removal - Refitting**) .

- Move aside the engine wiring.



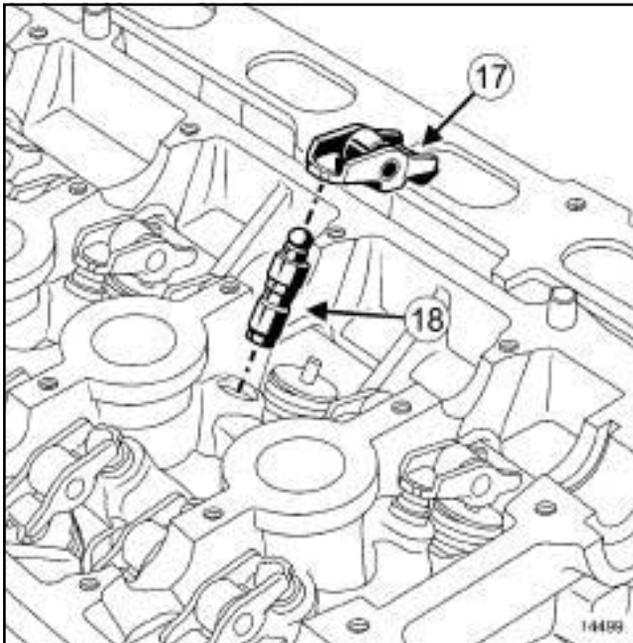
135700

- Remove:
  - the bolt (16) from the air conditioning pipe on the inlet manifold,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the lower engine tie-bar (see **Lower engine tie-bar: Removal - Refitting**) .
- Drain the manual gearbox (see **Manual gearbox oils: Draining - Filling**) (21A, Manual gearbox).
- Remove:
  - the front right-hand wheel driveshaft (see **Front right-hand driveshaft: Removal - Refitting**) (29A, Driveshafts),
  - the right-hand differential output seal (see **Front right-hand driveshaft: Removal - Refitting**) (21A, Manual gearbox),

## Cylinder head: Removal - Refitting

X95

- the catalytic converter (see **Catalytic converter: Removal - Refitting**),
- the turbocharger (see **Turbocharger: Removal - Refitting**),
- the oil separator (see **Oil decanter: Removal - Refitting**),
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25),
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74),
- the timing end camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**).



14499

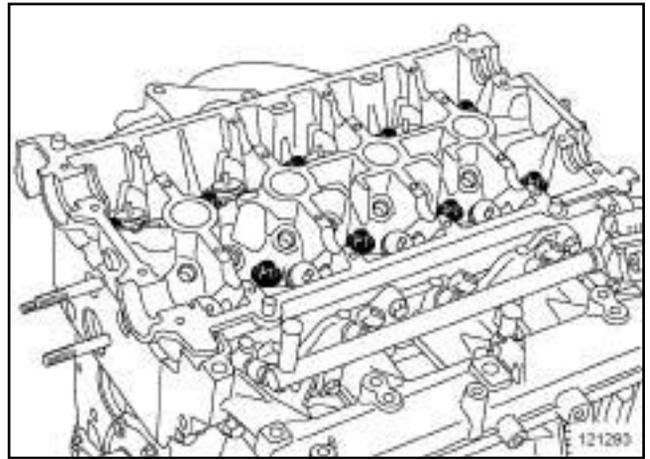
Note:

To prevent any risk of unpriming the hydraulic tappets, make sure that they are vertical.

 Remove:

- the valve rockers (17),
- the hydraulic tappets (18).

## II - OPERATION FOR REMOVAL OF PART CONCERNED



121293

 Remove:

- the cylinder head bolts,
- the cylinder head,
- the cylinder head gasket.

## REFITTING

## I - REFITTING PREPARATION OPERATION

- parts always to be replaced: Cylinder head gasket.
- parts always to be replaced: cylinder head bolts.

## Cylinder head: Removal - Refitting

X95

## 1 - Cleaning the cylinder head joint face

□

**IMPORTANT**

Wear goggles with side protectors for this operation.

**IMPORTANT**

Wear leaktight gloves (Nitrile type) for this operation.

**WARNING**

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

**WARNING**

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to avoid any foreign bodies entering the oil return and supply pipes.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

**WARNING**

Protect the oilway so that foreign bodies do not enter the oil pipes in the cylinder head.

Failure to follow this instruction could lead to the blocking of the oilways, resulting in a rapid deterioration of the camshaft.

- Clean the joint faces with **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products):

- the cylinder head gasket face if being reused,
- the cylinder block gasket face.

- Use **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) to degrease:

- the cylinder head gasket face if being reused,
- the cylinder block gasket face.

## 2 - Checking the gasket face

- Check for gasket face deformation using a ruler and a set of shims.

**WARNING**

No regrinding of the cylinder head is permitted.

- The maximum deformation is **0.05 mm**.

## Note:

If the cylinder head is faulty:

-strip the cylinder head (see ) (Technical Note 6027A, 10A, Engine and cylinder block assembly),

-test the cylinder head in order to detect any possible cracks using the cylinder head test kit (see ) (Technical Note 6026A, 11A, Top and front of engine),

-rebuild the cylinder head (see ) (Technical Note 6027A, 10A, Engine and cylinder block assembly).

**II - OPERATION FOR REFITTING PART CONCERNED**

- Bring the pistons to mid-stroke position to prevent any risk of contact with the valves when tightening the cylinder head.

**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

**WARNING**

In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

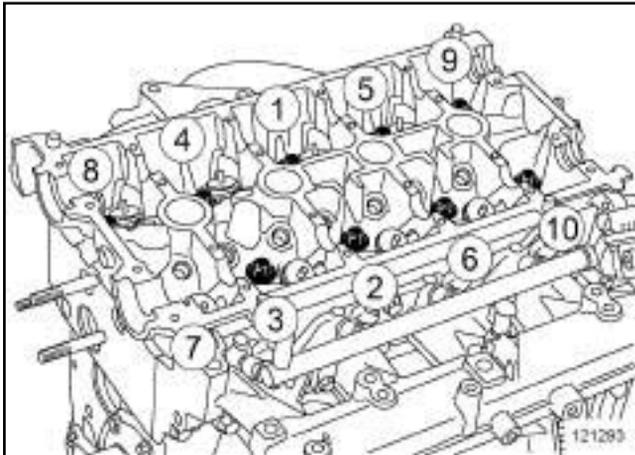
**WARNING**

Do not oil the new bolts. Be sure to oil bolts being reused.

## Cylinder head: Removal - Refitting

X95

- ❑ Fit:
  - a new cylinder head gasket,
  - the cylinder head equipped with new bolts on the cylinder block.
- ❑ Check that the centring devices are present and in good condition on the cylinder block.

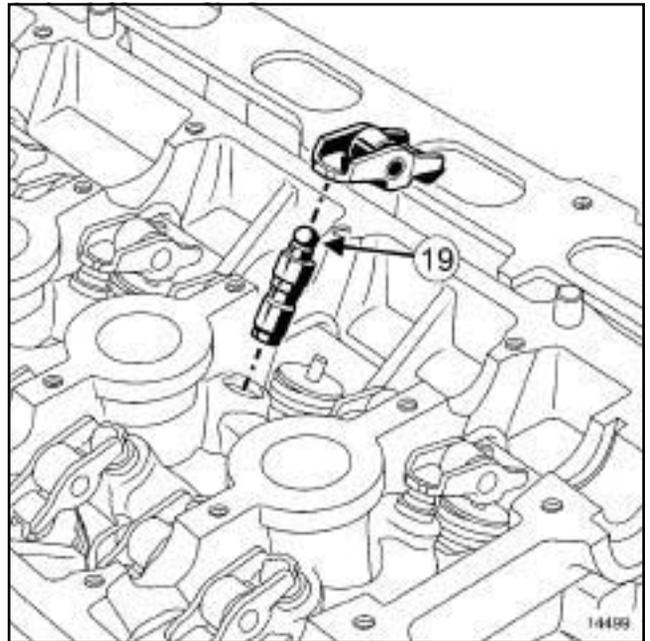


- ❑ Fit the new cylinder head bolts in order without tightening.
- ❑ Pretighten in order and to torque the **cylinder head bolts (30 N.m)**.
- ❑ Check that all new cylinder head bolts are correctly tightened to a torque of **30 N.m**.
- ❑ Angle tighten in order the **cylinder head bolts (180° ± 25°)**.

## Note:

Do not retighten the cylinder head bolts after applying this procedure.

## III - FINAL OPERATION



❑

## Note:

Because this engine is equipped with hydraulic tappets, there is no valve clearance adjustment.

- ❑ Reprime the hydraulic tappets (hydraulic tappets may empty if they have been removed for some time).
- ❑ To check if repriming is necessary, press the top of the tappet (19) with your thumb.
- ❑ If the tappet piston sinks, dip the tappet in a container filled with diesel.
- ❑ Press on the top of the tappet to expel air bubbles.
- ❑ Refit:
  - the hydraulic tappets,
  - the valve rockers.
- ❑ Refit:
  - the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**),
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**),
  - new timing end camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**),
  - the oil separator (see **Oil decanter: Removal - Refitting**),

## Cylinder head: Removal - Refitting

X95

- the turbocharger (see **Turbocharger: Removal - Refitting**) ,
- the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
- a new right-hand differential output seal (see **Differential output seal: Removal - Refitting**) (21A, Manual gearbox),
- the front right-hand wheel driveshaft (see **Front right-hand driveshaft: Removal - Refitting**) (29A, Driveshafts).
- Fill the manual gearbox (see **Manual gearbox oils: Draining - Filling**) (21A, Manual gearbox),
- Refit:
  - the lower engine tie-bar (see **Lower engine tie-bar: Removal - Refitting**) ,
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the right-hand suspended engine mounting (see **Right-hand suspended engine mounting: Removal - Refitting**) ,
  - the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the air conditioning pipe bolt on the inlet manifold.
- Fit the engine wiring.
- Refit:
  - the spark plugs (see **Plugs: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the camshaft dephaser solenoid valve (see **Camshaft dephaser solenoid valve: Removal - Refitting**) ,
  - the camshaft position sensor (see **Camshaft position sensor: Removal - Refitting**) .
- Fit the intercooler air outlet pipe.
- Refit:
  - the bolts of the intercooler air outlet pipe on the throttle valve,
  - the bolt of the intercooler air outlet pipe on the inlet manifold,
  - the dipstick guide.
- Connect:
  - the fuel supply pipe to the injector rail,
  - brake servo vacuum pipe ,
  - the brake servo vacuum pipe connector,
- Refit:
  - the fuel vapour rebreathing pipe,
  - the oil vapour rebreathing pipe.
- Connect:
  - the air pressure sensor connector to the inlet manifold,
  - the oil vapour rebreathing solenoid valve connector,
  - the injector connectors,
  - the air pressure sensor connector to the intercooler air outlet pipe.
  - the air temperature sensor connector to the intercooler air outlet pipe,
  - the coolant temperature sensor connector to the water chamber,
  - the heater matrix hose,
  - the cooling hose to the water chamber.
- Using the (**Mot. 1448**), fit:
  - the heater matrix hose clip,
  - the clip of the water chamber outlet hose.
- Refit:
  - the scoop under the scuttle panel grille (see **Scoop under the scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (56A, Exterior equipment),
  - the windscreen wiper arms (see **Windscreen wiper arm: Removal - Refitting**) (85A, Wiping - Washing),
  - the radiator mounting cross member (see **Radiator mounting cross member: Removal - Refitting**) (31A, Front axle components),
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the front section of the front wheel arch liners (see **Front wheel arch liner: Removal - Refitting**) (55A, Exterior protection),
  - the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the engine undertray,
  - the battery tray (see **Battery: Removal - Refitting**) (80A, Battery),
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the engine cover,

## Cylinder head: Removal - Refitting

X95

- Fill and bleed the cooling system (see **Cooling system: Draining - Refilling**).

## Cylinder head: Removal - Refitting

X85

### Equipment required

Diagnostic tool

### Tightening torques

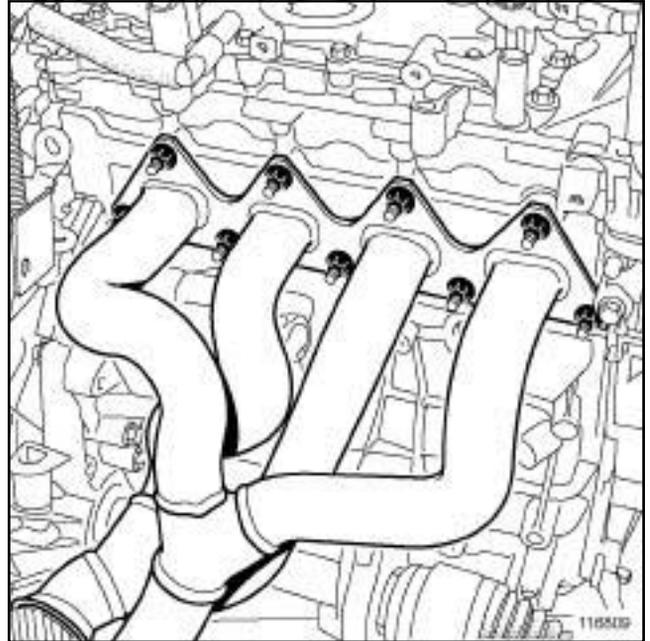
cylinder head bolts	30 N.m
cylinder head bolts	30 N.m
cylinder head bolts	180° ± 25°
exhaust manifold nuts	30 N.m

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Disconnect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Perform the following operations:
  - drain the engine oil (see **Engine oil: Draining - Refilling**) ,
  - drain the cooling system (see **Cooling system: Draining - Refilling**) .
- Remove:
  - the throttle valve (see **Throttle valve: Removal - Refitting**) ,
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
  - the injector holder plate equipped with the injector rail (see **Injector holder shim: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the oil separator (see **Oil decanter: Removal - Refitting**) ,
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the air filter unit (see **Air filter unit: Removal - Refitting**) ,
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),

- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) .



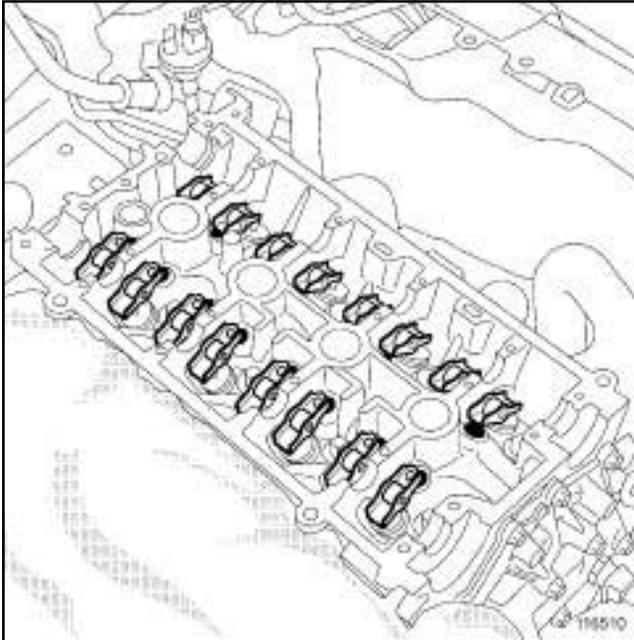
116809

- Remove the exhaust manifold nuts.
- Move aside the exhaust manifold.
- Remove:
  - the exhaust manifold gasket,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
  - the inlet and exhaust camshafts.

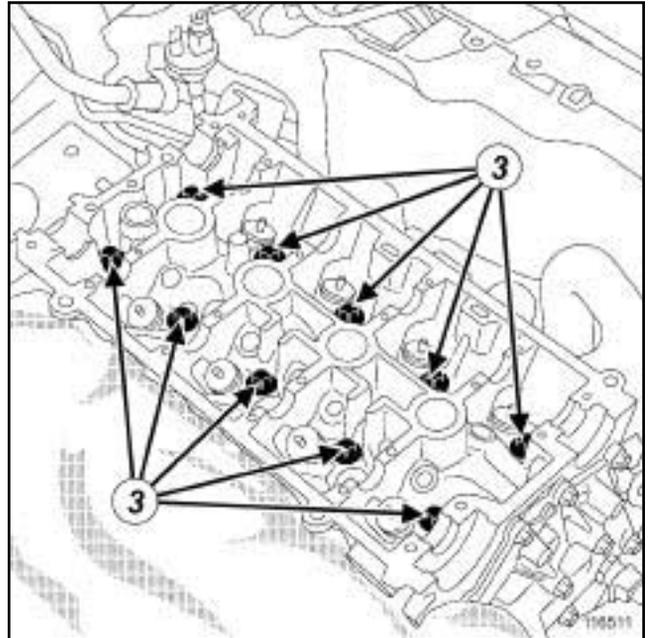
## Cylinder head: Removal - Refitting

X85

## II - OPERATION FOR REMOVAL OF PART CONCERNED



116510



116511

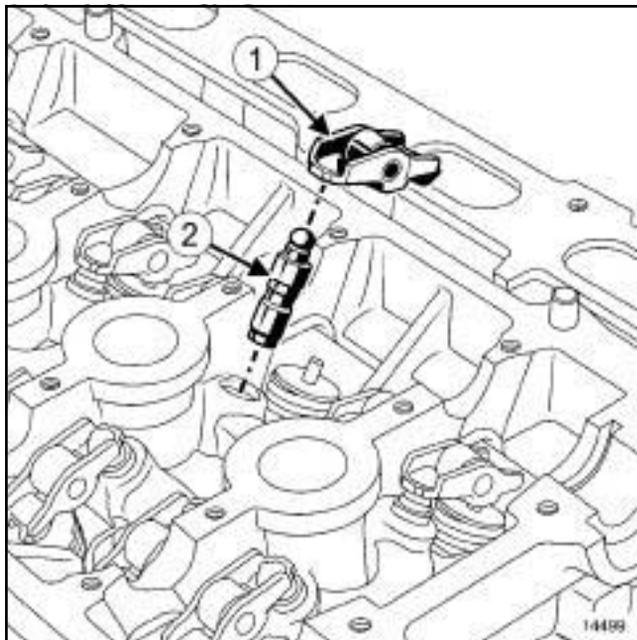
- Remove:
  - the cylinder head bolts (3) ,
  - the cylinder head.
- Mount the cylinder head on the cylinder head support.
- Remove the cylinder head seal.

## REFITTING

## I - REFITTING PREPARATION OPERATION

## 1 - CLEANING THE CYLINDER HEAD

- parts always to be replaced: cylinder head bolts.
- parts always to be replaced: Cylinder head gasket.
- parts always to be replaced: exhaust manifold seal.



14499

- Remove:
  - the valve rockers (1) ,
  - the hydraulic tappets (2) .

## Note:

To prevent any risk of unpriming the hydraulic tappets make sure that they are vertical.

## Cylinder head: Removal - Refitting

X85

- Clean the cylinder head.

**IMPORTANT**

Wear goggles with side protectors for this operation.

**IMPORTANT**

Wear leaktight gloves (Nitrile type) for this operation.

**WARNING**

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

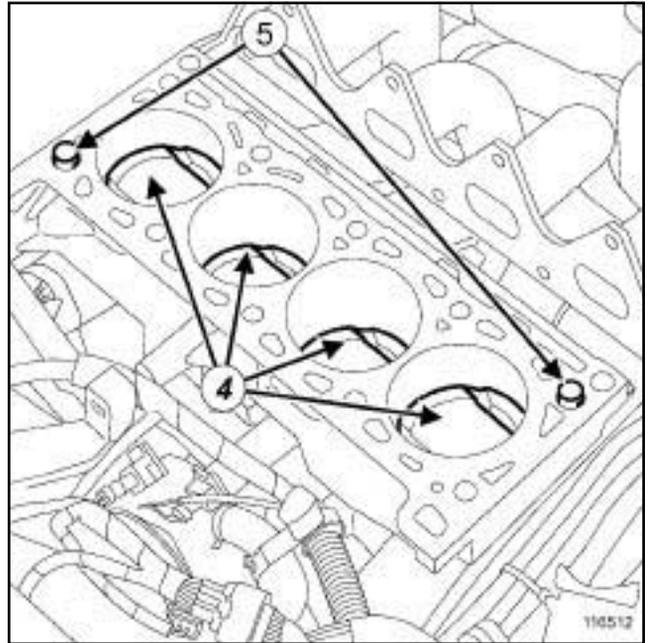
**WARNING**

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to avoid any foreign bodies entering the oil return and supply pipes.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

- Clean the joint faces using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) to dissolve the part of the seal that is still attached to the cylinder head and the cylinder block.
- Apply the product to the part to be cleaned, wait approximately ten minutes then remove the residue with a wooden spatula.

**2 - PREPARING TO FIT THE CYLINDER HEAD**

116512

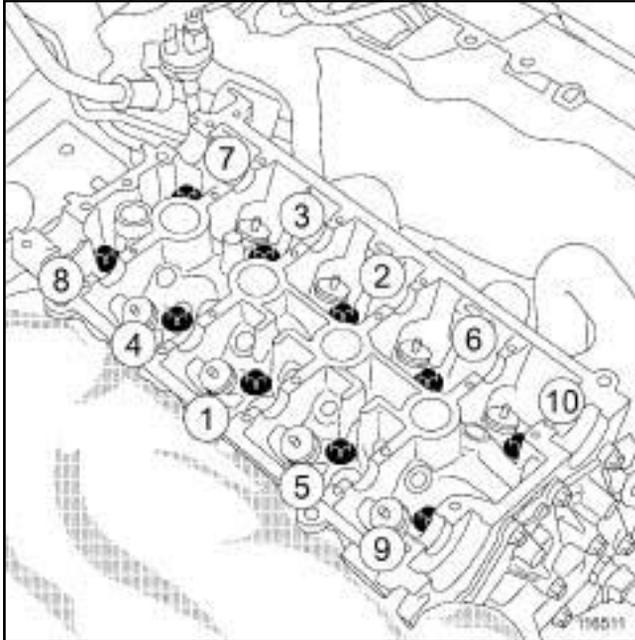
- Place the pistons at (4) half stroke.
- Check that the centring devices (5) are present and in good condition on the cylinder block.

**II - REFITTING OPERATION FOR PART CONCERNED**

- Refit:
  - a new cylinder head gasket,
  - the cylinder head,
  - new cylinder head bolts.

X85

## Tightening the cylinder head



116511

- Torque tighten (initial tightening) in order the **cylinder head bolts (30 N.m)**.
- Torque tighten (second tightening) in order the **cylinder head bolts (30 N.m)**.
- Angle tighten in order the **cylinder head bolts (180° ± 25°)**.

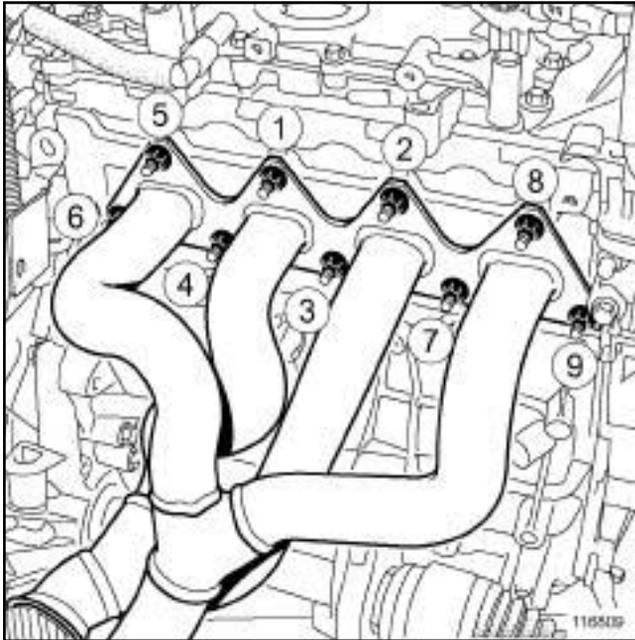
Note:

Do not retighten the cylinder head bolts after applying this procedure.

## III - FINAL OPERATION

- Refit:
  - the hydraulic tappets,
  - the valve rockers,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**).
- Fit:
  - a new exhaust manifold gasket,
  - the exhaust manifold.

X85



116809

- Refit the exhaust manifold nuts.
- Torque tighten in order the **exhaust manifold nuts (30 N.m)**.
- Refit:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the front right-hand wheel (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the air filter unit (see **Air filter unit: Removal - Refitting**) ,
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the oil separator (see **Oil decanter: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the injector holder plate equipped with the injector rail (see **Injector holder shim: Removal - Refitting**) ,
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
  - the throttle valve (see **Throttle valve: Removal - Refitting**) .
- Perform the following operations:
  - top up the engine oil (see **Engine oil: Draining -**

**Refilling** ,

- fill and bleed the coolant circuit (see **Cooling system: Draining - Refilling**) .

- Connect the battery (see **Battery: Removal - Refitting**) (80A, Battery).
- Refit the engine undertray.
- Using the **Diagnostic tool**, check that there are no faults stored by the injection computer and clear them if necessary.

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776

Special tooling required	
<b>Mot. 1672</b>	Lower engine support.
<b>Mot. 1509</b>	Camshaft sprocket locking tool.
<b>Mot. 1509-01</b>	Adapter kit for tool Mot.1509 or Mot.1801
<b>Mot. 1448</b>	Remote operation pliers for hose clips.
<b>Mot. 1517</b>	Tool for fitting inlet camshaft seal.
<b>Mot. 1512</b>	Tool for fitting exhaust camshaft seals (28 x 47).

Equipment required
workshop hoist
load balancer
cylinder head rule
set of feeler gauges
cylinder head testing tools

Tightening torques 	
nuts	<b>80 N.m</b>
cylinder head bolts (initial torque)	<b>30 N.m</b>
cylinder head bolts	<b>230° ± 6°</b>
new or original oil separator bolts (in tapped holes)	<b>10 N.m</b>
new oil separator bolts (in non-tapped holes)	<b>15 N.m</b>

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair:

- (see **Diesel injection: Precautions for the repair**) ,
- (see **Vehicle: Precautions for the repair**) (01D, Mechanical introduction).

### IMPORTANT

Use the diagnostic tool before any operation is carried out on the injection circuit to check:

- that the rail is not under pressure,
- that the fuel temperature is not too high.

Working on the circuit with the engine running is strictly forbidden.

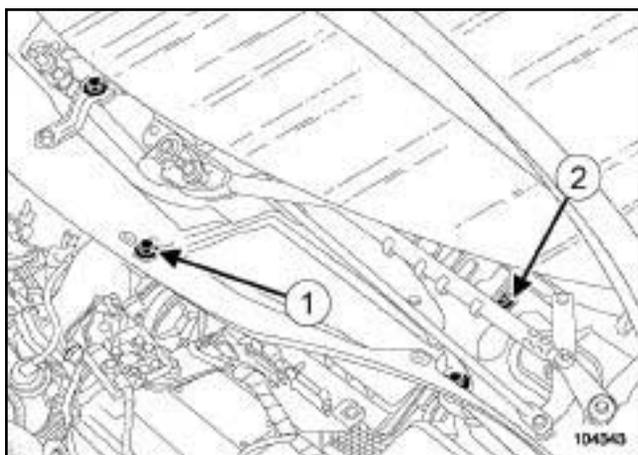
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Position the vehicle on a two-post lift (see **Vehicle: Towing and lifting**) (02A, Lifting equipment).
- Remove:
  - the engine covers,
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),
  - the bonnet (see **Bonnet: Removal - Refitting**) (48A, Non-side opening elements),
  - the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (55A, Exterior protection).

## Cylinder head: Removal - Refitting

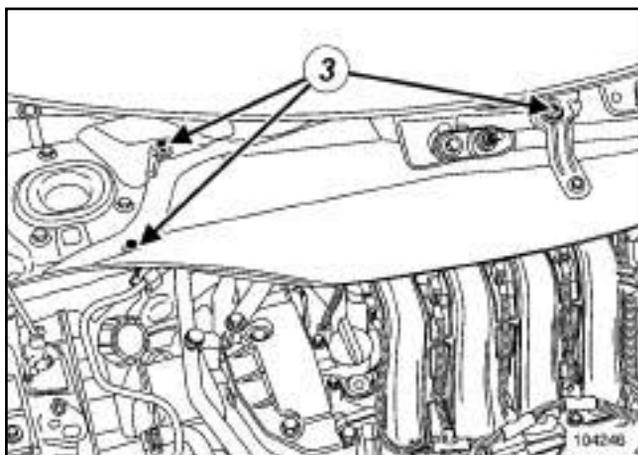
X84, and F4R, and 770 or 771 or 776



104343

Remove:

- the air filter access panel bolts (1) ,
- the air filter access panel,
- the bolt (2) from the scuttle panel partition.



104246

Remove:

- the bolts (3) from the scuttle panel partition,
- the scuttle panel partition,
- the windscreen wiper mechanism (see **Windscreen wiper mechanism: Removal - Refitting**) (85A, Wiping - Washing),
- the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
- the engine undertray bolts,
- the engine undertray.

Drain the engine cooling system (see **Cooling system: Draining - Refilling**) .

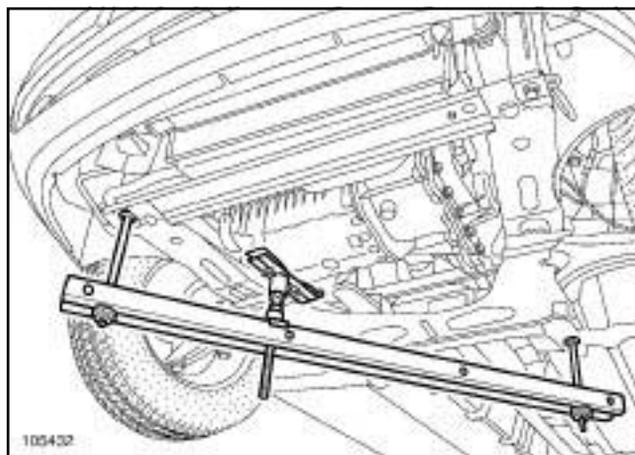
Remove:

- the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),

- the accessories belt (see **Accessories belt: Removal - Refitting**) ,

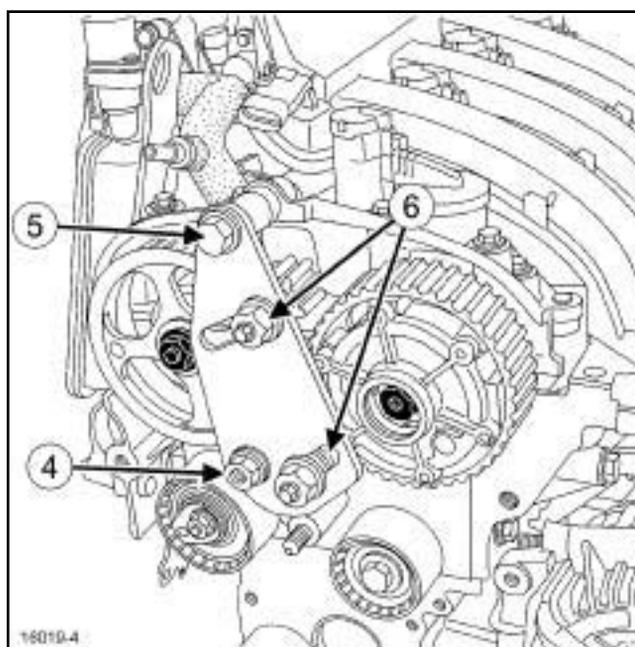
- the catalytic pre-converter (see **Catalytic pre-converter: Removal - Refitting**) ,

- the starter (see **Starter: Removal - Refitting**) .



105432

Fit the engine support (**Mot. 1672**).



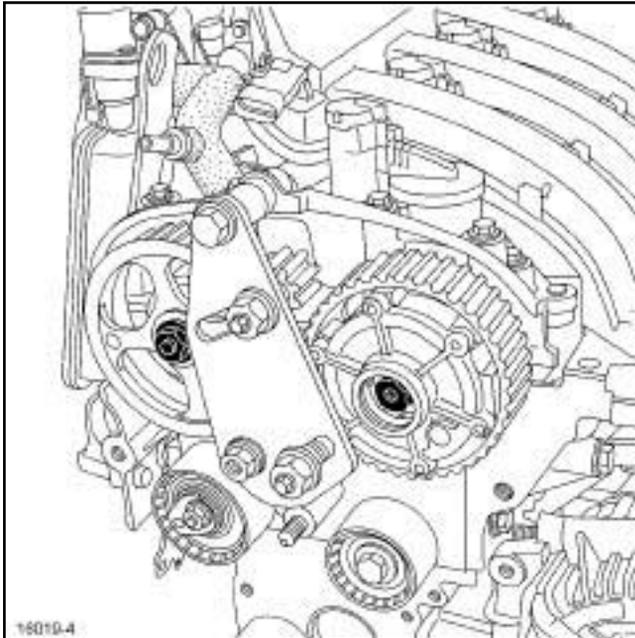
16019-4

Fit the (**Mot. 1509**) with the sprocket (**Mot. 1509-01**).

Tighten the collar nut (4) and the bolt (5) , then bring the sprockets of the tool (**Mot. 1509**) into contact with the camshaft pulleys whilst torque tightening the nuts (**80 N.m**) (6) .

Remove the blanking cover from the inlet camshaft dephaser using a **14 mm** Allen key.

X84, and F4R, and 770 or 771 or 776

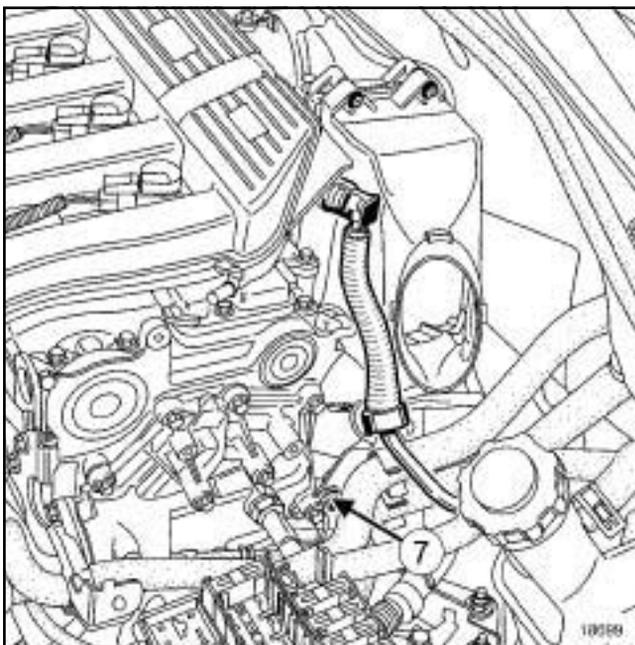


16019-4

Remove:

- the exhaust camshaft pulley nut,
- the inlet camshaft dephaser bolt.

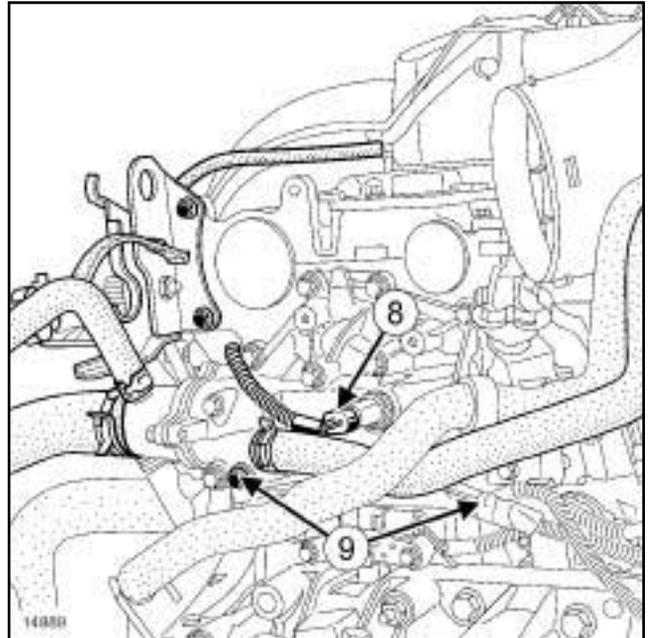
- Loosen the stud from the nut if necessary (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**).



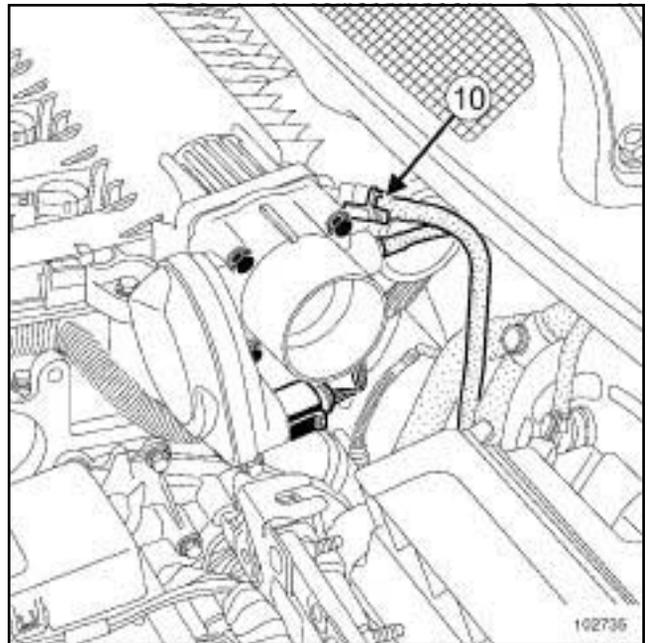
18699

- Remove the bracket bolt (7).

- Remove the bracket.



14889



102735

- Remove the bolts (8) from the electrical wiring support.

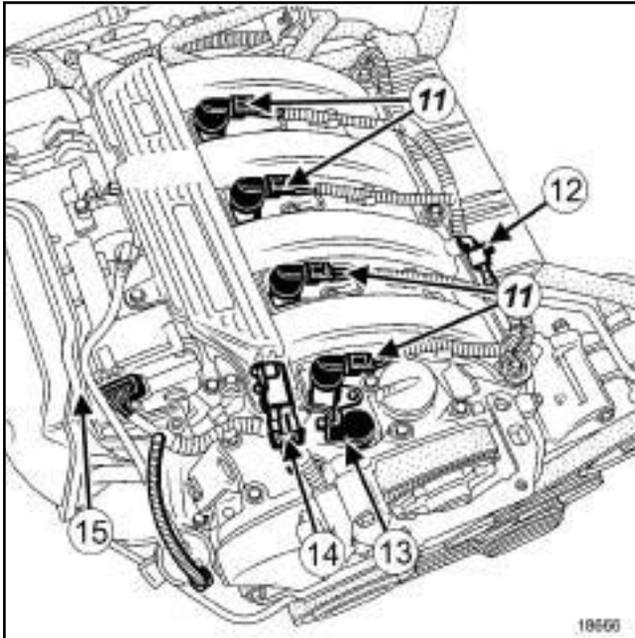
Disconnect:

- the coolant temperature sensor connector (9),
- the water chamber pipes using the tool (**Mot. 1448**),
- the brake servo vacuum pipe (10) from the inlet distributor side.

- Separate the wiring bracket assembly.

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776



18666

 Disconnect:

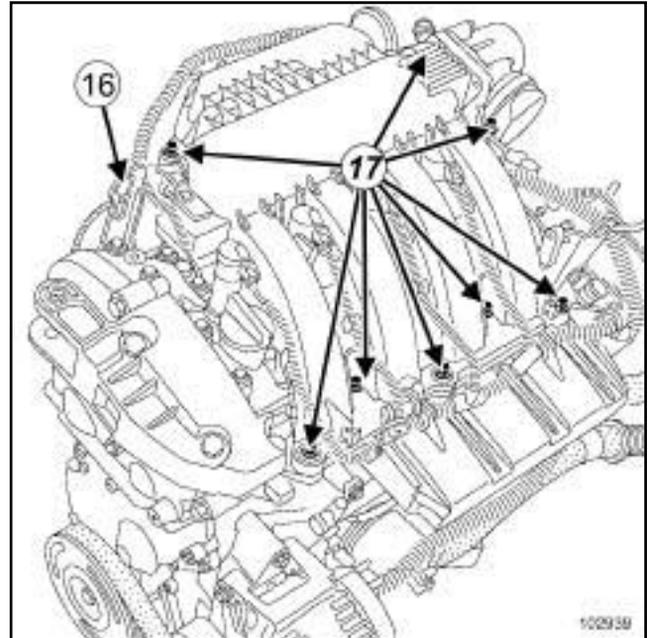
- the ignition coil connectors (11) ,
- the connector (12) from the air temperature sensor,
- the camshaft dephaser connector (13) ,
- the inlet distributor pressure sensor connector (14) ,
- the fuel vapour recirculation solenoid valve pipe (15) ,
- the injector connectors,
- the upstream oxygen sensor connector.

 Unclip the electrical wiring clip.

 Move the electrical wiring to one side.

 Remove:

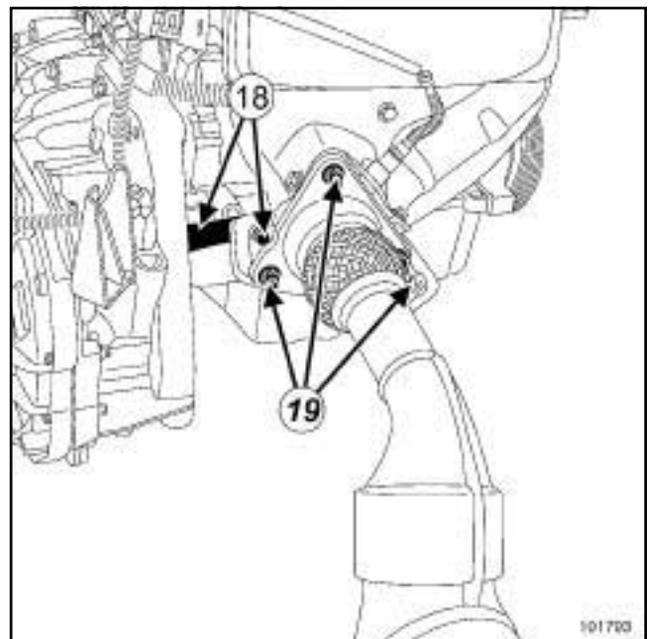
- the ignition coils,
- the spark plugs,
- the dephaser solenoid valve.



102939

 Remove:

- the engine lifting bracket (16) on the timing end,
- the inlet distributor bolts (17) ,
- the inlet distributor.

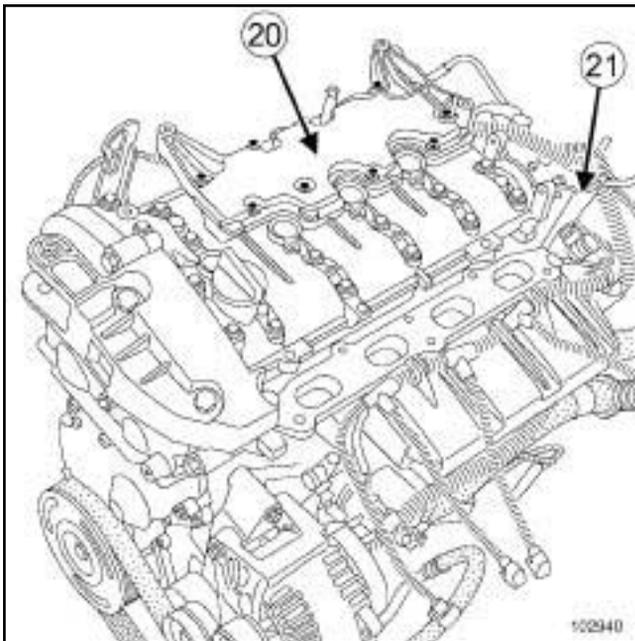


101700

 Remove:

- the catalytic converter - gearbox stay bolts (18) ,
- the catalytic converter/gearbox strut,
- the nuts (19) from the exhaust pipe.

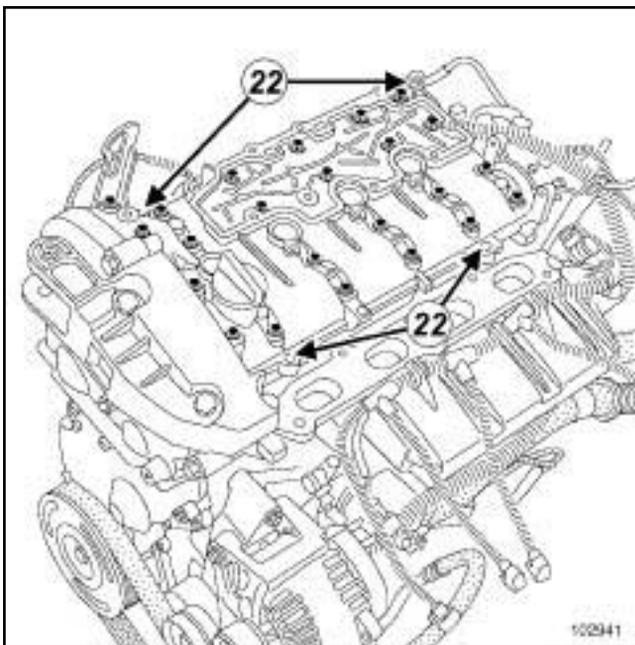
X84, and F4R, and 770 or 771 or 776



102940

Remove:

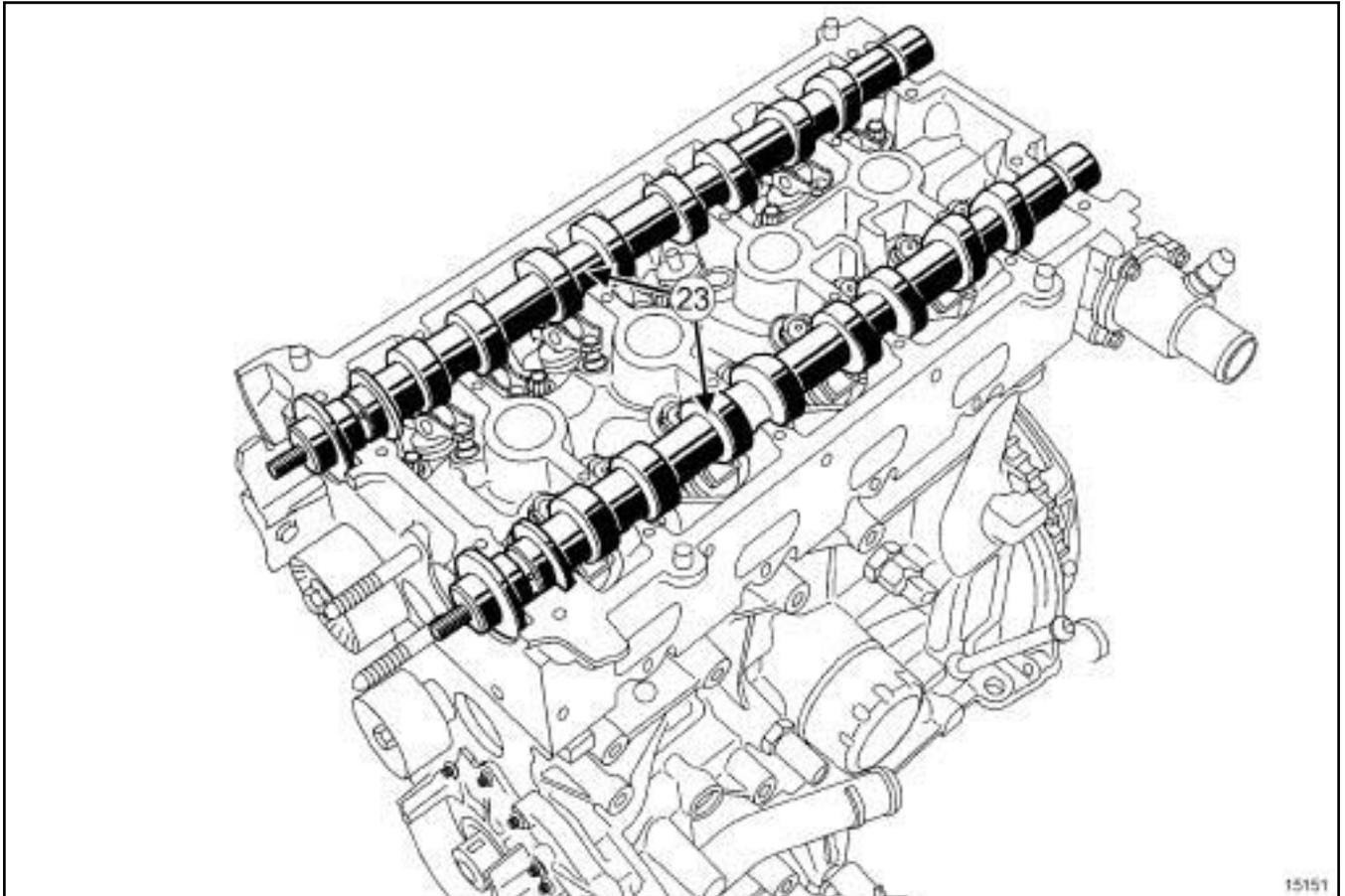
- the oil separator bolts,
- the oil separator (20) ,
- the lifting bracket on the flywheel end (21) .



102941

- Remove the rocker cover bolts.
- Remove the rocker cover vertically by tapping the lugs (22) with a copper hammer.
- Remove the camshaft seals.

X84, and F4R, and 770 or 771 or 776

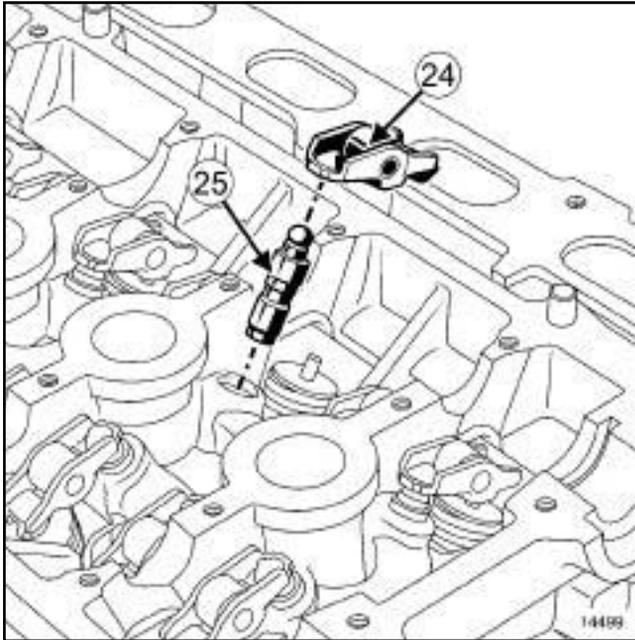


- Remove the inlet and exhaust camshafts (23)

15151

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776



14499

□ Remove:

- the valve rockers (24) ,
- the hydraulic tappets (25) .

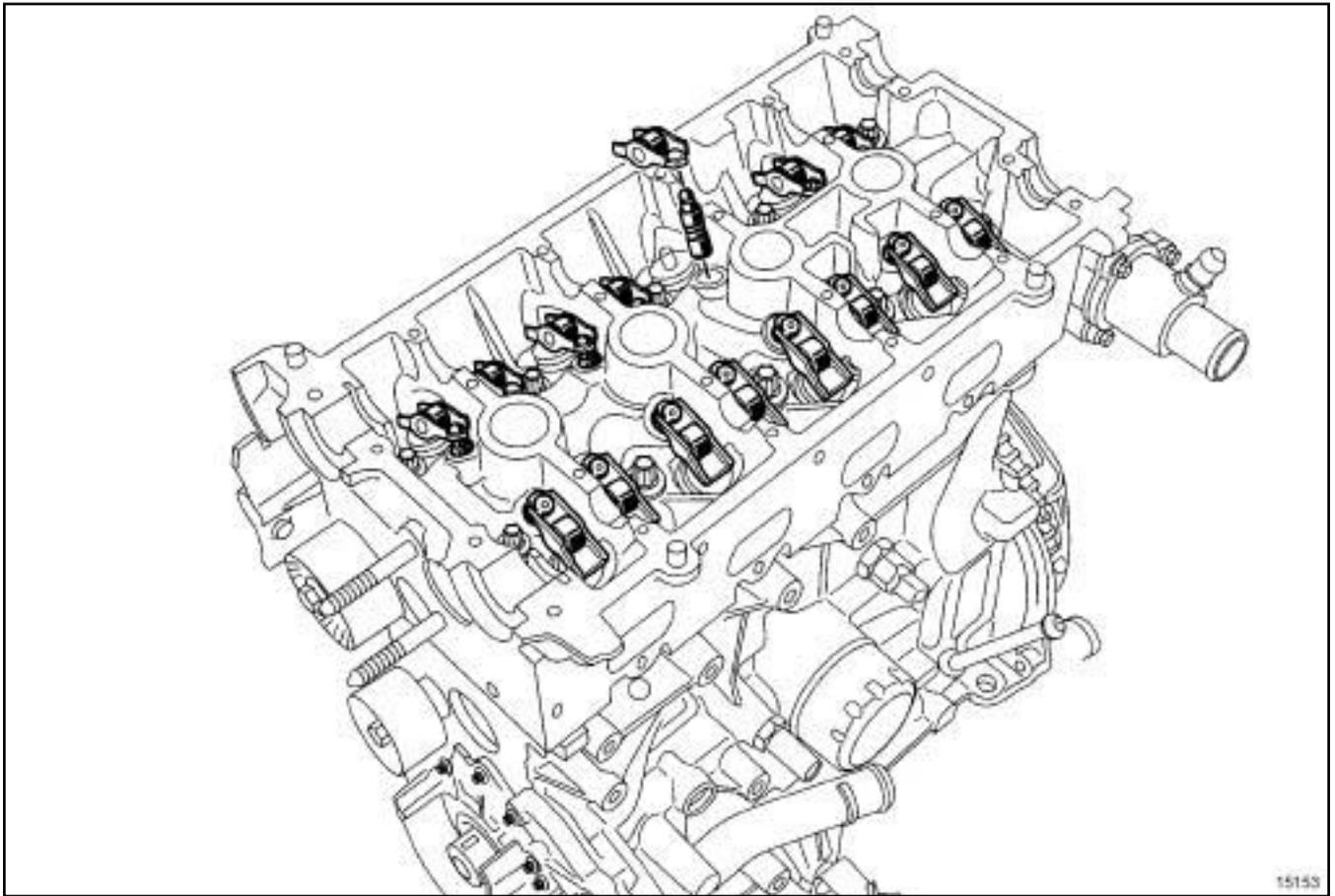
Note:

To prevent any risk of unpriming the hydraulic tappets, make sure that they are vertical.

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776

### II - OPERATION FOR REMOVAL OF PART CONCERNED



15153

15153

- Remove the cylinder head bolts.
- Recover the stem caps for the bolts on the cylinder head.
- Remove:
  - the cylinder head using a **workshop hoist** and a **load balancer**.
  - the cylinder head gasket.

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776

### REFITTING

#### I - REFITTING PREPARATION OPERATION

#### IMPORTANT

Wear goggles with side protectors for this operation.

#### IMPORTANT

Wear leaktight gloves (Nitrile type) for this operation.

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### WARNING

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to avoid any foreign bodies entering the oil return and supply pipes.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

#### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

**parts always to be replaced: cylinder head bolts.**

**parts always to be replaced: Cylinder head gasket.**

#### 1 - Cleaning the cylinder head joint face

#### WARNING

Protect the oilway so that foreign bodies do not enter the oil pipes in the cylinder head.

Failure to follow this instruction could lead to the blocking of the oilways, resulting in a rapid deterioration of the camshaft.

Clean the joint face using **GREY ABRASIVE PADS** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products):

- the cylinder head,

- of the cylinder block.

Use a **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) and **CLEAN CLOTHS** to degrease the joint faces:

- of the cylinder head,

- of the cylinder block.

#### 2 - Checking the gasket face

Check with a **cylinder head rule** and a **set of feeler gauges** to determine if the joint face has been deformed.

#### WARNING

No regrinding of the cylinder head is permitted.

The maximum deformation is **0.05 mm**.

#### Note:

If the cylinder head is faulty:

-strip the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding**, page **10A-180**) (Technical Note 6027A, 10A, Engine and cylinder block assembly),

-test the cylinder head for any cracks using the **cylinder head testing tools** (see **Cylinder head test tank: Use**) (Technical Note 6026A, 11A, Top and front of engine),

-rebuild the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding**, page **10A-180**) (Technical Note 6027A, 10A, Engine and cylinder block assembly).

#### II - REFITTING OPERATION FOR PART CONCERNED

Using a syringe, extract any oil which may have entered the cylinder head holes.

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776

Refit:

- a new cylinder head gasket,
- the cylinder head using a **workshop hoist** and a **load balancer**.

Note:

During this operation, be careful not to damage the windscreen.

**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

- Refit the stem caps for the bolts on the cylinder head.

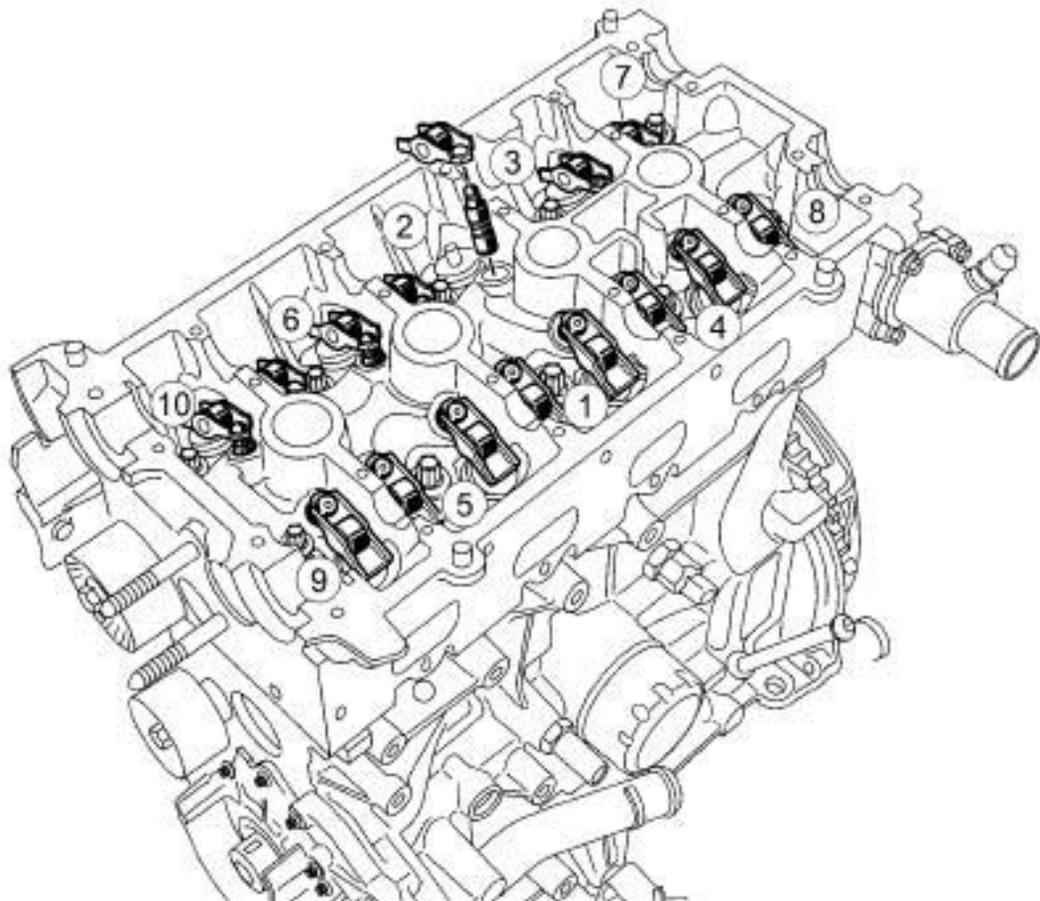
**WARNING**

In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

**WARNING**

Do not oil the new bolts. Be sure to oil bolts being reused.

- Refit new cylinder head bolts.



15153

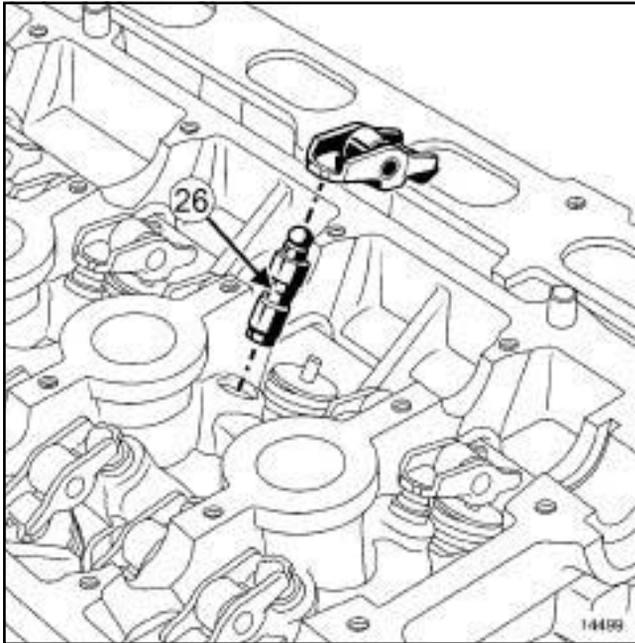
15153

- Tighten to torque and in order the **cylinder head bolts (initial torque) (30 N.m)**.
- Check that all the cylinder head bolts are correctly torque tightened **30 N.m**.
- Angle tighten in order the **cylinder head bolts (230° ± 6°)**.

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776

## III - FINAL OPERATION



14499

- ❑ Reprime the hydraulic tappets (hydraulic tappets may empty after a long down time).

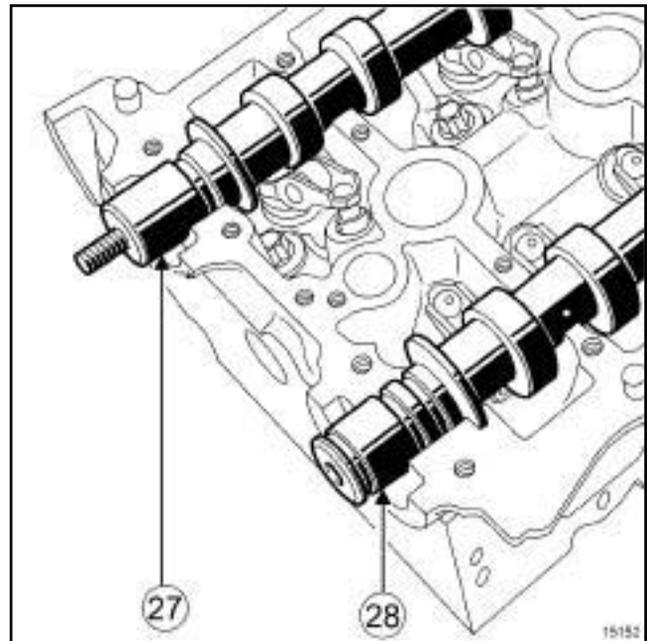
To check or reprime a hydraulic tappet, press the top of the tappet at **(26)** with the thumb.

If the tappet piston depresses:

- insert the tappets in a container of diesel fuel or new engine oil,
- refit the hydraulic tappets.

- ❑ Refit:

- the valve rockers,
- the camshafts, oiling the bearings.



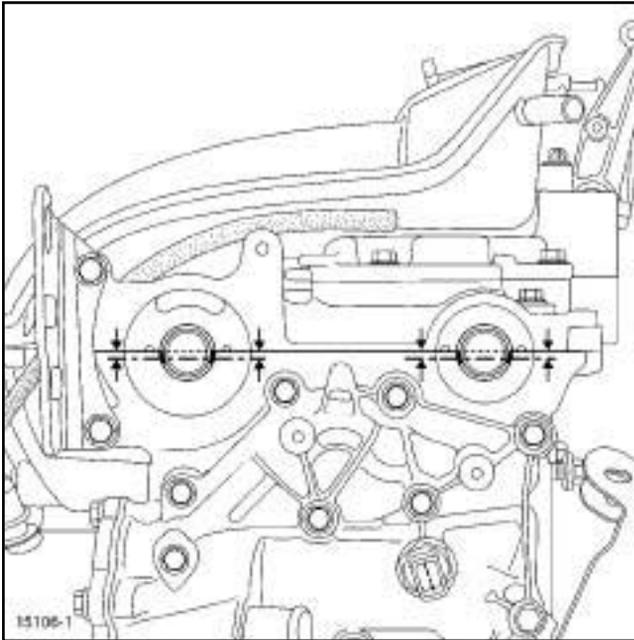
15152

- ❑ The camshafts are identified by the pulley mountings.

Detailed view of the pulley mountings:

- **(27)** : exhaust camshaft,
- **(28)** : inlet camshaft.

X84, and F4R, and 770 or 771 or 776

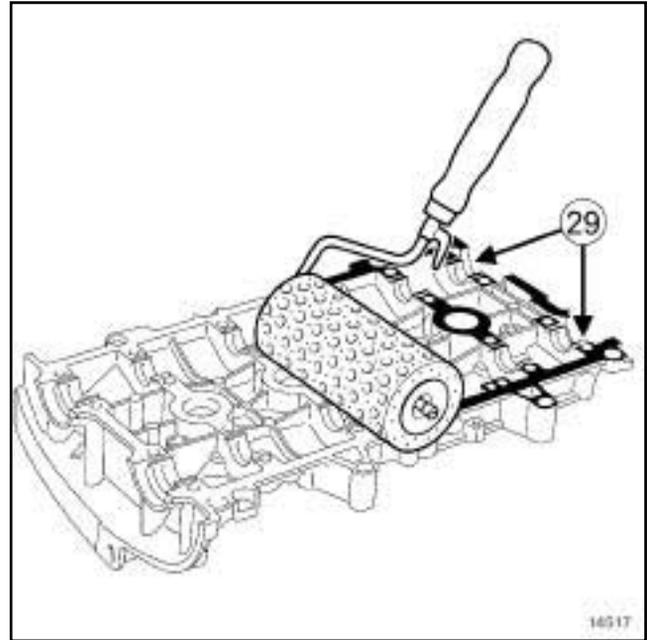


15106-1

- ❑ Position the camshaft grooves as shown in the diagram.

**WARNING**

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.).



14517

- ❑ Apply **RESIN ADHESIVE** to the rocker cover joint face using the (stipple) roller (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products).

**Note:**

Using a cloth, remove the **RESIN ADHESIVE** at **(29)** from the camshaft rocker cover bearings.

- ❑ Refit the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) .

X84, and F4R, and 770 or 771 or 776

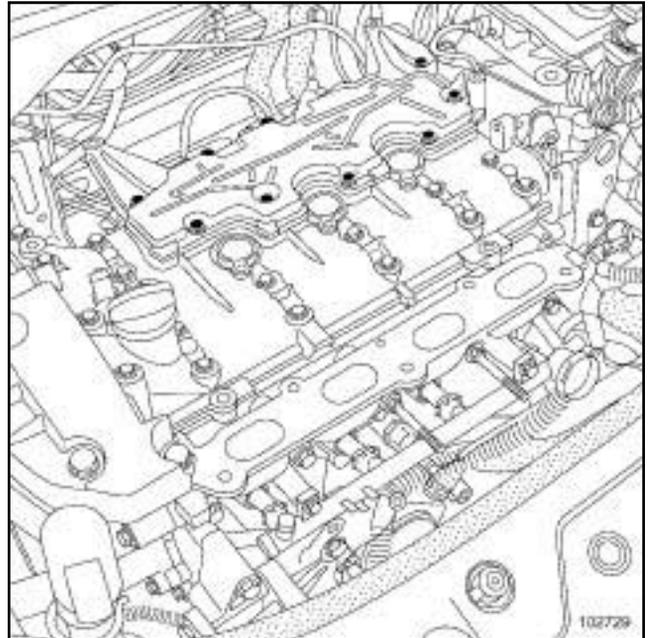


102738

**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

- Apply **RESIN ADHESIVE** to the oil separator joint face using the (stipple) roller (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products).
- Refit the lifting bracket on the flywheel end.



102729

- Refit the oil separator.
- Tighten to torque and in order:
  - the **new or original oil separator bolts (in tapped holes) (10 N.m)**,
  - the **new oil separator bolts (in non-tapped holes) (15 N.m)**.
- Refit:
  - the exhaust pipe,
  - the catalytic converter/gearbox strut,
  - the spark plugs (see **Plugs: Removal - Refitting**) ,
  - the ignition coils (see **Coils: Removal - Refitting**) ,
  - the inlet distributor with a new seal (see **Inlet distributor: Removal - Refitting**) ,
  - the camshaft dephaser solenoid valve.
- Replace the camshaft seals.
  - use the **(Mot. 1517)** for the inlet camshaft seal,
  - use the **(Mot. 1512)** for the exhaust camshaft seal.
- Refit the electrical wiring clip.
- Connect:
  - the upstream oxygen sensor connector,
  - the injector connectors,
  - the fuel vapour recirculation solenoid valve pipe,
  - the inlet distributor pressure sensor connector,
  - the camshaft dephaser connector,
  - the air temperature sensor connector,

## Cylinder head: Removal - Refitting

X84, and F4R, and 770 or 771 or 776

- the ignition coil connectors.
  - the brake servo vacuum pipe on the inlet distributor side,
  - the water chamber pipes using the tool (**Mot. 1448**),
  - the coolant temperature sensor connector.
- Refit:
- the electrical wiring support,
  - the exhaust camshaft pulley.
  - the blanking cover of the inlet camshaft dephaser,
  - the scuttle panel partition,
  - the windscreen wiper mechanism (see **Windscreen wiper mechanism: Removal - Refitting**) (85A, Wiping - Washing),
  - the front bumper (see **Front bumper: Removal - Refitting**) (55A, Exterior protection),
  - the starter (see **Starter: Removal - Refitting**) ,
  - the catalytic pre-converter (see **Catalytic pre-converter: Removal - Refitting**) ,
  - the accessories belt (see **Accessories belt: Removal - Refitting**) ,
  - the front wheels (see **Wheel: Removal - Refitting**) (35A, Wheels and tyres),
  - the air filter access panel,
  - the scuttle panel grille (see **Scuttle panel grille: Removal - Refitting**) (55A, Exterior protection),
  - the bonnet (see **Bonnet: Removal - Refitting**) (48A, Non-side opening elements),
  - the battery tray (see **Battery tray: Removal - Refitting**) (80A, Battery),
  - the battery (see **Battery: Removal - Refitting**) (80A, Battery),
  - the engine covers.
- Fill and bleed the cooling system (see **Cooling system: Draining - Refilling**) .
- Refit the engine undertray.

## Cylinder head: Removal - Refitting

X84, and F4R, and 774 or 776

Tightening torques 	
cylinder head bolts	30 N.m
cylinder head bolts	180° ± 25°

### REMOVAL

#### I - REMOVAL PREPARATION OPERATION

Remove:

- the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) ,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the coils (see **Coils: Removal - Refitting**) ,
- the oil separator (see **Oil decanter: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) .

F4R, and 774

- Remove the catalytic converter (see **Catalytic converter: Removal - Refitting**) .

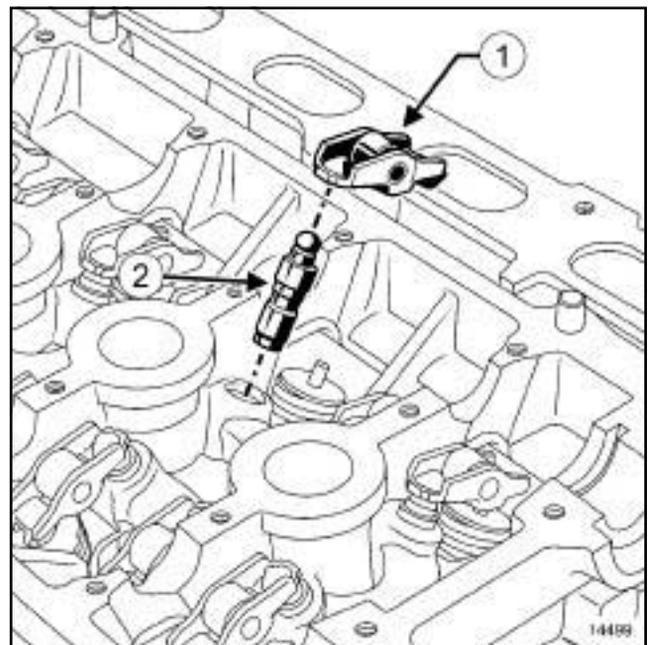
F4R, and 776

- Remove the catalytic pre-converter (see **Catalytic converter: Removal - Refitting**) .

Remove:

- the turbocharger (see **Turbocharger: Removal - Refitting**) ,
- the exhaust manifold (see **Exhaust manifold: Removal - Refitting**) ,
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,

- the water chamber (see **Water chamber: Removal - Refitting**) .



14499

Note:

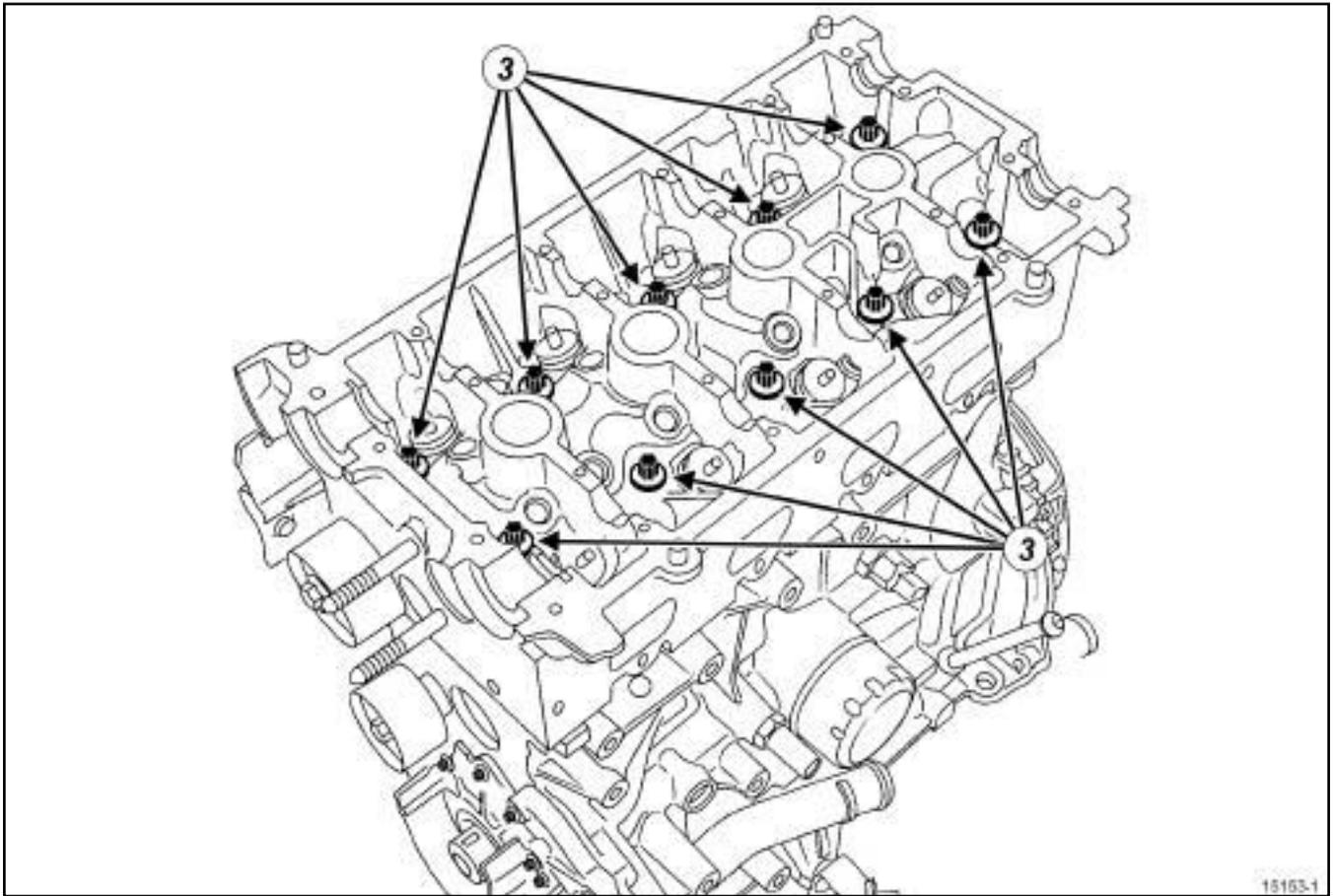
To prevent any risk of unpriming the hydraulic tappets, always make sure that they are vertical.

Remove:

- the valve rockers (1) ,
- the hydraulic tappets (2) .

## Cylinder head: Removal - Refitting

X84, and F4R, and 774 or 776

**II - OPERATION FOR REMOVAL OF PART CONCERNED**

15153-1

15153-1

 Remove:

- the cylinder head bolts (3) ,
- the cylinder head,
- the cylinder head gasket.

**REFITTING****I - REFITTING PREPARATION OPERATION**

- parts always to be replaced: Cylinder head gasket.
- parts always to be replaced: cylinder head bolts.

## Cylinder head: Removal - Refitting

X84, and F4R, and 774 or 776

### 1 - Cleaning the cylinder head joint face

#### IMPORTANT

Wear goggles with side protectors for this operation.

#### IMPORTANT

Wear leaktight gloves (Nitrile type) for this operation.

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### WARNING

Do not allow this product to drip onto the paintwork.

Clean the cylinder head carefully to avoid any foreign bodies entering the oil return and supply pipes.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

#### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

#### WARNING

Protect the oilway so that foreign bodies do not enter the oil pipes in the cylinder head.

Failure to follow this instruction could lead to the blocking of the oilways, resulting in a rapid deterioration of the camshaft.

- Clean the joint faces with **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products):

- the cylinder head gasket face if being reused,

- the cylinder block gasket face.

- Use **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) to degrease:

- the cylinder head gasket face if being reused,

- the cylinder block gasket face.

### 2 - Checking the gasket face

- Check for gasket face deformation using a ruler and a set of shims.

#### WARNING

No regrinding of the cylinder head is permitted.

- The maximum deformation is **0.05 mm**.

#### Note:

If the cylinder head is faulty:

-strip the cylinder head (see ) (Technical Note 6027A, 10A, Engine and cylinder block assembly),

-test the cylinder head in order to detect any possible cracks using the cylinder head test kit (see **Cylinder head test tank: Use**) (Technical Note 6026A, 11A, Top and front of engine),

-rebuild the cylinder head (see ) (Technical Note 6027A, 10A, Engine and cylinder block assembly).

### II - REFITTING OPERATION FOR PART CONCERNED

- Bring the pistons to mid-stroke position to prevent any risk of contact with the valves when tightening the cylinder head.

#### WARNING

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

#### WARNING

In order to ensure that the bolts are correctly tightened, use a syringe to remove any oil which may be in the cylinder head mounting holes.

#### WARNING

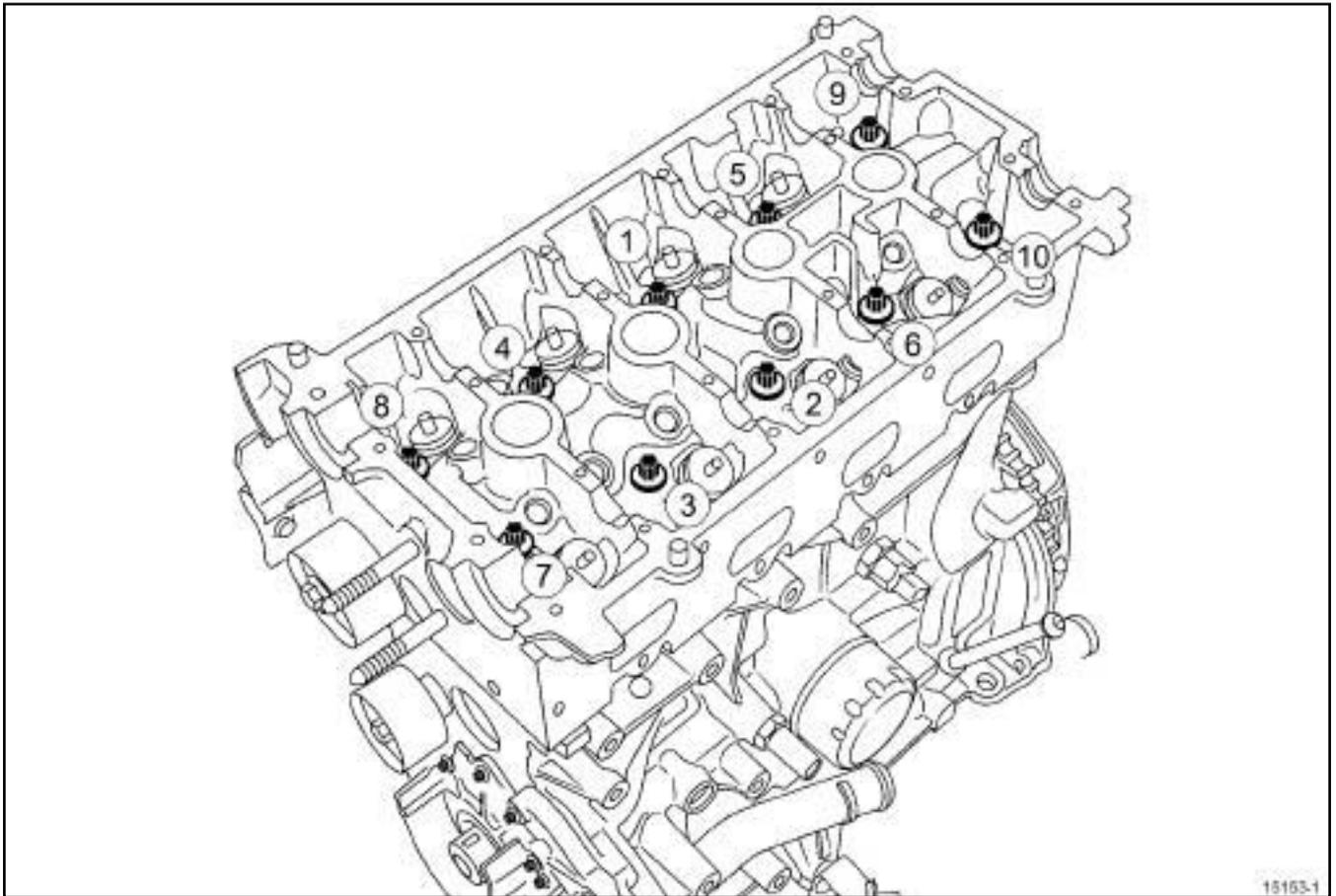
Do not oil the new bolts. Be sure to oil bolts being reused.

## Cylinder head: Removal - Refitting

X84, and F4R, and 774 or 776

- Check that the centring devices are present and in good condition on the cylinder block.
- Fit:
  - a new cylinder head gasket,

- the cylinder head equipped with new bolts on the cylinder block.



15153-1

15153-1

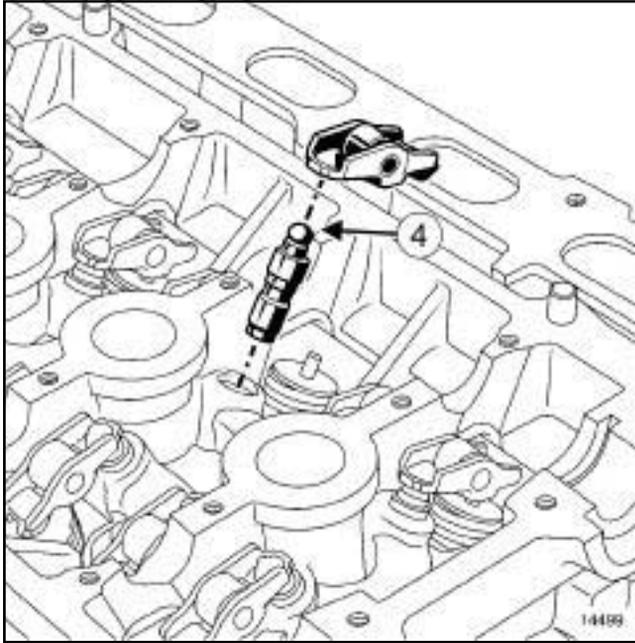
- Fit the new cylinder head bolts in order without tightening.
- Pretighten in order and to torque the **cylinder head bolts (30 N.m)**.
- Check that all new cylinder head bolts are correctly tightened to a torque of **30 N.m**.
- Angle tighten in order the **cylinder head bolts (180° ± 25°)**.

Note:

Do not retighten the cylinder head bolts after applying this procedure.

X84, and F4R, and 774 or 776

## III - FINAL OPERATION



14499

## Note:

Because this engine is equipped with hydraulic tappets, there is no valve clearance adjustment.

- Reprime the hydraulic tappets (hydraulic tappets may empty if they have been removed for some time).
- To check if repriming is necessary, press the top of the tappet (4) with your thumb.
- If the tappet piston sinks, dip the tappet in a container filled with diesel.
- Press on the top of the tappet to expel air bubbles.
- Refit:
  - the hydraulic tappets,
  - the valve rockers.
  - the water chamber (see **Water chamber: Removal - Refitting**) ,
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
  - the exhaust manifold (see **Exhaust manifold: Removal - Refitting**) ,
  - the turbocharger (see **Turbocharger: Removal - Refitting**) .

 F4R, and 776

- Refit the catalytic pre-converter (see **Catalytic converter: Removal - Refitting**) .

 F4R, and 774

- Refit the catalytic converter (see **Catalytic converter: Removal - Refitting**) .

 Refit:

- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the oil separator (see **Oil decanter: Removal - Refitting**) ,
- the coils (see **Coils: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the accessories belt (see **Accessories belt: Removal - Refitting**) ,
- the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Special tooling required

<b>Mot. 1573</b>	Cylinder head support
<b>Mot. 1502</b>	Tool for removing the pins from valve stems.
<b>Mot. 1511</b>	Tool for fitting valve stem seals.
<b>Mot. 1335</b>	Pliers for removing valve stem seals.

### Equipment required

tweezers
valve stem seal fitting kit
valve-spring compressor

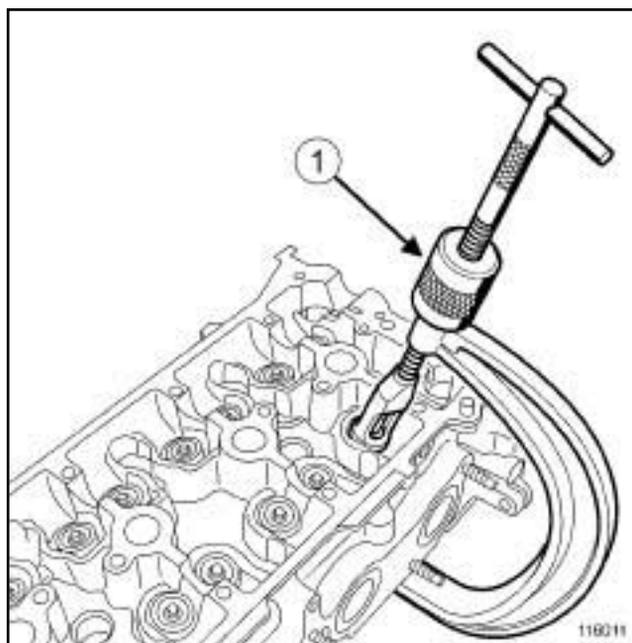
## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Drain the cooling system (see **Cooling system: Draining - Refilling**).
- Remove the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page 10A-109).
- Mount the cylinder head on the cylinder head support (**Mot. 1573**).
- Remove:
  - the injector rail (see **Injector rail: Removal - Refitting**),
  - the injector holder shim (see **Injector holder shim: Removal - Refitting**),
  - the exhaust manifold (see **Exhaust manifold: Removal - Refitting**).

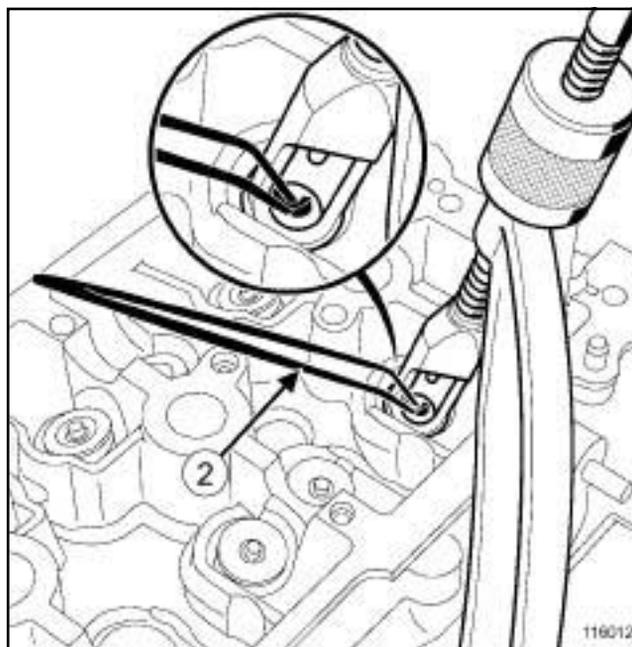
### II - VALVE REMOVAL OPERATION

- Mark the valves in relation to the cylinder head.



116011

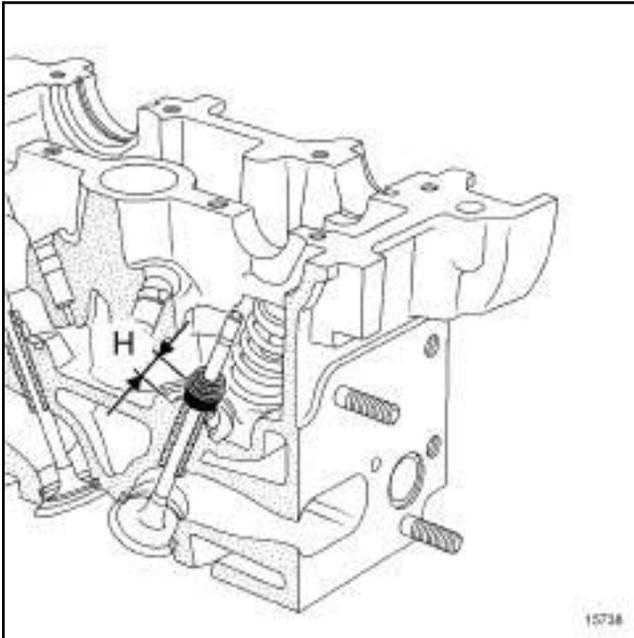
- Compress the valve spring using the (**Mot. 1502**) (1)



116012

- Remove:
  - the cotter pins using a **tweezers** (2),
  - the upper cup of the valve spring,
  - the valve spring.

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

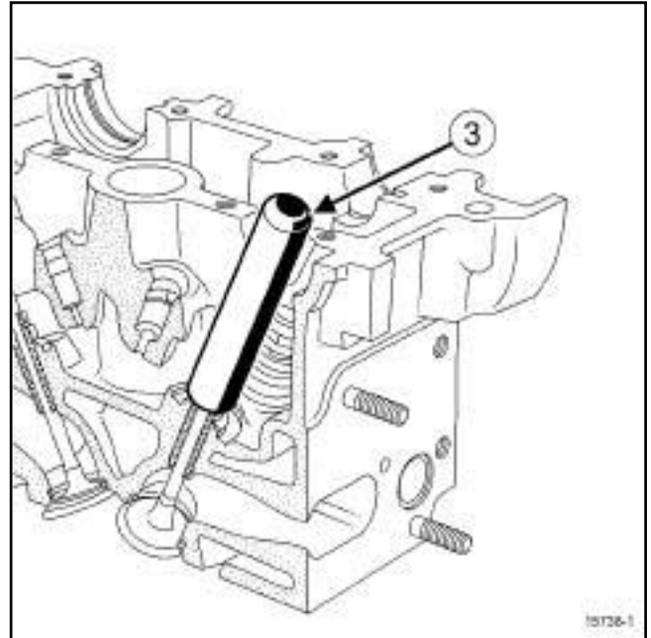


15738

**Note:**

Before removing the valve stem seals, it is essential to mark the position (**H**) of the old seals on the inlet side and then the exhaust side (as the fitting dimension may differ between the inlet and exhaust sides).

- Note the dimension (**H**) of an old seal using the tool (**Mot. 1511**) or the **valve stem seal fitting kit**.

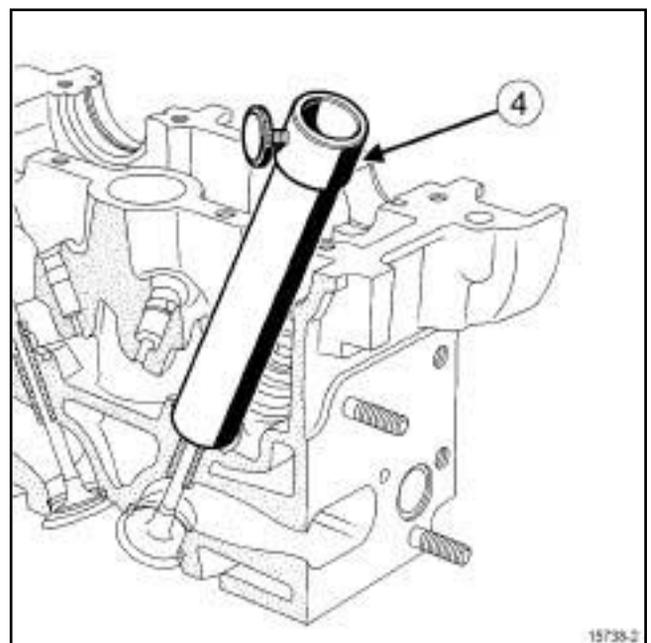


15738-1

- Fit the pushrod (**3**) of (**Mot. 1511**) onto the valve stem seal.

**Note:**

The internal diameter of the pushrod must be identical to that of the valve. In addition, the bottom of the pushrod must cover the metal upper section of the valve stem seal.

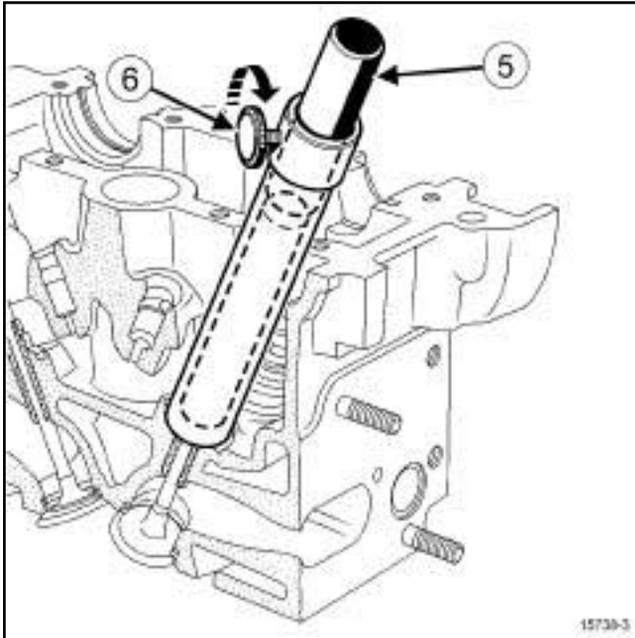


15738-2

- Fit the guide tube (**4**) over the pushrod until the guide tube comes into contact with the cylinder head.

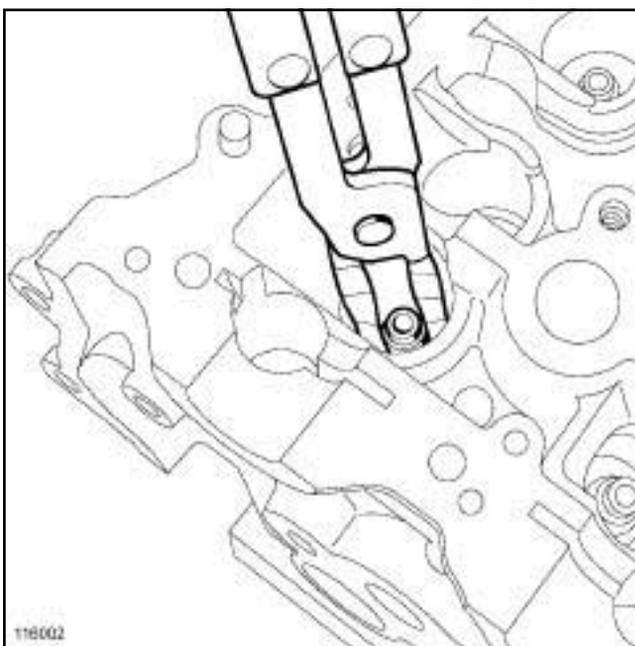
## Valve: Removal - Refitting

X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



15738-3

- Insert the sleeve (5) into the guide tube, until it comes into contact with the pushrod.
- Lock the sleeve using tumblewheel (6) .
- Remove the guide tube - sleeve assembly, being careful not to loosen the wheel.
- Remove the valve.
- Repeat the removal operation for the other valves.



116002

- Remove the valve stem seals using the (Mot. 1335).

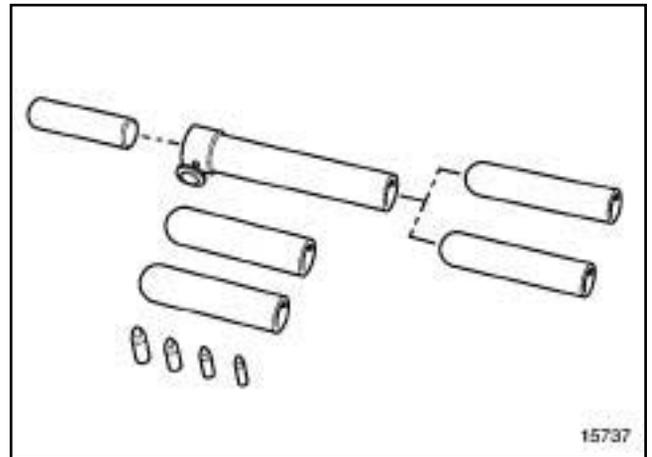
## REFITTING

## I - REFITTING PREPARATION OPERATION

- Always replace the valve stem seals.
- Use **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) to clean:
  - the valves,
  - the valve springs,
  - the valve spring cups,
  - the valve cotters,
  - the valve stem guides.

## II - VALVE REFITTING OPERATION

- Apply engine oil to the inside of the valve guide.

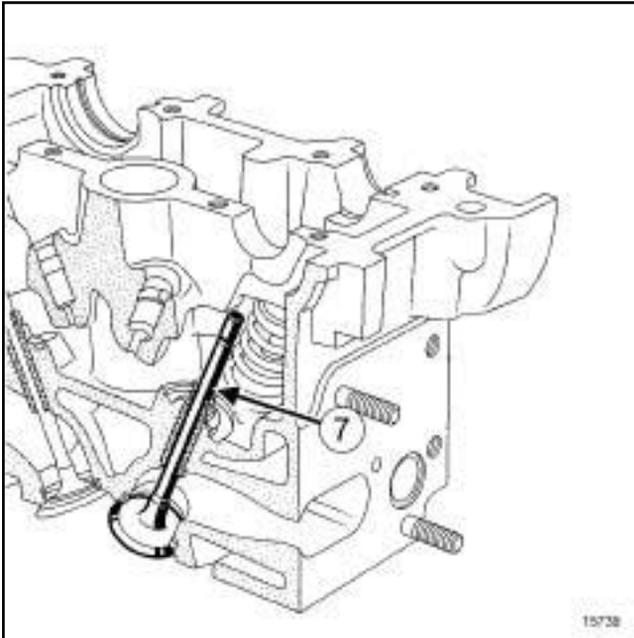


15737

- It is essential to refit the valve stem seals using the tool (Mot. 1511) or valve stem seal fitting kit.

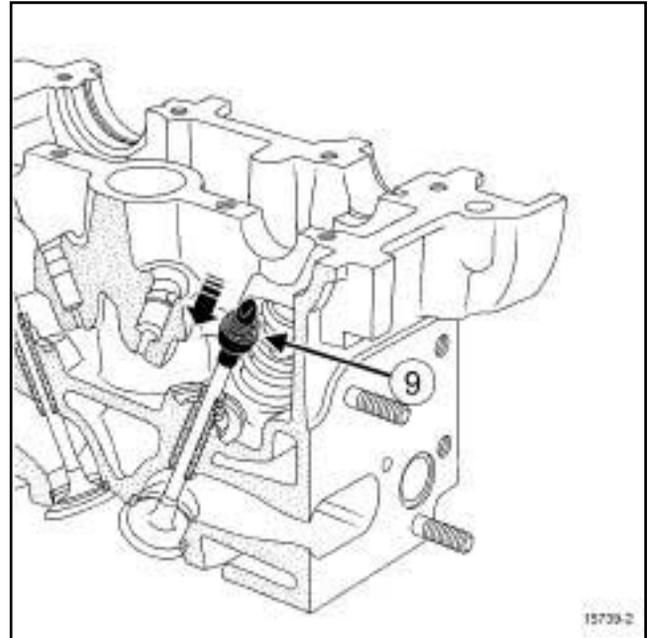
## Valve: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



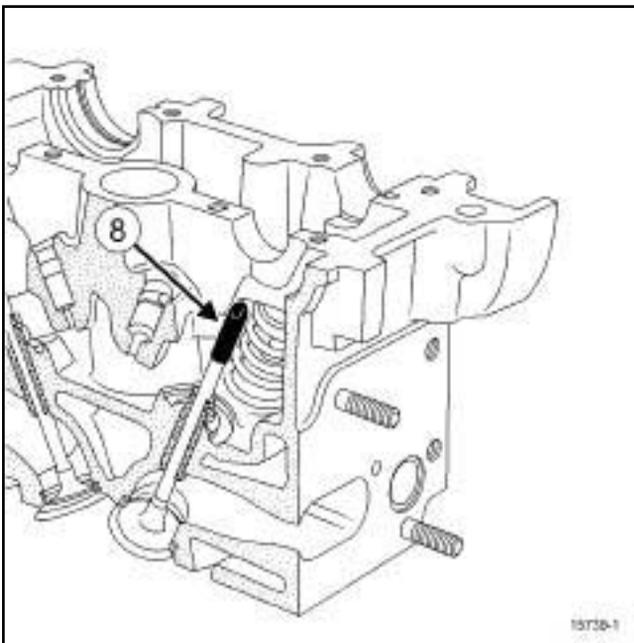
15739

- Fit the valve (7) into the cylinder head.



15739-2

- Keep the valve pressed against its seat.
- Fit the valve stem seal (9) (not lubricated) onto the seal guard.
- Push on the valve stem seal until it exceeds the seal guard.



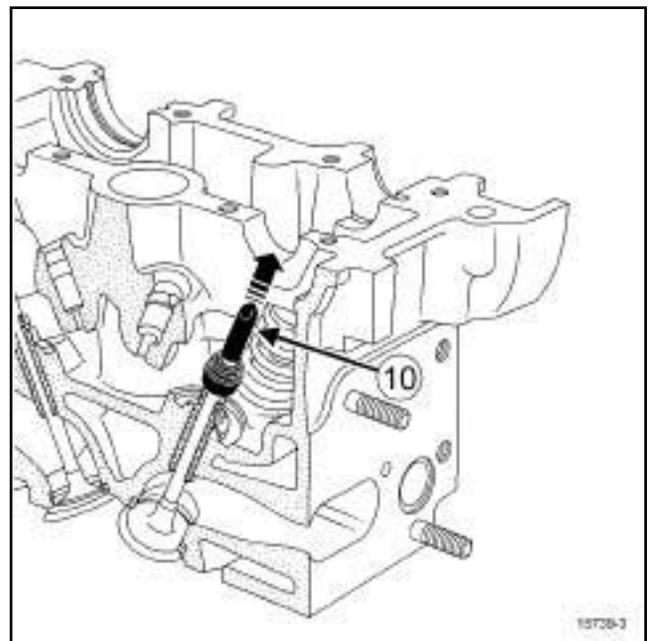
15739-1

Note:

The diameter of the protector (8) must be identical to that of the valve stem.

Do not lubricate the valve stem seal.

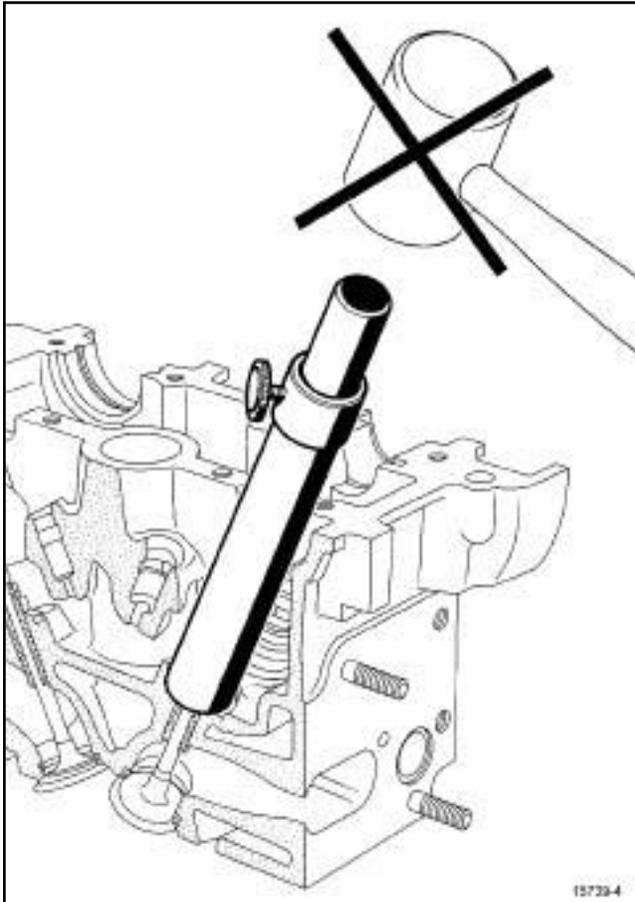
- Place the valve stem seal protector (8) of tool (Mot. 1511) on the valve.



15739-3

- Remove the guard (10) .

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



15739-4

- Place the « guide tube - sleeve » assembly which was previously adjusted during the valve removal stage onto the valve stem seal.
- Push the valve stem seal down by tapping the top of the sleeve with the palm of your hand until the guide tube touches the cylinder head.
- Repeat the preceding operations on all the inlet and exhaust valves.
- Refit:
  - the valve springs,
  - the valve spring upper cups.
- Compress the valve springs using the tool (**Mot. 1502**) or a **valve-spring compressor**.
- Refit the collets using a **tweezers**.

### III - FINAL OPERATION

- Refit:
  - the exhaust manifold (see **Exhaust manifold: Removal - Refitting**),
  - the injector holder shim (see **Injector holder shim: Removal - Refitting**),

- the injector rail (see **Injector rail: Removal - Refitting**).

- Remove the cylinder head from the cylinder head support (**Mot. 1573**).
- Refit the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**).
- Fill and bleed the cooling system (see **Cooling system: Draining - Refilling**).

## Valve: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

Equipment required
compressed air nozzle
external micrometer
dial gauge support
Dial gauge
internal micrometer
set of feeler gauges

### I - PREPARATION OPERATION FOR CHECK

#### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

#### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

Remove:

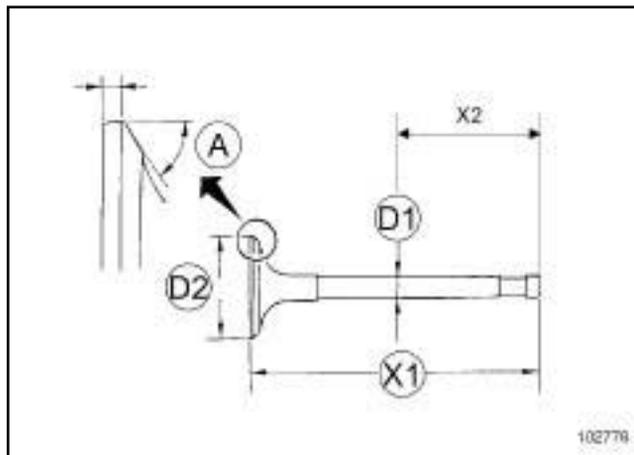
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting, page 10A-109**),
- the valves (see **10A, Engine and cylinder block assembly, Valve: Removal - Refitting, page 10A-170**).

Before any checks:

- clean the parts to be checked with **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) and dry them using a **compressed air nozzle**,
- check that the parts are not scratched and do not show signs of impact or abnormal wear (replace the part if necessary),
- check that the valve slides freely in the valve guide.

### II - CHECKING THE VALVE

#### 1 - Checking the valve size



102778

Measure using a **external micrometer** :

- the diameter (**D1**) of the valve stem,
- the length of the valve (**X1**).

	Inlet valve	Exhaust valve
Diameter ( <b>D1</b> ) of the valve stem (except F4R/870, 872, 874 engine) (mm)	<b>5.462 to 5.480</b>	<b>5.438 to 5.456</b>
Diameter ( <b>D1</b> ) of the valve stem (F4R/870, 872 engine) (mm)	<b>5.476 to 5.494</b>	<b>5.971 to 5.989</b>
Diameter ( <b>D1</b> ) of the valve stem (F4R/874 engine) (mm)		<b>5.956 to 5.970*</b>
Length ( <b>X1</b> ) of the valve (mm)	<b>109.93 to 110.23</b>	<b>108.72 to 109.02</b>

## Valve: Check

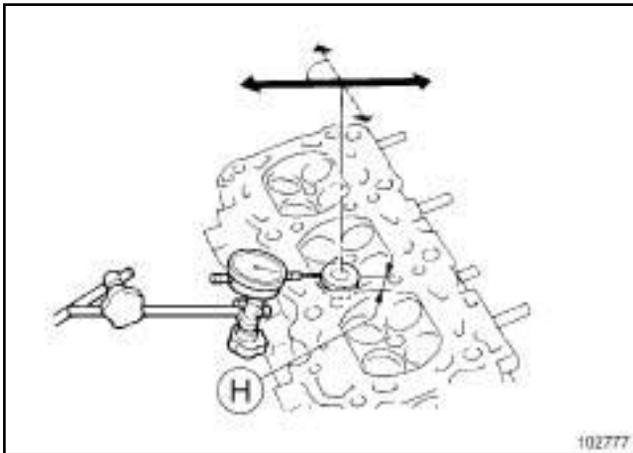
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

	Inlet valve	Exhaust valve
Diameter (D2) of the valve head (except F4R/870, 872, 874 engine) (mm)	<b>33.38 to 33.62</b>	<b>28.88 to 29.12</b>
Diameter (D2) of the valve head (F4R/870, 872, 874 engine) (mm)	<b>32.18 to 32.42</b>	
Mating face angle (A)	<b>45 to 45.15°</b>	

\* Value measured at (X2) = 76 mm.

### 2 - Clearance check between the valve and the valve guide

The clearance between the valve and the guide can be checked in two different ways.



102777

Position the valve head at a distance of (H) = **25 mm** from the valve seat.

Fit:

- the **dial gauge support**,
- the **Dial gauge** on the mounting.

Position the dial gauge feeler against the valve head at a **90°** angle in relation to the valve shaft.

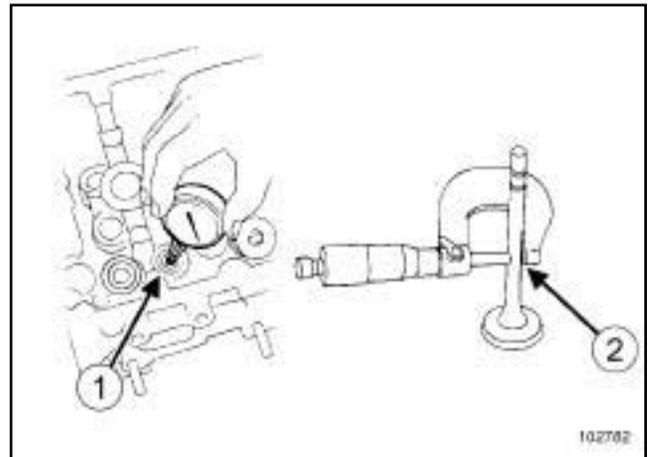
Push the valve head towards the dial gauge.

Calibrate the dial gauge to zero.

Push the valve head towards the side opposite the dial gauge.

Note the value displayed on the dial gauge.

Calculate the actual clearance between the valve and the valve guide by dividing the value measured on the dial gauge by two.



102782

Or measure:

- the internal diameter (1) of the valve guide using a **internal micrometer**,
- using a **external micrometer** the diameter (2) of the valve stem.

Calculate the actual clearance = internal diameter of the valve guide (1) - the diameter of the valve stem (2) .

The clearance between the valve and the valve guide must be between:

- **0.02 and 0.06 mm** for the inlet valve,
- **0.04 to 0.08 mm** for the exhaust valve.

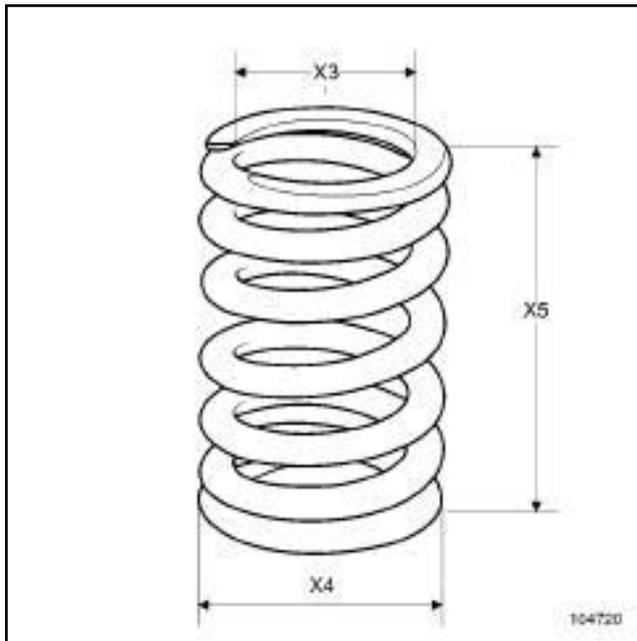
### III - CHECKING THE VALVE SPRING

#### 1 - Valve spring identification

The inlet and exhaust valve springs are identical.

## Valve: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



104720

	Specifications (mm)				
	Free length (X5)	Length with coils touching	Internal diameter (X3)	External diameter (X4)	Wire section type
F4P F4R and 700, 701, 712, 713, 714, 715, 720, 740, 741, 744, 746, 747, 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 780, 784, 786, 787, 790, 792, 794, 795, 796, 797	41.3	23.2	18.8	26.78	oval
F4R and 730, 732 736, 738	43.57	22		27	
F4R and 830, 832	46.1	22.5		26.78	
F4R and 800, 802, 811, 813, 820, 867, 870, 872, 874, 886, 887, 896, 897	41.3	23.2		27	

### Valve lift

Engine suffix	Inlet (mm)	Exhaust (mm)
F4P and 722, 760	9.21	8.86
F4P and 720 F4R and 720, 820	9.21	7.19
F4P and 770, 771, 772, 773, 774, 775	8.56	6.97

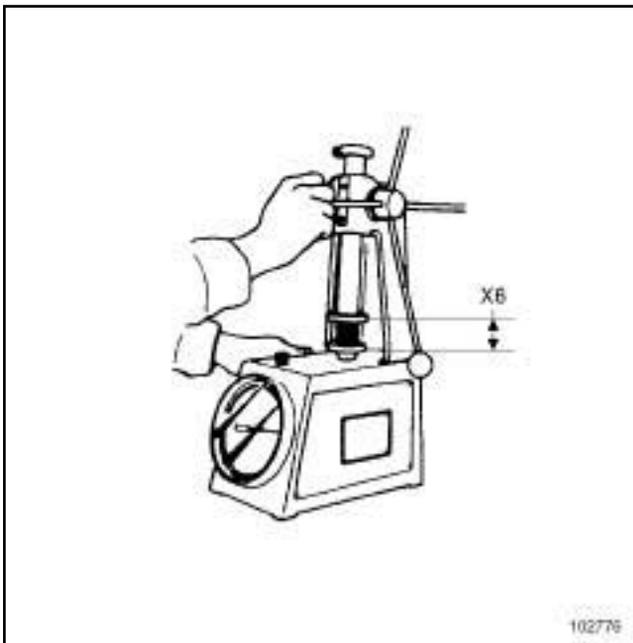
Engine suffix	Inlet (mm)	Exhaust (mm)
F4R and 700, 701, 740, 741, 744, 746, 747, 780	10.01	10.01
F4R and 712, 713, 714, 715, 790, 792	10	8.34
F4R and 730, 732 736, 738	11	10

## Valve: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

Engine suffix	Inlet (mm)	Exhaust (mm)
F4R and 770, 771	10.01	7.19
F4R and 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 784, 786, 787, 794, 795, 796, 797, 800, 802, 811, 813, 867, 870, 872, 874, 886, 887, 896, 897	9.33	9.25
F4R and 830, 832	11.43	10.76

### 2 - Checking the valve springs



102776

Use a dynamometer to check the calibration of the valve spring by measuring the length (X6) of the spring, which should be:

X56 – X64 – X66 – X73 – X74 – X81 – X83 – X84 – X91 – X95

With a load of **190 N**, the length of the spring is **34.5 mm**,

With a load of **590 N**, the length of the spring is **24.5 mm**.

X65

With a load of **270 N**, the length of the spring is **34.5 mm**,

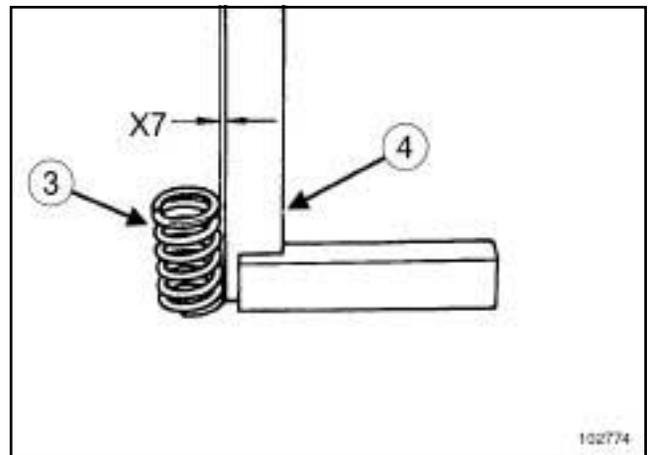
With a load of **650 N**, the length of the spring is **23.5 mm**.

X85

With a load of **270 N**, the length of the spring is **35.5 mm**,

With a load of **670 N**, the length of the spring is **24 mm**.

### 3 - Checking valve spring perpendicularity



102774

On the **body jig bench** place:

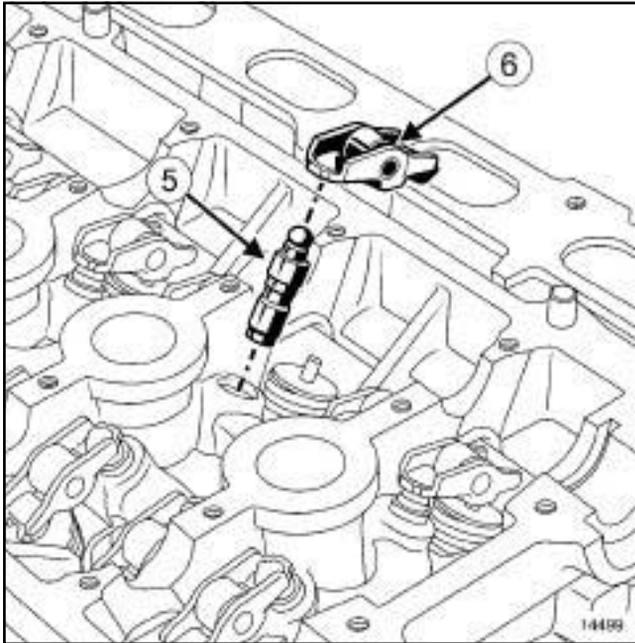
- the valve spring (3) ,
- the **bracket** (4) .

Check using a **set of feeler gauges** that the clearance (X7) is less than **1.2 mm**.

## Valve: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## IV - HYDRAULIC TAPPETS



14499

F4 engines are fitted with hydraulic tappets (5) and roller valve rockers (6) which are the same for the inlet and the exhaust.

On these engines the valve clearance cannot be adjusted.

## V - FINAL OPERATION

Refit:

- the valves (see **10A, Engine and cylinder block assembly, Valve: Removal - Refitting**, page **10A-170**)
- ,
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**) .

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Special tooling required

**Mot. 1573**      Cylinder head support

### Tightening torques

coolant temperature sensor      **33 N.m**

lifting eye mounting bolts      **18 N.m**

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

## STRIPPING

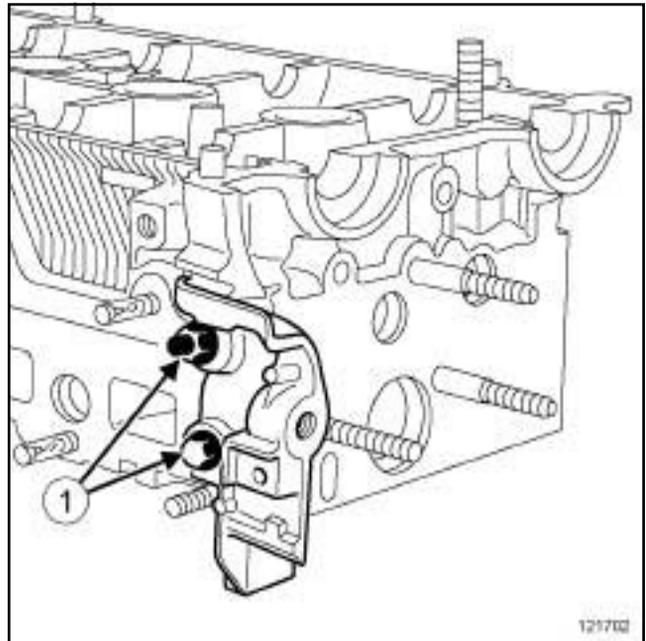
### I - STRIPPING PREPARATION OPERATION

- Drain the cooling system (see **Cooling system: Draining - Refilling**).
- Remove the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting, page 10A-109**).
- Mount the cylinder head on the cylinder head support (**Mot. 1573**).

### II - STRIPPING DOWN THE CYLINDER HEAD

- Remove:
  - the injector rail (see **Injector rail: Removal - Refitting**),
  - the injector holder shim (see **Injector holder shim: Removal - Refitting**).

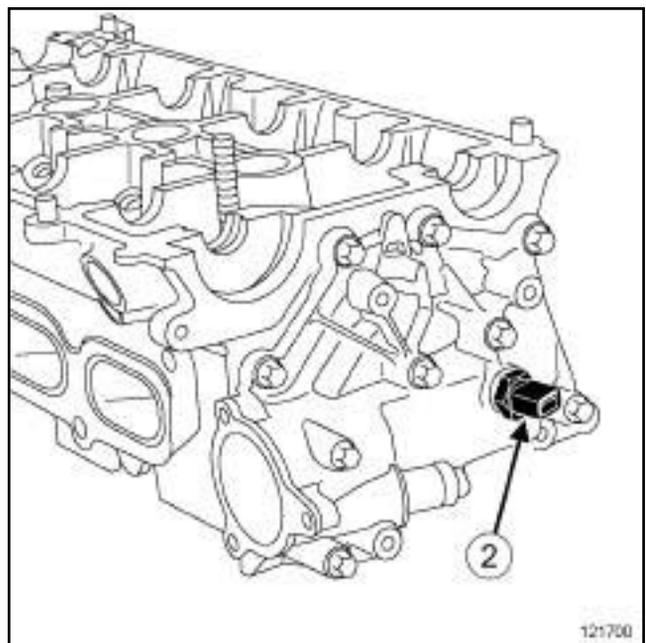
X85, and F4R, and 830 or 832



121702

#### Remove:

- the bolts (1) from the lifting eye mounting,
- the lifting eye mounting.



121700

#### Remove:

- the coolant temperature sensor (2),

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the exhaust manifold (see **Exhaust manifold: Removal - Refitting**) ,
- the water chamber (see **Water chamber: Removal - Refitting**) ,
- the thermostat (see **Thermostat: Removal - Refitting**) ,
- the valves (see **10A, Engine and cylinder block assembly, Valve: Removal - Refitting**, page **10A-170**) .

## REBUILDING

### I - PREPARATION OPERATION FOR REBUILDING THE CYLINDER HEAD

- Clean the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Cleaning**, page **10A-182**) .

### II - OPERATION FOR REFITTING THE CYLINDER HEAD

- Refit:
  - the valves (see **10A, Engine and cylinder block assembly, Valve: Removal - Refitting**, page **10A-170**) ,
  - the thermostat (see **Thermostat: Removal - Refitting**) ,
  - the water chamber (see **Water chamber: Removal - Refitting**) ,
  - the exhaust manifold (see **Exhaust manifold: Removal - Refitting**) ,
  - the coolant temperature sensor.
- Tighten to torque the **coolant temperature sensor (33 N.m)**.

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 X85, and F4R, and 830 or 832

- Refit:
  - the lifting eye mounting,
  - the lifting eye mounting bolts.
- Torque tighten the **lifting eye mounting bolts (18 N.m)**.

- Refit:
  - the injector holder shim (see **Injector holder shim: Removal - Refitting**) ,

- the injector rail (see **Injector rail: Removal - Refitting**) .

### III - FINAL OPERATION

- Remove the cylinder head from the cylinder head support (**Mot. 1573**).
- Refit the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**) .
- Fill and bleed the cooling system (see **Cooling system: Draining - Refilling**) .

## Cylinder head: Cleaning

X73 – X74 – X81 – X83 – X84 – X91 – X64 – X65 – X66 – X85 – X95 – X56

### Equipment required

parts washer

cleaning trough

### I - CLEANING PREPARATION OPERATION

□

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### IMPORTANT

Wear goggles with side protectors for this operation.

#### IMPORTANT

Wear leaktight gloves (Nitrile type) for this operation.

#### WARNING

Do not allow this product to drip onto the paintwork.

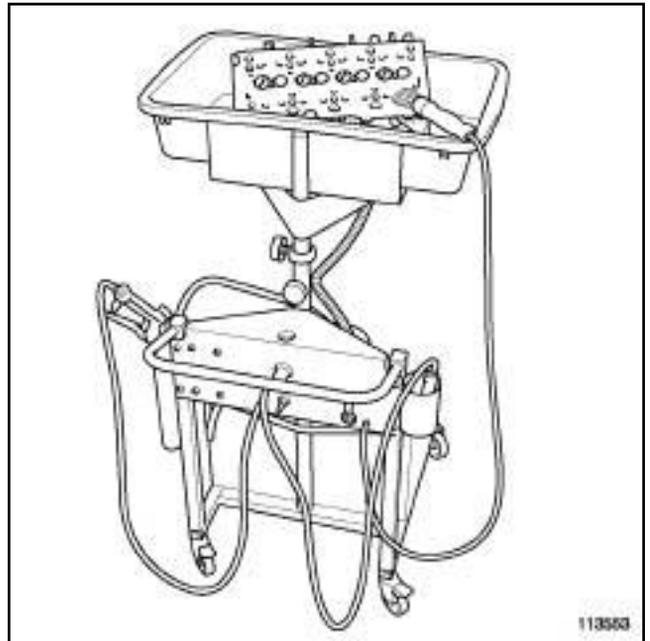
Clean the cylinder head carefully to avoid any foreign bodies entering the oil return and supply pipes.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

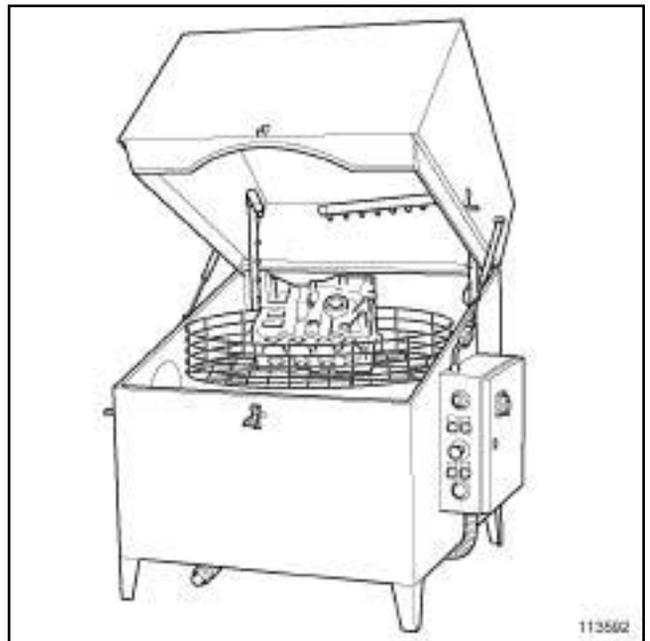
- Remove the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21).
- Remove the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page 10A-109).
- Strip the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding**, page 10A-180).

### II - CLEANING THE CYLINDER HEAD

- Clean the joint face of the cylinder head using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products).
- Remove the residue using a wooden spatula
- Finish cleaning the parts using a **GREY ABRASIVE PAD** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products).



113553



113592

- Wash the cylinder head using a **parts washer** or a **cleaning trough**.

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X73 – X74 – X81 – X83 – X84 – X91 – X64 – X65 – X66 – X85 – X95 – X56

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### III - FINAL OPERATION

- Rebuild the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Striping - Rebuilding**, page **10A-180**) .
- Refit the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**) .
- Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**) .
- Refit the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

## Cylinder head: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Equipment required

external micrometer
mortice gauge
depth gauge
cylinder head rule
set of feeler gauges
internal micrometer
cylinder head testing tools

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

### I - PREPARATION OPERATION FOR CHECK

Drain the cooling system (see **Cooling system: Draining - Refilling**).

Remove the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting, page 10A-109**).

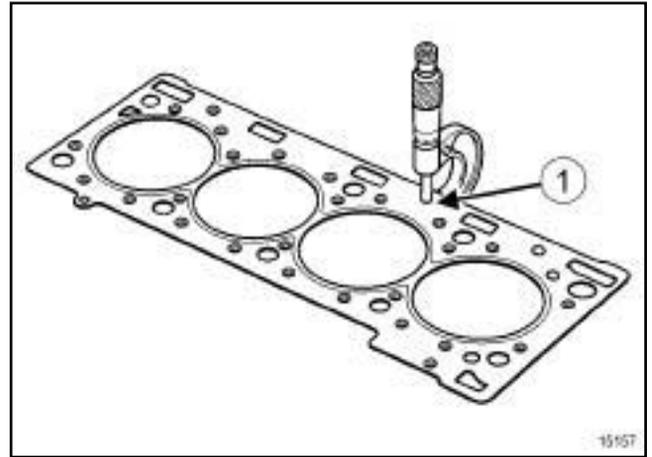
Strip down the cylinder head if required by the check (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding, page 10A-180**).

Before all checks:

- clean the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Cleaning, page 10A-182**),
- check that the cylinder head does not have any scratches, any trace of impact or abnormal wear (if necessary replace the part).

### II - CHECKING THE CYLINDER HEAD

#### 1 - Checking the cylinder head gasket



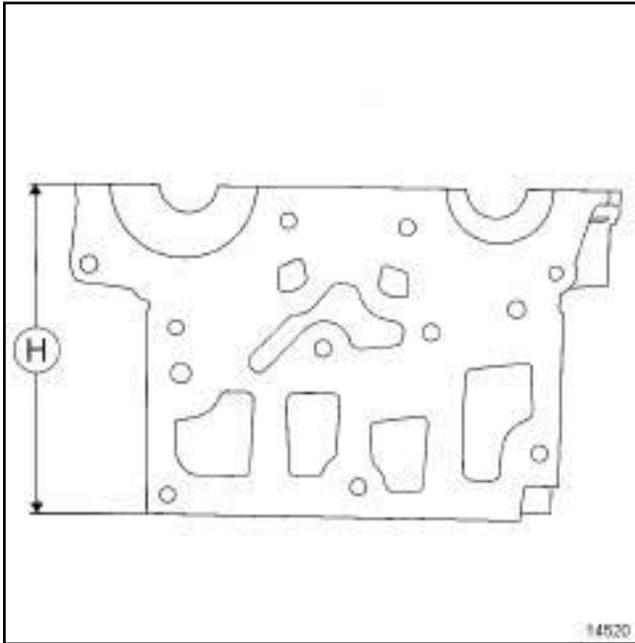
Using a **external micrometer**, measure the thickness of the cylinder head gasket at (1).

Engine suffix	Thickness of the cylinder head gasket (mm)
F4P/720, 722, 760, 770, 771, 772, 773, 774, 775	0.65 ± 0.02
F4R/700, 701, 712, 713, 714, 715, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 776, 780, 786, 787, 790, 792, 794, 795, 796, 797, 811, 813, 820, 867, 886, 887, 896, 897	0.78 ± 0.03
F4R/830, 832, 870, 872	1.29 ± 0.03
F4R/774, 784, 800, 802	1.48 ± 0.04
F4R/874	

## Cylinder head: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### 2 - Checking the height of the cylinder head

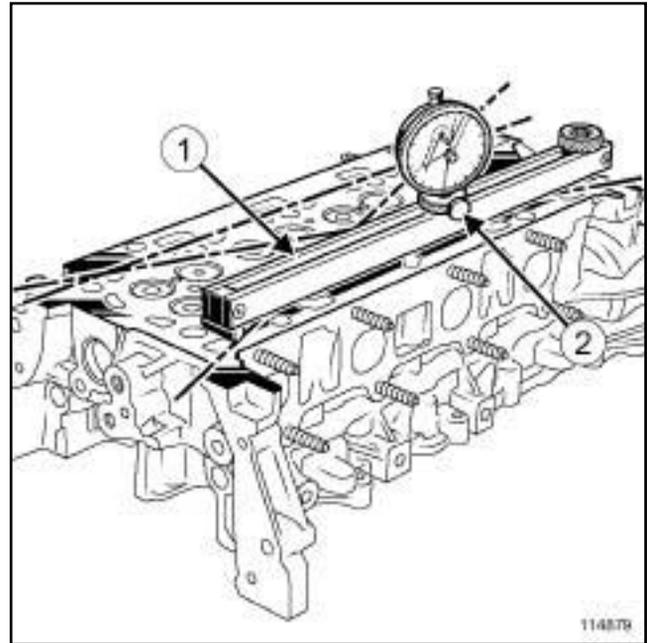


14520

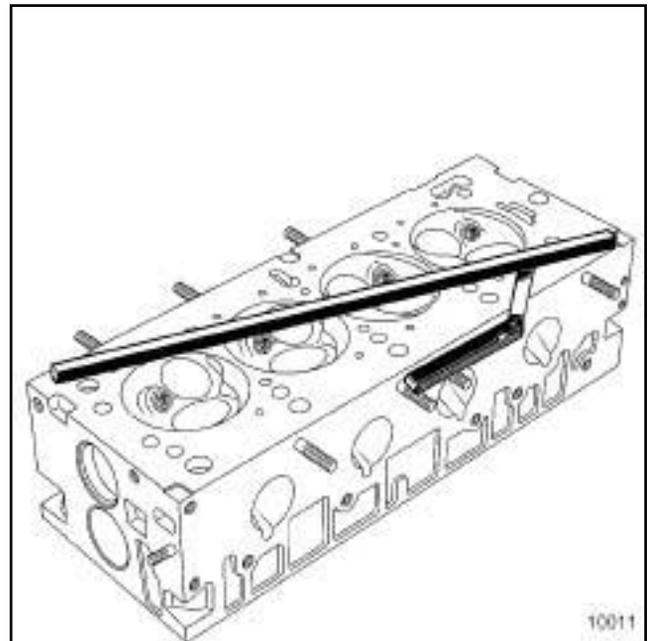
Using a **mortice gauge**, or a **depth gauge**, measure the height (H) of the cylinder head, which should be:

Engine suffix	Cylinder head height (mm)
F4R/714, 715, 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 784, 786, 787, 792, 794, 795, 796, 797, 800, 802, 811, 813, 820, 830, 832, 867, 870, 872, 874, 886, 887, 896, 897	138.4
F4P/720, 722, 760, 770, 771, 772, 773, 774, 775	138.15
F4R/700, 701, 712, 713, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 760, 780, 790	

### 3 - Checking the flatness of the cylinder head



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10011

Using a ruler (1) and a « dial gauge - support » assembly (2) or a **cylinder head rule** and a **set of feeler gauges**, check the flatness of the cylinder head gasket face.

Maximum deformation of the cylinder head gasket face: **0.05 mm**.

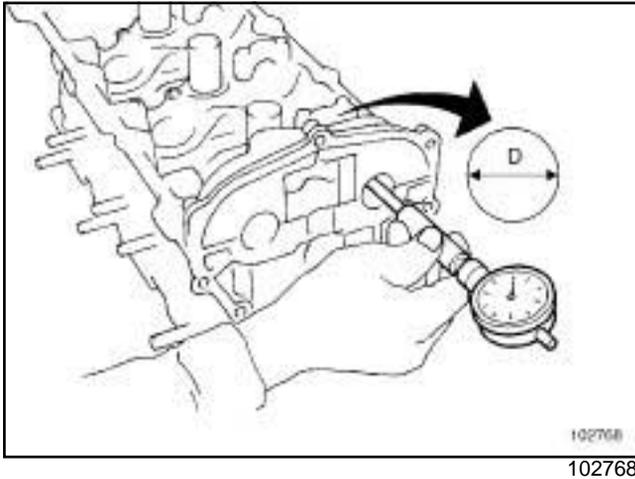
#### WARNING

No regrinding of the cylinder head is permitted.

## Cylinder head: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## 4 - Checking the camshaft bearing diameters



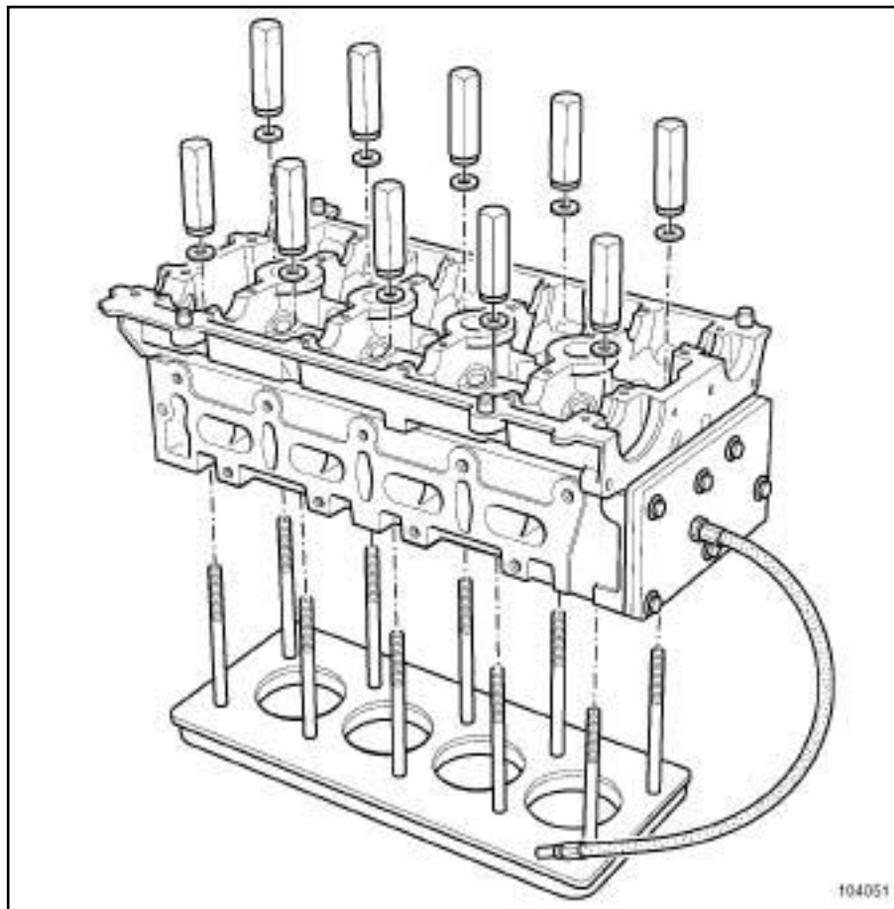
Note:

Camshaft bearing no.1 is located on the flywheel end.

Using a **internal micrometer**, measure the diameter (**D**) of the camshaft bearings of the cylinder head, which should be:

- bearings No.1, No.2, No.3, No.4, No.5: **25.04 to 25.06 mm**,
- bearing No.6: **28.04 to 28.06 mm**.

## 5 - Checking the sealing of the cylinder head



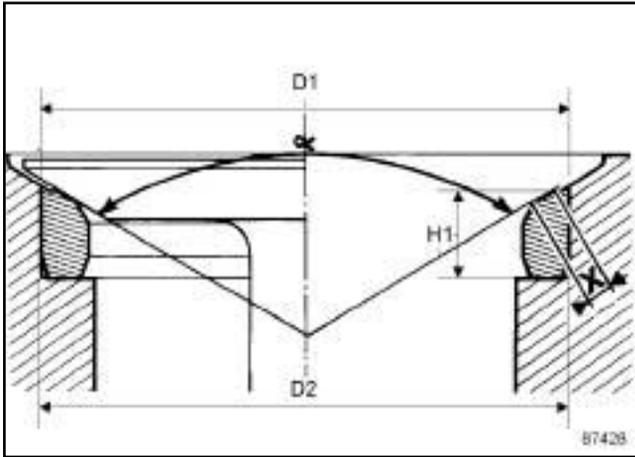
Test the cylinder head for any cracks using the **cylinder head testing tools** (see garage equipment catalogue).

For use of the cylinder head test bench (see **Cylinder head test tank: Use**) (Technical Note 6026A, 11A, Top and front of engine).

## Cylinder head: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### 6 - Identifying the valve seats



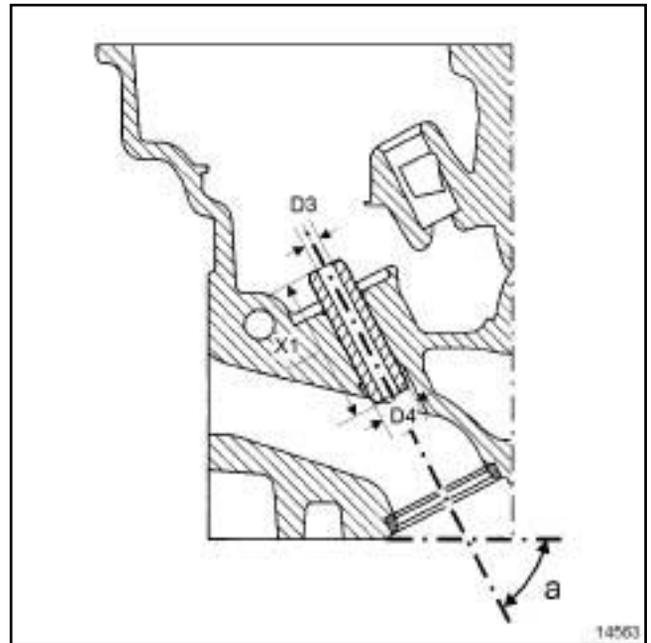
87428

	Inlet	Exhaust
Mating face angle (°)	89	89
Mating face width X (mm)	1.3 to 2.7	1.4 to 2.7
Seat height H1 (mm)	4.65 ± 0.05	
Outer diameter of seat (D1) (except F4R/870, 872, 874 engine) (mm)	34.542 ± 0.008	30.042 ± 0.006
Outer diameter of seat (D1) (F4R/870, 872 engine) (mm)	34.032 ± 0.008	30.042 ± 0.006
Outer diameter of seat (D1) (F4R/874 engine) (mm)	34.032 ± 0.008	30.292 ± 0.006
Internal diameter of the housing (D2) (except F4R/870, 872, 874 engine) (mm)	34.4 to 34.42	29.9 to 29.92

	Inlet	Exhaust
Internal diameter of the housing (D2) (F4R/870, 872 engine) (mm)	33.9 to 33.92	29.9 to 29.92
Internal diameter of the housing (D2) (F4R/874 engine) (mm)	30.292 ± 0.06	30.205 ± 0.016

### 7 - Valve guides

#### a - Guide dimensions



14563

	Inlet	Exhaust
Length of the guide (X1) (mm)	40.5 ± 0.15	
Internal diameter of the guide (D3) (except F4R/870, 872, 874 engine) (mm)	5.000 to 5.075 (not machined) 5.500 ± 5.518 (machined*)	
Internal diameter of the guide (D3) (F4R/870, 872, 874 engine) (mm)	5.500 ± 5.518 (machined*)	6.000 ± 6.018 (machined*)

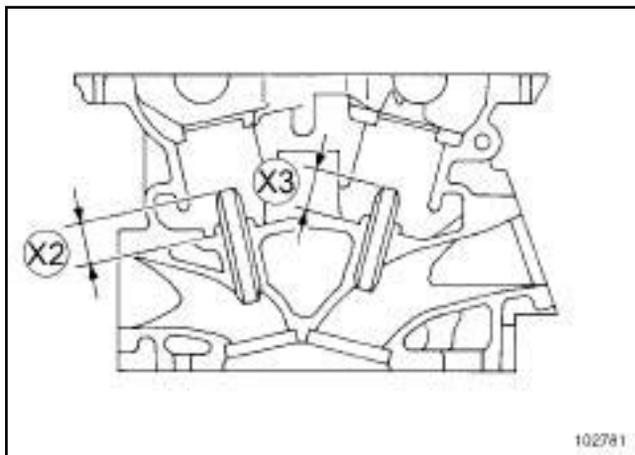
## Cylinder head: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

	Inlet	Exhaust
External diameter of the guide (D4) (mm)	11.050 to 11.068	
Internal diameter of the housing in the cylinder head (D4) (mm)	11.000 to 11.004	
Guide angles (a)	63° 30'	66°

\* The dimension is measured with the guide fitted to the cylinder head

### b - Guide positions



102781

	Inlet Dimension X2 (mm)	Exhaust Dimension X3 (mm)
F4R/760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 784, 786, 787, 794, 795, 796, 797, 800, 802, 811, 813, 820, 830, 867, 870, 872, 874, 886, 887, 896, 897	12 ± 0.15	10.2 ± 0.15

	Inlet Dimension X2 (mm)	Exhaust Dimension X3 (mm)
F4P/720, 722, 760, 770, 771, 772, 773, 774, 775	12 ± 0.15	11 ± 0.15
F4R/700, 701, 712, 713, 714, 715, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790, 792		
F4R/832	12 ± 0.15	12 ± 0.15

### III - FINAL OPERATION

Rebuild the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Stripping - Rebuilding**, page 10A-180) .

Refit the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page 10A-109) .

Fill and bleed the cooling system (see **Cooling system: Draining - Refilling**) .

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Special tooling required

<b>Mot. 1677</b>	Flywheel locking tool.
<b>Mot. 1492</b>	Tool for fitting main bearing shells.

### Equipment required

piston ring compressor
compressed air nozzle
piston mounting ring

### Tightening torques

con rod cap bolts	<b>25 N.m + 110°</b> <b>± 6°</b>
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### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump may also damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Remove the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and F4R, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Disconnect the manual gearbox from the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Disconnect the automatic gearbox from the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Remove the accessories belt. (see **Accessories belt: Removal - Refitting**)

- Immobilise the flywheel or the drive plate using the tool (**Mot. 1677**).

- Remove the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**).

## Piston - Con rod: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

X56, and 5-SPEED MANUAL GEARBOX – X64, and F4R, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

Remove:

- the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch),
- the flywheel (see **Flywheel: Removal - Refitting**) .

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

Remove the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission).

- Remove the flywheel locking tool (**Mot. 1677**).
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21) .
- Drain the engine (see **Engine oil: Draining - Refilling**) .

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

Remove:

- the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**) ,
- the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
- the turbocharger (see **Turbocharger: Removal - Refitting**) .

Remove:

- the timing belt (see **Timing belt: Removal - Refitting**) ,
- the alternator (see **Alternator: Removal - Refitting**) .

X56, and AIR CONDITIONING – X64, and AIR CONDITIONING – X65, and AIR CONDITIONING – X66, and AIR CONDITIONING – X73, and AIR CONDITIONING – X74, and F4R, and AIR CONDITIONING – X81, and AIR CONDITIONING – X83, and AIR CONDITIONING – X84, and AIR CONDITIONING – X85, and AIR CONDITIONING – X91 – X95

Remove the air conditioning compressor (see **Compressor: Removal - Refitting**) (62A, Air conditioning).

Remove:

- the power-assisted steering pump (see **Power-assisted steering pump: Removal - Refitting**) (36B, Power-assisted steering),
- the multifunction support (see **Multifunction support: Removal - Refitting**) ,
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the ignition coils (see **Coils: Removal - Refitting**) ,

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**),
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**),
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**).
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**).

□ Remove:

- the sump (see **Lower cover: Removal - Refitting**)

- the oil pump (see **Oil pump: Removal - Refitting**)

### II - PISTON - CON ROD ASSEMBLY REMOVAL OPERATION

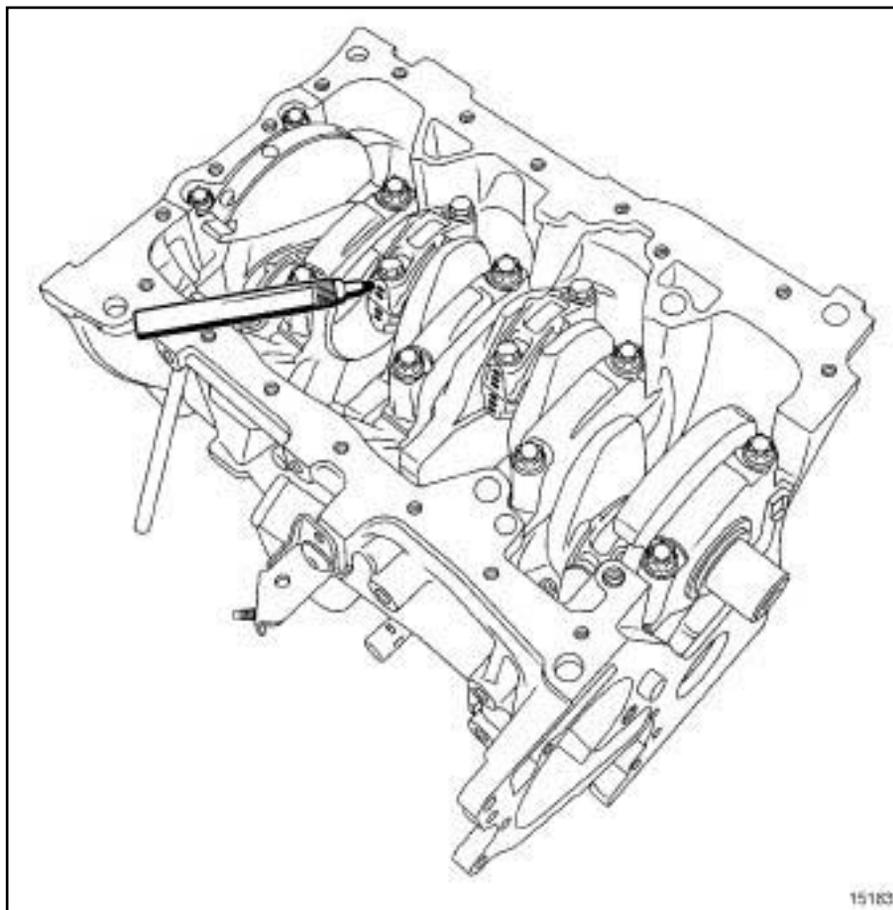
#### 1 - Piston - con rod assembly removal operation

□

#### WARNING

Do not use a punch or an etching tool to mark the con rod caps to match their bodies, to prevent incipient breakage of the con rod.

Use an indelible marker pen.

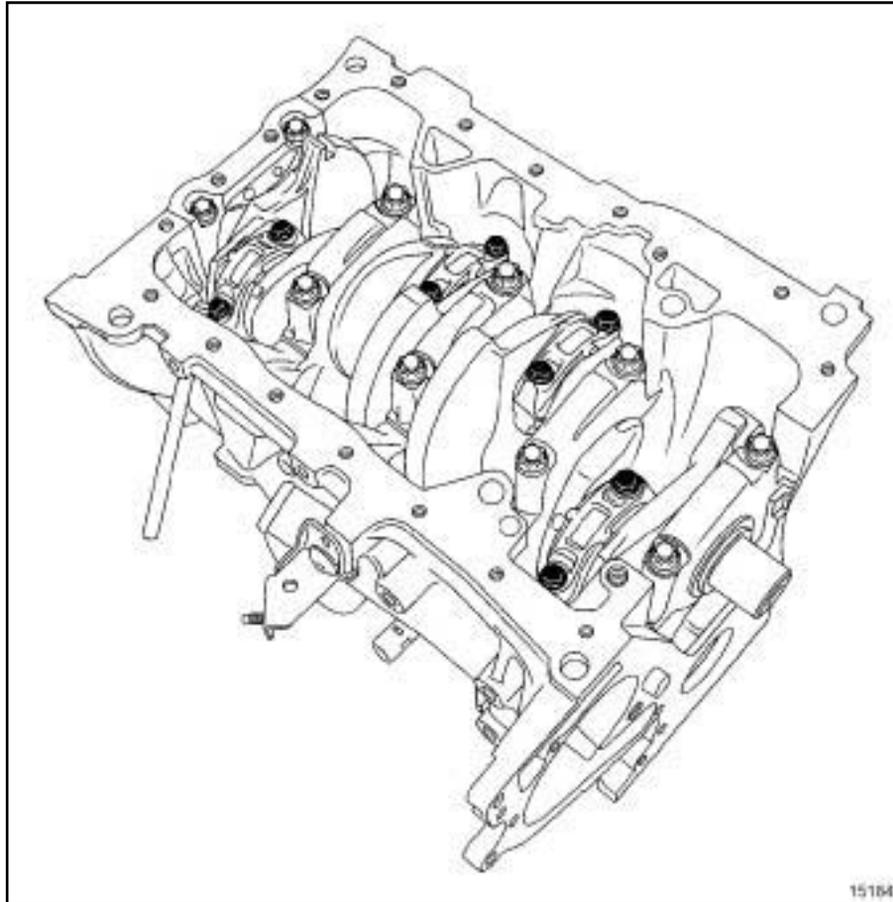


15183

15183

- Mark the con rod bodies and caps in relation to the cylinders using an indelible marker pen (cylinder 1 flywheel end).

X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



15184

15184

- Remove:
  - the con rod cap bolts,
  - the con rod cap,
  - the con rod cap bearing shell while marking its position in relation to the con rod cap.

**IMPORTANT**

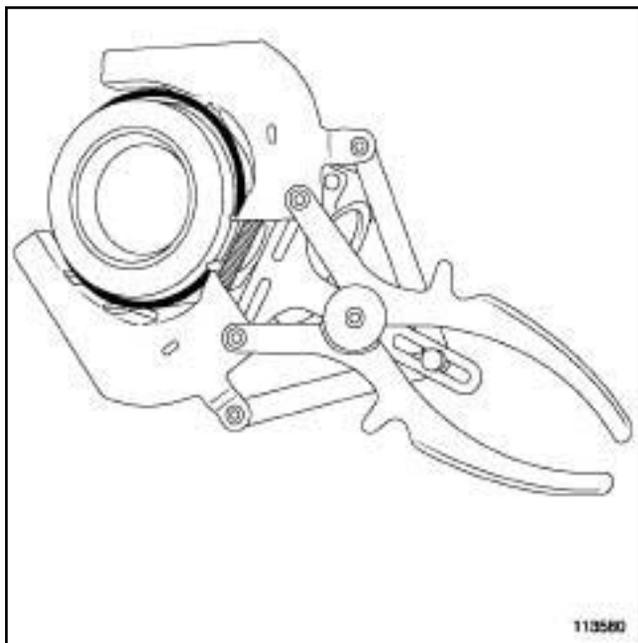
Wear cut-resistant gloves during every operation.

- Remove:
  - the « con rod - piston » assembly through the cylinder head side of the cylinder block,
  - the con rod body bearing.
- Mark the bearing shell in relation to the con rod body using an indelible marker pen.
- Repeat the above operations on the other cylinders.

**2 - Piston ring removal operation**

- Operation only to be carried out when replacing or checking the piston rings or the piston (see **10A, Engine and cylinder block assembly, Piston - Con rod: Check**, page **10A-200**).

X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



113580  
113580

- Remove the piston rings using a **piston ring compressor**.

**Note:**

Take care not to damage the piston when removing the rings. Do not open the rings too much as they risk becoming damaged.

If reusing, mark the piston rings in relation to the piston.

### 3 - Operation to separate the con rod and piston

- Operation only to be carried out when replacing or checking the piston or con rod (see **10A, Engine and cylinder block assembly, Piston - Con rod: Check**, page 10A-200) .



15187  
15187

- Remove the circlips using a flat-blade screwdriver.
- Remove the gudgeon pin by hand.
- Mark the gudgeon pin in relation to the piston using an indelible marker pen.
- Repeat the above operations for the other pistons.

## REFITTING

### I - REFITTING PREPARATION OPERATION

- parts always to be replaced: con rod cap bolts.**

**IMPORTANT**

Wear goggles with side protectors for this operation.

**Note:**

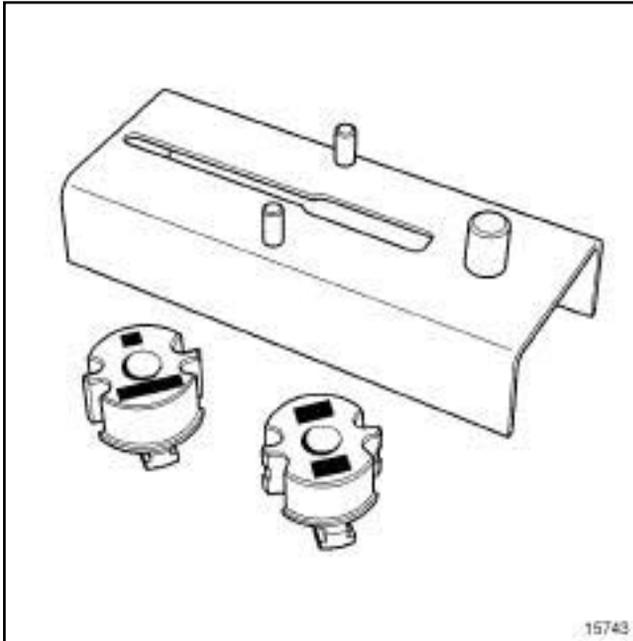
Do not knock or lean against the cap mating faces and the con rod body to prevent damaging the con rod.

- Clean the "piston - con rod" assembly with **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) .
- Dry the "piston - con rod" assembly using a **compressed air nozzle**.

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

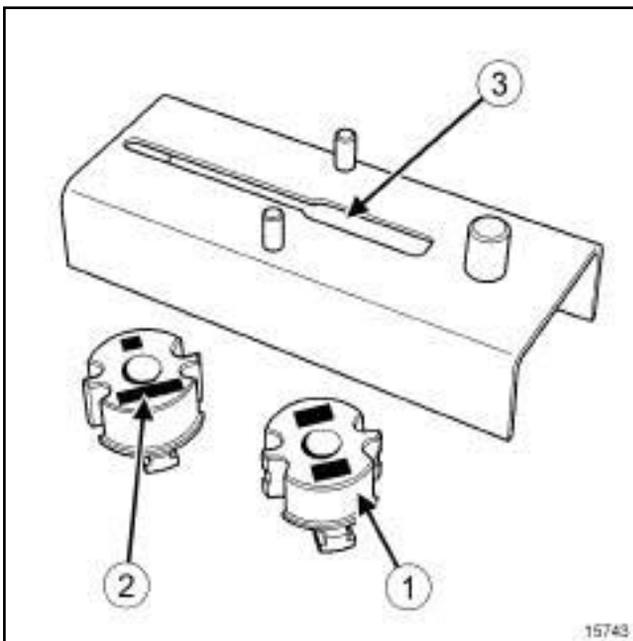
### 1 - Con rod bearing shells fitting operation

- ❑ The con rods are fitted with bearing shells without a foolproofing device.



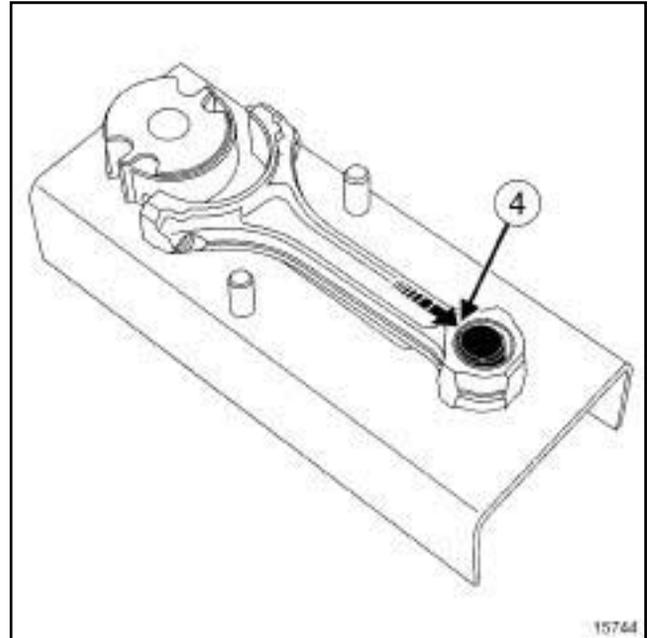
15743  
15743

- ❑ The bearing shells must be fitted using tool (Mot. 1492).



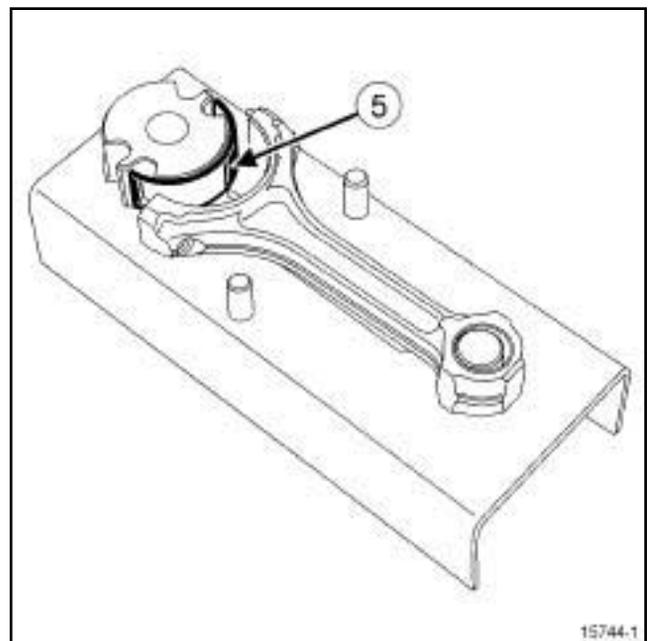
15743  
15743

- ❑ Select the bearing shell support (1) for the engine (engine type marked (2) on the support).
- ❑ Slide the bearing shell support into the groove (3) on the base.



15744  
15744

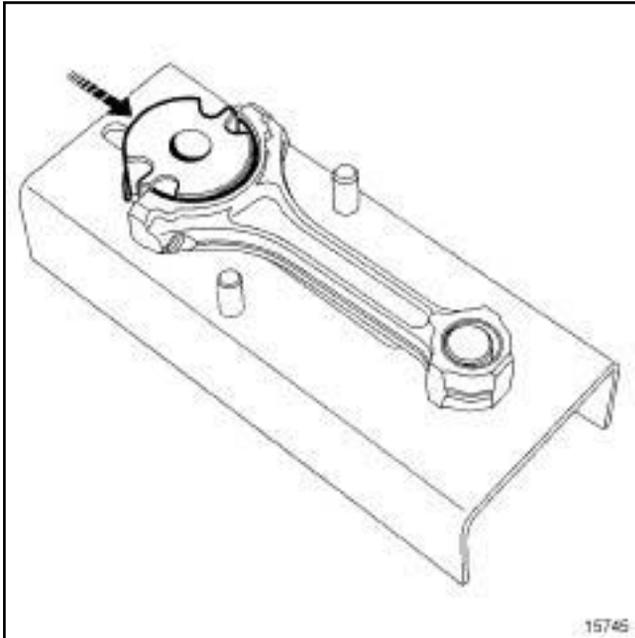
- ❑ Fit the con rod into the base.
- ❑ Press the lower section (4) of the small end against the centring pin.



15744-1  
15744-1

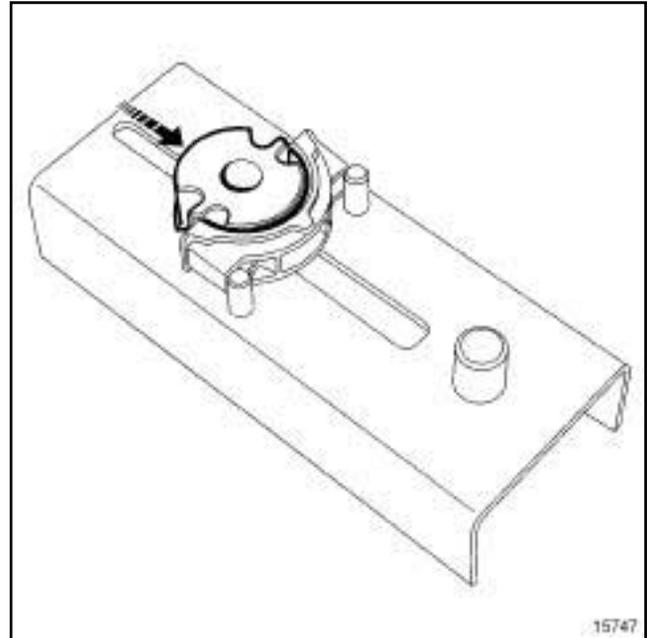
- ❑ Position the bearing shell (5) on the bearing shell support.

X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



15745

- Push the bearing shell support (in the direction of the arrow) until the bearing shell support is fully inserted in the body of the connecting rod.
- Remove the con rod body support and then repeat the operation for the other con rods.

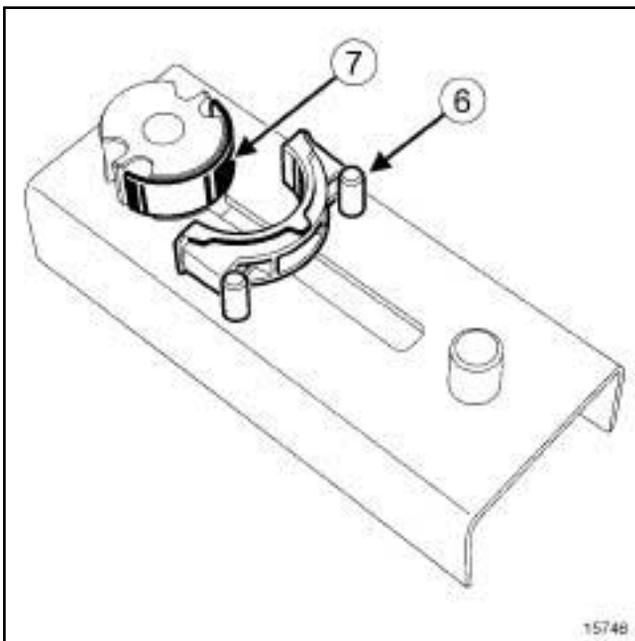


15747

- Push on the bearing shell support (in the direction of the arrow) until it is fully in the con rod cap.
- Remove the con rod cap support and repeat the operation for the other con rod caps.

### 2 - Piston and con rod assembly operation

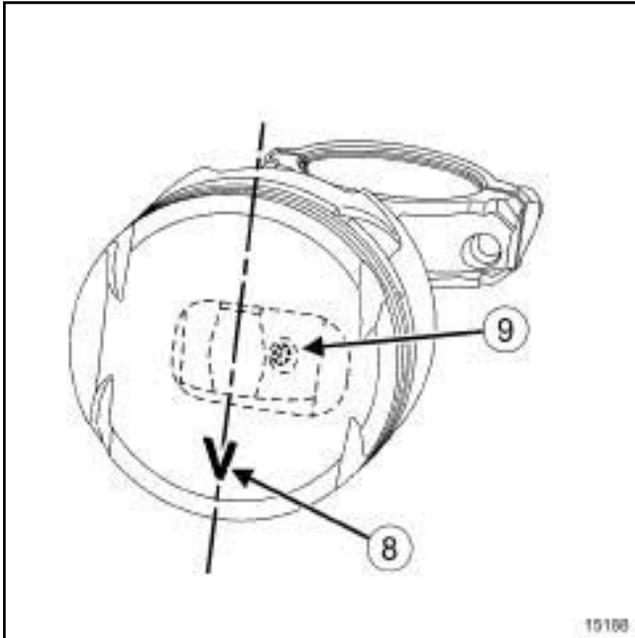
- Operation only to be carried out when replacing or checking the piston or con rod (see **10A, Engine and cylinder block assembly, Piston - Con rod: Check**, page **10A-200**) .
- If the piston is replaced, it is essential to check the pairing between the category of piston and that of the cylinder block barrel (see **10A, Engine and cylinder block assembly, Cylinder block: Check**, page **10A-242**) .
- If a piston is reused, check that the piston/con rod marks made by the operator during disassembly match.



15746

- Rest the con rod cap against the base plate pins **(6)** .
- Position the bearing shell **(7)** on the bearing shell support.

X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



15188

- Put the marking (8) downwards with the small end oil hole (9) to the right of the vertical axis.

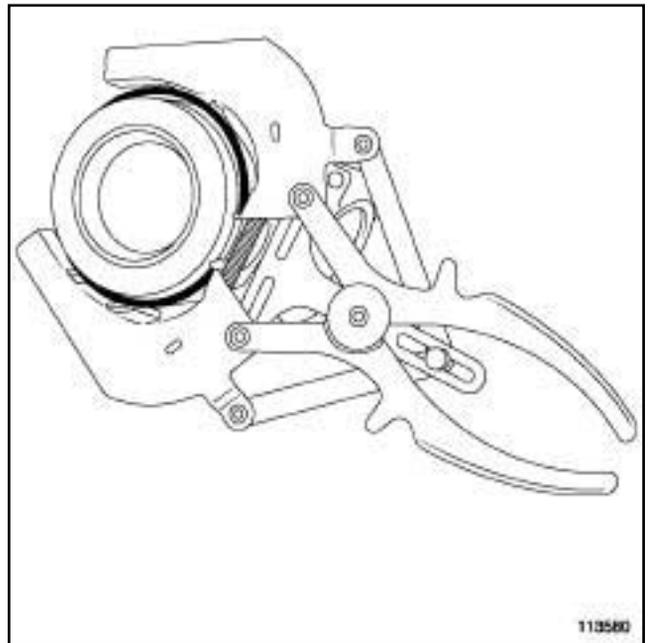


15611

- Position the locking spring ring gap (10) at the top at  $\pm 45^\circ$  to the vertical axis of the piston.
- Refit the second locking spring ring at the top of the piston. with the opening of the ring positioned opposite the removal - refitting groove with a tolerance of  $\pm 45^\circ$ .

### 3 - Piston ring refitting operation

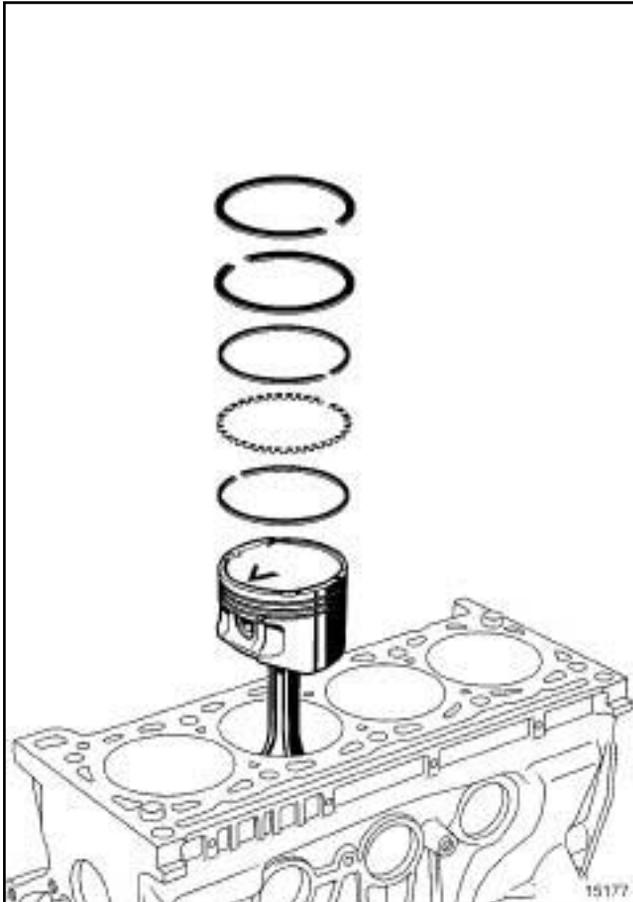
- Operation only to be carried out when replacing or checking the piston rings or the piston (see 10A, Engine and cylinder block assembly, Piston - Con rod: Check, page 10A-200) .
- Rings set to their original settings must be free within their channels.
- Respect the piston ring fitting direction, with **TOP** at the top.



113580

- Refit the piston rings using a **piston ring compressor**.

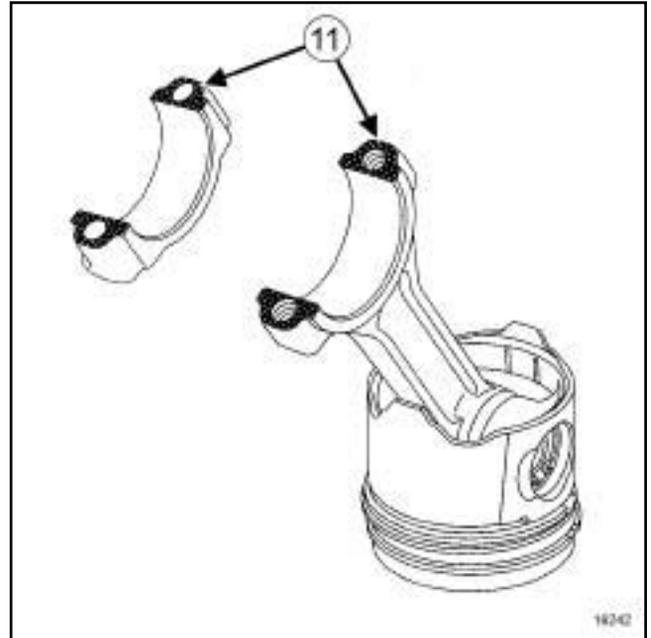
X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



15177

□ Arrange:

- the compression ring, the sealing ring and scraper ring in the correct order to stagger the end gaps at intervals of **120°**,
- the scraper ring components (ring - spring expander - ring) in the correct order and stagger the end gaps at intervals of **120°**.



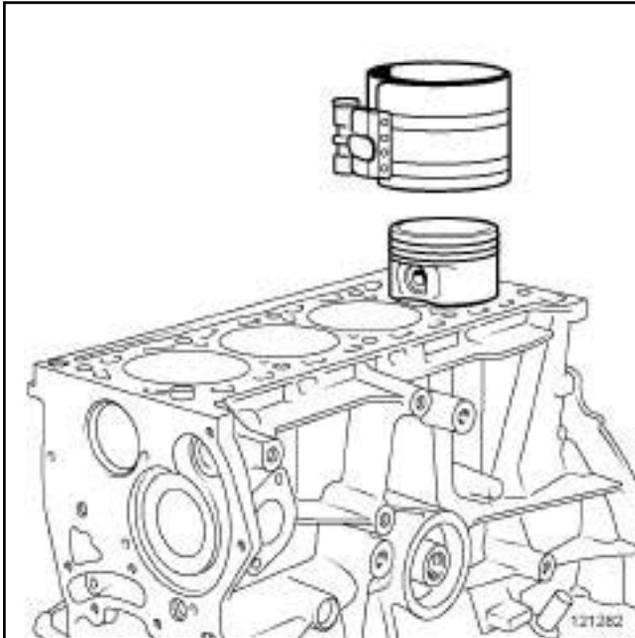
16242

- Degrease the mating faces (11) of the "cap - con rod casing" using **SURFACE CLEANER**.
- Lubricate with engine oil:
  - the cylinder block barrels,
  - the brake shoes,
  - the piston skirt,
  - the crankshaft crankpins.
- Observe the gap and direction of fitting for each piston ring.

## II - REFITTING OPERATION FOR PISTON - CON ROD ASSEMBLY

- Using engine oil, lubricate the tops of the cylinders and the crankshaft crankpins.

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



121282

- Refit the "con rod/piston" assemblies using the **piston mounting ring** (turning the piston marking towards the flywheel), ensuring that the pistons and cylinders match.
- Fit the con rods onto the crankshaft crankpins.
- Refit the con rod caps using new bolts.
- Torque and angle tighten the **con rod cap bolts (25 N.m + 110° ± 6°)**.
- Check that the rotating parts turns freely, with no resistance.
- Clean the piston crowns.

### III - FINAL OPERATION

- Refit:
  - the oil pump (see **Oil pump: Removal - Refitting**) ,
  - the sump (see **Lower cover: Removal - Refitting**) ,
  - the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting, page 10A-109**) ,
  - the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**) .
  - the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
  - the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**) ,

- the ignition coils (see **Coils: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the multifunction support (see **Multifunction support: Removal - Refitting**) .

- Refit the power-assisted steering pump (see **Power-assisted steering pump: Removal - Refitting**) (36B, Power-assisted steering).

X56, and AIR CONDITIONING – X64, and AIR CONDITIONING – X65, and AIR CONDITIONING – X66, and AIR CONDITIONING – X73, and AIR CONDITIONING – X74, and F4R, and AIR CONDITIONING – X81, and AIR CONDITIONING – X83, and AIR CONDITIONING – X84, and AIR CONDITIONING – X85, and AIR CONDITIONING – X91 – X95

- Refit the air conditioning compressor (see **Compressor: Removal - Refitting**) (62A, Air conditioning).

- Refit:

- the alternator (see **Alternator: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) .

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Refit:

- the turbocharger (see **Turbocharger: Removal - Refitting**) ,
- the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
- the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**) .

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and F4R, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Refit:

- the flywheel (see **Flywheel: Removal - Refitting**),
- the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Refit the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission).

- Refit:

- the tool (**Mot. 1677**) on the cylinder block,
- the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**).
- Remove the flywheel locking tool (**Mot. 1677**) from the cylinder block.
- Refit the accessories belt (see **Accessories belt: Removal - Refitting**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and F4R, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Connect the manual gearbox to the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Connect the automatic gearbox to the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Refit the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).

- Top up the engine oil (see **Engine oil: Draining - Refilling**).

## Piston - Con rod: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Equipment required

compressed air nozzle
external micrometer
internal micrometer
set of feeler gauges
radial play measuring tape

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

### I - PREPARATION OPERATION FOR CHECK

Remove the « engine - gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**).

Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use, page 10A-21**).

Remove the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting, page 10A-189**).

Separate the con rod from the piston, if required by the check (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting, page 10A-189**).

Remove the segments, if required by the check (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting, page 10A-189**).

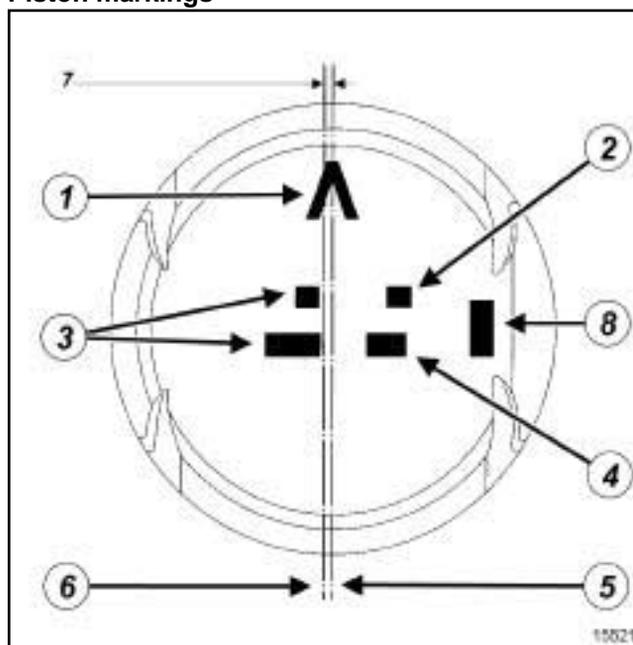
Before all checks:

- clean the part with **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) and dry using a **compressed air nozzle**,
- check that the part does not have any scratches, any trace of impact or abnormal wear (if necessary replace the part).

### II - PISTON

#### 1 - Piston identification

#### Piston markings

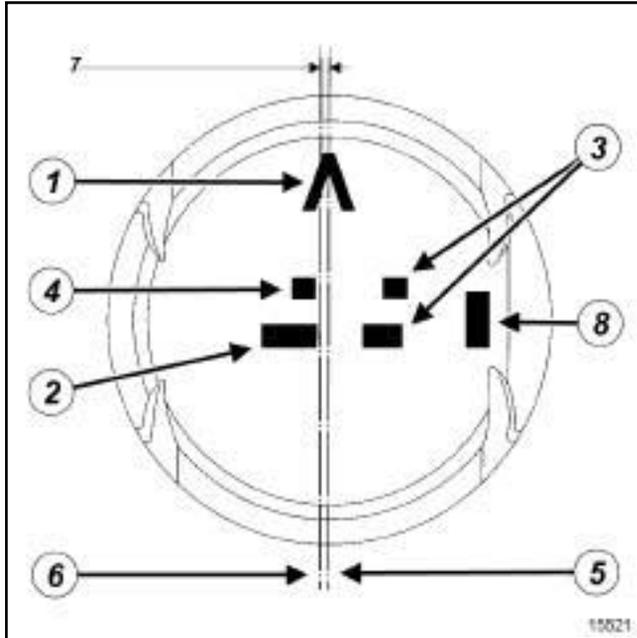


15521

## Piston - Con rod: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

F4R 774, 800, 802, 811



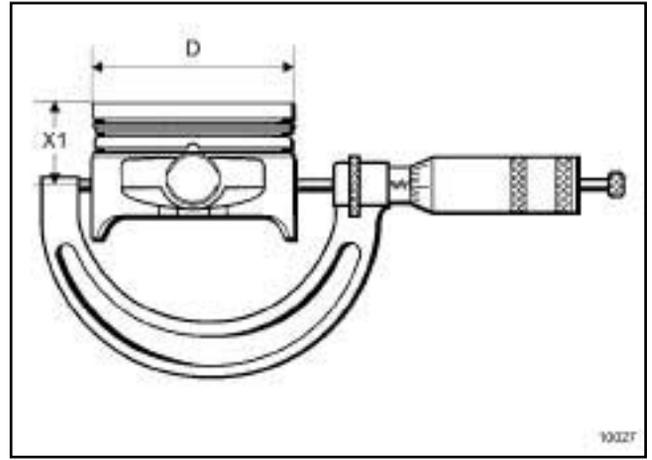
15521

- (1) Direction of piston  $\Lambda$  flywheel end
- (2) Piston category (2 - 3) or (B - C)
- (3) Used by the supplier only
- (4) Used by the supplier only
- (5) Piston axis of symmetry
- (6) Gudgeon pin hole axis
- (7) Offset between gudgeon pin hole axis (6) and piston axis of symmetry (5) (0.8 mm)
- (8) Engine suffix

Marking at (8)	Engine suffix
1.8	F4P 720, 722, 760, 770, 771, 772, 773, 774, 775
2.0	F4R 700, 701, 712, 713, 720, 740, 741, 744, 746, 747, 780, 790
770	F4R 770, 771, 714, 715, 792, 820
No marking	F4R 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 784, 786, 787, 794, 795, 796, 797, 800, 802, 811, 813, 830, 832, 867, 870, 872, 874, 886, 887, 896, 897
S	F4R 730, 732, 736, 738

### 2 - Piston check

#### a - Checking the piston diameter



10027

Use a **external micrometer** to measure the piston diameter (D) at dimension (X1) .

Dimension (X1) (mm)	Engine suffix
$43.8 \pm 0.01$	F4P 720, 722, 760, 770, 771, 772, 773, 774, 775 F4R 700, 701, 712, 713, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790, 792, 830, 832
$44 \pm 0.01$	F4R 714, 715, 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 784, 786, 787, 794, 795, 796, 797, 800, 802, 811, 813, 820, 867, 886, 887, 896, 897
$41.45 \pm 0.2$	F4R 870, 872, 874

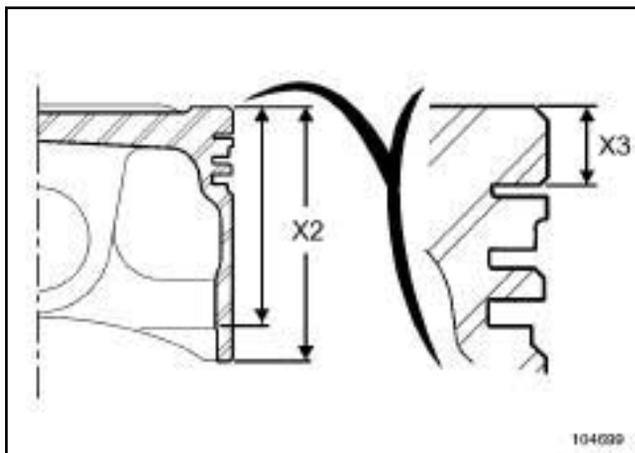
## Piston - Con rod: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Categories and nominal diameters of the pistons

Category reference on the piston	Diameter ( <i>D</i> ) of the piston (mm)		
		F4P 720, 722, 760, 770, 771, 772, 773, 774, 775	F4R 730, 732, 736, 738, 760, 761, 762, 763, 764, 765, 766, 767, 776, 786, 787, 794, 795, 796, 797, 813, 867, 886, 887, 896, 897
2 or B	82.680 inclusive to 82.690 exclusive	82.675 inclusive to 82.685 exclusive	82.655 inclusive to 82.665 exclusive
3 or C	82.690 inclusive to 82.700 inclusive	82.685 inclusive to 82.695 inclusive	82.665 inclusive to 82.675 inclusive

### b - Checking the height of the piston



104699

### Total height of pistons X2

Dimension (X2) (mm)	Engine suffix
56.8	F4P 720, 722, 760, 770, 771, 772, 773, 774, 775 F4R 700, 701, 712, 713, 714, 715, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790
57	F4R 714, 715, 760, 761, 761, 763, 764, 765, 766, 767, 770, 771, 774, 776, 784, 786, 787, 792; 794, 795, 796, 797, 800, 802, 811, 813, 820, 867, 886, 887, 896, 897
51.25	F4R 830, 832
51.45	F4R 870, 872, 874

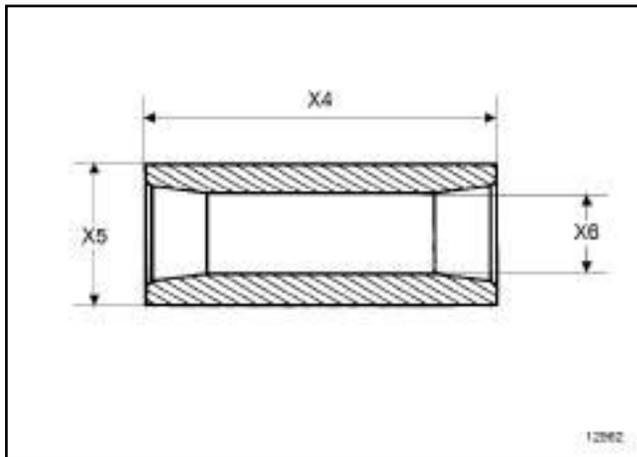
### Dimension X3, piston land/heat dam land

Dimension (X3) (mm)	Engine suffix
6 ± 0.1	F4P 720, 722, 760, 770, 771, 772, 773, 774, 775 F4R 700, 701, 712, 713, 714, 715, 720, 740, 741, 744, 746, 747, 770, 771, 780, 790, 820
6.3 ± 0.1	F4R 830, 832
6.6 ± 0.1	F4R 730, 732, 736, 738
5 ± 0.1	F4R 760, 761, 761, 763, 764, 765, 766, 767, 774, 776, 784, 786, 787, 792; 794, 795, 796, 797, 800, 802, 811, 813, 866, 870, 886, 887, 896, 897
7.5	F4R 870, 872, 874

## Piston - Con rod: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### c - Gudgeon pin check



Check that the pin slides freely in the piston before checking it.

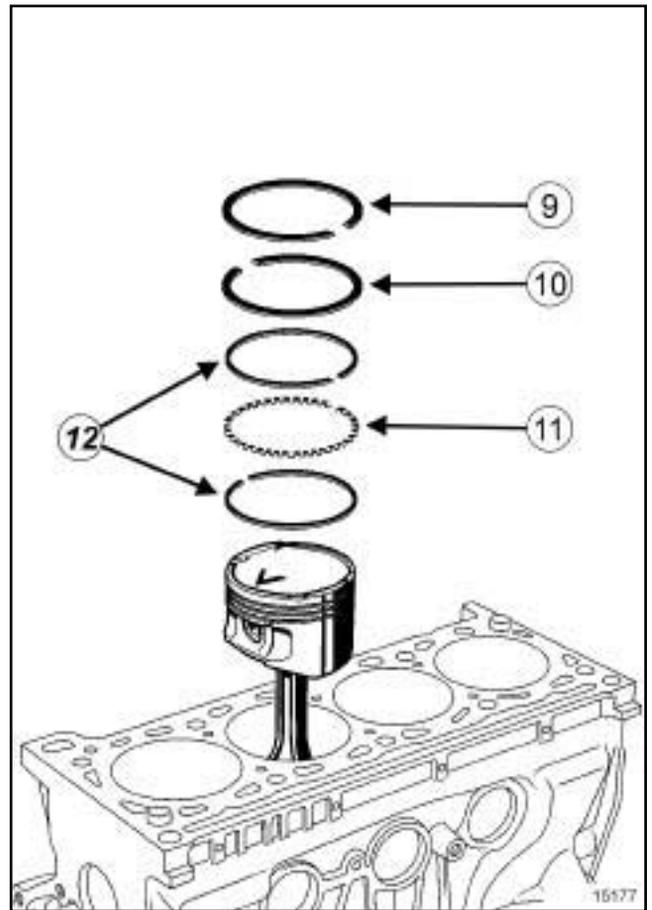
Measure using a **external micrometer** :

- the length (X4) of the gudgeon pin,
- the outer diameter (X5) .

Use a **internal micrometer** to measure the internal diameter (X6) .

Engine suffix	Length (X4)	Outer diameter (X5)	Internal diameter (X6)
F4P	60.7 to 61 mm	20.995 to 21 mm	12 to 12.3
F4R except F4R/830, 832, 870, 872, 874 engine			
F4R/830, 832	63	20.995	12.15 ± 0.15
F4R/870, 872	54.85	20.9975 ± 0.0025	11.45 ± 0.16
F4R/874	57.85	20.996 ± 0.004	10.95 ± 0.15

### d - Checking the piston rings



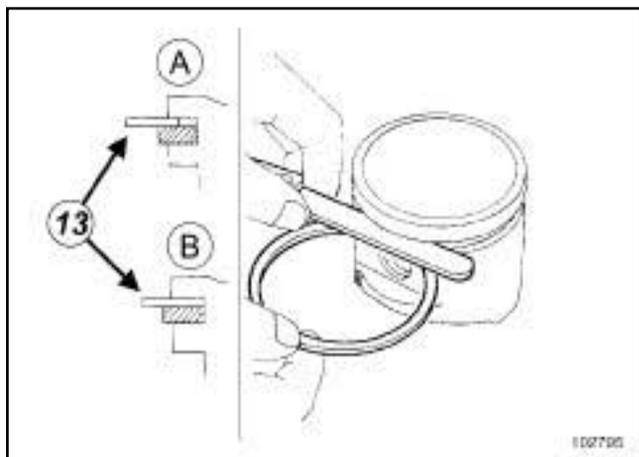
Using a **external micrometer**, measure the thickness of the piston ring:

- compression ring (9) : **1.17 to 1.19 mm**,
- sealing ring (10) : **1.47 to 1.50 mm**,
- scraper ring, comprising three parts:
  - a spring expander (11) ,
  - two steel rings (12) : **1.87 to 2.0 mm**.

## Piston - Con rod: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### e - Checking the clearance between the piston and ring



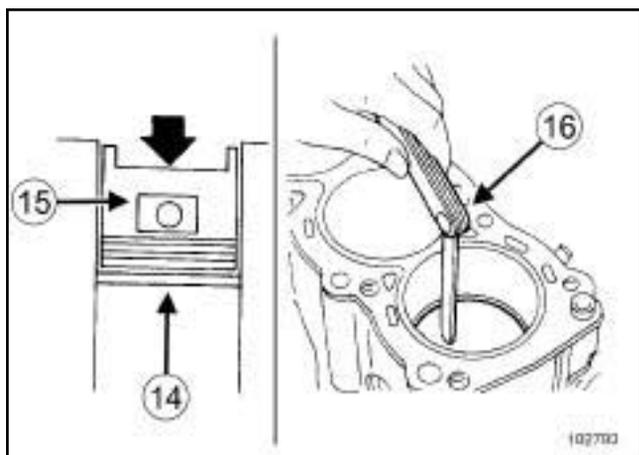
102795

- (A) Set of shims incorrectly positioned
- (B) Set of shims correctly positioned

Measure the clearance between the neck of the piston and the ring using a **set of feeler gauges (13)** (measure at three points 120° apart):

- compression ring - clearance between **0.04 and 0.08 mm**,
- sealing ring - clearance between **0.02 and 0.07 mm**,
- scraper ring - clearance between **0.01 and 0.16 mm**.

### f - Checking play at the ring section



102793

Position the ring (14) in the cylinder.

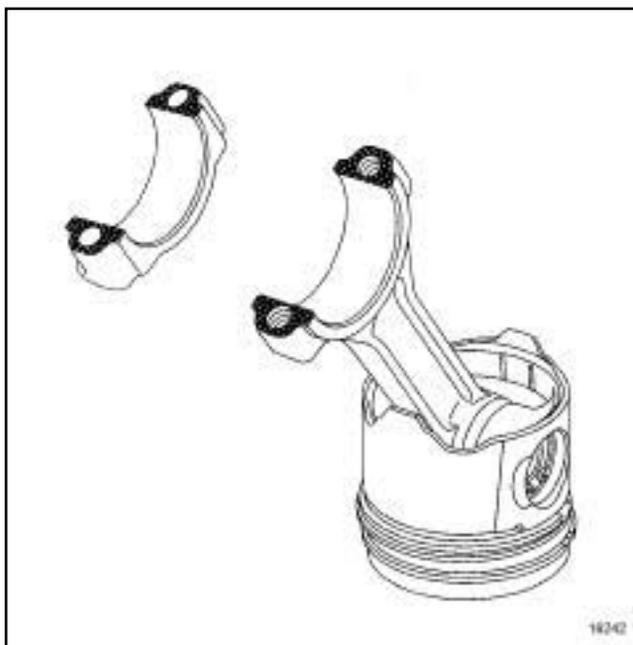
Push the piston ring (14) to the centre of the cylinder using the piston (15).

Measure the ring end clearance using a **set of feeler gauges** :

- compression ring:
  - F4P, F4R (except F4R 730, 732, 736, 738): the clearance should be **0.20 to 0.35 mm**,
  - F4R 730, 732, 736, 738: the clearance should be **0.15 to 0.25 mm**,
- sealing ring: the clearance should be **0.40 to 0.60 mm**,
- scraper ring: the clearance should be **0.25 to 0.75 mm**.

### III - CON ROD

#### 1 - Precautions when marking con rods



16242

The con rods are of the « SPLIT » type.

#### WARNING

Do not use a sharp point or engraving tool to mark the bearing caps con rods to avoid starting a crack in the rod.

Use an indelible marker pen.

## Piston - Con rod: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

Note:

Each con rod has its own con rod cap.

They cannot be swapped or reversed.

Nevertheless, it is necessary to mark them to facilitate reinstallation.

### 2 - Difference in weight of the « con rod - piston - pin » assembly

The maximum difference in weight between the « assembled con rod - piston - pin » assemblies for the same engine is **6 g**.

### 3 - Centre-to-centre distance between the big end and the small end

The centre-to-centre distance between the big end and the small end is:

- F4P: **149.5 ± 0.035 mm**,

- F4R: **144 ± 0.035 mm**.

### 4 - Checking the con rod

#### *a - Checking the diameters of the big end and small end*

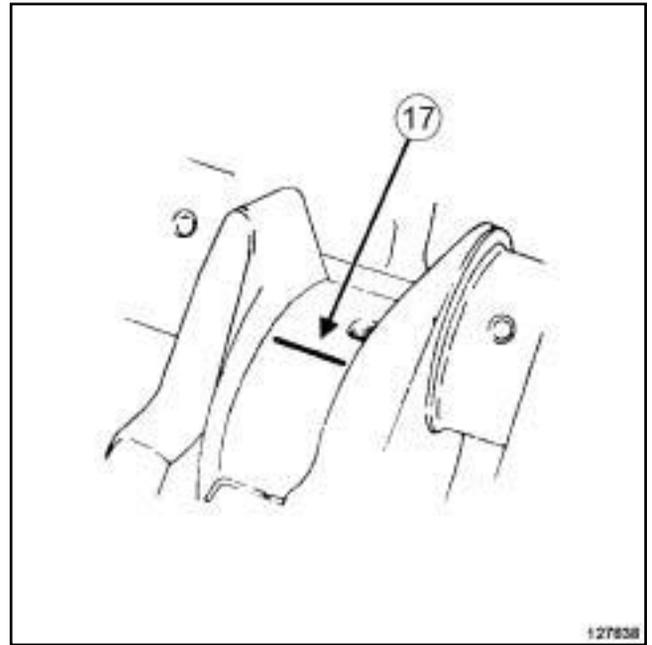
Measure using a **internal micrometer** :

- the diameter of the big end,

- the diameter of the small end.

	F4P	F4R
Diameter of the big end (with bearing shells) (mm)	48.016 to 48.035	48.035 to 48.053
Diameter of the big end (without bearing shells) (mm)	51.568 to 51.587	51.587 to 51.605
Diameter of the small end (without ring) (mm)	22.979 to 23.000	23.000 to 23.020
Diameter of the small end (with ring) (mm)	-	21.013 to 21.025

#### *b - Checking the diametric clearance of the big ends*



Cut pieces of **radial play measuring tape**.

Insert the wire (17) into the axis of the crankshaft crankpins (avoiding the bearing lubrication holes).

Note:

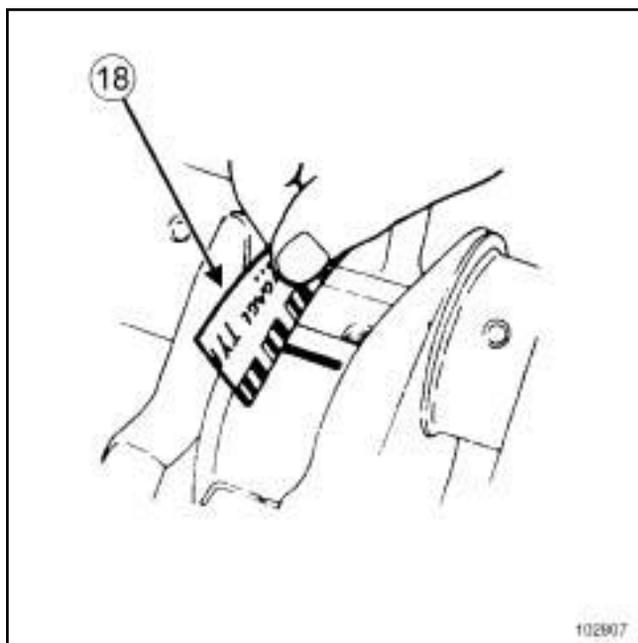
Do not rotate the con rod or crankshaft during the following steps.

Refit the « piston - con rod » assembly (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page **10A-189**).

Remove the « piston - con rod » assembly (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page **10A-189**).

## Piston - Con rod: Check

X56 - X64 - X65 - X66 - X73 - X74 - X81 - X83 - X84 - X85 - X91 - X95



102807

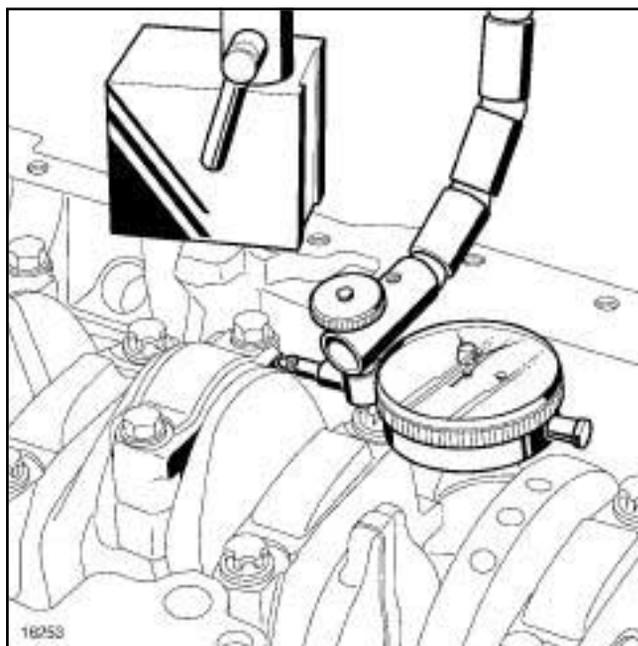
Measure the flattening of the wire which must be between **0.02 and 0.07 mm** using the gauge printed on the wrapping paper (18) of the wire.

Clean off of any remaining parts of the measuring wire on the crankshaft and bearing shells.

#### **c - Checking the diameter of the con rod small end**

Refit the « piston - con rod » assembly (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page 10A-189) .

Set the « piston - con rod » assembly of the cylinder concerned at bottom dead centre.



16253

Fit:

- a magnetic holder on the sump joint face of the cylinder block,
- a dial gauge on the magnetic holder, in contact with the machined flat surface of the big end cap.

Without using excessive force, manually move the con rod from one stop to the other.

Note the maximum and minimum values of con rod longitudinal displacement to determine the play between the con rod and the crankshaft.

The lateral play of the big end must be between **0.22 and 0.40 mm**.

Repeat the operation with each big end cap.

#### **IV - FINAL OPERATION**

Refit the piston rings (if removed) (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page 10A-189) .

Assemble the con rod and the piston (if separated) (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page 10A-189) .

Refit the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page 10A-189) .

Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21) .

Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Special tooling required

<b>Mot. 1677</b>	Flywheel locking tool.
<b>Mot. 1423</b>	Tool for removing silicon crankshaft bearing caps.
<b>Mot. 1493</b>	Crankshaft bearing tool.

### Equipment required

indelible pencil  
compressed air nozzle

### Tightening torques

crankshaft bearing bolts	<b>20 N.m + 62° ± 4°</b>
crankshaft closure panel bolts	<b>14 N.m</b>

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Remove the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**)

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Disconnect the manual gearbox from the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

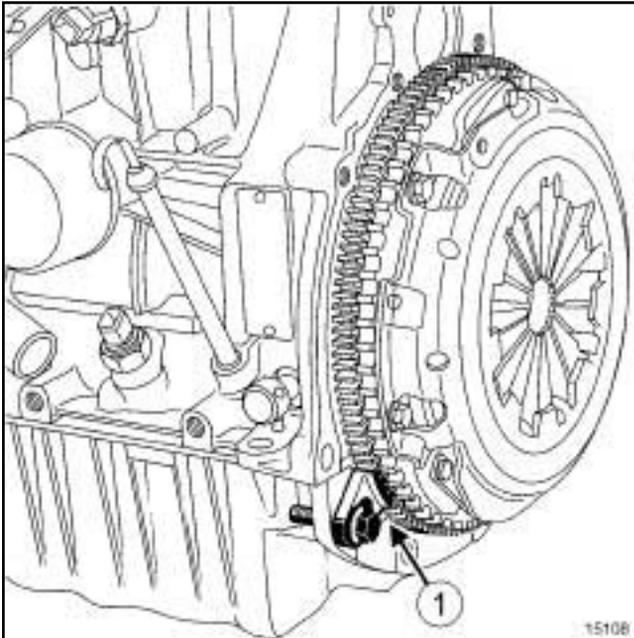
X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Disconnect the automatic gearbox from the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Remove the accessories belt (see **Accessories belt: Removal - Refitting**).

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



15108

- Immobilise the flywheel or the drive plate using the tool **(Mot. 1677)** (1) .
- Remove the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Remove:
  - the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch),
  - the flywheel (see **Flywheel: Removal - Refitting**) ,
  - the **(Mot. 1677)**.

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Remove:
  - the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission),
  - the **(Mot. 1677)**.
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21) .
- Drain the engine (see **Engine oil: Draining - Refilling**) .

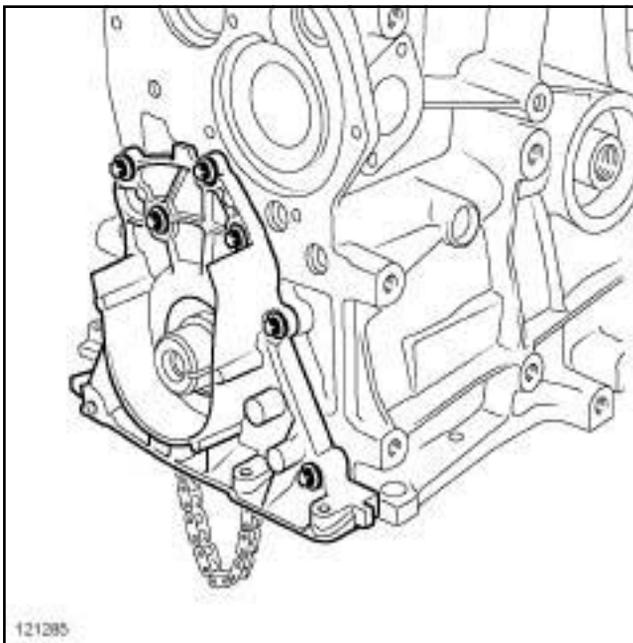
X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Remove:
  - the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**) ,
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
  - the turbocharger (see **Turbocharger: Removal - Refitting**) .
- Remove:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the timing sprockets (see **Timing sprocket: Removal - Refitting**) ,
  - the crankshaft seal on the timing side (see **Crankshaft seal on timing end: Removal - Refitting**) ,

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

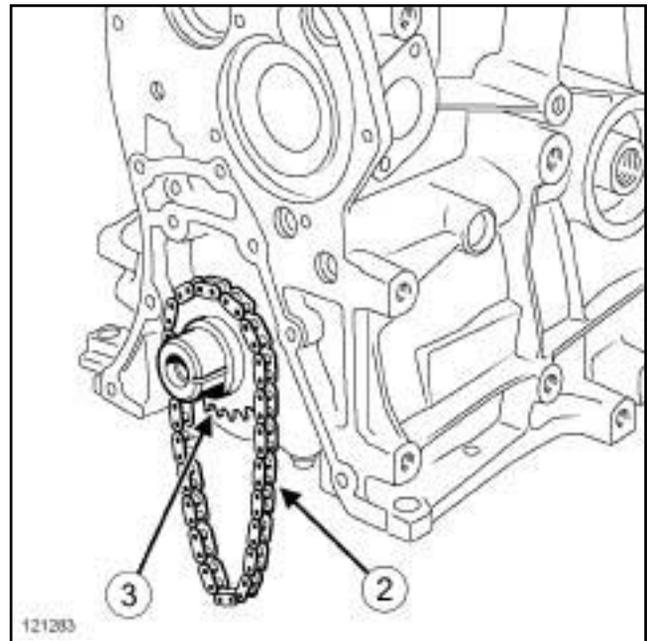
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the ignition coils (see **Coils: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the camshafts, marking the inlet and exhaust camshaft (if they are not engraved) (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) ,
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page 10A-109) ,
- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**) ,
- the sump (see **Lower cover: Removal - Refitting**) .



121285

Remove:

- the crankshaft closure panel bolts,
- the crankshaft closure panel,
- the crankshaft closure panel seal,
- the oil pump (see **Oil pump: Removal - Refitting**) .



121283

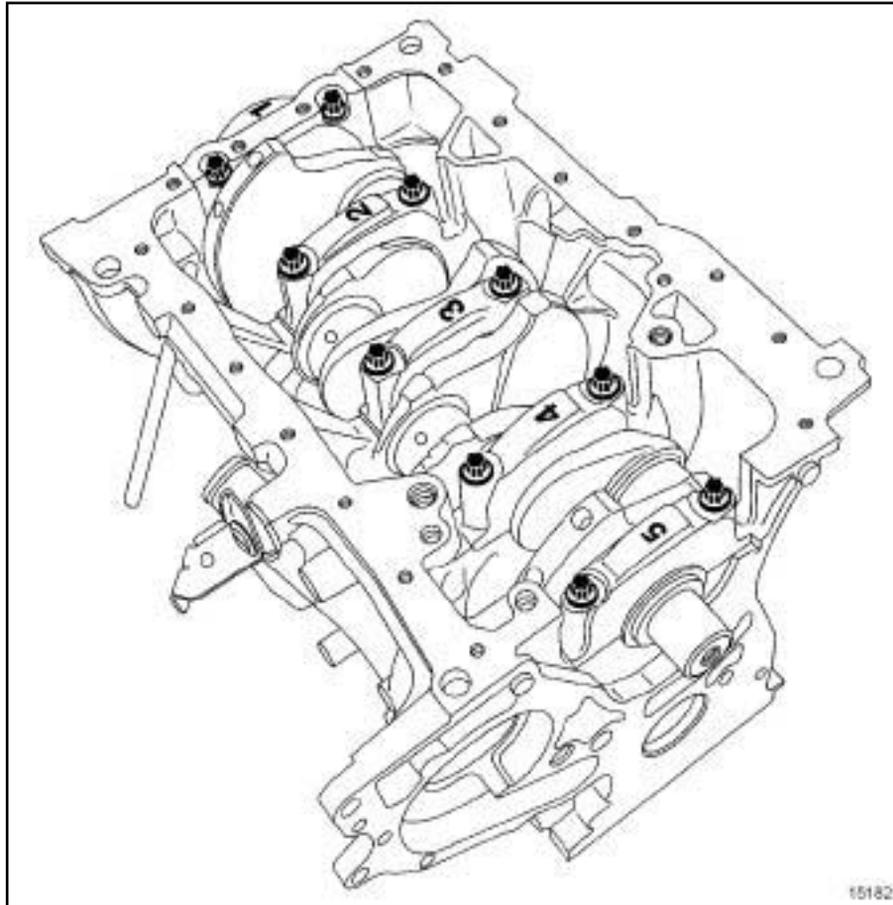
Remove:

- the oil pump drive chain (2) ,
- the oil pump drive chain pinion (3) on the crankshaft,
- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page 10A-189) .

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## II - CRANKSHAFT REMOVAL OPERATION



15182

□

**WARNING**

Do not use a sharp point or engraving tool to mark the bearing caps on rods to avoid starting a crack in the rod.

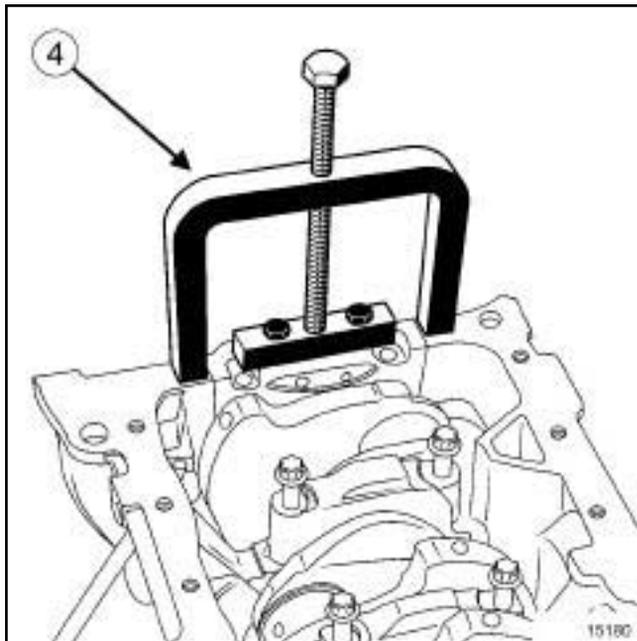
Use an indelible marker pen.

□ Mark:

- the crankshaft bearing caps using a **indelible pencil**, if necessary,
- the direction of fitting of the crankshaft bearing caps.

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



15180

- Remove:
  - the crankshaft bearing bolts,
  - crankshaft bearing caps no.2 to no.5,
  - bearing cap no. 1 using the **(Mot. 1423) (4)** ,
  - the crankshaft.

**Note:**

It is essential to mark the position of the crankshaft bearing shells, as the category may be different for each bearing.

- Remove:
  - the crankshaft bearing shells,
  - the crankshaft thrust washers.

## REFITTING

### I - REFITTING PREPARATION OPERATION

- parts always to be replaced: crankshaft bearing bolt.

### 1 - Cleaning parts



**IMPORTANT**

Wear goggles with side protectors for this operation.

**Note:**

Avoid any impact or pressure to:

- the mating faces of the seal and bearing of the crankshaft or cylinder block,
- the mating faces of the crankshaft bearing caps.

- Use **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) to clean:

- the crankshaft,
- the crankshaft bearing caps,
- the mating faces of the crankshaft journal bearing shells on the cylinder block,
- the mating faces of the crankshaft bearing caps on the cylinder block.

- Dry the parts using a **compressed air nozzle**.

### 2 - Preparation for refitting if replacing the crankshaft

- When replacing the crankshaft or crankshaft bearing shells, always identify the thickness class for each bearing shell that will be refitted on each crankshaft bearing, to ensure that the journal clearances remain within the tolerances, before refitting the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Check**, page **10A-219**) .

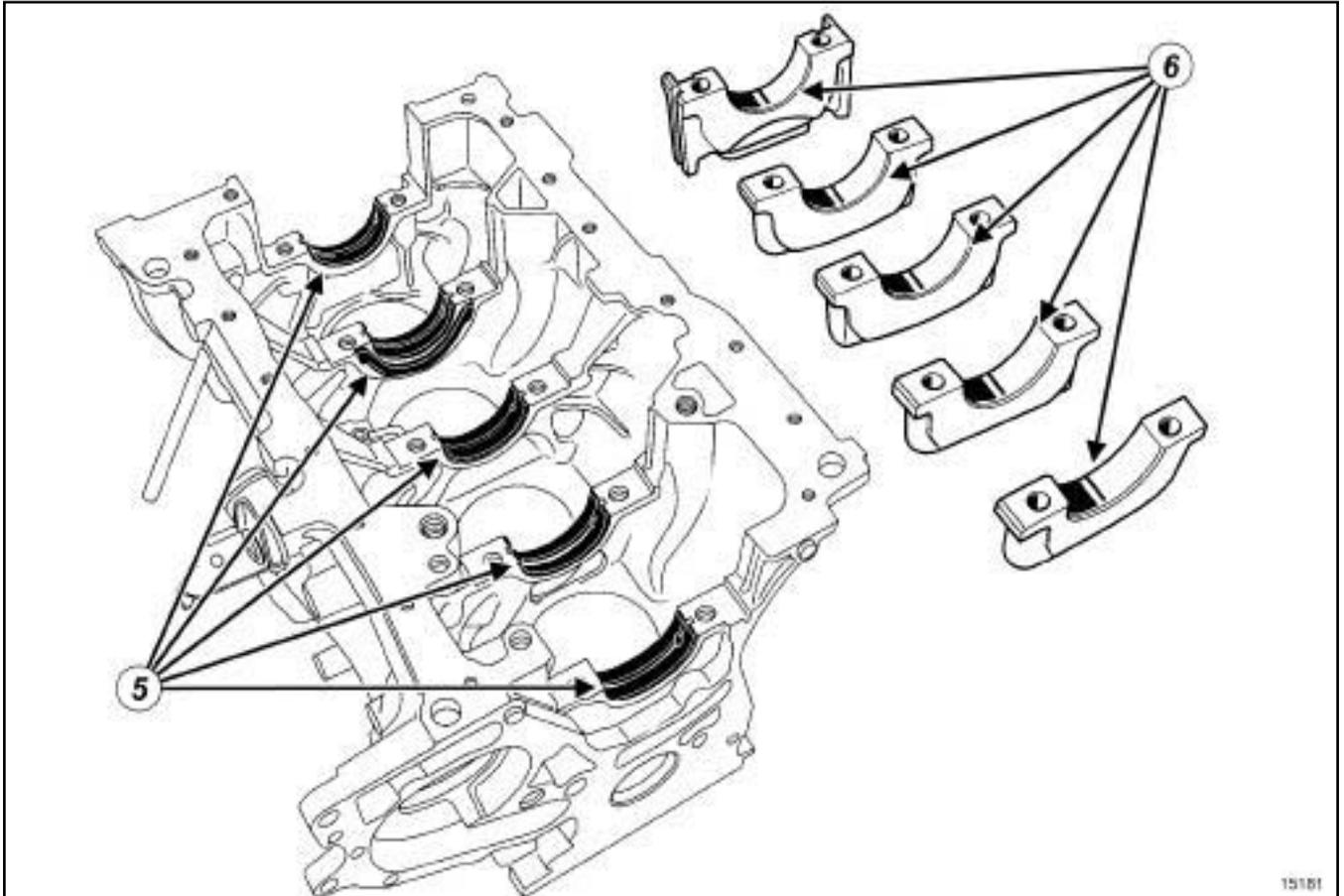
**Note:**

A crankshaft journal clearance which is outside the tolerances can cause engine destruction.

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## II - CRANKSHAFT REFITTING OPERATION

## 1 - Refitting the crankshaft bearing shells

*a - Direction of fitting for crankshaft bearing shells*

15181

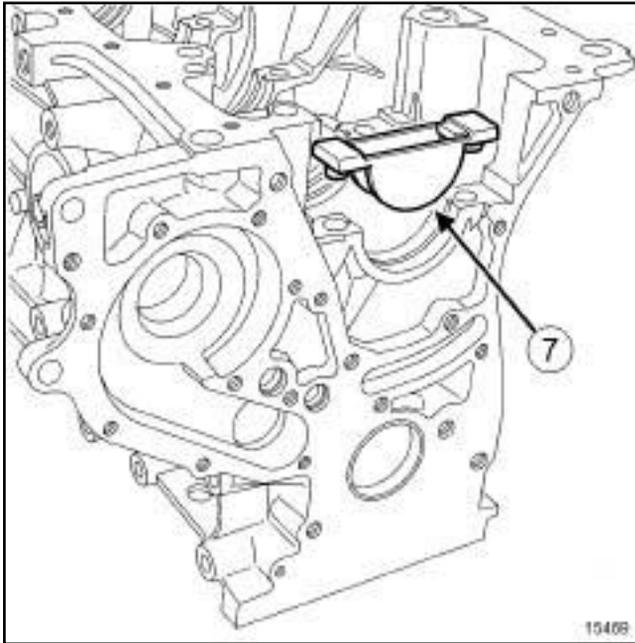
15181

- On the cylinder block, fit the grooved bearing shells (5) on all the bearings.
- Fit the non-grooved bearing shells (6) on the bearing caps.

## Crankshaft: Removal - Refitting

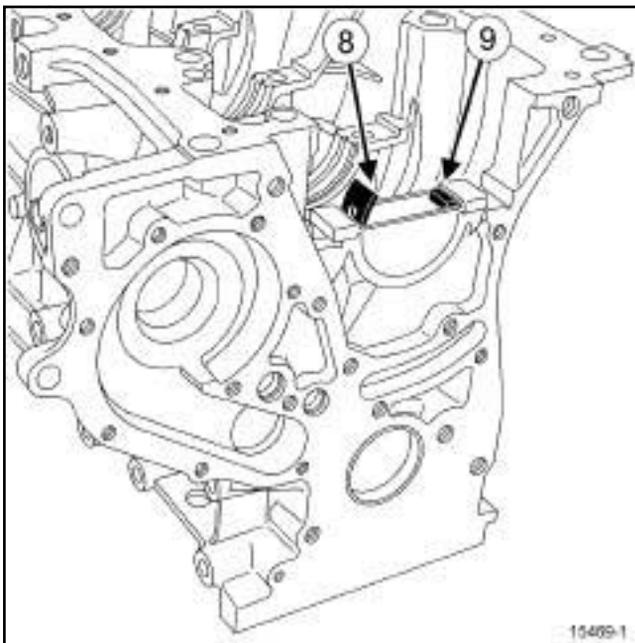
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### b - Fitting the bearing shells on the cylinder block



15469

- Fit the **(Mot. 1493)** aton the cylinder block. (7)

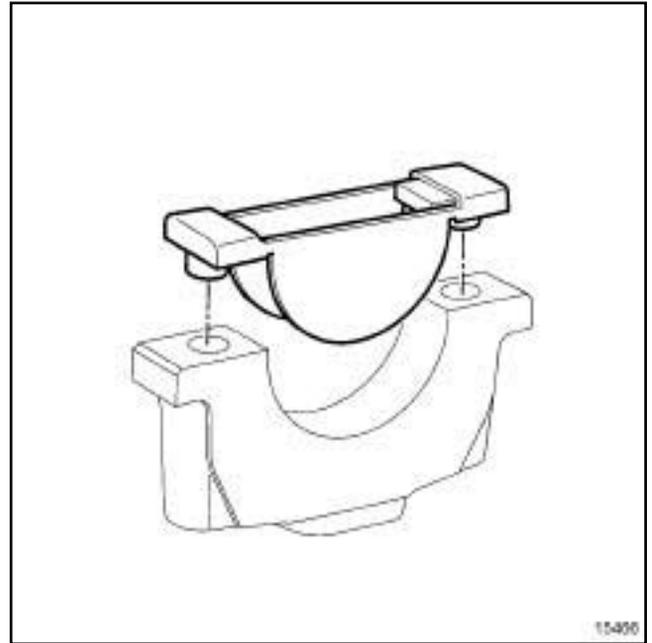


15469-1

15469-1

- Place the grooved bearing shell (8) in the **(Mot. 1493)**.
- Push on the bearing shell until it is pressed against the stop (9) .
- Repeat this process for other bearing shells.

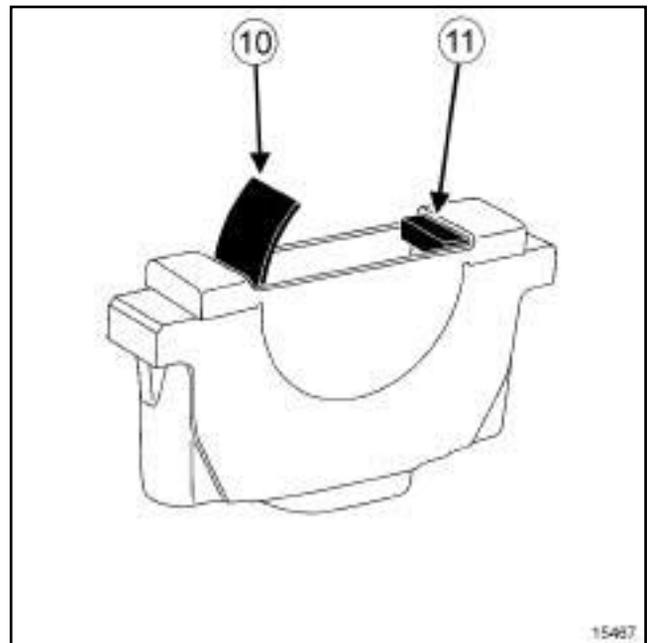
### c - Fitting the bearing shells onto the bearing caps



15466

15466

- Fit the **(Mot. 1493)** on the bearing cap.



15467

15467

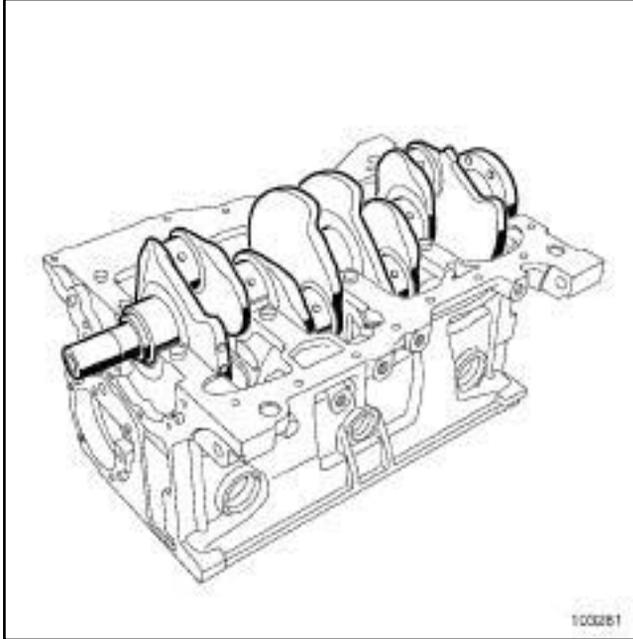
- Place the non-grooved bearing shell (10) in the **(Mot. 1493)**.
- Push on the bearing shell until it is pressed against the stop (11) .
- Repeat this process for other bearing shells.

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## 2 - Refitting the crankshaft

- ❑ Oil the crankshaft bearing shells with engine oil (only the side of the bearing that comes in contact with the crankshaft).



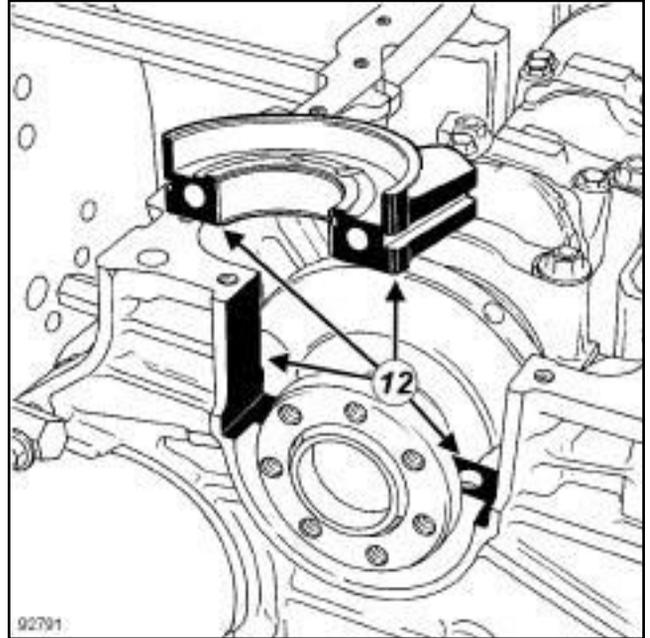
❑

## Note:

Ensure the bearing shells and the thrust washer do not move when refitting the crankshaft and bearing caps.

❑ Refit:

- the crankshaft,
- the crankshaft thrust washers on bearing No.2 (grooves at crankshaft end),
- the bearing caps of crankshafts No. 2 to No. 5, positioning them correctly,
- the new bolts of the bearing caps of crankshafts No. 2 to No. 5.



❑

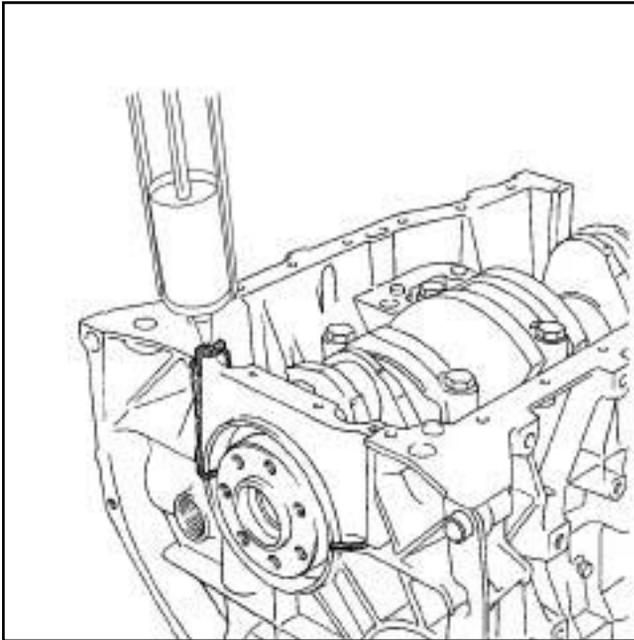
**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

- ❑ Thoroughly degrease the surfaces at (12) of the cylinder block and crankshaft bearing cap using **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products).
- ❑ Allow to dry.
- ❑ Refit:
  - the bearing cap of crankshaft no. 1,
  - the bolts of crankshaft bearing cap no.1.
- ❑ Torque and angle tighten the **crankshaft bearing bolts (20 N.m + 62° ± 4°)**.
- ❑ Check that the crankshaft turns freely, with no hard point.

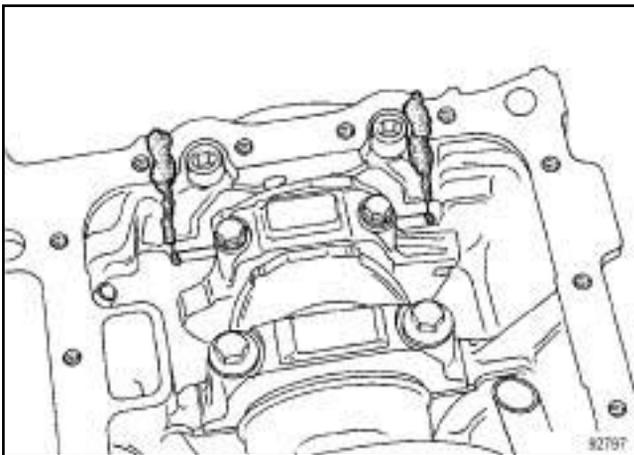
## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



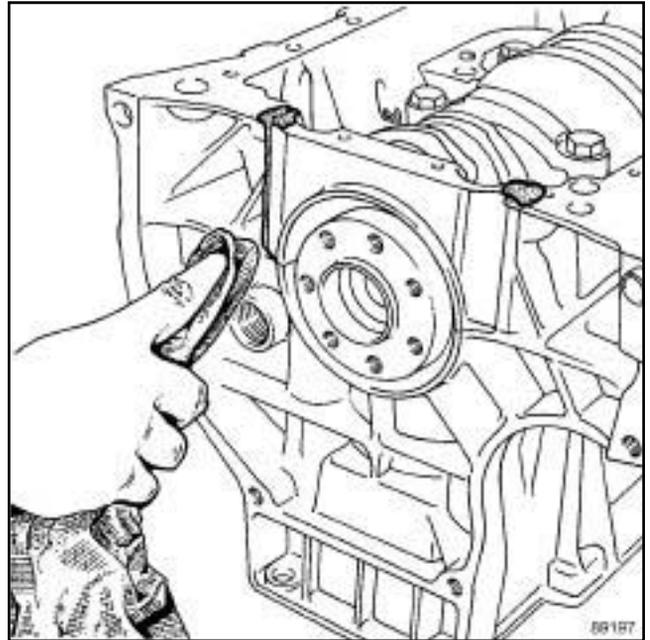
143095

- ❑ Insert the cartridge of **SILICONE ADHESIVE SEALANT** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products) into a silicone sealant gun.
- ❑ Inject the silicone into the grooves of the bearing cap of crankshaft no.1.



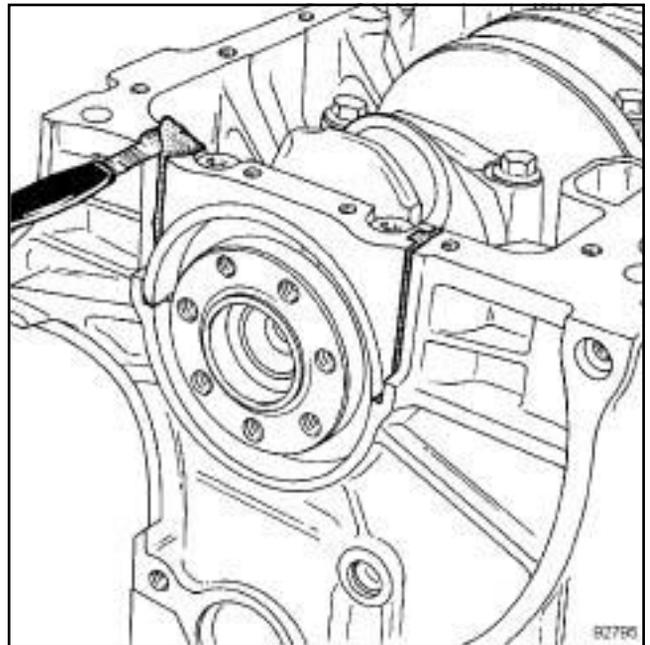
92797

- ❑ Allow the silicone sealant to run out slightly on either side of the crankshaft bearing cap grooves to be sure that the injected silicone has totally filled the sealing grooves.



89197

- ❑ Use a cloth to wipe off the excess silicone, both inside and outside the cylinder block.



92795

- ❑ Allow to dry for a few moments and cut the excess off the gasket face.
- ❑ Check that the crankshaft turns freely, with no hard point.

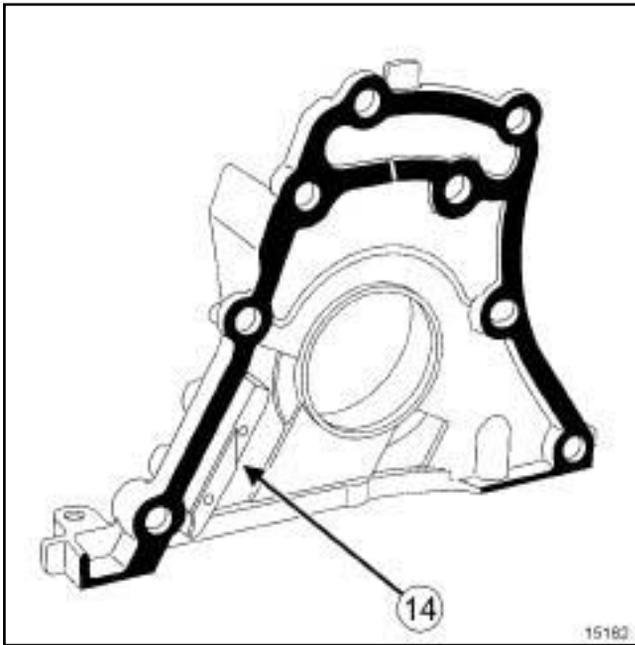
## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

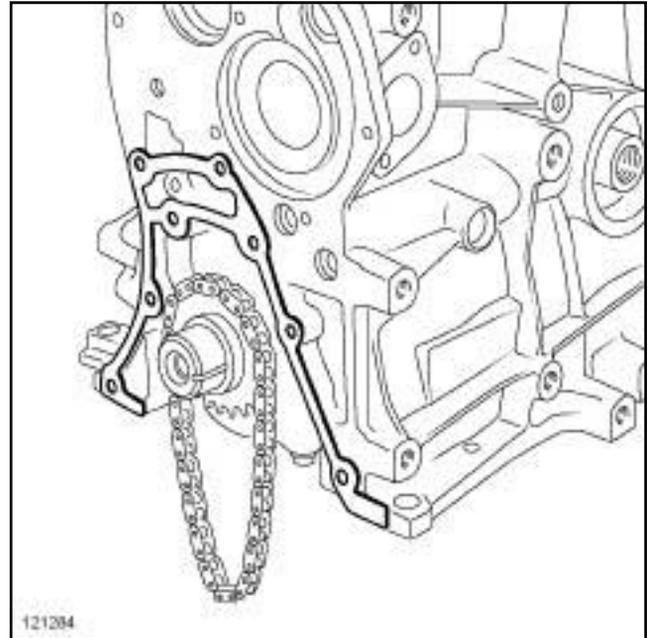
## III - FINAL OPERATION

## □ Refit:

- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting, page 10A-189**),
- the oil pump drive chain pinion on the crankshaft,
- the oil pump drive chain,
- the oil pump (see **Oil pump: Removal - Refitting**)



- Check that the timing chain glide shoe (**14**) is fitted.



121284

## □

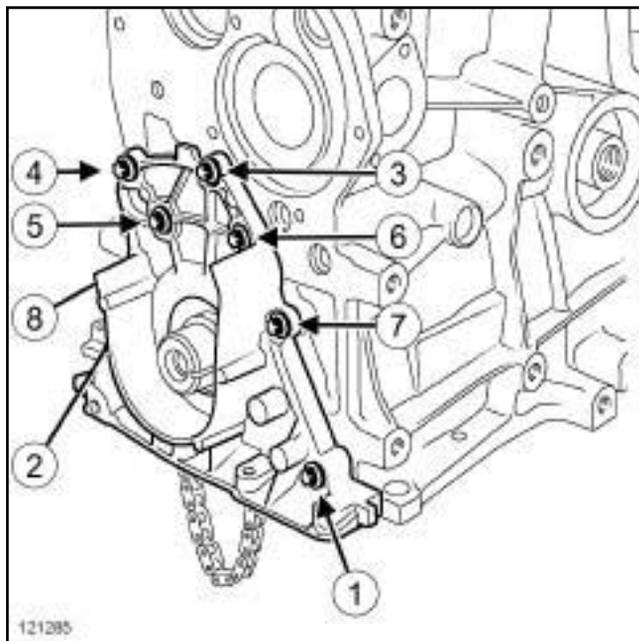
**WARNING**

To ensure proper sealing, the gasket surfaces must be clean, dry and not greasy (avoid any finger marks).

- Degrease the joint face between the cylinder block and the crankshaft closure panel using **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**) (04B, Consumables - Products).
- Refit a new crankshaft closure panel seal.

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



121285

Refit:

- the crankshaft closure panel,
- the crankshaft closure panel bolts.

Tighten to torque and in order the **crankshaft closure panel bolts (14 N.m)**.

**Note:**

This type of seal sticks out from the guard plate.  
Never cut it, because the two projecting tabs provide sealing when the sump is fitted.

Refit:

- the sump (see **Lower cover: Removal - Refitting**) ,
- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**) ,
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting, page 10A-109**) ,
- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74**) ,
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,

- the ignition coils (see **Coils: Removal - Refitting**) ,
- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the crankshaft seal at the timing end (see **Crankshaft seal on timing end: Removal - Refitting**) ,
- the timing sprockets (see **Timing sprocket: Removal - Refitting**) ,
- the timing belt (see **Timing belt: Removal - Refitting**) .

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

Refit:

- the turbocharger (see **Turbocharger: Removal - Refitting**) ,
- the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
- the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**) .

Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use, page 10A-21**) .

Immobilise the flywheel or the drive plate using the tool (**Mot. 1677**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

Refit:

- the flywheel (see **Flywheel: Removal - Refitting**) ,

## Crankshaft: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the clutch pressure plate and disc (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

Refit the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission).

Refit the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .

Remove the tool (**Mot. 1677**).

Refit the accessories belt (see **Accessories belt: Removal - Refitting**) .

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

Connect the manual gearbox to the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

Connect the automatic gearbox to the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

Top up the engine oil (see **Engine oil: Draining - Refilling**) .

## Crankshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Equipment required

compressed air nozzle
external micrometer
dial gauge support
Dial gauge
radial play measuring tape

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

### I - PREPARATION OPERATION FOR CHECK

Remove the « engine - gearbox assembly » (see **Engine - gearbox assembly: Removal - Refitting**).

Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use, page 10A-21**).

Remove the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting, page 10A-207**).

Before any checks:

- clean the crankshaft with **SURFACE CLEANER** (see **Vehicle: Parts and consumables for the repair**) and dry using a **compressed air nozzle**,
- check that the crankshaft does not have any scratches, any trace of impact or abnormal wear (if necessary replace the crankshaft).

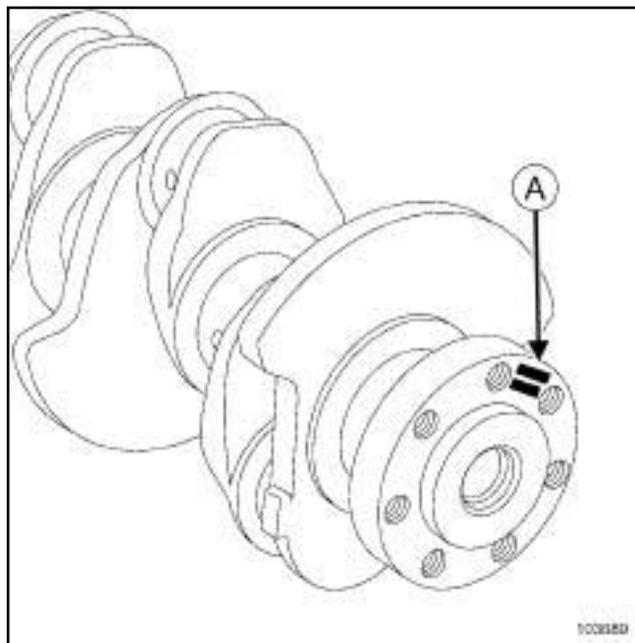
### II - CRANKSHAFT CHECK

#### 1 - Crankshaft identification

**a - First type of marking by paint spot on crankshaft**

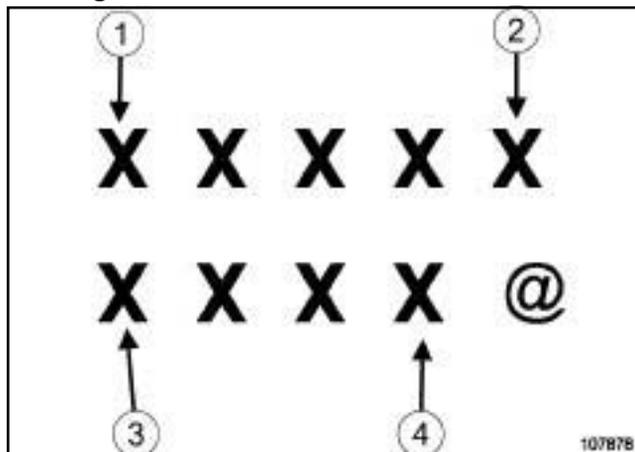
Paint mark	Blue	Red
Journal nominal diameter (mm)	54.785 inclusive to 54.795 exclusive	54.795 inclusive to 54.805 exclusive

**b - Second type of marking engraved on the crankshaft**



103689

Marking details « A »



107878

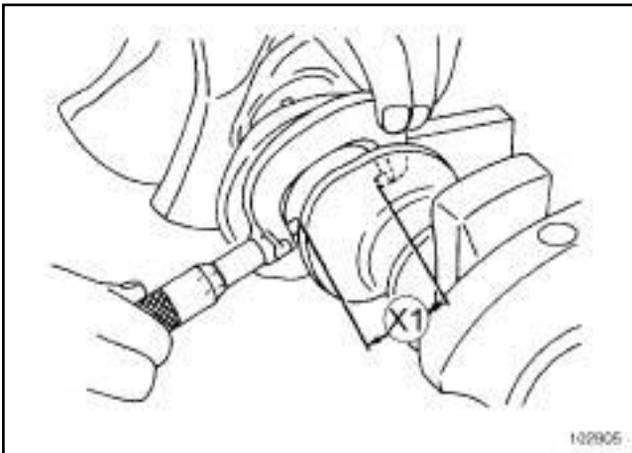
## Crankshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- (1) diameter category of journal no.1, flywheel end
- (2) diameter category of journal no.5, timing end
- (3) diameter category of crankpin no. 1, flywheel end
- (4) diameter category of crankpin no. 4, timing end

Mark etched on the crankshaft	1	0
Journal nominal diameter (mm)	54.785 inclusive to 54.795 exclusive	54.795 inclusive to 54.805 exclusive

### 2 - Checking the diameter of the crankshaft journals

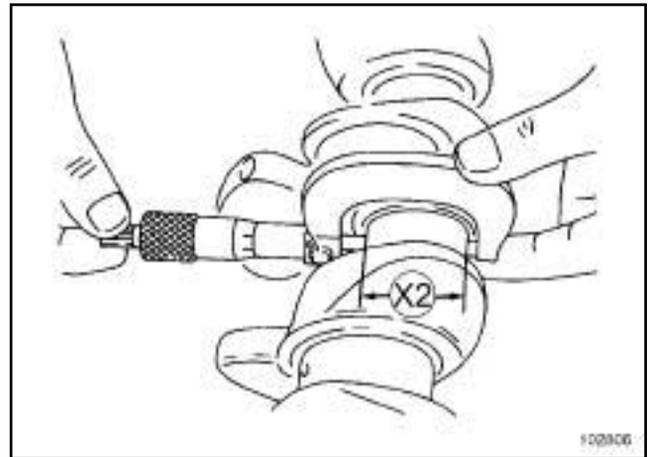


102805

Using a **external micrometer**, measure the diameter (X1) (at the centre of the mating face) of the crankshaft journal to be checked, which must be between **54.785 and 54.805 mm**.

Compare the value measured with the diameter category marked on the crankshaft (see **Crankshaft identification**).

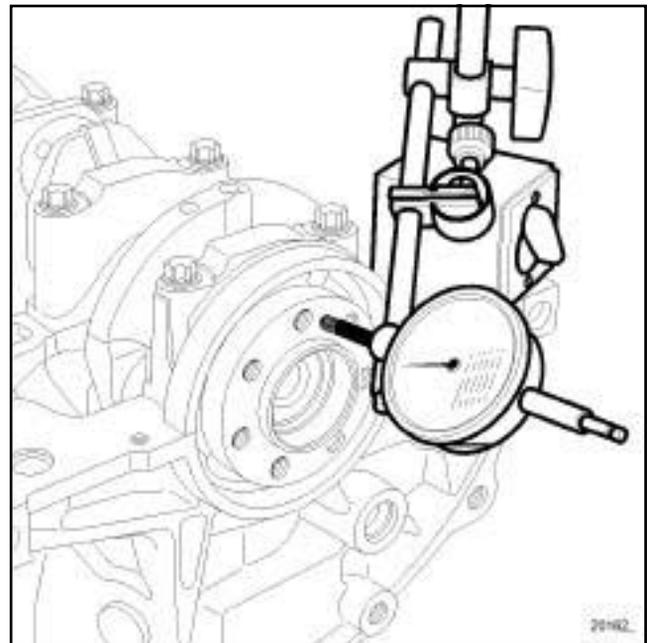
### 3 - Checking the diameter of the crankshaft crankpins



102806

Using a **external micrometer**, measure the diameter (X2) (at the centre of the mating face) of the crankshaft crankpin to be checked, which should be between **48.00 and 48.02 mm**.

### 4 - Check for deformation of the bearing face of the crankshaft flywheel



20162

#### Note:

Rest the crankshaft on two slightly oiled V-grooves to perform the check, if the crankshaft has been removed from the cylinder block.

#### Fit:

- the **dial gauge support**,

## Crankshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

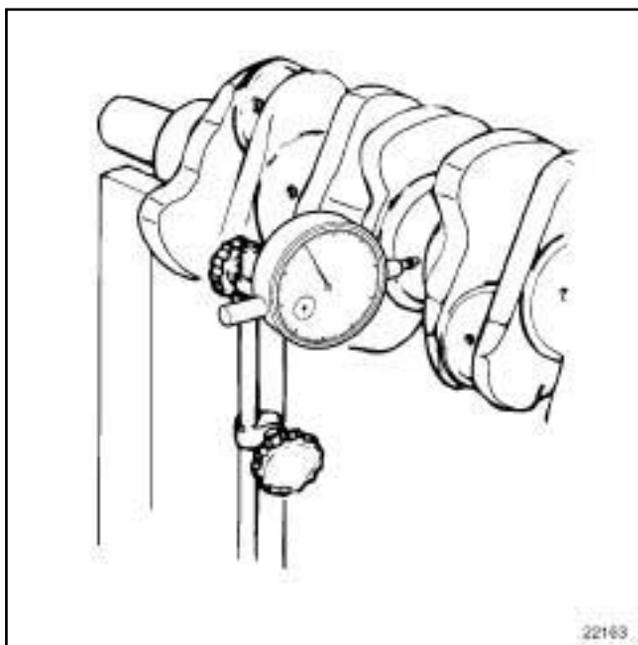
- the **Dial gauge** on the mounting.

Position the feeler of the **Dial gauge** on the flywheel face of the crankshaft avoiding the holes of the flywheel bolts.

Set the **Dial gauge** to zero.

Rotate the crankshaft once to measure the mounting flange of the flywheel face which must not be greater than **0.03 mm**.

### 5 - Checking the concentricity of the crankshaft journals



22163

Support the crankshaft on two slightly oiled V-blocks.

Fit:

- the **dial gauge support**,
- the **Dial gauge** on the mounting.

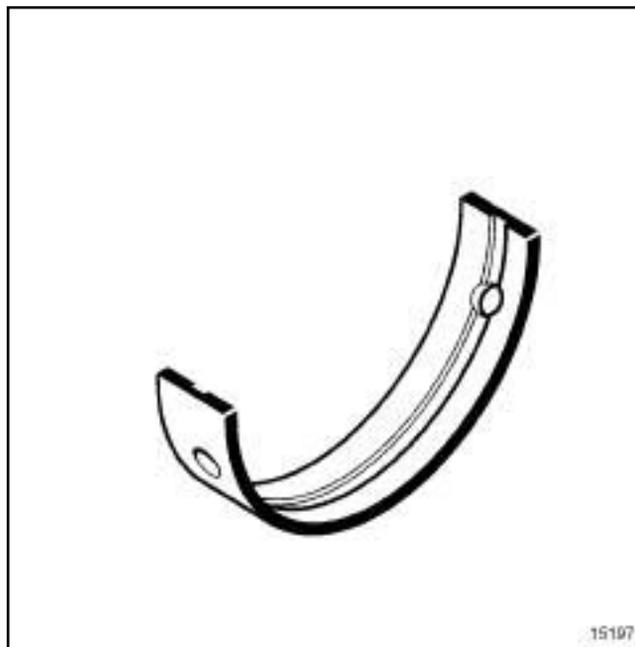
Support the feeler of **Dial gauge** on the centre of the mating face of the crankshaft journal to check.

Set the **Dial gauge** to zero.

Rotate the crankshaft once to check the concentricity of the journal which must not be greater than **0.02 mm**.

### III - CHECKING THE CRANKSHAFT BEARING SHELL

#### 1 - Identification of the crankshaft bearing shells



15197

The crankshaft is fitted with bearing shells without fool-proofing devices

There are two categories of bearing shell, each of which are identified by a blob of paint underneath the bearing shell.

Paint mark	Blue	Red
Bearing thickness (mm)	1.944 to 1.950	1.939 to 1.945

#### 2 - Checking the crankshaft diameter clearance

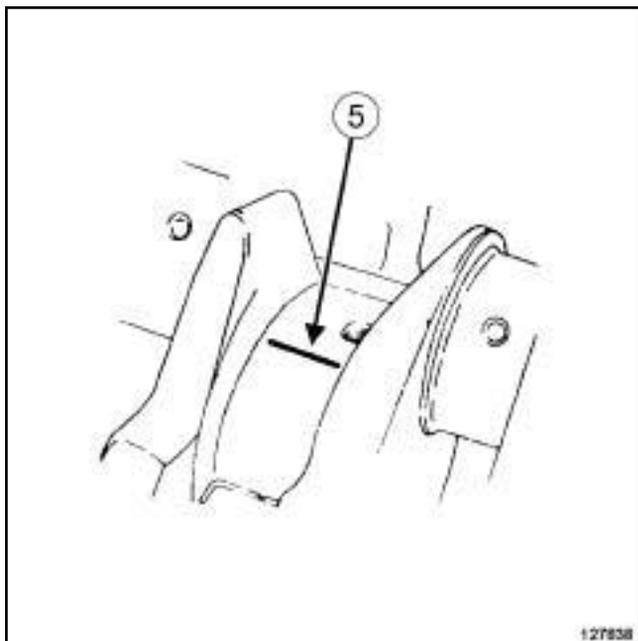
Note:

Do not rotate the crankshaft during this check.

Refit without lubricating (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) :

- the upper crankshaft bearing shells from the cylinder block,
- the crankshaft thrust washers on bearing no.2 (grooves at crankshaft end),
- the crankshaft.

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



127838

Cut pieces of **radial play measuring tape**.

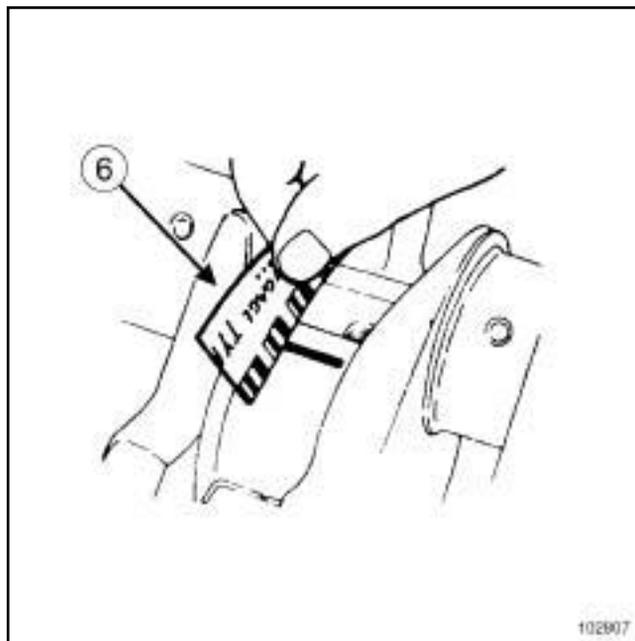
Position the wire (5) in the axis of the crankshaft journal avoiding the bearing lubrication holes.

Refit without lubricating (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) :

- the lower bearing shells on the crankshaft bearings,
- the « lower bearing shell - crankshaft bearing » assemblies,
- the old crankshaft bearing bolts.

Remove (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) :

- the old crankshaft bearing bolts,
- the « lower bearing shell - crankshaft bearing » assemblies.



102807

Measure the flattening of the **radial play measuring tape** which must be between **0.040 and 0.075 mm** using the gauge printed on the wire wrapping paper (6) .

Clean off of any remaining parts of the measuring wire on the crankshaft and bearing shells.

### 3 - Determination of the thickness class of the crankshaft bearing shell

When replacing the crankshaft or the crankshaft bearing shells, it is essential to determine the **classe d'épaisseur des coussinets de palier de vilebrequin** to refit on each bearing **avant de reposer le vilebrequin** using the following method:

Note:

Any clearances exceeding the tolerances of the crankshaft journals can cause engine damage.

Record the diameter category of the journal marked on the crankshaft (see **Crankshaft identification**).

Determine the thickness category of the bearing shells to refit on the bearing, in accordance with the table below:

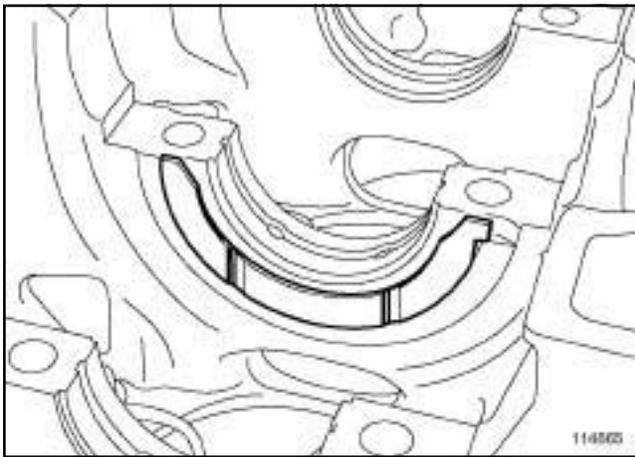
## Crankshaft: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

	Crankshaft journal diameter class mark	
	Blue or 1	Red or 0
Marking of the bearing shell thickness category	Blue	Red

### IV - CHECKING THE CRANKSHAFT THRUST WASHER

#### 1 - Checking the thickness of the crankshaft thrust washer



114865

The thrust washers are fitted on bearing no.2.

Use a **external micrometer** to measure the thickness of the thrust washer.

There are four thickness categories:

- Original: **2.30 to 2.35 mm**,
- After-Sales:
  - **2.35 to 2.40 mm**,
  - **2.40 to 2.45 mm**,
  - **2.45 to 2.50 mm**.

**Note:**

Do not lubricate between the cylinder block mating faces and the lateral shims.

Position the grooved faces of the thrust washers on the crankshaft end.

#### 2 - Checking the crankshaft lateral clearance

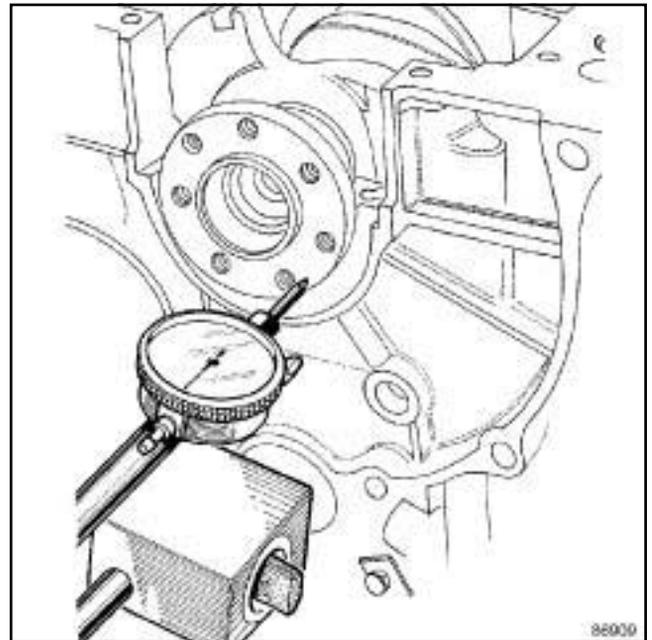
Oil the crankshaft bearings (only the surface that comes into contact with the crankshaft).

Refit (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page 10A-207)

:

- the upper crankshaft bearing shells from the cylinder block,
- the crankshaft thrust washers on bearing No.2 (grooves at crankshaft end),
- the crankshaft,
- the lower bearing shells on the crankshaft bearings,
- the « lower bearing shell - crankshaft bearing » assemblies,
- the old crankshaft bearing bolts.

Check that the crankshaft turns freely, with no hard point.



86909

Fit:

- the **dial gauge support**,
- the **Dial gauge** on the mounting.

Position the feeler of the **Dial gauge** on the flywheel face of the crankshaft.

Support the crankshaft on the thrust washer by pushing the crankshaft in the axis towards the timing end.

Set the **Dial gauge** to zero.

Support the crankshaft on the other thrust washer by pushing the crankshaft in the axis towards the flywheel end.

## Crankshaft: Check

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X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

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Check the crankshaft lateral clearance, which should be between **0.07** and **0.023** mm.

Remove the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) .

**V - FINAL OPERATION**

Refit the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) .

Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**) .

Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

Special tooling required	
<b>Mot. 1677</b>	Flywheel locking tool.
<b>Mot. 1485-01</b>	Tool for removing piston coolers.
<b>Emb. 880</b>	Pin extractor tool.
<b>Mot. 1516</b>	Piston cooler fitting tool (5° orientation).
<b>Mot. 1516-01</b>	Piston cooler fitting base plate (3° orientation).

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Remove the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**)

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX

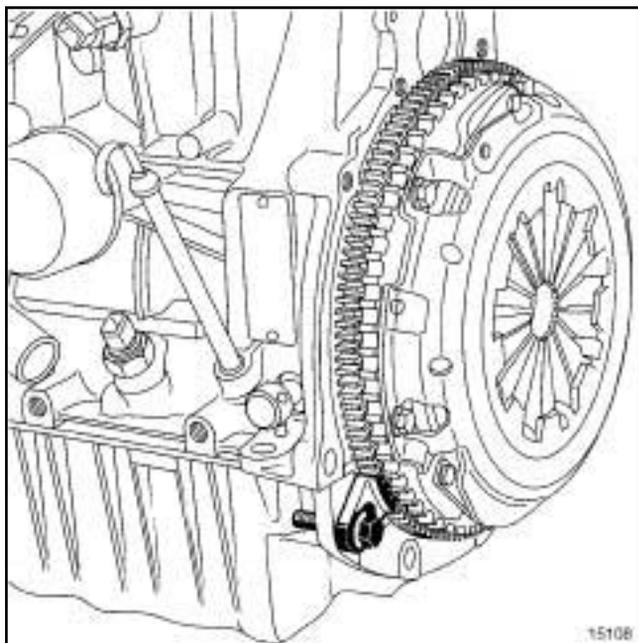
- Disconnect the manual gearbox from the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Disconnect the automatic gearbox from the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Remove the accessories belt (see **Accessories belt: Removal - Refitting**).

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91



15108

- Immobilise the flywheel or the drive plate using the tool (**Mot. 1677**).
- Remove the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX

- Remove:
  - the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch),
  - the flywheel (see **Flywheel: Removal - Refitting**),
  - the (**Mot. 1677**).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Remove:
  - the drive plate (see **Drive plate: Removal - Refitting**),
  - the (**Mot. 1677**).
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21).
- Drain the engine (see **Engine oil: Draining - Refilling**).

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813

- Remove:
  - the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**),
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**),
  - the turbocharger (see **Turbocharger: Removal - Refitting**).
- Remove:
  - the timing belt (see **Timing belt: Removal - Refitting**),
  - the timing sprockets (see **Timing sprocket: Removal - Refitting**),
  - the crankshaft seal on the timing side (see **Crankshaft seal on timing end: Removal - Refitting**),
  - the inlet distributor (see **Inlet distributor: Removal - Refitting**),

# ENGINE AND CYLINDER BLOCK ASSEMBLY

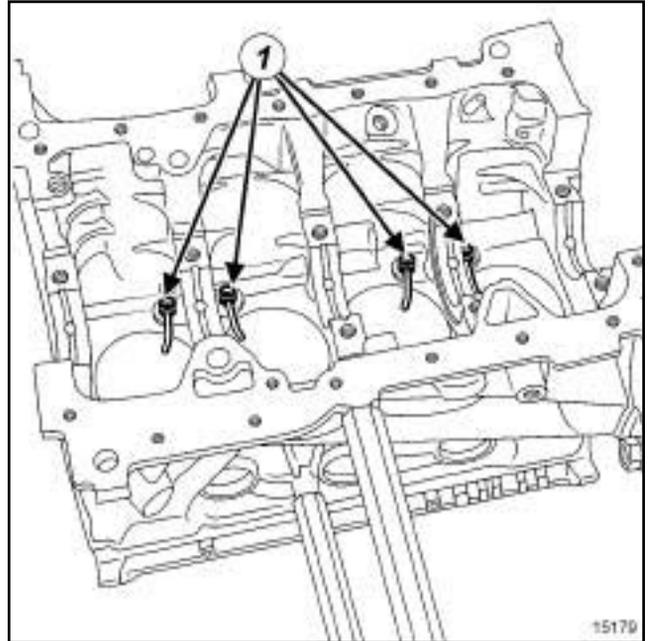
## Piston base cooling jet: Removal - Refitting

# 10A

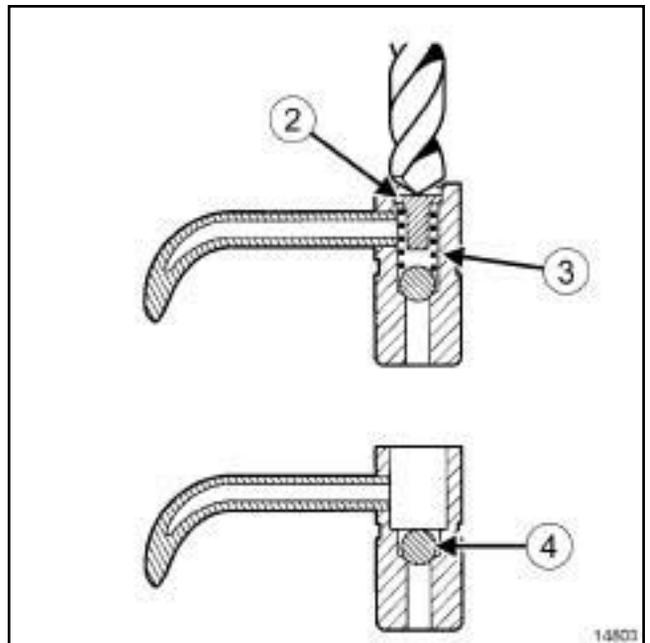
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

- the ignition coils (see **Coils: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page 10A-25) ,
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the camshafts, marking the inlet and exhaust camshaft (if they are not engraved) (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page 10A-74) ,
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page 10A-109) ,
- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**) ,
- the sump (see **Lower cover: Removal - Refitting**) ,
- the coolant pump (see **Coolant pump: Removal - Refitting**) ,
- the oil pump (see **Oil pump: Removal - Refitting**) ,
- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page 10A-189) ,
- the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page 10A-207) .

### II - REMOVING THE PISTON BASE COOLING JETS



- Drill the piston base cooling jets (1) using a 7 mm diameter drill bit.



- 

#### WARNING

Do not take out the ball from the piston base cooling nozzle, otherwise swarf may enter the lubrication circuit.

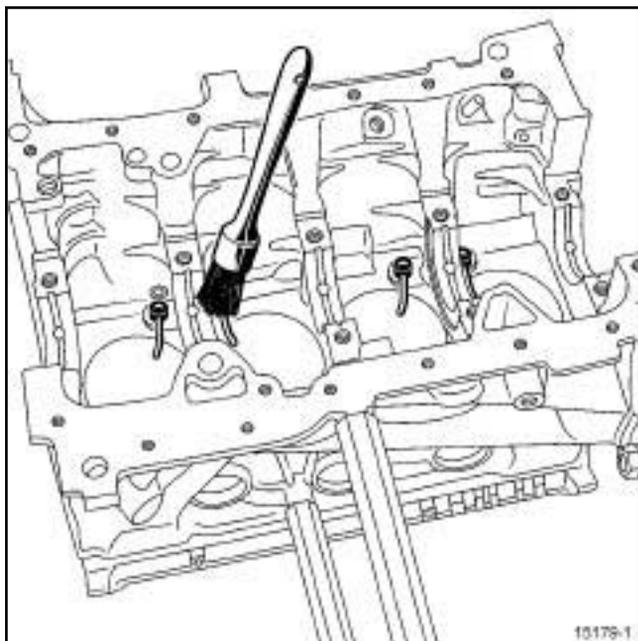
- Remove the spring tappet (2) and the springs (3) without taking out the ball (4) .

# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Piston base cooling jet: Removal - Refitting

# 10A

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91



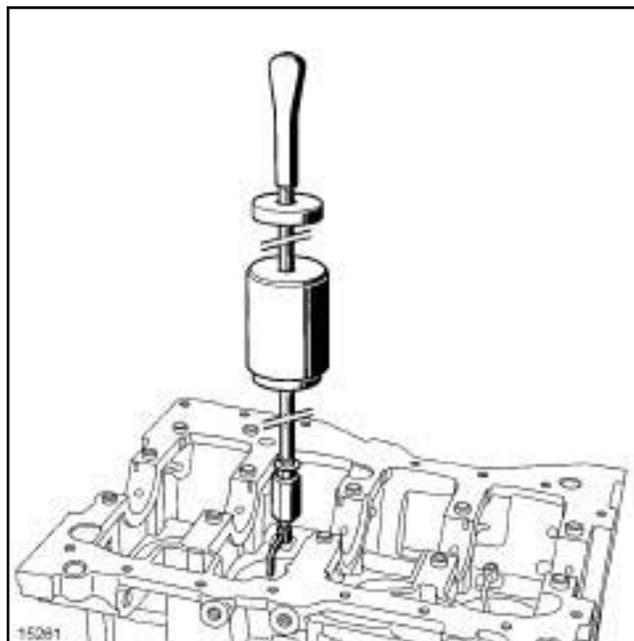
15179-1

- ❑ Remove any swarf present with a brush and a compressed air gun.



15178

- ❑ Screw the (**Mot. 1485-01**) into the drilled piston base cooling jets using a **6 mm** Allen key, which slides into the tool.



15261

- ❑ Screw the large slide hammer (**Emb. 880**) on the tool (**Mot. 1485-01**)
- ❑ Remove the piston base cooling jets.
- ❑ Fit a blanking plug whenever a piston base cooling jet is removed.

### REFITTING

#### I - REFITTING PREPARATION OPERATION

- ❑ Always replace the piston base cooling jets.
- ❑ Remove the blanking plugs.
- ❑ Use pressurised air and clean cloths to clean the oil circuit, the cylinders and the joint faces to ensure there is no swarf present.

# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Piston base cooling jet: Removal - Refitting

# 10A

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

### II - REFITTING THE PISTON BASE COOLING JETS

#### 1 - Inclining the piston base cooling jets

□

Note:

The different piston base cooling jets are fitted at different angles (3°, 5°).

Note:

The inclination of the piston base cooling jets must be respected in accordance with the engine suffix.

Not respecting this will lead to irreparable engine damage.

X56, and F4P, and 760

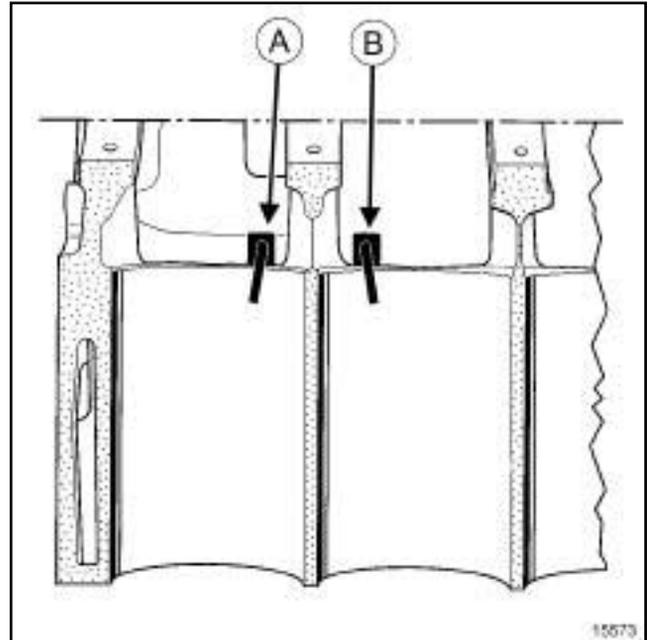
- From engine number C 027641 onwards, engines are equipped with piston base cooling jets inclined to 5°.

X66, and F4R, and 700

- From engine number C 006193 onwards, engines are equipped with piston base cooling jets inclined to 5°.

- All other engine suffixes in the F4 engine range are fitted with piston base cooling jets which are inclined to 3° from the start of their service life.

#### 2 - Inclining the piston base cooling jets



- (A) Orientation of the piston base cooling jets for cylinders 2 and 4.
- (B) Orientation of the piston base cooling jets for cylinders 1 and 3.

□

Note:

Direct the piston base cooling jet tube towards the centre of the cylinder.

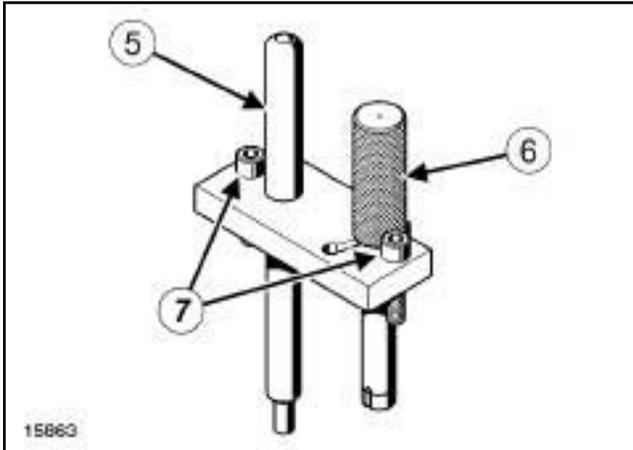
# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Piston base cooling jet: Removal - Refitting

# 10A

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

### 3 - Composition of the tooling



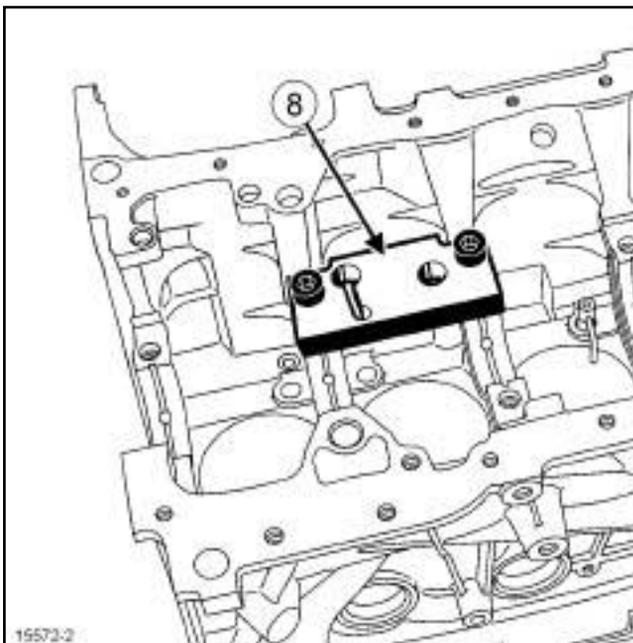
15863

- ❑ The piston base cooling jets must be fitted using the tools:

- **(Mot. 1516)** fitted with the guide rod (5), a pushrod (6) and two bolts (7) for an inclination to  $5^\circ$  only,

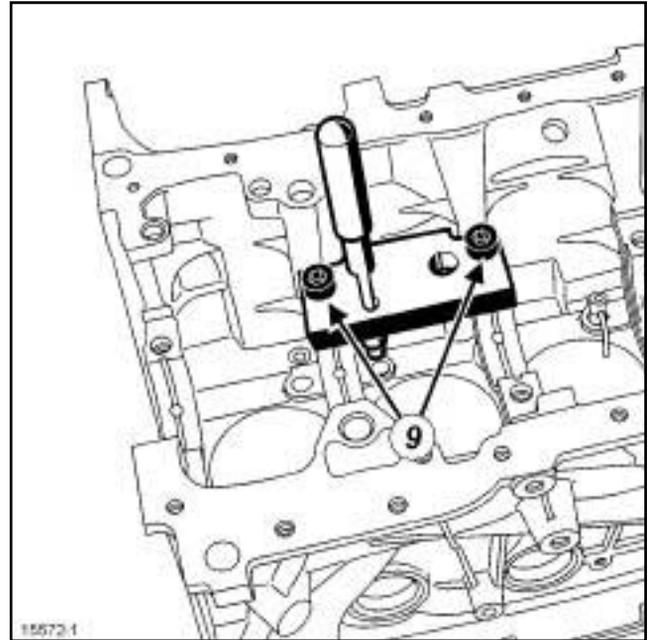
- **(Mot. 1516-01)** fitted with the guide rod (5), a pushrod (6) and two bolts (7) for an inclination to  $3^\circ$  only.

### 4 - Fitting the piston base cooling jets for cylinders 1 and 3.



15572-2

- ❑ Fit the plate (8) for the **(Mot. 1516)** for an inclination to  $5^\circ$  or the **(Mot. 1516-01)** for an inclination to  $3^\circ$  on the cylinder block, without tightening the two bolts.



15572-1

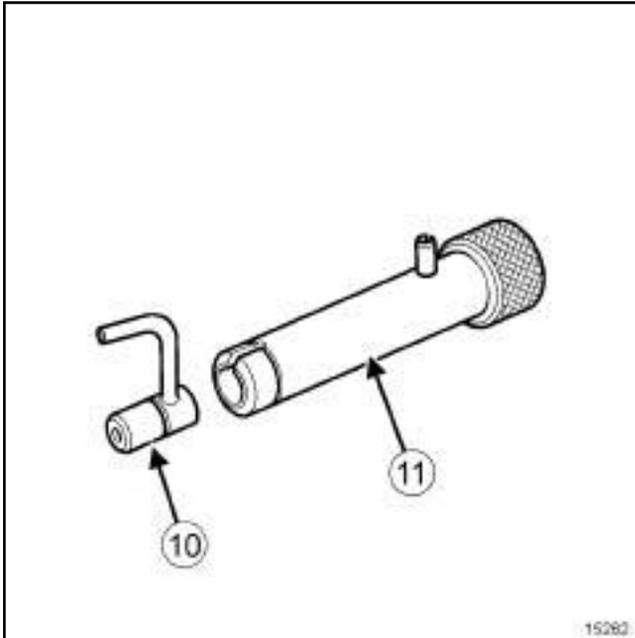
- ❑ Place the guide rod in the plate and the end of the guide rod in the piston base cooling jet hole to centre the plate.
- ❑ Tighten both bolts (9).
- ❑ Remove the guide rod.

# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Piston base cooling jet: Removal - Refitting

# 10A

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

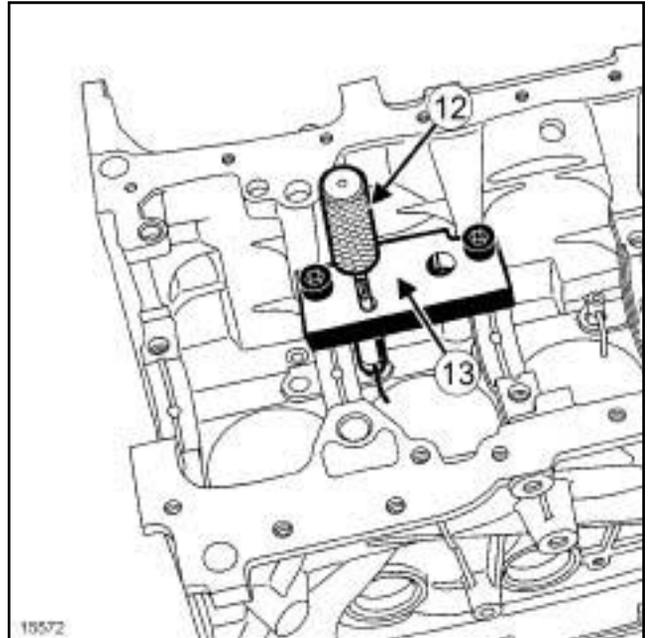


15262

- ❑ Insert the new piston base cooling jet (10) in the pushrod (11) .

### Note:

Direct the piston base cooling jet tube towards the centre of the cylinder.



15572

15572

- ❑ Fit the pushrod (12) in place of the guide rod.
- ❑ Tap the pushrod with a hammer until the shoulder of the pushrod (12) comes into contact with the plate (13) .
- ❑ Remove:
  - the pushrod (12) ,
  - the two bolts of the,
  - the plate (13) of the (Mot. 1516) or the (Mot. 1516-01).

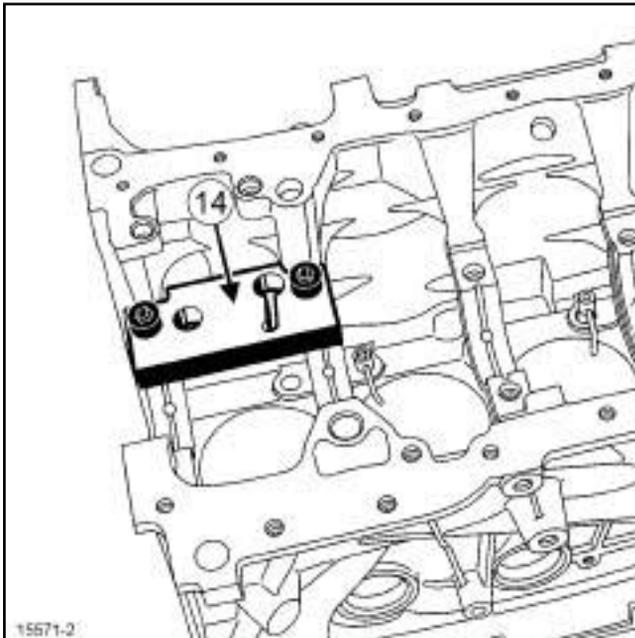
# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Piston base cooling jet: Removal - Refitting

# 10A

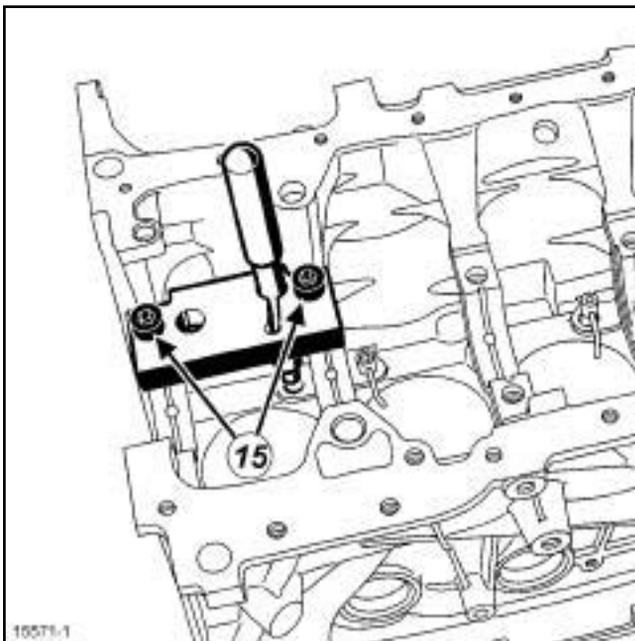
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

### 5 - Fitting the piston base cooling jets for cylinders 2 and 4.



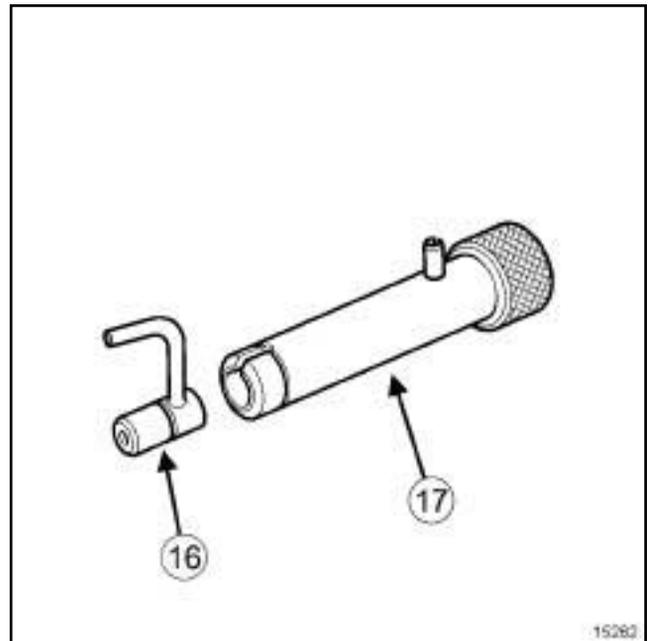
15571-2

- ❑ Fit the plate (14) of the **(Mot. 1516)** for a 5° inclination, or **(Mot. 1516-01)** for a 3° inclination, on the cylinder block without tightening the two bolts.



15571-1

- ❑ Place the guide rod in the plate and the end of the guide rod in the piston base cooling jet hole to centre the plate.
- ❑ Tighten both bolts (15) .
- ❑ Remove the guide rod.



15262

- ❑ Insert the new piston base cooling jet (16) in the pushrod (17) .

#### Note:

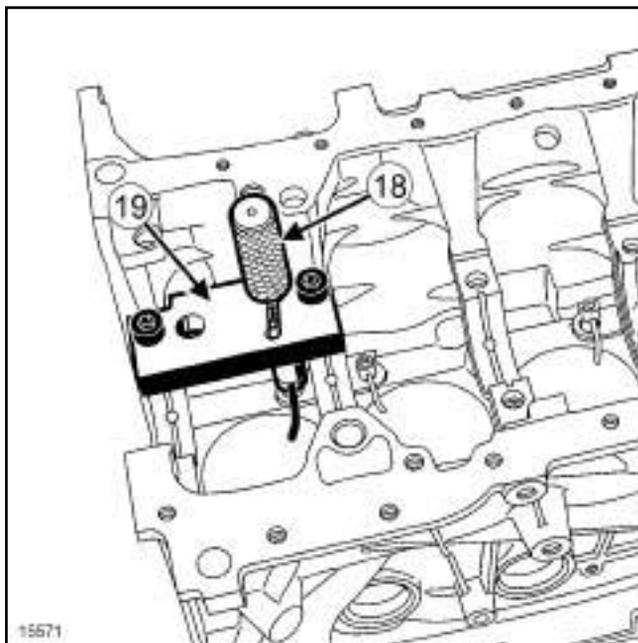
Direct the piston base cooling jet tube towards the centre of the cylinder.

# ENGINE AND CYLINDER BLOCK ASSEMBLY

## Piston base cooling jet: Removal - Refitting

# 10A

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91



15571

- Fit the pushrod (18) in place of the guide rod.
- Tap the pushrod with a hammer until the shoulder of the pushrod (18) comes into contact with the plate (19) .
- Remove:
  - the pushrod (18) ,
  - the two bolts of the,
  - the plate (19) of the (Mot. 1516) or the (Mot. 1516-01).

### III - FINAL OPERATION

- Refit:
  - the crankshaft (see 10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting, page 10A-207) ,
  - the « piston - con rod » assembly for each cylinder (see 10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting, page 10A-189) ,
  - the oil pump (see Oil pump: Removal - Refitting) ,
  - the coolant pump (see Coolant pump: Removal - Refitting) ,
  - the sump (see Lower cover: Removal - Refitting) ,
  - the crankshaft seal at the flywheel end (see Crankshaft seal, gearbox end: Removal - Refitting) ,

- the cylinder head (see 10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting, page 10A-109) ,
- the camshafts (see 10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting, page 10A-74) ,
- the camshaft seals (see Camshaft seal, timing end: Removal - Refitting) ,
- the rocker cover (see 10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting, page 10A-25) ,
- the oil decanter (see Oil decanter: Removal - Refitting) ,
- the ignition coils (see Coils: Removal - Refitting) ,
- the inlet distributor (see Inlet distributor: Removal - Refitting) ,
- the crankshaft seal on the timing side (see Crankshaft seal on timing end: Removal - Refitting) ,
- the timing sprockets (see Timing sprocket: Removal - Refitting) ,
- the timing belt (see Timing belt: Removal - Refitting) .

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813

- Refit:
  - the turbocharger (see Turbocharger: Removal - Refitting) ,
  - the catalytic converter (see Catalytic converter: Removal - Refitting) ,
  - the upstream oxygen sensor (see Oxygen sensors: Removal - Refitting) .
- Remove the engine from the component support (see 10A, Engine and cylinder block assembly, Engine support equipment: Use, page 10A-21) .
- Immobilise the flywheel or the drive plate using the tool (Mot. 1677).

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX

- Refit:
  - the flywheel (see **Flywheel: Removal - Refitting**) ,
  - the clutch pressure plate and disc (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Refit the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission).
- Refit the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .
- Remove the tool (**Mot. 1677**).
- Refit the accessories belt (see **Accessories belt: Removal - Refitting**) .

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX

- Connect the manual gearbox to the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Connect the automatic gearbox to the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).
- Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .
- Top up the engine oil (see **Engine oil: Draining - Refilling**) .

## Cylinder block: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Special tooling required

**Mot. 1677** Flywheel locking tool.

**Mot. 923** Engine lifting ring.

### Equipment required

workshop hoist

### Tightening torques

oil filter nipple **15 N.m**

### IMPORTANT

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

### WARNING

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump will irreparably damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

## REMOVAL

### I - REMOVAL PREPARATION OPERATION

- Remove the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**).

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Disconnect the manual gearbox from the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

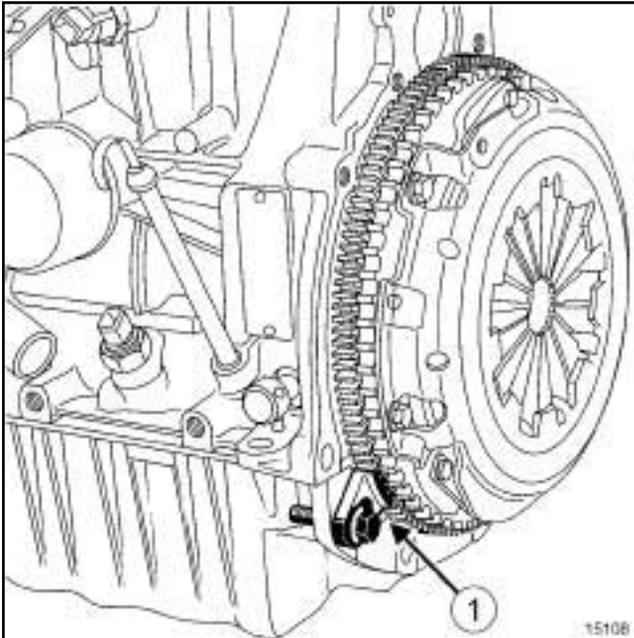
X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Disconnect the automatic gearbox from the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Remove the accessories belt (see **Accessories belt: Removal - Refitting**).

## Cylinder block: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95



15108

- Immobilise the flywheel or the drive plate using the tool **(Mot. 1677)** (1) .
- Remove the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

- Remove:
  - the clutch disc and pressure plate (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch),
  - the flywheel (see **Flywheel: Removal - Refitting**) ,
  - the **(Mot. 1677)**.

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

- Remove:
  - the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission),
  - the **(Mot. 1677)**.
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21) .
- Drain the engine (see **Engine oil: Draining - Refilling**) .

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Remove:
  - the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**) ,
  - the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,
  - the turbocharger (see **Turbocharger: Removal - Refitting**) .
- Remove:
  - the timing belt (see **Timing belt: Removal - Refitting**) ,
  - the timing sprockets (see **Timing sprocket: Removal - Refitting**) ,
  - the crankshaft seal on the timing side (see **Crankshaft seal on timing end: Removal - Refitting**) ,

## Cylinder block: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,
- the ignition coils (see **Coils: Removal - Refitting**) ,
- the oil decanter (see **Oil decanter: Removal - Refitting**) ,
- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**) ,
- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,
- the camshafts, marking the inlet and exhaust camshaft (if they are not engraved) (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**) ,
- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**) ,
- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**) ,
- the sump (see **Lower cover: Removal - Refitting**) ,
- the coolant pump (see **Coolant pump: Removal - Refitting**) ,
- the oil pump (see **Oil pump: Removal - Refitting**) ,
- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page **10A-189**) ,
- the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) .

### II - CYLINDER BLOCK REMOVAL OPERATION

- Operation only to be carried out when replacing or cleaning the cylinder block.
- Remove:
  - the power-assisted steering pump (see **Power-assisted steering pump: Removal - Refitting**) ,
  - the alternator (see **Alternator: Removal - Refitting**) .

X56, and AIR CONDITIONING or CLIMATE CONTROL – X64, and AIR CONDITIONING or CLIMATE CONTROL – X65, and AIR CONDITIONING or CLIMATE CONTROL – X66, and AIR CONDITIONING or CLIMATE CONTROL – X73, and AIR CONDITIONING or CLIMATE CONTROL – X74, and AIR CONDITIONING or CLIMATE CONTROL – X81, and AIR CONDITIONING or CLIMATE CONTROL – X83, and AIR CONDITIONING or CLIMATE CONTROL – X84, and AIR CONDITIONING or CLIMATE CONTROL – X85, and AIR CONDITIONING or CLIMATE CONTROL – X91, and AIR CONDITIONING 01 or AIR CONDITIONING 02 – X95, and AIR CONDITIONING or CLIMATE CONTROL

- Remove the air conditioning compressor (see **Compressor: Removal - Refitting**) .

- Remove:

- the multifunction support (see **Multifunction support: Removal - Refitting**) ,
- the coolant pump inlet pipe (see **Coolant pump inlet pipe: Removal - Refitting**) ,
- the engine oil pressure sensor (see **Oil pressure sensor: Removal - Refitting**) ,
- the pinking sensor (see **Pinking sensor: Removal - Refitting**) ,
- the oil level sensor (see **Oil level sensor: Removal - Refitting**) ,
- the oil filter (see **Oil filter: Removal - Refitting**) .

X56, and F4P – X64, and F4P – X74, and F4P

- Remove the oil filter nipple.

X56, and F4R – X64, and F4R – X65 – X66 – X73 – X74, and F4R – X81 – X83 – X84 – X85 – X91 – X95

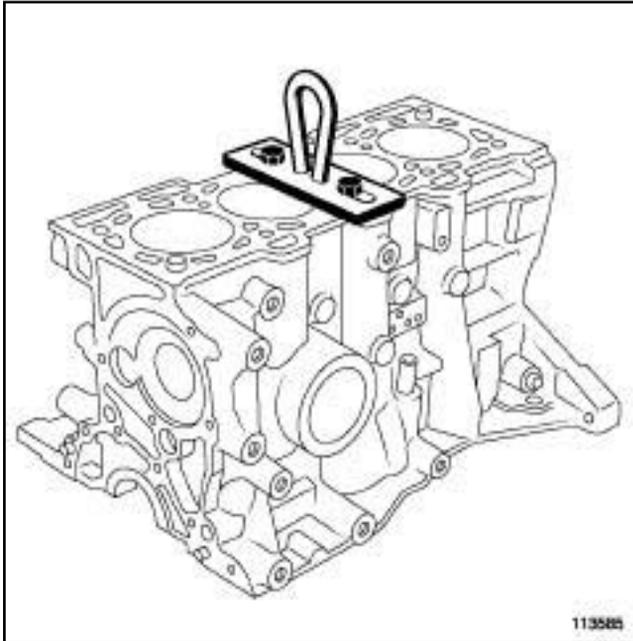
- Remove the oil-water heat exchanger (see **Oil-coolant heat exchanger: Removal - Refitting**) .

## Cylinder block: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## REFITTING

## I - REFITTING PREPARATION OPERATION



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- Position the (**Mot. 923**) on the cylinder block.
- Remove the cylinder block from the component support using a **workshop hoist** (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**) .
- Clean the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Cleaning**, page **10A-241**) .
- Refit the cylinder block on the component support using a **workshop hoist** (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**) .
- Remove the tool (**Mot. 923**).
- Parts always to be replaced:
  - the crankshaft seal on the timing side,
  - the gearbox side crankshaft seal,
  - the crankshaft closure panel seal,
  - the coolant pump (if necessary after inspection),
  - the sump seal,
  - the coolant pump inlet pipe seal,
  - the oil filter,
  - the crankshaft accessories pulley bolt,
  - the flywheel bolts,
  - the seal on the engine oil drain plug,

- the cylinder head seal.

## II - CYLINDER BLOCK REFITTING OPERATION

X56, and F4P – X64, and F4P – X74, and F4P

- Check that the cylinder head centring dowels are on the cylinder block and in good condition.
- Refit the oil filter nipple.
- Torque tighten the **oil filter nipple (15 N.m)**.

X56, and F4R – X64, and F4R – X65 – X66 – X73 – X74, and F4R – X81 – X83 – X84 – X85 – X91 – X95

- Refit the oil-water heat exchanger (see **Oil-coolant heat exchanger: Removal - Refitting**) .

- Refit:

- the oil filter (see **Oil filter: Removal - Refitting**) ,
- the oil level sensor (see **Oil level sensor: Removal - Refitting**) ,
- the pinking sensor (see **Pinking sensor: Removal - Refitting**) ,
- the engine oil pressure sensor (see **Oil pressure sensor: Removal - Refitting**) ,
- the coolant pump inlet pipe (see **Coolant pump inlet pipe: Removal - Refitting**) ,
- the multifunction support (see **Multifunction support: Removal - Refitting**) .

## Cylinder block: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

X56, and AIR CONDITIONING or CLIMATE CONTROL – X64, and AIR CONDITIONING or CLIMATE CONTROL – X65, and AIR CONDITIONING or CLIMATE CONTROL – X66, and AIR CONDITIONING or CLIMATE CONTROL – X73, and AIR CONDITIONING or CLIMATE CONTROL – X74, and AIR CONDITIONING or CLIMATE CONTROL – X81, and AIR CONDITIONING or CLIMATE CONTROL – X83, and AIR CONDITIONING or CLIMATE CONTROL – X84, and AIR CONDITIONING or CLIMATE CONTROL – X85, and AIR CONDITIONING or CLIMATE CONTROL – X91, and AIR CONDITIONING 01 or AIR CONDITIONING 02 – X95, and AIR CONDITIONING or CLIMATE CONTROL

- Refit the air conditioning compressor (see **Compressor: Removal - Refitting**) .

- Refit:

- the alternator (see **Alternator: Removal - Refitting**) ,
- the power-assisted steering pump (see **Power-assisted steering pump: Removal - Refitting**) .

### III - FINAL OPERATION

- Refit the crankshaft (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) .

- When replacing the cylinder block, it is essential to check the pairing between the piston category and the diameter of the cylinder block barrel before refitting the « piston - con rod » assemblies (see **10A, Engine and cylinder block assembly, Cylinder block: Check**, page **10A-242**) .

- Refit:

- the « piston - con rod » assembly for each cylinder (see **10A, Engine and cylinder block assembly, Piston - Con rod: Removal - Refitting**, page **10A-189**) ,
- the oil pump (see **Oil pump: Removal - Refitting**) ,
- the coolant pump (see **Coolant pump: Removal - Refitting**) ,
- the sump (see **Lower cover: Removal - Refitting**) ,
- the crankshaft seal at the flywheel end (see **Crankshaft seal, gearbox end: Removal - Refitting**) ,

- the cylinder head (see **10A, Engine and cylinder block assembly, Cylinder head: Removal - Refitting**, page **10A-109**) ,

- the camshafts (see **10A, Engine and cylinder block assembly, Camshaft: Removal - Refitting**, page **10A-74**) ,

- the camshaft seals (see **Camshaft seal, timing end: Removal - Refitting**) ,

- the rocker cover (see **10A, Engine and cylinder block assembly, Rocker cover: Removal - Refitting**, page **10A-25**) ,

- the oil decanter (see **Oil decanter: Removal - Refitting**) ,

- the ignition coils (see **Coils: Removal - Refitting**) ,

- the inlet distributor (see **Inlet distributor: Removal - Refitting**) ,

- the crankshaft seal on the timing side (see **Crankshaft seal on timing end: Removal - Refitting**) ,

- the timing sprockets (see **Timing sprocket: Removal - Refitting**) ,

- the timing belt (see **Timing belt: Removal - Refitting**) .

X66, and F4R, and 760 or 761 – X73, and F4R, and 762 or 763 or 766 or 767 or 867 – X74, and F4R, and 764 or 765 or 784 or 786 or 787 or 886 or 887 – X81, and F4R, and 794 or 795 or 796 or 797 or 896 or 897 – X84, and F4R, and 774 or 776 – X91, and F4R, and 800 or 802 or 811 or 813 – X95, and F4R, and 870 or 874

- Refit:

- the turbocharger (see **Turbocharger: Removal - Refitting**) ,

- the catalytic converter (see **Catalytic converter: Removal - Refitting**) ,

- the upstream oxygen sensor (see **Oxygen sensors: Removal - Refitting**) .

- Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**) .

- Immobilise the flywheel or the drive plate using the tool (**Mot. 1677**) .

## Cylinder block: Removal - Refitting

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

 Refit:

- the flywheel (see **Flywheel: Removal - Refitting**) ,
- the clutch pressure plate and disc (see **Pressure plate - Disc: Removal - Refitting**) (20A, Clutch).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

 Refit the drive plate (see **Drive plate: Removal - Refitting**) (23A, Automatic transmission).

- Refit the crankshaft accessories pulley (see **Crankshaft accessories pulley: Removal - Refitting**) .
- Remove the tool (**Mot. 1677**).
- Refit the accessories belt (see **Accessories belt: Removal - Refitting**) .

X56, and 5-SPEED MANUAL GEARBOX – X64, and 5-SPEED MANUAL GEARBOX – X65, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X66, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X73, and 6-SPEED MANUAL GEARBOX – X74, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X81, and 6-SPEED MANUAL GEARBOX – X83, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X84, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X85, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX – X91, and 6-SPEED MANUAL GEARBOX – X95, and 5-SPEED MANUAL GEARBOX or 6-SPEED MANUAL GEARBOX

 Connect the manual gearbox to the engine (see **Manual gearbox: Removal - Refitting**) (21A, Manual gearbox).

X64, and 4-SPEED AUTOMATIC GEARBOX – X66, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X73, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X74, and 4-SPEED AUTOMATIC GEARBOX or 5-SPEED AUTOMATIC GEARBOX – X81, and 5-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X84, and 4-SPEED AUTOMATIC GEARBOX or 6-SPEED AUTOMATIC GEARBOX – X91, and 6-SPEED AUTOMATIC GEARBOX

 Connect the automatic gearbox to the engine (see **Automatic gearbox: Removal - Refitting**) (23A, Automatic transmission).

- Refit the « engine and gearbox » assembly (see **Engine - gearbox assembly: Removal - Refitting**) .
- Top up the engine oil (see **Engine oil: Draining - Refilling**) .

## Cylinder block: Cleaning

X73 - X74 - X81 - X83 - X84 - X91 - X64 - X65 - X56 - X66 - X85 - X95

### I - CLEANING PREPARATION OPERATION

□

#### WARNING

Do not scrape the joint faces of the aluminium, any damage caused to the joint face will result in a risk of leaks.

#### IMPORTANT

Wear goggles with side protectors for this operation.

#### IMPORTANT

Wear leaktight gloves (Nitrile type) for this operation.

#### WARNING

Do not allow this product to drip onto the paintwork.

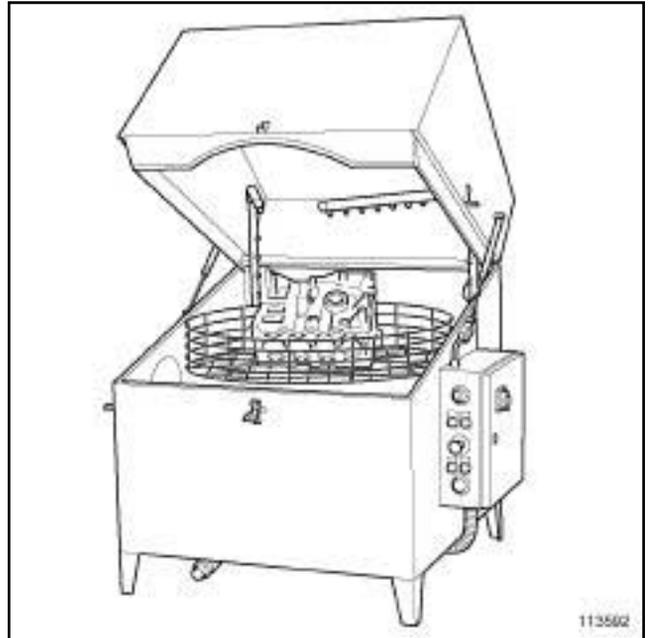
Clean the cylinder head carefully to avoid any foreign bodies entering the oil return and supply pipes.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

- Remove the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).
- Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page 10A-21).
- Remove the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Removal - Refitting**, page 10A-235).

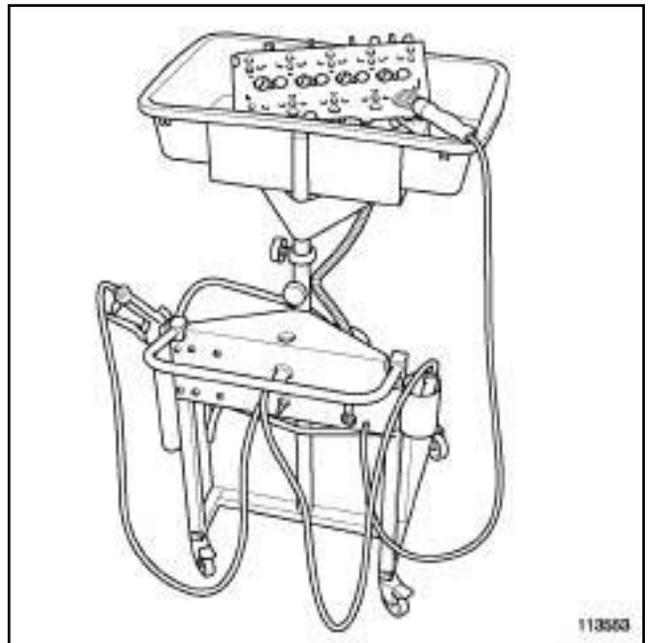
### II - CLEANING THE ENGINE PERIPHERALS

- Clean the gasket surfaces of the cylinder block with **SUPER CLEANING AGENT FOR JOINT FACES** (see **Vehicle: Parts and consumables for the repair**).
- Remove the residue using a wooden spatula
- Finish cleaning the parts using a **GREY ABRASIVE PAD**, part number **77 01 405 943**.



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- Wash the cylinder block using a cleaning fountain or a heated cleaning bath.

### III - FINAL OPERATION.

- Refit the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Removal - Refitting**, page 10A-235).
- Refit the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).

## Cylinder block: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

**Equipment required**

cylinder head rule

set of feeler gauges

internal micrometer

**I - PREPARATION OPERATION FOR CHECK****IMPORTANT**

To avoid all risk of damage to the systems, apply the safety and cleanliness instructions and operation recommendations before carrying out any repair (see **10A, Engine and cylinder block assembly, Engine: Precautions for the repair, page 10A-1**).

**WARNING**

It is strictly forbidden to apply any pressure to the engine oil sump. Damage to the sump may also damage the engine by:

- blocking the strainer,
- raising the oil level above maximum, with a risk of engine racing.

Remove the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).

Place the engine on the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use, page 10A-21**).

Remove the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Removal - Refitting, page 10A-235**).

Before any checks:

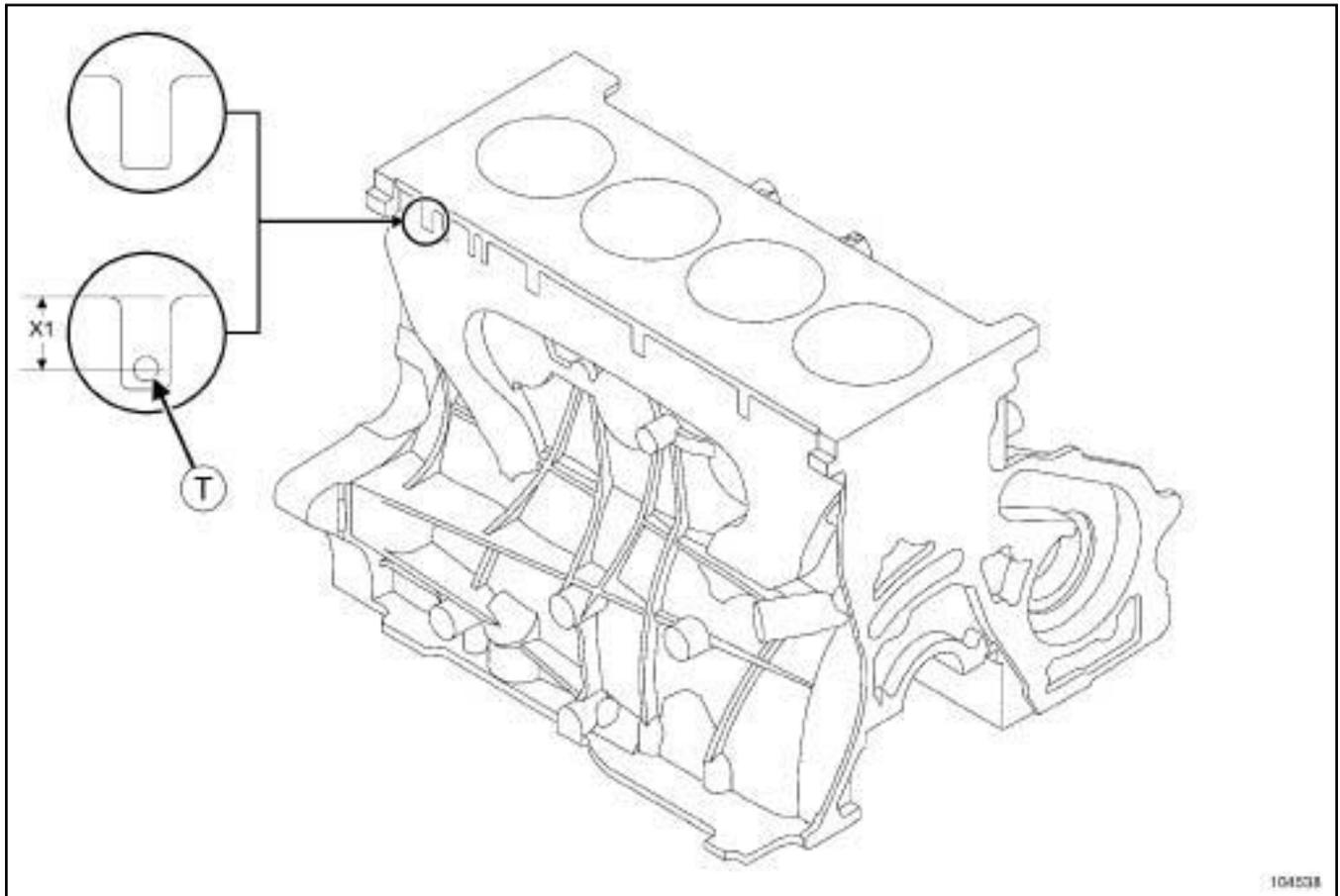
- clean the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Cleaning, page 10A-241**),
- Check that the cylinder block does not have any scratches, any trace of impact or abnormal wear on the cylinders, the gasket faces and the mating faces of the crankshaft bearing shell (if necessary, replace the cylinder block).

## Cylinder block: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

## II - CHECKING THE CYLINDER BLOCK

## 1 - Identification of the cylinder block



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The presence or absence of holes (T) and their position in relation to the gasket face of the cylinder block enable identification of the original nominal values of the barrel and consequently the diameters of the corresponding pistons.

## Cylinder block: Check

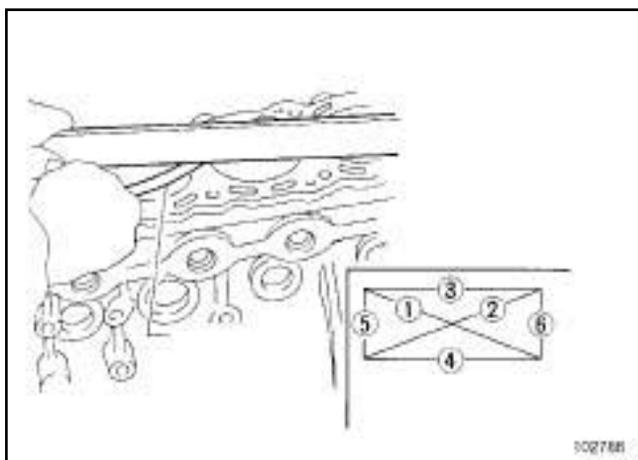
X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### Diameter classes of the cylinder block barrels

#### Matching the piston category to the cylinder block

Dimension (X1) of the holes (T) on the cylinder block	Piston class marking	Barrel diameter (mm)	Nominal piston diameter (mm)		
			F4P 720, 722, 760, 770, 771, 772, 773, 774, 775	F4R 730, 732, 736, 738, 760, 761, 762, 763, 764, 765, 766, 767, 776, 786, 787, 794, 795, 796, 797, 813, 867, 886, 887, 896, 897	F4R 774, 784, 800, 802, 830, 832, 870, 872, 874
Without hole	2 or B	82.710 inclusive to 82.720 exclusive	82.680 inclusive to 82.690 exclusive	82.675 inclusive to 82.685 exclusive	82.655 inclusive to 82.665 exclusive
Hole at (X1) = 19 mm	3 or C	82.720 inclusive to 82.730 inclusive	82.690 inclusive to 82.700 inclusive	82.685 inclusive to 82.695 inclusive	82.665 inclusive to 82.675 inclusive

### 2 - Checking the cylinder block joint face



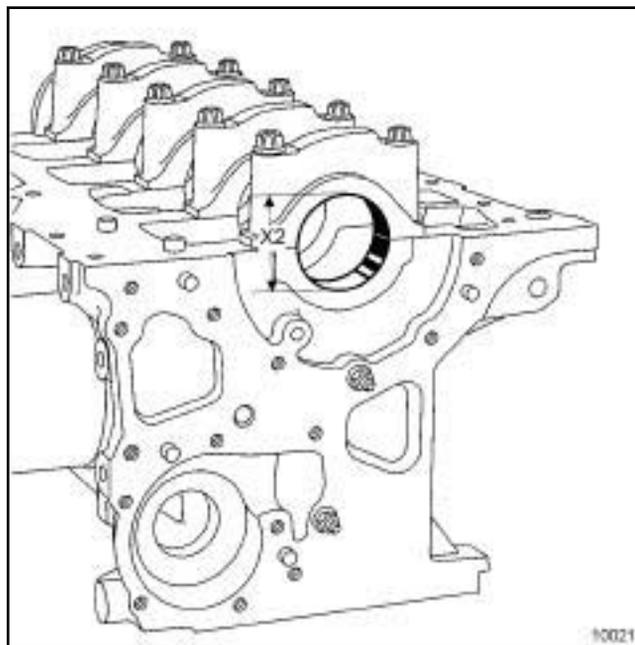
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Check the joint face deformation using a **cylinder head rule** and a **set of feeler gauges**.

Maximum deformation: **0.03 mm**.

### 3 - Checking the diameter of the crankshaft bearings

Refit (see **10A, Engine and cylinder block assembly, Crankshaft: Removal - Refitting**, page **10A-207**) the crankshaft bearing caps placing cap No. 1 on the flywheel end.



10021

Using a **internal micrometer**, measure the diameter (X2) of the crankshaft bearings, which must be between **58.731 and 58.750 mm**.

Remove the crankshaft bearing caps.

## Cylinder block: Check

X56 – X64 – X65 – X66 – X73 – X74 – X81 – X83 – X84 – X85 – X91 – X95

### III - FINAL OPERATION

Refit the cylinder block (see **10A, Engine and cylinder block assembly, Cylinder block: Removal - Refitting**, page **10A-235**).

Remove the engine from the component support (see **10A, Engine and cylinder block assembly, Engine support equipment: Use**, page **10A-21**).

Refit the engine - gearbox assembly (see **Engine - gearbox assembly: Removal - Refitting**).